

III 建設材料調査

INTRODUCTION

This part of the investigation were aimed to find the suitable construction material (aggregate) near proposed site. To achieve the objective, about seven locations (two near the intake site and five near the power house site) have been investigated through test pit and collecting of bulk samples. The test pit were located along the course of the river where the material were identified as suitable and reasonable quantity for those near the power house. Bulk samples of sufficient quantity were collected from each test pit and proposed quarry area near the intake to carry out the following laboratory tests:

<u>Item</u>	<u>Type of Test</u>	<u>Standard of Specification</u>
i)	Sieve analysis of aggregates	ASTM C 136
ii)	Specific Gravity and Absorption of gravel	ASTM C 127
	Specific Gravity and Absorption of sand	ASTM C 127
iii)	Organic Impurities of sand	ASTM C 40
iv)	Scratch Hardness of soft particles in gravel	ASTM C 235
v)	Soundness of aggregates by use of Sodium Sulphate	ASTM C 88
vi)	Abrasion Test of gravel (using the Los Angeles machine) (JIS A1121)	ASTM C 131 and ASTM C 535
vii)	Unit Weight Test of aggregates	ASTM C 29
viii)	Compressive Strength of drilled core samples	ASTM D 2938
ix)	Aggregate Impact Value	BS 812
x)	Aggregate Crushing Value	BS 812

SUMMARY OF TEST PIT LOCATIONS & SAMPLING

(Medamit - 2)

Section B - Table 1

Sampling No.	Distance from Dam or Power House Site (Km)	Volume of River Deposit (m ³)	Maximum Size of Particles (cm)	Sampling Weight (Kg)
TME - 1	From Dam Site up 0.85 Middle of River	1,000 (250)	30 - 50	120
TME - 2	From Dam Site up 0.60 Right Bank	600 (150)	30 - 50	90
TME - 3	From Power House up 2.50 Left Bank	9,000 (3,000)	30 - 50	90
TME - 4	From Power House up 1.70 Right Bank	18,000 (6,000)	30 - 50	180
TME - 5	From Power House up 0.70 Left Bank	21,000 (7,000)	30 - 50	90
TME - 6	From Power House Down 1.80 Right Bank	7,800 (2,600)	20 - 30	90
TME - 7	From Power House Down 2.20 Left Bank	10,000 (5,000)	20 - 30	180
Total Volume :		67,400 (24,000)		
QME-1	0.03 km upstream of dam site left bank	more than required	50 x 20	120

Note 1 : () Estimated Volume of Grain Size under 10cm.

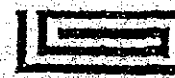
Note 2 : Rock Type of TME-1, TME-2 are Shale and Sandstone and TME-3 to TME-7 are Shale, Sandstone and Limestone.

SUMMARY OF LABORATORY TEST SCHEDULE

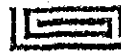
(Madamit - 2)

Section B - Table 2

Type of Test	Sieve Analysis		Specific gravity		Absorption		Organic Impurities	Scratch Hardness	Soundness		Abrasion (A+C+E)	Unit Weight		Aggregate Impact Value	Aggregate Crushing Value
	Sand	Gravel	Sand	Gravel	Sand	Gravel	Sand	Gravel	Sand	Gravel	Gravel	Sand	Gravel		
Sample No.	No. of Specimen Tested														
TME - 1	-	2	-	2	-	2	-	2	-	1	A X 2 E X 2	-	2		
TME - 2	2	2	2	2	2	2	2	2	-	-	-	-	-		
TME - 3	2	2	2	2	2	2	2	2	-	-	-	-	-		
TME - 4	2	2	2	2	2	2	2	2	1	1	A X 2 C X 2 E X 2	2	2		
TME - 5	2	2	2	2	2	2	2	2	-	-	-	-	-		
TME - 6	2	2	2	2	2	2	2	2	-	-	-	-	-		
TME - 7	2	2	2	2	2	2	2	2	1	1	A X 2 E X 2	2	2		
QME-1	-		2		2		-	2	2		A x 2 E x 2	-		2	2
Drilled Core Sample No.	Test Condition														
	In-Situ	Saturated													
BME-1/15.50-15.80m	1	-													
BME-2/19.60-19.80m	1	-													
BME-3/5.30-5.55m	1	-													
BME-4/3.07-3.33m	-	1													
BME-4/17.15-17.35m	-	1													
BME-5/26.40-26.55m	-	1													
BME-7/9.15-9.33m	-	1													



GEOTECHNIQUE EAST MALAYSIA SDN. BHD
 LOT 87, JALAN TAN SRI ONG KEE HUI
 KUCHING, SARAWAK.
 TEL : 243460, 243478
 TELEX : MA 70416 GEOTEC



Section 8 - Table 3
SUMMARY OF LABORATORY TEST RESULTS

(Medamit - 2)

Place and Sample No.	Sieve Analysis (Percentage Passing)														Specific gravity (SSD)	Absorption (%)	Organic Impurities	Scratch Hardness (%)	Soundness (%)	Abrasion (%)	Unit Weight (t/m ³)	Aggregate Impact Value	Aggregate Crushing Value	
	75 (%)	63 (%)	50 (%)	37.5 (%)	19.0 (%)	9.5 (%)	4.75 (%)	2.36 (%)	1.18 (%)	0.60 (%)	0.30 (%)	0.15 (%)	0.075 (%)	Fineness Modulus (F.M.)										
River bed deposit																								
TME - 1	Coarse	100	76	52	26	5	0	-	-	-	-	-	-	-	8.69	2.558	1.39	-	6.4	1.8	13.6	1.768		
	Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Original	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TME - 2	Coarse	-	100	87	71	40	22	0	-	-	-	-	-	-	7.67	2.548	1.68	-	4.7	-	-	-		
	Fine	-	-	-	-	-	-	100	68	35	20	7	2	0	3.68	2.438	3.12	Passed	-	-	-	-		
	Original	-	100	91	81	62	50	35	24	12	7	3	1	0	5.93	-	-	-	-	-	-	-		
TME - 3	Coarse	-	100	72	44	7	0	-	-	-	-	-	-	-	8.56	2.600	1.07	-	6.7	-	-	-		
	Fine	-	-	-	-	-	100	85	69	51	35	17	6	2	3.31	2.350	3.88	Not Passed	-	-	-	-		
	Original	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TME - 4	Coarse	100	93	87	66	28	11	0	-	-	-	-	-	-	7.95	2.566	1.70	-	12.1	8.2	21.0	1.779		
	Fine	-	-	-	-	-	-	100	79	62	37	9	3	0	3.10	2.336	4.13	Not Passed	-	15.8	-	1.302		
	Original	100	94	89	71	38	23	13	10	8	5	1	0	0	7.31	-	-	-	-	-	-	-		
TME - 5	Coarse	100	74	16	0	0	0	0	-	-	-	-	-	-	9.00	2.591	1.06	-	0	-	-	-		
	Fine	-	-	-	-	-	100	99	97	91	50	14	5	0	2.52	2.363	4.44	Not Passed	-	-	-	-		
	Original	100	79	31	18	18	18	18	18	17	10	3	1	0	7.79	-	-	-	-	-	-	-		
TME - 6	Coarse	100	83	50	29	3	0	-	-	-	-	-	-	-	8.69	2.590	1.14	-	1.8	-	-	-		
	Fine	-	-	-	-	-	100	93	79	60	46	13	3	0	2.98	2.393	3.42	Not Passed	-	-	-	-		
	Original	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TME - 7	Coarse	100	96	53	22	1	0	-	-	-	-	-	-	-	8.86	2.593	1.01	-	2.6	0.2	10.3	1.756		
	Fine	-	-	-	-	-	100	97	89	77	33	11	2	1	2.91	2.363	2.75	Not Passed	-	22.4	-	1.367		
	Original	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Quarry Sample QME-1																2.635	0.77	-	0.3	1.09	17.8	-	18	19
Drilled Core	Condition of Sample Cores					Specific gravity (SSD)	Absorption (%)	Compressive Strength (Kg/cm ²)	Remarks															
	Depth (m)	Moisture Condition	Rock Type	Diameter (cm)	Height (cm)																			
BME - 1	15.05 - 15.80	In-Situ	Sandstone	5.40	10.25	2.630	0.53*	499.76	* Moisture Content															
BME - 2	19.60 - 19.80	In-Situ	Shale	5.40	9.97	2.690	0.29*	21.52																
BME - 3	5.30 - 5.55	In-Situ	Shale	5.18	9.80	2.640	1.40	86.0																
BME - 4	3.07 - 3.33	Saturated	Sandstone	5.17	9.90	2.620	0.20	561.8																
BME - 4	17.15 - 17.35	Saturated	Sandstone	5.19	9.70	2.640	0.20	643.2																
BME - 5	26.40 - 26.55	Saturated	Shale	5.40	9.60	2.570	1.83*	172.74																
BME - 7	9.15 - 9.33	Saturated	Limestone	5.40	9.90	2.660	0.22*	259.01																



GEOTECHNIQUE EAST MALAYSIA SDN. BHD.
Foundation & Soil Specialists

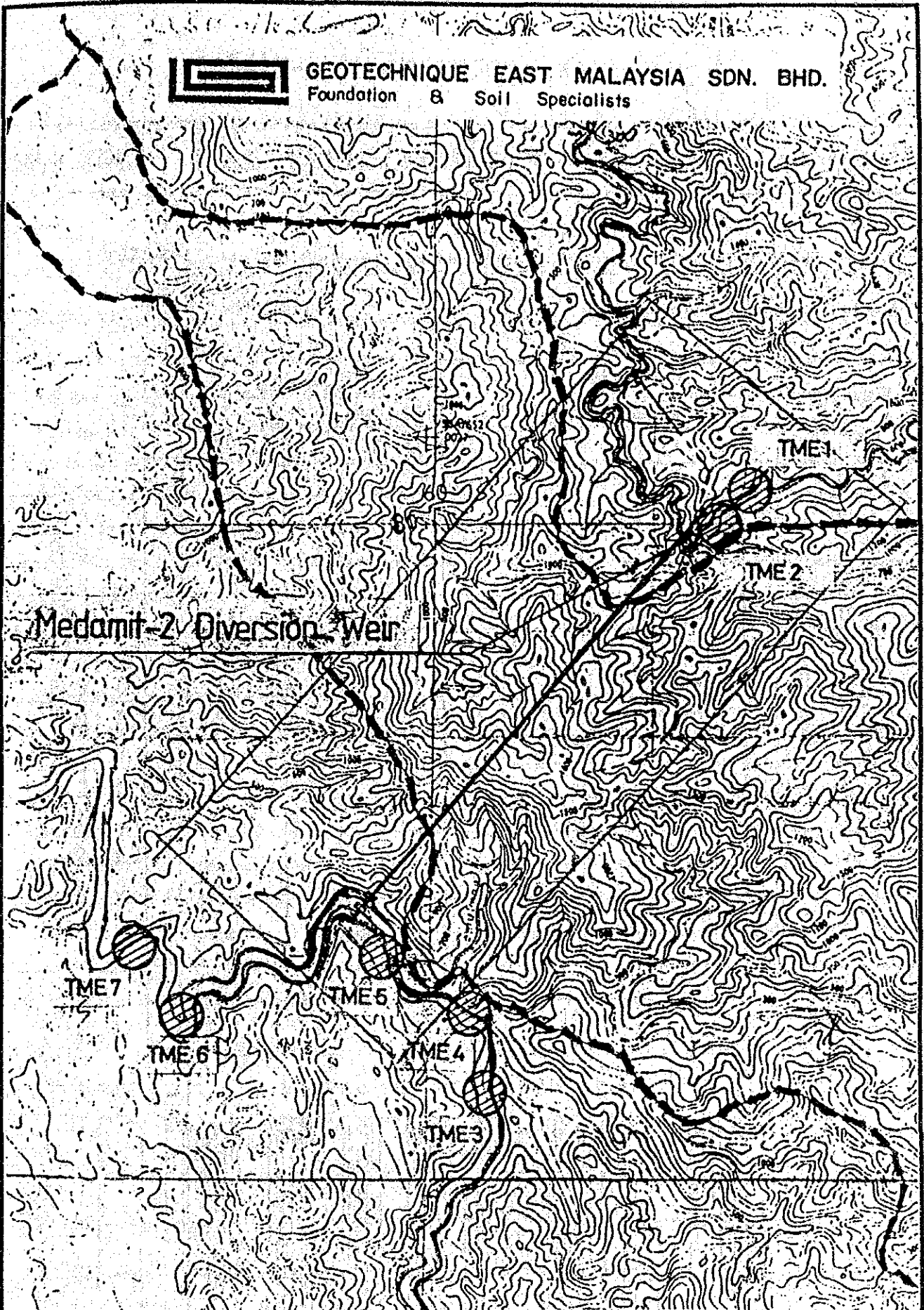


FIG.1 Location of Sampling for Laboratory Test

GOVERNMENT OF MALAYSIA
FEASIBILITY STUDY
SMALL SCALL HYDROELECTRIC POWER PROJECT IN SARAWAK
JAPAN INTERNATIONAL COOPERATION AGENCY