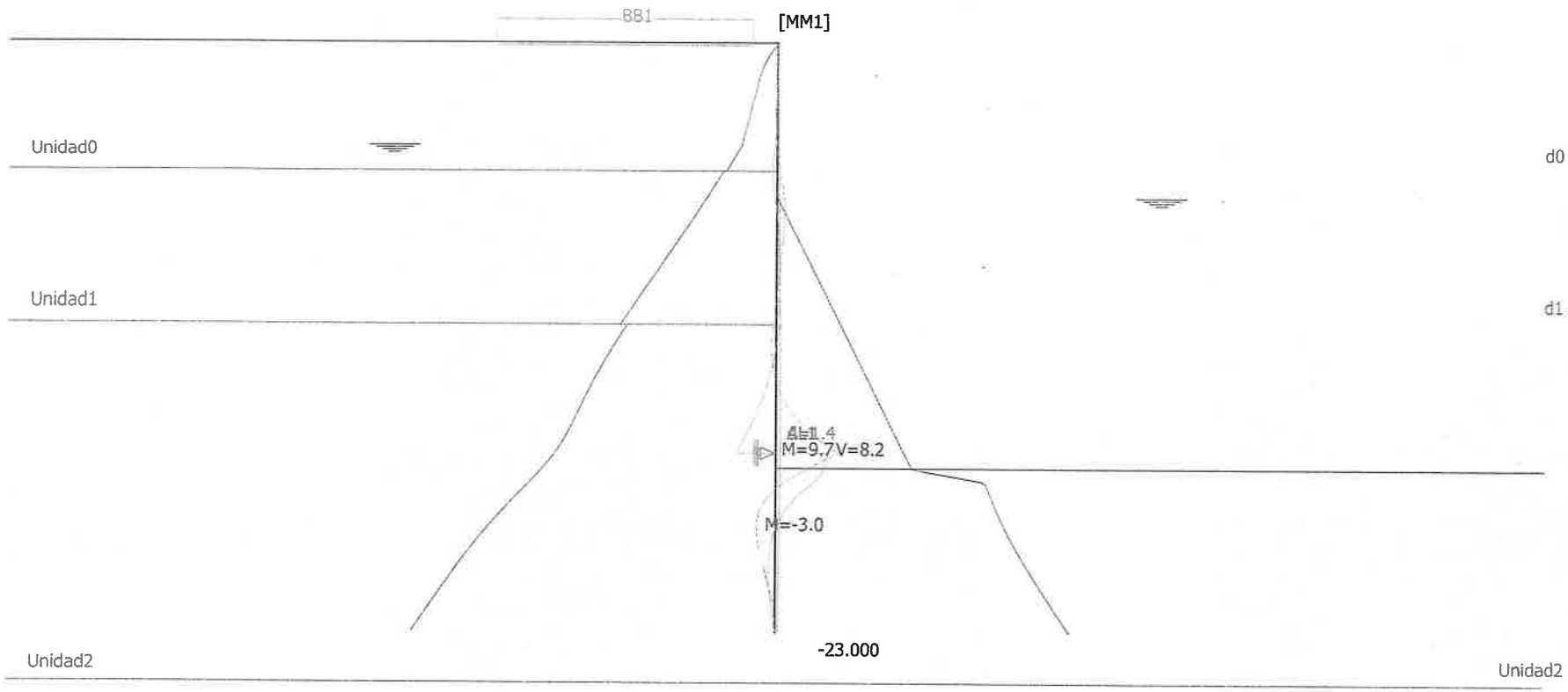
code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-18.90	-3.0	-16.00	9.7	-16.00	8.2	-15.4	1.4

code	B mobilizable	B mobilised	Coeff.
[MM1]	222.118	32.142	6.91



for 1 u :

M Bending Moment	10.00 t.m/m
V Shear F.	10.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

8.Envolvente

Data file : 01-MC800 rv02

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0190

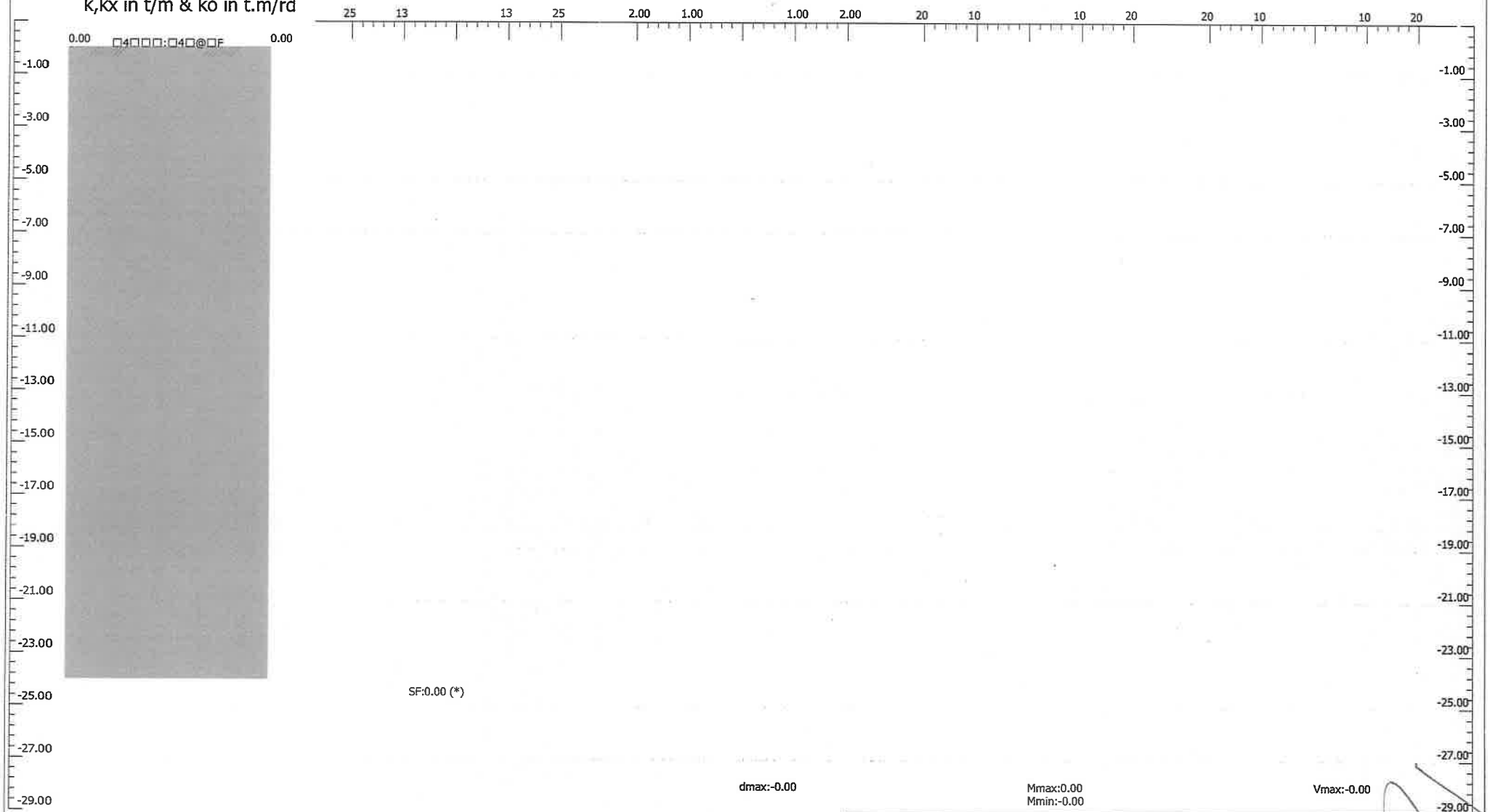
Model
Wall [MM1]
k,kx in t/m & ko in t.m/rd

Pressures (t/m2) & Force
(M in t.m & N in t)

Displacements (in mm)

Bending Moments (in t.m)

Shear forces (t)



1. Condiciones iniciales

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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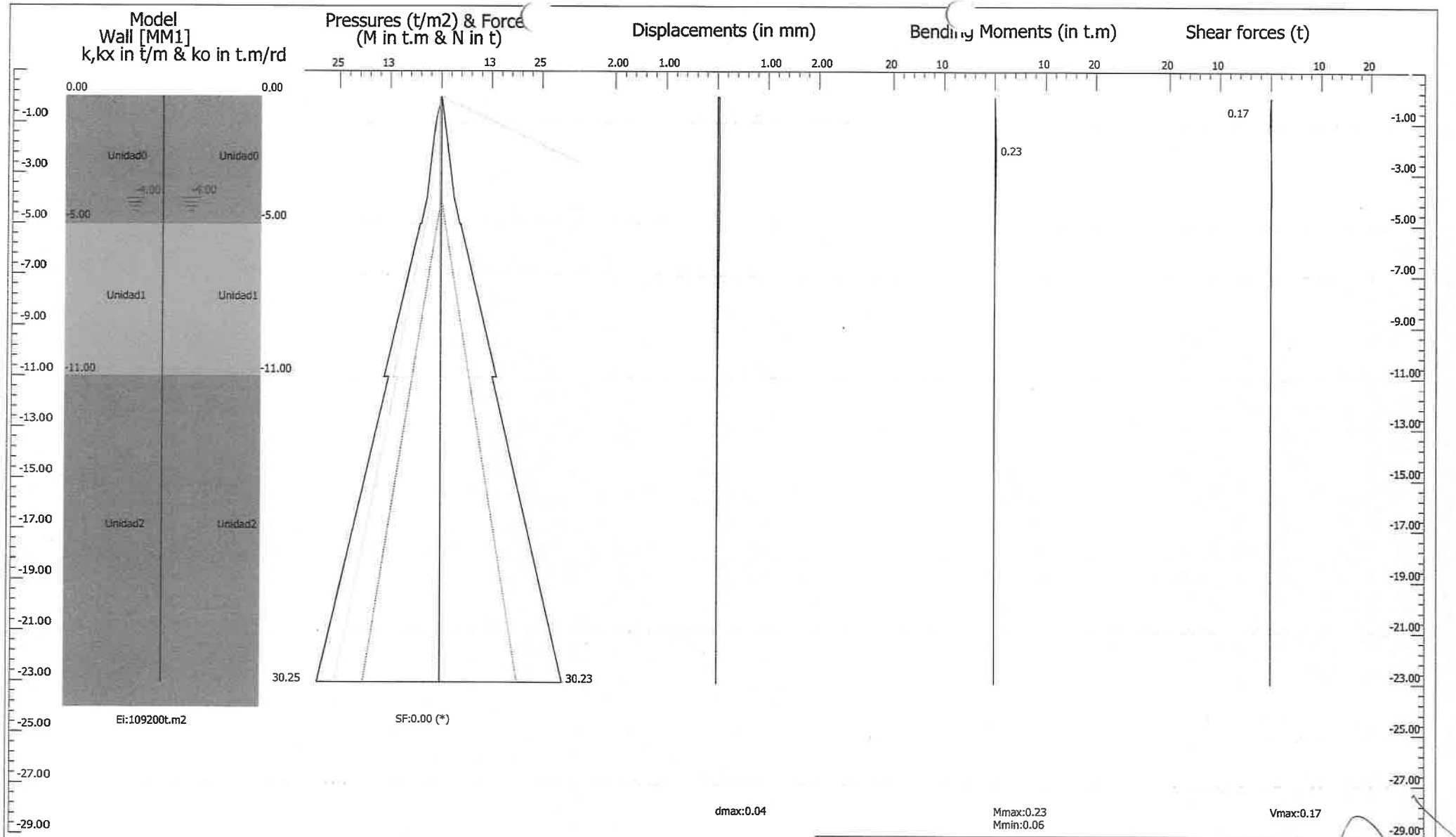

2. Construcci?n Muro circular MC800

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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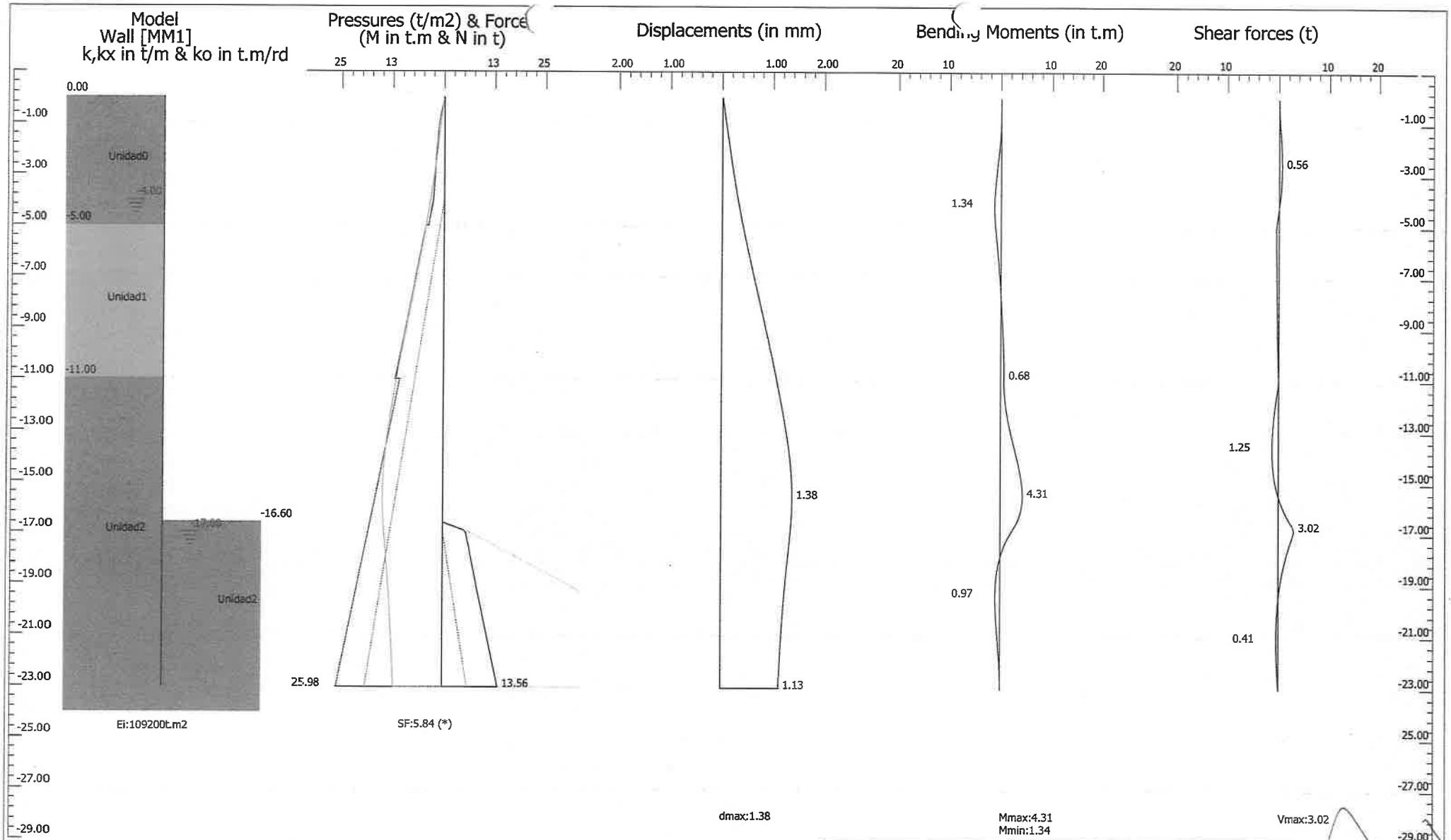

3. Excavacion a -16.60

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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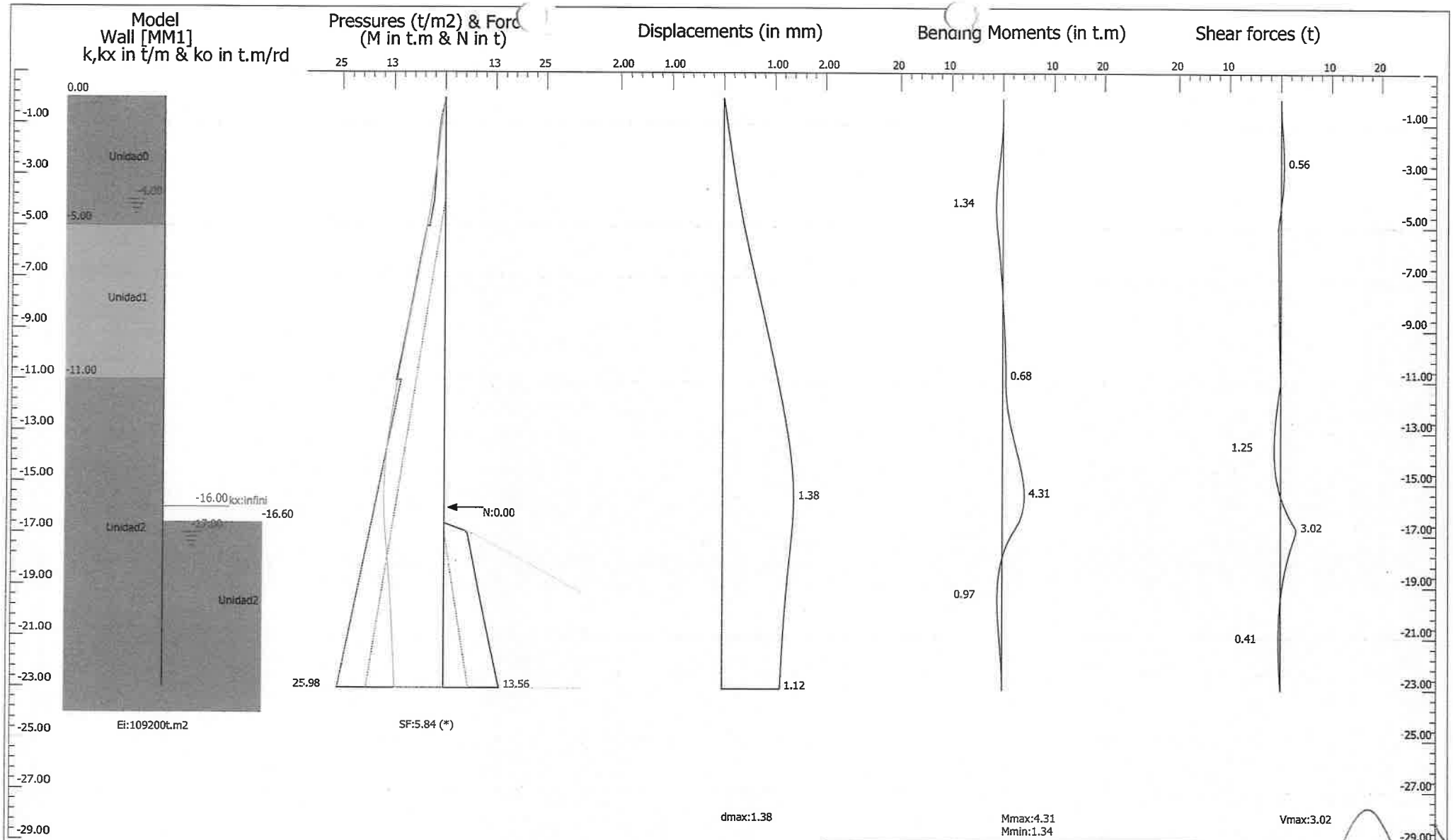

4. Ejecucion de losa de fondo.

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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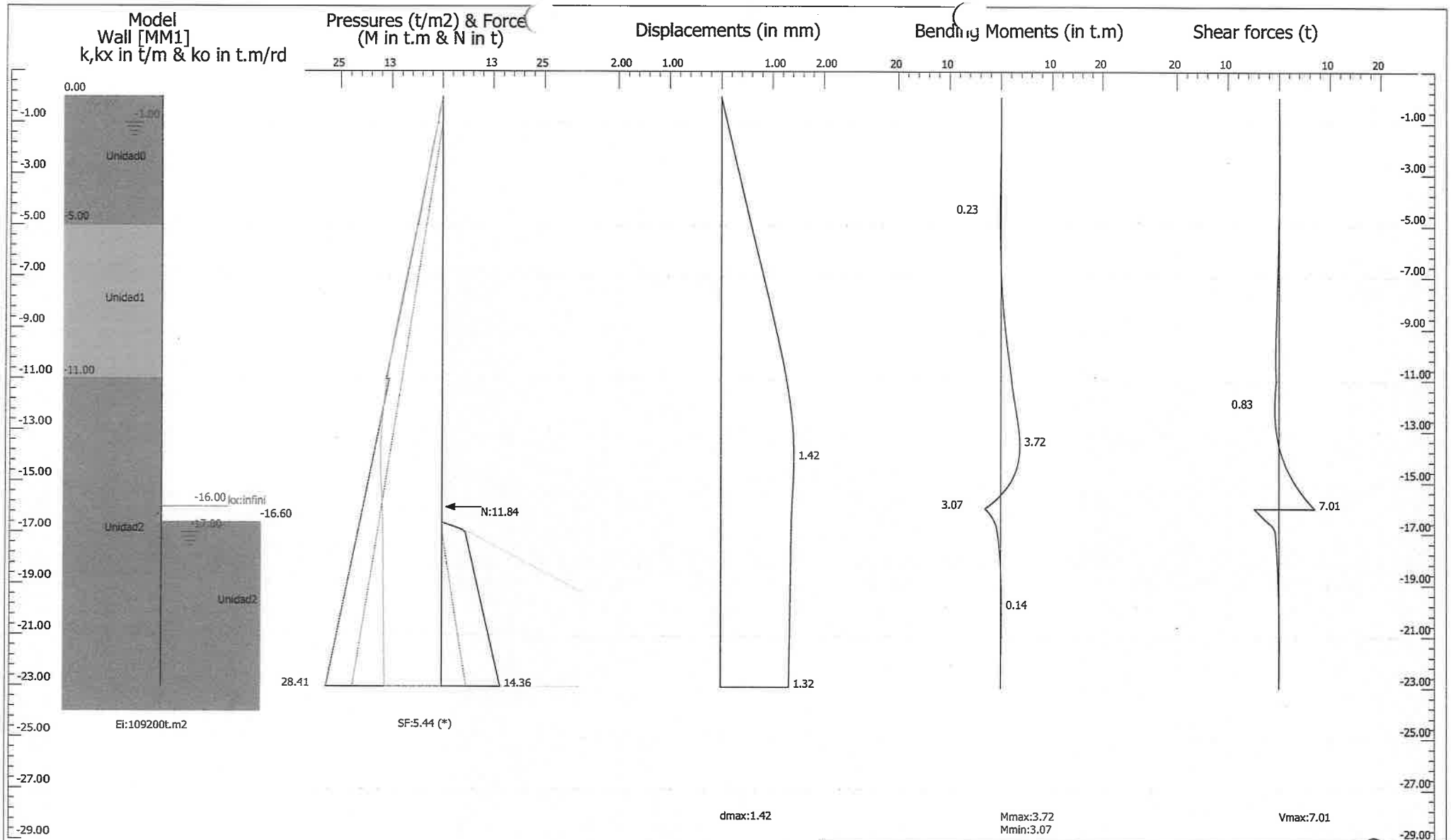

5. Nivel freatico maximo -1.0 (cota +63.0)

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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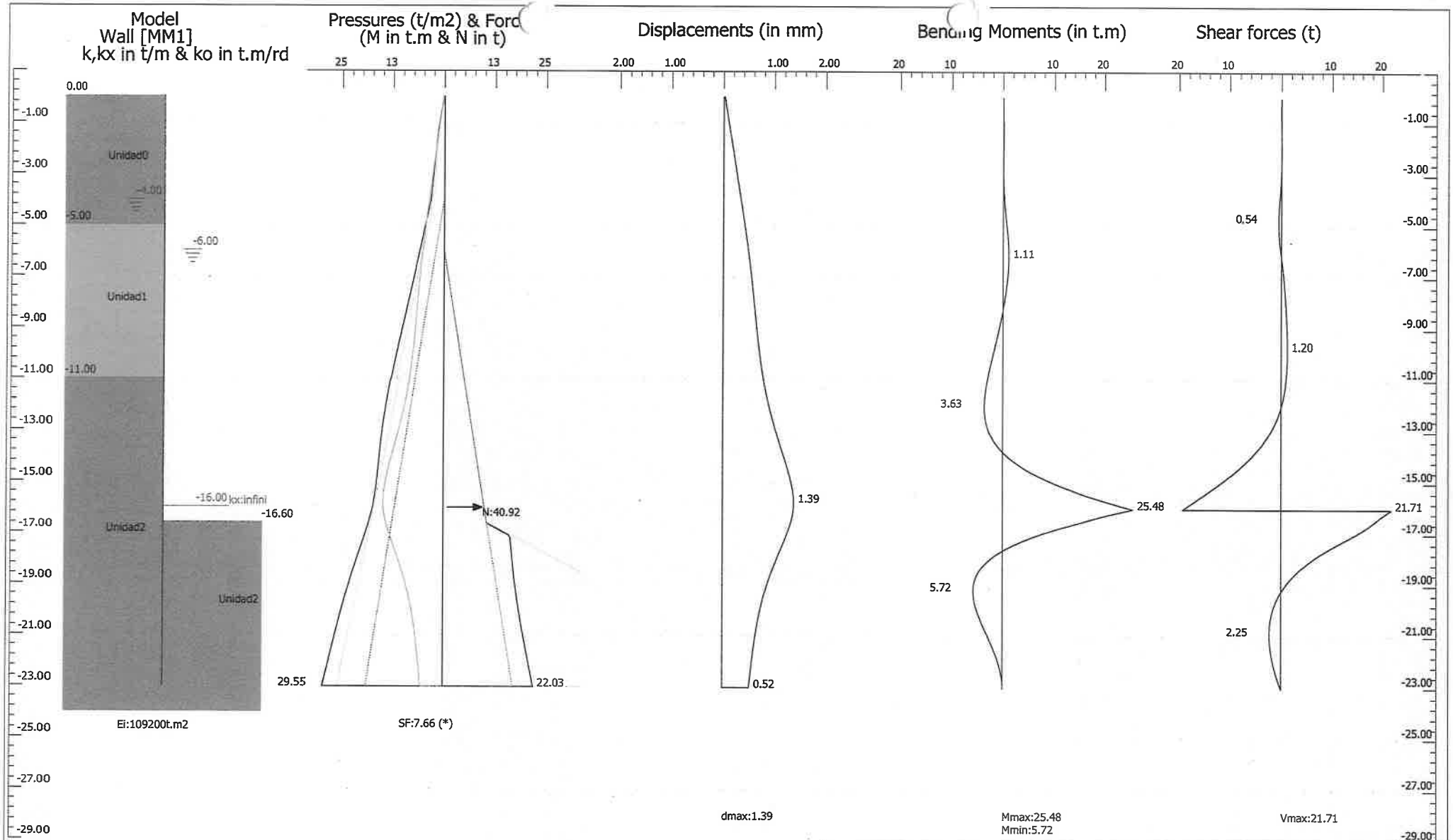

6. Camara llena(cota +58.0)- NF: (+60m)

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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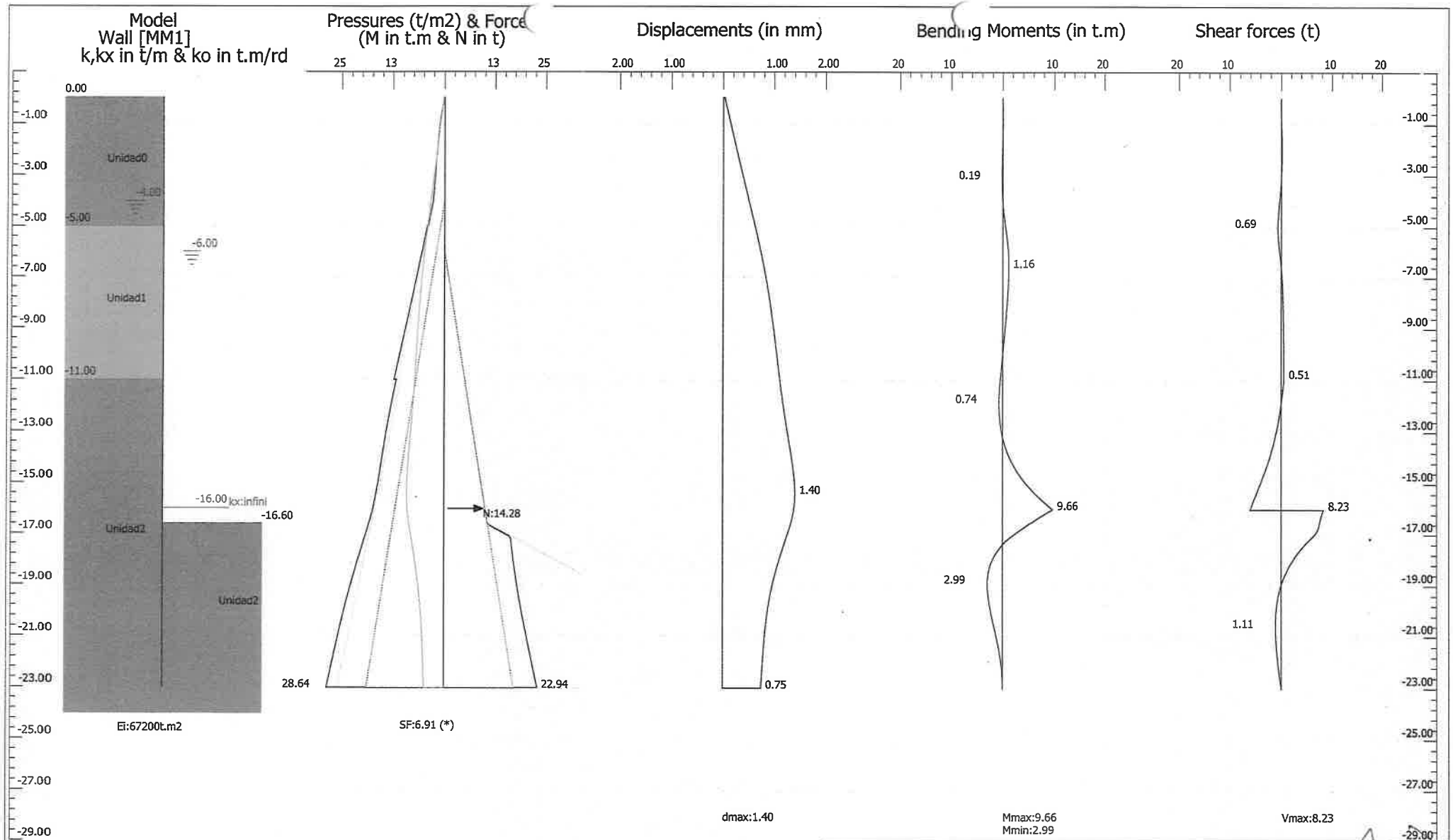

7. Fluencia a largo plazo

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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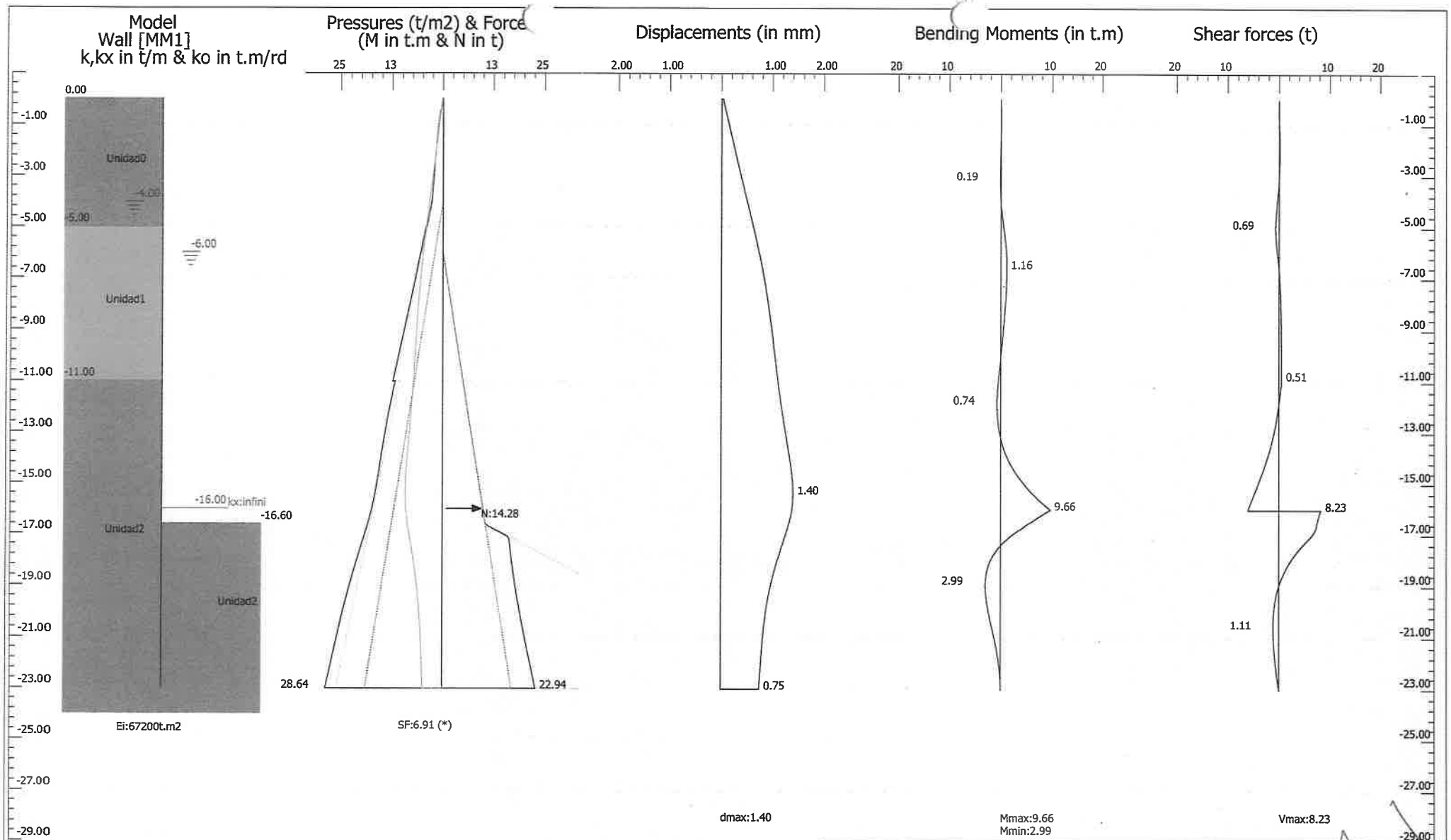
0183



8.Envolvente

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	KO	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Radial pressure
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 01-MC800 rv02

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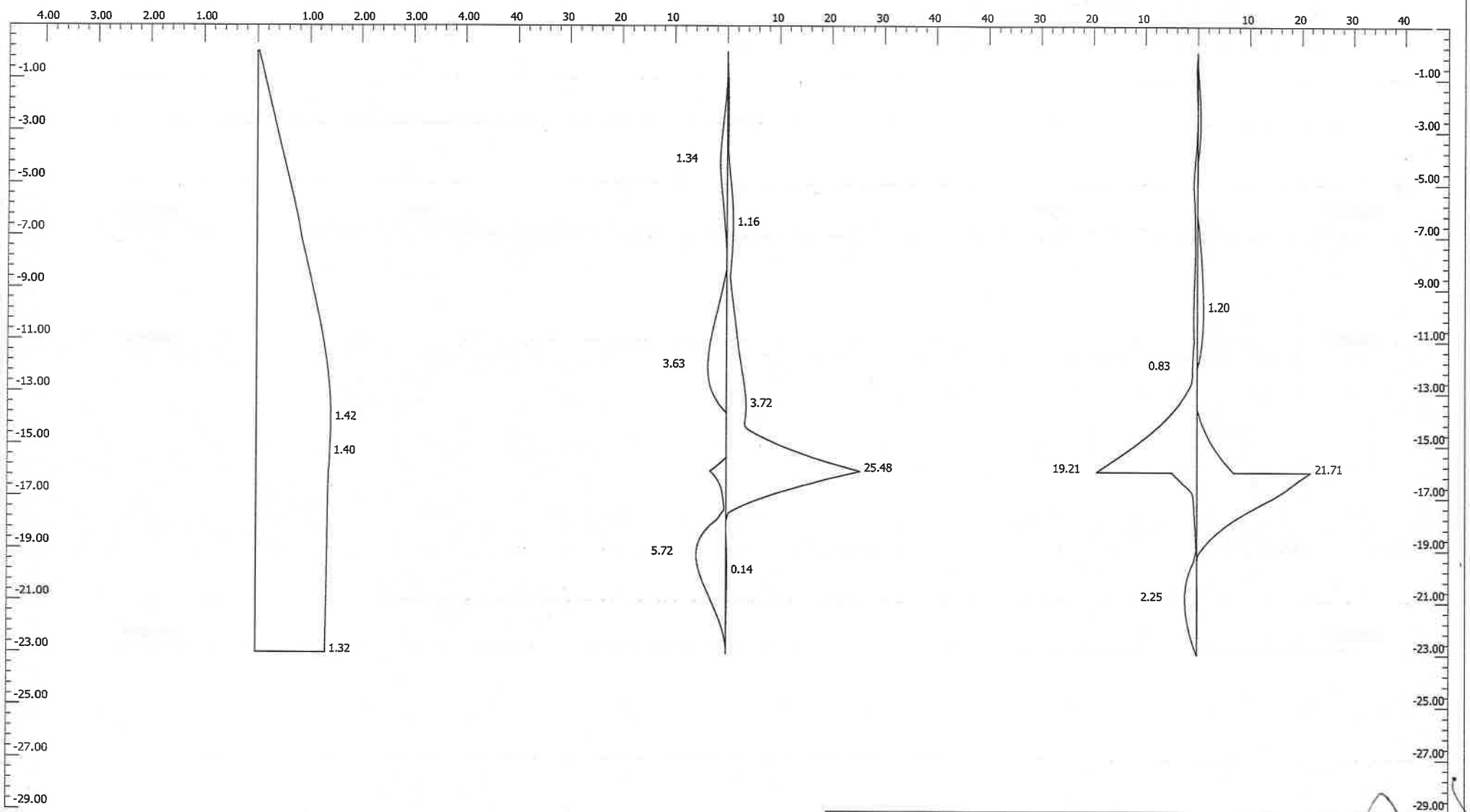
0182



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Envelop Env : 1 2 3 4 5 6 7 for Wall [MM1]

Values given for 1m of wall
Data file : 01-MC800 rv02

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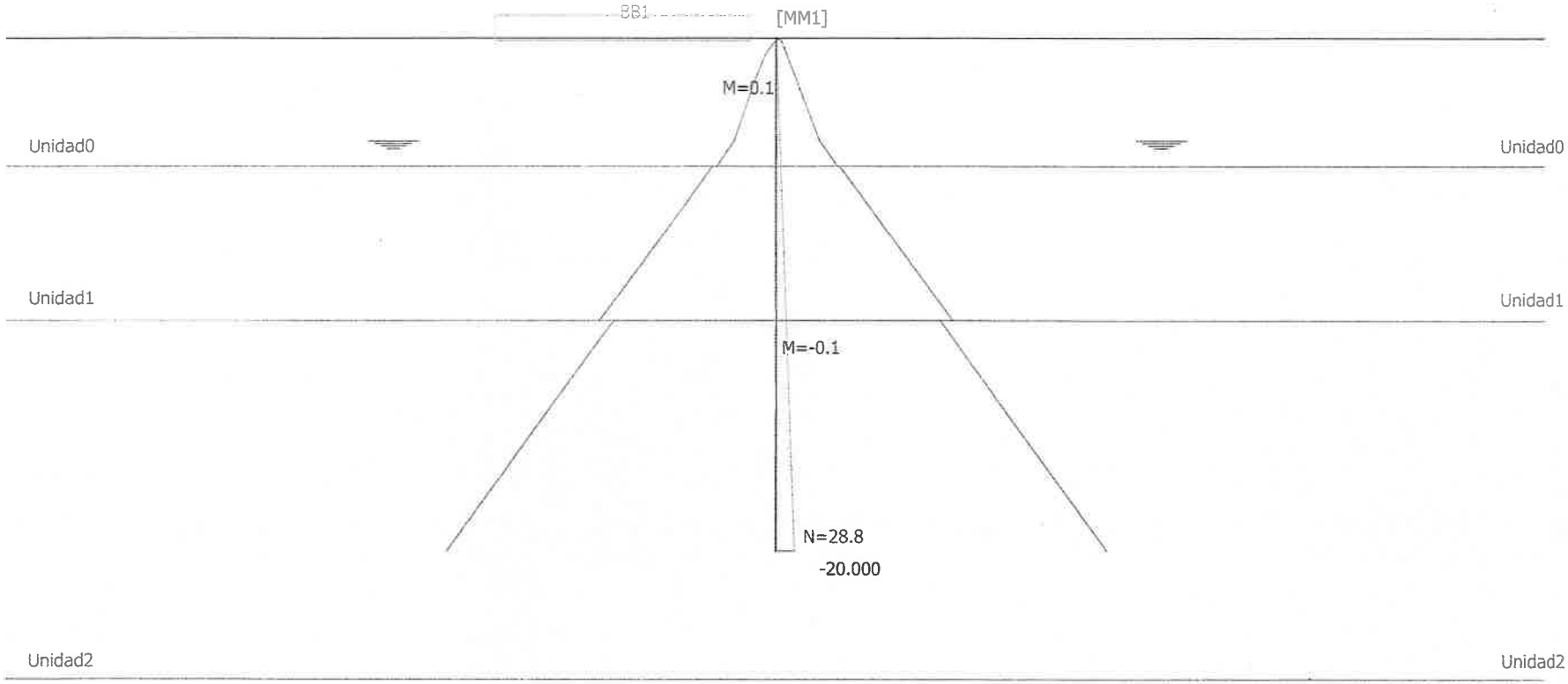
0181

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-12.15	-0.1	-2.04	0.1	-0.60	-0.1	-1.0	0.2

code	B mobilizable	B mobilised	Coeff.
[MM1]			



for 1 u : ├──┤

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * le3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

2. Construcci?n MC600

Data file : 02-MC600 +3 Punt

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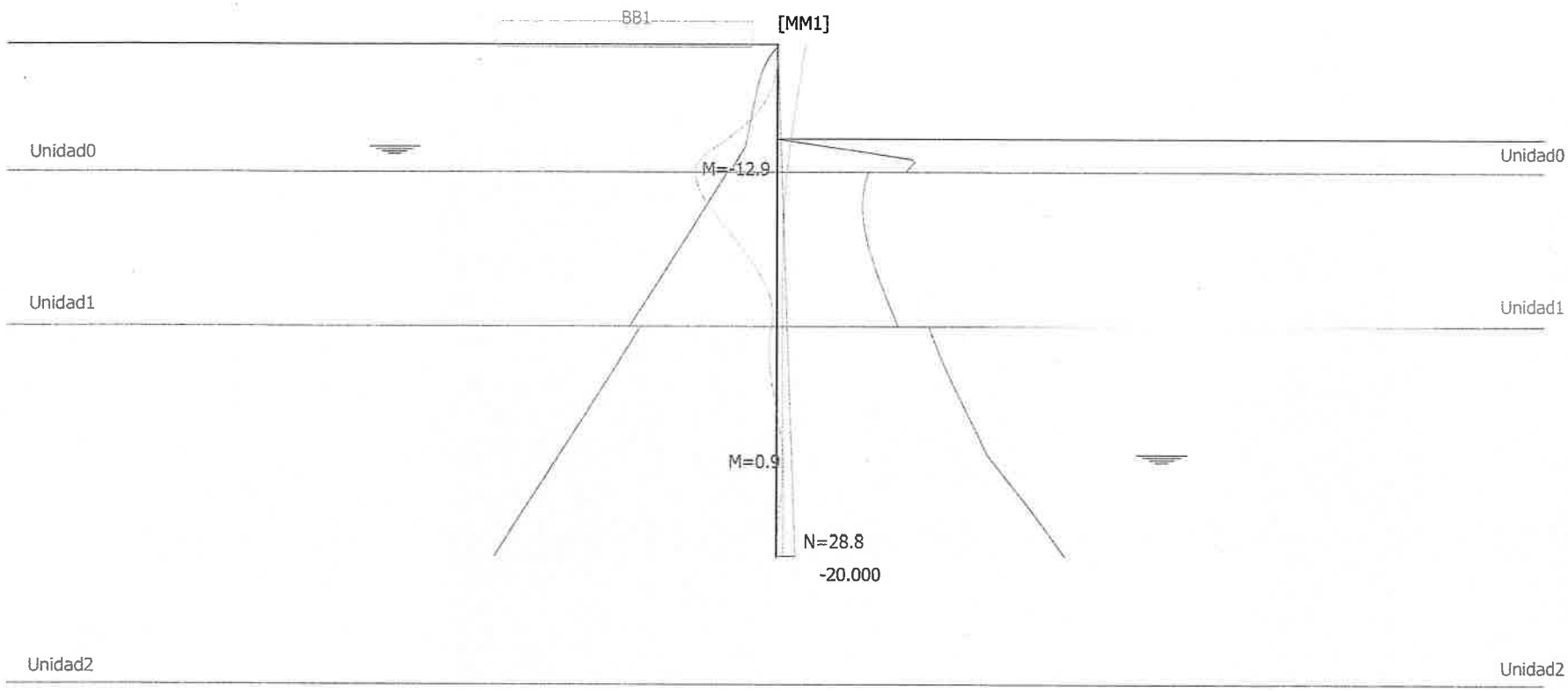
0179

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-5.00	-12.9	-16.40	0.9	-3.90	5.8	-0.0	8.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	2046.094	195.343	10.47



3. Excavacion a -3.70

Data file : 02-MC600 +3 Punt

for 1 u : ⊢——⊣

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

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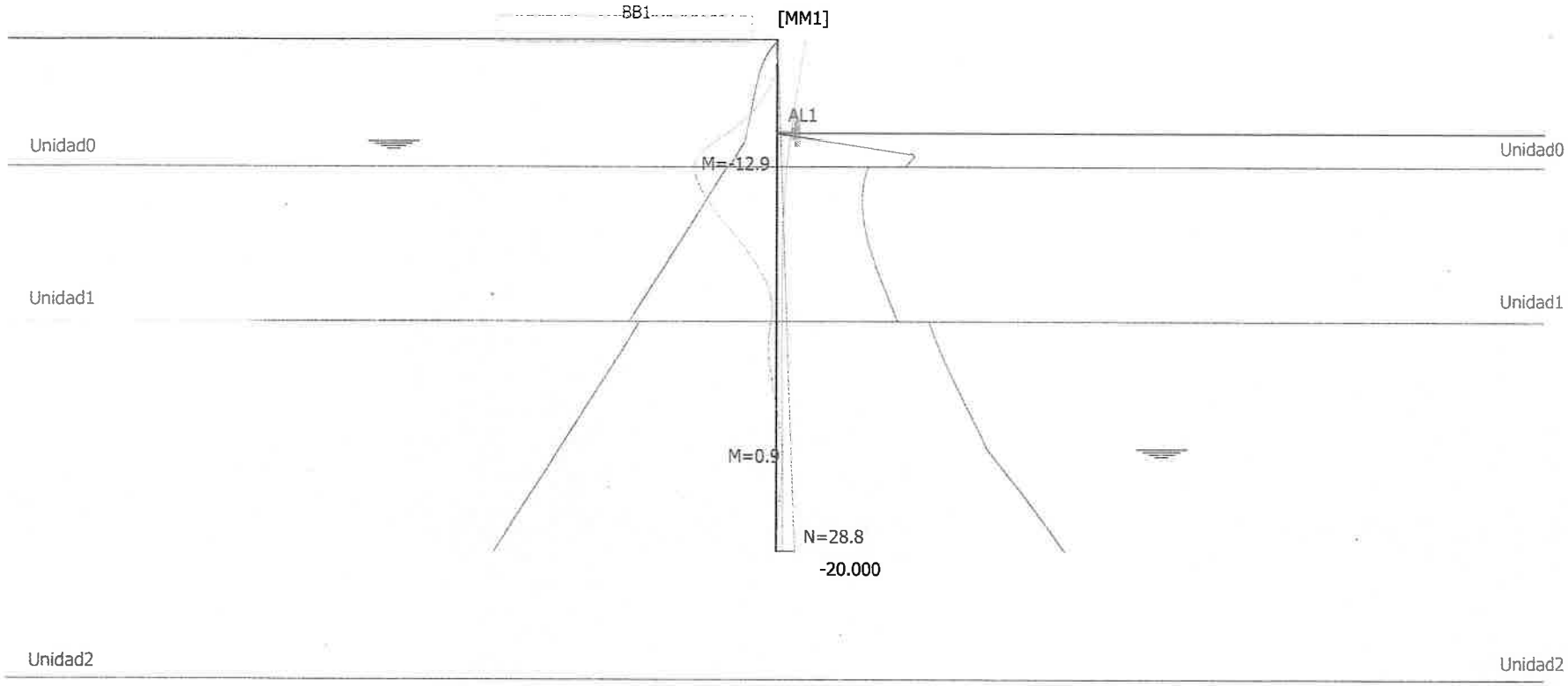
0178

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-5.00	-12.9	-16.40	0.9	-3.90	5.8	-0.0	8.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	2046.094	195.344	10.47



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

4. Construccion primer nivel de puntales

Data file : 02-MC600 +3 Punt

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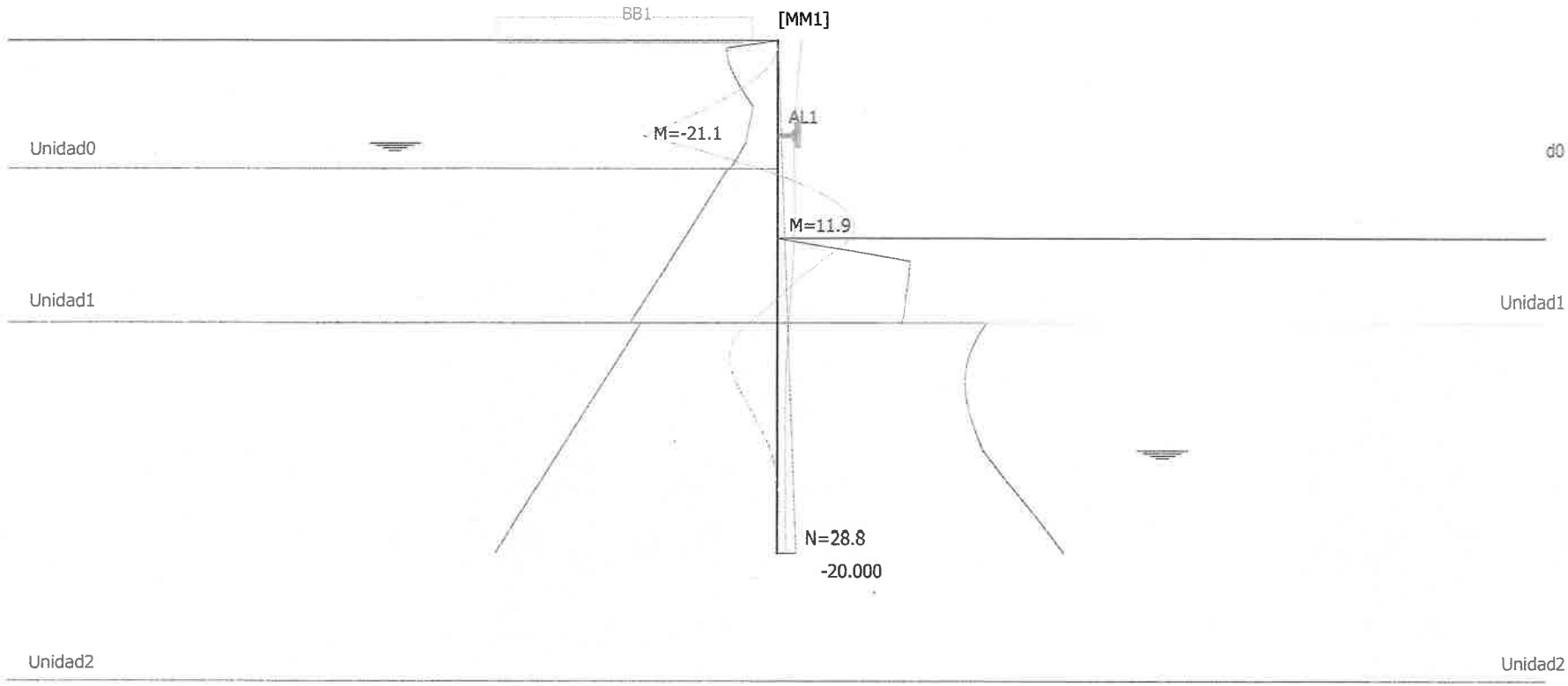
0177

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-3.70	-21.1	-7.30	11.9	-3.70	-15.9	-0.0	7.3

code	B mobilizable	B mobilised	Coeff.
[MM1]	1204.614	173.886	6.93



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

5. Excavacion a -7.70

Data file : 02-MC600 +3 Punt

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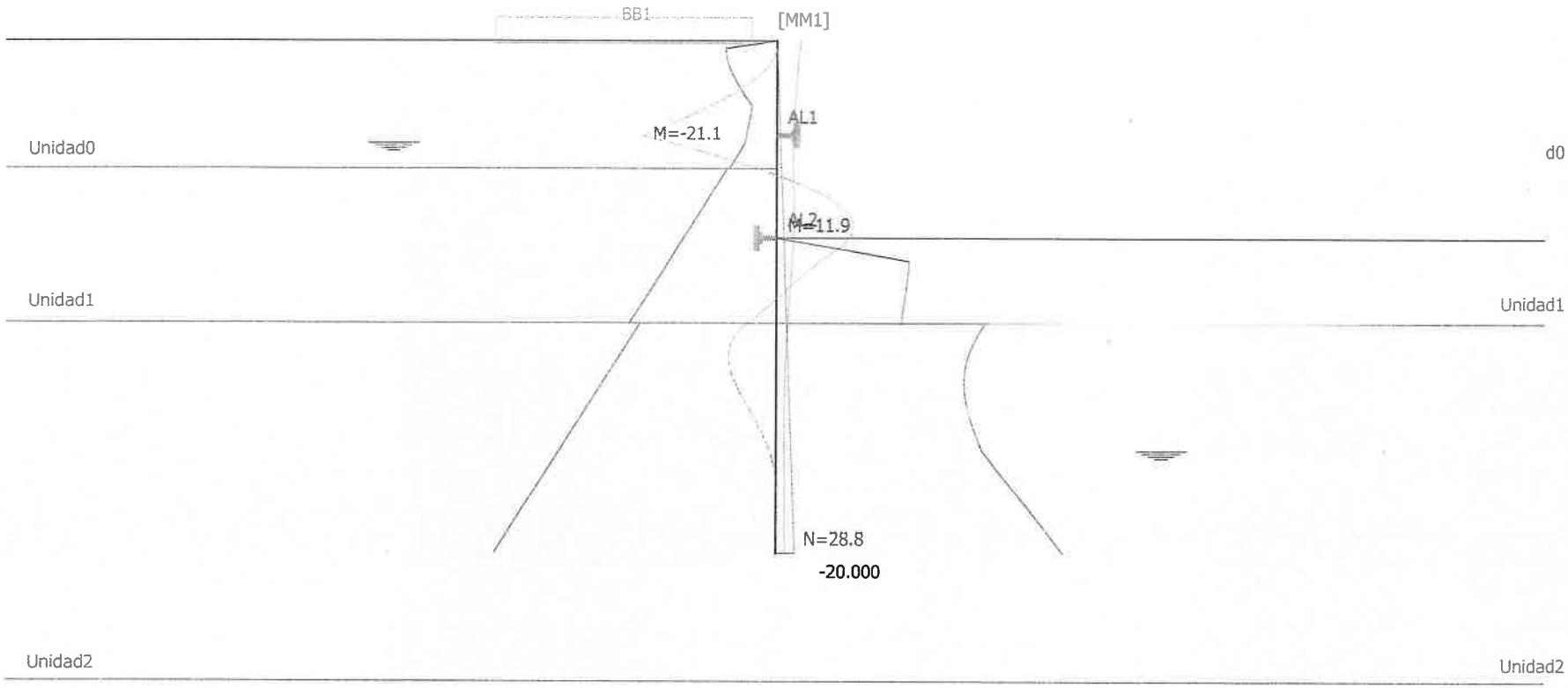
0176

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-3.70	-21.1	-7.30	11.9	-3.70	-15.9	-0.0	7.3

code	B mobilizable	B mobilised	Coeff.
[MM1]	1204.614	173.886	6.93



6. Construccion segundo nivel de puntales

Data file : 02-MC600 +3 Punt

for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

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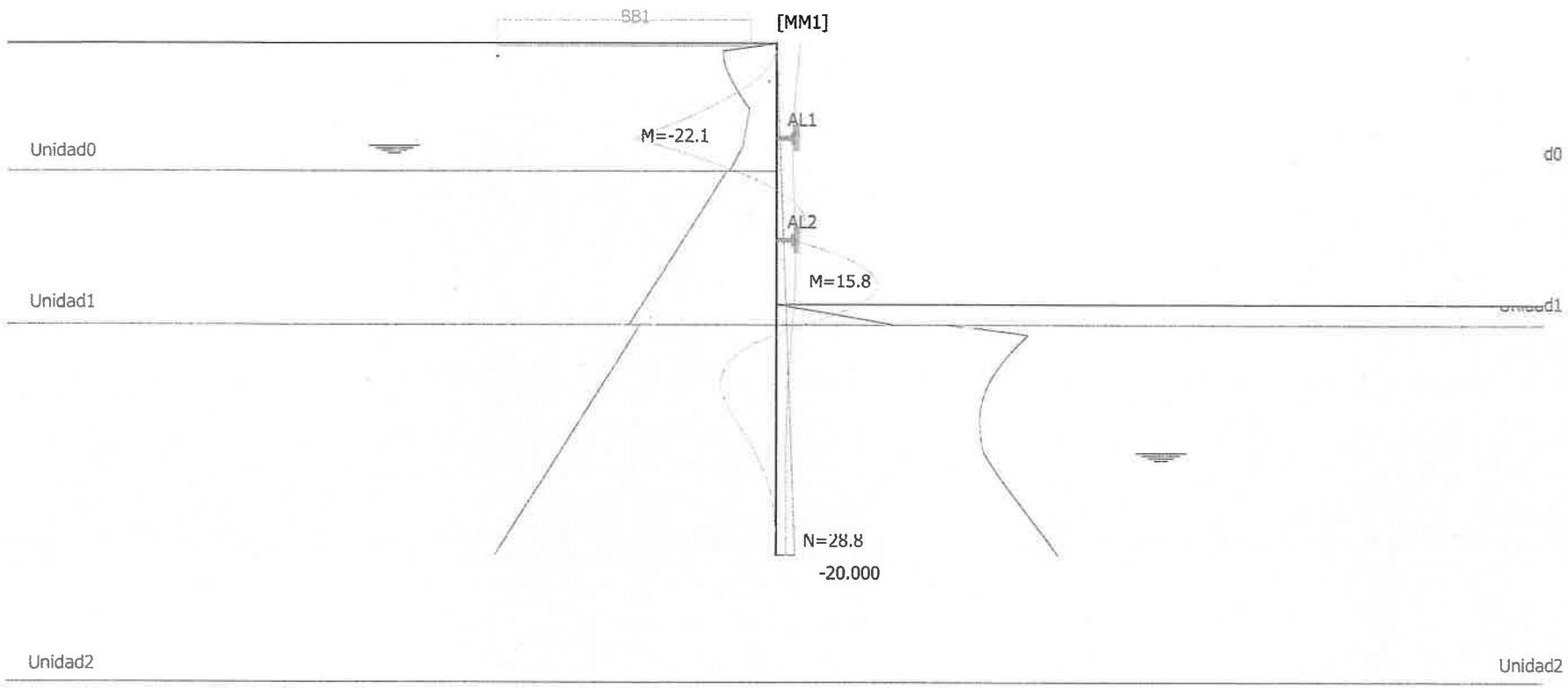
0175

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-3.70	-22.1	-9.40	15.8	-7.70	-14.6	-0.0	7.3

code	B mobilizable	B mobilised	Coeff.
[MM1]	768.960	156.162	4.92



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

7. Excavacion a -10.20

Data file : 02-MC600 +3 Punt

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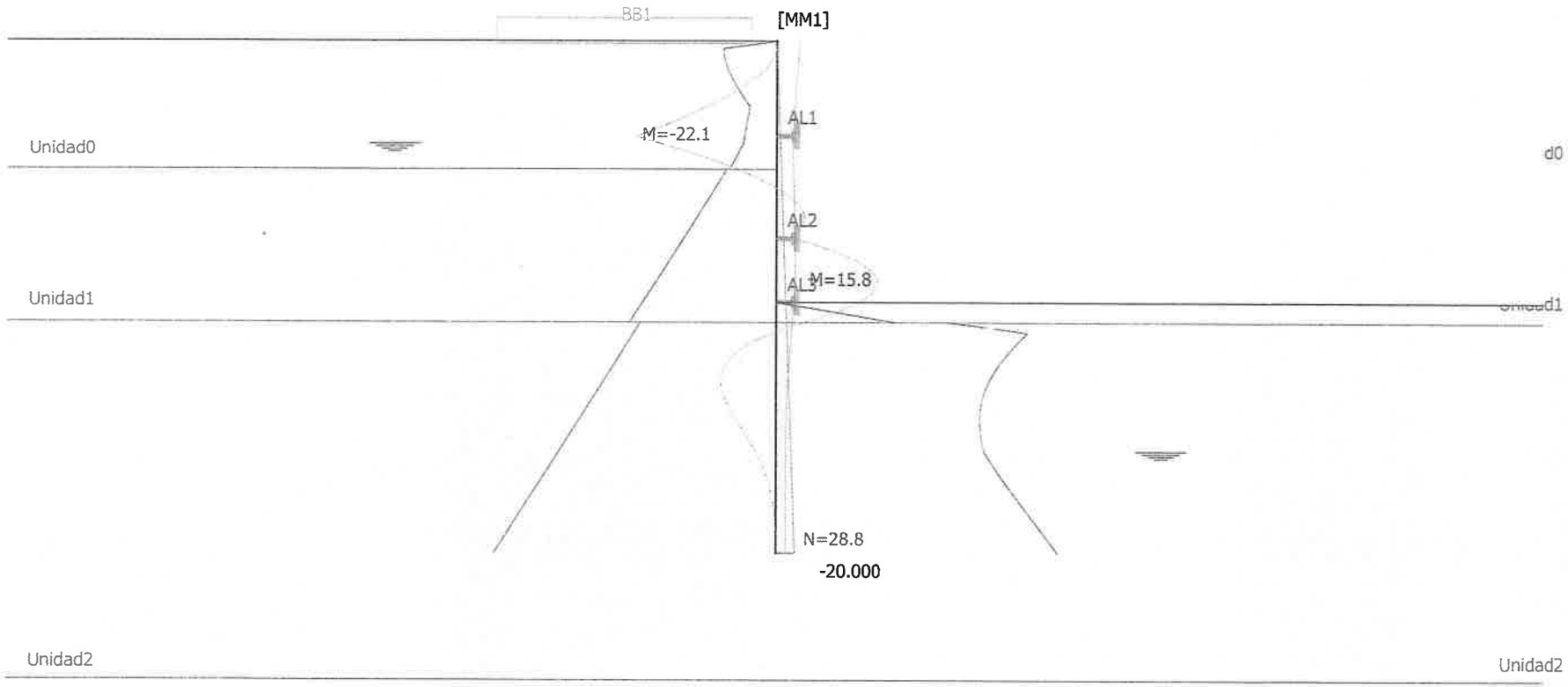
0174

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-3.70	-22.1	-9.40	15.8	-7.70	-14.6	-0.0	7.3

code	B mobilizable	B mobilised	Coeff.
[MM1]	768.960	156.163	4.92



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

8. Construccion tercer nivel de puntales

Data file : 02-MC600 +3 Punt

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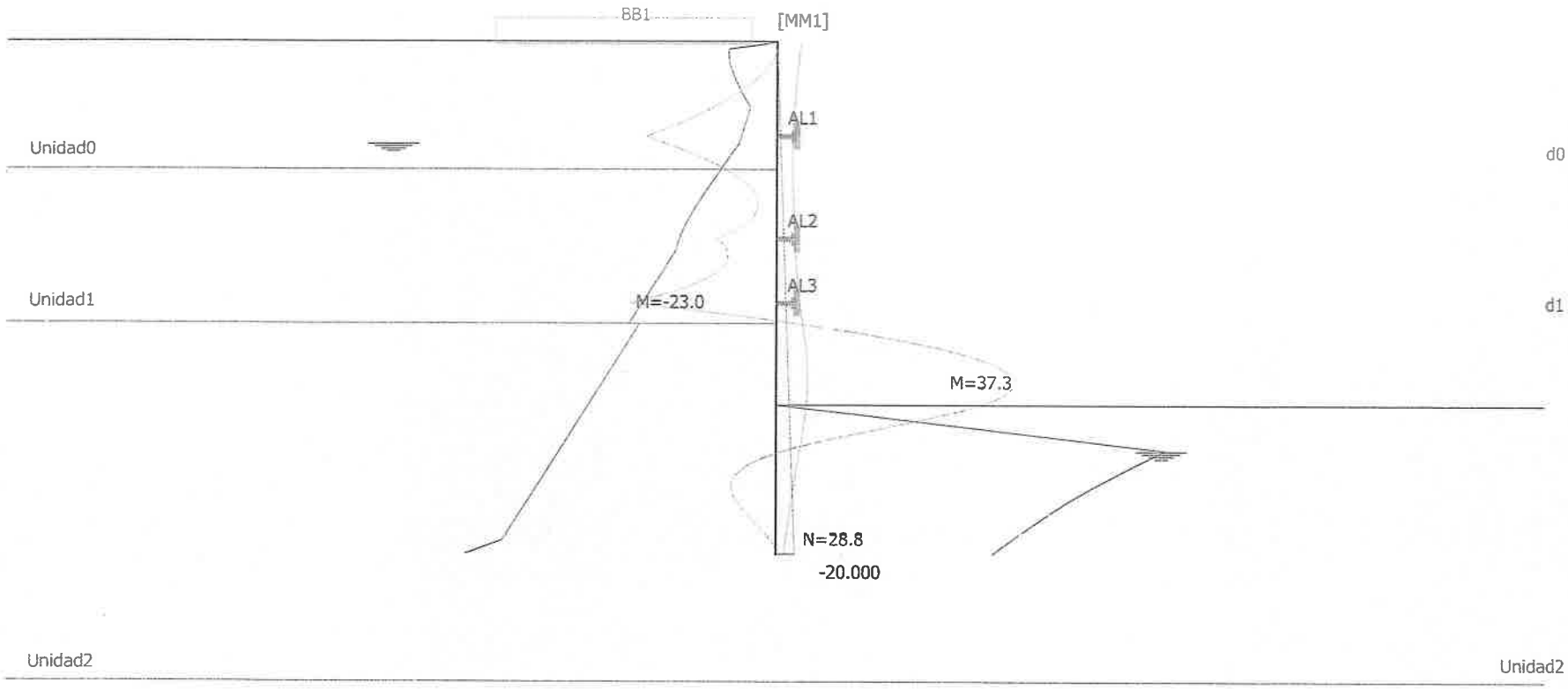
0173

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-10.20	-23.0	-13.35	37.3	-10.20	-37.1	-13.2	9.8

code	B mobilizable	B mobilised	Coeff.
[MM1]	238.224	112.010	2.13



9. Excavacion a -14.20

Data file : 02-MC600 +3 Punt

for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

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280 Av Napoleon Bonaparte 92500 Rueil Malmaison
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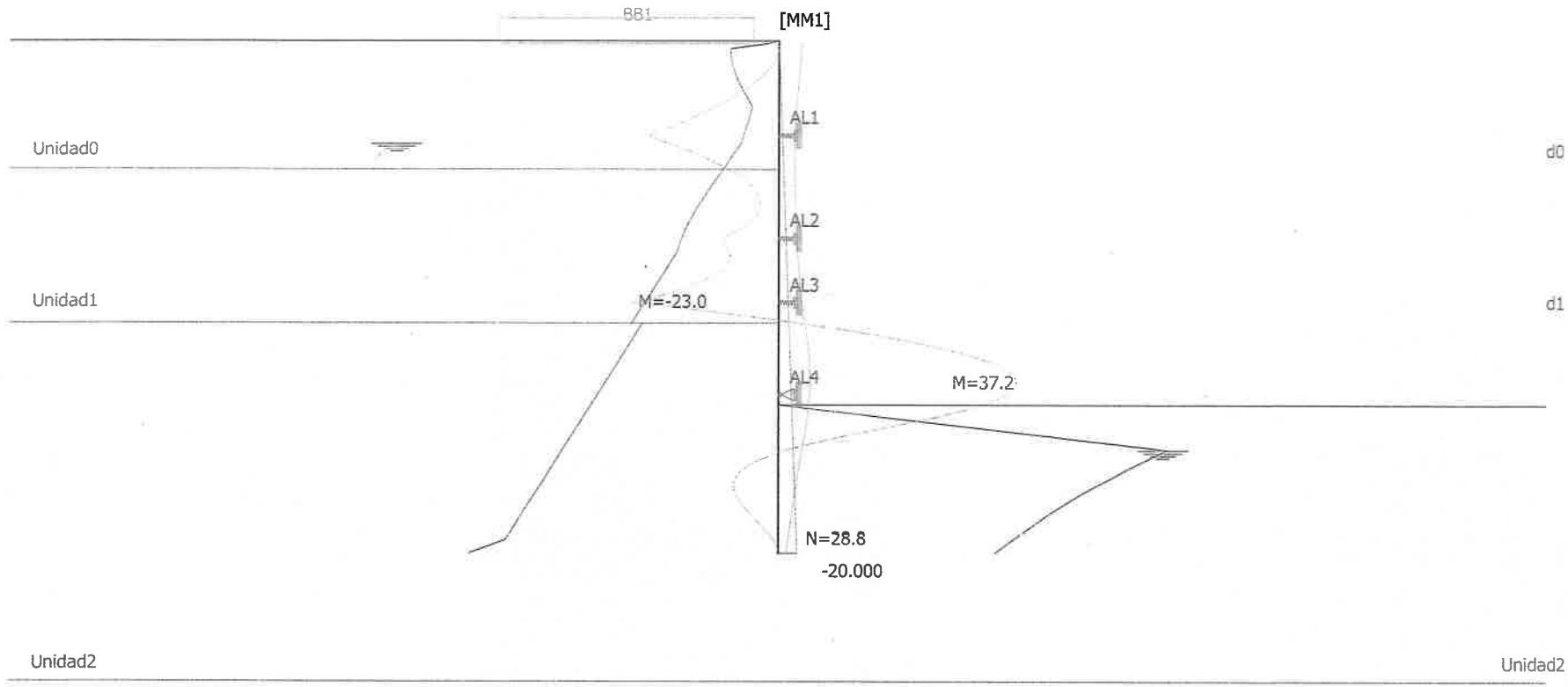
0172

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-10.20	-23.0	-13.35	37.2	-10.20	-37.1	-13.2	9.8

code	B mobilizable	B mobilised	Coeff.
[MM1]	238.224	112.001	2.13



for 1 u : ├──┤

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

10. Construccion de losa

Data file : 02-MC600 +3 Punt

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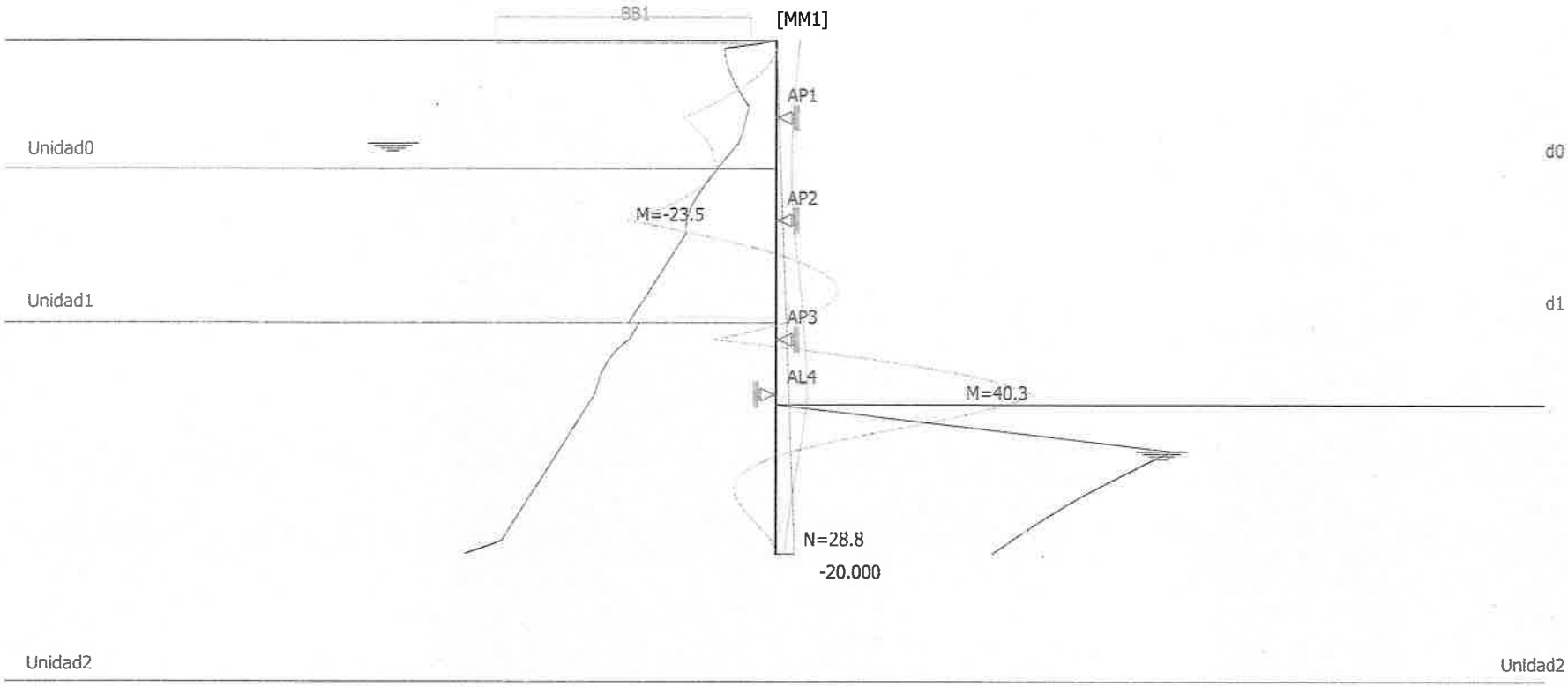
Director de Obra PTAR Bella Vista

0171

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-7.00	-23.5	-13.80	40.3	-11.65	-37.1	-13.5	9.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	238.224	113.246	2.10



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

11. Construccion puntales permanentes

Data file : 02-MC600 +3 Punt

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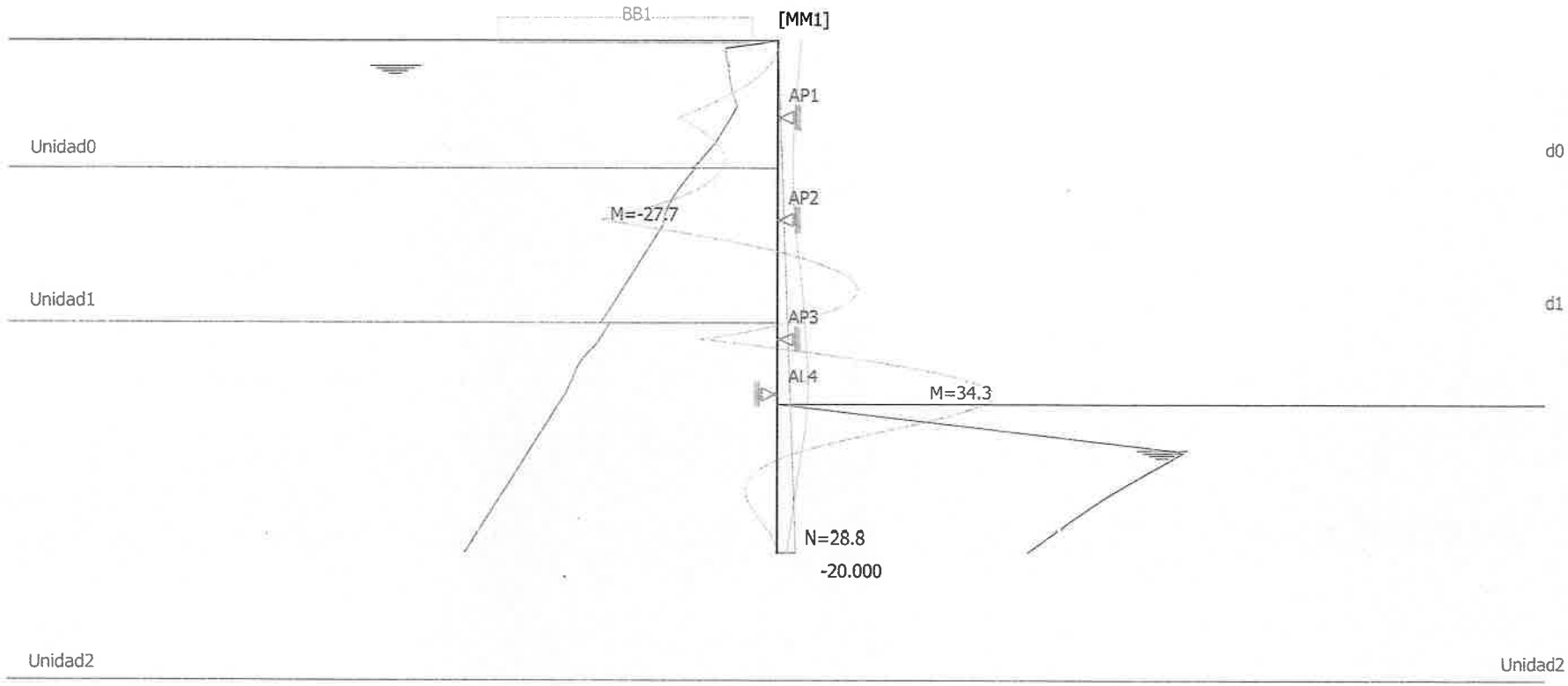
0170

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-7.00	-27.7	-13.80	34.3	-11.65	-37.8	-13.5	9.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	238.224	121.692	1.96



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

12.- NF hasta -1.00m (+63m)

Data file : 02-MC600 +3 Punt

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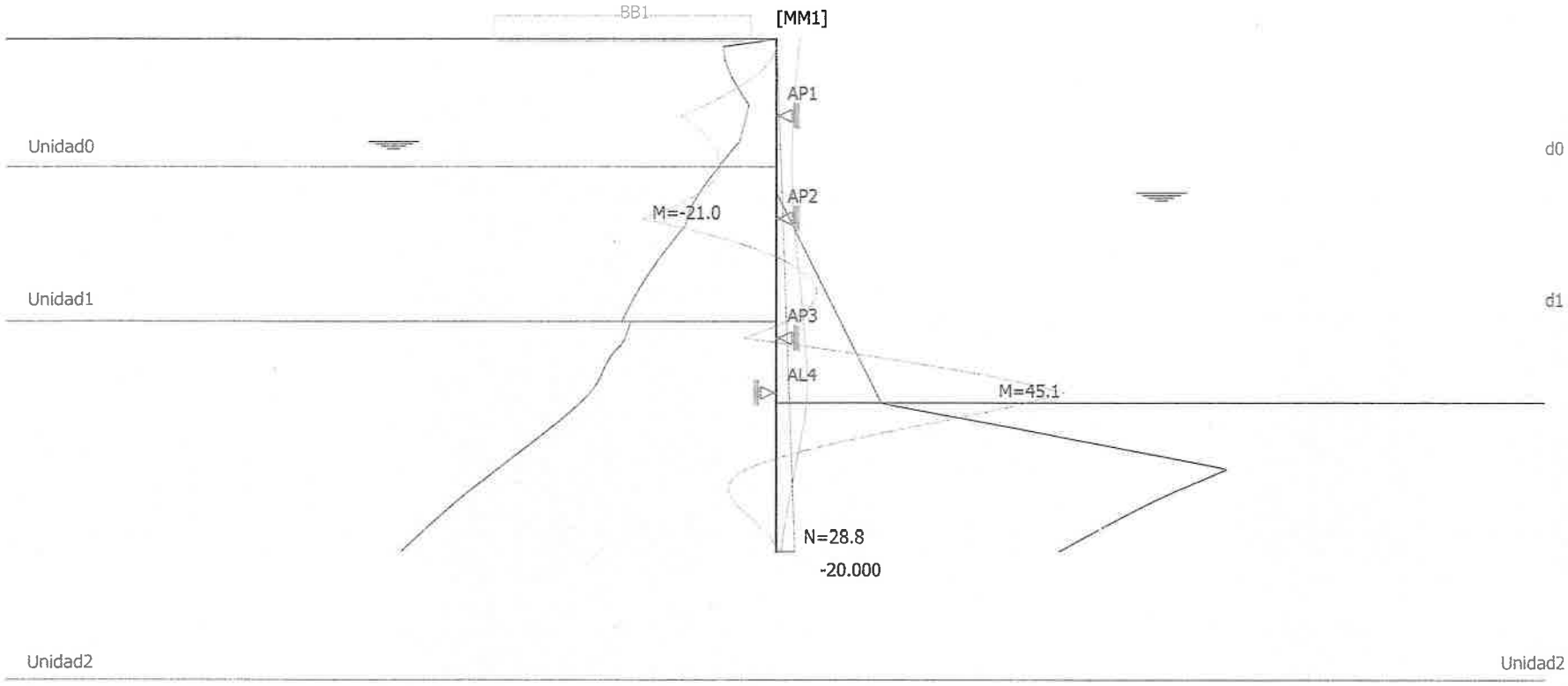
0169

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-7.00	-21.0	-13.80	45.1	-11.65	-30.3	-13.4	9.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	182.423	83.011	2.20



13.- Camara llena (+58m) - NF: (+60m)

Data file : 02-MC600 +3 Punt

for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

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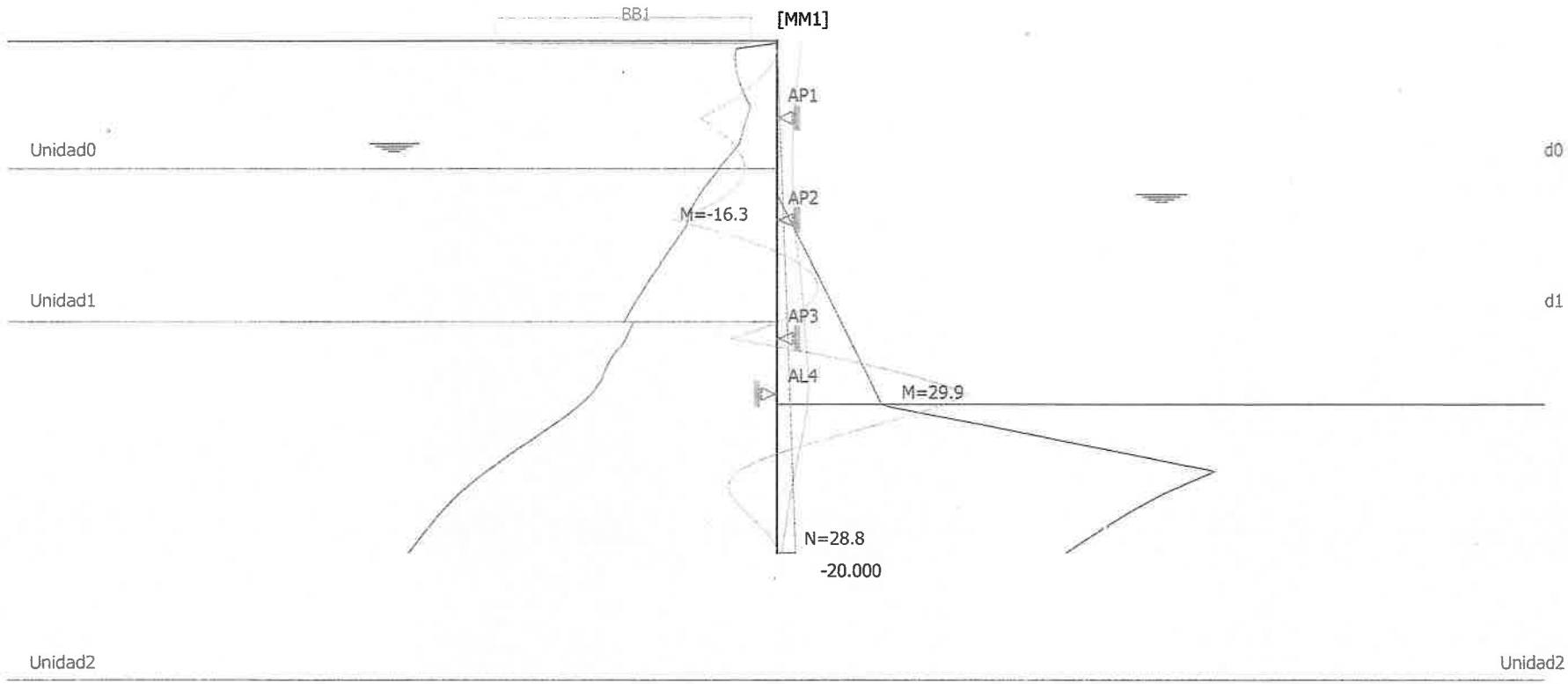
0168

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-7.00	-16.3	-13.80	29.9	-11.65	-24.2	-13.4	9.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	182.423	80.240	2.27



for 1 u :

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * le3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

14. Fluencia a largo plazo

Data file : 02-MC600 +3 Punt

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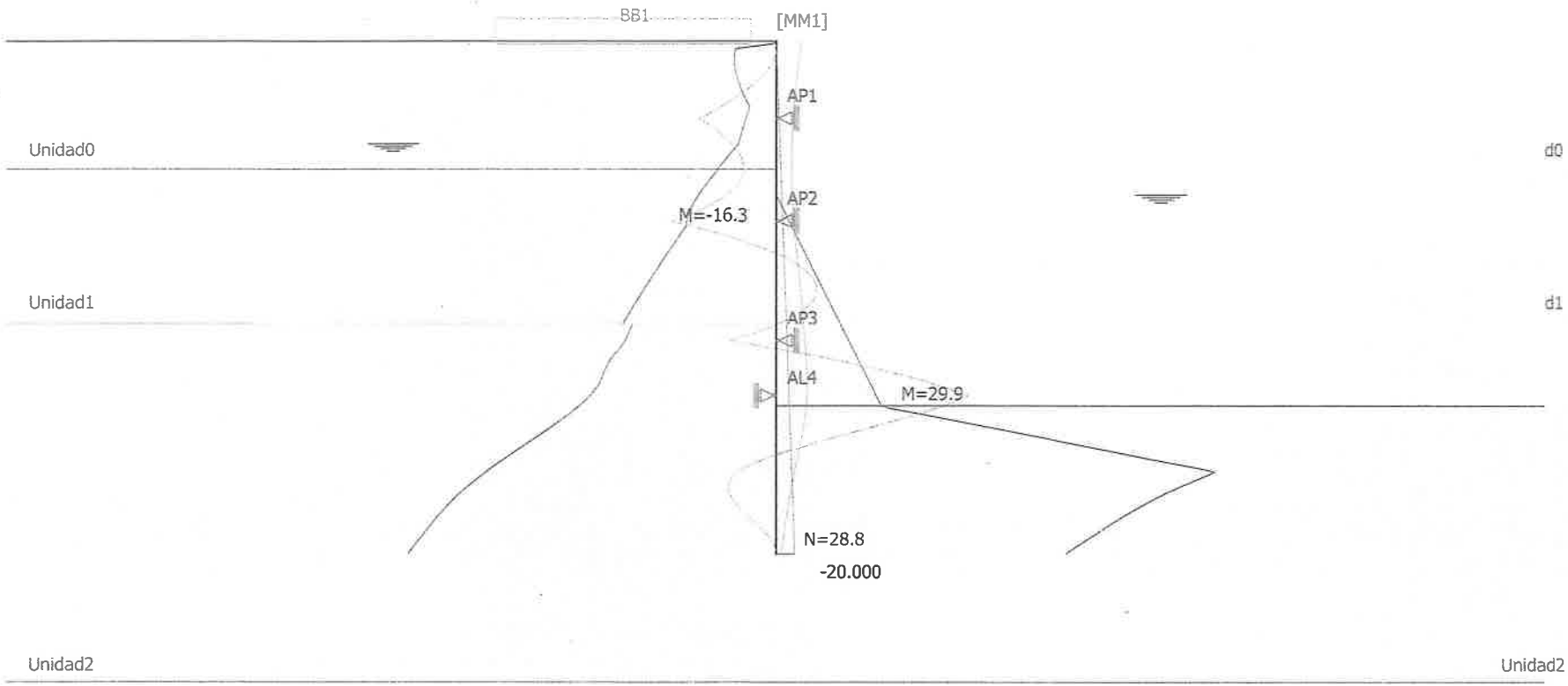
0167

code	Y	M min	Y	M max	Y	V max	Y	dmax
[MM1]	-7.00	-16.3	-13.80	29.9	-11.65	-24.2	-13.4	9.7

code	B mobilizable	B mobilised	Coeff.
[MM1]	182.423	80.235	2.27



for 1 u : |——|

M Bending Moment	10.00 t.m/m
N Normal F.	100.00 t/m
d Displact * 1e3	20.00 m E-3
Active / Passive pres.	5.00 t/m2
Length	2.50 m

15.Envolvente

Data file : 02-MC600 +3 Punt

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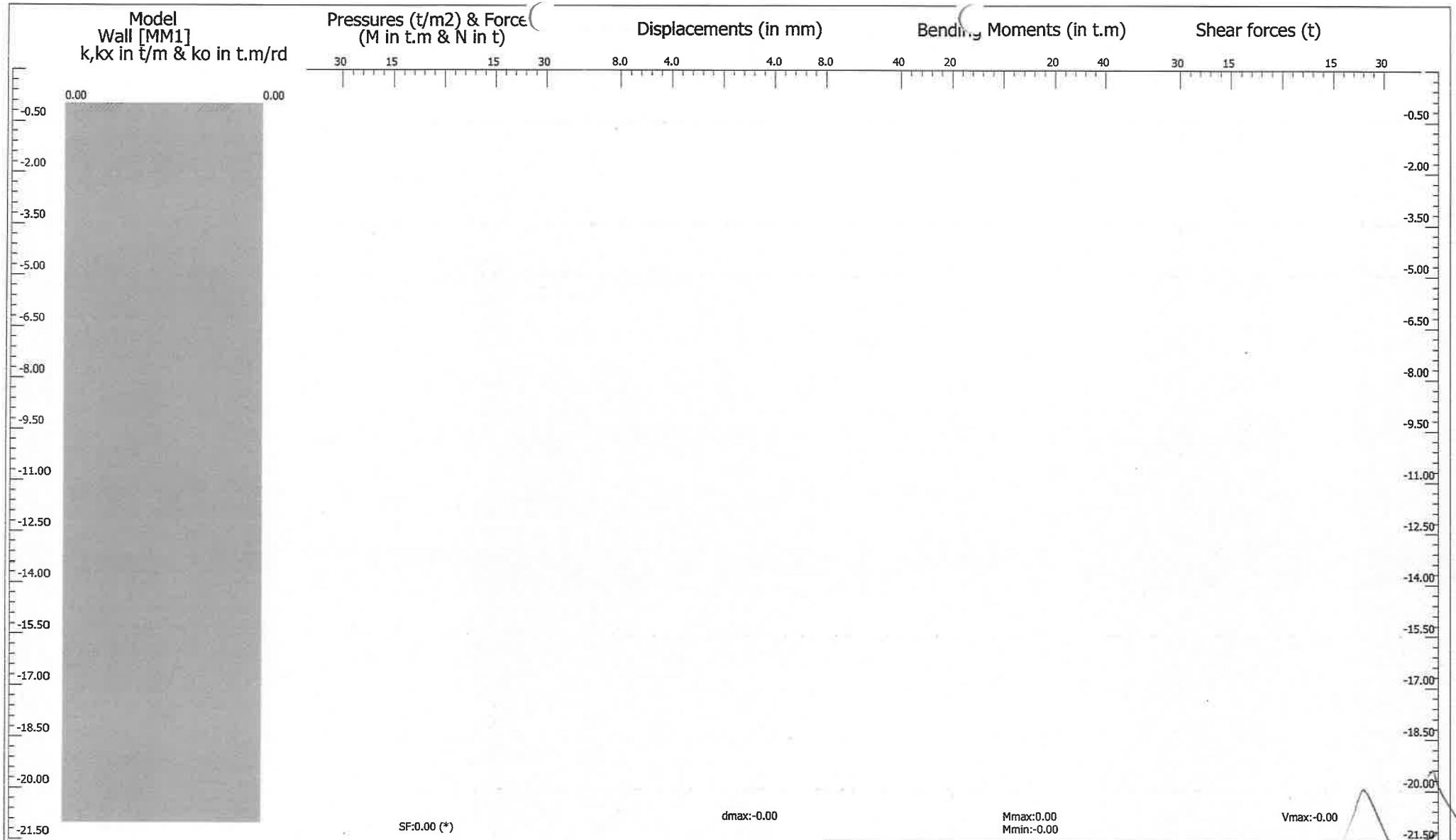
Ing. Juan Bonin
Director de Obras Tecnicas
Aguas del Chaco S.A. - Sucursal Paraguay

0166



code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3

——— water pressure curve
- - - Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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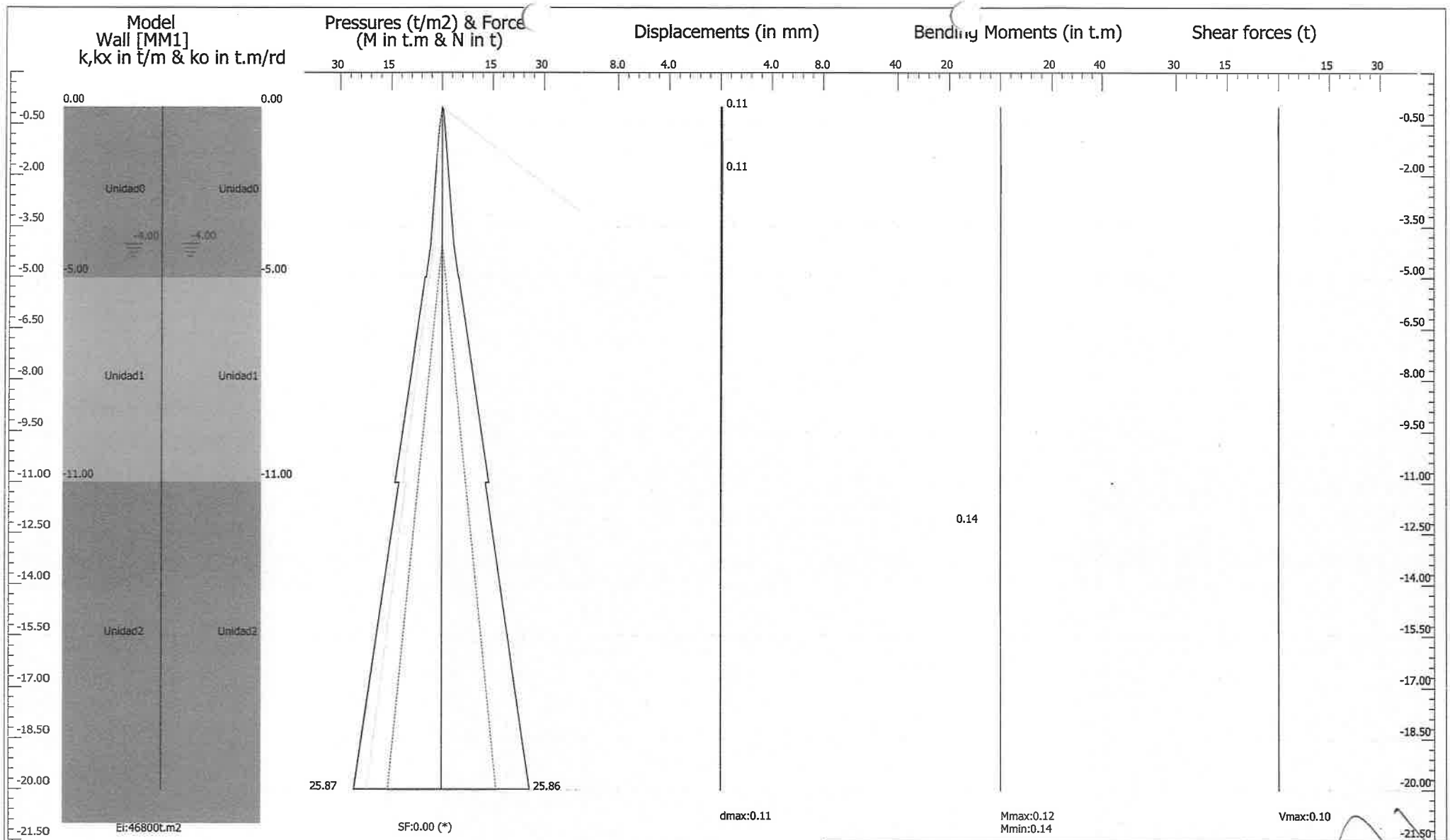
0163



2. Construcci?n MC600

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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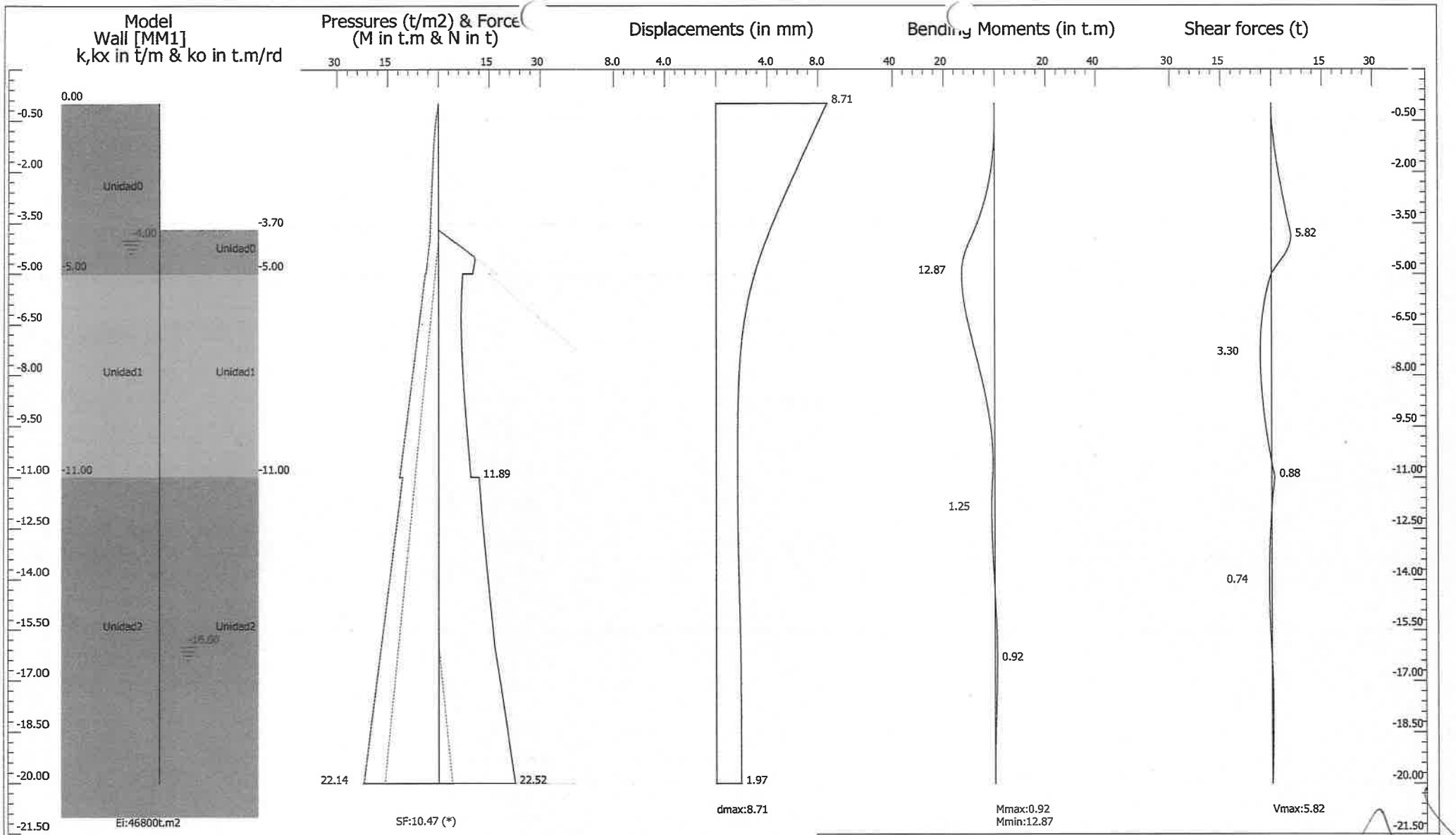
0164



3. Excavacion a -3.70

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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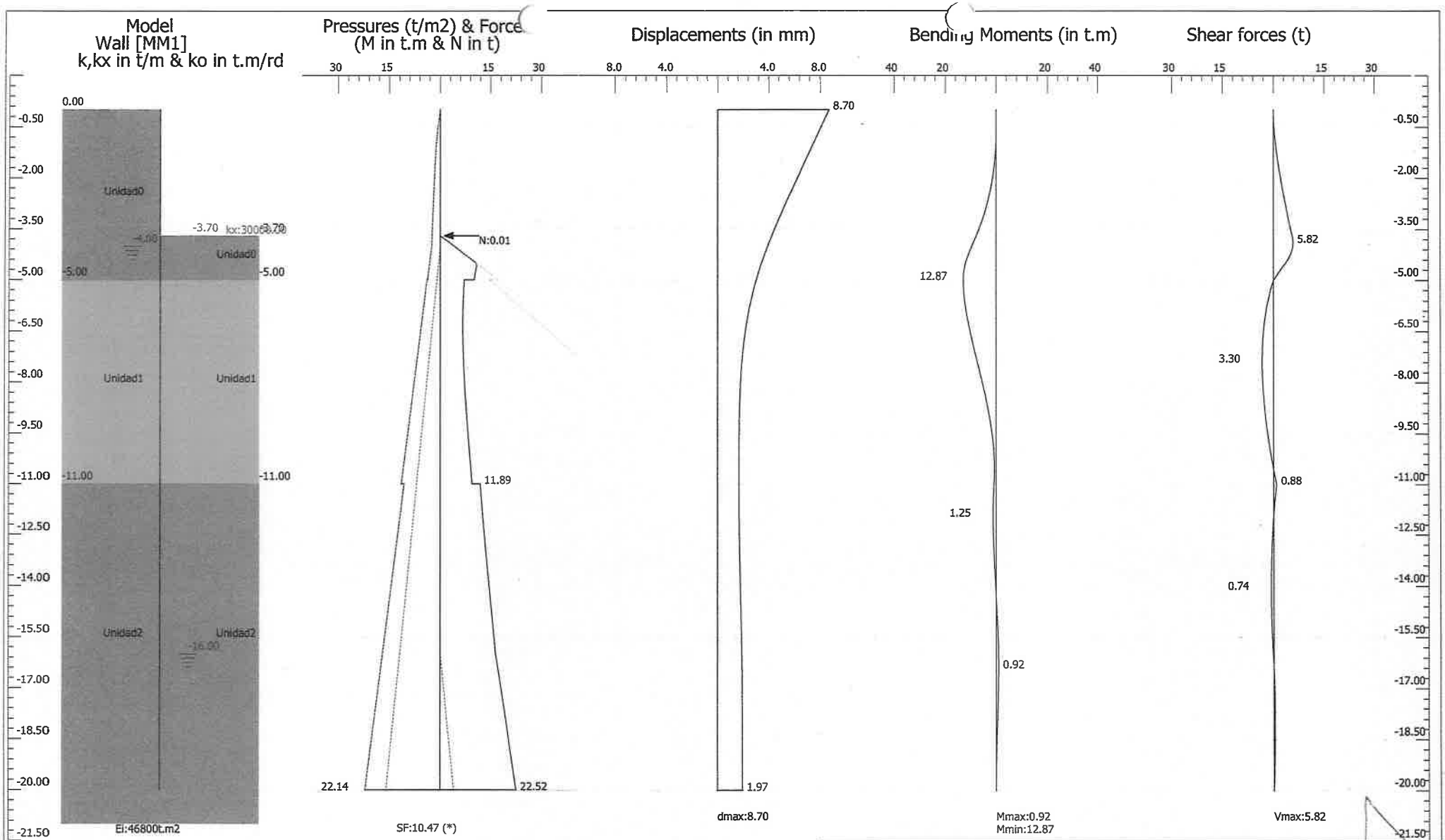
0163



4. Construccion primer nivel de puntales

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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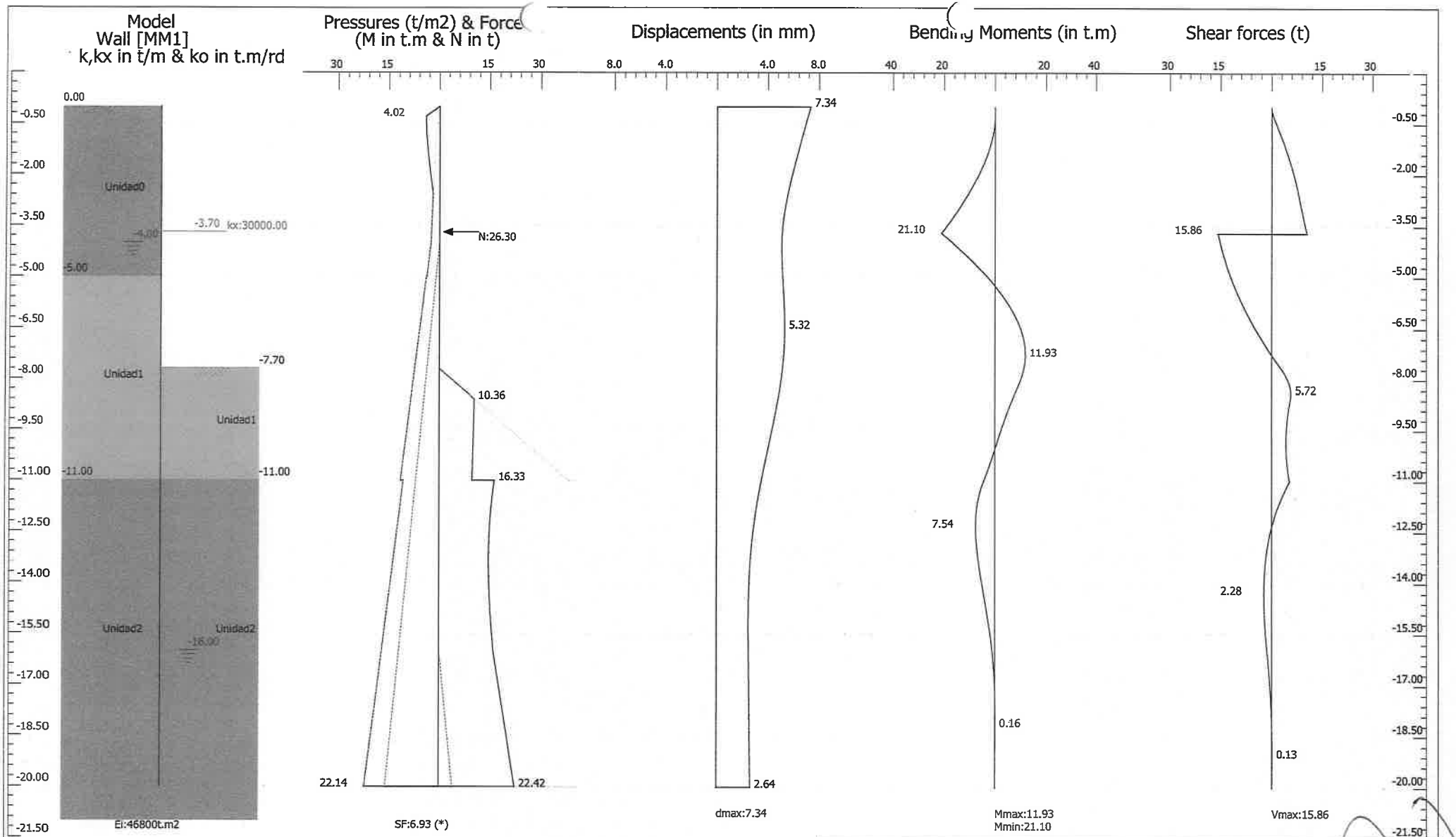
62



5. Excavacion a -7.70

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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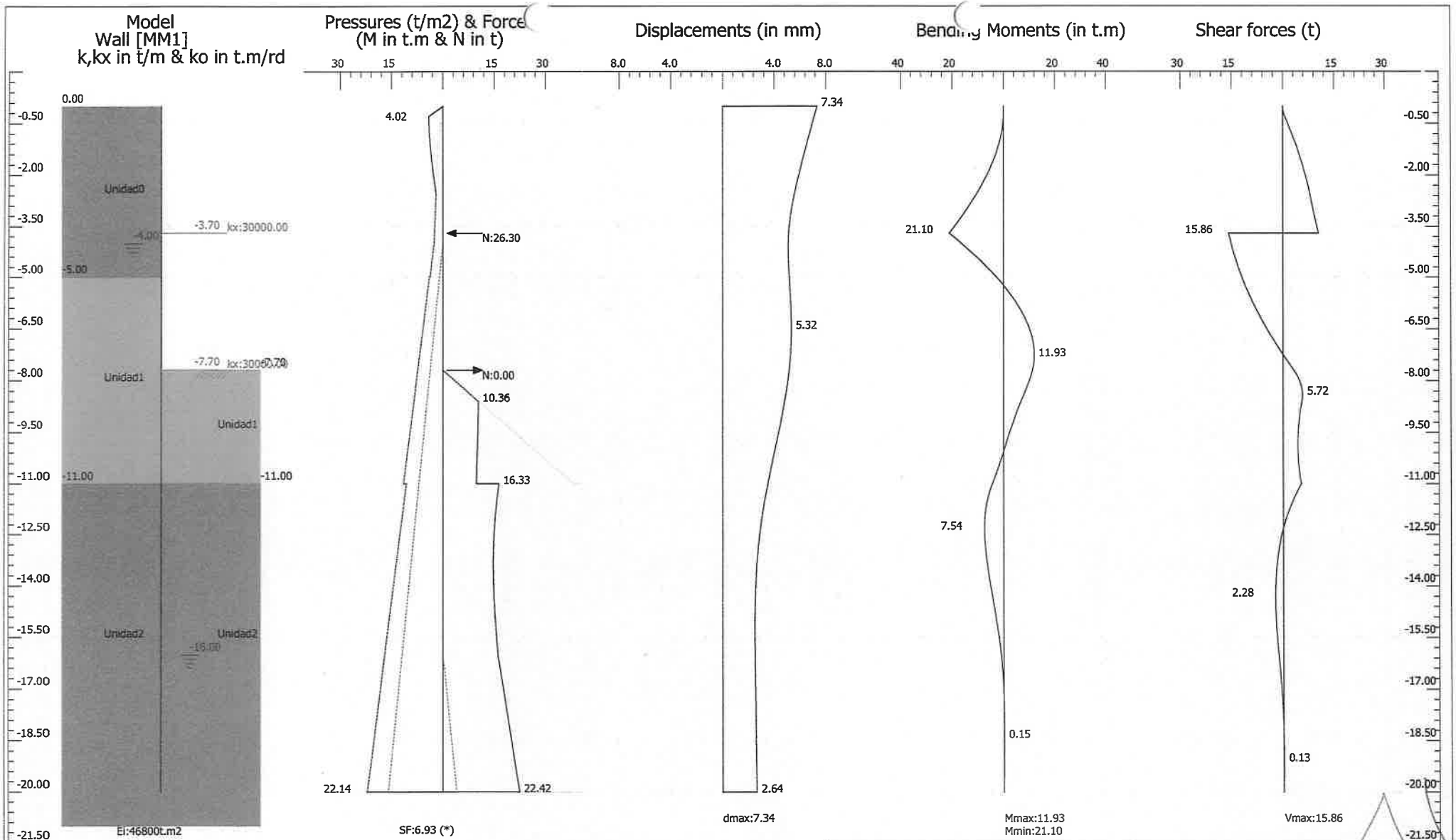
161



6. Construccion segundo nivel de puntales

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

---------- water pressure curve
- - - Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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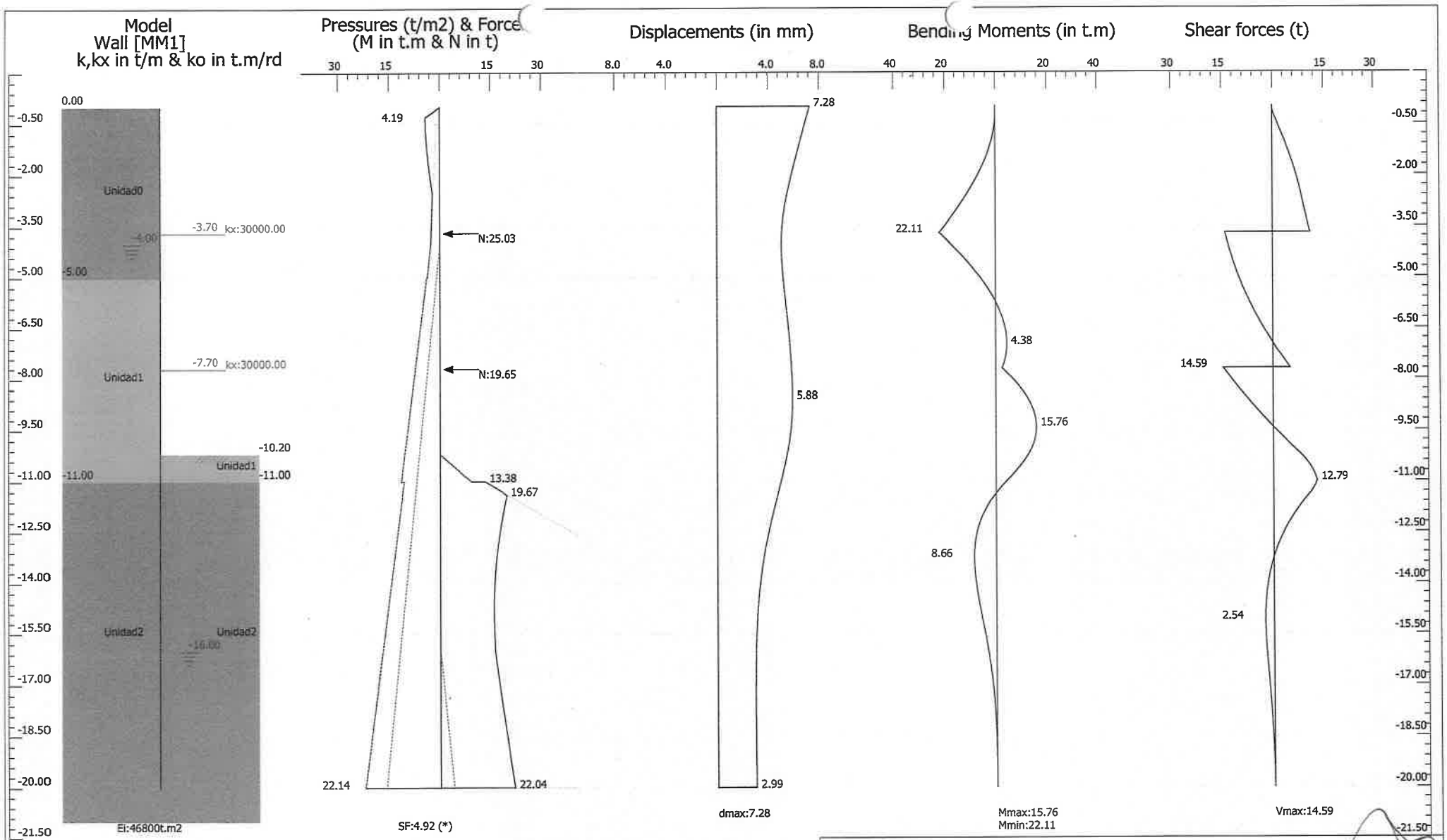
0160



7. Excavacion a -10.20

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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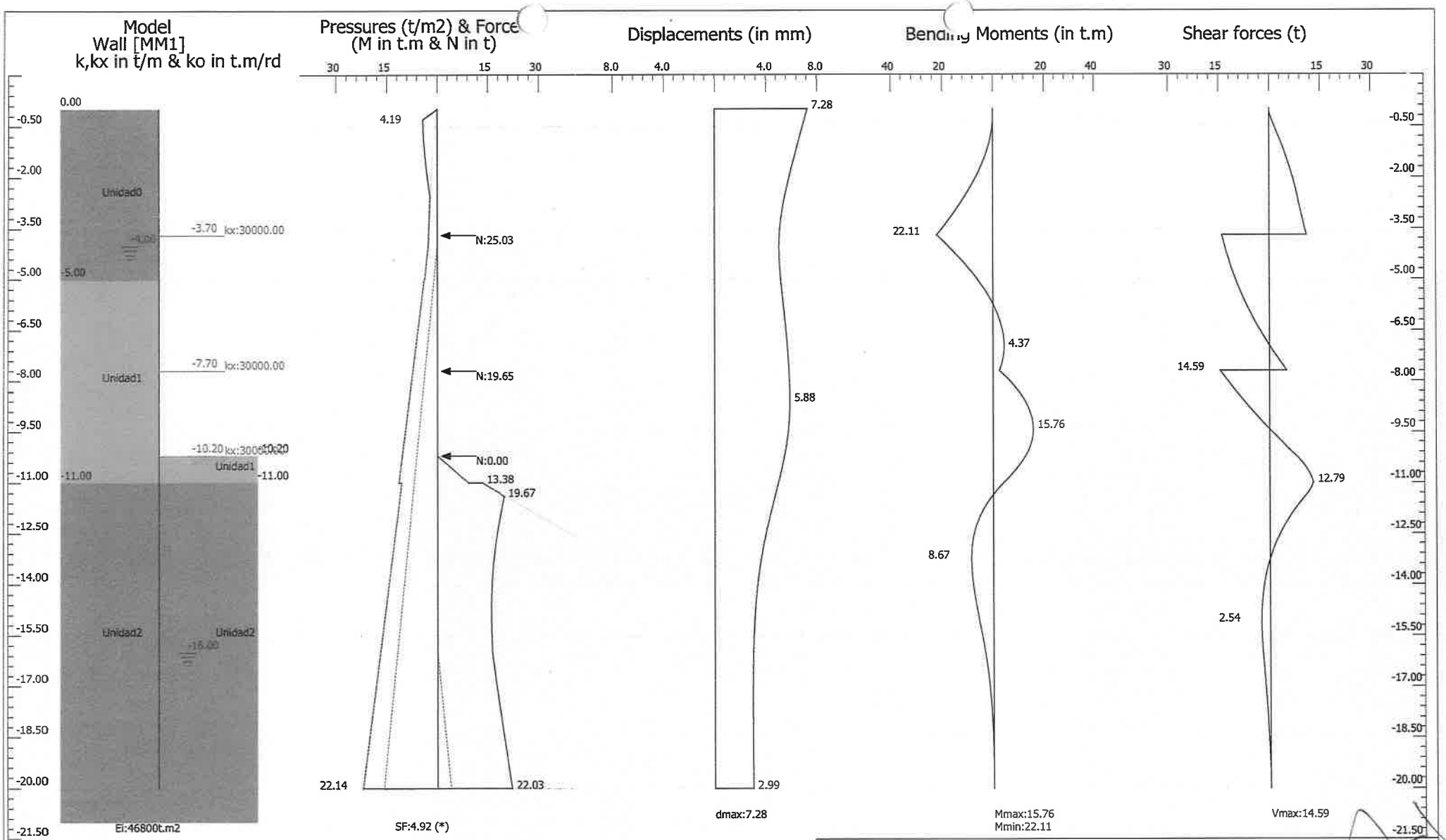
0159



8. Construcción tercer nivel de puntales

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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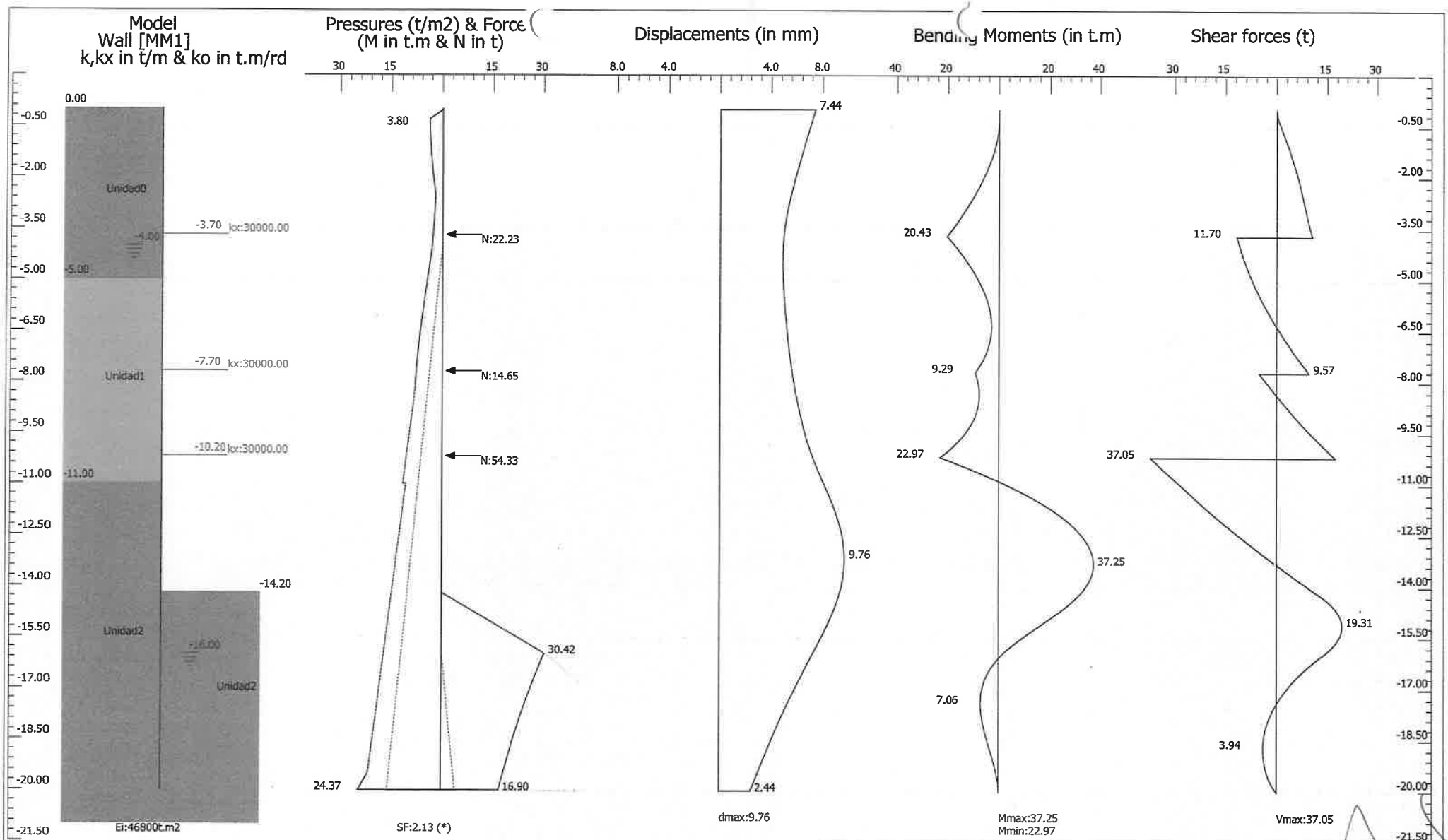
0158



9. Excavacion a -14.20

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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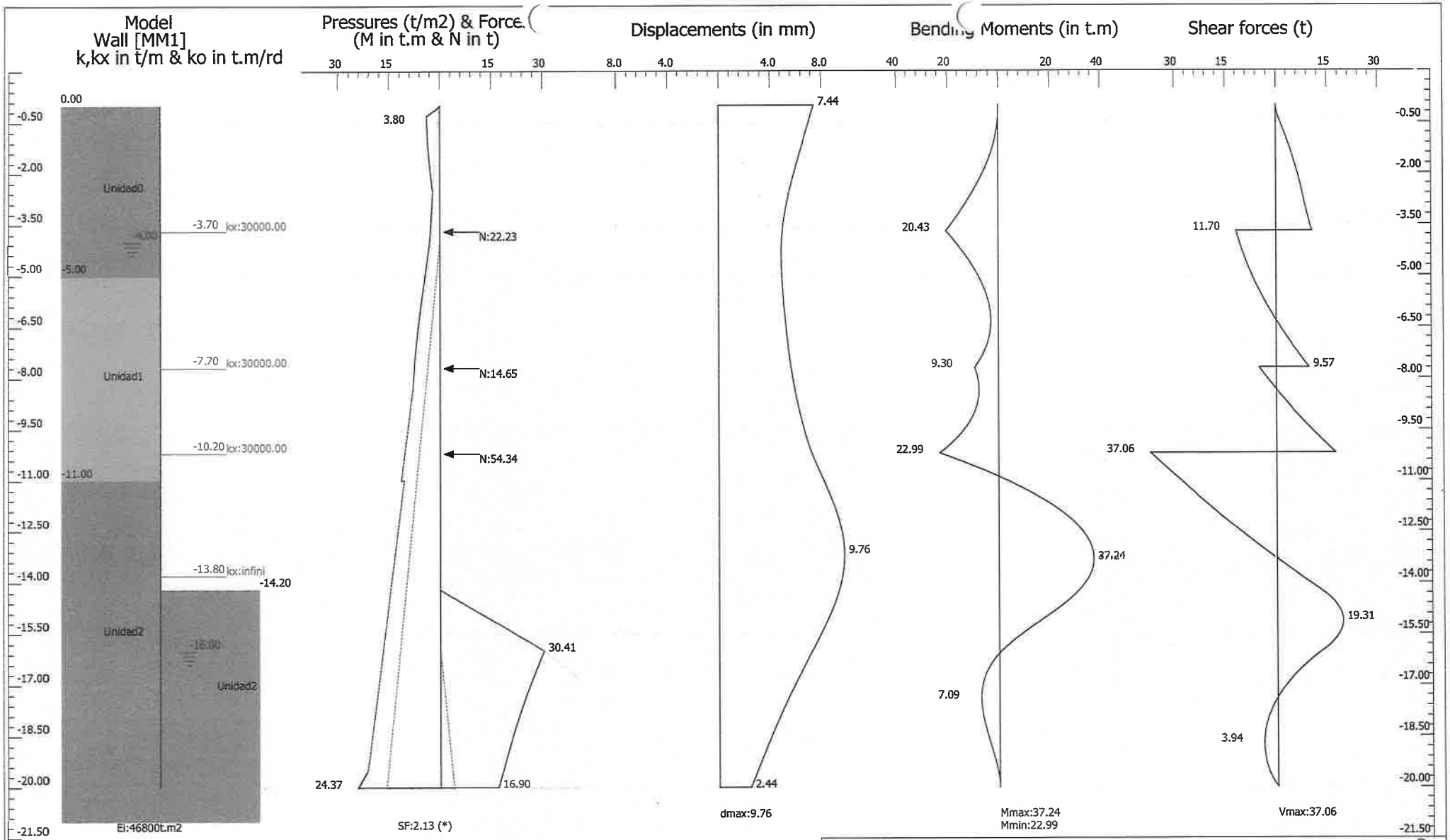
01157



10. Construccion de losa

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

---------- water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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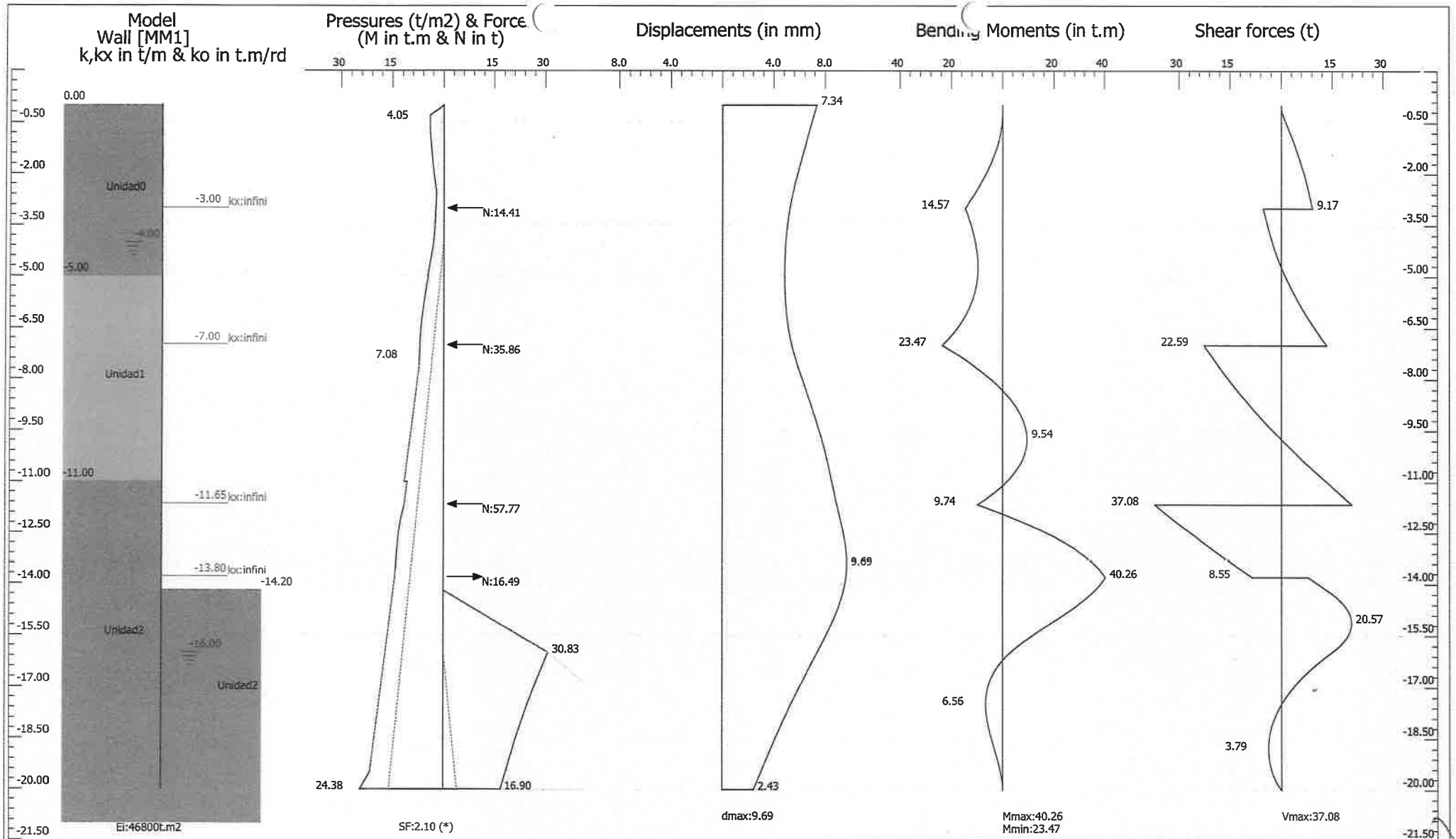
0156



11. Construccion puntales permanentes

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

---------- water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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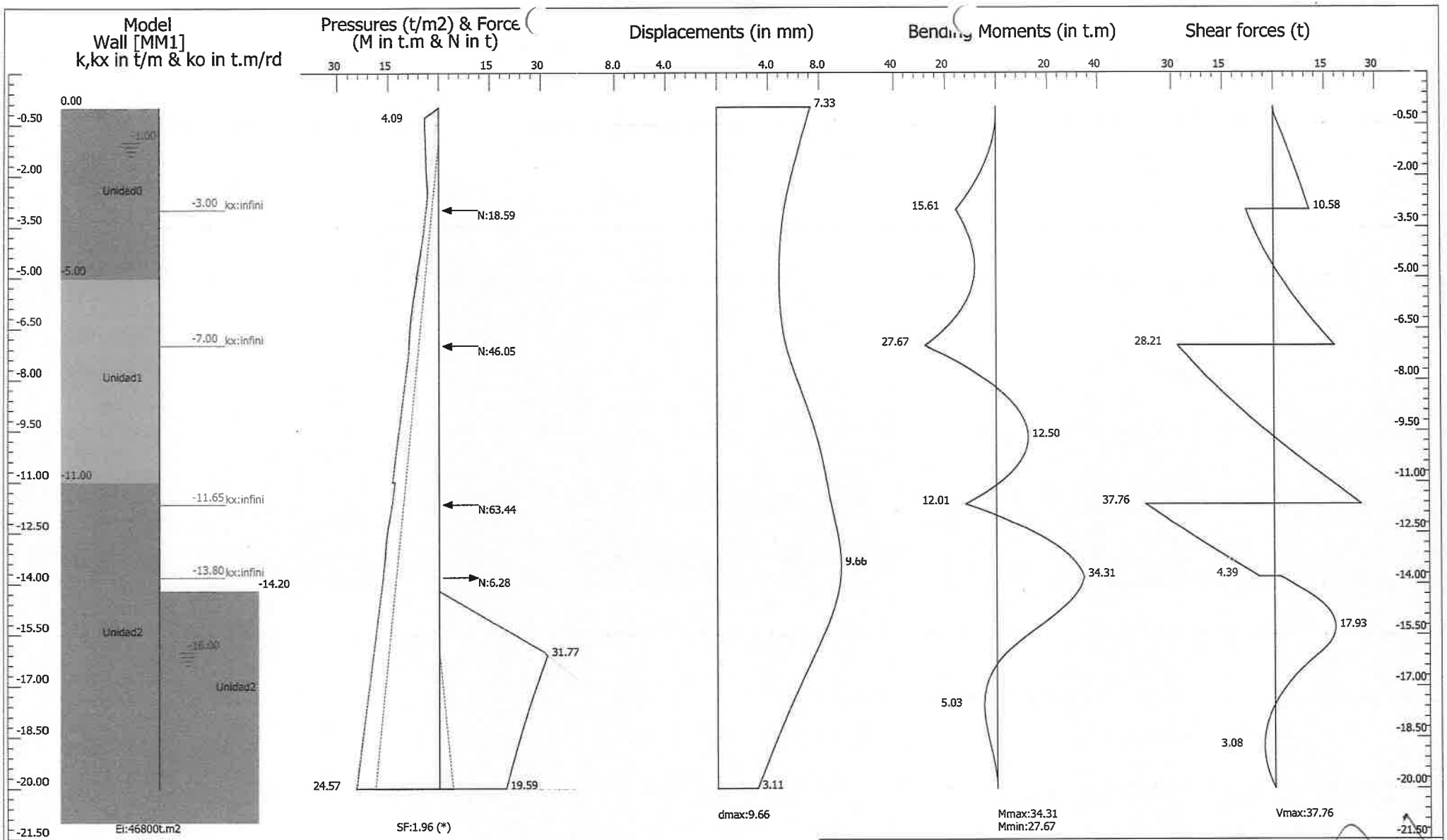

12.- NF hasta -1.00m (+63m)

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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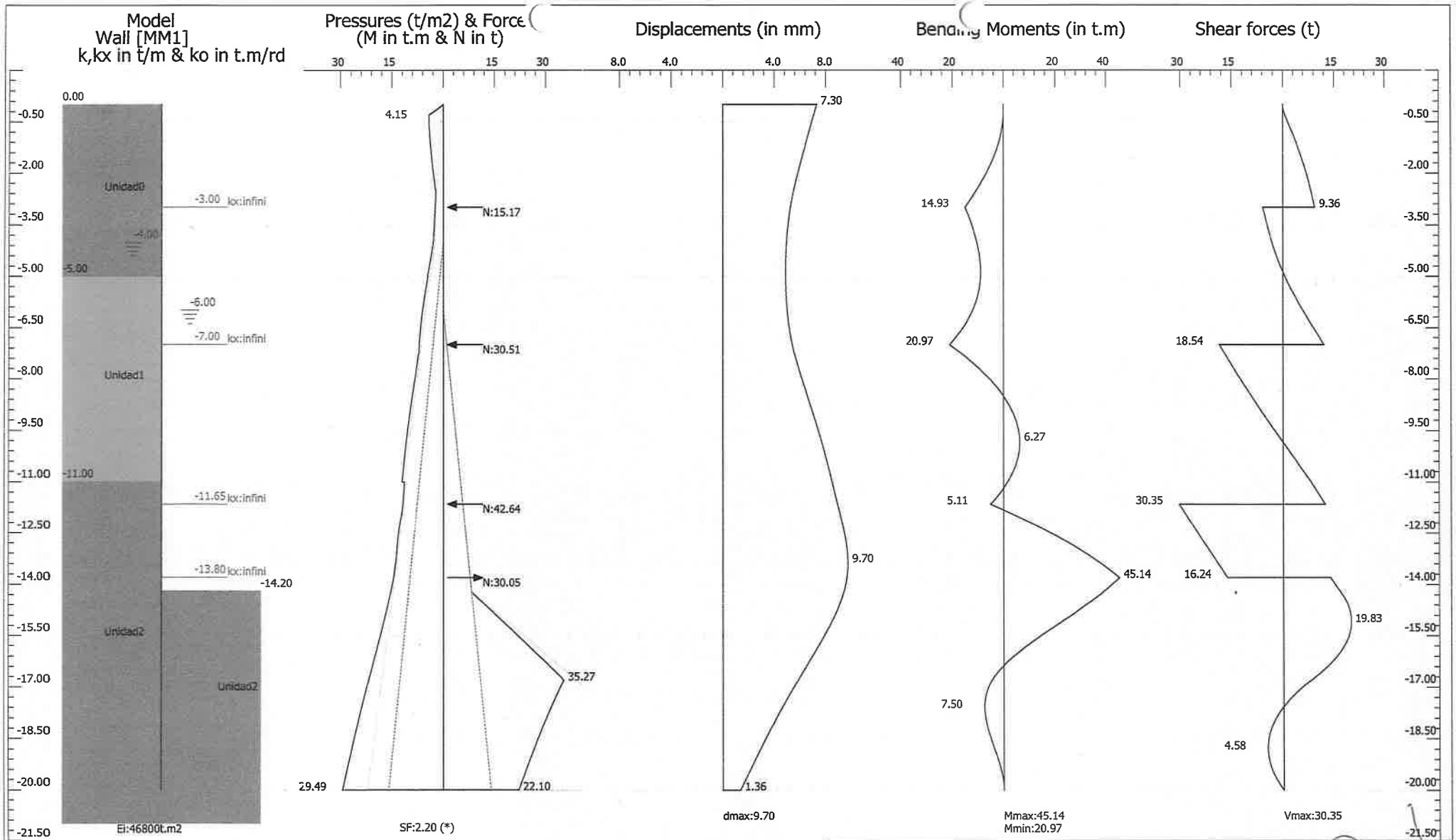
0154



13.- Camara llena (+58m) - NF: (+60m)

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

---------- water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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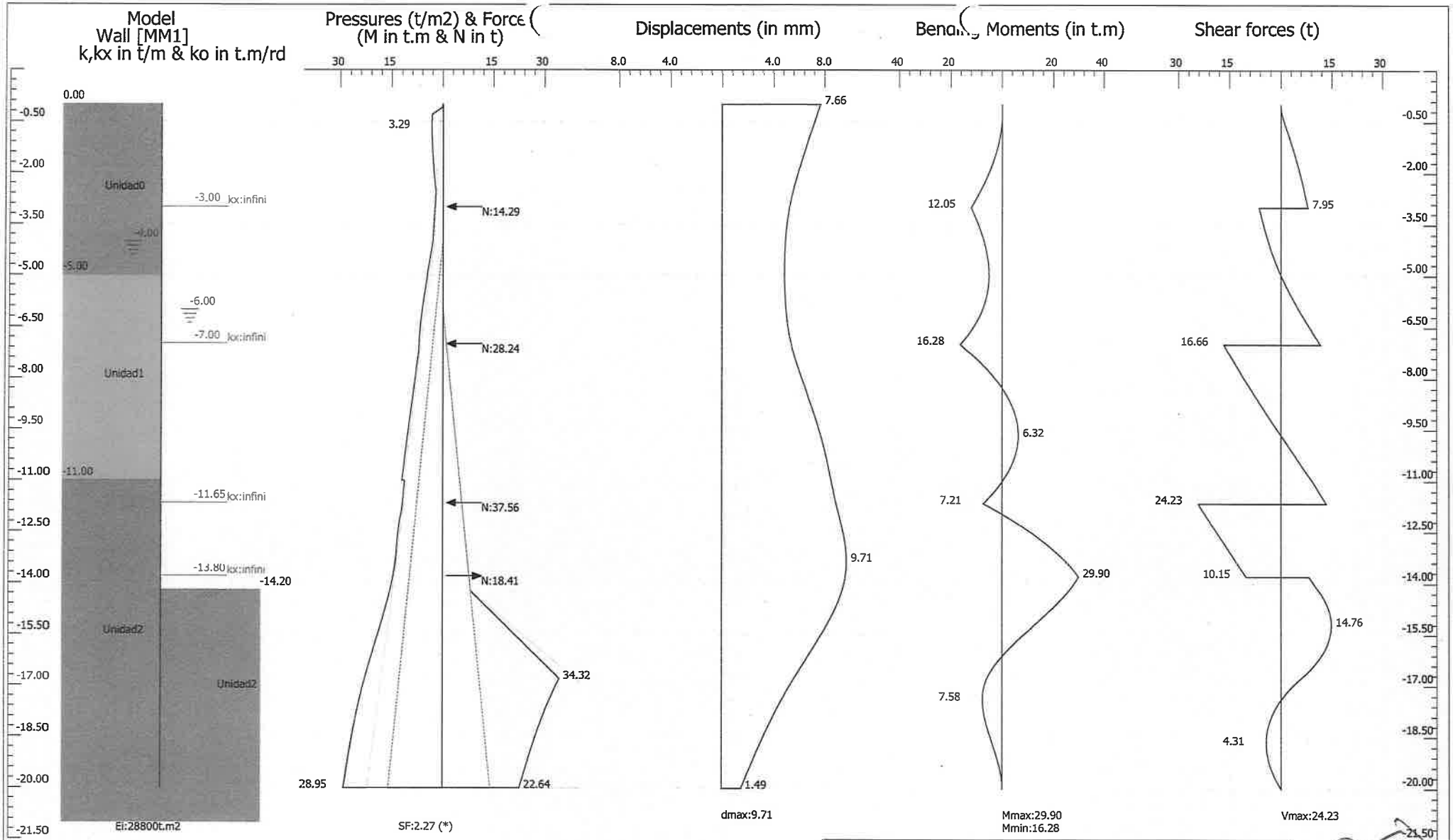

14. Fluencia a largo plazo

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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Tel:33 01 47 76 42 62
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Director de Obra PTAR Mariano Roque Alonso
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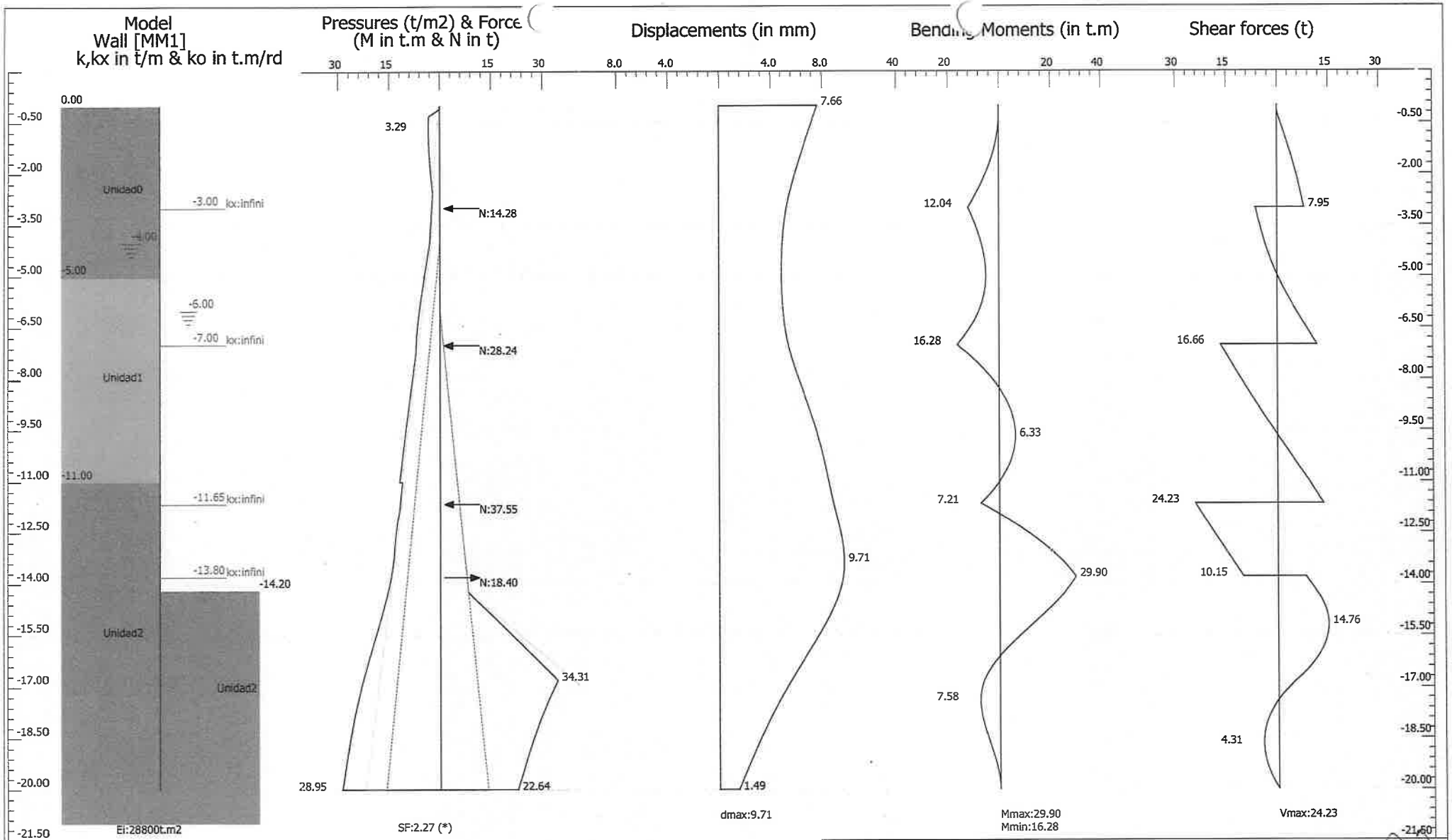

15.Envolvente

code	gama t/m3	gama sat t/m3	phi	Cohesion t/m2	K0	Coef.Sub.Reac Kh t/m3
Unidad2	1.90	2.20	38	0.00	0.384	4000
Unidad1	1.85	2.10	33	0.00	0.455	2000
Unidad0	1.80	2.00	35	0.00	0.426	3000

water pressure curve
Ka,Kp curve
(*):Available/Mobilised passive pressure
Values given for 1m of wall
Data file : 02-MC600 +3 Punt

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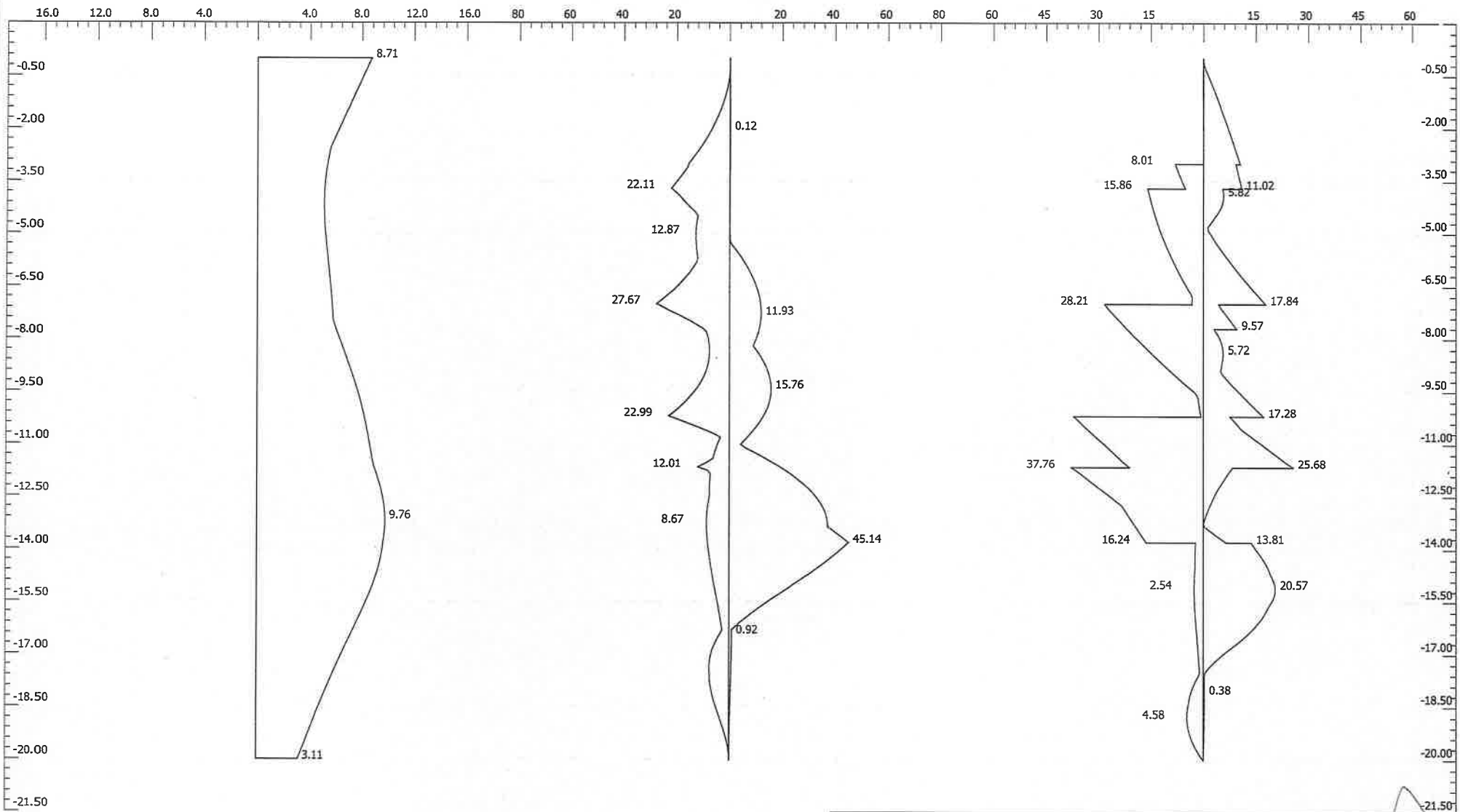

Envelop Env : 1 2 3 4 5 6 7 8 9 10 11 12 13 14 for Wall [MM1] Values given for 1m of wall

Data file : 02-MC600 +3 Punt

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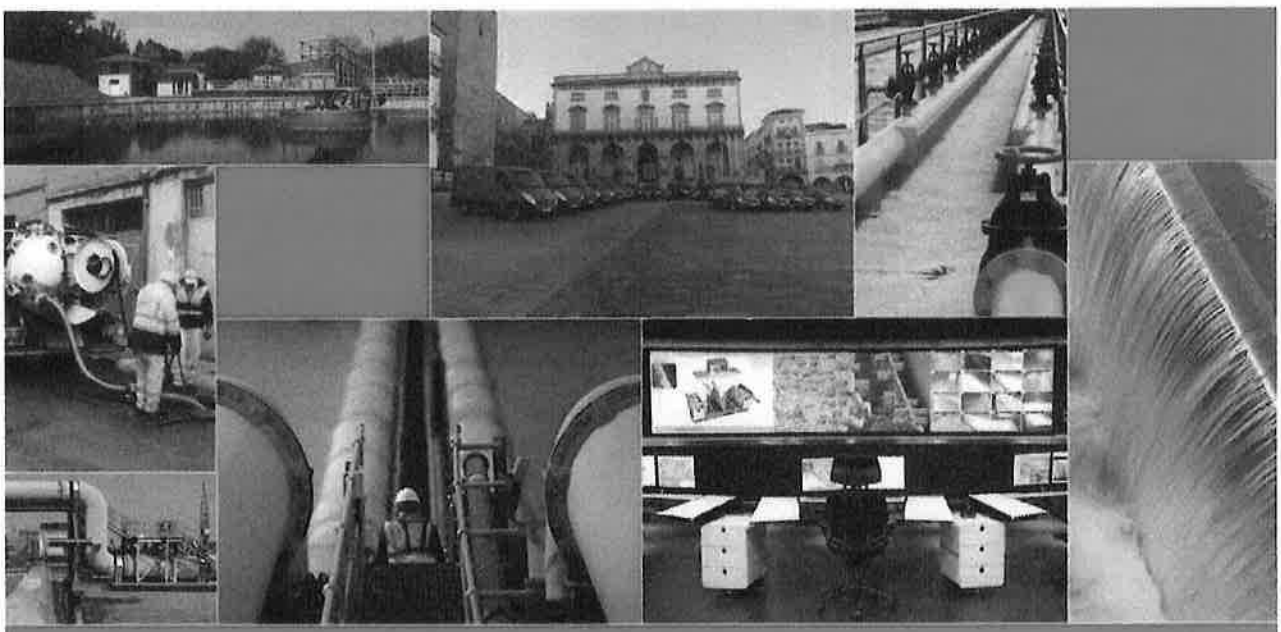
OBRAS DE REHABILITACIÓN Y AMPLIACIÓN DE LA RED DE ALCANTARILLADO SANITARIO Y CONSTRUCCIÓN DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES BELLAVISTA-ASUNCIÓN



Memoria de Cálculo de losas y muros interiores

Rejas Gruesas y Estación de Bombeo 1

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1 INTRODUCCIÓN

El presente documento tiene por objeto describir las hipótesis, metodología de cálculo empleada para el dimensionamiento estructural, así como la descripción de las acciones consideradas en cada unidad integradas en el "Construcción de la Planta de Tratamiento de Aguas Residuales Bellavista - Asunción"

Para la realización de este proyecto se han tenido en cuenta las normativas vigentes: Instrucción del Hormigón Estructural (EHE-08), Código Técnico de la Edificación (CTE-06),...

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