

III CONSTRUCTION MATERIAL SURVEY

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.

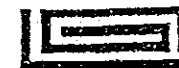
Note 2 : Rock Type of TME-1, TME-2 are Shale and Sandstone and TME-3 to TME-7 are Shale, Sandstone and Limestone.

SUMMARY OF LABORATORY TEST SCHEDULE

(Medamit - 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													

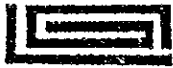


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Section B - Table 3
SUMMARY OF LABORATORY TEST RESULTS

(Medamit - 2)

Place and Sample No.	Sieva 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	57	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	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																



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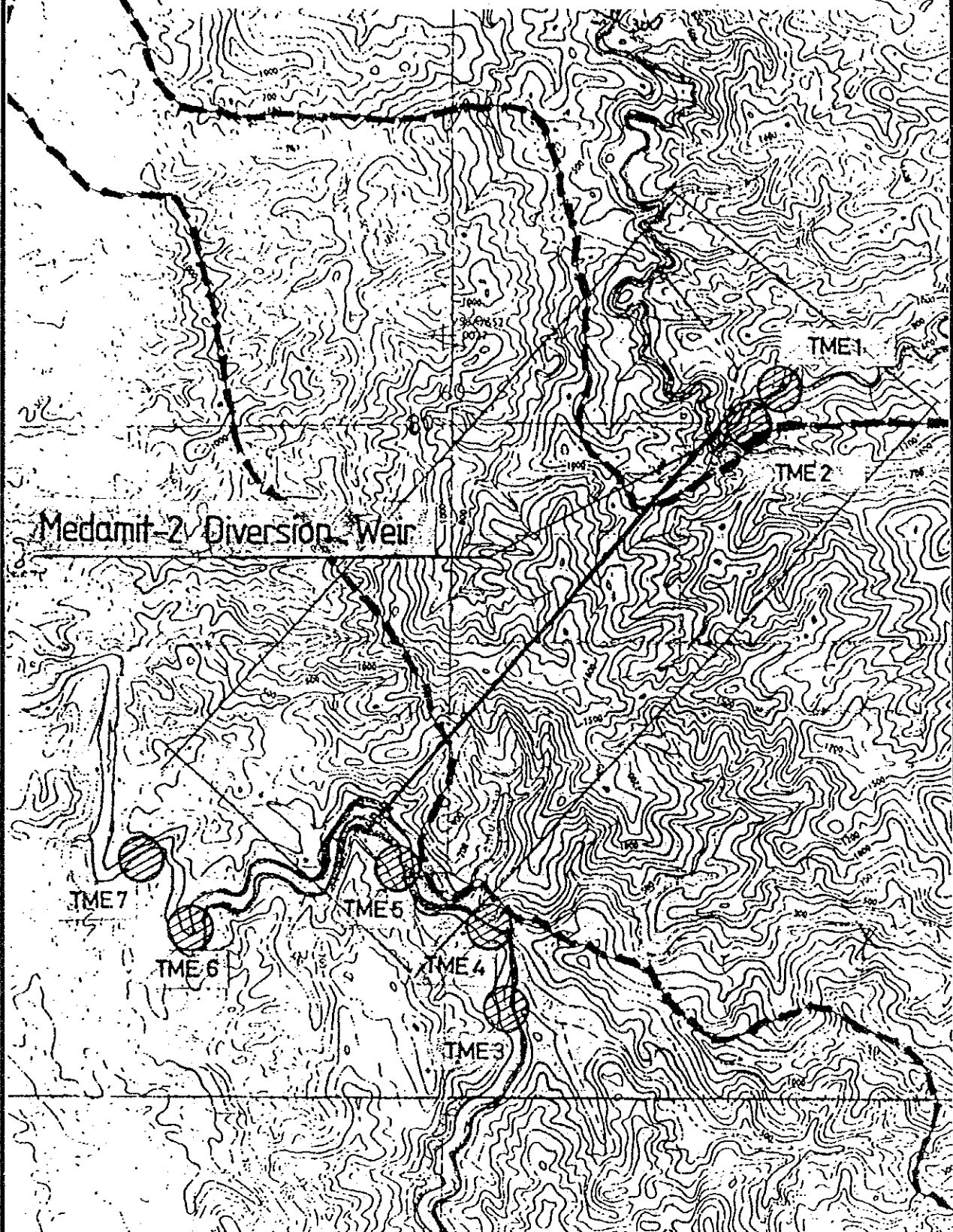


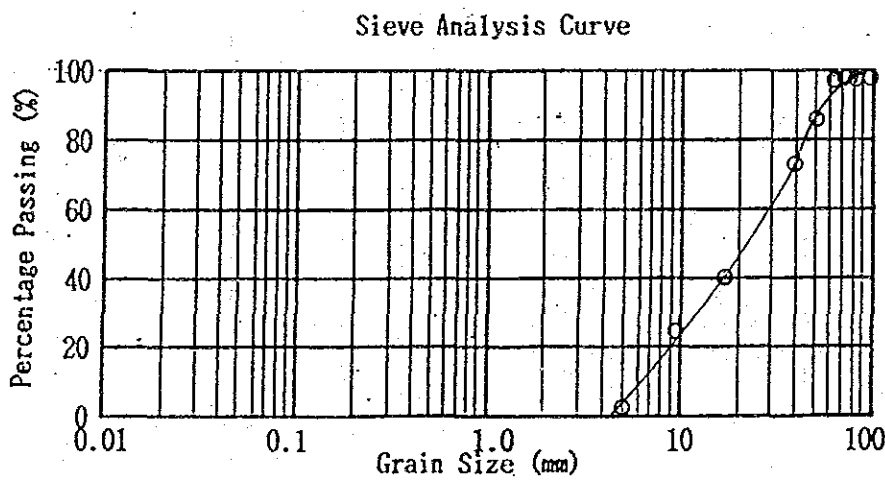
FIG.1 Location of Sampling for Laboratory Test

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SMALL SCALL HYDROELECTRIC POWER PROJECT IN SARAWAK
JAPAN INTERNATIONAL COOPERATION AGENCY

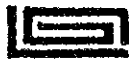


Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
Name of Project	Small Hydra Study For Medamit	Date <u>3.7.1987</u>
Sample	TME-2	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					100
50	5,102	13	5,102	13	87
37.5	11,386	29	6,284	16	71
19.0	23,462	60	12,076	31	40
9.5	30,372	78	6,910	18	22
4.75	39,118	100	8,746	22	0
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	7.67				



Remarks

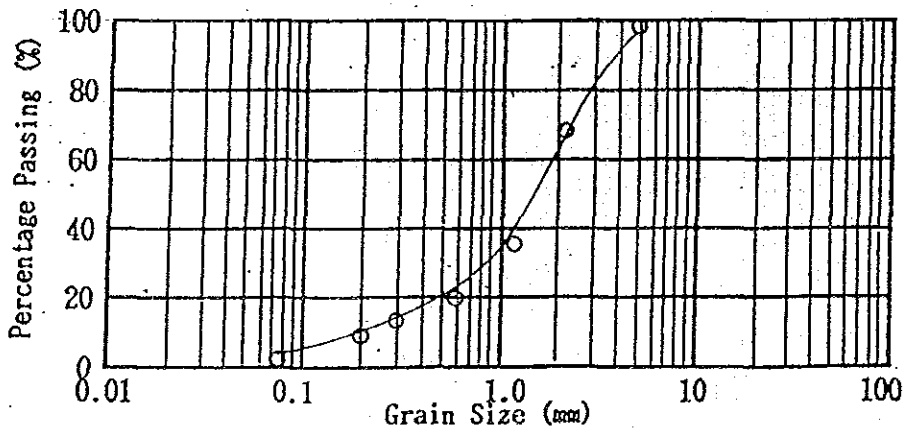


Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
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Name of Project Small Hydro. Study For Medamit Date 3.7.1987
 Sample TME-2 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75					100
2.36	6,725	32	6,725	32	68
1.18	13,761	65	7,036	33	35
0.60	16,899	80	3,138	15	20
0.30	19,560	93	2,661	13	7
0.15	20,530	98	970	5	2
0.075	20,882	100	352	2	0
Total					
Fineness Modulu	3.68				

Sieve Analysis Curve



Remarks



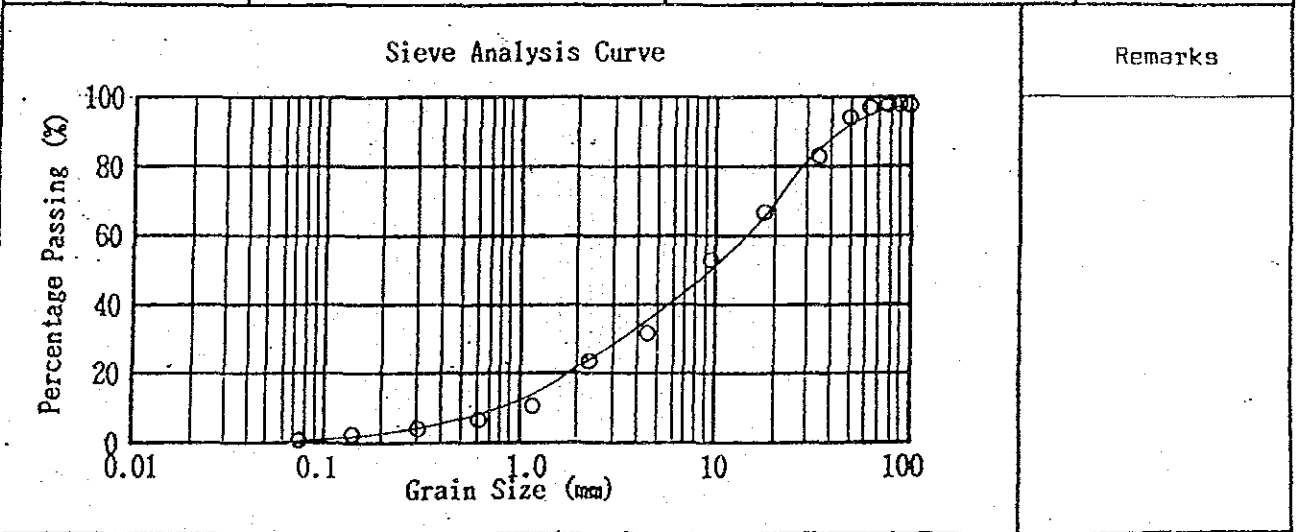
Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE + FINE)	ASTM C 136
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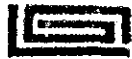
Name of Project Small Hydro Study For Medamit Date 4.7.1987

Sample TME-2 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50	5,102	9	5,102	9	91
37.5	11,286	19	6,284	10	81
19.0	23,362	38	12,076	20	62
9.5	30,272	50	6,910	12	50
4.75	39,018	65	8,746	15	35
2.36	45,743	76	6,725	11	24
1.18	52,779	88	7,036	12	12
0.60	55,917	93	3,138	5	7
0.30	58,578	97	2,661	4	3
0.15	59,548	99	970	2	1
0.075	59,900	100	352	1	0
Total					

Fineness Modulu 5.93

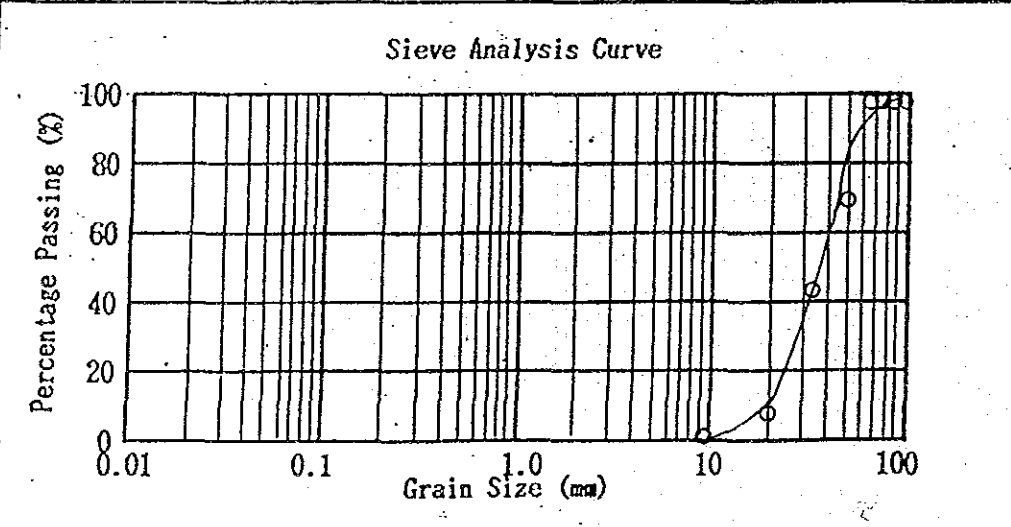




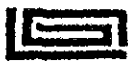
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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Name of Project	Small Hydro Study For Medamit	Date	4.7.1987
Sample	TME-3	Tested by	C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50	15,774	28	15,774	28	72
37.5	31,672	56	15,898	28	44
19.0	52,364	93	20,692	37	7
9.5	56,086	100	3,722	7	0
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	8.56				

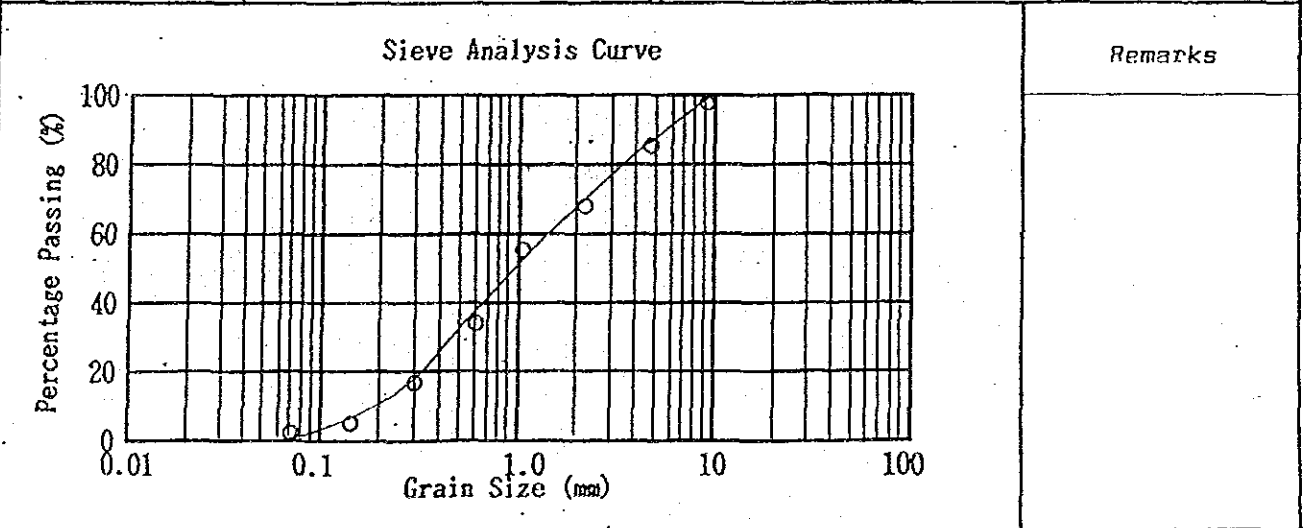


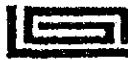
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
Name of Project	<u>Small Hydro Study For Medamit</u>	Date <u>24-7-1987</u>
Sample	<u>TME-3</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	604	15	604	15	85
2.36	1246	31	642	16	69
1.18	1724	43	478	12	57
0.60	2602	65	878	22	35
0.30	3322	83	720	18	17
0.15	3748	94	426	11	6
0.075	3914	98	166	4	2
Total					
Fineness Modulu	3.31				





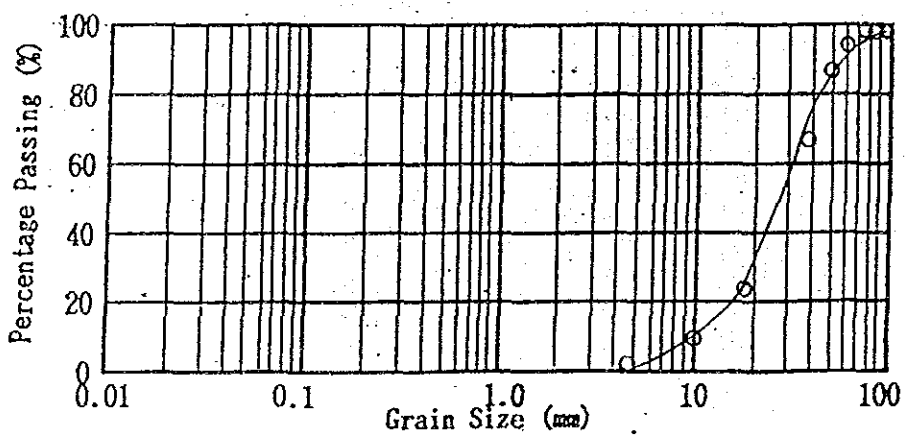
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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Name of Project <u>Small Hydro Study For Madamit</u>	Date <u>5-7-1987</u>
Sample <u>TME-4</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63	3,742	7	3,742	7	93
50	6,902	13	3,160	6	87
37.5	17,614	34	10,712	21	66
19.0	36,494	72	18,880	38	28
9.5	45,230	89	8,736	17	11
4.75	50,778	100	5,548	11	0
2.36					
1.18					
0.60					
0.30					
0.15					
Total					

Fineness Modulu	7.95	
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Sieve Analysis Curve

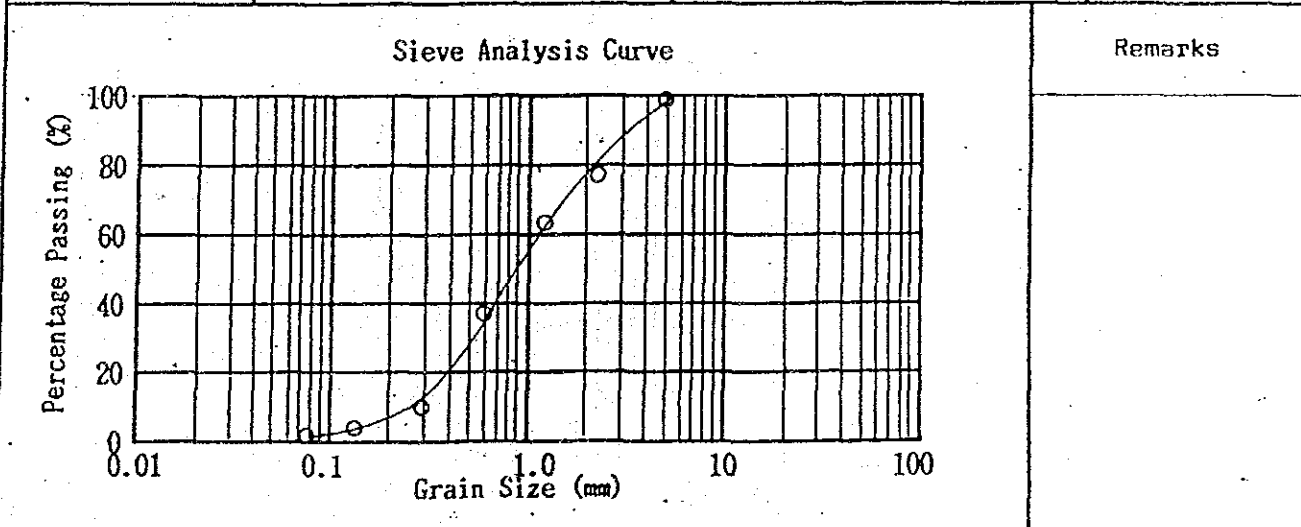


Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u> FINE </u>)	ASTM C 136
Name of Project	<u>Small Hydro Study For Medamit</u>	Date <u>5.7.1987</u>
Sample	<u>TME-4</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75					100
2.36	1,613	21	1,613	21	79
1.18	2,934	38	1,321	17	62
0.60	4,808	63	1,874	25	37
0.30	6,911	91	2,103	28	9
0.15	7,352	97	441	6	3
0.075	7,612	100	260	3	0
Total					
Fineness Modulu	3.10				





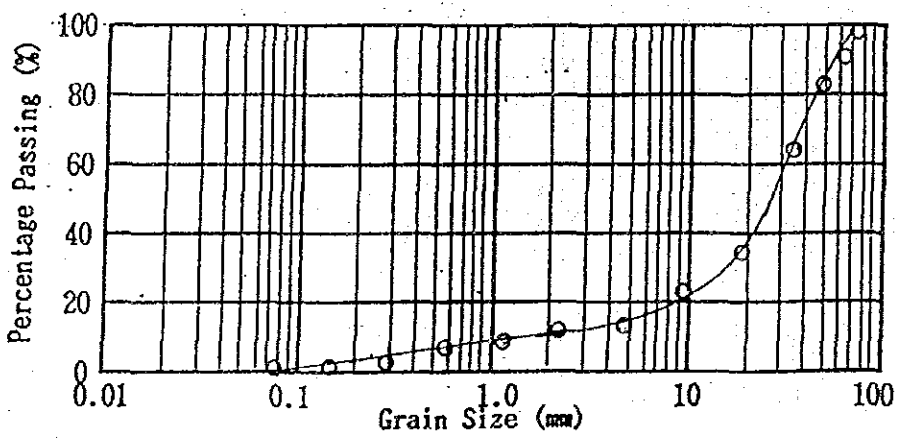
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Name of Project	Small Hydro Study For Medamit	Date 6-7-1987
Sample	TME-4	Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					100
63	3,742	6	3,742	6	94
50	6,902	11	3,160	5	89
37.5	17,614	29	10,712	18	71
19.0	36,494	62	18,880	33	38
9.5	45,230	77	8,736	15	23
4.75	50,778	87	5,548	10	13
2.36	52,391	90	1,613	3	10
1.18	53,712	92	1,321	2	8
0.60	55,586	95	1,874	3	5
0.30	57,689	99	2,103	4	1
0.15	58,130	100	441	1	0
0.075	58,390	100	260	0	0
Total					

Fineness Modulu

7.31

Sieve Analysis Curve



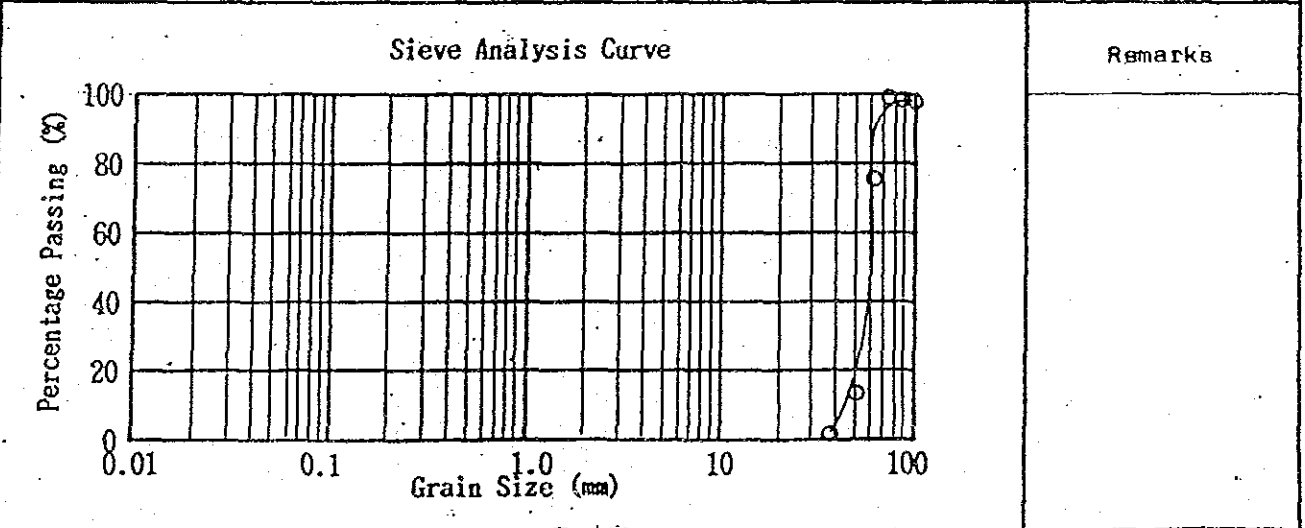
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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Name of Project <u>Small Hydro Study For Madamit</u>	Date <u>7-7-1987</u>
Sample <u>TME-5</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					100
63	11,380	26	11,380	26	74
50	37,066	84	25,686	58	16
37.5	43,983	100	6,917	16	0
19.0					
9.5					
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	9.00				

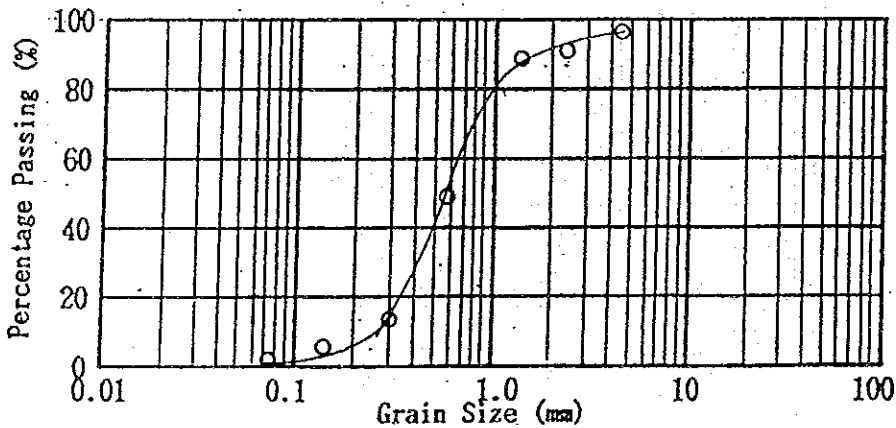




Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u> FINE</u>)	ASTM C 136
Name of Project	<u> Small Hydro Study For Medemit</u>	Date <u> 6.7.1987</u>
Sample	<u> TME-5</u>	Tested by <u> G.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	91	1	91	1	99
2.36	245	3	154	2	97
1.18	867	9	622	6	91
0.60	4,838	50	3,971	41	50
0.30	8,395	86	3,557	36	14
0.15	9,226	95	831	9	5
0.075	9,747	100	521	5	0
Total					
Fineness Modulu	2.52				

Sieve Analysis Curve

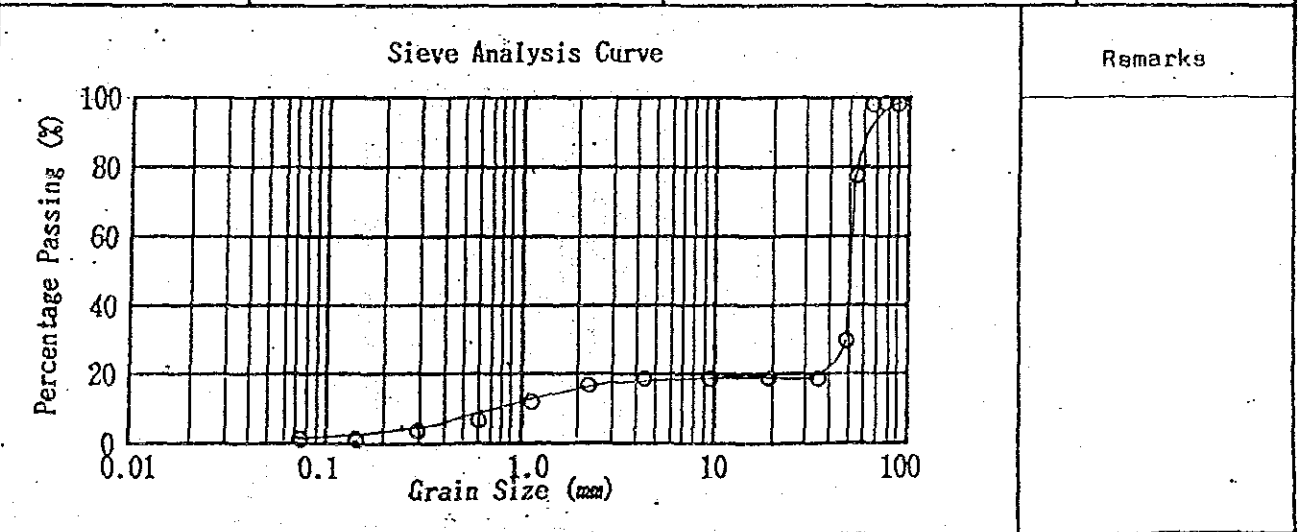


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Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE + FINE)	ASTM C 136	
Name of Project	Small Hydro Study For Medamit	Date	6-7-1987
Sample	TME-5	Tested by	C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					100
63	11,380	21	11,380	21	79
50	37,066	69	25,686	48	31
37.5	43,973	82	6,907	13	18
19.0	43,973	82	0	0	18
9.5	43,973	82	0	0	18
4.75	44,064	82	91	0	18
2.36	44,218	82	154	0	18
1.18	44,840	83	622	1	17
0.60	48,811	90	3,971	7	10
0.30	52,368	97	3,557	7	3
0.15	53,199	99	831	2	1
0.075	53,720	100	521	1	0
Total					
Fineness Modulu	7.79				





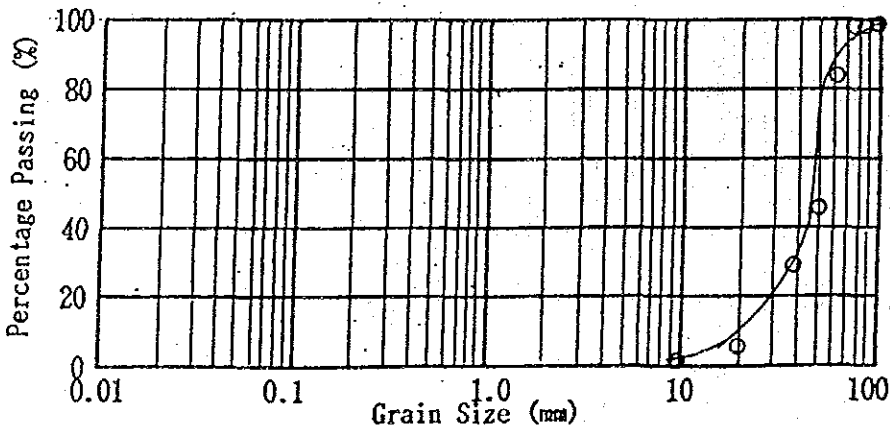
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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Name of Project Small Hydro Study For Medemit Date 7-7-1987

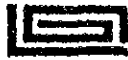
Sample TME-6 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					100
63	9,878	17	9,878	17	83
50	28,812	50	18,934	33	50
37.5	40,606	71	11,794	21	29
19.0	55,282	97	14,676	26	3
9.5	57,202	100	1,920	3	0
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	8.69				

Sieve Analysis Curve

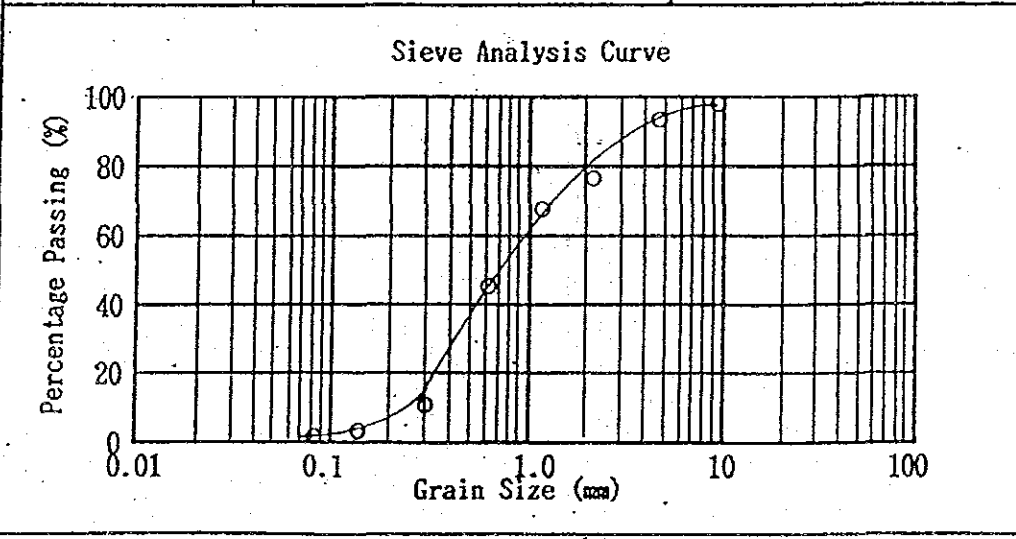


Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (FINE)	ASTM C 136
Name of Project	Small Hydro Study For Medamit	Date 24-7-1987
Sample	TME-6	Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	104	7	104	7	93
2.36	318	21	214	14	79
1.18	490	32	172	11	68
0.60	830	54	340	22	46
0.30	1334	87	504	33	13
0.15	1486	97	152	10	3
0.075	1538	100	52	3	0
Total					
Fineness Modulu	2.98				



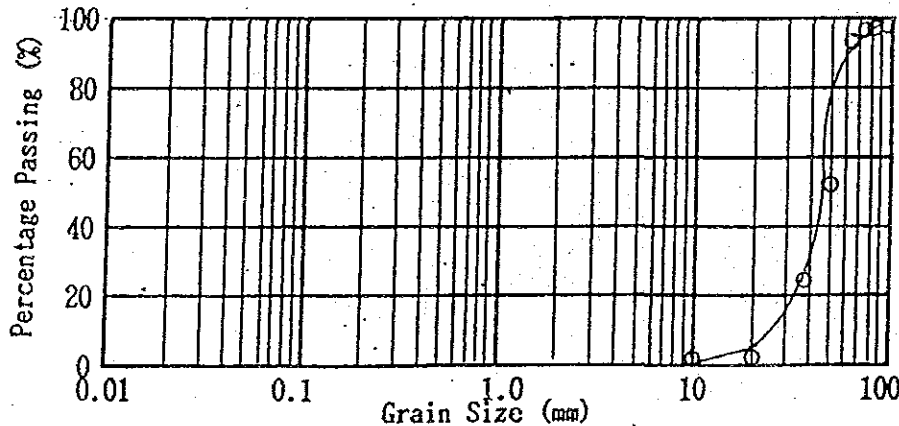
Remarks



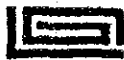
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Name of Project	<u>Small Hydro Study For Medamit</u>	Date <u>7.7.1987</u>
Sample	<u>TME-7</u>	Tested by <u>G.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63	2,130	4	2,130	4	96
50	26,312	47	24,182	4	53
37.5	43,686	78	17,374	3	22
19.0	55,560	99	11,874	21	1
9.5	55,924	100	364	1	0
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	8.86				

Sieve Analysis Curve

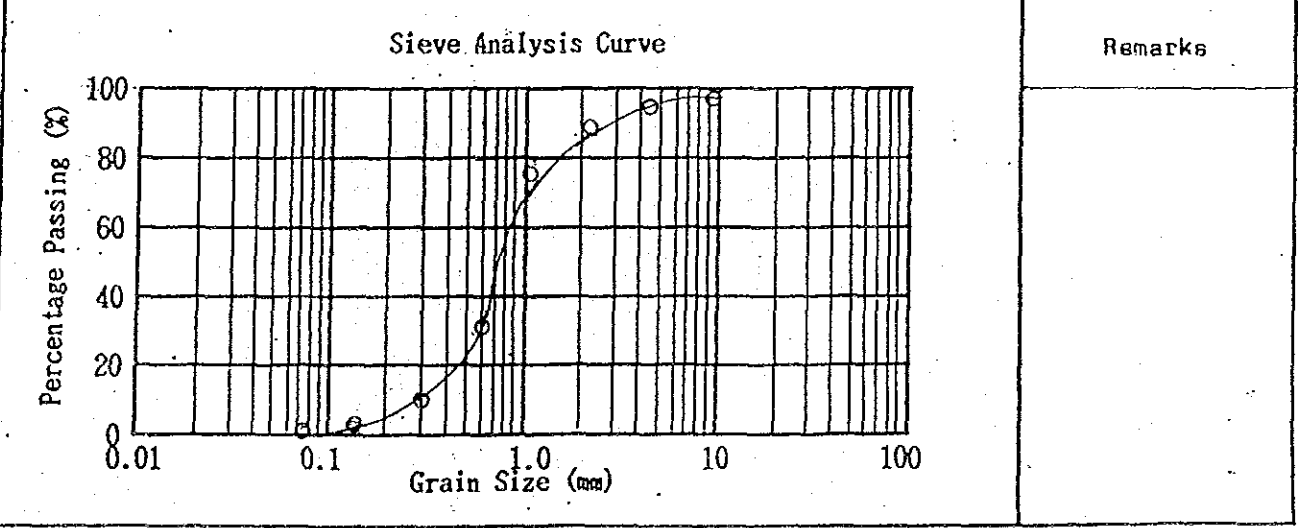


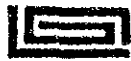
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
Name of Project	Small Hydro Study For Medemit	Date <u>24-7-1987</u>
Sample	<u>TME-7</u>	Tested by <u>C.S.M.</u>

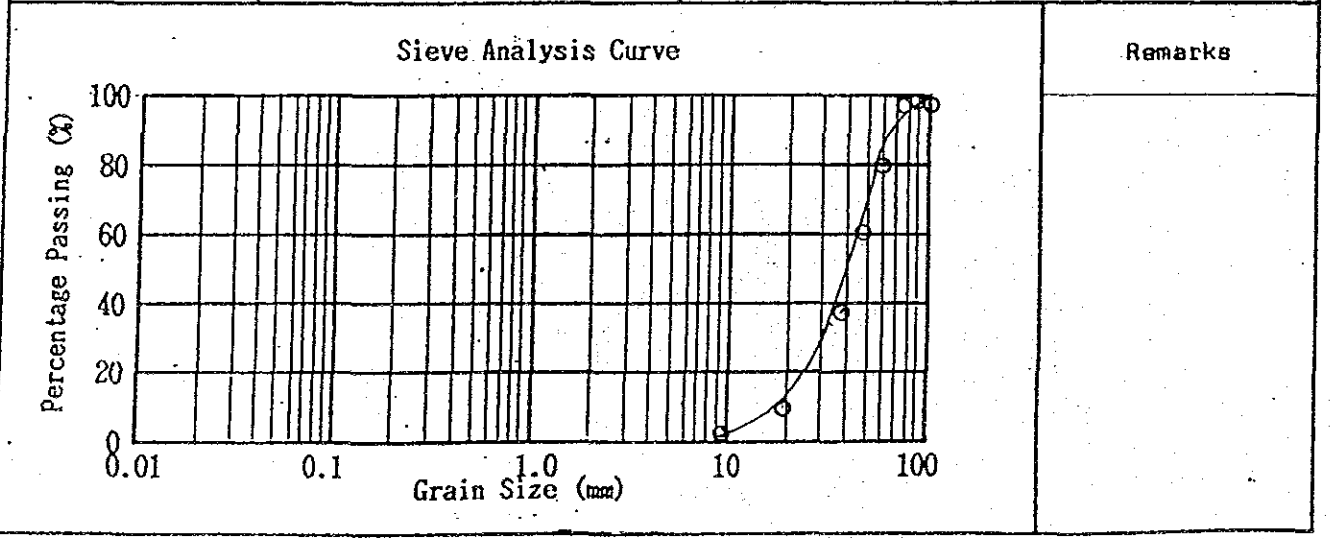
Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	126	3	126	3	97
2.36	450	11	324	8	89
1.18	938	23	488	12	77
0.60	2714	67	1776	44	33
0.30	3596	89	882	22	11
0.15	3972	98	376	9	2
0.075	4076	100	104	2	0
Total					
Fineness Modulu	2.91				





Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
Name of Project <u>Small Hydro Study For Madamit</u>		Date <u>3-7-1987</u>
Sample <u>TME-1/Test 1</u>		Tested by <u>C.S.M.</u>

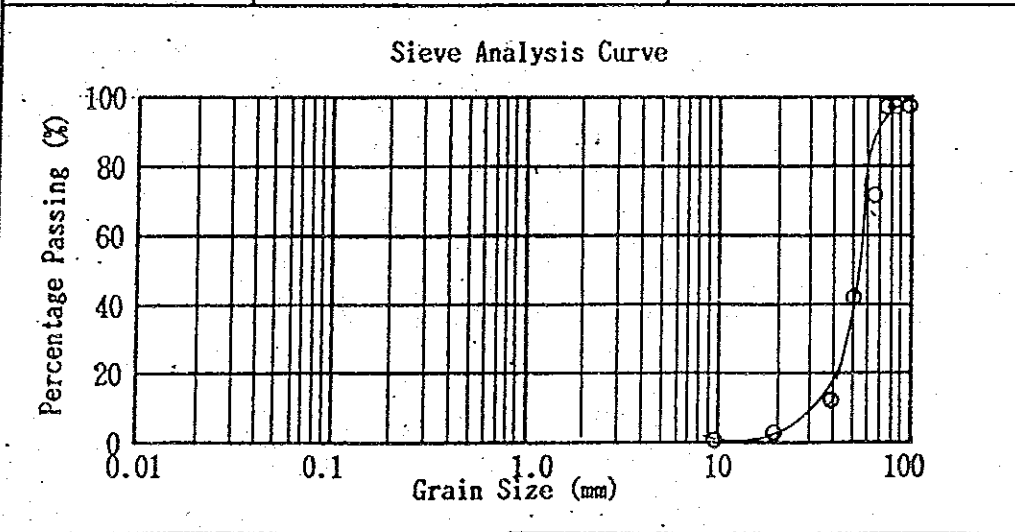
Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63	5,220	20	5,220	20	80
50	10,450	40	5,230	20	60
37.5	16,002	61	5,552	21	39
19.0	23,772	91	7,770	30	9
9.5	26,182	100	2,410	9	0
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	8.52				





Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
Name of Project	Small Hydro Study For Medamit	Date <u>3.7.1987</u>
Sample	TME-1/Test 2	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	7,970	27	7,970	27	73
50	16,428	55	8,458	28	45
37.5	25,186	84	8,758	29	16
19.0	29,356	98	4,170	14	2
9.5	29,804	100	448	2	0
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	8.82				



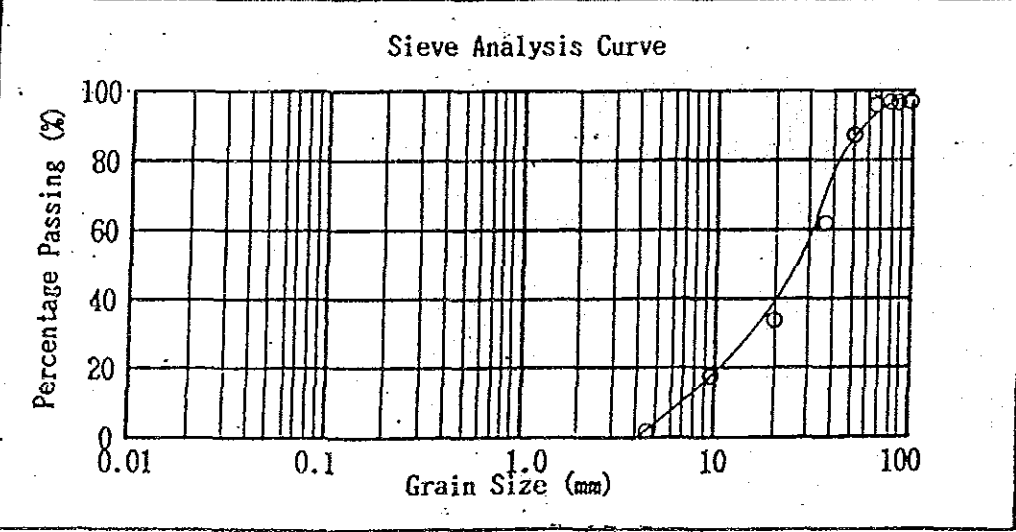
Remarks



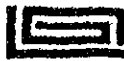
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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Name of Project <u>Small Hydro. Study For Medamit</u>	Date <u>3.7.1987</u>
Sample <u>TME-2/Test 1</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					100
50	2,802	13	2,802	13	87
37.5	7,752	36	4,950	23	64
19.0	13,446	64	5,694	28	36
9.5	17,140	81	3,694	17	19
4.75	21,191	100	4,051	19	0
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	7.81				



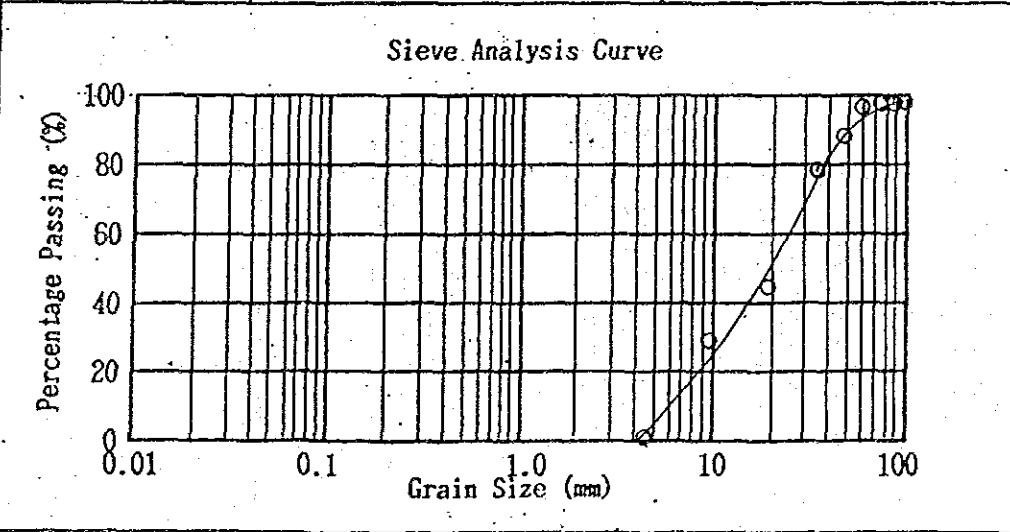
Remarks



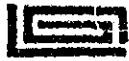
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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Name of Project <u>Small Hydro Study For Medemit</u>	Date <u>3.7.1987</u>
Sample <u>TME-2/Test 2</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50	2,300	13	2,300	13	87
37.5	3,634	20	1,334	7	80
19.0	10,016	56	6,382	36	44
9.5	13,232	74	3,216	18	26
4.75	17,927	100	4,695	26	0
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	7.50				



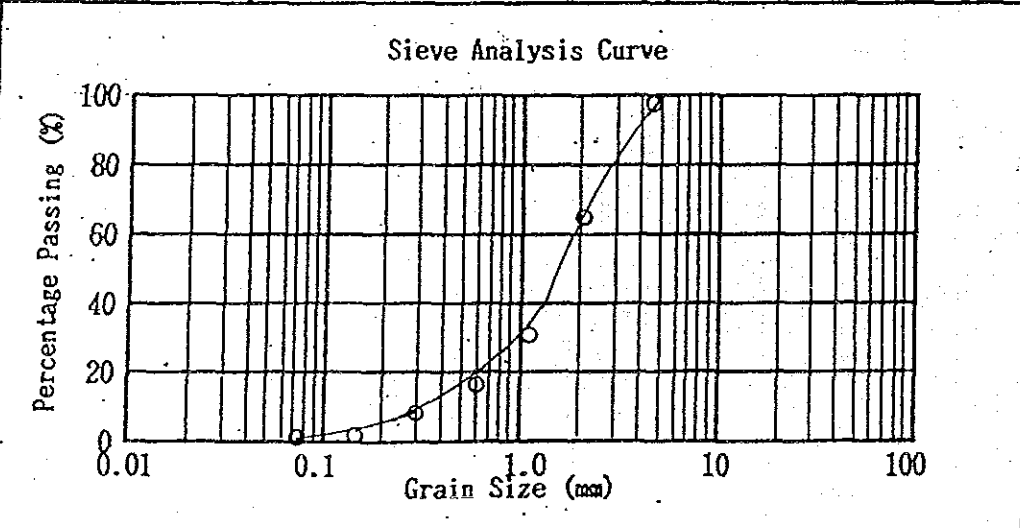
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Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
Name of Project	Small Hydro. Study For Medamit	Date <u>3.7.1987</u>
Sample	TME-2/Test 1	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75					
2.36	3,086	35	3,086	35	65
1.18	6,098	69	3,012	34	31
0.60	7,358	83	1,260	14	17
0.30	8,258	93	900	10	7
0.15	8,658	98	400	5	2
0.075	8,809	100	151	2	0
Total					

Fineness Modulu	3.78	
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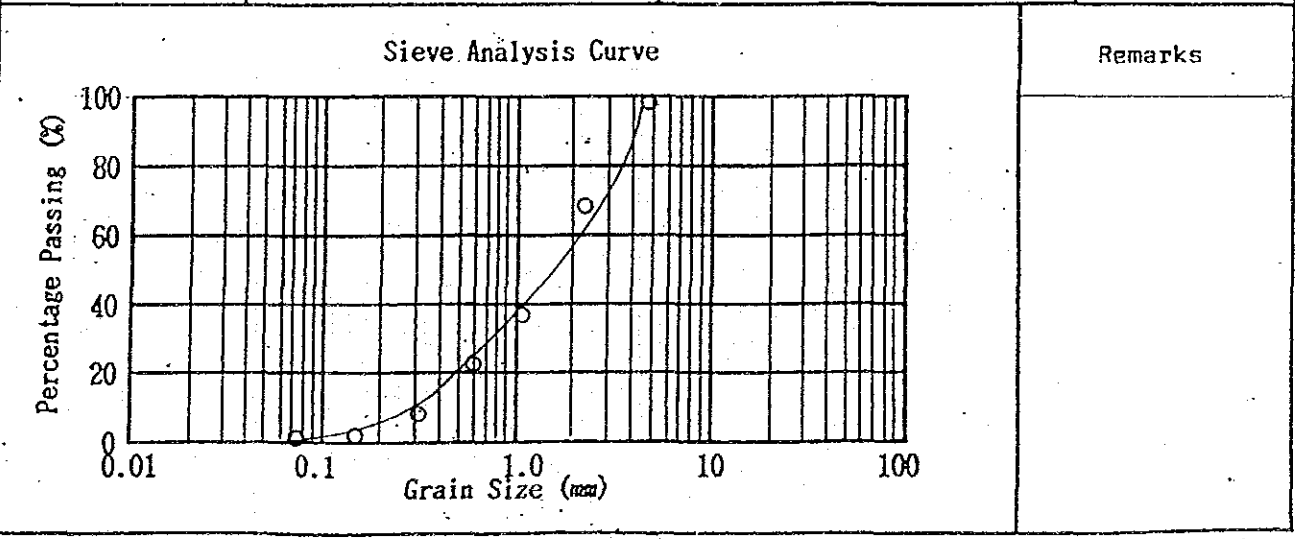


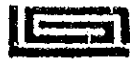
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (FINE)	ASTM C 136
Name of Project	Small Hydro Study For Medamit	Date 3.7.1987
Sample	TME-2/Test 2	Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75					
2.36	3,639	30	3,639	30	70
1.18	7,663	62	4,024	32	38
0.60	9,541	78	1,878	16	22
0.30	11,302	93	1,761	15	7
0.15	11,872	98	570	5	2
0.075	12,073	100	201	2	0
Total					
Fineness Modulu	3.61				





Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE+FINE)	ASTM C 136
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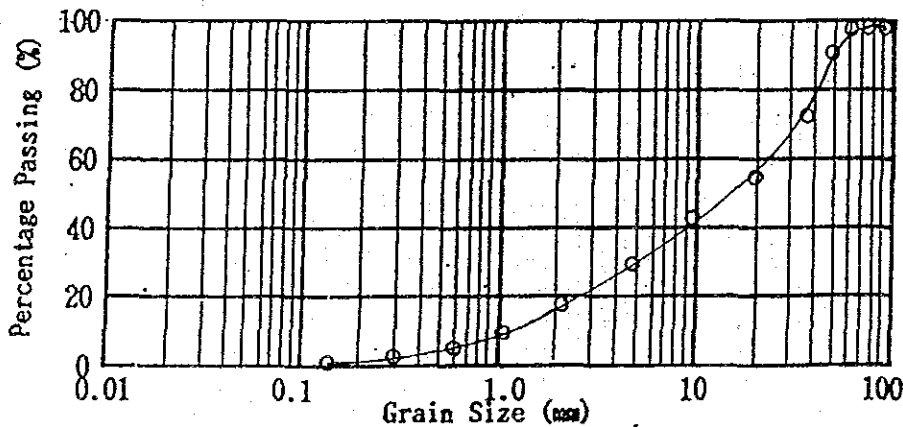
Name of Project Small Hydro Study For Medamit Date 3-7-1987

Sample TME-2/Test 1 Tested by C.S.M.

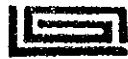
Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	-	-	-	-	-
50	2802	9	2802	9	91
37.5	7752	26	4950	17	74
19.0	13446	45	5694	19	55
9.5	17140	57	3694	12	43
4.75	21191	71	4051	14	29
2.36	24277	81	3086	10	19
1.18	27289	91	3012	10	9
0.60	28549	95	1260	4	5
0.30	29449	98	900	3	2
0.15	29849	99	400	1	1
	30000	100	151	1	0
Total					

Fineness Modulu 6.63

Sieve Analysis Curve



Remarks



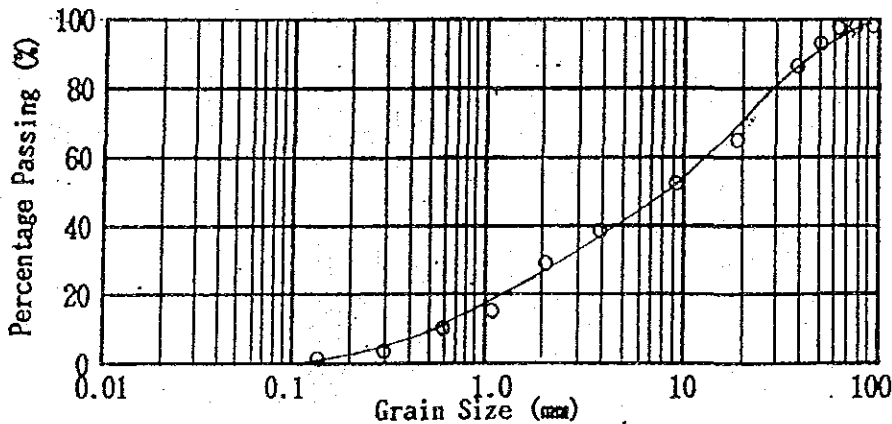
Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE+FINE)	ASTM C 136
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Name of Project Small Hydro Study For Medamit Date 4-7-1987

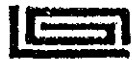
Sample TME-2/Test 2 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50	2300	8	2300	8	92
37.5	3634	12	1334	4	88
19.0	10016	33	6382	21	67
9.5	13232	44	3216	11	56
4.75	17927	60	4695	16	40
2.36	21566	72	3639	12	28
1.18	25590	85	4024	13	15
0.60	27468	91	1878	6	9
0.30	29229	97	1761	6	3
0.15	29799	99	570	2	1
	30000	100	201	1	0
Total					
Fineness Modulu	5.93				

Sieve Analysis Curve



Remarks



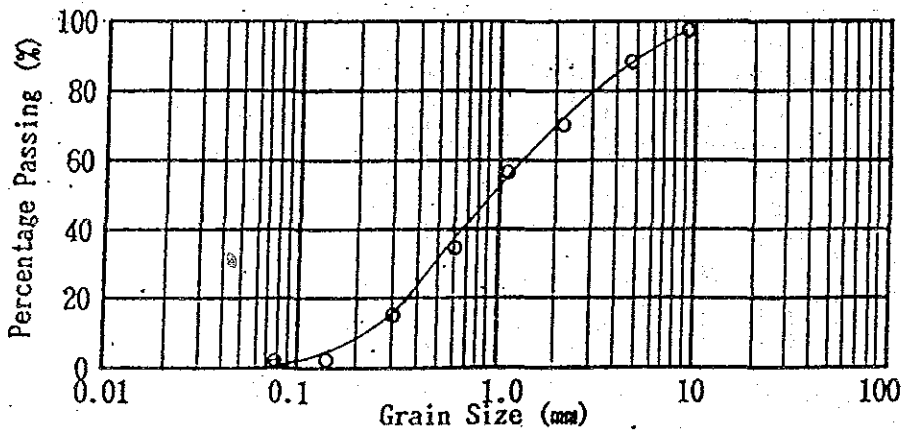
Name of Test	SIEVE ANALYSIS OF AGGREGATES (FINE)	ASTM C 136
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Name of Project Small Hydro Study For Madamit Date 23-7-1987

Sample TME-3/Test 1 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	330	14	330	14	86
2.36	712	31	382	17	69
1.18	966	42	254	11	58
0.60	1462	64	496	22	36
0.30	1888	83	426	19	17
0.15	2180	96	292	13	4
0.075	2294	100	114	4	0
Total					
Fineness Modulu	3.30				

Sieve Analysis Curve



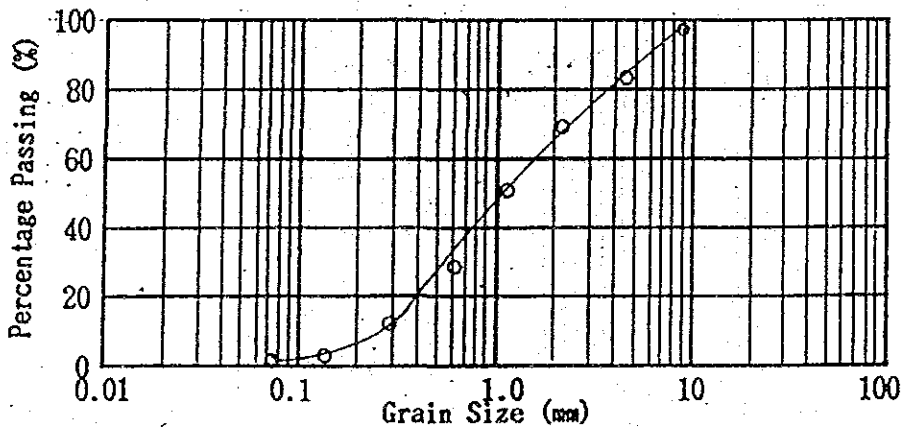
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
Name of Project	<u>Small Hydro Study For Medamit</u>	Date <u>23-7-1987</u>
Sample	<u>TME-3/Test 2</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	274	16	274	16	84
2.36	534	32	260	16	68
1.18	758	46	224	14	54
0.60	1140	70	382	24	30
0.30	1434	88	294	18	12
0.15	1568	96	134	8	4
0.075	1620	99	52	3	1
Total					
Fineness Modulu	4.47				

Sieve Analysis Curve

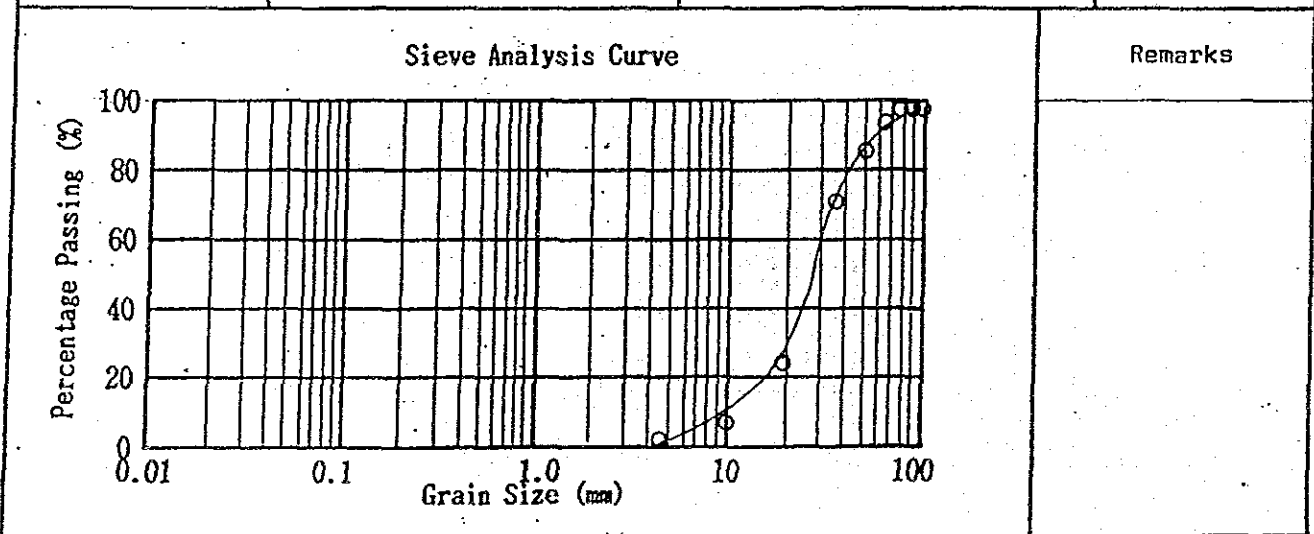


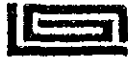
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
Name of Project	<u>Small Hydro. Study For Medemit</u>	Date <u>5.7.1987</u>
Sample	<u>TME-4/Test 1</u>	Tested by <u>C.S.M.</u>

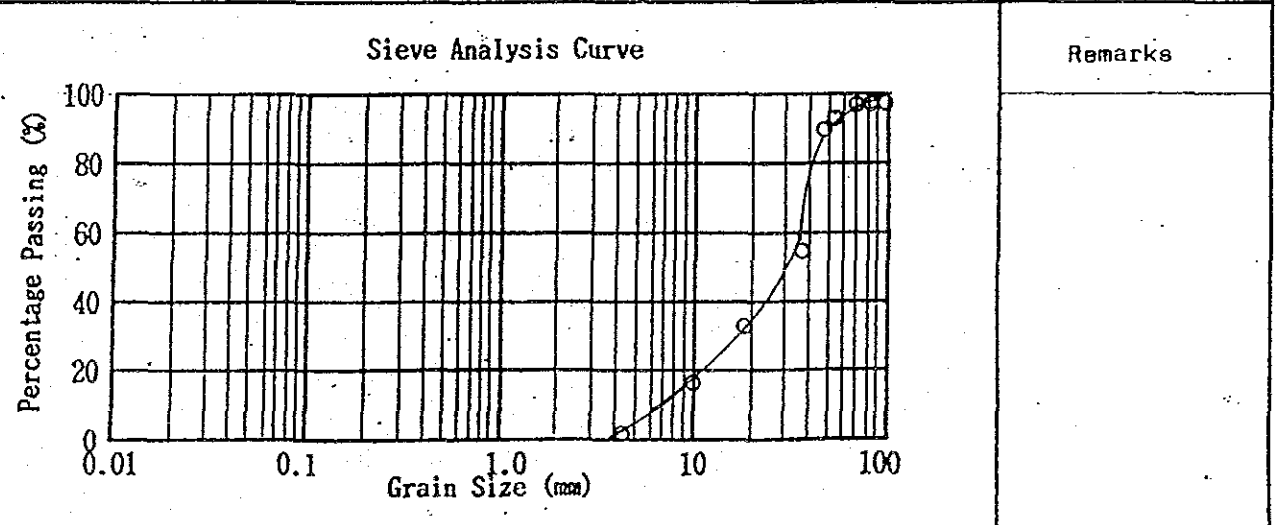
Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	1,702	6	1,702	6	94
50	3,912	14	2,210	8	86
37.5	7,786	27	3,874	13	73
19.0	22,236	77	14,450	50	23
9.5	27,082	94	4,846	17	6
4.75	28,707	100	1,625	6	0
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	7.98				





Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
Name of Project	Small Hydro Study For Medamit	Date <u>5-7-1987</u>
Sample	TME-4/Test 2	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	2,040	9	2,040	9	91
50	2,990	13	950	4	87
37.5	9,828	44	6,838	31	56
19.0	14,258	64	4,430	20	36
9.5	18,148	82	3,890	18	18
4.75	22,071	100	3,923	18	0
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	7.90				



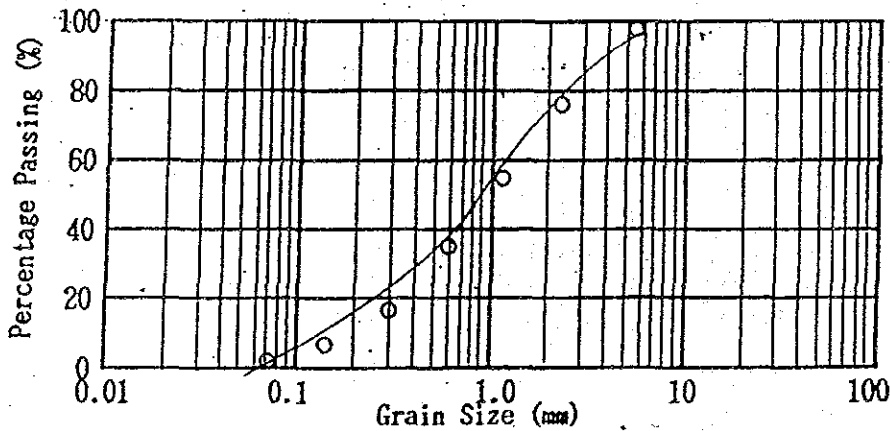


Name of Test	SIEVE ANALYSIS OF AGGREGATES (FINE)	ASTM C 136
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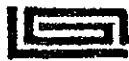
Name of Project	Small Hydro Study For Medamit	Date	5.7.1987
Sample	TME-4/Test 1	Tested by	C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75					
2.36	312	25	312	25	75
1.18	537	42	225	17	58
0.60	803	63	266	21	37
0.30	1,051	82	248	19	18
0.15	1,197	93	146	11	7
0.075	1,293	100	96	7	0
Total					
Fineness Modulu	3.05				

Sieve Analysis Curve



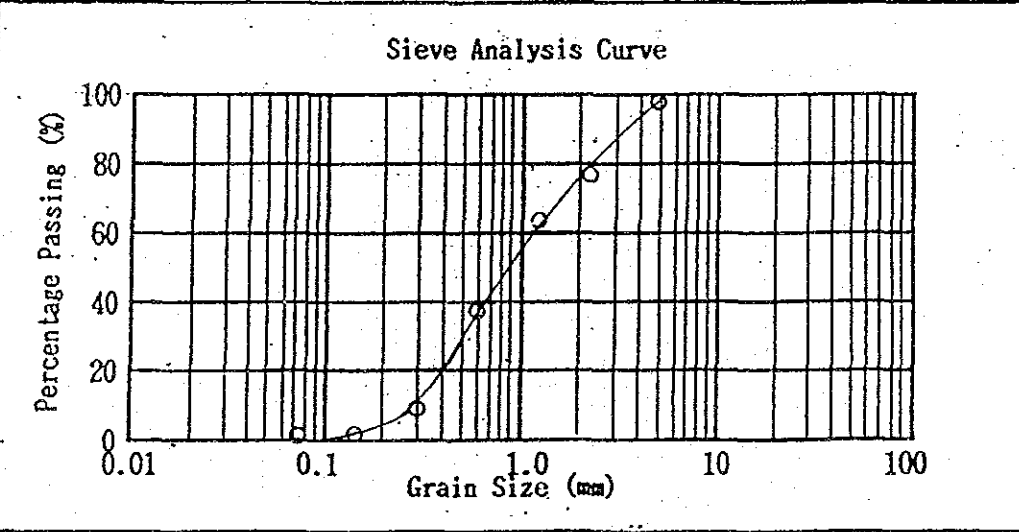
Remarks



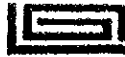
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
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Name of Project <u>Small Hydro Study For Medamit</u>	Date <u>5.7.1987</u>
Sample <u>TME-4/Test 2</u>	Tested by <u>G.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75					
2.36	1,301	21	1,301	21	79
1.18	2,397	38	1,096	17	62
0.60	4,005	63	1,608	25	37
0.30	5,860	92	1,855	29	8
0.15	6,155	97	295	5	3
0.075	6,319	100	164	3	0
Total					
Fineness Modulu	3.11				



Remarks



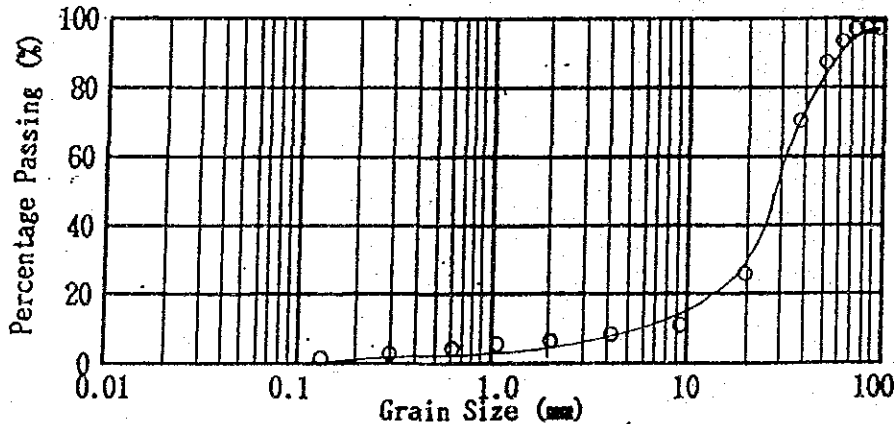
Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE+FINE)	ASTM C 136
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Name of Project Small Hydro Study For Medamit Date 5-7-1987

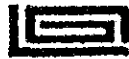
Sample TME-4/Test 1 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75			0		
63	1702	6	1702	6	94
50	3912	13	2210	7	87
37.5	7786	26	3874	13	74
19.0	22236	73	14450	47	27
9.5	27082	89	4846	16	11
4.75	28707	94	1625	5	6
2.36	29019	95	312	1	5
1.18	29244	96	225	1	4
0.60	29510	97	266	1	3
0.30	29758	98	248	1	2
0.15	29904	99	146	1	1
	30000	100	96	1	0
Total					
Fineness Modulu	7.67				

Sieve Analysis Curve

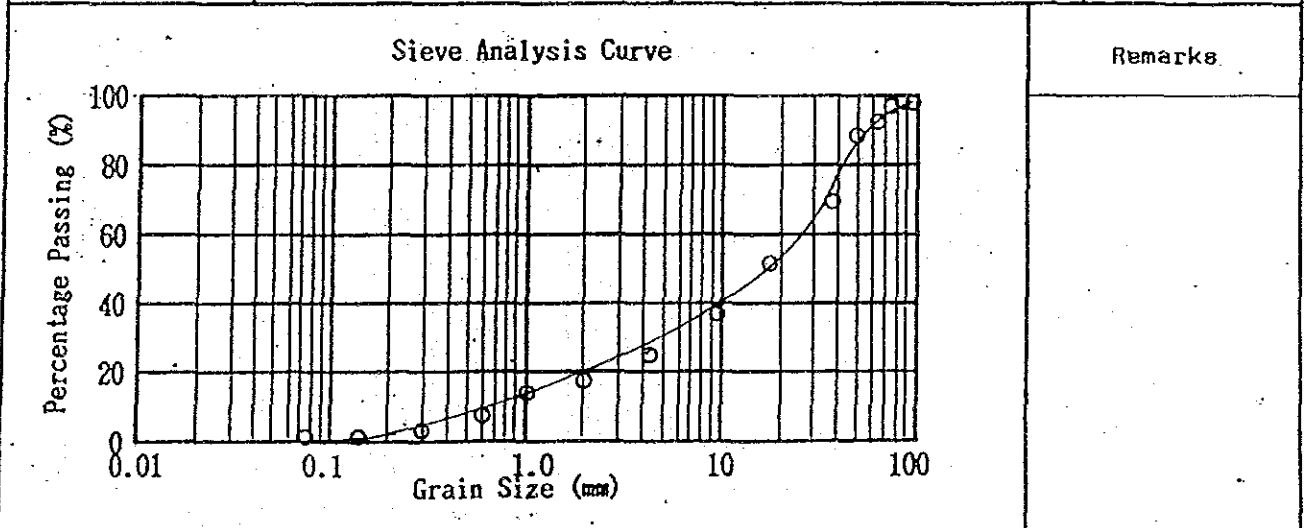


Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE + FINE)	ASTM C 136
Name of Project	Small Hydro Study For Medamit	Date 6-7-1987
Sample	TME-4/Test 2	Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	2,040	7	2,040	7	93
50	2,990	10	950	3	90
37.5	9,828	32	6,838	22	68
19.0	14,258	48	4,430	16	52
9.5	18,148	62	3,890	14	38
4.75	22,071	76	3,923	14	24
2.36	23,372	81	1,301	5	19
1.18	24,468	85	1,096	4	15
0.60	26,076	91	1,608	6	9
0.30	27,931	98	1,855	7	2
0.15	28,226	99	295	1	1
0.075	28,390	100	164	1	0
Total					
Fineness Modulu	6.72				



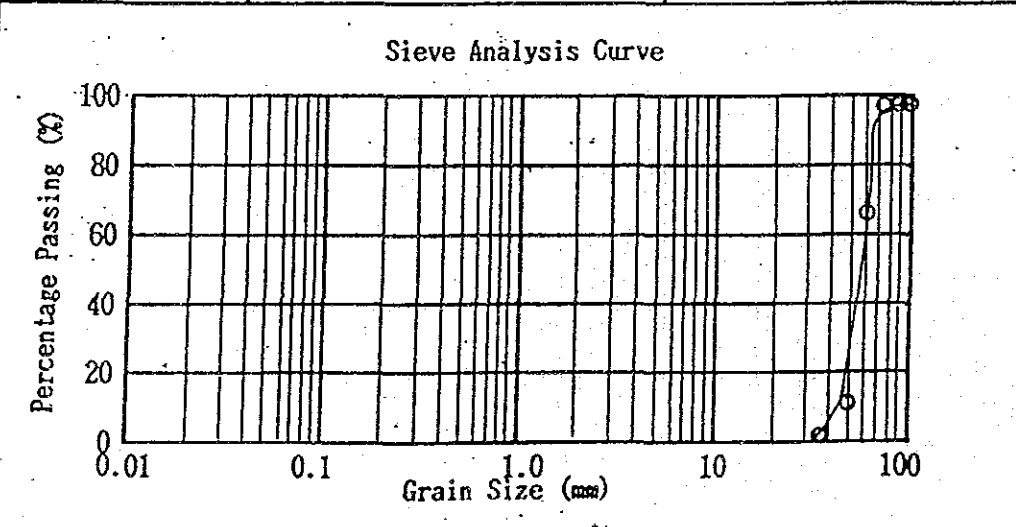


Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
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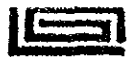
Name of Project <u>Small Hydro Study For Medamit</u>	Date <u>6-7-1987</u>
Sample <u>TME-5/Test 1</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	5,950	33	5,950	33	67
50	15,520	87	9,570	54	13
37.5	17,883	100	2,363	13	0
19.0					
9.5					
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					

Fineness Modulu	9.00
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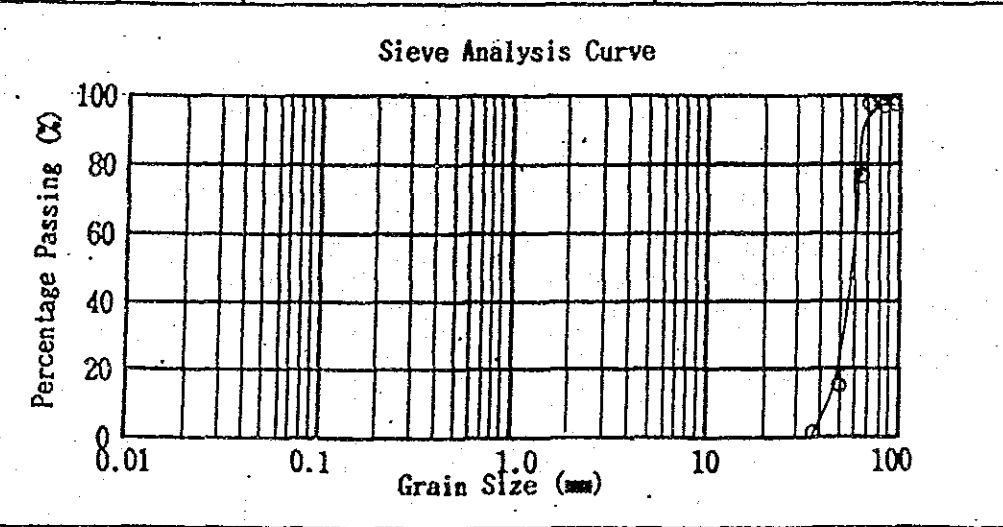


Remarks

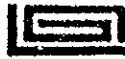


Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)		ASTM C 136
Name of Project	<u>Small Hydro Study For Madamit</u>	Date	<u>7-7-1987</u>
Sample	<u>TME-5/Test 2</u>	Tested by	<u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	0	-	-
63	5430	21	5430	21	79
50	21546	83	16116	62	17
37.5	26100	100	4554	17	10
19.0					
9.5					
Total					
Fineness Modulu	9.00				



Remarks

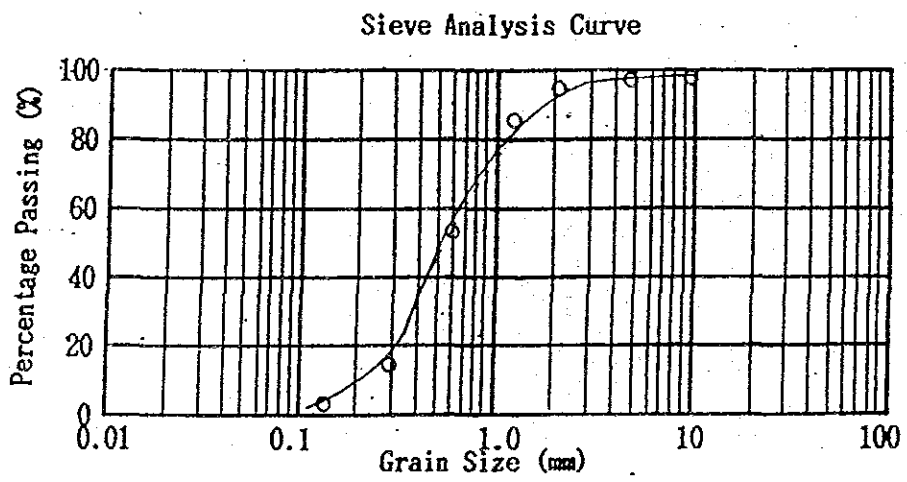


Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u> FINE </u>)	ASTM C 136
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Name of Project Small Hydro Study For Medamit Date 6-7-1987

Sample TME-5/Test 1 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	58	1	58	1	99
2.36	146	3	88	2	97
1.18	538	11	392	8	89
0.60	2619	45	2081	34	55
0.30	5022	85	2403	40	15
0.15	5525	94	503	9	6
	5847	100	322	6	0
Total					
Fineness Modulu	2.39				



Remarks

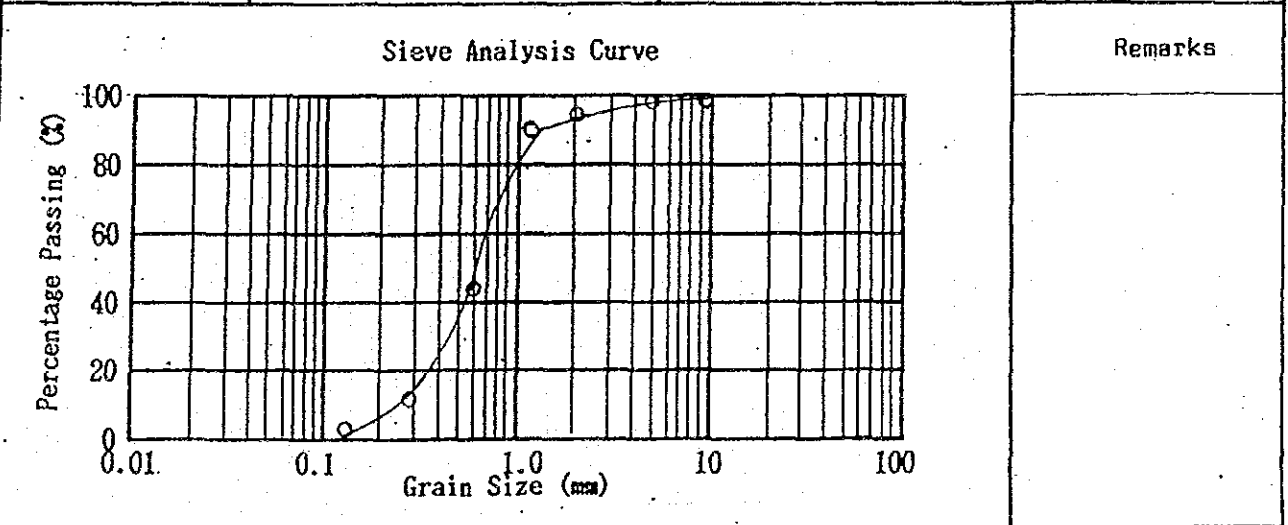


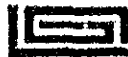
Name of Test	SIEVE ANALYSIS OF AGGREGATES (FINE)	ASTM C 136
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Name of Project <u>Small Hydro Study For Medamit</u>	Date <u>6-7-1987</u>
Sample <u>TME-5/Test 2</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	33	1	33	1	99
2.36	99	3	66	2	97
1.18	329	9	230	6	91
0.60	2219	57	1890	48	43
0.30	3373	87	1154	30	13
0.15	3701	95	328	8	5
	3900	100	199	5	0
Total					

Fineness Modulu	2.52	
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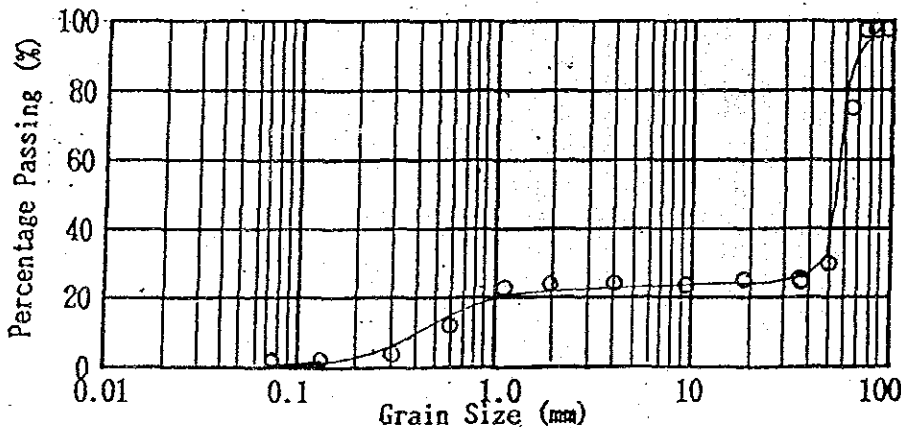


Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE + FINE)	ASTM C 136
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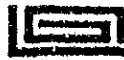
Name of Project Small Hydro Study For Medamit Date 6-7-1987
 Sample TME-5/Test 1 Tested by C,S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	-	-	-
63	5,950	25	5,950	25	75
50	15,520	66	9,570	41	34
37.5	17,883	76	2,363	10	24
19.0	17,883	76	0	0	24
9.5	17,883	76	0	0	24
4.75	17,941	76	58	0	24
2.36	18,029	76	88	0	24
1.18	18,421	78	392	2	22
0.60	20,502	87	2,081	9	13
0.30	22,905	97	2,403	10	3
0.15	23,408	99	503	2	1
0.075	23,730	100	322	1	0
Total					
Fineness Modulu	7.41				

Sieve Analysis Curve



Remarks



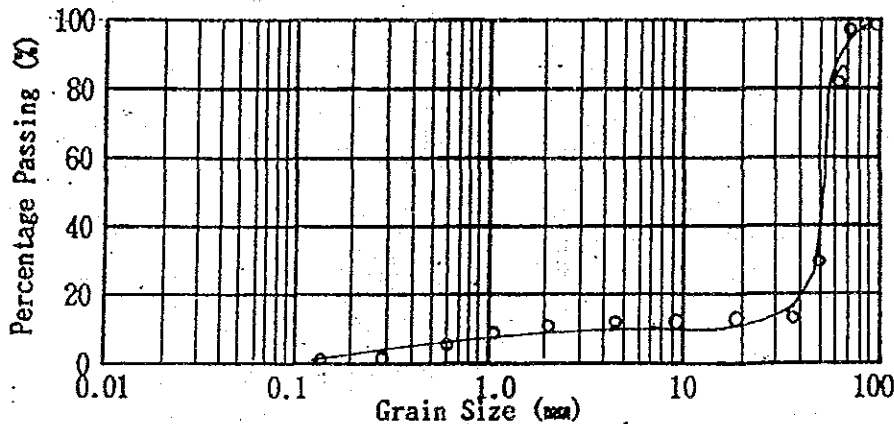
Name of Test	SIEVE ANALYSIS OF AGGREGATES (COARSE+FINE)	ASTM C 136
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Name of Project Small Hydro Study For Medamit Date 6-7-1987

Sample TME-5/Test 2 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100	-	-	-	-	-
90	-	-	-	-	-
75	-	-	0	-	-
63	5430	18	5430	18	82
50	21546	71	16116	53	29
37.5	26100	86	4544	15	14
19.0	26100	86	0	-	14
9.5	26100	86	0	-	14
4.75	26133	87	33	1	13
2.36	26199	88	66	1	12
1.18	26429	89	230	1	11
0.60	28319	95	1890	6	5
0.30	29470	98	1154	3	2
0.15	29801	99	328	1	1
	30000	100	199	1	0
Total					
Fineness Modulu	8.14				

Sieve Analysis Curve

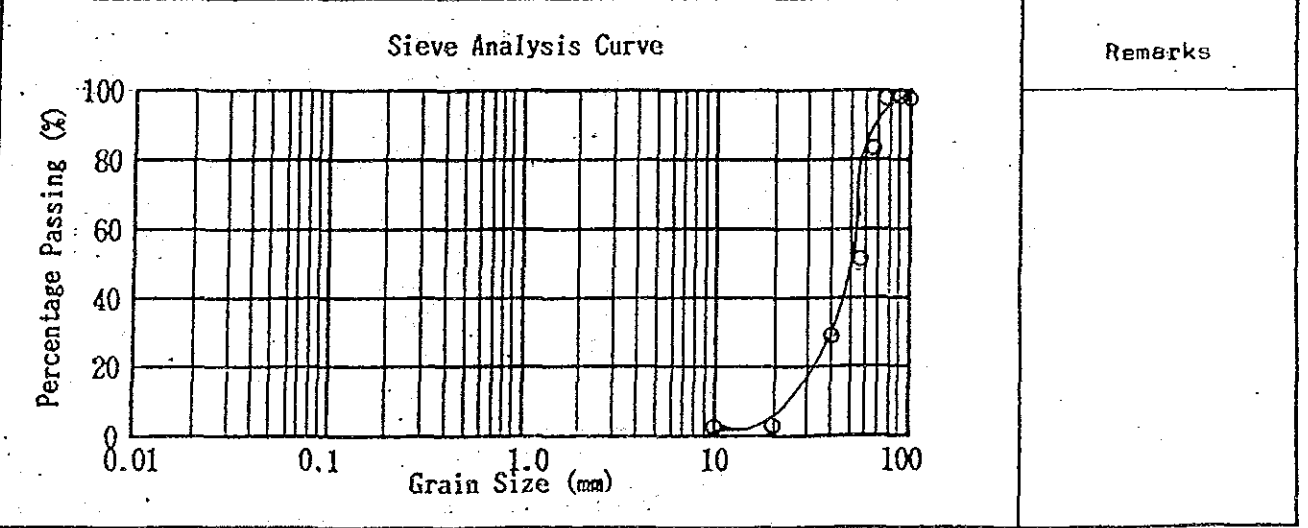


Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>COARSE</u>)	ASTM C 136
Name of Project	<u>Small Hydro Study For Madamit</u>	Date <u>7-7-1987</u>
Sample	<u>TME-6/Test 2</u>	Tested by <u>C.S.M.</u>

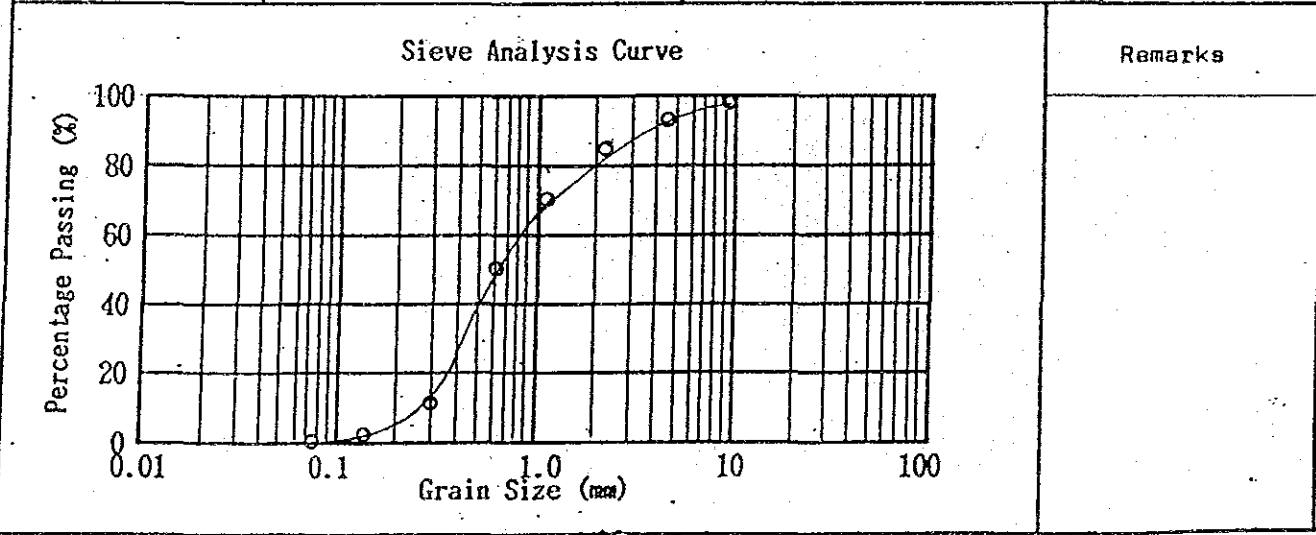
Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63	4,426	16	4,426	16	84
50	12,946	46	8,520	30	54
37.5	20,340	72	7,394	26	28
19.0	27,216	97	6,876	25	3
9.5	27,966	100	750	3	0
4.75					
2.36					
1.18					
0.60					
0.30					
0.15					
Total					
Fineness Modulu	8.69				

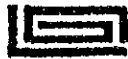




Name of Test	SIEVE ANALYSIS OF AGGREGATES (FINE)	ASTM C 136
Name of Project	Small Hydro Study For Madamit	Date 23-7-1987
Sample	TME-6/Test 1	Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	28	4	28	4	96
2.36	124	17	96	13	83
1.18	212	29	88	12	71
0.60	376	50	164	21	50
0.30	666	88	290	38	12
0.15	740	97	74	9	3
0.075	764	100	24	3	0
Total					
Fineness Modulu	2.85				

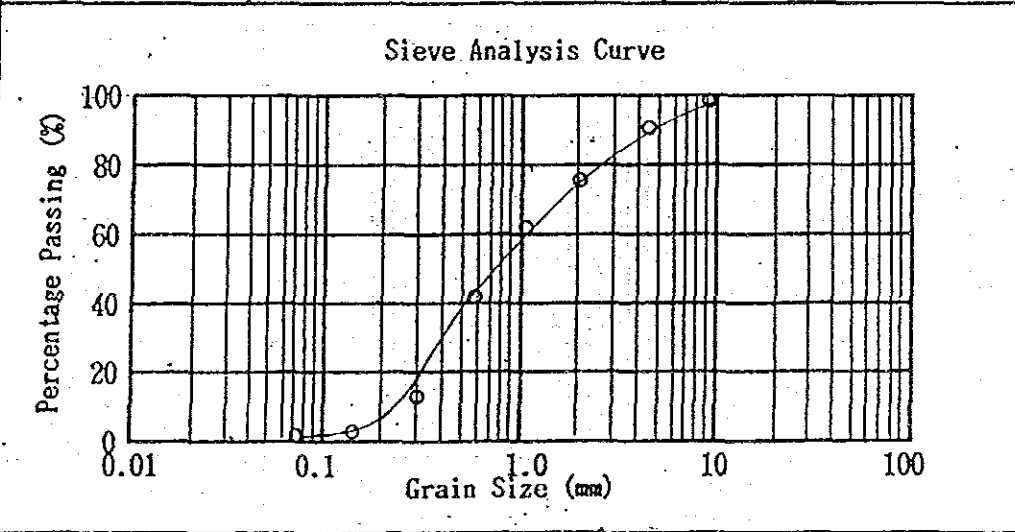




Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u> FINE </u>)	ASTM C 136
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Name of Project <u>Small Hydro Study For Medemit</u>	Date <u>23-7-1987</u>
Sample <u>TME-6/Test 2</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	76	10	76	10	90
2.36	194	25	118	15	75
1.18	278	36	84	11	64
0.60	454	59	176	23	41
0.30	668	87	214	28	13
0.15	746	97	78	10	3
0.075	774	100	28	3	0
Total					
Fineness Modulu	3.14				



Remarks



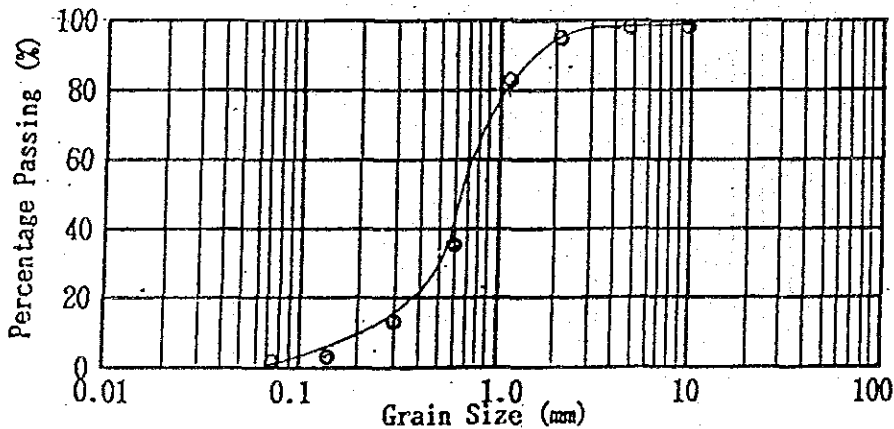
Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
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Name of Project Small Hydro Study For Medamit Date 23-7-1987

Sample TME-7/Test 1 Tested by C.S.M.

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	14	1	14	1	99
2.36	68	5	54	4	95
1.18	226	7	158	12	83
0.60	826	63	600	46	37
0.30	1156	88	330	25	12
0.15	1272	97	116	9	3
0.075	1310	100	38	3	0
Total					
Fineness Modulu	2.61				

Sieve Analysis Curve



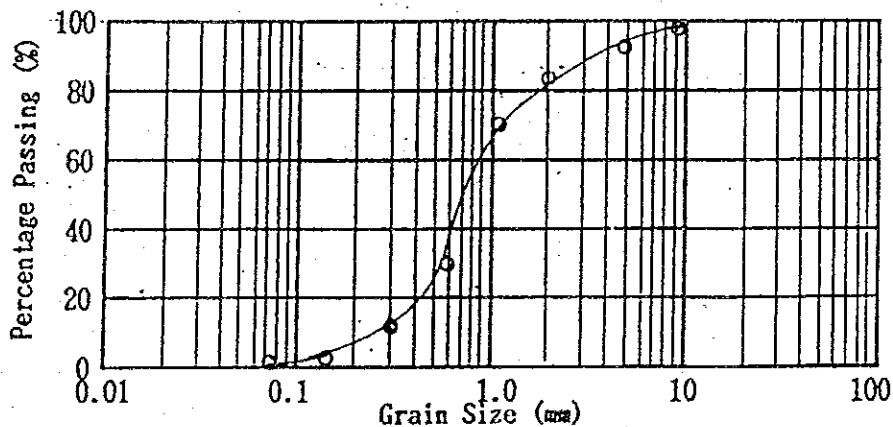
Remarks



Name of Test	SIEVE ANALYSIS OF AGGREGATES (<u>FINE</u>)	ASTM C 136
Name of Project	<u>Small Hydro Study For Medemit</u>	Date <u>25-7-1987</u>
Sample	<u>TME-7/Test 2</u>	Tested by <u>C.S.M.</u>

Sieve Opening (mm)	Cumulative Weight of Retained		Weight of Retained		Passing (%)
	(g)	(%)	(g)	(%)	
100					
90					
75					
63					
50					
37.5					
19.0					
9.5					
4.75	112	4	112	4	96
2.36	382	14	270	10	86
1.18	712	26	330	12	74
0.60	1888	69	1176	43	31
0.30	2440	89	552	20	11
0.15	2700	98	260	9	2
0.075	2766	100	66	2	0
Total					
Fineness Modulu	3.00				

Sieve Analysis Curve



Remarks