

## **Anexo A1: Contenido del CDROM de acompañamiento**

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El CDROM contiene el siguiente material:

- Documento íntegro de la tesina en formato OFFICE WORD 2000
- Resumen de la tesina
- Programa LOSAC
- Programa SECUENCIADOR DE LOSAC
- Programa TABLERO: genera las tablas de losas que no fallan y luces con cantos mínimos.
- Programa MAGNEL: permite visualizar las desigualdades de Magnel para una sección determinada.
- Secuencias generadas para 1 y 2 vanos en formato EXCEL 2000
- Desarrollos algebraicos en formato MAPLE 7
- Presentaciones en formato POWER POINT 2000
- Código de todos los programas incluidos en el CDROM.

## Anexo A2: Resultados de ejemplo calculado con LOSAC

### A2.1. Predimensionamiento de la fuerza de pretensado en anclajes ( $P_{anc}$ )

Ejecutando LOSAC como predimensionador se obtienen los siguientes resultados

```

*****
Puente de 3 vanos, ejemplo tesina
*****

OPCION DE CALCULO           3
PRETENSADO EN CLASE         2
NUMERO DE VANOS             3
NUMERO DE SECCIONES TIPO   2
NUM. SECCIONES DE CONTROL  51
NUM. ETAPAS CONSTRUCTIVAS  1

PUENTE DE CARRETERA

LUCES Y NUMERO DE TRAMOS DE LOS VANOS
-----
VANO 1  LUZ 18.000  NUM. DE TRAMOS DEL VANO  3
VANO 2  LUZ 27.000  NUM. DE TRAMOS DEL VANO  3
VANO 3  LUZ 18.000  NUM. DE TRAMOS DEL VANO  3

VANO  TRAMO  X-INICIAL  X-FINAL  TIPO SECCION
-----
1      1      0.000      1.000      1
1      2      1.000      17.000     2
1      3      17.000     18.000     1
-----
2      1      0.000      1.000      1
2      2      1.000     26.000     2
2      3     26.000     27.000     1
-----
3      1      0.000      1.000      1
3      2      1.000     17.000     2
3      3     17.000     18.000     1

PROCESO CONSTRUCTIVO
*****
ETAPA  FASE SIMULT.  X-INICIAL  X-FINAL
-----
      1      1      0.00      63.00

CARACTERISTICAS MECANICAS DE LAS SECCIONES TIPO
*****
SECCION TIPO NUMERO:  1
=====
AREA:                  9.77200
    
```

## Anexo A2: Resultados de ejemplo calculado con LOSAC

INERCIA: 0.85320  
 V.SUP: 0.45600  
 V.INF: -0.54400  
 CANTO: 1.00000  
 RADIO GIRO: 0.29548  
 RENDIMIENTO: 0.35197  
 SECCION TIPO NUMERO: 2  
 =====  
 AREA: 7.61200  
 INERCIA: 0.81400  
 V.SUP: 0.44300  
 V.INF: -0.55700  
 CANTO: 1.00000  
 RADIO GIRO: 0.32701  
 RENDIMIENTO: 0.43338

### CARACTERISTICAS DE LOS MATERIALES

\*\*\*\*\*

#### HORMIGON

=====

RESISTENCIA CARACTERISTICA (T/m2) 4000.00  
 RESISTENCIA A TRACCION (T/m2) 250.00  
 MODULO DE DEFORMACION (T/m2) 3000000.  
 RETRACCION FINAL -0.000350  
 COEFICIENTE DE FLUENCIA 2.00

#### ACERO PASIVO

=====

LIMITE ELASTICO (T/m2) 50000.00

#### ACERO DE PRETENSADO

=====

LIMITE ELASTICO CONVENCIONAL (T/m2) 167400.00  
 TENSION DE ROTURA (T/m2) 186000.00  
 RELAJACION UNITARIA FINAL 0.0800  
 FACTOR DE TESADO (TENSION/FPMAX) 0.750  
 AREA DE CADA TENDON (cm2) 21.00

#### COEFICIENTES DE PONDERACION

=====

COEF. MINORACION HORMIGON EN ROTURA 1.50  
 COEF. MINORACION ACERO EN ROTURA 1.15  
 COEF. PRETENSADO FAVORABLE EN SERVICIO 0.90  
 COEF. PRETENSADO DESFAVORABLE EN SERVICIO 1.10

#### ACCIONES SOBRE LA ESTRUCTURA

\*\*\*\*\*

PESO PROPIO (P.ESPECIFICO, T/m3) 2.50  
 CARGAS MUERTAS (T/ml) 3.25  
 GRADIENTE TERMICO (Tsup-Tinf) 10.00  
 COEFICIENTES DE COMBINACION 0.60 0.50 0.20  
 SOBRECARGA (T/m2) 0.40  
 PRIMERA CARGA PUNTUAL CARRO (T.) 20.00  
 SEGUNDA CARGA PUNTUAL CARRO (T.) 20.00  
 TERCERA CARGA PUNTUAL CARRO (T.) 20.00  
 COEF. REPARTO TRANSVERSAL FLEXION 1.00

#### ETAPA EN LA QUE SE COMPLETA CADA VANO

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VANO 1 ETAPA 1  
 VANO 2 ETAPA 1  
 VANO 3 ETAPA 1

#### ETAPA CONSTRUCTIVA NUMERO 1

\*\*\*\*\*

#### DEFINICION GEOMETRICA DEL PRETENSADO

=====

GRUPO DE TENDONES NUMERO 1 NUMERACION GLOBAL 1 IND.TESADO= 3

VANO	XINIC.	EX.ORIGEN	EX.PTO.MIN.	EX.FINAL	X-INFLEX.1	X-MINIMO	X-INFLEX.2	XFINAL
1	0.000	-0.456	-0.850	-0.150	0.000	7.200	14.400	18.000
2	0.000	-0.150	-0.850	-0.150	2.700	13.500	24.300	27.000
3	0.000	-0.150	-0.850	-0.456	3.600	10.800	18.000	18.000

#### FUERZA DE PRETENSADO

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## Anexo A2: Resultados de ejemplo calculado con LOSAC

COEFICIENTE DE ROZAMIENTO EN CURVA (MU)= 0.2100  
 COEFICIENTE DE ROZAMIENTO PARASITO (K)= 0.0020

GRUPO DE TENDONES NUMERO 1

VANO 1

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200	18.000
EXCENTR.	0.000	-0.185	-0.309	-0.382	-0.407	-0.378	-0.290	-0.144	0.060	0.235	0.306
D.FONDO	0.544	0.372	0.248	0.175	0.150	0.179	0.267	0.413	0.617	0.792	0.850
F.PRET.	1.000	0.991	0.981	0.972	0.963	0.953	0.943	0.934	0.924	0.908	0.893

VANO 2

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	2.700	5.400	8.100	10.800	13.500	16.200	18.900	21.600	24.300	27.000
EXCENTR.	0.306	0.153	-0.092	-0.267	-0.372	-0.407	-0.372	-0.267	-0.092	0.153	0.306
D.FONDO	0.850	0.710	0.465	0.290	0.185	0.150	0.185	0.290	0.465	0.710	0.850
F.PRET.	0.893	0.869	0.859	0.850	0.841	0.832	0.841	0.850	0.859	0.869	0.893

VANO 3

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200	18.000
EXCENTR.	0.306	0.235	0.060	-0.145	-0.290	-0.378	-0.407	-0.382	-0.309	-0.185	0.000
D.FONDO	0.850	0.792	0.617	0.412	0.267	0.179	0.150	0.175	0.248	0.372	0.544
F.PRET.	0.893	0.908	0.924	0.934	0.943	0.953	0.963	0.972	0.981	0.991	1.000

FUERZA DE PRETENSADO NECESARIA

HIPOT.	VANO	SECCION	PMINIMA	PERD.DIF	PINST	PANCL
1	1	1	-2687.301	305.183	-2992.484	-2992.484
1	1	6	-8502.051	-67.044	-8435.007	-8514.209
1	1	11	-147.334	18.959	-166.293	-169.430
1	1	16	-47.523	5.984	-53.506	-55.028
1	1	21	-65.778	8.220	-73.998	-76.817
1	1	26	-199.890	25.214	-225.104	-236.123
1	1	31	-28246.783	-9332.436	-18914.348	-20047.715
1	1	36	-1942.022	220.773	-2162.794	-2316.370
1	1	41	-18191.572	-1764.336	-16427.236	-17777.725
1	1	46	382.031	-51.984	434.015	477.849
1	1	51	1040.424	-137.261	1177.685	1319.137
1	2	1	1040.423	-137.261	1177.684	1319.137
1	2	6	-91.225	12.879	-104.105	-119.822
1	2	11	-2219.048	248.586	-2467.634	-2871.142
1	2	16	-9096.097	-718.506	-8377.591	-9853.777
1	2	21	513.381	-70.866	584.247	694.688
1	2	26	604.699	-82.691	687.390	826.240
1	2	31	513.380	-70.866	584.246	694.687
1	2	36	-9096.103	-718.507	-8377.596	-9853.780
1	2	41	-2219.046	248.586	-2467.632	-2871.139
1	2	46	-91.224	12.879	-104.104	-119.820
1	2	51	1040.422	-137.260	1177.683	1319.135
1	3	1	1040.424	-137.261	1177.685	1319.138
1	3	6	382.031	-51.984	434.015	477.849
1	3	11	-18191.469	-1764.307	-16427.162	-17777.643
1	3	16	-1942.025	220.773	-2162.798	-2316.373
1	3	21	-28247.070	-9332.611	-18914.459	-20047.832
1	3	26	-199.890	25.214	-225.104	-236.123
1	3	31	-65.778	8.220	-73.998	-76.817
1	3	36	-47.523	5.984	-53.507	-55.028
1	3	41	-147.334	18.959	-166.293	-169.430
1	3	46	-8502.051	-67.044	-8435.007	-8514.209
1	3	51	-2198.701	261.742	-2460.443	-2460.443

ESFUERZOS EN SERVICIO DEBIDO A ACCIONES EXTERIORES EN LAS DIVERSAS HIPOTESIS DE COMBINACION DEFINIDAS

HIPOTESIS 1 = PESO PROPIO  
 HIPOTESIS 2 = 1 + CARGAS MUERTAS  
 HIPOTESIS 3 = 2 + SOBRECARGA + CARRO  
 HIPOTESIS 4 = 2 + TEMPERATURA  
 HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
 HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

VANO NUMERO 1

HIPOTESIS	MOM.MAX	MOM.MIN	CORT.MAX	CORT.MIN
1	0.00	0.00	118.65	118.65

## Anexo A2: Resultados de ejemplo calculado con LOSAC

1	175.72	175.72	79.00	79.00
1	287.09	287.09	44.74	44.74
1	336.80	336.80	10.49	10.49
1	324.85	324.85	-23.76	-23.76
1	251.24	251.24	-58.02	-58.02
1	115.98	115.98	-92.27	-92.27
1	-80.94	-80.94	-126.53	-126.53
1	-339.52	-339.52	-160.78	-160.78
1	-659.75	-659.75	-195.03	-195.03
1	-1044.34	-1044.34	-234.69	-234.69

### VANO NUMERO 2

HIPOTESIS	MOM.MAX	MOM.MIN	CORT.MAX	CORT.MIN
1	-1044.34	-1044.34	262.30	262.30
1	-417.36	-417.36	205.52	205.52
1	68.19	68.19	154.14	154.14
1	415.01	415.01	102.76	102.76
1	623.10	623.10	51.38	51.38
1	692.47	692.47	0.00	0.00
1	623.10	623.10	-51.38	-51.38
1	415.01	415.01	-102.76	-102.76
1	68.19	68.19	-154.14	-154.14
1	-417.36	-417.36	-205.52	-205.52
1	-1044.34	-1044.34	-262.31	-262.31

### VANO NUMERO 3

HIPOTESIS	MOM.MAX	MOM.MIN	CORT.MAX	CORT.MIN
1	-1044.34	-1044.34	234.69	234.69
1	-659.75	-659.75	195.03	195.03
1	-339.52	-339.52	160.78	160.78
1	-80.94	-80.94	126.53	126.53
1	115.98	115.98	92.27	92.27
1	251.24	251.24	58.02	58.02
1	324.85	324.85	23.76	23.76
1	336.80	336.80	-10.49	-10.49
1	287.09	287.09	-44.74	-44.74
1	175.72	175.72	-79.00	-79.00
1	0.00	0.00	-118.65	-118.65

### ESFUERZOS HIPERESTATICOS DE PRETENSADO INICIALES

VANO	1	2	3	4	5	6	7	8	9	10	11
=====											
MOM. HIP	0.00	14.79	29.58	44.37	59.16	73.95	88.74	103.53	118.32	133.11	147.91
CORT.HIP	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22
=====											
VANO 2	1	2	3	4	5	6	7	8	9	10	11
=====											
MOM. HIP	147.91	147.91	147.91	147.91	147.91	147.91	147.91	147.91	147.91	147.91	147.91
CORT.HIP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
=====											
VANO 3	1	2	3	4	5	6	7	8	9	10	11
=====											
MOM. HIP	147.91	133.11	118.32	103.53	88.74	73.95	59.16	44.37	29.58	14.79	0.00
CORT.HIP	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22

### ESFUERZOS HIPERESTATICOS DE PRETENSADO DIFERIDOS

VANO	1	2	3	4	5	6	7	8	9	10	11
=====											
MOM. HIP	0.00	14.70	29.39	44.09	58.79	73.48	88.18	102.88	117.58	132.27	146.97
CORT.HIP	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22
=====											
VANO 2	1	2	3	4	5	6	7	8	9	10	11
=====											
MOM. HIP	146.97	146.97	146.97	146.97	146.97	146.97	146.97	146.97	146.97	146.97	146.97
CORT.HIP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
=====											
VANO 3	1	2	3	4	5	6	7	8	9	10	11
=====											
MOM. HIP	146.97	132.27	117.58	102.88	88.18	73.48	58.79	44.09	29.39	14.70	0.00
CORT.HIP	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22	-8.22

### FUERZA DE PRETENSADO EN ANCLAJES NECESARIA EN CADA HIPOTESIS DE COMBINACION DE ACCIONES

HIPOTESIS	VANO	SECCION	PMINIMO
1	3	1	1319.14

## Anexo A2: Resultados de ejemplo calculado con LOSAC

2	0	0	0.00
3	0	0	0.00
4	0	0	0.00
5	0	0	0.00
6	0	0	0.00

1

GRUPO DE TENDONES NUMERO 1  
 FUERZA EN ANCLAJES ADOPTADA 1319.138  
 SE REQUIEREN 5 TENDONES DE 2100. mm2  
 TENSION INICIAL 125.63 Kp/mm2  
 ALARGAMIENTO DURANTE EL TESADO 361. mm.

VANO SECCION DIST.ORIGEN F.PRET.INICIAL F.PRET.FINAL F.NEUTRAL.

VANO	SECCION	DIST.ORIGEN	F.PRET.INICIAL	F.PRET.FINAL	F.NEUTRAL.
1	1	0.00	1319.14	1135.99	1328.59
1	6	1.80	1306.87	1119.00	1322.75
1	11	3.60	1294.71	1105.70	1317.21
1	16	5.40	1282.67	1092.46	1310.59
1	21	7.20	1270.73	1079.87	1300.52
1	26	9.00	1257.58	1067.62	1284.58
1	31	10.80	1244.56	1057.46	1265.03
1	36	12.60	1231.68	1049.13	1245.22
1	41	14.40	1218.93	1042.12	1230.51
1	46	16.20	1198.13	1030.35	1214.82
1	51	18.00	1177.68	1030.17	1195.17
2	1	0.00	1177.68	1030.17	1195.17
2	6	2.70	1146.11	977.05	1158.96
2	11	5.40	1133.75	965.28	1145.00
2	16	8.10	1121.52	962.89	1138.71
2	21	10.80	1109.42	961.05	1132.83
2	26	13.50	1097.46	954.11	1123.18
2	31	16.20	1109.42	961.05	1132.83
2	36	18.90	1121.52	962.89	1138.71
2	41	21.60	1133.75	965.28	1145.00
2	46	24.30	1146.11	977.05	1158.96
2	51	27.00	1177.68	1030.17	1195.17
3	1	0.00	1177.68	1030.17	1195.17
3	6	1.80	1198.13	1030.35	1214.82
3	11	3.60	1218.93	1042.12	1230.51
3	16	5.40	1231.68	1049.13	1245.22
3	21	7.20	1244.56	1057.46	1265.03
3	26	9.00	1257.58	1067.62	1284.58
3	31	10.80	1270.73	1079.87	1300.52
3	36	12.60	1282.67	1092.46	1310.59
3	41	14.40	1294.71	1105.70	1317.21
3	46	16.20	1306.87	1119.00	1322.75
3	51	18.00	1319.14	1135.99	1328.59

=====

ESFUERZOS EN SERVICIO INCLUYENDO HIPERESTATICOS DE  
 PRETENSADO EN LAS HIPOTESIS DE COMBINACION DEFINIDAS

=====

HIPOTESIS 1 = PESO PROPIO  
 HIPOTESIS 2 = 1 + CARGAS MUERTAS  
 HIPOTESIS 3 = 2 + SOBRECARGA + CARRO  
 HIPOTESIS 4 = 2 + TEMPERATURA  
 HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
 HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

VANO	1	2	3	4	5	6	7	8	9	10	11
H 1 M.MX.	0.00	190.51	316.67	381.17	384.01	325.20	204.73	22.60	-221.19	-526.63	-896.44
H 1 M.MN.	0.00	190.51	316.67	381.17	384.01	325.20	204.73	22.60	-221.19	-526.63	-896.44
H 1 Q.MX.	126.87	87.21	52.96	18.71	-15.55	-49.80	-84.06	-118.31	-152.56	-186.82	-226.47
H 1 Q.MN.	126.87	87.21	52.96	18.71	-15.55	-49.80	-84.06	-118.31	-152.56	-186.82	-226.47
VANO 2	1	2	3	4	5	6	7	8	9	10	11
H 1 M.MX.	-896.44	-269.46	216.09	562.92	771.01	840.37	771.01	562.92	216.09	-269.46	-896.44
H 1 M.MN.	-896.44	-269.46	216.09	562.92	771.01	840.37	771.01	562.92	216.09	-269.46	-896.44
H 1 Q.MX.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
H 1 Q.MN.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
VANO 3	1	2	3	4	5	6	7	8	9	10	11
H 1 M.MX.	-896.44	-526.63	-221.19	22.60	204.72	325.20	384.01	381.17	316.67	190.51	0.00
H 1 M.MN.	-896.44	-526.63	-221.19	22.60	204.72	325.20	384.01	381.17	316.67	190.51	0.00
H 1 Q.MX.	226.47	186.82	152.56	118.31	84.06	49.80	15.55	-18.71	-52.96	-87.21	-126.87
H 1 Q.MN.	226.47	186.82	152.56	118.31	84.06	49.80	15.55	-18.71	-52.96	-87.21	-126.87

REACCIONES EN LOS APOYOS

HIPOTESIS	APOYO	REACCION CARGAS	RHIP. PRETENSADO	REACCION TOTAL
1	1	118.651062	8.164995	126.816055
1	2	496.993927	-8.165007	488.828918

## Anexo A2: Resultados de ejemplo calculado con LOSAC

1	3	496.993958	-8.164968	488.828979
1	4	118.651077	8.164980	126.816055

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TENSIONES A CORTO Y LARGO PLAZO  
HIPOTESIS DE CARGA NUMERO 1  
=====

TENSIONES DEBIDAS A MOMENTOS MAXIMOS  
\*\*\*\*\*

VANO	1	2	3	4	5	6	7	8	9	10	11
-----											
SIG SUP.INS.	-134.99	-143.52	-125.05	-109.03	-94.46	-83.60	-78.27	-77.24	-79.34	-23.81	165.99
SIG INF.INS.	-134.99	-207.09	-226.71	-243.29	-258.07	-267.82	-270.67	-268.13	-261.72	-325.37	-462.31
SIG SUP.DIF.	-116.25	-137.75	-131.86	-123.47	-111.46	-97.45	-82.95	-67.26	-49.96	20.12	205.71
SIG INF.DIF.	-116.25	-158.65	-162.11	-168.73	-180.10	-194.07	-209.30	-226.55	-246.22	-330.85	-476.59
-----											
VANO 2	1	2	3	4	5	6	7	8	9	10	11
-----											
SIG SUP.INS.	165.99	-99.35	-209.78	-290.72	-340.74	-358.44	-340.74	-290.72	-209.78	-99.35	165.99
SIG INF.INS.	-462.31	-214.96	-72.45	32.95	99.43	125.23	99.43	32.95	-72.45	-214.96	-462.31
SIG SUP.DIF.	205.71	-62.56	-195.57	-292.42	-350.78	-370.85	-350.78	-292.42	-195.57	-62.56	205.71
SIG INF.DIF.	-476.59	-211.09	-40.35	82.13	156.05	183.34	156.05	82.13	-40.35	-211.09	-476.59
-----											
VANO 3	1	2	3	4	5	6	7	8	9	10	11
-----											
SIG SUP.INS.	165.99	-23.81	-79.34	-77.24	-78.27	-83.60	-94.46	-109.03	-125.05	-143.52	-134.99
SIG INF.INS.	-462.31	-325.37	-261.72	-268.13	-270.67	-267.82	-258.07	-243.29	-226.71	-207.09	-134.99
SIG SUP.DIF.	205.71	20.12	-49.96	-67.26	-82.95	-97.45	-111.46	-123.47	-131.86	-137.74	-116.25
SIG INF.DIF.	-476.59	-330.85	-246.22	-226.55	-209.30	-194.08	-180.10	-168.73	-162.11	-158.65	-116.25

TENSIONES DEBIDAS A MOMENTOS MINIMOS  
\*\*\*\*\*

VANO	1	2	3	4	5	6	7	8	9	10	11
-----											
SIG SUP.INS.	-134.99	-143.52	-125.05	-109.03	-94.46	-83.60	-78.27	-77.24	-79.34	-23.81	165.99
SIG INF.INS.	-134.99	-207.09	-226.71	-243.29	-258.07	-267.82	-270.67	-268.13	-261.72	-325.37	-462.31
SIG SUP.DIF.	-116.25	-137.75	-131.86	-123.47	-111.46	-97.45	-82.95	-67.26	-49.96	20.12	205.71
SIG INF.DIF.	-116.25	-158.65	-162.11	-168.73	-180.10	-194.07	-209.30	-226.55	-246.22	-330.85	-476.59
-----											
VANO 2	1	2	3	4	5	6	7	8	9	10	11
-----											
SIG SUP.INS.	165.99	-99.35	-209.78	-290.72	-340.74	-358.44	-340.74	-290.72	-209.78	-99.35	165.99
SIG INF.INS.	-462.31	-214.96	-72.45	32.95	99.43	125.23	99.43	32.95	-72.45	-214.96	-462.31
SIG SUP.DIF.	205.71	-62.56	-195.57	-292.42	-350.78	-370.85	-350.78	-292.42	-195.57	-62.56	205.71
SIG INF.DIF.	-476.59	-211.09	-40.35	82.13	156.05	183.34	156.05	82.13	-40.35	-211.09	-476.59
-----											
VANO 3	1	2	3	4	5	6	7	8	9	10	11
-----											
SIG SUP.INS.	165.99	-23.81	-79.34	-77.24	-78.27	-83.60	-94.46	-109.03	-125.05	-143.52	-134.99
SIG INF.INS.	-462.31	-325.37	-261.72	-268.13	-270.67	-267.82	-258.07	-243.29	-226.71	-207.09	-134.99
SIG SUP.DIF.	205.71	20.12	-49.96	-67.26	-82.95	-97.45	-111.46	-123.47	-131.86	-137.74	-116.25
SIG INF.DIF.	-476.59	-330.85	-246.22	-226.55	-209.30	-194.08	-180.10	-168.73	-162.11	-158.65	-116.25

SE HA SUPERADO LA TENSION MAXIMA DE  
TRACCION EN LOS SIGUIENTES PUNTOS:

HIPOTESIS DE CARGA 1 VANO 1SECCION 47TENSION	0.89
HIPOTESIS DE CARGA 1 VANO 1SECCION 48TENSION	30.03
HIPOTESIS DE CARGA 1 VANO 1SECCION 49TENSION	85.98
HIPOTESIS DE CARGA 1 VANO 1SECCION 50TENSION	123.65
HIPOTESIS DE CARGA 1 VANO 1SECCION 51TENSION	165.99
HIPOTESIS DE CARGA 1 VANO 2SECCION 1TENSION	165.99
HIPOTESIS DE CARGA 1 VANO 2SECCION 2TENSION	97.39
HIPOTESIS DE CARGA 1 VANO 2SECCION 3TENSION	16.83
HIPOTESIS DE CARGA 1 VANO 2SECCION 15TENSION	14.93
HIPOTESIS DE CARGA 1 VANO 2SECCION 16TENSION	32.95
HIPOTESIS DE CARGA 1 VANO 2SECCION 17TENSION	49.42
HIPOTESIS DE CARGA 1 VANO 2SECCION 18TENSION	64.31
HIPOTESIS DE CARGA 1 VANO 2SECCION 19TENSION	77.62
HIPOTESIS DE CARGA 1 VANO 2SECCION 20TENSION	89.33
HIPOTESIS DE CARGA 1 VANO 2SECCION 21TENSION	99.43
HIPOTESIS DE CARGA 1 VANO 2SECCION 22TENSION	107.90
HIPOTESIS DE CARGA 1 VANO 2SECCION 23TENSION	114.73
HIPOTESIS DE CARGA 1 VANO 2SECCION 24TENSION	119.90
HIPOTESIS DE CARGA 1 VANO 2SECCION 25TENSION	123.41
HIPOTESIS DE CARGA 1 VANO 2SECCION 26TENSION	125.23
HIPOTESIS DE CARGA 1 VANO 2SECCION 27TENSION	123.41
HIPOTESIS DE CARGA 1 VANO 2SECCION 28TENSION	119.90
HIPOTESIS DE CARGA 1 VANO 2SECCION 29TENSION	114.73
HIPOTESIS DE CARGA 1 VANO 2SECCION 30TENSION	107.90
HIPOTESIS DE CARGA 1 VANO 2SECCION 31TENSION	99.43
HIPOTESIS DE CARGA 1 VANO 2SECCION 32TENSION	89.33
HIPOTESIS DE CARGA 1 VANO 2SECCION 33TENSION	77.62
HIPOTESIS DE CARGA 1 VANO 2SECCION 34TENSION	64.31
HIPOTESIS DE CARGA 1 VANO 2SECCION 35TENSION	49.42
HIPOTESIS DE CARGA 1 VANO 2SECCION 36TENSION	32.95
HIPOTESIS DE CARGA 1 VANO 2SECCION 37TENSION	14.93
HIPOTESIS DE CARGA 1 VANO 2SECCION 49TENSION	16.83
HIPOTESIS DE CARGA 1 VANO 2SECCION 50TENSION	97.39

## Anexo A2: Resultados de ejemplo calculado con LOSAC

HIPOTESIS DE CARGA	1	VANO	2SECCION	51TENSION	165.99
HIPOTESIS DE CARGA	1	VANO	3SECCION	1TENSION	165.99
HIPOTESIS DE CARGA	1	VANO	3SECCION	2TENSION	123.65
HIPOTESIS DE CARGA	1	VANO	3SECCION	3TENSION	85.98
HIPOTESIS DE CARGA	1	VANO	3SECCION	4TENSION	30.03
HIPOTESIS DE CARGA	1	VANO	3SECCION	5TENSION	0.89

SE HA SUPERADO LA TENSION MAXIMA DE COMPRESION EN LOS SIGUIENTES PUNTOS:

NINGUNO

### DEFORMADA DE LA ESTRUCTURA

=====  
VANO SECCION PESO PROPIO P.P+C.MUERTA PRET.INICIAL P.P+PR.INIC. P.P+C.M+PR.INIC. FLECHA DIFERIDA

1	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
1	6	-0.00108	-0.00108	0.00175	0.00067	0.00067	0.00156
1	11	-0.00192	-0.00192	0.00320	0.00128	0.00128	0.00299
1	16	-0.00240	-0.00240	0.00418	0.00178	0.00178	0.00420
1	21	-0.00243	-0.00243	0.00456	0.00213	0.00213	0.00513
1	26	-0.00204	-0.00204	0.00435	0.00231	0.00231	0.00568
1	31	-0.00133	-0.00133	0.00361	0.00229	0.00229	0.00577
1	36	-0.00046	-0.00046	0.00252	0.00206	0.00206	0.00535
1	41	0.00029	0.00029	0.00134	0.00163	0.00163	0.00437
1	46	0.00058	0.00058	0.00040	0.00098	0.00098	0.00273
1	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-----							
2	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	6	-0.00295	-0.00295	0.00055	-0.00239	-0.00239	-0.00767
2	11	-0.00717	-0.00717	0.00205	-0.00512	-0.00512	-0.01646
2	16	-0.01122	-0.01122	0.00369	-0.00753	-0.00753	-0.02423
2	21	-0.01406	-0.01406	0.00490	-0.00916	-0.00916	-0.02950
2	26	-0.01508	-0.01508	0.00534	-0.00974	-0.00974	-0.03136
2	31	-0.01406	-0.01406	0.00490	-0.00916	-0.00916	-0.02950
2	36	-0.01122	-0.01122	0.00369	-0.00753	-0.00753	-0.02423
2	41	-0.00717	-0.00717	0.00205	-0.00512	-0.00512	-0.01646
2	46	-0.00295	-0.00295	0.00055	-0.00239	-0.00239	-0.00767
2	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-----							
3	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	6	0.00058	0.00058	0.00040	0.00098	0.00098	0.00273
3	11	0.00029	0.00029	0.00134	0.00163	0.00163	0.00437
3	16	-0.00046	-0.00046	0.00252	0.00206	0.00206	0.00535
3	21	-0.00133	-0.00133	0.00361	0.00229	0.00229	0.00577
3	26	-0.00204	-0.00204	0.00435	0.00231	0.00231	0.00568
3	31	-0.00243	-0.00243	0.00456	0.00213	0.00213	0.00513
3	36	-0.00240	-0.00240	0.00418	0.00178	0.00178	0.00420
3	41	-0.00192	-0.00192	0.00320	0.00128	0.00128	0.00299
3	46	-0.00108	-0.00108	0.00175	0.00067	0.00067	0.00156
3	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

### ESFUERZOS DE CALCULO PARA COMPROBACION Y DIMENSIONAMIENTO DE LA SECCION EN ROTURA

=====											
VANO 1	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	263.58	430.63	505.20	487.28	376.87	173.97	0.00	0.00	0.00	0.00
Md NEG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-121.41	-509.27	-989.62	-1566.51
Qd POS	177.98	118.50	67.11	15.73	-21.39	-52.22	-83.05	-113.87	-144.70	-175.53	-211.22
Qd NEG	0.00	0.00	0.00	0.00	-35.65	-87.03	-138.41	-189.79	-241.17	-292.55	-352.03
=====											
VANO 2	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	0.00	102.28	622.52	934.66	1038.70	934.65	622.52	102.28	0.00	0.00
Md NEG-1566.51	-626.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-626.04	-1566.51
Qd POS	393.46	308.29	231.21	154.14	77.07	0.00	-46.24	-92.49	-138.73	-184.97	-236.07
Qd NEG	0.00	0.00	0.00	0.00	0.00	0.00	-77.07	-154.14	-231.21	-308.29	-393.46
=====											
VANO 3	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	0.00	0.00	0.00	173.97	376.87	487.27	505.20	430.63	263.58	0.00
Md NEG-1566.51	-989.62	-509.27	-121.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Qd POS	352.03	292.55	241.17	189.79	138.41	87.03	35.65	-9.44	-40.27	-71.10	-106.79
Qd NEG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-15.73	-67.11	-118.50	-177.98

### SITUACION FINAL DE LA ESTRUCTURA

\*\*\*\*\*

### DEFINICION GEOMETRICA DEL PRETENSADO

=====

GRUPO DE TENDONES NUMERO 1 NUMERACION GLOBAL 1 IND.TESADO= 3

## Anexo A2: Resultados de ejemplo calculado con LOSAC

```

=====
VANO XINIC. EX.ORIGEN EX.PTO.MIN. EX.FINAL X-INFLEX.1 X-MINIMO X-INFLEX.2 XFINAL
-----
1 0.000 -0.456 -0.850 -0.150 0.000 7.200 14.400 18.000
2 0.000 -0.150 -0.850 -0.150 2.700 13.500 24.300 27.000
3 0.000 -0.150 -0.850 -0.456 3.600 10.800 18.000 18.000
    
```

FUERZA DE PRETENSADO

```

=====
COEFICIENTE DE ROZAMIENTO EN CURVA (MU)= 0.2100
COEFICIENTE DE ROZAMIENTO PARASITO (K)= 0.0020
    
```

GRUPO DE TENDONES NUMERO 1

VANO 1

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
ABSCISA 0.000 1.800 3.600 5.400 7.200 9.000 10.800 12.600 14.400 16.200 18.000
EXCENTR. 0.000 -0.185 -0.309 -0.382 -0.407 -0.378 -0.290 -0.144 0.060 0.235 0.306
D.FONDO 0.544 0.372 0.248 0.175 0.150 0.179 0.267 0.413 0.617 0.792 0.850
F.PRET. 1.000 0.991 0.981 0.972 0.963 0.953 0.943 0.934 0.924 0.908 0.893
    
```

VANO 2

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
ABSCISA 0.000 2.700 5.400 8.100 10.800 13.500 16.200 18.900 21.600 24.300 27.000
EXCENTR. 0.306 0.153 -0.092 -0.267 -0.372 -0.407 -0.372 -0.267 -0.092 0.153 0.306
D.FONDO 0.850 0.710 0.465 0.290 0.185 0.150 0.185 0.290 0.465 0.710 0.850
F.PRET. 0.893 0.869 0.859 0.850 0.841 0.832 0.841 0.850 0.859 0.869 0.893
    
```

VANO 3

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
ABSCISA 0.000 1.800 3.600 5.400 7.200 9.000 10.800 12.600 14.400 16.200 18.000
EXCENTR. 0.306 0.235 0.060 -0.145 -0.290 -0.378 -0.407 -0.382 -0.309 -0.185 0.000
D.FONDO 0.850 0.792 0.617 0.412 0.267 0.179 0.150 0.175 0.248 0.372 0.544
F.PRET. 0.893 0.908 0.924 0.934 0.943 0.953 0.963 0.972 0.981 0.991 1.000
    
```

ENVOLVENTE DE ESFUERZOS DEL CARRO

VANO 1

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
M POS 0.00 82.96 142.55 177.16 195.18 193.50 174.26 138.58 89.59 32.23 27.09
M NEG 0.00 -15.07 -30.14 -45.21 -60.29 -75.36 -90.43 -105.50 -120.57 -135.64 -150.72
Q POS 52.71 46.09 39.60 30.23 24.33 18.77 13.62 8.93 1.51 1.51 1.51
Q NEG -8.37 -8.37 -8.37 -13.91 -20.40 -26.71 -35.67 -41.23 -46.38 -51.07 -55.23
    
```

VANO 2

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
M POS 27.09 47.03 118.71 179.66 220.05 235.42 220.05 179.66 118.71 47.03 27.09
M NEG -150.72 -78.18 -66.48 -54.78 -43.09 -31.39 -43.09 -54.78 -66.48 -78.18 -150.72
Q POS 57.01 52.44 45.03 38.78 32.22 25.57 17.00 11.11 5.93 4.33 4.33
Q NEG -4.33 -4.33 -5.93 -11.11 -17.00 -25.57 -32.22 -38.78 -47.00 -52.44 -57.01
    
```

VANO 3

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
M POS 27.09 32.23 89.59 138.58 174.26 193.50 195.18 177.16 142.55 82.96 0.00
M NEG -150.72 -135.64 -120.57 -105.50 -90.43 -75.36 -60.29 -45.21 -30.14 -15.07 0.00
Q POS 55.23 51.07 46.38 41.23 35.67 26.71 20.40 13.91 8.37 8.37 8.37
Q NEG -1.51 -1.51 -2.99 -8.93 -13.62 -18.77 -24.33 -30.23 -39.60 -46.09 -52.71
    
```

ENVOLVENTE DE ESFUERZOS DE LA SOBRECARGA

VANO 1

```

=====
1 2 3 4 5 6 7 8 9 10 11
-----
M POS 0.00 69.31 121.78 157.40 176.17 178.09 163.16 131.39 82.76 25.26 28.06
M NEG 0.00 -21.95 -43.90 -65.86 -87.81 -109.76 -131.71 -153.66 -175.61 -205.53 -312.60
Q POS 43.19 33.83 24.47 15.11 5.75 1.56 1.56 1.56 1.56 1.56 1.56
Q NEG -12.20 -12.20 -12.20 -12.20 -12.20 -17.37 -26.73 -36.09 -45.45 -54.81 -64.17
    
```

VANO 2

```

=====
1 2 3 4 5 6 7 8 9 10 11
    
```

## Anexo A2: Resultados de ejemplo calculado con LOSAC

M POS	28.06	15.95	87.58	178.52	235.38	254.33	235.38	178.52	87.58	15.95	28.06
M NEG	-312.60	-129.90	-68.86	-65.02	-65.02	-65.02	-65.02	-65.02	-68.86	-129.90	-312.60
Q POS	74.69	60.65	46.61	32.57	18.53	4.49	4.49	4.49	4.49	4.49	4.49
Q NEG	-4.49	-4.49	-4.49	-4.49	-4.49	-4.49	-18.53	-32.57	-46.61	-60.65	-74.69

VANO 3	1	2	3	4	5	6	7	8	9	10	11
=====											
M POS	28.06	25.26	82.76	131.39	163.16	178.09	176.17	157.40	121.78	69.31	0.00
M NEG	-312.60	-205.53	-175.61	-153.66	-131.71	-109.76	-87.81	-65.86	-43.90	-21.95	0.00
Q POS	64.17	54.81	45.45	36.09	26.73	17.37	12.20	12.20	12.20	12.20	12.20
Q NEG	-1.56	-1.56	-1.56	-1.56	-1.56	-1.56	-5.75	-15.11	-24.47	-33.83	-43.19

\*\*\*\*NON POSITIVE STIFFNESS MATRIX\*\*  
 DEGREE OF FREEDOM (DOF)= 2  
 DIAGONAL MATRIX TERM = -0.148712E+05

FUERZA DE PRETENSADO NECESARIA

HIPOT.	VANO	SECCION	PMINIMA	PERD.DIF	PINST	PANCL
1	1	1	-2687.301	305.183	-2992.484	-2992.484
1	1	6	-8502.051	-67.044	-8435.007	-8514.209
1	1	11	-147.334	18.959	-166.293	-169.430
1	1	16	-47.523	5.984	-53.506	-55.028
1	1	21	-65.778	8.220	-73.998	-76.817
1	1	26	-199.890	25.214	-225.104	-236.123
1	1	31	-28246.783	-9332.436	-18914.348	-20047.715
1	1	36	-1942.022	220.773	-2162.794	-2316.370
1	1	41	-18191.572	-1764.336	-16427.236	-17777.725
1	1	46	382.031	-51.984	434.015	477.849
1	1	51	1040.424	-137.261	1177.685	1319.137
1	2	1	1040.423	-137.261	1177.684	1319.137
1	2	6	-91.225	12.879	-104.105	-119.822
1	2	11	-2219.048	248.586	-2467.634	-2871.142
1	2	16	-9096.097	-718.506	-8377.591	-9853.777
1	2	21	513.381	-70.866	584.247	694.688
1	2	26	604.699	-82.691	687.390	826.240
1	2	31	513.380	-70.866	584.246	694.687
1	2	36	-9096.103	-718.507	-8377.596	-9853.780
1	2	41	-2219.046	248.586	-2467.632	-2871.139
1	2	46	-91.224	12.879	-104.104	-119.820
1	2	51	1040.422	-137.260	1177.683	1319.135
1	3	1	1040.424	-137.261	1177.685	1319.138
1	3	6	382.031	-51.984	434.015	477.849
1	3	11	-18191.469	-1764.307	-16427.162	-17777.643
1	3	16	-1942.025	220.773	-2162.798	-2316.373
1	3	21	-28247.070	-9332.611	-18914.459	-20047.832
1	3	26	-199.890	25.214	-225.104	-236.123
1	3	31	-65.778	8.220	-73.998	-76.817
1	3	36	-47.523	5.984	-53.507	-55.028
1	3	41	-147.334	18.959	-166.293	-169.430
1	3	46	-8502.051	-67.044	-8435.007	-8514.209
1	3	51	-2198.701	261.742	-2460.443	-2460.443
2	1	1	-2687.301	305.183	-2992.484	-2992.484
2	1	6	-8898.325	-128.497	-8769.828	-8852.174
2	1	11	-55.703	7.195	-62.898	-64.085
2	1	16	47.705	-6.022	53.727	55.255
2	1	21	23.915	-2.995	26.910	27.935
2	1	26	-125.078	15.823	-140.901	-147.798
2	1	31	-29211.840	-9932.504	-19279.336	-20434.574
2	1	36	-1870.577	215.646	-2086.224	-2234.362
2	1	41	-19689.264	-2221.154	-17468.109	-18904.170
2	1	46	596.837	-81.980	678.817	747.376
2	1	51	1361.330	-180.332	1541.662	1726.833
2	2	1	1361.330	-180.332	1541.662	1726.833
2	2	6	63.448	-9.053	72.502	83.447
2	2	11	-2268.268	251.720	-2519.988	-2932.057
2	2	16	-9834.005	-933.502	-8900.503	-10468.830
2	2	21	725.445	-101.641	827.086	983.431
2	2	26	823.417	-114.187	937.604	1126.996
2	2	31	725.445	-101.641	827.085	983.430
2	2	36	-9834.013	-933.504	-8900.509	-10468.835
2	2	41	-2268.266	251.720	-2519.986	-2932.054
2	2	46	63.449	-9.053	72.502	83.448
2	2	51	1361.328	-180.332	1541.659	1726.829
2	3	1	1361.330	-180.332	1541.663	1726.833
2	3	6	596.838	-81.980	678.818	747.376
2	3	11	-19689.154	-2221.119	-17468.035	-18904.086
2	3	16	-1870.581	215.646	-2086.227	-2234.365
2	3	21	-29212.137	-9932.688	-19279.449	-20434.691
2	3	26	-125.078	15.823	-140.901	-147.798
2	3	31	23.915	-2.995	26.910	27.935
2	3	36	47.705	-6.022	53.727	55.255
2	3	41	-55.703	7.195	-62.899	-64.085
2	3	46	-8898.326	-128.497	-8769.829	-8852.174
2	3	51	-2198.701	261.742	-2460.443	-2460.443
3	1	1	-2687.301	305.183	-2992.484	-2992.484

## Anexo A2: Resultados de ejemplo calculado con LOSAC

3	1	6	-9917.555	-292.187	-9625.368	-9715.747
3	1	11	193.107	-26.316	219.423	223.563
3	1	16	326.128	-44.435	370.563	381.100
3	1	21	325.476	-44.604	370.079	384.176
3	1	26	200.397	-27.718	228.115	239.281
3	1	31	-37494.813	-15394.188	-22100.625	-23424.918
3	1	36	-2057.410	230.136	-2287.546	-2449.979
3	1	41	-23511.340	-3527.668	-19983.672	-21626.537
3	1	46	922.061	-134.180	1056.241	1162.919
3	1	51	1779.354	-255.833	2035.187	2279.635
-----						
3	2	1	1779.354	-255.833	2035.187	2279.635
3	2	6	289.390	-42.681	332.071	382.204
3	2	11	-2702.123	279.025	-2981.148	-3468.626
3	2	16	-11697.068	-1499.740	-10197.328	-11994.164
3	2	21	1178.998	-187.452	1366.449	1624.751
3	2	26	1276.086	-203.963	1480.048	1779.011
3	2	31	1178.997	-187.452	1366.449	1624.750
3	2	36	-11697.077	-1499.742	-10197.335	-11994.169
3	2	41	-2702.121	279.025	-2981.146	-3468.623
3	2	46	289.390	-42.681	332.071	382.204
3	2	51	1779.352	-255.832	2035.183	2279.631
-----						
3	3	1	1779.355	-255.833	2035.188	2279.636
3	3	6	922.061	-134.180	1056.241	1162.919
3	3	11	-23511.207	-3527.619	-19983.588	-21626.443
3	3	16	-2057.407	230.136	-2287.543	-2449.976
3	3	21	-37495.191	-15394.451	-22100.740	-23425.037
3	3	26	200.397	-27.718	228.115	239.281
3	3	31	325.475	-44.604	370.079	384.176
3	3	36	326.128	-44.435	370.563	381.099
3	3	41	193.107	-26.316	219.422	223.562
3	3	46	-9917.555	-292.187	-9625.368	-9715.747
3	3	51	-2198.701	261.742	-2460.443	-2460.443
-----						
4	1	1	-2687.301	305.183	-2992.484	-2992.484
4	1	6	-9087.689	-156.912	-8930.777	-9014.635
4	1	11	-2.444	0.319	-2.763	-2.815
4	1	16	118.337	-15.236	133.573	137.371
4	1	21	115.810	-14.918	130.729	135.708
4	1	26	-1.180	0.155	-1.335	-1.400
4	1	31	-33378.590	-12600.377	-20778.213	-22023.266
4	1	36	-1870.577	215.646	-2086.224	-2234.362
4	1	41	-19689.264	-2221.154	-17468.109	-18904.170
4	1	46	596.837	-81.980	678.817	747.376
4	1	51	1361.330	-180.332	1541.662	1726.833
-----						
4	2	1	1361.330	-180.332	1541.662	1726.833
4	2	6	63.448	-9.053	72.502	83.447
4	2	11	-2863.254	287.539	-3150.793	-3666.011
4	2	16	-11305.521	-1372.759	-9932.763	-11682.980
4	2	21	1007.183	-152.856	1160.038	1379.322
4	2	26	1084.900	-163.606	1248.506	1500.699
4	2	31	1007.182	-152.856	1160.037	1379.321
4	2	36	-11305.530	-1372.761	-9932.770	-11682.985
4	2	41	-2863.252	287.539	-3150.792	-3666.009
4	2	46	63.449	-9.053	72.502	83.448
4	2	51	1361.328	-180.332	1541.659	1726.829
-----						
4	3	1	1361.330	-180.332	1541.663	1726.833
4	3	6	596.838	-81.980	678.818	747.376
4	3	11	-19689.154	-2221.119	-17468.035	-18904.086
4	3	16	-1870.581	215.646	-2086.227	-2234.365
4	3	21	-33378.934	-12600.605	-20778.328	-22023.387
4	3	26	-1.180	0.155	-1.335	-1.400
4	3	31	115.810	-14.918	130.728	135.708
4	3	36	118.337	-15.236	133.573	137.371
4	3	41	-2.444	0.319	-2.763	-2.815
4	3	46	-9087.690	-156.912	-8930.778	-9014.635
4	3	51	-2198.701	261.742	-2460.443	-2460.443
-----						
5	1	1	-2687.301	305.183	-2992.484	-2992.484
5	1	6	-9495.380	-221.201	-9274.179	-9361.261
5	1	11	97.080	-12.962	110.043	112.119
5	1	16	229.706	-30.496	260.201	267.600
5	1	21	236.435	-31.572	268.007	278.215
5	1	26	129.010	-17.507	146.517	153.689
5	1	31	-36691.781	-14837.998	-21853.783	-23163.285
5	1	36	-1786.193	208.695	-1994.887	-2136.540
5	1	41	-21218.094	-2717.770	-18500.324	-20021.242
5	1	46	726.927	-102.213	829.139	912.880
5	1	51	1528.540	-209.356	1737.896	1946.636
-----						
5	2	1	1528.540	-209.356	1737.896	1946.636
5	2	6	153.825	-22.243	176.068	202.649
5	2	11	-3036.796	295.736	-3332.532	-3877.468
5	2	16	-12050.746	-1617.932	-10432.814	-12271.145
5	2	21	1188.604	-189.463	1378.066	1638.564
5	2	26	1265.968	-201.736	1467.704	1764.174
5	2	31	1188.603	-189.462	1378.065	1638.563
5	2	36	-12050.755	-1617.935	-10432.820	-12271.149
5	2	41	-3036.795	295.736	-3332.531	-3877.466
5	2	46	153.825	-22.243	176.069	202.650
5	2	51	1528.537	-209.356	1737.893	1946.633
-----						
5	3	1	1528.540	-209.357	1737.897	1946.637
5	3	6	726.927	-102.213	829.140	912.881
5	3	11	-21217.977	-2717.729	-18500.248	-20021.156
5	3	16	-1786.191	208.694	-1994.885	-2136.537

## Anexo A2: Resultados de ejemplo calculado con LOSAC

5	3	21	-36692.156	-14838.256	-21853.900	-23163.406
5	3	26	129.010	-17.507	146.517	153.689
5	3	31	236.434	-31.572	268.007	278.215
5	3	36	229.706	-30.496	260.201	267.600
5	3	41	97.080	-12.962	110.043	112.119
5	3	46	-9495.381	-221.201	-9274.180	-9361.261
5	3	51	-2198.701	261.742	-2460.443	-2460.443
-----						
6	1	1	-2687.301	305.183	-2992.484	-2992.484
6	1	6	-9993.300	-305.391	-9687.909	-9778.875
6	1	11	214.411	-29.350	243.761	248.360
6	1	16	354.381	-48.648	403.029	414.488
6	1	21	362.234	-50.168	412.402	428.111
6	1	26	249.956	-35.028	284.984	298.934
6	1	31	-39161.512	-16564.549	-22596.963	-23950.996
6	1	36	-2057.410	230.136	-2287.546	-2449.979
6	1	41	-23511.340	-3527.668	-19983.672	-21626.537
6	1	46	922.061	-134.180	1056.241	1162.919
6	1	51	1779.354	-255.833	2035.187	2279.635
-----						
6	2	1	1779.354	-255.833	2035.187	2279.635
6	2	6	289.390	-42.681	332.071	382.204
6	2	11	-2940.118	291.293	-3231.411	-3759.812
6	2	16	-12285.675	-1698.237	-10587.438	-12453.014
6	2	21	1291.693	-211.556	1503.249	1787.410
6	2	26	1380.679	-227.586	1608.265	1933.127
6	2	31	1291.692	-211.556	1503.248	1787.409
6	2	36	-12285.684	-1698.239	-10587.444	-12453.019
6	2	41	-2940.116	291.293	-3231.410	-3759.810
6	2	46	289.390	-42.681	332.071	382.204
6	2	51	1779.352	-255.832	2035.183	2279.631
-----						
6	3	1	1779.355	-255.833	2035.188	2279.636
6	3	6	922.061	-134.180	1056.241	1162.919
6	3	11	-23511.207	-3527.619	-19983.588	-21626.443
6	3	16	-2057.407	230.136	-2287.543	-2449.976
6	3	21	-39161.910	-16564.834	-22597.076	-23951.115
6	3	26	249.956	-35.028	284.984	298.933
6	3	31	362.233	-50.168	412.402	428.110
6	3	36	354.380	-48.648	403.028	414.488
6	3	41	214.411	-29.350	243.761	248.360
6	3	46	-9993.301	-305.392	-9687.909	-9778.875
6	3	51	-2198.701	261.742	-2460.443	-2460.443

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ESFUERZOS EN SERVICIO DEBIDO A ACCIONES EXTERIORES  
EN LAS DIVERSAS HIPOTESIS DE COMBINACION DEFINIDAS

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HIPOTESIS 1 = PESO PROPIO  
HIPOTESIS 2 = 1 + CARGAS MUERTAS  
HIPOTESIS 3 = 2 + SOBRECARGA + CARRO  
HIPOTESIS 4 = 2 + TEMPERATURA  
HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

VANO NUMERO 1

=====

HIPOTESIS	MOM.MAX	MOM.MIN	CORT.MAX	CORT.MIN
1	0.00	0.00	118.65	118.65
1	175.72	175.72	79.00	79.00
1	287.09	287.09	44.74	44.74
1	336.80	336.80	10.49	10.49
1	324.85	324.85	-23.76	-23.76
1	251.24	251.24	-58.02	-58.02
1	115.98	115.98	-92.27	-92.27
1	-80.94	-80.94	-126.53	-126.53
1	-339.52	-339.52	-160.78	-160.78
1	-659.75	-659.75	-195.03	-195.03
1	-1044.34	-1044.34	-234.69	-234.69
2	0.00	0.00	138.02	138.02
2	205.32	205.32	92.52	92.52
2	335.76	335.76	52.41	52.41
2	394.01	394.01	12.31	12.31
2	380.07	380.07	-27.79	-27.79
2	293.95	293.95	-67.90	-67.90
2	135.64	135.64	-108.00	-108.00
2	-94.86	-94.86	-148.11	-148.11
2	-397.55	-397.55	-188.21	-188.21
2	-772.42	-772.42	-228.31	-228.31
2	-1222.18	-1222.18	-273.82	-273.82
3	0.00	0.00	185.97	127.74
3	281.46	186.81	132.47	82.23
3	467.92	298.74	84.45	42.13
3	561.29	338.48	34.98	-0.75
3	565.75	306.03	-12.75	-44.09
3	479.75	201.39	-57.73	-89.94
3	304.35	24.57	-100.41	-139.20
3	40.12	-224.44	-142.86	-186.76
3	-311.37	-545.64	-186.68	-234.13
3	-743.67	-943.00	-226.78	-281.25
3	-1194.60	-1453.84	-272.29	-333.52
4	0.00	0.00	145.88	138.02
4	219.47	205.32	100.38	92.52
4	364.05	335.76	60.27	52.41

## Anexo A2: Resultados de ejemplo calculado con LOSAC

4	436.45	394.01	20.17	12.31
4	436.66	380.07	-19.94	-27.79
4	364.68	293.95	-60.04	-67.90
4	220.51	135.64	-100.14	-108.00
4	4.16	-94.86	-140.25	-148.11
4	-284.38	-397.55	-180.35	-188.21
4	-645.11	-772.42	-220.46	-228.31
4	-1080.73	-1222.18	-265.96	-273.82
5	0.00	0.00	189.11	127.74
5	287.12	186.81	135.62	82.23
5	479.24	298.74	87.59	42.13
5	578.26	338.48	38.12	-0.75
5	588.38	306.03	-9.61	-44.09
5	508.04	201.39	-54.59	-89.94
5	338.30	24.57	-97.27	-139.20
5	79.73	-224.44	-139.72	-186.76
5	-266.11	-545.64	-183.54	-234.13
5	-692.75	-943.00	-223.64	-281.25
5	-1138.02	-1453.84	-269.14	-333.52
6	0.00	0.00	165.06	133.91
6	249.92	197.92	116.36	88.40
6	416.92	320.95	73.08	48.30
6	503.36	371.80	29.24	7.09
6	510.92	350.46	-13.92	-34.31
6	438.99	256.93	-55.97	-76.71
6	288.00	91.21	-97.11	-120.48
6	58.15	-146.69	-138.15	-163.57
6	-249.91	-456.78	-179.74	-206.58
6	-633.61	-840.65	-219.84	-249.49
6	-1069.70	-1314.84	-265.35	-297.70

VANO NUMERO 2

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HIPOTESIS	MOM. MAX	MOM. MIN	CORT. MAX	CORT. MIN
1	-1044.34	-1044.34	262.30	262.30
1	-417.36	-417.36	205.52	205.52
1	68.19	68.19	154.14	154.14
1	415.01	415.01	102.76	102.76
1	623.10	623.10	51.38	51.38
1	692.47	692.47	0.00	0.00
1	623.10	623.10	-51.38	-51.38
1	415.01	415.01	-102.76	-102.76
1	68.19	68.19	-154.14	-154.14
1	-417.36	-417.36	-205.52	-205.52
1	-1044.34	-1044.34	-262.31	-262.31
2	-1222.18	-1222.18	306.18	306.18
2	-488.58	-488.58	240.62	240.62
2	79.89	79.89	180.47	180.47
2	485.94	485.94	120.31	120.31
2	729.58	729.58	60.16	60.16
2	810.79	810.79	0.00	0.00
2	729.57	729.57	-60.16	-60.16
2	485.94	485.94	-120.31	-120.31
2	79.89	79.89	-180.47	-180.47
2	-488.58	-488.58	-240.62	-240.62
2	-1222.18	-1222.18	-306.18	-306.18
3	-1194.60	-1453.84	372.03	301.77
3	-457.10	-592.62	297.17	236.21
3	183.04	12.22	226.28	175.26
3	665.03	426.04	155.99	112.52
3	957.29	675.52	85.53	49.41
3	1055.66	762.58	15.03	-15.03
3	957.29	675.52	-49.41	-85.53
3	665.03	426.04	-112.52	-155.99
3	183.03	12.22	-175.26	-227.27
3	-457.10	-592.62	-236.21	-297.17
3	-1194.60	-1453.84	-301.77	-372.03
4	-1080.73	-1222.18	306.18	306.18
4	-347.13	-488.58	240.62	240.62
4	221.34	79.89	180.47	180.47
4	627.40	485.94	120.31	120.31
4	871.03	729.58	60.16	60.16
4	952.24	810.79	0.00	0.00
4	871.03	729.57	-60.16	-60.16
4	627.40	485.94	-120.31	-120.31
4	221.34	79.89	-180.47	-180.47
4	-347.13	-488.58	-240.62	-240.62
4	-1080.73	-1222.18	-306.18	-306.18
5	-1138.02	-1453.84	372.03	301.77
5	-400.52	-592.62	297.17	236.21
5	239.62	12.22	226.28	175.26
5	721.61	426.04	155.99	112.52
5	1013.87	675.52	85.53	49.41
5	1112.24	762.58	15.03	-15.03
5	1013.87	675.52	-49.41	-85.53
5	721.61	426.04	-112.52	-155.99
5	239.62	12.22	-175.26	-227.27
5	-400.52	-592.62	-236.21	-297.17
5	-1138.02	-1453.84	-301.77	-372.03
6	-1069.70	-1314.84	332.52	304.42
6	-334.54	-530.20	263.24	238.86
6	262.60	52.82	198.79	178.39
6	699.03	461.98	134.58	117.19
6	962.11	707.95	70.30	55.86
6	1050.19	791.50	6.01	-6.01
6	962.11	707.95	-55.86	-70.30
6	699.03	461.98	-117.19	-134.58

Anexo A2: Resultados de ejemplo calculado con LOSAC

6	262.60	52.82	-178.39	-199.19
6	-334.54	-530.20	-238.86	-263.24
6	-1069.70	-1314.84	-304.42	-332.52

VANO NUMERO 3

HIPOTESIS	MOM.MAX	MOM.MIN	CORT.MAX	CORT.MIN
1	-1044.34	-1044.34	234.69	234.69
1	-659.75	-659.75	195.03	195.03
1	-339.52	-339.52	160.78	160.78
1	-80.94	-80.94	126.53	126.53
1	115.98	115.98	92.27	92.27
1	251.24	251.24	58.02	58.02
1	324.85	324.85	23.76	23.76
1	336.80	336.80	-10.49	-10.49
1	287.09	287.09	-44.74	-44.74
1	175.72	175.72	-79.00	-79.00
1	0.00	0.00	-118.65	-118.65
2	-1222.18	-1222.18	273.82	273.82
2	-772.42	-772.42	228.31	228.31
2	-397.55	-397.55	188.21	188.21
2	-94.86	-94.86	148.11	148.11
2	135.64	135.64	108.00	108.00
2	293.95	293.95	67.90	67.90
2	380.07	380.07	27.79	27.79
2	394.01	394.01	-12.31	-12.31
2	335.76	335.76	-52.41	-52.41
2	205.32	205.32	-92.52	-92.52
2	0.00	0.00	-138.02	-138.02
3	-1194.60	-1453.84	333.52	272.29
3	-743.67	-943.00	281.25	226.78
3	-311.37	-545.64	234.13	185.93
3	40.12	-224.44	186.76	142.86
3	304.35	24.57	139.20	100.41
3	479.75	201.39	89.94	57.73
3	565.75	306.03	44.09	12.75
3	561.29	338.48	0.75	-34.98
3	467.92	298.74	-42.13	-84.45
3	281.46	186.81	-82.23	-132.47
3	0.00	0.00	-127.74	-185.97
4	-1080.73	-1222.18	234.69	265.96
4	-645.11	-772.42	195.03	220.46
4	-284.38	-397.55	160.78	180.35
4	4.16	-94.86	126.53	140.25
4	220.51	135.64	92.27	100.14
4	364.68	293.95	58.02	60.04
4	436.66	380.07	23.76	19.94
4	436.45	394.01	-10.49	-20.17
4	364.05	335.76	-44.74	-60.27
4	219.47	205.32	-79.00	-100.38
4	0.00	0.00	-118.65	-145.88
5	-1138.02	-1453.84	333.52	269.14
5	-692.75	-943.00	281.25	223.64
5	-266.11	-545.64	234.13	182.79
5	79.73	-224.44	186.76	139.72
5	338.30	24.57	139.20	97.27
5	508.04	201.39	89.94	54.59
5	588.38	306.03	44.09	9.61
5	578.26	338.48	0.75	-38.12
5	479.24	298.74	-42.13	-87.59
5	287.12	186.81	-82.23	-135.62
5	0.00	0.00	-127.74	-189.11
6	-1069.70	-1314.84	297.70	265.35
6	-633.61	-840.65	249.49	219.84
6	-249.91	-456.78	206.58	179.44
6	58.15	-146.69	163.57	138.15
6	288.00	91.21	120.48	97.11
6	438.99	256.93	76.71	55.97
6	510.92	350.46	34.31	13.92
6	503.36	371.80	-7.09	-29.24
6	416.92	320.95	-48.30	-73.08
6	249.92	197.92	-88.40	-116.36
6	0.00	0.00	-133.91	-165.06

ESFUERZOS HIPERESTATICOS DE PRETENSADO INICIALES

VANO	1	2	3	4	5	6	7	8	9	10	11
MOM. HIP	0.00	25.56	51.12	76.68	102.24	127.80	153.36	178.92	204.48	230.04	255.60
CORT. HIP	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20
VANO	2	3	4	5	6	7	8	9	10	11	
MOM. HIP	255.60	255.60	255.60	255.60	255.60	255.60	255.60	255.60	255.60	255.60	255.60
CORT. HIP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VANO	3	4	5	6	7	8	9	10	11		
MOM. HIP	255.60	230.04	204.48	178.92	153.36	127.80	102.24	76.68	51.12	25.56	0.00
CORT. HIP	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20

## Anexo A2: Resultados de ejemplo calculado con LOSAC

### ESFUERZOS HIPERESTATICOS DE PRETENSADO DIFERIDOS

```

=====
VANO 1      1      2      3      4      5      6      7      8      9      10     11
=====
MOM. HIP    0.00  25.18  50.36  75.54  100.72 125.90 151.08 176.26 201.44 226.62 251.80
CORT.HIP    14.20  14.20  14.20  14.20  14.20  14.20  14.20  14.20  14.20  14.20  14.20

VANO 2      1      2      3      4      5      6      7      8      9      10     11
=====
MOM. HIP    251.80 251.80 251.80 251.80 251.80 251.80 251.80 251.80 251.80 251.80 251.80
CORT.HIP     0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00

VANO 3      1      2      3      4      5      6      7      8      9      10     11
=====
MOM. HIP    251.80 226.62 201.44 176.26 151.08 125.90 100.72  75.54  50.36  25.18  0.00
CORT.HIP   -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20
    
```

### FUERZA DE PRETENSADO EN ANCLAJES NECESARIA EN CADA HIPOTESIS DE COMBINACION DE ACCIONES

HIPOTESIS	VANO	SECCION	PMINIMO
1	3	1	1319.14
2	3	1	1726.83
3	3	1	2279.64
4	3	1	1726.83
5	3	1	1946.64
6	3	1	2279.64

1

GRUPO DE TENDONES NUMERO 1  
 FUERZA EN ANCLAJES ADOPTADA 2279.636  
 SE REQUIEREN 8 TENDONES DE 2100. mm2  
 TENSION INICIAL 135.69 Kp/mm2  
 ALARGAMIENTO DURANTE EL TESADO 751. mm.

VANO	SECCION	DIST.ORIGEN	F.PRET.INICIAL	F.PRET.FINAL	F.NEUTRAL.
1	1	0.00	2279.64	1954.59	2305.76
1	6	1.80	2258.43	1915.10	2302.34
1	11	3.60	2237.42	1882.70	2299.64
1	16	5.40	2216.61	1852.39	2293.81
1	21	7.20	2195.99	1828.53	2278.35
1	26	9.00	2173.26	1812.01	2247.92
1	31	10.80	2150.76	1804.24	2207.35
1	36	12.60	2128.50	1799.35	2165.93
1	41	14.40	2106.46	1788.02	2138.49
1	46	16.20	2070.52	1757.98	2116.67
1	51	18.00	2035.19	1757.60	2083.53
2	1	0.00	2035.19	1757.60	2083.53
2	6	2.70	1980.62	1671.95	2016.14
2	11	5.40	1959.26	1658.60	1990.37
2	16	8.10	1938.13	1650.21	1985.65
2	21	10.80	1917.22	1641.05	1981.94
2	26	13.50	1896.54	1626.86	1967.67
2	31	16.20	1917.22	1641.05	1981.94
2	36	18.90	1938.13	1650.21	1985.65
2	41	21.60	1959.26	1658.60	1990.37
2	46	24.30	1980.62	1671.95	2016.14
2	51	27.00	2035.19	1757.60	2083.53
3	1	0.00	2035.19	1757.60	2083.53
3	6	1.80	2070.52	1757.98	2116.67
3	11	3.60	2106.46	1788.02	2138.49
3	16	5.40	2128.50	1799.35	2165.93
3	21	7.20	2150.76	1804.24	2207.35
3	26	9.00	2173.26	1812.01	2247.92
3	31	10.80	2195.99	1828.53	2278.35
3	36	12.60	2216.61	1852.39	2293.82
3	41	14.40	2237.42	1882.70	2299.64
3	46	16.20	2258.43	1915.10	2302.34
3	51	18.00	2279.64	1954.59	2305.76

### ESFUERZOS EN SERVICIO INCLUYENDO HIPERESTATICOS DE PRETENSADO EN LAS HIPOTESIS DE COMBINACION DEFINIDAS

```

=====
HIPOTESIS 1 = PESO PROPIO
HIPOTESIS 2 = 1 + CARGAS MUERTAS
HIPOTESIS 3 = 2 + SOBRECARGA + CARRO
HIPOTESIS 4 = 2 + TEMPERATURA
HIPOTESIS 5 = 3 + TEMPERATURA (determinante)
HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)
    
```

Anexo A2: Resultados de ejemplo calculado con LOSAC

VANO 1	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	0.00	201.28	338.21	413.48	427.09	379.04	269.34	97.98	-135.04	-429.71	-788.74
H 1 M.MN.	0.00	201.28	338.21	413.48	427.09	379.04	269.34	97.98	-135.04	-429.71	-788.74
H 1 Q.MX.	132.85	93.20	58.94	24.69	-9.56	-43.82	-78.07	-112.33	-146.58	-180.84	-220.49
H 1 Q.MN.	132.85	93.20	58.94	24.69	-9.56	-43.82	-78.07	-112.33	-146.58	-180.84	-220.49
H 2 M.MX.	0.00	230.88	386.88	470.69	482.31	421.75	289.00	84.06	-193.07	-542.38	-966.58
H 2 M.MN.	0.00	230.88	386.88	470.69	482.31	421.75	289.00	84.06	-193.07	-542.38	-966.58
H 2 Q.MX.	152.22	106.72	66.61	26.51	-13.59	-53.70	-93.80	-133.91	-174.01	-214.11	-259.62
H 2 Q.MN.	152.22	106.72	66.61	26.51	-13.59	-53.70	-93.80	-133.91	-174.01	-214.11	-259.62
H 3 M.MX.	0.00	307.02	519.04	637.97	667.99	607.54	457.71	219.04	-106.89	-513.64	-939.00
H 3 M.MN.	0.00	230.88	386.88	470.69	482.31	421.75	289.00	84.06	-193.07	-542.38	-966.58
H 3 Q.MX.	200.17	146.67	98.65	49.18	1.45	-43.53	-86.21	-128.66	-172.48	-212.58	-258.09
H 3 Q.MN.	141.94	96.43	56.33	13.45	-29.89	-75.74	-125.00	-172.56	-219.93	-267.05	-319.32
H 4 M.MX.	0.00	245.03	415.17	513.13	538.90	492.48	373.87	183.08	-79.91	-415.07	-825.13
H 4 M.MN.	0.00	230.88	386.88	470.69	482.31	421.75	289.00	84.06	-193.07	-542.38	-966.58
H 4 Q.MX.	160.08	114.58	74.47	34.37	-5.74	-45.84	-85.94	-126.05	-166.15	-206.26	-251.76
H 4 Q.MN.	152.22	106.72	66.61	26.51	-13.59	-53.70	-93.80	-133.91	-174.01	-214.11	-259.62
H 5 M.MX.	0.00	312.68	530.36	654.94	690.62	635.84	491.66	258.65	-61.63	-462.71	-882.42
H 5 M.MN.	0.00	212.37	349.86	415.16	408.27	329.19	177.93	-45.52	-341.16	-712.97	-1198.24
H 5 Q.MX.	203.31	149.82	101.79	52.32	4.59	-40.39	-83.07	-125.52	-169.34	-209.44	-254.94
H 5 Q.MN.	141.94	96.43	56.33	13.45	-29.89	-75.74	-125.00	-172.56	-219.93	-267.05	-319.32
H 6 M.MX.	0.00	275.48	468.04	580.04	613.16	566.79	441.35	237.07	-45.43	-403.58	-814.10
H 6 M.MN.	0.00	223.48	372.07	448.48	452.70	384.73	244.57	32.23	-252.30	-610.61	-1059.24
H 6 Q.MX.	179.26	130.56	87.28	43.44	0.28	-41.77	-82.91	-123.95	-165.54	-205.64	-251.15
H 6 Q.MN.	148.11	102.60	62.50	21.29	-20.11	-62.51	-106.28	-149.37	-192.38	-235.29	-283.50
VANO 2	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	-788.74	-161.76	323.79	670.61	878.70	948.07	878.70	670.61	323.79	-161.76	-788.74
H 1 M.MN.	-788.74	-161.76	323.79	670.61	878.70	948.07	878.70	670.61	323.79	-161.76	-788.74
H 1 Q.MX.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
H 1 Q.MN.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
H 2 M.MX.	-966.58	-232.98	335.49	741.54	985.17	1066.38	985.17	741.54	335.49	-232.99	-966.58
H 2 M.MN.	-966.58	-232.98	335.49	741.54	985.17	1066.38	985.17	741.54	335.49	-232.99	-966.58
H 2 Q.MX.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 2 Q.MN.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 3 M.MX.	-939.00	-201.50	438.63	920.63	1212.89	1311.26	1212.89	920.63	438.63	-201.50	-939.00
H 3 M.MN.	-1198.24	-337.02	267.82	681.64	931.12	1018.18	931.12	681.64	267.82	-337.02	-1198.24
H 3 Q.MX.	372.03	297.17	226.28	155.99	85.53	15.03	-49.41	-112.52	-175.26	-236.21	-301.77
H 3 Q.MN.	301.77	236.21	175.26	112.52	49.41	-15.03	-85.53	-155.99	-227.27	-297.17	-372.03
H 4 M.MX.	-825.13	-91.53	476.94	882.99	1126.63	1207.84	1126.63	882.99	476.94	-91.53	-825.13
H 4 M.MN.	-966.58	-232.98	335.49	741.54	985.17	1066.38	985.17	741.54	335.49	-232.99	-966.58
H 4 Q.MX.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 4 Q.MN.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 5 M.MX.	-882.42	-144.92	495.21	977.21	1269.47	1367.84	1269.47	977.21	495.21	-144.92	-882.42
H 5 M.MN.	-1198.24	-337.02	267.82	681.64	931.12	1018.18	931.12	681.64	267.82	-337.02	-1198.24
H 5 Q.MX.	372.03	297.17	226.28	155.99	85.53	15.03	-49.41	-112.52	-175.26	-236.21	-301.77
H 5 Q.MN.	301.77	236.21	175.26	112.52	49.41	-15.03	-85.53	-155.99	-227.27	-297.17	-372.03
H 6 M.MX.	-814.10	-78.94	518.20	954.63	1217.71	1305.79	1217.71	954.63	518.20	-78.94	-814.10
H 6 M.MN.	-1059.24	-274.60	308.42	717.58	963.55	1047.10	963.55	717.58	308.42	-274.60	-1059.24
H 6 Q.MX.	332.52	263.24	198.79	134.58	70.30	6.01	-55.86	-117.19	-178.39	-238.86	-304.42
H 6 Q.MN.	304.42	238.86	178.39	117.19	55.86	-6.01	-70.30	-134.58	-199.19	-263.24	-332.52
VANO 3	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	-788.74	-429.71	-135.04	97.98	269.34	379.04	427.09	413.48	338.21	201.28	0.00
H 1 M.MN.	-788.74	-429.71	-135.04	97.98	269.34	379.04	427.09	413.48	338.21	201.28	0.00
H 1 Q.MX.	220.49	180.84	146.58	112.33	78.07	43.82	9.57	-24.69	-58.94	-93.20	-132.85
H 1 Q.MN.	220.49	180.84	146.58	112.33	78.07	43.82	9.57	-24.69	-58.94	-93.20	-132.85
H 2 M.MX.	-966.58	-542.38	-193.07	84.06	289.00	421.75	482.31	470.69	386.88	230.88	0.00
H 2 M.MN.	-966.58	-542.38	-193.07	84.06	289.00	421.75	482.31	470.69	386.88	230.88	0.00
H 2 Q.MX.	259.62	214.11	174.01	133.91	93.80	53.70	13.59	-26.51	-66.61	-106.72	-152.22
H 2 Q.MN.	259.62	214.11	174.01	133.91	93.80	53.70	13.59	-26.51	-66.61	-106.72	-152.22
H 3 M.MX.	-939.00	-513.64	-106.89	219.04	457.71	607.54	667.99	637.97	519.04	307.02	0.00
H 3 M.MN.	-1198.24	-712.97	-341.16	-45.52	177.93	329.19	408.27	415.16	349.86	212.37	0.00
H 3 Q.MX.	319.32	267.05	219.93	172.56	125.00	75.74	29.89	-13.45	-56.33	-96.43	-141.94
H 3 Q.MN.	258.09	212.58	171.73	128.66	86.21	43.53	-1.45	-49.18	-98.65	-146.67	-200.17
H 4 M.MX.	-825.13	-415.07	-79.91	183.08	373.87	492.48	538.89	513.13	415.17	245.03	0.00
H 4 M.MN.	-966.58	-542.38	-193.07	84.06	289.00	421.75	482.31	470.69	386.88	230.88	0.00
H 4 Q.MX.	220.49	180.84	146.58	112.33	78.07	43.82	9.57	-24.69	-58.94	-93.20	-132.85
H 4 Q.MN.	251.76	206.26	166.15	126.05	85.94	45.84	5.74	-34.37	-74.47	-114.58	-160.08
H 5 M.MX.	-882.42	-462.71	-61.63	258.65	491.66	635.83	690.62	654.94	530.36	312.68	0.00
H 5 M.MN.	-1198.24	-712.97	-341.16	-45.52	177.93	329.19	408.27	415.16	349.86	212.37	0.00
H 5 Q.MX.	319.32	267.05	219.93	172.56	125.00	75.74	29.89	-13.45	-56.33	-96.43	-141.94
H 5 Q.MN.	254.94	209.44	168.59	125.52	83.07	40.39	-4.59	-52.32	-101.79	-149.82	-203.31
H 6 M.MX.	-814.10	-403.58	-45.44	237.07	441.35	566.79	613.16	580.04	468.04	275.48	0.00
H 6 M.MN.	-1059.24	-610.61	-252.30	32.23	244.57	384.73	452.70	448.48	372.07	223.48	0.00
H 6 Q.MX.	283.50	235.29	192.38	149.37	106.28	62.51	20.11	-21.29	-62.50	-102.60	-148.11
H 6 Q.MN.	251.15	205.64	165.24	123.95	82.91	41.77	-0.28	-43.44	-87.28	-130.56	-179.26

## Anexo A2: Resultados de ejemplo calculado con LOSAC

### REACCIONES EN LOS APOYOS

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HIPOTESIS	APOYO	REACCION CARGAS	RHIP. PRETENSADO	REACCION TOTAL
1	1	118.651062	13.988902	132.639969
1	2	496.993927	-13.988922	483.005005
1	3	496.993958	-13.988853	483.005096
1	4	118.651077	13.988873	132.639954
2	1	138.021149	13.988902	152.010056
2	2	579.998840	-13.988922	566.009888
2	3	579.998901	-13.988853	566.010071
2	4	138.021164	13.988873	152.010040
3	1	185.967468	13.988902	199.956375
3	2	679.450562	-13.988922	665.461670
3	3	679.450623	-13.988853	665.461792
3	4	185.967484	13.988873	199.956360
4	1	145.879593	13.988902	159.868500
4	2	579.998840	-13.988922	566.009888
4	3	579.998901	-13.988853	566.010071
4	4	145.879608	13.988873	159.868484
5	1	165.058121	13.988902	179.047028
5	2	619.779541	-13.988922	605.790649
5	3	619.779602	-13.988853	605.790771
5	4	165.058136	13.988873	179.047012
6	1	189.110855	13.988902	203.099762
6	2	679.450562	-13.988922	665.461670
6	3	679.450623	-13.988853	665.461792
6	4	189.110870	13.988873	203.099747

### TENSIONES A CORTO Y LARGO PLAZO

HIPOTESIS DE CARGA NUMERO 1  
\*\*\*\*\*

### TENSIONES DEBIDAS A MOMENTOS MAXIMOS

\*\*\*\*\*

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-178.39	-102.35	-54.95	-34.51	-44.91	-89.30	-165.56	-271.64	-302.58	-119.56
SIG INF.INS.	-233.28	-445.44	-534.82	-588.24	-607.83	-588.01	-525.53	-423.04	-283.13	-233.57	-314.09
SIG SUP.DIF.	-200.02	-167.72	-114.89	-82.28	-66.80	-70.70	-97.29	-146.76	-217.81	-219.74	-43.73
SIG INF.DIF.	-200.02	-357.04	-413.86	-445.88	-458.26	-448.46	-412.73	-349.07	-256.37	-245.04	-342.27
VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-119.56	-337.08	-335.51	-337.95	-341.94	-345.03	-341.94	-337.95	-335.51	-337.08	-119.56
SIG INF.INS.	-314.09	-163.53	-159.17	-149.83	-138.62	-128.60	-138.62	-149.83	-159.17	-163.53	-314.09
SIG SUP.DIF.	-43.73	-268.76	-309.00	-339.90	-359.50	-367.27	-359.50	-339.90	-308.99	-268.76	-43.73
SIG INF.DIF.	-342.27	-157.89	-103.35	-62.01	-34.64	-20.66	-34.64	-62.01	-103.35	-157.89	-342.27
VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-119.56	-302.58	-271.64	-165.56	-89.30	-44.91	-34.51	-54.95	-102.35	-178.39	-233.28
SIG INF.INS.	-314.09	-233.57	-283.13	-423.04	-525.53	-588.01	-607.83	-588.24	-534.82	-445.44	-233.28
SIG SUP.DIF.	-43.73	-219.74	-217.81	-146.76	-97.29	-70.70	-66.80	-82.28	-114.89	-167.72	-200.02
SIG INF.DIF.	-342.27	-245.04	-256.37	-349.07	-412.73	-448.46	-458.26	-445.88	-413.86	-357.04	-200.02

### TENSIONES DEBIDAS A MOMENTOS MINIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-178.39	-102.35	-54.95	-34.51	-44.91	-89.30	-165.56	-271.64	-302.58	-119.56
SIG INF.INS.	-233.28	-445.44	-534.82	-588.24	-607.83	-588.01	-525.53	-423.04	-283.13	-233.57	-314.09
SIG SUP.DIF.	-200.02	-167.72	-114.89	-82.28	-66.80	-70.70	-97.29	-146.76	-217.81	-219.74	-43.73
SIG INF.DIF.	-200.02	-357.04	-413.86	-445.88	-458.26	-448.46	-412.73	-349.07	-256.37	-245.04	-342.27
VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-119.56	-337.08	-335.51	-337.95	-341.94	-345.03	-341.94	-337.95	-335.51	-337.08	-119.56
SIG INF.INS.	-314.09	-163.53	-159.17	-149.83	-138.62	-128.60	-138.62	-149.83	-159.17	-163.53	-314.09
SIG SUP.DIF.	-43.73	-268.76	-309.00	-339.90	-359.50	-367.27	-359.50	-339.90	-308.99	-268.76	-43.73
SIG INF.DIF.	-342.27	-157.89	-103.35	-62.01	-34.64	-20.66	-34.64	-62.01	-103.35	-157.89	-342.27
VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-119.56	-302.58	-271.64	-165.56	-89.30	-44.91	-34.51	-54.95	-102.35	-178.39	-233.28
SIG INF.INS.	-314.09	-233.57	-283.13	-423.04	-525.53	-588.01	-607.83	-588.24	-534.82	-445.44	-233.28
SIG SUP.DIF.	-43.73	-219.74	-217.81	-146.76	-97.29	-70.70	-66.80	-82.28	-114.89	-167.72	-200.02
SIG INF.DIF.	-342.27	-245.04	-256.37	-349.07	-412.73	-448.46	-458.26	-445.88	-413.86	-357.04	-200.02

### TENSIONES A CORTO Y LARGO PLAZO

HIPOTESIS DE CARGA NUMERO 2  
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### TENSIONES DEBIDAS A MOMENTOS MAXIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
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## Anexo A2: Resultados de ejemplo calculado con LOSAC

SIG SUP.INS.	-233.28	-194.50	-128.84	-86.09	-64.57	-68.15	-99.99	-157.98	-240.06	-241.26	-24.51
SIG INF.INS.	-233.28	-425.18	-501.52	-549.09	-570.04	-558.79	-512.08	-432.56	-322.84	-310.67	-427.48
SIG SUP.DIF.	-200.02	-183.83	-141.38	-113.41	-96.86	-93.94	-107.98	-139.18	-186.23	-158.42	51.32
SIG INF.DIF.	-200.02	-336.79	-380.56	-406.73	-420.47	-419.23	-399.28	-358.60	-296.08	-322.13	-455.66

VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-24.51	-298.32	-341.87	-376.56	-399.88	-409.42	-399.88	-376.55	-341.87	-298.32	-24.51
SIG INF.INS.	-427.48	-212.26	-151.17	-101.29	-65.77	-47.64	-65.77	-101.29	-151.17	-212.26	-427.48
SIG SUP.DIF.	51.32	-230.00	-315.36	-378.50	-417.44	-431.66	-417.44	-378.50	-315.36	-230.00	51.32
SIG INF.DIF.	-455.66	-206.63	-95.34	-13.47	38.21	60.30	38.21	-13.47	-95.34	-206.63	-455.66

VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-24.51	-241.26	-240.06	-157.98	-99.99	-68.15	-64.57	-86.09	-128.84	-194.50	-233.28
SIG INF.INS.	-427.48	-310.67	-322.84	-432.57	-512.08	-558.79	-570.04	-549.09	-501.52	-425.18	-233.28
SIG SUP.DIF.	51.32	-158.42	-186.23	-139.18	-107.98	-93.94	-96.86	-113.41	-141.38	-183.83	-200.02
SIG INF.DIF.	-455.66	-322.14	-296.08	-358.60	-399.28	-419.23	-420.47	-406.73	-380.56	-336.79	-200.02

TENSIONES DEBIDAS A MOMENTOS MINIMOS

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VANO 1	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-194.50	-128.84	-86.09	-64.57	-68.15	-99.99	-157.98	-240.06	-241.26	-24.51
SIG INF.INS.	-233.28	-425.18	-501.52	-549.09	-570.04	-558.79	-512.08	-432.56	-322.84	-310.67	-427.48
SIG SUP.DIF.	-200.02	-183.83	-141.38	-113.41	-96.86	-93.94	-107.98	-139.18	-186.23	-158.42	51.32
SIG INF.DIF.	-200.02	-336.79	-380.56	-406.73	-420.47	-419.23	-399.28	-358.60	-296.08	-322.13	-455.66

VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-24.51	-298.32	-341.87	-376.56	-399.88	-409.42	-399.88	-376.55	-341.87	-298.32	-24.51
SIG INF.INS.	-427.48	-212.26	-151.17	-101.29	-65.77	-47.64	-65.77	-101.29	-151.17	-212.26	-427.48
SIG SUP.DIF.	51.32	-230.00	-315.36	-378.50	-417.44	-431.66	-417.44	-378.50	-315.36	-230.00	51.32
SIG INF.DIF.	-455.66	-206.63	-95.34	-13.47	38.21	60.30	38.21	-13.47	-95.34	-206.63	-455.66

VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-24.51	-241.26	-240.06	-157.98	-99.99	-68.15	-64.57	-86.09	-128.84	-194.50	-233.28
SIG INF.INS.	-427.48	-310.67	-322.84	-432.57	-512.08	-558.79	-570.04	-549.09	-501.52	-425.18	-233.28
SIG SUP.DIF.	51.32	-158.42	-186.23	-139.18	-107.98	-93.94	-96.86	-113.41	-141.38	-183.83	-200.02
SIG INF.DIF.	-455.66	-322.14	-296.08	-358.60	-399.28	-419.23	-420.47	-406.73	-380.56	-336.79	-200.02

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TENSIONES A CORTO Y LARGO PLAZO  
HIPOTESIS DE CARGA NUMERO 3

TENSIONES DEBIDAS A MOMENTOS MAXIMOS

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VANO 1	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-235.94	-200.76	-177.13	-165.62	-169.27	-191.81	-231.45	-286.96	-256.90	-39.25
SIG INF.INS.	-233.28	-373.08	-411.08	-434.63	-442.99	-431.65	-396.63	-340.20	-263.87	-291.00	-409.90
SIG SUP.DIF.	-200.02	-225.26	-213.30	-204.45	-197.91	-195.06	-199.80	-212.64	-233.13	-174.07	36.58
SIG INF.DIF.	-200.02	-284.69	-290.12	-292.26	-293.42	-292.10	-283.83	-266.23	-237.12	-302.47	-438.07

VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-39.25	-315.46	-398.01	-474.02	-523.81	-542.69	-523.81	-474.02	-398.01	-315.46	-39.25
SIG INF.INS.	-409.90	-190.72	-80.59	21.25	90.05	119.92	90.05	21.25	-80.59	-190.72	-409.90
SIG SUP.DIF.	36.58	-247.14	-371.50	-475.97	-541.37	-564.93	-541.37	-475.97	-371.50	-247.14	36.58
SIG INF.DIF.	-438.07	-185.08	-24.76	109.08	194.03	227.86	194.03	109.08	-24.76	-185.08	-438.07

VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-39.25	-256.90	-286.96	-231.45	-191.81	-169.27	-165.61	-177.13	-200.76	-235.94	-233.28
SIG INF.INS.	-409.90	-291.00	-263.87	-340.20	-396.64	-431.65	-442.99	-434.63	-411.08	-373.08	-233.28
SIG SUP.DIF.	36.58	-174.07	-233.13	-212.64	-199.80	-195.06	-197.91	-204.45	-213.30	-225.26	-200.02
SIG INF.DIF.	-438.07	-302.47	-237.12	-266.23	-283.83	-292.10	-293.42	-292.26	-290.12	-284.69	-200.02

TENSIONES DEBIDAS A MOMENTOS MINIMOS

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VANO 1	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-184.43	-108.69	-55.87	-24.27	-17.78	-39.55	-87.46	-159.46	-148.42	99.30
SIG INF.INS.	-233.28	-437.85	-526.85	-587.09	-620.71	-622.12	-588.08	-521.23	-424.17	-427.39	-575.19
SIG SUP.DIF.	-200.02	-173.76	-121.23	-83.19	-56.56	-43.57	-47.54	-68.66	-105.63	-65.59	175.13
SIG INF.DIF.	-200.02	-349.45	-405.89	-444.73	-471.14	-482.57	-475.28	-447.27	-397.42	-438.86	-603.36

VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	99.30	-241.70	-305.05	-343.95	-370.46	-383.19	-370.46	-343.95	-305.05	-241.70	99.30
SIG INF.INS.	-575.19	-283.45	-197.47	-142.28	-102.76	-80.63	-102.76	-142.28	-197.47	-283.45	-575.19
SIG SUP.DIF.	175.13	-173.38	-278.54	-345.90	-388.02	-405.42	-388.02	-345.90	-278.54	-173.38	175.13
SIG INF.DIF.	-603.36	-277.82	-141.64	-54.46	1.22	27.31	1.22	-54.46	-141.64	-277.82	-603.36

VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	99.30	-148.42	-159.46	-87.46	-39.55	-17.78	-24.27	-55.87	-108.69	-184.43	-233.28
SIG INF.INS.	-575.19	-427.40	-424.17	-521.23	-588.08	-622.12	-620.71	-587.09	-526.85	-437.85	-233.28
SIG SUP.DIF.	175.13	-65.59	-105.63	-68.66	-47.54	-43.57	-56.56	-83.19	-121.23	-173.75	-200.02
SIG INF.DIF.	-603.36	-438.86	-397.42	-447.27	-475.28	-482.57	-471.14	-444.73	-405.89	-349.45	-200.02

## Anexo A2: Resultados de ejemplo calculado con LOSAC

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TENSIONES A CORTO Y LARGO PLAZO
   
HIPOTESIS DE CARGA NUMERO 4
   
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TENSIONES DEBIDAS A MOMENTOS MAXIMOS
   
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-202.20	-144.23	-109.18	-95.36	-106.64	-146.18	-211.87	-301.64	-310.54	-100.11
SIG INF.INS.	-233.28	-415.50	-482.16	-520.05	-531.32	-510.39	-454.01	-364.81	-245.40	-223.55	-337.29
SIG SUP.DIF.	-200.02	-191.53	-156.77	-136.51	-127.65	-132.43	-154.17	-193.07	-247.82	-227.71	-24.28
SIG INF.DIF.	-200.02	-327.11	-361.20	-377.69	-381.75	-370.84	-341.20	-290.85	-218.65	-235.02	-365.47
VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-100.11	-375.30	-418.86	-453.54	-476.86	-486.40	-476.86	-453.54	-418.86	-375.30	-100.11
SIG INF.INS.	-337.29	-115.47	-54.37	-4.50	31.02	49.15	31.02	-4.50	-54.37	-115.47	-337.29
SIG SUP.DIF.	-24.28	-306.98	-392.35	-455.48	-494.42	-508.64	-494.42	-455.48	-392.35	-306.98	-24.28
SIG INF.DIF.	-365.47	-109.84	1.45	83.32	135.00	157.09	135.00	83.32	1.45	-109.84	-365.47
VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-100.11	-310.54	-301.64	-211.87	-146.18	-106.64	-95.36	-109.18	-144.23	-202.20	-233.28
SIG INF.INS.	-337.29	-223.55	-245.40	-364.81	-454.01	-510.39	-531.32	-520.05	-482.16	-415.50	-233.28
SIG SUP.DIF.	-24.28	-227.71	-247.82	-193.07	-154.17	-132.43	-127.65	-136.51	-156.77	-191.53	-200.02
SIG INF.DIF.	-365.47	-235.02	-218.65	-290.85	-341.20	-370.84	-381.75	-377.69	-361.20	-327.11	-200.02

TENSIONES DEBIDAS A MOMENTOS MINIMOS
   
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-194.50	-128.84	-86.09	-64.57	-68.15	-99.99	-157.98	-240.06	-241.26	-24.51
SIG INF.INS.	-233.28	-425.18	-501.52	-549.09	-570.04	-558.79	-512.08	-432.56	-322.84	-310.67	-427.48
SIG SUP.DIF.	-200.02	-183.83	-141.38	-113.41	-96.86	-93.94	-107.98	-139.18	-186.23	-158.42	51.32
SIG INF.DIF.	-200.02	-336.79	-380.56	-406.73	-420.47	-419.23	-399.28	-358.60	-296.08	-322.13	-455.66
VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-24.51	-298.32	-341.87	-376.56	-399.88	-409.42	-399.88	-376.56	-341.87	-298.32	-24.51
SIG INF.INS.	-427.48	-212.26	-151.17	-101.29	-65.77	-47.64	-65.77	-101.29	-151.17	-212.26	-427.48
SIG SUP.DIF.	51.32	-230.00	-315.36	-378.50	-417.44	-431.66	-417.44	-378.50	-315.36	-230.00	51.32
SIG INF.DIF.	-455.66	-206.63	-95.34	-13.47	38.21	60.30	38.21	-13.47	-95.34	-206.63	-455.66
VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-24.51	-241.26	-240.06	-157.98	-99.99	-68.15	-64.57	-86.09	-128.84	-194.50	-233.28
SIG INF.INS.	-427.48	-310.67	-322.84	-432.57	-512.08	-558.79	-570.04	-549.09	-501.52	-425.18	-233.28
SIG SUP.DIF.	51.32	-158.42	-186.23	-139.18	-107.98	-93.94	-96.86	-113.41	-141.38	-183.83	-200.02
SIG INF.DIF.	-455.66	-322.14	-296.08	-358.60	-399.28	-419.23	-420.47	-406.73	-380.56	-336.79	-200.02

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TENSIONES A CORTO Y LARGO PLAZO
   
HIPOTESIS DE CARGA NUMERO 5
   
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TENSIONES DEBIDAS A MOMENTOS MAXIMOS
   
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-239.02	-206.92	-186.36	-177.93	-184.66	-210.29	-253.00	-311.59	-284.62	-69.49
SIG INF.INS.	-233.28	-369.21	-403.34	-423.01	-427.50	-412.30	-373.40	-313.10	-232.89	-256.15	-373.82
SIG SUP.DIF.	-200.02	-228.34	-219.46	-213.69	-210.22	-210.45	-218.28	-234.20	-257.76	-201.78	6.34
SIG INF.DIF.	-200.02	-280.82	-282.38	-280.65	-277.93	-272.74	-260.60	-239.13	-206.14	-267.62	-402.00
VANO 2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-69.49	-346.25	-428.80	-504.81	-554.60	-573.48	-554.60	-504.81	-428.80	-346.25	-69.49
SIG INF.INS.	-373.82	-152.00	-41.87	59.97	128.77	158.64	128.77	59.97	-41.87	-152.00	-373.82
SIG SUP.DIF.	6.34	-277.93	-402.29	-506.76	-572.16	-595.72	-572.16	-506.76	-402.29	-277.93	6.34
SIG INF.DIF.	-402.00	-146.37	13.96	147.80	232.75	266.58	232.75	147.80	13.96	-146.37	-402.00
VANO 3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-69.49	-284.62	-311.59	-253.00	-210.29	-184.66	-177.93	-186.36	-206.92	-239.02	-233.28
SIG INF.INS.	-373.82	-256.15	-232.90	-313.10	-373.41	-412.30	-427.50	-423.01	-403.34	-369.21	-233.28
SIG SUP.DIF.	6.34	-201.78	-257.76	-234.20	-218.28	-210.45	-210.22	-213.69	-219.46	-228.34	-200.02
SIG INF.DIF.	-402.00	-267.62	-206.14	-239.13	-260.60	-272.74	-277.93	-280.65	-282.38	-280.82	-200.02

TENSIONES DEBIDAS A MOMENTOS MINIMOS
   
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-233.28	-184.43	-108.69	-55.87	-24.27	-17.78	-39.55	-87.46	-159.46	-148.42	99.30
SIG INF.INS.	-233.28	-437.85	-526.85	-587.09	-620.71	-622.12	-588.08	-521.23	-424.17	-427.39	-575.19
SIG SUP.DIF.	-200.02	-173.76	-121.23	-83.19	-56.56	-43.57	-47.54	-68.66	-105.63	-65.59	175.13
SIG INF.DIF.	-200.02	-349.45	-405.89	-444.73	-471.14	-482.57	-475.28	-447.27	-397.42	-438.86	-603.36
VANO 2	1	2	3	4	5	6	7	8	9	10	11

## Anexo A2: Resultados de ejemplo calculado con LOSAC

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SIG SUP.INS.   99.30 -241.70 -305.05 -343.95 -370.46 -383.19 -370.46 -343.95 -305.05 -241.70  99.30
SIG INF.INS.  -575.19 -283.45 -197.47 -142.28 -102.76 -80.63 -102.76 -142.28 -197.47 -283.45 -575.19
SIG SUP.DIF.   175.13 -173.38 -278.54 -345.90 -388.02 -405.42 -388.02 -345.90 -278.54 -173.38 175.13
SIG INF.DIF.  -603.36 -277.82 -141.64 -54.46  1.22  27.31  1.22 -54.46 -141.64 -277.82 -603.36
    
```

```

-----
VANO 3        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.   99.30 -148.42 -159.46 -87.46 -39.55 -17.78 -24.27 -55.87 -108.69 -184.43 -233.28
SIG INF.INS.  -575.19 -427.40 -424.17 -521.23 -588.08 -622.12 -620.71 -587.09 -526.85 -437.85 -233.28
SIG SUP.DIF.   175.13 -65.59 -105.63 -68.66 -47.54 -43.57 -56.56 -83.19 -121.23 -173.75 -200.02
SIG INF.DIF.  -603.36 -438.86 -397.42 -447.27 -475.28 -482.57 -471.14 -444.73 -405.89 -349.45 -200.02
    
```

```

=====
TENSIONES A CORTO Y LARGO PLAZO
HIPOTESIS DE CARGA NUMERO 6
=====
    
```

```

TENSIONES DEBIDAS A MOMENTOS MAXIMOS
*****
    
```

```

-----
VANO 1        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.  -233.28 -218.77 -173.00 -145.60 -135.78 -147.09 -182.91 -241.26 -320.40 -316.80 -106.01
SIG INF.INS.  -233.28 -394.66 -445.98 -474.27 -480.50 -459.54 -407.83 -327.86 -221.82 -215.69 -330.26
SIG SUP.DIF.  -200.02 -208.10 -185.54 -172.92 -168.07 -172.88 -190.90 -222.45 -266.58 -233.97 -30.18
SIG INF.DIF.  -200.02 -306.27 -325.02 -331.90 -330.93 -319.98 -295.02 -253.90 -195.06 -227.15 -358.43
    
```

```

-----
VANO 2        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.  -106.01 -382.16 -441.31 -492.52 -526.43 -539.71 -526.43 -492.52 -441.31 -382.16 -106.01
SIG INF.INS.  -330.26 -106.85 -26.14  44.52  93.35 116.18  93.35  44.52 -26.14 -106.85 -330.26
SIG SUP.DIF.  -30.18 -313.84 -414.80 -494.47 -544.00 -561.95 -544.00 -494.47 -414.80 -313.84 -30.18
SIG INF.DIF.  -358.43 -101.22  29.68 132.34 197.33 224.11 197.33 132.34  29.68 -101.22 -358.43
    
```

```

-----
VANO 3        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.  -106.01 -316.80 -320.40 -241.26 -182.91 -147.09 -135.78 -145.60 -173.00 -218.77 -233.28
SIG INF.INS.  -330.26 -215.69 -221.82 -327.86 -407.83 -459.54 -480.50 -474.27 -445.98 -394.66 -233.28
SIG SUP.DIF.  -30.18 -233.97 -266.58 -222.45 -190.90 -172.88 -168.07 -172.92 -185.54 -208.10 -200.02
SIG INF.DIF.  -358.43 -227.15 -195.06 -253.90 -295.02 -319.98 -330.93 -331.90 -325.02 -306.27 -200.02
    
```

```

TENSIONES DEBIDAS A MOMENTOS MINIMOS
*****
    
```

```

-----
VANO 1        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.  -233.28 -190.47 -120.78 -74.00 -48.45 -48.00 -75.82 -129.78 -207.82 -204.12  25.01
SIG INF.INS.  -233.28 -430.25 -511.65 -564.29 -590.30 -584.12 -542.48 -468.03 -363.37 -357.36 -486.56
SIG SUP.DIF.  -200.02 -179.80 -133.32 -101.32 -80.74 -73.79 -83.80 -110.97 -153.99 -121.29 100.85
SIG INF.DIF.  -200.02 -341.85 -390.69 -421.93 -440.74 -444.57 -429.68 -394.07 -336.62 -368.83 -514.74
    
```

```

-----
VANO 2        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.   25.01 -275.67 -327.14 -363.51 -388.11 -398.93 -388.11 -363.51 -327.14 -275.67  25.01
SIG INF.INS.  -486.56 -240.74 -169.69 -117.69 -80.56 -60.83 -80.56 -117.69 -169.69 -240.74 -486.56
SIG SUP.DIF.   100.85 -207.35 -300.63 -365.46 -405.68 -421.17 -405.68 -365.46 -300.63 -207.35 100.84
SIG INF.DIF.  -514.74 -235.11 -113.86 -29.86  23.42  47.10  23.42 -29.86 -113.86 -235.10 -514.74
    
```

```

-----
VANO 3        1      2      3      4      5      6      7      8      9      10     11
-----
SIG SUP.INS.   25.01 -204.12 -207.82 -129.78 -75.81 -48.00 -48.45 -74.00 -120.78 -190.47 -233.28
SIG INF.INS.  -486.56 -357.36 -363.37 -468.03 -542.48 -584.12 -590.31 -564.29 -511.65 -430.25 -233.28
SIG SUP.DIF.   100.85 -121.29 -153.99 -110.97 -83.80 -73.79 -80.74 -101.32 -133.32 -179.80 -200.02
SIG INF.DIF.  -514.74 -368.83 -336.62 -394.07 -429.68 -444.57 -440.74 -421.93 -390.69 -341.85 -200.02
    
```

SE HA SUPERADO LA TENSION MAXIMA DE TRACCION EN LOS SIGUIENTES PUNTOS:

```

HIPOTESIS DE CARGA 5 VANO 2 SECCION 23 TENSION 252.70
HIPOTESIS DE CARGA 5 VANO 2 SECCION 24 TENSION 258.75
HIPOTESIS DE CARGA 5 VANO 2 SECCION 25 TENSION 263.07
HIPOTESIS DE CARGA 5 VANO 2 SECCION 26 TENSION 266.58
HIPOTESIS DE CARGA 5 VANO 2 SECCION 27 TENSION 263.07
HIPOTESIS DE CARGA 5 VANO 2 SECCION 28 TENSION 258.75
HIPOTESIS DE CARGA 5 VANO 2 SECCION 29 TENSION 252.70
    
```

SE HA SUPERADO LA TENSION MAXIMA DE COMPRESION EN LOS SIGUIENTES PUNTOS:

NINGUNO

```

DEFORMADA DE LA ESTRUCTURA
=====
    
```

## Anexo A2: Resultados de ejemplo calculado con LOSAC

VANO SECCION PESO PROPIO P.P+C.MUERTA PRET.INICIAL P.P+PR.INIC. P.P+C.M+PR.INIC. FLECHA DIFERIDA

1	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
1	6	-0.00108	-0.00126	0.00477	0.00369	0.00351	0.00921
1	11	-0.00192	-0.00225	0.00874	0.00681	0.00649	0.01702
1	16	-0.00240	-0.00281	0.01139	0.00899	0.00859	0.02252
1	21	-0.00243	-0.00285	0.01245	0.01002	0.00960	0.02518
1	26	-0.00204	-0.00239	0.01187	0.00982	0.00948	0.02487
1	31	-0.00133	-0.00155	0.00985	0.00853	0.00830	0.02181
1	36	-0.00046	-0.00054	0.00688	0.00641	0.00634	0.01666
1	41	0.00029	0.00034	0.00365	0.00393	0.00399	0.01051
1	46	0.00058	0.00068	0.00110	0.00168	0.00178	0.00472
1	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	6	-0.00295	-0.00345	0.00151	-0.00143	-0.00194	-0.00718
2	11	-0.00717	-0.00839	0.00558	-0.00158	-0.00281	-0.01148
2	16	-0.01122	-0.01313	0.01007	-0.00115	-0.00307	-0.01380
2	21	-0.01406	-0.01646	0.01337	-0.00069	-0.00309	-0.01492
2	26	-0.01508	-0.01765	0.01457	-0.00051	-0.00309	-0.01526
2	31	-0.01406	-0.01646	0.01337	-0.00069	-0.00309	-0.01492
2	36	-0.01122	-0.01313	0.01007	-0.00115	-0.00307	-0.01380
2	41	-0.00717	-0.00839	0.00558	-0.00158	-0.00281	-0.01148
2	46	-0.00295	-0.00345	0.00151	-0.00143	-0.00194	-0.00718
2	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	6	0.00058	0.00068	0.00110	0.00168	0.00178	0.00472
3	11	0.00029	0.00034	0.00365	0.00393	0.00399	0.01051
3	16	-0.00046	-0.00054	0.00688	0.00641	0.00634	0.01666
3	21	-0.00133	-0.00155	0.00985	0.00853	0.00830	0.02181
3	26	-0.00204	-0.00239	0.01187	0.00982	0.00948	0.02487
3	31	-0.00243	-0.00285	0.01245	0.01002	0.00960	0.02518
3	36	-0.00240	-0.00281	0.01139	0.00899	0.00859	0.02252
3	41	-0.00192	-0.00225	0.00874	0.00681	0.00649	0.01702
3	46	-0.00108	-0.00126	0.00477	0.00369	0.00351	0.00921
3	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

=====

ESFUERZOS DE CALCULO PARA COMPROBACION Y  
DIMENSIONAMIENTO DE LA SECCION EN ROTURA

=====

VANO 1	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	604.39	1036.12	1296.84	1399.11	1338.29	1117.57	795.54	444.70	0.00	0.00
Md NEG	0.00	0.00	0.00	0.00	0.00	0.00	-60.05	-354.77	-839.16	-1443.76	-2276.45
Qd POS	388.65	296.42	212.49	124.25	57.88	7.17	-36.66	-79.79	-127.02	-163.11	-204.07
Qd NEG	0.00	0.00	0.00	-13.88	-76.39	-153.76	-241.39	-323.93	-405.86	-487.09	-575.63
VANO 2	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	334.69	1109.23	1946.14	2457.46	2630.76	2457.46	1946.14	1109.22	334.69	0.00
Md NEG	-2276.45	-793.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-793.19	-2276.45
Qd POS	656.82	530.57	408.15	287.49	166.35	45.09	-21.90	-84.89	-146.80	-203.33	-262.33
Qd NEG	0.00	0.00	0.00	0.00	0.00	-45.09	-166.35	-287.49	-411.11	-530.57	-656.82
VANO 3	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	0.00	444.70	795.54	1117.57	1338.29	1399.11	1296.84	1036.12	604.39	0.00
Md NEG	-2276.45	-1443.77	-839.16	-354.77	-60.06	0.00	0.00	0.00	0.00	0.00	0.00
Qd POS	575.63	487.09	405.86	323.93	241.39	153.76	76.39	13.88	-30.52	-66.61	-107.57
Qd NEG	0.00	0.00	0.00	0.00	0.00	-7.17	-57.88	-124.25	-212.49	-296.42	-388.65

Así, para LOSAC corriendo en modo predimensionamiento y obtención de tensiones, obtenemos una fuerza de pretensado en anclajes necesaria de  $Panc = 22796.36$  KN.

Se observa que hay secciones que fallan por un poco de exceso de tensión a tracción tanto en la fase de construcción como en la de servicio.

### A2.2. Comprobación

Para evitar estas tensiones basta elevar un poco la fuerza propuesta por LOSAC. Así, para  $Panc = 22800.00$  KN se obtienen los siguientes resultados:

\*\*\*\*\*

Ejemplo de puente 3 vanos, comprobación

## Anexo A2: Resultados de ejemplo calculado con LOSAC

\*\*\*\*\*

OPCION DE CALCULO           4  
 PRETENSADO EN CLASE       2  
 NUMERO DE VANOS           3  
 NUMERO DE SECCIONES TIPO 2  
 NUM. SECCIONES DE CONTROL 51  
 NUM. ETAPAS CONSTRUCTIVAS 1

PUENTE DE CARRETERA

LUCES Y NUMERO DE TRAMOS DE LOS VANOS

VANO	TRAMO	LUZ	NUM. DE TRAMOS DEL VANO
1	1	18.000	3
2	2	27.000	3
3	3	18.000	3

VANO	TRAMO	X-INICIAL	X-FINAL	TIPO SECCION
1	1	0.000	1.000	1
1	2	1.000	17.000	2
1	3	17.000	18.000	1
2	1	0.000	1.000	1
2	2	1.000	26.000	2
2	3	26.000	27.000	1
3	1	0.000	1.000	1
3	2	1.000	17.000	2
3	3	17.000	18.000	1

PROCESO CONSTRUCTIVO

\*\*\*\*\*

ETAPA	FASE SIMULT.	X-INICIAL	X-FINAL
1	1	0.00	63.00

CARACTERISTICAS MECANICAS DE LAS SECCIONES TIPO

\*\*\*\*\*

SECCION TIPO NUMERO: 1

\*\*\*\*\*

AREA: 9.77200  
 INERCIA: 0.85320  
 V.SUP: 0.45600  
 V.INF: -0.54400  
 CANTO: 1.00000  
 RADIO GIRO: 0.29548  
 RENDIMIENTO: 0.35197

SECCION TIPO NUMERO: 2

\*\*\*\*\*

AREA: 7.61200  
 INERCIA: 0.81400  
 V.SUP: 0.44300  
 V.INF: -0.55700  
 CANTO: 1.00000  
 RADIO GIRO: 0.32701  
 RENDIMIENTO: 0.43338

CARACTERISTICAS DE LOS MATERIALES

\*\*\*\*\*

HORMIGON

\*\*\*\*\*

RESISTENCIA CARACTERISTICA (T/m2) 4000.00  
 RESISTENCIA A TRACCION (T/m2) 250.00  
 MODULO DE DEFORMACION (T/m2) 3000000.  
 RETRACCION FINAL -0.000350  
 COEFICIENTE DE FLUENCIA 2.00

ACERO PASIVO

\*\*\*\*\*

LIMITE ELASTICO (T/m2) 50000.00

ACERO DE PRETENSADO

\*\*\*\*\*

LIMITE ELASTICO CONVENCIONAL (T/m2) 167400.00  
 TENSION DE ROTURA (T/m2) 186000.00  
 RELAJACION UNITARIA FINAL 0.0800  
 FACTOR DE TESADO (TENSION/FPMAX) 0.750  
 AREA DE CADA TENDON (cm2) 21.00

COEFICIENTES DE PONDERACION

\*\*\*\*\*

COEF. MINORACION HORMIGON EN ROTURA 1.50  
 COEF. MINORACION ACERO EN ROTURA 1.15  
 COEF. PRETENSADO FAVORABLE EN SERVICIO 0.90  
 COEF. PRETENSADO DESFAVORABLE EN SERVICIO 1.10

## Anexo A2: Resultados de ejemplo calculado con LOSAC

ACCIONES SOBRE LA ESTRUCTURA  
 \*\*\*\*\*  
 PESO PROPIO (P.ESPECIFICO, T/m<sup>3</sup>)      2.50  
 CARGAS MUERTAS (T/m<sup>1</sup>)                    3.25  
 GRADIENTE TERMICO (Tsup-Tinf)          10.00  
 COEFICIENTES DE COMBINACIÓN            0.60      0.50      0.20  
 SOBRECARGA (T/m<sup>2</sup>)                        0.40  
 PRIMERA CARGA PUNTUAL CARRO (T.)       20.00  
 SEGUNDA CARGA PUNTUAL CARRO (T.)      20.00  
 TERCERA CARGA PUNTUAL CARRO (T.)      20.00  
 COEF. REPARTO TRANSVERSAL FLEXION    1.00

ETAPA EN LA QUE SE COMPLETA CADA VANO  
 \*\*\*\*\*

VANO	1	ETAPA	1
VANO	2	ETAPA	1
VANO	3	ETAPA	1

\*\*\*\*\*  
 ETAPA CONSTRUCTIVA NUMERO 1  
 \*\*\*\*\*

DEFINICION GEOMETRICA DEL PRETENSADO  
 =====

GRUPO DE TENDONES NUMERO 1 NUMERACION GLOBAL 1 IND.TESADO= 3  
 =====  

VANO	XINIC.	EX.ORIGEN	EX.PTO.MIN.	EX.FINAL	X-INFLEX.1	X-MINIMO	X-INFLEX.2	XFINAL
1	0.000	-0.456	-0.850	-0.150	0.000	7.200	14.400	18.000
2	0.000	-0.150	-0.850	-0.150	2.700	13.500	24.300	27.000
3	0.000	-0.150	-0.850	-0.456	3.600	10.800	18.000	18.000

FUERZA DE PRETENSADO  
 =====  
 COEFICIENTE DE ROZAMIENTO EN CURVA (MU)= 0.2100  
 COEFICIENTE DE ROZAMIENTO PARASITO (K)= 0.0020

GRUPO DE TENDONES NUMERO 1  
 -----  
 VANO 1  
 =====  

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200	18.000
EXCENTR.	0.000	-0.185	-0.309	-0.382	-0.407	-0.378	-0.290	-0.144	0.060	0.235	0.306
D.FONDO	0.544	0.372	0.248	0.175	0.150	0.179	0.267	0.413	0.617	0.792	0.850
F.PRET.	1.000	0.991	0.981	0.972	0.963	0.953	0.943	0.934	0.924	0.908	0.893

  
 VANO 2  
 =====  

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	2.700	5.400	8.100	10.800	13.500	16.200	18.900	21.600	24.300	27.000
EXCENTR.	0.306	0.153	-0.092	-0.267	-0.372	-0.407	-0.372	-0.267	-0.092	0.153	0.306
D.FONDO	0.850	0.710	0.465	0.290	0.185	0.150	0.185	0.290	0.465	0.710	0.850
F.PRET.	0.893	0.869	0.859	0.850	0.841	0.832	0.841	0.850	0.859	0.869	0.893

  
 VANO 3  
 =====  

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200	18.000
EXCENTR.	0.306	0.235	0.060	-0.145	-0.290	-0.378	-0.407	-0.382	-0.309	-0.185	0.000
D.FONDO	0.850	0.792	0.617	0.412	0.267	0.179	0.150	0.175	0.248	0.372	0.544
F.PRET.	0.893	0.908	0.924	0.934	0.943	0.953	0.963	0.972	0.981	0.991	1.000

=====

ESFUERZOS EN SERVICIO DEBIDO A ACCIONES EXTERIORES  
 EN LAS DIVERSAS HIPOTESIS DE COMBINACION DEFINIDAS  
 =====

HIPOTESIS 1 = PESO PROPIO  
 HIPOTESIS 2 = 1 + CARGAS MUERTAS  
 HIPOTESIS 3 = 2 + SOBRECARGA + CARRO  
 HIPOTESIS 4 = 2 + TEMPERATURA  
 HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
 HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

Anexo A2: Resultados de ejemplo calculado con LOSAC

VANO NUMERO 1

HIPOTESIS	MOM. MAX	MOM. MIN	CORT. MAX	CORT. MIN
1	0.00	0.00	118.65	118.65
1	175.72	175.72	79.00	79.00
1	287.09	287.09	44.74	44.74
1	336.80	336.80	10.49	10.49
1	324.85	324.85	-23.76	-23.76
1	251.24	251.24	-58.02	-58.02
1	115.98	115.98	-92.27	-92.27
1	-80.94	-80.94	-126.53	-126.53
1	-339.52	-339.52	-160.78	-160.78
1	-659.75	-659.75	-195.03	-195.03
1	-1044.34	-1044.34	-234.69	-234.69

VANO NUMERO 2

HIPOTESIS	MOM. MAX	MOM. MIN	CORT. MAX	CORT. MIN
1	-1044.34	-1044.34	262.30	262.30
1	-417.36	-417.36	205.52	205.52
1	68.19	68.19	154.14	154.14
1	415.01	415.01	102.76	102.76
1	623.10	623.10	51.38	51.38
1	692.47	692.47	0.00	0.00
1	623.10	623.10	-51.38	-51.38
1	415.01	415.01	-102.76	-102.76
1	68.19	68.19	-154.14	-154.14
1	-417.36	-417.36	-205.52	-205.52
1	-1044.34	-1044.34	-262.31	-262.31

VANO NUMERO 3

HIPOTESIS	MOM. MAX	MOM. MIN	CORT. MAX	CORT. MIN
1	-1044.34	-1044.34	234.69	234.69
1	-659.75	-659.75	195.03	195.03
1	-339.52	-339.52	160.78	160.78
1	-80.94	-80.94	126.53	126.53
1	115.98	115.98	92.27	92.27
1	251.24	251.24	58.02	58.02
1	324.85	324.85	23.76	23.76
1	336.80	336.80	-10.49	-10.49
1	287.09	287.09	-44.74	-44.74
1	175.72	175.72	-79.00	-79.00
1	0.00	0.00	-118.65	-118.65

ESFUERZOS HIPERESTATICOS DE PRETENSADO INICIALES

VANO	1	2	3	4	5	6	7	8	9	10	11
MOM. HIP	0.00	25.56	51.13	76.69	102.26	127.82	153.38	178.95	204.51	230.08	255.64
CORT. HIP	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20
VANO	2	3	4	5	6	7	8	9	10	11	
MOM. HIP	255.64	255.64	255.64	255.64	255.64	255.64	255.64	255.64	255.64	255.64	255.64
CORT. HIP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VANO	3	4	5	6	7	8	9	10	11		
MOM. HIP	255.64	230.08	204.51	178.95	153.38	127.82	102.26	76.69	51.13	25.56	0.00
CORT. HIP	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20

ESFUERZOS HIPERESTATICOS DE PRETENSADO DIFERIDOS

VANO	1	2	3	4	5	6	7	8	9	10	11
MOM. HIP	0.00	25.11	50.22	75.33	100.43	125.54	150.65	175.76	200.87	225.98	251.09
CORT. HIP	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20	14.20
VANO	2	3	4	5	6	7	8	9	10	11	
MOM. HIP	251.09	251.09	251.09	251.09	251.09	251.09	251.08	251.08	251.08	251.08	251.08
CORT. HIP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VANO	3	4	5	6	7	8	9	10	11		
MOM. HIP	251.08	225.98	200.87	175.76	150.65	125.54	100.43	75.33	50.22	25.11	0.00
CORT. HIP	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20	-14.20

## Anexo A2: Resultados de ejemplo calculado con LOSAC

GRUPO DE TENDONES NUMERO 1  
 FUERZA EN ANCLAJES ADOPTADA 2280.000  
 SE REQUIEREN 8 TENDONES DE 2100. mm2  
 TENSION INICIAL 135.71 Kp/mm2  
 ALARGAMIENTO DURANTE EL TESADO 390. mm.

VANO	SECCION	DIST.ORIGEN	F.PRET.INICIAL	F.PRET.FINAL	F.NEUTRAL.
1	1	0.00	2280.00	1954.91	2306.13
1	6	1.80	2258.79	1914.15	2302.71
1	11	3.60	2237.78	1879.55	2300.01
1	16	5.40	2216.96	1847.64	2294.18
1	21	7.20	2196.34	1823.64	2278.71
1	26	9.00	2173.60	1808.58	2248.28
1	31	10.80	2151.10	1803.22	2207.70
1	36	12.60	2128.84	1800.12	2166.28
1	41	14.40	2106.80	1787.52	2138.83
1	46	16.20	2070.85	1752.16	2117.01
1	51	18.00	2035.51	1745.88	2083.86
2	1	0.00	2035.51	1745.88	2083.86
2	6	2.70	1980.94	1669.71	2016.46
2	11	5.40	1959.57	1658.64	1990.69
2	16	8.10	1938.44	1646.11	1985.97
2	21	10.80	1917.53	1632.17	1982.25
2	26	13.50	1896.85	1615.99	1967.99
2	31	16.20	1917.53	1632.17	1982.25
2	36	18.90	1938.44	1646.11	1985.97
2	41	21.60	1959.57	1658.64	1990.69
2	46	24.30	1980.94	1669.71	2016.46
2	51	27.00	2035.51	1745.89	2083.86
3	1	0.00	2035.51	1745.89	2083.86
3	6	1.80	2070.85	1752.16	2117.01
3	11	3.60	2106.80	1787.52	2138.83
3	16	5.40	2128.84	1800.12	2166.28
3	21	7.20	2151.10	1803.22	2207.70
3	26	9.00	2173.60	1808.58	2248.28
3	31	10.80	2196.34	1823.64	2278.72
3	36	12.60	2216.96	1847.64	2294.18
3	41	14.40	2237.78	1879.55	2300.01
3	46	16.20	2258.79	1914.15	2302.71
3	51	18.00	2280.00	1954.91	2306.13

=====

ESFUERZOS EN SERVICIO INCLUYENDO HIPERESTATICOS DE  
 PRETENSADO EN LAS HIPOTESIS DE COMBINACION DEFINIDAS

=====

HIPOTESIS 1 = PESO PROPIO  
 HIPOTESIS 2 = 1 + CARGAS MUERTAS  
 HIPOTESIS 3 = 2 + SOBRECARGA + CARRO  
 HIPOTESIS 4 = 2 + TEMPERATURA  
 HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
 HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

VANO	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	0.00	201.29	338.22	413.49	427.11	379.06	269.37	98.01	-135.00	-429.67	-788.70
H 1 M.MN.	0.00	201.29	338.22	413.49	427.11	379.06	269.37	98.01	-135.00	-429.67	-788.70
H 1 Q.MX.	132.85	93.20	58.95	24.69	-9.56	-43.82	-78.07	-112.32	-146.58	-180.83	-220.49
H 1 Q.MN.	132.85	93.20	58.95	24.69	-9.56	-43.82	-78.07	-112.32	-146.58	-180.83	-220.49
=====											
VANO 2	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	-788.70	-161.72	323.83	670.65	878.74	948.11	878.74	670.65	323.83	-161.72	-788.70
H 1 M.MN.	-788.70	-161.72	323.83	670.65	878.74	948.11	878.74	670.65	323.83	-161.72	-788.70
H 1 Q.MX.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
H 1 Q.MN.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
=====											
VANO 3	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	-788.70	-429.67	-135.00	98.01	269.37	379.06	427.11	413.49	338.22	201.29	0.00
H 1 M.MN.	-788.70	-429.67	-135.00	98.01	269.37	379.06	427.11	413.49	338.22	201.29	0.00
H 1 Q.MX.	220.49	180.83	146.58	112.32	78.07	43.82	9.56	-24.69	-58.95	-93.20	-132.85
H 1 Q.MN.	220.49	180.83	146.58	112.32	78.07	43.82	9.56	-24.69	-58.95	-93.20	-132.85

REACCIONES EN LOS APOYOS  
 =====

HIPOTESIS	APOYO	REACCION CARGAS	RHIP. PRETENSADO	REACCION TOTAL
1	1	118.651062	13.949181	132.600250
1	2	496.993927	-13.949198	483.044739
1	3	496.993958	-13.949136	483.044830
1	4	118.651077	13.949154	132.600235

=====

TENSIONES A CORTO Y LARGO PLAZO  
 HIPOTESIS DE CARGA NUMERO 1

=====

TENSIONES DEBIDAS A MOMENTOS MAXIMOS  
 =====

## Anexo A2: Resultados de ejemplo calculado con LOSAC

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP. INS.	-233.32	-178.41	-102.34	-54.93	-34.49	-44.90	-89.30	-165.59	-271.71	-302.68	-119.67
SIG INF. INS.	-233.32	-445.53	-534.94	-588.37	-607.96	-588.13	-525.63	-423.10	-283.14	-233.54	-314.04
SIG SUP. DIF.	-200.05	-167.65	-114.93	-82.52	-67.09	-70.76	-97.08	-146.53	-217.42	-217.88	-40.23
SIG INF. DIF.	-200.05	-356.85	-412.88	-444.16	-456.45	-447.36	-412.68	-349.59	-256.72	-245.65	-343.81

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP. INS.	-119.67	-337.17	-335.55	-337.97	-341.94	-345.02	-341.94	-337.97	-335.55	-337.17	-119.67
SIG INF. INS.	-314.04	-163.51	-159.21	-149.90	-138.71	-128.70	-138.71	-149.90	-159.21	-163.51	-314.03
SIG SUP. DIF.	-40.23	-267.89	-308.61	-339.57	-359.74	-367.86	-359.74	-339.56	-308.61	-267.89	-40.23
SIG INF. DIF.	-343.81	-158.32	-103.84	-61.21	-31.70	-16.70	-31.70	-61.21	-103.84	-158.32	-343.81

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP. INS.	-119.67	-302.68	-271.71	-165.59	-89.30	-44.90	-34.49	-54.93	-102.34	-178.41	-233.32
SIG INF. INS.	-314.04	-233.54	-283.14	-423.10	-525.63	-588.13	-607.96	-588.37	-534.94	-445.53	-233.32
SIG SUP. DIF.	-40.23	-217.88	-217.42	-146.53	-97.08	-70.76	-67.09	-82.52	-114.93	-167.65	-200.05
SIG INF. DIF.	-343.81	-245.65	-256.72	-349.59	-412.68	-447.36	-456.45	-444.16	-412.88	-356.85	-200.05

TENSIONES DEBIDAS A MOMENTOS MINIMOS  
\*\*\*\*\*

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP. INS.	-233.32	-178.41	-102.34	-54.93	-34.49	-44.90	-89.30	-165.59	-271.71	-302.68	-119.67
SIG INF. INS.	-233.32	-445.53	-534.94	-588.37	-607.96	-588.13	-525.63	-423.10	-283.14	-233.54	-314.04
SIG SUP. DIF.	-200.05	-167.65	-114.93	-82.52	-67.09	-70.76	-97.08	-146.53	-217.42	-217.88	-40.23
SIG INF. DIF.	-200.05	-356.85	-412.88	-444.16	-456.45	-447.36	-412.68	-349.59	-256.72	-245.65	-343.81

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP. INS.	-119.67	-337.17	-335.55	-337.97	-341.94	-345.02	-341.94	-337.97	-335.55	-337.17	-119.67
SIG INF. INS.	-314.04	-163.51	-159.21	-149.90	-138.71	-128.70	-138.71	-149.90	-159.21	-163.51	-314.03
SIG SUP. DIF.	-40.23	-267.89	-308.61	-339.57	-359.74	-367.86	-359.74	-339.56	-308.61	-267.89	-40.23
SIG INF. DIF.	-343.81	-158.32	-103.84	-61.21	-31.70	-16.70	-31.70	-61.21	-103.84	-158.32	-343.81

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP. INS.	-119.67	-302.68	-271.71	-165.59	-89.30	-44.90	-34.49	-54.93	-102.34	-178.41	-233.32
SIG INF. INS.	-314.04	-233.54	-283.14	-423.10	-525.63	-588.13	-607.96	-588.37	-534.94	-445.53	-233.32
SIG SUP. DIF.	-40.23	-217.88	-217.42	-146.53	-97.08	-70.76	-67.09	-82.52	-114.93	-167.65	-200.05
SIG INF. DIF.	-343.81	-245.65	-256.72	-349.59	-412.68	-447.36	-456.45	-444.16	-412.88	-356.85	-200.05

SE HA SUPERADO LA TENSION MAXIMA DE TRACCION EN LOS SIGUIENTES PUNTOS:

NINGUNO

SE HA SUPERADO LA TENSION MAXIMA DE COMPRESION EN LOS SIGUIENTES PUNTOS:

NINGUNO

DEFORMADA DE LA ESTRUCTURA

VANO SECCION PESO PROPIO P.P+C,MUERTA PRET.INICIAL P.P+PR.INIC. P.P+C,M+PR.INIC. FLECHA DIFERIDA

1	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
1	6	-0.00108	-0.00108	0.00302	0.00194	0.00194	0.00497
1	11	-0.00192	-0.00192	0.00554	0.00361	0.00361	0.00923
1	16	-0.00240	-0.00240	0.00722	0.00482	0.00482	0.01232
1	21	-0.00243	-0.00243	0.00789	0.00545	0.00545	0.01398
1	26	-0.00204	-0.00204	0.00752	0.00548	0.00548	0.01409
1	31	-0.00133	-0.00133	0.00624	0.00492	0.00492	0.01272
1	36	-0.00046	-0.00046	0.00436	0.00389	0.00389	0.01015
1	41	0.00029	0.00029	0.00231	0.00260	0.00260	0.00686
1	46	0.00058	0.00058	0.00069	0.00128	0.00128	0.00343
1	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	6	-0.00295	-0.00295	0.00096	-0.00199	-0.00199	-0.00685
2	11	-0.00717	-0.00717	0.00354	-0.00363	-0.00363	-0.01288
2	16	-0.01122	-0.01122	0.00638	-0.00484	-0.00484	-0.01752
2	21	-0.01406	-0.01406	0.00847	-0.00559	-0.00559	-0.02046
2	26	-0.01508	-0.01508	0.00923	-0.00585	-0.00585	-0.02148
2	31	-0.01406	-0.01406	0.00847	-0.00559	-0.00559	-0.02046
2	36	-0.01122	-0.01122	0.00638	-0.00484	-0.00484	-0.01752
2	41	-0.00717	-0.00717	0.00354	-0.00363	-0.00363	-0.01288
2	46	-0.00295	-0.00295	0.00096	-0.00199	-0.00199	-0.00685
2	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	6	0.00058	0.00058	0.00069	0.00128	0.00128	0.00343

Anexo A2: Resultados de ejemplo calculado con LOSAC

3	11	0.00029	0.00029	0.00231	0.00260	0.00260	0.00686
3	16	-0.00046	-0.00046	0.00436	0.00389	0.00389	0.01015
3	21	-0.00133	-0.00133	0.00624	0.00492	0.00492	0.01272
3	26	-0.00204	-0.00204	0.00752	0.00548	0.00548	0.01409
3	31	-0.00243	-0.00243	0.00789	0.00545	0.00545	0.01398
3	36	-0.00240	-0.00240	0.00722	0.00482	0.00482	0.01232
3	41	-0.00192	-0.00192	0.00554	0.00361	0.00361	0.00923
3	46	-0.00108	-0.00108	0.00302	0.00195	0.00195	0.00497
3	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

=====

ESFUERZOS DE CALCULO PARA COMPROBACION Y  
DIMENSIONAMIENTO DE LA SECCION EN ROTURA

=====

VANO	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	263.58	430.63	505.20	487.28	376.87	173.97	0.00	0.00	0.00	0.00
Md NEG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-121.41	-509.27	-989.62	-1566.51
Qd POS	177.98	118.50	67.11	15.73	-21.39	-52.22	-83.05	-113.87	-144.70	-175.53	-211.22
Qd NEG	0.00	0.00	0.00	0.00	-35.65	-87.03	-138.41	-189.79	-241.17	-292.55	-352.03

  

VANO	2	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	0.00	102.28	622.52	934.66	1038.70	934.65	622.52	102.28	0.00	0.00	
Md NEG	-1566.51	-626.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-626.04	-1566.51	
Qd POS	393.46	308.29	231.21	154.14	77.07	0.00	-46.24	-92.49	-138.73	-184.97	-236.07	
Qd NEG	0.00	0.00	0.00	0.00	0.00	0.00	-77.07	-154.14	-231.21	-308.29	-393.46	

  

VANO	3	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	0.00	0.00	0.00	173.97	376.87	487.27	505.20	430.63	263.58	0.00	
Md NEG	-1566.51	-989.62	-509.27	-121.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Qd POS	352.03	292.55	241.17	189.79	138.41	87.03	35.65	-9.44	-40.27	-71.10	-106.79	
Qd NEG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-15.73	-67.11	-118.50	-177.98	

SITUACION FINAL DE LA ESTRUCTURA

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DEFINICION GEOMETRICA DEL PRETENSADO

=====

GRUPO DE TENDONES NUMERO 1 NUMERACION GLOBAL 1 IND.TESADO= 3

=====

VANO	XINIC.	EX.ORIGEN	EX.PTO.MIN.	EX.FINAL	X-INFLEX.1	X-MINIMO	X-INFLEX.2	XFINAL
1	0.000	-0.456	-0.850	-0.150	0.000	7.200	14.400	18.000
2	0.000	-0.150	-0.850	-0.150	2.700	13.500	24.300	27.000
3	0.000	-0.150	-0.850	-0.456	3.600	10.800	18.000	18.000

FUERZA DE PRETENSADO

=====

COEFICIENTE DE ROZAMIENTO EN CURVA (MU)= 0.2100

COEFICIENTE DE ROZAMIENTO PARASITO (K)= 0.0020

GRUPO DE TENDONES NUMERO 1

-----

VANO 1

=====

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200	18.000
EXCENTR.	0.000	-0.185	-0.309	-0.382	-0.407	-0.378	-0.290	-0.144	0.060	0.235	0.306
D.FONDO	0.544	0.372	0.248	0.175	0.150	0.179	0.267	0.413	0.617	0.792	0.850
F.PRET.	1.000	0.991	0.981	0.972	0.963	0.953	0.943	0.934	0.924	0.908	0.893

  

VANO 2

=====

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	2.700	5.400	8.100	10.800	13.500	16.200	18.900	21.600	24.300	27.000
EXCENTR.	0.306	0.153	-0.092	-0.267	-0.372	-0.407	-0.372	-0.267	-0.092	0.153	0.306
D.FONDO	0.850	0.710	0.465	0.290	0.185	0.150	0.185	0.290	0.465	0.710	0.850
F.PRET.	0.893	0.869	0.859	0.850	0.841	0.832	0.841	0.850	0.859	0.869	0.893

  

VANO 3

=====

	1	2	3	4	5	6	7	8	9	10	11
ABSCISA	0.000	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200	18.000
EXCENTR.	0.306	0.235	0.060	-0.145	-0.290	-0.378	-0.407	-0.382	-0.309	-0.185	0.000
D.FONDO	0.850	0.792	0.617	0.412	0.267	0.179	0.150	0.175	0.248	0.372	0.544
F.PRET.	0.893	0.908	0.924	0.934	0.943	0.953	0.963	0.972	0.981	0.991	1.000

## Anexo A2: Resultados de ejemplo calculado con LOSAC

### ENVOLVENTE DE ESFUERZOS DEL CARRO

=====

VANO 1      1      2      3      4      5      6      7      8      9      10      11  
=====

M POS	0.00	82.96	142.55	177.16	195.18	193.50	174.26	138.58	89.59	32.23	27.09
M NEG	0.00	-15.07	-30.14	-45.21	-60.29	-75.36	-90.43	-105.50	-120.57	-135.64	-150.72
Q POS	52.71	46.09	39.60	30.23	24.33	18.77	13.62	8.93	1.51	1.51	1.51
Q NEG	-8.37	-8.37	-8.37	-13.91	-20.40	-26.71	-35.67	-41.23	-46.38	-51.07	-55.23

VANO 2      1      2      3      4      5      6      7      8      9      10      11  
=====

M POS	27.09	47.03	118.71	179.66	220.05	235.42	220.05	179.66	118.71	47.03	27.09
M NEG	-150.72	-78.18	-66.48	-54.78	-43.09	-31.39	-43.09	-54.78	-66.48	-78.18	-150.72
Q POS	57.01	52.44	45.03	38.78	32.22	25.57	17.00	11.11	5.93	4.33	4.33
Q NEG	-4.33	-4.33	-5.93	-11.11	-17.00	-25.57	-32.22	-38.78	-47.00	-52.44	-57.01

VANO 3      1      2      3      4      5      6      7      8      9      10      11  
=====

M POS	27.09	32.23	89.59	138.58	174.26	193.50	195.18	177.16	142.55	82.96	0.00
M NEG	-150.72	-135.64	-120.57	-105.50	-90.43	-75.36	-60.29	-45.21	-30.14	-15.07	0.00
Q POS	55.23	51.07	46.38	41.23	35.67	26.71	20.40	13.91	8.37	8.37	8.37
Q NEG	-1.51	-1.51	-2.99	-8.93	-13.62	-18.77	-24.33	-30.23	-39.60	-46.09	-52.71

### ENVOLVENTE DE ESFUERZOS DE LA SOBRECARGA

=====

VANO 1      1      2      3      4      5      6      7      8      9      10      11  
=====

M POS	0.00	69.31	121.78	157.40	176.17	178.09	163.16	131.39	82.76	25.26	28.06
M NEG	0.00	-21.95	-43.90	-65.86	-87.81	-109.76	-131.71	-153.66	-175.61	-205.53	-312.60
Q POS	43.19	33.83	24.47	15.11	5.75	1.56	1.56	1.56	1.56	1.56	1.56
Q NEG	-12.20	-12.20	-12.20	-12.20	-12.20	-17.37	-26.73	-36.09	-45.45	-54.81	-64.17

VANO 2      1      2      3      4      5      6      7      8      9      10      11  
=====

M POS	28.06	15.95	87.58	178.52	235.38	254.33	235.38	178.52	87.58	15.95	28.06
M NEG	-312.60	-129.90	-68.86	-65.02	-65.02	-65.02	-65.02	-65.02	-68.86	-129.90	-312.60
Q POS	74.69	60.65	46.61	32.57	18.53	4.49	4.49	4.49	4.49	4.49	4.49
Q NEG	-4.49	-4.49	-4.49	-4.49	-4.49	-4.49	-18.53	-32.57	-46.61	-60.65	-74.69

VANO 3      1      2      3      4      5      6      7      8      9      10      11  
=====

M POS	28.06	25.26	82.76	131.39	163.16	178.09	176.17	157.40	121.78	69.31	0.00
M NEG	-312.60	-205.53	-175.61	-153.66	-131.71	-109.76	-87.81	-65.86	-43.90	-21.95	0.00
Q POS	64.17	54.81	45.45	36.09	26.73	17.37	12.20	12.20	12.20	12.20	12.20
Q NEG	-1.56	-1.56	-1.56	-1.56	-1.56	-1.56	-5.75	-15.11	-24.47	-33.83	-43.19

\*\*\*NON POSITIVE STIFFNESS MATRIX\*\*  
DEGREE OF FREEDOM (DOF)= 2  
DIAGONAL MATRIX TERM = -0.148712E+05

=====

ESFUERZOS EN SERVICIO DEBIDO A ACCIONES EXTERIORES  
EN LAS DIVERSAS HIPOTESIS DE COMBINACION DEFINIDAS

=====

HIPOTESIS 1 = PESO PROPIO  
HIPOTESIS 2 = 1 + CARGAS MUERTAS  
HIPOTESIS 3 = 2 + SOBRECARGA + CARRO  
HIPOTESIS 4 = 2 + TEMPERATURA  
HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

### VANO NUMERO 1

=====

HIPOTESIS	MOM.MAX	MOM.MIN	CORT.MAX	CORT.MIN
1	0.00	0.00	118.65	118.65
1	175.72	175.72	79.00	79.00
1	287.09	287.09	44.74	44.74
1	336.80	336.80	10.49	10.49
1	324.85	324.85	-23.76	-23.76
1	251.24	251.24	-58.02	-58.02
1	115.98	115.98	-92.27	-92.27
1	-80.94	-80.94	-126.53	-126.53
1	-339.52	-339.52	-160.78	-160.78
1	-659.75	-659.75	-195.03	-195.03
1	-1044.34	-1044.34	-234.69	-234.69

## Anexo A2: Resultados de ejemplo calculado con LOSAC

2	0.00	0.00	138.02	138.02
2	205.32	205.32	92.52	92.52
2	335.76	335.76	52.41	52.41
2	394.01	394.01	12.31	12.31
2	380.07	380.07	-27.79	-27.79
2	293.95	293.95	-67.90	-67.90
2	135.64	135.64	-108.00	-108.00
2	-94.86	-94.86	-148.11	-148.11
2	-397.55	-397.55	-188.21	-188.21
2	-772.42	-772.42	-228.31	-228.31
2	-1222.18	-1222.18	-273.82	-273.82
3	0.00	0.00	185.97	127.74
3	281.46	186.81	132.47	82.23
3	467.92	298.74	84.45	42.13
3	561.29	338.48	34.98	-0.75
3	565.75	306.03	-12.75	-44.09
3	479.75	201.39	-57.73	-89.94
3	304.35	24.57	-100.41	-139.20
3	40.12	-224.44	-142.86	-186.76
3	-311.37	-545.64	-186.68	-234.13
3	-743.67	-943.00	-226.78	-281.25
3	-1194.60	-1453.84	-272.29	-333.52
4	0.00	0.00	145.88	138.02
4	219.47	205.32	100.38	92.52
4	364.05	335.76	60.27	52.41
4	436.45	394.01	20.17	12.31
4	436.66	380.07	-19.94	-27.79
4	364.68	293.95	-60.04	-67.90
4	220.51	135.64	-100.14	-108.00
4	4.16	-94.86	-140.25	-148.11
4	-284.38	-397.55	-180.35	-188.21
4	-645.11	-772.42	-220.46	-228.31
4	-1080.73	-1222.18	-265.96	-273.82
5	0.00	0.00	189.11	127.74
5	287.12	186.81	135.62	82.23
5	479.24	298.74	87.59	42.13
5	578.26	338.48	38.12	-0.75
5	588.38	306.03	-9.61	-44.09
5	508.04	201.39	-54.59	-89.94
5	338.30	24.57	-97.27	-139.20
5	79.73	-224.44	-139.72	-186.76
5	-266.11	-545.64	-183.54	-234.13
5	-692.75	-943.00	-223.64	-281.25
5	-1138.02	-1453.84	-269.14	-333.52
6	0.00	0.00	165.06	133.91
6	249.92	197.92	116.36	88.40
6	416.92	320.95	73.08	48.30
6	503.36	371.80	29.24	7.09
6	510.92	350.46	-13.92	-34.31
6	438.99	256.93	-55.97	-76.71
6	288.00	91.21	-97.11	-120.48
6	58.15	-146.69	-138.15	-163.57
6	-249.91	-456.78	-179.74	-206.58
6	-633.61	-840.65	-219.84	-249.49
6	-1069.70	-1314.84	-265.35	-297.70

VANO NUMERO 2

HIPOTESIS	MOM. MAX	MOM. MIN	CORT. MAX	CORT. MIN
1	-1044.34	-1044.34	262.30	262.30
1	-417.36	-417.36	205.52	205.52
1	68.19	68.19	154.14	154.14
1	415.01	415.01	102.76	102.76
1	623.10	623.10	51.38	51.38
1	692.47	692.47	0.00	0.00
1	623.10	623.10	-51.38	-51.38
1	415.01	415.01	-102.76	-102.76
1	68.19	68.19	-154.14	-154.14
1	-417.36	-417.36	-205.52	-205.52
1	-1044.34	-1044.34	-262.31	-262.31
2	-1222.18	-1222.18	306.18	306.18
2	-488.58	-488.58	240.62	240.62
2	79.89	79.89	180.47	180.47
2	485.94	485.94	120.31	120.31
2	729.58	729.58	60.16	60.16
2	810.79	810.79	0.00	0.00
2	729.57	729.57	-60.16	-60.16
2	485.94	485.94	-120.31	-120.31
2	79.89	79.89	-180.47	-180.47
2	-488.58	-488.58	-240.62	-240.62
2	-1222.18	-1222.18	-306.18	-306.18
3	-1194.60	-1453.84	372.03	301.77
3	-457.10	-592.62	297.17	236.21
3	183.04	12.22	226.28	175.26
3	665.03	426.04	155.99	112.52
3	957.29	675.52	85.53	49.41
3	1055.66	762.58	15.03	-15.03
3	957.29	675.52	-49.41	-85.53
3	665.03	426.04	-112.52	-155.99
3	183.03	12.22	-175.26	-227.27
3	-457.10	-592.62	-236.21	-297.17
3	-1194.60	-1453.84	-301.77	-372.03
4	-1080.73	-1222.18	306.18	306.18
4	-347.13	-488.58	240.62	240.62
4	221.34	79.89	180.47	180.47
4	627.40	485.94	120.31	120.31
4	871.03	729.58	60.16	60.16

## Anexo A2: Resultados de ejemplo calculado con LOSAC

4	952.24	810.79	0.00	0.00
4	871.03	729.57	-60.16	-60.16
4	627.40	485.94	-120.31	-120.31
4	221.34	79.89	-180.47	-180.47
4	-347.13	-488.58	-240.62	-240.62
4	-1080.73	-1222.18	-306.18	-306.18
5	-1138.02	-1453.84	372.03	301.77
5	-400.52	-592.62	297.17	236.21
5	239.62	12.22	226.28	175.26
5	721.61	426.04	155.99	112.52
5	1013.87	675.52	85.53	49.41
5	1112.24	762.58	15.03	-15.03
5	1013.87	675.52	-49.41	-85.53
5	721.61	426.04	-112.52	-155.99
5	239.62	12.22	-175.26	-227.27
5	-400.52	-592.62	-236.21	-297.17
5	-1138.02	-1453.84	-301.77	-372.03
6	-1069.70	-1314.84	332.52	304.42
6	-334.54	-530.20	263.24	238.86
6	262.60	52.82	198.79	178.39
6	699.03	461.98	134.58	117.19
6	962.11	707.95	70.30	55.86
6	1050.19	791.50	6.01	-6.01
6	962.11	707.95	-55.86	-70.30
6	699.03	461.98	-117.19	-134.58
6	262.60	52.82	-178.39	-199.19
6	-334.54	-530.20	-238.86	-263.24
6	-1069.70	-1314.84	-304.42	-332.52

VANO NUMERO 3

=====

HIPOTESIS	MOM. MAX	MOM. MIN	CORT. MAX	CORT. MIN
1	-1044.34	-1044.34	234.69	234.69
1	-659.75	-659.75	195.03	195.03
1	-339.52	-339.52	160.78	160.78
1	-80.94	-80.94	126.53	126.53
1	115.98	115.98	92.27	92.27
1	251.24	251.24	58.02	58.02
1	324.85	324.85	23.76	23.76
1	336.80	336.80	-10.49	-10.49
1	287.09	287.09	-44.74	-44.74
1	175.72	175.72	-79.00	-79.00
1	0.00	0.00	-118.65	-118.65
2	-1222.18	-1222.18	273.82	273.82
2	-772.42	-772.42	228.31	228.31
2	-397.55	-397.55	188.21	188.21
2	-94.86	-94.86	148.11	148.11
2	135.64	135.64	108.00	108.00
2	293.95	293.95	67.90	67.90
2	380.07	380.07	27.79	27.79
2	394.01	394.01	-12.31	-12.31
2	335.76	335.76	-52.41	-52.41
2	205.32	205.32	-92.52	-92.52
2	0.00	0.00	-138.02	-138.02
3	-1194.60	-1453.84	333.52	272.29
3	-743.67	-943.00	281.25	226.78
3	-311.37	-545.64	234.13	185.93
3	40.12	-224.44	186.76	142.86
3	304.35	24.57	139.20	100.41
3	479.75	201.39	89.94	57.73
3	565.75	306.03	44.09	12.75
3	561.29	338.48	0.75	-34.98
3	467.92	298.74	-42.13	-84.45
3	281.46	186.81	-82.23	-132.47
3	0.00	0.00	-127.74	-185.97
4	-1080.73	-1222.18	234.69	265.96
4	-645.11	-772.42	195.03	220.46
4	-284.38	-397.55	160.78	180.35
4	4.16	-94.86	126.53	140.25
4	220.51	135.64	92.27	100.14
4	364.68	293.95	58.02	60.04
4	436.66	380.07	23.76	19.94
4	436.45	394.01	-10.49	-20.17
4	364.05	335.76	-44.74	-60.27
4	219.47	205.32	-79.00	-100.38
4	0.00	0.00	-118.65	-145.88
5	-1138.02	-1453.84	333.52	269.14
5	-692.75	-943.00	281.25	223.64
5	-266.11	-545.64	234.13	182.79
5	79.73	-224.44	186.76	139.72
5	338.30	24.57	139.20	97.27
5	508.04	201.39	89.94	54.59
5	588.38	306.03	44.09	9.61
5	578.26	338.48	0.75	-38.12
5	479.24	298.74	-42.13	-87.59
5	287.12	186.81	-82.23	-135.62
5	0.00	0.00	-127.74	-189.11
6	-1069.70	-1314.84	297.70	265.35
6	-633.61	-840.65	249.49	219.84
6	-249.91	-456.78	206.58	179.44
6	58.15	-146.69	163.57	138.15
6	288.00	91.21	120.48	97.11
6	438.99	256.93	76.71	55.97
6	510.92	350.46	34.31	13.92
6	503.36	371.80	-7.09	-29.24
6	416.92	320.95	-48.30	-73.08
6	249.92	197.92	-88.40	-116.36

## Anexo A2: Resultados de ejemplo calculado con LOSAC

6            0.00            0.00            -133.91            -165.06

### ESFUERZOS HIPERESTATICOS DE PRETENSADO INICIALES

```

=====
VANO 1    1    2    3    4    5    6    7    8    9    10   11
=====
MOM. HIP   0.00 25.56 51.13 76.69 102.26 127.82 153.38 178.95 204.51 230.08 255.64
CORT.HIP   14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20

VANO 2    1    2    3    4    5    6    7    8    9    10   11
=====
MOM. HIP 255.64 255.64 255.64 255.64 255.64 255.64 255.64 255.64 255.64 255.64 255.64
CORT.HIP   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

VANO 3    1    2    3    4    5    6    7    8    9    10   11
=====
MOM. HIP 255.64 230.08 204.51 178.95 153.38 127.82 102.26 76.69 51.13 25.56 0.00
CORT.HIP -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20
    
```

### ESFUERZOS HIPERESTATICOS DE PRETENSADO DIFERIDOS

```

=====
VANO 1    1    2    3    4    5    6    7    8    9    10   11
=====
MOM. HIP   0.00 25.18 50.37 75.55 100.74 125.92 151.10 176.29 201.47 226.66 251.84
CORT.HIP   14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20 14.20

VANO 2    1    2    3    4    5    6    7    8    9    10   11
=====
MOM. HIP 251.84 251.84 251.84 251.84 251.84 251.84 251.84 251.84 251.84 251.84 251.84
CORT.HIP   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

VANO 3    1    2    3    4    5    6    7    8    9    10   11
=====
MOM. HIP 251.84 226.66 201.47 176.29 151.10 125.92 100.74 75.55 50.37 25.18 0.00
CORT.HIP -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20 -14.20
    
```

1

GRUPO DE TENDONES NUMERO 1  
 FUERZA EN ANCLAJES ADOPTADA    2280.000  
 SE REQUIEREN 8 TENDONES DE    2100. mm2  
 TENSION INICIAL            135.71 Kp/mm2  
 ALARGAMIENTO DURANTE EL TESADO    781. mm.

VANO	SECCION	DIST.ORIGEN	F.PRET.INICIAL	F.PRET.FINAL	F.NEUTRAL.
1	1	0.00	2280.00	1954.91	2306.13
1	6	1.80	2258.79	1915.42	2302.71
1	11	3.60	2237.78	1883.02	2300.01
1	16	5.40	2216.96	1852.70	2294.18
1	21	7.20	2196.34	1828.84	2278.71
1	26	9.00	2173.60	1812.31	2248.28
1	31	10.80	2151.10	1804.54	2207.70
1	36	12.60	2128.84	1799.66	2166.28
1	41	14.40	2106.80	1788.32	2138.83
1	46	16.20	2070.85	1758.27	2117.01
1	51	18.00	2035.51	1757.89	2083.86
2	1	0.00	2035.51	1757.89	2083.86
2	6	2.70	1980.94	1672.23	2016.46
2	11	5.40	1959.57	1658.88	1990.69
2	16	8.10	1938.44	1650.49	1985.97
2	21	10.80	1917.53	1641.32	1982.25
2	26	13.50	1896.85	1627.12	1967.99
2	31	16.20	1917.53	1641.32	1982.25
2	36	18.90	1938.44	1650.49	1985.97
2	41	21.60	1959.57	1658.88	1990.69
2	46	24.30	1980.94	1672.23	2016.46
2	51	27.00	2035.51	1757.89	2083.86
3	1	0.00	2035.51	1757.89	2083.86
3	6	1.80	2070.85	1758.27	2117.01
3	11	3.60	2106.80	1788.32	2138.83
3	16	5.40	2128.84	1799.66	2166.28
3	21	7.20	2151.10	1804.54	2207.70
3	26	9.00	2173.60	1812.31	2248.28
3	31	10.80	2196.34	1828.84	2278.72
3	36	12.60	2216.96	1852.70	2294.18
3	41	14.40	2237.78	1883.02	2300.01
3	46	16.20	2258.79	1915.42	2302.71
3	51	18.00	2280.00	1954.91	2306.13

### ESFUERZOS EN SERVICIO INCLUYENDO HIPERESTATICOS DE PRETENSADO EN LAS HIPOTESIS DE COMBINACION DEFINIDAS

HIPOTESIS 1 = PESO PROPIO  
 HIPOTESIS 2 = 1 + CARGAS MUERTAS  
 HIPOTESIS 3 = 2 + SOBRECARGA + CARRO

## Anexo A2: Resultados de ejemplo calculado con LOSAC

HIPOTESIS 4 = 2 + TEMPERATURA  
 HIPOTESIS 5 = 3 + TEMPERATURA (determinante)  
 HIPOTESIS 6 = 3 + TEMPERATURA (no determinante)

VANO 1	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	0.00	201.29	338.22	413.49	427.11	379.06	269.37	98.01	-135.00	-429.67	-788.70
H 1 M.MN.	0.00	201.29	338.22	413.49	427.11	379.06	269.37	98.01	-135.00	-429.67	-788.70
H 1 Q.MX.	132.85	93.20	58.95	24.69	-9.56	-43.82	-78.07	-112.32	-146.58	-180.83	-220.49
H 1 Q.MN.	132.85	93.20	58.95	24.69	-9.56	-43.82	-78.07	-112.32	-146.58	-180.83	-220.49
H 2 M.MX.	0.00	230.89	386.89	470.70	482.33	421.77	289.02	84.09	-193.03	-542.34	-966.54
H 2 M.MN.	0.00	230.89	386.89	470.70	482.33	421.77	289.02	84.09	-193.03	-542.34	-966.54
H 2 Q.MX.	152.22	106.72	66.62	26.51	-13.59	-53.70	-93.80	-133.90	-174.01	-214.11	-259.62
H 2 Q.MN.	152.22	106.72	66.62	26.51	-13.59	-53.70	-93.80	-133.90	-174.01	-214.11	-259.62
H 3 M.MX.	0.00	307.02	519.05	637.98	668.00	607.57	457.74	219.07	-106.86	-513.60	-938.96
H 3 M.MN.	0.00	212.38	349.87	415.17	408.28	329.21	177.95	-45.49	-341.13	-712.93	-1198.20
H 3 Q.MX.	200.17	146.68	98.65	49.18	1.45	-43.53	-86.21	-128.66	-172.48	-212.58	-258.08
H 3 Q.MN.	141.94	96.44	56.33	13.46	-29.89	-75.73	-125.00	-172.56	-219.92	-267.05	-319.32
H 4 M.MX.	0.00	245.03	415.18	513.14	538.91	492.50	373.89	183.10	-79.87	-415.04	-825.09
H 4 M.MN.	0.00	230.89	386.89	470.70	482.33	421.77	289.02	84.09	-193.03	-542.34	-966.54
H 4 Q.MX.	160.08	114.58	74.47	34.37	-5.73	-45.84	-85.94	-126.05	-166.15	-206.25	-251.76
H 4 Q.MN.	152.22	106.72	66.62	26.51	-13.59	-53.70	-93.80	-133.90	-174.01	-214.11	-259.62
H 5 M.MX.	0.00	312.68	530.37	654.96	690.64	635.86	491.68	258.68	-61.59	-462.68	-882.38
H 5 M.MN.	0.00	212.38	349.87	415.17	408.28	329.21	177.95	-45.49	-341.13	-712.93	-1198.20
H 5 Q.MX.	203.31	149.82	101.79	52.33	4.59	-40.39	-83.07	-125.52	-169.33	-209.44	-254.94
H 5 Q.MN.	141.94	96.44	56.33	13.46	-29.89	-75.73	-125.00	-172.56	-219.92	-267.05	-319.32
H 6 M.MX.	0.00	275.49	468.05	580.05	613.18	566.81	441.38	237.10	-45.40	-403.54	-814.06
H 6 M.MN.	0.00	223.48	372.08	448.49	452.71	384.75	244.59	32.26	-252.27	-610.58	-1059.20
H 6 Q.MX.	179.26	130.56	87.29	43.44	0.28	-41.77	-82.91	-123.95	-165.54	-205.64	-251.15
H 6 Q.MN.	148.11	102.61	62.50	21.29	-20.11	-62.51	-106.28	-149.37	-192.37	-235.29	-283.50
VANO 2	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	-788.70	-161.72	323.83	670.65	878.74	948.11	878.74	670.65	323.83	-161.72	-788.70
H 1 M.MN.	-788.70	-161.72	323.83	670.65	878.74	948.11	878.74	670.65	323.83	-161.72	-788.70
H 1 Q.MX.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
H 1 Q.MN.	262.30	205.52	154.14	102.76	51.38	0.00	-51.38	-102.76	-154.14	-205.52	-262.31
H 2 M.MX.	-966.54	-232.94	335.53	741.58	985.21	1066.43	985.21	741.58	335.53	-232.94	-966.54
H 2 M.MN.	-966.54	-232.94	335.53	741.58	985.21	1066.43	985.21	741.58	335.53	-232.94	-966.54
H 2 Q.MX.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 2 Q.MN.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 3 M.MX.	-938.96	-201.46	438.67	920.67	1212.93	1311.30	1212.93	920.67	438.67	-201.46	-938.96
H 3 M.MN.	-1198.20	-336.98	267.86	681.68	931.16	1018.22	931.16	681.68	267.86	-336.98	-1198.20
H 3 Q.MX.	372.03	297.17	226.28	155.99	85.53	15.03	-49.41	-112.52	-175.26	-236.21	-301.77
H 3 Q.MN.	301.77	236.21	175.26	112.52	49.41	-15.03	-85.53	-155.99	-227.27	-297.17	-372.03
H 4 M.MX.	-825.09	-91.49	476.98	883.04	1126.67	1207.88	1126.67	883.04	476.98	-91.49	-825.09
H 4 M.MN.	-966.54	-232.94	335.53	741.58	985.21	1066.43	985.21	741.58	335.53	-232.94	-966.54
H 4 Q.MX.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 4 Q.MN.	306.18	240.62	180.47	120.31	60.16	0.00	-60.16	-120.31	-180.47	-240.62	-306.18
H 5 M.MX.	-882.38	-144.88	495.26	977.25	1269.51	1367.88	1269.51	977.25	495.26	-144.88	-882.38
H 5 M.MN.	-1198.20	-336.98	267.86	681.68	931.16	1018.22	931.16	681.68	267.86	-336.98	-1198.20
H 5 Q.MX.	372.03	297.17	226.28	155.99	85.53	15.03	-49.41	-112.52	-175.26	-236.21	-301.77
H 5 Q.MN.	301.77	236.21	175.26	112.52	49.41	-15.03	-85.53	-155.99	-227.27	-297.17	-372.03
H 6 M.MX.	-814.06	-78.90	518.24	954.67	1217.75	1305.83	1217.75	954.67	518.24	-78.90	-814.06
H 6 M.MN.	-1059.20	-274.56	308.46	717.62	963.59	1047.14	963.59	717.62	308.46	-274.56	-1059.20
H 6 Q.MX.	332.52	263.24	198.79	134.58	70.30	6.01	-55.86	-117.19	-178.39	-238.86	-304.42
H 6 Q.MN.	304.42	238.86	178.39	117.19	55.86	-6.01	-70.30	-134.58	-199.19	-263.24	-332.52
VANO 3	1	2	3	4	5	6	7	8	9	10	11
=====											
H 1 M.MX.	-788.70	-429.67	-135.00	98.01	269.37	379.06	427.11	413.49	338.22	201.29	0.00
H 1 M.MN.	-788.70	-429.67	-135.00	98.01	269.37	379.06	427.11	413.49	338.22	201.29	0.00
H 1 Q.MX.	220.49	180.83	146.58	112.32	78.07	43.82	9.56	-24.69	-58.95	-93.20	-132.85
H 1 Q.MN.	220.49	180.83	146.58	112.32	78.07	43.82	9.56	-24.69	-58.95	-93.20	-132.85
H 2 M.MX.	-966.54	-542.34	-193.03	84.09	289.02	421.77	482.33	470.70	386.89	230.89	0.00
H 2 M.MN.	-966.54	-542.34	-193.03	84.09	289.02	421.77	482.33	470.70	386.89	230.89	0.00
H 2 Q.MX.	259.62	214.11	174.01	133.90	93.80	53.70	13.59	-26.51	-66.62	-106.72	-152.22
H 2 Q.MN.	259.62	214.11	174.01	133.90	93.80	53.70	13.59	-26.51	-66.62	-106.72	-152.22
H 3 M.MX.	-938.96	-513.60	-106.86	219.07	457.74	607.56	668.00	637.98	519.05	307.02	0.00
H 3 M.MN.	-1198.20	-712.93	-341.13	-45.49	177.95	329.21	408.28	415.17	349.87	212.38	0.00
H 3 Q.MX.	319.32	267.05	219.92	172.56	125.00	75.73	29.89	-13.46	-56.33	-96.44	-141.94
H 3 Q.MN.	258.08	212.58	171.73	128.66	86.21	43.53	-1.45	-49.18	-98.65	-146.68	-200.17
H 4 M.MX.	-825.09	-415.04	-79.87	183.10	373.89	492.50	538.91	513.14	415.18	245.03	0.00
H 4 M.MN.	-966.54	-542.34	-193.03	84.09	289.02	421.77	482.33	470.70	386.89	230.89	0.00
H 4 Q.MX.	220.49	180.83	146.58	112.32	78.07	43.82	9.56	-24.69	-58.95	-93.20	-132.85
H 4 Q.MN.	251.76	206.25	166.15	126.05	85.94	45.84	5.73	-34.37	-74.47	-114.58	-160.08
H 5 M.MX.	-882.38	-462.68	-61.59	258.68	491.68	635.86	690.64	654.96	530.37	312.68	0.00
H 5 M.MN.	-1198.20	-712.93	-341.13	-45.49	177.95	329.21	408.28	415.17	349.87	212.38	0.00
H 5 Q.MX.	319.32	267.05	219.92	172.56	125.00	75.73	29.89	-13.46	-56.33	-96.44	-141.94
H 5 Q.MN.	254.94	209.44	168.59	125.52	83.07	40.39	-4.59	-52.33	-101.79	-149.82	-203.31
H 6 M.MX.	-814.06	-403.54	-45.40	237.10	441.38	566.81	613.18	580.05	468.05	275.49	0.00
H 6 M.MN.	-1059.20	-610.58	-252.27	32.25	244.59	384.75	452.71	448.49	372.08	223.48	0.00
H 6 Q.MX.	283.50	235.29	192.37	149.37	106.28	62.51	20.11	-21.29	-62.50	-102.61	-148.11
H 6 Q.MN.	251.15	205.64	165.24	123.95	82.91	41.77	-0.28	-43.44	-87.29	-130.56	-179.26

Anexo A2: Resultados de ejemplo calculado con LOSAC

REACCIONES EN LOS APOYOS

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HIPOTESIS	APOYO	REACCION CARGAS	RHIP. PRETENSADO	REACCION TOTAL
1	1	118.651062	27.940285	146.591339
1	2	496.993927	-27.940317	469.053619
1	3	496.993958	-27.940201	469.053772
1	4	118.651077	27.940235	146.591309
2	1	138.021149	27.940285	165.961426
2	2	579.998840	-27.940317	552.058533
2	3	579.998901	-27.940201	552.058716
2	4	138.021164	27.940235	165.961395
3	1	185.967468	27.940285	213.907745
3	2	679.450562	-27.940317	651.510254
3	3	679.450623	-27.940201	651.510437
3	4	185.967484	27.940235	213.907715
4	1	145.879593	27.940285	173.819885
4	2	579.998840	-27.940317	552.058533
4	3	579.998901	-27.940201	552.058716
4	4	145.879608	27.940235	173.819839
5	1	165.058121	27.940285	192.998413
5	2	619.779541	-27.940317	591.839233
5	3	619.779602	-27.940201	591.839417
5	4	165.058136	27.940235	192.998367
6	1	189.110855	27.940285	217.051147
6	2	679.450562	-27.940317	651.510254
6	3	679.450623	-27.940201	651.510437
6	4	189.110870	27.940235	217.051102

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TENSIONES A CORTO Y LARGO PLAZO

HIPOTESIS DE CARGA NUMERO 1

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TENSIONES DEBIDAS A MOMENTOS MAXIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-261.18	-48.43	73.43	107.81	46.94	-115.48	-375.24	-728.20	-964.42	-797.50
SIG INF.INS.	-466.64	-1011.30	-1266.33	-1407.21	-1438.20	-1348.19	-1130.62	-790.81	-333.95	-15.62	37.80
SIG SUP.DIF.	-400.11	-239.75	-73.57	18.51	42.92	-4.72	-131.25	-337.36	-620.07	-796.77	-642.21
SIG INF.DIF.	-400.11	-834.21	-1023.29	-1120.61	-1137.10	-1067.85	-904.86	-643.33	-280.78	-39.20	-20.15
-----											
SIG SUP.INS.	-797.49	-901.48	-634.00	-450.08	-344.76	-313.19	-344.76	-450.08	-634.00	-901.48	-797.50
SIG INF.INS.	37.80	-41.43	-365.07	-583.78	-703.80	-731.23	-703.80	-583.78	-365.07	-41.42	37.80
SIG SUP.DIF.	-642.21	-763.87	-580.54	-453.62	-380.13	-358.27	-380.13	-453.62	-580.54	-763.88	-642.21
SIG INF.DIF.	-20.15	-30.61	-253.88	-407.25	-492.80	-511.28	-492.80	-407.25	-253.88	-30.60	-20.15
-----											
SIG SUP.INS.	-797.49	-964.42	-728.20	-375.24	-115.48	46.94	107.81	73.43	-48.43	-261.18	-466.64
SIG INF.INS.	37.80	-15.62	-333.95	-790.81	-1130.62	-1348.19	-1438.21	-1407.21	-1266.33	-1011.30	-466.64
SIG SUP.DIF.	-642.21	-796.77	-620.07	-337.36	-131.25	-4.72	42.92	18.51	-73.57	-239.75	-400.11
SIG INF.DIF.	-20.15	-39.20	-280.78	-643.33	-904.86	-1067.85	-1137.10	-1120.61	-1023.29	-834.21	-400.11

TENSIONES DEBIDAS A MOMENTOS MINIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-261.18	-48.43	73.43	107.81	46.94	-115.48	-375.24	-728.20	-964.42	-797.50
SIG INF.INS.	-466.64	-1011.30	-1266.33	-1407.21	-1438.20	-1348.19	-1130.62	-790.81	-333.95	-15.62	37.80
SIG SUP.DIF.	-400.11	-239.75	-73.57	18.51	42.92	-4.72	-131.25	-337.36	-620.07	-796.77	-642.21
SIG INF.DIF.	-400.11	-834.21	-1023.29	-1120.61	-1137.10	-1067.85	-904.86	-643.33	-280.78	-39.20	-20.15
-----											
SIG SUP.INS.	-797.49	-901.48	-634.00	-450.08	-344.76	-313.19	-344.76	-450.08	-634.00	-901.48	-797.50
SIG INF.INS.	37.80	-41.43	-365.07	-583.78	-703.80	-731.23	-703.80	-583.78	-365.07	-41.42	37.80
SIG SUP.DIF.	-642.21	-763.87	-580.54	-453.62	-380.13	-358.27	-380.13	-453.62	-580.54	-763.88	-642.21
SIG INF.DIF.	-20.15	-30.61	-253.88	-407.25	-492.80	-511.28	-492.80	-407.25	-253.88	-30.60	-20.15
-----											
SIG SUP.INS.	-797.49	-964.42	-728.20	-375.24	-115.48	46.94	107.81	73.43	-48.43	-261.18	-466.64
SIG INF.INS.	37.80	-15.62	-333.95	-790.81	-1130.62	-1348.19	-1438.21	-1407.21	-1266.33	-1011.30	-466.64
SIG SUP.DIF.	-642.21	-796.77	-620.07	-337.36	-131.25	-4.72	42.92	18.51	-73.57	-239.75	-400.11
SIG INF.DIF.	-20.15	-39.20	-280.78	-643.33	-904.86	-1067.85	-1137.10	-1120.61	-1023.29	-834.21	-400.11

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TENSIONES A CORTO Y LARGO PLAZO

HIPOTESIS DE CARGA NUMERO 2

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TENSIONES DEBIDAS A MOMENTOS MAXIMOS

## Anexo A2: Resultados de ejemplo calculado con LOSAC

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-277.29	-74.92	42.29	77.76	23.70	-126.18	-367.66	-696.62	-903.10	-702.45
SIG INF.INS.	-466.64	-991.04	-1233.02	-1368.06	-1400.42	-1318.96	-1117.17	-800.34	-373.66	-92.72	-75.59
SIG SUP.DIF.	-400.11	-255.86	-100.05	-12.63	12.86	-27.96	-141.95	-329.79	-588.49	-735.46	-547.16
SIG INF.DIF.	-400.11	-813.96	-989.99	-1081.46	-1099.31	-1038.62	-891.41	-652.86	-320.49	-116.30	-133.54

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-702.45	-862.72	-640.37	-488.68	-402.71	-377.58	-402.71	-488.68	-640.37	-862.72	-702.45
SIG INF.INS.	-75.59	-90.16	-357.06	-535.25	-630.95	-650.27	-630.95	-535.25	-357.06	-90.16	-75.59
SIG SUP.DIF.	-547.16	-725.11	-586.91	-492.22	-438.08	-422.66	-438.08	-492.22	-586.91	-725.11	-547.16
SIG INF.DIF.	-133.54	-79.34	-245.87	-358.71	-419.94	-430.32	-419.94	-358.71	-245.87	-79.34	-133.54

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-702.45	-903.10	-696.62	-367.66	-126.18	23.70	77.76	42.29	-74.92	-277.29	-466.64
SIG INF.INS.	-75.59	-92.72	-373.66	-800.34	-1117.17	-1318.96	-1400.42	-1368.06	-1233.02	-991.04	-466.64
SIG SUP.DIF.	-547.16	-735.45	-588.49	-329.79	-141.95	-27.96	12.86	-12.63	-100.05	-255.86	-400.11
SIG INF.DIF.	-133.54	-116.30	-320.49	-652.86	-891.41	-1038.62	-1099.32	-1081.46	-989.99	-813.96	-400.11

TENSIONES DEBIDAS A MOMENTOS MINIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-277.29	-74.92	42.29	77.76	23.70	-126.18	-367.66	-696.62	-903.10	-702.45
SIG INF.INS.	-466.64	-991.04	-1233.02	-1368.06	-1400.42	-1318.96	-1117.17	-800.34	-373.66	-92.72	-75.59
SIG SUP.DIF.	-400.11	-255.86	-100.05	-12.63	12.86	-27.96	-141.95	-329.79	-588.49	-735.46	-547.16
SIG INF.DIF.	-400.11	-813.96	-989.99	-1081.46	-1099.31	-1038.62	-891.41	-652.86	-320.49	-116.30	-133.54

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-702.45	-862.72	-640.37	-488.68	-402.71	-377.58	-402.71	-488.68	-640.37	-862.72	-702.45
SIG INF.INS.	-75.59	-90.16	-357.06	-535.25	-630.95	-650.27	-630.95	-535.25	-357.06	-90.16	-75.59
SIG SUP.DIF.	-547.16	-725.11	-586.91	-492.22	-438.08	-422.66	-438.08	-492.22	-586.91	-725.11	-547.16
SIG INF.DIF.	-133.54	-79.34	-245.87	-358.71	-419.94	-430.32	-419.94	-358.71	-245.87	-79.34	-133.54

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-702.45	-903.10	-696.62	-367.66	-126.18	23.70	77.76	42.29	-74.92	-277.29	-466.64
SIG INF.INS.	-75.59	-92.72	-373.66	-800.34	-1117.17	-1318.96	-1400.42	-1368.06	-1233.02	-991.04	-466.64
SIG SUP.DIF.	-547.16	-735.45	-588.49	-329.79	-141.95	-27.96	12.86	-12.63	-100.05	-255.86	-400.11
SIG INF.DIF.	-133.54	-116.30	-320.49	-652.86	-891.41	-1038.62	-1099.32	-1081.46	-989.99	-813.96	-400.11

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TENSIONES A CORTO Y LARGO PLAZO  
HIPOTESIS DE CARGA NUMERO 3

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TENSIONES DEBIDAS A MOMENTOS MAXIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-318.72	-146.85	-48.74	-23.29	-77.41	-218.00	-441.12	-743.52	-918.74	-717.19
SIG INF.INS.	-466.64	-938.94	-1142.59	-1253.59	-1273.36	-1191.83	-1001.72	-707.97	-314.69	-73.05	-58.01
SIG SUP.DIF.	-400.11	-297.29	-171.98	-103.66	-88.18	-129.07	-233.76	-403.25	-635.39	-751.10	-561.90
SIG INF.DIF.	-400.11	-761.86	-899.55	-966.99	-972.26	-911.49	-775.96	-560.49	-261.52	-96.63	-115.96

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-717.19	-879.86	-696.50	-586.15	-526.64	-510.85	-526.64	-586.15	-696.50	-879.86	-717.19
SIG INF.INS.	-58.01	-68.62	-286.48	-412.70	-475.13	-482.71	-475.13	-412.70	-286.48	-68.61	-58.00
SIG SUP.DIF.	-561.90	-742.25	-643.04	-589.69	-562.01	-555.93	-562.01	-589.69	-643.04	-742.25	-561.90
SIG INF.DIF.	-115.96	-57.80	-175.29	-236.17	-264.12	-262.76	-264.12	-236.17	-175.29	-57.79	-115.96

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-717.19	-918.74	-743.52	-441.12	-218.00	-77.41	-23.29	-48.74	-146.85	-318.72	-466.64
SIG INF.INS.	-58.01	-73.05	-314.69	-707.97	-1001.72	-1191.83	-1273.36	-1253.59	-1142.59	-938.94	-466.64
SIG SUP.DIF.	-561.90	-751.10	-635.39	-403.25	-233.76	-129.07	-88.18	-103.66	-171.98	-297.29	-400.11
SIG INF.DIF.	-115.96	-96.63	-261.52	-560.49	-775.96	-911.49	-972.26	-966.99	-899.55	-761.86	-400.11

TENSIONES DEBIDAS A MOMENTOS MINIMOS

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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-267.21	-54.77	72.52	118.06	74.07	-65.73	-297.14	-616.02	-810.26	-578.64
SIG INF.INS.	-466.64	-1003.71	-1258.36	-1406.06	-1451.08	-1382.30	-1193.17	-889.01	-474.99	-209.45	-223.30
SIG SUP.DIF.	-400.11	-245.79	-79.91	17.60	53.16	22.42	-81.50	-259.27	-507.89	-642.62	-423.35
SIG INF.DIF.	-400.11	-826.62	-1015.32	-1119.46	-1149.98	-1101.96	-967.41	-741.53	-421.82	-233.03	-281.25

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-578.64	-806.10	-603.54	-456.08	-373.29	-351.35	-373.29	-456.08	-603.54	-806.10	-578.64
SIG INF.INS.	-223.30	-161.35	-403.37	-576.24	-667.93	-683.26	-667.93	-576.24	-403.37	-161.35	-223.29
SIG SUP.DIF.	-423.35	-668.49	-550.08	-459.62	-408.66	-396.42	-408.66	-459.62	-550.08	-668.49	-423.35
SIG INF.DIF.	-281.25	-150.53	-292.17	-399.70	-456.93	-463.31	-456.93	-399.70	-292.17	-150.53	-281.25

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-578.63	-810.26	-616.02	-297.14	-65.73	74.07	118.06	72.52	-54.77	-267.21	-466.64

## Anexo A2: Resultados de ejemplo calculado con LOSAC

SIG INF.INS. -223.30 -209.45 -475.00 -889.01-1193.17-1382.30-1451.08-1406.06-1258.36-1003.71 -466.64  
 SIG SUP.DIF. -423.35 -642.62 -507.89 -259.27 -81.50 22.42 53.16 17.60 -79.90 -245.79 -400.11  
 SIG INF.DIF. -281.25 -233.03 -421.82 -741.53 -967.41-1101.96-1149.98-1119.46-1015.32 -826.62 -400.11

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 TENSIONES A CORTO Y LARGO PLAZO  
 HIPOTESIS DE CARGA NUMERO 4  
 =====

TENSIONES DEBIDAS A MOMENTOS MAXIMOS  
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-284.99	-90.32	19.20	46.97	-14.79	-172.37	-421.55	-758.20	-972.38	-778.05
SIG INF.INS.	-466.64	-981.36	-1213.66	-1339.02	-1361.70	-1270.57	-1059.09	-732.58	-296.22	-5.60	14.60
SIG SUP.DIF.	-400.11	-263.56	-115.45	-35.72	-17.93	-66.45	-188.14	-383.68	-650.07	-804.74	-622.76
SIG INF.DIF.	-400.11	-804.28	-970.63	-1052.42	-1060.60	-990.23	-833.33	-585.10	-243.05	-29.19	-43.35

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-778.05	-939.70	-717.35	-565.67	-479.69	-454.56	-479.69	-565.66	-717.35	-939.70	-778.05
SIG INF.INS.	14.60	6.63	-260.27	-438.45	-534.15	-553.48	-534.15	-438.45	-260.27	6.63	14.60
SIG SUP.DIF.	-622.76	-802.09	-663.89	-569.21	-515.06	-499.64	-515.06	-569.21	-663.89	-802.10	-622.76
SIG INF.DIF.	-43.35	17.45	-149.08	-261.92	-323.15	-333.53	-323.15	-261.92	-149.08	17.45	-43.35

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-778.05	-972.38	-758.20	-421.55	-172.37	-14.79	46.97	19.20	-90.32	-284.99	-466.64
SIG INF.INS.	-466.64	-991.04	-1233.02	-1368.06	-1400.42	-1318.96	-1117.17	-800.34	-373.66	-92.72	-75.59
SIG SUP.DIF.	-400.11	-255.86	-100.05	-12.63	12.86	-27.96	-141.95	-329.79	-588.49	-735.46	-547.16
SIG INF.DIF.	-400.11	-813.96	-989.99	-1081.46	-1099.31	-1038.62	-891.41	-652.86	-320.49	-116.30	-133.54

TENSIONES DEBIDAS A MOMENTOS MINIMOS  
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-277.29	-74.92	42.29	77.76	23.70	-126.18	-367.66	-696.62	-903.10	-702.45
SIG INF.INS.	-466.64	-991.04	-1233.02	-1368.06	-1400.42	-1318.96	-1117.17	-800.34	-373.66	-92.72	-75.59
SIG SUP.DIF.	-400.11	-255.86	-100.05	-12.63	12.86	-27.96	-141.95	-329.79	-588.49	-735.46	-547.16
SIG INF.DIF.	-400.11	-813.96	-989.99	-1081.46	-1099.31	-1038.62	-891.41	-652.86	-320.49	-116.30	-133.54

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-702.45	-862.72	-640.37	-488.68	-402.71	-377.58	-402.71	-488.68	-640.37	-862.72	-702.45
SIG INF.INS.	-75.59	-90.16	-357.06	-535.25	-630.95	-650.27	-630.95	-535.25	-357.06	-90.16	-75.59
SIG SUP.DIF.	-547.16	-725.11	-586.91	-492.22	-438.08	-422.66	-438.08	-492.22	-586.91	-725.11	-547.16
SIG INF.DIF.	-133.54	-79.34	-245.87	-358.71	-419.94	-430.32	-419.94	-358.71	-245.87	-79.34	-133.54

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-702.45	-903.10	-696.62	-367.66	-126.18	23.70	77.76	42.29	-74.92	-277.29	-466.64
SIG INF.INS.	-466.64	-991.04	-1233.02	-1368.06	-1400.42	-1318.96	-1117.17	-800.34	-373.66	-92.72	-75.59
SIG SUP.DIF.	-400.11	-255.86	-100.05	-12.63	12.86	-27.96	-141.95	-329.79	-588.49	-735.46	-547.16
SIG INF.DIF.	-400.11	-813.96	-989.99	-1081.46	-1099.31	-1038.62	-891.41	-652.86	-320.49	-116.30	-133.54

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 TENSIONES A CORTO Y LARGO PLAZO  
 HIPOTESIS DE CARGA NUMERO 5  
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TENSIONES DEBIDAS A MOMENTOS MAXIMOS  
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-321.80	-153.01	-57.98	-35.61	-92.81	-236.47	-462.68	-768.15	-946.46	-747.43
SIG INF.INS.	-466.64	-935.07	-1134.84	-1241.98	-1257.88	-1172.47	-978.49	-680.87	-283.72	-38.20	-21.93
SIG SUP.DIF.	-400.11	-300.37	-178.14	-112.90	-100.50	-144.47	-252.24	-424.80	-660.02	-778.81	-592.14
SIG INF.DIF.	-400.11	-757.99	-891.81	-955.38	-956.78	-892.13	-752.73	-533.39	-230.55	-61.78	-79.88

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-747.43	-910.65	-727.29	-616.94	-557.43	-541.64	-557.43	-616.94	-727.29	-910.65	-747.43
SIG INF.INS.	-21.93	-29.90	-247.77	-373.98	-436.41	-443.99	-436.41	-373.98	-247.77	-29.90	-21.93
SIG SUP.DIF.	-592.14	-773.04	-673.83	-620.48	-592.80	-586.72	-592.80	-620.48	-673.83	-773.04	-592.14
SIG INF.DIF.	-79.88	-19.08	-136.57	-197.45	-225.41	-224.04	-225.41	-197.45	-136.57	-19.08	-79.88

  

VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-747.43	-946.46	-768.15	-462.68	-236.47	-92.81	-35.61	-57.98	-153.01	-321.80	-466.64
SIG INF.INS.	-466.64	-935.07	-1134.84	-1241.98	-1257.88	-1172.47	-978.49	-680.87	-283.72	-38.20	-21.93
SIG SUP.DIF.	-400.11	-300.37	-178.14	-112.90	-100.50	-144.47	-252.24	-424.80	-660.02	-778.81	-592.14
SIG INF.DIF.	-400.11	-757.99	-891.81	-955.38	-956.78	-892.13	-752.73	-533.39	-230.55	-61.78	-79.88

TENSIONES DEBIDAS A MOMENTOS MINIMOS  
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VANO	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-267.21	-54.77	72.52	118.06	74.07	-65.73	-297.14	-616.02	-810.26	-578.64
SIG INF.INS.	-466.64	-1003.71	-1258.36	-1406.06	-1451.08	-1382.30	-1193.17	-889.01	-474.99	-209.45	-223.30

## Anexo A2: Resultados de ejemplo calculado con LOSAC

SIG SUP.DIF. -400.11 -245.79 -79.91 17.60 53.16 22.42 -81.50 -259.27 -507.89 -642.62 -423.35  
 SIG INF.DIF. -400.11 -826.62-1015.32-1119.46-1149.98-1101.96 -967.41 -741.53 -421.82 -233.03 -281.25

VANO	2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-578.64	-806.10	-603.54	-456.08	-373.29	-351.35	-373.29	-456.08	-603.54	-806.10	-578.64	
SIG INF.INS.	-223.30	-161.35	-403.37	-576.24	-667.93	-683.26	-667.93	-576.24	-403.37	-161.35	-223.29	
SIG SUP.DIF.	-423.35	-668.49	-550.08	-459.62	-408.66	-396.42	-408.66	-459.62	-550.08	-668.49	-423.35	
SIG INF.DIF.	-281.25	-150.53	-292.17	-399.70	-456.93	-463.31	-456.93	-399.70	-292.17	-150.53	-281.25	

VANO	3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-578.63	-810.26	-616.02	-297.14	-65.73	74.07	118.06	72.52	-54.77	-267.21	-466.64	
SIG INF.INS.	-223.30	-209.45	-475.00	-889.01	-1193.17	-1382.30	-1451.08	-1406.06	-1258.36	-1003.71	-466.64	
SIG SUP.DIF.	-423.35	-642.62	-507.89	-259.27	-81.50	22.42	53.16	17.60	-79.90	-245.79	-400.11	
SIG INF.DIF.	-281.25	-233.03	-421.82	-741.53	-967.41	-1101.96	-1149.98	-1119.46	-1015.32	-826.62	-400.11	

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 TENSIONES A CORTO Y LARGO PLAZO  
 HIPOTESIS DE CARGA NUMERO 6  
 =====

TENSIONES DEBIDAS A MOMENTOS MAXIMOS  
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VANO	1	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-301.56	-119.09	-17.21	6.55	-55.24	-209.09	-450.93	-776.96	-978.64	-783.94	
SIG INF.INS.	-466.64	-960.52	-1177.49	-1293.23	-1310.88	-1219.71	-1012.92	-695.64	-272.64	2.26	21.63	
SIG SUP.DIF.	-400.11	-280.13	-144.22	-72.14	-58.35	-106.89	-224.86	-413.06	-668.83	-811.00	-628.66	
SIG INF.DIF.	-400.11	-783.44	-934.45	-1006.63	-1009.78	-939.37	-787.15	-548.16	-219.47	-21.32	-36.32	

VANO	2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-783.94	-946.56	-739.80	-604.65	-529.26	-507.87	-529.26	-604.65	-739.80	-946.56	-783.95	
SIG INF.INS.	21.63	15.25	-232.04	-389.43	-471.83	-486.45	-471.83	-389.44	-232.04	15.25	21.63	
SIG SUP.DIF.	-628.66	-808.95	-686.34	-608.19	-564.63	-552.95	-564.63	-608.19	-686.34	-808.95	-628.66	
SIG INF.DIF.	-36.32	26.07	-120.85	-212.90	-260.82	-266.50	-260.82	-212.90	-120.85	26.07	-36.32	

VANO	3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-783.94	-978.64	-776.96	-450.93	-209.09	-55.23	6.55	-17.21	-119.09	-301.56	-466.64	
SIG INF.INS.	21.63	2.26	-272.64	-695.64	-1012.92	-1219.71	-1310.88	-1293.23	-1177.49	-960.52	-466.64	
SIG SUP.DIF.	-628.66	-811.00	-668.83	-413.06	-224.86	-106.89	-58.35	-72.14	-144.22	-280.13	-400.11	
SIG INF.DIF.	-36.32	-21.32	-219.47	-548.16	-787.15	-939.37	-1009.78	-1006.63	-934.45	-783.44	-400.11	

TENSIONES DEBIDAS A MOMENTOS MINIMOS  
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VANO	1	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-466.64	-273.26	-66.86	54.38	93.88	43.85	-102.00	-339.45	-664.38	-865.97	-652.92	
SIG INF.INS.	-466.64	-996.11	-1243.16	-1383.26	-1420.68	-1344.30	-1147.57	-835.80	-414.19	-139.41	-134.67	
SIG SUP.DIF.	-400.11	-251.83	-91.99	-0.54	28.98	-7.81	-117.77	-301.58	-556.25	-698.32	-497.64	
SIG INF.DIF.	-400.11	-819.02	-1000.12	-1096.66	-1119.58	-1063.96	-921.81	-688.33	-361.02	-162.99	-192.63	

VANO	2	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-652.92	-840.07	-625.64	-475.64	-390.94	-367.09	-390.94	-475.64	-625.64	-840.07	-652.93	
SIG INF.INS.	-134.67	-118.64	-375.59	-551.64	-645.74	-663.46	-645.74	-551.64	-375.59	-118.64	-134.67	
SIG SUP.DIF.	-497.64	-702.46	-572.18	-479.18	-426.31	-412.16	-426.31	-479.18	-572.18	-702.47	-497.64	
SIG INF.DIF.	-192.63	-107.82	-264.39	-375.11	-434.74	-443.52	-434.74	-375.11	-264.39	-107.82	-192.62	

VANO	3	1	2	3	4	5	6	7	8	9	10	11
SIG SUP.INS.	-652.92	-865.97	-664.38	-339.45	-102.00	43.85	93.88	54.38	-66.86	-273.26	-466.64	
SIG INF.INS.	-134.67	-139.41	-414.19	-835.81	-1147.57	-1344.30	-1420.68	-1383.26	-1243.16	-996.11	-466.64	
SIG SUP.DIF.	-497.64	-698.32	-556.25	-301.58	-117.77	-7.81	28.98	-0.54	-91.99	-251.83	-400.11	
SIG INF.DIF.	-192.63	-162.99	-361.02	-688.33	-921.81	-1063.96	-1119.58	-1096.66	-1000.12	-819.02	-400.11	

SE HA SUPERADO LA TENSION MAXIMA DE TRACCION EN LOS SIGUIENTES PUNTOS:

NINGUNO

SE HA SUPERADO LA TENSION MAXIMA DE COMPRESION EN LOS SIGUIENTES PUNTOS:

NINGUNO

DEFORMADA DE LA ESTRUCTURA

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 VANO SECCION PESO PROPIO P.P+C.MUERTA PRET.INICIAL P.P+PR.INIC. P.P+C.M+PR.INIC. FLECHA DIFERIDA

Anexo A2: Resultados de ejemplo calculado con LOSAC

1	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
1	6	-0.00108	-0.00126	0.00604	0.00497	0.00478	0.01263
1	11	-0.00192	-0.00225	0.01107	0.00915	0.00882	0.02327
1	16	-0.00240	-0.00281	0.01443	0.01204	0.01163	0.03064
1	21	-0.00243	-0.00285	0.01577	0.01334	0.01293	0.03403
1	26	-0.00204	-0.00239	0.01504	0.01299	0.01265	0.03328
1	31	-0.00133	-0.00155	0.01249	0.01116	0.01094	0.02876
1	36	-0.00046	-0.00054	0.00871	0.00825	0.00817	0.02147
1	41	0.00029	0.00034	0.00462	0.00491	0.00496	0.01300
1	46	0.00058	0.00068	0.00139	0.00197	0.00207	0.00542
1	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	6	-0.00295	-0.00345	0.00192	-0.00103	-0.00153	-0.00636
2	11	-0.00717	-0.00839	0.00708	-0.00009	-0.00131	-0.00790
2	16	-0.01122	-0.01313	0.01276	0.00154	-0.00038	-0.00708
2	21	-0.01406	-0.01646	0.01694	0.00288	0.00048	-0.00588
2	26	-0.01508	-0.01765	0.01846	0.00338	0.00081	-0.00538
2	31	-0.01406	-0.01646	0.01694	0.00288	0.00048	-0.00588
2	36	-0.01122	-0.01313	0.01276	0.00154	-0.00038	-0.00708
2	41	-0.00717	-0.00839	0.00708	-0.00009	-0.00131	-0.00790
2	46	-0.00295	-0.00345	0.00192	-0.00103	-0.00153	-0.00636
2	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	6	0.00058	0.00068	0.00139	0.00197	0.00207	0.00542
3	11	0.00029	0.00034	0.00462	0.00491	0.00496	0.01300
3	16	-0.00046	-0.00054	0.00871	0.00825	0.00817	0.02147
3	21	-0.00133	-0.00155	0.01249	0.01116	0.01094	0.02876
3	26	-0.00204	-0.00239	0.01504	0.01299	0.01265	0.03328
3	31	-0.00243	-0.00285	0.01577	0.01334	0.01293	0.03403
3	36	-0.00240	-0.00281	0.01443	0.01204	0.01163	0.03064
3	41	-0.00192	-0.00225	0.01107	0.00915	0.00882	0.02327
3	46	-0.00108	-0.00126	0.00604	0.00497	0.00478	0.01263
3	51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

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 ESFUERZOS DE CALCULO PARA COMPROBACION Y  
 DIMENSIONAMIENTO DE LA SECCION EN ROTURA  
 =====

VANO 1	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	604.39	1036.13	1296.85	1399.13	1338.31	1117.60	795.57	444.73	0.00	0.00
Md NEG	0.00	0.00	0.00	0.00	0.00	0.00	-60.03	-354.75	-839.13	-1443.73	-2276.41
Qd POS	388.65	296.42	212.49	124.25	57.88	7.17	-36.66	-79.79	-127.02	-163.11	-204.06
Qd NEG	0.00	0.00	0.00	-13.88	-76.39	-153.75	-241.39	-323.93	-405.86	-487.09	-575.62
VANO 2	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	334.73	1109.27	1946.18	2457.50	2630.80	2457.50	1946.18	1109.26	334.73	0.00
Md NEG	-2276.41	-793.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-793.15	-2276.41
Qd POS	656.82	530.57	408.15	287.49	166.35	45.09	-21.90	-84.89	-146.80	-203.33	-262.33
Qd NEG	0.00	0.00	0.00	0.00	0.00	-45.09	-166.35	-287.49	-411.11	-530.57	-656.82
VANO 3	1	2	3	4	5	6	7	8	9	10	11
Md POS	0.00	0.00	444.73	795.57	1117.60	1338.31	1399.13	1296.85	1036.13	604.39	0.00
Md NEG	-2276.41	-1443.73	-839.13	-354.75	-60.03	0.00	0.00	0.00	0.00	0.00	0.00
Qd POS	575.62	487.09	405.86	323.93	241.39	153.75	76.39	13.88	-30.52	-66.61	-107.57
Qd NEG	0.00	0.00	0.00	0.00	0.00	-7.17	-57.88	-124.25	-212.49	-296.42	-388.65

En esta ocasión se obtienen resultados fuera de cualquier fallo en estado límite de servicio, condición necesaria para predimensionar estructuras con presencia de acero postesado.