CHAPTER 4 INVESTIGATION FOR EMBANKMENT MATERIALS

4.1 Basic Condition for Embankment Material

Embankment Material consists of Core, Rock and Filter material. Basic condition for embankment material is component from quality, quantity and cost. Candidate embankment material should be selected, considering sufficiently each components. Basic quality condition required for each of these material are shown below.

Table-B.4.1 Basic Quality Condition of Embankment Material

| Material | | Basic | Quality Condi | tion | | |
|----------|---|--------------------------------|----------------|--------|---|------|
| Core | 1 | Non-permeability, Deformation, | Construction A | Aspect | | |
| Rock | 1 | Strength, Draining, Endurance | | . ! | | |
| Filter | | Strength, Draining, Endurance | | | · | • |

4.2 Candidate Rock

A distinctive feature of rock fill dam is to make a rational zoning of which materials are assorted from various rocks. The assortment of the materials have several cases, therefore, geological field reconnaissance executed by an experienced geotechnical engineer is necessary at an early stage. Usually, data collection, field reconnaissance and physical soil tests are carried out as a initial survey. As a result of field reconnaissance, candidates of embankment materials exposed in the vicinity of the dam sites are selected, as shown in Table-4.5.3.

Table-B.4.2 List of Candidates for Embankment Materials

| 1 4016-01442 | | monding to | | | |
|----------------------|-------------|------------|----------|---------|----------|
| Rock | S | Rock N | faterial | Core l | Material |
| | | Quality | Quantity | Quality | Quantity |
| 1. Detritus | | × | × | O | · · · × |
| 2. Terrace deposite | | × | × | × | × |
| 3. Coral limestone | (weathered) | × | × | 0 | 0 |
| | (fresh) | × | × | × | × |
| 4. Granite | (weathered) | × | × | × | 0 |
| | (fresh) | 0 | 0. | × | × |
| 5. Volcanie rocks | (weathered) | × | × | O | . 0 |
| | (fresh) | 0 | × | × | × |
| 6. Ultra basic rocks | (weathered) | × | × | 0 | 0 |
| | (fresh) | 0 | | × | × |
| 7. Kanikeh Formation | (weathered) | × | × | 0 | 0 |
| | (fresh) | 0 | | × | ļ × |

: suitable: unsuitable

4.3 Laboratory Test

4.3.1 Contents and Purpose of Laboratory Tests

The purpose of the laboratory tests is to investigate roughly the material quality of several candidate quarries. Tests are carried out for core and rock material, according to the contents focused on as follows.

Table-B.4.3 Contents and Purpose of Laboratory Tests

| | # (4 H) I # 17 h | Tio Contents and I | ui pose or raiovillor j | X C 5 C 5 |
|----------|------------------|---------------------------|---------------------------|-----------------|
| Material | Focusing Item | Contents of L | aboratory Test | Standard |
| Core | Non-permeability | - Grain Size Analysis | - Grain size distribution | ASTM-D-422-63 |
| | | - Plasticity | - Water contents | ASTM-D-4253-83, |
| ! | | | - | ASTM-D-4254-83 |
| 1 | | | - Atterberg limits | ASTM-D-4318-84 |
| | | | - Specific gravity | ASTM-D-2216-80 |
| Rock | Strength | - Strength of rock pieces | - Specific gravity | JIS-A-1110 |
| | | | - Absorption | JIS-A-1110 |

4.3.2 Sampling for Soil Tests

Samples for soil tests are collected, as shown in Table-B.4.4 and Figure-B.4.1.

Table-B.4.4 List of Samples for Soil Tests

| Material | Name | Rock | Location | Sampling Depth |
|----------|-------|------------------------------------|-------------------------------|-------------------|
| | R-A | Fresh Granite | Desa Halai/Soya | River Bed |
| | R-B | Fresh Granite | Desa Halai/Kayu putih | River Bed |
| Rock | R-C | Fresh Ultra Basic Rock | Batu Gajah | River Bed |
| Material | R-D | Fresh Ultra Basic Rock | Batu Gajah | River Bed |
| | R-E | Fresh Granite | Desa Mahia | River Bed |
| | R-F | Fresh Granite (Boulder) | Batu Gajah | River Bed |
| - 11 | C-1-1 | Weathered Quaternary sediment Rock | Desa Mangga Dua Atás | 2 m |
| | C-1-2 | Weathered Quaternary sediment Rock | Desa Mangga Dua Atas | 2 m |
| Core | C-2 | Weathered Granite | Desa Mahia | 4 m |
| Material | C-3 | Weathered Ultra Basic Rock | Puskesmas Urumesing | 4 m |
| | C-4 | Weathered Ultra Basic Rock | Batu Gajah | 0.5 m |
| | C-5 | Weathered Ultra Basic Rock | Desa Batu Gajah Kayu putih | 0.5 m |

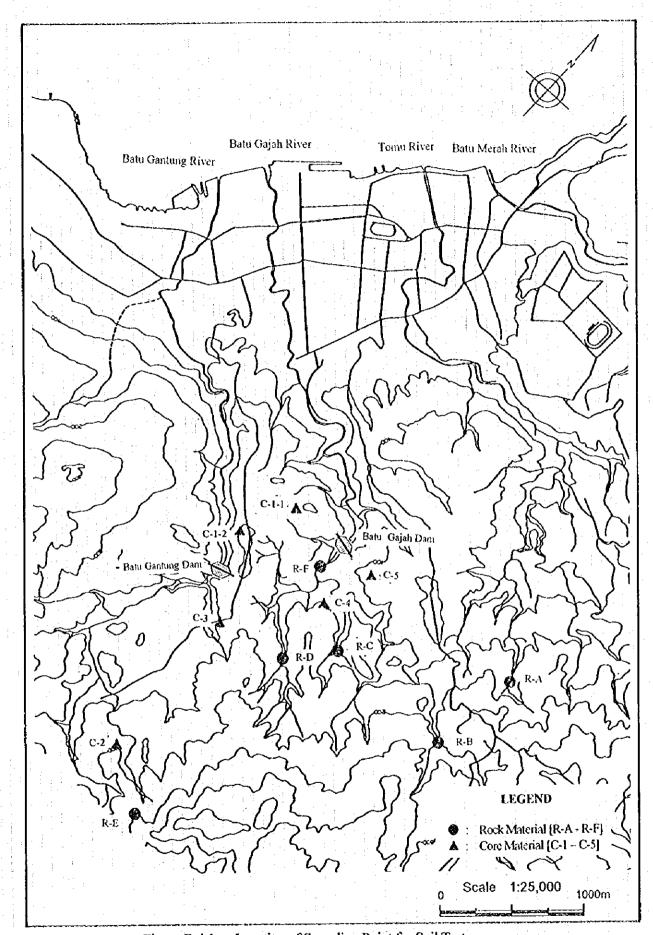


Figure-B.4.1 Location of Sampling Point for Soil Test

4.3.3 Results of Soil Tests

(1) Core Material

Test results for Core Material are indicated in Table-B.4.6. Specific gravity of all sampling is higher than 2.7 and excellent. Natural water contents are mostly between 10-30% with exception of C4 that is very high, 65%. C4 may have been caused by shallow sampling (0.5m) that must have been much weathered. In terms of Atterberg limits, index of plasticity is mostly 10-20 %. However, C4 is 50 % and excellent high, C2 is non-plastic. Grain size distribution consists of mainly silt or sand, secondly clay and there is little gravel. This main reason is that sampling was performed at shallow location. In terms of fine degree that should affect to permeability, clay consists of more than 10 %, fine degree under 0.074 mm consists of more than 40 % with exception of C2.

(2) Rock Material

Test results for rock material is shown in Table-B.4.5. Specific gravity is higher than 2.6 and absorption is generally less than 1.0 %. Therefore it is clear that so far as these samples own is concerned, these have excellent quality.

Table-B.4.5 Results of Soil Tests [Rock Material]

| Sampling | Sample | | Specific Gravity | | Absorption |
|----------|---------|----------|------------------|--------|------------|
| Location | No. | Apparent | Bulk | SSD | (%) |
| RA | 1 | 2.71 | 2.66 | 2.68 | 0.69 |
| | 2 | 2.71 | 2.66 | 2.67 | 0.69 |
| | Average | 2.71 | 2.66 | 2.68 | 0.69 |
| RB | l | 2.71 | 2.66 | 2.68 | 0.73 |
| | 2 | 2.71 | 2.66 | 2.68 | 0.73 |
| | Average | 2.71 | 2.66 | 2.68 | 0.73 |
| RC | 1 | 2.72 | 2.66 | 2.68 | 0.81 |
| ' | 2 | 2.72 | 2.66 | 2.69 | 0.82 |
| | Average | 2.72 | 2.66 | 2.69 | 0.82 |
| RD | 1 | 2,65 | 2.38 | 2.48 | 0.42 |
| | 2 | 2.65 | 2.38 | , 2.47 | 0.41 |
| | Average | 2.65 | 2.38 | 2.48 | 0.42 |
| RE | 1 | 2.61 | 2.54 | 2.57 | 1.05 |
| ì | 2 | 2.62 | 2.55 | 2.58 | 1.05 |
| L | Average | 2.62 | 2.55 | 2.58 | 1.05 |
| RF | 1 | 2.76 | 2.71 | 2.73 | 0.69 |
| } | 2 | 2.76 | 2.71 | 2.73 | 0.68 |
| | Average | 2.76 | 2.71 | 2.73 | 0.69 |

Note: SSD ... Saturated Surface Dry

| | Soil | Classification | | E | } | | | SC | ; ; ; | | | NS | | | 2 | MH | | | | NGE. | · | | | M | } | | |
|---------------------------------------|---------------------|--------------------|---------|------|------|------|---------|-------|-------------|------|---------|-------------|-------------|-------------|-------------|------|----------|------|---------|-----------------|-------|-------|---------|------|------|------|---------|
| | | Under | 0.074mm | 86 | | | | 45 | | | | 24 | | : | | 69 | . | | | 89 | | | | 50 | | | |
| | nalvsis | Clav | 8 | \$ | | | | 1.1 | | | | 7 | -1- | | | 33 | 1 | | | 23 | | | | 91 | | | |
| riall | Grain Size Analysis | Silt | 8 | 95 | | • | | 31 | | | | 17 | -: | | | 37 | | ş* | | 3 | | | | 4 | | | |
| re Mate | S | Sand | · % | 7. | | | | 22 | | | | 9/ | | : | 1 6 | 27 | | | | 31 | | | | 47 | | | |
| ests (Co | | Gravel | જ | 0 | | : | | | : | | | 0 | | | | n | | | | | • • | | | 8 | · | · . | |
| f Soil Te | ts | I _b (%) | | 24.6 | 25.1 | 25.0 | 24.9 | 12.7 | 12.9 | 11.6 | 12.4 | | | | | 12.4 | 12.7 | 12.0 | 12.4 | 47.6 | 52.4 | 1.67 | 49.7 | 11.3 | 13.1 | 12.1 | 12.2 |
| Results of Soil Tests [Core Material] | Afterberg Limits | W, (%) | | 29.7 | 29.1 | 28.5 | 29.1 | 24.0 | 23.6 | 23.1 | 23.6 | Non Plastic | Non Plastic | Non Plastic | Non Plastic | 43.0 | 41.8 | 42.8 | 42.5 | 68.4 | 68.1 | 68.1 | 68.2 | 30.2 | 30.2 | 29.9 | 30.1 |
| | Afte | W _L (%) | | 54.3 | 54.3 | 53.5 | 54.4 | 36.7 | 36.5 | 34.7 | 36.0 | Z | Z | Z | Z | 55.5 | 54.5 | 54.8 | 54.9 | 116.0 | 120.5 | 117.2 | 117.9 | 41.5 | 45.3 | 12.0 | 42.3 |
| Table-B.4.6 | Water | Contents | Wn (%) | 26.2 | 25.0 | 25.7 | 25.6 | 21.4 | 21.1 | 21.0 | 21.2 | 13.1 | 13.0 | 12.7 | 12.9 | 34.9 | 35.2 | 35.5 | 35.2 | 65.2 | 65.1 | 65.8 | 65.4 | 26.4 | 26.3 | 25.7 | 26.1 |
| | Specific | Gravity | દુ | 2.83 | 2.83 | 2.84 | 2.84 | 2.79 | 2.78 | 2.79 | 2.79 | 2.70 | 2.69 | 2.71 | 2.70 | 2.86 | 2.85 | 2.86 | 2.86 | 2.97 | 2.97 | 2.96 | 2.97 | 2.83 | 2.83 | 2.82 | 2.83 |
| | Sample | No. | | e-il | 2 | 3 | Average | 1 | 2 | 3 | Average | 1 | 2 | ťΩ | Average | - | 2 | Û | Average | - -1 | 2 | | Average | 4 | 2 | en | Average |
| | Sampling | Location | | C1.1 | | | | C.1.2 | | | | | | | | ິບ | | | | | | | | C.S | | | |

4,4 Embankment Material Potential

Potential for embankment material is studied through laboratory test results and is given as follows.

(a) Core Material

Results for core material are shown in Table-B.4.7 and Figure-B.4.2. In this table and figure, the suitable condition for embankment material and examples in previous works are indicated, too. C.2 is unsuitable because there is little clay and non-plasticity in C.2. C.1.2 is most suitable because this soil classification belongs to SC that can be generally recommended as core material and this indicates actually high quality results. The remaining (C.1.1, C.3, C.4, C.5) may be expected to be excellent for non-permeability because these contain much fine degree material (clay and sand). However, these may have some problems with deformation and constructability, because these have little coarse degree material (sand and gravel, especially gravel). All material sampling was performed at 2-4m depth which is very weathered. The above may be caused by this condition. From this point of view, it is likely that the sample from deeper location may contain coarse material more than the results above. Therefore it is decided that 5 locations with exception of C.2 should be set as candidates for core material quarries. It is recommended to study quarry quantity and physical characteristics (non-permeability, strength and compaction) through boring, trench and physical prospecting, etc.

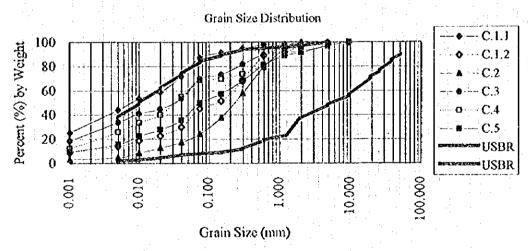


Figure-B.4.2 Grain Size Distribution [Core material]

(b) Rock Material

Results for rock material are shown in Table-B.4.8. All sampling locations can be expected to be suitable as rock material quarries, because rock piece samples at all locations indicate high quality. Therefore it is concluded that all 6 locations should be set as candidates for rock material quarries. It is recommended to study quarry quantity and physical characteristics (strength, compaction, draining, and endurance) through boring, trench and physical prospecting, etc.

| | | | 1able-B.4.7 | 7 | Core Mat | ena | Core Material Potential by Laboratory Test Result | تقدر و | oratory 10 | est Ke | sult | | |
|--------------------------------------|-----------|---|-------------|----|-------------------|-----|---|--------|------------|--------|-------------------------------------|----------|-------------------------|
| Sample No. | C.1.1 | | C.1.2 | 14 | C.2 | | C3 | | C.4 | | C.S | . 14 | Suitable Condition |
| Soil Classification | H | ◁ | SC | 0 | SM | ⊲ | MH | 4 | HIM | ⊲ | ML | √ | |
| Ratio Clay | 40 | 0 | 14 | 0 | 7. | 0 | 33 | 0 | 23 | 0 | 16 | : O | Over 5% |
| Clay + | 98 | ◁ | 45 | 4 | 24 | 0 | 70 | 4 | 89 | ۵ | 90 | ◁ | 10-20% |
| Gravel | 0 | ◁ | ~ | < | 0 | ◁ | 3 | ∇ | 1 | ◁ | 3 | ∇ | △ Previous Works: 5-60% |
| Natural Water Contents (%) | 26 | 0 | 21 | 0 | 13 | 0 | 35 | 0 | \$9 | ◁ | 26 | Ο, | Previous Works: 10-40% |
| Index of Plasticity I.P. (%) | 25 | 0 | 12 | 0 | | × | 12 | 0 | 90 | 0 | 71 | 0,5 | Over 10% |
| Imperviousness [Non-permeability] | Suitable | 0 | Suitable | 0 | Suitable | 0 | Suitable | O | Suitable | 0 | Suitable | Ó | |
| Plasticity | Suitable | 0 | Suitable | 0 | Non- available | × | Suitable | 0 | Surtable | 0 | Suitable | 0 | |
| Aspect of Construction | Available | ◁ | Suitable | 0 | Switzble | 0 | Available | ◁ | Available | ٥ | Available | 4 | |
| Potential | Available | ⊲ | Suitable | 0 | Not Available | × | Available | ⊲ | Available | 7 | Available \(\triangle \) Available | ◁ | |

| | | | Table-E.4 | 8 | Rock Mai | terial | S Rock Material Potential by Laboratory Test Result | V = 2 | oratory I | est Ke | suit | | | |
|----------------------------------|----------|---|----------------|---|----------------|----------------|---|-------|-----------|--------|--|----|--------------------|----------|
| Sample No. | RA | | R.B | | RC | | ያ የ | | R.E | * : | RF | | Suitable Condition | dition |
| Rock Description | Grante | 0 | Ultra Basic | 0 | Ultra Basic | O ¹ | Ultra Basic | O | Gramite | 0 | O Ultra O Granite O Granite O Basic | Ο. | | |
| Specific Gravity Gs: Apparent | 2.71 | O | 2.71 | 0 | 2.72 | 0 | 2.65 | 0 | 2.62 | 0 | 2.72 O 2.65 O 2.62 O 2.76 O | O | Over 2.5 | S |
| Absorption (%) | 0.7 | 0 | 0.7 | 0 | 0.8 | 0 | 0.8 0.4 | 0 | 0 1.1 0 | 0 | 0 2.0 | 0 | Under 3 % | % |
| Potentiai | Suitable | 0 | Suitable | 0 | Suitable | 0 | Suitable | 0 | Suitable | 0 | Suitable O Suitable O Suitable O | 0 | | |

CHAPTER 5 STANDARD PENETRATION TESTS FOR RIVER COURSE

The purpose of the standard penetration test(S.P.T) along the river course of five rivers is to understand the foundation condition necessary for design of river improvement and renewal bridges. This consists of boring investigation at 12 locations (10m depth at each location) and standard penetration test of total 120 times (10 times at each location). Figure-B.5.2 indicates locations where boring and S.P.T were performed. Test results of S.P.T. are shown in Table-B.5.1 and Figure-B.5.1. Most of them indicate that foundation is loose sand and silt. Base rock is confirmed at the location near the hill side of Batu Gantung (SGT-3). N Values of the foundation in shallow depth(0-5 m) are approximately 10 and less than 20 and not so steady.

Table-B.5.1 Latest Results of River Course Investigation

| <u> </u> | abie- | D.5.1 | Lat | est R | esunts o | IKI | er Cou | rse li | ivesuga | HOH | | 4 |
|----------|--------|-------|-------|-------|----------|--------|--------|--------|----------|-------|--------|-----|
| River | | Ru | hu | | | Batu l | Merah | | Ton | | mu | |
| Location | SRH | 1 | SRH | 2 | SBM | -1 | SBM | -2 | STM | - l | STM | -2 |
| Depth | Class | N | CL | N | CL | N | CL | N | CL | N | CŁ | N |
| 1 | Sand | 3 | Sand | 24 | Sand | 2 | Sand | 9 | Sand | 14 | Gravel | -11 |
| 2 | Gravel | 5 | Sand | 8 | Sand | 5 | Sand | - 5 | Sand | 10 | Gravel | 7 |
| . 3 | Gravel | 8 | Sand | 10 | Sand | 9 | Sand | 5 | Sand | 11 | Sand | -9 |
| 4 | Gravel | 19 | Sand | 10 | Sand | 46 | Sand | 7 | Sand | 6 | Sand | 14 |
| 5 | Gravel | 30 | Sand | 16 | Sand | 64 | Sand | 10 | Sand | 15 | Sand | 17 |
| 6 | Sand | 19 | Sand | 18 | Sand | .70 | Sand | 7 | Sand | 7 | Sand | 16 |
| 7 | Sand | 20 | Sand | 16 | Silt | 39 | Sand | 9 | Sand | 13 | Sand | 12 |
| 8 | Sand | 24 | Sand | 27 | Silt | 44 | Sand | 25 | Sand | 11 | Sand | 16 |
| 9 | Sand | 27 | Sand | 29 | Silt | 42 | Sand | 24 | Sand | 16 | Sand | 17 |
| 10 | Sand | 29 | Sand | 30 | Silt | 42 | Sand | 33 | Sand | 16 | Sand | 19 |
| 11 | | | | | | | | 1 / | | | Sand | 20 |
| River | Tonu | u | | Batu | Gajah | | | | Batu Gar | itung | | |
| Location | STM | -3 | SGJ- | 1 | SGJ- | 2 | SGT-1 | *1) | SGT- | 2 | SGT | 3 |
| Depth | Class | N | Class | N | Class | N | Class | N | Class | N | Class | N |
| 1 | Sand | 14 | Sand | 18 | Gravel | 50 | Sand | 5 | Sand | 15 | Sand | 24 |
| 2 | Sand | 10 | Sand | 23 | Sand | 9 | Sand | 7 | Sand | 3 | Sand | 75 |
| 3 | Sand | 11 | Sand | 6 | Sand | 10 | Sand | 9 | Sand | 15 | Sand | 14 |
| 4 | Sand | 6 | Sand | 9 | Sand | 11 | Sand | 12 | Sand | 14 | Sand | 5.5 |
| 5 | Sand | 15 | Sand | 10 | Sand | 27 | Sand | 14 | Sand | 27 | Sand | 67 |
| 6 | Sand | 7 | Sand | 16 | Sand | 23 | Sand | .15 | Sand | 29 | Sand | 50 |
| 7 | Sand | 13 | Sand | 22 | Sand | 5 | Sand | 10 | Sand | 13 | Rock | 50 |
| 8 | Sand | 11 | Sand | 27 | Sand | 13 | Sand | 12 | Sand | 35 | Rock | 50 |
| 9 | Sand | 16 | Sand | 33 | Sand | 20 | Sand | -13 | Sand | 33 | | |
| 10 | Sand | 16 | Sand | 28 | Rock | 59 | Sand | 14 | Sand | 28 | | |
| 11 | Sand | 18 | | | | | | | | | | |

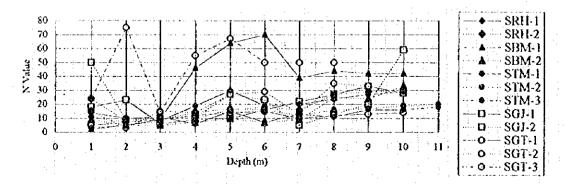
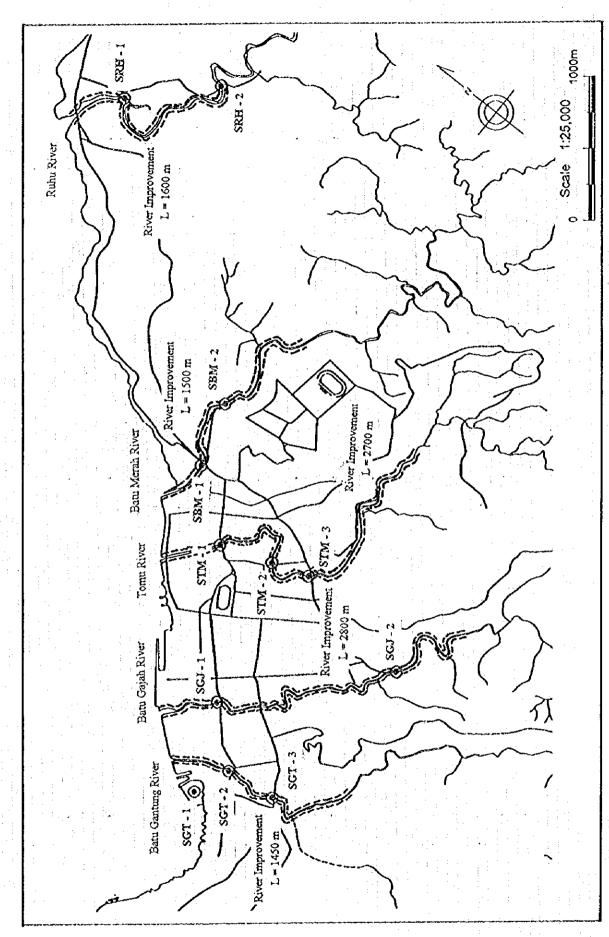


Figure-B.5.1 N Value along River Course



B - 23

CHAPTER6 RIVERBED MATERIAL AND SEDIMENT LOAD

6.1 Field Survey

The survey of river bed material was carried out under sub-contract to the JICA Study Team. Field work was completed during December 1996 and river bed material was sampled using a bed grab sampler at six locations on each of the five rivers in the Ambon target area. Two samples were taken at each location and the sampling locations are indicated on the map in Figure-B.6.1. The samples were sealed in plastic bags and transported to the laboratory for analysis.

The sediment transport survey was undertaken at the same time as the survey of river bed material. Samples of suspended sediment load and bed load were taken at three locations on each of the five rivers in the Ambon target area. The sampling locations in Ambon city coincided with those of the water quality survey. River discharge was measured using a current meter at the same time as the sediment sampling. Sediment sampling was completed during December 1996 and the sampling locations are indicated on the map shown in Figure-B.6.1.

6.2 Results of River Bed Material Survey

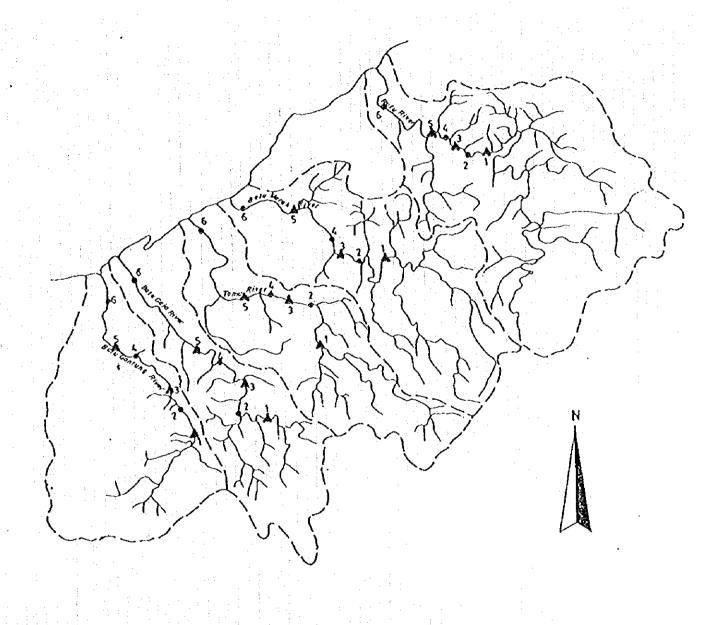
Particle size analysis and specific gravity analysis were undertaken in the laboratory and the results, including specific gravity, classification, grain size and uniformity coefficient C_u, are presented in Table-B.6.1. Summary grain size analysis curves for each of the five rivers are shown in Figure-B.6.2.

6.3 Results of Sediment Load Survey

Suspended sediment sampling was carried by means of the Point Integrated Method using a US-P.61 water sampler. Water samples were taken at a known point depth equivalent to 80% of the maximum river stream depth. Between 300 and 450 cc of water containing suspended sediment was sampled at each location. The sample bottles were then sealed and sent to the laboratory for analysis of suspended sediment concentration.

Bed load sampling was carried out by means of a Pan Sampler. The pan sampler was laid on the bed of the river at the stream center and water containing bed sediment allowed to flow over the fine gauze. Sampling continued for approximately 30 minutes and the accumulated material was removed from the fine gauze and sealed in plastic bags before being sent to the laboratory for analysis. River discharge was measured using a current meter while the bed load samples were collected.

The sediment samples were analyzed in the laboratory and the results, including specific gravity, particle size and sediment concentration, were presented in the Final Report submitted at the beginning of February 1997. The results of the suspended sediment analysis are given in Table-B.6.2 and the results of the bed load sediment analysis are given in Table-B.6.3. As the sampling was carried out during the dry season in Ambon, when river discharge is low, the observed concentrations of suspended sediment were also low. The range of values was typically between 5 and 10 mg/l, at least an order of magnitude lower than expected. Sampling should be repeated during the rainy season when river flows are higher.



Legend:

- Sediment Load Samples (incl. Bed Material Sample) Bed Material Sample only

Sampling Locations for River Bed Material and Sediment Load Surveys (Ambon Area) Figure-B.6.1

Table-B.6.1 River Bed Material Survey - Grain Size Analysis

| 1 | River | Sample | Specific | | assification | | · | rain Size Ar | |
|---|--|------------|-----------------------------|--------------|--------------|--|-------------|----------------------|--------------------|
| | Kitti | No. | Gravity (t/m ³) | Gravel | Sand | Silt / Clay | ่ d∞ (กษา) | d _{io} (mm) | $C_0 = d_0/d_{10}$ |
| | | NO. | | | | Sin / Ciay | | | |
| | Ruhu | IA. | 2.57 | 55.6 | 44.1 | 0,3 | 9.6 | 0.6 | 16.0 |
| ı | | 1B | 2.65 | 65.3 | 34.7 | 0.0 | 5.4 | 0.5 | 10.8 |
| | | 2A | 2.61 | 21.1 | 78.2 | 0.7 | 1.8 | 0.3 | 6.3 |
| | | 2B | 2.59 | 33.4 | 65.7 | 0.9 | 3.4 | 0.4 | 8.4 |
| 1 | | 3A 3B | 2.55 2.55 | 45.7 15.2 | 53.8 84.4 | 0.5 0.3 | 5.7 1.8 | 0.4 0.3 | 13.5 5.4 |
| 1 | | 4A | 2.55 | 35.2 | 64.5 | 0.2 | 3.5 | 0.5 | 6.8 |
| 1 | | 4B | 2.66 2.57 | 42.7 | 56.8 | 0.4 | 5.4 | 0.4 | 12.8 |
| | | 5A | 2.57 | 44.6 | 50.0 | 5,5 | 6.1 | 0.1 | 59.3 |
| | | 5B | 2.59 | 42.7 | 56.6 | 0.7 | 5.6 | 0.4 | 15.2 |
| 1 | | 6A | 2.49 | 60.0 | 39.8 | 0.3 | 90 | 0.6 | 15.2 |
| 1 | | 6B | 2.62 | 61.8 | 38.2 | 0.0 | 11.9 | 0.7 | 16.8 |
| - | Batu Merah | -1A | 2.58 | 23.6 | 75.9 | 0.4 | 2.7 | 0.4 | 6.7 |
| 1 | | <u>1B</u> | 2.50 | 50.5 | 49.2 | 0.3 | 8.9 | 0.5 | 17.4 |
| | | 2A 2B | 2.55 2.57 | 48.4 23.6 | 51.4 76.0 | 0.3 0.4 | 67 25 | 0.6 0.4 | 10.4 5.9 |
| ٠ | | 3A | 2.58 | 41,1 | 55.2 | 0.8 | 57 | 0.5 | 12.5 |
| | t L | 3B | 2.47 | 55.7 | 55.2 44.1 | 0.3 | 6.9 | 1.2 | 6.0 |
| | | 4A | 2.58 | 53.4 | 46.2 | 0.4 | 9.8 | 0.6 | 16.6 10.7 |
| | | 4B | 2.58 | 46.6 | 53.0 | 0.4 | 6.3 | 0.6 | 10.7 |
| | | 5A | 2.44 | 92.7 | 7.3 | 0.1 | 17.3 | 5.9 5.4 | 3.0 |
| | | 5B | 2.58 | 92.6 | 7.3 | 0.1 | 16.3 | 3.4 | 3.0 |
| | | 6A 6B | 2.09 2.08 | 37.8 37.4 | 61.4 62.0 | 0.8 0.6 | 4.3 4.3 | 0.3 0.3 | 14.0 14.0 |
| | Tomu | 1A | 2.62 | 2.4 | 97.3 | 0.3 | 1.1 | 0.3 | 3.1 |
| | Kana | 1B | 2.61 | 26 | 97.1 | 0.3 | 1.1 | 0.3 | 3.2 |
| | | 2A | 2.64 | 70 | 92.8 | 0.2 | 1.1 | 0.5 | 2.8 |
| : | | 2B | 2.61 | 8.2 | 91.4 | $0.\overline{4}$ | i.i | 0.5 | 3.0 |
| | | 3A | 2.59 | 39.1 | 90.4 | 0.5 | 4.6 | 0.3 | 13.4 |
| 1 | i i | 3B | 2.63 | 37.0 | 62,6 | 0.4 | 4.1 | 0.4 | 10.0 |
| | | 4A 4B | 2,59 2,67 | 52.7 81.6 | 47.0 18.1 | 0.4 0.3 | 7.3 21.2 | 0,6 2,1 | 12.3 10.0 |
| 1 | | 5A | 2.55 | 39.3 | 59,9 | 0.8 | 4.2 | 0.3 | 14.1 |
| 1 | * | 5B | 2.51 | 16.8 | 81.2 | $\begin{bmatrix} 2.1 \\ 2.1 \end{bmatrix}$ | 1.0 | 0.2 | 6.5 |
| | : | 6A | 2.58 | 7.2 | 91.2 | 1.6 | 0.7 | 02 | 3.5 |
| ı | | 6 <u>B</u> | 2.62 | 25.4 | 74.2 | 0.4 | 1.8 | 0.3 | 5.8 |
| | Batu Gajah | 1A | 2.60 | 30.1 | 69.5 | 0.4 | 3.1 | 0.4 | 8.2 |
| 1 | • | <u>1B</u> | 2.60 | 114 | 88.1 | 0.5 | 1.4 | 0.3 | 5.1 |
| | - | 2A | 2.62 | 16.4 | 82.6 | 1.1 | 1.3 | 0.3 | 4.9 |
| I | | 2B | 2.61 2.66 | 10.7 | 88.5 55.1 | 0.8 0.4 | 1.3 | 0.3 | 5.0 |
| | | 3A 3B | 2.66 | 44.5 36.4 | 62.9 | 0.7 | 5.9 3.1 | 0.5 0.3 | 12.9 12.1 |
| | | 4A | 2.57 | 34,3 | 61.9 | 0.9 | | 0.2 | 15.2 |
| | | 4B | 2.63 | 36.5 | 63.2 | 0.4 | 3.6 3.9 | 0.4 | 11.2 |
| | | 5A | 2.58 | 46.4 | 53.0 | 0.6 | 6.2 | 0.6 | 11.0 |
| | | 5B | 2.62 | 55.4 37.0 | 44.3 | 0.3 | 8.2 | 03 | 27.5 |
| | | 6A 6B | 2,56 2,51 | 37.0 26.6 | 62.6 73.0 | 0.4 0.5 | 3.9 18.4 | 0.3 0.3 | 14.5 6.4 |
| ١ | Batu Cantung | 1A | 2.55 | 58.4 | 41.0 | 0.6 | 9.3 | 0.5 | 19.0 |
| | DARG CORRUING | IB | 261 | 63.3 | 36.3 | 0.4 | 11.1 | 0.5 | 18.8 |
| | : | 2A | 2.51 | 43.1 | 56.5 | 0.4 | 6.4 | 0.4 | 15.9 |
| ļ | | 2B | 2.5i | 46.7 | 52.9 | 0.4 | 6.9 | 0.4 | 19.7 |
| - | | 3A | 2.59 | 57.5 | 42.2 | 0.3 | 8.5 | 0.6 | 14.0 |
| | | 3B | 2.62 | 58.6 | 41.0 | 0.5 | 8.1 | 0,6 | 14.6 |
| | | 4A | 2.55 | 12.2 | 87.4 | 0.4 | 1.9 | 0.5 | 3.7 |
| ļ | | 4B 5A | 2.58 2.61 | 13.5 37.6 | 86.1 61.1 | 1.3 | 1.9 4.2 | 0.5 | 3.8 |
| - | | 5B | 2.56 | 37.4 | 62.1 | 0.6 | 4.1 | 0.4 | 14.5 9.3 |
| | | 6A . | 2.62 | 54.1 | 45.3 | 0.6 | 8.0 | 0.5 | 15.3 |
| l | | 6B | 2.61 | 14.4 | 85.4 | 0.3 | 1.9 | 0.6 | 3.4 |
| | and the second s | | | | | | | | |

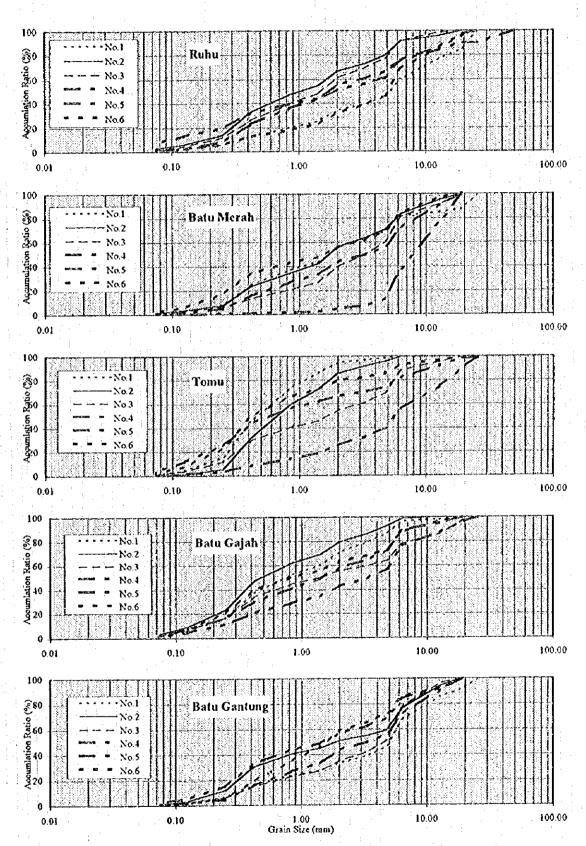


Figure-B.6.2 River Bed Material Survey - Grain Size Analysis

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Table-B.6.2 Results of Suspended Sediment Analysis

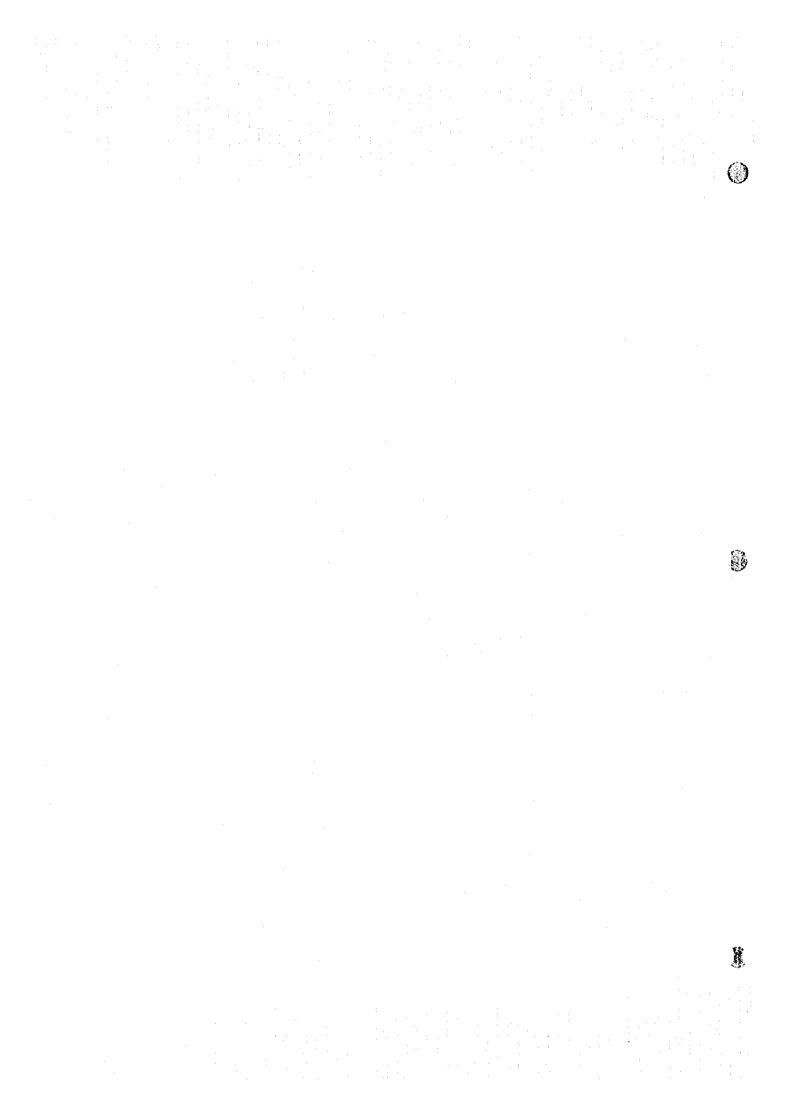
| | [| | | Van Princip | Volume of | Weight of | Sediment |
|------------|-----|--------------|----------|-------------|-----------|-----------|---------------|
| River | Sa. | mpling Point | Date of | Time of | Water | Sediment | Concentration |
| ٠ | No. | Location | Sampling | Sampling | - (ભી) | (St) | (mg/l) |
| Ruhu | 1 | | 11/12/96 | 10:45 | 475 | 0.0024 | 5.1 |
| 4 | 3 | ; | 09/12/96 | 14:53 | 405 | 0.0024 | 5.9 |
| - : | 5 | Staff Gauge | 09/12/96 | 12:25 | 405 | 0.0024 | 5.9 |
| Bt Merah | 1 | | 10/12/96 | 09:30 | 350 | 0.0026 | 7.4 |
| | 3 | · , | 10/12/96 | 10.45 | 358 | 0.0032 | 8.9 |
| | 5 | Bridge | 10/12/96 | 11:30 | 475 | 0.0030 | 6.3 |
| Tomu | 1 | | 12/12/96 | 16:00 | 390 | 0.0014 | 3.6 |
| | 3 | : ` | 12/12/96 | 16:45 | 310 | 0.0028 | 9.0 |
| | 5 | Staff Gauge | 12/12/96 | 09.52 | 295 | 0.0022 | 7.5 |
| Bt Gajah | 1 | | 11/12/96 | 14:37 | 350 | 0.0019 | 5.4 |
| | 3 ; | | 11/32/96 | 09:05 | 475 | 0.0024 | 5.1 |
| | 5 | | 10/12/96 | 15:27 | 410 | 0.0018 | 4.4 |
| Bt Gantung | 1 | ** | 08/12/96 | 09.15 | 205 | 0.0016 | 7.8 |
| | 3 | 1 | 08/12/96 | 10:30 | 375 | 0.0020 | 5.3 |

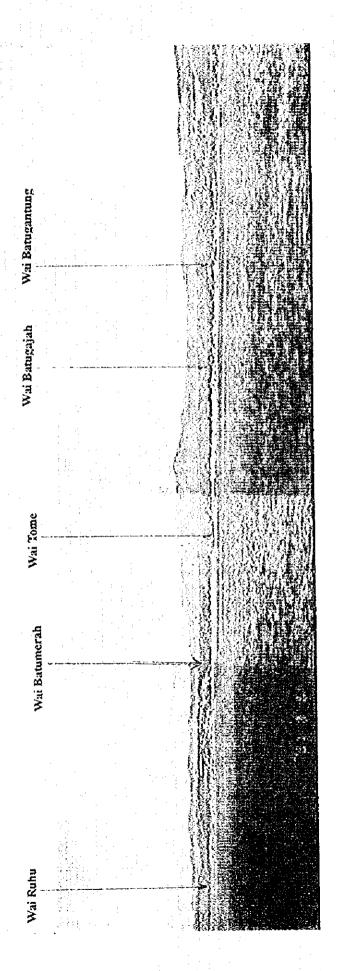
Table-B.6.3 Results of Bed Load Sediment Analysis

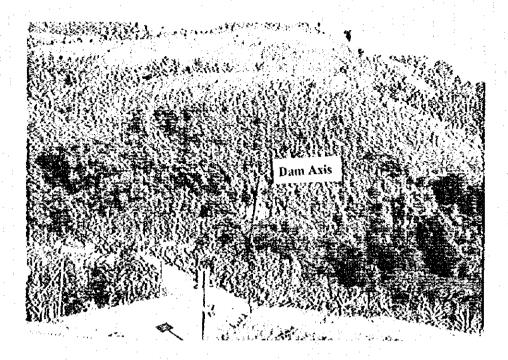
| and the second second | | E (UIC-DIO) | | uits of Dea Y | | | | | |
|-----------------------|-----|--------------|---------------------------------------|---------------|----------|---------|--------|------------|---------|
| | | | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | Specific | Weight | Grai | n Size Ana | lysis . |
| | San | opling Point | Date | Time of | Gravity | of Soil | Gravel | Sand | Silt & |
| River | No. | Location | | Survey | (t/m3) | (gr) | % | % | Clay |
| Ruhu | 1 | 4 | 09/12/96 | 14:50 - 15:25 | 1.66 | 0.35 | • | 91,4 | 8.6 |
| 1 | 3 | 1 | 11/12/96 | 12:45 - 13:05 | 2.37 | 0.19 | • | 86.3 | 13.7 |
| | 5 | Staff Gauge | 09/12/96 | 12:45 - 12:55 | 0.92 | 0.11 | - | 90.5 | 9.5 |
| Bt Merah | 1 | | 10/12/96 | 09:15 - 09:55 | 2.44 | 0.22 | | 91.2 | 8.8 |
| | 3 | | 10/12/96 | 11:00 - 11:35 | 2.08 | 4.19 | • | 33.1 | 66.9 |
| | - 5 | Bridge | 10/12/96 | 10:27 - 10:55 | 2.26 | 1.61 | · - | 47.3 | 52.8 |
| Tomu | 1 | | 12/12/96 | 15:30 - 15:50 | 1.80 | 1.46 | | 70.3 | 29.7 |
| | - 3 | | 12/12/96 | 16:40 - 17:05 | 1.92 | 0.96 | | 81.2 | 18.8 |
| | . 5 | Staff Gauge | 12/12/96 | 09:30 - 10:00 | 2.10 | 2.12 | _ | 76.5 | 23.5 |
| Bt Gajah | ī | | 10/12/96 | 15:10 - 15:45 | 1.44 | 0.26 | - ,- | 90.2 | 9.8 |
| | 3 | | 11/12/96 | 08:40 - 09:00 | 1.40 | 0.14 | - | 94.1 | 5.9 |
| | 5 | | 11/12/96 | 14:00 - 14:30 | 1.61 | 0.37 | _ | 92.6 | 7.4 |
| Bt Gantung | 1 | | 03/12/96 | 09:15 - 09:45 | 2.13 | 0.62 | - | 45.2 | 81.5 |
| | 3 | | 08/12/96 | 10:15 - 10:45 | 2.72 | 1.20 | | 70.8 | 29.2 |

APPENDIX 1

Photograph of Candidate Dam Sites



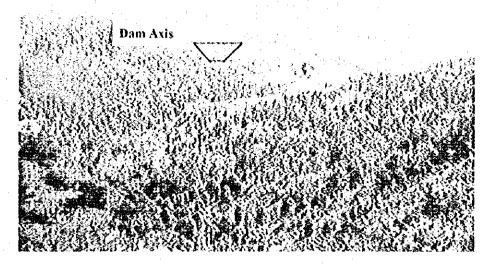




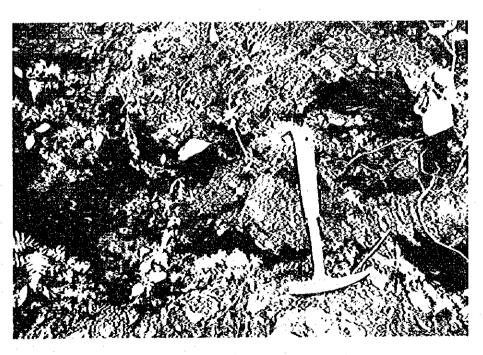
Ph-2 Batugajah Dam Site from Right Bank



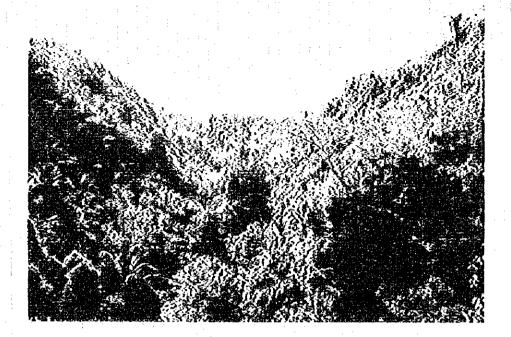
Ph-3 River Bed of Batugajah Dam Site from Downstream



Ph-4 Batugantung Dam Site



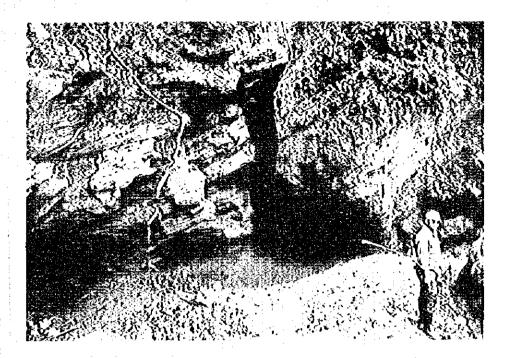
Ph-5 Kanikeh Formation at the River Bed (Sandstone and Shale)



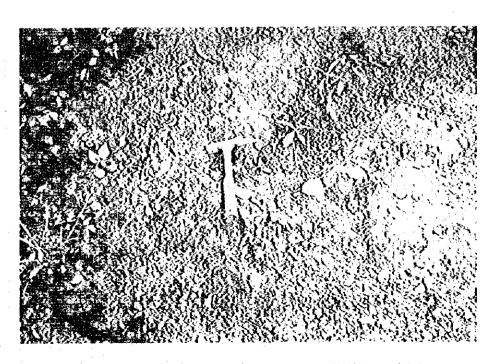
Ph-6 Ruhu Dam Site



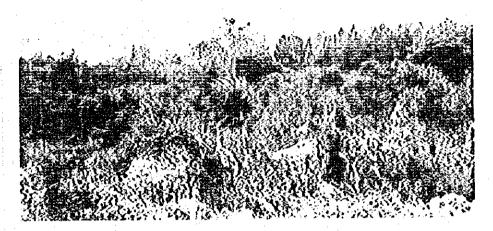
Ph-7 River Bed of Ruhu Dam Site



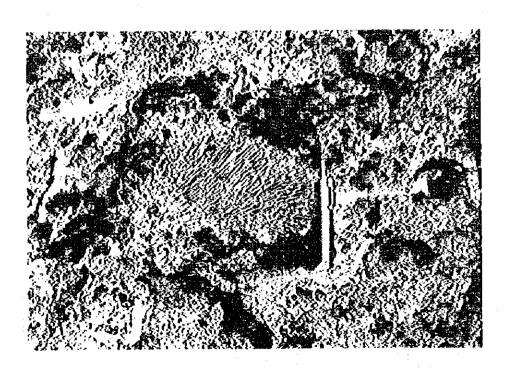
Ph-8 Coral Limestone in the Reservoir of the Batugantung Dam



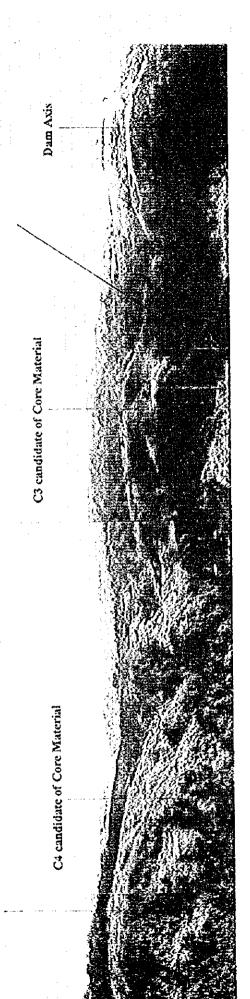
Ph-9 Kanikeh Formation at the Right Bank of the Batogajah Dam



Ph-10 Coral Limestone Plateau near Gunung Nona



Ph-11 Fossil in the Coral Limestone

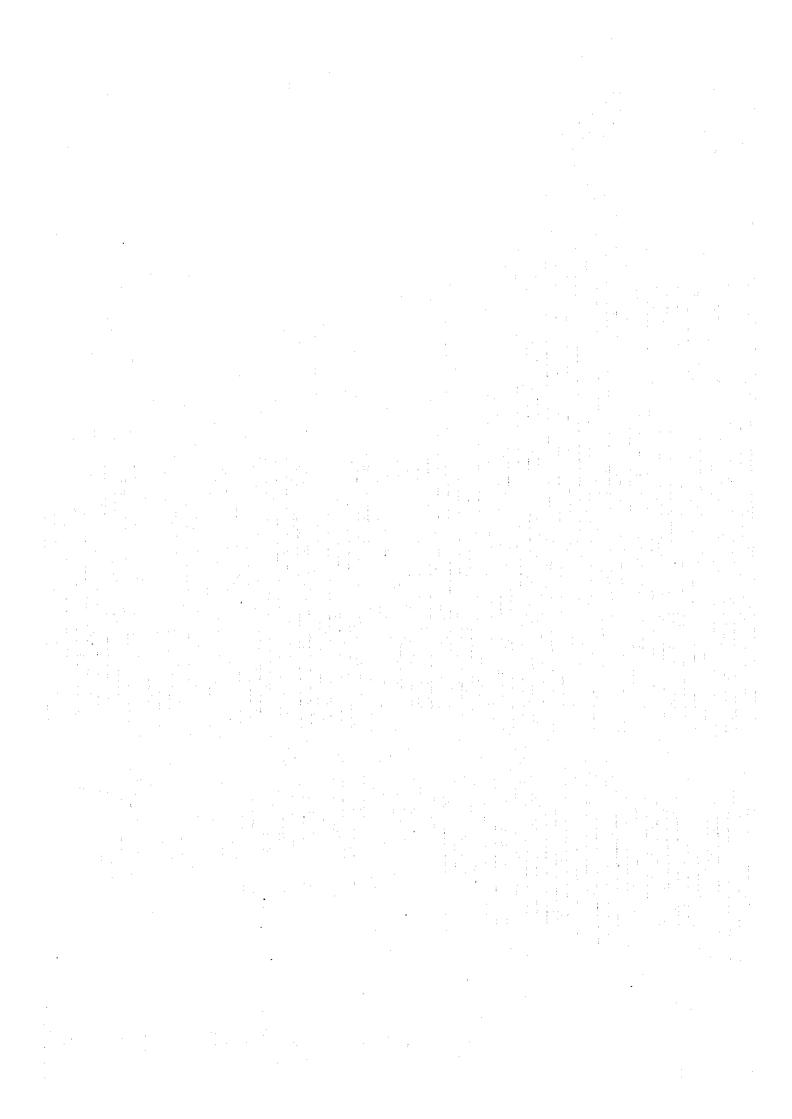


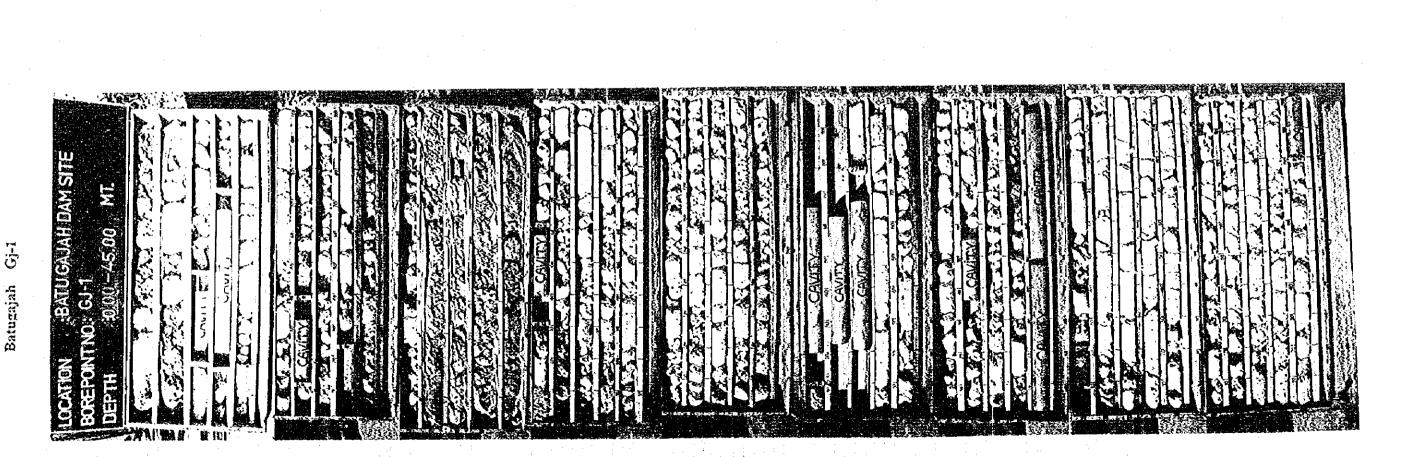
RC candidate of Rock Material

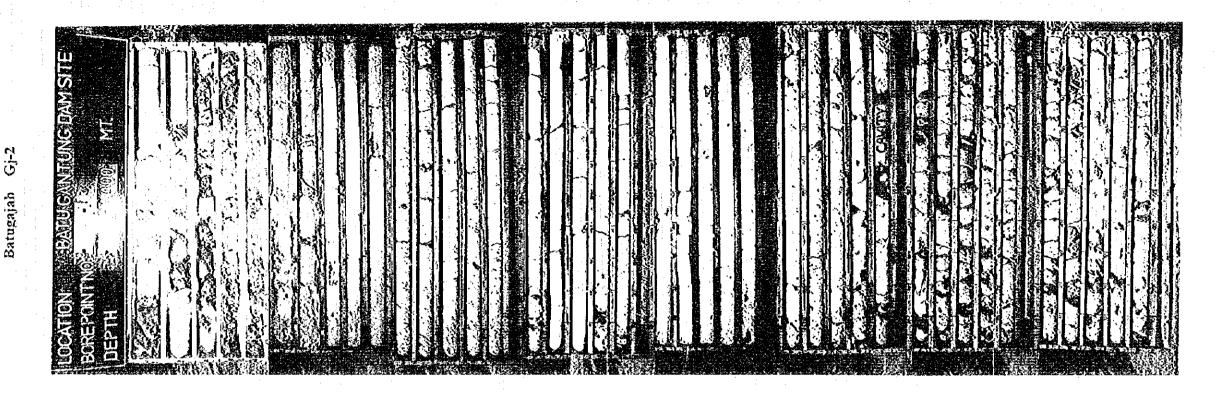
(1)

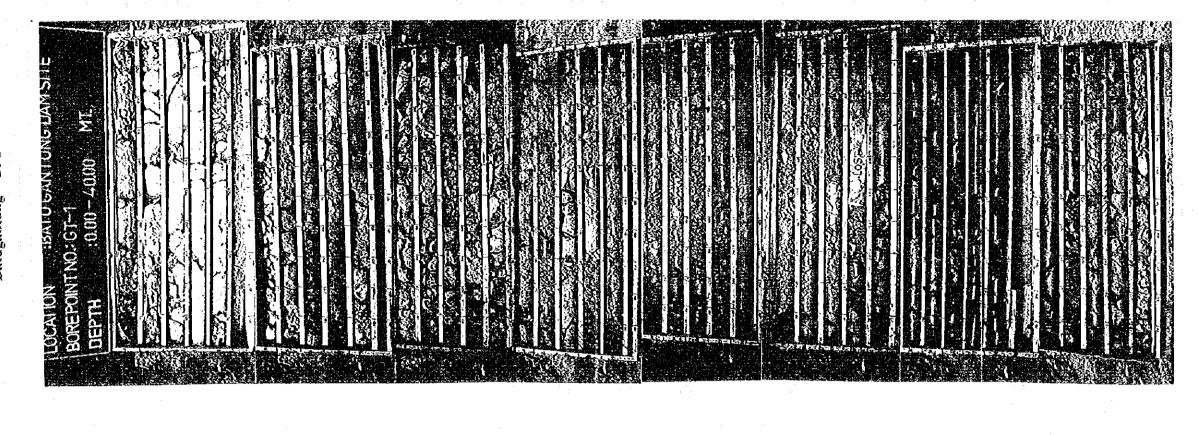
APPENDIX 2

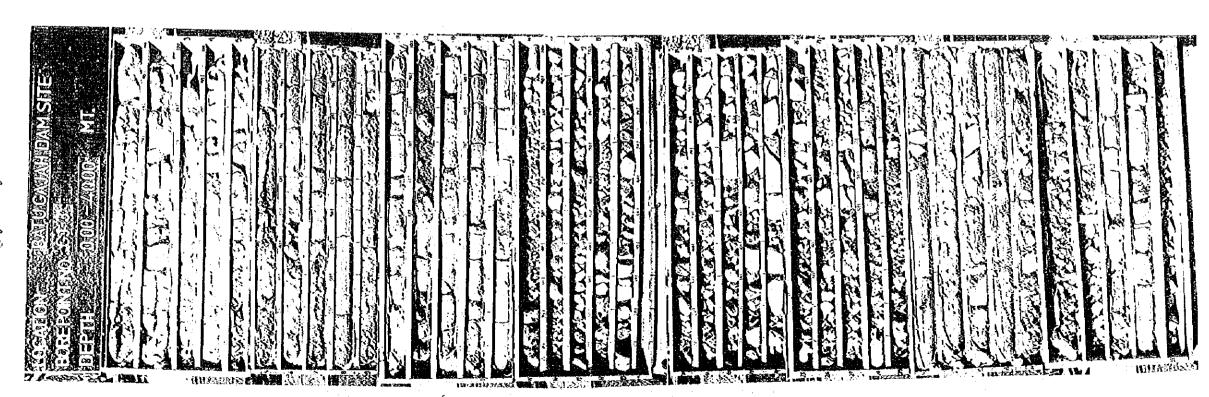
Photograph of Boring Core in Dam Sites



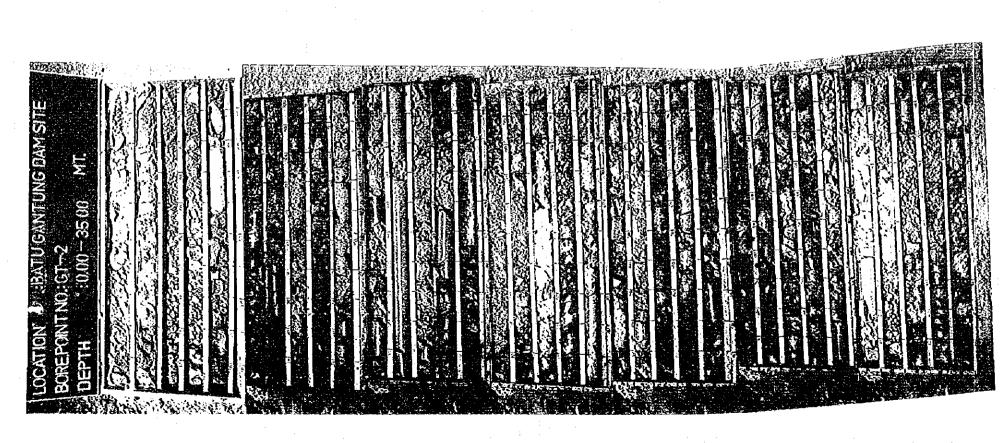








Batugantung Gt-3



DEPTH 0.000 AT DEPTH

APPENDIX 3

Borchole Log in Dam Sites

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| | | | -centura- | BORING LOG | <u> </u> | s apper | ir 31.443 S | et a lected | POPUL BALL BUILD | ***** | Ρ. | 1. SC | ϽΪĹΕ |
|--|------------------|--------------|-----------------|---|----------|---------|----------------|--------------------------------|--------------------------------------|---------------|-----------------------------------|------------|-----------|
| JOI CUI LOI BOI ELEI CO | VAR | NC ON 3JC |). | : THE STUDY ON FLOOD CONTROL FOR AMBON WATER TAB : DATE : JICA Study Team BORING Mi : Bota Merch River SAMPLING : SBM-1 SPI DRILLER : LOGGER | ETHC | OC | 00 | Corir Core Auto Ujoni | ust 18 to ng Dorrel malic F | dia.8 Iomr | 9, 73 ner (| & SP | |
| NAMP. | DEPTH (moter) | USCS | GRAPH SYMBOL | ROCK/SOIL DESCRIPTION | DEPTH | (meter) | 00 (40/cm2) | Deom (m) | SPI BLOWS PER CM | | ER FO | 10C 80 | EPECOVERY |
| | 000 | sw | | \$4ND, brown coloured, fine to oporse grained, well graded, few gravels, trace shell fragments, medium dense. | | | | 1.15 2.15 | 2/30 | | : : : : : : : : | | |
| | 300 | SM | | SRTY SAND, brown coloured, fine to coorse grained sand, few gravet, diameter steed 1 to 2 cm, medium dense to danse. | | | | 3.15 4.15 5.15 | 45/30 | KARISE | | | |
| 1.00 | 700 | МЖ | | CLAYEY SILT, whitish brown coloured, trace line grained sand, low plastic, shift to very stiff. | | | | 6.15 7.15 8.15 | 39/30 44/30 | | G | | |
| | 10.45 | MA | | END OF THIS BORING. CASING DOWN 10-3 20 METERS DEPTH. | - | | | 9.15 (0.15 | 1 | 1 1 | | | |
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| JO CL LO BC ELE CC DE | VATIO | NO ON 3JC | | : | | om | D CO | NIRO | taliance rep | AM8(|)N | BA SA SPI DR | ITE IRING MPUN | ME NG M | E (m) IHOD MEIHC | : : : OC : | Corio Core Auto Aep | ust 12 to ng borrel emotic t Rohmo Sumor | dio don don yor | 1.89, nme | 73 & er (Al | cspt H) | , . |
|---|------------------|--------------|-----------------|---------------------------------|--|---|------------------------------------|-----------------|-------------------------------|--------------------------------------|-----------------------------------|-----------------------------|----------------------|----------------------|------------------------|---------------------|--|---|--------------------------|--------------|----------------|------------|------------|
| SAMPLE | DEPTH (meter) | USCS | GRAPH SYMBOL | : | R | loci | (/\$ C | OIL [| DESC | RIP | ION | l | | 1.1 | DEPTH (meter) | QU (4Q/cm2) | Cep. | SPI - BLOWS PER CM | | PEr | ? FOX |)) | Secovery |
| | 000 | SM | | SAND, bi diomete | own color rezed 1 - 3 łD, dark g g greona | red, fine I cm, foo oy colou I groy co | to coo se red, tra foured | pelow ca org | ned sor onic mo 5 00 me | id, welf- itter, fini fens dec | graded, a graine ith, loose | gravel d sand a la me | dum | | | | 1.15 2.15 3.15 4.15 5.15 5.15 7.15 | 9/30 5/30 5/30 7/30 10/30 7/30 9/30 | | 4(| | 30 | 30 |
| | 8 30 | sw | | SANO, go whitish g medium | oy coloure loy coloure dense to d | id, fina lo ed below sense. | 9.10 m | e e e e | ed sond el attopi | weil gr w irnesi | oded, b | econii veis | νο | | | | 8.15 9.15 | | ; | • | - | | |
| | | | | CASING | HS BORW DOWN TO | ∙ co ME | TERS DE | РІН . | | | | | | | | | | | | | | | |
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| | 3 | | | BORING L | OG | | : | • . | 1 | | Ρ | .T. \$0 | OILE |
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| - | RRE HC | ON BJC | • | SGJ-1 | SPT DRILLER | | | | matic t | | meri | (AH) | |
| - | | JN NATES | | | LOGGER | | | | Rochm Sumai | | ` | | |
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| , , | | 7567.70 B 76 5 | | n, p took to the victorian made to have provided that the second the second term and the second of t | (100 克·斯·伊伊 (104 克斯·斯 萨·巴勒·达·巴 | | | | SPI - | N uc | ener No | - | È |
| } | DEPTH (meter) | 25.5 | 출 | ROCK/SOIL DESCRIPTION | 1 | 돌 호 호 | 90 (40/cm ² | £ _ | BLOWS | | | 001 | COVERY |
| • | äĚ | USCS | GRAPH SYMBOL | | | DEPTH (meter) | ફ | (E) | PER CM | | 40 | 80 | Š |
| | 000 | ČI. | | SAND, don't gray coloured, fine to coarse grained sond, well gro diameter sized 1 to 3 cm, medium danse. | ted few grovers | | | | . : | | Τ | | |
| | 3.00 | SW | | | and the second | | : | 3.15 | 10.77 | | | | |
| | " | 611 | | SAND, blockish gray coloured, fine to coorse grained, well grade mixtured, trace organic matter, loose. | d few sit | | 1 | 2.15 | | | | | |
| | | SW | $ \cdot,\cdot,\cdot $ | | | | | 3 .15 | | 1 1 | 7 | | |
| | 4 00 | | ::: | SAND, gray coloured, fine to coarse grained sond, well graded, medium dense. | oose to | | : | 415 | 9/30 | 1 | 1 | | |
| | | . : | ::: | Higoort Oglog | : | | | 5.15 | 10/30 | | | | |
| | | SW | | | | | | 5.15 | 16/30 | 56.NE | + | | |
| | - [| | | * | | | | 7.15 | 22/30 | M-85 | | - - | |
| | 800 | | r r z | SILLY SAND, groy coloured fine to medium critical your conduction | oroged | | | 8.15 | 27/30 | 255 | +- | | |
| | | SM | | SILIY SAND, gray coloured, fine to medium grained sond, poorly medium dense to dense. | * | } | | 9.15 | 33/30 | 1 1 | 4- | | |
| | | SIVI | | | | | | 10.15 | | 1 1 | - 1 | <u> </u> | |
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P.T. SOILENS BORING LOG PROJECT : THE STUDY ON FLOOD CONTROL FOR AMBON WATER TABLE (m) : -1.40 JOB NO. STAG : August 12 to August 13, 1997 CLIENT BORING METHOD JICA Study Team : Coring LOCATION Batu Gajoh River SAMPLING METHOD: Core borrel did.73 & SPT () BORE HOLE NO. SGJ-2 SPI : Automotic Hommer (AH) **ELEVATION** DRILLER : Ujong COORDINATES LOGGER : Yong Sumaryong DEPTH 10.45 m (co)(cw) SPI - Nivolue GRAPH DEPTH (mater) OEPTH (meter) USCS **ROCK/SOIL DESCRIPTION** BLOWS PER CM N PER FOOT (E) SM 13: SILTY SANO, brown coloured, fine to medium grained sand, loose 0.60 N > 100 SW \$AND, gray coloured, fine to coorse grained sand, few gravels, dense. 50/10 SANDSIONE BOULDER, gray coloured, strong. 2.15 9/30 \$10.7 \$2,000, greenish gray coloured, fine grained sand, madium dense. 10/30 3.15 \$M 4.15 11/30 5.15 27/30 51 SANO, brown coloured. In a to coorse grained, well graded, few grave's diameter sized $I\!-\!2\,\text{cm}$ medium dense. SW 6.15 23/30 67 SILTY SAND, gray coloured, fine grained sand, loose. 7.15 5/30 SM 13/30 8 30 8.15 SANO, brown coloured, fine to coarse groined sond, well groded, few grovels, diameter sized 1 to 2 cm, found sondstone boulder of 9.00 - 9.40 meters depth, medium dense to dense. SW 9.15 20/30 0.01 10.15 59/25 BRECCIA, blacksh brown coloured, sandstone fragments, strong, 10:45 END OF THIS BORING. CASING DOWN TO -9.45 METERS DEPTH.

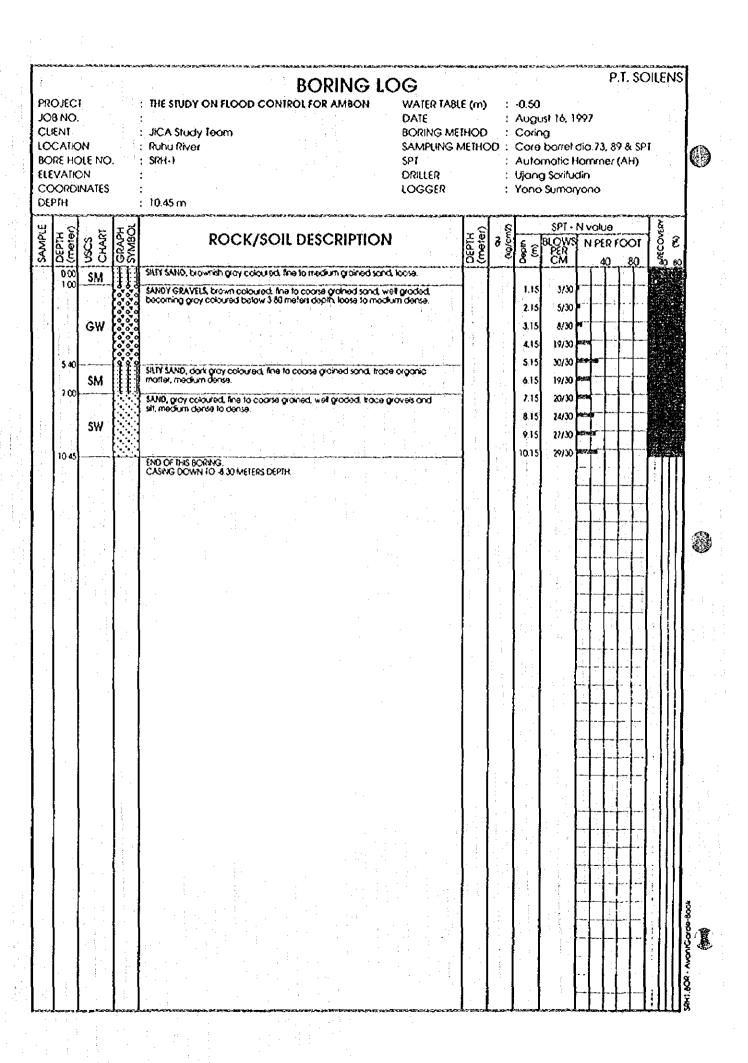
| S4300 401 | tede the graves | actor death at a said | to Apropri _a ce _e in | BORING LOG | r Mekapitan akama | LO REPTIONS | *************************************** | er bycer b | ****** | F CRAA | P | .T. S | Oil | <u>.</u> |
|-------------------|------------------|-----------------------|--|--|-------------------|------------------|---|--------------|--------------------|-------------------|-----------|--|-------|----------|
| | OJEC | | • | : THE STUDY ON FLOOD CONTROL FOR AMBON WATER | TABLE | (m) | | -0.40 | | | | : | | |
| | B NO IENT | | | : DATE : JICA Study Team BORING | S MED | 100 | | Corir | ist 2, 19 19 | 77 | | | | |
| | CAIK | | | : Mayome Dock SAMPLIF | NG M | ETHC | | | | | | | | |
| | RE HO | ON 3JC | | : SGT-1 SPT : DRILLER | } | | | | matic I Rohma | | mer | (AH) | 1 | ÷ |
| CC | XORD | INATES | | : LOGGE | | | | | Sumai | | ٥ | | | |
| DEI | PIH | n gertanisken: | **** | : 10.45 m | O september et al | | ranarar. | ense all and | all gridges as an | ار کام د کوال موس | -SVE-FILE | toer to the least of | | - |
| 'n | <u>د</u> څ | ≂ | ΣQ | DOOM OOF DECORION | | - Ç | 12) | | SPI - | | | | CONFR | 3 |
| SAMPLE | DEPTH (meter) | USCS | GRAPH SYMBOL | | | DEPTH (meter) | Co/cm | ₹ <u>€</u> | BLOWS PER CM | N | PER 1 | OO: | | o i |
| | 100 | SM | | Sitty SAND, brown coloured, fine to coorse grained sand, few graves, loose (FILL MATERIAL) | | | | ١,,, | 6/20 | | | | _ | |
| | | 1. | | SILTY SUND, do't gray coloured. The to coarse grained sand, trace gravets, organic matter included, medium danse. | | | 1 | 2.15 | i. ` . | 1 1 | | | | |
| | | SM | | | | | | 3.15 | • | • • | | | - | |
| | | 7.5 | | | | | | 4.15 | | 1 1 | + | ╁╌╂ | _ | |
| | 500 | - | | SAND, gray coloured, fine to medium grained sand, poorly graded, trace sit | | | | 5 .15 | ì | , , | - - | ╁╌╂ | - 🕷 | |
| | | SP | | mixtured, medium dense. | | | 1 | 6.15 | 1 | 11 | | | - | |
| | 700 | | | SANO, gray coloured, fine to coarse grained sand, found few gravels at 8 00 to 9 00 meters depth, diameter sted 0 50 to 1 00 cm, medium dense. | | | | 1,15 | 10/30 | ┢╌┼ | + | ╁╼╁ | - 1 | |
| | | | · | to 9 00 meters depth, diameter sted 0 50 to 1,00 cm, medium dense. | : | | | 8,15 | 12/30 | a | + | | | |
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| OB CUE OC OR LEV | ATIC E HO /ATIC ORDI | ON ON 3JC | | : THE STUDY ON FLOOD CONTROL FOR AMBON : JICA Study Team : Batu Gantung River : SGT-2 : : 10.45 m | WATER TABLE DATE 80RING MEE | THOO | 0 : | Corin Core Autor Aep I | st 3 to g borret | | | 0 |
| | (meter) | USCS | GRAPH SYMBOL | ROCK/SOIL DESCRIPTION | | DEPTH (meter) | (c)cm2) | (£ | | N volue N PER FOOT 40 80 | S (%) | |
| | 0.06 | SW | 7/7 | SILTY CUAY, brown coloured, frace fine grained sand, solf, SAND, gray coloured, fine to coorse grained sand, well graded, fer diameter sized 1 to 2 cm, toose. | | | | 1.35 | 15/30 | | | |
| | 2.45 | -311 | EI | SILIY SAND, gray coloured, fine to medium grained sand, medium | . 11.1 | | | 215 | 3/30 | | | |
| | | SM | | | 3.3 | | | 3 15 4 15 | 15/30 14/30 | | | |
| | 5 60 | | | | | | | 5.15 | 27/30 | 1 1 1 1 1 | | |
| | | | | SAND, gray coloured, fine to coorse grained sand, well graded, tro shell fragments, medium danse to dense. | ×θ | | : | 6.15 | 29/30 | | | |
| ŀ | | SW | | | | | | 7.15 8.15 | 13/30 35/30 | in the date | | |
| | | : | | | | | | 9.15 | 33/30 | 1 | | |
| | 10.45 | 1 | | END OF THIS BORING. CASING DOWN 10-900 METERS DEPTH. | | | | 10.15 | 28/30 | 25-7-26 | | |
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| PRO | OJEC |] | COLUMN | BORING LOG THE STUDY ON FLOOD CONTROL FOR AMBON WATER TABLE | .E (m | n) : | none |) : | | P.T. S | OIL | Ē |
|------------|------------------|--------|---|---|-------|------------|-----------------------------|----------------------------|----------------|---------------------|--|-----------------------|
| CLI ELE | VATIO | ON 3JC | | DATE UICA Study Team 80RiNG ME Batu Gontung River SAMPLING SGT-3 SPT ORILLER | THO | D 100 : | Cori Core Auto Aep | borrel matic l Rohmo | dio 89 Homm | . 73 & 9 | èr Sèr | |
| DEF | YH | NATES | *************************************** | : 8.06 m : 8.06 m | 7 | -1 | | Sumo | 71F SATURAL | and Above sources | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | Olica |
| SAMPLE | DEPTH (meter) | USCS | GRAPH SYMBOL | ROCK/SOIL DESCRIPTION | HIG3C | (meter) | e (£) | A | N VOIC | ie R FOO 0 80 | 1 7 | , , |
| | 0.00 | sw | | SAND, some gravels brown coloured, fine to coarse grained, well graded, gravel diameter steed 1 to 3 cm, medium dense to dense. | | | 1.15 | 24/30 | of sky | | 2 | |
| | 2.60 | | | SUND, whitsh gray coloured, fine to coalse grained, well graded, some coral grave's, dense to very dense. | | | 3.15 | 14/150 | } | | | A |
| | 6.30 | SW | | | : | | 4.15 5.15 6.15 | 67/25 | | | | A STATE OF THE PARTY. |
| | 8.06 | | 選 | UMESTONE, white coloured corollic fragments, hard. | | | 2,15 800 | 50/15 | era Historia | | | |
| | | | | END OF THIS BORING. CASING DOWN TO -7.00 METERS DEPTH. | | | | | | | - | |
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| SW SW dometric relative of the process grained well graded, few graves. SW SW SW SW SW SW SW SW SW SW SW SW SW S | | | |
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| DIRECT : THE STUDY ON FLOOD CONTROL FOR AMBON WAIRR TABLE (m) : -0.50 B NO. : ISH | | SAMPLI | JO CL IO BC ELE CC DE |
| THE STUDY ON FLOOD CONTROL FOR AMBON WARR TABLE (m): -0.50 DATE August 14 to August 15, 1997 POR ROTH River SMAPPLINS METHOD: Core borrel did 73, 89 & SPT Automotic Hommer (AH) DRILER Upong Sorinkon BORN SMAPPLINS METHOD: Core borrel did 73, 89 & SPT Automotic Hommer (AH) DRILER Upong Sorinkon BORN SMAPPLINS METHOD: Core borrel did 73, 89 & SPT Automotic Hommer (AH) DRILER Upong Sorinkon BORN NER FOOT STATE STAT | | | B NO IENT CATIO PRE HO EVATIO XORO |
| THE STUDY ON PLOOD CONTROL FOR AMBON WAIGR TARLE (m) JACA Study Team Roha River SRING SAMPLING METHOD: Coring Roha River SRH-2 SPI DRILLER LOGGER Tono Sumaryona TONO SUMARYON NER FOOT GOTHER RIVER SPI - N VOUS SPI - N VOUS SPI - N VOUS SPI - N VOUS SPI - N VOUS SAMPLING SILL DESCRIPTION SPI - N VOUS SPI | | | ON OLE NO ON |
| THE STUDY ON FLOOD CONTROL FOR AMBON WATER TABLE (m): -0.50 DATE August 14 to August 15, 1997 ROTHING REHOD Coring SAMPLING METHOD Coring Grid of August 15, 1997 ROCK/SOIL DESCRIPTION ROCK/SOIL DESCRIPTION ROCK/SOIL DESCRIPTION SAMPLING METHOD Coring Spring of August 15, 1997 SAMPLING METHOD Coring Grid of August 15, 1997 Automotic Harmer (AH) DRILLER Upong Sorthodn ROCK/SOIL DESCRIPTION SAMPLING METHOD ROCK/SOIL DESCRI | | GRAPH SYMBO | |
| (m) : -0.50 August 14 to August 15, 1997 HOD : Coring ETHOD : Core barrel dia 73, 89 & SPT Automatic Hammer (AH) Ujang Sorifudin : Yono Sumaryono SPT - N value E BLOWS N PER FOOT CM 40 80 1.15 24/30 24 2.15 8/30 25 3.15 16/30 25 3.15 16/30 25 3.15 16/30 25 3.15 27/30 25 3.15 29/30 25 3.15 29/30 25 3.15 29/30 25 3.15 30/30 25 3.15 | END OF THIS BORING. | | : THE STUDY ON FLOOD CONTROL FOR AMBON : DATE : JICA Study Team : Ruhu River : SRH-2 : ORILLER : ORICER |
| -0.50 August 14 to August 15, 1997 Coring D: Core barrel dia 73, 89 & SPI Automatic Hammer (AH) Ujang Sarifudin : Yano Sumaryano SPI - Nivolue SPI - Nivo | | OEPTH (meter) | HOD |
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| ust 14 to August 15, 1997 ng borrel dia 73, 89 & SPI matic Hammer (AH) g Sorifudin Sumoryono SPI - N Volue BLOWS N PER FOOT PER CM 40 80 24/30 24 8/30 25 16/30 25 16/30 25 27/30 25 30/30 27/30 25 30/30 27/30 27/30 28/30 | 3.15 4.15 5.15 5.15 7.15 8.15 9.15 | | Augu Corir Core Auto Ujan |
| o August 15, 1997 dia 73, 89 & SPI Hammer (AH) din Hyono N Volue N PER FOOT 40 80 | 10/30 10/30 16/30 18/30 16/30 27/30 | BLOWS PER CM | ust 14 forg borrel motic I g Sorifu i Sumo |
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P.T. SOILENS **BORING LOG PROJECT** : THE STUDY ON FLOOD CONTROL FOR AMBON WATER TABLE (m) : -3.00 JOB NO. DATE : August 8 to August 9, 1997 CUENT BORING METHOD JICA Study Team : Coring Tomu River LOCATION SAMPLING METHOD: Core borrel dia.73, 89 & SPT BORE HOLE NO. SIM-1 SPI : Automatic Hammer (AH) **ELÉVATION** DRILLER : Aep Rochmat COORDINATES LOGGER : Yono Sumaryono DEPTH : 10.45 m (kg/cm2) SPI - Nivalue DEPTH (meter) USCS CHARY GRAPH SYMBO DEPTH (meter) **ROCK/SOIL DESCRIPTION** BLOWS PER CM N PER FOOT **6** (3) SAND, brownish gray coloured, fine to coase grained sond, well graded, bace grave's mixtured, diameter sted 1 - 2 cm, at 1.45 to 2.00 meters depth found white coloured limestone boulder, medium dense. 000 SW 1.15 14/30 200 215 10/30 SAND, gray coloured, fine to coorse grained, well graded, medium dense. SP 11/30 3.15 SLITY SAND, dark gray coloured, trace organic matter, fine to medium grained sond, poorly graded, loose to medium dense. 6/30 5.15 15/30 4.15 7/30 13/30 SM 11/30 8.15 9.15 16/30 18/30 10.15 10.45 END OF THIS BORING. CASING DOWN TO 9.00 METERS DEPTH.

P.T. SOILENS **BORING LOG** THE STUDY ON FLOOD CONTROL FOR AMBON WATER TABLE (m) : -3.00 **PROJECT** : August 8 to August 9, 1997 JOB NO. DATE CLIENT **BORING METHOD** : Coring JICA Study Teom LOCATION : Tomu River SAMPLING METHOD: Core barrel dia.73, 89 & SPT SPT BORE HOLE NO. : STM-2 : Automatic Hammer (AH) **ELEVATION** DRREER : Aep Rochmot COORDINATES LOGGER : Yono Sumaryono DEPTH 11.45 m PRCOVERY SPI - Nivolue DEPTH (meter) DEPTH (meter) CHART ROCK/SOIL DESCRIPTION BLOWS PER CM δ N PER FOOT 3 SANDY GRAVELS, brownish gray coloured, fine to coarse graned sand, well graded, gravet diameter sized 1 to 2 cm, trace sit, loose to medium dense. 000 GW 11/30 7/30 SILTY SAND, greensh gray coloured, fine to medium graned sand, poorly graded, trace dark gray coloured organic motter at 3 00 to 5.50 metes depth, medium darke. 3.15 9/30 415 14/30 17/30 5.15 16/30 6.15 SM 7.15 12/30 8.15 16/30 9.15 17/30 19/30 10.15 11.15 20/30 END OF THIS BORING. CASING DOWN TO 11 00 METERS DEPTH.



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| tEV. | NO. NT. ATIC E HC ATIC PROI | ON 3JC | | THE STUDY ON FLOOD CONTROL FOR AMBON JICA Study Team Tomu River STM-3 | WATER FABI DATE BORING ME SAMPLING I SPT ORILLER LOGGER | THOO METHOO | Cori Core Auto Aep | ust 10 to . ng oboiret d | ommer (Al t | cSPT |
| DEPTH | ie.) | S 25 | FŠ | ROCK/SOIL DESCRIPTION | | DEPTH (meter) |) | | volue | S 60 80 |
| | (meter) | H CHART | GRAPH SYNBOL | | tra vitra rimanatako ni na ununusu u | CEPTH (meter) | S E | PER CM | N PER FOO | 30 30 8 30 8 |
| ' | 100 | SW | | SHTY CLAY, brown coloured, frace fine grained sand, soft. SAND, whitish gray coloured, fine to coorse grained sand, well grained graves, diameter sized 1 - 2 cm, medium dense. | ided. | | 1.15 | l I. | 1 1 1 | |
| ; | 3∞ | | | SAND, dark gray coloured, fine to coarse grained sand, trace gra- organic matter, medium dense. | vals some | - | 3.15 | | 1 1 1 | |
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| | 8 20 | | | SILIY SAND, don't gray coloured, fine to medium grained sand, fer mother, modium dense. | A orbasic | | 8.15 9.15 | | 111 | _ |
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| ŀ | 1,45 | | | END OF THIS BORING. CASING DOWN TO -9.00 METERS DEPTH. | | | | | | |
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