ΕΡΓΟΔΟΤΗΣ:

ΔΗΜΟΣ ΜΑΛΕΒΙΖΙΟΥ

ΕΡΓΟ:

Επικαιροποίηση - Τροποποίηση της Μελέτης «Ανάπλασης της Οδού Ελευθερίου Βενιζέλου. Υδραυλική μελέτη οδοποιίας.

ΘΕΣΗ: Επί της Παλαιάς Εθνικής Οδού, με ανατολική αφετηρία το όριο των Δήμων Ηρακλείου - Μαλεβιζίου (Χ.Θ. 0+000) μέχρι τον αρ. 123 της οδού Ελευθερίου Βενιζέλου (Χ.Θ. 2+574), στον οικισμό Γάζι

ΜΕΛΕΤΗΤΗΣ:

GTB ΑΝΟΔΟΣ Α.Ε.

Αγαθουπόλεως 64, Αθήνα 112 52
Τηλ. 210 8665622 & Fax 210 8665626
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ΓΙΑ ΤΟΝ ΜΕΛΕΤΗΤΗ

Κ. ΓΑΛΕΡΙΔΗΣ

	ΗΜΕΡΟΜΗΝΙΑ	ΟΝΟΜΑ	ΥΠΟΓΡΑΦΗ
ΣΥΝΤΑΞΗ	03/12/2021	Μ. ΣΟΛΩΜΟΥ	
ΕΛΕΓΧΟΣ	03/12/2021	Κ. ΓΑΛΕΡΙΔΗΣ	

ΑΝΑΘ. REV.	ΗΜ/ΝΙΑ DATE	ΣΥΝΤ. INIT.	ΕΛΕΓΧ. CHK	ΟΝΟΜΑ NAME	ΥΠΟΓΡ. SIGN.
G					
F					
E					
D					
C					
B					
A					

ΘΕΜΑ:

ΥΔΡΑΥΛΙΚΟΙ - ΣΤΑΤΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ

ΕΓΚΡΙΝΕΤΑΙ
Ηράκλειο .. -2- 2022
Ο Δ/ντής Δ/νσης Τεχνικών Έργων

ΑΡΙΘΜΟΣ ΣΧΕΔΙΟΥ
Τ-2

ΚΛΙΜΑΚΑ:

ΧΡΟΝΟΣ ΜΕΛΕΤΗΣ: ΔΕΚΕΜΒΡΙΟΣ 2021

Ο Μελετητής
σφραγίδα - υπογραφή

G.T.B. ΑΝΟΔΟΣ Α.Ε.
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Θεώρηση Υπηρεσίας

ΜΙΧΑΛΗΣ ΨΑΡΟΥΔΑΚΗΣ
ΠΟΛΙΤΙΚΟΣ ΜΗΧ/ΚΟΣ

2/2/2022
Η ΥΠΑΛΛΗΛΟΣ
ΠΑΡΑΣΚΕΥΗ ΒΑΣ. ΚΟΥΤΑΝΤΟΥ
ΠΕ ΠΟΛΙΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ
ΔΗΜΟΣ ΜΑΛΕΒΙΖΙΟΥ

Η ΑΝΤΙΔΗΜΑΡΧΟΣ
ΠΑΠΑΔΑΚΗ ΕΙΡΗΝΗ
ΠΟΛΙΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ MSc

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΣΥΛΛΕΚΤΗΡΩΝ			
Υδραυλικοί Υπολογισμοί Ορθογωνικού Αγωγού ΝΣ1 1.50x1.80			
Παροχή	Qad	m3/s	7,50
Κλίση	S	%	0,80
Πλάτος πυθμένα	m		1,50
Κλίση πρανούς 1	z1		0,00
Κλίση πρανούς 2	z2		0,00
N			0,014
Ταχύτητα	V	m/s	3,821
Βάθος ροής	y	m	1,309
Κρίσιμο Βάθος ροής	yc	m	1,366
Αριθμός Froude	Fr		1,070
Υψος διατομής	Y		1,800
Πληρότητα	y/Y		0,73

Υδραυλικοί Υπολογισμοί Σωληνωτού Αγωγού ΝΣ1 D=1.40m			
Παροχή	Qad	l/s	7500,00
Κλίση	S	%	2,63
D	m		1,40
N			0,014
Ταχύτητα	V	m/s	6,340
Βάθος ροής	y	m	1,004
Κρίσιμο Βάθος ροής	yc	m	1,332
Αριθμός Froude	Fr		2,092
Πληρότητα	y/d		0,72

Υδραυλικοί Υπολογισμοί του Συλλεκτήρα Σ7 μετά την συμβολή του αγωγού ΝΣ1			
Παροχή	Qad	m3/s	12,90
Κλίση	S	%	1,08
Πλάτος πυθμένα	m		2,50
Κλίση πρανούς 1	z1		0,00
Κλίση πρανούς 2	z2		0,00
N			0,014
Ταχύτητα	V	m/s	4,987
Βάθος ροής	y	m	1,035
Κρίσιμο Βάθος ροής	yc	m	1,395
Αριθμός Froude	Fr		1,570
Υψος διατομής	Y		1,500
Πληρότητα	y/Y		0,69

Υδραυλικοί Υπολογισμοί του Συλλεκτήρα Σ7 μετά την συμβολή του Συλλεκτήρα Σ8			
Παροχή	Qad	m3/s	15,30
Μήκος	L	m	10,00
Κλίση	S	%	1,08
Πλάτος πυθμένα	m		3,00
Κλίση πρανούς 1	z1		0,00
Κλίση πρανούς 2	z2		0,00
N			0,014
Ταχύτητα	V	m/s	5,160
Βάθος ροής	y	m	0,988
Κρίσιμο Βάθος ροής	yc	m	1,384
Αριθμός Froude	Fr		1,660
Υψος διατομής	Y		1,500
Πληρότητα	y/Y		0,66

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΦΡΕΑΤΙΩΝ ΥΔΡΟΣΥΛΛΟΓΗΣ

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018				0	0	0.000		7.810	-0.709		0.860	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
Οδός- δεξιά																				1.75
0+000.00	0+012.00	12.000	0.510	2.500	40.000	0.050	0.900	0.045												
						0.312	0.750	0.234												
						0.362	0.771	0.279	5.00	144.17	11.188	11.188	0.181	5.56	0.35	1	13.898	0.000	5.75	1.67
0+012.00	0+033.92	21.920	0.510	2.500	40.000	0.088	0.900	0.079												
						0.570	0.750	0.427												
						0.658	0.770	0.506	6.11	130.54	18.376	18.376	0.220	6.46	0.39	2	37.342	0.000	5.75	2.04
Οδός- δεξιά																				
0+083.00	0+097.00	14.000	2.500	2.500	40.000	0.057	0.900	0.052												
						0.462	0.750	0.347												
						0.519	0.767	0.398	5.00	144.17	15.958	15.958	0.335	4.88	0.68	2	47.449	0.000	5.75	1.40
Οδός- δεξιά																				3.95
0+196.65	0+164.00	32.650	0.800	2.500	40.000	1.535	0.750	1.151												
						0.186	0.900	0.167												
						1.721	0.766	1.318	5.00	144.17	52.841	52.841	0.375	8.39	0.59	2	77.143	0.000	5.75	2.81
0+164.00	0+150.00	14.000	0.800	2.500	40.000	0.049	0.900	0.044												
						0.532	0.750	0.399												
						0.581	0.763	0.443	6.45	127.04	15.649	15.649	0.237	5.75	0.45	1	18.586	0.000	5.75	1.75
0+150.00	0+135.00	15.000	0.800	2.500	40.000	0.000	0.900	0.000												
						0.570	0.750	0.428												
						0.570	0.750	0.428	7.43	118.37	14.068	14.068	0.227	5.57	0.43	1	17.448	0.000	5.75	1.68
0+135.00	0+117.00	18.000	0.800	2.500	40.000	0.000	0.900	0.000												
						0.684	0.750	0.513												
						0.684	0.750	0.513	8.54	110.51	15.761	15.761	0.237	5.76	0.45	1	18.664	0.000	5.75	1.75
0+117.00	0+106.00	11.000	0.800	2.500	40.000	0.000	0.900	0.000												
						0.418	0.750	0.314												
						0.418	0.750	0.314	9.80	103.19	8.993	8.993	0.189	4.88	0.39	1	13.391	0.000	5.75	1.40
0+106.00	0+095.00	11.000	0.800	2.500	40.000	0.000	0.900	0.000												
						0.418	0.750	0.314												
						0.418	0.750	0.314	10.77	98.46	8.581	8.581	0.185	4.81	0.38	2	26.049	0.000	5.75	1.37
Οδός- αριστερά																				
0+000.00	0+012.00	12.000	0.510	2.500	40.000	0.120	0.900	0.108												
						0.312	0.750	0.234												
						0.432	0.792	0.342	5.00	144.17	13.707	13.707	0.196	5.91	0.36	1	15.679	0.000	5.75	1.81
0+012.00	0+033.92	21.920	0.510	2.500	40.000	0.088	0.900	0.079												
						0.482	0.750	0.362												
						0.570	0.773	0.441	6.02	131.47	16.103	16.103	0.209	6.21	0.38	2	34.513	0.000	5.75	1.93
Οδός- αριστερά																				
0+196.65	0+153.00	43.650	0.800	2.500	40.000	0.249	0.900	0.224												
						0.249	0.900	0.224	5.00	144.17	8.975	8.975	0.189	4.87	0.39	1	13.375	0.000	5.75	1.40
0+153.00	0+140.00	13.000	0.800	2.500	40.000	0.046	0.750	0.034												
						0.046	0.750	0.034	8.85	108.54	1.030	1.030	0.076	2.60	0.21	1	3.469	0.000	5.75	0.49
0+140.00	0+097.00	43.000	0.800	2.500	40.000	0.151	0.750	0.113												
						0.151	0.750	0.113	11.71	94.46	2.964	2.964	0.118	3.55	0.28	1	6.921	0.000	5.75	0.87
Οδός- δεξιά																				3.95
0+196.65	0+222.00	25.350	0.760	2.500	40.000	0.144	0.900	0.130												
						2.050	0.750	1.538												
						2.194	0.760	1.668	5.00	144.17	66.834	66.834	0.402	9.12	0.60	2	88.112	0.000	5.75	3.10

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning		Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^-60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018		0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προσπιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
0+222.00	0+230.00	8.000	0.760	2.500	40.000	0.028	0.900	0.025												
						0.518	0.750	0.389												
						0.546	0.758	0.414	6.05	131.12	15.090	15.090	0.230	5.73	0.43	1	18.000	0.000	5.75	1.74
0+230.00	0+238.00	8.000	0.760	2.500	40.000	0.028	0.900	0.025												
						0.518	0.750	0.389												
						0.546	0.758	0.414	6.63	125.28	14.419	14.419	0.226	5.65	0.43	1	17.521	0.000	5.75	1.71
0+238.00	0+247.00	9.000	0.760	2.500	40.000	0.032	0.900	0.028												
						0.583	0.750	0.437												
						0.615	0.758	0.466	7.22	120.08	15.548	15.548	0.233	5.78	0.44	1	18.322	0.000	5.75	1.76
0+247.00	0+261.00	14.000	0.760	2.500	40.000	0.080	0.900	0.072												
						1.010	0.750	0.758												
						1.090	0.761	0.830	7.87	115.08	26.540	26.540	0.286	6.81	0.50	1	25.205	1.335	5.75	2.17
0+261.00	0+284.00	23.000	0.760	2.500	40.000	0.131	0.900	0.118												
						1.660	0.750	1.245												
						1.791	0.761	1.363	8.68	109.58	41.518	42.853	0.342	7.91	0.55	1	33.631	9.222	5.75	2.61
0+284.00	0+307.00	23.000	0.760	2.500	40.000	0.131	0.900	0.118												
						1.660	0.750	1.245												
						1.791	0.761	1.363	9.80	103.17	39.089	48.311	0.358	8.22	0.56	2	72.327	0.000	5.75	2.74
0+307.00	0+316.00	9.000	0.760	2.500	40.000	0.032	0.900	0.028												
						0.360	0.750	0.270												
						0.392	0.762	0.298	10.88	97.98	8.127	8.127	0.179	4.77	0.37	1	12.482	0.000	5.75	1.36
0+316.00	0+333.00	17.000	0.760	2.500	40.000	0.097	0.900	0.087												
						0.340	0.750	0.255												
						0.437	0.783	0.342	11.72	94.43	8.983	8.983	0.186	4.91	0.38	1	13.242	0.000	5.75	1.42
0+333.00	0+356.00	23.000	0.760	2.500	40.000	0.131	0.900	0.118												
						0.230	0.750	0.173												
						0.361	0.804	0.290	13.24	88.86	7.176	7.176	0.169	4.60	0.36	1	11.598	0.000	5.75	1.29
Οδός- αριστερά																				3.95
0+196.65	0+222.00	25.350	0.760	2.500	40.000	0.144	0.900	0.130												
						1.060	0.750	0.795												
						1.204	0.768	0.925	5.00	144.17	37.075	37.075	0.325	7.56	0.53	2	61.630	0.000	5.75	2.47
0+222.00	0+254.00	32.000	0.760	2.500	40.000	0.182	0.900	0.164												
						1.144	0.750	0.858												
						1.326	0.771	1.022	6.30	128.51	36.513	36.513	0.323	7.52	0.53	1	30.532	5.981	5.75	2.46
0+254.00	0+285.00	31.000	0.760	2.500	40.000	0.177	0.900	0.159												
						1.108	0.750	0.831												
						1.285	0.771	0.990	7.95	114.46	31.506	37.487	0.326	7.58	0.53	1	31.021	6.466	5.75	2.48
0+285.00	0+316.00	31.000	0.760	2.500	40.000	0.109	0.900	0.098												
						1.108	0.750	0.831												
						1.217	0.763	0.929	9.54	104.58	27.000	33.467	0.312	7.32	0.52	2	57.942	0.000	5.75	2.38
0+316.00	0+356.00	40.000	0.760	2.500	40.000	0.228	0.900	0.205												
						1.680	0.750	1.260												
						1.908	0.768	1.465	11.19	96.59	39.344	39.344	0.332	7.70	0.54	2	63.879	0.000	5.75	2.53
Οδός- αριστερά																				1.75
1+020.00	1+000.00	20.000	4.000	2.500	40.000	0.070	0.900	0.063												
						0.800	0.750	0.600												
						0.870	0.762	0.663	5.00	144.17	26.573	26.573	0.474	5.30	0.93	1	35.304	0.000	5.75	1.57
1+000.00	0+980.00	20.000	4.000	2.500	40.000	0.070	0.900	0.063												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning			Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018			0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προσπθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.590	0.750	0.443												
						0.660	0.766	0.506	5.70	135.04	18.977	18.977	0.413	4.80	0.65	1	28.936	0.000	5.75	1.37
0+980.00	0+947.00	33.000	4.000	2.500	40.000	0.116	0.900	0.104												
						1.040	0.750	0.780												
						1.156	0.765	0.884	6.51	126.44	31.070	31.070	0.505	5.55	0.97	1	38.729	0.000	5.75	1.67
0+947.00	0+924.00	23.000	4.000	2.500	40.000	0.131	0.900	0.118												
						0.940	0.750	0.705												
						1.071	0.768	0.823	7.60	117.08	26.786	26.786	0.475	5.31	0.93	1	35.472	0.000	5.75	1.57
0+924.00	0+900.00	24.000	4.000	2.500	40.000	0.084	0.900	0.076												
						1.000	0.750	0.750												
						1.084	0.762	0.826	8.41	111.36	25.558	25.558	0.466	5.23	0.92	1	34.501	0.000	5.75	1.54
0+900.00	0+847.00	53.000	3.700	2.500	40.000	0.186	0.900	0.167												
						1.360	0.750	1.020												
						1.546	0.768	1.187	9.26	106.11	35.013	35.013	0.517	5.82	0.97	1	40.920	0.000	5.75	1.78
0+847.00	0+829.00	18.000	3.700	2.500	40.000	0.063	0.900	0.057												
						0.620	0.750	0.465												
						0.683	0.764	0.522	10.97	97.55	14.148	14.148	0.357	4.45	0.76	1	23.943	0.000	5.75	1.23
0+829.00	0+795.00	34.000	3.700	2.500	40.000	0.119	0.900	0.107												
						0.670	0.750	0.503												
						0.789	0.773	0.610	11.61	94.03	15.936	15.936	0.375	4.61	0.79	1	25.686	0.000	5.75	1.29
0+795.00	0+759.00	36.000	3.700	2.500	40.000	0.205	0.900	0.185												
						1.160	0.750	0.870												
						1.365	0.773	1.055	13.33	88.57	25.969	25.969	0.459	5.32	0.90	1	34.276	0.000	5.75	1.58
0+759.00	0+723.00	36.000	3.700	2.500	40.000	0.205	0.900	0.185												
						1.160	0.750	0.870												
						1.365	0.773	1.055	14.63	84.54	24.788	24.788	0.450	5.25	0.89	1	33.347	0.000	5.75	1.55
0+723.00	0+710.00	13.000	2.630	2.500	40.000	0.046	0.900	0.041												
						0.377	0.750	0.283												
						0.423	0.766	0.324	15.97	80.96	7.285	7.285	0.243	3.87	0.56	1	15.068	0.000	5.75	1.00
0+710.00	0+680.00	30.000	2.630	3.000	33.333	0.105	0.900	0.095												
						1.170	0.750	0.878												
						1.275	0.762	0.972	16.86	78.81	21.294	21.294	0.432	5.44	0.84	1	28.795	0.000	6.50	1.40
0+680.00	0+655.00	25.000	2.630	3.000	33.333	0.088	0.900	0.079												
						0.975	0.750	0.731												
						1.063	0.762	0.810	18.02	76.24	17.169	17.169	0.397	5.09	0.79	1	25.146	0.000	6.50	1.26
0+655.00	0+630.00	25.000	2.630	3.000	33.333	0.139	0.900	0.125												
						0.672	0.750	0.504												
						0.811	0.776	0.629	19.06	74.13	12.966	12.966	0.356	4.68	0.74	1	21.058	0.000	6.50	1.14
0+630.00	0+610.00	20.000	2.630	3.000	33.333	0.111	0.900	0.100												
						0.538	0.750	0.403												
						0.649	0.776	0.503	20.24	71.96	10.070	10.070	0.321	4.34	0.70	1	17.929	0.000	6.50	1.03
0+610.00	0+563.00	47.000	2.630	3.000	33.333	0.240	0.900	0.216												
						1.420	0.750	1.065												
						1.660	0.772	1.281	21.27	70.20	24.999	24.999	0.459	5.72	0.87	1	31.847	0.000	6.50	1.49
0+563.00	0+550.00	13.000	2.630	2.500	40.000	0.260	0.900	0.234												
						0.416	0.750	0.312												
						0.676	0.808	0.546	5.00	144.17	21.883	21.883	0.387	5.32	0.76	1	28.891	0.000	5.75	1.58

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/(t+60)^c	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)						
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520							
ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
0+550.00	0+500.00	50.000	0.750	2.500	40.000	0.260	0.900	0.234												
						1.430	0.750	1.073												
						1.690	0.773	1.307	5.56	136.76	49.671	49.671	0.360	8.31	0.56	2	73.364	0.000	5.75	2.77
0+500.00	0+491.00	9.000	0.750	2.500	40.000	0.032	0.900	0.028												
						0.378	0.750	0.284												
						0.410	0.762	0.312	7.88	115.02	9.971	9.971	0.194	5.08	0.39	1	14.046	0.000	5.75	1.48
0+491.00	0+474.00	17.000	0.750	2.500	40.000	0.060	0.900	0.054												
						0.799	0.750	0.599												
						0.859	0.760	0.653	8.65	109.78	19.922	19.922	0.255	6.25	0.46	1	21.178	0.000	5.75	1.95
0+474.00	0+464.00	10.000	0.750	2.500	40.000	0.035	0.900	0.032												
						0.530	0.750	0.398												
						0.565	0.759	0.429	9.76	103.39	12.330	12.330	0.211	5.40	0.41	1	15.926	0.000	5.75	1.61
0+464.00	0+454.00	10.000	0.750	2.500	40.000	0.035	0.900	0.032												
						0.530	0.750	0.398												
						0.565	0.759	0.429	10.55	99.47	11.863	11.863	0.208	5.34	0.41	1	15.586	0.000	5.75	1.59
0+454.00	0+440.00	14.000	0.750	2.500	40.000	0.049	0.900	0.044												
						0.663	0.750	0.497												
						0.712	0.760	0.541	11.35	95.91	14.431	14.431	0.225	5.67	0.43	1	17.482	0.000	5.75	1.72
0+440.00	0+427.00	13.000	0.750	2.500	40.000	0.046	0.900	0.041												
						0.616	0.750	0.462												
						0.661	0.760	0.503	12.39	91.83	12.830	12.830	0.214	5.47	0.41	1	16.305	0.000	5.75	1.64
0+427.00	0+413.00	14.000	0.750	2.500	40.000	0.049	0.900	0.044												
						0.663	0.750	0.497												
						0.712	0.760	0.541	13.40	88.32	13.289	13.289	0.218	5.53	0.42	1	16.648	0.000	5.75	1.66
0+413.00	0+405.00	8.000	0.750	2.500	40.000	0.028	0.900	0.025												
						0.379	0.750	0.284												
						0.407	0.760	0.309	14.47	85.00	7.309	7.309	0.170	4.64	0.36	1	11.692	0.000	5.75	1.30
0+405.00	0+390.00	15.000	0.750	2.500	40.000	0.077	0.900	0.069												
						0.603	0.750	0.452												
						0.680	0.767	0.521	15.26	82.80	11.997	11.997	0.209	5.36	0.41	1	15.670	0.000	5.75	1.59
0+390.00	0+376.00	14.000	0.750	2.500	40.000	0.071	0.900	0.064												
						0.563	0.750	0.422												
						0.634	0.767	0.486	16.46	79.75	10.785	10.785	0.200	5.19	0.40	1	14.713	0.000	5.75	1.53
0+376.00	0+356.00	20.000	0.750	2.500	40.000	0.102	0.900	0.092												
						0.804	0.750	0.603												
						0.906	0.767	0.695	17.62	77.08	14.891	14.891	0.228	5.72	0.43	2	35.621	0.000	5.75	1.74
Οδός- δεξιά																				1.75
1+020.00	0+970.00	50.000	4.000	2.500	40.000	0.260	0.900	0.234												
						0.810	0.750	0.608												
						1.070	0.786	0.842	5.00	144.17	33.727	33.727	0.522	5.69	0.99	1	40.660	0.000	5.75	1.72
0+970.00	0+920.00	50.000	4.000	2.500	40.000	0.285	0.900	0.257												
						1.360	0.750	1.020												
						1.645	0.776	1.277	6.60	125.61	44.576	44.576	0.582	6.19	1.06	1	47.994	0.000	5.75	1.92
0+920.00	0+880.00	40.000	4.000	2.500	40.000	0.190	0.900	0.171												
						1.250	0.750	0.938												
						1.440	0.770	1.109	8.03	113.94	35.112	35.112	0.530	5.75	1.00	1	41.643	0.000	5.75	1.75
0+880.00	0+840.00	40.000	3.700	2.500	40.000	0.200	0.900	0.180												
						1.370	0.750	1.028												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						1.570	0.769	1.208	9.29	105.99	35.579	35.579	0.521	5.85	0.97	1	41.312	0.000	5.75	1.79
0+840.00	0+800.00	40.000	3.700	2.500	40.000	0.180	0.900	0.162												
						1.410	0.750	1.058												
						1.590	0.767	1.220	10.57	99.40	33.698	33.698	0.509	5.75	0.96	1	40.001	0.000	5.75	1.75
0+800.00	0+760.00	40.000	3.700	2.500	40.000	0.140	0.900	0.126												
						1.500	0.750	1.125												
						1.640	0.763	1.251	11.88	93.79	32.619	32.619	0.503	5.70	0.95	1	39.236	0.000	5.75	1.73
0+760.00	0+710.00	50.000	3.700	2.500	40.000	0.285	0.900	0.257												
						1.570	0.750	1.178												
						1.855	0.773	1.434	13.20	86.99	35.475	35.475	0.520	5.84	0.97	1	41.240	0.000	5.75	1.79
0+710.00	0+660.00	50.000	2.630	2.500	40.000	0.285	0.900	0.257												
						1.250	0.750	0.938												
						1.535	0.778	1.194	14.80	84.06	27.902	27.902	0.426	5.72	0.81	1	33.365	0.000	5.75	1.74
0+660.00	0+610.00	50.000	2.630	2.500	40.000	0.240	0.900	0.216												
						1.270	0.750	0.953												
						1.510	0.774	1.169	16.76	79.04	25.674	25.674	0.412	5.58	0.79	1	31.758	0.000	5.75	1.68
0+610.00	0+560.00	50.000	2.630	2.500	40.000	0.280	0.900	0.252												
						1.340	0.750	1.005												
						1.620	0.776	1.257	18.78	74.69	26.100	26.100	0.415	5.61	0.79	1	32.069	0.000	5.75	1.69
0+560.00	0+510.00	50.000	0.750	2.500	40.000	0.260	0.900	0.234												
						1.840	0.750	1.380												
						2.100	0.769	1.614	20.79	71.01	31.863	31.863	0.306	7.22	0.51	1	28.054	3.809	5.75	2.34
Οδός- δεξιά																				1.75
0+510.00	0+485.00	25.000	0.750	2.500	40.000	0.143	0.900	0.128												
						1.170	0.750	0.878												
						1.313	0.766	1.006	5.00	144.17	40.310	40.310	0.333	7.78	0.54	2	64.651	0.000	5.75	2.56
Οδός- δεξιά																				1.75
0+485.00	0+479.00	6.000	0.750	2.500	40.000	0.021	0.900	0.019												
						0.405	0.750	0.304												
						0.426	0.757	0.323	5.00	144.17	12.932	12.932	0.215	5.48	0.41	1	16.382	0.000	5.75	1.64
0+479.00	0+470.00	9.000	0.750	2.500	40.000	0.032	0.900	0.028												
						0.405	0.750	0.304												
						0.437	0.761	0.332	5.46	137.94	12.735	12.735	0.214	5.48	0.41	1	16.234	0.000	5.75	1.63
0+470.00	0+432.00	38.000	0.750	2.500	40.000	0.217	0.900	0.195												
						0.418	0.750	0.314												
						0.635	0.801	0.508	6.17	129.90	18.361	18.361	0.247	6.09	0.45	1	20.173	0.000	5.75	1.89
0+432.00	0+416.00	16.000	0.750	2.500	40.000	0.056	0.900	0.050												
						0.224	0.750	0.168												
						0.280	0.780	0.218	8.73	109.31	6.637	6.637	0.163	4.51	0.35	1	11.044	0.000	5.75	1.25
0+416.00	0+387.00	29.000	0.750	2.500	40.000	0.102	0.900	0.091												
						0.406	0.750	0.305												
						0.508	0.780	0.396	10.36	100.38	11.046	11.046	0.202	5.23	0.40	1	14.922	0.000	5.75	1.54
0+387.00	0+356.00	31.000	0.750	2.500	40.000	0.109	0.900	0.098												
						0.434	0.750	0.326												
						0.543	0.780	0.423	12.75	90.52	10.648	10.648	0.199	5.17	0.39	2	29.205	0.000	5.75	1.52
Οδός- δεξιά																				1.75
1+020.00	1+050.00	30.000	1.540	2.500	40.000	0.105	0.900	0.095												
						0.590	0.750	0.443												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	i=41.93*at^b=60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)						
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520							
ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρεκάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fmo	Απορροή σε φρεάτια σχάρας Qfσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.695	0.773	0.537	5.00	144.17	21.523	21.523	0.327	5.73	0.62	1	25.653	0.000	5.75	1.74
1+050.00	1+067.00	17.000	1.540	2.500	40.000	0.060	0.900	0.054												
						0.714	0.750	0.536												
						0.774	0.762	0.589	6.53	126.28	20.679	20.679	0.322	5.67	0.61	1	25.052	0.000	5.75	1.72
1+067.00	1+084.00	17.000	1.540	2.500	40.000	0.060	0.900	0.054												
						0.714	0.750	0.536												
						0.774	0.762	0.589	7.41	118.59	19.420	19.420	0.314	5.56	0.60	1	24.135	0.000	5.75	1.67
1+084.00	1+102.00	18.000	1.540	2.500	40.000	0.103	0.900	0.093												
						0.760	0.750	0.570												
						0.863	0.768	0.663	8.31	112.01	20.641	20.641	0.322	5.66	0.61	1	25.024	0.000	5.75	1.71
1+102.00	1+120.00	18.000	0.320	2.500	40.000	0.103	0.900	0.093												
						0.760	0.750	0.570												
						0.863	0.768	0.663	9.24	106.25	19.579	19.579	0.195	7.08	0.33	1	17.664	1.915	5.75	2.28
1+120.00	1+133.00	13.000	0.320	2.500	40.000	0.074	0.900	0.067												
						0.549	0.750	0.412												
						0.623	0.768	0.479	10.78	98.42	13.099	15.014	0.176	6.53	0.31	1	15.066	0.000	5.75	2.06
1+133.00	1+144.00	11.000	0.320	2.500	40.000	0.039	0.900	0.035												
						0.320	0.750	0.240												
						0.359	0.766	0.275	12.01	93.28	7.122	7.122	0.131	5.21	0.26	1	9.672	0.000	5.75	1.53
1+144.00	1+163.00	19.000	0.320	2.500	40.000	0.108	0.900	0.097												
						0.539	0.750	0.404												
						0.647	0.775	0.501	13.41	86.31	12.310	12.310	0.163	6.14	0.30	1	13.383	0.000	5.75	1.91
1+163.00	1+181.00	18.000	0.320	2.500	40.000	0.102	0.900	0.092												
						0.511	0.750	0.383												
						0.613	0.775	0.475	15.35	82.57	10.905	10.905	0.156	5.92	0.29	2	24.903	0.000	5.75	1.82
Οδός- αριστερά																				1.75
1+020.00	1+035.00	15.000	1.540	2.500	40.000	0.053	0.900	0.047												
						0.521	0.750	0.391												
						0.574	0.764	0.438	5.00	144.17	17.568	17.568	0.302	5.40	0.59	1	22.744	0.000	5.75	1.61
1+035.00	1+049.00	14.000	1.540	2.500	40.000	0.049	0.900	0.044												
						0.487	0.750	0.365												
						0.536	0.764	0.409	5.83	133.59	15.193	15.193	0.284	5.17	0.56	1	20.672	0.000	5.75	1.52
1+049.00	1+062.00	13.000	1.540	2.500	40.000	0.046	0.900	0.041												
						0.452	0.750	0.339												
						0.497	0.764	0.380	6.65	125.13	13.214	13.214	0.269	4.96	0.54	1	19.219	0.000	5.75	1.43
1+062.00	1+083.00	21.000	1.540	2.500	40.000	0.074	0.900	0.066												
						0.730	0.750	0.548												
						0.804	0.764	0.614	7.46	118.20	20.165	20.165	0.319	5.62	0.61	1	24.680	0.000	5.75	1.70
1+083.00	1+105.00	22.000	1.540	3.000	33.333	0.077	0.900	0.069												
						1.056	0.750	0.792												
						1.133	0.760	0.861	8.55	110.41	26.436	26.436	0.397	6.32	0.71	1	29.851	0.000	6.50	1.69
1+105.00	1+116.00	11.000	0.320	3.000	33.333	0.039	0.900	0.035												
						0.528	0.750	0.396												
						0.567	0.760	0.431	9.48	104.92	12.561	12.561	0.184	6.41	0.33	1	13.966	0.000	6.50	1.72
1+116.00	1+128.00	12.000	0.320	3.000	33.333	0.042	0.900	0.038												
						0.576	0.750	0.432												
						0.618	0.760	0.470	10.48	99.82	13.037	13.037	0.186	6.48	0.33	1	14.296	0.000	6.50	1.74
1+128.00	1+140.00	12.000	0.320	3.000	33.333	0.042	0.900	0.038												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)						
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520							
ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ							ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ						
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Αναγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προσπθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrox l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.576	0.750	0.432												
						0.618	0.760	0.470	11.55	95.09	12.420	12.420	0.183	6.38	0.33	1	13.867	0.000	6.50	1.71
1+140.00	1+181.00	41.000	0.320	3.000	33.333	0.234	0.900	0.210												
						1.353	0.750	1.015												
						1.587	0.772	1.225	12.64	90.91	30.962	30.962	0.254	8.56	0.39	2	49.214	0.000	6.50	2.44
Οδός- αριστερά																				1.75
1+233.00	1+224.00	9.000	1.140	3.000	33.333	0.032	0.900	0.028												
						0.114	0.750	0.086												
						0.148	0.782	0.114	5.00	144.17	4.570	4.570	0.182	3.88	0.42	0	0.000	4.570	6.50	0.66
1+224.00	1+181.00	43.000	2.510	3.000	33.333	0.245	0.900	0.221												
						0.546	0.750	0.409												
						0.791	0.796	0.630	5.82	133.65	23.405	27.974	0.472	5.96	0.87	2	67.758	0.000	6.50	1.57
Οδός- δεξιά																				1.75
1+233.00	1+224.00	9.000	1.140	2.500	40.000	0.033	0.900	0.030												
						0.163	0.750	0.122												
						0.196	0.775	0.152	5.00	144.17	6.077	6.077	0.177	4.14	0.39	0	0.000	6.077	5.75	1.11
1+224.00	1+181.00	43.000	2.510	2.500	40.000	0.157	0.900	0.141												
						0.777	0.750	0.583												
						0.934	0.775	0.724	5.85	133.40	26.864	32.941	0.449	6.06	0.82	2	72.955	0.000	5.75	1.87
οδός_GEN - δεξιά																				1.65
0+055.71	0+040.00	15.713	2.000	2.500	40.000	0.094	0.900	0.085												
						0.230	0.750	0.173												
						0.324	0.794	0.257	5.00	144.17	10.314	10.314	0.261	4.44	0.56	1	17.516	0.000	5.75	1.23
0+040.00	0+025.51	14.490	2.000	2.500	40.000	0.087	0.900	0.078												
						0.230	0.750	0.173												
						0.317	0.791	0.251	6.00	131.65	9.177	9.177	0.249	4.30	0.54	2	32.693	0.000	5.75	1.17
R.A2_GEN																				1.65
0+058.66	0+047.00	11.660	3.500	2.500	40.000	0.064	0.900	0.058												
						0.085	0.600	0.051												
						0.730	0.750	0.548												
						0.879	0.746	0.656	5.00	144.17	26.301	26.301	0.454	5.36	0.88	1	34.147	0.000	5.75	1.60
0+047.00	0+029.00	18.000	3.500	2.500	40.000	0.099	0.900	0.089												
						0.130	0.600	0.078												
						0.540	0.750	0.405												
						0.769	0.744	0.572	5.43	138.40	22.011	22.011	0.422	5.11	0.84	1	30.734	0.000	5.75	1.49
0+029.00	0+018.01	10.990	3.500	2.500	40.000	0.060	0.900	0.054												
						0.090	0.600	0.054												
						0.088	0.750	0.066												
						0.238	0.731	0.174	6.14	130.18	6.310	6.310	0.248	3.57	0.59	2	29.263	0.000	5.75	0.88
R.A2_GEN																				1.65
0+072.00	0+081.00	9.000	2.500	2.500	40.000	0.050	0.900	0.045												
						0.140	0.600	0.084												
						0.200	0.750	0.150												
						0.390	0.715	0.279	5.00	144.17	11.164	11.164	0.288	4.40	0.62	1	19.212	0.000	5.75	1.21
Οδός- αριστερά																				1.75
1+260.00	1+279.25	19.250	2.500	2.500	40.000	0.067	0.900	0.061												
						0.420	0.750	0.315												
						0.487	0.771	0.376	5.00	144.17	15.055	15.055	0.327	4.80	0.67	2	45.846	0.000	5.75	1.37

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς σταθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)						
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520							
ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fmo	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
Οδός- δεξιά																				1.75
1+252.00	1+279.25	27.250	2.500	2.500	40.000	0.095	0.900	0.086												
						0.450	0.750	0.338												
						0.545	0.776	0.423	5.00	144.17	16.967	16.967	0.343	4.97	0.70	2	49.199	0.000	5.75	1.44
R.A1- οδός LIDL - δεξιά																				1.65
0+046.00	0+005.73	40.270	6.520	3.000	33.333	0.262	0.900	0.236												
							0.750	0.000												
						0.262	0.900	0.236	5.00	144.17	9.442	9.442	0.445	3.57	1.06	2	42.221	0.000	6.50	0.77
R.A1- οδός Τσαλ. - δεξιά																				1.65
0+153.44	0+100.00	53.440	7.000	3.000	33.333	0.347	0.900	0.313												
							0.750	0.000												
						0.347	0.900	0.313	5.00	144.17	12.530	12.530	0.470	4.00	1.06	1	24.574	0.000	6.50	0.92
0+100.00	0+050.00	50.000	7.000	3.000	33.333	0.325	0.900	0.293												
							0.750	0.000												
						0.325	0.900	0.293	6.89	122.90	9.993	9.993	0.429	3.74	1.00	1	21.203	0.000	6.50	0.83
0+050.00	0+009.30	40.700	7.000	3.000	33.333	0.265	0.900	0.238												
							0.750	0.000												
						0.265	0.900	0.238	8.84	108.64	7.191	7.191	0.376	3.39	0.92	2	34.040	0.000	6.50	0.71
R.A1 (xalepa) - δεξιά																				
0+000.00	0+014.40	14.400	1.300	2.500	40.000	0.060	0.900	0.054												
						0.374	0.750	0.281												
						0.435	0.771	0.335	5.00	144.17	13.426	13.426	0.257	5.11	0.51	2	37.479	0.000	5.75	1.49
0+040.00	0+051.00	11.000	1.300	2.500	40.000	0.044	0.900	0.040												
							0.750	0.000												
						0.044	0.900	0.040	5.00	144.17	1.587	1.587	0.104	2.76	0.28	2	10.136	0.000	5.75	0.55
0+051.00	0+058.00	7.000	1.300	2.500	40.000	0.028	0.900	0.025												
							0.750	0.000												
						0.028	0.900	0.025	5.00	144.17	1.010	1.010	0.089	2.38	0.26	1	3.584	0.000	5.75	0.40
0+040.00	0+030.00	10.000	2.900	2.500	40.000	0.040	0.900	0.036												
							0.750	0.000												
						0.040	0.900	0.036	5.00	144.17	1.443	1.443	0.131	2.34	0.39	1	5.144	0.000	5.75	0.39
Οδός- δεξιά																				
0+061.36	0+033.92	27.440	2.480	2.500	40.000	0.110	0.900	0.099												
						0.741	0.750	0.556												
						0.851	0.769	0.654	5.00	144.17	26.230	26.230	0.409	5.66	0.78	1	31.782	0.000	5.75	1.72
Οδός- αριστερά																				3.95
1+578.00	1+555.00	23.000	1.730	2.500	40.000	0.099	0.900	0.089												
						0.828	0.750	0.621												
						0.927	0.766	0.710	5.00	144.17	28.457	28.457	0.379	6.13	0.69	2	62.019	0.000	5.75	1.90
1+555.00	1+537.00	18.000	1.730	2.500	40.000	0.077	0.900	0.070												
						0.648	0.750	0.486												
						0.725	0.766	0.556	6.01	131.55	20.320	20.320	0.331	5.54	0.64	1	25.387	0.000	5.75	1.67
1+537.00	1+518.00	19.000	1.730	2.500	40.000	0.067	0.900	0.060												
						0.560	0.750	0.420												
						0.627	0.766	0.480	6.92	122.68	16.366	16.366	0.303	5.19	0.60	1	22.334	0.000	5.75	1.53
1+518.00	1+498.00	20.000	1.730	2.500	40.000	0.114	0.900	0.103												
						0.680	0.750	0.510												
						0.794	0.772	0.613	7.96	114.41	19.484	19.484	0.326	5.47	0.63	1	24.763	0.000	5.75	1.64
1+498.00	1+462.00	36.000	2.700	2.500	40.000	0.205	0.900	0.185												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning					Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018					0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ						
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προσπθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						1.210	0.750	0.908												
						1.415	0.772	1.092	8.99	107.74	32.711	32.711	0.458	5.98	0.65	1	36.867	0.000	5.75	1.84
1+462.00	1+422.00	40.000	3.910	2.500	40.000	0.228	0.900	0.205												
						1.360	0.750	1.020												
						1.588	0.772	1.225	10.30	100.69	34.294	34.294	0.522	5.73	0.98	1	40.876	0.000	5.75	1.74
1+422.00	1+394.00	28.000	2.280	2.500	40.000	0.160	0.900	0.144												
						0.952	0.700	0.666												
						1.112	0.729	0.810	11.57	95.00	21.393	21.393	0.367	5.40	0.71	1	27.687	0.000	5.75	1.61
1+394.00	1+365.00	29.000	2.280	2.500	40.000	0.165	0.900	0.149												
						0.986	0.700	0.690												
						1.151	0.729	0.839	12.84	90.20	21.039	21.039	0.365	5.37	0.71	1	27.415	0.000	5.75	1.60
1+365.00	1+335.00	30.000	2.280	2.500	40.000	0.105	0.900	0.095												
						1.230	0.750	0.923												
						1.335	0.762	1.017	14.17	85.91	24.288	24.288	0.386	5.61	0.74	1	29.850	0.000	5.75	1.69
1+335.00	1+289.00	46.000	2.280	2.500	40.000	0.262	0.900	0.236												
						1.900	0.750	1.425												
						2.162	0.768	1.661	15.46	82.26	37.983	37.983	0.461	6.42	0.82	1	38.947	0.000	5.75	2.02
1+289.00	1+279.00	10.000	2.280	2.500	40.000	0.057	0.900	0.051												
						0.470	0.750	0.353												
						0.527	0.766	0.404	17.13	78.19	8.777	8.777	0.253	4.16	0.56	2	32.703	0.000	5.75	1.12
Οδός- δεξιά																				3.95
1+584.00	1+545.00	39.000	1.730	2.500	40.000	0.222	0.900	0.200												
						1.014	0.750	0.761												
						1.236	0.777	0.961	5.00	144.17	38.499	38.499	0.426	6.73	0.74	2	74.286	0.000	5.75	2.14
1+545.00	1+527.00	18.000	1.730	2.500	40.000	0.063	0.900	0.057												
						0.738	0.750	0.554												
						0.801	0.762	0.610	6.53	126.28	21.422	21.422	0.338	5.63	0.64	1	26.194	0.000	5.75	1.70
1+527.00	1+505.00	22.000	1.730	2.500	40.000	0.125	0.900	0.113												
						0.770	0.750	0.578												
						0.895	0.771	0.690	7.41	118.53	22.749	22.749	0.347	5.73	0.65	1	27.145	0.000	5.75	1.74
1+505.00	1+468.00	37.000	3.910	2.500	40.000	0.220	0.900	0.198												
						1.500	0.750	1.125												
						1.720	0.769	1.323	8.47	110.93	40.800	40.800	0.559	6.04	1.03	1	45.321	0.000	5.75	1.87
1+468.00	1+444.00	24.000	3.910	2.500	40.000	0.084	0.900	0.076												
						0.930	0.750	0.698												
						1.014	0.762	0.773	9.58	104.38	22.434	22.434	0.439	5.05	0.88	1	31.793	0.000	5.75	1.47
1+444.00	1+418.00	26.000	3.910	2.500	40.000	0.148	0.900	0.133												
						0.910	0.750	0.683												
						1.058	0.771	0.816	10.49	99.77	22.630	22.630	0.441	5.07	0.88	1	31.857	0.000	5.75	1.48
1+418.00	1+378.00	40.000	2.280	2.500	40.000	0.228	0.900	0.205												
						1.720	0.750	1.290												
						1.948	0.768	1.495	11.47	95.43	39.665	39.665	0.469	6.51	0.83	1	39.969	0.000	5.75	2.05
1+378.00	1+348.00	30.000	2.280	2.500	40.000	0.130	0.900	0.117												
						1.260	0.750	0.945												
						1.390	0.764	1.062	12.69	90.04	26.583	26.583	0.401	5.76	0.75	1	31.492	0.000	5.75	1.75
1+348.00	1+321.00	27.000	2.280	2.500	40.000	0.125	0.900	0.113												
						1.201	0.750	0.901												
						1.327	0.764	1.014	14.14	86.00	24.235	24.235	0.386	5.60	0.74	1	29.811	0.000	5.75	1.69

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)					
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520						
ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προσπθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fmo	Απορροή σε ψρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
1+321.00	1+295.00	26.000	2.280	2.500	40.000	0.121	0.900	0.109												
						1.157	0.750	0.868												
						1.277	0.764	0.976	15.31	82.68	22.436	22.436	0.374	5.47	0.72	1	28.479	0.000	5.75	1.64
1+295.00	1+279.00	16.000	2.280	2.500	40.000	0.074	0.900	0.067												
						0.712	0.750	0.534												
						0.786	0.764	0.601	16.46	79.74	13.316	13.316	0.302	4.69	0.63	2	41.842	0.000	5.75	1.33
R.A3																				
0+090.91	0+075.00	15.909	2.670	2.500	40.000	0.087	0.900	0.079												
						0.240	0.600	0.144												
						0.370	0.750	0.278												
						0.697	0.717	0.500	5.00	144.17	20.050	20.050	0.375	5.17	0.74	1	27.518	0.000	5.75	1.52
0+075.00	0+066.00	9.000	2.670	2.500	40.000	0.050	0.900	0.045												
						0.110	0.600	0.066												
						1.030	0.750	0.773												
						1.190	0.742	0.883	5.71	134.99	33.139	33.139	0.459	6.01	0.84	1	37.069	0.000	5.75	1.85
0+066.00	0+048.00	18.000	2.670	2.500	40.000	0.099	0.900	0.089												
						0.100	0.600	0.060												
						0.198	0.749	0.149	6.03	131.31	5.443	5.443	0.215	3.55	0.52	2	25.366	0.000	5.75	0.87
0+048.00	0+036.35	11.650	2.670	2.500	40.000	0.064	0.900	0.058												
						0.200	0.600	0.120												
						0.140	0.750	0.105												
						0.404	0.700	0.283	7.43	118.43	9.301	9.301	0.272	4.14	0.60	2	34.954	0.000	5.75	1.11
R.A3																				
0+090.91	0+110.00	19.091	2.300	2.500	40.000	0.105	0.900	0.095												
						0.160	0.600	0.096												
						0.950	0.750	0.713												
						1.215	0.743	0.903	5.00	144.17	36.192	36.192	0.454	6.32	0.81	2	75.814	0.000	5.75	1.98
R.A3	Χ.Θ. 1+600																			
0+000.00	0+014.00	14.000	2.300	2.500	40.000	0.077	0.900	0.069												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/(t+60)	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fmo	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντη Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.180	0.600	0.108												
						0.250	0.750	0.188												
						0.507	0.720	0.365	5.00	144.17	14.621	14.621	0.315	4.82	0.65	1	22.149	0.000	5.75	1.38
0+014.00	0+027.00	13.000	2.300	2.500	40.000	0.072	0.900	0.064												
						0.180	0.600	0.108												
						0.150	0.750	0.113												
						0.402	0.709	0.285	5.74	134.60	10.659	10.659	0.276	4.40	0.59	2	36.754	0.000	5.75	1.21
Οδός- αριστερά																				1.75
1+627.00	1+660.00	33.000	6.300	2.500	40.000	0.139	0.900	0.125												
						0.891	0.750	0.668												
						1.030	0.770	0.793	5.00	144.17	31.783	31.783	0.583	5.22	1.15	1	43.064	0.000	5.75	1.54
1+660.00	1+700.00	40.000	6.300	2.500	40.000	0.168	0.900	0.151												
						1.120	0.750	0.840												
						1.288	0.770	0.991	5.84	132.31	36.457	36.457	0.617	5.44	1.19	1	46.707	0.000	5.75	1.62
1+700.00	1+733.00	33.000	6.300	2.500	40.000	0.139	0.900	0.125												
						0.990	0.750	0.743												
						1.129	0.768	0.867	7.02	121.76	29.355	29.355	0.565	5.10	1.13	1	41.088	0.000	5.75	1.49
1+733.00	1+780.00	47.000	6.300	2.500	40.000	0.197	0.900	0.178												
						1.410	0.750	1.058												
						1.607	0.768	1.235	8.00	114.15	39.195	39.195	0.635	5.56	1.22	1	48.755	0.000	5.75	1.67
1+780.00	1+830.00	50.000	6.300	2.500	40.000	0.210	0.900	0.189												
						1.500	0.750	1.125												
						1.710	0.768	1.314	9.23	106.29	38.828	38.828	0.632	5.54	1.21	1	48.483	0.000	5.75	1.67
1+830.00	1+860.00	30.000	2.480	2.500	40.000	0.126	0.900	0.113												
						0.960	0.750	0.720												
						1.086	0.767	0.833	10.55	99.47	23.046	23.046	0.388	5.45	0.75	1	29.435	0.000	5.75	1.63
1+860.00	1+880.00	20.000	1.200	2.500	40.000	0.084	0.900	0.076												
						0.700	0.750	0.525												
						0.784	0.766	0.601	11.84	93.94	15.684	15.684	0.268	5.41	0.52	1	20.212	0.000	5.75	1.62
1+880.00	1+890.00	10.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.350	0.750	0.263												
						0.392	0.766	0.300	13.08	89.38	7.462	7.462	0.126	5.39	0.25	1	9.676	0.000	5.75	1.61
1+890.00	1+900.00	10.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.350	0.750	0.263												
						0.392	0.766	0.300	14.38	85.28	7.119	7.119	0.126	5.31	0.25	1	9.410	0.000	5.75	1.58
1+900.00	1+910.00	10.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.350	0.750	0.263												
						0.392	0.766	0.300	15.70	81.63	6.815	6.815	0.124	5.25	0.24	1	9.170	0.000	5.75	1.55
1+910.00	1+925.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												
						0.495	0.750	0.371												
						0.558	0.767	0.428	17.05	76.36	9.322	9.322	0.140	5.76	0.26	1	11.041	0.000	5.75	1.75
1+925.00	1+940.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												
						0.510	0.750	0.383												
						0.573	0.766	0.439	18.83	74.59	9.107	9.107	0.139	5.72	0.26	1	10.888	0.000	5.75	1.74
1+940.00	1+955.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												
						0.510	0.750	0.383												
						0.573	0.766	0.439	20.63	71.28	8.703	8.703	0.137	5.64	0.26	1	10.600	0.000	5.75	1.71
1+955.00	1+970.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.016				0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.510	0.750	0.383												
						0.573	0.766	0.439	22.46	68.33	8.344	8.344	0.134	5.57	0.26	1	10.338	0.000	5.75	1.68
1+970.00	1+985.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												
						0.510	0.750	0.383												
						0.573	0.766	0.439	24.32	65.68	8.020	8.020	0.132	5.51	0.25	1	10.098	0.000	5.75	1.65
1+985.00	2+003.00	18.000	0.280	2.500	40.000	0.076	0.900	0.068												
						0.648	0.750	0.486												
						0.724	0.766	0.554	26.21	63.29	9.747	9.747	0.143	5.84	0.27	1	11.337	0.000	5.75	1.79
2+003.00	2+015.00	12.000	0.280	2.500	40.000	0.050	0.900	0.045												
						0.432	0.750	0.324												
						0.482	0.766	0.369	28.31	60.91	6.254	6.254	0.120	5.11	0.24	1	8.716	0.000	5.75	1.50
2+015.00	2+030.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												
						0.495	0.750	0.371												
						0.556	0.767	0.428	29.98	59.19	7.042	7.042	0.125	5.30	0.25	1	9.350	0.000	5.75	1.57
2+030.00	2+070.00	40.000	0.280	3.500	28.571	0.280	0.900	0.252												
						1.240	0.750	0.930												
						1.520	0.778	1.182	31.97	57.33	18.839	18.839	0.222	7.70	0.36	1	18.163	0.676	7.25	1.88
2+070.00	2+110.00	40.000	0.280	3.500	28.571	0.168	0.900	0.151												
						1.000	0.750	0.750												
						1.168	0.772	0.901	34.97	54.83	13.737	14.413	0.203	7.06	0.34	1	15.247	0.000	7.25	1.69
2+110.00	2+150.00	40.000	0.280	3.500	28.571	0.168	0.900	0.151												
						1.000	0.750	0.750												
						1.168	0.772	0.901	38.26	52.44	13.137	13.137	0.196	6.85	0.34	2	28.698	0.000	7.25	1.63
Οδός- δεξιά																				2
1+627.00	1+660.00	33.000	2.500	2.500	40.000	0.149	0.900	0.134												
						0.528	0.750	0.396												
						0.677	0.783	0.530	5.00	144.17	21.228	21.228	0.376	5.31	0.74	1	26.084	0.000	5.75	1.57
1+660.00	1+700.00	40.000	6.300	2.500	40.000	0.228	0.900	0.205												
						0.480	0.750	0.360												
						0.708	0.798	0.565	6.46	126.92	19.942	19.942	0.461	4.55	1.02	1	32.699	0.000	5.75	1.27
1+700.00	1+733.00	33.000	6.300	2.500	40.000	0.188	0.900	0.169												
						0.825	0.750	0.619												
						1.013	0.778	0.788	7.85	115.22	25.243	25.243	0.530	4.88	1.08	1	37.583	0.000	5.75	1.40
1+733.00	1+770.00	37.000	6.300	2.500	40.000	0.211	0.900	0.190												
						1.110	0.750	0.833												
						1.321	0.774	1.022	8.89	108.33	30.788	30.788	0.576	5.17	1.14	2	84.524	0.000	5.75	1.52
1+770.00	1+805.00	35.000	6.300	2.500	40.000	0.200	0.900	0.180												
						1.190	0.750	0.893												
						1.390	0.772	1.072	9.96	102.37	30.511	30.511	0.574	5.16	1.14	1	42.036	0.000	5.75	1.51
1+805.00	1+843.00	38.000	3.700	2.500	40.000	0.217	0.900	0.195												
						1.292	0.750	0.969												
						1.509	0.772	1.164	10.97	97.54	31.563	31.563	0.496	5.64	0.94	1	38.477	0.000	5.75	1.71
1+843.00	1+880.00	37.000	1.600	2.500	40.000	0.211	0.900	0.190												
						1.406	0.750	1.055												
						1.617	0.770	1.244	12.25	92.35	31.947	31.947	0.387	6.43	0.69	1	32.705	0.000	5.75	2.02
1+880.00	1+913.00	33.000	0.280	2.500	40.000	0.188	0.900	0.169												
						1.254	0.750	0.941												
						1.442	0.770	1.110	13.85	86.90	26.812	26.812	0.210	7.99	0.34	2	41.583	0.000	5.75	2.65

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Αναγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
1+913.00	1+925.00	12.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.480	0.750	0.360												
						0.522	0.762	0.398	16.46	79.74	8.818	8.818	0.137	5.67	0.26	1	10.682	0.000	5.75	1.72
1+925.00	1+935.00	10.000	0.280	2.500	40.000	0.035	0.900	0.032												
						0.410	0.750	0.308												
						0.445	0.762	0.339	17.92	76.45	7.205	7.205	0.127	5.33	0.25	1	9.477	0.000	5.75	1.58
1+935.00	1+947.00	12.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.492	0.750	0.369												
						0.534	0.762	0.407	19.23	73.80	8.346	8.346	0.134	5.57	0.26	1	10.340	0.000	5.75	1.68
1+947.00	1+960.00	13.000	0.280	2.500	40.000	0.046	0.900	0.041												
						0.533	0.750	0.400												
						0.579	0.762	0.441	20.72	71.12	8.713	8.713	0.137	5.64	0.26	1	10.607	0.000	5.75	1.71
1+960.00	1+970.00	10.000	0.280	2.500	40.000	0.035	0.900	0.032												
						0.410	0.750	0.308												
						0.445	0.762	0.339	22.31	68.56	6.461	6.461	0.121	5.16	0.24	1	8.886	0.000	5.75	1.52
1+970.00	2+005.00	35.000	0.280	2.500	40.000	0.200	0.900	0.180												
						1.470	0.750	1.103												
						1.670	0.768	1.282	23.68	66.55	23.720	23.720	0.201	7.66	0.33	2	36.615	0.000	5.75	2.52
2+005.00	2+018.00	13.000	0.280	2.500	40.000	0.046	0.900	0.041												
						0.585	0.750	0.439												
						0.631	0.761	0.480	26.59	62.83	8.379	8.379	0.135	5.58	0.26	1	10.364	0.000	5.75	1.68
2+018.00	2+030.00	12.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.540	0.750	0.405												
						0.582	0.761	0.443	28.20	61.03	7.512	7.512	0.129	5.40	0.25	1	9.714	0.000	5.75	1.61
2+030.00	2+042.00	12.000	0.280	2.500	40.000	0.042	0.900	0.038												
						0.540	0.750	0.405												
						0.582	0.761	0.443	29.76	59.42	7.315	7.315	0.127	5.36	0.25	1	9.562	0.000	5.75	1.59
Οδός- δεξιά																				2
2+042.00	2+057.00	15.000	0.280	2.500	40.000	0.063	0.900	0.057												
							0.750	0.000												
						0.063	0.900	0.057	5.00	144.17	2.273	2.273	0.078	3.62	0.18	1	4.786	0.000	5.75	0.98
2+057.00	2+066.00	9.000	0.280	2.500	40.000	0.032	0.900	0.028												
						0.135	0.750	0.101												
						0.167	0.778	0.130	8.21	112.67	4.060	4.060	0.100	4.51	0.21	1	6.753	0.000	5.75	1.25
2+066.00	2+075.00	9.000	0.280	2.500	40.000	0.032	0.900	0.028												
						0.387	0.750	0.290												
						0.419	0.761	0.319	9.71	103.65	9.180	9.180	0.140	5.73	0.26	1	10.940	0.000	5.75	1.74
2+075.00	2+084.00	9.000	0.280	2.500	40.000	0.032	0.900	0.028												
						0.405	0.750	0.304												
						0.437	0.761	0.332	10.79	98.38	9.083	9.083	0.139	5.72	0.26	1	10.871	0.000	5.75	1.74
2+084.00	2+093.00	9.000	0.280	2.500	40.000	0.032	0.900	0.028												
						0.405	0.750	0.304												
						0.437	0.761	0.332	11.87	93.83	8.662	8.662	0.136	5.64	0.26	1	10.570	0.000	5.75	1.70
2+093.00	2+103.00	10.000	0.280	2.500	40.000	0.035	0.900	0.032												
						0.450	0.750	0.338												
						0.485	0.761	0.369	12.97	89.78	9.210	9.210	0.140	5.74	0.26	1	10.962	0.000	5.75	1.75
2+103.00	2+113.00	10.000	0.280	2.500	40.000	0.035	0.900	0.032												
						0.450	0.750	0.338												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)				
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520					
ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ						
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.485	0.761	0.369	14.16	85.94	8.816	8.816	0.137	5.66	0.26	1	10.681	0.000	5.75	1.72
2+113.00	2+123.00	10.000	0.280	2.500	40.000	0.035	0.900	0.032												
						0.450	0.750	0.338												
						0.485	0.761	0.369	15.37	82.50	8.463	8.463	0.135	5.60	0.26	1	10.425	0.000	5.75	1.69
2+123.00	2+132.00	9.000	0.280	2.500	40.000	0.032	0.900	0.028												
						0.405	0.750	0.304												
						0.437	0.761	0.332	16.61	79.40	7.330	7.330	0.128	5.36	0.25	1	9.574	0.000	5.75	1.59
2+132.00	2+141.00	9.000	0.280	2.500	40.000	0.032	0.900	0.028												
						0.405	0.750	0.304												
						0.437	0.761	0.332	17.78	76.74	7.085	7.085	0.126	5.31	0.25	1	9.383	0.000	5.75	1.57
2+141.00	2+151.00	10.000	0.280	2.500	40.000	0.035	0.900	0.032												
						0.450	0.750	0.338												
						0.485	0.761	0.369	18.97	74.30	7.622	7.622	0.130	5.42	0.25	2	19.597	0.000	5.75	1.62
Οδός- αριστερά																				2
2+307.00	2+257.00	50.000	5.540	6.000	16.667	0.225	0.900	0.203												
						1.150	0.750	0.863												
						1.375	0.775	1.065	5.00	144.17	42.685	42.685	1.107	6.80	1.92	1	51.362	0.000	11.00	1.05
2+257.00	2+215.00	42.000	5.540	6.000	16.667	0.147	0.900	0.132												
						1.050	0.750	0.788												
						1.197	0.768	0.920	5.75	134.46	34.382	34.382	1.039	6.30	1.87	1	43.058	0.000	11.00	0.97
2+215.00	2+181.00	34.000	3.000	3.500	28.571	0.119	0.900	0.107												
						0.850	0.750	0.638												
						0.969	0.768	0.745	6.43	127.26	26.343	26.343	0.539	5.85	1.01	1	34.024	0.000	7.25	1.35
2+181.00	2+151.00	30.000	1.000	3.500	28.571	0.105	0.900	0.095												
						0.780	0.750	0.585												
						0.885	0.768	0.680	7.48	118.04	22.297	22.297	0.357	6.61	0.63	2	50.543	0.000	7.25	1.57
Οδός- δεξιά																				2
2+307.00	2+257.00	50.000	5.540	6.000	16.667	0.225	0.900	0.203												
						1.350	0.750	1.013												
						1.575	0.771	1.215	5.00	144.17	48.697	48.697	1.150	7.13	1.94	1	57.085	0.000	11.00	1.10
2+257.00	2+215.00	42.000	5.540	6.000	16.667	0.147	0.900	0.132												
						1.344	0.750	1.008												
						1.491	0.765	1.140	5.72	134.79	42.729	42.729	1.107	6.81	1.92	1	51.405	0.000	11.00	1.05
2+215.00	2+180.00	35.000	3.000	3.500	28.571	0.200	0.900	0.180												
						1.260	0.750	0.945												
						1.460	0.771	1.125	6.36	127.95	40.000	40.000	0.626	6.69	1.09	1	44.793	0.000	7.25	1.59
2+180.00	2+156.00	24.000	1.000	3.500	28.571	0.137	0.900	0.123												
						0.864	0.750	0.648												
						1.001	0.771	0.771	7.29	119.54	25.626	25.626	0.375	6.92	0.64	1	27.686	0.000	7.25	1.65
2+156.00	2+151.00	5.000	1.000	3.500	28.571	0.018	0.900	0.016												
						0.180	0.750	0.135												
						0.196	0.763	0.151	8.36	111.69	4.681	4.681	0.201	4.04	0.45	2	17.705	0.000	7.25	0.83
Οδός- δεξιά																				1.75
2+510.00	2+493.00	17.000	2.730	2.500	40.000	0.058	0.900	0.052												
						0.580	0.750	0.435												
						0.638	0.764	0.487	5.00	144.17	19.520	19.520	0.373	5.11	0.75	1	27.209	0.000	5.75	1.50
2+493.00	2+479.00	14.000	2.730	2.500	40.000	0.048	0.900	0.043												
						0.775	0.750	0.581												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning					Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018					0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Frno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.823	0.759	0.624	5.76	134.39	23.316	23.316	0.401	5.39	0.78	1	30.225	0.000	5.75	1.61
2+479.00	2+466.00	13.000	2.730	2.500	40.000	0.044	0.900	0.040												
						0.775	0.750	0.581												
						0.819	0.758	0.621	6.34	128.11	22.118	22.118	0.393	5.31	0.77	1	29.296	0.000	5.75	1.57
2+466.00	2+448.00	18.000	2.730	2.500	40.000	0.063	0.900	0.057												
						1.060	0.750	0.795												
						1.123	0.758	0.852	6.89	122.91	29.102	29.102	0.439	5.76	0.82	1	34.470	0.000	5.75	1.75
2+448.00	2+433.00	15.000	4.940	2.500	40.000	0.053	0.900	0.047												
						0.825	0.750	0.619												
						0.878	0.759	0.666	7.56	117.26	21.711	21.711	0.464	4.84	0.95	1	32.712	0.000	5.75	1.38
2+433.00	2+420.00	13.000	4.940	2.500	40.000	0.046	0.900	0.041												
						0.825	0.750	0.619												
						0.871	0.758	0.660	8.12	113.33	20.784	20.784	0.456	4.78	0.94	1	31.880	0.000	5.75	1.36
2+420.00	2+390.00	30.000	4.940	2.500	40.000	0.126	0.900	0.113												
						0.838	0.750	0.629												
						0.964	0.770	0.742	8.12	113.33	23.376	23.376	0.478	4.94	0.97	1	34.171	0.000	5.75	1.43
2+390.00	2+357.00	33.000	4.940	2.500	40.000	0.139	0.900	0.125												
						0.922	0.750	0.691												
						1.061	0.770	0.816	9.16	106.71	24.211	24.211	0.485	4.99	0.98	2	69.775	0.000	5.75	1.45
Οδός- αριστερά																				1.7
2+580.00	2+570.00	10.000	1.590	2.500	40.000	0.140	0.900	0.126												
						0.480	0.750	0.360												
						0.620	0.784	0.486	5.00	144.17	19.479	19.479	0.318	5.54	0.61	1	24.336	0.000	5.75	1.67
2+570.00	2+560.00	10.000	1.590	2.500	40.000	0.065	0.900	0.058												
						0.480	0.750	0.360												
						0.545	0.768	0.418	5.52	137.19	15.944	15.944	0.293	5.22	0.58	1	21.616	0.000	5.75	1.54
2+560.00	2+550.00	10.000	1.590	2.500	40.000	0.065	0.900	0.058												
						0.595	0.750	0.446												
						0.660	0.765	0.504	6.09	130.67	18.319	18.319	0.310	5.44	0.60	1	23.467	0.000	5.75	1.63
2+550.00	2+543.00	7.000	1.590	2.500	40.000	0.045	0.900	0.041												
						0.595	0.750	0.446												
						0.640	0.761	0.487	6.63	125.29	16.958	16.958	0.300	5.31	0.59	1	22.419	0.000	5.75	1.58
2+543.00	2+525.00	18.000	2.730	2.500	40.000	0.116	0.900	0.104												
						1.270	0.750	0.953												
						1.386	0.763	1.057	7.02	121.79	35.788	35.788	0.476	6.13	0.87	1	38.980	0.000	5.75	1.90
2+525.00	2+510.00	15.000	2.730	2.500	40.000	0.097	0.900	0.087												
						1.270	0.750	0.953												
						1.367	0.761	1.040	7.65	116.70	33.725	33.725	0.465	6.02	0.86	1	37.627	0.000	5.75	1.86
2+510.00	2+493.00	17.000	2.730	2.500	40.000	0.071	0.900	0.064												
						0.500	0.750	0.375												
						0.571	0.769	0.439	8.19	112.82	13.777	13.777	0.323	4.62	0.68	1	22.148	0.000	5.75	1.30
2+493.00	2+465.00	28.000	2.730	2.500	40.000	0.118	0.900	0.106												
						0.485	0.750	0.364												
						0.603	0.779	0.470	9.07	107.26	14.002	14.002	0.325	4.64	0.68	1	22.361	0.000	5.75	1.31
2+465.00	2+434.00	31.000	2.730	2.500	40.000	0.177	0.900	0.159												
						0.860	0.750	0.645												
						1.037	0.776	0.804	10.50	99.70	22.285	22.285	0.394	5.32	0.77	1	29.427	0.000	5.75	1.58
2+434.00	2+405.00	29.000	4.940	2.500	40.000	0.122	0.900	0.110												

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ	Συντ. Manning				Πλάτος πυθμένα (m)	Ύψος (m)	Κλίση παρειάς στηθαίου	I=41.93*at^b/60	a	b	c	Μήκος εσχάρας	Πλάτος εσχάρας	Max επιτρ. βάθος (cm)	
	0.018				0	0	0.000		7.810	-0.709		0.880	0.520		

ΣΤΟΙΧΕΙΑ ΤΑΦΡΟΥ						ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΥΠΟΛΟΓΙΣΜΟΣ ΠΑΡΟΧΗΣ ΣΧΕΔΙΑΣΜΟΥ				ΣΤΟΙΧΕΙΑ ΡΟΗΣ							
Χ.Θ. αρχής	Χ.Θ. πέρατος	Μήκος L m	Κλίση S %	Επίκλιση i %	Κλίση δεξιάς παρειάς	Επιφ. απορροής Fi στρ	Συντελεστής απορροής Ci	Ανηγμένη Επιφάνεια Fi x Ci στρ	Χρόνος συρροής Ts min	Ένταση I mm/h	Προστιθ. Παροχή Qad l/s	Συνολική παροχή Q l/s	Ταχύτητα V m/s	Βάθος ροής y cm	Αριθμός Froude Fr	Αρ. φρεατίων Fno	Απορροή σε φρεάτια σχάρας Qfrσχ l/s	Παροχή κατάντι Qn l/s	Βάθος ροής για κάλυψη του ευρους κατάληψης yκ cm	Ευρος κατάληψης L m
						0.994	0.750	0.746												
						1.116	0.766	0.855	11.81	94.03	22.360	22.360	0.470	4.88	0.96	1	33.286	0.000	5.75	1.40
2+405.00	2+381.00	24.000	4.940	2.500	40.000	0.101	0.900	0.091												
						0.823	0.750	0.617												
						0.924	0.766	0.708	12.84	90.21	17.752	17.752	0.427	4.56	0.90	1	29.046	0.000	5.75	1.27
2+381.00	2+357.00	24.000	4.940	2.500	40.000	0.101	0.900	0.091												
						0.823	0.750	0.617												
						0.924	0.766	0.708	13.78	87.11	17.141	17.141	0.420	4.52	0.89	2	56.903	0.000	5.75	1.26
R.A4	Χ.Θ. 2+330																			
0+058.64	0+040.00	18.640	2.100	2.500	40.000	0.103	0.900	0.092												
						0.180	0.600	0.108												
						0.320	0.750	0.240												
						0.603	0.731	0.440	5.00	144.17	17.646	17.646	0.331	5.16	0.66	2	48.589	0.000	5.75	1.51
0+040.00	0+007.00	33.000	2.300	2.500	40.000	0.182	0.900	0.163												
						0.260	0.600	0.156												
						1.460	0.750	1.095												
						1.902	0.744	1.414	5.94	132.37	52.046	52.046	0.521	7.07	0.89	2	94.228	0.000	5.75	2.28
R.A4	Χ.Θ. 2+330																			
0+058.64	0+080.00	21.360	2.100	2.500	40.000	0.117	0.900	0.106												
						0.180	0.600	0.108												
						0.170	0.750	0.128												
						0.467	0.730	0.341	5.00	144.17	13.676	13.676	0.298	4.79	0.62	2	41.798	0.000	5.75	1.37
0+080.00	0+104.00	24.000	3.900	2.500	40.000	0.132	0.900	0.119												
						0.230	0.600	0.138												
						0.280	0.750	0.210												
						0.642	0.727	0.467	6.19	129.62	16.821	16.821	0.389	4.65	0.82	2	53.614	0.000	5.75	1.31

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jr %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
PIPE A1.1																	
A1.1-2	A1.1-1	19.24	1.00	19.24	10.64												
		19.24	1.00	19.24	10.64	99.04	529.36	9.12	2.48	0.60	0.013	3.500	0.317	0.48	2.22	0.04	0.53
					10.69												
A1.1-1	A1.1-1	19.24	1.00	19.24													
		0.61	1.00	0.61	7.15	PIPE A1.2											
		0.24	1.00	0.24													
		0.04	1.00	0.04													
		20.12	1.00	20.12	10.69	98.84	552.53	19.00	2.64	0.80	0.013	3.580	0.277	0.45	2.54	0.09	0.35
					10.78												
PIPE A1.2																	
A1.2-3	A1.2-2	0.31	1.00	0.31													
		0.31	1.00	0.31	5.00	144.17	12.52	26.00	6.95	0.60	0.013	1.700	0.038	0.07	3.41	0.25	0.06
					5.25												
A1.2-2	A1.1-1	0.31	1.00	0.31													
		0.29	1.00	0.29	6.89												
		0.61	1.00	0.61	6.89	122.90	20.66	30.37	7.22	0.60	0.013	2.010	0.047	0.09	3.58	0.25	0.08
					7.15												
PIPE A1.3																	
A1.3-1	A1-6	0.22	1.00	0.22		0+153	Χ.Θ.										
		2.19	1.00	2.19	7.43	Χ.Θ. 0+164 - Χ.Θ 0+150 - Χ.Θ 0+135											
		2.41	1.00	2.41	7.43	118.37	79.34	9.30	0.50	0.60	0.013	1.170	0.174	0.18	1.06	0.13	0.29
					7.57												
PIPE A1.4																	
A1.4-1	A1-4	3.79	1.00	3.79	7.87												
		3.79	1.00	3.79	7.87	115.08	121.18	9.60	0.50	0.60	0.013	1.320	0.217	0.22	1.05	0.12	0.36
					7.99												
PIPE S1																	
S1.1	A1-9	1.57	1.00	1.57	6.11												
		1.57	1.00	1.57	6.11	130.54	56.86	10.00	0.50	0.60	0.013	1.060	0.147	0.15	1.05	0.16	0.24
					6.26												
PIPE S4																	
S4.1	A1-8	1.14	1.00	1.14	10.77												
		0.33	1.00	0.33													
		1.47	1.00	1.47	10.77	98.46	40.34	6.55	1.00	0.60	0.013	1.230	0.104	0.13	1.46	0.09	0.17
					10.86												
PIPE A1																	

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jr %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
A1-9	A1-8	1.57	1.00	1.57	6.26	PIPE S1											
		0.03	1.00	0.03		R.A											
		1.59	1.00	1.59	6.26	128.90	57.05	57.00	0.35	0.60	0.013	0.940	0.161	0.15	0.68	1.01	0.27
					7.27												
A1-8	A1-7	1.59	1.00	1.59													
		20.12	1.00	20.12	10.78	PIPE A1.1											
		1.47	1.00	1.47		PIPE S4											
		0.40	1.00	0.40													
		0.04	1.00	0.04	30.00	Χ.Θ.											
		23.63	1.00	23.63	10.78	98.43	646.09	50.00	0.50	1.00	0.013	2.010	0.428	0.46	1.13	0.41	0.43
					11.19												
A1-7	A1-6	23.63	1.00	23.63													
		2.41	1.00	2.41		PIPE A1.3											
		0.03	1.00	0.03		0+140	Χ.Θ.										
		26.07	1.00	26.07	11.19	96.60	699.69	50.00	0.50	1.00	0.013	2.060	0.448	0.48	1.12	0.40	0.45
					11.59												
A1-6	A1-5	26.07	1.00	26.07													
		0.93	1.00	0.93		0+222	Χ.Θ.										
		27.00	1.00	27.00	11.59	94.91	711.84	50.00	0.50	1.00	0.013	2.060	0.452	0.48	1.12	0.40	0.45
					12.00												
A1-5	A1-4	27.00	1.00	27.00													
		3.79	1.00	3.79		PIPE A1.4											
		1.02	1.00	1.02													
		31.81	1.00	31.81	12.00	93.31	824.55	38.00	0.50	1.00	0.013	2.140	0.492	0.52	1.10	0.30	0.49
					12.30												
A1-4	A1-3	31.81	1.00	31.81													
		0.99	1.00	0.99		0+265	Χ.Θ.										
		32.80	1.00	32.80	12.30	92.19	839.98	31.00	0.50	1.00	0.013	2.150	0.497	0.52	1.10	0.24	0.50
					12.54												
A1-3	A1-2	32.80	1.00	32.80													
		0.93	1.00	0.93		0+316	Χ.Θ.										
		33.73	1.00	33.73	12.54	91.30	855.49	37.00	0.50	1.00	0.013	2.160	0.503	0.53	1.10	0.29	0.50
					12.82												
A1-2	A1-1	33.73	1.00	33.73													
		1.47	1.00	1.47		0+356	Χ.Θ.										
		35.20	1.00	35.20	12.82	90.29	882.72	7.20	0.50	1.00	0.013	2.180	0.512	0.54	1.09	0.06	0.51
					12.88												
A1-1	A1-S8	35.20	1.00	35.20													
		35.20	1.00	35.20	12.88	90.10	882.72	3.00	0.50	1.00	0.013	2.180	0.512	0.54	1.09	0.02	0.51
					12.90												
PIPE D1																	
D1-1	S7-F13	3.02	1.00	3.02	10.88												

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)					ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA							
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jτ %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
		3.02	1.00	3.02	10.88	97.98	82.31	17.00	0.55	0.60	0.013	1.220	0.173	0.18	1.11	0.23	0.29
					11.11												
PIPE A2																	
A2-5	A2-4	2.27	1.00	2.27	8.65												
		2.27	1.00	2.27	8.65	109.78	69.26	53.31	0.61	0.60	0.013	1.210	0.154	0.17	1.16	0.73	0.26
					9.39												
A2-4	A2-3	2.27	1.00	2.27													
		1.40	1.00	1.40													
		3.67	1.00	3.67	9.39	105.42	107.48	35.00	0.70	0.60	0.013	1.440	0.186	0.21	1.25	0.41	0.31
					9.79												
A2-3	A2-2	3.67	1.00	3.67													
		1.35	1.00	1.35													
		5.02	1.00	5.02	9.79	103.23	144.05	30.00	0.90	0.60	0.013	1.710	0.203	0.24	1.41	0.29	0.34
					10.08												
A2-2	A2-1	5.02	1.00	5.02													
		1.01	1.00	1.01													
		6.03	1.00	6.03	10.08	101.73	170.43	15.86	0.80	0.60	0.013	1.710	0.229	0.27	1.32	0.15	0.38
					10.24												
A2-1	A2-S8	6.03	1.00	6.03													
		0.42	1.00	0.42													
		6.45	1.00	6.45	10.24	100.97	181.02	4.50	0.80	0.60	0.013	1.740	0.237	0.27	1.32	0.04	0.40
					10.28												
PIPE D2																	
D2-4	D2-3	0.66	1.00	0.66	5.00												
		0.66	1.00	0.66	5.00	144.17	26.55	41.00	0.55	0.60	0.013	0.880	0.098	0.10	1.08	0.78	0.16
					5.78												
D2-3	D2-2	0.66	1.00	0.66													
		1.42	1.00	1.42													
		2.08	1.00	2.08	5.78	134.19	77.50	37.50	0.45	0.60	0.013	1.120	0.176	0.18	1.00	0.56	0.29
					6.33												
D2-2	D2-1	2.08	1.00	2.08													
		0.98	1.00	0.98													
		3.06	1.00	3.06	6.33	128.18	108.80	7.52	1.00	0.60	0.013	1.640	0.171	0.21	1.49	0.08	0.28
					6.33												
D2-1	S7-1	3.06	1.00	3.06													
		1.23	1.00	1.23													
		4.28	1.00	4.28	6.33	128.18	152.42	6.47	1.00	0.60	0.013	1.800	0.204	0.25	1.49	0.06	0.34
					6.33												
PIPE D2.1																	
D2.1-10	D2.1-9	0.84	1.00	0.84	5.00												

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jτ %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
		0.84	1.00	0.84	5.00	144.17	33.70	48.00	3.96	0.60	0.013	1.890	0.069	0.12	2.78	0.42	0.11
					5.42												
D2.1-9	D2.1-8	0.84	1.00	0.84													
		1.28	1.00	1.28	6.60												
		2.12	1.00	2.12	6.60	125.61	73.90	40.00	3.97	0.60	0.013	2.390	0.100	0.17	2.89	0.28	0.17
					6.88												
D2.1-8	D2.1-7	2.12	1.00	2.12													
		1.11	1.00	1.11													
		3.23	1.00	3.23	6.88	123.06	110.29	38.00	3.72	0.60	0.013	2.620	0.124	0.21	2.85	0.24	0.21
					6.88												
D2.1-7	D2.1-6	3.23	1.00	3.23													
		1.21	1.00	1.21													
		4.43	1.00	4.43	6.88	123.06	151.56	38.81	3.83	0.60	0.013	2.910	0.144	0.25	2.91	0.22	0.24
					7.10												
D2.1-6	D2.1-5	4.43	1.00	4.43													
		1.22	1.00	1.22													
		5.65	1.00	5.65	7.10	121.12	190.22	40.00	3.70	0.60	0.013	3.070	0.163	0.28	2.87	0.22	0.27
					7.32												
D2.1-5	D2.1-4	5.65	1.00	5.65													
		1.25	1.00	1.25													
		6.90	1.00	6.90	7.32	119.32	226.85	50.00	3.34	0.60	0.013	3.120	0.184	0.31	2.73	0.27	0.31
					7.58												
D2.1-4	D2.1-3	6.90	1.00	6.90													
		1.43	1.00	1.43													
		8.34	1.00	8.34	7.58	117.22	271.50	50.00	3.03	0.60	0.013	3.160	0.206	0.34	2.59	0.26	0.34
					7.85												
D2.1-3	D2.1-2	8.34	1.00	8.34													
		1.19	1.00	1.19													
		9.53	1.00	9.53	7.85	115.24	305.15	50.00	2.47	0.60	0.013	3.030	0.232	0.36	2.33	0.28	0.39
					8.12												
D2.1-2	D2.1-1	9.53	1.00	9.53													
		1.17	1.00	1.17													
		10.70	1.00	10.70	8.12	113.29	336.74	50.00	2.57	0.60	0.013	3.150	0.242	0.38	2.36	0.26	0.40
					8.39												
D2.1-1	D2.1-0	10.70	1.00	10.70													
		1.26	1.00	1.26													
		11.96	1.00	11.96	8.39	111.49	370.35	15.55	3.34	0.60	0.013	3.560	0.237	0.40	2.70	0.07	0.40
					8.46												
D2.1-0	S7	11.96	1.00	11.96													

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προσπιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jr %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
		11.96	1.00	11.96	8.46	111.02	370.35	7.74	1.96	0.60	0.013	2.930	0.275	0.40	2.03	0.04	0.46
					8.50												
PIPE D3																	
D3-8	D3-7	2.26	1.00	2.26	7.41												
		2.26	1.00	2.26	7.41	118.53	74.45	52.00	2.53	0.60	0.013	2.040	0.112	0.17	2.33	0.42	0.19
					7.84												
D3-7	D3-6	2.26	1.00	2.26													
		2.10	1.00	2.10	9.58												
		4.36	1.00	4.36	9.58	104.38	126.34	40.00	3.59	0.60	0.013	2.700	0.134	0.23	2.61	0.25	0.22
					9.82												
D3-6	D3-5	4.36	1.00	4.36													
		0.82	1.00	0.82	10.49												
		5.17	1.00	5.17	9.82	103.07	148.11	50.00	3.24	0.60	0.013	2.720	0.148	0.25	2.68	0.31	0.25
					9.82												
D3-5	D3-4	5.17	1.00	5.17													
		2.56	1.00	2.56	12.89												
		7.73	1.00	7.73	12.89	90.04	193.34	50.00	2.26	0.60	0.013	2.580	0.186	0.28	2.25	0.32	0.31
					13.22												
D3-4	D3-3	7.73	1.00	7.73													
		1.01	1.00	1.01	14.14												
		8.74	1.00	8.74	14.14	86.00	208.88	50.00	2.42	0.60	0.013	2.700	0.191	0.30	2.32	0.31	0.32
					14.45												
D3-3	D3-2	8.74	1.00	8.74													
		1.58	1.00	1.58	16.46												
		10.32	1.00	10.32	16.46	79.74	228.60	7.35	0.50	0.60	0.013	1.560	0.309	0.31	1.00	0.08	0.52
					16.54												
D3-2	D3-1	10.32	1.00	10.32													
		10.32	1.00	10.32	16.54	79.55	228.60	7.18	0.50	0.60	0.013	1.560	0.309	0.31	1.00	0.08	0.52
					16.62												
PIPE A3																	
A3-7	A3-6	0.90	1.00	0.90	5.00												
		0.71	1.00	0.71	6.01												
		1.61	1.00	1.61	6.01	131.55	58.94	47.68	1.83	0.60	0.013	1.700	0.108	0.15	1.98	0.47	0.18
					6.48												
A3-6	A3-5	1.61	1.00	1.61													
		1.65	1.00	1.65	7.96												
		3.26	1.00	3.26	7.96	114.41	103.64	50.00	2.48	0.60	0.013	2.230	0.133	0.21	2.33	0.37	0.22
					8.34												

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jr %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
A3-5	A3-4	3.26	1.00	3.26													
		1.09	1.00	1.09	8.99												
		4.35	1.00	4.35	8.99	107.74	130.28	50.00	3.51	0.60	0.013	2.700	0.136	0.23	2.78	0.31	0.23
					9.29												
A3-4	A3-3	4.35	1.00	4.35													
		2.04	1.00	2.04	11.57												
		6.39	1.00	6.39	11.57	95.00	168.58	50.00	3.24	0.60	0.013	2.820	0.158	0.26	2.69	0.30	0.26
					11.87												
A3-3	A3-2	6.39	1.00	6.39													
		0.84	1.00	0.84	14.17												
		7.23	1.00	7.23	14.17	85.91	172.47	50.00	2.24	0.60	0.013	2.490	0.176	0.27	2.24	0.33	0.29
					14.50												
A3-2	A3-1	7.23	1.00	7.23													
		1.02	1.00	1.02													
		8.24	1.00	8.24	14.50	84.92	194.47	50.00	2.05	0.60	0.013	2.500	0.192	0.28	2.14	0.33	0.32
					14.84												
A3-1	S6	8.24	1.00	8.24													
		2.72	1.00	2.72	17.13												
		10.32	1.00	10.32		PIPE D3											
		21.29	1.00	21.29	17.13	78.19	462.30	43.95	3.80	0.60	0.013	3.960	0.259	0.45	2.85	0.18	0.43
					17.31												
PIPE D3.1																	
D3.1-2	D3.1-1	0.75	1.00	0.75	6.14												
		0.75	1.00	0.75	6.14	130.18	26.99	13.00	0.50	0.60	0.013	0.850	0.101	0.10	1.03	0.25	0.17
					6.39												
D3.1-1	D3-3	0.75	1.00	0.75													
		0.75	1.00	0.75	6.39	127.58	26.99	19.00	0.50	0.60	0.013	0.850	0.101	0.10	1.03	0.37	0.17
					6.77												
PIPE A3.1																	
A3.1-3	A3.1-2	4.90	0.75	3.68	5.00												
		4.90	0.75	3.68	5.00	144.17	147.17	42.00	0.83	0.60	0.013	1.620	0.189	0.23	1.42	0.43	0.24
					5.43												
A3.1-2	A3.1-1	4.90	0.75	3.68													
		4.09	0.75	3.07													
		4.75	0.75	6.75													
		13.74	0.98	13.49	5.43	138.35	518.53	30.75	1.54	0.60	0.013	2.890	0.309	0.44	1.93	0.18	0.39

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προσπιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jτ %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
					5.61												
A3.1-1	S6	13.74	0.98	13.49													
		13.74	0.98	13.49	5.61	136.16	518.53	2.23	1.00	0.80	0.013	2.470	0.348	0.44	1.53	0.02	0.43
					5.62												
PIPE A1.5																	
A1.5-1	NS1-11	1.72	1.00	1.72	5.00												
		1.72	1.00	1.72	5.00	144.17	68.69	4.83	1.00	0.60	0.013	1.430	0.136	0.17	1.48	0.06	0.23
					5.06												
PIPE A4																	
A4-8	A4-7	1.38	1.00	1.38	5.71												
		1.38	1.00	1.38	5.71	134.99	51.87	24.00	4.40	0.60	0.013	2.230	0.082	0.14	2.99	0.18	0.14
					5.89												
A4-7	A4-6	1.38	1.00	1.38													
		0.79	1.00	0.79													
		2.18	1.00	2.18	5.89	132.93	80.36	36.00	6.26	0.60	0.013	2.870	0.093	0.18	3.61	0.21	0.16
					6.10												
A4-6	A4-5	2.18	1.00	2.18													
		0.99	1.00	0.99													
		3.17	1.00	3.17	6.10	130.65	114.95	40.00	6.24	0.60	0.013	3.190	0.111	0.22	3.66	0.21	0.19
					6.30												
A4-5	A4-4	3.17	1.00	3.17													
		0.87	1.00	0.87	7.02												
		4.03	1.00	4.03	7.02	121.76	136.46	50.00	5.94	0.60	0.013	3.290	0.122	0.24	3.59	0.25	0.20
					7.28												
A4-4	A4-3	4.03	1.00	4.03													
		1.24	1.00	1.24	10.50												
		5.27	1.00	5.27	10.50	99.70	145.95	50.00	4.42	0.60	0.013	3.030	0.136	0.25	3.12	0.28	0.23
					10.78												
A4-3	A4-2	5.27	1.00	5.27													
		1.31	1.00	1.31													
		6.58	1.00	6.58	10.78	98.43	180.01	32.00	2.47	0.60	0.013	2.610	0.176	0.27	2.35	0.20	0.29
					10.98												
A4-2	A4-1	6.58	1.00	6.58													
		0.83	1.00	0.83	10.55												
		7.42	1.00	7.42	10.98	97.51	200.91	34.00	1.00	0.60	0.013	1.940	0.236	0.29	1.48	0.29	0.39
					11.27												
A4-1	S5	7.42	1.00	7.42													
		7.42	1.00	7.42	11.27	96.25	200.91	6.02	1.31	0.60	0.013	2.140	0.220	0.29	1.70	0.05	0.37
					11.32												

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προσπιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jr %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
PIPE A5																	
A5-8	A5-7	1.31	1.00	1.31	20.63												
		1.31	1.00	1.31	20.63	71.28	25.87	50.00	0.50	0.60	0.013	0.840	0.099	0.10	1.03	0.99	0.17
					21.62												
A5-7	A5-6	1.31	1.00	1.31													
		0.88	1.00	0.88													
		2.18	1.00	2.18	21.62	69.64	42.26	23.00	0.50	0.60	0.013	0.970	0.126	0.13	1.04	0.40	0.21
					22.01												
A5-6	A5-5	2.18	1.00	2.18													
		0.92	1.00	0.92													
		3.11	1.00	3.11	22.01	69.01	59.58	20.00	0.50	0.60	0.013	1.080	0.150	0.15	1.05	0.31	0.25
					22.32												
A5-5	A5-4	3.11	1.00	3.11													
		0.43	1.00	0.43													
		3.54	1.00	3.54	22.32	68.54	67.32	38.00	0.30	0.60	0.013	0.930	0.182	0.16	0.82	0.68	0.30
					23.00												
A5-4	A5-3	3.54	1.00	3.54													
		1.18	1.00	1.18													
		4.72	1.00	4.72	23.00	67.52	88.49	32.00	0.30	0.60	0.013	1.000	0.210	0.19	0.82	0.53	0.35
					23.54												
A5-3	A5-2	4.72	1.00	4.72													
		0.90	1.00	0.90													
		5.62	1.00	5.62	23.54	66.76	104.20	50.00	0.30	0.60	0.013	1.050	0.229	0.21	0.81	0.79	0.38
					24.33												
A5-2	A5-1	5.62	1.00	5.62													
		5.62	1.00	5.62	24.33	65.67	104.20	9.91	0.30	0.60	0.013	1.050	0.229	0.21	0.81	0.16	0.38
					24.49												
A5-1	S4	5.62	1.00	5.62													
		0.90	1.00	0.90													
		6.52	1.00	6.52	24.49	65.46	118.56	3.35	8.25	0.60	0.013	3.550	0.105	0.22	4.19	0.02	0.18
					24.50												
PIPE A6																	
A6-13	A6-12	1.90	1.00	1.90	6.63												
		1.90	1.00	1.90	6.63	125.29	65.96	40.00	2.60	0.60	0.013	1.990	0.105	0.16	2.35	0.34	0.17
					6.97												
A6-12	A6-11	1.90	1.00	1.90													
		2.54	1.00	2.54	8.19												
		4.43	1.00	4.43	8.19	112.82	138.87	20.00	2.44	0.60	0.013	2.420	0.154	0.24	2.33	0.14	0.26
					8.33												
A6-11	A6-10	4.43	1.00	4.43													
		4.43	1.00	4.43	8.33	111.89	138.87	17.00	3.53	0.60	0.013	2.750	0.141	0.24	2.79	0.10	0.23

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προσπιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jτ %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
					8.43												
A6-10	A6-9	4.43	1.00	4.43													
		0.47	1.00	0.47	9.07												
		4.90	1.00	4.90	9.07	107.26	146.01	35.00	3.63	0.60	0.013	2.820	0.143	0.25	2.83	0.21	0.24
					9.27												
A6-9	A6-8	4.90	1.00	4.90													
		0.80	1.00	0.80	10.50												
		5.70	1.00	5.70	10.50	99.70	157.99	25.00	4.30	0.60	0.013	3.070	0.143	0.26	3.08	0.14	0.24
					10.64												
A6-8	A6-7	5.70	1.00	5.70													
		0.86	1.00	0.86	11.81												
		6.56	1.00	6.56	11.81	94.03	171.35	21.00	4.63	0.60	0.013	3.220	0.146	0.27	3.20	0.11	0.24
					11.92												
A6-7	A6-6	6.56	1.00	6.56													
		0.71	1.00	0.71	12.84												
		7.27	1.00	7.27	12.84	90.21	182.12	28.00	4.17	0.60	0.013	3.160	0.155	0.28	3.04	0.15	0.26
					12.99												
A6-6	A6-5	7.27	1.00	7.27													
		0.71	1.00	0.71	13.78												
		7.98	1.00	7.98	13.78	87.11	192.98	36.00	3.04	0.60	0.013	2.870	0.172	0.28	2.60	0.21	0.29
					13.99												
A6-5	A6-4	7.98	1.00	7.98													
		0.81	1.00	0.81													
		8.78	1.00	8.78	13.99	86.46	210.95	35.00	4.71	0.60	0.013	3.440	0.161	0.30	3.24	0.17	0.27
					14.16												
A6-4	A6-3	8.78	1.00	8.78													
		8.78	1.00	8.78	14.16	85.94	210.95	18.00	5.65	0.60	0.013	3.670	0.154	0.30	3.54	0.08	0.26
					14.24												
A6-3	A6-2	8.78	1.00	8.78													
		1.07	1.00	1.07	5.00												
		9.85	1.00	9.85	14.24	85.70	234.44	30.00	6.34	0.60	0.013	3.950	0.158	0.31	3.76	0.13	0.26
					14.37												
A6-2	A6-1	9.85	1.00	9.85													
		9.85	1.00	9.85	14.37	85.32	234.44	29.00	4.09	0.60	0.013	3.370	0.177	0.31	3.02	0.14	0.29
					14.51												
A6-1	S4	9.85	1.00	9.85													
		0.92	1.00	0.92													
		10.77	1.00	10.77	14.51	84.90	253.96	8.16	2.78	0.60	0.013	3.000	0.204	0.33	2.49	0.05	0.34
					14.56												
PIPE D4																	
D4-9	D4-8	1.08	1.00	1.08	7.43												
		1.08	1.00	1.08	7.43	118.43	35.57	28.00	0.50	0.60	0.013	0.930	0.116	0.12	1.04	0.50	0.19

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jτ %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
					7.93												
D4-8	D4-7	1.08	1.00	1.08													
		1.08	1.00	1.08	7.93	114.64	35.57	36.00	2.83	0.60	0.013	1.700	0.076	0.12	2.36	0.35	0.13
					8.28												
D4-7	D4-6	1.08	1.00	1.08													
		0.53	1.00	0.53													
		1.61	1.00	1.61	8.28	112.19	50.20	38.00	6.14	0.60	0.013	2.480	0.075	0.14	3.50	0.26	0.12
					8.54												
D4-6	D4-5	1.61	1.00	1.61													
		0.57	1.00	0.57		Χ.Θ. 1700											
		2.18	1.00	2.18	8.54	110.51	66.80	50.00	6.74	0.60	0.013	2.790	0.084	0.16	3.71	0.30	0.14
					8.84												
D4-5	D4-4	2.18	1.00	2.18													
		1.81	1.00	1.81													
		3.99	1.00	3.99	8.84	108.63	120.30	50.00	5.86	0.60	0.013	3.160	0.115	0.22	3.56	0.26	0.19
					9.10												
D4-4	D4-3	3.99	1.00	3.99													
		1.07	1.00	1.07	12.25	Χ.Θ. 1843											
		5.06	1.00	5.06	12.25	92.35	129.77	44.00	3.48	0.60	0.013	2.690	0.136	0.23	2.77	0.27	0.23
					12.52												
D4-3	D4-2	5.06	1.00	5.06													
		1.16	1.00	1.16													
		6.22	1.00	6.22	12.52	91.35	157.89	32.00	1.67	0.60	0.013	2.190	0.181	0.26	1.93	0.24	0.30
					12.77												
D4-2	D4-1	6.22	1.00	6.22													
		1.24	1.00	1.24													
		7.47	1.00	7.47	12.77	90.48	187.66	28.00	0.61	0.60	0.013	1.590	0.261	0.28	1.14	0.29	0.43
					13.06												
D4-1	S5	7.47	1.00	7.47													
		1.11	1.00	1.11	13.85												
		8.58	1.00	8.58	13.85	86.90	207.04	12.56	0.80	0.60	0.013	1.810	0.255	0.29	1.31	0.12	0.43
					13.96												
PIPE D5																	
D5-8	D5-7	1.73	1.00	1.73	6.34												
		0.85	1.00	0.85	6.89												
		1.73	1.00	1.73	6.89	122.91	59.14	30.00	3.38	0.60	0.013	2.110	0.093	0.15	2.65	0.24	0.16
					7.13												
D5-7	D5-6	1.73	1.00	1.73													
		1.33	1.00	1.33	8.19												
		3.06	1.00	3.06	8.19	112.82	95.83	50.00	4.79	0.60	0.013	2.750	0.108	0.20	3.20	0.30	0.18
					8.49												
D5-6	D5-5	3.06	1.00	3.06													

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΑΓΩΓΩΝ - HYDRAURIC CARCURATION OF PIPES

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ CATCHMENT AREA			ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ) DISCHARGE (RATIONAL METHOD)							ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ HYDRAULIC DATA					
		Εκταση area Fi στρ	Συντελεστής απορροής coefficient of runoff Ci	Fi x Ci στρ	Χρόνος συρροής time of concectration Ts min	Ενταση rainfall intensity I mm/h	Προστιθ. Παροχή discharge Qad l/s	Μήκος length L m	Κλίση longitutial slope Jτ %	D m	συντελεστής Manning Manning coefficient N	Ταχύτητα velocity V m/s	Βάθος ροής Depth y m	Κρίσιμο Βάθος ροής Critical Depth Yc m	Froude Fr	Χρόνος ροής time of concentration downstream Td min	Πληρότητα y/D
		0.74	1.00	0.74	8.12												
		3.80	1.00	3.80	6.49	110.80	116.95	30.00	4.23	0.60	0.013	2.790	0.123	0.22	3.03	0.18	0.21
					8.67												
D5-5	D5-4	3.80	1.00	3.80													
		0.82	1.00	0.82	9.16												
		0.44	1.00	0.44													
		5.06	1.00	5.06	9.16	106.71	149.87	40.00	3.14	0.60	0.013	2.700	0.150	0.25	2.64	0.25	0.25
					9.41												
D5-4	D5-3	5.06	1.00	5.06													
		1.41	1.00	1.41													
		6.47	1.00	6.47	9.41	105.31	189.27	50.00	3.55	0.60	0.013	3.020	0.164	0.28	2.81	0.28	0.27
					9.68												
D5-3	D5-2	6.47	1.00	6.47													
		1.22	1.00	1.22													
		7.69	1.00	7.69	9.68	103.80	221.61	50.00	5.65	0.60	0.013	3.730	0.158	0.30	3.55	0.22	0.26
					9.91												
D5-2	D5-1	7.69	1.00	7.69													
		1.14	1.00	1.14	12.84												
		8.83	1.00	8.83	12.84	90.21	221.61	25.00	4.88	0.60	0.013	3.540	0.164	0.30	3.30	0.12	0.27
					12.96												
D5-1	S4	8.83	1.00	8.83													
		8.83	1.00	8.83	12.96	89.80	221.61	10.47	1.77	0.60	0.013	2.460	0.214	0.30	1.98	0.07	0.36
					13.03												
PIPE S11-2																	
S11-2	D4-1	1.20	1.00	1.20	14.38												
		1.20	1.00	1.20	14.38	85.28	28.45	11.00	1.30	0.40	0.013	1.270	0.094	0.12	1.58	0.14	0.23
					14.53												

ΥΔΡΑΥΛΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΤΑΦΡΩΝ (Τ=10)

		ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ			ΧΡΟΝΟΣ ΣΥΡΡΟΗΣ		ΠΑΡΟΧΗ (ΟΡΘΟΛΟΓΙΚΗ ΜΕΘΟΔΟΣ)											ΥΔΡΑΥΛΙΚΑ ΣΤΟΙΧΕΙΑ					
		Εκταση	Συντελεστής απορροής		Kirpic	Giandotti	Χρόνος συρροής	Ενταση	Προσπθ. Παροχή	Μήκος	Κλίση	D	b	h	z1	z2	συντελεστής Manning	Ταχύτητα	Βάθος ροής	Κρίσιμο Βάθος ροής	Froude	Χρόνος ροής	Ελεύθερο ύψος(m) +βάθος ροής / freeboard + depth
		Fi στρ	Ci	Fi x Ci στρ	h		Ts min	I mm/h	Qad l/s	L m	Jτ %	m	m	m			N	V m/s	y m	Yc m	Fr	Td min	
Τ1 ΑΠΟ 0+141.06 ΕΩΣ 0+000.00																							
0+141.06	0+041.69	22.59	0.60	13.56			10.00																
		22.59	0.60	13.56			10.00	102.16	384.65	99.37	7.04		0.50	0.50	1.5	1.5	0.016	3.637	0.147	0.293	3.460	0.455	0.184
							10.46																
0+041.69	0+000.00	22.59	0.60	13.56																			
		9.48	0.60	5.69																			
		32.07	0.60	19.24			10.46	99.92	534.076	41.69	5.65		0.50	0.50	1.5	1.5	0.016	3.689	0.186	0.348	3.180	0.188	0.232
							10.64																

ΣΤΑΤΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ ΚΙΒΩΤΟΕΙΔΟΥΣ ΟΧΕΤΟΥ

ΠΕΡΙΕΧΟΜΕΝΑ

Α. ΕΙΣΑΓΩΓΗ **1**

Β. ΚΙΒΩΤΟΕΙΔΕΙΣ ΟΧΕΤΟΙ **3**

1. ΚΙΒ. ΟΧΕΤΟΣ 1.50x1.90 (Ηεπ=0.30m) 3
2. ΚΙΒ. ΟΧΕΤΟΣ 1.50x1.90 (Ηεπ=4.00m) 104

ΕΙΣΑΓΩΓΗ

Οι στατικοί υπολογισμοί που ακολουθούν αφορούν στον κιβωτοειδή οχετό 1.50x1.90m.

Οι στατικοί υπολογισμοί που εκπονήθηκαν είναι οι παρακάτω:

ΚΙΒΩΤΟΕΙΔΗΣ ΟΧΕΤΟΣ

1. ΚΙΒ. ΟΧΕΤΟΣ 1.50x1.90m.
   Πάχος πλακών και τοιχωμάτων d=0.30m

   Ελέγχεται για ύψος επίχωσης του φορέα: Ηεπ=0.30m

   Η επίλυση έγινε για δύο τιμές δείκτη εδάφους: α. ks=1000 KN/m^3 και β. ks=20000 KN/m^3
2. ΚΙΒ. ΟΧΕΤΟΣ 1.50x1.90m.
   Πάχος πλακών και τοιχωμάτων d=0.30m

   Ελέγχεται για ύψος επίχωσης του φορέα: Ηεπ=4.00m

   Η επίλυση έγινε για δύο τιμές δείκτη εδάφους: α. ks=1000 KN/m^3 και β. ks=20000 KN/m^3

ΠΡΟΓΡΑΜΜΑΤΑ Η/Υ

SOFISTIK: Πρόγραμμα στατικής και δυναμικής ανάλυσης ραβδωτών και επιφανειακών φορέων.

ΚΑΝΟΝΙΣΜΟΙ

. ΕΚΩΣ 2000: Ελληνικός Κανονισμός Ωπλισμένου Σκυροδέματος

. ΕΑΚ 2000: Ελληνικός Αντισεισμικός Κανονισμός

. Εγκύκλιος 39/99: Υ.ΠΕ.ΧΩ.Δ.Ε. "Οδηγίες για τον αντισεισμικό υπολογισμό γεφυρών"

. Κ.Μ.Ε.: Κανονισμός Μελετών Ερευνών του έργου

. ΠΡΟΣΥ: Προσωρινές Συστάσεις για το σχεδιασμό έργων γεφυροποιίας σε συνδυασμό με τους Ευρωκώδικες.

. ΕΝ 1990 (ΕΥΡΩΚΩΔΙΚΑΣ 0) : Βάσεις Σχεδιασμού

. ΕΝ 1991 (ΕΥΡΩΚΩΔΙΚΑΣ 1) : Δράσεις στους φορείς

. ΕΝ 1992 (ΕΥΡΩΚΩΔΙΚΑΣ 2) : Σχεδιασμός Κατασκευών από Σκυρόδεμα

. ΕΝ 1997 (ΕΥΡΩΚΩΔΙΚΑΣ 7) : ΓεωτεχνικόςΣχεδιασμός

. ΕΝ 1998 (ΕΥΡΩΚΩΔΙΚΑΣ 8) : Αντισεισμικός Σχεδιασμός

Αθήνα, Σεπτέμβριος 2021

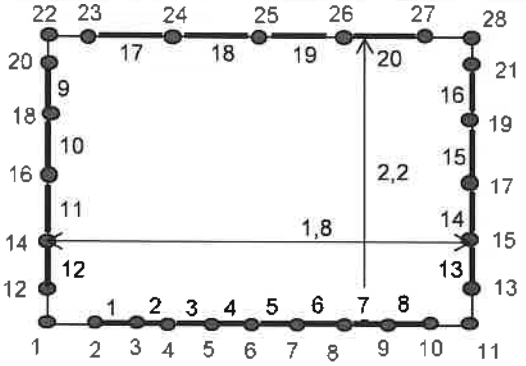
Συντάχθηκε
Δ. Μπούρμπου
Πολιτικός Μηχανικός

Έγκριση
Ε. Μπούρμπος
Πολιτικός Μηχανικός

ΚΙΒΩΤΟΕΙΔΗΣ ΟΧΕΤΟΣ 1.50x1.90, d=0.30m [Ηεπ=0.30m]
(ks=1000 KN/m^3)

ΟΧΕΤΟΣ 1.50x1.90 (Ηεπ=0.30m)

Εσωτερικό πλάτος	1,50 m
Εσωτερικό ύψος (με στρώση φθοράς)	1,90 m
Πάχος τοιχωμάτων	0,30 m
Πάχος πάνω πλάκας	0,30 m
Πάχος κάτω πλάκας	0,30 m
Ύψος επίχωσης	0,30 m
Δείκτης εδάφους	1000,00 kN/m^3
Es	50000,00 kN/m^2
H	2,80 m



ΚΟΜΒΟΙ	Συντεταγμένες κόμβων		Ελατήρια πυθμένα	Πλευρικά ελατήρια			ΜΕΛΗ	Κόμβοι αρχής-τέλους	Μήκη
	X (m)	Y (m)	kN/m	y	Ksh	cp (kN/m)			L (m)
1	0	0	422,50				1	2-3	0,245
2	0,15	0					2	3-4	0,16833
3	0,395	0	206,67				3	4-5	0,16833
4	0,563	0	168,33				4	5-6	0,16833
5	0,732	0	168,33				5	6-7	0,16833
6	0,900	0	168,33				6	7-8	0,16833
7	1,068	0	168,33				7	8-9	0,16833
8	1,237	0	168,33				8	9-10	0,245
9	1,405	0	206,67				9	20-18	0,475
10	1,650	0					10	18-16	0,475
11	1,800	0	422,50	2,65	40561,22	21801,66	11	16-14	0,475
12	0	0,15					12	14-12	0,475
13	1,800	0,15		2,50	38265,31		13	13-15	0,475
14	0	0,625					14	15-17	0,475
15	1,800	0,625		2,03	30994,90	14722,58	15	17-19	0,475
16	0	1,1					16	19-21	0,475
17	1,800	1,1		1,55	23724,49	11269,13	17	23-24	0,375
18	0	1,575					18	24-25	0,375
19	1,800	1,575		1,08	16454,08	7815,69	19	25-26	0,375
20	0	2,05					20	26-27	0,375
21	1,800	2,05		0,60	9183,67		ΑΚΑΜΠΤΑ ΜΕΛΗ	1-2	ΚΟΜΒΟΙ ΑΡΧΗΣ-ΤΕΛΟΥΣ
22	0	2,2						10-11	
23	0,15	2,2						1-12	
24	0,525	2,2						11-13	
25	0,9	2,2						20-22	
26	1,275	2,2						21-28	
27	1,65	2,2						22-23	
28	1,8	2,2		0,45	6887,76	3702,17		27-28	

ΟΧΕΤΟΣ1.50 X 1.90

Ηεπ = 0.30m

ΣΤΑΤΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ

ΓΕΝΙΚΑ ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ

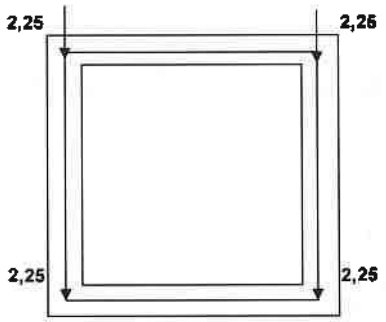
e: h επίχωσης= 0,30
f: πάχος στρ.φθοράς= 0,00
H: συνολ. εσωτ.υψος= 1,90
h: πάχος τοιχωμάτων= 0,30

d_1=πάχος άνω πλάκας= 0,30
d_2=πάχος κάτω πλάκας= 0,30
L:εσωτ. πλάτος τεχνικού= 1,50
g_1: ι.β. σκυροδέματος= 25,00
g_2: ι.β. επίχωσης= 18,00

a_0=σεισμικός συντελεστής= 0,276
β_0=συντ.φασματικής ενισχ.= 2,50
q=συντ. συμπεριφοράς= 1,50
φ=γωνία τριβής γαιών= 30,00

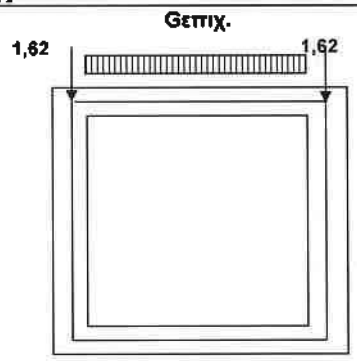
Σημειώσεις:
Ο πραγματικός φορέας έχει μεγαλύτερες διαστάσεις από τον φορέα της ανάλυσης. Τα κατανεμημένα φορτία ασκούνται στις εσωτερικές διαστάσεις του οχετού (δηλαδή χωρίς τα τοιχώματα) και στη συνέχεια ασκούνται κατάλληλα επικόμβια φορτία - είναι η επιρροή των κατανεμημένων στο πάχος του τοιχώματος ή της πλάκας - έτσι ώστε να ληφθούν οι σωστές φορτίσεις.

ΦΟΡΤΙΣΗ 1: Ιδιο βάρος



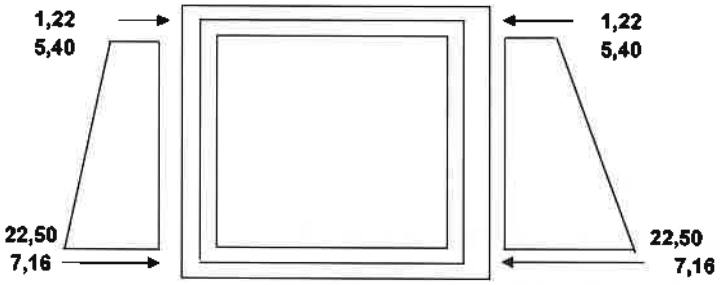
Ιδιο βάρος στρώσης φθοράς: Gπυθμ.=f*g1= 0,00 KN/m2
Ιδιο βάρος φορεα: Gιβ.=g1= 25,00 KN/m3

ΦΟΡΤΙΣΗ 2: Βάρος Επίχωσης



Ιδιο βάρος επίχωσης: Gεπιχ.=g_2*e= 5,40 KN/m2

ΦΟΡΤΙΣΗ 3: Ωθήσεις Γαιών.



λο: συντ. ουδ. ώθησης

(1-sinφ)= 0,500

P_{oben} = λο*g2*(e+d1)= 5,40 KN/m2

P_{unter} =λο*g2*(e+d1+H)= 22,50 KN/m2

ΦΟΡΤΙΣΗ 4: Συστολή Ξήρανσης.

Λαμβάνεται ομοιόμορφη μείωση της θερμοκρασίας ΔΤ=-15^{0}C στην άνω πλάκα και ΔΤ=-10^{0}C στην κάτω πλάκα και τα τοιχώματα

ΦΟΡΤΙΣΗ 5: Ομοιόμορφη θερμοκρασιακή μεταβολή ΔΤ=+35°C

Λαμβάνεται ΔΤΝ,exp=Te,max-To (§6.1.3.3, EN 1991-1-5). Οι αναφερόμενες στο παραπάνω εδάφιο θερμοκρασίες λαμβάνονται σύμφωνα με το Σχ. 6.1 για την Ελλάδα: Te,max=Tmax+2. Όπου Tmax=45^{0}C (τιμή από Χάρτη Εθνικού Προσαρτήματος)-0.65*350/100 (350m είναι το υψόμετρο στο σημείο της κατασκευής)= 42.7^{0}C = 43^{0}C . Η τιμή θερμοκρασίας κατασκευής του έργου Το για την Ελλάδα λαμβάνεται Το=10^{0}C .

Άρα ΔΤΝ,exp=Te,max-To=43+2-10=35^{0}C

Επομένως επιβάλλεται στο φορέα ομοιόμορφη θερμοκρασία (διαστολή) ΔΤ=+35^{0}C όπως περιγράφεται παρακάτω:

Στην άνω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=+35^{0}C και στα τοιχώματα και την κάτω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=+30^{0}C

ΦΟΡΤΙΣΗ 6: Ομοιόμορφη θερμοκρασιακή μεταβολή ΔΤ=-10.5°C

Λαμβάνεται ΔΤΝ,con= To-Te,min (§6.1.3.3. EN 1991-1-5). Οι αναφερόμενες στο παραπάνω εδάφιο θερμοκρασίες λαμβάνονται σύμφωνα με το Σχ. 6.1 για την Ελλάδα: Te,min=Tmin+8. Όπου Tmin=-50C (τιμή από Χάρτη Εθνικού Προσαρτήματος)-0.65*350/100 (350m είναι το υψόμετρο στο σημείο της κατασκευής)= -7.30C = -7.50C . Η τιμή θερμοκρασίας κατασκευής του έργου Το για την Ελλάδα λαμβάνεται Το=10^0 C .

Άρα ΔΤΝ,con= To-Te,min =10-(-7.5+8)= 10.5^{0}C

Επομένως επιβάλλεται στο φορέα ομοιόμορφη θερμοκρασία (συστολή) ΔΤ= -10.5^{0}C όπως περιγράφεται παρακάτω:

Στην άνω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=-10.50C και στα τοιχώματα και την κάτω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=-5.50C

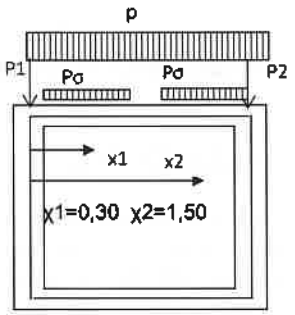
ΦΟΡΤΙΣΗ 7: Γραμμική θερμοκρασιακή διαφορά πελμάτων ΔΤ=+12°C

Για ανωδομές από σκυρόδεμα λαμβάνεται για την πλάκα ανωδομής:
ΔΤΜ,heat=+15^{0}x Ksur (σε Κ).
(βλ. Πιν. 6.1 και 6.2 της §6.1.4.1 EN 1991-1-5)
Ο συντελεστής επιρροής του πάχους επίστρωσης, λαμβάνεται ως Ksur=0.80 από τον Πινακα 6.2 της §6.1.4.1.
Επομένως επιβάλλεται στην πλάκα ανωδομής γραμμικά μεταβαλόμενη θερμοκρασιακή διαφορά ΔΤΜ,heat=+12.0^{0}C (άνω πλευρά θερμότερη).

ΦΟΡΤΙΣΗ 8: Γραμμική θερμοκρασιακή διαφορά πελμάτων ΔΤ=-8.8°C

Για ανωδομές από σκυρόδεμα λαμβάνεται για την πλάκα ανωδομής:
ΔΤΜ,cool= 8^{0}xKsur (σε Κ).
(βλ. Πιν. 6.1 `και 6.2 της §6.1.4.1 EN 1991-1-5)
Ο συντελεστής επιρροής του πάχους επίστρωσης, λαμβάνεται ως Ksur=1.10 από τον Πινακα 6.2 της §6.1.4.1.
Επομένως επιβάλλεται στο φορέα γραμμικά μεταβαλόμενη θερμοκρασιακή διαφορά ΔΤΜ,cool=-8.8^{0}C (κάτω πλευρά θερμότερη).

ΦΟΡΤΙΣΗ 91: Κινητά Φορτία , θέση 1



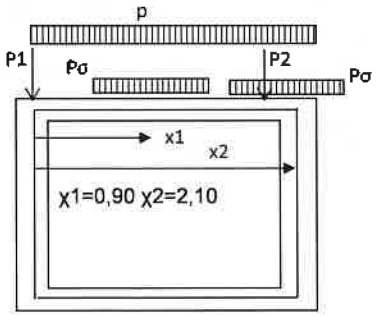
Επιφάνεια: F=[0.40+d1+2*e*tan30]*[0.40+d1+2*e*tan30]= 1,095 m2
Φορτίο τροχού κύριας τροχιάς Q= 150.0 KN

Pσ = 150 / F = 136,99 KN/m2

Κατανεμήμενο φορτίο Κύριας Λωρίδας:

p=	9,00 KN/m2
P1=	43,80 KN
P2=	43,80 KN

ΦΟΡΤΙΣΗ 92: Κινητά Φορτία , θέση 2



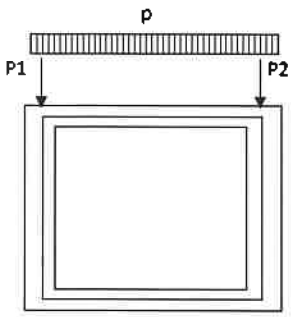
Επιφάνεια: F=[0.40+d1+2*e*tan30]*[0.40+d1+2*e*tan30]= 1,095
Φορτίο τροχού κύριας τροχιάς Q= 150 KN

Pσ = 150 / F = 136,99 KN/m2

Κατανεμήμενο φορτίο Κύριας Λωρίδας:

p=	9,00 KN/m2
P1=	2,70 KN
P2=	43,80 KN

ΦΟΡΤΙΣΗ 90: Κινητά Φορτία (ομοιομορφισμένα)



Κατανομή Φορτίων:

Επιφάνεια: $F_{60}=(3.00+d_1+2*\tan 30*e)*(2.20+d_1+2*\tan 30*e)=$ 10,38 m2

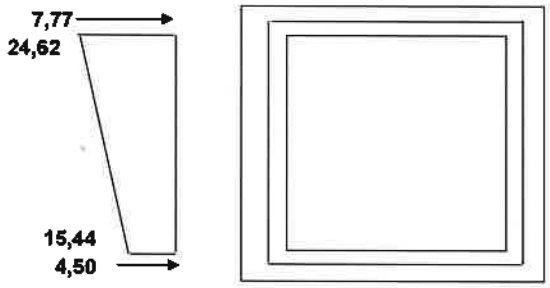
Δευτ/σα Τροχιά: p1=9.0 KN/m2

Όχημα Κύριας Τροχιάς Q= 600 KN

Ισοδύναμο Ομοιόμορφο φορτίο από όχημα

P=9.0+(600.0)/F60=	66,81 KN/m2
P1=	20,04 KN
P2=	20,04 KN

ΦΟΡΤΙΣΗ 10: Ωθήσεις Γαιών από Κινητά Αριστερά.

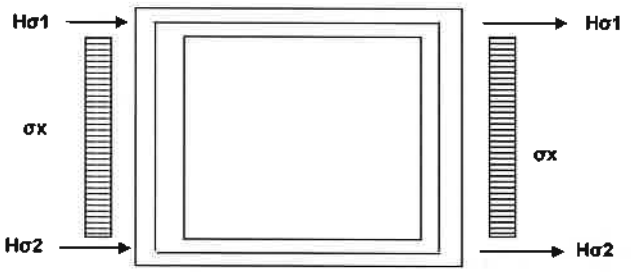


Λαμβάνεται γενικά φορτίο επιχώματος το ισοδύναμο ομοιόμορφο που προκύπτει από το Π.Φ.1 διανέμεται προς τα κάτω με γωνία 60 ως προς τον οριζοντα (EN 1991-2 παρ. 4.9.1)

$q=(2*aq1*Q1k+2*aq2*Q2k+2*aq3*Q3k/(3*3*2.2)=$ 60,61 KN/m2

$p_{oben}= \lambda o*60.61*3.00/\{3.00+2*(e+d1)*\tan 30\}=$	24,62 KN/m2
$p_{unter}= \lambda o*60.61*3.00/\{3.00+2*(H+d1+e)*\tan 30\}=$	15,44 KN/m2

ΦΟΡΤΙΣΗ 12: Σεισμός (σε φάση)



$H\sigma=g2*e*\alpha o*\beta o/q+20\%P*\alpha o*\beta o/q=$	8,63 KN/m
$\sigma x = 1.00*\alpha o*g_2*(H+d_1+d_2+e)=$	13,91 KN/m2
Σεισμος στο ι.β $=\alpha o*\beta o*g1/q*d=$	3,45 KN/m2
Στρώση φθοράς $=\alpha o*\beta o/q*G_{\pi\upsilon\theta\mu\acute{\eta}\nu}=$	0,00 KN/m2
Hσ1=	7,80 KN
Hσ2=	5,21 KN

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

No. 1 C 25/30 (EN 1992)

Youngs-modulus	E	31476 [MPa]	Safetyfactor		1.50 [-]	
Poisson-Ratio	mu	0.20 [-]	Strength	fc	21.25 [MPa]	
Shear-modulus	G	13115 [MPa]	Nomin. strength	fcn	25.00 [MPa]	
Compression modulus		17487 [MPa]	Tens. strength	fctm	2.56 [MPa]	
Weight		25.0 [kN/m3]	5 % t.strength	fctk	1.80 [MPa]	
Weight buoyancy		25.0 [kN/m3]	95 % t.strength	fctk	3.33 [MPa]	
Temp.elongat.coeff.		1.00E-05 [1/°K]	Bond strength	fbd	2.69 [MPa]	
			Service strength		33.00 [MPa]	
			Fatigue strength		12.75 [MPa]	

Stress-Strain for serviceability	eps[o/oo]	sig-m[MPa]	E-t[MPa]
Is only valid within the defined	0.000	0.00	33050
stress range	-1.035	-25.04	15658
	-2.069	-33.00	0
	-3.500	-18.95	-19203
	Safetyfactor		1.35
Stress-Strain for ultimate load	eps[o/oo]	sig-u[MPa]	E-t[MPa]
Is only valid within the defined	0.000	0.00	21250
stress range	-2.000	-21.25	0
	-3.500	-21.25	0
	Safetyfactor		1.50
Stress-Strain of calc. mean values	eps[o/oo]	sig-r[MPa]	E-t[MPa]
Is only valid within the defined	0.000	0.00	27541
stress range	-1.035	-12.41	4259
	-2.069	-14.17	0
	-3.500	-12.64	-1802
	Safetyfactor		(1.50)

No. 3 S 500 (EN 1992)

Youngs-modulus	E	200000 [MPa]	Safetyfactor		1.15 [-]	
Poisson-Ratio	mu	0.30 [-]	Yield stress	fy	500.00 [MPa]	
Shear-modulus	G	76923 [MPa]	Compr.yield val.	fyc	500.00 [MPa]	
Compression modulus		166667 [MPa]	Tens. strength	ft	550.00 [MPa]	
Weight		78.5 [kN/m3]	Compr. strength	fc	550.00 [MPa]	
Weight buoyancy		78.5 [kN/m3]	Ultim. plast. strain		50.00 [o/oo]	
Temp.elongat.coeff.		1.20E-05 [1/°K]	relative bond coeff.		1.00 [-]	
max. thickness		32.00 [mm]	EC2 bondcoeff. K1		0.80 [-]	
			Hardening modulus		0.00 [MPa]	
			Proportional limit		500.00 [MPa]	
			Dynamic stress range		152.17 [MPa]	

Stress-Strain for serviceability	eps[o/oo]	sig-m[MPa]	E-t[MPa]
Is also extended beyond the	1000.000	550.00	0
defined stress range	50.000	550.00	0
	2.500	500.00	1053
	0.000	0.00	200000
	-2.500	-500.00	200000
	-50.000	-550.00	1053
	-1000.000	-550.00	0
	Safetyfactor		1.15
Stress-Strain for ultimate load	eps[o/oo]	sig-u[MPa]	E-t[MPa]
Is also extended beyond the	1000.000	478.26	0
defined stress range	50.000	478.26	0
	2.174	434.78	909
	0.000	0.00	200000
	-2.174	-434.78	200000
	-50.000	-478.26	909
	-1000.000	-478.26	0
	Safetyfactor		(1.15)

Cross-sections static properties

No.	Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [m]	y/z-sc [m]	modules [MPa]	gam [kN/m]
1	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
2	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
3	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	

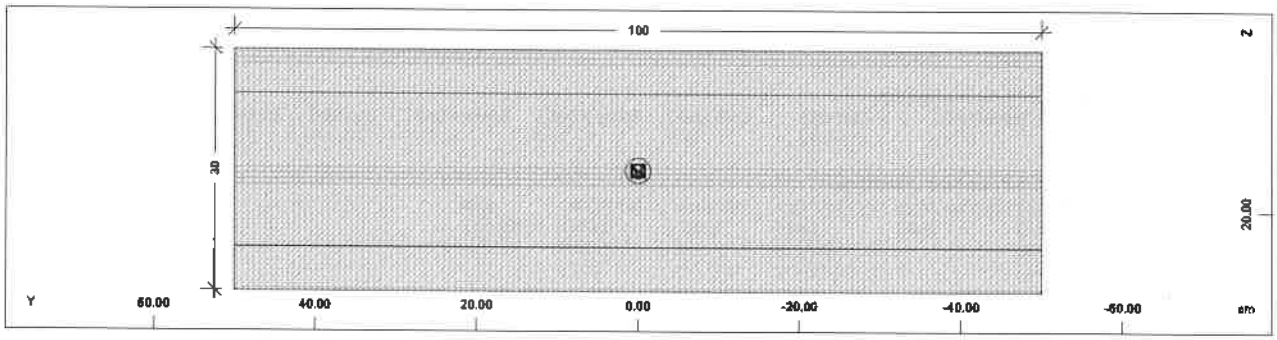
Summary of all beam elements

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Cross sections

No.	TotLength [m]	Max.Length [m]	TotWeight [t]	Surface [m2]	Title
1	1.500	0.375	1.125	3.900	
2	1.500	0.245	1.125	3.900	
3	3.800	0.475	2.850	9.880	
Sum	6.800		5.100	17.680	

Cross section No. 1



Static properties of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	y/z-sc [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	0.00	31476	7.50
3	7.311E-03		2.500E-02	15.00	15.00	13115	

Additional static properties of cross section

Alfa-T	ymin ymax	zmin zmax	hymin hzmin	AK AB	MB	Tau-T Tau-B	Tau-Vy Tau-Vz
[1/°K]	[cm]	[cm]	[cm]	[m2]		[1/m3]	[1/m2]
1.0E-05	-50.00	-15.00	1.633E-01		3	2.656E+01	
	50.00	15.00	3.000E-01				5.000E+00

Section values for warping

Wmin[m2]	Wmax[m2]	CM[m6]	CMS[m4]	ASwyy[m6]	ASwzz[m6]	ry[cm]	rz[cm]
-0.0535	0.0535	0.000	0.000	0.000	0.000	0.00	0.00

Design values of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	23315	7.50
	7.311E-03		2.500E-02	15.00	9715	

Additional Design Data

M	periphery-O/-I [m2/m]	[m2/m]	deff [cm]	t-min [cm]	t-max [cm]	SMP [o/o]	thet-p [tm2/m]	thet-y [tm2/m]	thet-z [tm2/m]	thet-yz [tm2/m]
	2.600		23.08			0.0	0.068	0.006	0.063	

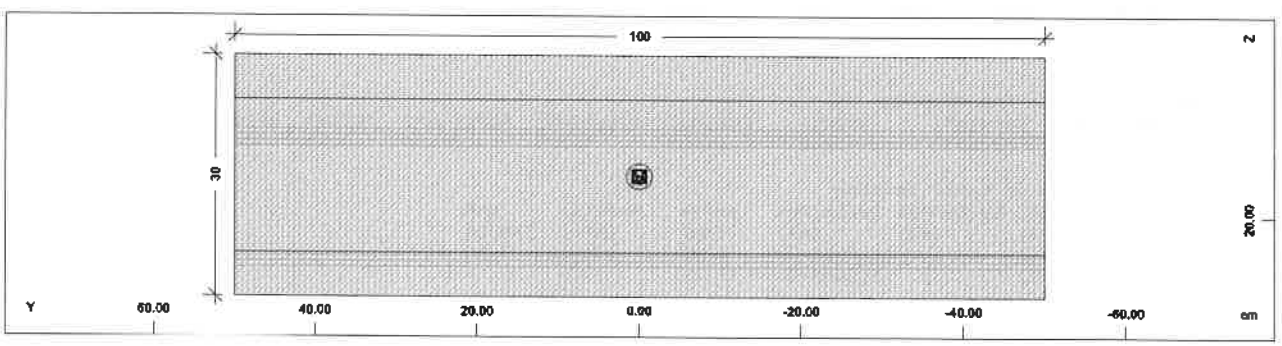
Reinforcement global values

Layer	mS	mR	area [cm2]	lower-A [cm2]	upper-A [cm2]	yL [cm]	zL [cm]	L-tors [cm]	N-pr [kN]	M-pr [kNm]
M1	1	3	1.00	1.00		0.00	24.50			
M2	1	3	1.00	1.00		0.00	5.50			

Distributed reinforcement

Id.	MNo	ya[cm]	za[cm]	ye[cm]	ze[cm]	As/As-max[cm2/m]	Lay	D	Ar[m2/m]
1	3	49.90	24.50	-49.90	24.50	1.00	1	14	
2	3	49.90	5.50	-49.90	5.50	1.00	2	12	

Cross section No. 2



BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Static properties of cross section

Mat / NoR	A[m2] / It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	y/z-sc [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	0.00	31476	7.50
3	7.311E-03		2.500E-02	15.00	15.00	13115	

Additional static properties of cross section

Alfa-T [1/°K]	ymin / ymax [cm]	zmin / zmax [cm]	hymin / hzmin [cm]	AK / AB [m2]	MB	Tau-T / Tau-B [1/m3]	Tau-Vy / Tau-Vz [1/m2]
1.0E-05	-50.00	-15.00		1.633E-01	3	2.656E+01	
	50.00	15.00		3.000E-01			5.000E+00

Section values for warping

Wmin[m2]	Wmax[m2]	CM[m6]	CMS[m4]	ASwyy[m6]	ASwzz[m6]	ry[cm]	rz[cm]
-0.0535	0.0535	0.000	0.000	0.000	0.000	0.00	0.00

Design values of cross section

Mat / NoR	A[m2] / It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	23315	7.50
	7.311E-03		2.500E-02	15.00	9715	

Additional Design Data

M	periphery-O/-I [m2/m]	[m2/m]	deff [cm]	t-min [cm]	t-max [cm]	SMP [o/o]	thet-p [tm2/m]	thet-y [tm2/m]	thet-z [tm2/m]	thet-yz [tm2/m]
	2.600		23.08			0.0	0.068	0.006	0.063	

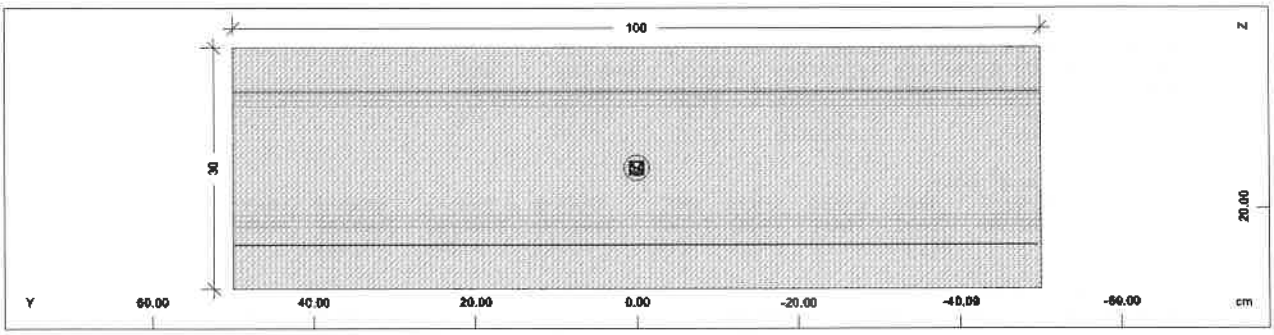
Reinforcement global values

Layer	mS	mR	area [cm2]	lower-A [cm2]	upper-A [cm2]	yL [cm]	zL [cm]	L-tors [cm]	N-pr [kN]	M-pr [kNm]
M1	1	3	1.00	1.00		0.00	24.50			
M2	1	3	1.00	1.00		0.00	5.50			

Distributed reinforcement

Id.	MNo	ya[cm]	za[cm]	ye[cm]	ze[cm]	As/As-max[cm2/m]	Lay	D	Ar[m2/m]
1	3	49.90	24.50	-49.90	24.50	1.00	1	12	
2	3	49.90	5.50	-49.90	5.50	1.00	2	12	

Cross section No. 3



Static properties of cross section

Mat / NoR	A[m2] / It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	y/z-sc [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	0.00	31476	7.50
3	7.311E-03		2.500E-02	15.00	15.00	13115	

Additional static properties of cross section

Alfa-T [1/°K]	ymin / ymax [cm]	zmin / zmax [cm]	hymin / hzmin [cm]	AK / AB [m2]	MB	Tau-T / Tau-B [1/m3]	Tau-Vy / Tau-Vz [1/m2]
1.0E-05	-50.00	-15.00		1.633E-01	3	2.656E+01	
	50.00	15.00		3.000E-01			5.000E+00

Section values for warping

Wmin[m2]	Wmax[m2]	CM[m6]	CMS[m4]	ASwyy[m6]	ASwzz[m6]	ry[cm]	rz[cm]
-0.0535	0.0535	0.000	0.000	0.000	0.000	0.00	0.00

Design values of cross section

Mat / NoR	A[m2] / It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	23315	7.50
	7.311E-03		2.500E-02	15.00	9715	

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Additional Design Data

M	periphery-O/-I [m2/m]	[m2/m]	deff [cm]	t-min [cm]	t-max [cm]	SMP [o/o]	thet-p [tm2/m]	thet-y [tm2/m]	thet-z [tm2/m]	thet-yz [tm2/m]
	2.600		23.08			0.0	0.068	0.006	0.063	

Reinforcement global values

Layer	mS	mR	area [cm2]	lower-A [cm2]	upper-A [cm2]	yL [cm]	zL [cm]	L-tors [cm]	N-pr [kN]	M-pr [kNm]
M1	1	3	0.99	0.99		0.20	24.50			
M2	1	3	1.00	1.00		0.00	5.50			

Distributed reinforcement

Id.	MNo	ya[cm]	za[cm]	ye[cm]	ze[cm]	As/As-max[cm2/m]	Lay	D	Ar[m2/m]
1	3	49.90	24.50	-49.50	24.50	1.00	1	12	
2	3	49.90	5.50	-49.90	5.50	1.00	2	12	

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Cross sections - Static Properties

No.	Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [m]	y/z-sc [m]	modules [MPa]	gam [kN/m]
1	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
2	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
3	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	

Summary of all beam elements

Groups

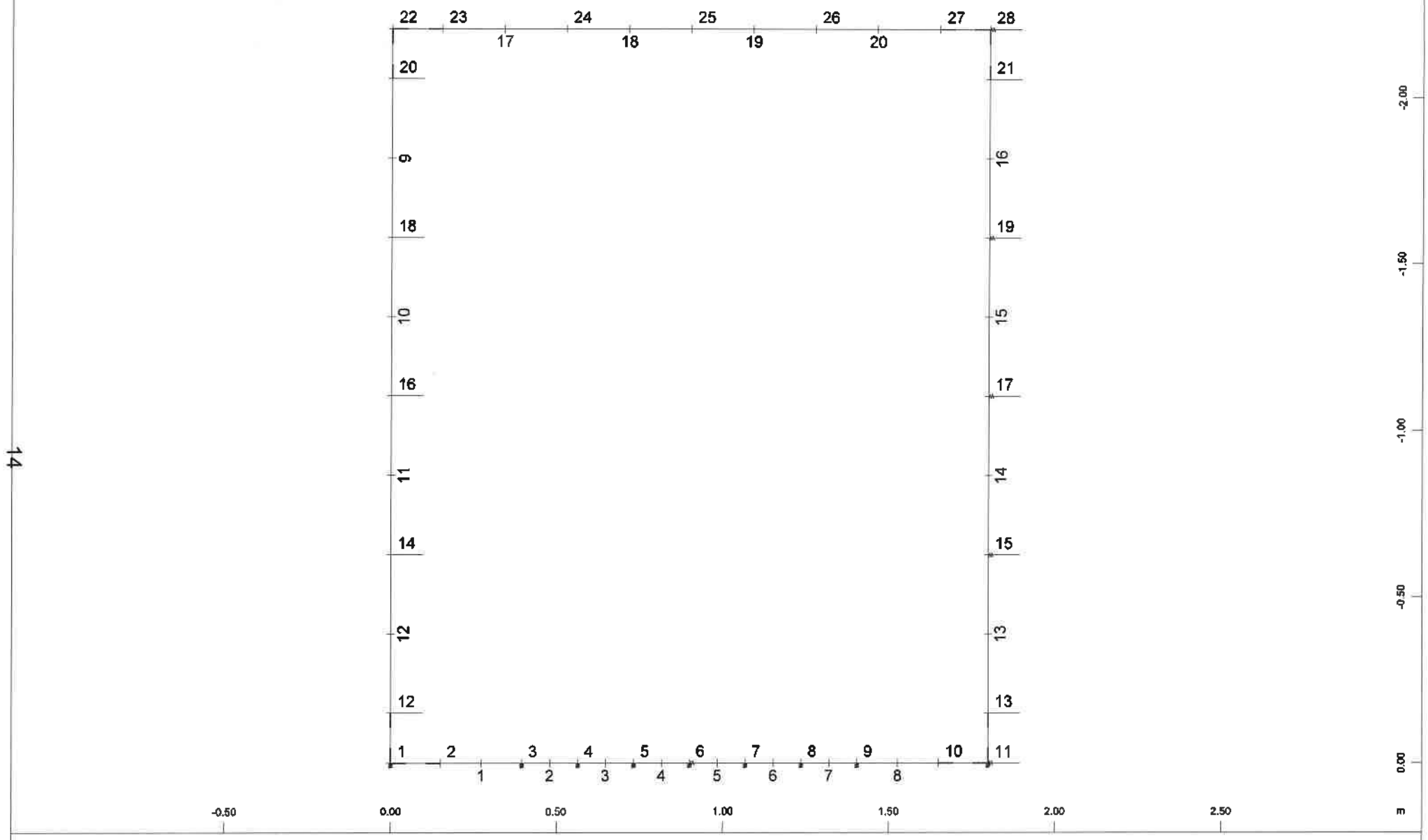
Grp	TotLength [m]	Max.Length [m]	TotWeight [t]	Surface [m2]
0	6.800	0.475	5.100	17.680
Sum	6.800		5.100	17.680

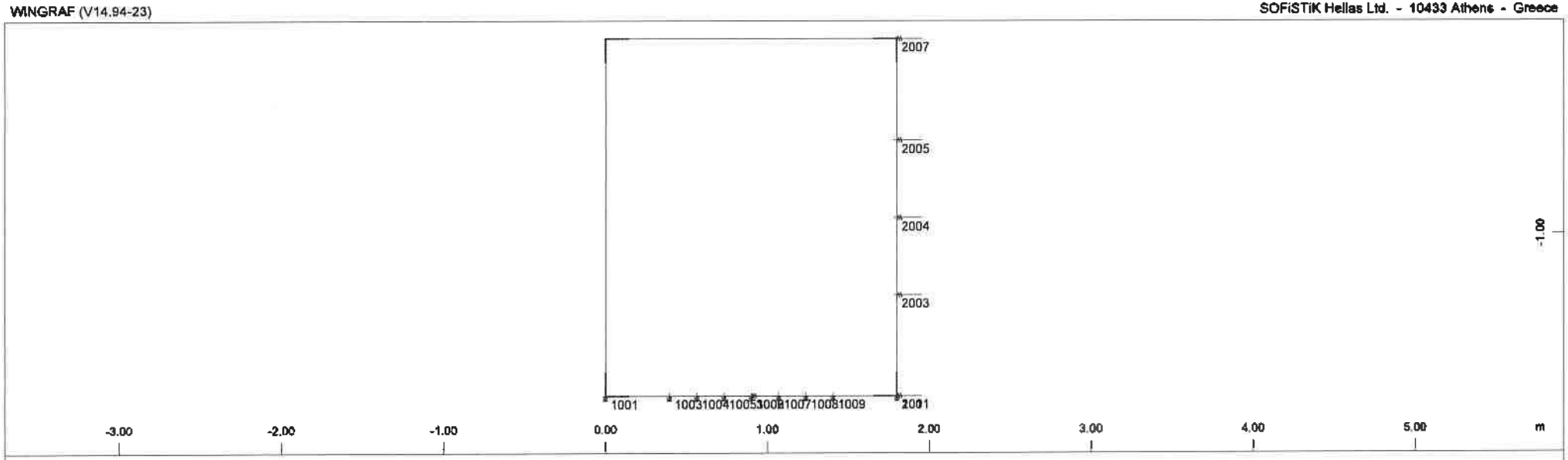
Beam Elements

Grp	Number	Node	x[m]	NoS	NoP	reference Hinges	direction	local y-axis
0	1	2	0.000	2			0.000	0.000 -1.000
		3	0.245	2				
0	2	3	0.000	2			0.000	0.000 -1.000
		4	0.168	2				
0	3	4	0.000	2			0.000	0.000 -1.000
		5	0.168	2				
0	4	5	0.000	2			0.000	0.000 -1.000
		6	0.168	2				
0	5	6	0.000	2			0.000	0.000 -1.000
		7	0.168	2				
0	6	7	0.000	2			0.000	0.000 -1.000
		8	0.168	2				
0	7	8	0.000	2			0.000	0.000 -1.000
		9	0.168	2				
0	8	9	0.000	2			0.000	0.000 -1.000
		10	0.245	2				
0	9	20	0.000	3			0.000	0.000 -1.000
		18	0.475	3				
0	10	18	0.000	3			0.000	0.000 -1.000
		16	0.475	3				
0	11	16	0.000	3			0.000	0.000 -1.000
		14	0.475	3				
0	12	14	0.000	3			0.000	0.000 -1.000
		12	0.475	3				
0	13	13	0.000	3			0.000	0.000 -1.000
		15	0.475	3				
0	14	15	0.000	3			0.000	0.000 -1.000
		17	0.475	3				
0	15	17	0.000	3			0.000	0.000 -1.000
		19	0.475	3				
0	16	19	0.000	3			0.000	0.000 -1.000
		21	0.475	3				
0	17	23	0.000	1			0.000	0.000 -1.000
			0.245	1i				
		24	0.375	1				
0	18	24	0.000	1			0.000	0.000 -1.000
		25	0.375	1				
0	19	25	0.000	1			0.000	0.000 -1.000
		26	0.375	1				
0	20	26	0.000	1			0.000	0.000 -1.000
			0.130	1i				
		27	0.375	1				

Spring Elements

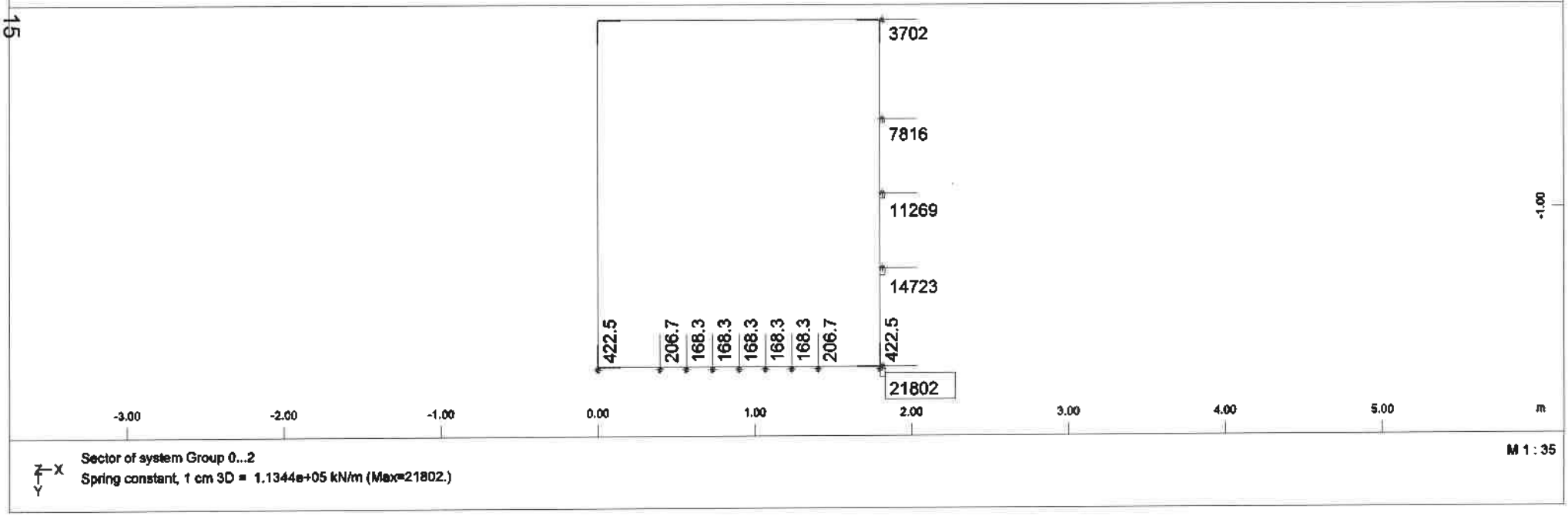
Grp	Number	Node	Node	dX[-] e-P[-]	dY[-] e-T[-]	dZ[-] e-M[-]	CP[kN/m] DP[kNsec/m]	CT[kN/m] DT[kNsec/m]	CM[kNm] DM[kNmsec]
1	1001	1		0.000	1.000	0.000	4.225E+02		
1	1003	3		0.000	1.000	0.000	2.067E+02		
1	1004	4		0.000	1.000	0.000	1.683E+02		
1	1005	5		0.000	1.000	0.000	1.683E+02		
1	1006	6		0.000	1.000	0.000	1.683E+02		
1	1007	7		0.000	1.000	0.000	1.683E+02		
1	1008	8		0.000	1.000	0.000	1.683E+02		
1	1009	9		0.000	1.000	0.000	2.067E+02		
1	1011	11		0.000	1.000	0.000	4.225E+02		
2	2001	11		1.000	0.000	0.000	2.180E+04		
2	2003	15		1.000	0.000	0.000	1.472E+04		
2	2004	17		1.000	0.000	0.000	1.127E+04		
2	2005	19		1.000	0.000	0.000	7.816E+03		
2	2007	28		1.000	0.000	0.000	3.702E+03		
3	3002	6		1.000	0.000	0.000	1.000E+06		


22 23 24 25 26 27 28
17 18 19 20
20 21
9 16
18 19
10 15
16 17
11 14
14 15
12 13
12 13
1 2 3 4 5 6 7 8 9 10 11
1 2 3 4 5 6 7 8
14
-0.50 0.00 0.50 1.00 1.50 2.00 2.50 m
-2.00 -1.50 -1.00 -0.50 0.00
Beam Elements , Number of element (Max=20)
Numbers of nodes (Max=28)
Z X Y
M 1 : 15



Spring Elements , Number of element (Max=3002)

M 1 : 34



Sector of system Group 0...2

Spring constant, 1 cm 3D = 1.1344e+05 kN/m (Max=21802.)

M 1 : 35

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Definition of load type in this output:
PZZ - load in global direction Z in reference to the element length
PZP - load in global direction Z in reference to the projection
Pz - load in local direction z
PG - load in dead load direction in reference to the element length

Load Case 1 SELF WEIGHT
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 1.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1		2.2					
11		2.3					
22		2.3					
28		2.3					
sum		9.0					

Load Case 2 SOIL FILL WEIGHT
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
22		1.6					
28		1.6					
sum		3.2					

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	PG	0.000	0.375	5.40		[kN/m]				
18	PG	0.000	0.375	5.40		[kN/m]				
19	PG	0.000	0.375	5.40		[kN/m]				
20	PG	0.000	0.375	5.40		[kN/m]				

Load Case 3 EARTH PRESSURE
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1	7.2						
11	-7.2						
22	1.2						
28	-1.2						
sum							

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
9	PXX	0.000	0.475	5.40	9.67	[kN/m]				
10	PXX	0.000	0.475	9.67	13.95	[kN/m]				
11	PXX	0.000	0.475	13.95	18.23	[kN/m]				
12	PXX	0.000	0.475	18.23	22.50	[kN/m]				
13	PXX	0.000	0.475	-22.50	-18.23	[kN/m]				
14	PXX	0.000	0.475	-18.23	-13.95	[kN/m]				
15	PXX	0.000	0.475	-13.95	-9.67	[kN/m]				
16	PXX	0.000	0.475	-9.67	-5.40	[kN/m]				

Load Case 4 SHRINKAGE OF CONCRETE
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
1	TEMP	0.000	0.245	-10.000		[°C]				
2	TEMP	0.000	0.168	-10.000		[°C]				
3	TEMP	0.000	0.168	-10.000		[°C]				
4	TEMP	0.000	0.168	-10.000		[°C]				
5	TEMP	0.000	0.168	-10.000		[°C]				
6	TEMP	0.000	0.168	-10.000		[°C]				
7	TEMP	0.000	0.168	-10.000		[°C]				

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
8	TEMP	0.000	0.245	-10.000	[°C]				
9	TEMP	0.000	0.475	-10.000	[°C]				
10	TEMP	0.000	0.475	-10.000	[°C]				
11	TEMP	0.000	0.475	-10.000	[°C]				
12	TEMP	0.000	0.475	-10.000	[°C]				
13	TEMP	0.000	0.475	-10.000	[°C]				
14	TEMP	0.000	0.475	-10.000	[°C]				
15	TEMP	0.000	0.475	-10.000	[°C]				
16	TEMP	0.000	0.475	-10.000	[°C]				
17	TEMP	0.000	0.375	-15.000	[°C]				
18	TEMP	0.000	0.375	-15.000	[°C]				
19	TEMP	0.000	0.375	-15.000	[°C]				
20	TEMP	0.000	0.375	-15.000	[°C]				

Load Case 5 TEMPERATURE FLUCTUATIONS DT +35

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
1	TEMP	0.000	0.245	30.000	[°C]				
2	TEMP	0.000	0.168	30.000	[°C]				
3	TEMP	0.000	0.168	30.000	[°C]				
4	TEMP	0.000	0.168	30.000	[°C]				
5	TEMP	0.000	0.168	30.000	[°C]				
6	TEMP	0.000	0.168	30.000	[°C]				
7	TEMP	0.000	0.168	30.000	[°C]				
8	TEMP	0.000	0.245	30.000	[°C]				
9	TEMP	0.000	0.475	30.000	[°C]				
10	TEMP	0.000	0.475	30.000	[°C]				
11	TEMP	0.000	0.475	30.000	[°C]				
12	TEMP	0.000	0.475	30.000	[°C]				
13	TEMP	0.000	0.475	30.000	[°C]				
14	TEMP	0.000	0.475	30.000	[°C]				
15	TEMP	0.000	0.475	30.000	[°C]				
16	TEMP	0.000	0.475	30.000	[°C]				
17	TEMP	0.000	0.375	35.000	[°C]				
18	TEMP	0.000	0.375	35.000	[°C]				
19	TEMP	0.000	0.375	35.000	[°C]				
20	TEMP	0.000	0.375	35.000	[°C]				

Load Case 6 TEMPERATURE FLUCTUATIONS DT -10.

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
1	TEMP	0.000	0.245	-5.500	[°C]				
2	TEMP	0.000	0.168	-5.500	[°C]				
3	TEMP	0.000	0.168	-5.500	[°C]				
4	TEMP	0.000	0.168	-5.500	[°C]				
5	TEMP	0.000	0.168	-5.500	[°C]				
6	TEMP	0.000	0.168	-5.500	[°C]				
7	TEMP	0.000	0.168	-5.500	[°C]				
8	TEMP	0.000	0.245	-5.500	[°C]				
9	TEMP	0.000	0.475	-5.500	[°C]				
10	TEMP	0.000	0.475	-5.500	[°C]				
11	TEMP	0.000	0.475	-5.500	[°C]				
12	TEMP	0.000	0.475	-5.500	[°C]				
13	TEMP	0.000	0.475	-5.500	[°C]				
14	TEMP	0.000	0.475	-5.500	[°C]				
15	TEMP	0.000	0.475	-5.500	[°C]				
16	TEMP	0.000	0.475	-5.500	[°C]				
17	TEMP	0.000	0.375	-10.500	[°C]				
18	TEMP	0.000	0.375	-10.500	[°C]				
19	TEMP	0.000	0.375	-10.500	[°C]				
20	TEMP	0.000	0.375	-10.500	[°C]				

Load Case 7 LINEAR TEMPERATURE DIFFERENCE dT

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	dTz	0.000	0.375	-12.000	[°C]				
18	dTz	0.000	0.375	-12.000	[°C]				
19	dTz	0.000	0.375	-12.000	[°C]				

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
20	dTz	0.000	0.375	-12.000	[°C]				

Load Case 8 LINEAR TEMPERATURE DIFFERENCE d

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	dTz	0.000	0.375	8.800	[°C]				
18	dTz	0.000	0.375	8.800	[°C]				
19	dTz	0.000	0.375	8.800	[°C]				
20	dTz	0.000	0.375	8.800	[°C]				

Load Case 90 LIVE LOADS

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
22		20.0					
28		20.0					
sum		40.1					

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	PYY	0.000	0.375	66.81	[kN/m]				
18	PYY	0.000	0.375	66.81	[kN/m]				
19	PYY	0.000	0.375	66.81	[kN/m]				
20	PYY	0.000	0.375	66.81	[kN/m]				

Load Case 91 POINT LOADS 1

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
22		43.8					
28		43.8					
sum		87.6					

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	PYY	0.000	0.375	9.00	[kN/m]				
17	PYY	0.000	0.375	136.99	[kN/m]				
18	PYY	0.000	0.375	9.00	[kN/m]				
18	PYY	0.000	0.375	136.99	[kN/m]				
19	PYY	0.000	0.375	9.00	[kN/m]				
19	PYY	0.070	0.305	136.99	[kN/m]				
20	PYY	0.000	0.375	9.00	[kN/m]				
20	PYY	0.000	0.375	136.99	[kN/m]				

Load Case 92 POINT LOADS 2

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
22		2.7					
28		43.8					
sum		46.5					

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	PYY	0.000	0.375	9.00	[kN/m]				
17	PYY	0.220	0.155	136.99	[kN/m]				
18	PYY	0.000	0.375	136.99	[kN/m]				
18	PYY	0.000	0.375	9.00	[kN/m]				
19	PYY	0.000	0.375	9.00	[kN/m]				
19	PYY	0.000	0.375	136.99	[kN/m]				
20	PYY	0.000	0.160	136.99	[kN/m]				
20	PYY	0.000	0.375	9.00	[kN/m]				
20	PYY	0.290	0.080	136.99	[kN/m]				

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Sum of Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
1	SELF WEIGHT	0.0	60.0	0.0
2	SOIL FILL WEIGHT	0.0	11.3	0.0
3	EARTH PRESSURE	0.0	0.0	0.0
4	SHRINKAGE OF CONCRETE	0.0	0.0	0.0
5	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
6	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
7	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
8	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
90	LIVE LOADS	0.0	140.3	0.0
91	POINT LOADS 1	0.0	297.0	0.0
92	POINT LOADS 2	0.0	216.9	0.0

Sum of Reactions and Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
1	SELF WEIGHT	0.0	-60.0	0.0
		0.0	60.0	0.0
2	SOIL FILL WEIGHT	0.0	-11.3	0.0
		0.0	11.3	0.0
3	EARTH PRESSURE	0.0	0.0	0.0
		0.0	0.0	0.0
4	SHRINKAGE OF CONCRETE	0.0	0.0	0.0
		0.0	0.0	0.0
5	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
		0.0	0.0	0.0
6	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
		0.0	0.0	0.0
7	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
		0.0	0.0	0.0
8	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
		0.0	0.0	0.0
90	LIVE LOADS	0.0	-140.3	0.0
		0.0	140.3	0.0
91	POINT LOADS 1	0.0	-297.0	0.0
		0.0	297.0	0.0
92	POINT LOADS 2	0.0	-216.9	0.0
		0.0	216.9	0.0

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Definition of load type in this output:
PZZ - load in global direction Z in reference to the element length
PZP - load in global direction Z in reference to the projection
Pz - load in local direction z
PG - load in dead load direction in reference to the element length

Load Case 10 LIVE LOAD EARTH PRESSURE
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1	4.5						
22	7.8						
sum	12.3						

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
9	PXX	0.000	0.475	24.62	22.33	[kN/m]				
10	PXX	0.000	0.475	22.33	20.03	[kN/m]				
11	PXX	0.000	0.475	20.03	17.74	[kN/m]				
12	PXX	0.000	0.475	17.74	15.44	[kN/m]				

Load Case 12 SEISMOS SE FASH
Factor forces and moments 1.000
Factor dead weight DL-XX 0.460
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1	1.0						
1	4.2						
11	1.0						
11	4.2						
22	0.7						
22	1.0						
22	1.8						
22	4.2						
28	0.7						
28	1.0						
28	1.8						
28	4.2						
sum	26.0						

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
9	PXX	0.000	0.475	13.91		[kN/m]				
10	PXX	0.000	0.475	13.91		[kN/m]				
11	PXX	0.000	0.475	13.91		[kN/m]				
12	PXX	0.000	0.475	13.91		[kN/m]				
13	PXX	0.000	0.475	13.91		[kN/m]				
14	PXX	0.000	0.475	13.91		[kN/m]				
15	PXX	0.000	0.475	13.91		[kN/m]				
16	PXX	0.000	0.475	13.91		[kN/m]				
17	PXX	0.000	0.375	6.15		[kN/m]				
17	PXX	0.000	0.375	2.48		[kN/m]				
18	PXX	0.000	0.375	6.15		[kN/m]				
18	PXX	0.000	0.375	2.48		[kN/m]				
19	PXX	0.000	0.375	6.15		[kN/m]				
19	PXX	0.000	0.375	2.48		[kN/m]				
20	PXX	0.000	0.375	6.15		[kN/m]				
20	PXX	0.000	0.375	2.48		[kN/m]				

Sum of Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
10	LIVE LOAD EARTH PRESSURE	50.3	0.0	0.0
12	SEISMOS SE FASH	115.3	0.0	0.0

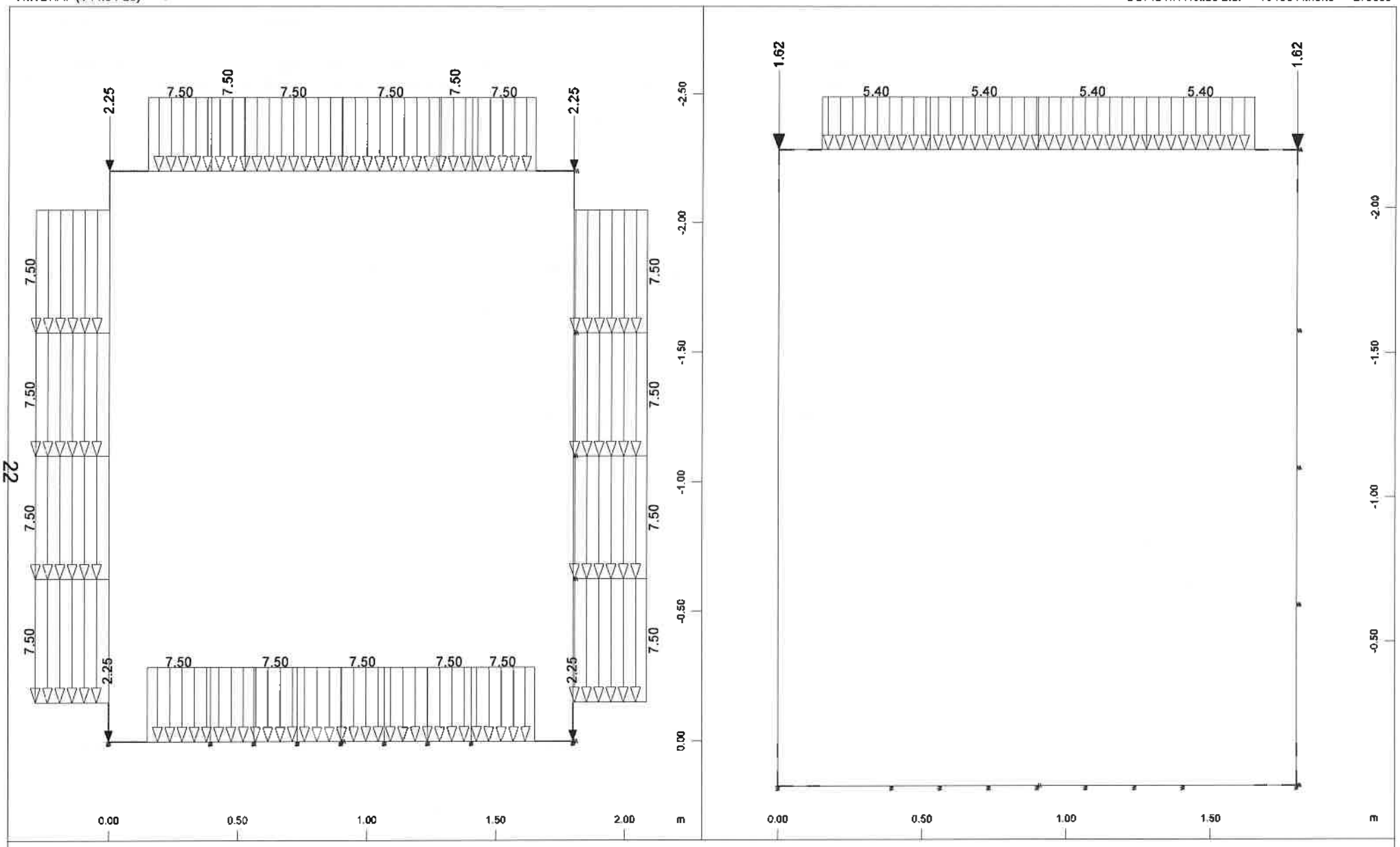
Eliminated Forces from Constraints
Loadcase 12 SEISMOS SE FASH

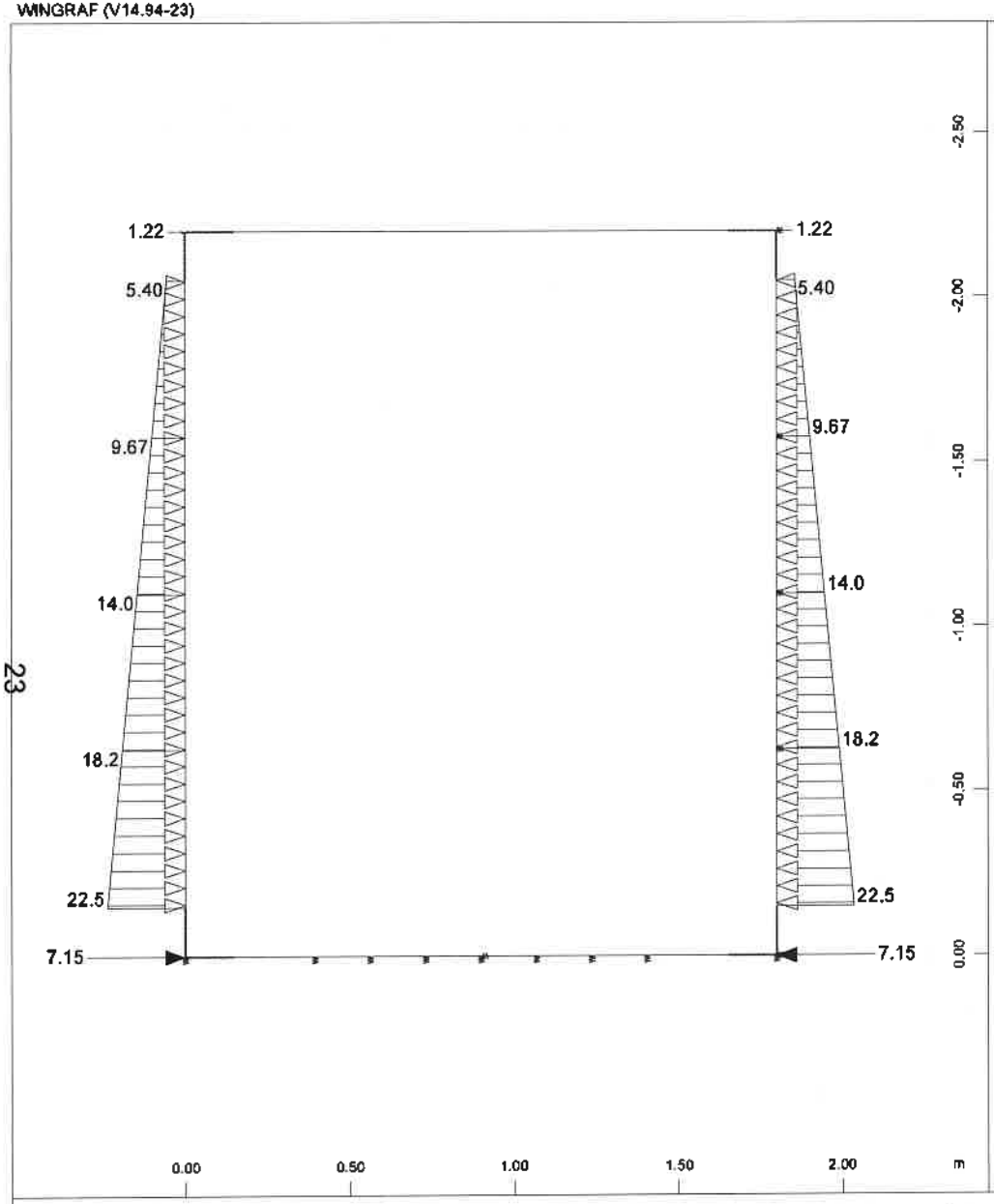
Node	P-X[kN]	P-Y[kN]	P-Z[kN]	M-X[kNm]	M-Y[kNm]	M-Z[kNm]Mb [kNm2]
2	22.1	-3.8	0.0	0.00	0.00	4.05
10	-27.3	3.8	0.0	0.00	0.00	-9.37
12	-16.9	4.7	0.0	0.00	0.00	-0.95
13	26.0	-4.7	0.0	0.00	0.00	6.04

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

Eliminated Forces from Constraints
Loadcase 12 SEISMOS SE FASH

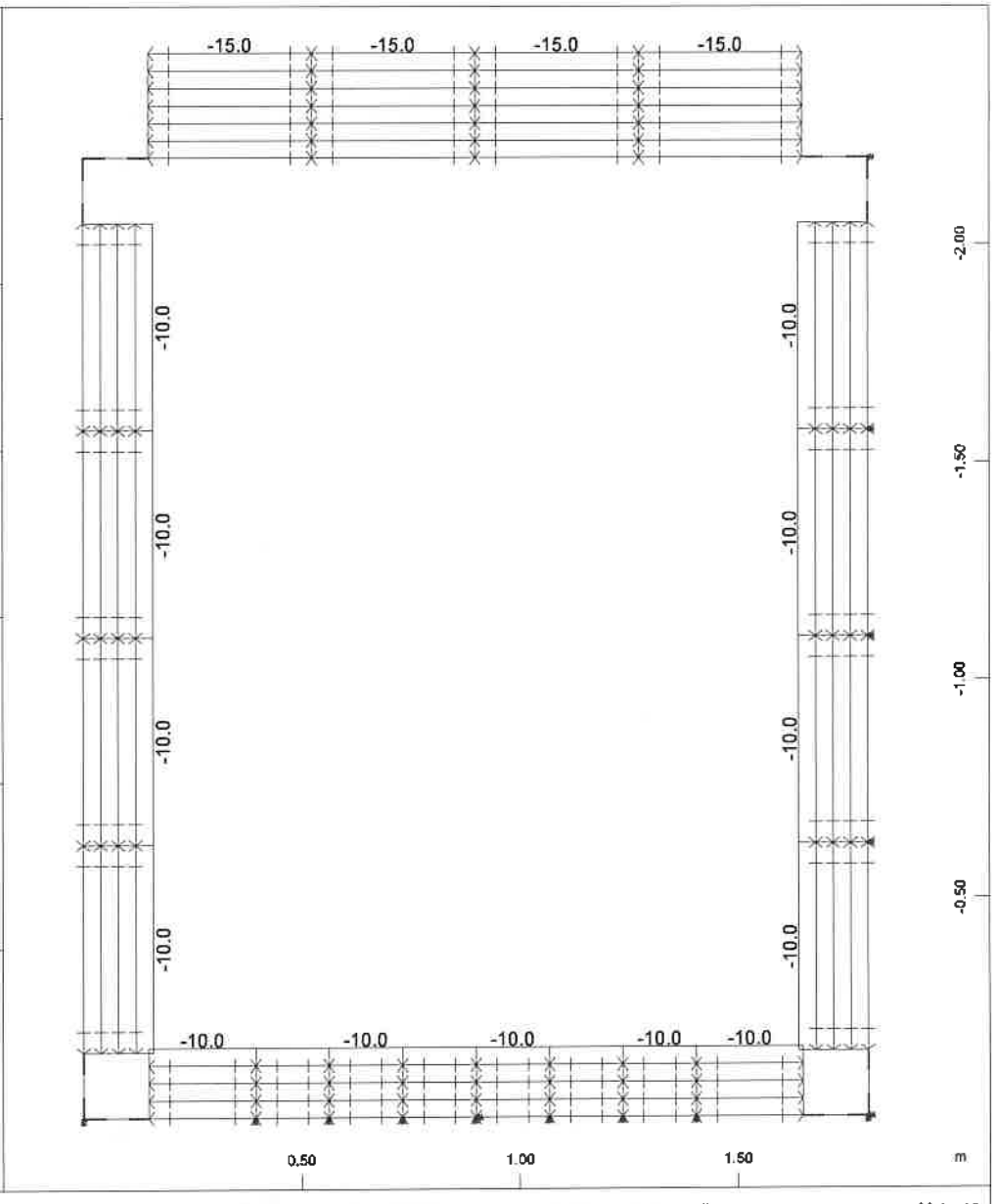
Node	P-X[kN]	P-Y[kN]	P-Z[kN]	M-X[kNm]	M-Y[kNm]	M-Z[kNm]Mb [kNm2]
20	-16.1	-4.7	0.0	0.00	0.00	0.22
21	29.4	4.7	0.0	0.00	0.00	-6.66
23	23.9	4.7	0.0	0.00	0.00	-3.34
27	-42.0	-4.7	0.0	0.00	0.00	10.37


22
2.25
7.50
7.50
7.50
7.50
7.50
7.50
2.25
7.50
7.50
7.50
7.50
7.50
7.50
2.25
2.25
7.50
7.50
7.50
7.50
7.50
2.25
0.00
0.50
1.00
1.50
2.00
m
-2.50
-2.00
-1.50
-1.00
-0.50
0.00
All loads, Loadcase 1 SELF WEIGHT , (1 cm 3D = unit) Beam dead load in global Y (Unit=5.00 kN/m), Nodal load (force) vector (Unit=2.00
M 1 : 19
1.62
1.62
5.40
5.40
5.40
5.40
0.00
0.50
1.00
1.50
m
-2.00
-1.50
-1.00
-0.50
All loads, Loadcase 2 SOIL FILL WEIGHT , (1 cm 3D = unit) Nodal load (force) vector (Unit=1.00 kN), Beam line load (force) in global Y
M 1 : 17



All loads, Loadcase 3 EARTH PRESSURE , (1 cm 3D = unit) Nodal load (force) vector (Unit=5.00 kN), Beam line load (force) in global X

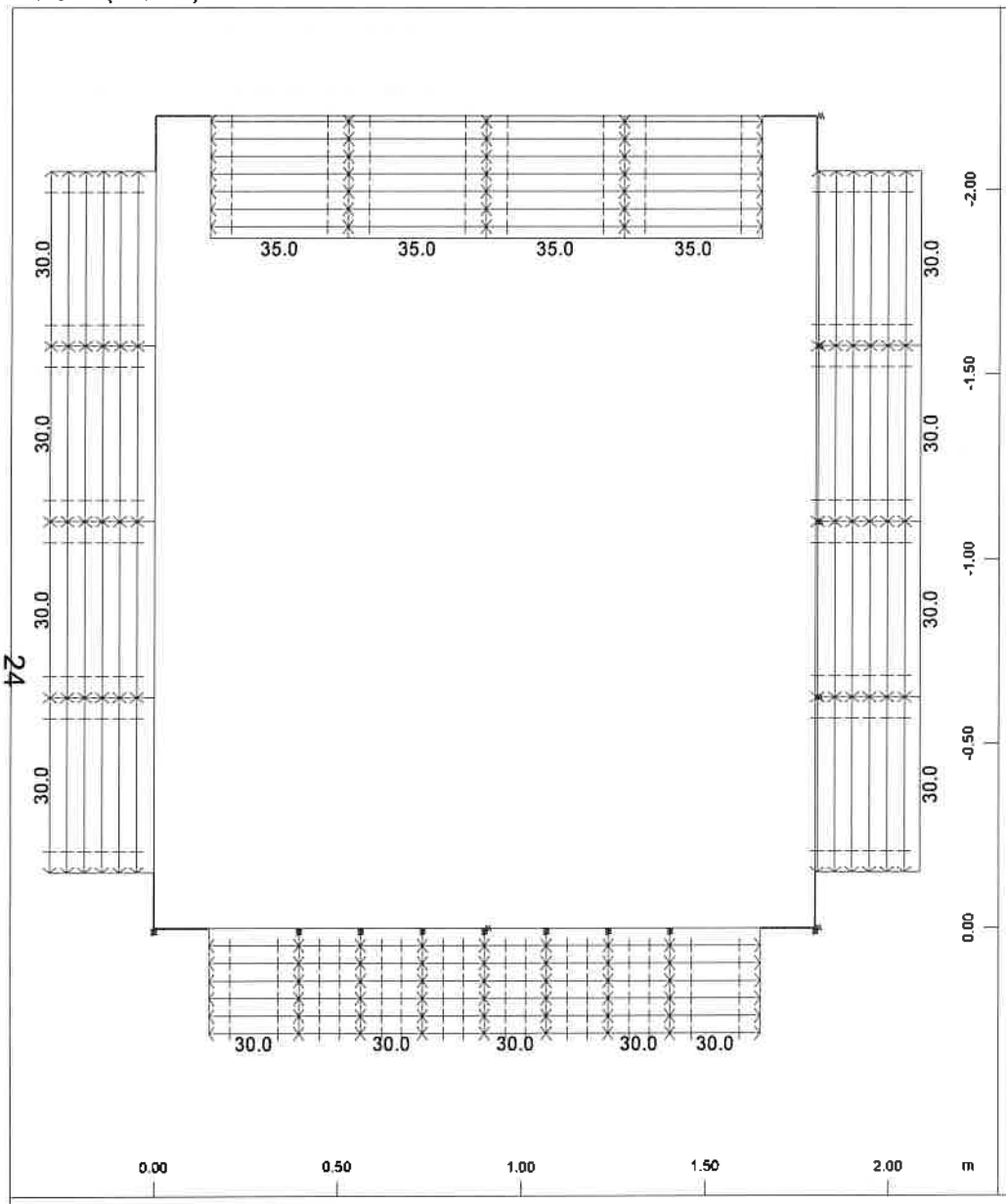
M 1 : 21



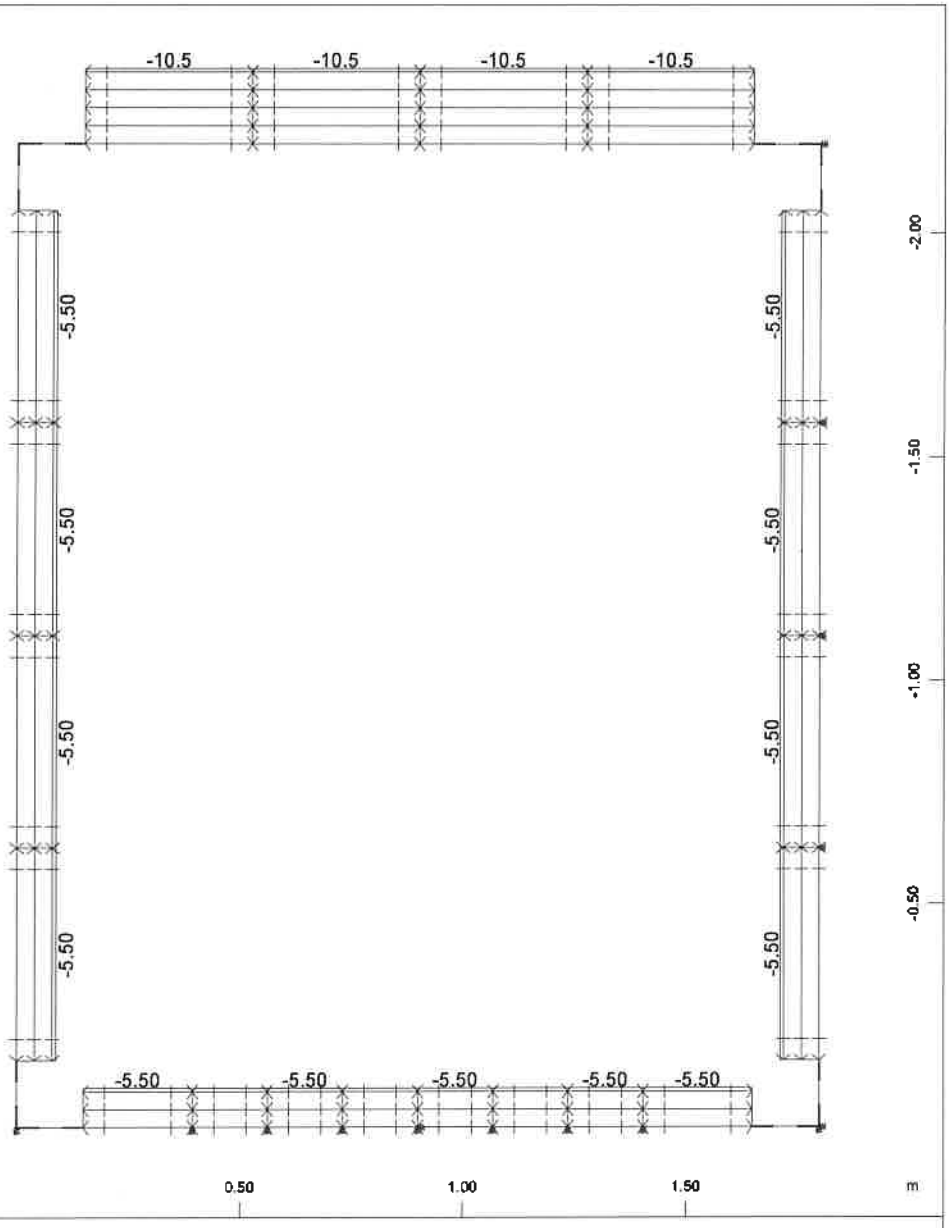
All loads, Loadcase 4 SHRINKAGE OF CONCRETE , (1 cm 3D = unit) Beam line load (uniform temperature change) (Unit=10.0 °C) (Min=-15.0) (Max=0)

M 1 : 16

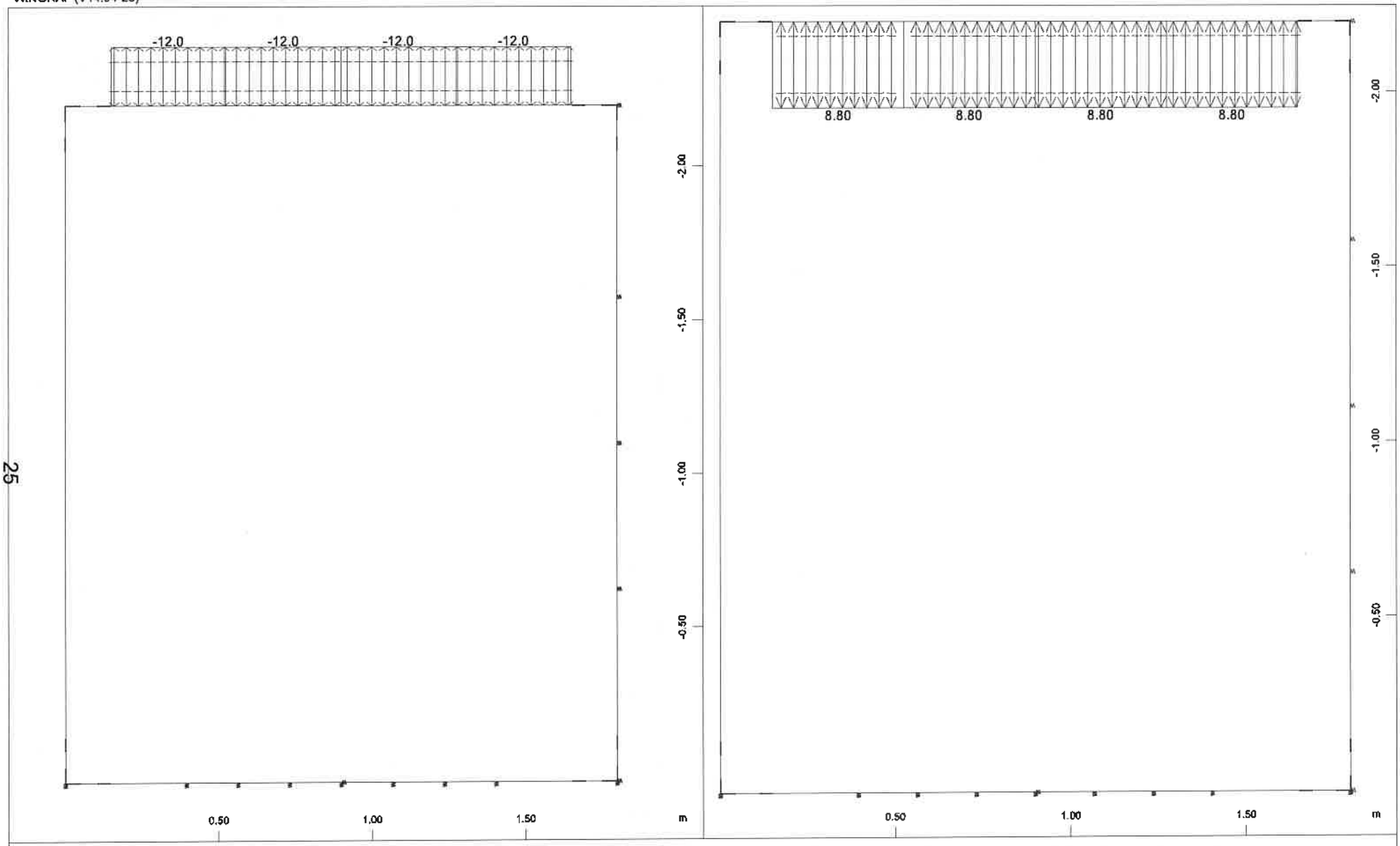
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

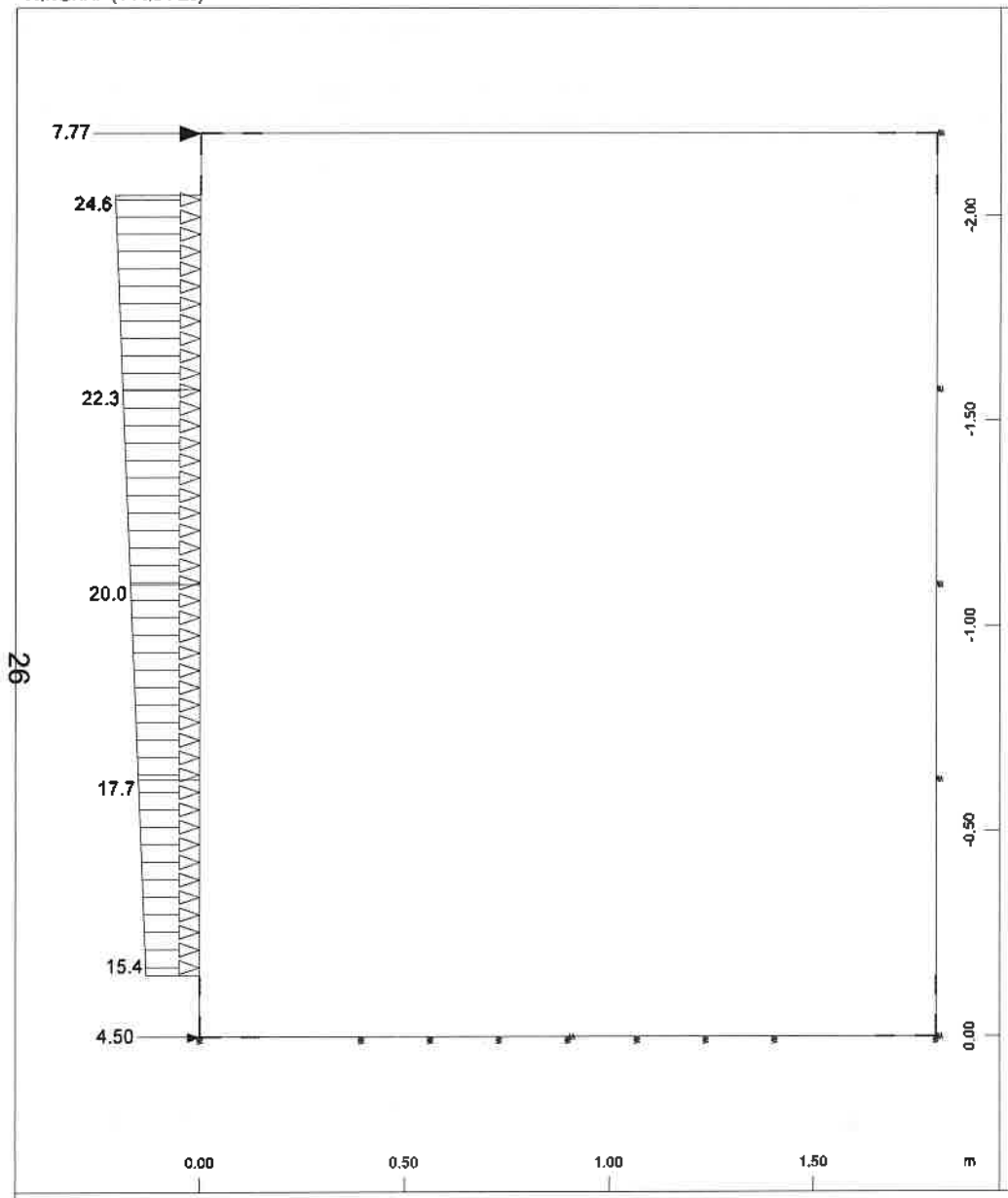


All loads, Loadcase 5 TEMPERATURE FLUCTUATIONS DT +35 , (1 cm 3D = unit) M 1 : 19
Beam line load (uniform temperature change) (Unit=20.0 °C ⟷) (Max=35.0)



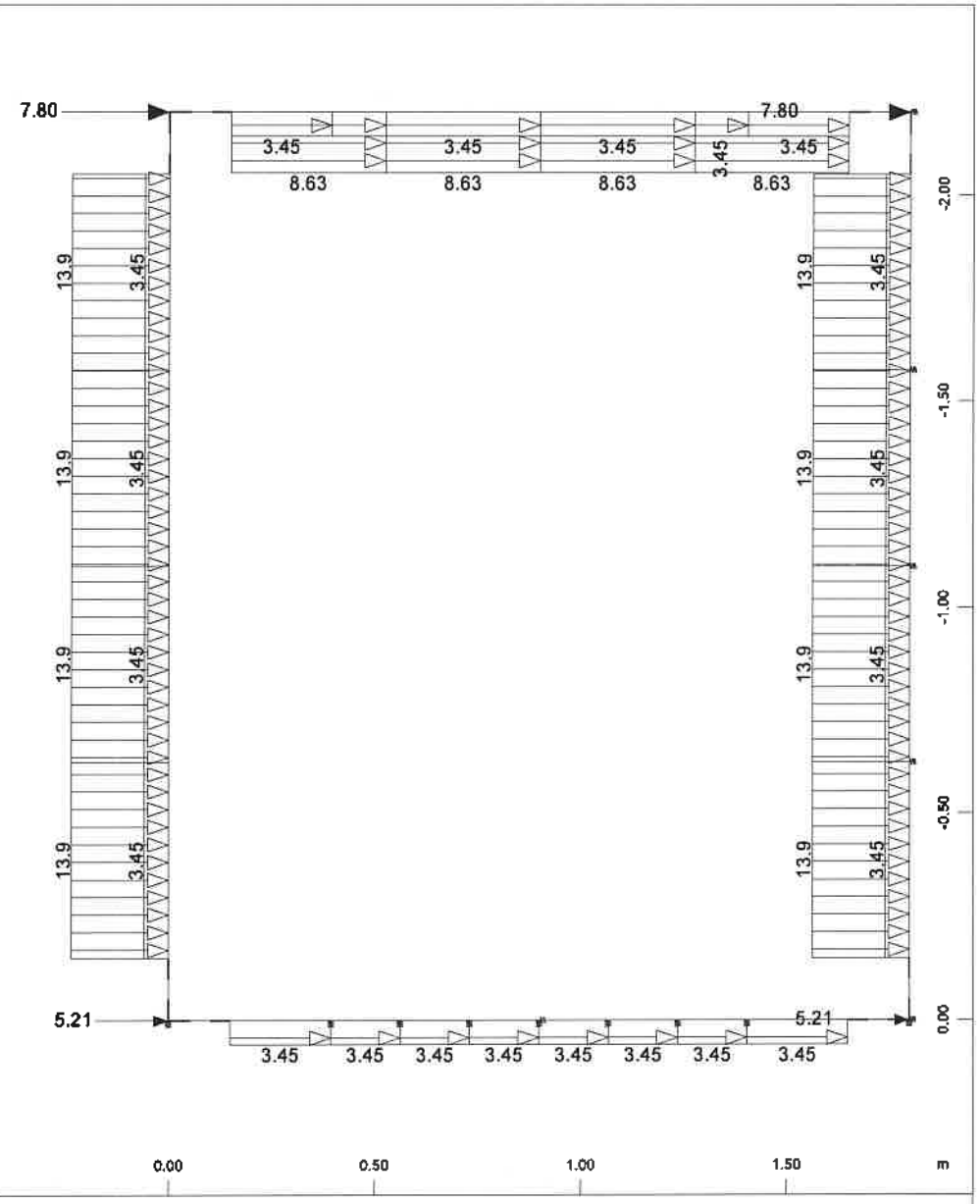
All loads, Loadcase 6 TEMPERATURE FLUCTUATIONS DT -10. , (1 cm 3D = unit) M 1 : 16
Beam line load (uniform temperature change) (Unit=10.0 °C ⟷) (Min=-10.5)


-12.0
-12.0
-12.0
-12.0
-2.00
-1.50
-1.00
-0.50
0.50
1.00
1.50
m
All loads, Loadcase 7 LINEAR TEMPERATURE DIFFERENCE dT , (1 cm 3D = unit)
Beam line load (temperature difference) in local z (Unit=10.0 °C
M 1 : 16
8.80
8.80
8.80
8.80
-2.00
-1.50
-1.00
-0.50
0.50
1.00
1.50
m
All loads, Loadcase 8 LINEAR TEMPERATURE DIFFERENCE d , (1 cm 3D = unit)
Beam line load (temperature difference) in local z (Unit=5.00 °C
M 1 : 14



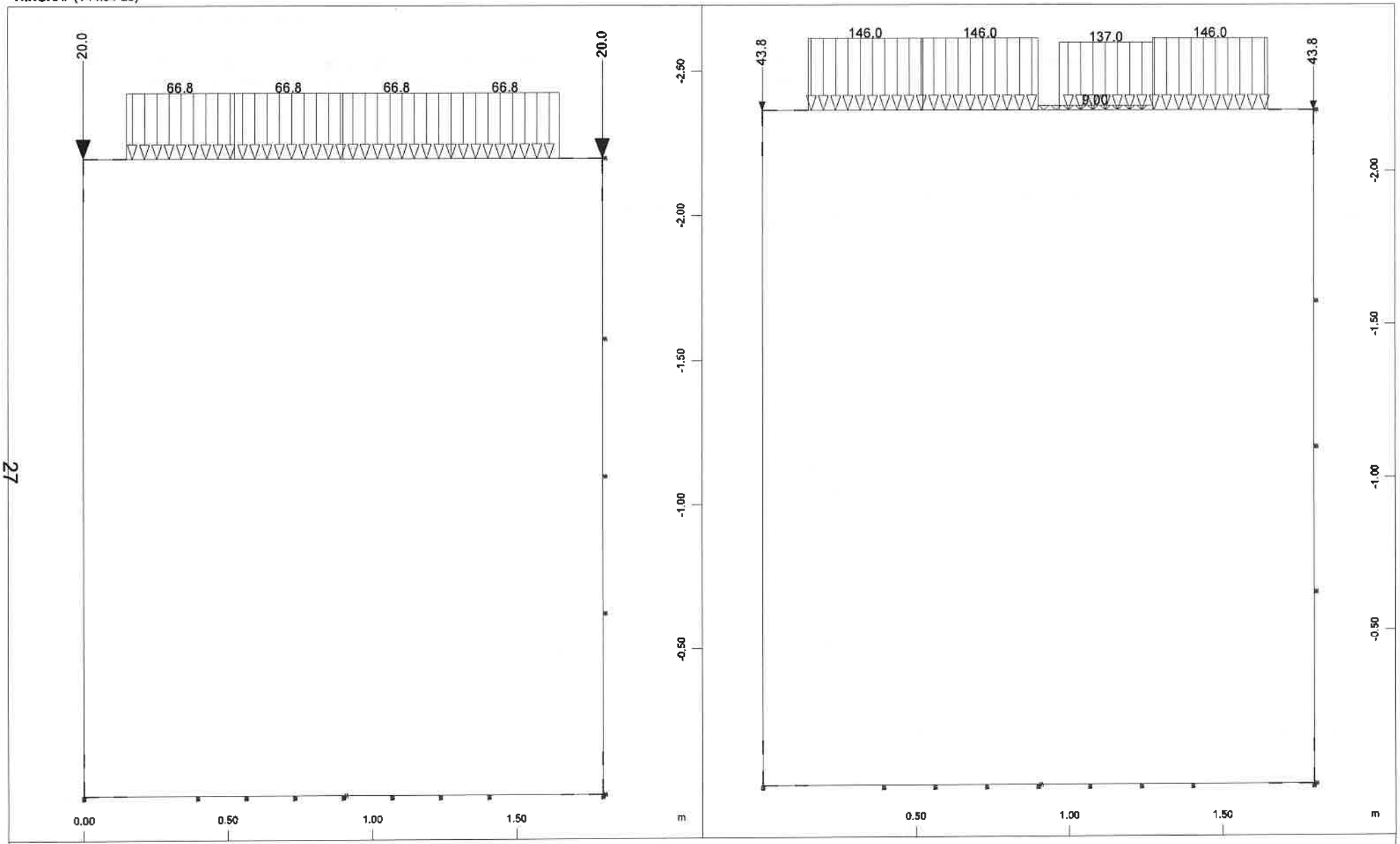
All loads, Loadcase 10 LIVE LOAD EARTH PRESSURE , (1 cm 3D = unit) Nodal load (force) vector (Unit=5.00 kN), Beam line load (force) in global

M 1 : 17

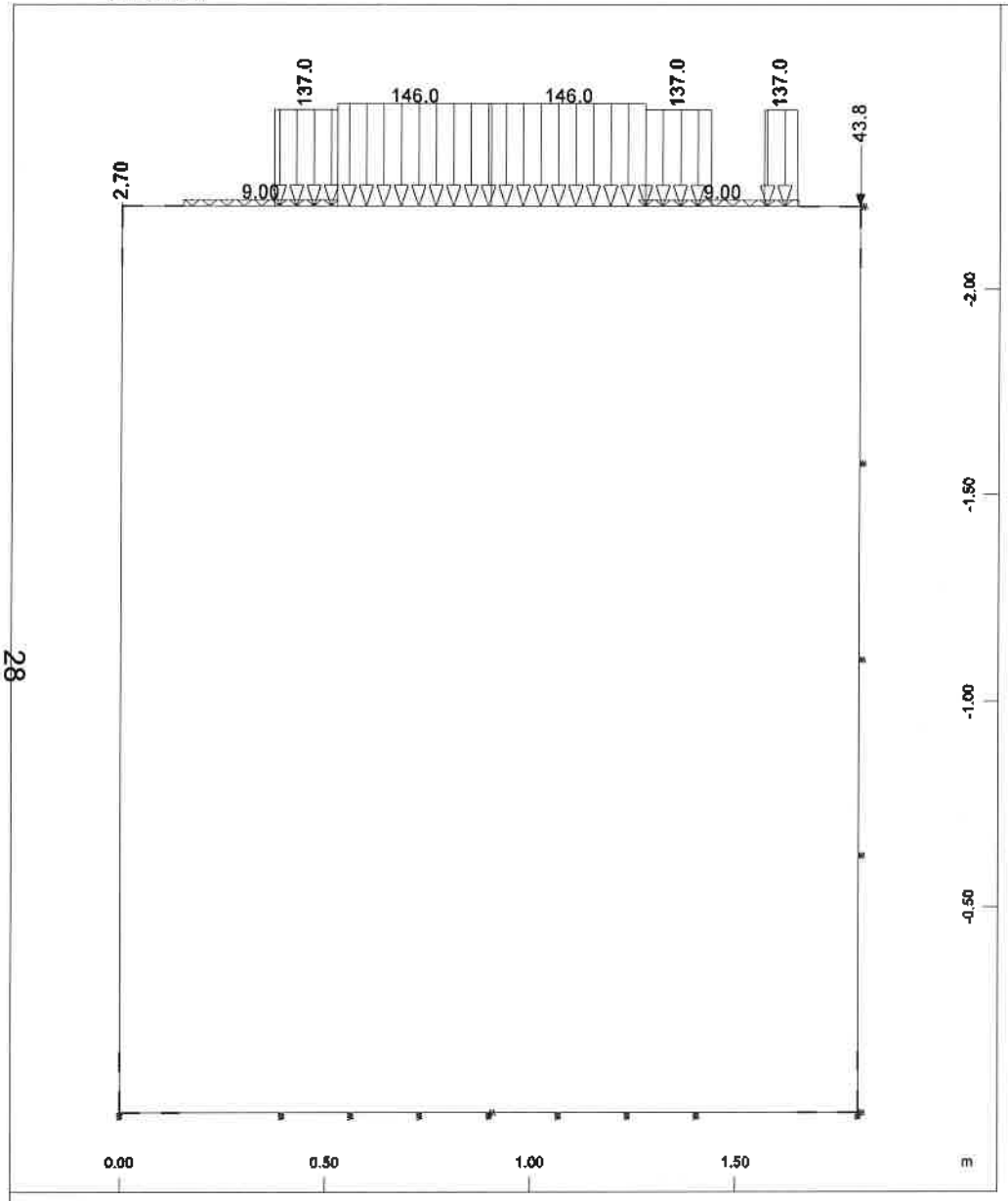


All loads, Loadcase 12 SEISMOS SE FASH , (1 cm 3D = unit) Beam dead load in global X (Unit=10.0 kN/m), Nodal load (force) vector (Unit=5.00

M 1 : 17


20.0
20.0
66.8
66.8
66.8
66.8
-2.50
-2.00
-1.50
-1.00
-0.50
0.00
0.50
1.00
1.50
m
All loads, Loadcase 90 LIVE LOADS , (1 cm 3D = unit) Nodal load (force) vector (Unit=10.0 kN), Beam line load (force) in global Y (Unit=50.0
M 1 : 17
43.8
146.0
146.0
137.0
146.0
43.8
9.00
-2.00
-1.50
-1.00
-0.50
0.50
1.00
1.50
m
All loads, Loadcase 91 POINT LOADS 1 , (1 cm 3D = unit) Nodal load (force) vector (Unit=50.0 kN), Beam line load (force) in global Y
M 1 : 16

27


137.0
146.0
146.0
137.0
137.0
43.8
2.70
9.00
9.00
-2.00
-1.50
-1.00
-0.50
0.00
0.50
1.00
1.50
m
All loads, Loadcase 92 POINT LOADS 2 , (1 cm 3D = unit) Nodal load
(force) vector (Unit=50.0 kN), Beam line load (force) in global Y
Z
X
Y
M 1 : 17

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb. no.1 U.L.S. - equation 6.10a

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.12	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.01	Exclusive LC	A	3	LIVE LOADS
91	1.01	Exclusive LC	A	3	POINT LOADS 1
92	1.01	Exclusive LC	A	3	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
101	1	MAX-MY BEAM
102	1	MIN-MY BEAM
103	1	MAX-VZ BEAM
104	1	MIN-VZ BEAM
105	1	MAX-N BEAM
106	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb. no.2 U.L.S. - equation 6.10b
MAIN VARIABLE LOAD: ROAD TRAFFIC

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.12	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.35	Exclusive LC	A	3	LIVE LOADS
91	1.35	Exclusive LC	A	3	POINT LOADS 1
92	1.35	Exclusive LC	A	3	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
121	1	MAX-MY BEAM
122	1	MIN-MY BEAM
123	1	MAX-VZ BEAM
124	1	MIN-VZ BEAM
125	1	MAX-N BEAM
126	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb. no.5 U.L.S. - equation 6.10b
MAIN VARIABLE LOAD: TEMPERATURE

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
5	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.12	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.01	Exclusive LC	A	3	LIVE LOADS
91	1.01	Exclusive LC	A	3	POINT LOADS 1
92	1.01	Exclusive LC	A	3	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
141	1	MAX-MY BEAM
142	1	MIN-MY BEAM
143	1	MAX-VZ BEAM
144	1	MIN-VZ BEAM
145	1	MAX-N BEAM
146	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb. no.6 U.L.S. - equation 6.10b
MAIN VARIABLE LOAD: EARTH PRESSURE DUE TO LIVE LOADS

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.15	Exclusive LC		AG	SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC		AG	SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC		AG	SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC		AG	SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC		AG	SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC		AG	SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC		AG	SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC		AG	SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.50	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.01	Exclusive LC	A	3	LIVE LOADS
91	1.01	Exclusive LC	A	3	POINT LOADS 1
92	1.01	Exclusive LC	A	3	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
161	1	MAX-MY BEAM
162	1	MIN-MY BEAM
163	1	MAX-VZ BEAM
164	1	MIN-VZ BEAM
165	1	MAX-N BEAM
166	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
101	1.00	Exclusive LC	AG	MAX-MY BEAM	
102	1.00	Exclusive LC	AG	MIN-MY BEAM	
121	1.00	Exclusive LC	AG	MAX-MY BEAM	
122	1.00	Exclusive LC	AG	MIN-MY BEAM	
141	1.00	Exclusive LC	AG	MAX-MY BEAM	
142	1.00	Exclusive LC	AG	MIN-MY BEAM	
161	1.00	Exclusive LC	AG	MAX-MY BEAM	
162	1.00	Exclusive LC	AG	MIN-MY BEAM	

Generated Loadcases

Number	Comb	Title
701	1	MAX-MY BEAM
702	1	MIN-MY BEAM

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
1	0.000	101		-70.7	-110.47	22.34			
1	0.000	102		-17.3	-15.69	1.68			
1	0.000	121		-65.1	-137.25	22.51			
1	0.000	122		-17.3	-15.69	1.68			
1	0.000	141		-71.4	-107.30	24.18			
1	0.000	142		-12.8	-15.68	-0.54			
1	0.000	161		-73.7	-107.10	23.10			
1	0.000	162		-17.3	-15.69	1.68			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

1	0.000	701	MAX-MY	-71.4	-107.30	24.18	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

1	0.000	702	MIN-MY	-12.8	-15.68	-0.54	0.00	0.000	0.000

1	0.245	101		-71.0	-16.95	14.13			
1	0.245	102		-17.0	-113.53	-21.55			
1	0.245	121		-65.8	-16.95	13.31			
1	0.245	122		-16.6	-139.94	-27.07			
1	0.245	141		-71.9	-16.95	16.25			
1	0.245	142		-12.3	-109.98	-23.22			
1	0.245	161		-74.2	-16.75	15.22			
1	0.245	162		-16.8	-109.98	-21.00			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

1	0.245	701	MAX-MY	-71.9	-16.95	16.25	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00

1	0.245	702	MIN-MY	-16.6	-139.94	-27.07	0.00	0.000	0.000

2	0.000	101		-71.0	-10.04	14.13			
2	0.000	102		-17.0	-74.42	-21.55			
2	0.000	121		-65.8	-10.04	13.31			
2	0.000	122		-16.6	-92.37	-27.07			
2	0.000	141		-71.9	-10.04	16.25			
2	0.000	142		-12.3	-72.29	-23.22			
2	0.000	161		-74.2	-9.88	15.22			
2	0.000	162		-16.8	-72.29	-21.00			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

2	0.000	701	MAX-MY	-71.9	-10.04	16.25	0.00	0.000	0.000

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
2	0.000	702	MIN-MY	-16.6	-92.37	-27.07	0.00	0.000	0.000
2	0.168	101		-71.0	-11.30	12.34			
2	0.168	102		-17.0	-76.12	-34.22			
2	0.168	121		-65.8	-11.30	11.51			
2	0.168	122		-16.6	-93.82	-42.74			
2	0.168	141		-71.9	-11.30	14.45			
2	0.168	142		-12.3	-73.74	-35.51			
2	0.168	161		-74.2	-11.14	13.45			
2	0.168	162		-16.8	-73.74	-33.29			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
2	0.168	701	MAX-MY	-71.9	-11.30	14.45	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
2	0.168	702	MIN-MY	-16.6	-93.82	-42.74	0.00	0.000	0.000
3	0.000	101		-71.0	-5.64	12.34			
3	0.000	102		-17.0	-44.29	-34.22			
3	0.000	121		-65.8	-5.64	11.51			
3	0.000	122		-16.6	-55.10	-42.74			
3	0.000	141		-71.9	-5.64	14.45			
3	0.000	142		-12.3	-43.06	-35.51			
3	0.000	161		-74.2	-5.50	13.45			
3	0.000	162		-16.8	-43.06	-33.29			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
3	0.000	701	MAX-MY	-71.9	-5.64	14.45	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
3	0.000	702	MIN-MY	-16.6	-55.10	-42.74	0.00	0.000	0.000
3	0.168	101		-71.0	-6.90	11.28			
3	0.168	102		-17.0	-45.99	-41.82			
3	0.168	121		-65.8	-6.90	10.46			
3	0.168	122		-16.6	-56.55	-52.14			
3	0.168	141		-71.9	-6.90	13.39			
3	0.168	142		-12.3	-44.51	-42.88			
3	0.168	161		-74.2	-6.76	12.41			
3	0.168	162		-16.8	-44.51	-40.66			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
3	0.168	701	MAX-MY	-71.9	-6.90	13.39	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
3	0.168	702	MIN-MY	-16.6	-56.55	-52.14	0.00	0.000	0.000
4	0.000	101		-71.0	-1.21	11.28			
4	0.000	102		-17.0	-14.17	-41.82			
4	0.000	121		-65.8	-1.21	10.46			
4	0.000	122		-16.6	-17.85	-52.14			
4	0.000	141		-71.9	-1.21	13.39			
4	0.000	142		-12.3	-13.85	-42.88			
4	0.000	161		-74.2	-1.08	12.41			
4	0.000	162		-16.8	-13.85	-40.66			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
4	0.000	701	MAX-MY	-71.9	-1.21	13.39	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
4	0.000	702	MIN-MY	-16.6	-17.85	-52.14	0.00	0.000	0.000
4	0.168	101		-71.0	-2.47	10.97			
4	0.168	102		-17.0	-15.87	-44.35			
4	0.168	121		-65.8	-2.47	10.15			
4	0.168	122		-16.6	-19.30	-55.27			
4	0.168	141		-71.9	-2.47	13.08			
4	0.168	142		-12.3	-15.29	-45.34			
4	0.168	161		-74.2	-2.34	12.13			
4	0.168	162		-16.8	-15.29	-43.11			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
4	0.168	701	MAX-MY	-71.9	-2.47	13.08	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
4	0.168	702	MIN-MY	-16.6	-19.30	-55.27	0.00	0.000	0.000
5	0.000	101		-71.0	3.25	10.97			
5	0.000	102		-17.0	15.93	-44.35			
5	0.000	121		-65.8	3.25	10.15			
5	0.000	122		-16.6	19.38	-55.27			
5	0.000	141		-71.9	3.25	13.08			
5	0.000	142		-12.3	15.36	-45.34			
5	0.000	161		-74.2	3.38	12.13			
5	0.000	162		-16.8	15.36	-43.11			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
5	0.000	701	MAX-MY	-71.9	3.25	13.08	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
5	0.000	702	MIN-MY	-16.6	19.38	-55.27	0.00	0.000	0.000
5	0.168	101		-71.0	1.99	11.41			
5	0.168	102		-17.0	14.23	-41.81			
5	0.168	121		-65.8	1.99	10.59			
5	0.168	122		-16.6	17.93	-52.13			
5	0.168	141		-71.9	1.99	13.53			
5	0.168	142		-12.3	13.91	-42.87			
5	0.168	161		-74.2	2.12	12.59			
5	0.168	162		-16.8	13.91	-40.65			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
5	0.168	701	MAX-MY	-71.9	1.99	13.53	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
5	0.168	702	MIN-MY	-16.6	17.93	-52.13	0.00	0.000	0.000
6	0.000	101		-71.0	7.75	11.41			
6	0.000	102		-17.0	46.03	-41.81			
6	0.000	121		-65.8	7.75	10.59			
6	0.000	122		-16.6	56.60	-52.13			
6	0.000	141		-71.9	7.75	13.53			
6	0.000	142		-12.3	44.55	-42.87			
6	0.000	161		-74.2	7.89	12.59			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
6	0.000	162		-16.8	44.55	-40.65			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
6	0.000	701	MAX-MY	-71.9	7.75	13.53	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
6	0.000	702	MIN-MY	-16.6	56.60	-52.13	0.00	0.000	0.000
6	0.168	101		-71.0	6.48	12.61			
6	0.168	102		-17.0	44.32	-34.20			
6	0.168	121		-65.8	6.48	11.79			
6	0.168	122		-16.6	55.15	-42.72			
6	0.168	141		-71.9	6.48	14.72			
6	0.168	142		-12.3	43.10	-35.50			
6	0.168	161		-74.2	6.62	13.81			
6	0.168	162		-16.8	43.10	-33.27			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
6	0.168	701	MAX-MY	-71.9	6.48	14.72	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
6	0.168	702	MIN-MY	-16.6	55.15	-42.72	0.00	0.000	0.000
7	0.000	101		-71.0	12.27	12.61			
7	0.000	102		-17.0	76.12	-34.20			
7	0.000	121		-65.8	12.27	11.79			
7	0.000	122		-16.6	93.81	-42.72			
7	0.000	141		-71.9	12.27	14.72			
7	0.000	142		-12.3	73.73	-35.50			
7	0.000	161		-74.2	12.43	13.81			
7	0.000	162		-16.8	73.73	-33.27			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
7	0.000	701	MAX-MY	-71.9	12.27	14.72	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
7	0.000	702	MIN-MY	-16.6	93.81	-42.72	0.00	0.000	0.000
7	0.168	101		-71.0	11.00	14.57			
7	0.168	102		-17.0	74.41	-21.53			
7	0.168	121		-65.8	11.00	13.74			
7	0.168	122		-16.6	92.36	-27.05			
7	0.168	141		-71.9	11.01	16.68			
7	0.168	142		-12.3	72.28	-23.21			
7	0.168	161		-74.2	11.17	15.80			
7	0.168	162		-16.8	72.28	-20.98			
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	
7	0.168	701	MAX-MY	-71.9	11.01	16.68	0.00	0.000	0.000
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
7	0.168	702	MIN-MY	-16.6	92.36	-27.05	0.00	0.000	0.000
8	0.000	101		-71.0	18.14	14.57			
8	0.000	102		-17.0	113.44	-21.53			
8	0.000	121		-65.8	18.14	13.74			
8	0.000	122		-16.6	139.81	-27.05			
8	0.000	141		-71.9	18.14	16.68			
8	0.000	142		-12.3	109.00	-23.21			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC Title No.	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
8	0.000	161	-74.2	18.34	15.80			
8	0.000	162	-16.8	109.89	-20.98			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

8	0.000	701 MAX-MY	-71.9	18.14	16.68	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00

8	0.000	702 MIN-MY	-16.6	139.81	-27.05	0.00	0.000	0.000
8	0.245	101	-70.7	111.57	23.06			
8	0.245	102	-17.3	15.69	1.68			
8	0.245	121	-65.1	138.32	23.22			
8	0.245	122	-17.3	15.69	1.68			
8	0.245	141	-71.4	108.40	24.90			
8	0.245	142	-12.8	15.68	-0.54			
8	0.245	161	-73.7	108.59	24.06			
8	0.245	162	-17.3	15.69	1.68			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

8	0.245	701 MAX-MY	-71.4	108.40	24.90	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

8	0.245	702 MIN-MY	-12.8	15.68	-0.54	0.00	0.000	0.000
9	0.000	101	-167.8	-44.68	35.32			
9	0.000	102	-13.5	0.66	-12.35			
9	0.000	121	-215.3	-42.73	40.90			
9	0.000	122	-13.5	0.66	-12.35			
9	0.000	141	-165.1	-47.03	41.73			
9	0.000	142	-13.5	6.74	-21.88			
9	0.000	161	-164.8	-50.07	35.29			
9	0.000	162	-13.5	0.66	-12.35			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

9	0.000	701 MAX-MY	-165.1	-47.03	41.73	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

9	0.000	702 MIN-MY	-13.5	6.74	-21.88	0.00	0.000	0.000
9	0.475	101	-173.6	-13.05	25.56			
9	0.475	102	-16.1	-9.49	-18.55			
9	0.475	121	-220.4	-13.50	31.29			
9	0.475	122	-16.1	-7.88	-17.95			
9	0.475	141	-170.2	-17.80	30.07			
9	0.475	142	-16.1	-1.80	-24.58			
9	0.475	161	-170.2	-13.28	25.18			
9	0.475	162	-15.8	-11.27	-19.93			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

9	0.475	701 MAX-MY	-220.4	-13.50	31.29	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

9	0.475	702 MIN-MY	-16.1	-1.80	-24.58	0.00	0.000	0.000
10	0.000	101	-173.6	-13.05	25.56			
10	0.000	102	-16.1	-9.49	-18.55			
10	0.000	121	-220.4	-13.50	31.29			
10	0.000	122	-16.1	-7.88	-17.95			
10	0.000	141	-170.2	-17.80	30.07			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
10	0.000	142		-16.1	-1.80	-24.58			
10	0.000	161		-170.2	-13.28	25.18			
10	0.000	162		-15.8	-11.27	-19.93			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
10	0.000	701	MAX-MY	-220.4	-13.50	31.29	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
10	0.000	702	MIN-MY	-16.1	-1.80	-24.58	0.00	0.000	0.000
10	0.475	101		-178.5	-5.63	20.62			
10	0.475	102		-19.7	8.44	-18.44			
10	0.475	121		-224.5	-6.08	26.13			
10	0.475	122		-19.7	8.78	-17.36			
10	0.475	141		-174.3	-9.92	22.87			
10	0.475	142		-19.7	14.40	-21.11			
10	0.475	161		-174.3	-5.86	20.12			
10	0.475	162		-19.3	9.17	-20.03			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
10	0.475	701	MAX-MY	-224.5	-6.08	26.13	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
10	0.475	702	MIN-MY	-19.7	14.40	-21.11	0.00	0.000	0.000
11	0.000	101		-178.5	-5.63	20.62			
11	0.000	102		-19.7	8.44	-18.44			
11	0.000	121		-224.5	-6.08	26.13			
11	0.000	122		-19.7	8.78	-17.36			
11	0.000	141		-174.3	-9.92	22.87			
11	0.000	142		-19.7	14.40	-21.11			
11	0.000	161		-174.3	-5.86	20.12			
11	0.000	162		-19.3	9.17	-20.03			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
11	0.000	701	MAX-MY	-224.5	-6.08	26.13	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
11	0.000	702	MIN-MY	-19.7	14.40	-21.11	0.00	0.000	0.000
11	0.475	101		-183.3	4.27	19.72			
11	0.475	102		-23.2	29.99	-9.39			
11	0.475	121		-228.5	3.81	25.02			
11	0.475	122		-23.2	28.62	-8.53			
11	0.475	141		-178.4	1.49	19.96			
11	0.475	142		-23.2	34.23	-9.61			
11	0.475	161		-178.4	4.04	19.11			
11	0.475	162		-22.9	32.37	-10.20			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
11	0.475	701	MAX-MY	-228.5	3.81	25.02	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
11	0.475	702	MIN-MY	-22.9	32.37	-10.20	0.00	0.000	0.000
12	0.000	101		-183.3	4.27	19.72			
12	0.000	102		-23.2	29.99	-9.39			
12	0.000	121		-228.5	3.81	25.02			
12	0.000	122		-23.2	28.62	-8.53			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
12	0.000	141		-178.4	1.49	19.96			
12	0.000	142		-23.2	34.23	-9.61			
12	0.000	161		-178.4	4.04	19.11			
12	0.000	162		-22.9	32.37	-10.20			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
12	0.000	701	MAX-MY	-228.5	3.81	25.02	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	0.00	1.00	
12	0.000	702	MIN-MY	-22.9	32.37	-10.20	0.00	0.000	0.000
12	0.475	101		-187.1	54.90	30.67			
12	0.475	102		-27.8	11.11	2.40			
12	0.475	121		-231.6	50.89	35.46			
12	0.475	122		-27.8	11.11	2.40			
12	0.475	141		-181.4	57.20	31.69			
12	0.475	142		-27.8	7.23	0.77			
12	0.475	161		-181.1	57.82	30.49			
12	0.475	162		-27.8	11.11	2.40			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
12	0.475	701	MAX-MY	-231.6	50.89	35.46	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
12	0.475	702	MIN-MY	-27.8	7.23	0.77	0.00	0.000	0.000
13	0.000	101		-188.7	-55.18	31.52			
13	0.000	102		-27.8	-11.11	2.40			
13	0.000	121		-233.1	-51.17	36.30			
13	0.000	122		-27.8	-11.11	2.40			
13	0.000	141		-183.1	-57.48	32.54			
13	0.000	142		-27.8	-7.23	0.77			
13	0.000	161		-183.4	-58.20	31.62			
13	0.000	162		-27.8	-11.11	2.40			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
13	0.000	701	MAX-MY	-233.1	-51.17	36.30	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
13	0.000	702	MIN-MY	-27.8	-7.23	0.77	0.00	0.000	0.000
13	0.475	101		-182.9	-4.27	19.70			
13	0.475	102		-25.2	-39.14	-10.71			
13	0.475	121		-228.0	-3.81	24.99			
13	0.475	122		-25.2	-37.76	-9.85			
13	0.475	141		-178.0	-1.49	19.94			
13	0.475	142		-25.2	-43.38	-10.94			
13	0.475	161		-178.0	-4.04	19.09			
13	0.475	162		-25.6	-44.56	-11.97			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
13	0.475	701	MAX-MY	-228.0	-3.81	24.99	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
13	0.475	702	MIN-MY	-25.6	-44.56	-11.97	0.00	0.000	0.000
14	0.000	101		-182.9	-4.27	19.70			
14	0.000	102		-25.2	-26.63	-10.71			
14	0.000	121		-228.0	-3.81	24.99			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
14	0.000	122		-25.2	-25.26	-9.85			
14	0.000	141		-178.0	-1.49	19.94			
14	0.000	142		-25.2	-30.87	-10.94			
14	0.000	161		-178.0	-4.04	19.09			
14	0.000	162		-25.6	-27.89	-11.97			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

14	0.000	701	MAX-MY	-228.0	-3.81	24.99	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

14	0.000	702	MIN-MY	-25.6	-27.89	-11.97	0.00	0.000	0.000
14	0.475	101		-178.1	5.63	20.60			
14	0.475	102		-21.7	-15.17	-20.52			
14	0.475	121		-223.9	6.08	26.10			
14	0.475	122		-21.7	-15.51	-19.43			
14	0.475	141		-173.9	9.92	22.85			
14	0.475	142		-21.7	-21.13	-23.18			
14	0.475	161		-173.9	5.86	20.10			
14	0.475	162		-22.0	-18.14	-22.80			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

14	0.475	701	MAX-MY	-223.9	6.08	26.10	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

14	0.475	702	MIN-MY	-21.7	-21.13	-23.18	0.00	0.000	0.000
15	0.000	101		-178.1	5.63	20.60			
15	0.000	102		-21.7	-0.01	-20.52			
15	0.000	121		-223.9	6.08	26.10			
15	0.000	122		-21.7	-0.35	-19.43			
15	0.000	141		-173.9	9.92	22.85			
15	0.000	142		-21.7	-5.97	-23.18			
15	0.000	161		-173.9	5.86	20.10			
15	0.000	162		-22.0	2.07	-22.80			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

15	0.000	701	MAX-MY	-223.9	6.08	26.10	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

15	0.000	702	MIN-MY	-21.7	-5.97	-23.18	0.00	0.000	0.000
15	0.475	101		-173.2	13.05	25.54			
15	0.475	102		-18.1	6.60	-19.26			
15	0.475	121		-219.8	13.50	31.26			
15	0.475	122		-18.1	5.00	-18.66			
15	0.475	141		-169.8	17.80	30.05			
15	0.475	142		-18.1	-1.09	-25.30			
15	0.475	161		-169.8	13.28	25.16			
15	0.475	162		-18.4	7.42	-20.87			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

15	0.475	701	MAX-MY	-219.8	13.50	31.26	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

15	0.475	702	MIN-MY	-18.1	-1.09	-25.30	0.00	0.000	0.000
16	0.000	101		-173.2	13.05	25.54			
16	0.000	102		-18.1	21.21	-19.26			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
16	0.000	121		-219.8	13.50	31.26			
16	0.000	122		-18.1	19.61	-18.66			
16	0.000	141		-169.8	17.80	30.05			
16	0.000	142		-18.1	13.53	-25.30			
16	0.000	161		-169.8	13.28	25.16			
16	0.000	162		-18.4	26.90	-20.87			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

16	0.000	701	MAX-MY	-219.8	13.50	31.26	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

16	0.000	702	MIN-MY	-18.1	13.53	-25.30	0.00	0.000	0.000
16	0.475	101		-169.4	43.87	37.23			
16	0.475	102		-13.5	-0.66	-12.35			
16	0.475	121		-216.8	41.91	42.80			
16	0.475	122		-13.5	-0.66	-12.35			
16	0.475	141		-166.7	46.21	43.63			
16	0.475	142		-13.5	-6.74	-21.88			
16	0.475	161		-167.0	48.98	37.84			
16	0.475	162		-13.5	-0.66	-12.35			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

16	0.475	701	MAX-MY	-166.7	46.21	43.63	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

16	0.475	702	MIN-MY	-13.5	-6.74	-21.88	0.00	0.000	0.000
17	0.000	101		-0.1	11.64	14.04			
17	0.000	102		-58.0	91.67	-27.39			
17	0.000	121		-0.4	10.50	13.96			
17	0.000	122		-56.3	118.05	-28.57			
17	0.000	141		5.7	10.50	24.40			
17	0.000	142		-59.9	90.85	-34.36			
17	0.000	161		-0.4	10.50	13.96			
17	0.000	162		-65.8	90.52	-28.43			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

17	0.000	701	MAX-MY	5.7	10.50	24.40	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

17	0.000	702	MIN-MY	-59.9	90.85	-34.36	0.00	0.000	0.000
17	0.245	101		-0.8	78.79	35.43			
17	0.245	102		-55.0	5.51	-19.81			
17	0.245	121		-1.3	100.80	41.22			
17	0.245	122		-52.3	5.51	-19.08			
17	0.245	141		5.0	77.47	45.41			
17	0.245	142		-56.8	5.51	-26.81			
17	0.245	161		-1.1	77.47	34.97			
17	0.245	162		-62.8	5.18	-20.96			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

17	0.245	701	MAX-MY	5.0	77.47	45.41	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

17	0.245	702	MIN-MY	-56.8	5.51	-26.81	0.00	0.000	0.000
17	0.375	101		-0.8	57.31	44.28			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
17	0.375	102		-55.0	3.83	-19.21			
17	0.375	121		-1.3	73.25	52.54			
17	0.375	122		-52.3	3.83	-18.48			
17	0.375	141		5.0	56.33	54.11			
17	0.375	142		-56.8	3.83	-26.20			
17	0.375	161		-1.1	56.33	43.67			
17	0.375	162		-62.8	3.50	-20.39			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
17	0.375	701	MAX-MY	5.0	56.33	54.11	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
17	0.375	702	MIN-MY	-56.8	3.83	-26.20	0.00	0.000	0.000
18	0.000	101		-0.8	57.31	44.28			
18	0.000	102		-55.0	3.83	-19.21			
18	0.000	121		-1.3	73.25	52.54			
18	0.000	122		-52.3	3.83	-18.48			
18	0.000	141		5.0	56.33	54.11			
18	0.000	142		-56.8	3.83	-26.20			
18	0.000	161		-1.1	56.33	43.67			
18	0.000	162		-62.8	3.50	-20.39			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
18	0.000	701	MAX-MY	5.0	56.33	54.11	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
18	0.000	702	MIN-MY	-56.8	3.83	-26.20	0.00	0.000	0.000
18	0.375	101		-0.8	-4.65	54.15			
18	0.375	102		-55.0	-1.00	-18.68			
18	0.375	121		-1.3	-6.21	65.11			
18	0.375	122		-52.3	-1.00	-17.95			
18	0.375	141		5.0	-4.65	63.80			
18	0.375	142		-56.8	-1.00	-25.67			
18	0.375	161		-1.1	-4.65	53.36			
18	0.375	162		-62.8	-1.34	-19.99			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
18	0.375	701	MAX-MY	-1.3	-6.21	65.11	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
18	0.375	702	MIN-MY	-56.8	-1.00	-25.67	0.00	0.000	0.000
19	0.000	101		-0.8	-4.65	54.15			
19	0.000	102		-55.0	-1.00	-18.68			
19	0.000	121		-1.3	-6.21	65.11			
19	0.000	122		-52.3	-1.00	-17.95			
19	0.000	141		5.0	-4.65	63.80			
19	0.000	142		-56.8	-1.00	-25.67			
19	0.000	161		-1.1	-4.65	53.36			
19	0.000	162		-62.8	-1.34	-19.99			
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
19	0.000	701	MAX-MY	-1.3	-6.21	65.11	0.00	0.000	0.000
LC		101	102	121	122	141	142	161	162
fact		0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
19	0.000	702	MIN-MY	-56.8	-1.00	-25.67	0.00	0.000	0.000

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

Number No.	x [m]	LC No.	Title	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
19	0.375	101		-0.8	-56.91	44.09			
19	0.375	102		-55.0	-5.84	-19.96			
19	0.375	121		-1.3	-72.72	52.29			
19	0.375	122		-52.3	-5.84	-19.23			
19	0.375	141		5.0	-55.93	53.92			
19	0.375	142		-56.8	-5.84	-26.95			
19	0.375	161		-1.1	-55.93	43.48			
19	0.375	162		-62.8	-6.17	-21.40			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

19	0.375	701	MAX-MY	5.0	-55.93	53.92	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

19	0.375	702	MIN-MY	-56.8	-5.84	-26.95	0.00	0.000	0.000
20	0.000	101		-0.8	-56.91	44.09			
20	0.000	102		-55.0	-5.84	-19.96			
20	0.000	121		-1.3	-72.72	52.29			
20	0.000	122		-52.3	-5.84	-19.23			
20	0.000	141		5.0	-55.93	53.92			
20	0.000	142		-56.8	-5.84	-26.95			
20	0.000	161		-1.1	-55.93	43.48			
20	0.000	162		-62.8	-6.17	-21.40			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

20	0.000	701	MAX-MY	5.0	-55.93	53.92	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

20	0.000	702	MIN-MY	-56.8	-5.84	-26.95	0.00	0.000	0.000
20	0.130	101		-0.8	-78.39	35.29			
20	0.130	102		-55.0	-7.52	-20.83			
20	0.130	121		-1.3	-100.26	41.04			
20	0.130	122		-52.3	-7.52	-20.10			
20	0.130	141		5.0	-77.07	45.27			
20	0.130	142		-56.8	-7.52	-27.82			
20	0.130	161		-1.1	-77.07	34.84			
20	0.130	162		-62.8	-7.85	-22.31			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

20	0.130	701	MAX-MY	5.0	-77.07	45.27	0.00	0.000	0.000

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

20	0.130	702	MIN-MY	-56.8	-7.52	-27.82	0.00	0.000	0.000
20	0.375	101		-0.1	-11.64	14.04			
20	0.375	102		-58.0	-102.99	-27.69			
20	0.375	121		-0.4	-10.50	13.96			
20	0.375	122		-56.3	-132.47	-28.46			
20	0.375	141		5.7	-10.50	24.40			
20	0.375	142		-59.9	-102.17	-34.66			
20	0.375	161		-0.4	-10.50	13.96			
20	0.375	162		-65.8	-102.51	-29.22			

LC	101	102	121	122	141	142	161	162
fact	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

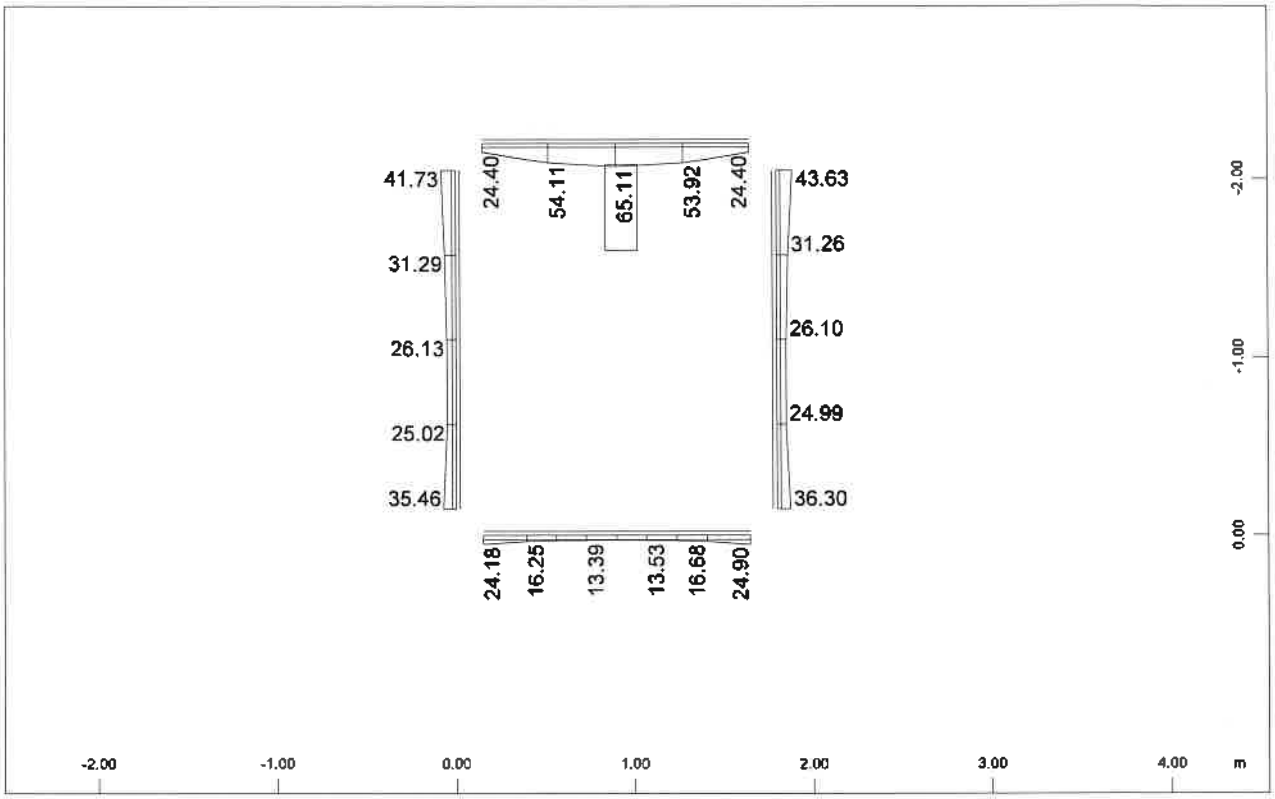
20	0.375	701	MAX-MY	5.7	-10.50	24.40	0.00	0.000	0.000

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

Forces in Beam-Elements

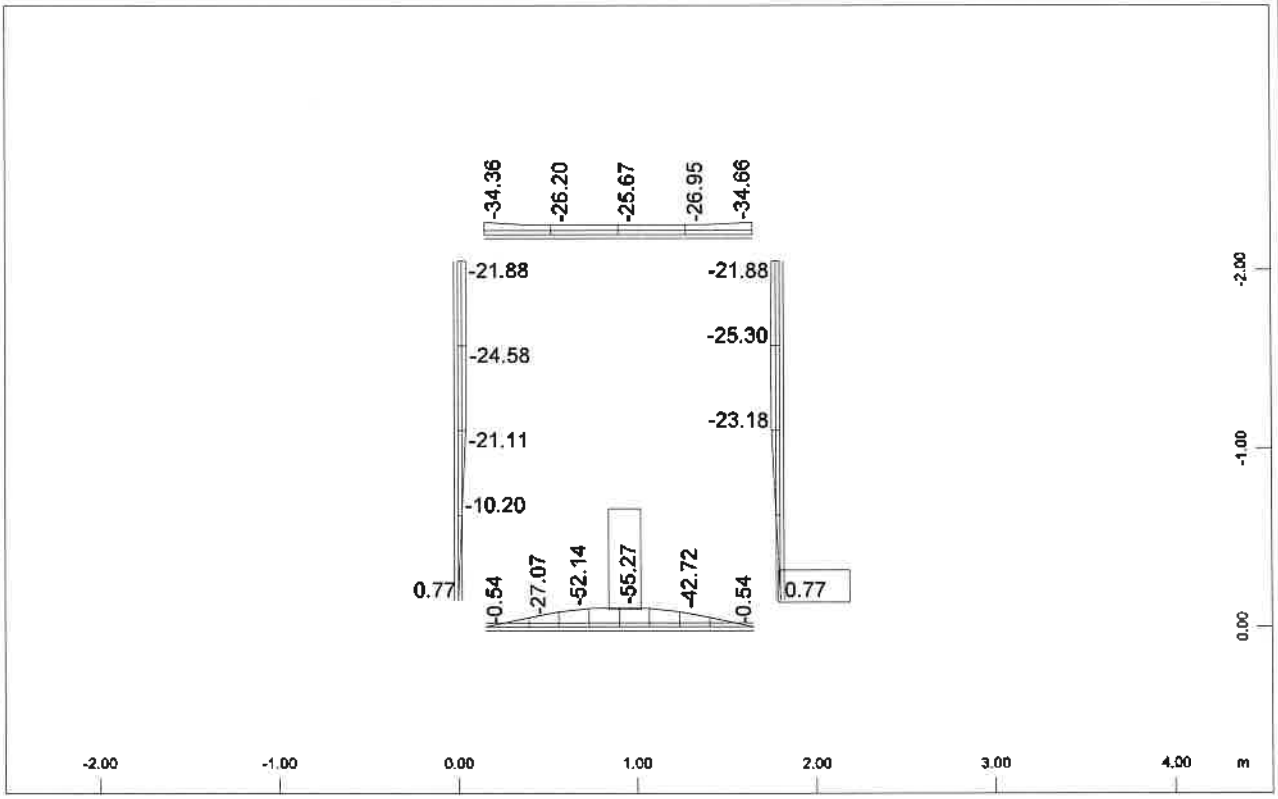
Number No.	x [m]	LC Title No.	N [kN]	Vz [kN]	My [kNm]	MB [kNm2]	u [mm]	u-z [mm]
LC	101	102	121	122	141	142	161	162	
fact	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	
20	0.375	702 MIN-MY	-59.9	-102.17	-34.66	0.00	0.000	0.000	

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
ENVELOPES FOR MY



Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 701 MAX-MY BEAM , 1 cm 3D = 200.0 kNm
(Max=65.1)

M 1 : 40



Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 702 MIN-MY BEAM , 1 cm 3D = 200.0 kNm
(Min=-55.3) (Max=0.771)

M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (VZ)
****

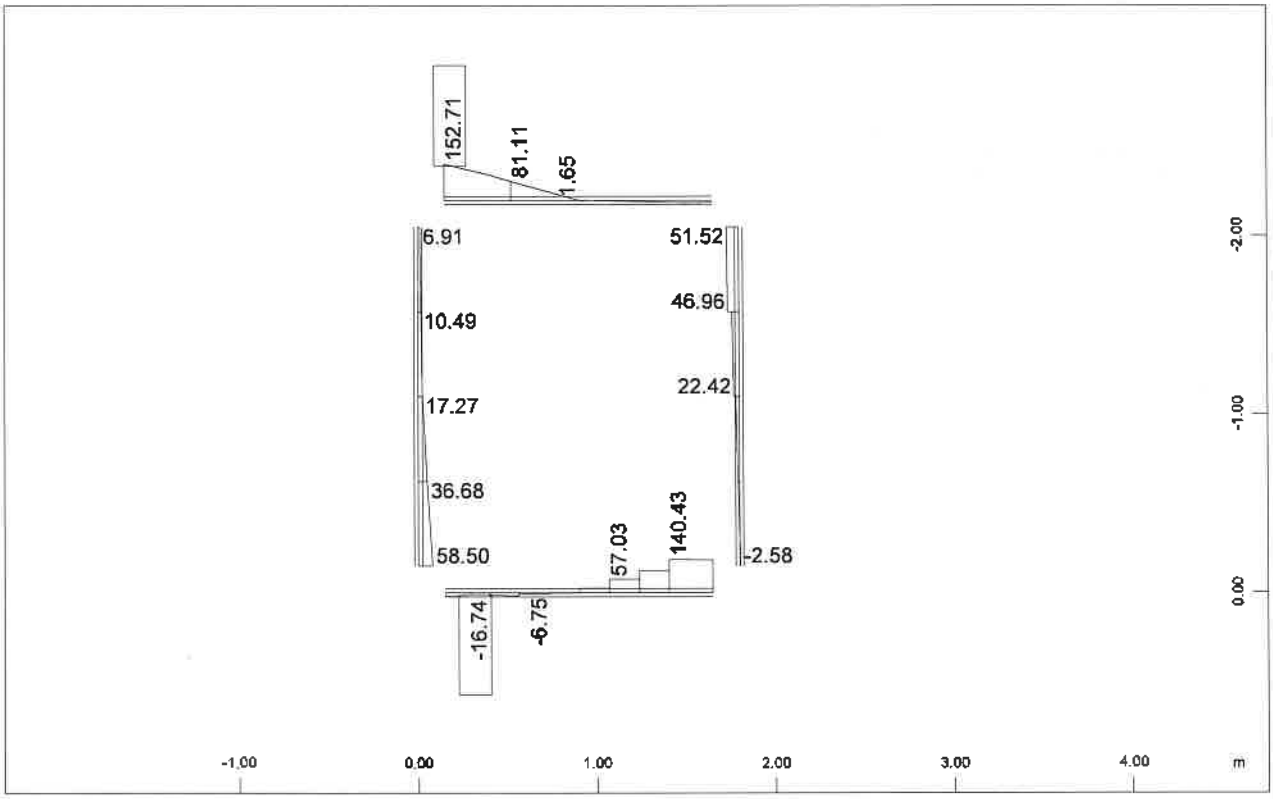
Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
103	1.00	Exclusive LC	AG	MAX-VZ BEAM	
104	1.00	Exclusive LC	AG	MIN-VZ BEAM	
123	1.00	Exclusive LC	AG	MAX-VZ BEAM	
124	1.00	Exclusive LC	AG	MIN-VZ BEAM	
143	1.00	Exclusive LC	AG	MAX-VZ BEAM	
144	1.00	Exclusive LC	AG	MIN-VZ BEAM	
163	1.00	Exclusive LC	AG	MAX-VZ BEAM	
164	1.00	Exclusive LC	AG	MIN-VZ BEAM	

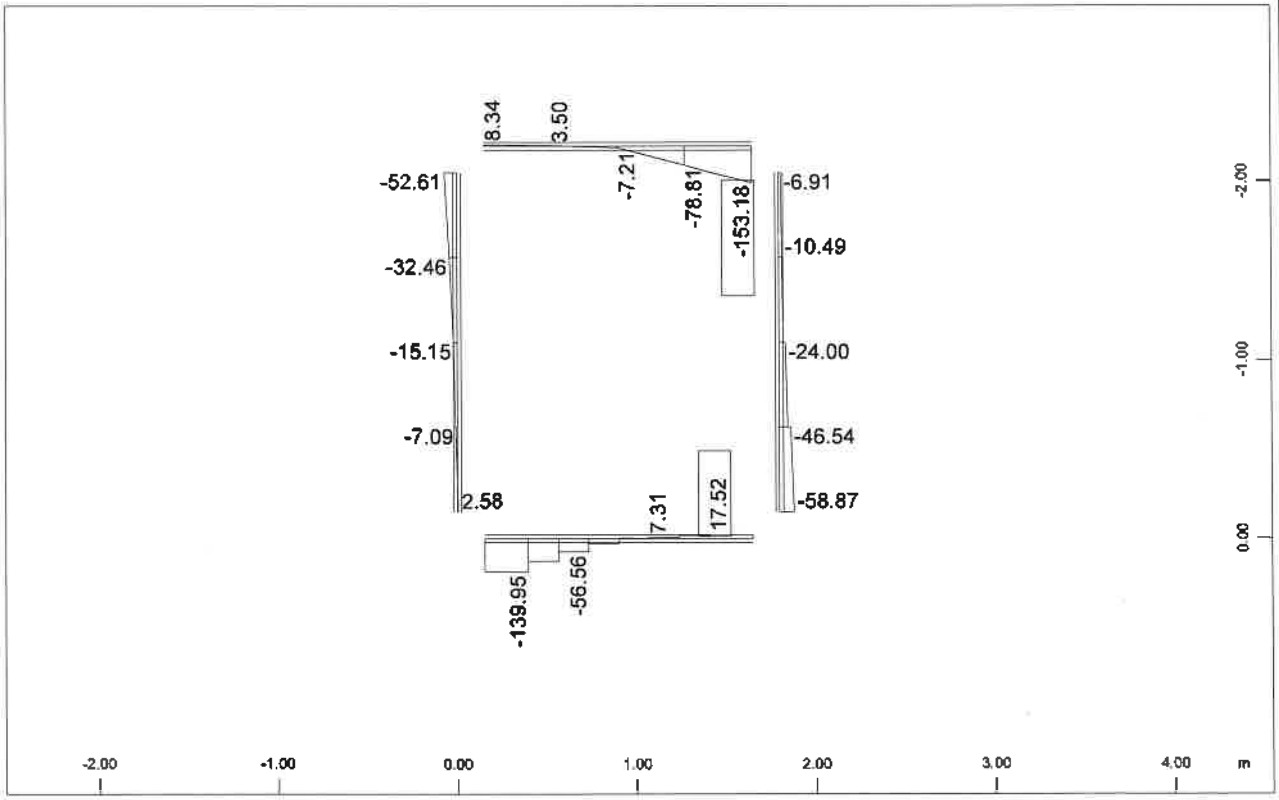
Generated Loadcases

Number	Comb	Title
703	1	MAX-VZ BEAM
704	1	MIN-VZ BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
ENVELOPES FOR VZ



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 703 MAX-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-16.7) (Max=152.7)
M 1 : 40



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 704 MIN-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-153.2) (Max=17.5)
M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (N)
****

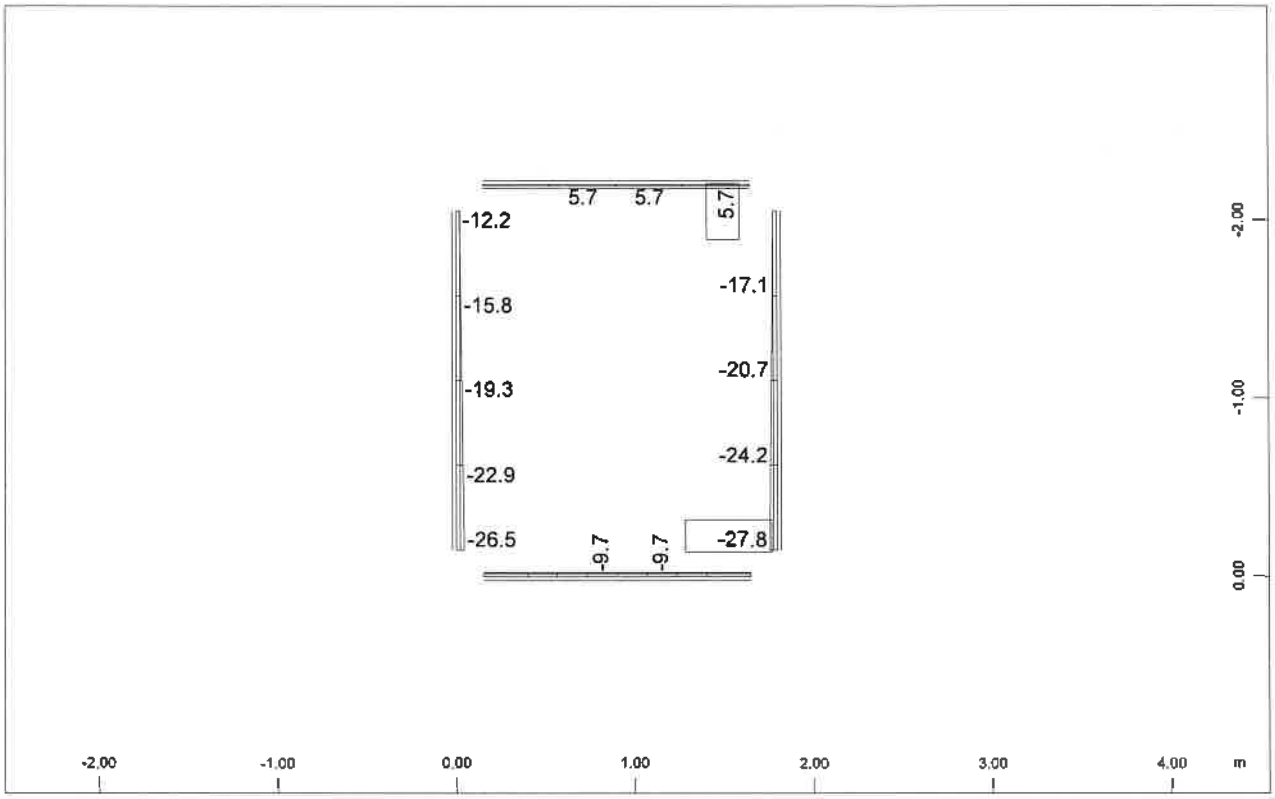
Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
105	1.00	Exclusive LC	AG	MAX-N	BEAM
106	1.00	Exclusive LC	AG	MIN-N	BEAM
125	1.00	Exclusive LC	AG	MAX-N	BEAM
126	1.00	Exclusive LC	AG	MIN-N	BEAM
145	1.00	Exclusive LC	AG	MAX-N	BEAM
146	1.00	Exclusive LC	AG	MIN-N	BEAM
165	1.00	Exclusive LC	AG	MAX-N	BEAM
166	1.00	Exclusive LC	AG	MIN-N	BEAM

Generated Loadcases

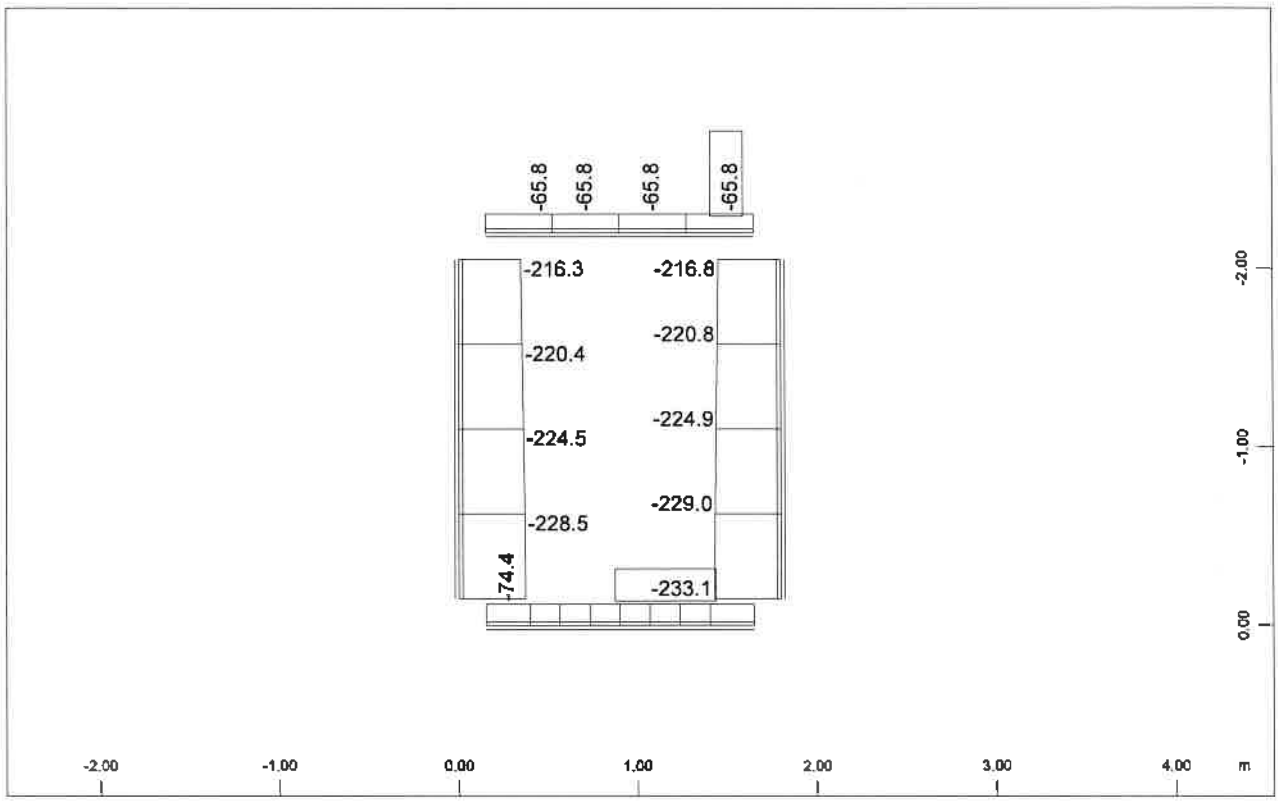
Number	Comb	Title
705	1	MAX-N BEAM
706	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
ENVELOPES FOR N



Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 705 MAX-N BEAM , 1 cm 3D = 250.0 kN
(Min=-27.8) (Max=5.70)

M 1 : 40



Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 706 MIN-N BEAM , 1 cm 3D = 250.0 kN
(Min=-233.1) (Max=-65.8)

M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb. no.5 U.L.S. - EARTHQUAKE

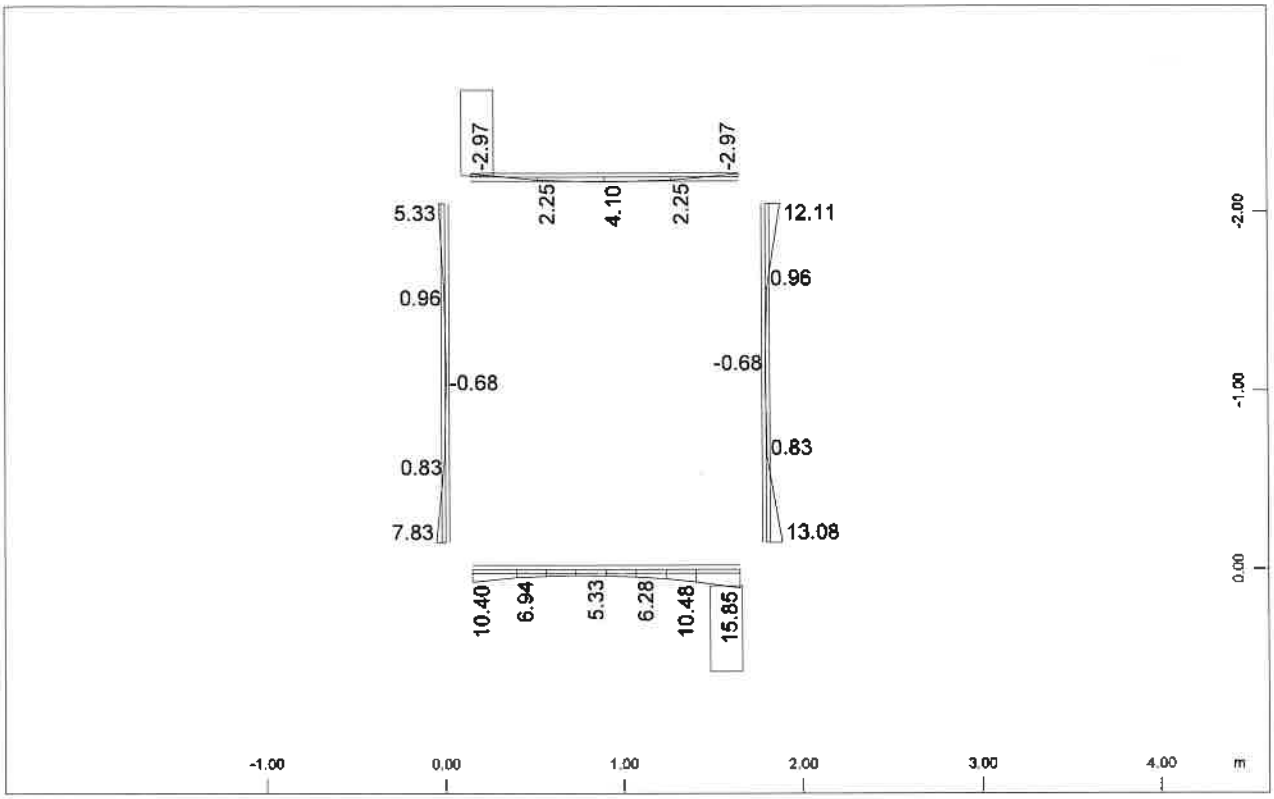
Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type	Title
1	1.00	permanent load grouped in actions	SELF WEIGHT
2	1.00	permanent load grouped in actions	SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions	EARTH PRESSURE
90	0.20	Conditional LC	LIVE LOADS
10	0.20	Conditional LC	LIVE LOAD EARTH PRESSURE
12	1.00	Exclusive LC	A 1 SEISMOS SE FASH

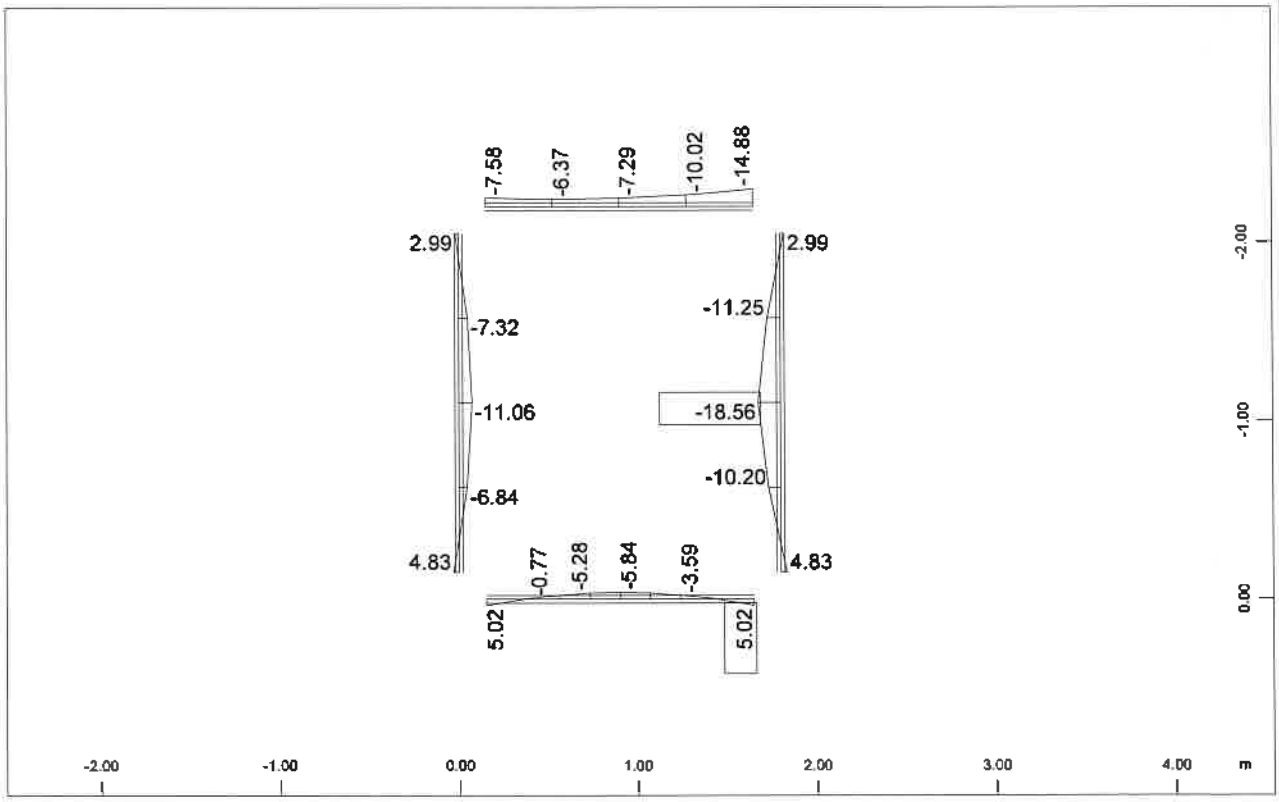
Generated Loadcases

Number	Comb	Title
201	1	MAX-MY BEAM
202	1	MIN-MY BEAM
203	1	MAX-VZ BEAM
204	1	MIN-VZ BEAM
205	1	MAX-N BEAM
206	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
ENVELOPES FOR MY

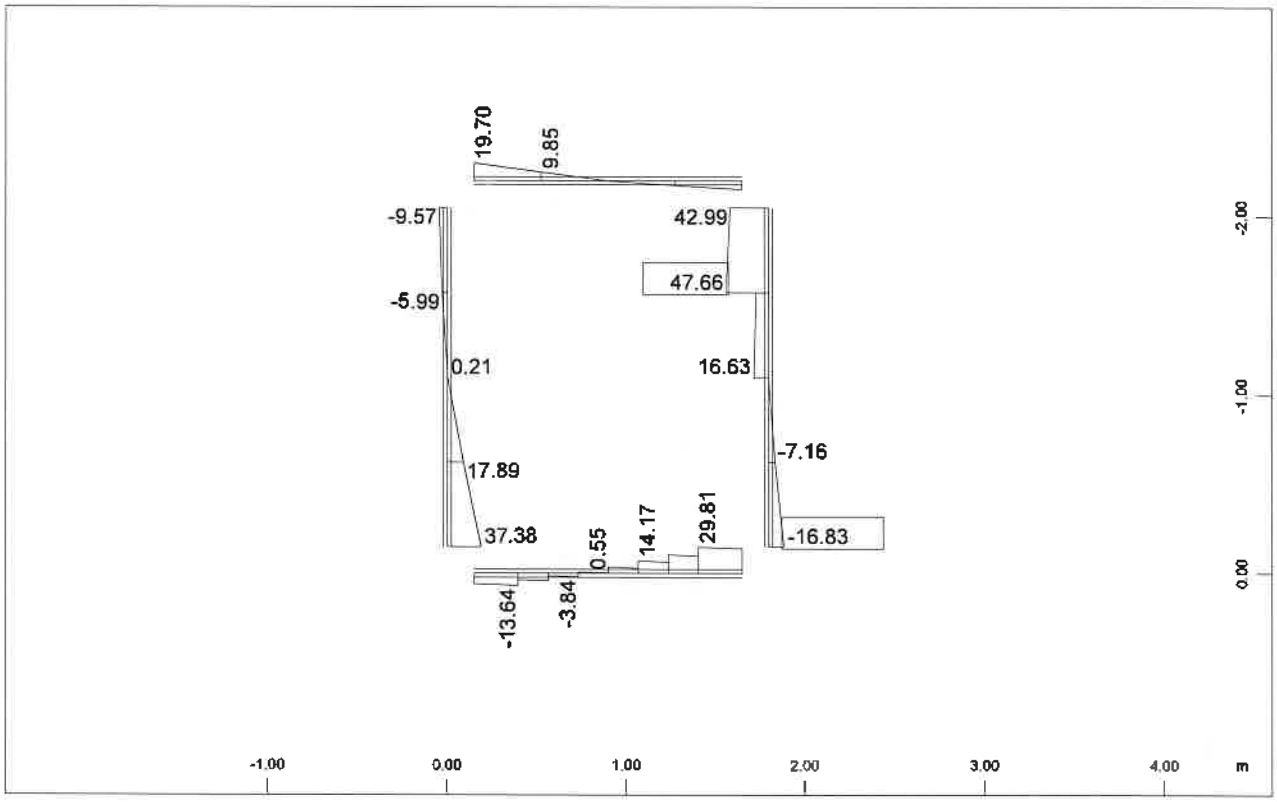


Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 201 MAX-MY BEAM , 1 cm 3D = 60.0 kNm
(Min=-2.97) (Max=15.8)
M 1 : 40



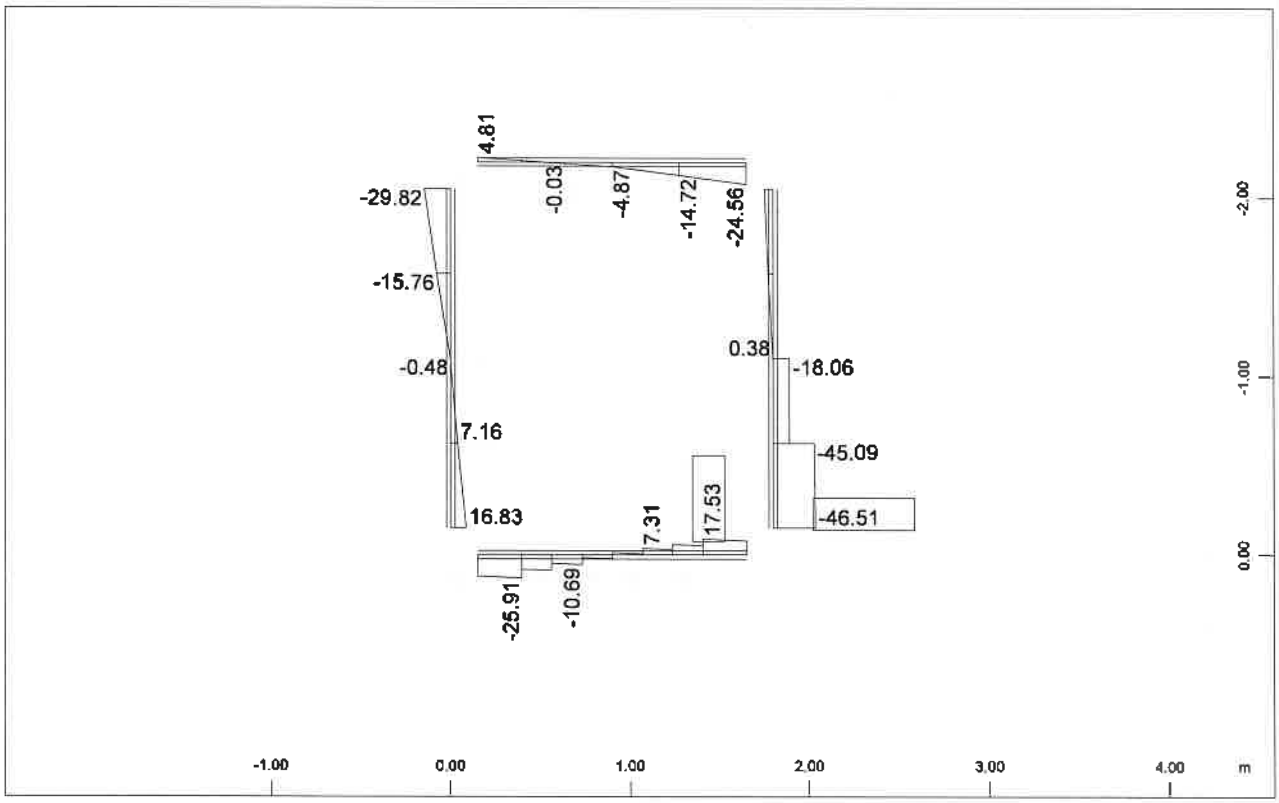
Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 202 MIN-MY BEAM , 1 cm 3D = 60.0 kNm
(Min=-18.6) (Max=5.02)
M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
ENVELOPES FOR VZ



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 203 MAX-VZ BEAM , 1 cm 3D = 80.0 kN (Min=-16.8)
(Max=47.7)

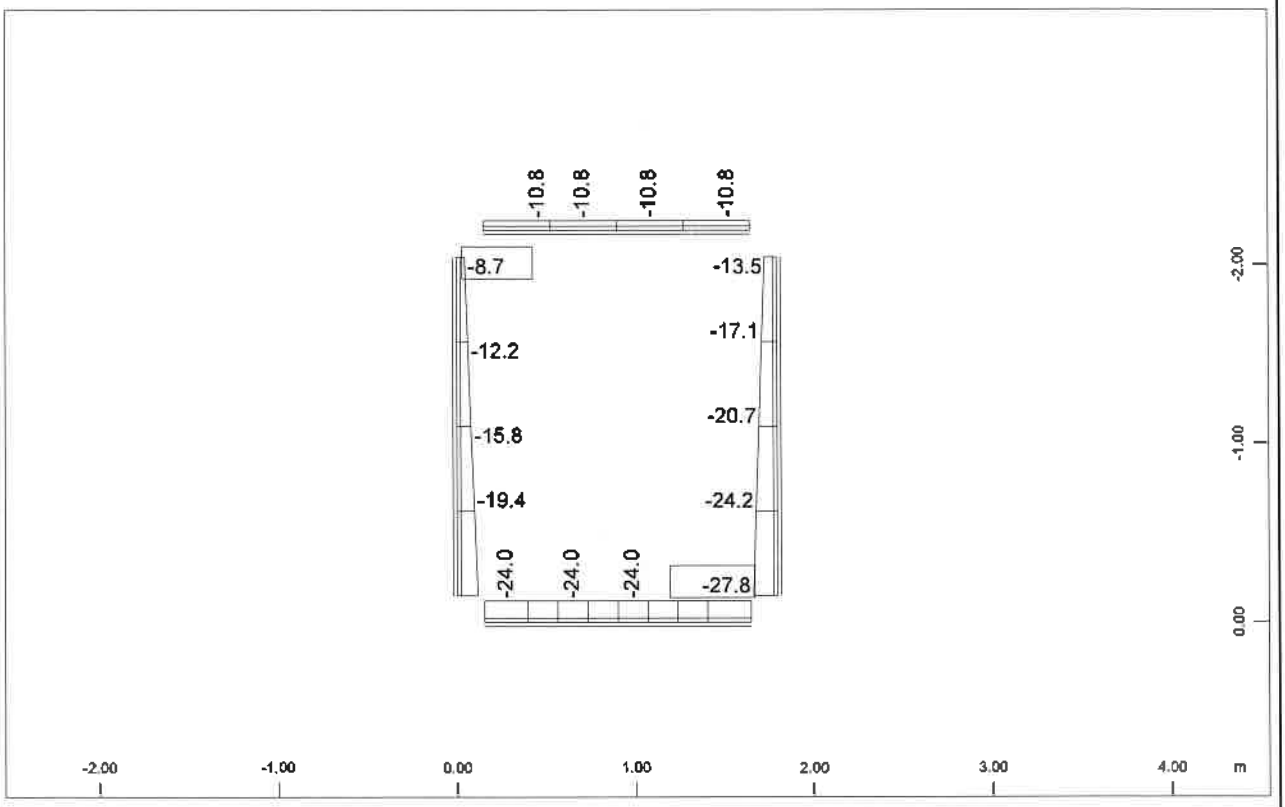
M 1 : 40



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 204 MIN-VZ BEAM , 1 cm 3D = 80.0 kN (Min=-46.5)
(Max=17.5)

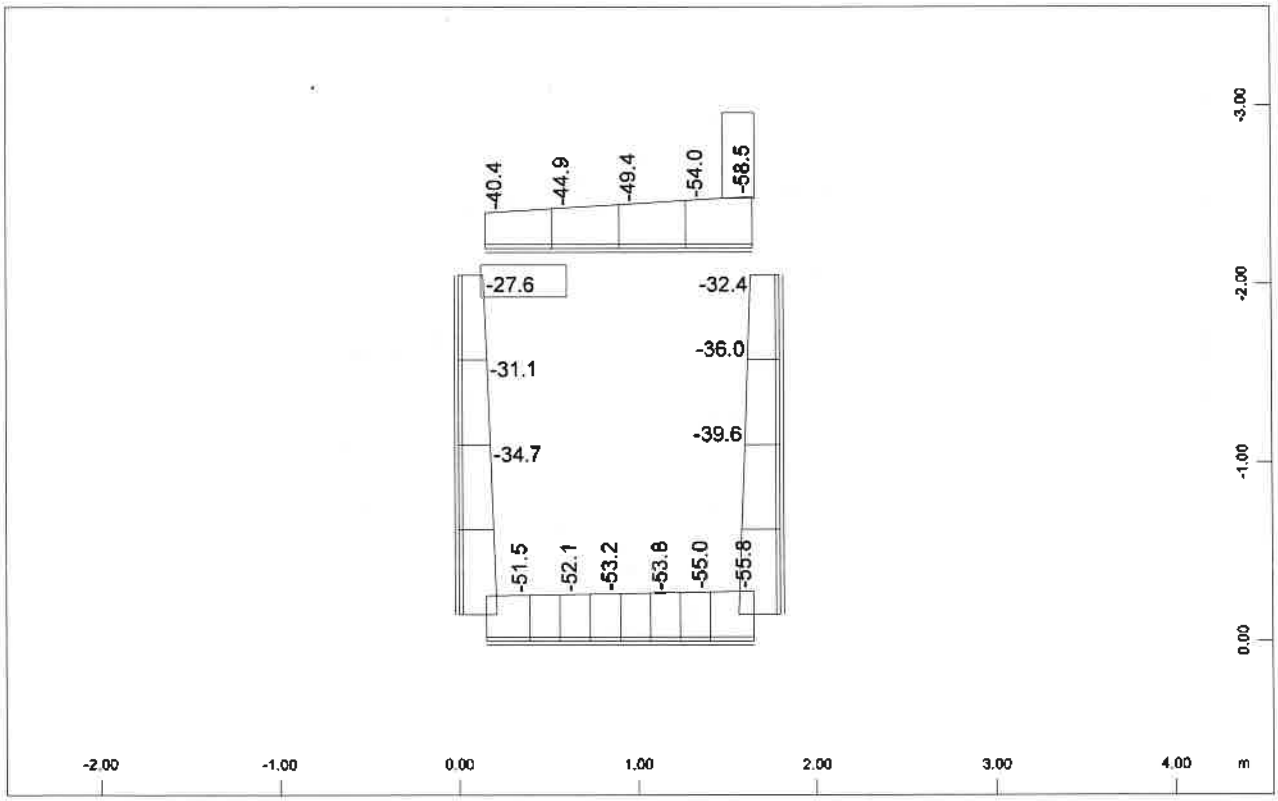
M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
ENVELOPES FOR N



Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 205 MAX-N BEAM , 1 cm 3D = 80.0 kN (Min=-27.8)
(Max=-8.68)

M 1 : 40



Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 206 MIN-N BEAM , 1 cm 3D = 80.0 kN (Min=-58.5)
(Max=-27.6)

M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN - ULTIMATE LIMIT STATE

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases

101	102	103	104	105	106
121	122	123	124	125	126
141	142	143	144	145	146
161	162	163	164	165	166

Ultimate Load Design

Design for ultimate loads EuroNorm EN 1992 Concrete
Uniaxial bending

Safety factors	SC-1	SC-2	SC-S	SS-1	SS-2	PIIa
	1.50	1.50	1.50	1.15	1.10	7

Strain limits	C1	C2	S1	S2	Z1	Z2
	-3.50	-2.00	3.00	45.00	-3.50	18.00

parameters for reinforcements

Minimum reinforcements Bending.	Compress.	compression e/d	N/Npl	min. reinforcem. requ. section	maximum-reinforc.
0.00 [cm2]	0.00 [cm2]	3.50	0.0010	0.00	0.10	8.00

normal force xsi*V*cot(Theta) where Theta is estimated before the design and xsi= 0.50

Material of sections uses Ultimate Limit strain-stress law with individual safety factors
Material of reinforcements uses Ultimate Limit strain-stress law with individual safety factors

MNo.	temp lev.	Material-safety [-]	max.compr stress [MPa]	at strain [o/oo]	max.tens stress [MPa]	at strain [o/oo]	tension-stiffening [MPa]
1	0	1.500	-14.17	-2.00	0.00	0.00	
3	0	1.150	-478.26	-50.00	478.26	50.00	

Shear Design

Design for shear Eurocode EC2 (2004) / GR
Minimum shear factor or tan of inclination of compressive struts 0.40 / 2.50

MNo	f-cd [MPa]	tau-rd [MPa]	sigIIQ [MPa]	sigIIT [MPa]	sigIIQ+ [MPa]	fyd [MPa]
1	14.17	0.12	7.65	7.65	7.65	
3						434.78

Tolerance for exceeding maximum shear or principal compression stress 0.0200

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mua [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.14	4.14			3.13	1.01		
1	0.245	2	0.17	5.19			1.00	4.20		
2	0.000	2	0.15	4.44			1.00	3.44		
2	0.168	2	0.20	5.87			1.00	4.87		
3	0.000	2	0.18	5.27			1.00	4.27		
3	0.168	2	0.21	6.22			1.00	5.22		
4	0.000	2	0.19	5.65			1.00	4.65		
4	0.168	2	0.20	5.99			1.00	4.99		
5	0.000	2	0.20	5.99			1.00	4.99		
5	0.168	2	0.19	5.65			1.00	4.65		
6	0.000	2	0.21	6.22			1.00	5.22		
6	0.168	2	0.18	5.27			1.00	4.27		
7	0.000	2	0.20	5.87			1.00	4.87		
7	0.168	2	0.15	4.44			1.00	3.44		
8	0.000	2	0.17	5.19			1.00	4.19		
8	0.245	2	0.14	4.27			3.21	1.06		
9	0.000	3	0.16	4.66			3.00	1.67		
9	0.475	3	0.09	2.79			0.99	1.80		
10	0.000	3	0.09	2.79			0.99	1.80		
10	0.475	3	0.09	2.63			0.99	1.64		
11	0.000	3	0.09	2.63			0.99	1.64		
11	0.475	3	0.07	1.99			0.99	1.00		

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN - ULTIMATE LIMIT STATE

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.09	2.58			1.58	1.00		
13	0.000	3	0.09	2.64			1.64	1.00		
13	0.475	3	0.07	2.23			0.99	1.23		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.10	2.90			0.99	1.91		
15	0.000	3	0.09	2.66			0.99	1.67		
15	0.475	3	0.09	2.82			0.99	1.82		
16	0.000	3	0.10	3.01			0.99	2.02		
16	0.475	3	0.14	4.22			2.56	1.67		
17	0.000	1	0.19	5.72			2.19	3.52		
17	0.245	1	0.22	6.67			5.13	1.54		
17	0.375	1	0.24	7.14			5.68	1.46		
18	0.000	1	0.24	7.14			5.68	1.46		
18	0.375	1	0.25	7.36			5.98	1.37		
19	0.000	1	0.25	7.36			5.98	1.37		
19	0.375	1	0.24	7.21			5.65	1.56		
20	0.000	1	0.24	7.21			5.65	1.56		
20	0.130	1	0.23	6.78			5.11	1.67		
20	0.375	1	0.20	5.92			2.19	3.73		

Shear Reinforcements per Cutted Part of Section LCR 1

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		6.34			
1	0.245	2	0.00		6.78			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		6.80			
8	0.245	2	0.00		6.36			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		7.02			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		7.42			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN ANALYSIS - SEISMIC COMBINATIONS

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases
201 202 203 204 205 206

Ultimate Load Design
==========

Design for ultimate loads EuroNorm EN 1992 Concrete
Uniaxial bending

Safety factors	SC-1	SC-2	SC-S	SS-1	SS-2	PIIa
	1.50	1.50	1.50	1.15	1.10	7

Strain limits	C1	C2	S1	S2	Z1	Z2
	-3.50	-2.00	3.00	45.00	-3.50	18.00

parameters for reinforcements

Minimum reinforcements		compression		min. reinforcem.	maximum-
Bending.	Compress.	e/d	N/Npl	requ. section	reinforc.
0.00 [cm2]	0.00 [cm2]	3.50	0.0010	0.00	0.10	8.00

normal force xsi*V*cot(Theta) where Theta is estimated before the design and xsi= 0.50

Material of sections uses Ultimate Limit strain-stress law with individual safety factors
Material of reinforcements uses Ultimate Limit strain-stress law with individual safety factors

MNo.	temp lev.	Material-safety [-]	max.compr stress [MPa]	at strain [o/oo]	max.tens stress [MPa]	at strain [o/oo]	tension-stiffening [MPa]
1	0	1.500	-14.17	-2.00	0.00	0.00	
3	0	1.150	-478.26	-50.00	478.26	50.00	

Shear Design
==========

Design for shear Eurocode EC2 (2004) / GR
Minimum shear factor or tan of inclination of compressive struts 0.40 / 2.50

MNo	f-cd [MPa]	tau-rd [MPa]	sigIIQ [MPa]	sigIIT [MPa]	sigIIQ+ [MPa]	fyd [MPa]
1	14.17	0.12	7.65	7.65	7.65	
3						434.78

Tolerance for exceeding maximum shear or principal compression stress 0.0200

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.14	4.14			3.13	1.01		
1	0.245	2	0.17	5.19			1.00	4.20		
2	0.000	2	0.15	4.44			1.00	3.44		
2	0.168	2	0.20	5.87			1.00	4.87		
3	0.000	2	0.18	5.27			1.00	4.27		
3	0.168	2	0.21	6.22			1.00	5.22		
4	0.000	2	0.19	5.65			1.00	4.65		
4	0.168	2	0.20	5.99			1.00	4.99		
5	0.000	2	0.20	5.99			1.00	4.99		
5	0.168	2	0.19	5.65			1.00	4.65		
6	0.000	2	0.21	6.22			1.00	5.22		
6	0.168	2	0.18	5.27			1.00	4.27		
7	0.000	2	0.20	5.87			1.00	4.87		
7	0.168	2	0.15	4.44			1.00	3.44		
8	0.000	2	0.17	5.19			1.00	4.19		
8	0.245	2	0.14	4.27			3.21	1.06		
9	0.000	3	0.16	4.66			3.00	1.67		
9	0.475	3	0.09	2.79			0.99	1.80		
10	0.000	3	0.09	2.79			0.99	1.80		
10	0.475	3	0.09	2.63			0.99	1.64		
11	0.000	3	0.09	2.63			0.99	1.64		
11	0.475	3	0.07	1.99			0.99	1.00		
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.09	2.58			1.58	1.00		
13	0.000	3	0.09	2.64			1.64	1.00		

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN ANALYSIS - SEISMIC COMBINATIONS

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
13	0.475	3	0.07	2.23			0.99	1.23		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.10	2.90			0.99	1.91		
15	0.000	3	0.09	2.66			0.99	1.67		
15	0.475	3	0.09	2.82			0.99	1.82		
16	0.000	3	0.10	3.01			0.99	2.02		
16	0.475	3	0.14	4.22			2.56	1.67		
17	0.000	1	0.19	5.72			2.19	3.52		
17	0.245	1	0.22	6.67			5.13	1.54		
17	0.375	1	0.24	7.14			5.68	1.46		
18	0.000	1	0.24	7.14			5.68	1.46		
18	0.375	1	0.25	7.36			5.98	1.37		
19	0.000	1	0.25	7.36			5.98	1.37		
19	0.375	1	0.24	7.21			5.65	1.56		
20	0.000	1	0.24	7.21			5.65	1.56		
20	0.130	1	0.23	6.78			5.11	1.67		
20	0.375	1	0.20	5.92			2.19	3.73		

Shear Reinforcements per Cutted Part of Section LCR 1

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		6.34			
1	0.245	2	0.00		6.78			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		6.80			
8	0.245	2	0.00		6.36			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		7.02			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		7.42			

Longitudinal Reinforcements Accumulated minimum
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.14	4.14			3.13	1.01		
1	0.245	2	0.17	5.19			1.00	4.20		
2	0.000	2	0.15	4.44			1.00	3.44		
2	0.168	2	0.20	5.87			1.00	4.87		
3	0.000	2	0.18	5.27			1.00	4.27		
3	0.168	2	0.21	6.22			1.00	5.22		
4	0.000	2	0.19	5.65			1.00	4.65		

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN ANALYSIS - SEISMIC COMBINATIONS

Longitudinal Reinforcements Accumulated minimum
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
4	0.168	2	0.20	5.99			1.00	4.99		
5	0.000	2	0.20	5.99			1.00	4.99		
5	0.168	2	0.19	5.65			1.00	4.65		
6	0.000	2	0.21	6.22			1.00	5.22		
6	0.168	2	0.18	5.27			1.00	4.27		
7	0.000	2	0.20	5.87			1.00	4.87		
7	0.168	2	0.15	4.44			1.00	3.44		
8	0.000	2	0.17	5.19			1.00	4.19		
8	0.245	2	0.14	4.27			3.21	1.06		
9	0.000	3	0.16	4.66			3.00	1.67		
9	0.475	3	0.09	2.79			0.99	1.80		
10	0.000	3	0.09	2.79			0.99	1.80		
10	0.475	3	0.09	2.63			0.99	1.64		
11	0.000	3	0.09	2.63			0.99	1.64		
11	0.475	3	0.07	1.99			0.99	1.00		
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.09	2.58			1.58	1.00		
13	0.000	3	0.09	2.64			1.64	1.00		
13	0.475	3	0.07	2.23			0.99	1.23		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.10	2.90			0.99	1.91		
15	0.000	3	0.09	2.66			0.99	1.67		
15	0.475	3	0.09	2.82			0.99	1.82		
16	0.000	3	0.10	3.01			0.99	2.02		
16	0.475	3	0.14	4.22			2.56	1.67		
17	0.000	1	0.19	5.72			2.19	3.52		
17	0.245	1	0.22	6.67			5.13	1.54		
17	0.375	1	0.24	7.14			5.68	1.46		
18	0.000	1	0.24	7.14			5.68	1.46		
18	0.375	1	0.25	7.36			5.98	1.37		
19	0.000	1	0.25	7.36			5.98	1.37		
19	0.375	1	0.24	7.21			5.65	1.56		
20	0.000	1	0.24	7.21			5.65	1.56		
20	0.130	1	0.23	6.78			5.11	1.67		
20	0.375	1	0.20	5.92			2.19	3.73		

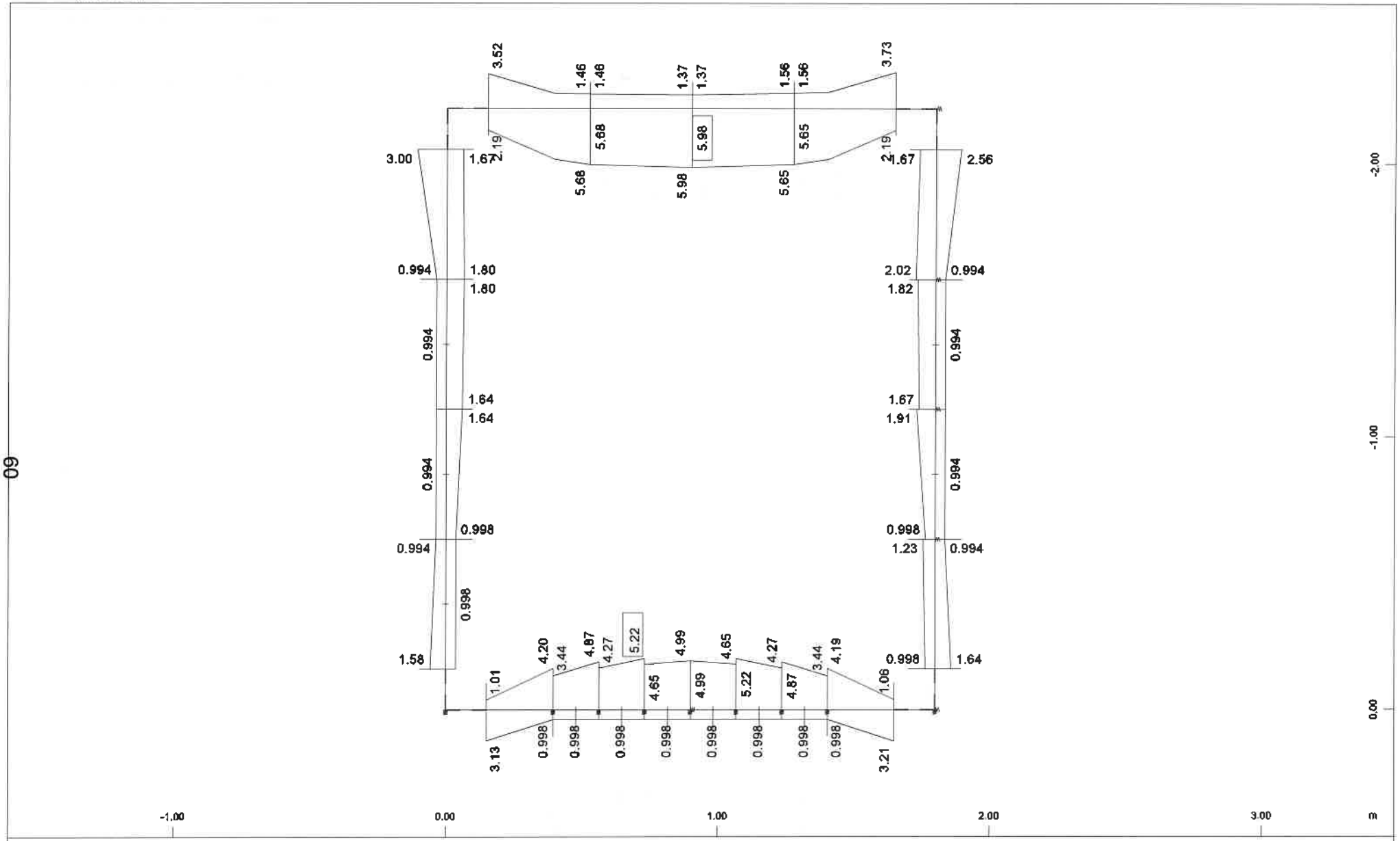
Shear Reinforcements per Cutted Part of Section Accumulated minimum

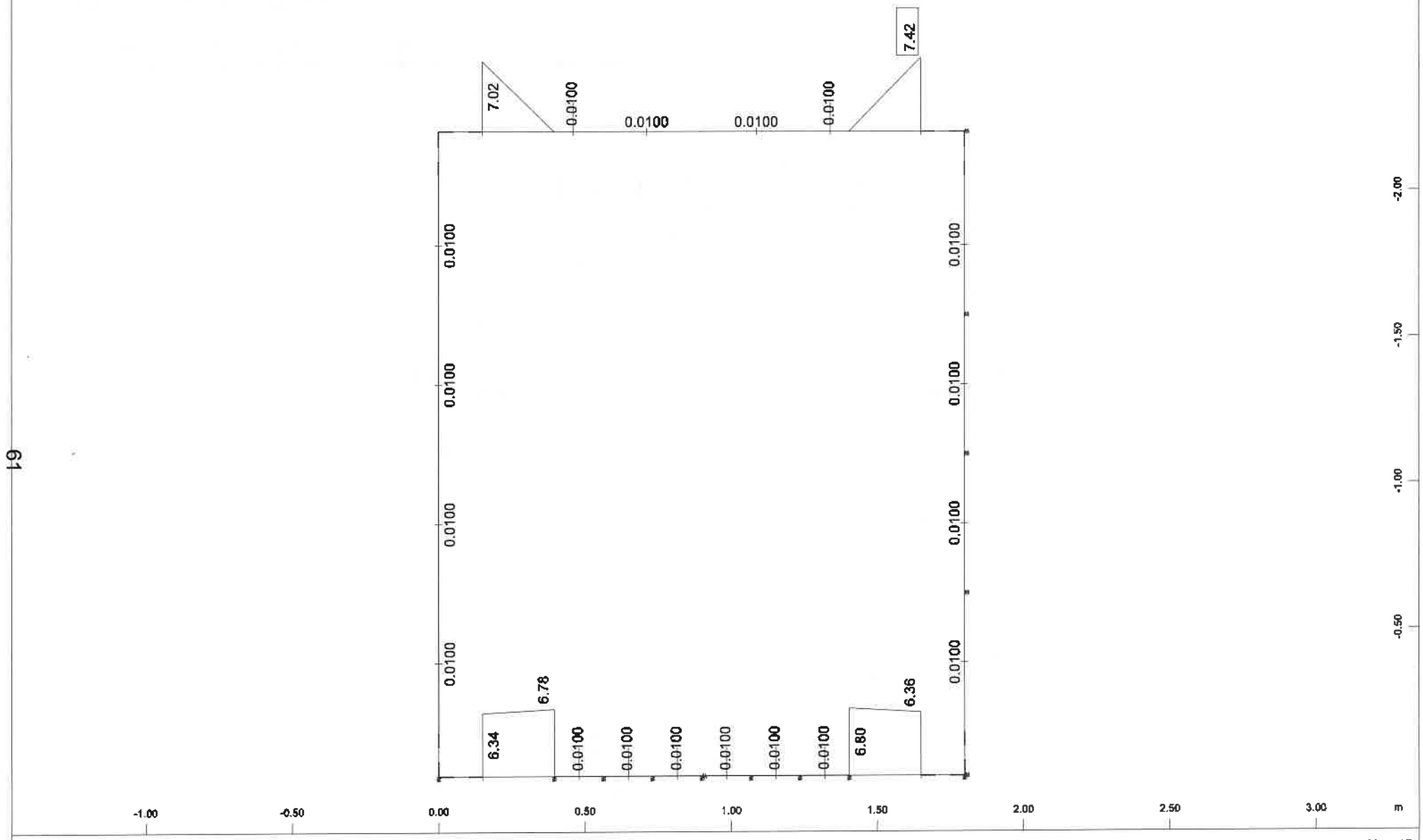
Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		6.34			
1	0.245	2	0.00		6.78			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		6.80			
8	0.245	2	0.00		6.36			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		7.02			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN ANALYSIS - SEISMIC COMBINATIONS

Shear Reinforcements per Cutted Part of Section Accumulated minimum

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		7.42			


3.52
1.46
1.46
1.37
1.37
1.56
1.56
3.73
2.19
5.68
5.98
5.65
2.19
3.00
1.67
1.67
2.56
5.68
5.98
5.65
0.994
1.80
1.80
2.02
0.994
1.82
0.994
0.994
1.64
1.64
1.67
1.91
0.994
0.994
0.998
0.998
0.994
1.23
0.994
0.998
0.998
1.58
0.998
1.64
4.20
3.44
4.87
4.27
5.22
4.99
4.65
4.27
3.44
4.19
1.01
4.65
4.99
5.22
4.87
1.06
3.13
0.998
0.998
0.998
0.998
0.998
0.998
0.998
0.998
3.21
-1.00
0.00
1.00
2.00
3.00
m
-2.00
-1.00
0.00
09
Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.98)
Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.22)
Z
X
Y
M 1 : 18


7.42
7.02
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
6.78
6.34
6.36
6.80
-2.00
-1.50
-1.00
-0.50
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00
2.50
3.00
m
Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.42)
M 1 : 17
Z
X
Y

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb 1 for S.L.S. -QUASI-PERMANENT COMBINATION

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type	Title
1	1.00	permanent load grouped in actions	SELF WEIGHT
2	1.00	permanent load grouped in actions	SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions	EARTH PRESSURE
4	1.00	Conditional LC	SHRINKAGE OF CONCRETE
5	0.50	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.38	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.50	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.38	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.17	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.50	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.17	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.50	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.50	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.38	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.50	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.38	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.17	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.50	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.17	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.50	Combined with LC	LINEAR TEMPERATURE DIFFE

Generated Loadcases

Number	Comb	Title
301	1	MAX-MY BEAM
302	1	MIN-MY BEAM
303	1	MAX-VZ BEAM
304	1	MIN-VZ BEAM
305	1	MAX-N BEAM
306	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb 2 for S.L.S. - CHARACTERISTIC COMBINATION
MAIN VARIABLE LOAD: UNIFORM ROAD TRAFFIC

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.00	permanent load grouped in actions			SELF WEIGHT
2	1.00	permanent load grouped in actions			SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
10	0.75	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.00	Exclusive LC	A	1	LIVE LOADS
91	1.00	Exclusive LC	A	1	POINT LOADS 1
92	1.00	Exclusive LC	A	1	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
401	1	MAX-MY BEAM
402	1	MIN-MY BEAM
403	1	MAX-VZ BEAM
404	1	MIN-VZ BEAM
405	1	MAX-N BEAM
406	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb 3 for S.L.S. - CHARACTERISTIC COMBINATION
MAIN VARIABLE LOAD: TEMPERATURE

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type	Title
1	1.00	permanent load grouped in actions	SELF WEIGHT
2	1.00	permanent load grouped in actions	SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions	EARTH PRESSURE
4	1.00	Conditional LC	SHRINKAGE OF CONCRETE
5	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
5	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
10	0.75	Conditional LC	LIVE LOAD EARTH PRESSURE
90	0.75	Exclusive LC A 1	LIVE LOADS
91	0.75	Exclusive LC A 1	POINT LOADS 1
92	0.75	Exclusive LC A 1	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
421	1	MAX-MY BEAM
422	1	MIN-MY BEAM
423	1	MAX-VZ BEAM
424	1	MIN-VZ BEAM
425	1	MAX-N BEAM
426	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb 4 for S.L.S. - CHARACTERISTIC COMBINATION
MAIN VARIABLE LOAD: EARTH PRESSURE DUE TO LIVE LOADS

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.00	permanent load grouped in actions			SELF WEIGHT
2	1.00	permanent load grouped in actions			SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.00	Conditional LC			LIVE LOAD EARTH PRESSURE
90	0.75	Exclusive LC	A	1	LIVE LOADS
91	0.75	Exclusive LC	A	1	POINT LOADS 1
92	0.75	Exclusive LC	A	1	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
441	1	MAX-MY BEAM
442	1	MIN-MY BEAM
443	1	MAX-VZ BEAM
444	1	MIN-VZ BEAM
445	1	MAX-N BEAM
446	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
SERVICEABILITY LIMIT STATE - CONTROL OF CRACKING
QUASI-PERMANENT COMBINATION

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases
301 302 303 304 305 306

Parameters for nonlinear stress / Crackwidth EC2 / 30

MNo	design width [mm]		bond [-]	load [-]	h-max [m]
3	0.300	0.300	0.80	0.50	0.800

Check for crack width passed with additional reinforcements

Stiffness is not saved in database

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.14	4.14			3.13	1.01		
1	0.245	2	0.17	5.19			1.00	4.20		
2	0.000	2	0.15	4.44			1.00	3.44		
2	0.168	2	0.20	5.87			1.00	4.87		
3	0.000	2	0.18	5.27			1.00	4.27		
3	0.168	2	0.21	6.22			1.00	5.22		
4	0.000	2	0.19	5.65			1.00	4.65		
4	0.168	2	0.20	5.99			1.00	4.99		
5	0.000	2	0.20	5.99			1.00	4.99		
5	0.168	2	0.19	5.65			1.00	4.65		
6	0.000	2	0.21	6.22			1.00	5.22		
6	0.168	2	0.18	5.27			1.00	4.27		
7	0.000	2	0.20	5.87			1.00	4.87		
7	0.168	2	0.15	4.44			1.00	3.44		
8	0.000	2	0.17	5.19			1.00	4.19		
8	0.245	2	0.14	4.27			3.21	1.06		
9	0.000	3	0.19	5.60			3.14	2.46		
9	0.475	3	0.12	3.62			1.14	2.48		
10	0.000	3	0.12	3.62			1.14	2.48		
10	0.475	3	0.10	2.88			0.99	1.88		
11	0.000	3	0.10	2.88			0.99	1.88		
11	0.475	3	0.07	1.99			0.99	1.00		
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.11	3.27			2.27	1.00		
13	0.000	3	0.11	3.27			2.27	1.00		
13	0.475	3	0.07	2.23			0.99	1.23		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.10	2.90			0.99	1.91		
15	0.000	3	0.10	2.88			0.99	1.88		
15	0.475	3	0.12	3.62			1.14	2.48		
16	0.000	3	0.12	3.62			1.14	2.48		
16	0.475	3	0.19	5.57			3.15	2.42		
17	0.000	1	0.23	6.80			3.28	3.52		
17	0.245	1	0.26	7.75			5.13	2.62		
17	0.375	1	0.27	8.10			5.68	2.42		
18	0.000	1	0.27	8.10			5.68	2.42		
18	0.375	1	0.27	8.13			5.98	2.14		
19	0.000	1	0.27	8.13			5.98	2.14		
19	0.375	1	0.27	8.06			5.65	2.42		
20	0.000	1	0.27	8.06			5.65	2.42		
20	0.130	1	0.26	7.73			5.11	2.62		
20	0.375	1	0.23	7.02			3.29	3.73		

Reinforcements saved as design case LCR 1

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
SERVICEABILITY LIMIT STATE - CONTROL OF CRACKING
QUASI-PERMANENT COMBINATION

Longitudinal Reinforcements Accumulated minimum
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.14	4.14			3.13	1.01		
1	0.245	2	0.17	5.19			1.00	4.20		
2	0.000	2	0.15	4.44			1.00	3.44		
2	0.168	2	0.20	5.87			1.00	4.87		
3	0.000	2	0.18	5.27			1.00	4.27		
3	0.168	2	0.21	6.22			1.00	5.22		
4	0.000	2	0.19	5.65			1.00	4.65		
4	0.168	2	0.20	5.99			1.00	4.99		
5	0.000	2	0.20	5.99			1.00	4.99		
5	0.168	2	0.19	5.65			1.00	4.65		
6	0.000	2	0.21	6.22			1.00	5.22		
6	0.168	2	0.18	5.27			1.00	4.27		
7	0.000	2	0.20	5.87			1.00	4.87		
7	0.168	2	0.15	4.44			1.00	3.44		
8	0.000	2	0.17	5.19			1.00	4.19		
8	0.245	2	0.14	4.27			3.21	1.06		
9	0.000	3	0.19	5.60			3.14	2.46		
9	0.475	3	0.12	3.62			1.14	2.48		
10	0.000	3	0.12	3.62			1.14	2.48		
10	0.475	3	0.10	2.88			0.99	1.88		
11	0.000	3	0.10	2.88			0.99	1.88		
11	0.475	3	0.07	1.99			0.99	1.00		
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.11	3.27			2.27	1.00		
13	0.000	3	0.11	3.27			2.27	1.00		
13	0.475	3	0.07	2.23			0.99	1.23		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.10	2.90			0.99	1.91		
15	0.000	3	0.10	2.88			0.99	1.88		
15	0.475	3	0.12	3.62			1.14	2.48		
16	0.000	3	0.12	3.62			1.14	2.48		
16	0.475	3	0.19	5.57			3.15	2.42		
17	0.000	1	0.23	6.80			3.28	3.52		
17	0.245	1	0.26	7.75			5.13	2.62		
17	0.375	1	0.27	8.10			5.68	2.42		
18	0.000	1	0.27	8.10			5.68	2.42		
18	0.375	1	0.27	8.13			5.98	2.14		
19	0.000	1	0.27	8.13			5.98	2.14		
19	0.375	1	0.27	8.06			5.65	2.42		
20	0.000	1	0.27	8.06			5.65	2.42		
20	0.130	1	0.26	7.73			5.11	2.62		
20	0.375	1	0.23	7.02			3.29	3.73		

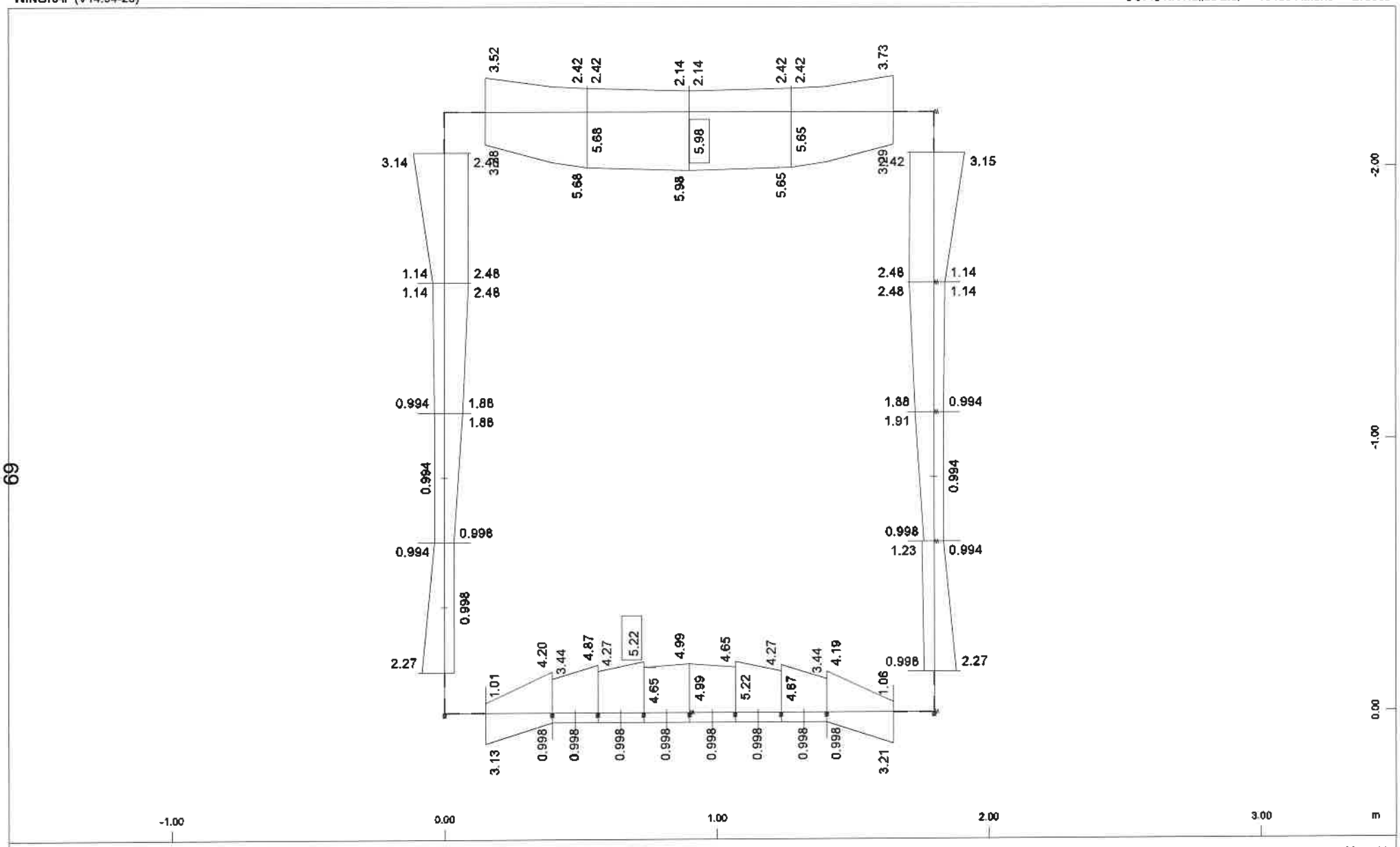
Shear Reinforcements per Cutted Part of Section Accumulated minimum

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		6.34			
1	0.245	2	0.00		6.78			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		6.80			
8	0.245	2	0.00		6.36			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
SERVICEABILITY LIMIT STATE - CONTROL OF CRACKING
QUASI-PERMANENT COMBINATION

Shear Reinforcements per Cutted Part of Section Accumulated minimum

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		7.02			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		7.42			



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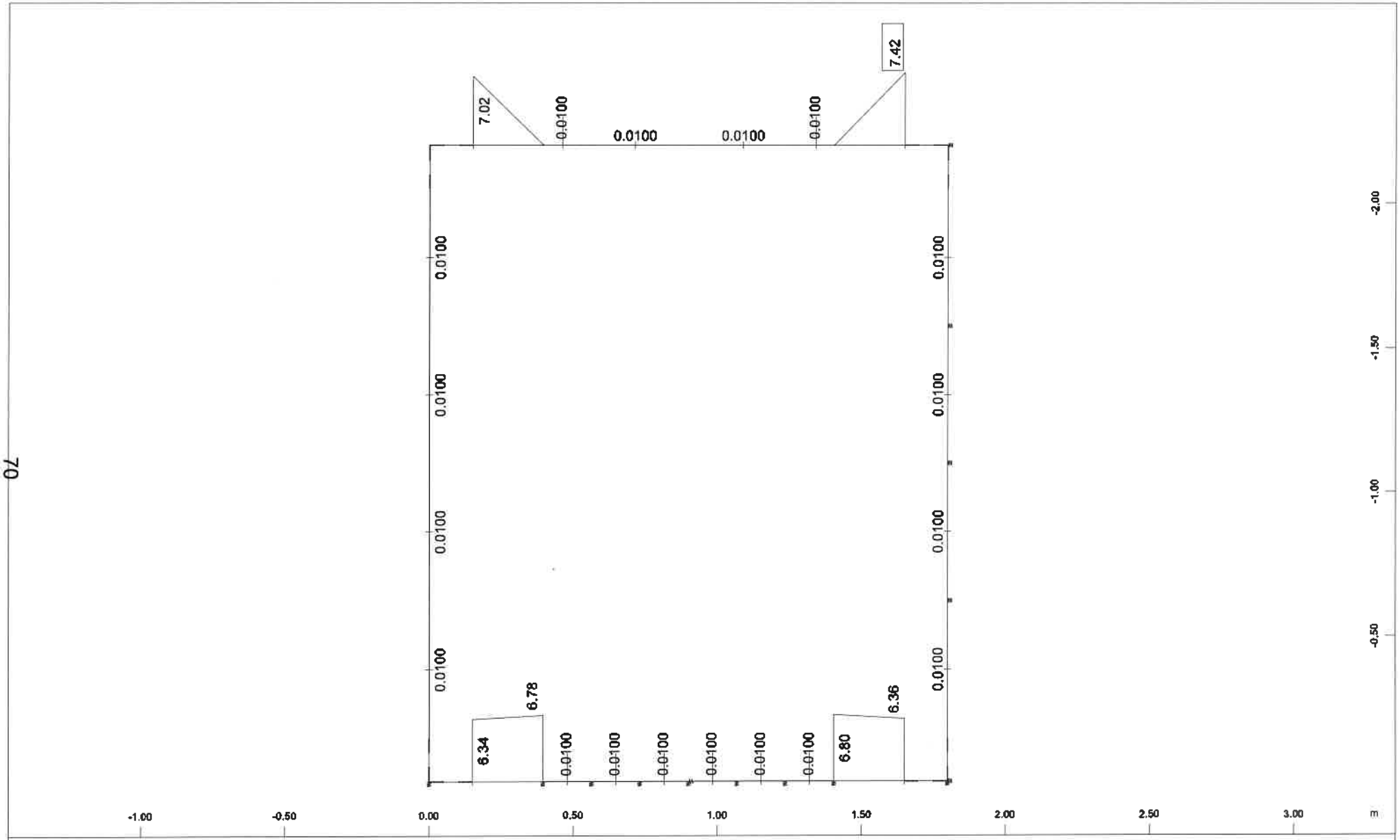
Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.98)

Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.22)

Z X Y

M 1 : 18



Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.42)

M 1 : 17

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
CHARACTERISTIC COMBINATION
SLS CHECK OF THE CONCRETE STRESSES CHARACTERISTIC < 0.6 fck

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases

401	402	403	404	405	406
421	422	423	424	425	426
441	442	443	444	445	446

Parameters for nonlinear stress / Crackwidth

MNo	sig-comp [MPa]	sig-comp [o/o]	sig-tens [MPa]	sig-tens [o/o]
1	-8.30	55.32	0.00	100.0
3	-11.29		338.40	

Stiffness is not saved in database

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
CHARACTERISTIC COMBINATION
SLS CHECK OF THE STEEL STRESSES CHARACTERISTIC < 0.8 fyk

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases

401	402	403	404	405	406
421	422	423	424	425	426
441	442	443	444	445	446

Parameters for nonlinear stress / Crackwidth

MNo	sig-comp [MPa]	[o/o]	sig-tens [MPa]	[o/o]
1	-8.30		0.00	
3	-11.29	2.82	338.40	84.60

Stiffness is not saved in database

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
OIWNEI MONIMOS SYNDYASMOS 0.45 fck
SLS CHECK OF THE CONCRETE STRESSES QUASI-PERMANENT < 0.45 fck

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

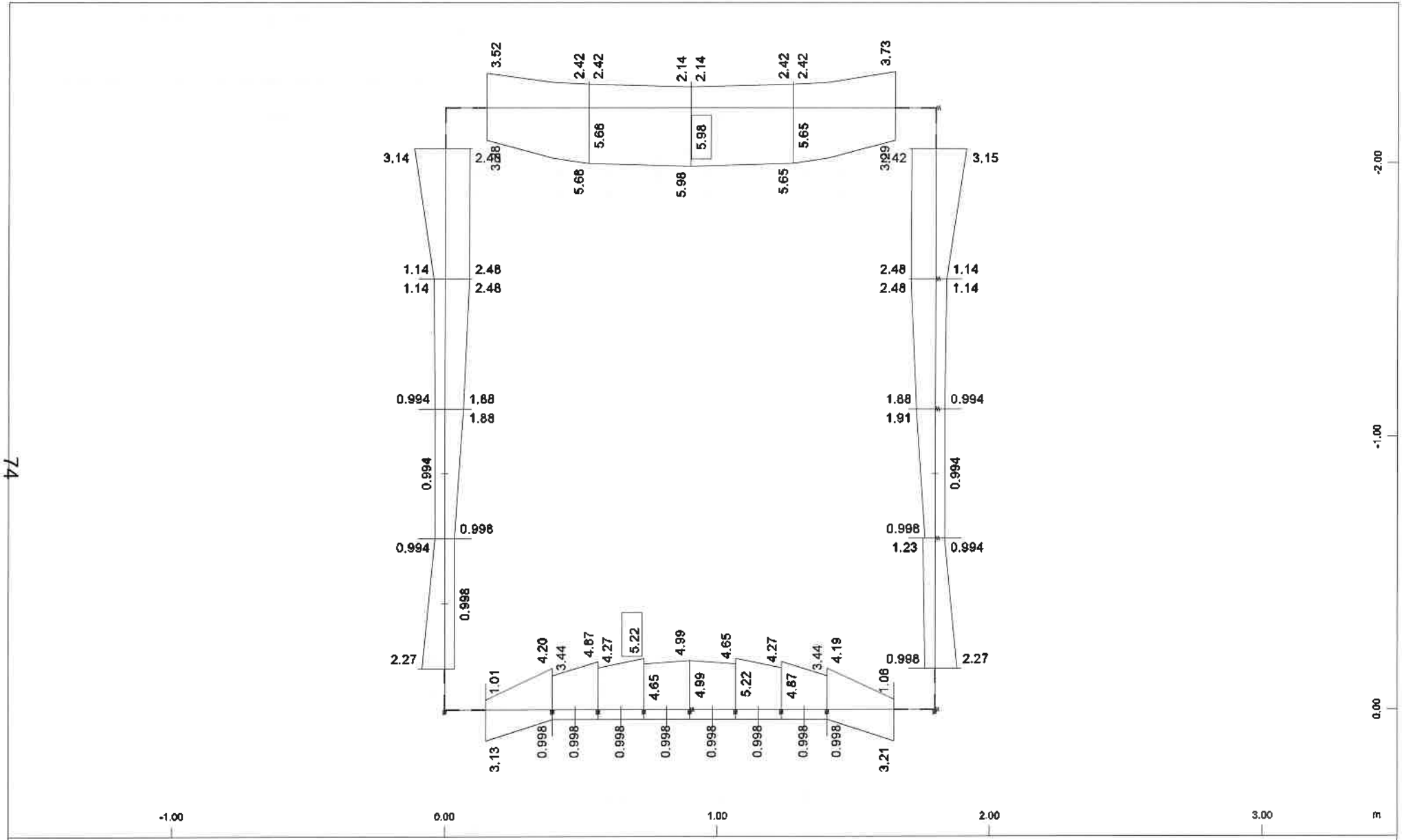
Considered Load Cases

301	302	303	304	305	306

Parameters for nonlinear stress / Crackwidth

MNo	sig-comp [MPa]	sig-comp [o/o]	sig-tens [MPa]	sig-tens [o/o]
1	-2.45	21.74	0.00	100.0
3	-1.66		94.44	

Stiffness is not saved in database

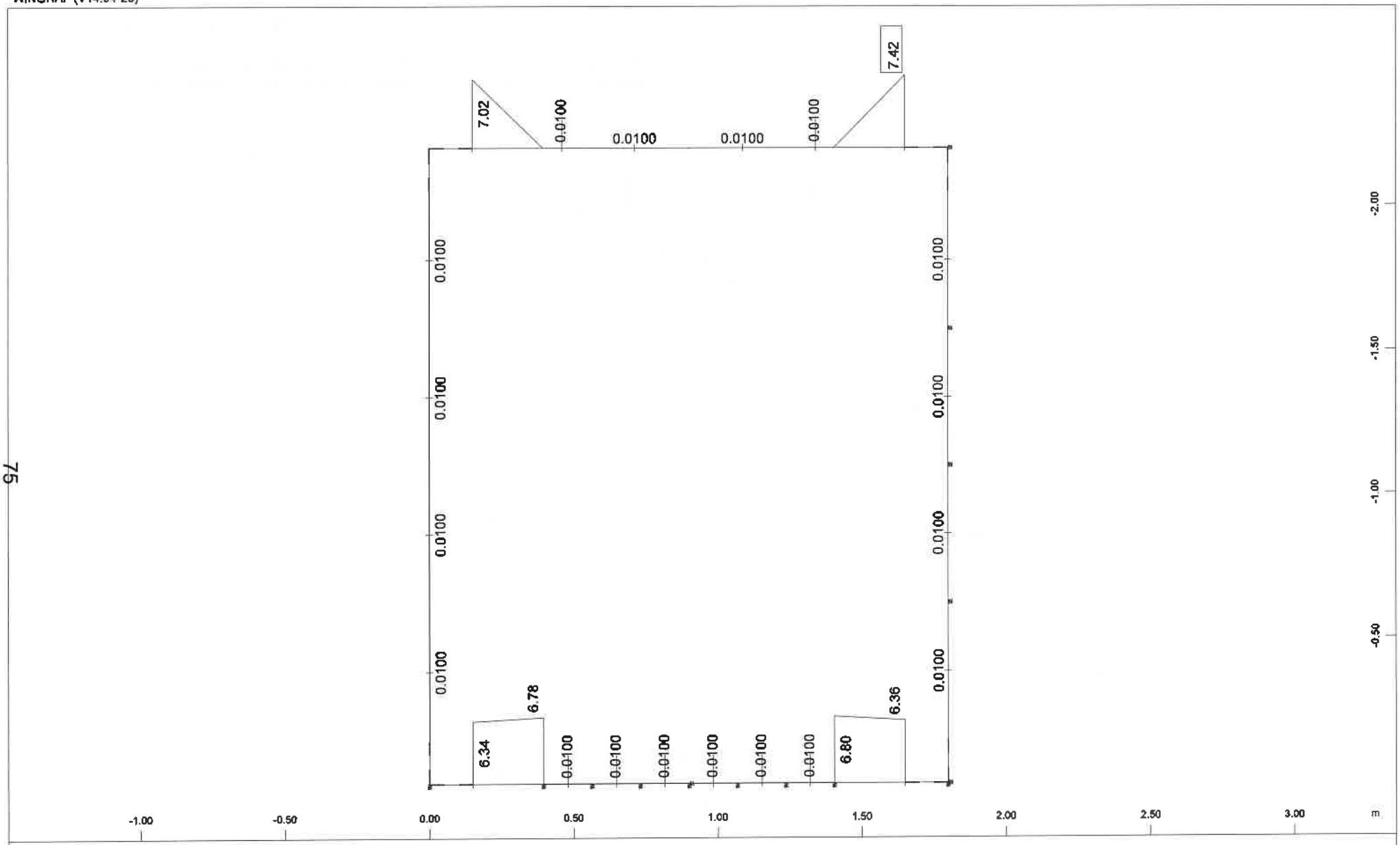


Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.98)

Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.22)

M 1 : 16

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)



Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.42)

M 1 : 17

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)

ΔΙΑΣΤΑΣΙΟΛΟΓΗΣΗ ΣΕ ΔΙΑΤΜΗΣΗ ΜΕ ΣΥΝΤΕΛΕΣΤΗ 1.25 ΣΤΟ ΣΕΙΣΜΟ

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN ANALYSIS - SEISMIC COMBINATIONS (EARTHQUAKE SHEAR)

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases
201 202 203 204 205 206

Ultimate Load Design

Design for ultimate loads EuroNorm EN 1992 Concrete
Uniaxial bending

Safety factors	SC-1	SC-2	SC-S	SS-1	SS-2	PIIa
	1.88	1.88	1.50	1.44	1.44	7
Strain limits	C1	C2	S1	S2	Z1	Z2
	-3.50	-2.00	3.00	45.00	-3.50	18.00

parameters for reinforcements

Minimum reinforcements Bending.	Compress.	compression e/d	N/Npl	min. reinforcem. requ. section		maximum- reinforc.
0.00 [cm2]	0.00 [cm2]	3.50	0.0010	0.00	0.10	8.00

normal force xsi*V*cot(Theta) where Theta is estimated before the design and xsi= 0.50

Material of sections uses Ultimate Limit strain-stress law with global safety factors
Material of reinforcements uses Ultimate Limit strain-stress law with global safety factors

MNo.	temp lev.	Material- safety [-]	max.compr stress [MPa]	at strain [o/oo]	max.tens stress [MPa]	at strain [o/oo]	tension- stiffening [MPa]
1	0	1.875	-11.33	-2.00	0.00	0.00	
3	0	1.438	-382.61	-50.00	382.61	50.00	

Shear Design

Design for shear Eurocode EC2 (2004) / GR
Minimum shear factor or tan of inclination of compressive struts 0.40 / 2.50

MNo	f-cd [MPa]	tau-rd [MPa]	sigIIQ [MPa]	sigIIT [MPa]	sigIIQ+ [MPa]	fyd [MPa]
1	14.17	0.12	7.65	7.65	7.65	
3						347.83

Tolerance for exceeding maximum shear or principal compression stress 0.0200

Shear Reinforcements per Cutted Part of Section LCR 1

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		6.34			
1	0.245	2	0.00		6.78			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		6.80			
8	0.245	2	0.00		6.36			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			

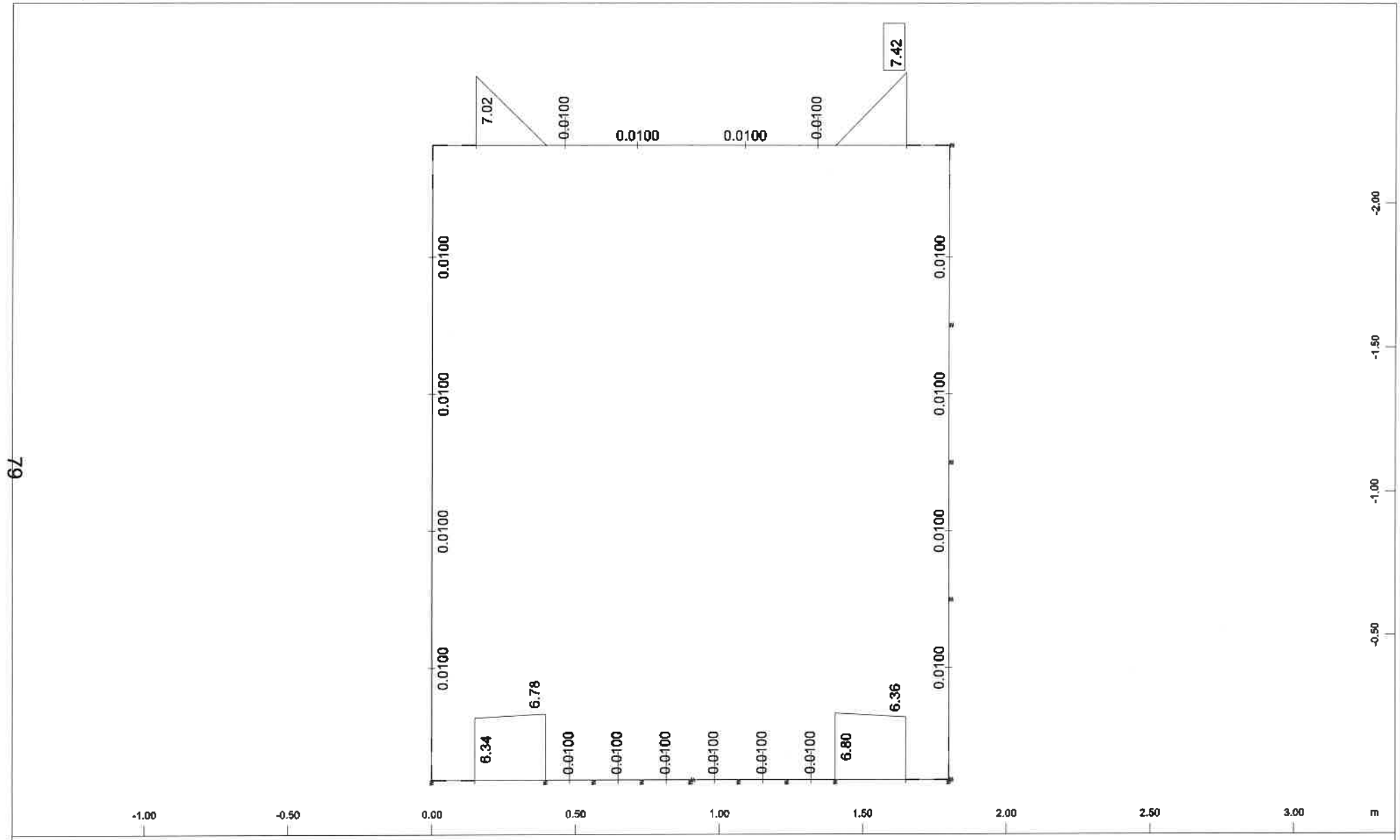
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
DESIGN ANALYSIS - SEISMIC COMBINATIONS (EARTHQUAKE SHEAR)

Shear Reinforcements per Cutted Part of Section LCR 1

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		7.02			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		7.42			

Shear Reinforcements per Cutted Part of Section Accumulated minimum

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		6.34			
1	0.245	2	0.00		6.78			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		6.80			
8	0.245	2	0.00		6.36			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		7.02			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		7.42			



Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.42)

M 1 : 17

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb 1 for bedding stresses

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.00	permanent load grouped in actions			SELF WEIGHT
2	1.00	permanent load grouped in actions			SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
5	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.00	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.00	Exclusive LC	A	1	LIVE LOADS
91	1.00	Exclusive LC	A	1	POINT LOADS 1
92	1.00	Exclusive LC	A	1	POINT LOADS 2

Generated Loadcases

Number	Comb	Title
1001	1	MAX-P SPRI
1002	1	MIN-P SPRI

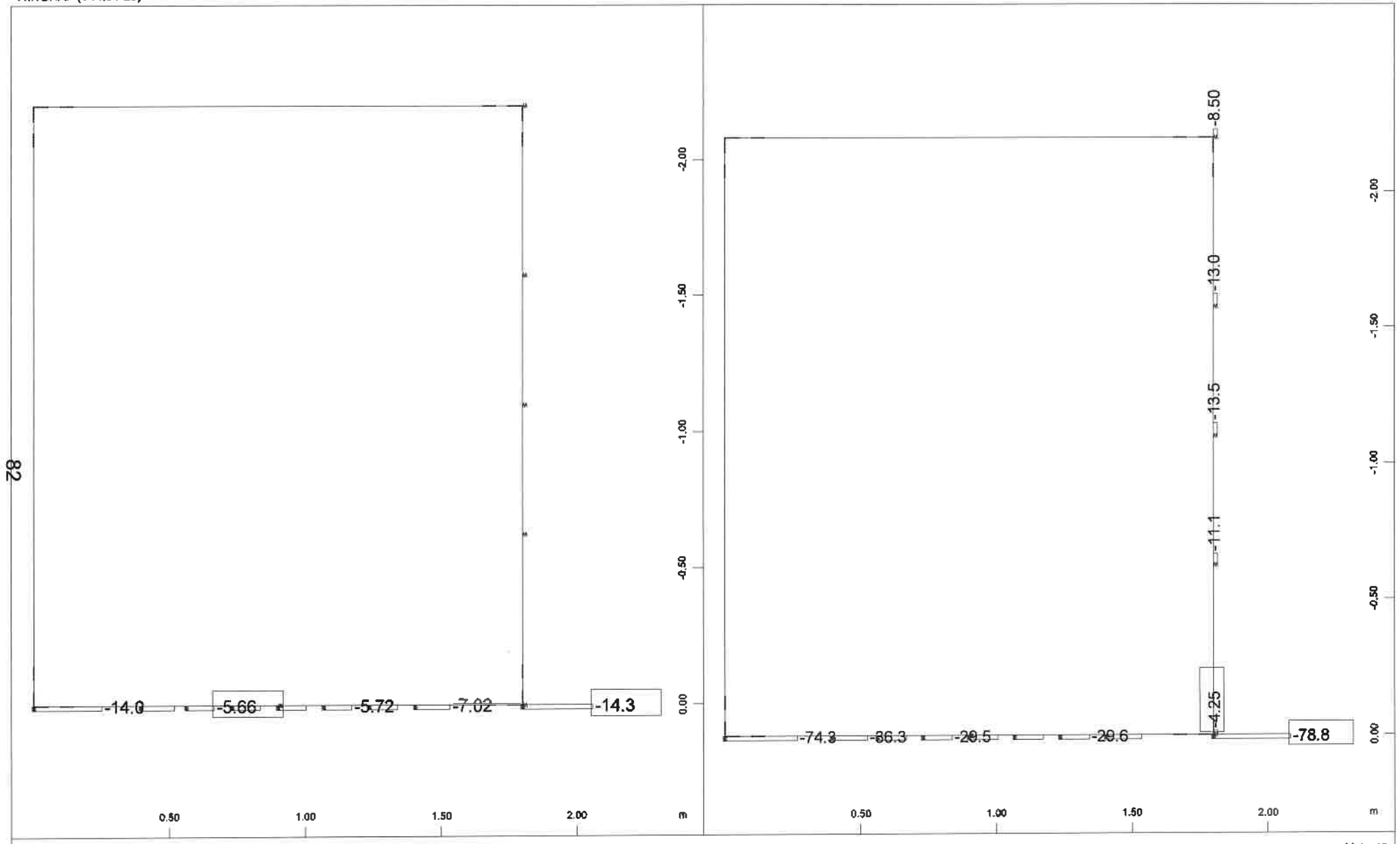
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=1000kN/m3)
comb. 2 for bedding stresses- EARTHQUAKE

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type	Title
1	1.00	permanent load grouped in actions	SELF WEIGHT
2	1.00	permanent load grouped in actions	SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions	EARTH PRESSURE
90	0.20	Conditional LC	LIVE LOADS
10	0.20	Conditional LC	LIVE LOAD EARTH PRESSURE
12	1.00	Exclusive LC A 1	SEISMOS SE FASH

Generated Loadcases

Number	Comb	Title
2001	1	MAX-P SPRI
2002	1	MIN-P SPRI

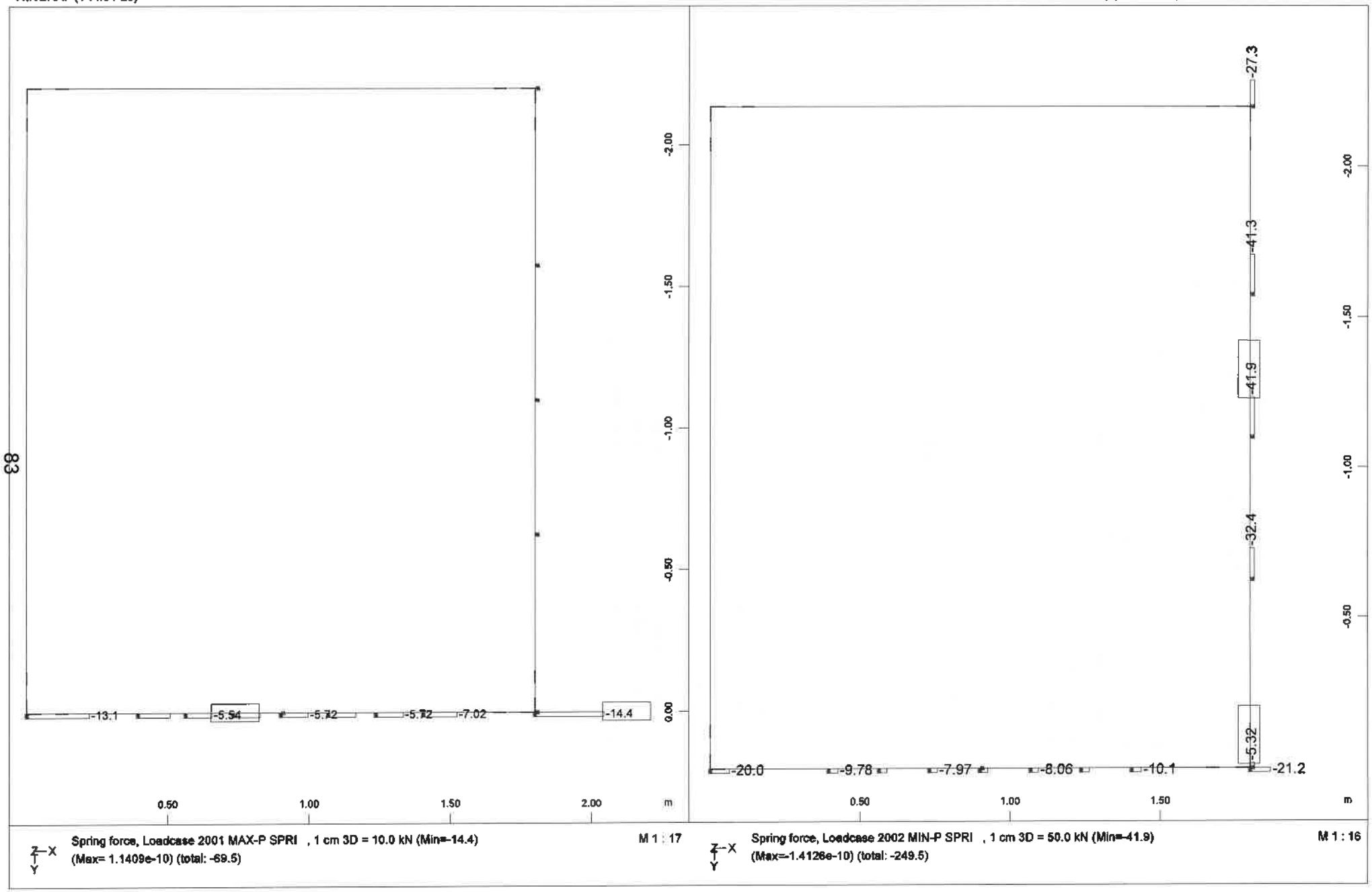


Spring force, Loadcase 1001 MAX-P SPRI , 1 cm 3D = 10.0 kN (Min=-14.3)
(Max= 3.7992e-09) (total: -70.8)

M 1 : 18

Spring force, Loadcase 1002 MIN-P SPRI , 1 cm 3D = 50.0 kN (Min=-78.8)
(Max=-1.1021e-09) (total: -423.7)

M 1 : 18



Spring force, Loadcase 2001 MAX-P SPRI , 1 cm 3D = 10.0 kN (Min=-14.4)
(Max= 1.1409e-10) (total: -69.5)

M 1 : 17

Spring force, Loadcase 2002 MIN-P SPRI , 1 cm 3D = 50.0 kN (Min=-41.9)
(Max=-1.4126e-10) (total: -249.5)

M 1 : 16

ΟΧΕΤΟΣ 1.50Χ1.90 (Ηεπ=0.30m)

Εσωτερικό πλάτος	1,50 m
Ολικό πλάτος	2,10 m
Εσωτερικό ύψος (με στρώση φθοράς)	1,90 m
Ολικό ύψος	2,50 m
Πάχος τοιχωμάτων	0,30 m
Πάχος πλακών	0,30 m
Ύψος επίχωσης	0,30 m

ΕΛΕΓΧΟΣ ΘΕΜΕΛΙΩΣΗΣ

Φορτία:

Ιδιο βάρος: ($E*25/b_{ολ}$)= 28,57 kN/m^2

Επίχωση: 5,40 kN/m^2

Κινητό: 66,81 kN/m^2

Επικάλυψη πυθμένα: 0,00 kN/m^2

100,78 kN/m^2 < σεπ

Τάσεις αιχμής:

-Στατικά (LC1002)

Επιφάνεια επιρροής δυσμενέστερου ελατηρίου

F = 0,30 + 1,50/16 = 0,3938 m

σmax = -78,8/0,394= **-200,13 kN/m^2**

-Σεισμός (LC2002)

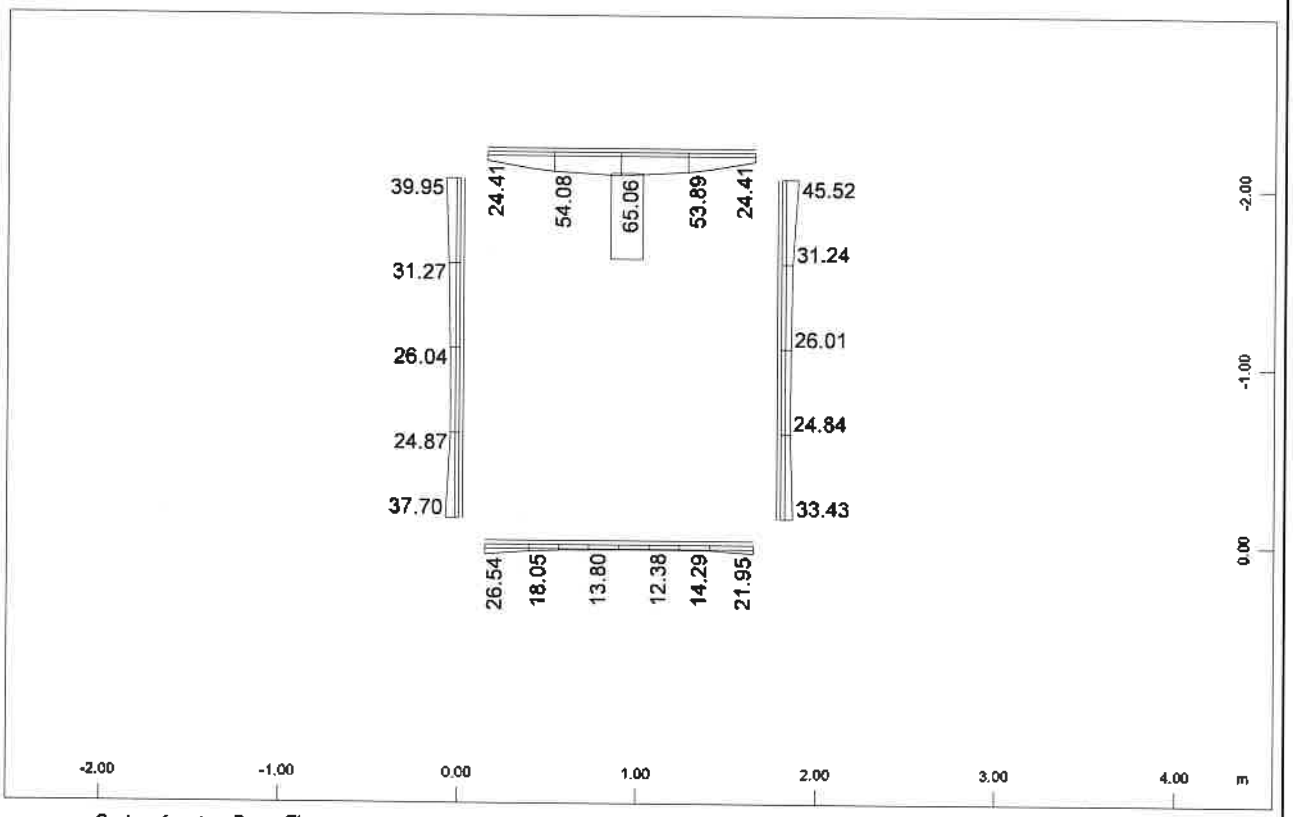
Επιφάνεια επιρροής δυσμενέστερου ελατηρίου

F = 0,30 + 1,5/16 = 0,3938 m

σmax = -21,2/0,394= **-53,84 kN/m^2**

ΓΡΑΦΗΜΑΤΑ ΑΠΟ ΕΠΙΛΥΣΗ ΚΙΒ. ΟΧΕΤΟΥ1.50x1.90 [Ηεπ=0.30m]
(ks=20000 KN/m^3)

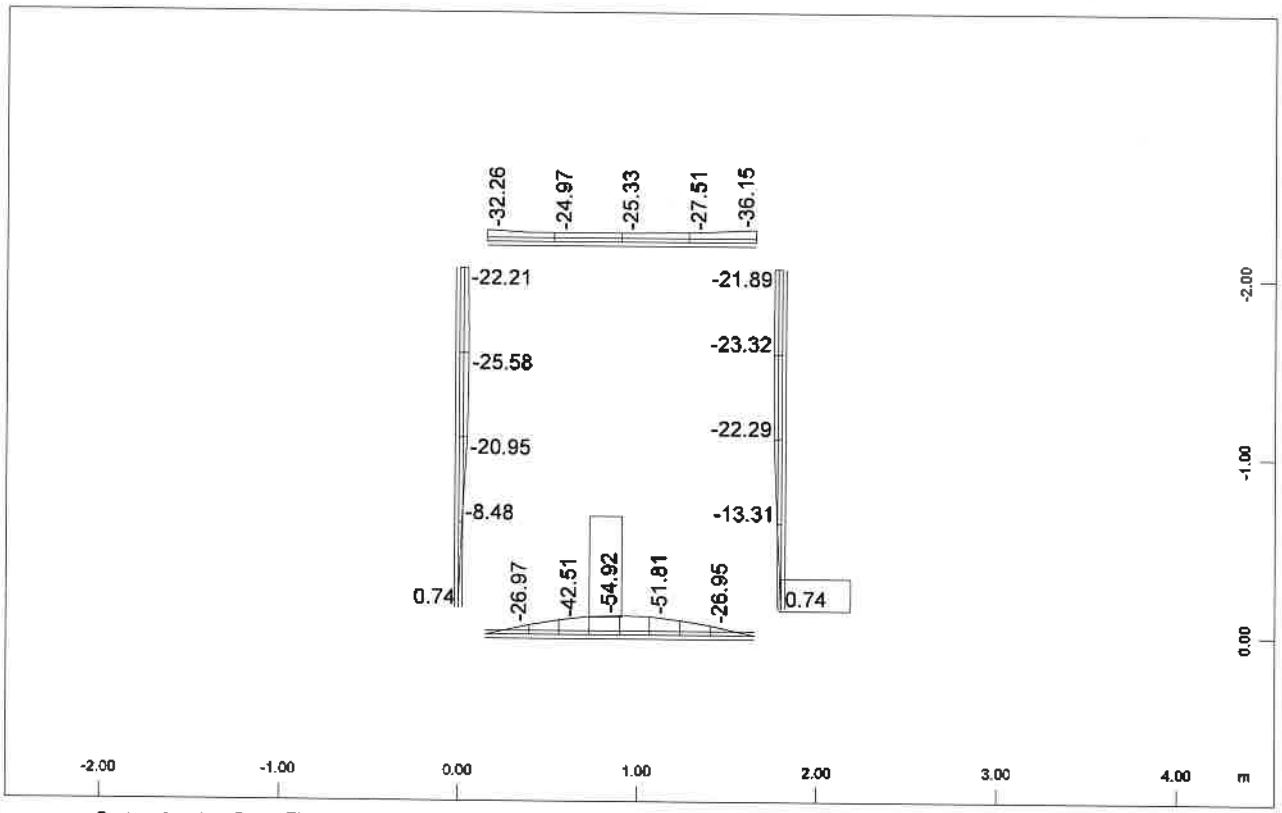
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)
ENVELOPES FOR MY



Z-X
Y

Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 701 MAX-MY BEAM , 1 cm 3D = 200.0 kNm
(Max=65.1)

M 1 : 40

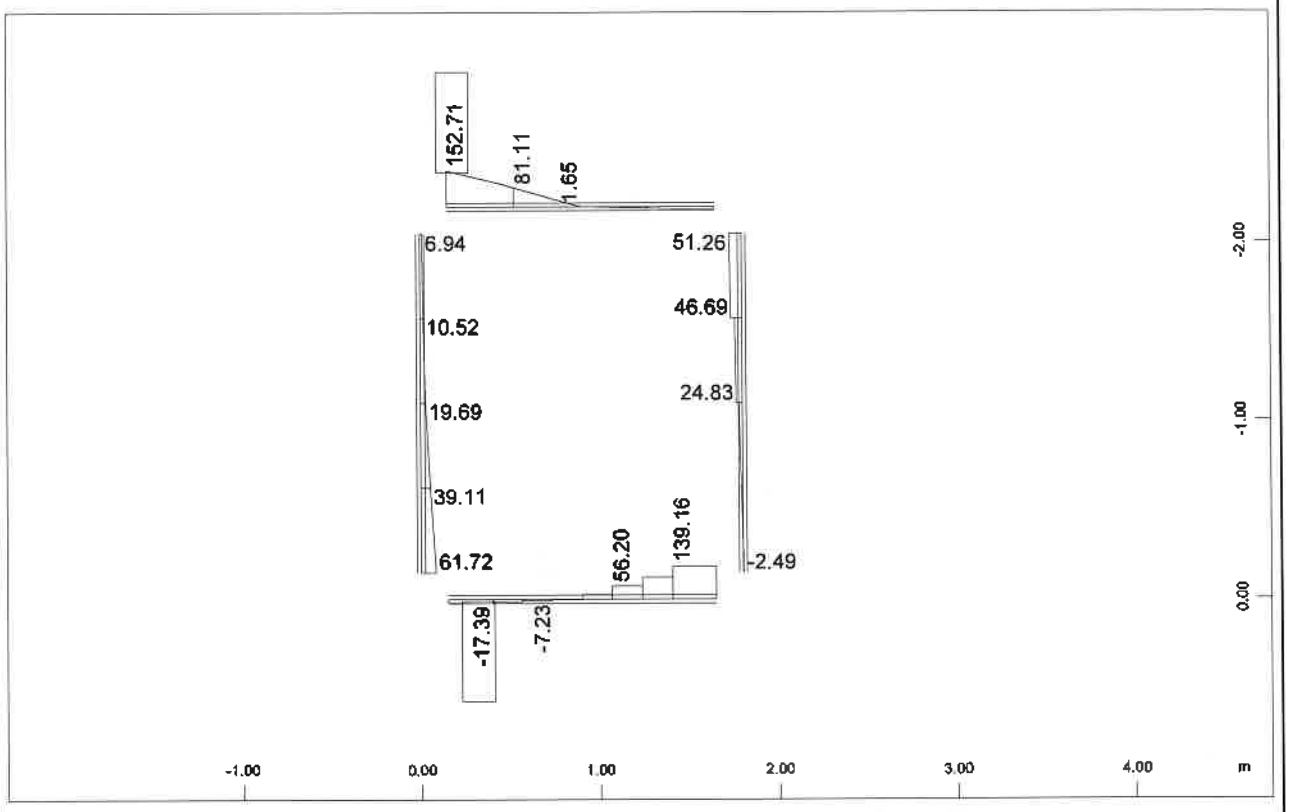


Z-X
Y

Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 702 MIN-MY BEAM , 1 cm 3D = 200.0 kNm
(Min=-54.9) (Max=0.736)

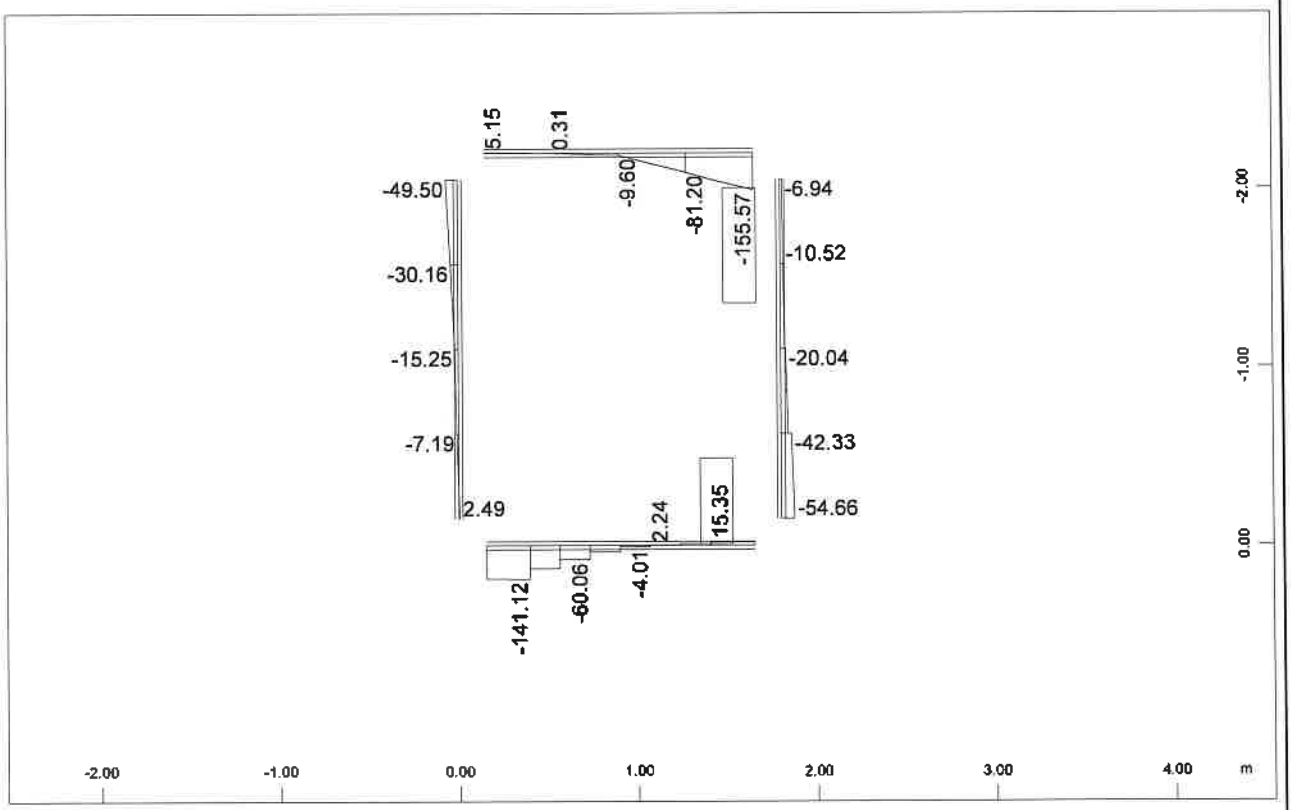
M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)
ENVELOPES FOR VZ



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 703 MAX-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-17.4) (Max=152.7)

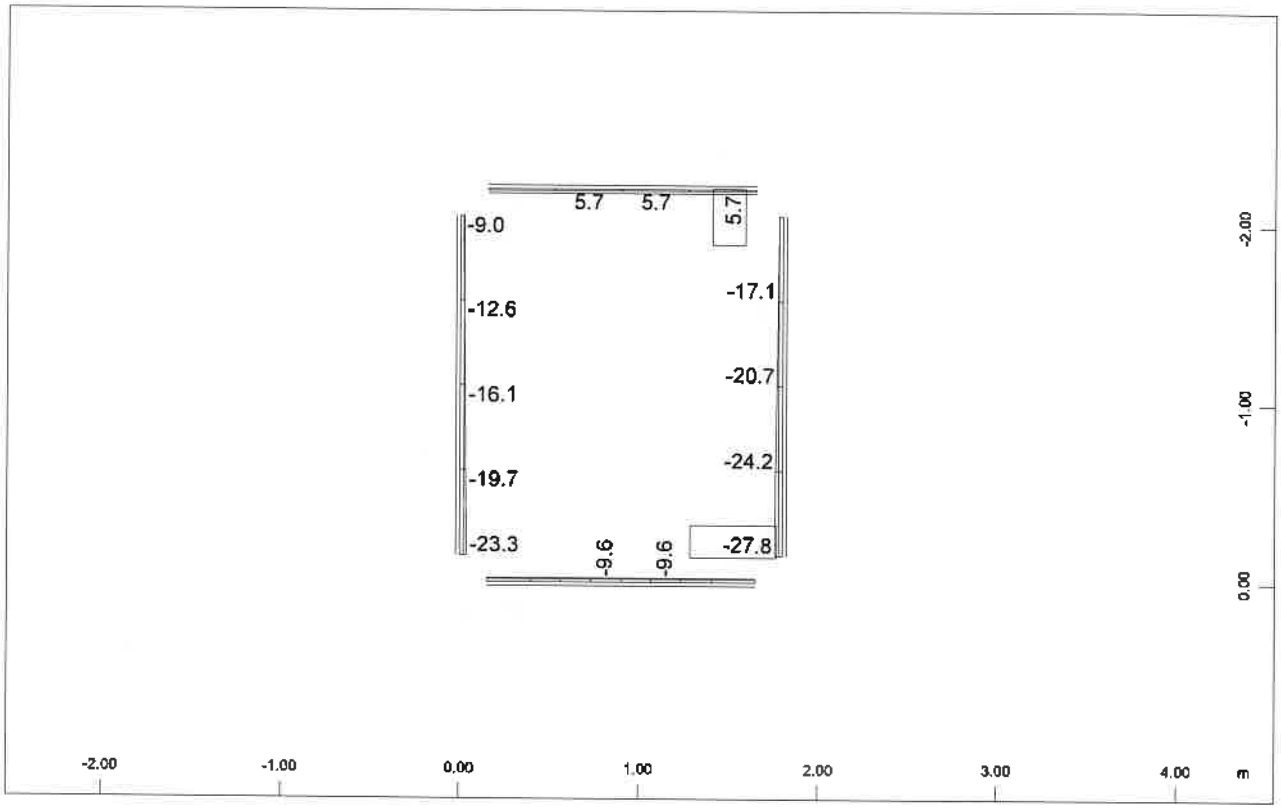
M 1 : 40



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 704 MIN-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-155.6) (Max=15.4)

M 1 : 40

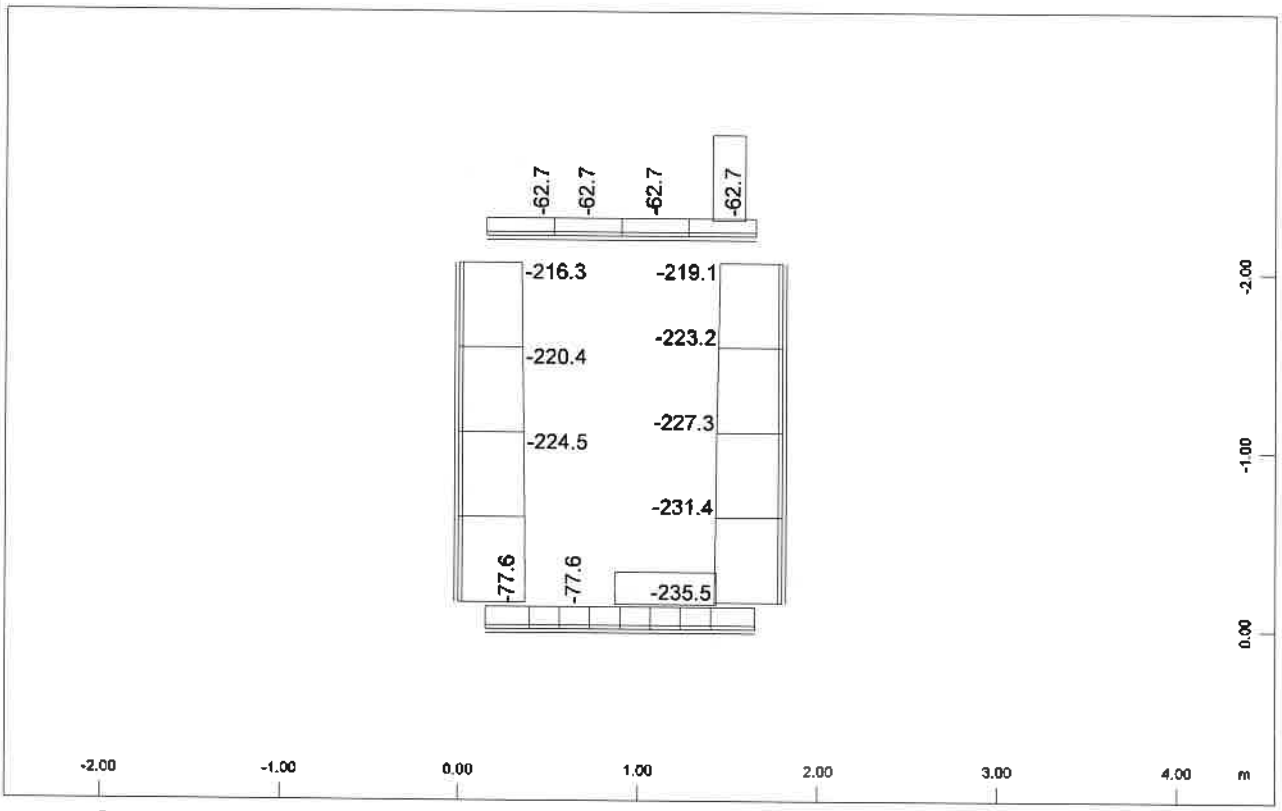
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)
ENVELOPES FOR N



Z–X
Y

Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 705 MAX-N BEAM , 1 cm 3D = 250.0 kN
(Min=-27.8) (Max=5.72)

M 1 : 40

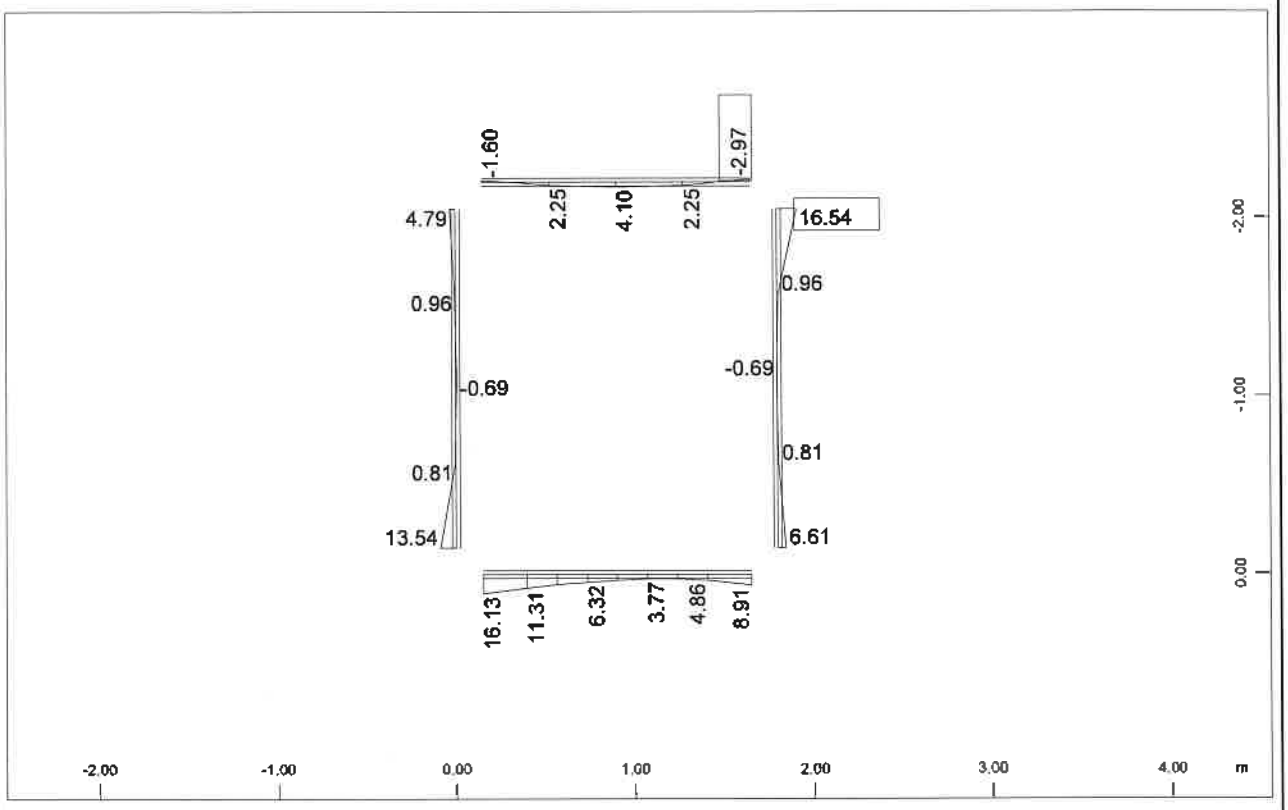


Z–X
Y

Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 706 MIN-N BEAM , 1 cm 3D = 250.0 kN
(Min=-235.5) (Max=-62.7)

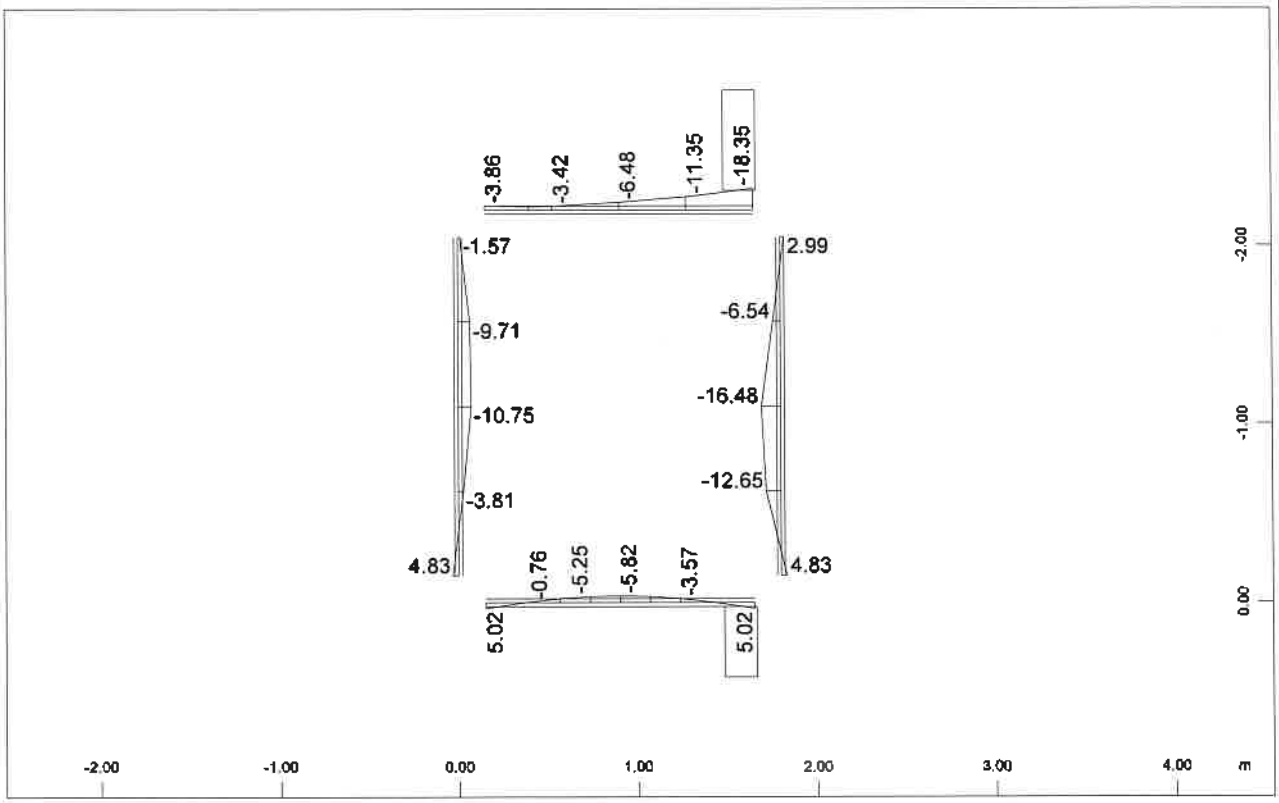
M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)
ENVELOPES FOR MY



Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 201 MAX-MY BEAM , 1 cm 3D = 60.0 kNm
(Min=-2.97) (Max=16.5)

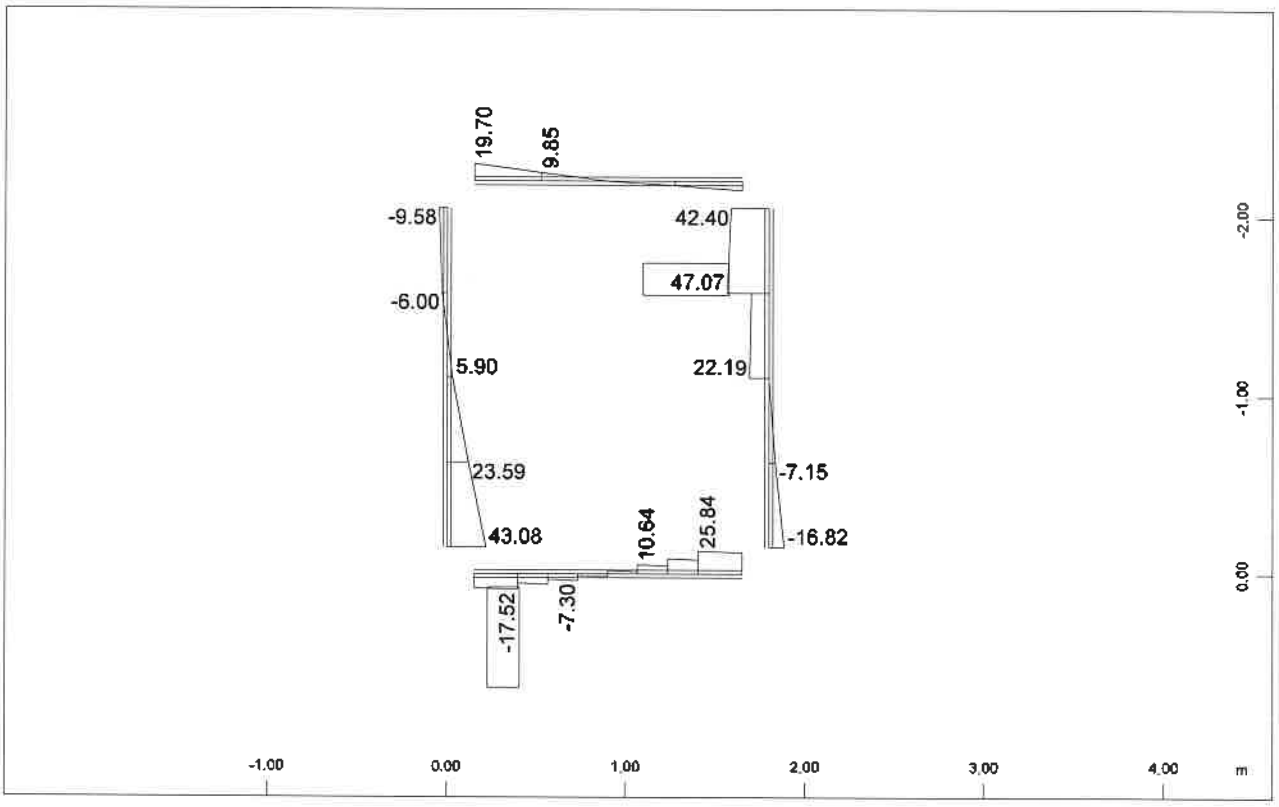
M 1 : 40



Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 202 MIN-MY BEAM , 1 cm 3D = 60.0 kNm
(Min=-18.4) (Max=5.02)

M 1 : 40

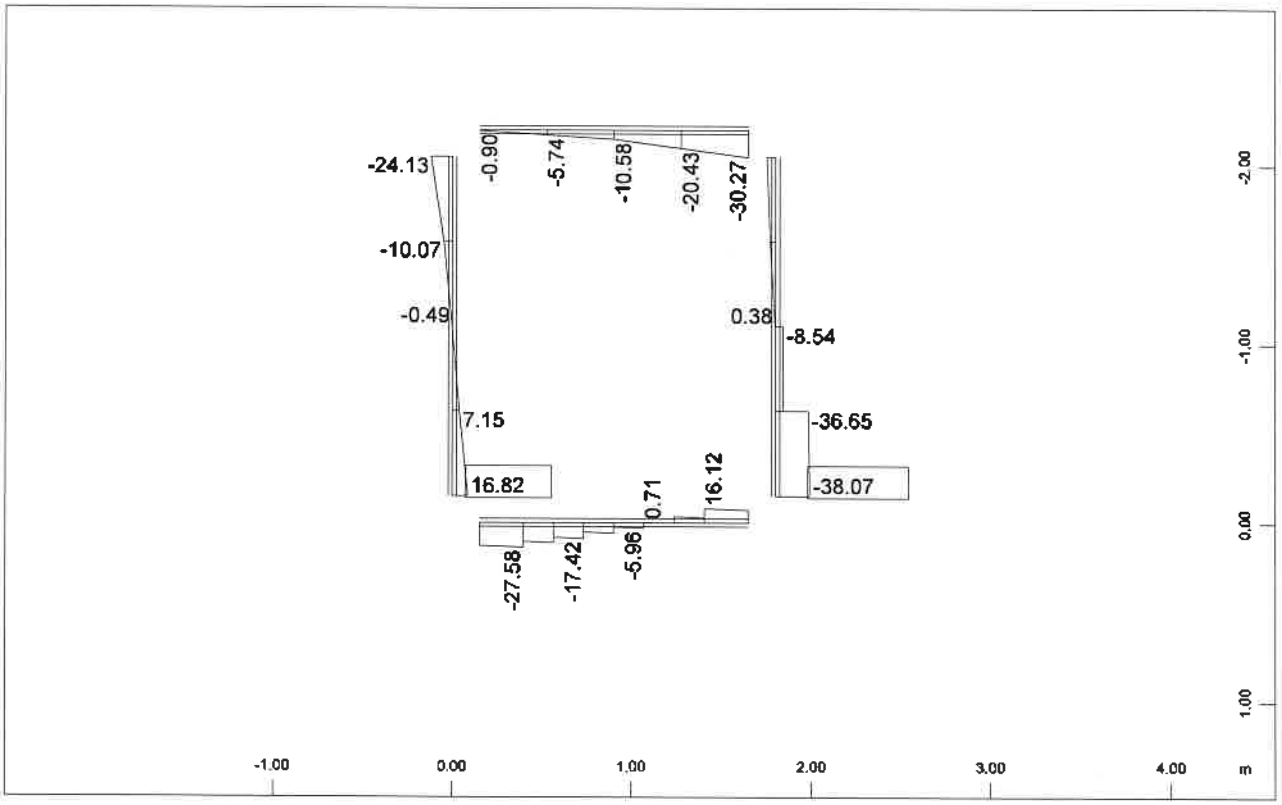
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)
ENVELOPES FOR VZ



Z X Y

Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 203 MAX-VZ BEAM , 1 cm 3D = 80.0 kN (Min=-17.5)
(Max=47.1)

M 1 : 40

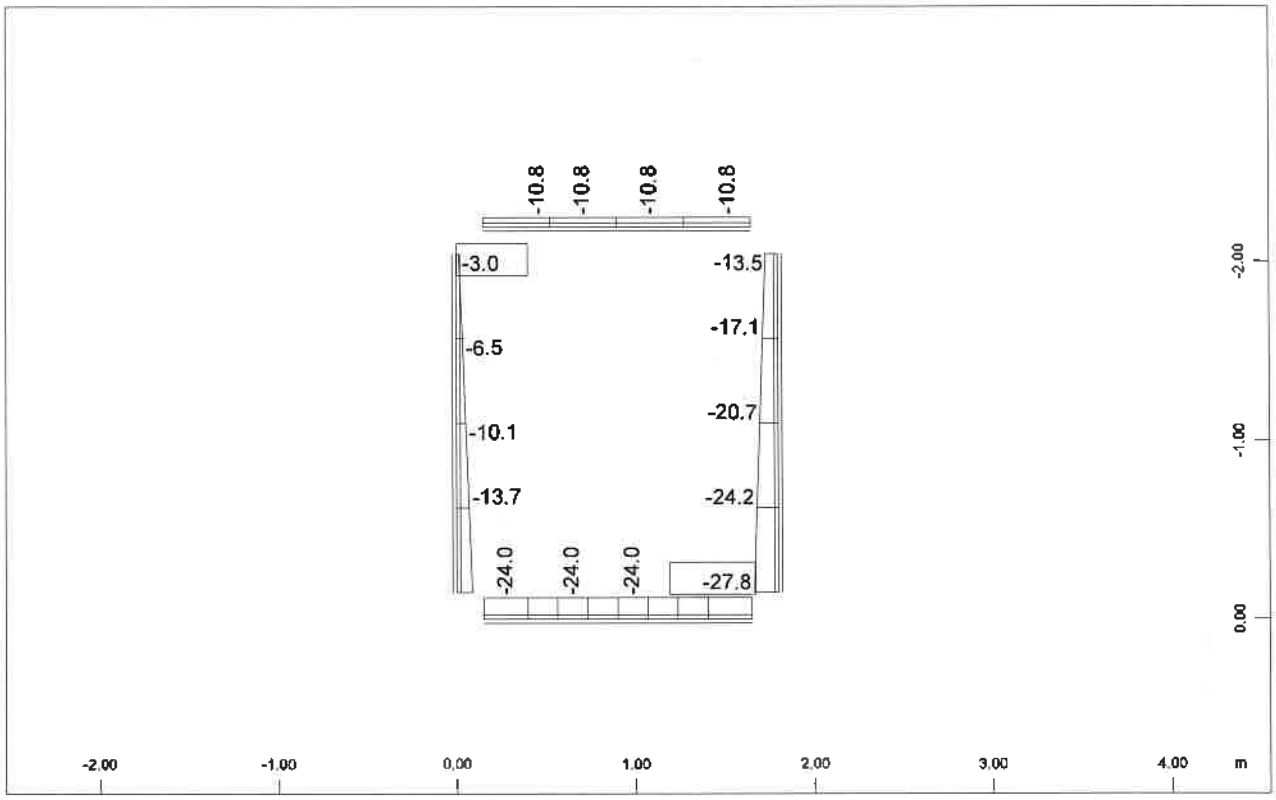


Z X Y

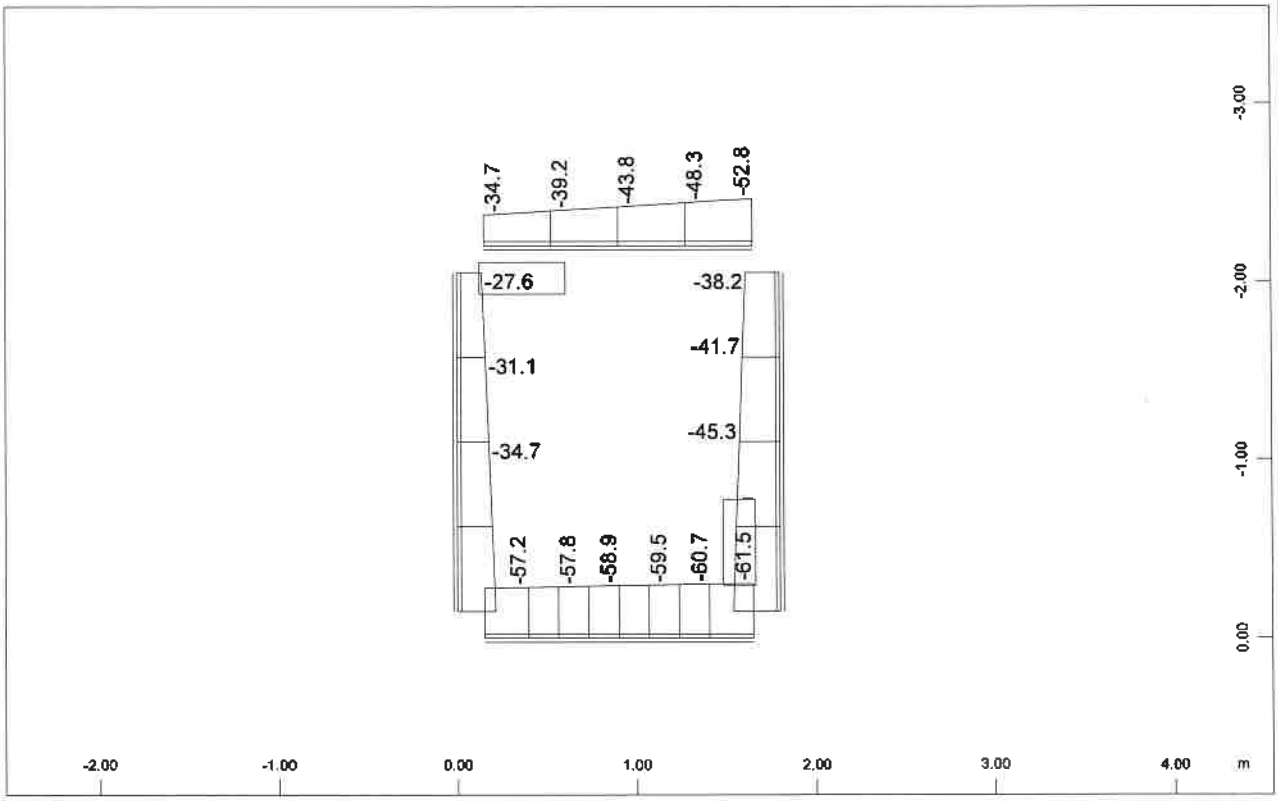
Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 204 MIN-VZ BEAM , 1 cm 3D = 80.0 kN (Min=-38.1)
(Max=16.8)

M 1 : 40

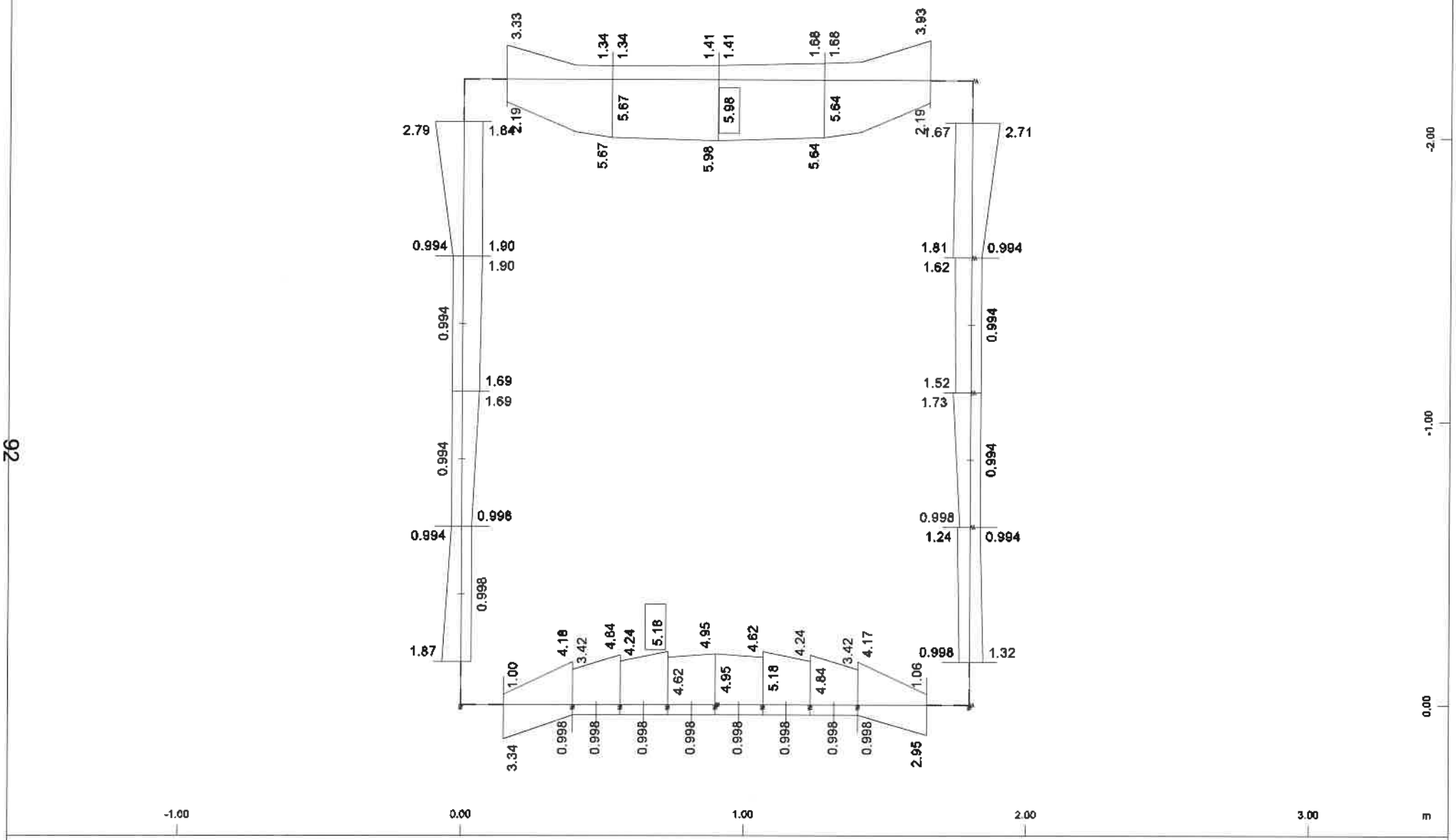
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)
ENVELOPES FOR N



Sector of system Beam Elements
M 1 : 40
Beam Elements , Normal force Nx, Loadcase 205 MAX-N BEAM , 1 cm 3D = 80.0 kN (Min=-27.8)
(Max=-2.97)



Sector of system Beam Elements
M 1 : 40
Beam Elements , Normal force Nx, Loadcase 206 MIN-N BEAM , 1 cm 3D = 80.0 kN (Min=-61.5)
(Max=-27.6)

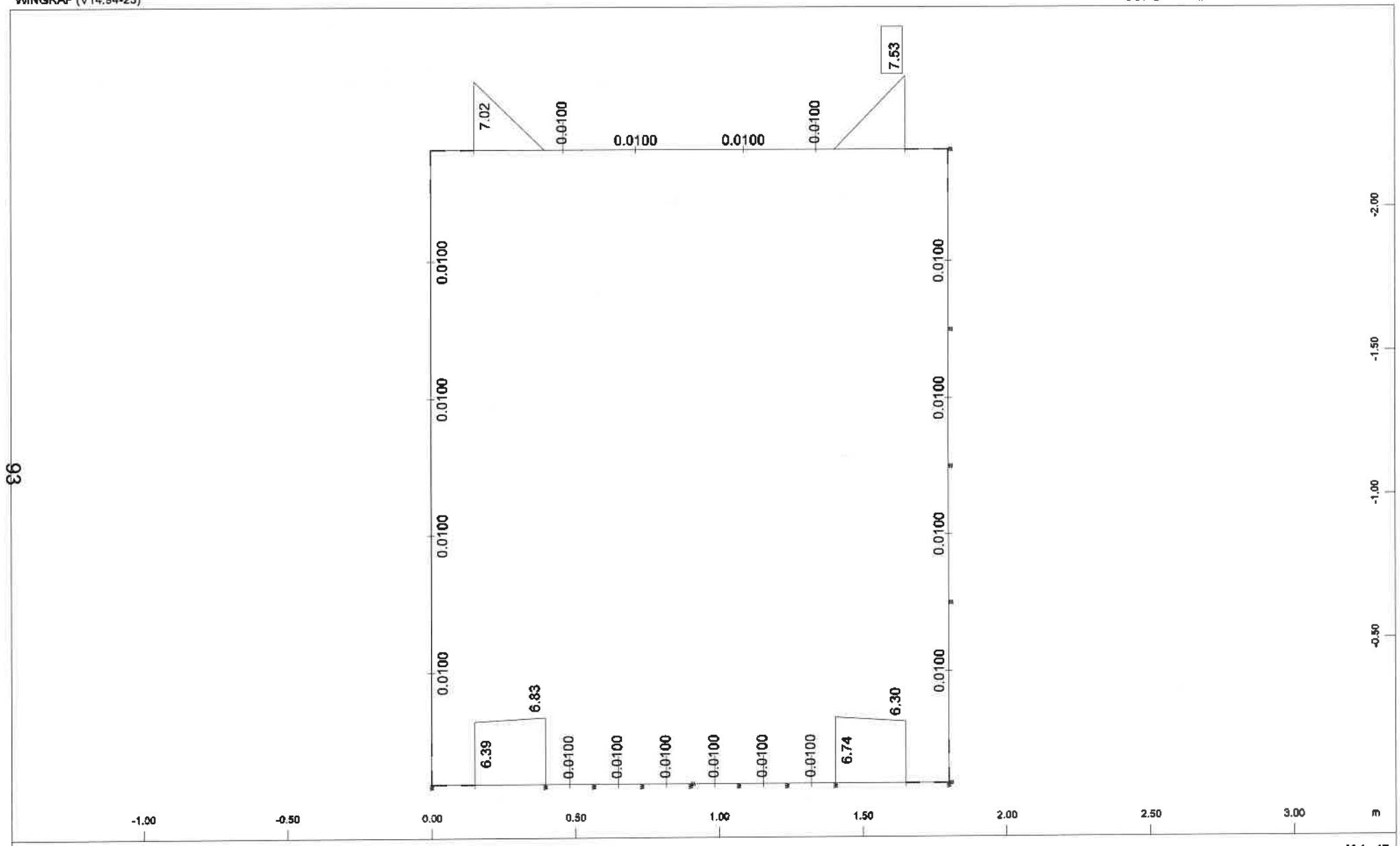


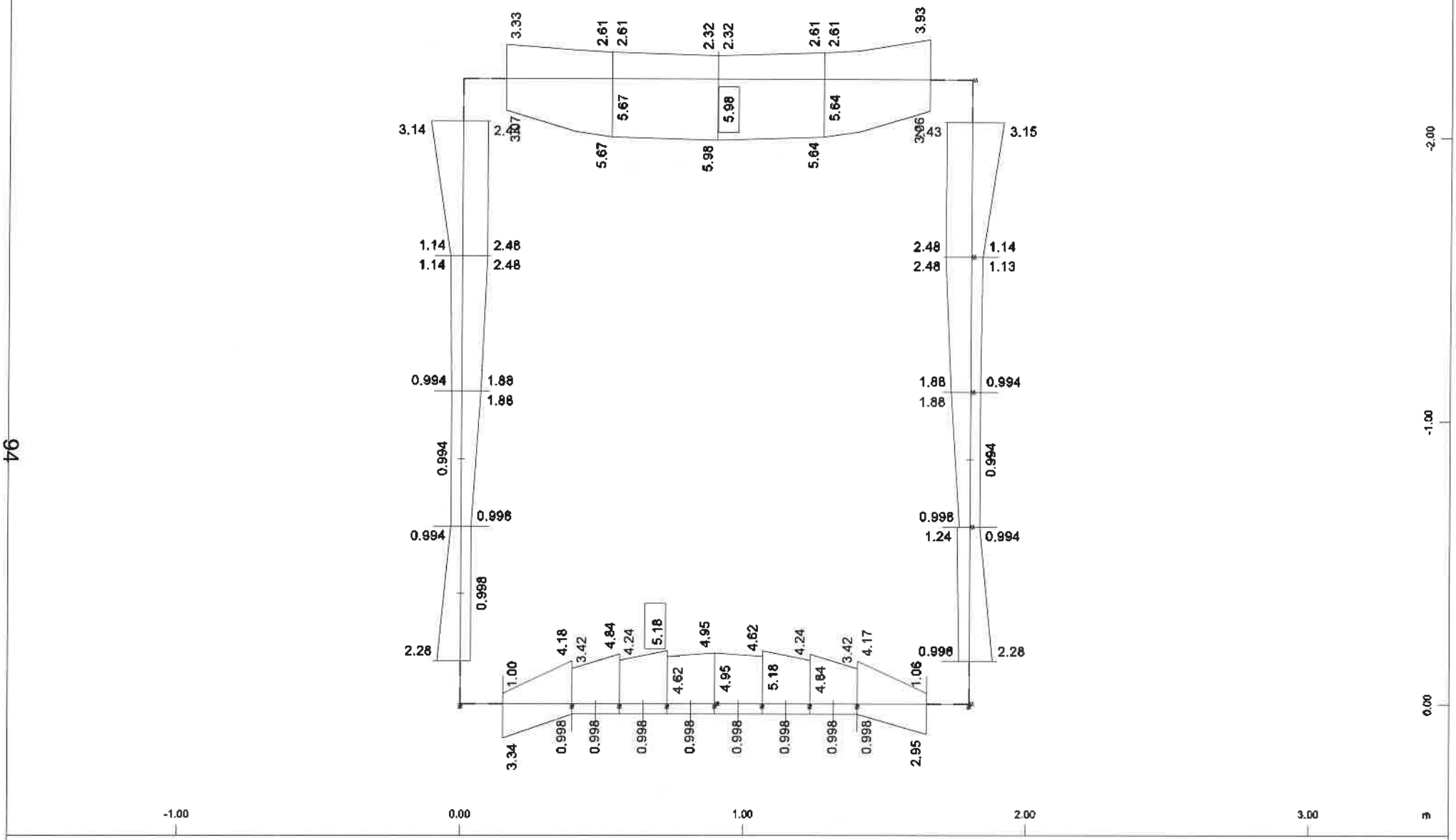
Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.98)

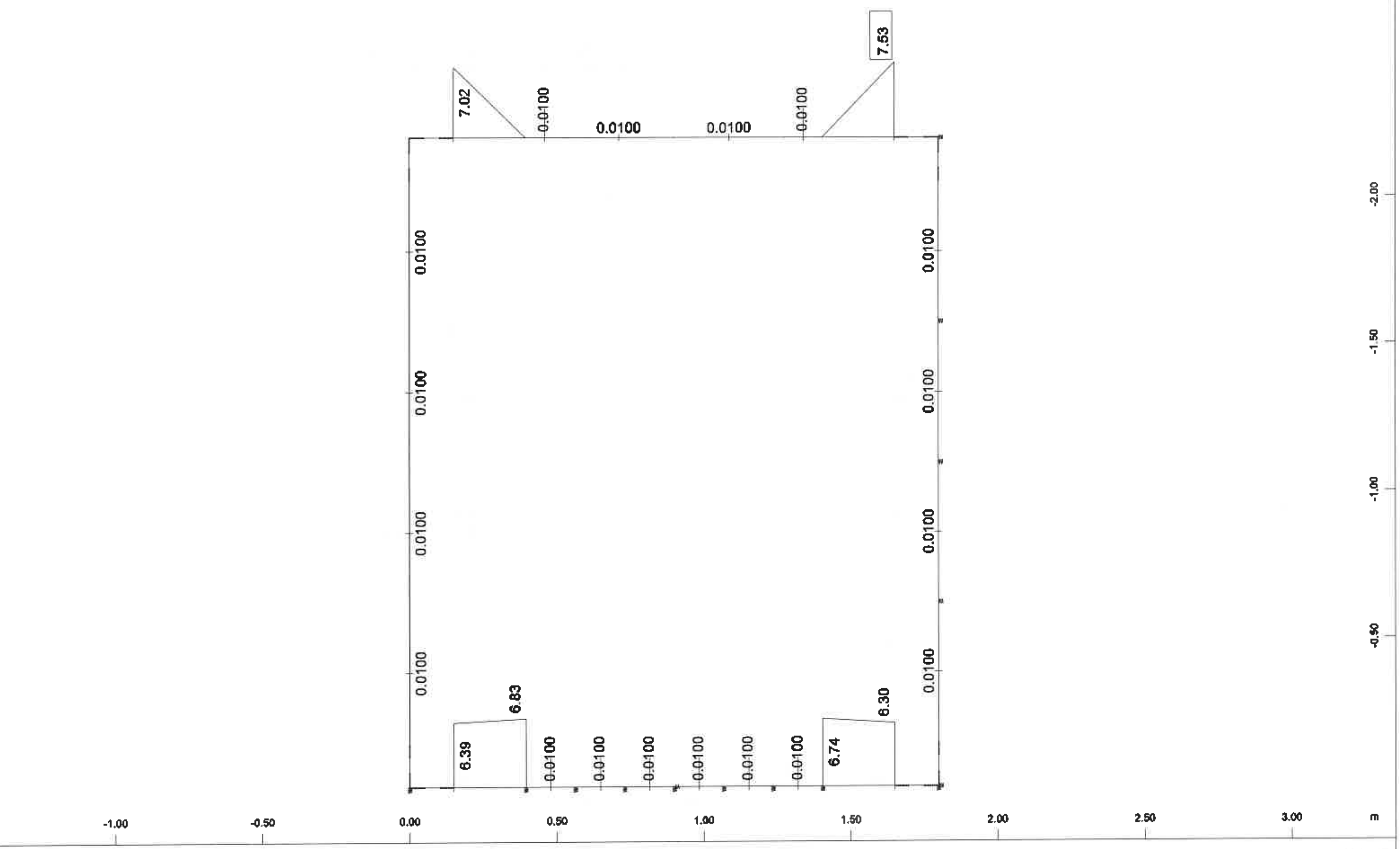
Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.18)

M 1 : 18

BOX CULVERT 1.60x1.90 (Hep=0.30m, ks=20000kN/m3)


7.53
7.02
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
0.0100
6.83
6.39
6.30
6.74
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00
2.50
3.00
m
-2.00
-1.50
-1.00
-0.50
Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.53)
M 1 : 17
Z
X
Y

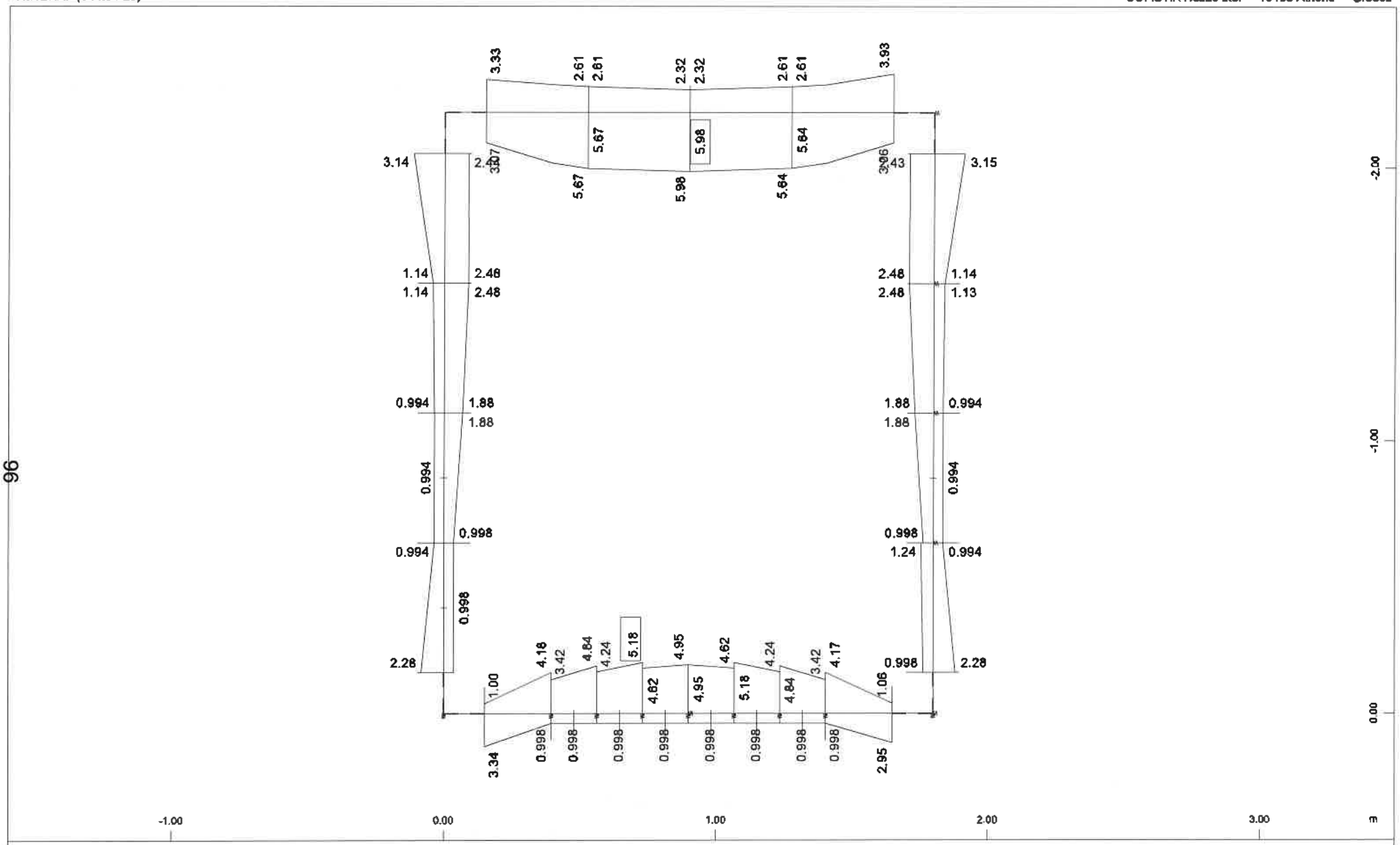

3.33
2.61
2.61
2.32
2.32
2.61
2.61
3.93
5.67
5.98
5.64
3.14
3.15
1.14
2.48
1.14
2.48
2.48
1.14
2.48
1.13
0.994
1.88
1.88
1.88
0.994
0.994
0.994
0.998
0.994
0.998
1.24
0.994
2.26
0.998
2.28
4.18
3.42
4.84
4.24
5.18
4.95
4.62
4.24
3.42
4.17
1.00
1.06
3.34
2.95
-1.00
0.00
1.00
2.00
3.00
m
-2.00
-1.00
0.00
Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.98)
Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.18)
M 1 : 18



Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.53)

M 1 : 17

BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)

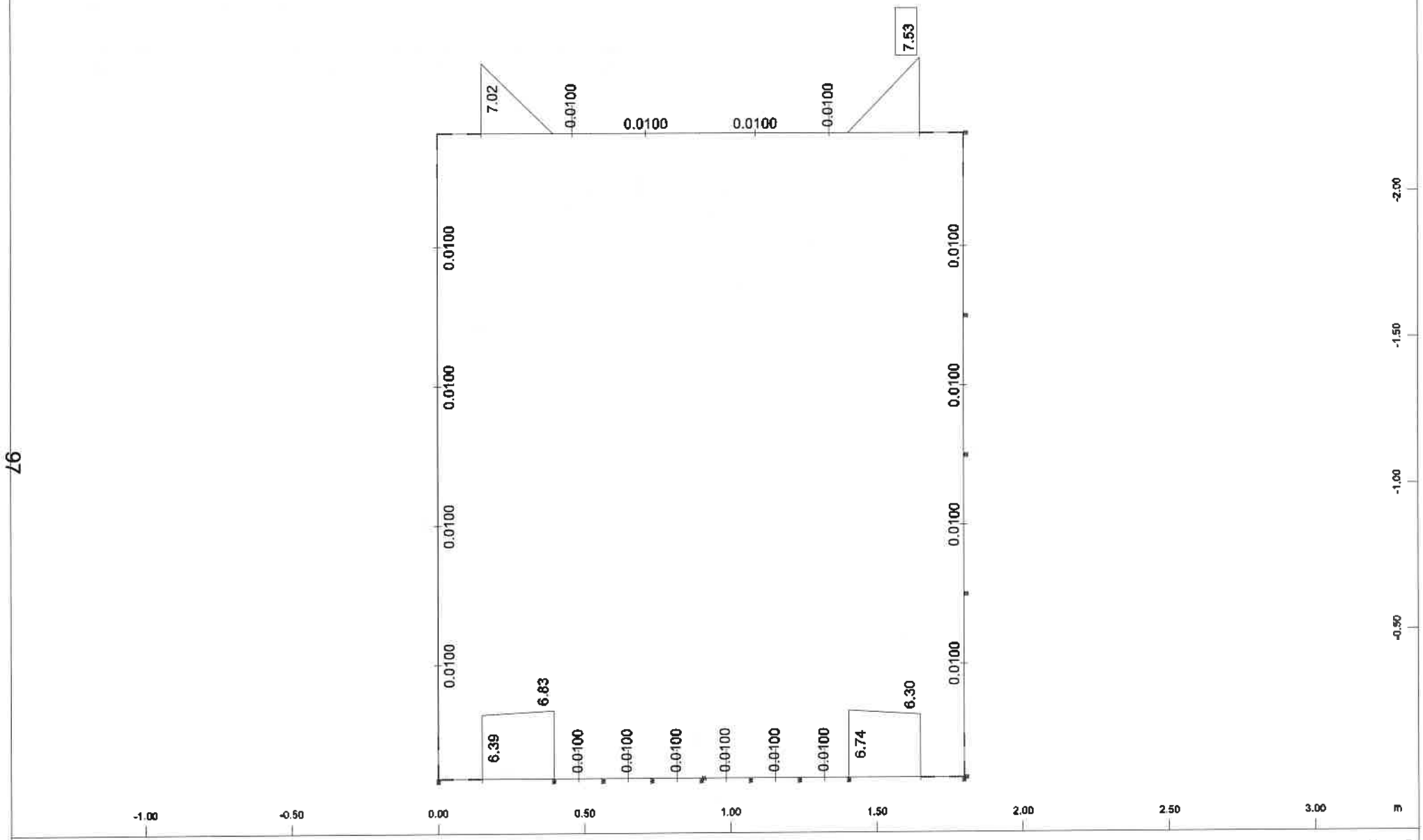


Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.98)

Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=5.18)

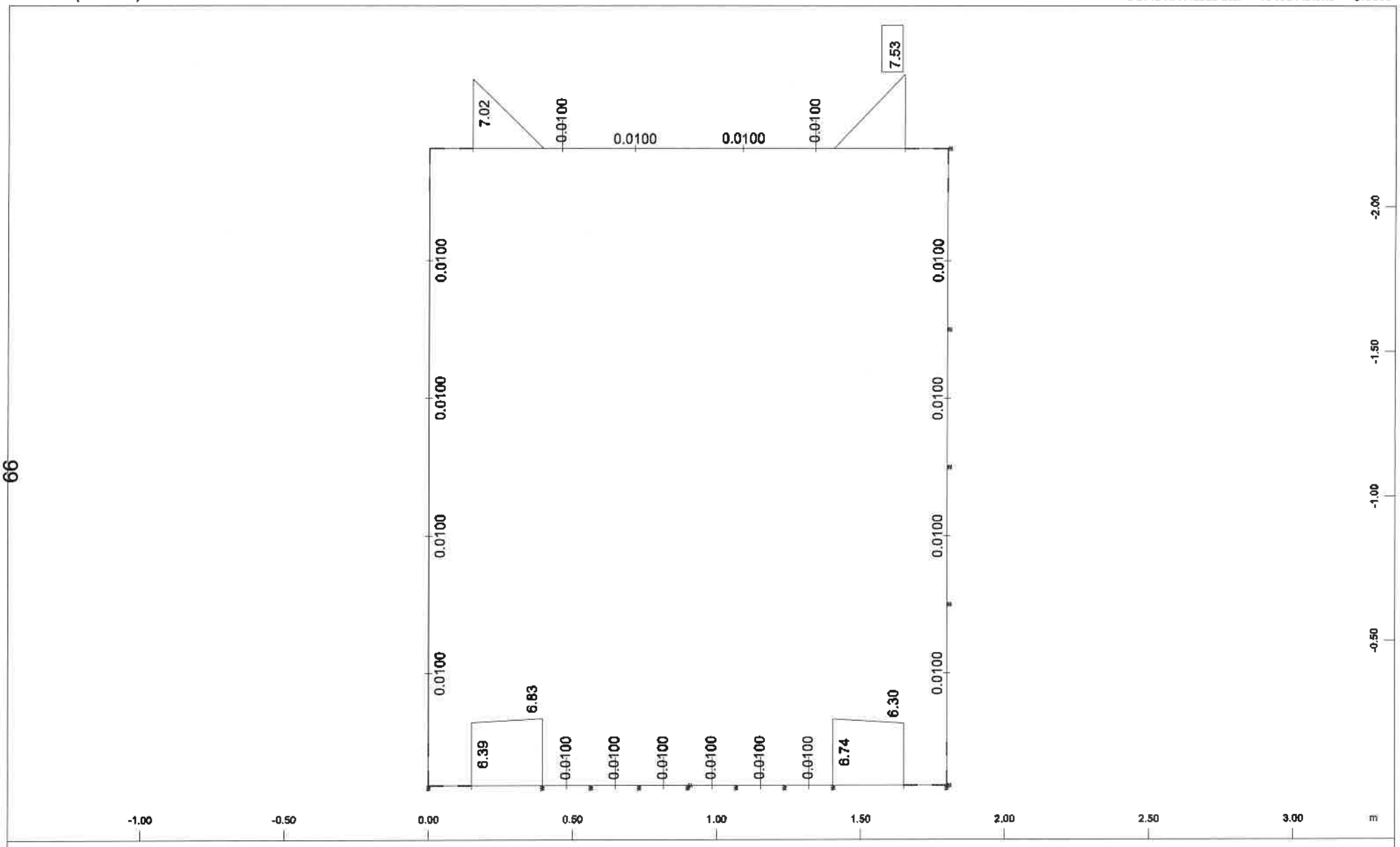
M 1 : 18

BOX CULVERT 1.60x1.90 (Hep=0.30m, ks=20000kN/m3)



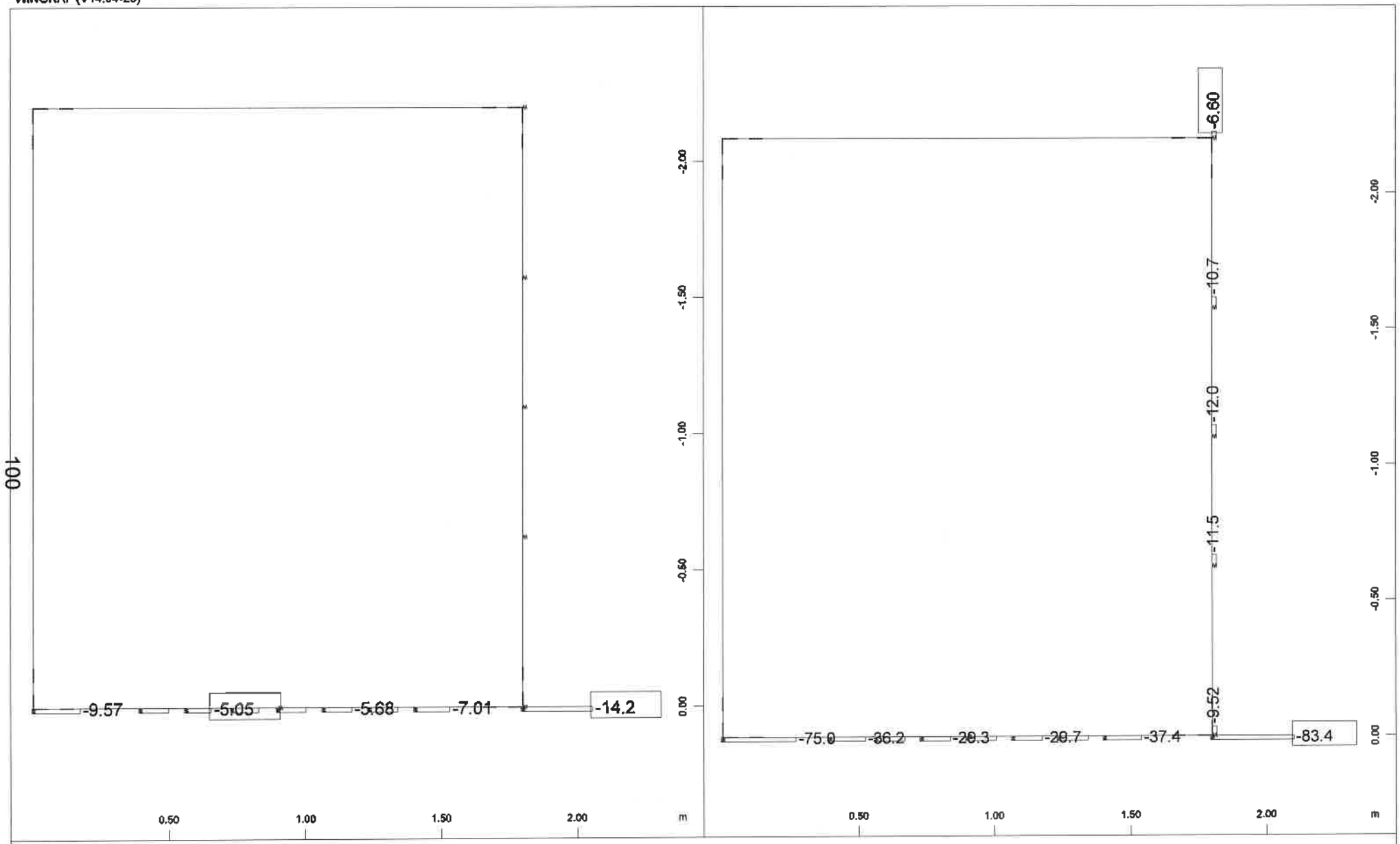
BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)

ΔΙΑΣΤΑΣΙΟΛΟΓΗΣΗ ΣΕ ΔΙΑΤΜΗΣΗ ΜΕ ΣΥΝΤΕΛΕΣΤΗ 1.25 ΣΤΟ ΣΕΙΣΜΟ

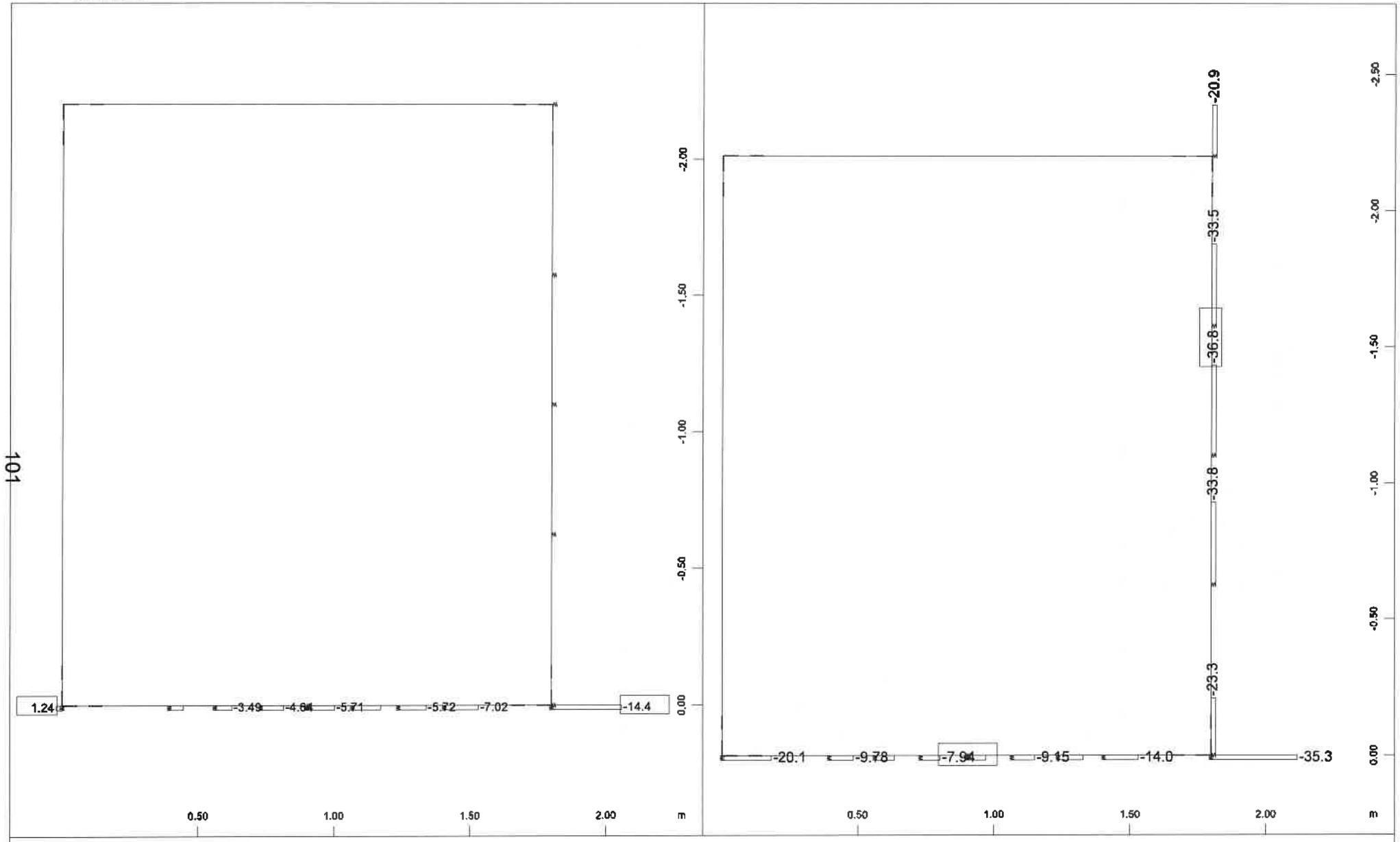


Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 5.00 cm2/m (Max=7.53)

M 1 : 17



BOX CULVERT 1.50x1.90 (Hep=0.30m, ks=20000kN/m3)



Spring force, Loadcase 2001 MAX-P SPRI , 1 cm 3D = 10.0 kN (Min=-14.4) (Max=1.24) (total: -48.3)

M 1 : 18

Spring force, Loadcase 2002 MIN-P SPRI , 1 cm 3D = 20.0 kN (Min=-36.6) (Max=-1.2480e-10) (total: -270.7)

M 1 : 18

ΟΧΕΤΟΣ 1.50Χ1.90 (Ηεπ=0.30m)

Εσωτερικό πλάτος	1,50 m
Ολικό πλάτος	2,10 m
Εσωτερικό ύψος (με στρώση φθοράς)	1,90 m
Ολικό ύψος	2,50 m
Πάχος τοιχωμάτων	0,30 m
Πάχος πλακών	0,30 m
Ύψος επίχωσης	0,30 m

ΕΛΕΓΧΟΣ ΘΕΜΕΛΙΩΣΗΣ

Φορτία:

Ίδιο βάρος: ($E^*25/b_{ολ}$)=	28,57	kN/m^2
Επίχωση:	5,40	kN/m^2
Κινητό:	66,81	kN/m^2
Επικάλυψη πυθμένα:	0,00	kN/m^2
	100,78	**kN/m^2** **< σεπ**

Τάσεις αιχμής:

-Στατικά (LC1002)

Επιφάνεια επιρροής δυσμενέστερου ελατηρίου

F = 0,30 + 1,50/16 = 0,3938 m

σmax = -83,4/0,394= **-211,81 kN/m^2**

-Σεισμός (LC2002)

Επιφάνεια επιρροής δυσμενέστερου ελατηρίου

F = 0,30 + 1,5/16 = 0,3938 m

σmax = -35,3/0,394= **-89,65 kN/m^2**

ΔΙΑΜΗΚΕΙΣ ΟΠΛΙΣΜΟΙ

Σύμφωνα με τη μέθοδο που παρουσιάζεται στην Τεχνική Έκθεση της DENCO A.E.

φ=30°, γ=18 KN/m3 - Η δύναμη τριβής εφαρμόζεται στις πλευρες των τοίχων και των πλακών που είναι σε επαφή με το έδαφος.

Παραδοχές:

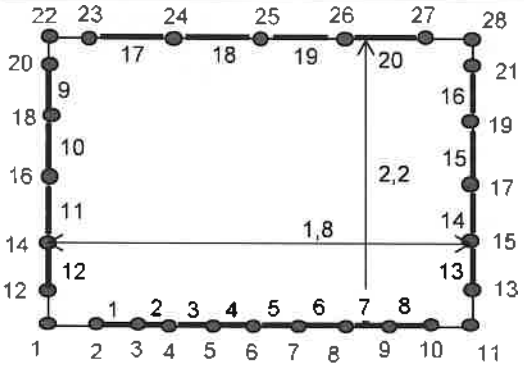
S.N.	B (m)	H (m)	Dslab (m)	Dwall (m)	A (m2)	Hemb (m)	Hemb (bot) (m)	L (m)	maximum stress σct (MPa)	ratio σct/βz (R)	diameter of long. Reinf. φs (mm)	bar incease ratio d/(10(d-h)) slab	new bar diameter	steel tensile stress MPa	μzmin=ko*β bz/σs (%) Full constraint	μzreq=R*μz max (%) actual constraint	Placed μz (>=μzmin) (%)	Reinforcements per face (cm2/m)	Reinforcements per face
ΟΧΕΤΟΣ	1,50	1,90	0,30	0,30	2,40	0,30	0,00	12,10	0,22	0,08	12	1,00	12,00	280	0,954	0,0792	0,2000	3,00	Φ12/15

μzmin=0.20%

ΚΙΒΩΤΟΕΙΔΗΣ ΟΧΕΤΟΣ 1.50x1.90, d=0.30m [Ηεπ=4.00m]
(ks=1000 KN/m^3)

ΟΧΕΤΟΣ 1.50x1.90 (Ηεπ=4.00m)

Εσωτερικό πλάτος	1,50 m
Εσωτερικό ύψος (με στρώση φθοράς)	1,90 m
Πάχος τοιχωμάτων	0,30 m
Πάχος πάνω πλάκας	0,30 m
Πάχος κάτω πλάκας	0,30 m
Ύψος επίχωσης	4,00 m
Δείκτης εδάφους	1000,00 kN/m^3
Es	50000,00 kN/m^2
H	6,50 m



ΚΟΜΒΟΙ	**Συντεταγμένες κόμβων**		**Ελατήρια πυθμένα**	**Πλευρικά ελατήρια**			**ΜΕΛΗ**	**Κομβοι αρχής-τέλους**	**Μήκη**
	X (m)	**Y (m)**	**kN/m**	**y**	**Ksh**	**cp (kN/m)**			**L (m)**
1	0	0	422,50				**1**	2-3	0,245
2	0,15	0					**2**	3-4	0,16833
3	0,395	0	206,67				**3**	4-5	0,16833
4	0,563	0	168,33				**4**	5-6	0,16833
5	0,732	0	168,33				**5**	6-7	0,16833
6	0,900	0	168,33				**6**	7-8	0,16833
7	1,068	0	168,33				**7**	8-9	0,16833
8	1,237	0	168,33				**8**	9-10	0,245
9	1,405	0	206,67				**9**	20-18	0,475
10	1,650	0					**10**	18-16	0,475
11	1,800	0	422,50	6,35	18035,50	9694,08	**11**	16-14	0,475
12	0	0,15					**12**	14-12	0,475
13	1,800	0,15		6,20	17609,47		**13**	13-15	0,475
14	0	0,625					**14**	15-17	0,475
15	1,800	0,625		5,73	16260,36	7723,67	**15**	17-19	0,475
16	0	1,1					**16**	19-21	0,475
17	1,800	1,1		5,25	14911,24	7082,84	**17**	23-24	0,375
18	0	1,575					**18**	24-25	0,375
19	1,800	1,575		4,78	13562,13	6442,01	**19**	25-26	0,375
20	0	2,05					**20**	26-27	0,375
21	1,800	2,05		4,30	12213,02		**ΑΚΑΜΠΤΑ ΜΕΛΗ**	1-2	**ΚΟΜΒΟΙ ΑΡΧΗΣ-ΤΕΛΟΥΣ**
22	0	2,2						10-11	
23	0,15	2,2						1-12	
24	0,525	2,2						11-13	
25	0,9	2,2						20-22	
26	1,275	2,2						21-28	
27	1,65	2,2						22-23	
28	1,8	2,2		4,15	11786,98	6335,50		27-28	

ΟΧΕΤΟΣ 1.50 X 1.90

Hεπ = 4.00m

ΣΤΑΤΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ

ΓΕΝΙΚΑ ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ

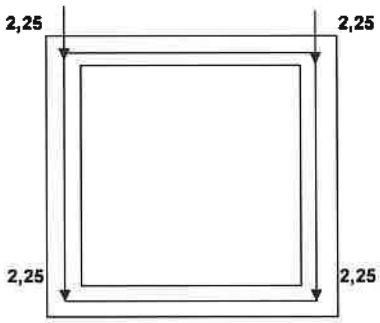
e: h επίχωσης= 4,00
f: πάχος στρ.φθοράς= 0,00
H: συνολ. εσωτ.υψος= 1,90
h: πάχος τοιχωμάτων= 0,30

d_1=πάχος άνω πλάκας= 0,30
d_2=πάχος κάτω πλάκας= 0,30
L:εσωτ. πλάτος τεχνικού= 1,50
g_1: ι.β. σκυροδέματος= 25,00
g_2: ι.β. επίχωσης= 18,00

a_0=σεισμικός συντελεστής= 0,276
β_0=συντ.φασματικής ενισχ.= 2,50
q=συντ. συμπεριφοράς= 1,50
φ=γωνία τριβής γαιών= 30,00

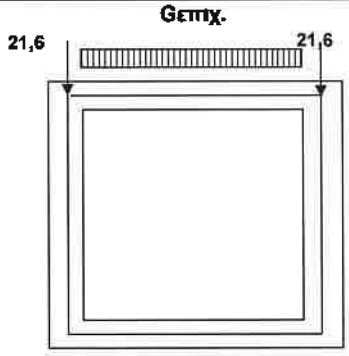
Σημειώσεις:
Ο πραγματικός φορέας έχει μεγαλύτερες διαστάσεις από τον φορέα της ανάλυσης. Τα κατανεμημένα φορτία ασκούνται στις εσωτερικές διαστάσεις του οχετού (δηλαδή χωρίς τα τοιχώματα) και στη συνέχεια ασκούνται κατάλληλα επικόμβια φορτία - είναι η επιρροή των κατανεμημένων στο πάχος του τοιχώματος ή της πλάκας - έτσι ώστε να ληφθούν οι σωστές φορτίσεις.

ΦΟΡΤΙΣΗ 1: Ιδιο βάρος



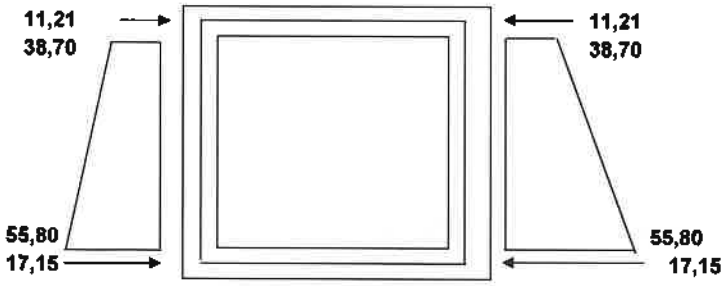
Ιδιο βάρος στρώσης φθοράς: Gπυθμ.=f*g1= 0,00 KN/m2
Ιδιο βάρος φορεα: Gιβ.=g1= 25,00 KN/m3

ΦΟΡΤΙΣΗ 2: Βάρος Επίχωσης



Ιδιο βάρος επίχωσης: Gεπιχ.=g_2*e= 72,00 KN/m2

ΦΟΡΤΙΣΗ 3: Ωθήσεις Γαιών.



λο: συντ. ουδ. ώθησης

(1-sinφ)=	0,500
P_{oben} = λο*g2*(e+d1)=	38,70 KN/m2
P_{unter} =λο*g2*(e+d1+H)=	55,80 KN/m2

ΦΟΡΤΙΣΗ 4: Συστολή Ξήρανσης.

Λαμβάνεται ομοιόμορφη μείωση της θερμοκρασίας ΔΤ=-15^{0}C στην άνω πλάκα και ΔΤ=-10^{0}C στην κάτω πλάκα και τα τοιχώματα

ΦΟΡΤΙΣΗ 5: Ομοιόμορφη θερμοκρασιακή μεταβολή ΔΤ=+35°C

Λαμβάνεται ΔΤN,exp=Te,max-To (§6.1.3.3. EN 1991-1-5). Οι αναφερόμενες στο παραπάνω εδάφιο θερμοκρασίες λαμβάνονται σύμφωνα με το Σχ. 6.1 για την Ελλάδα: Te,max=Tmax+2. Όπου Tmax=45^{0}C (τιμή από Χάρτη Εθνικού Προσαρτήματος)-0.65*350/100 (350m είναι το υψόμετρο στο σημείο της κατασκευής)= 42.7^{0}C = 43^{0}C . Η τιμή θερμοκρασίας κατασκευής του έργου Το για την Ελλάδα λαμβάνεται Το=10^{0}C .

Άρα ΔΤN,exp=Te,max-To=43+2-10=35^{0}C

Επομένως επιβάλλεται στο φορέα ομοιόμορφη θερμοκρασία (διαστολή) ΔΤ=+35^{0}C όπως περιγράφεται παρακάτω:

Στην άνω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=+35^{0}C και στα τοιχώματα και την κάτω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=+30^{0}C

ΦΟΡΤΙΣΗ 6: Ομοιόμορφη θερμοκρασιακή μεταβολή ΔΤ=-10.5°C

Λαμβάνεται ΔΤN,con= To-Te,min (§6.1.3.3. EN 1991-1-5). Οι αναφερόμενες στο παραπάνω εδάφιο θερμοκρασίες λαμβάνονται σύμφωνα με το Σχ. 6.1 για την Ελλάδα: Te,min=Tmin+8. Όπου Tmin=-50C (τιμή από Χάρτη Εθνικού Προσαρτήματος)-0.65*350/100 (350m είναι το υψόμετρο στο σημείο της κατασκευής)= -7.30C = -7.50C . Η τιμή θερμοκρασίας κατασκευής του έργου Το για την Ελλάδα λαμβάνεται Το=10^0 C .

Άρα ΔΤN,con= To-Te,min =10-(-7.5+8)= 10.5^{0}C

Επομένως επιβάλλεται στο φορέα ομοιόμορφη θερμοκρασία (συστολή) ΔΤ= -10.5^{0}C όπως περιγράφεται παρακάτω:

Στην άνω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=-10.50C και στα τοιχώματα και την κάτω πλάκα επιβάλλεται ομοιόμορφη θερμοκρασία ΔΤ=-5.50C

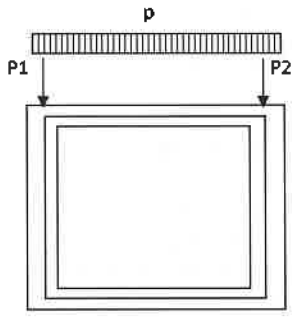
ΦΟΡΤΙΣΗ 7: Γραμμική θερμοκρασιακή διαφορά πελμάτων ΔΤ=+12°C

Για ανωδομές από σκυρόδεμα λαμβάνεται για την πλάκα ανωδομής:
ΔTM,heat=+15^{0}x Ksur (σε K).
(βλ. Πιν. 6.1 και 6.2 της §6.1.4.1 EN 1991-1-5)
Ο συντελεστής επιρροής του πάχους επίστρωσης, λαμβάνεται ως Ksur=0.80 από τον Πινακα 6.2 της §6.1.4.1.
Επομένως επιβάλλεται στην πλάκα ανωδομής γραμμικά μεταβαλόμενη θερμοκρασιακή διαφορά
ΔTM,heat=+12.0^{0}C (άνω πλευρά θερμότερη).

ΦΟΡΤΙΣΗ 8: Γραμμική θερμοκρασιακή διαφορά πελμάτων ΔΤ=-8.8°C

Για ανωδομές από σκυρόδεμα λαμβάνεται για την πλάκα ανωδομής:
ΔTM,cool= 8^{0}xKsur (σε K).
(βλ. Πιν. 6.1 `και 6.2 της §6.1.4.1 EN 1991-1-5)
Ο συντελεστής επιρροής του πάχους επίστρωσης, λαμβάνεται ως Ksur=1.10 από τον Πινακα 6.2 της §6.1.4.1.
Επομένως επιβάλλεται στο φορέα γραμμικά μεταβαλόμενη θερμοκρασιακή διαφορά
ΔTM,cool=-8.8^{0}C (κάτω πλευρά θερμότερη).

ΦΟΡΤΙΣΗ 90: Κινητά Φορτία (ομοιομορφισμένα)



Κατανομή Φορτίων:

Επιφάνεια: F60=(3.00+d1+2*tan30*e)*(2.20+d1+2*tan30*e)= 56,37 m2

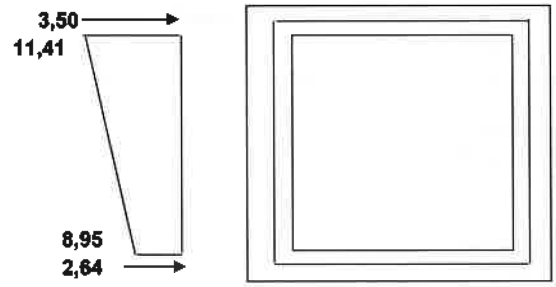
Δευτ/σα Τροχιά: p1=9.0 KN/m2

Όχημα Κύριας Τροχιάς Q= 600 KN

Ισοδύναμο Ομοιόμορφο φορτίο από όχημα

P=9.0+(600.0)/F60=	19,64 KN/m2
P1=	5,89 KN
P2=	5,89 KN

ΦΟΡΤΙΣΗ 10: Ωθήσεις Γαιών από Κινητά Αριστερά.



Λαμβάνεται γενικά φορτίο επιχώματος το ισοδύναμο ομοιόμορφο που προκύπτει από το Π.Φ.1 διανέμεται προς τα κάτω με γωνία 60 ως προς τον ορίζοντα (EN 1991-2 παρ. 4.9.1)

q=(2*aq1*Q1k+2*aq2*Q2k+2*aq3*Q3k/(3*3*2.2)= 60,61 KN/m2

p_{oben}= λo*60.61*3.00/{3.00+2*(e+d1)*tan30}=	11,41 KN/m2
p_{unter}= λo*60.61*3.00/{3.00+2*(H+d1+e)*tan30}=	8,95 KN/m2

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

No. 1 C 25/30 (EN 1992)

Youngs-modulus	E	31476 [MPa]	Safetyfactor		1.50	[-]
Poisson-Ratio	mu	0.20 [-]	Strength	fc	21.25	[MPa]
Shear-modulus	G	13115 [MPa]	Nomin. strength	fcn	25.00	[MPa]
Compression modulus		17487 [MPa]	Tens. strength	fctm	2.56	[MPa]
Weight		25.0 [kN/m3]	5 % t.strength	fctk	1.80	[MPa]
Weight buoyancy		25.0 [kN/m3]	95 % t.strength	fctk	3.33	[MPa]
Temp.elongat.coeff.		1.00E-05 [1/°K]	Bond strength	fbd	2.69	[MPa]
			Service strength		33.00	[MPa]
			Fatigue strength		12.75	[MPa]

Stress-Strain for serviceability
Is only valid within the defined
stress range

eps[o/oo]	sig-m[MPa]	E-t[MPa]
0.000	0.00	33050
-1.035	-25.04	15658
-2.069	-33.00	0
-3.500	-18.95	-19203
Safetyfactor		1.35

Stress-Strain for ultimate load
Is only valid within the defined
stress range

eps[o/oo]	sig-u[MPa]	E-t[MPa]
0.000	0.00	21250
-2.000	-21.25	0
-3.500	-21.25	0
Safetyfactor		1.50

Stress-Strain of calc. mean values
Is only valid within the defined
stress range

eps[o/oo]	sig-r[MPa]	E-t[MPa]
0.000	0.00	27541
-1.035	-12.41	4259
-2.069	-14.17	0
-3.500	-12.64	-1802
Safetyfactor		(1.50)

No. 3 S 500 (EN 1992)

Youngs-modulus	E	200000 [MPa]	Safetyfactor		1.15	[-]
Poisson-Ratio	mu	0.30 [-]	Yield stress	fy	500.00	[MPa]
Shear-modulus	G	76923 [MPa]	Compr.yield val.	fyc	500.00	[MPa]
Compression modulus		166667 [MPa]	Tens. strength	ft	550.00	[MPa]
Weight		78.5 [kN/m3]	Compr. strength	fc	550.00	[MPa]
Weight buoyancy		78.5 [kN/m3]	Ultim. plast. strain		50.00	[o/oo]
Temp.elongat.coeff.		1.20E-05 [1/°K]	relative bond coeff.		1.00	[-]
max. thickness		32.00 [mm]	EC2 bondcoeff. K1		0.80	[-]
			Hardening modulus		0.00	[MPa]
			Proportional limit		500.00	[MPa]
			Dynamic stress range		152.17	[MPa]

Stress-Strain for serviceability
Is also extended beyond the
defined stress range

eps[o/oo]	sig-m[MPa]	E-t[MPa]
1000.000	550.00	0
50.000	550.00	0
2.500	500.00	1053
0.000	0.00	200000
-2.500	-500.00	200000
-50.000	-550.00	1053
-1000.000	-550.00	0
Safetyfactor		1.15

Stress-Strain for ultimate load
Is also extended beyond the
defined stress range

eps[o/oo]	sig-u[MPa]	E-t[MPa]
1000.000	478.26	0
50.000	478.26	0
2.174	434.78	909
0.000	0.00	200000
-2.174	-434.78	200000
-50.000	-478.26	909
-1000.000	-478.26	0
Safetyfactor		(1.15)

Cross-sections static properties

No.	Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [m]	y/z-sc [m]	modules [MPa]	gam [kN/m]
1	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
2	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
3	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	

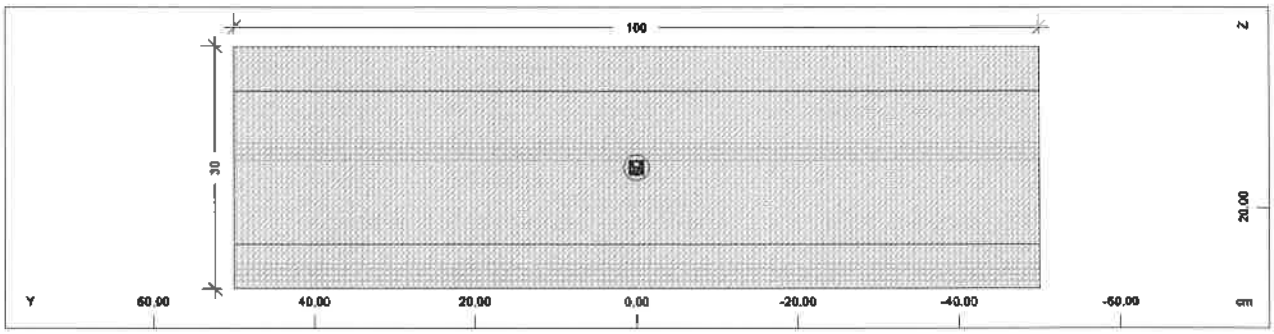
Summary of all beam elements

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Cross sections

No.	TotLength [m]	Max.Length [m]	TotWeight [t]	Surface [m2]	Title
1	1.500	0.375	1.125	3.900	
2	1.500	0.245	1.125	3.900	
3	3.800	0.475	2.850	9.880	
Sum	6.800		5.100	17.680	

Cross section No. 1



Static properties of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	y/z-sc [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	0.00	31476	7.50
3	7.311E-03		2.500E-02	15.00	15.00	13115	

Additional static properties of cross section

Alfa-T [1/°K]	ymin ymax [cm]	zmin zmax [cm]	hymin hzmin [cm]	AK AB [m2]	MB	Tau-T Tau-B [1/m3]	Tau-Vy Tau-Vz [1/m2]
1.0E-05	-50.00	-15.00		1.633E-01	3	2.656E+01	
	50.00	15.00		3.000E-01			5.000E+00

Section values for warping

Wmin[m2]	Wmax[m2]	CM[m6]	CMS[m4]	ASwyy[m6]	ASwzz[m6]	ry[cm]	rz[cm]
-0.0535	0.0535	0.000	0.000	0.000	0.000	0.00	0.00

Design values of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	23315	7.50
	7.311E-03		2.500E-02	15.00	9715	

Additional Design Data

M	periphery-O/-I [m2/m]	deff [m2/m]	t-min [cm]	t-max [cm]	SMP [o/o]	thet-p [tm2/m]	thet-y [tm2/m]	thet-z [tm2/m]	thet-yz [tm2/m]
	2.600	23.08			0.0	0.068	0.006	0.063	

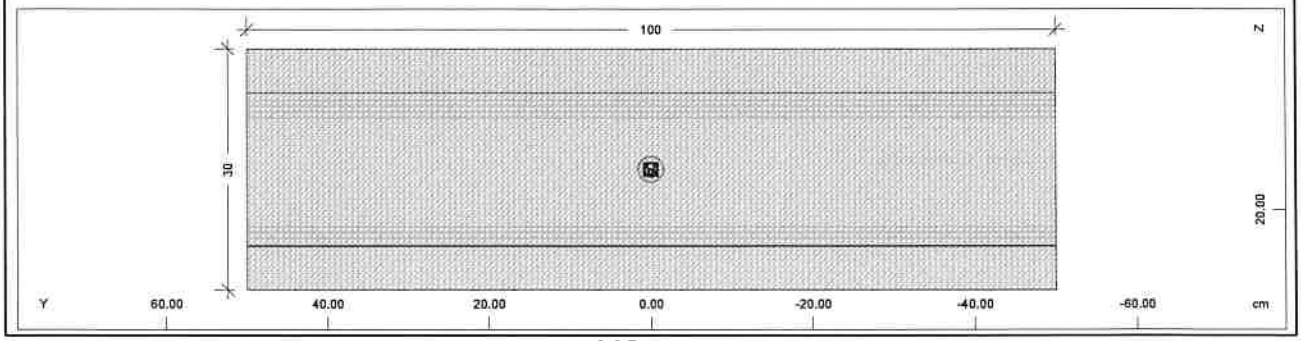
Reinforcement global values

Layer	mS	mR	area [cm2]	lower-A [cm2]	upper-A [cm2]	yL [cm]	zL [cm]	L-tors [cm]	N-pr [kN]	M-pr [kNm]
M1	1	3	1.00	1.00		0.00	24.50			
M2	1	3	1.00	1.00		0.00	5.50			

Distributed reinforcement

Id.	MNo	ya[cm]	za[cm]	ye[cm]	ze[cm]	As/As-max[cm2/m]	Lay	D	Ar[m2/m]
1	3	49.90	24.50	-49.90	24.50	1.00	1	14	
2	3	49.90	5.50	-49.90	5.50	1.00	2	12	

Cross section No. 2



BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Static properties of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	y/z-sc [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	0.00	31476	7.50
3	7.311E-03		2.500E-02	15.00	15.00	13115	

Additional static properties of cross section

Alfa-T	ymin ymax [cm]	zmin zmax [cm]	hymin hzmin [cm]	AK AB [m2]	MB	Tau-T Tau-B [1/m3]	Tau-Vy Tau-Vz [1/m2]
1.0E-05	-50.00	-15.00		1.633E-01	3	2.656E+01	
	50.00	15.00		3.000E-01			5.000E+00

Section values for warping

Wmin[m2]	Wmax[m2]	CM[m6]	CMS[m4]	ASwyy[m6]	ASwzz[m6]	ry[cm]	rz[cm]
-0.0535	0.0535	0.000	0.000	0.000	0.000	0.00	0.00

Design values of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	23315	7.50
	7.311E-03		2.500E-02	15.00	9715	

Additional Design Data

M	periphery-O/-I [m2/m]	[m2/m]	deff [cm]	t-min [cm]	t-max [cm]	SMP [o/o]	thet-p [tm2/m]	thet-y [tm2/m]	thet-z [tm2/m]	thet-yz [tm2/m]
	2.600		23.08			0.0	0.068	0.006	0.063	

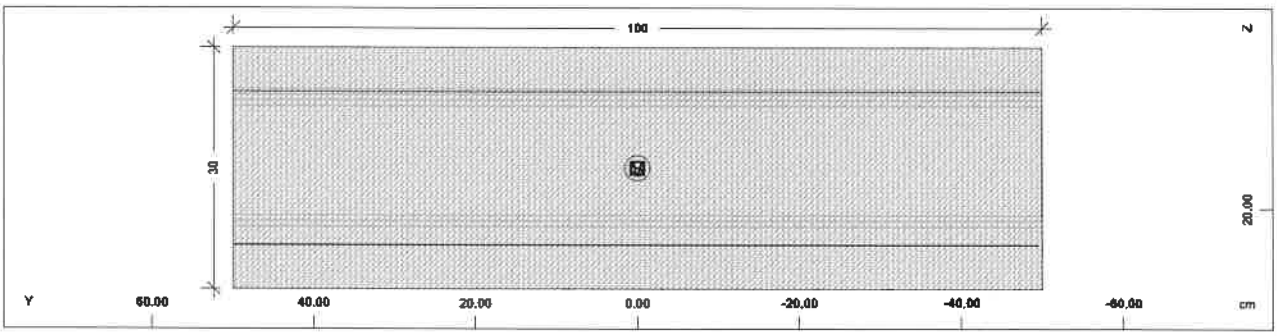
Reinforcement global values

Layer	mS	mR	area [cm2]	lower-A [cm2]	upper-A [cm2]	yL [cm]	zL [cm]	L-tors [cm]	N-pr [kN]	M-pr [kNm]
M1	1	3	1.00	1.00		0.00	24.50			
M2	1	3	1.00	1.00		0.00	5.50			

Distributed reinforcement

Id.	MNo	ya[cm]	za[cm]	ye[cm]	ze[cm]	As/As-max[cm2/m]	Lay	D	Ar[m2/m]
1	3	49.90	24.50	-49.90	24.50	1.00	1	12	
2	3	49.90	5.50	-49.90	5.50	1.00	2	12	

Cross section No. 3



Static properties of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	y/z-sc [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	0.00	31476	7.50
3	7.311E-03		2.500E-02	15.00	15.00	13115	

Additional static properties of cross section

Alfa-T	ymin ymax [cm]	zmin zmax [cm]	hymin hzmin [cm]	AK AB [m2]	MB	Tau-T Tau-B [1/m3]	Tau-Vy Tau-Vz [1/m2]
1.0E-05	-50.00	-15.00		1.633E-01	3	2.656E+01	
	50.00	15.00		3.000E-01			5.000E+00

Section values for warping

Wmin[m2]	Wmax[m2]	CM[m6]	CMS[m4]	ASwyy[m6]	ASwzz[m6]	ry[cm]	rz[cm]
-0.0535	0.0535	0.000	0.000	0.000	0.000	0.00	0.00

Design values of cross section

Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [cm]	modules [MPa]	gam [kN/m]
1	3.0000E-01		2.250E-03	0.00	23315	7.50
	7.311E-03		2.500E-02	15.00	9715	

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Additional Design Data

M	periphery-O/-I [m2/m]	[m2/m]	deff [cm]	t-min [cm]	t-max [cm]	SMP [o/o]	thet-p [tm2/m]	thet-y [tm2/m]	thet-z [tm2/m]	thet-yz [tm2/m]
	2.600		23.08			0.0	0.068	0.006	0.063	

Reinforcement global values

Layer	mS	mR	area [cm2]	lower-A [cm2]	upper-A [cm2]	yL [cm]	zL [cm]	L-tors [cm]	N-pr [kN]	M-pr [kNm]
M1	1	3	0.99	0.99		0.20	24.50			
M2	1	3	1.00	1.00		0.00	5.50			

Distributed reinforcement

Id.	MNo	ya[cm]	za[cm]	ye[cm]	ze[cm]	As/As-max[cm2/m]	Lay	D	Ar[m2/m]
1	3	49.90	24.50	-49.50	24.50	1.00	1	12	
2	3	49.90	5.50	-49.90	5.50	1.00	2	12	

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Nodal Coordinates and Supports

Number	X[m]	Y[m]	Z[m]	Support Conditions		
1	0.000	0.000	0.000			
2	0.150	0.000	0.000	*	*	*
3	0.395	0.000	0.000			
4	0.563	0.000	0.000			
5	0.732	0.000	0.000			
6	0.900	0.000	0.000			
7	1.068	0.000	0.000			
8	1.237	0.000	0.000			
9	1.405	0.000	0.000			
10	1.650	0.000	0.000	*	*	*
11	1.800	0.000	0.000			
12	0.000	-0.150	0.000	*	*	*
13	1.800	-0.150	0.000	*	*	*
14	0.000	-0.625	0.000			
15	1.800	-0.625	0.000			
16	0.000	-1.100	0.000			
17	1.800	-1.100	0.000			
18	0.000	-1.575	0.000			
19	1.800	-1.575	0.000			
20	0.000	-2.050	0.000	*	*	*
21	1.800	-2.050	0.000	*	*	*
22	0.000	-2.200	0.000			
23	0.150	-2.200	0.000	*	*	*
24	0.525	-2.200	0.000			
25	0.900	-2.200	0.000			
26	1.275	-2.200	0.000			
27	1.650	-2.200	0.000	*	*	*
28	1.800	-2.200	0.000			
MIN	0.000	-2.200	0.000			
MAX	1.800	0.000	0.000			

Kinematic Constraints

Grp	LV	Node	type	reference	dx	dy	dz	df
	1	2	KF	1	0.150	0.000	0.000	
	1	10	KF	11	-0.150	0.000	0.000	
	1	12	KF	1	0.000	-0.150	0.000	
	1	13	KF	11	0.000	-0.150	0.000	
	1	20	KF	22	0.000	0.150	0.000	
	1	23	KF	22	0.150	0.000	0.000	
	1	21	KF	28	0.000	0.150	0.000	
	1	27	KF	28	-0.150	0.000	0.000	

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Cross sections - Static Properties

No.	Mat NoR	A[m2] It[m4]	Ay/Az/Ayz [m2]	Iy/Iz/Iyz [m4]	ys/zs [m]	y/z-sc [m]	modules [MPa]	gam [kN/m]
1	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
2	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	
3	1	3.0000E-01		2.250E-03	0.000	0.000	31476	7.50
	3	7.311E-03		2.500E-02	0.150	0.150	13115	

Summary of all beam elements

Groups

Grp	TotLength [m]	Max.Length [m]	TotWeight [t]	Surface [m2]
0	6.800	0.475	5.100	17.680
Sum	6.800		5.100	17.680

Beam Elements

Grp	Number	Node	x[m]	NoS	NoP	reference	Hinges	direction	local	y-axis
0	1	2	0.000	2				0.000	0.000	-1.000
		3	0.245	2						
0	2	3	0.000	2				0.000	0.000	-1.000
		4	0.168	2						
0	3	4	0.000	2				0.000	0.000	-1.000
		5	0.168	2						
0	4	5	0.000	2				0.000	0.000	-1.000
		6	0.168	2						
0	5	6	0.000	2				0.000	0.000	-1.000
		7	0.168	2						
0	6	7	0.000	2				0.000	0.000	-1.000
		8	0.168	2						
0	7	8	0.000	2				0.000	0.000	-1.000

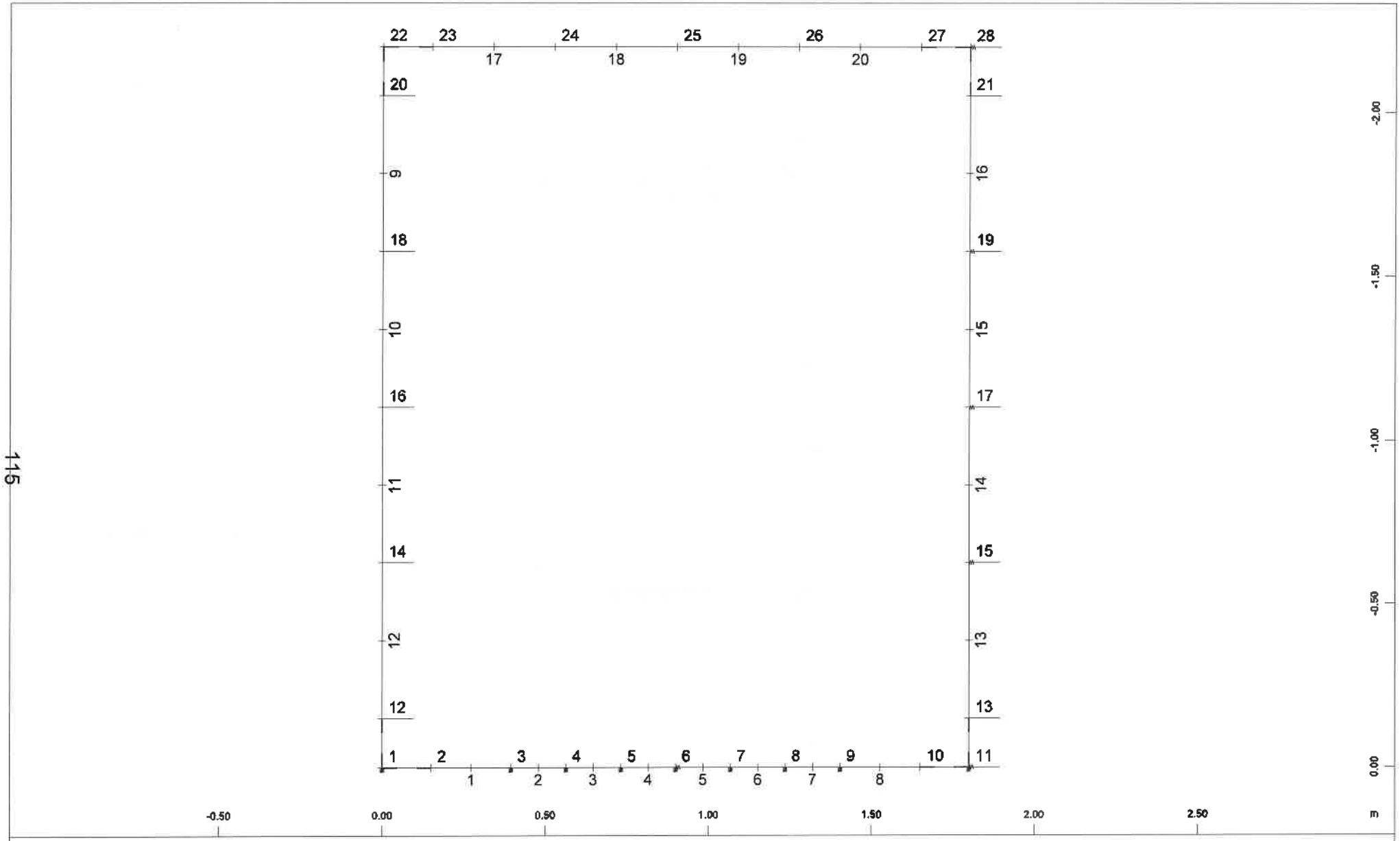
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

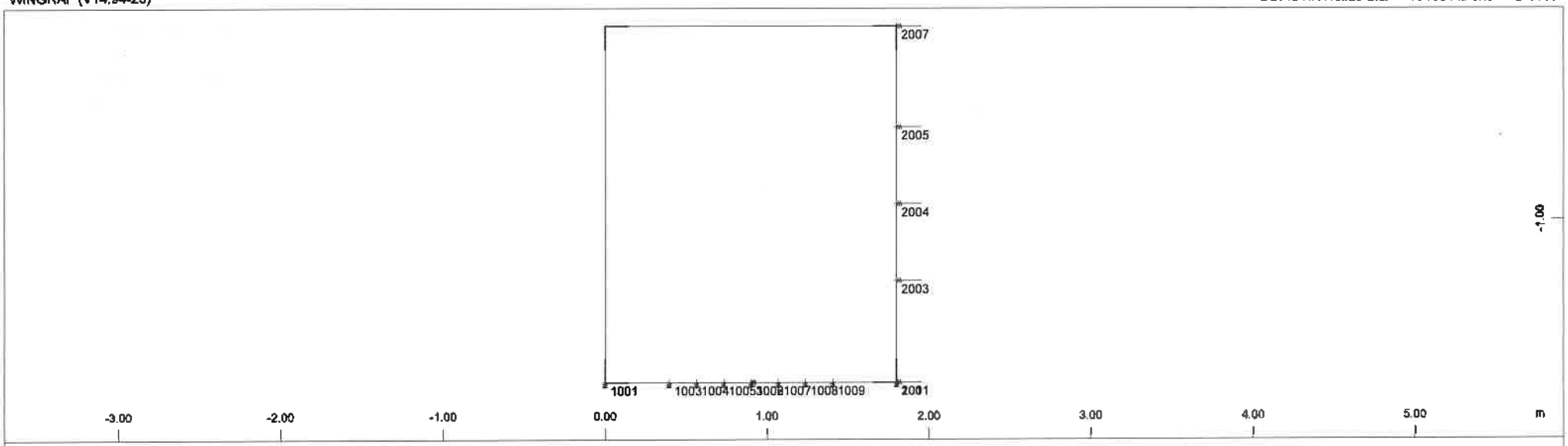
Beam Elements

Grp	Number	Node	x[m]	NoS	NoP	reference	Hinges	direction	local y-axis	
0	7	9	0.168	2						
0	8	9	0.000	2				0.000	0.000	-1.000
		10	0.245	2						
0	9	20	0.000	3				0.000	0.000	-1.000
		18	0.475	3						
0	10	18	0.000	3				0.000	0.000	-1.000
		16	0.475	3						
0	11	16	0.000	3				0.000	0.000	-1.000
		14	0.475	3						
0	12	14	0.000	3				0.000	0.000	-1.000
		12	0.475	3						
0	13	13	0.000	3				0.000	0.000	-1.000
		15	0.475	3						
0	14	15	0.000	3				0.000	0.000	-1.000
		17	0.475	3						
0	15	17	0.000	3				0.000	0.000	-1.000
		19	0.475	3						
0	16	19	0.000	3				0.000	0.000	-1.000
		21	0.475	3						
0	17	23	0.000	1				0.000	0.000	-1.000
			0.245	1i						
		24	0.375	1						
0	18	24	0.000	1				0.000	0.000	-1.000
		25	0.375	1						
0	19	25	0.000	1				0.000	0.000	-1.000
		26	0.375	1						
0	20	26	0.000	1				0.000	0.000	-1.000
			0.130	1i						
		27	0.375	1						

Spring Elements

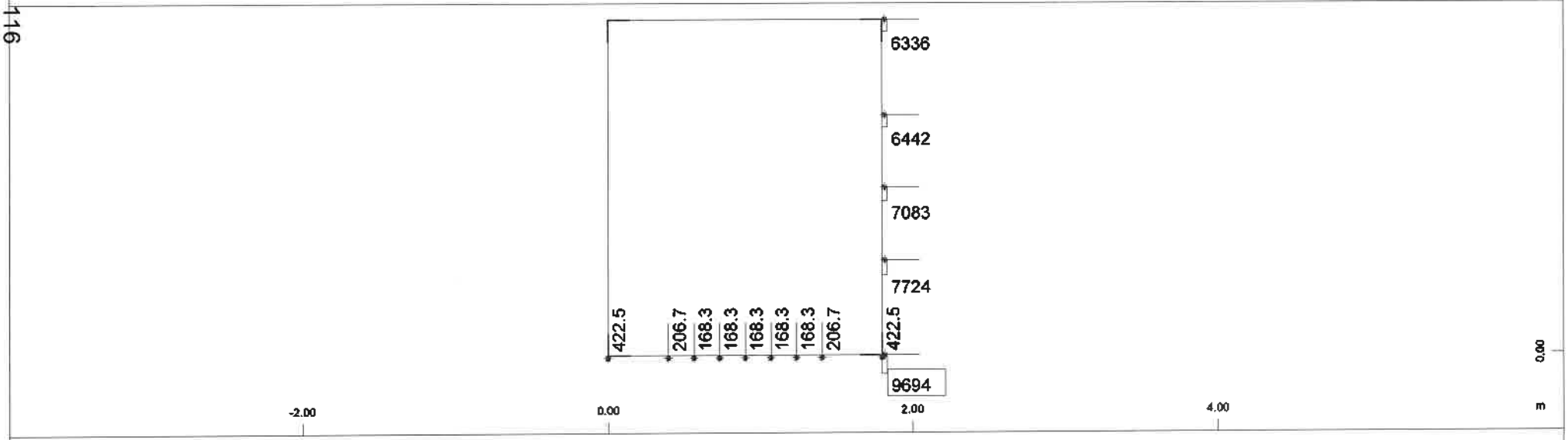
Grp	Number	Node	Node	dX[-] e-P[-]	dY[-] e-T[-]	dZ[-] e-M[-]	CP[kN/m] DP[kNsec/m]	CT[kN/m] DT[kNsec/m]	CM[kNm] DM[kNmsec]
1	1001	1		0.000	1.000	0.000	4.225E+02		
1	1003	3		0.000	1.000	0.000	2.067E+02		
1	1004	4		0.000	1.000	0.000	1.683E+02		
1	1005	5		0.000	1.000	0.000	1.683E+02		
1	1006	6		0.000	1.000	0.000	1.683E+02		
1	1007	7		0.000	1.000	0.000	1.683E+02		
1	1008	8		0.000	1.000	0.000	1.683E+02		
1	1009	9		0.000	1.000	0.000	2.067E+02		
1	1011	11		0.000	1.000	0.000	4.225E+02		
2	2001	11		1.000	0.000	0.000	9.694E+03		
2	2003	15		1.000	0.000	0.000	7.724E+03		
2	2004	17		1.000	0.000	0.000	7.083E+03		
2	2005	19		1.000	0.000	0.000	6.442E+03		
2	2007	28		1.000	0.000	0.000	6.336E+03		
3	3002	6		1.000	0.000	0.000	1.000E+06		


22 23 24 25 26 27 28
17 18 19 20
20 21
9 16
18 19
10 15
16 17
11 14
14 15
12 13
12 13
1 2 3 4 5 6 7 8 9 10 11
1 2 3 4 5 6 7 8
115
-2.00
-1.50
-1.00
-0.50
0.00
-0.50 0.00 0.50 1.00 1.50 2.00 2.50 m
Z X Y
Beam Elements , Number of element (Max=20)
Numbers of nodes (Max=28)
M 1 : 15



Spring Elements , Number of element (Max=3002)

M 1 : 34



Sector of system Group 0...2

Spring constant, 1 cm 3D = 28359. kN/m (Max=9694.)

M 1 : 36

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Definition of load type in this output:
PZZ - load in global direction Z in reference to the element length
PZP - load in global direction Z in reference to the projection
Pz - load in local direction z
PG - load in dead load direction in reference to the element length

Load Case 1 SELF WEIGHT
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 1.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1		2.2					
11		2.3					
22		2.3					
28		2.3					
sum		9.0					

Load Case 2 SOIL FILL WEIGHT
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
22		21.6					
28		21.6					
sum		43.2					

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	PG	0.000	0.375	72.00		[kN/m]				
18	PG	0.000	0.375	72.00		[kN/m]				
19	PG	0.000	0.375	72.00		[kN/m]				
20	PG	0.000	0.375	72.00		[kN/m]				

Load Case 3 EARTH PRESSURE
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1	17.1						
11	-17.1						
22	11.2						
28	-11.2						
sum							

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
9	PXX	0.000	0.475	38.70	42.98	[kN/m]				
10	PXX	0.000	0.475	42.98	47.25	[kN/m]				
11	PXX	0.000	0.475	47.25	51.53	[kN/m]				
12	PXX	0.000	0.475	51.53	55.80	[kN/m]				
13	PXX	0.000	0.475	-55.80	-51.53	[kN/m]				
14	PXX	0.000	0.475	-51.53	-47.25	[kN/m]				
15	PXX	0.000	0.475	-47.25	-42.98	[kN/m]				
16	PXX	0.000	0.475	-42.98	-38.70	[kN/m]				

Load Case 4 SHRINKAGE OF CONCRETE
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
1	TEMP	0.000	0.245	-10.000		[°C]				
2	TEMP	0.000	0.168	-10.000		[°C]				
3	TEMP	0.000	0.168	-10.000		[°C]				
4	TEMP	0.000	0.168	-10.000		[°C]				
5	TEMP	0.000	0.168	-10.000		[°C]				
6	TEMP	0.000	0.168	-10.000		[°C]				
7	TEMP	0.000	0.168	-10.000		[°C]				

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
8	TEMP	0.000	0.245	-10.000	[°C]				
9	TEMP	0.000	0.475	-10.000	[°C]				
10	TEMP	0.000	0.475	-10.000	[°C]				
11	TEMP	0.000	0.475	-10.000	[°C]				
12	TEMP	0.000	0.475	-10.000	[°C]				
13	TEMP	0.000	0.475	-10.000	[°C]				
14	TEMP	0.000	0.475	-10.000	[°C]				
15	TEMP	0.000	0.475	-10.000	[°C]				
16	TEMP	0.000	0.475	-10.000	[°C]				
17	TEMP	0.000	0.375	-15.000	[°C]				
18	TEMP	0.000	0.375	-15.000	[°C]				
19	TEMP	0.000	0.375	-15.000	[°C]				
20	TEMP	0.000	0.375	-15.000	[°C]				

Load Case 5 TEMPERATURE FLUCTUATIONS DT +35

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
1	TEMP	0.000	0.245	30.000	[°C]				
2	TEMP	0.000	0.168	30.000	[°C]				
3	TEMP	0.000	0.168	30.000	[°C]				
4	TEMP	0.000	0.168	30.000	[°C]				
5	TEMP	0.000	0.168	30.000	[°C]				
6	TEMP	0.000	0.168	30.000	[°C]				
7	TEMP	0.000	0.168	30.000	[°C]				
8	TEMP	0.000	0.245	30.000	[°C]				
9	TEMP	0.000	0.475	30.000	[°C]				
10	TEMP	0.000	0.475	30.000	[°C]				
11	TEMP	0.000	0.475	30.000	[°C]				
12	TEMP	0.000	0.475	30.000	[°C]				
13	TEMP	0.000	0.475	30.000	[°C]				
14	TEMP	0.000	0.475	30.000	[°C]				
15	TEMP	0.000	0.475	30.000	[°C]				
16	TEMP	0.000	0.475	30.000	[°C]				
17	TEMP	0.000	0.375	35.000	[°C]				
18	TEMP	0.000	0.375	35.000	[°C]				
19	TEMP	0.000	0.375	35.000	[°C]				
20	TEMP	0.000	0.375	35.000	[°C]				

Load Case 6 TEMPERATURE FLUCTUATIONS DT -10.

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
1	TEMP	0.000	0.245	-5.500	[°C]				
2	TEMP	0.000	0.168	-5.500	[°C]				
3	TEMP	0.000	0.168	-5.500	[°C]				
4	TEMP	0.000	0.168	-5.500	[°C]				
5	TEMP	0.000	0.168	-5.500	[°C]				
6	TEMP	0.000	0.168	-5.500	[°C]				
7	TEMP	0.000	0.168	-5.500	[°C]				
8	TEMP	0.000	0.245	-5.500	[°C]				
9	TEMP	0.000	0.475	-5.500	[°C]				
10	TEMP	0.000	0.475	-5.500	[°C]				
11	TEMP	0.000	0.475	-5.500	[°C]				
12	TEMP	0.000	0.475	-5.500	[°C]				
13	TEMP	0.000	0.475	-5.500	[°C]				
14	TEMP	0.000	0.475	-5.500	[°C]				
15	TEMP	0.000	0.475	-5.500	[°C]				
16	TEMP	0.000	0.475	-5.500	[°C]				
17	TEMP	0.000	0.375	-10.500	[°C]				
18	TEMP	0.000	0.375	-10.500	[°C]				
19	TEMP	0.000	0.375	-10.500	[°C]				
20	TEMP	0.000	0.375	-10.500	[°C]				

Load Case 7 LINEAR TEMPERATURE DIFFERENCE dT

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	dTz	0.000	0.375	-12.000	[°C]				
18	dTz	0.000	0.375	-12.000	[°C]				
19	dTz	0.000	0.375	-12.000	[°C]				

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
20	dTz	0.000	0.375	-12.000	[°C]				

Load Case 8 LINEAR TEMPERATURE DIFFERENCE d

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	dTz	0.000	0.375	8.800	[°C]				
18	dTz	0.000	0.375	8.800	[°C]				
19	dTz	0.000	0.375	8.800	[°C]				
20	dTz	0.000	0.375	8.800	[°C]				

Load Case 90 LIVE LOADS

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
22		5.9					
28		5.9					
sum		11.8					

Loads acting on Beam-elements

Number	Type	a[m]	l[m]	Loadval	Loadval Dimens.	ya[m]	za[m]	ye[m]	ze[m]
17	PYY	0.000	0.375	19.64	[kN/m]				
18	PYY	0.000	0.375	19.64	[kN/m]				
19	PYY	0.000	0.375	19.64	[kN/m]				
20	PYY	0.000	0.375	19.64	[kN/m]				

Sum of Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
1	SELF WEIGHT	0.0	60.0	0.0
2	SOIL FILL WEIGHT	0.0	151.2	0.0
3	EARTH PRESSURE	0.0	0.0	0.0
4	SHRINKAGE OF CONCRETE	0.0	0.0	0.0
5	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
6	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
7	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
8	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
90	LIVE LOADS	0.0	41.2	0.0

Sum of Reactions and Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
1	SELF WEIGHT	0.0	-60.0	0.0
		0.0	60.0	0.0
2	SOIL FILL WEIGHT	0.0	-151.2	0.0
		0.0	151.2	0.0
3	EARTH PRESSURE	0.0	0.0	0.0
		0.0	0.0	0.0
4	SHRINKAGE OF CONCRETE	0.0	0.0	0.0
		0.0	0.0	0.0
5	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
		0.0	0.0	0.0
6	TEMPERATURE FLUCTUATIONS	0.0	0.0	0.0
		0.0	0.0	0.0
7	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
		0.0	0.0	0.0
8	LINEAR TEMPERATURE DIFFE	0.0	0.0	0.0
		0.0	0.0	0.0
90	LIVE LOADS	0.0	-41.2	0.0
		0.0	41.2	0.0

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Definition of load type in this output:
PZZ - load in global direction Z in reference to the element length
PZP - load in global direction Z in reference to the projection
Pz - load in local direction z
PG - load in dead load direction in reference to the element length

Load Case 10 LIVE LOAD EARTH PRESSURE
Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000

Loads acting on Nodes

Node	PX[kN]	PY[kN]	PZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]	MB[kNm2]
1	2.6						
22	3.5						
sum	6.1						

Loads acting on Beam-elements

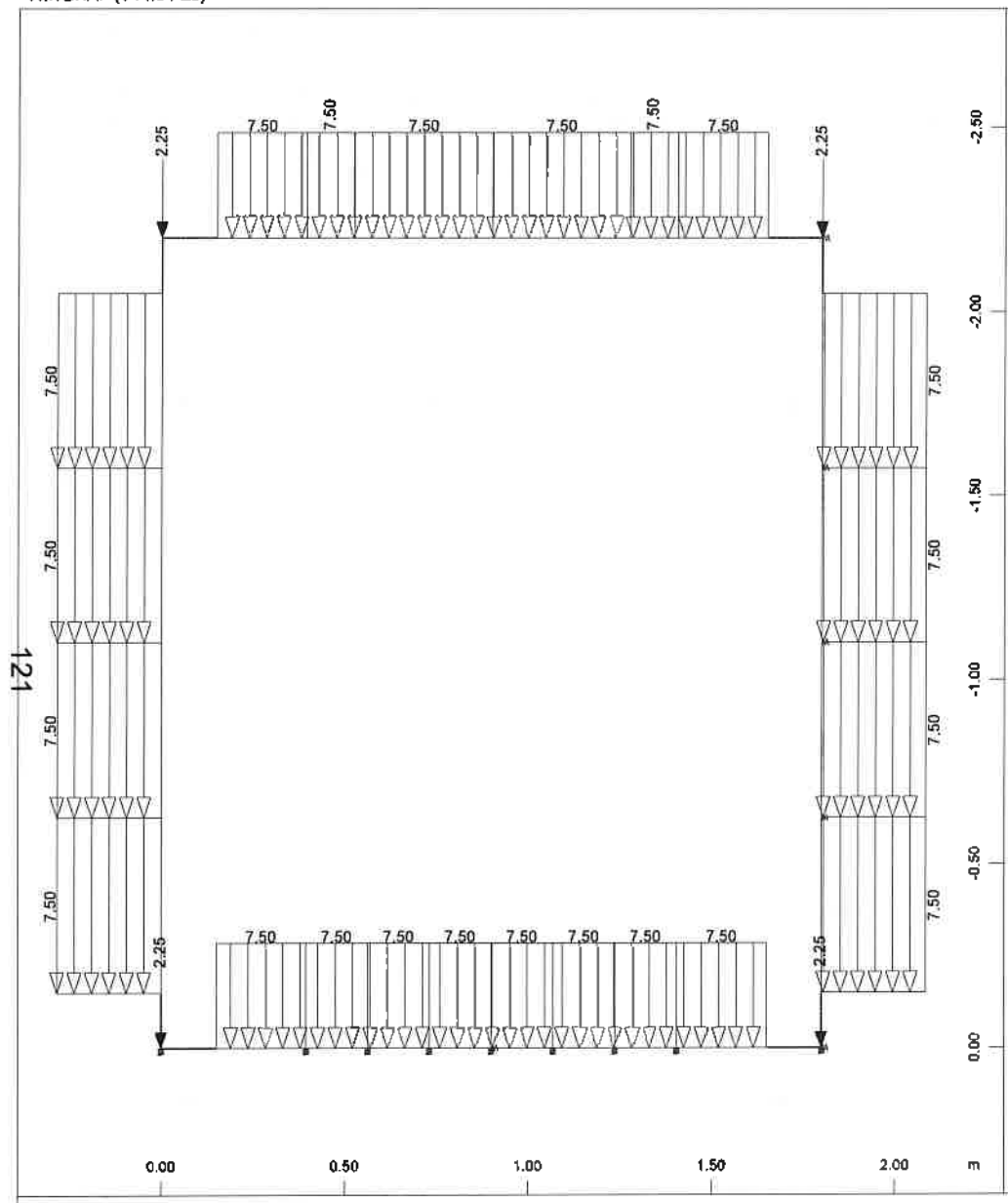
Number	Type	a[m]	l[m]	Loadval	Loadval	Dimens.	ya[m]	za[m]	ye[m]	ze[m]
9	PXX	0.000	0.475	11.41	10.80	[kN/m]				
10	PXX	0.000	0.475	10.80	10.18	[kN/m]				
11	PXX	0.000	0.475	10.18	9.56	[kN/m]				
12	PXX	0.000	0.475	9.56	8.95	[kN/m]				

Sum of Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
10	LIVE LOAD EARTH PRESSURE	25.5	0.0	0.0

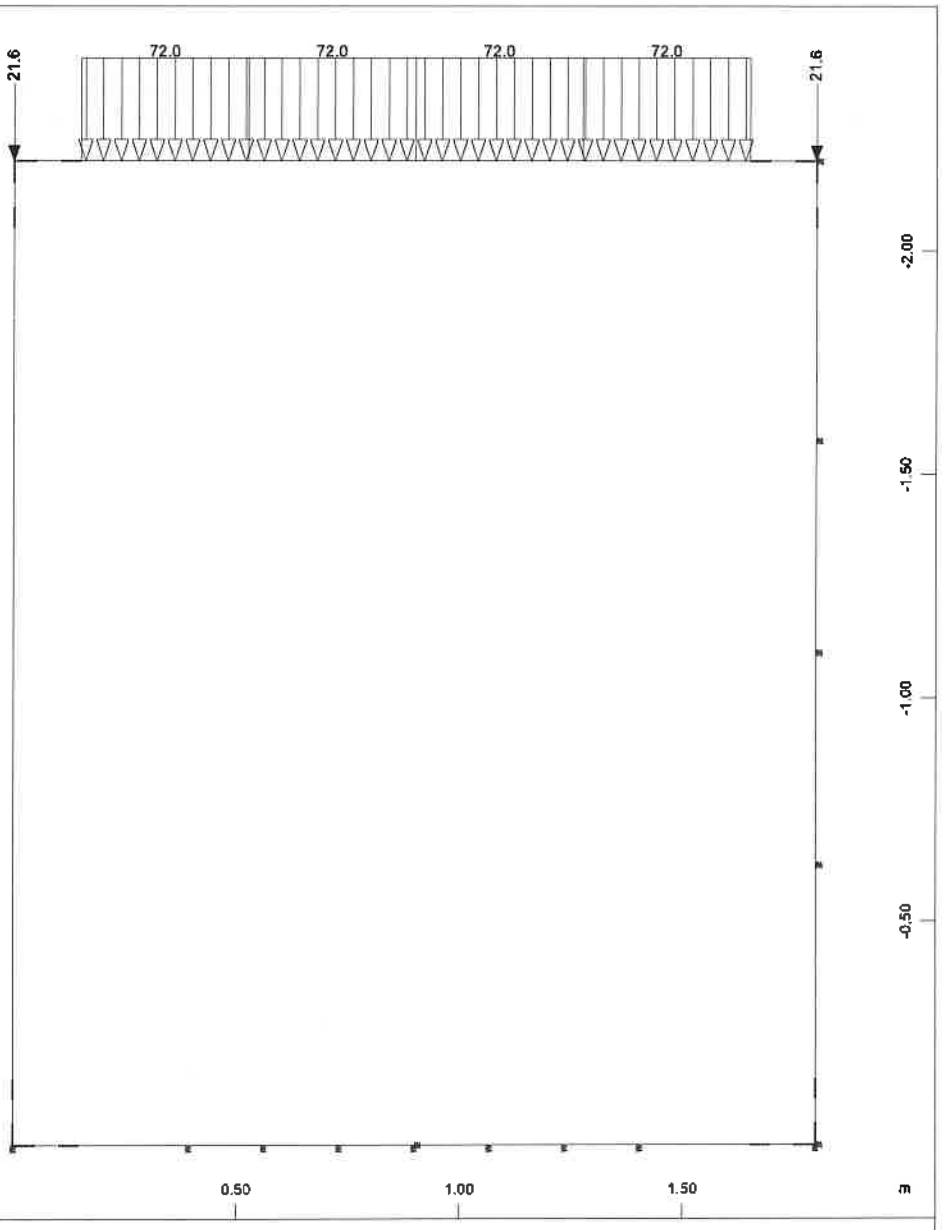
Sum of Reactions and Loads

LC	Title	PXX[kN]	PYY[kN]	PZZ[kN]
10	LIVE LOAD EARTH PRESSURE	-25.5	0.0	0.0
		25.5	0.0	0.0



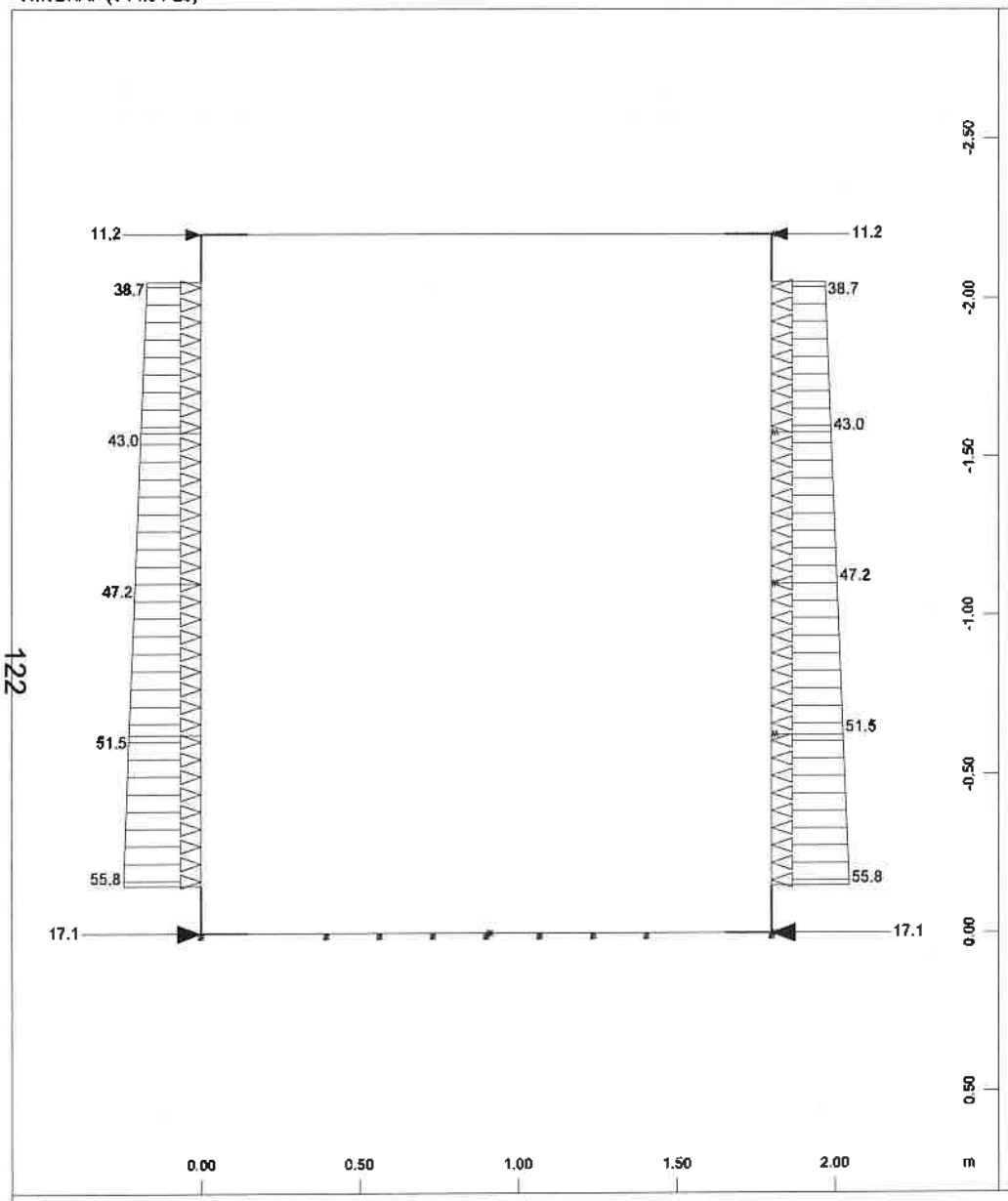
All loads, Loadcase 1 SELF WEIGHT , (1 cm 3D = unit) Beam dead load in global Y (Unit=5.00 kN/m), Nodal load (force) vector (Unit=2.00

M 1 : 19



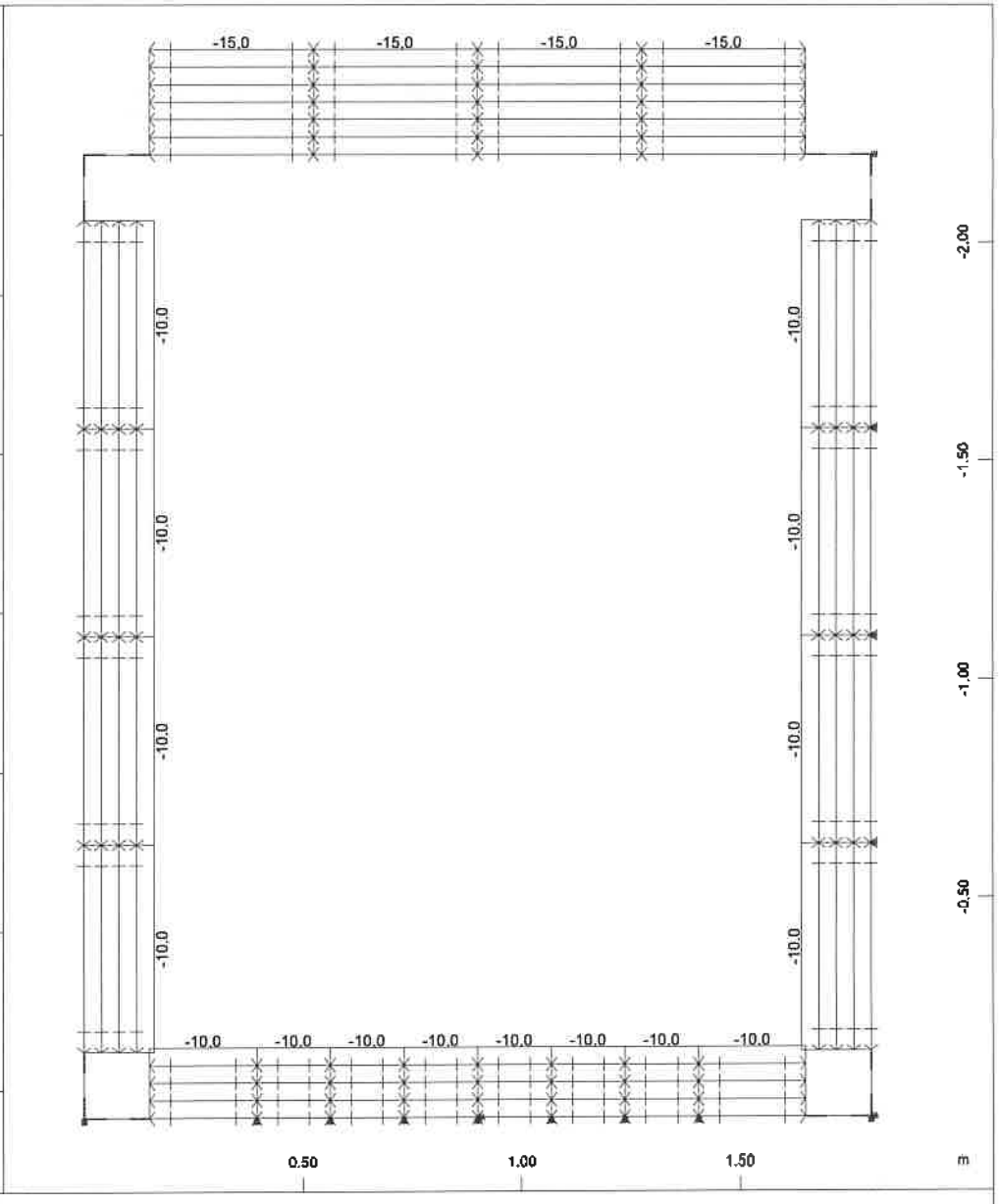
All loads, Loadcase 2 SOIL FILL WEIGHT , (1 cm 3D = unit) Nodal load (force) vector (Unit=20.0 kN), Beam line load (force) in global Y

M 1 : 16



All loads, Loadcase 3 EARTH PRESSURE , (1 cm 3D = unit) Nodal load (force) vector (Unit=10.0 kN), Beam line load (force) in global X

M 1 : 22

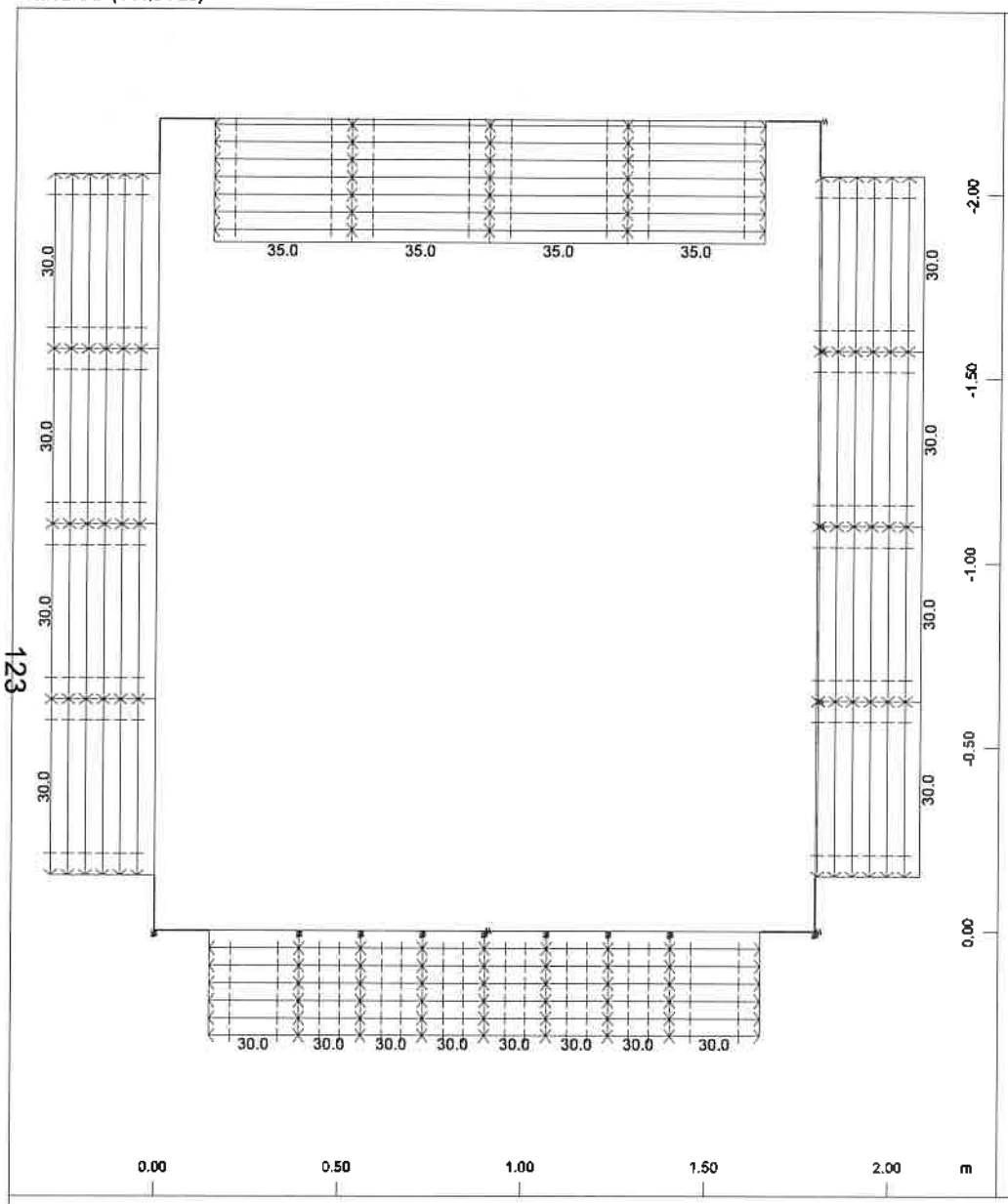


All loads, Loadcase 4 SHRINKAGE OF CONCRETE , (1 cm 3D = unit) Beam line load (uniform temperature change) (Unit=10.0 °C) (Min=-15.0) (Max=0)

M 1 : 16

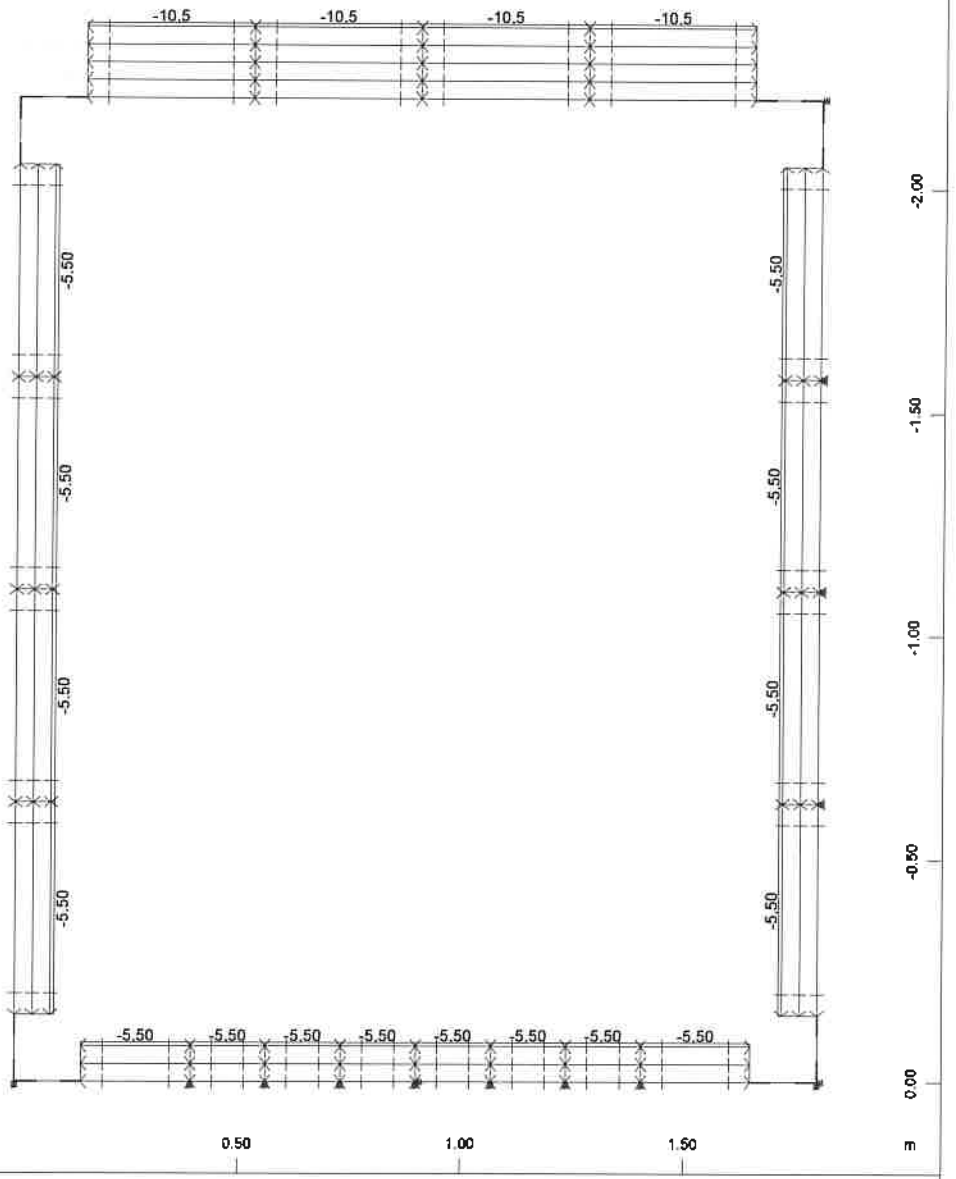
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

123



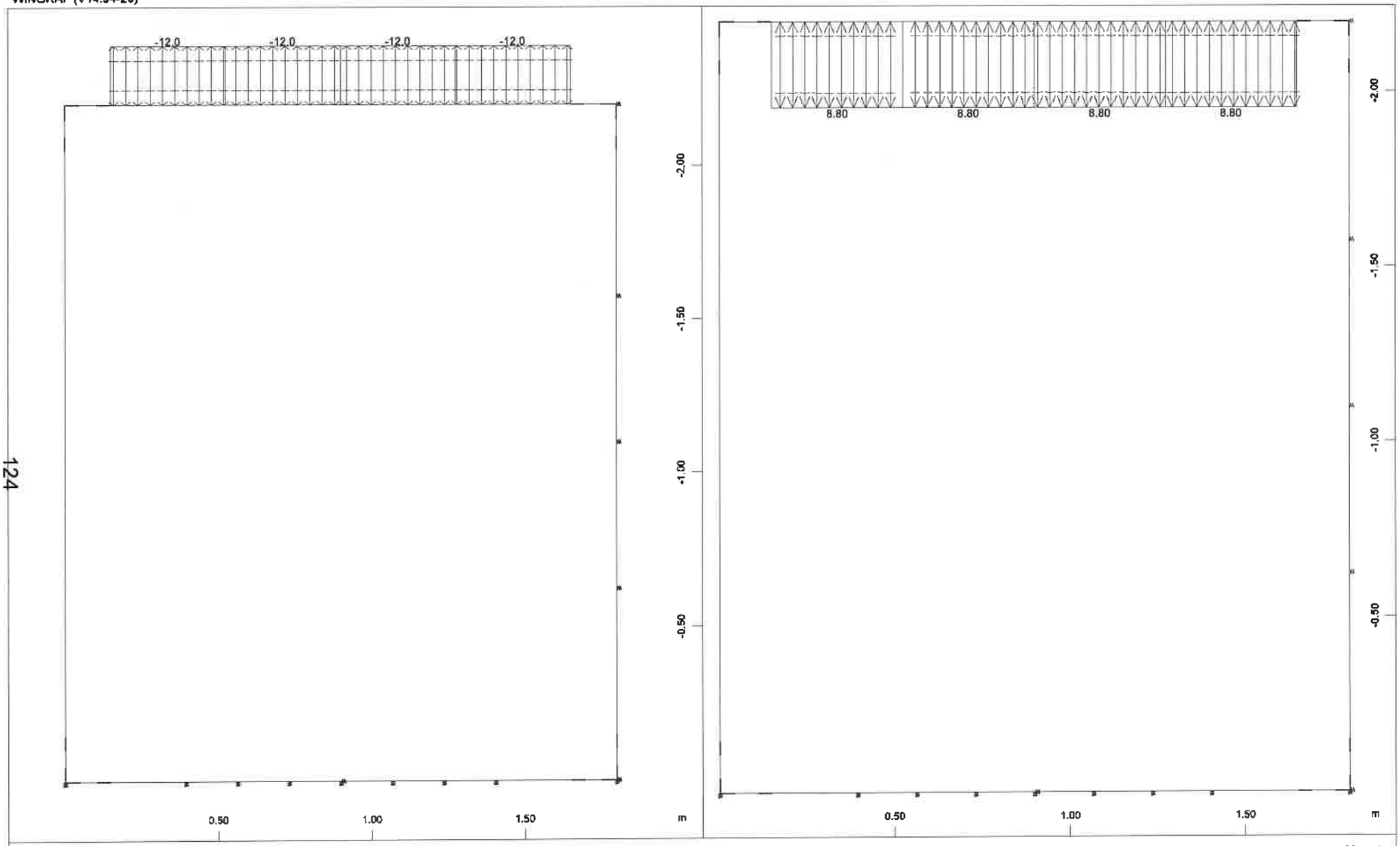
All loads, Loadcase 5 TEMPERATURE FLUCTUATIONS DT +35 , (1 cm 3D = unit) M 1 : 19

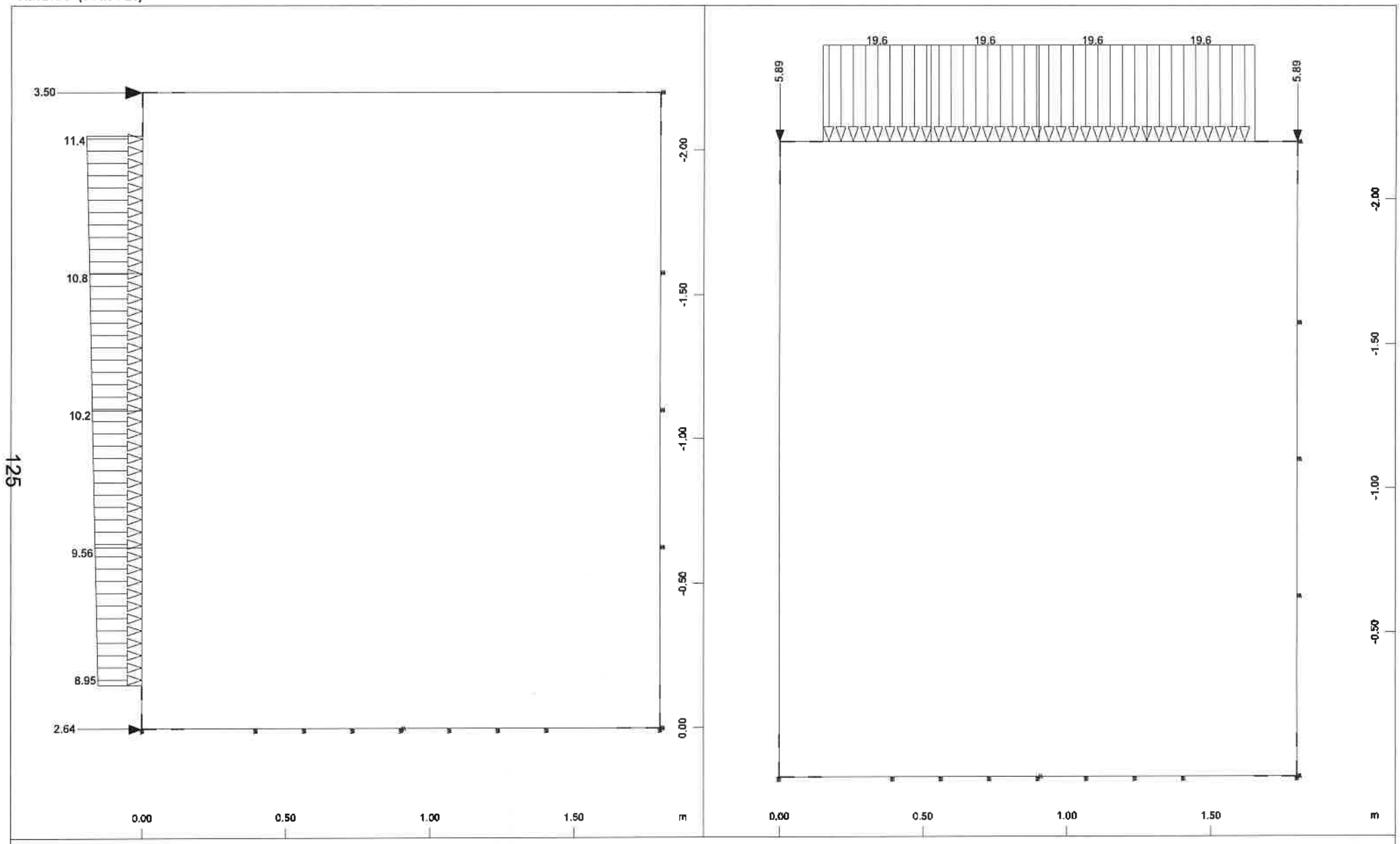
Beam line load (uniform temperature change) (Unit=20.0 °C) (Max=35.0)



All loads, Loadcase 6 TEMPERATURE FLUCTUATIONS DT -10. , (1 cm 3D = unit) M 1 : 16

Beam line load (uniform temperature change) (Unit=10.0 °C) (Min=-10.5)


-12.0
-12.0
-12.0
-12.0
-2.00
-1.50
-1.00
-0.50
0.50
1.00
1.50
m
Z
X
Y
All loads, Loadcase 7 LINEAR TEMPERATURE DIFFERENCE dT , (1 cm 3D = unit)
Beam line load (temperature difference) in local z (Unit=10.0 °C
M 1 : 16
8.80
8.80
8.80
8.80
-2.00
-1.50
-1.00
-0.50
0.50
1.00
1.50
m
Z
X
Y
All loads, Loadcase 8 LINEAR TEMPERATURE DIFFERENCE d , (1 cm 3D = unit)
Beam line load (temperature difference) in local z (Unit=5.00 °C
M 1 : 14



BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb. no.1 U.L.S. - equation 6.10a

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.35	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.35	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.50	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.12	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.01	Exclusive LC	A	3	LIVE LOADS

Generated Loadcases

Number	Comb	Title
101	1	MAX-MY BEAM
102	1	MIN-MY BEAM
103	1	MAX-VZ BEAM
104	1	MIN-VZ BEAM
105	1	MAX-N BEAM
106	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb. no.2 U.L.S. - equation 6.10b
MAIN VARIABLE LOAD: ROAD TRAFFIC

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.12	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.35	Exclusive LC	A	3	LIVE LOADS

Generated Loadcases

Number	Comb	Title
121	1	MAX-MY BEAM
122	1	MIN-MY BEAM
123	1	MAX-VZ BEAM
124	1	MIN-VZ BEAM
125	1	MAX-N BEAM
126	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb. no.5 U.L.S. - equation 6.10b
MAIN VARIABLE LOAD: TEMPERATURE

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
5	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.50	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.12	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.52	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.50	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.12	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.01	Exclusive LC	A	3	LIVE LOADS

Generated Loadcases

Number	Comb	Title
141	1	MAX-MY BEAM
142	1	MIN-MY BEAM
143	1	MAX-VZ BEAM
144	1	MIN-VZ BEAM
145	1	MAX-N BEAM
146	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb. no.6 U.L.S. - equation 6.10b
MAIN VARIABLE LOAD: EARTH PRESSURE DUE TO LIVE LOADS

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.15	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.15	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.28	Combined with LC			EARTH PRESSURE
1	1.00	Exclusive LC	AG		SELF WEIGHT
2	1.00	Combined with LC			SOIL FILL WEIGHT
3	1.00	Combined with LC			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.90	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.68	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.31	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.90	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.50	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.01	Exclusive LC	A	3	LIVE LOADS

Generated Loadcases

Number	Comb	Title
161	1	MAX-MY BEAM
162	1	MIN-MY BEAM
163	1	MAX-VZ BEAM
164	1	MIN-VZ BEAM
165	1	MAX-N BEAM
166	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (MY)
****

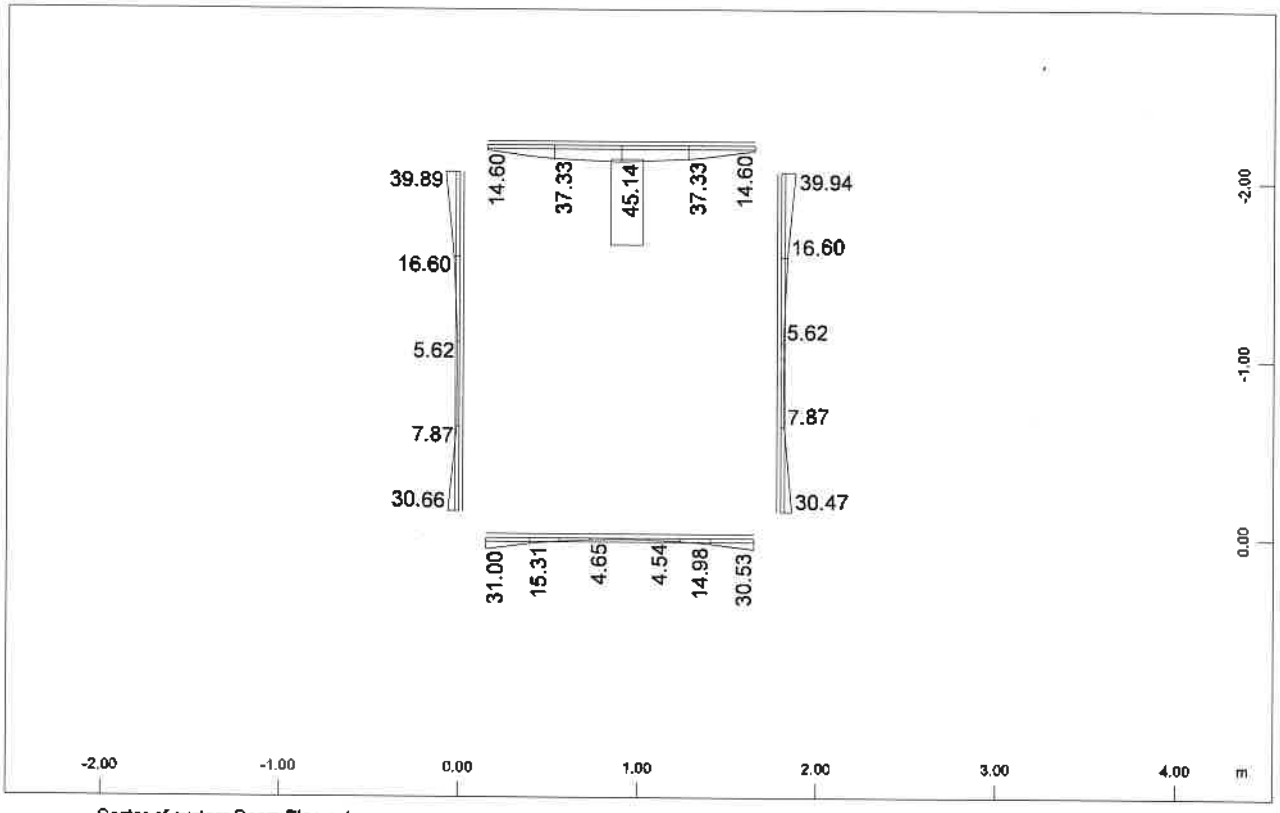
Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
101	1.00	Exclusive LC	AG	MAX-MY BEAM	
102	1.00	Exclusive LC	AG	MIN-MY BEAM	
121	1.00	Exclusive LC	AG	MAX-MY BEAM	
122	1.00	Exclusive LC	AG	MIN-MY BEAM	
141	1.00	Exclusive LC	AG	MAX-MY BEAM	
142	1.00	Exclusive LC	AG	MIN-MY BEAM	
161	1.00	Exclusive LC	AG	MAX-MY BEAM	
162	1.00	Exclusive LC	AG	MIN-MY BEAM	

Generated Loadcases

Number	Comb	Title
701	1	MAX-MY BEAM
702	1	MIN-MY BEAM

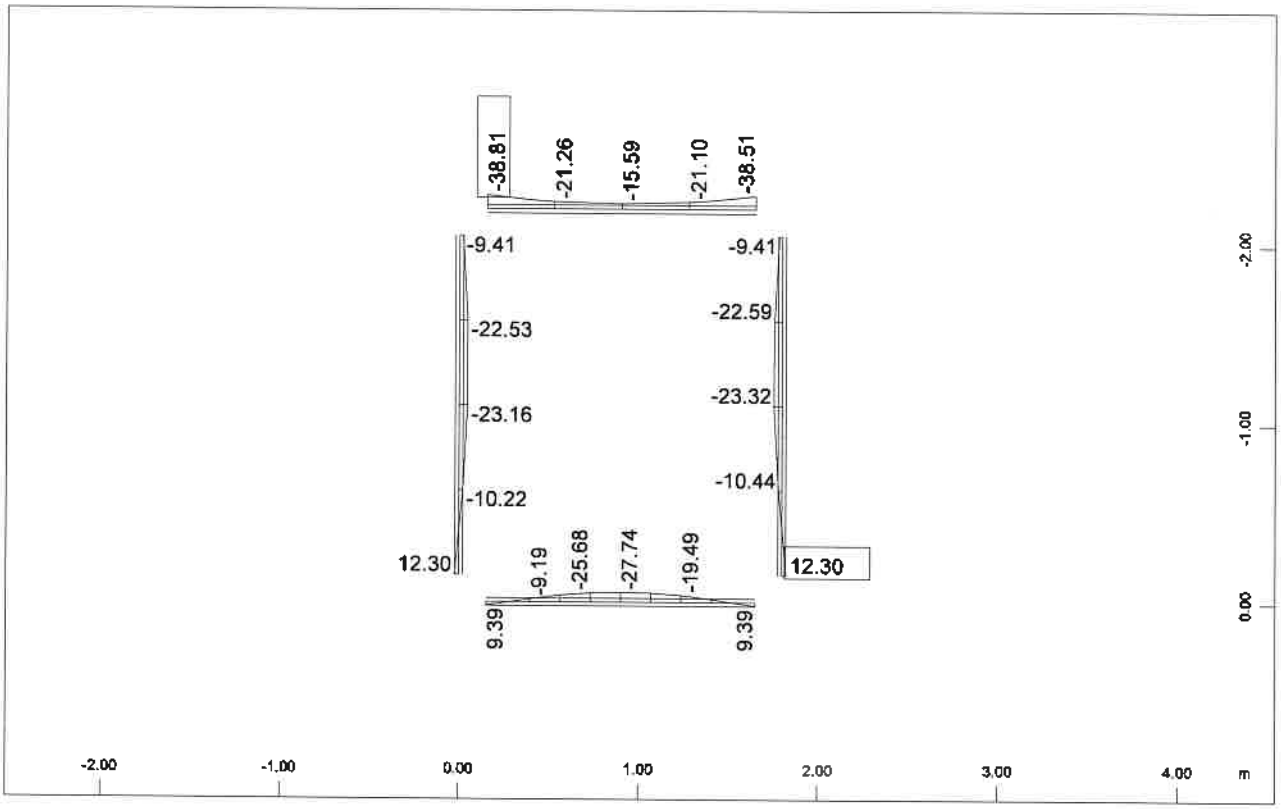
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
ENVELOPES FOR MY



Z X Y

Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 701 MAX-MY BEAM , 1 cm 3D = 200.0 kNm
(Max=45.1)

M 1 : 40



Z X Y

Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 702 MIN-MY BEAM , 1 cm 3D = 200.0 kNm
(Min=-38.8) (Max=12.3)

M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (V2)
****

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

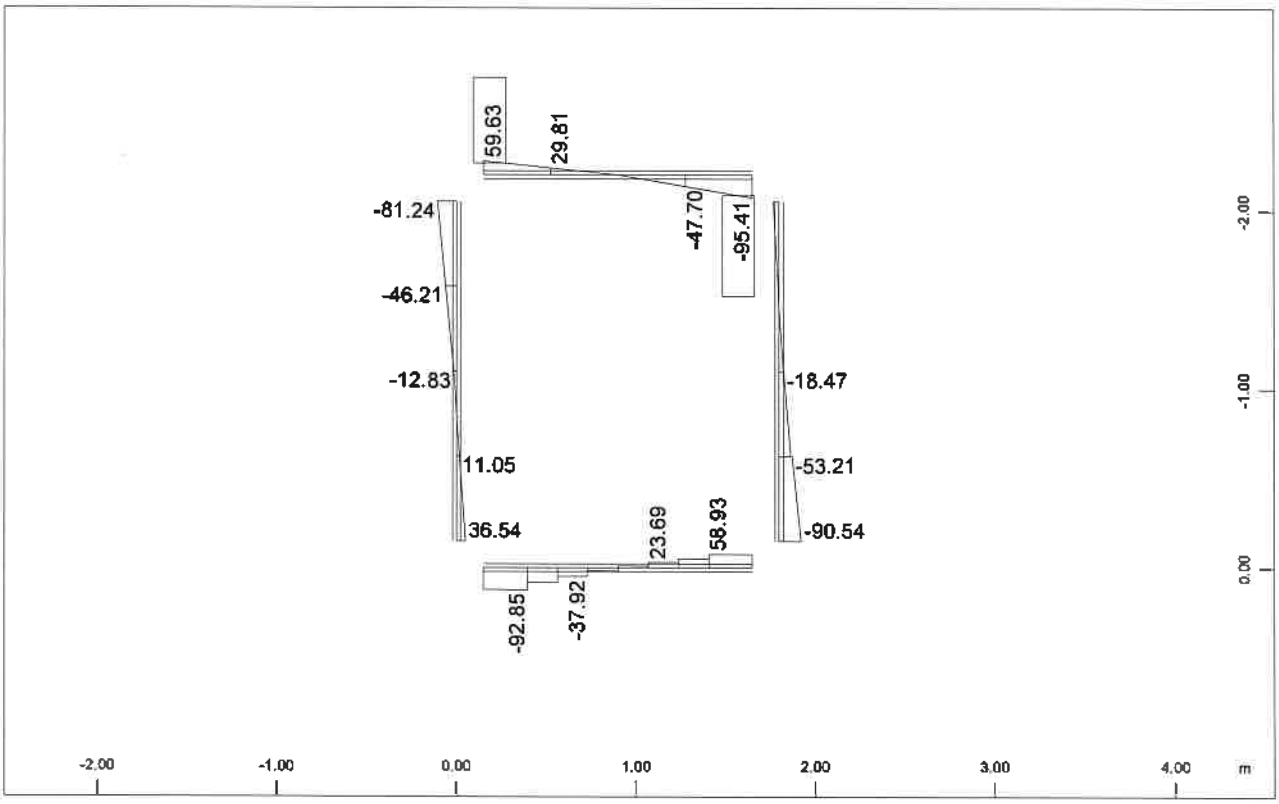
Number	factor	type			Title
103	1.00	Exclusive LC	AG	MAX-VZ BEAM	
104	1.00	Exclusive LC	AG	MIN-VZ BEAM	
123	1.00	Exclusive LC	AG	MAX-VZ BEAM	
124	1.00	Exclusive LC	AG	MIN-VZ BEAM	
143	1.00	Exclusive LC	AG	MAX-VZ BEAM	
144	1.00	Exclusive LC	AG	MIN-VZ BEAM	
163	1.00	Exclusive LC	AG	MAX-VZ BEAM	
164	1.00	Exclusive LC	AG	MIN-VZ BEAM	

Generated Loadcases

Number	Comb	Title
703	1	MAX-VZ BEAM
704	1	MIN-VZ BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
ENVELOPES FOR VZ

Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 703 MAX-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-59.4) (Max=95.6)
M 1 : 40



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 704 MIN-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-95.4) (Max=59.6)
M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
LOAD COMBINATION FOR DESIGN
****
ENVELOPES (N)
****

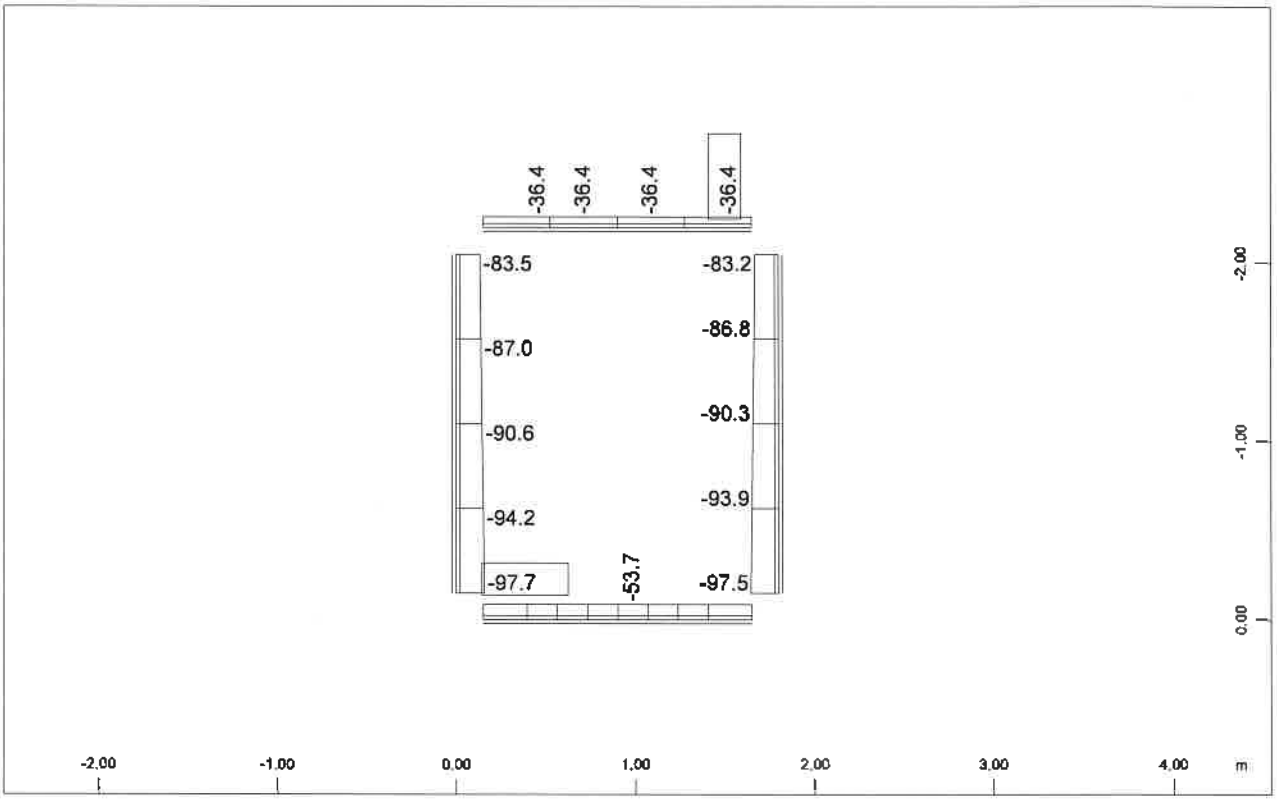
Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
105	1.00	Exclusive LC	AG	MAX-N	BEAM
106	1.00	Exclusive LC	AG	MIN-N	BEAM
125	1.00	Exclusive LC	AG	MAX-N	BEAM
126	1.00	Exclusive LC	AG	MIN-N	BEAM
145	1.00	Exclusive LC	AG	MAX-N	BEAM
146	1.00	Exclusive LC	AG	MIN-N	BEAM
165	1.00	Exclusive LC	AG	MAX-N	BEAM
166	1.00	Exclusive LC	AG	MIN-N	BEAM

Generated Loadcases

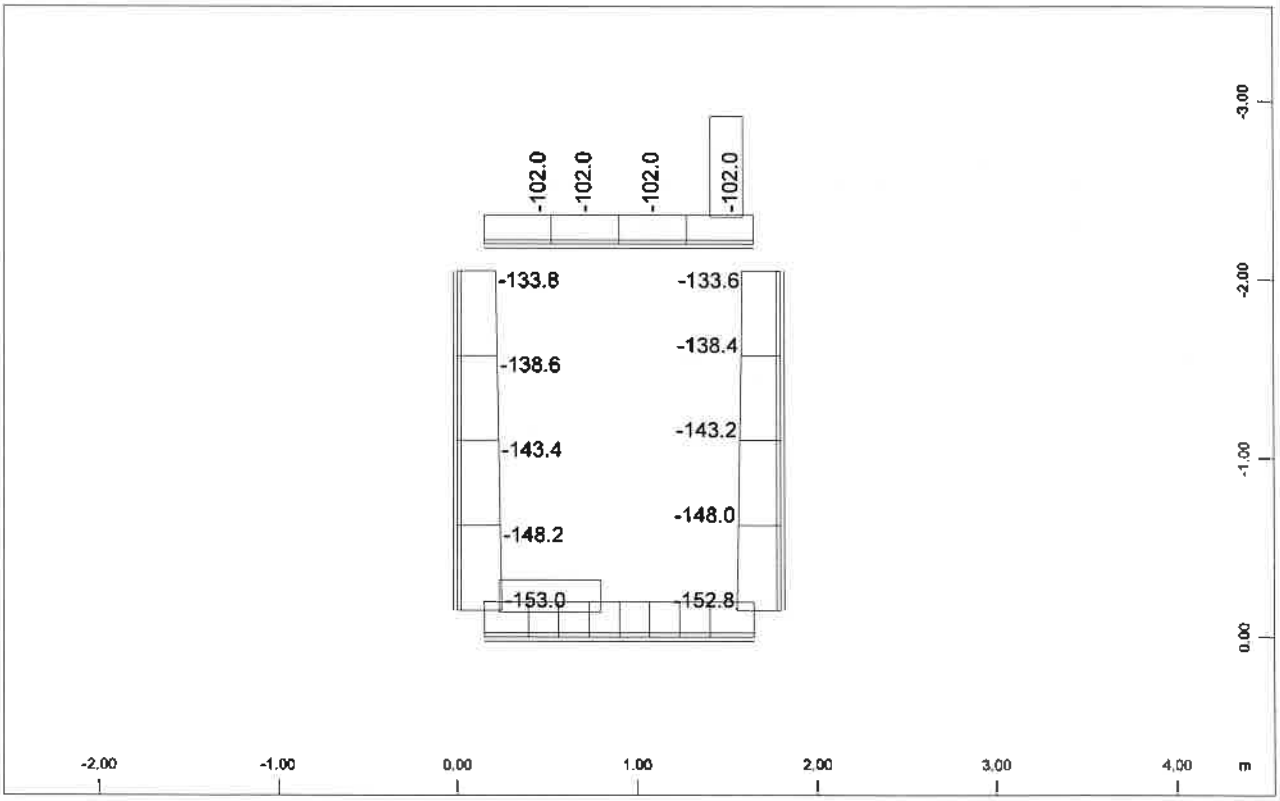
Number	Comb	Title
705	1	MAX-N BEAM
706	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
ENVELOPES FOR N



Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 705 MAX-N BEAM , 1 cm 3D = 250.0 kN
(Min=-97.7) (Max=-36.4)

M 1 : 40



Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 706 MIN-N BEAM , 1 cm 3D = 250.0 kN
(Min=-153.0) (Max=-102.0)

M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
DESIGN - ULTIMATE LIMIT STATE

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases

101	102	103	104	105	106
121	122	123	124	125	126
141	142	143	144	145	146
161	162	163	164	165	166

Ultimate Load Design

Design for ultimate loads EuroNorm EN 1992 Concrete
Uniaxial bending

Safety factors	SC-1	SC-2	SC-S	SS-1	SS-2	PIIa
	1.50	1.50	1.50	1.15	1.10	7

Strain limits	C1	C2	S1	S2	Z1	Z2
	-3.50	-2.00	3.00	45.00	-3.50	18.00

parameters for reinforcements

Minimum reinforcements		compression	min. reinforcem.	maximum-
Bending.	Compress.	e/d N/Npl	requ. section	reinforc.
0.00 [cm2]	0.00 [cm2]	3.50 0.0010	0.00 0.10	8.00

normal force xsi*V*cot(Theta) where Theta is estimated before the design and xsi= 0.50

Material of sections uses Ultimate Limit strain-stress law with individual safety factors
Material of reinforcements uses Ultimate Limit strain-stress law with individual safety factors

MNo.	temp lev.	Material-safety [-]	max.compr stress [MPa]	at strain [o/oo]	max.tens stress [MPa]	at strain [o/oo]	tension-stiffening [MPa]
1	0	1.500	-14.17	-2.00	0.00	0.00	
3	0	1.150	-478.26	-50.00	478.26	50.00	

Shear Design

Design for shear Eurocode EC2 (2004) / GR
Minimum shear factor or tan of inclination of compressive struts 0.40 / 2.50

MNo	f-cd [MPa]	tau-rd [MPa]	sigIIQ [MPa]	sigIIT [MPa]	sigIIQ+ [MPa]	fyd [MPa]
1	14.17	0.12	7.65	7.65	7.65	
3						434.78

Tolerance for exceeding maximum shear or principal compression stress 0.0200

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.11	3.44			2.44	1.00		
1	0.245	2	0.08	2.33			1.00	1.33		
2	0.000	2	0.07	2.00			1.00	1.00		
2	0.168	2	0.09	2.76			1.00	1.76		
3	0.000	2	0.08	2.34			1.00	1.34		
3	0.168	2	0.10	2.92			1.00	1.92		
4	0.000	2	0.08	2.51			1.00	1.51		
4	0.168	2	0.09	2.72			1.00	1.73		
5	0.000	2	0.09	2.72			1.00	1.73		
5	0.168	2	0.08	2.51			1.00	1.51		
6	0.000	2	0.10	2.92			1.00	1.92		
6	0.168	2	0.08	2.34			1.00	1.34		
7	0.000	2	0.09	2.76			1.00	1.76		
7	0.168	2	0.07	2.00			1.00	1.00		
8	0.000	2	0.08	2.33			1.00	1.33		
8	0.245	2	0.11	3.39			2.39	1.00		
9	0.000	3	0.14	4.10			3.11	1.00		
9	0.475	3	0.07	1.99			0.99	1.00		
10	0.000	3	0.07	1.99			0.99	1.00		
10	0.475	3	0.07	1.99			0.99	1.00		
11	0.000	3	0.07	1.99			0.99	1.00		
11	0.475	3	0.07	1.99			0.99	1.00		

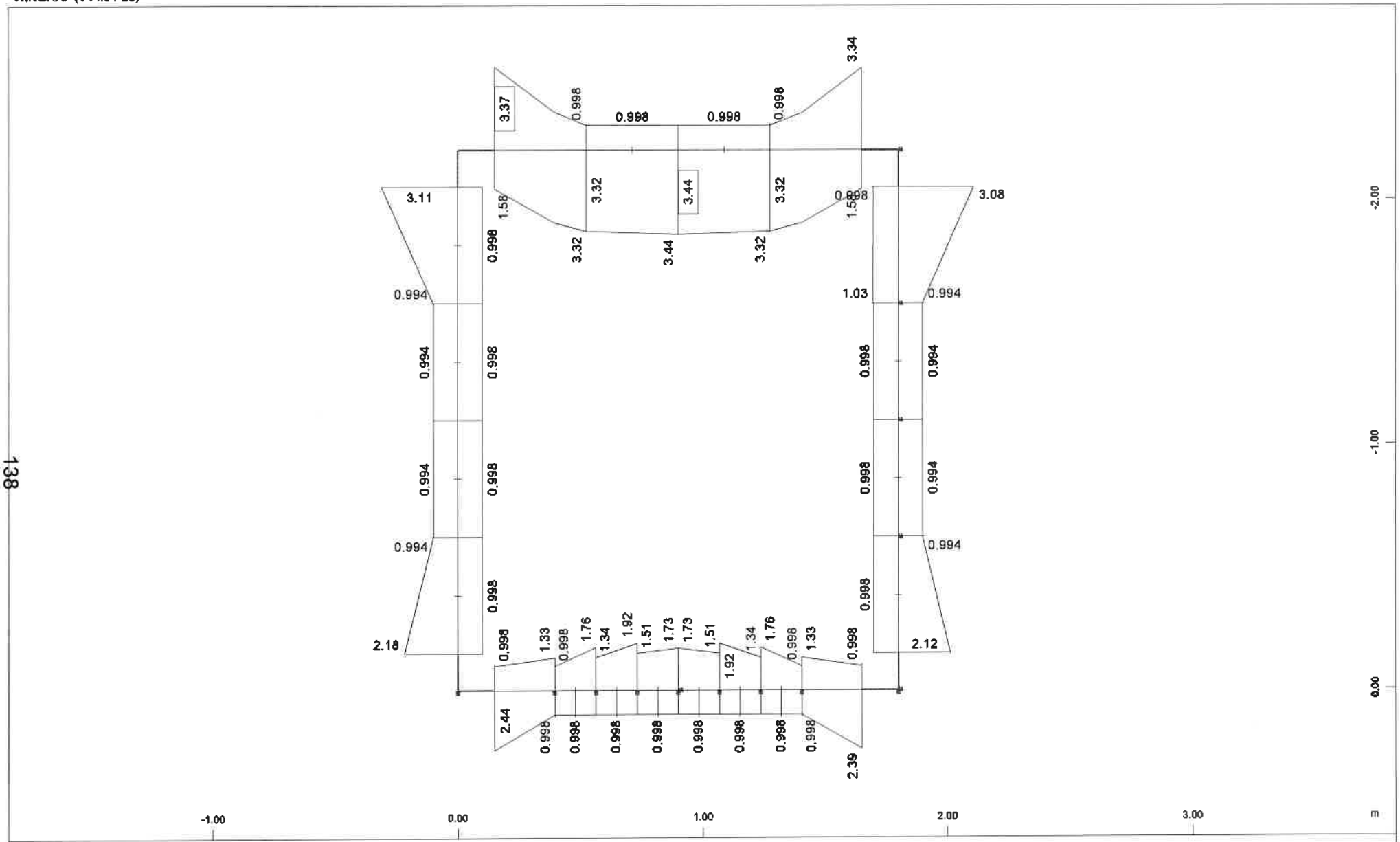
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
DESIGN - ULTIMATE LIMIT STATE

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

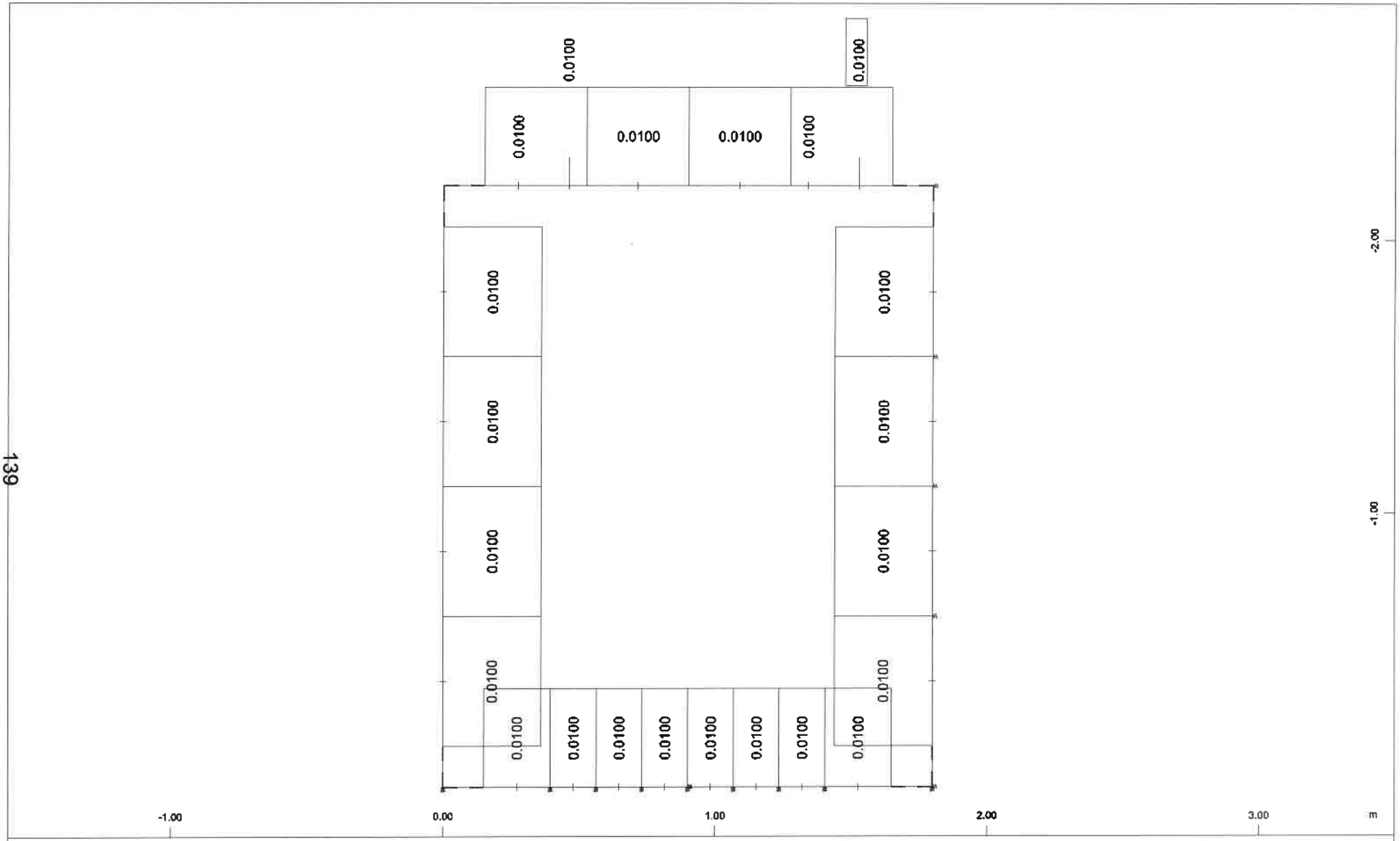
Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.11	3.17			2.18	1.00		
13	0.000	3	0.10	3.12			2.12	1.00		
13	0.475	3	0.07	1.99			0.99	1.00		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.07	1.99			0.99	1.00		
15	0.000	3	0.07	1.99			0.99	1.00		
15	0.475	3	0.07	1.99			0.99	1.00		
16	0.000	3	0.07	2.02			0.99	1.03		
16	0.475	3	0.14	4.07			3.08	1.00		
17	0.000	1	0.16	4.95			1.58	3.37		
17	0.245	1	0.15	4.50			2.97	1.53		
17	0.375	1	0.14	4.31			3.32	1.00		
18	0.000	1	0.14	4.31			3.32	1.00		
18	0.375	1	0.15	4.44			3.44	1.00		
19	0.000	1	0.15	4.44			3.44	1.00		
19	0.375	1	0.14	4.31			3.32	1.00		
20	0.000	1	0.14	4.31			3.32	1.00		
20	0.130	1	0.15	4.48			2.97	1.51		
20	0.375	1	0.16	4.92			1.58	3.34		

Shear Reinforcements per Cutted Part of Section LCR 1

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		0.01			
1	0.245	2	0.00		0.01			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		0.01			
8	0.245	2	0.00		0.01			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		0.01			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		0.01			



BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)



BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb 1 for S.L.S. -QUASI-PERMANENT COMBINATION

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type		Title
1	1.00	permanent load grouped in actions		SELF WEIGHT
2	1.00	permanent load grouped in actions		SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions		EARTH PRESSURE
4	1.00	Conditional LC		SHRINKAGE OF CONCRETE
5	0.50	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
7	0.38	Combined with LC		LINEAR TEMPERATURE DIFFE
5	0.50	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
8	0.38	Combined with LC		LINEAR TEMPERATURE DIFFE
5	0.17	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
7	0.50	Combined with LC		LINEAR TEMPERATURE DIFFE
5	0.17	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
8	0.50	Combined with LC		LINEAR TEMPERATURE DIFFE
6	0.50	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
7	0.38	Combined with LC		LINEAR TEMPERATURE DIFFE
6	0.50	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
8	0.38	Combined with LC		LINEAR TEMPERATURE DIFFE
6	0.17	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
7	0.50	Combined with LC		LINEAR TEMPERATURE DIFFE
6	0.17	Exclusive LC	A 2	TEMPERATURE FLUCTUATIONS
8	0.50	Combined with LC		LINEAR TEMPERATURE DIFFE

Generated Loadcases

Number	Comb	Title
301	1	MAX-MY BEAM
302	1	MIN-MY BEAM
303	1	MAX-VZ BEAM
304	1	MIN-VZ BEAM
305	1	MAX-N BEAM
306	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb 2 for S.L.S. - CHARACTERISTIC COMBINATION
MAIN VARIABLE LOAD: UNIFORM ROAD TRAFFIC

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.00	permanent load grouped in actions			SELF WEIGHT
2	1.00	permanent load grouped in actions			SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
10	0.75	Conditional LC			LIVE LOAD EARTH PRESSURE
90	1.00	Exclusive LC	A	1	LIVE LOADS

Generated Loadcases

Number	Comb	Title
401	1	MAX-MY BEAM
402	1	MIN-MY BEAM
403	1	MAX-VZ BEAM
404	1	MIN-VZ BEAM
405	1	MAX-N BEAM
406	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb 3 for S.L.S. - CHARACTERISTIC COMBINATION
MAIN VARIABLE LOAD: TEMPERATURE

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.00	permanent load grouped in actions			SELF WEIGHT
2	1.00	permanent load grouped in actions			SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
5	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC			LINEAR TEMPERATURE DIFFE
10	0.75	Conditional LC			LIVE LOAD EARTH PRESSURE
90	0.75	Exclusive LC	A	1	LIVE LOADS

Generated Loadcases

Number	Comb	Title
421	1	MAX-MY BEAM
422	1	MIN-MY BEAM
423	1	MAX-VZ BEAM
424	1	MIN-VZ BEAM
425	1	MAX-N BEAM
426	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb 4 for S.L.S. - CHARACTERISTIC COMBINATION
MAIN VARIABLE LOAD: EARTH PRESSURE DUE TO LIVE LOADS

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type			Title
1	1.00	permanent load grouped in actions			SELF WEIGHT
2	1.00	permanent load grouped in actions			SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions			EARTH PRESSURE
4	1.00	Conditional LC			SHRINKAGE OF CONCRETE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
5	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.60	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.45	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
7	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
6	0.21	Exclusive LC	A	2	TEMPERATURE FLUCTUATIONS
8	0.60	Combined with LC			LINEAR TEMPERATURE DIFFE
10	1.00	Conditional LC			LIVE LOAD EARTH PRESSURE
90	0.75	Exclusive LC	A	1	LIVE LOADS

Generated Loadcases

Number	Comb	Title
441	1	MAX-MY BEAM
442	1	MIN-MY BEAM
443	1	MAX-VZ BEAM
444	1	MIN-VZ BEAM
445	1	MAX-N BEAM
446	1	MIN-N BEAM

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
SERVICEABILITY LIMIT STATE - CONTROL OF CRACKING
QUASI-PERMANENT COMBINATION

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases
301 302 303 304 305 306

Parameters for nonlinear stress / Crackwidth EC2 / 30

MNo	design width [mm]		bond [-]	load [-]	h-max [m]
3	0.300	0.300	0.80	0.50	0.800

Check for crack width passed with additional reinforcements

Stiffness is not saved in database

Longitudinal Reinforcements LCR 1
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.16	4.69			3.70	1.00		
1	0.245	2	0.08	2.33			1.00	1.33		
2	0.000	2	0.07	2.00			1.00	1.00		
2	0.168	2	0.09	2.76			1.00	1.76		
3	0.000	2	0.08	2.34			1.00	1.34		
3	0.168	2	0.11	3.23			1.00	2.24		
4	0.000	2	0.11	3.23			1.00	2.24		
4	0.168	2	0.12	3.63			1.00	2.63		
5	0.000	2	0.12	3.63			1.00	2.63		
5	0.168	2	0.11	3.23			1.00	2.24		
6	0.000	2	0.11	3.23			1.00	2.24		
6	0.168	2	0.08	2.34			1.00	1.34		
7	0.000	2	0.09	2.76			1.00	1.76		
7	0.168	2	0.07	2.00			1.00	1.00		
8	0.000	2	0.08	2.33			1.00	1.33		
8	0.245	2	0.16	4.69			3.70	1.00		
9	0.000	3	0.17	4.95			3.96	1.00		
9	0.475	3	0.07	1.99			0.99	1.00		
10	0.000	3	0.07	1.99			0.99	1.00		
10	0.475	3	0.07	1.99			0.99	1.00		
11	0.000	3	0.07	1.99			0.99	1.00		
11	0.475	3	0.07	1.99			0.99	1.00		
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.13	4.04			3.04	1.00		
13	0.000	3	0.13	4.04			3.04	1.00		
13	0.475	3	0.07	1.99			0.99	1.00		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.07	1.99			0.99	1.00		
15	0.000	3	0.07	1.99			0.99	1.00		
15	0.475	3	0.07	1.99			0.99	1.00		
16	0.000	3	0.07	2.02			0.99	1.03		
16	0.475	3	0.17	4.95			3.96	1.00		
17	0.000	1	0.18	5.50			1.58	3.92		
17	0.245	1	0.15	4.50			2.97	1.53		
17	0.375	1	0.15	4.58			3.58	1.00		
18	0.000	1	0.15	4.58			3.58	1.00		
18	0.375	1	0.19	5.84			4.84	1.00		
19	0.000	1	0.19	5.84			4.84	1.00		
19	0.375	1	0.15	4.58			3.58	1.00		
20	0.000	1	0.15	4.58			3.58	1.00		
20	0.130	1	0.15	4.48			2.97	1.51		
20	0.375	1	0.18	5.50			1.58	3.92		

Reinforcements saved as design case LCR 1

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
SERVICEABILITY LIMIT STATE - CONTROL OF CRACKING
QUASI-PERMANENT COMBINATION

Longitudinal Reinforcements Accumulated minimum
Note: Layer includes reinforcements for torsion if followed by T
Note: Layer has only compression reinforcements if followed by a quote

Beam	x[m]	NoS	mue [-]	As-Sum [cm2]	shift by [m]	Lay-0&5 [cm2]	Lay-1&6 [cm2]	Lay-2&7 [cm2]	Lay-3&8 [cm2]	Lay-4&9 [cm2]
1	0.000	2	0.16	4.69			3.70	1.00		
1	0.245	2	0.08	2.33			1.00	1.33		
2	0.000	2	0.07	2.00			1.00	1.00		
2	0.168	2	0.09	2.76			1.00	1.76		
3	0.000	2	0.08	2.34			1.00	1.34		
3	0.168	2	0.11	3.23			1.00	2.24		
4	0.000	2	0.11	3.23			1.00	2.24		
4	0.168	2	0.12	3.63			1.00	2.63		
5	0.000	2	0.12	3.63			1.00	2.63		
5	0.168	2	0.11	3.23			1.00	2.24		
6	0.000	2	0.11	3.23			1.00	2.24		
6	0.168	2	0.08	2.34			1.00	1.34		
7	0.000	2	0.09	2.76			1.00	1.76		
7	0.168	2	0.07	2.00			1.00	1.00		
8	0.000	2	0.08	2.33			1.00	1.33		
8	0.245	2	0.16	4.69			3.70	1.00		
9	0.000	3	0.17	4.95			3.96	1.00		
9	0.475	3	0.07	1.99			0.99	1.00		
10	0.000	3	0.07	1.99			0.99	1.00		
10	0.475	3	0.07	1.99			0.99	1.00		
11	0.000	3	0.07	1.99			0.99	1.00		
11	0.475	3	0.07	1.99			0.99	1.00		
12	0.000	3	0.07	1.99			0.99	1.00		
12	0.475	3	0.13	4.04			3.04	1.00		
13	0.000	3	0.13	4.04			3.04	1.00		
13	0.475	3	0.07	1.99			0.99	1.00		
14	0.000	3	0.07	1.99			0.99	1.00		
14	0.475	3	0.07	1.99			0.99	1.00		
15	0.000	3	0.07	1.99			0.99	1.00		
15	0.475	3	0.07	1.99			0.99	1.00		
16	0.000	3	0.07	2.02			0.99	1.03		
16	0.475	3	0.17	4.95			3.96	1.00		
17	0.000	1	0.18	5.50			1.58	3.92		
17	0.245	1	0.15	4.50			2.97	1.53		
17	0.375	1	0.15	4.58			3.58	1.00		
18	0.000	1	0.15	4.58			3.58	1.00		
18	0.375	1	0.19	5.84			4.84	1.00		
19	0.000	1	0.19	5.84			4.84	1.00		
19	0.375	1	0.15	4.58			3.58	1.00		
20	0.000	1	0.15	4.58			3.58	1.00		
20	0.130	1	0.15	4.48			2.97	1.51		
20	0.375	1	0.18	5.50			1.58	3.92		

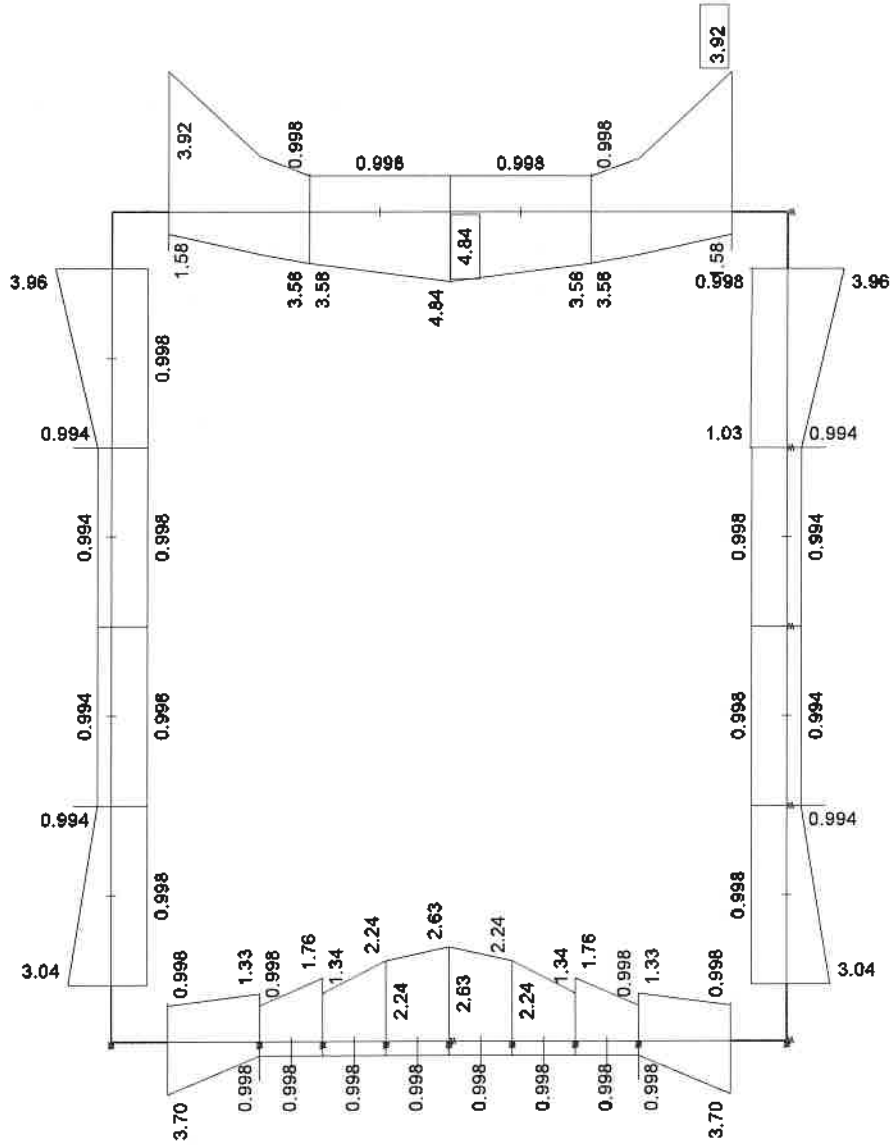
Shear Reinforcements per Cutted Part of Section Accumulated minimum

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
1	0.000	2	0.00		0.01			
1	0.245	2	0.00		0.01			
2	0.000	2	0.00		0.01			
2	0.168	2	0.00		0.01			
3	0.000	2	0.00		0.01			
3	0.168	2	0.00		0.01			
4	0.000	2	0.00		0.01			
4	0.168	2	0.00		0.01			
5	0.000	2	0.00		0.01			
5	0.168	2	0.00		0.01			
6	0.000	2	0.00		0.01			
6	0.168	2	0.00		0.01			
7	0.000	2	0.00		0.01			
7	0.168	2	0.00		0.01			
8	0.000	2	0.00		0.01			
8	0.245	2	0.00		0.01			
9	0.000	3	0.00		0.01			
9	0.475	3	0.00		0.01			
10	0.000	3	0.00		0.01			
10	0.475	3	0.00		0.01			
11	0.000	3	0.00		0.01			
11	0.475	3	0.00		0.01			
12	0.000	3	0.00		0.01			
12	0.475	3	0.00		0.01			
13	0.000	3	0.00		0.01			
13	0.475	3	0.00		0.01			
14	0.000	3	0.00		0.01			
14	0.475	3	0.00		0.01			
15	0.000	3	0.00		0.01			

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
SERVICEABILITY LIMIT STATE - CONTROL OF CRACKING
QUASI-PERMANENT COMBINATION

Shear Reinforcements per Cutted Part of Section Accumulated minimum

Beam	x[m]	NoS	Asl-Mt [cm2/m]	SLay-0&5 [cm2/m]	SLay-1&6 [cm2/m]	SLay-2&7 [cm2/m]	SLay-3&8 [cm2/m]	SLay-4&9 [cm2/m]
15	0.475	3	0.00		0.01			
16	0.000	3	0.00		0.01			
16	0.475	3	0.00		0.01			
17	0.000	1	0.00		0.01			
17	0.245	1	0.00		0.01			
17	0.375	1	0.00		0.01			
18	0.000	1	0.00		0.01			
18	0.375	1	0.00		0.01			
19	0.000	1	0.00		0.01			
19	0.375	1	0.00		0.01			
20	0.000	1	0.00		0.01			
20	0.130	1	0.00		0.01			
20	0.375	1	0.00		0.01			

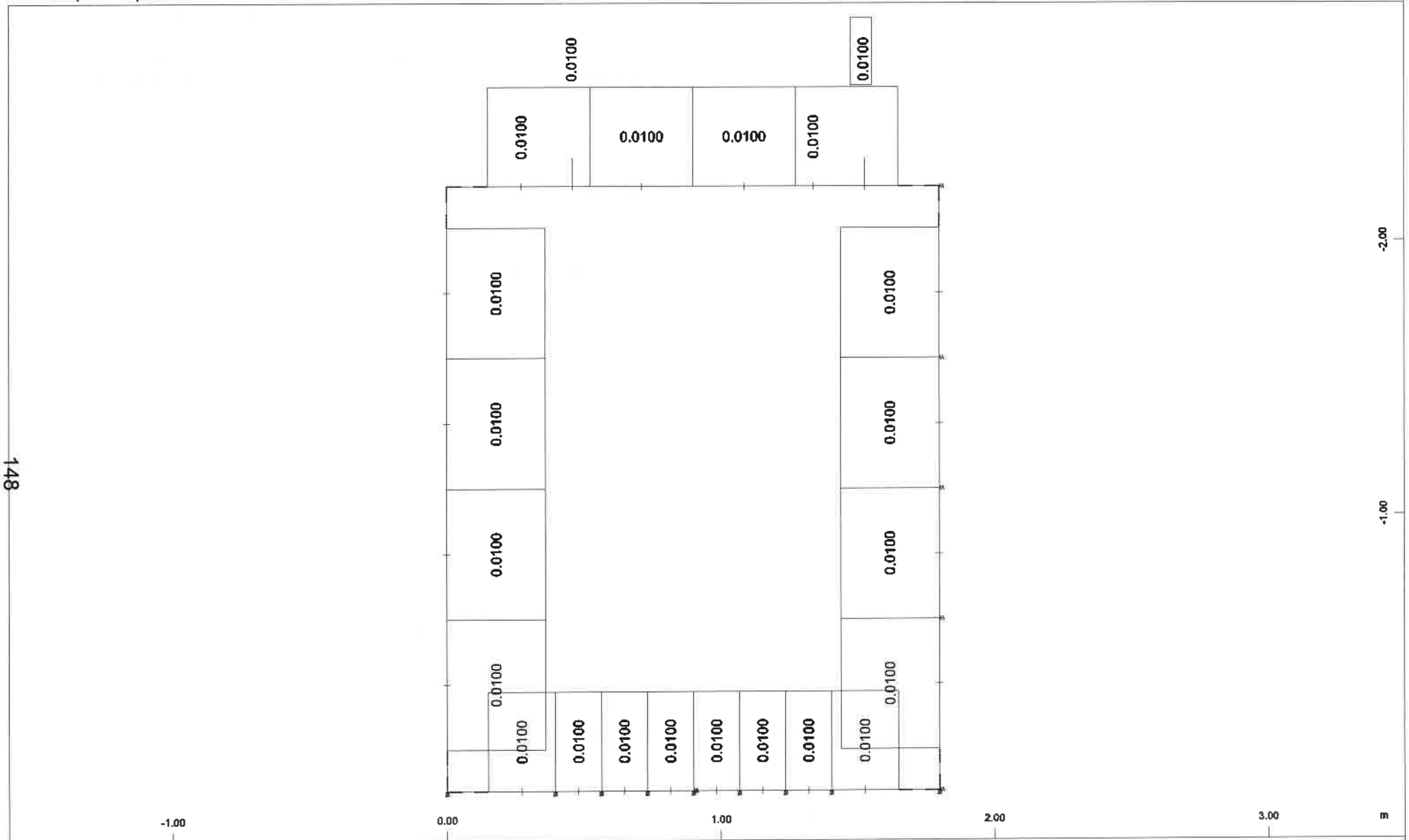


147

Z X
Y

Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=4.84)
Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 2.00 cm2 (Max=3.92)

M 1 : 19



M 1 : 18

Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 0.0050 cm2/m (Max=0.0100)

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
CHARACTERISTIC COMBINATION
SLS CHECK OF THE CONCRETE STRESSES CHARACTERISTIC < 0.6 fck

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases

401	402	403	404	405	406
421	422	423	424	425	426
441	442	443	444	445	446

Parameters for nonlinear stress / Crackwidth

MNo	sig-comp [MPa]	sig-comp [o/o]	sig-tens [MPa]	sig-tens [o/o]
1	-6.48	43.21	0.00	100.0
3	-7.13		237.36	

Stiffness is not saved in database

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
CHARACTERISTIC COMBINATION
SLS CHECK OF THE STEEL STRESSES CHARACTERISTIC < 0.8 fyk

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases

401	402	403	404	405	406
421	422	423	424	425	426
441	442	443	444	445	446

Parameters for nonlinear stress / Crackwidth

MNo	sig-comp [MPa]	[o/o]	sig-tens [MPa]	[o/o]
1	-6.48		0.00	
3	-7.13	1.78	237.36	59.34

Stiffness is not saved in database

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
OIWNEI MONIMOS SYNDYASMOS 0.45 fck
SLS CHECK OF THE CONCRETE STRESSES QUASI-PERMANENT < 0.45 fck

Selected Beam Elements

FROM	TO	INC	X-VALUE	NC	MEMBER	CS0	CS1	CS2	CS3	CS4	CS5
		all elements									

Default design code is EuroNorm EN 1992 Concrete with country code 30 (Hellas/Greece)
Class(Tab.7.1N): N (Reinforced members and prestressed members with unbonded tendons)
Snow load zone : 1

Materials
No. 1 C 25/30 (EN 1992)
No. 3 S 500 (EN 1992)

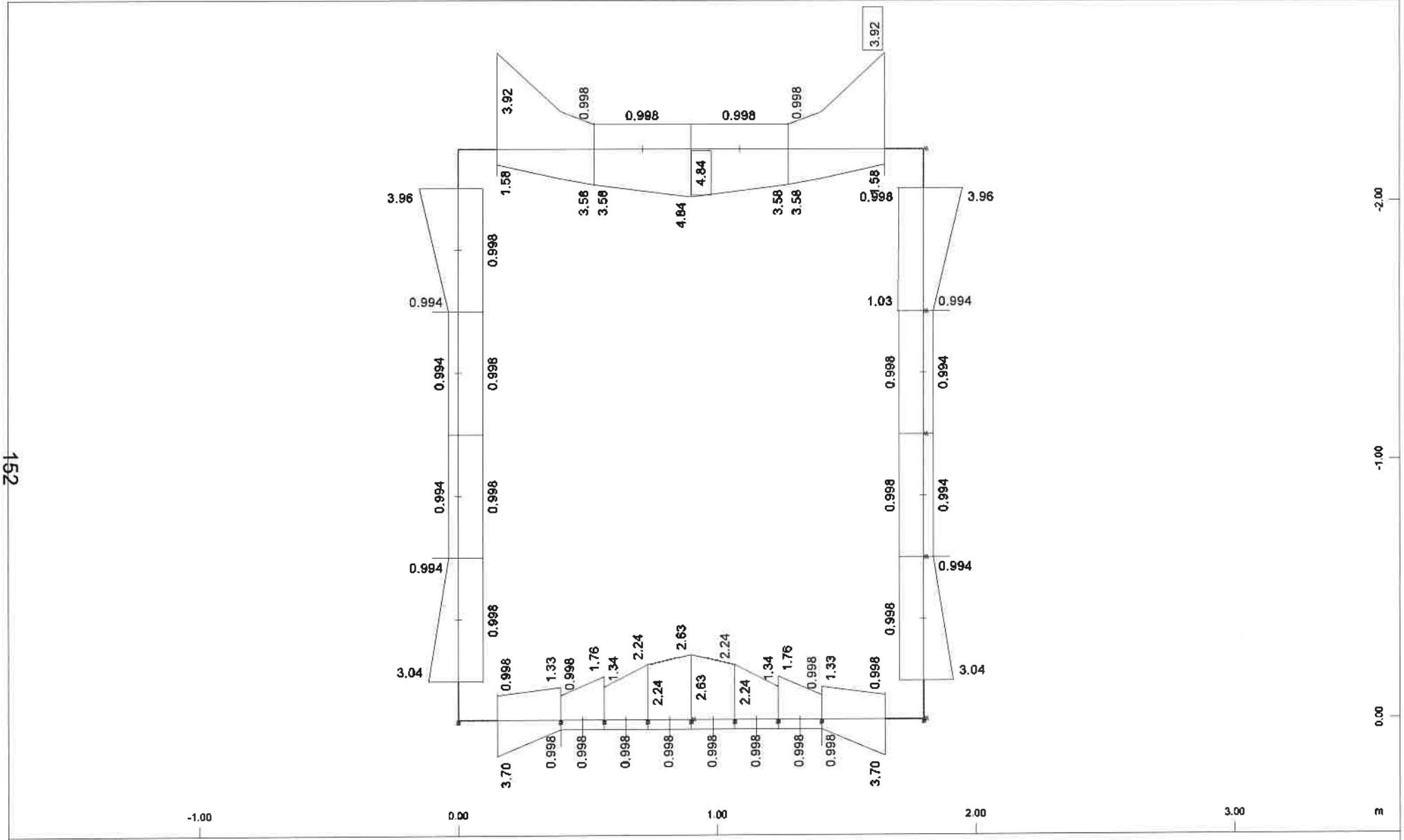
Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as design case LCR 1

Considered Load Cases
301 302 303 304 305 306

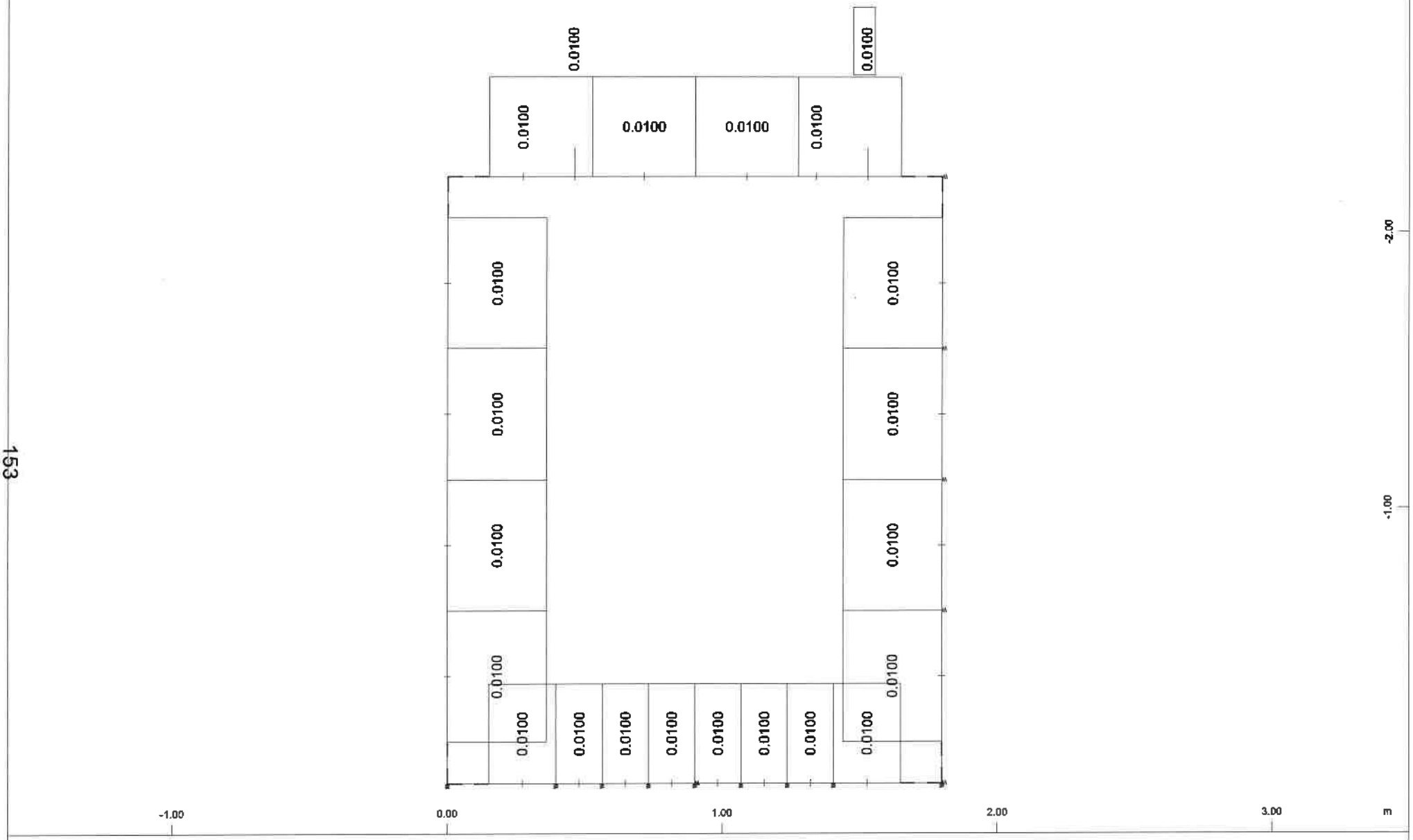
Parameters for nonlinear stress / Crackwidth

MNo	sig-comp [MPa]	sig-comp [o/o]	sig-tens [MPa]	sig-tens [o/o]
1	-4.49	39.89	0.00	100.0
3	-5.40		129.54	

Stiffness is not saved in database



BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)


0.0100
-2.00
-1.00
-1.00
0.00
1.00
2.00
3.00
m
Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 0.0050 cm2/m (Max=0.0100)
M 1 : 18
Z
X
Y

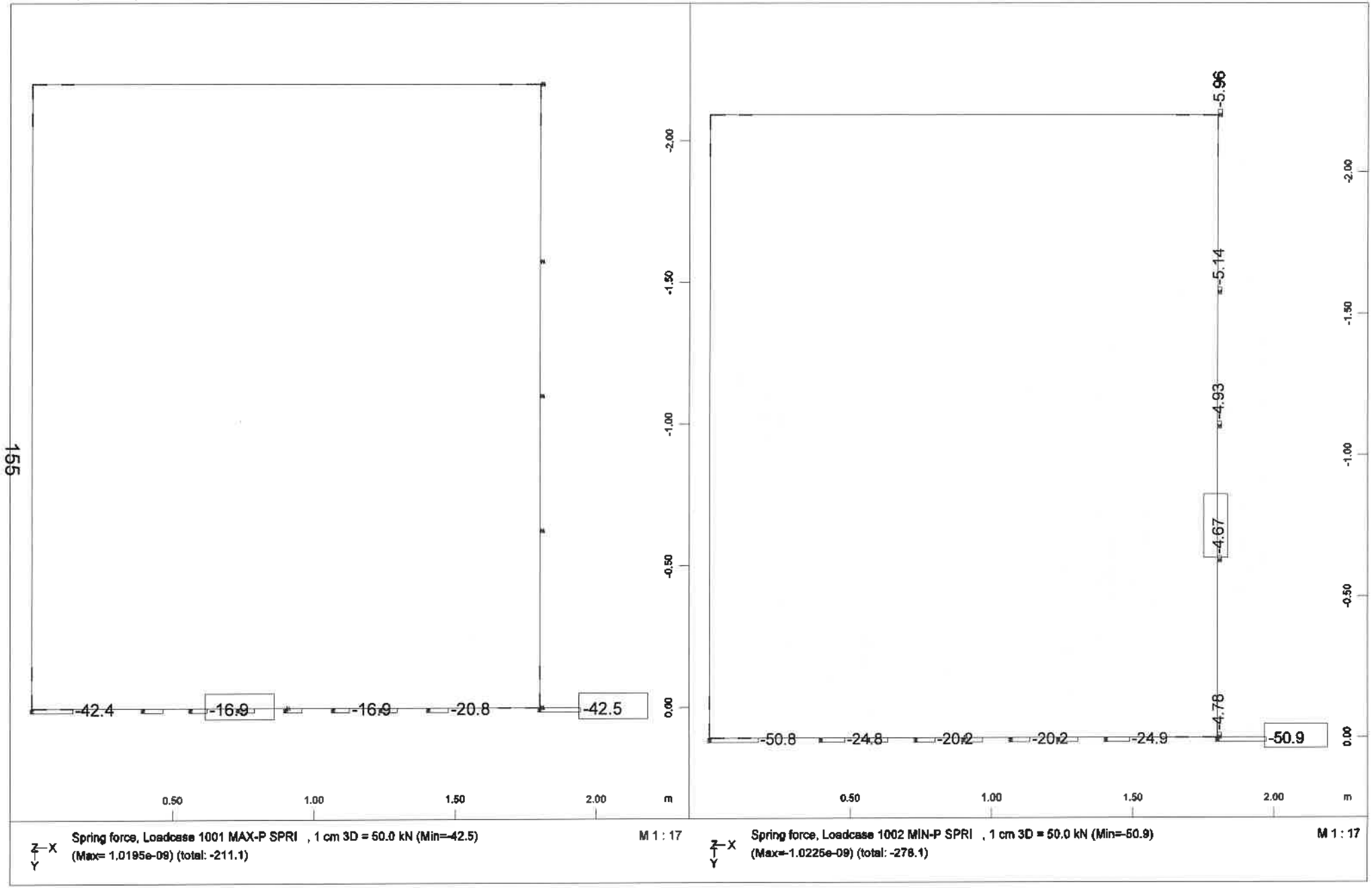
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=1000kN/m3)
comb 1 for bedding stresses

Combination rule Number 1
Design Combination
Resulting loadcases type Design Combination
Loadcase selection

Number	factor	type	Title
1	1.00	permanent load grouped in actions	SELF WEIGHT
2	1.00	permanent load grouped in actions	SOIL FILL WEIGHT
3	1.00	permanent load grouped in actions	EARTH PRESSURE
4	1.00	Conditional LC	SHRINKAGE OF CONCRETE
5	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
5	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
5	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
6	1.00	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	0.75	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
7	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
6	0.35	Exclusive LC A 2	TEMPERATURE FLUCTUATIONS
8	1.00	Combined with LC	LINEAR TEMPERATURE DIFFE
10	1.00	Conditional LC	LIVE LOAD EARTH PRESSURE
90	1.00	Exclusive LC A 1	LIVE LOADS

Generated Loadcases

Number	Comb	Title
1001	1	MAX-P SPRI
1002	1	MIN-P SPRI


155
-42.4
-16.9
-16.9
-20.8
-42.5
-2.00
-1.50
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00
m
Z
X
Y
Spring force, Loadcase 1001 MAX-P SPRI , 1 cm 3D = 50.0 kN (Min=-42.5)
(Max= 1.0195e-09) (total: -211.1)
M 1 : 17
-5.96
-5.14
-4.93
-4.67
-4.78
-50.8
-24.8
-20.2
-20.2
-24.9
-50.9
Spring force, Loadcase 1002 MIN-P SPRI , 1 cm 3D = 50.0 kN (Min=-50.9)
(Max=-1.0225e-09) (total: -278.1)
M 1 : 17

ΟΧΕΤΟΣ 1.50Χ1.90 (Ηεπ=4.00m)

Εσωτερικό πλάτος	1,50 m
Ολικό πλάτος	2,10 m
Εσωτερικό ύψος (με στρώση φθοράς)	1,90 m
Ολικό ύψος	2,50 m
Πάχος τοιχωμάτων	0,30 m
Πάχος πλακών	0,30 m
Ύψος επίχωσης	4,00 m

ΕΛΕΓΧΟΣ ΘΕΜΕΛΙΩΣΗΣ

Φορτία:

Ίδιο βάρος: ($E^*25/b_{ολ}$)=	28,57	kN/m^2
Επίχωση:	72,00	kN/m^2
Κινητό:	5,89	kN/m^2
Επικάλυψη πυθμένα:	0,00	kN/m^2
	106,46	**kN/m^2** < σεπ

Τάσεις αιχμής:

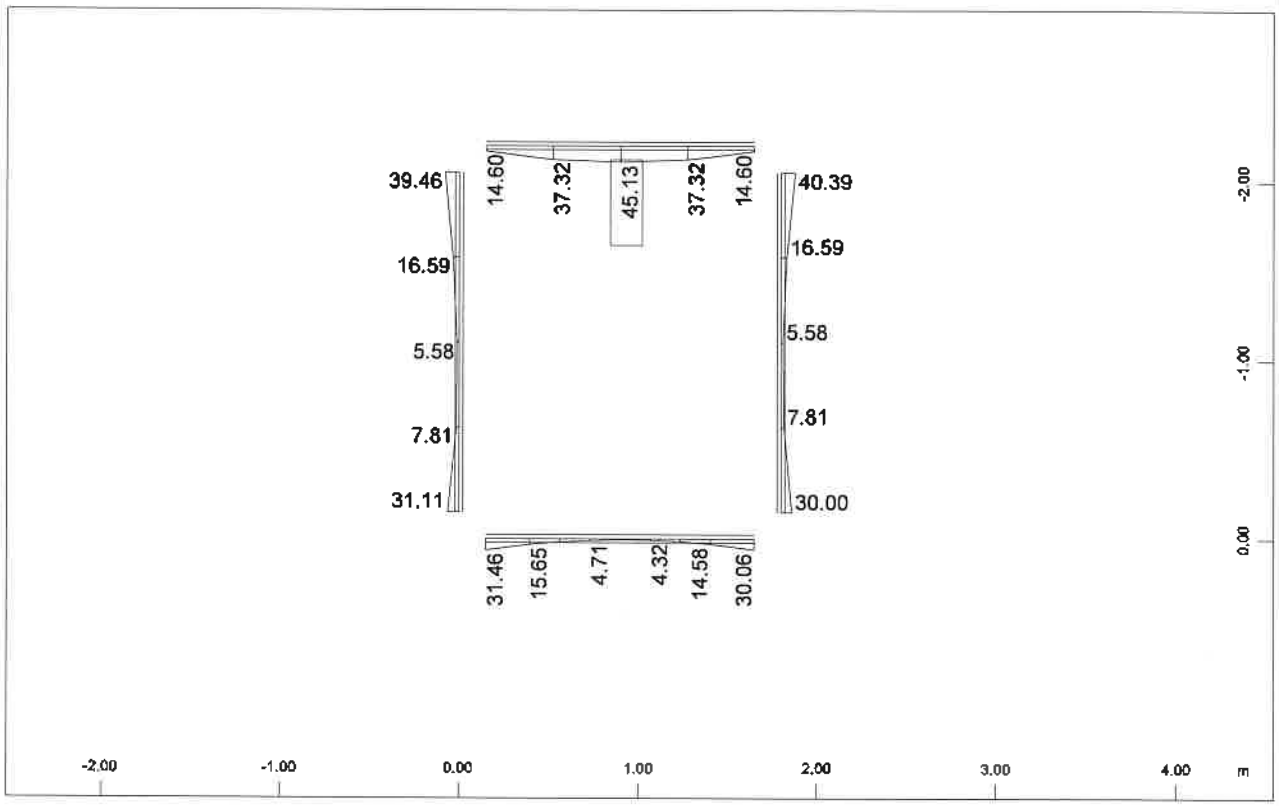
-Στατικά (LC1002)

Επιφάνεια επιρροής δυσμενέστερου ελατηρίου

F = 0,30 + 1,50/16 =	0,3938	m
σmax = -50,9/0,394=	**-129,27**	**kN/m^2**

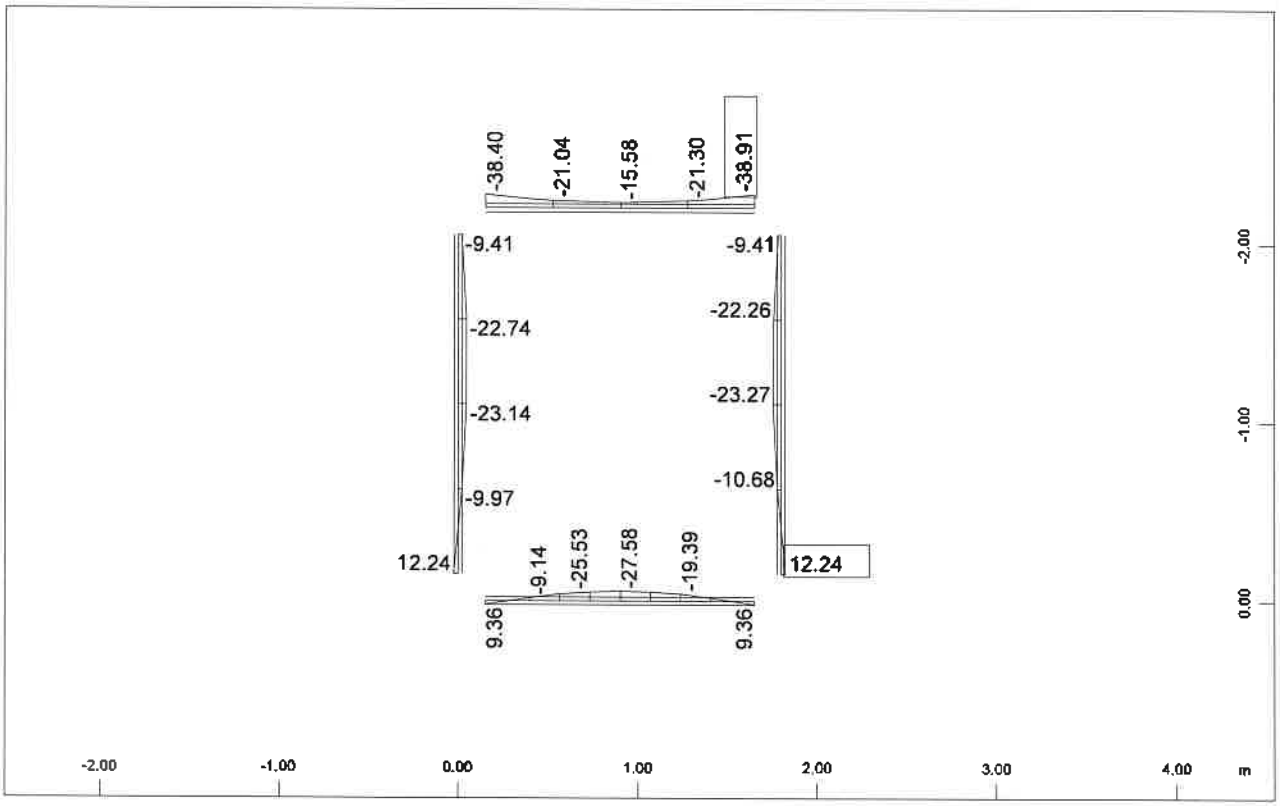
ΓΡΑΦΗΜΑΤΑ ΑΠΟ ΕΠΙΛΥΣΗ ΚΙΒ. ΟΧΕΤΟΥ1.50x1.90 [Ηεπ=4.00m]
(ks=20000 KN/m³)

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)
ENVELOPES FOR MY



Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 701 MAX-MY BEAM , 1 cm 3D = 200.0 kNm
(Max=45.1)

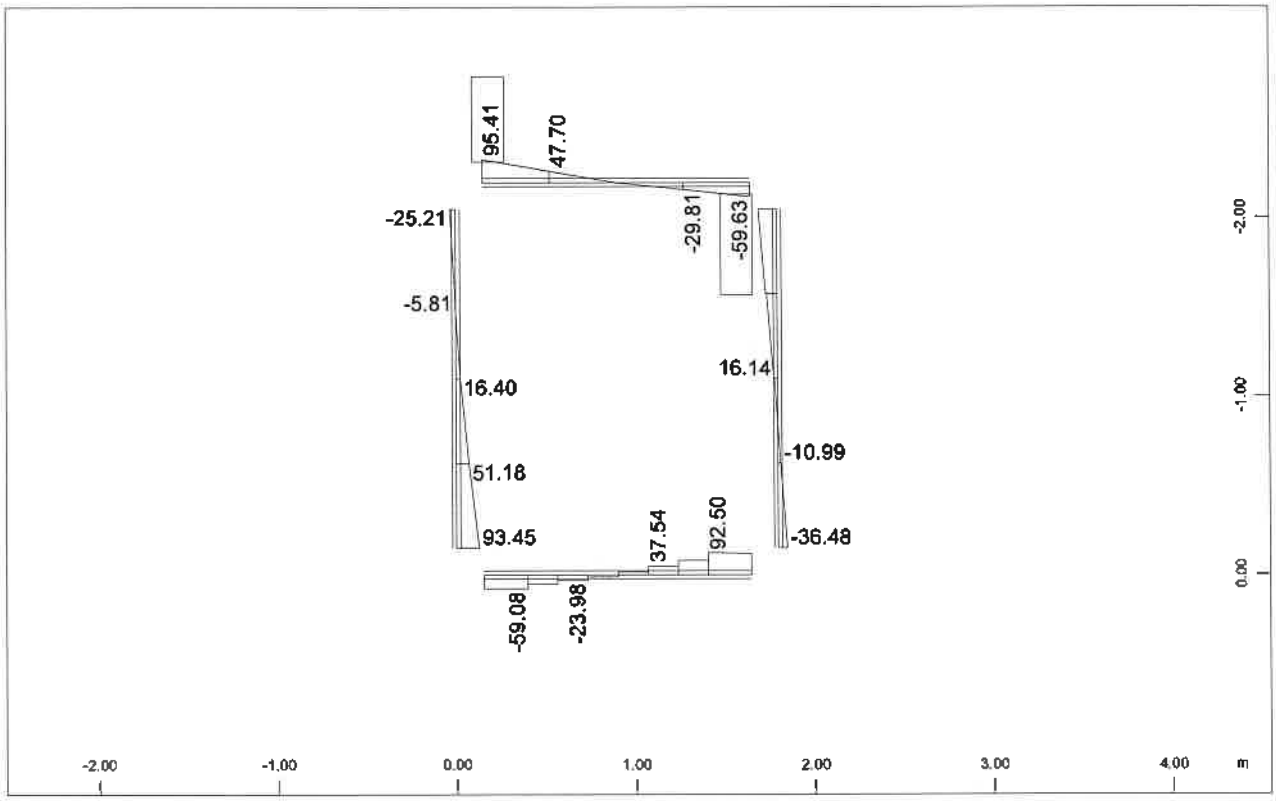
M 1 : 40



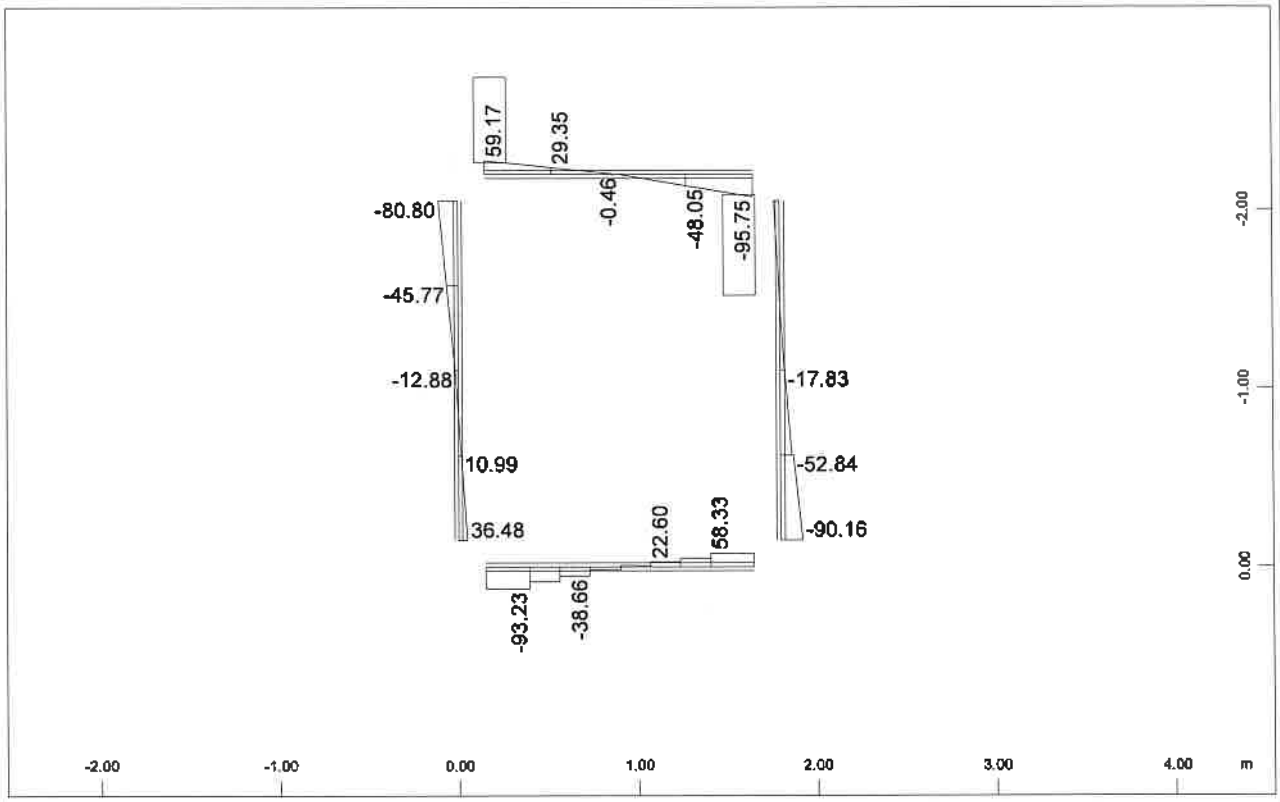
Sector of system Beam Elements
Beam Elements , Bending moment My, Loadcase 702 MIN-MY BEAM , 1 cm 3D = 200.0 kNm
(Min=-38.9) (Max=12.2)

M 1 : 40

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)
ENVELOPES FOR VZ

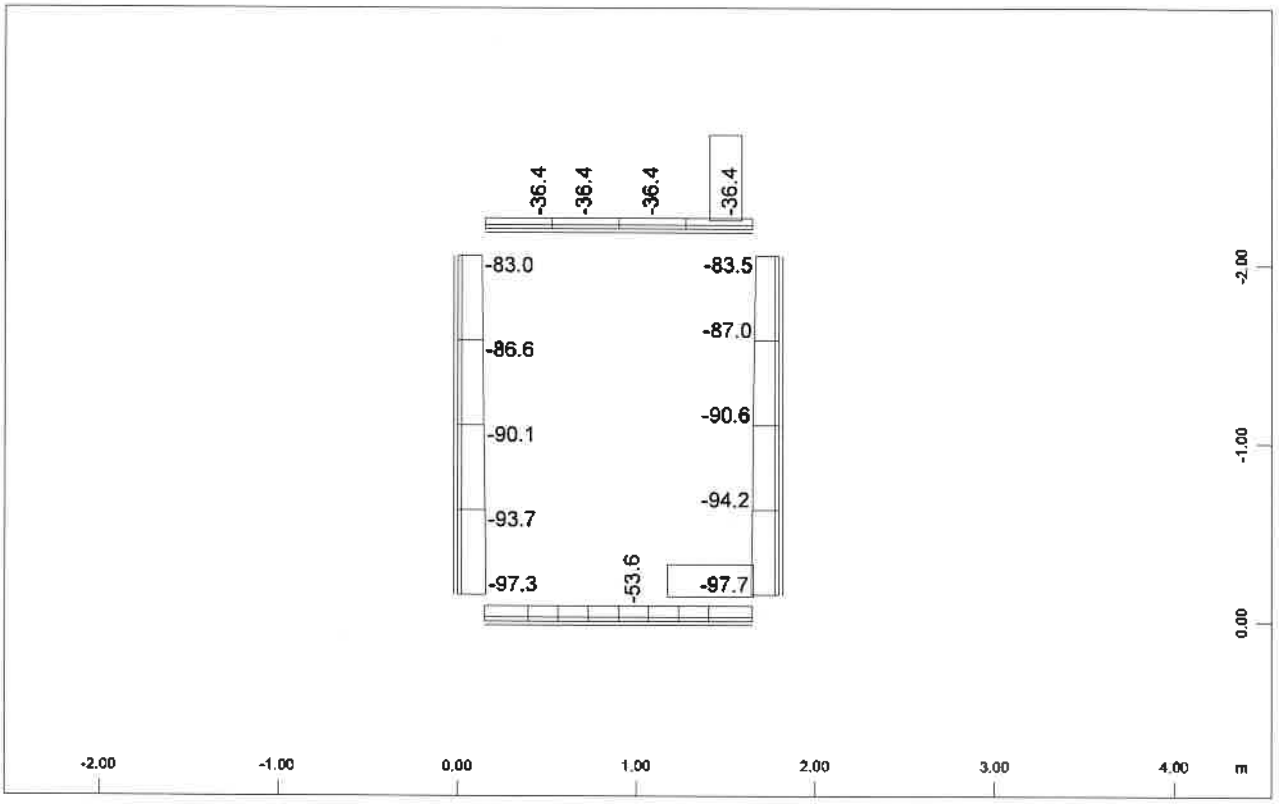


Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 703 MAX-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-59.6) (Max=95.4)
M 1 : 40



Sector of system Beam Elements
Beam Elements , Shear force Vz, Loadcase 704 MIN-VZ BEAM , 1 cm 3D = 300.0 kN
(Min=-95.8) (Max=59.2)
M 1 : 40

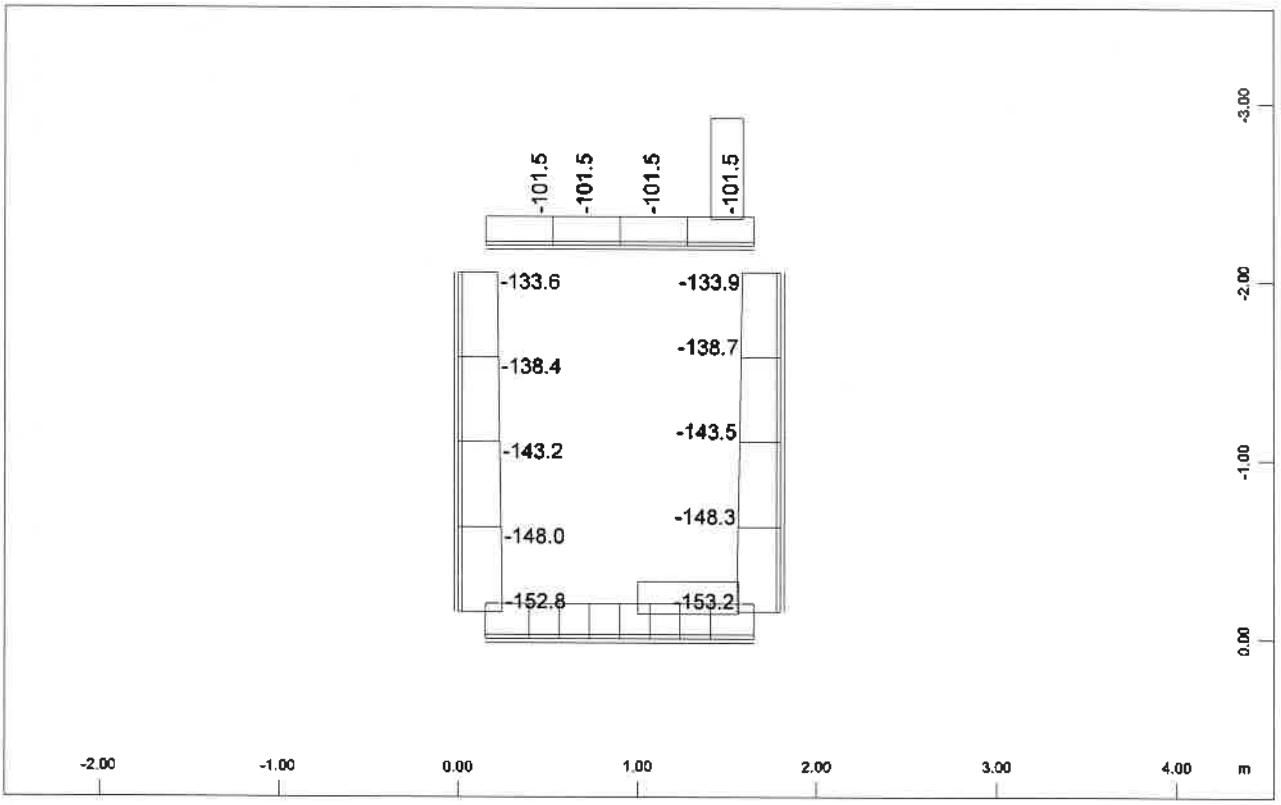
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)
ENVELOPES FOR N



Z–X
Y

Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 705 MAX-N BEAM , 1 cm 3D = 250.0 kN
(Min=-97.7) (Max=-36.4)

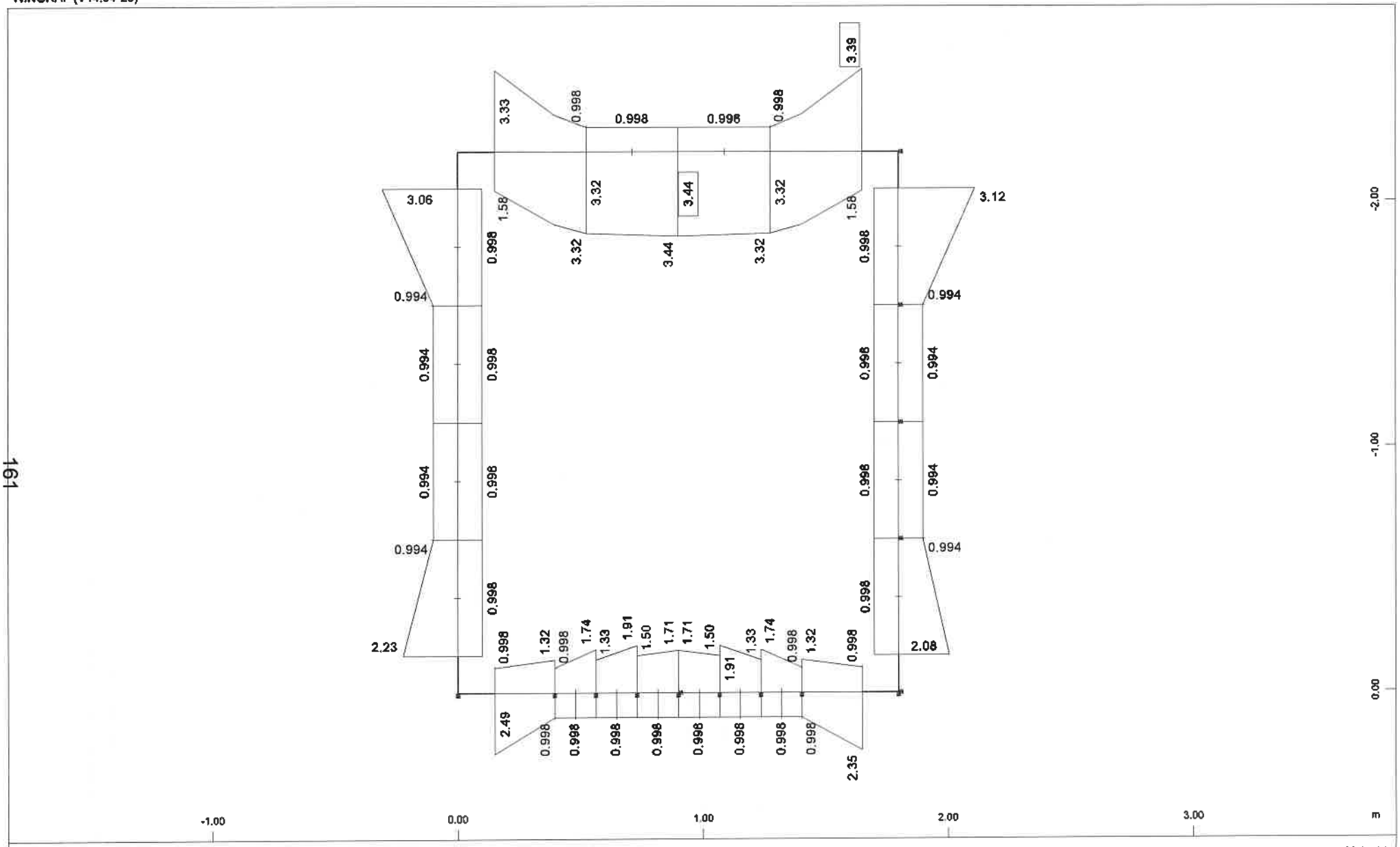
M 1 : 40



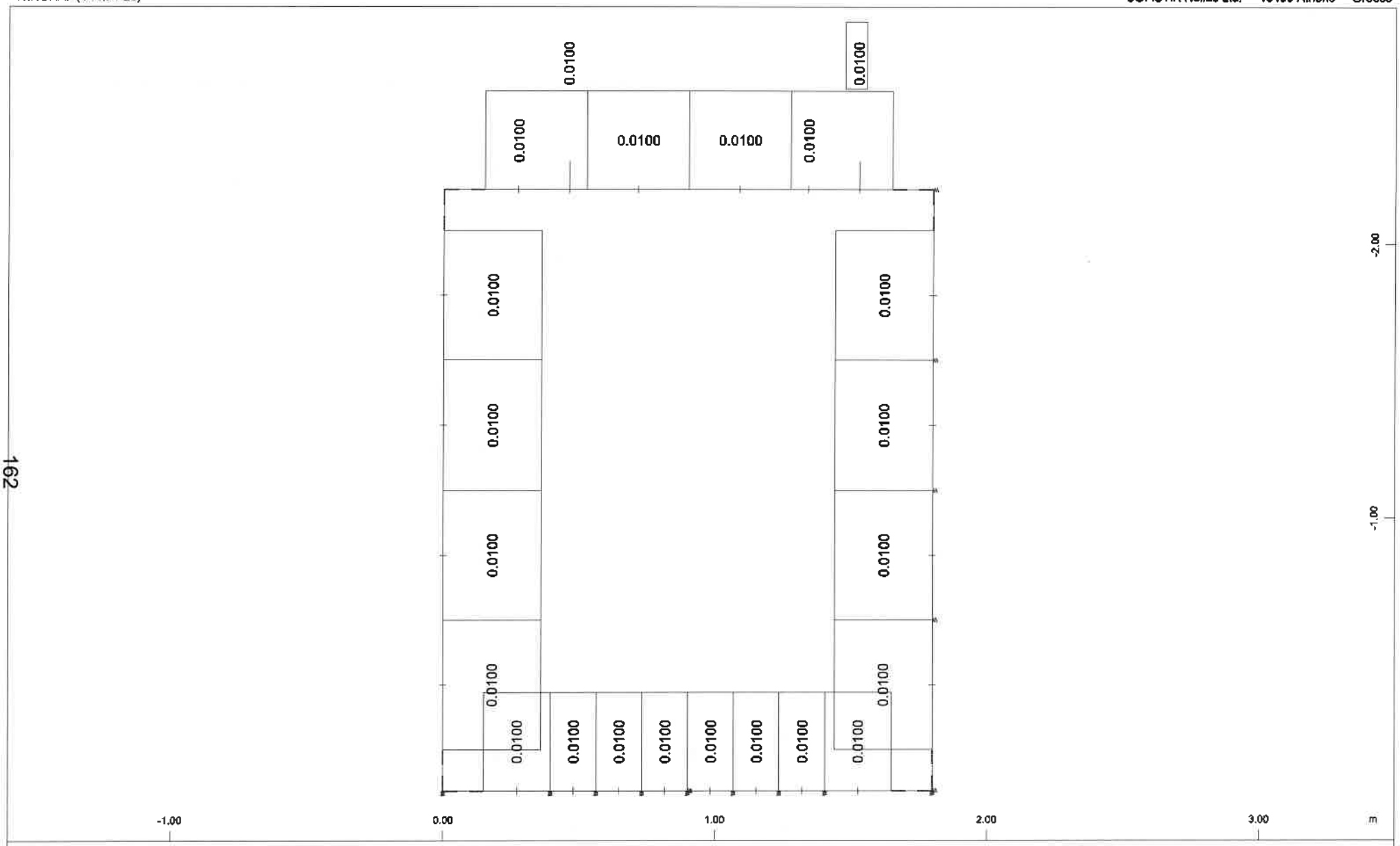
Z–X
Y

Sector of system Beam Elements
Beam Elements , Normal force Nx, Loadcase 706 MIN-N BEAM , 1 cm 3D = 250.0 kN
(Min=-153.2) (Max=-101.5)

M 1 : 40



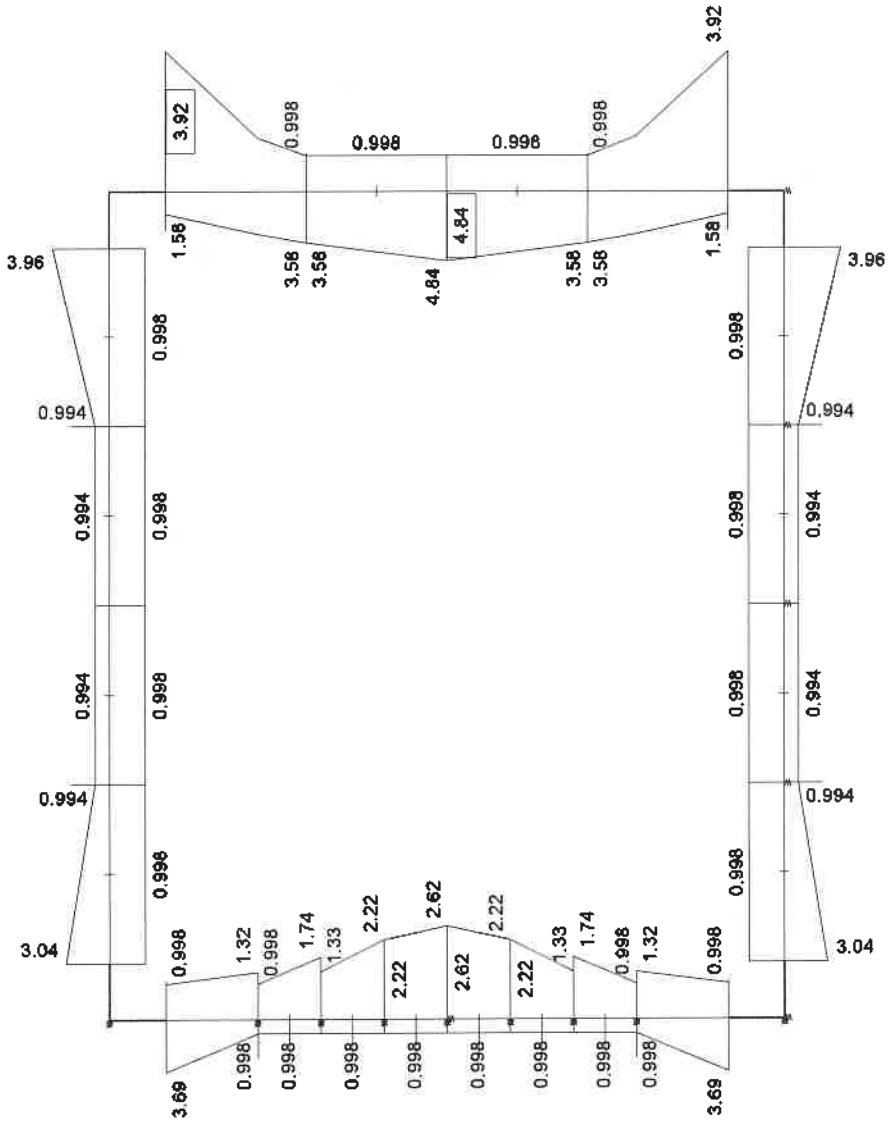
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)



Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 0.0050 cm2/m (Max=0.0100)

M 1 : 18

BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)



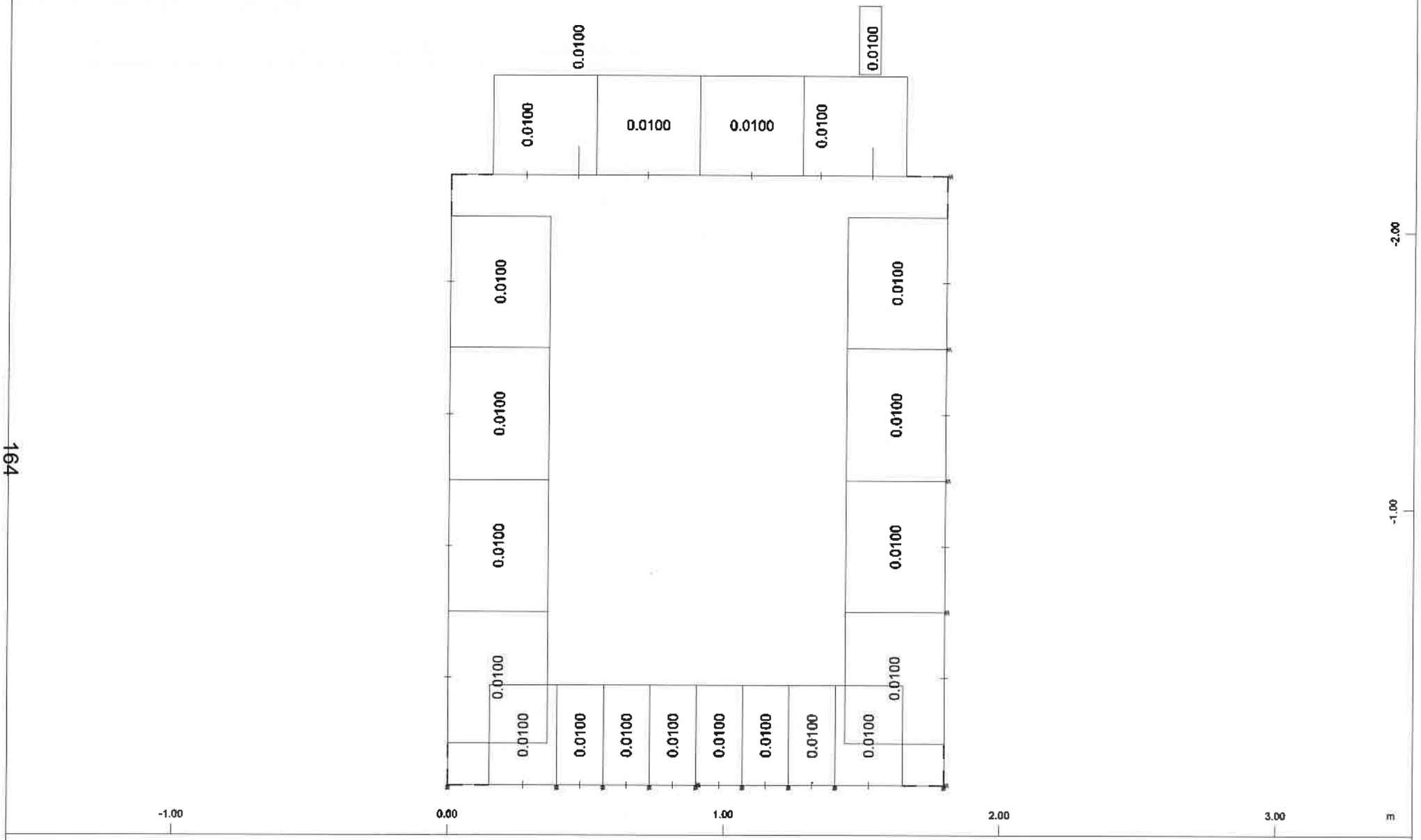
Z—X
Y

Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=4.84)

Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 2.00 cm2 (Max=3.92)

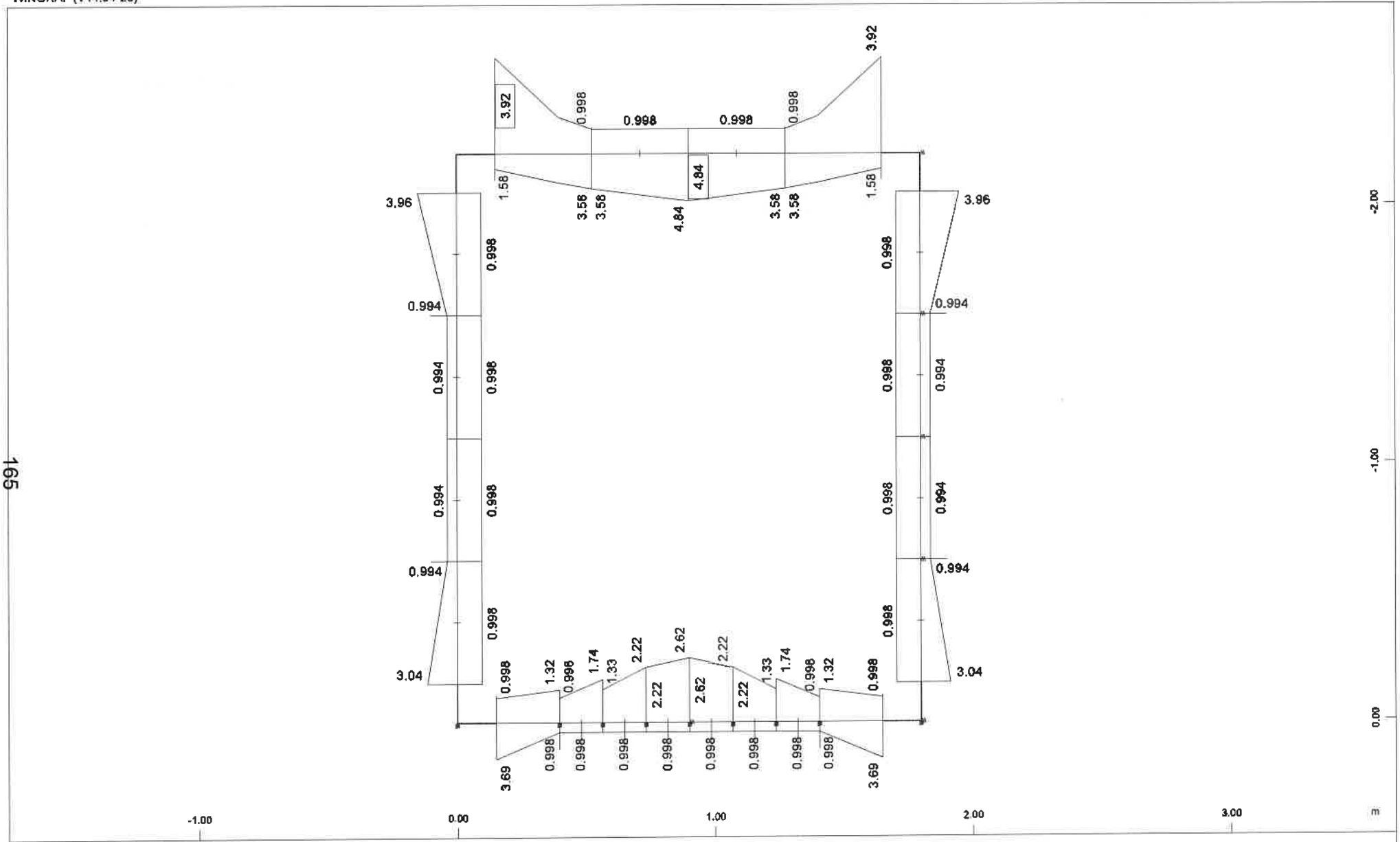
M 1 : 19

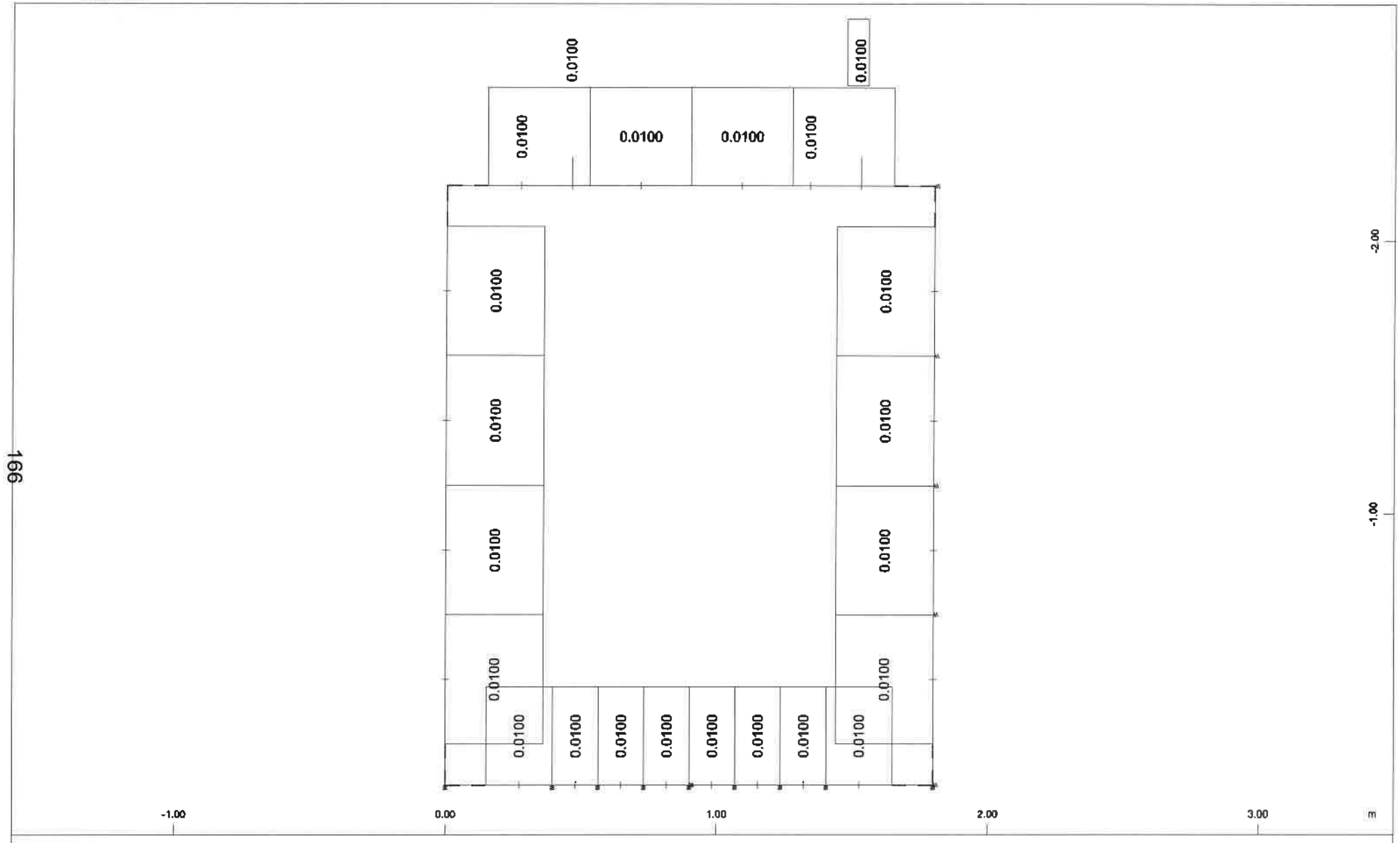
BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)



Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 0.0050 cm2/m (Max=0.0100)

M 1 : 18


3.92
0.998
0.998
0.998
0.998
3.92
1.58
3.58
3.58
4.84
4.84
3.58
3.58
1.58
3.96
3.96
0.998
0.998
0.994
0.994
0.994
0.994
0.998
0.998
0.998
0.998
0.994
0.994
0.994
0.994
0.998
0.998
0.998
0.998
3.04
3.04
0.998
1.32
0.998
1.74
1.33
2.22
2.22
2.62
2.62
2.22
2.22
1.33
1.74
0.998
1.32
0.998
3.69
3.69
0.998
0.998
0.998
0.998
0.998
0.998
0.998
0.998
0.998
-1.00
0.00
1.00
2.00
3.00
m
-2.00
-1.00
0.00
Beam Elements , Longitudinal Reinforcements Lay. 1, Design Case 1 , 1 cm 3D = 5.00 cm2 (Max=4.84)
Beam Elements , Longitudinal Reinforcements Lay. 2, Design Case 1 , 1 cm 3D = 2.00 cm2 (Max=3.92)
Z
X
Y
M 1 : 19



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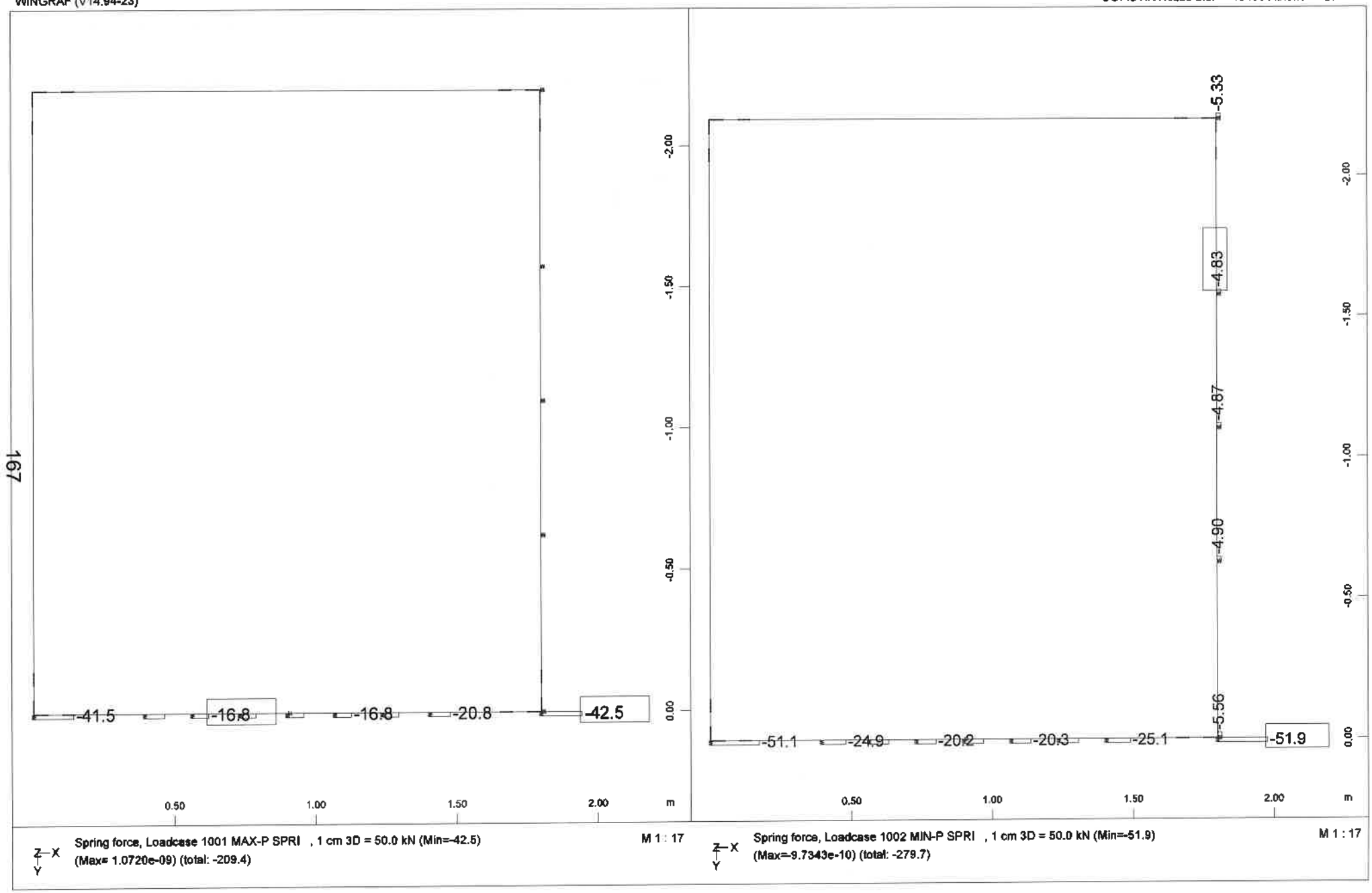
Beam Elements , Shear reinforcements (maximum), Design Case 1 , 1 cm 3D = 0.0050 cm2/m (Max=0.0100)

M 1 : 18



BOX CULVERT 1.50x1.90 (Hep=4.00m, ks=20000kN/m3)

ΟΧΕΤΟΣ 1.50Χ1.90 (Ηεπ=4.00m)

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	106,46	**kN/m^2** **< σεπ**

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F = 0,30 + 1,50/16 =	0,3938 m
σmax = -51,9/0,394=	**-131,81 kN/m^2**

ΔΙΑΜΗΚΕΙΣ ΟΠΛΙΣΜΟΙ

φ=30°, γ=18 KN/m3 - Η δύναμη τριβής εφαρμόζεται στις πλευρες των τοίχων και των πλακών που είναι σε επαφή με το έδαφος.

Παραδοχές:

S.N.	B (m)	H (m)	Dslab (m)	Dwall (m)	A (m2)	Hemb (m)	Hemb (bot) (m)	L (m)	maximum stress σct (MPa)	ratio σct/βz (R)	diameter of long. Reinf. φs (mm)	bar incease ratio d/(10(d-h)) slab	new bar diameter	steel tensile stress MPa	μzmin=ko*β bz/σs (%) Full constraint	μzreq=R*μz max (%) actual constraint	Placed μz (>=μzmin) (%)	Reinforcements per face (cm2/m)	Reinforcements per face
ΟΧΕΤΟΣ	1,50	1,90	0,30	0,30	2,40	4,00	0,00	12,10	0,87	0,33	12	1,00	12,00	280	0,954	0,3110	0,3110	4,66	Φ12/15

μzmin=0.20%