

Verification Test Number

101

Scope

- Verify the creation of the combination loadcases

Files Used

Example 1 files

Procedure

Combination loadcases

1. COMBO1 = 1.5 DL + 1.5 LL Type: Persistent / Transient
2. COMBO2X MAX = 1.0 DL + 0.3 LL + 1.0 EX + 0.3 EY Type: Seismic
3. COMBO2X MIN = 1.0 DL + 0.3 LL - 1.0 EX - 0.3 EY Type: Seismic

Beam 1, Story 2

V2 STATION	PRIMARY LOADCASES				COMBINATION LOADCASES		
	DL	LL	EX	EY	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-30.348	-5.178	9.209	0.222	-53.289	-22.625	-41.178
0.400	-26.809	-4.704	8.062	0.317	-47.269	-20.062	-36.378
0.800	-25.631	-4.704	8.062	0.317	-45.502	-18.884	-35.200
1.200	-21.502	-4.033	7.421	0.318	-38.302	-15.196	-30.228
1.600	-16.974	-3.237	7.054	0.231	-30.318	-10.823	-25.069
2.000	-12.230	-2.374	6.821	0.142	-21.905	-6.078	-19.805
2.400	-7.374	-1.474	6.666	0.068	-13.272	-1.130	-14.502
2.800	-2.483	-0.561	6.560	0.007	-4.565	3.911	-9.212
3.200	2.387	0.351	6.490	0.047	4.106	8.996	-4.012
3.600	7.179	1.246	6.454	0.099	12.637	14.036	1.069
4.000	11.833	2.109	6.459	0.155	20.912	18.971	5.959
4.400	16.264	2.917	6.524	0.221	28.771	23.729	10.549
4.800	20.346	3.637	6.683	0.291	35.975	28.208	14.666
5.200	23.864	4.214	7.008	0.340	42.117	32.238	18.019
5.600	26.314	4.520	7.667	0.253	46.250	35.413	19.927
6.000	27.061	4.400	9.016	0.059	47.191	37.414	19.347

Table 1. Beam forces V2.

M3	PRIMARY LOADCASES				COMBINATION LOADCASES		
STATION	DL	LL	EX	EY	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-29.499	-5.247	23.852	0.285	-52.119	-7.136	-55.011
0.400	-17.596	-3.176	20.168	0.197	-31.157	1.679	-38.775
0.800	-6.456	-1.179	16.749	0.058	-11.452	9.957	-23.577
1.200	2.939	0.536	13.604	0.077	5.212	16.727	-10.528
1.600	10.422	1.915	10.616	0.176	18.505	21.665	0.328
2.000	15.900	2.929	7.727	0.237	28.244	24.577	8.980
2.400	19.325	3.563	4.906	0.266	34.332	25.380	15.409
2.800	20.681	3.811	2.129	0.269	36.738	24.035	19.614
3.200	19.976	3.673	0.617	0.250	35.474	21.771	20.386
3.600	17.243	3.156	3.348	0.209	30.599	21.601	14.779
4.000	12.540	2.274	6.080	0.144	22.220	19.346	7.098
4.400	5.959	1.049	8.839	0.052	10.511	15.128	-2.582
4.800	-2.354	-0.482	11.665	0.070	-4.254	9.187	-14.184
5.200	-12.162	-2.258	14.625	0.213	-21.630	1.850	-27.529
5.600	-23.022	-4.168	17.860	0.322	-40.786	-6.316	-42.229
6.000	-34.238	-6.037	21.651	0.308	-60.412	-14.305	-57.792

Table 2. Beam bending moments M3.

Table 1 and Table 2 show the combination loadcases as they are calculated from the primary loadcases beam forces. The primary loadcases were exported from the ETABS analysis file.

The section bending moments, shown in Table 3, were calculated using a normalised end-section length of 0.25.

	M _{+ve} (i-end)	M _{+ve} (mid-span)	M _{+ve} (j-end)	M _{-ve} (i-end)	M _{-ve} (mid-span)	M _{-ve} (j-end)	V
COMBO1	5.618	36.750	0.000	-52.119	0.000	-60.412	53.289
COMBO2X MAX	16.886	25.371	9.005	-7.136	0.000	-14.305	37.414
COMBO2X MIN	0.000	20.260	0.000	-55.011	-2.873	-57.792	41.178

Table 3. Beam section forces in RC-PADD model.

Column 1, Story 2

P	PRIMARY LOADCASES				COMBINATION LOADCASES		
STATION	DL	LL	EX	EY	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-59.284	-7.589	8.402	13.189	-100.309	-49.202	-73.919
1.500	-52.922	-7.589	8.402	13.189	-90.767	-42.840	-67.557
3.000	-46.560	-7.589	8.402	13.189	-81.224	-36.479	-61.196

Table 4. Column forces P.

V _y	PRIMARY LOADCASES				COMBINATION LOADCASES		
STATION	DL	LL	EX	EX	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-24.254	-4.520	14.130	0.573	-43.162	-11.308	-39.912
1.500	-24.254	-4.520	14.130	0.573	-43.162	-11.308	-39.912
3.000	-24.254	-4.520	14.130	0.573	-43.162	-11.308	-39.912

Table 5. Column forces V_y.

V_z	PRIMARY LOADCASES				COMBINATION LOADCASES		
STATION	DL	LL	EX	EY	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-8.010	-1.577	0.320	14.676	-14.381	-3.760	-13.206
1.500	-8.010	-1.577	0.320	14.676	-14.381	-3.760	-13.206
3.000	-8.010	-1.577	0.320	14.676	-14.381	-3.760	-13.206

Table 6. Column forces V_z .

M_y	PRIMARY LOADCASES				COMBINATION LOADCASES		
STATION	DL	LL	EX	EY	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-11.778	-2.336	0.480	19.771	-21.171	-6.068	-18.890
1.500	0.236	0.030	0.011	2.297	0.400	0.945	-0.455
3.000	12.251	2.396	0.480	24.267	21.971	20.730	5.210

Table 7. Column forces M_y .

M_z	PRIMARY LOADCASES				COMBINATION LOADCASES		
STATION	DL	LL	EX	EY	COMBO1	COMBO2X MAX	COMBO2X MIN
0.000	-34.086	-6.355	15.376	0.932	-60.662	-20.338	-51.648
1.500	2.295	0.425	6.632	0.077	4.080	9.078	-4.233
3.000	38.676	7.206	27.386	0.789	68.822	68.460	13.214

Table 8. Column forces M_z .

Table 4, Table 5 and Table 8 show the combination loadcases as they are calculated from the primary loadcases beam forces. The primary loadcases were exported from the ETABS analysis file.

	P	V_y	V_z	M_y	M_z
COMBO1	-100.309	43.162	14.381	21.971	68.822
COMBO2X MAX	-49.202	11.308	3.760	20.730	68.460
COMBO2X MIN	-73.919	39.912	13.206	18.890	51.648

Table 9. Column design forces in RC-PADD model.