

5. Soil Investigation Report

SOIL INVESTIGATION FOR PROPOSED 4-STORIED BUILDING AT TEACHING HOSPITAL, JAFFNA

1. INTRODUCTION

As part of the project for the Improvement of the Central Functions of the Jaffna Teaching Hospital, it is proposed to construct a new 4-storied building within the existing hospital premises. The project is being implemented by, the Japan International Cooperation Agency (JICA). The Project Consultant is M/s. Yamachita Sekkei Inc.

M/s. Geotech Ltd. has been authorized to carry out a soil investigation at the site.

2. SCOPE OF WORK

The scope of work for the Soil Investigation was to:

- (i) Advance three boreholes at specified locations;
- (ii) Carry out regular SPT tests in each borehole;
- (iii) Collect undisturbed samples of soil from the clayey deposits, if encountered;
- (iv) Collect disturbed samples of soil from the SPT tube;
- (v) Undertake laboratory tests on both the disturbed and undisturbed soils;
- (vi) Make recommendations for the design of foundations.

3. GEOLOGICAL SET UP AND SITE DESCRIPTION

It has been reported by Cooray (1984) that the Jaffna Peninsula and the surrounding islands have a monotonous, flat landscape resulting from horizontal beds of limestone, which have been uplifted above the level of the sea only during recent geological times. This is a Miocene deposit falling within the 'Tertiary' system. The uplifted sub-surface displays many of the physical characteristics of limestone regions, which have been brought about by the solution of the limestone along joints and fissures. There is no surface drainage in the Jaffna Peninsula; all the water, which falls on the surface passes downwards along fissures formed by the solution of the limestone and flowing in underground channels.

The structure of the Jaffna limestone has been described as flat-bedded. It is generally at the surface or a little below it. The limestone beds are extremely well jointed, and aerial photographs show a clear rectangular pattern of closely spaced joints. The lithology of the limestone has been described as a hard, partly crystalline, compact, creamy coloured rock.

Overlying the limestone is a thin overburden, which near the coast consists of sand deposits, and elsewhere in the peninsula are recent gravels and alluvium.

The site for the proposed construction is located at Hospital Road, Jaffna. The premises contain several single storied and 2-storied units. These details are shown in Figs. 1a and 1b. An existing single storied ward building would be demolished to make way for the new construction.

4. FIELD INVESTIGATIONS

The field investigations consisted of advancing 3 boreholes at locations marked BH-01 to BH-03 in Figs. 1a and 1b. The boreholes were initially advanced up to the hard limestone rock stratum, with a rotary drilling machine up using overburden cutting tools and adopting the wash boring process to remove the cuttings from the bottom of the borehole. This hard stratum was close to the surface as indicated later in this section. The boreholes, which had a diameter of 75 mm were supported with casing.

The boreholes were thereafter further advanced, by coring the limestone using a double tube core barrel.

The depths of drilling are indicated in the table below.

Borehole No.	BH-01	BH-02	BH-03
Depth to layer of limestone rock (m)	2.2	2.7	2.8
Depth of borehole (m)	5.2	5.7	7.8

Standard Penetration Tests (SPT's) were carried out regularly in the overburden. This test was carried out as specified in BS 1377.

Disturbed samples of soil were collected both from the SPT tube and the cuttings collected from the washings.

Ground Water Level (GWL) was determined as the depth at which the water level stabilized inside the borehole.

These investigations were carried out from 1st to 3rd March, 2005.

5. SUB-SURFACE CONDITIONS

The results of the field investigations are given in Appendix 1.

Using the results of the Borehole Investigation, profiles of the sub-surface conditions across the boreholes have been constructed, and these are shown as

- Fig. 2a at location of borehole BH-01; and
- Fig. 2b across boreholes BH-02 and BH-03.

These results show that,

- (i) the soil overburden is very thin. The depth to the layer of hard limestone rock was varying between 2.2 m and 2.8 m in the three boreholes;
- (ii) the thin overburden consisted of a surface layer of thickness about 1.5 m of clayey sand mixed with building debris, followed by a cemented sandstone;
- (iii) Ground Water Level (GWL) was at the depths indicated below;

Borehole No.	BH-01	BH-02	BH-03
Depth to GWL (m)	2.5	2.3	2.4

- (iv) the depth to the hard limestone stratum varied between 2.2 m and 2.8 m at the three borehole locations;
- (v) the limestone layer was highly fractured over the 3 m of drilling at each borehole location. The core recoveries and RQD values are indicated below.

Borehole No.	Position	CR (%)	RQD (%)
BH-01	2.2-2.7	66	0
	2.7-3.0	40	0
	3.0-3.7	20	0
	3.7-4.5	No cores	
	4.5-5.2	54	28

Borehole No.	Position	CR (%)	RQD (%)
BH-02	2.7-3.5	60	0
	3.5-3.7	60	0
	3.7-4.3	70	43
	4.3-5.2	43	0
	5.2-5.7	48	0

Borehole No.	Position	CR (%)	RQD (%)
BH-03	2.8-3.4	75	0
	3.4-5.0	44	26
	5.0-5.4	51	0
	5.4-6.9	41	10
	6.9-7.8	55	0

The fractured nature of the limestone is also evident from the loss of drilling water during the advancement of the boreholes. These are indicated below:

At BH-01: Complete water loss from 2.6 m to 4.5 m.

At BH-02: Complete water loss from 1.1 m.

At BH-03: 30% water loss from 2.8 m to 5.8 m; and
Complete water loss from 5.8 m to 7.8 m.

6. ENGINEERING PROPERTIES OF SOIL & ROCK SAMPLES

6.1 Laboratory Investigations on soil samples

One sample from the surface layer of each of the boreholes was tested for its grain size distribution.

Again, Atterberg Limit Tests were carried out on 3 samples from the three boreholes.

These results are given in Appendix 2.

6.2 Laboratory Investigations on rock samples

Laboratory investigations were done on some of the rock core samples. Three of these cores were tested for their uniaxial compressive strength (UCS). These results are given in Appendix 2, and summarized below.

Borehole No.	BH-02	BH-03
Depth (m)	3.20-3.31	4.06-4.17
UCS (N/mm ²)	10.4	21.19

7. CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the foundations consist of individual pad footings, or RC strip footings.

It is recommended that the footings be founded on the layer of cemented sandstone, which was present at a depth of around (1.0-1.5) m, and overlying the limestone stratum.

It is recommended that the footings be designed for an allowable bearing capacity of 250 kN/m^2 , subject to a minimum footing dimension of 0.6 m.

B. L. Tennekoon

Prof. B. L. Tennekoon
University of Moratuwa

15th March 2005

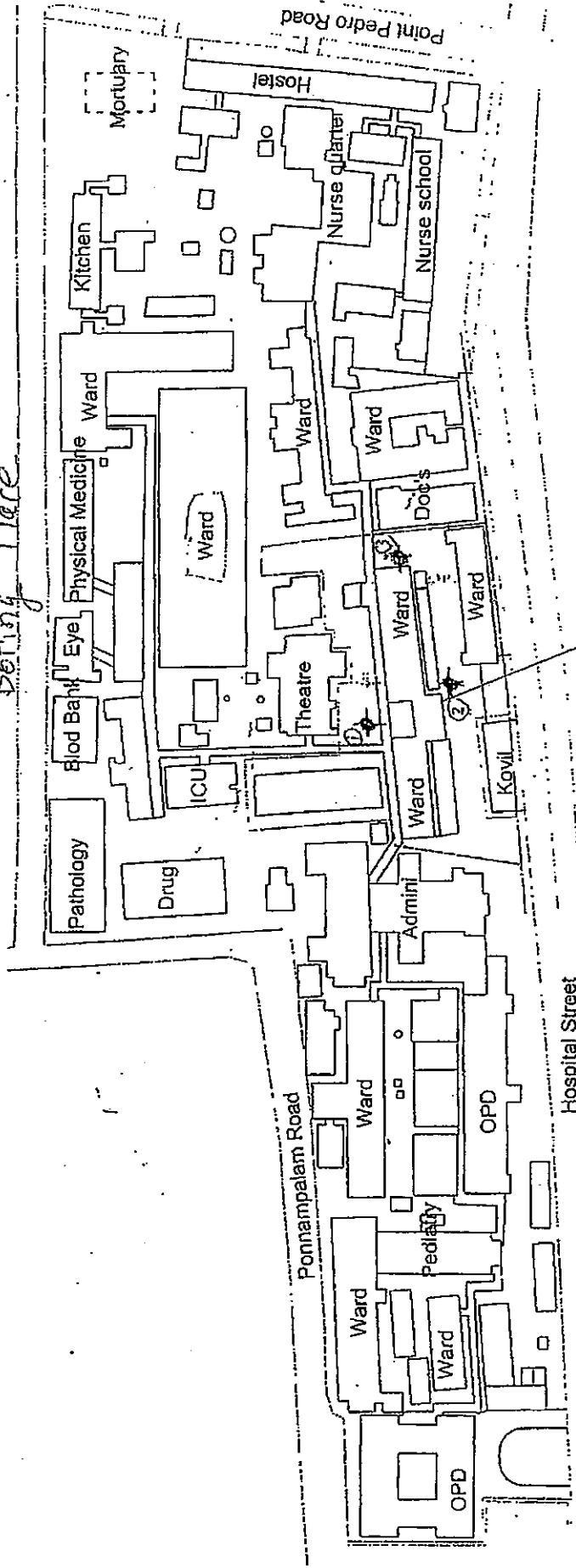


L.P. Jayasinghe
Geotech Limited

Annex 5

Fig. 1a -

Being Place

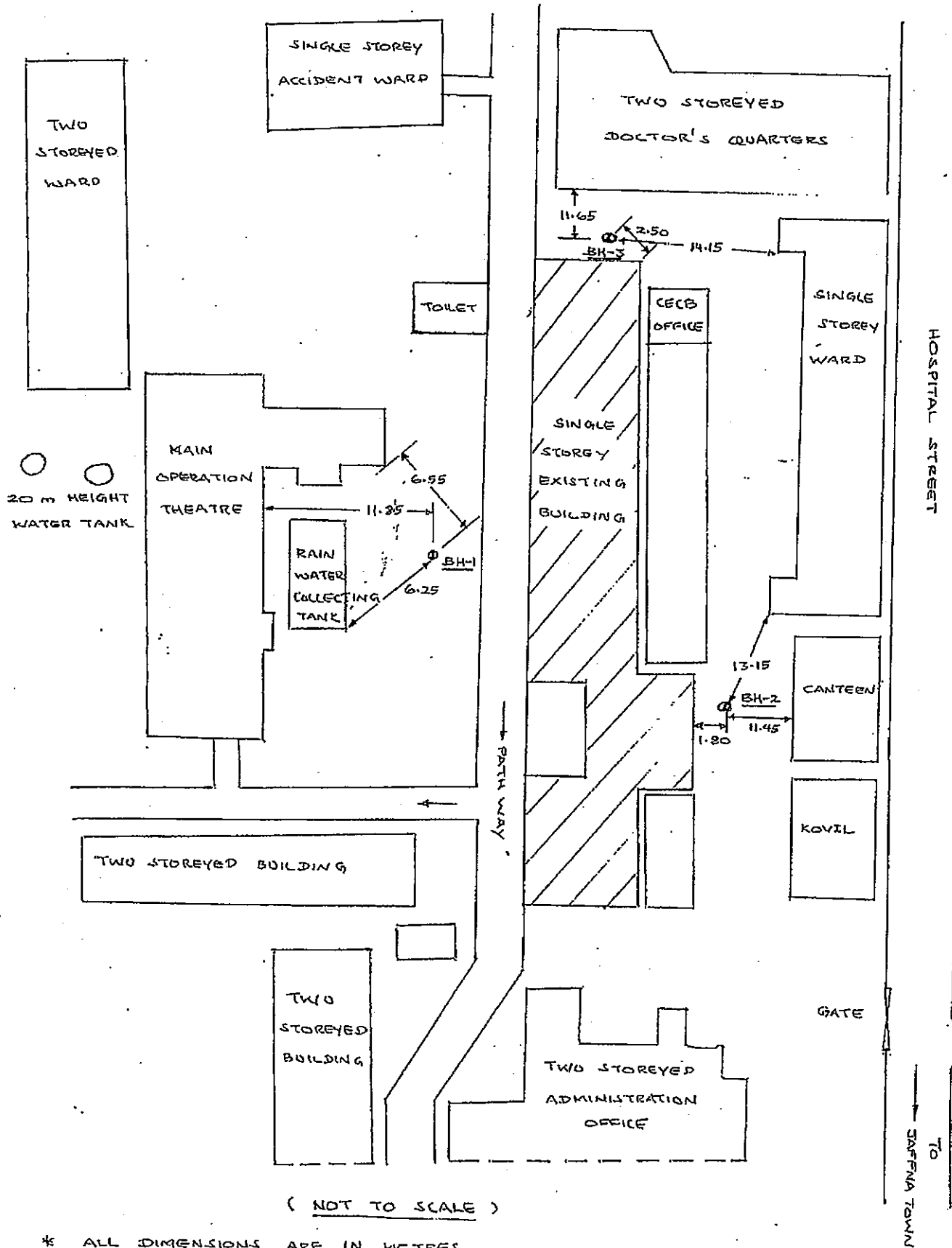


Construction Site

of THE PROJECT FOR THE IMPROVEMENT OF CENTRAL FUNCTIONS of JAFFNA TEACHING HOSPITAL

Fig 11.

SKETCH SHOWING BORE HOLE LOCATIONS FOR PROPOSED
FOUR STOREY BUILDING AT TEACHING HOSPITAL, JAFFNA.



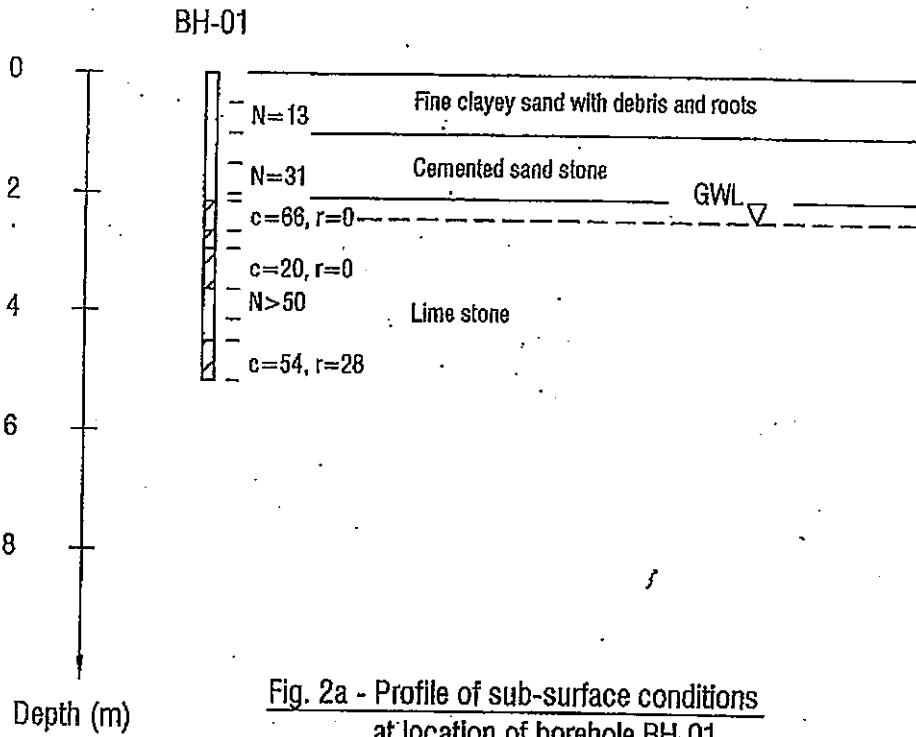


Fig. 2a - Profile of sub-surface conditions
at location of borehole BH-01

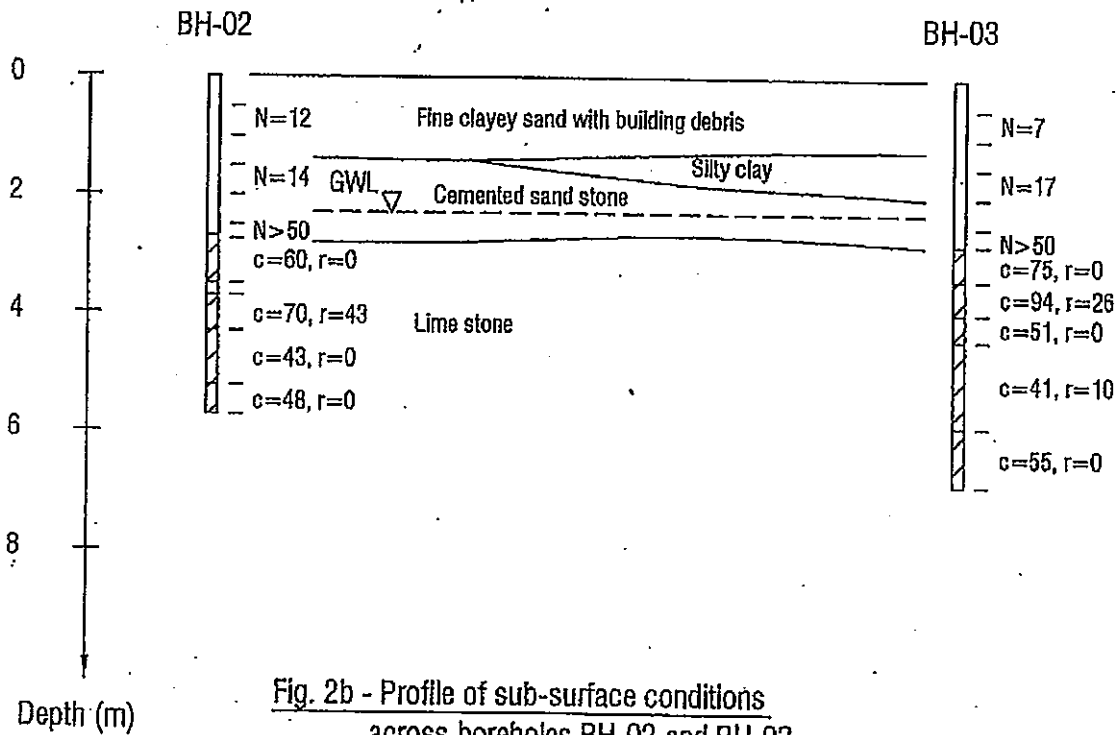


Fig. 2b - Profile of sub-surface conditions
across boreholes BH-02 and BH-03

BOREHOLE LOG

Client : Japan International Cooperation Agency (JICA)
 Consultant : Yamashita Sekkei Inc.

Job No: G/1823

Sheet : 1 of 1

B.H. No: BH-1

Level : MSL

Project : Soil Investigation for proposed four storeyed building at Jaffna Teaching Hospital.

Duration : 2005.03.03 TO 2005.03.03

Drilling Rig: XYL-1B

Logged by : K.Sasokanathan

Depth (m)	Water (m)	Case (mm)	In situ Tests and Samples	SPT No	Lithological Description	Legend	Penetration Resistance (Based on SPT values)				Depth (m)
							10	20	30	40	
01		NW	0.50 - 0.95 SPT	13	Reddish Very fine to fine clayey sand - Fill -						0.1
01			1.50 - 1.95 SPT	31	Brownish Fine clayey sand with debris and roots						01
02			GWL 2.5m		Yellow to White Highly cemented sand stone						02
03					Yellow to White Hard Lime stone						03
04			3.70 - 4.15 SPT	>50	Yellowish White Soft Lime stone						04
05		NW			Yellow to White Hard Lime stone						05
05.15					BH Terminated						5.15
06											06
07											07
08											08
09											09
10											10

Depth (m)	C.R (%)	RQD (%)
2.20-2.70	66	Nil
2.70-3.00	40	Nil
3.00-3.70	20	Nil
4.50-5.15	53.8	27.7

Comments: Weather Condition: Dry Rock level: 2.20m GWL: 2.50m BH terminated: 5.15m Completely water loss from 2.60m to 4.50m, BGL.

BOREHOLE LOG

Job No: G/1823

Sheet: 1 of 1

Client : Japan international Cooperation Agency (JICA)
 Consultant : Yamashita Sekkei Inc.

B.H. No: BH-2

Level: MSL

Project : Soil Investigation for proposed four storeyed building at
 Jaffna Teaching Hospital.

Duration : 2005.03.02 TO 2005.03.02

Drilling Rig: XYL-1B

Logged by : K.Sasokanthan

Depth (m)	Water (m)	Case (mm)	In situ Tests and Samples	SPT No	Lithological Description	Legend	Penetration Resistance (Based on SPT values)				Depth (m)
							10	20	30	40	
01		NW	0.50 - 0.95 SPT	12	Reddish Brown Very fine to fine clayey sand with building debris - Fill -						0.3
02			1.50 - 1.95 SPT	14	Brownish Very fine to fine sandy clay with less debris						01
02.3			GWL 2.3m		Brownish Fine sandy clay with cemented sand stones						02 2.2
03			2.50 - 2.95 SPT	>50	Yellowish Brown Hard sand stones						2.7
04					Yellow to White Hard Lime stone						03 04
05											05
06		NW			BH Terminated						5.7 06
07											07
08											08
09											09
10											10

Depth (m)	C.R (%)	RQD (%)
2.70-3.50	60	NII
3.50-3.70	60	NII
3.70-4.30	70	43.3
4.30-5.20	43.3	NII
5.20-5.70	48	NII

Comments: Weather Condition: Dry Rock level: 2.70m GWL: 2.30m BH terminated: 5.70m Completely water loss from 1.10m, BGL.

BOREHOLE LOG		Job No: G/1823	Sheet : 1 of 1
Client : Japan International Cooperation Agency (JICA)		B.H. No: BH-3	Level : MSL
Consultant : Yamashita Sekkei Inc.		Duration : 2005.03.01 TO 2005.03.01	
Project : Soil Investigation for proposed four storeyed building at Jaffna Teaching Hospital.		Drilling Rig: XYL-1B	
Logged by : K.Sasokanathan			

Depth (m)	Water (m)	Case (mm)	In situ Tests and Samples	SPT No	Lithological Description	Legend	Penetration Resistance (Based on SPT values)			Depth (m)																		
							10	20	30		40																	
01		NW	0.50 - 0.95 SPT	7	Light Brown to Brown Very fine to fine sandy clay with coarse lime stone pieces					0.3																		
02			1.50 - 1.95 SPT	17	Brownish Very fine to fine sandy clay with medium to coarse lime stone pieces and roots					0.9 01 1.2																		
03	2.35		GWL 2.35m 2.50 - 2.95 SPT	>50	Brownish Very fine to fine sandy clay					1.9 02																		
04					Dark Brownish Very fine to fine silty clay					2.8 03																		
05					Yellow to pink Hard sand stone					04																		
06					Yellow to White Hard Lime stone					05																		
07					BH Terminated					06																		
08					<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Depth (m)</th> <th>C.R (%)</th> <th>RQD (%)</th> </tr> </thead> <tbody> <tr> <td>2.80-3.40</td> <td>75</td> <td>Nil</td> </tr> <tr> <td>3.40-4.95</td> <td>93.5</td> <td>25.8</td> </tr> <tr> <td>4.95-5.40</td> <td>Nil</td> <td>Nil</td> </tr> <tr> <td>5.40-6.85</td> <td>41.4</td> <td>10.3</td> </tr> <tr> <td>6.85-7.85</td> <td>55</td> <td>Nil</td> </tr> </tbody> </table>					Depth (m)	C.R (%)	RQD (%)	2.80-3.40	75	Nil	3.40-4.95	93.5	25.8	4.95-5.40	Nil	Nil	5.40-6.85	41.4	10.3	6.85-7.85	55	Nil	07
Depth (m)	C.R (%)	RQD (%)																										
2.80-3.40	75	Nil																										
3.40-4.95	93.5	25.8																										
4.95-5.40	Nil	Nil																										
5.40-6.85	41.4	10.3																										
6.85-7.85	55	Nil																										
09		NW								7.85 08																		
10										09																		

Comments: Weather Condition: Dry
 Rock level: 2.80m
 BH terminated: 7.85m
 GWL: 2.35m
 30% of loss of water from 2.80m to 5.80m, Completely water loss from 5.80m to 6.30m, 80% of water loss from 6.30m to 7.85m, BGL.

GROUP ENGINEERING LABORATORIES LIMITED

996 A, Maradana Road, Colombo 08
 Tel: 2692482, 071 4735745
 Fax: 2823881

"Quality Assurance for Construction"

UNCONFINED COMPRESSIVE STRENGTH TEST ON INTACT ROCK CORE SPECIMENS.

ASTM D 2938

Client :	Geotech Limited	Job ref :	ML/AG/496
Project :	Jaffna Teaching Hospital Project	Client ref :	
Consultant :		Borehole No.	02
		Sample No.	2
Location :		Depth/m.	3.20-3.31
		Date of report	09.03.2005

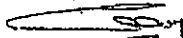
Soil description : Rock

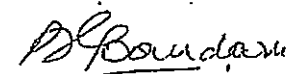
Specimen No.		1
Specimen diameter	cm	5.450
Specimen Length	cm	10.880
Sectional area of the Specimen	cm ²	23.33
Volume of Specimen	cm ³	253.812
Weight of specimen	g	577.78
Unit Weight	g/cm ³	2.276
Failure Load	kN	24.3
Measured Compressive Strength	N/mm ²	10.42
Correction Factor for height diameter ratio		1.00
Corrected Compressive Strength	N/mm ²	10.41

Mode of Failure



* Moisture Condition at time of test : Laboratory air dry.


 Tested By


 Manager Operation
 15-03-2005

GROUP ENGINEERING LABORATORIES LIMITED

996 A, Maradana Road, Colombo 08

Tel: 2692482, 071 4735745

Fax: 2823881

"Quality Assurance for Construction"

UNCONFINED COMPRESSIVE STRENGTH TEST ON INTACT ROCK CORE SPECIMENS.

ASTM D 2938

Client :	Geotech Limited	Job ref :	ML/AG/496
Project :	Jaffna Teaching Hospital Project	Client ref :	
Consultant :		Borehole No.	03
Location :		Sample No.	2
		Depth/m.	4.06-4.17
		Date of report	09.03.2005

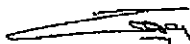
Soil description : Rock

Specimen No.		1
Specimen diameter	cm	5.440
Specimen Length	cm	10.960
Sectional area of the Specimen	cm ²	23.24
Volume of Specimen	cm ³	254.741
Weight of specimen	g	638.20
Unit Weight	g/cm ³	2.505
Failure Load	kN	49.2
Measured Compressive Strength	N/mm ²	21.17
Correction Factor for height diameter ratio		1.00
Corrected Compressive Strength	N/mm ²	21.19

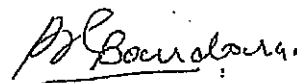
Mode of Failure



* Moisture Condition at time of test : Laboratory air dry.



Tested By



Manager Operation

15 - 03 - 2005

GROUP ENGINEERING LABORATORIES LIMITED

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Laboratory Test Results

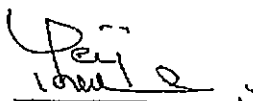
Project: Teaching Hospital - Jaffna

Result of Atterburg Limits Tests:

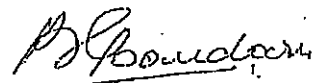
<u>B.H. No.</u>	<u>Depth (m)</u>	<u>L.L. (%)</u>	<u>P.L. (%)</u>	<u>P.I. (%)</u>
1	0.50 - 0.95	23	13	10
2	1.50 - 1.95	33	18	15
3	1.50 - 1.95	36	18	18

Result of Sieve Analysis Tests:

<u>B.H. No.</u>	<u>Depth (m)</u>	<u>Remarks</u>
1	0.50 - 0.95	Test Curve Attached
2	0.50 - 0.95	- do -
3	0.50 - 0.95	- do -



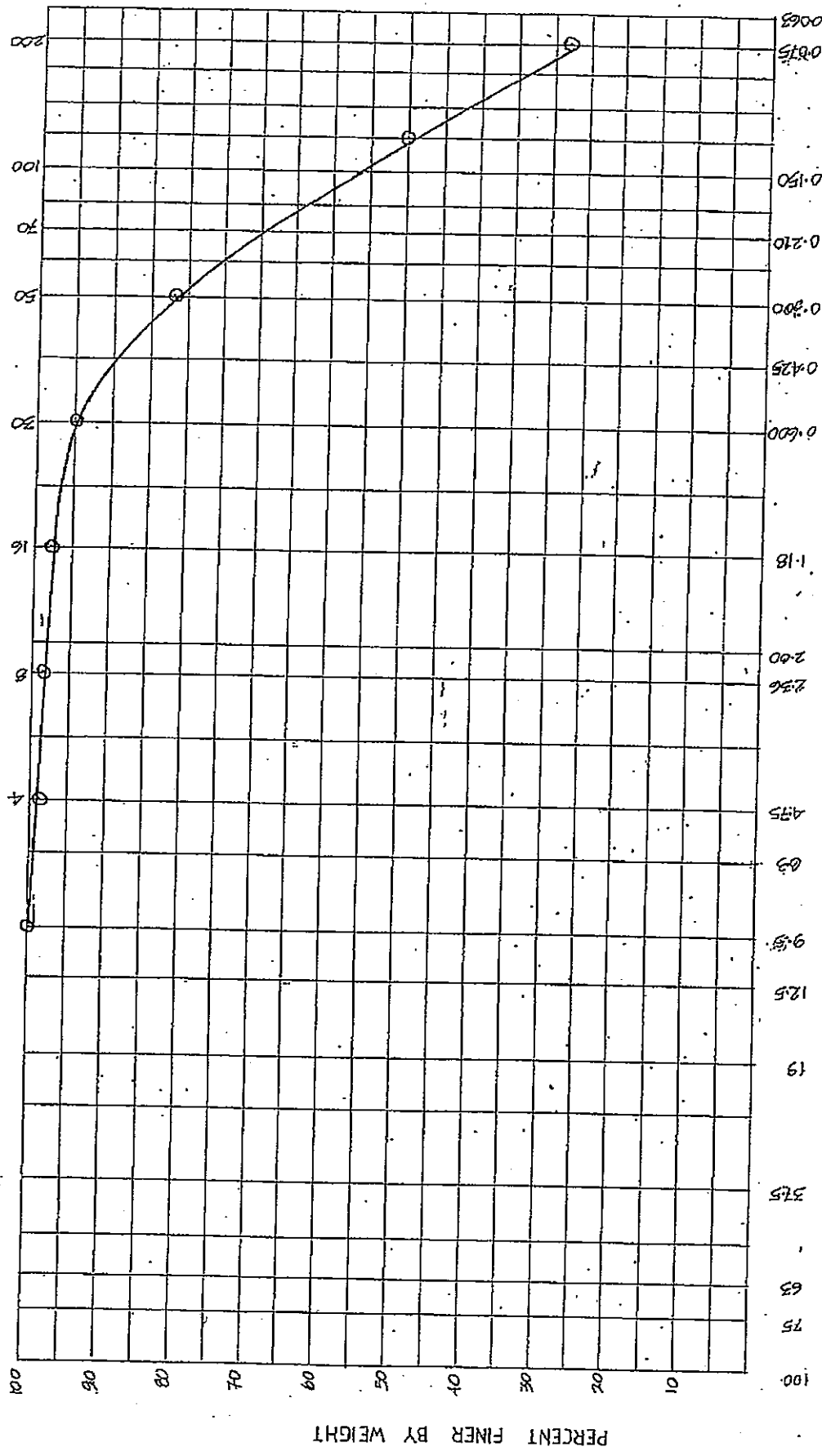
Laboratory Engineer



Manager Operation

15 - 03 - 2005

TYLER STANDARD SIEVE NUMBERS



ASTM COBBLES COARSE GRAVEL FINE GRAVEL COARSE SAND MEDIUM SAND FINE SAND

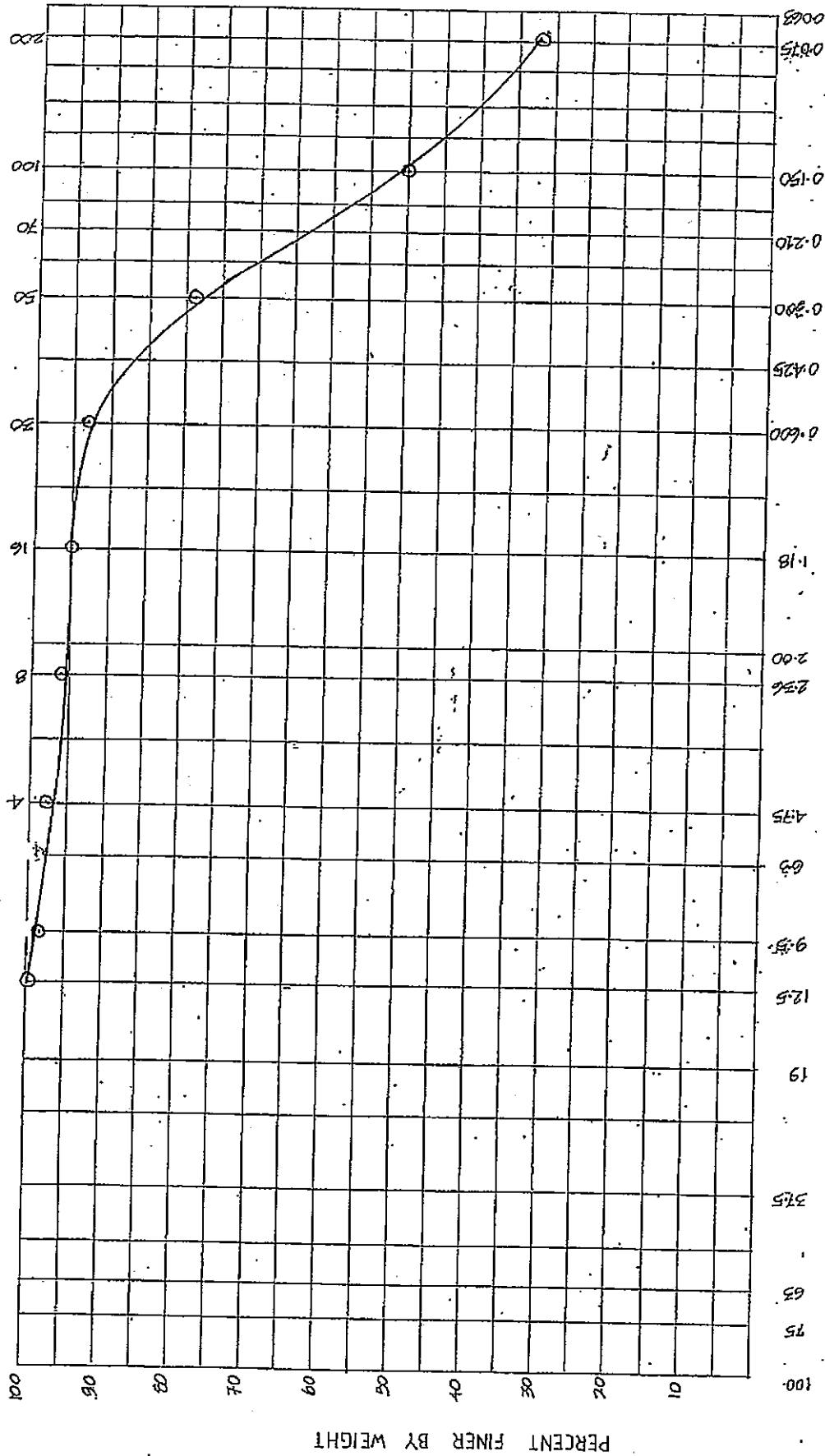
COBBLES COARSE GRAVEL MEDIUM GRAVEL FINE GRAVEL COARSE SAND MEDIUM SAND FINE SAND

PROJECT Teaching Hospital - Jaffna BORE HOLE NO. 1 SAMPLE NO. _____

DEPTH 0.50m ELEVATION _____ REMARKS sdet Sieving

GRAIN SIZE DISTRIBUTION DIAGRAM

TYLER STANDARD SIEVE NUMBERS



GRAIN SIZE IN MILLIMETERS

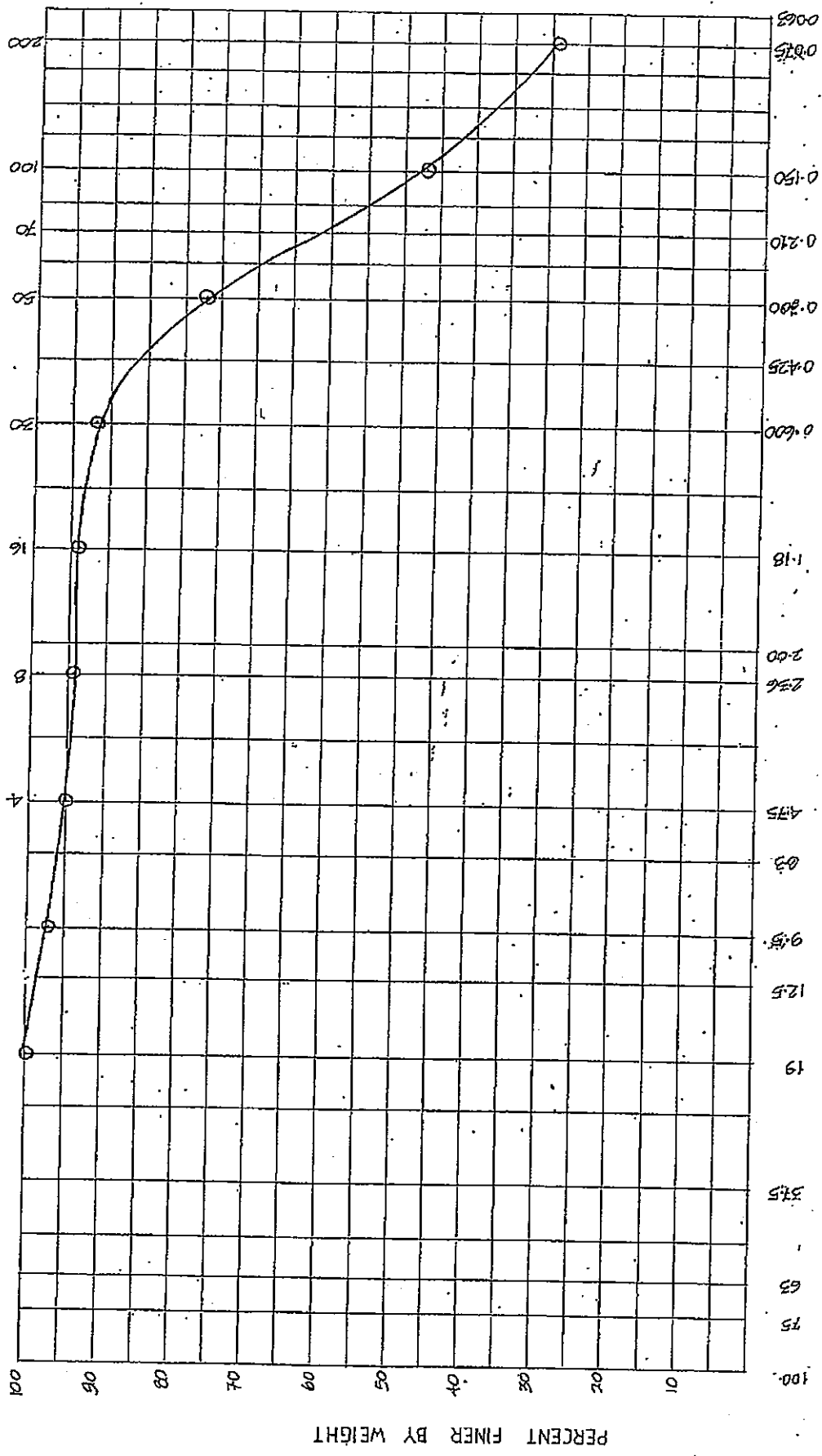
ASTM	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	%
B.S	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	

PROJECT Teaching Hospital - Jaffna.

DEPTH 0.50 NO. 95 ELEVATION 4 REMARKS BORE HOLE NO. 2 SAMPLE NO. COET Sieving

GRAIN SIZE DISTRIBUTION DIAGRAM

TYLER STANDARD SIEVE NUMBERS



ASTM	GRAIN SIZE IN MILLIMETERS					
	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	%
B.S	COARSE GRAVEL	MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND

PROJECT Teaching Hospital - Jaffna.

DEPTH 0.50m to 0.96m ELEVATION _____ REMARKS _____ CORE NO. 10 & SAMPLE NO. _____

GRAIN SIZE DISTRIBUTION DIAGRAM

6. Water Quality Test Report

Continuation sheet

CHEMICAL ANALYSIS OF WASTE WATER

Ref. No: 10-11/C/MAR/05

SPECIMEN : Water

NATURE OF SAMPLE : Waste Water
a. Sample taken at waste water tank of Jaffna Teaching Hospital
b. Sample taken after treatment to which Jaffna Teaching Hospital sewer is connected

COLLECTED BY : Tech Water Laboratories (Pvt) Ltd.

DATE OF COLLECTION : 12.03.2005

DATE OF RECEIPT : 13.03.2005

TEST METHOD & PRINCIPLES : Standard methods for the examination of water & waste water
APHA, AWWA, WEF 1998, 20th edition.

GC-ECD-Gas Chromatography-Electron Capture Detector

GE-NPD-Gas Chromatography-Nitrogen Phosphorous Detector

.....Continuation sheet

Ref. No:10-11/C/MAR/2005

No.	Test Parameters	Test Results		Units
		Sample (a)	Sample (b)	
1	pH	7.2	7.5	
2	Total Dissolve Solids	1819	1771	mg/L
3	BOD (5 Days at 20°C)	292	40	mg/L
4	Sulphate	114	106	mg/L
5	Chloride	988	591	mg/L
6	Sodium Absorption Ratio	0.2	0.2	
7	Arsenic	<0.1	<0.1	mg/L
8	Boron	<0.1	<0.1	mg/L
9	Cadmium	<0.1	<0.1	mg/L
10	Chromium	<0.1	<0.1	mg/L
11	Lead	<0.1	<0.1	mg/L
12	Mercury	<0.0005	<0.0005	mg/L
13	Residual Sodium Carbonate	1.0	0.9	mol/L
14	Oil & Grease	1.2	1	mg/L
15	Radioactive materials **			
16	Odour	Unobjectionable	Unobjectionable	
17	Floatables **			
18	Total Suspended Solids	91.7	28.4	mg/L
19	Temperature at the discharge	30.2	31.3	°C
20	Chemical Oxygen Demand	330	100	mg/L
21	Phenolic Compounds	2.8	0.9	mg/L
22	Cyanides	<0.05	<0.05	mg/L
23	Sulphides	4.2	1.8	mg/L
24	Fluorides	<0.1	<0.1	mg/L
25	Total Residual Chlorine	<0.2	<0.2	mg/L
26	Ammonical Nitrogen	29	18	mg/L
27	Copper	<0.1	<0.1	mg/L
28	Nickel	<0.1	<0.1	mg/L
29	Selenium	<0.001	<0.001	mg/L
30	Zinc	<0.1	<0.1	mg/L
31	Particle size **			
32	Residual Chlorine	<0.2	<0.2	mg/L
33	Colour	40	40	HZU
34	Free Residual Chlorine	<0.2	<0.2	mg/L

35.	Pesticides			
i.	α -HCH	<0.2	<0.2	$\mu\text{g/L}$
ii.	β -HCH	<0.2	<0.2	$\mu\text{g/L}$
iii.	γ -HCH (Lindane)	<0.3	<0.3	$\mu\text{g/L}$
iv.	δ -HCH	<0.2	<0.2	$\mu\text{g/L}$
v.	Aldrin	<0.2	<0.2	$\mu\text{g/L}$
vi.	Dieldrin	<0.2	<0.2	$\mu\text{g/L}$
vii.	Heptachlor	<0.2	<0.2	$\mu\text{g/L}$
viii.	Heptachlorepoxyde	<0.2	<0.2	$\mu\text{g/L}$
ix.	Endrin	<0.2	<0.2	$\mu\text{g/L}$
x.	Endrin aldehyde	<0.2	<0.2	$\mu\text{g/L}$
xi.	Endosulfan I	<0.2	<0.2	$\mu\text{g/L}$
xii.	Endosulfan II	<0.2	<0.2	$\mu\text{g/L}$
xiii.	Endosulfan Sulphate	<0.2	<0.2	$\mu\text{g/L}$
xiv.	p.p' DDE	<0.2	<0.2	$\mu\text{g/L}$
xv.	o.p' DDT	<0.2	<0.2	$\mu\text{g/L}$
xvi.	p.p' DDT	<0.2	<0.2	$\mu\text{g/L}$
xvii.	o.p' DDD	<0.2	<0.2	$\mu\text{g/L}$
xviii.	p.p' DDD	<0.2	<0.2	$\mu\text{g/L}$
xix.	Chlorpyrifos	<1	<1	$\mu\text{g/L}$
xx.	Dimethoate	<5	<5	$\mu\text{g/L}$
xxi.	Diazinon	<2	<2	$\mu\text{g/L}$
xxii.	Fenthion	<2	<2	$\mu\text{g/L}$
xxiii.	Fenitrothion	<2	<2	$\mu\text{g/L}$
xxiv.	Malathion	<2	<2	$\mu\text{g/L}$
xxv.	Parathion	<2	<2	$\mu\text{g/L}$
xxvi.	Parathion Methyl	<2	<2	$\mu\text{g/L}$
xxvii.	Pirimiphos Methyl	<2	<2	$\mu\text{g/L}$
xxviii.	Profenofos	<2	<2	$\mu\text{g/L}$
xxix.	Quinalphos	<2	<2	$\mu\text{g/L}$
xxx.	Carbofuran	<10	<10	$\mu\text{g/L}$
xxxi.	Chlorothalonil	<5	<5	$\mu\text{g/L}$
xxxii.	Captan	<1	<1	$\mu\text{g/L}$
xxxiii.	Metalaxyl	<5	<5	$\mu\text{g/L}$
xxxiv.	Alachlor	<2	<2	$\mu\text{g/L}$
xxxv.	Propanil	<2	<2	$\mu\text{g/L}$

** Not performed

DATES OF PERFORMANCE : 13.03.2005 to 31.03.2005

.....
 Chemist
 (H.G.C.V.Wijesiri)

.....
 Laboratory Manager
 (T.W.L.S. Wasalasooriya)

TEST REPORT

Reference No: SS 1543

SAMPLES : **WATER**

Collection Points : Sample 01 - Tap water distributed by Thinnaveli Water Scheme to the Hospital
Sample 02 - Rain water from the sump near the theatre
Sample 03 - From the Dugwell situated at the Hospital premises

Sampling Method : Grab sampling

Description of sample : Sample 01 - Clear colourless water
Sample 02 - Clear colourless water with settleable matter
Sample 03 - Clear water

Quantity of sample collected : Approximately 05 litres for chemical analysis and 200 ml for bacteriological analysis.

Sampling carried out by : Ms. N. Karunanayake and Mr. W. A. A. Peiris of ITI

Witness : Samples were collected in the presence of Mr. Sellah, Public Health Inspector from Jaffna Teaching Hospital

Date & Time of sampling : 03rd March, 2005 at 11.00 a. m

Temperature of samples at collection : 28°C

Date & time of reception of samples at ITI : 03rd March, 2005 at 5.00 p.m.

Temperature of samples at reception : 28°C

Condition of sample at reception : Satisfactory

TESTED FOR : All the parameters in SLS Standard 614: 1983 Part I & 11 – Physical, Chemical and bacteriological requirements except Anionic detergents. Anionic detergent could not be analysed due to the lack of validated method

Reference client's letter of 26th February, 2005

Date of analysis – 03rd - 19th March, 2005

3 of 6 pages

**TESTS, METHODS & COEFFICIENT
OF VARIATION**

Test	Unit	Method	Coefficient of Variation
Colour, HzU	HzU	APHA 2120 B	-
Odour	-	CETD 1	-
Taste	-	CETD 2	-
# ❖ Turbidity,	NTU	APHA 213 0 B	-
# ❖ pH at 25°C	-	APHA 4500 – H ⁺ B	0.5% (6.88)
# ❖ Electrical Conductivity at 25°C,	µS/cm	APHA 2510 B	1% (700 µS/ cm) 0.5% (74 µS/ cm) 1.5 % (10 µS/ cm)
# ❖ Chloride (as Cl),	mg/L	APHA 4500 – Cl B	1% (125 mg/L) 2% (12.5 mg/L)
# ❖ Total Alkalinity (as CaCO ₃),	mg/L	APHA 2320 B	1% (200 mg/L) 2% (20 mg/L)
Free Ammonia (as NH ₃),	mg/L	SLS 614 Part I 1983	-
Total Residual Chlorine *	mg/L	APHA 4500 Cl - G	-
Albuminoid Ammonia (as NH ₃),	mg/L	SLS 614 Part I 1983	-
Nitrate (as N),	mg/L	APHA 4500 – NO ₃ B	-
Nitrite (as N),	mg/L	APHA 4500 – NO ₂ B	-
❖ Fluoride (as F) at 25°C,	mg/L	APHA 4500 – FC	6% (0.10 mg/L) 3% (1.0 mg/L)
❖ Total Phosphate (as PO ₄),	mg/L	APHA 4500 – P C	9% (19.0 mg/L) 6% (1.0 mg/L)
# ❖ Total Solids at 103-105°C,	mg/L	APHA 2540 B	3% (209 mg/L) 5% (42 mg/L)
# ❖ Total Hardness (as CaCO ₃),	mg/L	APHA 2340 C	3% (225 mg/L) 4% (22 mg/L)
❖ Total Iron (as Fe),	mg/L	APHA 3500 – Fe D	5% (0.2 mg/L)
Sulphate (as SO ₄),	mg/L	Modified APHA SO ₄ ⁴ E	-
Phenolic compounds (as phenolic OH),	mg/L	APHA 5530 B & D	-
Oil & Grease,	mg/L	APHA 5520 B	-
# ❖ COD,	mg/L	APHA 5220 B	3% (250 mg/L) 16% (6 mg/L)
Calcium (as Ca),	mg/L	APHA 3500 Ca - D	-
Magnesium (as Mg),	mg/L	APHA 3111 B	-
❖ Copper (as Cu),	mg/L	APHA 3111 B	2% (1.00 mg/L)
❖ Manganese (as Mn),	mg/L	APHA 3111 B	2% (0.40 mg/L)
❖ Zinc (as Zn),	mg/L	APHA 3111 B	3% (1.00 mg/L)
Aluminium (as Al),	mg/L	APHA 3113 B	-
❖ Arsenic (as As),	mg/L	APHA 3114 C	8% (0.01 µg/L)
❖ Cadmium (as Cd)	mg/L	APHA 3113 A	4% (4.00 µg/L)
Cyanide (as CN)	mg/L	CETD 15	-
❖ Lead (as Pb)	mg/L	APHA 3113 A	6% (20.00 µg/L)
Mercury (as Hg)	mg/L	CETD 42	-
❖ Selenium (as Se)	mg/L	APHA 3114 C	8% (0.01 mg/L)
❖ Chromium (as Cr)	mg/L	APHA 3111 B	7% (0.40 mg/L) 8% (6.6 mg/L)
❖ Total Coliform, (confirmed MPM)	Per 100 ml/	SLS 614 part 2-1983	-
❖ <i>E. coli</i>		SLS 614 part 2-1983	-

RESULTS

Test	Unit	Results		
		Sample 01	Sample 02	Sample 03
Colour, HzU	HzU	5	15	15
Odour	-	Unobjectionable	Unobjectionable	Unobjectionable
Taste	-	Unobjectionable	Unobjectionable	Unobjectionable
# ❖ Turbidity,	NTU	0.18	0.24	0.40
# ❖ pH at 25°C	-	7.60	9.00	7.50
# ❖ Electrical Conductivity at 25°C,	µS/cm	1274	112	2370
# ❖ Chloride (as Cl),	mg/L	178	1	520
# ❖ Total Alkalinity (as CaCO ₃),	mg/L	360	56	630
Total Residual Chlorine *	mg/L	Less than 0.02	Less than 0.02	Less than 0.02
Free Ammonia (as NH ₃),	mg/L	0.01	0.05	0.04
Albuminoid Ammonia (as NH ₃),	mg/L	0.06	0.07	0.07
Nitrate (as N),	mg/L	Less than 0.10	Less than 0.10	Less than 0.10
Nitrite (as N),	mg/L	Less than 0.01	Less than 0.01	Less than 0.01
❖ Fluoride (as F) at 25°C,	mg/L	Less than 0.10	Less than 0.10	0.21
❖ Total Phosphate (as PO ₄),	mg/L	Less than 1.0	Less than 1.0	Less than 1.0
# ❖ Total Solids at 103-105°C,	mg/L	861	82	1495
# ❖ Total Hardness (as CaCO ₃),	mg/L	400	53	585
❖ Total Iron (as Fe),	mg/L	Less than 0.10	Less than 0.10	Less than 0.10
Sulphate (as SO ₄),	mg/L	76	Less than 10	140
Phenolic compounds (as phenolic OH),	mg/L	Less than 0.1	Less than 0.1	Less than 0.1
Oil & Grease,	mg/L	Less than 2	Less than 2	Less than 2
# ❖ COD,	mg/L	Less than 5	Less than 5	Less than 5
Calcium (as Ca),	mg/L	125	20	312
Magnesium (as Mg),	mg/L	19	0.70	94
❖ Copper (as Cu),	mg/L	Less than 0.05	Less than 0.05	Less than 0.05
❖ Manganese (as Mn),	mg/L	Less than 0.02	Less than 0.02	Less than 0.02
❖ Zinc (as Zn),	mg/L	0.03	0.03	0.10
Aluminium (as Al),	mg/L	Less than 0.05	0.14	Less than 0.05
❖ Arsenic (as As),	mg/L	Less than 0.001	Less than 0.001	Less than 0.001
❖ Cadmium (as Cd)	mg/L	Less than 0.001	Less than 0.001	Less than 0.001
Cyanide (as CN)	mg/L	Less than 0.05	Less than 0.05	Less than 0.05
❖ Lead (as Pb)	mg/L	Less than 0.05	Less than 0.05	Less than 0.05
Mercury (as Hg)	mg/L	Less than 0.001	Less than 0.001	Less than 0.001
❖ Selenium (as Se)	mg/L	Less than 0.001	Less than 0.001	Less than 0.001
❖ Chromium (as Cr)	mg/L	Less than 0.05	Less than 0.05	Less than 0.05
❖ Total Coliform, (confirmed MPM)	Per 100 ml/	110	Nil	> 1800
❖ <i>E. coli</i>	-	Present	Absent	Present

Table 2

Test	Coefficient of Variation		Results, µg/L			Limit of determination µg/L
			Sp. 01	Sp. 02	Sp. 03	
Pesticide residues – Test method - CETD 11						
❖ α -HCH	14% (0.2 µg/L)	33% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ β - HCH	-		Not detected	Not detected	Not detected	0.2
❖ γ - HCH (Lindane)	11% (0.2 µg/L)	14% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ δ - HCH	-		Not detected	Not detected	Not detected	0.2
❖ Aldrin	8% (0.2 µg/L)	15% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Dieldrin	13% (0.2 µg/L)	5% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Heptachlor	3% (0.2 µg/L)	20% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Heptachlorepoxide	6% (0.2 µg/L)	5% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Endrin	-		Not detected	Not detected	Not detected	0.2
❖ Endrin aldehyde	18% (0.2 µg/L)	25% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Endosulfan I	17% (0.2 µg/L)	12% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Endosulfan II	16% (1 µg/L)	4% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Endosulfan Sulphate	-		Not detected	Not detected	Not detected	0.2
❖ p,p' DDE	17% (1 µg/L)	5% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
o,p' DDT	-		Not detected	Not detected	Not detected	0.2
p,p' DDT	-		Not detected	Not detected	Not detected	0.2
o,p' DDD	-		Not detected	Not detected	Not detected	0.2
❖ p,p' DDD	15% (1 µg/L)	6% (0.04 µg/L)	Not detected	Not detected	Not detected	0.2
❖ Chlorpyrifos	12% (1 µg/L)		Not detected	Not detected	Not detected	1
Dimethoate	-		Not detected	Not detected	Not detected	5
Diazinon	-		Not detected	Not detected	Not detected	2
Fenthion	-		Not detected	Not detected	Not detected	2
Fenitrothion	-		Not detected	Not detected	Not detected	2
Malathion	-		Not detected	Not detected	Not detected	2
Parathion	-		Not detected	Not detected	Not detected	2
Parathion Methyl	-		Not detected	Not detected	Not detected	2
Pirimiphos Methyl	-		Not detected	Not detected	Not detected	2
Profenofos	-		Not detected	Not detected	Not detected	2
Quinalphos	-		Not detected	Not detected	Not detected	2
Carbofuran	-		Not detected	Not detected	Not detected	10
Chlorothalonil	-		Not detected	Not detected	Not detected	5
Captan	-		Not detected	Not detected	Not detected	1
Metalaxyl	-		Not detected	Not detected	Not detected	5
Alachlor	-		Not detected	Not detected	Not detected	2
Propanil	-		Not detected	Not detected	Not detected	2

APHA – Standard Methods for the examination of water and waste water APHA, AWWA , WEF, 1998 20th edition

CETD – Chemical & Environmental Technology Division # ASTEL Accredited test ❖ SWEDAC Accredited test

Chemical analyses were carried out by Ms. N. Karunanayake, Ms. C. Cooray, Mr. S. K. D. Sarath Kumara, Ms. Y. Pitawela, Mr. H. P. G. Gunawardhana and Ms. S. Wijeratne and bacteriological analysis was carried out by Mr. W. A. A Peiris under supervision of Ms. S. Perera.

Comment : The samples of water collected by ITI officers on 03rd March, 2005 conforms to the requirements of SLS 614: 1983 (Part I & II) for all parameters tested except Total Coliform and *E-coli* for samples 01 & 03.

.....
Ms. S. Wickramaratne
TECHNICAL MANAGER, CHEMICAL & MICROBIOLOGY LABORATORY

Enclosure: Maximum Permissible Level as per SLS: 614:1983 Physical, Chemical and bacteriological requirements.

7. Examination List of Requested Equipment

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Operation Theater Complex															
Operation Room	OT-01	Anesthetic apparatus	A	R	O	O	O	O	O	O	O	Existing too damaged to be used; one for recovery room	4	OT-01	Anesthetic apparatus
Operation Room	OT-02	Anesthetic apparatus with ventilator	A	R	O	O	O	O	O	O	O	Existing too damaged to be used	5	OT-02	Anesthetic apparatus with ventilator
CSSD	OT-03	Autoclave, large size	A	R	O	O	O	O	O	O	O	Existing too damaged to be repaired	2	OT-03	Autoclave, large size
CSSD	OT-04	Autoclave, medium size	A	R	O	O	O	O	O	O	O	Existing too damaged to be repaired	2	OT-04	Autoclave, medium size
Operation Room	OT-05	Blood warmer	B	N	O	O	O	O	O	O	O	Existing too old to be used; quantity not enough	6	OT-05	Blood warmer
Operation Room	OT-06	C-arm X-ray unit	B	R	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-07	Defibrillator	A	R	O	O	O	O	O	O	O	Existing too old to be used	2	OT-06	Defibrillator
Operation Room	OT-08	Drug cabinet	B	N	O	O	O	O	O	O	O	Essential; existing is cardboard box	4	OT-07	Drug cabinet
Operation Room	OT-09	Electric warming pad	B	R	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-10	Electrosurgical unit, complete	A	R	O	O	O	O	O	O	O	Renamed. Function of existing cannot be kept at the time of Project completion	8	OT-08	Electrosurgical unit
Operation Room	OT-11	Electrosurgical unit, simple	B	N	O	X	O	O	O	O	X	shall be planned by OT-10 Electrosurgery Unit, complete.	0		
Operation Room	OT-12	Foot stool	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Operation Room	OT-13	Instrument set for amputation	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-14	Instrument set for cervical fusion surgery	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-15	Instrument set for cleft palate surgery	B	A	O	X	O	O	O	O	X	Can be used with instrument set for pediatric plastic surgery	0		
Operation Room	OT-16	Instrument set for cut down	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-17	Instrument set for dilation & curettage	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-18	Instrument set for E.N.T. surgery	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-19	Instrument set for eye surgery	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-20	Instrument set for forearm surgery	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-21	Instrument set for gastrectomy	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-22	Instrument set for general surgery	B	A	O	O	O	O	O	O	O	Existing can be used	2	OT-09	Instrument set for general surgery
Operation Room	OT-23	Instrument set for intubation	B	A	O	O	O	O	O	O	O	Renamed	4	OT-10	Laryngoscope set
Operation Room	OT-24	Instrument set for laminectomy	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-25	Instrument set for meniscectomy	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-26	Instrument set for micro finger surgery	B	A	O	X	O	O	O	O	X	Existing can be used	0		
Operation Room	OT-27	Instrument set for micro hand surgery	B	A	O	X	O	O	O	O	X	Existing can be used	0		

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Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Operation Room	OT-28	Instrument set for micro vascular surgery	B	N	O	O	O	O	O	O	O		1	OT-11	Instrument set for micro vascular surgery
Operation Room	OT-29	Instrument set for minor and intermediate surgery	B	N	O	O	O	O	O	O	O		1	OT-12	Instrument set for minor and intermediate surgery
Operation Room	OT-30	Instrument set for nephrectomy	B	N	O	O	O	O	O	O	O		1	OT-13	Instrument set for nephrectomy
Operation Room	OT-31	Instrument set for neurology	B	N	O	O	O	O	O	O	O		1	OT-14	Instrument set for neurology
Operation Room	OT-32	Instrument set for oesophageal dilator	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-33	Instrument set for orthopaedic surgery	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-34	Instrument set for pediatric plastic surgery	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-35	Instrument set for prostatectomy	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-36	Instrument set for skin grafting	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-37	Instrument set for thoracic surgery	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-38	Instrument set for thyroidotomy	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-39	Instrument set for tonsillectomy	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-40	Instrument set for tracheostomy	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-41	Instrument set for vaginal hysterectomy & repair	B	A	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-42	Instrument table with guard rail	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-43	Instrument table with three fan-shaped tray	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-44	Instrument table, mayo's type	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-45	Klek bucket	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Operation Room	OT-46	Laundry cart	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Recovery	OT-47	Neonatal resuscitator with over head warmer	B	N	O	O	O	O	O	O	O		1	OT-15	Neonatal resuscitator with over head warmer
Operation Room	OT-48	Neuro muscular monitor	B	R	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Operation Room	OT-49	Operation chair	A	R	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Operation Room	OT-50	Operation Lamp	A	R	Δ	O	O	O	O	O	O	Planning two different type	4	OT-16	Operation Lamp, complete
Operation Room	OT-51	Operation Lamp, mobile with battery back up unit	B	R	O	O	O	O	O	O	O	Existent too damaged to be used	4	OT-17	Operation Lamp, simple
Operation Room	OT-52	Operation monitor	A	R	O	O	O	O	O	O	O	Lack of quantity; mountable on anesthesia apparatus	3	OT-18	Operation Lamp, mobile with battery back up unit
Operation Room	OT-53	Operation table	A	R	O	O	O	O	O	O	O	Existent too damaged to be used	8	OT-19	Operation monitor
Operation Room	OT-54	Operation table, Orthopedic	A	R	O	O	O	O	O	O	O	Existent too damaged to be used	7	OT-20	Operation table
Operation Room			A	R	O	O	O	O	O	O	O	Existent too damaged to be used	1	OT-21	Operation table for orthopedic

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Recovery	OT-55	Patient monitor	A	R	O	X	O	O	O	O	X	Existent in ICU can be used	0		
Recovery	OT-56	Recovery bed	A	N	O	O	O	O	O	O	O		8	OT-22	Recovery bed
Operation Room	OT-57	Retractor set	B	R	O	X	O	O	O	O	X	Included in Instrument set	0		
CSSD	OT-58	Shelf for container	B	R	O	O	O	O	O	O	O		2	OT-23	Shelf for container
CSSD	OT-59	Shelf for instrument	B	R	O	O	O	O	O	O	O		2	OT-24	Shelf for instrument
CSSD	OT-60	Sink unit	B	N	O	O	O	O	O	O	O		1	OT-25	Sink unit
CSSD	OT-61	Sterilizing container	B	R	O	O	O	O	O	O	O		1	OT-26	Sterilizing container
Operation Room	OT-62	Stretcher	B	R	O	O	O	O	O	O	O	Existent too damaged to be used	2	OT-27	Stretcher
Operation Room	OT-63	Suction unit	A	R	△	O	O	O	O	O	O	Planning portable type and kick type	3	OT-28	Suction unit, portable type
Operation Room	OT-64	Surgical hand scrub unit	A	N	O	O	O	O	O	O	O	10 units for 8 operation rooms	8	OT-29	Suction unit, kick type
Operation Room	OT-65	Syringe pump	A	R	O	O	O	O	O	O	O		10	OT-30	Surgical hand scrub unit
Operation Room	OT-66	Ventilator	B	R	O	X	O	O	O	O	X	Existent can be used	4	OT-31	Syringe pump
Operation Room	OT-67	Warming blanket	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Operation Room	OT-68	Working table	B	N	O	O	O	O	O	O	O	Can be procured by Hospital	0		
Operation Room	OT-69	X-ray film viewer	A	R	O	O	O	O	O	O	O	Renamed	2	OT-32	Working table
Operation Room		Automatic disinfectant	B	N	O	O	O	O	O	O	O	Preliminary washing for instrument in septic operation	11	OT-33	X-ray film viewer, large, wall mount type
													1	OT-34	Automatic disinfectant
ICU															
ICU	IC-01	Ambubag for adult	A	N	O	O	O	O	O	O	O		4	IC-01	Ambubag for adult
ICU	IC-02	Ambubag for pediatrics	A	N	O	O	O	O	O	O	O		2	IC-02	Ambubag for pediatrics
ICU	IC-03	Autoclave, table top type	A	R	O	O	O	O	O	O	O		1	IC-03	Autoclave, table top type
ICU	IC-04	Bedpan shelf	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
ICU	IC-05	Blood gas analyzer	C	R	O	X	O	O	O	O	X	Existent can be used	0		
ICU	IC-06	Blood warmer	B	N	O	O	O	O	O	O	O		4	IC-04	Blood warmer
ICU	IC-07	Central monitor	A	N	O	O	O	O	O	O	O		1	IC-05	Central monitor
ICU	IC-08	Defibrillator	A	R	O	O	O	O	O	O	O		1	IC-06	Defibrillator
ICU	IC-09	ECG	B	R	O	O	O	O	O	O	O		1	IC-07	ECG
ICU	IC-10	External cardiac pace maker	B	N	X	X	O	O	O	O	X	Low frequency of use	0		

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)	
ICU	IC-11	Glucosemeter	C	N	X	X	O	O	O	O	X	Function overlapped with Glucosemeter in Central Laboratory	0			
ICU	IC-12	Hemoglobinmeter	C	N	X	X	O	O	O	O	X	Function overlapped with Hemoglobinmeter in Central Laboratory	0			
ICU	IC-13	ICU bed	A	R	O	O	O	O	O	O	O		22	IC-08	ICU bed	
ICU	IC-14	Infusion pump	A	R	O	O	O	O	O	O	O		10	IC-09	Infusion pump	
ICU	IC-15	Laryngoscope set	A	N	O	O	O	O	O	O	O	Each for surgery, internal medicine and Infection	3	IC-10	Laryngoscope set	
ICU	IC-16	Mobile X-ray unit	C	N	O	X	O	O	O	O	X	Function overlapped with Mobile X-ray unit in Radiology	0			
ICU	IC-17	Ophthalmoscope	B	N	O	O	O	O	O	O	O		2	IC-11	Ophthalmoscope	
ICU	IC-18	Patient monitor	A	R	O	O	O	O	O	O	O		22	IC-12	Patient monitor	
ICU	IC-19	Patient monitor for pediatrics	A	N	O	X	O	O	O	O	X	Function overlapped with Patient monitor	0			
ICU	IC-20	Shelf for instrument	B	N	O	O	O	O	O	O	O		3	IC-13	Shelf for instrument	
ICU	IC-21	Shelf for linen	B	N	O	O	O	O	O	O	O		3	IC-14	Shelf for linen	
ICU	IC-22	Spot lamp	B	N	O	O	O	O	O	O	O	Planning shadowless type, without battery	1	IC-15	Spot lamp	
ICU	IC-23	Stethoscope	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0			
ICU	IC-24	Stretcher	B	N	O	O	O	O	O	O	O		2	IC-16	Stretcher	
ICU	IC-25	Stretcher, radiotransparent	A	N	O	O	O	O	O	O	O		1	IC-17	Stretcher, radiotransparent	
ICU	IC-26	Suction unit	A	R	O	O	O	O	O	O	O	Planning portable type and wall mount type; one for three beds	7	IC-18	Suction unit, wall mount type	
ICU	IC-26	Suction unit	A	R	O	O	O	O	O	O	O	Planning portable type and wall mount type	2	IC-19	Suction unit, portable type	
ICU	IC-27	Syringe pump	A	R	O	O	O	O	O	O	O		10	IC-20	Syringe pump	
ICU	IC-28	Trolley	B	R	O	X	O	O	O	O	X	Can be procured by Hospital	0			
ICU	IC-29	Ventilator	A	R	O	O	O	O	O	O	O	Renamed; Function of existent cannot be kept at the time of Project completion	7	IC-21	Ventilator for adult	
ICU	IC-30	Ventilator for pediatrics	A	R	O	O	O	O	O	O	O		2	IC-22	Ventilator for pediatrics	
ICU	IC-31	Wright spirometer	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0			
ICU	IC-32	X-ray film viewer	A	R	O	O	O	O	O	O	O	Renamed	2	IC-23	X-ray film viewer, large, mobile type	
Central Laboratory Complex																
Hematology	LA-01	Arm rest for blood collection	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0			
Washing	LA-02	Autoclave, table top type	A	R	O	O	O	O	O	O	O		1	LA-01	Autoclave, table top type	
Washing	LA-03	Autoclave, vertical type	A	R	O	O	O	O	O	O	O		1	LA-02	Autoclave, vertical type	
Biochemistry	LA-04	Automatic biochemistry analyzer	B	N	O	O	O	O	O	O	O		1	LA-03	Automatic biochemistry analyzer	

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Hematology	LA-05	Automatic blood cell analyzer	B	R	O	X	O	O	O	O	X	Existent can be used	0		
Biochemistry	LA-06	Balance	B	R	O	O	O	O	O	O	O	Existent too damaged to be used	2	LA-04	Electronic balance
Hematology	LA-07	Bilirubinmeter	A	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	LA-05	Bilirubinmeter
Hematology	LA-08	Blood culture monitor	C	N	O	X	X	X	X	X	X	Low frequency to use	0		
Hematology	LA-09	Blood gas analyzer	A	N	O	O	O	O	O	O	O		1	LA-06	Blood gas analyzer
Microbiology	LA-10	Bottom, pyrex	C	R	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Microbiology	LA-11	Bunsen burner	B	R	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Biochemistry	LA-12	Centrifuge	A	R	O	O	O	O	O	O	O		3	LA-07	Centrifuge
Microbiology	LA-13	Drying cabinet	A	R	O	O	O	O	O	O	O		1	LA-08	Drying cabinet
Biochemistry	LA-14	Electrolyte analyzer	B	R	O	X	O	O	O	O	X	Can be substituted for Flamephotometer	0		
Biochemistry	LA-15	Electrophoresis system	A	R	O	O	O	O	O	O	O	Existent cannot be used	1	LA-09	Electrophoresis system
Hematology	LA-16	ELISA reader	B	N	O	O	O	O	O	O	O		1	LA-10	ELISA reader
Microbiology	LA-17	ELISA washer	B	N	O	O	O	O	O	O	O		1	LA-11	ELISA washer
Hematology	LA-18	ESR analyzer	C	N	X	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Biochemistry	LA-19	Flamephotometer	A	R	O	O	O	O	O	O	O		1	LA-12	Flamephotometer
Microbiology	LA-20	Freeze drier	A	N	O	X	O	O	O	O	X	Low frequency to use	0		
Microbiology	LA-21	Deep freezer	A	N	O	O	O	O	O	O	O		1	LA-13	Deep freezer
Microbiology	LA-22	Glass ware set	B	R	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Hematology	LA-23	Glucosemeter	A	R	O	X	O	O	O	O	X	Can be substituted for Automatic biochemistry analyzer	0		
Hematology	LA-24	Haematogloblin variant analyzer	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Microbiology	LA-25	Heat dry block	A	N	O	O	O	O	O	O	O		1	LA-14	Heat dry block
Hematology	LA-26	Hemoglobinmeter	A	R	O	X	O	O	O	O	X	Existent can be used	0		
Microbiology	LA-27	Hot air oven	A	R	O	O	O	O	O	O	O		1	LA-15	Hot air oven
Microbiology	LA-28	Hot plate	B	R	O	X	O	O	O	O	X	Can be substituted for Hopt Plate Stirrer	0		
Microbiology	LA-29	Hot plate stirrer	A	N	O	O	O	O	O	O	O		1	LA-16	Hot plate stirrer
Microbiology	LA-30	Incubator	A	R	O	O	O	O	O	O	O		1	LA-17	Incubator
Microbiology	LA-31	Laminar flow cabinet	A	N	O	O	O	O	O	O	O		1	LA-18	Laminar flow cabinet
Microbiology	LA-32	Liquid dispenser	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Microbiology	LA-33	Media sterilizer	A	R	O	O	O	O	O	O	O		1	LA-19	Media sterilizer
Hematology	LA-34	Micro plate viewer	B	N	O	O	O	O	O	O	O		1	LA-20	Micro plate viewer
Histo-pathology	LA-35	Microscope	A	R	O	O	O	O	O	O	O	Existent too damaged to be used	4	LA-21	Microscope
Histo-pathology	LA-36	Microscope with CCD camera and monitor	A	N	O	O	O	O	O	O	O	Side-by-side observation unit for two observers	1	LA-22	Microscope with CCD camera and monitor
Histo-pathology	LA-37	Microtome, rotary type	B	R	O	O	O	O	O	O	O	Existent too damaged to be used	1	LA-23	Microtome, rotary type
Biochemistry	LA-38	Osmometer	B	N	O	O	O	O	O	O	O		1	LA-24	Osmometer
Hematology	LA-39	PH meter	A	N	O	O	O	O	O	O	O		1	LA-25	PH meter
Hematology	LA-40	Pipette	C	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Biochemistry	LA-41	Pipette drier	C	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Microbiology	LA-42	Plate incubator	B	R	O	O	O	O	O	O	O		1	LA-26	Plate incubator
Hematology	LA-43	Plate washer	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Microbiology	LA-44	Refrigerator	A	R	O	O	O	O	O	O	O		2	LA-27	Refrigerator
Hematology	LA-45	Rotamixer	A	R	Δ	O	O	O	O	O	O		2	LA-28	Rotamixer
Hematology	LA-45	Rotamixer	A	R	O	O	O	O	O	O	O	Renamed	1	LA-29	Hematology mixer
Hematology	LA-46	Semi automated coagulation analyzer	B	N	O	O	O	O	O	O	O		1	LA-30	Semi automated coagulation analyzer
Washing	LA-47	Shelf for Instrument	B	R	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Histo-pathology	LA-48	Slide staining machine	B	N	O	O	O	O	O	O	O	Renamed	1	LA-31	Slide staining apparatus
Biochemistry	LA-49	Spectrophotometer	A	N	O	O	O	O	O	O	O		1	LA-32	Spectrophotometer
Microbiology	LA-50	Standard wire loupe	C	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Biochemistry	LA-51	Stirrer	B	R	O	O	O	O	O	O	O		1	LA-33	Stirrer
Microbiology	LA-52	Stopwatch	C	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Histo-pathology	LA-53	Tissue processor	B	N	O	O	O	O	O	O	O	Renamed	1	LA-34	Tissue processing apparatus
Histo-pathology	LA-54	Urine analyzer	A	N	Δ	O	O	O	O	O	X	Can be substituted for Spectrophotometer and Urine meter	0		
Histo-pathology	LA-55	Urine meter	A	N	O	O	O	O	O	O	O		1	LA-35	Urine meter
Microbiology	LA-56	UV Sterilizer	A	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
atology & Microbi	LA-57	Water bath	A	R	O	O	O	O	O	O	O		2	LA-36	Water bath
Microbiology	LA-58	Wire loupe, straight wire, normal	C	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		

Central Facilities for Diagnostic Imaging

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Radiology	RA-01	Bone densitometer	C	N	O	X	X	X	X	X	X	Not measured so far and little possibility to be done in the future	0		
Radiology	RA-02	Dark room accessories	A	R	O	O	O	O	O	O	O	Including Lead numbering set	1	RA-01	Dark room accessories
Radiology	RA-03	Dental X-ray, panorama type	A	N	O	O	O	O	O	O	O		1	RA-02	Dental X-ray, panorama type
Radiology	RA-04	Digital fluoro & radiography system	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Radiology	RA-05	Digital mammography system	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Radiology	RA-06	Examination table	B	R	O	O	O	O	O	O	O		2	RA-03	Examination table
Radiology	RA-07	High performance computer radiography system	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		High performance computer radiography system
Radiology	RA-08	Instrument table with guard rail	B	N	O	X	O	O	O	O	O	Can be procured by Hospital	0		
Radiology	RA-09	Laryngoscope set	B	N	O	X	O	O	O	O	O	Can be procured by Hospital	0		
Radiology	RA-10	Laser camera	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Radiology	RA-11	Lead numbering set	A	N	O	X	O	O	O	O	O	Included in Dark room accessories	0		
Radiology	RA-12	Mammography unit	A	N	O	O	O	O	O	O	O		1	RA-04	Mammography unit
Radiology	RA-13	Mobile lamp	B	N	X	X	O	O	O	O	X	Not necessary because of facilities improved	0		
Radiology	RA-14	Mobile X-ray unit	A	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	RA-05	Mobile X-ray unit
Radiology	RA-15	C-arm X-ray unit	C	N	O	X	X	X	X	X	X	Used in operation theater, not radiology	0		
Radiology	RA-16	Pass box	A	N	O	O	O	O	O	O	O		1	RA-06	Pass box
Radiology	RA-17	Resuscitation bag for adult	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Radiology	RA-18	Resuscitation bag for paediatrics	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Radiology	RA-19	Shelf for instrument	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Radiology	RA-20	Stretcher	B	N	O	X	O	O	O	O	X	Existent can be used	0		
Radiology	RA-21	Teleradiology	C	N	O	X	X	X	X	X	X	Cannot be used under current system of the hospital	0		
Ultrasound	RA-22	Ultrasound scanner, B/W	A	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	RA-07	Ultrasound scanner, B/W
Ultrasound	RA-23	Ultrasound scanner, color doppler	A	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	RA-08	Ultrasound scanner, color doppler
Ultrasound	RA-24	Ultrasound scanner, digital color doppler	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Ultrasound	RA-25	Work station	C	N	O	X	X	X	X	X	X	Lack of competence to maintain at present	0		
Viewing/Dark Room	RA-26	X-ray film processor	A	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	RA-09	X-ray film processor
Viewing/Dark Room	RA-27	X-ray film viewer	A	R	O	O	O	O	O	O	O	Renamed	1	RA-10	X-ray film viewer, small, wall mount type
Viewing/Dark Room	RA-28	X-ray film viewer, Large	A	N	O	O	O	O	O	O	O	Renamed	2	RA-11	X-ray film viewer, large, wall mount type

Appendix 7 Examination List of Requested Equipment

Department (Request)	Minutes No.	Description (Request)	Priority	Category	①	②	③	④	⑤	⑥	⑦	Remarks	Qty	Item No	Description (Project)
Viewing/Dark Room	RA-29	X-ray protective set	A	R	O	O	O	O	O	O	O		1	RA-12	X-ray protective set
Radiology	RA-30	X-ray system, fluoroscopy	A	R	O	O	O	O	O	O	O		1	RA-13	X-ray system, fluoroscopy
Radiology	RA-31	X-ray system, simple bucky and stand	A	R	O	O	O	O	O	O	O		3	RA-14	X-ray system, simple bucky and stand
Endoscope	VS-01	Bronchoscope	B	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	VS-01	Bronchoscope
Endoscope	VS-02	Colonoscope	B	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	VS-02	Colonoscope
Endoscope	VS-03	Cystoscope	B	N	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	VS-03	Cystoscope
Endoscope	VS-04	Endoscopic retrograde cholangiopancreatography	B	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	VS-04	Endoscopic retrograde cholangiopancreatography
Endoscope	VS-05	Endoscopic cabinet	B	R	O	O	O	O	O	O	O	Existent cannot be moved to building constructed under Project	1	VS-05	Endoscopic cabinet
Endoscope	VS-06	Examination table	B	R	O	O	O	O	O	O	O	Renamed	2	VS-06	Examination table for endoscope
Endoscope	VS-07	Upper gastrointestinalscope	B	R	O	O	O	O	O	O	O	Function of existent cannot be kept at the time of Project completion	1	VS-07	Upper gastrointestinalscope
Physiological Diagnosis	EE-01	EEG	A	R	O	O	O	O	O	O	O		1	EE-01	EEG
Physiological Diagnosis	EE-02	Examination table	B	R	O	O	O	O	O	O	O		1	EE-02	Examination table
Physiological Diagnosis	EC-01	ECG	A	R	O	O	O	O	O	O	O		2	EC-01	ECG
Physiological Diagnosis	EC-02	ECG, holter testing	A	R	O	O	O	O	O	O	O		1	EC-02	ECG, holter testing
Physiological Diagnosis	EC-03	ECG, stress testing	B	R	O	O	O	O	O	O	O		1	EC-03	ECG, stress testing
Physiological Diagnosis	EC-04	Examination table	B	R	O	O	O	O	O	O	O		2	EC-04	Examination table
Training Management															
Lecture room	CO-01	Digital voice recorder	B	N	X	X	O	O	O	O	X	Can be procured by Hospital	0		
Lecture room	CO-02	Multimedia projector	B	N	O	O	O	O	O	O	O	Necessary for lecture, meeting, conference, etc.	1	CO-01	Multimedia projector
Lecture room	CO-03	Over head projector	B	N	X	X	O	O	O	O	X	Can be procured by Hospital	0		
Lecture room	CO-04	TV & video recorder	B	N	X	X	O	O	O	O	X	Can be procured by Hospital	0		
Lecture room	CO-05	White board	B	N	X	X	O	O	O	O	X	Can be procured by Hospital	0		
Maintenance	ME-01	Computer, desk top type	B	N	O	X	O	O	O	O	X	Can be procured by Hospital	0		
Maintenance	ME-02	Tool set	B	R	O	O	O	O	O	O	O	Necessary for maintenance services	1	ME-01	Tool set

Category : N=New, R=Replacement, A=Additional

①=Purpose, ②=Necessity, ③=Technique, ④=Organization of Operation, ⑤=Organization of Maintenance, ⑥=Operation & Maintenance Fee, ⑦=Judgement

8. Planned Equipment List

Appendix 8 Planned Equipment List

Item No.	Description	Q'ty
OT-01	Anesthetic apparatus	4
OT-02	Anesthetic apparatus with ventilator	5
OT-03	Autoclave, large size	2
OT-04	Autoclave, medium size	2
OT-05	Blood warmer	6
OT-06	Defibrillator	2
OT-07	Drug cabinet	4
OT-08	Electrosurgical unit	8
OT-09	Instrument set for general surgery	2
OT-10	Laryngoscope set	4
OT-11	Instrument set for micro vascular surgery	1
OT-12	Instrument set for minor and intermediate surgery	1
OT-13	Instrument set for nephrectomy	1
OT-14	Instrument set for neurology	1
OT-15	Neonatal resuscitator with over head warmer	1
OT-16	Operation Lamp, complete type	4
OT-17	Operation Lamp, simple type	4
OT-18	Operation Lamp, mobile with battery back up unit	3
OT-19	Operation monitor	8
OT-20	Operation table	7
OT-21	Operation table for orthopedic	1
OT-22	Recovery bed	8
OT-23	Shelf for container	2
OT-24	Shelf for instrument	2
OT-25	Sink unit	1
OT-26	Sterilizing container	1
OT-27	Stretcher	2
OT-28	Suction unit, portable type	3
OT-29	Suction unit, kick type	8
OT-30	Surgical hand scrub unit	10
OT-31	Syringe pump	4
OT-32	Working table	2
OT-33	X-ray film viewer, large, wall mount type	11
OT-34	Automatic disinfectant	1
IC-01	Ambubag for adult	4
IC-02	Ambubag for pediatrics	2
IC-03	Autoclave, table top type	1
IC-04	Blood warmer	4
IC-05	Central monitor	1
IC-06	Defibrillator	1
IC-07	ECG	1
IC-08	ICU bed	22
IC-09	Infusion pump	10
IC-10	Laryngoscope set	3
IC-11	Ophthalmoscope	2
IC-12	Patient monitor	22
IC-13	Shelf for instrument	3
IC-14	Shelf for linen	3
IC-15	Spot lamp	1
IC-16	Stretcher	2
IC-17	Stretcher, radiotransparent	1
IC-18	Suction unit, wall mount type	7
IC-19	Suction unit, portable type	2
IC-20	Syringe pump	10

Appendix 8 Planned Equipment List

Item No.	Description	Q'ty
IC-21	Ventilator for adult	7
IC-22	Ventilator for pediatrics	2
IC-23	X-ray film viewer, large, wall mount type	2
LA-01	Autoclave, table top type	1
LA-02	Autoclave, vertical type	1
LA-03	Automatic biochemistry analyzer	1
LA-04	Electronic balance	2
LA-05	Bilirubinmeter	1
LA-06	Blood gas analyzer	1
LA-07	Centrifuge	3
LA-08	Drying cabinet	1
LA-09	Electrophoresis system	1
LA-10	ELISA reader	1
LA-11	ELISA washer	1
LA-12	Flamephotometer	1
LA-13	Deep freezer	1
LA-14	Heat dry block	1
LA-15	Hot air oven	1
LA-16	Hot plate stirrer	1
LA-17	Incubator	1
LA-18	Laminar flow cabinet	1
LA-19	Media sterilizer	1
LA-20	Micro plate viewer	1
LA-21	Microscope	4
LA-22	Microscope with CCD camera and monitor	1
LA-23	Microtome, rotary type	1
LA-24	Osmometer	1
LA-25	PH meter	1
LA-26	Plate incubator	1
LA-27	Refrigerator	2
LA-28	Rotamixer	2
LA-29	Hematology mixer	1
LA-30	Semi automated coagulation analyzer	1
LA-31	Slide staining apparatus	1
LA-32	Spectrophotometer	1
LA-33	Stirrer	1
LA-34	Tissue processing apparatus	1
LA-35	Urine meter	1
LA-36	Water bath	2
RA-01	Dark room accessories	1
RA-02	Dental X-ray, panorama type	1
RA-03	Examination table	2
RA-04	Mammography unit	1
RA-05	Mobile X-ray unit	1
RA-06	Pass box	1
RA-07	Ultrasound scanner, B/W	1
RA-08	Ultrasound scanner, color doppler	1
RA-09	X-ray film processor	1
RA-10	X-ray film viewer, small, wall mount type	1
RA-11	X-ray film viewer, large, wall mount type	2
RA-12	X-ray protective set	1
RA-13	X-ray system, fluoroscopy	1
RA-14	X-ray system, simple bucky and stand	3
VS-01	Bronchoscope	1

Appendix 8 Planned Equipment List

Item No.	Description	Q'ty
VS-02	Colonoscope	1
VS-03	Cystoscope	1
VS-04	Endoscopic retrograde cholangiopancreatography	1
VS-05	Endoscopic cabinet	1
VS-06	Examination table for endoscope	2
VS-07	Upper gastrointestinalscope	1
EE-01	EEG	1
EE-02	Examination table	1
EC-01	ECG	2
EC-02	ECG, holter testing	1
EC-03	ECG, stress testing	1
EC-04	Examination table	2
CO-01	Multimedia projector	1
ME-01	Tool set	1

9. Detail of Main Equipment

Appendix 9 Detail of main equipment

Item No.	Description	Main specifications or components	Equipment	Qty	Purpose Appropriateness of medical equipment grade
OT-01	Anesthetic apparatus	<ol style="list-style-type: none"> Closed circuit type O₂ flow meter range <ol style="list-style-type: none"> Minimum : 0.1 liter/min. or less Maximum : 10 liter/min. or more N₂O flow meter range <ol style="list-style-type: none"> Minimum : 0.5 liter/min. or less Maximum : 10L liter/min. or more Vaporizer : Halothane, isoflurane and sevoflurane 	Middle Grade	4	To do general anesthesia during operations
OT-02	Anesthetic apparatus with ventilator	<ol style="list-style-type: none"> Anesthetic apparatus <ol style="list-style-type: none"> Closed circuit type O₂ flow meter range <ol style="list-style-type: none"> Minimum : 0.1 liter/min. or less Maximum : 10 liter/min. or more N₂O flow meter range <ol style="list-style-type: none"> Minimum : 0.5 liter/min. or less Maximum : 10L liter/min. or more Vaporizer : Halothane, isoflurane and sevoflurane Ventilator <ol style="list-style-type: none"> Ventilation mode : Pressure and volume control Tidal volume range <ol style="list-style-type: none"> Minimum : 50mL or less Maximum : 1,200mL or more 	Middle Grade	5	To ventilate to the patients under general anesthesia during operations
OT-03	Autoclave, large size	<ol style="list-style-type: none"> Horizontal type Double door type (pass through) Nominal chamber volume : 590 liter or more Built-in boiler Sterilizing temperature : 132°C or more 	Middle Grade	2	To sterilize instruments and linens used in the operation theaters and inpatient wards, with use of high pressure steam
OT-04	Autoclave, medium size	<ol style="list-style-type: none"> Horizontal type Double door type (pass through) Nominal chamber volume : 225 liter or more Built-in boiler Sterilizing temperature : 132°C or more 	Middle Grade	2	To sterilize instruments and linens used in the operation theaters and inpatient wards, with use of high pressure steam
OT-13	Instrument set for nephrectomy	<ol style="list-style-type: none"> Components : 61 items Material : Stainless steel 	Middle Grade	1	To carry out nephrectomy
OT-14	Instrument set for neurology	<ol style="list-style-type: none"> Components : 67 items Material : Stainless steel 	Middle Grade	1	To carry out neurosurgery
OT-16	Operation lamp, complete type	<ol style="list-style-type: none"> Ceiling type Lamp intensity of main light : 130,000 lux or more Arm : Radial arm type Operating time of battery back up : 2 hours or more 	Middle Grade	4	To keep brightness enough to operate and enable surgeons to see colors correctly
OT-19	Operation monitor	<ol style="list-style-type: none"> Measurement parameter : ECG, respiration, SpO₂, NIBP, ET/CO₂, temperature ECG lead : 3-electrodes or more With cart 	Middle Grade	8	To monitor and measure continuously vital signs of patients under general anesthesia in operation theaters
OT-20	Operation table	<ol style="list-style-type: none"> Accessory : Arm board, X-ray cassette holder, shoulder support, body support and knee crutch Operation <ol style="list-style-type: none"> Height elevating : Hydraulic oil pump by foot pedal Positioning : Manual handle or/and foot pedal Height elevating type Positioning : Trendelenburg, lateral tilting and back section 	Middle Grade	7	To position patients suitable for various operations
OT-21	Operation table for orthopedic	<ol style="list-style-type: none"> Electro hydraulic operation Table top size : Approx. 195(L) x 50(W)cm With limb traction device set Height adjustment : 75 to 95cm or more Trendelenburg : 20° or more Lateral tilting : 18° or more (right and left) Back section : 30° up or more Hip section : 30° up/ 90° down or more Leg section : 90° down or more 	Middle Grade	1	To position patients suitable for orthopedic operations
OT-34	Automatic disinfectant	<ol style="list-style-type: none"> Single door type Chamber capacity : 110 liter or more Disinfection progress : Washing - disinfection - drying 	Middle Grade	1	To wash and dry used instruments automatically in infectious section
IC-05	Central monitor	<ol style="list-style-type: none"> Number of patient on the display : 16 patients or more Display size : 17 inch or more Waveform display items : ECG, respiration and SpO₂ Alphanumeric display items : Heart rate, pulse rate, SpO₂, NIBP and temperature 	Middle Grade	1	To monitor centrally in ICU, via central monitor and 22 patient monitors
IC-21	Ventilator for adult	<ol style="list-style-type: none"> For adult Ventilation mode : Volume and pressure control PEEP : 0 to 19cmH₂O or more Inspiration pressure : 1 to 39cmH₂O or more Pressure support : 1 to 39cmH₂O or more Oxygen concentration : 21 to 100% 	Middle Grade	7	To ventilate to adult patients with difficulty to breathe voluntarily in ICU
IC-22	Ventilator for pediatrics	<ol style="list-style-type: none"> For pediatrics Ventilation mode : Volume and pressure control PEEP : 0 to 19cmH₂O or more Inspiration pressure : 1 to 39cmH₂O or more Pressure support : 1 to 39cmH₂O or more Oxygen concentration : 21 to 100% 	Middle Grade	2	To ventilate to child patients with difficulty to breathe voluntarily in ICU

Appendix 9 Detail of main equipment

Item No.	Description	Main specifications or components	Equipment	Qty	Purpose Appropriateness of medical equipment grade
LA-03	Automatic biochemistry analyzer	1. Test throughput : 180 tests/hour or more 2. Test menu : 24 tests or more 3. Built-in auto sampler 4. With printer	Middle Grade	1	To analyze metabolic condition rapidly from patients' samples like blood and urine with use of reagents
LA-06	Blood gas analyzer	1. Measurement parameter : pH, pCO ₂ and PO ₂ 2. Sample volume : 100µL or less 3. Built-in printer 4. LCD display	Middle Grade	1	To analyze respiratory and metabolic functions from measurement of pCO ₂ , PO ₂ and electrolyte in blood samples
LA-10	ELISA reader	1. Detection method : Absorbance 2. Measurement range : 0 to 3.0 OD or more 3. Light source : Tungsten halogen bulb 4. Temperature control function : Provided	Middle Grade	1	To analyze absorbance with ELISA test
LA-12	Flamephotometer	1. Measurement parameter : Sodium(Na), potassium(K) and lithium(Li) 2. Application gas : LP gas 3. Digital display	Middle Grade	1	To analyze metabolic function by measuring metallic elements from patients' samples of blood and urine with use of reagents
LA-18	Laminar flow cabinet	1. Safety cabinet class II type B3, floor stand type 2. Filter element : HEPA filter 3. Chamber material : Stainless steel	Middle Grade	1	To prevent pathogens from dispersing outside laboratory and technicians from being transmitted
LA-22	Microscope with CCD camera and monitor	1. Side by side teaching unit for 2 observers 2. Nose piece : Quintuple or sextuple, detachable type 3. Illumination : 6 or 12V/ 25 or 30W lamp 4. Accessory : 1/2inch or more color CCD camera and 17inch color monitor	Middle Grade	1	To enable some technicians to observe imaging of microscope from monitor
LA-24	Osmometer	1. Sample volume : 250µL or less 2. Measurement range : Max. 2,000mOsmols/kg or more 3. Digital display	Middle Grade	1	To examine metabolic function with measuring osmotic pressure
LA-30	Semi automated coagulation analyzer	1. Measurement parameter: Prothrombin time, Activated partial thromboplastin time, Fibrinogene, Thrombin time, and Factors III, IX and XI 2. Incubation function : Provided 3. Display : LCD	Middle Grade	1	To measure solidification (hemostasis) time of blood in the blood vessel inside and outside and use it to inspect abnormality of a solidification function and a liver function
RA-01	Dark room accessories	1. Film mark set 1) Type : Alphabets and numeral 2. Film loading and unloading table 1) Material : Wood 3. X-ray film cassette 1) 6 kinds, each 8pcs./kind 4. Intensifying screen 1) High speed type 5. Pocket dosimeter 1) Measurement range : 0 to 2.00mSv or more	Middle Grade	1	To intensify X-ray films, store developed films, etc. in radiology rooms
RA-02	Dental X-ray, panorama type	1. Tube voltage : Max. 80kV or more 2. Tube current : Max. 10mA or more 3. Exposure time : 15 seconds or less	Middle Grade	1	To radiograph teeth and bones around them
RA-04	Mammography unit	1. Generator : Inverter or high frequency type 2. Tube voltage : Max. 35kV or more 3. Tube current : Max. 600mAs or more 4. X-ray film cassette size : 18 x 24cm	Middle Grade	1	To radiograph myomas inside breasts
RA-05	Mobile X-ray unit	1. Generator : Inverter or high frequency type 2. Tube voltage : Max. 125kV or more 3. Tube current : Max. 160mAs or more 4. Focal size : 1.0mm or less	Middle Grade	1	To implement radiographic examinations urgently and simple for unwalkable patients in operation theater and wards
RA-07	Ultrasound scanner, B/W	1. Scanning method : Electronic convex and linear 2. Image mode : B and M mode 3. Image display mode : B, dual B, M and B&M 4. With printer	Middle Grade	1	To visually diagnose mainly abdomen, thyroid gland, etc.
RA-08	Ultrasound scanner, color doppler	1. Scanning method : Electronic convex, sector and linear 2. Image mode : B, M, pulsed wave doppler (PWD) and continuous wave doppler (CWD) mode 3. Image display mode : B, M, pulsed wave doppler (PWD) and continuous wave doppler (CWD) mode 4. With printer and MD drive 5. Cine memory : Provided	Middle Grade	1	To visually diagnose bloodstream and ultrasound image of heart, abdomen, thyroid gland, etc. with color imaging
RA-09	X-ray film processor	1. Automatic processing type 2. Processing film size : 102 x 127 to 356 x 432mm (4" x 5" to 14" x 17"inch) 3. Processing time : 90 seconds or faster	Middle Grade	1	To develop medical imaging like X-ray films
RA-13	X-ray system, fluoroscopy	1. Radiography 1) Tube voltage : Max. 150kV or more 2) Tube current : Max. 630mA or more 2. Fluoroscopy 1) Tube voltage a) Min. 50kV or less b) Max. 110kV or more 2) Tube current a) Min. 0.5mA or less b) Max. 4mA or more 3. Image intensifier 1) Input field : 9 inch	Middle Grade	1	To carry out fluoroscopy for multi-purpose like gastrointestinal diagnosis

Appendix 9 Detail of main equipment

Item No.	Description	Main specifications or components	Equipment	Qty	Purpose Appropriateness of medical equipment grade
RA-14	X-ray system, simple bucky and stand	1. Tube voltage : Max. 125kV or more 2. Tube current : Max. 500mA or more 3. Tube stand : Floor mounted type	Middle Grade	3	To implement general radiographic diagnosis of bone, lung, abdomen, etc.
VS-01	Bronchoscope	1. Field of view : 120° or more 2. Depth of field 1) Minimum : 3mm or less 2) Maximum : 50mm or more 3. Working length : 600mm or more 4. Outer diameter of distal end : 5.3mm or less	Middle Grade	1	To visually diagnose bronchitic diseases like lung cancer, pulmonary TB, etc.
VS-02	Colonoscope	1. Field of view : 140° or more 2. Depth of field 1) Minimum : 3mm or less 2) Maximum : 100mm or more 3. Working length : 1,040mm or more 4. Outer diameter of distal end : 12.8mm or less	Middle Grade	1	To visually diagnose colon through rectum
VS-03	Cystoscope	1. Field of view : 120° or more 2. Depth of field 1) Minimum : 3mm or less 2) Maximum : 50mm or more 3. Working length : 300mm or more 4. Outer diameter of distal end : 5.4mm or less 5. Light source : 300W xenon	Middle Grade	1	To do cystoscopy
VS-04	Endoscopic retrograde cholangiopancreatography	1. Field of view : 100° or more 2. Depth of field 1) Minimum : 5mm or less 2) Maximum : 60mm or more 3. Working length : 1,240mm or more 4. Outer diameter of distal end : 13.5mm or less	Middle Grade	1	To carry out radiographic diagnosis of bile duct and pancreatic duct
VS-07	Upper gastrointestinal scope	1. Field of view : 140° or more 2. Depth of field 1) Minimum : 6mm or less 2) Maximum : 100mm or more 3. Working length : 1,030mm or more 4. Outer diameter of distal end : 9.8mm or less 5. Light source : 300W xenon	Middle Grade	1	To diagnose visually diseases of esophagus, stomach and duodenum
EE-01	EEG	1. EEG input on electrode position layout : 25 or more 2. With photo stimulator 3. Data processing pattern : 36 set or more	Middle Grade	1	To diagnose central nerves such as epilepsy, brain tumor, etc.
EC-02	ECG, holter testing	1. Recording method : Multimedia card or other memory cards 2. 2ch. or more 3. Analyzing parameter : Arrhythmia, ST, HRV and pacemaker	Middle Grade	1	To diagnose arrhythmia, angina pectoris, etc.
EC-03	ECG, stress testing	1. Lead : 12 electrodes 2. Measurement parameter : ST 3. Stress treadmill : Belt driving type	Middle Grade	1	To diagnose heart diseases and rehabilitate heart condition

10. Annual contract for equipment maintenance cost

Appendix 10 Annual contract for equipment maintenance cost

Item No.	Description (Planned)	Q'ty	Unit	Price per one unit	Total (JPY)	Remark
OT-01	Anesthetic apparatus	4	Annual contract	262,500	1,050,000	
OT-02	Anesthetic apparatus with ventilator	5	Annual contract	265,000	1,325,000	
OT-03	Autoclave, large size	2	Annual contract	105,000	210,000	
OT-04	Autoclave, medium size	2	Annual contract	105,000	210,000	
OT-06	Defibrillator	2	Annual contract	21,000	42,000	
OT-08	Electrosurgical unit, complete	8	Annual contract	4,200	33,600	
OT-19	Operation monitor	8	Annual contract	31,500	252,000	
IC-05	Central monitor	1	Annual contract	31,500	31,500	
IC-06	Defibrillator	1	Annual contract	21,000	21,000	
IC-07	ECG	1	Annual contract	12,600	12,600	
IC-12	Patient monitor	22	Annual contract	31,500	693,000	
IC-21	Ventilator for adult	7	Annual contract	31,500	220,500	
IC-22	Ventilator for pediatrics	2	Annual contract	36,750	73,500	
LA-03	Automatic biochemistry analyzer	1	Annual contract	134,830	134,830	
LA-06	Blood gas analyzer	1	Annual contract	125,000	125,000	
LA-10	ELISA reader	1	Annual contract	19,700	19,700	
LA-11	ELISA washer	1	Annual contract	9,200	9,200	
LA-12	Flamephotometer	1	Annual contract	5,250	5,250	
LA-30	Semi automated coagulation analyzer	1	Annual contract	13,500	13,500	
LA-32	Spectrophotometer	1	Annual contract	46,700	46,700	
RA-02	Dental X-ray, panorama type	1	Annual contract	161,000	161,000	
RA-04	Mammography unit	1	Annual contract	161,000	161,000	
RA-05	Mobile X-ray unit	1	Annual contract	161,000	161,000	
RA-07	Ultrasound scanner, B/W	1	Annual contract	7,500	7,500	
RA-08	Ultrasound scanner, color doppler	1	Annual contract	147,000	147,000	
RA-09	X-ray film processor	1	Annual contract	26,300	26,300	
RA-13	X-ray system, fluoroscopy	1	Annual contract	250,000	250,000	
RA-14	X-ray system, simple bucky and stand	3	Annual contract	161,000	483,000	
EE-01	EEG	1	Annual contract	35,000	35,000	
EC-01	ECG	2	Annual contract	12,600	25,200	
EC-02	ECG, holter testing	1	Annual contract	26,300	26,300	
EC-03	ECG, stress testing	1	Annual contract	31,500	31,500	
Annual maintenance cost JPY					6,043,680	
Annual maintenance cost SRp					5,755,885	

11. Annual maintenance cost

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
OT-01	Anesthetic apparatus	4							
	CO2 absorber tablets	box			$300 \times 6H(\text{Hour}) \times 0.05\text{kg}/H = 90\text{kg}$ $90\text{kg}/4.5\text{kg} = 20$	20	10,000	259,000	1,036,000
	Closed patient circuit set for adult and in	set			$2\text{sets}/Y(\text{Year})$	2	10,000	20,000	
	Anesthesia mask and joint parts set	set			$3\text{sets}/Y$	3	13,000	39,000	
OT-02	Anesthetic apparatus with ventilator	5							
	CO2 absorber tablets	box			$300 \times 6H \times 0.05\text{kg}/H = 90\text{kg}$ $90\text{kg}/4.5\text{kg} = 20$	20	10,000	418,000	2,090,000
	Closed patient circuit set for adult and in	set			$2\text{sets}/Y$	2	10,000	20,000	
	Anesthesia mask and joint parts set	set			$3\text{sets}/Y$	3	13,000	39,000	
	Bacteria filter	pcs			$1\text{pcs}/M(\text{Month})$	2	25,000	50,000	
	Patient circuit set	set			$1\text{sets}/Y$	1	35,000	35,000	
	Bottle	set			$1\text{sets}/Y$	1	6,500	6,500	
	Coagulation tube	set			$1\text{sets}/Y$	1	25,000	25,000	
	Endotracheal tube	set			$1\text{sets}/Y$	1	12,500	12,500	
	N2O absorber	pc			$10\text{pcs}/Y$	10	3,000	30,000	
OT-03	Autoclave, large size	2							
	Pre-filter element	pc			$3T(\text{Time})/Y \times 2\text{pcs}=6$	6	3,000	18,000	633,000
	Ion-exchange resin	liter			$1T/Y \times 30L$	30	2,000	60,000	
	Salt	Kg			$1T/D(\text{day}) \times 365D \times 3\text{kg} = 1,095\text{kg}$	1,095	200	219,000	
	Printer paper	roll			$4T/D \times 365D \times 1/250T/R(\text{Roll}) = 4.38$	5	3,900	19,500	
OT-04	Autoclave, medium size	2							
	Pre-filter element	pc			$3T/Y \times 2\text{pcs}=6$	6	3,000	18,000	633,000
	Ion-exchange resin	pc			$1T/Y \times 30L$	30	2,000	60,000	
	Salt	Kg			$1T/D(\text{day}) \times 365D \times 3\text{kg} = 1,095\text{kg}$	1,095	200	219,000	
	Printer paper	roll			$4T/D \times 365D \times 1/250T/R(\text{Roll}) = 4.38$	5	3,900	19,500	
OT-06	Defibrillator	2							
	Gel	pc			$365D \times 0.5P(\text{Person}) = 182P/Y \times 2g/P$ $\div 100g/\text{pcs} = 3.64\text{pcs}$	4	3,000	12,000	95,200
	ECG electrode	box			$365D \times 0.3P/D = 109P \times 3\text{pcs} \div 250 = 1.3$	2	16,000	32,000	
	Printer paper	roll			$365D \times 0.5P/D = 182P/Y \div 30P/R = 6.08R$	6	600	3,600	
OT-08	Electrosurgical unit	8							
									1,240,000

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
			Plate electrode	pc	1pc/Y	1	21,000	21,000	
			Plate electrode cable	pc	1pc/Y	1	15,000	15,000	
			Electrode set	set	2set/Y	2	30,000	60,000	
			Electrode set with cable	pc	2pcs/Y	2	8,000	16,000	
			Electrode holder with cable	pc	1pc/Y	1	43,000	43,000	
OT-10	Laryngoscope set	4							10,400
OT-15	Neonatal resuscitator with over head warmer	1							
			Bulb	pc	2pcs/Y	2	1,300	2,600	
			Skin temperature sensor	pc	2pcs/Y	2	18,000	36,000	45,200
			Matress	pc	1pc/Y	1	5,600	5,600	
			Bulb	pc	365D/Yx12H ÷ 2000H/pc=2.19	3	1,200	3,600	
OT-16	Operation Lamp, complete type	4							760,000
			Bulb	pc	8H/Dx365 ÷ 1000Hx13bulbs=37.96	38	5,000	190,000	
OT-17	Operation Lamp, simple type	4							480,000
			Bulb	pc	8H/Dx365 ÷ 1000Hx8bulbs=23.36	24	5,000	120,000	
OT-18	Operation Lamp, mobile with battery back-up unit	3							15,000
			Bulb	pc	3H/Dx365 ÷ 1000Hx1bulb=1.095	1	5,000	5,000	
OT-19	Operation monitor	8							1,651,200
			Disposable electrode	box	300Dx3P/Dx3pcs/P=2700pcs ÷ 250=10.8	11	15,000	165,000	
			SpO2 Probe	pc	1pc/Y	1	30,000	30,000	
			ECG cream	pc	300Dx0.5P/D=150P/Yx2g/P ÷ 200g/pc=1.5pcs	2	1,200	2,400	
			Connection cable	pc	1pc/Y	1	9,000	9,000	
OT-28	Suction unit, portable type	3							141,000
			Battery	pc	1pc/Y	1	5,000	5,000	
			Connection tube and adapter set	set	1set/Y	1	35,000	35,000	
			Suction bottle	pc	1pc/Y	1	7,000	7,000	
OT-29	Suction unit, kick type	8							376,000
			Suction bottle	pc	1set/Y	1	7,000	7,000	

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
			Cap unit	pc	1pc/Y	1	5,000	5,000	
			Connection tube and adapter set	set	1set/Y	1	35,000	35,000	
OT-30	Surgical hand scrub unit	10							85,000
			Percolation module	pc	1pc/Y	1	5,000	5,000	
			Pre-filter element	pc	1pc/Y	1	2,500	2,500	
			UV lamp	pc	1pc/Y	1	1,000	1,000	
OT-31	Syringe pump	4							432,000
			Syringe pump	pc	2pcs/Y	600	100	60,000	
			Extension tube set	set	2sets/Y	600	80	48,000	
OT-33	X-ray film viewer, large, wall mount type	11							103,950
			Fluorescent lump	pc	8H/Dx365 ÷ 2000Hx6pcs=8.76	9	1,050	9,450	
OT-34	Automatic disinfectant	1							52,000
			Chemical for washing type A	Kg	300Dx2T/D=600T/Yx10g/T ÷ 4000g/pcs=1.5pcs	2	8,000	16,000	
			Chemical for washing type B	4liter /1pc	300Dx2T/D=600T/Yx10cc/T ÷ 4000g/pcs=1.5	2	8,000	16,000	
			Chemical for washing type C	4liter /1pc	300Dx2T/D=600T/Yx10cc/T ÷ 4000g/pcs=1.5	2	10,000	20,000	
IC-05	Central monitor	1							113,900
			Recording paper	pc	365D/Yx11P/D=4015P/Y ÷ 30P/R=134	134	850	113,900	
IC-06	Defibrillator	1							47,600
			Gel	set	365Dx0.5P/D=182P/Yx2g/P ÷ 100g/pcs=3.64pcs	4	3,000	12,000	
			ECG electrode	box	365Dx0.3P/D=109Px3pcs ÷ 250=1.38boxes	2	16,000	32,000	
			Printer paper	roll	365Dx0.5P/D=182P/Y ÷ 30P/R=6.08R	6	600	3,600	
IC-07	ECG	1							62,800
			Chest electrode for adult	set	2sets/Y	2	5,500	11,000	
			Limb electrode for adult	set	2sets/Y	2	6,000	12,000	
			Chest electrode for child	set	2sets/Y	2	5,500	11,000	
			Limb electrode for child	set	2sets/Y	2	6,000	12,000	

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
			ECG cream	pc	$360D/Y \times 0.5P/D = 180P/Y \times 10g/P \div 100g = 18$	18	650	11,700	
			Recording paper	roll	$360D/Y \times 0.5P/D = 180P/Y \div 30P/R = 6$	6	850	5,100	
IC-09	Infusion pump	10	Tube set	pc	$300D/Y \times 10P/D \times 5\% = 1500\text{pcs}$	1500	150	225,000	2,250,000
IC-10	Laryngoscope set	3	Bulb	pc	2pcs/Y	2	1,300	2,600	7,800
IC-11	Ophthalmoscope	2	Bulb	pc	2pcs/Y	2	1,000	2,000	4,000
IC-12	Patient monitor	22	Disposable electrode	box	$300D \times 3P/D \times 3\text{pcs}/P = 2700\text{pcs} \div 250 = 10.8$	11	15,000	165,000	4,540,800
			SpO2 Probe	pc	1pc/Y	1	30,000	30,000	
			ECG cream	pc	$300D \times 0.5P/D = 150P/Y \times 2g/P \div 200g/\text{pcs} = 1.5\text{pcs}$	2	1,200	2,400	
			Connection cable	pc	1pc/Y	1	9,000	9,000	
IC-15	Spot lamp	1	Bulb	pc	$3H/D \times 365 \div 1000H \times 1\text{bulb} = 1.095$	1	5,000	5,000	5,000
IC-18	Suction unit, wall mount type	7	Connection tube and adapter set	set	1set/Y	1	35,000	35,000	294,000
			Suction bottle	pc	1pc/Y	1	7,000	7,000	
IC-19	Suction unit, portable type	2	Battery	pc	1pc/Y	1	5,000	5,000	94,000
			Connection tube and adapter set	set	1set/Y	1	35,000	35,000	
			Suction bottle	pc	1pc/Y	1	7,000	7,000	
IC-20	Syringe pump	10	Syringe pump	pc	2sets/Y	600	50	66,000	660,000
			Extension tube set	set	2sets/Y	600	60	36,000	

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
IC-21	Ventilator for adult	7							
			Coagulation tube	pc	1pc/Y	1	25,000	99,000	693,000
			Endotracheal tube	set	1set/Y	1	14,000	25,000	
			Bacteria filter	pc	2pcs/Y	2	30,000	14,000	
								60,000	
IC-22	Ventilator for pediatrics	2							
			Coagulation tube	set	1set/Y	1	25,000	99,000	198,000
			Endotracheal tube	set	1set/Y	1	14,000	25,000	
			Bacteria filter	pc	2pcs/Y	2	30,000	14,000	
								60,000	
IC-23	X-ray film viewer, large, wall mount type	2							
			Fluorescent lump	pc	8H/Dx365 ÷ 2000Hx6pcs=8.76	9	1,050	9,450	18,900
LA-03	Automatic biochemistry analyzer	1							
			Reagents set	set	1set/Y	1	250,000	250,000	250,000
LA-05	Bilirubinmeter	1							
			capillary tube	set	3sets/Y	3	30,000	95,000	95,000
			Tap seal	pc	1pc/Y	1	5,000	90,000	
								5,000	
LA-06	Blood gas analyzer	1							
			Electrode set	set	1set/Y	1	450,000	1,531,400	1,531,400
			Reagents set	set	5S(sample)/Dx300=1500S/Y ÷ 1000I(inspection)/set=1.5set	2	350,700	450,000	
			Quality control set	set	1Level C(calibretion)xIT/Dx 30Dx12M=360C/Y ÷ 350C/set=1.02	1	380,000	701,400	
LA-07	Centrifuge	3							
			Bursh	pc	2pcs/Y	2	3,000	6,000	18,000
LA-09	Electrophoresis system	1							
			Cellulose acetate membraane	box	1box/Y	1	20,000	58,000	58,000
			Startup solution set	set	1set/Y	1	15,000	20,000	
			Printer paper	roll	3R/Y	3	6,000	15,000	
			Lamp	pc	1pc/Y	1	5,000	18,000	
LA-10	ELISA reader	1							
			Halogen bulb	pc	2pcs/Y	2	12,000	5,000	24,000
								24,000	24,000

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
LA-11	ELISA washer	1	Washing	Liter	3liter/Y	3	15,000	45,000	45,000
LA-12	Flamephotometer	1	Electrode set Reagents set	set set	2sets/Y 1set/Y	2 1	30,000 50,000	60,000 50,000	110,000
LA-18	Laminar flow cabinet	1	Pre-filter element HEPA filter element Fluorescent lump UV lamp	pc pc pc pc	1pc/Y 1pc/Y 1pc/Y 1pc/Y	1 1 1 1	120,000 120,000 6,000 2,500	248,500	248,500
LA-21	Microscope	4	Halogen bulb Immersion oil	pc pc	5H/Dx365 ÷ 2000Hx.1pc=0.91 1pc/Y	1 1	3,000 3,500	6,500 3,000 3,500	26,000
LA-22	Microscope with CCD camera and monitor	1	Halogen bulb Immersion oil	pc pc	5H/Dx365 ÷ 2000Hx.1pc=0.91 1pc/Y	1 1	3,000 3,500	6,500 3,000 3,500	6,500
LA-23	Microtome, rotary type	1	Disposable knife	pc	50pcs/Y	1	20,000	20,000	20,000
LA-24	Osmometer	1	Sample container Standard solution sets	pc set	500pcs/Y 1set/Y	500 1	50 35,000	60,000 25,000 35,000	60,000
LA-25	PH meter	1	Standard solution sets, (pH 4.04, acidity, 6.86, neuter, 9.18, alkali, KCl)	set	2sets/Y	2	20,000	40,000	40,000
LA-30	Semi automated coagulation analyzer	1	Reagents set Sample tube Printing paper	set box box	1set/Y 3boxes/Y 1box/Y	1 3 1	250,000 15,000 7,000	302,000 250,000 45,000 7,000	302,000

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
LA-32	Spectrophotometer	1						86,500	86,500
			Halogen lamp	pc	2pcs/Y	2	12,000	24,000	
			Cell holder	pc	2pcs/Y	2	20,000	40,000	
			Printing paper	roll	5R/Y	5	4,500	22,500	
RA-02	Dental X-ray, panorama type	1	X-ray film	box	300Dx2P/Dx1S(sheet)/P=600S 600 ÷ 100S=6	6	42,000	252,000	252,000
RA-04	Mammography unit	1	X-ray film	box	300Dx2P/Dx1S/P=600S 100S=6	6	42,000	252,000	252,000
RA-05	Mobile X-ray unit	1	X-ray film	box	300Dx2P/Dx2S/P=1200S ÷ 100S=12	12	42,000	504,000	504,000
RA-07	Ultrasound scanner, B/W	1	Gel	pc	300D/Yx8P/D=2400P/Yx2g/P ÷ 300g=16	16	1,800	28,800	136,800
			Printer paper	roll	300D/Yx8P/D=2400P/Yx0.3m/P ÷ 20m=36	36	3,000	108,000	
RA-08	Ultrasound scanner, color doppler	1	Gel	liter	300D/Yx8P/D=2400P/Yx2g/P ÷ 300g=16	16	1,800	28,800	136,800
			Color printer paper	roll	300D/Yx8P/D=2400P/Yx0.3m/P ÷ 20m=36	36	3,000	108,000	
RA-09	X-ray film processor	1	Developer	liter	15lx3T/Mx12M=540l 540 ÷ 19l =28.4	29	6,500	188,500	314,500
			Fixative	liter	15lx3T/Mx12M=540l 540 ÷ 19l =28.4	29	4,000	116,000	
			Filter	pc	2pcs/Y	2	5,000	10,000	
RA-10	X-ray film viewer, small, wall mount type	1	Fluorescent lump	pc	8H/Dx365 ÷ 2000Hx2pcs=1.46	2	1,050	2,100	2,100
RA-11	X-ray film viewer, large, wall mount type	2	Fluorescent lump	pc	8H/Dx365 ÷ 2000Hx6pcs=8.76	9	1,050	9,450	18,900

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
RA-13	X-ray system, fluoroscopy	1							
			X-ray film	box	30 S/Dx300D=9000S ÷ 100/B/Y	90	3,000	270,000	270,000
RA-14	X-ray system, simple bucky and stand	3							
			X-ray film	box	30 S/Dx300D=9000S ÷ 100/B/Y	90	3,000	270,000	810,000
VS-03	Cystoscope	1							
			Xsenon lamp	pc	6H/Dx365 ÷ 2000Hx1pc=1.095	1	110,000	110,000	110,000
VS-07	Upper gastrointestinalscope	1							
			Xsenon lamp	pc	6H/Dx365 ÷ 2000Hx1pc=1.095	1	110,000	110,000	110,000
EE-01	EEG	1							
			Recording paper	roll	300D/Yx0.5P/D=150P/Y ÷ 30P/R=5	5	6,000	30,000	106,000
			EEG electrode set	set	2sets/Y	2	20,000	40,000	
			Paste	pc	2pcs/Y	2	12,000	24,000	
			Ink	pc	2pcs/Y	2	6,000	12,000	
EC-01	EEG	2							
			Chest electrode for adult	set	2pcs/Y	2	5,500	11,000	125,600
			Limb electrode for adult	set	2pcs/Y	2	6,000	12,000	
			Chest electrode for child	set	2sets/Y	2	5,500	11,000	
			Limb electrode for child	set	2sets/Y	2	6,000	12,000	
			ECG cream	pc	360D/Yx0.5P/D=180P/Yx10g/P ÷ 100g=18	18	650	11,700	
			Recording paper	roll	360D/Yx0.5P/D=180P/Y ÷ 30P/R=6	6	850	5,100	
EC-02	EEG, holter testing	1							
			Battery	pc	12pcs/Y	12	1,000	12,000	23,000
			Chest electrode	set	2sets/Y	2	5,500	11,000	
EC-03	EEG, stress testing	1							
			Recording paper	roll	360D/Yx0.5P/D=180P/Y ÷ 30P/R=6	6	6,500	39,000	171,000
			EEG electrode set	set	2sets/Y	2	6,000	12,000	
			Buck up tape	pc	2pcs/Y	2	5,000	10,000	

Appendix 11 Annual maintenance cost

Item No.	Description (Planned)	Unit	Spare parts and Consumables	Unit	Evidence for calculation	Q'ty	Unit price	Price per one set	Total
			Connection cable	set	2sets/Y	2	10,000	20,000	
			Induction cable repeater	set	2sets/Y	2	20,000	40,000	
			Induction cable holster	set	1set/Y	2	25,000	50,000	
CO-01	Multimedia projector	1							
			Lamp	pc	5H/Dx312 ÷ 2000Hx1pc=0.78	1	35,000	35,000	35,000
						Total annual maintenance cost JPY			25,167,350
						Total annual maintenance cost SRp			23,968,905

12. Annual Maintenance cost for Air conditioners

Appendix 12 Annual Maintenance cost for Air conditioners

Equip No.	Type	Specification	Q'ty	Maintenance Fee	
PAC-2	Packaged Air Conditioning	Floor Standing Split Type 床置型	9	46,000	414,000
	System	Cooling Cap. 冷房能力 9100kcal/h w/Remote Controller,Standard Accessories			
PAC-3	Packaged Air Conditioning	Floor Standing Split Type 床置型	9	46,000	414,000
	System	Cooling Cap. 冷房能力 11200kcal/h w/Remote Controller,Standard Accessories			
PAC-4	Packaged Air Conditioning	Ceiling Mounting Split Type 天井かけ外型	2	39,000	78,000
	System	Cooling Cap. 冷房能力 3000kcal/h w/Remote Controller,Standard Accessories			
PAC-5	Packaged Air Conditioning	Ceiling Mounting Split Type 天井かけ外型	2	39,000	78,000
	System	Cooling Cap. 冷房能力 4500kcal/h w/Remote Controller,Standard Accessories			
PAC-6	Packaged Air Conditioning	Ceiling Mounting Split Type 天井かけ外型	1	39,000	39,000
	System	Cooling Cap. 冷房能力 5500kcal/h w/Remote Controller,Standard Accessories			
PAC-7	Packaged Air Conditioning	Ceiling Mounting Split Type 天井かけ外型	2	47,000	94,000
	System	Cooling Cap. 冷房能力 6700kcal/h w/Remote Controller,Standard Accessories			
PAC-9	Packaged Air Conditioning	Ceiling Mounting Split Type 天井かけ外型	7	47,000	329,000
	System	Cooling Cap. 冷房能力 11200kcal/h w/Remote Controller,Standard Accessories			
PAC-11	Packaged Air Conditioning	Ceiling Suspended Split Type 天井吊型	5	37,000	185,000
	System	Cooling Cap. 冷房能力 4500kcal/h w/Remote Controller,Standard Accessories			
PAC-12	Packaged Air Conditioning	Ceiling Suspended Split Type 天井吊型	9	37,000	333,000
	System	Cooling Cap. 冷房能力 5500kcal/h w/Remote Controller,Standard Accessories			
PAC-13	Packaged Air Conditioning	Ceiling Suspended Split Type 天井吊型	3	45,000	135,000
	System	Cooling Cap. 冷房能力 6700kcal/h w/Remote Controller,Standard Accessories			
PAC-14	Packaged Air Conditioning	Ceiling Suspended Split Type 天井吊型	10	45,000	450,000
	System	Cooling Cap. 冷房能力 9100kcal/h w/Remote Controller,Standard Accessories			
PAC-15	Packaged Air Conditioning	Ceiling Suspended Split Type 天井吊型	2	45,000	90,000
	System	Cooling Cap. 冷房能力 11200kcal/h w/Remote Controller,Standard Accessories			
PAC-17	Packaged Air Conditioning	Wall Suspended Split Type 壁掛型	3	19,000	57,000
	System	Cooling Cap. 冷房能力 3500kcal/h w/Remote Controller,Standard Accessories			
PAC-18	Packaged Air Conditioning	Wall Suspended Split Type 壁掛型	17	19,000	323,000
	System	Cooling Cap. 冷房能力 4500kcal/h w/Remote Controller,Standard Accessories			
HAC-2	HEPA Air Circulation Unit	55 m ³ /min	11	3,000	33,000
	(Floor Mounted Type)	w/Pre-Filter,HEPA-Filter,Standard Accessories			
	Renewal of Hepa filters	per 3 years	11	34,000	374,000
Annual maintenance cost (Japanese Yen)					3,426,000
Annual maintenance cost (Sri Lanka Rupees)					3,262,857