ANEXO A

Valores calculados para la elaboración de las gráficas que representan los empujes, tanto del suelo como del concreto (figuras 10, 11 y 12).

Tabla 8. Empujes del suelo durante la excavación [t/m^2]

Estrato	Prof. [m]	u [t/m2]	σv [t/m2]	σ'v [t/m2]	σ'h [t/m2]	σh [t/m2]
A	0.0	0.0	0.000	0.000	0.000	0.000
	0.2	0.0	0.300	0.300	0.246	0.246
	0.4	0.0	0.600	0.600	0.492	0.492
	0.6	0.0	0.900	0.900	0.738	0.738
	0.8	0.0	1.200	1.200	0.984	0.984
	1.0	0.0	1.500	1.500	1.230	1.230
	1.2	0.0	1.800	1.800	1.476	1.476
	1.4	0.0	2.100	2.100	1.722	1.722
B	1.6	0.0	2.342	2.342	1.569	1.569
	2.0	0.4	2.826	2.426	1.625	2.025
	4.0	1.0	5.246	4.246	2.845	3.845
	6.0	1.6	7.666	6.066	4.064	5.664
	8.0	2.2	10.086	7.886	5.284	7.484
	10.0	3.0	12.506	9.506	6.369	9.369
	12.0	3.8	14.926	11.126	7.454	11.254
	14.0	4.4	17.346	12.946	8.674	13.074
	14.3	4.6	17.709	13.109	8.783	13.383
C1	14.6	4.8	18.063	13.263	7.162	11.962
	14.8	5.0	18.299	13.299	7.181	12.181
	15.0	5.2	18.535	13.335	7.201	12.401
	15.2	5.4	18.771	13.371	7.220	12.620
	15.4	5.6	19.007	13.407	7.240	12.840
	15.6	5.8	19.243	13.443	7.259	13.059
	15.8	6.0	19.479	13.479	7.279	13.279
	16.0	6.2	19.715	13.515	7.298	13.498
	16.3	6.3	20.069	13.769	7.435	13.735
C2	16.6	6.4	20.453	14.053	9.416	15.816
	16.8	6.6	20.709	14.109	9.453	16.053
	17.0	6.8	20.965	14.165	9.491	16.291
	17.2	7.0	21.221	14.221	9.528	16.528
	17.4	7.2	21.477	14.277	9.566	16.766
	17.6	7.4	21.733	14.333	9.603	17.003
	17.8	7.6	21.989	14.389	9.641	17.241
	18.0	7.8	22.245	14.445	9.678	17.478
	18.2	8.0	22.501	14.501	9.716	17.716

	19.0	8.4	23.861	15.461	6.803	15.203
	19.5	9.0	24.711	15.711	6.913	15.913
C3	20.0	9.2	25.561	16.361	7.199	16.399
	20.5	10.0	26.411	16.411	7.221	17.221
	21.0	10.4	27.261	16.861	7.419	17.819
	21.6	10.8	28.281	17.481	7.692	18.492
	22.0	10.8	28.853	18.053	9.749	20.549
	23.0	10.2	30.283	20.083	10.845	21.045
	24.0	9.6	31.713	22.113	11.941	21.541
	25.0	9.0	33.143	24.143	13.037	22.037
D	26.0	8.6	34.573	25.973	14.025	22.625
	27.0	8.0	36.003	28.003	15.122	23.122
	28.0	7.6	37.433	29.833	16.110	23.710
	29.0	6.8	38.863	32.063	17.314	24.114
	30.3	6.2	40.722	34.522	18.642	24.842
	31.0	5.8	41.702	35.902	19.387	25.187
	32.0	5.2	43.102	37.902	20.467	25.667
	33.0	4.4	44.502	40.102	21.655	26.055
F1	34.0	4.0	45.902	41.902	22.627	26.627
	35.0	3.4	47.302	43.902	23.707	27.107
	36.0	2.8	48.702	45.902	24.787	27.587
	37.0	2.0	50.102	48.102	25.975	27.975
	38.1	1.6	51.642	50.042	27.023	28.623
	40.0	1.6	54.321	52.721	28.469	30.069
	40.5	1.6	55.026	53.426	28.850	30.450
F2	41.0	1.6	55.731	54.131	29.231	30.831
	41.5	1.6	56.436	54.836	29.611	31.211
	42.0	1.6	57.141	55.541	29.992	31.592
	42.9	1.6	58.410	56.810	30.677	32.277
	44.0	1.6	60.214	58.614	25.204	26.804
	45.0	1.6	61.854	60.254	25.909	27.509
	46.0	1.6	63.494	61.894	26.614	28.214
G1	47.0	1.6	65.134	63.534	27.320	28.920
	48.0	1.6	66.774	65.174	28.025	29.625
	49.0	1.6	68.414	66.814	28.730	30.330
	50.1	1.6	70.218	68.618	29.506	31.106
	51.0	1.6	71.856	70.256	46.369	47.969
	52.0	1.6	73.676	72.076	47.570	49.170
	53.0	1.6	75.496	73.896	48.771	50.371
G2	54.0	1.6	77.316	75.716	49.973	51.573
	55.0	1.6	79.136	77.536	51.174	52.774
	56.0	1.6	80.956	79.356	52.375	53.975
	57.0	1.6	82.776	81.176	53.576	55.176

Tabla 9. Empuje de concreto vs empuje pasivo del suelo, [t/m^2]

Estrato	Prof. [m]	σv concr.	σh concr.	σ'h suelo	σh suelo
	0.0	0.00	0.000	0.000	0.000
	0.2	0.48	0.144	0.450	0.450
	0.4	0.96	0.288	0.900	0.900
	0.6	1.44	0.432	1.350	1.350
A	0.8	1.92	0.576	1.800	1.800
	1.0	2.40	0.720	2.250	2.250
	1.2	2.88	0.864	2.700	2.700
	1.4	3.36	1.008	3.150	3.150
	1.6	3.84	1.152	3.513	3.513
	2.0	4.80	1.440	3.639	4.039
	4.0	9.60	2.880	6.369	7.369
	6.0	14.40	4.320	9.099	10.699
B	8.0	19.20	5.760	11.829	14.029
	10.0	24.00	7.200	14.259	17.259
	12.0	28.80	8.640	16.689	20.489
	14.0	33.60	10.080	19.419	23.819
	14.3	34.32	10.296	19.664	24.264
	14.6	35.04	10.512	19.895	24.695
	14.8	35.52	10.656	19.949	24.949
	15.0	36.00	10.800	20.003	25.203
	15.2	36.48	10.944	20.057	25.457
C1	15.4	36.96	11.088	20.111	25.711
	15.6	37.44	11.232	20.165	25.965
	15.8	37.92	11.376	20.219	26.219
	16.0	38.40	11.520	20.273	26.473
	16.3	39.12	11.736	20.654	26.954
	16.6	39.84	11.952	21.080	27.480
	16.8	40.32	12.096	21.164	27.764
	17.0	40.80	12.240	21.248	28.048
	17.2	41.28	12.384	21.332	28.332
C2	17.4	41.76	12.528	21.416	28.616
	17.6	42.24	12.672	21.500	28.900
	17.8	42.72	12.816	21.584	29.184
	18.0	43.20	12.960	21.668	29.468
	18.2	43.68	13.104	21.752	29.752
	19.0	45.60	13.680	23.192	31.592
	19.5	46.80	14.040	23.567	32.567
C3	20.0	48.00	14.400	24.542	33.742
	20.5	49.20	14.760	24.617	34.617
	21.0	50.40	15.120	25.292	35.692
	21.6	51.84	15.552	26.222	37.022

	22.0	52.80	15.840	27.080	37.880
	23.0	55.20	16.560	30.125	40.325
	24.0	57.60	17.280	33.170	42.770
	25.0	60.00	18.000	36.215	45.215
D	26.0	62.40	18.720	38.960	47.560
	27.0	64.80	19.440	42.005	50.005
	28.0	67.20	20.160	44.750	52.350
	29.0	69.60	20.880	48.095	54.895
	30.3	72.72	21.816	51.783	57.983
	31.0	74.40	22.320	53.853	59.653
	32.0	76.80	23.040	56.853	62.053
	33.0	79.20	23.760	60.153	64.553
F1	34.0	81.60	24.480	62.853	66.853
	35.0	84.00	25.200	65.853	69.253
	36.0	86.40	25.920	68.853	71.653
	37.0	88.80	26.640	72.153	74.153
	38.1	91.44	27.432	75.063	76.663
	40.0	96.00	28.800	79.082	80.682
	40.5	97.20	29.160	80.139	81.739
F2	41.0	98.40	29.520	81.197	82.797
	41.5	99.60	29.880	82.254	83.854
	42.0	100.80	30.240	83.312	84.912
	42.9	102.96	30.888	85.215	86.815
	44.0	105.60	31.680	87.921	89.521
	45.0	108.00	32.400	90.381	91.981
	46.0	110.40	33.120	92.841	94.441
G1	47.0	112.80	33.840	95.301	96.901
	48.0	115.20	34.560	97.761	99.361
	49.0	117.60	35.280	100.221	101.821
	50.1	120.24	36.072	102.927	104.527
	51.0	122.40	36.720	105.384	106.984
	52.0	124.80	37.440	108.114	109.714
	53.0	127.20	38.160	110.844	112.444
G2	54.0	129.60	38.880	113.574	115.174
	55.0	132.00	39.600	116.304	117.904
	56.0	134.40	40.320	119.034	120.634
	57.0	136.80	41.040	121.764	123.364

Tabla 10. Empuje del concreto vs suelo con nivel freático recuperado

Estrato	Prof. [m]	u [t/m2]	σv concr.	σh concr.	σ'h suelo	σh suelo
A	0.0	0.0	0.00	0.000	0.000	0.000
	0.2	0.0	0.48	0.144	0.246	0.246
	0.4	0.0	0.96	0.288	0.492	0.492
	0.6	0.0	1.44	0.432	0.738	0.738
	0.8	0.0	1.92	0.576	0.984	0.984
	1.0	0.0	2.40	0.720	1.230	1.230
	1.2	0.0	2.88	0.864	1.476	1.476
	1.4	0.0	3.36	1.008	1.722	1.722
B	1.6	0.0	3.84	1.152	1.569	1.569
	2.0	0.4	4.80	1.440	1.625	2.025
	4.0	2.4	9.60	2.880	2.845	5.245
	6.0	4.4	14.40	4.320	4.064	8.464
	8.0	6.4	19.20	5.760	5.284	11.684
	10.0	8.4	24.00	7.200	6.369	14.769
	12.0	10.4	28.80	8.640	7.454	17.854
	14.0	12.4	33.60	10.080	8.674	21.074
	14.3	12.7	34.32	10.296	8.783	21.483
C1	14.6	13.0	35.04	10.512	7.162	20.162
	14.8	13.2	35.52	10.656	7.181	20.381
	15.0	13.4	36.00	10.800	7.201	20.601
	15.2	13.6	36.48	10.944	7.220	20.820
	15.4	13.8	36.96	11.088	7.240	21.040
	15.6	14.0	37.44	11.232	7.259	21.259
	15.8	14.2	37.92	11.376	7.279	21.479
	16.0	14.4	38.40	11.520	7.298	21.698
	16.3	14.7	39.12	11.736	7.435	22.135
C2	16.6	15.0	39.84	11.952	9.416	24.416
	16.8	15.2	40.32	12.096	9.453	24.653
	17.0	15.4	40.80	12.240	9.491	24.891
	17.2	15.6	41.28	12.384	9.528	25.128
	17.4	15.8	41.76	12.528	9.566	25.366
	17.6	16.0	42.24	12.672	9.603	25.603
	17.8	16.2	42.72	12.816	9.641	25.841
	18.0	16.4	43.20	12.960	9.678	26.078
	18.2	16.6	43.68	13.104	9.716	26.316
C3	19.0	17.4	45.60	13.680	6.803	24.203
	19.5	17.9	46.80	14.040	6.913	24.813
	20.0	18.4	48.00	14.400	7.199	25.599
	20.5	18.9	49.20	14.760	7.221	26.121
	21.0	19.4	50.40	15.120	7.419	26.819
	21.6	20.0	51.84	15.552	7.692	27.692

	22.0	20.4	52.80	15.840	9.749	30.149
	23.0	21.4	55.20	16.560	10.845	32.245
	24.0	22.4	57.60	17.280	11.941	34.341
	25.0	23.4	60.00	18.000	13.037	36.437
D	26.0	24.4	62.40	18.720	14.025	38.425
	27.0	25.4	64.80	19.440	15.122	40.522
	28.0	26.4	67.20	20.160	16.110	42.510
	29.0	27.4	69.60	20.880	17.314	44.714
	30.3	28.7	72.72	21.816	18.642	47.342
	31.0	29.4	74.40	22.320	19.387	48.787
	32.0	30.4	76.80	23.040	20.467	50.867
	33.0	31.4	79.20	23.760	21.655	53.055
F1	34.0	32.4	81.60	24.480	22.627	55.027
	35.0	33.4	84.00	25.200	23.707	57.107
	36.0	34.4	86.40	25.920	24.787	59.187
	37.0	35.4	88.80	26.640	25.975	61.375
	38.1	36.5	91.44	27.432	27.023	63.523
	40.0	38.4	96.00	28.800	28.469	66.869
	40.5	38.9	97.20	29.160	28.850	67.750
F2	41.0	39.4	98.40	29.520	29.231	68.631
	41.5	39.9	99.60	29.880	29.611	69.511
	42.0	40.4	100.80	30.240	29.992	70.392
	42.9	41.3	102.96	30.888	30.677	71.977
	44.0	42.4	105.60	31.680	25.204	67.604
	45.0	43.4	108.00	32.400	25.909	69.309
	46.0	44.4	110.40	33.120	26.614	71.014
G1	47.0	45.4	112.80	33.840	27.320	72.720
	48.0	46.4	115.20	34.560	28.025	74.425
	49.0	47.4	117.60	35.280	28.730	76.130
	50.1	48.5	120.24	36.072	29.506	78.006
	51.0	49.4	122.40	36.720	46.369	95.769
	52.0	50.4	124.80	37.440	47.570	97.970
	53.0	51.4	127.20	38.160	48.771	100.171
G2	54.0	52.4	129.60	38.880	49.973	102.373
	55.0	53.4	132.00	39.600	51.174	104.574
	56.0	54.4	134.40	40.320	52.375	106.775
	57.0	55.4	136.80	41.040	53.576	108.976

Figura 26. Esquema general de la lumbrera vista en elevación