5. Conditions of the Project Site

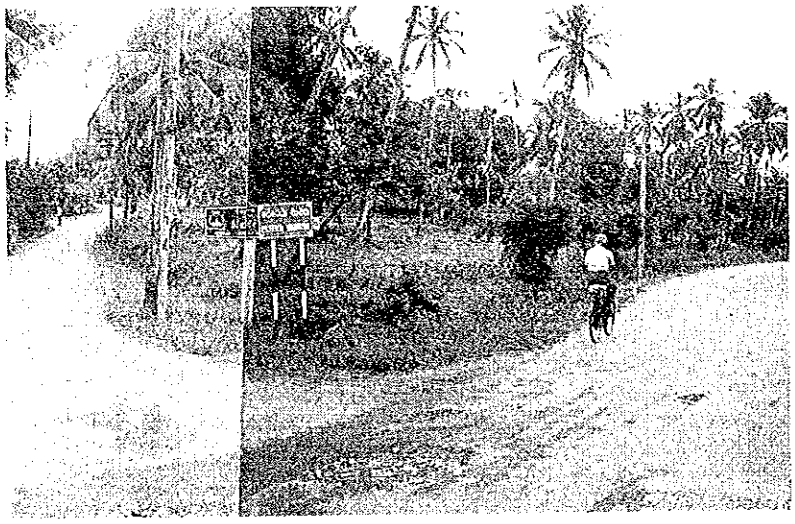
5-1. Photos Around the Proposed Site

5-2. Site Survey Map

5-3. Report on Soil Investigation

5-1. Photos Around the Proposed Site

(1)



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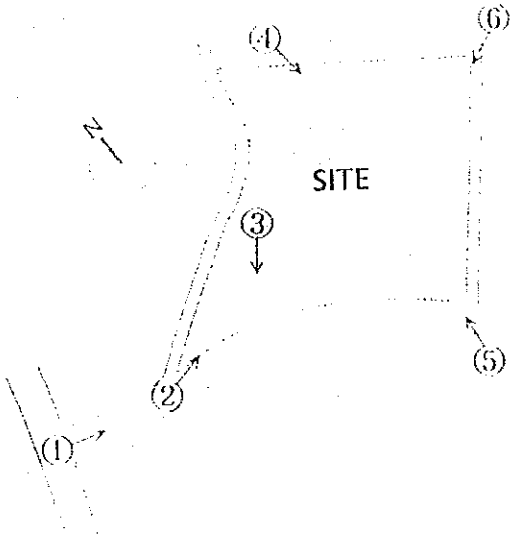
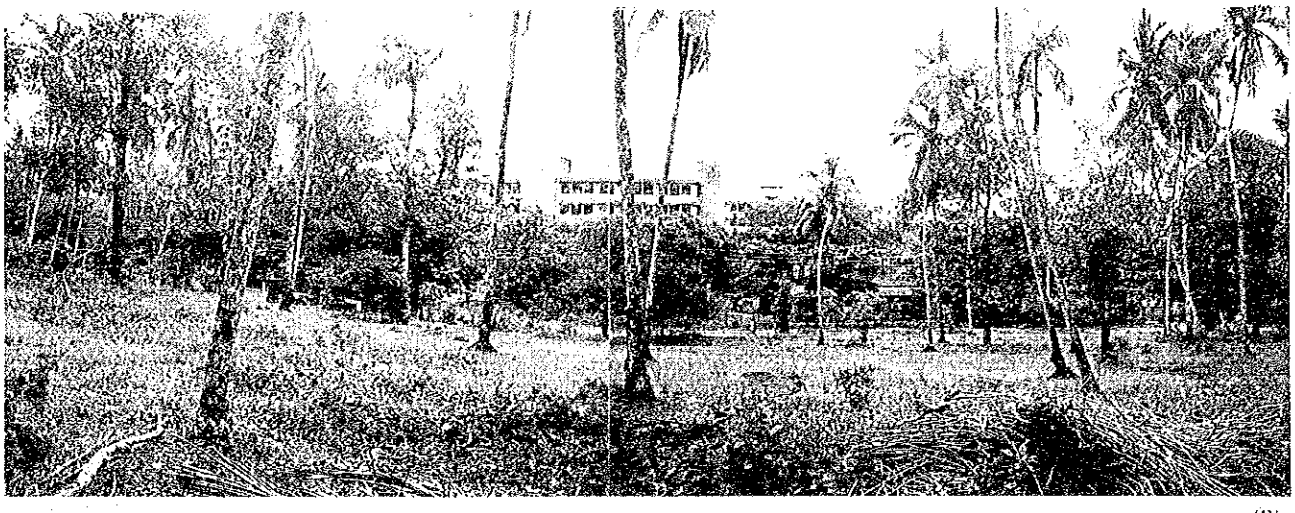
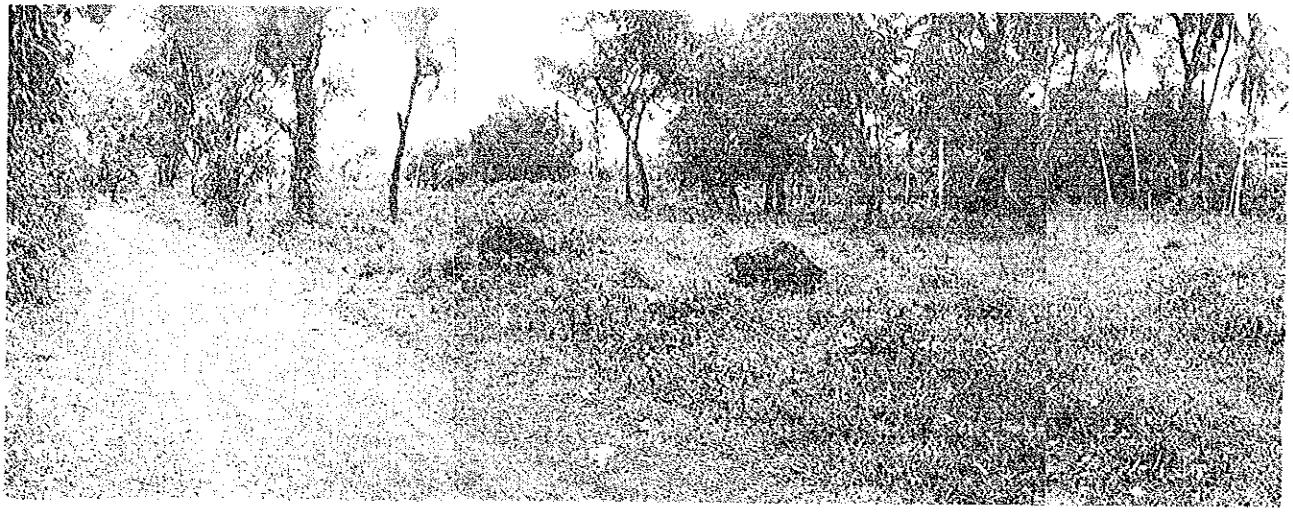




(3)

Photos Around the Proposed Site



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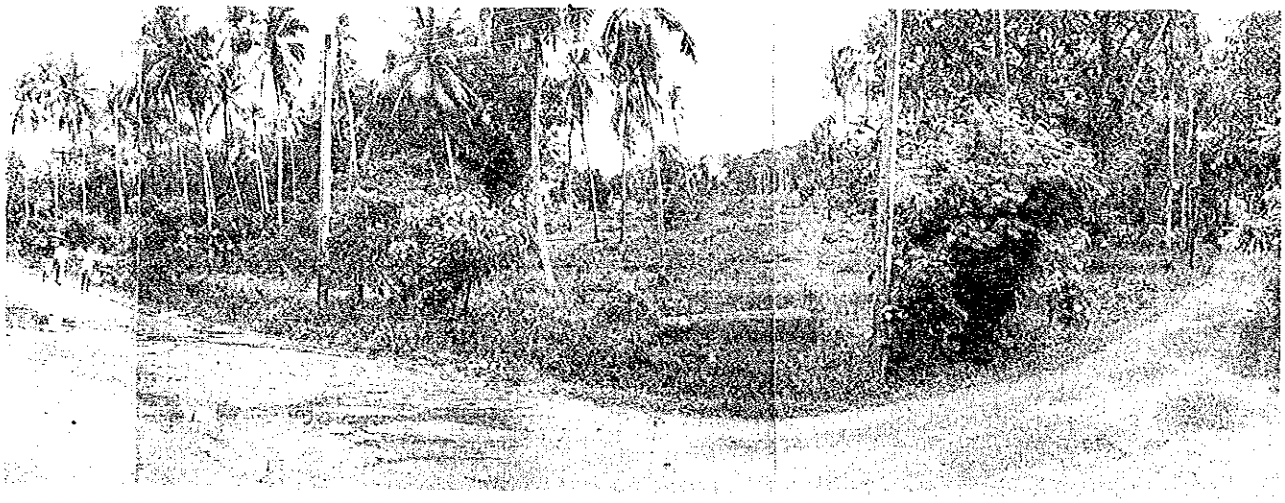

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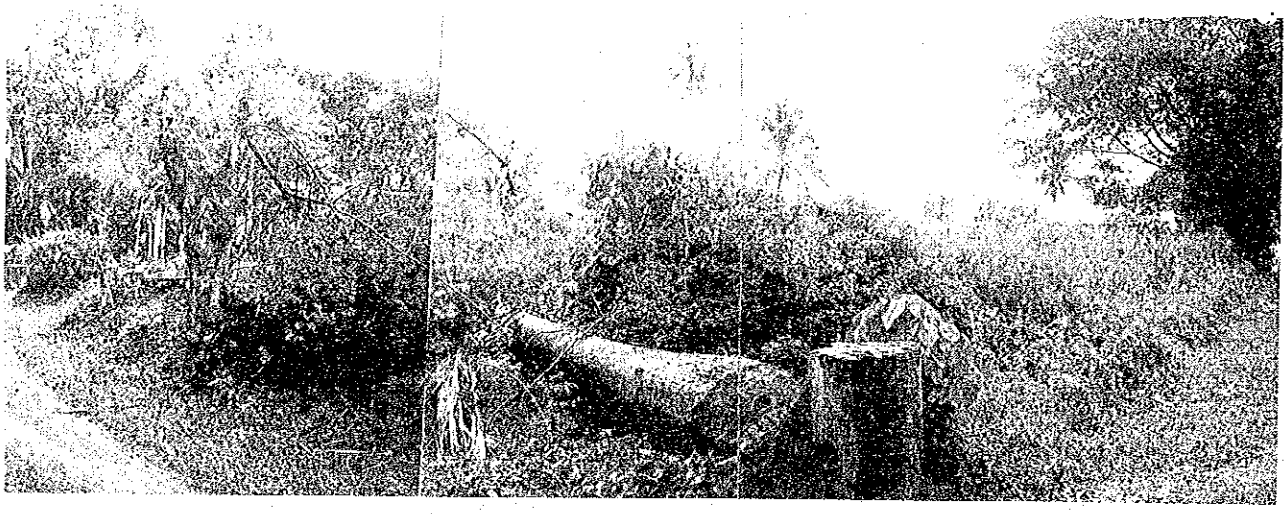
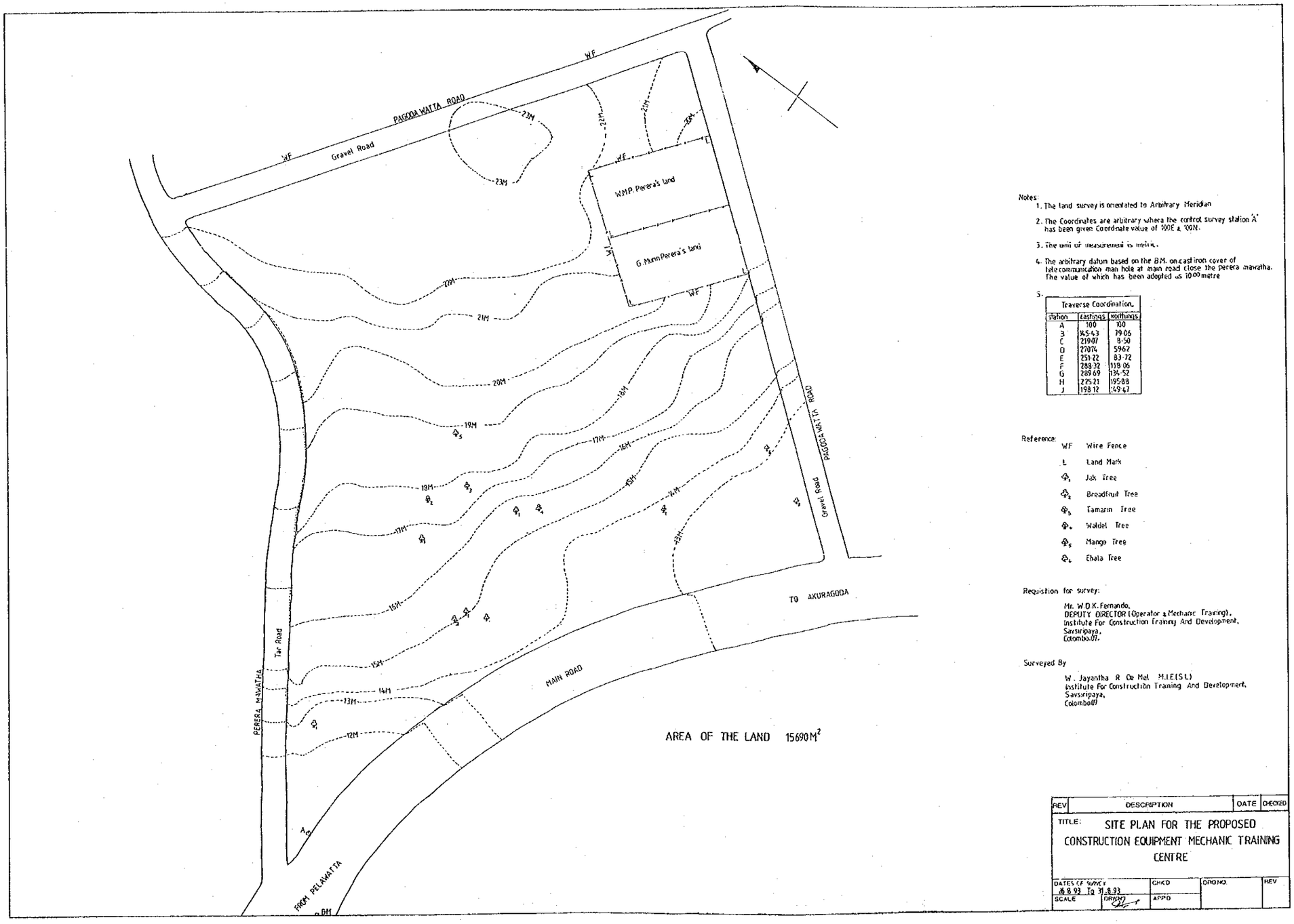


(6)

5-2. Site Survey Map



Notes:

1. The land survey is orientated to Arbitrary Meridian
2. The Coordinates are arbitrary where the control survey station 'A' has been given Coordinate value of 100E & 100N.
3. The unit of measurement is metric.
4. The arbitrary datum based on the B.M. on cast iron cover of tele communication man hole at main road close the Perera mawatha. The value of which has been adopted as 10.00 metre
5. Traverse Coordination.

station	Eastings	Northings
A	100	100
B	145·43	79·06
C	219·07	8·50
D	270·74	59·62
E	251·22	83·72
F	288·32	118·06
G	289·69	134·52
H	275·21	195·88
J	198·12	159·47

Reference:

- WF Wire Fence
- L Land Mark
- Jak Tree
- Breadfruit Tree
- Tamarin Tree
- Waldel Tree
- Mango Tree
- Ebala Tree

Requisition for survey:

Mr. W.D.K. Fernando,
DEPUTY DIRECTOR (Operator & Mechanic Training),
Institute For Construction Training And Development,
Savsiripaya,
Colombo.07.

Surveyed By

W. Jayantha R De Mel M.I.E(S.L)
Institute For Construction Training And Development,
Savsiripaya,
Colombo07

REV	DESCRIPTION	DATE	CHECKED

TITLE: SITE PLAN FOR THE PROPOSED CONSTRUCTION EQUIPMENT MECHANIC TRAINING CENTRE

DATES OF SURVEY	CHKD	DRGNO.	REV
8.8.93 To 31.8.93			
SCALE DRWN	APPD		

S. 1:1000

5-3. Report on Soil Investigation

INSTITUTE FOR CONSTRUCTION TRAINING & DEVELOPMENT

SAVSIRIPAYA,

123, WIJERAMA MAWATHA,

COLOMBO-7,

SRI LANKA.

Report on Soil Investigation

For

THE PROPOSED CONSTRUCTION EQUIPMENT TRAINING CENTRE

At

AKUREGODA ROAD,

PELAWATTE - BATTARAMULLA

For

ICTAD

November 1993

by

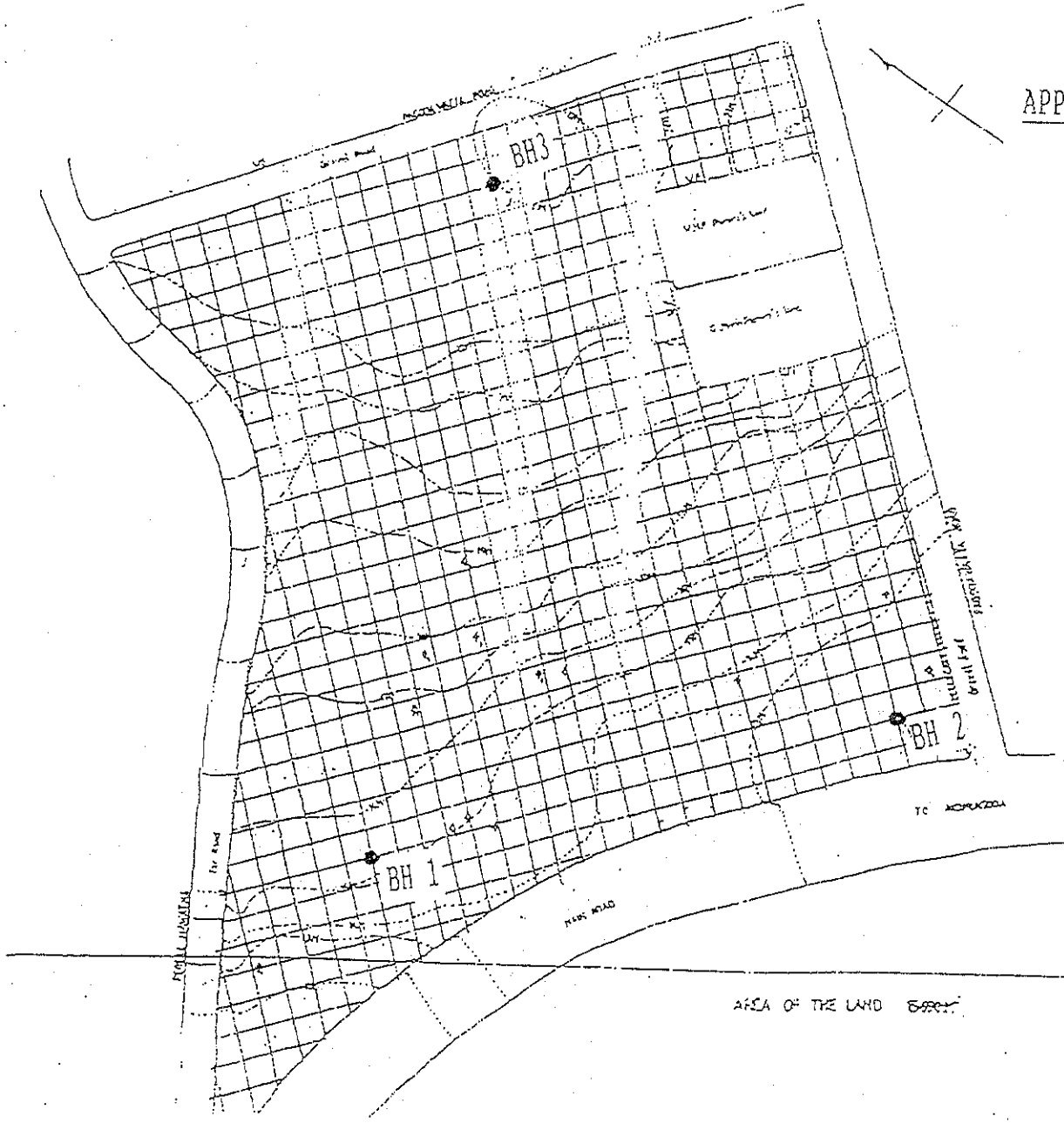
SOIL ENGINEERING
and
DEEPWELLS (PVT) LIMITED

CONTENTS

FIGURE I

APPROXIMATE LOCATION OF BORE HOLES

(NOT TO SCALE)



REPORT

REPORT ON SOIL INVESTIGATION

FOR

THE PROPOSED CONSTRUCTION EQUIPMENT TRAINING CENTRE

AT AKUREGODA ROAD

PELAWATTE-BATTARAMULLA

1. ORIGIN

This investigation has been carried out by M/S SOIL ENGINEERING AND DEEPWELLS (PVT) LIMITED for the Institute for Construction Training and Development , Savsiripaya, 123, Wijerama Mawatha , Colombo -7.

2. SCOPE

The scope of work was to drill 3 nos bore holes at the locations shown to us by the Client's representative. It has also been suggested to advance the bore holes only down to a maximum depth of 15 metres or else up to bed rock whichever is encountered first.

Standard Penetration Tests were to be conducted at every 1.0M depth. It has been proposed to avoid conducting laboratory tests.

The object of the soil investigation was to determine the subsoil structure and its strength characteristics for designing suitable foundations for the proposed factory buildings.

3. LOCATION

The site is located at Akuregoda Road , Pelawatte , Battaramulla, within Kotte U.C. limits.

Approximate locations of the bore holes are shown in Figure I.

4. WORK DONE

4.1 GENERAL

A Joy rotary core drilling machine together with a drilling team was mobilized for this work initially on the 2nd of November 1993. Since the progress of work was badly hampered due to heavy rains, another Tone rotary core drilling machine was mobilised on the 08th of November 1993.

BH 1 and BH 3 were terminated in completely decomposed rock while BH 2 was terminated in moderately weathered biotite gneiss . BH 3 was advanced down to 20.45m as the soil was not so strong at 15.0 metres. Finally, all the bore holes were terminated on fairly hard strata , where SPT 'N' values were above 50.

Depths at which the bore holes were terminated are as follows ;

BH 1	; 15.45 M
BH 2	; 11.10 M
BH 3	; 20.45 M

Standard Penetration Tests were conducted at every 1.0M depth.

4.2 SAMPLING AND CLASSIFICATION

The subsoil strata were recovered using a split spoon sampler, by other dry blocking methods and sometimes by washing. Representative samples were collected at every change of soil type and at least at every 1.0M.

The soils were examined visually using a 10 X 1 magnifying lens and classified under the Unified Soil Classification System.

4.3 UNDISTURBED SAMPLING

No undisturbed soil samples were collected as it has been requested not to conduct laboratory tests.

4.4 LABORATORY TESTING

No laboratory tests were conducted as the Client wanted the Report urgently.

4.5 STANDARD PENETRATION TEST (SPT)

Standard Penetration Tests (SPT) were conducted inside the bore holes in accordance with ASTM D 1586 at every 1.0M depth.

'N' values are reported in Pages 5 to 7 in the vertical soil profiles.

4.6 WATER TABLE

The water table inside the bore holes have been observed and are reported in the vertical soil profiles in Pages 5 to 7.

BH1	;	1.35M/GL
BH2	;	0.93M/GL
BH3	;	M/GL

4.7 SOIL PROFILE

Vertical soil profiles are reported in Pages 5 to 7.

5. DESIGN RECOMMENDATION

The sub-soil in the investigated area consists of residual soils underlained by completely decomposed rock overlying bed rock. The bore holes BH 1 and BH 3 have been terminated at 15.45m and at 20.45m respectively once a SPT 'N' value of over 50 was recorded. In BH 2 bed rock was encountered at a depth of 10.86m and a small core sample was also obtained by core drilling.

In BH 2 a thin surface layer of very soft organic silty clay was encountered. In BH 1 and BH 3 There is a sandy-clayey gravel layer near the surface. Then, there is a thick layer of residual soils , mainly very stiff to stiff sandy clay layer with friable nodules. The sand content in this layer varies from around 10 to 30% from place to place. The completely decomposed layer is also fairly thick in this area.

In general SPT 'N' values decrease with depth closer to the surface and then a slight increase with depth is again observed. However , this type of residual soils do not pose serious foundation problems and, therefore, following bearing capacities can be recommended for shallow foundations. It should also be mentioned that the ground water level in BH 1 and BH 2 area is fairly high and therefore a high water table has been assumed in bearing capacity calculations. In BH 3 area a very deep ground water table has been assumed.

Bore Hole No.	Foundation Level below Ground Level(m)	Allowable Bearing Capacity (kN/m^2)
BH 1	1.0 2.0 3.0	40 75 110
BH 2	1.0 2.0 3.0	70 90 110
BH 3	1.5 2.0 3.0	110 240 350

If the upper slope is going to be heavily loaded the stability of this hill slope will have to be checked at the design stage.

Date: 11-11-93 ...Signature: .....

Dr. N.S.K.N. DE SILVA
B.Sc.(Eng)Hons.,M.Eng.,Ph.D.

VERTICAL SOIL PROFILE

GEOLOGICAL RECORD OF BORING

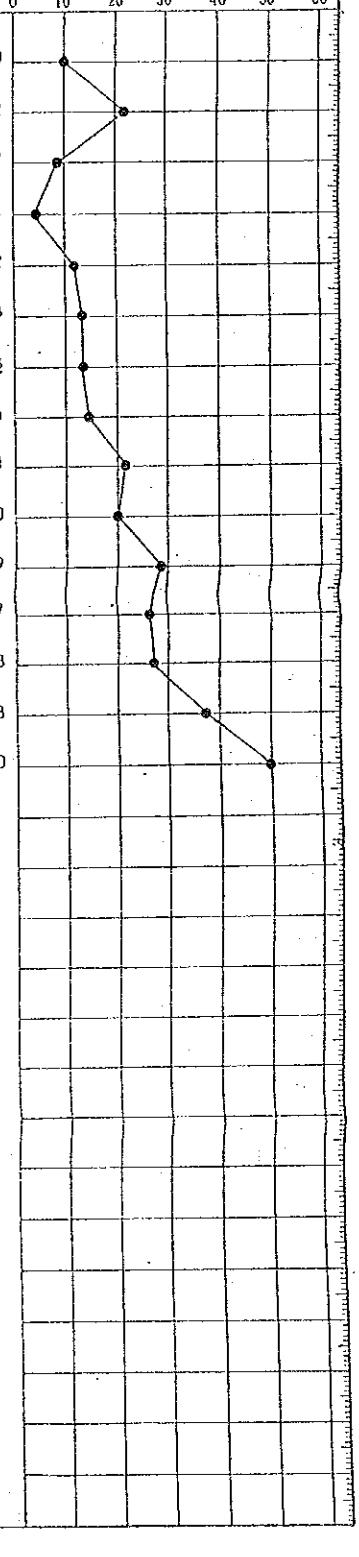
HOLE No. BH 1

PROJECT	CETRAC	LOCATION	PELAWATTE , BATTARAMULLA		
GROUND ELEVATION		DEPTH OF HOLE	15.45m	ANGLE FROM VERTICAL	0
DIAMETER OF HOLE	100mm	MACHINE	JOY	DATE OF DRILLING	03rd to 07th Nov '93
CORE RECOVERY		DEPTH TO GROUND WATER LEVEL IN HOLE	1.35m below ground level		
		DRILLED BY O. Somapala		LOGGED BY Sunil de Silva	

ELEVATION (m)	DEPTH (m)	THICKNESS (m)	FIELD OBSERVATION: COLUMN SECTION	SOIL OR ROCK CLASSIFICATION	COLOUR	DESCRIPTION	CORE RECOVERY %	CORE RECOVERY cm
					Dark Brown to Reddish Yellowish Brown	Medium dense to dense clayey-sandy gravel		
	4.65	4.65		GC				
	5.95	1.30		CI	Reddish Yellowish Brown	Stiff silty-sandy Clay		
				CI	Brown White Grey	Completely decomposed rock disintegrating into clays, sands, lots of mica		
				SC				
					White light Brown Grey	Stiff to very stiff / Medium dense to very dense in place		
					Yellowish Brown			
	15.45	9.50		SC				
						BORE HOLE TERMINATED ON COMPLETELY DECOMPOSED ROCK AT 15.45M BELOW GROUND LEVEL		

STANDARD PENETRATION TEST

DEPTH (m)	NUMBER OF BLOWS N (N)
1.0	10
2.0	22
3.0	09
4.0	04
5.0	12
6.0	13
7.0	13
8.0	14
9.0	21
10.0	20
11.0	29
12.0	27
13.0	28
14.0	38
15.0	50



GEOLOGICAL RECORD OF BORING

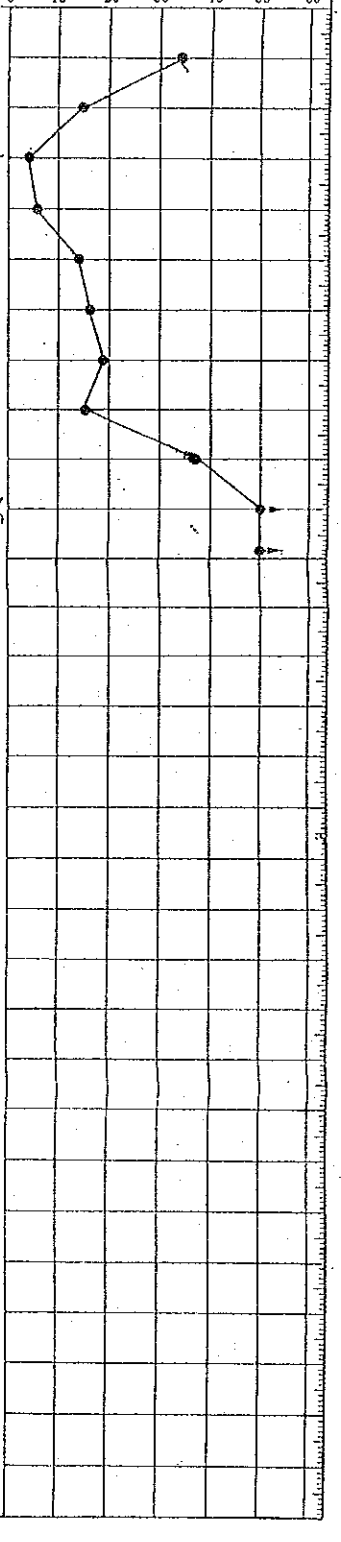
HOLE No. BH 2

PROJECT	CETRAC	LOCATION	Pelawatte, Battaramulla		
GROUND ELEVATION		DEPTH OF HOLE	11.10m	ANGLE FROM VERTICAL	0
DIAMETER OF HOLE	100mm	MACHINE	JOY	DATE OF DRILLING	08th & 09th Nov '93
CORE RECOVERY		DEPTH TO GROUND WATER LEVEL IN HOLE	0.90m below ground level		
		DRILLED BY D. Somapala		LOGGED BY Sunil de Silva	

ELEVATION (m)	DEPTH (m)	THICKNESS (m)	FIELD OBSERVATION: COLUMN SECTION	SOIL OR ROCK CLASSIFICATION	COLOUR	DESCRIPTION	CORE RECOVERY %	CORE RECOVERY cm
	0.90	0.90		CL	Dark Brown	Very soft silty sandy organic clay		
	2.85	1.95		GC	Dark Reddish Brown	Very dense to dense clayey sandy gravel		
	4.90	2.05		CL	Yellowish Reddish Brown	Medium stiff sandy clay		
	10.86	5.96		SC	Yellowish light Brown	Completely decomposed rock disintegrating into sands, clays black iron minerals Medium dense to dense in place		
	11.10	0.24		Quartzo Biotite Gneiss	Grey Brown	Moderately weathered Quartzo Biotite Gneiss Core Recovery=40% BORE HOLE TERMINATED IN MODERATELY WEATHERED BIOTITE GNEISS AT 11.10M BELOW GROUND LEVEL		

STANDARD PENETRATION TEST

DEPTH (m)	NUMBER OF BLOWS N (N)
1.0	34
2.0	15
3.0	04
4.0	06
5.0	14
6.0	17
7.0	19
8.0	16
9.0	38
10.0	50/25cm



GEOLOGICAL RECORD OF BORING

HOLE No. BH 3

PROJECT	CETRAC	LOCATION	Pelawatte , Battaramulla		
GROUND ELEVATION		DEPTH OF HOLE	20.45m	ANGLE FROM VERTICAL	0
DIAMETER OF HOLE	100mm	MACHINE	Tone	DATE OF DRILLING	09th to 11th Nov '93
CORE RECOVERY		DEPTH TO GROUND WATER LEVEL IN HOLE			
		DRILLED BY O. Sunil		LOGGED BY Sunil de Silva	

ELEVATION (m)	DEPTH (m)	THICKNESS (m)	FIELD OBSERVATION: COLUMN SECTION	SOIL OR ROCK CLASSIFICATION	COLOUR	DESCRIPTION	CORE RECOVERY %	CORE RECOVERY cm
	0.20	0.20		GC	Dark Brown	Loose Clayey Gravel		
					Reddish Brown	Very stiff to Stiff sandy clay with hard nodules		
					Reddish Light Brown			
					Reddish Brown			
	9.90	9.70		CL				
					Reddish Brown	Very stiff to stiff sandy clay with little mica		
					Slightly Reddish Brown			
	15.60	5.70		CL				
					Slightly Reddish Brown	Completely decomposed rock disintegrating into clays, sands and and black iron minerals Very stiff to very dense in place		
	20.45	4.85		CL/SC				
						BORE HOLE TERMINATED IN COMPLETELY DECOMPOSED ROCK AT 20.45M BELOW GROUND LEVEL		

STANDARD PENETRATION TEST

DEPTH (m)	NUMBER OF BLOWS N (N)
1.0	03
2.0	30
3.0	31
4.0	26
5.0	13
6.0	13
7.0	08
8.0	09
9.0	11
10.0	15
11.0	16
12.0	18
13.0	13
14.0	11
15.0	12
16.0	23
17.0	43
18.0	44
19.0	34
20.0	50

6. Estimate of Operation and Maintenance Cost

6. Estimate of Operation and Maintenance Cost

The operation and maintenance cost of the facilities after their completion and handing over to the Sri Lankan side is estimated here. The major expenditure items to be considered are the personnel cost, operation cost and maintenance cost.

1) Personnel Cost

The ICTAD's budget for fiscal 1994 sets the basic annual salaries for its staff as follows.

Supervisor	approximately 60,600 Rs/year
Technician	approximately 50,300 Rs/year
Senior Clerk	approximately 47,800 Rs/year
Junior Clerk	approximately 34,700 Rs/year
Labourer	approximately 25,400 Rs/year
Helper	approximately 23,800 Rs/year

The total basic salaries amount to 18,743,940 Rs/year. With additional budgetary appropriation of 2,021,100 Rs/year for bonuses and 5,009,305 Rs/year for overtime, the grant personnel cost total is 25,774,345 Rs/year. Divided by 480 employees, the average salary at the ICTAD is 53,696 Rs/year. The total budgetary appropriation for the CETRAC proposed by the ICTAD is 2,600,000 Rs/year. With a total of 48 employees, therefore, the average salary at the CETRAC is set at 54,166 Rs/year which appears to be in line with the ICTAD standard due to the relatively high ratio of technical staff at the CETRAC.

* Personnel Cost (48 employees): 2,600,000 Rs/year

2) Operation Cost

The costs of electricity, water and LPG, all of which are essential for the operation of the CETRAC, are estimated based on the assumed daily consumption.

① Electricity Charge

- Estimation Conditions

Estimate of monthly electricity consumption
12 hours/day and 25 days/month for building services
8 hours/day and 25 days/month for other types of equipment

- Load

a. Lighting and Power Point Load

			d.f.		
Administration Building	53 KVA	×	0.5	=	26.5 KW
Training Building	108 KVA	×	0.5	=	54.0 KW
(Canteen Building	8 KVA)	×	0.5	=	(4.0 KW)
(Dormitory Building	26 KVA)	×	0.5	=	(13.0 KW)
(Connecting Corridors	2 KVA)	×	0.5	=	(1.0 KW)
Garage	5 KVA	×	0.3	=	1.5 KW
(Street Lighting	15 KVA)	×	1.0	=	(15.0 KW)
Sub-Total	166 KVA (51 KVA)			=	82 KW (33 KW)

b. Ordinary Power Load

			d.f.		
Air-Conditioning	280 KVA	×	0.4	=	112.0 KW
(Kitchen	40 KVA)	×	0.4	=	(16.0 KW)
Toilets	25 KVA	×	0.2	=	5.0 KW
Sub-Total	305 KVA (40 KVA)			=	117 KW (16 KW)

c. Training Equipment Load

			d.f.		
	430 KVA	×	0.1	=	43 KW

Estimated Subscribed Electricity Load: a + b + c = 291 KW

- Electricity Consumption (per month)

[242 KW × 0.7 × 8 hrs × 25 days] + [49 KW × 0.7 × 12 hrs × 25 days]
= 33,880 KWh/month + 10,290 KWh/month
= 44,170 KWh/month

- Electricity Charge

Monthly Charge = Standing Charge + Meter Charge + Fixed Charge
= [291 KW × 183 Rs/KW] + [44,170 KWH × 3.85 Rs/KWh] + 313 Rs
= 53,253 Rs + 170,055 Rs + 313 Rs
= 233,621 Rs/month

Annual Cost = 223,621 Rs/month × 12 months = 2,683,452 Rs

② Water Charge

Water Extension Charge	: 100,000 Rs
Meter Charge	: 19.5 Rs/m^3
Estimated Water Consumption	: 40 m^3/day

The use of both municipal water and groundwater from dug wells is planned for the CETRAC. Assuming that the ratio of municipal water is one-third of the total consumption, the daily consumption of municipal water is approximately 15 m^3.

Water Charge

Monthly Charge = 15 m^3/day × 19.5 Rs/m^3 × 25 days = 7,312 Rs/month
Annual Cost = 7,312 Rs/month × 12 months = 87,744 Rs

③ LPG Cost

LPG Cylinder Deposit	: 12,000 Rs/cylinder
Meter Charge	: 800 Rs/40 kg = 20 Rs/kg

LPG Consumption

Water Heater	2.97 kg/hr	×	2	=	5.94 kg/hr
Gas Booster				=	1.51 kg/hr
Gas Rice Cooker				=	2.38 kg/hr
Gas Roaster				=	2.23 kg/hr
Gas Range				=	4.36 kg/hr
Gas Fryer				=	1.07 kg/hr
Low Range				=	2.25 kg/hr
Washer				=	0.97 kg/hr
Total					20.71 kg/hr

LPG Heat Value: 10,300 kcal/kg/hr

- LPG Cost

Monthly Cost : 20.71 kg/hr × 4 hrs/day × 0.6 (rate of simultaneous use)
= 49.7 kg/day
49.7 kg/day × 20 Rs/kg × 25 days/month
= 24,850 Rs/month

Annual Cost : 24,850 Rs/month × 12 months = 298,200 Rs

Total Operation Cost

①	Electricity Charge	2,683,452 Rs/year
②	Water Charge	87,744 Rs/year
③	LPG Cost	298,200 Rs/year
	Total	3,069,396 Rs/year
		approximately 3,070,000 Rs/year

The above estimate is based on the assumption that the facilities in question will be operated all year round under uniform conditions. According to the planned CETRAC curriculum, there will be no training courses in 2 months of the year, i.e. 6th and 12th month, and the annual operation cost should be lower than that above provided that the Training Building, Dormitory Building and Canteen Building are used less frequently during these 2 months. In the case of the Canteen Building, as full operation based on 3 meals/day and 25 days/month is assumed, the LPG cost and water charge can be reduced with less use.

3) Maintenance Cost

① Building Maintenance Cost

In general, the building repair cost substantially varies from year to year, Here, the annual maintenance cost is estimated based on an average annual cost of 50 Rs/m^2 over a time span of 30 years.

50 Rs/m^2/year × 7,181 m^2 = 359,050 Rs/year
approximately 360,000 Rs/year

② Building Services Equipment Maintenance Cost

While the building services equipment maintenance cost will be rather low in the first 5 years or so, the replacement of parts and the equipment itself will then be required. Here, the annual average maintenance cost is estimated based on 1 to 2% of the original building services equipment cost over a time span of 10 years.

1,300,000 Rs/year

③ Equipment Maintenance Cost

While the equipment maintenance cost will be low in the first one or two years, it will gradually increase with the ageing of the equipment. Here, the annual maintenance cost is estimated based on 2 to 3% of the original equipment cost.

Ratio of equipment requiring maintenance is comsidered as 50%.

First 5 Years 3,400,000Rs/year

Total Maintenance Cost

①	Buildings	360,000 Rs/year
②	Building Services	1,300,000 Rs/year
③	Equipment	3,400,000 Rs/year
	Total	5,060,000 Rs/year

4) Total Running Cost of CETRAC

①	Personnel Cost	2,600,000 Rs/year
②	Operation Cost	3,070,000 Rs/year
③	Maintenance Cost	5,060,000 Rs/year
	Total	10,730,000 Rs/year

The total operation and maintenance cost is estimated to be 10,730,000 Rs which is converted to approximately 23,700,000 yen.