

**Fig. II-2 GRAIN SIZE DISTRIBUTION CURVES OF SOILS  
STABILIZED WITH CEMENT**

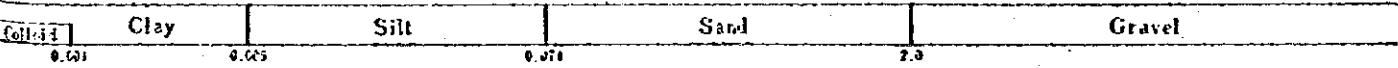
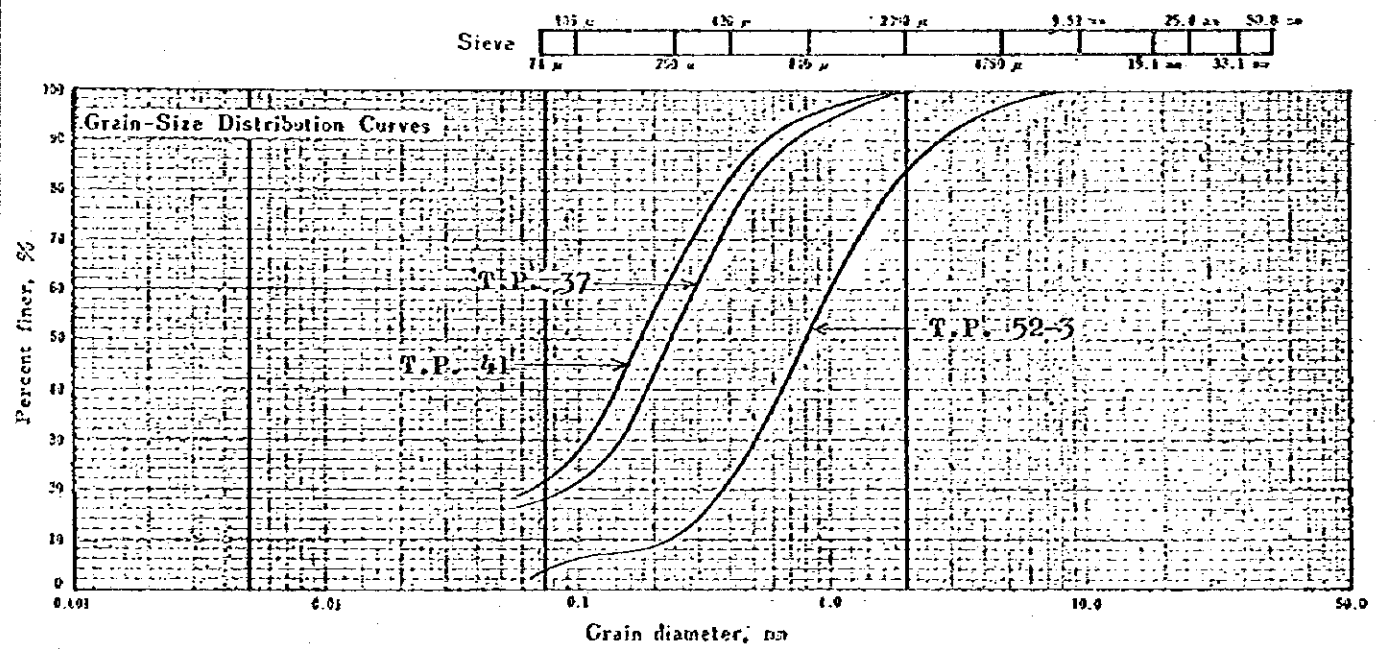
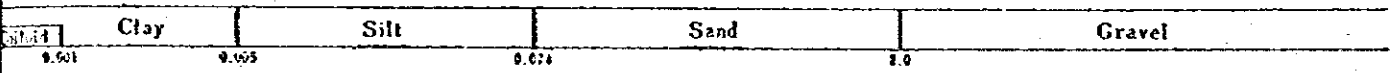
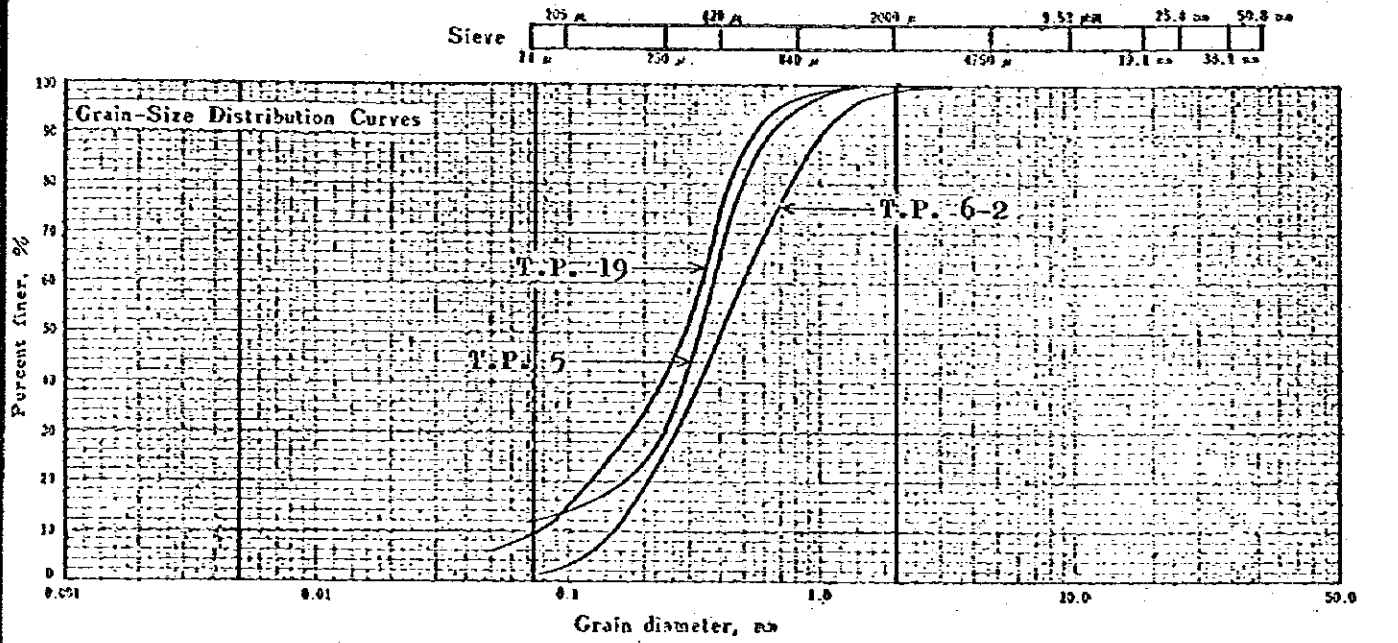


Fig. I - 3 RESULTS OF CEMENT STABILIZATION TEST

Sample no.	TP 5	TP 6-2	TP 19	TP 37	TP 41	TP 52-3		
Natural water content (%)	3.9	2.0	1.3	2.3	5.7	0.6		
Specific gravity	2.640	2.664	2.662	2.618	2.646	2.650		
Atterberg limits	Liquid limit (%)				28			
	Plastic limit (%)	NP	NP	NP	NP	NP		
	Plasticity index				21			
Grain size analysis	Gravel (%)	0	1	0	0	0	16	
	Sand (%)	88	98	90	81	78	80	
	Silt (%)	12	1	10	6	15	4	
	Clay & colloid (%)	0	0	0	13	7	0	
	Max. diameter (mm)	2.00	4.76	2.00	2.00	2.00	9.52	
	Diam. at 60% (mm)	0.38	0.50	0.33	0.29	0.225	1.05	
	Diam. at 10% (mm)	0.050	0.15	0.075	-	0.014	0.26	
Visual soil description	Medium sand	Medium-coarse sand	Medium sand	Silty sand	Silty sand	Coarse sand		
Unified Soil Classification	SC	SP	SP-SM	SC	SC	SP		
AASHTO Soil Classification	A-2-4	A-3	A-3	A-2-4	A-2-4	A-1-b		
Cement Content	0 %	Maximum dry density (g/cm <sup>3</sup> )	1.834	1.770	1.766	1.856	1.905	1.904
		Optimum moisture Content (%)	11.3	14.7	8.2	11.1	12.6	12.7
	2 %	Maximum dry density (g/cm <sup>3</sup> )	1.842	1.778	1.840	1.870	1.915	1.921
		Optimum moisture Content (%)	11.1	14.4	8.9	10.9	12.3	11.8
	4 %	Unconfined compressive strength (kg/cm <sup>2</sup> )	2.25	0.53	1.66	2.93	3.63	1.31
		Maximum dry density (g/cm <sup>3</sup> )	1.864	1.804	1.865	1.877	1.925	1.938
	6 %	Optimum moisture Content (%)	10.6	14.0	9.0	10.6	12.1	11.5
		Unconfined compressive strength (kg/cm <sup>2</sup> )	5.85	1.31	6.03	9.44	8.21	3.19
	8 %	Maximum dry density (g/cm <sup>3</sup> )	1.892	1.835	1.875	1.906	1.943	1.956
		Optimum moisture Content (%)	10.5	13.3	9.1	10.6	11.6	11.1
	8 %	Unconfined compressive strength (kg/cm <sup>2</sup> )	12.62	4.07	12.22	17.65	14.37	5.60
		Maximum dry density (g/cm <sup>3</sup> )	1.904	1.848	1.889	1.931	1.967	2.004
8 %	Optimum moisture Content (%)	10.1	13.0	8.8	10.3	11.3	9.7	
	Unconfined compressive strength (kg/cm <sup>2</sup> )	20.03	8.28	18.91	22.00	20.06	12.00	

Compaction tests were carried out in accordance with standard practice.  
Specimens of unconfined compression test were soaked for 24 hours after 6 days curing.

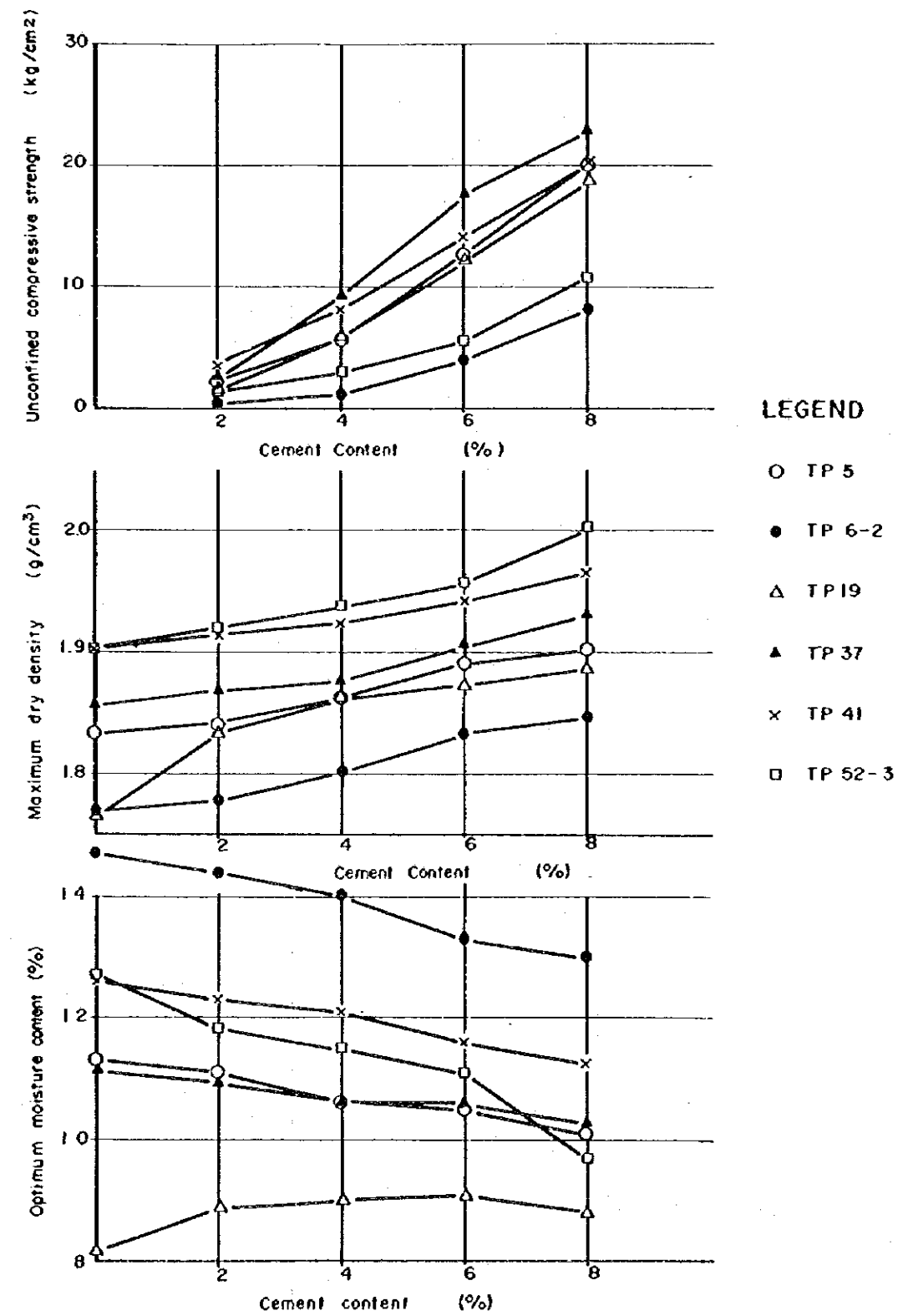
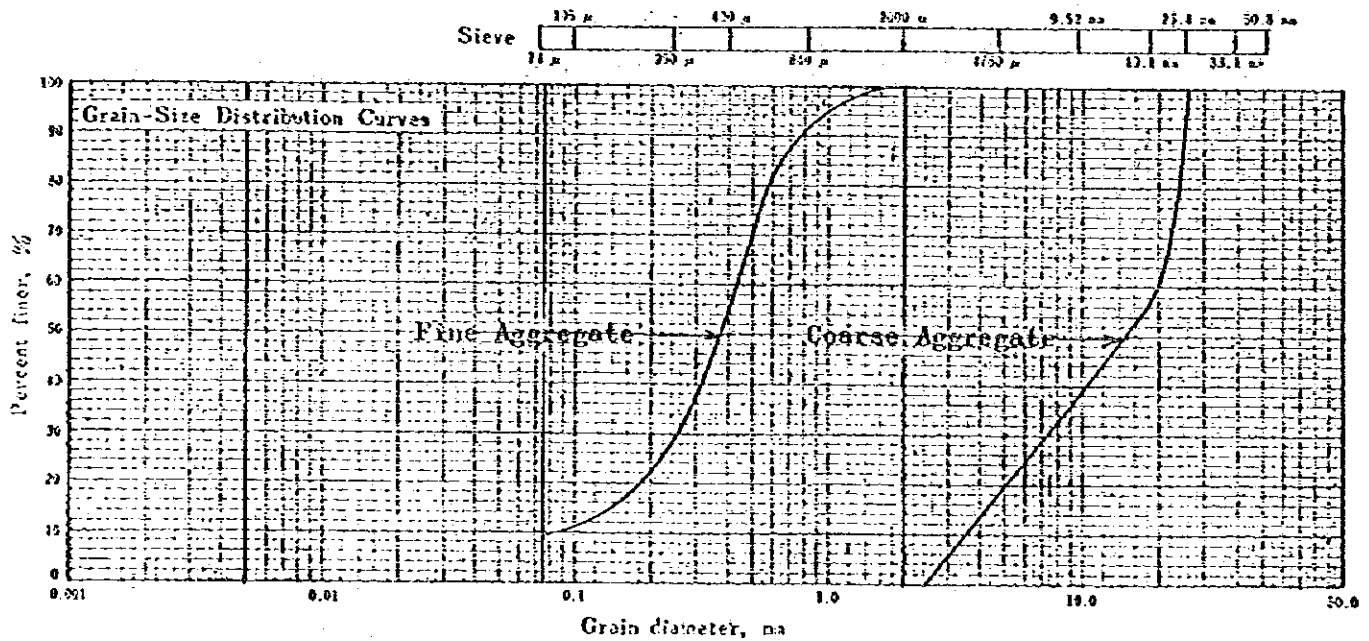
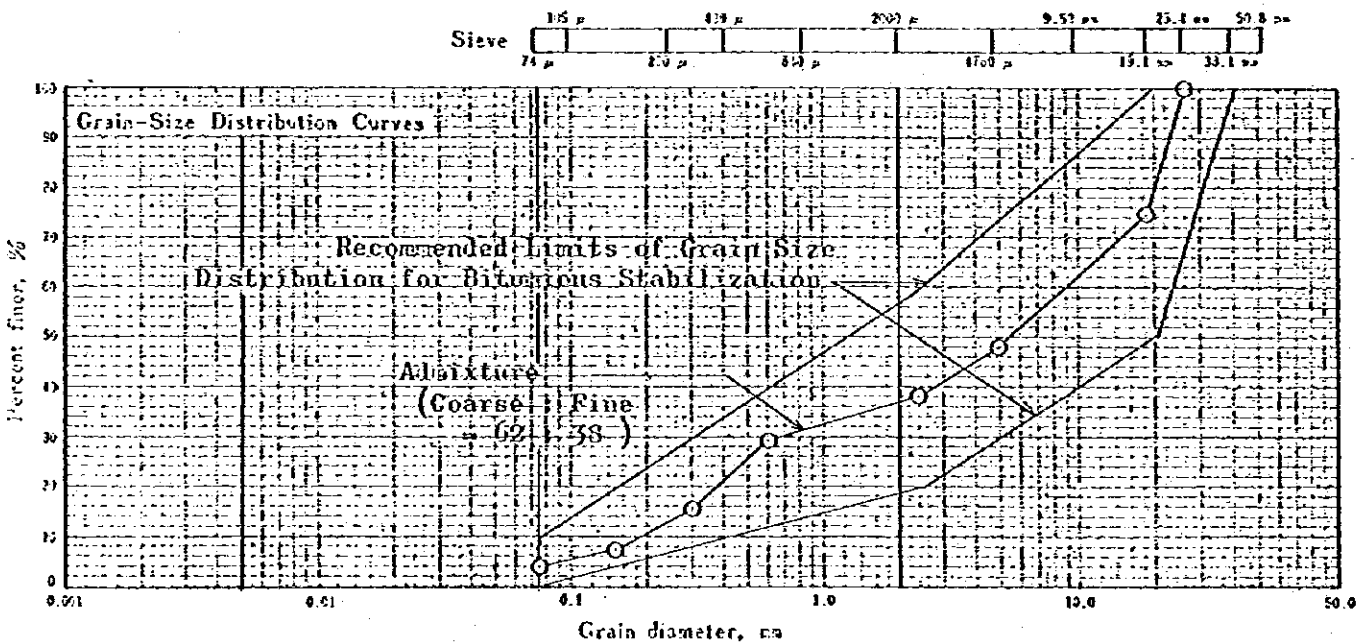




Fig. II-4 GRAIN SIZE DISTRIBUTION CURVES OF SAMPLES  
STABILIZED WITH STRAIGHT-RUN ASPHALT CEMENT



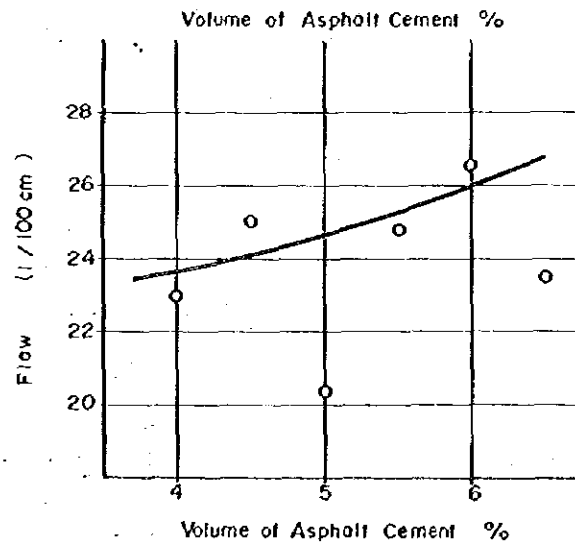
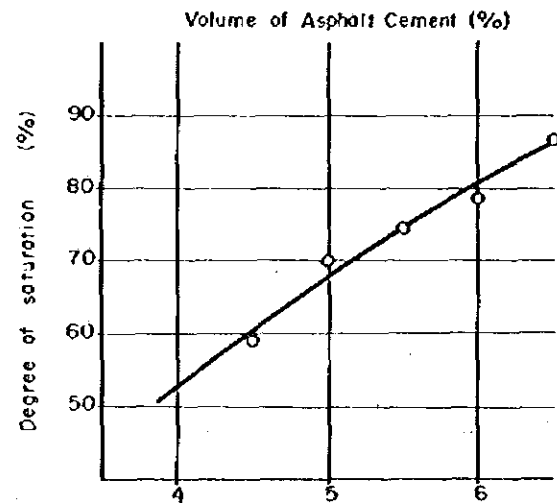
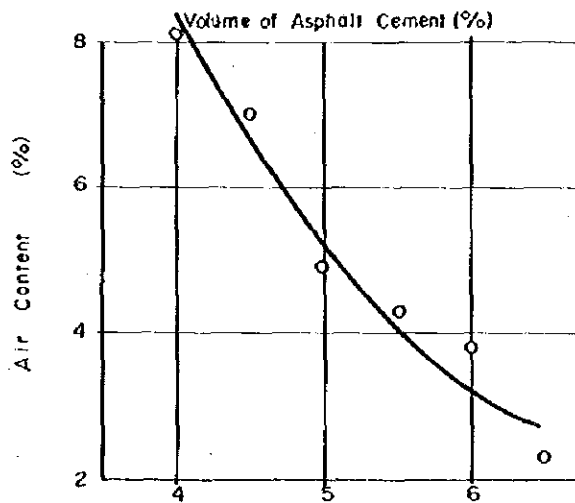
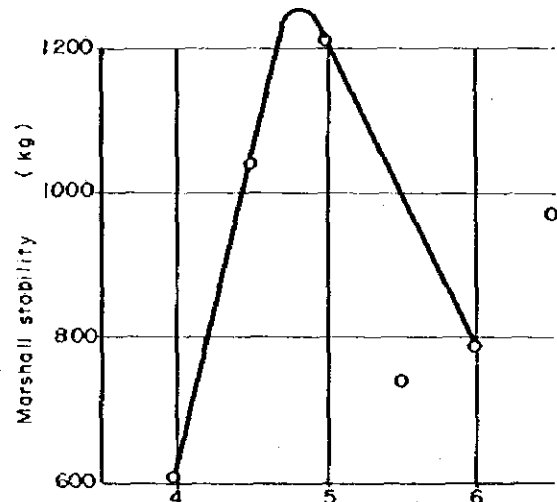
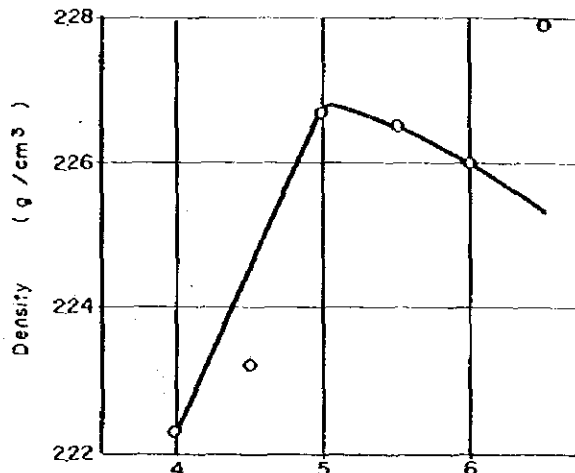
Clay	Silt	Sand	Gravel
0.002	0.075	2.0	



Clay	Silt	Sand	Gravel
0.002	0.075	2.0	

**Fig. 11-5-1 RESULTS OF MARSHALL STABILITY TEST FOR SAMPLES  
STABILIZED WITH STRAIGHT-RUN ASPHALT CEMENT**

**SAMPLE NO. S-5**



**Fig. II-5-2 RESULTS OF MARSHALL STABILITY TEST FOR SAMPLES  
STABILIZED WITH STRAIGHT-RUN ASPHALT CEMENT**

**SAMPLE NO. S-7**

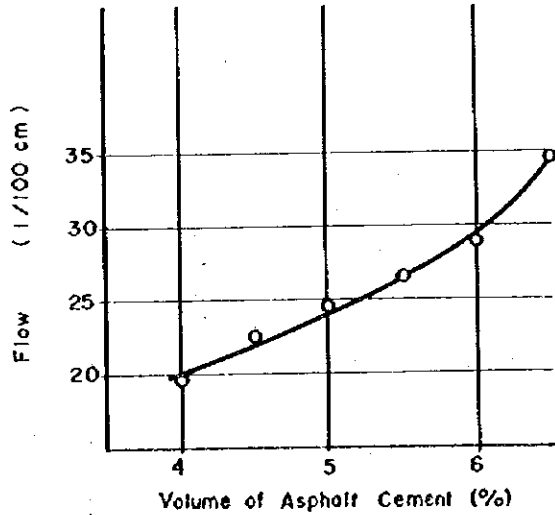
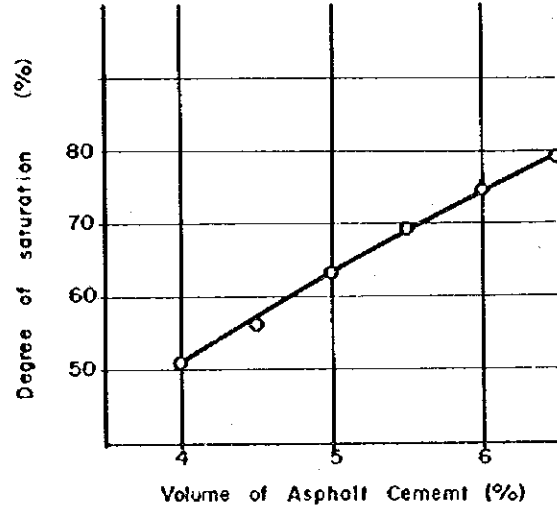
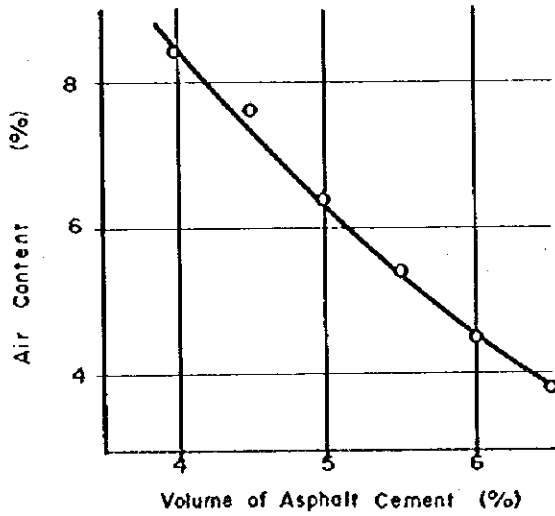
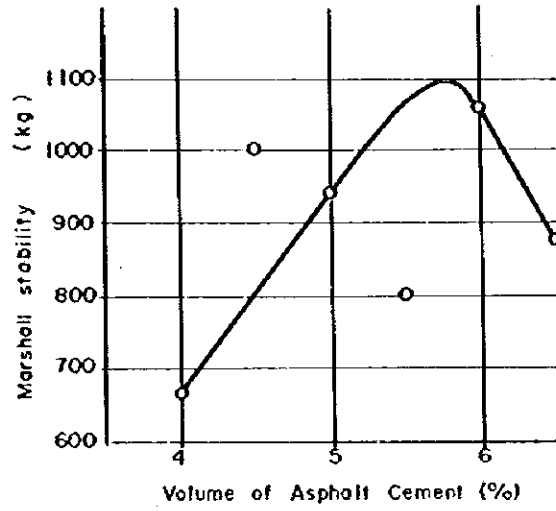
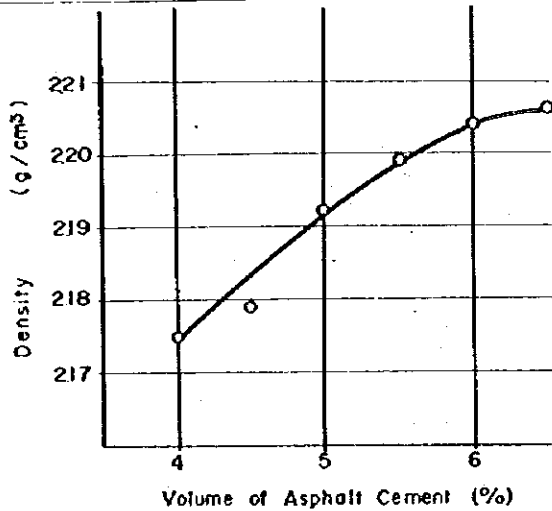
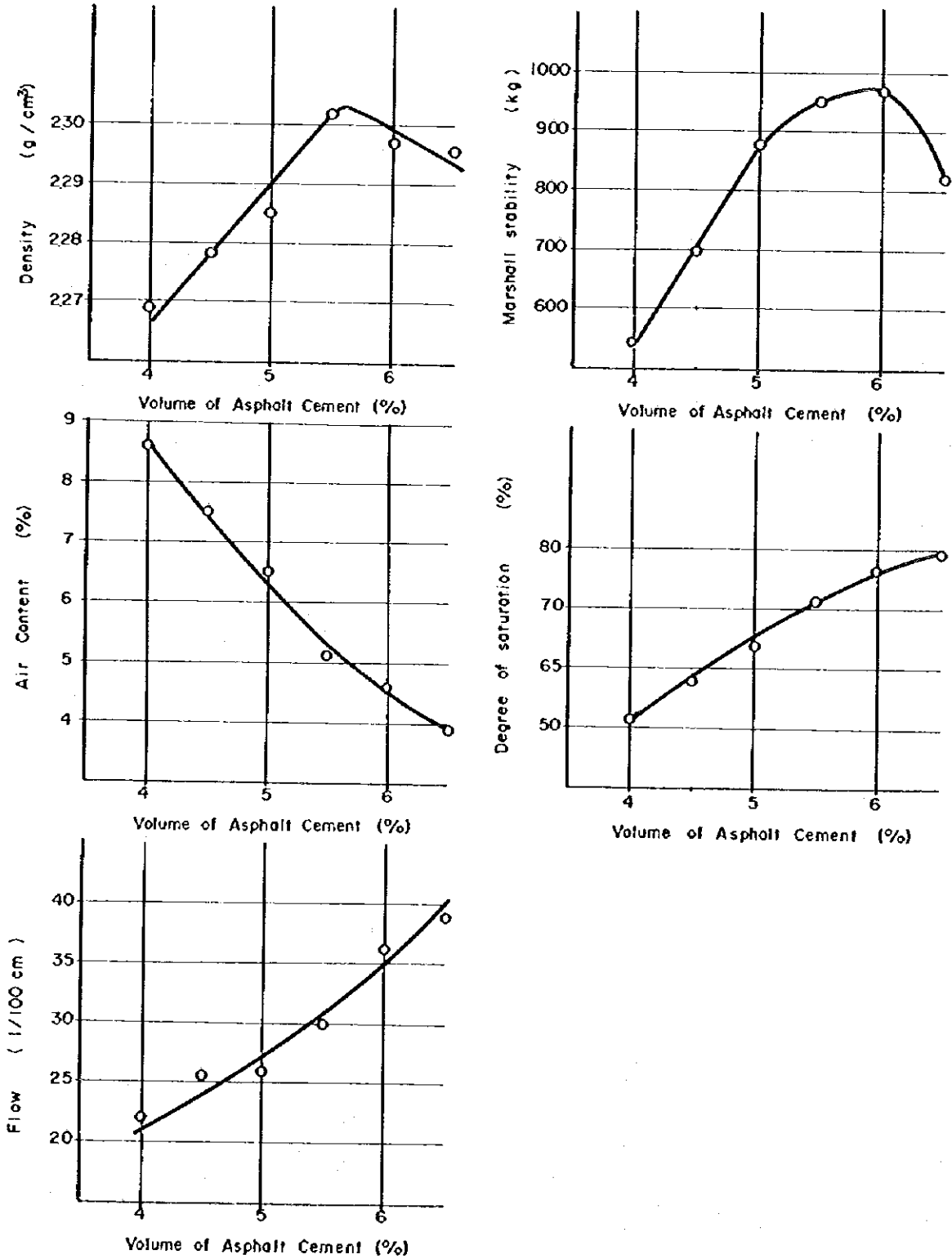
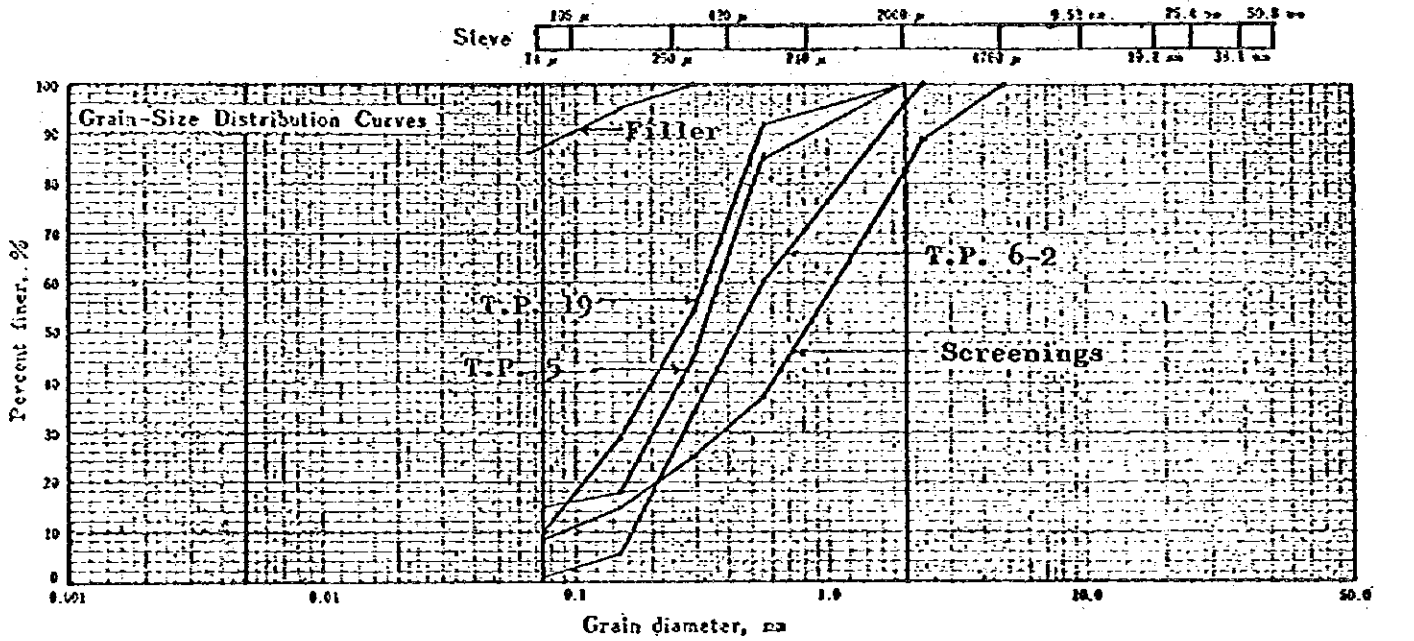


Fig.II-5-3 RESULTS OF MARSHALL STABILITY TEST FOR SAMPLES  
STABILIZED WITH STRAIGHT-RUN ASPHALT CEMENT

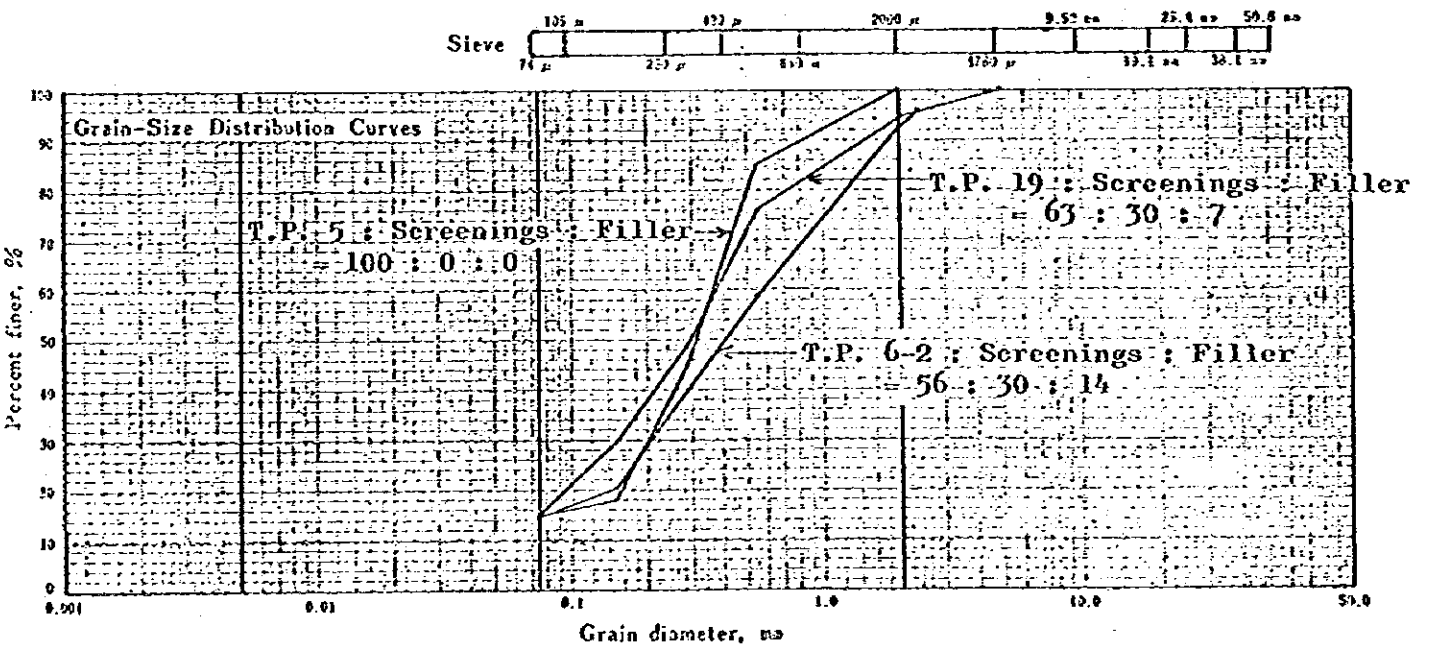
SAMPLE NO. S-8



**Fig. II-6 GRAIN SIZE DISTRIBUTION CURVES OF SAMPLES  
STABILIZED WITH EMULSIFIED ASPHALT**



Colloid	Clay	Silt	Sand	Gravel
0.001	0.005	0.075	1.0	



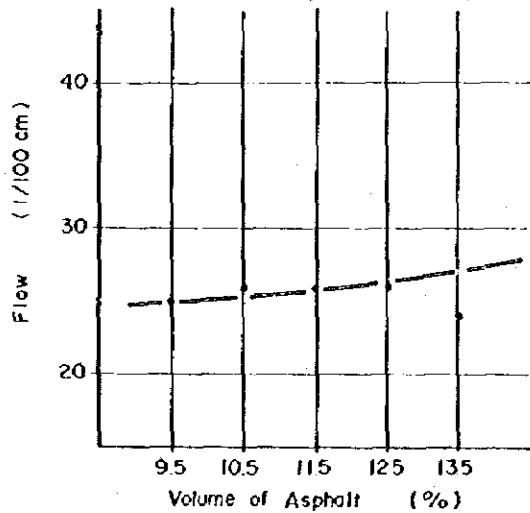
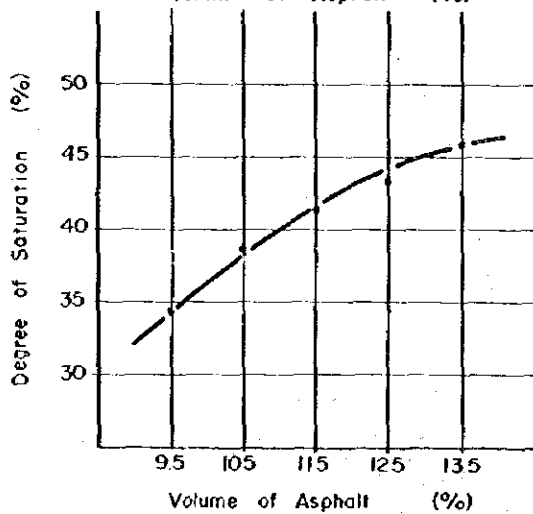
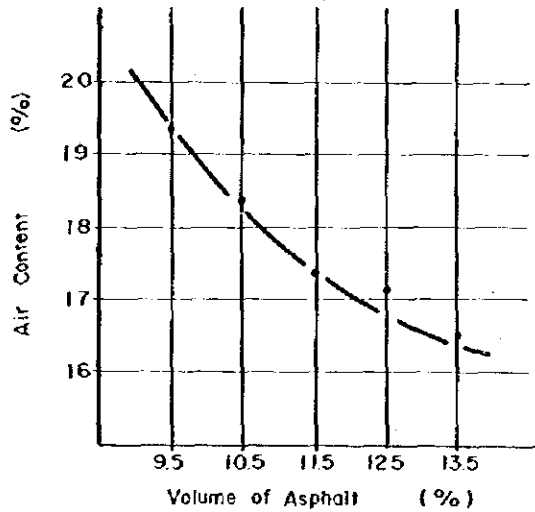
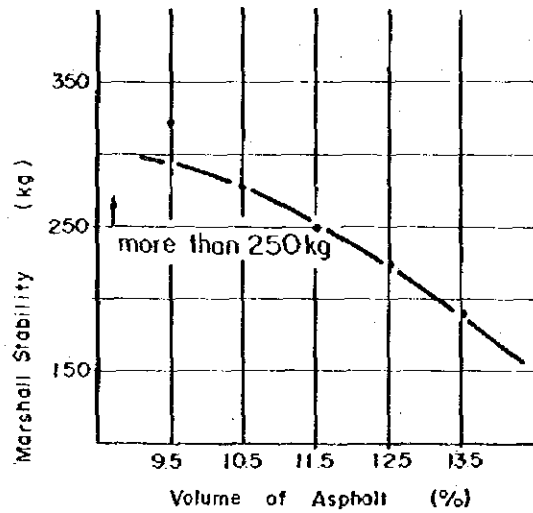
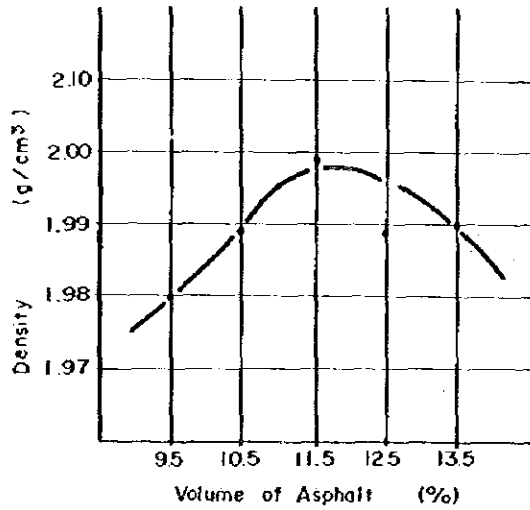
Colloid	Clay	Silt	Sand	Gravel
0.001	0.005	0.075	2.0	



Fig.II-7-1RESULTS OF MARSHALL STABILITY TEST FOR

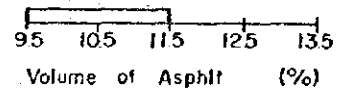
SAMPLES STABILIZED WITH EMULSIFIED ASPHALT

SAMPLE NO. TP-5



Range of Stability having more than 250 kg

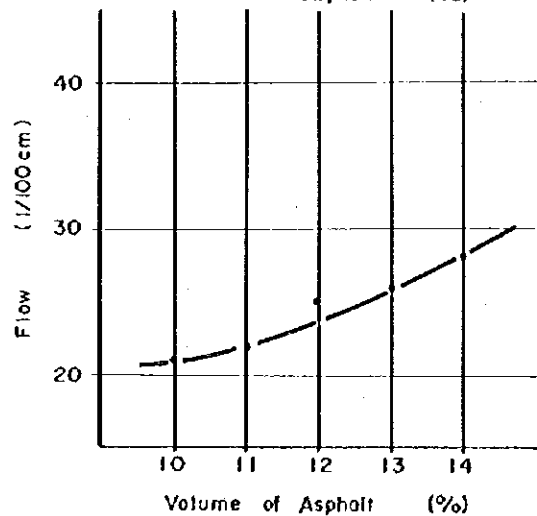
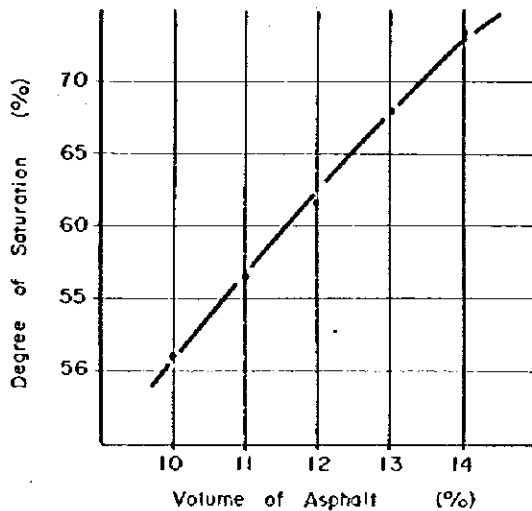
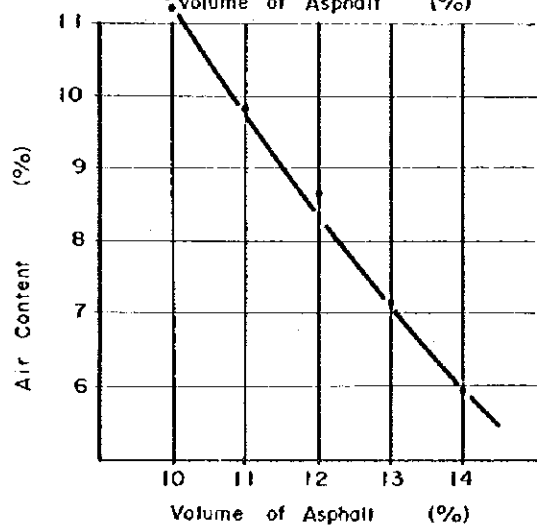
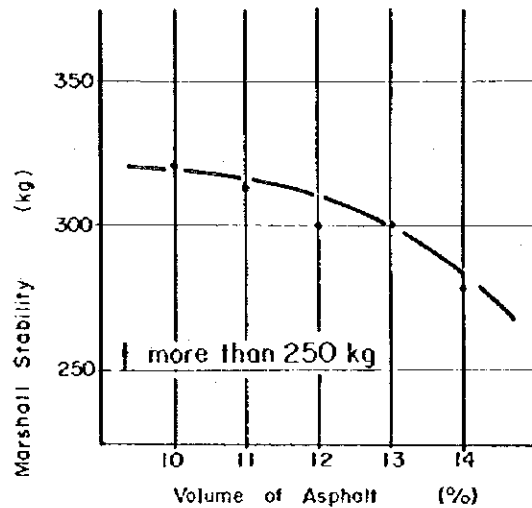
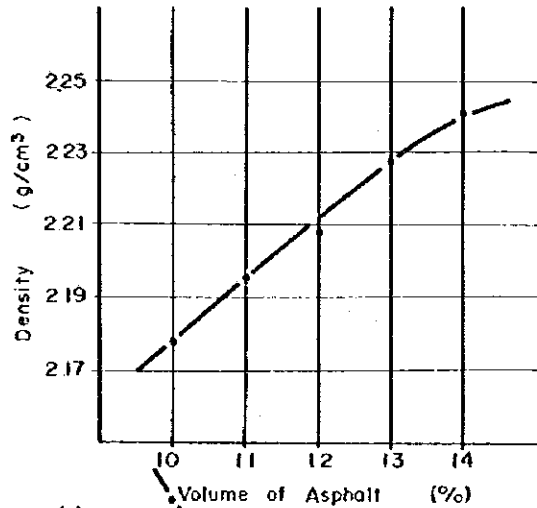
9.5% ~ 11.5%



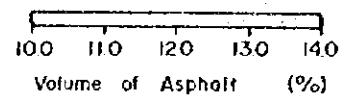
**Fig.II-7-2 RESULTS OF MARSHALL STABILITY TEST FOR**

**SAMPLES STABILIZED WITH EMULSIFIED ASPHALT**

SAMPLE NO. TP-6-2 (Sc, Filler)

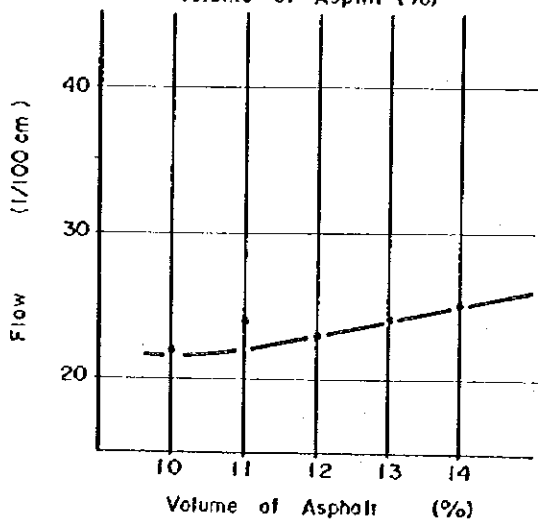
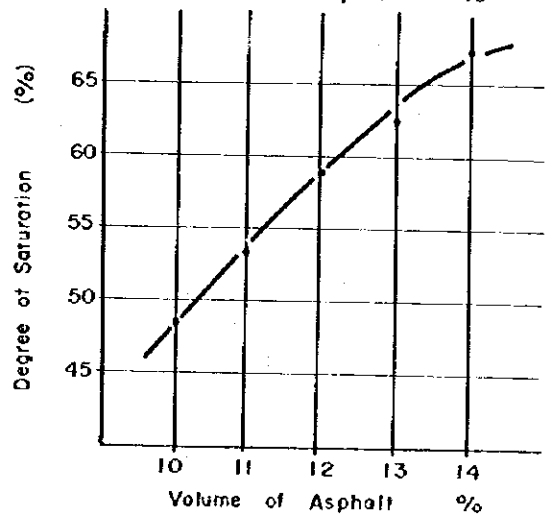
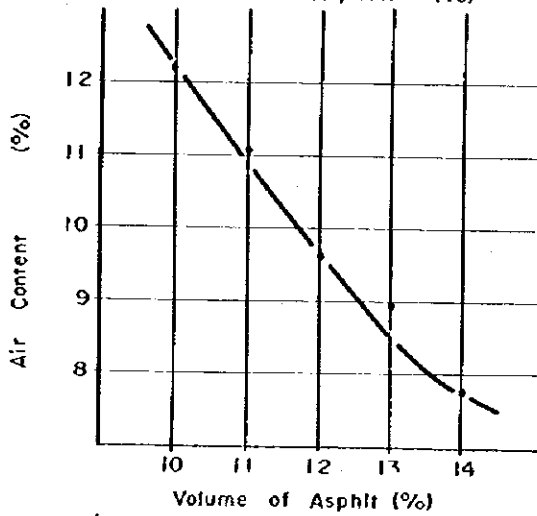
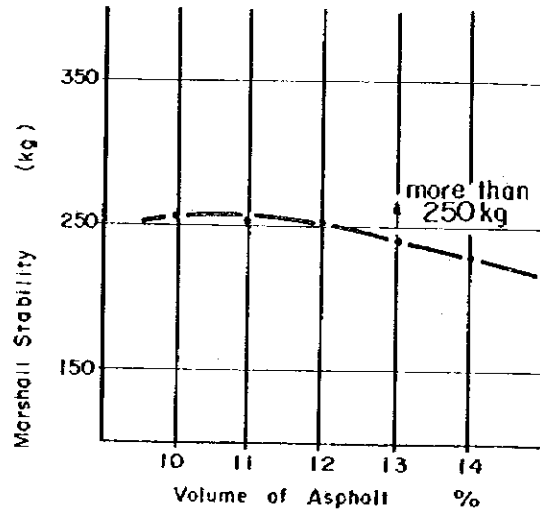
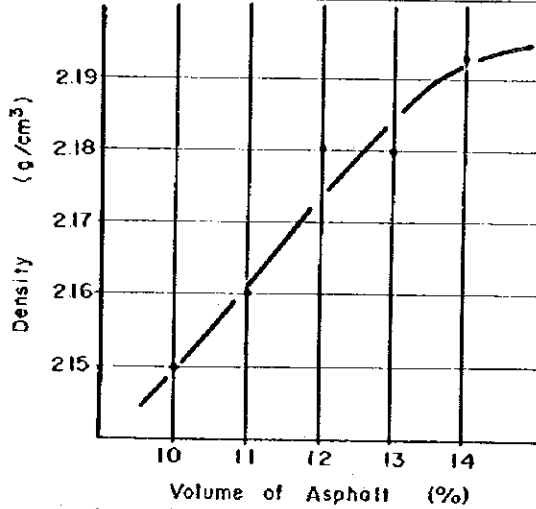


Range of Stability having more than 250 kg  
10.0% ~ 14.0%



**II-7-3 RESULTS OF MARSHALL STABILITY TEST FOR**  
**SAMPLES STABILIZED WITH EMULSIFIED ASPHALT**

SAMPLE NO. TP-19 (Sc, Filler)



Range of Stability having more than 250 kg  
100% ~ 120%

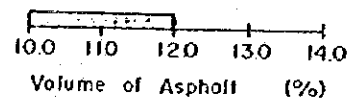


Fig. II-9 LOCATION OF INVESTIGATION FOR AGGREGATE

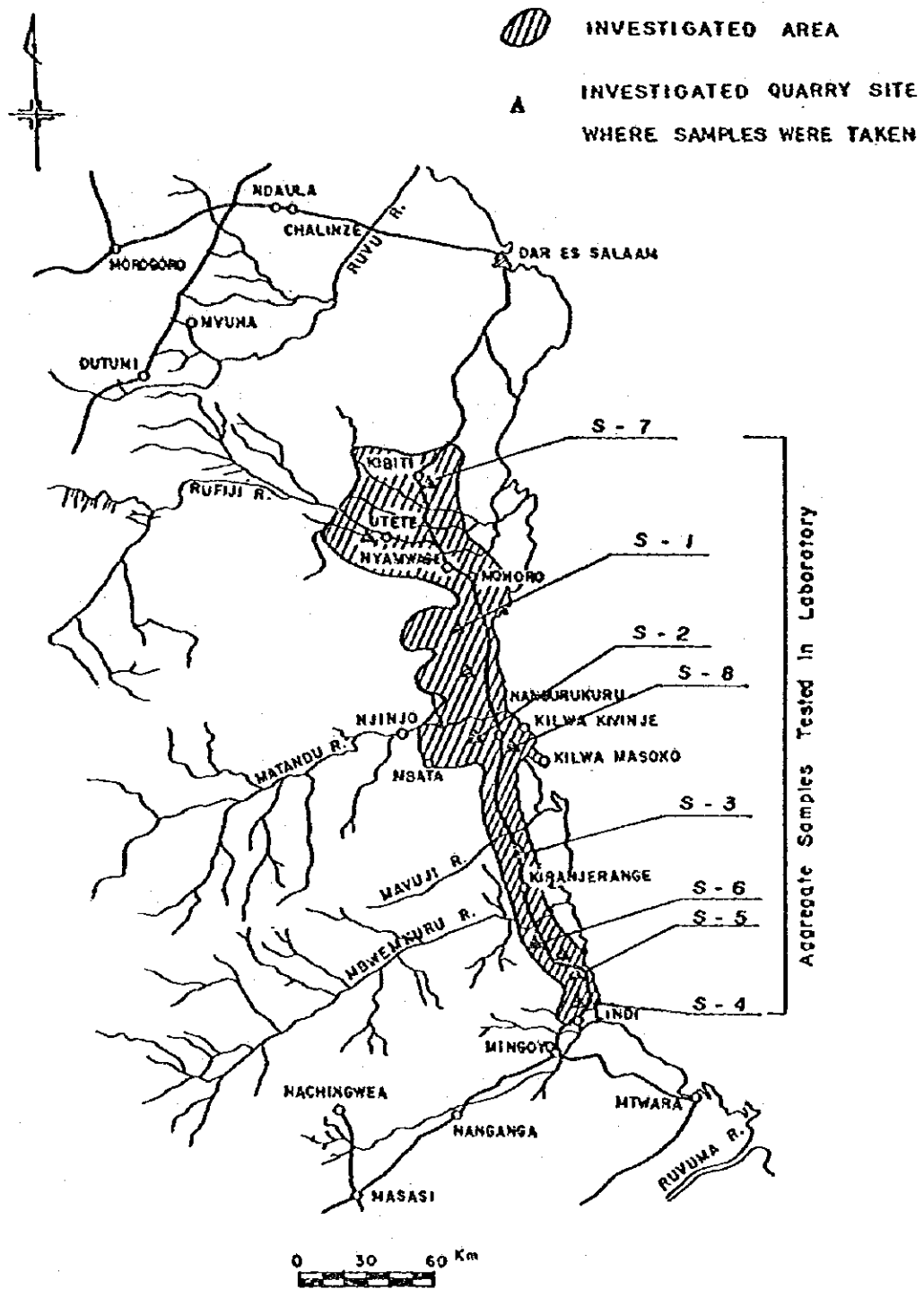


Fig. II-10-1 GRAIN SIZE DISTRIBUTION CURVES OF SAND  
AS FINE AGGREGATE

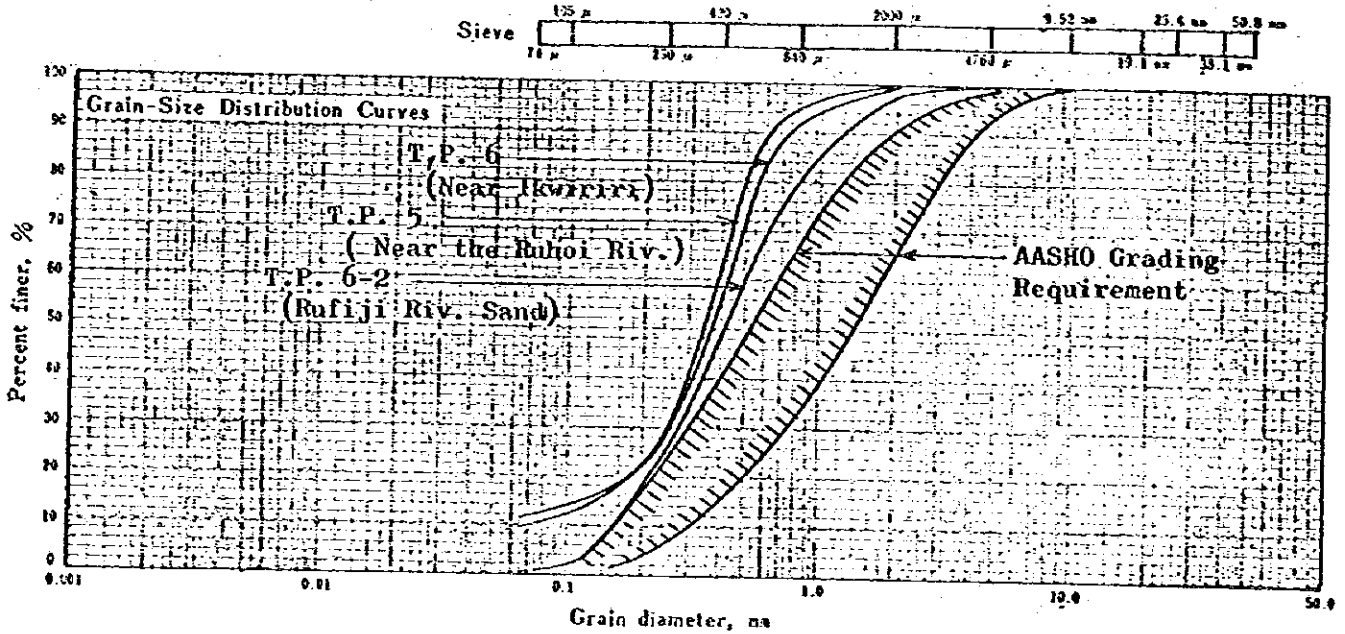


Fig. II-10-2 GRAIN SIZE DISTRIBUTION CURVES OF SAND  
AS FINE AGGREGATE

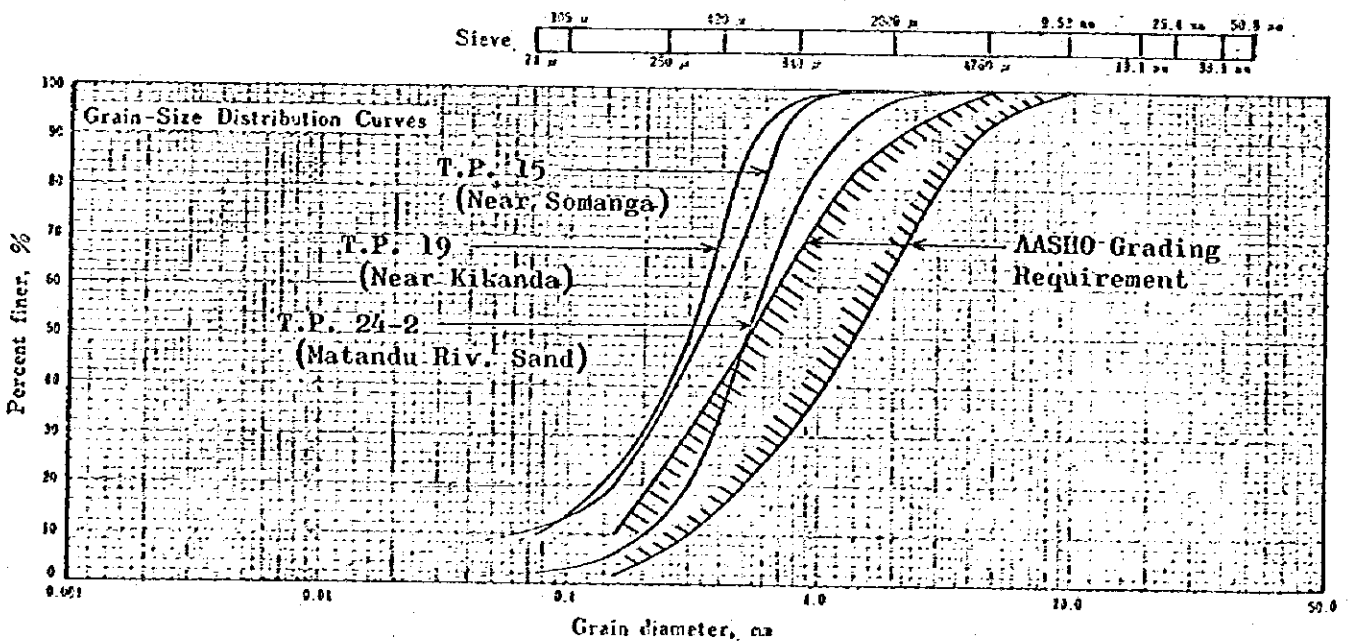


Fig. II-10-3 GRAIN SIZE DISTRIBUTION CURVES OF SAND AS FINE AGGREGATE

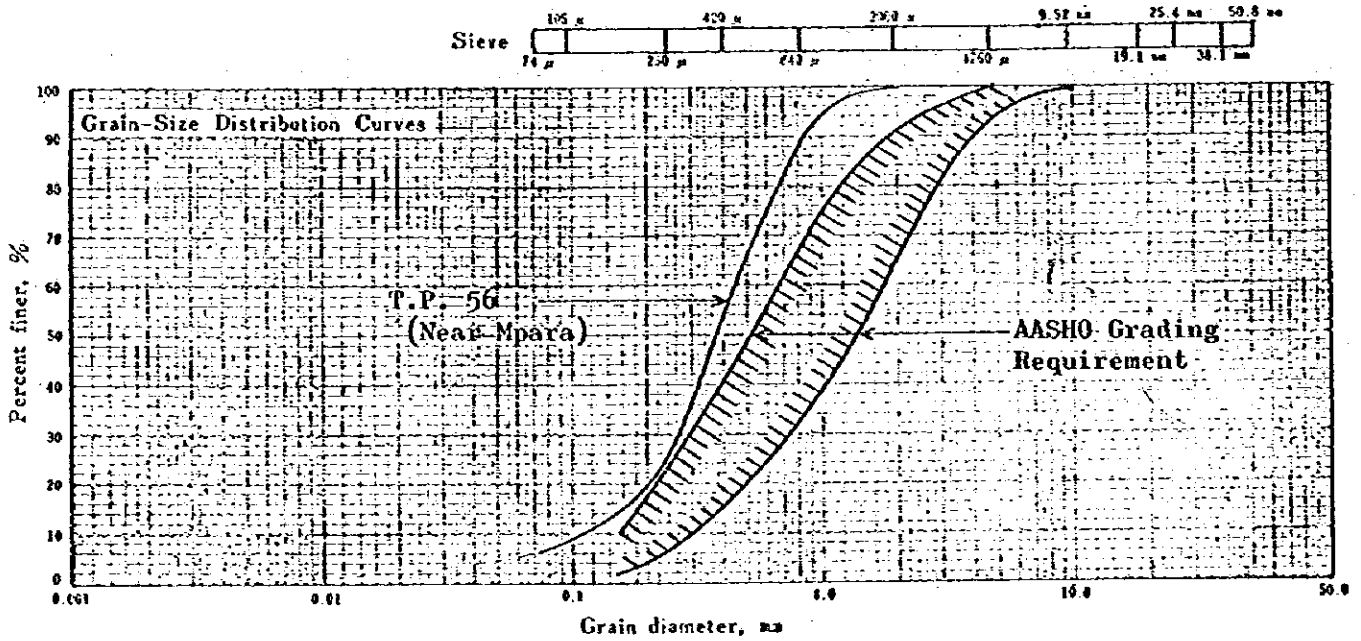


Fig. II-10-4 GRAIN SIZE DISTRIBUTION CURVES OF SAND AS FINE AGGREGATE

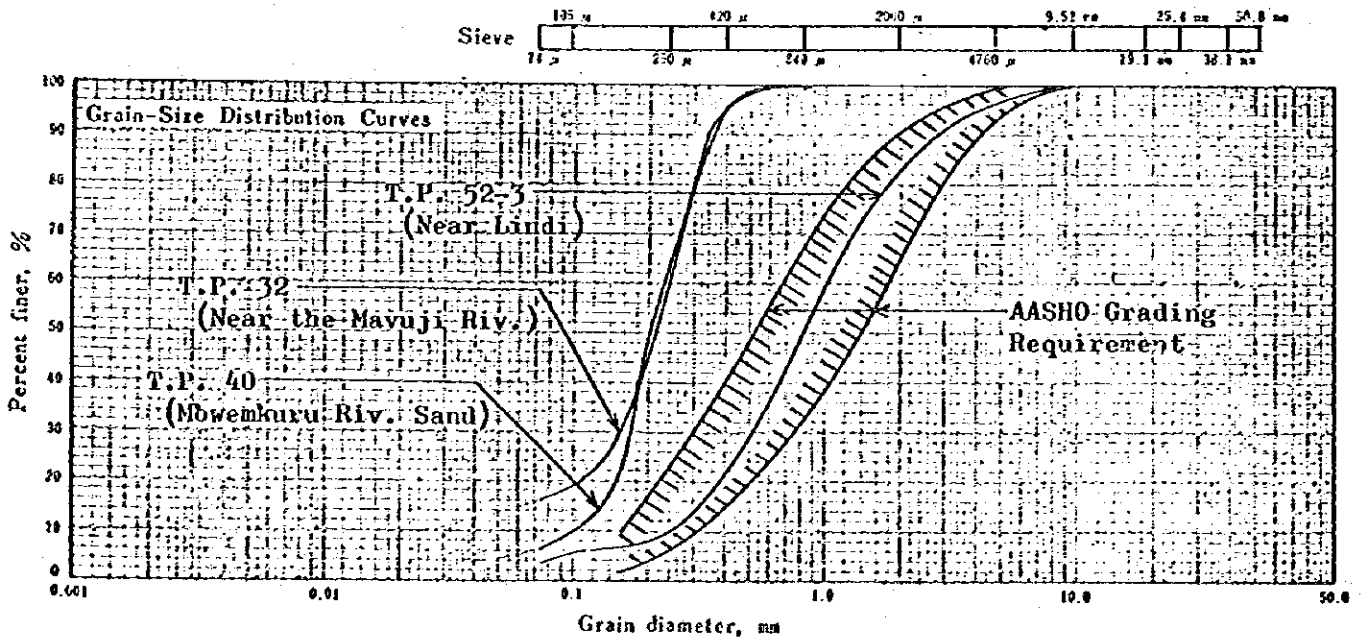
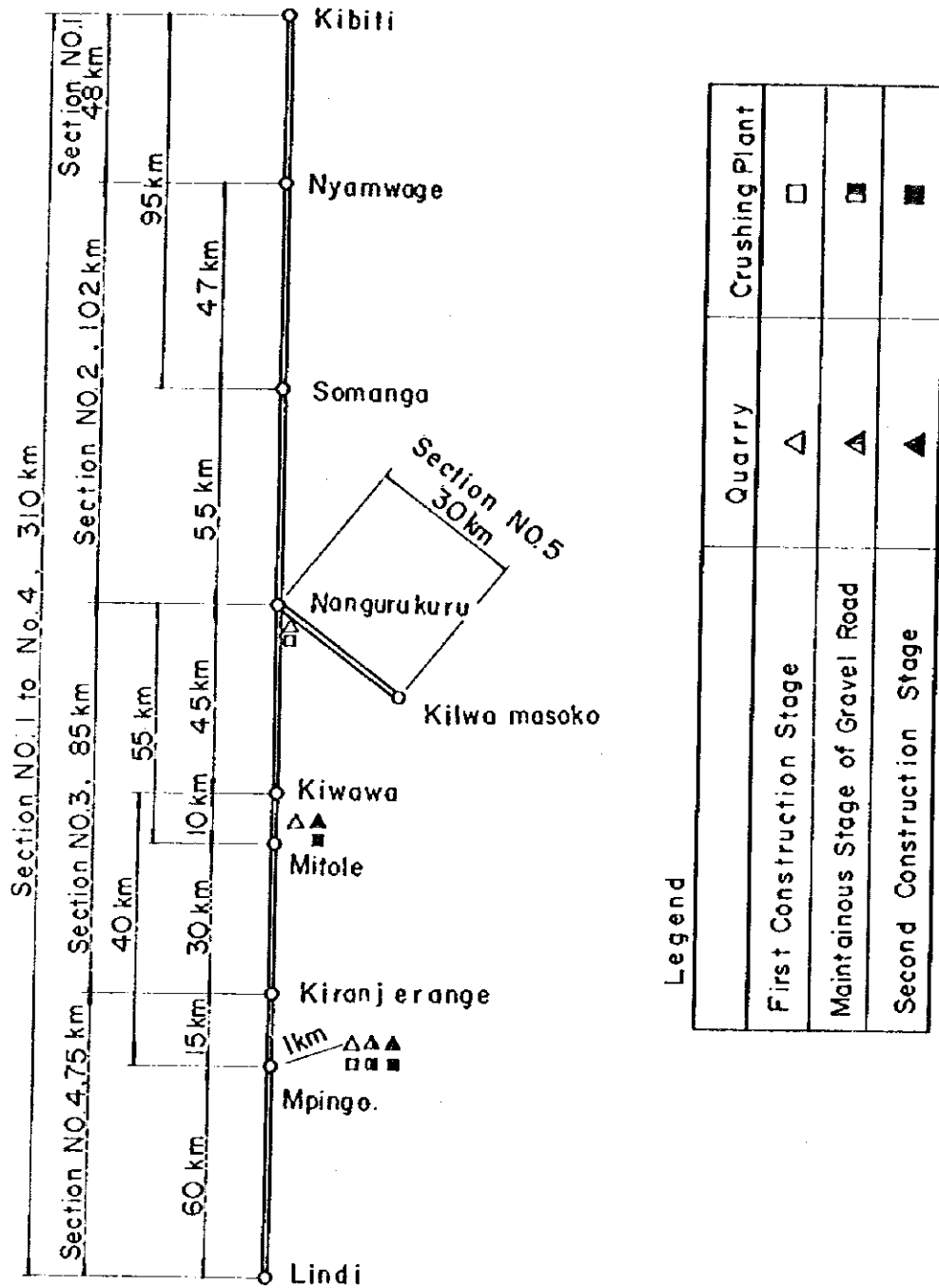


Fig. II-1) OUTLINE OF QUARRIES AND CRUSHING PLANTS LOCATION



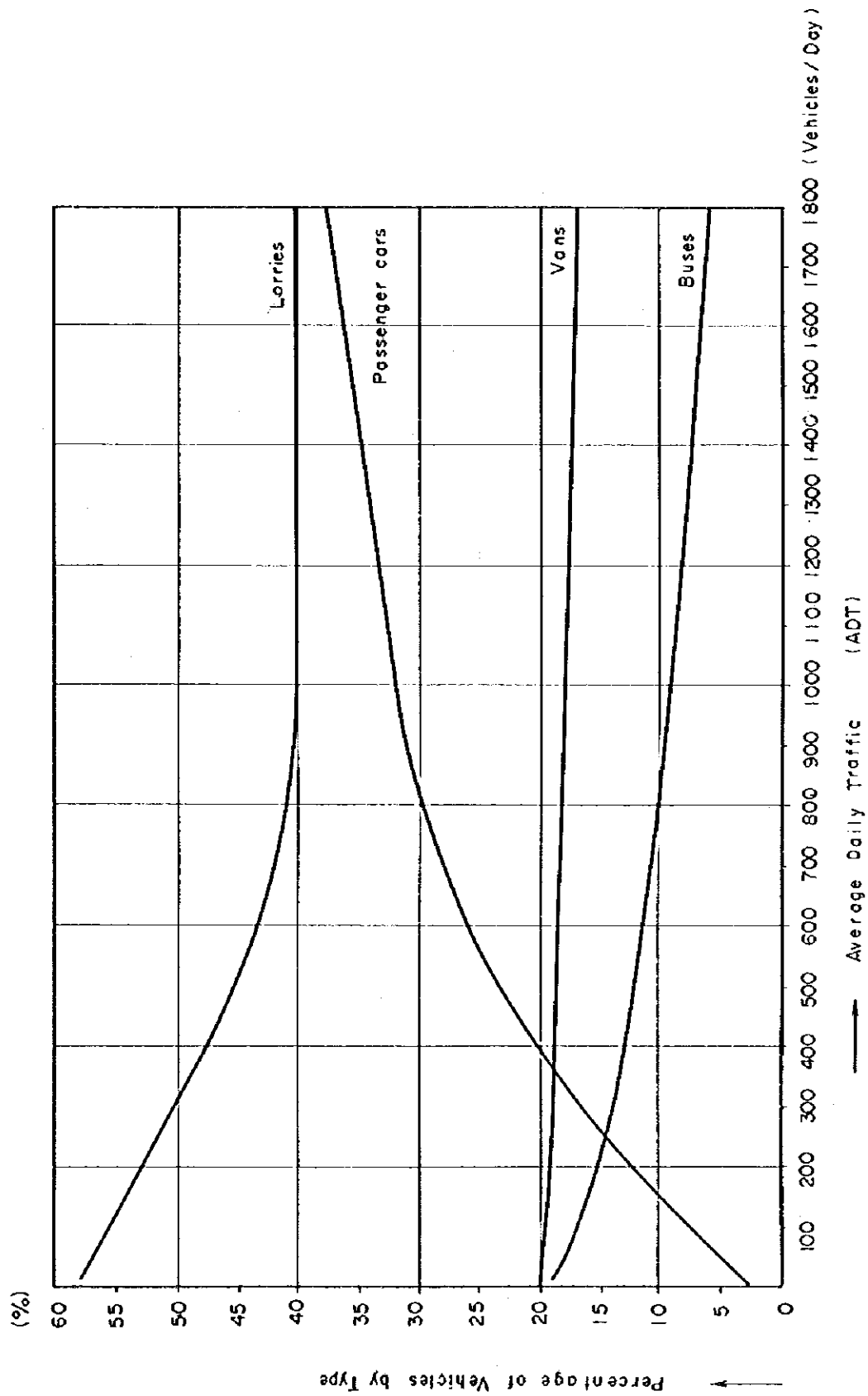


Fig. II-12 RELATIONSHIP BETWEEN TRAFFIC VOLUME AND  
VEHICLE CLASSIFICATION



Fig. II-13 PAVEMENT CROSS SECTION OF FIRST AND SECOND CONSTRUCTION STAGE

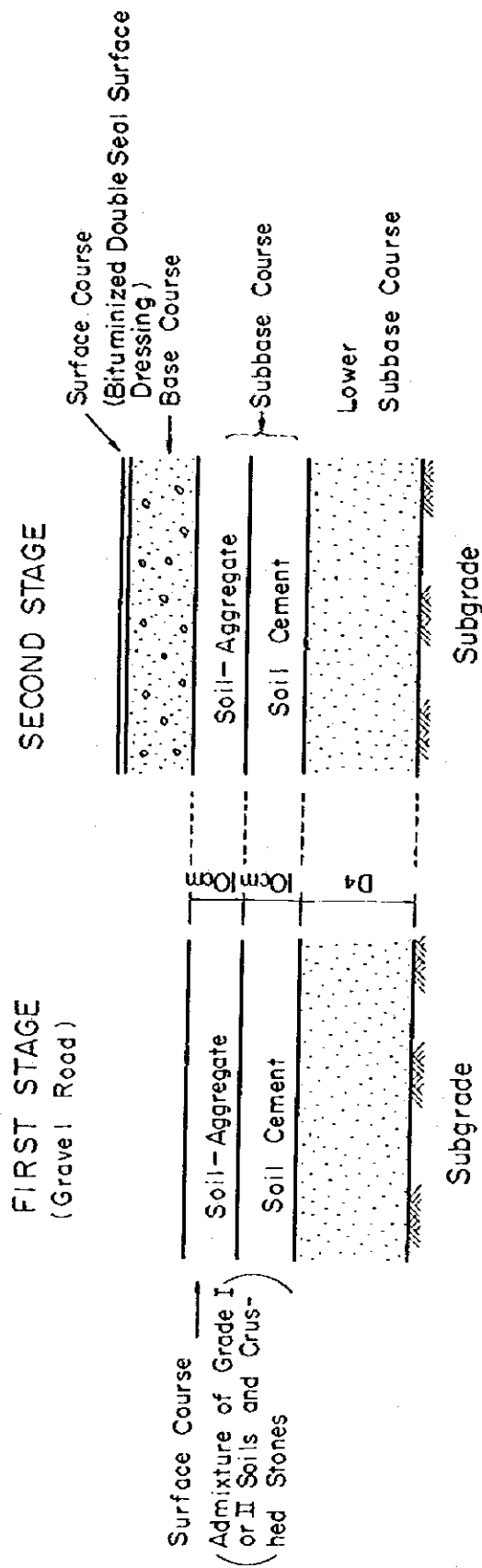
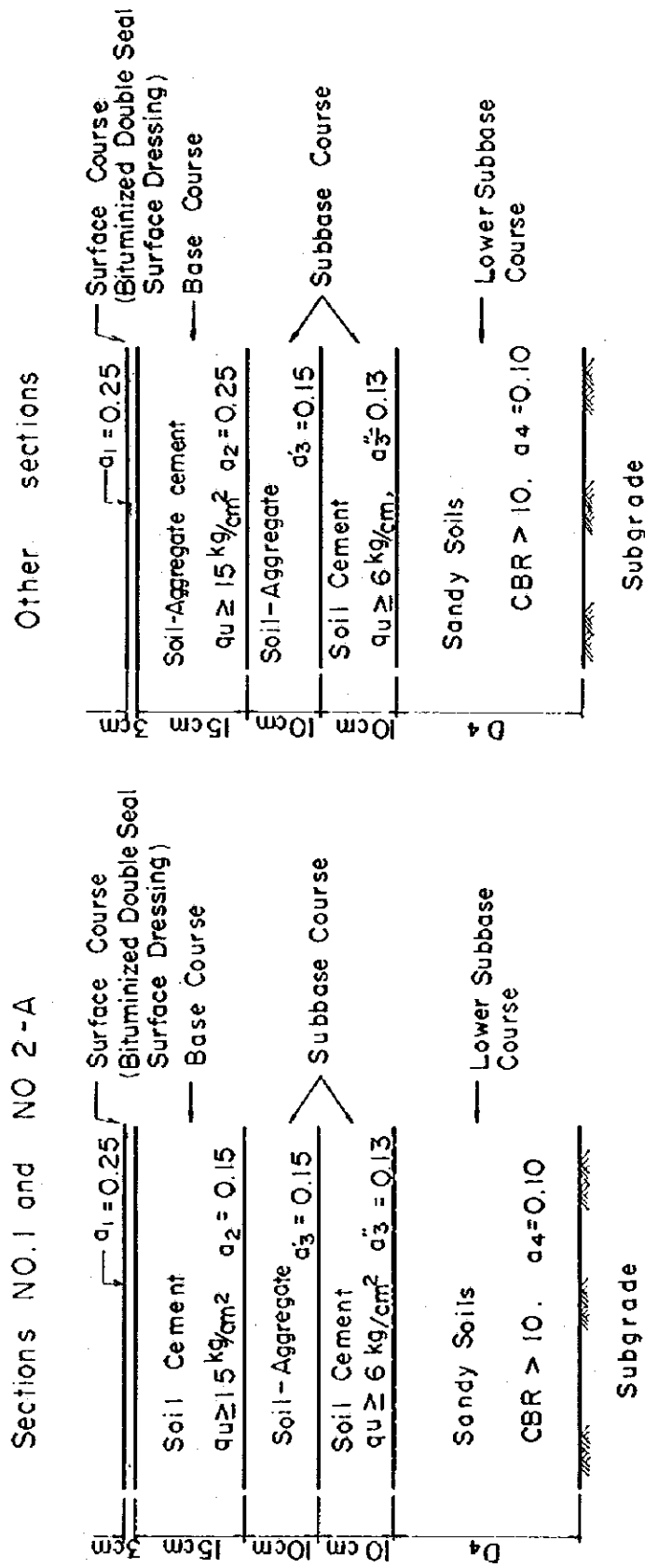
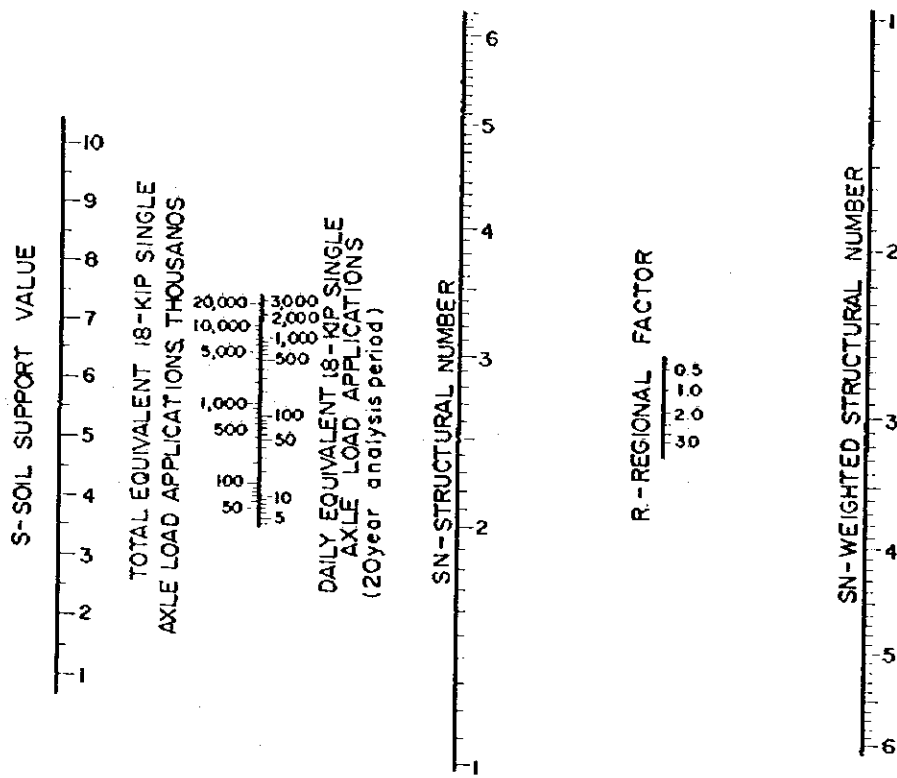


Fig. II-14 GENERAL PAVEMENT CROSS SECTION FOR STAGE CONSTRUCTION



Note

1.  $q_u$  : Unconfined compressive strength
2.  $a_1, a_2, a_3, a_3', a_4$  : Layer coefficient
3. D : Shall be determined taking account of soil grade and design equivalent 18 kip single axle load applications



Design chart for flexible pavements,  $p_1 = 2.0$

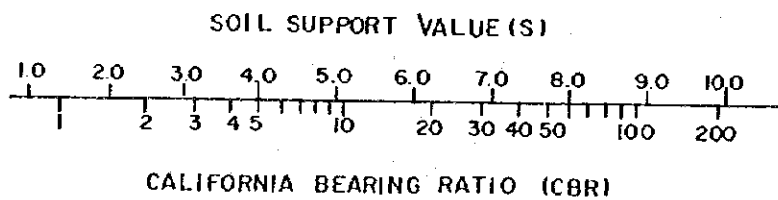
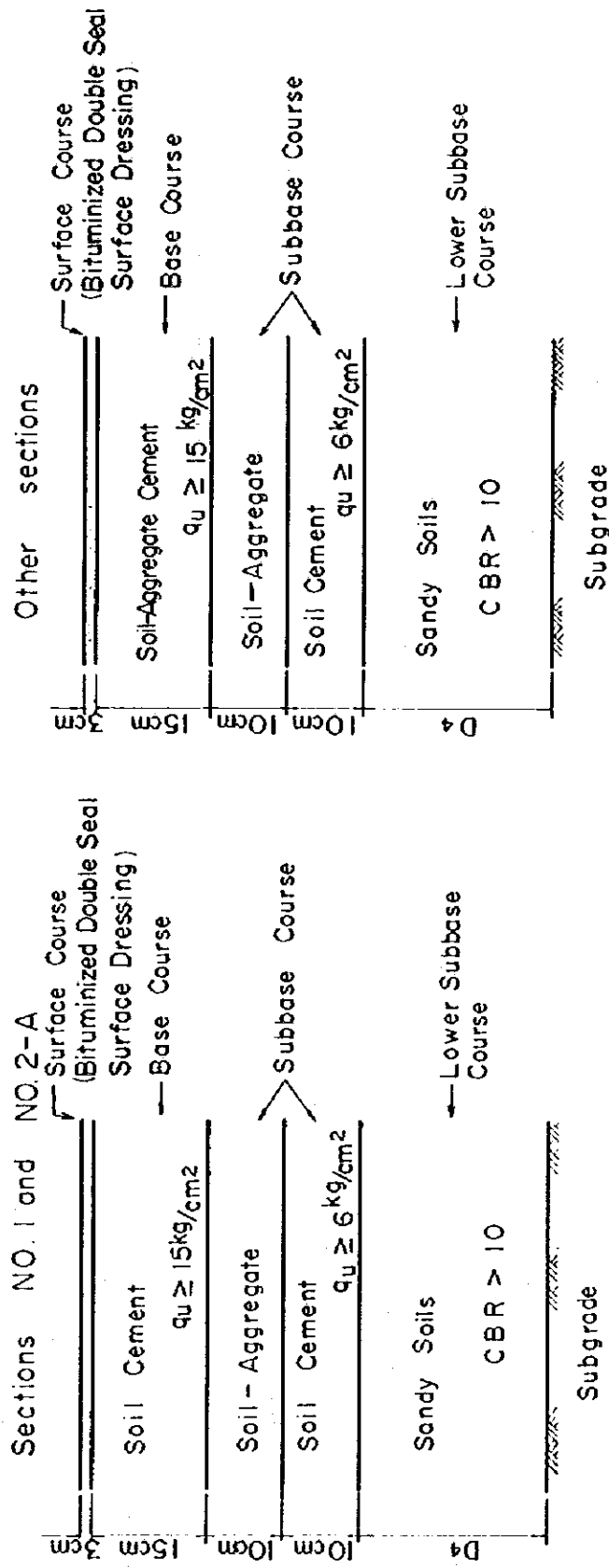


Fig. II-15 DESIGN CHART FOR FLEXIBLE PAVEMENTS AND RELATIONSHIP BETWEEN CBR AND SOIL SUPPORT VALUE

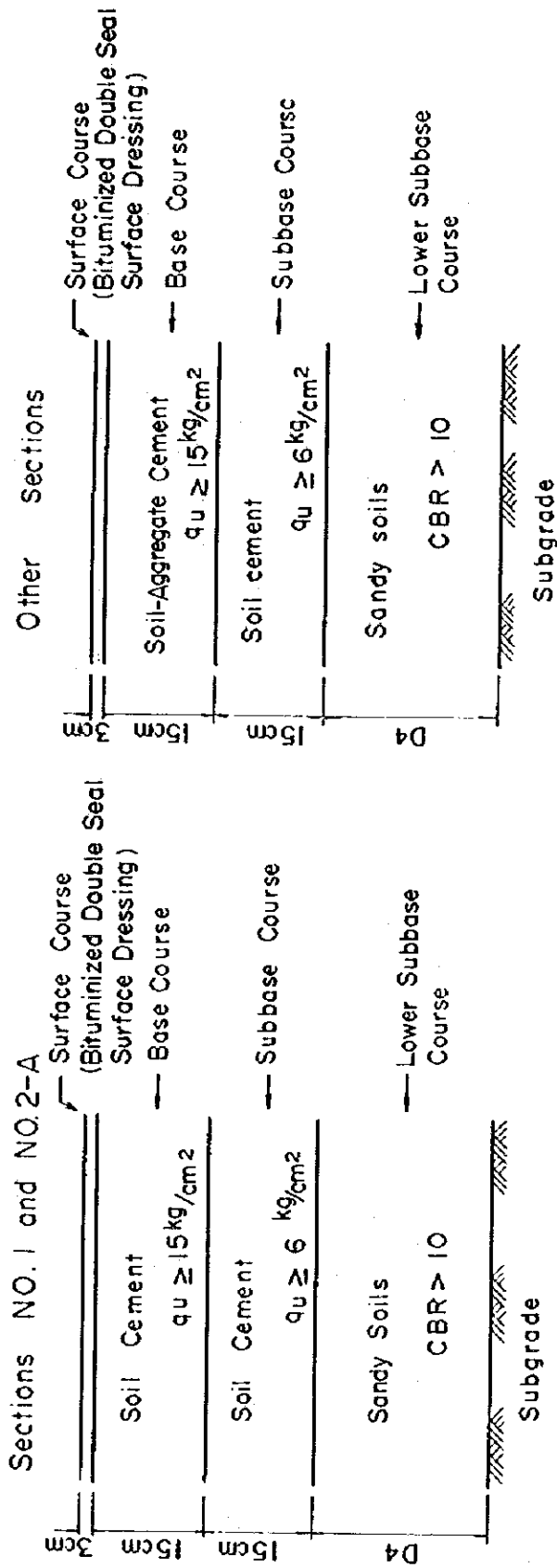
Fig. II-16 PAVEMENT CROSS SECTION FOR STAGE CONSTRUCTION



D 4 in centimeters

Section	NO. 1	NO. 2-A	NO. 2-B, NO.3 and NO.4	NO. 5
Soil grade				
I	0	0	0	0
II	0	0	0	0
III	40	40	20	10
IV	50	50	40	30

Fig. II-17 PAVEMENT PROFILE FOR NON STAGE CONSTRUCTION



D4 in centimeter

Section	NO. 1	NO. 2-A	NO. 2-B, NO. 3 and NO. 4	NO. 5
Soil Grade				
I	0	0	0	0
II	0	0	0	0
III	50	40	30	20
IV	60	60	40	30

Table 11-1-1 SUMMARY OF SOIL TESTS FOR TEST PIT SAMPLES  
Project - Southern Coastal Link - Reg'd

Sample no.	TP 1	TP 2	TP 3	TP 4	TP 4-L	TP 5	TP 5-L	TP 6	TP 6-L	TP 6-2	TP 7	TP 7-L	TP 8	TP 8-L	TP 9-L
Station no.	3+500	6+750	11+100	15+400	15+400	21+650	21+650	25+700	25+700	36+500	40+600	40+600	46+100	46+100	53+300
Depth of sample	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	1.50 - 1.50 m 1.50 - 1.50 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	1.50 - 1.50 m 1.50 - 1.50 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	1.50 - 1.50 m 1.50 - 1.50 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m	0.00 - 0.30 m 0.70 - 0.70 m
Natural water content %	61.3	71.5	91.3	2.6	3.1	3.9	4.2	3.7	3.9	2.0	3.0	6.0	4.9	2.4	3.5
Specific gravity	2.651	2.646	2.642	2.653	2.671	2.640	2.637	2.643	2.631	2.664	2.664	2.616	2.651	2.646	2.630
Ignition loss %															
Liquid limit %	3.6	2.4	2.7									3.1	2.7		
Plastic limit %	1.2	8	9	NP	NP	NP	NP	NP	NP	NP	NP	9	8	NP	NP
Plasticity Index	2.4	1.6	1.8									2.2	1.9		
Gravel (greater than 2.00mm) %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand (300 to 0.075 mm) %	69	74	57	78	80	88	89	90	90	98	85	82	50	80	80
Silt (0.075 to 0.0025 mm) %	11	2	15	13	13	12	11	10	10	1	15	21	20	9	8
Clay & Colloid (less than 0.0025 mm) %	20	24	28	9	7	0	0	0	0	0	0	17	30	11	12
Maximum bearing capacity (kPa)	31	26	43	22	20	12	11	10	10	1	15	3.8	5.0	20	20
Max. diameter mm	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Diam. at 60% mm	0.37	0.39	0.28	0.36	0.38	0.38	0.40	0.42	0.43	0.30	0.41	0.18	0.14	0.35	0.34
Diam. at 10% mm	—	—	—	0.0064	0.010	0.050	0.060	0.075	0.070	0.13	0.028	—	—	0.0035	0.001
Visual soil description	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Medium sand	Medium sand	Medium sand	Medium sand	Medium sand	Medium sand	Clayey sand	Sandy clay	Silty sand	Silty sand
Unified system	SC	SC	SC	SC	SC	SC	SW-SM	SW-SM	SW-SM	SP	SC	SC	CL	SC	SC
AASHTO system	A-2-6	A-2-6	A-6	A-2-4(A-2-4)	A-2-4(A-2-4)	A-2-4(A-2-4)	A-2-4(A-2-4)	A-3	A-3	A-3	A-3	A-6	A-6	A-6	(A-2-4)
Max. dry density g/cm <sup>3</sup>	1.942	2.032	1.910	1.900	1.834	1.834	1.834	1.834	1.834	1.770	1.830	1.845	1.845	1.990	1.990
Optimum moisture %	11.3	9.3	11.3	11.4	11.3	11.3	11.3	11.3	11.3	14.7	12.6	12.4	12.4	9.4	9.4
Max. dry density g/cm <sup>3</sup>	2.040	2.040	2.040	2.040	1.935	1.935	1.935	1.935	1.935	1.844	1.844	2.027	2.027	2.027	2.027
Optimum moisture %	9.3	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	14.4	14.4	8.5	8.5	8.5	8.5
CBR (Optimum water content, 95% R <sub>max</sub> )	3.3	3.3	3.3	3.3	17.9	17.9	17.9	17.9	17.9	15.4	15.4	36.9	36.9	36.9	36.9
Swelling ratio %	1.01	1.01	1.01	1.01	-0.016	-0.016	-0.016	-0.016	-0.016	-0.02	-0.02	0.02	0.02	0.02	0.02
CBR (Optimum water content, 95% R <sub>max</sub> , soaked)	7.0	7.0	7.0	7.0	36.0	36.0	36.0	36.0	36.0	24.3	24.3	60.0	60.0	60.0	60.0
Swelling ratio %	1.36	1.36	1.36	1.36	-0.008	-0.008	-0.008	-0.008	-0.008	-0.02	-0.02	0.05	0.05	0.05	0.05
CBR (Optimum water content, 95% R <sub>max</sub> , soaked)	13.6	13.6	13.6	13.6	58.6	58.6	58.6	58.6	58.6	47.3	47.3	72.4	72.4	72.4	72.4
Swelling ratio %	1.61	1.61	1.61	1.61	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008	0.08	0.08	0.08	0.08
Corrected CBR	10.6	10.6	10.6	10.6	40.0	40.0	40.0	40.0	40.0	22.0	22.0	127.0	127.0	127.0	127.0
CBR (Optimum water content, 95% R <sub>max</sub> )	80.1	80.1	80.1	80.1	62.6	62.6	62.6	62.6	62.6	92.7	92.7	38.9	38.9	38.9	38.9
CBR (Optimum water content, 95% R <sub>max</sub> , soaked)	3.0	3.0	3.0	3.0	48.9	48.9	48.9	48.9	48.9	2.2	2.2	2.8	2.8	2.8	2.8
Swelling ratio	0.03	0.03	0.03	0.03	0.06	0.06	0.06	0.06	0.06	1.94	1.94	-0.02	-0.02	-0.02	-0.02
Field CBR	28.9	28.9	28.9	28.9	29.6	29.6	29.6	29.6	29.6	32.4	32.4	32.4	32.4	32.4	32.4

\* Number of blows for each of three layers



Table XI-1-3 SUMMARY OF SOIL TESTS FOR TEST PIT SAMPLES

Project Southern Coastal Link Road

Sample no.	TP1-L	TP1-R	TP19-L	TP20-L	TP20-L	TP20-L	TP21-L	TP21-L	TP22-L	TP23-L	TP24-L	TP24-L	TP24-L	TP25-L	TP26-L
Station no.	108+150	114+850	114+850	122+100	122+100	122+100	127+300	127+300	127+300	133+000	133+500	135+500	138+550	140+500	145+600
Depth of sample	1.30 m 0.30 m 0.70 m	1.30 m 0.30 m 0.70 m	1.30 m 0.30 m 0.70 m	0.30 m 1.10 m 1.20 m	0.30 m 1.10 m 1.20 m	0.30 m 1.10 m 1.20 m	0.30 m 1.10 m 1.70 m	0.30 m 1.10 m 1.70 m	0.30 m 1.10 m 1.70 m	0.30 m 0.70 m 1.10 m	0.30 m 0.70 m 1.10 m	0.30 m 0.70 m 1.10 m	0.30 m 0.70 m 1.10 m	0.30 m 0.70 m 1.10 m	0.30 m 0.70 m 1.10 m
Natural water content %	3.7	1.3	4.9	12.8	19.8	19.8	26.9	32.5	9.8	3.8	4.6	15.3	3.1	11.3	23.8
Specific gravity	2.637	2.662	2.650	2.625	2.619	2.608	2.624	2.641	2.641	2.637	2.666	2.627	2.661	2.624	2.611
Ignition loss %							9.17							6.09	11.94
Liquid limit %				57	57	99	95	33	33		4.9	63		64	85
Plastic limit %	NP	NP	NP	16	21	19	21	14	NP	NP	16	18	NP	19	19
Plasticity index				41	36	60	74	19			33	45		45	66
Gravel (greater than 2.00mm) %	0	0	0	1	2	2	1	0	0	0	28	0	2	14	1
Sand (200 to 0.075mm) %	87	90	90	57	43	3	5	48	79	51	7	94	6	6	6
Silt (0.075 to 0.0075mm) %	13	10	10	5	11	3	14	19	10	4	40	4	24	11	25
Clay & colloid (less than 0.0075mm) %	0	0	0	37	44	92	80	33	11	17	93	0	56	82	68
Percentage passing #200 sieve %	13	10	10	42	55	95	94	52	21	21	95	4	80	93	93
Max. diameter mm	200	200	200	476	476	476	476	476	200	200	19.1	0.84	4.76	932	476
Diam. at 60% mm	0.36	0.33	0.35	0.205	0.105				0.12	0.23	13.0	0.0097	0.57	0.0062	
Diam. at 10% mm	0.080	0.075	0.075							0.010			0.20		
Visual soil description	Medium sand	Medium sand	Medium sand	Silty sand	Silty sand	Silty sand	Clay	Clay	Silty clay	Silty clay	Gravelly sand	Clay	Medium sand	Clay	Clay
Unified system	SC	SP-SM	SP-SM	SC	CH	CH	CH	CH	CL	SC	SC	CH	SP	CH	CH
AASHTO system	(A-2-a)	A-3	A-3	A-7-6	A-7-6	A-7-6	A-7-6	A-7-6	A-6	(A-2-4)	A-7-6	A-7-6	A-1-b	A-7-6	A-7-6
Max. dry density g/cm <sup>3</sup>	1.766			1.712					1.744	1.863	1.875		1.661	1.511	1.260
Optimum moisture %	8.2			16.3					14.5	10.1	10.7		15.9	17.6	28.8
Max. dry density g/cm <sup>3</sup>	1.823								1.872		2.006		1.760		
Optimum moisture %	6.2								13.7		9.5		15.0		
CBR (Optimum water content, 97.75% comp.) %	10.7								3.3		1.8		10.1		
Swelling ratio %	-0.008								0.08		2.36		0.02		
CBR (Optimum water content, 95% comp., soaked) %	24.1								10.7		2.7		21.5		
Swelling ratio %	-0.008								0.14		2.64		0.03		
CBR (Optimum water content, 95% comp., soaked) %	46.4								13.9		4.3		41.0		
Swelling ratio %	-0.008								0.20		3.17		0.04		
Corrected CBR at 95% comp. %	12.0								9.3		2.4		19.0		
CBR (Natural water content, 95% comp., soaked) %	37.9								37.2		46.6				35.6
CBR (Natural water content, 95% comp., soaked) %	6.1								6.0		15.6				6.68
Swelling ratio %	-0.03								2.05		0.27				10.38
Field CBR									22.9		36.3				20.7

\* Number of blows for each of three layers



Table II-1-4. SUMMARY OF SOIL TEST

Project Southern Coastal Link Road

Sample no.	TP 27	TP 28	TP 29	TP 30	TP 31	TP 31-L	TP 31-2	TP 32	TP 32-L	TP 33	TP 34	TP 35	TP 36	TP 36-L
Station no.	134+00	161+50	166+00	157+00	183+00	183+00	183+00	189+50	189+50	197+50	209+00	209+00	215+75	215+75
Depth of sample	0.50 m 0.70 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m	0.50 m 1.00 m
Natural water content %	20.3	8.5	10.6	9.3	14.6	21.7	18.4	9.0	1.3	3.8	2.1	13.4	15.7	18.9
Specific gravity	2.615	2.657	2.656	2.645	2.606	2.624	2.633	2.640	2.658	2.674	2.660	2.641	2.635	2.610
Ignition loss %	13.78													
Liquid limit %	100	35	33	45	42	90	46	40				30	65	65
Plastic limit %	25	14	12	15	17	23	18	12	NP	NP	NP	14	19	21
Plasticity Index	75	21	21	30	25	67	28	28				26	44	44
Gravel (greater than 200mm) %	0	0	0	7	0	5	0	0	0	0	0	47	0	4
Sand (0.075 to 0.0075mm) %	7	50	57	25	2	12	4	53	84	83	75	23	12	5
Silt (0.075 to 0.00075mm) %	9	25	17	31	47	12	43	16	17	12	17	47	45	40
Clay % (colloid)	80	25	26	37	51	71	53	31	0	13	13	41	46	23
Percentage passing no. 200 sieve %	80	50	43	68	98	83	96	47	16	17	25	30	88	91
Max. diameter mm	4.76	0.84	2.00	9.52	0.25	4.76	0.25	0.84	0.84	0.84	2.00	25.4	2.00	4.76
Diam. at 60% mm	—	0.10	0.125	0.056	0.0078	—	0.0087	0.125	0.235	0.25	0.30	0.04	0.0185	0.067
Diam. at 10% mm	—	—	—	—	—	—	—	—	0.027	0.031	—	0.0024	—	—
Visual soil description	Clay	Silt	Silt	Clayey silt	Silt	Clay	Silt	Sandy silt	Fine silt	Fine silt	Silty clay	Silty clay	Silty clay	Silt
Unified system	CH	CL	CL	CL	CL	CH	CL	SC	SC	SC	SC	SC	CH	CL
AASHTO system	A-7.6	A-6	A-6	A-7.6	A-7.6	A-7.6	A-7.6	A-6	(A-2-4)	(A-2-4)	(A-2-6)	A-2-6	A-7.6	A-6
Max. dry density g/cm <sup>3</sup>	1.700	1.662	1.602	1.662	1.602	1.662	1.665	1.627	1.627	1.627	1.685	1.685	1.510	1.510
Optimum moisture %	16.6	17.4	21.4	17.4	21.4	17.4	19.2	11.0	9.4	12.0	22.2	22.2	—	—
Max. dry density g/cm <sup>3</sup>	—	—	—	—	—	—	—	1.677	1.677	1.677	1.959	1.959	—	—
Optimum moisture %	—	—	—	—	—	—	—	9.6	9.6	9.6	9.1	9.1	—	—
CBR (Optimum water content, 25 blows, 4.75mm) %	—	—	—	—	—	—	—	10.7	10.7	10.7	16.7	16.7	—	—
Swelling ratio %	—	—	—	—	—	—	—	0.02	0.02	0.02	0.16	0.16	—	—
CBR (Optimum water content, 25 blows, soaked) %	—	—	—	—	—	—	—	29.6	29.6	29.6	49.5	49.5	—	—
Swelling ratio %	—	—	—	—	—	—	—	0.02	0.02	0.02	0.14	0.14	—	—
CBR (Optimum water content, 25 blows, soaked) %	—	—	—	—	—	—	—	38.5	38.5	38.5	71.4	71.4	—	—
Swelling ratio %	—	—	—	—	—	—	—	0.04	0.04	0.04	0.18	0.18	—	—
Compacted CBR at 95% air voids %	—	—	—	—	—	—	—	26.0	26.0	26.0	33.0	33.0	—	—
CBR (Optimum water content, 25 blows, soaked) %	85.2	72.3	75.0	72.3	75.0	75.1	75.1	21.8	86.9	86.9	55.3	55.3	—	—
CBR (Optimum water content, 25 blows, soaked) %	1.6	1.2	4.5	1.2	4.5	1.0	3.7	6.3	6.3	6.3	0.58	0.58	—	—
Swelling ratio %	2.64	7.91	4.83	7.91	4.83	3.88	-0.01	0.16	0.16	0.16	4.82	4.82	—	—
Field CBR	29.2	17.5	15.5	17.5	15.5	24.5	24.5	—	—	—	—	—	—	—

\* Number of blows for each of three layers

Table II-1-5 SUMMARY OF SOIL TESTS FOR TEST PIT SAMPLES  
Project Southern Coastal Link Road

Sample no.	TP37	TP37-L	TP38	TP38-L	TP39	TP40	TP41	TP42	TP43	TP44	TP45	TP46	TP46-L	TP47	TP48	
Station no.	222-354222-350	230-500230-500	238-200242-630	245-850248-800251-600	251-700	267-900272-700	272-700278-800281-700									
Depth of sample	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m	0.50 m 1.0 m 1.20 m
Natural water content %	2.5	3.0	9.0	14.6	10.7	3.1	5.7	3.3	11.7	6.6	28.4	4.2	6.4	1.3	3.1	
Specific gravity	2.618	2.635	2.622	2.645	2.624	2.646	2.640	2.630	2.636	2.615	2.628	2.635	2.645	2.666		
Ignition loss %			3.30		3.67						8.56					
Liquid limit %			36	34	41		28		33	30	92					39
Plastic limit %			NP	NP	12	NP	7	NP	16	9	25	NP	NP	NP	NP	9
Plasticity Index			26	25	29		21		17	21	67					30
Gravel (greater than 4.75mm) %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5
Sand (4.75 to 0.075mm) %	61	78	27	32	25	92	78	67	32	69	5	70	71	94	17	1.7
Silt (0.075 to 0.0075mm) %	6	9	40	36	40	6	19	13	59	20	4	22	21	6	14	1.4
Clay & colloidal (less than 0.0075mm) %	13	13	33	32	35	0	7	0	9	12	91	8	8	0	24	2.4
Percentages totaling 100%	19	22	73	68	73	8	22	13	68	32	95	30	29	6	38	3.8
Max. diameter mm	2.00	2.00	0.84	2.00	0.84	0.84	2.00	2.00	0.84	2.00	2.00	2.00	2.00	0.84	2.00	2.00
Diam. at 60% mm	0.29	0.27	0.061	0.059	0.061	0.22	0.225	0.31	0.058	0.17		0.155	0.16	0.166	0.165	0.165
Diam. at 10% mm						0.095	0.014	0.048	0.0052	0.0018		0.0091	0.010	0.105		
Visual soil description	Sandy silt	Silty clay	Silty clay	Silty clay	Silty clay	Medium sand	Sandy silt	Silty sand	Silt	Fine sand	Clay	Silty sand	Fine sand	Silty sand	Fine sand	Gravelly silt
Unified system	SC	SC	CL	CL	CL	SP-SM	SC	SC	CL	SC	CH	SC	SC	SP-SM	GC	GC
AASHTO system	(A-2-4)	(A-2-4)	A-6	A-6	A-7-6	A-3	A-2-6	(A-2-4)	A-6	A-2-6	A-7-6	(A-2-4)	(A-2-4)	A-3	A-6	A-6
Max. dry density g/cm <sup>3</sup>	1.856		1.665			1.623	1.903	1.915	1.626	1.843	1.195	1.943		1.746	1.846	
Optimum moisture %	11.1		17.6			13.8	12.6	10.3	20.0	12.8	33.2	10.7		12.0	11.8	
Max. dry density g/cm <sup>3</sup>			2.033				9.0							2.026		
Optimum moisture %							2.5							10.3		
CBR (Optimum water content, 4.2% moisture, tested) %							0.02							13.6		
Swelling ratio %							0.02							0.49		
CBR (Optimum water content, 15% moisture, tested) %							15.1							18.6		
Swelling ratio %							0.03							0.53		
CBR (Optimum water content, 36.0% moisture, tested) %							36.0							19.7		
Swelling ratio %							0.04							0.61		
Corrected CBR 0.95% air dry, 4%							13.0							16.8		
CBR (Natural water content, 4.2% moisture, tested) %	4.2		62.2			25.6	64.7	75.3		7.66		114.3		11.6	81.3	
CBR (Natural water content, 15% moisture, tested) %	3.0		1.7			13.7	2.7	5.2		2.5		4.5		0.90	3.0	
Swelling ratio	1.20		5.80			-0.01	1.58	0.38		0.68		0.18		-0.0068	2.76	
Field CBR	20.1						23.6			29.6				31.8		

\* Number of blows for each of three layers

Table II-1-6 SUMMARY OF SOIL TEST

Project Southern Coastal Link Road

Sample no.	TP49	TP49-2	TP50	TP51	TP52	TP52-2	TP52-3	TP52-4	TP53	TP54	TP55	TP56	TP57	TP58	TP59
Station no.	287+600	287+400	293+500	299+000	302+000	304+600	308+800	308+800	3+900	8+100	8+700	15+900	26+50	13+250	—
Depth of sample	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m	0.30 m
Natural water content %	3.3	3.5	13.2	13.9	6.0	2.0	0.6	0.6	9.6	9.4	22.5	0.9	7.6	1.4	21.4
Specific gravity	2.647	2.650	2.627	2.635	2.625	2.640	2.650	2.639	2.646	2.646	2.617	2.625	2.640	2.639	2.642
Shrinkage loss %											6.53				10.92
Liquid limit %	37	32	34	33	31	30		22	40	32	85		42		97
Plastic limit %	10	14	14	14	12	15	NP	13	18	14	23	NP	10	NP	22
Plasticity Index	27	18	20	4	19	15		9	22	18	60		32		75
Gravel (greater than 2.0mm) %	2.0	2.9	0	0	0	3.5	1.6	6.4	0	0	0	0	0	0	4.8
Sand (200 to 0.075 mm) %	2.9	2.5	5.8	2.5	6.2	1.5	9.0	1.7	8.5	6.4	1	9.4	7.3	3.8	9
Silt (0.075 to 0.0075 mm) %	2.7	2.3	2.8	2.0	2.5	2.2	4	9	7	1.2	6	6	1.4	2	1.2
Clay B (colloid (smaller than 0.0025 mm)) %	2.4	2.3	1.4	5.5	1.3	8	0	10	8	2.4	9.3	0	1.3	1.2	8.3
Percentage passing No. 200 sieve %	5.1	6.5	4.2	7.5	3.8	3.0	4	1.9	1.5	3.6	9.9	6	2.7	1.4	9.5
Max. diameter mm	9.52	19.1	2.00	2.00	2.00	38.1	9.52	38.1	0.42	2.00	0.25	2.00	2.00	5.08	0.84
Diam. of 60% mm	0.25	0.41	0.14	0.0088	0.185	6.9	1.05	14.0	0.158	0.285	—	0.50	0.31	9.4	—
Diam. of 10% mm	—	—	0.0010	—	0.0013	0.0079	0.26	0.0050	0.030	—	—	0.11	0.0028	—	—
Visual soil description	Clay	Gravelly silty clay	Silty clay	Silty clay	Silty clay	Weathered limestone	Coarse sandstone	Sandy limestone	Silty sandstone	Silty sandstone	Clay	Clay	SP-SM	SC	GC
Unified system	CL	SC	SC	CH	SC	SC	SC	OC	SC	SC	SC	CH	SP-SM	SC	GC
AASHTO system	A-6	A-6	A-6	A-7-6	A-6	A-2-6	A-1-8	A-2-4	A-2-6	A-6	A-7-6	A-1-8	A-2-7	A-1-8	A-7-6
Max. dry density g/cm <sup>3</sup>	1.830	1.732			1.747	1.904	1.915	1.717	1.880	1.600	1.825		1.993	1.540	
Optimum moisture %	14.5	18.4			17.5	12.7	10.7	15.8	13.1	2.66	13.5		4.2	20.8	
Max. dry density g/cm <sup>3</sup>		1.797			1.816	1.960			1.967		1.850		2.283		
Optimum moisture %		16.5			15.3	11.5			11.8		12.1		3.6		
CBR (optimum water content, 1.7 blow, 45mm)		1.8			20.8	18.0			2.7		24.1		5.3		
Swelling ratio %		0.04			0.04	-0.05			0.10		-0.02		0.38		
CBR (optimum water content, 2 blow, 45mm, 4.75mm)		17.7			21.8	26.9			11.5		36.5		23.6		
Swelling ratio %		0.06			0.06	-0.04			0.12		-0.008		0.41		
CBR (optimum water content, 2 blow, 45mm, 4.75mm, 10.0mm)		2.11			25.4	56.9			20.8		40.1		68.9		
Swelling ratio %		0.08			0.04	-0.03			0.17		-0.008		0.42		
Corrected CBR at 95% air void ratio		18.4			21.1	24.0			13.5		23.0		40.0		
CBR (optimum water content, 2 blow, 45mm, 4.75mm, 10.0mm, 100 blows)		65.5			149.6	63.4			71.3		33.6		26.0		
CBR (optimum water content, 2 blow, 45mm, 100 blows, soaked)		2.8			16.5	3.8			2.7		0.85		2.8		
Swelling ratio		0.19			0.19	7.44			0.35		1.84		-0.01		
Field CBR		2.64			32.0	49.6			31.7		32.3				

\* Number of blows for each of three layers

**Table I-2 RESULTS OF MARSHALL STABILITY TEST FOR  
SAMPLES STABILIZED WITH STRAIGHT-RUN ASPHALT CEMENT**

Sample no.		S-5	S-7	S-8	
Location of sampling		Muchinga	Kibiti	Nongurukuru	
Rock		Hard limestone	Hard sandstone	Hard limestone	
Apparent Specific Gravity		2.53	2.45	2.65	
Water absorption (%)		1.92	3.85	1.33	
Los Angeles abrasion test (%)		37.1	74.0	31.6	
Marshall stability test	* 4.0 %	Density (g/cm <sup>3</sup> )	2.223	2.175	2.269
		Air Content (%)	8.1	8.4	8.6
		Degree of saturation (%)	52.4	50.9	51.4
		Marshall stability (kg)	608	664	546
		Flow (1/100cm)	2.3	19.5	2.2
	* 4.5 %	Density (g/cm <sup>3</sup> )	2.232	2.179	2.278
		Air Content (%)	7.0	7.6	7.5
		Degree of saturation (%)	58.8	56.3	57.9
		Marshall stability (kg)	1040	1006	699
		Flow (1/100cm)	2.5	22.5	25.5
	* 5.0 %	Density (g/cm <sup>3</sup> )	2.267	2.192	2.285
		Air Content (%)	4.9	6.4	6.5
		Degree of saturation (%)	69.9	63.2	63.7
		Marshall stability (kg)	1211	941	873
		Flow (1/100cm)	20.3	24.5	2.6
	* 5.5 %	Density (g/cm <sup>3</sup> )	2.265	2.199	2.302
		Air Content (%)	4.3	5.4	5.1
		Degree of saturation (%)	74.4	69.1	71.3
		Marshall stability (kg)	741	801	949
		Flow (1/100cm)	24.8	26.5	3.0
* 6.0 %	Density (g/cm <sup>3</sup> )	2.260	2.204	2.297	
	Air Content (%)	3.8	4.5	4.6	
	Degree of saturation (%)	78.2	74.6	76.2	
	Marshall stability (kg)	788	1054	967	
	Flow (1/100cm)	26.5	29.0	36.3	
* 6.5 %	Density (g/cm <sup>3</sup> )	2.279	2.206	2.296	
	Air Content (%)	2.3	3.8	3.9	
	Degree of saturation (%)	86.5	79.0	79.3	
	Marshall stability (kg)	968	873	819	
	Flow (1/100cm)	23.5	34.6	3.9	

\* Asphalt content, total mix

Table II-3 RESULTS OF MARSHALL STABILITY TEST FOR  
SAMPLES STABILIZED WITH EMULSIFIED ASPHALT

Item	Density (g/cm <sup>3</sup> )	Theoretical Density (g/cm <sup>3</sup> )	Volume Ratio of Binder (%)	Air Content (%)	Degree of Saturation (%)	Stability (kg)	Flow (1/100cm)	
Sample No. & Admixture (%)	9.5	1.980	2.455	10.06	19.35	34.2	320	25
	10.5	1.989	2.437	11.54	18.38	38.6	276	26
	11.5	1.999	2.419	12.15	17.36	41.2	248	26
	12.5	1.989	2.401	13.08	17.16	43.3	225	26
	13.5	1.990	2.384	14.05	16.53	46.0	189	24
TP-5 (100)	10.0	2.178	2.453	11.62	11.21	50.9	321	21
	11.0	2.196	2.435	12.81	9.82	56.6	316	22
	12.0	2.208	2.417	13.96	8.65	61.7	300	25
	13.0	2.228	2.399	15.20	7.13	68.1	302	26
	14.0	2.241	2.382	16.37	5.92	73.4	278	28
TP-6.2 (56) Screenings (30) Filler (14)	10.0	2.150	2.449	11.47	12.21	48.4	255	22
	11.0	2.161	2.430	12.61	11.07	53.3	252	24
	12.0	2.181	2.413	13.79	9.61	58.9	252	23
	13.0	2.181	2.395	14.88	8.94	62.5	240	24
	14.0	2.193	2.378	16.02	7.78	67.3	231	25
TP-19 (63) Screenings (30) Filler (7)	10.0	2.150	2.449	11.47	12.21	48.4	255	22
	11.0	2.161	2.430	12.61	11.07	53.3	252	24
	12.0	2.181	2.413	13.79	9.61	58.9	252	23
	13.0	2.181	2.395	14.88	8.94	62.5	240	24
	14.0	2.193	2.378	16.02	7.78	67.3	231	25

Asphalt was added in the ratio of wt. of Dried Aggregate.



Table II-4 Classification of Soils Found along the Proposed Route

Grade	Classification Criteria	Suitability for Road Material				For Base Course Material	Remarks
		For Embankment Material	For Replacement Material	For Subgrade Material	For Subbase Course Material		
I	AASHO Classification A-1-6, A-3 and A-2-4 CBRs = 17~40 % Estimated CBR <sub>m</sub> > 25 %	Excellent	Excellent	Excellent	Good to Acceptable	Acceptable when mechanically stabilized by adding granular materials. Acceptable when stabilized with cement. Admixtures of granular materials and these soils are acceptable when stabilized with cement or bituminous materials. Sand near the Ruhoi River is acceptable when stabilized with bituminous materials.	Sandy soils found in flat planes are included in this Grade.
II	AASHO Classification A-3, A-2-4 and A-2-6 Lateritic soils of A-6 are included. CBRs = 3~8 % CBR <sub>m</sub> = 10~25 %	Excellent to Good	Excellent to Medium	Excellent to Good	Acceptable to Unacceptable for Lower Subbase Course	A-3, A-2-4 and A-2-6 groups are acceptable when stabilized with cement. Admixtures of granular materials and lateritic soils of A-2-4 and A-2-6 are acceptable when stabilized with cement. Admixtures of granular materials and these soils of A-3 and A-2-4 are acceptable when stabilized with bituminous materials.	Lateritic soils and some of sandy soils in flat planes are included in this Grade.
III	AASHO Classification A-6 and A-7-6 Excluding lateritic soils of A-6 and black cotton clay and yellowish brown kaolin clay of A-7-6. CBRs = 1~4 %	Acceptable	Unacceptable	Poor. Recommended to use the material of Grade I or II for upper part of sub-grade.	Unacceptable	Unacceptable	Clayey soils of decomposed soft rock in hilly areas are included in this Grade. Some clayey soils in flat planes are also included.
IV	AASHO Classification A-6 and A-7-6 Excluding soils of Grade III. CBRs ≤ 1 %	To be avoided in principle	Unacceptable	Unacceptable. Recommended to use the material of Grade I or II for upper part of sub-grade.	Unacceptable	Unacceptable	Black cotton clay found in both hilly and flat areas is included in this Grade. Yellowish brown kaolin clay in hilly area is also included.

Note: CBRs denotes the CBR value of the soaked specimen compacted under natural moisture content with the compaction effort of 18.4 kg.cm/cm<sup>3</sup>

CBR<sub>m</sub> denotes the CBR value at soaked condition corresponding to 95 % of the maximum dry density, γ<sub>dmax</sub>. γ<sub>dmax</sub> is obtained by compacting sample under the compaction effort of 25.6 kg.cm/cm<sup>3</sup> (the modified Proctor).

Table II-5 SUMMARY OF MATERIAL INVESTIGATION FOR COARSE AGGREGATE

No. of Site	Location	Station No.	Material	Description	Sampling No.	Estimated Total Volume (m <sup>3</sup> )	Volume to be obtained (m <sup>3</sup> )	Easiness for Obtaining Material	Material Quality	Judgement for Quarry
1	Kibiti	7km E-1.5km	Hard sandstone	Layer having the thickness of 0.5m, distributed in clay 5-10m deep under the ground.	S-7	S=100x200m H=0.5m V=10,000	2,000	Difficult	Good	Poor
			Soft sandstone	Boulder having the diameter of 30-50cm, scattered on the ground surface.		S=500x500m V=3,000	3,000	Medium	Medium	Medium
2	Kikanda	110km W-8km	Soft sandstone	Boulder having the diameter of 30-50cm, scattered on the ground surface.	S-1	S=200x500m V=5,000	5,000	Medium	Medium	Poor
3	Mingumbi	114km W-14km	Soft sandstone	Boulder having the diameter of 30-50cm, scattered on the ground surface.		S=100x100m V=1,000	1,000	Difficult	Medium	Poor
4	Near Matand River	131km	Gravel	Gravel having the diameter of 3-10cm, distributed on the ground surface. The thickness of layer is about 10-50cm.		S=50x100m H=0.1-0.5m V=1,500	500	Easy	Excellent	Medium
5	Matandu	142km	Hard limestone	Layer having the thickness of 1m in clay. Some boulders (30-50cm) are on the ground.		S=50x50m H=0.3-0.5m V=1,000	300	Easy	Good	Medium
6	Nangurukuru	150km E-0.3km	Hard limestone	Limestone stratum having the thickness of 30-50cm. Exposed on the ground surface.		S=50x100m H=0.3-0.5m V=2,000	1,000	Medium	Good	Medium
7	Nangurukuru	150km E-1.0km	Hard limestone	Limestone stratum having the thickness of 3-5m, distributed on the top of hill.		S=50x250m H=3-5m V=100,000	100,000	Very easy	Good	Medium
8	Migeregere	151km W-15km	Gravel	Layer having the thickness of 1-1.5m, distributed on the top of hill. The diameter of gravel is 2-7cm.	S-2	S=50mx30m H=1m-1.5m V=2,000	1,000	Easy	Excellent	Good
9	Mpara	15km	Gravel	Layer having the thickness of 0.5-1m, distributed on the ground surface. The diameter of gravel is 2-7cm.		S=50mx100m H=0.5m-1m V=5,000	2,000	Easy	Excellent	Good
10	Mpara	17km W-3.5km	Gravel	Gravel having the thickness of 0.1-0.3m, distributed on the top of hill.		S=30mx30m H=0.1-0.3m V=200	100	Difficult	Excellent	Poor
11	Mpara	15km W-4km	Gravel	Gravel layer having the thickness of 10-30cm, covered on the black cotton clay. The diameter of gravel is 2-7cm.		S=500mx500m H=0.1-0.3m V=50,000	1,000	Difficult	Excellent	Medium
12	Mtanga	20km	Soft limestone	Soft limestone distributed at the depth of 0.5-1.0m under the ground surface. Quality is poor.		S=50mx100m H=1.0m-1.5m V=7,000	5,000	Easy	Poor	Poor
13	Kikone	31km	Soft limestone	Soft limestone distributed at the depth of 0.5-1.0m under the ground surface. Around 10% can be used as aggregate in quality.		S=200mx200m H=3-5m V=100,000	10,000-20,000	Easy	Poor	Poor
14	Kiwawa	197km W-0.2km	Hard limestone	Stratum having the thickness of 3-5m, distributed along the slope of hill.		S=100mx500m H=3-5m V=200,000	150,000	Very easy	Good	Excellent
15	Mitole	202km W-0.2km	Hard limestone	Ditto	S-3	S=150mx500m H=3-5m V=300,000	250,000	Very easy	Good	Excellent
16	Mitole	205km	Hard limestone	Ditto		S=150mx500m H=3-5m V=300,000	250,000	Very easy	Good	Excellent
						S=50mx100m				
				Stratum having the thickness		H=3-5m	5,000	Medium	Good	Medium



12	Mtanga	20km	Soft limestone	Soft limestone distributed at the depth of 0.5-1.0m under the ground surface. Quality is poor.	S=50mx100m H=1.0m-1.5m V=7,000	5,000	Easy	Poor	Poor
13	Kikone	31km	Soft limestone	Soft limestone distributed at the depth of 0.5-1.0m under the ground surface. Around 10% can be used as aggregate in quality.	S=200mx200m H=3-5m V=100,000	10,000-20,000	Easy	Poor	Poor
14	Kiwawa	197km W-0.2km	Hard limestone	Stratum having the thickness of 3-5m, distributed along the slope of hill.	S=100mx500m H=3-5m V=200,000	150,000	Very easy	Good	Excellent
15	Mitole	202km W-0.2km	Hard limestone	Ditto	S=150mx500m H=3-5m V=300,000	250,000	Very easy	Good	Excellent
16	Mitole	205km	Hard limestone	Ditto	S=150mx500m H=3-5m V=300,000	250,000	Very easy	Good	Excellent
17	Mbaro	217km	Hard limestone	Stratum having the thickness of 3-5m.	S=50mx100m H=3-5m V=20,000	5,000	Medium	Good	Medium
18	Mbaro	220km	Soft sandstone	Boulder having the diameter of 0.2-0.5m, scattered on the ground surface.	S=150mx1000m H=0.5-1.0m V=100,000	100,000	Easy	Medium	Medium
19	Kiranjerange	235km	Soft sandstone	Sandstone gravel is sandwiched in between black cotton clay and lateritic soil.	S=10mx3.0m H=0.5-1.0m V=200	100	Difficult	Medium	Poor
20	Kiranjerange	240km W-0.3km	Soft sandstone	Scattered as boulder on the ground surface.	S=20mx30m H=0.3-0.5m V=200	200	Difficult	Medium	Poor
21	Mpingo	249km E-1.0km	Hard sandstone	Ditto	S=200mx500m H=0.1-0.5m V=2-30,000	10,000 20,000	Medium	Good	Medium
22	Mpingo	253km W-2.5km	Hard limestone	Stratum having the thickness of 3-5m, distributed on the top of hill.	S=400mx700m H=3m-5m V=1,000,000	1,000,000	Easy	Good	Good
22	Ditto	Ditto	Ditto	Limestone boulder of 0.5-1.0m in diameter, scattered on the ground.	S=800mx2000m H=0.2-0.5m V=500,000	500,000	Medium	Good	Medium
23	Mchinga	275km N-1.0km	Hard limestone	Stratum, widely distributed on the top of mountain.	S=100mx20m H=1-2m V=3,000	2,000	Difficult	Good	Poor
24	Mchinga	277km N-0.5km	Soft sandstone	Stratum, distributed from the top to the slope of mountain.	S=200mx500m S=5m-10m V=700,000	500,000	Easy	Poor	Poor
25	Ditto	278km S-0.1km	Ditto	Ditto	S=150mx500m H=5m-10m V=500,000	400,000	Easy	Poor	Poor
26	Ditto	279km S-0.3km	Hard limestone	Stratum having the thickness of 5-10m, distributed on the top of mountain.	S=500mx500m H=5-10m V=1,500,000	1,000,000	Easy	Good	Excellent
27	Ditto	280km to 282km	Soft limestone	Quality is very poor.	S=1000x1500m H=15m-20m V=20,000,000	15000,000	Medium	Poor	Poor
28	Mitonga	296km W-0.2km	Hard limestone	Three limestone hills.	S=20mx30m H=15m V=9,000 S=30mx50m H=20m V=50,000 S=30mx50m H=15m V=20,000	50,000	Easy	Good	Good
29	Mbanja	299km	Hard limestone	Stratum having the thickness of 2-3m, distributed in clay layer.	S=100mx200m H=2-3m V=50,000	10,000	Medium	Good	Medium
30	Rus Bura	302km to 305km	Limestone & Sandstone Gravel	Discontinuous strata.	S=200mx1500 H=3-5m V=1,000,000	10,000	Difficult	Medium	Poor



Table II-6 SUMMARY OF COARSE AGGREGATE TEST

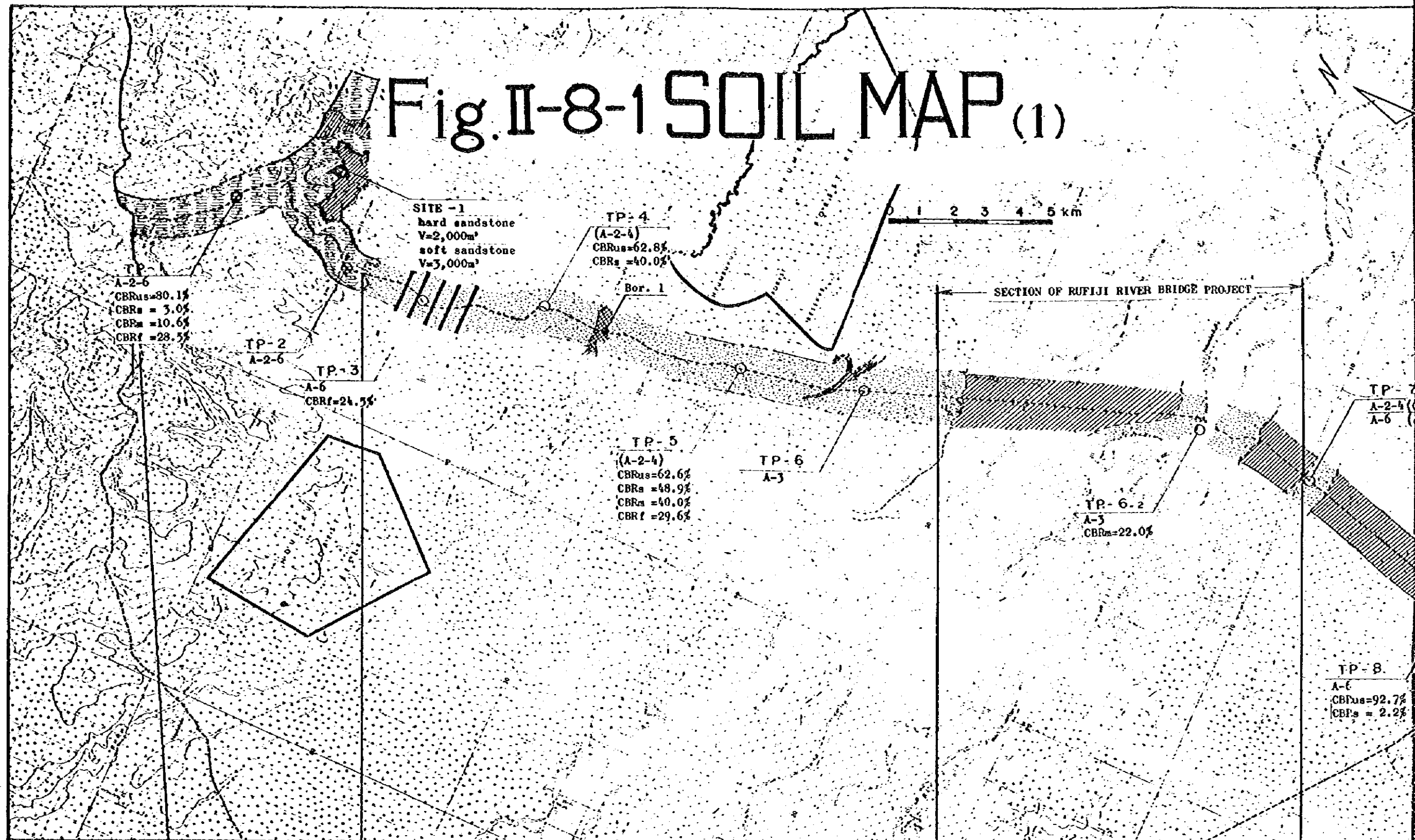
Sample No.	Location of Sampling	Material	Apparent Specific Gravity	Water Absorption (%)	Los Angeles Abrasion Test (%)	Compression Test of Concrete	
						(kg/cm <sup>2</sup> )	0.7.028
S-1	Kikanda	Soft Sandstone Boulder	2.26	8.05	87.2	—	—
S-2	Migerere	Hard Gravel	2.63	0.55	29.7	296	300*
S-3	Mitole	Hard Limestone	2.66	1.10	33.8	246	210
S-4	Mitonga	Hard Limestone	2.64	0.90	28.9	—	—
S-5	Mchinga	Ditto	2.53	1.92	37.1	243	260
S-6	Mpingo	Ditto	2.59	1.99	39.7	—	—
S-7	Kibiti	Hard Sandstone	2.45	3.85	74.0	223	232*
S-8	Nangurakuru	Hard Limestone	2.65	1.33	31.6	262	260

Note: (1) Size of Concrete Specimen: 10cm x 10cm x 10cm  
 (2) \* Estimated from 0.28 = 1.3507 + 30





# Fig. II-8-1 SOIL MAP (1)

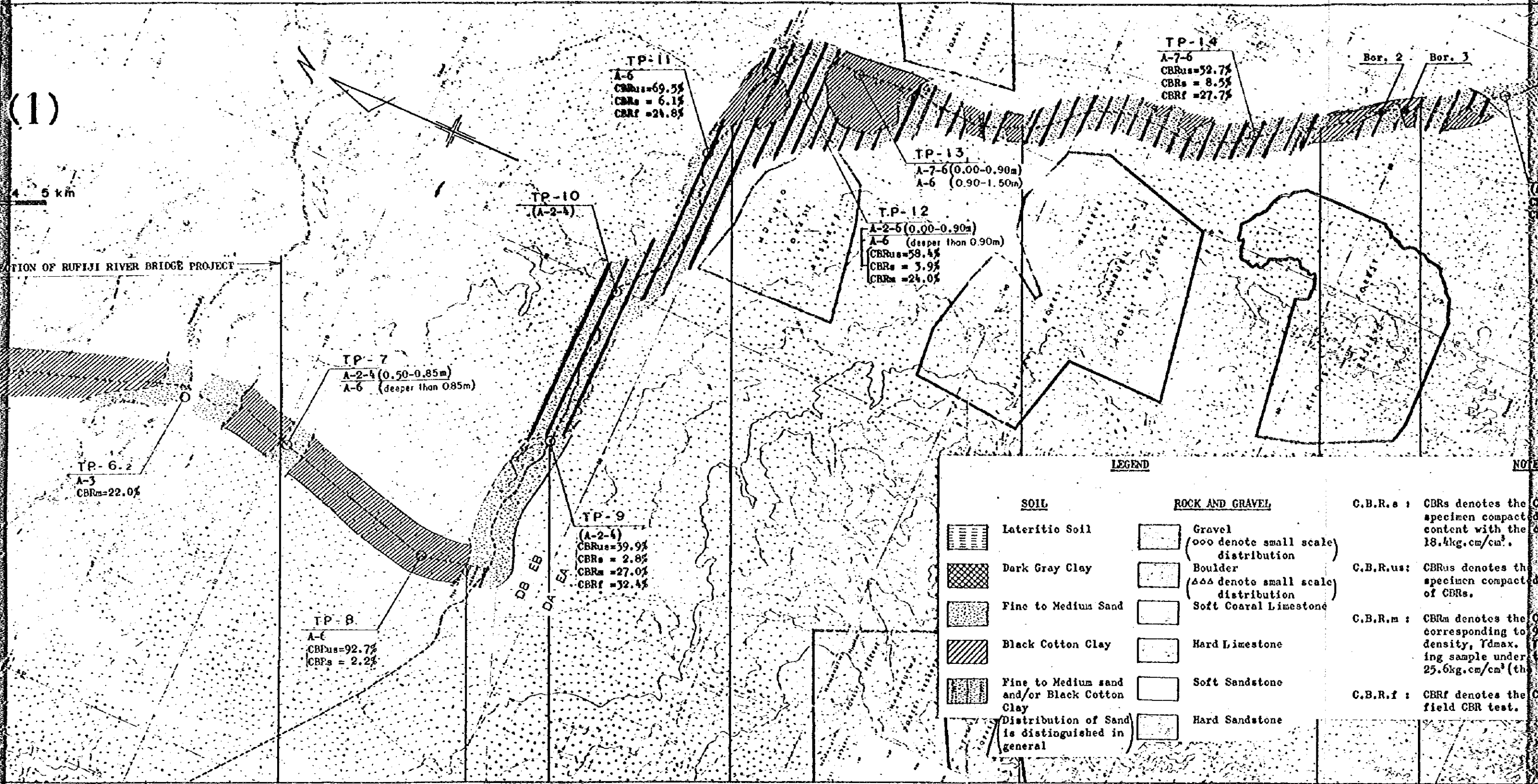


SECTION NO.	I	2	SECTION OF RUFUJI RIVER BRIDGE PROJECT	3
SOIL GRADE	II	I		IV
LENGTH IN KM	9.0	19.0	12.0	8.0

(1)

4 5 km

SECTION OF RUFUJI RIVER BRIDGE PROJECT



**LEGEND**

SOIL		ROCK AND GRAVEL	
	Lateritic Soil		Gravel (ooo denote small scale distribution)
	Dark Gray Clay		Boulder (AAA denote small scale distribution)
	Fine to Medium Sand		Soft Coaral Limestone
	Black Cotton Clay		Hard Limestone
	Fine to Medium sand and/or Black Cotton Clay		Soft Sandstone
	Distribution of Sand is distinguished in general		Hard Sandstone

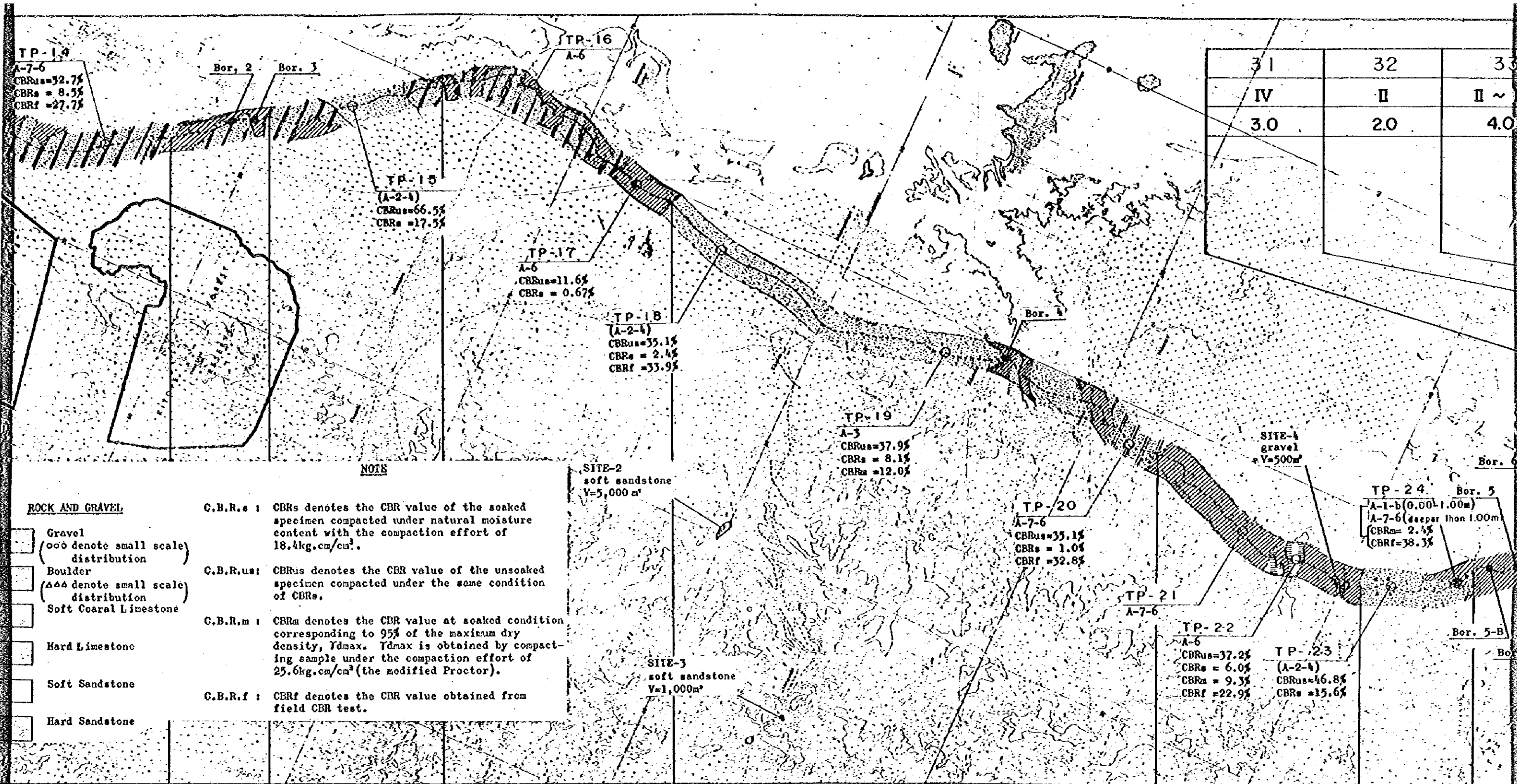
**C.B.R.s :** CBRs denotes the specimen compacted content with the 18.4kg/cm<sup>2</sup>.

**C.B.R.us :** CBRus denotes the specimen compacted of CBRs.

**C.B.R.m :** CBRm denotes the corresponding to density,  $\gamma_{dmax}$ , ing sample under 25.6kg/cm<sup>2</sup> (th

**C.B.R.f :** CBRf denotes the field CBR test.

SECTION OF RUFUJI RIVER BRIDGE PROJECT	3	4	5	6	7	8	9
	IV	II	II ~ III	IV	III	IV	I
	12.0	8.0	13.0	9.0	11.0	3.0	6.0



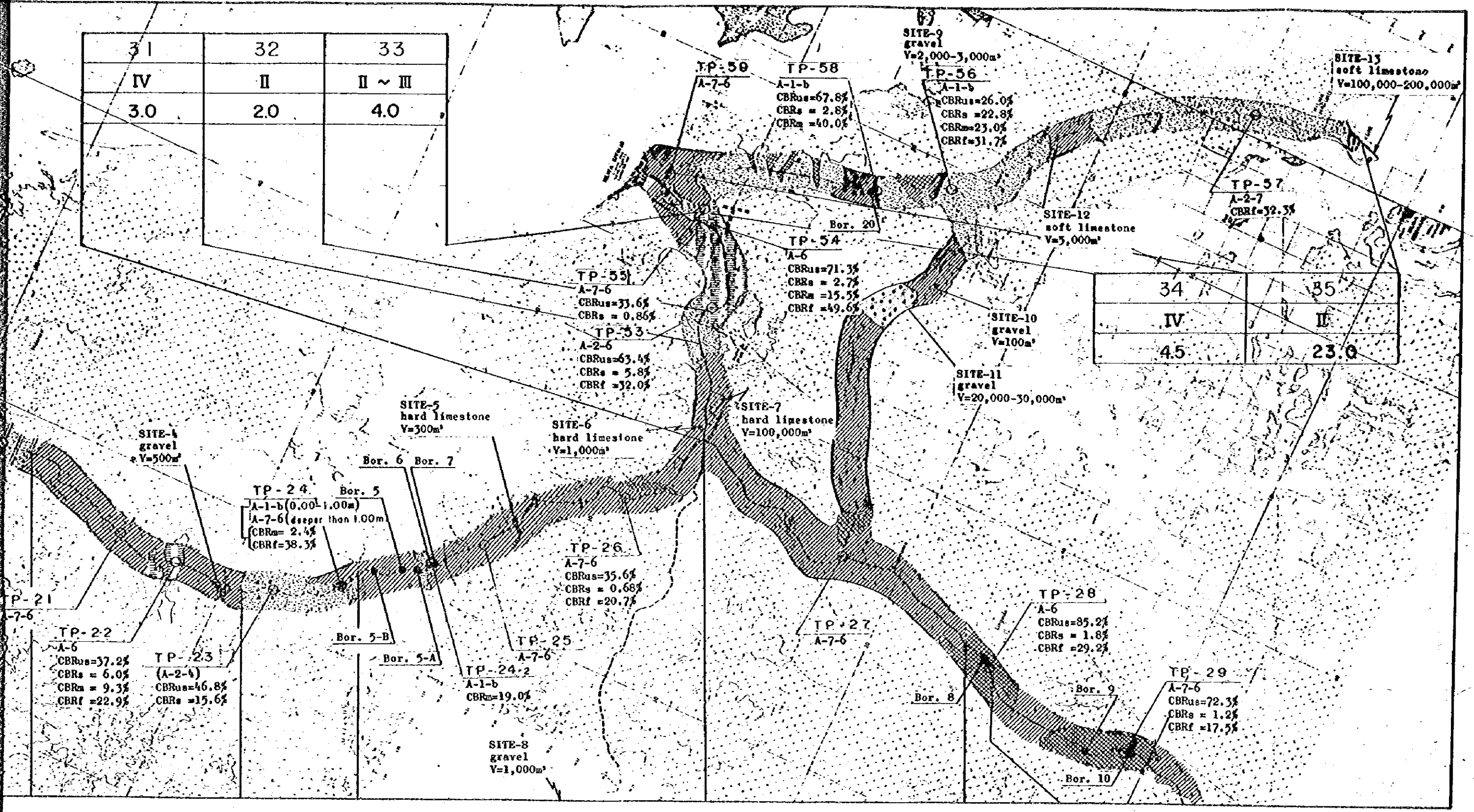
31	32	33
IV	II	II ~ III
3.0	2.0	4.0

7	8	9	10	I	12	13
III	IV	I	IV	II ~ III	IV	I
11.0	3.0	6.0	9.5	200	9.0	4.5



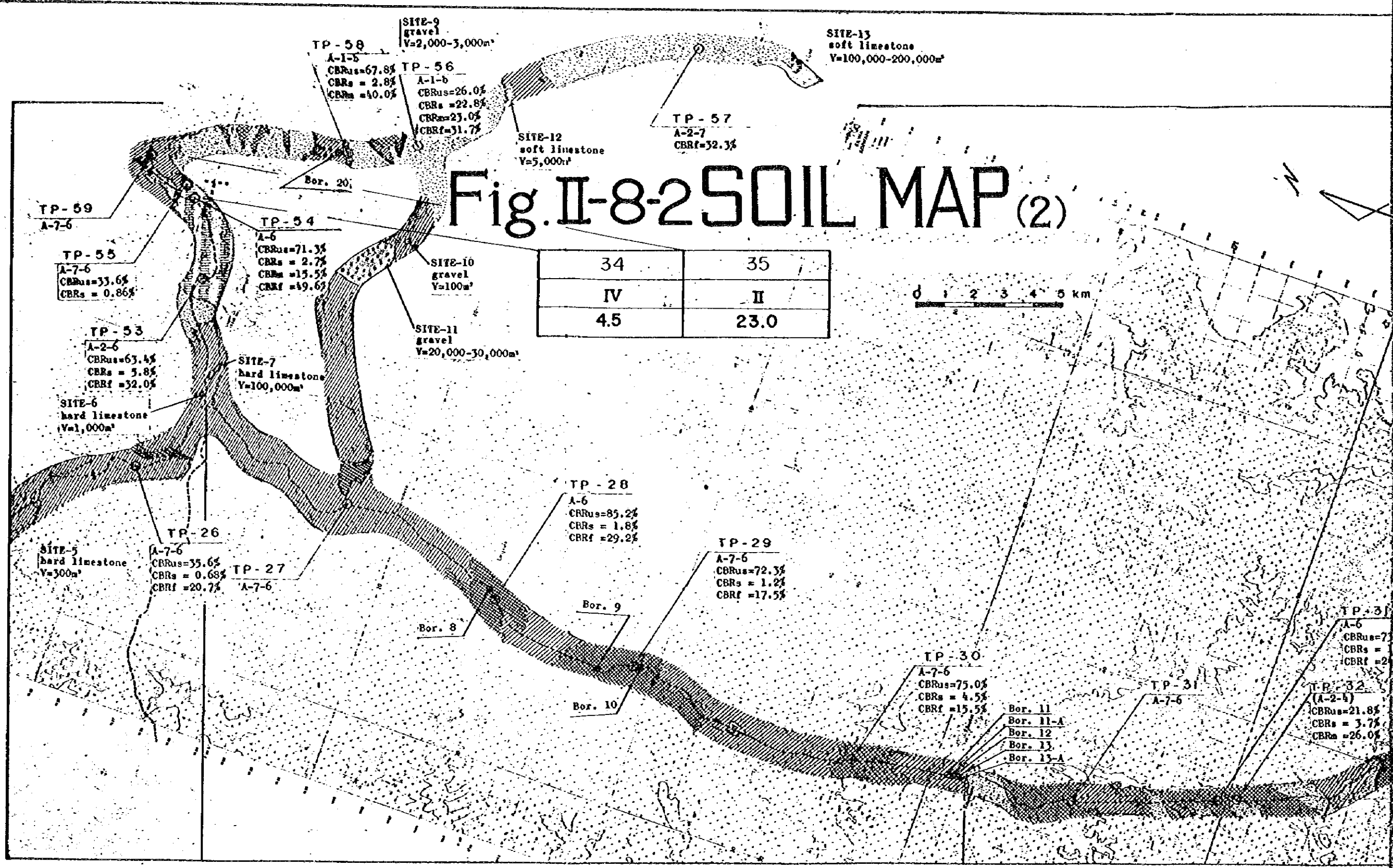
31	32	33
IV	II	II ~ III
3.0	2.0	4.0

34	35
IV	II
4.5	23.0

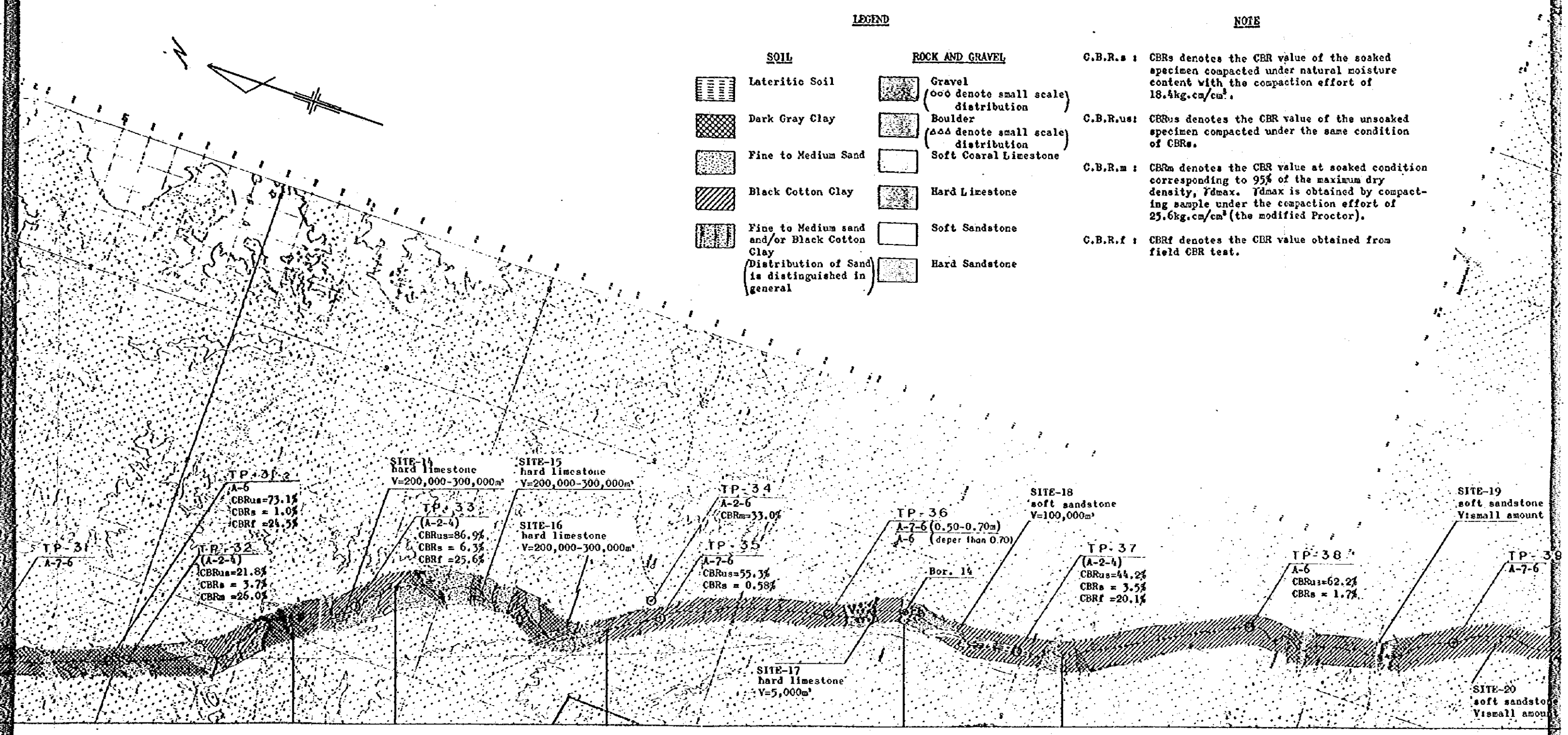


12	13	14	15
IV	I	IV	IV
9.0	4.5	13.5	300

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 交付  
 冊  
 登録No. 13489  
 416  
 664  
 SDF



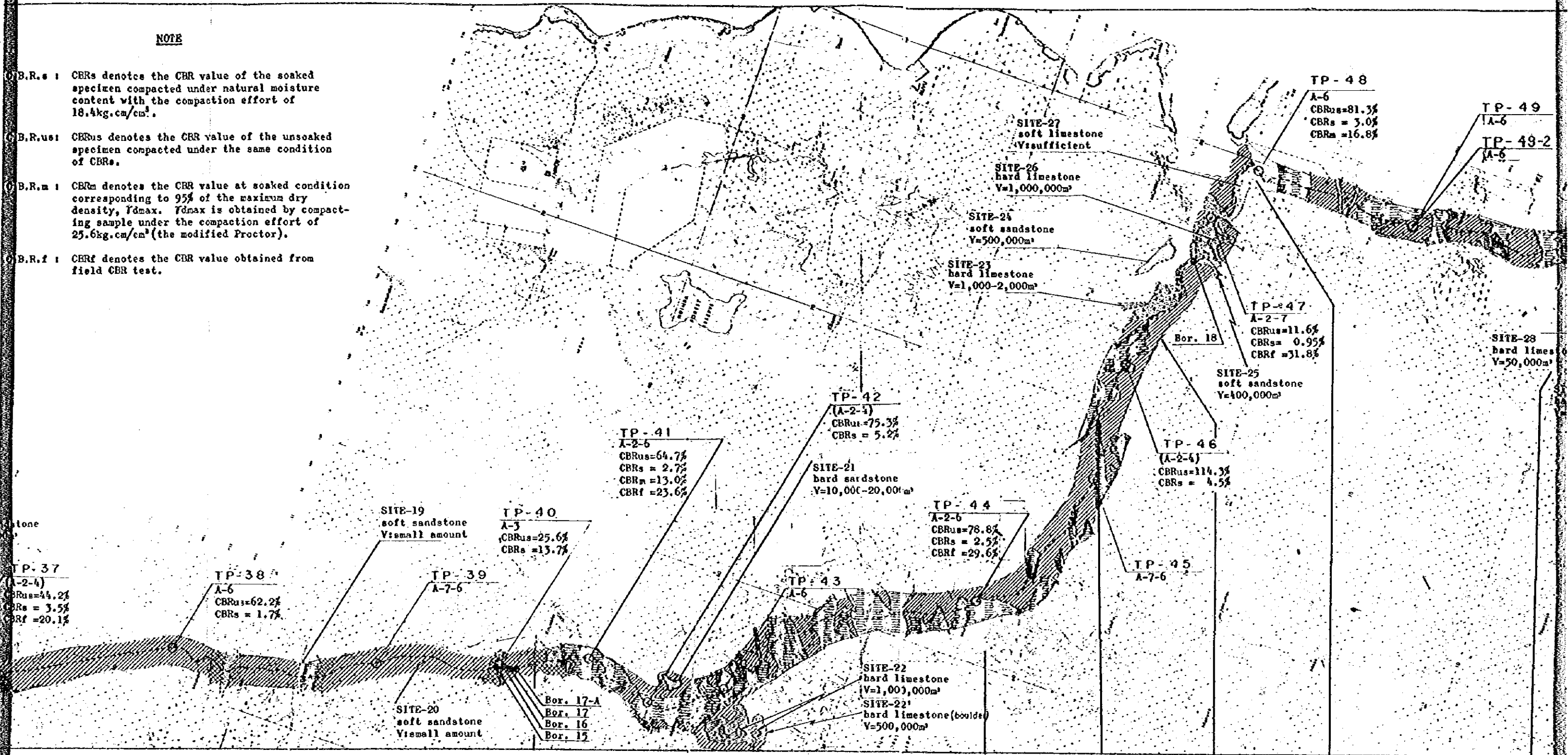
SECTION NO.	15	16
SOIL GRADE	IV	III ~ IV
LENGTH IN KM	300	17.5



16	17	18	19	20	21
III ~ IV	IV	II	IV	II	IV
17.5	3.0	8.0	11.0	5.5	2.1

**NOTE**

- B.R.s : CBR<sub>s</sub> denotes the CBR value of the soaked specimen compacted under natural moisture content with the compaction effort of 18.4kg/cm<sup>2</sup>.
- B.R.us : CBR<sub>us</sub> denotes the CBR value of the unsoaked specimen compacted under the same condition of CBRs.
- B.R.m : CBR<sub>m</sub> denotes the CBR value at soaked condition corresponding to 95% of the maximum dry density, γ<sub>dmax</sub>. γ<sub>dmax</sub> is obtained by compacting sample under the compaction effort of 25.6kg/cm<sup>2</sup> (the modified Proctor).
- B.R.f : CBR<sub>f</sub> denotes the CBR value obtained from field CBR test.



stone  
TP-37  
(A-2-4)  
CBR<sub>us</sub>=44.2%  
CBR<sub>s</sub> = 3.5%  
CBR<sub>f</sub> = 20.1%

TP-38  
A-6  
CBR<sub>us</sub>=62.2%  
CBR<sub>s</sub> = 1.7%

SITE-19  
soft sandstone  
V=small amount

TP-39  
A-7-6

TP-40  
A-3  
CBR<sub>us</sub>=25.6%  
CBR<sub>s</sub> = 13.7%

SITE-20  
soft sandstone  
V=small amount

Bor. 17-A  
Bor. 17  
Bor. 16  
Bor. 15

TP-41  
A-2-6  
CBR<sub>us</sub>=64.7%  
CBR<sub>s</sub> = 2.7%  
CBR<sub>m</sub> = 13.0%  
CBR<sub>f</sub> = 23.6%

TP-42  
(A-2-4)  
CBR<sub>us</sub>=75.3%  
CBR<sub>s</sub> = 5.2%

SITE-21  
hard sandstone  
V=10,000-20,000m<sup>3</sup>

TP-43  
A-6

SITE-22  
hard limestone  
V=1,000,000m<sup>3</sup>  
SITE-22'  
hard limestone (boulders)  
V=500,000m<sup>3</sup>

TP-44  
A-2-6  
CBR<sub>us</sub>=78.8%  
CBR<sub>s</sub> = 2.5%  
CBR<sub>f</sub> = 29.6%

SITE-23  
hard limestone  
V=1,000-2,000m<sup>3</sup>

TP-45  
A-7-6

Bor. 18

SITE-25  
soft sandstone  
V=400,000m<sup>3</sup>

TP-47  
A-2-7  
CBR<sub>us</sub>=11.6%  
CBR<sub>s</sub> = 0.95%  
CBR<sub>f</sub> = 31.8%

TP-46  
(A-2-4)  
CBR<sub>us</sub>=114.3%  
CBR<sub>s</sub> = 4.5%

SITE-24  
soft sandstone  
V=500,000m<sup>3</sup>

SITE-25  
soft sandstone  
V=500,000m<sup>3</sup>

SITE-26  
hard limestone  
V=1,000,000m<sup>3</sup>

SITE-27  
soft limestone  
V=sufficient

TP-48  
A-6  
CBR<sub>us</sub>=81.3%  
CBR<sub>s</sub> = 3.0%  
CBR<sub>m</sub> = 16.8%

TP-49  
A-6  
TP-49-2  
A-6

SITE-28  
hard limestone  
V=50,000m<sup>3</sup>

21

IV

21

22

II

18.0

23

IV

9.5

24

II

4.0

25

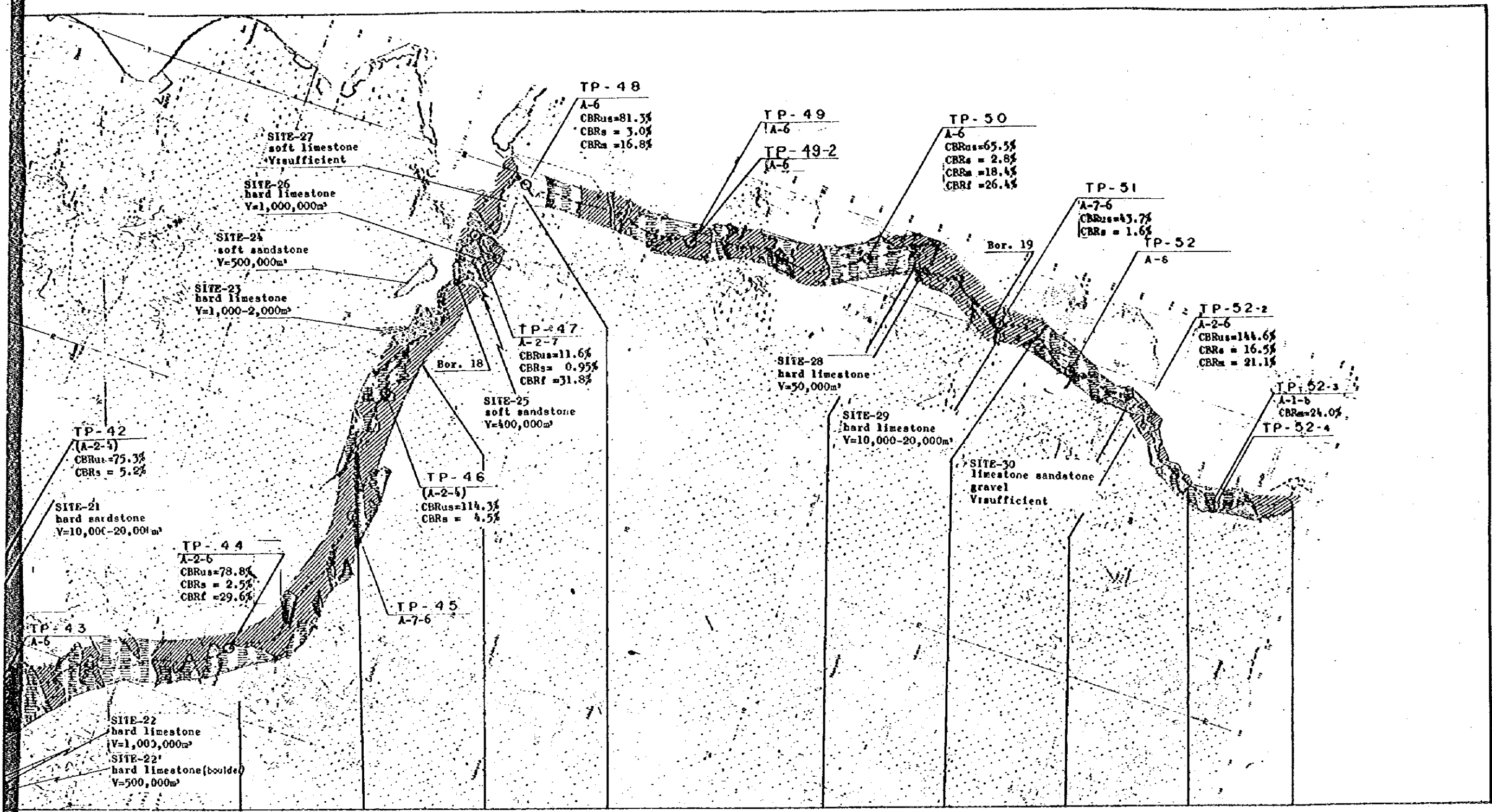
III ~ IV

6.5

26

II

15.5



	23	24	25	26	27	28	29	30
	IV	II	III ~ IV	II	IV	II	I	II
0	9.5	4.0	6.5	15.5	5.0	8.0	3.0	3.5

国際協力事業団  
 受入 416  
 月日 61.4  
 登録No. 03489 PDF

