

**THE REPUBLIC OF INDONESIA**  
**THE FEASIBILITY STUDY**  
**ON**  
**THE URGENT BALI BEACH**  
**CONSERVATION PROJECT**

**FINAL REPORT**

**VOLUME 3 DATA BOOK**

**MARCH 1989**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**THE REPUBLIC OF INDONESIA**

**THE FEASIBILITY STUDY**

**ON**

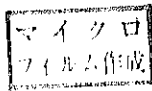
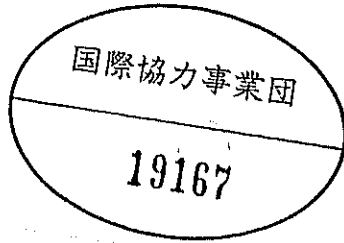
**THE URGENT BALI BEACH**

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VOLUME 3 DATA BOOK

Data of Material Test and Geological Survey

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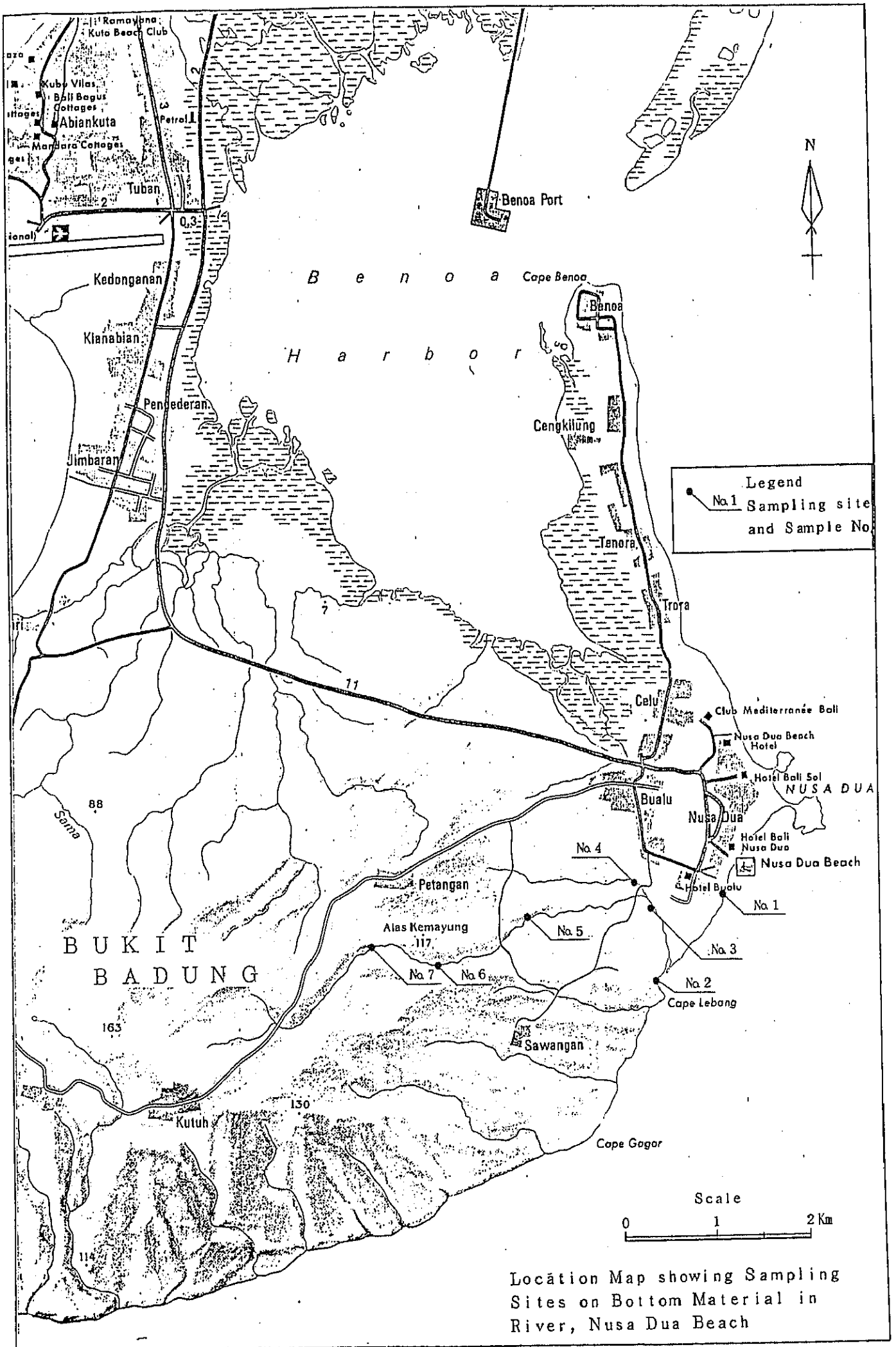
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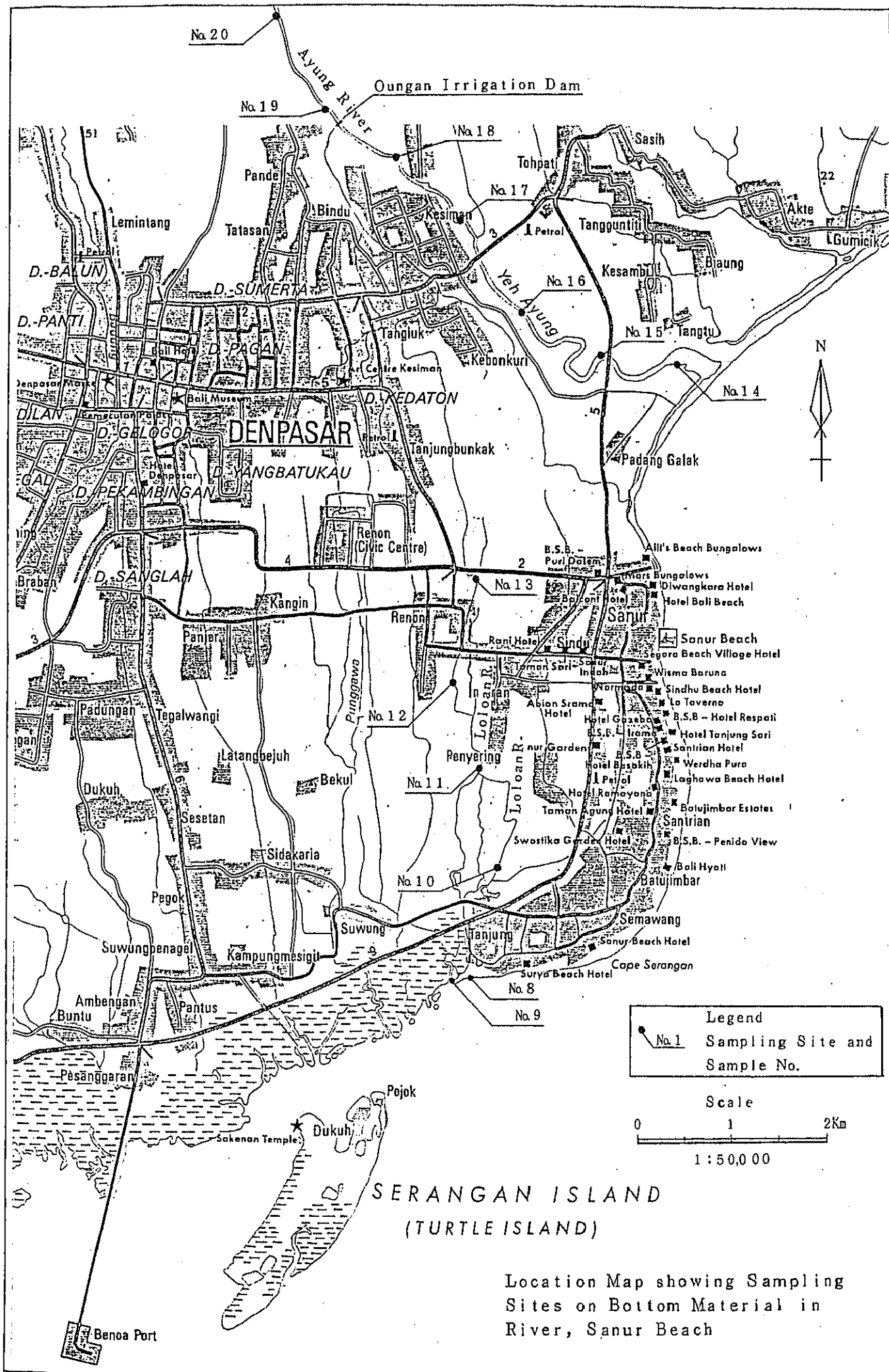
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I. Bottom Material Tests, Nusa Dua,  
Kuta and Sanur Beach



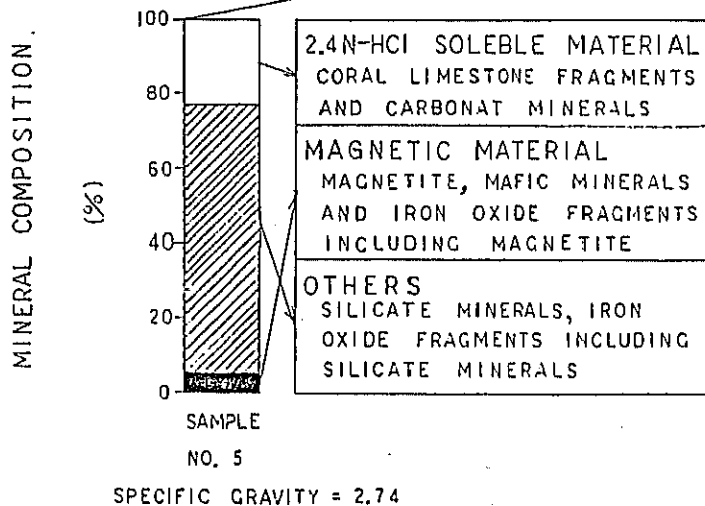
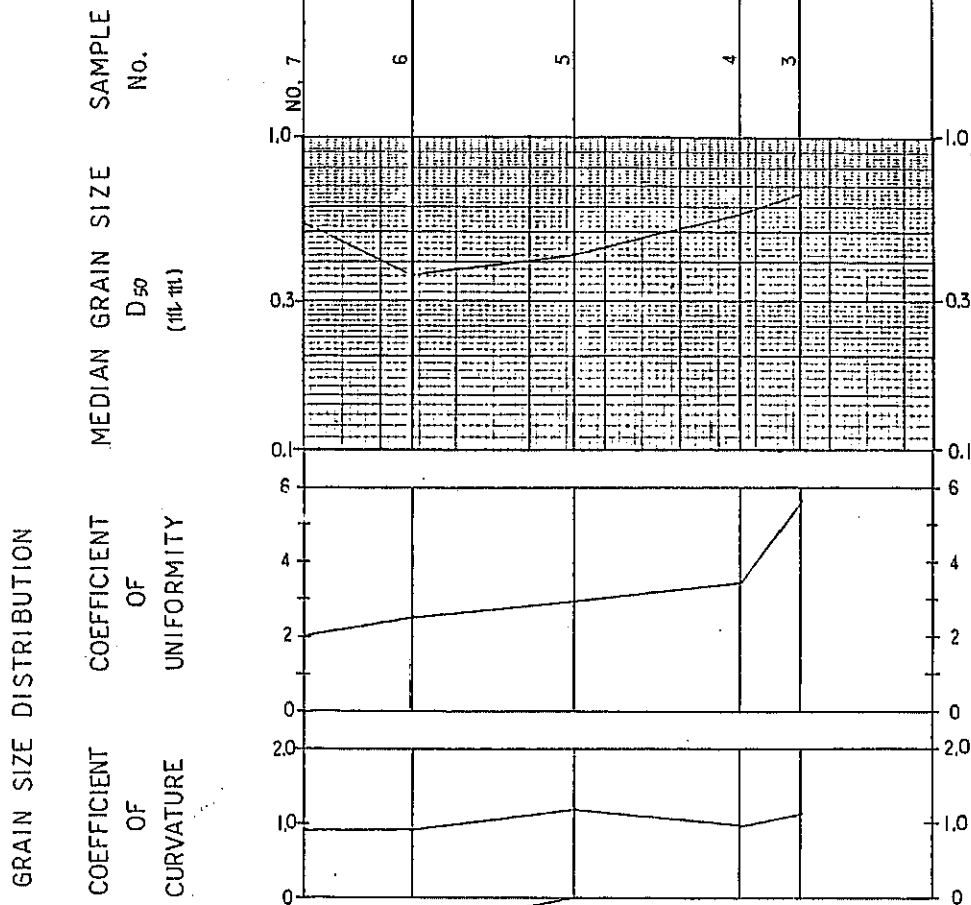
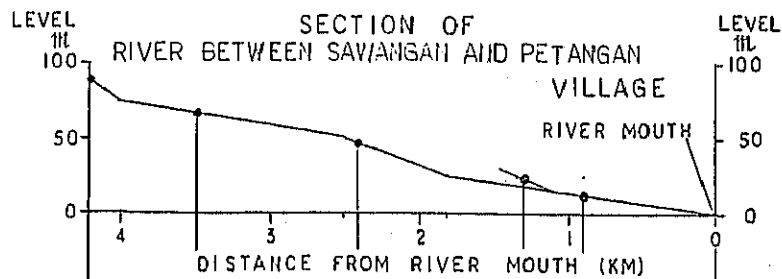
Location Map showing Sampling Sites on Bottom Material in River, Nusa Dua Beach





SERANGAN ISLAND  
(TURTLE ISLAND)

Location Map showing Sampling Sites on Bottom Material in River, Sanur Beach



GRAIN SIZE DISTRIBUTION

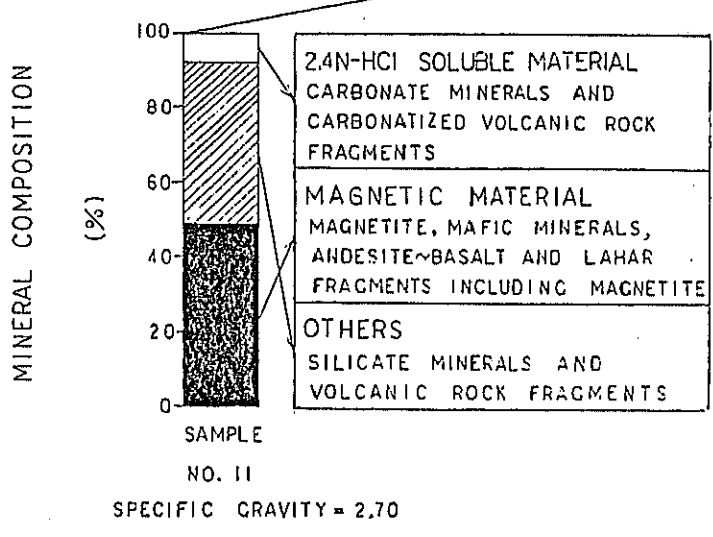
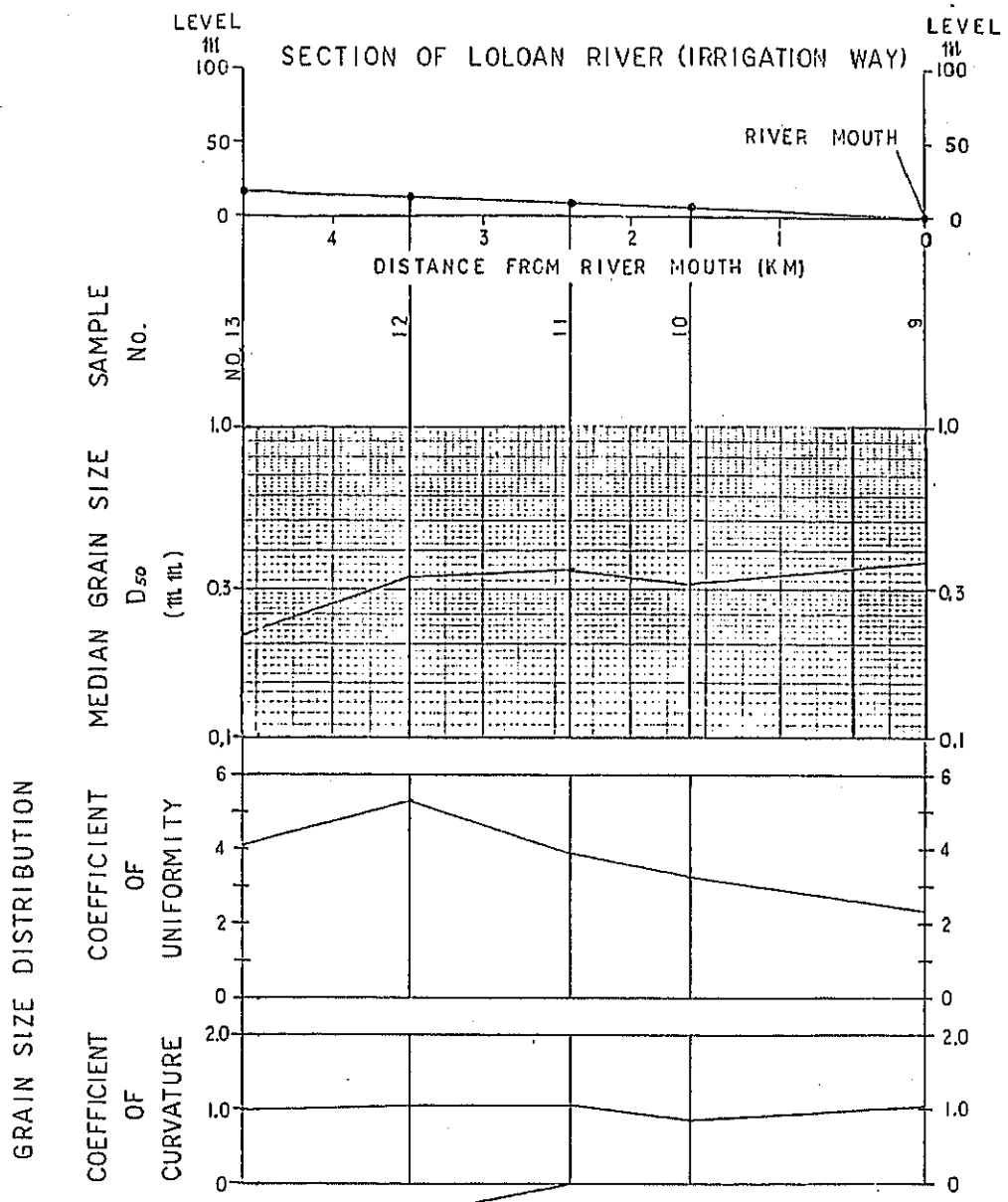
$$Uc = D_{60} / D_{10}$$

$$Uc^3 = (D_{30})^2 / (D_{10} \times D_{60})$$

Uc: COEFFICIENT OF UNIFORMITY  
 Uc<sup>3</sup>: COEFFICIENT OF CURVATURE  
 D<sub>10</sub>: 10% GRAIN SIZE (11L 111)  
 D<sub>30</sub>: 30% GRAIN SIZE (11L 111)  
 D<sub>60</sub>: 60% GRAIN SIZE (11L 111)

MEDIAN GRAIN SIZE  
 D<sub>50</sub>: 50% GRAIN SIZE (11L 111)

Diagram showing the Result of Grain Size Analysis, Specific Gravity and Mineral Composition Test, on Bottom Material in the River between Sawangan and Petangan Village.



**GRAIN SIZE DISTRIBUTION**

$U_c = D_{60} / D_{10}$

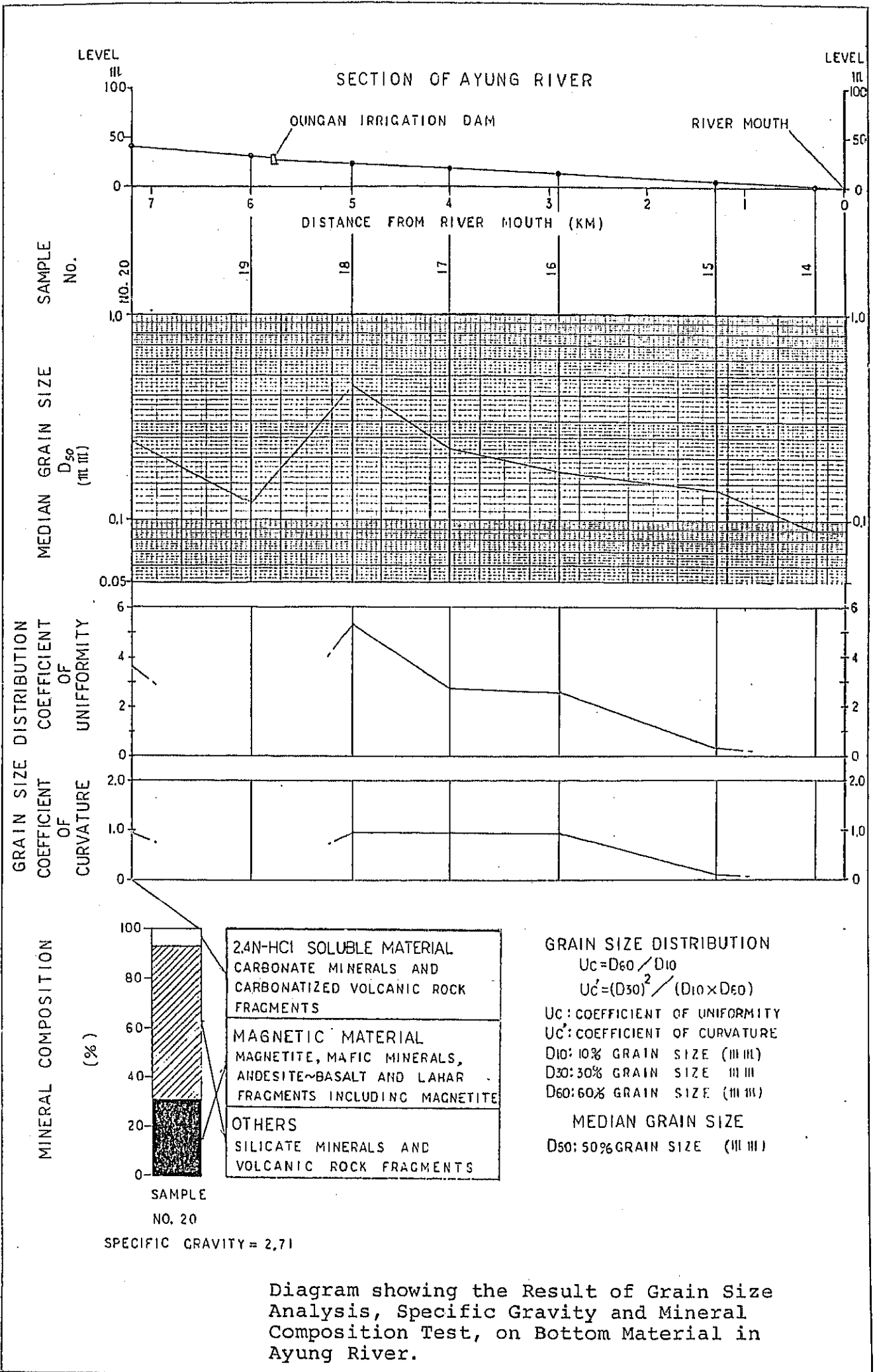
$U_c^1 = (D_{30})^2 / (D_{10} \times D_{60})$

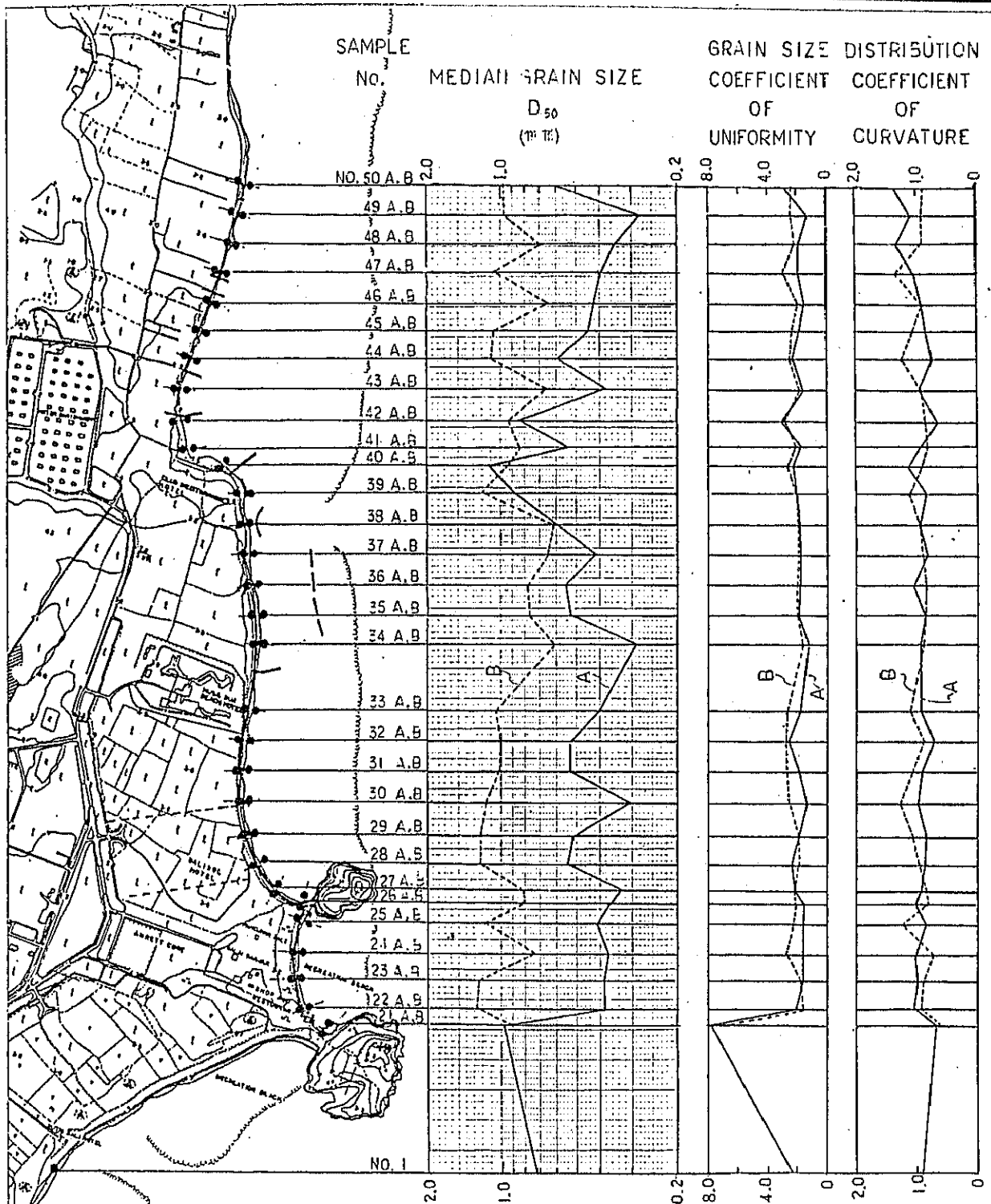
Uc : COEFFICIENT OF UNIFORMITY  
 U<sup>c</sup> : COEFFICIENT OF CURVATURE  
 D<sub>10</sub>: 10% GRAIN SIZE (mm phi)  
 D<sub>30</sub>: 30% GRAIN SIZE (mm phi)  
 D<sub>60</sub>: 60% GRAIN SIZE (mm phi)

**MEDIAN GRAIN SIZE**

D<sub>50</sub>: 50% GRAIN SIZE (mm phi)

Diagram showing the Result of Grain Size Analysis, Specific Gravity and Mineral Composition Test, on Bottom Material in Loloan River.





SAMPLE No.

MEDIAN GRAIN SIZE

GRAIN SIZE DISTRIBUTION  
COEFFICIENT OF UNIFORMITY  
COEFFICIENT OF CURVATURE

NO. 50 A.B

2.0

1.0

0.2

8.0

4.0

0

2.0

1.0

0

NO. 1

2.0

1.0

0.2

8.0

4.0

0

2.0

1.0

0

LEGEND

- SAMPLING SITE
- CORAL REEF

GRAIN SIZE DISTRIBUTION

$$U_c = D_{60} / D_{10}$$

$$U_c' = (D_{30})^2 / (D_{10} \times D_{60})$$

U<sub>c</sub>: COEFFICIENT OF UNIFORMITY

U<sub>c</sub>': COEFFICIENT OF CURVATURE

D<sub>10</sub>: 10% GRAIN SIZE (mm)

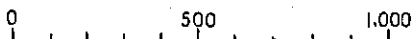
D<sub>30</sub>: 30% GRAIN SIZE (mm)

D<sub>60</sub>: 60% GRAIN SIZE (mm)

MEDIAN GRAIN SIZE

D<sub>50</sub>: 50% GRAIN SIZE (mm)

SCALE



Location Map showing Sampling Sites and Diagram showing the Result of Grain Size Analysis, on Bottom Material in Nusa Dua Beach.

GRAIN SIZE DISTRIBUTION; SAMPLE  
 MEDIAN GRAIN SIZE      COEFFICIENT OF UNIFORMITY      COEFFICIENT OF CURVATURE      No.



LEGEND

- SAMPLING SITE
- CORAL REEF

GRAIN SIZE DISTRIBUTION

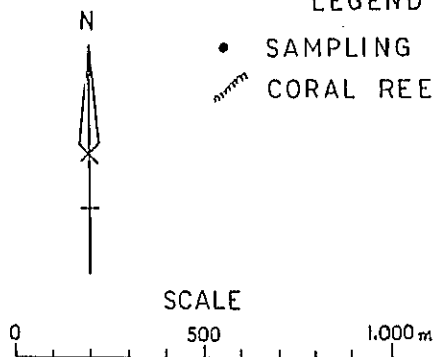
$$U_c = D_{60} / D_{10}$$

$$U_c' = (D_{30})^2 / (D_{10} \times D_{60})$$

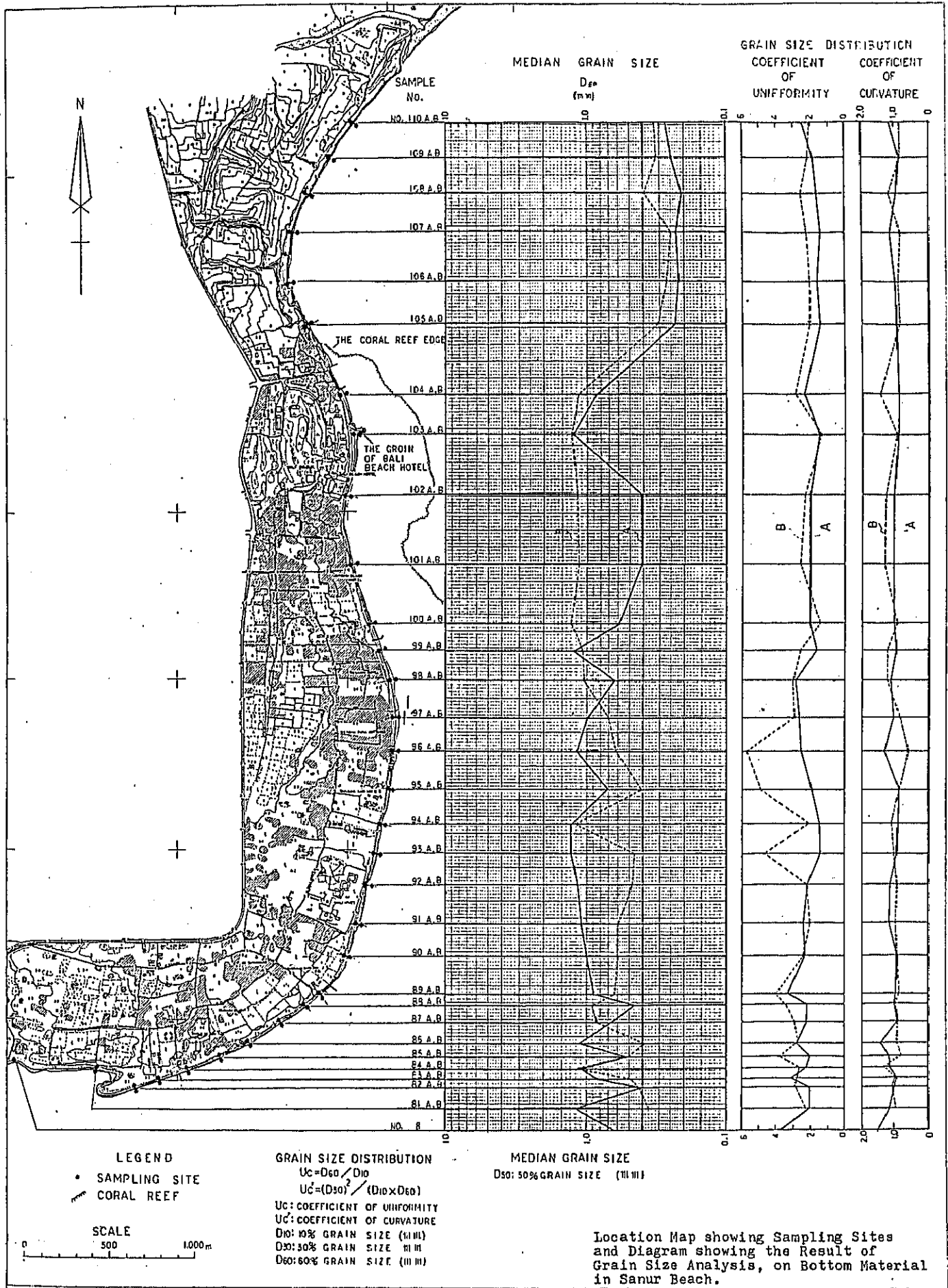
U<sub>c</sub>: COEFFICIENT OF UNIFORMITY  
 U<sub>c</sub>': COEFFICIENT OF CURVATURE  
 D<sub>10</sub>: 10% GRAIN SIZE (III III)  
 D<sub>30</sub>: 30% GRAIN SIZE (III III)  
 D<sub>60</sub>: 60% GRAIN SIZE (III III)

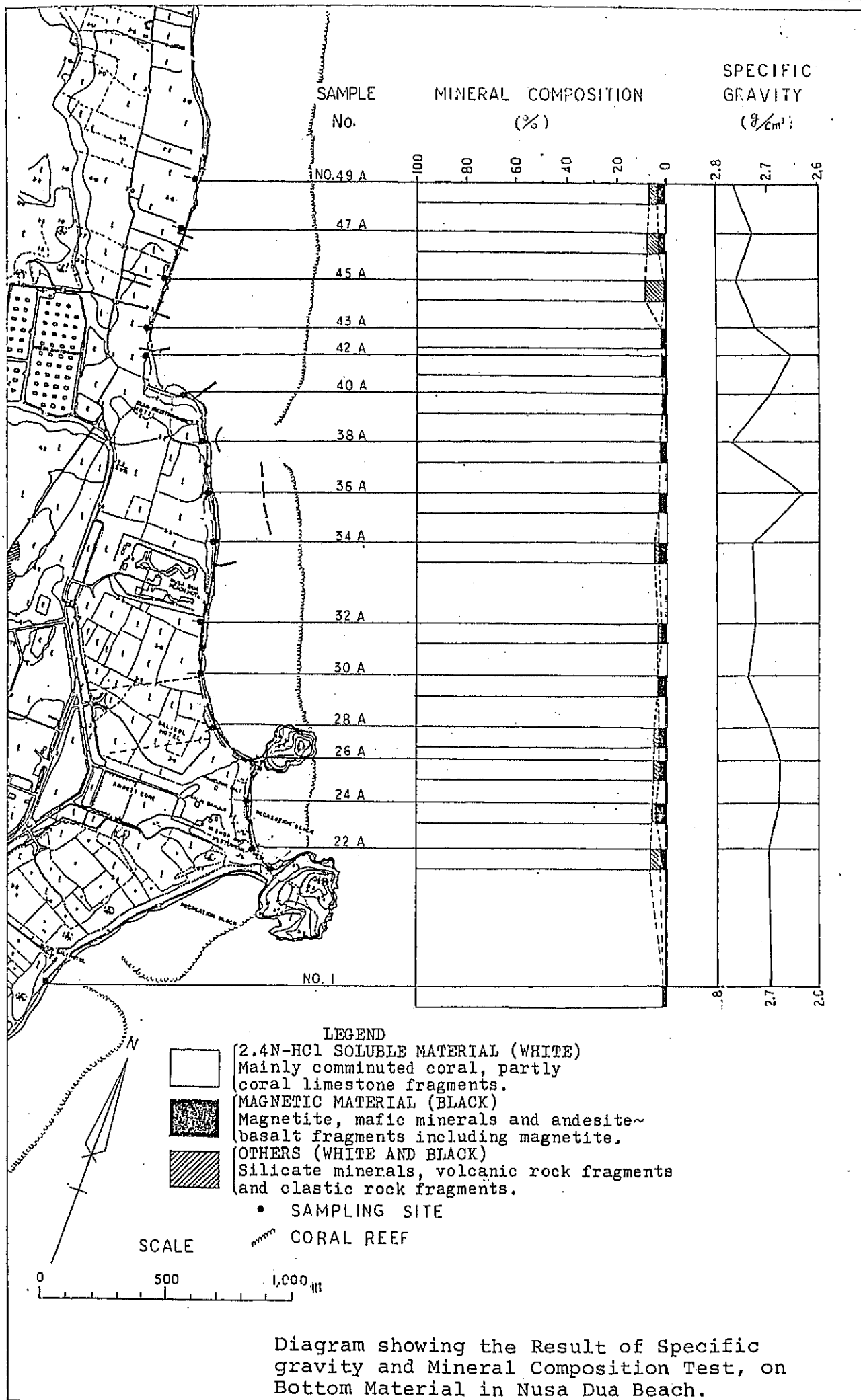
MEDIAN GRAIN SIZE

D<sub>50</sub>: 50% GRAIN SIZE (III III)



Location Map showing Sampling Sites and Diagram showing the Result of Grain Size Analysis, on Bottom Material in Kuta Beach.



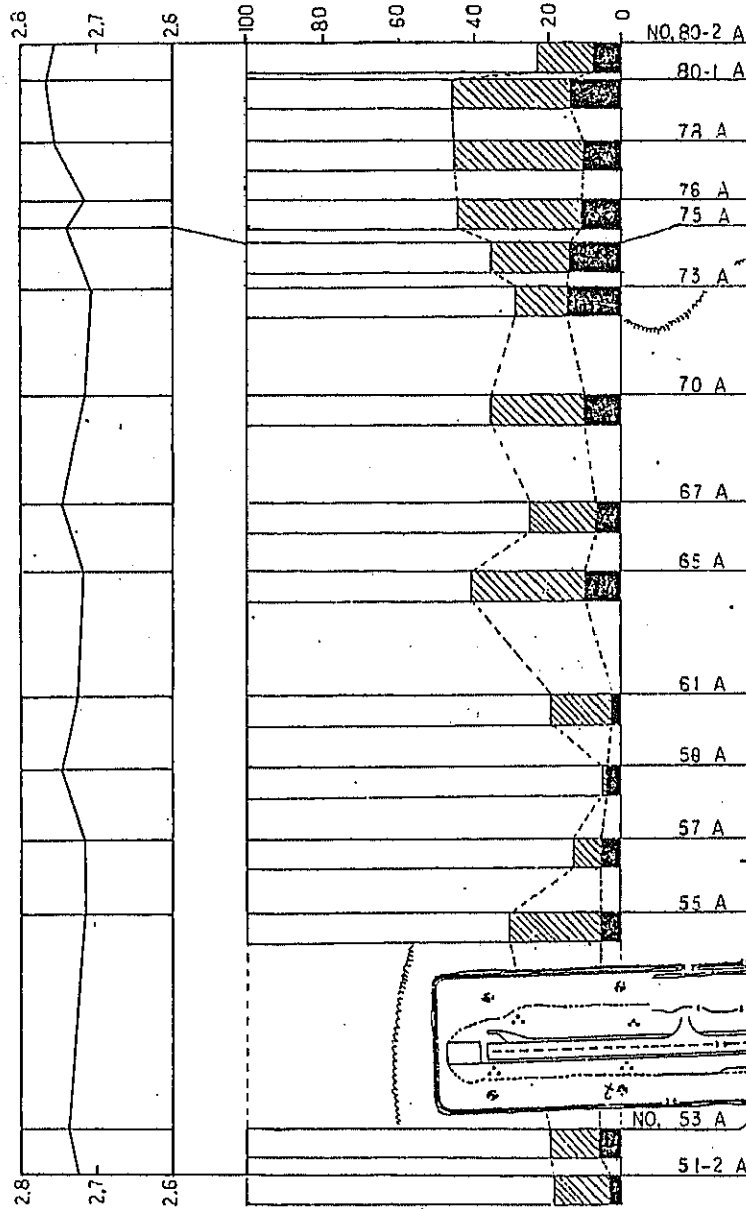







SPECIFIC GRAVITY  
(g/cm<sup>3</sup>)

MINERAL COMPOSITION  
(%)

SAMPLE  
No.



LEGEND

-  [2.4N-HCl SOLUBLE MATERIAL (WHITE)  
Mainly comminuted coral, partly coral limestone fragments.
-  [MAGNETIC MATERIAL (BLACK)  
Magnetite, mafic minerals and andesite~basalt fragments including magnetite.
-  [OTHERS (WHITE AND BLACK)  
Silicate minerals, volcanic rock fragments and clastic rock fragments.

• SAMPLING SITE

 CORAL REEF

SCALE

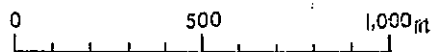
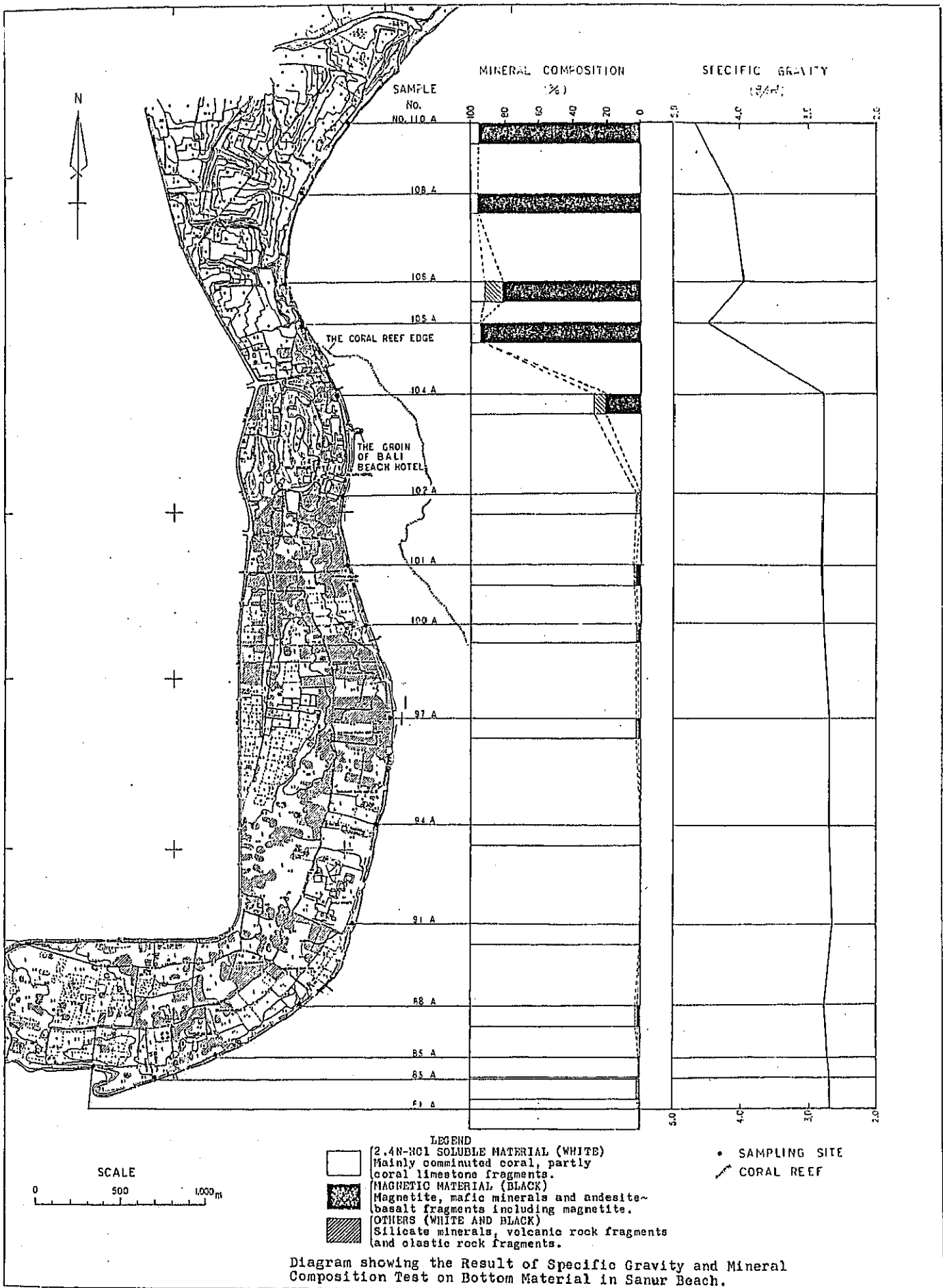


Diagram showing the Result of Specific Gravity and Mineral Composition Test, on Bottom Material in Kuta Beach.



Result of Grain Size Analysis, Specific Gravity and Mineral Composition Test

(1)

Sample No.	Sample Name (Sand)	Location	Laboratory Test Results					
			Median Grain Size D <sub>50</sub> (mm)	Grain Size Distribution		Specific Gravity	Min. Composition	
				U <sub>c</sub>	U <sub>c</sub> <sup>1</sup>		Magnetic Material (%)	Soluble Material (%)
1	Beach Sa	Nusa Dua	0.72	2.270	0.904	2.698	1.54	98.80
2	Beach Sa	Lebang	1.05	2.500	1.111	2.696	1.71	98.70
3	River Sa	Sawangan	0.67	5.649	1.135	2.744	5.71	22.70
4	River Sa	Sawangan	0.57	3.463	0.992			
5	River Sa	Sawangan	0.42	2.941	1.205			
6	River Sa	Sawangan	0.36	2.545	0.902			
7	River Sa	Sawangan	0.54	2.032	0.933			
8	Beach Sa	W. Sanur	0.63	3.737	1.508			
9	River Sa	Loloan	0.37	2.356	1.060			
10	River Sa	Loloan	0.31	3.214	0.849			
11	River Sa	Loloan	0.35	3.832	1.054	2.696	49.69	7.75
12	River Sa	Loloan	0.33	5.333	1.021			
13	River Sa	Loloan	0.23	4.091	0.991			
14	River Sa	Ayung	0.09	-	-			
15	River Sa	Ayung	0.14	0.237	0.100			
16	River Sa	Ayung	0.17	2.597	0.935			
17	River Sa	Ayung	0.22	2.755	0.967			
18	River Sa	Ayung	0.45	5.357	0.975			
19	River Sa	Ayung	0.12	-	-			
20	River Sa	Ayung	0.24	3.626	0.951	2.706	31.52	6.80
21 A	Beach Sa	Nusa Dua	0.97	7.929	0.701			
21 B	Beach Sa	Nusa Dua	0.90	6.993	0.665			
22 A	Beach Sa	Nusa Dua	0.38	1.955	1.082	2.700	2.32	93.55
22 B	Beach Sa	Nusa Dua	1.28	1.556	0.926			
23 A	Beach Sa	Nusa Dua	0.39	1.556	1.019			
23 B	Beach Sa	Nusa Dua	1.25	1.580	0.919			
24 A	Beach Sa	Nusa Dua	0.37	1.667	1.067	2.680	4.21	94.60
24 B	Beach Sa	Nusa Dua	0.73	2.844	0.759			
25 A	Beach Sa	Nusa Dua	0.41	1.610	0.870			
25 B	Beach Sa	Nusa Dua	1.18	2.289	1.239			
26 A	Beach Sa	Nusa Dua	0.37	1.538	1.047	2.681	3.55	94.80
26 B	Beach Sa	Nusa Dua	0.80	2.043	0.846			
27 A	Beach Sa	Nusa Dua	0.33	2.182	0.970			
27 B	Beach Sa	Nusa Dua	0.81	2.233	0.843			
28 A	Beach Sa	Nusa Dua	0.54	2.388	0.905	2.702	3.55	95.35
28 B	Beach Sa	Nusa Dua	1.22	1.811	1.008			
29 A	Beach Sa	Nusa Dua	0.52	1.970	0.830			
29 B	Beach Sa	Nusa Dua	1.22	1.929	1.079			
30 A	Beach Sa	Nusa Dua	0.31	1.422	1.006	2.741	3.87	96.00

(2)

Sample No.	Sample Name (Sand)	Location	Laboratory Test Results					
			Median Grain Size D <sub>50</sub> (mm)	Grain Size Distribution		Specific Gravity	Min. Composition	
				Uc	Uc'		Magnetic Material (%)	Soluble Material (%)
30 B	Beach Sa	Nusa Dua	1.15	2.612	1.291			
31 A	Beach Sa	Nusa Dua	0.53	1.788	0.928			
31 B	Beach Sa	Nusa Dua	1.03	2.682	1.055			
32 A	Beach Sa	Nusa Dua	0.53	2.577	0.744	2.725	1.90	97.25
32 B	Beach Sa	Nusa Dua	1.00	2.738	0.957			
33 A	Beach Sa	Nusa Du	0.41	1.607	0.972			
33 B	Beach Sa	Nusa Dua	1.05	2.674	1.120			
34 A	Beach Sa	Nusa Dua	0.29	1.180	0.950	2.731	3.31	95.60
34 B	Beach Sa	Nusa Dua	0.62	1.634	0.910			
35 A	Beach Sa	Nusa Dua	0.53	1.869	0.873			
35 B	Beach Sa	Nusa Dua	0.76	2.000	0.869			
36 A	Beach Sa	Nusa Dua	0.55	1.794	1.020	2.634	2.71	97.00
36 B	Beach Sa	Nusa Dua	0.78	2.022	0.850			
37 A	Beach Sa	Nusa Dua	0.42	1.690	0.862			
37 B	Beach Sa	Nusa Dua	0.65	1.816	0.921			
38 A	Beach Sa	Nusa Dua	0.60	1.833	0.970	2.769	2.26	99.25
38 B	Beach Sa	Nusa Dua	0.62	1.971	0.994			
39 A	Beach Sa	Nusa Dua	0.88	2.115	0.867			
39 B	Beach Sa	Nusa Dua	1.20	2.015	1.151			
40 A	Beach Sa	Nusa Dua	1.12	2.352	1.155	2.697	1.28	98.90
40 B	Beach Sa	Nusa Dua	0.95	2.558	0.949			
41 A	Beach Sa	Nusa Dua	0.54	1.765	0.949			
41 B	Beach Sa	Nusa Dua	0.84	2.106	0.853			
42 A	Beach Sa	Nusa Dua	0.85	3.125	0.661	2.656	1.49	98.95
42 B	Beach Sa	Nusa Dua	0.92	2.972	0.873			
43 A	Beach Sa	Nusa Dua	0.38	1.455	0.960	2.726	1.92	98.05
43 B	Beach Sa	Nusa Dua	0.66	1.800	0.939			
44 A	Beach Sa	Nusa Dua	0.60	2.290	0.764			
44 B	Beach Sa	Nusa Dua	1.10	2.510	1.227			
45 A	Beach Sa	Nusa Dua	0.44	1.790	0.843	2.759	0.95	91.80
45 B	Beach Sa	Nusa Dua	1.07	2.353	1.099			
46 A	Beach Sa	Nusa Dua	0.42	1.508	0.924			
46 B	Beach Sa	Nusa Dua	0.66	2.090	0.940			
47 A	Beach Sa	Nusa Dua	0.40	1.872	1.053	2.728	3.30	92.35
47 B	Beach Sa	Nusa Dua	1.07	2.860	1.334			
48 A	Beach Sa	Nusa Dua	0.35	1.854	1.315			
48 B	Beach Sa	Nusa Dua	0.70	2.189	0.902			
49 A	Beach Sa	Nusa Dua	0.28	1.318	1.101	2.764	3.63	92.75
49 B	Beach Sa	Nusa Dua	0.98	2.523	0.919			
50 A	Beach Sa	Nusa Dua	0.60	2.792	1.374			
50 B	Beach Sa	Nusa Dua	0.98	2.375	0.895			
51-1 A	Beach Sa	Kuta	0.22	1.656	0.887			
51-1 B	Beach Sa	Kuta	0.19	1.736	1.020			
51-2 A	Beach Sa	Kuta	0.22	1.731	1.095	2.729	3.19	81.95

Sample No.	Sample Name (Sand)	Location	Laboratory Test Results					
			Median Grain Size D <sub>50</sub> (mm)	Grain Size Distribution		Specific Gravity	Min. Composition	
				U <sub>c</sub>	U <sub>c</sub> '		Magnetic Material (%)	Soluble Material (%)
51-2 B	Beach Sa	Kuta	0.18	1.773	1.021			
52 A	Beach Sa	Kuta	0.14	1.620	1.195			
52 B	Beach Sa	Kuta	0.14	1.596	1.021			
53 A	Beach Sa	Kuta	0.13	1.614	1.040	2.739	5.94	80.35
53 B	Beach Sa	Kuta	0.16	1.830	0.951			
54 A	Beach Sa	Kuta	0.15	1.739	0.995			
54 B	Beach Sa	Kuta	0.16	1.650	0.965			
55 A	Beach Sa	Kuta	0.16	2.021	0.917	2.714	5.29	69.80
55 B	Beach Sa	Kuta	0.15	1.923	0.919			
56 A	Beach Sa	Kuta	0.13	1.726	0.993			
56 B	Beach Sa	Kuta	0.14	1.713	0.968			
57 A	Beach Sa	Kuta	0.42	8.352	0.244	2.716	5.13	86.75
57 B	Beach Sa	Kuta	0.56	7.685	0.238			
58 A	Beach Sa	Kuta	0.18	3.830	0.499			
58 B	Beach Sa	Kuta	0.15	1.848	0.936			
59 A	Beach Sa	Kuta	0.99	10.000	1.742	2.745	3.53	95.75
59 B	Beach Sa	Kuta	0.13	1.595	1.036			
60 A	Beach Sa	Kuta	0.25	3.897	0.425			
60 B	Beach Sa	Kuta	0.14	0.172	0.100			
61 A	Beach Sa	Kuta	0.24	6.040	0.318	2.725	2.46	80.90
61 B	Beach Sa	Kuta	0.13	1.667	1.029			
62 B	Beach Sa	Kuta	0.14	1.629	1.079			
64 B	Beach Sa	Kuta	0.20	2.207	0.883			
65 A	Beach Sa	Kuta	0.14	1.607	1.021	2.717	9.95	59.65
65 B	Beach Sa	Kuta	0.18	1.667	1.140			
66 A	Beach Sa	Kuta	0.15	1.700	0.934			
66 B	Beach Sa	Kuta	0.14	1.722	1.015			
67 A	Beach Sa	Kuta	0.18	1.776	0.978	2.744	6.49	75.30
67 B	Beach Sa	Kuta	0.20	3.727	0.435			
68 A	Beach Sa	Kuta	0.16	1.716	0.947			
68 B	Beach Sa	Kuta	0.75	2.903	1.007			
69 A	Beach Sa	Kuta	0.14	1.598	1.030			
69 B	Beach Sa	Kuta	0.15	1.732	0.990			
70 A	Beach Sa	Kuta	0.21	1.677	1.068	2.716	10.00	64.15
70 B	Beach Sa	Kuta	0.13	1.609	1.030			
71 A	Beach Sa	Kuta	0.14	1.728	0.984			
71 B	Beach Sa	Kuta	0.16	1.938	0.898			
72 A	Beach Sa	Kuta	0.15	1.691	0.963			
72 B	Beach Sa	Kuta	0.15	1.798	0.994			
73 A	Beach Sa	Kuta	0.19	1.641	1.013	2.708	15.00	71.75
73 B	Beach Sa	Kuta	0.16	1.786	0.878			

(4)

Sample No.	Sample Name (Sand)	Location	Laboratory Test Results					
			Median Grain Size D <sub>50</sub> (mm)	Grain Size Distribution		Specific Gravity	Min. Composition	
				Uc	Uc'		Magnetic Material (%)	Soluble Material (%)
74 A	Beach Sa	Kuta	0.17	1.990	0.800			
74 B	Beach Sa	Kuta	0.16	2.220	0.813			
75 A	Beach Sa	Kuta	0.15	1.734	0.971	2.739	14.06	64.75
75 B	Beach Sa	Kuta	0.18	1.835	0.836			
76 A	Beach Sa	Kuta	0.13	1.667	1.029	2.715	11.00	56.10
76 B	Beach Sa	Kuta	0.15	1.643	0.990			
77 A	Beach Sa	Kuta	0.14	1.648	1.020			
77 B	Beach Sa	Kuta	0.15	1.581	0.925			
78 A	Beach Sa	Kuta	0.15	1.649	0.959	2.755	10.03	55.25
78 B	Beach Sa	Kuta	0.17	1.682	0.946			
79 A	Beach Sa	Kuta	0.15	1.626	1.034			
79 B	Beach Sa	Kuta	0.13	1.296	0.952			
80-1 A	Beach Sa	Kuta	0.19	1.650	1.077	2.765	14.51	54.75
80-1 B	Beach Sa	Kuta	0.17	1.636	1.047			
80-2 A	Beach Sa	Kuta	0.21	1.958	1.025	2.755	7.15	77.55
80-2 B	Beach Sa	Kuta	0.19	1.842	1.069			
81 A	Beach Sa	Sanur	1.20	2.079	1.164	2.706	0.15	99.65
81 B	Beach Sa	Sanur	0.36	2.343	0.928			
82 A	Beach Sa	Sanur	0.41	2.085	1.004			
82 B	Beach Sa	Sanur	0.42	2.928	1.067			
83 A	Beach Sa	Sanur	0.83	3.175	0.892	2.691	0.30	99.10
83 B	Beach Sa	Sanur	0.49	2.791	0.950			
84 A	Beach Sa	Sanur	1.08	2.330	1.142			
84 B	Beach Sa	Sanur	1.15	2.667	1.318			
85 A	Beach Sa	Sanur	0.53	2.035	1.171	2.720	0.45	99.30
85 B	Beach Sa	Sanur	0.51	3.804	0.795			
86 A	Beach Sa	Sanur	1.12	2.864	1.429			
86 B	Beach Sa	Sanur	0.39	2.818	0.943			
87 A	Beach Sa	Sanur	0.67	2.294	0.905			
87 B	Beach Sa	Sanur	0.85	2.941	0.890			
88 A	Beach Sa	Sanur	0.46	2.208	1.019	2.764	1.17	97.75
88 B	Beach Sa	Sanur	0.90	3.453	0.998			
89 A	Beach Sa	Sanur	0.88	3.355	0.973			
89 B	Beach Sa	Sanur	0.64	4.050	0.845			
90 A	Beach Sa	Sanur	1.00	2.300	0.952			
90 B	Beach Sa	Sanur	0.60	2.536	0.974			
91 A	Beach Sa	Sanur	1.10	2.315	1.200	2.645	0.27	99.75
91 B	Beach Sa	Sanur	0.60	2.092	1.000			
92 A	Beach Sa	Sanur	1.16	2.167	1.133			
92 B	Beach Sa	Sanur	0.48	2.327	0.928			
93 A	Beach Sa	Sanur	1.30	1.522	0.939			
93 B	Beach Sa	Sanur	0.46	4.714	1.007			
94 A	Beach Sa	Sanur	1.30	1.538	0.916	2.685	0.06	99.55
94 B	Beach Sa	Sanur	1.20	2.062	1.125			

Sample No.	Sample Name (Sand)	Location	Laboratory Test Results					
			Median Grain Size D <sub>50</sub> (mm)	Grain Size Distribution		Specific Gravity	Min. Composition	
				U <sub>c</sub>	U <sub>c</sub> '		Magnetic Material (%)	Soluble Material (%)
95 A	Beach Sa	Sanur	0.70	1.951	0.889			
95 B	Beach Sa	Sanur	0.41	4.909	0.891			
96 A	Beach Sa	Sanur	1.17	2.600	1.339			
96 B	Beach Sa	Sanur	0.62	5.731	0.592			
97 A	Beach Sa	Sanur	1.00	2.714	1.023	2.678	0.74	98.20
97 B	Beach Sa	Sanur	0.70	3.000	0.839			
98 A	Beach Sa	Sanur	0.64	2.980	1.140			
98 B	Beach Sa	Sanur	1.05	3.077	1.267			
99 A	Beach Sa	Sanur	1.23	1.722	0.968			
99 B	Beach Sa	Sanur	1.08	2.727	1.273			
100 A	Beach Sa	Sanur	0.59	2.094	1.030	2.764	1.39	98.10
100 B	Beach Sa	Sanur	1.30	1.538	0.950			
101 A	Beach Sa	Sanur	0.41	2.087	1.047	2.788	2.36	97.05
101 B	Beach Sa	Sanur	1.15	2.612	1.320			
102 A	Beach Sa	Sanur	0.41	2.133	1.070	2.776	0.27	97.65
102 B	Beach Sa	Sanur	1.18	2.434	1.292			
103 A	Beach Sa	Sanur	1.28	1.562	0.908			
103 B	Beach Sa	Sanur	1.30	1.514	0.934			
104 A	Beach Sa	Sanur	0.87	2.525	0.891	2.774	20.56	72.00
104 B	Beach Sa	Sanur	1.16	2.955	1.496			
105 A	Beach Sa	Sanur	0.23	1.509	0.976	4.478	95.88	9.75
105 B	Beach Sa	Sanur	0.31	2.060	0.863			
106 A	Beach Sa	Sanur	0.22	1.655	0.973	3.949	81.37	8.30
106 B	Beach Sa	Sanur	0.27	2.105	0.898			
107 A	Beach Sa	Sanur	0.23	1.500	1.148			
107 B	Beach Sa	Sanur	0.25	2.319	0.817			
108 A	Beach Sa	Sanur	0.21	1.703	0.944	4.124	95.05	9.90
108 B	Beach Sa	Sanur	0.40	2.629	1.194			
109 A	Beach Sa	Sanur	0.25	1.906	0.861			
109 B	Beach Sa	Sanur	0.32	2.182	0.852			
110 A	Beach Sa	Sanur	0.27	2.481	1.172	4.659	97.48	6.05
110 B	Beach Sa	Sanur	0.33	2.118	0.864			

Note; Median Grain Size

D<sub>50</sub> : 50% Grain size (mm)

Grain Size Distribution

$$U_c = D_{60} \times D_{10}$$

$$U_c' = (D_{30})^2 / (D_{10} \times D_{60})$$

U<sub>c</sub> : Coefficient of uniformity

U<sub>c</sub>' : Coefficient of curvature

D<sub>10</sub> : 10% of Grain size (mm)

D<sub>30</sub> : 30% Grain size (mm)

D<sub>60</sub> : 60% Grain size (mm)

## I-1. Grain Size Analysis



Grain Size Analysis

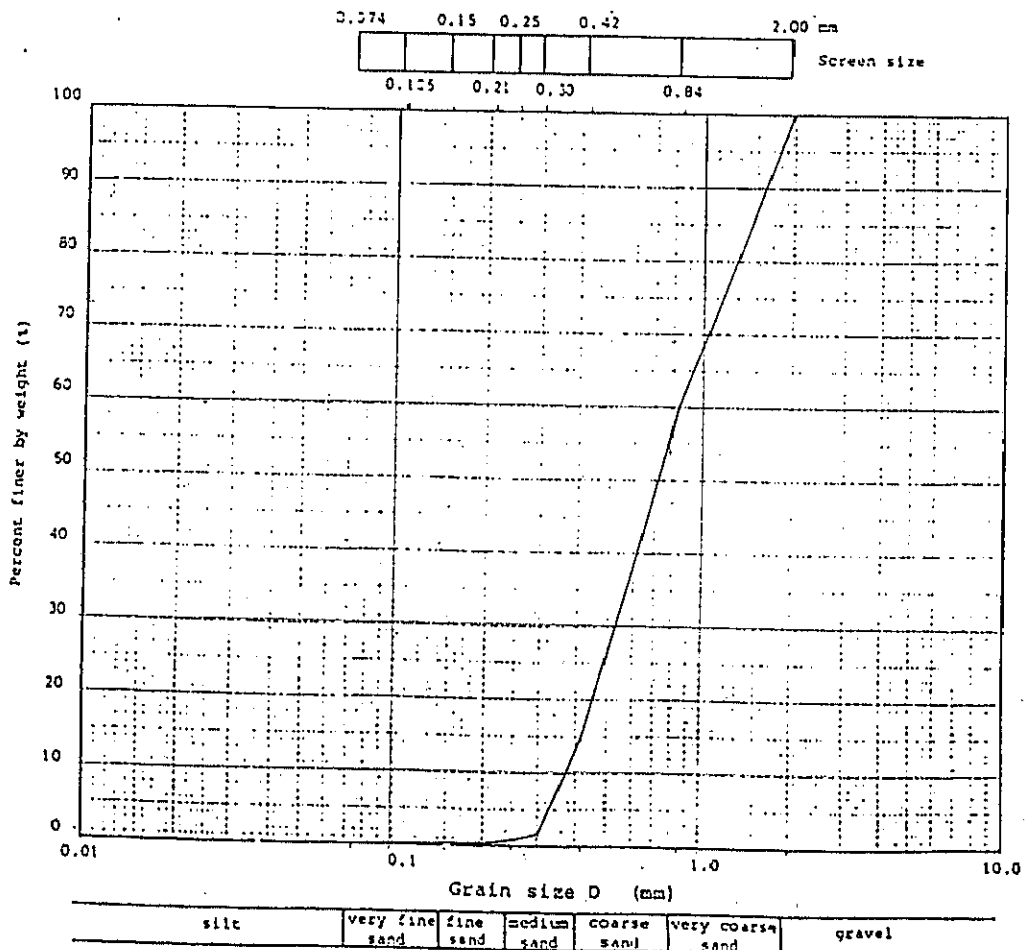
Sample No. 1  
 Name of sample Beach Sand  
 Locality South of Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	79.45	60.275
0.42	90.70	14.925
0.30	26.70	1.575
0.25	1.15	1.0
0.21	1.40	0.30
0.15	0.45	0.075
0.105	0.10	0.025
0.074	0.05	0
	0	-

Very coarse sand (2.00-0.84mm) %	39.725
Coarse sand (0.84-0.42mm) %	45.35
Medium sand (0.42-0.25mm) %	13.925
Fine sand (0.25-0.15mm) %	0.925
Very fine sand (0.15-0.074mm) %	0.075
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	0.84
30% grain size mm	0.53
10% grain size mm	0.37
Coefficient of uniformity $U_c$	2.270
Coefficient of curvature $U_c'$	0.904

Grain size accumulation curve



App.3.1

### Grain Size Analysis

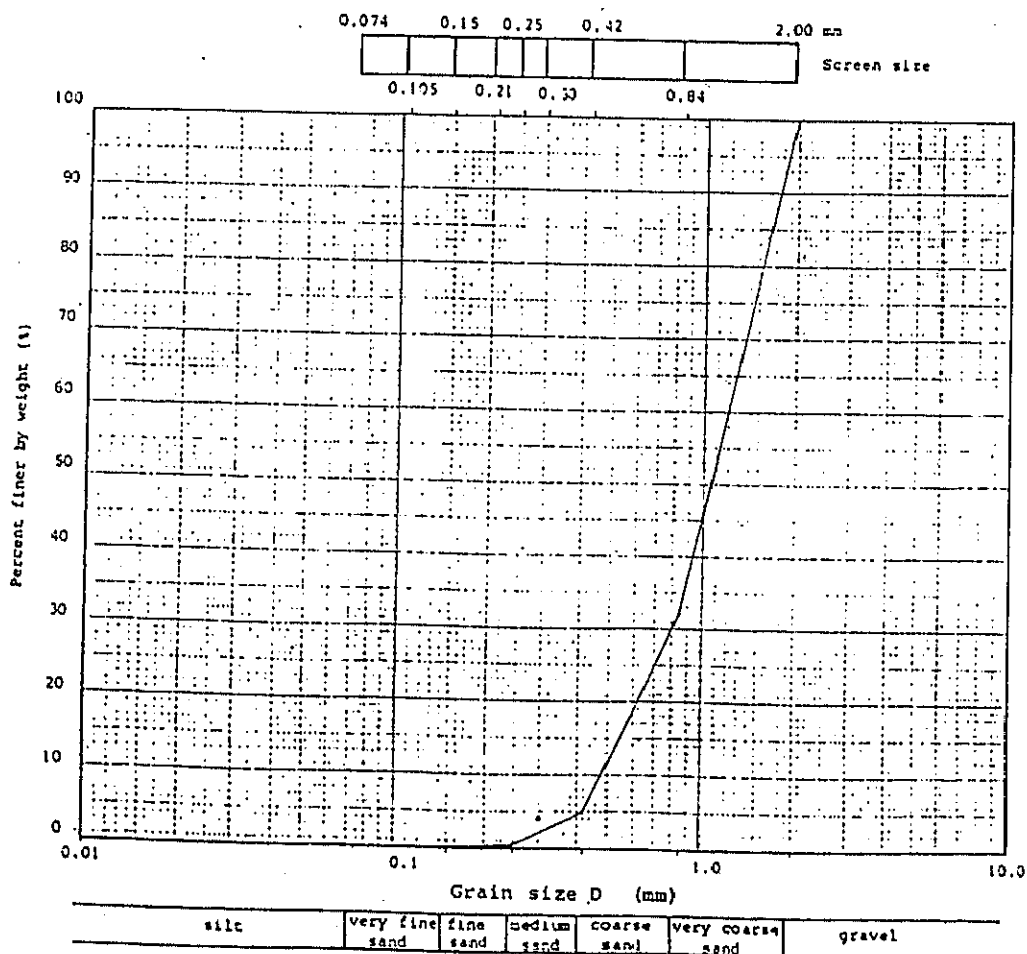
Sample No. 2  
 Name of sample Beach Sand  
 Locality Cape Lebong

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		1.00
0.84	135.8	32.10
0.42	54.15	5.025
0.30	1.60	4.225
0.25	7.65	0.4
0.21	0.35	0.225
0.15	0.30	0.075
0.105	0	0.075
0.074	0.15	0
	0	-

Very coarse sand (2.00-0.84mm) %	67.9
Coarse sand (0.84-0.42mm) %	27.075
Medium sand (0.42-0.25mm) %	4.625
Fine sand (0.25-0.15mm) %	0.325
Very fine sand (0.15-0.074mm) %	0.075
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	1.20
30% grain size mm	0.80
10% grain size mm	0.48
Coefficient of uniformity $U_c$	2.500
Coefficient of curvature $U_c'$	1.111

Grain size accumulation curve



**Grain Size Analysis**

Sample No. 3

Date \_\_\_\_\_

Name of sample River Sand

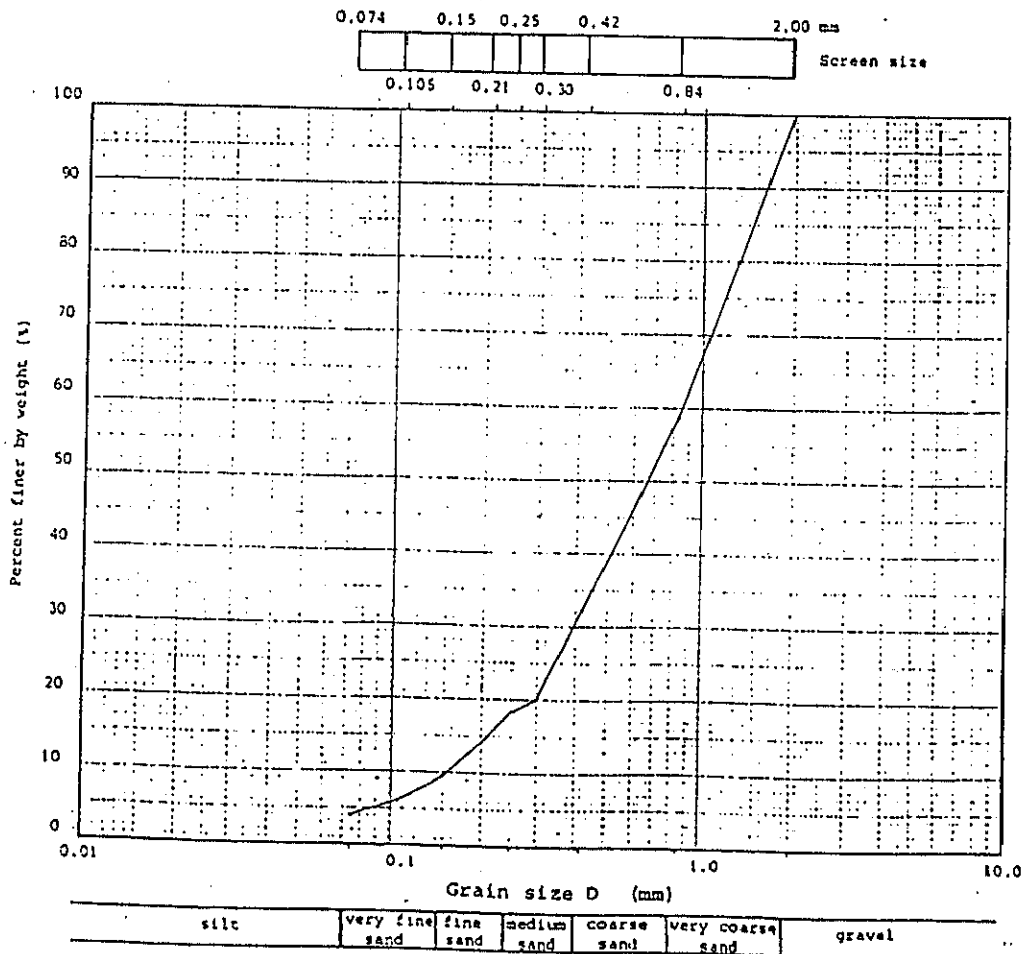
Signature \_\_\_\_\_

Locality River between Patangan & Sawangan

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	82.50	58.75
0.42	52.65	32.425
0.30	24.80	20.025
0.25	3.30	18.375
0.21	6.75	15.00
0.15	10.75	9.625
0.105	6.85	6.20
0.074	4.35	4.025
	8.05	-

Very coarse sand (2.00-0.84mm) %	41.25
Coarse sand (0.84-0.42mm) %	26.325
Medium sand (0.42-0.25mm) %	14.05
Fine sand (0.25-0.15mm) %	8.75
Very fine sand (0.15-0.074mm) %	5.60
Silt or clay (under 0.074mm) %	4.025
Maximum grain size mm	0.84
60% grain size mm	0.87
30% grain size mm	0.39
10% grain size mm	0.154
Coefficient of uniformity $U_c$	5.649
Coefficient of curvature $U_c'$	1.135

Grain size accumulation curve



**Grain Size Analysis**

Sample No. 4

Date \_\_\_\_\_

Name of sample River Sand

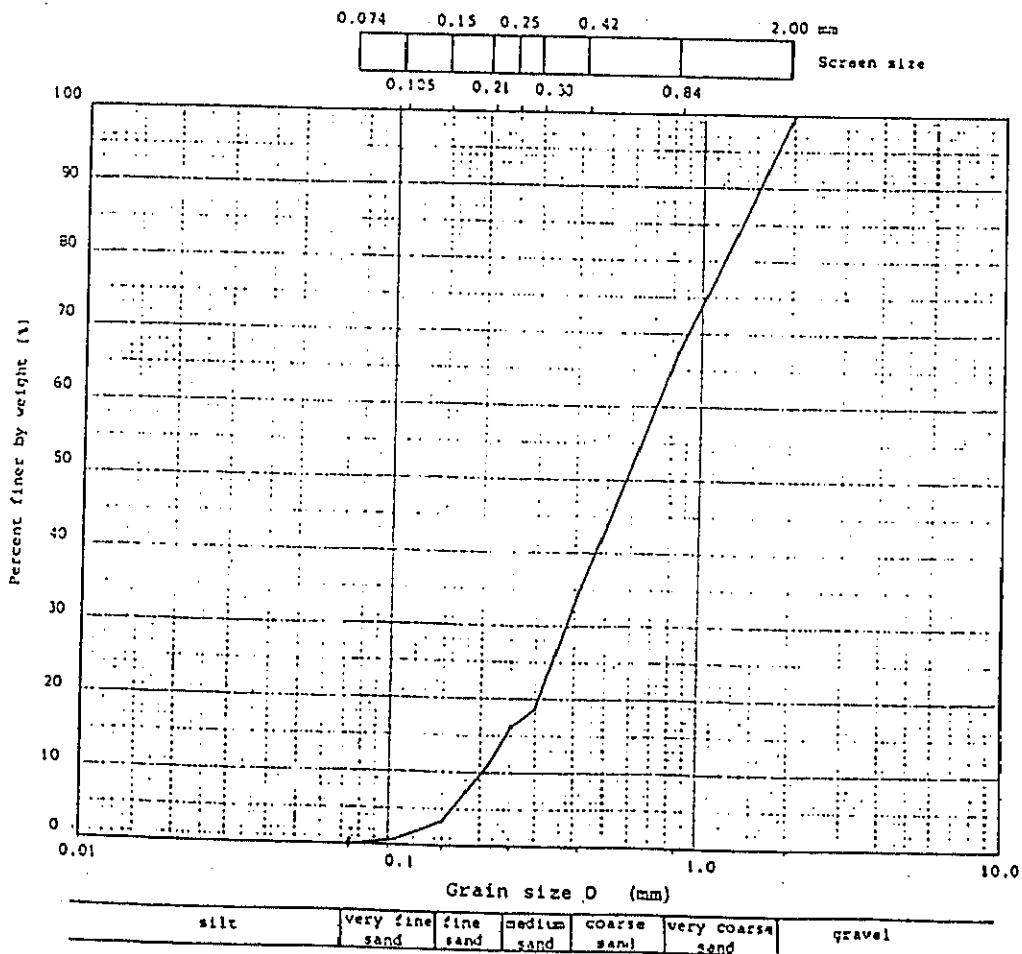
Signature \_\_\_\_\_

Locality River between Patangan & Sawangan

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	65.0	67.5
0.42	64.5	35.25
0.30	32.8	18.85
0.25	5.35	16.175
0.21	10.4	10.975
0.15	15.35	3.3
0.105	4.95	0.825
0.074	1.5	0.075
	0.15	-

Very coarse sand (2.00-0.84mm) %	32.5
Coarse sand (0.84-0.42mm) %	32.25
Medium sand (0.42-0.25mm) %	19.075
Fine sand (0.25-0.15mm) %	12.875
Very fine sand (0.15-0.074mm) %	3.225
Silt or clay (under 0.074mm) %	0.075
Maximum grain size mm	0.84
60% grain size mm	0.71
30% grain size mm	0.38
10% grain size mm	0.205
Coefficient of uniformity $U_c$	3.463
Coefficient of curvature $U_c'$	0.992

Grain size accumulation curve



**Grain Size Analysis**

Sample No. 5

Date \_\_\_\_\_

Name of sample River Sand

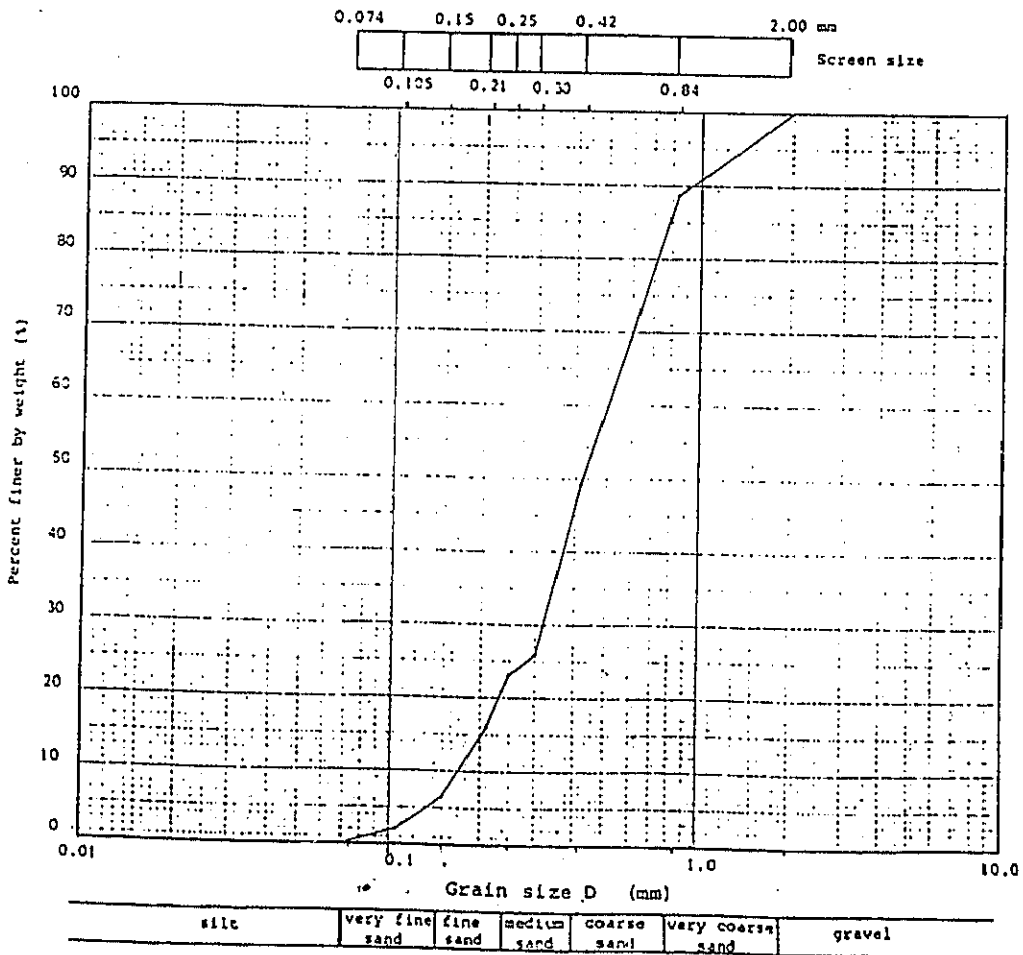
Signature \_\_\_\_\_

Locality River Between Patangan & Sawangan

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	22.35	88.825
0.42	78.95	49.35
0.30	46.8	25.95
0.25	6.1	22.90
0.21	13.4	16.20
0.15	19.35	6.525
0.105	9.05	2.0
0.074	3.65	0.175
	0.35	-

Very coarse sand (2.00-0.84mm) %	11.175
Coarse sand (0.84-0.42mm) %	39.475
Medium sand (0.42-0.25mm) %	26.45
Fine sand (0.25-0.15mm) %	16.375
Very fine sand (0.15-0.074mm) %	6.35
Silt or clay (under 0.074mm) %	0.175
Maximum grain size mm	0.84
60% grain size mm	0.50
30% grain size mm	0.32
10% grain size mm	0.17
Coefficient of uniformity $U_c$	2.941
Coefficient of curvature $U_c'$	1.205

Grain size accumulation curve



**Grain Size Analysis**

Sample No. 6

Date \_\_\_\_\_

Name of sample River Sand

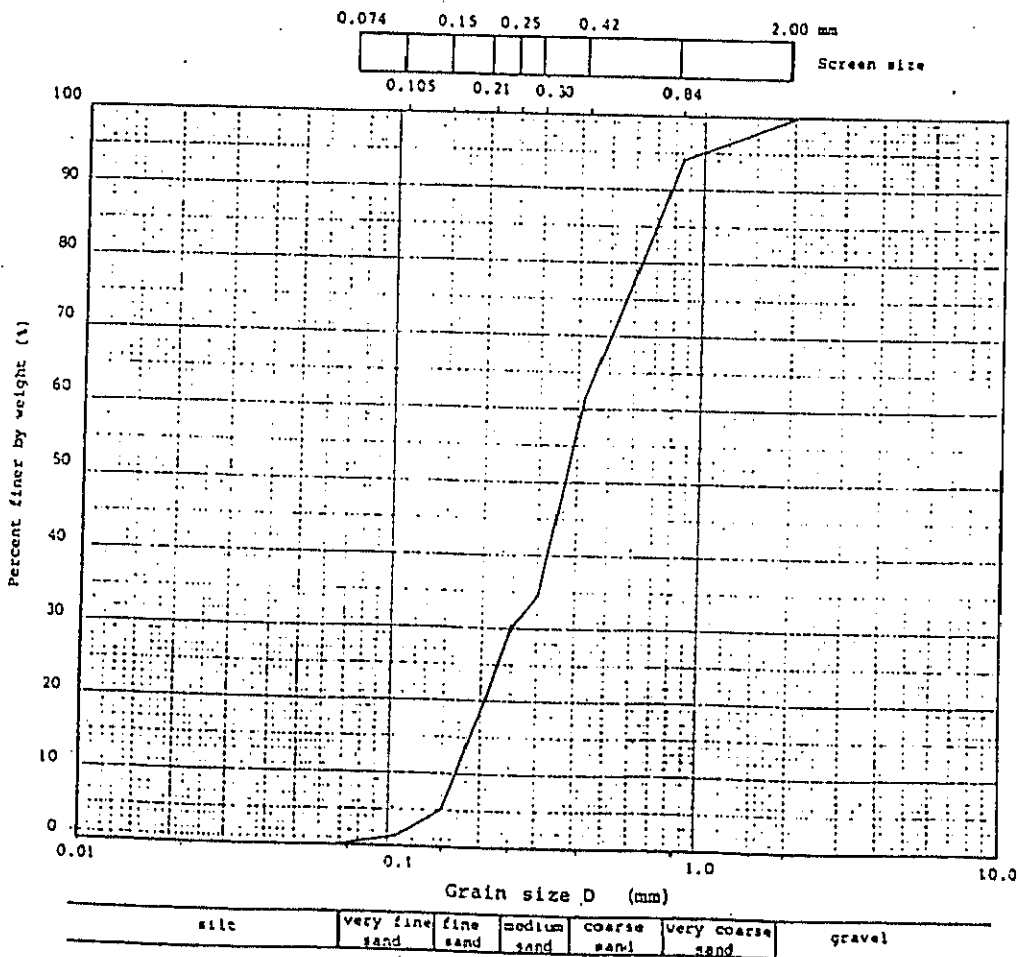
Signature \_\_\_\_\_

Locality River between Patangan & Sawangan

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	11.60	94.20
0.42	66.10	61.15
0.30	52.95	34.675
0.25	8.80	30.275
0.21	19.50	20.525
0.15	30.50	5.275
0.105	8.30	1.125
0.074	2.00	0.125
	0.25	-

Very coarse sand (2.00-0.84mm) %	5.80
Coarse sand (0.84-0.42mm) %	33.05
Medium sand (0.42-0.25mm) %	30.875
Fine sand (0.25-0.15mm) %	25.00
Very fine sand (0.15-0.074mm) %	5.15
Silt or clay (under 0.074mm) %	0.125
Maximum grain size mm	0.84
60% grain size mm	0.42
30% grain size mm	0.25
10% grain size mm	0.165
Coefficient of uniformity $U_c$	2.545
Coefficient of curvature $U_c'$	0.902

Grain size accumulation curve



App.3.6

**Grain Size Analysis**

Sample No. 7

Date \_\_\_\_\_

Name of sample River Sand

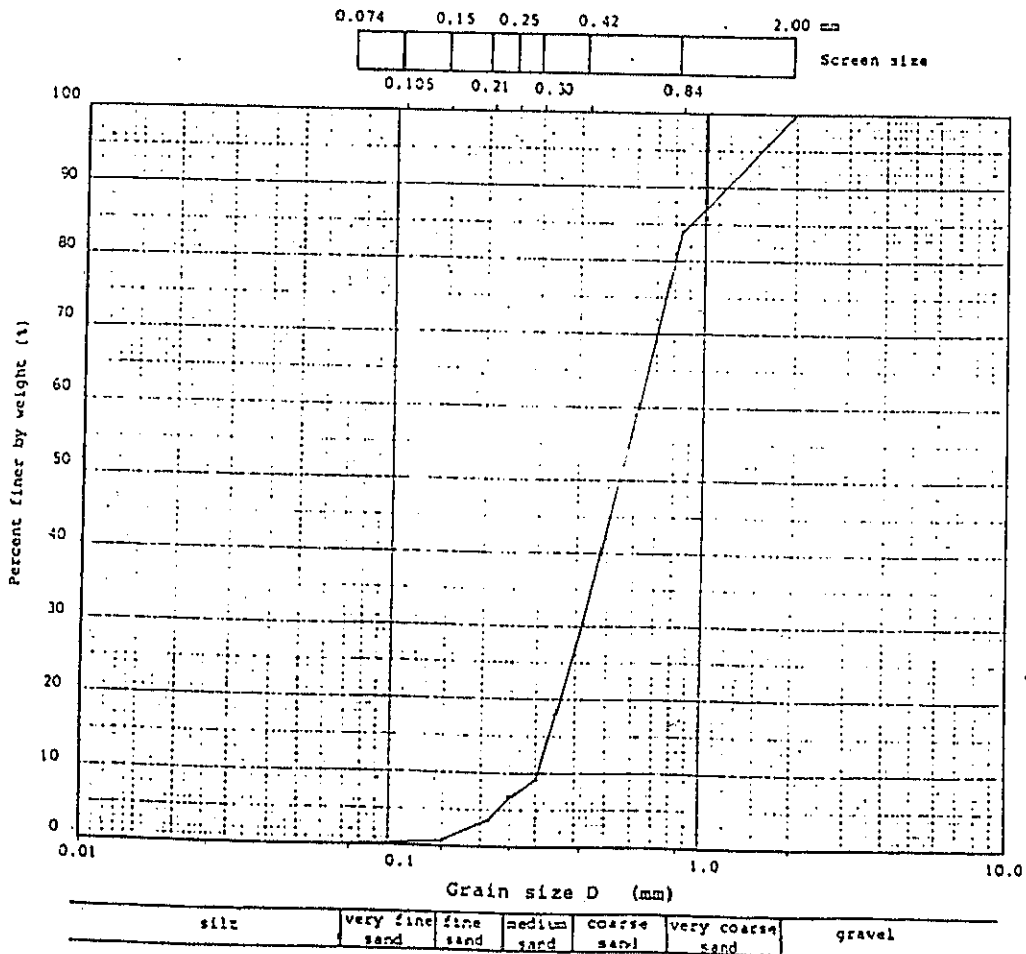
Signature \_\_\_\_\_

Locality River between Patangan & Sawangan

Grain size (mm)	Weight (g)	Weight percent (%)
2.00	-	100
0.84	32.25	83.875
0.42	106.75	30.5
0.30	42.7	9.15
0.25	4.3	7.0
0.21	6.7	3.65
0.15	5.85	0.725
0.105	0.95	0.25
0.074	0.5	0
	0	-

%	
Very coarse sand (2.00-0.84mm)	16.125
Coarse sand (0.84-0.42mm)	53.375
Medium sand (0.42-0.25mm)	23.5
Fine sand (0.25-0.15mm)	6.275
Very fine sand (0.15-0.074mm)	0.725
Silt or clay (under 0.074mm)	0
Maximum grain size mm	0.84
60% grain size mm	0.62
30% grain size mm	0.42
10% grain size mm	0.305
Coefficient of uniformity $U_c$	2.032
Coefficient of curvature $U_c'$	0.933

Grain size accumulation curve



App.3.7

**Grain Size Analysis**

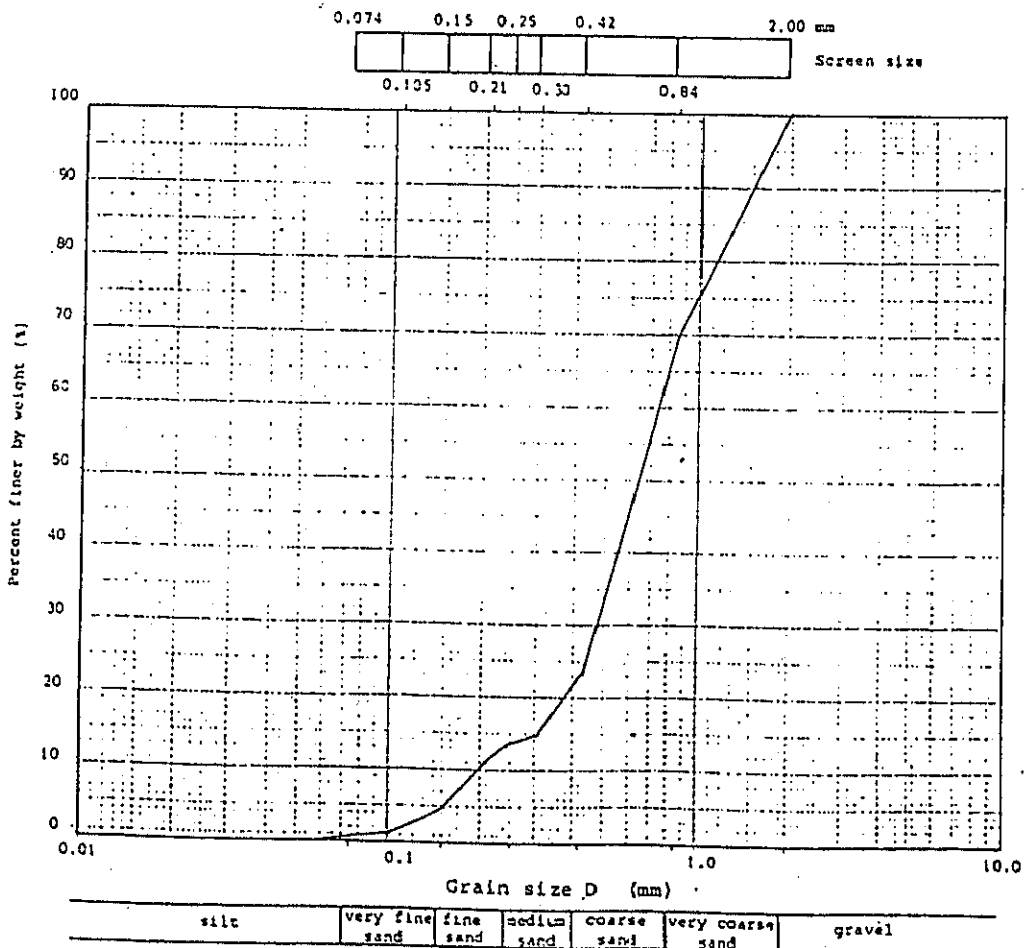
Sample No. 8  
 Name of sample Peach Sand  
 Locality West of Sanur Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	60.35	69.825
0.42	92.70	23.475
0.30	17.75	14.60
0.25	2.20	13.15
0.21	4.85	11.075
0.15	12.65	4.75
0.105	7.15	1.175
0.074	1.60	0.375
	0.75	-

Very coarse sand (2.00-0.84mm) %	30.175
Coarse sand (0.84-0.42mm) %	46.35
Medium sand (0.42-0.25mm) %	9.975
Fine sand (0.25-0.15mm) %	8.75
Very fine sand (0.15-0.074mm) %	4.375
Silt or clay (under 0.074mm) %	0.375
Maximum grain size mm	0.84
60% grain size mm	0.74
30% grain size mm	0.47
10% grain size mm	0.198
Coefficient of uniformity $U_c$	3.737
Coefficient of curvature $U_c'$	1.508

Grain size accumulation curve





Grain Size Analysis

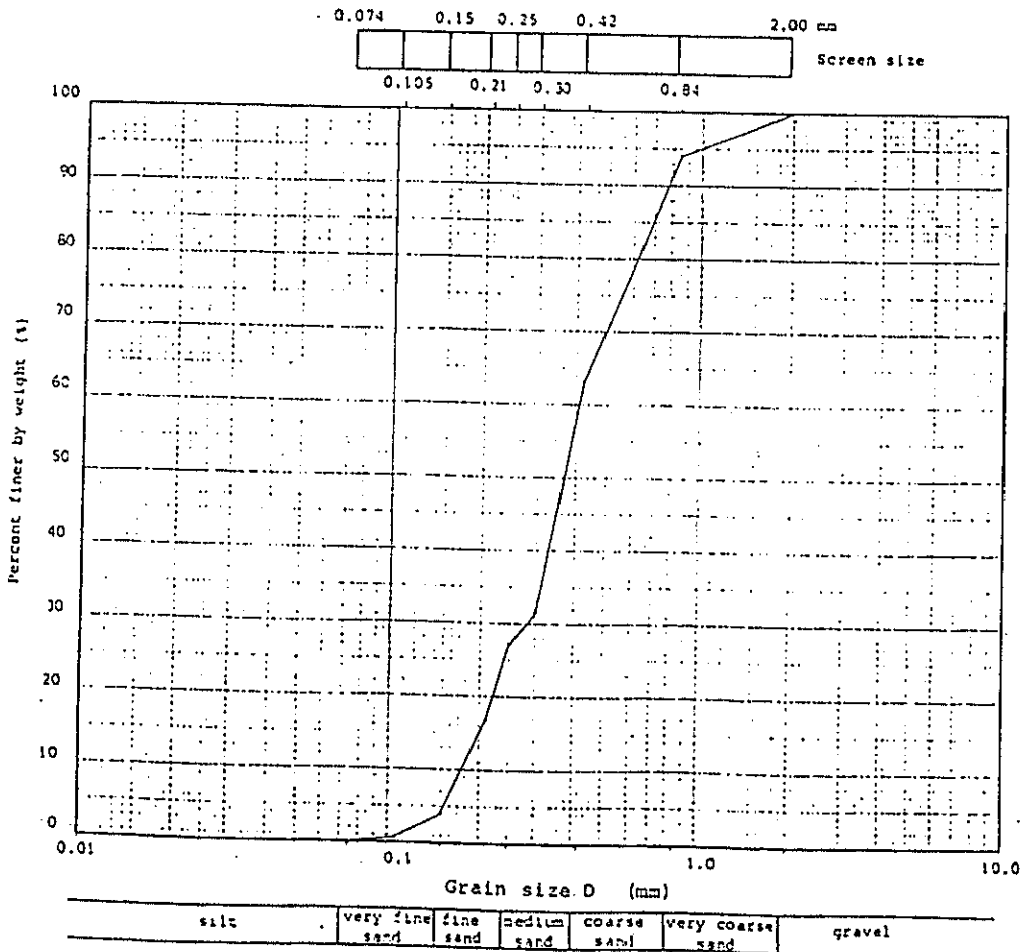
Sample No. 9  
 Name of sample River Sand  
 Locality River Loloan

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	11.60	94.20
0.42	62.40	63.00
0.30	62.70	31.65
0.25	8.95	27.175
0.21	20.50	16.925
0.15	25.90	3.975
0.105	6.40	0.775
0.074	1.50	0.025
	0.05	-

Very coarse sand (2.00-0.84mm) %	5.80
Coarse sand (0.84-0.42mm) %	31.20
Medium sand (0.42-0.25mm) %	35.825
Fine sand (0.25-0.15mm) %	23.20
Very fine sand (0.15-0.074mm) %	3.95
Silt or clay (under 0.074mm) %	0.025
Maximum grain size mm	0.84
60% grain size mm	0.410
30% grain size mm	0.275
10% grain size mm	0.174
Coefficient of uniformity $U_c$	2.356
Coefficient of curvature $U_c'$	1.060

Grain size accumulation curve



**Grain Size Analysis**

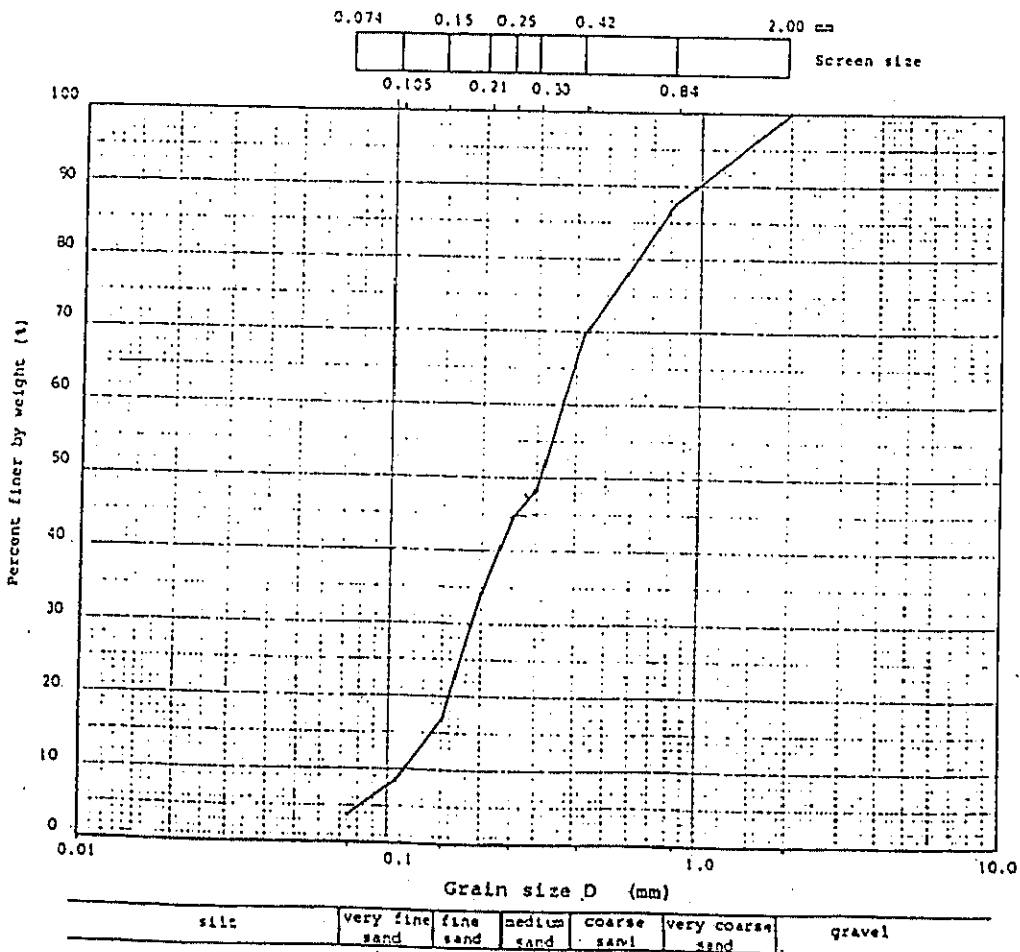
Sample No. 10  
 Name of sample River Sand  
 Locality River Loloan

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	24.55	87.725
0.42	36.0	69.725
0.30	42.8	48.325
0.25	7.8	44.425
0.21	20.45	34.2
0.15	34.8	16.8
0.105	17.15	8.225
0.074	8.8	3.825
	7.65	-

Very coarse sand (2.00-0.84mm) %	12.275
Coarse sand (0.84-0.42mm) %	18.0
Medium sand (0.42-0.25mm) %	25.3
Fine sand (0.25-0.15mm) %	27.625
Very fine sand (0.15-0.074mm) %	12.975
Silt or clay (under 0.074mm) %	3.825
Maximum grain size mm	0.84
60% grain size mm	0.36
30% grain size mm	0.185
10% grain size mm	0.112
Coefficient of uniformity $U_c$	3.214
Coefficient of curvature $U_c'$	0.849

Grain size accumulation curve



App 3.10

**Grain Size Analysis**

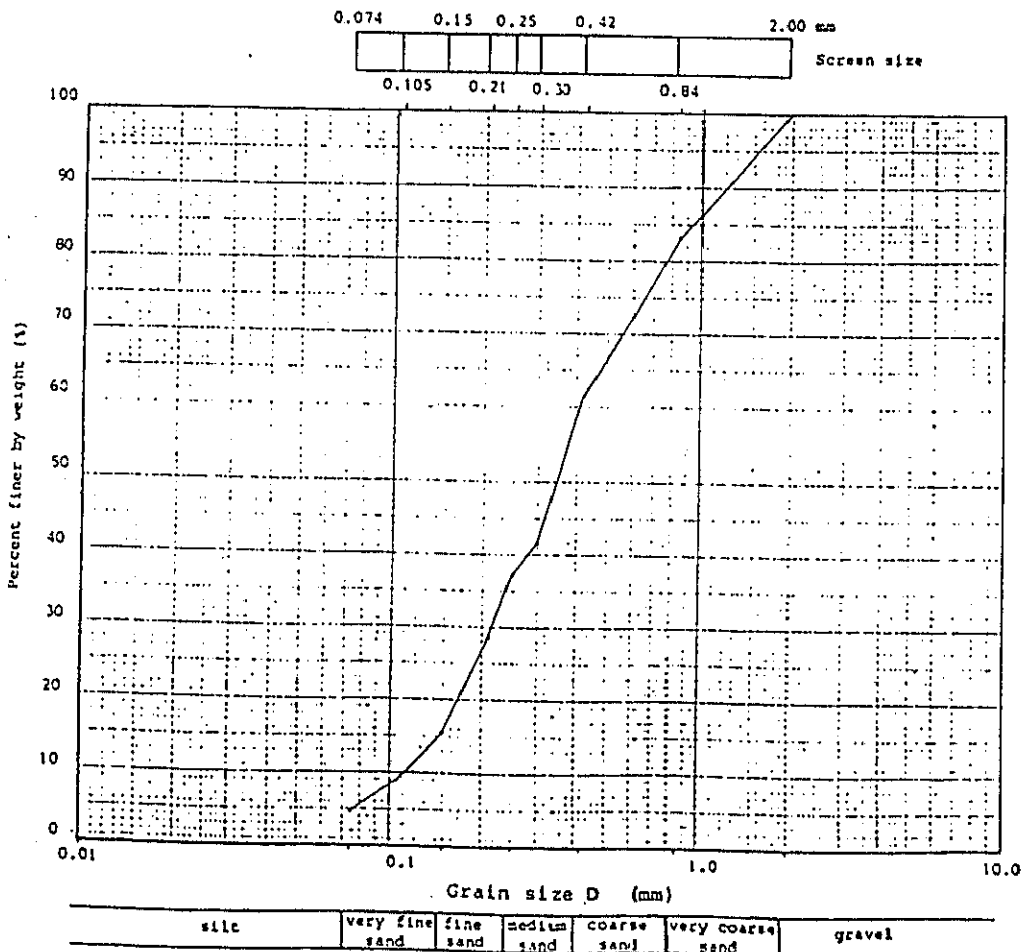
Sample No. 11  
 Name of sample River Sand  
 Locality River Loloan

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	33.45	83.275
0.42	43.50	61.525
0.30	40.10	41.475
0.25	8.15	37.40
0.21	17.55	28.625
0.15	26.25	15.50
0.105	12.90	9.05
0.074	8.65	4.725
	9.45	-

Very coarse sand (2.00-0.84mm) %	16.725
Coarse sand (0.84-0.42mm) %	21.75
Medium sand (0.42-0.25mm) %	24.125
Fine sand (0.25-0.15mm) %	21.90
Very fine sand (0.15-0.074mm) %	10.775
Silt or clay (under 0.074mm) %	4.725
Maximum grain size mm	0.84
60% grain size mm	0.41
30% grain size mm	0.215
10% grain size mm	0.107
Coefficient of uniformity $U_c$	3.832
Coefficient of curvature $U_c'$	1.054

Grain size accumulation curve



App. 3.11

**Grain Size Analysis**

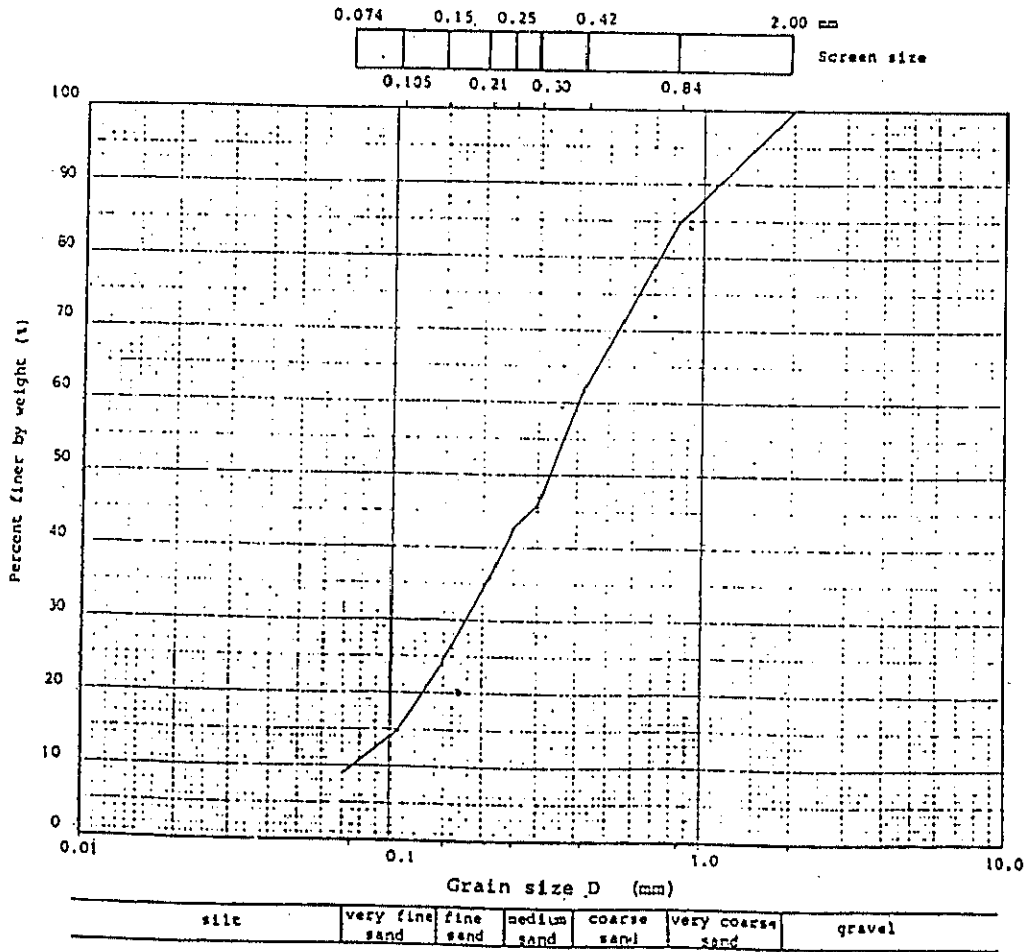
Sample No. 12  
 Name of sample River Sand  
 Locality River Loloan

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	30.40	84.80
0.42	46.15	61.725
0.30	32.20	45.625
0.25	5.65	42.80
0.21	13.85	35.875
0.15	23.55	24.10
0.105	18.60	14.80
0.074	10.40	9.60
	19.20	-

Very coarse sand (2.00-0.84mm) %	15.20
Coarse sand (0.84-0.42mm) %	23.075
Medium sand (0.42-0.25mm) %	18.925
Fine sand (0.25-0.15mm) %	18.70
Very fine sand (0.15-0.074mm) %	14.50
Silt or clay (under 0.074mm) %	9.60
Maximum grain size mm	0.84
60% grain size mm	0.40
30% grain size mm	0.175
10% grain size mm	0.075
Coefficient of uniformity $U_c$	5.333
Coefficient of curvature $U_c'$	1.021

Grain size accumulation curve



App. 3.12

Grain Size Analysis

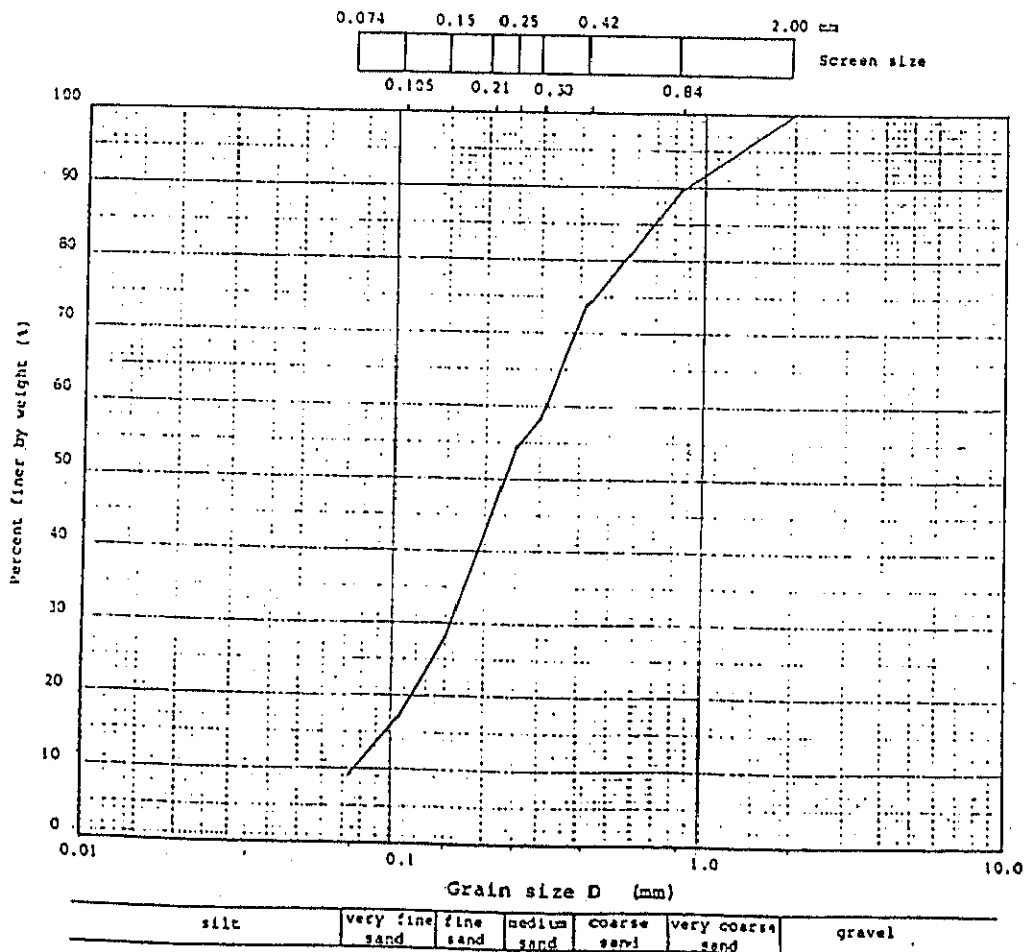
Sample No. 13  
 Name of sample River Sand  
 Locality River Loloan

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	20.50	89.75
0.42	31.90	73.80
0.30	31.60	58.00
0.25	7.30	54.35
0.21	18.20	45.25
0.15	34.30	28.10
0.105	22.00	17.10
0.074	15.35	9.425
	18.85	-

Very coarse sand (2.00-0.84mm) %	10.25
Coarse sand (0.84-0.42mm) %	15.95
Medium sand (0.42-0.25mm) %	19.45
Fine sand (0.25-0.15mm) %	26.25
Very fine sand (0.15-0.074mm) %	18.675
Silt or clay (under 0.074mm) %	9.425
Maximum grain size mm	0.84
60% grain size mm	0.315
30% grain size mm	0.155
10% grain size mm	0.077
Coefficient of uniformity $U_c$	4.091
Coefficient of curvature $U_c'$	0.991

Grain size accumulation curve



App.3.13

### Grain Size Analysis

Sample No. 14

Date \_\_\_\_\_

Name of sample River Sand

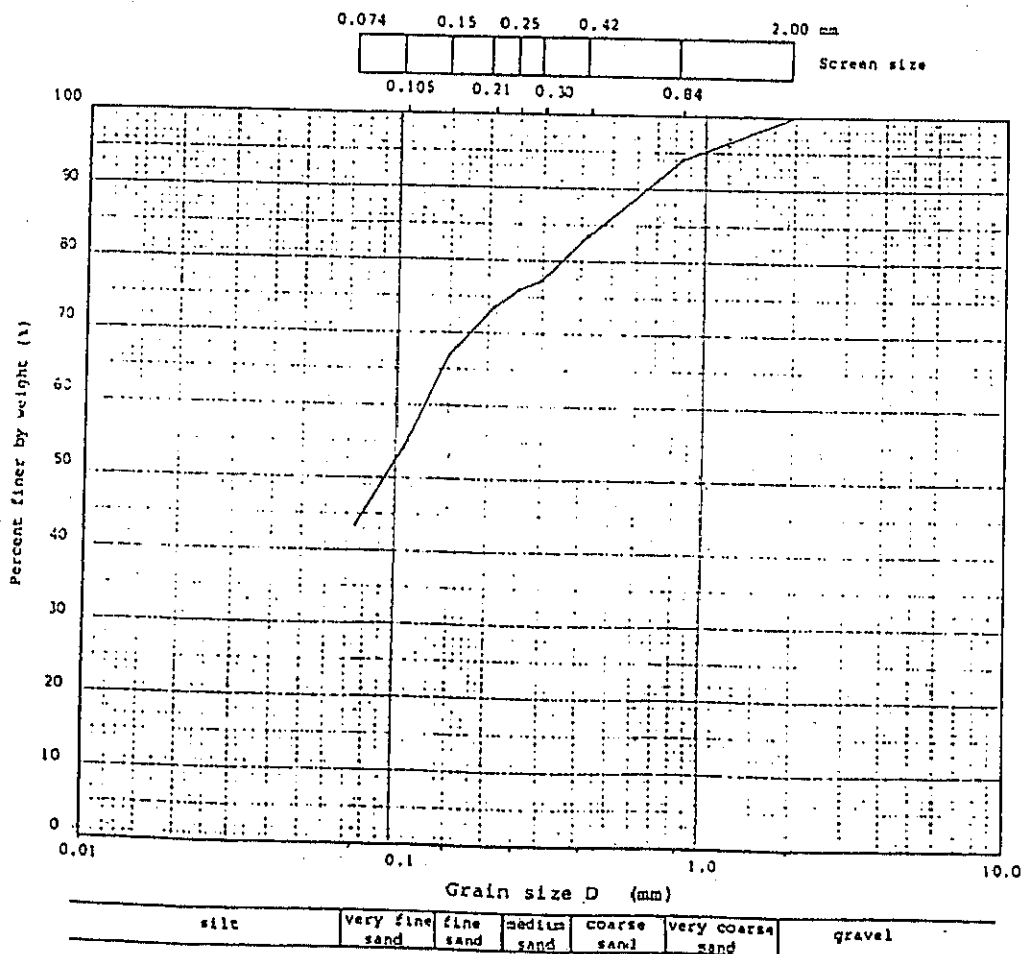
Signature \_\_\_\_\_

Locality River Ayung

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	12.40	93.80
0.42	20.60	83.50
0.30	12.45	77.275
0.25	1.85	76.35
0.21	5.15	73.775
0.15	13.40	67.075
0.105	25.85	54.15
0.074	21.30	43.50
	87.00	-

Very coarse sand (2.00-0.84mm) %	6.2
Coarse sand (0.84-0.42mm) %	10.3
Medium sand (0.42-0.25mm) %	7.15
Fine sand (0.25-0.15mm) %	9.275
Very fine sand (0.15-0.074mm) %	23.575
Silt or clay (under 0.074mm) %	43.50
Maximum grain size mm	0.84
60% grain size mm	0.125
30% grain size mm	
10% grain size mm	
Coefficient of uniformity $U_c$	
Coefficient of curvature $U_c'$	

Grain size accumulation curve



App.3.14

Grain Size Analysis

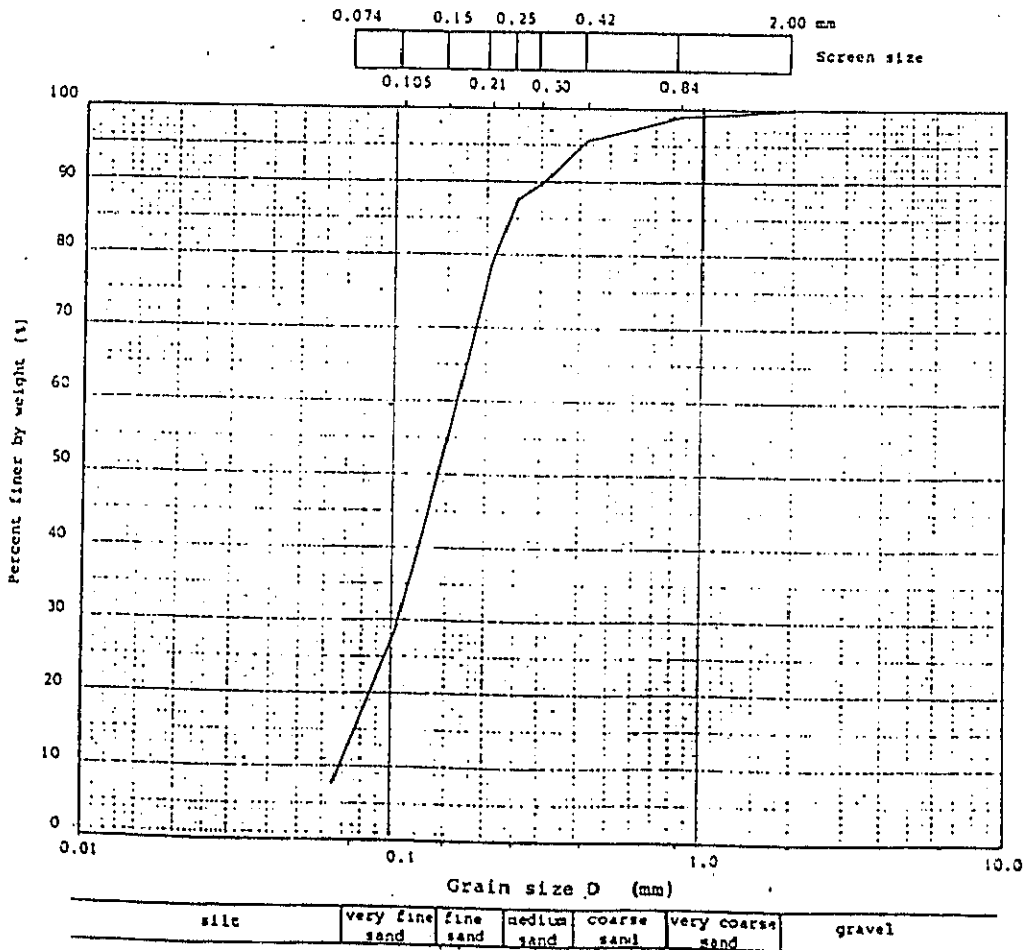
Sample No. 15  
 Name of sample River Sand  
 Locality River Ayung

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	2.05	98.975
0.42	6.45	95.75
0.30	12.05	89.725
0.25	4.5	87.475
0.21	17.55	78.70
0.15	49.15	54.125
0.105	50.1	29.075
0.074	35.65	11.25
	22.50	-

Very coarse sand (2.00-0.84mm) %	1.025
Coarse sand (0.84-0.42mm) %	3.225
Medium sand (0.42-0.25mm) %	8.275
Fine sand (0.25-0.15mm) %	33.35
Very fine sand (0.15-0.074mm) %	42.875
Silt or clay (under 0.074mm) %	11.25
Maximum grain size mm	0.84
60% grain size mm	0.16
30% grain size mm	0.104
10% grain size mm	0.675
Coefficient of uniformity $U_c$	0.237
Coefficient of curvature $U_c'$	0.100

Grain size accumulation curve



App.3.15

**Grain Size Analysis**

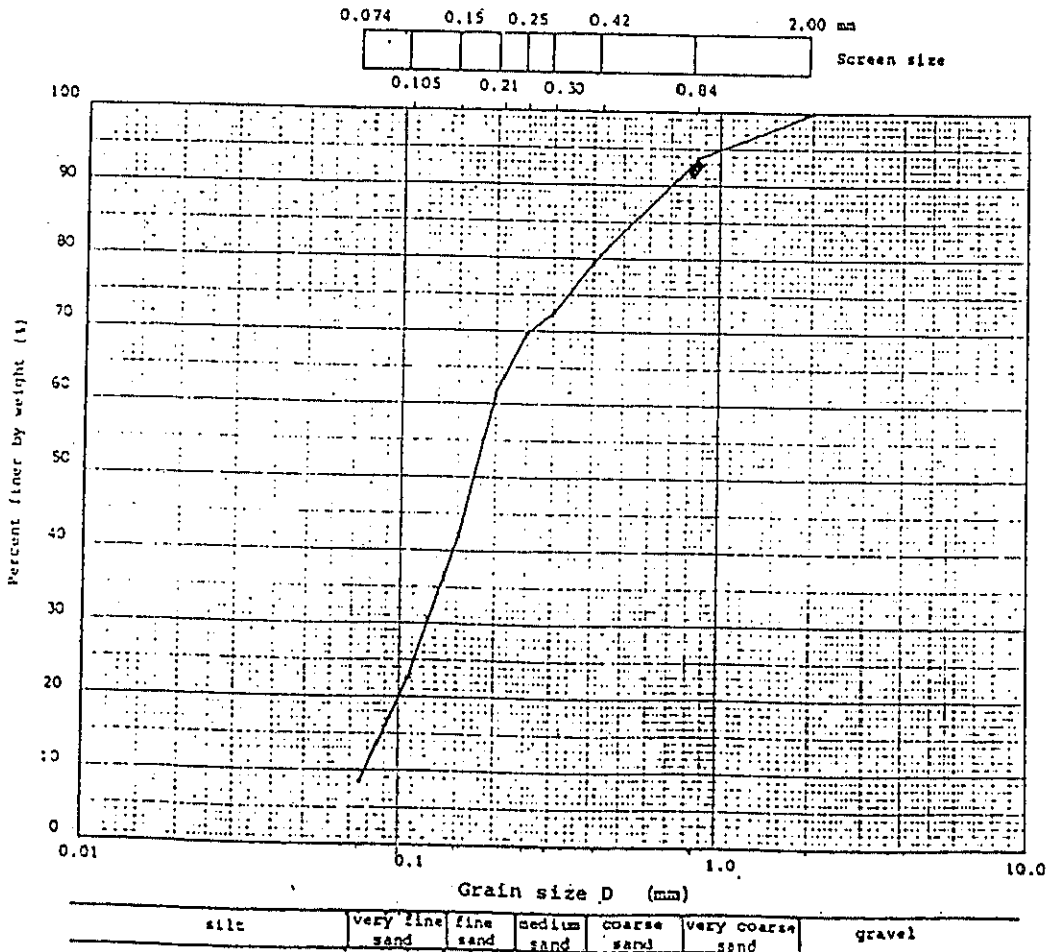
Sample No. 16  
 Name of sample River Sand  
 Locality River Ayung

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	12.15	93.925
0.42	26.15	80.85
0.30	16.25	72.725
0.25	5.8	69.825
0.21	16.85	61.4
0.15	38.85	41.975
0.105	38.40	22.775
0.074	28.7	8.425
	16.85	-

Very coarse sand (2.00-0.84mm) %	6.075
Coarse sand (0.84-0.42mm) %	13.075
Medium sand (0.42-0.25mm) %	11.025
Fine sand (0.25-0.15mm) %	27.85
Very fine sand (0.15-0.074mm) %	33.55
Silt or clay (under 0.074mm) %	8.425
Maximum grain size mm	0.84
60% grain size mm	0.20
30% grain size mm	0.12
10% grain size mm	0.077
Coefficient of uniformity $U_c$	2.597
Coefficient of curvature $U_c'$	0.935

Grain size accumulation curve





**Grain Size Analysis**

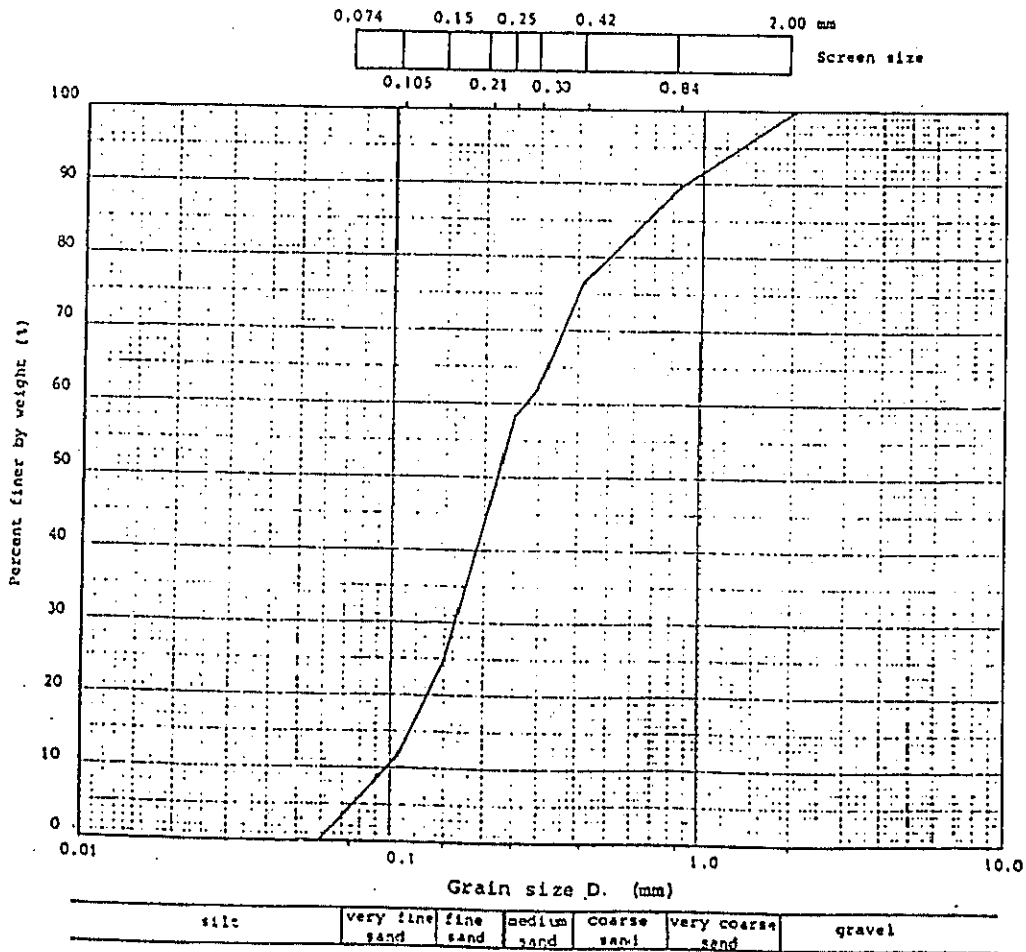
Sample No. 17  
 Name of sample River Sand  
 Locality River Ayung

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	20.90	89.55
0.42	25.40	76.85
0.30	28.90	62.40
0.25	8.05	58.375
0.21	24.05	46.35
0.15	42.90	24.90
0.105	29.15	10.325
0.074	14.05	3.30
	6.60	-

Very coarse sand (2.00-0.84mm) %	10.45
Coarse sand (0.84-0.42mm) %	12.70
Medium sand (0.42-0.25mm) %	18.475
Fine sand (0.25-0.15mm) %	33.475
Very fine sand (0.15-0.074mm) %	21.60
Silt or clay (under 0.074mm) %	3.30
Maximum grain size mm	0.84
60% grain size mm	0.27
30% grain size mm	0.16
10% grain size mm	0.098
Coefficient of uniformity $U_c$	2.755
Coefficient of curvature $U_c'$	0.967

Grain size accumulation curve



App.3.17

**Grain Size Analysis**

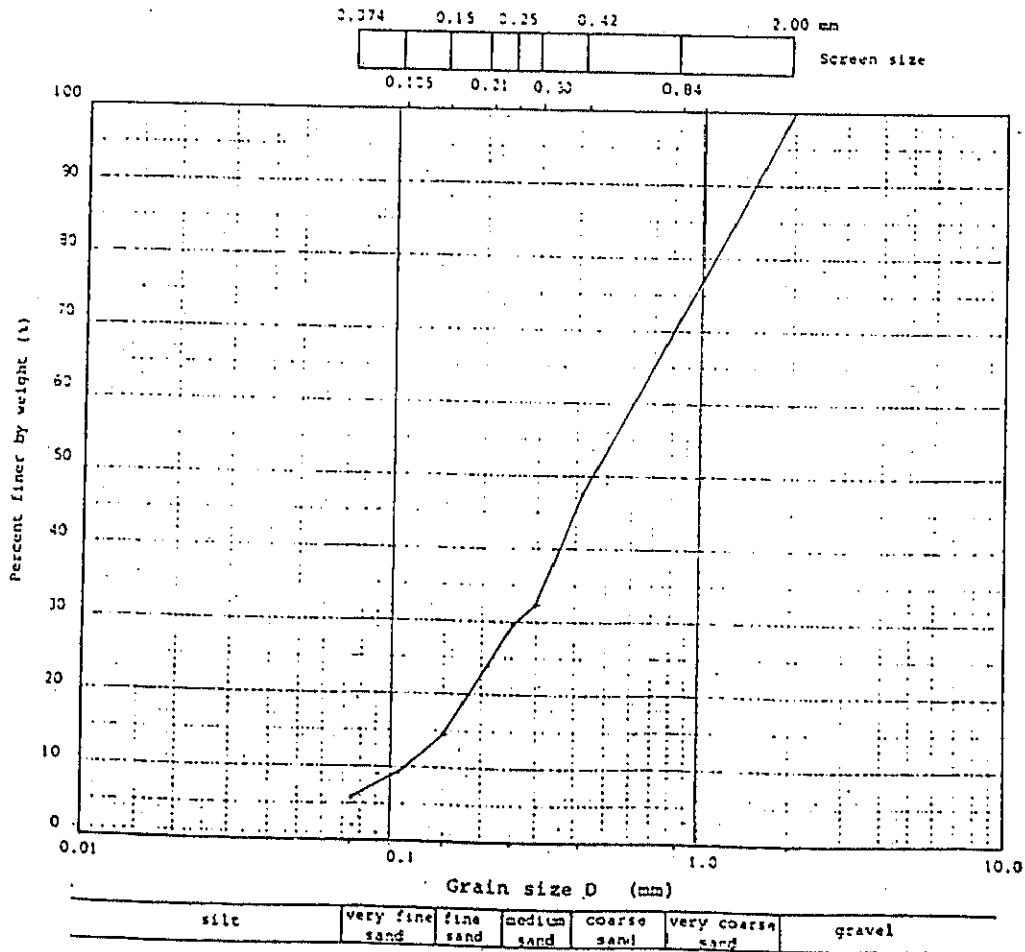
Sample No. 18  
 Name of sample River Sand  
 Locality River Ayung

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	57.05	71.475
0.42	48.0	47.475
0.30	30.45	32.25
0.25	15.10	24.70
0.21	1.40	24.0
0.15	18.95	14.525
0.105	10.45	9.30
0.074	6.55	6.025
	12.05	-

Very coarse sand (2.00-0.84mm) %	28.525
Coarse sand (0.84-0.42mm) %	24.0
Medium sand (0.42-0.25mm) %	22.775
Fine sand (0.25-0.15mm) %	10.175
Very fine sand (0.15-0.074mm) %	8.500
Silt or clay (under 0.074mm) %	6.025
Maximum grain size mm	0.84
60% grain size mm	0.60
30% grain size mm	0.256
10% grain size mm	0.112
Coefficient of uniformity $U_c$	5.357
Coefficient of curvature $U_c'$	0.975

Grain size accumulation curve



App.3.18

Grain Size Analysis

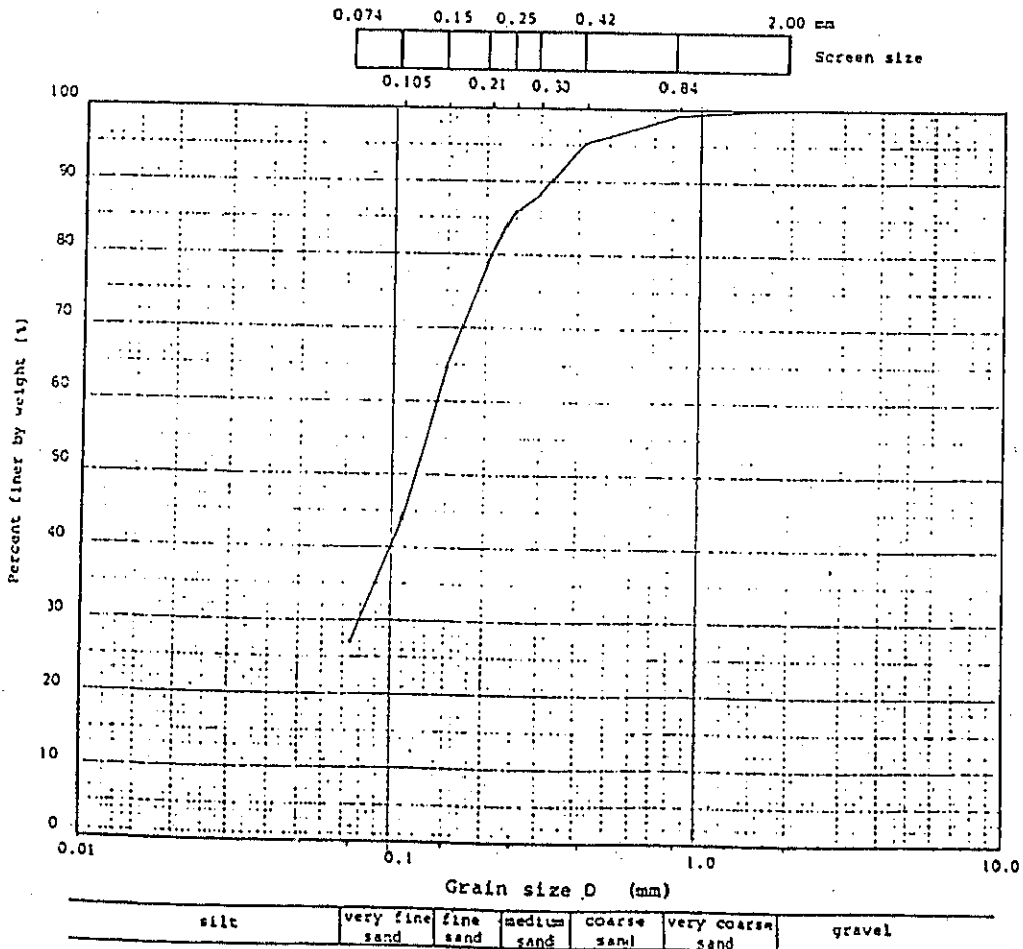
Sample No. 19  
 Name of sample River Sand  
 Locality River Ayung

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	1.70	99.15
0.42	7.55	95.375
0.30	14.65	88.05
0.25	4.1	86.00
0.21	12.05	79.975
0.15	30.70	64.625
0.105	40.40	44.425
0.074	34.50	27.175
	54.35	-

Very coarse sand (2.00-0.84mm) %	0.85
Coarse sand (0.84-0.42mm) %	3.775
Medium sand (0.42-0.25mm) %	9.375
Fine sand (0.25-0.15mm) %	21.375
Very fine sand (0.15-0.074mm) %	37.45
Silt or clay (under 0.074mm) %	27.175
Maximum grain size mm	0.84
60% grain size mm	0.14
30% grain size mm	0.08
10% grain size mm	
Coefficient of uniformity $U_c$	
Coefficient of curvature $U_c'$	

Grain size accumulation curve



App.3.19

**Grain Size Analysis**

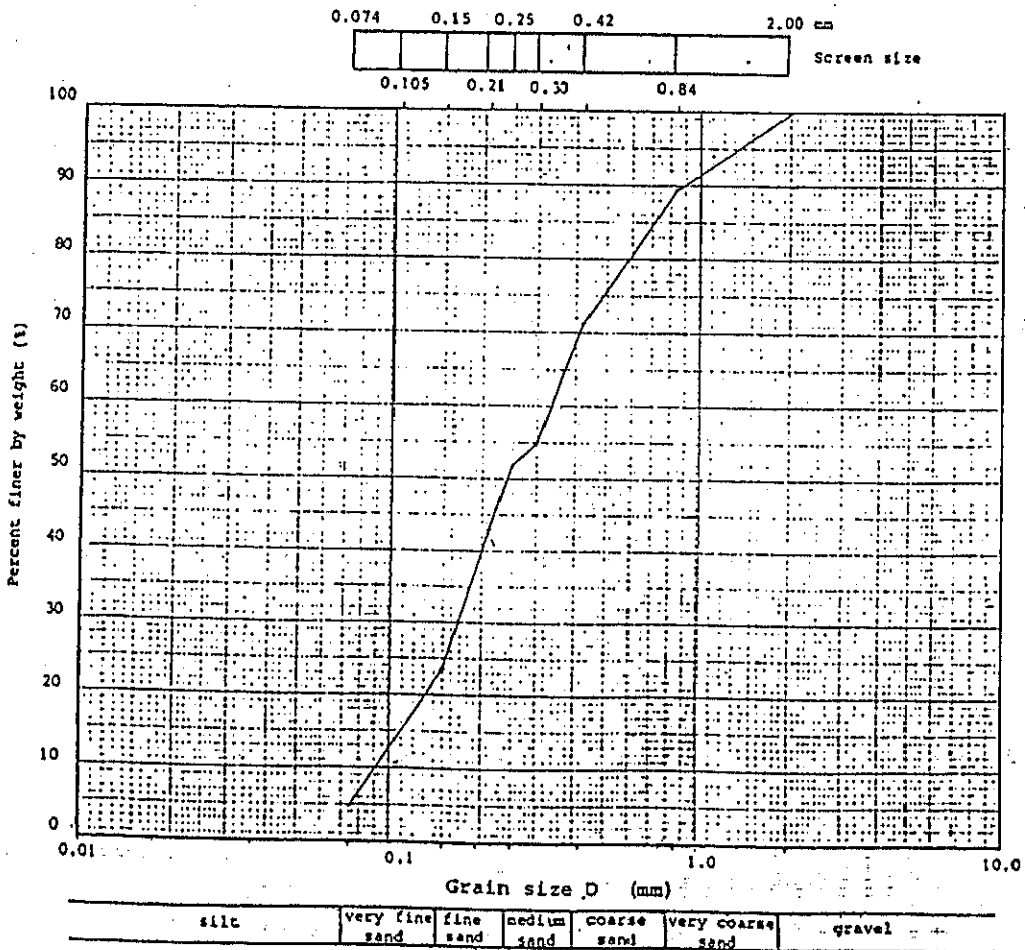
Sample No. 20  
 Name of sample River Sand  
 Locality River Ayung

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	20.75	89.525
0.42	36.50	71.275
0.30	32.80	54.875
0.25	5.5	52.125
0.21	17.65	43.30
0.15	39.3	23.65
0.105	25.65	10.825
0.074	11.90	4.875
	9.75	-

Very coarse sand (2.00-0.84mm) %	10.475
Coarse sand (0.84-0.42mm) %	18.25
Medium sand (0.42-0.25mm) %	19.15
Fine sand (0.25-0.15mm) %	28.475
Very fine sand (0.15-0.074mm) %	18.775
Silt or clay (under 0.074mm) %	4.875
Maximum grain size mm	0.84
60% grain size mm	0.33
30% grain size mm	0.169
10% grain size mm	0.091
Coefficient of uniformity $U_c$	3.626
Coefficient of curvature $U_c'$	0.951

Grain size accumulation curve



App. 3.20

**Grain Size Analysis**

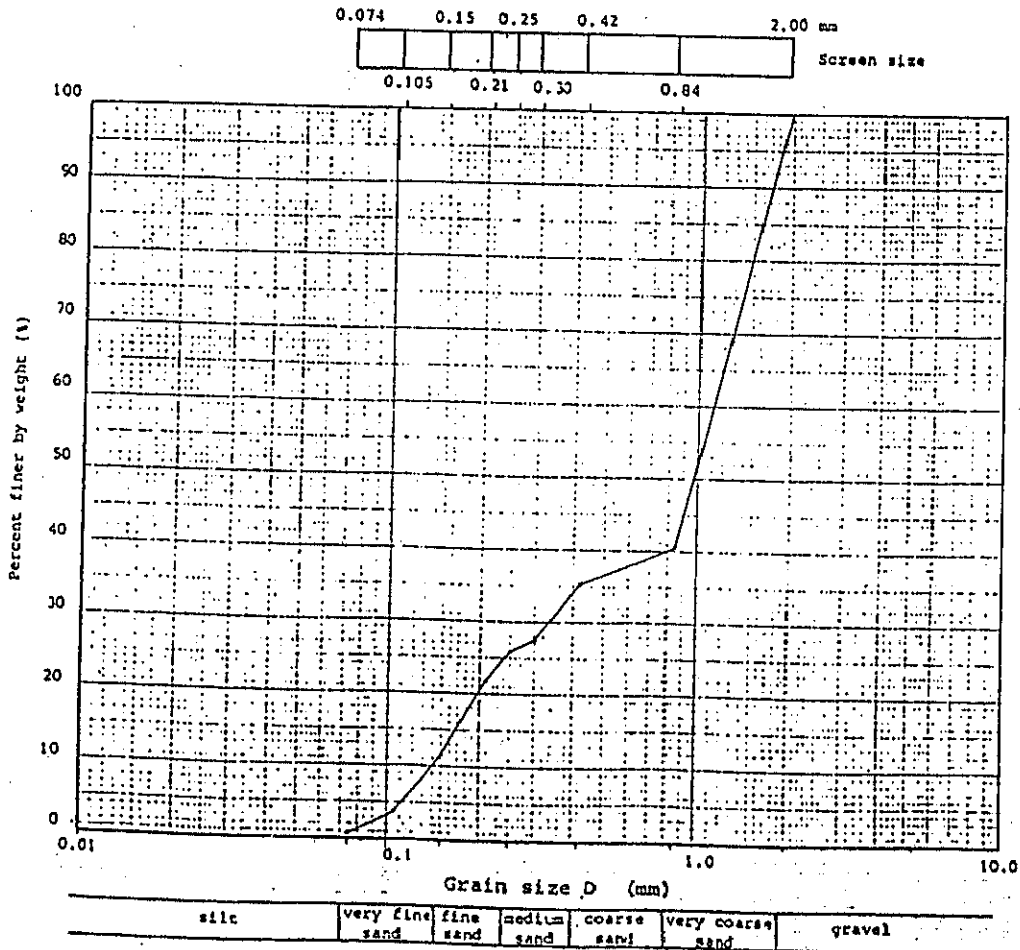
Sample No. 21 A  
 Name of sample Bali Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	118.95	40.525
0.42	10.0	35.525
0.30	16.15	27.45
0.25	3.3	25.80
0.21	8.05	21.775
0.15	20.3	11.625
0.105	15.45	3.9
0.074	6.45	0.675
	1.35	-

Very coarse sand (2.00-0.84mm) %	59.475
Coarse sand (0.84-0.42mm) %	5.00
Medium sand (0.42-0.25mm) %	9.725
Fine sand (0.25-0.15mm) %	14.175
Very fine sand (0.15-0.074mm) %	10.95
silt or clay (under 0.074mm) %	0.675
Maximum grain size mm	0.84
60% grain size mm	1.11
30% grain size mm	0.33
10% grain size mm	0.14
Coefficient of uniformity $U_c$	7.929
Coefficient of curvature $U_c'$	0.701

Grain size accumulation curve



App. 3.21

**Grain Size Analysis**

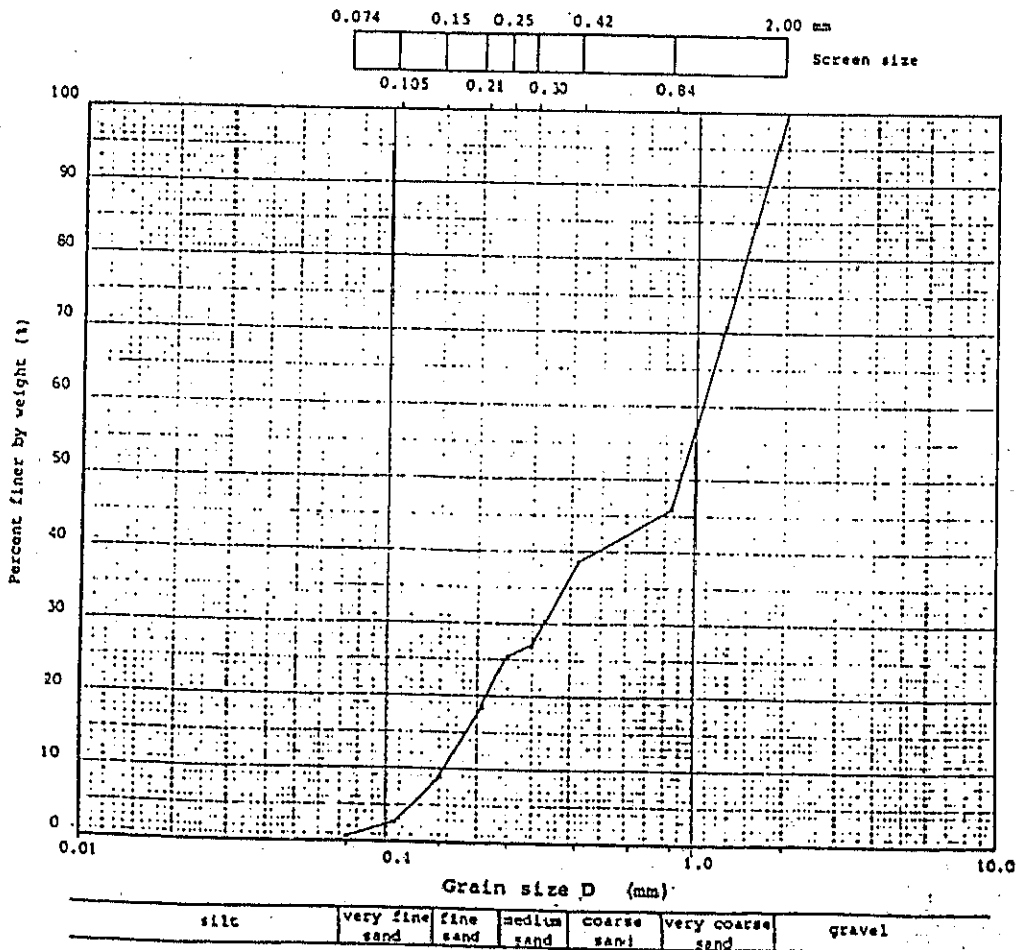
Sample No. 21 B  
 Name of sample Bali Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	107.6	46.2
0.42	15.15	38.625
0.30	23.05	27.1
0.25	3.2	25.5
0.21	13.95	18.525
0.15	19.15	8.95
0.105	12.65	2.625
0.074	4.00	0.625
	1.25	-

Very coarse sand (2.00-0.84mm) %	53.8
Coarse sand (0.84-0.42mm) %	7.575
Medium sand (0.42-0.25mm) %	13.125
Fine sand (0.25-0.15mm) %	16.55
Very fine sand (0.15-0.074mm) %	8.325
Silt or clay (under 0.074mm) %	0.625
Maximum grain size mm	0.84
60% grain size mm	1.07
30% grain size mm	0.33
10% grain size mm	0.153
Coefficient of uniformity $U_c$	6.993
Coefficient of curvature $U_c'$	0.665

Grain size accumulation curve



App.3.22

**Grain Size Analysis**

Sample No. 22 A

Date \_\_\_\_\_

Name of sample Bali Beach Sand

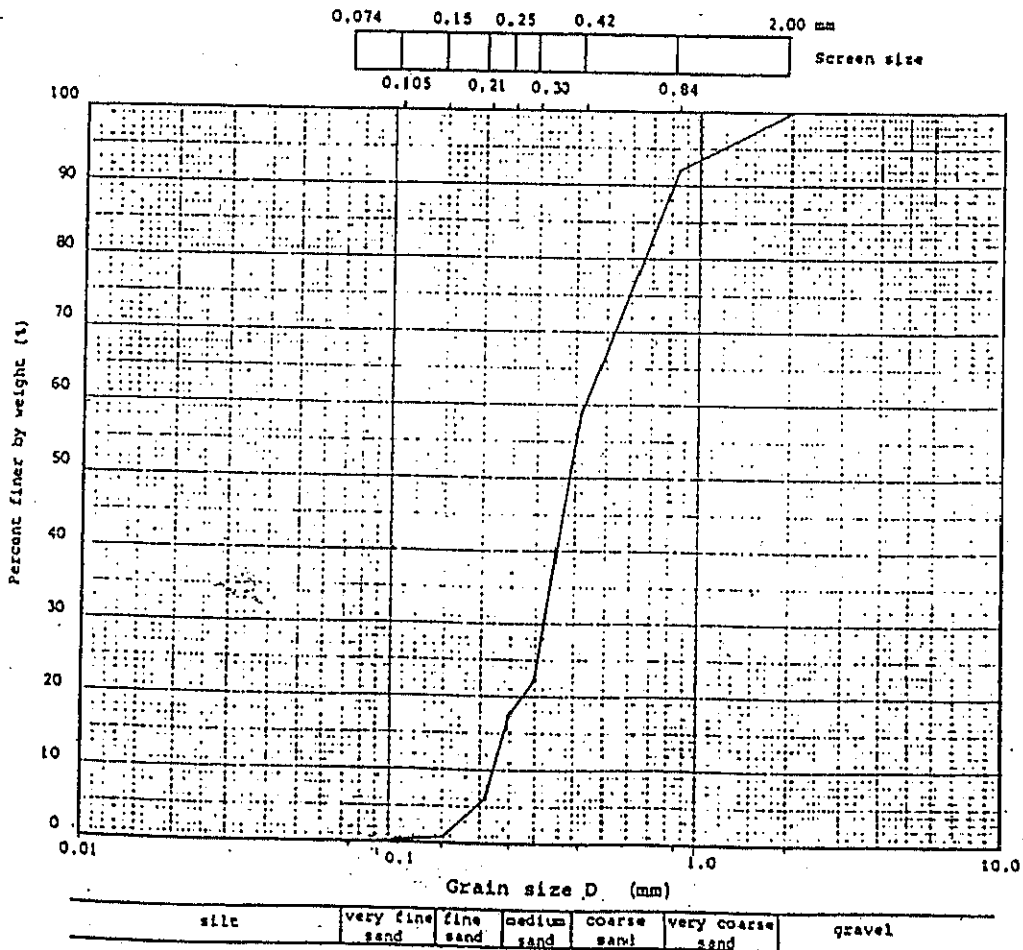
Signature \_\_\_\_\_

Locality Nusa Dua Beach

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	15.75	92.125
0.42	66.15	59.05
0.30	73.55	22.275
0.25	9.95	17.3
0.21	22.75	5.925
0.15	10.4	0.725
0.105	1.2	0.125
0.074	0.15	0.05
	0.10	-

Very coarse sand (2.00-0.84mm) %	7.875
Coarse sand (0.84-0.42mm) %	33.075
Medium sand (0.42-0.25mm) %	41.75
Fine sand (0.25-0.15mm) %	16.575
Very fine sand (0.15-0.074mm) %	0.675
Silt or clay (under 0.074mm) %	0.05
Maximum grain size mm	0.84
60% grain size mm	0.43
30% grain size mm	0.32
10% grain size mm	0.22
Coefficient of uniformity $U_c$	1.955
Coefficient of curvature $U_c'$	1.082

Grain size accumulation curve



App. 3.23

**Grain Size Analysis**

Sample No. 22 B

Date \_\_\_\_\_

Name of sample Beach Sand

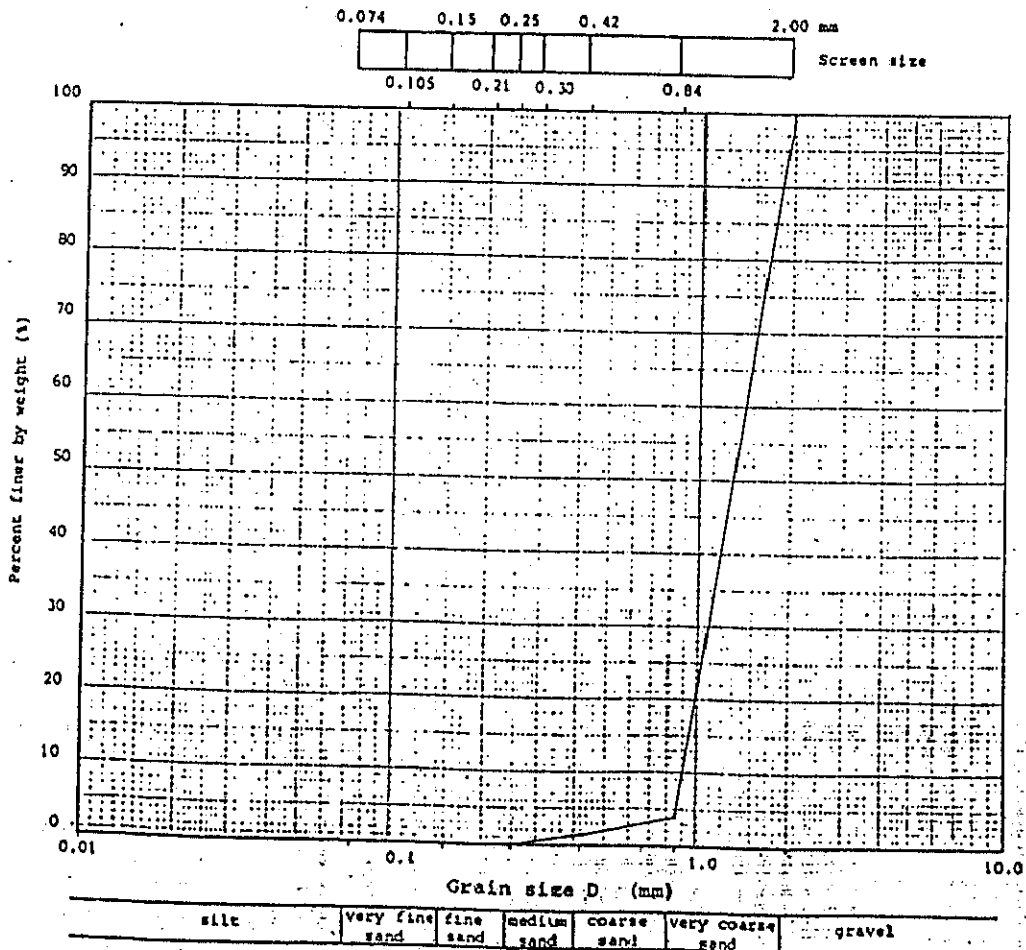
Signature \_\_\_\_\_

Locality Nusa Dua Beach

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	192.95	3.525
0.42	6.80	0.125
0.30	0.15	0.05
0.25	0.10	0
0.21	0	0
0.15	0	0
0.105	0	0
0.074	0	0
	0	-

Very coarse sand (2.00-0.84mm) %	96.475
Coarse sand (0.84-0.42mm) %	3.40
Medium sand (0.42-0.25mm) %	0.125
Fine sand (0.25-0.15mm) %	0
Very fine sand (0.15-0.074mm) %	0
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	1.4
30% grain size mm	1.08
10% grain size mm	0.90
Coefficient of uniformity $U_c$	1.556
Coefficient of curvature $U_c'$	0.926

Grain size accumulation curve





**Grain Size Analysis**

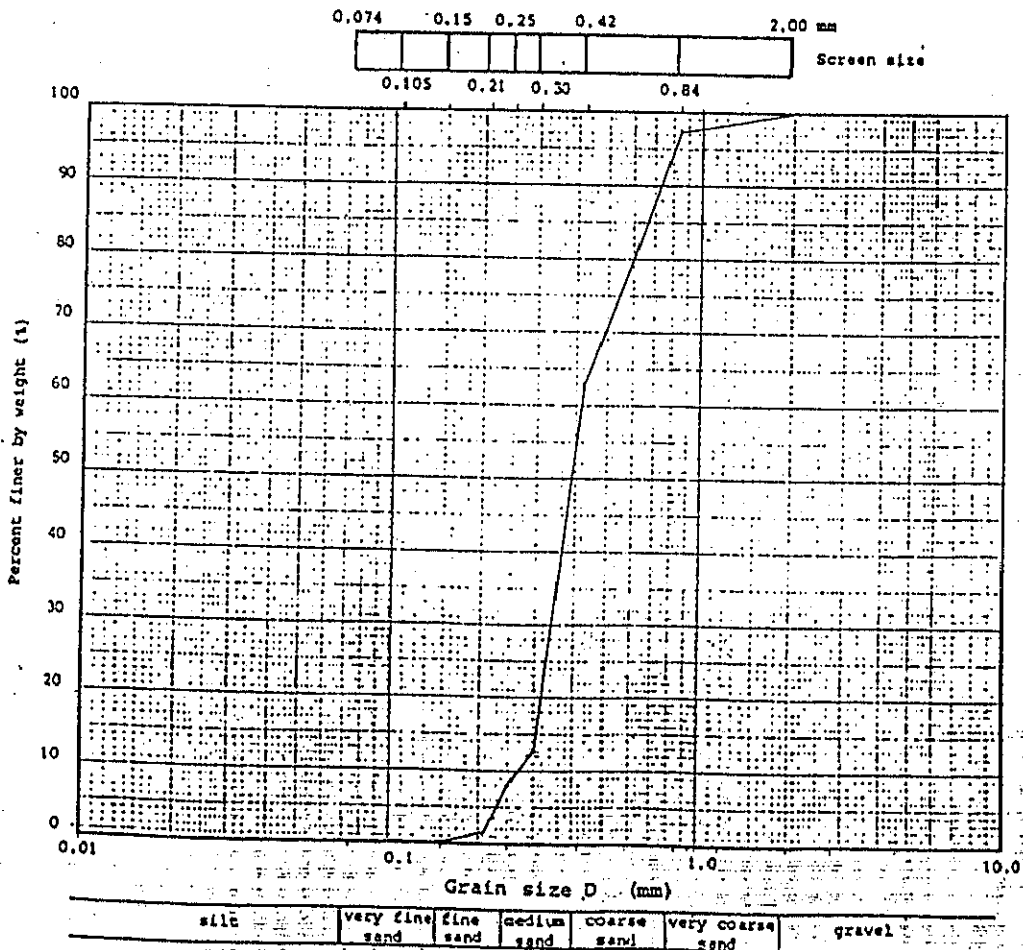
Sample No. 23 A  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	4.8	97.6
0.42	69.15	63.025
0.30	100.95	12.55
0.25	9.10	8.0
0.21	12.50	1.75
0.15	3.30	0.1
0.105	0.15	0.025
0.074	0.05	0
	0	-

Very coarse sand (2.00-0.84mm) %	2.4
Coarse sand (0.84-0.42mm) %	34.575
Medium sand (0.42-0.25mm) %	55.025
Fine sand (0.25-0.15mm) %	7.9
Very fine sand (0.15-0.074mm) %	0.1
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	0.42
30% grain size mm	0.34
10% grain size mm	0.27
Coefficient of uniformity $U_c$	1.556
Coefficient of curvature $U_c'$	1.019

Grain size accumulation curve



App. 3.25

**Grain Size Analysis**

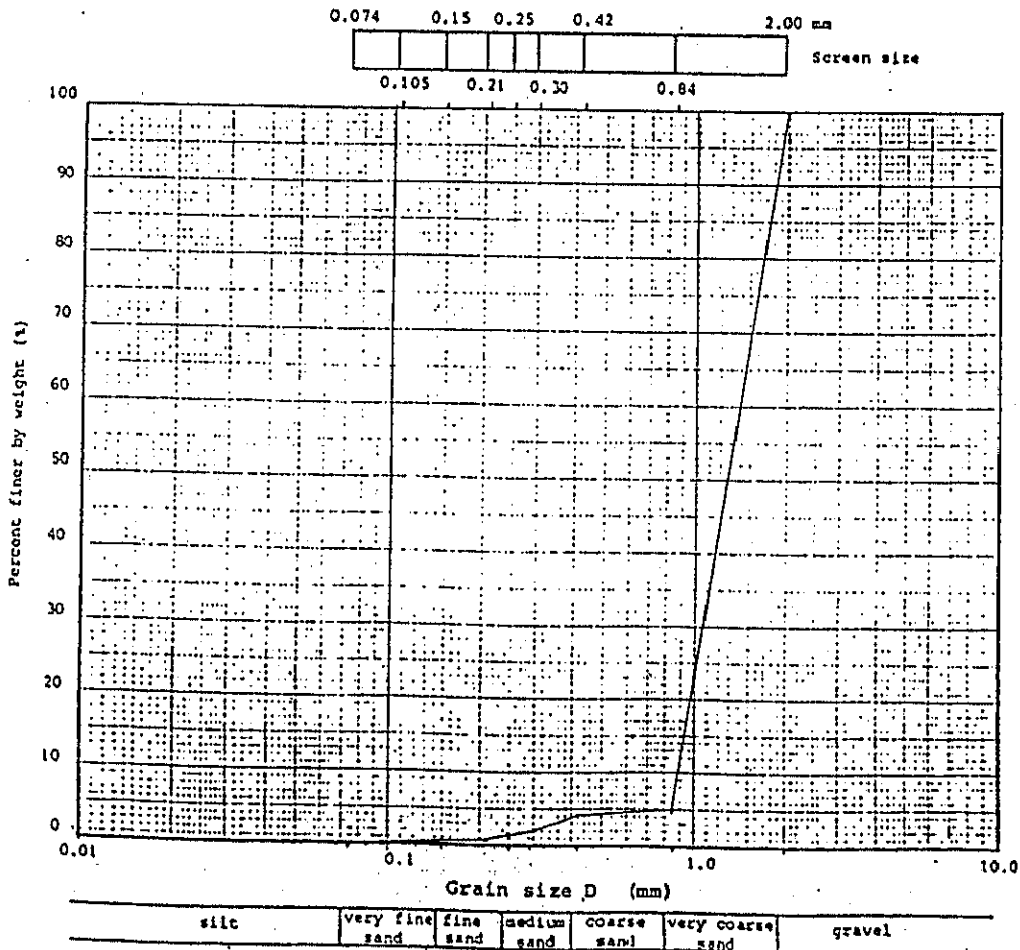
Sample No. 23 B  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	189.80	5.1
0.42	1.75	4.225
0.30	4.3	2.075
0.25	0.85	1.65
0.21	1.80	0.75
0.15	1.35	0.075
0.105	0.10	0.025
0.074	0.05	0
	0	-

Very coarse sand (2.00-0.84mm) %	94.90
Coarse sand (0.84-0.42mm) %	0.875
Medium sand (0.42-0.25mm) %	2.575
Fine sand (0.25-0.15mm) %	1.575
Very fine sand (0.15-0.074mm) %	0.075
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	1.39
30% grain size mm	1.06
10% grain size mm	0.88
Coefficient of uniformity $U_c$	1.580
Coefficient of curvature $U_c'$	0.919

Grain size accumulation curve



App.3.26

**Grain Size Analysis**

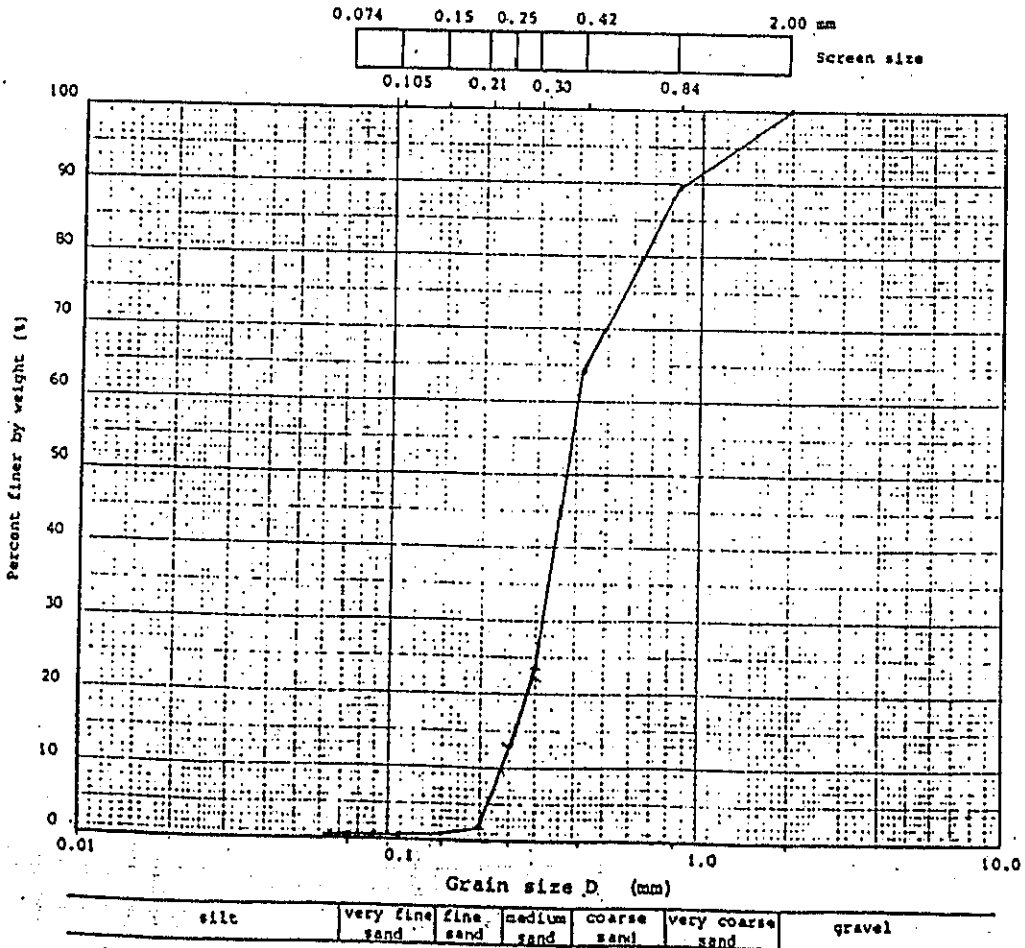
Sample No. 24 A  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	21.60	89.2
0.42	50.36	64.02
0.30	83.30	22.37
0.25	18.6	13.07
0.21	22.0	2.07
0.15	3.7	0.22
0.105	0.26	0.07
0.074	0.1	0.04
	0.08	-

Very coarse sand (2.00-0.84mm) %	10.80
Coarse sand (0.84-0.42mm) %	25.18
Medium sand (0.42-0.25mm) %	50.95
Fine sand (0.25-0.15mm) %	12.85
Very fine sand (0.15-0.074mm) %	0.18
Silt or clay (under 0.074mm) %	0.04
Maximum grain size mm	0.84
60% grain size mm	0.40
30% grain size mm	0.32
10% grain size mm	0.24
Coefficient of uniformity $U_c$	1.667
Coefficient of curvature $U_c'$	1.067

Grain size accumulation curve



App. 3.27

**Grain Size Analysis**

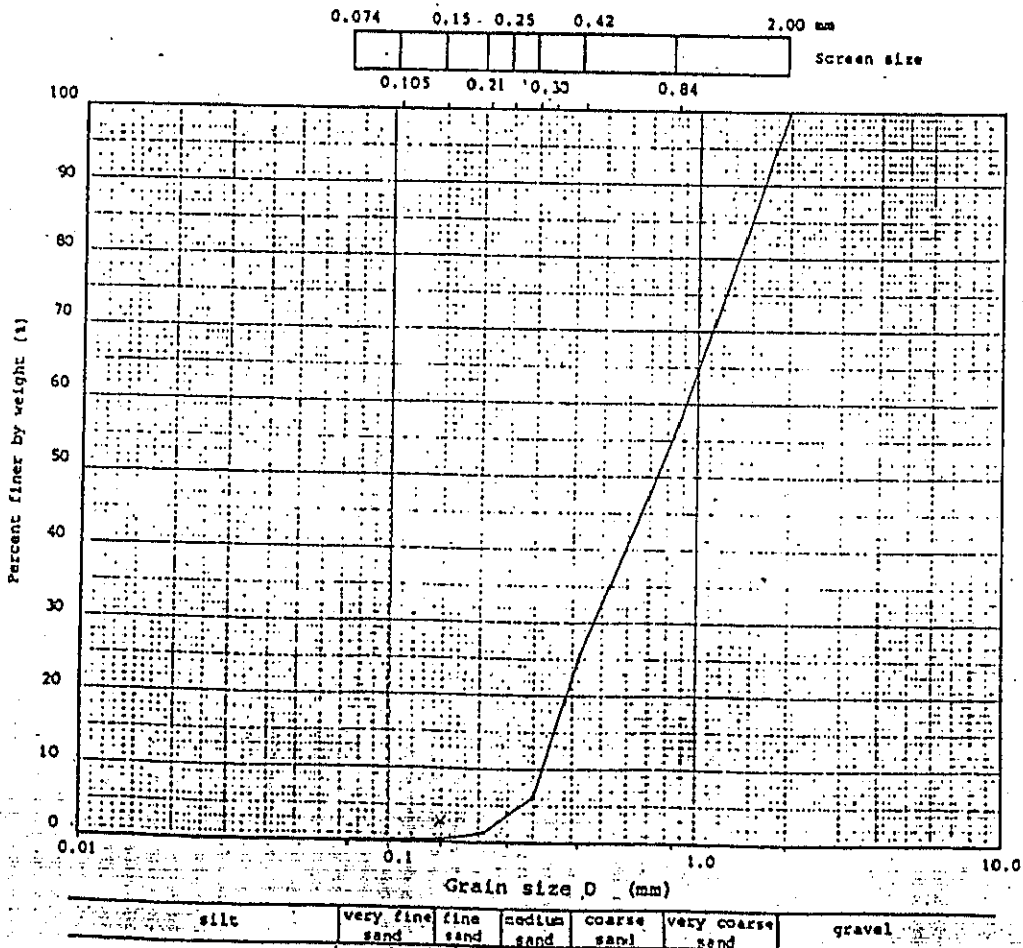
Sample No. 24 B  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	89.05	55.475
0.42	61.40	24.775
0.30	37.35	6.10
0.25	4.05	4.075
0.21	5.85	1.15
0.15	1.75	0.275
0.105	0.40	0.075
0.074	0.15	0
	0	-

Very coarse sand (2.00-0.84mm) %	44.525
Coarse sand (0.84-0.42mm) %	30.70
Medium sand (0.42-0.25mm) %	20.70
Fine sand (0.25-0.15mm) %	3.80
Very fine sand (0.15-0.074mm) %	0.275
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	0.91
30% grain size mm	0.47
10% grain size mm	0.32
Coefficient of uniformity $U_c$	2.844
Coefficient of curvature $U_c'$	0.759

Grain size accumulation curve



App. 3.28

Grain Size Analysis

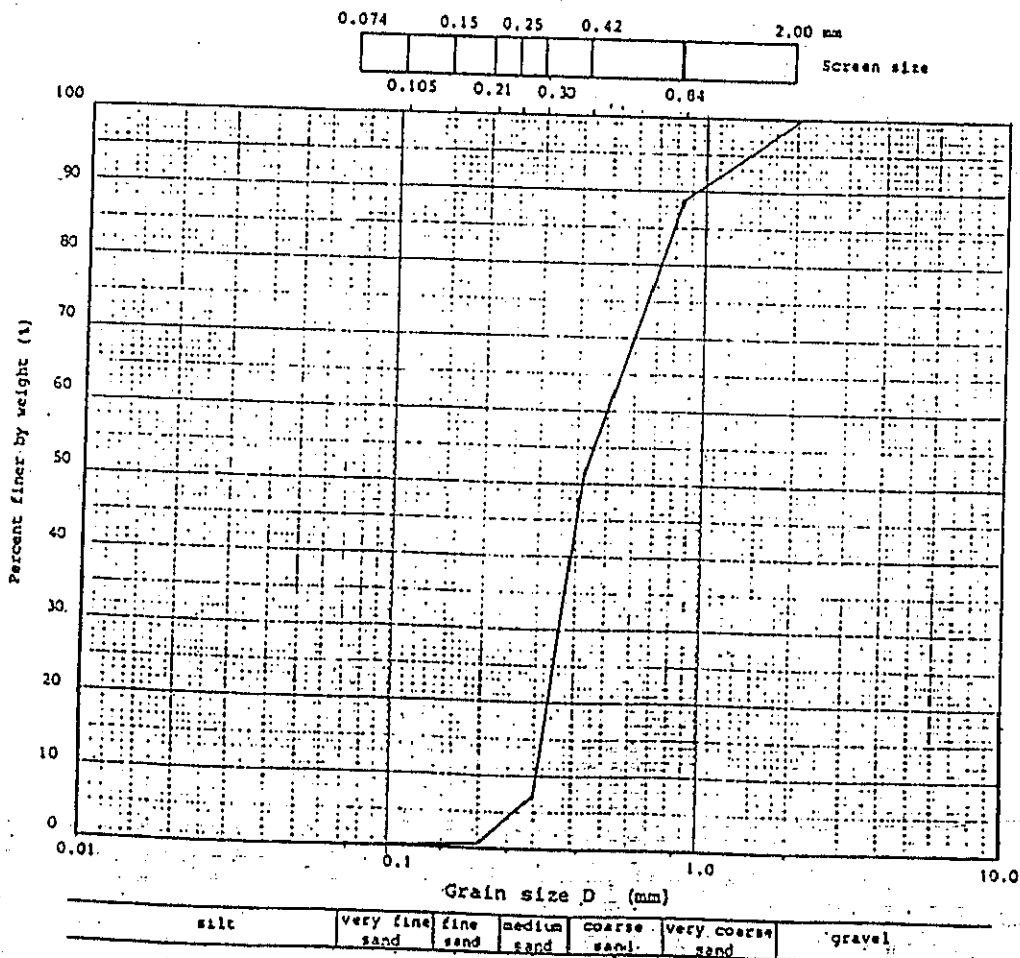
Sample No. 25 A  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	22.65	88.675
0.42	74.40	51.475
0.30	87.65	7.65
0.25	6.85	4.225
0.21	6.90	0.775
0.15	1.20	0.175
0.105	0.05	0.15
0.074	0.05	0.125
	0.25	-

Very coarse sand (2.00-0.84mm) %	11.325
Coarse sand (0.84-0.42mm) %	37.20
Medium sand (0.42-0.25mm) %	47.25
Fine sand (0.25-0.15mm) %	4.05
Very fine sand (0.15-0.074mm) %	0.05
Silt or clay (under 0.074mm) %	0.125
Maximum grain size mm	0.84
60% grain size mm	0.49
30% grain size mm	0.36
10% grain size mm	0.305
Coefficient of uniformity $U_c$	1.61
Coefficient of curvature $U_c'$	0.87

Grain size accumulation curve



Grain Size Analysis

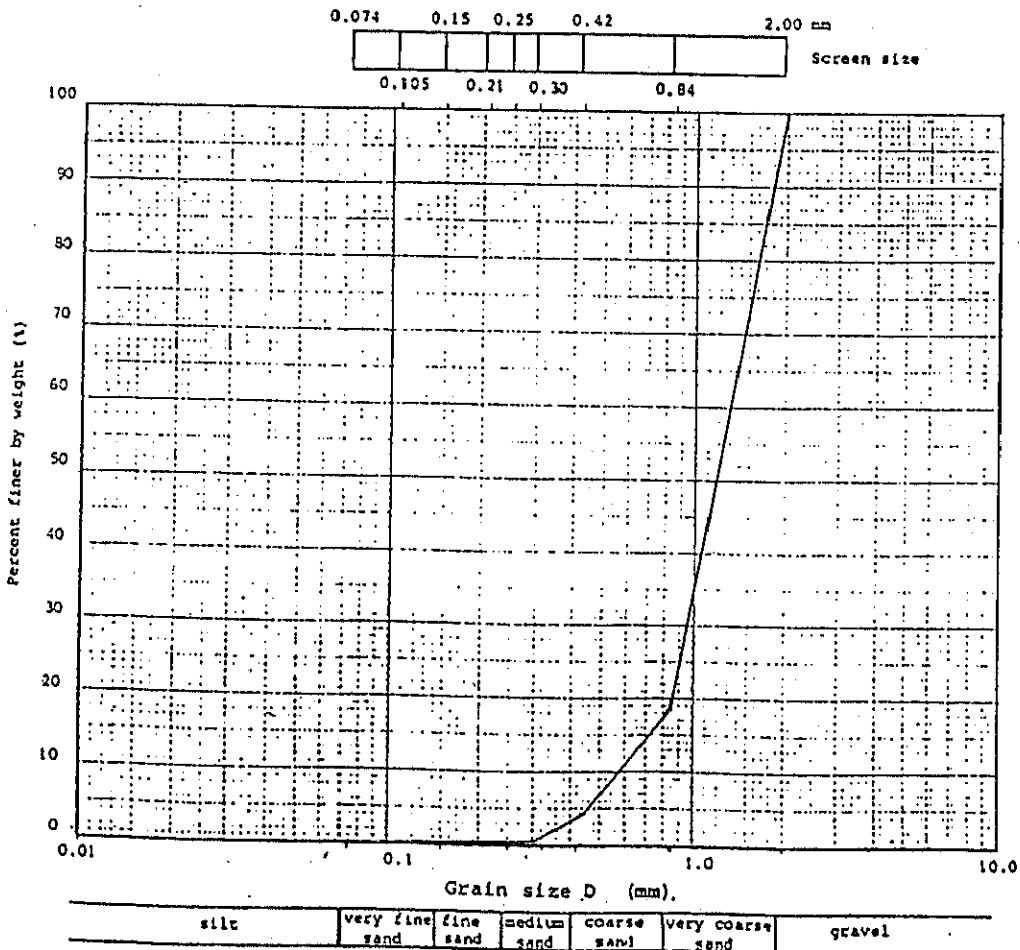
Sample No. 25 B  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	163.05	18.475
0.42	28.45	4.25
0.30	7.10	0.7
0.25	0.5	0.45
0.21	0.45	0.225
0.15	0.15	0.15
0.105	0.1	0.1
0.074	0.05	0.075
	0.15	-

Very coarse sand (2.00-0.84mm) %	81.525
Coarse sand (0.84-0.42mm) %	14.225
Medium sand (0.42-0.25mm) %	3.80
Fine sand (0.25-0.15mm) %	0.30
Very fine sand (0.15-0.074mm) %	0.075
Silt or clay (under 0.074mm) %	0.075
Maximum grain size mm	0.84
60% grain size mm	1.305
30% grain size mm	0.96
10% grain size mm	0.57
Coefficient of uniformity $U_c$	2.289
Coefficient of curvature $U_c'$	1.239

Grain size accumulation curve



**Grain Size Analysis**

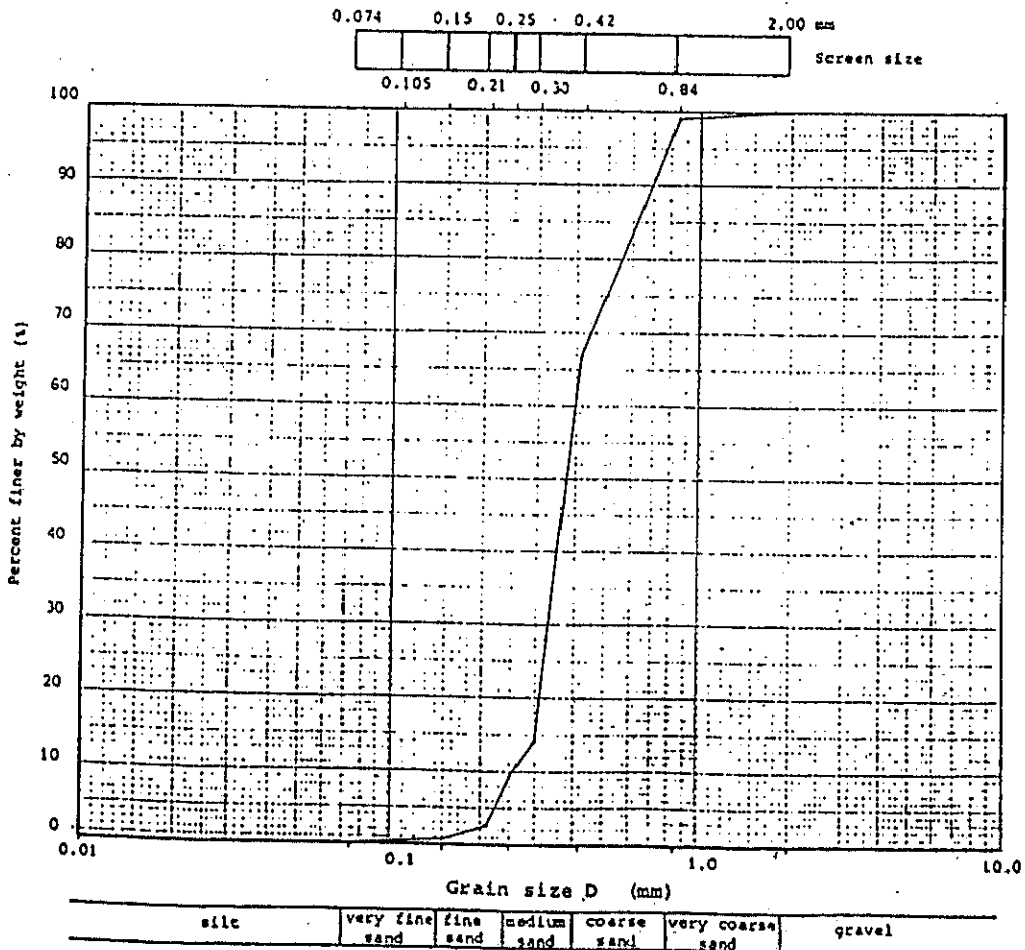
Sample No. 26 A  
 Name of sample Bali Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	2	99
0.42	64.15	66.925
0.30	105.05	14.4
0.25	9.4	9.7
0.21	14.0	2.7
0.15	3.70	0.85
0.105	1.05	0.325
0.074	0.4	0.125
	0.25	-

Very coarse sand (2.00-0.84mm) %	1.0
Coarse sand (0.84-0.42mm) %	32.075
Medium sand (0.42-0.25mm) %	57.225
Fine sand (0.25-0.15mm) %	8.85
Very fine sand (0.15-0.074mm) %	0.725
Silt or clay (under 0.074mm) %	0.125
Maximum grain size mm	0.84
60% grain size mm	0.40
30% grain size mm	0.33
10% grain size mm	0.26
Coefficient of uniformity $U_c$	1.538
Coefficient of curvature $U_c'$	1.047

Grain size accumulation curve



App. 3.31

**Grain Size Analysis**

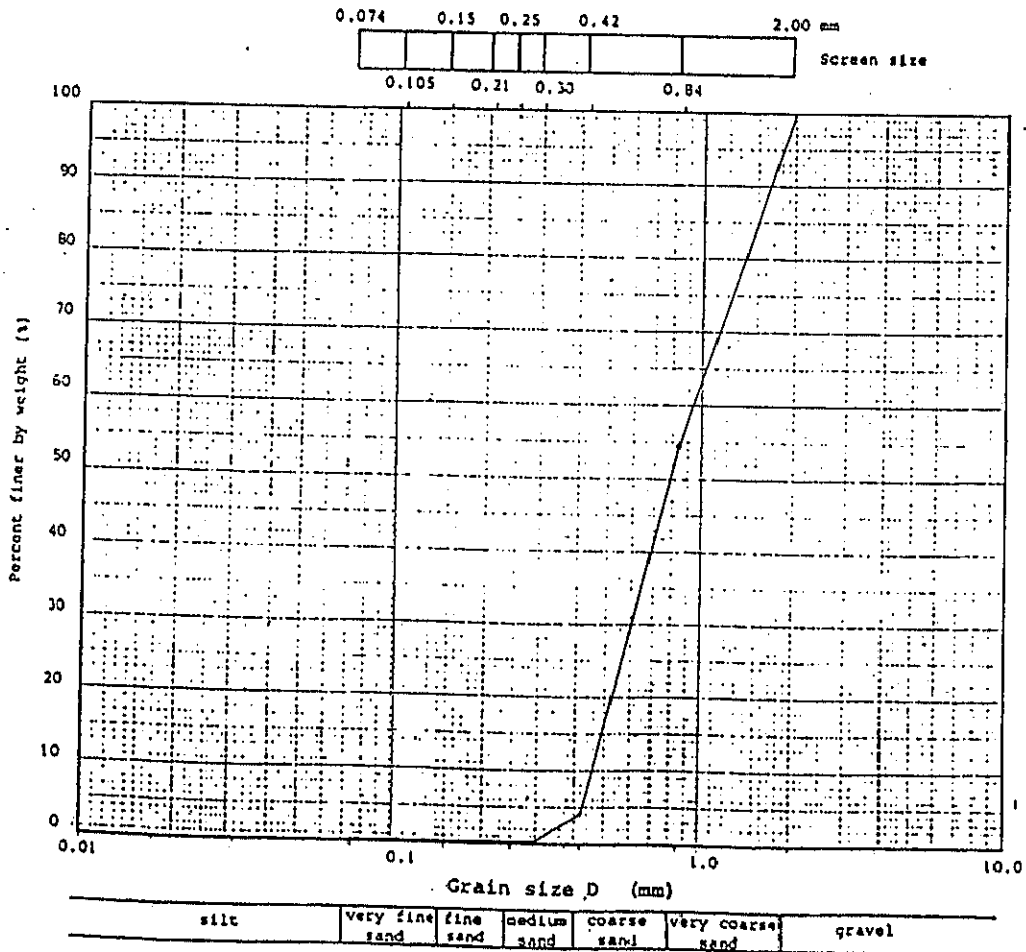
Sample No. 26 B  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	91.10	54.45
0.42	101.10	3.9
0.30	7.35	0.225
0.25	0.15	0.15
0.21	0.1	0.1
0.15	0.1	0.075
0.105	0.05	0.025
0.074	0.05	0
	0	-

Very coarse sand (2.00-0.84mm) %	45.55
Coarse sand (0.84-0.42mm) %	50.55
Medium sand (0.42-0.25mm) %	3.75
Fine sand (0.25-0.15mm) %	0.075
Very fine sand (0.15-0.074mm) %	0.075
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	0.94
30% grain size mm	0.605
10% grain size mm	0.46
Coefficient of uniformity $U_c$	2.043
Coefficient of curvature $U_c'$	0.846

Grain size accumulation curve



App.3.32



### Grain Size Analysis

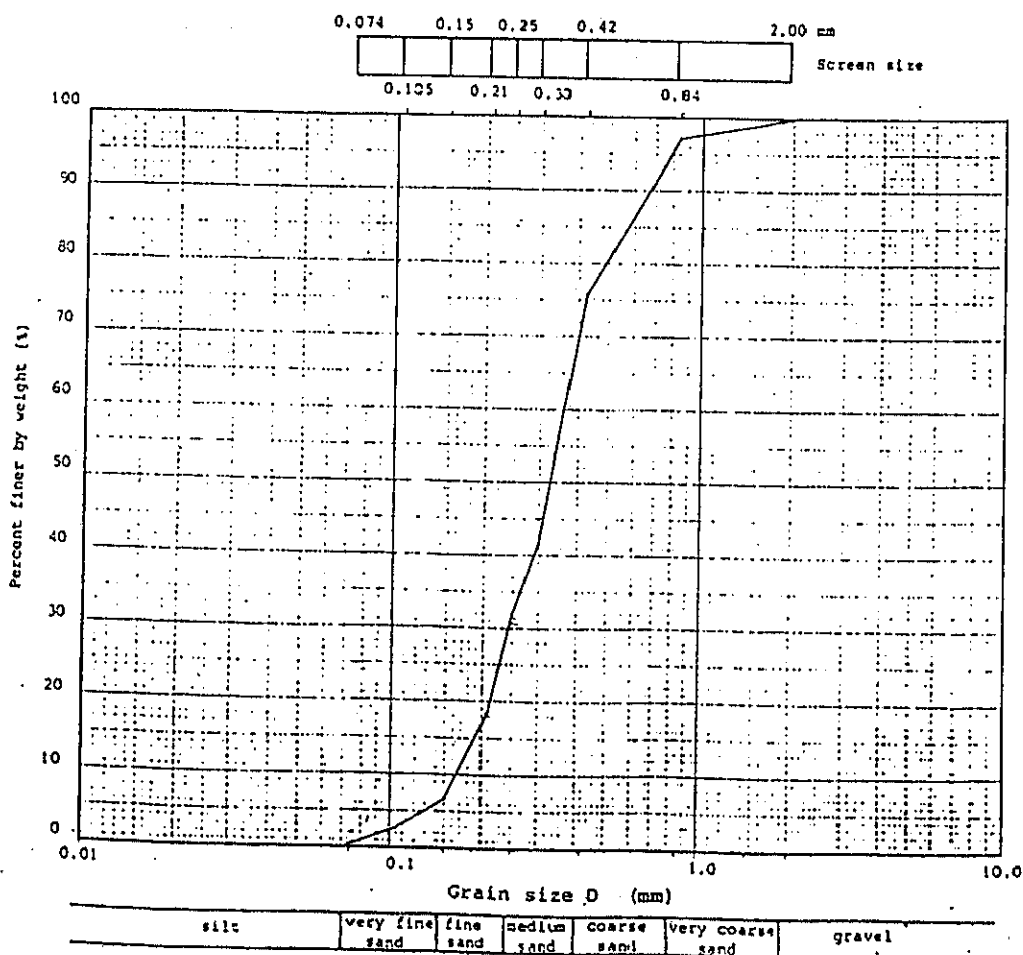
Sample No. 27 A  
 Name of sample Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	5.95	97.025
0.42	42.3	75.875
0.30	68.95	41.4
0.25	18.1	32.35
0.21	27.3	18.70
0.15	23.6	6.9
0.105	8.4	2.7
0.074	4.55	0.425
	0.85	-

Very coarse sand (2.00-0.84mm) %	2.975
Coarse sand (0.84-0.42mm) %	21.15
Medium sand (0.42-0.25mm) %	43.525
Fine sand (0.25-0.15mm) %	25.45
Very fine sand (0.15-0.074mm) %	6.475
Silt or clay (under 0.074mm) %	0.425
Maximum grain size mm	0.84
60% grain size mm	0.36
30% grain size mm	0.24
10% grain size mm	0.165
Coefficient of uniformity $U_c$	2.182
Coefficient of curvature $U_c'$	0.970

Grain size accumulation curve



**Grain Size Analysis**

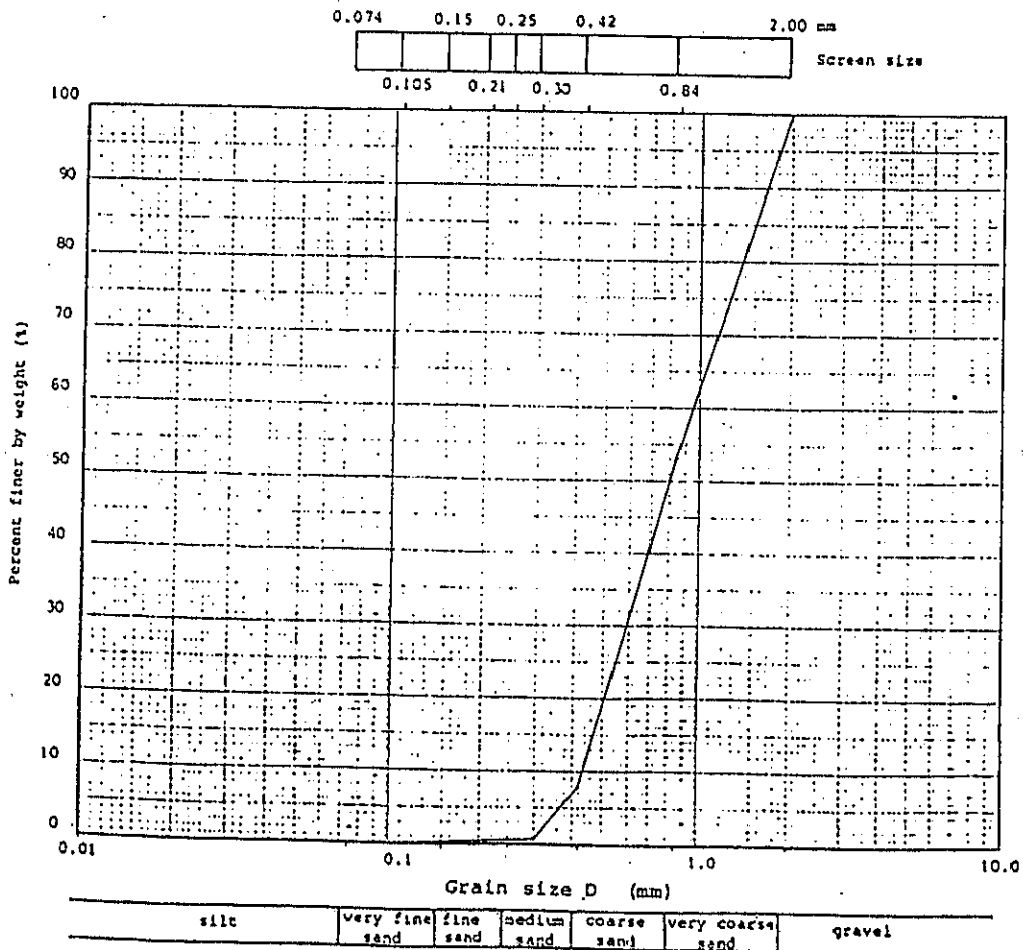
Sample No. 27 B  
 Name of sample Bali Beach Sand  
 Locality Nusa Dua Beach

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Grain size (mm)	Weight (g)	Weight percent (%)
2.00		100
0.84	93.45	53.275
0.42	90.60	7.975
0.30	14.20	0.875
0.25	0.40	0.675
0.21	0.55	0.40
0.15	0.50	0.15
0.105	0.20	0.05
0.074	0.10	0
	0	-

Very coarse sand (2.00-0.84mm) %	46.725
Coarse sand (0.84-0.42mm) %	45.30
Medium sand (0.42-0.25mm) %	7.30
Fine sand (0.25-0.15mm) %	0.525
Very fine sand (0.15-0.074mm) %	0.15
Silt or clay (under 0.074mm) %	0
Maximum grain size mm	0.84
60% grain size mm	0.96
30% grain size mm	0.59
10% grain size mm	0.43
Coefficient of uniformity $U_c$	2.233
Coefficient of curvature $U_c'$	0.843

Grain size accumulation curve



App.3.34