REPORT ON PRELIMINARY SURVEY OF THE PONTIANAK BRIDGE CONSTRUCTION PROJECT IN THE REPUBLIC OF INDONESIA

MARCH 1965

OVERSEAS TECHNICAL COOPERATION AGENCY OF JAPAN

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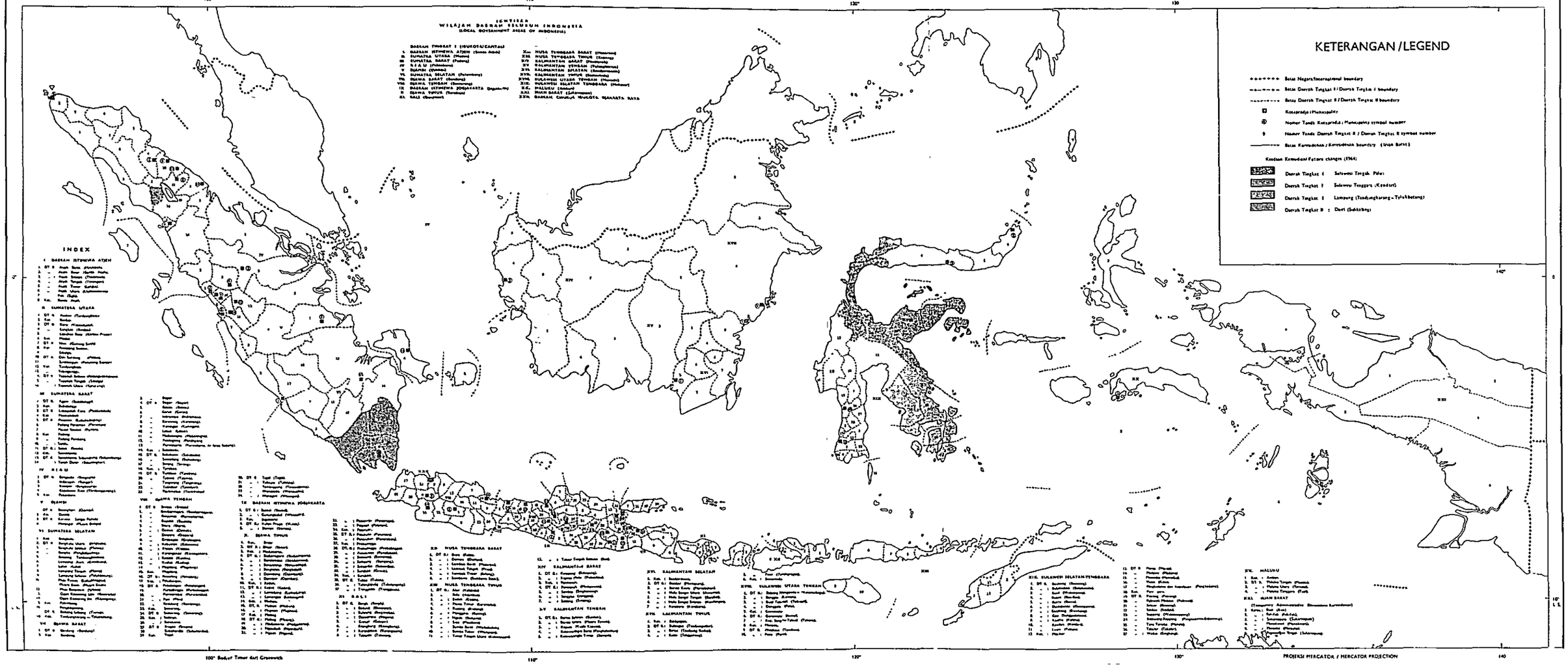
ATLAS SUMBER² KEMAKMURAN INDONESIA / ATLAS OF INDONESIAN RESOURCES

WILAJAH DAERAH/ LOCAL GOVERNMENT AREAS



PREFACE

This report is a summary of the records of technical preliminary survey made by the Japanese Bridge-building survey team in close co-operation with the Indonesian Government authorities in order to realize the bridge-building project for Pontianak City, West Kalimantan, which had been requested by the Government of Republic of Indonesia.

The survey team of six expert engineers was organized and dispatched by the Overseas Technical Cooperation Agency of Japan. The survey team made various survey works on the expected bridge-building sites and their related areas in co-operation with the Indonesian survey team. They carefully made investigations and researches into the bridge-building sites, bridge type, construction costs, etc., which would be reasonable from an economical and technical viewpoint. As this survey was a preparatory work, they additionally examined the exact survey, which would be necessary at the following stage.

It is a great pleasure to our Overseas Technical Cooperation Agency, which has since its establishment in 1962 given various technical co-operation of the Japanese Government that this report, which was made in close co-operation with both countries with an effort, can be hereby submitted to your respectable Government. At the same-time, we keenly expect that the fruit of the recent survey would contribute to the realization of this project in near future as well as the mutual understanding between both nations, and the further development of the economy thereof.

I conclude this preface, by paying our hearty respect and expressing our great gratitude to the Indonesian Republic Government, authorities concerned and the Indonesian people, who were willing to give the greatest support and co-operation to the recent survey of our team.

March, 1965

S. Shibusawa
Director General
Overseas Technical
Cooperation Agency

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1. Introduction

1-1 Outline of the Investigation

1-1-1 Objective of the Investigation

The objective of this investigation was to survey the expected bridge-building site in relation to the Pontianak bridge-building project made by the Indonesian Government, and prepare a summary of preliminary investigation report on the construction work of the bridge. In this connection, the investigation items are as follows:

(1) Survey of the area close to the expected bridge-building site

(2) Investigation of the conditions on the spot

(3) Investigation of the materials and others in the area, where the bridge is to be built

(4) Investigation of design condition

(5) Collection of the informations and data upon the above-mentioned items.

1-1-2 Organization of the Investigation Party

Chief:	Mitsuo Nishino,
	Japan Design and Survey (Nippon Sekkei Sokuryo) Co., Ltd.
Member:	Tatsuo Kawagoe,
	Construction Ministry
Member:	Yoshio Sakamoto,
	Obayashi-gumi Co., Ltd.
Member:	Hisao Oka,
	Japan Steel Mfg. (Nippon Kokan) Co., Ltd.
Member:	Hiroshi Tomita ,
	Fuji Car, Co., Ltd.
Member:	Akihiro Mitarai,
	Overseas Technical Co-operation Agency

In connection with the above, the Indonesian Government has organized a survey team of the following officials, who accompanied the above Japanese Survey Team members to Pontianak.

Mr. Santoso	D.P.U.T.
Mr. Soerjatin	D.P.U.T.
Mr. Sakli Anggoro	Indah Karja

The Indonesian Survey Team has made a careful survey on the job site in close co-operation with the Japanese Investigation Team.

1-1-3 Investigation Period

About one month from 4 Jan. to 4 Feb., 1965

1-2 Acknowledgement

We owe to the devoted support of the Indonesian Government and the people that our Investigation Party could successfully completed its investigation work, though its members were staying for a short period. In this connection, we herely express our hearty gratitude to the Indonesian Government.

The Survey Team has received cordial help and co-operation from the following Indonesian gentlemen and others after its arrival at Djakarta: D.P.U.T. (Ministry of Public Works and Energy) Minister, Lt. General Soeprajogi; Vice-Minister, Mr. Tambunan; Vice-Minister, Mr. Soefeat; Vice-Minister, Mr. Harja Soedirdja; Director of the Road Bureau, Mr. Kwee H.S.; Head of the Road Construction Dept., Mr. Theng K. Y.; Three members of the above Indonesian Team; Head of the Public Sanitation Section, Mr. Hidajat; Mr. Sumargo; Messrs. Soejono, Hamimjar S., and Prasidjo, Dept. Perhugungan Laut (Marine Transportation Ministry); Messrs. Moeljatno Sindhoedarmoko, Bintoro T., Sihombing and Soedaliman, Biro Finek (Economic and Finance Agency); President of the Indah Karja, Mr. Achja; President of the Waskita Karja, Mr. Danunagoro, and others. In addition to the above, particular mention must be made of the following gentlemen, who gave a hospitality to our Survey Team in making arrangement for hotels, motorcars, ships, etc., helping the Team to make a field survey or, giving various kinds of information and data. We hereby express our profound thanks to them:

Governor of West Kalimantan Province, Mr, Oevaang Oeray

Vice-governor of West Kalimantan Province, Mr. Pasaribu

Commander of the Pontianak Military Headquarters, West Kalimantan Province, Mr, B.G. Ryacudu

Chief of the Pontianak Police, West Kalimantan Province, Mr, Gatot Soewirjo

Mayor of Pontianak, Mr. Moeis Amin

Director of the Pontianak Bureau, D.P.U. (Public Works Bureau), Mr, Soedarjoko

Vice-director of the ditto., Mr. W.S. Silitonga

Director of the Port Authority, Pontianak, Mr. Soeradijo

Vice-director of the above, Mr. Langitan

Waskita Karja, Mr. Soehaimi

In relation to the investigation of the Pontianak bridge-building work, meanwhile, the Investigation Team has received instructions from the following gentlemen, and borrowed the data therefrom:

Bandung Technical College Professor, Mr. Rochadji

- ditto - Mr. Sawarso

Head of the Soil Research Laboratory, Mr. M.A. Zacharias

Head of the Hydraulics Laboratory, Mrs. Surimurni Dorhomit

Colombo Plan Expert, Mr. Yoshio Miyashita

Head of the Geological Bureau, Mr. S. Sigit

1-3 Record of Survey Works of the Team

Date	Day of the week	Details of the work
4 Jan.	Mon.	Arrived in Djakarta
5 Jan.	Tues.	Called at the Japan Embassy to notify of the arrival of the team, and make arrangements for the Survey Works.
6 Jan.	Weds.	Called at the Ministry of Public Works and Energy (D.P.U.T.) make arrangements for the investigation
7 Jan.	Thurs.	Started from Djakarta, and arrived in Bandung by motorcar
8 Jan.	Fri.	Called at the Road Bureau, D.P.U.T. to make arrangements for

		the investigation, bridge-building conditions
9 Jan.	Sat.	Paid a visit to the Bandung Technical College, Soil, Hydraulics and Geological Research Laboratories to collect the information and data upon the earth quality, hydrological condition, water quality, aggregate, etc.
10 Jan.	Sun.	Left Bandung and reached Djakarta
11 Jan.	Mon.	Called upon Hutama Karya and Waskita Karya, investigated the state on the field, and collected the data in the D.P.U.T., and the Meteorological Agency
12 Jan.	Tues.	Arrived in the airport at 5.00, the flight to Pontianak was cancelled after we waited.
13 Jan.	Wed.	Being accompanied by 3 Indonesian Survey Team members, left Djakarta and arrived in Pontianak.
14 Jan.	Thurs.	At the residence of the Governor of West Kalimantan Province, saluted Province Governor, and the heads of the Military, Police Forces and Pontianak Municipal Governments, investigated the opposite side (the expected building site, No. 1) by means of ferry-boat, investigated the harbor facilities in cooperation with the Port Authority. Survey teams (Japan and Indonesia) made arrangements for the investigation schedule.
15 Jan.	Fri.	Investigated the expected building sites, Nos. 2 and 3 on the upper stream of Landak and small Kapuas Rivers by using a boat of the Port Authority, investigated the boring machine carried in by the Indonesian authorities, heard from the Indonesian authorities such situations as the population, traffic, city planning, etc. and then decided the expected bridge-building site (No. 2)
16 Jan.	Sat.	Investigated the bridge-building sites on both banks of Landak and small Kapuas Rivers, drove a center pile for the bridge, and negotiated with the Overland Transportation and Export Bureau members.

17 Jan.	Sun.	Japanese Party drew three drafts for the bridge, in the afternoon, the Japanese Party, with the Indonesian Team, examined the type of bridge. Part of the Party members investigated the field where the aggregates are mined.
18 Jan.	Mon.	Indonesian Survey Team returned to Djakarta. Made preparations and arrangements for measuring the river width, water depth and the flow velocity.
19 Jan.	Tues.	Measured the river width, water depth and the flow velocity of the Kapuas River, surveyed the road length for checking the aerophotographs, checked by the river with by means of triangulation and adjusted the survey records
20 Jan.	Wed.	Surveyed the Kapuas River again, surveyed the river width, water depth and flow velocity of Landak River, surveyed the prolongation of access road on the left bank of small Kapuas River, and surveyed the flow velocity at the max. water-level of small Kapuas and Landak Rivers (at 22.00-23.00)
21 Jan.	Thurs.	Calculated and drew 6 plans for the bridge to be built, and heard from the construction companies in the area concerned the status of construction works there.
22 Jan.	Fri.	Calculated and drew 6 plans for the bridge to be built, investigated the power supply in the city, aggregate makers and the public work constructors in the area concerned.
23 Jan.	Sat.	Set the water-gauges on both banks of small Kapuas and Landak rivers respectively, and dined with the persons concerned in this work in the evening for making farewell.
24 Jan.	Sun.	Saluted the Governor at his official residence, flied from Pontianak to Djakarta.
25 Jan.	Mon.	Notified the Japan Embassy of the investigation work, met the Indonesian Survey team, and collected the data.
26 Jan.	Tues.	Collected the data in the Central Statistics Bureau, and made a

		visit of the Economic and Finance Agency (Biro Finek)
27 Jan.	Wed.	Called at the Marine Transportation Ministry (Dept. Perhubungan Laut) for consultation, and negotiated with Head of the Road Construction, Dept., D.P.U.T. for the investigation records.
28 Jan.	Thurs.	Made fundamental drawings
29 Jan.	Fri.	Made report upon the survey works to Vice-minister Mr. Tambunan and other officials of the D.P.U.T., and exchanged the letter of confirmation.
30 Jan.	Sat.	Worked out plan drawings for the bridge. In the evening, thank party was held at the Hotel Indonesia.
31 Jan.	Sun.	Plan drawings for the bridge was completed.
1 Feb.	Mon.	Left Djakarta and arrived in Palembang and inspected the building work for the Musi bridge
2 Feb.	Tues.	Returned from Palembang to Djakarta
3 Feb.	Wed.	Called upon Mr. Achiea, Indaha Karja
4 Feb.	Thurs.	Left Djakarta for Tokyo

2. Conclusion and Recommendation

2-1 Introduction

2-1-1 Building Site of the Bridge

In deciding the building site of the bridge, we must first consider the following items; Present traffic condition or roads, the development of the areas corcerned and the increase in population in future and the subsequent city planning, etc. In derterming the site technically, meanwhile, the following various problems should be taken into consideration; whether the building site is suitabk for building the bridge, or not, for example, whether the topographical condition is sounfarorable as to make the building of access road difficult, or not, whether the flow velocity of river is too high to give tecknical difficulties to the work of substracture, or not. In this connection, we have decided the building site of bridge after investigating such detailed materials as the city plan of the Indonesian Ministry of Public Works & Energy,

rarious collected data, surrey data of the conditions on the job site, etc.

2-1-2 Type of the Bridge

In deciding the type of the bridge (the super- and substructure of the main bridge and the access road bridge), we must first take the following items into consideration: In the first place, the water depth of small Kapuas and Landak Rivers is as large as 12-17m. In addition, as larger a clearance below the bridge girder as 15m is required for the navigation of vessels. In the second place, the ground for both rivers is not firm, and the access road portion is also made of swampy ground. Thus the ground condition is extremely bad. The above two conditions would inevitably not only give technical difficulties to the lower bridge construction works, but also increase the construction costs. In deciding the system of the bridge, therefore, specially careful consideration must be given to the substructure of the bridge. From a viewpoint of the above, we suggest such five kinds of bridge-building plans as hereinafter mentioned, whose chief object in view is as follows:

1. Superstructure

   a) The ground is so weak that the substructure would sink. The superstructure must be, therefore, a statically determinate structure externally.

   b) As the main bridge is in need of a considerable channel width for the passage of vessels, the bridge span would become large. In consequence, the vertical reaction against the substructure and the horizontal reaction based upon the earthquake would be so large as to increase the load upon the substructure. It is, therefore, desirable that the superstructure should be of a system of small selfweight. In this connection, concrete bridge, prestressed concrete bridge, etc. are impossible.

   c) As the main bridge requires a considerable clearance below the girders, the elevation of substructure would become large to increase the load upon the foundation. It is, therefore, advisable that the superstructure should be of such a system as would lower its support position as far as possible.

   d) As the ground of the access road portion is extremely bad, it is unfavourable to fill up the ground. In this connection, simple girder system of light self-

weight should be considered.

2. Substructure

a) As the water depth is large, and still the ground is in a bad status, the caisson or sunk-well foundation is not technically and economically justified. It is, therefore, desirable to use a foundation pile system.

b) As the foundation piles, the steel pipe and concrete piles would come into question. As the steel pipe pile is unfavorable from a viewpoint of transportation, however, the concrete pile is more favorable. When the concrete piles are used, the concrete pile based upon the reverse circulation system would be best. As for the thickness of the foundation piles, it is advisable to use as thick piles as possible to resist the horizontal force due to the earthquake.

c) Bridge body shall be a rigid-frame bridge to decrease its selfweight as much as possible.

d) On the access road portion, too, it is desirable to use the foundation piles. As the bridge span on this section is not so large, it would be advantageous to employ the H-shaped steel.

2-1-3 Construction Costs for the Bridge

If the system of superstructure is decided, the construction costs for the bridge can be more correctly calculated. In relation to the substructure, its cost cannot be calculated exactly, unless the geological survey of foundation ground is completed, and its record is made known. In connection with the above, the construction costs for the bridge have been estimated on the basis of data collected.

2-1-4 Technical Survey in Future

Our recent survey is not perfect, because it is a preliminary investigation. In building the bridge, therefore, another advanced survey and full scale is required.

2-2 Conclusions of the Building Site of Bridge

From a viewpoint of the utility of bridge, we have suggested the following 3 building site of Pontianak bridge:

i) Site close to the present ferry on the downstream of the confluence of small Kapuas and Landak Rivers

ii) Site not so far from the civic center on the upperstream of the confluence

iii) Site a long way off the city on the more upper stream than mentioned in the item, ii)

As the results of our actual survey on the job site, and our negotiations with the Indonesian authorities (including the Ministry of Public Works and Energy, Public Works Bureau of Pontianak City, Pontianak Port Authority and Pontianak Municipal Government), the site mentioned in the above 11) has been employed. Considering the general traffic network for West Kalimantan and Pontianak, bridges would be required for all the above sites mentioned in the items, i), ii), and iii). If one plan is chosen, it would come into question which site is most reasonable.

In the first place, the site mentioned in the item iii) is a point, which aims at the regional development in Kalimantan Barat, and would not agree with the objective of this bridge-building program to incorporate other areas into Pontianak City. Not only that, little economic effect would be achieved.

The site mentioned in the item i) is a point, which should be first employed from a viewpoint of the urban constitution. But it has the following disadvantages:

a) According to the land use surveys (made in 1957, 1960 and 1963), Pontianak City has been growing toward the upper stream of the river. It is, therefore, expected that the civic center would be transferred from the present confluence to the upper stream side

b) As the expected bridge is within the harbor area, large clearance below the girder is required for the passage of large vessels. Therefore, not a fixed bridge but a movable bridge becomes an issue of discussion. In case of the movable bridge, construction expenses and maintenance come into question.

c) Traffic to the City area between small Kapuas and Landak Rivers would remain unsettled. Due to the backward development of this area, Pointianak City would assume an unnatural form.

d) The site mentioned in the item i) is crowded with buildings, and the traffic there is congested (chiefly according to the view of Indonesian authorities). In this area, moreover, there are many grounds for military use. It is, therefore, difficult to secure a lot for the access road. In addition, if the bridge is built there, the congestion of traffic would increase more and more. While the i) and iii) site have the above difficulties, the ii) site has the following advantages.

a) As there are a small number of buildings at present, the bridge-building work is easy.

b) This site would become a civic center.

c) Bridge would also contribute to the development of the area between Landak and small Kapuas Rivers, and would pave the way for the traffic to the inland of this area. In this connection, 3 areas on the left bank of small Kapuas River, on the right bank of Landak River, and between both rivers are tied with one another overland. Consequently Pontianak City, center of this area would make rapid progress economically.

d) By means of this route, and the ferryboat traffic now in operation, a loop road traffic could be realized in Pontianak City (Indonesian authorities also desire to remodel the ferry)

From such a viewpoint as mentioned above, our Investigation Party has chosen a route crossing both rivers at a point approx. 2 Km up the confluence of small Kapuas and Landak River to build the bridge. In addition, the access road on the left bank of small Kapuas River is scheduled to connect to the existing road.

2-3 Technical Conclusion and Recommendation for the Type of Bridge.

2-3-1 Technical Conclusion.

On the basis of our survey, our Investigation Party recommends the following 5 types of bridges, which would be suitable for various conditions of the job site. The major dimensions of various types of bridge are as shown in the attached general plan drawings. There is a difference of approx. 30m between small Kapuas and Landak Rivers in their width. It is, however, economical to build the bridges of the same

type and length on both rivers.

Superstructure of the main bridge

1. 3-span Gerber truss
2. 3-span Gerber self-anchored arch
3. 3-span Gerber-type tied arch
4. 3-span self-anchored suspension bridge
5. 3-span steg girder bridge

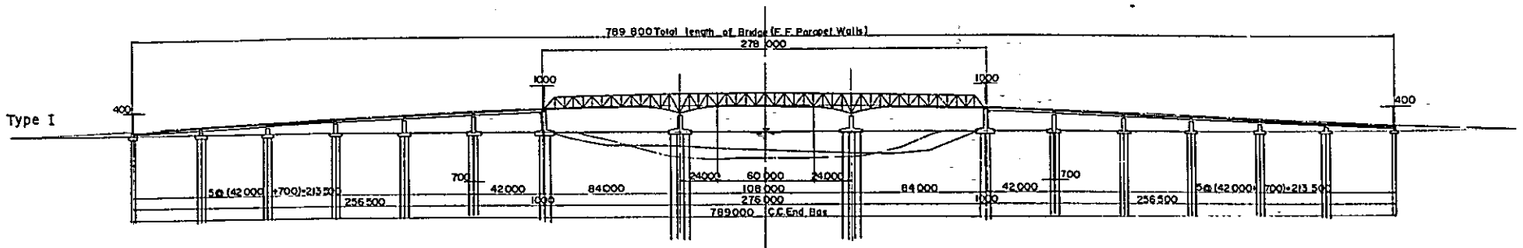
Superstructure of the access road

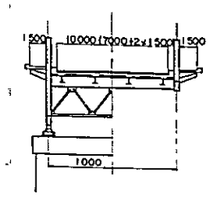
In any system, composite girders shall be employed. No ground shall be filled up as far as possible.

Substructure

The main bridge portion, i.e., foundation piles in the water sahll be concrete piles based upon the reverse circulation method. Access road portion, i.e., the portion above the water shall be made of H-shaped steel piles. All the bodies of the bridge piers shall be made of reinforced concrete. Its structure shall be of rigid frame

Type I





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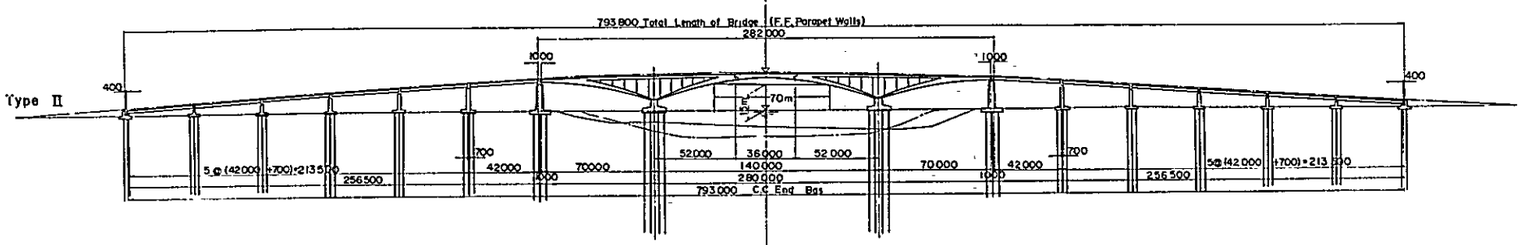

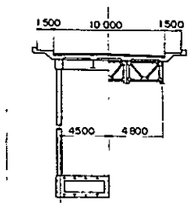

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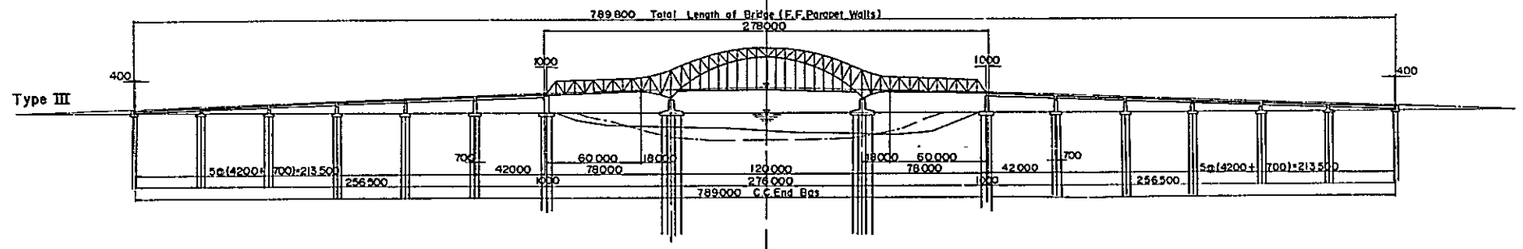
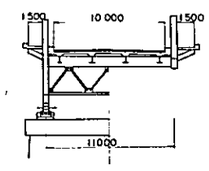
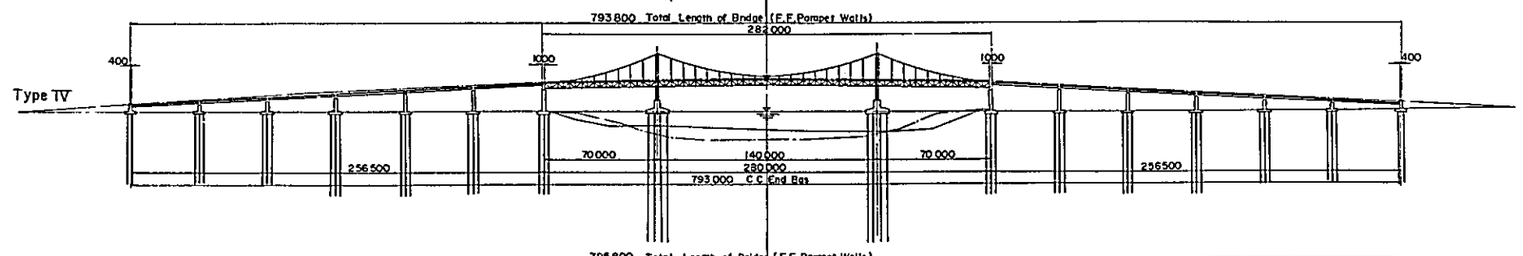
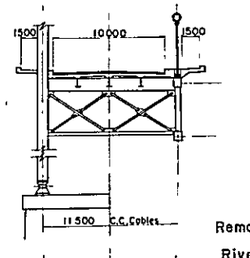




Type IV





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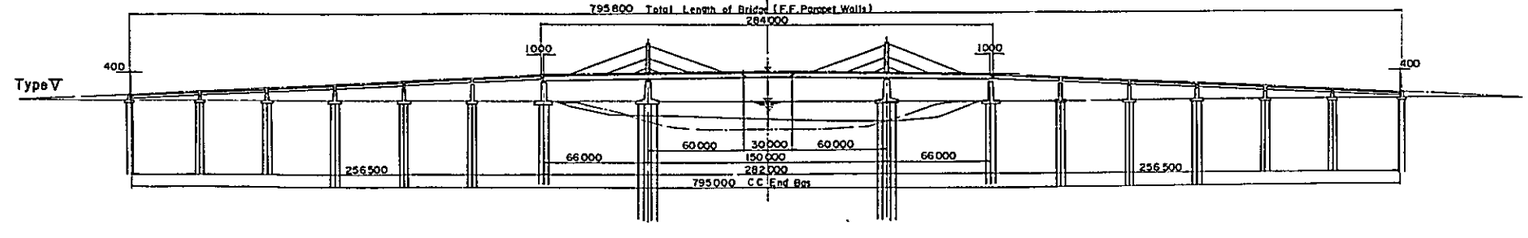
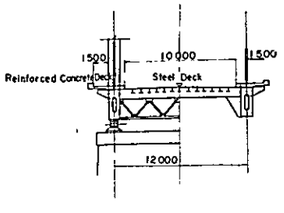




Remarks

River Bed of Kapuas K : — — —

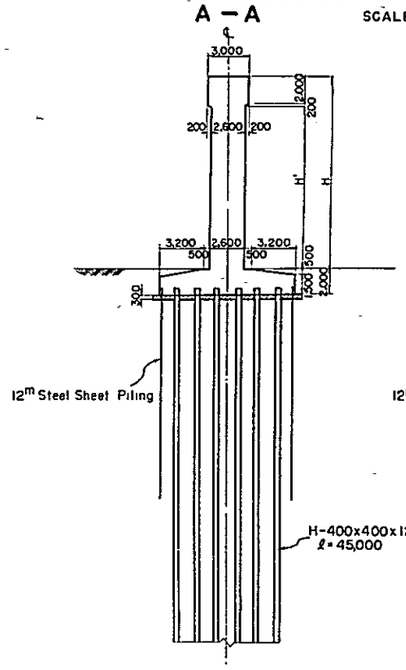
River Bed of Landak : ——

PROPOSED DESIGNS
OF
PONTIANAK BRIDGE

JAPANESE SURVEY MISSION
30TH JAN. 1965

TYPICAL CROSS SECTION A – A

SCALE 1/200



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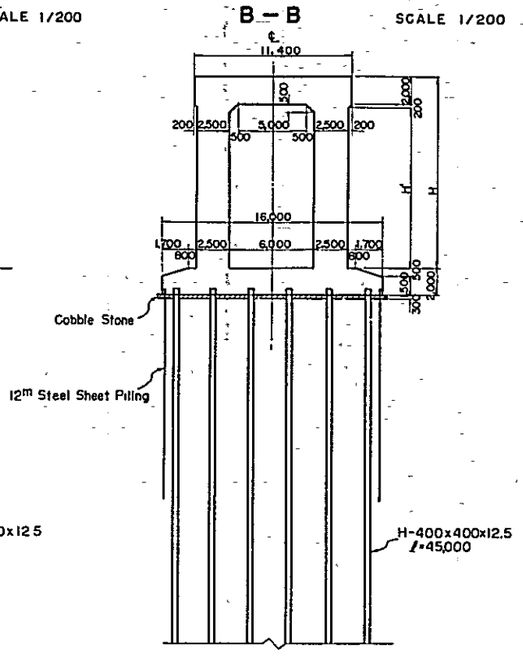

TYPICAL CROSS SECTION A – A

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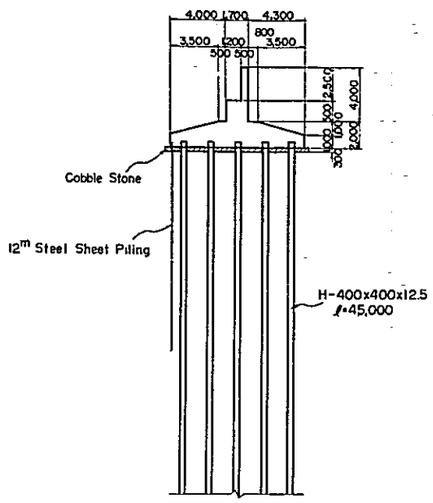

PIER (3) ~ (7)

PILES LAY OUT PLAN

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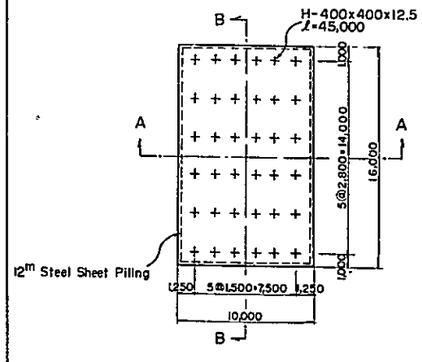

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ABUTMENT

PILES LAY OUT PLAN

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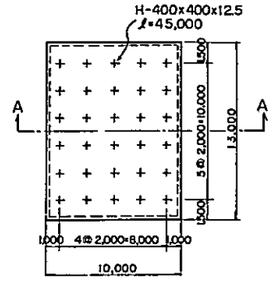

PROPOSED DESIGN OF PONTIANAK BRIDGE FOUNDATION (TENTATIVE).

Drg. No. 2

JAPANESE SURVEY MISSION

20 TH FEB 1965

TYPICAL CROSS SECTION A–A

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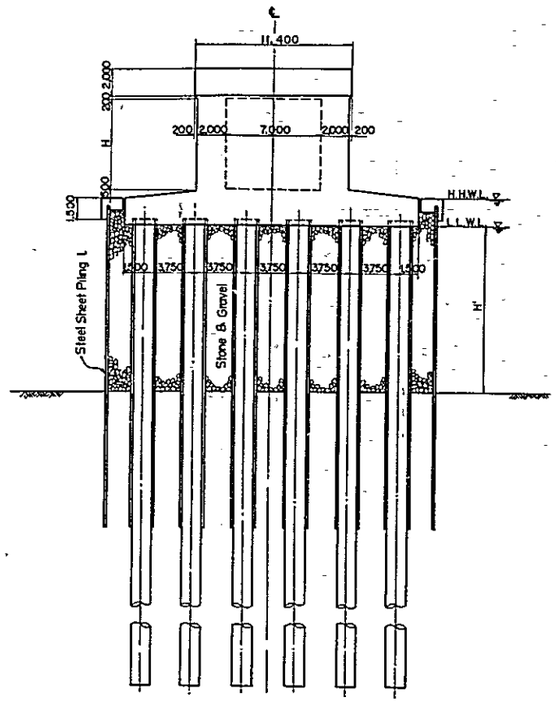

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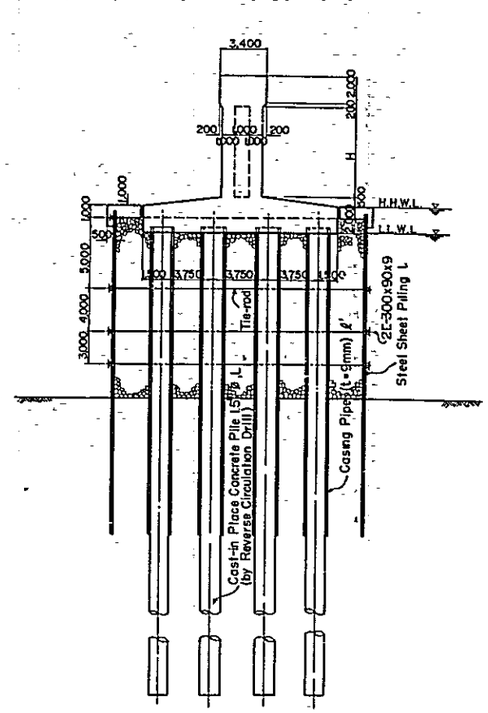

PLAN OF STEEL FRAME

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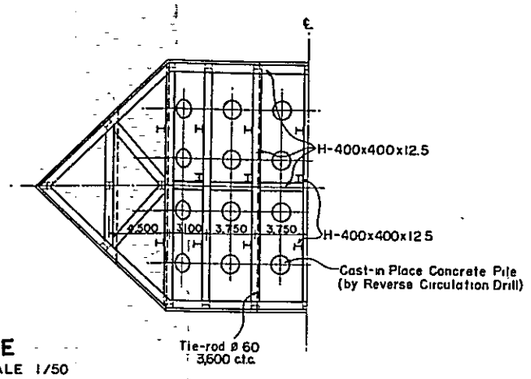
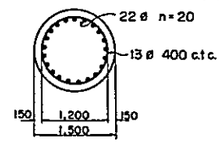


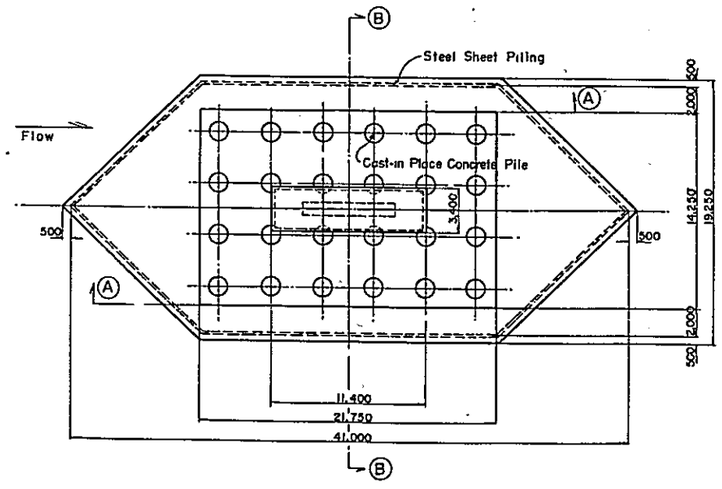
CROSS SECTION OF PILE

SCALE 1/50



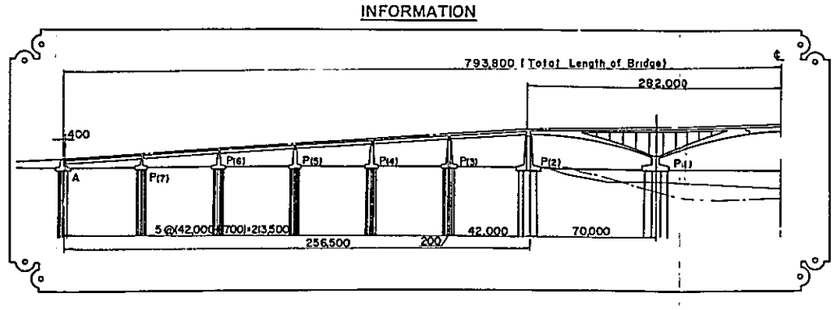
PLAN

SCALE 1/200



		H(m)	H'(m)	L(m)	ℓ(m)	ℓ'(m)
River Landa k	P(1)	6,500	12,000	60,000	21,000	22,000
	P(2)	12,000	0	60,000	12,000	10,000
River Kapuas k	P(1)	6,500	17,000	60,000	30,000	27,000
	P(2)	12,000	0	60,000	12,000	10,000

INFORMATION



PROPOSED DESIGN OF PONTIANAK BRIDGE FOUNDATION (TENTATIVE)

Drg. No 1

JAPANESE SURVEY MISSION

20 TH FEB 1965

system to reduce the self weight of the bodies.

2-3-2 Technical Description

In relation to each bridge type plans suggested in the above, brief technical description shall be given hereunder:

1. 3-span Gerber truss

This type is the most general, and economical type of bridge, which requires a small quantity of steel materials. As the bridge members are small and light, meanwhile, they can be easily carried to the building site. According to this construction system, haunches are laid downward on the bridge piers, in order to curtail the construction costs of the substructure. In relation to this 3-span Gerber truss system, it is also possible that a suspension girder is given to the span between both sides. But this idea has a difficulty in building the bridge. In addition, the construction costs would increase, because either of two center piers becomes a fixed pier. In this plan, therefore, a system, in which the center span is equipped with suspension girder, has been employed.

2. 3-span Gerber self-anchored arch

This bridge type is a newest type, whose structure is externally and statically determinate, because the horizontal reaction force of the arch member is resisted by brace materials. The whole arch materials form a box section, while the brace materials of box section are used for both sides. Steel materials used for the bracing shall be made of high tension steel. As for the arch members, however, it is favorable not to use the high tension steel to reduce the bridge deflection as much as possible. As for the vertical members, steel pipes shall be used. As the arch members form a box section, and the torsional rigidity in the traverse direction is large, no sway bracing is required. Suspension girders shall be composite box girders.

This self-anchored arch system is characterized by the followings: In the first place, this system is very economical, because the required steel materials are small in quantity. In the second place, this system is very favorable for the substructure, as the supports are inevitably positioned downward, and further allowance can be given to the clearance below the girders within a certain limit on a

section close to the bridge center.

Another great advantage is as follows:

Arch members, major members form a box section, vertical members are steel pipes, and other complicated members as the cross frame, etc. are not required. Consequently the whole exposed area of the bridge is very small, and the maintenance costs for the repainting work, etc. can be saved.

As for the beauty of the bridge, an arched bridge generally presents a fine sight, even though there is a difference among the lookers-on in view and feeling. From such a point of view, too, it can be concluded that the bridge of this type is a bridge of type most suitable for the site.

3. 3-span Gerber-type tied arch

Like the above Gerber truss system, this type is an extremely general bridge type. But it can be said that this type is superior to the former in appearance.

As the steel weight is heavier, and there are structurally suspension girders on the span of both sides, this system is unfavorable for the building work. Additionally, as either of two center bridge piers becomes a fixed pier inevitably, the expenses for building the substructure would increase.

4. 3-span self-anchored suspension bridge

As the ground of the building site for this bridge is not firm, it is undesirable to give an anchor block of large self-weight to the suspension type bridge. Therefore, the so-called "Self-anchored suspension bridge type", in which the main cable is anchored to the stiffening truss itself, would be preferable.

This suspension bridge type is divided into two types: Plate girder or truss is used for the stiffening girder. But the plate girder would be inevitably inferior to the truss not only in wind resistance but also in transit of materials, and erection of bridge by reason that the exposed area of the members for plate girder is larger than that of those for truss, and that the members themselves are larger.

5. 3-span steg girder bridge

This bridge type is a relatively new and economical type. This type is structually featured by the followings: This type is a system midway between the general sus-

pension type in rigidity. As the main oblique tension cable is expensive, it is desirable to reduce the self-weight of bridge as much as possible to curtail the expenses. It is, therefore, advisible that the floor should not be made of reinforced concrete, but of steel. In case of this type, more economy could be obtained, when the bridge span is larger. Therefore, this type could not necessarily display its economical performance to so large a span as expected from this bridge. In this connection, it would be rather more profitable to employ the suspension type previously mentioned.

2-3-3 Recommendation

2-3-3-1 Decision of the type of bridge

As mentioned above, our Investigation Party have suggested 5 sorts of the bridge building plans, which would be suitable for various conditions on the site. As described in another item, however, the construction costs are lower in the following order: 1. Gerber truss system, 2. Self-anchored arch system, 3. Tied arch system, 4. Self-anchored suspension system, 5. Steg girder system. But there is no great difference among them in construction costs.

Of the above 5 suggested plans, our Investigation Party considers the No. 2 Self-anchored arch system plan most advisable from the following reasons:

1. This plan is more advantageous than any other plan in the maintenance cost.
2. More allowance can be given to the specified clearance below the girders within a certain limit on a section close to the middle of the bridge. As there is no clearance near the bridge piers, meanwhole; it would serve not only to curb the passage of large vessels but also to prevent larger vessels from colliding against the bridge piers.
3. As the bridge of this type is an arched deck bridge, it is superior any other bridge in beauties.

2-3-3-2 Clearance below the girders

As for the clearance below the girders, a height 25.5m above H.W.L. is required by the Djakarta Marine Transportation Bureau, though it is a temporary requirement. According to the survey records of our Investigation Party, however, large vessels are found navigating scarcely on the upper stream off the present

harbor, and only tugboats or patrol boats of the Port Authority are expected to sail, It would be, therefore, reasonable that the clearance below the girders should be 15m above H.W.L. Any useless enlargement of the clearance below the girders would increase the construction costs of substructure, prolong the access road, and consequently increase the total construction expenses more greatly.

2-4 Costs for the Bridge Building Works

As mentioned above, our Investigation Party has suggested 5 sorts of the bridge building plans. In relation to the No. 2 Self-anchored arch bridge plan, which would be most suitable for various conditions on the site, we roughly estimate various construction costs as shwon hereunder. In this estimate, the clearance below the girders is computed at 15m high. In the construction costs for the sub-structure, meanwhile such expenses as those for the temporary works, machines and instruments, etc. are common to both bridges. These expenses for two bridges are collectively estimated.

Rough estimate of the construction costs for the No. 2 3-span self-anchored arch plan.

1. Manufacturing costs for the superstructure, costs for the domestic and marine transportation, etc. (Unit: U.S.$)

   A. Cost for making the main bridge, and the freight for the domestic trans-transportation; 856,000

   B. Cost for making the access road portion and the freight for its domestic conveyance; 633,000

   C. Costs for making the handrails, expansion joints and the drains, and the expenses for the lighting equipment; 166,000

   D. Packing and warehouse charges, maritime freight and insurance cost; 834,000

   Total 2,489,000

   Sum total for two bridges on small Kapuas and Landak Rivers: 4,978,000

2. Manufacturing costs for the substructure and the erection costs for the super-

structure (including the floor, pavement, railing and illumination equipment)

F. Working costs for the substructure, main bridge and the access roads, and the cost for erecting steel girders; 15,966,000

G. Costs of the flooring, pavement, railing and the lighting equipment; 1,056,000

Total for two bridges: 17,022,000

3. Total sum of the construction costs: US$ 22,000,000

4,978,000 + 17,022,000 = 22,000,000

Table 1: Rough estimate of the construction costs for other plans

		1st plan; Gerber truss system	3rd plan; Tied arch system	4th plan; Suspension bridge	5th plan; steg tension bridge
Freight for the domestic and maritime transportation, and the costs for making the superstructure	Item A	778,000	903,000	986,000	1,000,000
	Item B	633,000	633,000	633,000	633,000
	Item C	167,000	167,000	167,000	167,000
	Item D	694,000	708,000	708,000	833,000
	Total of the above A B C D	2,272,000	2,411,000	2,494,000	2,633,000
	Item E (Total sum for two bridges)	4,544,000	4,822,000	4,988.000	5,266,000
		1st plan; Gerber truss system	3rd plan; Tied arch system	4th plan; Suspension bridge	5th plan; Steg tension bridge
Working cost for the substructure, and the cost for erecting the superstructure (including the flooring, pavement and railing works)	Item F	15,556,000	16,666,000	16,666,000	17,222,000
	Item G	1,056,000	1,056,000	1,056,000	1,056,000
	Item H (Total of the F G)	16,612,000	17,722,000	17,722,000	18,278,000
	Sum total (E H) in US$	21,156,000	22,544,000	22,710,000	23,544,000

Remarks:-

From the viewpoint of expediting realization of the project, further consideration as mentioned in "Alternative Plan Recommended" attached to at the end of this report shall be taken into.

2-5 Recommendations for the Technical Surveys to be made for Building the Bridge

2-5-1 Geological Survey

The expected bridge-building site is generally made of soft and weak ground, and its geological condition is very bad. Especially, as small Kapuas and Landak

Rivers are considerably deep, construction of the bridge substructure would play an important role technically and economically, Geological survey is, therefore, the most important survey of the technical investigation for building the bridge.

According to the trial, the required driving depth of the foundation piles for the substructure would become 40m - 50m, whichever bridge system of the above suggested 5 plans may be employed. In this connection, strict geological survey must be given to the ground so deep as the above.

2-5-2 Survey of the Water-level of Rivers

Water level of rivers (flood level, ordinary water-level and the low water-level) has a great effect upon the channel limit of bridge, length of access road, etc., and subsequently affects the construction costs for bridges greatly. But little data of the water level of small Kapuas and Landak Rivers are found. Our investigation team must, therefore, observe the water gauges set in both rivers to obtain the data of the water level of both rivers.

3. Investigation of the Conditions for the Bridge-Building Site

Pontianak is located at the confluence of small Kapuas River, a branch of the Kapuas River, and Landak River. Civic center is located approx. 15 Km off the mouth of the River.

The expected bridge-building site is further 2 Km up the above. Tidal effect is reported to reach Soeka Lanting, 80 Km up the mouth of the River. In the Pontianak area, therefore, the tidal effect upon the flow of rivers is very large. But the rivers naturally flows without any embankment, and the river basin assumes an aspect of swamp. Consequently all the houses there have high floors.

On the other hand, Pontianak is latitudinally located in approx. $2^{\circ}S$, and almost on the equator. It belongs to the doldrums. There is no distinction between the rainy and dry seasons. According to the data, the number of rainy days is large, and little earthquake is felt there.

In relation to the job site, the topography, weather, river flow, geological condition and the earthquake shall be described hereunder. The description is based upon the field survey of Pontianak, information obtained from the meeting

with the Port Authority, Pontianak and various data made available to us.

3-2 Topography

In short, Pontianak is a city on the swamp.

As the city is an alluvion of Kapuas and Landak Rivers, the height above the sea level is almost zero.

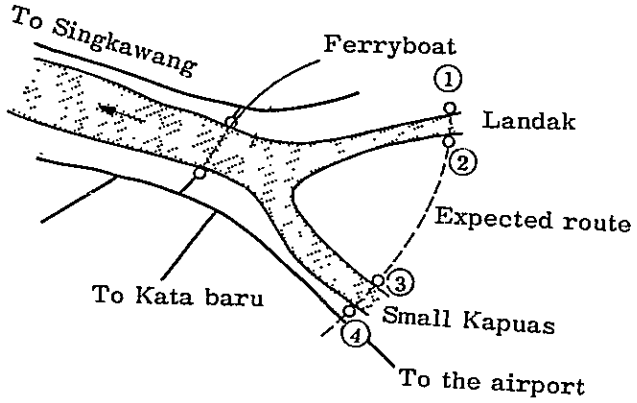


Fig. 1 Sketch of the Bridge-building site

Houses are built along the river and roads.

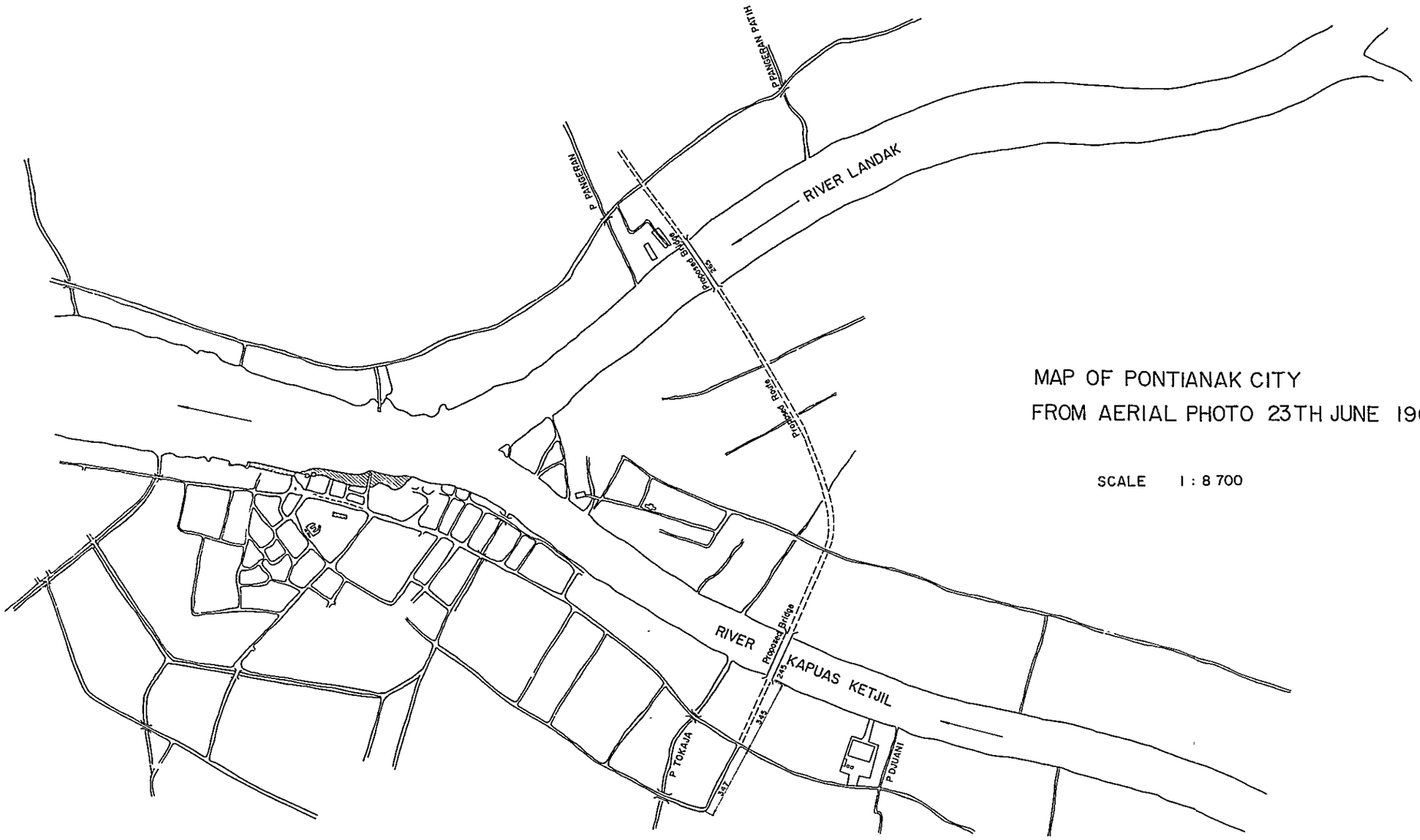
The swamps at their backside are thickly covered with trees and grasses twice as tall as the human stature, and the ground is extremely soft and weak. On both side of the road highly built, streams stretch all over the grounds. In time of flood tide, not only the zones facing the river but also the other wide areas are flooded. In time of ebb tide, however, they are dried. Along the river, there are small board bridges for the pedestrians. In the neighborhood, there is no mountain. If man comes off the urban area, only endless forests comes into his sight.

3-3 Weather

3-3-1 Max., Min., and Mean Temperature

According to the statistical data of the Meteorological Agency, Djawatan Meteorologi Dan Geofisik of Djakarta, the temperature in Pontianak for 8 years from 1952 to 1959 is as follows:

NO 5



MAP OF PONTIANAK CITY
FROM AERIAL PHOTO 23TH JUNE 1963

SCALE 1 : 8 700

Table 2

Month	Max. temperature	Min. temperature	Mean temperature
1	31.1	23.3	26.2
2	32.0	23.1	26.0
3	32.3	23.5	27.0
4	32.5	23.8	27.2
5	32.3	24.0	27.2
6	32.7	23.8	27.2
7	32.6	23.5	26.8
8	32.9	23.3	27.0
9	32.1	23.3	26.7
10	31.5	23.5	26.3
11	30.9	23.3	26.1
12	31.0	23.1	26.0
Average	31.8	23.5	26.7

The above data disclose that there is little change in temperature throughout the year, and that the difference between the max and min. temperature for 8 years is approx. 10°C. In other word, this region is literally an island of everlasting summer, but no abnormal high temperature is observed there.

3-3-2 Max. Wind Velocity

According to the Meteorological Agency data obtained for 8 years from 1952 to 1959, the max. wind velocity, is 8 miles/hr. (5m/sec.). Therefore, we could consider that no wind blows.

3-3-3 Rainfall

Rainfall in Pontianak is yearly approx. 3,200 mm, about once as much as that in Djakarta, approx. 1,780 mm. Though June, July and August are the rainy season, considerably much rainfall is observed even in the dry season. Thus there is not great difference between both seasons in rainfall. The rainfall table shown

hereunder disclose the mean values for the rainfall in 63 years from 1879 to 1941.

Table 3. Table of the rainfall in Pontianak

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Rainfall per month, mm.	277	208	242	278	282	222	164	204	228	365	388	322	3,180
Max. Rainfall for 24/hr.	67	59	65	62	67	65	55	57	59	74	73	68	Max. 74
Number of the rainy days	17 days	13	15	16	16	13	10	12	13	19	21	19	183

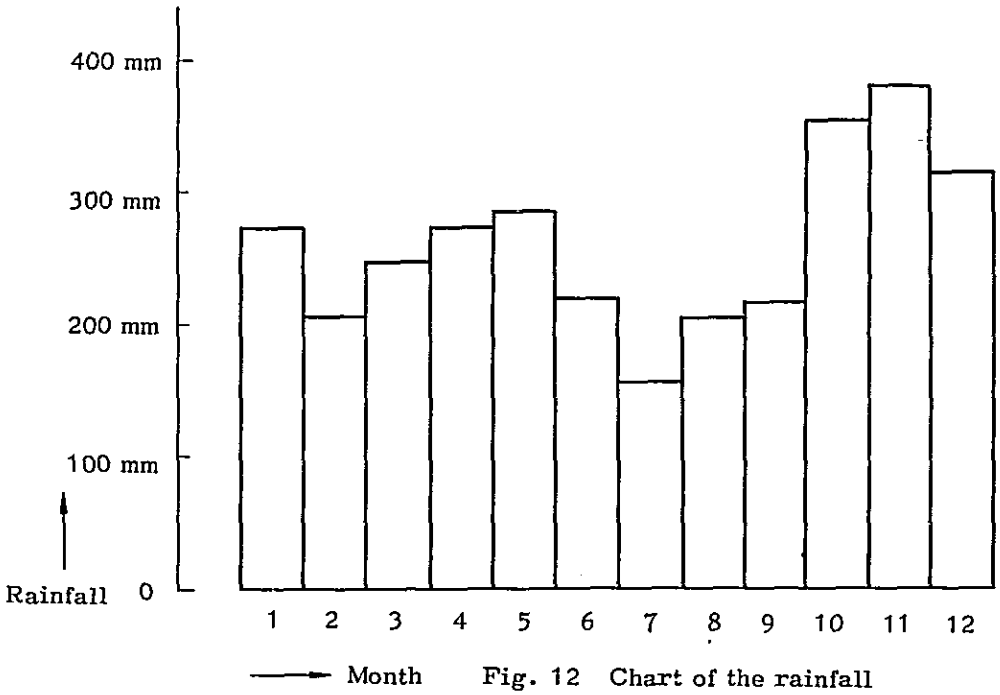


Fig. 12 Chart of the rainfall

Details of the rainfall data during the period from 1953 to 1963 shall be omitted, though they were made avilable to us.

As occasion demands, the following data shall be refered to:

Statistical data on the rainfall;

i) Rainfall in Indonesia by Prof. Dr. H.P. Berlage, Jr. mean rainfall figures for 4,339 rainfall stations in Indonesia, calculated from

observations made during the period 1879-1941, p. 142, p. 143.

ii) Rain observations in Indonesia (the sixty-eight volume) 1953 Published by Meteorological and geophysical institute: Ministry of Communications at Djakarta, p. 104, p. 105.

iii) ditto. (The sixty-ninth volume) 1954-1955, p. 112, p. 113.

iv) ditto. (The seventieth volume) 1956-1953, p. 234, p. 235.

v) Rainobservation in Indonesia, Pontianak (Metro), 1958-1963, Extraction made by the Meteorological Agency

During the stay of our Investigation Party (a total of 12 days from 13 to 24 Jan.), it rained only for two days actually.

According to the survey of Institute of Hydrogy, Penjelidikan Masalah Airdan Hidrologi at Bandung (in charge of Miyashita), there were 8 rainfall observatories (in 1957, 21 during the Dutch regime) in the Kapuas basin, and 1 observatory (in 1957, 3 during the Dutch regime) in the Landak basin.

3-4 Flowing Condition of the Rivers

3-4-1 Basin Area, Watercourse Length, River Width and the Water Depth

According to Mr. Miyashita, Institute of Hydrogy, basin area and the watercourse length of Kapuas River (including the small Kapuas) are respectively 89,760 Km^2 and 1,108 Km^2, while those of the Landak are respectively 9,280 Km^2 and 340 Km.

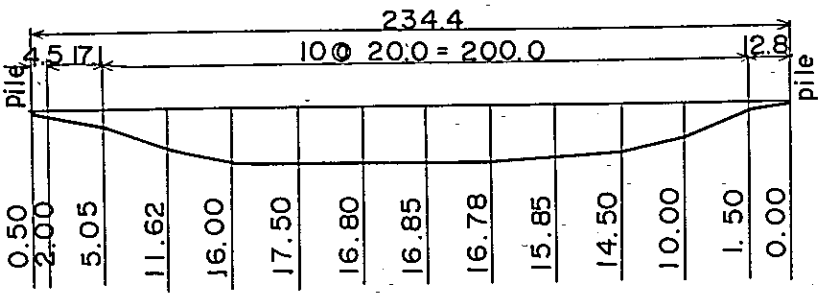
According to the hydrographic map at the mouth of River (issued in 1960) and that of the Landak and small Kapuas Rivers (issued in 1919), which have been made available to us from the Pontianak Port Authority, the water depth at the mouth area of Landak River has become approx. 3m due to the deposits of soil and sand. Up to the confluence off the mouth of Landak River, however, a water depth, more than 6m is maintained. In relation to the small Kapuas, the water depth is more than 4.5m over the watercourse from the confluence with the Landak to that with the Kapuas.

Even on the upperstream, 50 Km off the confluence, the Landak maintains a water depth, 5m.

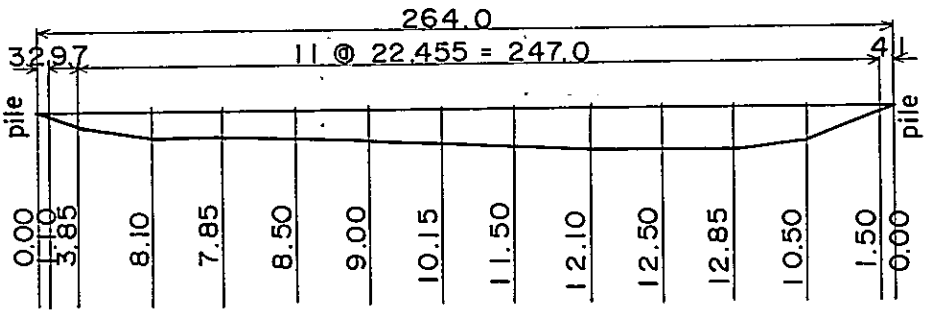
NO 12

CROSS SECTION OF RIVERS AT THE PROPOSED BRIDGES' SITES

R. Kapuas Ketjil



R. Landak

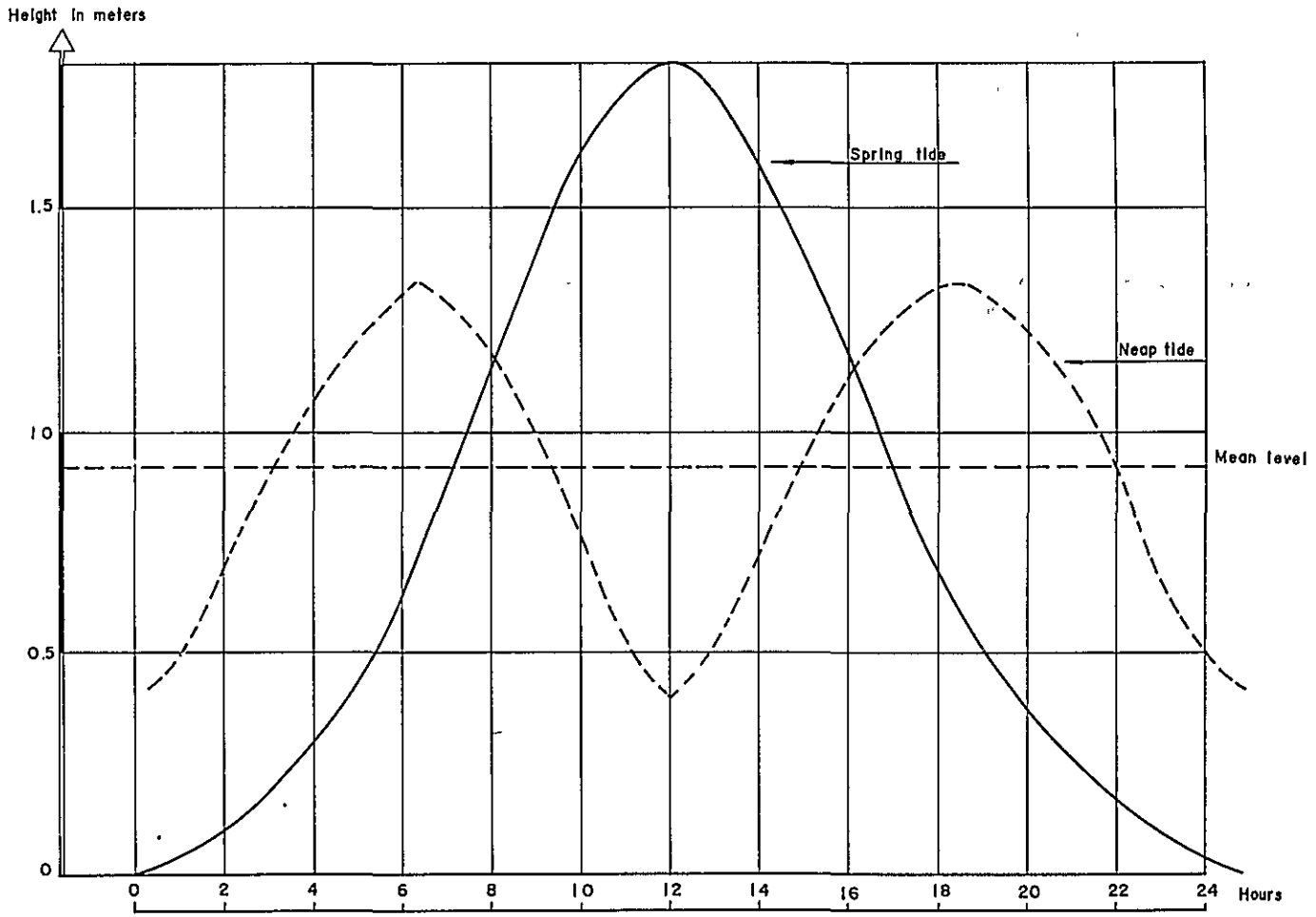


Scale : 1 : 2000

Unit : m

NO. 11

TYPICAL TIDE CURVES AT PONTIANAK



When we went up the stream, 4 Km off the confluence by boat, little change was observed in the river width as well as the flowing condition of small Kapuas and Landak Rivers.

In general, the Landak seems to be larger than the small Kapuas in river width, while the latter seems to be larger than the former in water depth.

3-4-2 Tide

According to the Tide Table, Daftar Pasang Surat issued by the Djawatan Hidrografi Angkatan Laut (Hydrographical Department, Navy Ministry), 1965, P.244-257, the tide of small Kapuas River ranges from the max. 0.9m to the min. 1.0m. Thus the tidal difference is 1.9m. This value agrees with that of the data (Typical Tide Curves at Pontianak) of hydrographical survey of Pontianak Port made by Harbor Department.

4-4-3 Water Level

According to the data, "Grafik Duga Muka Air; Sungai Kapuas di Pontinaka" made available from the Public Works Bureau, Pontianak, the water level change in Pontianak City is approx. 170 cm.

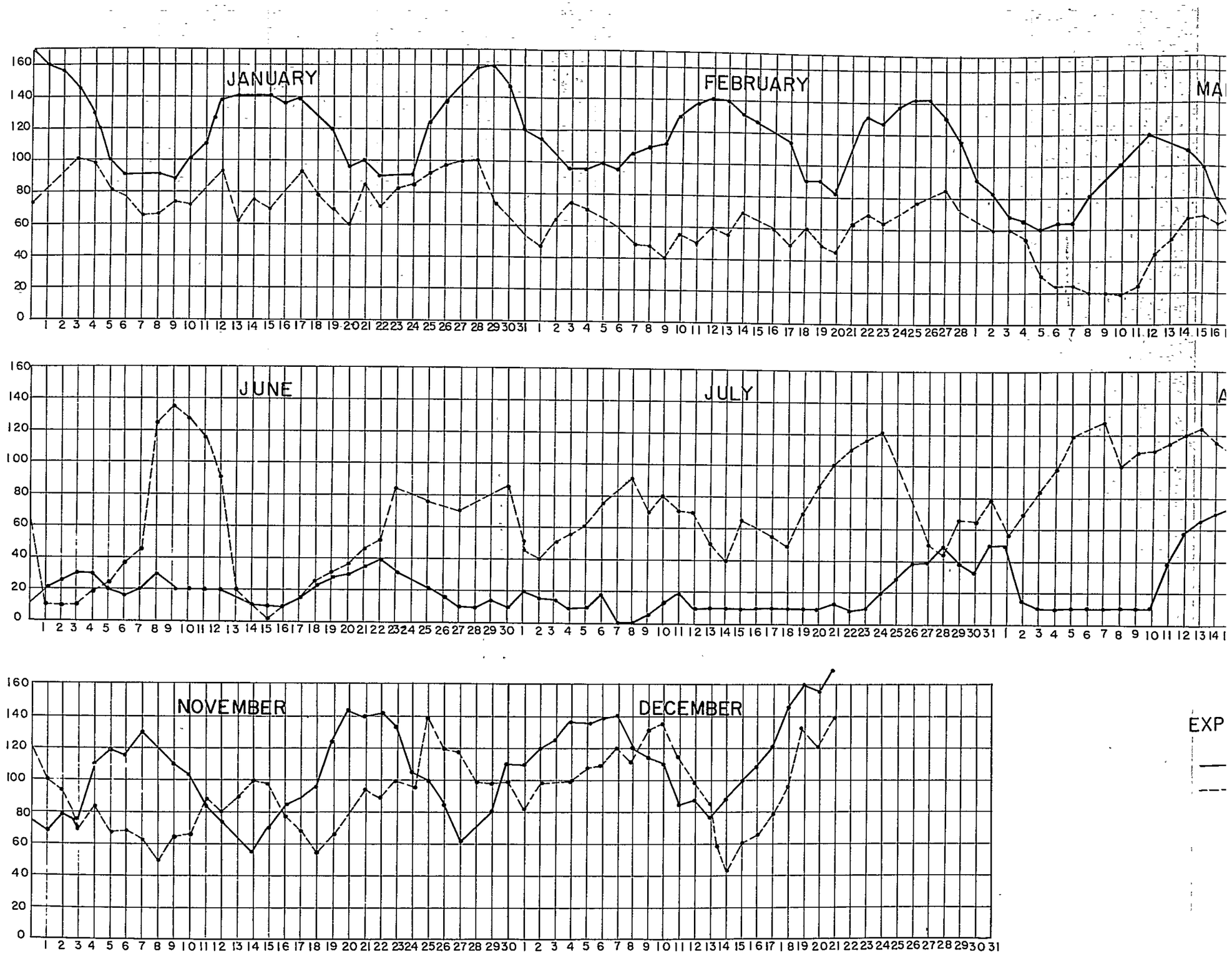
Large water level change between morning and evening proves the large effect of tide.

On the other hand, the effect of rainfall upon the water level change is quite unknown. At present when the rivers are left as they naturally are, and the area along the rivers are swampted over a wide range, however, it is expected that the rainfall effect is not so large.

In addition, we have laid one water gauge on the bridge-building sites of small Kapuas and Landak Rivers, and further requested the Pontianak Public Works Bureau authorities to observe the water level.

3-4-4 Velocity and Discharge of the Flow

When the flow velocity, was observed on the expected bridge-building site the max. flow velocity of the small Kapuas and Landak Rivers were respectively 0.45 m/sec and 0.65 m/sec. As these values refer to the observation at the optional time, they cannot be made too much of.


JANUARY
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MA
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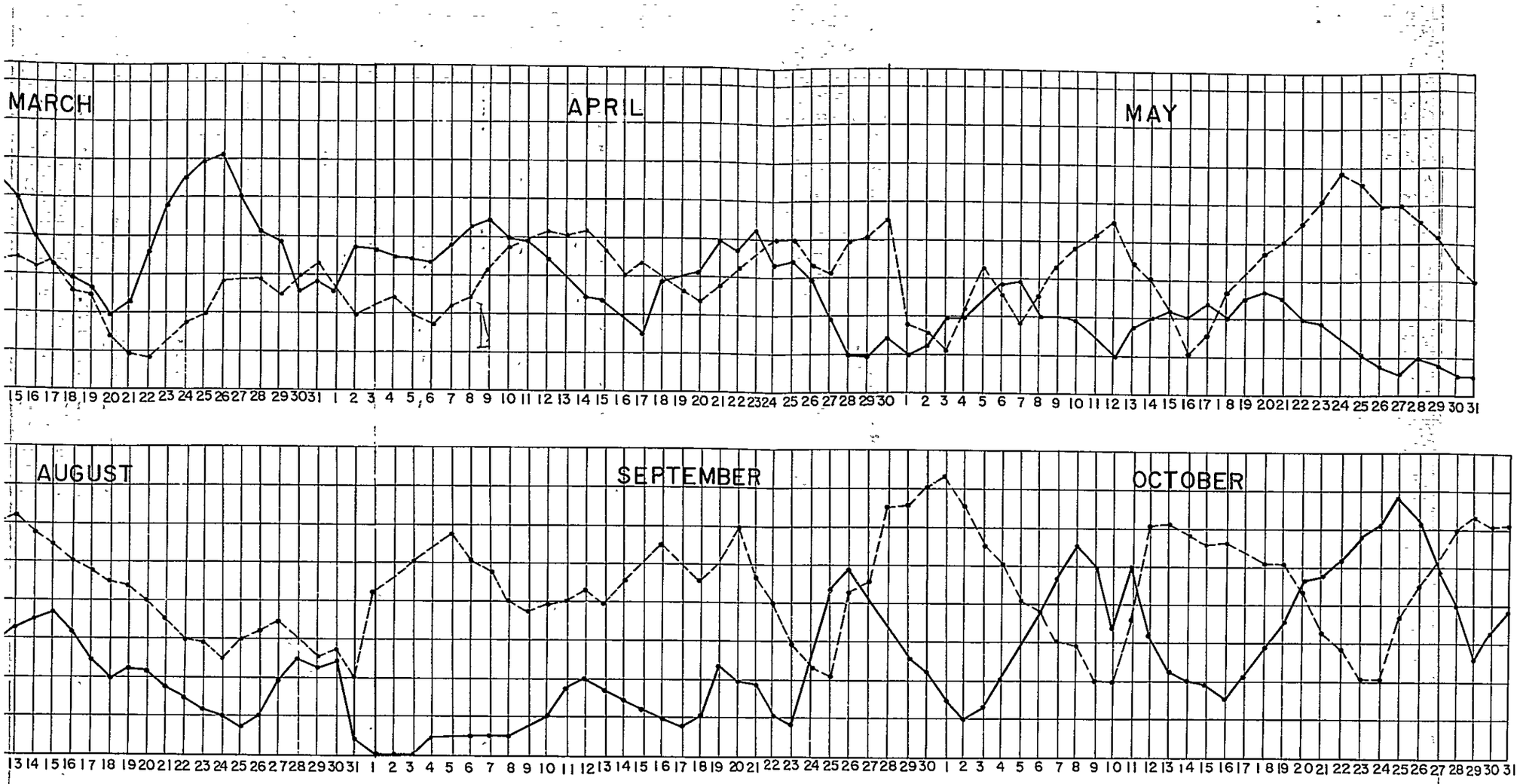


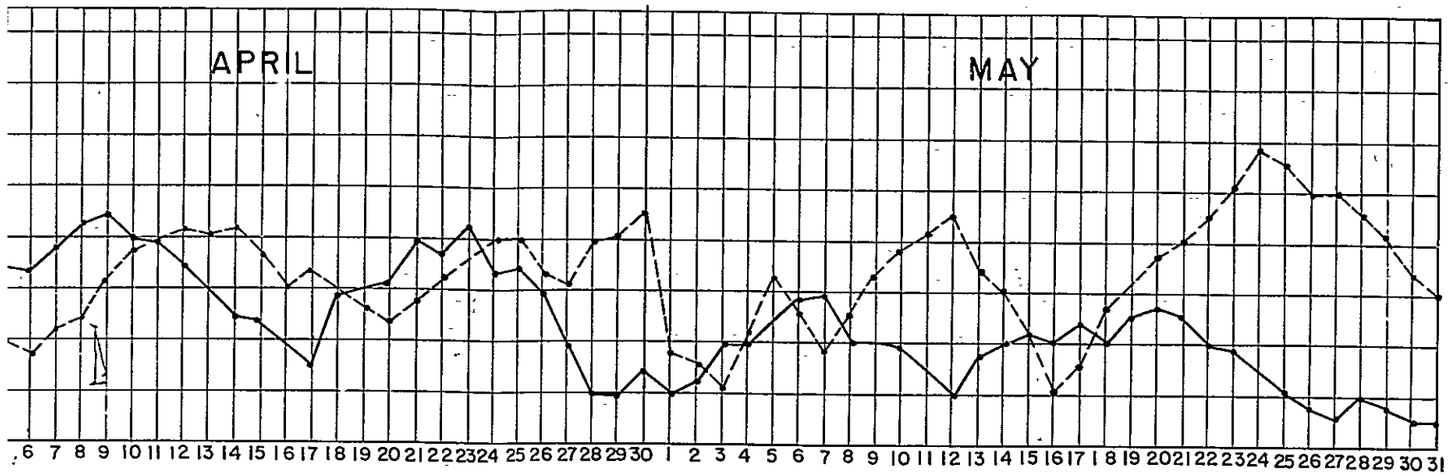
EXPLANATION

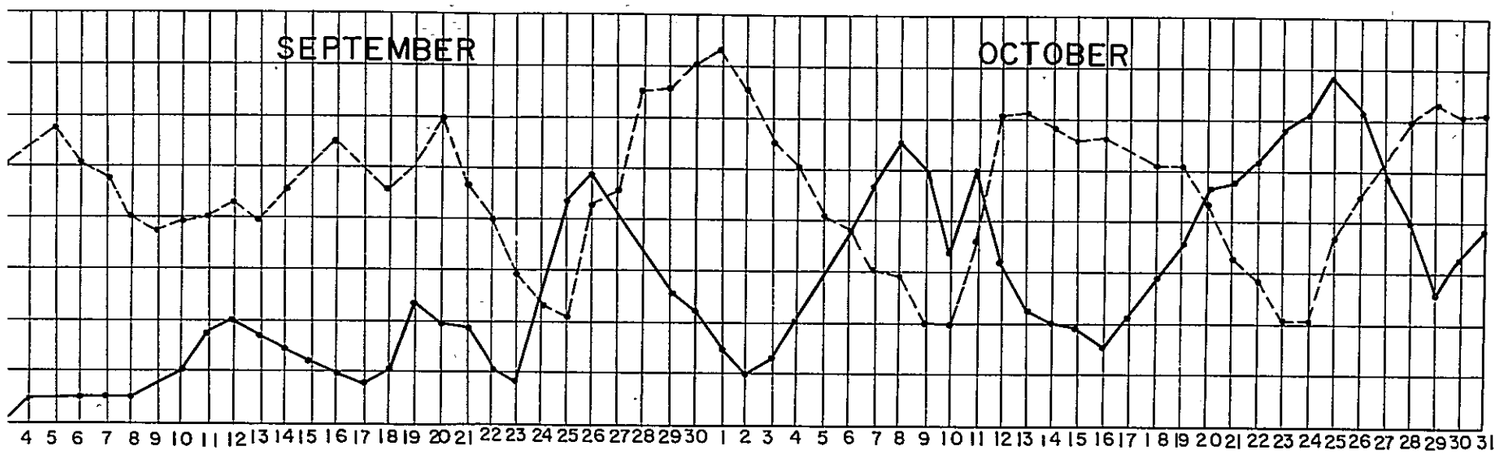
—— MORNING
----- EVENING
} 1960

GRAPH OF WATER SURFACE

OF RIVER KAPUAS KETJIL AT PONTIANAK

NO. 9





GRAPH OF WATER SURFACE

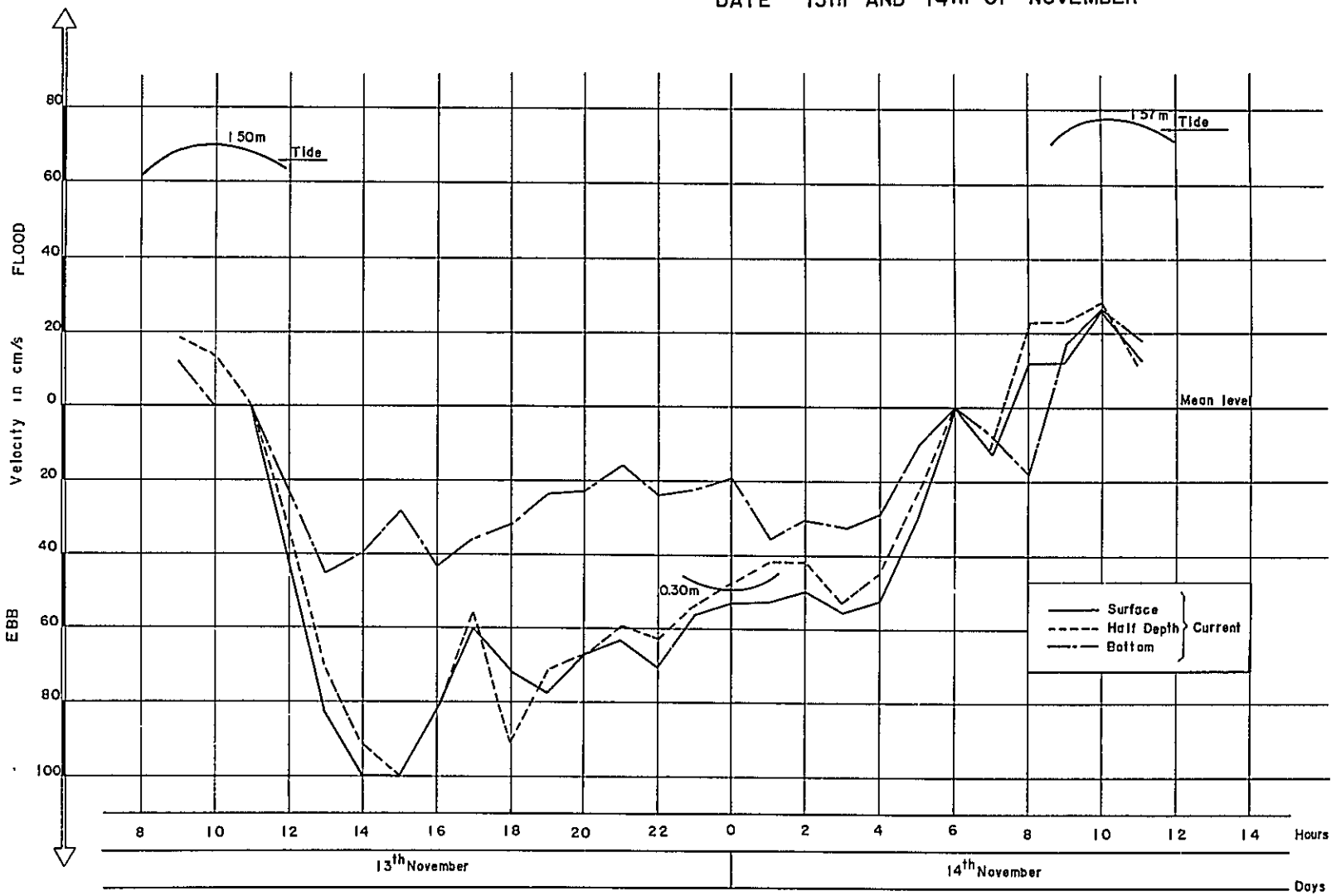
OF RIVER KAPUAS KETJIL AT PONTIANAK

NO. 10 – 1

CURRENT VARIATIONS WITH TIME

POINT PONTIANAK

DATE 13th AND 14th OF NOVEMBER

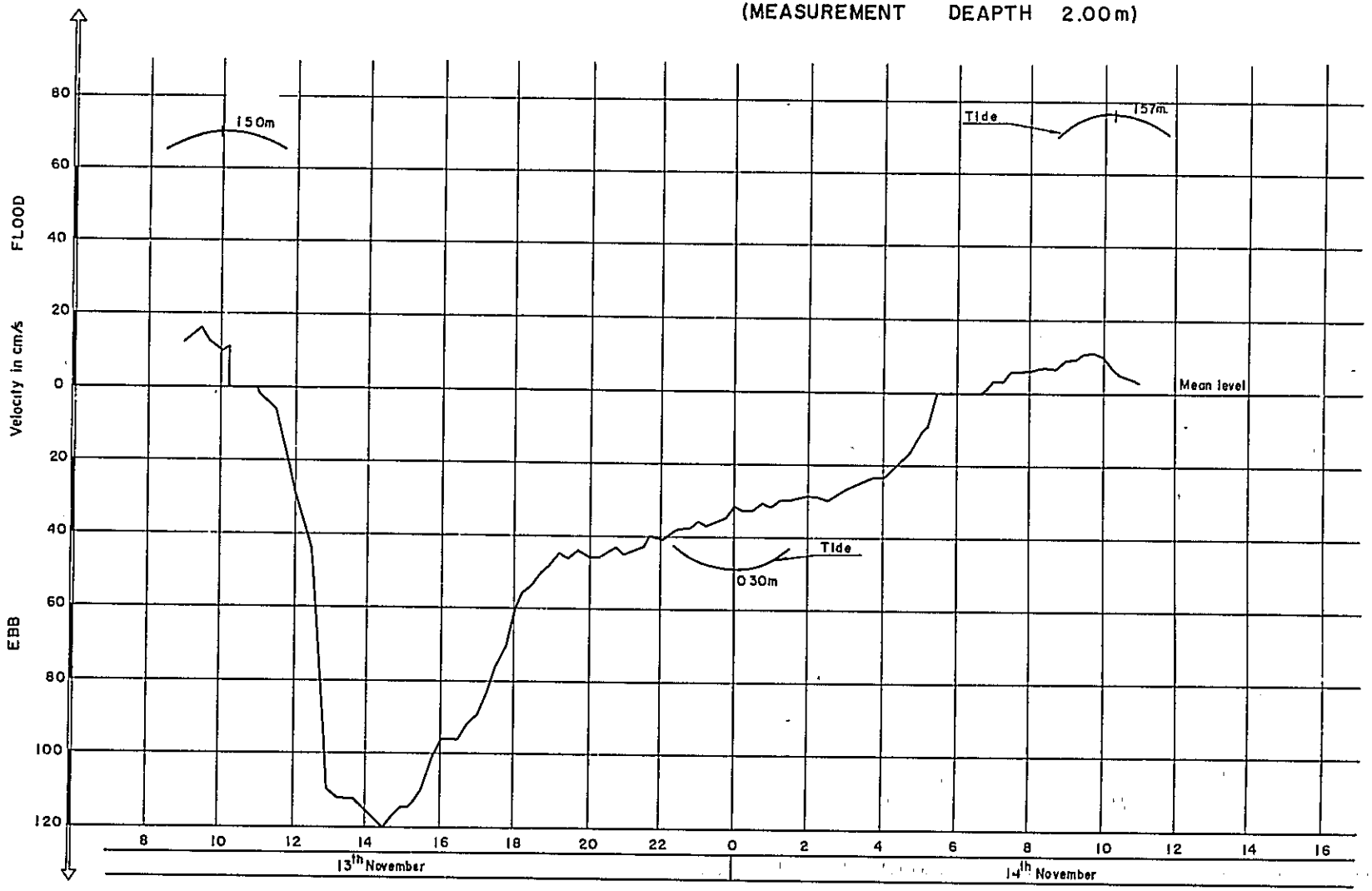


CURRENT VARIATIONS WITH TIME

NO. 10-2

POINT PONTIANAK

DATE 13th AND 14th OF NOVEMBER
(MEASUREMENT DEAPTH 2.00m)



According to the hydraulic survey of the port Pontianak made by the Harbor Department, meanwhile, the max. flow velocity in Pontianak is 1.00 m/sec. 1.20 m/sec., 1.00 m/sec. and 0.45 m/sec. on the water surface, at the water depth, 2m, at the middle of the depth and at the bottom of river respectively. As for the tide at the survey, the high tide is 0.60m and the low-0.60m. In approx. 2 hr. after the high tide, the max. flow velocity is observed. At the high tide, meanwhile, adverse tide is found, and its flow velocity is approx. 0.25 m/sec.

3-5 Geological Condition

Pontianak area is an alluvion of the small Kapuas and Landak Rivers, whose ground is very soft.

As no boring was given in the recent survey, geological condition of the expected bridge-building site cannot be made known until the boring work of the Indonesian boring team under way, and the following boring survey works are completed.

The major construction works so far given in Pontianak are the construction works of the filter plant (conducted by Declamon,Co., France, Waskita-Karja), harbor (worked by Hawaiian Dredge Co., Ltd., U.S.A.), telephone exchange office, etc.

Geological boring surveys incident to these construction works have been made. But the data of these works made available to us are as follows:

i) Data of the quality of soil on the right bank of Landak River (Filter plant project) written in Dutch

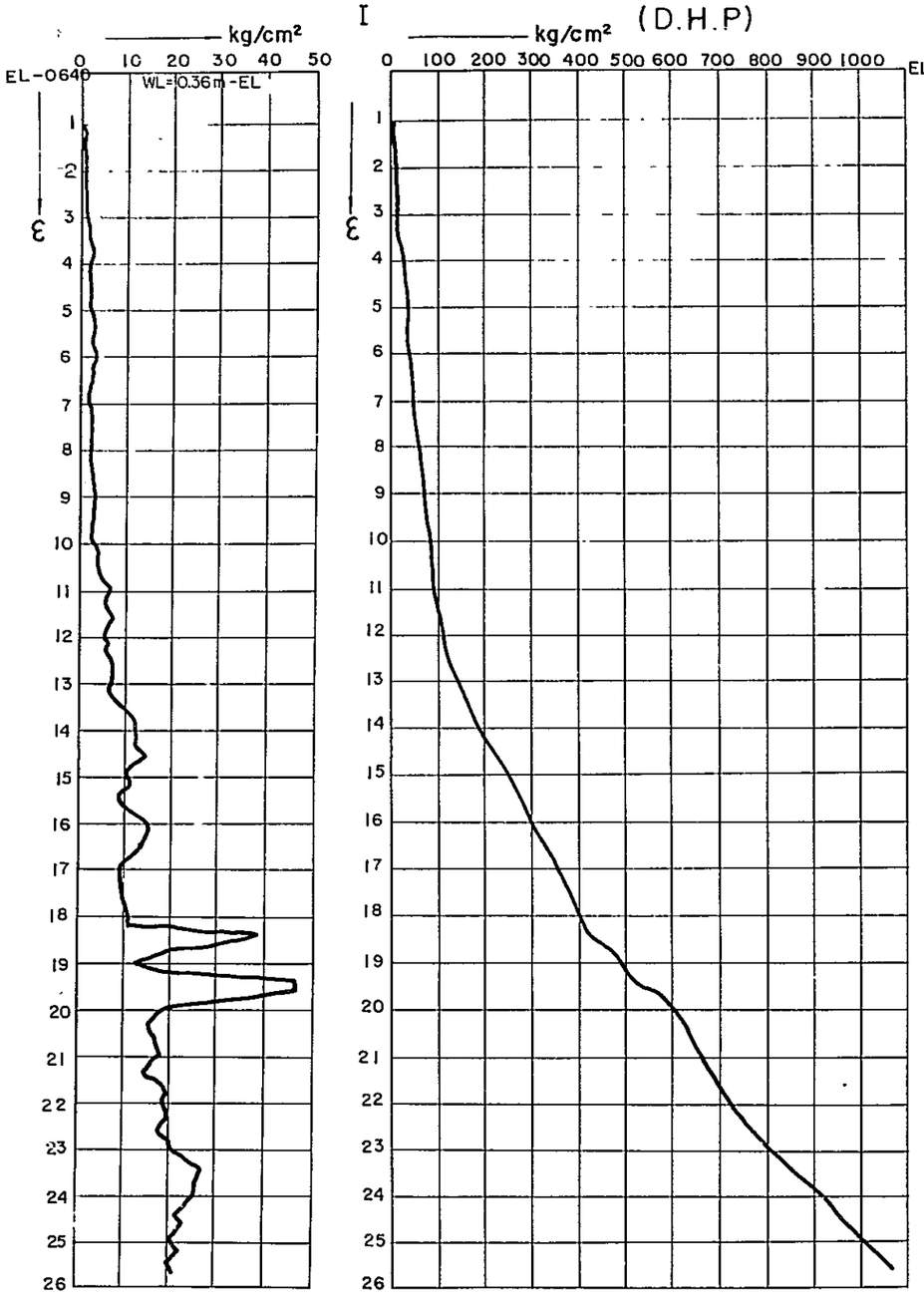
ii) Data of the quality of soil on the left bank of small Kapuas River (Filter plant close to the bridge-building site)

iii) Geological survey for the Central

From the above data, and the foundation work process employed on the job site, it is conceivable that the Pontianak ground is made of very soft and weak clay loam. The existance of support layer is inconceivable from the data. (according to the boring data, there is found no support layer at the Central site, though the boring depth was 28m.) We were, however, told from the Waskita

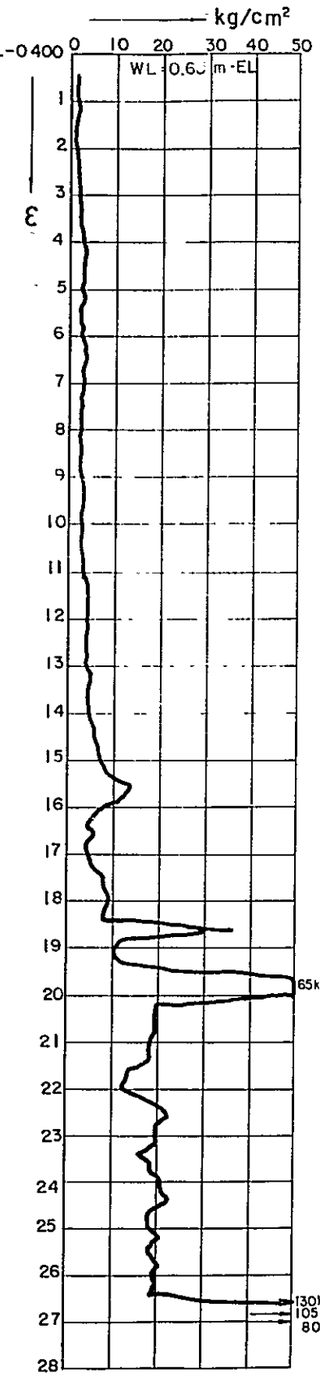
RESULT OF SOI

I

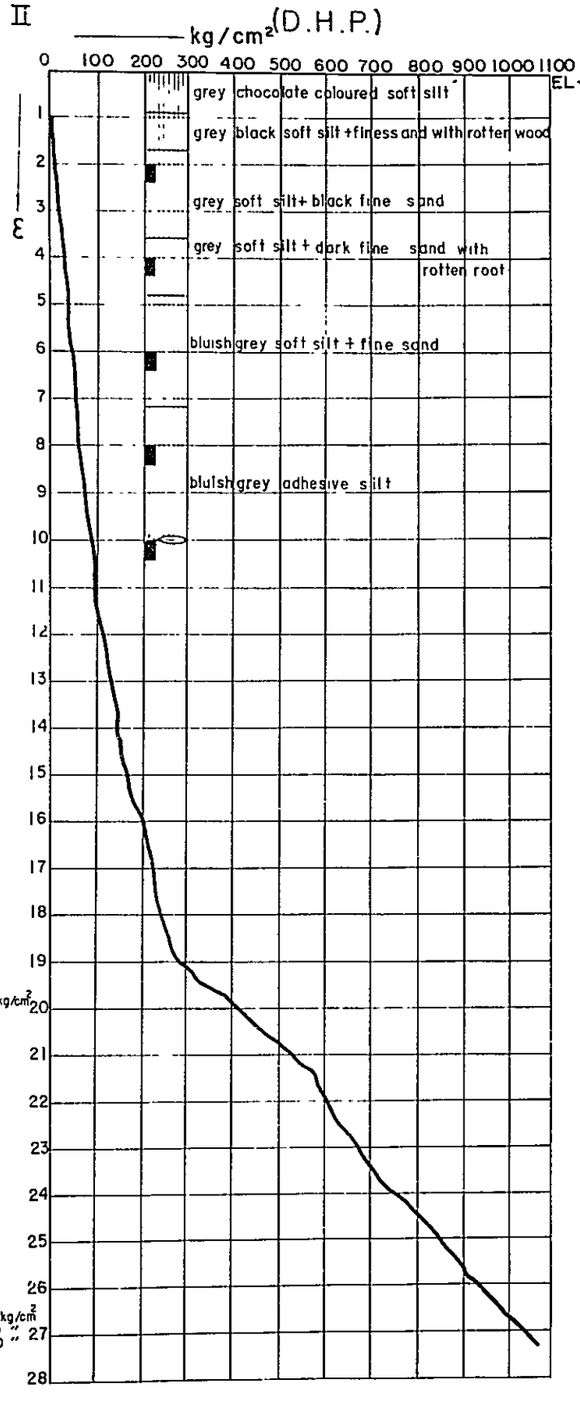


(D.H.P)

II



(D.H.P.)



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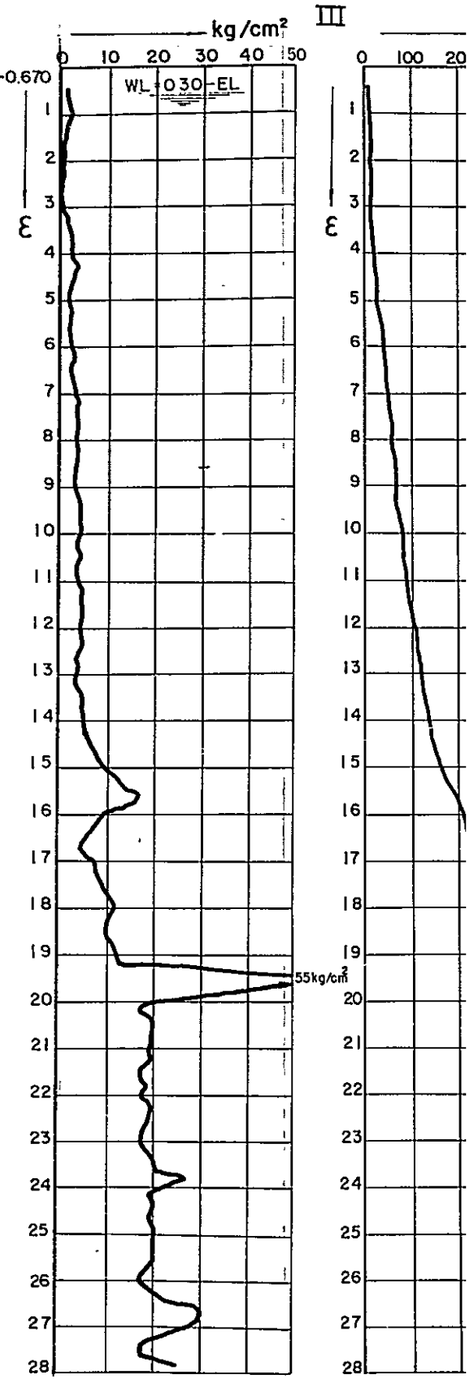
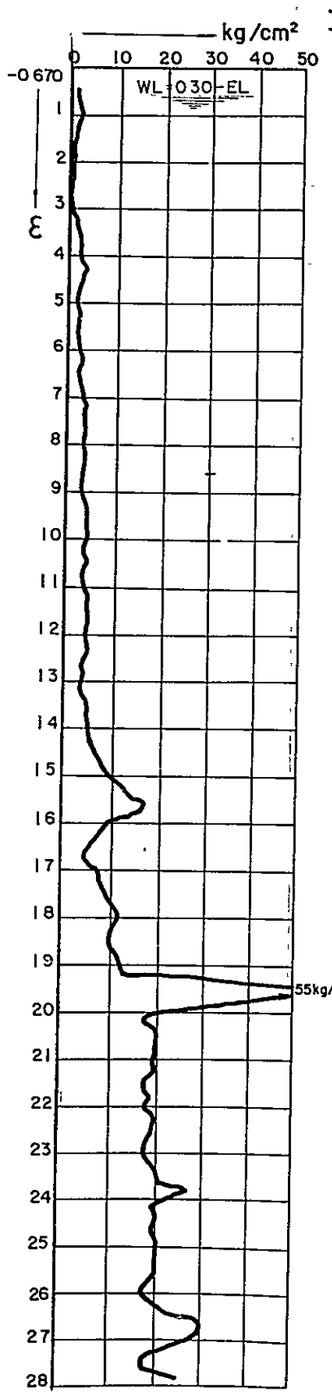


RESULT OF SOUNGING AND BORING (AN EXAMPLE OF SOIL SURVEYS AT PONTIANAK)



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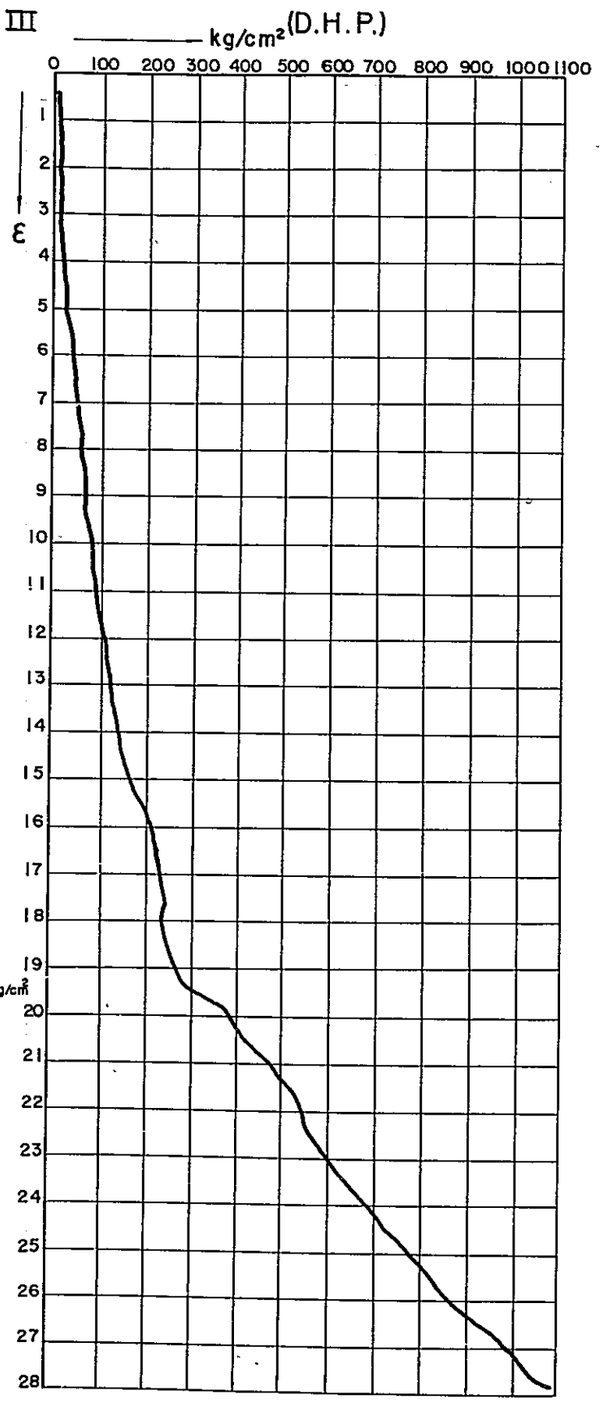

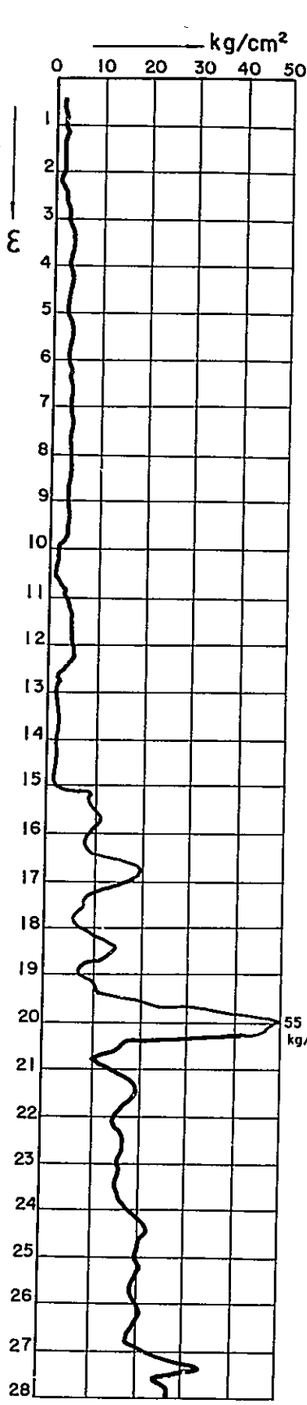

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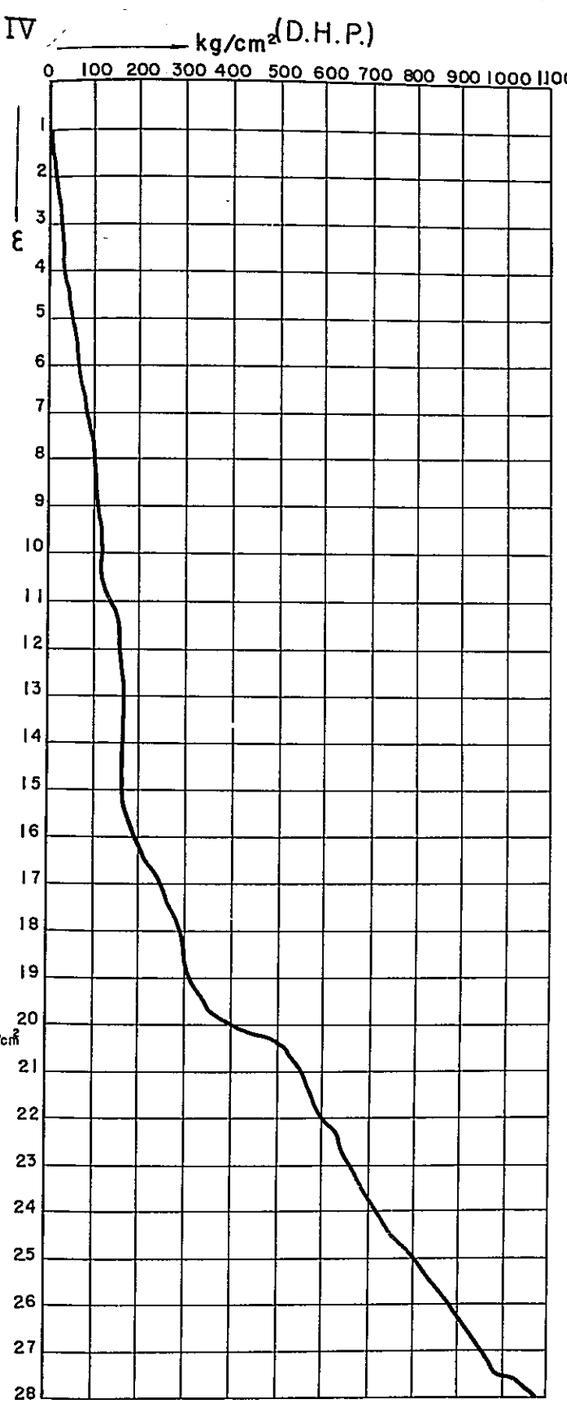

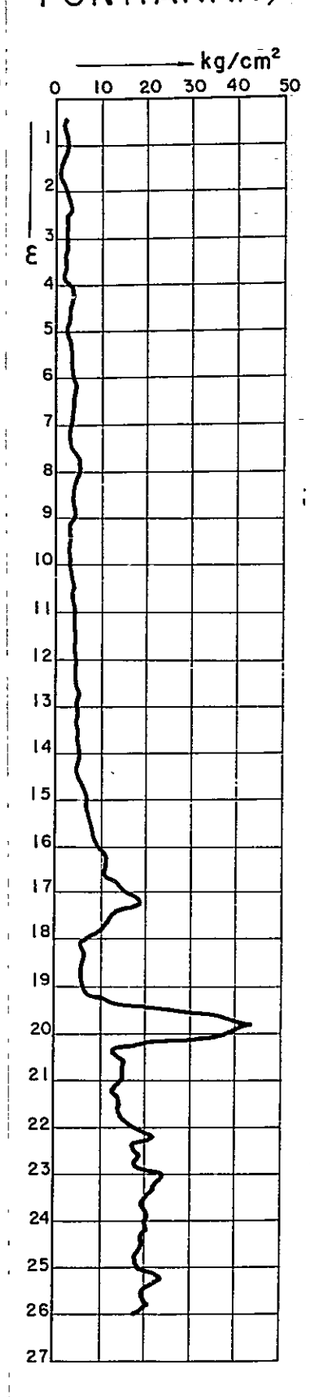

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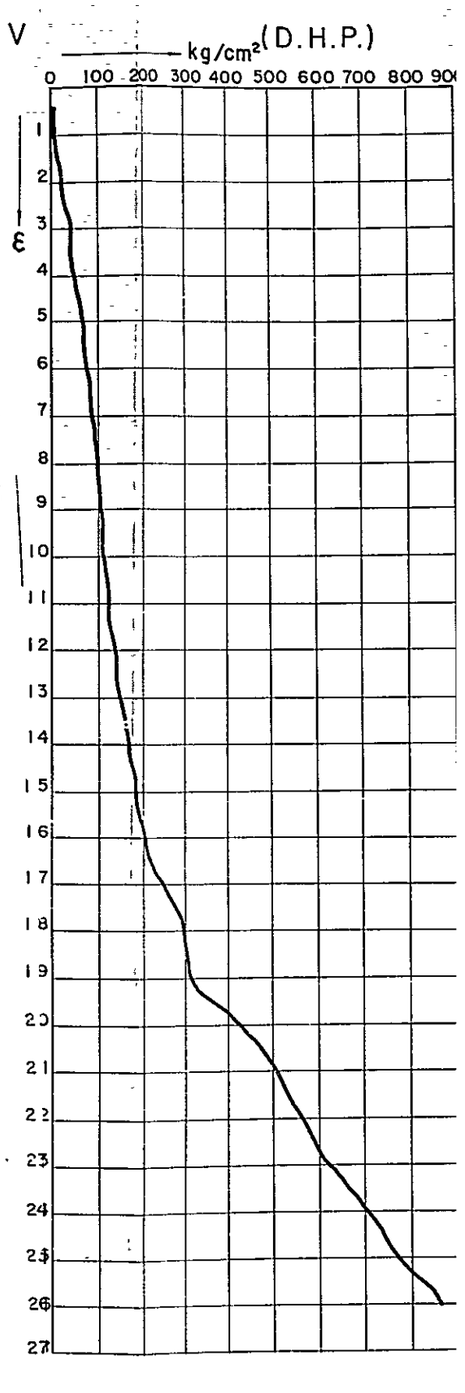
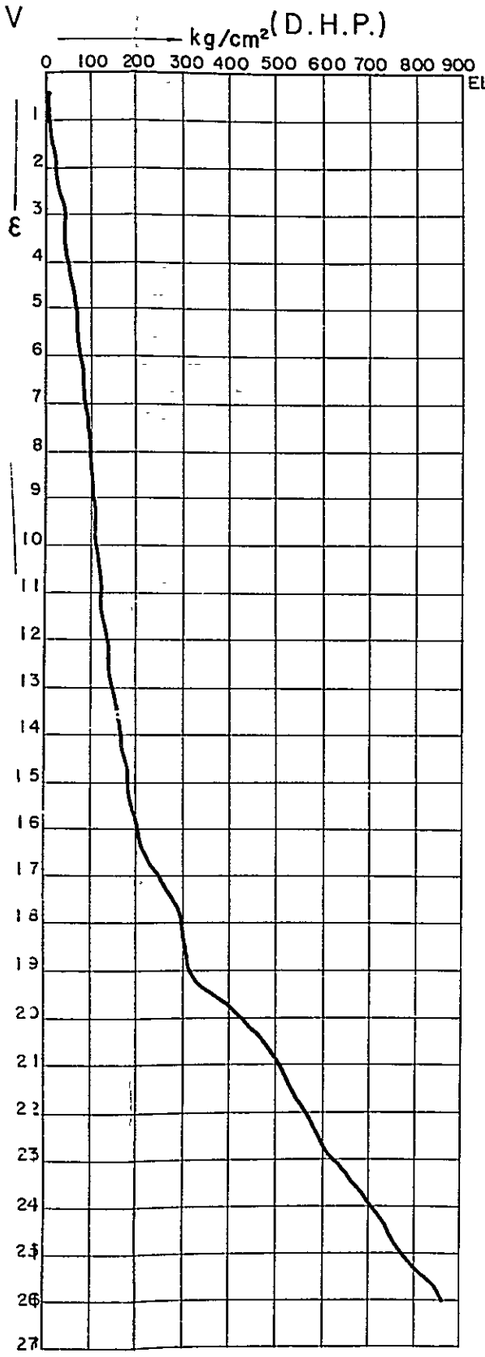
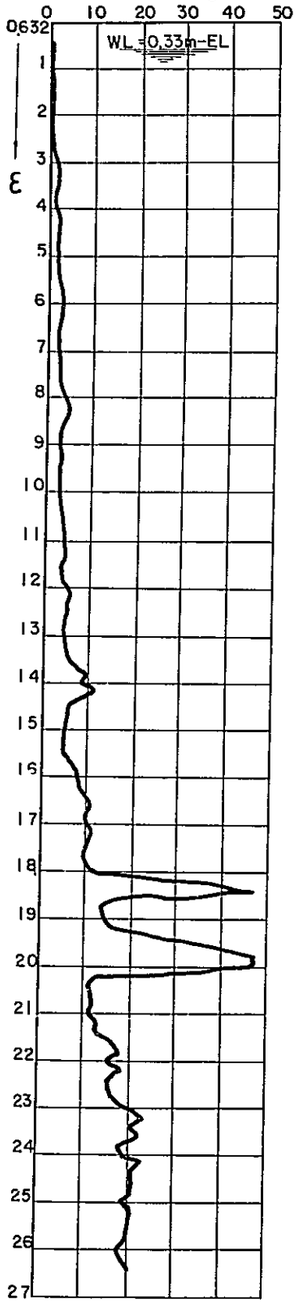


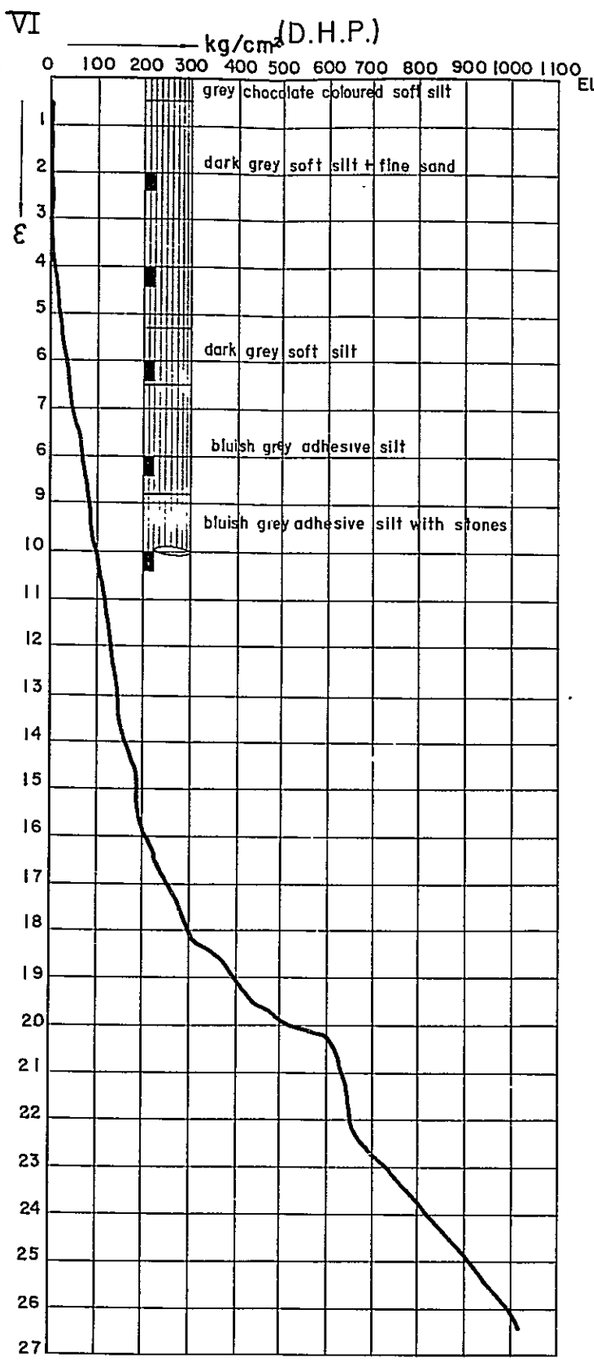
NO 8

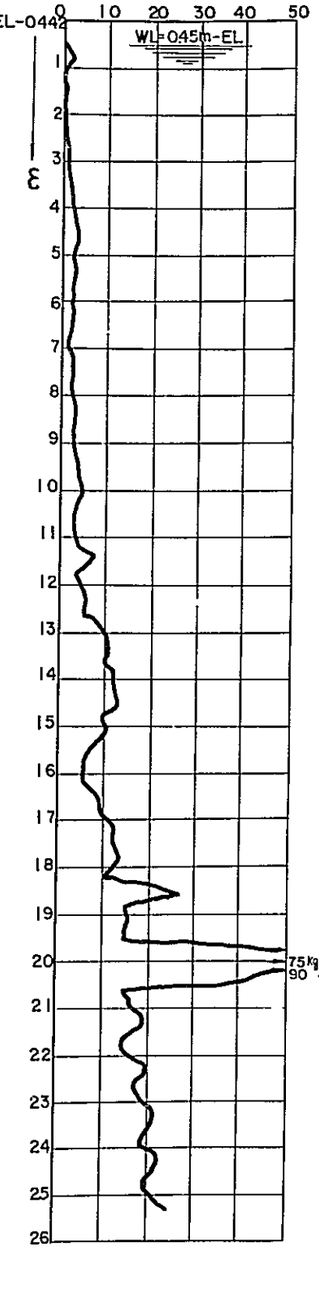
V


kg/cm²(D.H.P.)
0 100 200 300 400 500 600 700 800 900
EL-
ε
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

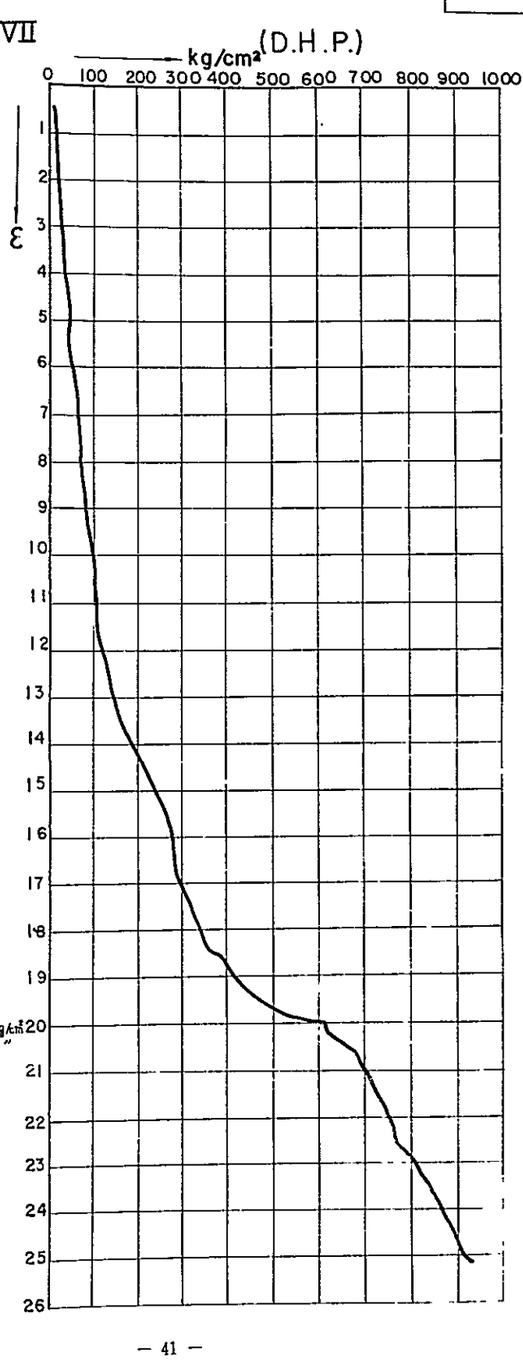

kg/cm²
0 10 20 30 40 50
EL- 0632
WL =0.33m-EL
ε
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

VI


kg/cm²(D.H.P.)
0 100 200 300 400 500 600 700 800 900 1000 1100
grey chocolate coloured soft silt
dark grey soft silt + fine sand
dark grey soft silt
bluish grey adhesive silt
bluish grey adhesive silt with stones
ε
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


kg/cm²
0 10 20 30 40 50
EL-0442
WL=045m-EL
75kg/cm²
90 "
ε
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

VII


kg/cm²(D.H.P.)
0 100 200 300 400 500 600 700 800 900 1000
ε
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

Karja at Djakarta that there seems to be no support layer up to 100m. according to the penetration test given by the I.T.B.

3-6 Earthquake

According to the "Seismic Zones in Indonesia" written by R. Soetadi, 1962, the Kalimantan-Barat area does not belong to the earthquake zone. No seismic record has since 1900 been made there.

According to the "Seismicity di Daerah" signed by Mr. R. Soetadi, the following data upon the earthquake in Pontianak are given:

Max. magnitude; IV (R.F.)

Max. velocity; 0.02 - 0.05g

Other items; Pontianak belongs to the geologically stabilized area.

4. Design Conditions

4-1 Introduction

In relation to the design conditions, fundamentals of the bridge-building project, we nave made previous arrangements with the Ministry of Public Works & Energy (O.P.U.T.), Road Bureau authorities, and discussed the specification for road bridges in general as well as the specification for large bridges. After that, the followings have been disclosed: Specification of the Road Bureau itself (Keterangan^2 dasar untuk merentjanakan djembatam^2 guna lalu-Lintas di Indonesia) has applied to the present bridges built on the general small-scaled roads. According to this specification, the road connecting to the bridge-building site belons to the 3rd-grade road. But it shall be promoted to the 2nd-grade road. In consideration of the development in future, however, the Road Bureau authorities have the intention of working out another specification, which shall apply to such big bridges as those of this project.

Specifications for large bridges, which had actually been given, varies with each design. At the current stage, therefore, there are various applicable specifications, but no unified standard specification. At this opportunity, therefore, the authorities have scheduled to make a standard specification for building the

large bridges, and decided a policy of tempering the fundamental condition with the local according to the AASHO. Considering the local condition of Pontianak and the specialities of the materials in Japan, our Investigation Team has thereafter worked out the "Design Specifications for Pontianak River Bridge, Confirmation of Data" on 27 Jan. 1965, confirmed it with the Road Bureau authorities, and decided the overall specification. Special items shall be detailed in the following 4-2 and 4-3. In relation to the most important below-girder clearance and the channel width, the Marine Transportation Bureau has been investigation the rivers. Therefore, no official agreement could not be made.

4-2 Specification for the Design, Manufacturing and the Execution of Works

4-2-1 Specification for the Design

Limits of the plan:	Plan of the bridges crossing the small Kapuas and Landak Rivers, foundation works and its access road.
Type of the bridges:	No specific type is desired. But both bridges shall be of the same type. Friction piles shall be used for the foundation works.
Width of the bridges:	Width of the sidewalk; 2@ $1^{M}500$ Width of the roadway; $1^{M}500 + 7^{M}000 \quad 1^{M}500$
Design load:	In relation to the primary load, the truck load, $14^{t}5$ of the AASHO shall be used. In relation to the secondary load, the AASHO shall be used except in the following local conditions. As for the wind load, 100 Kg/m^2 shall be used. As for the earthquake, the 0.05g mentioned in the "Confirmation of Data" shall be used. One water supply pipe, 1,000 mmϕ shall be added to the bridges.
Allowable stress:	As the materials are based upon the JIS, the Japan Road Bridge Standard shall be used in deciding the

allowable stress.

Materials to be used: According to the "Confirmation of Data", the JIS shall be employed.

Specially mentioned items: Even in case of the earthquake, safety factor for the foundation work shall be not less than 5. No bridge pier shall be laid in the center line of the stream of rivers.

4-2-2 Specifications for the Shop Working, and the Execution of Construction Works.

In relation to the specifications for the shop working and the execution of construction works, the specifications standardized in Japan shall be used, because the machine facilities belonging to each country is specialized.

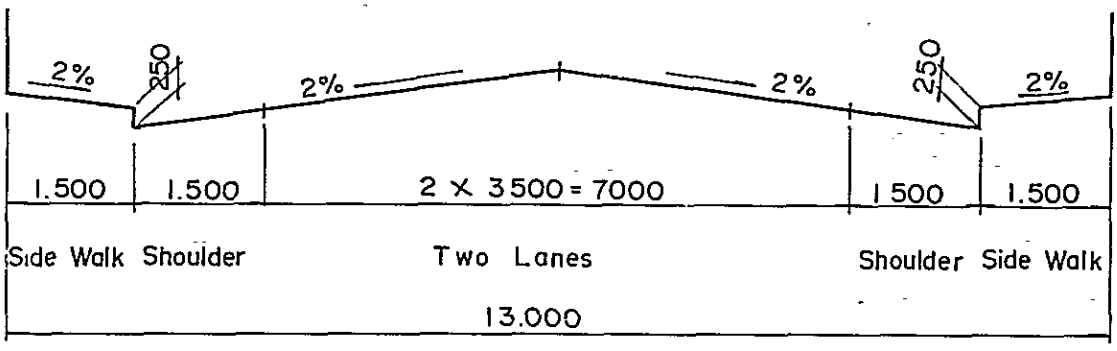
4-3 General Conditions for the Clearance below the Girders, and the Channel Width

In relation to this item, after the survey on the job site, the Indonesian Survey Team, Pontianak Port Authority, and our Investigation Team have agreed on the following points: The clearance below the girders shall be $15^{M}000$ and the channel width $75^{M}000$ by reason of the followings; In old days, vessels of 2,000-ton capacity entered the Pontianak harbor from the mouth of river. At present, however, only vessels of 600-ton capacity on average enter the harbor. Vessels go up the stream off the harbor scarcely. Only tugboats or patrol boats are sometimes found navigating. Especially in the Landak, it is unnecessary to widen the channel.

When we thereafter inquired of the Marine Transportation Bureau authorities, they said that the investigation of river channels is under way and they could officially make conclusions toward the beginning of March. When we further asked the authorities to offer the data of the estimated channel limits, we were told that the clearance below the girders should be $25^{M}500$ above the H.W.L. and the channel width is unknown, and could not obtain any official decision.

NO 15

WIDTH OF PONTIANAK BRIDGE



DESIGN SPECIFICATIONS FOR PONTIANAK RIVER BRIDGE.

CONFIRMATION OF DATAS.

1. The Bridge should be a two Lane Bridge with a total width of 13 m (2 x 3,5m + 2 x 1,5 m + 2 x 1,5 m).

2. Safety Coefficient to be used for soil conditions and soil Analyses will be 5 (five) and the earthquake effort 0.05 g.

3. Wind force to be used in calculations will be 100 kg/ m2.

4. Standards to be used :
   a). for strength Computation : A A S H O Standards.
   b). " material used : J I S Standards.- and/ or equivalents (except for roadasphalts will be used the Indonesian Standards)

5. Clearance between H.W.L. and Bridge will be decided later on when the inland river transport surveys are completed.

6. Location of Bridge are according to drawings.

7. Five variaties of Bridge types remains to be considered for the final decision.

Djakarta 27 - 1 - 1965.

FOR THE JAPANESE SURVEY TEAM,

M. Nishino

(M. N I S H I N O).

Kepala Direktorat Djalan Umum

u.b.

(IR. THENG KHAY YAN).

5. Details of the Survey Work

5-1 Introduction

As the objective of our recent survey of our recent survey of our Team was to make preliminary surveys for building the bridges, most of our works were general investigations, or collection of various kinds of data, and their analyses, etc. Such survey works as the measurement of river width, water depth and level, surveying work for the access road, etc., which would be indispensable to the making of plan for building the bridges, were conducted as far as possible within the limits of time and ability. In relation to the geological survey, the most important survey work on the job site, fortunately, engineers of the Geological Research Laboratory of D.P.U.T. in Bandong, and the boring machines have been sent to the job site in co-operation with the Indonesian authorities. Accordingly, several points on the bridge-building site, which our Investigation Party suggested, were to be bored. In this connection, we expect much from this boring work. River width has been roughly measured by means of a distance surveying machine we carried, and then directly measured by a simple triangulation and the tense eslon tape. The access road has been directly surveyed by means of eslon tape. Air photos offered by the Indonesian authorities were fundamentally useful for the general survey to make choice of the bridge-building site, and for the measurement of the river width, access road length, etc. As their scale was doubtful, however, the road was measured by means of tape to confirm the scale. In measuring the flow velocity, the electric current meter, model AN-2 made by Naka-asa survey Instrument Mfg. Co., Ltd., we carried has been used. The survey on the spot disclosed that there are little data on the water level. In this connection, water gauges have been laid on the left bank of Kapuas River and on the right bank of Landak River.

In making these survey works, the Port Authorities have greatly co-operated with us for offering the vessels, etc. and the Public Works Bureau Authorities for the measuring and piling works, etc.

5-2 Survey of the Bridge-Building Point to be Chosen

On the morning of 15 Jan. 1965, we went up the small Kapuas River with a boat belonging to the Pontianak Port Authority to make general surveys to choose the bridge-building point. We six Survey Team members were accompanied by the Indonesian members, Mr. Santoso, Mr. Sakli and Mr. Soerjatin, Mr. Soeradijo, official of the Port Authority, Mr. Soedarjoko of the P.U.T. Pontianak and others.

On the afternoon of 15 Jan. 1965, when we discussed with them to make choice of the bridge-building points, we Party members have completely agreed with the Indonesian party members. At this meeting, discussion was made chiefly in reference to the air photos. The bridge-building points are as shown in the following figures:

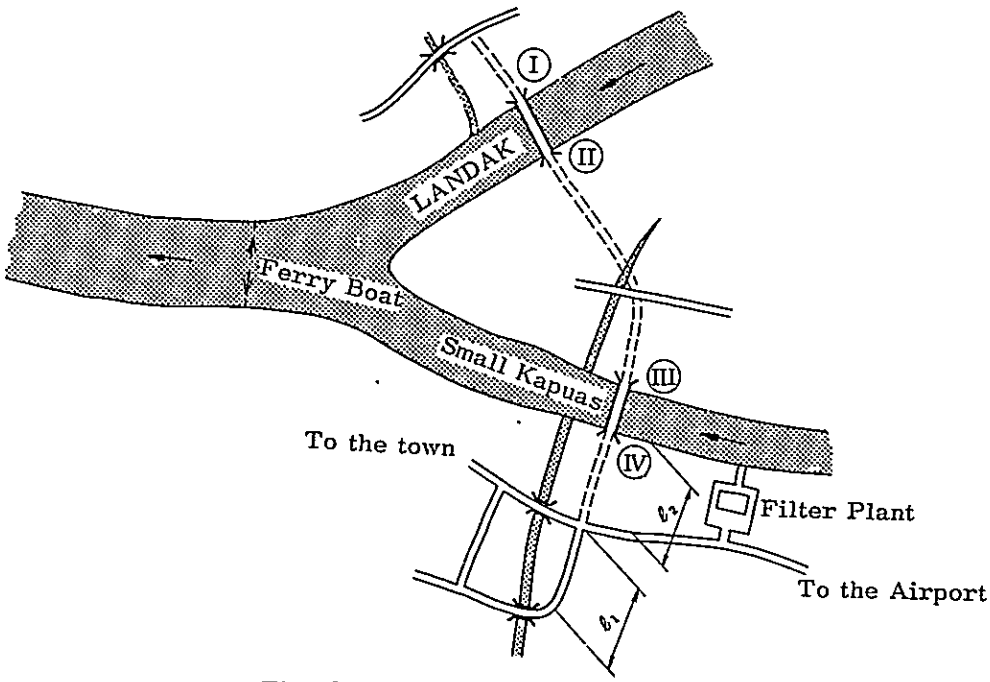


Fig. 3

On the morning of 16 Jan. 1965, when we went up the small Kapuas and Landak Rivers on board the ship of the Port Authority, we have laid the datum piles, surveyed the geological condition of the near by areas, and confirmed the bridge-building points. We six members were accompanied by the Indonesian

party members, Mr. Santoso, Mr. Sakli and Mr. Soerjatin, Mr. Sudariman, official of the Port Authority, Mr. Soedarjoko, P.U.T. Pontianak, and others. In this survey, one patrol boat of the Port Authority and three sampans were used.

5-3 Survey of the River Width and the Access Road

On the afternoon of 19 Jan. 1965, the length of the road on the left bank of Kapuas River was surveyed by means of cloth tape to check whether the scale of air photos was correct, or not. Though it was stated that the scale of air photos was 1/10,000, the actual survey has disclosed that the correct scale is 1/10,000 x400/347.4 = 1/8,700 as shown in the following figure:

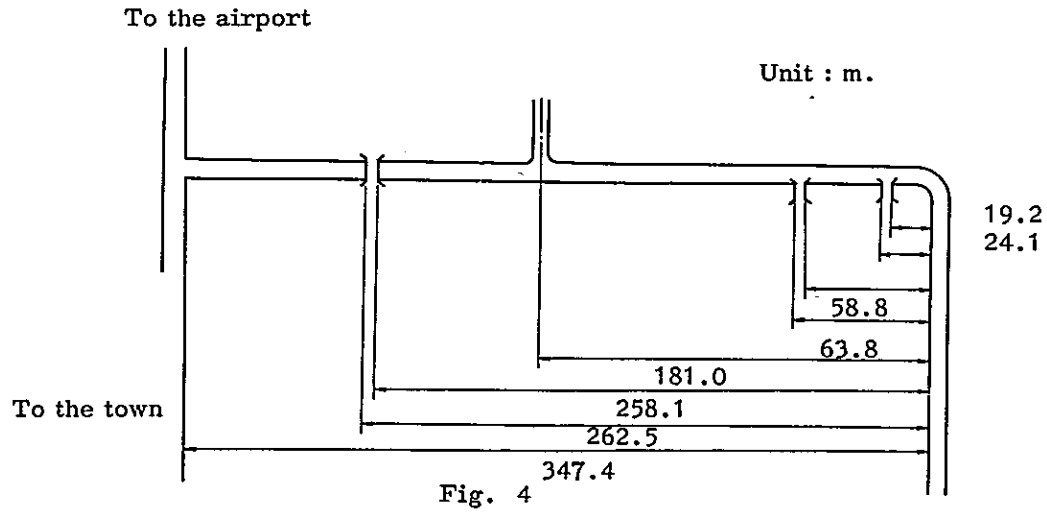


Fig. 4

On the afternoon of 19 Jan. 1965, the width of small Kapuas River was surveyed by means of simple triangulation. But good results could not be obtained for the following reasons: In the bank area, there were many inaccessible landing quays; visibility was poor, satisfactory base-line could not be measured, and still the survey work was interrupted by many native lookers-on. At the same time when the River width was measured by means of range finder we had carried, it was revealed that the distance between the telegram posts on the ground off approx. 15m off the driven piles was 270-280m. It almost agreed with the distance,

240m between piles on both banks, which was finally surveyed with rope.

As the results of the triangulation on the previous day were thus unfavorable, the River width was directly survey by means of eslon tape on the morning of the following day, 20 Jan. 1965, when the sampans and motor-boats were arranged in a row across the River in co-operation with the Port Authority. The boats used were composed of 1 large motorboat, 2 medium-sized motorboats and 5 sampans. According to the above survey, the distance between the piles driven on both banks of the River is as follows:

234.42m for the small Kapuas

263.98m for the Landak

The above values for the river width seem to be most reliable.

On the afternoon of 20 Jan. 1965, the access road on the left bank of small Kapuas River was surveyed. As this access road is scheduled to connect with the main highway, which ties the Pontianak City with its airport, its correct length must be actually surveyed. According to the survey record, the distance to the datum pile, IV was approx. 344.7m. The length of the l_2 portion shown in the Fig. 9 was 348.38m.

5-4 Survey of the Depth and Flow Velocity

On the morning of 19 Jan. 1965 when a rope, which had been marked each 20m, was stretched between both banks of the River in co-operation with the Port Authority, the water depth at intervals of 20m, and the flow velocity on optional points were surveyed. Survey was started at 11.00, and finished at 11.40 a.m. The boats used were 1 large-sized and 2 medium-sized motor-boats. The survey has disclosed the water depth and flow velocity as shown hereunder. But the survey of flow velocity following the course No. 8 was suspended, because the current meter was put out of order.

Table 4

Course No.	Distance from the right bank, m.	Water depth, m.	Flow velocity, m/sec.
1	12.80	1.50	
2	32.80	10.00	
3	52.80	14.50	0.3
4	72.80	15.85	0.25
5	92.80	16.78	
6	112.80	16.85	0.40 - 0.45
7	132.80	16.80	
8	152.80	17.50	
9	172.80	16.00	
10	192.80	11.62	
11	212.80	5.05	
12	From the left bank 4.50	2.00	
13	Pile on the left bank	0.50	

On the morning of 20 Jan. 1965, the water depth and flow velocity of the Landak River were surveyed. In co-operation with the Port Authority, motorboats and sampans were arranged in a line across the River to stretch a eslon-made tape between both banks. Along this tape, the water depth and flow velocity on optional points were surveyed. The boats used were 1 large motorboat, 2 medium-sized motorboats and 5 sampans. In the middle of the River, the large motorboat watched the passage of vessels. Survey was started at 11.00 a.m. and finished at 11.40 a.m. Survey of the water depth and flow velocity has disclosed the following results:

Table 5

Course No.	Distance from the right bank, m.	Water depth, m	Flow velocity, m/sec.
1	3.60 (4.10)	1.50	
2	23.60 (26.60)	10.50	0.4
3	43.60 (49.20)	12.85	
4	63.60 (71.70)	12.50	0.5
5	83.60 (94.10)	12.10	
6	103.60 (116.80)	11.50	
7	123.60 (139.00)	10.15	
8	143.60 (162.00)	9.00	0.20
9	163.60 (184.50)	8.50	
10	183.60 (207.0)	7.85	0.20
11	203.60 (229.0)	8.10	
12	223.60 (261.0)	3.85	
13	231.60 (261.0)	1.10	
14	234.60 (264.0)		

Late on the evening of 20 Jan. 1965, the flow velocity was surveyed to confirm our estimate, as it was conceivable from the tide table made available that the flow velocity would become max. about at 11:00 p.m. But the results of the survey was quite the reverse of our estimate. When the data were re-examined after the survey, it has proved that our estimate is incorrect. In the survey, 1 large motorboat was used. Survey was started at 10.30 p.m. and completed at 11.00 p.m.. Survey was firstly given to the Landak, and then to the small Kapuas. The results of the survey are as shown in the following tables:

Table 6

Landak

Point close to the left bank,

Depth 0.5 m ..... V = 0.2 m/sec

7.0 m ..... V = 0.2 m/sec

Center

Depth 0.5 m ..... V = 0

0.7 m ..... V = 0

Table 7

Small Kapuas

Point close to the left bank

Depth 0.5 m ..... V = 0.15 m/sec

8 m ..... V = 0.1 m/sec

Center

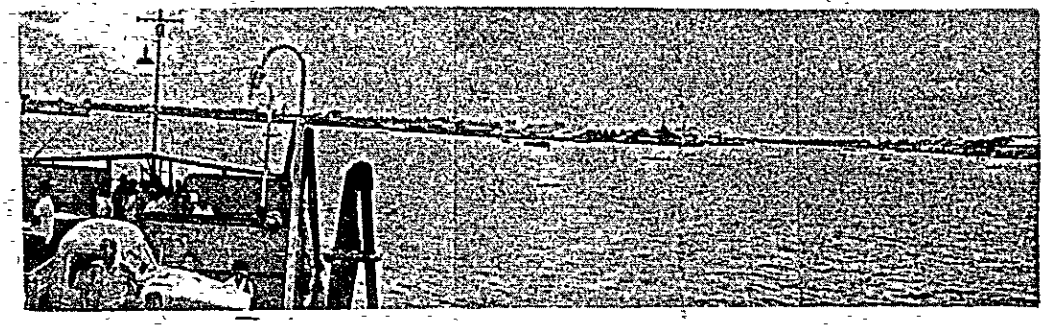
Depth 0.5 m ..... V = 0.4 m/sec

8 m .....V = 0.1 m/sec

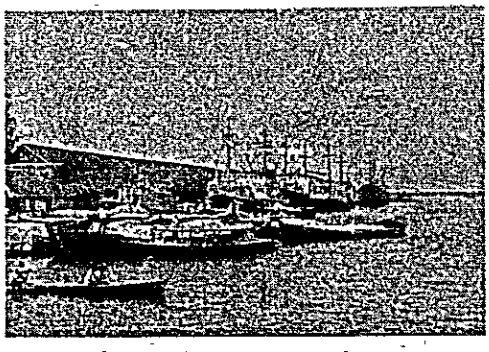
5-5 On 22 Jan. 1965, the water gauges were laid in the water close to the left bank of small Kapuas and to the right bank of the Landak. Though we made investigation into the water level in the job site area, we obtained little data thereof, and finally laid the water gauges. We have further recommended the Indonesian authorities to observe the water level for some years in future. The water gauge, which we had carried there, was nailed, or pasted on a pile, approx. 15 cm.

square. When this pile was driven in, the length of its underground portion was more than 5m. The scale pasted on each water gauge pile was approx. 4m. The top of the scale of the water gauge laid in the Kapuas River was 1m. higher than the elevation of the center of the road leading to the airport. The top of the scale of the water gauge laid in the Landak was 0.315m. higher than the B.M. laid in the foundation side-ditch concrete in the works (lian Haut Company).

Photographs

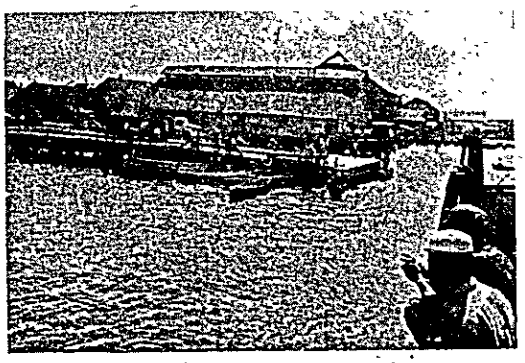


1. Area near the confluence of small Kapuas and Landak Rivers

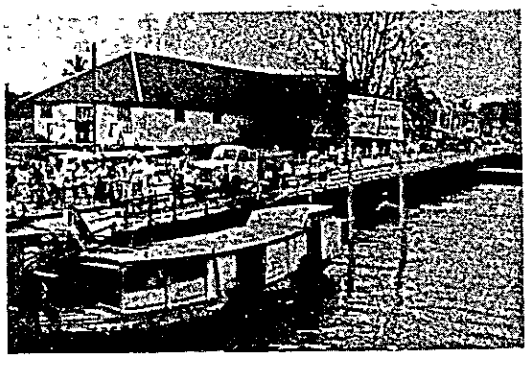


2. Pontianak Harbor

3. Pontianak city streets



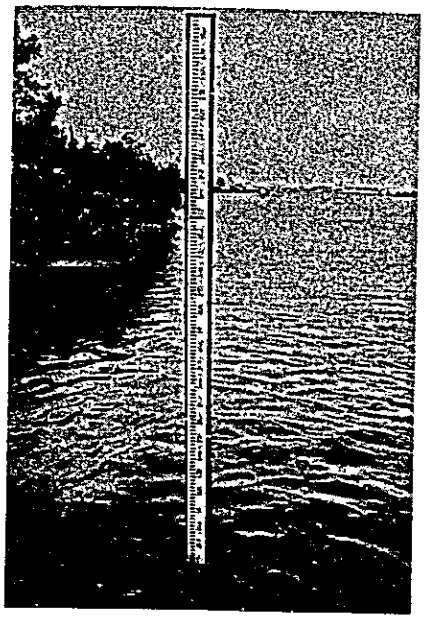
4. Ferry (on the right bank)



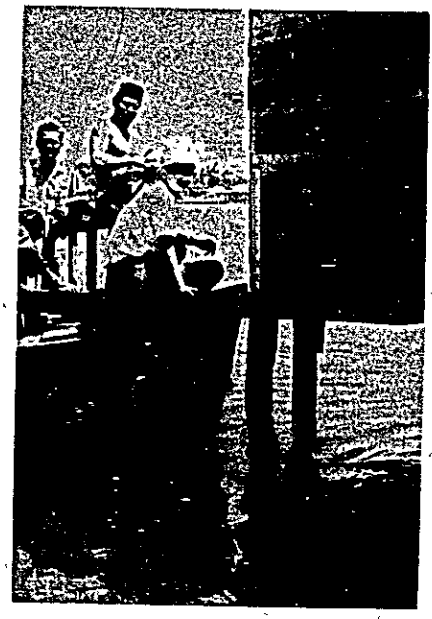
5. Ferry (on the left bank)

6. Bridge-building site on the right bank of small Kapuas River

7. Bridge-building site on the left bank of small Kapuas River

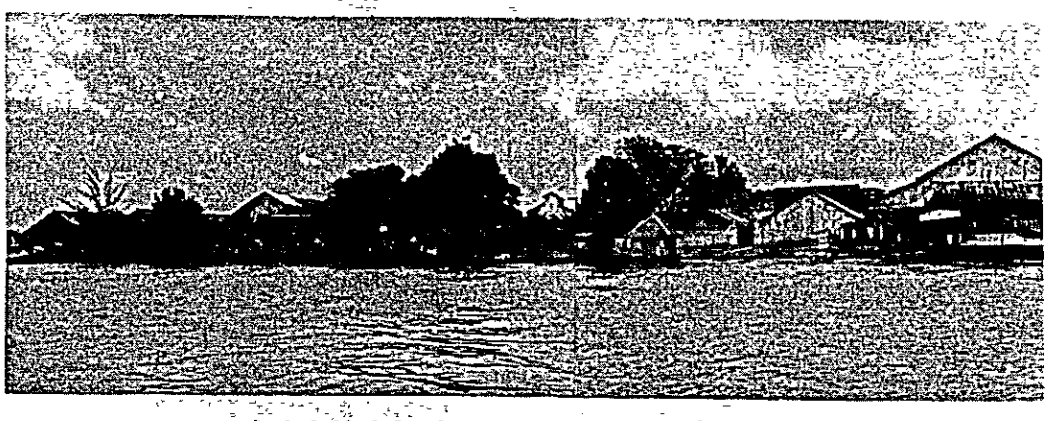


8. Water-gauge laid in the water near the bridge-building site on the left bank of small Kapuas River



9. Water-gauge laid close to a private house on the bridge-building site of the left bank of small Kapuas River

10. Bridge-building site on the left bank of Landak River



11. Bridge-building site on the right bank of Landak River

12. Water-gauge laid in the water near the bridge-building site on the right bank of Landak River

13. Preparations for setting a water-gauge on the bridge-building site of the right bank of Landak River

14. Road connecting with the access road on the left bank of small Kapuas River

15. Pontianak Port Authority Director Mr. Soeradijo (center), and Vice-director of Public Works Bureau, Mr. Silitonga (rear)

16. Preparations for taping the riverwidth

17. Quarry at Sungai Pinjuh approx. 52 Km. north of Pontianak

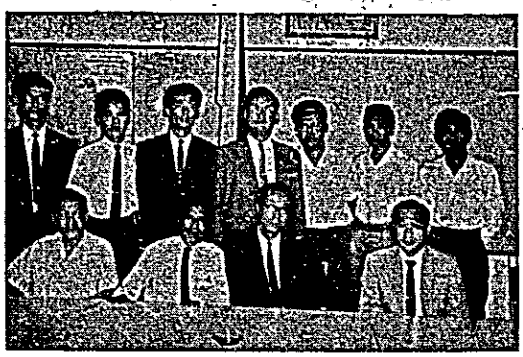
18. Quarry at Sungai Pinjuh approx. 52 Km north of Pontianak

19. Triangulation of the width of small Kapuas River

20. Survey of the flow velocity of small Kapuas River

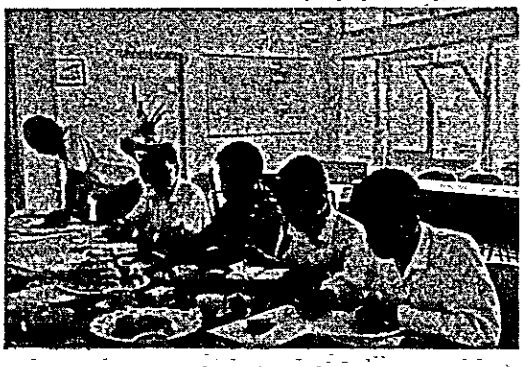
21. Survey of the width of Landak River by means of Eslon tape

22. Piling on the bridge-building site of the right bank of small Kapuas River



23. Preliminary meeting in presence of Vice-minister Tambunan at D.P.U.T.

24. Five suggested plans were explained to Mr. Tambunan at D.P.U.T.



25. Consultation was held about the survey design condition, etc. at the Road I Bureau in Bandang.

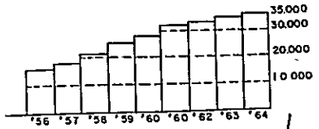
26. Consulation was held about the clerance below the girders at the Marine Transportation Ministry in Djakarta

27. Thanking party given at Hotel Indonesia

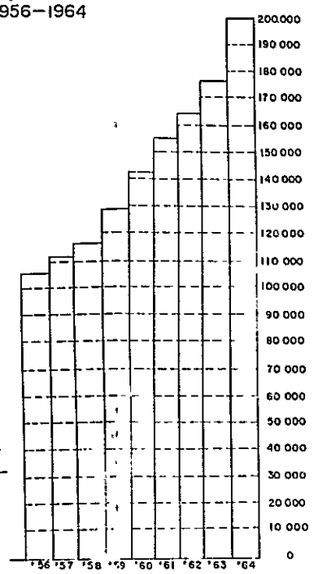
28. Greeting to West Kalimantan Province Governor. He is the 6th person from the left.

NO. 7

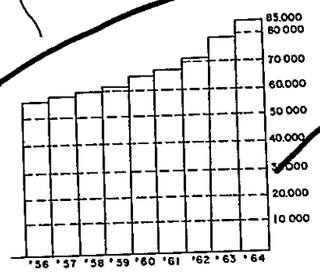
35.000
POPULATION OF NORTH DISTRICT
1956–1964



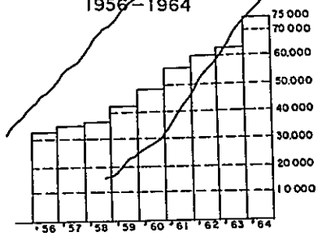
200.000
POPULATION OF PONTIANAK CITY
1956–1964



85.000
POPULATION OF WEST DISTRICT
1956–1964



75.000
POPULATION OF EAST DISTRICT
1956–1964



RIVER LANDAK

RIVER KAPUAS KETJIL

N

SCALE 1: 50000

MAP OF POPULATION
AND ADMINISTRATIVE DIVISION
OF PONTIANAK CITY

LANDUSE 1961
PONTIANAK CITY

NO 6-3

LEGEND

- PUBLIC BUILDINGS-OFFICES
- INDUSTRY
- TRADE, SHOPS
- DRY ARABLE LAND
- YARDS-OPEN FIELD

RIVER LANDAK

RIVER KAPUAS KETJIL

N

SCALE 1 : 50.000

LANDUSE 1960
PONTIANAK CITY

NO 6-2

LEGEND

- PUBLIC BUILDINGS – OFFICES
- INDUSTRY
- TRADE , SHOPS
- DRY ARABLE LAND
- YARDS – OPEN FIELD

RIVER LANDAK

RIVER KAPUAS KETJIL

N

SCALE 1·50000

LANDUSE 1957

PONTIANAK CITY

NO 6-1

LEGEND

- PUBLIC BUILDINGS-OFFICES
- INDUSTRY
- TRADE , SHOPS
- DRY ARABLE LAND
- YARDS—OPEN FIELD

RIVER LANDAK

RIVER KAPUAS KETJIL

N

SCALE 1:50000

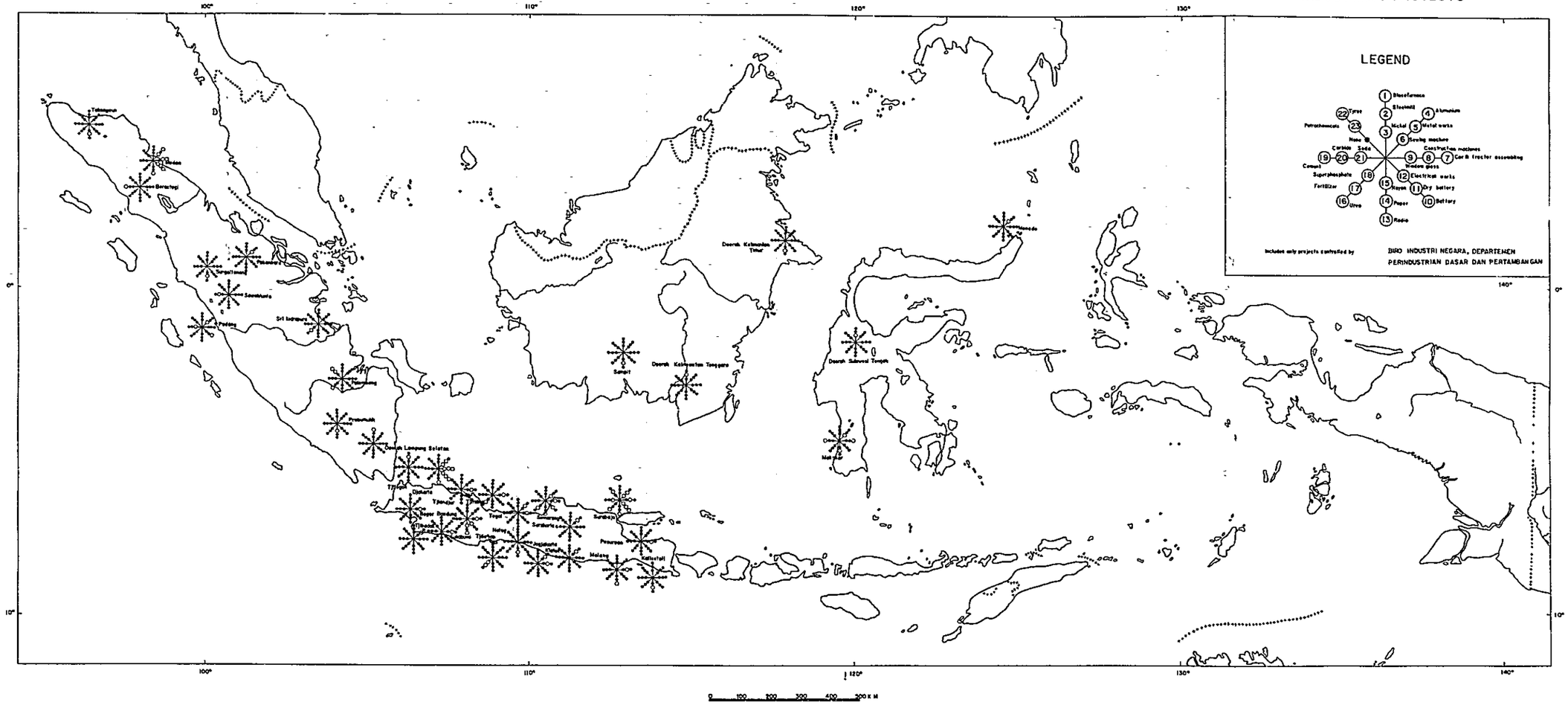
NO. 4

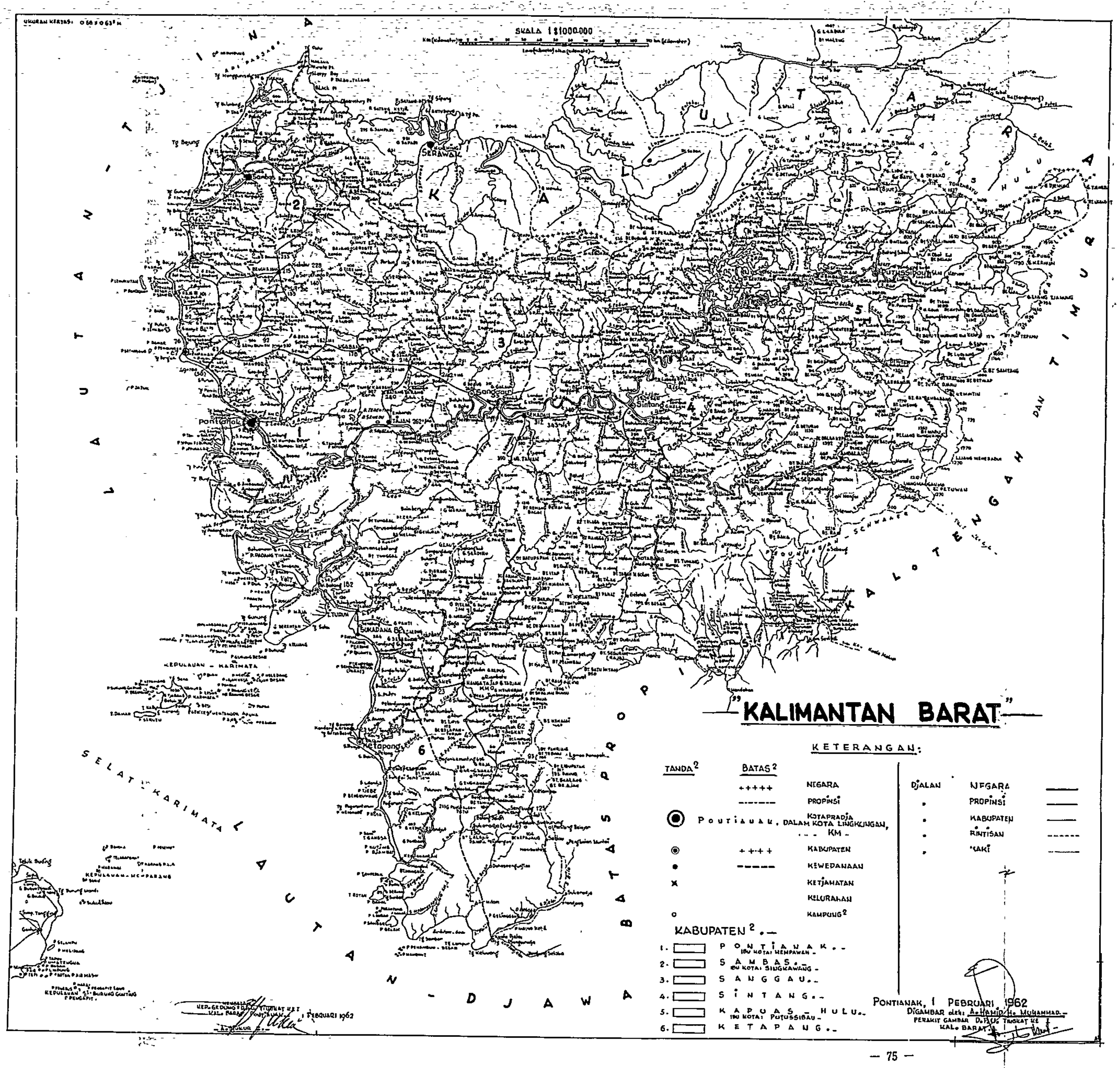
MAP OF PONTIANAK CITY

SCALE 1:5000

NO. 2

INDUSTRIAL PROJECTS




SKALA 1 : 1.000.000
SERAWAK
Sambas
Pontianak
Sanggau
Sintang
Putussibau
Ketapang
SUKADANA
KEPULAUAN – KARIMATA
SELAT – KARIMATA
LAUT – TJINA – SELATAN
LAUTAN – DJAWA
KALIMANTAN – UTARA
GUNUNG – KAPUAS – HULU
BATAS PROPINSI
KALIMANTAN TENGAH DAN TIMUR
"KALIMANTAN BARAT"
KETERANGAN:
TANDA²
BATAS²
+++++ NEGARA
PROPINSI
Pontianak, KOTAPRADJA DALAM KOTA LINGKUNGAN, ... KM -
++++ KABUPATEN
KEWEDANAAN
KETJAMATAN
KELURAHAN
KAMPUNG²
DJALAN
NEGARA
PROPINSI
KABUPATEN
RINTISAN
KAKI
KABUPATEN².–
1. PONTIANAK.– IBU KOTA: MEMPAWAH –
2. SAMBAS.– IBU KOTA: SINGKAWANG –
3. SANGGAU.–
4. SINTANG.–
5. KAPUAS – HULU.– IBU KOTA: PUTUSSIBAU –
6. KETAPANG.–
PONTIANAK, 1 PEBRUARI 1962
DIGAMBAR oleh: A. HAMID H. MUHAMMAD.–
PERAKIT GAMBAR D.P.U. TINGKAT KE KAL. BARAT.
1 FEBRUARI 1962

Alternative Plan Recommended

The construction cost has apparently and inevitably become rather high as shown in the foregoing paragraph, 2-4, P.22, resulting from the fact that all the technical requirements of the Indonesian Government authorities concerned have been met, though the aggregate figure of US$22,000,000 (for two bridges) includes local currency portion amounting to the equivalent of US$2 million.

It is feared therefore that, supposing this project to entertained by the Japanese Economic Cooperation Scheme, the above-mentioned cost would not attract the favourable attention of both the Indonesian and the Japanese Government in view of the fact that there have already been rushing many other important projects from your country, almost of which have reached the conclusion of contracts and are about tc commence construction works upon obtaining approval of the Japanese Government.

Therefore, our Survey Team, with a view to economizing the construction cost, had made further studies and have arrived at conclusion that the following two alterations in the original plan are to be proposed:-

width of the bridge : from 13m to 10m

slope of the approach bridge : from 3/100 to 10/100

Thus, the construction cost in the case of Type II will be decreased to:-

US$6,400,000 x 2 bridges ==US$12,800,000

(Foreign Currency Portion only)

(Super Structure - US$1,630,000 x 2

(Sub Structure - US$4,770,000 x 2

By dint of this figure, the project is raised to practicability for approval of inclusion in the Economic Cooperation Scheme, The Survey Team is quite confident that even by this alternative plan the bridge will be veyy powerful in

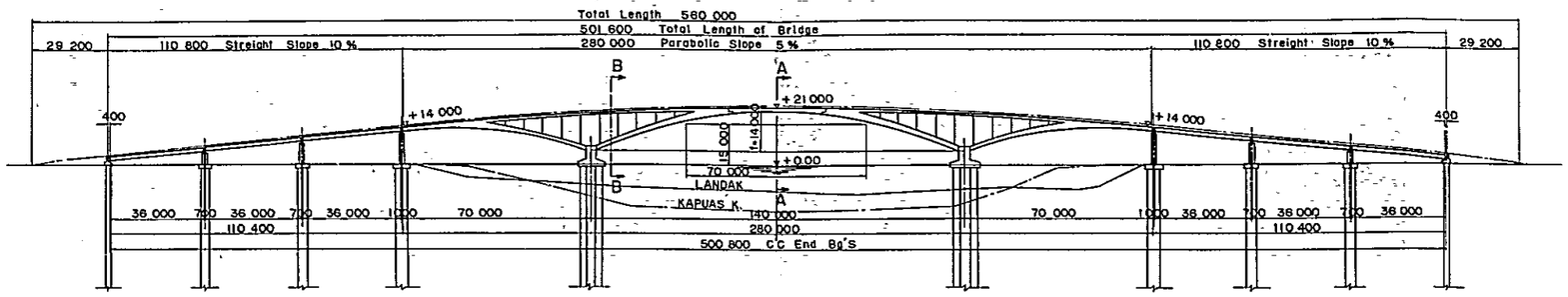
contribution to the development of West Kalimantan district.

The Indonesian Government authorities are therefore strongly suggested to approve our proposal for alternative plan and to take prompt action for timely application to the Japanese Government to your great advantage.

Drawings for the alternative plan are attached hereto for your perusal.

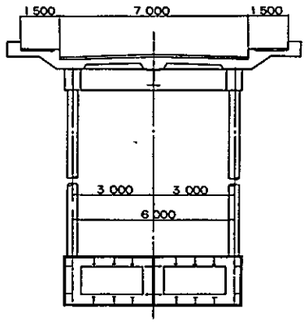
NO. 13'

SIDE VIEW

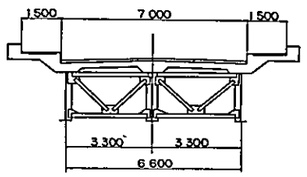


CROSS SECTIONS OF MAIN SPANS

SECTION B — B

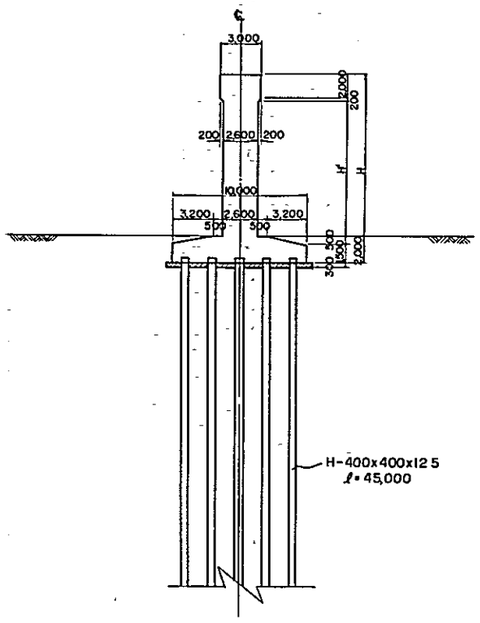


SECTION A — A

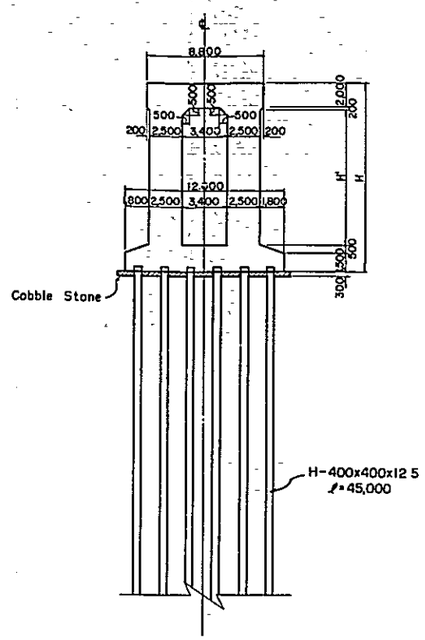


PROPOSED DESIGN
OF
PONTIANAK BRIDGE
(ALTERNATIVE PROPOSAL)
JAPANESE SURVEY MISSION
18TH MAY 1965

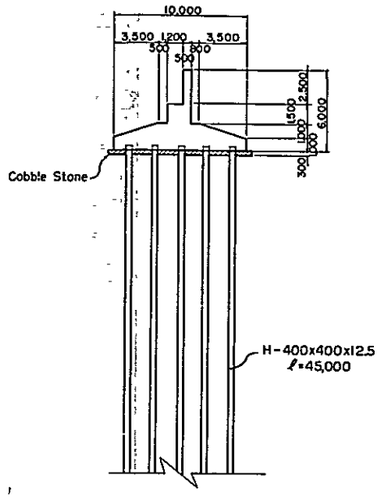
TYPICAL CROSS SECTION
SCALE 1/200
A — A



TYPICAL CROSS SECTION
SCALE 1/200
B — B

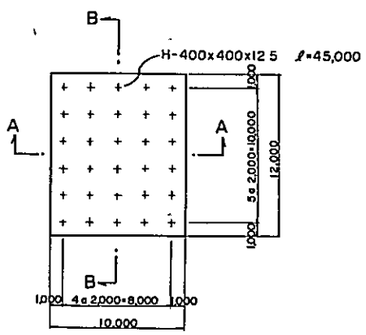


TYPICAL CROSS SECTION
SCALE 1/200
A — A



PIER (3),(4)

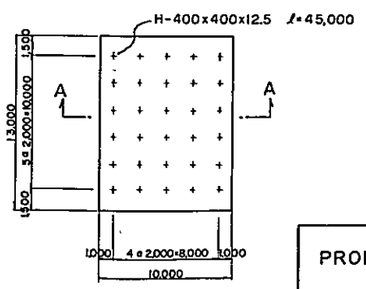
PILES LAY OUT PLAN
SCALE 1/200



No.	P3	P4
H (m)	8,500	5,500
H' (m)	6,300	3,300

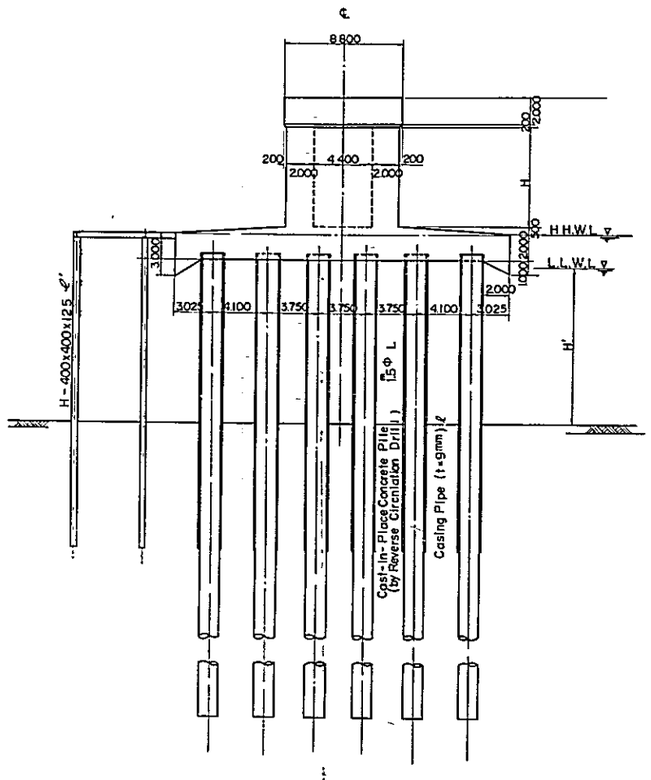
ABUTMENT

PILES LAY OUT PLAN
SCALE 1/200

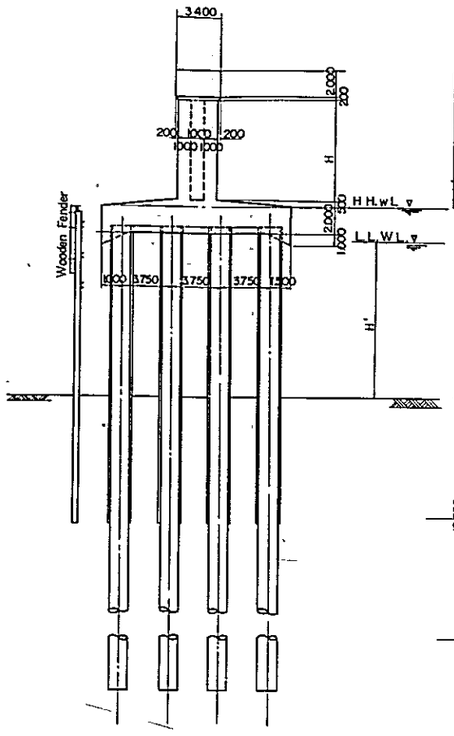


PROPOSED DESIGN
OF
PONTIANAK BRIDGE
FOUNDATION
(TENTATIVE)
Drg. No. 2
JAPANESE SURVEY MISSION
20TH FEB. 1965

TYPICAL CROSS SECTION
A — A SCALE 1/200

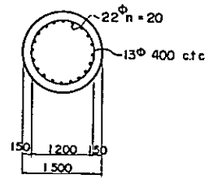


TYPICAL CROSS SECTION
B — B SCALE 1/200

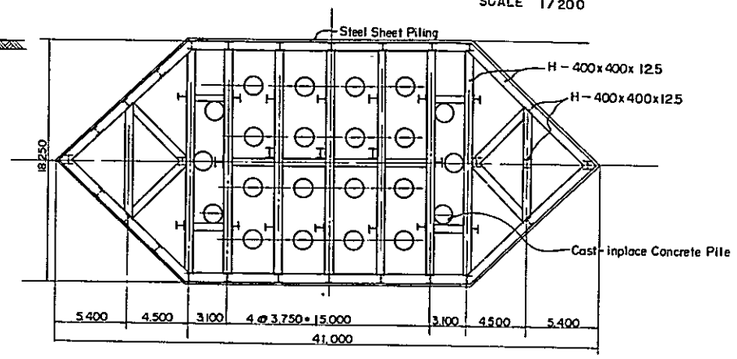


		H(m)	H'(m)	L (m)	ℓ(m)	ℓ'(m)
River Landa k	P(1)	3.300	12.000	40.000	22.000	21.000
	P(2)	8.300	0	"	10.000	0
River Kapuas k	P(1)	3.300	17.000	"	27.000	30.000
	P(2)	8.300	0	"	10.000	0

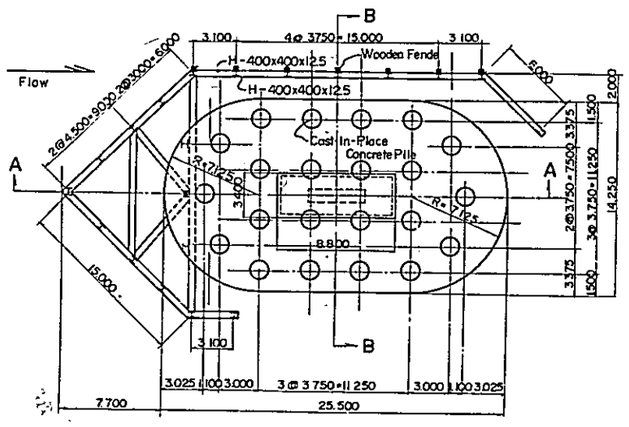
CROSS SECTION OF PILE
SCALE 1/50



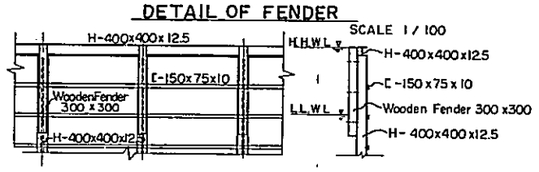
PLAN OF STEEL FRAME & TEMPORAL COFFERDAM
SCALE 1/200



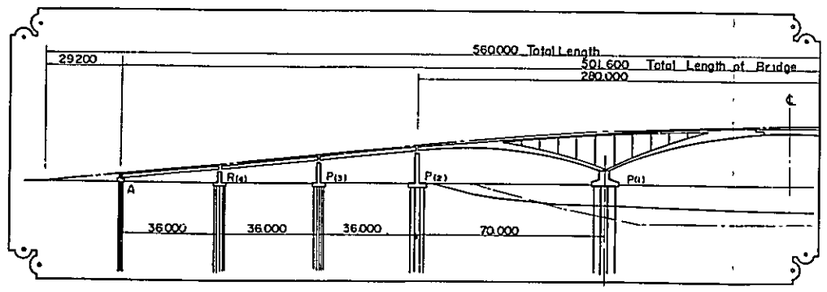
PLAN
SCALE 1/200



DETAIL OF FENDER
SCALE 1/100



INFOMATION



PROPOSED DESIGN
OF
PONTIANAK BRIDGE
FOUNDATION
(TENTATIVE)
Drg. No. 1
JAPANESE SURVEY MISSION
20TH FEB. 1965