

EVERING PUMPING STATION (13/02/94)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE		AXIAL TORI
			SHEAR	MOMENT		SHEAR	MOMENT	
7	.000				-256.762			
	.000		88.422	-304.346				
	1.130		80.930	-208.323				
	4.250		31.925	9.331				
	4.250				-256.762			
8	.000				-371.055			
	.000		120.882	-404.667				
	1.130		110.393	-273.522				
	4.250		41.786	22.117				
	4.250				-371.055			
9	.000				-307.977			
	.000		92.418	-325.028				
	1.130		84.551	-224.685				
	4.250		33.095	2.523				
	4.250				-307.977			
10	.000				-248.605			
	.000		88.906	-281.972				
	1.130		81.039	-185.598				
	4.250		29.583	30.653				
	4.250				-248.605			
11	.000				-198.596			
	.000		126.741	-435.627				
	1.130		116.252	-297.862				
	4.250		47.644	16.056				
	4.250				-198.596			
12	.000				-321.548			
	.000		115.239	-357.543				
	1.130		104.751	-232.774				
	4.250		36.143	45.258				
	4.250				-321.548			
13	.000				-273.374			
	.000		85.816	-266.149				
	1.130		77.949	-173.266				
	4.250		26.493	33.343				
	4.250				-273.374			
14	.000				-283.208			
	.000		95.508	-340.851				
	1.130		87.641	-237.016				
	4.250		36.185	-1.167				
	4.250				-283.208			
18	1	.000			-253.250			

60

1-1-65

70

COVERED PUMPING STATION (13/09/94)

FRAME ELEMENT FORCES

ELT LOAD ID COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE		AXIAL TORQ
		SHEAR	MOMENT		SHEAR	MOMENT	
	.000	28.463	21.299				
	2.250	12.353	69.006				
	2.250			-253.250			
2	.000			-281.522			
	.000	30.136	7.903				
	2.250	14.026	59.374				
	2.250			-281.522			
3	.000			-224.978			
	.000	26.791	34.694				
	2.250	10.681	78.638				
	2.250			-224.978			
4	.000			-120.636			
	.000	31.541	21.369				
	2.250	15.431	76.002				
	2.250			-120.636			
5	.000			-208.459			
	.000	23.326	42.228				
	2.250	7.216	78.377				
	2.250			-208.459			
6	.000			-249.739			
	.000	25.002	33.266				
	2.250	8.892	73.186				
	2.250			-249.739			
7	.000			-256.762			
	.000	31.925	9.331				
	2.250	15.815	64.826				
	2.250			-256.762			
8	.000			-371.055			
	.000	41.786	22.117				
	2.250	19.232	93.266				
	2.250			-371.055			
9	.000			-307.977			
	.000	33.095	2.523				
	2.250	16.180	59.835				
	2.250			-307.977			
10	.000			-248.605			
	.000	29.583	30.653				
	2.250	12.668	80.063				
	2.250			-248.605			
11	.000			-198.596			
	.000	47.644	16.056				

65

1-1-66

SEVERINO PUMPING STATION (13/09/94)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE		AXIAL TORQ
			SHEAR	MOMENT		SHEAR	MOMENT	
		2.250	25.090	100.386				
		2.250			-198.596			
12		.000			-321.548			
		.000	36.143	45.258				
		2.250	13.589	103.711				
		2.250			-321.548			
13		.000			-273.374			
		.000	26.493	33.343				
		2.250	9.578	75.801				
		2.250			-273.374			
14		.000			-283.208			
		.000	36.185	-.167				
		2.250	19.270	64.098				
		2.250			-283.208			
-----								
19		.000			-253.250			
		.000	12.353	69.006				
		1.587	.000	78.180				
		2.250	-3.757	76.888				
		2.250			-253.250			
2		.000			-281.522			
		.000	14.026	59.374				
		1.864	.000	71.430				
		2.250	-2.084	71.019				
		2.250			-281.522			
3		.000			-224.978			
		.000	10.681	78.638				
		1.331	.000	85.375				
		2.250	-5.429	82.758				
		2.250			-224.978			
4		.000			-120.636			
		.000	15.431	76.002				
		2.119	.000	90.854				
		2.250	-.679	90.810				
		2.250			-120.636			
5		.000			-208.459			
		.000	7.216	78.377				
		.851	.000	81.351				
		2.250	-8.894	74.700				
		2.250			-208.459			
6		.000			-249.739			
		.000	8.892	73.186				

60

(-1-67

22

SEVERINO PUMPING STATION (13/09/94)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE		AXIAL TORQ
			SHEAR	MOMENT		SHEAR	MOMENT	
		1.076	.000	77.772				
		2.250	-7.218	73.280				
		2.250			-249.739			
7		.000			-256.762			
		.000	15.815	64.826				
		2.192	.000	80.506				
		2.250	-.295	80.497				
		2.250			-256.762			
8		.000			-371.055			
		.000	19.232	93.266				
		1.815	.000	109.401				
		2.250	-3.322	108.660				
		2.250			-371.055			
9		.000			-307.977			
		.000	16.180	59.835				
		2.114	.000	75.382				
		2.250	-.736	75.332				
		2.250			-307.977			
10		.000			-248.605			
		.000	12.668	80.063				
		1.541	.000	89.222				
		2.250	-4.248	87.658				
		2.250			-248.605			
11		.000			-198.596			
		.000	25.090	100.386				
		2.250	2.536	128.962				
		2.250			-198.596			
12		.000			-321.548			
		.000	13.589	103.711				
		1.190	.000	111.424				
		2.250	-8.965	106.408				
		2.250			-321.548			
13		.000			-273.374			
		.000	9.578	75.801				
		1.107	.000	80.880				
		2.250	-7.338	76.443				
		2.250			-273.374			
14		.000			-283.208			
		.000	19.270	64.098				
		2.250	2.354	86.547				
		2.250			-283.208			

69

1-1-60

SEWERING PUMPING STATION (10/09/74)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE SHEAR	MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	MOMENT	AXIAL TORQ
20	1	.000			-253.250			
		.000	-32.077	76.888				
		1.880	-44.541	5.804				
		3.750	-56.939	-90.006				
		3.750			-253.250			
2		.000			-281.522			
		.000	-30.404	71.019				
		1.880	-42.869	3.079				
		3.750	-55.267	-89.605				
		3.750			-281.522			
3		.000			-224.978			
		.000	-33.749	82.758				
		1.880	-46.213	8.530				
		3.750	-58.612	-90.408				
		3.750			-224.978			
4		.000			-120.636			
		.000	-28.999	90.810				
		1.880	-41.463	25.512				
		3.750	-53.861	-64.543				
		3.750			-120.636			
5		.000			-208.459			
		.000	-37.214	74.700				
		1.880	-49.678	-6.042				
		3.750	-62.077	-111.460				
		3.750			-208.459			
6		.000			-249.739			
		.000	-35.538	73.280				
		1.880	-48.003	-4.312				
		3.750	-60.401	-106.595				
		3.750			-249.739			
7		.000			-256.762			
		.000	-28.615	80.497				
		1.880	-41.080	15.920				
		3.750	-53.478	-73.417				
		3.750			-256.762			
8		.000			-371.055			
		.000	-42.970	108.660				
		1.880	-60.420	12.783				
		3.750	-77.778	-117.729				
		3.750			-371.055			
9		.000			-307.977			

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1-1-69

74

SEVERINO PUMPING STATION (13/09/94)

FRAME ELEMENT FORCES

ELT LOAD ID COMB	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	.000	-30.472	75.332				
	1.880	-43.559	6.726				
	3.750	-56.577	-87.875				
	3.750			-307.977			
10	.000			-248.605			
	.000	-33.984	87.658				
	1.880	-47.071	12.449				
	3.750	-60.089	-88.719				
	3.750			-248.605			
11	.000			-198.596			
	.000	-37.112	128.962				
	1.880	-54.562	44.099				
	3.750	-71.919	-75.458				
	3.750			-198.596			
12	.000			-321.548			
	.000	-48.613	106.408				
	1.880	-66.063	-.076				
	3.750	-83.421	-141.141				
	3.750			-321.548			
13	.000			-273.374			
	.000	-37.074	76.443				
	1.880	-50.161	-4.575				
	3.750	-63.179	-111.522				
	3.750			-273.374			
14	.000			-283.208			
	.000	-27.382	86.547				
	1.880	-40.469	23.750				
	3.750	-53.487	-65.072				
	3.750			-283.208			
21							
1	.000			.000			
	.000	81.800	-40.900				
	.500	5.400	-1.350				
	1.000	.000	.000				
	1.000			.000			
2	.000			.000			
	.000	81.800	-40.900				
	.500	5.400	-1.350				
	1.000	.000	.000				
	1.000			.000			
3	.000			.000			
	.000	81.800	-40.900				
	.500	5.400	-1.350				

69

1-1-70

2(-

SEVERINO PUMPING STATION (13/09/94)

FRAME ELEMENT FORCES

ELT LOAD ID COMB	DIST ENDI	1-2 PLANE SHEAR	MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	MOMENT	AXIAL TOP
	1.000	.000	.000	.000			
	1.000			.000			
4	.000			.000			
	.000	81.800	-40.900				
	.500	5.400	-1.350				
	1.000	.000	.000				
	1.000			.000			
5	.000			.000			
	.000	81.800	-40.900				
	.500	5.400	-1.350				
	1.000	.000	.000				
	1.000			.000			
6	.000			1.080			
	.000	81.800	-40.900				
	.500	5.400	-1.350				
	1.000	.000	.000				
	1.000			.000			
7	.000			-1.080			
	.000	81.800	-40.900				
	.500	5.400	-1.350				
	1.000	.000	.000				
	1.000			.000			
8	.000			.000			
	.000	114.520	-57.260				
	.500	7.560	-1.890				
	1.000	.000	.000				
	1.000			.000			
9	.000			.000			
	.000	85.890	-42.945				
	.500	5.670	-1.417				
	1.000	.000	.000				
	1.000			.000			
10	.000			.000			
	.000	85.890	-42.945				
	.500	5.670	-1.417				
	1.000	.000	.000				
	1.000			.000			
11	.000			.000			
	.000	114.520	-57.260				
	.500	7.560	-1.890				
	1.000	.000	.000				
	1.000			.000			

1-1-71

SEWERING PUMPING STATION (13/02/71)

FRAME ELEMENT FORCES

ELT LOAD ID COMB	DIST ENDI	1-2 PLANE SHEAR	MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	MOMENT	AXIAL TORQ
12	.000			.000			
	.000	114.520	-57.260				
	.500	7.560	-1.890				
	1.000	.000	.000				
	1.000			.000			
13	.000			1.512			
	.000	85.890	-42.945				
	.500	5.670	-1.417				
	1.000	.000	.000				
	1.000			.000			
14	.000			-1.512			
	.000	85.890	-42.945				
	.500	5.670	-1.417				
	1.000	.000	.000				
	1.000			.000			
22							
1	.000			.000			
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			.000			
2	.000			.000			
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			.000			
3	.000			.000			
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			.000			
4	.000			.000			
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			.000			
5	.000			.000			
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			.000			
6	.000			.000			

71

1-1-72

27



SEVERINO PUMPING STATION (13/09/94)

FRAME ELEMENT FORCES

ELT LOAD ID COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE		AXIA TOR
		SHEAR	MOMENT		SHEAR	MOMENT	
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			-1.080			
7	.000			.000			
	.000	.000	.000				
	.500	-76.400	-1.350				
	1.000	-81.800	-40.900				
	1.000			1.080			
8	.000			.000			
	.000	.000	.000				
	.500	-106.960	-1.890				
	1.000	-114.520	-57.260				
	1.000			.000			
9	.000			.000			
	.000	.000	.000				
	.500	-80.220	-1.418				
	1.000	-85.890	-42.945				
	1.000			.000			
10	.000			.000			
	.000	.000	.000				
	.500	-80.220	-1.418				
	1.000	-85.890	-42.945				
	1.000			.000			
11	.000			.000			
	.000	.000	.000				
	.500	-106.960	-1.890				
	1.000	-114.520	-57.260				
	1.000			.000			
12	.000			.000			
	.000	.000	.000				
	.500	-106.960	-1.890				
	1.000	-114.520	-57.260				
	1.000			.000			
13	.000			.000			
	.000	.000	.000				
	.500	-80.220	-1.418				
	1.000	-85.890	-42.945				
	1.000			-1.512			
14	.000			.000			
	.000	.000	.000				
	.500	-80.220	-1.418				
	1.000	-85.890	-42.945				

72

(-1-73

78

SEVERINO PUMPING STATION (13/07/94)

FRAME ELEMENT FORCES

ELT LOAD	DIST	1-2 PLANE	AXIAL	1-3 PLANE	AXIAL
ID COMB	ENDI	SHEAR	FORCE	SHEAR	TORQ
		MOMENT		MOMENT	
	1.000		1.512		

1-1-74

29

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STRUCTURAL ANALYSIS PROGRAMS

VERSION 5.41

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SEVERIN PUMPING STATION (12/02/94)

JOINT DISPLACEMENTS

LOAD COMBINATION 1 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.2857E-03	-.1057E-03	.1035E-04
3	.7295E-04	-.1834E-03	.1256E-03
4	-.001836	-.000252	.000286
5	.000000	.000000	.000000
6	-.2861E-03	-.3415E-03	.1596E-03
7	-.001615	-.000619	.000250
8	-.002287	-.000740	.000219
9	-.002592	-.000832	.000043
10	-.002478	-.000972	.000053
11	.000000	.000000	.000000
12	-.1112E-03	-.1947E-04	.6799E-04
13	-.001721	-.000178	.000260
14	-.002695	-.000285	.000097
15	-.002756	-.000336	.000017
16	-.002054	-.000865	-.000256
17	-.002170	-.001362	-.000139
18	-.002286	-.001475	.000046
19	.7295E-04	-.8441E-04	.1169E-03
20	-.002287	-.000985	.000227

JOINT DISPLACEMENTS

LOAD COMBINATION 2 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	-.1780E-03	-.1061E-03	.5341E-04
3	-.2709E-03	-.1840E-03	.1963E-03
4	-.002829	-.000253	.000382
5	.000000	.000000	.000000
6	-.7704E-03	-.3318E-03	.2300E-03
7	-.002117	-.000599	.000213
8	-.002636	-.000714	.000155
9	-.002773	-.000801	-.000034
10	-.002294	-.000931	.000013
11	.000000	.000000	.000000
12	-.1025E-03	-.1986E-04	.6244E-04
13	-.001563	-.000183	.000214
14	-.002228	-.000294	.000030
15	-.001946	-.000347	-.000051
16	-.002647	-.000640	-.000238
17	-.002551	-.001133	-.000149
18	-.002455	-.001293	.000017
19	-.2709E-03	-.1431E-04	.1876E-03
20	-.002636	-.000896	.000164

## JOINT DISPLACEMENTS

LOAD COMBINATION 3 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.3934E-03	-.1054E-03	-.3271E-04
3	.4168E-03	-.1829E-03	.5488E-04
4	-.8418E-03	-.2505E-03	.1896E-03
5	.000000	.000000	.000000
6	.1982E-03	-.3511E-03	.8927E-04
7	-.001114	-.000640	.000287
8	-.001939	-.000766	.000282
9	-.002412	-.000864	.000120
10	-.002663	-.001012	.000093
11	.000000	.000000	.000000
12	-.1200E-03	-.1909E-04	.7355E-04
13	-.001880	-.000174	.000306
14	-.003162	-.000277	.000164
15	-.003566	-.000325	.000085
16	-.001461	-.001090	-.000274
17	-.001789	-.001592	-.000129
18	-.002117	-.001657	.000075
19	.4168E-03	-.1545E-03	.4621E-04
20	-.001939	-.001074	.000290

SEVERINO PUMPING STATION (13/09/94)

JOINT DISPLACEMENTS

LOAD COMBINATION 4 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	-.3977E-03	-.1063E-03	.1528E-03
3	-.001232	-.000185	.000241
4	-.003356	-.000254	.000283
5	.000000	.000000	.000000
6	-.2246E-03	-.3589E-03	.1387E-03
7	-.001483	-.000655	.000276
8	-.002320	-.000785	.000302
9	-.002901	-.000888	.000198
10	-.003662	-.001044	.000135
11	.000000	.000000	.000000
12	-.8104E-04	-.1862E-04	.5848E-04
13	-.001536	-.000169	.000289
14	-.002948	-.000267	.000228
15	-.003812	-.000312	.000178
16	-.003460	-.000971	-.000289
17	-.003515	-.001538	-.000163
18	-.003570	-.001682	.000048
19	-.001232	.000030	.000233
20	-.002320	-.001114	.000310

SEWERING PUMPING STATION (13/02/94)

## JOINT DISPLACEMENTS

LOAD COMBINATION 5 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.4537E-03	-.1048E-03	-.5656E-04
3	.6078E-03	-.1816E-03	.1612E-04
4	-.3004E-03	-.2480E-03	.1394E-03
5	.000000	.000000	.000000
6	-.1691E-03	-.3314E-03	.8620E-04
7	-.8742E-03	-.6009E-03	.1173E-03
8	-.001163	-.000720	.000087
9	-.001208	-.000810	-.000049
10	-.8296E-03	-.9483E-03	.5098E-04
11	.000000	.000000	.000000
12	-.6740E-04	-.2005E-04	.3874E-04
13	-.9528E-03	-.1839E-03	.1254E-03
14	-.001301	-.000294	.000005
15	-.001045	-.000346	-.000045
16	-.000480	-.001122	-.000256
17	-.000576	-.001564	-.000102
18	-.000671	-.001571	.000092
19	.6078E-03	-.1920E-03	.7444E-05
20	-.001163	-.000833	.000096



GEVEPINO PUMPING STATION (13/02/90)

## JOINT DISPLACEMENTS

LOAD COMBINATION 6 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.4412E-03	-.1051E-03	-.4211E-04
3	.5051E-03	-.1822E-03	.4985E-04
4	-.8015E-03	-.2492E-03	.2023E-03
5	.000000	.000000	.000000
6	-.2373E-03	-.3331E-03	.1294E-03
7	-.001293	-.000603	.000181
8	-.001739	-.000721	.000136
9	-.001859	-.000810	-.000035
10	-.001436	-.000946	.000038
11	.000000	.000000	.000000
12	-.1005E-03	-.1993E-04	.5744E-04
13	-.001420	-.000183	.000189
14	-.001981	-.000293	.000020
15	-.001700	-.000346	-.000050
16	-.001017	-.000995	-.000251
17	-.001131	-.001448	-.000114
18	-.001245	-.001495	.000072
19	.5052E-03	-.1589E-03	.4118E-04
20	-.001739	-.000884	.000145

SEWERING PUMPING STATION (13/09/94)

JOINT DISPLACEMENTS

LOAD COMBINATION 7 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.1302E-03	-.1064E-03	.6280E-04
3	-.3592E-03	-.1847E-03	.2013E-03
4	-.002870	-.000254	.000369
5	.000000	.000000	.000000
6	-.3349E-03	-.3499E-03	.1898E-03
7	-.001938	-.000635	.000319
8	-.002836	-.000759	.000301
9	-.003325	-.000855	.000121
10	-.003521	-.000998	.000068
11	.000000	.000000	.000000
12	-.1220E-03	-.1901E-04	.7855E-04
13	-.002022	-.000174	.000330
14	-.003408	-.000277	.000174
15	-.003812	-.000326	.000085
16	-.003091	-.000736	-.000262
17	-.003209	-.001277	-.000164
18	-.003326	-.001456	.000020
19	-.3593E-03	-.9921E-05	.1926E-03
20	-.002836	-.001087	.000310

81

1-1-02

SEVERING PUMPING STATION (13/09/74)

JOINT DISPLACEMENTS

LOAD COMBINATION 8 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.3381E-03	-.1484E-03	.3912E-04
3	-.9478E-04	-.2575E-03	.2161E-03
4	-.003135	-.000354	.000454
5	.000000	.000000	.000000
6	-.4392E-03	-.4819E-03	.2485E-03
7	-.002517	-.000874	.000398
8	-.003599	-.001044	.000355
9	-.004125	-.001174	.000097
10	-.004077	-.001370	.000076
11	.000000	.000000	.000000
12	-.1696E-03	-.2704E-04	.1050E-03
13	-.002672	-.000247	.000412
14	-.004271	-.000396	.000172
15	-.004489	-.000467	.000050
16	-.003455	-.001119	-.000360
17	-.003625	-.001836	-.000209
18	-.003794	-.002033	.000048
19	-.9478E-04	-.7858E-04	.2040E-03
20	-.003599	-.001436	.000367

SEVERINO PUMPING STATION (13/9/94)

JOINT DISPLACEMENTS

LOAD COMBINATION 9 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.1405E-03	-.1116E-03	.7455E-04
3	-.4321E-03	-.1938E-03	.2363E-03
4	-.003394	-.000267	.000441
5	.000000	.000000	.000000
6	-.8379E-03	-.3513E-03	.2603E-03
7	-.002415	-.000634	.000260
8	-.003065	-.000756	.000200
9	-.003283	-.000848	-.000008
10	-.002864	-.000985	.000015
11	.000000	.000000	.000000
12	-.1181E-03	-.2069E-04	.7295E-04
13	-.001838	-.000191	.000261
14	-.002713	-.000306	.000059
15	-.002516	-.000362	-.000034
16	-.003214	-.000603	-.000251
17	-.003118	-.001135	-.000167
18	-.003023	-.001334	.000005
19	-.4321E-03	.1467E-04	.2272E-03
20	-.003065	-.000984	.000209

83

1-1-89

SEWERING PUMPING STATION (13/09/94)

## JOINT DISPLACEMENTS

LOAD COMBINATION 10 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.3667E-03	-.1110E-03	-.1587E-04
3	.2900E-03	-.1925E-03	.8785E-04
4	-.001308	-.000264	.000239
5	.000000	.000000	.000000
6	.1791E-03	-.3716E-03	.1125E-03
7	-.001361	-.000677	.000337
8	-.002333	-.000810	.000333
9	-.002905	-.000914	.000153
10	-.003251	-.001070	.000099
11	.000000	.000000	.000000
12	-.1364E-03	-.1988E-04	.8462E-04
13	-.002171	-.000181	.000357
14	-.003694	-.000288	.000199
15	-.004217	-.000338	.000109
16	-.001968	-.001075	-.000289
17	-.002318	-.001618	-.000146
18	-.002668	-.001716	.000066
19	.2900E-03	-.1325E-03	.7874E-04
20	-.002333	-.001171	.000342

SEVERINO PUMPING STATION (13/09/91)

JOINT DISPLACEMENTS

LOAD COMBINATION 11 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	-.6681E-03	-.1495E-03	.2583E-03
3	-.002079	-.000260	.000410
4	-.005715	-.000358	.000493
5	.000000	.000000	.000000
6	-.3840E-03	-.5095E-03	.2393E-03
7	-.002536	-.000930	.000473
8	-.003962	-.001114	.000511
9	-.004955	-.001259	.000343
10	-.006219	-.001479	.000192
11	.000000	.000000	.000000
12	-.1385E-03	-.2567E-04	.9961E-04
13	-.002623	-.000232	.000492
14	-.005025	-.000368	.000385
15	-.006472	-.000429	.000295
16	-.005887	-.001191	-.000405
17	-.005977	-.002024	-.000253
18	-.006068	-.002298	.000037
19	-.002079	.000114	.000398
20	-.003962	.001662	.000523

85

1-1-86

SEVERINO PUMPING STATION (11/09/94)

## JOINT DISPLACEMENTS

LOAD COMBINATION 12 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.5238E-03	-.1474E-03	-.3485E-04
3	.4965E-03	-.2555E-03	.9508E-04
4	-.001437	-.000350	.000292
5	.000000	.000000	.000000
6	-.3062E-03	-.4710E-03	.1657E-03
7	-.001684	-.000854	.000250
8	-.002342	-.001022	.000210
9	-.002584	-.001150	-.000004
10	-.002254	-.001345	.000075
11	.000000	.000000	.000000
12	-.1194E-03	-.2767E-04	.7198E-04
13	-.001807	-.000253	.000263
14	-.002720	-.000405	.000072
15	-.002598	-.000477	-.000017
16	-.001715	-.001404	-.000360
17	-.001862	-.002061	-.000168
18	-.002009	-.002142	.000099
19	.4965E-03	-.1976E-03	.8294E-04
20	-.002342	-.001270	.000222

SEWETING PUMPING STATION (13/09/87)

JOINT DISPLACEMENTS

LOAD COMBINATION 13 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.4713E-03	-.1104E-03	-.4410E-04
3	.5340E-03	-.1914E-03	.5606E-04
4	-.9033E-03	-.2619E-03	.2236E-03
5	.000000	.000000	.000000
6	-.2611E-03	-.3497E-03	.1441E-03
7	-.001436	-.000633	.000202
8	-.001931	-.000756	.000151
9	-.002068	-.000849	-.000037
10	-.001597	-.000991	.000036
11	.000000	.000000	.000000
12	-.1122E-03	-.2093E-04	.6401E-04
13	-.001583	-.000192	.000210
14	-.002205	-.000308	.000022
15	-.001888	-.000364	-.000057
16	-.001139	-.001020	-.000262
17	-.001264	-.001497	-.000121
18	-.001389	-.001552	.000072
19	.5341E-03	-.1632E-03	.4695E-04
20	-.001931	-.000935	.000160

87

1-1-88



SEVERINO PUMPING STATION (13/07/74)

## JOINT DISPLACEMENTS

LOAD COMBINATION 14 - DISPLACEMENTS "U" AND ROTATIONS "R"

JOINT	U(X)	U(Y)	R(Z)
1	.000000	.000000	.000000
2	.3584E-04	-.1122E-03	.1028E-03
3	-.6762E-03	-.1949E-03	.2681E-03
4	-.003799	-.000269	.000457
5	.000000	.000000	.000000
6	-.3977E-03	-.3732E-03	.2287E-03
7	-.002339	-.000678	.000395
8	-.003467	-.000810	.000382
9	-.004120	-.000912	.000182
10	-.004518	-.001064	.000078
11	.000000	.000000	.000000
12	-.1423E-03	-.1964E-04	.9356E-04
13	-.002426	-.000179	.000408
14	-.004202	-.000286	.000236
15	-.004845	-.000336	.000131
16	-.004043	-.000658	-.000278
17	-.004173	-.001257	-.000192
18	-.004302	-.001498	-.000001
19	-.6763E-03	.4535E-04	.2590E-03
20	-.003467	-.001220	.000391

DIVERING JIGGING STATION

(10/00/90)

Weld  
Approved 20000/ D.L. [unclear]

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 1 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-616.7215	645.6808	858.3956
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-21.1030	.621.7392	-40.3885
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000E+00	.1009E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1148.9375	774.8299	-3179.0074
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.1920E-11
15	.0000E+00	.0000E+00	.2508E-11
16	.1037E-11	.0000E+00	.0000E+00
17	-.1239E-11	.0000E+00	.0000E+00
18	-.1842E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

89

1-1-90

95

SEVERINO PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 2 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-588.4495	647.3532	461.8862
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	36.5142	604.8351	-225.4850
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000	.0000	.0000
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1063.0483	790.0617	-2920.6449
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.2085E-11
15	.1006E-11	.0000E+00	.2608E-11
16	.0000	.0000	.0000
17	-.1129E-11	.0000E+00	.0000E+00
18	-.2052E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

96



SEVERING PUMPING STATION (12/09/74)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 4 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	120.6361	648.7588	-1447.8058
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-22.8288	652.3533	-23.8765
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000E+00	.1016E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	806.3652	741.1379	-2690.4381
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000	.0000	.0000
15	.0000E+00	.0000E+00	.1009E-11
16	.0000	.0000	.0000
17	-.1473E-11	.0000E+00	.0000E+00
18	-.1785E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

SLIVERED PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 5 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-661.5128	640.5435	1476.3044
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-8.6789	604.2140	-28.6040
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000	.0000	.0000
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	704.3922	797.4925	-1823.3057
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000	.0000	.0000
15	.0000	.0000	.0000
16	.1492E-11	.0000E+00	.0000E+00
17	-.1402E-11	.0000E+00	.0000E+00
18	.0000	.0000	.0000
19	.0000	.0000	.0000
20	.0000	.0000	.0000

SEVERINO PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 6 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-693.1514	642.2194	1411.9884
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-19.7064	607.0407	-32.2544
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	-.1051E-11	.0000E+00	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1052.6648	792.9900	-2705.0480
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.2455E-11
15	.1194E-11	.0000E+00	.2572E-11
16	.0000	.0000	.0000
17	.0000	.0000	.0000
18	-.1533E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

1-1-85

92

SEWERTHO PUMPING STATION (15/02/78)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 7 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-540.2916	649.1423	304.8028
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-22.4996	636.4378	-48.5225
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000E+00	.1026E-11	.0000E+00
9	-.1067E-11	.0000E+00	.0000E+00
10	.0000	.0000	.0000
11	1245.2102	756.6699	-3652.9668
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.1386E-11
15	.0000E+00	.0000E+00	.2444E-11
16	.1362E-11	.0000E+00	.0000E+00
17	-.2012E-11	.0000E+00	.0000E+00
18	-.2152E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000



SEVERED PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 8 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-846.9063	905.8902	974.2553
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000E+00	.0000E+00	-.1035E-11
5	-34.0156	877.2325	-59.9703
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	-.1456E-11	.1426E-11	.0000E+00
9	-.1283E-11	.0000E+00	.0000E+00
10	.0000	.0000	.0000
11	1747.1805	1076.0273	-4904.7576
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.2907E-11
15	.1347E-11	.0000E+00	.3987E-11
16	.1409E-11	.0000E+00	.0000E+00
17	-.2146E-11	.0000E+00	.0000E+00
18	-.2766E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.1048E-11	.0000E+00	.0000E+00

102  
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1-1-97

5

SEVERINO PUMPING STATION (11/05/88)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 9 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-605.4941	681.1736	314.3566
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	34.9864	640.1751	-239.3290
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	-.1092E-11	.1045E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1220.2017	823.0138	-3407.2876
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.2354E-11
15	.1133E-11	.0000E+00	.3095E-11
16	.0000	.0000	.0000
17	-.1494E-11	.0000E+00	.0000E+00
18	-.2295E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

INVERTED SUMPING STATION (10/02/90)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 10 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-664.8653	677.6617	1147.0263
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-86.0098	675.6737	149.3737
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	-.1091E-11	.1094E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1400.5691	791.0271	-3949.8488
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.2007E-11
15	.0000E+00	.0000E+00	.2886E-11
16	.1258E-11	.0000E+00	.0000E+00
17	-.1725E-11	.0000E+00	.0000E+00
18	-.1855E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

1-1-99

96

REVERINO PUMP AND STATION

(17/04/94)

PROGRAM: CA...

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 11 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	198.5959	911.7487	-2436.4023
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-40.0083	925.5295	-39.5945
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000E+00	.1427E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1378.5057	1021.8717	-4584.0439
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000	.0000	.0000
15	.0000E+00	.0000E+00	.1711E-11
16	.0000	.0000	.0000
17	-.2506E-11	.0000E+00	.0000E+00
18	-.3037E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

99

SEVERINO PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 12 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-896.4127	900.2474	1657.3520
2	.0000	.0000	.0000
3	-.1083E-11	.0000E+00	.0000E+00
4	.0000	.0000	.0000
5	-20.1984	858.1346	-46.2129
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000E+00	.1293E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1235.7436	1100.7681	-3370.0585
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000	.0000	.0000
15	.0000E+00	.0000E+00	.1234E-11
16	.2080E-11	.0000E+00	.0000E+00
17	-.2407E-11	.0000E+00	.0000E+00
18	-.1226E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

100

SLVERING PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 13 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-742.1816	674.5716	1505.7213
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	-23.5564	637.3464	-33.5900
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	-.1521E-11	.1045E-11	.0000E+00
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	1175.6036	832.4445	-3015.0251
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.2929E-11
15	.1438E-11	.0000E+00	.3080E-11
16	.0000	.0000	.0000
17	.0000	.0000	.0000
18	-.1642E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

101

SEWERED PUMPING STATION (13/09/94)

REACTIONS AND APPLIED FORCES

LOAD COMBINATION 14 - FORCES "F" AND MOMENTS "M"

JOINT	F(X)	F(Y)	M(Z)
1	-528.1778	684.2637	-44.3384
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000E+00	.0000E+00	-.1025E-11
5	-27.4669	678.5024	-56.3654
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000E+00	.1094E-11	.0000E+00
9	-.1285E-11	.0000E+00	.0000E+00
10	.0000	.0000	.0000
11	1445.1672	781.5964	-4342.1114
12	.0000	.0000	.0000
13	.0000	.0000	.0000
14	.0000E+00	.0000E+00	.1432E-11
15	.0000E+00	.0000E+00	.2901E-11
16	.1512E-11	.0000E+00	.0000E+00
17	-.2691E-11	.0000E+00	.0000E+00
18	-.2508E-11	.0000E+00	.0000E+00
19	.0000	.0000	.0000
20	.0000	.0000	.0000

10.

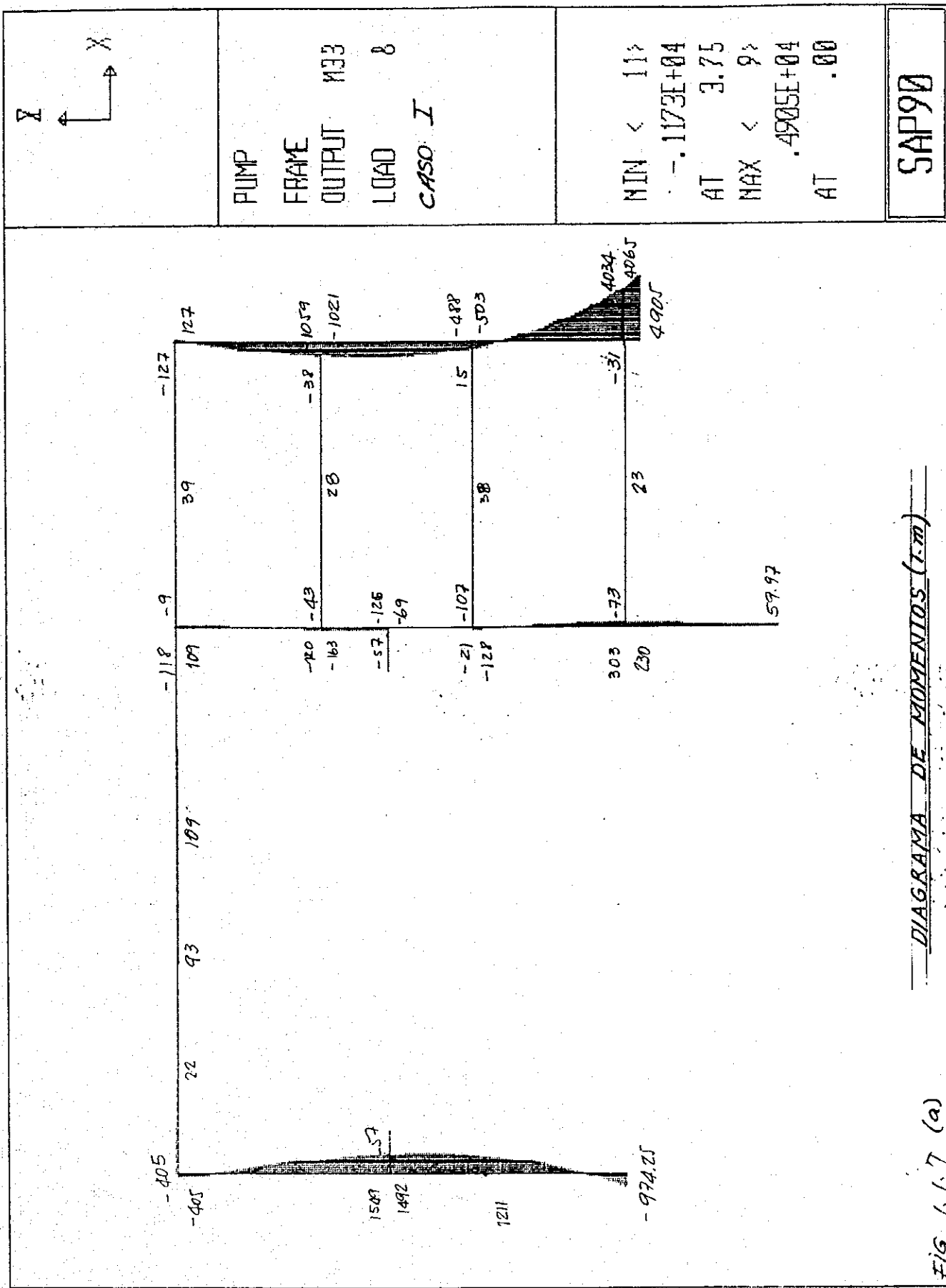
TABLA 1.1.1 RESUMEN DE CALCULOS

LOAD MEMBER COND STRESS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	REMARKS	
I	M	1271	1554	1548	230	303	-68	-183	-120	4905	-1180	-1058	-73	-107	-43	-137	-405	93	108	-118	-97	-97	-57	Normal
	G	847	276	-371	34	-86	-17	-17	48	-1747	-487	323	-77	-85	-80	-159	121	42	19	-76	115	-115	-115	Condition
	N	-718	-718	-424	-810	-720	-513	-377	-285	-1076	-894	-388	120	-48	-85	-323	-371	-371	-371	-371	0	0	0	0
II	M	1206	1322	1347	239	129	-89	-121	115	3407	-873	-845	-84	-73	-41	-137	-325	80	75	-86	-43	-43	-43	Temperature
	G	805	177	-303	-35	-52	-4	-4	48	-1220	-329	282	-85	-81	-64	-153	92	33	16	-37	96	-86	-86	Change
	N	-540	-408	-320	-640	-470	-367	-285	-172	-823	-375	-308	17	-47	-50	-282	308	-308	-308	-308	0	0	0	+ 10 °C
III	M	-1147	952	977	281	385	-34	-124	-77	3950	-818	-741	-45	-88	-47	-53	-382	80	89	-89	-43	-43	-43	Temperature
	G	865	236	-248	88	-78	-21	-21	27	-1401	-371	222	-80	-48	-58	-130	89	30	13	-80	98	-86	-86	Change
	N	-878	-402	-317	-625	-560	-402	-300	-235	-791	-341	-285	164	-87	-48	-222	-249	-249	-248	-248	0	0	0	- 10 °C
IV	M	2456	1642	245	240	510	52	-127	-41	4584	-878	-822	-70	-120	-88	-113	-436	100	128	128	-57	-57	-57	Completion
	G	-189	-189	-199	40	-70	-30	-30	1	-1378	-425	188	-78	58	-87	-151	127	48	25	-72	115	-115	-115	Time - 1
	N	-312	-724	-430	-858	-783	-686	-421	-327	-1022	-425	-358	110	-39	-51	-186	-196	-199	-199	-199	0	0	0	0
V	M	-1857	1212	1222	147	207	-53	-128	145	3370	-925	-817	-80	-79	-58	-159	-355	104	111	-141	-97	-97	-97	Completion
	G	990	325	-322	20	-83	-8	-8	52	-1226	-325	289	-80	-73	-88	-185	115	38	14	-83	115	-115	-115	Time - 2
	N	-801	-533	-419	-791	-704	-508	-370	-246	-1101	-488	-195	83	-85	-81	-288	-322	-322	-322	-322	0	0	0	0
VI	M	-1508	948	1007	126	175	-55	-113	133	3015	-900	-750	-48	-82	-48	-145	-286	78	81	-112	-43	-43	-43	Earthquake
	G	742	286	-273	24	-83	-3	-8	83	-1178	-288	328	-88	-84	-86	-153	86	28	10	-83	86	-86	-86	Earthquake
	N	-875	-399	-313	-587	-521	-372	-288	-178	-832	-375	-309	68	-83	-81	-226	-273	-273	-273	-273	2	-2	-2	Condition 1
VII	M	1312	1416	1317	219	280	-48	-132	-79	4342	-903	-839	-81	-88	-53	-48	-341	84	87	-87	-43	-43	-43	Earthquake
	G	526	125	-233	36	-76	-28	-20	27	-1445	-412	287	-56	46	-54	-130	88	36	19	-83	88	-86	-86	Earthquake
	N	-543	-409	-323	-826	-539	-393	-288	-228	-782	-339	-285	114	-38	-37	-257	-283	-283	-283	-283	-2	-2	-2	Condition 2

1-1-104

103





1-1-105

FIG 1.1.7 (a)

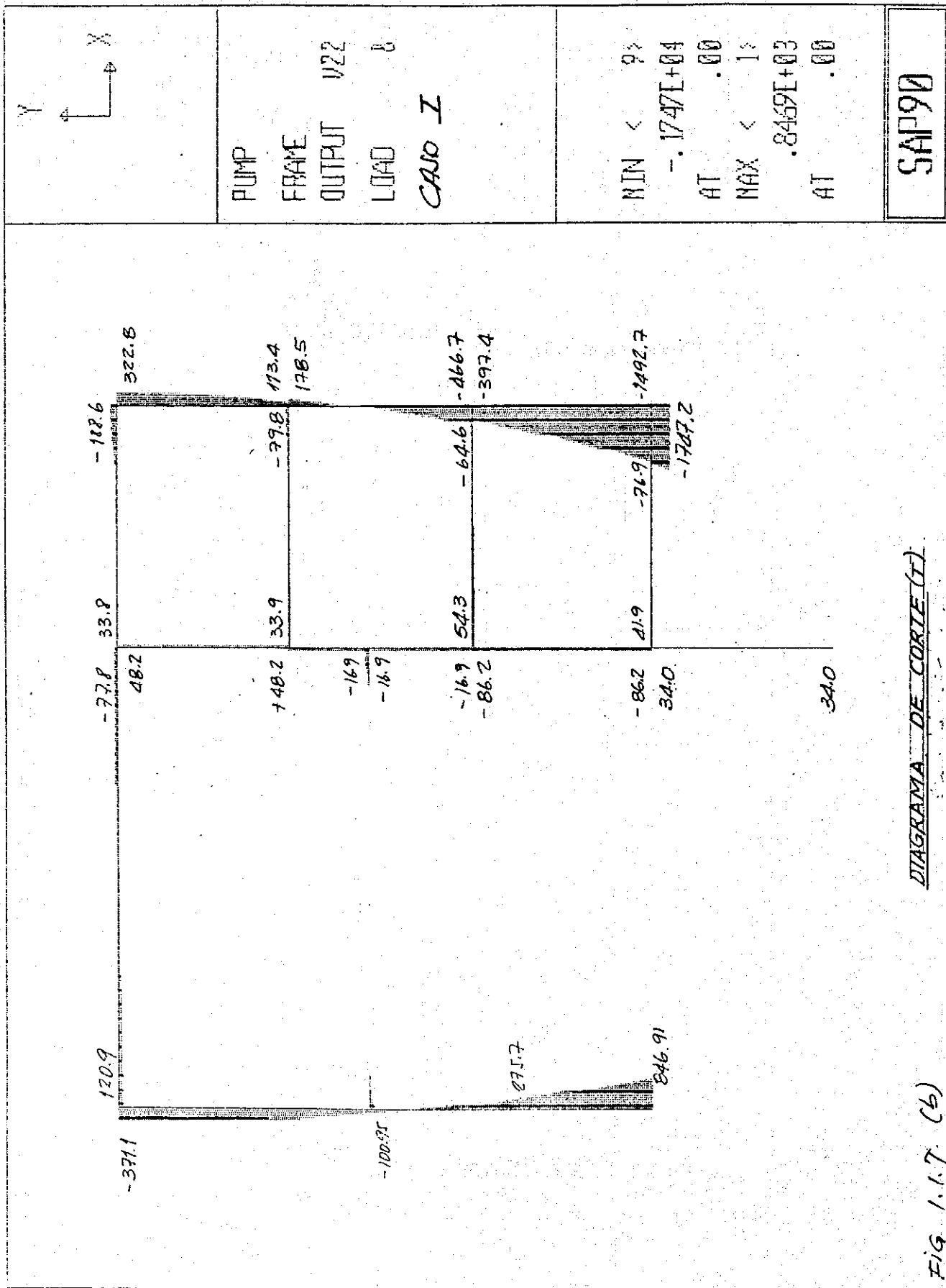


DIAGRAMA DE CORTE (I)

FIG. 1.1.7. (b)



PUMP  
 FRAME  
 OUTPUT P  
 LOAD 8  
 CASO: I

MIN < 9  
 --.1076E+04  
 AT .00  
 MAX < 13  
 .1202E+03  
 AT .00

SAP90

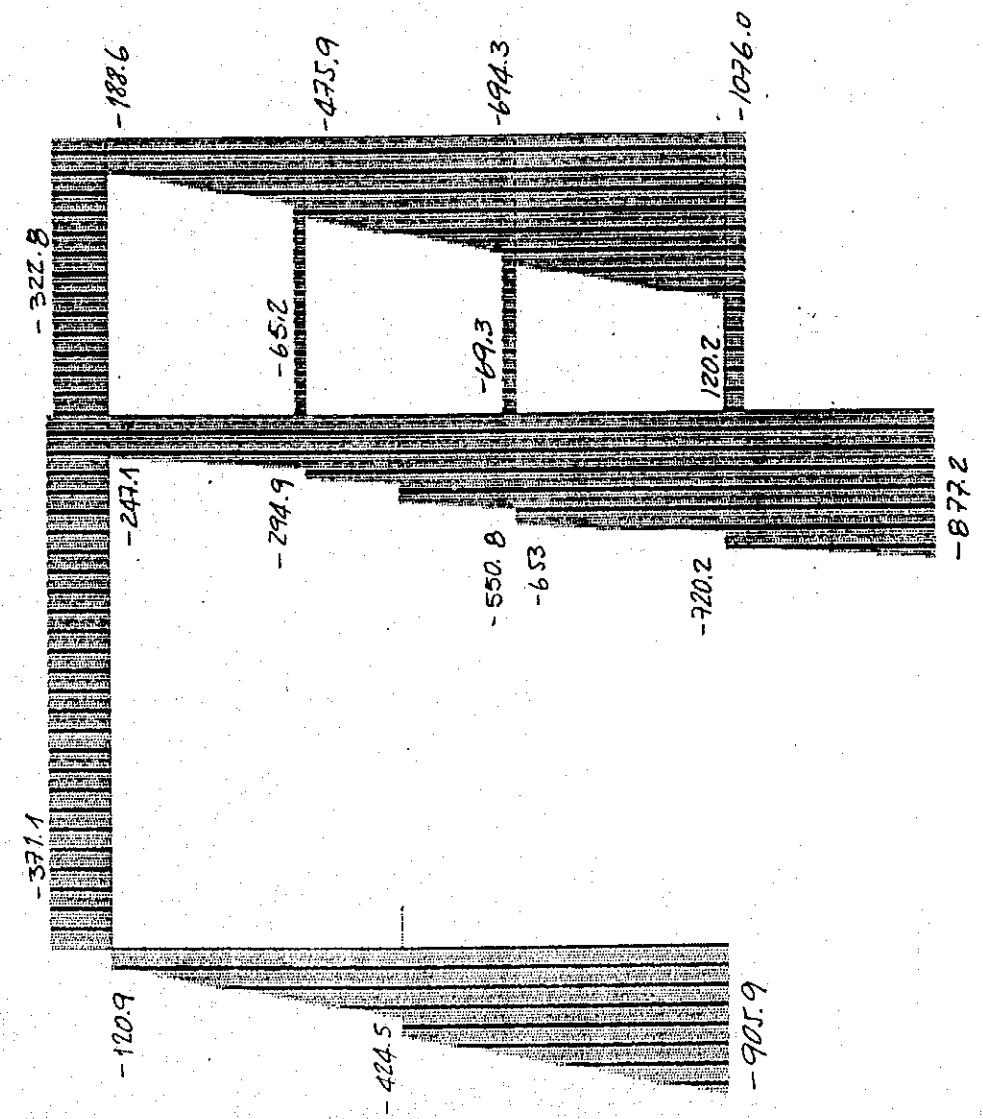
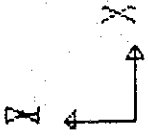


DIAGRAMA DE FUERZAS AXIALES (T)

1-1-107



PUMP  
 FRAME  
 OUTPUT M33  
 LOAD 9  
 CASO: II

MIN < 11>  
 - .9621E+03  
 AT 2.50  
 MAX < 9>  
 .3407E+04  
 AT .00

SAP90

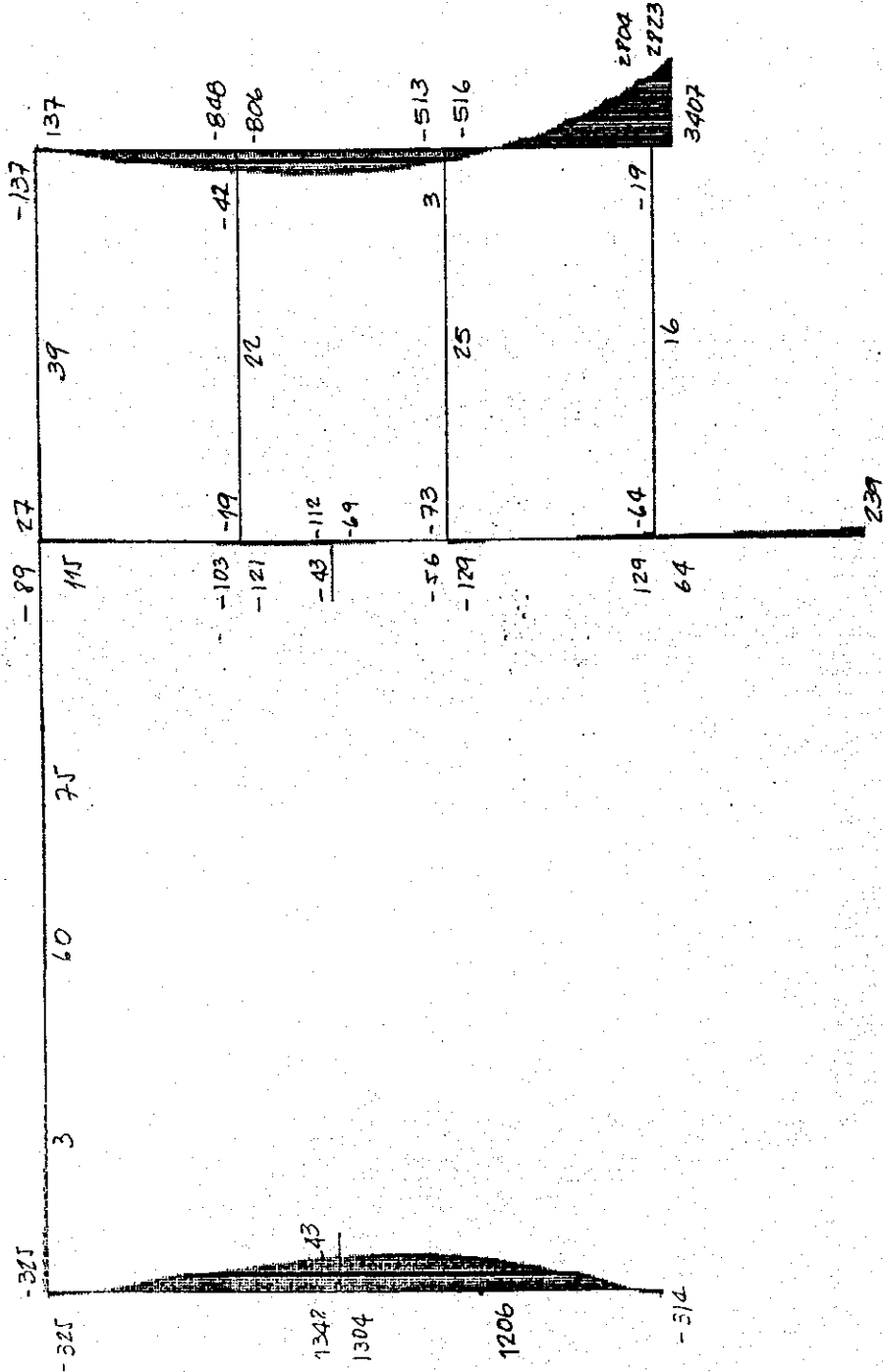
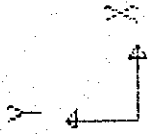


DIAGRAMA DE MOMENTOS (T.M)

FIG 1.1.8 (a)

201-1-1



PUMP  
 FRAME  
 OUTPUT U22  
 LOAD 9  
 CASO II

MIN < 9>  
 -.1220E+04  
 AT .00  
 MAX < 1>  
 .6055E+03  
 AT .00

SAP90

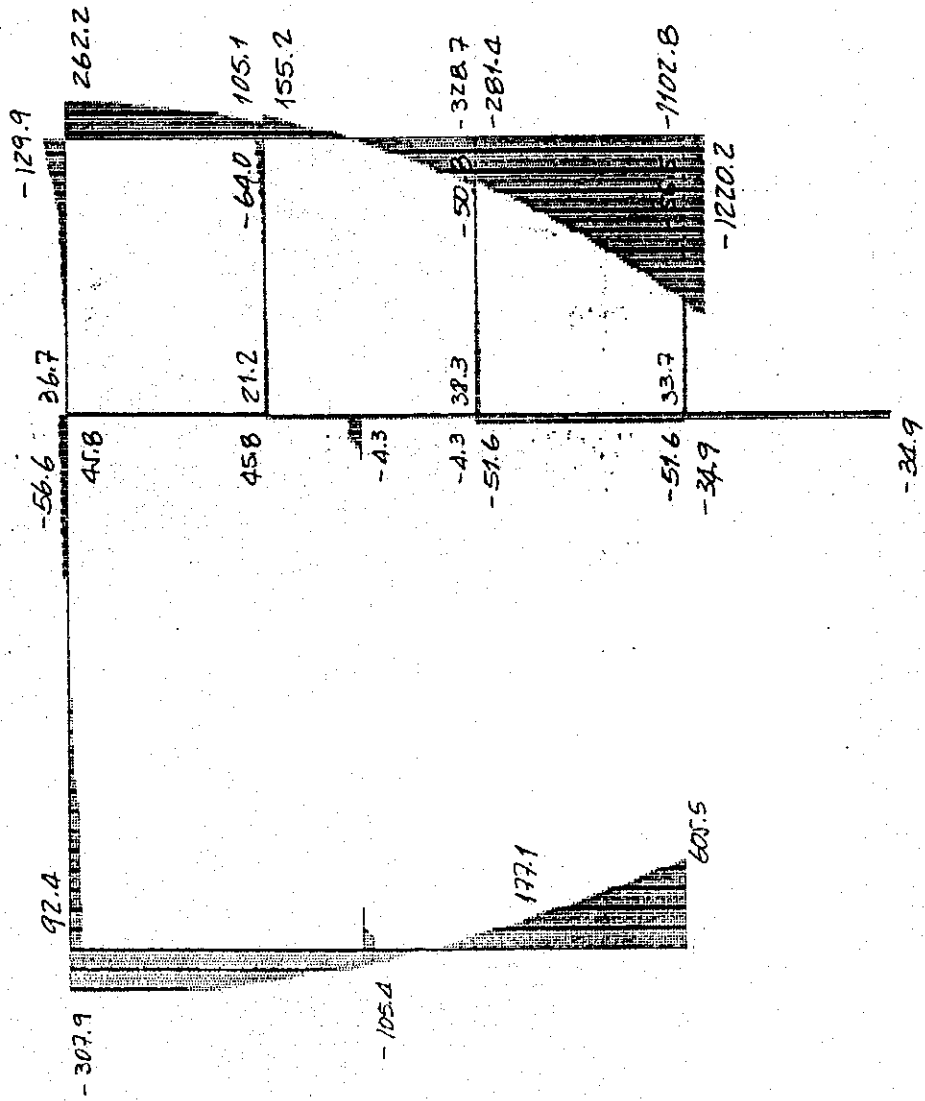


DIAGRAMA DE CORTE (T)

Fig 1.1.8 (6)

1-1-109

	PUMP FRAME OUTPUT P LOAD 9 CASO II	MIN < 9> - .8200E+03 AT .00 MAX < 13> .1665E+02 AT .00
--	--	---

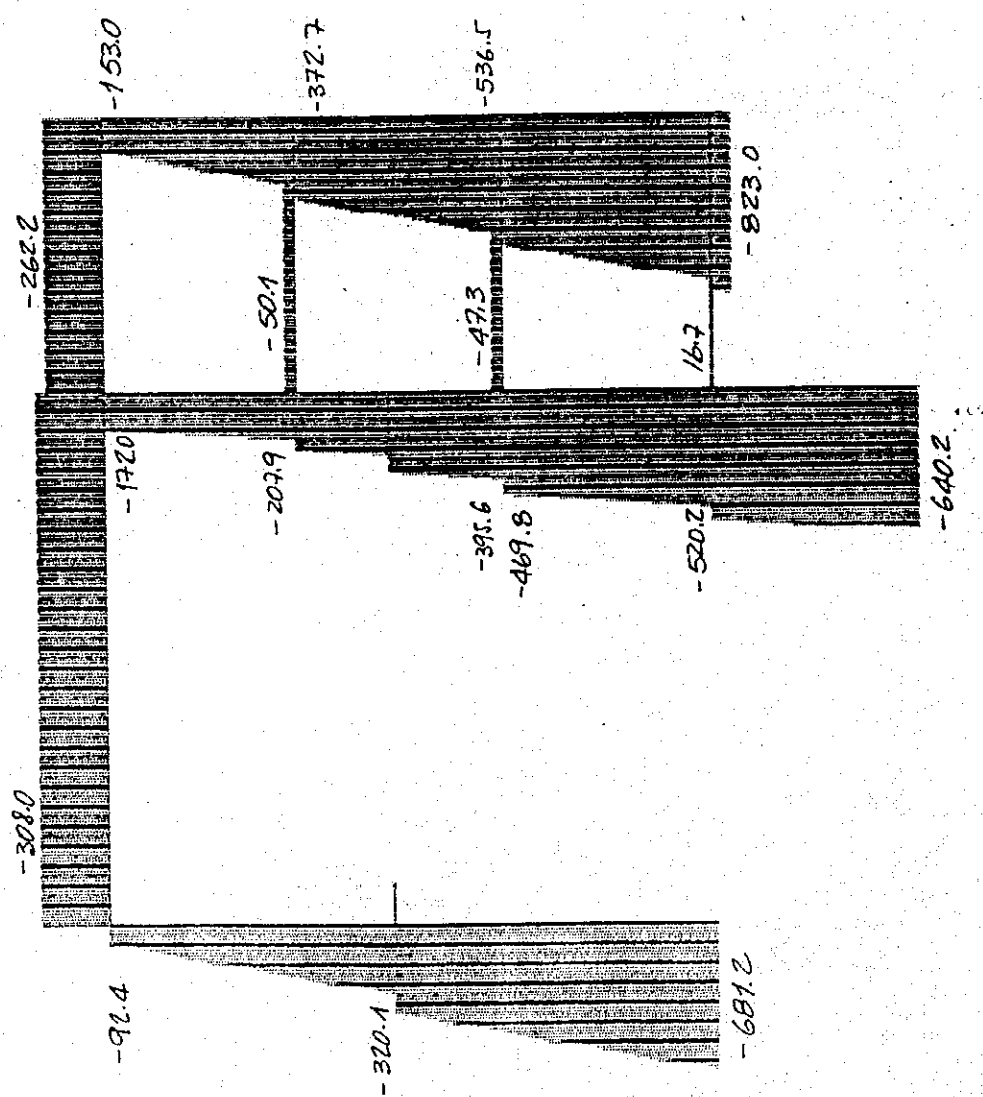


DIAGRAMA DE FUERZAS AXIALES (t.)

FIG. 1.1.8 (c)

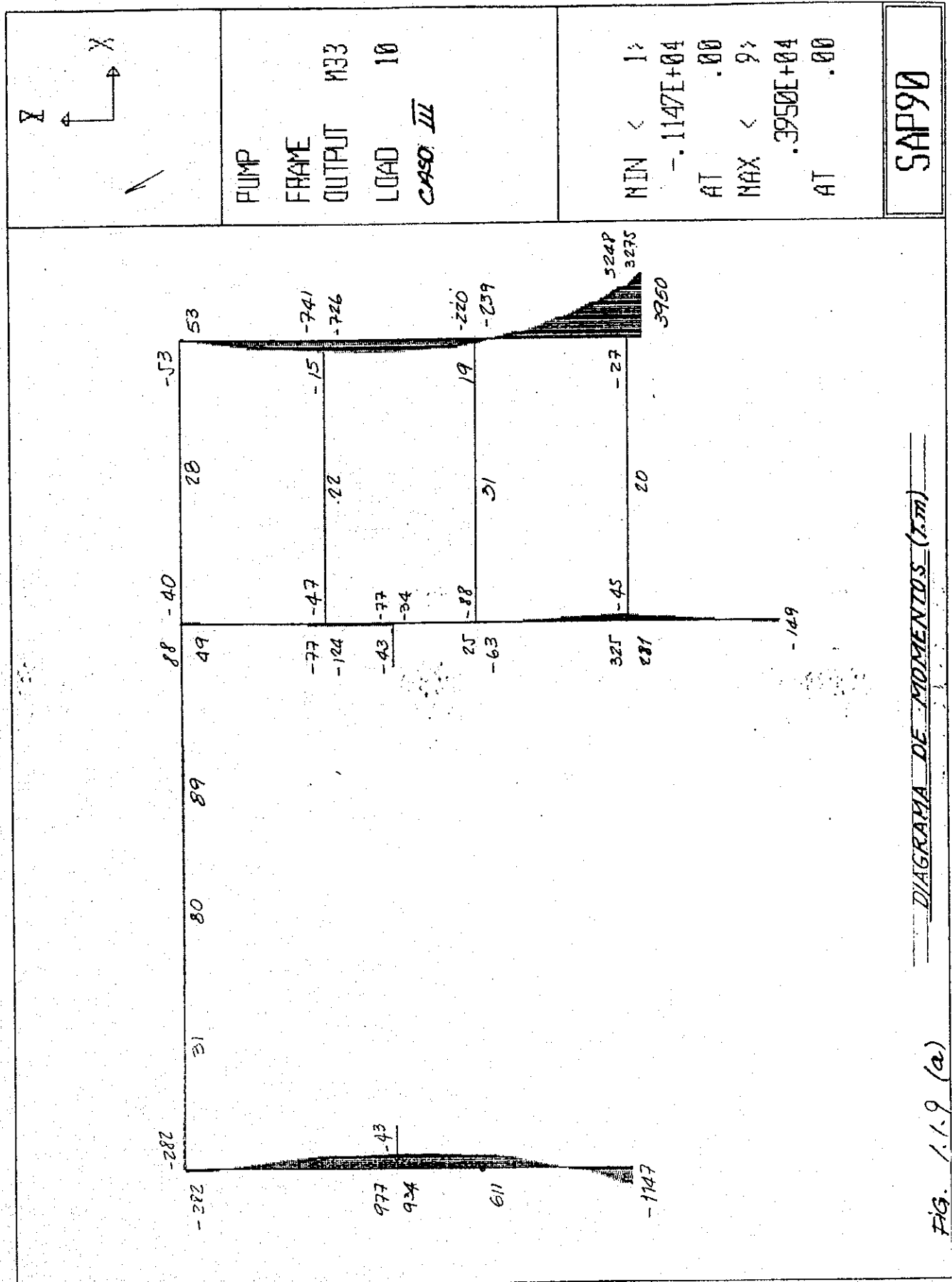
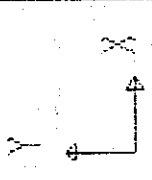


DIAGRAMA DE MOMENTOS (k.m)

Fig. 1.1.9 (a)

1-1-111



PUMP  
 FRAME  
 OUTPUT U22  
 LOAD 10  
 CASO: III

MIN < 92  
 -1401E+04  
 AT .00  
 MAX < 13  
 .6649E+03  
 AT .00

SAP90

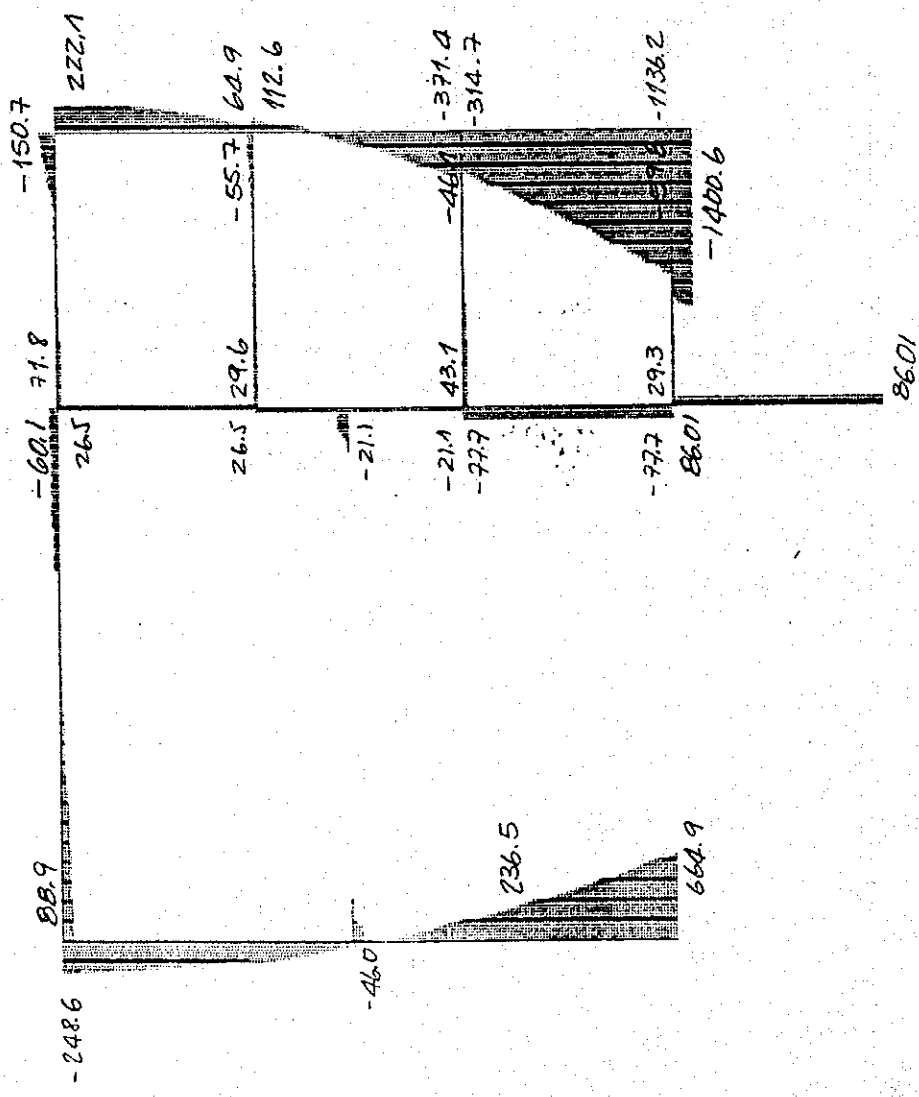


DIAGRAMA DE CORTE (T.)

Fig. 1.1.9 (b)



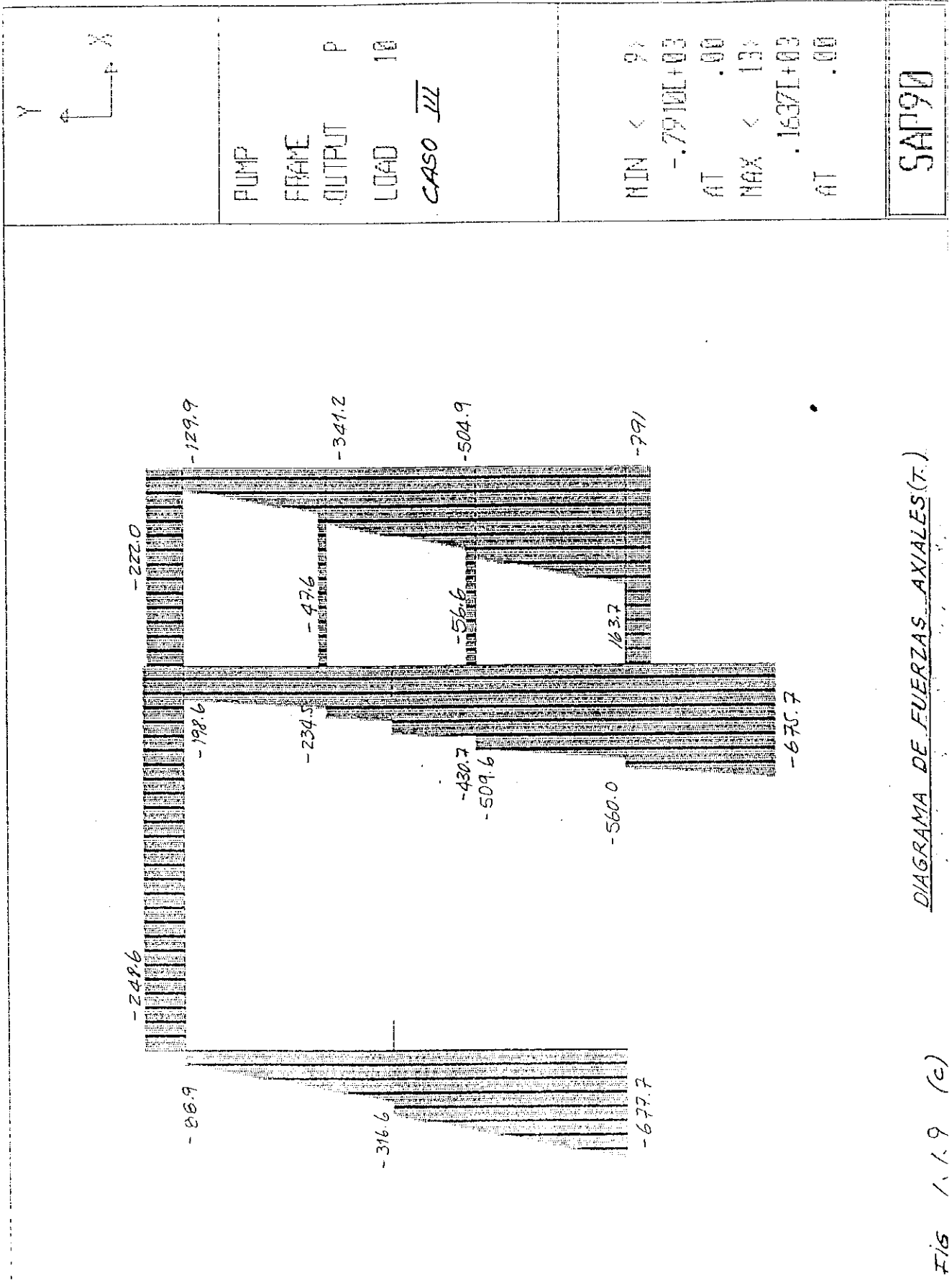


DIAGRAMA DE FUERZAS AXIALES (T.)

Fig 1.1.9 (c)

PUMP

FRAME

OUTPUT

LOAD

CASO IV

M33

11

MIN < 11

AT -6695E+03

MAX < 9

AT .4584E+04

AT .00

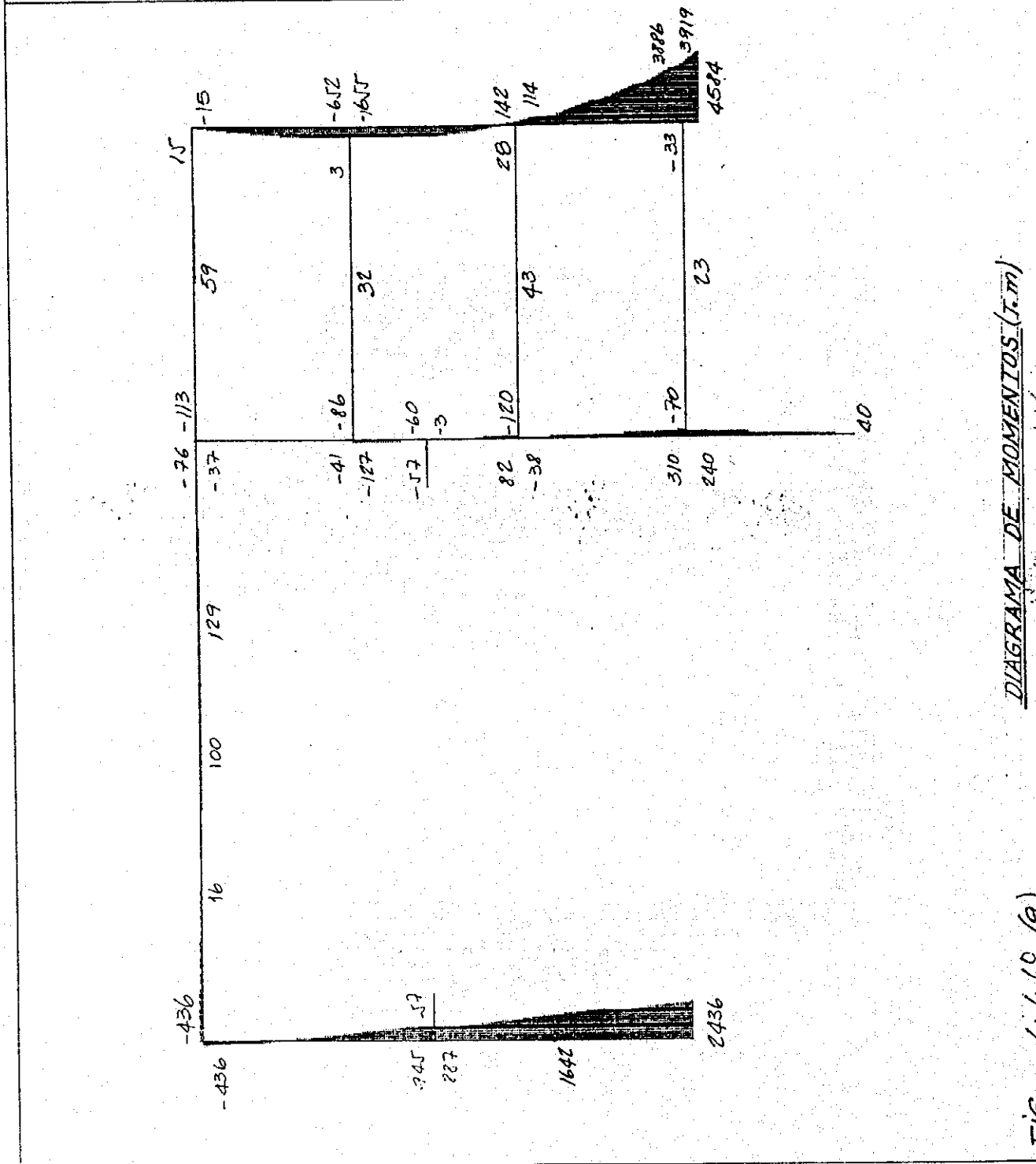


DIAGRAMA DE MOMENTOS (kg.m)

FIG. 1.1.10 (a)

1-1-114

PUMP	
FRAME	V22
OUTPUT	V22
LOAD	11
CASO	IV
MIN <	97
	-1379E+04
AT	.00
MAX <	127
	1978E+03
AT	4.75

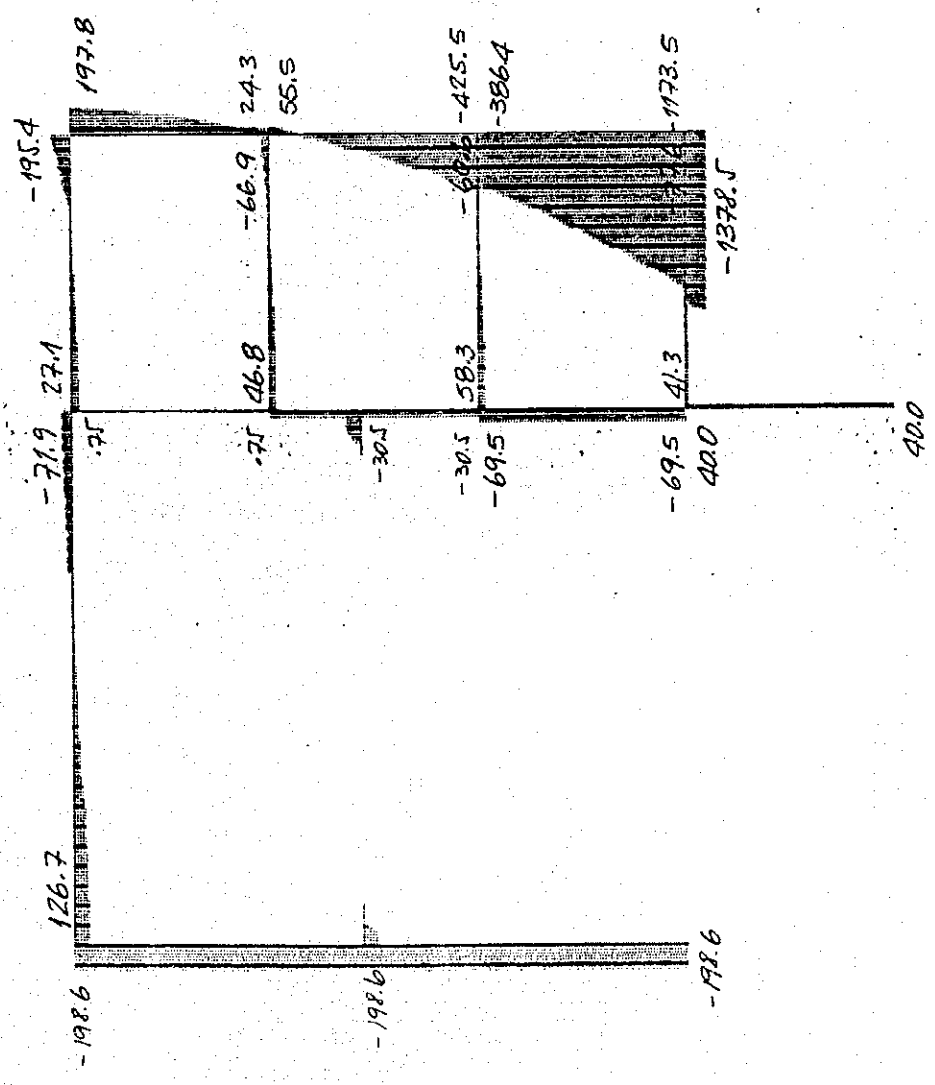
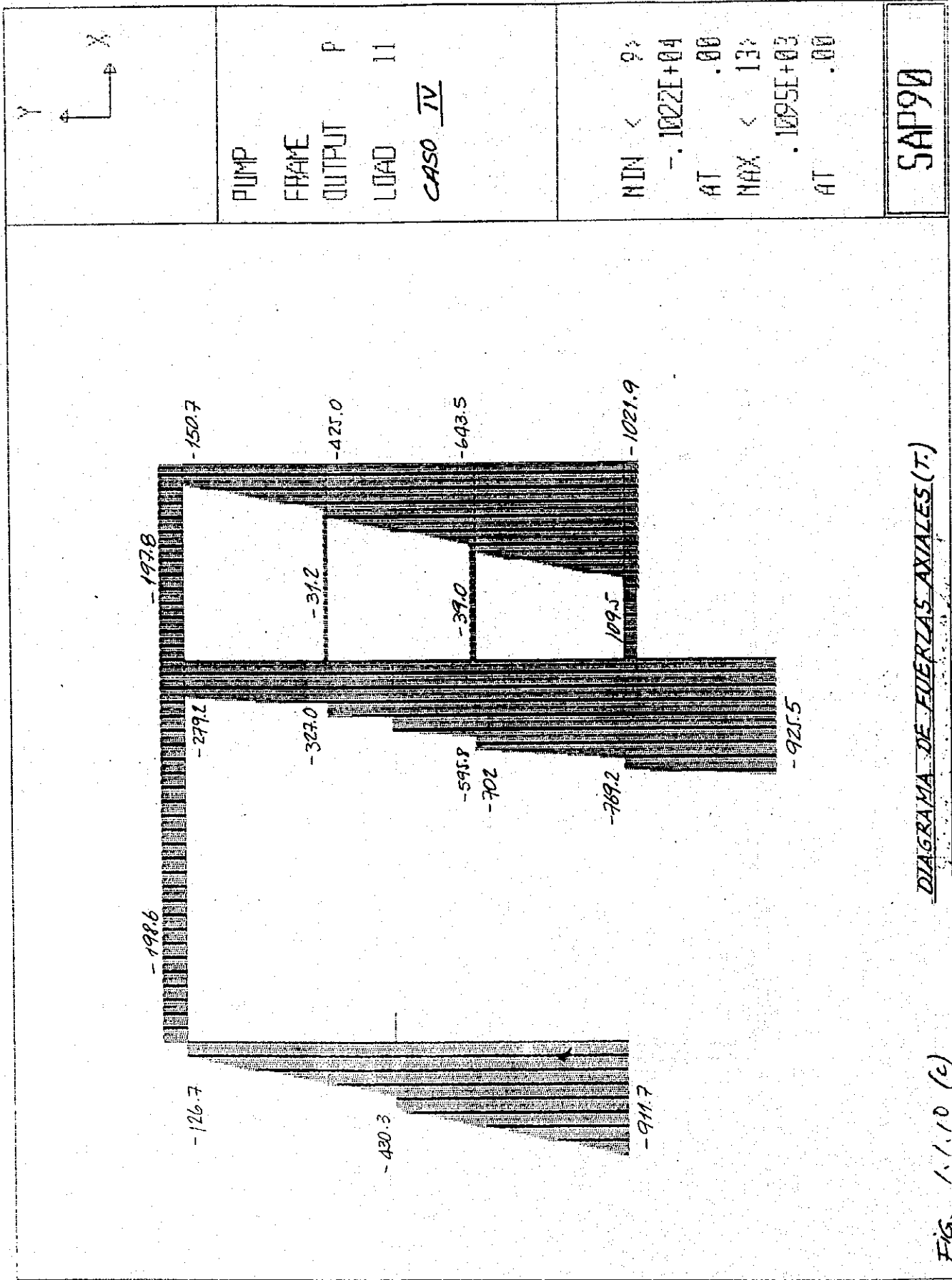



DIAGRAMA DE CORTE (T)

Fig. 1.1.10 (6)

SAP90

1-1-115





PUMP  
 FRAME M33  
 OUTPUT 12  
 LOAD 12  
 CASO V

MIN < 1 >  
 -1.657E+04  
 AT .00  
 MAX < 9 >  
 .3370E+04  
 AT .00

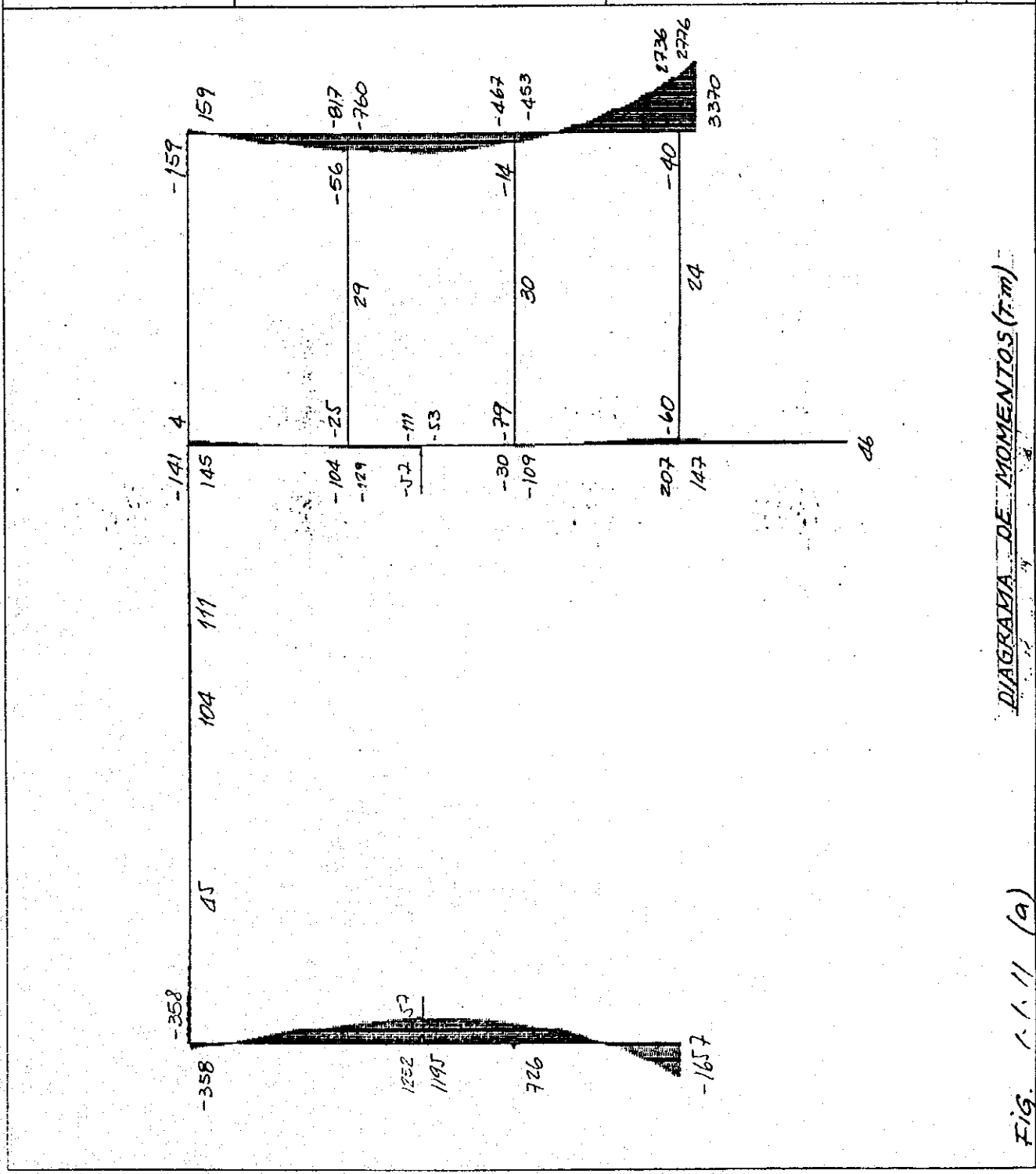


DIAGRAMA DE MOMENTOS (T.m)

Fig. 1.1.11 (a)

1-1-17



PUMP  
 FRAME  
 OUTPUT V22  
 LOAD 12  
 CASO V

MIN < 9>  
 -1.236E+04  
 AT .00  
 MAX < 12>  
 .8964E+03  
 AT .00

SAP90

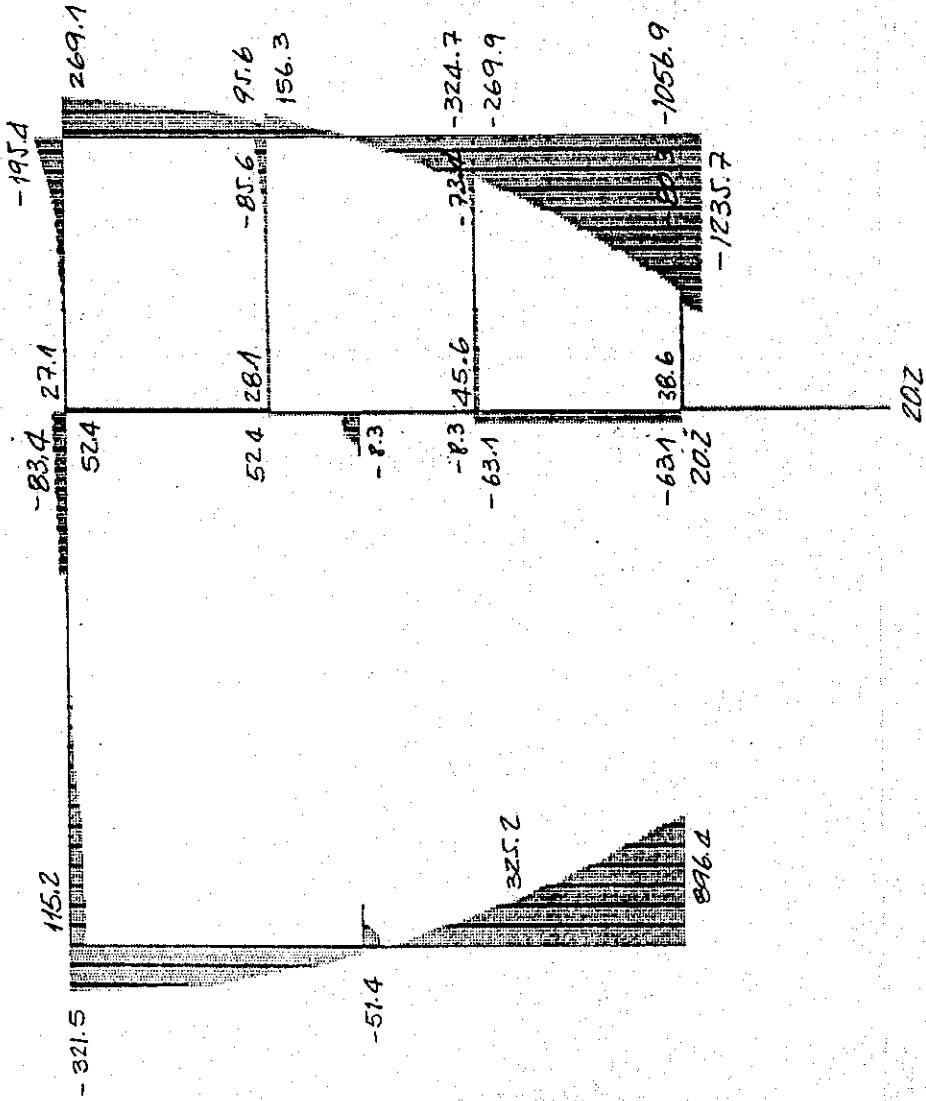


DIAGRAMA DE CORTE (I)

Fig. 1.1.11 (b)

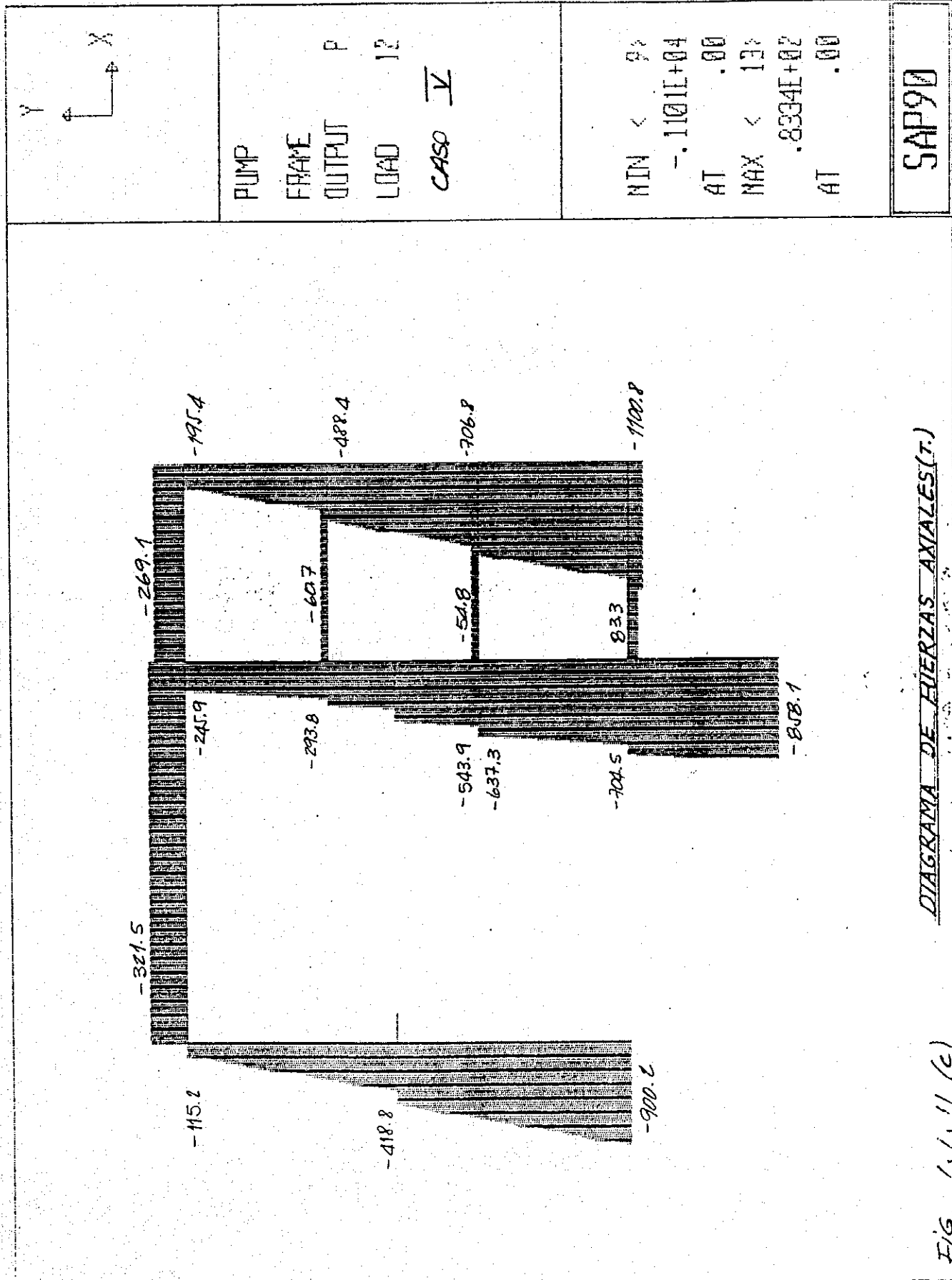
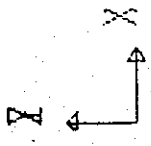


DIAGRAMA DE FUERZAS AXIALES(T.)

Fig. 1.1.11 (c)

1-1-119



PUMP  
 FRAME M33  
 OUTPUT M33  
 LOAD 13  
 CASO VI

MIN < 1>  
 - .1506E+04  
 AT .00  
 MAX < 2>  
 .3015E+04  
 AT .00

SAP90

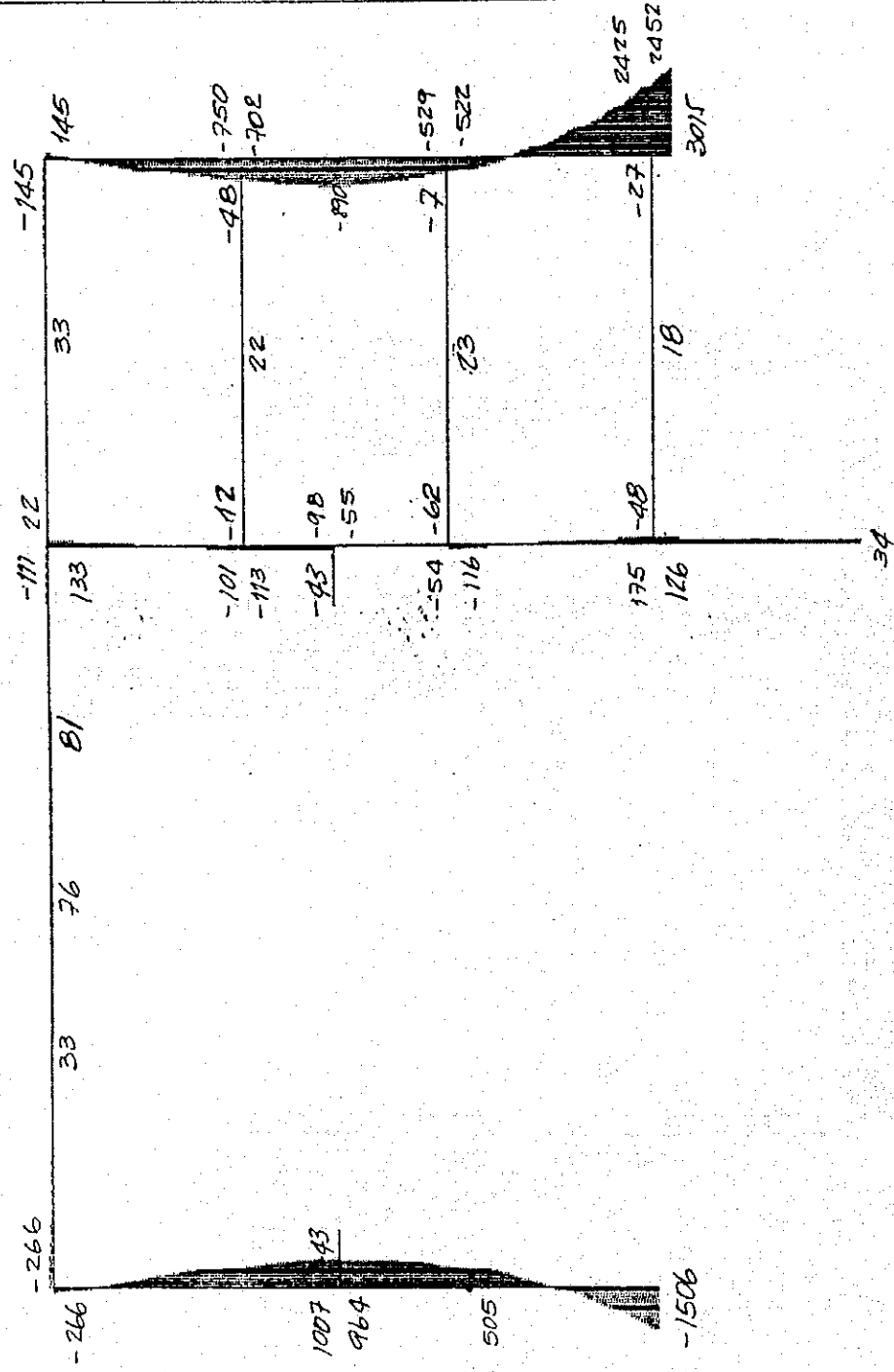


DIAGRAMA DE MOMENTOS (T.m)

Fig. 1.1.12(a)





PUMP  
 FRAME  
 OUTPUT V22  
 LOAD 13  
 CASO VI

MIN < 3>  
 -.1176E+04  
 AT  
 MAX < 1>  
 .7422E+03  
 AT

SAP90

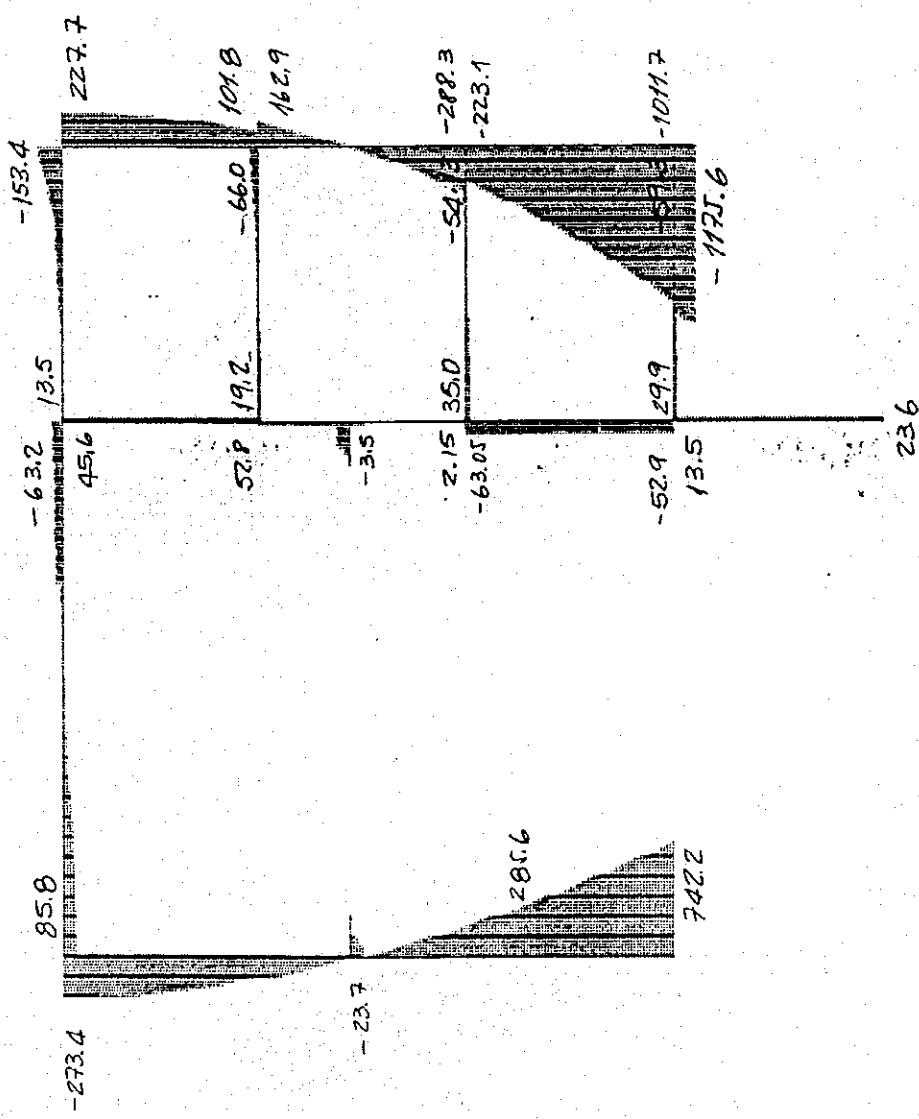
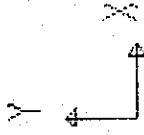


DIAGRAMA DE CORTE (J.)

Fig. 1.1.12.(6)

1-1-12/



PUMP  
 FRAME  
 OUTPUT P  
 LOAD 13  
 CASO VI

MIN < P  
 -.8324E+03  
 AT .00  
 MAX < 13  
 .6644E+02  
 AT .00

SAP90

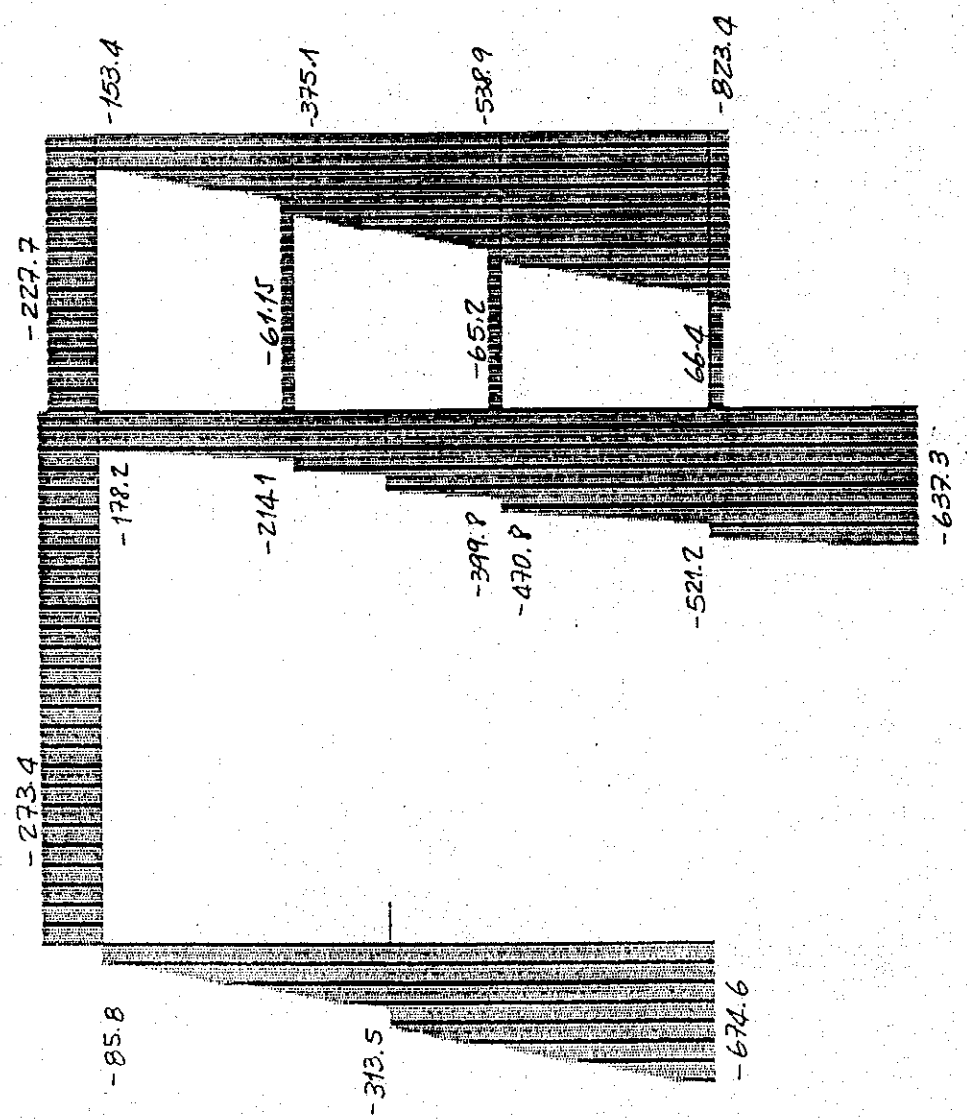


DIAGRAMA DE FUERZAS AXIALES (L)

FIG. 1.1.12 (c)

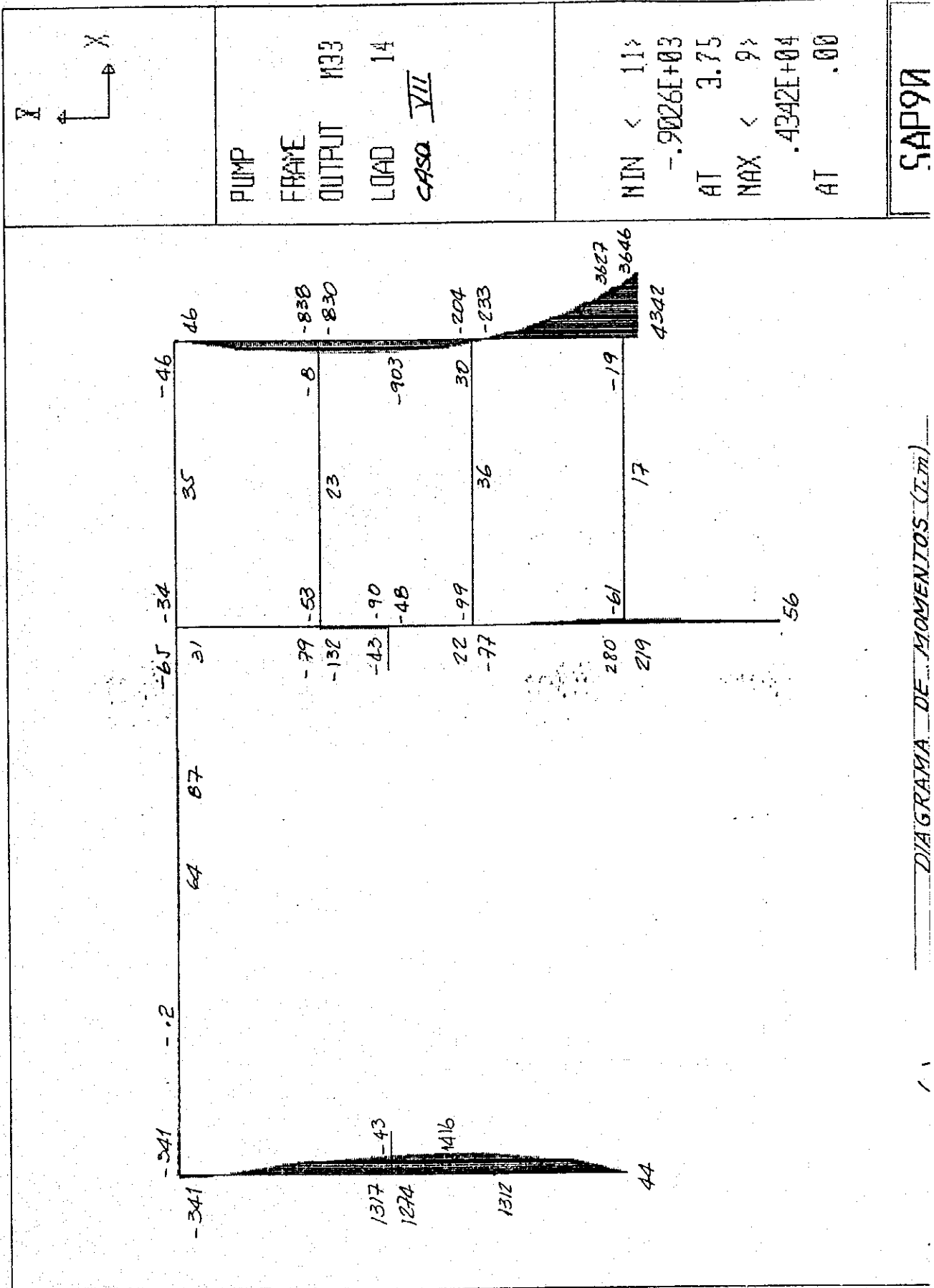
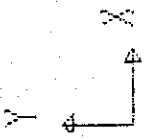


DIAGRAMA DE MOMENTOS (Cm)

1-1-123



PUMP  
 FRAME  
 OUTPUT 122  
 LOAD 14  
 CASO VII

MIN < 95  
 -1445E+04  
 AT .00  
 MAX < 13  
 .5282E+03  
 AT .00

SAP90

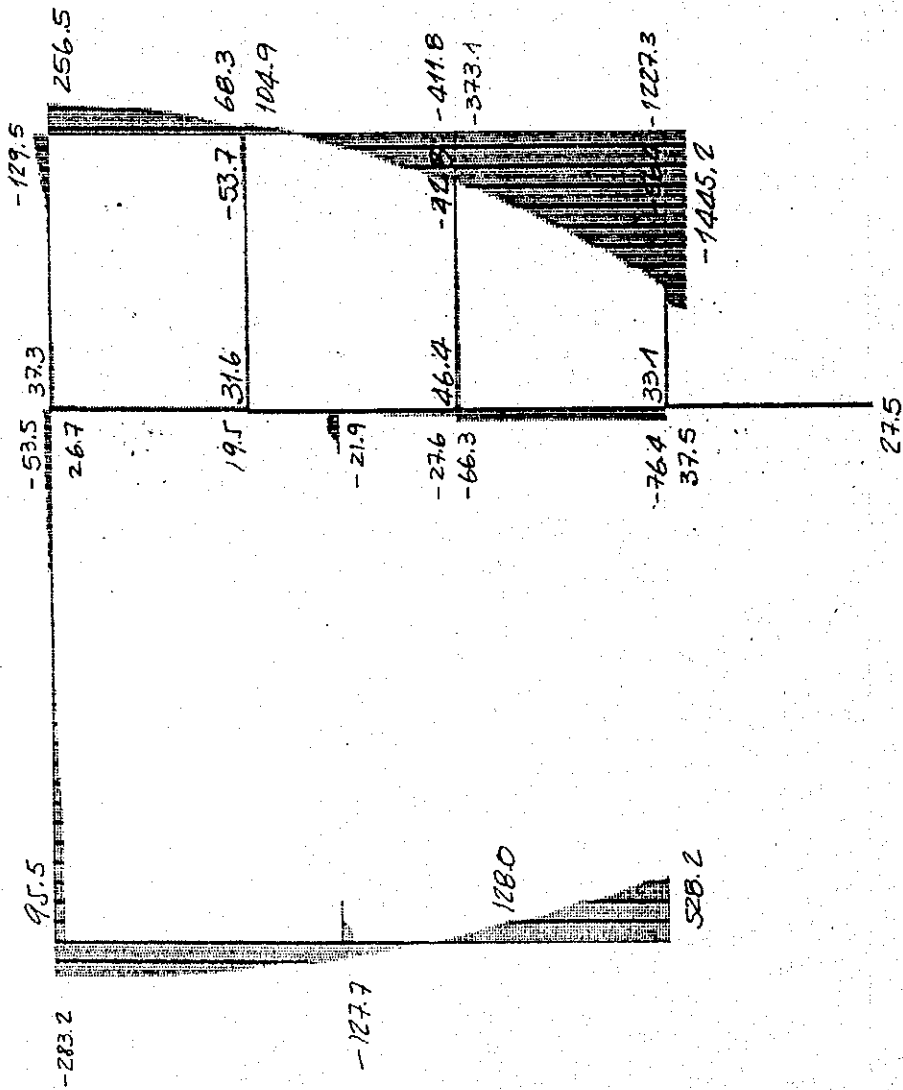
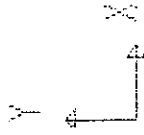


DIAGRAMA DE CORTE (7)

FIG. 1.1.13 (6)

	PUMP FRAME OUTPUT P LOAD 14 CASO VII	MIN < 94 -.7816E+03 AT .00 MAX < 194 .1139E+03 AT .00
---	--	--

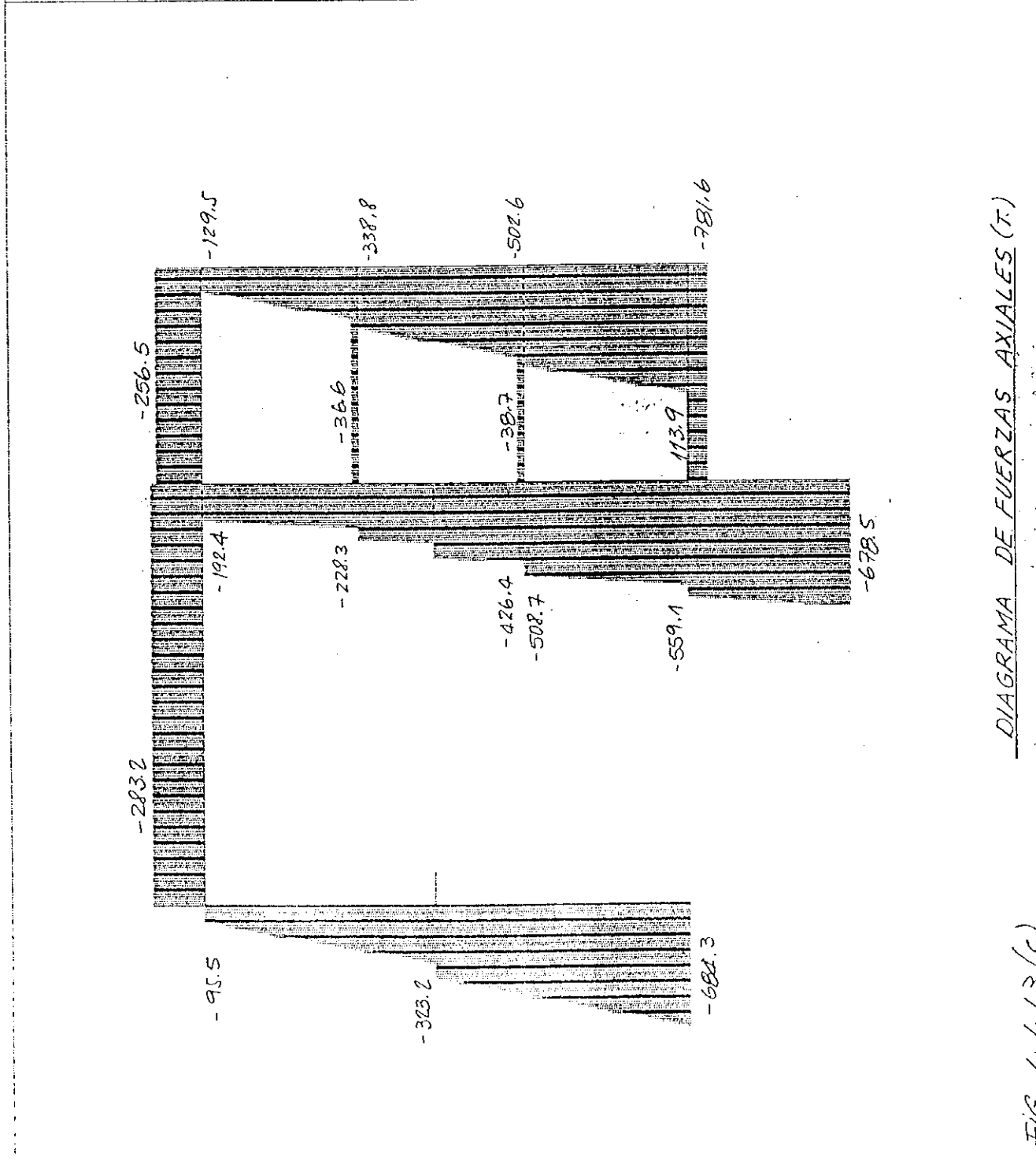


DIAGRAMA DE FUERZAS AXIALES (T.)

FIG. 1.1.13 (c)

1-1-10V

#### (d) DISEÑO DE HORMIGÓN ARMADO

El cálculo del refuerzo requerido y de los esfuerzos, se detalla en las tablas de las siguientes páginas.

La resistencia de diseño de los miembros de fundamento en los siguientes requerimientos:

#### - Flexión

Resistencia de diseño  $\geq$  Resistencia requerida

$$\phi (\text{Resistencia nominal}) \geq U$$

El diseño a la flexión de una sección (sin refuerzo a compresión) puede expresarse como sigue:

$$\phi M_n \geq M_u$$

$$\phi M_n = \phi [A_s f_y (d - a/2)]$$

donde:  $A_s$  = área del refuerzo a tracción

$f_y$  = esfuerzo de fluencia del refuerzo

$d$  = distancia de la fibra extrema a compresión al centroide del refuerzo a tracción.

$$a = A_s f_y / 0.85 f_c b$$

$\phi$  = factor de reducción de capacidad

#### - Cortante

$$\phi V_n \geq V_u \quad \text{donde}$$

$V_u$  = fuerza cortante mayorada, en la sección considerada

$V_n$  = resistencia nominal al cortante calculada por:

$$V_n = V_c + V_s$$

$V_c$  = resistencia nominal proporcionada por el hormigón,

y  $V_s$  es la resistencia nominal al cortante proporcionada por medio del refuerzo para cortante.

Para miembros sujetos solamente a flexión y cortante:

$$V_c = 0.53 \sqrt{f_c} b w d$$

Los resultados de los cálculos se ilustran en las siguientes tablas y el arreglo del refuerzo en las figs. 1.1.14.

15-Oct-94

ESTACION DE BOMBEO SEVERINO

DISEÑO A FLEXION

DATOS :

$f'c =$  210 Kg/cm<sup>2</sup>  
 $f_y =$  4200  
 $r =$  4.0 cm  
 $p_{max} = 0.75 p_b =$  1.61 (%)  
 $p_s =$  0.90 (%)

ID ELEM	Mu (t-m)	b (cm)	h (cm)	d (cm)	P (%)	As (cm <sup>2</sup> )	As(min) (cm <sup>2</sup> )	As(temp) (cm <sup>2</sup> )	As(adopt) (cm <sup>2</sup> )	As(adopt) (varillas)
13	73.00	100.0	100.0	96.0	0.22	20.64	32.00	12.50	34.36	7 ø 25 @ 14 cm.
14	120.00	100.0	100.0	96.0	0.36	34.53	32.00	12.50	34.36	7 ø 25 @ 14 cm.
15	86.00	100.0	100.0	96.0	0.25	24.43	32.00	12.50	34.36	7 ø 25 @ 14 cm.
16	159.00	150.0	150.0	146.0	0.13	29.27	73.00	28.13	72.38	9 ø 32 @ 17 cm.
17	436.00	150.0	150.0	146.0	0.38	82.69	73.00	28.13	88.44	11 ø 32 @ 13 cm.
18	104.00	150.0	150.0	146.0	0.09	19.04	73.00	28.13	72.38	9 ø 32 @ 17 cm.
19	129.00	150.0	150.0	146.0	0.11	23.68	73.00	28.13	72.38	9 ø 32 @ 17 cm.
20	141.00	150.0	150.0	146.0	0.12	25.91	73.00	28.13	72.38	9 ø 32 @ 17 cm.

1-1-127

## ESTACION DE BOMBEO SEVERINO

## DISEÑO A CORTE

ID ELEM	Vu (ton)	bw (cm)	dn (cm)	h (cm)	d(adopt) (cm)	s/vc (ton)	Vs (ton)	Av (cm <sup>2</sup> )	S (cm)	Smax (cm)	Smax (cm)	Smax (cm)
13	80.00	100.0	122.54	100.0	96.00	62.67	20.39	3.08	60.9	37.0	48.0	24.0
14	73.00	100.0	111.82	100.0	96.00	62.67	12.15	3.08	102.2	37.0	48.0	24.0
15	86.00	100.0	131.73	100.0	96.00	62.67	27.44	3.08	45.2	37.0	48.0	24.0
16	195.00	150.0	199.13	150.0	146.00	142.97	61.21	3.08	30.9	24.6	73.0	36.5
17	127.00	150.0	129.69	150.0	146.00	142.97	-18.79	3.08	-100.5	24.6	73.0	36.5
18	48.00	150.0	49.02	150.0	146.00	142.97	-111.73	3.08	-16.9	24.6	73.0	36.5
19	25.00	150.0	25.53	150.0	146.00	142.97	-138.79	3.08	-13.6	24.6	73.0	36.5
20	83.00	150.0	84.76	150.0	146.00	142.97	-70.55	3.08	-26.8	24.6	73.0	36.5
21	115.00	200.0	88.08	150.0	146.00	190.63	-88.97	3.08	-21.2	18.5	73.0	36.5
22	115.00	200.0	88.08	150.0	146.00	190.63	-88.97	3.08	-21.2	18.5	73.0	36.5
1	896.00	200.0	686.24	400.0	396.00	517.05	445.83	36.95	137.8	221.7	198.0	99.0
2	325.00	200.0	248.91	400.0	396.00	517.05	-225.94	36.95	-272.0	221.7	198.0	99.0
3	371.00	200.0	284.14	400.0	396.00	517.05	-171.82	36.95	-357.7	221.7	198.0	99.0
9	1747.00	200.0	1338.01	350.0	346.00	451.76	1523.81	30.79	29.4	184.7	173.0	86.5
10	1493.00	200.0	1143.47	350.0	346.00	451.76	1224.98	30.79	36.5	184.7	173.0	86.5
11	467.00	200.0	357.67	350.0	346.00	451.76	17.93	30.79	2496.0	184.7	173.0	86.5
12	323.00	200.0	247.36	350.0	346.00	451.76	-151.49	3.08	-29.5	18.5	173.0	86.5



## DISEÑO DE MIEMBROS A FLEXOCOMPRESION

Ref.: Design Handbook in Accordance with the Strength Design Method of ACI 318  
Publication SP-17A ACI

ID ELEM	Pu (t)	Mu (t-m)	h (m)	Ag (m <sup>2</sup> )	Pu/Ag (ksi)	Mu/Ag h (ksi)	pg (%)
1	912	2436	4.0	8.0	0.16	0.11	1.0
2	724	1642	4.0	8.0	0.13	0.07	1.0
4	625	281	2.0	4.0	0.22	0.05	1.0
5	560	325	2.0	4.0	0.20	0.06	1.0
9	1076	4905	3.5	7.0	0.22	0.28	1.0
9	782	4342	3.5	7.0	0.16	0.25	1.0

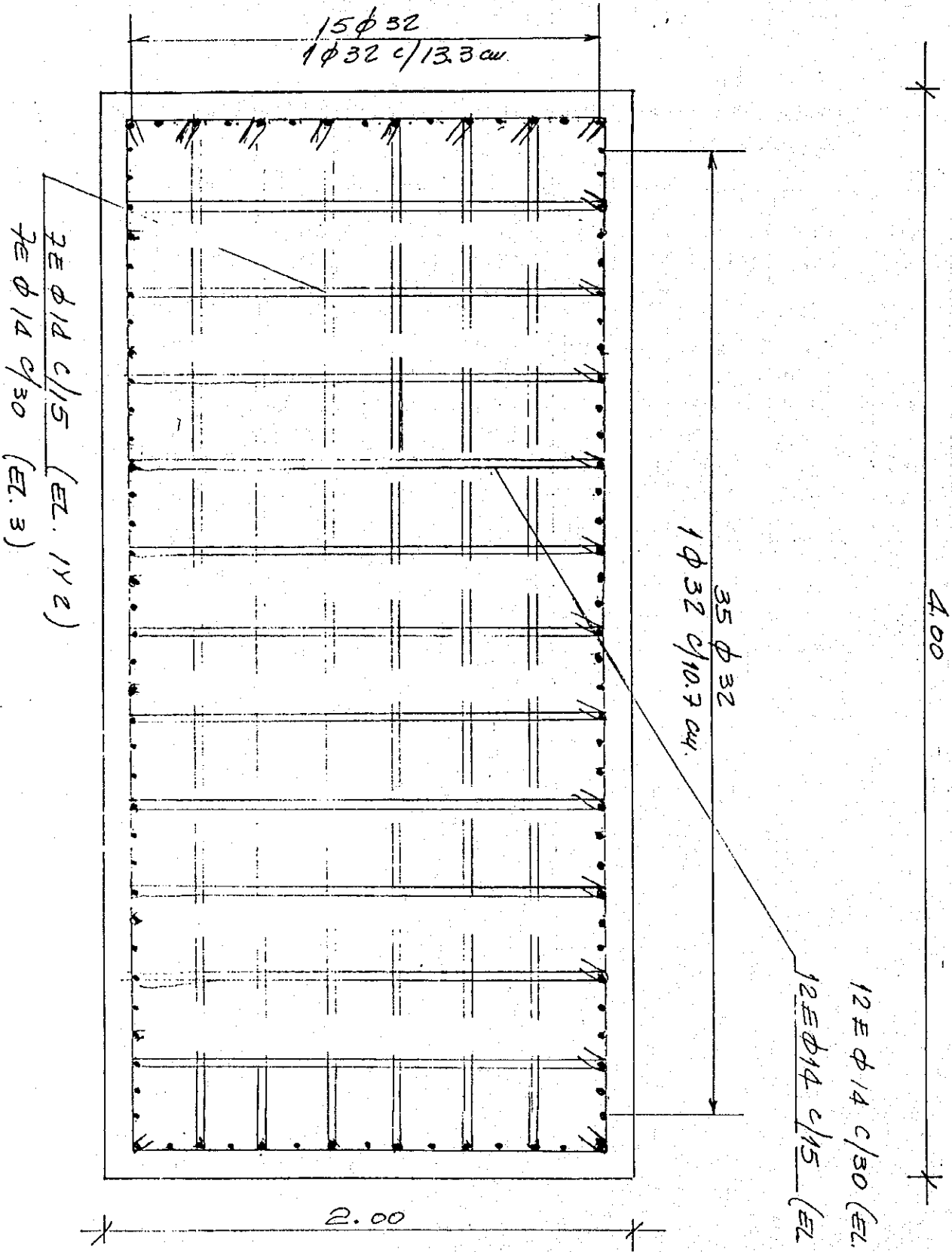
1-1-129

126

ELEMENTOS - 1, 2, 3

REFUERZO

$A_s = 100 \phi 32$



7  $\phi 14$  c/30 (EL. 3)  
2  $\phi 14$  c/15 (EL. 1 y 2)

35  $\phi 32$   
1  $\phi 32$  c/10.7 cm.

12  $\phi 14$  c/30 (EL. 3)  
12  $\phi 14$  c/15 (EL. 1 y 2)

2.00

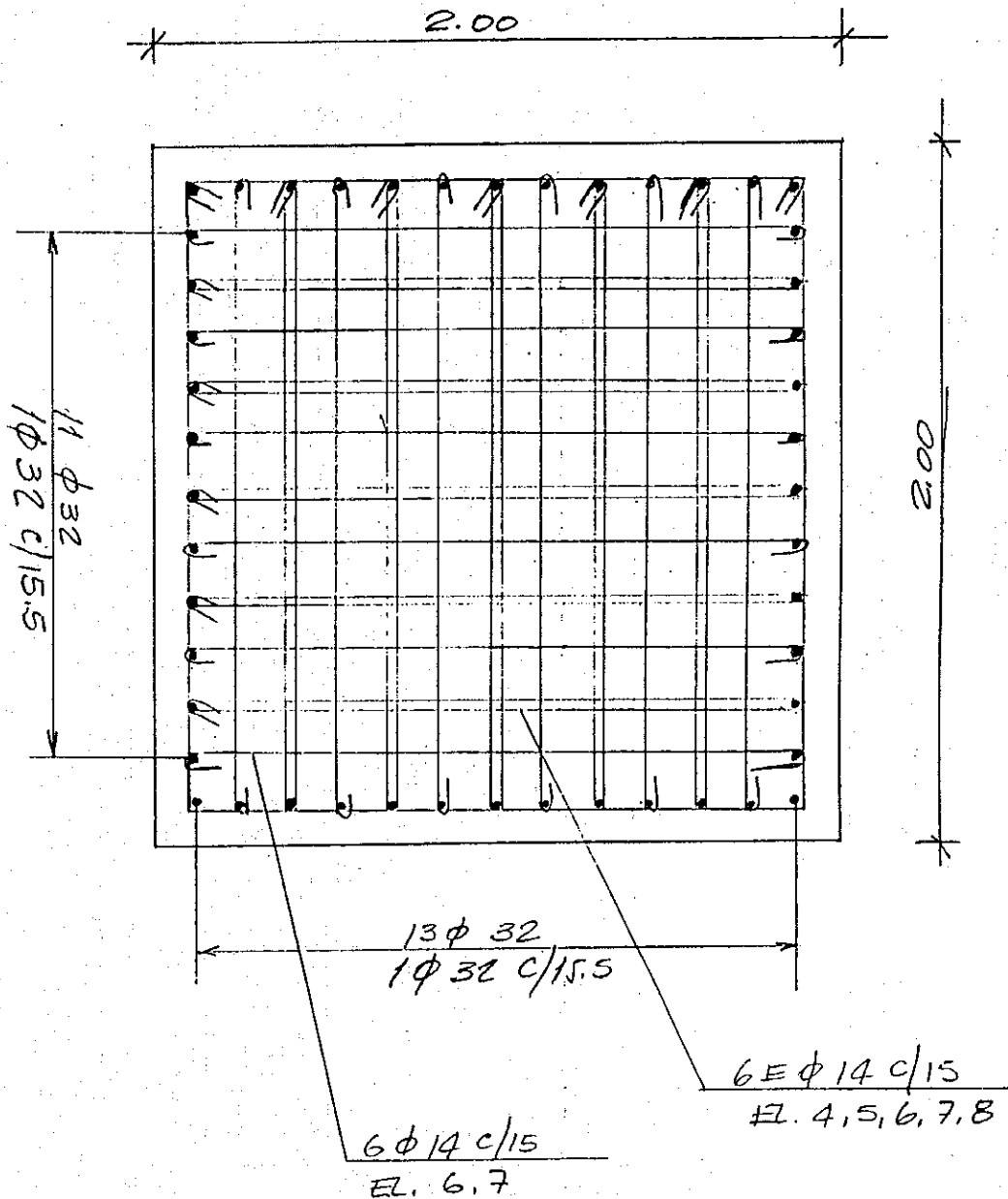
4.00

1-1-130

129

ELEMENTOS 4, 5, 6, 7, 8

$$A_s = 48 \cdot \phi 32$$



ESPACIAMIENTO DEL REFUERZO

Tamaño máximo del agregado = 40 mm.

ACI 7.6  $1.5 d_b = 1.5(3.2) = 4.80$  cm.

4 cm = 4.00 cm

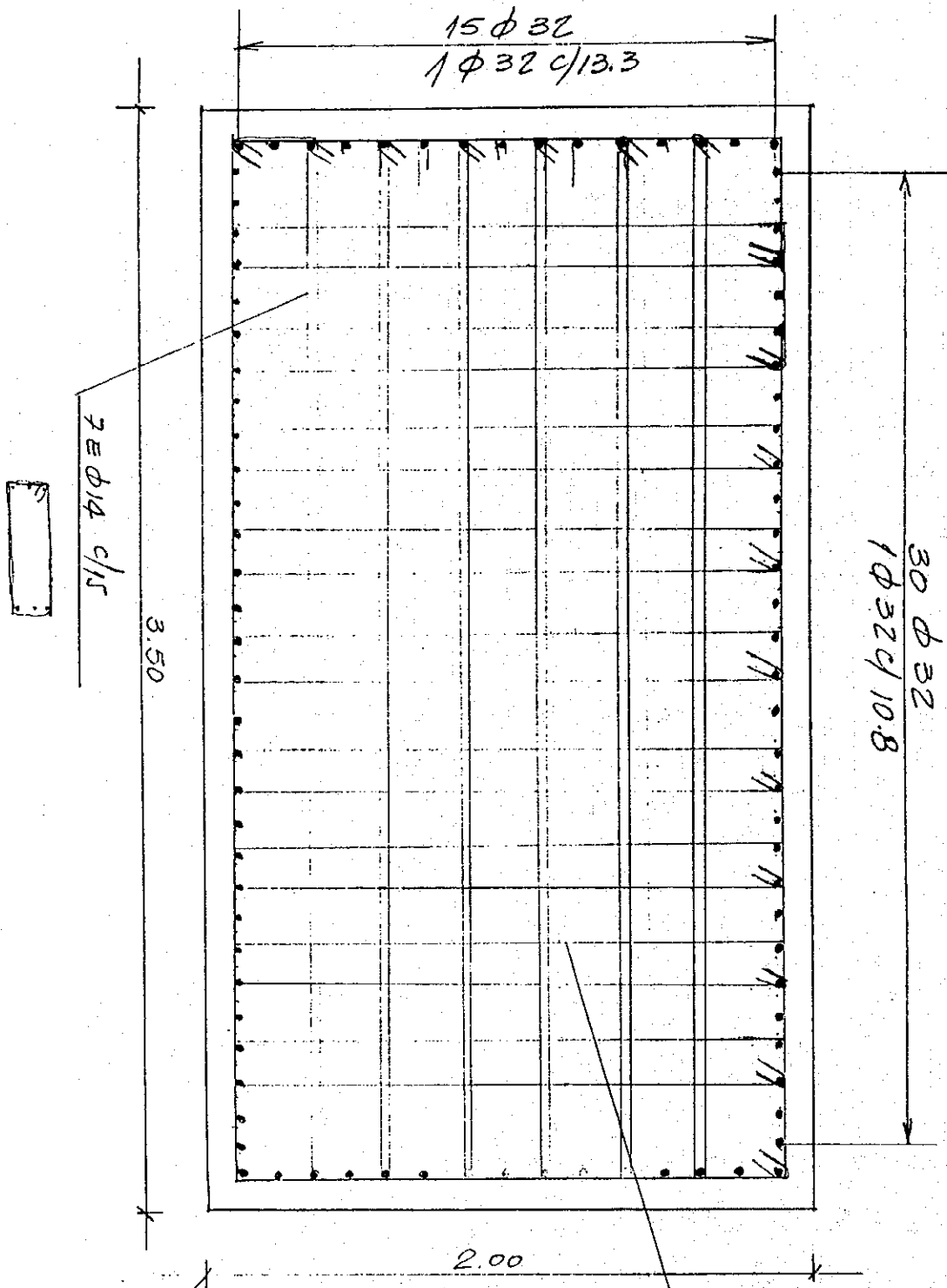
$3/4 L = 4.0 \rightarrow L = 16/3 = 5.33$  cm

Dist. entre qe =  $5.33 + 3.20 = 8.53$  cm.

1-1-R/1

ELEMENTOS: 9, 10, 11, 12

$A_s = 90 \phi 32$



$7 \phi 14$  c/15

3.50

2.00

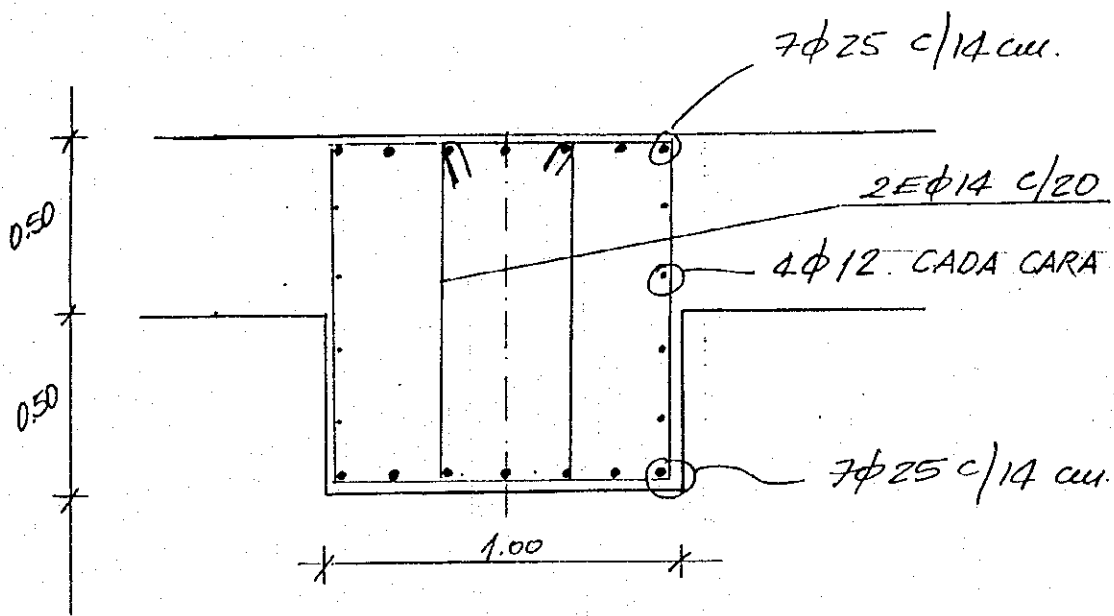
30  $\phi 32$   
1  $\phi 32$  c/10.8  
8.00



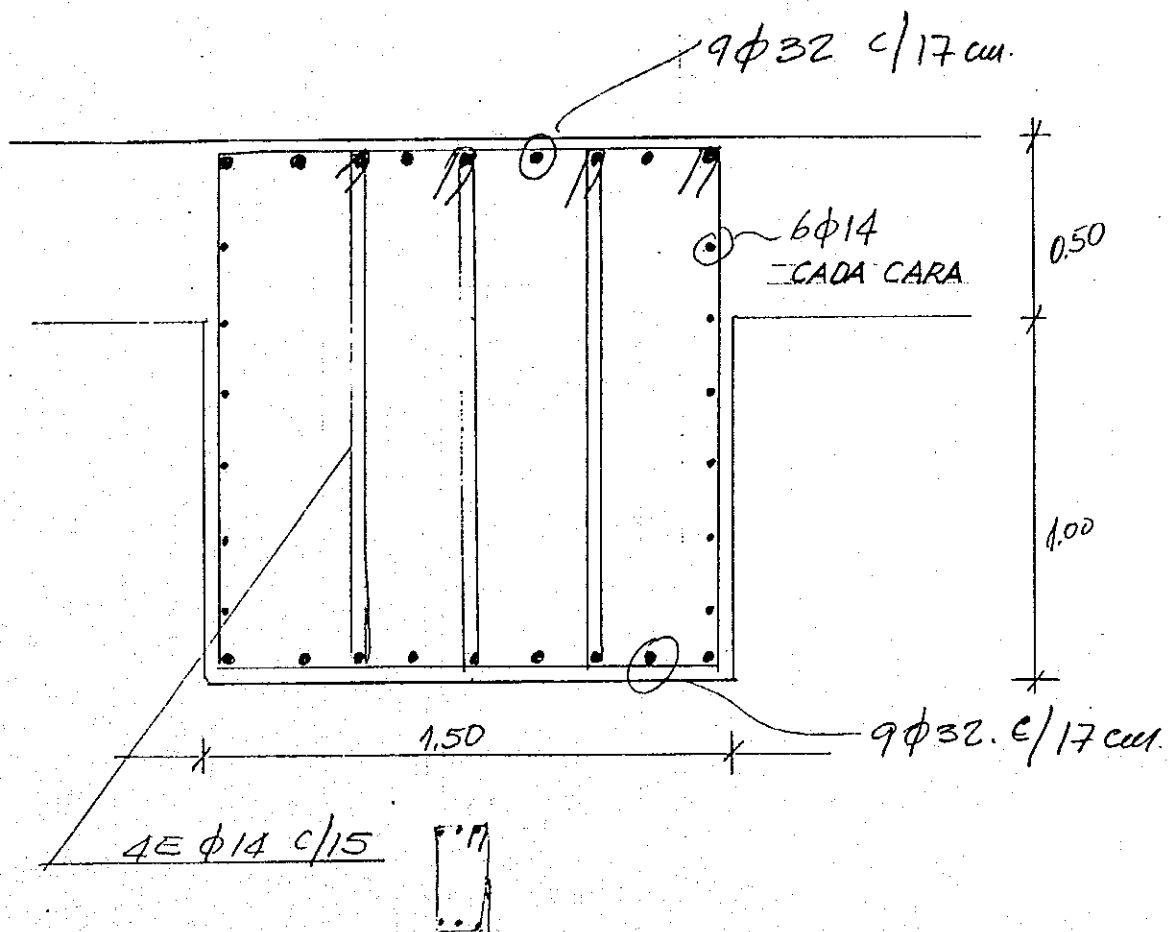
$10 \phi 14$  c/15

1-1-132

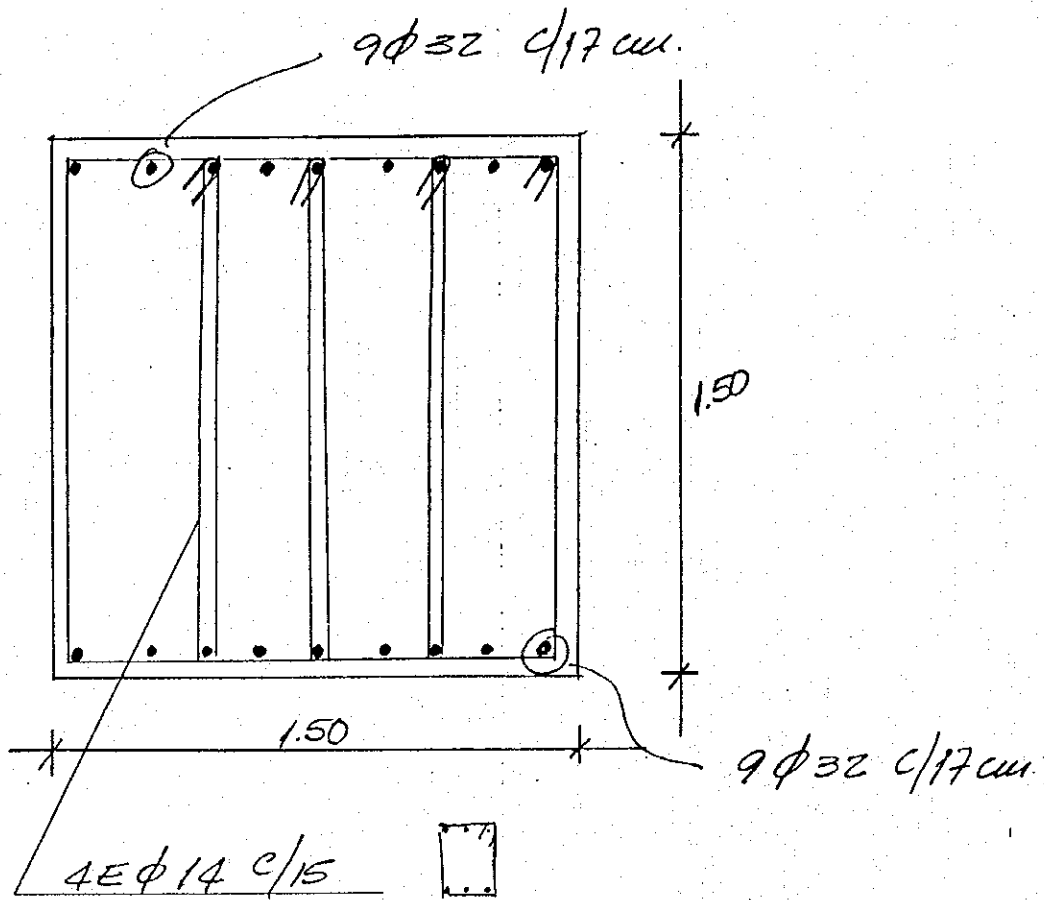
# ELEMENTOS 13, 14, 15



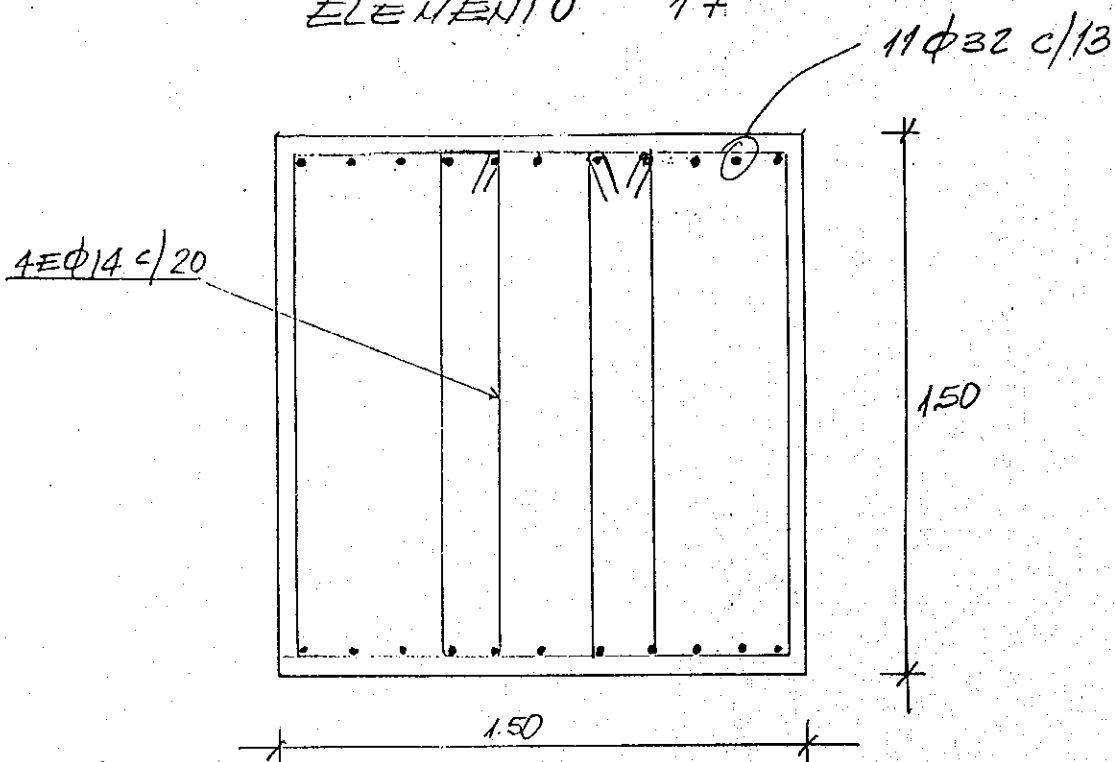
# ELEMENTO 16



ELEMENTOS 18, 19, 20



ELEMENTO 17



1-1-134

133

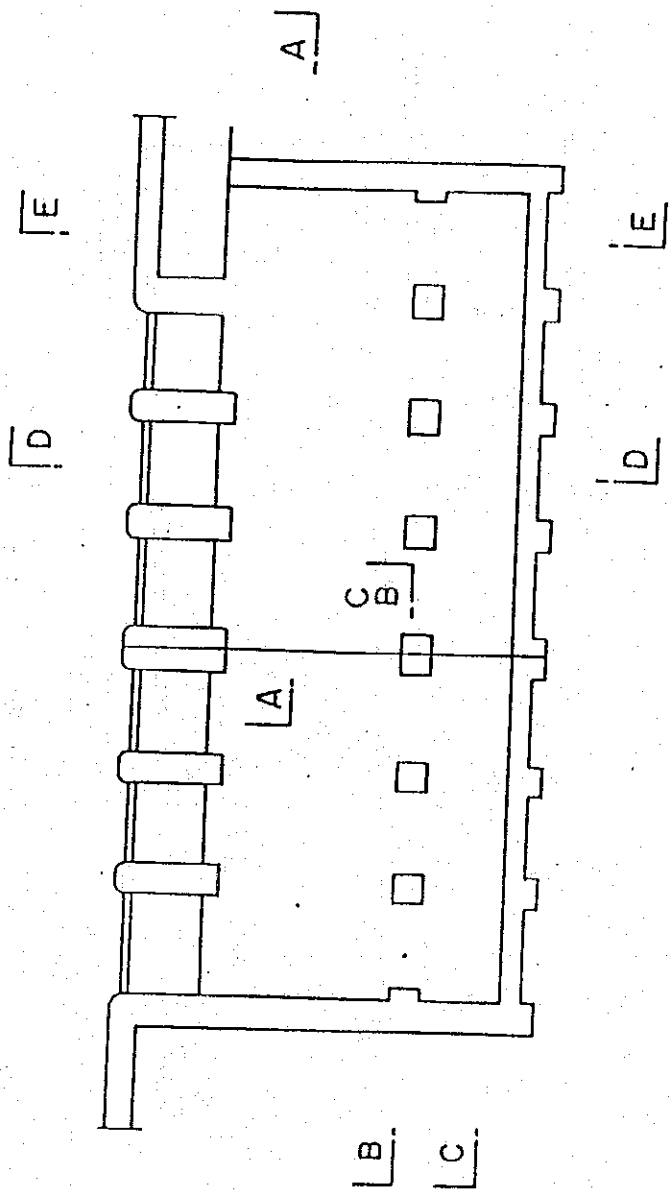


Fig. 4.1.4 (a) — PLANTA CLAVE