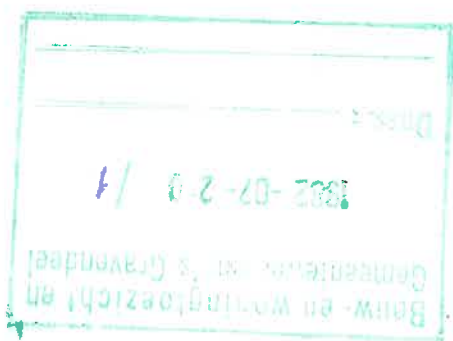


De Secretaris,

behoort bij ~~het~~ bestuurs/bestuur van
burgemeester en wethouders
van 's-Gravenhage,
d.d. 12 Aug. 1982 no 82-

: рпору!

b1z. 34.
b1z. 33.
b1z. 30.
b1z. 27.
b1z. 26.
b1z. 23.
b1z. 21.
b1z. 19.
b1z. 17.
b1z. 14.
b1z. 10.
b1z. 7.
b1z. 4.



opdrachtgever	Gemeentebest. 's-Gravendeel / b.v. Aannemingsbedrijf IJsellbouw b.v. te Capelle a/d IJssel.	
werk	Gemeentehuis te 's-Gravendeel.	werken
onderwerp	Funderingsadvies	archiefrn
datum	berekend:	gecontroleerd:
15-7-'82	R.J.F. Boham	
Sramota partners bv architecten dna		
postzeedijk 238		010 - 14 98 23
3063 bp rotterdam		010 - 33 26 11

Inleiding:

-Door de gemeente 's-Gravendeel werd aan ons ter beschikking gesteld een 9-tal sonderingen (93 t/m 97 en 132 t/m 135).

Deze sonderingen zijn in de buurt van het toekomstige gemeentehuis gemaakt, ten behoeve van het eerder gepland woningbouw-project.

-Daar de sonderingen 93 t/m 97 een nogal wisselvallig beeld geven, is in het verleden reeds besloten een 4-tal extra sonderingen te maken (132 t/m 135).

-De sonderingen werden gemaakt door de fa. Rietveld & Zn. te Capelle a/d IJssel op 07-11-'79, resp. op 16-11-'79 en 19-11-'79.

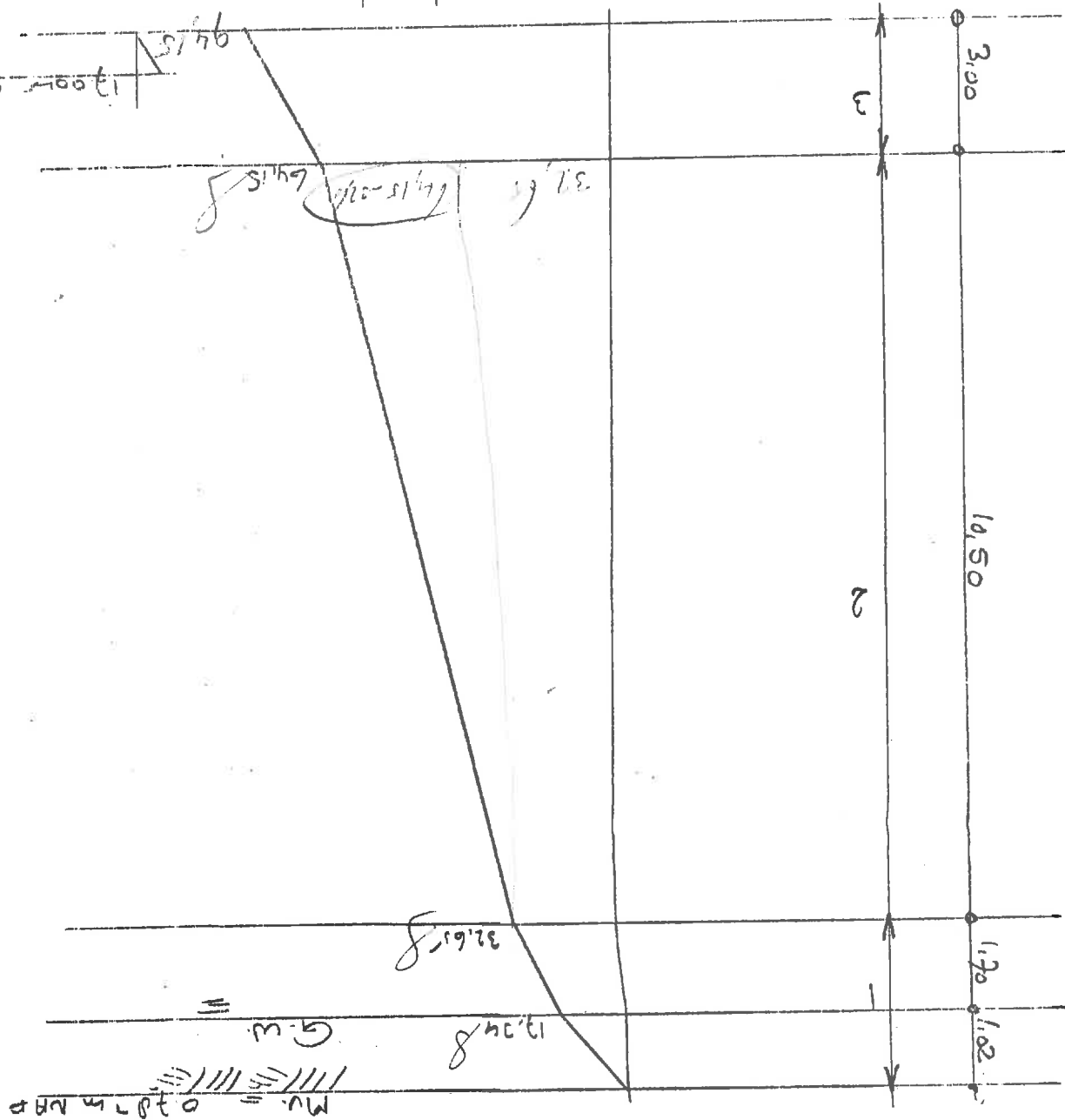
-Bij de sonderingen werd ook het bijbehorende funderingsadvies van adviesbureau Gamma uit Rotterdam geleverd.

-Na vergelijking van de situatie's uit 1979 en de huidige bleek dat slechts 2 van de in 1979 gemaakte sonderingen binnen de huidige situering passen, t.w. de sonderingen 97 en 135, die binnen het raadszaal-complex vallen.

Om deze reden is door ons geadviseerd nog een vierstal aanvullende sonderingen te maken ten behoeve van de kantoor-vleugels. Deze sonderingen zijn eveneens door de firma Rietveld & Zn gemaakt en wel op 11-06-'82.

-Daar de sonderingen 1 en 4 een afwijkend beeld vertoonden t.o.v. de sonderingen 3 en 4, zijn daarna de sonderingen 5,6,6A,6B,7,8,9,10 en 11 gemaakt, teneinde de slechtere plaatsen beter te localiseren (sonderingen gemaakt 07-07-'82).

Sondering 1.



laag	f	mg	k	c
1	31	0,51	17/9	0
2	14	0,38	3	5
3	35	0,6	10	0

negatieve kleef:

Ø 220

$$0,88 \times 1,02 \times \frac{17,34}{2} \times 0,51 \times 1,0$$

$$0,88 \times 1,70 \times \frac{17,34 + 32,65}{2} \times 0,51 \times 1,0$$

$$0,88 \times 10,50 \times \frac{32,65 + 64,15}{2} \times 0,38 \times 0,59$$

$$0,88 \times 10,50 \times 5$$

$$= 45,20$$

$$= 100,27$$

$$= 18,70$$

$$= 3,90$$

Ø 320

$$320/220 \times 169,07$$

$$= 245,92$$

Ø 290

$$290/220 \times 169,07$$

$$= 222,87$$

Ø 250

$$250/220 \times 169,07$$

$$= 192,13$$

positieve kleef:

Ø 220

$$0,88 \times 3,00 \times \frac{94,15 + 64,15}{2} \times 0,60 \times 1,5$$

$$= 168,07$$

Ø 250

$$250/220 \times 188,07$$

$$= 213,72$$

Ø 290

$$290/220 \times 188,07$$

$$= 247,92$$

Ø 320

$$320/220 \times 188,07$$

$$= 273,56$$

$$\text{Evenwichtsdraagvermogen:} \\ \frac{2 \times 8 + 6,8 + 5 \times 6}{6}$$

$$= 6,83 \text{ N/mm}^2$$

$$\sigma_{\text{onder}} = \frac{13,4 + 9,4 + 2 \times 8,5 + 8,4 \times 8}{9}$$

$$= 8,87 \text{ N/mm}^2$$

Fp =

$$\frac{6,83 + 8,87}{2} \times 220^2 \times 10^{-3}$$

$$= 379,94$$

$$\sigma_{\text{boven}} = \frac{8 \times 6}{8}$$

$$= 6,0 \text{ N/mm}^2$$

$$\sigma_{\text{onder}} = \frac{13,4 + 9,4 + 8,5 \times 2 + 6 + 4 \times 6}{9}$$

$$= 7,74 \text{ N/mm}^2$$

Fp =

$$\frac{6,0 + 7,74}{2} \times 250^2 \times 10^{-3}$$

$$= 429,38$$

$$\sigma_{\text{onder}} = \frac{13,4 + 9,2 + 2 \times 8,5 + 7,4 \times 6 + 4 \times 6}{9}$$

$$= 7,62 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{8 \times 6 + 5 + 4}{10}$$

$$= 5,7 \text{ N/mm}^2$$

Fp =

$$\frac{5,70 + 7,60}{2} \times 290^2 \times 10^{-3}$$

$$= 560,11$$

$$\sigma_{\text{boven}} = \frac{6 \times 6 + 2,6 + 0,2}{8}$$

$$= 4,85 \text{ N/mm}^2$$

$$\sigma_{\text{onder}} = \frac{13,4 + 9 + 8,5 + 6 + 6 + 4 \times 6}{9}$$

$$= 7,44 \text{ N/mm}^2$$

Fp =

$$\frac{7,44 + 1,85}{2}$$

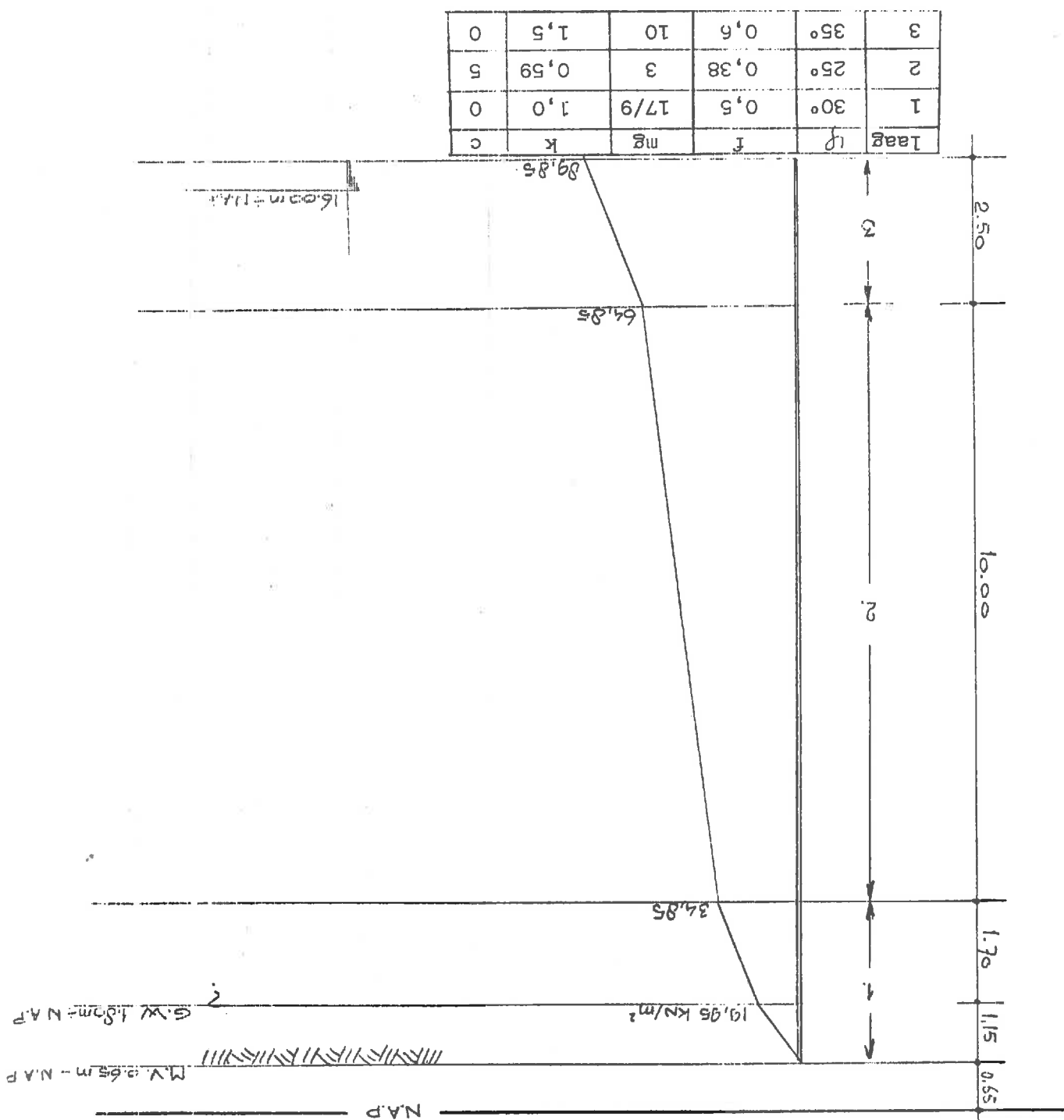
$$\times 320^2 \times 10^{-3}$$

$$= 529,71$$

toelaatbare pealbelasting:

∅ 220	1/1,4x	(379,94+188,07 1,4	-169,07)	16 100	= 169,05
∅ 250	1/1,4x	(429,38+213,72 1,4	-192,13)		= 150,88
∅ 290	1/1,4x	(560,14+247,92 1,4	-222,87)		= 253,09
∅ 320	1/1,4x	(629,76+273,56 1,4	-245,92)	16 274	= 285,23

Sondering 2:



negatieve kleef in de zone van m.v. tot 13,50 m ÷ N.A.P.
de bovenste zone 3,5 zanderig

Positieve kleef in de zone van 13,50 m ÷ N.A.P. tot 16,00 m ÷ N.A.P.

negatieve kleef:

$$\sigma_{220} = \frac{0,88 \times 1,15 \times 19,55}{2} - 0,5 \times 1 = 4,95$$

$$\sigma_{250} = \frac{0,88 \times \frac{19,55+34,85}{2} \times 0,5 \times 1,70}{2} = 20,35$$

$$\sigma_{290} = \frac{0,88 \times \frac{34,85+64,85}{2} \times 10,00 \times 0,38 \times 0,59}{2} = 98,36$$

$$= 44,00$$

σ_{250}	$\frac{250}{220 \times 167,66}$	$= 190,53$
σ_{290}	$\frac{290}{220 \times 167,66}$	$= 221,01$
σ_{320}	$\frac{320}{220 \times 167,66}$	$= 243,87$

positieve kleef:

σ_{220}	$\frac{0,88 \times 2,5 \times 64,85 + 89,85}{2} \times 0,6 \times 1,5$	$= 153,15$
σ_{250}	$\frac{250}{220 \times 153,16}$	$= 174,05$
σ_{290}	$\frac{290}{220 \times 153,16}$	$= 201,90$
σ_{320}	$\frac{320}{220 \times 153,16}$	$= 222,78$

evenwichtsdraagvermogen:

$$\sigma_{\text{onder}} = \frac{10,4+11,15+8,4+3 \times 8,4+5 \times 8,4}{11} = 8,84 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{8,4+8,84}{2} \times 220 \times 10^{-3} = 8,4 \text{ N/mm}^2$$

$$\sigma_{\text{onder}} = \frac{10,4+11,15+5 \times 8,4+6 \times 8,4}{13} = 8,77 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{10 \times 8,4+5,4+5}{12} = 7,87 \text{ N/mm}^2$$

$$\sigma_{\text{onder}} = \frac{8,77+7,87}{2} \times 250 \times 10^{-3} = 520 \text{ KI}$$

$$\sigma_{\text{onder}} = \frac{10,4+11,15+5 \times 8,4+7 \times 7}{15} = 7,97 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{10 \times 7+5,4+5+0,8 \times 2}{14} = 5,86 \text{ N/mm}^2$$

$$\sigma_{\text{onder}} = \frac{5,86+7,97}{2} \times 290 \times 10^{-3} = 581,98$$

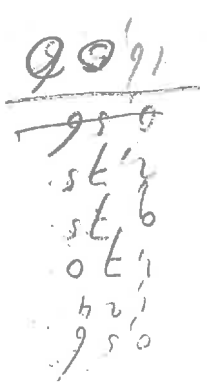
$$\sigma_{\text{onder}} = \frac{10,4+11,15+5 \times 8,4+7+6,9+8 \times 6,9}{17} = 7,81 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{10 \times 6,9+5,4+5+0,8 \times 3}{15} = 5,46 \text{ N/mm}^2$$

$$\sigma_{\text{p}} = \frac{7,82+5,46}{2} \times 320 \times 10^{-3} = 679,94$$

toelaatbare paalbelasting:

Ø 220	$\frac{1}{1,4} \times \left(\frac{417,21+153,16}{1,4} - 167,66 \right)$	= 171,25 KN
Ø 250	$\frac{1}{1,4} \times \left(\frac{520+174,05}{1,4} - 190,53 \right)$	= 219,02 KN
Ø 290	$\frac{1}{1,4} \times \left(\frac{581,98+201,9}{1,4} - 281,90 \right)$	= 241,45 KN
Ø 320	$\frac{1}{1,4} \times \left(\frac{679,94+222,78}{1,4} - 243,87 \right)$	= 286,33 KN



negatieve kleef in de zone van m.v. tot 13,25 m ÷ N.A.P.

bovenste 3,50 m zandlaag

positieve kleeft in de zone van 13,25 m ÷ tot 16,00 m ÷ N.A.P.

negatieve kleef:

$$\sigma_{220} = 0,88 \times 1,24 \times \frac{21,08}{2} \times 0,5 \times 1 = 5,75 \text{ KN}$$

$$= 21,49 - 0,88 \times 1,70 \times \frac{21,08 + 36,38}{2} \times 0,5 \times 1$$

$$= 98,12 - 0,88 \times 9,75 \times \frac{36,38 + 65,63}{2} \times 0,38 \times 0,59$$

$$168,26 \text{ KN}$$

$$= 191,21 \text{ KN}$$

$$= 221,80 \text{ KN}$$

$$= 244,75 \text{ KN}$$

Positieve kleef:

$$\sigma_{220} = 0,88 \times \frac{65,63 + 93,13}{2} \times 0,6 \times 1,5 \times 2,75 = 172,89 \text{ KN}$$

$$= 196,47 \text{ KN}$$

$$= 227,91 \text{ KN}$$

$$= 251,48 \text{ KN}$$

Evenwichtsdraagvermogen:

$$\sigma_{220} \text{ onder} = \frac{8,6 \times 9}{9} = 8,60 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{8 \times 8}{8} = 8,00 \text{ N/mm}^2$$

$$F_p = \frac{8,6 + 8}{2} \times 220^2 \times 10^{-3} = 401,72 \text{ KN}$$

$$\sigma_{250} \text{ onder} = \frac{8,6 + 8,2 \times 8}{9} = 8,25 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{6 \times 8,0 + 3,5 + 3,5}{8} = 6,88 \text{ N/mm}^2$$

$$F_p = \frac{8,25 + 6,88}{2} \times 250^2 \times 10^{-3} = 473,13 \text{ KN}$$

$$\sigma_{290} \text{ onder} = \frac{8,6 + 8 \times 8,2}{9} = 8,25 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{5 \times 8 + 3,5 + 3,5 + 2,2}{8} = 6,15 \text{ N/mm}^2$$

$$F_p = \frac{8,25 + 6,15}{2} \times 290^2 \times 10^{-3} = 605,52 \text{ KN}$$

$$\sigma_{320} \text{ onder} = \frac{8,6 + 8 \times 8,2}{9} = 8,25 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{4 \times 8,0 + 3,5 + 2,2 + 0,2 + 0,2}{8} = 4,8 \text{ N/mm}^2$$

$$F_p = \frac{4,8 + 8,25}{2} \times 328^2 \times 10^{-3} = 668,68 \text{ KN}$$

toelaatbare paalbelasting:

Ø 220	$\frac{1}{1,4} \times \frac{401,72+172,89}{1,4} - 168,26$	= 172,99 KN
Ø 250	$\frac{1}{1,4} \times \frac{473,13+196,47}{1,4} - 191,21$	= 205,06 KN
Ø 290	$\frac{1}{1,4} \times \frac{605,52+227,91}{1,4} - 221,80$	= 266,80 KN
Ø 320	$\frac{1}{1,4} \times \frac{668,68-251,48}{1,4} - 244,75$	= 294,65 KN

Inheinvlaau 17,00 m ÷ N.A.P.:

positieve kleef: Ø 220 0,88x3,75x $\frac{65,63+103,13}{2}$ x0,6x1,5

Ø 220	= 250,61 KN
Ø 250	= 284,79 KN
Ø 290	= 330,35 KN
Ø 320	= 364,53 KN

evenwichtsdragvermogen:

Ø 220 $\sigma_o = \frac{9+8,2 \times 8}{9} = 8,29$ N/mm²

$\sigma_b = 8,0$ N/mm²

F_p

= 394,46 KN

Ø 250 $\sigma_o = \frac{9+8 \times 8,2}{9} = 8,29$ N/mm²

$\sigma_b = 8,0$ N/mm²

F_p

= 509,38 KN

Ø 290 $\sigma_o = \frac{9+8 \times 8,2}{9} = 8,29$ N/mm²

$\sigma_b = 8,0$ N/mm²

F_p

= 684,99 KN

Ø 320 $\sigma_b = \frac{9+8 \times 8,2}{9} = 8,29$ N/mm²

$\sigma_o = \frac{7 \times 80+3,5}{8} = 7,44$ N/mm²

F_p

= 805,38 KN

toelaatbare paalbelasting:

Ø 220 $= \frac{1}{1,4} \times \frac{394,46+250,61}{1,4} - 168,26$

= 208,93 KN

Ø 250 $= \frac{1}{1,4} \times \frac{509,38+284,79}{1,4} - 191,21$

= 268,61 KN

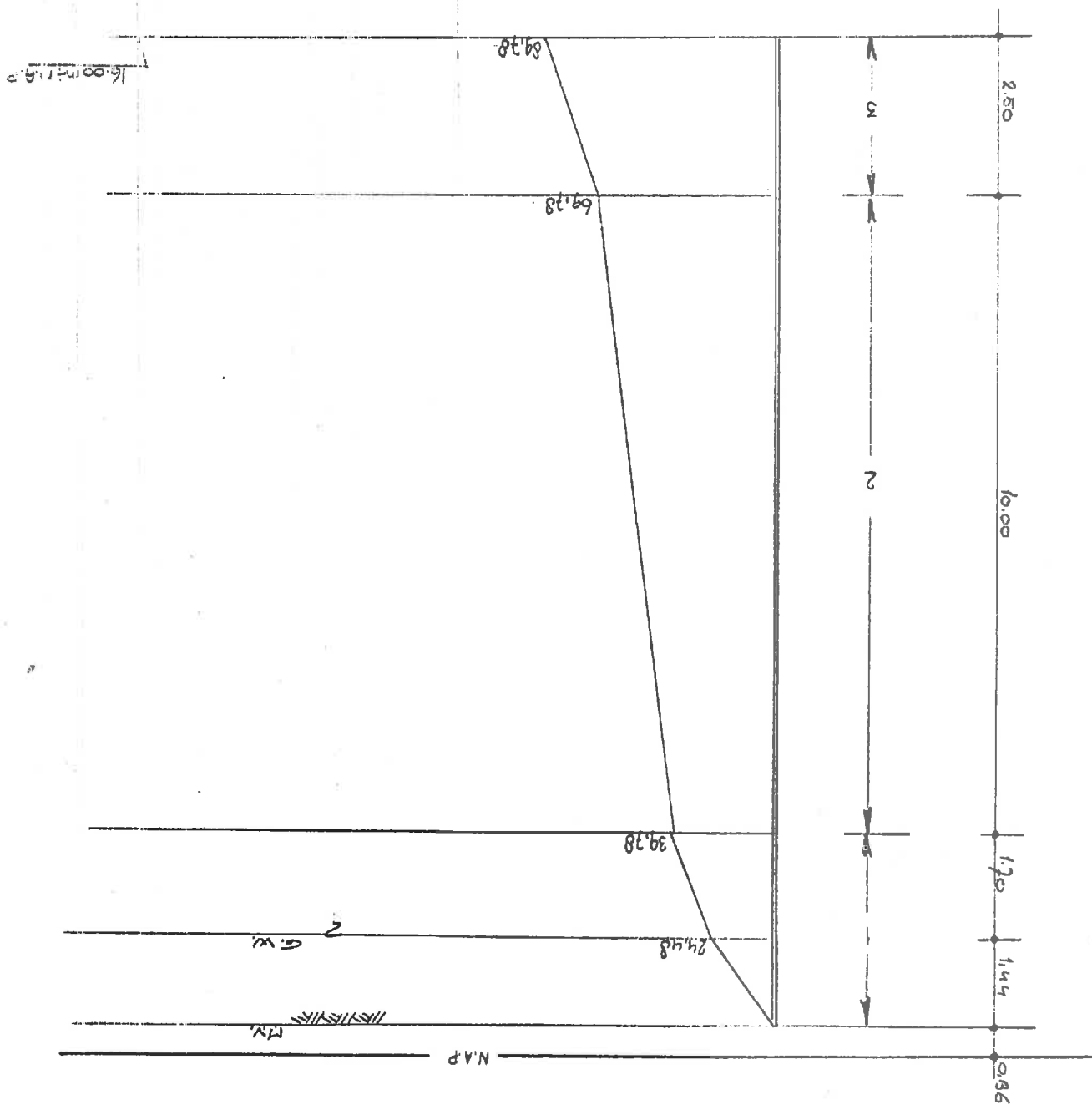
Ø 290 $= \frac{1}{1,4} \times \frac{684,99+330,35}{1,4} - 221,80$

= 359,60 KN

Ø 320 $= \frac{1}{1,4} \times \frac{805,38+364,53}{1,4} - 244,75$

= 422,07 KN

Sondering 4:



laag	f	mg	k	c
1	30°	0,5	17/9	1,0
2	25°	0,38	3	0,59
3	35°	0,6	10	1,5

negatieve kleef in de zone van m.v. tot 13,50 m ± N.A.P.
 bovenste laag van 3,5 m zandlaag.
 positieve kleef in de zone van ~~12,00~~ tot 15,50 m ± N.A.P.

negatieve kleef:

Ø 220	0,88x1,44x24,48/2x0,5x1	= 7,76 KN
	0,88x1,70x	= 24,04 -
	$\frac{24,48+39,78}{2}$	= 108,08 -
	$\frac{0,88x10,00x(39,78+69,78)}{2}$	= 44,00 -
	0,88x10,00x5	183,88 KN

Ø 250	250/220x183,88	= 208,96 KN
Ø 290	290/220x183,88	= 242,39 KN
Ø 320	320/220x183,88	= 267,47 KN

Positieve kleef:

Ø 220	0,88x2,50x69,78+94,78	= 162,91 KN
Ø 240	250/220x162,91	= 185,13 KN
Ø 290	290/220x162,91	= 214,75 KN
Ø 320	320/220x162,91	= 236,97 KN

evenwichtsdraagvermogen:

Ø 220	$\sigma_{\text{onder}} = \frac{9,0+8,4x3+7+4x7}{9}$	= 7,68 N/mm ²
	$\sigma_{\text{boven}} = \frac{5x7,0+3x4,0}{8}$	= 5,88 N/mm ²
Fp =	$\frac{7,68+5,88}{2} \times 220^2 \times 10^{-3}$	= 328,15 KN

Ø 250	$\sigma_{\text{onder}} = \frac{9,0+8,4x2+7+5x7}{9}$	= 7,53 N/mm ²
	$\sigma_{\text{boven}} = \frac{3x7,0+6+4+4+2+0,2}{8}$	= 4,65 N/mm ²
Fp =	$\frac{7,53x4,65}{2} \times 250^2 \times 10^{-3}$	= 380,63 KN

Ø 290	$\sigma_{\text{onder}} = \frac{9,0+8,4x2+7+5+4x5}{9}$	= 6,42 N/mm ²
	$\sigma_{\text{boven}} = \frac{3x5+4+4+2+0,2+0,2}{8}$	= 3,18 N/mm ²
Fp =	$\frac{6,42+3,18}{2} \times 290^2 \times 10^{-3}$	= 403,68 KN

$$\sigma_{\text{onder}} = \frac{9+8,4x2+7+5+4x5}{9} = 6,42 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{3x5+4+4+2+0,2+0,2}{8} = 3,18 \text{ N/mm}^2$$

$$F_p = \frac{6,42+3,18}{2} \times 320^2 \times 10^{-3} = 491,52 \text{ KN}$$

toelaatbare paalbelasting:

$$\phi 220 \quad 1/1,4x \quad \frac{328,15+162,91}{1,4} = -183,88$$

$$\phi 250 \quad 1/1,4x \quad \frac{380,63+185,13}{1,4} = -208,96$$

$$\phi 290 \quad 1/1,4x \quad \frac{403,68x214,75}{1,4} = -242,39$$

$$\phi 320 \quad 1/1,4x \quad \frac{491,52+236,97}{1,4} = -267,47$$

$$\text{Inheliveau 19,00 m} \div \text{N.A.P.:}$$

$$\text{positieve kleef: } \phi 220: 0,88x5,5x \frac{69,78+124,78}{2} x 0,6x1,5$$

$$\phi 250: 250/220x423,76$$

$$\phi 290: 290/220x423,76$$

$$\phi 320: 320/220x423,76$$

evenwichtsdragvermogen:

$$\phi 220 \quad \sigma_{\text{onder}} = \frac{15x4+8+4x8}{9} = 11,12 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{2x8+4,1+4,1+2+3x2}{8} = 4,03 \text{ N/mm}^2$$

$$F_p = \frac{11,12+4,03}{2} \times 220^2 \times 10^{-3} = 366,88 \text{ KN}$$

$$\phi 250 \quad \sigma_{\text{onder}} = \frac{15x4+8+2,4+5x2,4}{11} = 7,49 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = 2,4 \text{ N/mm}^2$$

$$F_p = \frac{7,49+2,4}{2} \times 250^2 \times 10^{-3} = 309,38 \text{ KN}$$

$$\phi 290 \quad \sigma_{\text{onder}} = \frac{15x4+8+2,4+2,4+6x2,4}{13} = 6,71 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = 2,4 \text{ N/mm}^2$$

$$F_p = \frac{6,71+2,4}{2} \times 290^2 \times 10^{-3} = 383,50 \text{ KN}$$

$$\phi 320 \quad \sigma_{\text{onder}} = \frac{15x4+8+2,4+2,4+2+7x2}{15} = 5,92 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = 2 \text{ N/mm}^2$$

$$F_p = \frac{5,92+2}{2} \times 320^2 \times 10^{-3} = 405,51 \text{ KN}$$

$$= 491,52 \text{ KN}$$

$$= 119,19 \text{ KN}$$

$$= 139,40 \text{ KN}$$

$$= 142,39 \text{ KN}$$

$$= 180,63 \text{ KN}$$

$$= 423,76 \text{ KN}$$

$$= 481,55 \text{ KN}$$

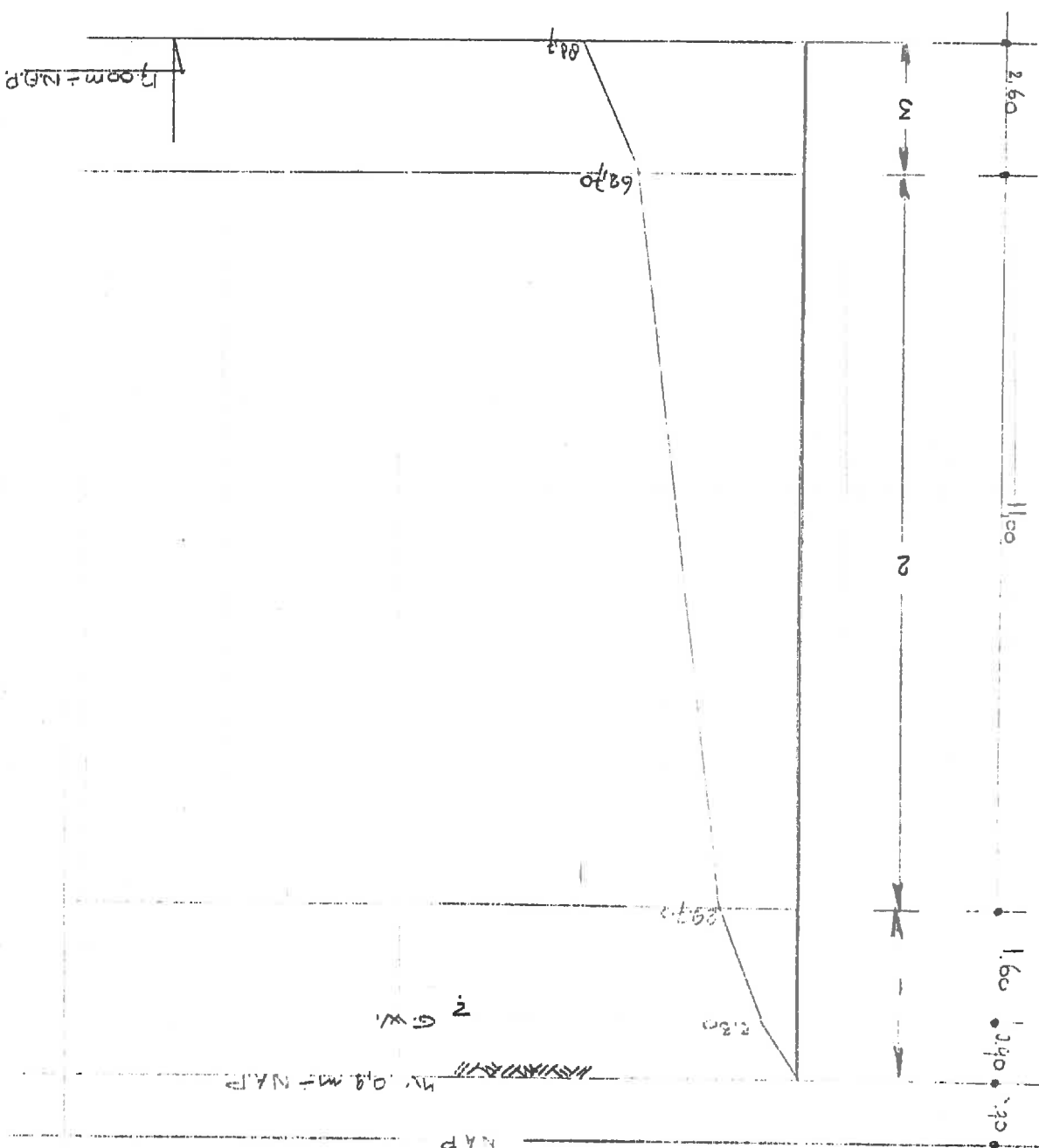
$$= 558,60 \text{ KN}$$

$$= 616,38 \text{ KN}$$

toelaatbare paalbelasting:

Ø 220	$1/1,4x \left(\frac{366,88+423,76}{1,4} \right)$	-183,88)	= 272,05 KN
Ø 250	$1/1,4x \left(\frac{309,38+481,55}{1,4} \right)$	-208,96)	= 254,28 KN
Ø 290	$1/1,4x \left(\frac{383,5+558,6}{1,4} \right)$	-242,39)	= 307,53 KN
Ø 320	$1/1,4x \left(\frac{405,51+616,38}{2} \right)$	-267,47)	= 330,33 KN

sondering:



Laag	10	17/9	1,0	0
1	30°	0,5	1,0	0
2	25°	0,38	0,59	5
3	35°	0,6	1,4	0

negatieve kleef in de zône van maaiveld tot 14,50 m ÷ N.A.P.

bovenlaag van 2,5 m zandlaag.

positieve kleef in de zone van 14,50 m ÷ N.A.P. tpt 17,00 m ÷ N.A.P.

negatieve kleef:

$$\emptyset 220 \quad \frac{0,88 \times 0,9 \times 15,30}{2} \times 0,5 \times 1 = 3,04 \text{ KN}$$

$$0,88 \times 1,60 \times \frac{15,30 + 39,7}{2} \times 0,5 \times 1 = 15,84 -$$

$$0,88 \times 11,00 \times \frac{29,7 + 62,70}{2} \times 0,38 \times 0,59 = 100,27 -$$

$$0,88 \times 11,00 \times 5 = 48,40 -$$

$\emptyset 250$	250/220x167,55	= 190,40 KN
$\emptyset 290$	290/220x167,55	= 220,87 KN
$\emptyset 320$	320/220x167,55	= 243,71 KN

positieve kleef:

$\emptyset 220$	$0,88 \times 2,60 \times \frac{62,70 + 88,70}{2} \times 0,6 \times 1,5$	= 155,88 KN
$\emptyset 250$	250/220x155,88	= 177,14 KN
$\emptyset 290$	290/220x155,88	= 205,48 KN
$\emptyset 320$	320/220x155,88	= 226,74 KN

Evenwichtsdraagvermogen:

$$\emptyset 220 \quad \text{vonder} = \frac{8,9 + 8 \times 8,00}{9} = 8,1 \text{ N/mm}^2$$

$$\text{vboven} =$$

$$F_{\text{punt}} =$$

$$\emptyset 250 \quad \text{vonder} = \frac{8,9 + 8 \times 8,00}{9} = 8,10 \text{ N/mm}^2$$

$$\text{vboven} =$$

$$F_{\text{punt}} =$$

$$\emptyset 290 \quad \text{vonder} = \frac{8,9 + 8 \times 8,00}{9} = 8,10 \text{ N/mm}^2$$

$$\text{vboven} =$$

$$F_{\text{punt}} =$$

$$\emptyset 320 \quad \text{vonder} = \frac{8,9 + 3 \times 8,00 + 6,5 \times 5}{9} = 7,26 \text{ N/mm}^2$$

$$\text{vboven} =$$

$$F_{\text{punt}} =$$

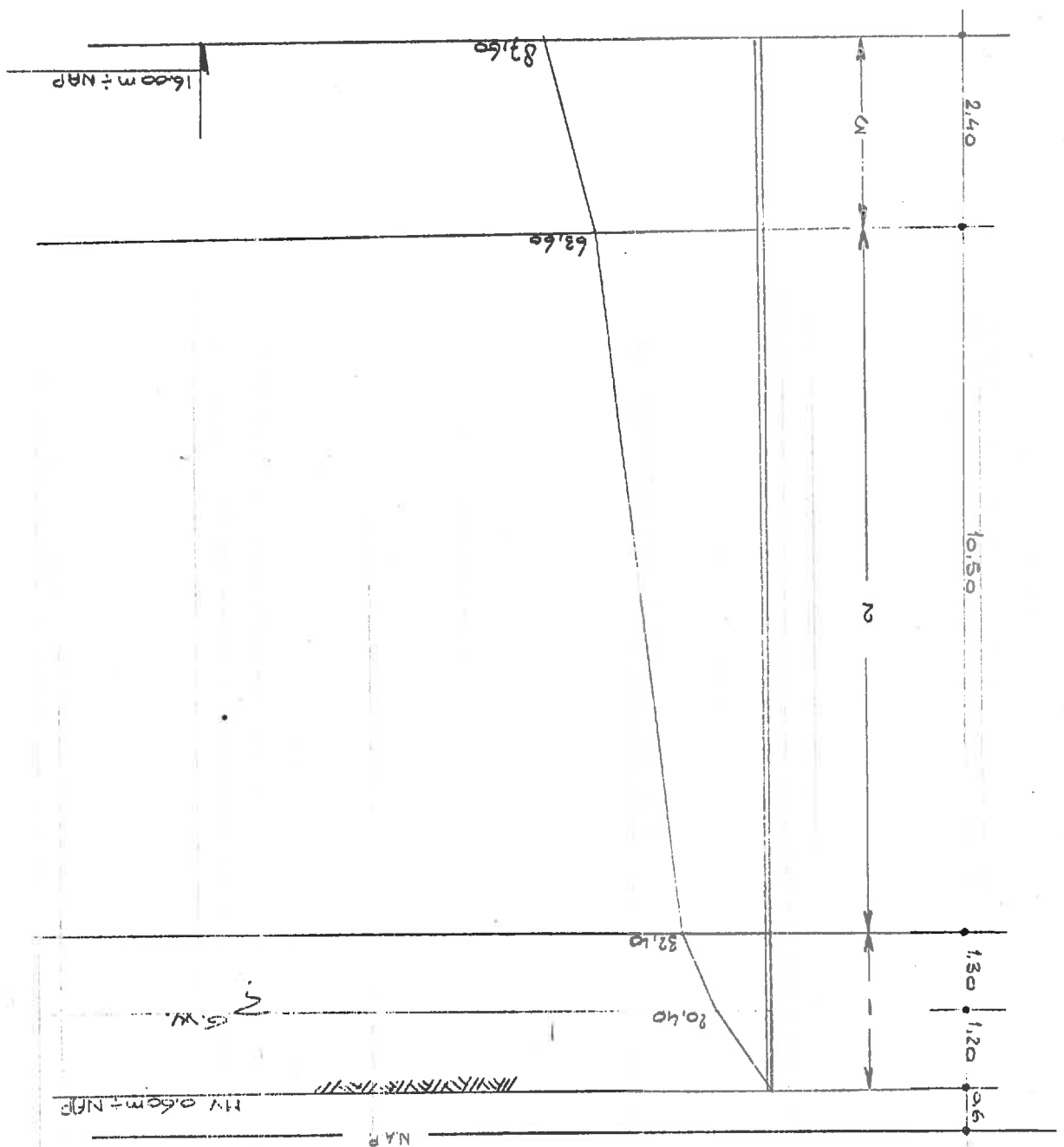
$$\frac{7 \times 6,5 + 0,2}{8} = 5,71 \text{ N/mm}^2$$

$$\frac{5,71 + 7,26}{2} \times 320^2 \times 10^{-3} = 664,06 \text{ KN}$$

toelaatbare paalbelastingen:

Ø 220	$\frac{389,62+155,88}{1,4}$	$\frac{1}{1,4x}$	-167,55)	= 158,64 KN
Ø 250	$\frac{499,38+177,14}{1,4}$	$\frac{1}{1,4x}$	-190,40)	= 209,16 KN
Ø 290	$\frac{651,78+205,48}{1,4}$	$\frac{1}{1,4x}$	-220,87)	= 279,61 KN
Ø 320	$\frac{664,06+226,74}{1,4}$	$\frac{1}{1,4x}$	-243,71)	= 280,41 KN

Sondering 6:



laag	4	f	mg	17/9	1,00	0
1	30°	0,5				0
2	25°	0,38	3		0,59	5
3	35°	0,6	10		1,5	0

negatieve kleeft:

Ø 220 $\frac{0,88 \times 1,2 \times 20,40}{2} \times 0,5 \times 1 = 5,39 \text{ KN}$

$\frac{0,88 \times 1,3 \times 20,40 + 32,10}{2} \times 0,5 \times 1 = 15,02 =$

$\frac{0,88 \times 10,5 \times 32,10 + 63,60}{2} \times 0,38 \times 0,59 = 99,13 =$

$0,88 \times 10,5 \times 5 = 46,20 =$

Ø 250 $\frac{165,74 \text{ KN}}{188,35 \text{ KN}} = 218,48 \text{ KN}$
 Ø 290 $= 241,08 \text{ KN}$

positieve kleeft:

Ø 220 $\frac{0,88 \times 2,4 \times 63,60 + 87,6}{2} \times 0,6 \times 1,5 = 143,70 \text{ KN}$

Ø 250 $= 163,30 \text{ KN}$

Ø 290 $= 189,42 \text{ KN}$

Ø 320 $= 209,02 \text{ KN}$

evenwichtsdraagvermogen:

Ø 220 $\frac{15 + 8 \times 10}{9} = 10,55 \text{ N/mm}^2$

$\frac{15 + 8 \times 10}{9} = 10,0 \text{ N/mm}^2$

$F_p =$

Ø 250 $\frac{15 + 8 \times 10}{9} = 10,55 \text{ N/mm}^2$

$\frac{15 + 8 \times 10}{9} = 10,0 \text{ N/mm}^2$

$F_p =$

Ø 290 $\frac{7 \times 10 + 2,6}{8} = 10,55 \text{ N/mm}^2$

$\frac{7 \times 10 + 2,6}{8} = 9,08 \text{ N/mm}^2$

$F_p =$

Ø 320 $\frac{6 \times 10,0 + 2,4 + 0,4}{8} = 10,55 \text{ N/mm}^2$

$\frac{6 \times 10,0 + 2,4 + 0,4}{8} = 7,85 \text{ N/mm}^2$

$F_p =$

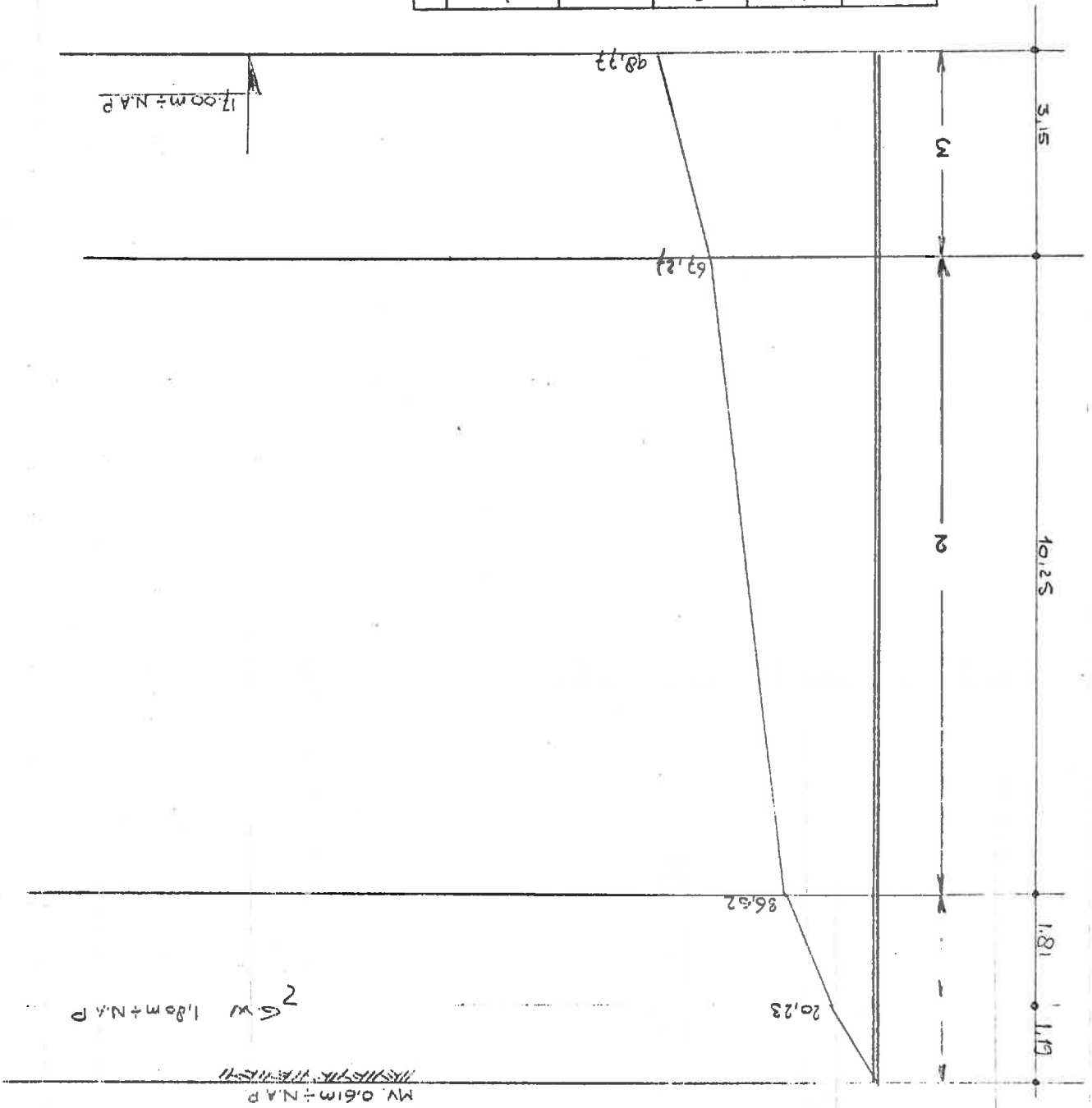
toelaatbare paalbelasting:

Ø 220 $\frac{1}{1,4 \times} \left(\frac{497,31 + 143,70}{1,4} - 165,74 \right) = 208,66 \text{ KN}$

Ø 250 $\frac{1}{1,4 \times} \left(\frac{642,36 + 163,30}{1,4} - 188,35 \right) = 276,52 \text{ KN}$

Ø 290 $\frac{1}{1,4 \times} \left(\frac{825,44 + 189,42}{1,4} - 218,48 \right) = 361,73 \text{ KN}$

Ø 320 $\frac{1}{1,4 \times} \left(\frac{942,08 + 209,02}{1,4} - 241,08 \right) = 415,10 \text{ KN}$



laag	l	f	mg	k	c
1	30°	0,5	17/9	1	0
2	25°	0,38	3	0,59	5
3	35°	0,6	10	1,5	0

negatieve kleef in de zone van maaienveld tot 13,85 m ÷ N.A.P.
 bovenste laag 3 m zand.
 positieve kleef in de zone van 13,85 m ÷ N.A.P. tot 17,00 m ÷ N.A.P.

negatieve kleeft:

Ø 220 $0,88 \times 1,19 \times \frac{20,23}{2} \times 0,5 \times 1 = 5,30 \text{ KN}$

$0,88 \times 1,81 \times \frac{36,52 + 20,23}{2} \times 0,5 \times 1 = 22,60$

$0,88 \times 10,25 \times \frac{36,52 + 67,27}{2} \times 0,38 \times 0,59 = 104,95$

$0,88 \times 10,25 \times 5 = 45,10$

Ø 250 $= 202,22 \text{ KN}$
 Ø 290 $= 234,57 \text{ KN}$
 Ø 320 $= 258,84 \text{ KN}$

positieve kleeft:

Ø 220 $0,88 \times 3,15 \times \frac{67,27 + 98,77}{2} \times 0,6 \times 1,5 = 207,12 \text{ KN}$

$= 207,12 \text{ KN}$
 $= 235,36 \text{ KN}$
 $= 273,02 \text{ KN}$
 $= 301,26 \text{ KN}$

Evenwichtsdraagvermogen:

Ø 220 $\sigma_o = 10 \text{ N/mm}^2$

$\sigma_b = 8 \text{ N/mm}^2$

$F_p =$

$9 \times 220^2 \times 10^{-3}$

Ø 250 $\sigma_o = 10 \text{ N/mm}^2$

$\sigma_b = 8 \text{ N/mm}^2$

$F_p =$

Ø 290 $\sigma_o = 10 \text{ N/mm}^2$

$\sigma_b = 8 \text{ N/mm}^2$

$F_p =$

Ø 320 $\sigma_o = 10 \text{ N/mm}^2$

$\sigma_b = \frac{7 \times 8,0 + 1,2}{8} = 7,15 \text{ N/mm}^2$

F_p

toelaatbare paalbelasting:

Ø 220 $\frac{435,6 + 207,12}{1,4} \times 1/1,4 \times (-177,95)$

Ø 250 $\frac{562,5 + 235,56}{1,4} \times 1/1,4 \times (-202,22)$

Ø 290 $\frac{756,9 + 273,02}{1,4} \times 1/1,4 \times (-234,57)$

Ø 320 $\frac{878,08 + 301,26}{1,4} \times 1/1,4 \times (-258,84)$

$= 878,08 \text{ KN}$

$= 756,9 \text{ KN}$

$= 562,5 \text{ KN}$

$= 435,6 \text{ KN}$

$= 177,95 \text{ KN}$
 $= 202,22 \text{ KN}$
 $= 234,57 \text{ KN}$
 $= 258,84 \text{ KN}$

$= 104,95$

$= 22,60$

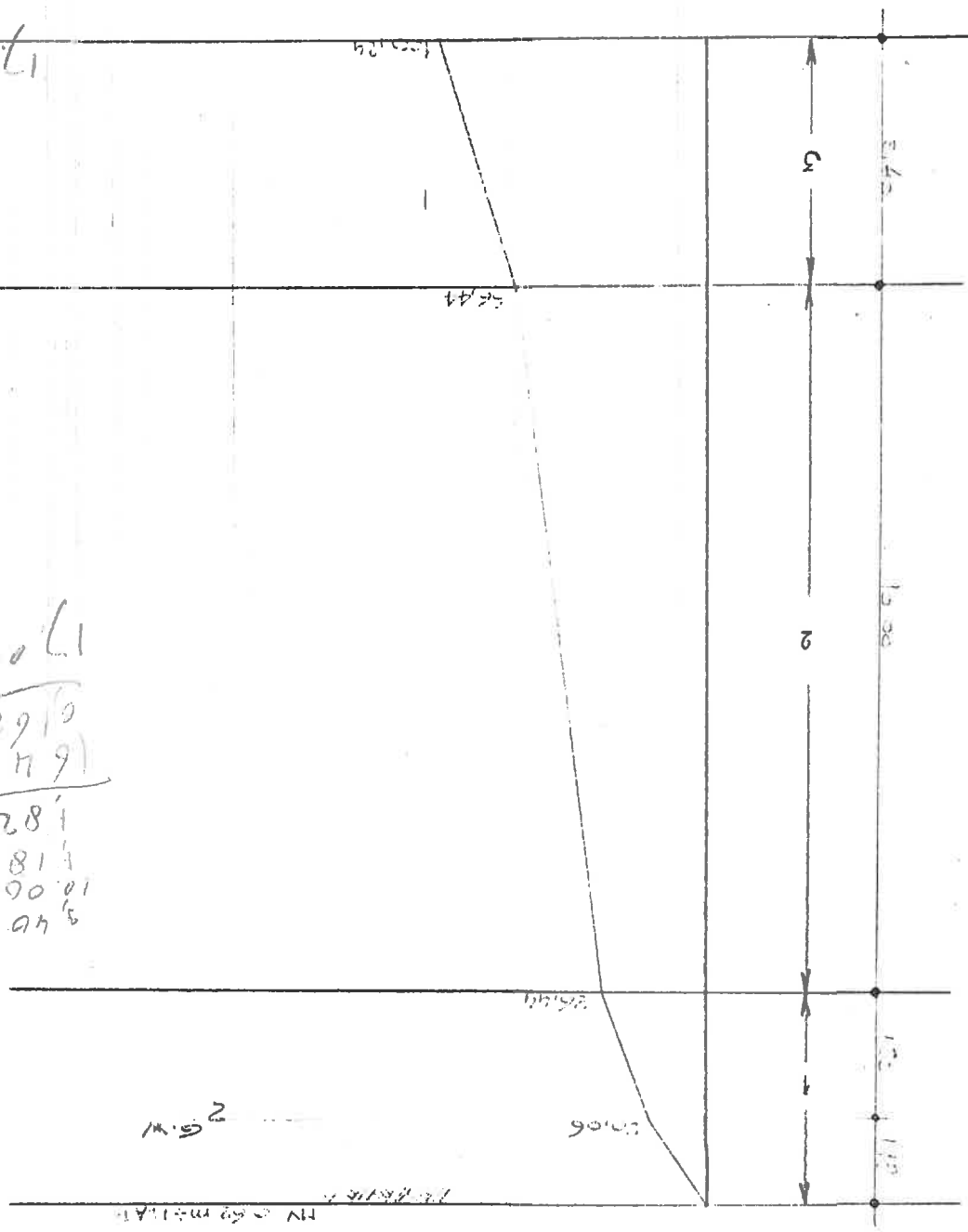
$= 5,30 \text{ KN}$

$= 416,82 \text{ KN}$

$= 357,92 \text{ KN}$

$= 262,63 \text{ KN}$

$= 200,81 \text{ KN}$



17.00
 16.40
 1.82
 1.18
 1.00
 1.40

laag	f	mg	k	c
1	30°	0,5	17/9	0
2	25°	0,38	3	0,59
3	35°	0,6	10	1,5

negatieve kleeft:

220 =

$$0,22 \times 4 \times 1,18 \times 20,06 / 2 \times 0,5 \times 1$$

$$0,22 \times 4 \times 1,82 \times 20,06 + 36,44 \times 0,5 \times 1$$

$$0,22 \times 4 \times 10 \times (36,44 + 66,44 \times 0,38 \times 0,59 + 5) \times 2$$

- = 5,21 KN
- = 22,63
- = 145,56
- = 173,40 KN
- = 197,05 KN
- = 228,58 KN
- = 252,22 KN

- 250
- 290
- 320

- 25/22x173,40
- 29/22x173,40
- 32/22x173,40

positieve kleeft:

$$0,22 \times 4 \times 3,38 \times \frac{66,44 + 100,24}{2} \times 0,6 \times 1,5$$

220	220	= 223,09 KN
250	250	= 253,53 KN
290	290	= 294,08 KN
320	320	= 324,51 KN

evenwichtsdraagvermogen:

$$\frac{7,0 + 11,0 + 10,8 + 8,6 + 8,1 \times 5}{9}$$

$$\begin{aligned} \sigma_{\text{onder}} &= 8,65 \text{ N/mm}^2 \\ \sigma_{\text{boven}} &= 7,0 \text{ N/mm}^2 \end{aligned}$$

$$F_p = 378,73 \text{ KN}$$

$$\sigma_{\text{onder}} = 7,0 + 11,0 + 10,8 + 8,6 + 8,1 \times 5$$

$$\begin{aligned} \sigma_{\text{boven}} &= 7,0 \text{ N/mm}^2 \\ F_p &= 489,06 \text{ KN} \end{aligned}$$

$$\sigma_o = \frac{7,0 + 11,2 + 9,0 + 8,1 + 8,1 \times 5}{9}$$

$$\begin{aligned} \sigma_b &= 8,42 \text{ N/mm}^2 \\ F_p &= 648,41 \text{ KN} \end{aligned}$$

$$\sigma_o = \frac{7,0 + 11,2 + 9,0 + 8,1 + 8,1 \times 5}{9}$$

$$\begin{aligned} \sigma_b &= 5,94 \text{ N/mm}^2 \\ F_p &= 735,23 \text{ KN} \end{aligned}$$

toelaatbare paalbelastingen:

$$\frac{1}{1,4} \times \frac{378,73 + 223,09}{1,4}$$

$$= 183,19 \text{ KN}$$

$$\frac{1}{1,4} \times \frac{489,06 + 253,52}{1,4}$$

$$= 238,12 \text{ KN}$$

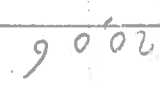
$$\frac{1}{1,4} \times \frac{648,41 + 294,08}{1,4}$$

$$= 317,59 \text{ KN}$$

$$\frac{1}{1,4} \times \frac{735,23 + 324,51}{1,4}$$

$$= 360,53 \text{ KN}$$

dd'N + W 89'0 A/4



10/91	01	9'0	18	5
565'0	5	0'0	24	48
0 0'1	6	15'0	18	23
5 65'0	3	0'0	24	22
0 1	6 16	15'0	18	14
5	6 16	15'0	18	1

negatieve kleef:

$$\sigma_{220} = 0,88 \times 1,18 \times \frac{20,06}{2} \times 0,5 \times 1,0 = 5,35 \text{ KN}$$

$$0,88 \times 1,32 \times \frac{20,06 + 31,94}{2} \times 0,5 \times 1,0 = 15,26 -$$

$$0,88 \times 10,75 \times \left(\frac{31,94 + 64,19}{2} \times 0,38 \times 0,59 \right) = 101,94 -$$

$$0,88 \times 10,75 \times 5 = 47,3 -$$

$$\sigma_{250} = 169,85 \text{ KN} \quad \sigma_{290} = 223,89 \text{ KN} \quad \sigma_{320} = 247,05 \text{ KN}$$

positieve kleef:

$$\sigma_{220} = 0,88 \times 3,15 \times \frac{64,19 + 95,69}{2} \times 0,6 \times 1,5 = 199,43 \text{ KN}$$

$$\sigma_{250} = 226,63 \text{ KN} \quad \sigma_{290} = 262,89 \text{ KN} \quad \sigma_{320} = 290,09 \text{ KN}$$

evenwichtsdraagvermogen:

$$\sigma_{220} = 8,5 + 8,5 + 12,2 + 11,1 + 10 = 5$$

$$\sigma_b = 6 \text{ N/mm}^2 \quad F_p = 10,08 \text{ N/mm}^2$$

$$\sigma_{250} = \frac{2 \times 8,5 + 11,5 + 11,4 + 10,8}{5} = 10,14 \text{ N/mm}^2$$

$$\sigma_b = 6 \text{ N/mm}^2 \quad F_p = 10,14 \text{ N/mm}^2$$

$$\sigma_{290} = \frac{8,5 \times 2 + 11,6 + 10,8 + 8,5}{5} = 9,58 \text{ N/mm}^2$$

$$\sigma_b = 6 \text{ N/mm}^2 \quad F_p = 9,58 \text{ N/mm}^2$$

$$\sigma_{320} = \frac{8,5 \times 2 + 11,6 + 10,8 + 8,5}{5} = 9,58 \text{ N/mm}^2$$

$$\sigma_b = 6 \text{ N/mm}^2 \quad F_p = 9,58 \text{ N/mm}^2$$

toelaatbare paalbelasting

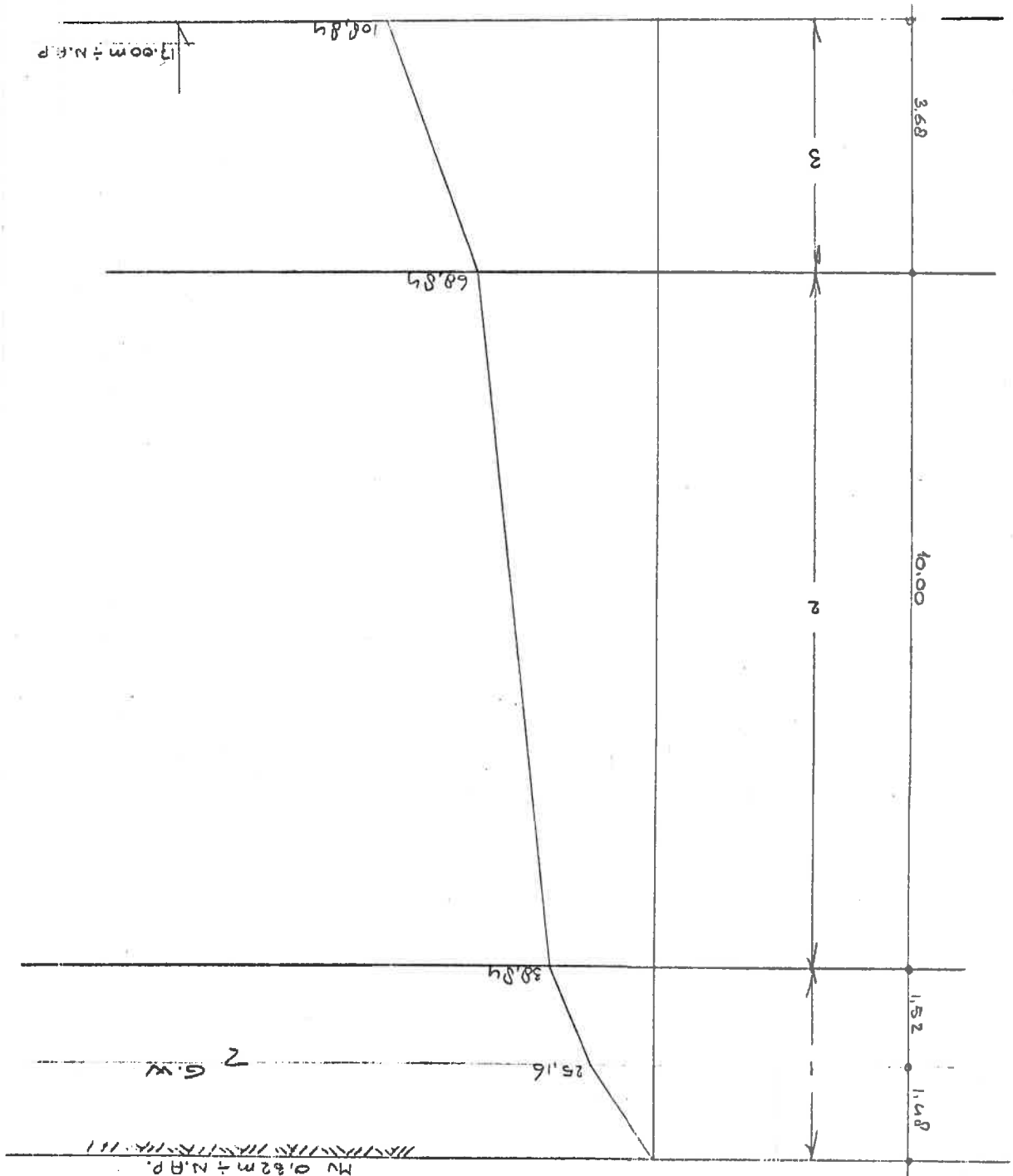
$$\sigma_{220} = \frac{389,14 + 199,43}{1,4} - 169,85 = 178,97 \text{ KN}$$

$$\sigma_{250} = \frac{504,38 + 226,63}{1,4} - 193,01 = 235,10 \text{ KN}$$

$$\sigma_{290} = \frac{655,14 + 262,89}{1,4} - 223,89 = 308,46 \text{ KN}$$

$$\sigma_{320} = \frac{797,69 + 290,09}{1,4} - 247,05 = 378,53 \text{ KN}$$

sondering 8:



laag	φ	f	mg	k	c
1	30°	0,5	17/9	1	0
2	25°	0,38	3	0,59	5
3	35°	0,6	10	1,5	0

negatieve kleef:

Ø 220 $\sigma_b = \frac{25,16}{2} \times 0,88 \times 1,48 \times \frac{2}{25,16} \times 0,5 \times 1 = 8,20 \text{ KN}$

$\sigma_b = \frac{25,16 + 38,84}{2} \times 0,88 \times 1,52 \times \frac{2}{25,16} \times 0,5 \times 1 = 21,41$

$\sigma_b = \frac{38,84 + 68,84}{2} \times 0,88 \times 1,00 \times \frac{2}{38,84 + 68,84} \times 0,38 \times 0,59 + 5 = 150,22$

$= 179,83 \text{ KN}$

$= 204,36 \text{ KN}$

$= 237,05 \text{ KN}$

$= 261,58 \text{ KN}$

Ø 320

Ø 290

Ø 250

positieve kleef:

Ø 220

$\sigma_b = \frac{68,84 + 105,64}{2} \times 0,88 \times 3,68 \times \frac{2}{68,84 + 105,64} \times 0,6 \times 1,5 = 254,27 \text{ KN}$

$= 254,27 \text{ KN}$

Ø 250

$= 288,94 \text{ KN}$

Ø 290

$= 335,17 \text{ KN}$

Ø 320

$= 369,84 \text{ KN}$

evenwichtsdraagvermogen:

Ø 220 $\sigma_o = \frac{12 + 10,8 + 9,5 + 8,2 \times 6}{9} = 9,06 \text{ N/mm}^2$

$\sigma_b = \frac{2 \times 8,2 + 6 \times 4,0}{8} = 5,05 \text{ N/mm}^2$

$\sigma_b = \frac{2 \times 8,2 + 6 \times 4,0}{8} = 5,05 \text{ N/mm}^2$

$= 341,46 \text{ KN}$

Ø 250 $\sigma_o = \frac{12 + 10,8 + 9,5 + 8,2 \times 6}{9} = 9,06 \text{ N/mm}^2$

$\sigma_b = \frac{2 \times 8,2 + 6 \times 4,0}{8} = 5,05 \text{ N/mm}^2$

$= 440,94 \text{ KN}$

Ø 290 $\sigma_o = \frac{12 + 10,8 + 9,5 + 8,2 \times 8}{11} = 8,9 \text{ N/mm}^2$

$\sigma_b = \frac{2 \times 8,2 + 6 \times 4}{8} = 5,05 \text{ N/mm}^2$

$= 586,50 \text{ KN}$

Ø 320 $\sigma_o = \frac{12 + 10,8 + 8,2 + 8,2 + 4 \times 8,2}{9} = 8,91 \text{ N/mm}^2$

$\sigma_b = \frac{2 \times 8,2 + 6 \times 4}{8} = 5,05 \text{ N/mm}^2$

$= 714,75 \text{ KN}$

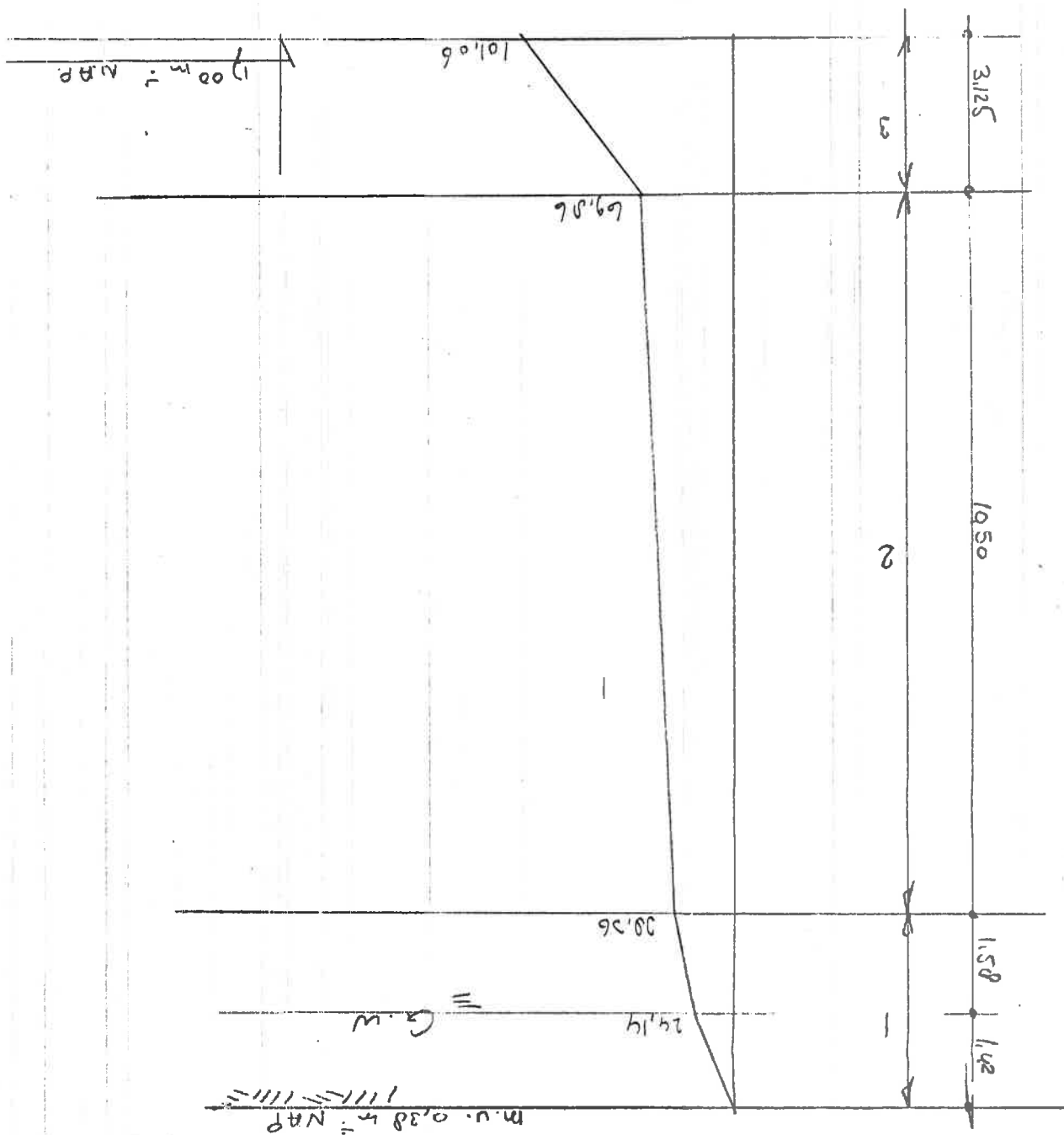
toelaatbare paalbelasting:

Ø 220 $\frac{1}{1,4} \times \frac{341,46 + 254,27}{1,4} - 179,83 = 175,49 \text{ KN}$

Ø 250 $\frac{1}{1,4} \times \frac{440,94 + 288,94}{1,4} - 204,36 = 226,42 \text{ KN}$

sondering 9:

$$\begin{aligned} \varnothing 290 &= \frac{586,60+335,17}{1,4} \cdot \frac{1}{1,4} \cdot (-237,05) = 300,97 \text{ KN} \\ \varnothing 320 &= \frac{714,75+369,84}{1,4} \cdot \frac{1}{1,4} \cdot (-261,58) = 366,52 \text{ KN} \end{aligned}$$



laag	f	mg	h	c
1	30°	0,5	17/9	0
2	25°	0,38	3	0,59
3	35°	0,6	10	1,5
4	25°	0,38	3	0,59
5	35°	0,6	10	1,5

negatieve kleef:

$$\varnothing 220 \quad 0,22 \times 4 \times 1,42 \times \frac{24,14}{2} \times 0,5 \times 1 = 7,55 \text{ KN}$$

$$0,22 \times 4 \times 1,58 \times \frac{24,14 + 38,36}{2} \times 0,5 \times 1 = 21,73 \text{ KN}$$

$$0,22 \times 4 \times 10,50 \times \left(\frac{38,36 + 69,86}{2} \times 0,38 \times 0,59 + 5 \right) = 158,29 -$$

$$187,57 \text{ KN} = 213,15 \text{ KN} = 247,25 \text{ KN} = 272,83 \text{ KN}$$

positieve kleef:

$$\varnothing 220 \quad 0,22 \times 4 \times 2,37 \times \frac{69,86 + 101,06}{2} \times 0,6 \times 1,5 = 160,41 \text{ KN}$$

$$= 182,29 \text{ KN} = 211,45 \text{ KN} = 233,33 \text{ KN}$$

evenwichts draagvermogen:

$$\varnothing 220 \quad \text{onder} = \frac{10,4 + 10,4 + 9,0 + 8,0 + 8,0 + 5}{9}$$

boven

Fp

$$= 8,64 \text{ N/mm}^2 = 8,0 \text{ N/mm}^2 = 402,69 \text{ KN}$$

$$\frac{10,4 + 10,4 + 7 \times 7,0}{9}$$

$$\varnothing 250 \quad \text{onder} =$$

boven

Fp

$$= 7,76 \text{ N/mm}^2 = 7,0 \text{ N/mm}^2 = 461,25 \text{ KN}$$

$$\frac{10,4 + 10,4 + 7 \times 7,0}{9}$$

$$\varnothing 290 \quad \text{onder} =$$

boven

Fp

$$= 6,125 \text{ N/mm}^2 = 7,76 \text{ N/mm}^2 = 584,86 \text{ KN}$$

$$\frac{6 \times 7,0 + 5,5 + 1,5}{8}$$

$$\varnothing 320 \quad \text{onder} =$$

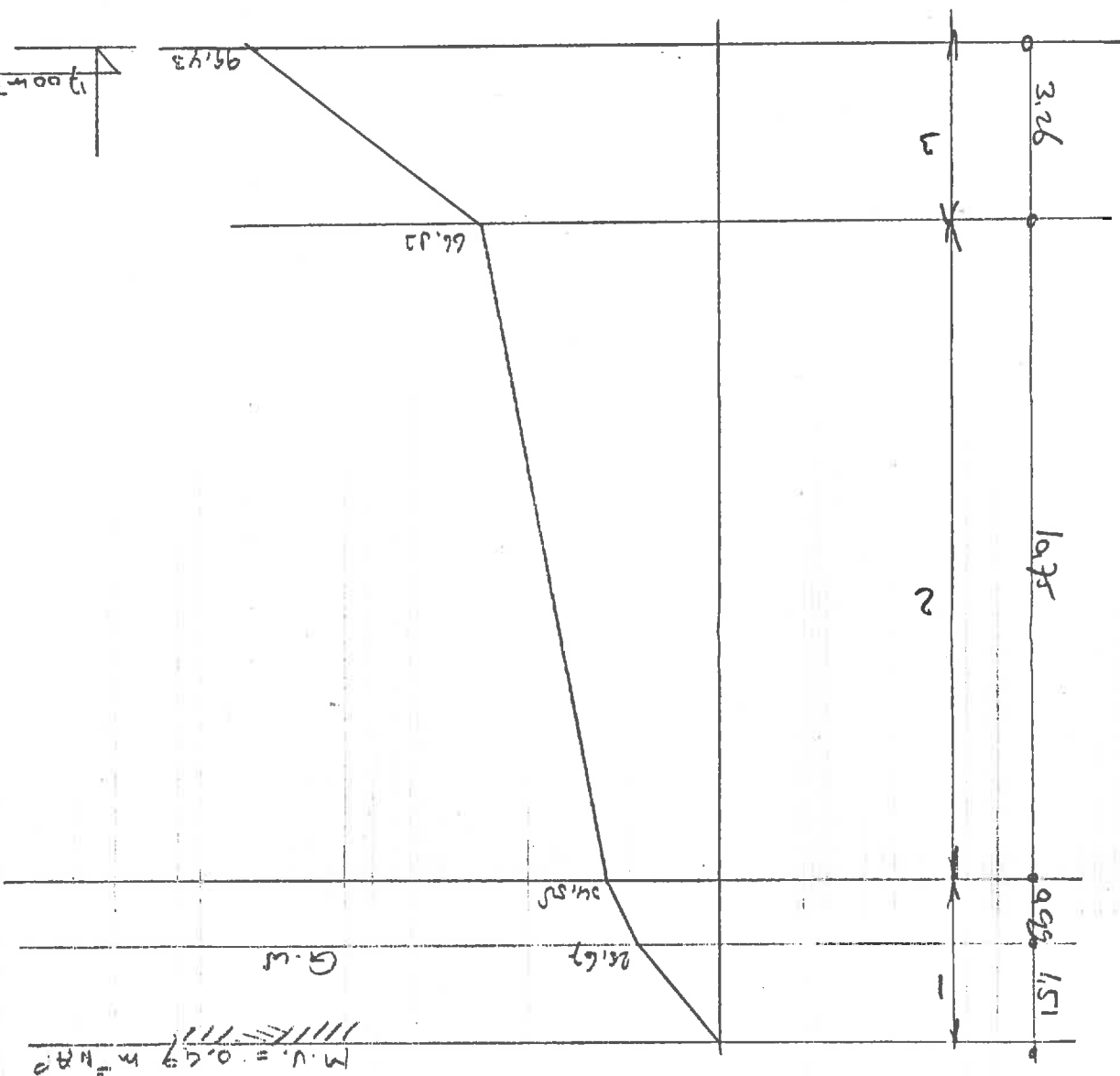
boven

Fp

$$= 5,375 \text{ N/mm}^2 = 7,76 \text{ N/mm}^2 = 672,5 \text{ KN}$$

$$\frac{5 \times 7,0 + 5,5 + 1,5}{8}$$

ø 220	$1/1,4 \times \frac{402,69+160,41}{1,4}$	-187,57)	= 153,31 KN
ø 250	$1/1,4 \times \frac{461,25+182,29}{1,4}$	-213,15)	= 176,09 KN
ø 290	$1/1,4 \times \frac{584,86+211,45}{1,4}$	-247,83)	= 229,26 KN
ø 320	$1/1,4 \times \frac{672,5+233,33}{1,4}$	-272,83)	= 267,30 KN



laag	V	F	mg	k	c
1	30°	0,5	17/9	1	0
2	25°	0,38	3	0,59	5
3	35°	0,6	10	1,5	0

negatieve kleeft:

$$\begin{aligned} \varnothing 220 &= 8,53 \text{ KN} \\ &= 25,67 \times 0,22 \times 1,51 \times \frac{2}{25,67} \times 0,5 \times 1 \end{aligned}$$

$$= 13,13 - 25,67 + 34,58 \times 0,22 \times 4 \times 0,99 \times \frac{2}{25,67 + 34,58} \times 0,5 \times 1$$

$$= 154,84 - 34,58 + 66,83 \times 0,22 \times 4 \times 10,75 \times \left(\frac{2}{34,58 + 66,83} \right) \times 0,38 \times 0,59 + 5$$

$$= 176,50 \text{ KN}$$

$$\varnothing 250 = 200,57 \text{ KN}$$

$$\varnothing 290 = 232,66 \text{ KN}$$

$$\varnothing 320 = 256,73 \text{ KN}$$

positieve kleeft:

$$\varnothing 220 = 214,64 \text{ KN}$$

$$\varnothing 250 = 243,90 \text{ KN}$$

$$\varnothing 290 = 282,93 \text{ KN}$$

$$\varnothing 320 = 312,20 \text{ KN}$$

evenwichtsdragsvermogen:

$$\begin{aligned} \varnothing 220 & \quad \begin{aligned} \sigma_{\text{onder}} &= \frac{10,2 + 13,6 + 12 + 10,4 + 10 \times 5}{9} = 10,69 \text{ N/mm}^2 \\ \sigma_{\text{boven}} &= 10 \text{ N/mm}^2 \end{aligned} \\ & \quad F_p = 500,7 \text{ KN} \end{aligned}$$

$$\begin{aligned} \varnothing 250 & \quad \begin{aligned} \sigma_{\text{onder}} &= \frac{10,2 + 13,6 + 12 + 10,4 + 10 \times 5}{9} = 10,69 \text{ N/mm}^2 \\ \sigma_{\text{boven}} &= 10 \text{ N/mm}^2 \end{aligned} \\ & \quad F_p = 646,56 \text{ KN} \end{aligned}$$

$$\varnothing 290 \quad \begin{aligned} \sigma_{\text{onder}} &= \frac{10,2 + 14 + 11,1 + 10 + 10 \times 5}{9} = 10,59 \text{ N/mm}^2 \\ & \quad F_p = 839,74 \text{ KN} \end{aligned}$$

$$\varnothing 320 \quad \begin{aligned} \sigma_{\text{onder}} &= \frac{10,2 + 14 + 11,1 + 10 + 10 \times 5}{9} = 10,59 \text{ N/mm}^2 \\ & \quad F_p = 966,66 \text{ KN} \end{aligned}$$

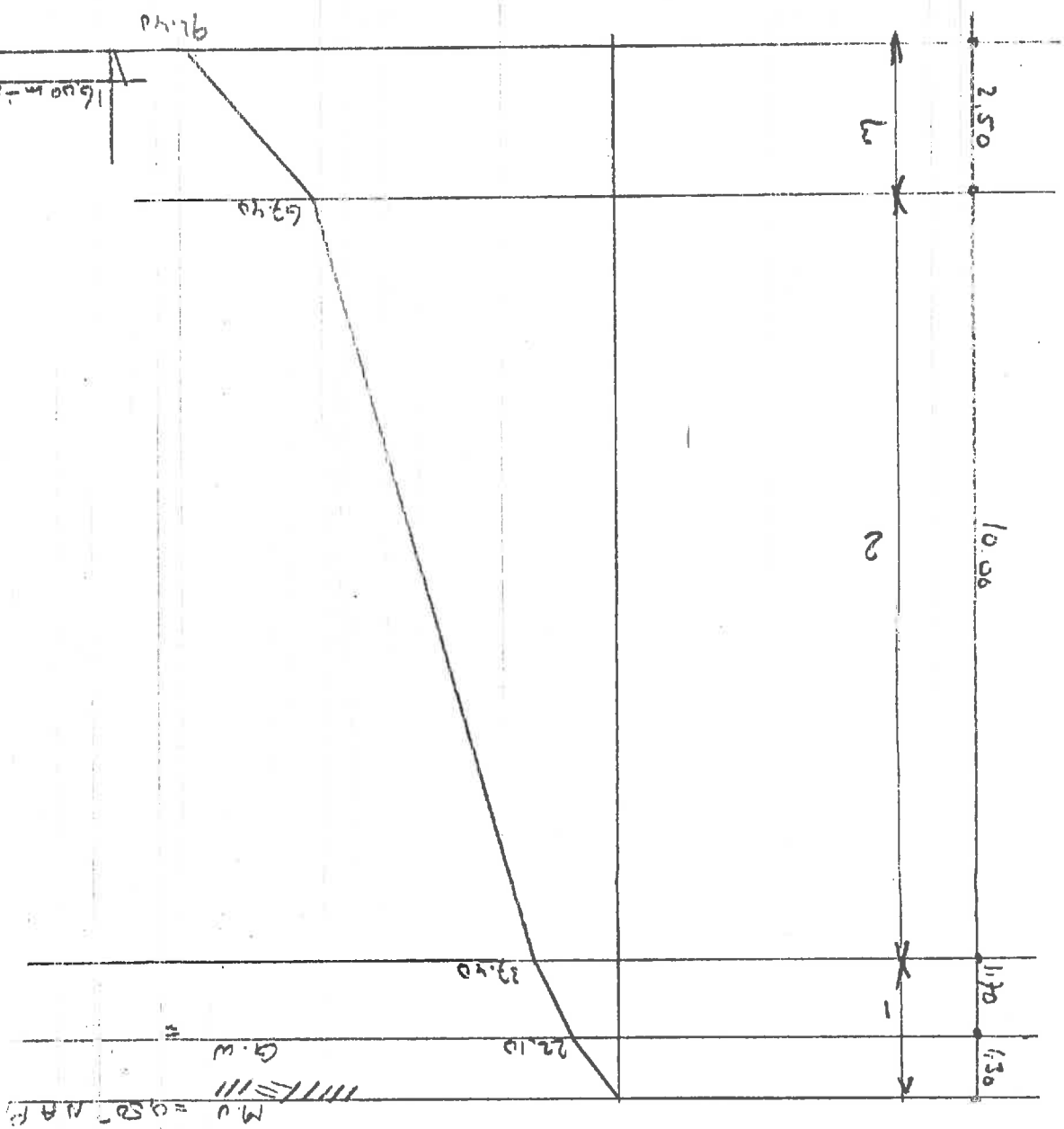
toelaatbare paalbelastingen:

$$\varnothing 220 = 238,90 \text{ KN}$$

$$\varnothing 250 = 311,05 \text{ KN}$$

Sondering 11:

$$\begin{aligned} \phi \quad 290 &= 839,74 + 282,93 \frac{1,4}{1/1,4 \times (-232,66)} = 406,61 \text{ KN} \\ \phi \quad 320 &= 966,66 + 312,20 \frac{1,4}{1/1,4 \times (-256,73)} = 469,10 \text{ KN} \end{aligned}$$



Laag	h	f	mg	k	c
1	30°	0,5	17/9	1	0
2	25°	0,38	3	0,59	5
3	35°	0,6	10	1,5	0

negatieve kleeft:

Ø 220 $\frac{0,22 \times 4 \times 1,3 \times 22,10}{2} \times 0,5 \times 1 = 6,32 \text{ KN}$

$\frac{0,22 \times 4 \times 1,7 \times 22,10 + 37,40}{2} \times 0,5 \times 1 = 22,26 -$

$\frac{0,22 \times 4 \times 10,0 \times (37,40 + 67,4)}{2} \times 0,38 \times 0,50 + 5 = 147,38 -$

Ø 250 = 199,95 KN
 Ø 290 = 231,95 KN
 Ø 320 = 255,94 KN

positieve kleeft:

Ø 220 $\frac{0,22 \times 4 \times 2,5 \times 67,40 + 92,40}{2} \times 0,6 \times 1,5 = 158,20 \text{ KN}$

Ø 250 = 179,78 KN
 Ø 290 = 208,54 KN
 Ø 320 = 230,11 KN

evenwichtsdraagvermogen:

Ø 220 $\sigma_{\text{onder}} = \frac{11,0 + 10,2 + 10,2 \times 7}{9} = 10,3 \text{ N/mm}^2$

$\sigma_{\text{boven}} = \sigma_{\text{onder}} = 10,2 \text{ N/mm}^2$

Ø 250 $\sigma_{\text{onder}} = \frac{11,0 + 10,2 \times 2 + 10,2 \times 6}{9} = 10,3 \text{ N/mm}^2$
 $\sigma_{\text{boven}} = 10,2 \text{ N/mm}^2$

Ø 290 $\sigma_{\text{onder}} = \frac{11,0 + 10,2 \times 8}{9} = 10,3 \text{ N/mm}^2$
 $\sigma_{\text{boven}} = \frac{6 \times 10,2 + 5,4 + 0,2}{8} = 8,4 \text{ N/mm}^2$

Ø 320 $\sigma_{\text{onder}} = \frac{11,0 + 10,2 \times 8}{9} = 10,3 \text{ N/mm}^2$
 $\sigma_{\text{boven}} = \frac{5 \times 10,2 + 5,6 + 2 \times 0,2}{8} = 7,13 \text{ N/mm}^2$

Fp

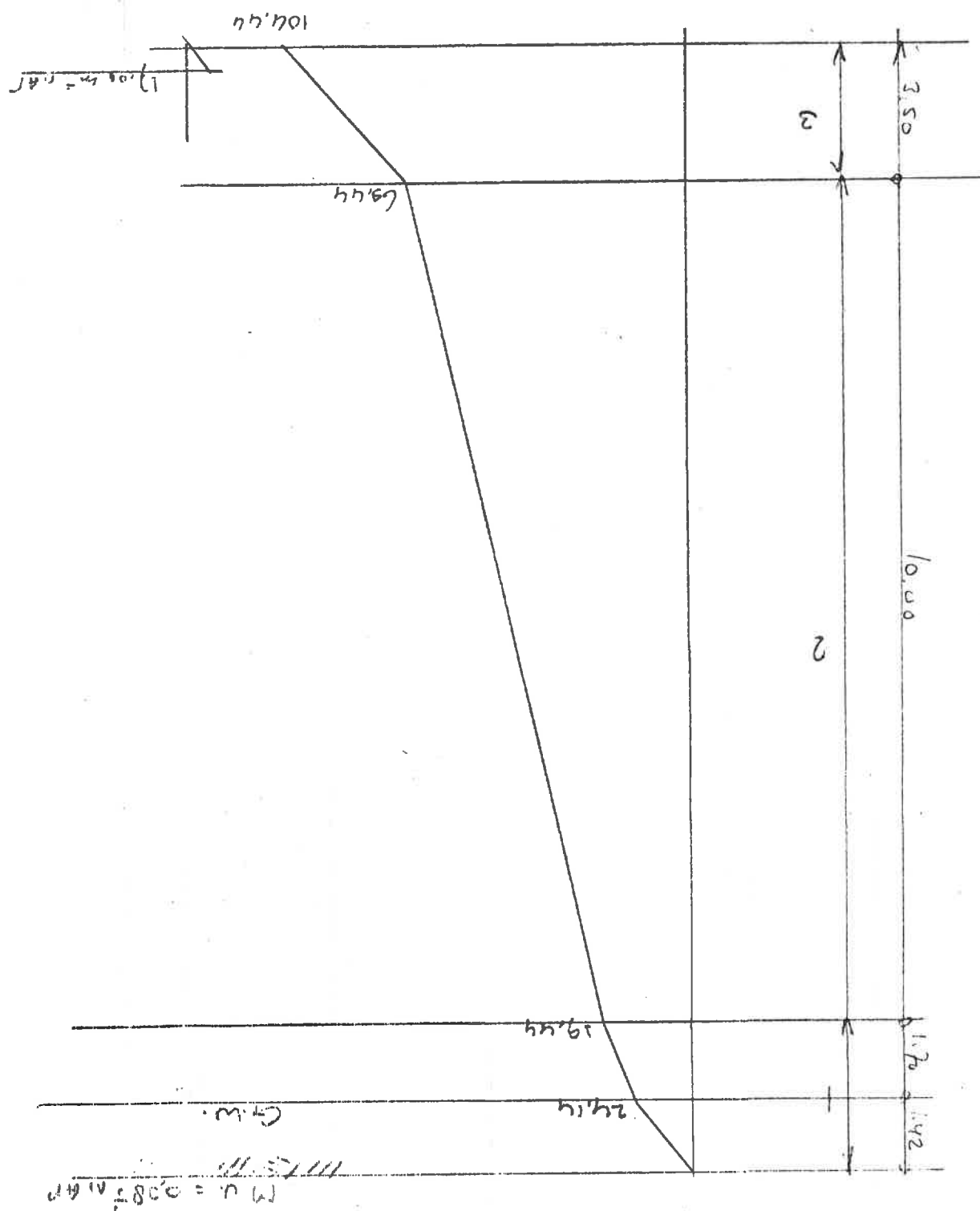
= 892,16 KN

toelaatbare paalbelasting:

Ø 220 $\frac{1}{1,4 \times} \frac{496,1 + 158,2}{1,4} - 175,96 = 208,14 \text{ KN}$

Ø 250 $\frac{1}{1,4 \times} \frac{640,62 + 179,78}{1,4} - 199,95 = 275,75 \text{ KN}$

290	$\frac{1}{1,4}x: \frac{786,34+208,54}{1,4} - 231,95$	$= 341,91 \text{ KN}$
320	$\frac{1}{1,4}x: \frac{892,16+230,11}{1,4} - 255,94$	$= 389,77 \text{ KN}$



laag	f	mg	k	c
2	24°	0,38	3	5
1	30°	0,50	17/9	0
	36°	0,6	10	0

negatieve kleef:

ϕ 220 $\sigma_o = \frac{24,14}{2} (0,88 \times 1,42 \times (24,14 - x_0,5 \times 1))$ = 7,54 KN

$= 23,78 - \frac{24,14 + 39,44}{2} \times 0,88 \times 1,7 \times (24,14 + 39,44 - x_0,5 \times 1)$

$= 151,41 - \frac{39,44 + 69,44}{2} \times 0,88 \times 10 \times (39,44 + 69,44 - x_0,38 \times 0,59 \times 5)$

ϕ 250 = 207,65 KN
 ϕ 290 = 240,87 KN
 ϕ 320 = 265,79 KN

positieve kleef:

ϕ 220 $\sigma_o = \frac{69,44 + 104,44}{2} \times 0,88 \times 3,5 \times (69,44 + 104,44 - x_0,6 \times 1,5)$

ϕ 250 = 273,86 KN
 ϕ 290 = 317,7 KN
 ϕ 320 = 350,54 KN

evenwichtsdraagvermogen:

ϕ 220 $\sigma_o = \frac{10,4 + 8,2 + 7,5 + 7,5 \times 6}{9} = 7,90$ N/mm²

ϕ boven = $\frac{7,5 + 7 \times 6,4}{8}$ = 6,54 N/mm²

F_p = 49,4 KN

ϕ 250 $\sigma_{onder} = \frac{10,4 + 8,2 + 7 \times 7,5}{9}$ = 7,90 N/mm²

ϕ boven = $\frac{7,5 + 7 \times 6,4}{8}$ = 6,54 N/mm²

F_p = 451,25 KN

ϕ 290 $\sigma_{onder} = \frac{10,4 + 8 + 7,5 \times 7}{9}$ = 7,87 N/mm²

ϕ boven = $\frac{7,5 + 7 \times 6,4}{8}$ = 6,54 N/mm²

$F_p = \frac{6,54 + 7,87}{2} \times 290^2 \times 10^{-3}$ = 605,94 KN

$$\sigma_{\text{onder}} = \frac{10,4 + 7,8 + 7 \times 7,5}{9} = 7,86 \text{ N/mm}^2$$

$$\sigma_{\text{boven}} = \frac{7,5 + 7 \times 6,4}{8} = 6,54 \text{ N/mm}^2$$

$$= 737,28 \text{ KN}$$

toelaatbare paalbelasting:

$$1/1,4 \times \left(\frac{349,4 + 241}{1,4} - 182,73 \right) = 170,7 \text{ KN}$$

$$1/1,4 \times \left(\frac{451,25 + 273,86}{1,4} - 207,65 \right) = 221,63 \text{ KN}$$

$$1/1,4 \times \left(\frac{605,94 + 317,7}{1,4} - 240,87 \right) = 299,19 \text{ KN}$$

$$\phi 320 \quad 1/1,4 \times \left(\frac{737,28 + 350,54}{1,4} - 265,79 \right) = 365,16 \text{ KN}$$

sondering	inheidspte	Ø 220	Ø 250	Ø 290	Ø 320
1	17,00 ÷	169,05	190,88	253,09	285,23
2	16,00 ÷	171,25	218,02	241,45	286,38
3	17,00 ÷	208,93	268,61	359,60	422,07
4	16,00 ÷	119,19	139,40	142,39	180,63
5	17,00 ÷	158,64	209,16	279,61	280,41
6	16,00 ÷	208,66	276,52	361,73	415,10
6A	17,00 ÷	200,81	262,63	357,92	416,82
6B	17,00 ÷	183,19	238,12	317,59	360,53
7	17,00 ÷	178,97	235,10	308,46	378,53
8	17,00 ÷	175,49	226,42	300,97	366,52
9	17,00 ÷	153,31	176,09	229,26	267,30
10	17,00 ÷	238,90	311,05	406,61	469,10
11	16,00 ÷	208,14	275,75	341,91	389,77
135	17,00 ÷	170,7	221,63	299,14	365,16
97	17,00 ÷	179,7	221,63	299,19	365,16

Handwritten note: *Handwritten text, possibly a signature or date.*

Handwritten note: *Handwritten text, possibly "Handwritten" or "Handwritten"*

sondering	inheidspe	t.o.v. N.A.P.	220	250	290	320
1	17,00 ÷	169,05	190,88	253,09	285,23	285,23
2	16,00 ÷	171,25	218,02	241,45	286,38	286,38
3	17,00 ÷	208,93	268,61	359,60	422,07	422,07
4	16,00 ÷	119,19	139,40	142,39	180,63	180,63
5	17,00 ÷	158,64	209,16	279,61	280,41	280,41
6	16,00 ÷	208,66	276,52	361,73	415,10	415,10
6A	17,00 ÷	200,81	262,63	357,92	416,82	416,82
6B	17,00 ÷	183,19	238,12	317,59	360,53	360,53
7	17,00 ÷	178,97	235,10	308,46	378,53	378,53
8	17,00 ÷	175,49	226,42	300,97	366,52	366,52
9	17,00 ÷	153,31	176,09	229,26	267,30	267,30
10	17,00 ÷	238,90	311,05	406,61	469,10	469,10
11	16,00 ÷	208,14	275,75	341,91	389,77	389,77
135	17,00 ÷	170,7	221,63	299,14	365,16	365,16
97	17,00 ÷	179,7	221,63	299,19	365,16	365,16

$\varnothing 220 = 170,7 \text{ KN}$
 $\varnothing 250 = 221,63 \text{ KN}$
 $\varnothing 290 = 299,19 \text{ KN}$
 $\varnothing 320 = 365,16 \text{ KN}$

toelaatbare paalbelasting:

$\varnothing 320 = 7,86 \text{ N/mm}^2$
 $\varnothing 220 = 6,54 \text{ N/mm}^2$