REPORT
FOR
THE FEASIBILITY STUDY
ON
THE REINFORCEMENT AND EXPANTION PLAN
OF
P.T. IKI MAKASSAR SHIPYARD AT UJUNG PANDANG
IN
THE REPUBLIC OF INDONESIA

SUPPLEMENTARY DATA

1. SURVEYING
2. INFRASTRUCTRE
3. SOIL INVESTIGATION

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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1. SURVEYING

1.1 Purpose

The purpose of surveying and investigation is to acquire fundamental information required for improvement plan of Makassar Shipyard.

1.2 Items to be Surveyed

(1) Control point surveying and traversing
(2) Topographic surveying
    (cross-leveling)
(3) Planimetric surveying
(4) Sounding

1.3 Surveying Instruments Used

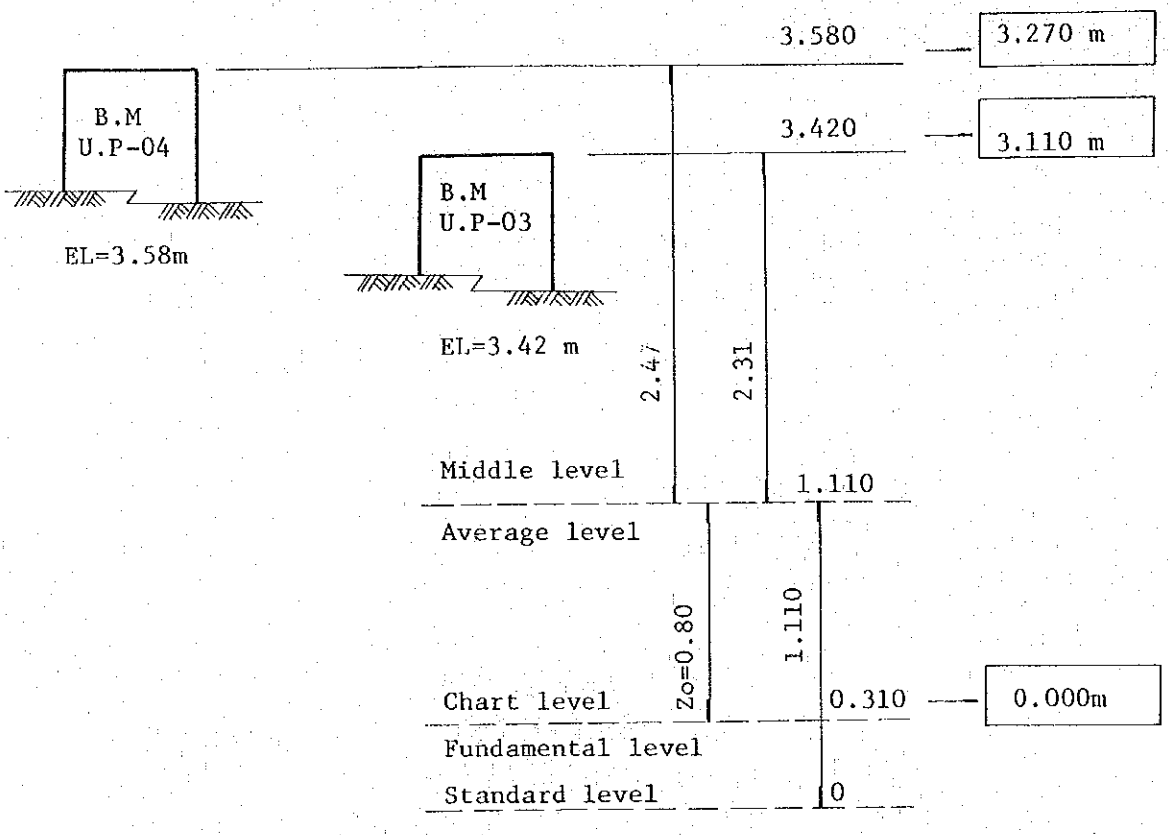
	Manufactured by	Model
(1) Theodolite	Sokkisha	TM-20D
(2) Auto-level	"	B-1
(3) Distance meter	Topcon	DM-C1
(4) Echo sounder	Kaijyo Denki	
(5) Kit for plane tabling		
(6) Tape, staff, pole, etc.		

1.4 Method of Surveying

1.4.1 Control Point Surveying

Fig. 1 shows the topography of the project area which is based on the result of a topographic survey and sounding.
The elevations in Fig. 2 are calculated on the basis of the data of the Ujung Pandang Port Office, on condition that the chart level is ± 0.00m.

Fig. 2



[ ] : elevation with chart level ± 0.00m

BM : bench-mark

The shipyard construction site was reclaimed about 18 years ago. It is mostly flat, 1.0m - 2.5m above the sea level.

A part of the revetment in the northeastern site is broken down, and as a result of the outflow of sand and earth, the northeastern site is a low and swampy zone.

Sea area around the shipyard is shallow over a long distance from the shore. Sea route was dredged at a depth of minus 4 meters, thereby facilitating the arrival and departure of vessels. However, further dredging will be required for vessels to be constructed at the shipyard in the future, because of narrow course and insufficient depth of water.

Observation

Table 1 presents the results obtained by leveling from A & B routes between established bench marks (B.M-1). An error is proportionally allotted by the distance between B.M (UP-03) and B.M-1, and as a result, the error of closure is 4mm. (see Fig. 16)

Table 1. Observed error of bench mark

Bench mark	Length	Difference in distance of both ways between bench marks	Error of closure
B.M			
UP-03	-	-	-
No. 1	0.9 Km	2mm	-
No. 2	0.9	7	-
No. 3	0.9	2	-
B.M-1	1.3	4	4mm
Total	4.0	B.M-1 EL = 2.520m	

1.4.2 Traversing

A driver pile is established by selecting a clear point within the proposed site.

After a traverse point is established, the trees and plants are cut down to secure the visibility of piles. (see Fig. 15)

Observation

The driver pile is established at the desired place, and observation is made in each point.

Observation of angle and distance measurement is made by using a distance meter and theodolite.

As for the observed results, calculation is made by using an angle measurement, and a value measured by the distance meter. As for the coordinate value, calculation is made without employing the angle measurement and the measured value of distance.

Table 2. Observed error of driver net

Point	Error of closure	Ratio of closure
T-1	0.114	1/16,700
T-2	0.045	1/33,000
A-1	0.058	1/ 8,000
B-1	0.062	1/ 5,300
C-1	0.110	1/ 8,700

1.4.3 Topographic Surveying (cross-leveling)

After establishing points for cross-leveling on a revetment at intervals of 25m prior to surveying, and cutting the trees and plants in the perpendicular to the revetment, elevation of topographic variation point is observed with an auto-level.

1.4.4 Planimetric Surveying

Planimetric surveying is conducted in the projected site (about 14 ha.). The topographic plane of the site is drawn to a scale of 1:500, and the topographic plane of a harbor and sea is drawn to a scale of 1:1,000.

1.4.5 Sounding

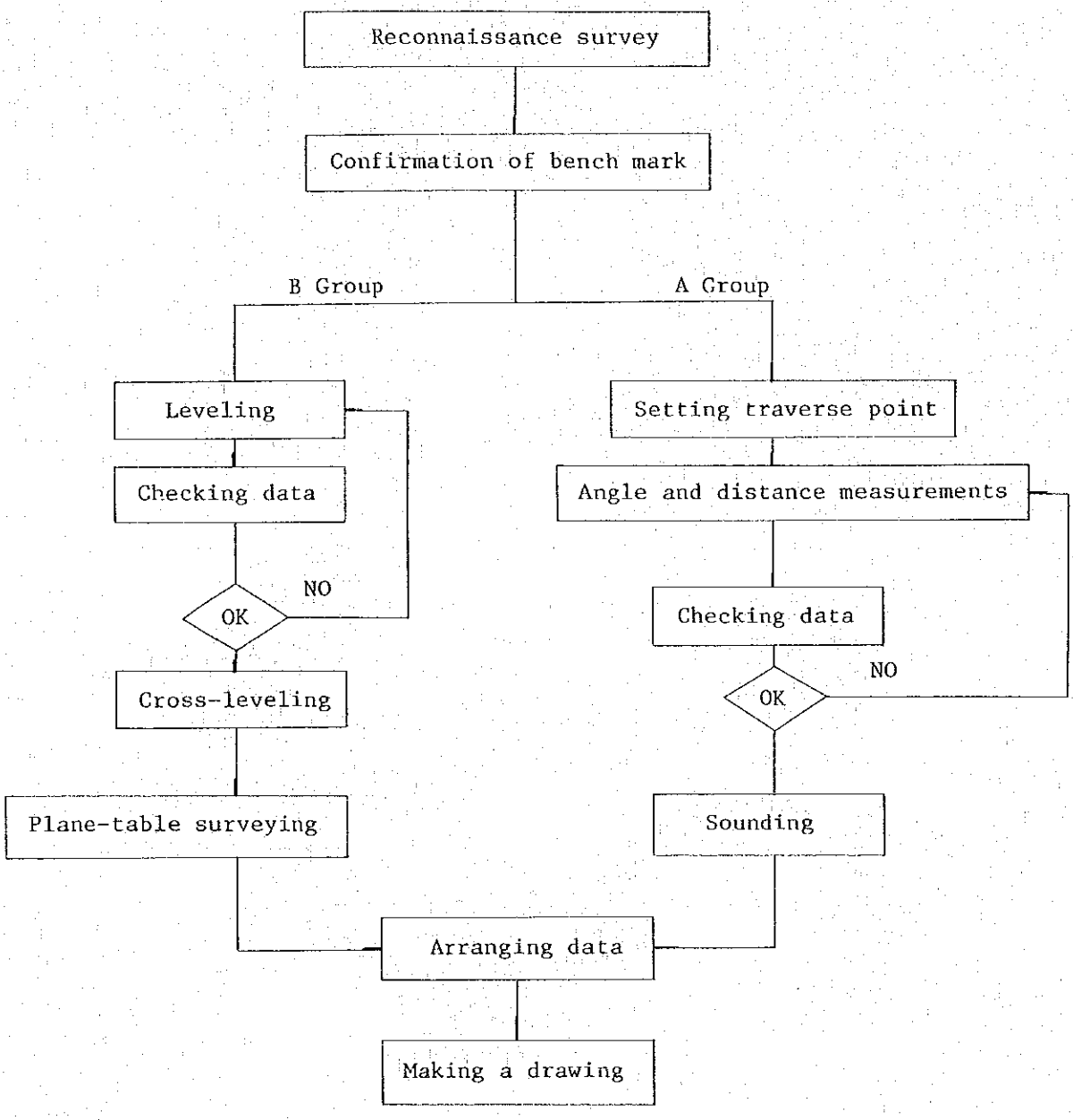
To investigate the condition of the seabed and topography within the proposed site, the following survey is made:

Sounding is performed using an echo sounder in the harbor and a range of 1600m along the revetment and 600m at sea. Points of 200m, 400m and 600m are measured applying a method of intersection and resectin and using a tape (for marine survey) at 200 meters' distance from the revetment and within the harbor.

1.5 Observing Tide Level (see Fig. 3)

Setting up a staff gauge at the revetment of P.T. IKI Shipyard, a visual observation of tide level is regularly made, and the observed results are represented as a tide curve. Since the observation and record of tide level are made during a short period, a statistical analysis is not made.

Fig. 4 Flowchart of Surveying Works



2. INFRASTRUCTURE

1. Road

Fig. 5 shows the road network in the suburbs of Ujung Pandang city. Random asphalt-paving road accounts for about 80% of the city, and the remaining 20% is gravel road.

There is only Gowa-Jaya Road (about 20km in length) leading from the Hasanuddin Airport to the city, and the traffic situation of the existing road is very bad. For further development of South Selebesu, the government of Indonesia plans to widen the Gowa-Jaya Road and construct a bypass, of which the work will commence on 1981. The Tallo River Bridge is under construction with a target date of December, 1980 for completion.

2. Waterworks

Water supply capacity to the city is 500 lit./sec. A 50 mmϕ pipe is used for supplying water to the shipyard where water consumption is currently only 10 tons per day.

A plan is underway to raise the water supply capacity. In the near future, 350 mmϕ pipe will be installed at a main line located 500 meters away from the shipyard. As a result, the water supply capacity will increase to 1,500 lit./sec. (See Fig. 6.)

Therefore, the supply of the water required after the shipyard expansion will be possible.

3. Electric Power

Electric power for Ujung Pandang city is primarily supplied by a thermoelectric power station (equipped with two units of 12,500 KW steam turbine) along the Tallo River. Addition of 720 KW generated by a diesel engine and 9,250 KW generated by a Bontoard diesel engine amounts more than 40,000 KW, of which about 10% is an actual amount of electric power consumed. Thus, it is understood that the city is sufficiently capable of supplying electric power. (see Fig. 7.)

3. SOIL INVESTIGATION

3.1 Methods

3.1.1 Boring

Boring survey is conducted by use of two boring machines of hand-feed type (Bell 2).

Diameter of boring hole is 66 to 86mmϕ at the places where the standard penetration test is performed, and 86 to 116mmϕ at the places where the thin-walled sampling is performed.

To protect a wall for boring hole, a casing pipe is used to a depth of 6 to 8m below the surface of the ground that the wall for boring hole is able to stand itself. A slurry is used to a depth of more than 8m below the surface of the ground. The boring suvey is conducted until the bedrock is confirmed to a depth of more than 5m. A marine survey is conducted on a scaffolding, the dimensions of which are 6m x 6m in width and about 4m in height. The location of boring points is shown on Fig. 17.

3.1.2 Standard Penetration Test (SPT)

For the purpose of extracting samples of soil and studying a relative strength of soil, the SPT is conducted at all boring places at intervals of 1m. The SPT is not performed to a depth that a disturbed sample is extracted. A test method shall conform to the standards given in JIS-A-1219. The number of blows (N value) is measured to penetrate a sampler for the SPT to 30cm deep layer by dropping a knocking hammer weighing 63.5 kg from a height of 75cm. The sampler is penetrated to a depth of more than 30cm solely by the knocking hammer's own weight, because the clayey soil of the survey site is poor. In this case, the N value is recorded as zero. A part of samples obtained by the SPT is used for physical test, and the remainings are put into a sample bottle and stored in the site.

3.1.3 Undisturbed Sampling

A thin-walled sampling is conducted to extract an undisturbed sample which is used as specimen for dynamic testing. A thin-walled sampler of fixed piston type, and stainless sampling tube having an ID of 75mm and a wall thickness of 1.5mm are used.

3.1.4 Swedish Sounding (SS)

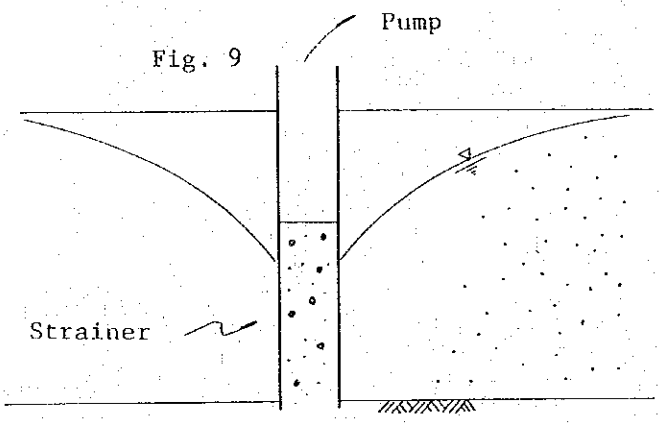
Swedish sounding is performed for the purpose of determining a relative strength of soil and a depth of bedrock to facilitate the boring survey. The relationship between load and the amount of penetration is determined by using a testing machine as shown in Fig. 8 and applying a load of 5 to 100kg. When the penetration to 100kg load stops, the relation between a half rotation of handle and the amount of penetration is determined by rotating a handle of sounding. A half rotation reaches 700 to 800 times when converting data of this relation between them to the amount of penetration per 1m, the SS is judged to be impossible and the test is completed.

3.1.5 Field Permiability Test (FPT)

Water needs to be treated in conjunction with an excavation work, because about 7m-deep excavation must be done to construct a dock. For water treatment planning, it is necessary to determine the coefficient of permiability in the upper sandy layer, and the FPT is conducted at two places where a dock will be built. The test is done in accordance with recovery method by single well and by utilizing a boring hole.

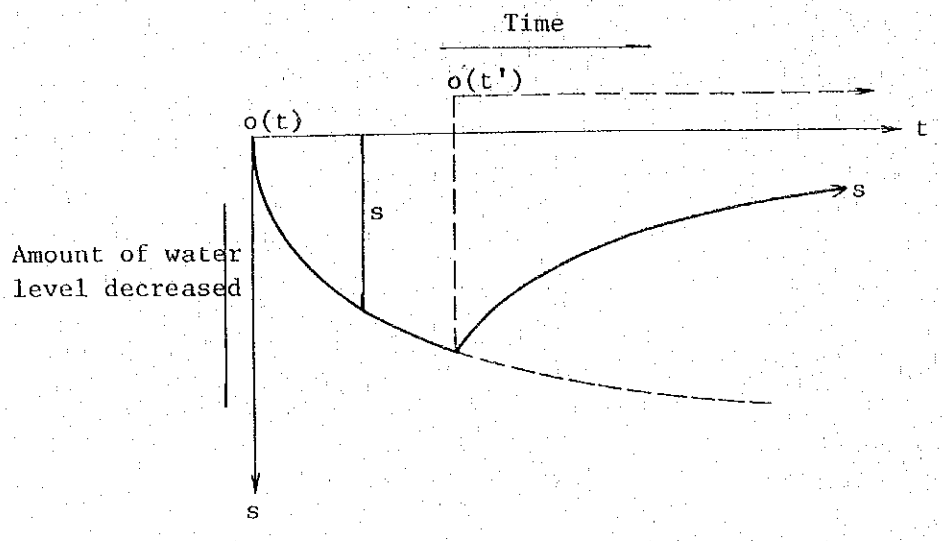
(1) Recovery method by single well is applied by providing a pumping well as shown in Fig. 9.

Fig. 9



During the test, the operation of puming-up continues for a given time and stops. Time(t) and the amount of water level decreased(s) after the operation of puming-up starts, and time(t') and the amount of recovery(s) after the operation of pumping-up stops, are measured, and then the coefficient of permiability is given by the following equation:

$$T=(k \times D)=2.30Qp/4\pi s \times \log 10t/t'$$

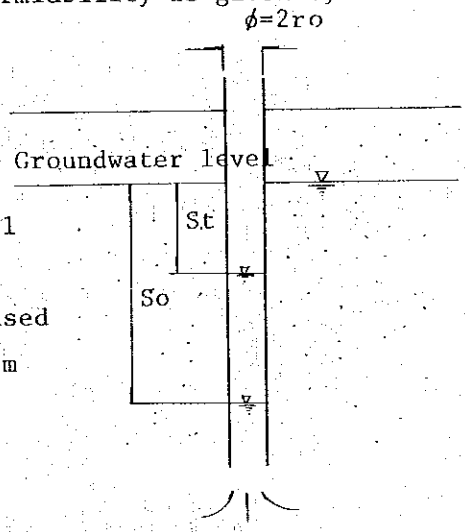


where, T = coefficient of permiable amount, cm/sec
k = coefficient of permiability, cm2/sec
D = length of permiability, cm
Qp = amount of pumping-up, cm3/sec

(2) FPT utilizing the boring hole is conducted by boring to a predetermined depth and inserting a casing into the boring hole. The operation of pumping-up stops after the water level in a hole lowers to So by pumping-up. After the operation of pumping-up stops, time(t) and the amount of water level recovery(St) are measured, and then the coefficient of permiability is given by the following equation:

$$k = 2.30\, ro/4t \times \log 10\, (So/St)$$

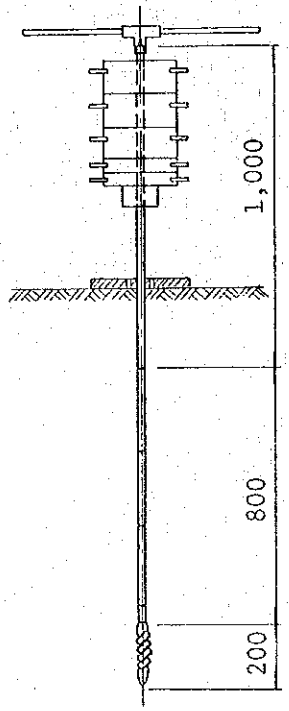
where, ro = diameter of boring hole, cm
t = time, sec
So = amount of initial water level decreased, cm
St = amount of water level decreased after the time(t) elapses, cm



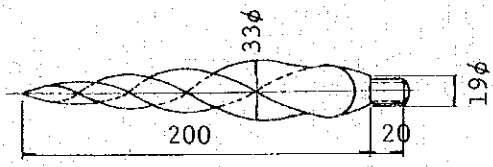
A mean value of coefficient of permiability for a sandy soil can be obtained by (1) the recovery method by single well. In the field permiability test employing the boring hole, the coefficient of permiability around the boring hole can be given.

Fig. 8 Sounding

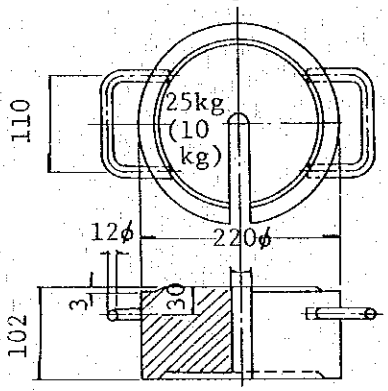
(a) Swedish sounding machine



(b) Screw point



(c) Weight



3.1.7 Laboratory Soil Tests

(1) Physical Test

The physical test is conducted on the items as summarized in Table 3 in accordance with the standards specified under JIS.

Table 3. Laboratory soil tests

Items	Method of test	To be tested
Specific gravity test	JIS-A-1202	for representative sampling
Natural water content test	-1203	for all samplings
Sieve analysis	-1204	for representative sampling
Liquid limit test	-1205	for representative sampling
Plastic limit test	-1206	for representative sampling

(2) Unit Weight Test

The test is conducted in accordance with method of trimming.

(3) Unconfined Compression Test

The test is made in accordance with the method as summarized in Table 4.

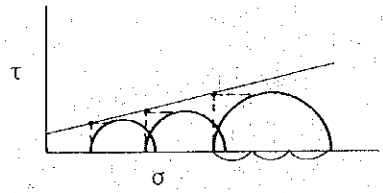
Table 4. Unconfined compression test

Method of test	JIS-A-1216
Kind of testing machine used	machine being capable of controling a strain
Configuration and dimensions of specimen	cylindric shape, 5.0cmϕ x 12.5cm(H)
Repeated sample	unconfined compression test is not performed for a repeated sample.
Rate of axial compression loading	1 %/min.
Max. strain	breaking strain + 2 to 3%
Summarized test result	the coefficient of deformation is calculated by a strain corresponding to E_{50} = 1/2 qu.

(4) Triaxial Compression Test

The test is conducted in accordance with the method specified in Table 5.

Table 5. Summary of triaxial compression test

Method of test	in accordance with the standards specified under the Japanese Society of Soil Mechanics and Foundation Engineering
Kind of test	consolidated undrained test
Dimensions of specimen	3.5cmϕ x 8.0cm(H)
Kind of testing machine	Norway type
Necessity of drain	Use of paper drain
Lateral pressure	σ_1=0.5kg/cm2, σ_2=1.0kg/cm2, σ_3=1.5kg/cm2, σ_4=3.0kg/cm2
Consolidation time	8 to 14 hours at σ_1 and σ_2, 24 hours at σ_3 and σ_4
Rate of axial compression loading	1 %/min.
Summarized test result	 on condition that average main stress is constant

(5) Consolidation Test

The test is performed in accordance with the method described in Table 6 .

Table 6. Method of consolidation test

Method of test	in accordance with the standards specified under JIS-A-1217
Kind of consolidation box	fixed ring
Dimensions of specimen	6.0cmϕ x 2.0cm(H)
Consolidation load	eight stages; p1 p2 p3 p4 p5 p6 p7 p8 0.1-0.2-0.4-0.8-1.6-3.2-6.4-12.8kg/cm2
Time of loading	24 hours at each stage
Unloading	Measurement of expansion by unloading is not made.
Determination of Cv	Square root of time fitting method is applied.
Determination of yield stress of consolidation	in accordance with the draft standard specified under the Japanese Society of Soil Mechanics and Foundation Engineering
Consolidated test result	It is expressed by e ~ log p, log p ~ log Cv, log p ~ log mv.

3.2 Result of Soil Investigation

3.2.1 Soil Composition

Fig. 10 and Fig. 11 show assumed soil profiles drawn on the basis of the results of boring survey and Swedish sounding.

A typical soil profile of the survey site is shown in Fig. 12 and the general characteristics of each soil layer and representative values for testing are summarized in Table 7.

Fig. 12 Typical soil profile

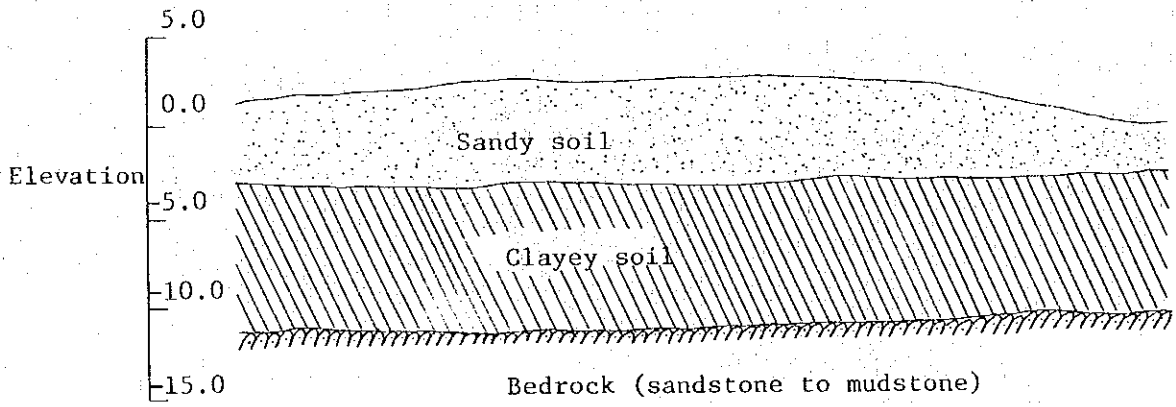


Table 7 . Representative values for testing

Description	N value	Water content Wn(%)	Specific gravity Gs	Unit weight γt(g/cm3)	Compression index Cc	Unconfined compressive strength qu (kg/cm2)
Very loose, fine-grained sand having grain size of 2mm which contains a great amount of shell fragment and sand	10 - 2	8 - 40	2.6-2.7	-	-	-
Very soft, cohesive and uniform clay including a small amount of shell fragment and sand	0	75-100	2.5-2.6	1.5-1.6	0.8-1.2	0.2 - 0.6
Unsound rock containing sandstone or mudstone	above 50	-	-	-	-	-

The shipyard construction site was reclaimed about 18 years ago, and consists primarily of sandy soil, clayey soil and bedrock.

(1) Sandy Soil

Sandy soil is 5- to 7-meter thick, and composed of an original sedimentary layer and a reclaimed layer. The boundary between these layers is indefinite, because the former layer is identical with the latter layer in soil properties.

The sandy soil is of fine-grained sand having a grain size of about 2mm, and contains a small amount of shell fragment. The upper layer is dark brown in color, and the lower layer is black in color. The sandy soil at a depth of 1m below the surface of the ground contains a small amount of silt and clay, but at a depth of more than 1m includes a great amount of clay and silt. The N value of the upper sandy soil is 5 to 10, but the N value decreases to 2 or 3, because of the fact that the greater the depth, the greater the inclusion of silt or clay. As a result, it is very loose for the sandy soil.

(2) Clayey Soil

A 7 to 10cm thick marine clay formed in the alluvial epoch is deposited under the upper sandy soil. The clay is dark blueish gray and greenish gray in color, and great cohesive. The clay includes a small amount of shell fragment and sand, but is generally uniform. The N value of the clayey soil is zero, so that it is very poor.

On the other hand, apart from the other places, the soil layer of Boring Nos. 9 and 14 is composed of sandy soil including a great amount of clay, or cohesive soil containing a lot of coral fragments.

3.2.2 Results of Soil Tests

(1) Standard Penetration Test (SPT)

Fig. 14 shows depth distribution of N value as a comparative diagram on the basis of the results of SPT.

The N value of sandy soil ranges from 1 to 10, and the N value at a depth of 2m is 5 to 10, with the average N value of 7. The greater the depth, the greater the inclusion of silt or clay, and the average N value decreases to 3. In the majority of clayey soil, a rod penetrates to a depth of 60 to 70cm by a hammer weight, and the N value is zero. In the bedrock, the penetration by 50 times of blows is 8 to 15cm except where the upper layer is in a clayey state. It is obvious that the bedrock is very hard.

(2) Swedish Sounding (SS)

Fig. 14 shows the comparative chart of the results of Swedish sounding. A half rotation by 100kg load is 10 to 40 times at the upper sandy soil and 20 times at the lower sandy soil.

A sounding instrument itself does not settle excessively when reaching the clayey soil from the sandy soil, and the half rotation by 100kg is about 10 times. The greater the depth, the greater the half rotation, and then 10 to 40 times of half rotation result. The half rotation per 1m is 800 to 1000 times when the sounding instrument reaches the bedrock, so that the SS is impossible to conduct.

The boundary between the sandy soil and the clayey soil is indefinite through the Swedish sounding, because the lower sandy soil has a great amount of clayey soil and a low strength. Since the effect of circle friction cannot be avoided, converting a constant of the clayey soil's strength by an empirical formula and the test results will become a problem in terms of the accuracy.

The purpose of Swedish sounding is to determine the depth of bedrock. The survey site proves to satisfactorily attain the purpose of the test.

(3) Field Permiability Test (FPT)

Table 8 indicates the result of FPT.

Table 8. Results of FPT

Method of test	Place	Depth	Time	Coefficient of permiability (cm2/sec)
Method of recovery by single well	B-7	-2.60 ~ -4.10	1	7.3×10^{-4}
			2	1.0×10^{-3}
Employing a boring hole	B-13	-3.2	1	2.2×10^{-2}
			2	1.1×10^{-2}
		-4.1	1	6.0×10^{-3}
			2	4.2×10^{-3}
Average				7.5×10^{-3}

The coefficient of permiability shows increased disperation in depth, and ranges from 7.3×10^{-4} to 1.1×10^{-2}. The characteristics of grading is correlated with the coefficient of permiability. According to the Hazen's theory, diameter at which 10% of the soil is finer and the coefficient of permiability are approximately given by the following equation:

$$k = 100 (D10)^2$$

where k = coefficient of permiability, cm2/sec

$D10$ = diameter at which 10% of the soil is finer, mm

k is calcualted as 6.4×10^{-3} cm2/sec by the above equation on condition that D10 of the lower sandy soil is 0.008mm. This value shows to be identical with the test value.

(4) Water Content Test

Fig. 13 shows the depth distribution of natural water content. Water content of the upper sandy soil is about 10%, and water content has a great value of 40 to 60%, because the greater the depth, the greater the inclusion of clayey soil. The water content throughout the clayey soil shows a constant value, ranging from 70 to 100%.

(5) Liquid Limit Test (LL) and Plastic Limit Test (PL)

In Fig. 13, the results of LL, PL are plotted on a plastic chart, and the clayey soil of the survey site is distributed on A-line. A liquid limit ranges from 90 to 130%, and classified as CH (clayey soil of high plasticity) on the basis of the Unified Soil Classification of Japan and ASTM D-2488.

In general, the clayey soil classified as CH has a high compressibility, and low shearing strength. The distribution of a consistency (Ic = WL - Wn/Ip) is shown in Fig. 13.

The consistency index represents a relative hardness of clayey soil, natural water content at $Ic \geqq 1$ is close to or less than the plastic limit, being in a state of stability.

On the other hand, natural water content at $Ic \leqq 0$ is near to or greater than the liquid limit, being in an unstable state.

The clayey soil of the site ranges from Ic = 0.2 to Ic = 0.5.

It is common that Ic in the marine clay of the alluvial epoch is near to or below zero. The consistency index shows that the clayey soil of the survey site is stable for the marine clay of the alluvial epoch.

(6) Result of Sieve Analysis

Fig. 13 shows a comparative diagram and representative value of grain-size accumulation curve of each layer.

In a triangular classification system classified according to the characteristics of grain-size, the upper sandy soil, the lower sandy soil, and the clayey soil are classified as sand, silty sand and clay or silty clay, respectively.

(7) Results of Unit Weight and Specific Gravity Tests

Fig. 13 shows the depth distribution of unit weight, and Fig. indicates the depth distribution of specific gravity. The unit weight represents a constant distribution to the direction of depth, and averages 1.57 g/cm3. The specific gravity of sandy soil averages 2.60, and shows a constant distribution. The specific gravity of the clayey soil ranges from 2.45 to 2.60, showing the tendency that the specific gravity of the lower layer is great. This is attributable to a small amount of an organic matter included in the layer.

(8) Result of Unconfined Compression Test

Fig. 12 shows the depth distribution of unconfined compressive strength. The greater the depth, the greater the value of the unconfined compressive strength. The unconfined compressive strength of the upper layer and lower layer is 0.2 to 0.4kg/cm2, and 0.4 to 0.8kg/cm2, respectively. A line of effective overburden load (Po) is noted in Fig. 12.

From Po and a consistency increase rate (Cu/p), a theoretic cohesion (Co) is calculated by

$$Co = Cu/p \times Po$$

A distribution of theoretic cohesion is calculated, assuming that the consistency increase rate is 0.25 to 0.35. Comparing a half value of unconfined compressive strength (qu), which is called cohesion, with the theoretic value, the value of unconfined compressive strength of the survey site is greater than that of theoretic unconfined compressive strength. The clayey soil of the site is pressumed to be slightly in an overconsolidated state.

(9) Result of Consolidation Test

Fig. 14 shows e - log p curve, log cv - log p curve, and log mv - log p curve on the basis of the result of consolidation test.

A compression index (Cc) determined as gradient of straight line on e - log p curve ranges from 0.8 to 1.2, and natural water content is 70 to 100%, which is a standard value for alluvial clay. On the other hand, particularly in the clayey soil of the survey site, a consolidated yield load (Py) becomes greater than the effective overburden load (Po). This will be attributed to sedimentation of cement and increased load of consolidated yield (Pc effect).

In calculating amount of settlement due to consolidation, the amount of settlement will be overestimated only when the compression index (Cc) is used, because the value of consolidated yield load is great.

The coefficient of consolidation (Cv) corresponding to Py is 0.15 cm2/sec, and the coefficient of volume compressibility(mv) is 7.0×10^{-2} cm2/kg. Natural water content is 70 to 100%, showing a standard value for the clayey soil.

(10) Triaxial Compression Test (Consolidated Undrained Test)

Fig. 14 presents a Mohr's stress chart on the basis of the result of triaxial compression test. A constant of strength (ϕcu) at a normally consolidated zone is 14° to 18°. The consistency increase rate, $Cu/p = \tan \phi cu$, is 0.25 to 0.33.

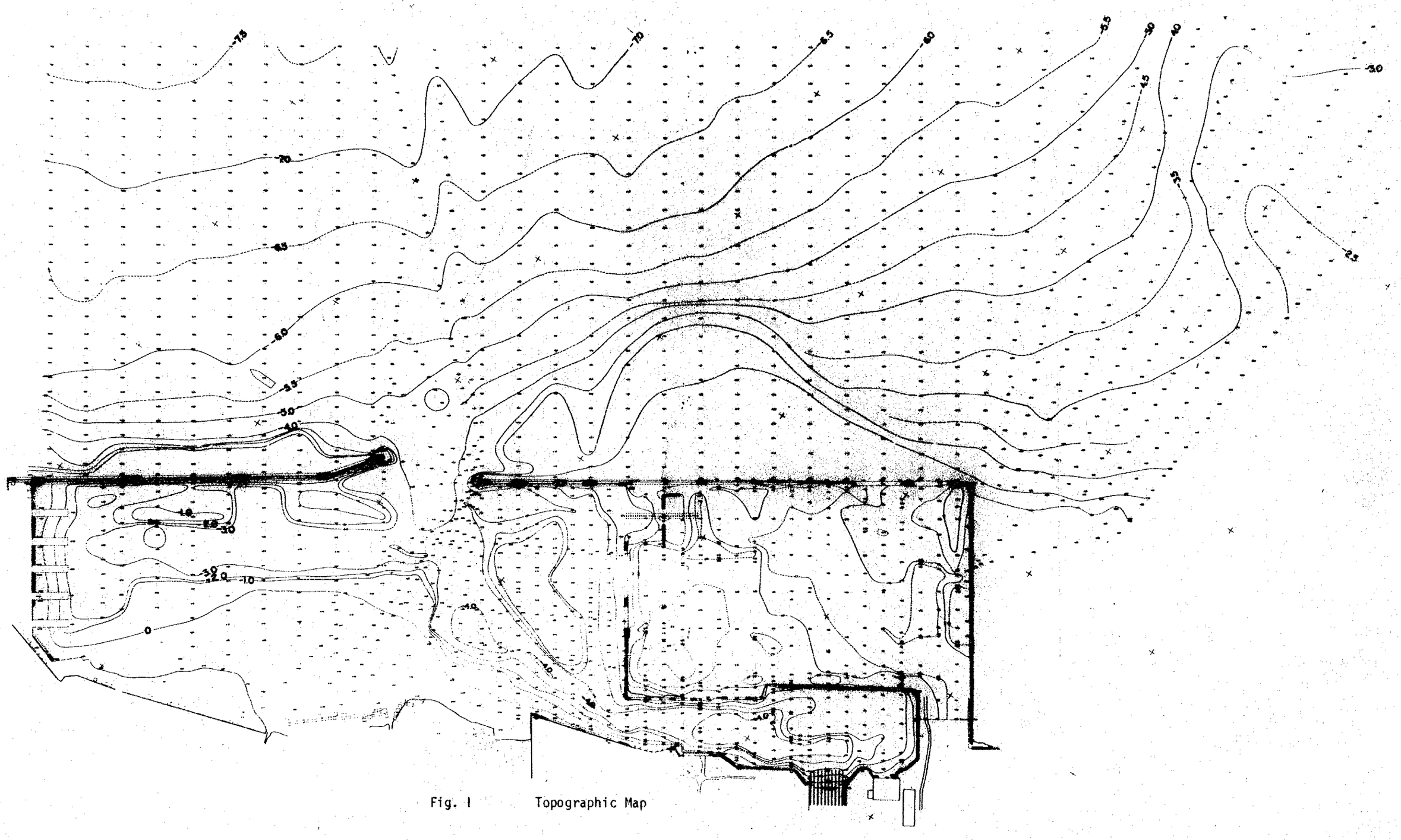


Fig. 1 Topographic Map

Fig. 3 TIDE CURVE

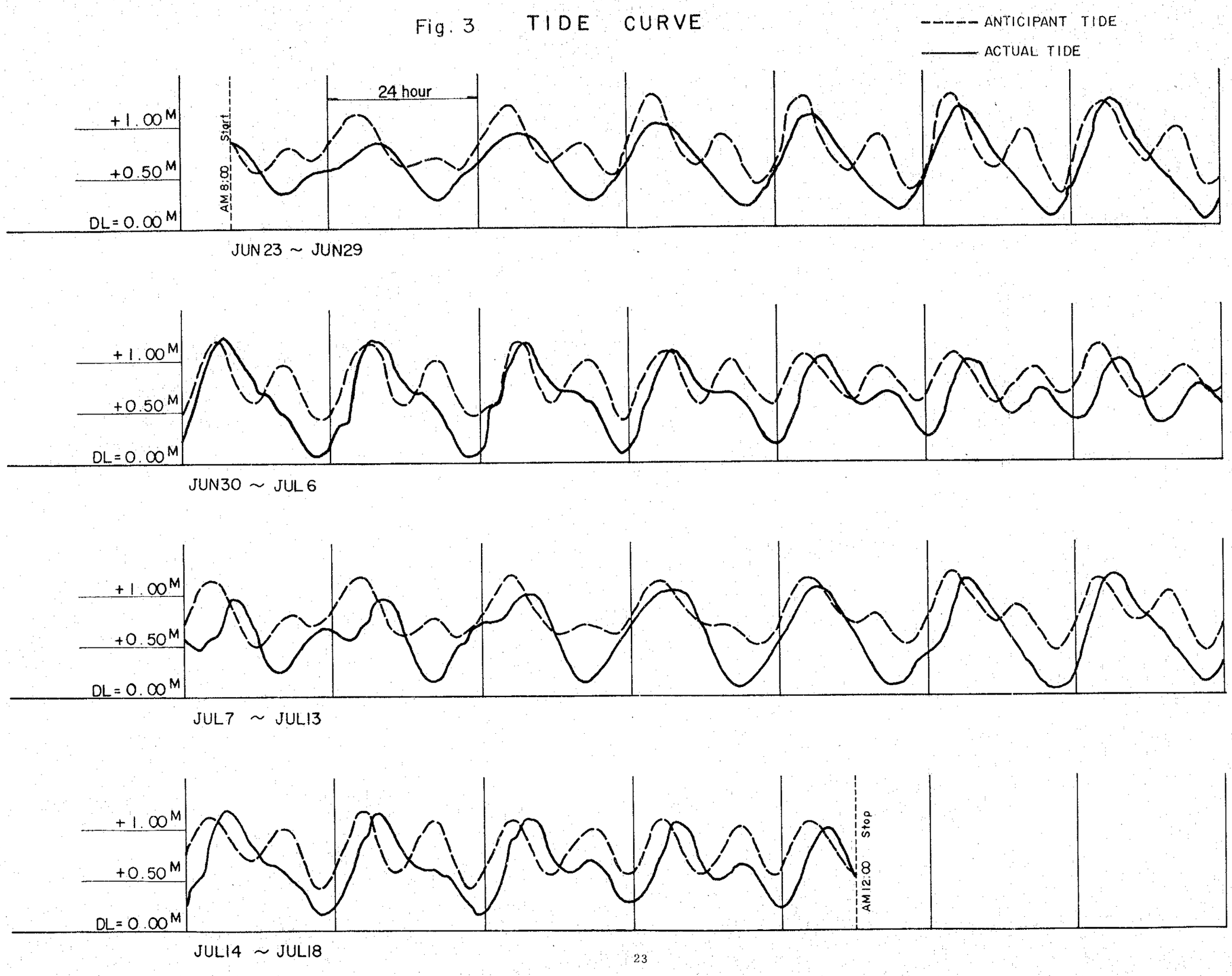


Fig . 5 ROAD PROJECT

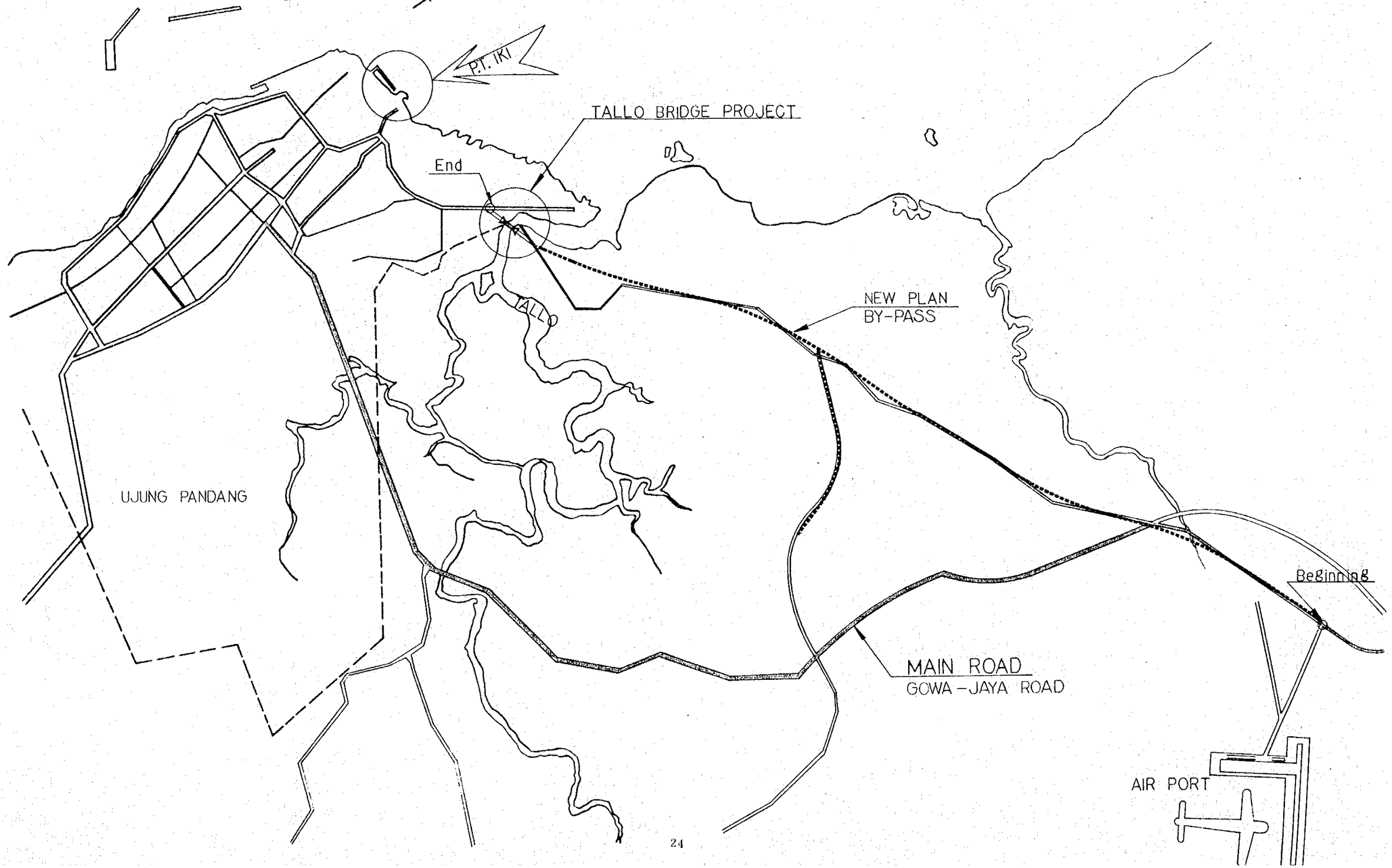


Fig . 6 WATER SUPPLY

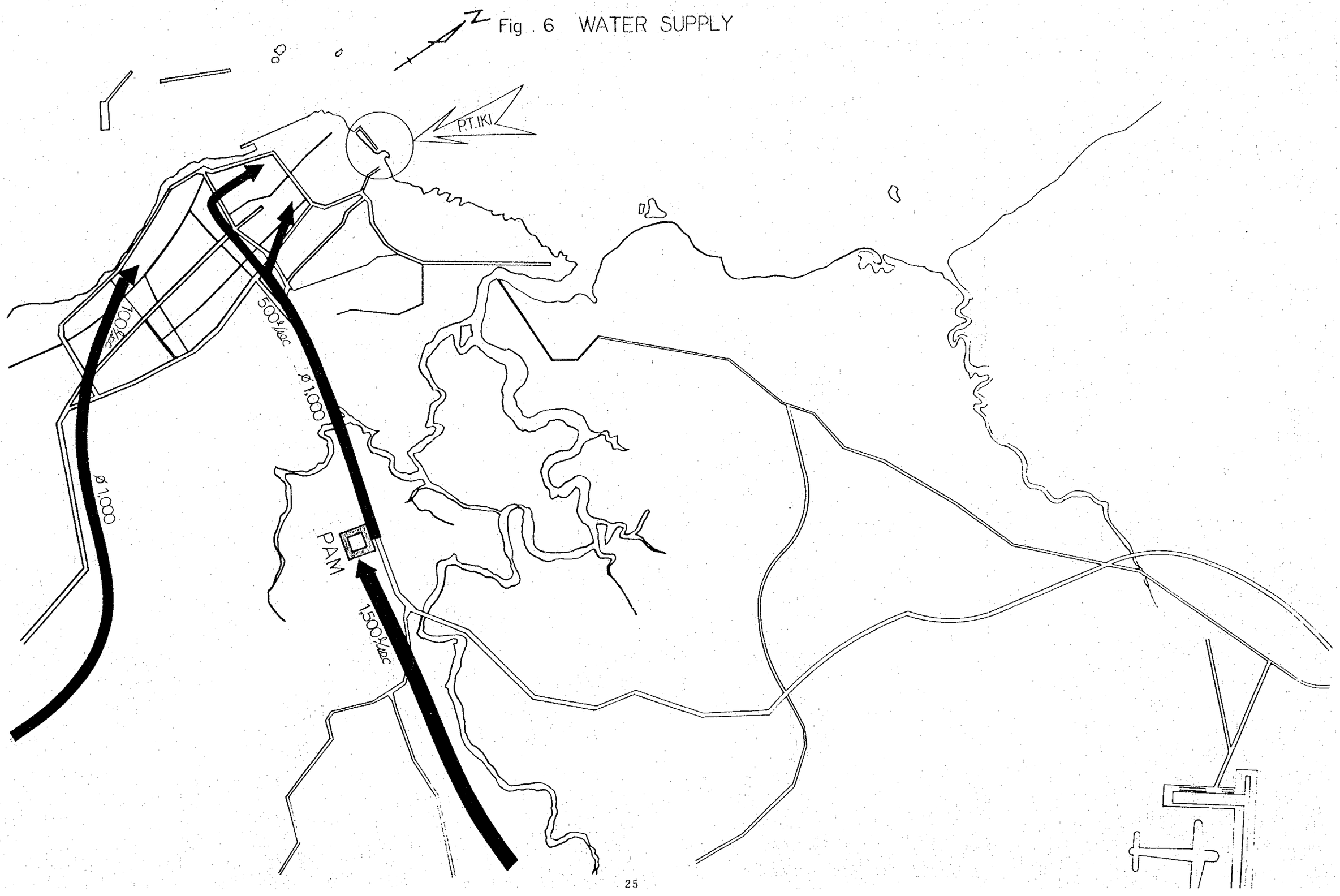
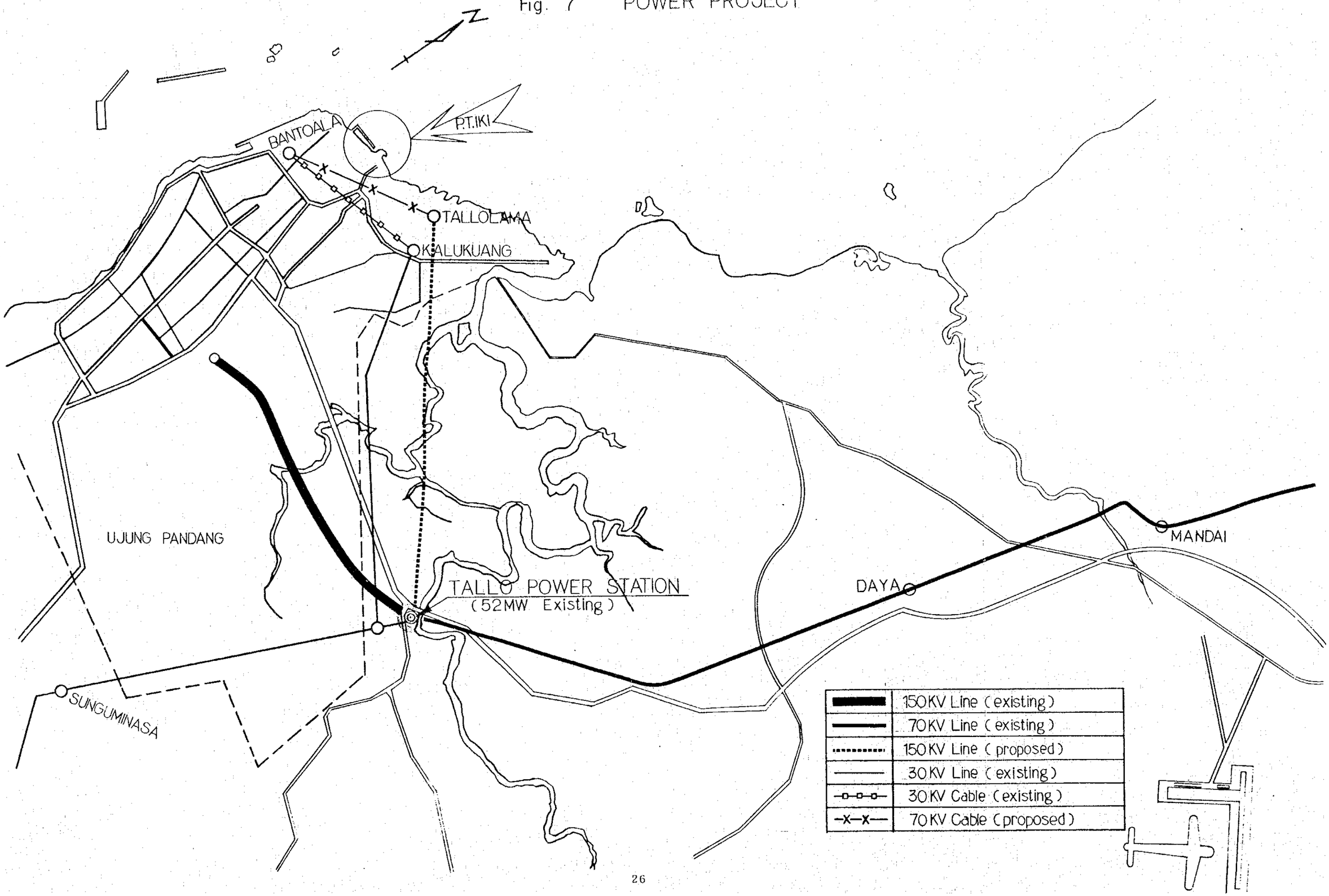
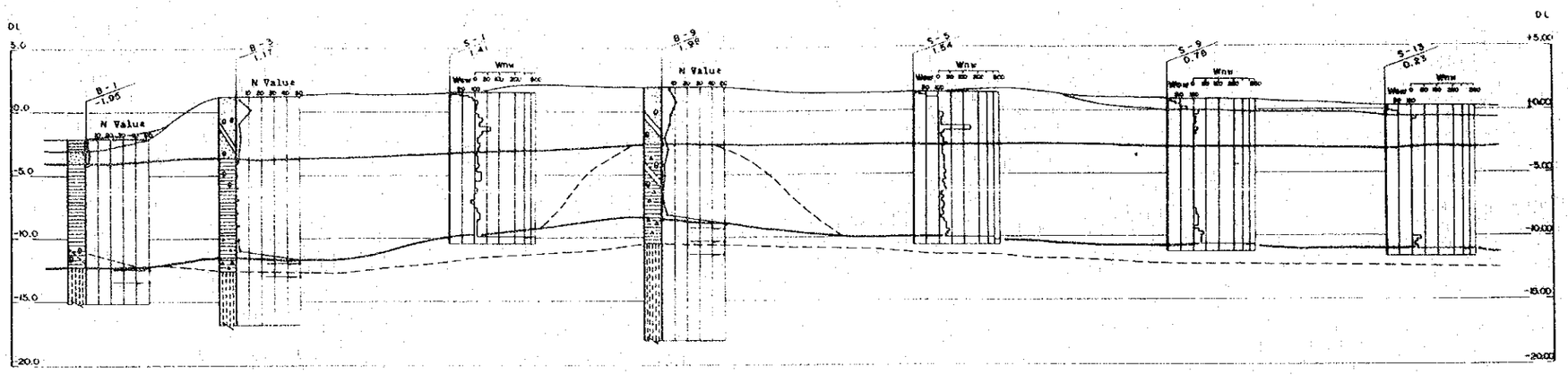


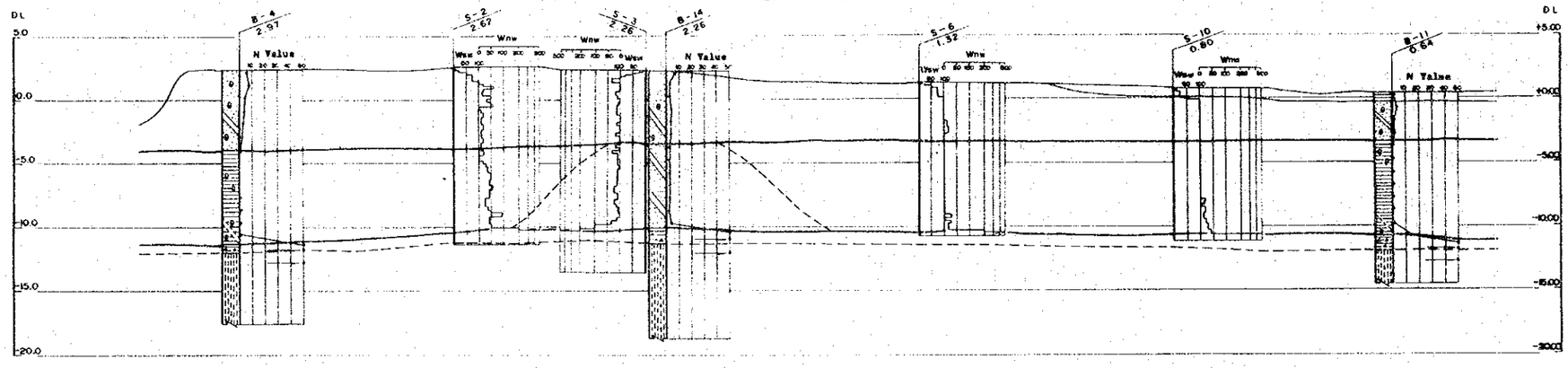
Fig. 7 POWER PROJECT



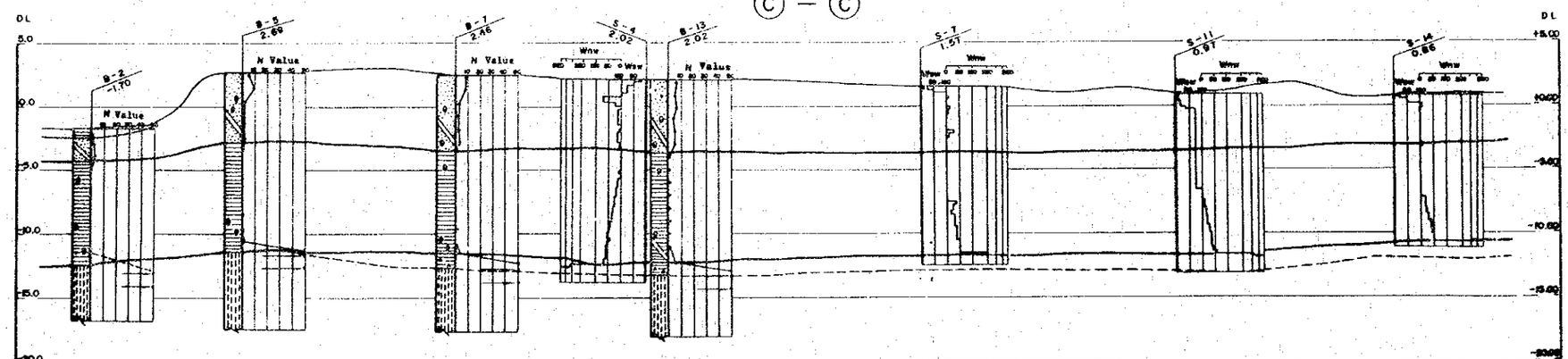
Ⓐ — Ⓐ

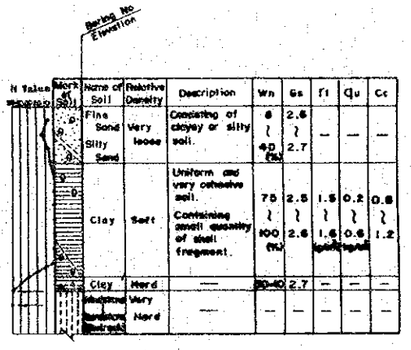


Ⓑ — Ⓑ



Ⓒ — Ⓒ





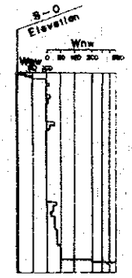
Wn : Natural Moisture Content

Gs : Specific Gravity

ri : Wet Density

Qu : Unconfined Compressive Strength

Cc : Compression Index



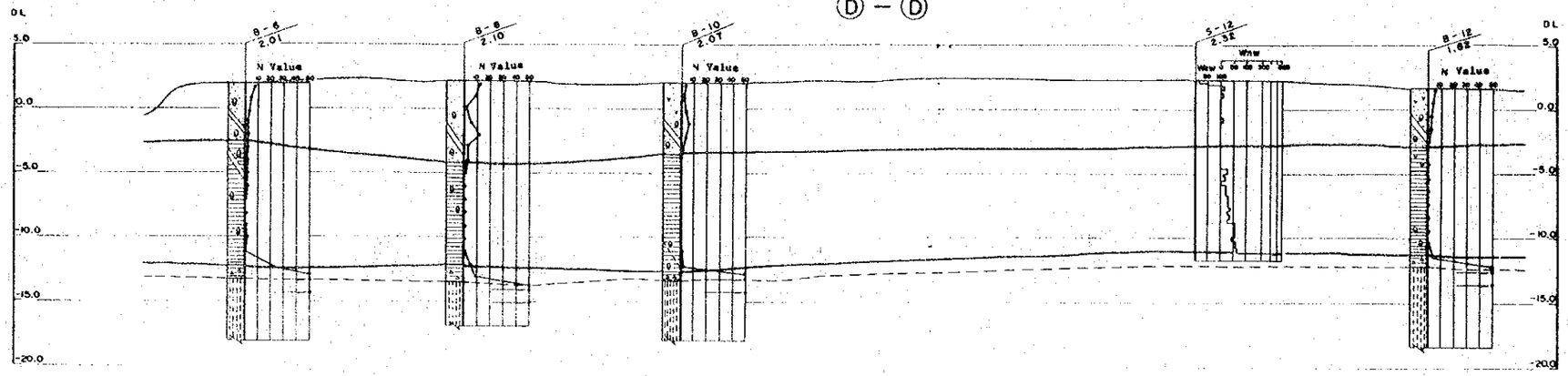
S-0 : Swedish Sounding No

Wnw : Load

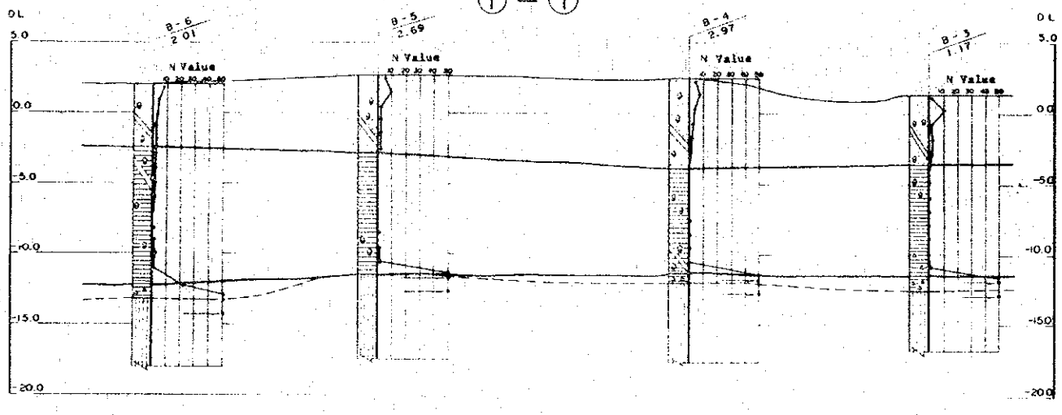
Wnw : Number of half revolution per 1m

Fig. IO Soil Profile 1

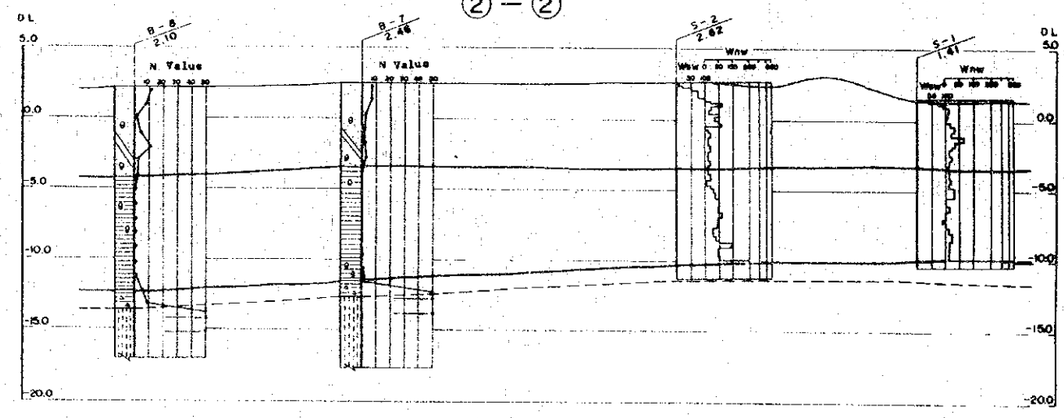
Ⓓ — Ⓓ



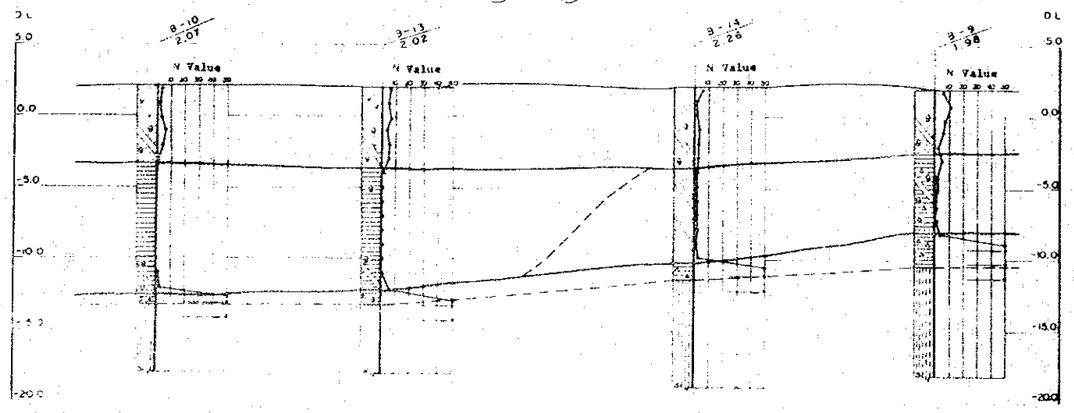
① — ①



② — ②



③ — ③



④ — ④

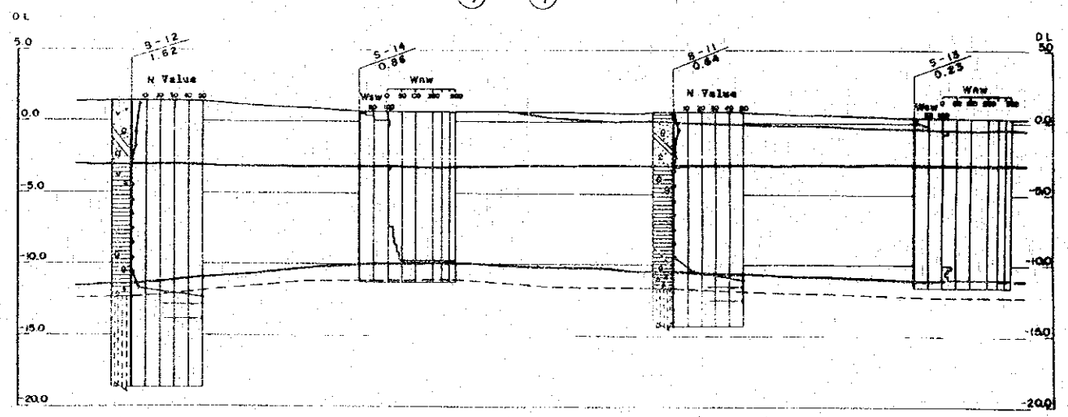
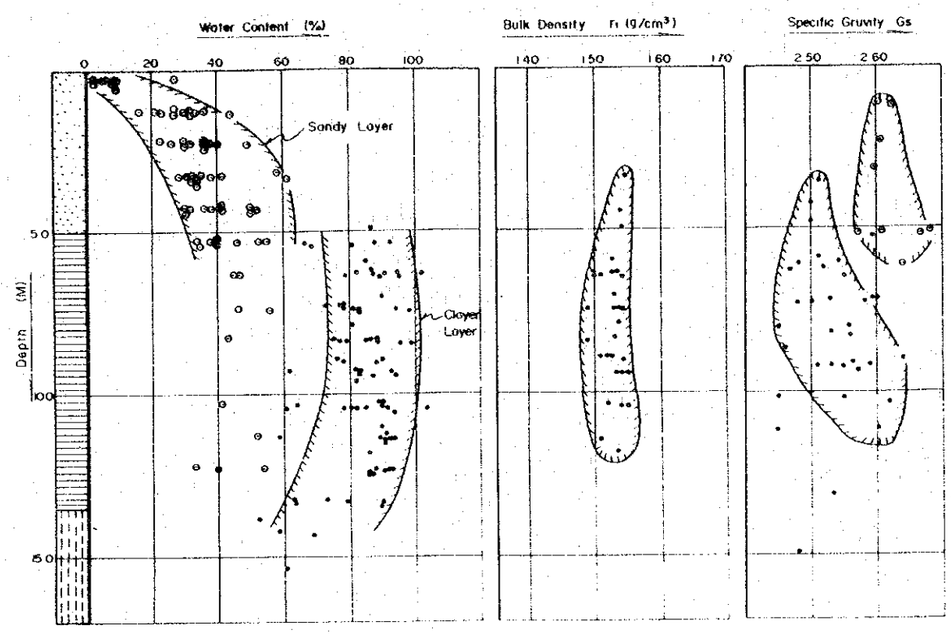
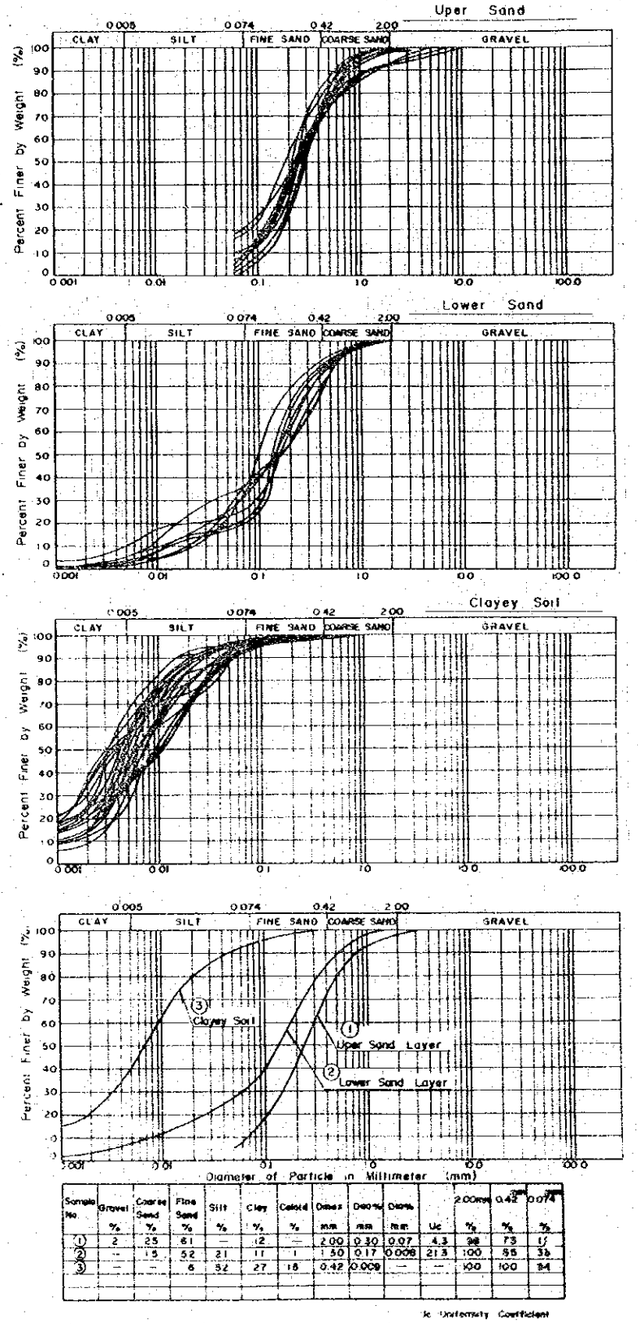
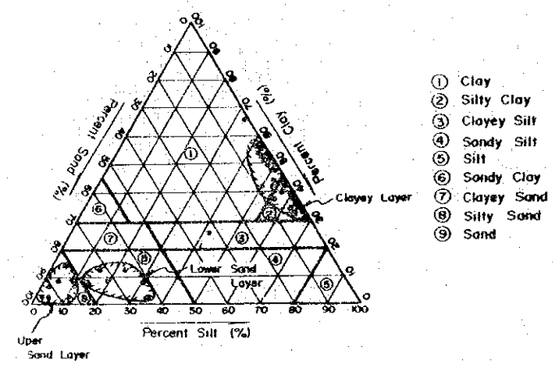


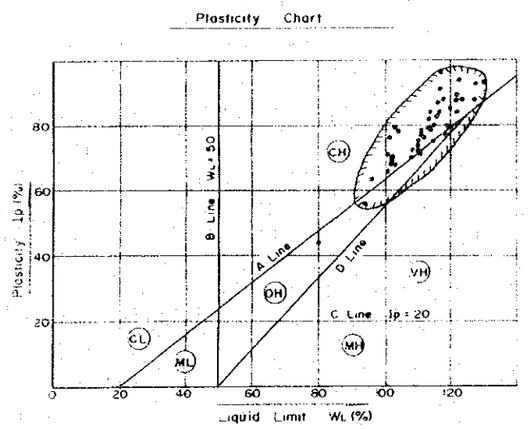
Fig. 11 Soil Profile 2

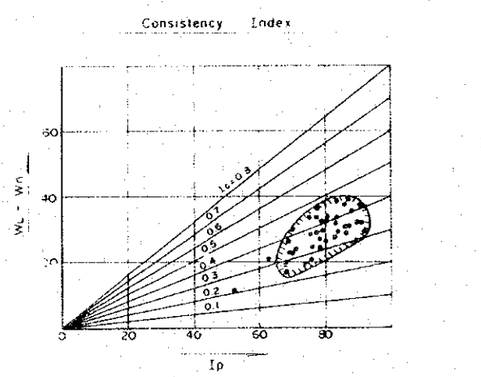






① Clay
② Silty Clay
③ Clayey Silt
④ Sandy Silt
⑤ Silt
⑥ Sandy Clay
⑦ Clayey Sand
⑧ Silty Sand
⑨ Sand



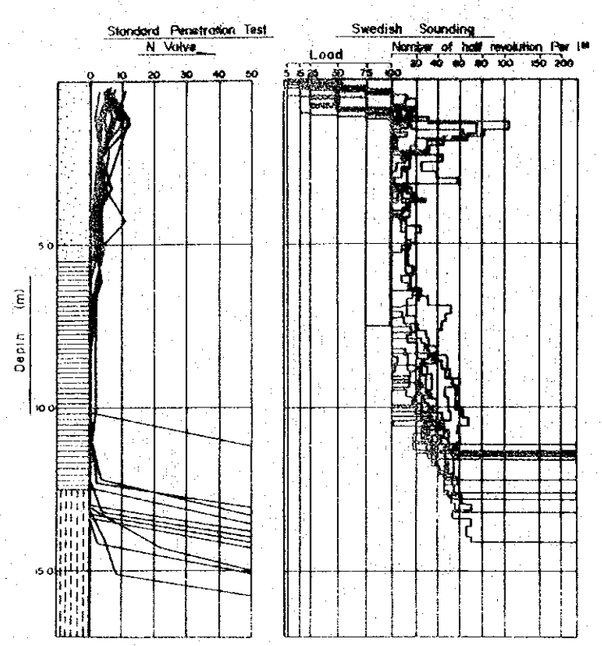


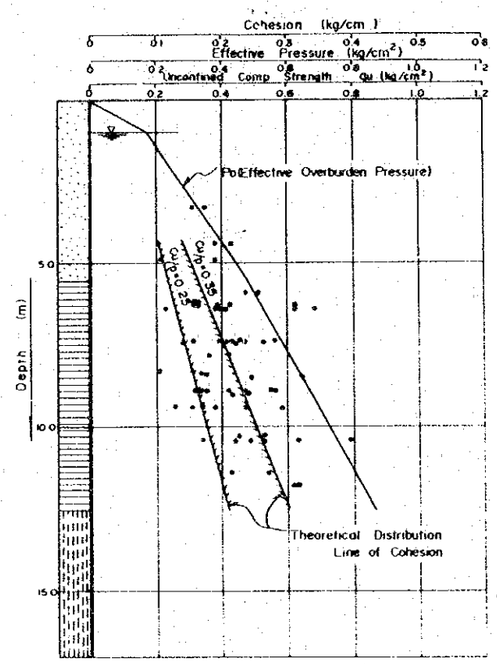
WL Liquid Limit
Wn Natural Moisture Content
Ip Plasticity Index

Sample No	Gravel %	Coarse Sand %	Fine Sand %	Silt %	Clay %	Colloid %	D60 mm	D30 mm	D10 mm	Uc	2.00mm %	0.42 %	0.074 %
①	2	25	61	—	12	—	2.00	0.30	0.07	4.3	98	73	17
②	—	15	52	21	11	1	1.50	0.17	0.006	21.3	100	55	33
③	—	—	6	52	27	15	0.42	0.009	—	—	100	100	84

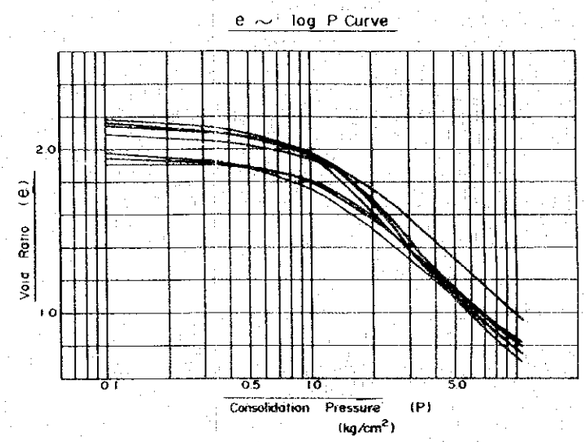
Uc Uniformity Coefficient

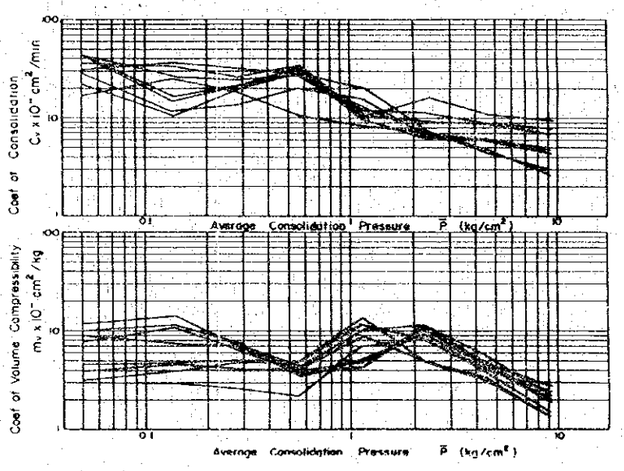
Fig. 13 Result of Soil Test (Fisical Test)





Consolidation





Triaxial Compression

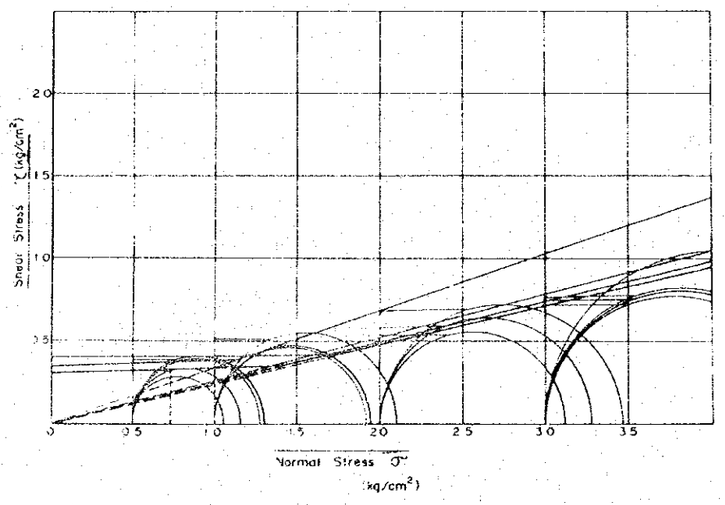
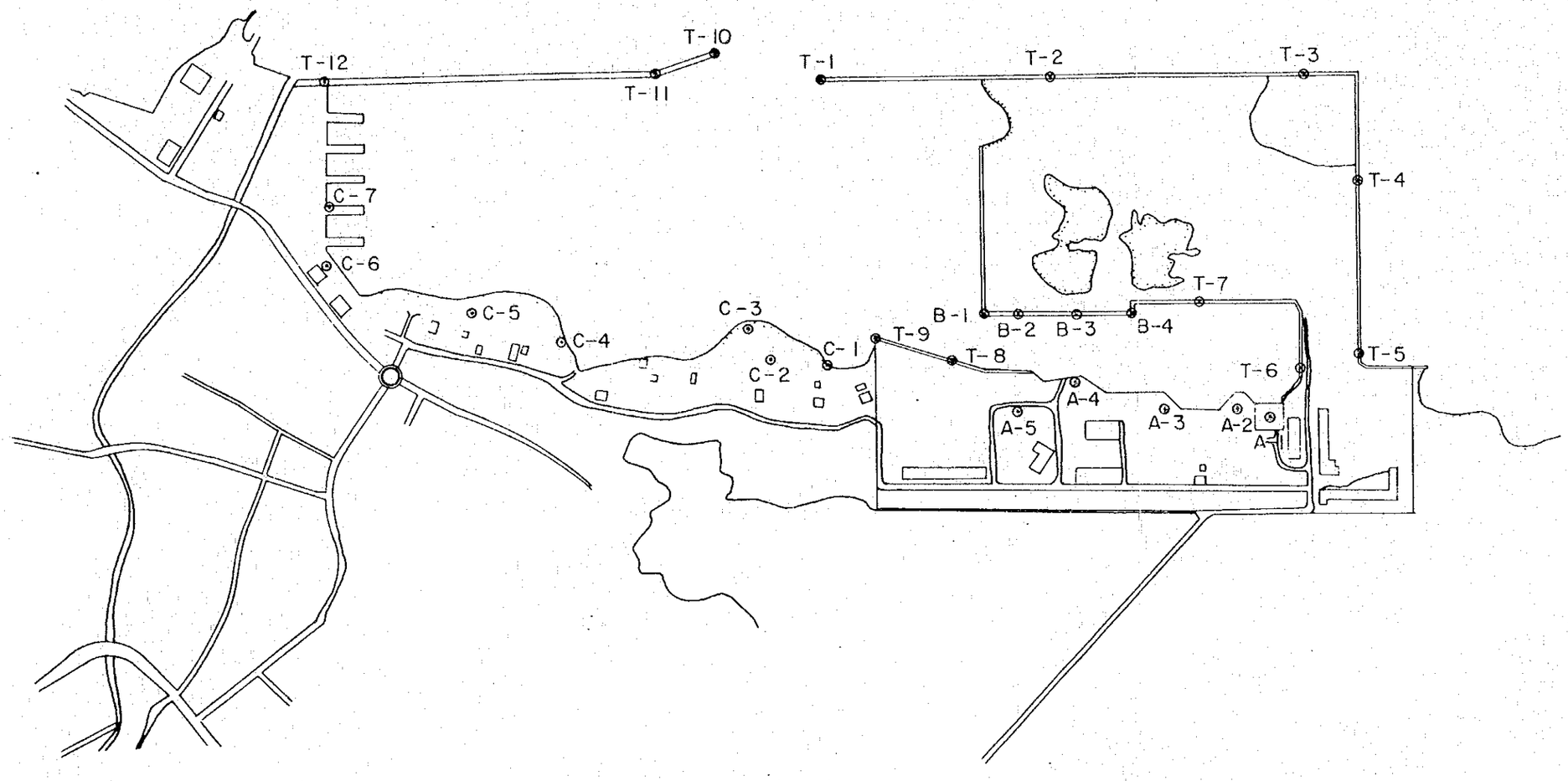


Fig. 14 Result of Soil Test (Dynamic Test)

Fig. 15 LOCATION OF TRAVERSE POINTS



No.	X	Y	No.	X	Y	No.	X	Y	No.	X	Y
T - 1	2,000 .000	2,000 .000	T - 8	1,793 .270	2,338 .715	A - 3	1,897 .768	2,577 .664	C - 1	1,713 .108	2,199 .949
T - 2	2,147 .801	2,231 .286	T - 9	1,765 .547	2,236 .424	A - 4	1,855 .856	2,469 .073	C - 2	1,676 .838	2,139 .322
T - 3	2,315 .566	2,492 .875	T -10	1,952 .596	1,869 .443	A - 5	1,829 .549	2,419 .938	C - 3	1,698 .100	2,086 .819
T - 4	2,265 .458	2,626 .553	T -11	1,889 .297	1,819 .786	B - 1	1,858 .048	2,329 .802	C - 4	1,549 .552	1,900 .434
T - 5	2,086 .248	2,742 .476	T -12	1,665 .253	1,484 .618	B - 2	1,880 .547	2,367 .095	C - 5	1,516 .755	1,786 .166
T - 6	2,029 .201	2,694 .409	A - 1	1,963 .623	2,697 .088	B - 3	1,915 .908	2,425 .382	C - 6	1,477 .573	1,606 .494
T - 7	2,013 .370	2,543 .489	A - 2	1,948 .573	2,653 .172	B - 4	1,957 .715	2,484 .094	C - 7	1,532 .850	1,566 .055

Fig .16 LOCATION OF BENCH MARK

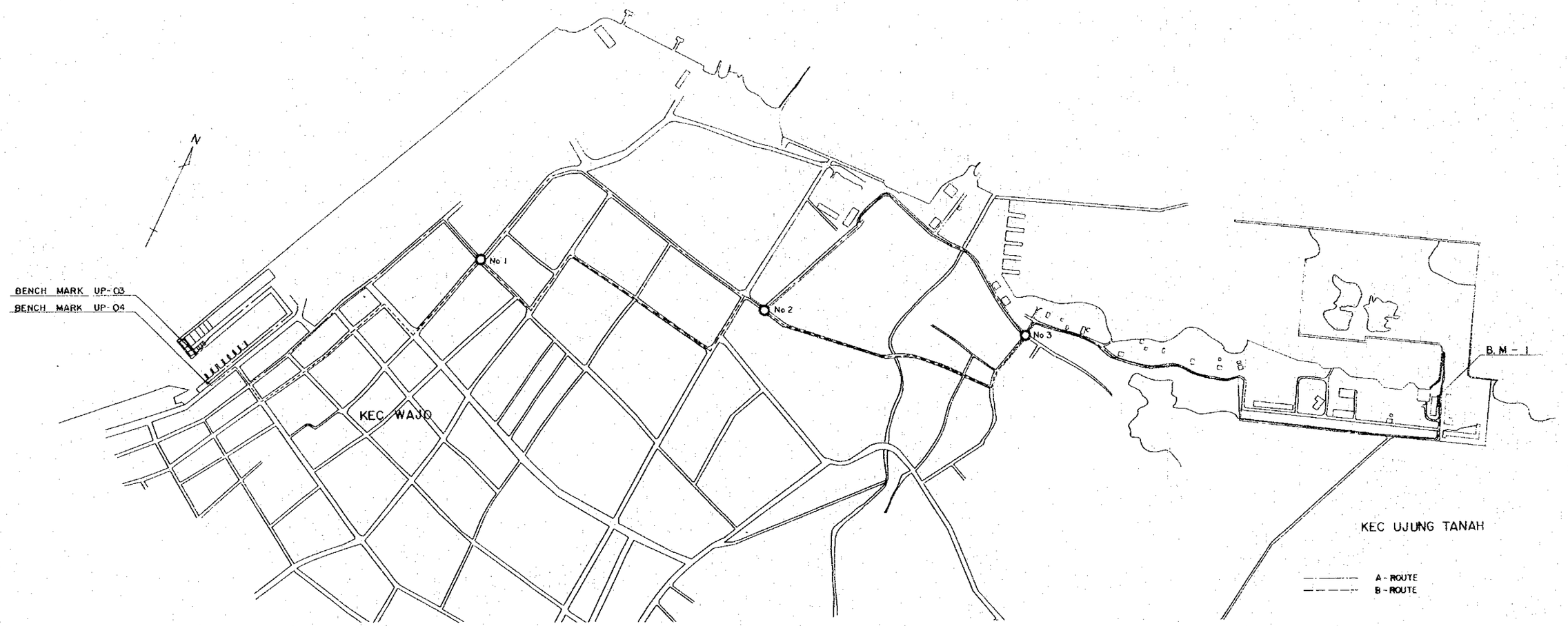
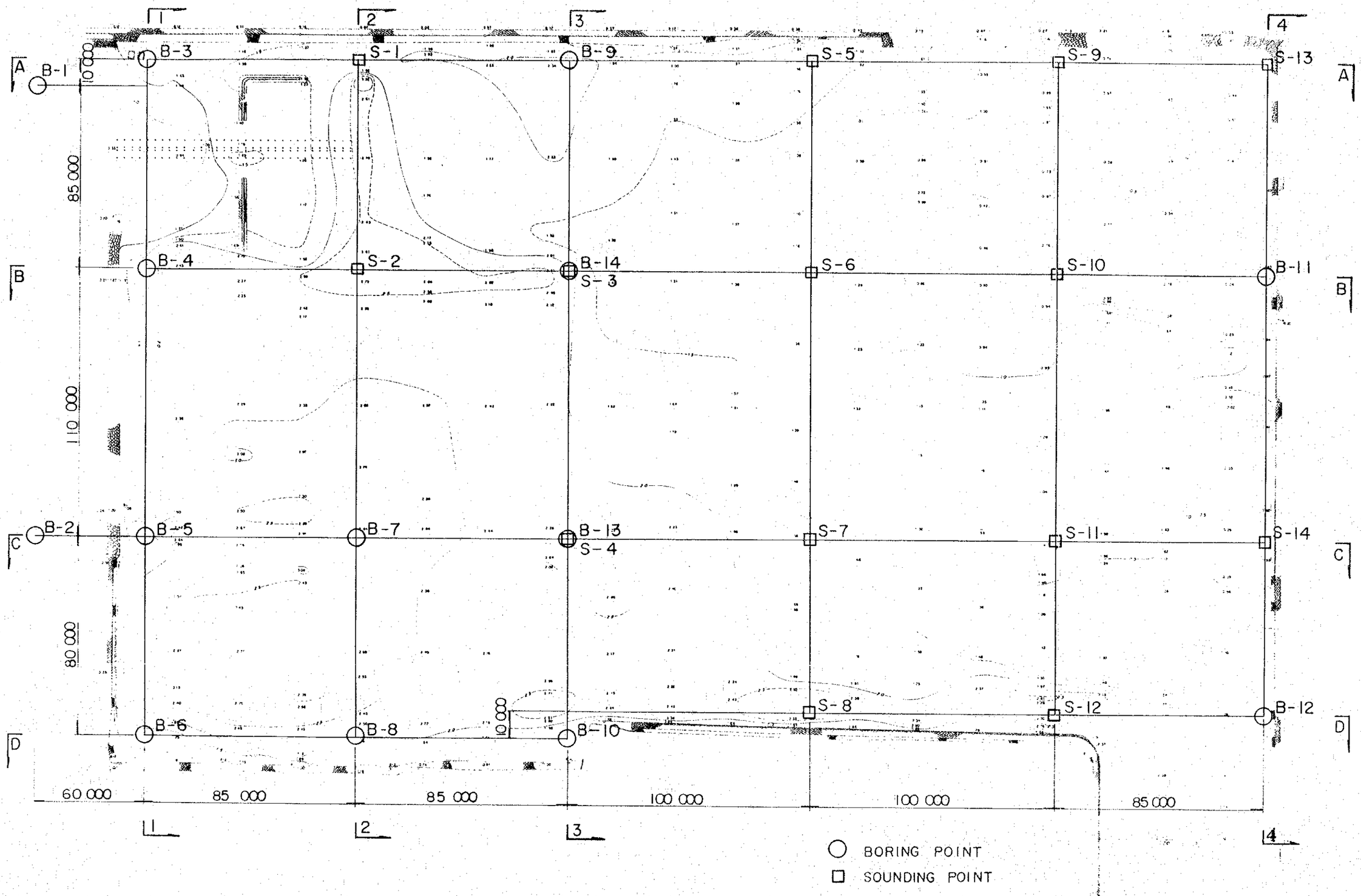


Fig. 17 LOCATION OF BORING & SWEDISH WEIGHT SOUNDING POINTS



ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: −1.95 m
孔内水位 Water Level: m
調査年月日 Date: 1980年JUL月 8 日～1980年JUL月 10 日
ボーリング孔番号 Boring Hole No.: B − 1 (On Sea)
ボーリング孔径 Diameter of Boring Hole: 116～86 mm
深さ Depth: 15.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1	1.05	1.05		Silty Clay	Darkgrey	Very soft
2			θ	Silty Sand	Darkgrey ～ Black	Very loose Fine sand with 1mm grain size Including shell fragment.
3	2.91	1.86	θ			
4				Clay	Darkgrey	Very cohesive and soft clay
5						Containing shell fragment in places and uniform clay
6						
7					Darkgreenish grey	Inclusion of shell and sand increases at a depth of 8m to 10m.
8			θ			
9			θ			
10	10.16	7.25	θ			
11				Mudstone	Brown	Soft rock Upper portion is noticeably weathered.
12				～	～	
13				Sandstone	Darkgrey	Rate of core collection using single core tube is about 80%.
14						
15	15.00					
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.00		0		
0.72		72		
1.15	2	1	1	
1.66	51	23	28	
2.15	1	1		
2.44	29	29		
10.15	50	27	23	
10.32	17	10	7	
11.15	50	50		
11.23	8	8		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
3.00		
	TWS−1	
3.55		
4.50		
	TWS−2	
5.21		
6.00		
	TWS−3	
6.82		
7.50		
	TWS−4	
8.18		
9.00		
	TWS−5	
9.77		

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: −1.70 m
孔内水位 Water Level: m
調査年月日 Date: 1980年JUL月 5 日~1980年JUL月 8 日
ボーリング孔番号 Boring Hole No.: B − 2 (On Sea)
ボーリング孔径 Diameter of Boring Hole: 116~86 mm
深さ Depth: 17.0 m
調査担当者名 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場観察による分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
0		0.71		Clay (Sedimental mud)	Darkgrey	Very soft
1				Siltysand	Darkgrey	Fine sand of 1mm grain size or less which contains shell fragment.
2		2.63		⌇ Clayeysand	⌇ Black	
3		1.92				Very loose
						This portion has a smell of organism.
4			θ			
					Darkgrey	Very cohesive and soft
5						
						Containing a small quantity of smell fragment and generally even clay.
6			θ	Clay	⌇	
7						
					Darkgreenish grey	This portion dose not include sand. Many shell fragments (2mm to 5mm dia) contains at a depth Of 9.5m to 10.5m.
8						
9						
			θ			
10			θ			
	10.70	8.07	θ			
11	11.50	0.80	△ △	Clay	Darkgrey	Very hard clay Including many square gravels.
12				Mudstone	Brown	This portion is noticeably weathered.
13						
14				Sandstone	Darkgrey	Unsound rock
15						
						Rate of core collection by single tube is about 80%.
16						
17	17.00					
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10 cm	20 cm	30 cm
0.00	0	Knocking		
0.64	64	Stop		
1.15	1	1		
1.50	35	35		
2.15	2	1	1	
2.63	48	22	26	
3.00	0			
3.54	54			
11.15	50	28	22	
11.30	15	10	5	
12.15	50	50		
12.23	8	8		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
4.00		
	TWS-1	
4.77		
5.50		
	TWS-2	
6.28		
7.00		
	TWS-3	
7.73		
8.50		
	TWS-4	
9.21		
10.00		
	TWS-5	
10.72		

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 1.17 m
孔内水位 Water Level: -0.2 m
調査年月日 Date: 1980年JUN月19日～1980年JUN月23日
ボーリング孔番号 Boring Hole No.: B-3
ボーリング孔径 Diameter of Boring Hole: 86～66 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1			θ θ θ	Fine Sand	Darkgrey	Fine sand of about 1mm grain size Including shell fragment (1mm to 5mm)
2			θ θ	Silty Sand	Darkgrey ⟩ Black	The greater the depth, the greater the inclusion of silt and clay. Very loose
4	4.95	4.95	θ θ			
5			θ	Clay	Darkgrey	very soft
6			θ			Containing shell fragment (1mm to 3mm)
7			θ		⟩	Very uniform clay, with a few inclusion of sand.
8			θ			
9			θ		Darkgreenish grey	Containing many sands and shell fragments at a depth of 10m to 12m.
10			θ			
11			Δ Δ		Darkgreen	Including a lot of coral fragment (1mm to 2mm)
12			Δ θ θ			
13	12.75	7.80	θ	Clay	Darkblue	Containing a small quantity of fine gravel (2mm to 5mm) Very hard clay
14	13.80	1.05		Mudstone (Bedrock)	Brown	Upper portion esaily gets a finger nail scratch, and the greater the depth, the greater the hardness.
16						
17				Sandstone	Darkgrey	Containing fossiliferous shell fragment
18						
20	20.00					Unsound rock

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.15	5	2	1	2
0.46	31	11	10	10
1.15	11	5	3	3
1.45	30	12	10	8
2.15	2	1	1	
2.46	31	18	13	
3.15	3	1	2	
3.46	31	15	16	
4.15	2	1	1	
4.47	32	18	14	
5.00	0	Knocking		
5.76	76		Stop	
6.00	0	Knocking		
6.59	56		Stop	
7.00	0	Knocking		
7.48	48		Stop	
8.00	0	Knocking		
8.61	61		Stop	
9.00	0	Knocking		
9.57	57		Stop	
10.00	0	Knocking		
10.51	51		Stop	
11.15	1	1		
11.71	56	56		
12.15	2	1	2	
12.67	52	25	27	
13.15	50	21	29	
13.29	14	10	4	
14.15	50	50		
14.26	11	11		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
6.00		
6.79	TWS-1	
7.00		
7.76	TWS-2	
8.00		
8.74	TWS-3	
9.00		
9.85	TWS-4	
10.00		
10.70	TWS-5	
11.00		
11.50	TWS-6	

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.47 m
孔内水位 Water Level: GL－1.4 m
調査年月日 Date: 1980年JUN月23日～1980年JUN月25日
ボーリング孔番号 Boring Hole No.: B－4
ボーリング孔径 Diameter of Boring Hole: 116～86 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1		0.80		Fine Sand	Brown	Max. grain size of about 1mm
2				Darkgrey	Darkgrey	Containing 10mmφ to 20mmφ square gravel at a depth of 1m to 2m.
3						
4				Black	Black	The greater the depth, the greater the inclusion of silt and clay.
5						
6	6.30	6.30				Very loose
7					Darkbrown	Including a small quantity of humus.
8						Very cohesive and soft clay
9					Darkgrey	
10				Clay		Containing a small quantity of shell fragment(1mm to 2mm) with few inclusion of sand.
11						
12					Darkgreenish grey	Containing many shell fragments and sands at a depth of 12m to 13m.
13	13.70	7.40				
14	14.40	0.70		Clay	Darkgreen	Very hard clay Including 10mmφ to 20mmφ gravel
15						Unsound rock
16						The greater the depth, the greater the hardness. Rate of core collection is about 70%.
17				Sandstone (Bedrock)	Darkgrey	
18						
19						
20	20.00					
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.15	5	2	2	1
0.47	32	12	9	11
1.15	7	2	3	2
1.46	31	11	11	9
2.15	4	1	2	1
2.48	33	14	12	7
3.15	3	1	1	1
3.53	38	12	13	13
4.15	2	1	1	
4.51	36	15	21	
5.15	1	1		
5.47	32	32		
10.00	0	Knocking		
10.59	59	Stop		
11.00	0	Knocking		
11.54	54	Stop		
12.00	0	Knocking		
12.51	51	Stop		
13.00	0	Knocking		
13.49	49	Stop		
14.15	50	16	34	
14.28	13	10	3	
15.15	50	50		
15.27	12	12		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
6.50		
	TWS－1	
7.07		
8.00		
8.60	TWS－2	
9.00		
	TWS－3	
9.88		

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.69 m
孔内水位 Water Level: GL-1.70 m
調査年月日 Date: 1980年JUL月 26日～1980年JUL月 28日
ボーリング孔番号 Boring Hole No.: B－5
ボーリング孔径 Diameter of Boring Hole: 116～86 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1				Fine Sand	Brown	Max. grain size of about 1mm.
2				Silty Sand	Darkgrey	Containing a small quantity of shell fragment.
3						The greater the depth, the greater the inclusion of silt and clay.
4				Clayey Sand		Including humus.
5						
6				Clay	Black	Comparatively uniform clay.
7						Very soft
8					Darkgrey	Very cohesive This portion has a smell of organism.
9						
10						This clay is sand-witched partially by sand in lumps.
11					Darkgreenish grey	
12						Containing a small quantity of shell fragment.
13						
14				Sandstone (Bedrock)	Darkgrey	Upper portion is noticeably weathered but the greater the depth, the greater the hardness.
15						
16						
17						Unsound rock
18						Rate of core collection by single core tube is about 80%.
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.15	5	2	2	1
0.48	33	13	11	9
1.15	10	4	3	3
1.47	32	12	10	10
2.15	2	1	1	
2.53	38	13	25	
3.15	2	1	1	
3.55	40	18	22	
4.15	2	1	1	
4.51	36	24	12	
5.15	2	1	1	
5.57	42	15	27	
11.00	0	Knocking		
11.63	63	Stop		
12.00	0	Knocking		
12.61	61	Stop		
13.15	1	1		
13.56	41	41		
14.15	50	45	5	
14.26	11	10	1	
15.15	50	50		
15.24	9	9		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
6.00		
6.67	TWS－1	
7.00		
7.83	TWS－2	
8.50		
9.37	TWS－3	
10.00		
10.68	TWS－4	

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　自岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.01 m
孔内水位 Water Level: GL−1.0 m
調査年月日 Date: 1980年JUN月19日～1980年JUN月21日
ボーリング孔番号 Boring Hole No.: B − 6
ボーリング孔径 Diameter of Boring Hole: 86～66 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 (角座標分類(TC) 日本統一土質分類(JUC))	色調 Colour	観察 Observation
1		1.30		Fine Sand	Brown	Containing a small quantity of shell fragment and grass root.
2				Fine Sand ～ Silty Sand	Darkgrey	The greater the depth, the geater the inclusion of silt and clay. Max. grain size of about 1mm.
3						
4	4.45	3.15				
5				Clayey Silt	Black	Very soft. Including a small quantity of shell fragment.
6						
7				Clay	Darkgrey ～ Darkgreenish grey	Upper portion contains a small quantity of sand, and it becomes uniform clay, as the depth is deep. As the depth is deep, it changes from dark gray color to dark blueish color. Very soft. Containing a small quantity of organism.
8						
9						
10						
11						
12						
13						
14	14.20	9.75				
15	15.20	1.00		Clay	Dark blue	Including rigid weathered rock stratum, and square gravel.
16				Mudstone ～ Sandstone (bedrock)	Brown ～ Dark grey	Unsound rock. Rate of core collection by single core tube is about 70%.
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.15	7	2	2	3
0.47	32	13	10	9
1.15	4	1	2	1
1.47	32	10	10	12
2.15	3	1	1	1
2.45	30	10	11	9
3.15	2	1	1	
3.68	53	25	28	
4.15	1	1		
4.45	30	30		
5.15	1	1		
5.71	56	56		
6.15	2	1	1	
6.65	50	25	25	
7.15	1	1		
7.47	32	32		
8.15	1	1		
8.66	51	51		
9.15	0	Nokking		
9.51	36	Stop		
10.15	0	Nokking		
10.58	43	Stop		
11.15	0	Nokking		
11.52	37	Stop		
12.15	1	Nokking		
12.79	64	Stop		
13.00	0	Nokking		
13.32	32	Stop		
14.15	22	2	1	19
14.45	30	14	6	10
15.15	50	25	25	
15.31	16	10	6	
16.15	50	50		
16.24	9	9		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.46 m
孔内水位 Water Level: GL−1.50 m
調査年月日 Date: 1980年JUN月30日−1980年JUL月2日
ボーリング孔番号 Boring Hole No.: B − 7
ボーリング孔径 Diameter of Boring Hole: 116〜86 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 土質標準分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1				Fine Sand	Brown	Max. grain size of 1mm.
2				Silty Sand	Darkgrey	Containing a little humus (root of grass)
3						Including shell fragment.
4						Very loose
5	5.90	5.90		Clayey Sand	Black	Irregularly containing silt and clay.
6				Clay	Darkgrey	Very soft
7						Including a little fine sand, but comparatively uniform clay.
8						
9						Very cohesive
10					Darkgreenish grey	Containing a little shell fragment.
11						
12						
13	13.85	7.95				
14				Clay	Darkbrown	Rigid clay
15	15.05	1.20				Including pumice
16				Mudstone	Darkbrown	Unsound rock
17						The greater the depth, the greater the hardness.
18				Sandstone (Bedrock)	Darkgrey	
19						Rate of core collection is about 80%.
20	20.00					
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.15	7	3	2	2
0.46	31	11	9	11
1.15	7	2	3	2
1.47	32	12	11	9
2.15	3	1	2	
2.48	33	17	16	
3.15	2	1	1	
3.50	35	22	13	
4.15	2	1	1	
4.48	33	18	15	
5.15	3	1	1	1
5.49	34	10	10	14
12.00	0	Knocking		
12.61	61	Stop		
13.00	0	Knocking		
13.56	56	Stop		
14.15	3	1	1	1
14.53	38	16	12	10
15.15	50	50		
15.24	9	9		
16.15	50	50		
16.22	7	7		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
6.00		
6.70	TWS−1	
7.00		
7.73	TWS−2	
8.00		
8.70	TWS−3	
9.00		
9.71	TWS−4	
10.00		
10.88	TWS−5	

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.10 m
孔内水位 Water Level: GL−1.20 m
調査年月日 Date: 1980年JUN月21日～1980年JUN月23日
ボーリング孔番号 Boring Hole No.: B − 8
ボーリング孔径 Diameter of Boring Hole: 86~66 mm
深さ Depth: 21.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1			θ	Fine Sand	Brown	Max. grain size of about 1mm. Very loose
2			θ	Silty Sand	Darkgrey	The greater the depth, the greater the inclusion of silt and clay.
3						
4						
5			θ	Clayey Sand	Darkgrey	Containing clay in lumps, and shell fragment.
6	6.35	6.35	θ	Sandy Silt		
7			θ	Clay	Darkgrey	Very soft and cohesive.
8			θ			Including a little shell fragment (1mm to 2mm), with a few inclusion of sand.
9						
10			θ			Uniform clay layer.
11						
12					Darkgreenish grey	
13						
14	14.20	7.85				
15			Δ	Clay	Darkgreenish grey	Rigid clay Containing gravel.
	15.60	1.40	Δ			
16				Sandstone (Bedrock)	Darkgrey	Unsound rock
17						Upper portion easily gets a finger nail scratch, the greater the depth, the greater the hardness.
18						
19						Rate of core collection is about 60%.
20						
21	21.00					
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10 cm	20 cm	30 cm
0.15	11	4	4	3
0.45	30	10	10	10
1.15	8	2	4	2
1.45	30	10	10	10
2.15	1	1		
2.45	30	30		
3.15	5	1	2	2
3.45	30	10	12	8
4.15	11	3	3	5
4.45	30	12	10	8
5.15	1	1		
5.61	46	46		
6.15	2	1	1	
6.48	33	20	13	
7.00	0	Knocking		
7.40	40		Stop	
8.00	0	Knocking		
8.85	85		Stop	
9.00	0	Knocking		
9.56	56		Stop	
10.00	0	Knocking		
10.55	55		Stop	
11.00	0	Knocking		
11.63	63		Stop	
12.00	0	Knocking		
12.68	68		Stop	
13.00	0	Knocking		
13.53	53		Stop	
14.00	5	1	2	2
14.30	30	10	10	10
15.15	9	2	3	4
15.45	30	10	10	10
16.15	50	30	20	
16.33	18	10	8	
17.15	50	41	9	
17.28	13	10	3	

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 1.98 m
孔内水位 Water Level: GL−1.10 m
調査年月日 Date: 1980年JUL月1日~1980年JUL月3日
ボーリング孔番号 Boring Hole No.: B−9
ボーリング孔径 Diameter of Boring Hole: 86~66 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1				Gravel ~ Sand	Brown	Backfilling embankment for reclaimed land.
2				Siltysand	Darkgrey	Irregularly containing clay and silt.
3				~	~	
4	4.50	4.50		Clayey Sand	Black	Including shell fragment (2mm to 5mm).
5						Including a lot of shell fragment(5mm to 10mm) and coral fragment (5mm to 20mm).
6				Sandy Clay		
7				~	Darkgreenish grey	Soft clay
8				Clayey Sand		
9						
10	10.50	6.00				
11				Clay	Brown	Rigid clay Including gravel.
12	12.30	1.80				
13					Brown	The upper portion is greatly weathered, but the greater the depth, the greater the hardness.
14				Mudstone	~	
15				~		Rate of core collection is about 70% to 80%.
16					Darkgrey	
17				Sandstone		Containing a little fossiliferous shell fragment.
18						
19						
20	20.00					
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10 cm	20 cm	30 cm
0.15	6	2	3	1
0.49	34	11	10	13
1.15	11	5	4	2
1.46	31	10	10	11
2.15	7	3	3	1
2.45	30	10	8	12
3.15	6	1	2	3
3.45	30	10	10	10
4.15	2	1	1	
4.48	33	20	13	
5.15	5	1	1	3
5.46	31	11	10	10
6.15	2	1	1	
6.45	30	10	20	
7.15	2	1	1	
7.48	33	20	13	
8.00	0	Knocking		
8.70	70	Stop		
9.00	0	Knocking		
9.65	65	Stop		
10.15	4	2	1	1
10.50	35	14	10	11
11.15	50	8	17	25
11.41	26	10	10	6
12.15	50	14	36	
12.33	18	10	8	
13.15	50	50		
13.22	7	7		

打撃回数 N 値 Number of Blows per 30cm
0 . 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.07 m
孔内水位 Water Level: GL−1.20 m
調査年月日 Date: 1980年JUN月22日～1980年JUN月24日
ボーリング孔番号 Boring Hole No.: B−10
ボーリング孔径 Diameter of Boring Hole: 116～86 mm
深さ Depth: 22.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1			V V	Silty Sand	Darkgrey	Max. grain size of about 1mm. Including humus(root of grass). Containing silt and clay in lumps.
2			θ			
3			θ	Clayey Sand	Black	The greater the depth, the greater the inclusion of clay.
4						
5	5.55	5.55	θ θ	Silty Clay	Darkgrey	Entirely containing shell fragment.
6				Clay	Darkgrey	Including a little sand and shell fragment (1mm to 2mm), but uniform clay throughout the stratum.
7						
8						
9					Darkgreenish grey	Very cohesive and soft
10						
11						Containing a lot of shell fragment and sand at a depth of 12m to 14m.
12						
13			θ		Darkbrown	
14	14.70	9.20	θ			
15	15.30	0.60	Δ Δ	Clay	Darkgreenish grey	Rigid clay Weathered rock stratum
16						
17				Sandstone	Darkgrey	The upper portion is noticeably weathered the greathr the depth, the greater the hardness.
18						
19						Rate of core collection is about 80%.
20						
21						
22	22.00					
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10 cm	20 cm	30 cm
0.15	3	1	1	1
0.50	35	10	12	13
1.15	2	1	1	
1.50	35	15	20	
2.15	3	2	1	
2.46	31	15	16	
3.15	6	3	2	1
3.45	30	10	10	10
4.15	4	2	1	1
4.45	30	10	12	8
5.00	0	Knocking		
5.55	55	Stop		
13.00	0	Knocking		
13.66	56	Stop		
14.15	2	1	1	
14.48	33	16	17	
15.15	50	26	24	
15.30	15	10	5	
16.15	50	50		
16.23	8	8		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method
6.00		
6.57	TWS−1	
7.00		
7.77	TWS−2	
8.50		
8.20	TWS−3	
10.00		
10.87	TWS−4	
11.50		
12.07	TWS−5	

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 0.64 m
孔内水位 Water Level: GL-0.10 m
調査年月日 Date: 1980年JUL月 9 日～1980年JUL月 11 日
ボーリング孔番号 Boring Hole No.: B－11
ボーリング孔径 Diameter of Boring Hole: mm
深さ Depth: 18.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 三角座標分類(TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
	0.75	0.75		Clay	Darkgrey	Very soft
1			θ	Silty Sand	Darkgrey	Very loose
2			θ	～	～	Containing shell fragment.
3	3.80	3.05	θ	Clayey Sand	Black	
4			θ		Black	Upper porting includes shell fragment.
5			θ			
6				Clay		Very cohesive and soft clay.
7					Darkgrey	
8						Containing a lot of shell fragment at a depth of 9.5m to 1.1m.
9						
10			θ		Darkgreenish grey	
11	11.20	9.40	θ			
12	12.40	1.20	△	Clay	Darkgreenish grey	Rigid Including gravel.
13				Sandstorne (Bedrock)	Darkgrey	Unsound rock
14						Rate of core collection by single core tube is about 70%.
15						
16						
17						
18	18.00					
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.00	0			
0.63	63			
1.15	4	2	1	1
1.47	32	12	8	12
2.15	1	0	1	
2.47	32	10	22	
3.15	1	1		
3.70	55	55		
4.00	0	Knocking		
4.76	76		Stop	
5.00	0	Knocking		
5.68	68		Stop	
6.00	0	Knocking		
6.77	77		Stop	
7.00	0	Knocking		
7.78	78		Stop	
8.00	0	Knocking		
8.74	74		Stop	
9.00	0	Knocking		
9.75	75		Stop	
10.00	0	Knocking		
10.74	74		Stop	
11.15	16	4	6	6
11.45	30	10	10	10
12.15	50	7	12	31
12.40	25	10	10	5
13.15	50	50		
13.25	10	10		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 1.62 m
孔内水位 Water Level: GL − 0.70 m
調査年月日 Date: 1980年JUL月 4日 − 1980年JUL月 5日
ボーリング孔番号 Boring Hole No.: B − 12
ボーリング孔径 Diameter of Boring Hole: 86 ~ 66 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 規場判定 (TC) 日本統一土質分類(JUC)	色調 Colour	観察 Observation
1				Fine Sand	Brown	Max. grain size of about 1mm. Very loose
2				Silty Sand	Darkgrey	Containing clay and silt in lumps.
3				Clayey Sand	Black	Including humus(root of grass) and shell fragment.
4	4.50	4.50				
5				Clay	Darkbrown	Containing a little humus in the upper portion.
6						
7						Comparatively uniform soft clay.
8					Darkgrey	Very cohesive
9						Including shell fragment in the lower portion.
10						
11					Darkgreenish grey	
12	12.80	8.30				
13	13.70	0.90		Clay	grey	Rigid clay Containing gravel.
14				Sandstone (Bedrock)	Darkgrey	Unsound rock
15						Rate of core collection is about 80%.
16						
17						
18						
19						
20	20.00					
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10 cm	20 cm	30 cm
0.15	6	2	3	1
0.49	34	11	10	13
1.15	4	2	1	1
1.45	30	10	10	10
2.15	3	1	1	1
2.48	33	10	11	12
3.15	3	1	1	1
3.47	32	10	12	10
4.00	0	Knocking		
4.81	81		Stop	
5.00	0	Knocking		
5.61	61		Stop	
6.00	0	Knocking		
6.70	70		Stop	
7.00	0	Knocking		
7.65	65		Stop	
8.00	0	Knocking		
8.55	55		Stop	
9.00	0	Knocking		
9.73	73		Stop	
10.00	0	Knocking		
10.70	70		Stop	
11.00	0	Knocking		
11.70	70		Stop	
12.00	0	Knocking		
12.75	75		Stop	
13.15	5	1	2	2
13.45	30	10	10	10
14.15	50	28	22	
14.30	15	10	5	
15.15	50	50		
15.23	8	8		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.02 m
孔内水位 Water Level: GL−1.10 m
調査年月日 Date: 1980年JUN月28日 − 1980年JUN月30日
ボーリング孔番号 Boring Hole No.: B − 13
ボーリング孔径 Diameter of Boring Hole: 86〜66 mm
深さ Depth: 20.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定 (地盤標分類:TC) (日本統一土質分類:JUC)	色調 Colour	観察 Observation
				Fine Sand	Brown	Max. grain size of about 1mm.
1						
2				Silty Sand	Darkgrey	Containing shell fragment.
3						Very loose
4				Clayey Sand		Irregularly including clay.
5	5.70	5.70				
6						This portion has a smell of organism.
7					Darkbrown	Containing shell fragment in places.
8						Soft
9						
10				Clay	Darkgrey	Very cohesive
11						Including a lot of shell fragment and sand at a depth of 12m to 14m.
12						
13					Darkgreenish grey	
14	14.20	8.50				
15				Clay		Rigid (weathered rock stratum) Including gravel
	15.23	1.03				
16				Mudstone		Upper portion is noticeably weathered, but the greater the depth, the greater the hardness.
17						
18					Darkgrey	
19				Sandstone		
20						Rate of core collection is about 80%.
	20.00					
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10 cm	20 cm	30 cm
0.15	6	3	2	1
0.46	31	10	11	10
1.15	5	2	2	1
1.46	31	12	12	7
2.15	6	2	2	2
2.47	32	12	11	9
3.15	4	1	2	1
3.45	30	10	10	10
4.15	5	2	2	1
4.45	30	10	11	9
5.15	5	2	1	1
5.46	31	10	10	11
6.00	0	Knocking		
6.65	65	Stop		
7.00	0	Knocking		
7.68	68	Stop		
8.00	0	Knocking		
8.75	75	Stop		
9.00	0	Knocking		
9.56	56	Stop		
10.00	0	Knocking		
10.75	75	Stop		
11.00	0	Knocking		
11.65	65	Stop		
12.00	0	Knocking		
12.50	50	Stop		
13.00	0	Knocking		
13.74	74	Stop		
14.15	6	2	2	2
14.50	35	10	12	13
15.15	50	27	23	
15.29	14	10	4	
16.15	50	50		
16.23	8	8		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

ボーリング柱状図

BORING LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard
地盤標高 Ground Elevation: 2.24 m
孔内水位 Water Level: GL-1.30 m
調査年月日 Date: 1980年JUN月29日～1980年JUL月 1 日
ボーリング孔番号 Boring Hole No.: B－14
ボーリング孔径 Diameter of Boring Hole: 86～66 mm
深さ Depth: 21.0 m
調査担当者 Tested By:

標尺 Staff GL-m	標高 Elevation 孔内水位 Water Level m	層厚 Stratum Thickness m	土質記号 Mark of Soil	土質名 現場判定（列帳標の場：TC）日本統一土質分類(JUC)	色調 Colour	観察 Observation
1		1.50		Fine Sand	Brown	Max. grain size of about 1mm.
2				Silty Sand	Darkgrey	Irregularly containing clay and silt. Including a little humus (root of grass) and shell fragment.
3						
4				Clayey Sand	Black	
5	5.70	5.70				
6				Clayey Sand	greenish grey	Mainly consisting of medium sand and fine sand, of which a cohesive clay accounts for 30% to 40%.
7						
8						Including a lot of shell fragment and coral fragment.
9						
10						
11						
12	12.31	6.61				
13	13.55	1.24		Clay	greenish grey	Rigid clay Containing pumice (5mm to 8mm).
14				Mudstone	Darkgrey	Unsound rock
15						
16						Upper portion is noticeably weathered but the greater the depth, the greater the hardness.
17						
18				Sandstone		
19						Rate of core collection is about 70% to 80%.
20				(Bedrock)		
21	21.00					
22						
23						
24						
25						
26						
27						
28						
29						
30						

標準貫入試験 Standard Penetration Test

深さ Depth m	打撃回数/貫入量(cm) (N値) 回/cm	10cmごとの打撃回数 Blow Count per 10cm 10cm	20cm	30cm
0.15	5	2	2	2
0.48	33	10	11	12
1.15	2	1	1	
1.46	31	13	18	
2.15	2	1	1	
2.46	31	16	15	
3.15	4	2	1	1
3.50	35	13	12	10
4.15	3	1	1	1
4.46	31	10	11	10
5.15	3	1	1	1
5.48	33	11	12	10
6.15	2	1	1	
6.45	30	13	17	
7.15	2	1	1	
7.55	40	25	15	
8.15	2	1	1	
8.54	39	26	13	
9.15	2	1	1	
9.48	33	20	13	
10.15	2	1	1	
10.53	38	21	17	
11.15	1	1		
11.66	51	51		
12.15	3	1	2	
12.49	34	18	16	
13.15	50	28	22	
13.30	15	10	5	
14.15	50	50		
14.23	8	8		

打撃回数 N 値 Number of Blows per 30cm: 0 10 20 30 40 50

試料採取 Sampling

深さ Depth m	試料番号 Sample No.	採取方法 Sampling Method

備考

レキ Gravel　砂 Sand　シルト Silt　粘土 Clay　頁岩 Shale　ピート有機 Peat　貝殻 Shell

B－1

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard

地盤標高 Ground Elevation: −1.95 m

孔内水位 Water Level: m

調査年月日 Date: 80 7 10 ～ 80 7 19

ボーリング孔番号 Boring Hole No.: B — 1

ボーリング孔径 Diameter of Boring Hole: 116 ～ 86 mm

深さ Depth: m

調査試験担当者 Tested By:

尺 Staff / 標高 Elevation / 孔内水位 Water Level / 層厚 Stratum Thickness / 試料番号 Sample No. / GL. m / 記号 Mark of Soil / 試料番号 Example No. / 試料番号 Sample No.

粒度組成 Gradation Composition: 粘土 Clay, シルト Silt, 砂 Sand, レキ Gravel; 色調 (Colour); P (%) 0 20 40 60 80 100

液性限界 Liquid Limit ○ ω_L %

塑性限界 Plastic Limit ● ω_P %

含水比 Natural Moisture Content △ ω_n % 20 60 100 140

湿潤密度 Wet Density ○ γ_t g/cm³

土粒子の比重 Specific Gravity ● G_s

間ゲキ比 Void Ratio △ e 0 1 2 3

一軸圧縮強さ Unconfined Compressive Strength ○ q_u kg/cm² 0.2 0.4 0.6

変形係数 Deformation Coef. ● E_{50} kg/cm² 20 30 40

破壊時のヒズミ Failure Strain △ ε % 1 2 3

粘着力 Cohesion ○ C kg/cm²

せん断抵抗角 Angle of Shearing Resistance ● ϕ 10 20 30 40 50 60 70

圧密降伏応力 Consolidation Yield Stress △ P_y kg/cm²

圧縮指数 Compression Index ▲ C_c

標準貫入試験 Standard Penetration Test ● N 0 10 20 30 40 50

コーン支持力 Cone Penetration Resistance △ q_c kg/cm² 0 40 80 120 160 200

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

備考 (Remarks)

B—2

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard

地盤標高 Ground Elevation: −1.70 m

孔内水位 Water Level: m

調査年月日 Date: 60 年 7 月 9 日 ~ 80 年 7 月 19 日

ボーリング孔番号 Boring Hole No.: B—2

ボーリング孔径 Diameter of Boring Hole: 116 ~ 86 mm

深さ Depth: 0.00 ~ 10.72 m

調査試験担当者 Tested By:

標尺 Staff	標高 Elevation	孔内水位 Water Level	層厚 Stratum Thickness	土質名 Name of Soil	標本番号 Example No.	試料番号 Sample No.	GL
	m			USC			m

粒度組成 Gradation Composition: 粘土 Clay / シルト Silt / 砂 Sand / レキ Gravel

色調 (Colour)

→ P (%)

液性限界 Liquid Limit ○ ω_L %

塑性限界 Plastic Limit ● ω_P %

含水比 Natural Moisture Content △ ω_N %

湿潤密度 Wet Density ○ γ_t g/cm³

土粒子の比重 Specific Gravity ● G_s

間ゲキ比 Void Ratio △ e

一軸圧縮強さ Unconfined Compressive Strength ○ q_u kg/cm²

変形係数 Deformation Coef. ● E_{50} kg/cm²

破壊時のヒズミ Failure Strain △ ε %

粘着力 Cohesion ○ C kg/cm²

せん断抵抗角 Angle of Shearing Resistance ● ϕ °

圧密降伏応力 Consolidation Yield Stress △ P_y kg/cm²

圧縮指数 Compression Index ▲ C_c

標準貫入試験 Standard Penetration Test ● N

コーン支持力 Cone Penetration Resistance △ q_c kg/cm²

備考 (Remarks)

B—3

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard

地盤標高 Ground Elevation: 1.17 m

孔内水位 Water Level: m

調査年月日 Date: 80 6 27 ~ 80 7 19

ボーリング孔番号 Boring Hole No.: B— 3

ボーリング孔径 Diameter of Boring Hole: 86~66 mm

深さ Depth: 0.00 ~ 13.49 m

調査試験担当者 Tested By:

GL m

孔内水位 Water Level

層厚 Stratum Thickness

土質区分 Mark of Soil

USC

粒度組成 Gradation Composition
粘土 Clay / シルト Silt / 砂 Sand / レキ Gravel
色調 (Colour)
—— P (%)
0 20 40 60 80 100

液性限界 Liquid Limit ○ w_L %
塑性限界 Plastic Limit ● w_P %
含水比 Natural Moisture Content △ w_n %
20 60 100 140

湿潤密度 Wet Density ○ γ_t g/cm³
土粒子の比重 Specific Gravity ● G_s
間ゲキ比 Void Ratio △ e
0 1 2 3

一軸圧縮強さ Unconfined Compressive Strength ○ q_u kg/cm²
0.1 0.2 0.3
変形係数 Deformation Coef. ● E_{50} kg/cm²
10 20 30
破壊時のヒズミ Failure Strain △ ε %
2 3 4

粘着力 Cohesion ○ C kg/cm²
せん断抵抗角 Angle of Shearing Resistance ● ϕ
10 20 30 40 50 60 70
圧密降伏応力 Consolidation Yield Stress △ P_y kg/cm²
圧縮指数 Compression Index ▲ C_c

標準貫入試験 Standard Penetration Test ● N
0 10 20 30 40 50
コーン支持力 Cone Penetration Resistance △ q_c kg/cm²
0 40 80 120 160 200

GL m	USC	層厚
1–2	SM ~ SC	
3–4	SM ~ S ~ SC	
5–6		
6–7	CH	
7–8	CH	
8–9	CH	
9–10	CH	
10–11	SM ~ S ~ SC	
11–12	SM ~ S ~ SC	
12–13		
13–14		
14–15		
15–16		
16–17		
17–18		
18–19		
19–20		
20–21		
21–22		
22–23		
23–24		
24–25		
25–26		
26–27		
27–28		
28–29		
29–30		

備考 (Remarks)

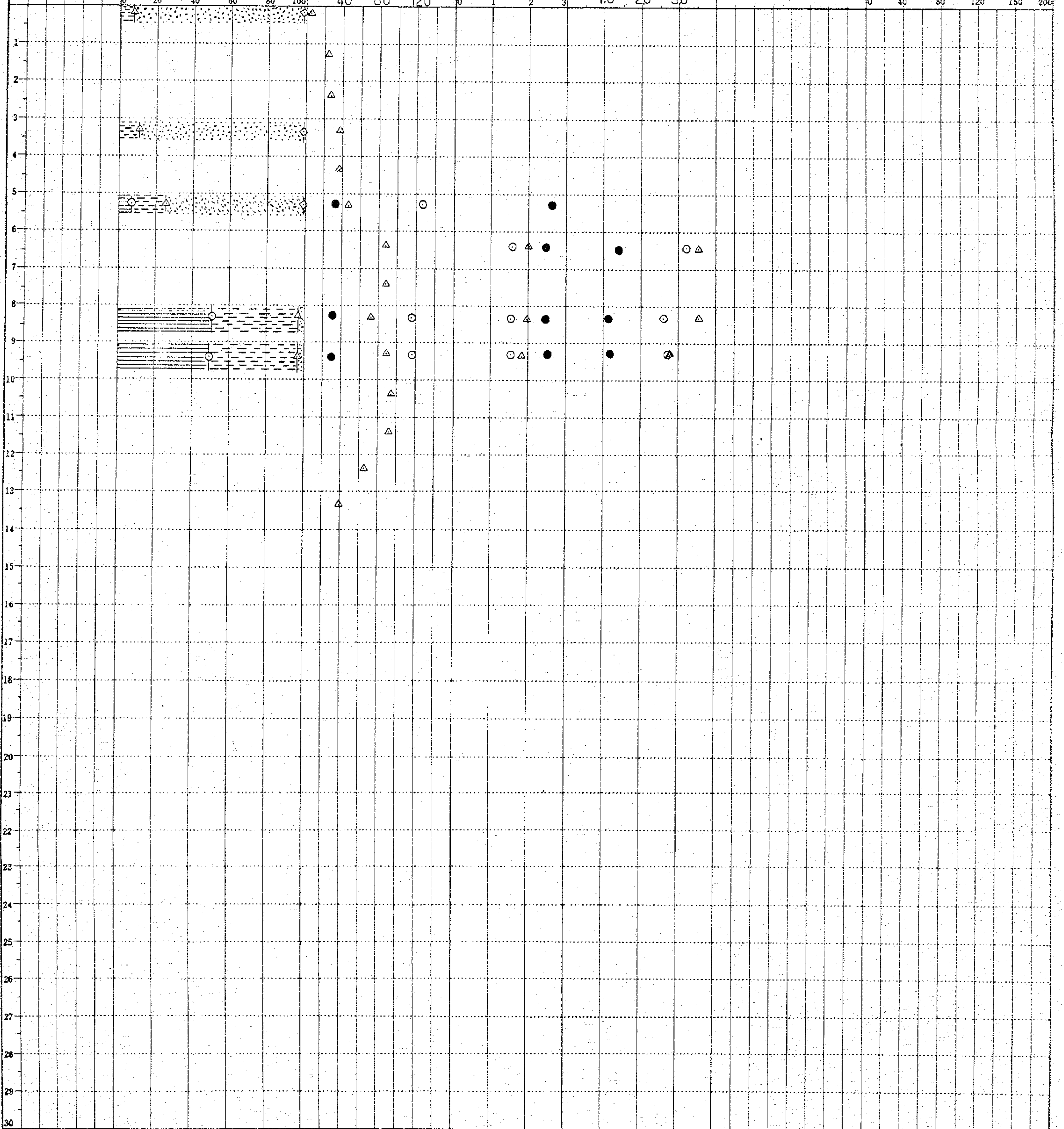
B——4

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title. Investigation Place: Makassar Ship Yard	地盤標高 Ground Elevation: 2.47 m	孔内水位 Water Level: m	調査年月日 Date: 80年6月25日~80年7月19日
ボーリング孔番号 Boring Hole No.: B——4	ボーリング孔径 Diameter of Boring Hole: 116~86 mm	深さ Depth: 0.00 ~ 14.28 m	調査試験担当者 Tested By:

GL m / 尺度 Scale / 標高 Elevation / 孔内水位 Water Level / 層厚 Stratum Thickness / 土質記号 Mark of Soil (JUSC) / 標本番号 Example No. / 試料番号 Sample No.	粒度組成 Gradation Composition: 粘土 Clay, シルト Silt, 砂 Sand, レキ Gravel; 色調 (Colour); —— P (%) 0 20 40 60 80 100	液性限界 Liquid Limit ○ ω_L %; 塑性限界 Plastic Limit ● ω_P %; 含水比 Natural Moisture Content △ ω_n %; 40 80 120	湿潤密度 Wet Density ○ γ_t g/cm³; 土粒子の比重 Specific Gravity ● Gs; 間ゲキ比 Void Ratio △ e; 0 1 2 3	一軸圧縮強さ Unconfined Compressive Strength ○ q_u kg/m²: 0.1 0.2 0.3; 変形係数 Deformation Coef. ● E_{50} kg/cm²: 10 20; 破壊時のヒズミ Failure Straine △ ε %: 1.0 2.0 3.0	粘着力 Cohesion ○ C kg/cm²; セン断抵抗角 Angle of Shearing Resistance ● φ: 10 20 30 40 50 60 70; 圧密降伏応力 Consolidation Yield Stress △ P_y kg/cm²; 圧縮指数 Compression Index ▲ Cc	標準貫入試験 Standard Penetration Test ● N: 0 10 20 30 40 50; コーン支持力 Cone Penetration Resistance △ q_c kg/cm²: 0 40 80 120 160 200



備考 (Remarks)

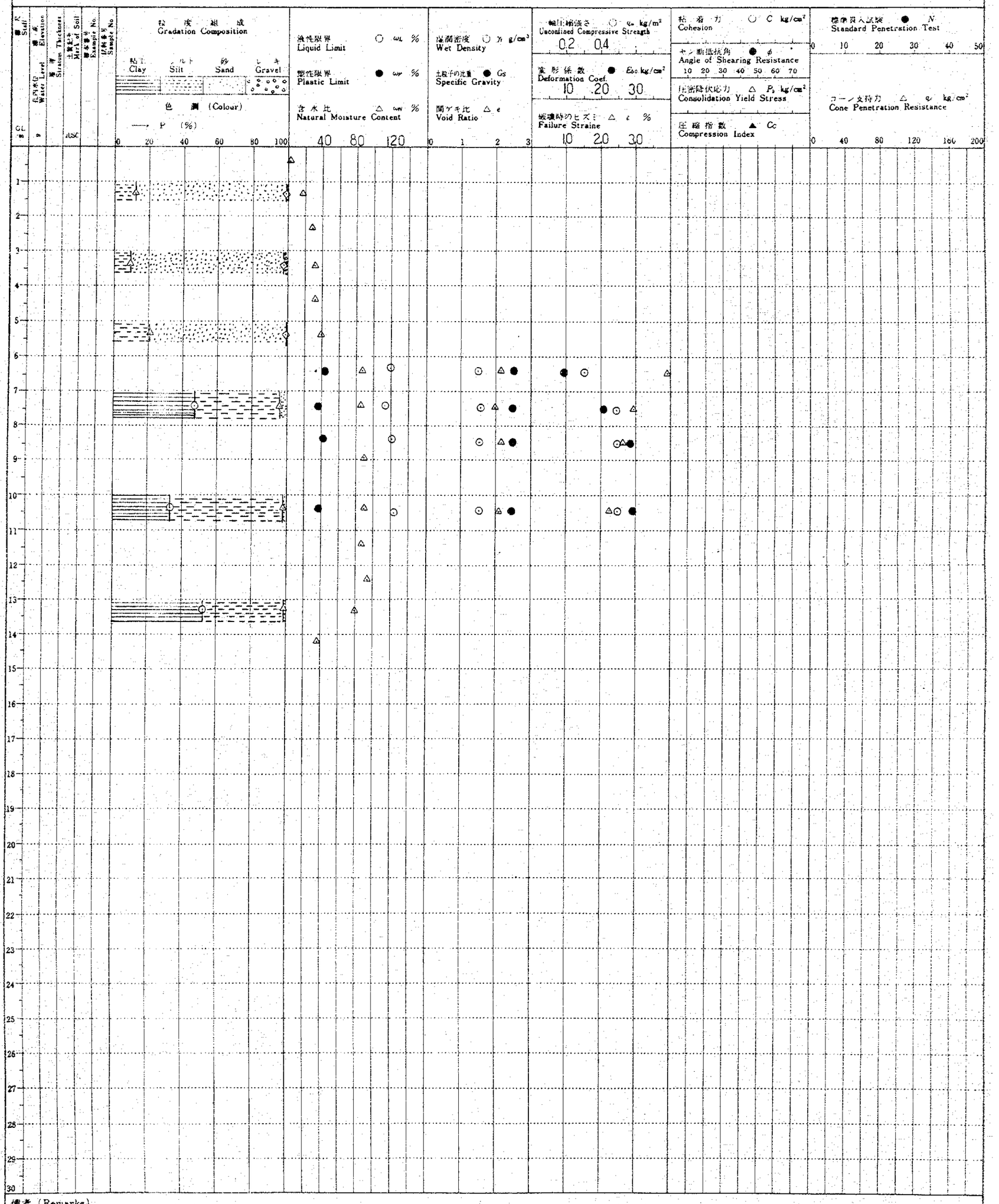
B——5

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title, Investigation Place: Makassar Shi Yard
地盤標高 Ground Elevation: 2.69 m
孔内水位 Water Level: m
調査年月日 Date: 80年 6月 28日 ~ 80年 7月 19日

ボーリング孔番号 Boring Hole No.: B—5
ボーリング孔径 Diameter of Boring Hole: 116~86 mm
深さ Depth: 0.00 ~ 14.26 m
調査試験担当者 Tested By:



備考（Remarks）

B－7

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title, Investigation Place: Makassar ShiP Yard

地盤標高 Ground Elevation: 2.46 m

孔内水位 Water Level: m

調査年月日 Date: 80 7 2 ～ 80 7

ボーリング孔番号 Boring Hole No.: B－7

ボーリング孔径 Diameter of Boring Hole: 116～86 mm

深さ Depth: 0.00 ～ 14.53 m

調査試験担当者 Tested By:

柱状図 Stuff / 標高 Elevation / 孔内水位 Water Level / 層厚 Stratum Thickness / 土質記号 Mark of Soil / 標本番号 Example No / 試料番号 Sample No / GL

粒度組成 Gradation Composition
粘土 Clay　シルト Silt　砂 Sand　レキ Gravel
色調 (Colour)
P (%)
0 20 40 60 80 100

液性限界 Liquid Limit ○ ω_L %
塑性限界 Plastic Limit ● ω_P %
含水比 Natural Moisture Content △ ω_N %
20 60 100 140

湿潤密度 Wet Density ○ γ_t g/cm³
土粒子の比重 Specific Gravity ● G_s
間ゲキ比 Void Ratio △ e
0 1 2 3

一軸圧縮強さ Unconfined Compressive Strength ○ q_u kg/m²
0.2 0.4 0.6
変形係数 Deformation Coef. ● E_{50} kg/cm²
20 40 60
破壊時のヒズミ Failure Strain △ ε %
1 2 3

粘着力 Cohesion ○ C kg/cm²
せん断抵抗角 Angle of Shearing Resistance ● φ °
10 20 30 40 50 60 70
圧密降伏応力 Consolidation Yield Stress △ P_y kg/cm²
圧縮指数 Compression Index ▲ C_c

標準貫入試験 Standard Penetration Test ● N
0 10 20 30 40 50
コーン支持力 Cone Penetration Resistance △ q_c kg/cm²
0 40 80 120 160 200

備考 (Remarks)

B－10

土質試験柱状図

SOIL TESTS LOG

調査名・調査地点 Title, Investigation Place: Makassar Ship Yard

地盤標高 Ground Elevation: 2.07 m

孔内水位 Water Level: m

調査年月日 Date: 80 年 6 月 25 日 ～ 80 年 7 月 19 日

ボーリング孔番号 Boring Hole No.: B－10

ボーリング孔径 Diameter of Boring Hole: 116～86 mm

深さ Depth: 0.00～12.07 m

調査試験担当者 Tested By:

粒度組成 Gradation Composition	液性限界 Liquid Limit ○ ω_L %	湿潤密度 Wet Density ○ γ_t g/cm³	一軸圧縮強さ Unconfined Compressive Strength ○ q_u kg/cm²	粘着力 Cohesion ○ C kg/cm²	標準貫入試験 Standard Penetration Test ● N
粘土 Clay / シルト Silt / 砂 Sand / レキ Gravel	塑性限界 Plastic Limit ● ω_P %	土粒子の比重 Specific Gravity ● G_S	変形係数 Deformation Coef. ● E_{50} kg/cm²	せん断抵抗角 Angle of Shearing Resistance ● ϕ °	コーン支持力 Cone Penetration Resistance △ q_c kg/cm²
色調 (Colour)	含水比 Natural Moisture Content △ ω_N %	間ゲキ比 Void Ratio △ e	破壊時のヒズミ Failure Strain △ ε %	圧密降伏応力 Consolidation Yield Stress △ P_y kg/cm²	
P (%)				圧縮指数 Compression Index ▲ C_c	

GL. m	Water Level m	Stratum Thickness m	Mark of Soil USC	Sample No.	Sample No.
1			SM S SC		
2					
3			SM S SC		
4					
5			SM S SC		
6					
7			CH		
8					
9					
10					
11					
12			CH		
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

備考 (Remarks)