APPENDIX-III : GEOLOGICAL SURVEY AT PROPOSED SITES FOR CONSTRUCTION OF FOOD GRAIN STOREHOUSES

APPENDIX-III : GEOLOGICAL SURVEY AT PROPOSED SITES FOR CONSTRUCTION OF FOOD GRAIN STOREHOUSES

1. Period of Survey

November 21, 1978 through December 7, 1978

2. Purpose of Survey

The purpose of the geological survey is to provide fundamental data for design and execution of the project storehouses by clarifying the soil composition, the depth of distribution of bearing layer, and the situation of ground-water, etc. at the proposed sites of construction by making use of portable type cone penetrometers.

3. Method of Survey

Because the survey was conducted in the dry season, the ground surfaces were of high consolidation due to drying shrinkage, a test pit (ø50 ∿ 70 cm x ℓ55 ∿ 100 cm) was made at each point of survey, and soil composition, depth of distribution of the bearing layer and situation of ground-water were checked with a cone penetrometer penetrated into the soil from the bottom of the pit. The excavation length (ℓ) of each test pit was included in the penetration depth of the penetrometer.

4. Places of Survey and Number of Plots

Place of Survey	Santahar	Narayanganj	Boyra	Maheswarpasha	Halishahar	Dewanhat
Number of Plots	10	10	3	6	22	6

The number of plots at each site is indicated in Fig. III-1 ∿ 6.

5. Results of Survey

The result of the survey is shown in data sheets (Table III-1 ∿ 10) for each site. The bearing capacity is indicated by q_u value by making use of the relative formula $q_c = 5\ q_u$ (kg/cm^2) between cone bearing capacity q_c and unconfined compression strength (q_u).

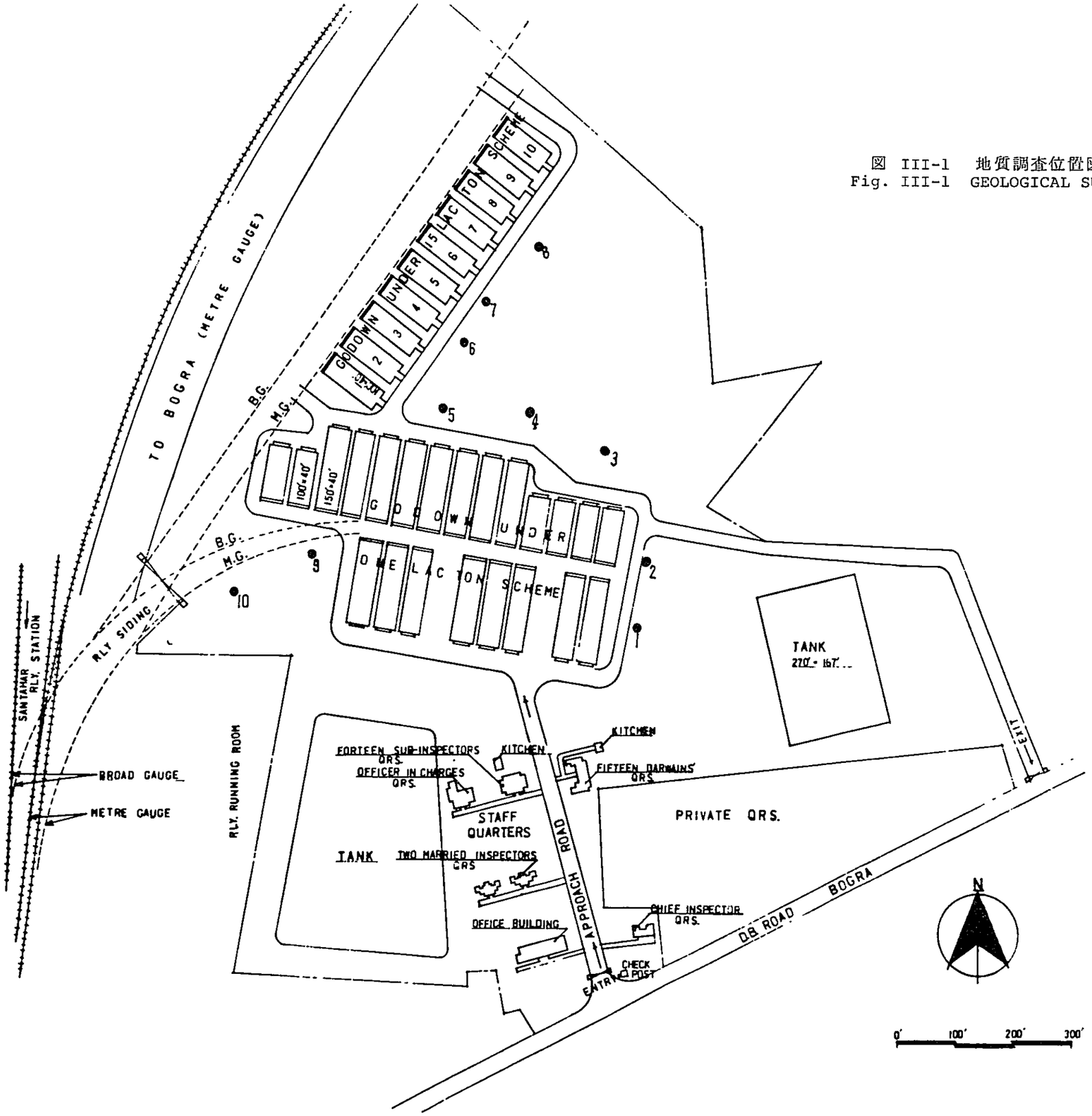
The result of the survey in each site is described in 4-2 "Conditions of Each Area".

In general, there is a trend that a soft layer is developed and geological conditions are poor in low grounds with alluvium deposit in the delta zones. According to the result of the survey of this time, data which indicate the necessity of the use of special improved ground method were not obtained at the proposed sites of construction of food storehouses.

It is considered that the reason why the sites of the existing storehouses showed relatively good geological result is because the storehouses were built on the stable grounds through experience.

The bearing layers at the proposed sites provide the unconfined compression strength (q_u) of 12.0 ∿ 21.9 t/m^2. As the approximate design load is 3.4 t/m^2, and the layer up to the bearing layer provides q_u of 4.0 ∿ 8.0 t/m^2 by calculations, there is no anxiety with respect to the bearing capacity if a mat foundation is adopted. However, it is desirable that examination of the settlement due to consolidation, etc. is made through execution of a detailed survey in the future.

図 III-1 地質調査位置図
Fig. III-1 GEOLOGICAL SURVEY, SANTAHAR CSD



REMARKS

RLY	RAILWAY
QRS	QUARTERS
DB	DACCA-BOGRA
BG	BROAD CAUGE
MG	METRE CAUGE
LAC	100000.
●1～10	Test Pits

Table III-1 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: SANTAHAR

Date: NOV. 27. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
1	120~125	100	125	5	120~170	110	130
Paddy Field	Average	112.5		Paddy Field	Average	120	
G.W.L.– cm	G.V. x 0.533kg	60.0		G.W.L.– cm	G.V. x 0.533kg	64.0	
Strata Encountered	qc kg/cm2	9.30		Strata Encountered	qc kg/cm2	9.92	
0~1.25m	qu kg/cm2	1.86		0~1.70	qu kg/cm2	1.98	
Silt	Test Pit Depth (cm)	70		Silt	Test Pit Depth (cm)	60	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
2	175~180	100	105	6	170~195	125	130
Tank Side	Average	102.5		Paddy Field	Average	127.5	
G.W.L.– 60 cm	G.V. x 0.533kg	54.7		G.W.L.– cm	G.V. x 0.533kg	68.0	
Strata Encountered	qc kg/cm2	8.48		Strata Encountered	qc kg/cm2	10.5	
0~1.80m	qu kg/cm2	1.69		0~1.95m	qu kg/cm2	2.11	
Silt	Test Pit Depth (cm)	60		Silt	Test Pit Depth (cm)	60	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
3	180~190	105	110	7	170~195	125	125
Paddy Field	Average	107.5		Paddy Field	Average	125	
G.W.L.–110cm	G.V. x 0.533kg	57.3		G.W.L.– cm	G.V. x 0.533kg	66.7	
Strata Encountered	qc kg/cm2	8.89		Strata Encountered	qc kg/cm2	10.3	
0~190	qu kg/cm2	1.78		0~1.95m	qu kg/cm2	2.07	
Silt	Test Pit Depth (cm)	70		Silt	Test Pit Depth (cm)	80	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
4	170~185	120	130	8	110~145	130	135
Paddy Field	Average	125		Paddy Field	Average	132.5	
G.W.L.– cm	G.V. x 0.533kg	66.7		G.W.L.– cm	G.V. x 0.533kg	70.7	
Strata Encountered	qc kg/cm2	10.3		Strata Encountered	qc kg/cm2	10.9	
0~1.85m	qu kg/cm2	2.07		0~1.85m	qu kg/cm2	2.19	
Silt	Test Pit Depth (cm)	55		Silt	Test Pit Depth (cm)	55	

Table III-2 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: SANTAHAR

Date: NOV. 27. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
9	155 ~ 180	115	130				
Paddy Field	Average	122.5			Average		
G.W.L.– cm	G.V. x 0.533kg	65.3		G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	10.1		Strata Encountered	qc kg/cm2		
0 ~ 1.80m	qu kg/cm2	2.03			qu kg/cm2		
Silt	Test Pit Depth (cm)	65					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
10	175	130	130				
Paddy Field	Average	130			Average		
G.W.L.– cm	G.V. x 0.533kg	69.3		G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	10.7		Strata Encountered	qc kg/cm2		
0 ~ 1.75m	qu kg/cm2	2.15			qu kg/cm2		
Silt	Test Pit Depth (cm)	75					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
	Average				Average		
G.W.L.– cm	G.V. x 0.533kg			G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2			Strata Encountered	qc kg/cm2		
	qu kg/cm2				qu kg/cm2		
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
	Average				Average		
G.W.L.– cm	G.V. x 0.533kg			G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2			Strata Encountered	qc kg/cm2		
	qu kg/cm2				qu kg/cm2		

図 III-2 地質調査位置図
Fig. III-2 GEOLOGICAL SURVEY, NARAYANGANJ CSD

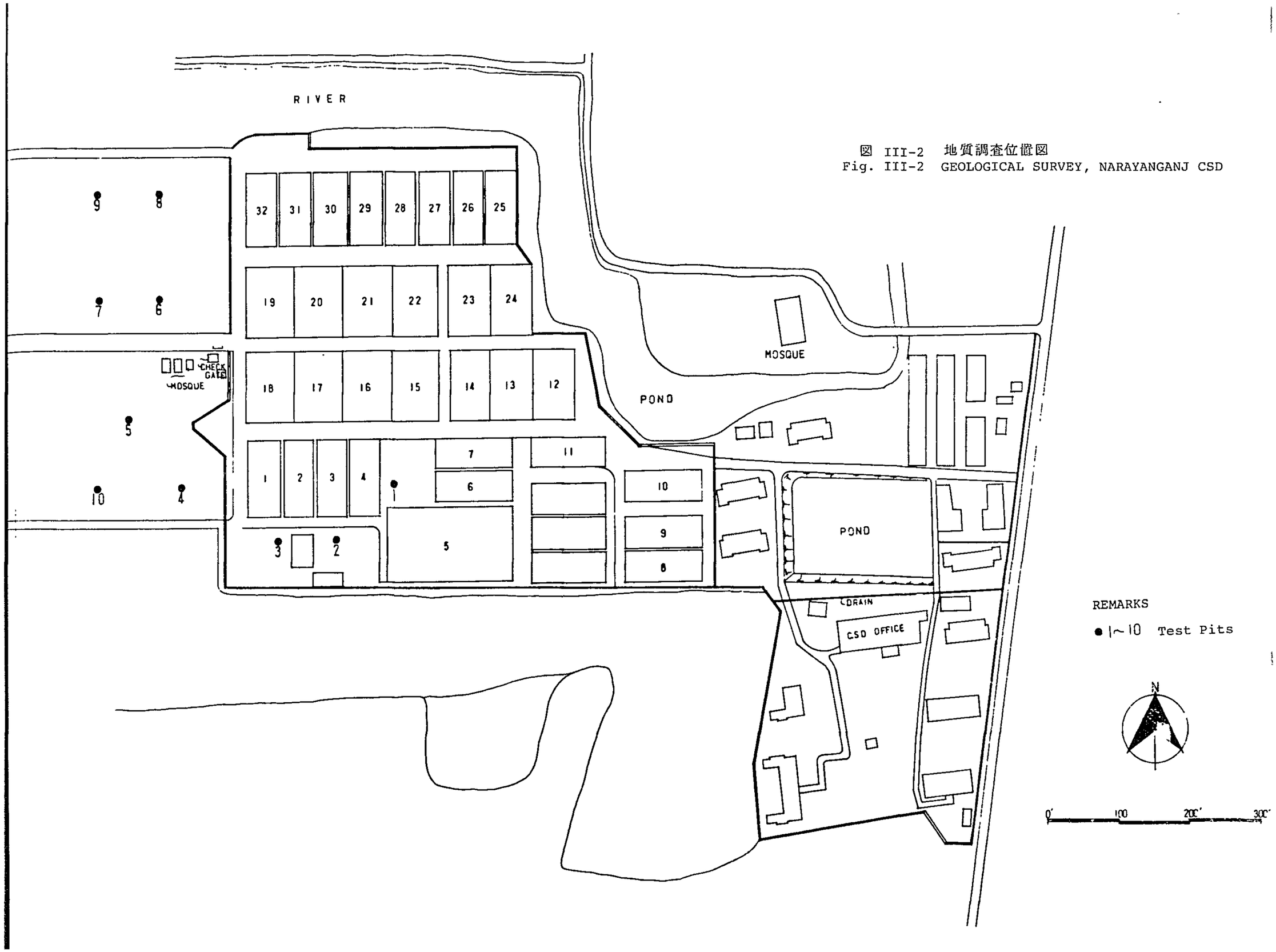


Table III-3 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: NARAYANGANJ

Date: DEC. 7. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
1	60	90	100
Ready Land	Average	95	
G.W.L.– cm	G.V. x 0.533kg	50.6	
Strata Encountered	qc kg/cm2	7.85	
0 ~ 0.60 m	qu kg/cm2	1.57	
Sandy Silt	Test Pit Depth (cm)	55	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
5	70 ~ 80	105	110
River Side	Average	107.5	
G.W.L.– cm	G.V. x 0.533kg	57.3	
Strata Encountered	qc kg/cm2	8.88	
0 ~ 0.80 m	qu kg/cm2	1.78	
Silty Fine Sand	Test Pit Depth (cm)	55	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
2	65	90	95
Ready Land	Average	92.5	
G.W.L.– cm	G.V. x 0.533kg	49.3	
Strata Encountered	qc kg/cm2	7.69	
0 ~ 0.65 m	qu kg/cm2	1.53	
Sandy Silt	Test Pit Depth (cm)	60	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
6	80 ~ 90	105	115
River Side	Average	110	
G.W.L.– cm	G.V. x 0.533kg	58.6	
Strata Encountered	qc kg/cm2	9.09	
0 ~ 0.90 m	qu kg/cm2	1.82	
Sandy Silt	Test Pit Depth (cm)	60	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
3	65	85	90
Ready Land	Average	87.5	
G.W.L.– cm	G.V. x 0.533kg	46.6	
Strata Encountered	qc kg/cm2	7.23	
0 ~ 0.65 m	qu kg/cm2	1.45	
Sandy Silt	Test Pit Depth (cm)	60	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
7	145	90	110
River Side	Average	100	
G.W.L.– cm	G.V. x 0.533kg	53.3	
Strata Encountered	qc kg/cm2	8.26	
0 ~ 1.45 m	qu kg/cm2	1.65	
Silt	Test Pit Depth (cm)	65	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
4	100 ~ 110	95	110
River Side	Average	102.5	
G.W.L.– cm	G.V. x 0.533kg	54.6	
Strata Encountered	qc kg/cm2	8.47	
0 ~ 1.10 m	qu kg/cm2	1.69	
Silt	Test Pit Depth (cm)	60	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
8	85 ~ 95	90	100
River Side	Average	95	
G.W.L.– cm	G.V. x 0.533kg	50.6	
Strata Encountered	qc kg/cm2	7.85	
0 ~ 0.95 m	qu kg/cm2	1.57	
Silt	Test Pit Depth (cm)	60	

Table III-4 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: NARAYANGANJ

Date: DEC. 7. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
9	95	100	105				
River Side	Average	102.5			Average		
G.W.L.– cm	G.V. x 0.533kg	54.6		G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	8.47		Strata Encountered	qc kg/cm2		
0 ~ 0.95m	qu kg/cm2	1.69			qu kg/cm2		
Silt	Test Pit Depth (cm)	80					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
10	65 ~ 70	90	100				
River Side	Average	95			Average		
G.W.L.– cm	G.V. x 0.533kg	50.6		G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	7.85		Strata Encountered	qc kg/cm2		
0~0.85m Silt	qu kg/cm2	1.57		-	qu kg/cm2		
0.85~0.7m Fine Sand	Test Pit Depth (cm)	60					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
	Average				Average		
G.W.L.– cm	G.V. x 0.533kg			G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2			Strata Encountered	qc kg/cm2		
	qu kg/cm2				qu kg/cm2		
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
	Average				Average		
G.W.L.– cm	G.V. x 0.533kg			G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2			Strata Encountered	qc kg/cm2		
	qu kg/cm2				qu kg/cm2		

図 III-3 地質調査位置図
Fig. III-3 GEOLOGICAL SURVEY, BOYRA CSD

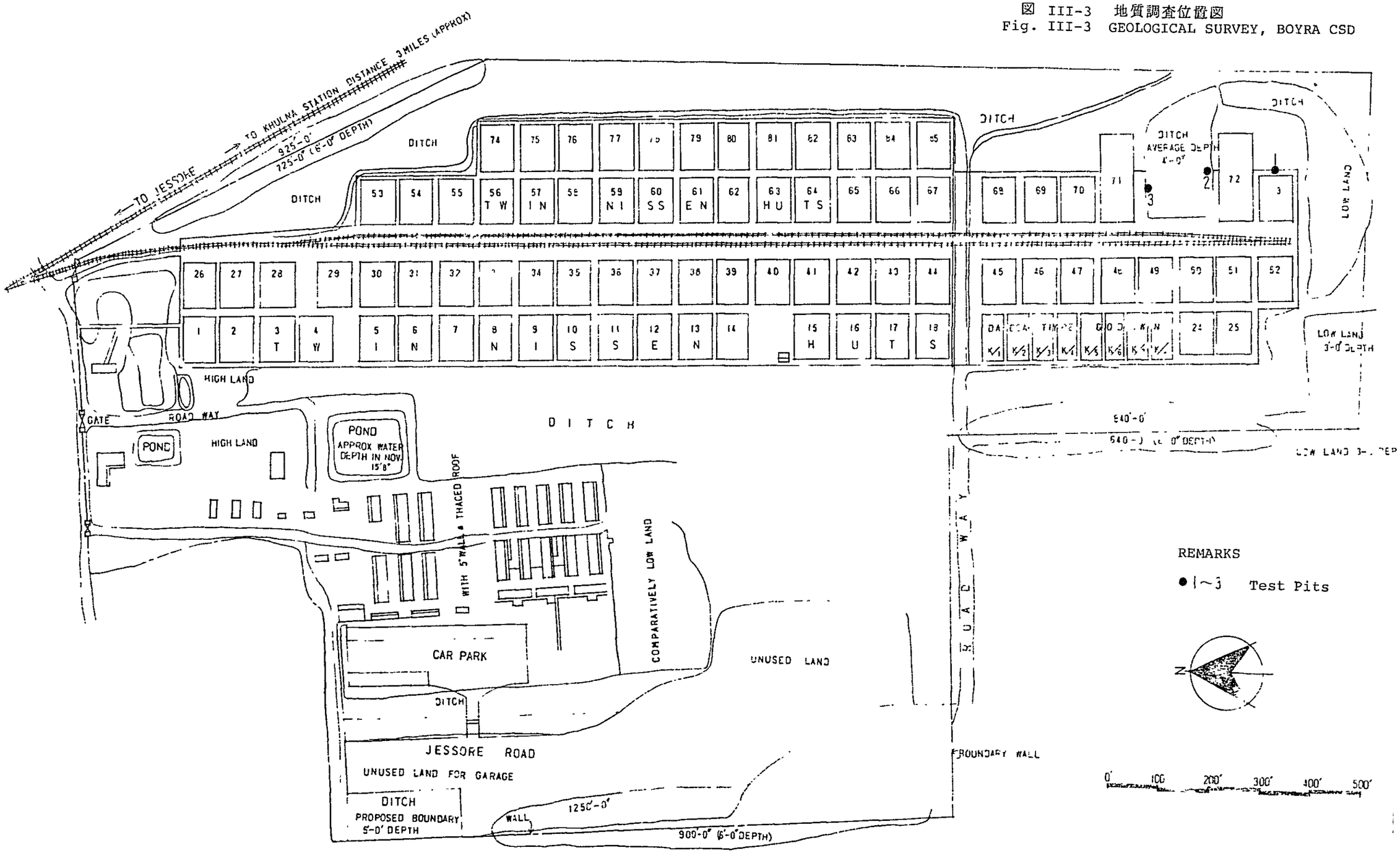


Table III-5 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

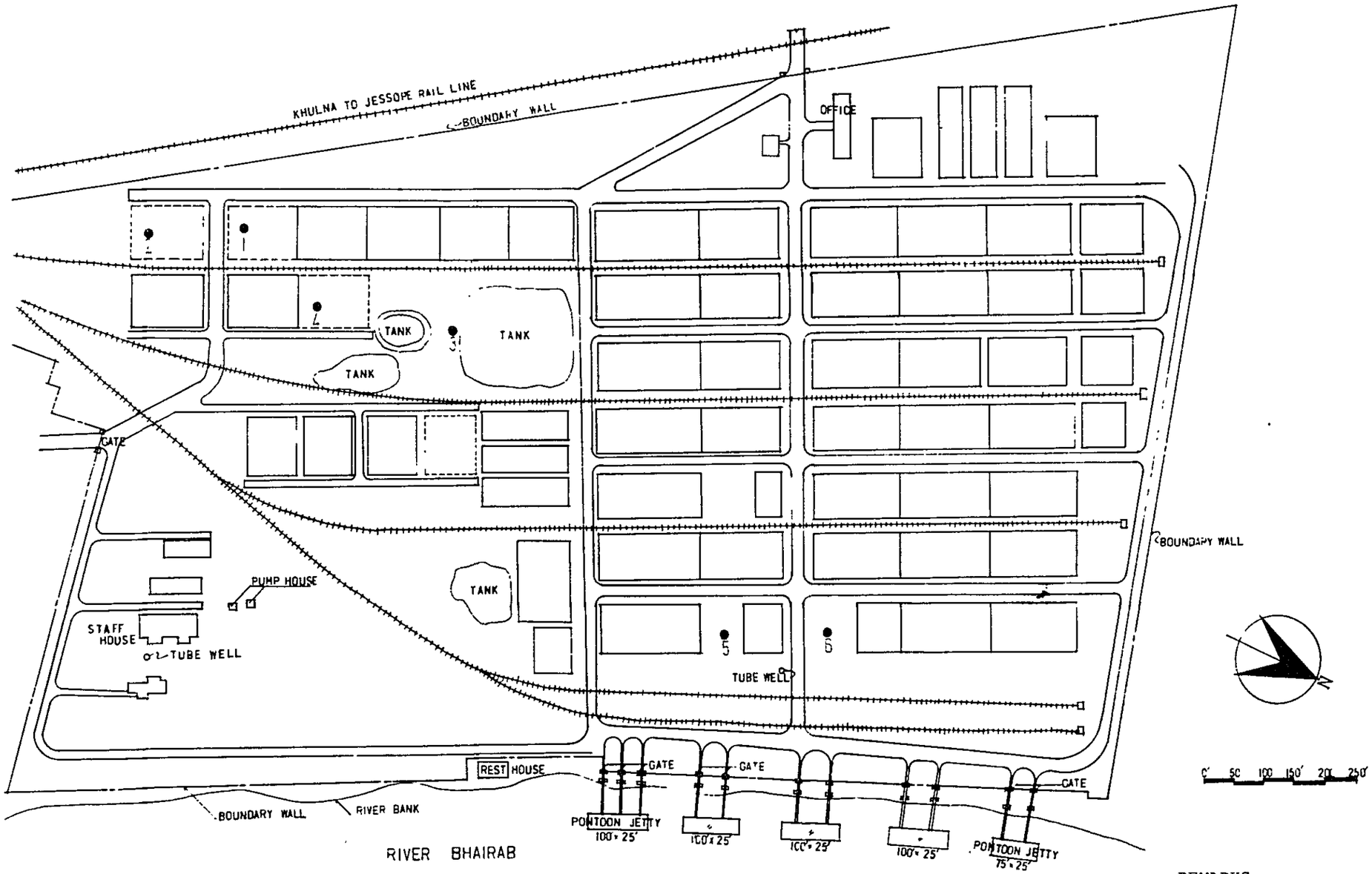
Site: BOYRA

Date: NOV. 24. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
1	150	95	110				
Ready Land	Average	102.5			Average		
G.W.L.-120 cm	G.V. x 0.533kg	54.7		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	8.48		Strata Encountered	qc kg/cm2		
0 ~ 1.50m	qu kg/cm2	1.69			qu kg/cm2		
Silty Fine Sand	Test Pit Depth (cm)	95					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
2	105 ~ 135	115	120				
Tank Side	Average	117.5			Average		
G.W.L.- 40 cm	G.V. x 0.533kg	62.7		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	9.72		Strata Encountered	qc kg/cm2		
0 ~ 1.35m	qu kg/cm2	1.94			qu kg/cm2		
Silt	Test Pit Depth (cm)	80					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
3	150 ~ 195	120	120				
Tank Side	Average	120			Average		
G.W.L.- 35 cm	G.V. x 0.533kg	64.0		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	9.92		Strata Encountered	qc kg/cm2		
0 ~ 1.95m	qu kg/cm2	1.98			qu kg/cm2		
Silt	Test Pit Depth (cm)	70					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
	Average				Average		
G.W.L.- cm	G.V. x 0.533kg			G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2			Strata Encountered	qc kg/cm2		
	qu kg/cm2				qu kg/cm2		

図 III-4　地質調査位置図
Fig. III-4　GEOLOGICAL SURVEY, MAHESWARPASHA CSD



REMARKS

● 1～5　Test Pits

Table III-6 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: MAHESWARPASHA

Date: NOV. 23. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
1.	175 ~ 190	60	90	5	110 ~ 120	100	120
Old Borrow Pit	Average	75		Ready Land	Average	110	
G.W.L.- 75 cm	G.V. x 0.533kg	34.0		G.W.L.- cm	G.V. x 0.533kg	58.7	
Strata Encountered	qc kg/cm2	6.20		Strata Encountered	qc kg/cm2	9.10	
0 ~ 1.90m	qu kg/cm2	1.24		0 ~ 1.20m	qu kg/cm2	1.82	
Silt	Test Pit Depth (cm)	75		Silt	Test Pit Depth (cm)	90	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
2	295	90	100	6	230 ~ 240	95	100
Old Borrow Pit	Average	95		Ready Land	Average	97.5	
G.W.L.- 85 cm	G.V. x 0.533kg	50.7		G.W.L.- cm	G.V. x 0.533kg	52.0	
Strata Encountered	qc kg/cm2	7.86		Strata Encountered	qc kg/cm2	8.06	
0~0.85m Silt	qu kg/cm2	1.57		0 ~ 2.40m	qu kg/cm2	1.61	
0.85~2.95m Silty Fine Sand	Test Pit Depth (cm)	75		Silt	Test Pit Depth (cm)	80	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
3	175 ~ 185	100	100				
Tank Side	Average	105			Average		
G.W.L.-85 cm	G.V. x 0.533kg	56.0		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	8.68		Strata Encountered	qc kg/cm2		
0 ~ 1.85m	qu kg/cm2	1.74			qu kg/cm2		
Silt	Test Pit Depth (cm)	100					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
4	125 ~ 175	90	110				
Ready Land	Average	100			Average		
G.W.L.- 70 cm	G.V. x 0.533kg	53.3		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	8.27		Strata Encountered	qc kg/cm2		
0 ~ 1.75m	qu kg/cm2	1.65			qu kg/cm2		
Silt	Test Pit Depth (cm)	75					

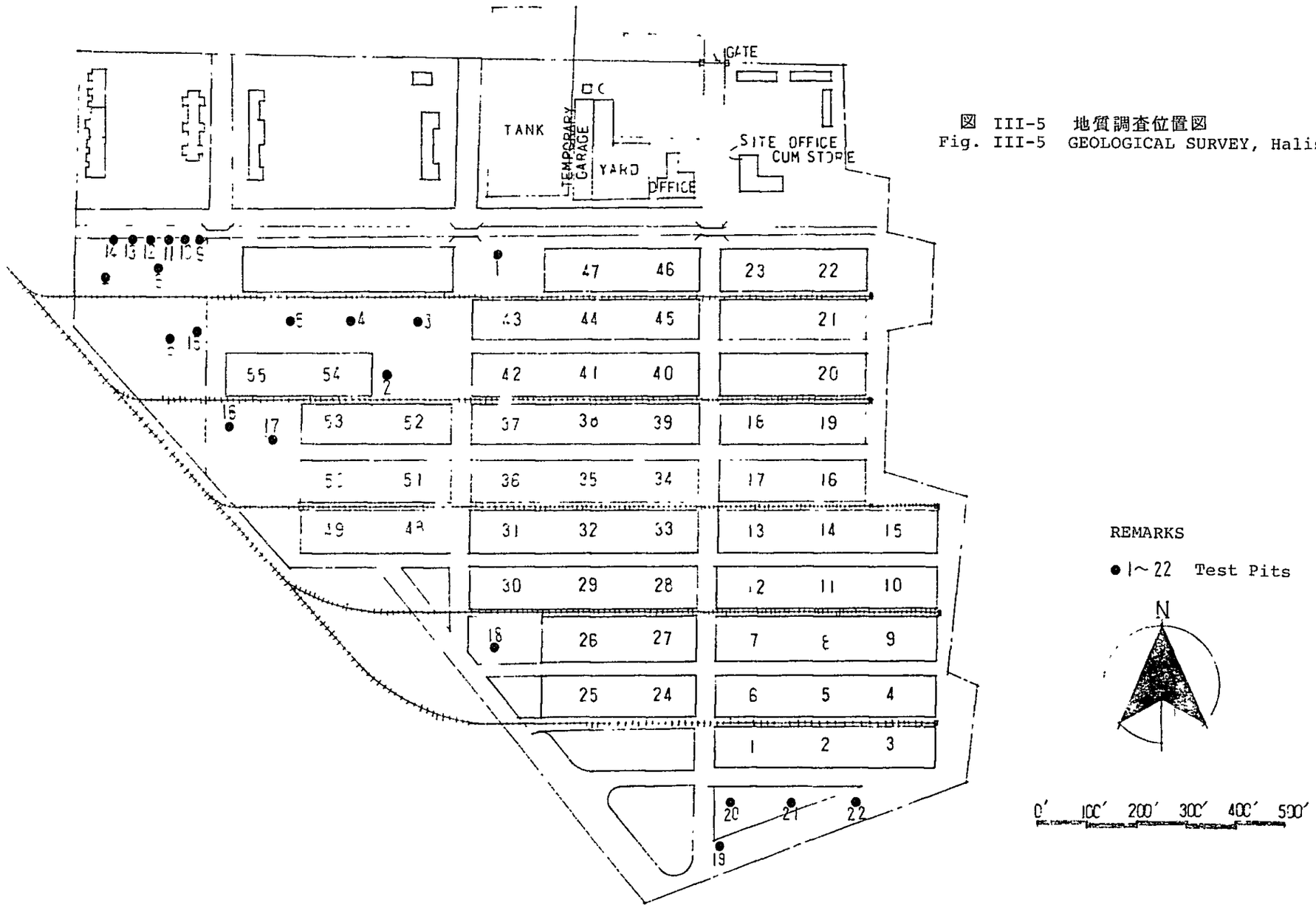


図 III-5 地質調査位置図
Fig. III-5 GEOLOGICAL SURVEY, Halishahar CSD

Table III-7 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: HALISHAHAR

Date: NOV. 22. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
1	90 ~ 115	90	100	5	90 ~ 95	100	100
Ready Land	Average	95		Ready Land	Average	100	
G.W.L.– cm	G.V. x 0.533kg	50.7		G.W.L.– cm	G.V. x 0.533kg	53.3	
Strata Encountered	qc kg/cm2	7.86		Strata Encountered	qc kg/cm2	8.27	
0 ~ 1.15m	qu kg/cm2	1.57		0 ~ 0.95m	qu kg/cm2	1.65	
Silt	Test Pit Depth (cm)	80		Silty Fine Sand	Test Pit Depth (cm)	80	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
2	90	110	120	6	85	90	100
Ready Land	Average	115		Paddy Field	Average	95	
G.W.L.– cm	G.V. x 0.533kg	61.3		G.W.L.– cm	G.V. x 0.533kg	50.7	
Strata Encountered	qc kg/cm2	9.51		Strata Encountered	qc kg/cm2	7.86	
0 ~ 0.90m	qu kg/cm2	1.90		0 ~ 0.85m	qu kg/cm2	1.57	
Sandy Silt	Test Pit Depth (cm)	85		Silt	Test Pit Depth (cm)	80	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
3	135	100	110	7	85 ~ 90	110	120
Ready Land	Average	105		Paddy Field	Average	115	
G.W.L.– cm	G.V. x 0.533kg	56.0		G.W.L.– cm	G.V. x 0.533kg	61.3	
Strata Encountered	qc kg/cm2	8.68		Strata Encountered	qc kg/cm2	9.51	
0~0.90m Silt	qu kg/cm2	1.74		0 ~ 0.90m	qu kg/cm2	1.90	
0.90~1.35m Sandy Silt	Test Pit Depth (cm)	90		Silt	Test Pit Depth (cm)	80	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
4	105 ~ 110	110	120	8	110	110	120
	Average	115		Paddy Field	Average	115	
G.W.L.– cm	G.V. x 0.533kg	61.3		G.W.L.– cm	G.V. x 0.533kg	61.3	
Strata Encountered	qc kg/cm2	9.51		Strata Encountered	qc kg/cm2	9.51	
0 ~ 1.10m	qu kg/cm2	1.90		0~0.90m Fine Sand	qu kg/cm2	1.90	
Fine Sand	Test Pit Depth (cm)	95		0.90~1.10m Silt	Test Pit Depth (cm)	95	

Table III-8 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: HALISHAHAR

Date: NOV. 22 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
9	50	70	80
Tank Side	Average	75	
G.W.L.– cm	G.V. x 0.533kg	40.0	
Strata Encountered	qc kg/cm2	6.20	
0 ~ 0.50m	qu kg/cm2	1.24	
Silt	Test Pit Depth (cm)	0	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
13	50 ~ 60	70	75
Tank Side	Average	72.5	
G.W.L.– cm	G.V. x 0.533kg	38.6	
Strata Encountered	qc kg/cm2	5.99	
0 ~ 0.60m	qu kg/cm2	1.20	
Silt	Test Pit Depth (cm)	0	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
10	20 ~ 30	75	80
Tank Side	Average	77.5	
G.W.L.– 20 cm	G.V. x 0.533kg	41.3	
Strata Encountered	qc kg/cm2	6.40	
0 ~ 0.30m	qu kg/cm2	1.28	
Silt	Test Pit Depth (cm)	0	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
14	20 ~ 30	70	80
Tank Side	Average	75	
G.W.L.– 25 cm	G.V. x 0.533kg	40.0	
Strata Encountered	qc kg/cm2	6.20	
0 ~ 0.30m	qu kg/cm2	1.24	
Silt	Test Pit Depth (cm)	0	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
11	35 ~ 40	80	90
Tank Side	Average	85	
G.W.L.– 30 cm	G.V. x 0.533kg	45.3	
Strata Encountered	qc kg/cm2	7.02	
0 ~ 0.40m	qu kg/cm2	1.40	
Silt	Test Pit Depth (cm)	0	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
15	65 ~ 70	80	90
Ready Land	Average	85	
G.W.L.– cm	G.V. x 0.533kg	45.3	
Strata Encountered	qc kg/cm2	7.02	
0 ~ 0.70m	qu kg/cm2	1.40	
Fine Sand	Test Pit Depth (cm)	65	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
12	30 ~ 40	70	80
Tank Side	Average	75	
G.W.L.– 30 cm	G.V. x 0.533kg	40.0	
Strata Encountered	qc kg/cm2	6.24	
0 ~ 0.40m	qu kg/cm2	1.24	
Silt	Test Pit Depth (cm)	0	

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
16	85	100	100
Ready Land	Average	100	
G.W.L.– cm	G.V. x 0.533kg	53.3	
Strata Encountered	qc kg/cm2	8.27	
0 ~ 0.85m	qu kg/cm2	1.65	
Fine Sand	Test Pit Depth (cm)	80	

Table III-9 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: HALISHAHAR

Date: NOV. 22. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
17	95	105	110	21	90	120	120
Ready Land	Average	107.5		Paddy Field	Average	120	
G.W.L.– cm	G.V. x 0.533kg	57.3		G.W.L.– cm	G.V. x 0.533kg	64.0	
Strata Encountered	qc kg/cm2	8.89		Strata Encountered	qc kg/cm2	9.92	
0 ~ 0.95m Silty Fine Sand	qu kg/cm2	1.74		0~0.75m Fine Sand	qu kg/cm2	1.98	
	Test Pit Depth (cm)	90		0.75~0.90 Silt	Test Pit Depth (cm)	80	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
18	90	110	110	22	100	90	100
Paddy Field	Average	110		Paddy Field	Average	95	
G.W.L.– cm	G.V. x 0.533kg	58.7		G.W.L.– cm	G.V. x 0.533kg	50.7	
Strata Encountered	qc kg/cm2	9.10		Strata Encountered	qc kg/cm2	7.86	
0~0.65m Fine Sand	qu kg/cm2	1.82		0~0.90m Fine Sand	qu kg/cm2	1.57	
0.65~0.90m Silt	Test Pit Depth (cm)	85		0.90~1.0m Sand	Test Pit Depth (cm)	85	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
19	80	95	100				
Paddy Field	Average	97.5			Average		
G.W.L.– cm	G.V. x 0.533kg	52.0		G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	8.06		Strata Encountered	qc kg/cm2		
0~0.75m Fine Sand	qu kg/cm2	1.61			qu kg/cm2		
0.75~0.80m Silt	Test Pit Depth (cm)	75					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
20	100 ~ 110	115	120				
Paddy Field	Average	117.5			Average		
G.W.L.– cm	G.V. x 0.533kg	62.7		G.W.L.– cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	9.72		Strata Encountered	qc kg/cm2		
0~0.65m Fine Sand	qu kg/cm2	1.94			qu kg/cm2		
0.65~1.10m Silt	Test Pit Depth (cm)	95					

図 III-6 地質調査位置図
Fig. III-6 GEOLOGICAL SURVEY, DEWANHAT CSD

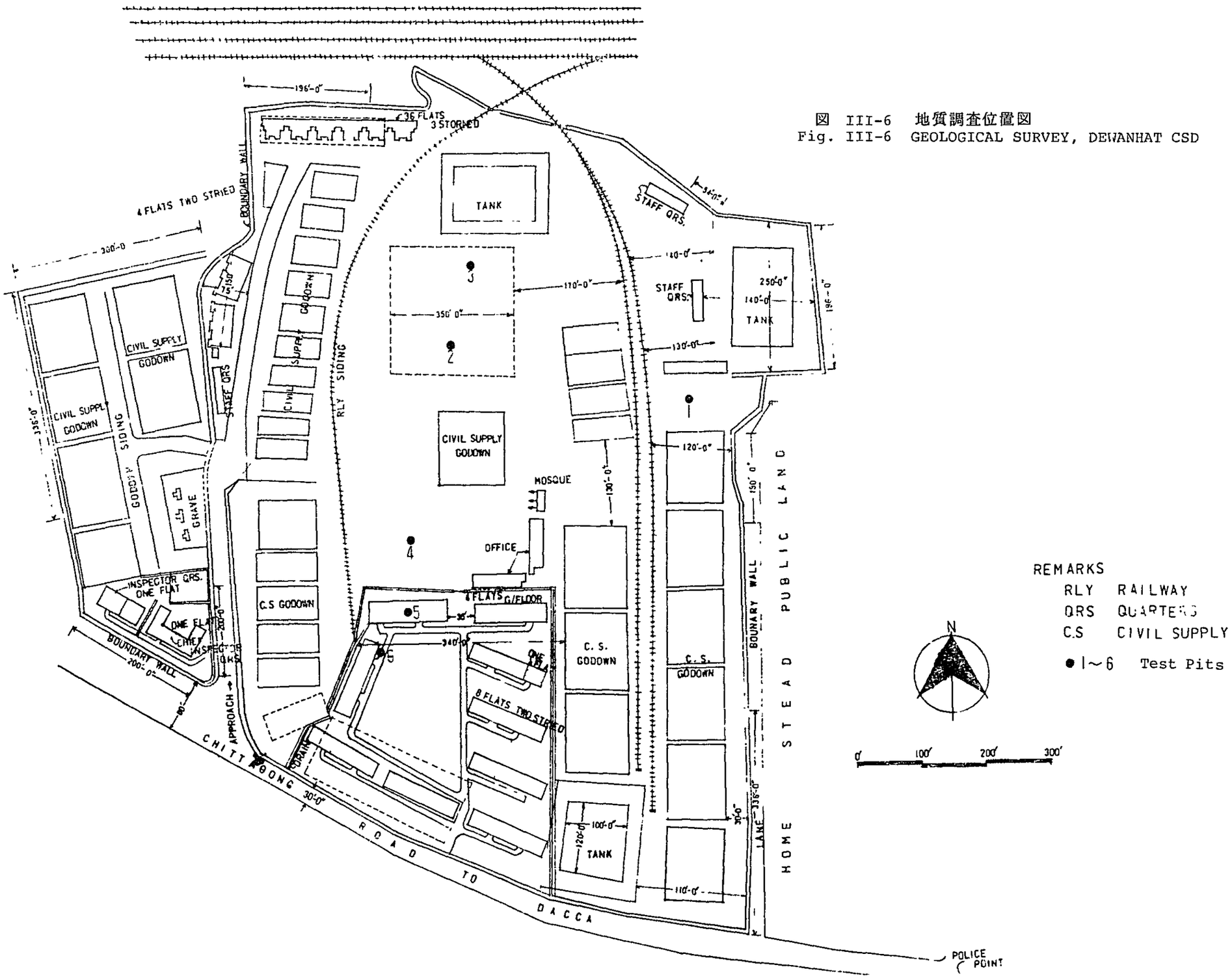


Table III-10 CONE PENETRATION TEST

$$qc = \frac{\text{Penetration Strength}}{\text{Cone Base Area}}$$

$$= \frac{(\text{Gauge Value})\,0.533}{6.45}\ \text{kg/cm}^2$$

$$qc = 5\ qu\ \text{kg/cm}^2$$

Site: DEWANHAT

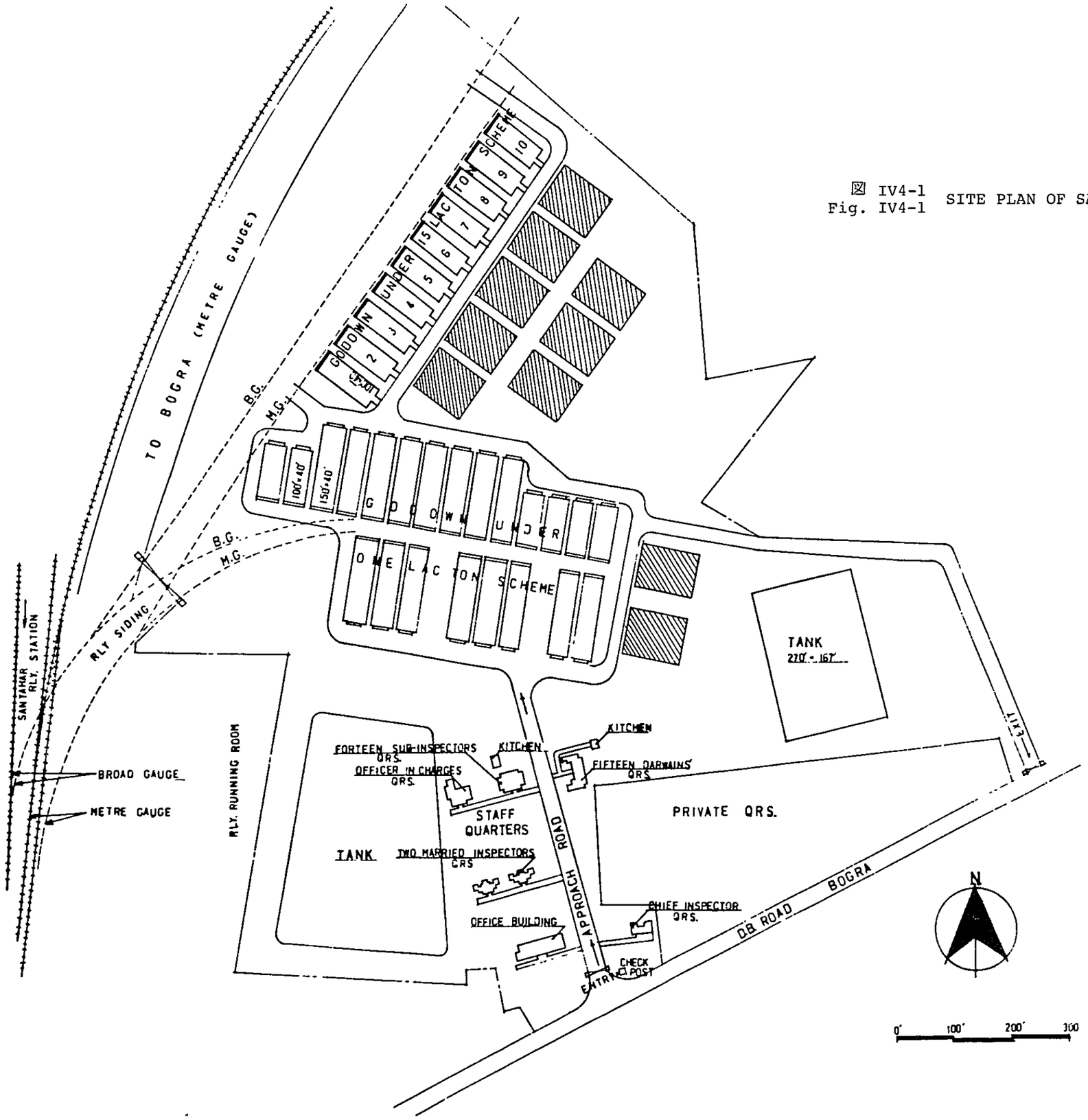
Date: NOV. 21. 1978

Tested by: K. Takamura

Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
1	80	95	115	5	55	70	75
Ready Land	Average	105		Paddy Field	Average	72.5	
G.W.L.- 75 cm	G.V. x 0.533kg	56.0		G.W.L.- 50 cm	G.V. x 0.533kg	38.7	
Strata Encountered	qc kg/cm2	8.68		Strata Encountered	qc kg/cm2	5.99	
0 ~ 0.80m	qu kg/cm2	1.74		0 ~ 0.55m	qu kg/cm2	1.20	
Sandy Silt	Test Pit Depth (cm)	75		Silty Fine Sand	Test Pit Depth (cm)	50	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
2	80	85	100	6	90~95	80	90
Ready Land	Average	92.5		Paddy Field	Average	85	
G.W.L.- 75 cm	G.V. x 0.533kg	49.3		G.W.L.- 50 cm	G.V. x 0.533kg	45.3	
Strata Encountered	qc kg/cm2	7.64		Strata Encountered	qc kg/cm2	7.03	
0 ~ 0.80m	qu kg/cm2	1.53		0 ~ 0.95m	qu kg/cm2	1.41	
Sandy Silt	Test Pit Depth (cm)	75		Sandy Silt	Test Pit Depth (cm)	60	
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
3	95	105	105				
Ready Land	Average	105			Average		
G.W.L.- 95 cm	G.V. x 0.533kg	56.0		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	8.68		Strata Encountered	qc kg/cm2		
0 ~ 0.95m	qu kg/cm2	1.74			qu kg/cm2		
Sandy Silt	Test Pit Depth (cm)	65					
Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2	Plot No. & Location	Penetration Depth (cm)	Proving Reading 1	Proving Reading 2
4	60 ~ 70	75	80				
Paddy Field	Average	77.5			Average		
G.W.L.- 35 cm	G.V. x 0.533kg	41.3		G.W.L.- cm	G.V. x 0.533kg		
Strata Encountered	qc kg/cm2	6.41		Strata Encountered	qc kg/cm2		
0 ~ 0.70m	qu kg/cm2	1.28			qu kg/cm2		
Sandy Silt	Test Pit Depth (cm)	40					

APPENDIX-IV : TABLES, FIGURES and OTHERS

図 IV4-1
Fig. IV4-1 SITE PLAN OF SANTAHAR CSD, BOGRA



REMARKS

RLY	RAILWAY
QRS	QUARTERS
DB	DACCA-BOGRA
BG	BPOAD GAUGE
MG	METRE GAUGE
LAC	100000.

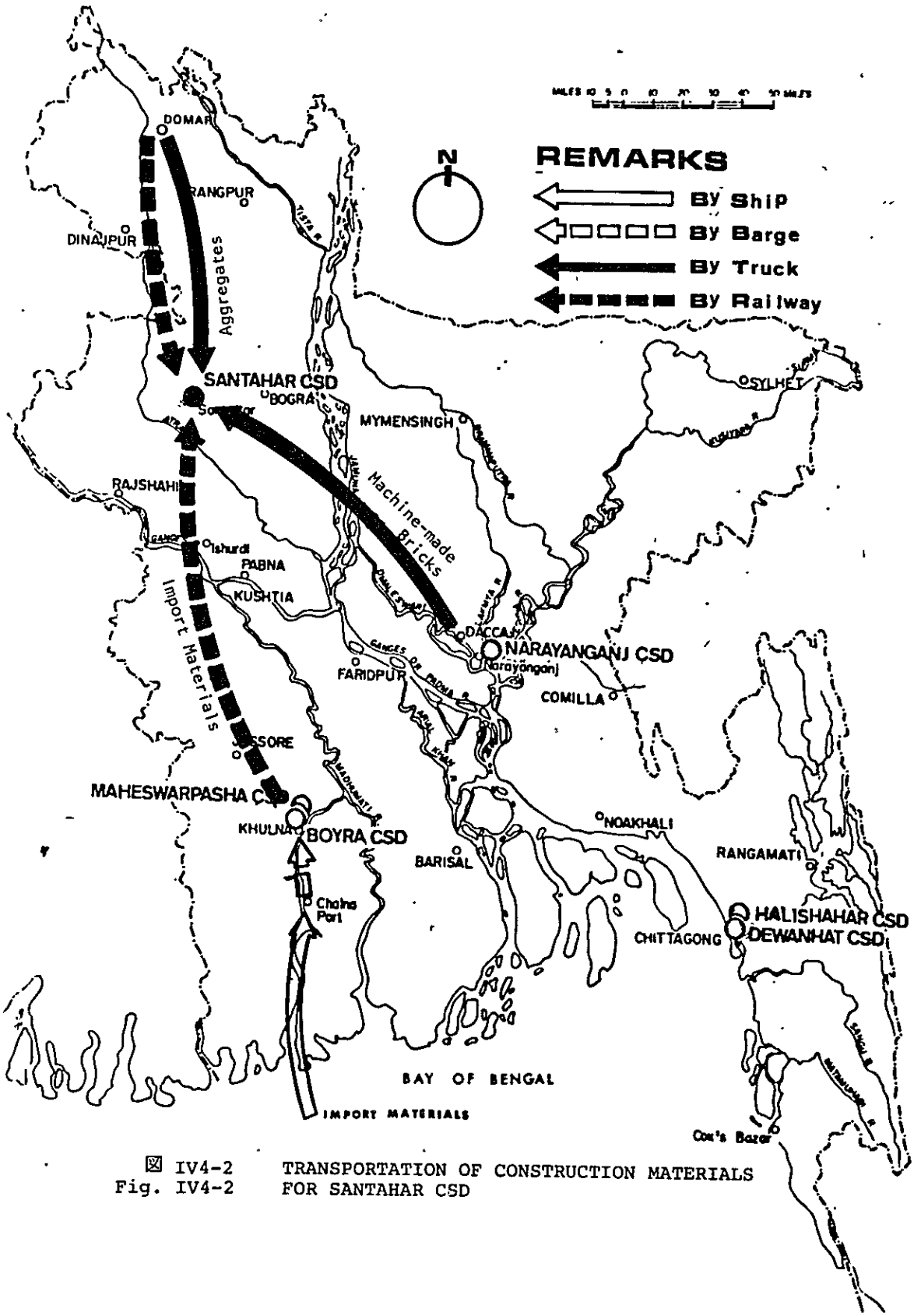
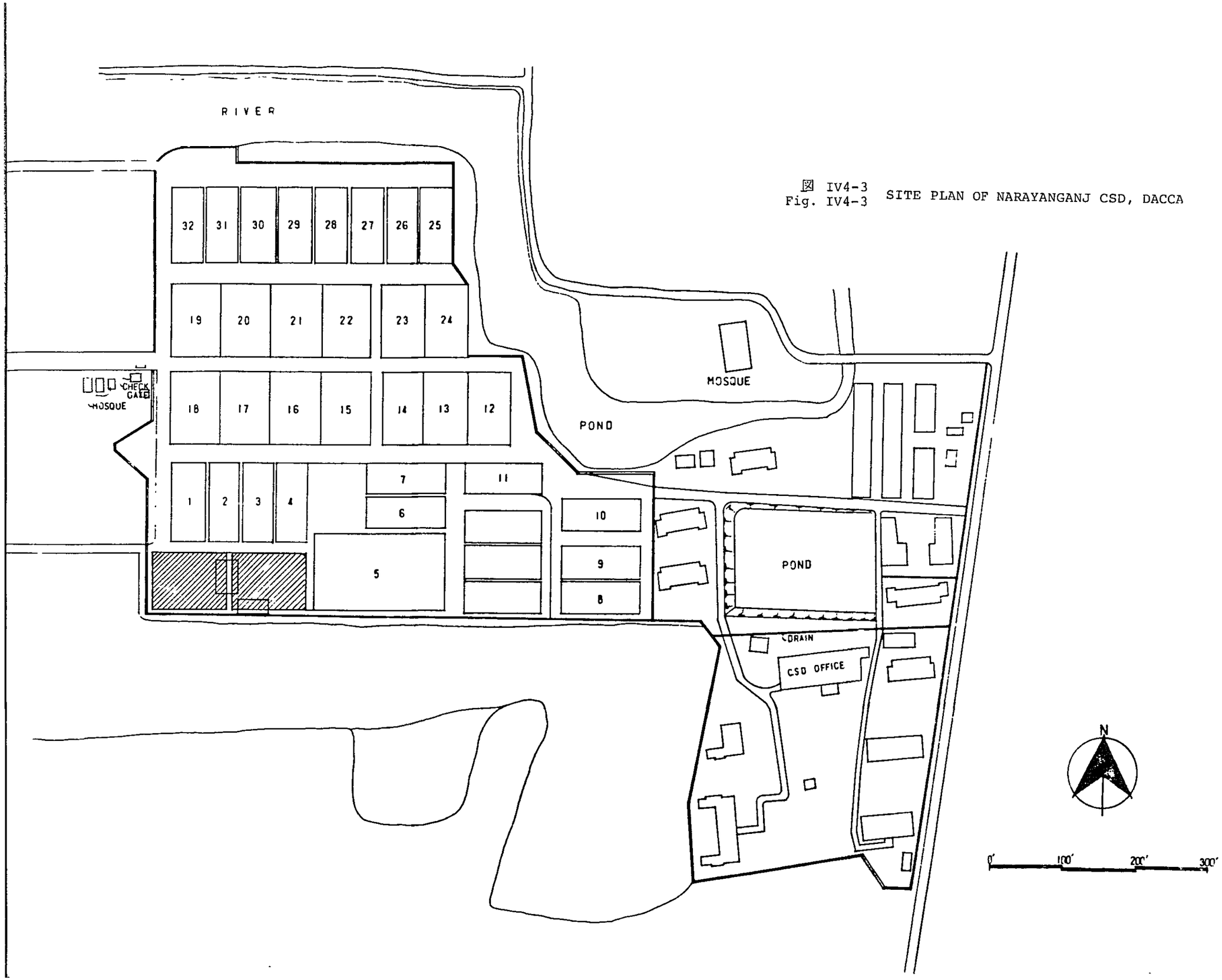


図 IV4-2 TRANSPORTATION OF CONSTRUCTION MATERIALS
Fig. IV4-2 FOR SANTAHAR CSD

図 IV4-3
Fig. IV4-3 SITE PLAN OF NARAYANGANJ CSD, DACCA



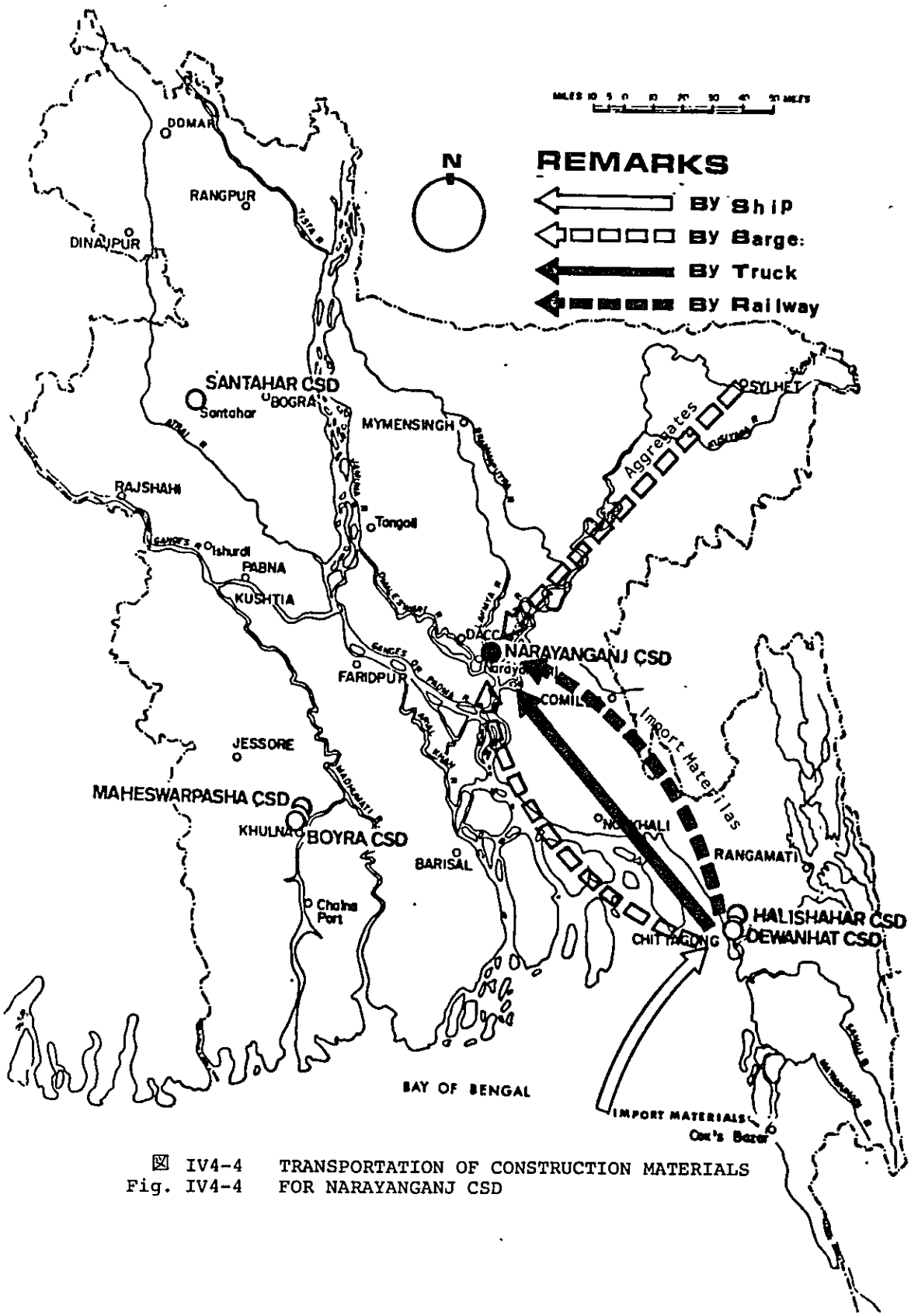
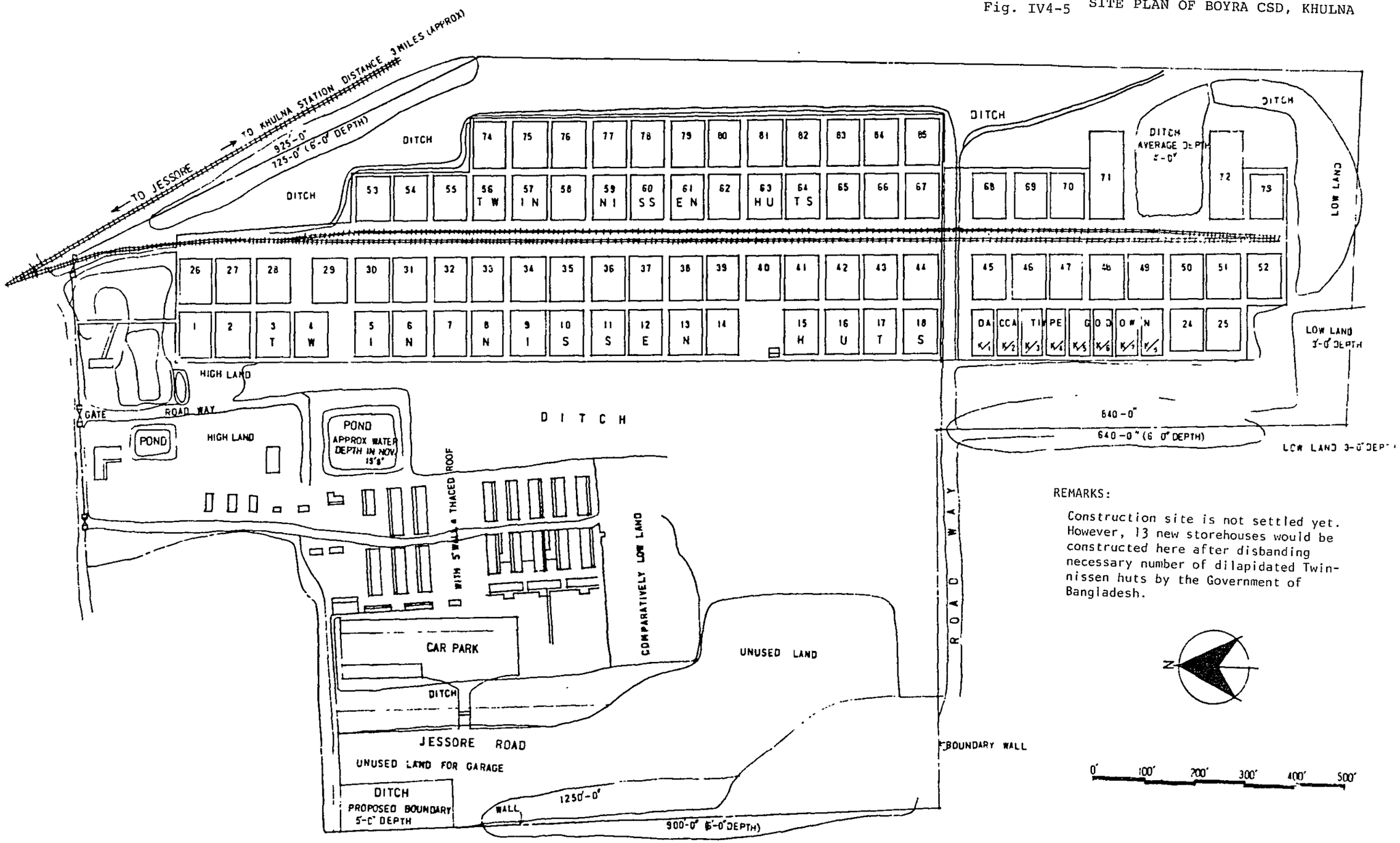


図 IV4-4 TRANSPORTATION OF CONSTRUCTION MATERIALS
Fig. IV4-4 FOR NARAYANGANJ CSD

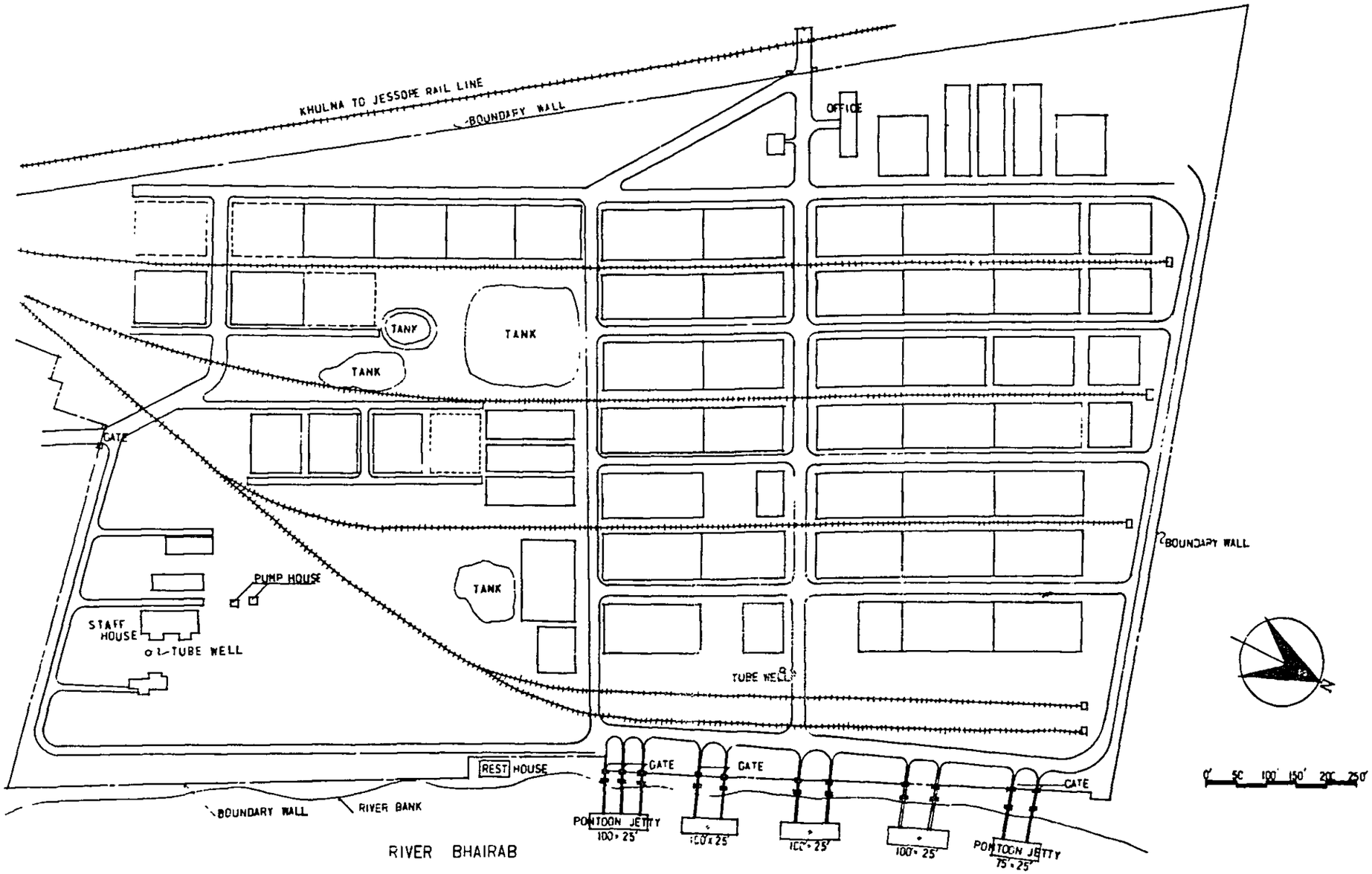
図 IV4-5
Fig. IV4-5 SITE PLAN OF BOYRA CSD, KHULNA



REMARKS:

Construction site is not settled yet. However, 13 new storehouses would be constructed here after disbanding necessary number of dilapidated Twin-nissen huts by the Government of Bangladesh.

図 IV4-6
Fig. IV4-6 SITE PLAN OF MAHESWARPASHA CSD, KHULNA



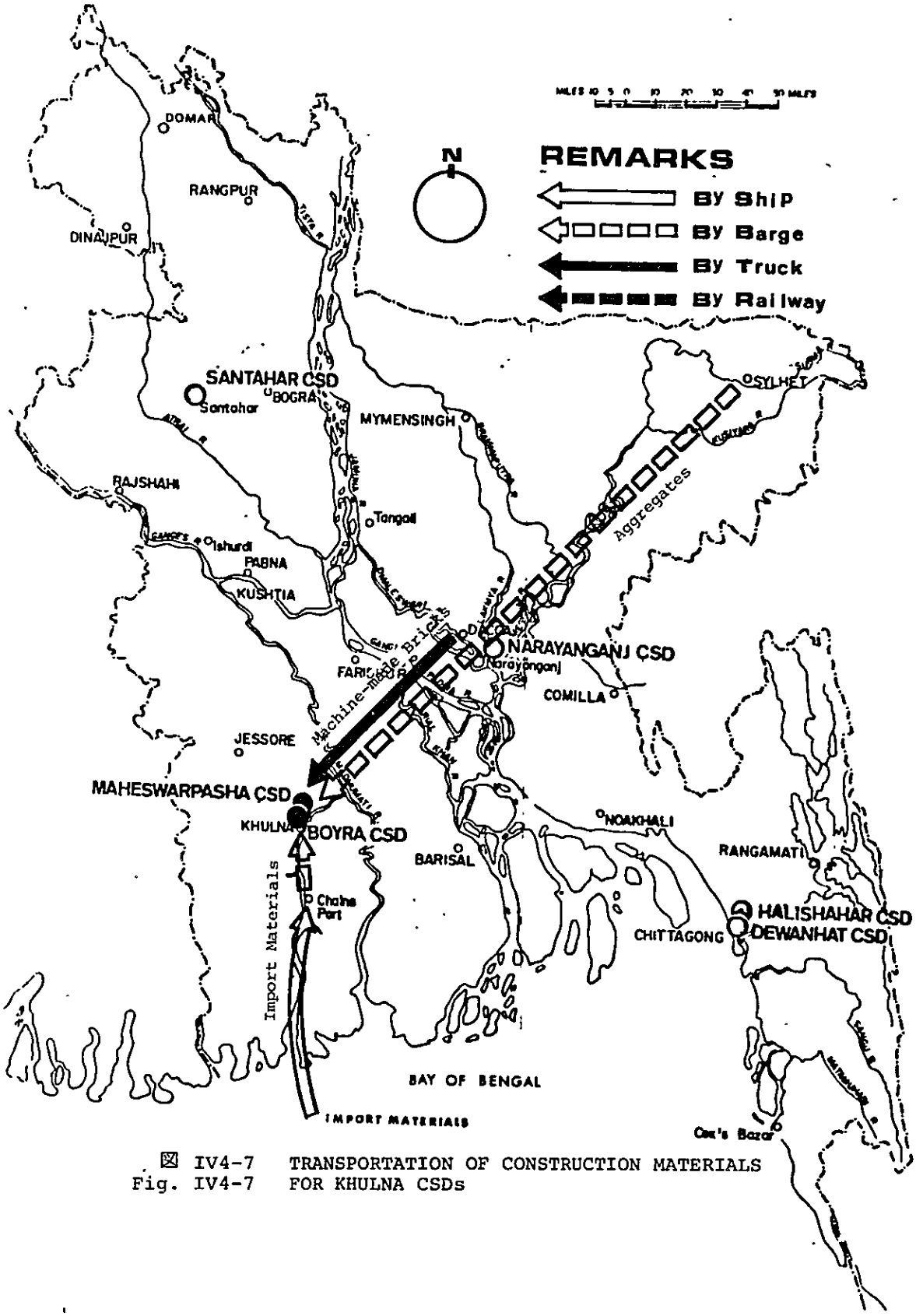


図 IV4-7 TRANSPORTATION OF CONSTRUCTION MATERIALS
Fig. IV4-7 FOR KHULNA CSDs

図 IV4-8
Fig. IV4-8 SITE PLAN OF HALISHAHAR CSD, CHITTAGONG

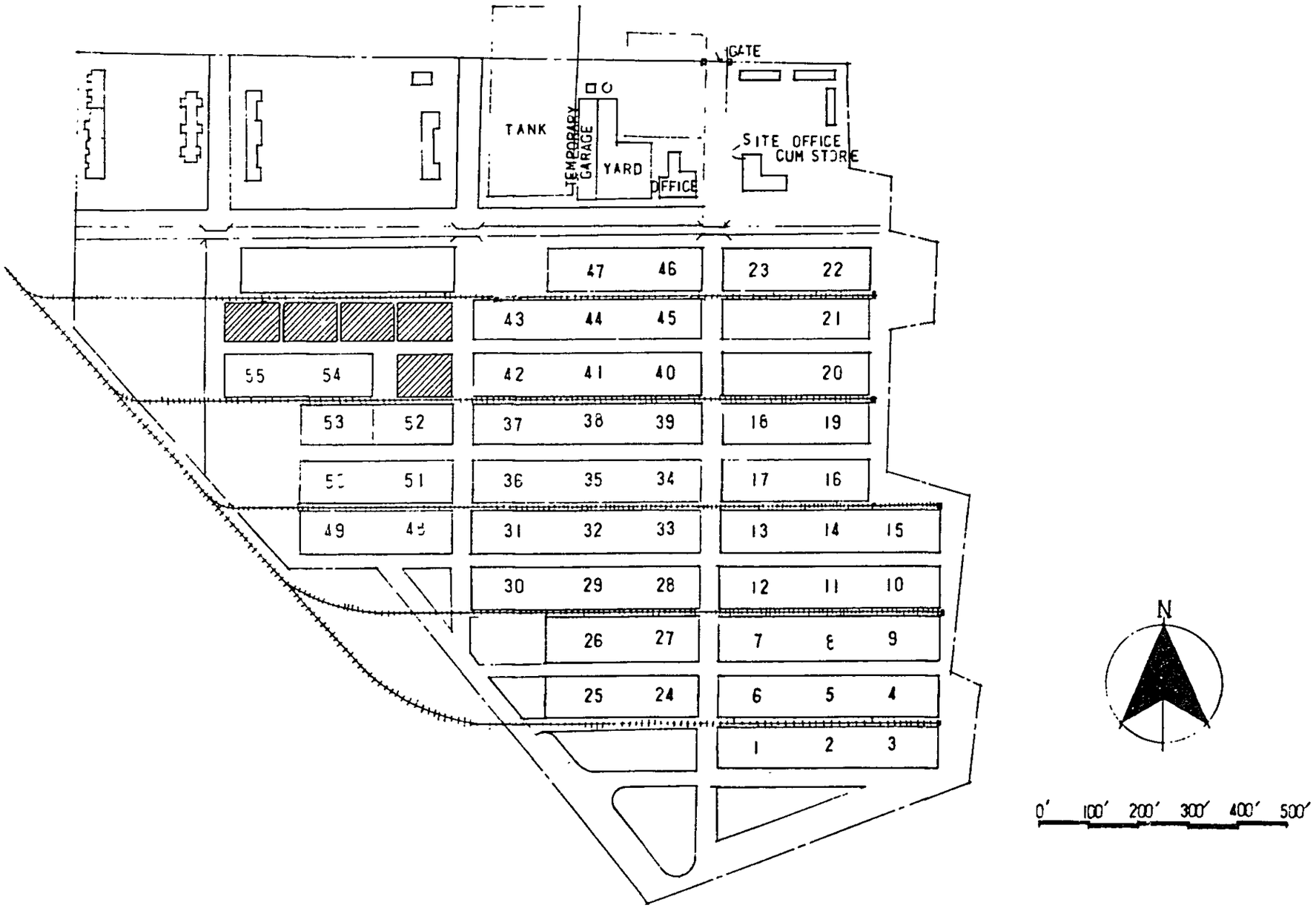
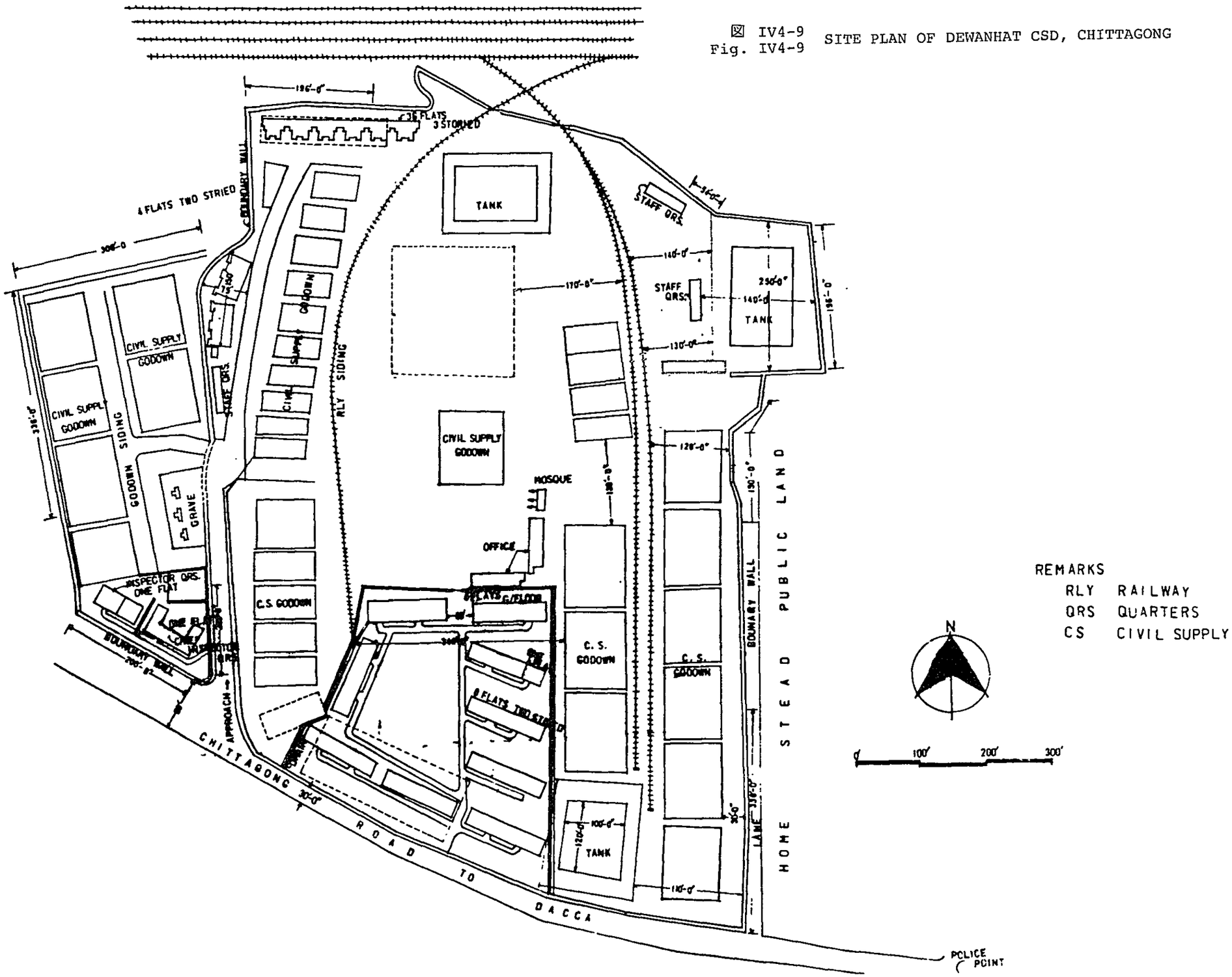


図 IV4-9
Fig. IV4-9 SITE PLAN OF DEWANHAT CSD, CHITTAGONG



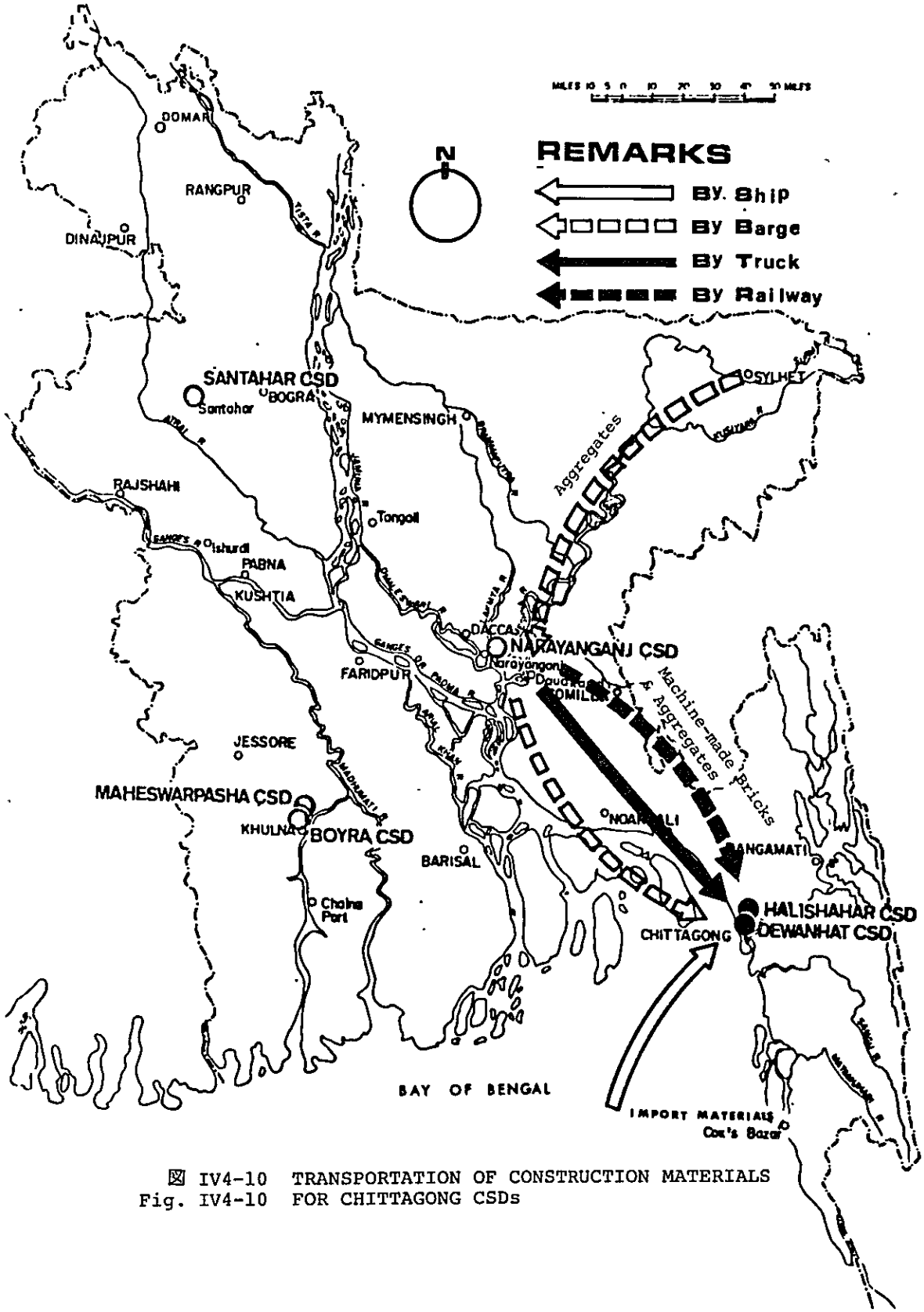


図 IV4-10 TRANSPORTATION OF CONSTRUCTION MATERIALS
Fig. IV4-10 FOR CHITTAGONG CSDs

Table IV5-1 Schedule of Rates for Civil Construction

Sl.No.	Description	Unit	Rate in Taka
1.	Earth work in excavation including refilling the trenches	% cft	300.00
2.	One brick flat soling	% sft	340.00
3.	Best quality sand filling	% cft	300.00
4.	Applying hot bitumin with bituminous paper over soling	% sft	400.00
5.	Cement concrete 1:3:6 with ships	/ cft	29.00
6.	10" thick 1st class brick work	/ cft	20.00
7.	5" thick 1st class brick work	/ sft	9.00
8.	Cast-in-situ mosaic over 1" thick	/ sft	42.00
9.	R.C.C. 1:2:4 with jhama ships for footing, colums beams & slabs	/ cft	42.00
10.	M.S. work	/ ton	12,500.00
11.	1/2" - 3/4" cement plaster 1:6 to wall	% sft	250.00
12.	1/4" thic cement plaster 1:4 to RCC	% sft	200.00
13.	Previding fitting & fixing of Cta. teak wood glazing door (4" x $1\frac{1}{2}$")	/ sft	150.00
14.	Supplying fitting & fixing of $1\frac{1}{2}$" thick A.K.Khan Warne sound proof door with 3" x 5" wooden frame	/ sft	75.00
15.	Providing fitting & fixing of welded steel glazing window or ventilator	/ sft	58.00
16.	White or colour work 3 coats	% sft	120.00
17.	3 coats of approved distemper	% sft	250.00
18.	3 coats of approved snow ceam	% sft	300.00
19.	Providing 3" thick lime terracing 2:2:7	/ sft	11.00
20.	Supplying fitting & fixing of rolling shutter	/ sft	60.00
21.	6" thick foam concrete over RCC slab	/ cft	55.00

(Source: PWD)

cft : cubic foot
sft : square foot

Table IV5-2 Materials, Labor and Construction Costs

Description		A Company	B Company	Remarks
Cement		70~75TK/bag	70TK/bag	50kg/bag
Aggregate	Jhama Brick 1st class	700TK/1000nos	800TK/1000nos	
	Jhama Brick 2nd class	-	700TK/1000nos	
	Shingle	380TK/m^3	425TK/m^3	
	Boulder	290~300TK/m^3	425TK/m^3	
	Sand(Local)	100TK/m^3	106TK/m^3	
	Sand(Sylhet)	220TK/m^3	283TK/m^3	
	Jhama Brick	-	1000TK/1000cft	
	Boulder Shingle	-	2000TK/1000cft	
Brick	Machine Made 1st class	1000~1150TK/1000nos	1100TK/1000nos	
	Machine Made 2nd class	-	1000TK/1000nos	
	Machine Made super class	1000~1250TK/1000nos	1200TK/1000nos	
	Hand Made 1st class	750~850TK/1000nos	800TK/1000nos	
	Hand Made 2nd class	-	700TK/1000nos	
	Fancy Brick	-	1200TK/1000nos	
	Reinforced Concrete	1400~1450TK/m^3	1400TK/m^3	Mixed by machine
	"	-	1230TK/m^3	Manually mixed
Wood	Chittagong Teak	-	17650TK/m^3	
	Sli Korai	5297TK/m^3	5650TK/m^3	
	Tel Suck	6357TK/m^3	6710TK/m^3	
	Chamkle Chamailis	8123TK/m^3	5650TK/m^3	
	Gorjon	4944TK/m^3	-	
Floor Material	Terazzo Brock	160TK/m^2	194TK/m^2	
Labor Rate	Mason (skilled) (Brick, Conc, Plaster)	35TK/dy	45TK/dy	
	Mason Overtime	-	10TK/hr	
	Ordinary Labor	20TK/dy	20TK/dy	
	Ordinary Overtime	-	5TK/hr	
	Carpenter Form Work	35TK/dy	45TK/dy	
	Labor	-	25TK/dy	
	Steelbar Work	35TK/dy	35TK/dy	
	Welding	55TK/dy	60TK/dy	
	Operater Crane	30~75TK/dy	70TK/dy	
	Operater Dumptruck	30~75TK/dy	75TK/dy	
	Electrician	50~60TK/dy	40TK/dy	
	Plumbing	40~50TK/dy	25TK/dy	
	Labor	25TK/dy	-	

TK = Taka
nos = numbers
cft = cubic foot
sft = square foot
dy = day
hr = hour

Table IV5-3 Rail Transportation Rates

Material	From	To	Freight rate
Cement	Chittagong	Narayanganj	5.54 TK/md
	Khulna	Santahar	5.42 TK/md
Reinforcing bar	Chittagong	Narayanganj	5.81 TK/md
	Khulna	Santahar	5.65 TK/md
Gravel	Sylhet	Chittagong	5.41 TK/md
	Domar	Santahar	4.62 TK/md
	Sylhet	Narayanganj	5.06 TK/md
Sand	Sylhet	Narayanganj	5.31 TK/md
	Sylhet	Chittagong	5.41 TK/md

TK = Taka

md = maound

Table IV-1

Monthly and Total Annual Rainfall

		1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bogra	(in)	0.43	0.79	1.14	2.24	8.40	13.04	12.83	13.00	11.29	5.13	0.77	0.09	69.15
	(mm)	11	20	29	57	213	331	326	330	287	130	20	2	1756
Narayanganj	(in)	0.32	1.24	2.39	5.40	9.64	12.39	12.97	13.26	9.76	5.27	0.95	0.20	73.75
	(mm)	8	31	61	137	245	315	329	337	248	134	24	5	1873
Khulna	(in)	0.44	0.93	1.64	2.91	7.75	12.46	14.44	13.79	7.92	4.26	1.12	0.19	57.85
	(mm)	11	24	42	74	197	316	367	350	201	108	28	5	1469
Chittagong	(in)	0.24	1.10	2.46	5.93	10.42	20.99	23.53	20.42	12.64	7.09	2.17	0.64	107.63
	(mm)	6	28	62	151	265	533	598	519	321	180	55	16	2734
Sylhet	(in)	0.37	0.48	6.25	13.92	21.83	32.17	25.39	25.39	20.55	7.90	1.12	0.27	156.46
	(mm)	9	12	159	354	554	817	645	645	522	201	28	7	3974
Rangpur	(in)	0.34	0.69	1.13	3.09	10.93	17.61	15.26	13.63	13.74	5.36	0.21	0.04	82.03
	(mm)	9	18	29	78	278	447	388	346	349	136	5	1	2084

Source : Geography of Bangladesh, Haroun Er Rashid, University Press 1977

Table IV-2

Mean Monthly Maximum and Minimum Temperatures

		1		2		3		4		5		6		7		8		9		10		11		12	
		max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
Rajishahi	(°F)	76	52	80	55	97	65	90	73	95	76	90	78	89	79	88	79	88	78	86	73	82	69	76	53
	(°C)	24.4	11.1	26.7	12.8	36.1	18.3	32.2	22.8	35.0	24.4	32.2	25.6	31.7	26.1	31.1	26.1	31.1	25.6	30.0	22.8	27.8	20.6	24.4	11.7
Narayanganji	(°F)	78	55	82	59	90	69	92	74	91	76	89	79	88	79	87	79	88	79	88	75	83	66	77	57
	(°C)	25.6	12.8	27.8	15.0	32.2	20.6	33.3	23.3	32.8	24.4	31.7	26.1	31.1	26.1	30.6	26.1	31.1	26.1	31.1	23.9	28.3	18.9	25.0	13.9
Jessore	(°F)	78	53	82	58	91	68	96	75	94	77	91	79	89	79	88	79	89	79	89	75	83	64	77	55
	(°C)	25.6	11.7	27.8	14.4	32.8	20.0	35.6	23.9	34.4	25.0	32.8	26.1	31.7	26.1	31.1	26.1	31.7	26.1	31.7	23.9	28.3	17.8	25.0	12.8
Chittagong	(°F)	79	55	83	59	87	67	89	73	89	76	87	77	86	77	86	76	87	76	87	73	84	66	78	57
	(°C)	26.1	12.8	28.3	15.0	30.6	19.4	31.7	22.8	31.7	24.4	30.6	25.0	30.0	25.0	30.0	24.4	30.6	24.4	30.6	22.8	28.9	18.9	25.6	13.9

Source: Geography of Bangladesh, Haroun Er Rashid, University Press 1977

Table IV-3

Monthly Average Humidity Per Cent

	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Rajishahi	68.00	62.00	47.00	49.00	72.00	82.00	83.00	83.00	82.00	78.00	73.00	72.00	72.60
Narayanganj	67.00	63.00	59.50	65.00	76.00	82.00	82.00	82.50	81.00	76.50	72.00	73.50	71.66
Jessore	75.00	70.00	63.50	66.00	78.00	84.00	87.00	87.50	86.50	82.50	78.00	77.50	77.96
Chittagong	70.00	66.50	71.50	73.50	78.00	84.00	86.59	86.50	84.50	81.50	76.50	76.00	77.95

Source : Geography of Bangladesh, Haroun Er Rashid, University Press 1977

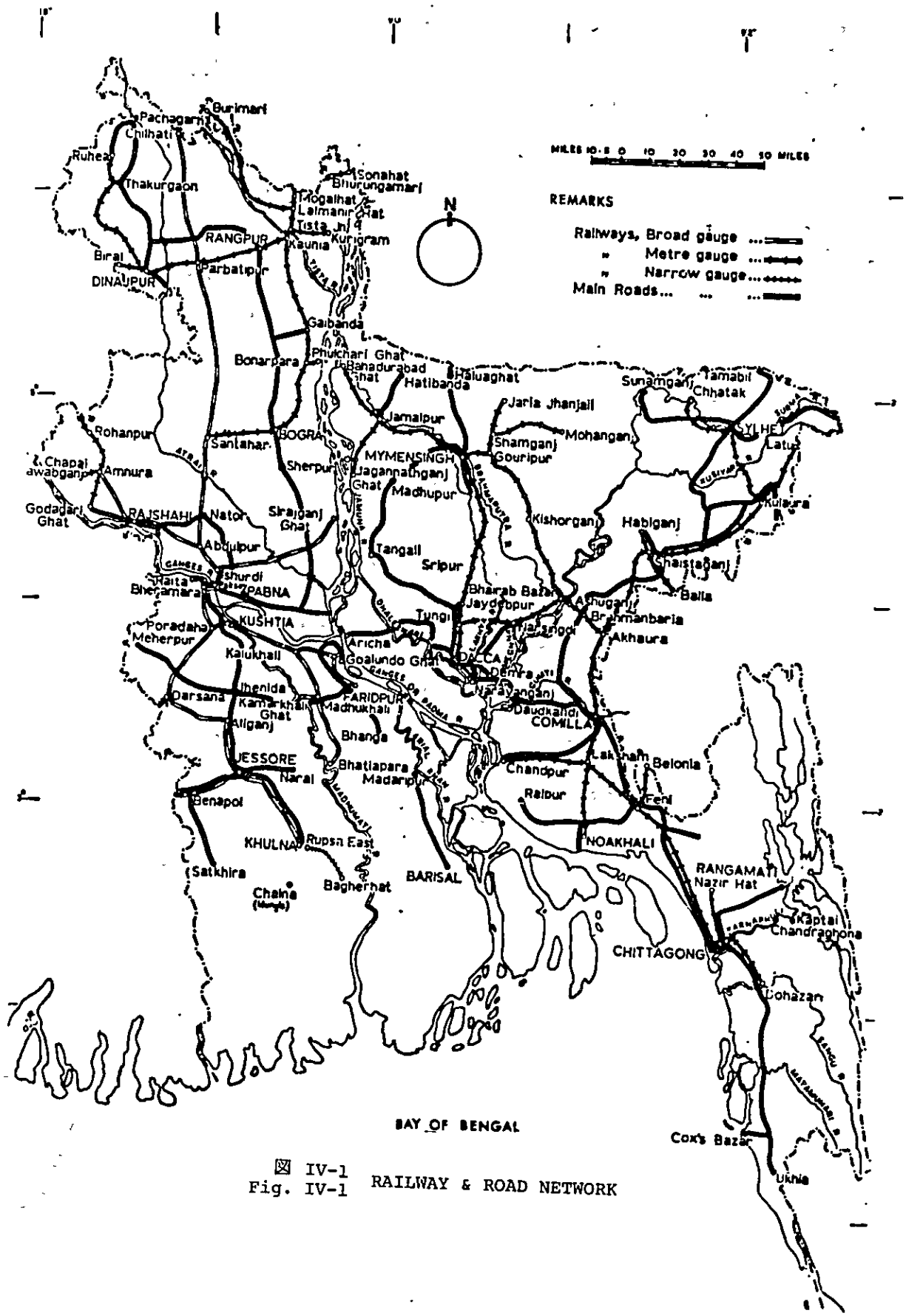


図 IV-1
Fig. IV-1 RAILWAY & ROAD NETWORK

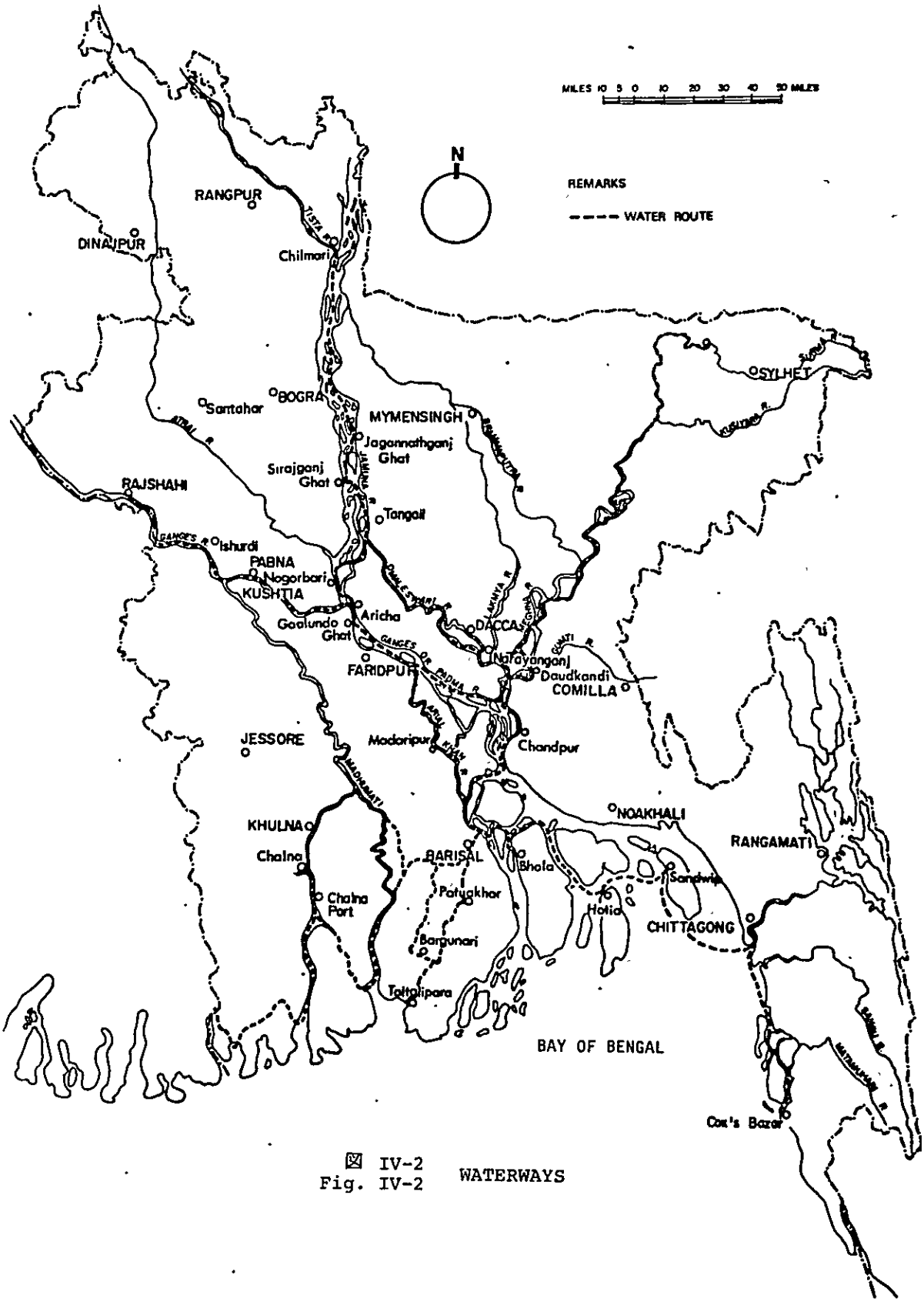


図 IV-2
Fig. IV-2 WATERWAYS