ÍNDICE							
Categoría	**Número de Documento**	**Fecha**	**Descripción**	**Observaciones**	**Tomo**	**N° de Folio Inicio**	**N° de Folio final**
Estructuras			Continuación Estructuras Informe estudio y diseño de estructuras de puentes		41	8001	8200

Continuación Estructuras Informe estudio y diseño de estructuras de puentes

The Loss of tendon group [C23-P1] at the stage of [CS12]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	359.22	0.14	1.00	-2.05	-2.63	0.99
34	J	323.04	0.14	1.00	-2.68	-1.18	0.99

The Loss of tendon group [C24-P1] at the stage of [CS12]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
7	I	312.78	0.13	1.00	-2.62	-0.82	0.99
7	J	368.66	0.14	1.00	-2.10	-3.05	0.99
8	I	368.66	0.12	1.00	-1.75	-3.05	0.99
8	J	367.44	0.12	1.00	-1.51	-3.00	0.99
9	I	367.44	0.11	1.00	-1.28	-3.00	0.99
9	J	365.95	0.10	1.00	-1.11	-2.93	0.99
10	I	365.95	0.10	1.00	-1.05	-2.93	0.99
10	J	362.73	0.09	1.00	-0.91	-2.79	0.99
11	I	362.73	0.09	1.00	-0.81	-2.79	0.99
11	J	361.54	0.08	1.00	-0.72	-2.73	0.99
12	I	361.54	0.08	1.00	-0.69	-2.73	0.99
12	J	357.15	0.08	1.00	-0.62	-2.54	0.99
13	I	357.15	0.08	1.00	-0.58	-2.54	0.99
13	J	356.22	0.07	1.00	-0.54	-2.50	0.99
14	I	356.22	0.08	1.00	-0.55	-2.50	0.99
14	J	351.90	0.07	1.00	-0.51	-2.32	0.99
15	I	351.90	0.07	1.00	-0.48	-2.32	0.99
15	J	350.97	0.06	1.00	-0.44	-2.28	0.99
16	I	350.97	0.07	1.00	-0.44	-2.28	0.99
16	J	350.05	0.06	1.00	-0.41	-2.24	0.99
17	I	350.05	0.07	1.00	-0.44	-2.24	0.99
17	J	345.81	0.06	1.00	-0.41	-2.06	0.99
18	I	345.81	0.05	1.00	-0.30	-2.06	0.99
18	J	345.30	0.05	1.00	-0.29	-2.04	0.99
19	I	345.30	0.01	1.00	-0.10	-2.04	0.99
19	J	345.16	0.01	1.00	-0.10	-2.04	0.99
20	I	345.16	0.05	1.00	-0.28	-2.04	0.99
20	J	344.73	0.05	1.00	-0.26	-2.02	0.99
21	I	344.73	0.05	1.00	-0.27	-2.02	0.99
21	J	344.30	0.05	1.00	-0.29	-2.00	0.99
22	I	344.20	0.01	1.00	-0.10	-2.00	0.99
22	J	344.24	0.01	1.00	-0.11	-2.00	0.99
23	I	344.24	0.05	1.00	-0.29	-2.00	0.99
23	J	344.24	0.05	1.00	-0.30	-2.00	0.99
24	I	344.25	0.06	1.00	-0.42	-2.00	0.99
24	J	345.16	0.07	1.00	-0.45	-2.04	0.99
25	I	345.16	0.06	1.00	-0.41	-2.04	0.99
25	J	349.39	0.07	1.00	-0.44	-2.21	0.99
26	I	349.39	0.07	1.00	-0.45	-2.21	0.99
26	J	350.31	0.07	1.00	-0.48	-2.25	0.99
27	I	350.31	0.07	1.00	-0.52	-2.25	0.99
27	J	351.23	0.07	1.00	-0.56	-2.29	0.99
28	I	351.23	0.07	1.00	-0.54	-2.29	0.99
28	J	355.55	0.08	1.00	-0.59	-2.47	0.99
29	I	355.55	0.08	1.00	-0.63	-2.47	0.99
29	J	356.48	0.08	1.00	-0.69	-2.51	0.99

The Loss of tendon group [C24-P1] at the stage of [CS12]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	I	356.48	0.08	1.00	-0.72	-2.51	0.99
30	J	361.09	0.09	1.00	-0.82	-2.71	0.99
31	I	361.09	0.09	1.00	-0.92	-2.71	0.99
31	J	362.28	0.10	1.00	-1.05	-2.77	0.99
32	I	362.28	0.10	1.00	-1.11	-2.77	0.99
32	J	366.97	0.11	1.00	-1.28	-2.98	0.99
33	I	366.97	0.12	1.00	-1.54	-2.98	0.99
33	J	359.22	0.12	1.00	-1.75	-2.63	0.99
34	I	359.22	0.14	1.00	-2.05	-2.63	0.99
34	J	323.01	0.14	1.00	-2.68	-1.18	0.99

The Loss of tendon group [C25-P1] at the stage of [CS13]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
6	I	306.76	0.13	1.00	-2.58	-0.62	0.99
6	J	359.50	0.14	1.00	-1.97	-2.64	0.99
7	I	359.50	0.12	1.00	-1.70	-2.64	0.99
7	J	358.32	0.11	1.00	-1.44	-2.59	0.99
8	I	358.32	0.11	1.00	-1.26	-2.59	0.99
8	J	357.14	0.10	1.00	-1.07	-2.54	0.99
9	I	357.14	0.10	1.00	-0.95	-2.54	0.99
9	J	355.68	0.09	1.00	-0.81	-2.48	0.99
10	I	355.68	0.09	1.00	-0.80	-2.48	0.99
10	J	352.55	0.08	1.00	-0.69	-2.34	0.99
11	I	352.55	0.08	1.00	-0.64	-2.34	0.99
11	J	351.40	0.08	1.00	-0.56	-2.29	0.99
12	I	351.40	0.08	1.00	-0.56	-2.29	0.99
12	J	347.14	0.07	1.00	-0.50	-2.12	0.99
13	I	347.14	0.07	1.00	-0.46	-2.12	0.99
13	J	346.23	0.06	1.00	-0.42	-2.08	0.99
14	I	346.23	0.07	1.00	-0.46	-2.08	0.99
14	J	342.03	0.06	1.00	-0.43	-1.91	0.99
15	I	342.03	0.06	1.00	-0.40	-1.91	0.99
15	J	341.13	0.06	1.00	-0.37	-1.87	0.99
16	I	341.13	0.06	1.00	-0.37	-1.87	0.99
16	J	340.24	0.06	1.00	-0.35	-1.84	0.99
17	I	340.24	0.06	1.00	-0.39	-1.84	0.99
17	J	336.11	0.06	1.00	-0.36	-1.67	0.99
18	I	336.11	0.05	1.00	-0.27	-1.67	0.99
18	J	335.61	0.04	1.00	-0.26	-1.65	0.99
19	I	335.61	0.01	1.00	-0.09	-1.65	0.99
19	J	335.48	0.01	1.00	-0.09	-1.65	0.99
20	I	335.48	0.04	1.00	-0.25	-1.65	0.99
20	J	335.06	0.04	1.00	-0.23	-1.63	0.99
21	I	335.06	0.04	1.00	-0.24	-1.63	0.99
21	J	334.64	0.04	1.00	-0.26	-1.62	0.99
22	I	334.64	0.01	1.00	-0.09	-1.62	0.99
22	J	331.41	0.01	1.00	-0.09	-1.49	1.00
23	I	331.41	0.04	1.00	-0.26	-1.49	0.99
23	J	331.41	0.05	1.00	-0.27	-1.49	0.99
24	I	331.37	0.05	1.00	-0.37	-1.49	0.99
24	J	332.24	0.06	1.00	-0.39	-1.52	0.99

The Loss of tendon group [C25-P1] at the stage of [CS13]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
25	I	332.24	0.05	1.00	-0.34	-1.52	0.99
25	J	336.32	0.06	1.00	-0.37	-1.68	0.99
26	I	336.32	0.06	1.00	-0.38	-1.68	0.99
26	J	337.21	0.06	1.00	-0.41	-1.72	0.99
27	I	337.21	0.06	1.00	-0.43	-1.72	0.99
27	J	338.09	0.07	1.00	-0.47	-1.75	0.99
28	I	338.09	0.06	1.00	-0.42	-1.75	0.99
28	J	342.24	0.07	1.00	-0.47	-1.92	0.99
29	I	342.24	0.07	1.00	-0.51	-1.92	0.99
29	J	343.14	0.07	1.00	-0.56	-1.95	0.99
30	I	343.14	0.07	1.00	-0.56	-1.95	0.99
30	J	347.59	0.08	1.00	-0.65	-2.14	0.99
31	I	347.59	0.08	1.00	-0.69	-2.14	0.99
31	J	348.73	0.09	1.00	-0.80	-2.18	0.99
32	I	348.73	0.09	1.00	-0.81	-2.18	0.99
32	J	353.24	0.10	1.00	-0.95	-2.37	0.99
33	I	353.24	0.10	1.00	-1.08	-2.37	0.99
33	J	354.40	0.11	1.00	-1.26	-2.42	0.99
34	I	354.40	0.11	1.00	-1.42	-2.42	0.99
34	J	358.46	0.12	1.00	-1.70	-2.60	0.99
35	I	358.46	0.14	1.00	-1.96	-2.60	0.99
35	J	311.26	0.14	1.00	-2.61	-0.77	0.99

The Loss of tendon group [C26-P1] at the stage of [CS13]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
6	I	306.76	0.13	1.00	-2.58	-0.62	0.99
6	J	359.50	0.14	1.00	-1.97	-2.64	0.99
7	I	359.50	0.12	1.00	-1.70	-2.64	0.99
7	J	358.32	0.11	1.00	-1.44	-2.59	0.99
8	I	358.32	0.11	1.00	-1.26	-2.59	0.99
8	J	357.13	0.10	1.00	-1.07	-2.54	0.99
9	I	357.13	0.10	1.00	-0.95	-2.54	0.99
9	J	355.69	0.09	1.00	-0.81	-2.48	0.99
10	I	355.69	0.09	1.00	-0.80	-2.48	0.99
10	J	352.55	0.08	1.00	-0.69	-2.34	0.99
11	I	352.55	0.08	1.00	-0.64	-2.34	0.99
11	J	351.40	0.08	1.00	-0.56	-2.29	0.99
12	I	351.40	0.08	1.00	-0.56	-2.29	0.99
12	J	347.14	0.07	1.00	-0.50	-2.12	0.99
13	I	347.14	0.07	1.00	-0.46	-2.12	0.99
13	J	346.23	0.06	1.00	-0.42	-2.08	0.99
14	I	346.23	0.07	1.00	-0.46	-2.08	0.99
14	J	342.03	0.06	1.00	-0.43	-1.91	0.99
15	I	342.03	0.06	1.00	-0.40	-1.91	0.99
15	J	341.13	0.06	1.00	-0.37	-1.87	0.99
16	I	341.13	0.06	1.00	-0.37	-1.87	0.99
16	J	340.24	0.06	1.00	-0.35	-1.84	0.99
17	I	340.24	0.06	1.00	-0.39	-1.84	0.99
17	J	336.11	0.06	1.00	-0.36	-1.67	0.99
18	I	336.11	0.05	1.00	-0.27	-1.67	0.99
18	J	335.61	0.04	1.00	-0.26	-1.65	0.99

The Loss of tendon group [C26-P1] at the stage of [CS13]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
19	I	335.61	0.01	1.00	-0.09	-1.65	0.99
19	J	335.48	0.01	1.00	-0.09	-1.65	0.99
20	I	335.48	0.04	1.00	-0.25	-1.65	0.99
20	J	335.06	0.04	1.00	-0.23	-1.63	0.99
21	I	335.06	0.04	1.00	-0.24	-1.63	0.99
21	J	334.64	0.04	1.00	-0.26	-1.62	0.99
22	I	334.64	0.01	1.00	-0.09	-1.62	0.99
22	J	331.81	0.01	1.00	-0.09	-1.51	1.00
23	I	331.81	0.04	1.00	-0.26	-1.51	0.99
23	J	331.81	0.05	1.00	-0.27	-1.51	0.99
24	I	331.81	0.05	1.00	-0.37	-1.51	0.99
24	J	332.22	0.06	1.00	-0.39	-1.52	0.99
25	I	332.22	0.05	1.00	-0.34	-1.52	0.99
25	J	336.30	0.06	1.00	-0.37	-1.68	0.99
26	I	336.30	0.06	1.00	-0.38	-1.68	0.99
26	J	337.19	0.06	1.00	-0.41	-1.72	0.99
27	I	337.19	0.06	1.00	-0.43	-1.72	0.99
27	J	338.07	0.07	1.00	-0.47	-1.75	0.99
28	I	338.07	0.06	1.00	-0.42	-1.75	0.99
28	J	342.22	0.07	1.00	-0.47	-1.92	0.99
29	I	342.22	0.07	1.00	-0.51	-1.92	0.99
29	J	343.12	0.07	1.00	-0.56	-1.95	0.99
30	I	343.12	0.07	1.00	-0.56	-1.95	0.99
30	J	347.56	0.08	1.00	-0.65	-2.13	0.99
31	I	347.56	0.08	1.00	-0.69	-2.13	0.99
31	J	348.71	0.09	1.00	-0.80	-2.18	0.99
32	I	348.71	0.09	1.00	-0.81	-2.18	0.99
32	J	353.22	0.10	1.00	-0.95	-2.37	0.99
33	I	353.22	0.10	1.00	-1.08	-2.37	0.99
33	J	354.38	0.11	1.00	-1.26	-2.42	0.99
34	I	354.38	0.11	1.00	-1.42	-2.42	0.99
34	J	358.61	0.12	1.00	-1.70	-2.60	0.99
35	I	358.61	0.14	1.00	-1.96	-2.60	0.99
35	J	311.22	0.14	1.00	-2.61	-0.77	0.99

The Loss of tendon group [C27-P1] at the stage of [CS14]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
5	I	301.45	0.13	1.00	-2.55	-0.44	0.99
5	J	350.91	0.13	1.00	-1.84	-2.27	0.99
6	I	350.91	0.12	1.00	-1.65	-2.27	0.99
6	J	349.75	0.11	1.00	-1.36	-2.23	0.99
7	I	349.75	0.11	1.00	-1.17	-2.23	0.99
7	J	348.60	0.10	1.00	-0.97	-2.18	0.99
8	I	348.60	0.10	1.00	-0.93	-2.18	0.99
8	J	347.45	0.09	1.00	-0.77	-2.13	0.99
9	I	347.45	0.09	1.00	-0.71	-2.13	0.99
9	J	346.04	0.08	1.00	-0.60	-2.07	0.99
10	I	346.04	0.08	1.00	-0.60	-2.07	0.99
10	J	342.99	0.08	1.00	-0.51	-1.95	0.99
11	I	342.99	0.08	1.00	-0.50	-1.95	0.99

The Loss of tendon group [C27-P1] at the stage of [CS14]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
11	J	341.87	0.07	1.00	-0.44	-1.90	0.99
12	I	341.87	0.07	1.00	-0.44	-1.90	0.99
12	J	337.72	0.07	1.00	-0.40	-1.74	0.99
13	I	337.72	0.06	1.00	-0.35	-1.74	0.99
13	J	336.84	0.06	1.00	-0.32	-1.70	0.99
14	I	336.84	0.07	1.00	-0.38	-1.70	0.99
14	J	332.75	0.06	1.00	-0.35	-1.54	0.99
15	I	332.75	0.06	1.00	-0.33	-1.54	0.99
15	J	331.88	0.06	1.00	-0.31	-1.51	0.99
16	I	331.88	0.06	1.00	-0.32	-1.51	0.99
16	J	331.01	0.05	1.00	-0.30	-1.48	0.99
17	I	331.01	0.06	1.00	-0.33	-1.48	0.99
17	J	327.00	0.05	1.00	-0.31	-1.33	1.00
18	I	327.00	0.05	1.00	-0.24	-1.33	1.00
18	J	326.51	0.04	1.00	-0.23	-1.31	1.00
19	I	326.51	0.01	1.00	-0.08	-1.31	1.00
19	J	326.38	0.01	1.00	-0.07	-1.30	1.00
20	I	326.38	0.04	1.00	-0.22	-1.30	1.00
20	J	325.97	0.04	1.00	-0.21	-1.29	1.00
21	I	325.97	0.04	1.00	-0.21	-1.29	1.00
21	J	325.57	0.04	1.00	-0.23	-1.27	1.00
22	I	325.57	0.01	1.00	-0.08	-1.27	1.00
22	J	322.92	0.01	1.00	-0.08	-1.18	1.00
23	I	322.92	0.04	1.00	-0.23	-1.18	1.00
23	J	322.92	0.04	1.00	-0.24	-1.18	1.00
24	I	322.92	0.05	1.00	-0.32	-1.18	1.00
24	J	323.23	0.06	1.00	-0.33	-1.19	1.00
25	I	323.23	0.05	1.00	-0.29	-1.19	1.00
25	J	327.20	0.05	1.00	-0.31	-1.33	1.00
26	I	327.20	0.05	1.00	-0.32	-1.33	1.00
26	J	328.06	0.06	1.00	-0.34	-1.37	1.00
27	I	328.06	0.06	1.00	-0.36	-1.37	0.99
27	J	328.92	0.06	1.00	-0.39	-1.40	0.99
28	I	328.92	0.06	1.00	-0.33	-1.40	0.99
28	J	332.96	0.06	1.00	-0.36	-1.55	0.99
29	I	332.96	0.06	1.00	-0.41	-1.55	0.99
29	J	333.83	0.07	1.00	-0.45	-1.59	0.99
30	I	333.83	0.07	1.00	-0.44	-1.59	0.99
30	J	338.15	0.08	1.00	-0.51	-1.75	0.99
31	I	338.15	0.07	1.00	-0.51	-1.75	0.99
31	J	339.26	0.08	1.00	-0.60	-1.80	0.99
32	I	339.26	0.08	1.00	-0.60	-1.80	0.99
32	J	343.65	0.09	1.00	-0.71	-1.97	0.99
33	I	343.65	0.09	1.00	-0.77	-1.97	0.99
33	J	344.78	0.10	1.00	-0.92	-2.02	0.99
34	I	344.78	0.10	1.00	-0.97	-2.02	0.99
34	J	349.25	0.11	1.00	-1.18	-2.20	0.99
35	I	349.25	0.12	1.00	-1.36	-2.20	0.99
35	J	356.54	0.12	1.00	-1.67	-2.51	0.99
36	I	356.54	0.14	1.00	-1.85	-2.51	0.99
36	J	310.53	0.14	1.00	-2.58	-0.74	0.99

The Loss of tendon group [C28-P1] at the stage of [CS14]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
5	I	301.45	0.13	1.00	-2.55	-0.44	0.99
5	J	350.91	0.13	1.00	-1.84	-2.27	0.99
6	I	350.91	0.12	1.00	-1.65	-2.27	0.99
6	J	349.75	0.11	1.00	-1.36	-2.23	0.99
7	I	349.75	0.11	1.00	-1.17	-2.23	0.99
7	J	348.60	0.10	1.00	-0.97	-2.18	0.99
8	I	348.60	0.10	1.00	-0.93	-2.18	0.99
8	J	347.45	0.09	1.00	-0.77	-2.13	0.99
9	I	347.45	0.09	1.00	-0.71	-2.13	0.99
9	J	346.04	0.08	1.00	-0.60	-2.07	0.99
10	I	346.04	0.08	1.00	-0.60	-2.07	0.99
10	J	342.99	0.08	1.00	-0.51	-1.95	0.99
11	I	342.99	0.08	1.00	-0.50	-1.95	0.99
11	J	341.87	0.07	1.00	-0.44	-1.90	0.99
12	I	341.87	0.07	1.00	-0.44	-1.90	0.99
12	J	337.72	0.07	1.00	-0.40	-1.74	0.99
13	I	337.72	0.06	1.00	-0.35	-1.74	0.99
13	J	336.84	0.06	1.00	-0.32	-1.70	0.99
14	I	336.84	0.07	1.00	-0.38	-1.70	0.99
14	J	332.75	0.06	1.00	-0.35	-1.54	0.99
15	I	332.75	0.06	1.00	-0.33	-1.54	0.99
15	J	331.88	0.06	1.00	-0.31	-1.51	0.99
16	I	331.88	0.06	1.00	-0.32	-1.51	0.99
16	J	331.01	0.05	1.00	-0.30	-1.48	0.99
17	I	331.01	0.06	1.00	-0.33	-1.48	0.99
17	J	327.00	0.05	1.00	-0.31	-1.33	1.00
18	I	327.00	0.05	1.00	-0.24	-1.33	1.00
18	J	326.51	0.04	1.00	-0.23	-1.31	1.00
19	I	326.51	0.01	1.00	-0.08	-1.31	1.00
19	J	326.38	0.01	1.00	-0.07	-1.30	1.00
20	I	326.38	0.04	1.00	-0.22	-1.30	1.00
20	J	325.97	0.04	1.00	-0.21	-1.29	1.00
21	I	325.97	0.04	1.00	-0.21	-1.29	1.00
21	J	325.57	0.04	1.00	-0.23	-1.27	1.00
22	I	325.57	0.01	1.00	-0.08	-1.27	1.00
22	J	323.98	0.01	1.00	-0.08	-1.22	1.00
23	I	323.98	0.04	1.00	-0.23	-1.22	1.00
23	J	323.98	0.04	1.00	-0.24	-1.22	1.00
24	I	323.98	0.05	1.00	-0.32	-1.22	1.00
24	J	323.99	0.06	1.00	-0.33	-1.22	1.00
25	I	323.99	0.05	1.00	-0.29	-1.22	1.00
25	J	327.16	0.05	1.00	-0.31	-1.33	1.00
26	I	327.16	0.05	1.00	-0.32	-1.33	1.00
26	J	328.02	0.06	1.00	-0.34	-1.37	1.00
27	I	328.02	0.06	1.00	-0.36	-1.37	0.99
27	J	328.88	0.06	1.00	-0.39	-1.40	0.99
28	I	328.88	0.06	1.00	-0.33	-1.40	0.99
28	J	332.92	0.06	1.00	-0.36	-1.55	0.99
29	I	332.92	0.06	1.00	-0.41	-1.55	0.99
29	J	333.79	0.07	1.00	-0.45	-1.59	0.99
30	I	333.79	0.07	1.00	-0.44	-1.59	0.99

The Loss of tendon group [C28-P1] at the stage of [CS14]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	J	338.11	0.08	1.00	-0.51	-1.75	0.99
31	I	338.11	0.07	1.00	-0.51	-1.75	0.99
31	J	339.22	0.08	1.00	-0.60	-1.80	0.99
32	I	339.22	0.08	1.00	-0.60	-1.80	0.99
32	J	343.62	0.09	1.00	-0.71	-1.97	0.99
33	I	343.62	0.09	1.00	-0.77	-1.97	0.99
33	J	344.75	0.10	1.00	-0.92	-2.02	0.99
34	I	344.75	0.10	1.00	-0.97	-2.02	0.99
34	J	349.21	0.11	1.00	-1.18	-2.20	0.99
35	I	349.21	0.12	1.00	-1.36	-2.20	0.99
35	J	354.66	0.12	1.00	-1.67	-2.43	0.99
36	I	354.66	0.14	1.00	-1.85	-2.43	0.99
36	J	305.28	0.14	1.00	-2.58	-0.57	0.99

The Loss of tendon group [C29-P1] at the stage of [CS15]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
4	I	296.70	0.13	1.00	-2.52	-0.29	0.99
4	J	342.87	0.13	1.00	-1.72	-1.94	0.99
5	I	342.87	0.11	1.00	-1.56	-1.94	0.99
5	J	341.74	0.11	1.00	-1.26	-1.90	0.99
6	I	341.74	0.10	1.00	-1.12	-1.90	0.99
6	J	340.61	0.10	1.00	-0.89	-1.85	0.99
7	I	340.61	0.09	1.00	-0.83	-1.85	0.99
7	J	339.49	0.09	1.00	-0.66	-1.81	0.99
8	I	339.49	0.09	1.00	-0.67	-1.81	0.99
8	J	338.37	0.08	1.00	-0.54	-1.76	0.99
9	I	338.37	0.08	1.00	-0.52	-1.76	0.99
9	J	337.00	0.07	1.00	-0.43	-1.71	0.99
10	I	337.00	0.07	1.00	-0.43	-1.71	0.99
10	J	334.03	0.06	1.00	-0.36	-1.59	0.99
11	I	334.03	0.07	1.00	-0.38	-1.59	0.99
11	J	332.94	0.06	1.00	-0.33	-1.55	0.99
12	I	332.94	0.06	1.00	-0.34	-1.55	0.99
12	J	328.90	0.06	1.00	-0.31	-1.40	1.00
13	I	328.90	0.05	1.00	-0.26	-1.40	1.00
13	J	328.04	0.05	1.00	-0.24	-1.37	1.00
14	I	328.04	0.06	1.00	-0.31	-1.37	1.00
14	J	324.06	0.05	1.00	-0.28	-1.22	1.00
15	I	324.06	0.05	1.00	-0.27	-1.22	1.00
15	J	323.21	0.05	1.00	-0.26	-1.19	1.00
16	I	323.21	0.05	1.00	-0.27	-1.19	1.00
16	J	322.36	0.05	1.00	-0.25	-1.16	1.00
17	I	322.36	0.05	1.00	-0.28	-1.16	1.00
17	J	318.45	0.05	1.00	-0.26	-1.02	1.00
18	I	318.45	0.04	1.00	-0.21	-1.02	1.00
18	J	317.98	0.04	1.00	-0.20	-1.00	1.00
19	I	317.98	0.01	1.00	-0.06	-1.00	1.00
19	J	317.86	0.01	1.00	-0.06	-0.99	1.00
20	I	317.86	0.04	1.00	-0.19	-0.99	1.00
20	J	317.46	0.04	1.00	-0.18	-0.98	1.00
21	I	317.46	0.04	1.00	-0.19	-0.98	1.00

The Loss of tendon group [C29-P1] at the stage of [CS15]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
21	J	317.06	0.04	1.00	-0.20	-0.97	1.00
22	I	317.06	0.01	1.00	-0.06	-0.97	1.00
22	J	313.91	0.01	1.00	-0.07	-0.86	1.00
23	I	313.91	0.04	1.00	-0.20	-0.86	1.00
23	J	313.46	0.04	1.00	-0.21	-0.84	1.00
24	I	313.46	0.05	1.00	-0.27	-0.84	1.00
24	J	312.64	0.05	1.00	-0.28	-0.81	1.00
25	I	312.64	0.04	1.00	-0.23	-0.81	1.00
25	J	315.55	0.05	1.00	-0.25	-0.91	1.00
26	I	315.55	0.05	1.00	-0.26	-0.91	1.00
26	J	316.38	0.05	1.00	-0.28	-0.94	1.00
27	I	316.38	0.05	1.00	-0.29	-0.94	1.00
27	J	317.21	0.06	1.00	-0.31	-0.97	1.00
28	I	317.21	0.05	1.00	-0.24	-0.97	1.00
28	J	321.11	0.05	1.00	-0.27	-1.11	1.00
29	I	321.11	0.06	1.00	-0.31	-1.11	1.00
29	J	321.95	0.06	1.00	-0.35	-1.14	1.00
30	I	321.95	0.06	1.00	-0.33	-1.14	1.00
30	J	326.12	0.07	1.00	-0.39	-1.29	1.00
31	I	326.12	0.06	1.00	-0.36	-1.29	1.00
31	J	327.19	0.07	1.00	-0.43	-1.33	0.99
32	I	327.19	0.07	1.00	-0.43	-1.33	0.99
32	J	331.42	0.08	1.00	-0.53	-1.49	0.99
33	I	331.42	0.08	1.00	-0.52	-1.49	0.99
33	J	332.51	0.08	1.00	-0.65	-1.53	0.99
34	I	332.51	0.08	1.00	-0.65	-1.53	0.99
34	J	336.82	0.09	1.00	-0.83	-1.70	0.99
35	I	336.82	0.10	1.00	-0.89	-1.70	0.99
35	J	337.92	0.10	1.00	-1.12	-1.74	0.99
36	I	337.92	0.11	1.00	-1.25	-1.74	0.99
36	J	342.30	0.12	1.00	-1.56	-1.92	0.99
37	I	342.30	0.14	1.00	-1.71	-1.92	0.99
37	J	295.90	0.14	1.00	-2.52	-0.27	0.99

The Loss of tendon group [C30-P1] at the stage of [CS15]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
4	I	296.70	0.13	1.00	-2.52	-0.29	0.99
4	J	342.87	0.13	1.00	-1.72	-1.94	0.99
5	I	342.87	0.11	1.00	-1.56	-1.94	0.99
5	J	341.74	0.11	1.00	-1.26	-1.90	0.99
6	I	341.74	0.10	1.00	-1.12	-1.90	0.99
6	J	340.61	0.10	1.00	-0.89	-1.85	0.99
7	I	340.61	0.09	1.00	-0.83	-1.85	0.99
7	J	339.49	0.09	1.00	-0.66	-1.81	0.99
8	I	339.49	0.09	1.00	-0.67	-1.81	0.99
8	J	338.37	0.08	1.00	-0.54	-1.76	0.99
9	I	338.37	0.08	1.00	-0.52	-1.76	0.99
9	J	337.00	0.07	1.00	-0.43	-1.71	0.99
10	I	337.00	0.07	1.00	-0.43	-1.71	0.99
10	J	334.03	0.06	1.00	-0.36	-1.59	0.99
11	I	334.03	0.07	1.00	-0.38	-1.59	0.99

The Loss of tendon group [C30-P1] at the stage of [CS15]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
11	J	332.94	0.06	1.00	-0.33	-1.55	0.99
12	I	332.94	0.06	1.00	-0.34	-1.55	0.99
12	J	328.90	0.06	1.00	-0.31	-1.40	1.00
13	I	328.90	0.05	1.00	-0.26	-1.40	1.00
13	J	328.04	0.05	1.00	-0.24	-1.37	1.00
14	I	328.04	0.06	1.00	-0.31	-1.37	1.00
14	J	324.06	0.05	1.00	-0.28	-1.22	1.00
15	I	324.06	0.05	1.00	-0.27	-1.22	1.00
15	J	323.21	0.05	1.00	-0.26	-1.19	1.00
16	I	323.21	0.05	1.00	-0.27	-1.19	1.00
16	J	322.36	0.05	1.00	-0.25	-1.16	1.00
17	I	322.36	0.05	1.00	-0.28	-1.16	1.00
17	J	318.45	0.05	1.00	-0.26	-1.02	1.00
18	I	318.45	0.04	1.00	-0.21	-1.02	1.00
18	J	317.98	0.04	1.00	-0.20	-1.00	1.00
19	I	317.98	0.01	1.00	-0.06	-1.00	1.00
19	J	317.86	0.01	1.00	-0.06	-0.99	1.00
20	I	317.86	0.04	1.00	-0.19	-0.99	1.00
20	J	317.46	0.04	1.00	-0.18	-0.98	1.00
21	I	317.46	0.04	1.00	-0.19	-0.98	1.00
21	J	317.06	0.04	1.00	-0.20	-0.97	1.00
22	I	317.06	0.01	1.00	-0.06	-0.97	1.00
22	J	313.91	0.01	1.00	-0.07	-0.86	1.00
23	I	313.91	0.04	1.00	-0.20	-0.86	1.00
23	J	313.46	0.04	1.00	-0.21	-0.84	1.00
24	I	313.46	0.05	1.00	-0.27	-0.84	1.00
24	J	312.99	0.05	1.00	-0.28	-0.83	1.00
25	I	312.99	0.04	1.00	-0.23	-0.83	1.00
25	J	315.53	0.05	1.00	-0.25	-0.91	1.00
26	I	315.53	0.05	1.00	-0.26	-0.91	1.00
26	J	316.36	0.05	1.00	-0.28	-0.94	1.00
27	I	316.36	0.05	1.00	-0.29	-0.94	1.00
27	J	317.19	0.06	1.00	-0.31	-0.97	1.00
28	I	317.19	0.05	1.00	-0.24	-0.97	1.00
28	J	321.08	0.05	1.00	-0.27	-1.11	1.00
29	I	321.08	0.06	1.00	-0.31	-1.11	1.00
29	J	321.93	0.06	1.00	-0.35	-1.14	1.00
30	I	321.93	0.06	1.00	-0.33	-1.14	1.00
30	J	326.09	0.07	1.00	-0.39	-1.29	1.00
31	I	326.09	0.06	1.00	-0.36	-1.29	1.00
31	J	327.17	0.07	1.00	-0.43	-1.33	0.99
32	I	327.17	0.07	1.00	-0.43	-1.33	0.99
32	J	331.40	0.08	1.00	-0.53	-1.49	0.99
33	I	331.40	0.08	1.00	-0.52	-1.49	0.99
33	J	332.49	0.08	1.00	-0.65	-1.53	0.99
34	I	332.49	0.08	1.00	-0.65	-1.53	0.99
34	J	336.79	0.09	1.00	-0.83	-1.70	0.99
35	I	336.79	0.10	1.00	-0.89	-1.70	0.99
35	J	337.90	0.10	1.00	-1.12	-1.74	0.99
36	I	337.90	0.11	1.00	-1.25	-1.74	0.99
36	J	342.27	0.12	1.00	-1.56	-1.92	0.99
37	I	342.27	0.14	1.00	-1.71	-1.92	0.99
37	J	295.89	0.14	1.00	-2.52	-0.27	0.99

The Loss of tendon group [C31-P1] at the stage of [CS16]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
3	I	292.44	0.13	1.00	-2.49	-0.16	0.99
3	J	335.37	0.13	1.00	-1.62	-1.64	0.99
4	I	335.37	0.11	1.00	-1.57	-1.64	0.99
4	J	334.26	0.10	1.00	-1.21	-1.60	0.99
5	I	334.26	0.10	1.00	-1.06	-1.60	0.99
5	J	333.16	0.09	1.00	-0.80	-1.56	0.99
6	I	333.16	0.09	1.00	-0.76	-1.56	0.99
6	J	332.06	0.08	1.00	-0.57	-1.52	0.99
7	I	332.06	0.08	1.00	-0.57	-1.52	0.99
7	J	330.97	0.07	1.00	-0.42	-1.48	0.99
8	I	330.97	0.07	1.00	-0.45	-1.48	0.99
8	J	329.88	0.07	1.00	-0.34	-1.43	0.99
9	I	329.88	0.07	1.00	-0.37	-1.43	0.99
9	J	328.54	0.06	1.00	-0.29	-1.38	1.00
10	I	328.54	0.06	1.00	-0.28	-1.38	1.00
10	J	325.65	0.05	1.00	-0.22	-1.28	1.00
11	I	325.65	0.06	1.00	-0.28	-1.28	1.00
11	J	324.58	0.05	1.00	-0.23	-1.24	1.00
12	I	324.58	0.05	1.00	-0.25	-1.24	1.00
12	J	320.64	0.05	1.00	-0.22	-1.09	1.00
13	I	320.64	0.05	1.00	-0.18	-1.09	1.00
13	J	319.80	0.04	1.00	-0.16	-1.06	1.00
14	I	319.80	0.05	1.00	-0.24	-1.06	1.00
14	J	315.92	0.05	1.00	-0.21	-0.93	1.00
15	I	315.92	0.05	1.00	-0.21	-0.93	1.00
15	J	315.09	0.04	1.00	-0.20	-0.90	1.00
16	I	315.09	0.05	1.00	-0.22	-0.90	1.00
16	J	314.27	0.04	1.00	-0.21	-0.87	1.00
17	I	314.27	0.05	1.00	-0.23	-0.87	1.00
17	J	310.46	0.04	1.00	-0.21	-0.74	1.00
18	I	310.46	0.04	1.00	-0.17	-0.74	1.00
18	J	310.00	0.04	1.00	-0.17	-0.72	1.00
19	I	310.00	0.01	1.00	-0.05	-0.72	1.00
19	J	309.87	0.01	1.00	-0.04	-0.72	1.00
20	I	309.87	0.03	1.00	-0.16	-0.72	1.00
20	J	309.49	0.03	1.00	-0.15	-0.71	1.00
21	I	309.49	0.03	1.00	-0.16	-0.71	1.00
21	J	309.10	0.04	1.00	-0.17	-0.69	1.00
22	I	309.10	0.01	1.00	-0.05	-0.69	1.00
22	J	306.03	0.01	1.00	-0.05	-0.59	1.00
23	I	306.03	0.04	1.00	-0.18	-0.59	1.00
23	J	305.59	0.04	1.00	-0.18	-0.58	1.00
24	I	305.59	0.04	1.00	-0.22	-0.58	1.00
24	J	305.01	0.04	1.00	-0.23	-0.56	1.00
25	I	305.01	0.04	1.00	-0.18	-0.56	1.00
25	J	307.63	0.04	1.00	-0.20	-0.64	1.00
26	I	307.63	0.04	1.00	-0.21	-0.64	1.00

The Loss of tendon group [C31-P1] at the stage of [CS16]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
26	J	308.44	0.04	1.00	-0.22	-0.67	1.00
27	I	308.44	0.04	1.00	-0.22	-0.67	1.00
27	J	309.25	0.05	1.00	-0.24	-0.70	1.00
28	I	309.25	0.04	1.00	-0.17	-0.70	1.00
28	J	313.05	0.04	1.00	-0.19	-0.83	1.00
29	I	313.05	0.05	1.00	-0.23	-0.83	1.00
29	J	313.87	0.05	1.00	-0.26	-0.86	1.00
30	I	313.87	0.05	1.00	-0.24	-0.86	1.00
30	J	317.93	0.06	1.00	-0.28	-1.00	1.00
31	I	317.93	0.05	1.00	-0.23	-1.00	1.00
31	J	318.98	0.06	1.00	-0.29	-1.03	1.00
32	I	318.98	0.06	1.00	-0.29	-1.03	1.00
32	J	323.10	0.07	1.00	-0.37	-1.18	1.00
33	I	323.10	0.06	1.00	-0.33	-1.18	1.00
33	J	324.17	0.07	1.00	-0.42	-1.22	1.00
34	I	324.17	0.07	1.00	-0.42	-1.22	1.00
34	J	328.36	0.08	1.00	-0.57	-1.38	0.99
35	I	328.36	0.08	1.00	-0.58	-1.38	0.99
35	J	329.44	0.09	1.00	-0.77	-1.42	0.99
36	I	329.44	0.09	1.00	-0.80	-1.42	0.99
36	J	333.70	0.10	1.00	-1.06	-1.58	0.99
37	I	333.70	0.11	1.00	-1.21	-1.58	0.99
37	J	354.79	0.13	1.00	-1.63	-2.44	0.99
38	I	354.79	0.15	1.00	-1.69	-2.44	0.99
38	J	299.97	0.14	1.00	-2.53	-0.40	0.99

The Loss of tendon group [C32-P1] at the stage of [CS16]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
3	I	292.44	0.13	1.00	-2.49	-0.16	0.99
3	J	335.37	0.13	1.00	-1.62	-1.64	0.99
4	I	335.37	0.11	1.00	-1.57	-1.64	0.99
4	J	334.26	0.10	1.00	-1.21	-1.60	0.99
5	I	334.26	0.10	1.00	-1.06	-1.60	0.99
5	J	333.16	0.09	1.00	-0.80	-1.56	0.99
6	I	333.16	0.09	1.00	-0.76	-1.56	0.99
6	J	332.06	0.08	1.00	-0.57	-1.52	0.99
7	I	332.06	0.08	1.00	-0.57	-1.52	0.99
7	J	330.97	0.07	1.00	-0.42	-1.48	0.99
8	I	330.97	0.07	1.00	-0.45	-1.48	0.99
8	J	329.88	0.07	1.00	-0.34	-1.43	0.99
9	I	329.88	0.07	1.00	-0.37	-1.43	0.99
9	J	328.54	0.06	1.00	-0.29	-1.38	1.00
10	I	328.54	0.06	1.00	-0.28	-1.38	1.00
10	J	325.65	0.05	1.00	-0.22	-1.28	1.00
11	I	325.65	0.06	1.00	-0.28	-1.28	1.00
11	J	324.58	0.05	1.00	-0.23	-1.24	1.00
12	I	324.58	0.05	1.00	-0.25	-1.24	1.00
12	J	320.64	0.05	1.00	-0.22	-1.09	1.00
13	I	320.64	0.05	1.00	-0.18	-1.09	1.00
13	J	319.80	0.04	1.00	-0.16	-1.06	1.00
14	I	319.80	0.05	1.00	-0.24	-1.06	1.00

The Loss of tendon group [C32-P1] at the stage of [CS16]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
14	J	315.92	0.05	1.00	-0.21	-0.93	1.00
15	I	315.92	0.05	1.00	-0.21	-0.93	1.00
15	J	315.09	0.04	1.00	-0.20	-0.90	1.00
16	I	315.09	0.05	1.00	-0.22	-0.90	1.00
16	J	314.27	0.04	1.00	-0.21	-0.87	1.00
17	I	314.27	0.05	1.00	-0.23	-0.87	1.00
17	J	310.46	0.04	1.00	-0.21	-0.74	1.00
18	I	310.46	0.04	1.00	-0.17	-0.74	1.00
18	J	310.00	0.04	1.00	-0.17	-0.72	1.00
19	I	310.00	0.01	1.00	-0.05	-0.72	1.00
19	J	309.87	0.01	1.00	-0.04	-0.72	1.00
20	I	309.87	0.03	1.00	-0.16	-0.72	1.00
20	J	309.49	0.03	1.00	-0.15	-0.71	1.00
21	I	309.49	0.03	1.00	-0.16	-0.71	1.00
21	J	309.10	0.04	1.00	-0.17	-0.69	1.00
22	I	309.10	0.01	1.00	-0.05	-0.69	1.00
22	J	306.13	0.01	1.00	-0.05	-0.59	1.00
23	I	306.13	0.04	1.00	-0.18	-0.59	1.00
23	J	306.13	0.04	1.00	-0.18	-0.59	1.00
24	I	306.13	0.04	1.00	-0.22	-0.59	1.00
24	J	306.14	0.04	1.00	-0.23	-0.59	1.00
25	I	306.14	0.04	1.00	-0.18	-0.59	1.00
25	J	306.20	0.04	1.00	-0.20	-0.60	1.00
26	I	307.60	0.04	1.00	-0.21	-0.64	1.00
26	J	308.41	0.04	1.00	-0.22	-0.67	1.00
27	I	308.41	0.04	1.00	-0.22	-0.67	1.00
27	J	309.22	0.05	1.00	-0.24	-0.70	1.00
28	I	309.22	0.04	1.00	-0.17	-0.70	1.00
28	J	313.02	0.04	1.00	-0.19	-0.83	1.00
29	I	313.02	0.05	1.00	-0.23	-0.83	1.00
29	J	313.84	0.05	1.00	-0.26	-0.86	1.00
30	I	313.84	0.05	1.00	-0.24	-0.86	1.00
30	J	317.90	0.06	1.00	-0.28	-1.00	1.00
31	I	317.90	0.05	1.00	-0.23	-1.00	1.00
31	J	318.95	0.06	1.00	-0.29	-1.03	1.00
32	I	318.95	0.06	1.00	-0.29	-1.03	1.00
32	J	323.07	0.07	1.00	-0.37	-1.18	1.00
33	I	323.07	0.06	1.00	-0.33	-1.18	1.00
33	J	324.14	0.07	1.00	-0.42	-1.22	1.00
34	I	324.14	0.07	1.00	-0.42	-1.22	1.00
34	J	328.33	0.08	1.00	-0.57	-1.38	0.99
35	I	328.33	0.08	1.00	-0.58	-1.38	0.99
35	J	329.41	0.09	1.00	-0.77	-1.42	0.99
36	I	329.41	0.09	1.00	-0.80	-1.42	0.99
36	J	333.67	0.10	1.00	-1.06	-1.58	0.99
37	I	333.67	0.11	1.00	-1.21	-1.58	0.99
37	J	354.79	0.13	1.00	-1.63	-2.44	0.99
38	I	354.79	0.15	1.00	-1.69	-2.44	0.99
38	J	299.95	0.14	1.00	-2.53	-0.40	0.99

The Loss of tendon group [C33-P1] at the stage of [CS17]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
2	I	288.57	0.08	1.00	-2.63	-0.05	0.99
2	J	328.36	0.09	1.00	-1.86	-1.38	0.99
3	I	328.36	0.11	1.00	-1.73	-1.38	0.99
3	J	327.28	0.11	1.00	-1.44	-1.34	0.99
4	I	327.28	0.10	1.00	-1.24	-1.34	0.99
4	J	326.20	0.09	1.00	-1.02	-1.30	0.99
5	I	326.20	0.09	1.00	-0.95	-1.30	0.99
5	J	325.12	0.08	1.00	-0.76	-1.26	0.99
6	I	325.12	0.08	1.00	-0.72	-1.26	0.99
6	J	324.05	0.08	1.00	-0.58	-1.22	0.99
7	I	324.05	0.08	1.00	-0.57	-1.22	0.99
7	J	322.99	0.07	1.00	-0.45	-1.18	1.00
8	I	322.99	0.07	1.00	-0.44	-1.18	1.00
8	J	321.92	0.06	1.00	-0.36	-1.14	1.00
9	I	321.92	0.07	1.00	-0.39	-1.14	1.00
9	J	320.61	0.06	1.00	-0.32	-1.09	1.00
10	I	320.61	0.06	1.00	-0.29	-1.09	1.00
10	J	317.79	0.05	1.00	-0.24	-0.99	1.00
11	I	317.79	0.06	1.00	-0.30	-0.99	1.00
11	J	316.75	0.05	1.00	-0.26	-0.96	1.00
12	I	316.75	0.05	1.00	-0.27	-0.96	1.00
12	J	312.91	0.05	1.00	-0.25	-0.82	1.00
13	I	312.91	0.04	1.00	-0.20	-0.82	1.00
13	J	312.09	0.04	1.00	-0.19	-0.79	1.00
14	I	312.09	0.05	1.00	-0.25	-0.79	1.00
14	J	308.30	0.05	1.00	-0.23	-0.67	1.00
15	I	308.30	0.05	1.00	-0.23	-0.67	1.00
15	J	307.49	0.04	1.00	-0.22	-0.64	1.00
16	I	307.49	0.05	1.00	-0.24	-0.64	1.00
16	J	306.69	0.04	1.00	-0.23	-0.61	1.00
17	I	306.69	0.04	1.00	-0.23	-0.61	1.00
17	J	302.97	0.04	1.00	-0.22	-0.49	1.00
18	I	302.97	0.04	1.00	-0.18	-0.49	1.00
18	J	302.52	0.03	1.00	-0.17	-0.48	1.00
19	I	302.52	0.01	1.00	-0.05	-0.48	1.00
19	J	302.40	0.01	1.00	-0.05	-0.47	1.00
20	I	302.40	0.03	1.00	-0.17	-0.47	1.00
20	J	302.02	0.03	1.00	-0.15	-0.46	1.00
21	I	302.02	0.04	1.00	-0.19	-0.46	1.00
21	J	301.64	0.04	1.00	-0.20	-0.45	1.00
22	I	301.64	0.01	1.00	-0.07	-0.45	1.00
22	J	298.65	0.01	1.00	-0.07	-0.35	1.00
23	I	298.65	0.04	1.00	-0.21	-0.35	1.00
23	J	298.22	0.04	1.00	-0.21	-0.34	1.00
24	I	298.22	0.05	1.00	-0.27	-0.34	1.00
24	J	297.43	0.05	1.00	-0.28	-0.32	1.00
25	I	297.43	0.04	1.00	-0.24	-0.32	1.00
25	J	295.84	0.04	1.00	-0.25	-0.27	1.00
26	I	297.32	0.05	1.00	-0.29	-0.31	1.00
26	J	298.10	0.05	1.00	-0.31	-0.34	1.00
27	I	298.10	0.05	1.00	-0.31	-0.34	1.00
27	J	298.89	0.05	1.00	-0.32	-0.36	1.00
28	I	298.89	0.05	1.00	-0.27	-0.36	1.00
28	J	302.56	0.05	1.00	-0.29	-0.48	1.00
29	I	302.56	0.05	1.00	-0.35	-0.48	1.00

The Loss of tendon group [C33-P1] at the stage of [CS17]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
29	J	303.35	0.06	1.00	-0.37	-0.50	1.00
30	I	303.35	0.06	1.00	-0.37	-0.50	1.00
30	J	307.28	0.06	1.00	-0.41	-0.63	1.00
31	I	307.28	0.06	1.00	-0.36	-0.63	1.00
31	J	308.29	0.06	1.00	-0.40	-0.67	1.00
32	I	308.29	0.07	1.00	-0.46	-0.67	1.00
32	J	312.28	0.07	1.00	-0.53	-0.80	1.00
33	I	312.28	0.07	1.00	-0.49	-0.80	1.00
33	J	313.30	0.07	1.00	-0.56	-0.84	1.00
34	I	313.30	0.08	1.00	-0.63	-0.84	1.00
34	J	317.36	0.08	1.00	-0.73	-0.98	0.99
35	I	317.36	0.08	1.00	-0.77	-0.98	0.99
35	J	318.40	0.09	1.00	-0.88	-1.01	0.99
36	I	318.40	0.09	1.00	-0.95	-1.01	0.99
36	J	322.52	0.10	1.00	-1.10	-1.16	0.99
37	I	322.52	0.10	1.00	-1.23	-1.16	0.99
37	J	323.58	0.11	1.00	-1.39	-1.20	0.99
38	I	323.58	0.12	1.00	-1.63	-1.20	0.99
38	J	327.77	0.12	1.00	-1.83	-1.36	0.99
39	I	327.77	0.09	1.00	-1.98	-1.36	0.99
39	J	287.90	0.09	1.00	-2.70	-0.03	0.99

The Loss of tendon group [C34-P1] at the stage of [CS17]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
2	I	288.57	0.08	1.00	-2.63	-0.05	0.99
2	J	328.36	0.09	1.00	-1.86	-1.38	0.99
3	I	328.36	0.11	1.00	-1.73	-1.38	0.99
3	J	327.28	0.11	1.00	-1.44	-1.34	0.99
4	I	327.28	0.10	1.00	-1.24	-1.34	0.99
4	J	326.20	0.09	1.00	-1.02	-1.30	0.99
5	I	326.20	0.09	1.00	-0.95	-1.30	0.99
5	J	325.12	0.08	1.00	-0.76	-1.26	0.99
6	I	325.12	0.08	1.00	-0.72	-1.26	0.99
6	J	324.05	0.08	1.00	-0.58	-1.22	0.99
7	I	324.05	0.08	1.00	-0.57	-1.22	0.99
7	J	322.99	0.07	1.00	-0.45	-1.18	1.00
8	I	322.99	0.07	1.00	-0.44	-1.18	1.00
8	J	321.92	0.06	1.00	-0.36	-1.14	1.00
9	I	321.92	0.07	1.00	-0.39	-1.14	1.00
9	J	320.61	0.06	1.00	-0.32	-1.09	1.00
10	I	320.61	0.06	1.00	-0.29	-1.09	1.00
10	J	317.79	0.05	1.00	-0.24	-0.99	1.00
11	I	317.79	0.06	1.00	-0.30	-0.99	1.00
11	J	316.75	0.05	1.00	-0.26	-0.96	1.00
12	I	316.75	0.05	1.00	-0.27	-0.96	1.00
12	J	312.91	0.05	1.00	-0.25	-0.82	1.00
13	I	312.91	0.04	1.00	-0.20	-0.82	1.00
13	J	312.09	0.04	1.00	-0.19	-0.79	1.00
14	I	312.09	0.05	1.00	-0.25	-0.79	1.00
14	J	308.30	0.05	1.00	-0.23	-0.67	1.00
15	I	308.30	0.05	1.00	-0.23	-0.67	1.00

The Loss of tendon group [C34-P1] at the stage of [CS17]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
15	J	307.49	0.04	1.00	-0.22	-0.64	1.00
16	I	307.49	0.05	1.00	-0.24	-0.64	1.00
16	J	306.69	0.04	1.00	-0.23	-0.61	1.00
17	I	306.69	0.04	1.00	-0.23	-0.61	1.00
17	J	302.97	0.04	1.00	-0.22	-0.49	1.00
18	I	302.97	0.04	1.00	-0.18	-0.49	1.00
18	J	302.52	0.03	1.00	-0.17	-0.48	1.00
19	I	302.52	0.01	1.00	-0.05	-0.48	1.00
19	J	302.40	0.01	1.00	-0.05	-0.47	1.00
20	I	302.40	0.03	1.00	-0.17	-0.47	1.00
20	J	302.02	0.03	1.00	-0.15	-0.46	1.00
21	I	302.02	0.04	1.00	-0.19	-0.46	1.00
21	J	301.64	0.04	1.00	-0.20	-0.45	1.00
22	I	301.64	0.01	1.00	-0.07	-0.45	1.00
22	J	298.65	0.01	1.00	-0.07	-0.35	1.00
23	I	298.65	0.04	1.00	-0.21	-0.35	1.00
23	J	298.22	0.04	1.00	-0.21	-0.34	1.00
24	I	298.22	0.05	1.00	-0.27	-0.34	1.00
24	J	297.43	0.05	1.00	-0.28	-0.32	1.00
25	I	297.43	0.04	1.00	-0.24	-0.32	1.00
25	J	296.47	0.04	1.00	-0.25	-0.29	1.00
26	I	297.28	0.05	1.00	-0.29	-0.31	1.00
26	J	298.07	0.05	1.00	-0.31	-0.34	1.00
27	I	298.07	0.05	1.00	-0.31	-0.34	1.00
27	J	298.85	0.05	1.00	-0.32	-0.36	1.00
28	I	298.85	0.05	1.00	-0.27	-0.36	1.00
28	J	302.52	0.05	1.00	-0.29	-0.48	1.00
29	I	302.52	0.05	1.00	-0.35	-0.48	1.00
29	J	303.31	0.06	1.00	-0.37	-0.50	1.00
30	I	303.31	0.06	1.00	-0.37	-0.50	1.00
30	J	307.24	0.06	1.00	-0.41	-0.63	1.00
31	I	307.24	0.06	1.00	-0.36	-0.63	1.00
31	J	308.25	0.06	1.00	-0.40	-0.66	1.00
32	I	308.25	0.07	1.00	-0.46	-0.66	1.00
32	J	312.24	0.07	1.00	-0.53	-0.80	1.00
33	I	312.24	0.07	1.00	-0.49	-0.80	1.00
33	J	313.27	0.07	1.00	-0.56	-0.83	1.00
34	I	313.27	0.08	1.00	-0.63	-0.83	1.00
34	J	317.32	0.08	1.00	-0.73	-0.98	0.99
35	I	317.32	0.08	1.00	-0.77	-0.98	0.99
35	J	318.36	0.09	1.00	-0.88	-1.01	0.99
36	I	318.36	0.09	1.00	-0.95	-1.01	0.99
36	J	322.48	0.10	1.00	-1.10	-1.16	0.99
37	I	322.48	0.10	1.00	-1.23	-1.16	0.99
37	J	323.54	0.11	1.00	-1.39	-1.20	0.99
38	I	323.54	0.12	1.00	-1.63	-1.20	0.99
38	J	327.73	0.12	1.00	-1.83	-1.35	0.99
39	I	327.73	0.09	1.00	-1.98	-1.35	0.99
39	J	287.88	0.09	1.00	-2.70	-0.04	0.99

3.5.10.2. FAMILIA DE CABLES TIPO B

Para la familia de cables de postensado a momento positivo de continuidad tipo B, se emplean 28 cables de 22 torones cada uno en el vano central después de realizar el cierre de dovelas, estos cables que se distribuyen equitativamente sobre la losa inferior, a fin de garantizar la estabilidad de la estructura durante su fase de servicio.

The Loss of tendon group [C37] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
38	I	374.51	1.14	1.00	-4.27	-3.33	0.98
38	J	395.82	1.46	1.00	-5.00	-4.37	0.98
39	I	395.82	1.53	1.00	-6.03	-4.37	0.98
39	J	396.97	1.63	1.00	-6.25	-4.43	0.98
40	I	396.97	2.47	1.01	-12.38	-4.43	0.96
40	J	397.08	2.67	1.01	-12.98	-4.43	0.96
41	I	397.08	2.48	1.01	-12.41	-4.43	0.96
41	J	397.19	2.70	1.01	-13.10	-4.44	0.96
42	I	397.19	1.51	1.00	-5.86	-4.44	0.98
42	J	399.08	1.69	1.00	-6.32	-4.54	0.98
43	I	399.08	1.51	1.00	-5.01	-4.54	0.98
43	J	376.86	1.18	1.00	-4.27	-3.44	0.98
The Loss of tendon group [C38] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
38	I	376.39	1.14	1.00	-4.27	-3.41	0.98
38	J	396.88	1.46	1.00	-5.00	-4.42	0.98
39	I	396.88	1.53	1.00	-6.03	-4.42	0.98
39	J	396.89	1.63	1.00	-6.25	-4.42	0.98
40	I	396.89	2.47	1.01	-12.38	-4.42	0.96
40	J	396.90	2.67	1.01	-12.98	-4.42	0.96
41	I	396.90	2.48	1.01	-12.41	-4.42	0.96
41	J	396.89	2.70	1.01	-13.10	-4.42	0.96
42	I	396.89	1.51	1.00	-5.86	-4.42	0.98
42	J	396.86	1.69	1.00	-6.32	-4.42	0.98
43	I	396.86	1.51	1.00	-5.01	-4.42	0.98
43	J	374.37	1.18	1.00	-4.27	-3.32	0.98
The Loss of tendon group [C39] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
36	I	374.97	0.73	1.00	-2.24	-3.34	0.99
36	J	394.80	0.92	1.00	-2.37	-4.31	0.99
37	I	394.80	1.00	1.00	-2.91	-4.31	0.98
37	J	399.49	1.01	1.00	-2.78	-4.56	0.98
38	I	399.49	1.34	1.00	-4.60	-4.56	0.98
38	J	403.61	1.45	1.00	-4.98	-4.77	0.98
39	I	403.61	1.52	1.00	-6.01	-4.77	0.98
39	J	404.42	1.63	1.00	-6.25	-4.81	0.98
40	I	404.42	2.47	1.01	-12.38	-4.81	0.96
40	J	404.09	2.67	1.01	-12.98	-4.80	0.96
41	I	404.09	2.48	1.01	-12.41	-4.80	0.96

41	J	403.75	2.70	1.01	-13.10	-4.78	0.96
42	I	403.05	1.51	1.00	-5.86	-4.74	0.98
42	J	400.27	1.68	1.00	-6.29	-4.60	0.98
43	I	400.27	1.50	1.00	-4.99	-4.60	0.98
43	J	398.92	1.40	1.00	-4.61	-4.53	0.98
44	I	398.92	1.07	1.00	-2.81	-4.53	0.98
44	J	392.92	1.09	1.00	-2.99	-4.22	0.98
45	I	392.92	1.01	1.00	-2.49	-4.22	0.99
45	J	372.30	0.81	1.00	-2.36	-3.22	0.99

The Loss of tendon group [C40] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
36	I	374.97	0.73	1.00	-2.24	-3.34	0.99
36	J	394.80	0.92	1.00	-2.37	-4.31	0.99
37	I	394.80	1.00	1.00	-2.91	-4.31	0.98
37	J	399.49	1.01	1.00	-2.78	-4.56	0.98
38	I	399.49	1.34	1.00	-4.60	-4.56	0.98
38	J	403.61	1.45	1.00	-4.98	-4.77	0.98
39	I	403.61	1.52	1.00	-6.01	-4.77	0.98
39	J	404.42	1.63	1.00	-6.25	-4.81	0.98
40	I	404.42	2.47	1.01	-12.38	-4.81	0.96
40	J	404.09	2.67	1.01	-12.98	-4.80	0.96
41	I	404.09	2.48	1.01	-12.41	-4.80	0.96
41	J	403.75	2.70	1.01	-13.10	-4.78	0.96
42	I	403.05	1.51	1.00	-5.86	-4.74	0.98
42	J	400.49	1.68	1.00	-6.29	-4.61	0.98
43	I	400.49	1.50	1.00	-4.99	-4.61	0.98
43	J	397.42	1.40	1.00	-4.61	-4.45	0.98
44	I	397.42	1.07	1.00	-2.81	-4.45	0.98
44	J	393.13	1.09	1.00	-2.99	-4.23	0.98
45	I	393.13	1.01	1.00	-2.49	-4.23	0.99
45	J	372.52	0.81	1.00	-2.36	-3.23	0.99
The Loss of tendon group [C41] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	374.52	0.46	1.00	-1.39	-3.32	0.99
34	J	394.18	0.60	1.00	-1.47	-4.28	0.99
35	I	394.18	0.63	1.00	-1.65	-4.28	0.99
35	J	398.25	0.67	1.00	-1.46	-4.49	0.99
36	I	398.25	0.83	1.00	-2.32	-4.49	0.99
36	J	402.38	0.92	1.00	-2.37	-4.71	0.98
37	I	402.38	1.00	1.00	-2.91	-4.71	0.98
37	J	404.38	1.01	1.00	-2.78	-4.81	0.98
38	I	404.38	1.34	1.00	-4.60	-4.81	0.98
38	J	400.30	1.45	1.00	-4.97	-4.60	0.98
39	I	400.30	1.52	1.00	-6.00	-4.60	0.98
39	J	397.87	1.63	1.00	-6.25	-4.47	0.98
40	I	397.87	2.47	1.01	-12.38	-4.47	0.96
40	J	397.54	2.67	1.01	-12.98	-4.46	0.96
41	I	397.54	2.48	1.01	-12.41	-4.46	0.96
41	J	397.21	2.70	1.01	-13.10	-4.44	0.96
42	I	396.99	1.51	1.00	-5.86	-4.43	0.98
42	J	402.13	1.67	1.00	-6.28	-4.69	0.98
43	I	402.13	1.49	1.00	-4.98	-4.69	0.98
43	J	403.86	1.40	1.00	-4.61	-4.78	0.98

44	I	403.86	1.07	1.00	-2.81	-4.78	0.98
44	J	401.29	1.09	1.00	-2.99	-4.65	0.98
45	I	401.29	1.01	1.00	-2.49	-4.65	0.98
45	J	399.92	0.94	1.00	-2.47	-4.58	0.98
46	I	399.92	0.78	1.00	-1.58	-4.58	0.99
46	J	393.48	0.75	1.00	-1.79	-4.25	0.99
47	I	393.48	0.72	1.00	-1.60	-4.25	0.99
47	J	374.49	0.56	1.00	-1.50	-3.32	0.99

The Loss of tendon group [C42] at the stage of [CS20]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	374.47	0.46	1.00	-1.39	-3.32	0.99
34	J	394.13	0.60	1.00	-1.47	-4.28	0.99
35	I	394.13	0.63	1.00	-1.65	-4.28	0.99
35	J	398.20	0.67	1.00	-1.46	-4.49	0.99
36	I	398.20	0.83	1.00	-2.32	-4.49	0.99
36	J	402.33	0.92	1.00	-2.37	-4.70	0.98
37	I	402.33	1.00	1.00	-2.91	-4.70	0.98
37	J	404.37	1.01	1.00	-2.78	-4.81	0.98
38	I	404.37	1.34	1.00	-4.60	-4.81	0.98
38	J	400.29	1.45	1.00	-4.97	-4.60	0.98
39	I	400.29	1.52	1.00	-6.00	-4.60	0.98
39	J	397.86	1.63	1.00	-6.25	-4.47	0.98
40	I	397.86	2.47	1.01	-12.38	-4.47	0.96
40	J	397.53	2.67	1.01	-12.98	-4.45	0.96
41	I	397.53	2.48	1.01	-12.41	-4.45	0.96
41	J	398.48	2.70	1.01	-13.10	-4.50	0.96
42	I	398.32	1.51	1.00	-5.86	-4.50	0.98
42	J	402.12	1.67	1.00	-6.28	-4.69	0.98
43	I	402.12	1.49	1.00	-4.98	-4.69	0.98
43	J	403.85	1.40	1.00	-4.61	-4.78	0.98
44	I	403.85	1.07	1.00	-2.81	-4.78	0.98
44	J	401.06	1.09	1.00	-2.99	-4.64	0.98
45	I	401.06	1.01	1.00	-2.49	-4.64	0.98
45	J	399.68	0.94	1.00	-2.47	-4.57	0.98
46	I	399.68	0.78	1.00	-1.58	-4.57	0.99
46	J	393.24	0.75	1.00	-1.79	-4.24	0.99
47	I	393.24	0.72	1.00	-1.60	-4.24	0.99
47	J	374.25	0.56	1.00	-1.50	-3.31	0.99

The Loss of tendon group [C43] at the stage of [CS20]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	374.47	0.46	1.00	-1.39	-3.32	0.99
34	J	394.12	0.60	1.00	-1.47	-4.28	0.99
35	I	394.12	0.63	1.00	-1.65	-4.28	0.99
35	J	398.20	0.67	1.00	-1.46	-4.49	0.99
36	I	398.20	0.83	1.00	-2.32	-4.49	0.99
36	J	402.33	0.92	1.00	-2.37	-4.70	0.98
37	I	402.33	1.00	1.00	-2.91	-4.70	0.98
37	J	404.37	1.01	1.00	-2.78	-4.81	0.98
38	I	404.37	1.34	1.00	-4.60	-4.81	0.98
38	J	400.29	1.45	1.00	-4.97	-4.60	0.98
39	I	400.29	1.52	1.00	-6.00	-4.60	0.98

The Loss of tendon group [C43] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
39	J	397.86	1.63	1.00	-6.25	-4.47	0.98
40	I	397.86	2.47	1.01	-12.38	-4.47	0.96
40	J	397.54	2.67	1.01	-12.98	-4.46	0.96
41	I	397.54	2.48	1.01	-12.41	-4.46	0.96
41	J	398.49	2.70	1.01	-13.10	-4.50	0.96
42	I	398.30	1.51	1.00	-5.86	-4.49	0.98
42	J	402.11	1.67	1.00	-6.28	-4.69	0.98
43	I	402.11	1.49	1.00	-4.98	-4.69	0.98
43	J	403.89	1.40	1.00	-4.61	-4.79	0.98
44	I	403.89	1.07	1.00	-2.81	-4.79	0.98
44	J	401.15	1.09	1.00	-2.99	-4.64	0.98
45	I	401.15	1.01	1.00	-2.49	-4.64	0.98
45	J	399.78	0.94	1.00	-2.47	-4.57	0.98
46	I	399.78	0.78	1.00	-1.58	-4.57	0.99
46	J	393.33	0.75	1.00	-1.79	-4.24	0.99
47	I	393.33	0.72	1.00	-1.60	-4.24	0.99
47	J	374.34	0.56	1.00	-1.50	-3.31	0.99

The Loss of tendon group [C44] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	I	370.46	0.26	1.00	-0.72	-3.13	0.99
32	J	390.82	0.32	1.00	-0.62	-4.11	0.99
33	I	390.82	0.32	1.00	-0.52	-4.11	0.99
33	J	397.10	0.36	1.00	-0.37	-4.43	0.99
34	I	397.10	0.51	1.00	-1.40	-4.43	0.99
34	J	401.75	0.61	1.00	-1.47	-4.67	0.99
35	I	401.75	0.63	1.00	-1.65	-4.67	0.99
35	J	402.20	0.67	1.00	-1.46	-4.70	0.99
36	I	402.20	0.82	1.00	-2.32	-4.70	0.98
36	J	397.78	0.90	1.00	-2.36	-4.47	0.99
37	I	397.78	0.98	1.00	-2.90	-4.47	0.98
37	J	390.64	1.01	1.00	-2.78	-4.10	0.99
38	I	390.64	1.34	1.00	-4.60	-4.10	0.98
38	J	386.71	1.45	1.00	-4.97	-3.91	0.98
39	I	386.71	1.52	1.00	-6.00	-3.91	0.98
39	J	384.34	1.63	1.00	-6.25	-3.79	0.98
40	I	384.34	2.47	1.01	-12.38	-3.79	0.96
40	J	384.03	2.67	1.01	-12.98	-3.78	0.96
41	I	384.03	2.48	1.01	-12.41	-3.78	0.96
41	J	383.71	2.70	1.01	-13.10	-3.76	0.96
42	I	383.61	1.51	1.00	-5.86	-3.76	0.98
42	J	388.57	1.67	1.00	-6.28	-4.00	0.98
43	I	388.57	1.49	1.00	-4.98	-4.00	0.98
43	J	390.24	1.40	1.00	-4.61	-4.08	0.98
44	I	390.24	1.07	1.00	-2.81	-4.08	0.99
44	J	396.91	1.07	1.00	-2.98	-4.42	0.98
45	I	396.91	0.99	1.00	-2.48	-4.42	0.99
45	J	401.04	0.94	1.00	-2.47	-4.64	0.98
46	I	401.04	0.78	1.00	-1.58	-4.64	0.99
46	J	399.35	0.75	1.00	-1.80	-4.55	0.99
47	I	399.35	0.73	1.00	-1.60	-4.55	0.99

47	J	396.47	0.64	1.00	-1.55	-4.40	0.99
48	I	396.47	0.49	1.00	-0.58	-4.40	0.99
48	J	391.86	0.45	1.00	-0.73	-4.17	0.99
49	I	391.86	0.45	1.00	-0.76	-4.17	0.99
49	J	369.55	0.35	1.00	-0.83	-3.09	0.99

The Loss of tendon group [C45] at the stage of [CS20]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	I	370.37	0.26	1.00	-0.72	-3.13	0.99
32	J	390.73	0.32	1.00	-0.62	-4.11	0.99
33	I	390.73	0.32	1.00	-0.52	-4.11	0.99
33	J	397.01	0.36	1.00	-0.37	-4.43	0.99
34	I	397.01	0.51	1.00	-1.40	-4.43	0.99
34	J	401.66	0.61	1.00	-1.47	-4.67	0.99
35	I	401.66	0.63	1.00	-1.65	-4.67	0.99
35	J	402.10	0.67	1.00	-1.46	-4.69	0.99
36	I	402.10	0.82	1.00	-2.32	-4.69	0.98
36	J	397.78	0.90	1.00	-2.36	-4.47	0.99
37	I	397.78	0.98	1.00	-2.90	-4.47	0.98
37	J	390.63	1.01	1.00	-2.78	-4.10	0.99
38	I	390.63	1.34	1.00	-4.60	-4.10	0.98
38	J	386.70	1.45	1.00	-4.97	-3.91	0.98
39	I	386.70	1.52	1.00	-6.00	-3.91	0.98
39	J	384.34	1.63	1.00	-6.25	-3.79	0.98
40	I	384.34	2.47	1.01	-12.38	-3.79	0.96
40	J	384.03	2.67	1.01	-12.98	-3.78	0.96
41	I	384.03	2.48	1.01	-12.41	-3.78	0.96
41	J	385.01	2.70	1.01	-13.10	-3.83	0.96
42	I	384.88	1.51	1.00	-5.86	-3.82	0.98
42	J	388.56	1.67	1.00	-6.28	-4.00	0.98
43	I	388.56	1.49	1.00	-4.98	-4.00	0.98
43	J	390.23	1.40	1.00	-4.61	-4.08	0.98
44	I	390.23	1.07	1.00	-2.81	-4.08	0.99
44	J	396.89	1.07	1.00	-2.98	-4.42	0.98
45	I	396.89	0.99	1.00	-2.48	-4.42	0.99
45	J	401.02	0.94	1.00	-2.47	-4.64	0.98
46	I	401.02	0.78	1.00	-1.58	-4.64	0.99
46	J	399.24	0.75	1.00	-1.80	-4.54	0.99
47	I	399.24	0.73	1.00	-1.60	-4.54	0.99
47	J	396.36	0.64	1.00	-1.55	-4.39	0.99
48	I	396.36	0.49	1.00	-0.58	-4.39	0.99
48	J	391.74	0.45	1.00	-0.73	-4.16	0.99
49	I	391.74	0.45	1.00	-0.76	-4.16	0.99
49	J	369.43	0.35	1.00	-0.83	-3.09	0.99

The Loss of tendon group [C46] at the stage of [CS20]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	I	370.36	0.26	1.00	-0.72	-3.13	0.99
32	J	390.73	0.32	1.00	-0.62	-4.11	0.99
33	I	390.73	0.32	1.00	-0.52	-4.11	0.99
33	J	397.00	0.36	1.00	-0.37	-4.43	0.99
34	I	397.00	0.51	1.00	-1.40	-4.43	0.99
34	J	401.65	0.61	1.00	-1.47	-4.67	0.99

The Loss of tendon group [C46] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
35	I	401.65	0.63	1.00	-1.65	-4.67	0.99
35	J	402.11	0.67	1.00	-1.46	-4.69	0.99
36	I	402.11	0.82	1.00	-2.32	-4.69	0.98
36	J	397.77	0.90	1.00	-2.36	-4.47	0.99
37	I	397.77	0.98	1.00	-2.90	-4.47	0.98
37	J	390.62	1.01	1.00	-2.78	-4.10	0.99
38	I	390.62	1.34	1.00	-4.60	-4.10	0.98
38	J	386.69	1.45	1.00	-4.97	-3.91	0.98
39	I	386.69	1.52	1.00	-6.00	-3.91	0.98
39	J	384.33	1.63	1.00	-6.25	-3.79	0.98
40	I	384.33	2.47	1.01	-12.38	-3.79	0.96
40	J	384.02	2.67	1.01	-12.98	-3.78	0.96
41	I	384.02	2.48	1.01	-12.41	-3.78	0.96
41	J	385.01	2.70	1.01	-13.10	-3.83	0.96
42	I	384.86	1.51	1.00	-5.86	-3.82	0.98
42	J	388.54	1.67	1.00	-6.28	-4.00	0.98
43	I	388.54	1.49	1.00	-4.98	-4.00	0.98
43	J	390.22	1.40	1.00	-4.61	-4.08	0.98
44	I	390.22	1.07	1.00	-2.81	-4.08	0.99
44	J	396.88	1.07	1.00	-2.98	-4.42	0.98
45	I	396.88	0.99	1.00	-2.48	-4.42	0.99
45	J	401.01	0.94	1.00	-2.47	-4.64	0.98
46	I	401.01	0.78	1.00	-1.58	-4.64	0.99
46	J	399.25	0.75	1.00	-1.80	-4.54	0.99
47	I	399.25	0.73	1.00	-1.60	-4.54	0.99
47	J	396.35	0.64	1.00	-1.55	-4.39	0.99
48	I	396.35	0.49	1.00	-0.58	-4.39	0.99
48	J	391.73	0.45	1.00	-0.73	-4.16	0.99
49	I	391.73	0.45	1.00	-0.76	-4.16	0.99
49	J	369.42	0.35	1.00	-0.83	-3.09	0.99

The Loss of tendon group [C47] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	I	336.20	0.09	1.00	-0.18	-1.68	0.99
30	J	373.91	0.15	1.00	-0.21	-3.30	0.99
31	I	373.91	0.15	1.00	-0.11	-3.30	0.99
31	J	382.79	0.20	1.00	0.00	-3.72	0.99
32	I	382.79	0.28	1.00	-0.69	-3.72	0.99
32	J	372.58	0.32	1.00	-0.62	-3.23	0.99
33	I	372.58	0.32	1.00	-0.52	-3.23	0.99
33	J	367.73	0.36	1.00	-0.37	-3.01	0.99
34	I	367.73	0.51	1.00	-1.40	-3.01	0.99
34	J	363.28	0.61	1.00	-1.47	-2.81	0.99
35	I	363.28	0.63	1.00	-1.65	-2.81	0.99
35	J	360.98	0.67	1.00	-1.46	-2.71	0.99
36	I	360.98	0.82	1.00	-2.32	-2.71	0.99
36	J	356.25	0.90	1.00	-2.36	-2.50	0.99
37	I	356.25	0.98	1.00	-2.90	-2.50	0.99
37	J	350.69	1.01	1.00	-2.78	-2.27	0.99
38	I	350.69	1.34	1.00	-4.60	-2.27	0.98
38	J	346.56	1.45	1.00	-4.97	-2.09	0.98
39	I	346.56	1.52	1.00	-6.00	-2.09	0.98
39	J	345.11	1.63	1.00	-6.25	-2.03	0.98

The Loss of tendon group [C47] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
40	I	345.11	2.47	1.01	-12.38	-2.03	0.97
40	J	345.11	2.67	1.01	-12.98	-2.03	0.96
41	I	345.11	2.48	1.01	-12.41	-2.03	0.97
41	J	346.27	2.70	1.01	-13.10	-2.08	0.96
42	I	345.17	1.51	1.00	-5.86	-2.04	0.98
42	J	348.47	1.67	1.00	-6.28	-2.17	0.98
43	I	348.47	1.49	1.00	-4.98	-2.17	0.98
43	J	350.65	1.40	1.00	-4.61	-2.26	0.98
44	I	350.65	1.07	1.00	-2.81	-2.26	0.99
44	J	356.39	1.07	1.00	-2.98	-2.51	0.99
45	I	356.39	0.99	1.00	-2.48	-2.51	0.99
45	J	360.28	0.94	1.00	-2.47	-2.68	0.99
46	I	360.28	0.78	1.00	-1.58	-2.68	0.99
46	J	364.60	0.75	1.00	-1.80	-2.87	0.99
47	I	364.60	0.73	1.00	-1.60	-2.87	0.99
47	J	367.87	0.64	1.00	-1.55	-3.02	0.99
48	I	367.87	0.49	1.00	-0.58	-3.02	0.99
48	J	371.35	0.45	1.00	-0.73	-3.18	0.99
49	I	371.35	0.45	1.00	-0.76	-3.18	0.99
49	J	383.05	0.41	1.00	-0.83	-3.73	0.99
50	I	383.05	0.32	1.00	-0.18	-3.73	0.99
50	J	380.88	0.28	1.00	-0.29	-3.63	0.99
51	I	380.88	0.28	1.00	-0.34	-3.63	0.99
51	J	335.43	0.17	1.00	-0.27	-1.65	0.99

The Loss of tendon group [C48] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	I	345.87	0.10	1.00	-0.19	-2.07	0.99
30	J	380.38	0.17	1.00	-0.22	-3.60	0.99
31	I	380.38	0.17	1.00	-0.12	-3.60	0.99
31	J	388.16	0.21	1.00	-0.02	-3.98	0.99
32	I	388.16	0.30	1.00	-0.71	-3.98	0.99
32	J	382.53	0.33	1.00	-0.65	-3.71	0.99
33	I	382.53	0.33	1.00	-0.55	-3.71	0.99
33	J	378.18	0.37	1.00	-0.41	-3.50	0.99
34	I	378.18	0.52	1.00	-1.45	-3.50	0.99
34	J	373.52	0.61	1.00	-1.51	-3.28	0.99
35	I	373.52	0.64	1.00	-1.71	-3.28	0.99
35	J	370.96	0.67	1.00	-1.53	-3.16	0.99
36	I	370.96	0.83	1.00	-2.38	-3.16	0.99
36	J	365.82	0.91	1.00	-2.44	-2.92	0.99
37	I	365.82	0.99	1.00	-2.99	-2.92	0.99
37	J	360.69	1.02	1.00	-2.87	-2.70	0.99
38	I	360.69	1.34	1.00	-4.71	-2.70	0.98
38	J	356.10	1.45	1.00	-5.09	-2.50	0.98
39	I	356.10	1.52	1.00	-6.14	-2.50	0.98
39	J	354.70	1.63	1.00	-6.40	-2.44	0.98
40	I	354.70	2.48	1.01	-12.67	-2.44	0.96
40	J	354.64	2.68	1.01	-13.29	-2.43	0.96
41	I	354.64	2.48	1.01	-12.70	-2.43	0.96
41	J	356.18	2.70	1.01	-13.41	-2.50	0.96

The Loss of tendon group [C48] at the stage of [CS20]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
42	I	355.91	1.51	1.00	-6.00	-2.49	0.98
42	J	359.08	1.67	1.00	-6.43	-2.63	0.98
43	I	359.08	1.50	1.00	-5.10	-2.63	0.98
43	J	362.32	1.40	1.00	-4.72	-2.77	0.98
44	I	362.32	1.08	1.00	-2.90	-2.77	0.99
44	J	367.52	1.08	1.00	-3.06	-3.00	0.99
45	I	367.52	1.00	1.00	-2.55	-3.00	0.99
45	J	371.10	0.94	1.00	-2.53	-3.17	0.99
46	I	371.10	0.78	1.00	-1.64	-3.17	0.99
46	J	375.68	0.76	1.00	-1.85	-3.38	0.99
47	I	375.68	0.74	1.00	-1.65	-3.38	0.99
47	J	378.64	0.65	1.00	-1.59	-3.52	0.99
48	I	378.64	0.50	1.00	-0.61	-3.52	0.99
48	J	383.40	0.46	1.00	-0.76	-3.75	0.99
49	I	383.40	0.46	1.00	-0.79	-3.75	0.99
49	J	387.14	0.42	1.00	-0.85	-3.93	0.99
50	I	387.14	0.34	1.00	-0.20	-3.93	0.99
50	J	382.56	0.30	1.00	-0.31	-3.71	0.99
51	I	382.56	0.29	1.00	-0.36	-3.71	0.99
51	J	348.39	0.18	1.00	-0.28	-2.17	0.99

3.5.10.3. FAMILIA DE CABLES TIPO C

Para la familia de cables de postensado a momento positivo de continuidad tipo C, se emplean 8 cables de 15 torones cada uno por cada estribo, que se distribuyen equitativamente sobre la losa inferior, a fin de garantizar la estabilidad de la estructura y anclaje con la viga cabezal de los estribos.

The Loss of tendon group [C49] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C50] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C51] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C52] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99

6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C53] at the stage of [CS19]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C54] at the stage of [CS19]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C55] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99
The Loss of tendon group [C56] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.03	1.00	-0.89	-3.09	0.99
1	J	272.28	0.05	1.00	-1.26	-3.10	0.98
2	I	250.96	0.13	1.00	-2.20	-2.06	0.98
2	J	257.04	0.24	1.00	-2.78	-2.35	0.98
3	I	257.04	0.23	1.00	-2.08	-2.35	0.98
3	J	259.00	0.27	1.00	-2.07	-2.44	0.98
4	I	259.00	0.25	1.00	-1.70	-2.44	0.99
4	J	260.68	0.29	1.00	-1.69	-2.52	0.98
5	I	260.68	0.27	1.00	-1.43	-2.52	0.99
5	J	262.38	0.29	1.00	-1.43	-2.60	0.99
6	I	262.38	0.27	1.00	-1.22	-2.60	0.99
6	J	262.59	0.28	1.00	-1.20	-2.61	0.99
7	I	262.59	0.27	1.00	-1.06	-2.61	0.99
7	J	261.72	0.27	1.00	-1.04	-2.57	0.99
8	I	261.72	0.26	1.00	-0.89	-2.57	0.99
8	J	255.95	0.21	1.00	-0.77	-2.29	0.99

The Loss of tendon group [C57] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.36	0.20	1.00	-0.75	-1.73	0.99
73	J	257.70	0.29	1.00	-1.02	-2.38	0.99
74	I	257.70	0.30	1.00	-1.13	-2.38	0.99
74	J	260.55	0.30	1.00	-1.16	-2.51	0.99
75	I	260.55	0.31	1.00	-1.31	-2.51	0.99
75	J	262.47	0.30	1.00	-1.33	-2.61	0.99
76	I	262.47	0.32	1.00	-1.54	-2.61	0.99
76	J	265.42	0.30	1.00	-1.53	-2.75	0.99
77	I	265.42	0.32	1.00	-1.81	-2.75	0.98
77	J	264.07	0.28	1.00	-1.79	-2.69	0.98
78	I	264.07	0.29	1.00	-2.17	-2.69	0.98
78	J	261.07	0.24	1.00	-2.13	-2.54	0.98
79	I	261.07	0.24	1.00	-2.68	-2.54	0.98
79	J	234.19	0.13	1.00	-2.12	-1.34	0.99
80	I	234.19	0.04	1.00	-1.12	-1.34	0.99
80	J	233.92	0.02	1.00	-0.83	-1.33	0.99
The Loss of tendon group [C58] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.49	0.20	1.00	-0.75	-1.73	0.99
73	J	257.82	0.29	1.00	-1.02	-2.38	0.99
74	I	257.82	0.30	1.00	-1.13	-2.38	0.99
74	J	260.67	0.30	1.00	-1.16	-2.52	0.99
75	I	260.67	0.31	1.00	-1.31	-2.52	0.99
75	J	262.59	0.30	1.00	-1.33	-2.61	0.99
76	I	262.59	0.32	1.00	-1.54	-2.61	0.99
76	J	265.54	0.30	1.00	-1.53	-2.76	0.99
77	I	265.54	0.32	1.00	-1.81	-2.76	0.98
77	J	264.13	0.28	1.00	-1.79	-2.69	0.98
78	I	264.13	0.29	1.00	-2.17	-2.69	0.98
78	J	261.13	0.24	1.00	-2.12	-2.54	0.98
79	I	261.13	0.24	1.00	-2.68	-2.54	0.98
79	J	234.36	0.13	1.00	-2.12	-1.35	0.99
80	I	234.36	0.04	1.00	-1.12	-1.35	0.99
80	J	234.10	0.02	1.00	-0.83	-1.34	0.99

The Loss of tendon group [C59] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.63	0.20	1.00	-0.75	-1.74	0.99
73	J	257.94	0.29	1.00	-1.02	-2.39	0.99
74	I	257.94	0.30	1.00	-1.13	-2.39	0.99
74	J	260.80	0.30	1.00	-1.16	-2.53	0.99
75	I	260.80	0.31	1.00	-1.31	-2.53	0.99
75	J	262.72	0.30	1.00	-1.33	-2.62	0.99
76	I	262.72	0.32	1.00	-1.54	-2.62	0.99
76	J	265.66	0.30	1.00	-1.53	-2.76	0.99
77	I	265.66	0.32	1.00	-1.81	-2.76	0.98
77	J	264.23	0.28	1.00	-1.79	-2.69	0.98
78	I	264.23	0.29	1.00	-2.17	-2.69	0.98
78	J	261.23	0.24	1.00	-2.12	-2.55	0.98
79	I	261.23	0.24	1.00	-2.68	-2.55	0.98
79	J	234.59	0.13	1.00	-2.13	-1.36	0.99
80	I	234.59	0.04	1.00	-1.13	-1.36	0.99
80	J	234.32	0.02	1.00	-0.84	-1.35	0.99
The Loss of tendon group [C60] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.23	0.20	1.00	-0.75	-1.72	0.99
73	J	257.59	0.29	1.00	-1.02	-2.37	0.99
74	I	257.59	0.30	1.00	-1.13	-2.37	0.99
74	J	260.44	0.30	1.00	-1.16	-2.51	0.99
75	I	260.44	0.31	1.00	-1.31	-2.51	0.99
75	J	262.35	0.30	1.00	-1.33	-2.60	0.99
76	I	262.35	0.32	1.00	-1.54	-2.60	0.99
76	J	265.30	0.30	1.00	-1.53	-2.75	0.99
77	I	265.30	0.32	1.00	-1.81	-2.75	0.98
77	J	263.92	0.28	1.00	-1.79	-2.68	0.98
78	I	263.92	0.29	1.00	-2.17	-2.68	0.98
78	J	260.91	0.24	1.00	-2.13	-2.53	0.98
79	I	260.91	0.24	1.00	-2.68	-2.53	0.98
79	J	233.91	0.13	1.00	-2.12	-1.33	0.99
80	I	233.91	0.04	1.00	-1.12	-1.33	0.99
80	J	233.65	0.02	1.00	-0.83	-1.32	0.99

The Loss of tendon group [C61] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	242.68	0.20	1.00	-0.75	-1.70	0.99
73	J	257.11	0.29	1.00	-1.02	-2.35	0.99
74	I	257.11	0.30	1.00	-1.13	-2.35	0.99
74	J	259.93	0.30	1.00	-1.16	-2.48	0.99
75	I	259.93	0.31	1.00	-1.31	-2.48	0.99
75	J	261.84	0.30	1.00	-1.33	-2.58	0.99
76	I	261.84	0.32	1.00	-1.54	-2.58	0.99
76	J	264.82	0.30	1.00	-1.53	-2.72	0.99
77	I	264.82	0.32	1.00	-1.81	-2.72	0.98
77	J	263.35	0.28	1.00	-1.79	-2.65	0.98
78	I	263.35	0.30	1.00	-2.17	-2.65	0.98
78	J	260.33	0.24	1.00	-2.13	-2.50	0.98
79	I	260.33	0.24	1.00	-2.69	-2.50	0.98
79	J	232.83	0.13	1.00	-2.11	-1.29	0.99
80	I	232.83	0.04	1.00	-1.12	-1.29	0.99
80	J	232.58	0.02	1.00	-0.83	-1.28	0.99
The Loss of tendon group [C62] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	244.15	0.20	1.00	-0.75	-1.76	0.99
73	J	258.39	0.29	1.00	-1.02	-2.41	0.99
74	I	258.39	0.30	1.00	-1.13	-2.41	0.99
74	J	261.27	0.30	1.00	-1.16	-2.55	0.99
75	I	261.27	0.31	1.00	-1.31	-2.55	0.99
75	J	263.20	0.30	1.00	-1.33	-2.64	0.99
76	I	263.20	0.32	1.00	-1.54	-2.64	0.99
76	J	264.30	0.30	1.00	-1.53	-2.70	0.99
77	I	264.30	0.32	1.00	-1.81	-2.70	0.98
77	J	262.33	0.28	1.00	-1.79	-2.60	0.98
78	I	262.33	0.29	1.00	-2.17	-2.60	0.98
78	J	259.35	0.24	1.00	-2.12	-2.46	0.98
79	I	259.35	0.24	1.00	-2.68	-2.46	0.98
79	J	250.47	0.13	1.00	-2.13	-2.04	0.98
80	I	250.47	0.04	1.00	-1.13	-2.04	0.99
80	J	232.91	0.02	1.00	-0.84	-1.29	0.99

The Loss of tendon group [C63] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	244.27	0.20	1.00	-0.75	-1.77	0.99
73	J	258.50	0.29	1.00	-1.02	-2.41	0.99
74	I	258.50	0.30	1.00	-1.13	-2.41	0.99
74	J	261.39	0.30	1.00	-1.16	-2.55	0.99
75	I	261.39	0.31	1.00	-1.31	-2.55	0.99
75	J	263.32	0.30	1.00	-1.33	-2.65	0.99
76	I	263.32	0.32	1.00	-1.54	-2.65	0.99
76	J	264.40	0.30	1.00	-1.53	-2.70	0.99
77	I	264.40	0.32	1.00	-1.81	-2.70	0.98
77	J	262.43	0.28	1.00	-1.79	-2.60	0.98
78	I	262.43	0.29	1.00	-2.17	-2.60	0.98
78	J	259.46	0.24	1.00	-2.12	-2.46	0.98
79	I	259.46	0.24	1.00	-2.68	-2.46	0.98
79	J	250.58	0.13	1.00	-2.14	-2.05	0.98
80	I	250.58	0.04	1.00	-1.13	-2.05	0.99
80	J	233.12	0.02	1.00	-0.84	-1.30	0.99
The Loss of tendon group [C64] at the stage of [CS19]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	242.54	0.20	1.00	-0.75	-1.69	0.99
73	J	256.98	0.29	1.00	-1.02	-2.34	0.99
74	I	256.98	0.30	1.00	-1.13	-2.34	0.99
74	J	259.80	0.30	1.00	-1.16	-2.48	0.99
75	I	259.80	0.31	1.00	-1.31	-2.48	0.99
75	J	261.71	0.30	1.00	-1.33	-2.57	0.99
76	I	261.71	0.32	1.00	-1.54	-2.57	0.99
76	J	264.69	0.30	1.00	-1.53	-2.72	0.99
77	I	264.69	0.32	1.00	-1.81	-2.72	0.98
77	J	263.20	0.28	1.00	-1.79	-2.64	0.98
78	I	263.20	0.30	1.00	-2.17	-2.64	0.98
78	J	260.18	0.24	1.00	-2.13	-2.50	0.98
79	I	260.18	0.24	1.00	-2.69	-2.50	0.98
79	J	232.55	0.13	1.00	-2.11	-1.28	0.99
80	I	232.55	0.04	1.00	-1.11	-1.28	0.99
80	J	232.30	0.02	1.00	-0.83	-1.27	0.99

3.5.11. PERDIDAS A LARGO PLAZO DE CABLES DE POSTENSADO

3.5.11.1. FAMILIA DE CABLES TIPO A

Se definen las pérdidas a largo plazo definiendo una etapa constructiva de 10000 días, conforme lo estipulado en la normativa CCP-14, teniendo en cuenta la aplicación de cargas de servicio y funcionamiento.

Para la familia de cables de postensado a momento negativo de construcción tipo A, se emplean 34 cables de 22 torones cada uno por cada tabique, para un total de 68 cables que se distribuyen equitativamente sobre la losa superior, a fin de garantizar la estabilidad de la estructura durante su construcción.

The Loss of tendon group [C1-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
18	I	394.06	-9.37	0.98	-25.99	-8.53	0.89
18	J	394.07	-8.79	0.98	-25.26	-8.58	0.89
19	I	394.07	-2.66	0.99	-10.65	-9.21	0.94
19	J	394.07	-2.47	0.99	-10.52	-9.23	0.94
20	I	394.07	-8.46	0.98	-24.82	-8.60	0.89
20	J	394.07	-7.36	0.98	-23.65	-8.68	0.90
21	I	394.07	-8.42	0.98	-24.65	-8.60	0.89
21	J	394.06	-9.52	0.98	-25.81	-8.52	0.89
22	I	394.06	-3.30	0.99	-11.07	-9.17	0.94
22	J	394.04	-3.57	0.99	-11.33	-9.15	0.94
23	I	394.04	-9.74	0.98	-26.17	-8.51	0.89
23	J	394.03	-10.46	0.97	-26.98	-8.46	0.88
The Loss of tendon group [C2-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
18	I	393.97	-9.37	0.98	-25.99	-8.52	0.89
18	J	393.98	-8.79	0.98	-25.26	-8.57	0.89
19	I	393.98	-2.66	0.99	-10.65	-9.20	0.94
19	J	393.98	-2.47	0.99	-10.52	-9.22	0.94
20	I	393.98	-8.46	0.98	-24.82	-8.59	0.89
20	J	393.98	-7.36	0.98	-23.65	-8.67	0.90
21	I	393.98	-8.42	0.98	-24.65	-8.59	0.89
21	J	394.00	-9.52	0.98	-25.81	-8.52	0.89
22	I	394.00	-3.30	0.99	-11.07	-9.17	0.94
22	J	394.01	-3.57	0.99	-11.33	-9.15	0.94
23	I	394.01	-9.74	0.98	-26.17	-8.51	0.89
23	J	394.01	-10.46	0.97	-26.98	-8.46	0.88
The Loss of tendon group [C3-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
17	I	384.83	-8.90	0.98	-29.84	-7.19	0.88
17	J	396.59	-7.77	0.98	-28.22	-8.54	0.89
18	I	396.59	-7.43	0.98	-21.11	-8.94	0.91
18	J	396.59	-6.95	0.98	-20.54	-8.98	0.91
19	I	396.59	-1.77	1.00	-7.54	-9.63	0.95
19	J	396.59	-1.59	1.00	-7.42	-9.64	0.95
20	I	396.59	-6.64	0.98	-20.17	-9.01	0.91
20	J	396.59	-5.62	0.99	-19.21	-9.08	0.91
21	I	396.59	-6.69	0.98	-20.21	-8.99	0.91
21	J	396.58	-7.70	0.98	-21.16	-8.92	0.90
22	I	396.58	-2.43	0.99	-7.99	-9.58	0.95
22	J	396.57	-2.67	0.99	-8.20	-9.56	0.95
23	I	396.57	-7.88	0.98	-21.45	-8.90	0.90
23	J	396.56	-8.50	0.98	-22.10	-8.85	0.90

24	I	396.56	-8.87	0.98	-29.42	-8.45	0.88
24	J	384.51	-10.20	0.97	-31.18	-7.07	0.87

The Loss of tendon group [C4-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
17	I	366.17	-8.90	0.98	-29.84	-5.31	0.88
17	J	380.46	-7.77	0.98	-28.22	-6.83	0.89
18	I	380.46	-7.43	0.98	-21.11	-7.20	0.91
18	J	385.18	-6.95	0.98	-20.54	-7.74	0.91
19	I	385.18	-1.77	1.00	-7.54	-8.35	0.95
19	J	385.34	-1.59	1.00	-7.42	-8.38	0.95
20	I	385.34	-6.64	0.98	-20.17	-7.78	0.91
20	J	385.86	-5.62	0.99	-19.21	-7.91	0.92
21	I	385.86	-6.69	0.98	-20.21	-7.82	0.91
21	J	386.39	-7.70	0.98	-21.16	-7.81	0.91
22	I	386.35	-2.43	0.99	-7.99	-8.43	0.95
22	J	387.53	-2.67	0.99	-8.20	-8.55	0.95
23	I	387.53	-7.88	0.98	-21.45	-7.92	0.90
23	J	386.93	-8.50	0.98	-22.10	-7.81	0.90
24	I	386.93	-8.87	0.98	-29.42	-7.42	0.88
24	J	368.68	-10.20	0.97	-31.18	-5.47	0.87
The Loss of tendon group [C5-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
16	I	374.21	-8.31	0.98	-29.71	-6.14	0.88
16	J	388.17	-7.27	0.98	-28.15	-7.68	0.89
17	I	388.17	-6.95	0.98	-27.11	-7.76	0.89
17	J	397.45	-5.95	0.99	-25.75	-8.86	0.90
18	I	397.45	-5.73	0.99	-20.74	-9.14	0.91
18	J	398.14	-5.33	0.99	-20.20	-9.26	0.91
19	I	398.14	-1.12	1.00	-7.37	-9.86	0.95
19	J	398.14	-0.94	1.00	-7.26	-9.87	0.95
20	I	398.14	-5.06	0.99	-19.84	-9.28	0.91
20	J	398.14	-4.16	0.99	-18.94	-9.35	0.92
21	I	398.14	-5.15	0.99	-19.87	-9.26	0.91
21	J	398.15	-6.04	0.98	-20.77	-9.19	0.91
22	I	397.77	-1.75	1.00	-7.80	-9.76	0.95
22	J	393.63	-1.96	1.00	-8.00	-9.27	0.95
23	I	393.63	-6.22	0.98	-21.04	-8.67	0.91
23	J	393.03	-6.74	0.98	-21.67	-8.56	0.91
24	I	393.03	-7.00	0.98	-26.87	-8.28	0.89
24	J	387.58	-8.14	0.98	-28.36	-7.60	0.89
25	I	387.58	-8.58	0.98	-28.99	-7.52	0.88
25	J	373.59	-10.03	0.97	-30.82	-5.97	0.87

The Loss of tendon group [C6-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
16	I	374.8	-8.3	1.0	-29.7	-6.2	0.9
16	J	388.7	-7.3	1.0	-28.1	-7.7	0.9
17	I	388.7	-7.0	1.0	-27.1	-7.8	0.9

The Loss of tendon group [C6-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
17	J	398.0	-5.9	1.0	-25.7	-8.9	0.9
18	I	398.0	-5.7	1.0	-20.7	-9.2	0.9
18	J	398.1	-5.3	1.0	-20.2	-9.3	0.9
19	I	398.1	-1.1	1.0	-7.4	-9.9	1.0
19	J	398.1	-0.9	1.0	-7.3	-9.9	1.0
20	I	398.1	-5.1	1.0	-19.8	-9.3	0.9
20	J	398.1	-4.2	1.0	-18.9	-9.3	0.9
21	I	398.1	-5.1	1.0	-19.9	-9.3	0.9
21	J	398.1	-6.0	1.0	-20.8	-9.2	0.9
22	I	397.4	-1.7	1.0	-7.8	-9.7	1.0
22	J	393.2	-2.0	1.0	-8.0	-9.2	1.0
23	I	393.2	-6.2	1.0	-21.0	-8.6	0.9
23	J	392.6	-6.7	1.0	-21.7	-8.5	0.9
24	I	392.6	-7.0	1.0	-26.9	-8.2	0.9
24	J	387.2	-8.1	1.0	-28.4	-7.6	0.9
25	I	387.2	-8.6	1.0	-29.0	-7.5	0.9
25	J	373.2	-10.0	1.0	-30.8	-5.9	0.9

The Loss of tendon group [C7-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
15	I	379.06	-8.07	0.98	-28.10	-6.67	0.89
15	J	388.80	-6.98	0.98	-26.63	-7.79	0.89
16	I	388.80	-6.48	0.98	-27.08	-7.87	0.89
16	J	398.33	-5.57	0.99	-25.77	-9.00	0.90
17	I	398.33	-5.33	0.99	-25.37	-9.04	0.90
17	J	403.39	-4.44	0.99	-24.12	-9.70	0.91
18	I	403.39	-4.30	0.99	-20.34	-9.91	0.91
18	J	404.00	-3.96	0.99	-19.82	-10.02	0.92
19	I	404.00	-0.59	1.00	-7.20	-10.58	0.95
19	J	404.16	-0.42	1.00	-7.09	-10.61	0.96
20	I	404.16	-3.72	0.99	-19.48	-10.06	0.92
20	J	404.68	-2.93	0.99	-18.62	-10.19	0.92
21	I	404.68	-3.83	0.99	-19.50	-10.10	0.92
21	J	405.19	-4.61	0.99	-20.35	-10.09	0.91
22	I	402.17	-1.19	1.00	-7.60	-10.32	0.95
22	J	398.08	-1.38	1.00	-7.79	-9.82	0.95
23	I	398.08	-4.80	0.99	-20.61	-9.26	0.91
23	J	397.49	-5.25	0.99	-21.20	-9.16	0.91
24	I	397.49	-5.44	0.99	-25.18	-8.94	0.90
24	J	396.40	-6.41	0.98	-26.53	-8.73	0.89
25	I	396.40	-6.77	0.98	-26.55	-8.68	0.89
25	J	387.15	-8.07	0.98	-28.10	-7.58	0.89
26	I	387.15	-8.55	0.98	-28.09	-7.50	0.89
26	J	373.01	-9.99	0.97	-29.76	-5.94	0.88

The Loss of tendon group [C8-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
15	I	379.07	-8.07	0.98	-28.10	-6.67	0.89

The Loss of tendon group [C8-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
15	J	388.81	-6.98	0.98	-26.63	-7.79	0.89
16	I	388.81	-6.48	0.98	-27.08	-7.87	0.89
16	J	398.34	-5.57	0.99	-25.77	-9.00	0.90
17	I	398.34	-5.33	0.99	-25.37	-9.04	0.90
17	J	403.39	-4.44	0.99	-24.12	-9.70	0.91
18	I	403.39	-4.30	0.99	-20.34	-9.91	0.91
18	J	404.00	-3.96	0.99	-19.82	-10.02	0.92
19	I	404.00	-0.59	1.00	-7.20	-10.58	0.95
19	J	404.17	-0.42	1.00	-7.09	-10.61	0.96
20	I	404.17	-3.72	0.99	-19.48	-10.06	0.92
20	J	404.68	-2.93	0.99	-18.62	-10.19	0.92
21	I	404.68	-3.83	0.99	-19.50	-10.10	0.92
21	J	405.20	-4.61	0.99	-20.35	-10.09	0.91
22	I	402.15	-1.19	1.00	-7.60	-10.31	0.95
22	J	398.07	-1.38	1.00	-7.79	-9.82	0.95
23	I	398.07	-4.80	0.99	-20.61	-9.26	0.91
23	J	397.48	-5.25	0.99	-21.20	-9.15	0.91
24	I	397.48	-5.44	0.99	-25.18	-8.94	0.90
24	J	396.39	-6.41	0.98	-26.53	-8.72	0.89
25	I	396.39	-6.77	0.98	-26.55	-8.68	0.89
25	J	387.16	-8.07	0.98	-28.10	-7.58	0.89
26	I	387.16	-8.55	0.98	-28.09	-7.50	0.89
26	J	372.98	-9.99	0.97	-29.76	-5.94	0.88

The Loss of tendon group [C9-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
14	I	350.94	-6.76	0.98	-28.30	-4.05	0.89
14	J	379.05	-5.50	0.99	-26.60	-6.85	0.90
15	I	379.05	-5.30	0.99	-25.25	-6.92	0.90
15	J	387.10	-4.36	0.99	-23.97	-7.85	0.91
16	I	387.10	-3.91	0.99	-25.11	-7.89	0.90
16	J	388.15	-3.21	0.99	-23.84	-8.08	0.91
17	I	388.15	-3.01	0.99	-23.86	-8.09	0.91
17	J	392.99	-2.28	0.99	-22.64	-8.70	0.91
18	I	392.99	-2.19	0.99	-19.79	-8.86	0.92
18	J	393.54	-1.95	1.00	-19.27	-8.95	0.92
19	I	393.54	0.38	1.00	-6.90	-9.43	0.96
19	J	393.54	0.56	1.00	-6.78	-9.44	0.96
20	I	393.54	-1.72	1.00	-18.92	-8.97	0.92
20	J	393.07	-0.93	1.00	-18.01	-8.98	0.93
21	I	393.07	-1.98	1.00	-19.00	-8.89	0.92
21	J	392.58	-2.77	0.99	-19.91	-8.77	0.92
22	I	390.27	-0.33	1.00	-7.36	-9.01	0.96
22	J	392.39	-0.50	1.00	-7.56	-9.23	0.96
23	I	392.39	-2.95	0.99	-20.18	-8.73	0.92
23	J	391.82	-3.33	0.99	-20.79	-8.63	0.92
24	I	391.82	-3.46	0.99	-23.86	-8.46	0.91
24	J	390.78	-4.30	0.99	-25.21	-8.27	0.90
25	I	390.78	-4.62	0.99	-24.85	-8.24	0.90
25	J	385.92	-5.81	0.98	-26.41	-7.62	0.90
26	I	385.92	-6.24	0.98	-25.67	-7.58	0.90
26	J	376.79	-7.61	0.98	-27.24	-6.54	0.89
27	I	376.79	-7.89	0.98	-28.93	-6.47	0.89

27	J	350.23	-9.51	0.97	-30.94	-3.83	0.87

The Loss of tendon group [C10-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
14	I	351.01	-6.75	0.98	-28.30	-4.06	0.89
14	J	377.30	-5.50	0.99	-26.60	-6.68	0.90
15	I	377.30	-5.30	0.99	-25.25	-6.74	0.90
15	J	387.23	-4.36	0.99	-23.97	-7.87	0.91
16	I	387.23	-3.91	0.99	-25.11	-7.90	0.90
16	J	388.27	-3.21	0.99	-23.84	-8.09	0.91
17	I	388.27	-3.01	0.99	-23.86	-8.11	0.91
17	J	392.98	-2.28	0.99	-22.64	-8.70	0.91
18	I	392.98	-2.19	0.99	-19.79	-8.86	0.92
18	J	392.97	-1.95	1.00	-19.27	-8.89	0.92
19	I	392.97	0.38	1.00	-6.90	-9.37	0.96
19	J	392.97	0.56	1.00	-6.78	-9.38	0.96
20	I	392.97	-1.72	1.00	-18.92	-8.91	0.92
20	J	392.97	-0.93	1.00	-18.01	-8.97	0.93
21	I	392.97	-1.98	1.00	-19.00	-8.87	0.92
21	J	392.52	-2.77	0.99	-19.91	-8.76	0.92
22	I	390.28	-0.33	1.00	-7.36	-9.01	0.96
22	J	392.26	-0.50	1.00	-7.56	-9.21	0.96
23	I	392.26	-2.95	0.99	-20.18	-8.72	0.92
23	J	391.69	-3.33	0.99	-20.79	-8.62	0.92
24	I	391.69	-3.46	0.99	-23.86	-8.45	0.91
24	J	390.65	-4.30	0.99	-25.21	-8.25	0.90
25	I	390.65	-4.62	0.99	-24.85	-8.23	0.90
25	J	385.79	-5.81	0.98	-26.41	-7.61	0.90
26	I	385.79	-6.24	0.98	-25.67	-7.57	0.90
26	J	376.71	-7.61	0.98	-27.24	-6.53	0.89
27	I	376.71	-7.89	0.98	-28.93	-6.46	0.89
27	J	350.10	-9.51	0.97	-30.95	-3.82	0.87

The Loss of tendon group [C11-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
13	I	349.47	-6.53	0.98	-27.80	-3.95	0.89
13	J	375.68	-5.31	0.99	-26.12	-6.55	0.90
14	I	375.68	-4.97	0.99	-25.72	-6.62	0.90
14	J	388.69	-3.81	0.99	-24.26	-8.07	0.91
15	I	388.69	-3.69	0.99	-23.51	-8.10	0.91
15	J	389.73	-2.90	0.99	-22.35	-8.30	0.91
16	I	389.73	-2.52	0.99	-23.76	-8.32	0.91
16	J	390.77	-1.93	1.00	-22.60	-8.50	0.92
17	I	390.77	-1.77	1.00	-22.76	-8.50	0.92
17	J	390.26	-1.14	1.00	-21.61	-8.52	0.92
18	I	390.26	-1.09	1.00	-19.37	-8.64	0.93
18	J	389.68	-0.90	1.00	-18.88	-8.60	0.93
19	I	389.68	0.76	1.00	-6.74	-9.03	0.96
19	J	389.52	0.93	1.00	-6.63	-9.02	0.96
20	I	389.52	-0.69	1.00	-18.54	-8.60	0.93
20	J	389.16	0.00	1.00	-17.68	-8.62	0.93

The Loss of tendon group [C11-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
21	I	389.16	-0.97	1.00	-18.62	-8.53	0.93
21	J	389.28	-1.66	1.00	-19.47	-8.48	0.92
22	I	389.28	0.08	1.00	-7.17	-8.93	0.96
22	J	393.18	-0.05	1.00	-7.36	-9.35	0.96
23	I	393.18	-1.80	1.00	-19.73	-8.90	0.92
23	J	393.55	-2.12	0.99	-20.31	-8.91	0.92
24	I	393.55	-2.21	0.99	-22.76	-8.78	0.91
24	J	393.55	-2.93	0.99	-24.01	-8.70	0.91
25	I	393.55	-3.21	0.99	-23.48	-8.69	0.91
25	J	388.86	-4.27	0.99	-24.92	-8.08	0.90
26	I	388.86	-4.63	0.99	-23.94	-8.07	0.91
26	J	387.81	-5.80	0.99	-25.35	-7.85	0.90
27	I	387.81	-6.00	0.98	-26.43	-7.81	0.90
27	J	377.43	-7.43	0.98	-28.15	-6.63	0.89
28	I	377.43	-7.84	0.98	-28.61	-6.56	0.89
28	J	352.15	-9.64	0.97	-30.74	-4.01	0.87

The Loss of tendon group [C12-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
13	I	349.47	-6.53	0.98	-27.80	-3.95	0.89
13	J	375.68	-5.31	0.99	-26.12	-6.55	0.90
14	I	375.68	-4.97	0.99	-25.72	-6.62	0.90
14	J	388.69	-3.81	0.99	-24.26	-8.07	0.91
15	I	388.69	-3.69	0.99	-23.51	-8.10	0.91
15	J	389.73	-2.90	0.99	-22.35	-8.30	0.91
16	I	389.73	-2.52	0.99	-23.76	-8.32	0.91
16	J	390.77	-1.93	1.00	-22.60	-8.50	0.92
17	I	390.77	-1.77	1.00	-22.76	-8.50	0.92
17	J	390.26	-1.14	1.00	-21.61	-8.52	0.92
18	I	390.26	-1.09	1.00	-19.37	-8.64	0.93
18	J	389.68	-0.90	1.00	-18.88	-8.60	0.93
19	I	389.68	0.76	1.00	-6.74	-9.03	0.96
19	J	389.53	0.93	1.00	-6.63	-9.02	0.96
20	I	389.53	-0.69	1.00	-18.54	-8.60	0.93
20	J	389.23	0.00	1.00	-17.68	-8.63	0.93
21	I	389.23	-0.97	1.00	-18.62	-8.53	0.93
21	J	389.25	-1.66	1.00	-19.47	-8.48	0.92
22	I	389.21	0.08	1.00	-7.17	-8.92	0.96
22	J	393.11	-0.05	1.00	-7.36	-9.35	0.96
23	I	393.11	-1.80	1.00	-19.73	-8.89	0.92
23	J	393.68	-2.12	0.99	-20.31	-8.92	0.92
24	I	393.68	-2.21	0.99	-22.76	-8.79	0.91
24	J	393.35	-2.93	0.99	-24.01	-8.68	0.91
25	I	393.35	-3.21	0.99	-23.48	-8.67	0.91
25	J	388.50	-4.27	0.99	-24.92	-8.04	0.90
26	I	388.50	-4.63	0.99	-23.94	-8.03	0.91
26	J	387.45	-5.80	0.99	-25.35	-7.81	0.90
27	I	387.45	-6.00	0.98	-26.43	-7.77	0.90
27	J	379.00	-7.43	0.98	-28.15	-6.79	0.89
28	I	379.00	-7.84	0.98	-28.61	-6.72	0.89
28	J	351.71	-9.64	0.97	-30.74	-3.98	0.87

The Loss of tendon group [C13-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
12	I	348.95	-6.53	0.98	-27.75	-3.92	0.89
12	J	384.20	-5.27	0.99	-26.04	-7.44	0.90
13	I	384.20	-4.98	0.99	-25.37	-7.51	0.90
13	J	385.25	-3.97	0.99	-23.94	-7.72	0.91
14	I	385.25	-3.69	0.99	-24.12	-7.75	0.91
14	J	390.10	-2.69	0.99	-22.76	-8.37	0.91
15	I	390.10	-2.61	0.99	-22.22	-8.38	0.91
15	J	391.14	-1.95	1.00	-21.16	-8.57	0.92
16	I	391.14	-1.61	1.00	-22.72	-8.58	0.92
16	J	392.17	-1.11	1.00	-21.64	-8.75	0.92
17	I	392.17	-0.98	1.00	-21.85	-8.75	0.92
17	J	388.36	-0.45	1.00	-20.77	-8.39	0.92
18	I	388.36	-0.42	1.00	-18.98	-8.49	0.93
18	J	387.78	-0.26	1.00	-18.51	-8.45	0.93
19	I	387.78	0.90	1.00	-6.59	-8.83	0.96
19	J	387.63	1.05	1.00	-6.49	-8.83	0.96
20	I	387.63	-0.08	1.00	-18.18	-8.45	0.93
20	J	387.14	0.51	1.00	-17.38	-8.44	0.93
21	I	387.14	-0.38	1.00	-18.25	-8.36	0.93
21	J	386.66	-0.97	1.00	-19.05	-8.25	0.93
22	I	384.53	0.25	1.00	-7.00	-8.42	0.96
22	J	388.38	0.15	1.00	-7.18	-8.84	0.96
23	I	388.38	-1.08	1.00	-19.30	-8.43	0.93
23	J	388.94	-1.35	1.00	-19.85	-8.46	0.92
24	I	388.94	-1.43	1.00	-21.85	-8.36	0.92
24	J	389.97	-2.05	0.99	-23.01	-8.40	0.91
25	I	389.97	-2.29	0.99	-22.37	-8.40	0.92
25	J	390.56	-3.21	0.99	-23.70	-8.38	0.91
26	I	390.56	-3.53	0.99	-22.63	-8.37	0.91
26	J	389.52	-4.53	0.99	-23.92	-8.17	0.91
27	I	389.52	-4.68	0.99	-24.76	-8.15	0.90
27	J	388.48	-5.87	0.98	-26.31	-7.93	0.90
28	I	388.48	-6.21	0.98	-26.20	-7.89	0.90
28	J	375.52	-7.79	0.98	-28.02	-6.43	0.89
29	I	375.52	-8.16	0.98	-28.88	-6.37	0.88
29	J	348.96	-9.73	0.97	-30.86	-3.75	0.87

The Loss of tendon group [C14-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
12	I	350.21	-6.53	0.98	-27.75	-4.04	0.89
12	J	377.24	-5.27	0.99	-26.04	-6.73	0.90
13	I	377.24	-4.98	0.99	-25.37	-6.79	0.90
13	J	386.22	-3.97	0.99	-23.94	-7.83	0.91
14	I	386.22	-3.69	0.99	-24.12	-7.86	0.91
14	J	391.07	-2.69	0.99	-22.76	-8.48	0.91

The Loss of tendon group [C14-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
15	I	391.07	-2.61	0.99	-22.22	-8.49	0.91
15	J	392.11	-1.95	1.00	-21.16	-8.68	0.92
16	I	392.11	-1.61	1.00	-22.72	-8.69	0.92
16	J	392.94	-1.11	1.00	-21.64	-8.84	0.92
17	I	392.94	-0.98	1.00	-21.85	-8.83	0.92
17	J	388.64	-0.45	1.00	-20.77	-8.42	0.92
18	I	388.64	-0.42	1.00	-18.98	-8.52	0.93
18	J	388.07	-0.26	1.00	-18.51	-8.48	0.93
19	I	388.07	0.90	1.00	-6.59	-8.87	0.96
19	J	387.91	1.05	1.00	-6.49	-8.86	0.96
20	I	387.91	-0.08	1.00	-18.18	-8.48	0.93
20	J	387.43	0.51	1.00	-17.38	-8.48	0.93
21	I	387.43	-0.38	1.00	-18.25	-8.39	0.93
21	J	387.14	-0.97	1.00	-19.05	-8.31	0.93
22	I	387.14	0.25	1.00	-7.00	-8.71	0.96
22	J	388.38	0.15	1.00	-7.18	-8.84	0.96
23	I	388.38	-1.08	1.00	-19.30	-8.43	0.93
23	J	388.94	-1.35	1.00	-19.85	-8.46	0.92
24	I	388.94	-1.43	1.00	-21.85	-8.36	0.92
24	J	389.97	-2.05	0.99	-23.01	-8.40	0.91
25	I	389.97	-2.29	0.99	-22.37	-8.40	0.92
25	J	390.55	-3.21	0.99	-23.70	-8.38	0.91
26	I	390.55	-3.53	0.99	-22.63	-8.37	0.91
26	J	389.51	-4.53	0.99	-23.92	-8.17	0.91
27	I	389.51	-4.68	0.99	-24.76	-8.15	0.90
27	J	388.47	-5.87	0.98	-26.31	-7.93	0.90
28	I	388.47	-6.21	0.98	-26.20	-7.89	0.90
28	J	375.57	-7.79	0.98	-28.02	-6.44	0.89
29	I	375.57	-8.16	0.98	-28.88	-6.37	0.88
29	J	348.95	-9.73	0.97	-30.86	-3.75	0.87

The Loss of tendon group [C15-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
11	I	348.04	-5.61	0.98	-27.62	-3.87	0.89
11	J	376.24	-4.04	0.99	-25.06	-6.72	0.90
12	I	376.24	-3.75	0.99	-24.69	-6.78	0.91
12	J	389.77	-2.60	0.99	-23.08	-8.30	0.91
13	I	389.77	-2.36	0.99	-23.16	-8.33	0.91
13	J	390.81	-1.58	1.00	-21.78	-8.53	0.92
14	I	390.81	-1.34	1.00	-22.39	-8.54	0.92
14	J	388.81	-0.56	1.00	-21.06	-8.41	0.92
15	I	388.81	-0.50	1.00	-20.79	-8.41	0.92
15	J	387.79	-0.06	1.00	-19.78	-8.36	0.93
16	I	387.79	0.28	1.00	-21.49	-8.35	0.92
16	J	386.77	0.58	1.00	-20.45	-8.29	0.93
17	I	386.77	0.69	1.00	-20.81	-8.28	0.93
17	J	382.16	1.04	1.00	-19.76	-7.83	0.93
18	I	382.16	1.06	1.00	-18.43	-7.90	0.93
18	J	382.15	1.14	1.00	-17.96	-7.92	0.94
19	I	382.15	1.53	1.00	-6.32	-8.26	0.97
19	J	382.16	1.69	1.00	-6.20	-8.27	0.97
20	I	382.16	1.31	1.00	-17.63	-7.94	0.94
20	J	382.16	1.88	1.00	-16.77	-7.99	0.94

The Loss of tendon group [C15-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
21	I	382.16	0.85	1.00	-17.76	-7.89	0.94
21	J	382.15	0.28	1.00	-18.61	-7.84	0.93
22	I	381.20	0.78	1.00	-6.78	-8.10	0.96
22	J	385.02	0.70	1.00	-6.97	-8.50	0.96
23	I	385.02	0.19	1.00	-18.87	-8.14	0.93
23	J	385.58	-0.02	1.00	-19.43	-8.18	0.93
24	I	385.58	-0.08	1.00	-20.99	-8.09	0.92
24	J	386.60	-0.59	1.00	-22.15	-8.15	0.92
25	I	386.60	-0.82	1.00	-21.34	-8.15	0.92
25	J	391.34	-1.61	1.00	-22.69	-8.59	0.92
26	I	391.34	-1.92	1.00	-21.49	-8.59	0.92
26	J	392.37	-2.80	0.99	-22.80	-8.62	0.91
27	I	392.37	-2.93	0.99	-23.41	-8.61	0.91
27	J	393.40	-4.01	0.99	-25.01	-8.62	0.90
28	I	393.40	-4.32	0.99	-24.48	-8.61	0.90
28	J	390.69	-5.85	0.99	-26.40	-8.18	0.90
29	I	390.69	-6.17	0.98	-26.55	-8.14	0.90
29	J	372.20	-7.83	0.98	-28.56	-6.10	0.89
30	I	372.20	-8.00	0.98	-28.60	-6.05	0.89
30	J	352.57	-9.56	0.97	-31.21	-4.07	0.87

The Loss of tendon group [C16-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
11	I	348.03	-5.61	0.98	-27.62	-3.87	0.89
11	J	376.22	-4.04	0.99	-25.07	-6.72	0.90
12	I	376.22	-3.75	0.99	-24.69	-6.78	0.91
12	J	389.77	-2.60	0.99	-23.08	-8.30	0.91
13	I	389.77	-2.36	0.99	-23.16	-8.33	0.91
13	J	390.80	-1.58	1.00	-21.78	-8.53	0.92
14	I	390.80	-1.34	1.00	-22.39	-8.54	0.92
14	J	388.81	-0.56	1.00	-21.06	-8.41	0.92
15	I	388.81	-0.50	1.00	-20.79	-8.41	0.92
15	J	387.79	-0.06	1.00	-19.78	-8.36	0.93
16	I	387.79	0.28	1.00	-21.49	-8.35	0.92
16	J	386.77	0.58	1.00	-20.45	-8.29	0.93
17	I	386.77	0.69	1.00	-20.81	-8.28	0.93
17	J	382.59	1.04	1.00	-19.76	-7.88	0.93
18	I	382.59	1.06	1.00	-18.43	-7.95	0.93
18	J	382.60	1.14	1.00	-17.96	-7.97	0.94
19	I	382.60	1.53	1.00	-6.32	-8.31	0.97
19	J	382.60	1.69	1.00	-6.20	-8.32	0.97
20	I	382.60	1.31	1.00	-17.63	-7.99	0.94
20	J	382.60	1.88	1.00	-16.77	-8.04	0.94
21	I	382.60	0.85	1.00	-17.76	-7.94	0.94
21	J	382.62	0.28	1.00	-18.61	-7.89	0.93
22	I	381.13	0.78	1.00	-6.78	-8.09	0.96
22	J	384.95	0.70	1.00	-6.97	-8.50	0.96
23	I	384.95	0.19	1.00	-18.87	-8.14	0.93
23	J	385.51	-0.02	1.00	-19.43	-8.17	0.93
24	I	385.51	-0.08	1.00	-20.99	-8.09	0.92
24	J	386.53	-0.59	1.00	-22.15	-8.14	0.92
25	I	386.53	-0.82	1.00	-21.34	-8.15	0.92
25	J	391.27	-1.61	1.00	-22.69	-8.59	0.92

The Loss of tendon group [C16-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
26	I	391.27	-1.92	1.00	-21.49	-8.58	0.92
26	J	392.30	-2.80	0.99	-22.80	-8.61	0.91
27	I	392.30	-2.93	0.99	-23.41	-8.60	0.91
27	J	393.33	-4.01	0.99	-25.01	-8.61	0.90
28	I	393.33	-4.32	0.99	-24.48	-8.60	0.90
28	J	390.68	-5.85	0.99	-26.40	-8.18	0.90
29	I	390.68	-6.17	0.98	-26.55	-8.14	0.90
29	J	372.16	-7.83	0.98	-28.56	-6.09	0.89
30	I	372.16	-8.00	0.98	-28.60	-6.05	0.89
30	J	352.49	-9.56	0.97	-31.21	-4.06	0.87

The Loss of tendon group [C17-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
10	I	350.55	-6.05	0.98	-27.88	-4.09	0.89
10	J	378.84	-4.42	0.99	-25.26	-6.98	0.90
11	I	378.84	-4.10	0.99	-25.14	-7.03	0.90
11	J	389.02	-2.80	0.99	-23.09	-8.23	0.91
12	I	389.02	-2.57	0.99	-23.22	-8.26	0.91
12	J	392.63	-1.60	1.00	-21.74	-8.75	0.92
13	I	392.63	-1.41	1.00	-21.99	-8.77	0.92
13	J	392.02	-0.77	1.00	-20.74	-8.77	0.92
14	I	392.02	-0.56	1.00	-21.48	-8.77	0.92
14	J	387.27	0.08	1.00	-20.25	-8.32	0.93
15	I	387.27	0.12	1.00	-20.01	-8.32	0.93
15	J	386.25	0.49	1.00	-19.07	-8.26	0.93
16	I	386.25	0.80	1.00	-20.84	-8.25	0.93
16	J	385.24	1.06	1.00	-19.85	-8.19	0.93
17	I	385.24	1.14	1.00	-20.18	-8.17	0.93
17	J	380.57	1.44	1.00	-19.19	-7.72	0.93
18	I	380.57	1.45	1.00	-18.09	-7.78	0.94
18	J	380.01	1.52	1.00	-17.64	-7.73	0.94
19	I	380.01	1.54	1.00	-6.21	-8.03	0.97
19	J	379.85	1.68	1.00	-6.10	-8.03	0.97
20	I	379.85	1.66	1.00	-17.32	-7.73	0.94
20	J	379.38	2.15	1.01	-16.51	-7.73	0.94
21	I	379.38	1.22	1.00	-17.45	-7.63	0.94
21	J	378.90	0.73	1.00	-18.25	-7.54	0.93
22	I	376.29	0.82	1.00	-6.65	-7.58	0.96
22	J	380.06	0.77	1.00	-6.83	-7.97	0.96
23	I	380.06	0.67	1.00	-18.49	-7.65	0.93
23	J	380.61	0.47	1.00	-19.02	-7.68	0.93
24	I	380.61	0.42	1.00	-20.33	-7.62	0.93
24	J	381.61	-0.02	1.00	-21.42	-7.67	0.92
25	I	381.61	-0.24	1.00	-20.60	-7.68	0.93
25	J	386.30	-0.92	1.00	-21.85	-8.12	0.92
26	I	386.30	-1.20	1.00	-20.66	-8.11	0.92
26	J	387.31	-1.96	0.99	-21.86	-8.15	0.92
27	I	387.31	-2.06	0.99	-22.42	-8.15	0.92
27	J	388.33	-2.99	0.99	-23.88	-8.17	0.91
28	I	388.33	-3.26	0.99	-23.20	-8.17	0.91
28	J	390.44	-4.55	0.99	-24.94	-8.28	0.90
29	I	390.44	-4.82	0.99	-24.90	-8.26	0.90
29	J	389.41	-6.19	0.98	-26.71	-8.03	0.89

30	I	389.41	-6.51	0.98	-26.45	-8.01	0.89
30	J	384.31	-7.83	0.98	-28.52	-7.33	0.89
31	I	384.31	-8.25	0.98	-28.78	-7.27	0.88
31	J	347.19	-10.68	0.97	-31.97	-3.54	0.87

The Loss of tendon group [C18-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
10	I	350.57	-6.04	0.98	-27.88	-4.09	0.89
10	J	378.76	-4.42	0.99	-25.26	-6.98	0.90
11	I	378.76	-4.10	0.99	-25.14	-7.03	0.90
11	J	388.93	-2.80	0.99	-23.09	-8.22	0.91
12	I	388.93	-2.57	0.99	-23.22	-8.25	0.91
12	J	392.53	-1.60	1.00	-21.74	-8.74	0.92
13	I	392.53	-1.41	1.00	-21.99	-8.75	0.92
13	J	392.13	-0.77	1.00	-20.74	-8.79	0.92
14	I	392.13	-0.56	1.00	-21.48	-8.78	0.92
14	J	387.37	0.08	1.00	-20.25	-8.33	0.93
15	I	387.37	0.12	1.00	-20.01	-8.33	0.93
15	J	386.36	0.49	1.00	-19.07	-8.27	0.93
16	I	386.36	0.80	1.00	-20.84	-8.27	0.93
16	J	385.35	1.06	1.00	-19.85	-8.20	0.93
17	I	385.35	1.14	1.00	-20.18	-8.19	0.93
17	J	380.67	1.44	1.00	-19.19	-7.73	0.93
18	I	380.67	1.45	1.00	-18.09	-7.79	0.94
18	J	380.11	1.52	1.00	-17.64	-7.74	0.94
19	I	380.11	1.54	1.00	-6.21	-8.05	0.97
19	J	379.96	1.68	1.00	-6.10	-8.04	0.97
20	I	379.96	1.66	1.00	-17.32	-7.74	0.94
20	J	379.48	2.15	1.01	-16.51	-7.74	0.94
21	I	379.48	1.22	1.00	-17.45	-7.64	0.94
21	J	379.01	0.73	1.00	-18.25	-7.55	0.93
22	I	376.27	0.82	1.00	-6.65	-7.58	0.96
22	J	380.05	0.77	1.00	-6.83	-7.97	0.96
23	I	380.05	0.67	1.00	-18.49	-7.65	0.93
23	J	380.60	0.47	1.00	-19.02	-7.68	0.93
24	I	380.60	0.42	1.00	-20.33	-7.62	0.93
24	J	381.60	-0.02	1.00	-21.42	-7.67	0.92
25	I	381.60	-0.24	1.00	-20.60	-7.68	0.93
25	J	386.28	-0.92	1.00	-21.85	-8.12	0.92
26	I	386.28	-1.20	1.00	-20.66	-8.11	0.92
26	J	387.30	-1.96	0.99	-21.86	-8.15	0.92
27	I	387.30	-2.06	0.99	-22.42	-8.15	0.92
27	J	388.32	-2.99	0.99	-23.88	-8.17	0.91
28	I	388.32	-3.26	0.99	-23.20	-8.17	0.91
28	J	391.77	-4.55	0.99	-24.94	-8.43	0.90
29	I	391.77	-4.82	0.99	-24.90	-8.41	0.90
29	J	390.83	-6.19	0.98	-26.71	-8.19	0.89
30	I	390.83	-6.51	0.98	-26.45	-8.16	0.89
30	J	376.82	-7.83	0.98	-28.52	-6.58	0.89
31	I	376.82	-8.25	0.98	-28.78	-6.52	0.88
31	J	348.60	-10.68	0.97	-31.97	-3.66	0.87

The Loss of tendon group [C19-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
9	I	335.17	-5.76	0.98	-28.06	-2.78	0.89
9	J	371.53	-4.00	0.99	-25.11	-6.28	0.90
10	I	371.53	-3.73	0.99	-24.97	-6.32	0.91
10	J	384.10	-2.27	0.99	-22.63	-7.75	0.92
11	I	384.10	-2.00	0.99	-23.11	-7.77	0.91
11	J	383.93	-0.98	1.00	-21.13	-7.87	0.92
12	I	383.93	-0.78	1.00	-21.61	-7.87	0.92
12	J	379.27	-0.02	1.00	-20.18	-7.46	0.93
13	I	379.27	0.14	1.00	-20.60	-7.46	0.93
13	J	378.28	0.61	1.00	-19.42	-7.42	0.93
14	I	378.28	0.81	1.00	-20.34	-7.41	0.93
14	J	373.69	1.28	1.00	-19.16	-6.99	0.93
15	I	373.69	1.31	1.00	-19.06	-6.98	0.93
15	J	372.71	1.55	1.00	-18.16	-6.92	0.94
16	I	372.71	1.85	1.01	-20.00	-6.91	0.93
16	J	371.73	2.01	1.01	-19.05	-6.84	0.94
17	I	371.73	2.08	1.01	-19.41	-6.83	0.94
17	J	367.23	2.27	1.01	-18.46	-6.40	0.94
18	I	367.23	2.29	1.01	-17.63	-6.45	0.94
18	J	366.68	2.31	1.01	-17.20	-6.40	0.94
19	I	366.68	1.81	1.00	-6.01	-6.66	0.97
19	J	366.53	1.95	1.01	-5.90	-6.65	0.97
20	I	366.53	2.44	1.01	-16.88	-6.40	0.94
20	J	366.53	2.88	1.01	-16.06	-6.44	0.95
21	I	366.53	1.91	1.01	-17.04	-6.35	0.94
21	J	366.52	1.46	1.00	-17.86	-6.31	0.94
22	I	364.85	1.06	1.00	-6.49	-6.41	0.97
22	J	368.51	1.02	1.00	-6.66	-6.78	0.97
23	I	368.51	1.42	1.00	-18.11	-6.50	0.94
23	J	369.04	1.26	1.00	-18.63	-6.54	0.94
24	I	369.04	1.21	1.00	-19.67	-6.48	0.93
24	J	370.01	0.82	1.00	-20.74	-6.54	0.93
25	I	370.01	0.62	1.00	-19.87	-6.55	0.93
25	J	374.55	0.02	1.00	-21.10	-6.96	0.93
26	I	374.55	-0.25	1.00	-19.87	-6.96	0.93
26	J	375.54	-0.93	1.00	-21.05	-6.99	0.92
27	I	375.54	-1.02	1.00	-21.50	-6.99	0.92
27	J	376.53	-1.86	1.00	-22.96	-7.02	0.92
28	I	376.53	-2.13	0.99	-22.10	-7.03	0.92
28	J	381.15	-3.30	0.99	-23.84	-7.41	0.91
29	I	381.15	-3.56	0.99	-23.65	-7.40	0.91
29	J	382.15	-4.83	0.99	-25.48	-7.39	0.90
30	I	382.15	-4.91	0.99	-24.69	-7.40	0.90
30	J	382.68	-5.94	0.98	-26.66	-7.34	0.90
31	I	382.68	-6.32	0.98	-26.34	-7.31	0.90
31	J	381.41	-8.55	0.98	-29.35	-6.99	0.88
32	I	381.41	-8.74	0.98	-29.37	-6.96	0.88
32	J	333.43	-11.56	0.97	-33.05	-2.37	0.86

The Loss of tendon group [C20-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
9	I	334.88	-5.76	0.98	-28.06	-2.75	0.89
9	J	371.45	-4.00	0.99	-25.11	-6.27	0.90
10	I	371.45	-3.73	0.99	-24.97	-6.31	0.91
10	J	384.27	-2.27	0.99	-22.63	-7.77	0.92
11	I	384.27	-2.00	0.99	-23.11	-7.79	0.91
11	J	383.93	-0.98	1.00	-21.13	-7.87	0.92
12	I	383.93	-0.78	1.00	-21.61	-7.87	0.92
12	J	379.27	-0.02	1.00	-20.18	-7.46	0.93
13	I	379.27	0.14	1.00	-20.60	-7.46	0.93
13	J	378.28	0.61	1.00	-19.42	-7.42	0.93
14	I	378.28	0.81	1.00	-20.34	-7.41	0.93
14	J	373.69	1.28	1.00	-19.16	-6.99	0.93
15	I	373.69	1.31	1.00	-19.06	-6.98	0.93
15	J	372.71	1.55	1.00	-18.16	-6.92	0.94
16	I	372.71	1.85	1.01	-20.00	-6.91	0.93
16	J	371.73	2.01	1.01	-19.05	-6.84	0.94
17	I	371.73	2.08	1.01	-19.41	-6.83	0.94
17	J	367.23	2.27	1.01	-18.46	-6.40	0.94
18	I	367.23	2.29	1.01	-17.63	-6.45	0.94
18	J	367.06	2.31	1.01	-17.20	-6.44	0.94
19	I	367.06	1.81	1.00	-6.01	-6.70	0.97
19	J	367.06	1.95	1.01	-5.90	-6.71	0.97
20	I	367.06	2.44	1.01	-16.88	-6.46	0.94
20	J	367.07	2.88	1.01	-16.06	-6.50	0.95
21	I	367.07	1.91	1.01	-17.04	-6.40	0.94
21	J	367.08	1.46	1.00	-17.86	-6.36	0.94
22	I	367.08	1.06	1.00	-6.49	-6.64	0.97
22	J	368.44	1.02	1.00	-6.66	-6.77	0.97
23	I	368.44	1.42	1.00	-18.11	-6.50	0.94
23	J	368.97	1.26	1.00	-18.63	-6.53	0.94
24	I	368.97	1.21	1.00	-19.67	-6.48	0.93
24	J	369.94	0.82	1.00	-20.74	-6.53	0.93
25	I	369.94	0.62	1.00	-19.87	-6.55	0.93
25	J	374.49	0.02	1.00	-21.10	-6.95	0.93
26	I	374.49	-0.25	1.00	-19.87	-6.95	0.93
26	J	375.47	-0.93	1.00	-21.05	-6.99	0.92
27	I	375.47	-1.02	1.00	-21.50	-6.99	0.92
27	J	376.46	-1.86	1.00	-22.96	-7.01	0.92
28	I	376.46	-2.13	0.99	-22.10	-7.02	0.92
28	J	381.08	-3.30	0.99	-23.84	-7.40	0.91
29	I	381.08	-3.56	0.99	-23.65	-7.39	0.91
29	J	382.08	-4.83	0.99	-25.48	-7.39	0.90
30	I	382.08	-4.91	0.99	-24.69	-7.39	0.90
30	J	382.66	-5.94	0.98	-26.66	-7.34	0.90
31	I	382.66	-6.32	0.98	-26.34	-7.31	0.90
31	J	381.39	-8.55	0.98	-29.35	-6.99	0.88
32	I	381.39	-8.74	0.98	-29.37	-6.95	0.88
32	J	333.34	-11.56	0.97	-33.05	-2.36	0.86

The Loss of tendon group [C21-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
8	I	319.75	-5.06	0.98	-27.20	-1.60	0.89
8	J	377.72	-3.63	0.99	-24.49	-6.93	0.91
9	I	377.72	-3.77	0.99	-25.33	-6.93	0.90
9	J	376.84	-2.38	0.99	-22.84	-6.99	0.91
10	I	376.84	-2.16	0.99	-23.20	-7.01	0.91
10	J	373.53	-1.02	1.00	-21.03	-6.79	0.92
11	I	373.53	-0.79	1.00	-21.77	-6.79	0.92
11	J	372.30	0.00	1.00	-19.93	-6.76	0.93
12	I	372.30	0.18	1.00	-20.55	-6.76	0.93
12	J	367.79	0.78	1.00	-19.22	-6.37	0.93
13	I	367.79	0.92	1.00	-19.68	-6.37	0.93
13	J	366.82	1.28	1.00	-18.58	-6.32	0.94
14	I	366.82	1.47	1.00	-19.56	-6.30	0.93
14	J	362.37	1.84	1.01	-18.45	-5.91	0.94
15	I	362.37	1.86	1.01	-18.39	-5.89	0.94
15	J	361.42	2.04	1.01	-17.54	-5.83	0.94
16	I	361.42	2.34	1.01	-19.41	-5.82	0.94
16	J	360.48	2.44	1.01	-18.50	-5.76	0.94
17	I	360.48	2.51	1.01	-18.83	-5.75	0.94
17	J	356.11	2.65	1.01	-17.92	-5.35	0.94
18	I	356.11	2.66	1.01	-17.28	-5.38	0.94
18	J	355.58	2.67	1.01	-16.86	-5.35	0.95
19	I	355.58	1.84	1.01	-5.88	-5.56	0.97
19	J	355.44	1.96	1.01	-5.77	-5.55	0.97
20	I	355.44	2.78	1.01	-16.54	-5.34	0.95
20	J	354.99	3.16	1.01	-15.74	-5.34	0.95
21	I	354.99	2.23	1.01	-16.72	-5.25	0.94
21	J	354.55	1.83	1.01	-17.52	-5.17	0.94
22	I	354.55	1.08	1.00	-6.36	-5.40	0.97
22	J	354.06	1.05	1.00	-6.53	-5.35	0.97
23	I	354.06	1.80	1.01	-17.76	-5.12	0.94
23	J	354.57	1.65	1.00	-18.27	-5.15	0.94
24	I	354.57	1.60	1.00	-19.13	-5.11	0.94
24	J	355.51	1.25	1.00	-20.16	-5.16	0.93
25	I	355.51	1.05	1.00	-19.29	-5.17	0.93
25	J	359.87	0.52	1.00	-20.49	-5.54	0.93
26	I	359.87	0.26	1.00	-19.24	-5.54	0.93
26	J	360.82	-0.36	1.00	-20.37	-5.57	0.93
27	I	360.82	-0.44	1.00	-20.77	-5.58	0.93
27	J	361.77	-1.20	1.00	-22.17	-5.60	0.92
28	I	361.77	-1.46	1.00	-21.25	-5.61	0.92
28	J	366.21	-2.51	0.99	-22.91	-5.96	0.91
29	I	366.21	-2.74	0.99	-22.67	-5.95	0.91
29	J	367.17	-3.87	0.99	-24.41	-5.96	0.91
30	I	367.17	-3.93	0.99	-23.49	-5.97	0.91
30	J	371.92	-4.73	0.99	-25.32	-6.35	0.90
31	I	371.92	-5.07	0.99	-24.74	-6.34	0.90
31	J	373.14	-7.01	0.98	-27.53	-6.31	0.89
32	I	373.14	-7.14	0.98	-27.07	-6.30	0.89
32	J	377.41	-9.54	0.97	-30.33	-6.53	0.88
33	I	377.41	-10.05	0.97	-30.36	-6.48	0.88
33	J	319.03	-12.81	0.96	-33.95	-1.35	0.85

The Loss of tendon group [C22-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
8	I	325.28	-5.06	0.98	-27.20	-2.03	0.89
8	J	369.61	-3.63	0.99	-24.49	-6.13	0.91
9	I	369.61	-3.77	0.99	-25.33	-6.13	0.90
9	J	376.85	-2.38	0.99	-22.84	-6.99	0.91
10	I	376.85	-2.16	0.99	-23.20	-7.01	0.91
10	J	373.53	-1.02	1.00	-21.03	-6.79	0.92
11	I	373.53	-0.79	1.00	-21.77	-6.79	0.92
11	J	372.30	0.00	1.00	-19.93	-6.76	0.93
12	I	372.30	0.18	1.00	-20.55	-6.76	0.93
12	J	367.79	0.78	1.00	-19.22	-6.37	0.93
13	I	367.79	0.92	1.00	-19.68	-6.37	0.93
13	J	366.82	1.28	1.00	-18.58	-6.32	0.94
14	I	366.82	1.47	1.00	-19.56	-6.30	0.93
14	J	362.37	1.84	1.01	-18.45	-5.91	0.94
15	I	362.37	1.86	1.01	-18.39	-5.89	0.94
15	J	361.42	2.04	1.01	-17.54	-5.83	0.94
16	I	361.42	2.34	1.01	-19.41	-5.82	0.94
16	J	360.48	2.44	1.01	-18.50	-5.76	0.94
17	I	360.48	2.51	1.01	-18.83	-5.75	0.94
17	J	356.11	2.65	1.01	-17.92	-5.35	0.94
18	I	356.11	2.66	1.01	-17.28	-5.38	0.94
18	J	355.58	2.67	1.01	-16.86	-5.35	0.95
19	I	355.58	1.84	1.01	-5.88	-5.56	0.97
19	J	355.44	1.96	1.01	-5.77	-5.55	0.97
20	I	355.44	2.78	1.01	-16.54	-5.34	0.95
20	J	354.99	3.16	1.01	-15.74	-5.34	0.95
21	I	354.99	2.23	1.01	-16.72	-5.25	0.94
21	J	354.55	1.83	1.01	-17.52	-5.17	0.94
22	I	353.08	1.08	1.00	-6.36	-5.26	0.97
22	J	354.04	1.05	1.00	-6.53	-5.35	0.97
23	I	354.04	1.80	1.01	-17.76	-5.11	0.94
23	J	354.55	1.65	1.00	-18.27	-5.14	0.94
24	I	354.55	1.60	1.00	-19.13	-5.10	0.94
24	J	355.49	1.25	1.00	-20.16	-5.15	0.93
25	I	355.49	1.05	1.00	-19.29	-5.17	0.93
25	J	359.85	0.52	1.00	-20.49	-5.53	0.93
26	I	359.85	0.26	1.00	-19.24	-5.53	0.93
26	J	360.80	-0.36	1.00	-20.37	-5.57	0.93
27	I	360.80	-0.44	1.00	-20.77	-5.57	0.93
27	J	361.74	-1.20	1.00	-22.17	-5.60	0.92
28	I	361.74	-1.46	1.00	-21.25	-5.61	0.92
28	J	366.19	-2.51	0.99	-22.91	-5.96	0.91
29	I	366.19	-2.74	0.99	-22.67	-5.95	0.91
29	J	367.15	-3.87	0.99	-24.41	-5.95	0.91
30	I	367.15	-3.93	0.99	-23.49	-5.97	0.91
30	J	371.90	-4.73	0.99	-25.32	-6.35	0.90
31	I	371.90	-5.07	0.99	-24.74	-6.34	0.90
31	J	373.12	-7.01	0.98	-27.53	-6.30	0.89
32	I	373.12	-7.14	0.98	-27.07	-6.30	0.89
32	J	377.39	-9.54	0.97	-30.33	-6.53	0.88
33	I	377.39	-10.05	0.97	-30.36	-6.48	0.88
33	J	319.04	-12.81	0.96	-33.95	-1.35	0.85

The Loss of tendon group [C23-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
7	I	312.78	-4.98	0.98	-27.29	-1.13	0.89
7	J	368.66	-3.41	0.99	-24.27	-6.05	0.91
8	I	368.66	-3.15	0.99	-24.54	-6.07	0.91
8	J	367.44	-2.15	0.99	-22.31	-6.07	0.92
9	I	367.44	-2.35	0.99	-23.54	-6.05	0.91
9	J	365.95	-1.28	1.00	-21.27	-6.02	0.92
10	I	365.95	-1.09	1.00	-21.84	-6.02	0.92
10	J	362.73	-0.20	1.00	-19.84	-5.81	0.93
11	I	362.73	0.01	1.00	-20.73	-5.80	0.93
11	J	361.54	0.63	1.00	-19.01	-5.76	0.93
12	I	361.54	0.80	1.00	-19.71	-5.75	0.93
12	J	357.15	1.27	1.00	-18.44	-5.38	0.94
13	I	357.15	1.40	1.00	-18.94	-5.38	0.94
13	J	356.22	1.69	1.00	-17.90	-5.33	0.94
14	I	356.22	1.86	1.01	-18.91	-5.31	0.94
14	J	351.90	2.16	1.01	-17.84	-4.94	0.94
15	I	351.90	2.18	1.01	-17.82	-4.93	0.94
15	J	350.97	2.32	1.01	-17.02	-4.87	0.94
16	I	350.97	2.61	1.01	-18.91	-4.86	0.94
16	J	350.05	2.69	1.01	-18.03	-4.79	0.94
17	I	350.05	2.75	1.01	-18.32	-4.78	0.94
17	J	345.81	2.86	1.01	-17.44	-4.42	0.95
18	I	345.81	2.88	1.01	-16.95	-4.44	0.95
18	J	345.30	2.88	1.01	-16.54	-4.41	0.95
19	I	345.30	1.77	1.01	-5.76	-4.59	0.98
19	J	345.16	1.89	1.01	-5.66	-4.58	0.98
20	I	345.16	2.97	1.01	-16.23	-4.40	0.95
20	J	344.73	3.30	1.01	-15.45	-4.40	0.95
21	I	344.73	2.41	1.01	-16.43	-4.31	0.95
21	J	344.30	2.07	1.01	-17.21	-4.24	0.94
22	I	343.31	1.03	1.00	-6.24	-4.35	0.97
22	J	343.80	1.01	1.00	-6.41	-4.39	0.97
23	I	343.80	2.04	1.01	-17.44	-4.19	0.94
23	J	344.30	1.90	1.01	-17.94	-4.22	0.94
24	I	344.30	1.84	1.01	-18.65	-4.19	0.94
24	J	345.21	1.51	1.00	-19.65	-4.23	0.94
25	I	345.21	1.32	1.00	-18.81	-4.24	0.94
25	J	349.45	0.84	1.00	-19.97	-4.59	0.93
26	I	349.45	0.57	1.00	-18.71	-4.59	0.94
26	J	350.36	-0.01	1.00	-19.80	-4.62	0.93
27	I	350.36	-0.09	1.00	-20.16	-4.63	0.93
27	J	351.28	-0.79	1.00	-21.51	-4.65	0.92
28	I	351.28	-1.04	1.00	-20.58	-4.66	0.93
29	I	355.60	-2.21	0.99	-21.89	-4.99	0.92
29	J	356.53	-3.25	0.99	-23.57	-4.99	0.91
30	I	356.53	-3.30	0.99	-22.58	-5.01	0.91
30	J	361.15	-3.90	0.99	-24.28	-5.38	0.91
31	I	361.15	-4.23	0.99	-23.54	-5.38	0.91
31	J	362.33	-5.93	0.98	-26.17	-5.35	0.90
32	I	362.33	-6.04	0.98	-25.50	-5.36	0.90
32	J	367.02	-8.10	0.98	-28.53	-5.64	0.88

The Loss of tendon group [C23-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
33	I	367.02	-8.56	0.98	-28.15	-5.62	0.88
33	J	359.22	-10.98	0.97	-31.31	-4.70	0.87
34	I	359.22	-11.21	0.97	-31.23	-4.67	0.87
34	J	323.04	-13.45	0.96	-34.93	-1.59	0.85

The Loss of tendon group [C24-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
7	I	312.78	-4.98	0.98	-27.29	-1.13	0.89
7	J	368.66	-3.41	0.99	-24.27	-6.05	0.91
8	I	368.66	-3.15	0.99	-24.54	-6.07	0.91
8	J	367.44	-2.15	0.99	-22.31	-6.07	0.92
9	I	367.44	-2.35	0.99	-23.54	-6.05	0.91
9	J	365.95	-1.28	1.00	-21.27	-6.02	0.92
10	I	365.95	-1.09	1.00	-21.84	-6.02	0.92
10	J	362.73	-0.20	1.00	-19.84	-5.81	0.93
11	I	362.73	0.01	1.00	-20.73	-5.80	0.93
11	J	361.54	0.63	1.00	-19.01	-5.76	0.93
12	I	361.54	0.80	1.00	-19.71	-5.75	0.93
12	J	357.15	1.27	1.00	-18.44	-5.38	0.94
13	I	357.15	1.40	1.00	-18.94	-5.38	0.94
13	J	356.22	1.69	1.00	-17.90	-5.33	0.94
14	I	356.22	1.86	1.01	-18.91	-5.31	0.94
14	J	351.90	2.16	1.01	-17.84	-4.94	0.94
15	I	351.90	2.18	1.01	-17.82	-4.93	0.94
15	J	350.97	2.32	1.01	-17.02	-4.87	0.94
16	I	350.97	2.61	1.01	-18.91	-4.86	0.94
16	J	350.05	2.69	1.01	-18.03	-4.79	0.94
17	I	350.05	2.75	1.01	-18.32	-4.78	0.94
17	J	345.81	2.86	1.01	-17.44	-4.42	0.95
18	I	345.81	2.88	1.01	-16.95	-4.44	0.95
18	J	345.30	2.88	1.01	-16.54	-4.41	0.95
19	I	345.30	1.77	1.01	-5.76	-4.59	0.98
19	J	345.16	1.89	1.01	-5.66	-4.58	0.98
20	I	345.16	2.97	1.01	-16.23	-4.40	0.95
20	J	344.73	3.30	1.01	-15.45	-4.40	0.95
21	I	344.73	2.41	1.01	-16.43	-4.31	0.95
21	J	344.30	2.07	1.01	-17.21	-4.24	0.94
22	I	344.20	1.03	1.00	-6.24	-4.43	0.97
22	J	344.24	1.01	1.00	-6.41	-4.43	0.97
23	I	344.24	2.04	1.01	-17.44	-4.23	0.94
23	J	344.24	1.90	1.01	-17.94	-4.21	0.94
24	I	344.25	1.84	1.01	-18.65	-4.18	0.94
24	J	345.16	1.51	1.00	-19.65	-4.23	0.94
25	I	345.16	1.32	1.00	-18.81	-4.24	0.94
25	J	349.39	0.84	1.00	-19.97	-4.58	0.93
26	I	349.39	0.57	1.00	-18.71	-4.58	0.94
26	J	350.31	-0.01	1.00	-19.80	-4.62	0.93
27	I	350.31	-0.09	1.00	-20.16	-4.62	0.93
27	J	351.23	-0.79	1.00	-21.51	-4.65	0.92
28	I	351.23	-1.04	1.00	-20.58	-4.66	0.93
28	J	355.55	-1.99	0.99	-22.17	-4.99	0.92

The Loss of tendon group [C24-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
29	I	355.55	-2.21	0.99	-21.89	-4.98	0.92
29	J	356.48	-3.25	0.99	-23.57	-4.99	0.91
30	I	356.48	-3.30	0.99	-22.58	-5.01	0.91
30	J	361.09	-3.90	0.99	-24.28	-5.37	0.91
31	I	361.09	-4.23	0.99	-23.54	-5.37	0.91
31	J	362.28	-5.93	0.98	-26.17	-5.35	0.90
32	I	362.28	-6.04	0.98	-25.50	-5.35	0.90
32	J	366.97	-8.10	0.98	-28.53	-5.64	0.88
33	I	366.97	-8.56	0.98	-28.15	-5.61	0.88
33	J	359.22	-10.98	0.97	-31.31	-4.70	0.87
34	I	359.22	-11.21	0.97	-31.23	-4.67	0.87
34	J	323.01	-13.45	0.96	-34.93	-1.59	0.85

The Loss of tendon group [C25-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
6	I	306.76	-4.75	0.98	-27.22	-0.78	0.89
6	J	359.50	-3.48	0.99	-24.24	-5.17	0.91
7	I	359.50	-3.17	0.99	-24.67	-5.19	0.91
7	J	358.32	-2.07	0.99	-22.18	-5.21	0.92
8	I	358.32	-1.84	0.99	-22.79	-5.21	0.92
8	J	357.14	-1.20	1.00	-20.80	-5.19	0.92
9	I	357.14	-1.41	1.00	-22.27	-5.15	0.92
9	J	355.68	-0.60	1.00	-20.16	-5.11	0.93
10	I	355.68	-0.42	1.00	-20.79	-5.11	0.93
10	J	352.55	0.25	1.00	-18.93	-4.89	0.93
11	I	352.55	0.46	1.00	-19.92	-4.88	0.93
11	J	351.40	0.95	1.00	-18.30	-4.84	0.94
12	I	351.40	1.11	1.00	-19.02	-4.83	0.94
12	J	347.14	1.48	1.00	-17.82	-4.48	0.94
13	I	347.14	1.62	1.00	-18.36	-4.47	0.94
13	J	346.23	1.85	1.01	-17.36	-4.42	0.94
14	I	346.23	2.03	1.01	-18.35	-4.41	0.94
14	J	342.03	2.26	1.01	-17.33	-4.06	0.94
15	I	342.03	2.29	1.01	-17.35	-4.05	0.94
15	J	341.13	2.41	1.01	-16.57	-3.99	0.95
16	I	341.13	2.70	1.01	-18.47	-3.98	0.94
16	J	340.24	2.76	1.01	-17.62	-3.92	0.94
17	I	340.24	2.83	1.01	-17.88	-3.91	0.94
17	J	336.11	2.91	1.01	-17.03	-3.57	0.95
18	I	336.11	2.94	1.01	-16.66	-3.59	0.95
18	J	335.61	2.95	1.01	-16.26	-3.56	0.95
19	I	335.61	1.62	1.00	-5.66	-3.71	0.98
19	J	335.48	1.72	1.01	-5.55	-3.71	0.98
20	I	335.48	3.02	1.01	-15.95	-3.55	0.95
20	J	335.06	3.29	1.01	-15.18	-3.54	0.95
21	I	335.06	2.46	1.01	-16.16	-3.46	0.95
21	J	334.64	2.17	1.01	-16.92	-3.40	0.95
22	I	334.64	0.89	1.00	-6.14	-3.57	0.97
22	J	331.41	0.87	1.00	-6.30	-3.29	0.97
23	I	331.41	2.13	1.01	-17.15	-3.12	0.95
23	J	331.41	1.99	1.01	-17.64	-3.10	0.94

The Loss of tendon group [C25-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
24	I	331.37	1.92	1.01	-18.23	-3.07	0.94
24	J	332.24	1.59	1.00	-19.20	-3.11	0.94
25	I	332.24	1.40	1.00	-18.40	-3.12	0.94
25	J	336.32	0.95	1.00	-19.53	-3.43	0.93
26	I	336.32	0.68	1.00	-18.25	-3.43	0.94
26	J	337.21	0.12	1.00	-19.32	-3.46	0.93
27	I	337.21	0.04	1.00	-19.64	-3.47	0.93
27	J	338.09	-0.62	1.00	-20.96	-3.50	0.93
28	I	338.09	-0.88	1.00	-20.03	-3.51	0.93
28	J	342.24	-1.75	0.99	-21.58	-3.80	0.92
29	I	342.24	-1.98	0.99	-21.26	-3.80	0.92
29	J	343.14	-2.93	0.99	-22.88	-3.81	0.91
30	I	343.14	-2.99	0.99	-21.86	-3.82	0.92
30	J	347.59	-3.44	0.99	-23.46	-4.16	0.91
31	I	347.59	-3.77	0.99	-22.62	-4.17	0.91
31	J	348.73	-5.28	0.98	-25.11	-4.15	0.90
32	I	348.73	-5.39	0.98	-24.40	-4.16	0.90
32	J	353.24	-7.17	0.98	-27.25	-4.43	0.89
33	I	353.24	-7.62	0.98	-26.61	-4.42	0.89
33	J	354.40	-9.68	0.97	-29.56	-4.37	0.88
34	I	354.40	-9.89	0.97	-29.19	-4.36	0.88
34	J	358.46	-11.65	0.97	-32.26	-4.58	0.86
35	I	358.46	-12.18	0.97	-32.27	-4.54	0.86
35	J	311.26	-14.79	0.95	-36.37	-0.95	0.83

The Loss of tendon group [C26-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
6	I	306.76	-4.75	0.98	-27.22	-0.78	0.89
6	J	359.50	-3.48	0.99	-24.24	-5.17	0.91
7	I	359.50	-3.17	0.99	-24.67	-5.19	0.91
7	J	358.32	-2.07	0.99	-22.18	-5.21	0.92
8	I	358.32	-1.84	0.99	-22.79	-5.21	0.92
8	J	357.13	-1.20	1.00	-20.80	-5.19	0.92
9	I	357.13	-1.41	1.00	-22.27	-5.15	0.92
9	J	355.69	-0.60	1.00	-20.16	-5.11	0.93
10	I	355.69	-0.42	1.00	-20.79	-5.11	0.93
10	J	352.55	0.25	1.00	-18.93	-4.89	0.93
11	I	352.55	0.46	1.00	-19.92	-4.88	0.93
11	J	351.40	0.95	1.00	-18.30	-4.84	0.94
12	I	351.40	1.11	1.00	-19.02	-4.83	0.94
12	J	347.14	1.48	1.00	-17.82	-4.48	0.94
13	I	347.14	1.62	1.00	-18.36	-4.47	0.94
13	J	346.23	1.85	1.01	-17.36	-4.42	0.94
14	I	346.23	2.03	1.01	-18.35	-4.41	0.94
14	J	342.03	2.26	1.01	-17.33	-4.06	0.94
15	I	342.03	2.29	1.01	-17.35	-4.05	0.94
15	J	341.13	2.41	1.01	-16.57	-3.99	0.95
16	I	341.13	2.70	1.01	-18.47	-3.98	0.94
16	J	340.24	2.76	1.01	-17.62	-3.92	0.94
17	I	340.24	2.83	1.01	-17.88	-3.91	0.94
17	J	336.11	2.91	1.01	-17.03	-3.57	0.95
18	I	336.11	2.94	1.01	-16.66	-3.59	0.95
18	J	335.61	2.95	1.01	-16.26	-3.56	0.95

The Loss of tendon group [C26-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
19	I	335.61	1.62	1.00	-5.66	-3.71	0.98
19	J	335.48	1.72	1.01	-5.55	-3.71	0.98
20	I	335.48	3.02	1.01	-15.95	-3.55	0.95
20	J	335.06	3.29	1.01	-15.18	-3.55	0.95
21	I	335.06	2.46	1.01	-16.16	-3.46	0.95
21	J	334.64	2.17	1.01	-16.92	-3.40	0.95
22	I	334.64	0.89	1.00	-6.14	-3.57	0.97
22	J	331.81	0.87	1.00	-6.30	-3.32	0.97
23	I	331.81	2.13	1.01	-17.15	-3.15	0.95
23	J	331.81	1.99	1.01	-17.64	-3.14	0.94
24	I	331.81	1.92	1.01	-18.23	-3.11	0.94
24	J	332.22	1.59	1.00	-19.20	-3.11	0.94
25	I	332.22	1.40	1.00	-18.40	-3.12	0.94
25	J	336.30	0.95	1.00	-19.53	-3.43	0.93
26	I	336.30	0.68	1.00	-18.25	-3.43	0.94
26	J	337.19	0.12	1.00	-19.32	-3.46	0.93
27	I	337.19	0.04	1.00	-19.64	-3.47	0.93
27	J	338.07	-0.62	1.00	-20.96	-3.49	0.93
28	I	338.07	-0.88	1.00	-20.03	-3.50	0.93
28	J	342.22	-1.75	0.99	-21.58	-3.80	0.92
29	I	342.22	-1.98	0.99	-21.26	-3.80	0.92
29	J	343.12	-2.93	0.99	-22.88	-3.81	0.91
30	I	343.12	-2.99	0.99	-21.86	-3.82	0.92
30	J	347.56	-3.44	0.99	-23.46	-4.16	0.91
31	I	347.56	-3.77	0.99	-22.62	-4.17	0.91
31	J	348.71	-5.28	0.98	-25.11	-4.15	0.90
32	I	348.71	-5.39	0.98	-24.40	-4.16	0.90
32	J	353.22	-7.17	0.98	-27.25	-4.43	0.89
33	I	353.22	-7.62	0.98	-26.61	-4.42	0.89
33	J	354.38	-9.68	0.97	-29.56	-4.37	0.88
34	I	354.38	-9.89	0.97	-29.19	-4.36	0.88
34	J	358.61	-11.65	0.97	-32.26	-4.60	0.86
35	I	358.61	-12.18	0.97	-32.27	-4.56	0.86
35	J	311.22	-14.79	0.95	-36.37	-0.94	0.83

The Loss of tendon group [C27-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
5	I	301.45	-4.20	0.99	-26.58	-0.52	0.90
5	J	350.91	-3.39	0.99	-23.87	-4.39	0.91
6	I	350.91	-3.07	0.99	-24.64	-4.40	0.91
6	J	349.75	-2.29	0.99	-22.26	-4.40	0.92
7	I	349.75	-2.02	0.99	-22.97	-4.41	0.92
7	J	348.60	-1.30	1.00	-20.74	-4.40	0.92
8	I	348.60	-1.08	1.00	-21.53	-4.39	0.92
8	J	347.45	-0.73	1.00	-19.73	-4.36	0.93
9	I	347.45	-0.94	1.00	-21.32	-4.32	0.92
9	J	346.04	-0.36	1.00	-19.35	-4.26	0.93
10	I	346.04	-0.18	1.00	-19.99	-4.26	0.93
10	J	342.99	0.34	1.00	-18.24	-4.05	0.94
11	I	342.99	0.56	1.00	-19.28	-4.04	0.93
11	J	341.87	0.94	1.00	-17.73	-3.99	0.94
12	I	341.87	1.11	1.00	-18.46	-3.98	0.94
12	J	337.72	1.41	1.00	-17.32	-3.65	0.94

The Loss of tendon group [C27-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
13	I	337.72	1.55	1.00	-17.90	-3.65	0.94
13	J	336.84	1.75	1.01	-16.94	-3.60	0.94
14	I	336.84	1.93	1.01	-17.89	-3.58	0.94
14	J	332.75	2.12	1.01	-16.91	-3.26	0.95
15	I	332.75	2.16	1.01	-16.95	-3.25	0.95
15	J	331.88	2.28	1.01	-16.20	-3.19	0.95
16	I	331.88	2.57	1.01	-18.10	-3.18	0.94
16	J	331.01	2.64	1.01	-17.27	-3.13	0.95
17	I	331.01	2.71	1.01	-17.49	-3.12	0.95
17	J	327.00	2.79	1.01	-16.67	-2.81	0.95
18	I	327.00	2.84	1.01	-16.39	-2.82	0.95
18	J	326.51	2.85	1.01	-16.00	-2.79	0.95
19	I	326.51	1.38	1.00	-5.57	-2.93	0.98
19	J	326.38	1.45	1.00	-5.47	-2.92	0.98
20	I	326.38	2.91	1.01	-15.70	-2.79	0.95
20	J	325.97	3.12	1.01	-14.95	-2.78	0.96
21	I	325.97	2.36	1.01	-15.92	-2.70	0.95
21	J	325.57	2.12	1.01	-16.67	-2.64	0.95
22	I	325.57	0.67	1.00	-6.05	-2.79	0.97
22	J	322.92	0.65	1.00	-6.21	-2.57	0.97
23	I	322.92	2.08	1.01	-16.89	-2.42	0.95
23	J	322.92	1.92	1.01	-17.37	-2.40	0.94
24	I	322.92	1.85	1.01	-17.86	-2.38	0.94
24	J	323.23	1.50	1.00	-18.82	-2.38	0.94
25	I	323.23	1.31	1.00	-18.06	-2.38	0.94
25	J	327.20	0.87	1.00	-19.16	-2.67	0.94
26	I	327.20	0.59	1.00	-17.87	-2.67	0.94
26	J	328.06	0.04	1.00	-18.91	-2.70	0.93
27	I	328.06	-0.05	1.00	-19.21	-2.71	0.93
27	J	328.92	-0.70	1.00	-20.49	-2.73	0.93
28	I	328.92	-0.96	1.00	-19.61	-2.74	0.93
28	J	332.96	-1.78	0.99	-21.11	-3.01	0.92
29	I	332.96	-2.01	0.99	-20.75	-3.01	0.92
29	J	333.83	-2.92	0.99	-22.32	-3.02	0.92
30	I	333.83	-2.98	0.99	-21.29	-3.03	0.92
30	J	338.15	-3.32	0.99	-22.81	-3.36	0.91
31	I	338.15	-3.66	0.99	-21.93	-3.36	0.91
31	J	339.26	-5.03	0.99	-24.31	-3.36	0.90
32	I	339.26	-5.14	0.98	-23.59	-3.36	0.91
32	J	343.65	-6.68	0.98	-26.30	-3.63	0.89
33	I	343.65	-7.14	0.98	-25.53	-3.62	0.89
33	J	344.78	-8.91	0.97	-28.29	-3.59	0.88
34	I	344.78	-9.12	0.97	-27.76	-3.59	0.88
34	J	349.25	-10.48	0.97	-30.55	-3.86	0.87
35	I	349.25	-10.99	0.97	-30.31	-3.83	0.87
35	J	356.54	-13.06	0.96	-33.76	-4.32	0.86
36	I	356.54	-13.59	0.96	-33.04	-4.29	0.86
36	J	310.53	-15.05	0.95	-36.18	-0.90	0.83

The Loss of tendon group [C28-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
5	I	301.45	-4.20	0.99	-26.58	-0.52	0.90
5	J	350.91	-3.39	0.99	-23.87	-4.39	0.91
6	I	350.91	-3.07	0.99	-24.64	-4.40	0.91
6	J	349.75	-2.29	0.99	-22.26	-4.40	0.92
7	I	349.75	-2.02	0.99	-22.97	-4.41	0.92
7	J	348.60	-1.30	1.00	-20.74	-4.40	0.92
8	I	348.60	-1.08	1.00	-21.53	-4.39	0.92
8	J	347.45	-0.73	1.00	-19.73	-4.36	0.93
9	I	347.45	-0.94	1.00	-21.32	-4.32	0.92
9	J	346.04	-0.36	1.00	-19.35	-4.27	0.93
10	I	346.04	-0.18	1.00	-19.99	-4.26	0.93
10	J	342.99	0.34	1.00	-18.24	-4.05	0.94
11	I	342.99	0.56	1.00	-19.28	-4.04	0.93
11	J	341.87	0.94	1.00	-17.73	-3.99	0.94
12	I	341.87	1.11	1.00	-18.46	-3.98	0.94
12	J	337.72	1.41	1.00	-17.32	-3.65	0.94
13	I	337.72	1.55	1.00	-17.90	-3.65	0.94
13	J	336.84	1.75	1.01	-16.94	-3.60	0.94
14	I	336.84	1.93	1.01	-17.89	-3.58	0.94
14	J	332.75	2.12	1.01	-16.91	-3.26	0.95
15	I	332.75	2.16	1.01	-16.95	-3.25	0.95
15	J	331.88	2.28	1.01	-16.20	-3.20	0.95
16	I	331.88	2.57	1.01	-18.10	-3.18	0.94
16	J	331.01	2.64	1.01	-17.27	-3.13	0.95
17	I	331.01	2.71	1.01	-17.49	-3.12	0.95
17	J	327.00	2.79	1.01	-16.67	-2.81	0.95
18	I	327.00	2.84	1.01	-16.39	-2.82	0.95
18	J	326.51	2.85	1.01	-16.00	-2.79	0.95
19	I	326.51	1.38	1.00	-5.57	-2.93	0.98
19	J	326.38	1.45	1.00	-5.47	-2.92	0.98
20	I	326.38	2.91	1.01	-15.70	-2.79	0.95
20	J	325.97	3.12	1.01	-14.95	-2.78	0.96
21	I	325.97	2.36	1.01	-15.92	-2.70	0.95
21	J	325.57	2.12	1.01	-16.67	-2.64	0.95
22	I	325.57	0.67	1.00	-6.05	-2.79	0.97
22	J	323.98	0.65	1.00	-6.21	-2.66	0.97
23	I	323.98	2.08	1.01	-16.89	-2.50	0.95
23	J	323.98	1.92	1.01	-17.37	-2.49	0.94
24	I	323.98	1.85	1.01	-17.86	-2.47	0.94
24	J	323.99	1.50	1.00	-18.82	-2.44	0.94
25	I	323.99	1.31	1.00	-18.06	-2.45	0.94
25	J	327.16	0.87	1.00	-19.16	-2.67	0.94
26	I	327.16	0.59	1.00	-17.87	-2.67	0.94
26	J	328.02	0.04	1.00	-18.91	-2.70	0.93
27	I	328.02	-0.05	1.00	-19.21	-2.70	0.93
27	J	328.88	-0.70	1.00	-20.49	-2.73	0.93
28	I	328.88	-0.96	1.00	-19.61	-2.74	0.93
28	J	332.92	-1.78	0.99	-21.11	-3.01	0.92
29	I	332.92	-2.01	0.99	-20.75	-3.01	0.92
29	J	333.79	-2.92	0.99	-22.32	-3.02	0.92
30	I	333.79	-2.98	0.99	-21.29	-3.03	0.92
30	J	338.11	-3.32	0.99	-22.81	-3.36	0.91
31	I	338.11	-3.66	0.99	-21.93	-3.36	0.91
31	J	339.22	-5.03	0.99	-24.31	-3.35	0.90
32	I	339.22	-5.14	0.98	-23.59	-3.36	0.91

The Loss of tendon group [C28-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	J	343.62	-6.68	0.98	-26.30	-3.62	0.89
33	I	343.62	-7.14	0.98	-25.53	-3.62	0.89
33	J	344.75	-8.91	0.97	-28.29	-3.59	0.88
34	I	344.75	-9.12	0.97	-27.76	-3.59	0.88
34	J	349.21	-10.48	0.97	-30.55	-3.86	0.87
35	I	349.21	-10.99	0.97	-30.31	-3.83	0.87
35	J	354.66	-13.06	0.96	-33.76	-4.15	0.86
36	I	354.66	-13.59	0.96	-33.04	-4.12	0.86
36	J	305.28	-15.05	0.95	-36.18	-0.67	0.83

The Loss of tendon group [C29-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
4	I	296.70	-3.13	0.99	-25.86	-0.32	0.90
4	J	342.87	-2.92	0.99	-23.51	-3.70	0.91
5	I	342.87	-2.63	0.99	-24.03	-3.71	0.91
5	J	341.74	-2.36	0.99	-22.03	-3.69	0.92
6	I	341.74	-2.05	0.99	-22.98	-3.69	0.92
6	J	340.61	-1.71	1.00	-20.90	-3.67	0.92
7	I	340.61	-1.44	1.00	-21.80	-3.66	0.92
7	J	339.49	-1.06	1.00	-19.77	-3.64	0.93
8	I	339.49	-0.84	1.00	-20.60	-3.63	0.93
8	J	338.37	-0.74	1.00	-18.96	-3.58	0.93
9	I	338.37	-0.93	1.00	-20.60	-3.53	0.93
9	J	337.00	-0.52	1.00	-18.75	-3.48	0.93
10	I	337.00	-0.33	1.00	-19.39	-3.47	0.93
10	J	334.03	0.06	1.00	-17.73	-3.27	0.94
11	I	334.03	0.29	1.00	-18.77	-3.26	0.93
11	J	332.94	0.61	1.00	-17.29	-3.21	0.94
12	I	332.94	0.79	1.00	-18.02	-3.20	0.94
12	J	328.90	1.04	1.00	-16.92	-2.89	0.94
13	I	328.90	1.19	1.00	-17.55	-2.89	0.94
13	J	328.04	1.38	1.00	-16.61	-2.84	0.94
14	I	328.04	1.57	1.00	-17.51	-2.83	0.94
14	J	324.06	1.75	1.01	-16.56	-2.53	0.95
15	I	324.06	1.80	1.01	-16.61	-2.52	0.95
15	J	323.21	1.94	1.01	-15.89	-2.47	0.95
16	I	323.21	2.23	1.01	-17.78	-2.46	0.94
16	J	322.36	2.32	1.01	-16.97	-2.41	0.95
17	I	322.36	2.40	1.01	-17.16	-2.40	0.95
17	J	318.45	2.49	1.01	-16.36	-2.11	0.95
18	I	318.45	2.55	1.01	-16.15	-2.12	0.95
18	J	317.98	2.58	1.01	-15.77	-2.09	0.95
19	I	317.98	1.03	1.00	-5.50	-2.22	0.98
19	J	317.86	1.09	1.00	-5.39	-2.21	0.98
20	I	317.86	2.62	1.01	-15.48	-2.09	0.95
20	J	317.46	2.78	1.01	-14.74	-2.08	0.96
21	I	317.46	2.10	1.01	-15.70	-2.00	0.95
21	J	317.06	1.91	1.01	-16.44	-1.95	0.95
22	I	317.06	0.35	1.00	-5.98	-2.09	0.98
22	J	313.91	0.33	1.00	-6.13	-1.84	0.98
23	I	313.91	1.85	1.01	-16.66	-1.70	0.95

The Loss of tendon group [C29-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
23	J	313.46	1.68	1.01	-17.13	-1.65	0.95
24	I	313.46	1.59	1.01	-17.55	-1.63	0.94
24	J	312.64	1.21	1.00	-18.48	-1.54	0.94
25	I	312.64	1.02	1.00	-17.77	-1.55	0.94
25	J	315.55	0.56	1.00	-18.85	-1.73	0.94
26	I	315.55	0.27	1.00	-17.55	-1.73	0.94
26	J	316.38	-0.30	1.00	-18.57	-1.76	0.93
27	I	316.38	-0.39	1.00	-18.85	-1.76	0.93
27	J	317.21	-1.04	1.00	-20.10	-1.78	0.93
28	I	317.21	-1.32	1.00	-19.28	-1.79	0.93
28	J	321.11	-2.11	0.99	-20.75	-2.04	0.92
29	I	321.11	-2.35	0.99	-20.35	-2.04	0.92
29	J	321.95	-3.23	0.99	-21.88	-2.04	0.92
30	I	321.95	-3.31	0.99	-20.85	-2.06	0.92
30	J	326.12	-3.58	0.99	-22.30	-2.35	0.91
31	I	326.12	-3.93	0.99	-21.42	-2.36	0.92
31	J	327.19	-5.19	0.98	-23.71	-2.35	0.90
32	I	327.19	-5.31	0.98	-22.99	-2.36	0.91
32	J	331.42	-6.67	0.98	-25.58	-2.60	0.89
33	I	331.42	-7.14	0.98	-24.76	-2.60	0.90
33	J	332.51	-8.68	0.97	-27.37	-2.58	0.88
34	I	332.51	-8.89	0.97	-26.80	-2.58	0.88
34	J	336.82	-9.91	0.97	-29.37	-2.84	0.87
35	I	336.82	-10.42	0.97	-28.95	-2.83	0.87
35	J	337.92	-12.07	0.96	-32.09	-2.79	0.86
36	I	337.92	-12.59	0.96	-31.19	-2.77	0.86
36	J	342.30	-13.49	0.96	-33.60	-3.04	0.85
37	I	342.30	-14.11	0.96	-34.21	-3.01	0.85
37	J	295.90	-15.33	0.95	-37.37	-0.29	0.82

The Loss of tendon group [C30-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
4	I	296.70	-3.13	0.99	-25.86	-0.32	0.90
4	J	342.87	-2.92	0.99	-23.51	-3.70	0.91
5	I	342.87	-2.63	0.99	-24.03	-3.71	0.91
5	J	341.74	-2.36	0.99	-22.03	-3.69	0.92
6	I	341.74	-2.05	0.99	-22.98	-3.69	0.92
6	J	340.61	-1.71	1.00	-20.90	-3.67	0.92
7	I	340.61	-1.44	1.00	-21.80	-3.66	0.92
7	J	339.49	-1.06	1.00	-19.77	-3.64	0.93
8	I	339.49	-0.84	1.00	-20.60	-3.63	0.93
8	J	338.37	-0.74	1.00	-18.96	-3.58	0.93
9	I	338.37	-0.93	1.00	-20.60	-3.53	0.93
9	J	337.00	-0.52	1.00	-18.75	-3.48	0.93
10	I	337.00	-0.33	1.00	-19.39	-3.47	0.93
10	J	334.03	0.06	1.00	-17.73	-3.27	0.94
11	I	334.03	0.29	1.00	-18.77	-3.26	0.93
11	J	332.94	0.61	1.00	-17.29	-3.21	0.94
12	I	332.94	0.79	1.00	-18.02	-3.20	0.94
12	J	328.90	1.04	1.00	-16.92	-2.89	0.94
13	I	328.90	1.19	1.00	-17.55	-2.89	0.94

The Loss of tendon group [C30-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
13	J	328.04	1.38	1.00	-16.61	-2.84	0.94
14	I	328.04	1.57	1.00	-17.51	-2.83	0.94
14	J	324.06	1.75	1.01	-16.56	-2.53	0.95
15	I	324.06	1.80	1.01	-16.61	-2.52	0.95
15	J	323.21	1.94	1.01	-15.89	-2.47	0.95
16	I	323.21	2.23	1.01	-17.78	-2.46	0.94
16	J	322.36	2.32	1.01	-16.97	-2.41	0.95
17	I	322.36	2.40	1.01	-17.16	-2.40	0.95
17	J	318.45	2.49	1.01	-16.36	-2.11	0.95
18	I	318.45	2.55	1.01	-16.15	-2.12	0.95
18	J	317.98	2.58	1.01	-15.77	-2.09	0.95
19	I	317.98	1.03	1.00	-5.50	-2.22	0.98
19	J	317.86	1.09	1.00	-5.39	-2.21	0.98
20	I	317.86	2.62	1.01	-15.48	-2.09	0.95
20	J	317.46	2.78	1.01	-14.74	-2.08	0.96
21	I	317.46	2.10	1.01	-15.70	-2.00	0.95
21	J	317.06	1.91	1.01	-16.44	-1.95	0.95
22	I	317.06	0.35	1.00	-5.98	-2.09	0.98
22	J	313.91	0.33	1.00	-6.13	-1.84	0.98
23	I	313.91	1.85	1.01	-16.66	-1.70	0.95
23	J	313.46	1.68	1.01	-17.13	-1.65	0.95
24	I	313.46	1.59	1.01	-17.55	-1.63	0.94
24	J	312.99	1.21	1.00	-18.48	-1.57	0.94
25	I	312.99	1.02	1.00	-17.77	-1.57	0.94
25	J	315.53	0.56	1.00	-18.85	-1.73	0.94
26	I	315.53	0.27	1.00	-17.55	-1.73	0.94
26	J	316.36	-0.30	1.00	-18.57	-1.76	0.93
27	I	316.36	-0.39	1.00	-18.85	-1.76	0.93
27	J	317.19	-1.04	1.00	-20.10	-1.78	0.93
28	I	317.19	-1.32	1.00	-19.28	-1.79	0.93
28	J	321.08	-2.11	0.99	-20.75	-2.04	0.92
29	I	321.08	-2.35	0.99	-20.35	-2.03	0.92
29	J	321.93	-3.23	0.99	-21.88	-2.04	0.92
30	I	321.93	-3.31	0.99	-20.85	-2.06	0.92
30	J	326.09	-3.58	0.99	-22.30	-2.35	0.91
31	I	326.09	-3.93	0.99	-21.42	-2.35	0.92
31	J	327.17	-5.19	0.98	-23.71	-2.35	0.90
32	I	327.17	-5.31	0.98	-22.99	-2.36	0.91
32	J	331.40	-6.67	0.98	-25.58	-2.60	0.89
33	I	331.40	-7.14	0.98	-24.76	-2.60	0.90
33	J	332.49	-8.68	0.97	-27.37	-2.58	0.88
34	I	332.49	-8.89	0.97	-26.80	-2.58	0.88
34	J	336.79	-9.91	0.97	-29.37	-2.84	0.87
35	I	336.79	-10.42	0.97	-28.95	-2.83	0.87
35	J	337.90	-12.07	0.96	-32.09	-2.79	0.86
36	I	337.90	-12.59	0.96	-31.19	-2.77	0.86
36	J	342.27	-13.49	0.96	-33.60	-3.04	0.85
37	I	342.27	-14.11	0.96	-34.21	-3.00	0.85
37	J	295.89	-15.33	0.95	-37.37	-0.29	0.82

The Loss of tendon group [C31-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
3	I	292.44	-1.37	1.00	-24.00	-0.17	0.91
3	J	335.37	-1.92	0.99	-22.37	-3.13	0.92
4	I	335.37	-1.66	1.00	-23.34	-3.13	0.92
4	J	334.26	-2.04	0.99	-21.79	-3.07	0.92
5	I	334.26	-1.76	0.99	-22.47	-3.07	0.92
5	J	333.16	-1.97	0.99	-20.77	-3.01	0.92
6	I	333.16	-1.66	1.00	-21.87	-3.01	0.92
6	J	332.06	-1.70	0.99	-20.01	-2.96	0.93
7	I	332.06	-1.43	1.00	-20.97	-2.96	0.92
7	J	330.97	-1.34	1.00	-19.11	-2.91	0.93
8	I	330.97	-1.11	1.00	-19.93	-2.91	0.93
8	J	329.88	-1.20	1.00	-18.42	-2.84	0.93
9	I	329.88	-1.38	1.00	-20.08	-2.80	0.93
9	J	328.54	-1.10	1.00	-18.32	-2.74	0.93
10	I	328.54	-0.89	1.00	-18.96	-2.74	0.93
10	J	325.65	-0.59	1.00	-17.37	-2.55	0.94
11	I	325.65	-0.35	1.00	-18.39	-2.53	0.93
11	J	324.58	-0.06	1.00	-16.96	-2.49	0.94
12	I	324.58	0.14	1.00	-17.68	-2.48	0.94
12	J	320.64	0.37	1.00	-16.61	-2.20	0.94
13	I	320.64	0.54	1.00	-17.29	-2.19	0.94
13	J	319.80	0.74	1.00	-16.38	-2.15	0.94
14	I	319.80	0.93	1.00	-17.20	-2.14	0.94
14	J	315.92	1.12	1.00	-16.28	-1.86	0.95
15	I	315.92	1.19	1.00	-16.34	-1.85	0.95
15	J	315.09	1.36	1.00	-15.63	-1.81	0.95
16	I	315.09	1.66	1.01	-17.51	-1.80	0.94
16	J	314.27	1.79	1.01	-16.72	-1.75	0.95
17	I	314.27	1.88	1.01	-16.88	-1.75	0.95
17	J	310.46	1.99	1.01	-16.10	-1.48	0.95
18	I	310.46	2.08	1.01	-15.95	-1.49	0.95
18	J	310.00	2.13	1.01	-15.57	-1.46	0.95
19	I	310.00	0.58	1.00	-5.44	-1.58	0.98
19	J	309.87	0.62	1.00	-5.34	-1.57	0.98
20	I	309.87	2.16	1.01	-15.29	-1.46	0.95
20	J	309.49	2.25	1.01	-14.57	-1.45	0.96
21	I	309.49	1.67	1.01	-15.52	-1.37	0.95
21	J	309.10	1.53	1.00	-16.23	-1.33	0.95
22	I	309.10	-0.06	1.00	-5.91	-1.46	0.98
22	J	306.03	-0.09	1.00	-6.06	-1.22	0.98
23	I	306.03	1.46	1.00	-16.45	-1.09	0.95
23	J	305.59	1.26	1.00	-16.92	-1.05	0.95
24	I	305.59	1.15	1.00	-17.28	-1.03	0.94
24	J	305.01	0.73	1.00	-18.20	-0.96	0.94
25	I	305.01	0.53	1.00	-17.54	-0.96	0.94
25	J	307.63	0.05	1.00	-18.60	-1.12	0.94
26	I	307.63	-0.26	1.00	-17.29	-1.11	0.94
26	J	308.44	-0.86	1.00	-18.29	-1.13	0.93
27	I	308.44	-0.96	1.00	-18.56	-1.14	0.93
27	J	309.25	-1.64	0.99	-19.79	-1.16	0.93
28	I	309.25	-1.93	0.99	-19.04	-1.16	0.93
28	J	313.05	-2.71	0.99	-20.49	-1.39	0.92
29	I	313.05	-2.97	0.99	-20.03	-1.39	0.92
29	J	313.87	-3.85	0.99	-21.53	-1.39	0.91
30	I	313.87	-3.94	0.99	-20.52	-1.40	0.92

The Loss of tendon group [C31-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	J	317.93	-4.17	0.99	-21.91	-1.68	0.91
31	I	317.93	-4.54	0.99	-21.06	-1.68	0.91
31	J	318.98	-5.74	0.98	-23.28	-1.68	0.90
32	I	318.98	-5.88	0.98	-22.57	-1.68	0.91
32	J	323.10	-7.09	0.98	-25.06	-1.92	0.89
33	I	323.10	-7.58	0.98	-24.23	-1.91	0.90
33	J	324.17	-8.92	0.97	-26.73	-1.90	0.88
34	I	324.17	-9.15	0.97	-26.15	-1.90	0.89
34	J	328.36	-9.89	0.97	-28.55	-2.16	0.88
35	I	328.36	-10.39	0.97	-28.06	-2.15	0.88
35	J	329.44	-11.67	0.96	-30.97	-2.14	0.86
36	I	329.44	-12.20	0.96	-29.94	-2.12	0.87
36	J	333.70	-12.62	0.96	-32.04	-2.40	0.86
37	I	333.70	-13.23	0.96	-32.50	-2.37	0.86
37	J	354.79	-13.69	0.96	-34.85	-4.08	0.85
38	I	354.79	-14.14	0.96	-34.60	-4.05	0.85
38	J	299.97	-13.31	0.96	-35.70	-0.45	0.84

The Loss of tendon group [C32-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
3	I	292.44	-1.37	1.00	-24.00	-0.17	0.91
3	J	335.37	-1.92	0.99	-22.37	-3.13	0.92
4	I	335.37	-1.66	1.00	-23.34	-3.13	0.92
4	J	334.26	-2.04	0.99	-21.79	-3.07	0.92
5	I	334.26	-1.76	0.99	-22.47	-3.07	0.92
5	J	333.16	-1.97	0.99	-20.77	-3.01	0.92
6	I	333.16	-1.66	1.00	-21.87	-3.01	0.92
6	J	332.06	-1.70	0.99	-20.01	-2.96	0.93
7	I	332.06	-1.43	1.00	-20.97	-2.96	0.92
7	J	330.97	-1.34	1.00	-19.11	-2.91	0.93
8	I	330.97	-1.11	1.00	-19.93	-2.91	0.93
8	J	329.88	-1.20	1.00	-18.42	-2.84	0.93
9	I	329.88	-1.38	1.00	-20.08	-2.80	0.93
9	J	328.54	-1.10	1.00	-18.32	-2.74	0.93
10	I	328.54	-0.89	1.00	-18.96	-2.74	0.93
10	J	325.65	-0.59	1.00	-17.37	-2.55	0.94
11	I	325.65	-0.35	1.00	-18.39	-2.53	0.93
11	J	324.58	-0.06	1.00	-16.96	-2.49	0.94
12	I	324.58	0.14	1.00	-17.68	-2.48	0.94
12	J	320.64	0.37	1.00	-16.61	-2.20	0.94
13	I	320.64	0.54	1.00	-17.29	-2.19	0.94
13	J	319.80	0.74	1.00	-16.38	-2.15	0.94
14	I	319.80	0.93	1.00	-17.20	-2.14	0.94
14	J	315.92	1.12	1.00	-16.28	-1.86	0.95
15	I	315.92	1.19	1.00	-16.34	-1.85	0.95
15	J	315.09	1.36	1.00	-15.63	-1.81	0.95
16	I	315.09	1.66	1.01	-17.51	-1.80	0.94
16	J	314.27	1.79	1.01	-16.72	-1.75	0.95
17	I	314.27	1.88	1.01	-16.88	-1.75	0.95
17	J	310.46	1.99	1.01	-16.10	-1.48	0.95
18	I	310.46	2.08	1.01	-15.95	-1.49	0.95
18	J	310.00	2.13	1.01	-15.57	-1.46	0.95
19	I	310.00	0.58	1.00	-5.44	-1.58	0.98

The Loss of tendon group [C32-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
19	J	309.87	0.62	1.00	-5.34	-1.57	0.98
20	I	309.87	2.16	1.01	-15.29	-1.46	0.95
20	J	309.49	2.25	1.01	-14.57	-1.45	0.96
21	I	309.49	1.67	1.01	-15.52	-1.37	0.95
21	J	309.10	1.53	1.00	-16.23	-1.33	0.95
22	I	309.10	-0.06	1.00	-5.91	-1.46	0.98
22	J	306.13	-0.09	1.00	-6.06	-1.23	0.98
23	I	306.13	1.46	1.00	-16.45	-1.10	0.95
23	J	306.13	1.26	1.00	-16.92	-1.09	0.95
24	I	306.13	1.15	1.00	-17.28	-1.07	0.94
24	J	306.14	0.73	1.00	-18.20	-1.04	0.94
25	I	306.14	0.53	1.00	-17.54	-1.04	0.94
25	J	306.20	0.05	1.00	-18.60	-1.02	0.94
26	I	307.60	-0.26	1.00	-17.29	-1.11	0.94
26	J	308.41	-0.86	1.00	-18.29	-1.13	0.93
27	I	308.41	-0.96	1.00	-18.56	-1.14	0.93
27	J	309.22	-1.64	0.99	-19.79	-1.16	0.93
28	I	309.22	-1.93	0.99	-19.04	-1.16	0.93
28	J	313.02	-2.71	0.99	-20.49	-1.39	0.92
29	I	313.02	-2.97	0.99	-20.03	-1.38	0.92
29	J	313.84	-3.85	0.99	-21.53	-1.39	0.91
30	I	313.84	-3.94	0.99	-20.52	-1.40	0.92
30	J	317.90	-4.17	0.99	-21.91	-1.68	0.91
31	I	317.90	-4.54	0.99	-21.06	-1.68	0.91
31	J	318.95	-5.74	0.98	-23.28	-1.68	0.90
32	I	318.95	-5.88	0.98	-22.57	-1.68	0.91
32	J	323.07	-7.09	0.98	-25.06	-1.91	0.89
33	I	323.07	-7.58	0.98	-24.23	-1.91	0.90
33	J	324.14	-8.92	0.97	-26.73	-1.90	0.88
34	I	324.14	-9.15	0.97	-26.15	-1.90	0.89
34	J	328.33	-9.89	0.97	-28.55	-2.16	0.88
35	I	328.33	-10.39	0.97	-28.06	-2.15	0.88
35	J	329.41	-11.67	0.96	-30.97	-2.14	0.86
36	I	329.41	-12.20	0.96	-29.94	-2.12	0.87
36	J	333.67	-12.62	0.96	-32.04	-2.40	0.86
37	I	333.67	-13.23	0.96	-32.50	-2.37	0.86
37	J	354.79	-13.69	0.96	-34.85	-4.08	0.85
38	I	354.79	-14.14	0.96	-34.60	-4.05	0.85
38	J	299.95	-13.31	0.96	-35.70	-0.45	0.84

The Loss of tendon group [C33-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
2	I	288.57	0.50	1.00	-21.81	-0.05	0.93
2	J	328.36	-0.17	1.00	-20.66	-2.68	0.93
3	I	328.36	0.48	1.00	-21.51	-2.69	0.93
3	J	327.28	-0.45	1.00	-20.75	-2.58	0.93
4	I	327.28	-0.24	1.00	-21.77	-2.58	0.92
4	J	326.20	-0.95	1.00	-20.58	-2.49	0.93
5	I	326.20	-0.70	1.00	-21.42	-2.48	0.92
5	J	325.12	-1.19	1.00	-19.96	-2.41	0.93
6	I	325.12	-0.89	1.00	-21.10	-2.40	0.93

The Loss of tendon group [C33-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
6	J	324.05	-1.15	1.00	-19.44	-2.34	0.93
7	I	324.05	-0.89	1.00	-20.41	-2.34	0.93
7	J	322.99	-0.96	1.00	-18.69	-2.28	0.93
8	I	322.99	-0.73	1.00	-19.48	-2.28	0.93
8	J	321.92	-0.94	1.00	-18.08	-2.21	0.93
9	I	321.92	-1.11	1.00	-19.71	-2.17	0.93
9	J	320.61	-0.90	1.00	-18.04	-2.11	0.93
10	I	320.61	-0.70	1.00	-18.68	-2.11	0.93
10	J	317.79	-0.44	1.00	-17.15	-1.93	0.94
11	I	317.79	-0.20	1.00	-18.11	-1.92	0.94
11	J	316.75	0.08	1.00	-16.73	-1.87	0.94
12	I	316.75	0.27	1.00	-17.42	-1.87	0.94
12	J	312.91	0.49	1.00	-16.39	-1.60	0.94
13	I	312.91	0.66	1.00	-17.11	-1.59	0.94
13	J	312.09	0.87	1.00	-16.21	-1.55	0.95
14	I	312.09	1.06	1.00	-16.96	-1.55	0.94
14	J	308.30	1.24	1.00	-16.06	-1.29	0.95
15	I	308.30	1.32	1.00	-16.13	-1.28	0.95
15	J	307.49	1.50	1.00	-15.43	-1.24	0.95
16	I	307.49	1.80	1.01	-17.29	-1.23	0.95
16	J	306.69	1.95	1.01	-16.51	-1.19	0.95
17	I	306.69	2.03	1.01	-16.66	-1.19	0.95
17	J	302.97	2.15	1.01	-15.89	-0.94	0.95
18	I	302.97	2.24	1.01	-15.77	-0.95	0.95
18	J	302.52	2.30	1.01	-15.40	-0.92	0.95
19	I	302.52	0.53	1.00	-5.39	-1.02	0.98
19	J	302.40	0.56	1.00	-5.29	-1.01	0.98
20	I	302.40	2.32	1.01	-15.12	-0.92	0.95
20	J	302.02	2.39	1.01	-14.42	-0.90	0.96
21	I	302.02	2.56	1.01	-15.36	-0.86	0.95
21	J	301.64	2.43	1.01	-16.06	-0.82	0.95
22	I	301.64	0.35	1.00	-5.87	-0.92	0.98
22	J	298.65	0.32	1.00	-6.01	-0.70	0.98
23	I	298.65	2.34	1.01	-16.28	-0.60	0.95
23	J	298.22	2.14	1.01	-16.74	-0.56	0.95
24	I	298.22	2.05	1.01	-17.06	-0.55	0.95
24	J	297.43	1.63	1.01	-17.97	-0.48	0.94
25	I	297.43	1.45	1.00	-17.35	-0.48	0.94
25	J	295.84	0.96	1.00	-18.41	-0.37	0.94
26	I	297.32	0.67	1.00	-17.08	-0.45	0.94
26	J	298.10	0.08	1.00	-18.07	-0.47	0.94
27	I	298.10	-0.01	1.00	-18.33	-0.47	0.94
27	J	298.89	-0.68	1.00	-19.55	-0.50	0.93
28	I	298.89	-0.95	1.00	-18.87	-0.49	0.93
28	J	302.56	-1.70	0.99	-20.30	-0.68	0.93
29	I	302.56	-1.95	0.99	-19.80	-0.68	0.93
29	J	303.35	-2.82	0.99	-21.27	-0.70	0.92
30	I	303.35	-2.89	0.99	-20.29	-0.70	0.92
30	J	307.28	-3.09	0.99	-21.63	-0.94	0.92
31	I	307.28	-3.44	0.99	-20.82	-0.93	0.92
31	J	308.29	-4.61	0.99	-23.00	-0.95	0.91
32	I	308.29	-4.74	0.98	-22.28	-0.95	0.91
32	J	312.28	-5.90	0.98	-24.69	-1.15	0.90
33	I	312.28	-6.36	0.98	-23.91	-1.15	0.90
33	J	313.30	-7.65	0.98	-26.30	-1.16	0.89

The Loss of tendon group [C33-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	313.30	-7.86	0.97	-25.72	-1.16	0.89
34	J	317.36	-8.51	0.97	-27.97	-1.39	0.88
35	I	317.36	-8.98	0.97	-27.48	-1.38	0.88
35	J	318.40	-10.18	0.97	-30.20	-1.39	0.87
36	I	318.40	-10.67	0.97	-29.13	-1.38	0.87
36	J	322.52	-10.95	0.97	-30.98	-1.63	0.86
37	I	322.52	-11.51	0.96	-31.29	-1.61	0.86
37	J	323.58	-11.86	0.96	-33.22	-1.66	0.86
38	I	323.58	-12.25	0.96	-32.90	-1.64	0.86
38	J	327.77	-11.23	0.97	-33.17	-1.96	0.86
39	I	327.77	-12.52	0.96	-33.56	-1.92	0.85
39	J	287.90	-12.57	0.96	-35.09	-0.03	0.83

The Loss of tendon group [C34-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
2	I	288.57	0.50	1.00	-21.81	-0.05	0.93
2	J	328.36	-0.17	1.00	-20.66	-2.68	0.93
3	I	328.36	0.48	1.00	-21.51	-2.69	0.93
3	J	327.28	-0.45	1.00	-20.75	-2.58	0.93
4	I	327.28	-0.24	1.00	-21.77	-2.58	0.92
4	J	326.20	-0.95	1.00	-20.58	-2.49	0.93
5	I	326.20	-0.70	1.00	-21.42	-2.48	0.92
5	J	325.12	-1.19	1.00	-19.96	-2.41	0.93
6	I	325.12	-0.89	1.00	-21.10	-2.40	0.93
6	J	324.05	-1.15	1.00	-19.44	-2.34	0.93
7	I	324.05	-0.89	1.00	-20.41	-2.34	0.93
7	J	322.99	-0.96	1.00	-18.69	-2.28	0.93
8	I	322.99	-0.73	1.00	-19.48	-2.28	0.93
8	J	321.92	-0.94	1.00	-18.08	-2.21	0.93
9	I	321.92	-1.11	1.00	-19.71	-2.17	0.93
9	J	320.61	-0.90	1.00	-18.04	-2.11	0.93
10	I	320.61	-0.70	1.00	-18.68	-2.11	0.93
10	J	317.79	-0.44	1.00	-17.15	-1.93	0.94
11	I	317.79	-0.20	1.00	-18.11	-1.92	0.94
11	J	316.75	0.08	1.00	-16.73	-1.87	0.94
12	I	316.75	0.27	1.00	-17.42	-1.87	0.94
12	J	312.91	0.49	1.00	-16.39	-1.60	0.94
13	I	312.91	0.66	1.00	-17.11	-1.59	0.94
13	J	312.09	0.87	1.00	-16.21	-1.55	0.95
14	I	312.09	1.06	1.00	-16.96	-1.55	0.94
14	J	308.30	1.24	1.00	-16.06	-1.29	0.95
15	I	308.30	1.32	1.00	-16.13	-1.28	0.95

The Loss of tendon group [C34-P1] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
15	J	307.49	1.50	1.00	-15.43	-1.24	0.95
16	I	307.49	1.80	1.01	-17.29	-1.23	0.95
16	J	306.69	1.95	1.01	-16.51	-1.19	0.95
17	I	306.69	2.03	1.01	-16.66	-1.19	0.95
17	J	302.97	2.15	1.01	-15.89	-0.94	0.95
18	I	302.97	2.24	1.01	-15.77	-0.95	0.95
18	J	302.52	2.30	1.01	-15.40	-0.92	0.95
19	I	302.52	0.53	1.00	-5.39	-1.02	0.98
19	J	302.40	0.56	1.00	-5.29	-1.01	0.98
20	I	302.40	2.32	1.01	-15.12	-0.92	0.95
20	J	302.02	2.39	1.01	-14.42	-0.90	0.96
21	I	302.02	2.56	1.01	-15.36	-0.86	0.95
21	J	301.64	2.43	1.01	-16.06	-0.82	0.95
22	I	301.64	0.35	1.00	-5.87	-0.92	0.98
22	J	298.65	0.32	1.00	-6.01	-0.70	0.98
23	I	298.65	2.34	1.01	-16.28	-0.60	0.95
23	J	298.22	2.14	1.01	-16.74	-0.56	0.95
24	I	298.22	2.05	1.01	-17.06	-0.55	0.95
24	J	297.43	1.63	1.01	-17.97	-0.48	0.94
25	I	297.43	1.45	1.00	-17.35	-0.48	0.94
25	J	296.47	0.96	1.00	-18.41	-0.41	0.94
26	I	297.28	0.67	1.00	-17.08	-0.45	0.94
26	J	298.07	0.08	1.00	-18.07	-0.47	0.94
27	I	298.07	-0.01	1.00	-18.33	-0.47	0.94
27	J	298.85	-0.68	1.00	-19.55	-0.49	0.93
28	I	298.85	-0.95	1.00	-18.87	-0.49	0.93
28	J	302.52	-1.70	0.99	-20.30	-0.68	0.93
29	I	302.52	-1.95	0.99	-19.80	-0.68	0.93
29	J	303.31	-2.82	0.99	-21.27	-0.70	0.92
30	I	303.31	-2.89	0.99	-20.29	-0.70	0.92
30	J	307.24	-3.09	0.99	-21.63	-0.93	0.92
31	I	307.24	-3.44	0.99	-20.82	-0.93	0.92
31	J	308.25	-4.61	0.99	-23.00	-0.95	0.91
32	I	308.25	-4.74	0.98	-22.28	-0.94	0.91
32	J	312.24	-5.90	0.98	-24.69	-1.15	0.90
33	I	312.24	-6.36	0.98	-23.91	-1.15	0.90
33	J	313.27	-7.65	0.98	-26.30	-1.16	0.89
34	I	313.27	-7.86	0.97	-25.72	-1.15	0.89
34	J	317.32	-8.51	0.97	-27.97	-1.39	0.88
35	I	317.32	-8.98	0.97	-27.48	-1.38	0.88
35	J	318.36	-10.18	0.97	-30.20	-1.39	0.87
36	I	318.36	-10.67	0.97	-29.13	-1.38	0.87
36	J	322.48	-10.95	0.97	-30.98	-1.63	0.86
37	I	322.48	-11.51	0.96	-31.29	-1.61	0.86
37	J	323.54	-11.86	0.96	-33.22	-1.66	0.86
38	I	323.54	-12.25	0.96	-32.90	-1.64	0.86
38	J	327.73	-11.23	0.97	-33.17	-1.97	0.86
39	I	327.73	-12.52	0.96	-33.56	-1.92	0.85
39	J	287.88	-12.57	0.96	-35.09	-0.04	0.83

3.5.11.2. FAMILIA DE CABLES TIPO B

Para la familia de cables de postensado a momento positivo de continuidad tipo B, se emplean 28 cables de 22 torones cada uno en el vano central después de realizar el cierre de dovelas, estos cables que se distribuyen equitativamente sobre la losa inferior, a fin de garantizar la estabilidad de la estructura durante su fase de servicio.

The Loss of tendon group [C37] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
38	I	374.51	9.36	1.03	-28.99	-7.01	0.93
38	J	395.82	12.51	1.03	-29.14	-9.43	0.93
39	I	395.82	12.17	1.03	-31.38	-9.32	0.93
39	J	396.97	13.01	1.03	-31.35	-9.48	0.93
40	I	396.97	13.48	1.03	-37.82	-9.12	0.92
40	J	397.08	14.36	1.04	-38.83	-9.12	0.92
41	I	397.08	13.54	1.03	-37.86	-9.13	0.92
41	J	397.19	14.43	1.04	-39.08	-9.12	0.92
42	I	397.19	12.39	1.03	-30.67	-9.51	0.93
42	J	399.08	13.49	1.03	-33.06	-9.69	0.93
43	I	399.08	13.08	1.03	-29.97	-9.80	0.93
43	J	376.86	10.01	1.03	-29.84	-7.26	0.93

The Loss of tendon group [C38] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
38	I	376.39	9.36	1.02	-28.99	-7.21	0.93
38	J	396.88	12.51	1.03	-29.14	-9.55	0.93
39	I	396.88	12.17	1.03	-31.38	-9.44	0.93
39	J	396.89	13.01	1.03	-31.35	-9.47	0.93
40	I	396.89	13.48	1.03	-37.82	-9.11	0.92
40	J	396.90	14.36	1.04	-38.83	-9.10	0.92
41	I	396.90	13.54	1.03	-37.86	-9.11	0.92
41	J	396.89	14.43	1.04	-39.08	-9.09	0.92
42	I	396.89	12.39	1.03	-30.67	-9.48	0.93
42	J	396.86	13.49	1.03	-33.06	-9.44	0.93
43	I	396.86	13.08	1.03	-29.97	-9.55	0.93
43	J	374.37	10.01	1.03	-29.84	-7.00	0.93
The Loss of tendon group [C39] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
36	I	374.97	6.47	1.02	-25.61	-7.08	0.93
36	J	394.80	9.07	1.02	-23.23	-9.42	0.94
37	I	394.80	9.37	1.02	-24.88	-9.37	0.94
37	J	399.49	10.29	1.03	-21.94	-10.05	0.95
38	I	399.49	11.41	1.03	-28.93	-9.81	0.93
38	J	403.61	12.40	1.03	-29.15	-10.32	0.93
39	I	403.61	12.06	1.03	-31.37	-10.21	0.93
39	J	404.42	13.01	1.03	-31.35	-10.34	0.93
40	I	404.42	13.48	1.03	-37.82	-9.97	0.92
40	J	404.09	14.36	1.04	-38.83	-9.91	0.91
41	I	404.09	13.54	1.03	-37.86	-9.93	0.92
41	J	403.75	14.43	1.04	-39.08	-9.87	0.91
42	I	403.05	12.39	1.03	-30.67	-10.19	0.93

42	J	400.27	13.36	1.03	-33.04	-9.81	0.93
43	I	400.27	12.97	1.03	-29.96	-9.92	0.93
43	J	398.92	12.32	1.03	-30.06	-9.74	0.93
44	I	398.92	11.22	1.03	-23.09	-9.98	0.95
44	J	392.92	10.65	1.03	-26.49	-9.14	0.94
45	I	392.92	10.34	1.03	-24.76	-9.19	0.94
45	J	372.30	7.63	1.02	-27.04	-6.80	0.93

The Loss of tendon group [C40] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
36	I	374.97	6.47	1.02	-25.61	-7.08	0.93
36	J	394.80	9.07	1.02	-23.23	-9.42	0.94
37	I	394.80	9.37	1.02	-24.88	-9.37	0.94
37	J	399.49	10.29	1.03	-21.94	-10.05	0.95
38	I	399.49	11.41	1.03	-28.93	-9.81	0.93
38	J	403.61	12.40	1.03	-29.15	-10.32	0.93
39	I	403.61	12.06	1.03	-31.37	-10.21	0.93
39	J	404.42	13.01	1.03	-31.35	-10.34	0.93
40	I	404.42	13.48	1.03	-37.82	-9.97	0.92
40	J	404.09	14.36	1.04	-38.83	-9.91	0.91
41	I	404.09	13.54	1.03	-37.86	-9.93	0.92
41	J	403.75	14.43	1.04	-39.08	-9.87	0.91
42	I	403.05	12.39	1.03	-30.67	-10.19	0.93
42	J	400.49	13.36	1.03	-33.04	-9.84	0.93
43	I	400.49	12.97	1.03	-29.96	-9.95	0.93
43	J	397.42	12.32	1.03	-30.06	-9.57	0.93
44	I	397.42	11.22	1.03	-23.09	-9.80	0.95
44	J	393.13	10.65	1.03	-26.49	-9.17	0.94
45	I	393.13	10.34	1.03	-24.76	-9.21	0.94
45	J	372.52	7.63	1.02	-27.04	-6.82	0.93

The Loss of tendon group [C41] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	374.52	3.24	1.01	-25.82	-6.95	0.92
34	J	394.18	5.10	1.01	-23.90	-9.19	0.93
35	I	394.18	5.21	1.01	-24.99	-9.16	0.93
35	J	398.25	6.69	1.02	-20.97	-9.82	0.94
36	I	398.25	7.52	1.02	-25.47	-9.67	0.93
36	J	402.38	9.07	1.02	-23.23	-10.29	0.94
37	I	402.38	9.37	1.02	-24.88	-10.24	0.94
37	J	404.38	10.29	1.03	-21.94	-10.62	0.94
38	I	404.38	11.41	1.03	-28.93	-10.38	0.93
38	J	400.30	12.35	1.03	-29.15	-9.93	0.93
39	I	400.30	12.01	1.03	-31.36	-9.83	0.93
39	J	397.87	13.01	1.03	-31.35	-9.58	0.93
40	I	397.87	13.48	1.03	-37.82	-9.22	0.92
40	J	397.54	14.36	1.04	-38.83	-9.17	0.92
41	I	397.54	13.54	1.03	-37.86	-9.18	0.92
41	J	397.21	14.43	1.04	-39.08	-9.12	0.92
42	I	396.99	12.39	1.03	-30.67	-9.49	0.93
42	J	402.13	13.30	1.03	-33.02	-10.03	0.93

43	I	402.13	12.91	1.03	-29.96	-10.14	0.93
43	J	403.86	12.32	1.03	-30.06	-10.32	0.93
44	I	403.86	11.22	1.03	-23.09	-10.56	0.94
44	J	401.29	10.65	1.03	-26.49	-10.10	0.94
45	I	401.29	10.34	1.03	-24.76	-10.15	0.94
45	J	399.92	9.04	1.02	-27.29	-9.84	0.93
46	I	399.92	8.20	1.02	-22.85	-10.00	0.94
46	J	393.48	6.86	1.02	-27.06	-9.06	0.93
47	I	393.48	6.75	1.02	-25.91	-9.10	0.93
47	J	374.49	4.61	1.01	-27.48	-6.93	0.92

The Loss of tendon group [C42] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	374.47	3.24	1.01	-25.82	-6.94	0.92
34	J	394.13	5.10	1.01	-23.90	-9.19	0.93
35	I	394.13	5.21	1.01	-24.99	-9.15	0.93
35	J	398.20	6.69	1.02	-20.97	-9.81	0.94
36	I	398.20	7.52	1.02	-25.47	-9.66	0.93
36	J	402.33	9.07	1.02	-23.23	-10.29	0.94
37	I	402.33	9.37	1.02	-24.88	-10.24	0.94
37	J	404.37	10.29	1.03	-21.94	-10.62	0.94
38	I	404.37	11.41	1.03	-28.93	-10.38	0.93
38	J	400.29	12.35	1.03	-29.15	-9.93	0.93
39	I	400.29	12.01	1.03	-31.36	-9.83	0.93
39	J	397.86	13.01	1.03	-31.35	-9.58	0.93
40	I	397.86	13.48	1.03	-37.82	-9.22	0.92
40	J	397.53	14.36	1.04	-38.83	-9.17	0.92
41	I	397.53	13.54	1.03	-37.86	-9.18	0.92
41	J	398.48	14.43	1.04	-39.08	-9.27	0.91
42	I	398.32	12.39	1.03	-30.67	-9.64	0.93
42	J	402.12	13.30	1.03	-33.02	-10.02	0.93
43	I	402.12	12.91	1.03	-29.96	-10.14	0.93
43	J	403.85	12.32	1.03	-30.06	-10.31	0.93
44	I	403.85	11.22	1.03	-23.09	-10.55	0.94
44	J	401.06	10.65	1.03	-26.49	-10.08	0.94
45	I	401.06	10.34	1.03	-24.76	-10.12	0.94
45	J	399.68	9.04	1.02	-27.29	-9.82	0.93
46	I	399.68	8.20	1.02	-22.85	-9.97	0.94
46	J	393.24	6.86	1.02	-27.06	-9.03	0.93
47	I	393.24	6.75	1.02	-25.91	-9.07	0.93
47	J	374.25	4.61	1.01	-27.48	-6.91	0.92

The Loss of tendon group [C43] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	I	374.47	3.24	1.01	-25.82	-6.94	0.92
34	J	394.12	5.10	1.01	-23.90	-9.18	0.93
35	I	394.12	5.21	1.01	-24.99	-9.15	0.93
35	J	398.20	6.69	1.02	-20.97	-9.81	0.94
36	I	398.20	7.52	1.02	-25.47	-9.66	0.93
36	J	402.33	9.07	1.02	-23.23	-10.29	0.94
37	I	402.33	9.37	1.02	-24.88	-10.24	0.94
37	J	404.37	10.29	1.03	-21.94	-10.62	0.94
38	I	404.37	11.41	1.03	-28.93	-10.38	0.93

The Loss of tendon group [C43] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
38	J	400.29	12.35	1.03	-29.15	-9.93	0.93
39	I	400.29	12.01	1.03	-31.36	-9.83	0.93
39	J	397.86	13.01	1.03	-31.35	-9.58	0.93
40	I	397.86	13.48	1.03	-37.82	-9.22	0.92
40	J	397.54	14.36	1.04	-38.83	-9.17	0.92
41	I	397.54	13.54	1.03	-37.86	-9.18	0.92
41	J	398.49	14.43	1.04	-39.08	-9.27	0.91
42	I	398.30	12.39	1.03	-30.67	-9.64	0.93
42	J	402.11	13.30	1.03	-33.02	-10.02	0.93
43	I	402.11	12.91	1.03	-29.96	-10.14	0.93
43	J	403.89	12.32	1.03	-30.06	-10.32	0.93
44	I	403.89	11.22	1.03	-23.09	-10.56	0.94
44	J	401.15	10.65	1.03	-26.49	-10.09	0.94
45	I	401.15	10.34	1.03	-24.76	-10.13	0.94
45	J	399.78	9.04	1.02	-27.29	-9.83	0.93
46	I	399.78	8.20	1.02	-22.85	-9.98	0.94
46	J	393.33	6.86	1.02	-27.06	-9.04	0.93
47	I	393.33	6.75	1.02	-25.91	-9.08	0.93
47	J	374.34	4.61	1.01	-27.48	-6.92	0.92

The Loss of tendon group [C44] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	I	370.46	0.27	1.00	-24.34	-6.49	0.92
32	J	390.82	1.02	1.00	-22.44	-8.72	0.92
33	I	390.82	1.10	1.00	-23.04	-8.70	0.92
33	J	397.10	2.44	1.01	-19.68	-9.57	0.93
34	I	397.10	3.44	1.01	-26.14	-9.38	0.92
34	J	401.75	5.12	1.01	-23.89	-10.06	0.93
35	I	401.75	5.24	1.01	-24.99	-10.02	0.93
35	J	402.20	6.62	1.02	-21.04	-10.27	0.94
36	I	402.20	7.45	1.02	-25.48	-10.12	0.93
36	J	397.78	8.90	1.02	-23.31	-9.75	0.94
37	I	397.78	9.19	1.02	-24.94	-9.70	0.94
37	J	390.64	10.29	1.03	-21.94	-9.04	0.95
38	I	390.64	11.41	1.03	-28.93	-8.81	0.93
38	J	386.71	12.35	1.03	-29.15	-8.40	0.93
39	I	386.71	12.01	1.03	-31.36	-8.30	0.93
39	J	384.34	13.01	1.03	-31.35	-8.08	0.93
40	I	384.34	13.48	1.04	-37.82	-7.74	0.92
40	J	384.03	14.36	1.04	-38.83	-7.69	0.92
41	I	384.03	13.54	1.04	-37.86	-7.70	0.92
41	J	383.71	14.43	1.04	-39.08	-7.65	0.92
42	I	383.61	12.39	1.03	-30.67	-8.01	0.93
42	J	388.57	13.30	1.03	-33.02	-8.49	0.93
43	I	388.57	12.91	1.03	-29.96	-8.60	0.93
43	J	390.24	12.32	1.03	-30.06	-8.76	0.93
44	I	390.24	11.22	1.03	-23.09	-8.99	0.95
44	J	396.91	10.43	1.03	-26.50	-9.59	0.94
45	I	396.91	10.14	1.03	-24.81	-9.63	0.94
45	J	401.04	8.94	1.02	-27.27	-9.97	0.93
46	I	401.04	8.11	1.02	-22.89	-10.12	0.94
46	J	399.35	6.91	1.02	-27.08	-9.73	0.93
47	I	399.35	6.79	1.02	-25.92	-9.77	0.93

47	J	396.47	5.16	1.01	-28.21	-9.30	0.92
48	I	396.47	4.15	1.01	-21.62	-9.49	0.93
48	J	391.86	2.79	1.01	-25.00	-8.81	0.92
49	I	391.86	2.70	1.01	-24.43	-8.82	0.92
49	J	369.55	1.56	1.00	-25.86	-6.39	0.92

The Loss of tendon group [C45] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	I	370.37	0.27	1.00	-24.34	-6.48	0.92
32	J	390.73	1.02	1.00	-22.44	-8.71	0.92
33	I	390.73	1.10	1.00	-23.04	-8.69	0.92
33	J	397.01	2.44	1.01	-19.68	-9.56	0.93
34	I	397.01	3.44	1.01	-26.14	-9.37	0.92
34	J	401.66	5.12	1.01	-23.89	-10.05	0.93
35	I	401.66	5.24	1.01	-24.99	-10.01	0.93
35	J	402.10	6.62	1.02	-21.04	-10.26	0.94
36	I	402.10	7.45	1.02	-25.48	-10.11	0.93
36	J	397.78	8.90	1.02	-23.31	-9.75	0.94
37	I	397.78	9.19	1.02	-24.94	-9.70	0.94
37	J	390.63	10.29	1.03	-21.94	-9.04	0.95
38	I	390.63	11.41	1.03	-28.93	-8.81	0.93
38	J	386.70	12.35	1.03	-29.15	-8.40	0.93
39	I	386.70	12.01	1.03	-31.36	-8.30	0.93
39	J	384.34	13.01	1.03	-31.35	-8.08	0.93
40	I	384.34	13.48	1.04	-37.82	-7.74	0.92
40	J	384.03	14.36	1.04	-38.83	-7.69	0.92
41	I	384.03	13.54	1.04	-37.86	-7.70	0.92
41	J	385.01	14.43	1.04	-39.08	-7.79	0.92
42	I	384.88	12.39	1.03	-30.67	-8.15	0.93
42	J	388.56	13.30	1.03	-33.02	-8.49	0.93
43	I	388.56	12.91	1.03	-29.96	-8.60	0.93
43	J	390.23	12.32	1.03	-30.06	-8.76	0.93
44	I	390.23	11.22	1.03	-23.09	-8.99	0.95
44	J	396.89	10.43	1.03	-26.50	-9.59	0.94
45	I	396.89	10.14	1.03	-24.81	-9.63	0.94
45	J	401.02	8.94	1.02	-27.27	-9.97	0.93
46	I	401.02	8.11	1.02	-22.89	-10.12	0.94
46	J	399.24	6.91	1.02	-27.08	-9.72	0.93
47	I	399.24	6.79	1.02	-25.92	-9.75	0.93
47	J	396.36	5.16	1.01	-28.21	-9.28	0.92
48	I	396.36	4.15	1.01	-21.62	-9.47	0.93
48	J	391.74	2.79	1.01	-25.00	-8.79	0.92
49	I	391.74	2.70	1.01	-24.43	-8.81	0.92
49	J	369.43	1.56	1.00	-25.86	-6.37	0.92

The Loss of tendon group [C46] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
32	I	370.36	0.27	1.00	-24.34	-6.48	0.92
32	J	390.73	1.02	1.00	-22.44	-8.71	0.92
33	I	390.73	1.10	1.00	-23.04	-8.69	0.92
33	J	397.00	2.44	1.01	-19.68	-9.56	0.93
34	I	397.00	3.44	1.01	-26.14	-9.37	0.92

The Loss of tendon group [C46] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
34	J	401.65	5.12	1.01	-23.89	-10.05	0.93
35	I	401.65	5.24	1.01	-24.99	-10.01	0.93
35	J	402.11	6.62	1.02	-21.04	-10.26	0.94
36	I	402.11	7.45	1.02	-25.48	-10.11	0.93
36	J	397.77	8.90	1.02	-23.31	-9.75	0.94
37	I	397.77	9.19	1.02	-24.94	-9.70	0.94
37	J	390.62	10.29	1.03	-21.94	-9.04	0.95
38	I	390.62	11.41	1.03	-28.93	-8.81	0.93
38	J	386.69	12.35	1.03	-29.15	-8.40	0.93
39	I	386.69	12.01	1.03	-31.36	-8.30	0.93
39	J	384.33	13.01	1.03	-31.35	-8.08	0.93
40	I	384.33	13.48	1.04	-37.82	-7.73	0.92
40	J	384.02	14.36	1.04	-38.83	-7.69	0.92
41	I	384.02	13.54	1.04	-37.86	-7.70	0.92
41	J	385.01	14.43	1.04	-39.08	-7.79	0.92
42	I	384.86	12.39	1.03	-30.67	-8.14	0.93
42	J	388.54	13.30	1.03	-33.02	-8.49	0.93
43	I	388.54	12.91	1.03	-29.96	-8.60	0.93
43	J	390.22	12.32	1.03	-30.06	-8.76	0.93
44	I	390.22	11.22	1.03	-23.09	-8.99	0.95
44	J	396.88	10.43	1.03	-26.50	-9.59	0.94
45	I	396.88	10.14	1.03	-24.81	-9.63	0.94
45	J	401.01	8.94	1.02	-27.27	-9.97	0.93
46	I	401.01	8.11	1.02	-22.89	-10.12	0.94
46	J	399.25	6.91	1.02	-27.08	-9.72	0.93
47	I	399.25	6.79	1.02	-25.92	-9.75	0.93
47	J	396.35	5.16	1.01	-28.21	-9.28	0.92
48	I	396.35	4.15	1.01	-21.62	-9.47	0.93
48	J	391.73	2.79	1.01	-25.00	-8.79	0.92
49	I	391.73	2.70	1.01	-24.43	-8.81	0.92
49	J	369.42	1.56	1.00	-25.86	-6.37	0.92

The Loss of tendon group [C47] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	I	336.20	-1.82	0.99	-20.87	-3.34	0.92
30	J	373.91	-1.99	0.99	-21.20	-6.85	0.92
31	I	373.91	-1.92	0.99	-21.78	-6.84	0.92
31	J	382.79	-1.07	1.00	-19.44	-7.87	0.93
32	I	382.79	-0.29	1.00	-24.98	-7.72	0.91
32	J	372.58	1.02	1.00	-22.44	-6.78	0.92
33	I	372.58	1.10	1.00	-23.04	-6.76	0.92
33	J	367.73	2.44	1.01	-19.68	-6.41	0.94
34	I	367.73	3.44	1.01	-26.14	-6.25	0.92
34	J	363.28	5.12	1.01	-23.89	-5.93	0.93
35	I	363.28	5.24	1.01	-24.99	-5.90	0.93
35	J	360.98	6.62	1.02	-21.04	-5.84	0.94
36	I	360.98	7.45	1.02	-25.48	-5.71	0.93
36	J	356.25	8.90	1.03	-23.31	-5.37	0.94
37	I	356.25	9.19	1.03	-24.94	-5.33	0.94
37	J	350.69	10.29	1.03	-21.94	-4.92	0.95
38	I	350.69	11.41	1.03	-28.93	-4.74	0.94

The Loss of tendon group [C47] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
38	J	346.56	12.35	1.04	-29.15	-4.38	0.94
39	I	346.56	12.01	1.03	-31.36	-4.30	0.93
39	J	345.11	13.01	1.04	-31.35	-4.19	0.93
40	I	345.11	13.48	1.04	-37.82	-3.91	0.92
40	J	345.11	14.36	1.04	-38.83	-3.90	0.92
41	I	345.11	13.54	1.04	-37.86	-3.91	0.92
41	J	346.27	14.43	1.04	-39.08	-3.99	0.92
42	I	345.17	12.39	1.04	-30.67	-4.20	0.93
42	J	348.47	13.30	1.04	-33.02	-4.46	0.93
43	I	348.47	12.91	1.04	-29.96	-4.55	0.94
43	J	350.65	12.32	1.04	-30.06	-4.73	0.94
44	I	350.65	11.22	1.03	-23.09	-4.91	0.95
44	J	356.39	10.43	1.03	-26.50	-5.33	0.94
45	I	356.39	10.14	1.03	-24.81	-5.37	0.94
45	J	360.28	8.94	1.02	-27.27	-5.63	0.93
46	I	360.28	8.11	1.02	-22.89	-5.75	0.94
46	J	364.60	6.91	1.02	-27.08	-6.01	0.93
47	I	364.60	6.79	1.02	-25.92	-6.05	0.93
47	J	367.87	5.16	1.01	-28.21	-6.25	0.92
48	I	367.87	4.15	1.01	-21.62	-6.42	0.94
48	J	371.35	2.79	1.01	-25.00	-6.62	0.92
49	I	371.35	2.70	1.01	-24.43	-6.64	0.92
49	J	383.05	1.41	1.00	-27.01	-7.73	0.91
50	I	383.05	0.62	1.00	-21.40	-7.88	0.93
50	J	380.88	-0.39	1.00	-23.84	-7.54	0.92
51	I	380.88	-0.48	1.00	-23.20	-7.56	0.92
51	J	335.43	-0.80	1.00	-22.16	-3.25	0.92

The Loss of tendon group [C48] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
30	I	345.87	-1.89	0.99	-20.98	-4.18	0.92
30	J	380.38	-2.06	0.99	-21.33	-7.53	0.92
31	I	380.38	-1.99	0.99	-21.92	-7.52	0.92
31	J	388.16	-1.10	1.00	-19.58	-8.45	0.93
32	I	388.16	-0.32	1.00	-25.14	-8.30	0.91
32	J	382.53	1.02	1.00	-22.61	-7.82	0.92
33	I	382.53	1.10	1.00	-23.22	-7.81	0.92
33	J	378.18	2.45	1.01	-19.88	-7.50	0.93
34	I	378.18	3.45	1.01	-26.34	-7.33	0.92
34	J	373.52	5.14	1.01	-24.11	-6.97	0.93
35	I	373.52	5.26	1.01	-25.22	-6.94	0.93
35	J	370.96	6.65	1.02	-21.28	-6.85	0.94
36	I	370.96	7.48	1.02	-25.72	-6.72	0.93
36	J	365.82	8.94	1.02	-23.57	-6.32	0.94
37	I	365.82	9.22	1.03	-25.21	-6.27	0.94
37	J	360.69	10.34	1.03	-22.23	-5.90	0.95
38	I	360.69	11.46	1.03	-29.23	-5.70	0.93
38	J	356.10	12.40	1.03	-29.45	-5.28	0.94
39	I	356.10	12.06	1.03	-31.69	-5.19	0.93
39	J	354.70	13.07	1.04	-31.70	-5.09	0.93
40	I	354.70	13.55	1.04	-38.24	-4.78	0.92
40	J	354.64	14.43	1.04	-39.27	-4.77	0.92
41	I	354.64	13.61	1.04	-38.28	-4.78	0.92

The Loss of tendon group [C48] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
41	J	356.18	14.51	1.04	-39.53	-4.91	0.92
42	I	355.91	12.44	1.04	-31.01	-5.21	0.93
42	J	359.08	13.36	1.04	-33.35	-5.47	0.93
43	I	359.08	12.96	1.04	-30.26	-5.56	0.94
43	J	362.32	12.37	1.03	-30.36	-5.85	0.93
44	I	362.32	11.27	1.03	-23.38	-6.05	0.95
44	J	367.52	10.47	1.03	-26.78	-6.44	0.94
45	I	367.52	10.18	1.03	-25.06	-6.48	0.94
45	J	371.10	8.97	1.02	-27.51	-6.72	0.93
46	I	371.10	8.14	1.02	-23.13	-6.85	0.94
46	J	375.68	6.93	1.02	-27.31	-7.15	0.93
47	I	375.68	6.81	1.02	-26.13	-7.18	0.93
47	J	378.64	5.18	1.01	-28.41	-7.36	0.92
48	I	378.64	4.16	1.01	-21.81	-7.54	0.93
48	J	383.40	2.79	1.01	-25.17	-7.89	0.92
49	I	383.40	2.70	1.01	-24.59	-7.90	0.92
49	J	387.14	1.40	1.00	-27.14	-8.18	0.91
50	I	387.14	0.62	1.00	-21.53	-8.33	0.92
50	J	382.56	-0.40	1.00	-23.94	-7.72	0.92
51	I	382.56	-0.49	1.00	-23.31	-7.74	0.92
51	J	348.39	-0.82	1.00	-22.24	-4.40	0.92

3.5.11.3. FAMILIA DE CABLES TIPO C

Para la familia de cables de postensado a momento positivo de continuidad tipo C, se emplean 8 cables de 15 torones cada uno por cada estribo, que se distribuyen equitativamente sobre la losa inferior, a fin de garantizar la estabilidad de la estructura y anclaje con la viga cabezal de los estribos.

The Loss of tendon group [C49] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.36	1.00	-9.59	-6.74	0.94
2	I	250.96	1.07	1.00	-17.27	-4.25	0.92
2	J	257.04	2.43	1.01	-18.86	-4.88	0.92
3	I	257.04	2.56	1.01	-16.77	-4.96	0.93
3	J	259.00	3.29	1.01	-17.34	-5.20	0.93
4	I	259.00	3.26	1.01	-16.13	-5.24	0.93
4	J	260.68	3.62	1.01	-17.30	-5.42	0.93
5	I	260.68	3.53	1.01	-16.05	-5.45	0.93
5	J	262.38	3.51	1.01	-17.44	-5.60	0.93
6	I	262.38	3.40	1.01	-16.88	-5.63	0.93
6	J	262.59	3.13	1.01	-18.40	-5.60	0.92
7	I	262.59	3.09	1.01	-17.52	-5.63	0.92
7	J	261.72	2.64	1.01	-18.90	-5.48	0.92
8	I	261.72	2.54	1.01	-17.80	-5.51	0.92
8	J	255.95	1.87	1.01	-18.08	-4.86	0.92

The Loss of tendon group [C50] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.37	1.00	-9.59	-6.74	0.94
2	I	250.96	1.07	1.00	-17.27	-4.25	0.92
2	J	257.04	2.43	1.01	-18.85	-4.88	0.92
3	I	257.04	2.57	1.01	-16.76	-4.96	0.93
3	J	259.00	3.29	1.01	-17.33	-5.20	0.93
4	I	259.00	3.27	1.01	-16.12	-5.24	0.93
4	J	260.68	3.63	1.01	-17.29	-5.42	0.93
5	I	260.68	3.54	1.01	-16.05	-5.45	0.93
5	J	262.38	3.52	1.01	-17.43	-5.60	0.93
6	I	262.38	3.42	1.01	-16.88	-5.63	0.93
6	J	262.59	3.14	1.01	-18.40	-5.60	0.92
7	I	262.59	3.11	1.01	-17.51	-5.63	0.92
7	J	261.72	2.65	1.01	-18.89	-5.48	0.92
8	I	261.72	2.55	1.01	-17.80	-5.51	0.92
8	J	255.95	1.87	1.01	-18.08	-4.86	0.92

The Loss of tendon group [C51] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.37	1.00	-9.59	-6.74	0.94
2	I	250.96	1.08	1.00	-17.27	-4.25	0.92
2	J	257.04	2.44	1.01	-18.85	-4.88	0.92
3	I	257.04	2.57	1.01	-16.76	-4.96	0.93
3	J	259.00	3.30	1.01	-17.33	-5.20	0.93
4	I	259.00	3.28	1.01	-16.12	-5.24	0.93
4	J	260.68	3.64	1.01	-17.29	-5.42	0.93
5	I	260.68	3.55	1.01	-16.04	-5.45	0.93
5	J	262.38	3.54	1.01	-17.43	-5.60	0.93
6	I	262.38	3.43	1.01	-16.87	-5.63	0.93
6	J	262.59	3.15	1.01	-18.39	-5.60	0.92
7	I	262.59	3.12	1.01	-17.51	-5.63	0.92
7	J	261.72	2.66	1.01	-18.89	-5.48	0.92
8	I	261.72	2.56	1.01	-17.80	-5.51	0.92
8	J	255.95	1.88	1.01	-18.08	-4.86	0.92

The Loss of tendon group [C52] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.36	1.00	-9.59	-6.74	0.94
2	I	250.96	1.07	1.00	-17.27	-4.25	0.92
2	J	257.04	2.42	1.01	-18.86	-4.88	0.92
3	I	257.04	2.55	1.01	-16.77	-4.96	0.93
3	J	259.00	3.28	1.01	-17.35	-5.20	0.93
4	I	259.00	3.26	1.01	-16.14	-5.24	0.93
4	J	260.68	3.61	1.01	-17.31	-5.42	0.93
5	I	260.68	3.51	1.01	-16.06	-5.45	0.93
5	J	262.38	3.50	1.01	-17.44	-5.60	0.93
6	I	262.38	3.39	1.01	-16.89	-5.63	0.93
6	J	262.59	3.12	1.01	-18.41	-5.60	0.92

7	I	262.59	3.08	1.01	-17.52	-5.63	0.92
7	J	261.72	2.63	1.01	-18.90	-5.48	0.92
8	I	261.72	2.53	1.01	-17.80	-5.51	0.92
8	J	255.95	1.86	1.01	-18.08	-4.86	0.92

The Loss of tendon group [C53] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.36	1.00	-9.60	-6.74	0.94
2	I	250.96	1.06	1.00	-17.28	-4.25	0.92
2	J	257.04	2.39	1.01	-18.88	-4.88	0.92
3	I	257.04	2.53	1.01	-16.79	-4.96	0.93
3	J	259.00	3.24	1.01	-17.37	-5.20	0.93
4	I	259.00	3.22	1.01	-16.16	-5.24	0.93
4	J	260.68	3.56	1.01	-17.34	-5.42	0.93
5	I	260.68	3.47	1.01	-16.09	-5.45	0.93
5	J	262.38	3.45	1.01	-17.47	-5.60	0.93
6	I	262.38	3.34	1.01	-16.91	-5.63	0.93
6	J	262.59	3.07	1.01	-18.42	-5.60	0.92
7	I	262.59	3.04	1.01	-17.54	-5.63	0.92
7	J	261.72	2.59	1.01	-18.91	-5.48	0.92
8	I	261.72	2.49	1.01	-17.82	-5.51	0.92
8	J	255.95	1.83	1.01	-18.07	-4.86	0.92

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.37	1.00	-9.59	-6.74	0.94
2	I	250.96	1.08	1.00	-17.26	-4.25	0.92
2	J	257.04	2.46	1.01	-18.83	-4.89	0.92
3	I	257.04	2.60	1.01	-16.74	-4.96	0.93
3	J	259.00	3.34	1.01	-17.30	-5.20	0.93
4	I	259.00	3.32	1.01	-16.09	-5.25	0.93
4	J	260.68	3.69	1.01	-17.26	-5.42	0.93
5	I	260.68	3.59	1.01	-16.02	-5.45	0.93
5	J	262.38	3.58	1.01	-17.40	-5.60	0.93
6	I	262.38	3.47	1.01	-16.84	-5.63	0.93
6	J	262.59	3.20	1.01	-18.37	-5.60	0.92
7	I	262.59	3.16	1.01	-17.49	-5.63	0.92
7	J	261.72	2.70	1.01	-18.88	-5.48	0.92
8	I	261.72	2.60	1.01	-17.78	-5.51	0.92
8	J	255.95	1.91	1.01	-18.09	-4.86	0.92
The Loss of tendon group [C55] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.37	1.00	-9.58	-6.74	0.94
2	I	250.96	1.08	1.00	-17.26	-4.25	0.92
2	J	257.04	2.47	1.01	-18.82	-4.89	0.92
3	I	257.04	2.60	1.01	-16.73	-4.96	0.93
3	J	259.00	3.35	1.01	-17.29	-5.20	0.93
4	I	259.00	3.33	1.01	-16.08	-5.25	0.93

4	J	260.68	3.70	1.01	-17.25	-5.42	0.93
5	I	260.68	3.60	1.01	-16.01	-5.45	0.93
5	J	262.38	3.60	1.01	-17.40	-5.60	0.93
6	I	262.38	3.49	1.01	-16.84	-5.63	0.93
6	J	262.59	3.21	1.01	-18.37	-5.60	0.92
7	I	262.59	3.17	1.01	-17.48	-5.63	0.92
7	J	261.72	2.71	1.01	-18.88	-5.48	0.92
8	I	261.72	2.61	1.01	-17.78	-5.51	0.92
8	J	255.95	1.92	1.01	-18.09	-4.86	0.92

The Loss of tendon group [C56] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
1	I	272.02	0.16	1.00	-8.51	-6.74	0.94
1	J	272.28	0.36	1.00	-9.60	-6.74	0.94
2	I	250.96	1.06	1.00	-17.28	-4.25	0.92
2	J	257.04	2.39	1.01	-18.89	-4.88	0.92
3	I	257.04	2.52	1.01	-16.79	-4.96	0.93
3	J	259.00	3.23	1.01	-17.38	-5.20	0.93
4	I	259.00	3.21	1.01	-16.17	-5.24	0.93
4	J	260.68	3.55	1.01	-17.34	-5.41	0.93
5	I	260.68	3.46	1.01	-16.09	-5.45	0.93
5	J	262.38	3.44	1.01	-17.47	-5.60	0.93
6	I	262.38	3.33	1.01	-16.92	-5.63	0.93
6	J	262.59	3.06	1.01	-18.43	-5.60	0.92
7	I	262.59	3.03	1.01	-17.54	-5.63	0.92
7	J	261.72	2.58	1.01	-18.91	-5.48	0.92
8	I	261.72	2.48	1.01	-17.82	-5.51	0.92
8	J	255.95	1.82	1.01	-18.07	-4.86	0.92
The Loss of tendon group [C57] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.36	2.13	1.01	-17.78	-3.62	0.92
73	J	257.70	3.19	1.01	-18.82	-5.07	0.92
74	I	257.70	3.30	1.01	-19.67	-5.05	0.92
74	J	260.55	3.74	1.01	-18.24	-5.41	0.92
75	I	260.55	3.80	1.01	-19.18	-5.38	0.92
75	J	262.47	4.01	1.02	-17.57	-5.64	0.93
76	I	262.47	4.14	1.02	-18.17	-5.60	0.93
76	J	265.42	4.04	1.02	-16.68	-5.96	0.93
77	I	265.42	4.16	1.02	-17.97	-5.93	0.93
77	J	264.07	3.65	1.01	-16.62	-5.79	0.93
78	I	264.07	3.68	1.01	-17.85	-5.74	0.92
78	J	261.07	2.79	1.01	-17.06	-5.39	0.92
79	I	261.07	2.52	1.01	-18.68	-5.32	0.92
79	J	234.19	1.17	1.01	-16.97	-2.68	0.92
80	I	234.19	0.36	1.00	-9.17	-2.83	0.95
80	J	233.92	0.16	1.00	-8.32	-2.83	0.95

The Loss of tendon group [C58] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.49	2.15	1.01	-17.78	-3.63	0.92
73	J	257.82	3.20	1.01	-18.82	-5.08	0.92
74	I	257.82	3.31	1.01	-19.66	-5.06	0.92
74	J	260.67	3.76	1.01	-18.23	-5.42	0.92
75	I	260.67	3.81	1.01	-19.17	-5.39	0.92
75	J	262.59	4.03	1.02	-17.56	-5.65	0.93
76	I	262.59	4.16	1.02	-18.16	-5.62	0.93
76	J	265.54	4.05	1.02	-16.67	-5.98	0.93
77	I	265.54	4.17	1.02	-17.96	-5.94	0.93
77	J	264.13	3.66	1.01	-16.60	-5.79	0.93
78	I	264.13	3.69	1.01	-17.84	-5.75	0.92
78	J	261.13	2.80	1.01	-17.04	-5.39	0.92
79	I	261.13	2.53	1.01	-18.66	-5.32	0.92
79	J	234.36	1.17	1.01	-16.97	-2.70	0.92
80	I	234.36	0.36	1.00	-9.18	-2.85	0.95
80	J	234.10	0.16	1.00	-8.32	-2.85	0.95
The Loss of tendon group [C59] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.63	2.16	1.01	-17.78	-3.64	0.92
73	J	257.94	3.22	1.01	-18.81	-5.10	0.92
74	I	257.94	3.33	1.01	-19.65	-5.07	0.92
74	J	260.80	3.77	1.01	-18.22	-5.43	0.92
75	I	260.80	3.83	1.01	-19.16	-5.41	0.92
75	J	262.72	4.04	1.02	-17.55	-5.66	0.93
76	I	262.72	4.17	1.02	-18.15	-5.63	0.93
76	J	265.66	4.07	1.02	-16.66	-5.99	0.93
77	I	265.66	4.18	1.02	-17.94	-5.96	0.93
77	J	264.23	3.67	1.01	-16.59	-5.81	0.93
78	I	264.23	3.70	1.01	-17.83	-5.76	0.92
78	J	261.23	2.80	1.01	-17.02	-5.41	0.92
79	I	261.23	2.53	1.01	-18.64	-5.34	0.92
79	J	234.59	1.17	1.01	-16.98	-2.72	0.92
80	I	234.59	0.36	1.00	-9.18	-2.87	0.95
80	J	234.32	0.16	1.00	-8.33	-2.87	0.95

The Loss of tendon group [C60] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	243.23	2.12	1.01	-17.78	-3.60	0.92
73	J	257.59	3.18	1.01	-18.83	-5.06	0.92
74	I	257.59	3.29	1.01	-19.67	-5.04	0.92
74	J	260.44	3.73	1.01	-18.25	-5.39	0.92
75	I	260.44	3.78	1.01	-19.18	-5.37	0.92

75	J	262.35	4.00	1.02	-17.58	-5.62	0.93
76	I	262.35	4.13	1.02	-18.18	-5.59	0.93
76	J	265.30	4.03	1.02	-16.69	-5.95	0.93
77	I	265.30	4.14	1.02	-17.98	-5.91	0.93
77	J	263.92	3.64	1.01	-16.63	-5.77	0.93
78	I	263.92	3.67	1.01	-17.86	-5.72	0.92
78	J	260.91	2.79	1.01	-17.09	-5.37	0.92
79	I	260.91	2.51	1.01	-18.70	-5.30	0.92
79	J	233.91	1.16	1.01	-16.96	-2.66	0.92
80	I	233.91	0.36	1.00	-9.17	-2.81	0.95
80	J	233.65	0.16	1.00	-8.32	-2.81	0.95

The Loss of tendon group [C61] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	242.68	2.07	1.01	-17.78	-3.55	0.92
73	J	257.11	3.12	1.01	-18.85	-5.01	0.92
74	I	257.11	3.23	1.01	-19.70	-4.98	0.92
74	J	259.93	3.67	1.01	-18.28	-5.34	0.92
75	I	259.93	3.72	1.01	-19.21	-5.31	0.92
75	J	261.84	3.94	1.02	-17.62	-5.56	0.93
76	I	261.84	4.07	1.02	-18.22	-5.53	0.92
76	J	264.82	3.98	1.02	-16.74	-5.89	0.93
77	I	264.82	4.09	1.02	-18.03	-5.86	0.93
77	J	263.35	3.60	1.01	-16.68	-5.70	0.93
78	I	263.35	3.63	1.01	-17.91	-5.66	0.92
78	J	260.33	2.77	1.01	-17.18	-5.30	0.92
79	I	260.33	2.49	1.01	-18.78	-5.23	0.92
79	J	232.83	1.15	1.01	-16.94	-2.56	0.92
80	I	232.83	0.35	1.00	-9.15	-2.71	0.95
80	J	232.58	0.16	1.00	-8.32	-2.71	0.95

The Loss of tendon group [C62] at the stage of [CS22]

Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	244.15	2.21	1.01	-17.77	-3.69	0.92
73	J	258.39	3.27	1.01	-18.79	-5.15	0.92
74	I	258.39	3.38	1.01	-19.63	-5.12	0.92
74	J	261.27	3.83	1.01	-18.18	-5.49	0.92
75	I	261.27	3.88	1.01	-19.13	-5.46	0.92
75	J	263.20	4.10	1.02	-17.50	-5.72	0.93
76	I	263.20	4.23	1.02	-18.11	-5.69	0.93
76	J	264.30	4.12	1.02	-16.61	-5.84	0.93
77	I	264.30	4.24	1.02	-17.89	-5.81	0.93
77	J	262.33	3.72	1.01	-16.54	-5.60	0.93
78	I	262.33	3.75	1.01	-17.77	-5.55	0.93
78	J	259.35	2.83	1.01	-16.92	-5.21	0.93
79	I	259.35	2.56	1.01	-18.56	-5.14	0.92
79	J	250.47	1.18	1.00	-17.00	-4.22	0.92
80	I	250.47	0.37	1.00	-9.19	-4.39	0.95
80	J	232.91	0.17	1.00	-8.34	-2.74	0.95

The Loss of tendon group [C63] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	244.27	2.22	1.01	-17.77	-3.70	0.92
73	J	258.50	3.29	1.01	-18.78	-5.16	0.92
74	I	258.50	3.40	1.01	-19.62	-5.13	0.92
74	J	261.39	3.84	1.01	-18.17	-5.50	0.92
75	I	261.39	3.90	1.01	-19.12	-5.47	0.92
75	J	263.32	4.11	1.02	-17.49	-5.73	0.93
76	I	263.32	4.24	1.02	-18.10	-5.70	0.93
76	J	264.40	4.13	1.02	-16.60	-5.85	0.93
77	I	264.40	4.25	1.02	-17.88	-5.82	0.93
77	J	262.43	3.73	1.01	-16.53	-5.61	0.93
78	I	262.43	3.76	1.01	-17.76	-5.57	0.93
78	J	259.46	2.83	1.01	-16.90	-5.22	0.93
79	I	259.46	2.56	1.01	-18.55	-5.15	0.92
79	J	250.58	1.18	1.00	-17.00	-4.23	0.92
80	I	250.58	0.37	1.00	-9.20	-4.40	0.95
80	J	233.12	0.17	1.00	-8.34	-2.76	0.95

The Loss of tendon group [C64] at the stage of [CS22]							
Elem	Part	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
73	I	242.54	2.06	1.01	-17.78	-3.54	0.92
73	J	256.98	3.11	1.01	-18.86	-4.99	0.92
74	I	256.98	3.22	1.01	-19.70	-4.97	0.92
74	J	259.80	3.66	1.01	-18.29	-5.32	0.92
75	I	259.80	3.71	1.01	-19.22	-5.30	0.92
75	J	261.71	3.93	1.02	-17.63	-5.55	0.93
76	I	261.71	4.05	1.02	-18.23	-5.52	0.92
76	J	264.69	3.96	1.02	-16.75	-5.88	0.93
77	I	264.69	4.08	1.02	-18.05	-5.84	0.93
77	J	263.20	3.59	1.01	-16.69	-5.69	0.93
78	I	263.20	3.62	1.01	-17.93	-5.64	0.92
78	J	260.18	2.76	1.01	-17.20	-5.29	0.92
79	I	260.18	2.48	1.01	-18.80	-5.22	0.92
79	J	232.55	1.15	1.00	-16.93	-2.54	0.92
80	I	232.55	0.35	1.00	-9.15	-2.69	0.95
80	J	232.30	0.16	1.00	-8.32	-2.69	0.95

3.5.12. **ALARGAMIENTO DE CABLES DE POSTENSADO**

Se calcularán los alargamientos en los cables luego del tensionamiento, para el cálculo de alargamientos se consideran únicamente las pérdidas instantáneas, utilizando la expresión:

$$\delta = \frac{P * L}{A * E}$$

Tendon Name	Tendon Elongation		Element Elongation		Summation	
	Begin (mm)	End (mm)	Begin (mm)	End (mm)	Begin (mm)	End (mm)
C1-P1-D	66.16	0.00	0.04	0.00	66.20	0.00
C1-P1-I	0.00	67.43	0.00	0.04	0.00	67.47
C1-P2-D	67.83	0.00	0.04	0.00	67.87	0.00
C1-P2-I	0.00	67.56	0.00	0.04	0.00	67.60
C2-P1-D	0.00	65.68	0.00	0.04	0.00	65.72
C2-P1-I	67.92	0.00	0.04	0.00	67.96	0.00
C2-P2-D	0.00	65.60	0.00	0.04	0.00	65.64
C2-P2-I	68.07	0.00	0.04	0.00	68.12	0.00
C3-P1-D	116.90	0.00	0.08	0.00	116.98	0.00
C3-P1-I	0.00	118.89	0.00	0.08	0.00	118.97
C3-P2-D	118.00	0.00	0.08	0.00	118.08	0.00
C3-P2-I	0.00	118.76	0.00	0.08	0.00	118.84
C4-P1-D	71.32	46.53	0.05	0.03	71.37	46.56
C4-P1-I	75.21	46.95	0.05	0.03	75.25	46.98
C4-P2-D	72.08	46.51	0.05	0.03	72.13	46.54
C4-P2-I	75.04	47.03	0.05	0.03	75.09	47.06
C5-P1-D	67.71	105.34	0.05	0.07	67.76	105.41
C5-P1-I	100.80	74.40	0.07	0.05	100.87	74.45
C5-P2-D	62.55	110.29	0.05	0.07	62.60	110.37
C5-P2-I	100.94	74.41	0.07	0.05	101.00	74.46
C6-P1-D	98.58	72.72	0.07	0.05	98.65	72.77
C6-P1-I	60.70	115.95	0.04	0.08	60.75	116.03
C6-P2-D	98.20	72.87	0.07	0.05	98.27	72.92
C6-P2-I	63.76	113.04	0.05	0.07	63.81	113.11
C7-P1-D	126.25	99.08	0.09	0.07	126.33	99.15
C7-P1-I	128.19	101.50	0.09	0.07	128.27	101.57
C7-P2-D	125.87	99.18	0.09	0.07	125.96	99.25
C7-P2-I	128.19	101.37	0.09	0.07	128.27	101.44
C8-P1-D	125.81	98.55	0.09	0.07	125.90	98.63
C8-P1-I	128.62	102.02	0.09	0.07	128.71	102.09
C8-P2-D	125.02	98.67	0.09	0.07	125.11	98.74
C8-P2-I	128.66	101.87	0.09	0.07	128.75	101.94
C9-P1-D	146.78	122.16	0.11	0.09	146.89	122.25
C9-P1-I	150.58	124.38	0.11	0.09	150.69	124.48
C9-P2-D	147.57	122.05	0.11	0.09	147.68	122.14
C9-P2-I	150.15	124.20	0.11	0.09	150.26	124.29
C10-P1-D	145.18	121.18	0.11	0.09	145.29	121.27
C10-P1-I	151.83	124.98	0.11	0.09	151.94	125.07
C10-P2-D	146.45	121.08	0.11	0.09	146.56	121.17
C10-P2-I	151.16	124.85	0.11	0.09	151.26	124.94
C11-P1-D	169.20	150.76	0.13	0.12	169.33	150.88
C11-P1-I	159.15	166.20	0.12	0.12	159.27	166.32
C11-P2-D	158.97	160.12	0.12	0.12	159.09	160.24
C11-P2-I	162.34	163.33	0.12	0.12	162.46	163.45
C12-P1-D	170.92	146.93	0.13	0.11	171.05	147.05
C12-P1-I	158.25	169.12	0.12	0.12	158.36	169.24
C12-P2-D	158.37	158.81	0.12	0.12	158.49	158.93
C12-P2-I	164.01	163.75	0.12	0.12	164.13	163.87
C13-P1-D	196.60	171.71	0.15	0.14	196.76	171.85
C13-P1-I	199.92	175.66	0.15	0.14	200.07	175.80
C13-P2-D	198.27	171.72	0.15	0.14	198.42	171.85

Tendon Name	Tendon Elongation		Element Elongation		Summation	
	Begin (mm)	End (mm)	Begin (mm)	End (mm)	Begin (mm)	End (mm)
C13-P2-I	199.53	175.86	0.15	0.14	199.68	176.00
C14-P1-D	188.26	176.04	0.15	0.14	188.41	176.17
C14-P1-I	203.83	176.20	0.15	0.14	203.98	176.33
C14-P2-D	195.08	171.03	0.15	0.14	195.23	171.17
C14-P2-I	202.91	176.44	0.15	0.14	203.06	176.57
C15-P1-D	183.74	248.63	0.16	0.19	183.89	248.82
C15-P1-I	230.49	205.77	0.18	0.17	230.67	205.94
C15-P2-D	176.39	255.42	0.15	0.20	176.54	255.62
C15-P2-I	230.53	205.78	0.18	0.17	230.71	205.95
C16-P1-D	225.38	200.53	0.18	0.17	225.56	200.70
C16-P1-I	177.32	265.54	0.15	0.20	177.47	265.74
C16-P2-D	224.48	200.66	0.18	0.17	224.66	200.83
C16-P2-I	182.61	260.40	0.15	0.20	182.76	260.60
C17-P1-D	259.12	232.84	0.21	0.20	259.34	233.04
C17-P1-I	261.80	237.40	0.21	0.20	262.01	237.59
C17-P2-D	259.68	232.78	0.21	0.20	259.90	232.98
C17-P2-I	261.49	237.54	0.21	0.20	261.70	237.74
C18-P1-D	255.53	231.52	0.21	0.20	255.75	231.71
C18-P1-I	265.16	239.00	0.21	0.20	265.37	239.19
C18-P2-D	255.23	231.30	0.21	0.20	255.44	231.50
C18-P2-I	266.18	238.90	0.21	0.20	266.39	239.10
C19-P1-D	259.62	282.79	0.23	0.24	259.85	283.03
C19-P1-I	286.10	260.64	0.24	0.22	286.34	260.87
C19-P2-D	233.49	307.41	0.21	0.25	233.70	307.67
C19-P2-I	285.36	260.86	0.24	0.22	285.60	261.09
C20-P1-D	280.25	253.69	0.24	0.22	280.49	253.91
C20-P1-I	251.59	303.71	0.22	0.25	251.81	303.96
C20-P2-D	277.57	254.04	0.24	0.22	277.81	254.26
C20-P2-I	241.35	314.18	0.21	0.25	241.57	314.43
C21-P1-D	305.73	279.53	0.27	0.25	306.00	279.79
C21-P1-I	309.06	284.30	0.27	0.25	309.33	284.55
C21-P2-D	305.28	279.64	0.27	0.25	305.55	279.90
C21-P2-I	307.31	284.65	0.27	0.25	307.57	284.90
C22-P1-D	303.73	276.23	0.27	0.25	303.99	276.48
C22-P1-I	311.60	287.62	0.27	0.25	311.87	287.88
C22-P2-D	299.33	276.71	0.27	0.25	299.59	276.96
C22-P2-I	313.50	287.49	0.27	0.25	313.77	287.74
C23-P1-D	327.95	305.45	0.29	0.28	328.24	305.74
C23-P1-I	331.45	305.24	0.29	0.28	331.74	305.52
C23-P2-D	282.30	346.01	0.27	0.30	282.57	346.31
C23-P2-I	327.49	305.19	0.29	0.28	327.78	305.46
C24-P1-D	339.70	282.66	0.30	0.27	340.01	282.93
C24-P1-I	333.55	314.26	0.29	0.28	333.85	314.54
C24-P2-D	318.74	296.69	0.29	0.28	319.03	296.96
C24-P2-I	291.06	354.53	0.27	0.31	291.33	354.84
C25-P1-D	365.07	306.76	0.33	0.30	365.40	307.06
C25-P1-I	352.83	325.27	0.32	0.31	353.15	325.58
C25-P2-D	346.22	321.45	0.32	0.30	346.54	321.76
C25-P2-I	347.65	326.33	0.32	0.31	347.97	326.64
C26-P1-D	371.94	291.80	0.34	0.29	372.28	292.09
C26-P1-I	355.65	330.61	0.32	0.31	355.97	330.91

Tendon Name	Tendon Elongation		Element Elongation		Summation	
	Begin (mm)	End (mm)	Begin (mm)	End (mm)	Begin (mm)	End (mm)
C26-P2-D	338.08	316.80	0.32	0.30	338.40	317.10
C26-P2-I	356.09	330.89	0.32	0.31	356.42	331.19
C27-P1-D	370.30	345.22	0.35	0.34	370.65	345.56
C27-P1-I	400.09	317.50	0.36	0.32	400.45	317.81
C27-P2-D	325.96	380.83	0.32	0.35	326.28	381.18
C27-P2-I	366.12	344.75	0.35	0.33	366.47	345.08
C28-P1-D	416.81	285.48	0.38	0.30	417.19	285.78
C28-P1-I	375.63	354.68	0.35	0.34	375.98	355.02
C28-P2-D	354.36	334.71	0.34	0.33	354.71	335.04
C28-P2-I	336.63	391.21	0.33	0.35	336.96	391.56
C29-P1-D	439.32	310.16	0.40	0.33	439.73	310.48
C29-P1-I	430.09	324.99	0.40	0.34	430.49	325.33
C29-P2-D	382.78	359.43	0.37	0.35	383.15	359.78
C29-P2-I	384.35	363.70	0.37	0.35	384.72	364.05
C30-P1-D	435.68	303.36	0.40	0.33	436.09	303.68
C30-P1-I	421.29	344.31	0.39	0.34	421.67	344.65
C30-P2-D	373.35	352.72	0.37	0.35	373.71	353.07
C30-P2-I	394.08	370.34	0.37	0.36	394.45	370.70
C31-P1-D	436.54	354.41	0.41	0.37	436.95	354.78
C31-P1-I	459.38	332.46	0.43	0.35	459.81	332.81
C31-P2-D	369.49	409.40	0.38	0.40	369.87	409.80
C31-P2-I	400.48	380.60	0.39	0.38	400.88	380.98
C32-P1-D	454.70	320.84	0.43	0.35	455.13	321.19
C32-P1-I	414.68	392.95	0.40	0.39	415.08	393.34
C32-P2-D	387.64	369.17	0.39	0.37	388.03	369.54
C32-P2-I	376.59	425.74	0.38	0.40	376.97	426.14
C33-P1-D	476.52	345.74	0.45	0.37	476.97	346.12
C33-P1-I	476.97	349.33	0.45	0.38	477.42	349.71
C33-P2-D	363.36	460.30	0.39	0.44	363.74	460.75
C33-P2-I	417.11	397.82	0.42	0.40	417.53	398.22
C34-P1-D	472.43	336.82	0.45	0.37	472.88	337.19
C34-P1-I	481.05	358.28	0.45	0.38	481.50	358.66
C34-P2-D	384.39	401.23	0.40	0.41	384.79	401.63
C34-P2-I	346.58	460.66	0.37	0.48	346.95	461.14
C37A	150.61	0.00	0.20	0.00	150.81	0.00
C37D	150.44	0.00	0.20	0.00	150.65	0.00
C37I	0.00	149.74	0.00	0.20	0.00	149.94
C38D	150.28	0.00	0.20	0.00	150.48	0.00
C38I	0.00	149.92	0.00	0.20	0.00	150.12
C39D	152.25	133.41	0.20	0.17	152.45	133.58
C39I	152.67	134.15	0.20	0.17	152.87	134.33
C40D	152.11	133.17	0.20	0.17	152.31	133.34
C40I	152.83	134.44	0.20	0.17	153.03	134.62
C41D	216.00	199.13	0.27	0.25	216.27	199.38
C41I	217.30	201.05	0.27	0.25	217.58	201.30
C42D	215.69	198.83	0.27	0.25	215.96	199.09
C42I	215.42	203.39	0.27	0.25	215.69	203.64
C43D	215.44	198.56	0.27	0.25	215.71	198.81
C43I	215.72	203.68	0.27	0.25	215.99	203.93
C44D	276.50	260.37	0.34	0.31	276.84	260.68
C44I	278.63	263.72	0.34	0.31	278.97	264.04

Tendon Name	Tendon Elongation		Element Elongation		Summation	
	Begin (mm)	End (mm)	Begin (mm)	End (mm)	Begin (mm)	End (mm)
C45D	276.12	259.92	0.34	0.31	276.45	260.23
C45I	277.28	265.75	0.33	0.32	277.61	266.06
C46D	275.73	259.48	0.34	0.31	276.06	259.79
C46I	277.68	266.15	0.33	0.32	278.02	266.46
C47AD	314.45	293.21	0.36	0.33	314.82	293.55
C47AI	291.26	324.56	0.32	0.37	291.59	324.93
C47D	318.26	297.22	0.37	0.34	318.63	297.56
C47I	293.08	332.17	0.33	0.38	293.40	332.56
C48AD	319.67	311.75	0.37	0.36	320.04	312.11
C48AI	308.26	336.89	0.34	0.38	308.61	337.27
C48BD	320.00	296.42	0.37	0.34	320.37	296.76
C48BI	315.17	316.91	0.36	0.36	315.53	317.27
C48D	320.70	302.27	0.37	0.35	321.07	302.62
C48I	289.49	344.36	0.32	0.40	289.81	344.76
C49	232.68	0.00	0.19	0.00	232.87	0.00
C50	232.68	0.00	0.19	0.00	232.87	0.00
C51	232.68	0.00	0.19	0.00	232.87	0.00
C52	232.68	0.00	0.19	0.00	232.87	0.00
C53	232.68	0.00	0.19	0.00	232.87	0.00
C54	232.68	0.00	0.19	0.00	232.87	0.00
C55	232.68	0.00	0.19	0.00	232.87	0.00
C56	232.68	0.00	0.19	0.00	232.87	0.00
C57	0.00	230.17	0.00	0.19	0.00	230.36
C58	0.00	230.95	0.00	0.19	0.00	231.13
C59	0.00	231.33	0.00	0.19	0.00	231.52
C60	0.00	229.68	0.00	0.19	0.00	229.87
C61	0.00	227.85	0.00	0.19	0.00	228.03
C62	0.00	232.48	0.00	0.19	0.00	232.66
C63	0.00	232.85	0.00	0.19	0.00	233.04
C64	0.00	227.38	0.00	0.19	0.00	227.57

3.5.13. **REVISIÓN DE CAPACIDAD A FLEXIÓN, CORTANTE Y TORSIÓN**

Se verifica la sección crítica en la dovela de cierre, es decir en el centro de la luz del vano 2 y en la dovela 0 sobre la pila de los apoyos intermedios

La dovela 0 de estudio corresponde al elemento 20.
La dovela de cierre de estudio corresponde al elemento 40

Se revisa la capacidad del puente teniendo en cuenta la resistencia a flexión de los cables de postensado, la capacidad del puente se tomó como:

$$\emptyset M_n = \emptyset * A_{ps} * F_{ps} * \left(d_p - \frac{a_p}{2}\right)$$

Donde:

$\boldsymbol{A_{ps}}$ Área de acero presforzado.

$\boldsymbol{f_{ps}}$ Tensiones efectivas de presfuerzo, calculadas según el 5.7.3.2.2)

$\boldsymbol{d_p}$ Profundidad efectiva de presforzado, distancia desde la fibra extrema a compresión al centroide del acero de presfuerzo, debe evaluarse si la sección está sometida a un momento positivo o negativo.

a Profundidad del bloque de compresión del concreto, calculada como $a_p = \beta * C_p$

Siendo C la distancia del eje neutro a la fibra extrema a compresión.

$$C_p = \frac{A_{ps} * f_{pu} + A_s * fs - A's * f's}{0.85 * f'c * \beta * b + k * A_{ps} * \frac{f_{pu}}{d_p}}$$

1. Design Condition

Design Code	Element	Node(I/J)
AASHTO-LRFD2016	20	J

■ Section Properties

- Gross section

H	8000.000	(mm)	A_g	2.208E+07	(mm^2)	S_t	5.271E+10	(mm^3)
B	14200.000	(mm)	I_y	2.123E+14	(mm^4)	S_b	5.345E+10	(mm^3)
C_{zp}	4027.925	(mm)						
C_{zm}	3972.075	(mm)						

- Transformed section

H	8000.000	(mm)	A_g	2.390E+07	(mm^2)	S_t	6.129E+10	(mm^3)
B	14200.000	(mm)	I_y	2.344E+14	(mm^4)	S_b	5.614E+10	(mm^3)
C_{zp}	3824.601	(mm)						
C_{zm}	4175.399	(mm)						

■ Materials

- Concrete

f'_c (MPa)	E_c (MPa)	$f_r=0.20\sqrt{f'_c}$ (MPa)	β_1
45.000	32094.6	3.523	0.724

* β_1 is 0.85 in lower f'c 4ksi, the others are 0.85-0.05(f'c-4.0)≥0.65

- Prestressing steel Information

No.	Tendon Name	Bond Type	d_p (mm)	A_{ps} (mm^2)	Strength (MPa)		E_p (MPa)
					f_{py}	f_{pu}	
1	S_C7-P1-I	Bond	425.0	3051.4	1676.9	1863.3	196500.6
2	S_C9-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
3	S_C25-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
4	S_C25-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
5	S_C2-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
6	S_C15-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
7	S_C15-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
8	S_C5-P1-I	Bond	275.0	3051.4	1676.9	1863.3	196500.6
9	S_C8-P1-I	Bond	425.0	3051.4	1676.9	1863.3	196500.6
10	S_C33-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
11	S_C33-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
12	S_C30-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
13	S_C30-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
14	S_C23-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
15	S_C23-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6

16	S_C20-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
17	S_C20-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
18	S_C13-P1-I	Bond	425.0	3051.4	1676.9	1863.3	196500.6
19	S_C13-P1-D	Bond	425.0	3051.4	1676.9	1863.3	196500.6
20	S_C10-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
21	S_C10-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
22	S_C1-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
23	S_C6-P1-D	Bond	275.0	3051.4	1676.9	1863.3	196500.6
24	S_C34-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
25	S_C34-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
26	S_C31-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
27	S_C31-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
28	S_C3-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
29	S_C24-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
30	S_C24-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
31	S_C21-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
32	S_C21-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
33	S_C14-P1-I	Bond	425.0	3051.4	1676.9	1863.3	196500.6
34	S_C14-P1-D	Bond	425.0	3051.4	1676.9	1863.3	196500.6
35	S_C11-P1-I	Bond	275.0	3051.4	1676.9	1863.3	196500.6
36	S_C11-P1-D	Bond	275.0	3051.4	1676.9	1863.3	196500.6
37	S_C2-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
38	S_C5-P1-D	Bond	275.0	3051.4	1676.9	1863.3	196500.6
39	S_C32-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
40	S_C32-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
41	S_C22-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
42	S_C22-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
43	S_C12-P1-I	Bond	275.0	3051.4	1676.9	1863.3	196500.6
44	S_C12-P1-D	Bond	275.0	3051.4	1676.9	1863.3	196500.6
45	S_C6-P1-I	Bond	275.0	3051.4	1676.9	1863.3	196500.6
46	S_C4-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
47	S_C3-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
48	S_C1-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
49	S_C8-P1-D	Bond	425.0	3051.4	1676.9	1863.3	196500.6
50	S_C27-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
51	S_C27-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
52	S_C17-P1-I	Bond	275.0	3051.4	1676.9	1863.3	196500.6
53	S_C17-P1-D	Bond	275.0	3051.4	1676.9	1863.3	196500.6
54	S_C4-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
55	S_C9-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
56	S_C7-P1-D	Bond	425.0	3051.4	1676.9	1863.3	196500.6
57	S_C26-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6

58	S_C26-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
59	S_C16-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
60	S_C16-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
61	S_C29-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
62	S_C29-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
63	S_C28-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
64	S_C28-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
65	S_C19-P1-I	Bond	125.0	3051.4	1676.9	1863.3	196500.6
66	S_C19-P1-D	Bond	125.0	3051.4	1676.9	1863.3	196500.6
67	S_C18-P1-I	Bond	275.0	3051.4	1676.9	1863.3	196500.6
68	S_C18-P1-D	Bond	275.0	3051.4	1676.9	1863.3	196500.6

* d_p is Distance from extreme compression fiber to centroid of prestressing tendon.

- Longitudinal non prestressed steel reinforcement Information.

E_s (MPa)	f_y (MPa)	Bottom for Flexure		Top for Flexure		Torsion
		d_s (mm)	A_s (mm^2)	d'_s (mm)	A'_s (mm^2)	A_l (mm^2)
199948.0	413.7	4920.1	86709.5	112.7	55741.8	136257.8

* d_s or d'_s is Distance from extreme compression fiber to centroid of non prestressing reinforcement.

- Tranverse non prestressed steel reinforcement Information.

E_s (MPa)	f_y (MPa)	α (deg.)	Shear		Torsion	
			A_v (mm^2)	s (mm)	A_t (mm^2)	s_t (mm)
199948.0	413.7	90.0	2038.7	100.0	2038.7	100.0

* α is angle between longitudinal and stirrup.

■ Sectional forces/stresses due to effective prestress

No.	Tendon Name	Bond Type	e_p (mm)	$A_{ps}f_{e(z\text{-}dir)}$ (kN)	$A_{ps}f_{e(x\text{-}dir)}$ (kN)	$A_{ps}f_{e(x\text{-}dir)}e_p$ (kN·m)
1	S_C7-P1-I	Bond	3399.6	0.00	3654.56	-12424.04
2	S_C9-P1-I	Bond	3699.6	0.00	3586.33	-13267.99
3	S_C25-P1-I	Bond	3699.6	0.00	3130.71	-11582.36
4	S_C25-P1-D	Bond	3699.6	0.00	3138.08	-11609.63
5	S_C2-P1-I	Bond	3699.6	0.00	3468.35	-12831.52
6	S_C15-P1-I	Bond	3699.6	0.00	3507.24	-12975.39
7	S_C15-P1-D	Bond	3699.6	0.00	3539.38	-13094.30
8	S_C5-P1-I	Bond	3549.6	0.00	3572.18	-12679.83
9	S_C8-P1-I	Bond	3399.6	0.00	3652.31	-12416.41
10	S_C33-P1-I	Bond	3699.6	0.00	2833.31	-10482.12
11	S_C33-P1-D	Bond	3699.6	0.00	2836.60	-10494.30
12	S_C30-P1-I	Bond	3699.6	0.00	2961.62	-10956.82

13	S_C30-P1-D	Bond	3699.6	0.00	2989.25	-11059.03
14	S_C23-P1-I	Bond	3699.6	0.00	3214.20	-11891.24
15	S_C23-P1-D	Bond	3699.6	0.00	3222.59	-11922.30
16	S_C20-P1-I	Bond	3699.6	0.00	3404.25	-12594.38
17	S_C20-P1-D	Bond	3699.6	0.00	3409.25	-12612.85
18	S_C13-P1-I	Bond	3399.6	0.00	3538.74	-12030.32
19	S_C13-P1-D	Bond	3399.6	0.00	3558.00	-12095.77
20	S_C10-P1-I	Bond	3699.6	0.00	3587.09	-13270.80
21	S_C10-P1-D	Bond	3699.6	0.00	3572.99	-13218.62
22	S_C1-P1-D	Bond	3699.6	0.00	3475.48	-12857.88
23	S_C6-P1-D	Bond	3549.6	0.00	3594.09	-12757.59
24	S_C34-P1-I	Bond	3699.6	0.00	2820.16	-10433.45
25	S_C34-P1-D	Bond	3699.6	0.00	2849.75	-10542.95
26	S_C31-P1-I	Bond	3699.6	0.00	2897.94	-10721.21
27	S_C31-P1-D	Bond	3699.6	0.00	2902.25	-10737.17
28	S_C3-P1-I	Bond	3699.6	0.00	3558.82	-13166.22
29	S_C24-P1-I	Bond	3699.6	0.00	3206.05	-11861.12
30	S_C24-P1-D	Bond	3699.6	0.00	3230.72	-11952.38
31	S_C21-P1-I	Bond	3699.6	0.00	3300.93	-12212.13
32	S_C21-P1-D	Bond	3699.6	0.00	3310.36	-12247.01
33	S_C14-P1-I	Bond	3399.6	0.00	3571.91	-12143.06
34	S_C14-P1-D	Bond	3399.6	0.00	3529.70	-11999.56
35	S_C11-P1-I	Bond	3549.6	0.00	3553.45	-12613.32
36	S_C11-P1-D	Bond	3549.6	0.00	3563.38	-12648.59
37	S_C2-P1-D	Bond	3699.6	0.00	3480.79	-12877.54
38	S_C5-P1-D	Bond	3549.6	0.00	3600.18	-12779.20
39	S_C32-P1-I	Bond	3699.6	0.00	2885.78	-10676.24
40	S_C32-P1-D	Bond	3699.6	0.00	2914.40	-10782.12
41	S_C22-P1-I	Bond	3699.6	0.00	3293.80	-12185.76
42	S_C22-P1-D	Bond	3699.6	0.00	3317.49	-12273.38
43	S_C12-P1-I	Bond	3549.6	0.00	3550.81	-12603.96
44	S_C12-P1-D	Bond	3549.6	0.00	3567.28	-12662.41
45	S_C6-P1-I	Bond	3549.6	0.00	3577.63	-12699.16
46	S_C4-P1-D	Bond	3699.6	0.00	3470.88	-12840.88
47	S_C3-P1-D	Bond	3699.6	0.00	3554.37	-13149.76
48	S_C1-P1-I	Bond	3699.6	0.00	3475.24	-12857.00
49	S_C8-P1-D	Bond	3399.6	0.00	3662.33	-12450.44
50	S_C27-P1-I	Bond	3699.6	0.00	3050.30	-11284.88
51	S_C27-P1-D	Bond	3699.6	0.00	3056.64	-11308.36
52	S_C17-P1-I	Bond	3549.6	0.00	3494.19	-12402.97
53	S_C17-P1-D	Bond	3549.6	0.00	3513.37	-12471.06
54	S_C4-P1-I	Bond	3699.6	0.00	3455.00	-12782.12

55	S_C9-P1-D	Bond	3699.6	0.00	3575.51	-13227.96
56	S_C7-P1-D	Bond	3399.6	0.00	3660.02	-12442.62
57	S_C26-P1-I	Bond	3699.6	0.00	3121.56	-11548.52
58	S_C26-P1-D	Bond	3699.6	0.00	3147.22	-11643.46
59	S_C16-P1-I	Bond	3699.6	0.00	3532.38	-13068.39
60	S_C16-P1-D	Bond	3699.6	0.00	3521.97	-13029.87
61	S_C29-P1-I	Bond	3699.6	0.00	2972.78	-10998.10
62	S_C29-P1-D	Bond	3699.6	0.00	2978.11	-11017.82
63	S_C28-P1-I	Bond	3699.6	0.00	3040.14	-11247.32
64	S_C28-P1-D	Bond	3699.6	0.00	3066.79	-11345.92
65	S_C19-P1-I	Bond	3699.6	0.00	3394.80	-12559.41
66	S_C19-P1-D	Bond	3699.6	0.00	3409.19	-12612.64
67	S_C18-P1-I	Bond	3549.6	0.00	3507.95	-12451.83
68	S_C18-P1-D	Bond	3549.6	0.00	3501.40	-12428.58
			Σ	0.00	227092.36	-825113.38

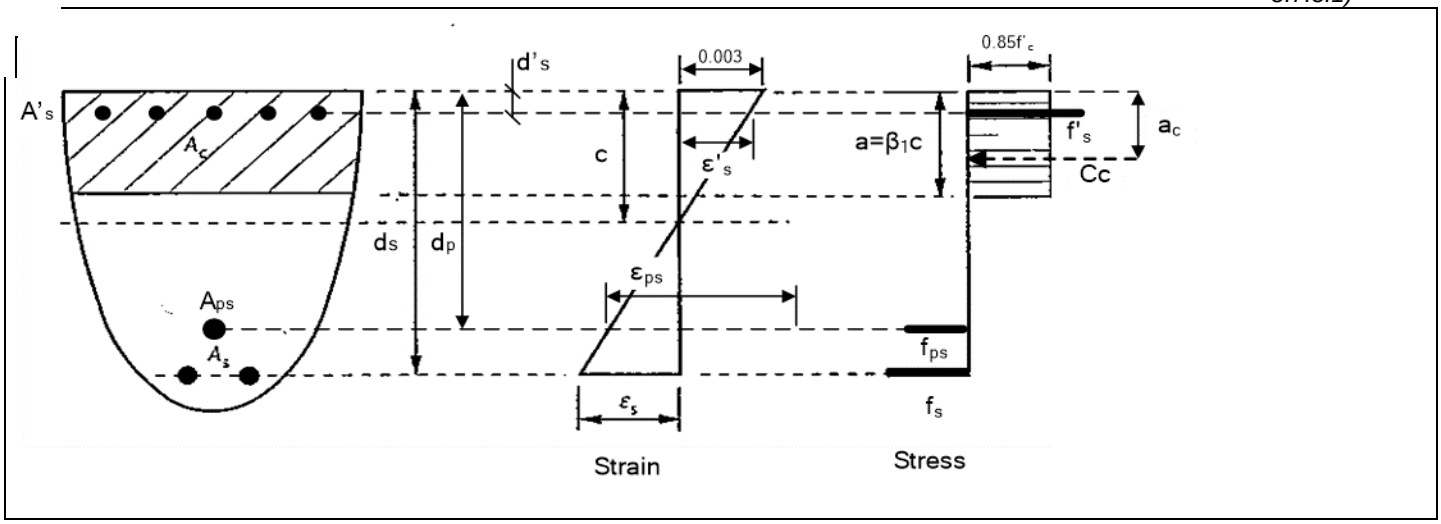
* e_p is Distance from centroid of section to centroid of tendon

2.Flexure design for a section

■ **Moment Direction :** **Positive**

- Method of Calculation : Code
- The maximum Strength Limit Load Combination : cLCB3
- The maximum factored moment (M_u) : 0.000 (kN·m)

1) Depth of neutral axis to compression face (c). *(see. 5.7.3.1)*



Axial force in concrete (compressive zone)					
c	$a=\beta_1 c$	A_c	a_c	$C_c=0.85f'_cA_c$ (kN)	$C_c(c-a_c)$ (kN·m)
365.967	264.837	3760691.54	132.42	143846.45	33595.06

Axial force in reinforcement steels

tensile zone		compressive zone	
$T_s=A_sf_s$ (kN)	$\Sigma A_sf_s(d_s-c)$	$C_s=A'_sf'_s$ (kN)	$\Sigma A'_sf'_s(c-d'_s)$ (kN·m)
35340.80	160946.24	18000.30	4559.23

No.	Axial force in tendons(Bond) by Code				
	Tendon Name	k	f_{ps} (MPa)	$T_{ps}=A_{ps}f_{ps}$ (kN)	$A_{ps}f_{ps}(d_p-c)$ (kN·m)
1	S_C7-P1-I	0.280	1414.02	4314.73	254.71
2	S_C9-P1-I	0.280	335.82	1024.73	-246.93
3	S_C25-P1-I	0.280	335.82	1024.73	-246.93
4	S_C25-P1-D	0.280	335.82	1024.73	-246.93
5	S_C2-P1-I	0.280	335.82	1024.73	-246.93
6	S_C15-P1-I	0.280	335.82	1024.73	-246.93
7	S_C15-P1-D	0.280	335.82	1024.73	-246.93
8	S_C5-P1-I	0.280	1168.97	3567.00	-324.48
9	S_C8-P1-I	0.280	1414.02	4314.73	254.71
10	S_C33-P1-I	0.280	335.82	1024.73	-246.93
11	S_C33-P1-D	0.280	335.82	1024.73	-246.93
12	S_C30-P1-I	0.280	335.82	1024.73	-246.93
13	S_C30-P1-D	0.280	335.82	1024.73	-246.93
14	S_C23-P1-I	0.280	335.82	1024.73	-246.93
15	S_C23-P1-D	0.280	335.82	1024.73	-246.93
16	S_C20-P1-I	0.280	335.82	1024.73	-246.93
17	S_C20-P1-D	0.280	335.82	1024.73	-246.93
18	S_C13-P1-I	0.280	1414.02	4314.73	254.71
19	S_C13-P1-D	0.280	1414.02	4314.73	254.71
20	S_C10-P1-I	0.280	335.82	1024.73	-246.93
21	S_C10-P1-D	0.280	335.82	1024.73	-246.93
22	S_C1-P1-D	0.280	335.82	1024.73	-246.93
23	S_C6-P1-D	0.280	1168.97	3567.00	-324.48
24	S_C34-P1-I	0.280	335.82	1024.73	-246.93
25	S_C34-P1-D	0.280	335.82	1024.73	-246.93
26	S_C31-P1-I	0.280	335.82	1024.73	-246.93
27	S_C31-P1-D	0.280	335.82	1024.73	-246.93
28	S_C3-P1-I	0.280	335.82	1024.73	-246.93
29	S_C24-P1-I	0.280	335.82	1024.73	-246.93
30	S_C24-P1-D	0.280	335.82	1024.73	-246.93
31	S_C21-P1-I	0.280	335.82	1024.73	-246.93
32	S_C21-P1-D	0.280	335.82	1024.73	-246.93
33	S_C14-P1-I	0.280	1414.02	4314.73	254.71
34	S_C14-P1-D	0.280	1414.02	4314.73	254.71
35	S_C11-P1-I	0.280	1168.97	3567.00	-324.48
36	S_C11-P1-D	0.280	1168.97	3567.00	-324.48

37	S_C2-P1-D	0.280	335.82	1024.73	-246.93
38	S_C5-P1-D	0.280	1168.97	3567.00	-324.48
39	S_C32-P1-I	0.280	335.82	1024.73	-246.93
40	S_C32-P1-D	0.280	335.82	1024.73	-246.93
41	S_C22-P1-I	0.280	335.82	1024.73	-246.93
42	S_C22-P1-D	0.280	335.82	1024.73	-246.93
43	S_C12-P1-I	0.280	1168.97	3567.00	-324.48
44	S_C12-P1-D	0.280	1168.97	3567.00	-324.48
45	S_C6-P1-I	0.280	1168.97	3567.00	-324.48
46	S_C4-P1-D	0.280	335.82	1024.73	-246.93
47	S_C3-P1-D	0.280	335.82	1024.73	-246.93
48	S_C1-P1-I	0.280	335.82	1024.73	-246.93
49	S_C8-P1-D	0.280	1414.02	4314.73	254.71
50	S_C27-P1-I	0.280	335.82	1024.73	-246.93
51	S_C27-P1-D	0.280	335.82	1024.73	-246.93
52	S_C17-P1-I	0.280	1168.97	3567.00	-324.48
53	S_C17-P1-D	0.280	1168.97	3567.00	-324.48
54	S_C4-P1-I	0.280	335.82	1024.73	-246.93
55	S_C9-P1-D	0.280	335.82	1024.73	-246.93
56	S_C7-P1-D	0.280	1414.02	4314.73	254.71
57	S_C26-P1-I	0.280	335.82	1024.73	-246.93
58	S_C26-P1-D	0.280	335.82	1024.73	-246.93
59	S_C16-P1-I	0.280	335.82	1024.73	-246.93
60	S_C16-P1-D	0.280	335.82	1024.73	-246.93
61	S_C29-P1-I	0.280	335.82	1024.73	-246.93
62	S_C29-P1-D	0.280	335.82	1024.73	-246.93
63	S_C28-P1-I	0.280	335.82	1024.73	-246.93
64	S_C28-P1-D	0.280	335.82	1024.73	-246.93
65	S_C19-P1-I	0.280	335.82	1024.73	-246.93
66	S_C19-P1-D	0.280	335.82	1024.73	-246.93
67	S_C18-P1-I	0.280	1168.97	3567.00	-324.48
68	S_C18-P1-D	0.280	1168.97	3567.00	-324.48
			Σ	126509.11	-13708.54

* f_{ps} = $f_{pu}(1-k\ c/d_p)$ k = $2(1.04-f_{py}/f_{pu})$

c (mm)	Compression Force (kN)		Tensile Force (kN)		Tolerance (C/T)
	C_c	C_s	T_s	T_{ps}	
365.967	143846.45	18000.30	35340.80	126509.11	0.99998

2) Flexural resistance

▪ Nominal resistance(Mn). *(see. 5.7.3.2)*

M_n = $\Sigma A_s f_s(d_s-c)+\Sigma A_{ps} f_{ps}(d_p-c)+C_c(c-a_c)+\Sigma A'_s f'_s(c-d'_s)$ = 185392.00 (kN·m)

▪ Resistance factor(Φ).

d_t = 7950.0 (mm)

ε_t = $0.003(d_t/c-1)$ = 0.06217 : Net tensile strain in the extreme tension steel

∴ Φ = 1.00 : Tension Controlled Range, $0.005 \leq \varepsilon_t$

▪ Factored resistance($M_r = \Phi M_n$)

M_r = 185392.00 (kN·m) ≥ M_u = 0.00 (kN·m) **OK**

3) Minimum reinforcement

▪ Judgement *(see. 5.7.3.3.2)*

M_r = 185392.00 (kN·m) ≥ $1.33M_u$ = 0.00 (kN·m)

∴ No check.

■ **Moment Direction :** **Negative**

- Method of Calculation : Code
- The maximum Strength Limit Load Combination : cLCB5
- The maximum factored moment (M_u) : -1574323.022 (kN·m)

1) Depth of neutral axis to compression face (c). *(see. 5.7.3.1)*

Axial force in concrete (compressive zone)					
c	$a=\beta_1 c$	A_c	a_c	$C_c=0.85f'_cA_c$ (kN)	$C_c(c-a_c)$ (kN·m)
3281.250	2374.526	9435931.69	750.50	360924.39	913407.72

Axial force in reinforcement steels			
tensile zone		compressive zone	
$T_s=A_sf_s$ (kN)	$\Sigma A_sf_s(d_s-c)$	$C_s=A'_sf'_s$ (kN)	$\Sigma A'_sf'_s(c-d'_s)$ (kN·m)
35132.06	138107.04	15379.58	37321.79

No.	Axial force in tendons(Bond) by Code				
	Tendon Name	k	f_{ps} (MPa)	$T_{ps}=A_{ps}f_{ps}$ (kN)	$A_{ps}f_{ps}(d_p-c)$ (kN·m)
1	S_C7-P1-I	0.280	1637.27	4995.98	21451.48
2	S_C9-P1-I	0.280	1645.88	5022.25	23070.95
3	S_C25-P1-I	0.280	1645.88	5022.25	23070.95
4	S_C25-P1-D	0.280	1645.88	5022.25	23070.95
5	S_C2-P1-I	0.280	1645.88	5022.25	23070.95
6	S_C15-P1-I	0.280	1645.88	5022.25	23070.95
7	S_C15-P1-D	0.280	1645.88	5022.25	23070.95
8	S_C5-P1-I	0.280	1641.66	5009.37	22260.37
9	S_C8-P1-I	0.280	1637.27	4995.98	21451.48
10	S_C33-P1-I	0.280	1645.88	5022.25	23070.95

11	S_C33-P1-D	0.280	1645.88	5022.25	23070.95
12	S_C30-P1-I	0.280	1645.88	5022.25	23070.95
13	S_C30-P1-D	0.280	1645.88	5022.25	23070.95
14	S_C23-P1-I	0.280	1645.88	5022.25	23070.95
15	S_C23-P1-D	0.280	1645.88	5022.25	23070.95
16	S_C20-P1-I	0.280	1645.88	5022.25	23070.95
17	S_C20-P1-D	0.280	1645.88	5022.25	23070.95
18	S_C13-P1-I	0.280	1637.27	4995.98	21451.48
19	S_C13-P1-D	0.280	1637.27	4995.98	21451.48
20	S_C10-P1-I	0.280	1645.88	5022.25	23070.95
21	S_C10-P1-D	0.280	1645.88	5022.25	23070.95
22	S_C1-P1-D	0.280	1645.88	5022.25	23070.95
23	S_C6-P1-D	0.280	1641.66	5009.37	22260.37
24	S_C34-P1-I	0.280	1645.88	5022.25	23070.95
25	S_C34-P1-D	0.280	1645.88	5022.25	23070.95
26	S_C31-P1-I	0.280	1645.88	5022.25	23070.95
27	S_C31-P1-D	0.280	1645.88	5022.25	23070.95
28	S_C3-P1-I	0.280	1645.88	5022.25	23070.95
29	S_C24-P1-I	0.280	1645.88	5022.25	23070.95
30	S_C24-P1-D	0.280	1645.88	5022.25	23070.95
31	S_C21-P1-I	0.280	1645.88	5022.25	23070.95
32	S_C21-P1-D	0.280	1645.88	5022.25	23070.95
33	S_C14-P1-I	0.280	1637.27	4995.98	21451.48
34	S_C14-P1-D	0.280	1637.27	4995.98	21451.48
35	S_C11-P1-I	0.280	1641.66	5009.37	22260.37
36	S_C11-P1-D	0.280	1641.66	5009.37	22260.37
37	S_C2-P1-D	0.280	1645.88	5022.25	23070.95
38	S_C5-P1-D	0.280	1641.66	5009.37	22260.37
39	S_C32-P1-I	0.280	1645.88	5022.25	23070.95
40	S_C32-P1-D	0.280	1645.88	5022.25	23070.95
41	S_C22-P1-I	0.280	1645.88	5022.25	23070.95
42	S_C22-P1-D	0.280	1645.88	5022.25	23070.95
43	S_C12-P1-I	0.280	1641.66	5009.37	22260.37
44	S_C12-P1-D	0.280	1641.66	5009.37	22260.37
45	S_C6-P1-I	0.280	1641.66	5009.37	22260.37
46	S_C4-P1-D	0.280	1645.88	5022.25	23070.95
47	S_C3-P1-D	0.280	1645.88	5022.25	23070.95
48	S_C1-P1-I	0.280	1645.88	5022.25	23070.95
49	S_C8-P1-D	0.280	1637.27	4995.98	21451.48
50	S_C27-P1-I	0.280	1645.88	5022.25	23070.95
51	S_C27-P1-D	0.280	1645.88	5022.25	23070.95
52	S_C17-P1-I	0.280	1641.66	5009.37	22260.37

53	S_C17-P1-D	0.280	1641.66	5009.37	22260.37
54	S_C4-P1-I	0.280	1645.88	5022.25	23070.95
55	S_C9-P1-D	0.280	1645.88	5022.25	23070.95
56	S_C7-P1-D	0.280	1637.27	4995.98	21451.48
57	S_C26-P1-I	0.280	1645.88	5022.25	23070.95
58	S_C26-P1-D	0.280	1645.88	5022.25	23070.95
59	S_C16-P1-I	0.280	1645.88	5022.25	23070.95
60	S_C16-P1-D	0.280	1645.88	5022.25	23070.95
61	S_C29-P1-I	0.280	1645.88	5022.25	23070.95
62	S_C29-P1-D	0.280	1645.88	5022.25	23070.95
63	S_C28-P1-I	0.280	1645.88	5022.25	23070.95
64	S_C28-P1-D	0.280	1645.88	5022.25	23070.95
65	S_C19-P1-I	0.280	1645.88	5022.25	23070.95
66	S_C19-P1-D	0.280	1645.88	5022.25	23070.95
67	S_C18-P1-I	0.280	1641.66	5009.37	22260.37
68	S_C18-P1-D	0.280	1641.66	5009.37	22260.37
			Σ	341148.05	1546141.67

* f_{ps} = $f_{pu}(1-k\,c/d_p)$ k = $2(1.04-f_{py}/f_{pu})$

c (mm)	Compression Force (kN)		Tensile Force (kN)		Tolerance (C/T)
	C_c	C_s	T_s	T_{ps}	
3281.250	360924.39	15379.58	35132.06	341148.05	1.00006

2) Flexural resistance

▪ Nominal resistance(Mn). *(see. 5.7.3.2)*

$M_n = \Sigma A_s f_s(d_s-c)+\Sigma A_{ps} f_{ps}(d_p-c)+C_c(c-a_c)+\Sigma A'_s f'_s(c-d'_s)$ = 2634978.22 (kN·m)

▪ Resistance factor(Φ).

d_t = 7950.0 (mm)

$\varepsilon_t = 0.003(d_t/c-1)$ = 0.00427 : Net tensile strain in the extreme tension steel

∴ $\Phi = 0.583+0.25(d_t/c-1)$ = 0.94 : Transition Range 0.002< ε_t <0.005

▪ Factored resistance($M_r = \Phi M_n$)

M_r = 2474364.94 (kN·m) ≥ M_u = -1574323.02 (kN·m) **OK**

3) Minimum reinforcement

▪ Judgement *(see. 5.7.3.3.2)*

M_r = 2474364.94 (kN·m) ≥ $1.33M_u$ = -2093849.62 (kN·m)

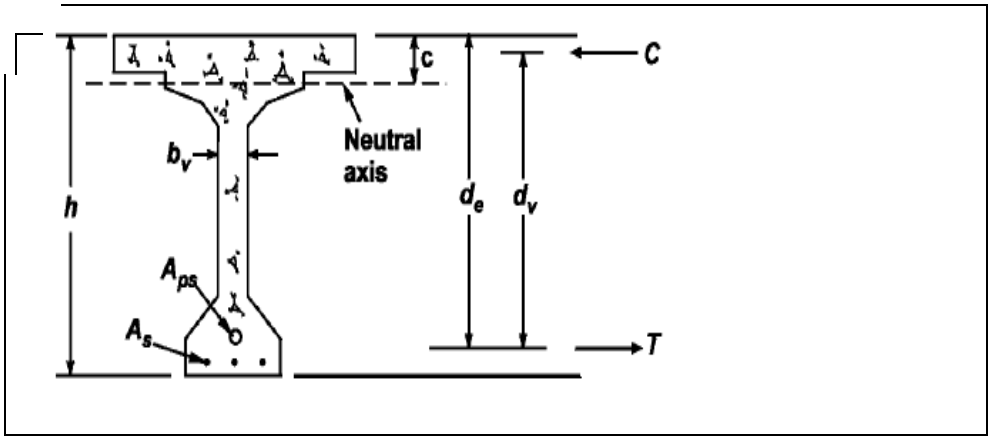
∴ No check.

3.Shear design for a section

■ **Maximum Shear**

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB5
- The factored Shear force : V_u = 51327.24 (kN)
- Factored moment : M_u = -1574323.02 (kN·m)
- Factored axial force : N_u = 6133.65 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 0.00 (kN)

1) Effective depth



b_v = 1200.0 (mm) : Effective web width

$$d_e = \frac{A_{ps}f_{ps}d_p + A_sf_sd_s}{A_{ps}f_{ps}+A_sf_s} = 7757.3 \text{ (mm)}$$: Effective depth for Bending

$$d_v = \text{Max}\left[\frac{M_n}{A_{ps}f_{ps}+A_sf_s},\ 0.9d_e,\ 0.72h\right]$$: Effective depth for shear

= Max [7002.7 , 6981.6 , 5760.0]

= 7002.704 (mm)

d'_v = max[0.8h, D_t] = Max [6400.0 , 7813.2]

= 7813.2 (mm) : Effective depth for shear for Segmental Box

* D_t : The distance from the extreme compression fiber to the centroid of the prestressing reinforcement

2) Maximum spacing for transverse reinforcement (s_{max})

▪ Shear stress on concrete (v_u).

$$v_u = \frac{|V_u - \Phi V_p|}{\Phi b_v d_v} = 6.79 \text{ (MPa)}$$ *(Eq. 5.8.2.9-1)*

▪ Maximum spacing for transverse reinforcement (s_{max})

v_u = 6.79 (MPa) ≥ $0.19\cdot\sqrt{f'_c}$ = 3.35 (MPa)

∴ s_{max} = Min[0.4d'$_v$, 18.0(mm)] = 457.2 (mm) *(Eq. 5.8.6.6-2)*

$\therefore \quad s = 100.0 \text{ (mm)} \leq s_{max}$ **OK**

3) Minimum required transverse reinforcement ($A_{v,min}$)

$$A_{v,min} = 0.05 \frac{b_v s}{f_y} = 100.0 \text{ (mm}^2\text{)} \qquad \textit{(Eq. 5.8.2.5-2)}$$

$\therefore \quad A_v = 2038.706 \text{ (mm}^2\text{)} \geq A_{v,min}$ * Defining "OK" or "NG" will be checked in checking Shear resistance by transverse reinforcement

4) Stress Variable (K)

$$f_{tc} = \left| -4.21 \right| \text{ (MPa)} > 0.19 \cdot \sqrt{f'_c} = 3.35 \text{ (MPa)} \quad \text{(- : tensile stress)}$$

$$\therefore \quad K = \text{Min} \left[\left(1 + \frac{f_{pc}}{0.0632 \cdot \sqrt{f'_c}} \right)^{(1/2)}, 1.0 \right] \qquad \textit{(Eq. 5.8.6.3-3)}$$

$$= \text{Min} [3.16 , 1.0] = 1.00$$

where,

f_{tc} = The stress in the extreme tension fiber due to factored load and effective prestress after losses

f_{pc} = *unfactored compressive stress in concrete due to effective prestress only.*

$$= \frac{\Sigma A_{ps} \cdot f_{e(x\text{-}dir)}}{A_g} + \frac{\Sigma A_{ps} \cdot f_{e(x\text{-}dir)} \cdot e_p \cdot y_{joint}}{I_y} - \frac{N_u}{A_g} = 10.01 \text{ (MPa)}$$

5) Component of shear resisted by tensile stresses in concrete (V_c)

▪ Nominal shear resistance provide by concrete

$$V_c = 0.0632K \sqrt{f'_c}\, b_v\, d'_v = 10437.47 \text{ (kN)} \qquad \textit{(Eq. 5.8.6.5-3)}$$

6) Component of shear resisted by transverse reinforcement (V_s)

▪ Area of transverse reinforcement required *(See 5.8.2.4)*

$0.5\Phi(V_c+V_p)$	$\Phi(V_c+V_p)$	V_u
4696.86 kN	9393.72 kN	51327.24 kN

$V_u \geq 0.5\Phi(V_c+V_p)$

$$A_{v,req1} = \frac{\{ V_u - \Phi(V_c+V_p) \} \cdot s}{\Phi \cdot f_y \cdot d_v (\sin\alpha + \cos\alpha)} = 1608.4 \text{ (mm}^2\text{)}$$

where, $s = 100.0$ (mm), $\alpha = 90.0$ (deg.)

$A_{v,req2} = A_{v,min} = 100.0 \text{ (mm}^2\text{)}$

$A_{v,req} = \max [A_{v,req1} , A_{v,req2}] = 1608.4 \text{ (mm}^2\text{)}$

$A_v = 2038.7 \text{ (mm}^2\text{)} \geq A_{v,req}$ **OK**

▪ Component of shear resisted by transverse reinforcement (V_s)

$$V_s = \frac{A_v \cdot f_y \cdot d'_v (\sin\alpha + \cos\alpha)}{s} = 65895.50 \text{ (kN)} \qquad \textit{(Eq. 5.8.6.5-4)}$$

where, $\alpha = 90.000$ (deg.)

7) Shear resistance.

▪ Nominal shear strength *(Eq. 5.8.6.5.-1)*

$V_c + V_s + V_p =$ 76332.97 (kN) > $0.379 \cdot \sqrt{f'_c} b_v d'_v + V_p =$ 62591.76 (kN)

∴ $V_n = 0.379 \cdot \sqrt{f'_c} b_v d'_v + V_p =$ 62591.76 (kN)

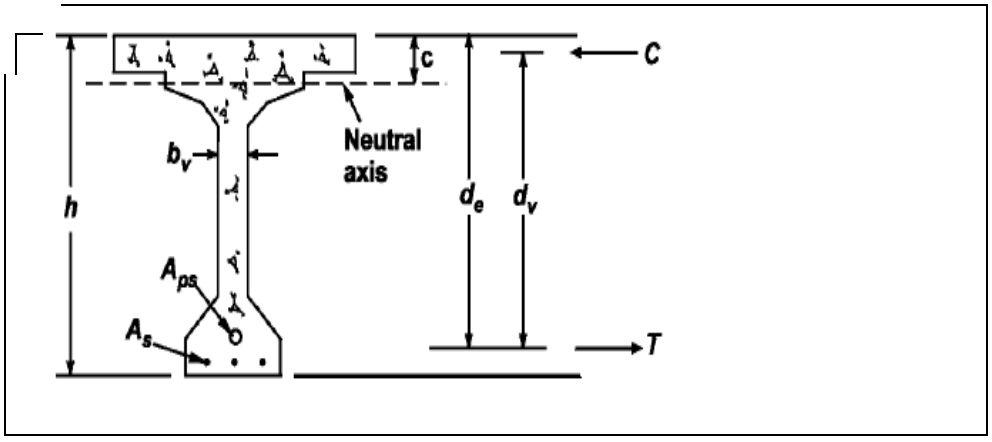
▪ Factored shear resistance (V_r).

∴ $V_r = \Phi V_n =$ 56332.59 (kN) ≥ $V_u =$ 51327.24 (kN) **OK**

■ Minimum Shear

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB11
- The factored Shear force : $V_u =$ 40464.37 (kN)
- Factored moment : $M_u =$ -1489167.31 (kN·m)
- Factored axial force : $N_u =$ -8009.47 (kN)
- Resistance factor for shear : $\Phi =$ 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)} =$ 0.00 (kN)

1) Effective depth



b_v = 1200.0 (mm) : Effective web width

$d_e = \dfrac{A_{ps}f_{ps}d_p + A_s f_s d_s}{A_{ps}f_{ps} + A_s f_s} =$ 7757.3 (mm) : Effective depth for Bending

d_v = Max [$\dfrac{M_n}{A_{ps}f_{ps} + A_s f_s}$, $0.9d_e$, $0.72h$] : Effective depth for shear

= Max [7002.7 , 6981.6 , 5760.0]

= 7002.704 (mm)

d'_v = max[$0.8h$, D_t] = Max [6400.0 , 7813.2]

= 7813.2 (mm) : Effective depth for shear for Segmental Box

* D_t : The distance from the extreme compression fiber to the centroid of the prestressing reinforcement

2) Maximum spacing for transverse reinforcement (s_{max})

▪ Shear stress on concrete (v_u).

$$v_u = \frac{|V_u - \Phi V_p|}{\Phi b_v d_v} = 5.35 \text{ (MPa)} \qquad \textit{(Eq. 5.8.2.9-1)}$$

▪ Maximum spacing for transverse reinforcement (s_{max})

$v_u = 5.35$ (MPa) $\geq 0.19 \cdot \sqrt{f'_c} = 3.35$ (MPa)

$\therefore s_{max} = \text{Min}[0.4d'_v, 18.0(\text{mm})] = 457.2$ (mm) *(Eq. 5.8.6.6-2)*

$\therefore s = 100.0$ (mm) $\leq s_{max}$ **OK**

3) Minimum required transverse reinforcement ($A_{v,min}$)

$$A_{v,min} = 0.05 \frac{b_v s}{f_y} = 100.0 \text{ (mm}^2\text{)} \qquad \textit{(Eq. 5.8.2.5-2)}$$

$\therefore A_v = 2038.706$ (mm^2) $\geq A_{v,min}$ * Defining "OK" or "NG" will be checked in checking Shear resistance by transverse reinforcement

4) Stress Variable (K)

$f_{tc} = |-1.95|$ (MPa) $< 0.19 \cdot \sqrt{f'_c} = 3.35$ (MPa) (- : tensile stress)

$$\therefore K = \text{Min}\left[\left(1 + \frac{f_{pc}}{0.0632 \cdot \sqrt{f'_c}}\right)^{(1/2)}, 2.0 \right] \qquad \textit{(Eq. 5.8.6.3-3)}$$

$= \text{Min}[3.25, 2.0] = 2.00$

where,

f_{tc} = The stress in the extreme tension fiber due to factored load and effective prestress after losses

f_{pc} = *unfactored compressive stress in concrete due to effective prestress only.*

$$= \frac{\Sigma A_{ps} \cdot f_{e(x\text{-}dir)}}{A_g} + \frac{\Sigma A_{ps} \cdot f_{e(x\text{-}dir)} \cdot e_p \cdot y_{joint}}{I_y} - \frac{N_u}{A_g} = 10.65 \text{ (MPa)}$$

5) Component of shear resisted by tensile stresses in concrete (V_c)

▪ Nominal shear resistance provide by concrete

$$V_c = 0.0632K\sqrt{f'_c}\, b_v\, d'_v = 20874.93 \text{ (kN)} \qquad \textit{(Eq. 5.8.6.5-3)}$$

6) Component of shear resisted by transverse reinforcement (V_s)

▪ Area of transverse reinforcement required *(See 5.8.2.4)*

$0.5\Phi(V_c+V_p)$	$\Phi(V_c+V_p)$	V_u
9393.72 kN	18787.44 kN	40464.37 kN

$V_u \geq 0.5\Phi(V_c+V_p)$

$$A_{v,req1} = \frac{\{V_u - \Phi(V_c+V_p)\} \cdot s}{\Phi \cdot f_y \cdot d_v (\sin\alpha + \cos\alpha)} = 831.4 \text{ (mm}^2\text{)}$$

where,

$s = 100.0$ (mm)

$\alpha = 90.0$ (deg.)

$A_{v,req2} = A_{v,min} = 100.0$ (mm^2)

$A_{v,req} = \max[A_{v,req1}, A_{v,req2}] = 831.4$ (mm^2)

$A_v = 2038.7$ $(mm^2) \geq A_{v,req}$ **OK**

▪ Component of shear resisted by transverse reinforcement (V_s)

$$V_s = \frac{A_v \cdot f_y \cdot d'_v(\sin\alpha+\cos\alpha)}{s} = 65895.50 \text{ (kN)} \quad \textit{(Eq. 5.8.6.5-4)}$$

where, $\alpha = 90.000$ (deg.)

7) Shear resistance.

▪ Nominal shear strength *(Eq. 5.8.6.5.-1)*

$V_c + V_s + V_p = 86770.44$ (kN) $> 0.379 \cdot \sqrt{f'_c} b_v d'_v + V_p = 62591.76$ (kN)

$\therefore V_n = 0.379 \cdot \sqrt{f'_c} b_v d'_v + V_p = 62591.76$ (kN)

▪ Factored shear resistance (V_r).

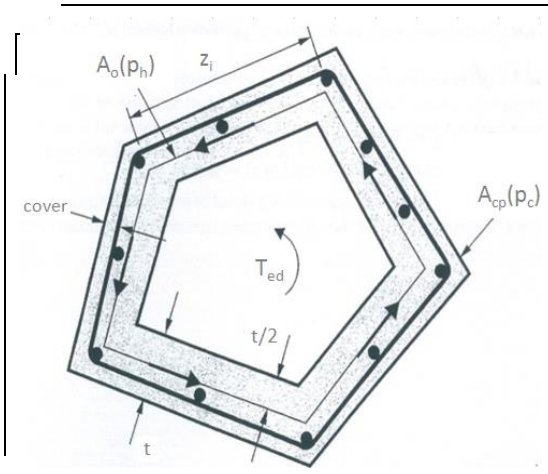
$\therefore V_r = \Phi V_n = |56332.59|$ (kN) $\geq V_u = |40464.37|$ (kN) **OK**

4.Torsional design for a section

■ **Case of V_{max}.**

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB5
- The factored Torsional moment : $T_u = -109307.40$ (kN·m)
- The factored Shear force : $V_u = 51327.24$ (kN)
- Factored moment : $M_u = -1574323.02$ (kN·m)
- Factored axial force : $N_u = 6133.65$ (kN)
- Resistance factor for shear : $\Phi = 0.90$
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)} = 0.00$ (kN)

1) Notation



A_o = Area enclosed by the shear flow path, including any area of holes therein
= 6.025E+07 (mm^2)

p_h = Perimeter of the centerline of the closed tranverse torsion reinforcement.
= 43345.5 (mm)

A_{cp} = Total area enclosed by outside Perimeter of the concrete section.
= 6.025E+07 (mm^2)

p_c = The length of the outside perimeter of concrete section.
= 43345.5 (mm)

2) Checking Torsional Effects

▪ Torsional cracking moment (T_{cr}).

b_e = 600.0 (mm) : The effective thickness of shear flow path of elements

$T_{cr} = 0.0632K\sqrt{f'_c}\,2A_o b_e$ = 80482.15 (kN·m) *(Eq. 5.8.6.3-2)*

T_u = |-109307.40| (kN·m) > $(1/3)\Phi T_{cr}$ = |24144.64| (kN·m) *(Eq. 5.8.6.3-1)*

∴ $T_u > (1/3)\Phi T_{cr}$, Consider Torsional Effects.

▪ Check torsional moment *(Eq. 5.8.6.4-2)*

T_u = |-109307.40| (kN·m) ≤ $\Phi T_n = \dfrac{\Phi \cdot 2 \cdot A_o \cdot A_t \cdot f_y}{s_t}$ = |914603.41| (kN·m) **OK**

▪ Required longitudinal reinforcement

In box section,

A_l = 136257.8 (mm^2) ≥ $(T_u/\Phi)\cdot p_h/(2A_o \cdot fy)$ = 105612.4 (mm^2) **OK**

▪ Check combined torsional and shear *(Eq. 5.8.6.5-5)*

$\dfrac{V_u}{b_v d_v} + \dfrac{T_u}{2A_o b_e}$ = 6.99 (MPa) < $0.474\sqrt{f'_c}$ = 8.35 (MPa) **OK**

■ Case of $V_{min.}$

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB11
- The factored Torsional moment : T_u = -110233.84 (kN·m)
- The factored Shear force : V_u = 40464.37 (kN)
- Factored moment : M_u = -1489167.31 (kN·m)
- Factored axial force : N_u = -8009.47 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 0.00 (kN)

1) Checking Torsional Effects

▪ Torsional cracking moment (T_{cr}).

b_e = 600.0 (mm) : The effective thickness of shear flow path of elements

$T_{cr} = 0.0632K\sqrt{f'_c}\,2A_o b_e$ = 160964.30 (kN·m) *(Eq. 5.8.6.3-2)*

T_u = |-110233.84| (kN·m) > $(1/3)\Phi T_{cr}$ = |48289.29| (kN·m) *(Eq. 5.8.6.3-1)*

∴ $T_u > (1/3)\Phi T_{cr}$, Consider Torsional Effects.

▪ Check torsional moment *(Eq. 5.8.6.4-2)*

T_u = -110233.84 (kN·m) ≤ $\Phi T_n = \frac{\Phi \cdot 2 \cdot A_o \cdot A_t \cdot f_y}{s_t}$ = 914603.41 (kN·m) **OK**

▪ Required longitudinal reinforcement

In box section,

A_l = 136257.8 (mm^2) ≥ $(T_u/\Phi) \cdot p_h/(2A_o \cdot fy)$ = 106507.6 (mm^2) **OK**

▪ Check combined torsional and shear *(Eq. 5.8.6.5-5)*

$\frac{V_u}{b_v d_v} + \frac{T_u}{2A_o b_e}$ = 5.84 (MPa) < $0.474\sqrt{f'_c}$ = 8.35 (MPa) **OK**

■ Case of $T_{max.}$

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB13
- The factored Torsional moment : T_u = -120538.03 (kN·m)
- The factored Shear force : V_u = 41631.09 (kN)
- Factored moment : M_u = -1473794.79 (kN·m)
- Factored axial force : N_u = -3915.63 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 0.00 (kN)

1) Checking Torsional Effects

▪ Torsional cracking moment (T_{cr}).

b_e = 600.0 (mm) : The effective thickness of shear flow path of elements

$T_{cr} = 0.0632K\sqrt{f'_c}\, 2A_o b_e$ = 160964.30 (kN·m) *(Eq. 5.8.6.3-2)*

T_u = -120538.03 (kN·m) > $(1/3)\Phi T_{cr}$ = 48289.29 (kN·m) *(Eq. 5.8.6.3-1)*

∴ $T_u > (1/3)\Phi T_{cr}$, Consider Torsional Effects.

▪ Check torsional moment *(Eq. 5.8.6.4-2)*

T_u = -120538.03 (kN·m) ≤ $\Phi T_n = \frac{\Phi \cdot 2 \cdot A_o \cdot A_t \cdot f_y}{s_t}$ = 914603.41 (kN·m) **OK**

▪ Required longitudinal reinforcement

In box section,

A_l = 136257.8 (mm^2) ≥ $(T_u/\Phi) \cdot p_h/(2A_o \cdot fy)$ = 116463.4 (mm^2) **OK**

▪ Check combined torsional and shear *(Eq. 5.8.6.5-5)*

$V_u + T_u$ = 6.11 (MPa) < $0.474\sqrt{f'_c}$ = 8.35 **OK**

$b_v d_v$	$2A_o b_e$	(MPa)

5.Crack check

■ Top

- The maximum Service Limit Load Combination : cLCB24
- The maximum spacing of steel reinforcement in layer closet to the tension face(s_{max}) *(Eq. 5.7.3.4-1)*

$$s_{max} = \frac{700 \cdot \gamma_e}{\beta_s \cdot f_{ss}} - 2d_c = 12943.3 \text{ (mm)} \geq s_{use} = 198.6 \text{ (mm)}$$ **OK**

where,

$$\beta_s = 1 + \frac{d_c}{0.7(h-d_c)} = 1.009$$

d_c = 50.0 (mm)

γ_e = 1.00 : Exposure factor

f_{ss} = 9.315 (MPa) : Tensile stress in bar at the service limit state

■ Bottom

- The maximum Service Limit Load Combination : cLCB24
- The maximum spacing of steel reinforcement in layer closet to the tension face(s_{max}) *(Eq. 5.7.3.4-1)*

$$s_{max} = \frac{700 \cdot \gamma_e}{\beta_s \cdot f_{ss}} - 2d_c = 176137.0 \text{ (mm)} \geq s_{use} = 200.0 \text{ (mm)}$$ **OK**

where,

$$\beta_s = 1 + \frac{d_c}{0.7(h-d_c)} = 1.009$$

d_c = 50.0 (mm)

γ_e = 1.00 : Exposure factor

f_{ss} = 0.689 (MPa) : Tensile stress in bar at the service limit state

1. Design Condition

Design Code	Element	Node(I/J)
AASHTO-LRFD2016	40	J

■ Section Properties

- Gross section

H	3000.000	(mm)	A_g	1.035E+07	(mm^2)	S_t	1.207E+10	(mm^3)
B	14200.000	(mm)	I_y	1.216E+13	(mm^4)	S_b	6.100E+09	(mm^3)
C_{zp}	1006.946	(mm)						
C_{zm}	1993.054	(mm)						

- Transformed section

H	3000.000	(mm)	A_g	1.084E+07	(mm^2)	S_t	1.265E+10	(mm^3)
B	14200.000	(mm)	I_y	1.380E+13	(mm^4)	S_b	7.233E+09	(mm^3)
C_{zp}	1091.409	(mm)						
C_{zm}	1908.591	(mm)						

■ Materials

- Concrete

f'_c (MPa)	E_c (MPa)	$f_r=0.20\sqrt{f'_c}$ (MPa)	β_1
45.000	32094.6	3.523	0.724

* β_1 is 0.85 in lower f'c 4ksi, the others are 0.85-0.05(f'c-4.0)≥0.65

- Prestressing steel Information

No.	Tendon Name	Bond Type	d_p (mm)	A_{ps} (mm^2)	Strength (MPa)		E_p (MPa)
					f_{py}	f_{pu}	
1	S_C48D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
2	S_C47AD	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
3	S_C38I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
4	S_C48AD	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
5	S_C47D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
6	S_C39D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
7	S_C37D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
8	S_C44I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
9	S_C43D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
10	S_C41D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
11	S_C48AI	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
12	S_C47I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
13	S_C42I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
14	S_C48BD	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
15	S_C46D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
16	S_C48I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
17	S_C44D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6

18	S_C39I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
19	S_C38D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
20	S_C42D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
21	S_C40D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
22	S_C37I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
23	S_C46I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
24	S_C45D	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
25	S_C48BI	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
26	S_C40I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
27	S_C47AI	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
28	S_C45I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
29	S_C41I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
30	S_C43I	Bond	2890.0	3051.4	1676.9	1863.3	196500.6
31	S_C37A	Bond	2890.0	3051.4	1676.9	1863.3	196500.6

* d_p is Distance from extreme compression fiber to centroid of prestressing tendon.

- Longitudinal non prestressed steel reinforcement Information.

E_s (MPa)	f_y (MPa)	Bottom for Flexure		Top for Flexure		Torsion
		d_s (mm)	A_s (mm^2)	d'_s (mm)	A'_s (mm^2)	A_l (mm^2)
199948.0	413.7	0.0	0.0	0.0	0.0	105290.1

* d_s or d'_s is Distance from extreme compression fiber to centroid of non prestressing reinforcement.

- Tranverse non prestressed steel reinforcement Information.

E_s (MPa)	f_y (MPa)	α (deg.)	Shear		Torsion	
			A_v (mm^2)	s (mm)	A_t (mm^2)	s_t (mm)
199948.0	413.7	90.0	2038.7	200.0	2038.7	200.0

* α is angle between longitudinal and stirrup.

■ **Sectional forces/stresses due to effective prestress**

No.	Tendon Name	Bond Type	e_p (mm)	$A_{ps}f_{e(z\text{-}dir)}$ (kN)	$A_{ps}f_{e(x\text{-}dir)}$ (kN)	$A_{ps}f_{e(x\text{-}dir)}e_p$ (kN•m)
1	S_C48D	Bond	-1798.6	0.00	3194.62	5745.81
2	S_C47AD	Bond	-1798.6	0.00	3100.54	5576.60
3	S_C38I	Bond	-1798.6	0.00	3553.52	6391.33
4	S_C48AD	Bond	-1798.6	0.00	3238.39	5824.53
5	S_C47D	Bond	-1798.6	0.00	3150.40	5666.28
6	S_C39D	Bond	-1798.6	0.00	3629.11	6527.28
7	S_C37D	Bond	-1798.6	0.00	3570.44	6421.76
8	S_C44I	Bond	-1798.6	0.00	3444.07	6194.48
9	S_C43D	Bond	-1798.6	0.00	3579.94	6438.85

10	S_C41D	Bond	-1798.6	0.00	3575.49	6430.84
11	S_C48AI	Bond	-1798.6	0.00	3213.11	5779.07
12	S_C47I	Bond	-1798.6	0.00	3111.29	5595.94
13	S_C42I	Bond	-1798.6	0.00	3559.65	6402.35
14	S_C48BD	Bond	-1798.6	0.00	3170.31	5702.09
15	S_C46D	Bond	-1798.6	0.00	3461.07	6225.05
16	S_C48I	Bond	-1798.6	0.00	3159.22	5682.15
17	S_C44D	Bond	-1798.6	0.00	3457.31	6218.28
18	S_C39I	Bond	-1798.6	0.00	3622.02	6514.53
19	S_C38D	Bond	-1798.6	0.00	3572.62	6425.68
20	S_C42D	Bond	-1798.6	0.00	3577.61	6434.66
21	S_C40D	Bond	-1798.6	0.00	3631.40	6531.41
22	S_C37I	Bond	-1798.6	0.00	3555.30	6394.54
23	S_C46I	Bond	-1798.6	0.00	3440.12	6187.37
24	S_C45D	Bond	-1798.6	0.00	3459.24	6221.75
25	S_C48BI	Bond	-1798.6	0.00	3132.68	5634.40
26	S_C40I	Bond	-1798.6	0.00	3619.72	6510.39
27	S_C47AI	Bond	-1798.6	0.00	3062.44	5508.07
28	S_C45I	Bond	-1798.6	0.00	3442.13	6190.99
29	S_C41I	Bond	-1798.6	0.00	3561.94	6406.48
30	S_C43I	Bond	-1798.6	0.00	3557.40	6398.31
31	S_C37A	Bond	-1798.6	0.00	3568.31	6417.93
			Σ	0.00	105971.38	190599.21

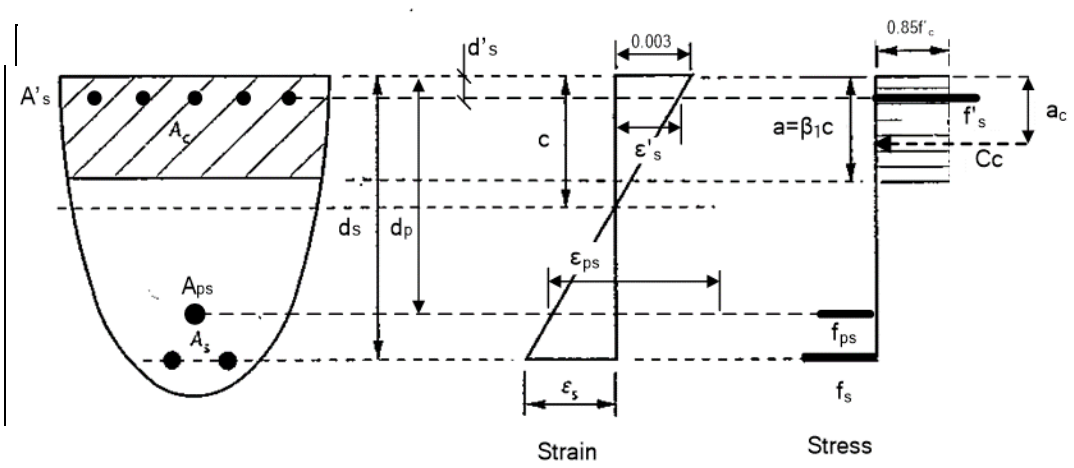
* e_p is Distance from centroid of section to centroid of tendon

2.Flexure design for a section

■ **Moment Direction :** **Positive**

- Method of Calculation : Code
- The maximum Strength Limit Load Combination : cLCB1
- The maximum factored moment (M_u) : 321859.776 (kN•m)

1) Depth of neutral axis to compression face (c). *(see. 5.7.3.1)*



Axial force in concrete (compressive zone)					
c	$a=\beta_1 c$	A_c	a_c	$C_c=0.85f'_cA_c$ (kN)	$C_c(c-a_c)$ (kN•m)
445.313	322.257	4381460.49	155.06	167590.86	48644.05

Axial force in reinforcement steels			
tensile zone		compressive zone	
$T_s=A_sf_s$ (kN)	$\Sigma A_sf_s(d_s-c)$	$C_s=A'_sf'_s$ (kN)	$\Sigma A'_sf'_s(c-d'_s)$ (kN•m)
19178.96	37383.10	20169.33	6490.16

No.	Axial force in tendons(Bond) by Code				
	Tendon Name	k	f_{ps} (MPa)	$T_{ps}=A_{ps}f_{ps}$ (kN)	$A_{ps}f_{ps}(d_p-c)$ (kN•m)
1	S_C48D	0.280	1782.87	5440.26	13299.74
2	S_C47AD	0.280	1782.87	5440.26	13299.74
3	S_C38I	0.280	1782.87	5440.26	13299.74
4	S_C48AD	0.280	1782.87	5440.26	13299.74
5	S_C47D	0.280	1782.87	5440.26	13299.74
6	S_C39D	0.280	1782.87	5440.26	13299.74
7	S_C37D	0.280	1782.87	5440.26	13299.74
8	S_C44I	0.280	1782.87	5440.26	13299.74
9	S_C43D	0.280	1782.87	5440.26	13299.74
10	S_C41D	0.280	1782.87	5440.26	13299.74
11	S_C48AI	0.280	1782.87	5440.26	13299.74
12	S_C47I	0.280	1782.87	5440.26	13299.74
13	S_C42I	0.280	1782.87	5440.26	13299.74
14	S_C48BD	0.280	1782.87	5440.26	13299.74
15	S_C46D	0.280	1782.87	5440.26	13299.74
16	S_C48I	0.280	1782.87	5440.26	13299.74
17	S_C44D	0.280	1782.87	5440.26	13299.74
18	S_C39I	0.280	1782.87	5440.26	13299.74
19	S_C38D	0.280	1782.87	5440.26	13299.74
20	S_C42D	0.280	1782.87	5440.26	13299.74
21	S_C40D	0.280	1782.87	5440.26	13299.74
22	S_C37I	0.280	1782.87	5440.26	13299.74
23	S_C46I	0.280	1782.87	5440.26	13299.74
24	S_C45D	0.280	1782.87	5440.26	13299.74
25	S_C48BI	0.280	1782.87	5440.26	13299.74
26	S_C40I	0.280	1782.87	5440.26	13299.74
27	S_C47AI	0.280	1782.87	5440.26	13299.74
28	S_C45I	0.280	1782.87	5440.26	13299.74

29	S_C41I	0.280	1782.87	5440.26	13299.74
30	S_C43I	0.280	1782.87	5440.26	13299.74
31	S_C37A	0.280	1782.87	5440.26	13299.74
			Σ	168648.11	412291.93

* f_{ps} = $f_{pu}(1-k\ c/d_p)$ k = $2(1.04-f_{py}/f_{pu})$

c (mm)	Compression Force (kN)		Tensile Force (kN)		Tolerance (C/T)
	C_c	C_s	T_s	T_{ps}	
445.313	167590.86	20169.33	19178.96	168648.11	0.99964

2) Flexural resistance

▪ Nominal resistance(Mn). *(see. 5.7.3.2)*

$M_n = \Sigma A_s f_s(d_s-c)+\Sigma A_{ps} f_{ps}(d_p-c)+C_c(c-a_c)+\Sigma A'_s f'_s(c-d'_s)$ = 504809.24 (kN•m)

▪ Resistance factor(Φ).

d_t = 2947.6 (mm)

ε_t = $0.003(d_t/c-1)$ = 0.01686 : Net tensile strain in the extreme tension steel

∴ Φ = 1.00 : Tension Controlled Range, $0.005 \le \varepsilon_t$

▪ Factored resistance($M_r = \Phi M_n$)

M_r = 504809.24 (kN•m) ≥ M_u = 321859.78 (kN•m) **OK**

3) Minimum reinforcement

▪ Judgement *(see. 5.7.3.3.2)*

M_r = 504809.24 (kN•m) ≥ $1.33M_u$ = 428073.50 (kN•m)

∴ No check.

■ **Moment Direction :** **Negative**

- Method of Calculation : Code
- The maximum Strength Limit Load Combination : cLCB13
- The maximum factored moment (M_u) : 0.000 (kN•m)

1) Depth of neutral axis to compression face (c). *(see. 5.7.3.1)*

Axial force in concrete (compressive zone)					
c	$a=\beta_1 c$	A_c	a_c	$C_c=0.85f'_c A_c$ (kN)	$C_c(c-a_c)$ (kN•m)
308.167	223.009	1574283.08	110.87	60216.33	11880.47

Axial force in reinforcement steels			
tensile zone		compressive zone	
$T_s=A_s f_s$ (kN)	$\Sigma A_s f_s(d_s-c)$	$C_s=A'_s f'_s$ (kN)	$\Sigma A'_s f'_s(c-d'_s)$ (kN•m)
31589.52	69852.48	9364.24	1952.23

No.	Axial force in tendons(Bond) by Code

	Tendon Name	k	f_{ps} (MPa)	$T_{ps}=A_{ps}f_{ps}$ (kN)	$A_{ps}f_{ps}(d_p-c)$ (kN•m)
1	S_C48D	0.280	401.68	1225.67	-242.89
2	S_C47AD	0.280	401.68	1225.67	-242.89
3	S_C38I	0.280	401.68	1225.67	-242.89
4	S_C48AD	0.280	401.68	1225.67	-242.89
5	S_C47D	0.280	401.68	1225.67	-242.89
6	S_C39D	0.280	401.68	1225.67	-242.89
7	S_C37D	0.280	401.68	1225.67	-242.89
8	S_C44I	0.280	401.68	1225.67	-242.89
9	S_C43D	0.280	401.68	1225.67	-242.89
10	S_C41D	0.280	401.68	1225.67	-242.89
11	S_C48AI	0.280	401.68	1225.67	-242.89
12	S_C47I	0.280	401.68	1225.67	-242.89
13	S_C42I	0.280	401.68	1225.67	-242.89
14	S_C48BD	0.280	401.68	1225.67	-242.89
15	S_C46D	0.280	401.68	1225.67	-242.89
16	S_C48I	0.280	401.68	1225.67	-242.89
17	S_C44D	0.280	401.68	1225.67	-242.89
18	S_C39I	0.280	401.68	1225.67	-242.89
19	S_C38D	0.280	401.68	1225.67	-242.89
20	S_C42D	0.280	401.68	1225.67	-242.89
21	S_C40D	0.280	401.68	1225.67	-242.89
22	S_C37I	0.280	401.68	1225.67	-242.89
23	S_C46I	0.280	401.68	1225.67	-242.89
24	S_C45D	0.280	401.68	1225.67	-242.89
25	S_C48BI	0.280	401.68	1225.67	-242.89
26	S_C40I	0.280	401.68	1225.67	-242.89
27	S_C47AI	0.280	401.68	1225.67	-242.89
28	S_C45I	0.280	401.68	1225.67	-242.89
29	S_C41I	0.280	401.68	1225.67	-242.89
30	S_C43I	0.280	401.68	1225.67	-242.89
31	S_C37A	0.280	401.68	1225.67	-242.89
			Σ	37995.82	-7529.50

* f_{ps} = $f_{pu}(1-k\ c/d_p)$ k = $2(1.04-f_{py}/f_{pu})$

c (mm)	Compression Force (kN)		Tensile Force (kN)		Tolerance (C/T)
	C_c	C_s	T_s	T_{ps}	
308.167	60216.33	9364.24	31589.52	37995.82	0.99993

2) Flexural resistance

▪ Nominal resistance(Mn). *(see. 5.7.3.2)*

M_n = $\Sigma A_s f_s(d_s-c)+\Sigma A_{ps}f_{ps}(d_p-c)+C_c(c-a_c)+\Sigma A'_s f'_s(c-d'_s)$ = 76155.68 (kN•m)

▪ Resistance factor(Φ).

d_t = 2952.4 (mm)

ε_t = $0.003(d_t/c-1)$ = 0.02574 : Net tensile strain in the extreme tension steel

∴ Φ = 1.00 : Tension Controlled Range, $0.005 \leq \varepsilon_t$

▪ Factored resistance($M_r = \Phi M_n$)

M_r = 76155.68 (kN•m) ≥ M_u = 0.00 (kN•m) **OK**

3) Minimum reinforcement

▪ Judgement *(see. 5.7.3.3.2)*

M_r = 76155.68 (kN•m) ≥ $1.33M_u$ = 0.00 (kN•m)

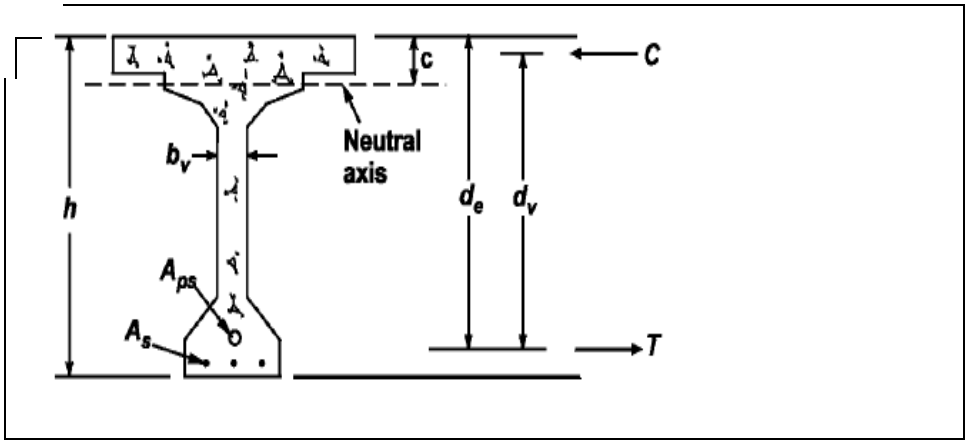
∴ No check.

3.Shear design for a section

■ **Maximum Shear**

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB10
- The factored Shear force : V_u = 2734.40 (kN)
- Factored moment : M_u = 122375.17 (kN•m)
- Factored axial force : N_u = -10191.91 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 0.00 (kN)

1) Effective depth



b_v = 800.0 (mm) : Effective web width

$d_e = \dfrac{A_{ps}f_{ps}d_p+A_sf_sd_s}{A_{ps}f_{ps}+A_sf_s}$ = 2839.4 (mm) : Effective depth for Bending

d_v = Max [$\dfrac{M_n}{A_{ps}f_{ps}+A_sf_s}$, $0.9d_e$, $0.72h$] : Effective depth for shear

= Max [2687.6 , 2555.5 , 2160.0]

= 2687.628 (mm)

d'_v = max[0.8h, D_t] = Max [2400.0 , 2890.0]

= 2890.0 (mm) : Effective depth for shear for Segmental Box

* D_t : The distance from the extreme compression fiber to the centroid of the prestressing reinforcement

2) Maximum spacing for transverse reinforcement (s_{max})

▪ Shear stress on concrete (v_u).

$$v_u = \frac{| V_u - \Phi V_p |}{\Phi b_v d_v} = 1.41 \text{ (MPa)} \qquad \textit{(Eq. 5.8.2.9-1)}$$

▪ Maximum spacing for transverse reinforcement (s_{max})

v_u = 1.41 (MPa) < $0.19 \cdot \sqrt{f'_c}$ = 3.35 (MPa)

∴ s_{max} = Min[0.8d'_v, 36.0(mm)] = 914.4 (mm) *(Eq. 5.8.6.6-1)*

∴ s = 200.0 (mm) ≤ s_{max} **OK**

3) Minimum required transverse reinforcement ($A_{v,min}$)

$$A_{v,min} = 0.05 \frac{b_v s}{f_y} = 133.3 \text{ (mm}^2\text{)} \qquad \textit{(Eq. 5.8.2.5-2)}$$

∴ A_v = 2038.706 (mm^2) ≥ $A_{v,min}$ * Defining "OK" or "NG" will be checked in checking Shear resistance by transverse reinforcement

4) Stress Variable (K)

f_{tc} = | 0.04 | (MPa) < $0.19 \cdot \sqrt{f'_c}$ = 3.35 (MPa) (- : tensile stress)

∴ $K = \text{Min}\left[\left(1 + \frac{f_{pc}}{0.0632 \cdot \sqrt{f'_c}} \right)^{(1/2)} , 2.0 \right]$ *(Eq. 5.8.6.3-3)*

= Min [3.33 , 2.0] = 2.00

where,

f_{tc} = The stress in the extreme tension fiber due to factored load and effective prestress after losses

f_{pc} = *unfactored compressive stress in concrete due to effective prestress only.*

$$= \frac{\Sigma A_{ps} \cdot f_{e(x\text{-}dir)}}{A_g} + \frac{\Sigma A_{ps} \cdot f_{e(x\text{-}dir)} \cdot e_p \cdot y_{joint}}{I_y} - \frac{N_u}{A_g} = 11.22 \text{ (MPa)}$$

5) Component of shear resisted by tensile stresses in concrete (V_c)

▪ Nominal shear resistance provide by concrete

$V_c = 0.0632K \sqrt{f'_c}\, b_v\, d'_v$ = 5147.55 (kN) *(Eq. 5.8.6.5-3)*

6) Component of shear resisted by transverse reinforcement (V_s)

▪ Area of transverse reinforcement required *(See 5.8.2.4)*

$0.5\Phi(V_c+V_p)$	$\Phi(V_c+V_p)$	V_u
2316.40 kN	4632.80 kN	2734.40 kN

$V_u \geq 0.5\Phi(V_c+V_p)$

$$A_{v,req1} = \frac{\{ V_u - \Phi(V_c+V_p) \} \cdot s}{\Phi \cdot f_y \cdot d_v (\sin\alpha + \cos\alpha)} = 0.0 \text{ (mm}^2\text{)}$$

where, $s = 200.0$ (mm)

$\alpha = 90.0$ (deg.)

$A_{v,req2} = A_{v,min} = 133.3$ (mm^2)

$A_{v,req} = \max[A_{v,req1}, A_{v,req2}] = 133.3$ (mm^2)

$A_v = 2038.7$ (mm^2) $\geq A_{v,req}$ **OK**

- Component of shear resisted by transverse reinforcement (V_s)

$$V_s = \frac{A_v \cdot f_y \cdot d'_v(\sin\alpha+\cos\alpha)}{s} = 12186.89 \text{ (kN)} \quad \textit{(Eq. 5.8.6.5-4)}$$

where, $\alpha = 90.000$ (deg.)

7) Shear resistance.

- Nominal shear strength *(Eq. 5.8.6.5.-1)*

$V_c + V_s + V_p = 17334.44$ (kN) > $0.379 \cdot \sqrt{f'_c} b_v d'_v + V_p = 15434.51$ (kN)

$\therefore V_n = 0.379 \cdot \sqrt{f'_c} b_v d'_v + V_p = 15434.51$ (kN)

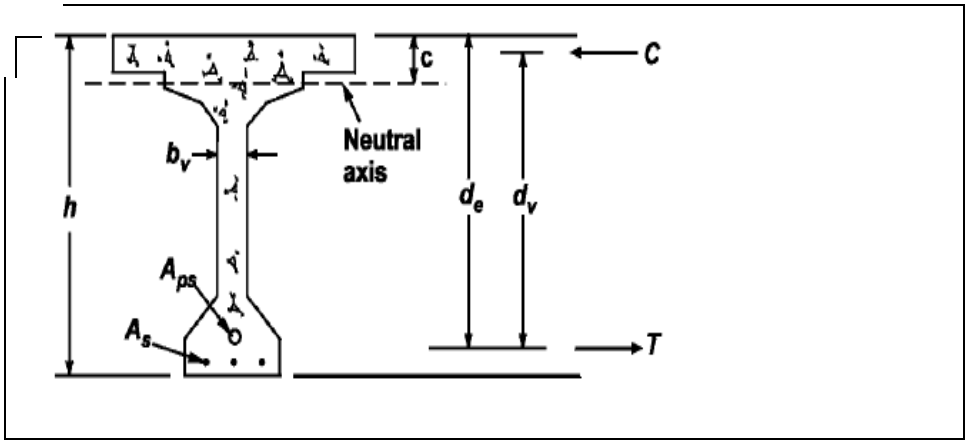
- Factored shear resistance (V_r).

$\therefore V_r = \Phi V_n = |13891.06|$ (kN) $\geq V_u = |2734.40|$ (kN) **OK**

■ **Minimum Shear**

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB11
- The factored Shear force : $V_u = -2798.62$ (kN)
- Factored moment : $M_u = 60670.99$ (kN•m)
- Factored axial force : $N_u = -27932.53$ (kN)
- Resistance factor for shear : $\Phi = 0.90$
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)} = 0.00$ (kN)

1) Effective depth



$b_v = 800.0$ (mm) : Effective web width

$d_e = A_{ps}f_{ps}d_p + A_s f_s d_s = 2839.4$ (mm) : Effective depth for Bending

$$d_v = \text{Max}\left[\frac{M_n}{A_{ps}f_{ps}+A_sf_s},\ 0.9d_e,\ 0.72h\right]$$: Effective depth for shear

$= \text{Max}[\ 2687.6\ ,\ 2555.5\ ,\ 2160.0\ ]$

$= 2687.628$ (mm)

$d'_v = \max[0.8h, D_t] = \text{Max}[\ 2400.0\ ,\ 2890.0\ ]$

$= 2890.0$ (mm) : Effective depth for shear for Segmental Box

* D_t : The distance from the extreme compression fiber to the centroid of the prestressing reinforcement

2) Maximum spacing for transverse reinforcement (s_{max})

- Shear stress on concrete (v_u).

$$v_u = \frac{|V_u - \Phi V_p|}{\Phi b_v d_v} = 1.45 \text{ (MPa)} \quad \textit{(Eq. 5.8.2.9-1)}$$

- Maximum spacing for transverse reinforcement (s_{max})

$v_u = 1.45$ (MPa) $<$ $0.19\cdot\sqrt{f'_c} = 3.35$ (MPa)

$\therefore\ s_{max} = \text{Min}[0.8d'_v, 36.0(\text{mm})] = 914.4$ (mm) *(Eq. 5.8.6.6-1)*

$\therefore\ s = 200.0$ (mm) $\le s_{max}$ **OK**

3) Minimum required transverse reinforcement ($A_{v,min}$)

$$A_{v,min} = 0.05\frac{b_v s}{f_y} = 133.3 \text{ (mm}^2\text{)} \quad \textit{(Eq. 5.8.2.5-2)}$$

$\therefore\ A_v = 2038.706$ (mm^2) $\ge A_{v,min}$

* Defining "OK" or "NG" will be checked in checking Shear resistance by transverse reinforcement

4) Stress Variable (K)

$f_{tc} = |-8.37|$ (MPa) $> 0.19\cdot\sqrt{f'_c} = 3.35$ (MPa) (- : tensile stress)

$$\therefore\ K = \text{Min}\left[\left(1 + \frac{f_{pc}}{0.0632\cdot\sqrt{f'_c}}\right)^{(1/2)},\ 1.0\right] \quad \textit{(Eq. 5.8.6.3-3)}$$

$= \text{Min}[\ 3.55\ ,\ 1.0\ ] = 1.00$

where,

f_{tc} = The stress in the extreme tension fiber due to factored load and effective prestress after losses

f_{pc} = *unfactored compressive stress in concrete due to effective prestress only.*

$$= \frac{\Sigma A_{ps}\cdot f_{e(x\text{-}dir)}}{A_g} + \frac{\Sigma A_{ps}\cdot f_{e(x\text{-}dir)}\cdot e_p\cdot y_{joint}}{I_y} - \frac{N_u}{A_g} = 12.93 \text{ (MPa)}$$

5) Component of shear resisted by tensile stresses in concrete (V_c)

- Nominal shear resistance provide by concrete

$V_c = 0.0632K\sqrt{f'_c}\, b_v d'_v = 2573.78$ (kN) *(Eq. 5.8.6.5-3)*

6) Component of shear resisted by transverse reinforcement (V_s)

- Area of transverse reinforcement required *(See 5.8.2.4)*

$0.5\Phi(V_c+V_p)$	$\Phi(V_c+V_p)$	V_u
1158.20 kN	2316.40 kN	2798.62 kN

$V_u \geq 0.5\Phi(V_c+V_p)$

$$A_{v,req1} = \frac{\{V_u - \Phi(V_c+V_p)\}\cdot s}{\Phi\cdot f_y\cdot d_v(\sin\alpha+\cos\alpha)} = 96.4 \ (mm^2)$$

where,

$s = 200.0$ (mm)

$\alpha = 90.0$ (deg.)

$A_{v,req2} = A_{v,min} = 133.3 \ (mm^2)$

$A_{v,req} = \max[A_{v,req1}, A_{v,req2}] = 133.3 \ (mm^2)$

$A_v = 2038.7 \ (mm^2) \geq A_{v,req}$ **OK**

- Component of shear resisted by transverse reinforcement (V_s)

$$V_s = \frac{A_v\cdot f_y\cdot d'_v(\sin\alpha+\cos\alpha)}{s} = 12186.89 \ (kN)$$

(Eq. 5.8.6.5-4)

where,

$\alpha = 90.000$ (deg.)

7) Shear resistance.

- Nominal shear strength

(Eq. 5.8.6.5.-1)

$V_c+V_s+V_p = 14760.66$ (kN) $\leq 0.379\cdot\sqrt{f'_c}b_v d'_v + V_p = 15434.51$ (kN)

$\therefore V_n = V_c+V_s+V_p = 14760.66$ (kN)

- Factored shear resistance (V_r).

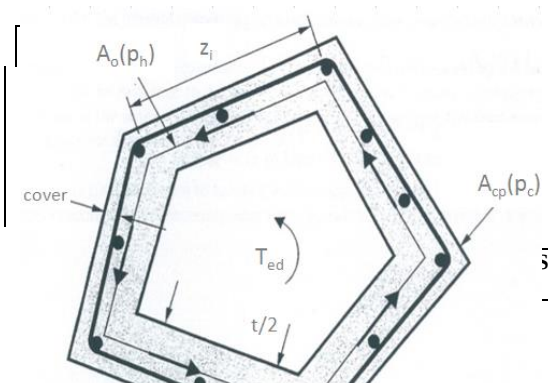
$\therefore V_r = \Phi V_n = |13284.60|$ (kN) $\geq V_u = |-2798.62|$ (kN) **OK**

4.Torsional design for a section

■ **Case of $V_{max.}$**

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB10
- The factored Torsional moment : $T_u = 4402.67$ (kN•m)
- The factored Shear force : $V_u = 2734.40$ (kN)
- Factored moment : $M_u = 122375.17$ (kN•m)
- Factored axial force : $N_u = -10191.91$ (kN)
- Resistance factor for shear : $\Phi = 0.90$
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps}\cdot f_{e(z\text{-}dir)} = 0.00$ (kN)

1) Notation



A_o = Area enclosed by the shear flow path, including any area of holes therein = 2.475E+07 (mm^2)

p_h = Perimeter of the centerline of the closed tranverse torsion reinforcement.

= 33345.5 (mm)

A_{cp} = Total area enclosed by outside Perimeter of the concrete section.

= 2.475E+07 (mm^2)

p_c = The length of the outside perimeter of concrete section.

= 33345.5 (mm)

2) Checking Torsional Effects

- Torsional cracking moment (T_{cr}).

b_e = 400.0 (mm) : The effective thickness of shear flow path of elements

$T_{cr} = 0.0632K\sqrt{f'_c}\,2A_o b_e$ = 44078.36 (kN•m) *(Eq. 5.8.6.3-2)*

T_u = 4402.67 (kN•m) ≤ $(1/3)\Phi T_{cr}$ = 13223.51 (kN•m) *(Eq. 5.8.6.3-1)*

∴ $T_u \le (1/3)\Phi T_{cr}$, Ignore Torsional Effects.

- Check combined torsional and shear *(Eq. 5.8.6.5-5)*

$$\frac{V_u}{b_v d_v} + \frac{T_u}{2A_o b_e} = 0.00\ (MPa) \ge 0.474\sqrt{f'_c} = 0.00\ (MPa)$$ **OK**

■ Case of $V_{min.}$

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB11
- The factored Torsional moment : T_u = -5828.49 (kN•m)
- The factored Shear force : V_u = -2798.62 (kN)
- Factored moment : M_u = 60670.99 (kN•m)
- Factored axial force : N_u = -27932.53 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 0.00 (kN)

1) Checking Torsional Effects

- Torsional cracking moment (T_{cr}).

b_e = 400.0 (mm) : The effective thickness of shear flow path of elements

$T_{cr} = 0.0632K\sqrt{f'_c}\,2A_o b_e$ = 22039.18 (kN•m) *(Eq. 5.8.6.3-2)*

T_u = -5828.49 (kN•m) ≤ $(1/3)\Phi T_{cr}$ = 6611.75 (kN•m) *(Eq. 5.8.6.3-1)*

∴ $T_u \le (1/3)\Phi T_{cr}$, Ignore Torsional Effects.

- Check combined torsional and shear *(Eq. 5.8.6.5-5)*

$$\frac{V_u}{b_v d_v} + \frac{T_u}{2A_o b_e} = 0.00\ (MPa) \ge 0.474\sqrt{f'_c} = 0.00\ (MPa)$$ **OK**

■ Case of $T_{max.}$

- Section type : Segmental-Box
- The Strength Limit Load Combination : cLCB1
- The factored Torsional moment : T_u = -6648.24 (kN•m)
- The factored Shear force : V_u = -1703.10 (kN)
- Factored moment : M_u = 284003.66 (kN•m)
- Factored axial force : N_u = 5558.37 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 0.00 (kN)

1) Checking Torsional Effects

▪ Torsional cracking moment (T_{cr}).

b_e = 400.0 (mm) : The effective thickness of shear flow path of elements

$T_{cr} = 0.0632K\sqrt{f'_c}\,2A_o b_e$ = 22039.18 (kN•m) *(Eq. 5.8.6.3-2)*

$|T_u|$ = |-6648.24| (kN•m) > $(1/3)\Phi T_{cr}$ = |6611.75| (kN•m) *(Eq. 5.8.6.3-1)*

∴ $T_u > (1/3)\Phi T_{cr}$, Consider Torsional Effects.

▪ Check torsional moment *(Eq. 5.8.6.4-2)*

$|T_u|$ = |-6648.24| (kN•m) ≤ $\Phi T_n = \dfrac{\Phi \cdot 2 \cdot A_o \cdot A_t \cdot f_y}{s_t}$ = |187840.81| (kN•m) **OK**

▪ Required longitudinal reinforcement

In box section, *(Eq. 5.8.3.6.3-2)*

A_l = 105290.1 (mm^2) ≥ $(T_u/\Phi)\cdot p_h/(2A_o \cdot fy)$ = 12030.3 (mm^2) **OK**

▪ Check combined torsional and shear *(Eq. 5.8.6.5-5)*

$\dfrac{V_u}{b_v d_v} + \dfrac{T_u}{2A_o b_e}$ = 1.07 (MPa) < $0.474\sqrt{f'_c}$ = 8.35 (MPa) **OK**

5.Crack check

■ **Top**

- The maximum Service Limit Load Combination : cLCB24
- The maximum spacing of steel reinforcement in layer closet to the tension face(s_{max}) *(Eq. 5.7.3.4-1)*

$s_{max} = \dfrac{700\cdot\gamma_e}{\beta_s \cdot f_{ss}} - 2d_c$ = 14224.8 (mm) ≥ s_{use} = 198.6 (mm) **OK**

where

, $\beta_s = 1 + \dfrac{d_c}{0.7(h-d_c)}$ = 1.023

d_c = 47.6 (mm)

γ_e = 1.00 : Exposure factor

f_{ss} = 8.368 (MPa) : Tensile stress in bar at the service limit state

■ **Bottom**

- The maximum Service Limit Load Combination : cLCB24

- The maximum spacing of steel reinforcement in layer closet to the tension face(s_{max}) *(Eq. 5.7.3.4-1)*

$$s_{max} = \frac{700 \cdot \gamma_e}{\beta_s \cdot f_{ss}} - 2d_c = 3722.1 \text{ (mm)} \geq s_{use} = 200.0 \text{ (mm)}$$ **OK**

where

$$\beta_s = 1 + \frac{d_c}{0.7(h-d_c)} = 1.025$$

d_c = 52.4 (mm)

γ_e = 1.00 : Exposure factor

f_{ss} = 31.241 (MPa) : Tensile stress in bar at the service limit state

3.5.14. **DISEÑO A FLEXIÓN TRANSVERSAL**

Para el diseño a flexión en la sección transversal se elaboró un modelo de la sección en la dovela D0 (al inicio del voladizo) y en la dovela de cierre D17, con la cual se obtuvo la demanda de flexión y se calculó el refuerzo requerido para atender dichas solicitaciones.

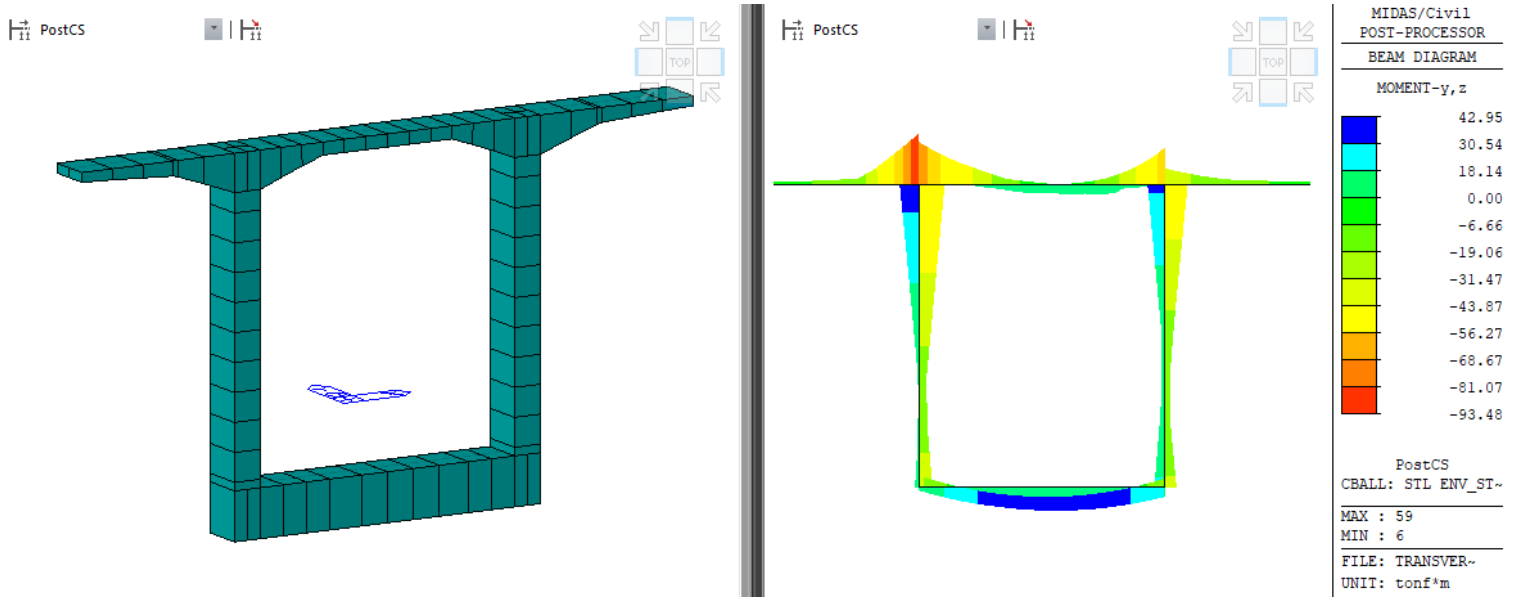


Figura 106. Modelo plano de la sección transversal en la dovela D0

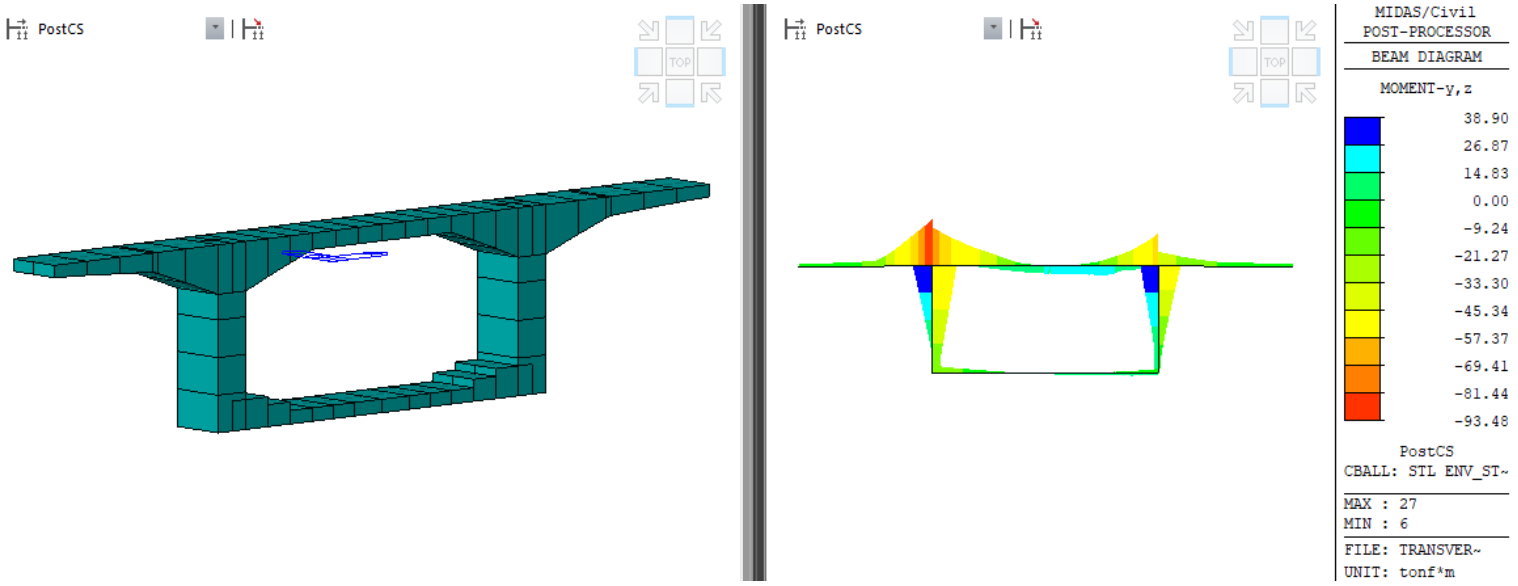


Figura 107. Modelo plano de la sección transversal en la dovela D17

Tabla 10. Refuerzo para atender las solicitaciones de flexión en la sección transversal

			Momento Mu (ton-m)	Altura h (m)	Ancho b (m)	Recubr. r (m)	Cuantía ρ	As (cm^2)	As (cm^2)	Check
Dovela D0	Losa Superior	As+	18.16	0.27	1.00	0.05	0.01054	23.18	#7@0.10	OK
		As-	-93.48	0.81	1.00	0.05	0.00439	33.88	#7@0.10	OK
	Losa Inferior	As+	42.95	1.05	1.00	0.05	0.00333	33.33	#7@0.10	OK
		As-	21.41	1.05	1.00	0.05	0.00333	33.33	#7@0.10	OK
	Tabique Derecho	As+	32.05	0.60	1.00	0.05	0.00333	18.33	#8@0.10	OK
		As-	-41.48	0.60	1.00	0.05	0.00370	20.37	#8@0.10	OK
	Tabique Izquierdo	As+	35.76	0.60	1.00	0.05	0.00333	18.33	#8@0.10	OK
		As-	46.77	0.60	1.00	0.05	0.00425	23.38	#8@0.10	OK
Dovela D17	Losa Superior	As+	18.13	0.27	1.00	0.05	0.01052	23.14	#7@0.10	OK
		As-	-93.48	0.81	1.00	0.05	0.00439	33.35	#7@0.10	OK
	Losa Inferior	As+	4.90	0.22	1.00	0.05	0.00460	7.82	#7@0.10	OK
		As-	-15.71	0.49	1.00	0.05	0.00333	14.67	#7@0.10	OK
	Tabique Derecho	As+	36.14	0.60	1.00	0.05	0.00333	18.33	#8@0.10	OK
		As-	-43.75	0.60	1.00	0.05	0.00391	21.51	#8@0.10	OK
	Tabique Izquierdo	As+	38.90	0.60	1.00	0.05	0.00347	19.08	#8@0.10	OK
		As-	-48.27	0.60	1.00	0.05	0.00432	23.78	#8@0.10	OK

Por lo tanto, se verifica las solicitaciones a las dovelas más críticas, la dovela 0 por tener la mayor inercia geométrica y la dovela 17 por tener la menor inercia geométrica, es así que, el refuerzo presentado aplica para todas las dovelas.

3.5.15. **DISEÑO A FLEXIÓN LONGITUDINAL**

Por torsión se especifica una cantidad mínima de refuerzo longitudinal según el 5.8.6.4-3 el cual corresponde a

$$A_l = \frac{T_u \cdot p_h}{2 \cdot \emptyset \cdot A_o \cdot f_y}$$

Se debe disponer además una cantidad de refuerzo longitudinal para anteder las tensiones de tracción en la sección transversal del cajón debido a las solicitaciones del puente, las cuales tienen la siguiente configuración:

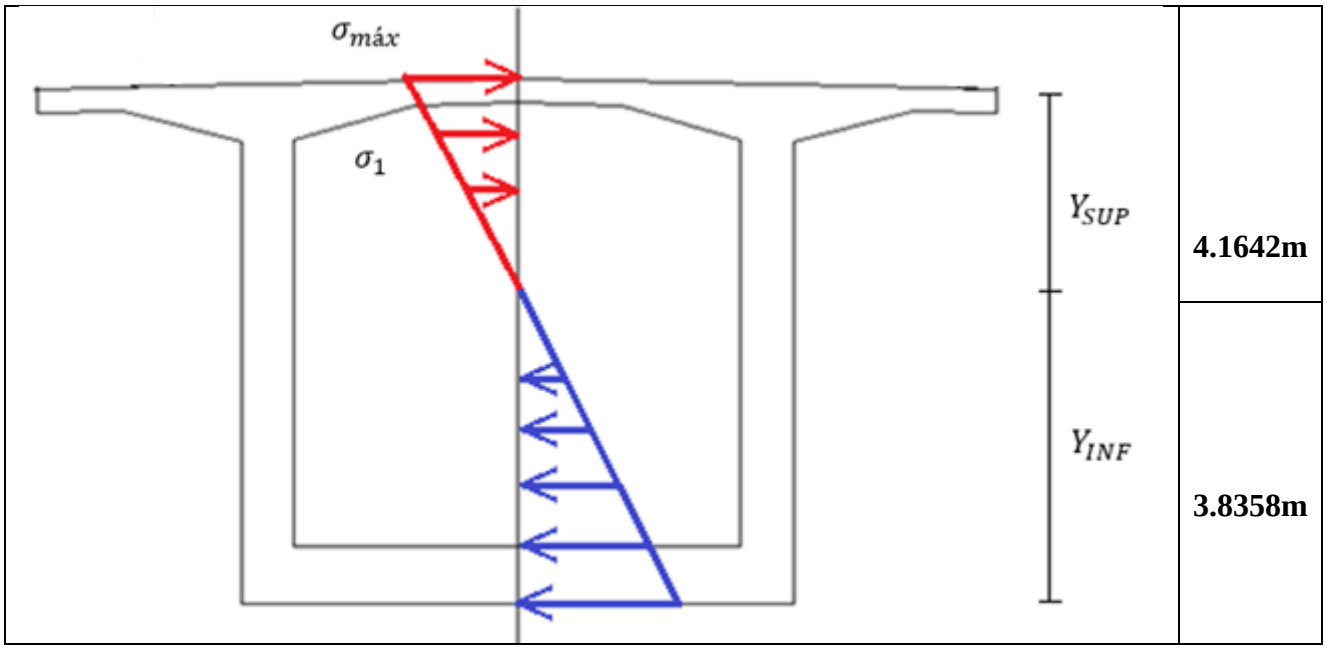


Figura 108. Diagrama de tensiones en dovela de máxima tensión en fibra superior

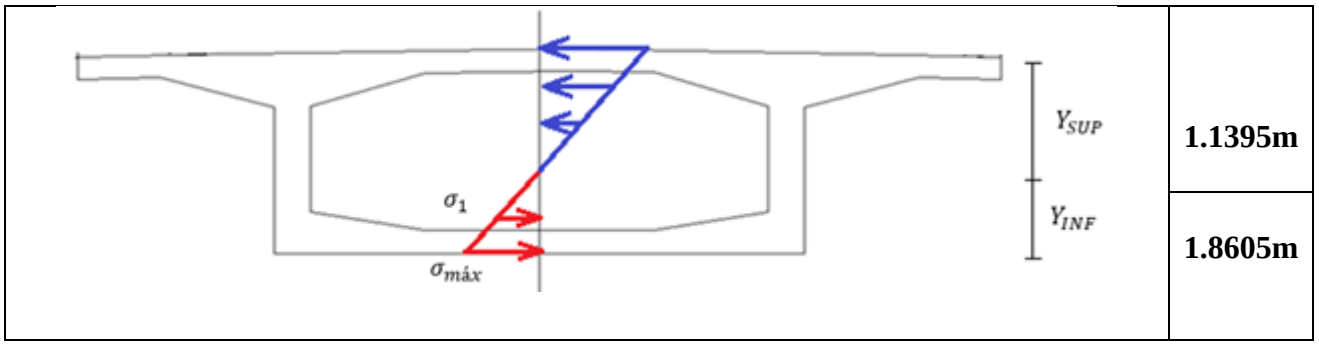


Figura 109. Diagrama de tensiones en dovela de máxima tensión en fibra inferior

Las fuerzas totales sobre las losas y los tabiques se calculan respectivamente como:

$$T_{Losa} = \sigma_{Máx} * B * h \qquad T_{Tabique} = \sigma_{Máx} * b_w * (Y_{sup} - h)$$

El máximo esfuerzo de tracción permitido por norma es:

$$\sigma_{Máx} = 34.13\ \text{kg/cm}^2 = 341.3\ ton/m^2$$

Las cuales deben ser atendidas por una cantidad de acero tal que:

$$A_s = \frac{T}{\emptyset\, f_y}, \quad donde\ \emptyset = 0.60$$

DOVELA 00

Losa Inferior

$$T = 7.10\ m \cdot 1.05\ m \cdot 341.30\ \frac{ton}{m^2} = 2544.39\ ton$$

$$A_s = \frac{2544.39\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 1009.67\ cm^2$$

Por tanto, en la losa inferior se dispondrán 4 capas con barras longitudinales N7 cada 0.10 m tanto en cara superior como en cara inferior

Losa superior

$$T = 14.20\ m \cdot 0.27\ m \cdot 341.30 \frac{ton}{m^2} = 1308.55\ ton$$

$$A_s = \frac{1308.55\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 519.26\ cm^2$$

Por tanto, en la losa superior se dispondrán barras longitdudinales N6 cada 0.10 m tanto en cara superior como en cara inferior

Tabique (Parte superior)

$$T = 0.60\ m \cdot (4.1642 - 0.27)\ m \cdot 341.30 \frac{ton}{m^2} = 797.45\ ton$$

$$A_s = \frac{797.45\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 316.45\ cm^2$$

Por tanto, en el tabique lateral se dispondrán barras longitdudinales N7 cada 0.10 m tanto en cara exterior como en cara interior.

Tabique (Parte inferior)

$$T = 0.60\ m \cdot (3.8358 - 1.05)\ m \cdot 341.30 \frac{ton}{m^2} = 570.47\ ton$$

$$A_s = \frac{570.47\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 226.37\ cm^2$$

Por tanto, en el tabique lateral se dispondrán barras longitdudinales N7 cada 0.10 m tanto en cara exterior como en cara interior.

DOVELA 17

Losa Inferior

$$T = 7.10\ m \cdot 22\ m \cdot 341.30\ \frac{ton}{m^2} = 533.11\ ton$$

$$A_s = \frac{533.11\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 211.55\ cm^2$$

Por tanto, en la losa inferior se dispondrán barras longitudinales N7 cada 0.10 m tanto en cara superior como en cara inferior

Losa superior

$$T = 14.20\ m \cdot 0.27\ m \cdot 341.30 \frac{ton}{m^2} = 1308.55\ ton$$

$$A_s = \frac{1308.55\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 519.26\ cm^2$$

Por tanto, en la losa superior se dispondrán barras longitdudinales N6 cada 0.10 m tanto en cara superior como en cara inferior

Tabique (Parte superior)

$$T = 0.60\ m \cdot (1.1395 - 0.27)\ m \cdot 341.30 \frac{ton}{m^2} = 178.05\ ton$$

$$A_s = \frac{178.05\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 70.65\ cm^2$$

Por tanto, en el tabique lateral se dispondrán barras longitdudinales N7 cada 0.10 m tanto en cara exterior como en cara interior.

Tabique (Parte inferior)

$$T = 0.60\ m \cdot (1.8605 - 0.22)\ m \cdot 341.30 \frac{ton}{m^2} = 335.94\ ton$$

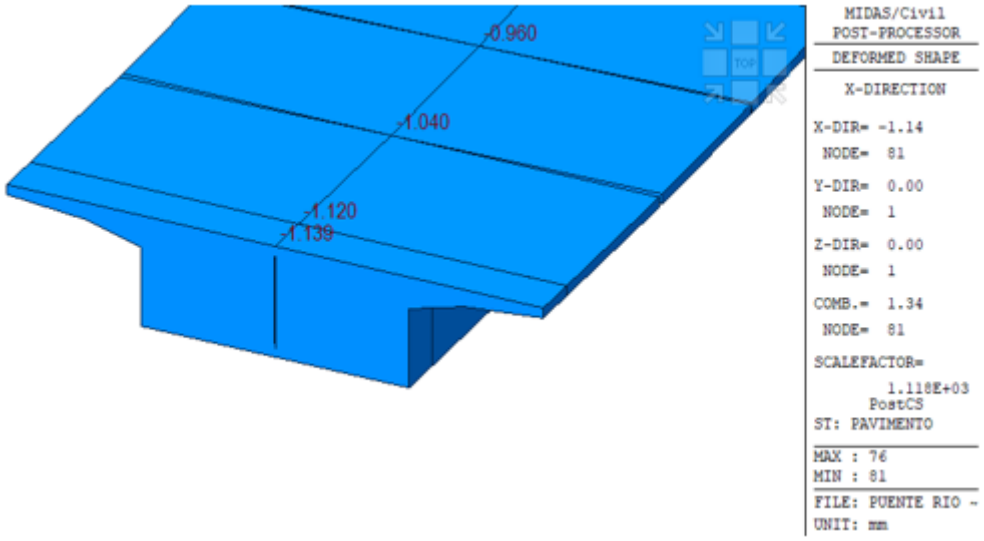
$$A_s = \frac{335.94\ ton/m^2}{0.6 * 4.2\ ton/cm^2} = 133.31\ cm^2$$

Por tanto, en el tabique lateral se dispondrán barras longitdudinales N7 cada 0.10 m tanto en cara exterior como en cara interior.

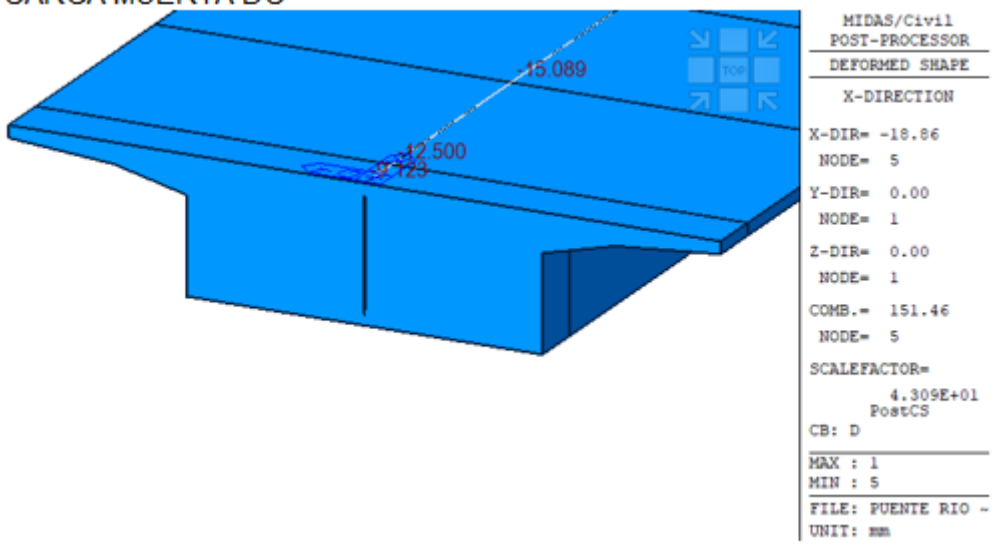
3.6. DISEÑO DE JUNTAS DE EXPANSIÓN VOLADIZOS

Se diseña para la condición más crítica, es decir para el apoyo intermedio 3, que está en contacto con las vigas postensadas de 21.0m.

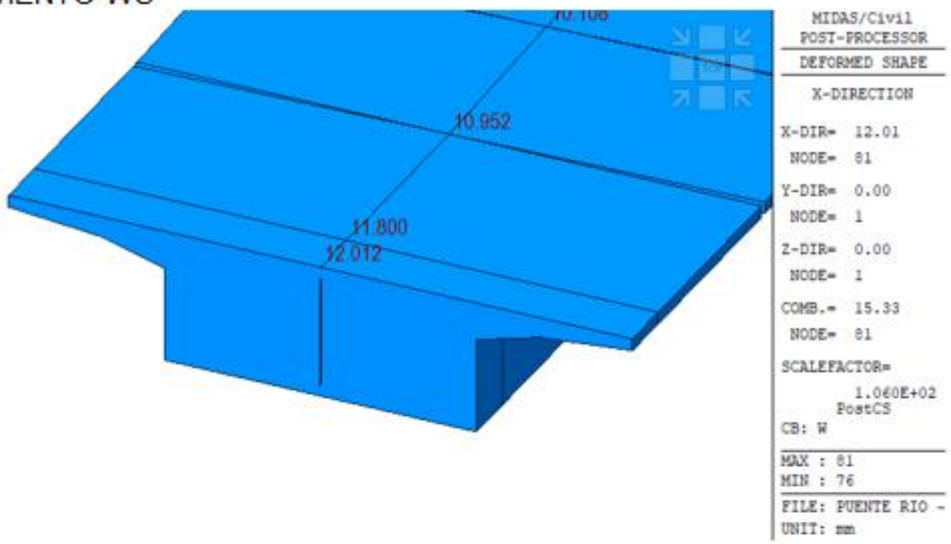
PAVIMENTO DW



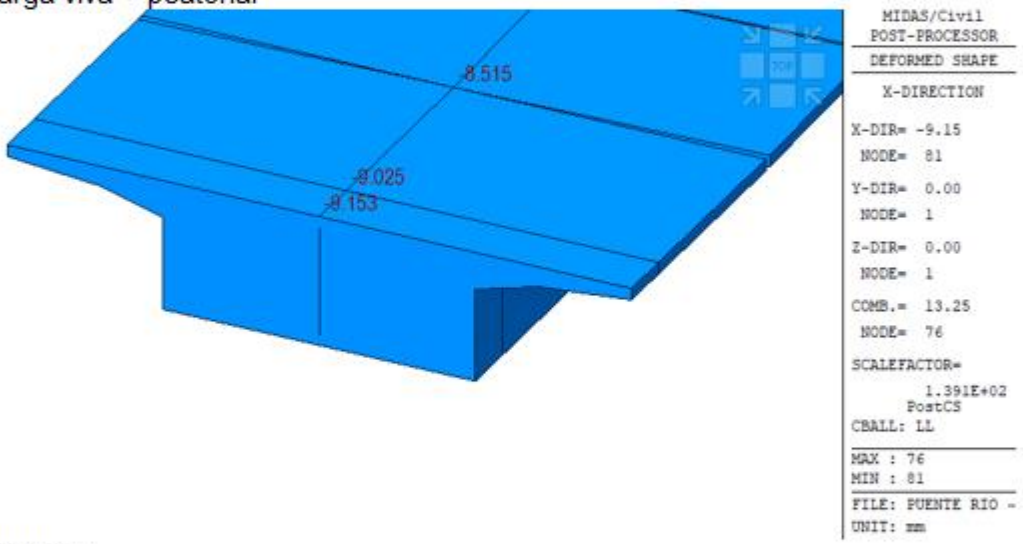
CARGA MUERTA DC



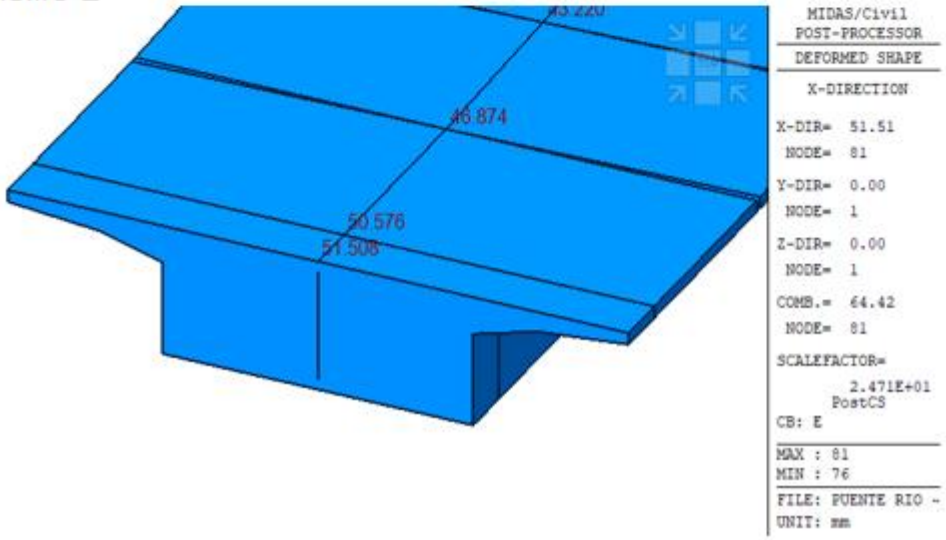
VIENTO WS



Carga viva + peatonal



SISMO E



JUNTAS DE EXPANSIÓN TÉRMICA

Las juntas de expansión serán diseñadas para acomodar los desplazamientos que se derivan de condiciones especificas

1. Máximo desplazamiento debido a combinaciones de estado límite de servicio que se obtienen del modelo estructural, más los desplazamientos reológicos del concreto (temperatura, contracción y flujo plástico), más un porcentaje del desplazamiento máximo producto del sismo de diseño.
2. Máximo desplazamiento debido a las combinaciones de estado límite de resistencia que se obtiene del modelo estructural, más el desplazamiento por el acortamiento del concreto, más 1.2 veces el desplazamiento debido al cambio uniforme de temperatura.

Δ DW=	1.14	mm
Δ DC=	9.12	mm
Δ WS=	12.01	mm
Δ LL=	9.15	mm
Δ E=	51.51	mm
% sismo	80%	
Δ sismo diseño	41.21	mm

Según el numeral 5.4.2.3.2 de la CCP-14, el coeficiente del flujo plástico puede calcularse como:

$$\psi = 1.9 K_s K_{hc} K_f K_{td} t_i^{-0.118}$$

Edad al inicio de carga, t_i	28	dias
Tiempo final de cálculo, t_i	4000	dias
Resistencia del concreto f'c	45	MPa
% Resistencia al momento de carga f'ci	80%	
Resistencia al momento de carga f'ci	36	MPa
Humedad relativa, H	70%	
F. relación de volumen, K_s	1.00	(para vigas presforzadas)
F. humedad, K_{hc}	1.00	
F. resistencia concreto, K_f	0.67	
F. desarrollo de tiempo, K_{td}	0.99	
Coeficiente flujo Plástico, ψ	0.476	

El movimiento provocado por el flujo plástico, se calcula multiplicando los desplazamientos elásticos debidos a las cargas muertas por el coeficiente de flujo plástico

Δ Creep = 4.882 mm

Para concreto no restringido, la deformación por contracción máxima despues de la instalación, β, puede suponerse igual a 0.0002 (WSDOT,2011). El acortamiento del tablero, Δ Shrink, se calcula como:

$$\Delta_{SHRINK} = \beta(\mu)L_{trib}$$

Deformación unitaria máxima, β=	0.0002	
F. efecto de restricción, μ=	0.5	(para vigas de concreto presforzadas)
Longitud tributaria Ltrib=	80	m
Δ Shrink =	8	mm

El desplazamiento debido al cambio de temperatura uniforme se calcula:

$$\Delta_{temp} = \alpha(L_{trib})\delta T$$

Coef. De expansión térmica, α=	9.00E-06	
Variación de temperatura, δT=	10	°C
Δ temp =	7.20	mm

El desplazamiento total se determina:

Caso 1 =	84.30 mm
Caso 2 =	50.64 mm

gobierna el mayor desplazamiento
84.30 mm

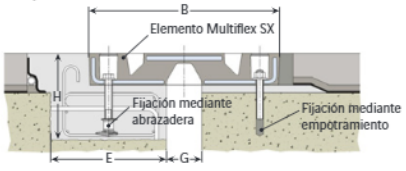
Se presentan catálogos comerciales de juntas de dilatación elastomérica, queda a criterio del constructor definir la marca y especificación técnica de cada una de ellas; se recomienda que el GAP mínimo de desplazamiento longitudinal no sea menor de 140mm±50mm, teniendo en cuenta el desplazamiento de las vigas postensadas de 21.0m.

Según el cálculo, se registra un desplazamiento máximo de 84.30 mm → CUMPLE OK

- Catalogo FREYSSINET

Ficha técnica

Existen dos diseños diferentes: la junta de módulo simple y la junta puenteada. Estos diseños se derivan del movimiento admisible de la junta.



Elemento de módulo simple

Tipo	Módulo	B mín.	B máx.	G mín.	G máx.	E mín.	H mín.
SX80	simple	235	315	10	90	195	190
SX100	simple	305	405	10	110	225	190
SX120	simple	330	450	10	130	235	210
SX160	simple	390	550	10	170	265	230
SX180	simple	410	590	10	190	275	230

Dimensiones en mm

- Catalogo AGOM

AGOM
IDEAS, ENGINEERING AND MANUFACTURE

Technical Specifications: AGFLEXJ-series expansion joints

Model	Movement [mm]	Dimensions AxHxL [mm]	P [mm]	Weight [kg/m]
AGFLEXJ 30	± 15	269 X 32 X 2000	200	17
AGFLEXJ 50	± 25	272 X 41 X 2000	200	25
AGFLEXJ 80	± 40	358 X 46 X 2000	250	32
AGFLEXJ 100	± 50	388 X 53 X 2000	250	37
AGFLEXJ 120	± 60	427 X 69 X 1000	250	59
AGFLEXJ 140	± 70	465 X 80 X 2000	250	81
AGFLEXJ 160	± 80	498 X 84 X 2000	250	88
AGFLEXJ 200	± 100	802 X 71 X 2000	250	135
AGFLEXJ 250	± 125	882 X 78 X 2000	250	170
AGFLEXJ 330	± 165	1108 X 100 X 1000	250	285

- Catalogo E&M

E&M
AISLADORES APOYOS Y JUNTAS DE DILATACIÓN

JUNTAS DE DILATACIÓN ELASTOMÉRICAS

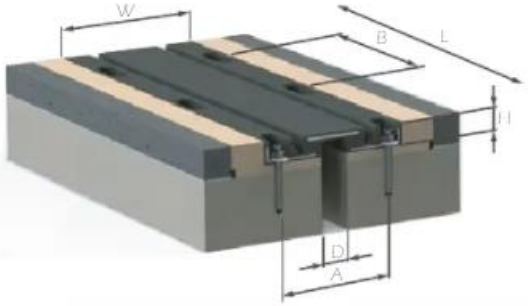
MODELO DE JUNTA	LONGITUD (mm)	ANCHURA DE TOPE (mm)	PROFUNDIDAD (mm)	DESP. LONGITUDINAL (mm)	DESP. TRANSVERSAL (mm)	APLICACIONES RECOMENDADAS
E&M 50	2000±10	264±10	39±5	50(±25)	50(±25)	Losas de puentes, losas de parqueo, rampas, estribos, estructuras elevadas, sobrepasos, presas, estadios y juntas de alivio de presión.
E&M 64	2000±10	343±10	45±5	64(±32)	64(±32)	
E&M 80	2000±10	357±10	46±5	80(±40)	80(±40)	
E&M 100	2000±10	390±10	53±5	100(±50)	100(±50)	Losas de puentes, estribos y estructuras elevadas.
E&M 140	2000±10	440±5	54±5	140(±70)	140(±70)	
E&M 160	2000±10	500±10	80±5	160(±80)	160(±80)	
E&M 180	2000±10	480±5	66±5	180(±90)	180(±90)	
E&M 200	2000±10	480±5	66±5	200(±100)	200(±100)	

- Catalogo HERFLEX SISTEMAS

Herflex Sistemas

JUNTAS DE DILATACIÓN PARA PUENTES

El sistema Herflex HF permite absorber grandes movimientos debido a su elemento elástico, de deformación multidireccional. **Se asegura un sellado eficaz, bajo mantenimiento y fácil reposición.**
Los modelos Herflex HF 50-180 cubren un rango de movimiento que va desde 50mm a 180mm y los modelos Herflex HF 195-380 desde 195mm a 380mm.



HF 50 - 180

APLICACIONES PRINCIPALES

Puentes con recorridos inferiores a 180mm
Estructuras de tamaño medío
Parkings
Viaductos y puentes

MODELO		MÓDULO							PERNO
	Recorrido (mm)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	D* (mm)	Peso (kg)	M x c (mm)
HF-50	50 (±25)	1830	240	35	190	334	40	26	M14 x 170
HF-80	80 (±40)	1830	274	40	220	305	55	35	M14 x 170
HF-110	110 (±55)	1830	356	46	279	305	70	55	M16 x 170
HF-140	140 (±70)	1830	432	54	342	305	85	75	M18 x 196
HF-180	180 (±90)	1830	480	66	390	305	105	109	M20 x 196

* Máxima abertura estructural en el momento de la instalación a temperatura media.

3.1. DISEÑO DE APOYOS ELASTOMÉRICOS VOLADIZOS

Se define la mayor carga que desciende por cada tabique proveniente de la superestructura, tanto para el voladizo 1 (izquierda), como voladizo 4 (derecha)

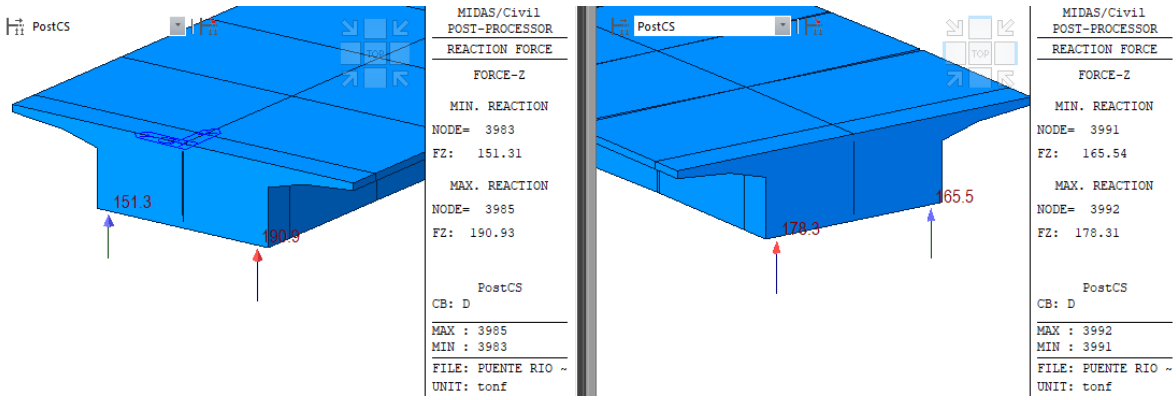


Figura 110. Reacciones debidas a cargas muertas en servicio

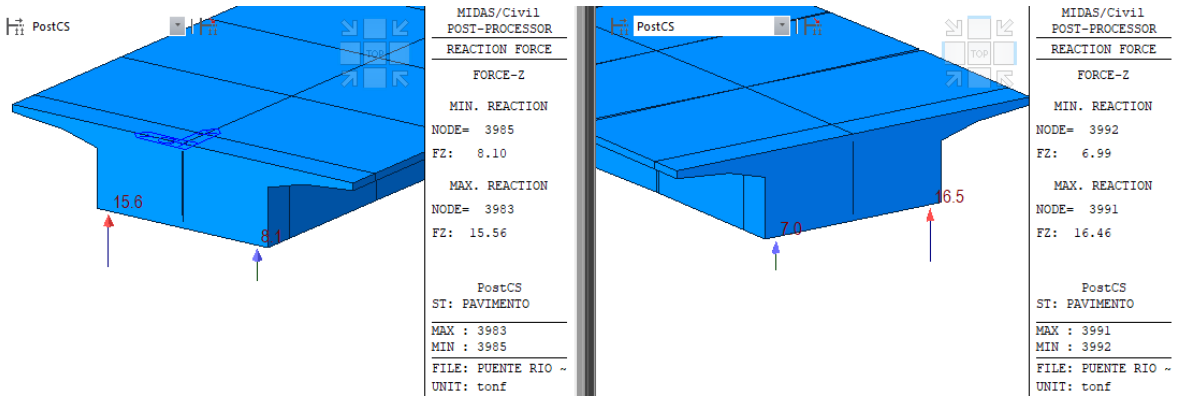


Figura 111. Reacciones debidas a cargas de pavimento en servicio

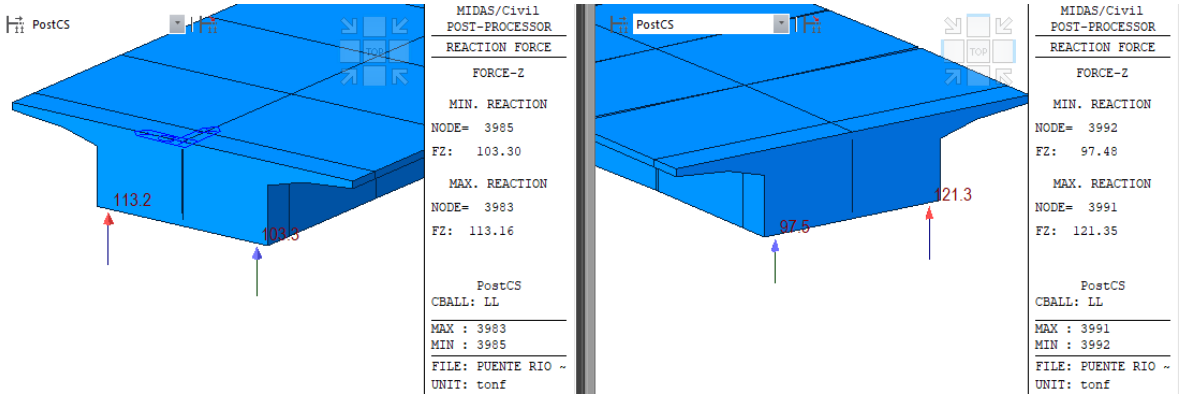


Figura 112. Reacciones debidas a cargas vivas en servicio

ton	ESTRIBO 1 – VOLADIZO 1		Máxima Carga	total
CARGA MUERTA	151.31	191.93	191.93	343.24
PAVIMENTO	8.1	15.56	15.56	23.66
CARGA VIVA	103.3	113.16	113.16	216.46

ton	APOYO 3 – VOLADIZO 4		Máxima Carga	total
CARGA MUERTA	165.54	178.31	178.31	343.85
PAVIMENTO	6.99	16.46	16.46	23.45
CARGA VIVA	67.48	121.35	121.35	188.83

Se diseña para la condición más crítica, es decir para las solicitaciones mayores provenientes de la superestructura.

1. DATOS DE ENTRADA

carga muerta	DC	190.9	ton
pavimento	DW	16.5	ton
carga viva sin impacto	LL	121.3	ton
Luz del puente	L	80	m
carga total	PT	328.7	ton

Nota: sin impacto según 14.4.1

Estado límite de servicio 1
neopreno dureza 50 en escala Shore A
Metodo diseño tipo A (14.7.6)

max temp	22	°C	
mín temp	-10	°C	
temp instalación	23	°C	
ΔT	32	°C	
acortamiento por postensado	Δpost	20	mm
por retracción de fragua	Δfragua	9	mm

Coef. Dilatación concreto	α	1.08E-05	1/°C
defor. Unitaria por flujo plástico	εp	0.0003	
Acero A36 Fy	250	Mpa	

2. DEFORM. CORTANTE DEL APOYO NEOPRENO

La altura total de las capas de neopreno hrt exteriores e interiores, que conforman el apoyo debe cumplir con la siguiente condición

$$hrt \geq \frac{2*\gamma Tu*\Delta s}{\Delta temp} \quad \frac{\alpha*L*\Delta T}{\Delta temp} \quad 14.7.6.3.4\text{-}1$$

27.648 mm

γTu	1.2		
Δs		56.65	
Δs		67.98	mm

Espesor mínimmo requerido de las capas de elastomérico

De acuerdo con tabla 3.4.1-1 y para el estado límite de servicio se tiene

Sutituyendo valores en 14.7.6.3.4-1

hrt 135.9552 mm
hrt 136 mm

Tabla 14.7.6.2-1— Propiedades Físicas Correlacionadas

	Dureza (Shore A)		
	50	60	70[1]
Módulo de Cortante a 23°C (MPa)	0.66-0.90	0.90-1.38	1.38-2.07
Deflexión de flujo plástico a 25 años dividida por la deflexión inicial	0.25	0.35	0.45

[1] Sólo para PEP, FGP, y apoyos elastoméricos reforzados con acero con un deslizador de PTFE o equivalente encima del apoyo.

módulo de elasticidad a cortante
dureza 60 G 0.9 Mpa
dureza 60 G 9.14 kg/m2

σs req PT/A 67.08 kg/cm2

3. ESFUERZOS Y RELACIONES GEOMÉTRICAS DEL APOYO

de acuerdo con 14.7.6.3.2, los esfuerzos sobre el apoyo de neopreno debe cumplir lo siguiente

$\sigma_s \le 1.25GS_i$ y (14.7.6.3.2-7)

$\sigma_s \le 8.6MPa$ (14.7.6.3.2-8)

σs 8.6 Mpa
σs 87.72 kg/cm2

determinación del ancho W (normal al eje del puente) del apoyo de neopreno

Areq PT/σs
Areq 3747.150 cm2

W selec. 70 cm

W es la superficie de contacto con neopreno

determinación de la longitud L (a lo largo del eje del puente) del apoyo de neopreno

$$L = \frac{DC + DW + LL}{\sigma s * W}$$

L 53.530715 cm

L 54 cm

se toma longitud de apoyo de neopreno tal que se tenga en cuenta el cumplimiento de requisitos adicionales dimensionales

L selec 70 cm

Area 4900 cm2

OK CUMPLE

determinación del factor de forma

$$S_i \geq \frac{\sigma_s}{1.25\,G} = \text{min} = 5.87$$

Grosor de una capa interna del elastómero

$$S_i \geq \frac{LW}{2h_{ri}(L+W)} \rightarrow h_{ri} \leq \frac{LW}{2S_i(L+W)} \qquad (14.7.5.1\text{-}1)$$

hri 2.98 cm

hri 29.79 mm

hri selec 20 mm

hri selec debe ser menor que hri

Si 8.75

OK CUMPLE

		σs req		σs máx	
si		6.71 Mpa	<	8.6 Mpa	**OK CUMPLE**

grosor espesor capas externas

$h_{re} \leq 0.7\, h_{ri}$ (Art. 14.7.6.1)

hre	14 mm
hre selec	15 mm

factor de forma externo

Se	11.67

numero de capas interiores

Siendo: $h_{rt} = nh_{ri} + 2h_{re}$

n	5.30
n selec	6

Se verifica además:

$\frac{S_i^2}{n} < 20$, para dispositivos rectangulares con n≥3 (C14.7.6.1)

$\frac{S_i^2}{n}$	=	10.94	<	20	**OK CUMPLE**

Espesor total elastómero

$h_{rt} = nh_{ri} + 2h_{re}$ hrt 150 mm

Espesor placas de refuerzo

- En el estado límite de servicio:

$h_s \geq \frac{3h_{ri}\sigma_s}{F_y}$ (14.7.5.3.5-1)

$$\frac{3h_n\sigma_s}{F_y} = 1.61 \text{ mm} < 20 \text{ mm}$$

OK cumple

- En el estado límite de fatiga:

$$h_s \geq \frac{2h_n\sigma_L}{\Delta F_{TH}} \qquad (14.7.5.3.5\text{-}2)$$

Umbral de fatiga 6.6.1.2.5-3 ΔFTH 165 Mpa

$$\frac{2h_n\sigma_L}{\Delta F_{TH}} = 0.60 \text{ mm} < 20 \text{ mm}$$

σL PLL/A 24.7551 kg/cm2

OK cumple

hs 1.61 mm
hs selex 3 mm

altura total elastómero

$H = h_{rt} + (n+1)h_s$ H 171 mm

verificaciones por estabilidad

el espesor total es H= 171mm y no debe exceder el menor valor entre

L/3 y W/3

L/3= 233.33 mm > 171 mm

OK CUMPLE

W/3= 233.33 mm > 171 mm

OK CUMPLE

Verificación de la condición requerida 14.7.6.1

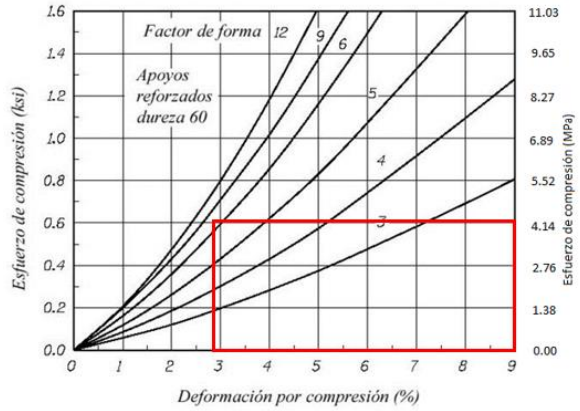
- Apoyos elastoméricos reforzados con acero en los cuales $S_i^2/n < 22$, y para los cuales la rotación principal es alrededor del eje paralelo al eje transversal del puente; y

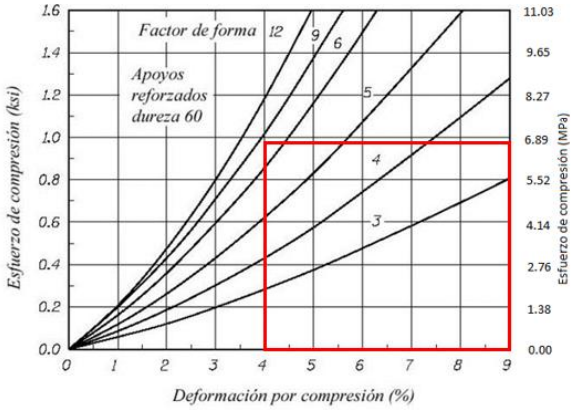
Si*Si/n	12.76	<	22

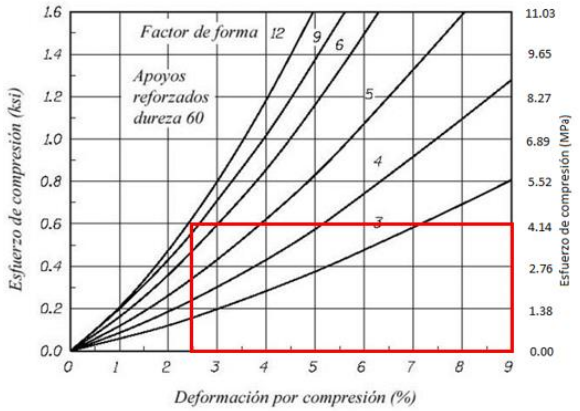
OK CUMPLE METODO A

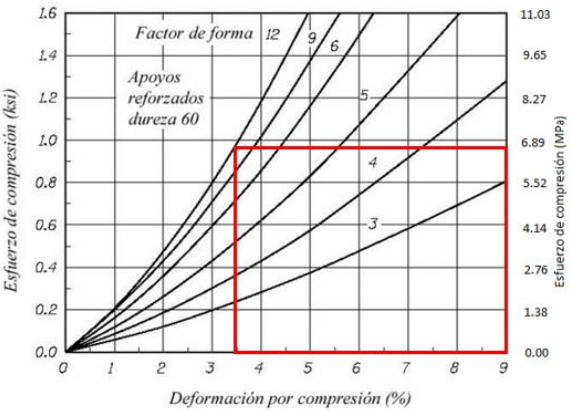
4. DEFORMACIONES DEL APOYO DE NEOPRENO

CAPA	CARGA	S	σ (Mpa)	ε unitaria %
INTERIOR	MUERTA	8.75	4.15	2.8%
	TOTAL	8.75	6.71	4.0%
EXTERIOR	MUERTA	11.67	4.15	2.5%
	TOTAL	11.67	6.71	3.5%









deflexión por compresión inicial del dispositivo

Deflexión por compresión inicial del dispositivo (14.7.5.3.6-1 y 14.7.5.3.6-2)

$$\delta = nh_n\varepsilon_{int} + 2h_{re}\varepsilon_{ext}$$

δ= 5.85 mm

Esfuerzo promedio sobre el apoyo de neopreno debido a la carga permanente de servicio

$$\sigma = \frac{DC + DW}{W * L}$$

σ 423.27 ton/m2

σ 4.15 Mpa

Deflexión por compresión inicial debido a la carga muerta (14.7.5.3.6-2)

$$\delta_{DC} = nh_n\varepsilon_{D\,int} + 2h_{re}\varepsilon_{D\,ext}$$

δdc= 4.110 mm

Deflexión por compresión debido a la carga viva

$$\delta_{LL} = \delta - \delta_{DC}$$

δLL= 1.740 mm

La deflexión de largo plazo de carga muerta, incluyendo los efectos de flujo plástico, debe tomarse así:

$$\delta_{lt} = \delta_d + a_{cr}\delta_d \qquad (14.7.5.3.6\text{-}3)$$

deflexión por flujo plástico αcr= 0.35

δcreep= 1.439 mm

δcreep+LL= 3.179 mm

De acuerdo con 14.7.6.3.3, la deformación por compresión debe ser menor que 0.09*hri

Deflexión por compresión inicial de una capa interior de elastómero

$$\delta_{si} = \varepsilon_{int} h_{ri} < 0.09 h_{ri} \qquad (14.7.6.3.3)$$

$$\varepsilon_{int} < 0.09$$

0.09*hri=		1.8 mm
hri*ε unitaria int=	0.80	
0.80	<	1.8

OK CUMPLE

5. FUERZA CORTANTE GENERADA EN EL APOYO DEBIDA A LOS MOVIMIENTOS POR TEMPERATURA

La fuerza debida a la deformación de un elemento elastomérico debe tomarse así:

$$H_{bu} = GA\frac{\Delta_u}{h_{rt}} \qquad (14.6.3.1\text{-}2)$$

donde:

G = módulo de cortante del elastómero (MPa)
A = área en planta del elemento elastomérico o del apoyo (mm^2)
Δ_u = deformación de cortante, obtenida de las combinaciones de carga de resistencia aplicables y evento extremo de la Tabla 3.4.1-1 (mm)
h_{rt} = espesor total del elastómero (mm)

14.7.5.2 — *Propiedades Físicas* — El módulo de cortante del elastómero a 23°C debe usarse como base para el diseño.

El elastómero debe tener un módulo de cortante especificado entre 0.55 MPa y 1.21| MPa.

G	0.9	Mpa
G	9.144	kg/cm2
Δu	1.2*Δs	
Δu	67.9776	mm
Hu	G*W*L*Δu/hrt	
Hu	0.200	MN
Hu	20.675	ton
con u=	0.200	
Ff=	u*Pdc	
Ff	38.2	ton
como Hu	< Ft	

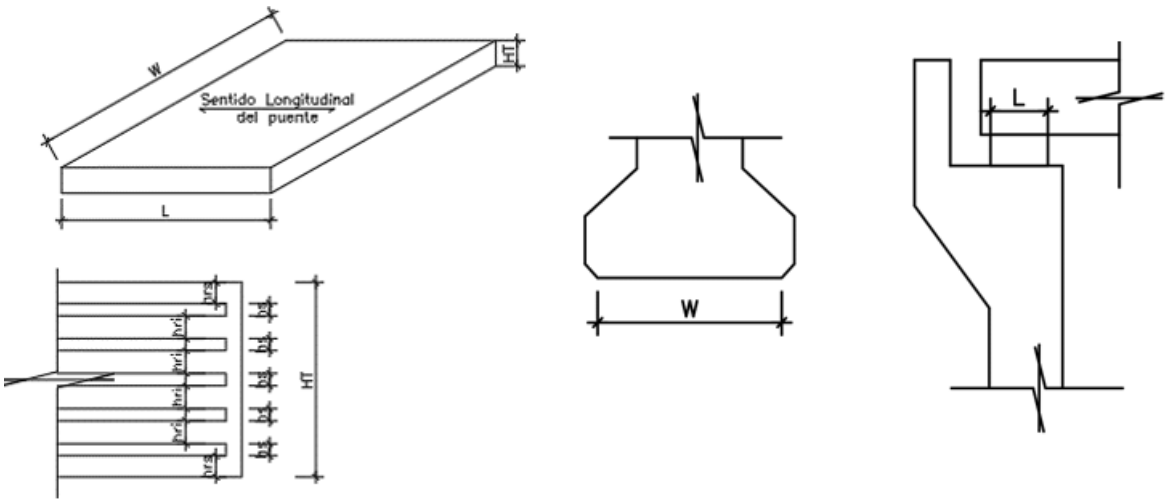
OK CUMPLE

NO REQUIERE ANCLAJES

Resumen

W=	700	mm
L=	700	mm
HT	171	mm

capas externas - hrs	2	und	15 mm	cada una
capas internas - hri	6	und	20 mm	cada una
láminas de acero - hs	7	und	3 mm	cada una



CALCULO DE RIGIDEZ NEOPRENO

se describe la geometría del apoyo elastómero a considerar

Base Elastómero W=	700	mm
Largo Elastómero L=	700	mm
Altura total Elastómero HT=	171	mm

La rigidez K de un elemento lineal elástico, se puede definir como la relación entre la fuerza P aplicada en el elemento y al deformación δ resultante:

$$P = K * \delta$$

Despejando K se tiene

$$K = P/\delta$$

Así mismo, teniendo en cuenta la resistencia de materiales de los elementos, el desplazamiento está definido como

$$\delta = \frac{P*L}{A*L}$$

despejando la variable δ, se tiene lo siguiente.

$$K = \frac{A*E}{L}$$

A es el área en planta del elastómero
L es la longitud del elemento, tomado como el espesor HT del neopreno
E es el módulo de elasticidad del material, se tomará como módulo efectivo a compresión del apoyo Ec, acorde con el C.14.6.3.2-1, el cual está definido

Ec=4.8 * G * S * S (Mpa)

A=	490000 mm2	0.49 m2
L=	171 mm	0.171 m
G=	0.9 Mpa	91.776 ton/m2
S=	8.75	

Ec= 330.75 Mpa
33727.54 Ton/m2

La rigidez vertical del elemento está definida como

K= 96646.2 ton/m

La rigidez horizontal, acorde con el numeral 14.6.3.1-2, se define como

$$Kel = \frac{G * A}{hrt}$$

Kel= 263.0 ton/m

3.2. DISEÑO DE BLOQUES SÍSMICOS VOLADIZOS

Se define la carga muerta que desciende de la superestructura, esta deberá ser soportada por los topes sísmicos ante algún movimiento telúrico. La masa gravitacional por la aceleración horizontal del espectro de aceleraciones, genera la fuerza horizontal que deberá soportar el bloque de cortante o tope sísmico.

Se diseña para la condición más crítica, es decir para el voladizo de luz de 80.0m.

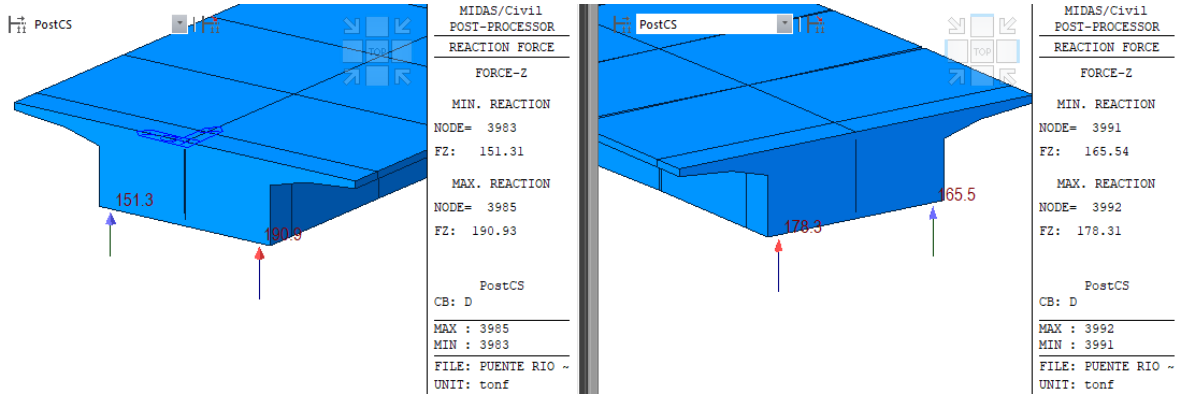


Figura 113. Reacciones debidas a cargas muertas en servicio

BLOQUES DE CORTANTE		
Fluencia del acero de refuerzo Fy	4200	kg/cm2

R: coef. de modificación de respuesta =	0.80
P_{DE}: Carga muerta sobre el estribo (ton)	190.9 ton
N_{blq} : numero de bloques de cortante =	1
Coef. para presión lateral de tierra b_E =	1.30

Máxima Aceleración Horizontal As	0.225
Cs = As / R =	0.281

$V_u = 1{,}0 * b_E * P_{DE} * Cs / N_{blq}$ =	69.8 ton	(Por bloque de cortante)

Cortante por fricción : Av	
Coeficiente de fricción para concreto vaciado contra concreto endurecido con su superficie intencionalmente rugosa	
μ:	1.00
f: coef. de reducción de resistencia =	0.90

$A_v = Vu / (\phi * fy * \mu)$	18.47 cm²

Tipo de Barra a usar	N6	
Área de la barra (cm^2)	2.84 cm²	
Ramas N6	3.25	U
Se usaran	4.00	Ramas N6 por cada bloque

Por lo tanto, se requieren mínimo 4 ramas No.6 por cada bloque sísmico.

3.3. DISEÑO DE VIGA RIGIDIZADORA

El diseño estructural de este elemento, se determina bajo la hipótesis de brindar amarre estructural y confinamiento al cierre de dovelas, aumentando la rigidez del sistema, proporcionando estabilidad y confinamiento entre frentes de dovelas; este elemento no requiere atender momentos flectores, puesto que esta demanda se contempla con el refuerzo pasivo de cada dovela y refuerzo activo de postensado positivo del vano central, es por ello que se aplica cuantía mínima de acero ρmin = 0.0033 para las dimensiones geométricas de la viga.

DISEÑO A FLEXIÓN POSITIVA Y NEGATIVA	
Resistencia del concreto f'c	280 kg/cm²
Fluencia del acero de refuerzo Fy	4200 kg/cm²
Momento de diseño Mu	26.00 ton-m/m
SECCIÓN	
$\phi_{FLUENCIA}$	0.9
Ancho b (cm)	60.0 cm
Altura h (cm)	65.0 cm
Recubrimiento (cm)	5.0 cm
Profundidad efectiva d (cm)	60.0 cm
Cuantía Calculada ρ_{CALC}	0.0033
Factor del bloque a comp. β1	0.85
Cuantía Balanceada ρ_b	0.02856
Cuantía Mínima $\rho_{Mínima}$	0.00333
Verificación Cuantía Máxima	MENOR QUE LA BALANCEADA
Verificación Cuantía Mínima	MENOR QUE LA MÍNIMA
Cuantía Seleccionada $\rho_{Seleccionada}$	0.00330
As a Utilizar (cm^2)	11.88 cm²
As a Colocado (cm^2)	12.00 cm²
Cuantía calculada	**0.0033**
Prof. Bl. de Compresión a (cm)	3.49 cm
Prof. Eje Neutro C (cm)	4.11 cm
Resistencia a la flexión refuerzo utilizado ϕMn (Ton-m)	26.42 ton-m
Resistencia a la flexión refuerzo utilizado ϕMn (kN-m)	259.21 ton-m
Relación Capacidad / demanda	**1.0163**
VERIFICACIÓN RESISTENCIA	CUMPLE
REFUERZO A FLEXION	
Tipo de Barra a usar	N5
Área de la barra (cm^2)	2.00 cm²
Separación (m)	0.101 m
Separación Seleccionada (m)	0.100 m
Numero de barras	5.940
Numero de barras seleccionada	6

Por lo tanto, se utilizará 6 barras No.5 espaciadas cada 0.10, para momento positivo como momento negativo, es decir para la cara inferior como cara superior, respectivamente.

3.4. MODELO ESTRUCTURAL VIGAS POSTENSADAS

Para modelar la estructura se empleó el programa de análisis estructural MIDAS CIVIL. El modelo se ubica dentro de un sistema global de coordenadas en donde el plano XY coincide con el plano longitudinal del puente y el eje Z es vertical.

Todos los elementos que conforman la estructura han sido modelados con elementos tipo BEAM y los encepados se modelan como elementos tipo SHELL.

Los elementos fueron dibujados teniendo en cuenta el centro de gravedad de cada una de las secciones que componen la estructura. Para la integración entre superestructura y subestructura se modelaron neoprenos con restricciones a desplazamientos en el sentido longitudinal y transversal y con un resorte vertical que simula la rigidez de este.

En los caisson de fundación se utilizaron resortes para simular el efecto de confinamiento y de la interacción suelo – estructura.

Las unidades que se emplean dentro del modelo son las siguientes:

Fuerza: tonelada (ton)
Longitud: metro (m)
Tiempo: segundo (s).
Temperatura: grados centígrados (ºC).

En las siguientes figuras se presentan el modelo estructural creado en el software MIDAS CIVIL, conformado por una estructura tipo vigas postensadas y cimentación profunda tipo caisson.

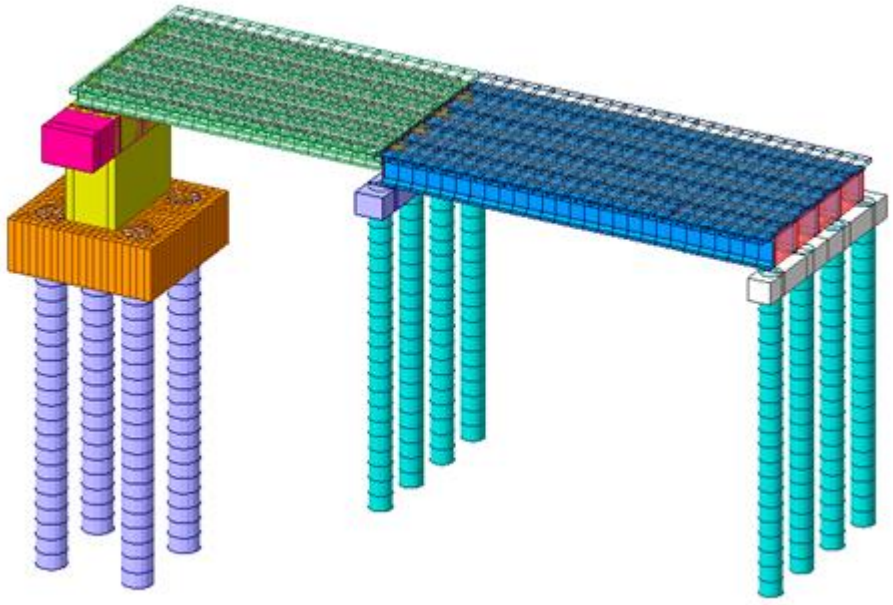


Figura 114. Modelo estructural software MIDAS CIVIL (1/2)

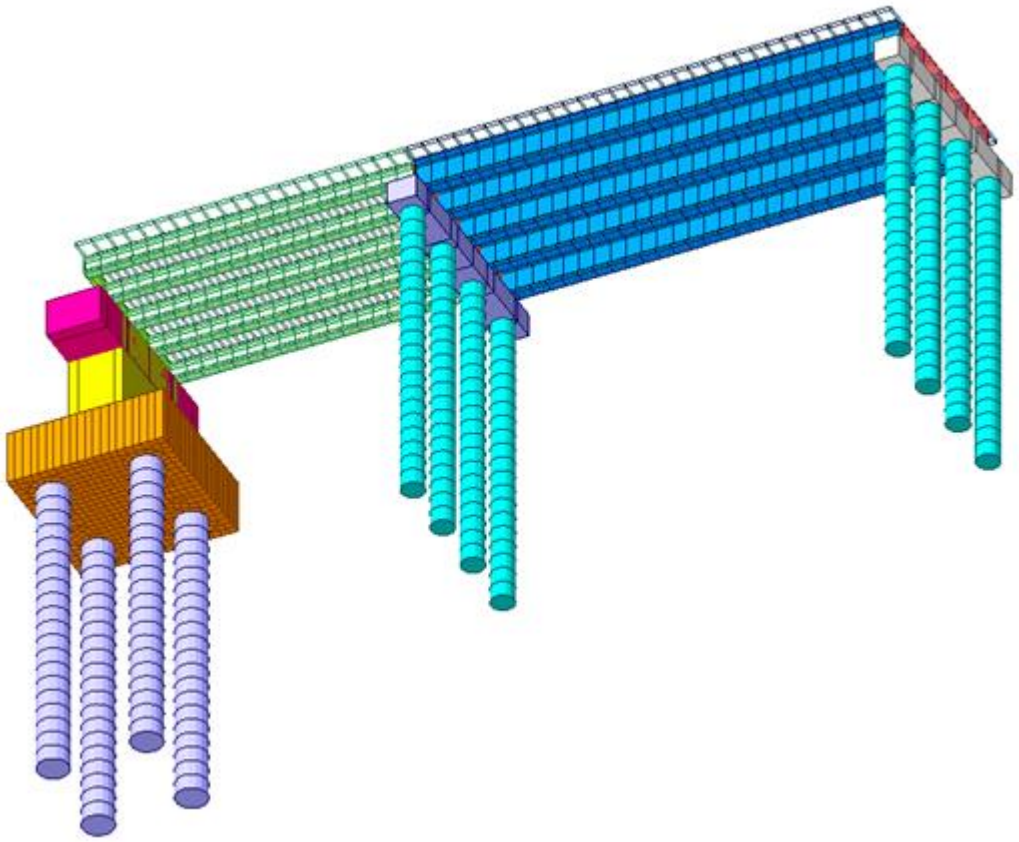


Figura 115. Modelo estructural software MIDAS CIVIL (2/2)

3.4.1. **PROPIEDADES MECÁNICAS DE LOS MATERIALES**

Se definen las propiedades mecánicas de los materiales empleados para el modelo estructural en las siguientes figuras respectivamente.

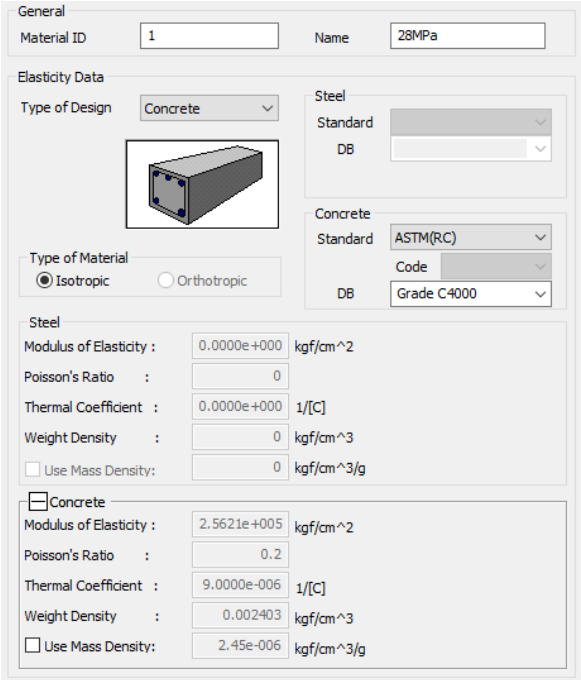


Figura 116. Propiedades mecánicas para concreto de 28 MPa (280 kg/cm2)

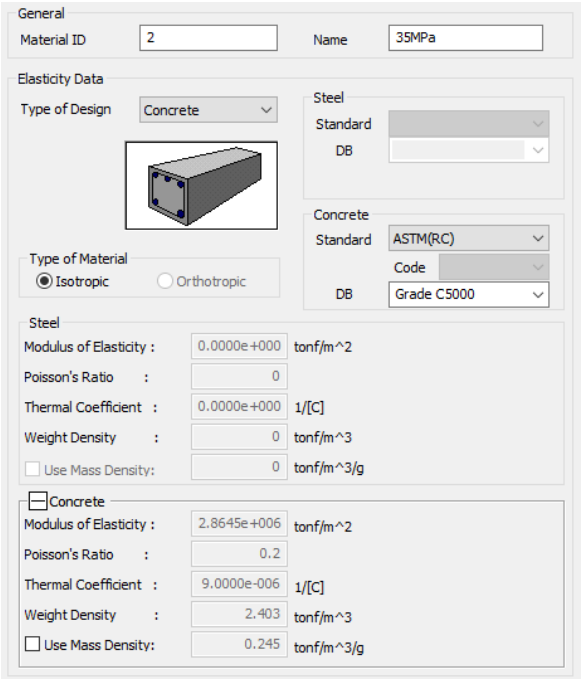


Figura 117. Propiedades mecánicas para concreto de 35 MPa (350 kg/cm2)

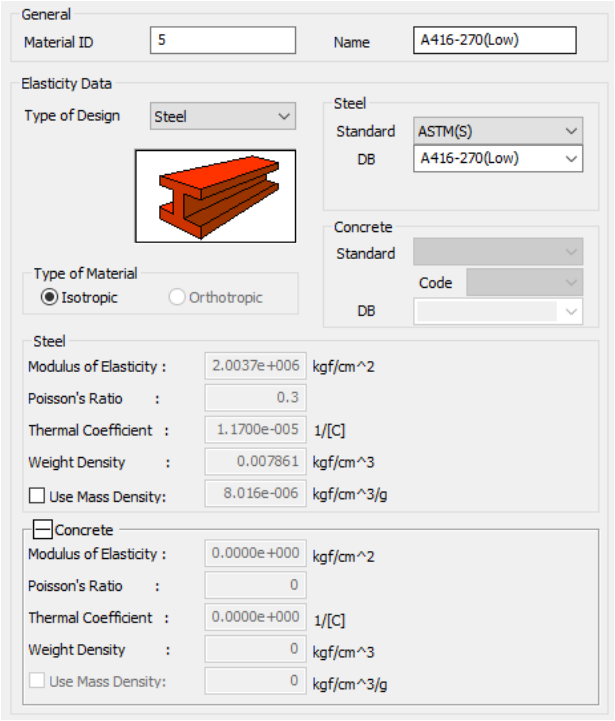
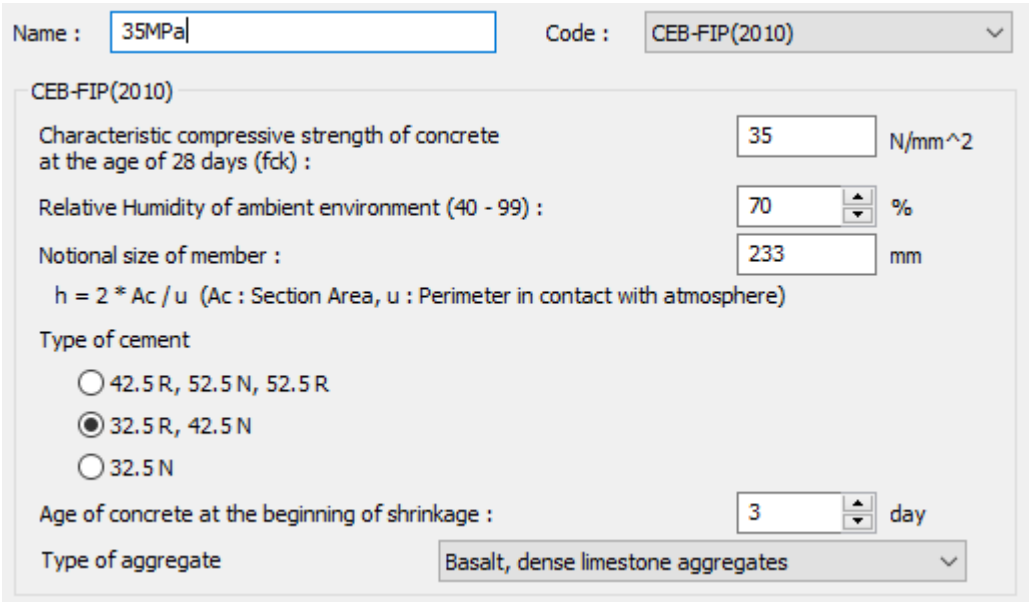


Figura 118. Propiedades mecánicas para los cables de postensado de baja relajación

3.4.2. **PROPIEDADES DEL MATERIAL FUNCIÓN DEL TIEMPO**

Se incluyen también las propiedades del material que dependen del tiempo, definidas para la retracción (Creep) y flujo plástico (Shrinkage) del concreto.



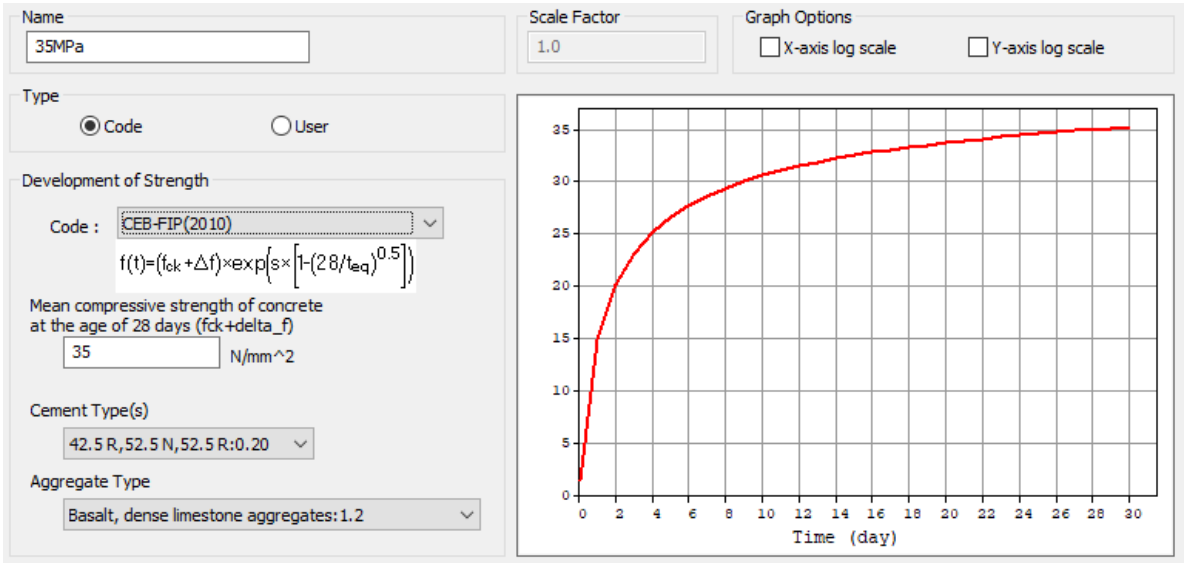
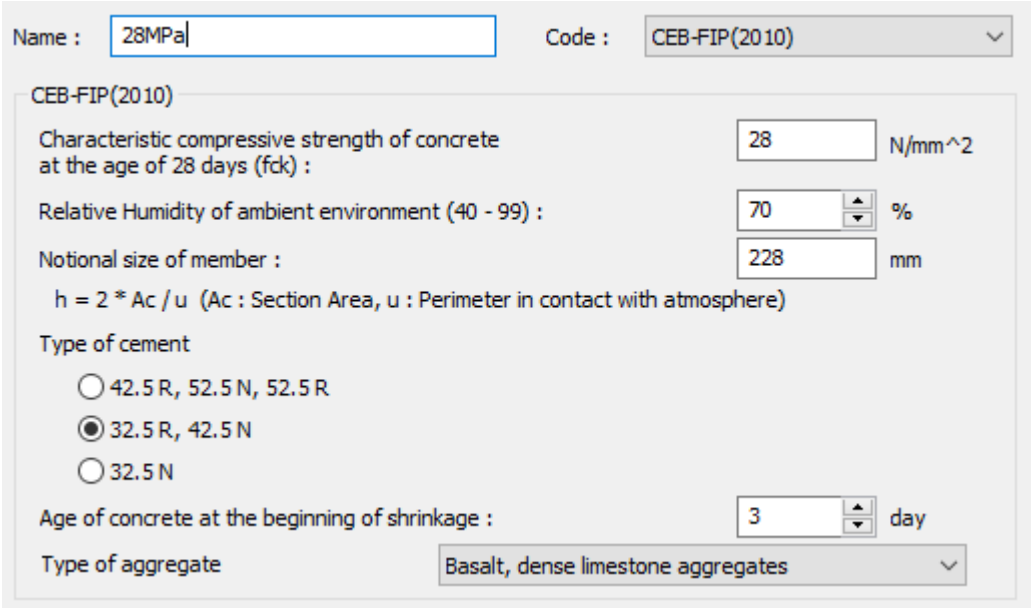


Figura 119. Retracción y flujo plástico para concreto de 35 Mpa



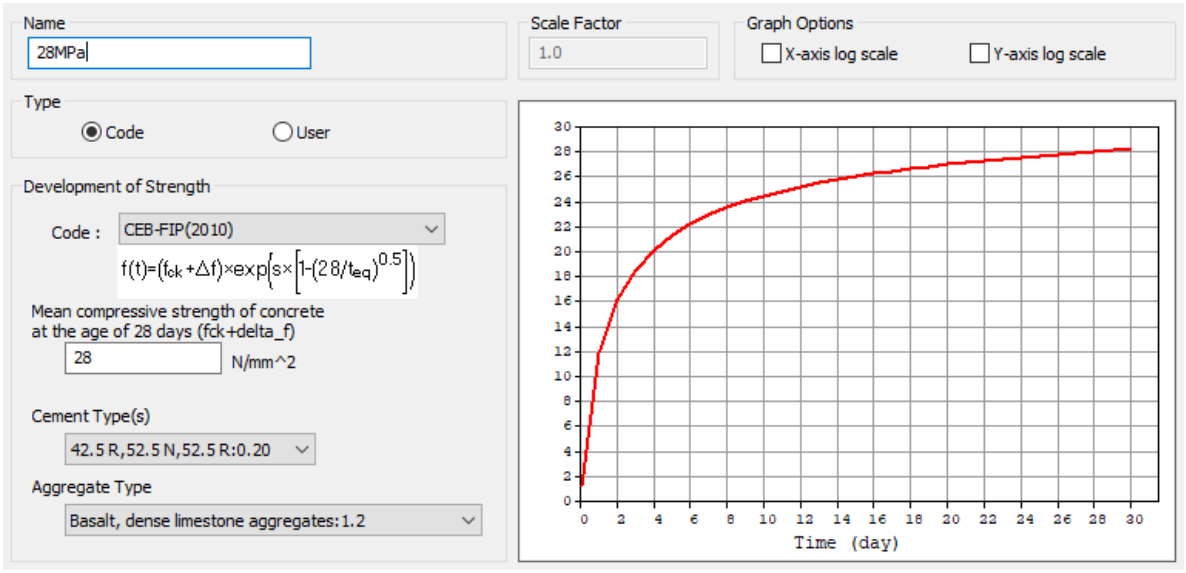


Figura 120. Retracción y flujo plástico para concreto de 28 MPa

3.4.3. **PROPIEDADES GEOMÉTRICAS DE LOS ELEMENTOS**

Definidas las diferentes características de los materiales, se definen las secciones y elementos estructurales con sus respectivas propiedades geométricas empleadas en el modelo estructural.

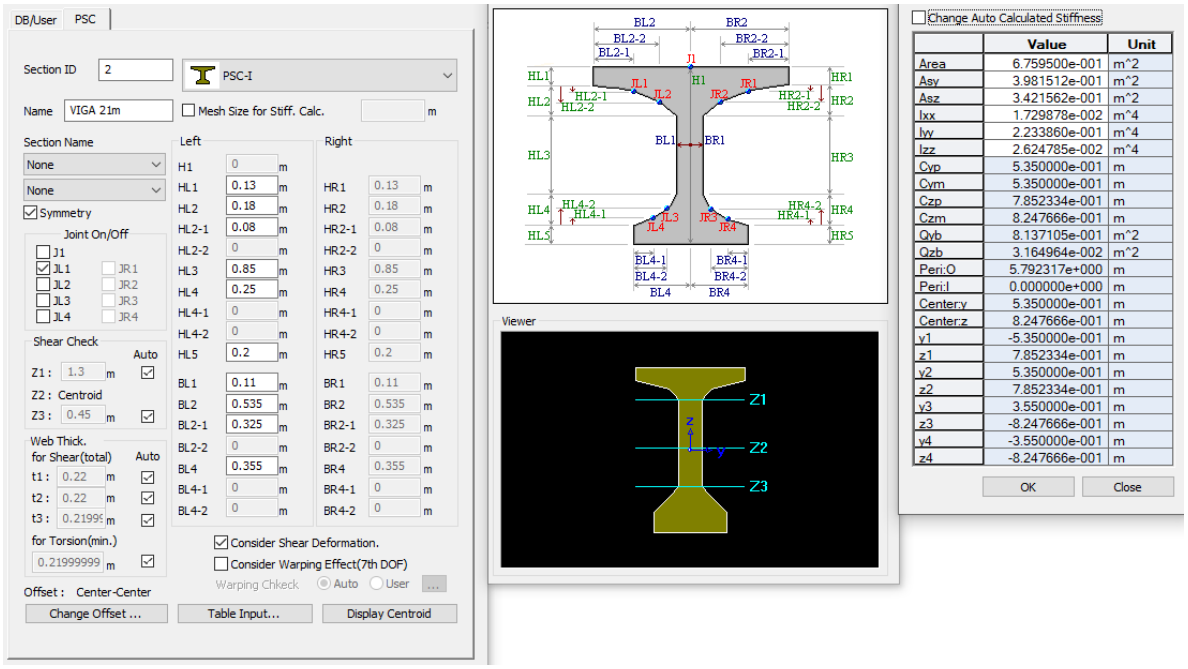


Figura 121. Viga I sección simple 21.0m y 30.0m, h = 1.61 m

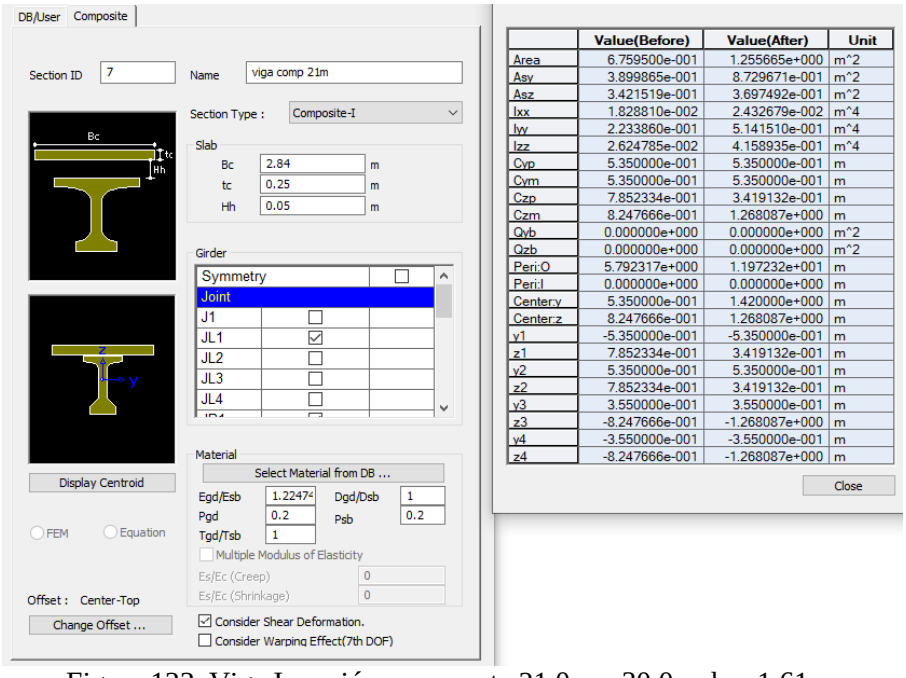


Figura 122. Viga I sección compuesta 21.0m y 30.0m, h = 1.61 m

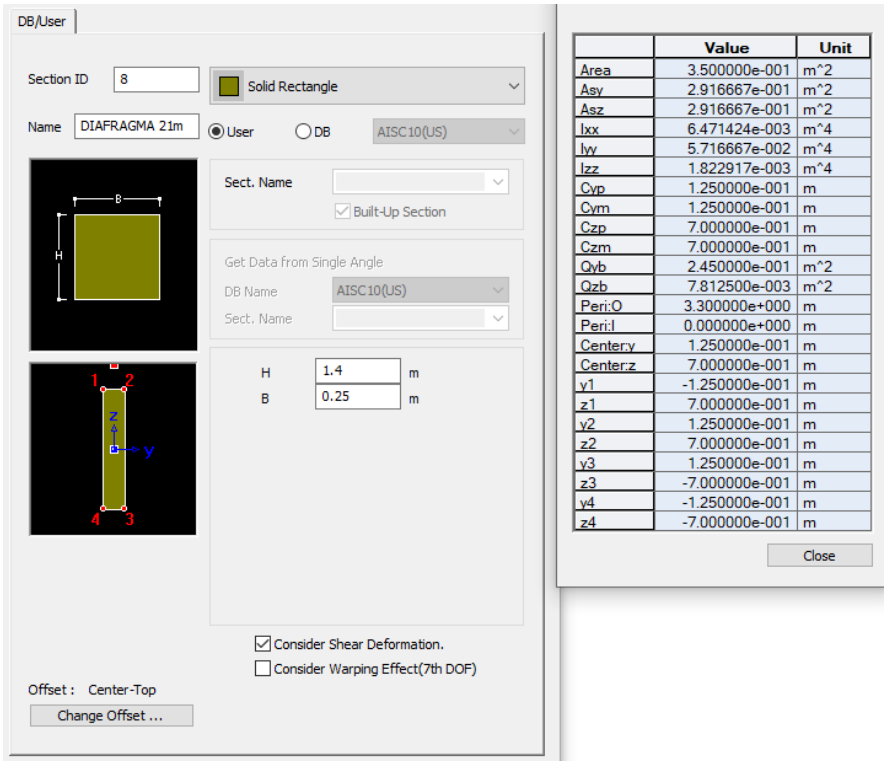


Figura 123. Viga diafragma viga 21.0m y 30.0m

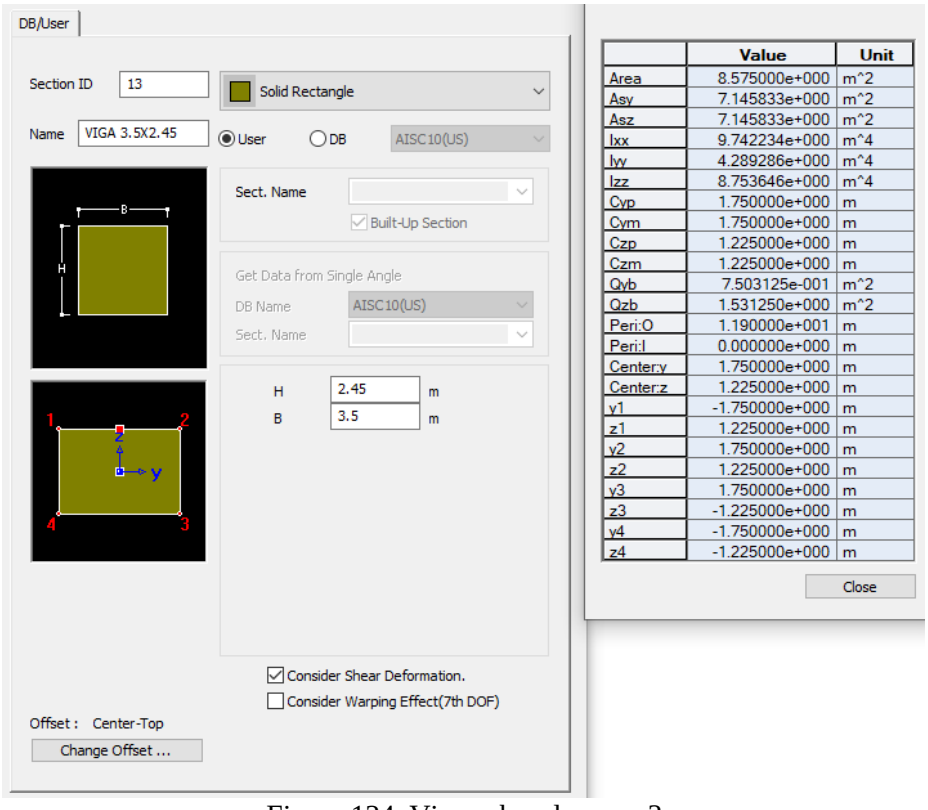


Figura 124. Viga cabezal apoyo 3

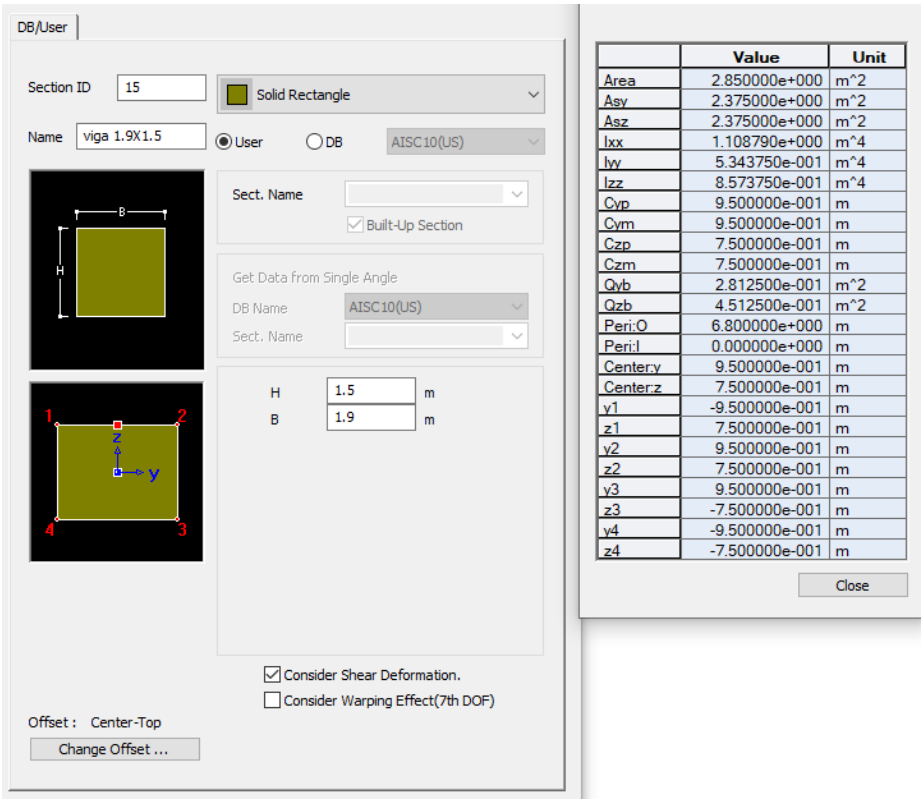


Figura 125. Viga cabezal apoyo 4

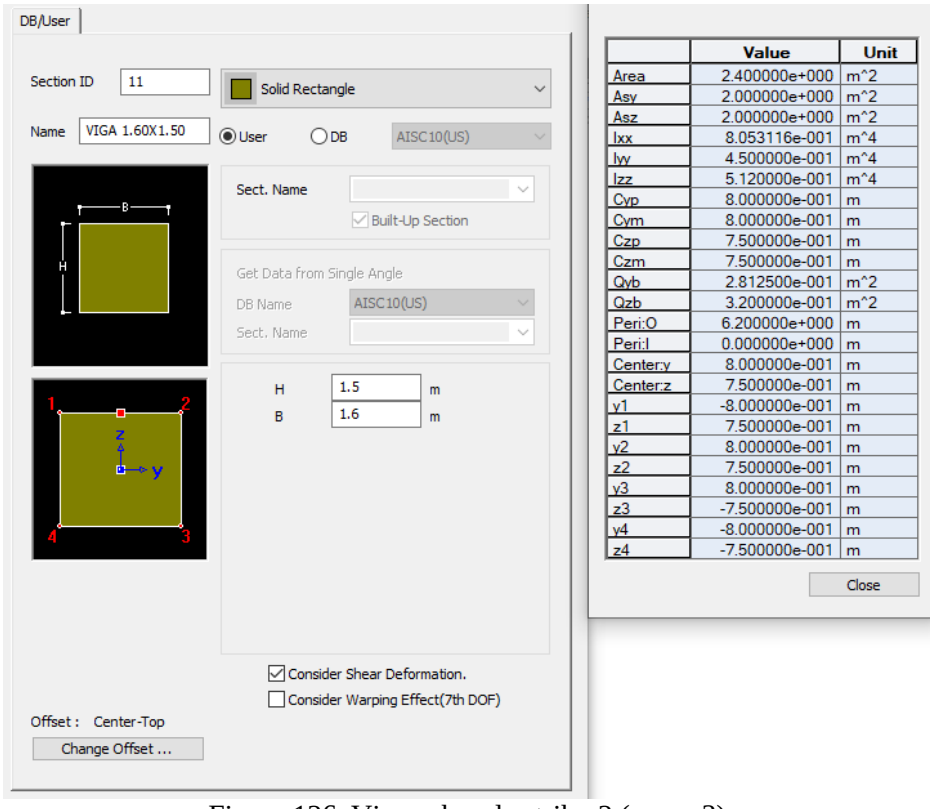


Figura 126. Viga cabezal estribo 2 (apoyo3)

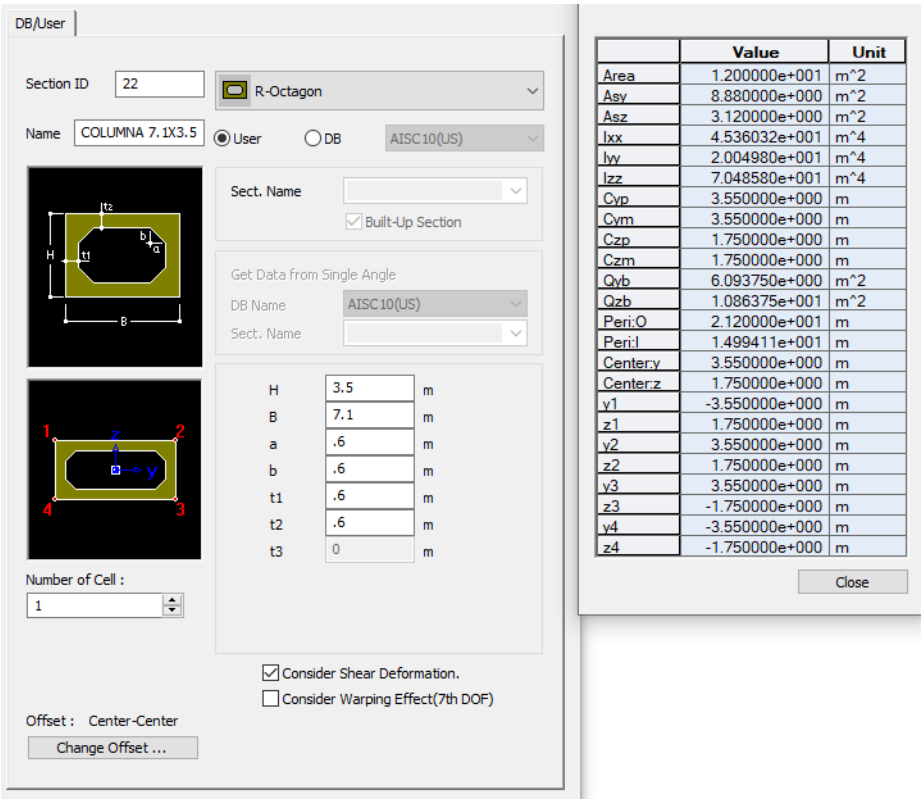


Figura 127. Pila - Columna apoyo intermedio 3

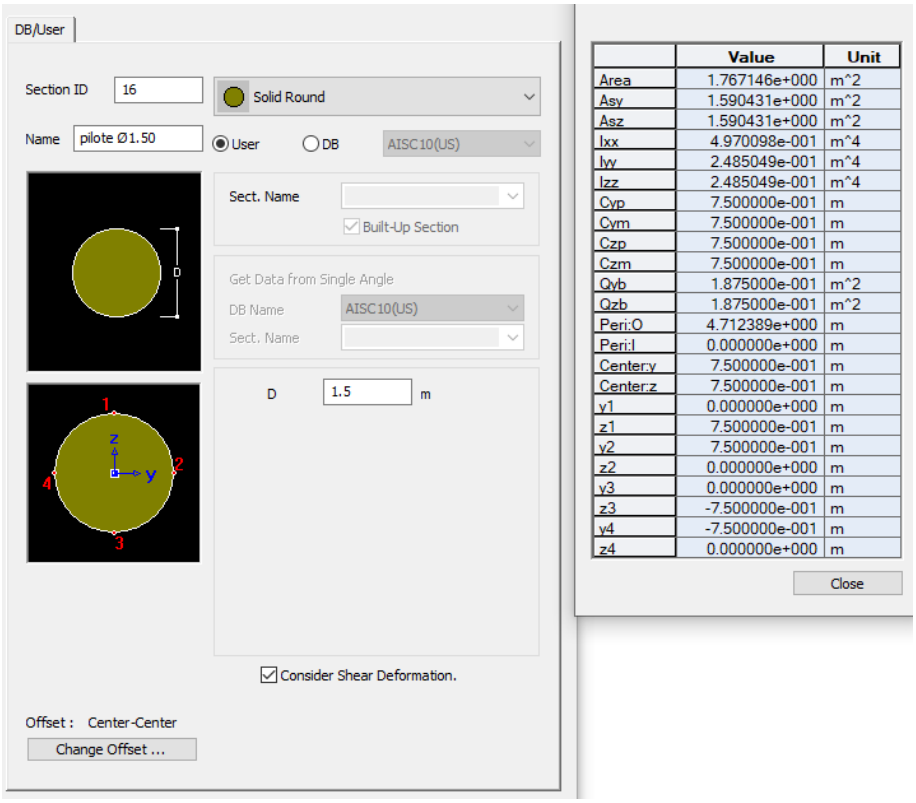


Figura 128. Pilote Ø1.50m

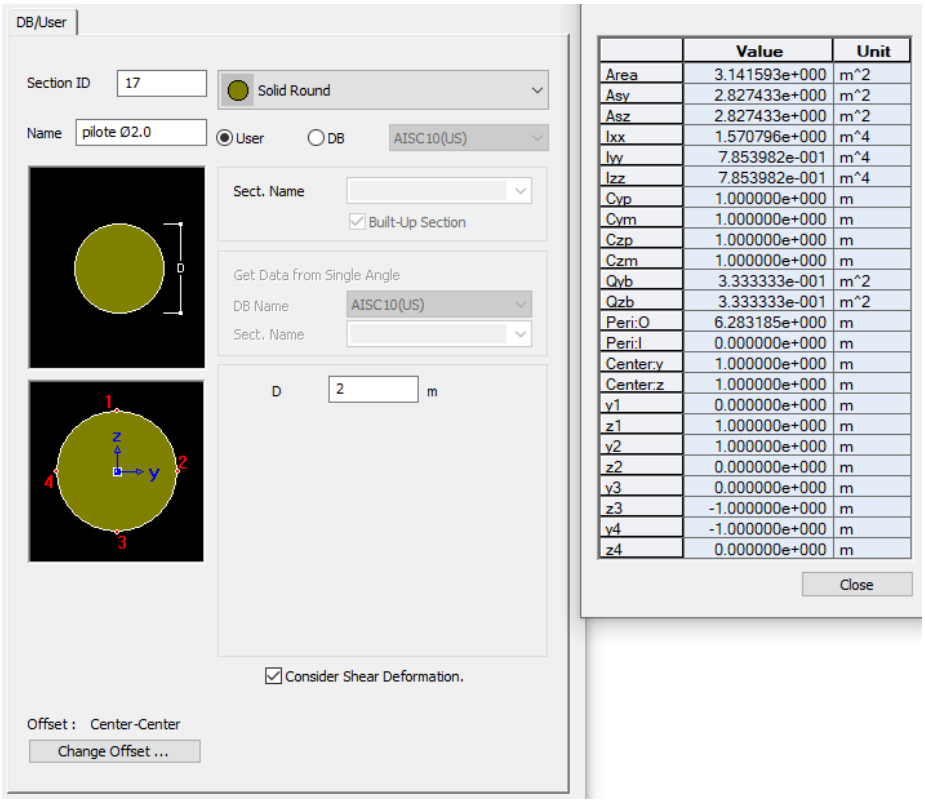


Figura 129. Pilote Ø2.0m

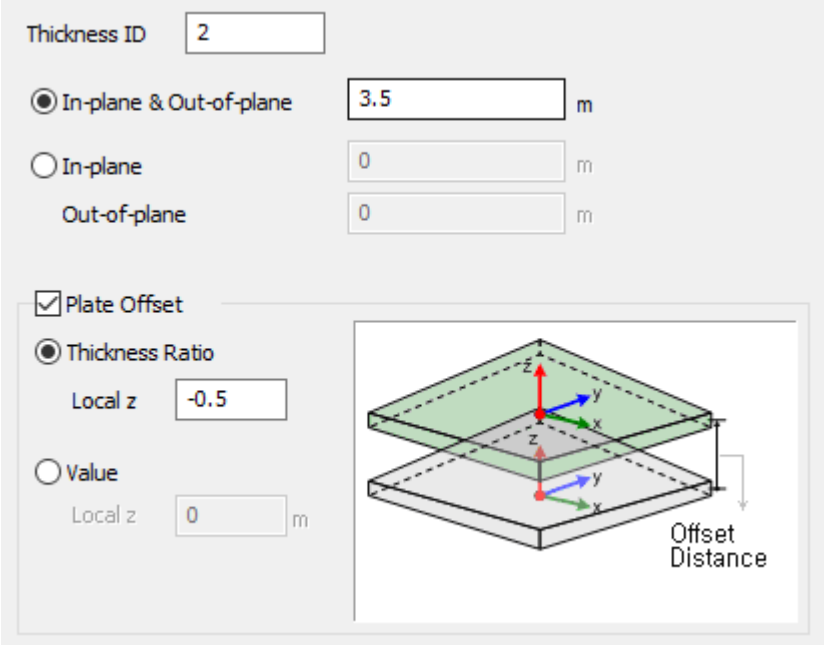
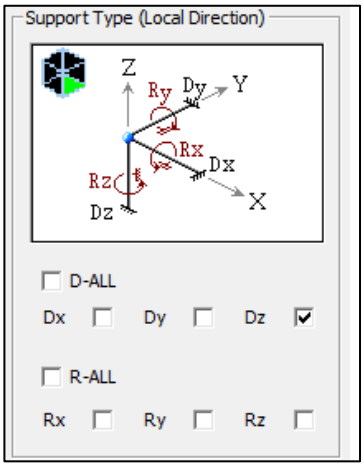


Figura 130. Espesor encepado apoyo intermedio 3

3.4.4. CONDICIONES DE CONTORNO

Para las diferentes condiciones de contorno (Figura 29), fueron utilizadas de tres (3) tipos:

4. Apoyos móviles, con un (1) grado de restricción al desplazamiento vertical.
5. Apoyo fijo, con tres (3) grados de restricción al desplazamiento en los tres (3) ejes cartesianos.
6. Apoyo semi empotrado, con dos (2) restricciones al desplazamiento en el eje x longitudinal y eje z vertical.



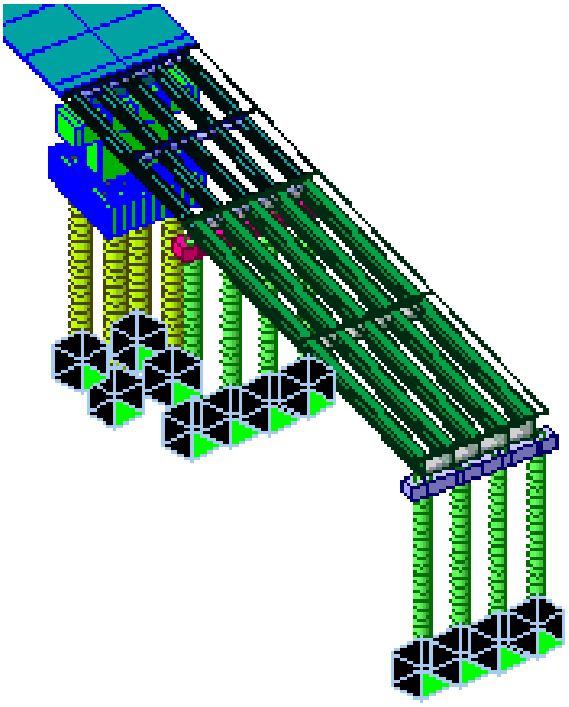


Figura 131. Condiciones de contorno

3.4.5. **ETAPAS CONSTRUCTIVAS**

En el modelo estructural se consideraron dos (2) tipos de cargas:

b) Cargas durante el proceso constructivo

- Peso propio de la estructura: Corresponde al peso de las vigas postensadas ya fraguadas.

- Tensionamiento de los cables: Los cuales se van tensionando con cada etapa constructiva según corresponda, cada cable va por un ducto de diámetro de Ø0.09 m para 7 torones,. El tensionamiento de los cables se realizará al 70% del f_{pu}, es decir, 0.7*19000 kgf/cm^2, lo que corresponde a 13300 kg/cm^2.

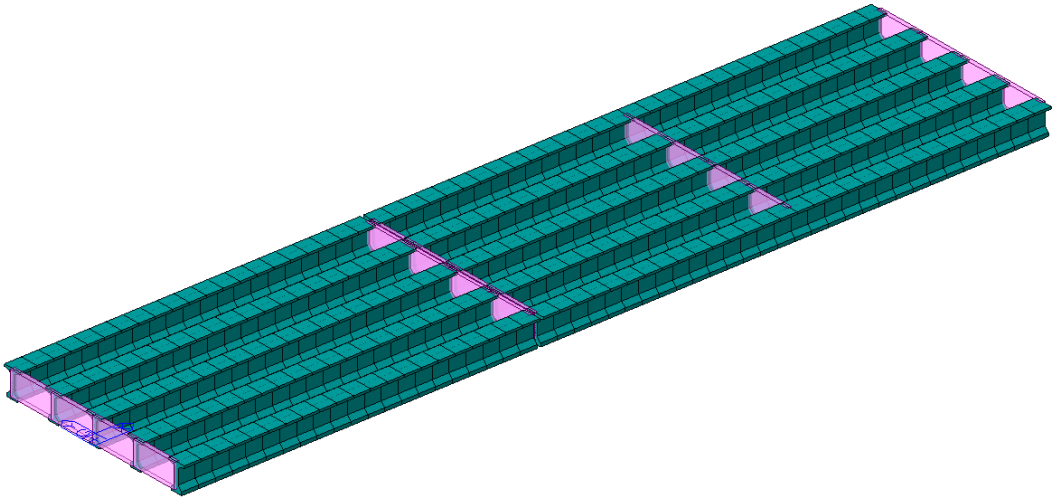


Figura 132. Etapa de construcción CS1 – sección simple

33.

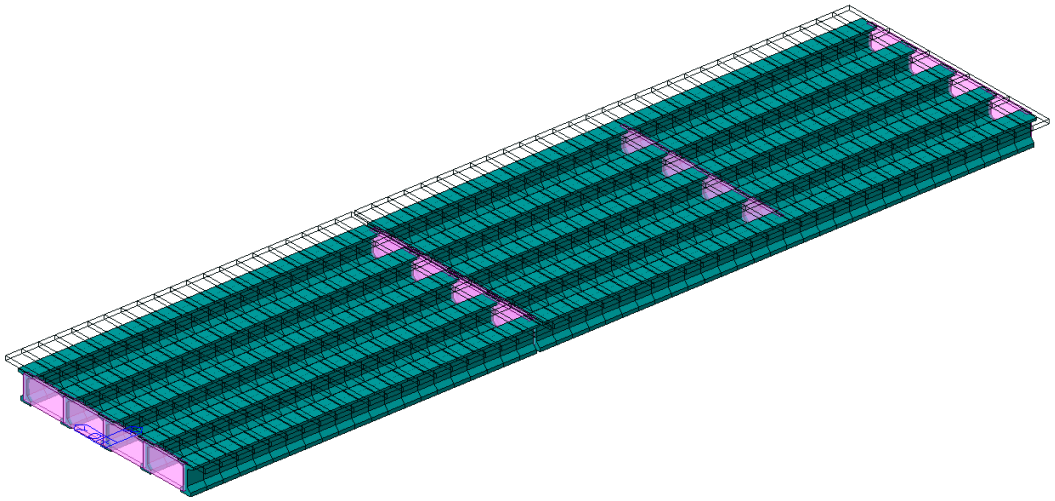


Figura 133. Etapa de construcción CS2 – sección compuesta

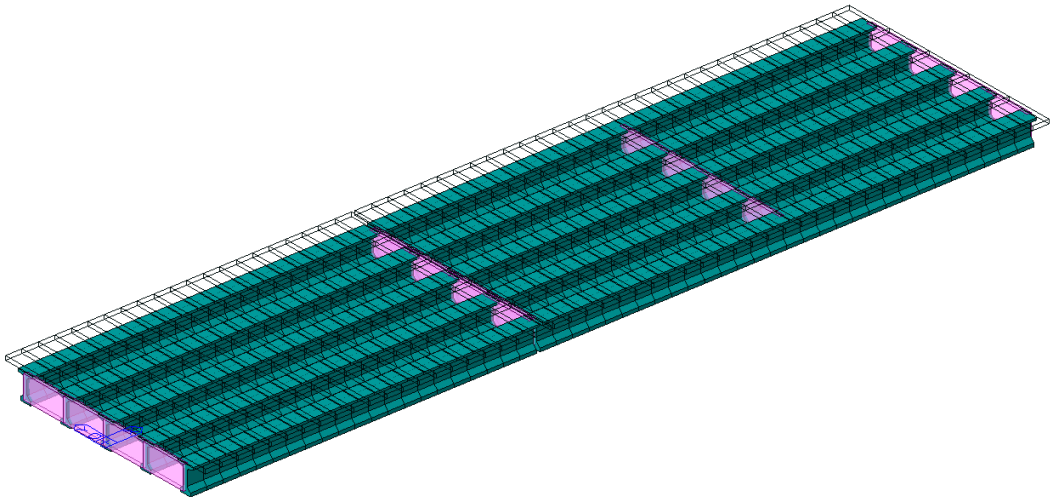


Figura 134. Etapa de construcción CS3 – aplicación de cargas de servicio

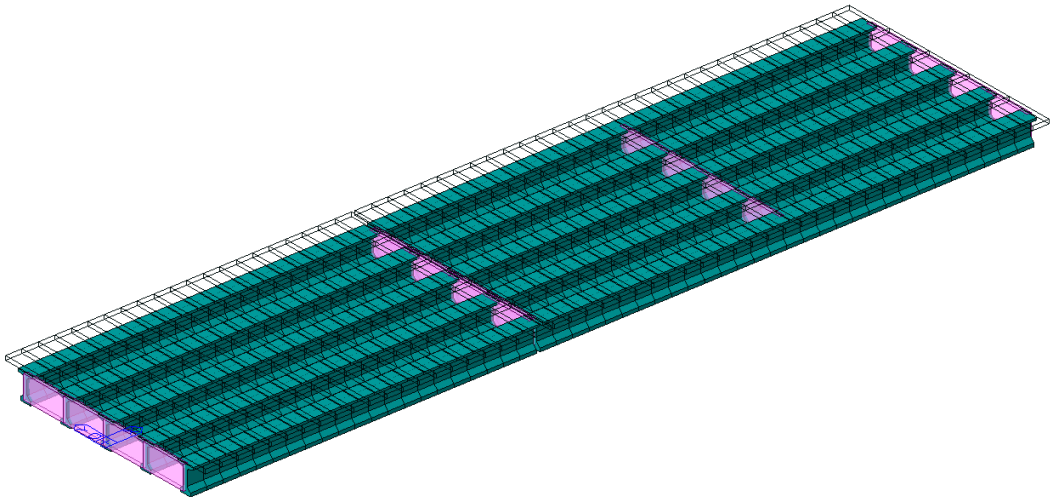


Figura 135. Etapa de construcción CS4 – comportamiento a largo plazo (10.000 días)

3.4.6. RESULTADOS MODELO ESTRUCTURAL VIGAS POSTENSADAS

3.4.7. CARGAS APLICADAS VIGAS POSTENSADAS

Se presentan las cargas aplicadas en el modelo estructural, como cargas distribuidas en la longitud del puente.

Carga Muerta (D)

Carga gravitacional muerta por peso de concreto γconc= 2.4 ton/m3

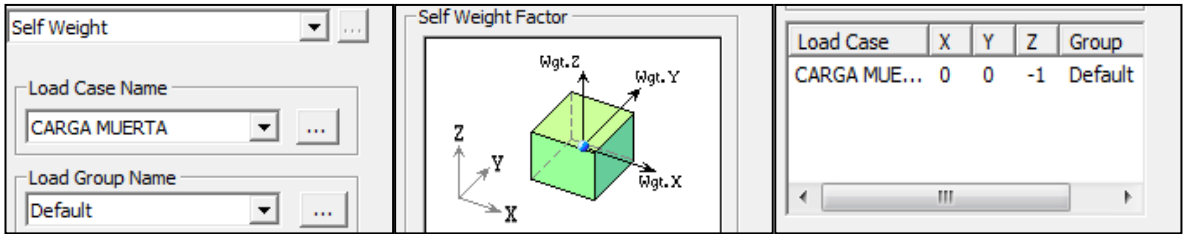
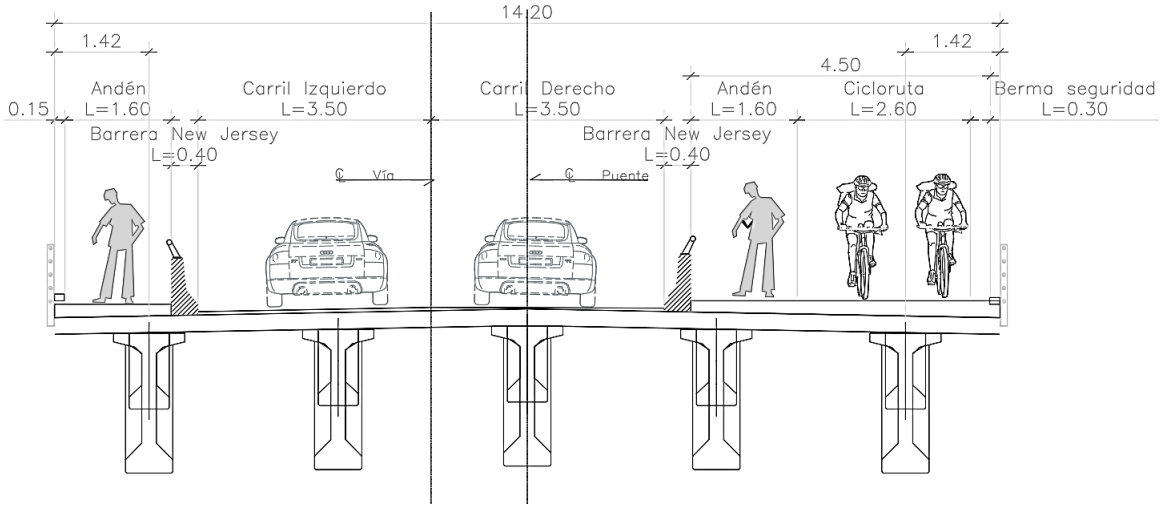


Figura 136. Asignación de la carga muerta en el modelo estructural

Sobre Carga (DC)

Carga muerta de barandas (DC): cargas muertas de componentes y accesorios aplicadas en el extremo izquierdo y derecho del tablero, determinada por 0.10 ton/m.



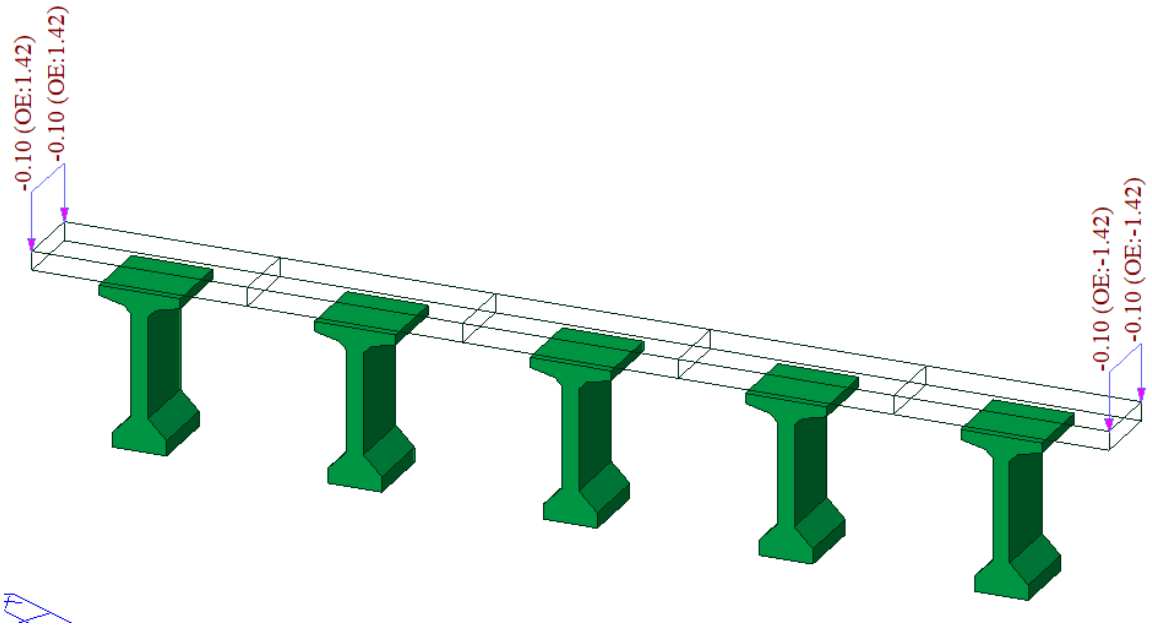
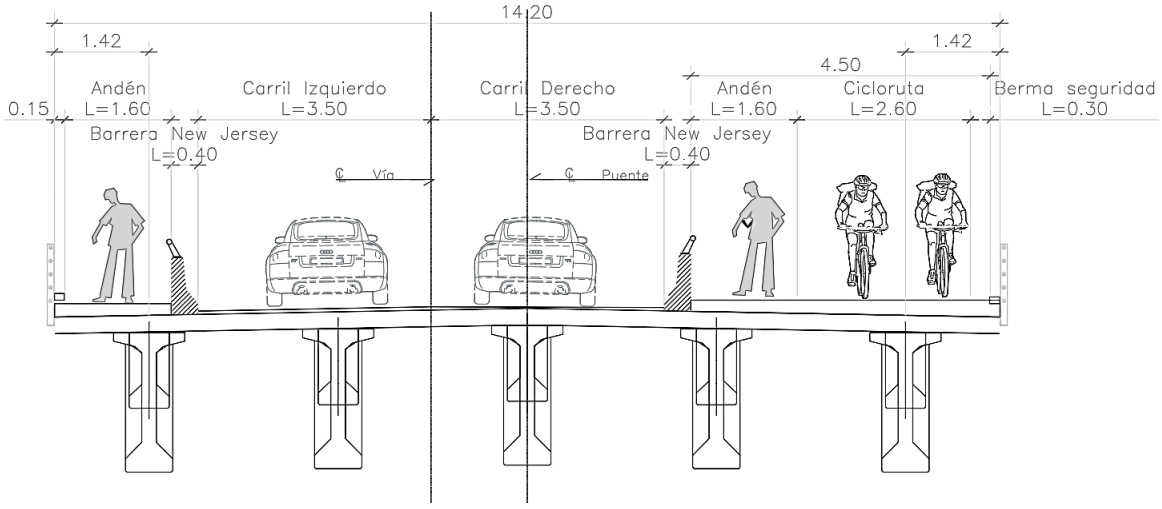


Figura 137. Cargas de baranda

Carga muerta de bordillos (DC): cargas muertas de componentes y accesorios aplicadas en el borde del tablero, determinada por 0.15 ton/m.



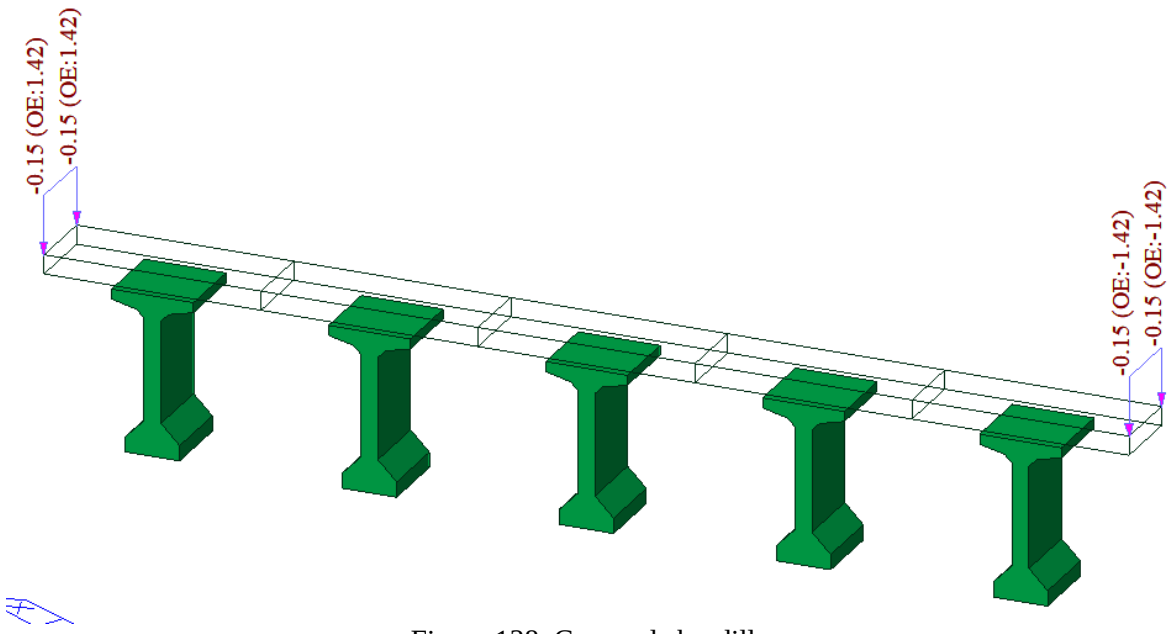
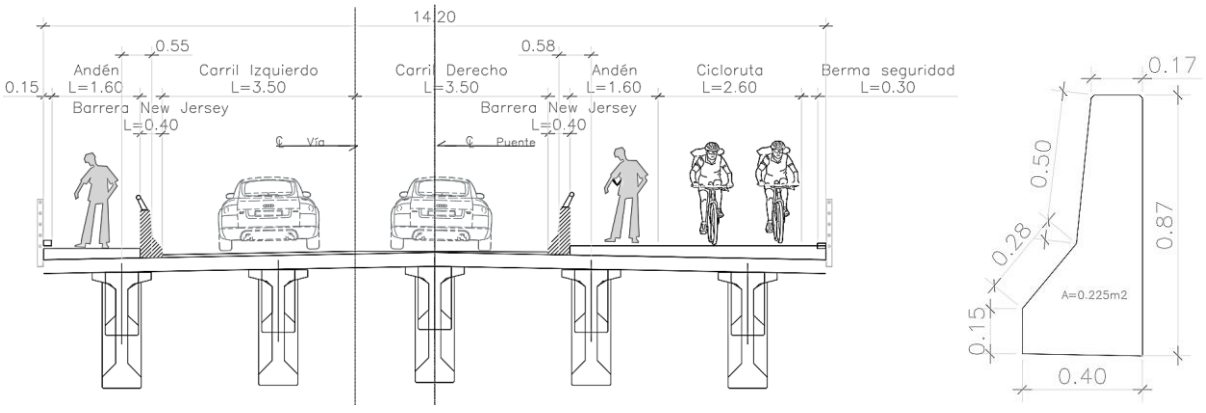


Figura 138. Cargas de bordillos

Carga muerta de barreras New Jersey (DC): cargas muertas de componentes y accesorios aplicadas en el tablero, determinada por 0.55 ton/m.

Área = 0.225 m2
Carga = 0.225 m2 * 2.40 ton/m3 = 0.55 ton/m



La carga de barrera New Jersey se aplica a 0.55 m del eje de la viga externa izquierda y a 0.58m del eje de la viga interna

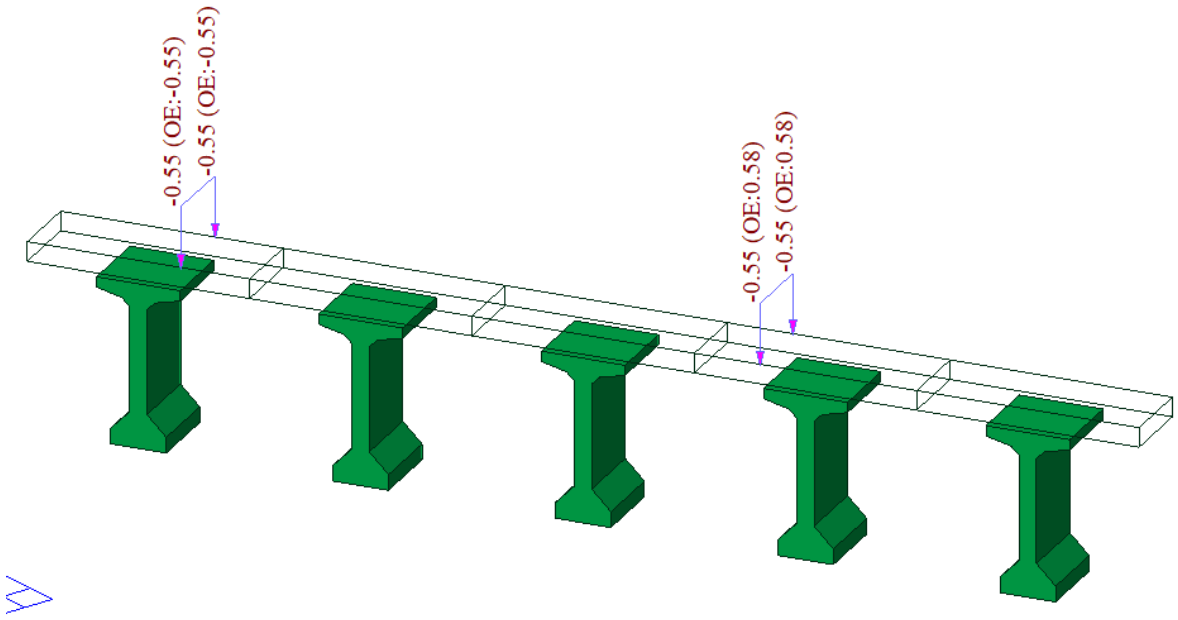


Figura 139. Cargas de barreras New Jersey

Carga muerta de andén (DC): cargas muertas de componentes y accesorios aplicadas en el lado derecho e izquierdo del tablero, determinada por 2.40 ton/m y 0.85 ton/m, respectivamente.

Andén derecho: (1.60m + 2.60m + 0.30m) * 0.22m * 2.40 ton/m3 = 2.40 ton/m
Andén izquierdo: 1.60m * 0.22m * 2.40 ton/m3 = 0.85 ton/m

Para el andén derecho, se tiene un ancho de pasarela de 4.50m y espesor de 0.22m; se aplica como carga distribuida con una excentricidad de 0.98m medidas desde el eje de la viga externa derecha del puente.

Para el andén izquierdo, se tiene un ancho de pasarela de 1.60m y espesor de 0.22m; se aplica como carga distribuida con una excentricidad de 0.47m medidas desde el eje de la viga externa izquierda del puente.

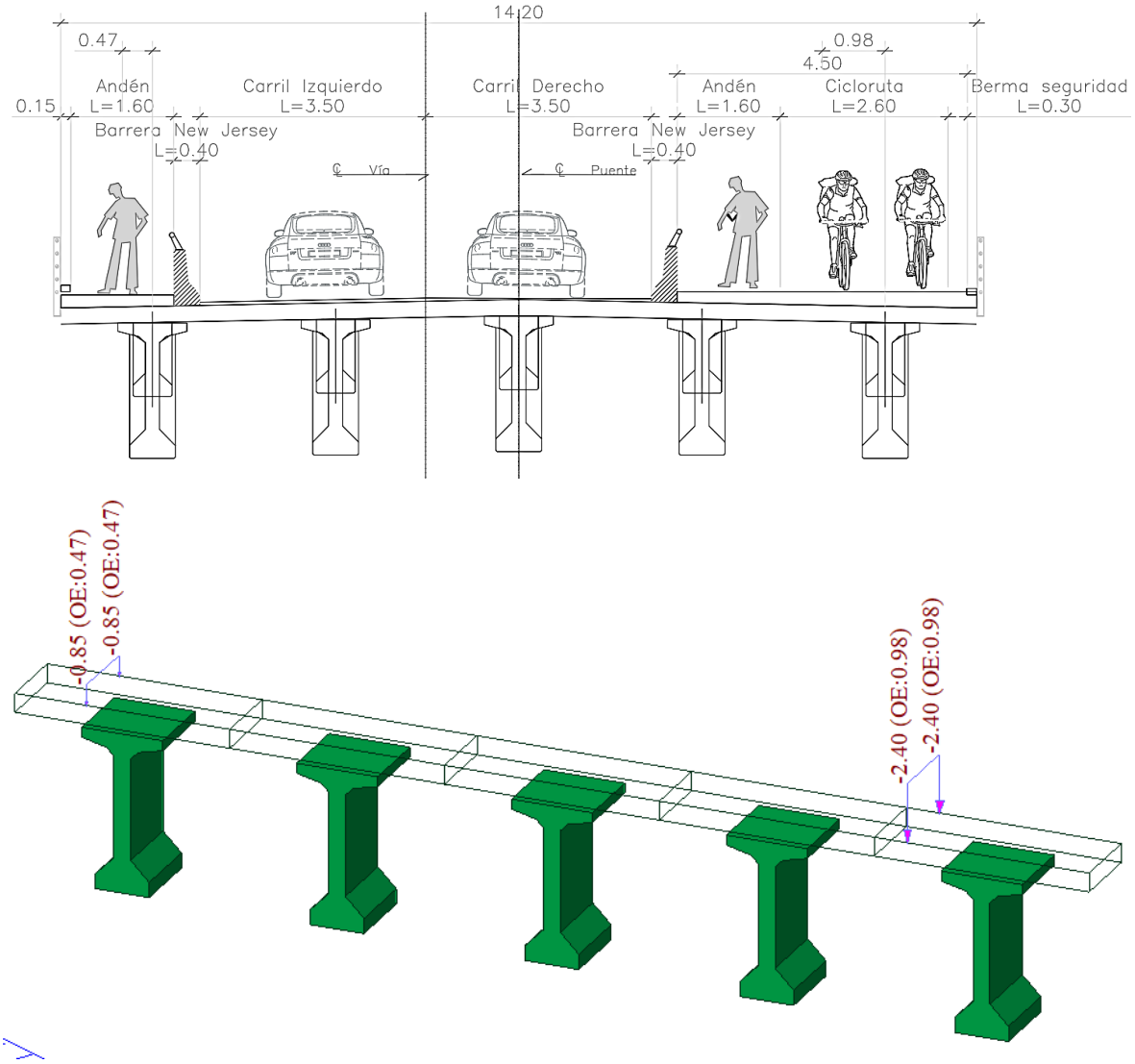


Figura 140. Cargas de andén

Sobre Carga de pavimento (DW)

Sobre carga de Pavimento (DW): cargas muertas por superficie de rodadura aplicadas sobre el tablero superior, se tiene una calzada bidireccional, con ancho de 7.0.0 m y dos carriles de 3.50m en total según diseño de trazado vial. La carga de pavimento se determinada por:

Espesor pavimento más repavimentación e=0.075m
Ancho de doble calzada 7.0m
Densidad pavimento γpav = 2.25 ton/m3

DW = 0.075m * 7.0m * 2.25 ton/m3 = 1.20 ton/m

La carga de pavimento se aplica sobre dos vigas internas, es decir:

DW = 1.20 ton/m / 2 vigas = 0.60 ton/m por cada viga

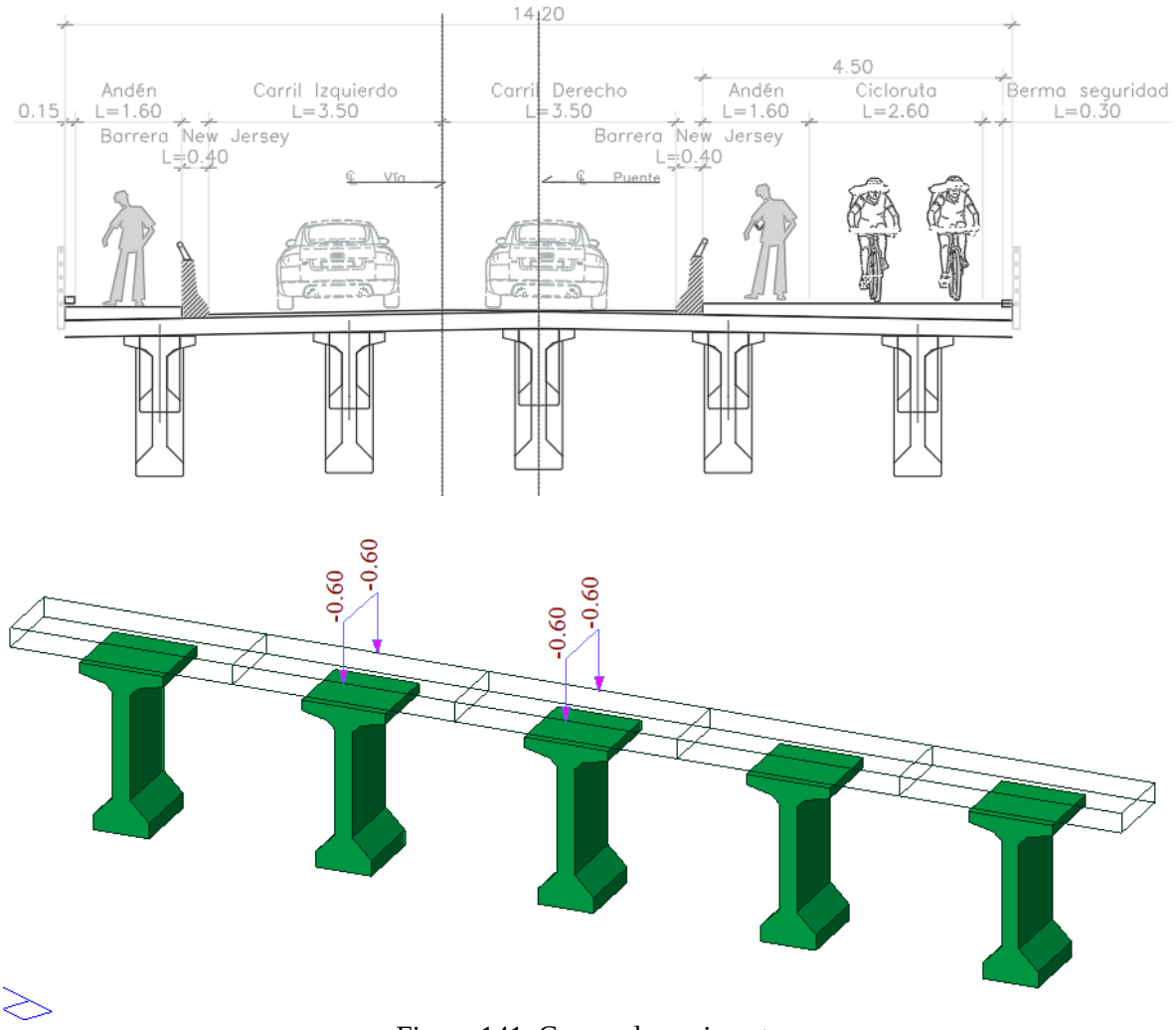


Figura 141. Cargas de pavimento

Carga viva vehicular (LL)

Para la aplicación de la carga viva se consideran las indicaciones de la sección 3.6 de la CCP-14.

Se analizará diferentes condiciones de servicio, sin embargo, se evaluará la condición más desfavorable para la estructura que corresponde a la variación de los diferentes carriles operativos:

4. cuando la estructura esté operando con un (1) carril de tráfico.
5. cuando la estructura esté operando con dos (2) carriles de tráfico.

6. cuando la estructura esté operando con tres (3) carriles de tráfico.

La carga viva de diseño será:

CAMIÓN DE DISEÑO

	(sin impacto)		(con impacto)	
P1 =	**40.0**	kN	**53.20**	kN
P2 =	**160.0**	kN	**212.80**	kN
P3 =	**160.0**	kN	**212.80**	kN

P1: Carga del eje delantero del camión
P2: Carga del eje medio del camión
P3: Carga del eje trasero del camión

CARRIL DE DISEÑO

w_L = 10.3 kN/m

AMPLIFICACIÓN POR CARGA DINÁMICA IM (3.6.2)

IM = 33%

TANDEM DE DISEÑO

	(sin impacto)		(con impacto)	
P1 =	**125.0**	kN	**166.25**	kN
P2 =	**125.0**	kN	**166.25**	kN

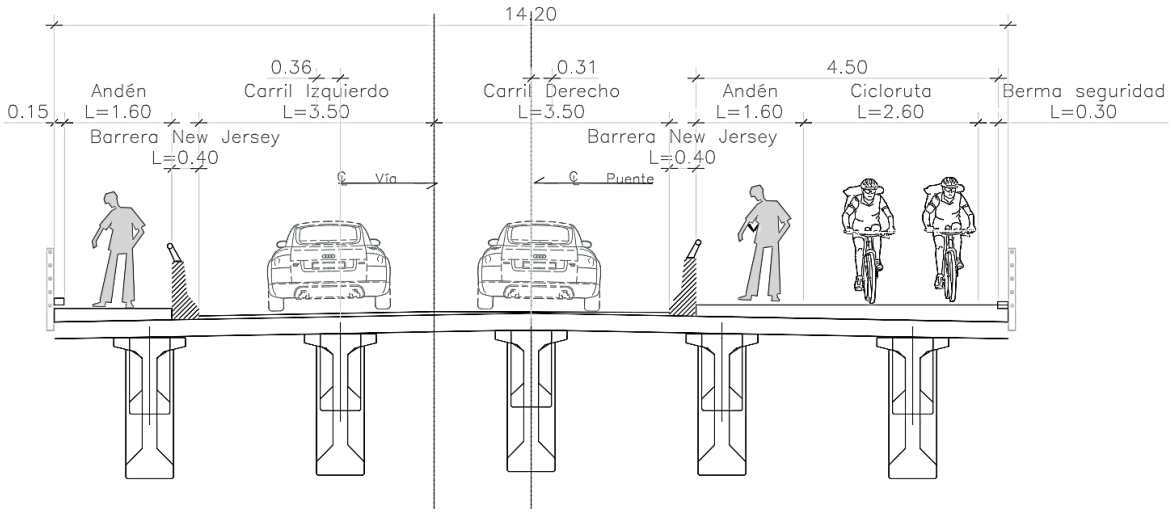
P1: Carga del eje delantero del tándem
P2: Carga del eje medio del tándem

CARRIL DE DISEÑO

w_L = 10.3 kN/m

AMPLIFICACIÓN POR CARGA DINÁMICA IM (3.6.2)

IM = 33%



CARRIL 1 – C1 carril derecho con excentricidad de 0.31m de la viga central

CARRIL 2 – C2 carril izquierdo con excentricidad de 0.36m de la viga intermedia

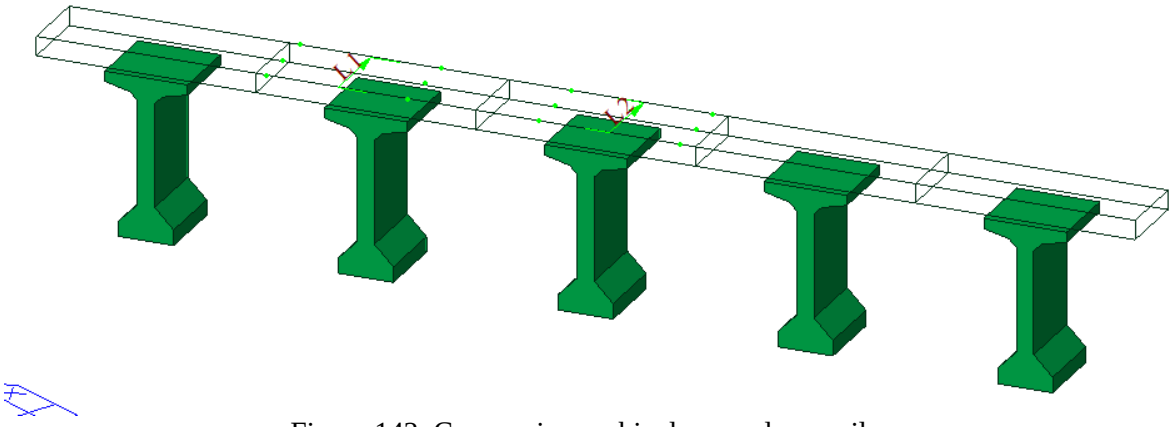
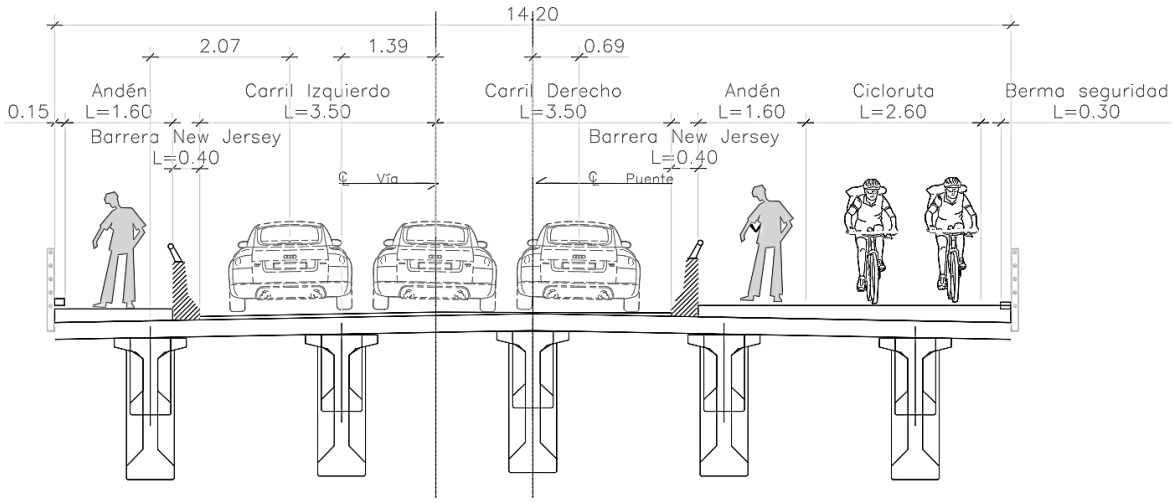


Figura 142. Cargas vivas vehicular con dos carriles.



CARRIL 1 – C_IZQ con excentricidad de 2.07 m desde el eje de la viga externa izquierda

CARRIL 2 – C_CEN con excentricidad de 1.39 m desde el eje de la viga interna

CARRIL 3 – C_DER excentricidad de 0.69m desde el eje de la viga central

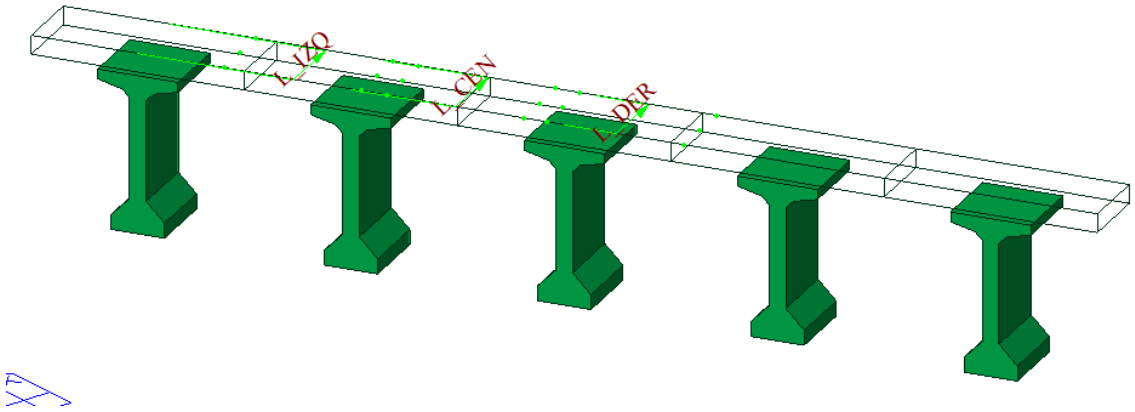


Figura 143. Cargas vivas vehicular con tres carriles.

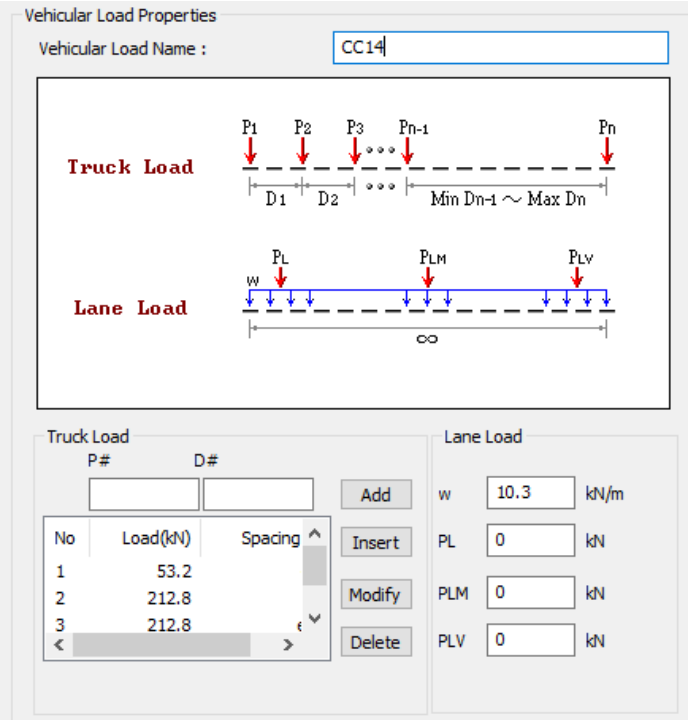


Figura 144. Camión de diseño CC14

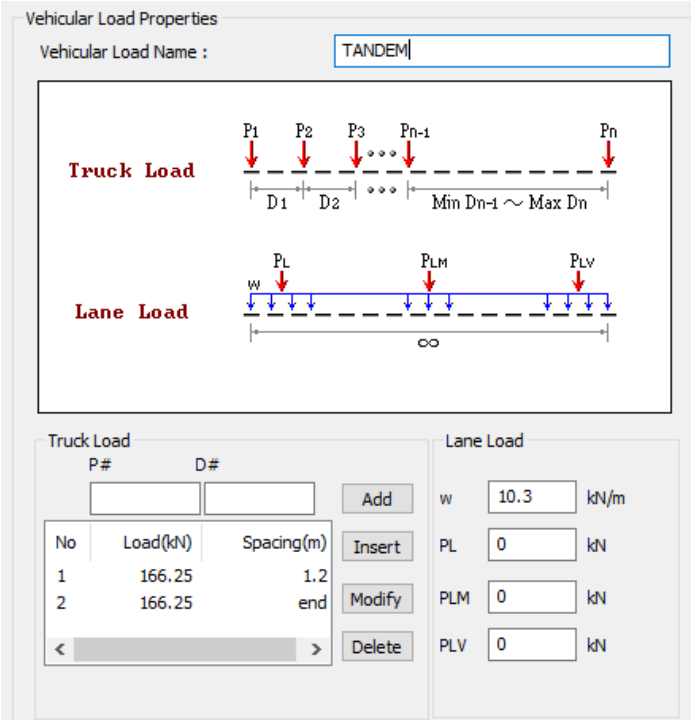


Figura 145. Tándem de diseño CC14

Nota: las cargas vehiculares ya se aplican incluyendo el factor de amplificación de carga dinámica.

Carga Viva Peatonal (PL)

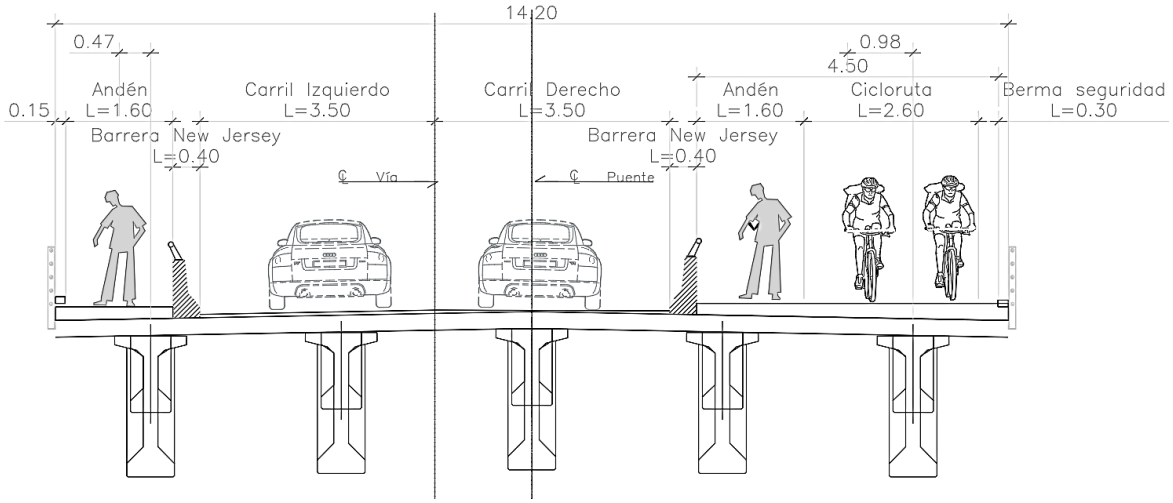
Aplicada sobre el tablero superior a los extremos derecho e izquierdo que soporta la pasarela peatonal y ciclo-ruta, en la misma dirección vertical de la gravedad; el ancho total de la pasarela peatonal es de 4.50 m para el costado derecho y 1.60m para el costado izquierdo, por tanto, la carga viva peatonal corresponde según lo descrito en la sección 3 numeral 3.6.1.6 del CCP-2014:

> Los puentes exclusivos para peatones, tráfico ecuestre, vehículos livianos de mantenimiento, y/o tráfico de bicicletas deberían diseñarse de acuerdo con *LRFD Guide Specifications for the Design of Pedestrian Bridges* de la AASHTO.

Figura 146. CCP-2014 referente a la carga viva peatonal.

> **3.1—PEDESTRIAN LOADING (PL)**
>
> Pedestrian bridges shall be designed for a uniform pedestrian loading of 90 psf. This loading shall be patterned to produce the maximum load effects. Consideration of dynamic load allowance is not required with this loading.

Figura 147. LRFD Guide Specifications for the Design of Pedestrian Bridges.



Es decir, la carga aplicada es de 90 libras por pie cuadrado (1 psf es equivalente a 0.0478803 kPa) aproximadamente 4.40 kN/m^2 (0.45 ton/m2), con el fin de calcular los efectos torsionales producidos por la carga parcial de la pasarela, la carga viva peatonal y ciclo-ruta está determinada por

$$PL = 0.45\ {}^{ton}/_{m^2} * 1.60\ m = 0.75\ {}^{ton}/_{m}$$

La carga peatonal del costado izquierdo, se aplica con una excentricidad de 0.47m

$$PL = 0.45\ {}^{ton}/_{m^2} * 4.50\ m = 2.05\ {}^{ton}/_{m}$$

La carga peatonal del costado derecho, se aplica con una excentricidad de 0.98m

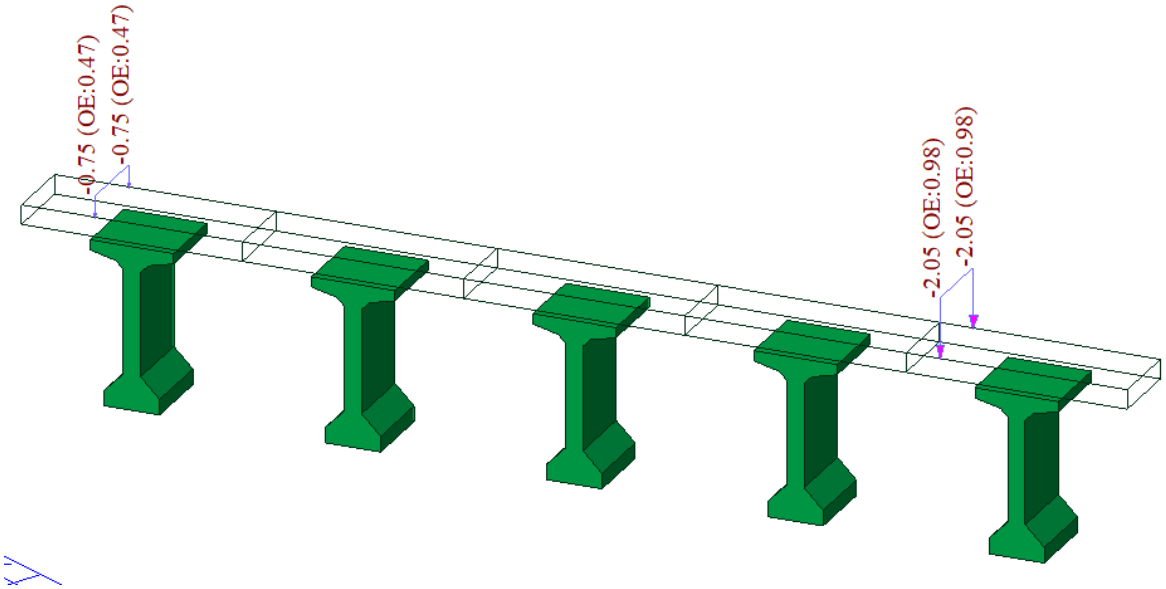


Figura 148. Cargas vivas peatonales.

Carga de viento (W):

Las cargas de viento fueron definidas según el artículo 3.8.1.3 del código CCP-14. Se consideró carga de viento sobre la carga viva (WL), presión de viento vertical (WV) y carga de viento sobre la estructura (W).

Adicionalmente, se aclara que la carga de viento se consideró horizontalmente sobre la estructura tal cual lo describe el artículo 3.8.1.2.1 "La dirección del viento de diseño debe suponerse horizontal, a menos que se especifique otra cosa en el artículo 3.8.3".

Artículo 3.8.3.1. "Deben tener en cuenta las fuerzas aeroelásticas en el diseño de puentes y los componentes que sean sensibles al viento. Para los fines de este artículo, todos los puentes con una relación de vano a profundidad, y componentes estructurales con una relación de longitud a profundidad, mayor que 30,00 deben considerarse sensibles al viento".

Profundidad apoyo: 16,00 m

Vano: 160 m

$$Relación\ \frac{Vano}{profundidad} = \frac{160.0m}{16.0m} = 10.0 < 30.0\ OK$$

Como la relación Vano/Profundidad es menor de 30 no debe evaluarse la inestabilidad Aeroelástica y la carga de viento puede aplicarse horizontalmente sobre la estructura

Debe aplicarse la carga de viento sobe la estructura, usando la presión básico PB debido a la ausencia de datos precisos del sitio, por tanto, siguiendo la tabla 3.8.1.2.1-1 para una velocidad básica del viento V_B = 160km/h:

Tabla 3.8.1.2.1-1 — Presiones Básicas, P_B, Correspondientes a $V_B = 160$ km/h

Componente de la Subestructura	Carga de Barlovento MPa	Carga de Sotavento MPa
Cerchas, Columnas, y Arcos	0.0024	0.0012
Vigas	0.0024	NA
Superficies grandes Planas	0.0019	NA

Figura 149. Párrafo del CCP-2014 referente a la carga de viento.

Para vigas se tiene una carga de barlovento de 0.0024 MPa, que equivale aproximadamente a 245 kg/m2.

Sin embargo, dada la altura de la estructura, se tiene

$$V_{DZ} = (2.5)(V_0)\left(\frac{V_9}{V_B}\right) ln\left(\frac{Z}{Z_0}\right)$$

Condición	Campo Abierto	Suburbano	Ciudad
V_o (km/h)	13.20	17.50	19.30
Z_o (m)	0.07	1.00	2.50

De la anterior tabla, se obtiene los valores de Vo y Zo

$$V_{DZ} = (2.5)(13.20)\left(\frac{160}{160}\right) ln\left(\frac{16.0}{0.07}\right) = 179.25\ km/h$$

$$P_D = P_B\left(\frac{V_{DZ}}{V_B}\right)^2 = 245\left(\frac{179.25}{160}\right)^2 = 307.50\ kg/m^2$$

Como criterio conservador, se aplicará la carga de viento horizontal teniendo en cuenta la mayor altura de la viga; Para el viento horizontal se tiene que la altura de la viga postensada más altura de bordillo es de 2.10 m + 0.25 m y se aplica a H/2, tal que:
H=2.35m

$$F_W = P_D * H = 307.50\frac{kg}{m^2} * 2.35m = 722.62\frac{kg}{m} = 0.72\frac{tn}{m}$$

Para el viento vertical se debe tener en cuenta que la magnitud es de 100 kg/m2 por el ancho total de la superestructura del puente, cuando no existe circulación vehicular, aplicada por el eje central del puente.

$$P_V = Pve * W = 100\frac{kg}{m^2} * 14.20\ m = 1420\frac{kg}{m} = 1.42\frac{tn}{m}$$

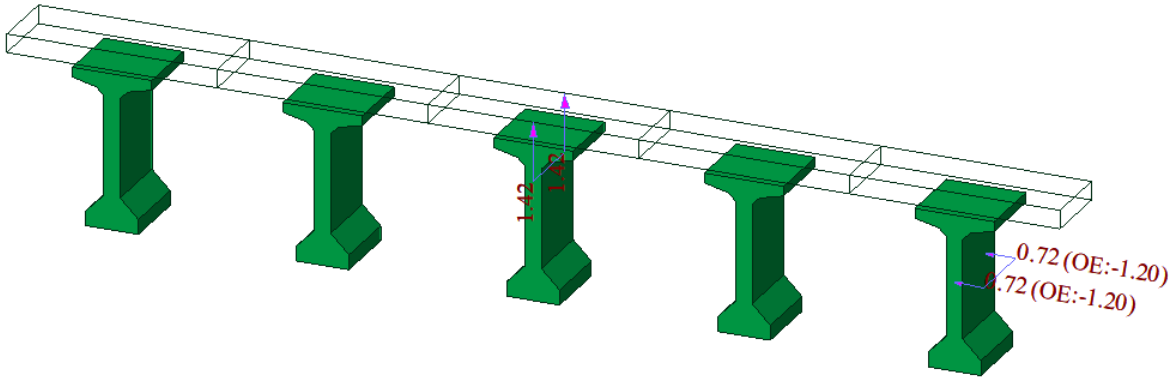


Figura 150. Cargas de viento horizontal y vertical.

Carga de viento sobre carga viva (WL):

La presión de viento sobre la carga viva, se representa como una fuerza interrumpible y móvil de 1.46 kN/m (0.15 ton/m), según la tabla 3.8.1.3-1 para un ángulo de esviaje de cero grados y aplicada a 1.80m de altura sobre el tablero del puente:

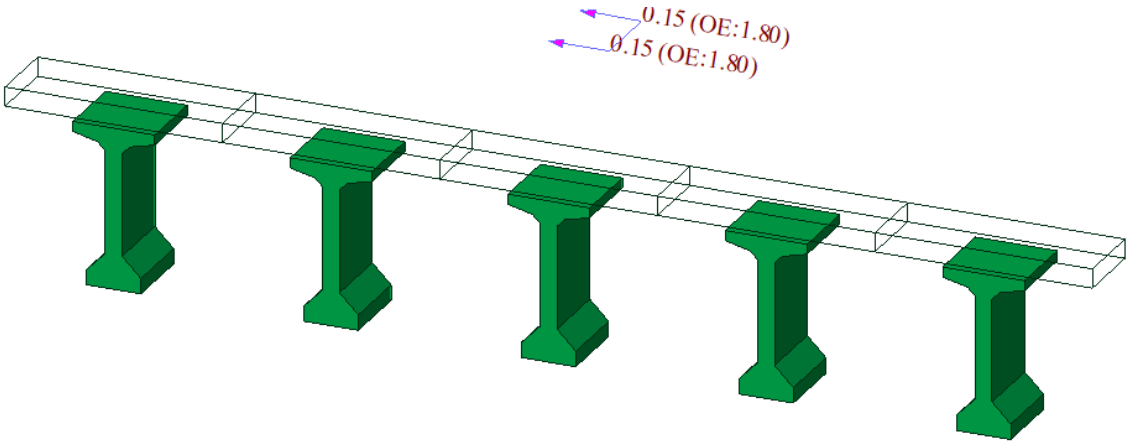


Figura 151. Cargas de viento transversal sobre la carga viva.

Carga de frenado (BR):

De acuerdo con las especificaciones, la fuerza de frenado será la mayor de:

- 25% de los pesos por eje de camión o tándem de diseño
- 5% del camión o tándem de diseño más la carga de carril
- Longitud total del puente L=320.0m

Para este caso, teniendo en cuenta que la carga de camión CC-14 es de 36 ton, el peso de tándem es de 25 ton.

La fuerza de frenado se calcula con los carriles que transportan tráfico en la misma dirección, asumiendo que a futuro los dos carriles transportan tráfico en la misma dirección y considerando un factor de presencia múltiple FPM=1.00 se tiene:

BR1=0.25 * 36 ton * 3 vías * 0.85 FPM = 22.95 ton
BR2=0.25 * 25 ton * 3 vías * 0.85 FPM = 15.94 ton
BR3=0.05 * (36 ton + (320m) * 1.03) * 3 vías * 0.85 FPM = 46.61 ton
BR4=0.05 * (25 ton + (320m) * 1.03) * 3 vías * 0.85 FPM = 45.21 ton

Se selecciona la mayor de todas, que para este caso es la BR3 = 46.61 ton
La carga de frenado se aplica a 1.80m medidos desde el tablero.

Mf = momento de frenado = BR3*brazo = 46.61 ton*1.80m = 83.90 ton.m

Mf por metro lineal = 83.90 ton.m/20.0m = 4.20 ton.m

Mf por metro lineal por cada viga = 4.20/5 = 0.84 ton.m
Pf = carga de frenado = BR3/L = 46.61ton /20m = 0.15 ton/m
Pf = carga de frenado por cada viga = 0.15/ 5 vigas = 0.03 ton/m

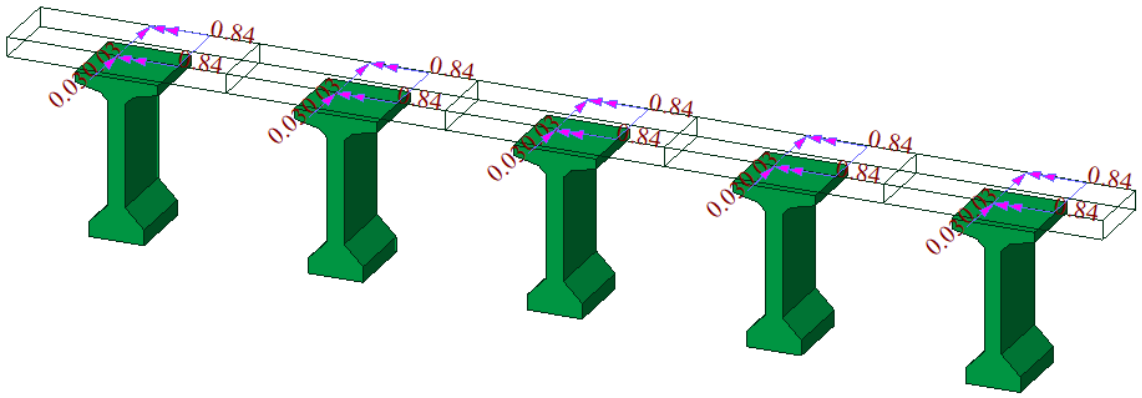


Figura 152. Cargas de frenado.

Carga Dinámica (EQ)

El análisis sísmico y cálculo de las cargas dinámicas se realizará de acuerdo al Título 3.10 del CCP-14; adicionalmente considerando el tipo de estructuras teniendo en cuenta lo expuesto en el titulo 3.10.5 – Clasificación Operacional este puede clasificarse como puente esencial.

El espectro de diseño, se realizará teniendo en cuenta los parámetros sísmicos dados en el estudio geotécnico y se tendrán en cuenta los efectos ortogonales del sismo, donde se considerará el 100% actuando en la dirección longitudinal más el 30% del sismo en la dirección transversal y posteriormente el sismo actuando 100% en la dirección transversal y 30% en la dirección longitudinal.

El modelo estructural debe ser afectado por las fuerzas sísmicas generadas por el espectro de aceleraciones de diseño, grafica que dependen de los siguientes parámetros sísmicos:

Coeficiente de aceleración pico efectiva PGA	Región 3 = 0.15
Coeficiente de Aceleración Espectral Horizontal Ss	Región 3 = 0.30
Coeficiente de aceleración de respuesta espectral horizontal S1	Región 4 = 0.20

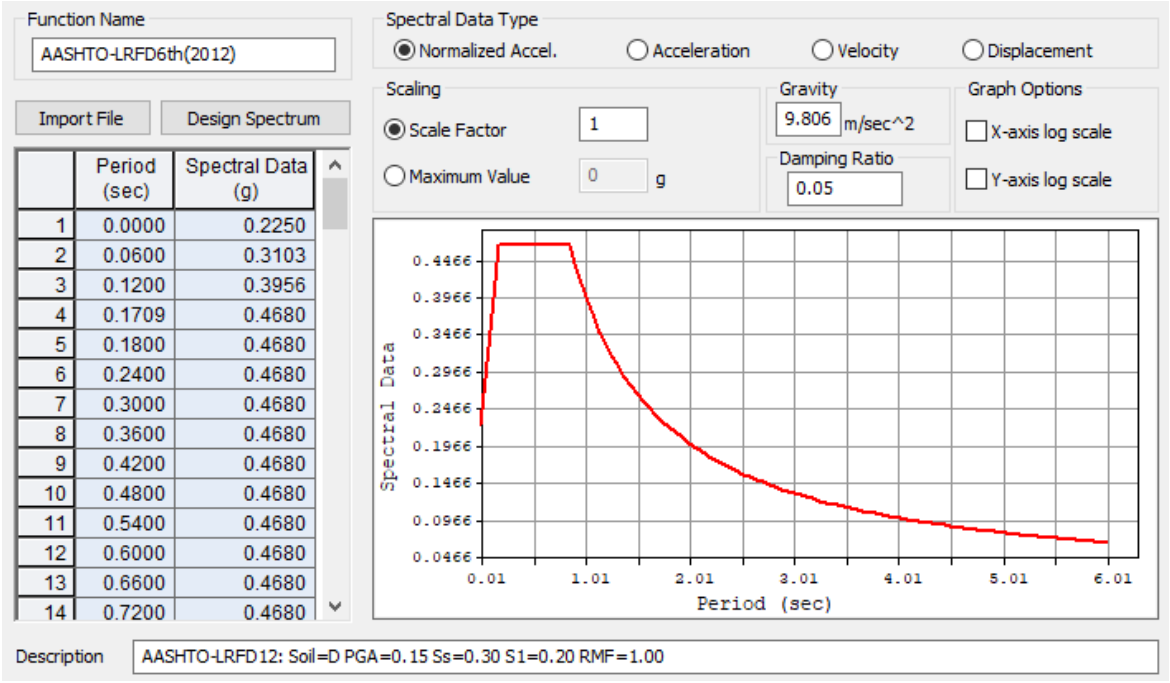


Figura 153. Espectro de aceleraciones de diseño CCP14

Empuje Horizontal Del Suelo (EH)

Se supone que la presión horizontal del suelo aumenta linealmente con la profundidad siguiendo la relación:

$$p_{EH} = K * \gamma_s * Z$$

Donde K corresponde al coeficiente de presión lateral del suelo según corresponda. Esta carga se utilizó para el cálculo del espaldar y las aletas de contención.

Fuerzas Debidas Al Flujo Plástico (CR)

Se consideró con base al CEB-FIP (2010) teniendo en cuenta que la humedad promedio en el sector es de aproximadamente el 70% y el concreto a usar es de endurecimiento normal.

Fuerzas Debidas A La Retracción (SH)

Se consideró con base al CEB-FIP (2010) teniendo en cuenta que la retracción del concreto comienza a partir del tercer día de vaciado y se está usando concreto de endurecimiento normal.

Carga De Presforzado (PS)

La carga de presforzado consiste en tensionar todos los cables a un 70% de su tensión de fluencia f_{pu}, de manera que antes del acuñamiento los esfuerzos en los gatos son los esfuerzos límites establecidos en la tabla 5.9.3-1 para torones de preesfuerzo.

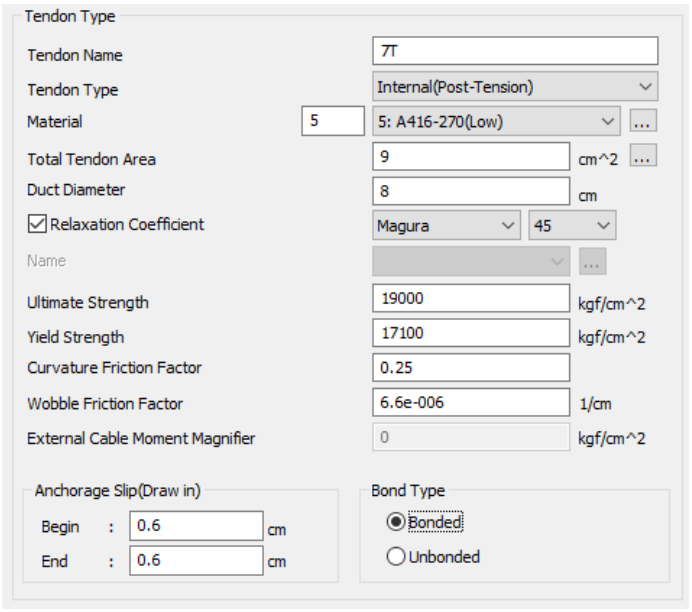


Figura 154. Propiedades del cable de presfuerzo 7 torones

Fpu = 19000 kg/cm2
Fpy = 0.9*fpu = 0.9*19000 = 17100 kg/cm2
Fpi = 0.7* fpu = 0.7*19000 = 13300 kg/cm2

Fuerza del cable de 7 torones

Ci = fpi * Asp *# torones
Ci = 13300 kg/cm2 * 1.40 cm2 * 7 torones
Ci = 130340 kg
Ci = 130.34 ton

3.4.8. **ELEMENTOS VIGA I POSTENSADA – L=21.0m**

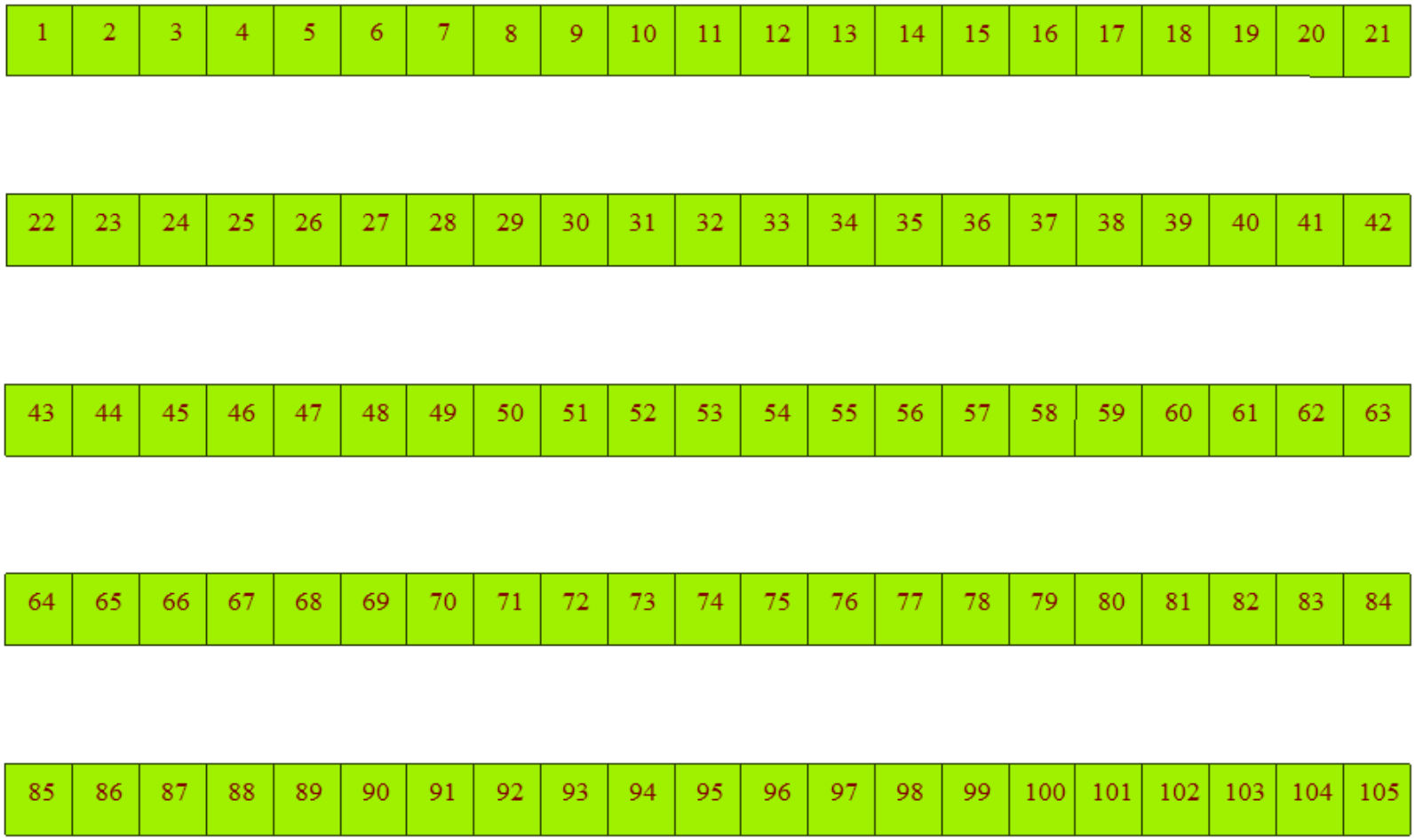


Figura 155. Número de elementos viga 21.0m

3.4.9. GEOMETRÍA DE LOS CABLES Y FUERZA DE TENSIONAMIENTO

Luz = 21.0m

El esfuerzo máximo permitido por la Norma antes de cualquier tipo de pérdidas corresponde a un 70*fpu, para efectos prácticos se tensionarán los cables a un esfuerzo igual a:

$$f_{pi} = 13300\ kg/cm^2$$

El cual corresponde a un 70% de fpu, de esta manera cada torón se tensionará a una fuerza de:

$$Fpi = 13300 \frac{kg}{cm^2} * 1.40\ cm^2 \ = 18620\ kg = 18.62\ tn$$

Si cada cable tiene 7 torones, la carga total por cable es fpi*# torones = 7*18.62 = 130.34 ton (130340 kg)

Sobre la viga I postensada se dispondrán 3 cables de 7 torones de 5/8” en primera etapa de tensionamiento, tal como se presenta en la siguiente figura:

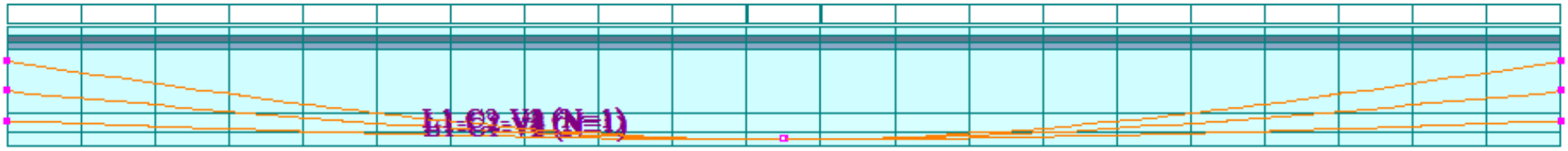


Figura 156. Configuración de los cables en la viga I postensada primera etapa

Se presenta en las siguientes tablas la geometría de los cables y la variación tanto en los ejes coordenados X, Y la coordenada Z medida desde la cara inferior de la viga, para toda la longitud del puente

Tabla 11. Geometría y posición de los cables vigas – L=21.0m

TENSIONAMIENTO ETAPA 1									
CABLE C1				CABLE C2				CABLE C3		
7 torones				7 torones				7 torones		
X (m)	Y (m)	Z (m)		X (m)	Y (m)	Z (m)		X (m)	Y (m)	Z (m)
0	0.000	0.350		0	0.000	0.750		0	0.000	1.150
1	0.036	0.314		1	-0.036	0.657		1	0.000	1.000
2	0.071	0.279		2	-0.071	0.566		2	0.000	0.853
3	0.104	0.246		3	-0.104	0.479		3	0.000	0.711
4	0.136	0.214		4	-0.136	0.396		4	0.000	0.578
5	0.165	0.185		5	-0.165	0.321		5	0.000	0.456
6	0.191	0.159		6	-0.191	0.253		6	0.000	0.347
7	0.213	0.137		7	-0.213	0.196		7	0.000	0.255
8	0.230	0.120		8	-0.231	0.151		8	0.000	0.182
9	0.243	0.107		9	-0.243	0.119		9	0.000	0.130
10	0.249	0.101		10	-0.249	0.102		10	0.000	0.104
11	0.249	0.101		11	-0.249	0.102		11	0.000	0.104
12	0.243	0.107		12	-0.243	0.119		12	0.000	0.130
13	0.230	0.120		13	-0.231	0.151		13	0.000	0.182
14	0.213	0.137		14	-0.213	0.196		14	0.000	0.255
15	0.191	0.159		15	-0.191	0.253		15	0.000	0.347
16	0.165	0.185		16	-0.165	0.321		16	0.000	0.456
17	0.136	0.214		17	-0.136	0.396		17	0.000	0.578
18	0.104	0.246		18	-0.104	0.479		18	0.000	0.711
19	0.071	0.279		19	-0.071	0.566		19	0.000	0.853
20	0.0356	0.3143		20	-0.036	0.657		20	0.000	1.000
21	0.0000	0.35		21	0.000	0.750		21	0.000	1.150

3.4.10. **RESULTADOS DEL MODELO VIGAS - L=21.0m**

DIAGRAMAS DE MOMENTO Y CORTANTE

Se presentan los principales resultados del modelo estructural teniendo en cuenta los estados límites de resistencia, extremos y de servicio.

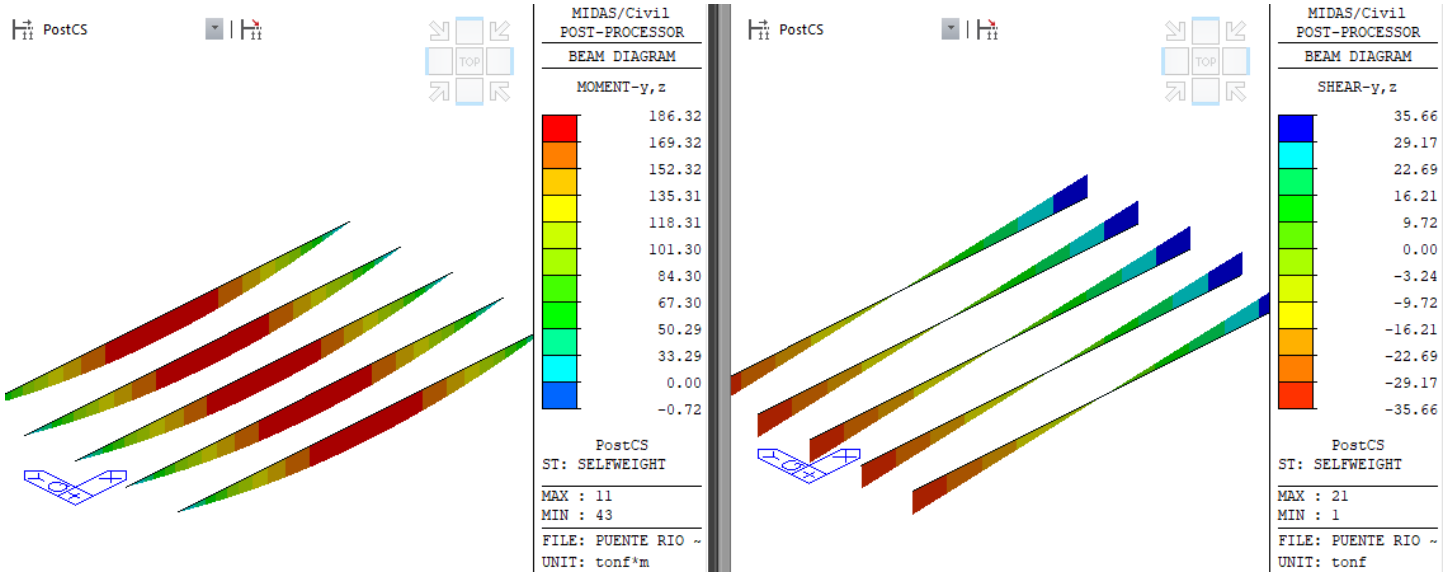


Figura 157. Resultados Momento flector y fuerza cortante para carga muerta

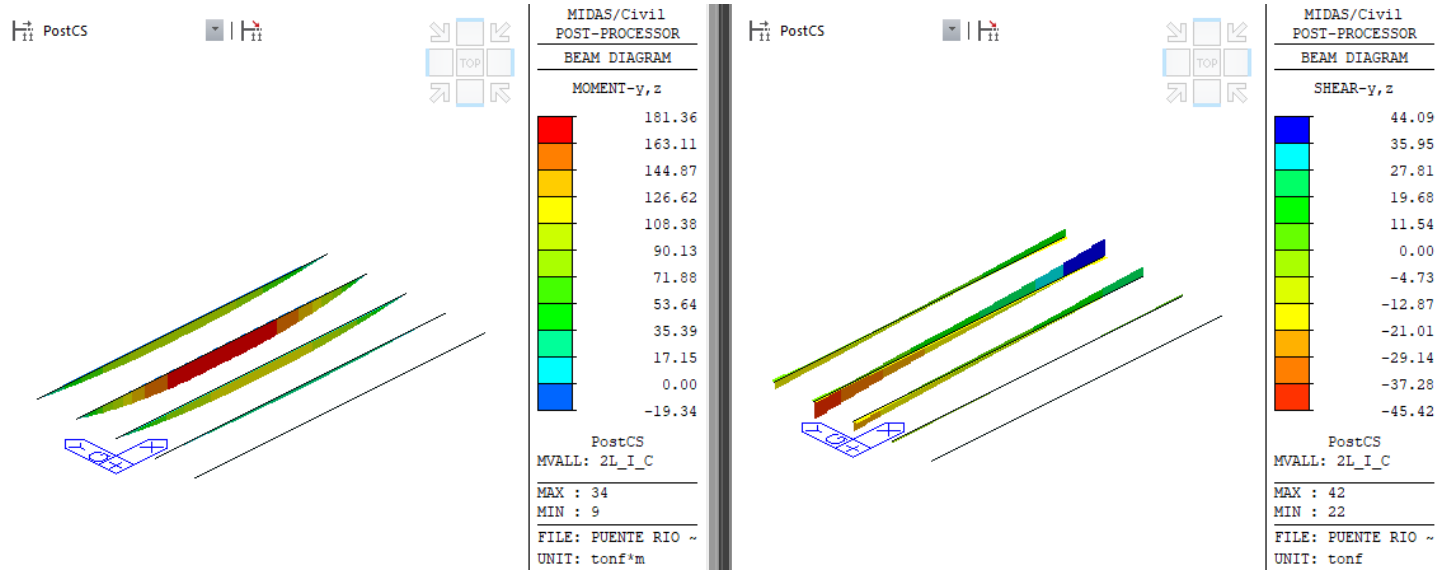


Figura 158. Resultados Momento flector y fuerza cortante para carga viva vehicular

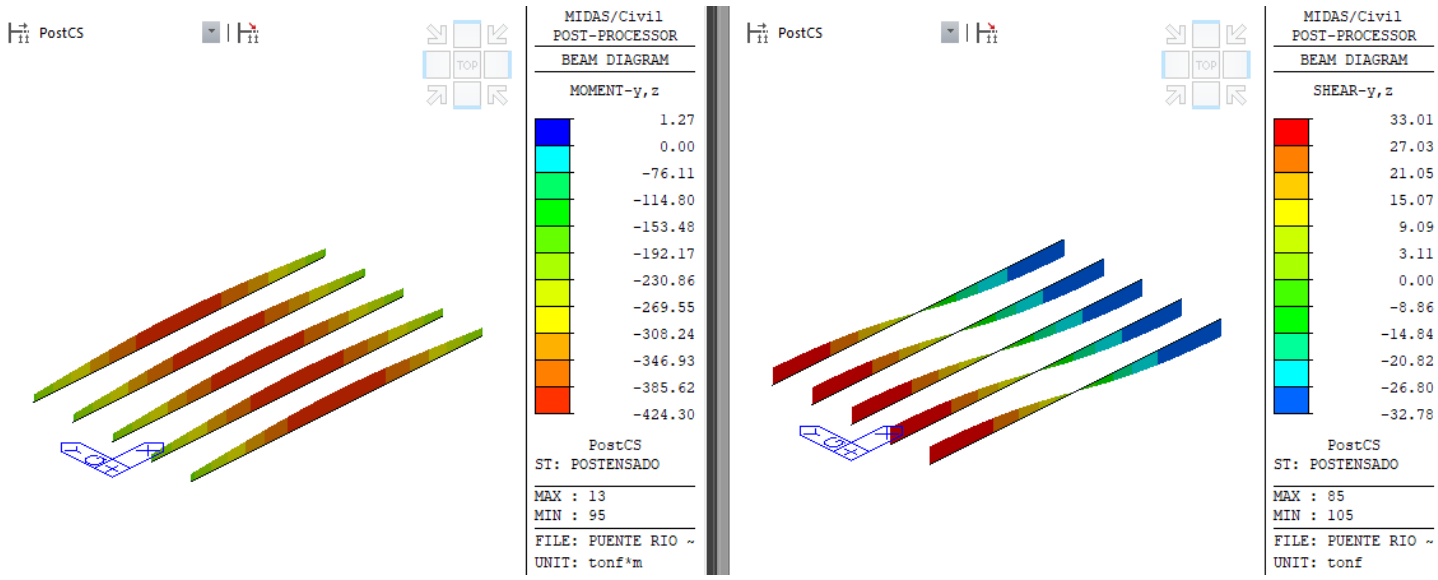


Figura 159. Resultados Momento flector y fuerza cortante para carga de postensado

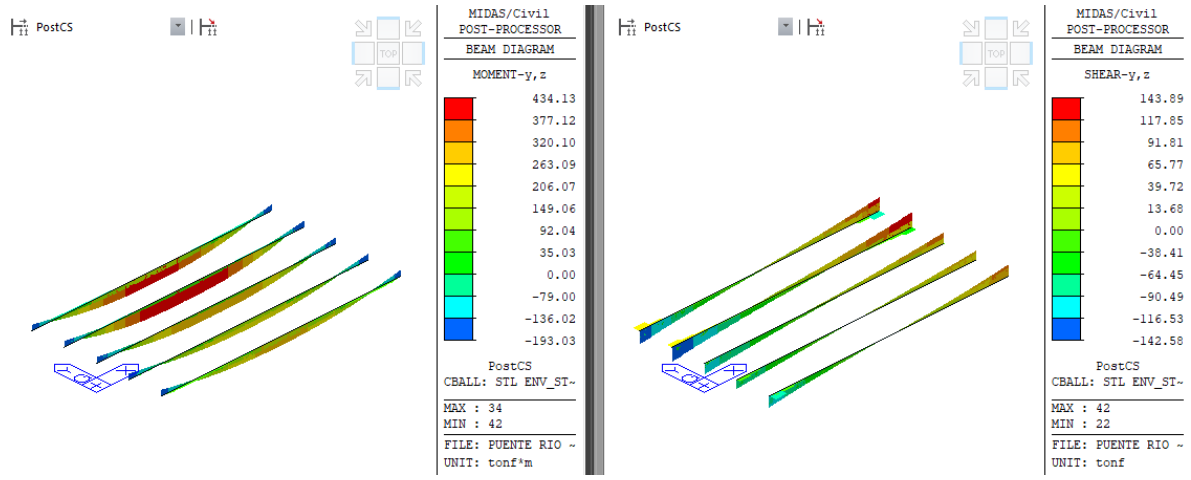


Figura 160. Resultados Momento cortante para la envolvente de resistencia

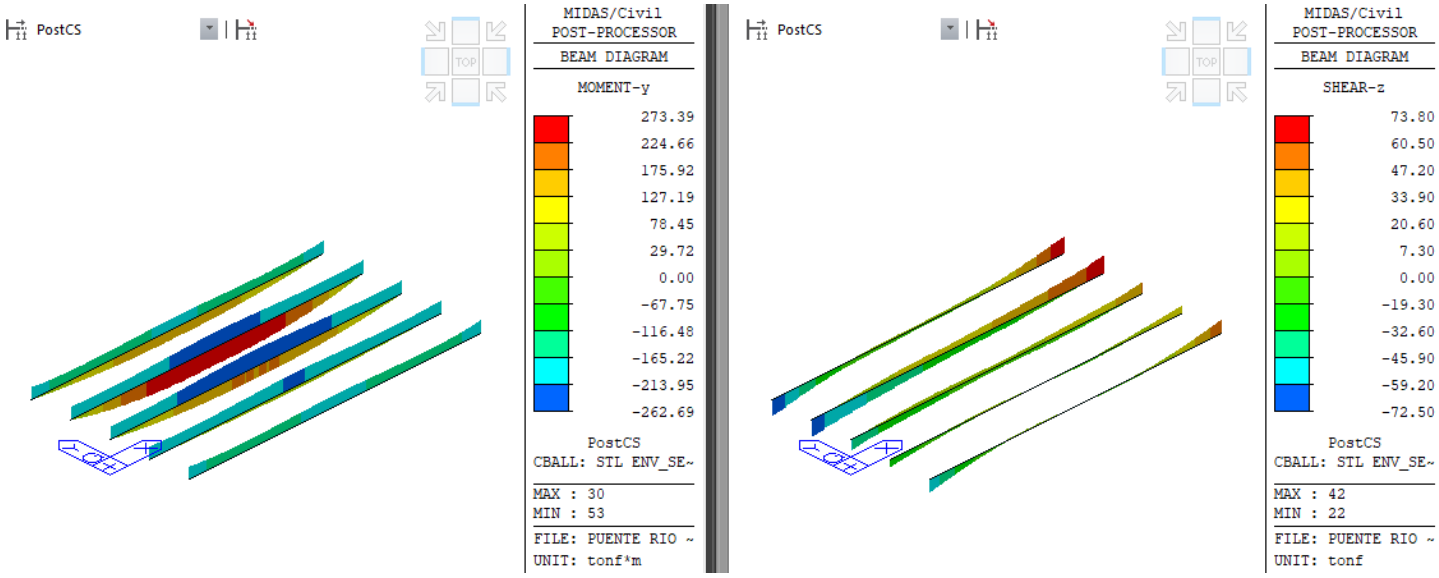


Figura 161. Resultados Momento flector y fuerza cortante en servicio

3.4.11. **REVISIÓN DE ESFUERZOS**

Se calculan los esfuerzos producidos en la viga I postensada debido a la combinación de Estado Límite de Servicio I y Estado Limite de Servicio III.

Para la revisión de los esfuerzos tanto en fibra superior como inferior se empleó la siguiente formulación:

$$\sigma_{sup} = \frac{P}{A} - M_P \frac{Y_{sup}}{I_g} - M_{DL} \frac{Y_{sup}}{I_g}$$

$$\sigma_{Inf} = \frac{P}{A} + M_P \frac{Y_{inf}}{I_g} + M_{DL} \frac{Y_{inf}}{I_g}$$

Donde:

$\boldsymbol{P}$ Carga axial por el tensionamiento de los cables (t)

$\boldsymbol{M_p}$ Momento por presforzado debido a la excentricidad de los cables.

$\boldsymbol{M_{DL}}$ Momento debido a la carga muerta, sobrecarga y carga viva.

Y_{sup} *e* Y_{inf} Son las distancias desde el centroide a la fibra extrema superior e inferior respectivamente.

I_g Inercia total de la sección

A Área de la sección transversal.

Se define los parámetros de diseño para la sección PSC (prestressed concrete)

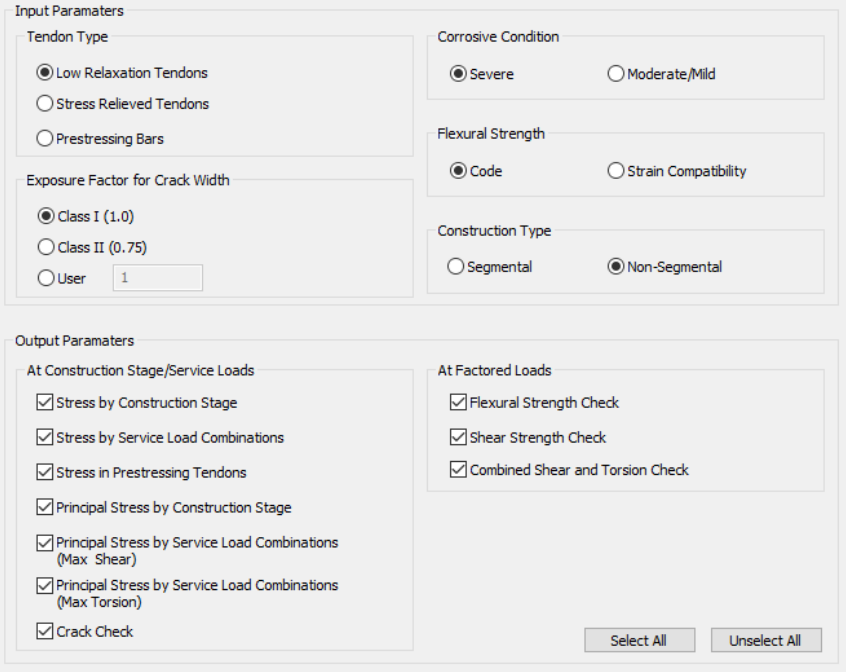


Figura 162. Parámetros de diseño de concreto postensado NO-SEGMENTAL

3.4.11.1. REVISIÓN DE ESFUERZOS EN ETAPAS CONSTRUCTIVAS:

Elem: número de elemento

Comp./Tens.: Compresión o Tensión

FT: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My) y fuerza axial en la fibra superior

FB: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My) y fuerza axial en la fibra inferior

FTL: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra superior izquierda

FBL: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra inferior izquierda

FTR: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra superior derecha

FBR: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra inferior derecha

ALW: Esfuerzo admisible en el hormigón en el estado límite de servicio.

CHK: comprobación de esfuerzos combinados para cargas de servicio

Tabla 12. Verificación de esfuerzos a compresión y tracción en fibra superior

Elem	Comp./Tens.	FT (kgf/cm^2)	FTL (kgf/cm^2)	FTR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1	Compression	35.19	35.37	35.00	175.32	OK
2	Compression	29.95	30.02	29.87	175.32	OK
3	Compression	24.52	24.51	24.53	175.32	OK
4	Compression	19.09	19.03	19.16	175.32	OK
5	Compression	13.85	13.78	13.92	175.32	OK
6	Compression	8.98	8.92	9.04	175.32	OK
7	Compression	4.72	4.57	4.87	175.32	OK
8	Compression	1.25	1.01	1.49	175.32	OK
9	Compression	-1.25	-1.57	-0.94	175.32	OK
10	Compression	-2.62	-3.01	-2.22	175.32	OK
11	Compression	-2.53	-2.99	-2.08	175.32	OK
12	Compression	-1.05	-1.55	-0.55	175.32	OK
13	Compression	1.53	1.04	2.01	175.32	OK
14	Compression	5.02	4.56	5.48	175.32	OK
15	Compression	9.22	8.83	9.61	175.32	OK
16	Compression	13.96	13.64	14.27	175.32	OK
17	Compression	19.04	18.83	19.26	175.32	OK
18	Compression	24.29	24.19	24.39	175.32	OK
19	Compression	29.53	29.56	29.49	175.32	OK
20	Compression	34.56	34.73	34.40	175.32	OK
21	Compression	39.23	39.36	39.10	175.32	OK

Elem	Comp./Tens.	FT (kgf/cm^2)	FTL (kgf/cm^2)	FTR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.00	Tension	35.19	35.37	35.00	-34.40	OK
2.00	Tension	29.95	30.02	29.87	-34.40	OK
3.00	Tension	24.52	24.51	24.53	-34.40	OK
4.00	Tension	19.09	19.03	19.16	-34.40	OK
5.00	Tension	13.85	13.78	13.92	-34.40	OK
6.00	Tension	8.98	8.92	9.04	-34.40	OK
7.00	Tension	4.72	4.57	4.87	-34.40	OK
8.00	Tension	1.25	1.01	1.49	-34.40	OK
9.00	Tension	-1.25	-1.57	-0.94	-34.40	OK
10.00	Tension	-2.62	-3.01	-2.22	-34.40	OK
11.00	Tension	-2.53	-2.99	-2.08	-34.40	OK
12.00	Tension	-1.05	-1.55	-0.55	-34.40	OK
13.00	Tension	1.53	1.04	2.01	-34.40	OK
14.00	Tension	5.02	4.56	5.48	-34.40	OK
15.00	Tension	9.22	8.83	9.61	-34.40	OK
16.00	Tension	13.96	13.64	14.27	-34.40	OK
17.00	Tension	19.04	18.83	19.26	-34.40	OK
18.00	Tension	24.29	24.19	24.39	-34.40	OK
19.00	Tension	29.53	29.56	29.49	-34.40	OK
20.00	Tension	34.56	34.73	34.40	-34.40	OK
21.00	Tension	39.23	39.36	39.10	-34.40	OK

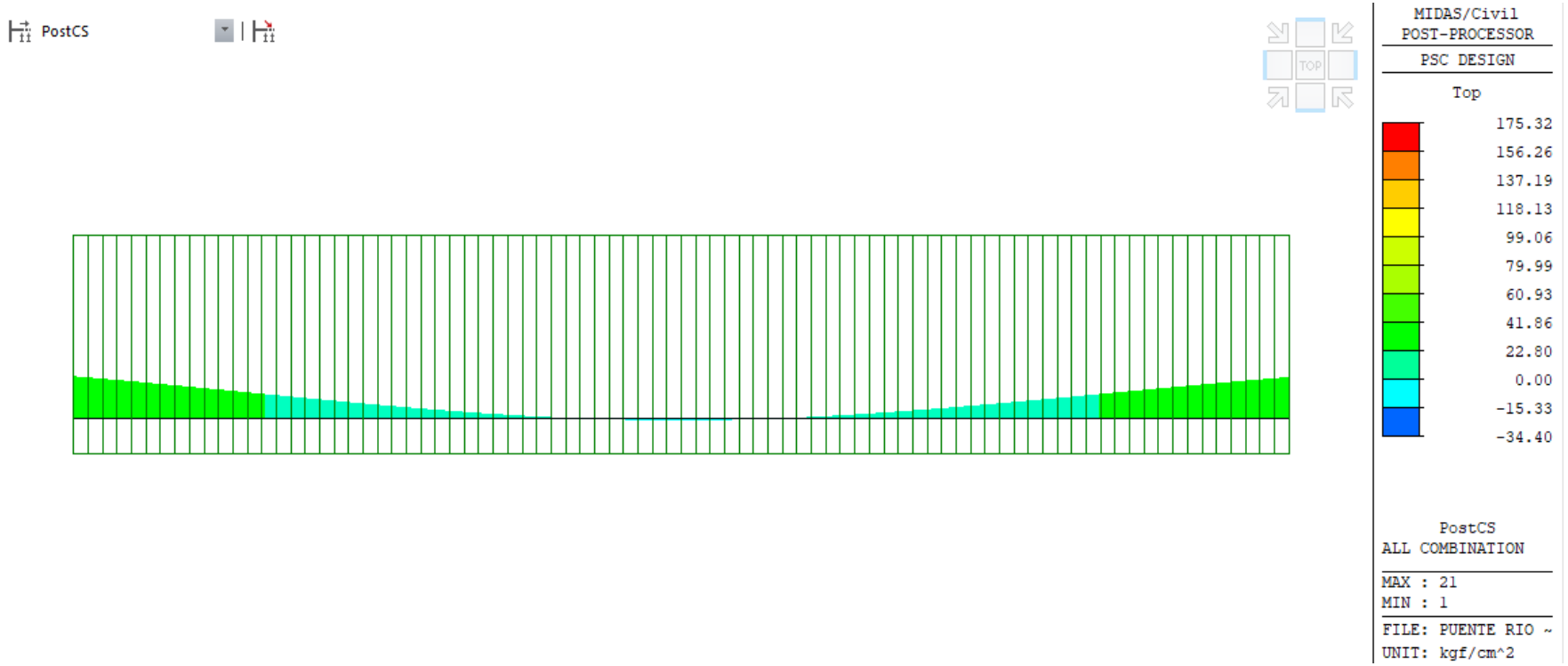


Figura 163. Verificación de esfuerzos a compresión y tracción en fibra superior

Tabla 13. Verificación de esfuerzos a compresión y tracción en fibra inferior

Elem	Comp./Tens.	FB (kgf/cm^2)	FBL (kgf/cm^2)	FBR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.00	Compression	63.87	63.99	63.74	175.32	OK
2.00	Compression	69.36	69.41	69.31	175.32	OK
3.00	Compression	75.07	75.06	75.08	175.32	OK
4.00	Compression	80.83	80.79	80.87	175.32	OK
5.00	Compression	86.41	86.36	86.46	175.32	OK
6.00	Compression	91.64	91.60	91.68	175.32	OK
7.00	Compression	96.06	95.96	96.16	175.32	OK
8.00	Compression	99.73	99.57	99.89	175.32	OK
9.00	Compression	102.42	102.21	102.63	175.32	OK
10.00	Compression	104.00	103.74	104.27	175.32	OK
11.00	Compression	103.82	103.51	104.12	175.32	OK
12.00	Compression	102.01	101.68	102.34	175.32	OK
13.00	Compression	99.16	98.84	99.48	175.32	OK
14.00	Compression	95.38	95.08	95.69	175.32	OK
15.00	Compression	90.93	90.67	91.19	175.32	OK
16.00	Compression	85.93	85.72	86.14	175.32	OK
17.00	Compression	80.61	80.47	80.75	175.32	OK
18.00	Compression	75.11	75.05	75.18	175.32	OK
19.00	Compression	69.65	69.67	69.63	175.32	OK
20.00	Compression	64.39	64.50	64.28	175.32	OK
21.00	Compression	59.54	59.62	59.45	175.32	OK

Elem	Comp./Tens.	FB (kgf/cm^2)	FBL (kgf/cm^2)	FBR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.00	Tension	63.87	63.99	63.74	-34.40	OK
2.00	Tension	69.36	69.41	69.31	-34.40	OK
3.00	Tension	75.07	75.06	75.08	-34.40	OK
4.00	Tension	80.83	80.79	80.87	-34.40	OK
5.00	Tension	86.41	86.36	86.46	-34.40	OK
6.00	Tension	91.64	91.60	91.68	-34.40	OK
7.00	Tension	96.06	95.96	96.16	-34.40	OK
8.00	Tension	99.73	99.57	99.89	-34.40	OK
9.00	Tension	102.42	102.21	102.63	-34.40	OK
10.00	Tension	104.00	103.74	104.27	-34.40	OK
11.00	Tension	103.82	103.51	104.12	-34.40	OK
12.00	Tension	102.01	101.68	102.34	-34.40	OK
13.00	Tension	99.16	98.84	99.48	-34.40	OK
14.00	Tension	95.38	95.08	95.69	-34.40	OK
15.00	Tension	90.93	90.67	91.19	-34.40	OK
16.00	Tension	85.93	85.72	86.14	-34.40	OK
17.00	Tension	80.61	80.47	80.75	-34.40	OK
18.00	Tension	75.11	75.05	75.18	-34.40	OK
19.00	Tension	69.65	69.67	69.63	-34.40	OK
20.00	Tension	64.39	64.50	64.28	-34.40	OK
21.00	Tension	59.54	59.62	59.45	-34.40	OK

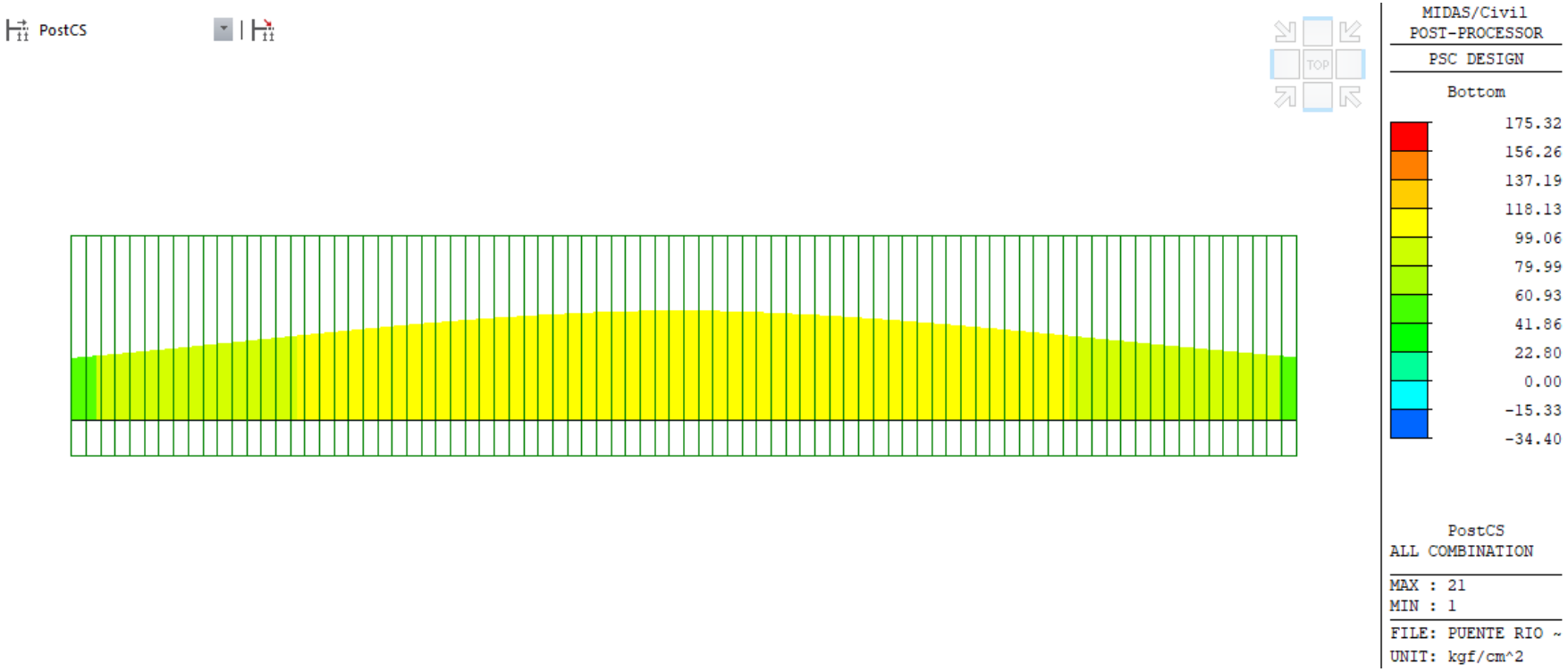


Figura 164. Verificación de esfuerzos a compresión y tracción en fibra inferior

3.4.11.2. REVISIÓN DE ESFUERZOS EN ETAPA DE SERVICIO:

Elem: número de elemento

Comp./Tens.: Esfuerzo de Compresión o Tensión

FT: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My) y fuerza axial en la fibra superior

FB: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My) y fuerza axial en la fibra inferior

FTL: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra superior izquierda

FBL: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra inferior izquierda

FTR: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra superior derecha

FBR: Esfuerzo combinado debido al momento de flexión sobre el eje mayor (My), el eje menor (Mz) y la fuerza axial en la fibra inferior derecha

ALW: Esfuerzo admisible en el hormigón en el estado límite de servicio.

CHK: comprobación de esfuerzos combinados para cargas de servicio

Tabla 14. Verificación de esfuerzos a compresión y tracción en fibra superior

Elem	Comp./Tens.	FT (kgf/cm^2)	FTL (kgf/cm^2)	FTR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.0	Compression	46.39	55.54	37.24	210.92	OK
2.0	Compression	45.45	55.17	35.73	210.92	OK
3.0	Compression	44.18	52.68	35.68	210.92	OK
4.0	Compression	42.70	49.52	35.88	210.92	OK
5.0	Compression	41.09	46.33	35.85	210.92	OK
6.0	Compression	39.46	43.43	35.49	210.92	OK
7.0	Compression	37.92	40.91	34.92	210.92	OK
8.0	Compression	36.58	38.87	34.29	210.92	OK
9.0	Compression	35.57	37.43	33.72	210.92	OK
10.0	Compression	35.01	36.62	33.40	210.92	OK
11.0	Compression	35.05	36.64	33.47	210.92	OK
12.0	Compression	35.68	37.42	33.93	210.92	OK
13.0	Compression	36.70	38.84	34.57	210.92	OK
14.0	Compression	38.00	40.73	35.27	210.92	OK
15.0	Compression	39.43	43.00	35.86	210.92	OK
16.0	Compression	40.87	45.52	36.23	210.92	OK
17.0	Compression	42.23	48.17	36.28	210.92	OK
18.0	Compression	43.38	50.57	36.19	210.92	OK
19.0	Compression	44.15	51.79	36.50	210.92	OK
20.0	Compression	44.68	51.06	38.30	210.92	OK
21.0	Compression	44.75	44.64	44.86	210.92	OK

Elem	Comp./Tens.	FT (kgf/cm^2)	FTL (kgf/cm^2)	FTR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.0	Tension	46.33	55.30	37.36	-29.87	OK
2.0	Tension	45.30	54.73	35.86	-29.87	OK
3.0	Tension	43.94	52.10	35.78	-29.87	OK
4.0	Tension	42.38	48.83	35.92	-29.87	OK
5.0	Tension	40.70	45.57	35.83	-29.87	OK
6.0	Tension	39.01	42.61	35.41	-29.87	OK
7.0	Tension	37.42	40.03	34.81	-29.87	OK
8.0	Tension	36.05	37.95	34.14	-29.87	OK
9.0	Tension	35.01	36.48	33.55	-29.87	OK
10.0	Tension	34.43	35.65	33.22	-29.87	OK
11.0	Tension	34.47	35.65	33.29	-29.87	OK
12.0	Tension	35.10	36.44	33.77	-29.87	OK
13.0	Tension	36.15	37.87	34.44	-29.87	OK
14.0	Tension	37.48	39.79	35.17	-29.87	OK
15.0	Tension	38.95	42.10	35.80	-29.87	OK
16.0	Tension	40.45	44.68	36.22	-29.87	OK
17.0	Tension	41.86	47.40	36.33	-29.87	OK
18.0	Tension	43.09	49.90	36.29	-29.87	OK
19.0	Tension	44.05	51.55	36.55	-29.87	OK
20.0	Tension	44.63	50.92	38.34	-29.87	OK
21.0	Tension	44.77	44.51	45.02	-29.87	OK

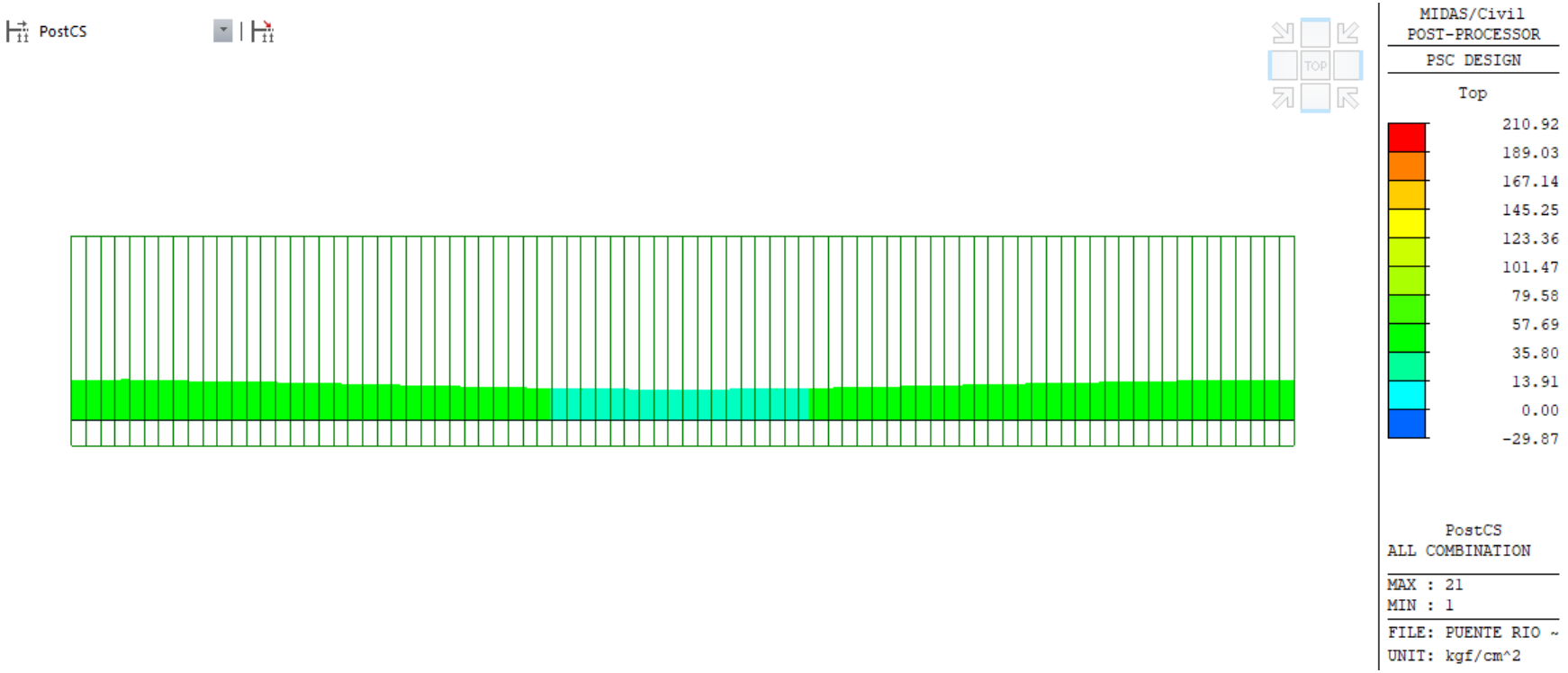


Figura 165. Verificación de esfuerzos a compresión y tracción en fibra superior

Tabla 15. Verificación de esfuerzos a compresión y tracción en fibra inferior

Elem	Comp./Tens.	FB (kgf/cm^2)	FBL (kgf/cm^2)	FBR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.0	Compression	117.51	123.59	111.44	210.92	OK
2.0	Compression	112.55	119.00	106.09	210.92	OK
3.0	Compression	109.63	115.27	103.98	210.92	OK
4.0	Compression	108.44	112.97	103.92	210.92	OK
5.0	Compression	108.55	112.03	105.08	210.92	OK
6.0	Compression	109.63	112.27	107.00	210.92	OK
7.0	Compression	110.87	112.86	108.89	210.92	OK
8.0	Compression	112.39	113.91	110.87	210.92	OK
9.0	Compression	113.80	115.03	112.57	210.92	OK
10.0	Compression	114.90	115.97	113.83	210.92	OK
11.0	Compression	114.62	115.67	113.57	210.92	OK
12.0	Compression	113.20	114.36	112.04	210.92	OK
13.0	Compression	111.58	112.99	110.16	210.92	OK
14.0	Compression	109.91	111.72	108.10	210.92	OK
15.0	Compression	108.64	111.01	106.27	210.92	OK
16.0	Compression	107.98	111.07	104.90	210.92	OK
17.0	Compression	108.37	112.31	104.43	210.92	OK
18.0	Compression	110.07	114.84	105.30	210.92	OK
19.0	Compression	113.64	118.72	108.57	210.92	OK
20.0	Compression	119.15	123.38	114.91	210.92	OK
21.0	Compression	126.98	126.91	127.05	210.92	OK

Elem	Comp./Tens.	FB (kgf/cm^2)	FBL (kgf/cm^2)	FBR (kgf/cm^2)	ALW (kgf/cm^2)	CHK
1.0	Tension	117.74	123.70	111.79	-29.87	OK
2.0	Tension	113.01	119.27	106.75	-29.87	OK
3.0	Tension	110.29	115.70	104.87	-29.87	OK
4.0	Tension	109.27	113.56	104.99	-29.87	OK
5.0	Tension	109.52	112.75	106.29	-29.87	OK
6.0	Tension	110.71	113.10	108.32	-29.87	OK
7.0	Tension	112.04	113.77	110.31	-29.87	OK
8.0	Tension	113.62	114.89	112.36	-29.87	OK
9.0	Tension	115.08	116.05	114.11	-29.87	OK
10.0	Tension	116.20	117.00	115.39	-29.87	OK
11.0	Tension	115.92	116.71	115.14	-29.87	OK
12.0	Tension	114.49	115.38	113.60	-29.87	OK
13.0	Tension	112.83	113.97	111.69	-29.87	OK
14.0	Tension	111.10	112.63	109.57	-29.87	OK
15.0	Tension	109.75	111.84	107.66	-29.87	OK
16.0	Tension	108.99	111.79	106.18	-29.87	OK
17.0	Tension	109.24	112.91	105.56	-29.87	OK
18.0	Tension	110.78	115.29	106.26	-29.87	OK
19.0	Tension	114.02	118.99	109.04	-29.87	OK
20.0	Tension	119.27	123.44	115.10	-29.87	OK
21.0	Tension	126.54	126.37	126.71	-29.87	OK

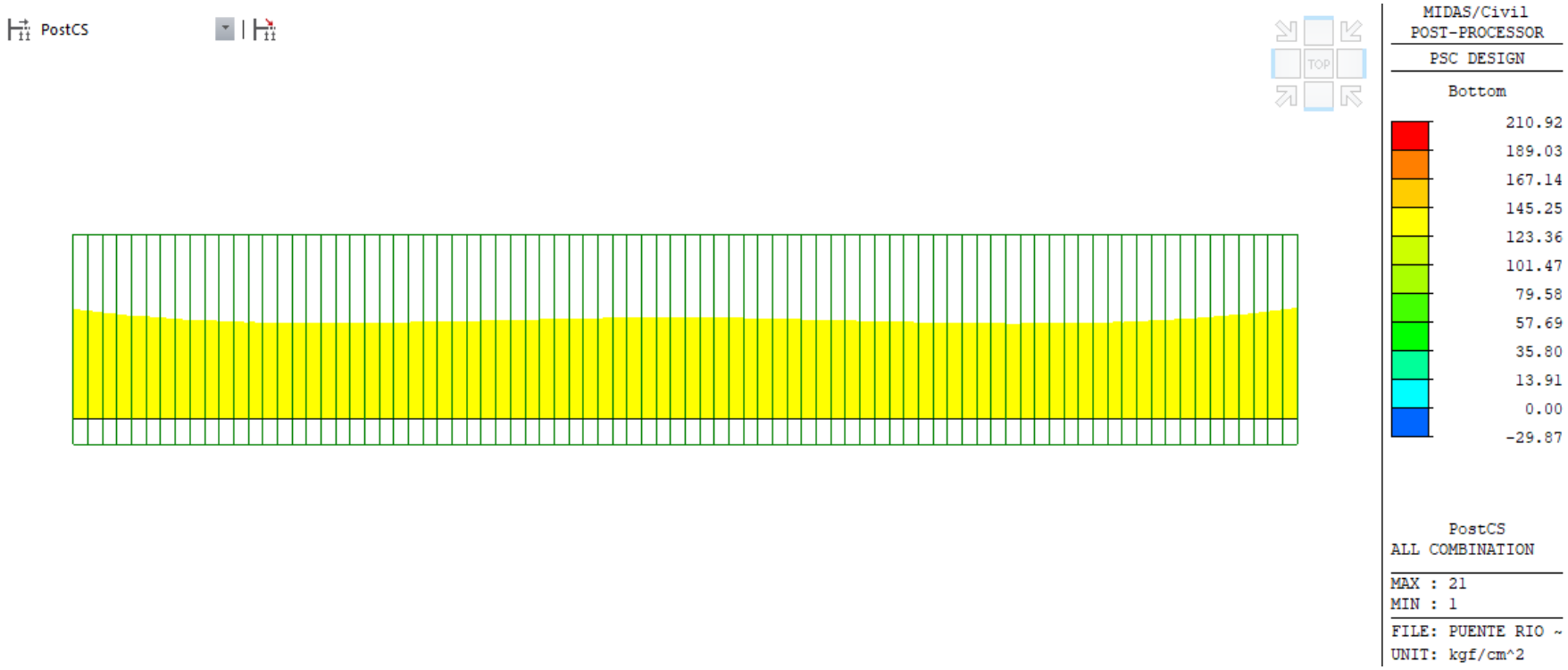


Figura 166. Verificación de esfuerzos a compresión y tracción en fibra inferior

3.4.12. **PERDIDAS INSTANTÁNEAS DE CABLES DE POSTENSADO**

CABLES C1

Elem	Force (tonf)	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
The Loss of tendon group [L1-V1-C1] at the stage of [CS1]							
1.00	130.34	118.70	0.11	1.00	-2.81	-1.04	0.91
2.00	130.34	118.83	0.14	1.00	-2.98	-1.04	0.91
3.00	130.34	118.98	0.16	1.00	-3.17	-1.05	0.91
4.00	130.34	119.18	0.18	1.00	-3.37	-1.06	0.91
5.00	130.34	119.39	0.20	1.00	-3.58	-1.07	0.92
6.00	130.34	119.64	0.23	1.00	-3.79	-1.08	0.92
7.00	130.34	119.91	0.25	1.00	-3.96	-1.09	0.92
8.00	130.34	120.22	0.27	1.00	-4.12	-1.11	0.92
9.00	130.34	120.54	0.29	1.00	-4.23	-1.12	0.92
10.00	130.34	120.91	0.30	1.00	-4.29	-1.14	0.93
11.00	130.34	121.28	0.30	1.00	-4.29	-1.16	0.93
12.00	130.34	121.65	0.29	1.00	-4.22	-1.18	0.93
13.00	130.34	121.97	0.27	1.00	-4.10	-1.19	0.94
14.00	130.34	122.28	0.25	1.00	-3.95	-1.21	0.94
15.00	130.34	122.53	0.22	1.00	-3.77	-1.22	0.94
16.00	130.34	122.78	0.20	1.00	-3.57	-1.23	0.94
17.00	130.34	122.99	0.17	1.00	-3.37	-1.24	0.94
18.00	130.34	123.18	0.15	1.00	-3.17	-1.25	0.95
19.00	130.34	123.33	0.13	1.00	-2.98	-1.26	0.95
20.00	130.34	123.45	0.11	1.00	-2.82	-1.26	0.95
21.00	130.34	123.55	0.09	1.00	-2.68	-1.27	0.95

CABLES C2

Elem	Force (tonf)	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
The Loss of tendon group [L1-V1-C2] at the stage of [CS1]							
1.00	130.34	121.29	0.07	1.00	-2.56	-1.16	0.93
2.00	130.34	121.46	0.09	1.00	-2.70	-1.17	0.93
3.00	130.34	121.67	0.11	1.00	-2.88	-1.18	0.93
4.00	130.34	121.95	0.13	1.00	-3.10	-1.19	0.94
5.00	130.34	122.26	0.16	1.00	-3.34	-1.21	0.94
6.00	130.34	122.52	0.19	1.00	-3.59	-1.22	0.94
7.00	130.34	122.10	0.22	1.00	-3.83	-1.20	0.94
8.00	130.34	121.58	0.25	1.00	-4.03	-1.17	0.93
9.00	130.34	121.05	0.27	1.00	-4.19	-1.15	0.93
10.00	130.34	120.40	0.28	1.00	-4.28	-1.12	0.92
11.00	130.34	119.78	0.28	1.00	-4.27	-1.09	0.92
12.00	130.34	119.13	0.27	1.00	-4.17	-1.06	0.91
13.00	130.34	118.59	0.25	1.00	-4.01	-1.03	0.91
14.00	130.34	118.05	0.22	1.00	-3.80	-1.01	0.91
15.00	130.34	117.61	0.19	1.00	-3.57	-0.99	0.90
16.00	130.34	117.20	0.16	1.00	-3.32	-0.97	0.90
17.00	130.34	116.87	0.14	1.00	-3.09	-0.95	0.90
18.00	130.34	116.57	0.11	1.00	-2.87	-0.94	0.89
19.00	130.34	116.35	0.10	1.00	-2.70	-0.93	0.89
20.00	130.34	116.17	0.08	1.00	-2.56	-0.92	0.89
21.00	130.34	116.05	0.08	1.00	-2.48	-0.91	0.89

CABLES C3

Elem	Force (tonf)	Force (After Immediate Loss) : A (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
The Loss of tendon group [L1-V1-C3] at the stage of [CS1]							
1.00	130.34	114.25	0.06	1.00	-2.32	-0.83	0.88
2.00	130.34	114.48	0.08	1.00	-2.41	-0.84	0.88
3.00	130.34	114.77	0.10	1.00	-2.58	-0.86	0.88
4.00	130.34	115.17	0.13	1.00	-2.82	-0.88	0.88
5.00	130.34	115.63	0.15	1.00	-3.10	-0.90	0.89
6.00	130.34	116.21	0.19	1.00	-3.41	-0.92	0.89
7.00	130.34	116.82	0.22	1.00	-3.70	-0.95	0.90
8.00	130.34	117.58	0.25	1.00	-3.96	-0.98	0.90
9.00	130.34	118.34	0.28	1.00	-4.16	-1.02	0.91
10.00	130.34	119.27	0.29	1.00	-4.28	-1.06	0.92
11.00	130.34	119.08	0.29	1.00	-4.27	-1.05	0.91
12.00	130.34	118.16	0.28	1.00	-4.15	-1.01	0.91
13.00	130.34	117.39	0.25	1.00	-3.95	-0.98	0.90
14.00	130.34	116.64	0.22	1.00	-3.68	-0.94	0.89
15.00	130.34	116.03	0.19	1.00	-3.39	-0.91	0.89
16.00	130.34	115.44	0.15	1.00	-3.09	-0.89	0.89
17.00	130.34	114.99	0.13	1.00	-2.81	-0.87	0.88
18.00	130.34	114.58	0.10	1.00	-2.58	-0.85	0.88
19.00	130.34	114.29	0.09	1.00	-2.41	-0.84	0.88
20.00	130.34	114.07	0.08	1.00	-2.31	-0.83	0.88
21.00	130.34	113.94	0.07	1.00	-2.28	-0.82	0.87

3.4.13. PERDIDAS A LARGO PLAZO DE CABLES DE POSTENSADO

CABLES C1

Elem	Force (tonf)	Force (After Immediate Loss) : A (tonf)	Force (After All Loss) (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
The Loss of tendon group [L1-V1-C1] at the stage of [CS22]								
1.00	130.34	118.70	115.05	0.59	1.01	-12.56	-1.95	0.88
2.00	130.34	118.83	115.26	0.83	1.01	-12.61	-1.97	0.88
3.00	130.34	118.98	115.36	1.05	1.01	-12.73	-1.99	0.89
4.00	130.34	119.18	115.36	1.22	1.01	-12.91	-2.01	0.89
5.00	130.34	119.39	115.30	1.38	1.01	-13.13	-2.03	0.88
6.00	130.34	119.64	115.18	1.51	1.01	-13.37	-2.05	0.88
7.00	130.34	119.91	115.08	1.62	1.01	-13.59	-2.07	0.88
8.00	130.34	120.22	114.97	1.71	1.01	-13.78	-2.10	0.88
9.00	130.34	120.54	114.89	1.77	1.01	-13.93	-2.13	0.88
10.00	130.34	120.91	114.83	1.81	1.01	-14.03	-2.16	0.88
11.00	130.34	121.28	114.86	1.81	1.01	-14.02	-2.20	0.88
12.00	130.34	121.65	114.93	1.77	1.01	-13.91	-2.24	0.88
13.00	130.34	121.97	115.04	1.71	1.01	-13.75	-2.28	0.88
14.00	130.34	122.28	115.16	1.62	1.01	-13.55	-2.32	0.88
15.00	130.34	122.53	115.27	1.51	1.01	-13.33	-2.35	0.88
16.00	130.34	122.78	115.36	1.37	1.01	-13.11	-2.38	0.89
17.00	130.34	122.99	115.40	1.21	1.01	-12.90	-2.40	0.89
18.00	130.34	123.18	115.39	1.03	1.01	-12.74	-2.42	0.89
19.00	130.34	123.33	115.29	0.82	1.01	-12.63	-2.43	0.88
20.00	130.34	123.45	115.08	0.57	1.00	-12.59	-2.44	0.88
21.00	130.34	123.55	114.80	0.32	1.00	-12.61	-2.44	0.88

CABLES C2

Elem	Force (tonf)	Force (After Immediate Loss) : A (tonf)	Force (After All Loss) (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
The Loss of tendon group [L1-V1-C2] at the stage of [CS22]								
1.00	130.34	121.29	115.43	0.38	1.00	-12.03	-2.23	0.89
2.00	130.34	121.46	115.44	0.54	1.00	-12.18	-2.25	0.89
3.00	130.34	121.67	115.43	0.73	1.01	-12.38	-2.27	0.89
4.00	130.34	121.95	115.38	0.92	1.01	-12.63	-2.30	0.89
5.00	130.34	122.26	115.30	1.12	1.01	-12.91	-2.32	0.88
6.00	130.34	122.52	115.18	1.31	1.01	-13.21	-2.35	0.88
7.00	130.34	122.10	115.06	1.47	1.01	-13.49	-2.30	0.88
8.00	130.34	121.58	114.95	1.61	1.01	-13.74	-2.24	0.88
9.00	130.34	121.05	114.84	1.71	1.01	-13.93	-2.18	0.88
10.00	130.34	120.40	114.76	1.76	1.01	-14.04	-2.11	0.88
11.00	130.34	119.78	114.76	1.76	1.01	-14.03	-2.05	0.88
12.00	130.34	119.13	114.83	1.71	1.01	-13.89	-1.99	0.88
13.00	130.34	118.59	114.93	1.61	1.01	-13.69	-1.94	0.88
14.00	130.34	118.05	115.05	1.47	1.01	-13.43	-1.89	0.88
15.00	130.34	117.61	115.16	1.31	1.01	-13.15	-1.85	0.88
16.00	130.34	117.20	115.26	1.12	1.01	-12.87	-1.81	0.88
17.00	130.34	116.87	115.34	0.93	1.01	-12.60	-1.79	0.88
18.00	130.34	116.57	115.38	0.75	1.01	-12.36	-1.76	0.89
19.00	130.34	116.35	115.40	0.57	1.00	-12.17	-1.74	0.89
20.00	130.34	116.17	115.39	0.41	1.00	-12.02	-1.72	0.89
21.00	130.34	116.05	115.32	0.26	1.00	-11.92	-1.71	0.88

CABLES C3

Elem	Force (tonf)	Force (After Immediate Loss) : A (tonf)	Force (After All Loss) (tonf)	Elastic Deform. Loss : B (tonf)	Force(Elastic Loss)/ Force(Immediate Loss)	Creep/Shrinkage Loss (tonf)	Relaxation Loss (tonf)	Force(After All Loss)/ Force(After Immediate Loss)
The Loss of tendon group [L1-V1-C3] at the stage of [CS22]								
1.00	130.34	114.25	115.85	0.27	1.00	-11.42	-1.55	0.89
2.00	130.34	114.48	115.83	0.43	1.00	-11.60	-1.58	0.89
3.00	130.34	114.77	115.78	0.62	1.01	-11.84	-1.60	0.89
4.00	130.34	115.17	115.68	0.83	1.01	-12.15	-1.64	0.89
5.00	130.34	115.63	115.52	1.04	1.01	-12.51	-1.67	0.89
6.00	130.34	116.21	115.34	1.25	1.01	-12.90	-1.72	0.88
7.00	130.34	116.82	115.16	1.44	1.01	-13.28	-1.77	0.88
8.00	130.34	117.58	114.99	1.60	1.01	-13.61	-1.84	0.88
9.00	130.34	118.34	114.86	1.72	1.01	-13.87	-1.91	0.88
10.00	130.34	119.27	114.78	1.78	1.01	-14.03	-2.00	0.88
11.00	130.34	119.08	114.79	1.78	1.02	-14.02	-1.98	0.88
12.00	130.34	118.16	114.87	1.72	1.01	-13.85	-1.89	0.88
13.00	130.34	117.39	115.01	1.60	1.01	-13.58	-1.82	0.88
14.00	130.34	116.64	115.19	1.44	1.01	-13.23	-1.76	0.88
15.00	130.34	116.03	115.38	1.25	1.01	-12.86	-1.71	0.89
16.00	130.34	115.44	115.56	1.04	1.01	-12.48	-1.66	0.89
17.00	130.34	114.99	115.70	0.83	1.01	-12.13	-1.62	0.89
18.00	130.34	114.58	115.81	0.63	1.01	-11.83	-1.58	0.89
19.00	130.34	114.29	115.87	0.45	1.00	-11.58	-1.56	0.89
20.00	130.34	114.07	115.91	0.30	1.00	-11.39	-1.54	0.89
21.00	130.34	113.94	115.96	0.19	1.00	-11.23	-1.53	0.89

3.4.14. **ALARGAMIENTO DE CABLES DE POSTENSADO**

Se calcularán los alargamientos en los cables luego del tensionamiento, para el cálculo de alargamientos se consideran únicamente las pérdidas instantáneas, utilizando la expresión:

$$\delta = \frac{P * L}{A * E}$$

	Tendon Name	Tendon Elongation		Element Elongation		Summation	
		Begin (cm)	End (cm)	Begin (cm)	End (cm)	Begin (cm)	End (cm)
	L1-V1-C1	13.6795	0.0000	0.0586	0.0000	13.7380	0.0000
	L1-V1-C2	0.0000	13.5419	0.0000	0.0579	0.0000	13.5998
	L1-V1-C3	6.9261	6.8764	0.0528	0.0524	6.9789	6.9288
	L1-V2-C1	13.6794	0.0000	0.0586	0.0000	13.7380	0.0000
	L1-V2-C2	0.0000	13.5419	0.0000	0.0579	0.0000	13.5998
	L1-V2-C3	6.8764	6.9261	0.0524	0.0528	6.9288	6.9789
	L1-V3-C1	13.6795	0.0000	0.0586	0.0000	13.7380	0.0000
	L1-V3-C2	0.0000	13.5419	0.0000	0.0579	0.0000	13.5998
	L1-V3-C3	6.9261	6.8764	0.0528	0.0524	6.9789	6.9288
	L1-V4-C1	13.6795	0.0000	0.0586	0.0000	13.7380	0.0000
	L1-V4-C2	0.0000	13.5419	0.0000	0.0579	0.0000	13.5998
	L1-V4-C3	6.9261	6.8764	0.0528	0.0524	6.9789	6.9288
	L1-V5-C1	13.6794	0.0000	0.0586	0.0000	13.7380	0.0000
	L1-V5-C2	0.0000	13.5420	0.0000	0.0579	0.0000	13.5999
	L1-V5-C3	6.8764	6.9261	0.0524	0.0528	6.9288	6.9789

Figura 167. Alargamientos teóricos de cables de postensado

3.4.15. **REVISIÓN DE CAPACIDAD A FLEXIÓN, CORTANTE Y TORSIÓN**

Se verifica la sección crítica en el centro de la luz, es decir a 10.50 m.

Se revisa la capacidad del puente teniendo en cuenta la resistencia a flexión de los cables de postensado, la capacidad del puente se tomó como:

$$\emptyset M_n = \emptyset * A_{ps} * F_{ps} * \left(d_p - \frac{a_p}{2}\right)$$

Donde:

$\boldsymbol{A_{ps}}$ Área de acero presforzado.

$\boldsymbol{f_{ps}}$ Tensiones efectivas de presfuerzo, calculadas según el 5.7.3.2.2)

$\boldsymbol{d_p}$ Profundidad efectiva de presforzado, distancia desde la fibra extrema a compresión al centroide del acero de presfuerzo, debe evaluarse si la sección está sometida a un momento positivo o negativo.

$\boldsymbol{a}$ Profundidad del bloque de compresión del concreto, calculada como $a_p = \beta * C_p$

Siendo C la distancia del eje neutro a la fibra extrema a compresión.

$$C_p = \frac{A_{ps} * f_{pu} + A_s * fs - A's * f's}{0.85 * f'c * \beta * b + k * A_{ps} * \frac{f_{pu}}{d_p}}$$

1. Design Condition

Design Code	Element	Node(I/J)	Section
AASHTO-LRFD2016	12	I	Composite

■ **Section Properties**

- Gross section

Before	After

- Transformed section

Before	After

H	(mm)	1610.0	1910.0
B	(mm)	1070.0	2840.0
C_{zp}	(mm)	785.2	341.9
C_{zm}	(mm)	824.8	1268.1
C_{zps}	(mm)		641.9
C_{zms}	(mm)		391.9
A_g	(mm^2)	6.759.E+05	1.256.E+06
I_y	(mm^4)	2.234.E+11	5.142.E+11
S_t	(mm^3)	2.845.E+08	6.533.E+08
S_b	(mm^3)	2.708.E+08	1.762.E+08
S_{ts}	($mm^{3)}$		8.010.E+08
S_{bs}	($mm^{3)}$		1.312.E+09

H	(mm)	1610.0	1910.0
B	(mm)	1070.0	2840.0
C_{zp}	(mm)	804.6	366.3
C_{zm}	(mm)	805.4	1243.7
C_{zps}	(mm)		666.3
C_{zms}	(mm)		416.3
A_g	(mm^2)	7.161.E+05	1.296.E+06
I_y	(mm^4)	2.404.E+11	5.508.E+11
S_t	(mm^3)	2.988.E+08	6.562.E+08
S_b	(mm^3)	2.985.E+08	1.933.E+08
S_{ts}	($mm^{3)}$		7.716.E+08
S_{bs}	($mm^{3)}$		1.235.E+09

■ **Materials**

- Concrete

	f'_c (MPa)	E_c (Mpa)	$f_r=0.20\sqrt{f'_c}$ (Mpa)	β_1
Girder	34.474	28091.2	3.083	0.800
Slab	27.579	25125.5	2.758	0.850

* β_1 is 0.85 in lower f'c 4ksi, the others are 0.85-0.05(f'c-4.0)≥0.65

- Prestressing steel Information

No.	Tendon Name	Bond Type	d_p (mm)	A_{ps} (mm^2)	Strength (MPa)		E_p (MPa)
					f_{py}	f_{pu}	
1	S_L1-V1-C3	Bond	1806.6	970.9	1676.9	1863.3	196500.6
2	S_L1-V1-C2	Bond	1808.0	970.9	1676.9	1863.3	196500.6
3	S_L1-V1-C1	Bond	1809.3	970.9	1676.9	1863.3	196500.6

* d_p is Distance from extreme compression fiber to centroid of prestressing tendon.

- Longitudinal non prestressed steel reinforcement Information.

Girder		Slab		Bottom for Flexure		Top for Flexure		Torsion
Es (MPa)	fy (MPa)	Es (MPa)	fy (MPa)	ds (mm)	As (mm^2)	ds (mm)	As (mm^2)	A_l (mm^2)
199948.0	413.7	199948.0	413.7	1139.6	3709.7	0.0	0.0	3709.7

* d_s or d'_s is Distance from extreme compression fiber to centroid of non prestressing reinforcement.

- Tranverse non prestressed steel reinforcement Information.

E_s (MPa)	f_y (MPa)	α (deg.)	Shear		Torsion	
			A_v (mm^2)	s (mm)	A_t (mm^2)	s_t (mm)
199948.0	413.7	90.0	258.1	100.0	258.1	100.0

* α is angle between longitudinal and stirrup.

■ **Sectional forces/stresses due to effective prestress**

No.	Tendon Name	Bond Type	e_p (mm)	$A_{ps}f_{e(z\text{-}dir)}$ (kN)	$A_{ps}f_{e(x\text{-}dir)}$ (kN)	$A_{ps}f_{e(x\text{-}dir)}e_p$ (kN•m)
1	S_L1-V1-C3	Bond	-1140.3	13.51	1028.36	1172.64
2	S_L1-V1-C2	Bond	-1141.6	8.43	1034.15	1180.61
3	S_L1-V1-C1	Bond	-1143.0	3.29	1048.06	1197.90
			Σ	25.23	3110.57	3551.14

* e_p is Distance from centroid of section to centroid of tendon

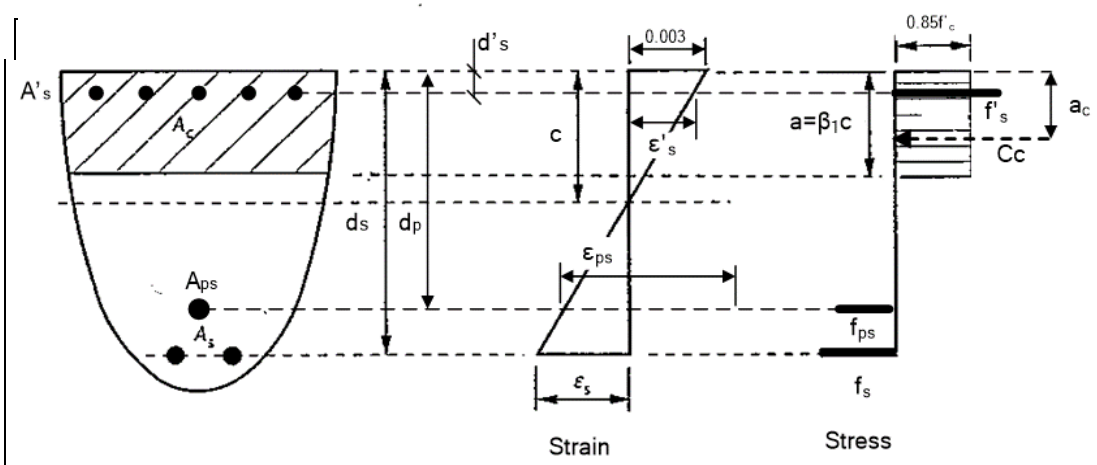
2.Flexure design for a section

■ **Moment Direction :** **Positive**

- Method of Calculation : Code
- The maximum Strength Limit Load Combination : cLCB1

- The maximum factored moment (M_u) : 3850.812 (kN•m)

1) Depth of neutral axis to compression face (c). *(see. 5.7.3.1)*



Axial force in concrete (compressive zone)					
c	$a=\beta_1 c$	A_c	a_c	$C_c=0.85f'_cA_c$ (kN)	$C_c(c-a_c)$ (kN•m)
121.240	103.054	292673.93	51.53	6860.92	478.30

Axial force in reinforcement steels			
tensile zone		compressive zone	
$T_s=A_sf_s$ (kN)	$\Sigma A_sf_s(d_s-c)$	$C_s=A'_sf'_s$ (kN)	$\Sigma A'_sf'_s(c-d'_s)$ (kN•m)
1534.64	1562.81	0.00	0.00

No.	Axial force in tendons(Bond) by Code

	Tendon Name	k	f_{ps} (MPa)	$T_{ps}=A_{ps}f_{ps}$ (kN)	$A_{ps}f_{ps}(d_p-c)$ (kN•m)
1	S_L1-V1-C3	0.280	1828.25	1775.05	2991.67
2	S_L1-V1-C2	0.280	1828.28	1775.08	2994.06
3	S_L1-V1-C1	0.280	1828.30	1775.10	2996.49
			Σ	5325.23	8982.22

* $f_{ps} = f_{pu}(1-k\,c/d_p)$ $\quad k = 2(1.04-f_{py}/f_{pu})$

c (mm)	Compression Force (kN)		Tensile Force (kN)		Tolerance (C/T)
	C_c	C_s	T_s	T_{ps}	
121.240	6860.92	0.00	1534.64	5325.23	1.00015

2) Flexural resistance

- Nominal resistance(Mn). *(see. 5.7.3.2)*

$M_n = \Sigma A_s f_s(d_s-c)+\Sigma A_{ps}f_{ps}(d_p-c)+C_c(c-a_c)+\Sigma A'_s f'_s(c-d'_s) =$ 11023.32 (kN•m)

- Resistance factor(Φ).

$d_t =$ 1860.0 (mm)

$\varepsilon_t = 0.003(d_t/c-1) =$ 0.04302 : Net tensile strain in the extreme tension steel

$\therefore\ \Phi =$ 1.00 : Tension Controlled Range, $0.005 \le \varepsilon_t$

- Factored resistance($M_r = \Phi M_n$)

$M_r =$ 11023.32 (kN•m) ≥ $M_u =$ 3850.81 (kN•m) **OK**

3) Minimum reinforcement

- Judgement *(see. 5.7.3.3.2)*

$M_r =$ 11023.32 (kN•m) ≥ $1.33M_u =$ 5121.58 (kN•m)

∴ No check.

■ **Moment Direction :** **Negative**

- Method of Calculation : Code
- The maximum Strength Limit Load Combination : cLCB3
- The maximum factored moment (M_u) : 0.000 (kN•m)

1) Depth of neutral axis to compression face (c). *(see. 5.7.3.1)*

Axial force in concrete (compressive zone)					
c	$a=\beta_1 c$	A_c	a_c	$C_c=0.85f'_cA_c$ (kN)	$C_c(c-a_c)$ (kN•m)
206.808	175.787	124808.54	87.89	2925.78	347.92

Axial force in reinforcement steels			
tensile zone		compressive zone	
$T_s=A_sf_s$ (kN)	$\Sigma A_sf_s(d_s-c)$	$C_s=A'_sf'_s$ (kN)	$\Sigma A'_sf'_s(c-d'_s)$ (kN•m)
1014.19	932.69	434.06	65.43

No.	Axial force in tendons(Bond) by Code				
	Tendon Name	k	f_{ps} (MPa)	$T_{ps}=A_{ps}f_{ps}$ (kN)	$A_{ps}f_{ps}(d_p-c)$ (kN•m)
1	S_L1-V1-C3	0.280	819.41	795.56	-82.30
2	S_L1-V1-C2	0.280	805.83	782.38	-81.97
3	S_L1-V1-C1	0.280	791.74	768.70	-81.57
			Σ	2346.64	-245.84

* $f_{ps} = f_{pu}(1-k\,c/d_p)$ $k = 2(1.04-f_{py}/f_{pu})$

c (mm)	Compression Force (kN)		Tensile Force (kN)		Tolerance (C/T)
	C_c	C_s	T_s	T_{ps}	
206.808	2925.78	434.06	1014.19	2346.64	0.99970

2) Flexural resistance

- Nominal resistance(Mn). *(see. 5.7.3.2)*

$M_n = \Sigma A_s f_s(d_s-c)+\Sigma A_{ps} f_{ps}(d_p-c)+C_c(c-a_c)+\Sigma A'_s f'_s(c-d'_s) =$ 1100.20 (kN•m)

- Resistance factor(Φ).

d_t = 1560.0 (mm)

$\varepsilon_t = 0.003(d_t/c-1) =$ 0.01963 : Net tensile strain in the extreme tension steel

∴ Φ = 1.00 : Tension Controlled Range, $0.005 \leq \varepsilon_t$

- Factored resistance($M_r = \Phi M_n$)

M_r = 1100.20 (kN•m) ≥ M_u = 0.00 (kN•m) **OK**

3) Minimum reinforcement

- Judgement *(see. 5.7.3.3.2)*

M_r = 1100.20 (kN•m) ≥ $1.33M_u$ = 0.00 (kN•m)

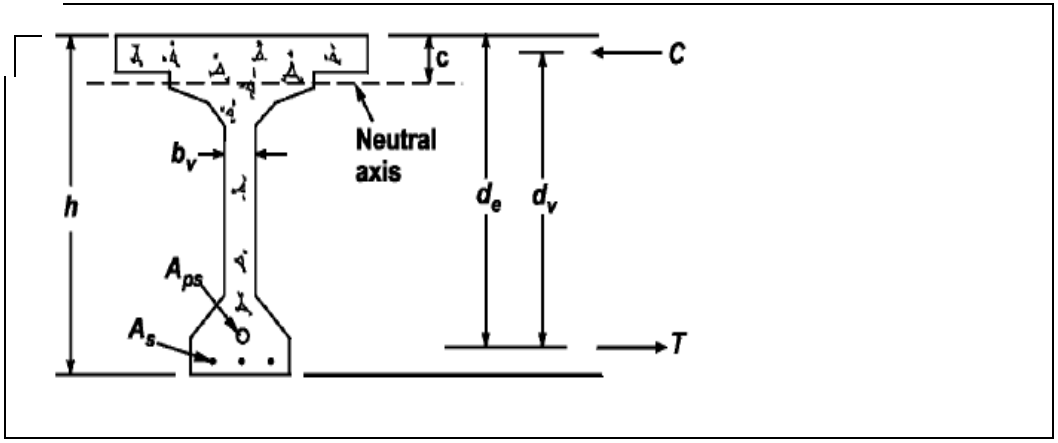
∴ No check.

3.Shear design for a section

■ **Maximum Shear**

- Section type : Nonsegmental-Solid
- The Strength Limit Load Combination : cLCB1
- The factored Shear force : V_u = 154.34 (kN)
- Factored moment : M_u = 3850.81 (kN•m)
- Factored axial force : N_u = -3230.52 (kN)
- Resistance factor for shear : Φ = 0.90
- Component of prestressing force in direction of the shear force : $V_p = \Sigma A_{ps} \cdot f_{e(z\text{-}dir)}$ = 25.23 (kN)

1) Effective depth



b_v = 220.0 (mm) : Effective web width

$$d_e = \frac{A_{ps}f_{ps}d_p+A_sf_sd_s}{A_{ps}f_{ps}+A_sf_s} = 1658.4 \text{ (mm)}$$: Effective depth for Bending

$$d_v = \text{Max}\left[\frac{M_n}{A_{ps}f_{ps}+A_sf_s}, 0.9d_e, 0.72h\right]$$: Effective depth for shear

= Max [1606.9 , 1492.6 , 1375.2]

= 1606.931 (mm)

2) Maximum spacing for transverse reinforcement (s_{max})

- Shear stress on concrete (v_u).

v_u = $|V_u - \Phi V_p|$ = 0.41 (MPa)