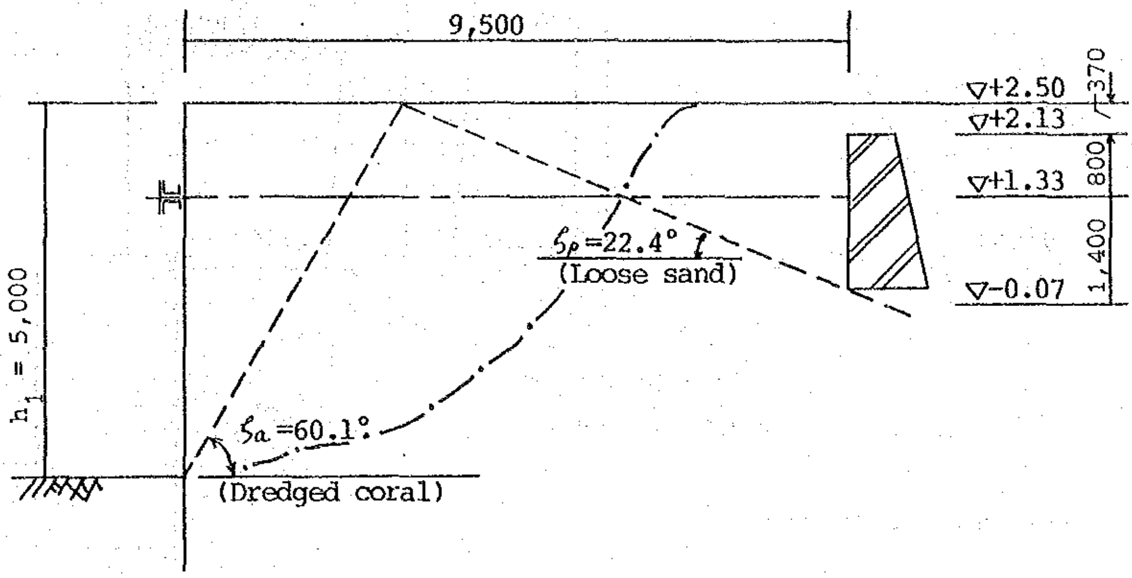
5. Design of Anchor Plate

(1) Location of Installation



$L = h_1 \cot \zeta_a + h_2 \cot \zeta_p$

$= 5.0 \times \cot 60.1° + 2.57 \times \cot 22.4°$

$= 9.11 \longrightarrow 9.5$ m

(2) Height of Anchor Plate

$\psi = \beta = 0$, therefore, $K_a \cos\delta = 0.35$, $K_p \cos\delta = 3.72$

$Pa_{+2.50} = 0.35$

$Pa_{+2.13} = 0.35 \times (1.00 + 1.70 \times 0.37) = 0.57$ tf/m^2

$Pa_{+1.33} = 0.35 \times (1.00 + 1.70 \times 1.17) = 1.05$ tf/m^2

$Pa_{-0.07} = 0.35 \times (1.00 + 1.70 \times 1.17 + 0.80 \times 1.40) = 1.44$ tf/m^2

$Pp_{+2.13} = 3.72 \times (1.70 \times 0.37) = 2.34$ tf/m^2

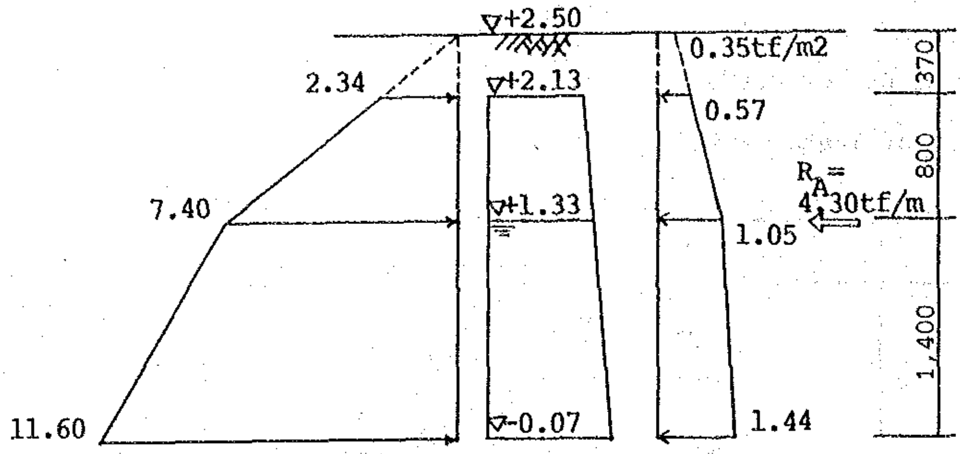
$Pp_{+1.33} = 3.72 \times (1.70 \times 1.17) = 7.40$ tf/m^2

$Pp_{-0.07} = 3.72 \times (1.70 \times 1.17 + 0.80 \times 1.40) = 11.60$ tf/m^2

$R_A = 4.30$ tf/m

$E_A = 2.39$ tf/m

$E_p = 17.2$ tf/m



$$F = Ep/(R_A+E_A)$$
$$= 17.2/(4.30+2.39)$$
$$= 2.57 > 2.50$$

(3) Section of Anchor Plate

$M_H = TL/12$ (Horizontal max. bending moment)

$Mr = TD/8L$ (Vertical max. bending moment per 1 meter of quay wall length)

$T = 6.88$ tf/m

$L = 1.60$ m

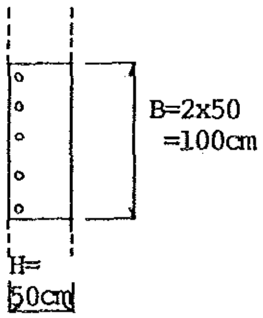
$D = 2.20$ m

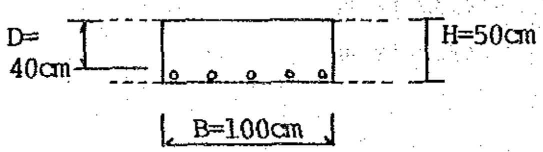
Therefore,

$M_H = (6.88 \times 2.20)/12 = 0.92$ tfm

$Mr = (6.88 \times 2.20)/(8 \times 1.6) = 1.18$ tfm/m

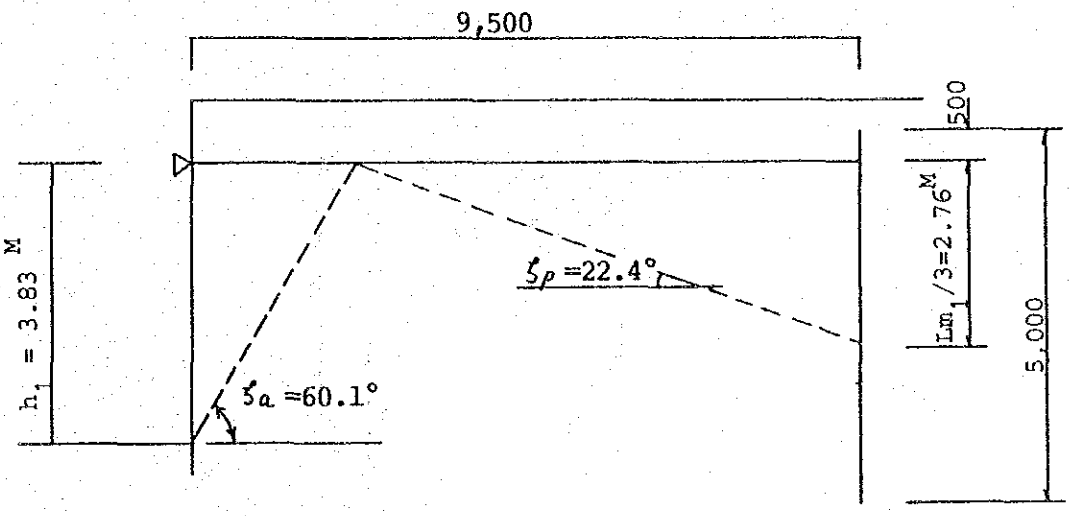
	Horizontal	Vertical	
M	0.92 tfm	1.18 tfm	
B	2 x H = 100 cm	100 cm	
H	50 cm	50 cm	
d	40 cm	40 cm	
As	D10 @300 = 2,375 cm^2/m	D10 @300 = 2.375 cm^2/m	Welded steel net (NK high mesh)





	Horizontal	Vertical
σ_s	1,010 kgf/cm^2	1,300 kgf/cm^2
σ_c	10 kgf/cm^2	12 kgf/cm^2

(In case of the Sheet Pile)



Soil condition of loose sand

$r_t = 1.70\ tf/m^3$

$r' = 0.80$

$\phi = 25°$

$\bar{N} = 5$ (Assume)

$E = 28N = 140\ kgf/cm^2$

Therefore, $k_0 = 1/3 \times 0.2 \times 140 \times 100^{-3/4}$ ——→ Fig 4-22 (p.98)

$= 0.30\ kgf/cm^3$ 0.6 - 1.0

$\beta = \sqrt[4]{k_0 B/4EI}$

$B = 100cm$

$E = 2.1 \times 10^6\ kgf/cm^2$

$I = 16,400\ cm^4/m$ (SP Type-III)

Therefore,

$\beta = \sqrt[4]{(0.30x100)/(4x2.1x10^6x16,400)} = 0.00384\ cm^{-1} = 0.38m^{-1}$

$Lm_1 = \pi/\beta = \pi/0.38 = 8.27$ m

$Lm_1/3 = 2.76$ m

$L_{req} = h_1 \cos \zeta_a + Lm_1/3 \cos \zeta_p$

$= 3.83 \cos 60.1° + 2.76 \cot 22.4°$

$= 2.02 + 6.70$

$= 8.72\ m < 9.50\ m$

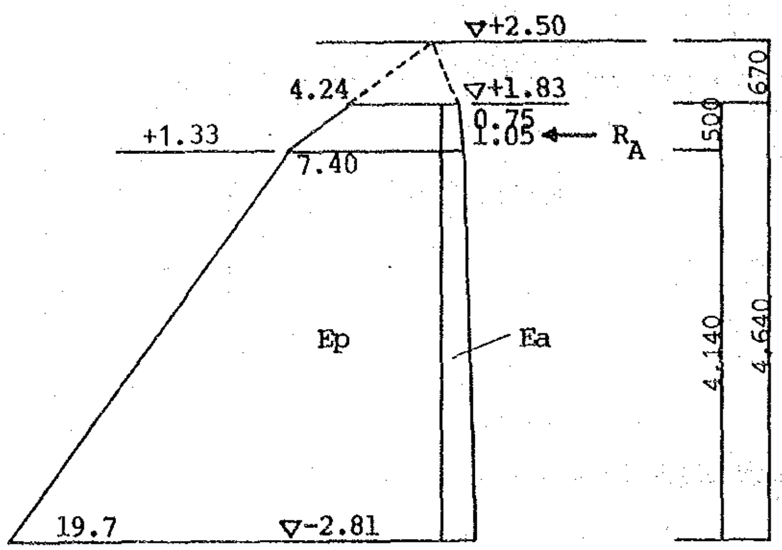
Length of embedding

$L = L_0 - 0.5 = 5.0 - 0.5 = 4.50\ m < lm_1 = 8.27\ m$

Therefore,

Same as for anchor plate because of short pile.

Herein, short pile between anchoring position and the point of $lm_1/2$ $= 4.14m$ shall be neglected.



$Pa_{+2.50} = 0.35\ tf/m^2$

$Pa_{+1.83} = 0.35 \times (1.0 + 1.70 \times 0.67) = 0.75\ tf/m^2$

$Pa_{+1.33} = 0.35 \times (1.0 + 1.70 \times 1.17) = 1.05\ tf/m^2$

$Pa_{-2.81} = 0.35 \times (1.0 + 1.70 \times 1.17 + 0.8 \times 4.14) = 2.21\ tf/m^2$

$Pp_{+2.50} = 0$

$Pp_{+1.83} = 3.72 \times (1.70 \times 0.67) = 4.24\ tf/m^2$

$Pp_{+1.33} = 3.72 \times (1.70 \times 1.17) = 7.40\ tf/m^2$

$Pp_{-2.81} = 3.72 \times (1.70 \times 1.17 + 0.8 \times 4.14) = 19.70\ tf/m^2$

$R_A = 4.30\ tf/m$

$Ea = 7.20\ tf/m$

$Ep = 59.0\ tf/m$

Therefore,

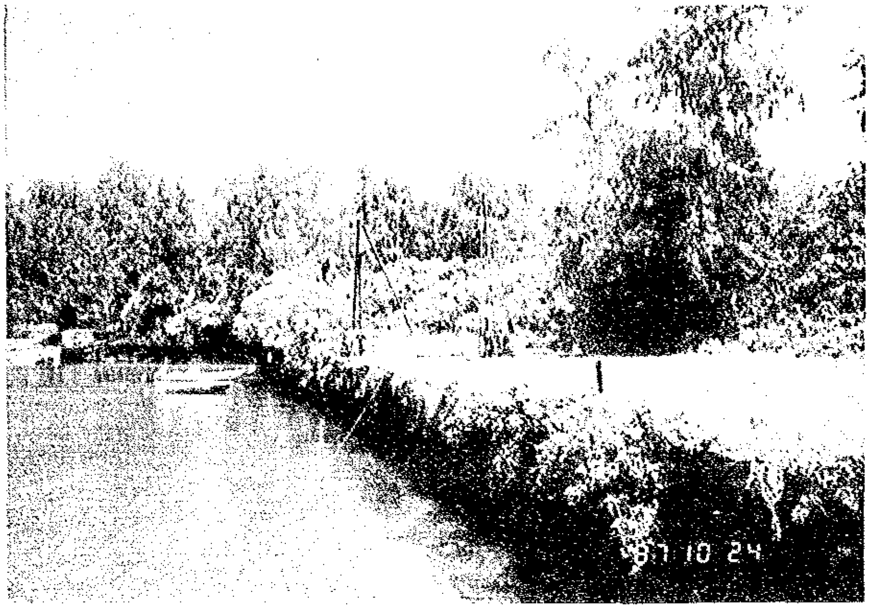
$F = 59.0/(4.30+7.20) = 5.13 > Fs = 2.50$

Against M_H, wale can resist as the front sheet pile.

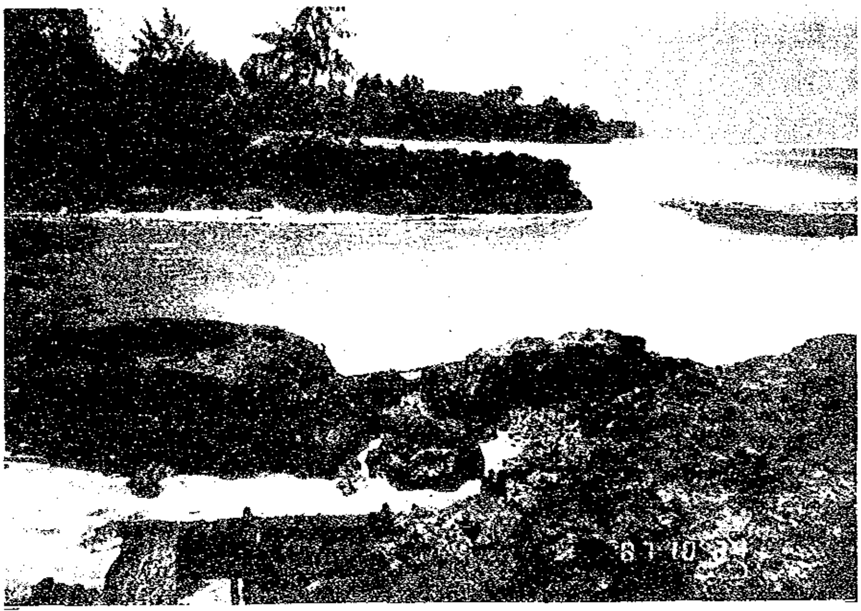
$Mr = TD/8L = (6.88 \times 4.64)/(8 \times 1.6) = 2.49\ tfm/m$

$= M/Z = (2.49 \times 10^5)/1{,}310 = 190\ kgf/cm^2$

写 真 集

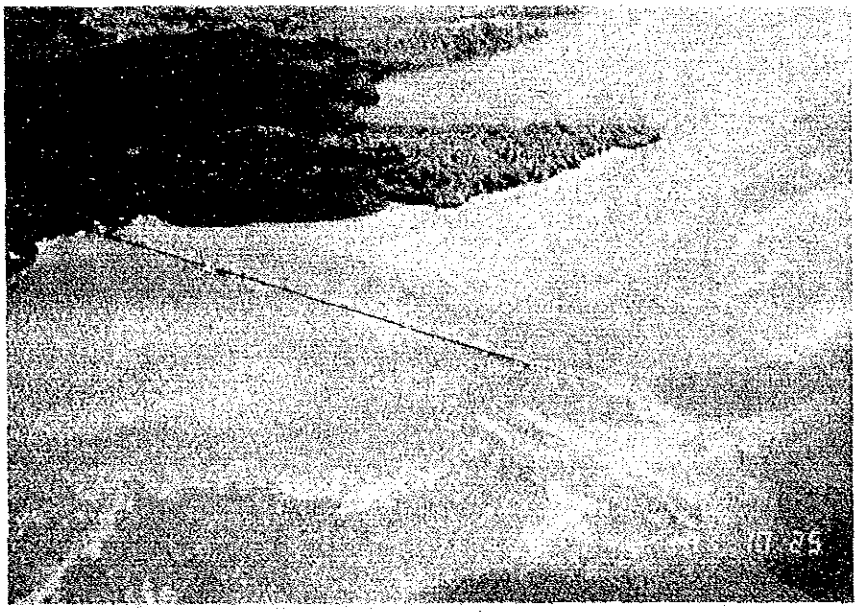


アンガウル港物揚場予定地

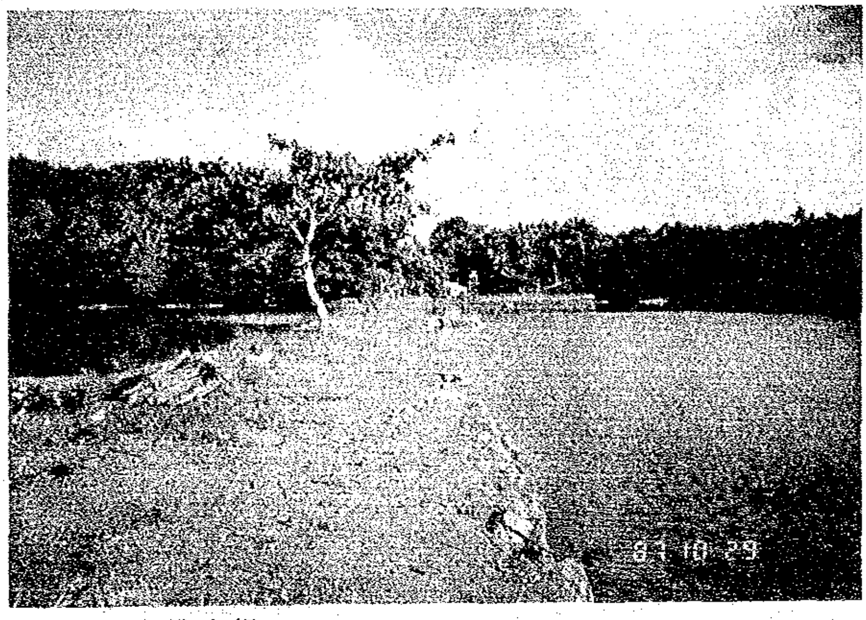


アンガウル港入口

アンガウル港全景

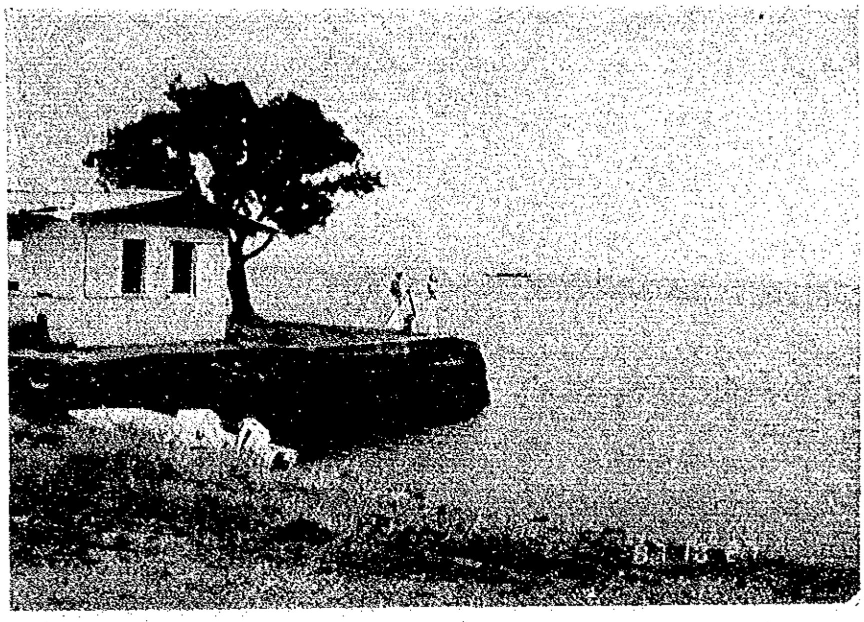


アルコロン港空中写真

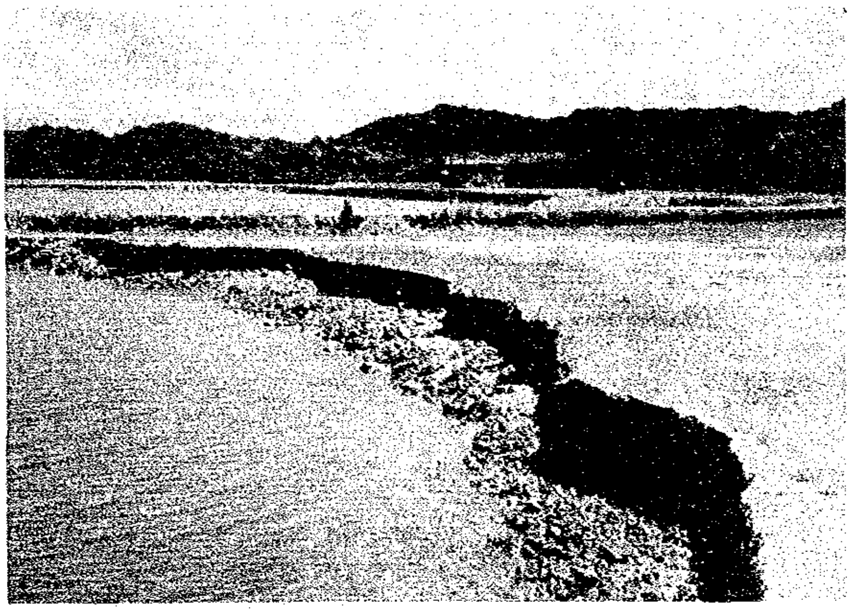


アルコロン港突堤

アルコロン・ボーリングサイト



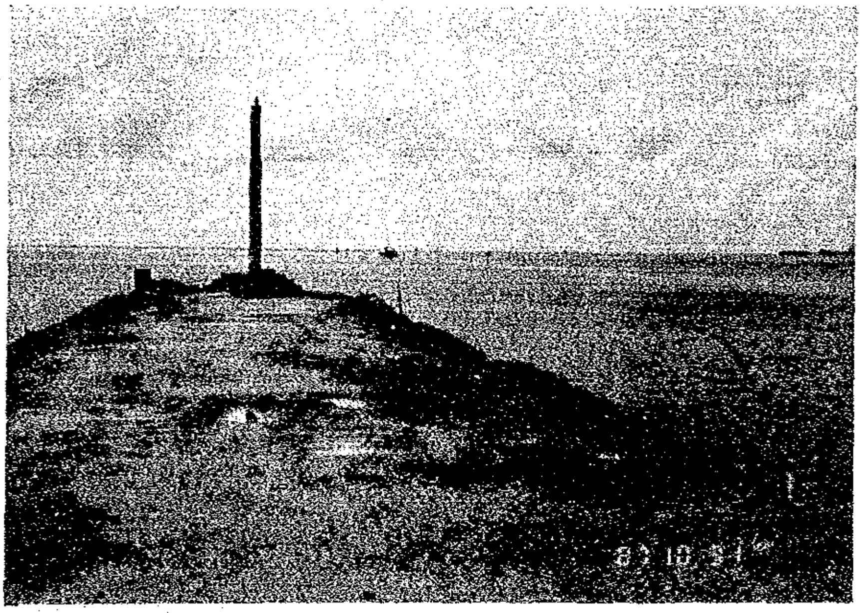
ガッパン港突堤



ガッパン港物揚場予定地

ガッパン港空中写真

メレケオク港空中写真



メレケオク既存突堤

メレケオク港定期船