

## **5. Technical Notes (Implementation Review Study)**

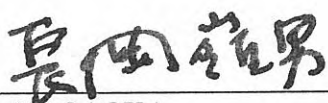
TECHNICAL NOTE  
ON THE IMPLEMENTATION REVIEW STUDY  
ON THE PROJECT FOR  
THE IMPROVEMENT OF CENTRAL FUNCTIONS OF JAFFNA TEACHING HOSPITAL  
IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

The Implementation Review Study Team (hereinafter referred to as "the Team"), had further technical discussions with the Government of Sri Lanka (hereinafter referred to as "G.O.S.L.") after signing the Minutes of Discussion on October 12<sup>th</sup>, 2009 (hereinafter referred to as "the Minutes").

Both parties have agreed that X-ray system Fluoroscopy and CT scanner in the Requested Items (Equipment) ANNEX-2 attached to the Minutes are to be provided by G.O.S.L., and will be excluded from the scope of work of the Project.

Therefore Requested Items (Equipment) ANNEX-2 of the Minutes shall be replaced by attached Revised Requested Items (Equipment) TN-ANNEX-1.

Colombo, October 19th, 2009



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TN-ANNEX-1: Revised Requested Items (Equipment)

**Revised Requested Items (Equipment)**

TN-ANNEX-1

Department	Item No.	Description	Q'ty	Priority	
Operation Theater Complex	OT-01	Anesthetic apparatus	4	A	
	OT-02	Anesthetic apparatus with ventilator	5	A	
	OT-03	Autoclave, large size	2	A	
	OT-04	Autoclave, medium size	2	A	
	OT-05	Blood warmer	6	A	
	OT-06	Defibrillator	2	A	
	OT-07	Drug cabinet	4	A	
	OT-08	Electrosurgical unit	8	A	
	OT-09	Instrument set for general surgery	2	A	
	OT-10	Laryngoscope set	4	A	
	OT-11	Instrument set for micro vascular surgery	1	A	
	OT-12	Instrument set for minor and intermediate surgery	1	A	
	OT-13	Instrument set for nephrectomy	1	A	
	OT-14	Instrument set for neurology	1	A	
	OT-15	Neonatal resuscitator with over head warmer	1	A	
	OT-16	Operation Lamp, complete type	4	A	
	OT-17	Operation Lamp, simple type	4	A	
	OT-18	Operation Lamp, mobile with battery back up unit	3	A	
	OT-19	Operation monitor	8	A	
	OT-20	Operation table	7	A	
	OT-21	Operation table for orthopedic	1	A	
	OT-22	Recovery bed	8	A	
	OT-23	Shelf for container	2	A	
	OT-24	Shelf for instrument	2	A	
	OT-25	Sink unit	1	A	
	OT-26	Sterilizing container	1	A	
	OT-27	Stretcher	2	A	
	OT-28	Suction unit, portable type	3	A	
	OT-29	Suction unit, kick type	8	A	
	OT-30	Surgical hand scrub unit	10	A	
	OT-31	Syringe pump	4	A	
	OT-32	Working table	2	A	
	OT-33	X-ray film viewer, large, wall mount type	11	A	
	OT-34	Automatic disinfectant	1	A	
			C-arm X-ray unit		B
			Instrument set for amputation		B
			Instrument set for cervical fusion surgery		B
			Instrument set for cut down		B
			Instrument set for dilation & curettage		B
			Instrument set for E.N.T. surgery		B
			Instrument set for eye surgery		B
			Instrument set for forearm surgery		B
			Instrument set for gastrectomy		B
			Instrument set for laminectomy		B
			Instrument set for meniscectomy		B
			Instrument set for micro finger surgery		B
			Instrument set for micro hand surgery		B
		Instrument set for oesophageal dilator		B	
		Instrument set for orthopaedic surgery		B	
		Instrument set for pediatric plastic surgery		B	
		Instrument set for prostatectomy		B	
		Instrument set for skin grafting		B	
		Instrument set for thoracic surgery		B	
		Instrument set for thyroidotomy		B	
		Instrument set for tonsillectomy		B	
		Instrument set for tracheostomy		B	
		Instrument set for vaginal hysterectomy & repair		B	
		Instrument table with guard rail		B	
		Instrument table with three fan-shaped tray		B	
		Instrument table, mayo's type		B	
		Operation Chair		B	
		Patient monitor		B	
		Ventilator		C	

*Handwritten notes:*  
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## Revised Requested Items (Equipment)

TN-ANNEX-1

Department	Item No.	Description	Q'ty	Priority
ICU	IC-01	Ambubag for adult	4	A
	IC-02	Ambubag for pediatrics	2	A
	IC-03	Autoclave, table top type	1	A
	IC-04	Blood warmer	4	A
	IC-05	Central monitor	1	A
	IC-06	Defibrillator	1	A
	IC-07	ECG	1	A
	IC-08	ICU bed	22	A
	IC-09	Infusion pump	10	A
	IC-10	Laryngoscope set	3	A
	IC-11	Ophthalmoscope	2	A
	IC-12	Patient monitor	22	A
	IC-13	Shelf for instrument	3	A
	IC-14	Shelf for linen	3	A
	IC-15	Spot lamp	1	A
	IC-16	Stretcher	2	A
	IC-17	Stretcher, radiotransparent	1	A
	IC-18	Suction unit, wall mount type	7	A
	IC-19	Suction unit, portable type	2	A
	IC-20	Syringe pump	10	A
	IC-21	Ventilator for adult	7	A
	IC-22	Ventilator for pediatrics	2	A
	IC-23	X-ray film viewer, large, wall mount type	2	A
			Blood gas analyzer	
		Trolley		B
Central Laboratory Complex	LA-01	Autoclave, table top type	1	A
	LA-02	Autoclave, vertical type	1	A
	LA-03	Automatic biochemistry analyzer	1	A
	LA-04	Electronic balance	2	A
	LA-05	Bilirubinmeter	1	A
	LA-06	Blood gas analyzer	1	A
	LA-07	Centrifuge	3	A
	LA-08	Drying cabinet	1	A
	LA-09	Electrophoresis system	1	A
	LA-10	ELISA reader	1	A
	LA-11	ELISA washer	1	A
	LA-12	Flamephotometer	1	A
	LA-13	Deep freezer	1	A
	LA-14	Heat dry block	1	A
	LA-15	Hot air oven	1	A
	LA-16	Hot plate stirrer	1	A
	LA-17	Incubator	1	A
	LA-18	Laminar flow cabinet	1	A
	LA-19	Media sterilizer	1	A
	LA-20	Micro plate viewer	1	C
	LA-21	Microscope	4	A
	LA-22	Microscope with CCD camera and monitor	1	A
	LA-23	Microtome, rotary type	1	A
	LA-24	Osmometer	1	A
	LA-25	PH meter	1	A
	LA-26	Plate incubator	1	A
	LA-27	Refrigerator	2	A
	LA-28	Rotamixer	2	A
	LA-29	Hematology mixer	1	A
	LA-30	Semi automated coagulation analyzer	1	A
	LA-31	Slide staining apparatus	1	A
	LA-32	Spectrophotometer	1	A
	LA-33	Stirrer	1	A
	LA-34	Tissue processing apparatus	1	A
	LA-35	Urine meter	1	A
	LA-36	Water bath	2	A
		Automatic blood cell analyzer		B
		Hemoglobinmeter		B

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**Revised Requested Items (Equipment)**

TN-ANNEX-1

Department	Item No.	Description	Qty	Priority	
Central Facilities for Diagnostic Imaging	RA-01	Dark room accessories	1	A	
	RA-02	Dental X-ray, panorama type	1	A	
	RA-03	Examination table	2	A	
	RA-04	Mammography unit	1	A	
	RA-05	Mobile X-ray unit	1	A	
	RA-06	Pass box	1	A	
	RA-07	Ultrasound scanner, B/W	1	A	
	RA-08	Ultrasound scanner, color doppler	1	A	
	RA-09	X-ray film processor	1	A	
	RA-10	X-ray film viewer, small, wall mount type	1	A	
	RA-11	X-ray film viewer, large, wall mount type	2	A	
	RA-12	X-ray protective set	1	A	
	RA-13	X-ray system, fluoroscopy	By GOSL		
	RA-14	X-ray system, simple bucky and stand	3	A	
		Resuscitation bag for adult		B	
		Resuscitation bag for paediatrics		B	
		Stretcher		B	
		CT Scanner	By GOSL		
		VS-01	Bronchoscope	1	A
		VS-02	Colonoscope	1	A
		VS-03	Cystoscope	1	A
		VS-04	Endoscopic retrograde cholangiopancreatography	1	A
		VS-05	Endoscopic cabinet	1	A
		VS-06	Examination table for endoscope	2	A
		VS-07	Upper gastrointestinalscope	1	A
		EE-01	EEG	1	A
		EE-02	Examination table	1	A
		EC-01	ECG	2	A
		EC-02	ECG, holter testing	1	A
		EC-03	ECG, stress testing	1	A
	EC-04	Examination table	2	A	
	CO-01	Multimedia projector	1	A	
Training Management	ME-01	Tool set	1	A	

M.H.

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## **6. Examination of Requested Equipment**

Examination of Requested Equipment

Item No. (Request)	Description (Request)	Priority	Category	Purpose	Necessity	Tec. level	Management system	& maintenance	Maintenance cost	Judgement	Remarks	Q'ty (Plan)	Item No. (Plan)	Description (Plan)	Delivery place (Plan)
<b>Operation Theater Complex</b>															
OT-01	Anesthetic apparatus	A	R	o	o	o	o	o	o	o	Same as Basic Design.	4	OT-01	Anesthetic apparatus	OR
OT-02	Anesthetic apparatus with ventilator	A	R	o	o	o	o	o	o	o	Same as Basic Design.	5	OT-02	Anesthetic apparatus with ventilator	OR/Recovery room
OT-03	Autoclave, large size	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-03	Autoclave, large size	CSSD
OT-04	Autoclave, medium size	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-04	Autoclave, medium size	CSSD
OT-05	Blood warmer	A	N	o	o	o	o	o	o	o	Same as Basic Design.	6	OT-05	Blood warmer	OR
OT-06	Defibrillator	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-06	Defibrillator	OR
OT-07	Drug cabinet	A	N	o	o	o	o	o	o	o	Same as Basic Design.	4	OT-07	Drug cabinet	OR
OT-08	Electrosurgical unit	A	R	o	o	o	o	o	o	o	Same as Basic Design.	8	OT-08	Electrosurgical unit	OR
OT-09	Instrument set for general surgery	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-09	Instrument set for general surgery	OR
OT-10	Laryngoscope set	A	R	o	o	o	o	o	o	o	Same as Basic Design.	4	OT-10	Laryngoscope set	OR
OT-11	Instrument set for micro vascular surgery	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-11	Instrument set for micro vascular surgery	OR
OT-12	Instrument set for minor and intermediate surgery	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-12	Instrument set for minor and intermediate surgery	OR
OT-13	Instrument set for nephrectomy	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-13	Instrument set for nephrectomy	OR
OT-14	Instrument set for neurology	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-14	Instrument set for neurology	OR
OT-15	Neonatal resuscitator with over head warmer	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-15	Neonatal resuscitator with over head warmer	OR
OT-16	Operation Lamp, complete type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	4	OT-16	Operation lamp, complete type	OR
OT-17	Operation Lamp, simple type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	4	OT-17	Operation lamp, simple type	OR
OT-18	Operation Lamp, mobile with battery back up unit	A	R	o	o	o	o	o	o	o	Same as Basic Design.	3	OT-18	Operation lamp, mobile with battery back up unit	OR
OT-19	Operation monitor	A	R	o	o	o	o	o	o	o	Same as Basic Design.	8	OT-19	Operation monitor	OR
OT-20	Operation table	A	R	o	o	o	o	o	o	o	Same as Basic Design.	7	OT-20	Operation table	OR
OT-21	Operation table for orthopedic	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-21	Operation table for orthopedic	OR
OT-22	Recovery bed	A	N	o	o	o	o	o	o	o	Same as Basic Design.	8	OT-22	Recovery bed	Recovery room
OT-23	Shelf for container	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-23	Shelf for container	CSSD
OT-24	Shelf for instrument	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-24	Shelf for instrument	CSSD
OT-25	Sink unit	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-25	Sink unit	CSSD
OT-26	Sterilizing container	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-26	Sterilizing container	CSSD
OT-27	Stretcher	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-27	Stretcher	OR
OT-28	Suction unit, portable type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	3	OT-28	Suction unit, portable type	OR
OT-29	Suction unit, kick type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	8	OT-29	Suction unit, kick type	OR
OT-30	Surgical hand scrub unit	A	N	o	o	o	o	o	o	o	Wall mount type was planned, but shall be changed to sink type (for 2 persons).	5	OT-30	Surgical hand scrub unit	OR
OT-31	Syringe pump	A	R	o	o	o	o	o	o	o	Same as Basic Design.	4	OT-31	Syringe pump	OR
OT-32	Working table	A	N	o	o	o	o	o	o	o	Same as Basic Design.	2	OT-32	Working table	OR
OT-33	X-ray film viewer, large, wall mount type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	11	OT-33	X-ray film viewer, large, wall mount type	OR
OT-34	Automatic disinfectant	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	OT-34	Automatic disinfectant	OR
	C-arm X-ray unit	B	R	o	o	o	o	o	o	o	Existing equipment (made in India, 2003) is too damaged to be used.	1	OT-35	C-arm X-ray unit	OR
	Instrument set for amputation	B	R	o	o	o	o	o	o	o	One of two existing sets is too damaged to be used.	1	OT-36	Instrument set for amputation	OR
	Instrument set for cervical fusion surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-37	Instrument set for cervical fusion surgery	OR

Item No. (Request)	Description (Request)	Priority	Category	Purpose	Necessity	Tec. level	Management system	& maintenance	Maintenance cost	Judgement	Remarks	Q'ty (Plan)	Item No. (Plan)	Description (Plan)	Delivery place (Plan)
	Instrument set for cut down	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-38	Instrument set for cut down	OR
	Instrument set for dilation & curettage	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-39	Instrument set for dilation & curettage	OR
	Instrument set for E.N.T. surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-40	Instrument set for E.N.T. surgery	OR
	Instrument set for eye surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-41	Instrument set for eye surgery	OR
	Instrument set for forearm surgery	B	R	o	x	o	o	o	o	x	Existing set can be still used.	0			
	Instrument set for gastrectomy	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-42	Instrument set for gastrectomy	OR
	Instrument set for laminectomy	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-43	Instrument set for laminectomy	OR
	Instrument set for meniscectomy	B	R	o	x	o	o	o	o	x	Existing set can be still used.	0			
	Instrument set for micro finger surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-44	Instrument set for micro finger surgery	OR
	Instrument set for micro hand surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-45	Instrument set for micro hand surgery	OR
	Instrument set for oesophageal dilator	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-46	Instrument set for oesophageal dilator	OR
	Instrument set for orthopedic surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-47	Instrument set for orthopedic surgery	OR
	Instrument set for pediatric plastic surgery	B	N	o	o	o	o	o	o	o	Instrument for pediatrics only is needed.	1	OT-48	Instrument set for pediatric plastic surgery	OR
	Instrument set for prostatectomy	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-49	Instrument set for prostatectomy	OR
	Instrument set for skin grafting	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-50	Instrument set for skin grafting	OR
	Instrument set for thoracic surgery	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-51	Instrument set for thoracic surgery	OR
	Instrument set for thyroidotomy	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-52	Instrument set for thyroidotomy	OR
	Instrument set for tonsillectomy	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-53	Instrument set for tonsillectomy	OR
	Instrument set for tracheostomy	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-54	Instrument set for tracheostomy	OR
	Instrument set for vaginal hysterectomy & repair	B	R	o	o	o	o	o	o	o	Existing set is too damaged to be used.	1	OT-55	Instrument set for hysterectomy	OR
	Instrument table with guard rail	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	8	OT-56	Instrument table with guard rail	OR
	Instrument table with three fan-shaped tray	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	8	OT-57	Instrument table with three fan-shaped tray	OR
	Instrument table, mayo's type	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	8	OT-58	Instrument table, mayo's type	OR
	Operation Chair	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	8	OT-59	Operation chair	OR
	Patient monitor	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used (for recovery room).	4	OT-60	Patient monitor	Recovery room
	Ventilator	C	R	x	x	o	o	o	o	x	Not necessary for OR.	0			
<b>ICU</b>															
IC-01	Ambubag for adult	A	N	o	o	o	o	o	o	o	Same as Basic Design.	4	IC-01	Ambubag for adult	ICU
IC-02	Ambubag for pediatrics	A	N	o	o	o	o	o	o	o	Same as Basic Design.	2	IC-02	Ambubag for pediatrics	ICU
IC-03	Autoclave, table top type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	IC-03	Autoclave, table top type	ICU
IC-04	Blood warmer	A	N	o	o	o	o	o	o	o	Same as Basic Design.	4	IC-04	Blood warmer	ICU
IC-05	Central monitor	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	IC-05	Central monitor	ICU
IC-06	Defibrillator	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	IC-06	Defibrillator	ICU
IC-07	ECG	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	IC-07	ECG	ICU
IC-08	ICU bed	A	R	o	o	o	o	o	o	o	Same as Basic Design.	22	IC-08	ICU bed	ICU
IC-09	Infusion pump	A	R	o	o	o	o	o	o	o	Same as Basic Design.	10	IC-09	Infusion pump	ICU
IC-10	Laryngoscope set	A	N	o	o	o	o	o	o	o	Same as Basic Design.	3	IC-10	Laryngoscope set	ICU
IC-11	Ophthalmoscope	A	N	o	o	o	o	o	o	o	Same as Basic Design.	2	IC-11	Ophthalmoscope	ICU
IC-12	Patient monitor	A	R	o	o	o	o	o	o	o	IBP function shall be added for 2 units, and IBP&CO function shall be added for another 2 units out of 22 units.	18	IC-12A	Patient monitor A	ICU



Item No. (Request)	Description (Request)	Priority	Category	Purpose	Necessity	Tec. level	Management system	& maintenance cost	Judgement	Remarks	Q'ty (Plan)	Item No. (Plan)	Description (Plan)	Delivery place (Plan)
										Item shall be separated to A, B, and C according to function (A: NIBP, B: IBP, C: IBP&CO).	2	IC-12B	Patient monitor B	ICU
											2	IC-12C	Patient monitor C	ICU
IC-13	Shelf for instrument	A	N	o	o	o	o	o	o	Same as Basic Design.	3	IC-13	Shelf for instrument	ICU
IC-14	Shelf for linen	A	N	o	o	o	o	o	o	Same as Basic Design.	3	IC-14	Shelf for linen	ICU
IC-15	Spot lamp	A	N	o	o	o	o	o	o	Same as Basic Design.	1	IC-15	Spot lamp	ICU
IC-16	Stretcher	A	N	o	o	o	o	o	o	Same as Basic Design.	2	IC-16	Stretcher	ICU
IC-17	Stretcher, radiotransparent	A	N	o	o	o	o	o	o	Same as Basic Design.	1	IC-17	Stretcher, radiotransparent	ICU
IC-18	Suction unit, wall mount type	A	R	o	o	o	o	o	o	15 units shall be added according to No. of beds.	22	IC-18	Suction unit, wall mount type	ICU
IC-19	Suction unit, portable type	A	R	o	o	o	o	o	o	Same as Basic Design.	2	IC-19	Suction unit, portable type	ICU
IC-20	Syringe pump	A	R	o	o	o	o	o	o	12 units shall be added according to No. of beds.	22	IC-20	Syringe pump	ICU
IC-21	Ventilator for adult	A	R	o	o	o	o	o	o	6 units shall be added since existing equipment are not working.	13	IC-21	Ventilator for adult	ICU
IC-22	Ventilator for pediatrics	A	R	o	o	o	o	o	o	Same as Basic Design.	2	IC-22	Ventilator for pediatrics	ICU
IC-23	X-ray film viewer, large, wall mount type	A	R	o	o	o	o	o	o	Same as Basic Design.	2	IC-23	X-ray film viewer, large, wall mount type	ICU
	Blood gas analyzer	B	R	o	x	o	o	o	x	Shall be excluded from the plan since same item is planned in laboratory and can be shared.	0			
	Trolley	B	R	o	o	o	o	o	o	Existing equipment is too damaged to be used.	2	IC-24	Emergency trolley	ICU
<b>Central Laboratory Complex</b>														
LA-01	Autoclave, table top type	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-01	Autoclave, table top type	Washing room
LA-02	Autoclave, vertical type	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-02	Autoclave, vertical type	Washing room
LA-03	Automatic biochemistry analyzer	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-03	Automatic biochemistry analyzer	Biochemistry
LA-04	Electronic balance	A	R	o	o	o	o	o	o	Same as Basic Design.	2	LA-04	Electronic balance	Biochemistry/ Microbiology
LA-05	Bilirubinmeter	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-05	Bilirubinmeter	Hematology
LA-06	Blood gas analyzer	A	N	o	o	o	o	o	o	Electrolyte measurement function shall be added since LA-12 Flamephotometer is excluded from the plan.	1	LA-06	Blood gas analyzer	Hematology
LA-07	Centrifuge	A	R	o	o	o	o	o	o	Same as Basic Design.	3	LA-07	Centrifuge	Hema/Bio/ Microbio
LA-08	Drying cabinet	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-08	Drying cabinet	Microbiology
LA-09	Electrophoresis system	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-09	Electrophoresis system	Biochemistry
LA-10	ELISA reader	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-10	ELISA reader	Hematology
LA-11	ELISA washer	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-11	ELISA washer	Hematology
LA-12	Flamephotometer	A	R	o	x	o	o	o	x	Shall be excluded from the plan since measuring method is outdated and manufacturer is limited.	0			
LA-13	Deep freezer	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-13	Deep freezer	Microbiology
LA-14	Heat dry block	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-14	Heat dry block	Hematology
LA-15	Hot air oven	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-15	Hot air oven	Microbiology
LA-16	Hot plate stirrer	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-16	Hot plate stirrer	Microbiology
LA-17	Incubator	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-17	Incubator	Microbiology
LA-18	Laminar flow cabinet	A	N	o	o	o	o	o	o	Same as Basic Design.	1	LA-18	Laminar flow cabinet	Microbiology
LA-19	Media sterilizer	A	R	o	o	o	o	o	o	Same as Basic Design.	1	LA-19	Media sterilizer	Microbiology
LA-20	Micro plate viewer	A	N	o	x	o	o	o	x	Shall be excluded from the plan since this item is discontinued. LA-10 ELISA reader shall be used as an alternative.	0			
LA-21	Microscope	A	R	o	o	o	o	o	o	Same as Basic Design.	4	LA-21	Microscope	Pathology/Hema/ Microbio

Item No. (Request)	Description (Request)	Priority	Category	Purpose	Necessity	Tec. level	Management system	& maintenance	Maintenance cost	Judgement	Remarks	Q'ty (Plan)	Item No. (Plan)	Description (Plan)	Delivery place (Plan)
LA-22	Microscope with CCD camera and monitor	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-22	Microscope with CCD camera and monitor	Pathology
LA-23	Microtome, rotary type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-23	Microtome, rotary type	Pathology
LA-24	Osmometer	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-24	Osmometer	Biochemistry
LA-25	PH meter	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-25	PH meter	Biochemistry
LA-26	Plate incubator	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-26	Plate incubator	Microbiology
LA-27	Refrigerator	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	LA-27	Refrigerator	Biochemistry/ Microbiology
LA-28	Rotamixer	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	LA-28	Rotor mixer	Biochemistry/ Microbiology
LA-29	Hematology mixer	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-29	Hematology mixer	Hematology
LA-30	Semi automated coagulation analyzer	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-30	Semi automated coagulation analyzer	Hematology
LA-31	Slide staining apparatus	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-31	Slide staining apparatus	Pathology
LA-32	Spectrophotometer	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-32	Spectrophotometer	Biochemistry
LA-33	Stirrer	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-33	Stirrer	Biochemistry
LA-34	Tissue processing apparatus	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-34	Tissue processing apparatus	Pathology
LA-35	Urine meter	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	LA-35	Urine meter	Pathology
LA-36	Water bath	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	LA-36	Water bath	Hema/ Biochemistry
	Automatic blood cell analyzer	B	R	o	o	o	o	o	o	o	One of two existing equipment is not working.	1	LA-37	Automatic blood cell analyzer	Hematology
	Hemoglobinmeter	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	1	LA-38	Hemoglobinmeter	Hematology
<b>Central Facilities for Diagnostic Imaging</b>															
RA-01	Dark room accessories	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-01	Dark room accessories	Dark room
RA-02	Dental X-ray, panorama type	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-02	Dental X-ray, panorama type	X-ray
RA-03	Examination table	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	RA-03	Examination table	X-ray
RA-04	Mammography unit	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-04	Mammography unit	X-ray
RA-05	Mobile X-ray unit	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-05	Mobile X-ray unit	X-ray
RA-06	Pass box	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-06	Pass box	Dark room
RA-07	Ultrasound scanner, B/W	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-07	Ultrasound scanner, B/W	Ultrasound
RA-08	Ultrasound scanner, color doppler	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-08	Ultrasound scanner, color doppler	Ultrasound
RA-09	X-ray film processor	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-09	X-ray film processor	Dark room
RA-10	X-ray film viewer, small, wall mount type	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-10	X-ray film viewer, small, wall mount type	Dark room
RA-11	X-ray film viewer, large, wall mount type	A	N	o	o	o	o	o	o	o	Same as Basic Design.	2	RA-11	X-ray film viewer, large, wall mount type	Film viewing room
RA-12	X-ray protective set	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	RA-12	X-ray protective set	X-ray
RA-13	X-ray system, fluoroscopy	A	R	o	x	o	o	o	o	x	Shall be excluded from the plan since this equipment shall be renewed by MOH.	0			
RA-14	X-ray system, simple bucky and stand	A	R	o	o	o	o	o	o	o	Same as Basic Design.	3	RA-14	X-ray system, simple bucky and stand	X-ray
	Resuscitation bag for adult	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	2	RA-15	Ambubag for adult	X-ray
	Resuscitation bag for pediatrics	B	R	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	1	RA-16	Ambubag for pediatrics	X-ray
	Stretcher	B	N	o	o	o	o	o	o	o	Existing equipment is too damaged to be used.	1	RA-17	Stretcher	X-ray
	CT Scanner	B	R	o	x	o	o	o	o	x	Shall be excluded from the plan since this equipment shall be renewed by loans from French government.	0			
VS-01	Bronchoscope	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	VS-01	Bronchoscope	Endoscope
VS-02	Colonoscope	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	VS-02	Colonoscope	Endoscope
VS-03	Cystoscope	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	VS-03	Cystoscope	Endoscope
VS-04	Endoscopic retrograde	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	VS-04	Endoscopic retrograde	Endoscope

Item No. (Request)	Description (Request)	Priority	Category	Purpose	Necessity	Tec. level	Management system	& maintenance	Maintenance cost	Judgement	Remarks	Q'ty (Plan)	Item No. (Plan)	Description (Plan)	Delivery place (Plan)
	cholangiopancreatography													cholangiopancreatography	
VS-05	Endoscopic cabinet	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	VS-05	Endoscopic cabinet	Endoscope
VS-06	Examination table for endoscope	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	VS-06	Examination table for endoscope	Endoscope
VS-07	Upper gastrointestinalscope	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	VS-07	Upper gastrointestinalscope	Endoscope
EE-01	EEG	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	EE-01	EEG	EEG
EE-02	Examination table	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	EE-02	Examination table	EEG
EC-01	ECG	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	EC-01	ECG	ECG
EC-02	ECG, holter testing	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	EC-02	ECG, holter testing	ECG
EC-03	ECG, stress testing	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	EC-03	ECG, stress testing	ECG
EC-04	Examination table	A	R	o	o	o	o	o	o	o	Same as Basic Design.	2	EC-04	Examination table	ECG
<b>Training Management</b>															
CO-01	Multimedia projector	A	N	o	o	o	o	o	o	o	Same as Basic Design.	1	CO-01	Multimedia projector	Meeting room
ME-01	Tool set	A	R	o	o	o	o	o	o	o	Same as Basic Design.	1	ME-01	Tool set	Maintenance

## **7. Equipment List**

## Equipment List

Item No.	Description	Country of Origin	Procured from	Main specifications or components	Grade	Q'ty	Purpose/ Appropriateness of medical equipment grade
OT-01	Anesthetic apparatus	Japan	Japan	1. Anesthetic apparatus 1) Anesthesia circuit : Closed type 2) O2 flow meter range Minimum : 0.1 liter/min. or less Maximum : 10 liter/min. or more 3) N2O flow meter range Minimum : 0.5 liter/min. or less Maximum : 10L liter/min. or more 4) Vaporizer : Isoflurane and halothane	Middle Grade	4	To give patients a general anesthesia during short-lasting operation.
OT-02	Anesthetic apparatus with ventilator	Japan	Japan	1. Anesthetic apparatus 1) Anesthesia circuit : Closed type 2) O2 flow meter range Minimum : 0.1 liter/min. or less Maximum : 10 liter/min. or more 3) N2O flow meter range Minimum : 0.5 liter/min. or less Maximum : 10L liter/min. or more 4) Vaporizer : Isoflurane and halothane 2. Ventilator 1) Ventilation mode : Pressure and volume control 2) Tidal volume range Minimum : 20mL or less Maximum : 1,400mL or more	Middle Grade	5	To give patients a general anesthesia during long-lasting operation and assist breathing of patients.
OT-03	Autoclave, large size	Spain	Sri Lanka	1. Pass through type 2. Two door 3. Nominal chamber volume : 580 liter or more 4. With boiler 5. Sterilizing temperature : 132°C or more	Middle Grade	2	To sterilize instruments or linens used in the operation theaters and wards, with use of high-pressure steam.
OT-04	Autoclave, medium size	USA	Sri Lanka	1. Pass through type 2. Two door 3. Nominal chamber volume : 225 liter or more 4. With boiler 5. Sterilizing temperature : 132°C or more	Middle Grade	2	To sterilize instruments or linens used in the operation theaters and wards, with use of high-pressure steam.
OT-06	Defibrillator	Japan	Japan	1. Defibrillation : Monophasic or biphasic waveform 1) Monophasic waveform : Max. 360 joules or more 2) Biphasic waveform : Max. 270 joules or more 2. ECG lead : 3-electrodes or more	Middle Grade	2	To deliver an electrical shock to recover heart movement from ventricular fibrillation.
OT-13	Instrument set for nephrectomy	Japan	Japan	1. Components : 61 items 2. Material : Stainless steel	Middle Grade	1	To carry out nephrectomy.
OT-14	Instrument set for neurology	Japan	Japan	1. Components : 67 items 2. Material : Stainless steel	Middle Grade	1	To carry out neurosurgery.
OT-16	Operation lamp, complete type	Japan	Japan	1. Lamp intensity of main light : 130,000 lux or more 2. Halogen lamp 3. 2 arms, radial arm type 4. Operating time of battery back up : 2 hours or more	Middle Grade	4	To light up surgical field during operation.
OT-17	Operation lamp, simple type	Japan	Japan	1. Lamp intensity of main light : 130,000 lux or more 2. Halogen lamp 3. 1 arm 4. Operating time of battery back up : 2 hours or more	Middle Grade	4	To light up surgical field during operation.
OT-19	Operation monitor	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO2, NIBP, ETCO2, temperature 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	8	To monitor vital signs of patients continuously under general anesthesia during operation.
OT-20	Operation table	Japan	Japan	1. Accessories : Arm board, X-ray cassette holder, shoulder support, body support and knee crutch 2. Operation 1) Height elevating : Hydraulic oil pump by foot pedal 2) Positioning : Manual handle or/and foot pedal 3. Height elevating type 4. Positioning : Trendelenburg, lateral tilting, back section and others	Middle Grade	7	To keep patients in the suitable positions for various operations.
OT-21	Operation table for orthopedic	Japan	Japan	1. Operation : Electro hydraulic type 2. With limb traction device set 3. Positioning : Trendelenburg, lateral tilting, back section and others	Middle Grade	1	To keep patients in the suitable positions for orthopedic operations.
OT-30	Surgical hand scrub unit	Japan	Japan	1. Type : For two person 2. Fluorescent lamp equipped	Middle Grade	5	To scrub hand before and after operation.
OT-34	Automatic disinfectant	Sweden	Sri Lanka	1. Single door type 2. Chamber capacity : 150 liter or more 3. Disinfection progress : Washing - disinfection - drying	Middle Grade	1	To wash and dry used instruments automatically.
OT-35	C-arm X-ray unit	Japan	Japan	1. Type : Inverter, 20kHz or more 2. Tube voltage : Max. 110kV or more 3. Image Intensifier size : 6/9 inch or more	Middle Grade	1	To carry out fluoroscopy diagnosis (orthopedic, urology) during operation.
OT-36	Instrument set for amputation	Japan	Japan	1. Components : 65 items 2. Material : Stainless steel	Middle Grade	1	To carry out amputation.

Item No.	Description	Country of Origin	Procured from	Main specifications or components	Grade	Q'ty	Purpose/ Appropriateness of medical equipment grade
OT-37	Instrument set for cervical fusion surgery	Japan	Japan	1. Components : 7 items 2. Material : Stainless steel	Middle Grade	1	To carry out cervical fusion surgery.
OT-42	Instrument set for gastrectomy	Japan	Japan	1. Components : 68 items 2. Material : Stainless steel	Middle Grade	1	To carry out gastrectomy.
OT-46	Instrument set for oesophageal dilator	Japan	Japan	1. Components : 40 items 2. Material : Stainless steel	Middle Grade	1	To carry out oesophageal dilator.
OT-47	Instrument set for orthopedic surgery	Japan	Japan	1. Components : 60 items 2. Material : Stainless steel	Middle Grade	1	To carry out orthopedic surgery.
OT-50	Instrument set for skin grafting	USA	Japan	1. Dermotome : Electrical 2. Cutting thickness range : 0.2 to 0.75 mm or wider, adjustable 3. Cutting wide range : 26 to 78 mm or wider, adjustable	Middle Grade	1	To denude skin for skin grafting on raw area and skin ulcer.
OT-51	Instrument set for thoracic surgery	Japan	Japan	1. Components : 41 items 2. Material : Stainless steel	Middle Grade	1	To carry out thoracic surgery.
OT-52	Instrument set for thyroidotomy	Japan	Japan	1. Components : 44 items 2. Material : Stainless steel	Middle Grade	1	To carry out thyroidotomy.
OT-55	Instrument set for hysterectomy	Japan	Japan	1. Components : pair of set, 32 items and 38 items 2. Material : Stainless steel	Middle Grade	1	To carry out hysterectomy.
OT-60	Patient monitor	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO <sub>2</sub> , NIBP, ETCO <sub>2</sub> , temperature 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	4	To monitor vital signs of patients continuously after surgery.
IC-05	Central monitor	Japan	Japan	1. Number of patient on the display : 16 patients or more 2. Display size : 19 inch or more 3. Waveform display items : ECG, respiration and SpO <sub>2</sub> 4. Alphanumeric display items : Heart rate, respiration rate, VPC rate, ST level, SpO <sub>2</sub> , NIBP, temperature, etCO <sub>2</sub> , CO	Middle Grade	1	To monitor 22 patient monitors which are installed at each bedside in ICU.
IC-06	Defibrillator	Japan	Japan	1. Defibrillation : Monophasic or biphasic waveform 1) Monophasic waveform : Max. 360 joules or more 2) Biphasic waveform : Max. 270 joules or more 2. ECG lead : 3-electrodes or more	Middle Grade	1	To deliver an electrical shock to recover heart movement from ventricular fibrillation.
IC-12A	Patient monitor A	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO <sub>2</sub> , NIBP, ETCO <sub>2</sub> , temperature 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	18	To monitor vital signs of patients continuously in ICU.
IC-12B	Patient monitor B	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO <sub>2</sub> , NIBP, ETCO <sub>2</sub> , temperature, IBP 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	2	To monitor vital signs of patients continuously in ICU. IBP is also monitored.
IC-12C	Patient monitor C	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO <sub>2</sub> , NIBP, ETCO <sub>2</sub> , temperature, IBP, CO 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	2	To monitor vital signs of patients continuously in ICU. IBP and CO are also monitored.
IC-21	Ventilator for adult	Japan	Japan	1. For adult 2. Ventilation mode : Volume and pressure control 3. Tidal volume : 100 to 2000mL or more 4. PEEP : 0 to 19cmH <sub>2</sub> O or more 5. Respiratory rate : 1 to 60 breath/min. or wider 6. Oxygen concentration : 21 to 100%	Middle Grade	13	To assist breathing of adult patients who have difficulties in spontaneous breathing.
IC-22	Ventilator for pediatrics	Japan	Japan	1. For pediatrics 2. Ventilation mode : Volume and pressure control 3. Tidal volume : 50 to 1300mL or more 4. PEEP : 0 to 19cmH <sub>2</sub> O or more 5. Respiratory rate : 1 to 60 breath/min. or wider 6. Oxygen concentration : 21 to 100%	Middle Grade	2	To assist breathing of pediatric patients who have difficulties in spontaneous breathing.
LA-03	Automatic biochemistry analyzer	Japan	Japan	1. Test throughput : 400 tests/hour or more 2. Test menu : 39 tests or more 3. Built-in auto sampler 4. With printer	Middle Grade	1	To analyze metabolic status rapidly from patients' blood or urine with use of reagents.
LA-06	Blood gas analyzer	USA	Japan	1. Measurement parameter : pH, pCO <sub>2</sub> , PO <sub>2</sub> , Na <sup>+</sup> and K <sup>+</sup> 2. Analysis time : 120 second or less 3. Sample volume : 195µL or less 4. Automatic calibration	Middle Grade	1	To analyze respiratory and metabolic status by measuring pO <sub>2</sub> , pCO <sub>2</sub> , pH and electrolyte in arterial blood.
LA-09	Electrophoresis system	Japan	Japan	1. For cellulose acetate electrophoresis 2. Components : Electrophoresis vessel and power supply unit 3. Vessel capacity : 20 samples or more	Middle Grade	1	To analyze protein in serum and examine liver function, renal function and metabolic status.
LA-18	Laminar flow cabinet	Japan	Japan	1. Safety cabinet class II A2, outdoor exhaust type, floor stand type 2. Filter element : HEPA filter 3. Chamber material : Stainless steel	Middle Grade	1	To prevent pathogens from dispersing in laboratory when handling viruliferous sample.
LA-22	Microscope with CCD camera and monitor	Japan	Japan	1. Side by side teaching unit for 2 observers 2. Nose piece : Quintuple or sextuple 3. Illumination : 6 or 12V/ 25 or 30W lamp 4. Accessory : 1/1.8 inch or more color CCD camera 5. With color monitor	Middle Grade	1	To enable some technicians to observe imaging of microscope at the same time. Also, to enable medical students to study through monitor image.

Item No.	Description	Country of Origin	Procured from	Main specifications or components	Grade	Q'ty	Purpose/ Appropriateness of medical equipment grade
LA-30	Semi automated coagulation analyzer	Japan	Japan	1. Measurement parameter : Prothrombin time, activated partial thromboplastin time, fibrinogene and Thrombin time 2. Incubation function : Provided 3. Display : LCD	Middle Grade	1	To measure solidification (hemostasis) time of blood inside and outside of blood vessels and to examine solidification and liver functions.
LA-32	Spectrophotometer	Germany	Japan	1. Measurement method : Single beam or double beam system 2. Wavelength repeatability : 3nm or less 3. Wavelength range : 190 to 1,100nm or wider 4. With printer	Middle Grade	1	To measure intensity distribution of light spectrum and perform quantitative analysis for solution sample.
LA-37	Automatic blood cell analyzer	Japan	Japan	1. Test throughput : 50 tests/hour or more 2. Test menu : 12 tests or more 3. Sample volume : 50µL or less 4. With printer	Middle Grade	1	To count the number of red blood cell, white blood cell, hemoglobin, etc. in blood vessels.
RA-01	Dark room accessories	Japan	Japan	1. Film mark set : Alphabets and numeral 2. Film loading and unloading table : Wood 3. X-ray film cassette : 4 kinds, each 8pcs. /kind 4. Intensifying screen : High speed type 5. Pocket dosimeter : Measurement range : 0 to 2.00mSv or more	Middle Grade	1	To intensify X-ray films, store raw films, etc. in dark room.
RA-02	Dental X-ray, panorama type	Japan	Japan	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 alveolar bones and diagnose the status.
RA-04	Mammography unit	Finland	Japan	1. Generator : Inverter type 2. Tube voltage : Max. 35kV or more 3. Tube current : Max. 100mA or more 4. X-ray film cassette size : 18 X 24cm to 24 X 30cm	Middle Grade	1	To radiograph breasts to diagnose inside myoma and cancer.
RA-05	Mobile X-ray unit	Japan	Japan	1. Generator : Inverter type 2. Tube voltage : Max. 125kV or more 3. Tube current : Max. 160mA or more 4. X-ray film cassette size : Max. 24 X 30cm	Middle Grade	1	To carry out emergency and brief radiographic diagnosis for patients who cannot walk or need complete bed rest.
RA-07	Ultrasound scanner, B/W	Japan	Japan	1. Scanning method : Electronic convex 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 carry out ultrasound diagnosis of abdomen.
RA-08	Ultrasound scanner, color doppler	Japan	Japan	1. Scanning method : Electronic convex, linear and sector 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 color printer 5. Cine memory : Provided 6. With CD/DVD drive	Middle Grade	1	To carry out ultrasound diagnosis of abdomen, heart, bloodstream of thyroid gland or carotid artery with color images.
RA-14	X-ray system, simple bucky and stand	Japan	Japan	1. Tube voltage : Max. 150kV or more 2. Tube current : Max. 500mA or more 3. AEC : Equipped	Middle Grade	3	To carry out general radiographic diagnosis of fracture, lung, abdomen, etc.
VS-01	Bronchoscope	Japan	Japan	1. Field of view : 120° 2. Depth of field : 3 to 50 mm 3. Working length : 600mm or more 4. Outer diameter of distal end : 4.9mm or less	Middle Grade	1	To diagnose bronchitic disorders, such as lung cancer, pulmonary TB, etc.
VS-02	Colonoscope	Japan	Japan	1. Field of view : 140° or more 2. Depth of field : 3 to 100 mm 3. Working length : 1300mm or more 4. Outer diameter of distal end : 12.8mm or less	Middle Grade	1	To diagnose colon through rectum.
VS-03	Cystoscope	Japan	Japan	1. Field of view : 120° or more 2. Depth of field : 3 to 50 mm 3. Working length : 380mm or more 4. Outer diameter of distal end : 5.5mm or less	Middle Grade	1	To diagnose disorders of bladders.
VS-04	Endoscopic retrograde cholangiopancreatography	Japan	Japan	1. Field of view : 100° 2. Depth of field : 5 to 60 mm 3. Working length : 1240mm or more 4. Outer diameter of distal end : 13.5mm or less	Middle Grade	1	To carry out radiographical diagnosis of bile duct and pancreatic duct. Also, to use for retrieval of bile duct stones.
VS-07	Upper gastrointestinal scope	Japan	Japan	1. Field of view : 140° 2. Depth of field : 4 to 100 mm 3. Working length : 1030mm or more 4. Outer diameter of distal end : 9.8mm or less	Middle Grade	1	To diagnose disorders of esophagus, stomach and duodenum.
EE-01	EEG	Japan	Japan	1. EEG input on electrode position layout : 25 or more 2. With photic stimulator	Middle Grade	1	To diagnose epilepsy, encephalitis, and cerebral disorders by recording electrical activities of brain.
EC-02	ECG, holter testing	Japan	Japan	1. Recording method : 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	Japan	Japan	1. Lead : 12 electrodes 2. Measurement parameter : ST 3. Stress treadmill : Belt driving type	Middle Grade	1	To diagnose heart disorders and to rehabilitate heart conditions.
ME-01	Tool set	Japan	Japan	1. Components : Tool set (mechanical, electrical and electrical), BP calibrator, ECG simulator etc. (Total 7 items)	Middle Grade	1	To repair broken medical equipments and calibrate sphygmomanometer, defibrillator and ECG.

## **8. Outline of Main Equipment**



## Outline of Main Equipment

Item No.	Description	Country of Origin	Procured from	Main specifications or components	Grade	Q'ty	Purpose/ Appropriateness of medical equipment grade
OT-01	Anesthetic apparatus	Japan	Japan	1. Anesthetic apparatus 1) Anesthesia circuit : Closed type 2) O2 flow meter range Minimum : 0.1 liter/min. or less Maximum : 10 liter/min. or more 3) N2O flow meter range Minimum : 0.5 liter/min. or less Maximum : 10L liter/min. or more 4) Vaporizer : Isoflurane and halothane	Middle Grade	4	To give patients a general anesthesia during short-lasting operation.
OT-02	Anesthetic apparatus with ventilator	Japan	Japan	1. Anesthetic apparatus 1) Anesthesia circuit : Closed type 2) O2 flow meter range Minimum : 0.1 liter/min. or less Maximum : 10 liter/min. or more 3) N2O flow meter range Minimum : 0.5 liter/min. or less Maximum : 10L liter/min. or more 4) Vaporizer : Isoflurane and halothane 2. Ventilator 1) Ventilation mode : Pressure and volume control 2) Tidal volume range Minimum : 20mL or less Maximum : 1,400mL or more	Middle Grade	5	To give patients a general anesthesia during long-lasting operation and assist breathing of patients.
OT-03	Autoclave, large size	Spain	Sri Lanka	1. Pass through type 2. Two door 3. Nominal chamber volume : 580 liter or more 4. With boiler 5. Sterilizing temperature : 132°C or more	Middle Grade	2	To sterilize instruments or linens used in the operation theaters and wards, with use of high-pressure steam.
OT-04	Autoclave, medium size	USA	Sri Lanka	1. Pass through type 2. Two door 3. Nominal chamber volume : 225 liter or more 4. With boiler 5. Sterilizing temperature : 132°C or more	Middle Grade	2	To sterilize instruments or linens used in the operation theaters and wards, with use of high-pressure steam.
OT-06	Defibrillator	Japan	Japan	1. Defibrillation : Monophasic or biphasic waveform 1) Monophasic waveform : Max. 360 joules or more 2) Biphasic waveform : Max. 270 joules or more 2. ECG lead : 3-electrodes or more	Middle Grade	2	To deliver an electrical shock to recover heart movement from ventricular fibrillation.
OT-13	Instrument set for nephrectomy	Japan	Japan	1. Components : 61 items 2. Material : Stainless steel	Middle Grade	1	To carry out nephrectomy.
OT-14	Instrument set for neurology	Japan	Japan	1. Components : 67 items 2. Material : Stainless steel	Middle Grade	1	To carry out neurosurgery.
OT-16	Operation lamp, complete type	Japan	Japan	1. Lamp intensity of main light : 130,000 lux or more 2. Halogen lamp 3. 2 arms, radial arm type 4. Operating time of battery back up : 2 hours or more	Middle Grade	4	To light up surgical field during operation.
OT-17	Operation lamp, simple type	Japan	Japan	1. Lamp intensity of main light : 130,000 lux or more 2. Halogen lamp 3. 1 arm 4. Operating time of battery back up : 2 hours or more	Middle Grade	4	To light up surgical field during operation.
OT-19	Operation monitor	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO2, NIBP, ETCO2, temperature 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	8	To monitor vital signs of patients continuously under general anesthesia during operation.
OT-20	Operation table	Japan	Japan	1. Accessories : Arm board, X-ray cassette holder, shoulder support, body support and knee crutch 2. Operation 1) Height elevating : Hydraulic oil pump by foot pedal 2) Positioning : Manual handle or/and foot pedal 3. Height elevating type 4. Positioning : Trendelenburg, lateral tilting, back section and others	Middle Grade	7	To keep patients in the suitable positions for various operations.
OT-21	Operation table for orthopedic	Japan	Japan	1. Operation : Electro hydraulic type 2. With limb traction device set 3. Positioning : Trendelenburg, lateral tilting, back section and others	Middle Grade	1	To keep patients in the suitable positions for orthopedic operations.
OT-30	Surgical hand scrub unit	Japan	Japan	1. Type : For two person 2. Fluorescent lamp equipped	Middle Grade	5	To scrub hand before and after operation.
OT-34	Automatic disinfector	Sweden	Sri Lanka	1. Single door type 2. Chamber capacity : 150 liter or more 3. Disinfection progress : Washing - disinfection - drying	Middle Grade	1	To wash and dry used instruments automatically.
OT-35	C-arm X-ray unit	Japan	Japan	1. Type : Inverter, 20kHz or more 2. Tube voltage : Max. 110kV or more 3. Image Intensifier size : 6/9 inch or more	Middle Grade	1	To carry out fluoroscopy diagnosis (orthopedic, urology) during operation.
OT-36	Instrument set for amputation	Japan	Japan	1. Components : 65 items 2. Material : Stainless steel	Middle Grade	1	To carry out amputation.

Item No.	Description	Country of Origin	Procured from	Main specifications or components	Grade	Q'ty	Purpose/ Appropriateness of medical equipment grade
OT-37	Instrument set for cervical fusion surgery	Japan	Japan	1. Components : 7 items 2. Material : Stainless steel	Middle Grade	1	To carry out cervical fusion surgery.
OT-42	Instrument set for gastrectomy	Japan	Japan	1. Components : 68 items 2. Material : Stainless steel	Middle Grade	1	To carry out gastrectomy.
OT-46	Instrument set for oesophageal dilator	Japan	Japan	1. Components : 40 items 2. Material : Stainless steel	Middle Grade	1	To carry out oesophageal dilator.
OT-47	Instrument set for orthopedic surgery	Japan	Japan	1. Components : 60 items 2. Material : Stainless steel	Middle Grade	1	To carry out orthopedic surgery.
OT-50	Instrument set for skin grafting	USA	Japan	1. Dermatome : Electrical 2. Cutting thickness range : 0.2 to 0.75 mm or wider, adjustable 3. Cutting wide range : 26 to 78 mm or wider, adjustable	Middle Grade	1	To denude skin for skin grafting on raw area and skin ulcer.
OT-51	Instrument set for thoracic surgery	Japan	Japan	1. Components : 41 items 2. Material : Stainless steel	Middle Grade	1	To carry out thoracic surgery.
OT-52	Instrument set for thyroidotomy	Japan	Japan	1. Components : 44 items 2. Material : Stainless steel	Middle Grade	1	To carry out thyroidotomy.
OT-55	Instrument set for hysterectomy	Japan	Japan	1. Components : pair of set, 32 items and 38 items 2. Material : Stainless steel	Middle Grade	1	To carry out hysterectomy.
OT-60	Patient monitor	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO2, NIBP, ETCO2, temperature 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	4	To monitor vital signs of patients continuously after surgery.
IC-05	Central monitor	Japan	Japan	1. Number of patient on the display : 16 patients or more 2. Display size : 19 inch or more 3. Waveform display items : ECG, respiration and SpO2 4. Alphanumeric display items : Heart rate, respiration rate, VPC rate, ST level, SpO2, NIBP, temperature, etCO2, CO	Middle Grade	1	To monitor 22 patient monitors which are installed at each bedside in ICU.
IC-06	Defibrillator	Japan	Japan	1. Defibrillation : Monophasic or biphasic waveform 1) Monophasic waveform : Max. 360 joules or more 2) Biphasic waveform : Max. 270 joules or more 2. ECG lead : 3-electrodes or more	Middle Grade	1	To deliver an electrical shock to recover heart movement from ventricular fibrillation.
IC-12A	Patient monitor A	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO2, NIBP, ETCO2, temperature 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	18	To monitor vital signs of patients continuously in ICU.
IC-12B	Patient monitor B	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO2, NIBP, ETCO2, temperature, IBP 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	2	To monitor vital signs of patients continuously in ICU. IBP is also monitored.
IC-12C	Patient monitor C	Japan	Japan	1. Measurement parameter : ECG, respiration, SpO2, NIBP, ETCO2, temperature, IBP, CO 2. ECG lead : 3-electrodes or more 3. With cart	Middle Grade	2	To monitor vital signs of patients continuously in ICU. IBP and CO are also monitored.
IC-21	Ventilator for adult	Japan	Japan	1. For adult 2. Ventilation mode : Volume and pressure control 3. Tidal volume : 100 to 2000mL or more 4. PEEP : 0 to 19cmH2O or more 5. Respiratory rate : 1 to 60 breath/min. or wider 6. Oxygen concentration : 21 to 100%	Middle Grade	13	To assist breathing of adult patients who have difficulties in spontaneous breathing.
IC-22	Ventilator for pediatrics	Japan	Japan	1. For pediatrics 2. Ventilation mode : Volume and pressure control 3. Tidal volume : 50 to 1300mL or more 4. PEEP : 0 to 19cmH2O or more 5. Respiratory rate : 1 to 60 breath/min. or wider 6. Oxygen concentration : 21 to 100%	Middle Grade	2	To assist breathing of pediatric patients who have difficulties in spontaneous breathing.
LA-03	Automatic biochemistry analyzer	Japan	Japan	1. Test throughput : 400 tests/hour or more 2. Test menu : 39 tests or more 3. Built-in auto sampler 4. With printer	Middle Grade	1	To analyze metabolic status rapidly from patients' blood or urine with use of reagents.
LA-06	Blood gas analyzer	USA	Japan	1. Measurement parameter : pH, pCO2, PO2, Na+ and K+ 2. Analysis time : 120 second or less 3. Sample volume : 195µL or less 4. Automatic calibration	Middle Grade	1	To analyze respiratory and metabolic status by measuring pO2, pCO2, pH and electrolyte in arterial blood.
LA-09	Electrophoresis system	Japan	Japan	1. For cellulose acetate electrophoresis 2. Components : Electrophoresis vessel and power supply unit 3. Vessel capacity : 20 samples or more	Middle Grade	1	To analyze protein in serum and examine liver function, renal function and metabolic status.
LA-18	Laminar flow cabinet	Japan	Japan	1. Safety cabinet class II A2, outdoor exhaust type, floor stand type 2. Filter element : HEPA filter 3. Chamber material : Stainless steel	Middle Grade	1	To prevent pathogens from dispersing in laboratory when handling viruliferous sample.
LA-22	Microscope with CCD camera and monitor	Japan	Japan	1. Side by side teaching unit for 2 observers 2. Nose piece : Quintuple or sextuple 3. Illumination : 6 or 12V/ 25 or 30W lamp 4. Accessory : 1/1.8 inch or more color CCD camera 5. With color monitor	Middle Grade	1	To enable some technicians to observe imaging of microscope at the same time. Also, to enable medical students to study through monitor image.

Item No.	Description	Country of Origin	Procured from	Main specifications or components	Grade	Q'ty	Purpose/ Appropriateness of medical equipment grade
LA-30	Semi automated coagulation analyzer	Japan	Japan	1. Measurement parameter: Prothrombin time, activated partial thromboplastin time, fibrinogen and Thrombin time 2. Incubation function : Provided 3. Display : LCD	Middle Grade	1	To measure solidification (hemostasis) time of blood inside and outside of blood vessels and to examine solidification and liver functions.
LA-32	Spectrophotometer	Germany	Japan	1. Measurement method : Single beam or double beam system 2. Wavelength repeatability : 3nm or less 3. Wavelength range : 190 to 1,100nm or wider 4. With printer	Middle Grade	1	To measure intensity distribution of light spectrum and perform quantitative analysis for solution sample.
LA-37	Automatic blood cell analyzer	Japan	Japan	1. Test throughput : 50 tests/hour or more 2. Test menu : 12 tests or more 3. Sample volume : 50µL or less 4. With printer	Middle Grade	1	To count the number of red blood cell, white blood cell, hemoglobin, etc. in blood vessels.
RA-01	Dark room accessories	Japan	Japan	1. Film mark set : Alphabets and numeral 2. Film loading and unloading table : Wood 3. X-ray film cassette : 4 kinds, each 8pcs. /kind 4. Intensifying screen : High speed type 5. Pocket dosimeter : Measurement range : 0 to 2.00mSv or more	Middle Grade	1	To intensify X-ray films, store raw films, etc. in dark room.
RA-02	Dental X-ray, panorama type	Japan	Japan	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 alveolar bones and diagnose the status.
RA-04	Mammography unit	Finland	Japan	1. Generator : Inverter type 2. Tube voltage : Max. 35kV or more 3. Tube current : Max. 100mA or more 4. X-ray film cassette size : 18 X 24cm to 24 X 30cm	Middle Grade	1	To radiograph breasts to diagnose inside myoma and cancer.
RA-05	Mobile X-ray unit	Japan	Japan	1. Generator : Inverter type 2. Tube voltage : Max. 125kV or more 3. Tube current : Max. 160mA or more 4. X-ray film cassette size : Max. 24 X 30cm	Middle Grade	1	To carry out emergency and brief radiographic diagnosis for patients who cannot walk or need complete bed rest.
RA-07	Ultrasound scanner, B/W	Japan	Japan	1. Scanning method : Electronic convex 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 carry out ultrasound diagnosis of abdomen.
RA-08	Ultrasound scanner, color doppler	Japan	Japan	1. Scanning method : Electronic convex, linear and sector 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 color printer 5. Cine memory : Provided 6. With CD/DVD drive	Middle Grade	1	To carry out ultrasound diagnosis of abdomen, heart, bloodstream of thyroid gland or carotid artery with color images.
RA-14	X-ray system, simple bucky and stand	Japan	Japan	1. Tube voltage : Max. 150kV or more 2. Tube current : Max. 500mA or more 3. AEC : Equipped	Middle Grade	3	To carry out general radiographic diagnosis of fracture, lung, abdomen, etc.
VS-01	Bronchoscope	Japan	Japan	1. Field of view : 120° 2. Depth of field : 3 to 50 mm 3. Working length : 600mm or more 4. Outer diameter of distal end : 4.9mm or less	Middle Grade	1	To diagnose bronchitic disorders, such as lung cancer, pulmonary TB, etc.
VS-02	Colonoscope	Japan	Japan	1. Field of view : 140° or more 2. Depth of field : 3 to 100 mm 3. Working length : 1300mm or more 4. Outer diameter of distal end : 12.8mm or less	Middle Grade	1	To diagnose colon through rectum.
VS-03	Cystoscope	Japan	Japan	1. Field of view : 120° or more 2. Depth of field : 3 to 50 mm 3. Working length : 380mm or more 4. Outer diameter of distal end : 5.5mm or less	Middle Grade	1	To diagnose disorders of bladders.
VS-04	Endoscopic retrograde cholangiopancreatography	Japan	Japan	1. Field of view : 100° 2. Depth of field : 5 to 60 mm 3. Working length : 1240mm or more 4. Outer diameter of distal end : 13.5mm or less	Middle Grade	1	To carry out radiographical diagnosis of bile duct and pancreatic duct. Also, to use for retrieval of bile duct stones.
VS-07	Upper gastrointestinal scope	Japan	Japan	1. Field of view : 140° 2. Depth of field : 4 to 100 mm 3. Working length : 1030mm or more 4. Outer diameter of distal end : 9.8mm or less	Middle Grade	1	To diagnose disorders of esophagus, stomach and duodenum.
EE-01	EEG	Japan	Japan	1. EEG input on electrode position layout : 25 or more 2. With photic stimulator	Middle Grade	1	To diagnose epilepsy, encephalitis, and cerebral disorders by recording electrical activities of brain.
EC-02	ECG, holter testing	Japan	Japan	1. Recording method : 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	Japan	Japan	1. Lead : 12 electrodes 2. Measurement parameter : ST 3. Stress treadmill : Belt driving type	Middle Grade	1	To diagnose heart disorders and to rehabilitate heart conditions.
ME-01	Tool set	Japan	Japan	1. Components : Tool set (mechanical, electrical and electronic), BP calibrator, ECG simulator etc. (Total 7 items)	Middle Grade	1	To repair broken medical equipments and calibrate sphygmomanometer, defibrillator and ECG.

## **9. Annual Operation and Maintenance Cost of Equipment**

Annual Operation and Maintenance Cost of Equipment

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
OT-01	Anesthetic apparatus	4						253,000	1,012,000
			Patient circuit set for adult	set	2sets/year	2	10,500	21,000	
			Patient circuit set for pediatrics	set	2sets/year	2	17,500	35,000	
			Mask set for adult	set	2sets/year	2	20,000	40,000	
			Mask set for pediatrics	set	2sets/year	2	9,200	18,400	
			CO2 absorber tablets	5kg/pc	300days/yearx6h/dayx0.05kg/h=90kg/year 90kg/year÷5kg=18	18	7,700	138,600	
OT-02	Anesthetic apparatus with ventilator	5						253,000	1,265,000
			Patient circuit set for adult	set	2sets/year	2	10,500	21,000	
			Patient circuit set for pediatrics	set	2sets/year	2	17,500	35,000	
			Mask set for adult	set	2sets/year	2	20,000	40,000	
			Mask set for pediatrics	set	2sets/year	2	9,200	18,400	
			CO2 absorber tablets	5kg/pc	300days/yearx6h/dayx0.05kg/h=90kg/year 90kg/year÷5kg=18	18	7,700	138,600	
OT-03	Autoclave, large size	2						263,000	526,000
			Pre-filter	pc	3times/year	3	9,500	28,500	
			Resin	10L/set	3times/yearx10L	3	30,000	90,000	
			Salt	20kg/pc	1time/week=52times/yearx20kg=1,040kg/year 1,040kg/year÷20kg=25	25	5,000	125,000	
			Recording paper	roll	4times/dayx300days/year=1,200times/year 1,200times/year÷250times/roll=4.8	5	3,900	19,500	
OT-04	Autoclave, medium size	2						263,000	526,000
			Pre-filter	pc	3times/year	3	9,500	28,500	
			Resin	10L/set	3times/yearx10L	3	30,000	90,000	
			Salt	20kg/pc	1time/week=52times/yearx20kg=1,040kg/year 1,040kg/year÷20kg=25	25	5,000	125,000	
			Recording paper	roll	4times/dayx300days/year=1,200times/year 1,200times/year÷250times/roll=4.8	5	3,900	19,500	
OT-06	Defibrillator	2						51,050	102,100
			Gel	250g/pc	300days/yearx0.5patient/day=150patient/year 150patientx20g/patient÷250g/pc=12	12	1,250	15,000	
			Electrode	150pc /box	300days/yearx0.5patient/day=150patient/year 150patientx3electrode÷150pcs=3	3	10,950	32,850	
			Recording paper	10pc/set (200m)	300daysx0.5patient/day=150patient/year 150patientx1m÷200m=0.75	1	3,200	3,200	
OT-08	Electrosurgical unit	8						212,000	1,696,000
			Plate electrode	pc	2pcs/year	2	26,000	52,000	
			Electrode set	set	1set/year	1	20,000	20,000	
			Bipolar forceps, straight	pc	1pc/year	1	70,000	70,000	

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Bipolar forceps, bent	pc	1pc/year	1	70,000	70,000	
OT-10	Laryngoscope set	4						5,200	20,800
			Bulb for adult	pc	2pcs/year	2	1,300	2,600	
			Bulb for pediatrics	pc	2pcs/year	2	1,300	2,600	
OT-15	Neonatal resuscitator with over head warmer	1						8,000	8,000
			Mattress	pc	1pc/year	1	5,600	5,600	
			Lamp	pc	300days/yearx12h÷2,000h/pc=1.8	2	1,200	2,400	
OT-16	Operation lamp, complete type	4						144,000	576,000
			Bulb(10bulb)	set	8h/dayx300days/year÷1,000h=2.4	3	48,000	144,000	
OT-17	Operation lamp, simple type	4						72,000	288,000
			Bulb(5bulb)	set	8h/dayx300days/year÷1,000h=2.4	3	24,000	72,000	
OT-18	Operation lamp, mobile with battery back up unit	3						43,200	129,600
			Bulb(3bulb)	set	8h/dayx300days/year÷1,000h=2.4	3	14,400	43,200	
OT-19	Operation monitor	8						563,400	4,507,200
			ECG electrode	150pc /box	300days/yearx2patient/dayx3pcs/patient=1,800pc÷150=12	12	10,950	131,400	
			etCO2 sensor set	set	300days/yearx0.5patient/day=150	150	2,400	360,000	
			SpO2 finger probe	pc	1year/pc	1	30,000	30,000	
			ECG electrode lead	set	1year/set	1	42,000	42,000	
OT-28	Suction unit, portable type	3						9,500	28,500
			Suction bottle	set	1set/year	1	1,500	1,500	
			Suction tube	set	1set/year	1	2,000	2,000	
			Suction catheter	set	1set/year	1	6,000	6,000	
OT-29	Suction unit, kick type	8						27,000	216,000
			Suction bottle	set	1set/year	1	18,000	18,000	
			Suction tube	set	1set/year	1	2,000	2,000	
			Cap unit	pc	1pc/year	1	5,000	5,000	
			Float set	set	1set/year	1	2,000	2,000	
OT-30	Surgical hand scrub unit	5						90,000	450,000
			Filter	set	1set/year	1	90,000	90,000	
OT-31	Syringe pump	4						201,600	806,400

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Syringe(30mL)	400pc /set	2sets/year	2	28,800	57,600	
			Extension tube	400pc /set	2sets/year	2	72,000	144,000	
OT-33	X-ray film viewer, large, wall mount type	11						12,600	138,600
			Fluorescent lamp(6pc/unit)	set	8h/dayx300days/year÷2,000h=1.275	2	6,300	12,600	
OT-34	Automatic disinfecter	1						36,000	36,000
			Chemical for washing (acid)	4L/pc	300days/yearx2times/dayx0.1L/time=6L/year 6L/year÷4L/pc=1.5pcs	2	8,000	16,000	
			Chemical for washing (alkaline)	4L/pc	300days/yearx2times/dayx0.1L/time=6L/year 6L/year÷4L/pc=1.5pcs	2	10,000	20,000	
OT-35	C-arm X-ray unit	1						126,000	126,000
			X-ray film	100sheet/box	300days/yearx0.5patient/dayx2sheet/patient= 300sheet/year 300sheet/year÷100sheet/box=3	3	42,000	126,000	
OT-50	Instrument set for skin grafting	1						565,000	565,000
			Blade	10pc/set	2sets/year	2	57,500	115,000	
			Skin carrier, 2 size	10pc/set	5sets/year	5	90,000	450,000	
OT-60	Patient monitor	4						203,400	813,600
			ECG electrode	150pc /box	300days/yearx2patient/dayx3pcs/patient= 1,800pc÷150=12	12	10,950	131,400	
			SpO2 finger probe	pc	1pc/year	1	30,000	30,000	
			ECG electrode lead	set	1set/year	1	42,000	42,000	
IC-05	Central monitor	1						7,500	7,500
			Recording paper	150pc /set	5sets/year	5	1,500	7,500	
IC-06	Defibrillator	1						65,750	65,750
			Gel	250g/pc	365days/yearx0.5patient/day=182patient/year 182patientx20g/patient÷250g=14.56	15	1,250	18,750	
			Electrode	150pc /box	365days/yearx0.5patient/day=182patient/year 182patientx3electrode÷150pcs=3.64	4	10,950	43,800	
			Recording paper (200m)	10pc/set (200m)	365days/yearx0.5patient/day=182patient/year 182patientx1m÷200m=0.91	1	3,200	3,200	
IC-07	ECG	1						57,550	57,550
			Chest Electrode for adult	pc	2sets/year	2	5,500	11,000	
			Limb Electrode for adult	pc	2sets/year	2	6,000	12,000	

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Chest Electrode for pediatrics	pc	2sets/year	2	5,500	11,000	
			Limb Electrode for pediatrics	pc	2sets/year	2	6,000	12,000	
			ECG cream(100g)	pc	$365\text{days/year} \times 1\text{patient/day} \times 5\text{g/patient} \div 100\text{g} = 18.25$	19	550	10,450	
			Recording paper	10pc/set (200m)	$365\text{days/year} \times 1\text{patient/day} \times 0.5\text{m} \div 200\text{m} = 0.91$	1	1,100	1,100	
IC-09	Infusion pump	10						352,000	3,520,000
			Tube set	200set /box	$365\text{days/year} \times 2\text{patient/day} = 730\text{patient/year} \div 200 = 3.65$	4	88,000	352,000	
IC-10	Laryngoscope set	3						5,200	15,600
			Bulb for adult	pc	2pcs/year	2	1,300	2,600	
			Bulb for pediatrics	pc	2pcs/year	2	1,300	2,600	
IC-11	Ophthalmoscope	2						15,400	30,800
			Bulb for ophthalmoscope	pc	2pcs/year	2	4,400	8,800	
			Bulb for otoscope	pc	2pcs/year	2	3,300	6,600	
IC-12A	Patient monitor A	18						172,400	3,103,200
			ECG electrode	150pc /box	$365\text{days/year} \times 1\text{patient/day} \times 3\text{pcs/patient} = 1,095\text{pcs} \div 150 = 7.3$	8	10,950	87,600	
			SpO2 finger probe	pc	1pc/year	1	30,000	30,000	
			ECG electrode lead	set	1set/year	1	42,000	42,000	
			Recording paper	10pc/set	4sets/year	4	3,200	12,800	
IC-12B	Patient monitor B	2						652,400	1,304,800
			ECG electrode	150pc /box	$365\text{days/year} \times 1\text{patient/day} \times 3\text{pcs/patient} = 1,095\text{pcs} \div 150 = 7.3$	8	10,950	87,600	
			IBP monitoring kit	20kit/set	4sets/year	4	120,000	480,000	
			SpO2 finger probe	pc	1year/pc	1	30,000	30,000	
			ECG electrode lead	set	1year/set	1	42,000	42,000	
			Recording paper	10pc/set	4sets/year	4	3,200	12,800	
IC-12C	Patient monitor C	2						920,400	1,840,800
			ECG electrode	150pc /box	$365\text{days/year} \times 1\text{patient/day} \times 3\text{pcs/patient} = 1,095\text{pcs} \div 150 = 7.3$	8	10,950	87,600	
			IBP monitoring kit	20kit/set	4sets/year	4	120,000	480,000	
			Catheter for CO	set	8sets/year	8	33,500	268,000	
			SpO2 finger probe	pc	1year/pc	1	30,000	30,000	
			ECG electrode lead	set	1year/set	1	42,000	42,000	
			Recording paper	10pc/set	4sets/year	4	3,200	12,800	
IC-15	Spot lamp	1						4,800	4,800
			Bulb	pc	$3\text{h/day} \times 365\text{days/year} \div 1,000\text{h} = 1.095$	1	4,800	4,800	



Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
IC-18	Suction unit, wall mount type	7						9,000	63,000
			Suction bottle	set	1set/year	1	5,000	5,000	
			Suction tube	set	1set/year	1	1,500	1,500	
			Float set	set	1set/year	1	2,500	2,500	
IC-19	Suction unit, portable type	2						9,500	19,000
			Suction bottle	set	1set/year	1	1,500	1,500	
			Suction tube	set	1set/year	1	2,000	2,000	
			Suction catheter	set	1set/year	1	6,000	6,000	
IC-20	Syringe pump	22						201,600	4,435,200
			Syringe(30mL)	400pc /set	2sets/year	2	28,800	57,600	
			Extension tube	400pc /set	2sets/year	2	72,000	144,000	
IC-21	Ventilator for adult	13						231,100	3,004,300
			Mask set	set	3sets/year	3	13,700	41,100	
			Patient circuit set	set	2sets/year	2	75,000	150,000	
			Bactria filter	100pc /set	2sets/year	2	20,000	40,000	
IC-22	Ventilator for pediatrics	2						231,100	462,200
			Mask set	set	3sets/year	3	13,700	41,100	
			Patient circuit set	set	2sets/year	2	75,000	150,000	
			Bactria filter	100pc /set	2sets/year	2	20,000	40,000	
IC-23	X-ray film viewer, large, wall mount type	2						12,600	25,200
			Fluorescent lamp(6pc/unit)	set	8h/dayx300days/year÷2,000h=1.275	2	6,300	12,600	
LA-03	Automatic biochemistry analyzer	1						250,000	250,000
			Reagent set	set	1set	1	250,000	250,000	
LA-06	Blood gas analyzer	1						1,531,400	1,531,400
			Electrode set	pc	1set/1year	1	450,000	450,000	
			Reagent set(1000test/set)	set	5test/dayx300days/year=1,500test/year÷1,000test/set=1.5sets	2	350,700	701,400	
			Calibration set(350times/set)	set	1times/dayx30day/yearx12months=360times/year÷350times/set=1.02	1	380,000	380,000	
LA-09	Electrophoresis system	1						58,000	58,000
			Cellulose acetate membrane(100pc/box)	box	1box/year	1	20,000	20,000	

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Reagent set	set	1set/year	1	15,000	15,000	
			Lamp	pc	1pc/year	1	5,000	5,000	
			Recording paper	pc	3pcs/year	3	6,000	18,000	
LA-10	ELISA reader	1						24,000	24,000
			Halogen bulb	pc	2pcs/year	2	12,000	24,000	
LA-11	ELISA washer	1						45,000	45,000
			Washing solution	pc	3pcs/year	3	15,000	45,000	
LA-18	Laminar flow cabinet	1						222,000	222,000
			HEPA filter for supply and exhaust	set	1set/year	1	210,000	210,000	
			Sterilizing lamp(2pcs/set)	set	1set/year	1	8,000	8,000	
			Illumination lamp(2pcs/set)	set	1set/year	1	4,000	4,000	
LA-21	Microscope	4						15,000	60,000
			Halogen bulb	pc	5h/dayx300days/year÷2,000hx1bulb=0.75	1	8,000	8,000	
			Immersion oil(50cc)	pc	1pc/year	1	7,000	7,000	
LA-22	Microscope with CCD camera and monitor	1						15,000	15,000
			Halogen bulb	pc	5h/dayx300days/year÷2,000hx1bulb=0.75	1	8,000	8,000	
			Immersion oil(50cc)	pc	1pc/year	1	7,000	7,000	
LA-23	Microtome, rotary type	1						15,600	15,600
			Blade(50pc/box)	box	2box/year	2	7,800	15,600	
LA-24	Osmometer	1						34,000	34,000
			Sample container	pc	500pc/year	500	40	20,000	
			Standard solution	set	1set/year	1	14,000	14,000	
LA-25	PH meter	1						11,800	11,800
			Standard solution(pH4)	pc	2pcs/year	2	1,300	2,600	
			Standard solution(pH7)	pc	2pcs/year	2	1,300	2,600	
			Standard solution(pH9)	pc	2pcs/year	2	1,300	2,600	
			Saturated solution	pc	2pcs/year	2	2,000	4,000	
LA-30	Semi automated coagulation analyzer	1						388,000	388,000
			Reagent set	set	1set/year	1	257,000	257,000	
			Sample tube	3000pc /box	3box/year	3	43,000	129,000	
			Recording paper	5pcs/box	1box/year	1	2,000	2,000	
LA-32	Spectrophotometer	1						267,500	267,500

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Halogen lamp	pc	2pcs/year	2	80,000	160,000	
			Deuterium lamp	pc	2pcs/year	2	20,000	40,000	
			Flow cell	pc	1pc/year	1	40,000	40,000	
			Tube set for shipper unit	set	1set/year	1	20,000	20,000	
			Recording paper	5pcs/box	1box/year	5	1,500	7,500	
LA-37	Automatic blood cell analyzer	1						660,000	660,000
			Reagent set(6000test/set)	set	1set/year	1	656,000	656,000	
			Recording paper	5pcs/box	1box/year	1	4,000	4,000	
LA-38	Hemoglobinmeter	1						679,000	679,000
			Reagent set	set	300days/yearx100test/day=30,000test/year	1	675,000	675,000	
			Recording paper	5pcs/box	1box/year	1	4,000	4,000	
RA-02	Dental X-ray, panorama type	1						52,200	52,200
			X-ray film	100sheet /box	300days/yearx2patient/dayx1sheet/patient=600sheets/year 600sheet/year÷100sheets/box=6	6	6,300	37,800	
			Mouth piece	100pc/box	300days/yearx2patient/dayx1pc/patient=600pc 600÷100pc=6	6	2,400	14,400	
RA-04	Mammography unit	1						252,000	252,000
			X-ray film	100sheet /box	300days/yearx2patient/dayx1sheet/patient=600sheets/year 600sheets/year÷100sheets/box=6	6	42,000	252,000	
RA-05	Mobile X-ray unit	1						504,000	504,000
			X-ray film	100sheet /box	300days/yearx2patient/dayx2sheets/patient=1,200 sheets/year 1,200sheets/year÷100sheets/box=12	12	42,000	504,000	
RA-07	Ultrasound scanner, B/W	1						89,380	89,380
			Gel(300g)	pc	300days/yearx8patient/day= 2,400patient/yearx2g/patient÷300g=16	16	1,300	20,800	
			Recording paper(18m)	roll	300days/yearx8patient/day= 2,400patient/yearx0.2m/patient÷18m/roll=26.6	27	2,540	68,580	
RA-08	Ultrasound scanner, color doppler	1						87,000	87,000
			Gel(300g)	pc	300days/yearx5patient/day= 1,500patient/yearx2g/patient÷300g=10	10	1,800	18,000	
			Recording paper(250pc/set)	set	300days/yearx5patient/day= 1,500patient/year÷250pc=6	6	11,500	69,000	
RA-09	X-ray film processor	1						314,500	314,500

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Developer	19L/pc	15Lx3times/monthx12month=540L/year 540L/year÷19L=28.4	29	6,500	188,500	
			Fixer	19L/pc	15Lx3times/monthx12month=540L/year 540L/year÷19L=28.4	29	4,000	116,000	
			Filter	pc	2pcs/year	2	5,000	10,000	
RA-10	X-ray film viewer, small, wall mount type	1						2,100	2,100
			Fluorescent lamp(2pcs/unit)	set	8h/dayx300÷2000h=1.275	2	1,050	2,100	
RA-11	X-ray film viewer, large, wall mount type	2						12,600	25,200
			Fluorescent lamp(6pc/unit)	set	8h/dayx300÷2000h=1.275	2	6,300	12,600	
RA-14	X-ray system, simple bucky and stand	3						270,000	810,000
			X-ray film (100pc/box)	100sheet /box	30sheets/dayx300days/year=9,000sheets/year	90	3,000	270,000	
VS-03	Cystoscope	1						110,000	110,000
			Bulb for light source	pc	1pc/year	1	110,000	110,000	
VS-04	Endoscopic retrograde cholangiopancreatography	1						561,200	561,200
			Bulb for light source	pc	1pc/year	1	110,000	110,000	
			Lithotripter basket	pc	24pcs/year	24	4,600	110,400	
			Guidewire	pc	48pcs/year	48	1,500	72,000	
			Extraction balloon	pc	12pcs/year	12	3,700	44,400	
			Balloon dilator	pc	12pcs/year	12	9,300	111,600	
			Biliary drainage tube	pc	12pcs/year	12	1,000	12,000	
			Cytology brush	pc	48pcs/year	48	2,100	100,800	
VS-07	Upper gastrointestinalscope	1						110,000	110,000
			Bulb for light source	pc	1pc/year	1	110,000	110,000	
EE-01	EEG	1						68,450	68,450
			EEG electrode set	set	2sets/year	2	20,000	40,000	
			EEG paste(180g/pc)	pc	5pcs/year	5	2,000	10,000	
			ECG cream(100g)	pc	9pcs/year	9	550	4,950	
			Recording paper	250pc /set	300days/yearx2.5patient/day= 750patient/yearx3pcs/patient÷250pc=9	9	1,500	13,500	
EC-01	ECG	2						118,600	237,200
			Chest Electrode for adult	pc	2sets/year	2	5,500	11,000	
			Limb Electrode for adult	pc	2sets/year	2	6,000	12,000	
			Chest Electrode for pediatrics	pc	2sets/year	2	5,500	11,000	

Item No.	Description	Q'ty	Spare parts/Consumables	Sales unit	Basis for calculation	Q'ty	Unit price (JPY)	Total/unit (JPY)	Total/item (JPY)
			Limb Electrode for pediatrics	pc	2sets/year	2	6,000	12,000	
			ECG cream(100g)	pc	$300\text{days/year} \times 8\text{patient/day} \times 5\text{g/patient} \div 100\text{g} = 120$	120	550	66,000	
			Recording paper	10pc/set (200m)	$300\text{days/year} \times 8\text{patient/day} \times 0.5\text{m} \div 200\text{m} = 6$	6	1,100	6,600	
EC-02	ECG, holter testing	1						33,900	33,900
			ECG electrode	set	2sets/year	2	10,950	21,900	
			Dry cell batteries	pc	12pcs/year	12	1,000	12,000	
EC-03	ECG, stress testing	1						139,400	139,400
			ECG electrode	set	2sets/year	2	10,950	21,900	
			ECG electrode lead	set	2sets/year	2	10,000	20,000	
			QRS cable	set	2sets/year	2	20,000	40,000	
			Connection cable	set	1set/year	1	25,000	25,000	
			Recording paper	roll	$300\text{days/year} \times 0.5\text{patient/day} = 150\text{patient/year} \div 30\text{patient/roll} = 5$	5	6,500	32,500	
CO-01	Multimedia projector	1						35,000	35,000
			Bulb	pc	1pc/year	1	35,000	35,000	
<b>Total annual cost (JPY)</b>									<b>39,489,330</b>
<b>Total annual cost (LKR)</b>									<b>45,790,039.42</b>

**10. Annual Contract Fees for Maintenance of Equipment**

Annual Contract Fees for Maintenance of Equipment

Item No.	Description	Q'ty	Contract	Unit price (JPY)	Total price (JPY)	Remarks
OT-01	Anesthetic apparatus	4	Yearly	110,100	440,400	
OT-02	Anesthetic apparatus with ventilator	5	Yearly	154,200	771,000	
OT-03	Autoclave, large size	2	Yearly	215,600	431,200	
OT-04	Autoclave, medium size	2	Yearly	215,600	431,200	
OT-06	Defibrillator	2	Yearly	12,600	25,200	
OT-08	Electrosurgical unit	8	Yearly	40,000	320,000	
OT-19	Operation monitor	8	Yearly	6,700	53,600	
OT-34	Automatic disinfecter	1	Yearly	215,600	215,600	
OT-35	C-arm X-ray unit	1	Yearly	200,000	200,000	
OT-60	Patient monitor	4	Yearly	6,700	26,800	
IC-05	Central monitor	1	Yearly	6,700	6,700	
IC-06	Defibrillator	1	Yearly	12,600	12,600	
IC-07	ECG	1	Yearly	12,600	12,600	
IC-12A	Patient monitor A	18	Yearly	6,700	120,600	
IC-12B	Patient monitor B	2	Yearly	6,700	13,400	
IC-12C	Patient monitor C	2	Yearly	6,700	13,400	
IC-21	Ventilator for adult	13	Yearly	100,200	1,302,600	
IC-22	Ventilator for pediatrics	2	Yearly	100,200	200,400	
LA-03	Automatic biochemistry analyzer	1	Yearly	150,000	150,000	
LA-06	Blood gas analyzer	1	Yearly	125,000	125,000	
LA-10	ELISA reader	1	Yearly	19,700	19,700	
LA-11	ELISA washer	1	Yearly	9,200	9,200	
LA-30	Semi automated coagulation analyzer	1	Yearly	56,000	56,000	
LA-32	Spectrophotometer	1	Yearly	46,700	46,700	
LA-37	Automatic blood cell analyzer	1	Yearly	56,000	56,000	
RA-02	Dental X-ray, panorama type	1	Yearly	150,000	150,000	
RA-04	Mammography unit	1	Yearly	200,000	200,000	
RA-05	Mobile X-ray unit	1	Yearly	200,000	200,000	
RA-07	Ultrasound scanner, B/W	1	Yearly	100,000	100,000	
RA-08	Ultrasound scanner, color doppler	1	Yearly	200,000	200,000	
RA-09	X-ray film processor	1	Yearly	26,300	26,300	
RA-14	X-ray system, simple bucky and stand	3	Yearly	150,000	450,000	
EE-01	EEG	1	Yearly	35,000	35,000	
EC-01	ECG	2	Yearly	12,600	25,200	
EC-02	ECG, holter testing	1	Yearly	26,300	26,300	
EC-03	ECG, stress testing	1	Yearly	31,500	31,500	
<b>Total annual cost (JPY)</b>					<b>6,504,200</b>	
<b>Total annual cost (LKR)</b>					<b>7,541,975.88</b>	

## **11. Annual Maintenance Cost for Air Conditioners**



• 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 天井カセット型	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 天井カセット型	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 天井カセット型	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 天井カセット型	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 天井カセット型	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 <sup>3</sup> /min	11	3,000	33,000
	(Floor Mounted Type)	w/Pre-Filter,HEPA-Filter,Standard Accessories			
	Renewal of Hepa filters	per 3 years			
Annual maintenance cost (Japanese Yen)					3,426,000
Annual maintenance cost (Sri Lanka Rupees)					3,262,857

## **12. Soft Component (Technical Assistance) Plan**

## **Soft Component (Technical Assistance) Plan**

### **1. Background**

The project for the Improvement of Central Functions of Jaffna Teaching Hospital in the Democratic Socialist Republic of Sri Lanka is designed to construct facilities and procure medical equipment related to the central functions of Jaffna Teaching Hospital, such as operation theater complex, central supply and sterilizing department, intensive care units, and laboratory complex etc. This project aims to improve the central functions of Jaffna Teaching Hospital as the only tertiary level teaching hospital in the northern region.

#### **1) Current situation of BES head office**

All the work related to medical equipment, including budget management, determination of the specifications, procurement of medical equipment and consumables, and maintenance of medical equipment, is conducted by BES under the Ministry of Healthcare, Nutrition and Uva Wellassa Department.

BES head office is located in the facilities constructed by Japan's Grant Aid in 1991 on premises of the Ministry of Healthcare and Nutrition. In BES head office, the work is divided among general management department, electronic equipment department, ventilator and anesthesia apparatus department, and radiology department. There are 17 branch offices all over Sri Lanka and about 150 staff work in BES. In each branch office, a few engineers are dispatched from BES head office and they are in charge of maintenance of medical equipment in neighborhood healthcare facilities.

BES head office has an authority to determine all aspect of branch offices not only the instructions on maintenance of equipment but also budget for salaries, personnel matters, and training of new equipment and so on. Therefore, the healthcare facilities, where branch office is located, do not have direct control over branch office. The engineers in branch office execute the work, such as maintenance and checkup of the equipment, repair, and procurement of spare parts and consumables etc., when requested by the healthcare facilities.

BES head office repairs the medical equipment which cannot be fixed in branch offices as well as provides maintenance services of the medical equipment in healthcare facilities in Colombo. From 1993 to 1998, specialist on maintenance of medical equipment was dispatched in BES head office and introduced management system of maintenance work, such as formulation of equipment registration book; however, it was a paper based system and all the related documents were written by hand. Regarding the level of maintenance service, BES owns the most basic tools and measuring instrument. Although they are old, BES is equipped to provide minimal level of maintenance services.

Current management system of maintenance work in BES was established more than 10 years ago, which was before computerization became popular, so in searching the registered equipment, BES staff have to go through all pages of the equipment registration book one by one. This way is inefficient and often leads mistakes. Also, when they deliver the consumables or spare parts, they record it on paper form, so it often causes writing errors. Furthermore, branch offices make request of consumables and spare

parts to BES head office by mail, so it takes long time to supply necessary parts, or it happens that request mails do not reach to BES head office due to loss during the delivery.

To solve the above mentioned problems, improvement of management system of maintenance work and establishment of computerized system are considered as essential and urgent matters.

## 2) Current situation in BES Jaffna Teaching Hospital branch

Jaffna Teaching Hospital, the target facility of the project, had continued to provide medical services even during the dispute. Even residents near the boarder visited Jaffna Teaching Hospital all the way because travel between provinces was restricted during the dispute.

New equipment or spare parts have not been procured for long due to the dispute, but they managed to provide medical services by maintaining the existing equipment.

Maintenance of medical equipment in Jaffna Teaching Hospital is conducted by BES Jaffna Teaching Hospital branch (hereinafter referred to as “BES-JTH”). Although there are 5 workers in BES-JTH (2 engineers dispatched from BES head office, and 1 assistant and 2 desk workers directly employed by Jaffna Teaching Hospital), it is difficult to maintain all the equipment in Jaffna Teaching Hospital only by 2 engineers. There are many broken equipment waiting for repair in their workshop and those equipment narrow the workspace, but, BES-JTH staff do not know how to organize and keep the workshop clean. The equipment which cannot be repaired in BES-JTH is sent to BES head office in Colombo, but it takes long time to receive repaired equipment, and sometimes transportation on bumpy road causes a secondary defect. In addition, some equipment cannot be repaired even in BES head office. These situations cause to decrease the quality of healthcare services of Jaffna Teaching Hospital.

Furthermore, management system of maintenance work in BES-JTH is not computerized same like BES head office, so they encounter the same problem as BES head office.

Jaffna city is in Tamil region, so only Tamil engineers can work in BES-JTH, however, BES head office rarely hire Tamil engineers, so it is difficult to replace the engineers in BES-JTH. Furthermore, engineers currently working in BES-JTH do not have a chance to get training, so it is difficult to improve the maintenance skills to repair the latest electronic medical equipment.

To solve the above mentioned problems, improvement of management system of maintenance work and establishment of computerized system are necessary. In addition, improvement of maintenance skills of engineers and learning how to organize the workspace are considered as essential and urgent matters.

## 3) Current situation in Jaffna Teaching Hospital

Medical staff in Jaffna Teaching Hospital are inexperienced on handling the medical equipment in appropriate way since they had lacked the chance to get training due to the long-lasting dispute. In addition, there are few medical staff who are familiar with preventive maintenance method. Medical equipment would break up much earlier than expected life time if they are handled in inappropriate way. Moreover, medical staff do not know how to organize the equipment and they keep the broken equipment,

so it narrows the workspace and decreases the medical work efficiency.

To solve the above mentioned problems, learning the preventive maintenance method of the equipment and how to organize the workspace based on 5S principles (Sort, Set, Shine, Standardize, and Sustain) are considered as essential and urgent matters.

It is considered reasonable to provide the following technical assistances by Japan side to solve the problems in BES head office, BES-JTH, and Jaffna Teaching Hospital;

- a) Assistance for improvement of management system of maintenance work and establishment of computerized system in BES head office and BES-JTH
- b) Assistance for improvement of maintenance skills of engineers and learning how to organize the workspace in BES-JTH
- c) Assistance for learning the preventive maintenance method of the equipment and how to organize the workspace based on 5S principles in Jaffna Teaching Hospital

By implementing the technical assistances right after completion of the installation work of the equipment procured under the project, it is expected to promote a smooth start of the project. Furthermore, by acquiring the basic maintenance method, it is expected that it will take root in the target facilities, and the equipment will be effectively utilized for long term. For these reasons, it is considered reasonable to implement the above mentioned technical assistance by means of soft component.

## 2. Goals

- 1) Effective management shall be done by improvement of management system of maintenance work and establishment of computerized system in BES head office and BES-JTH.
- 2) Maintenance work efficiency shall be improved by acquiring 5S principles in BES-JTH.
- 3) Trouble of the equipment shall be prevented and the equipment shall be effectively utilized for long term by acquiring the preventive maintenance method of the equipment.
- 4) Medical work efficiency shall be improved by acquiring 5S principles in Jaffna Teaching Hospital. In addition, it shall give a positive effect on other departments and general work efficiency shall be improved.

## 3. Outcomes

Following outcomes are expected by implementation of soft component;

- 1) Computerized management system including equipment registration system, repair record system, and other necessary systems related to maintenance work of medical equipment shall be improved in BES head office and BES-JTH.

- 2) Annual activity plan of BES-JTH shall be made.
- 3) Preventive maintenance of the equipment shall be done in Jaffna Teaching Hospital.
- 4) Enough work space shall be secured and maintenance work efficiency shall be improved in BES-JTH.
- 5) Enough work space shall be secured and medical work efficiency shall be improved in Jaffna Teaching Hospital. In addition, it shall give a positive effect on other departments and general work efficiency shall be improved.

#### 4. Confirmation methods of outcomes

The following points shall be checked to confirm the attainment level of outcomes;

- 1) Computerized management system including equipment registration system, repair record system, and other necessary systems related to maintenance work are established in BES head office and BES-JTH.
- 2) Annual activity plan of BES-JTH is made.
- 3) Workshop on preventive operation and maintenance is conducted and daily checklist of major equipment is formulated.
- 4) Necessary equipment and unnecessary equipment are distinguished and unnecessary equipment is disposed in appropriate way in BES-JTH. Procured equipment are maintained by engineers of BES-JTH.
- 5) Necessary equipment and unnecessary equipment are distinguished and unnecessary equipment is disposed in appropriate way in Jaffna Teaching Hospital. Awareness of 5S principles is increased.

#### 5. Activities (Input)

##### 1) Activities

Soft component shall start right after completion of the installation work of the equipment. Necessary days for activities are shown in 7. Implementation schedule. Target groups are 30 staff in BES head office, 5 staff in BES-JTH, and 60 medical staff (mainly nurses) in Jaffna Teaching Hospital.

- a) Assistance for improvement of management system of maintenance work and establishment of computerized system
  - ① Assist BES head office to determine the necessary categories for equipment registration system through discussion and establish computerized registration system
  - ② Assist BES head office to formulate the standardized format related to maintenance work which is

used in BES head office and branch offices, such as newly procured equipment report, disposed equipment report, request form for repair, repair status report, repair completion report, repair record, request form for equipment/parts purchase, and purchase record etc.

- ③ Assist BES head office to formulate the user's guide of standardized format for BES-JTH staff
  - ④ Assist BES head office to formulate daily checklist of equipment in accordance with the periodic check points by BES-JTH
  - ⑤ Assist BES head office to understand the purpose, background, frequency of use of each form, and defects of current form, and reflect them to the new form prior to formulation of standardized format
- b) Assistance to formulate the annual activity plan of BES-JTH
- ① Assist BES head office and BES-JTH to list the equipment which need maintenance out of procured equipment, and provide advice to formulate the annual activity plan of BES-JTH
  - ② Assist BES head office and BES-JTH to make budget plan, implementation plan for annual activity plan of BES-JTH
- c) Assistance to learn the preventive maintenance method of the equipment in Jaffna Teaching Hospital
- ① Assist BES-JTH to formulate simple operation instruction based on the preventive maintenance method of the equipment
  - ② Hold workshops on basic precautions in handling the equipment for medical staff of Jaffna Teaching Hospital by the consultant and BES-JTH
  - ③ Assist BES-JTH to formulate the training materials on handling the equipment
- d) Assist to learn how to organize the workspace in BES-JTH
- ① Point out the problems of the current work environment of BES-JTH, and provide advice on how to improve the work efficiency
  - ② Assist BES-JTH to learn how to organize the equipment based on 5S principles
  - ③ Provide advice on basic maintenance method of the equipment
  - ④ Provide instructions on how to use measuring instruments procured under the project
- e) Assistance to learn how to organize the workspace in Jaffna Teaching Hospital
- ① Teach 5S principles to medical staff in Jaffna Teaching Hospital
  - ② Point out the current problems and explain why they are problems, and provide advice on how to improve the work efficiency
  - ③ Teach how to organize the medical equipment and assist medical staff to put into practice

## 6. Procurement method of human resources

It is difficult to procure the local human resources and there are no Japanese or international NGOs working on this field in Jaffna region. In addition, it is difficult to find a specialist on maintenance of the medical equipment and who are familiar with 5S principles even in Sri Lanka.

Requirements of human resources are as follows;

- a) Type of assistance: Technical assistance of operation and maintenance of medical equipment
- b) Starting period: Right after completion of the installation work of the equipment procured under the project
- c) Required skills and experiences: More than 12 years experience of technical assistance of operation and maintenance of medical equipment, all-round knowledge on medical equipment, skill to instruct management of spare parts/consumables, adequate knowledge of 5S principles and experience of instruction of 5S in soft component

For the above requirements, eligible person for this soft component is a Japanese technical consultant who has sufficient knowledge of maintenance of medical equipment and 5S principles, and experience of technical assistance in English speaking countries.

## 7. Implementation schedule

Necessary days of activities in accordance with 5.(1) Activities are as follows;

Activities	Japan (No. of Days)	Sri Lanka (No. of Days)	Activities of Soft Component			
			Japan side Consultant (Japanese)	Sri Lanka side		
				BES head office	BES-JTH	JTH
Work in Japan (Preparation for activities)	7					
Courtesy call to JICA, Embassy of Japan, MOH		2	○			
Arrangement of the documents		8	○			
Travel days		4	○			
Confirmation of current situations in BES head office		2	○	○		
Confirmation of related documents in BES head office		3	○	○		
Assistance for improving the standardized formats in BES head office		3	○	○		
Report of activities to BES head office		3	○	○		
Confirmation of current situations in BES-JTH		4	○		○	
Confirmation of maintenance work in BES-JTH		4	○		○	
Instructions on each format and outlines of the activities in BES-JTH		3	○		○	
Guidance on basic maintenance method in BES-JTH		3	○		○	
Guidance on operation method of measuring instruments in BES-JTH		2	○		○	
Guidance on organization method of work space based on 5S principles in BES-JTH		4	○		○	
Guidance on preventive maintenance method in JTH		2	○			○
Guidance on organization method of work space based on 5S principles in JTH		4	○			○
Instructions on 5S principles in JTH		6	○			○
Review of activities in BES-JTH		3	○			○
Work in Japan (Preparation of report)	3					
Total necessary days						
Japan	10					
Sri Lanka		60				



## 8. Outputs

- a) Computerized standardized format, such as equipment registration form, request form for repair, repair completion report, request form for equipment/parts delivery, etc.
- b) Daily checklist of major equipment
- c) Annual activity plan of BES-JTH
- d) Educational materials on 5S principles
- e) Progress report of soft component
- f) Completion report of soft component

## 9. Obligations of Sri Lanka side

Management system of maintenance work and standardized format which are formulated by soft component might need to be revised in response to changing situations. In addition, whenever they purchase or dispose the equipment, equipment data needs to be revised to formulate the procurement plan of spare parts and consumables. In such cases, BES head office and BES-JTH have obligations to revise the system, format, and data in accordance with the situation.



## **13. 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 1<sup>st</sup> to 3<sup>rd</sup> 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 <sup>2</sup> )	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  $250 \text{ kN/m}^2$ , subject to a minimum footing dimension of 0.6 m.

*B. L. Tennekoon*

Prof. B. L. Tennekoon  
University of Moratuwa

15<sup>th</sup> March 2005



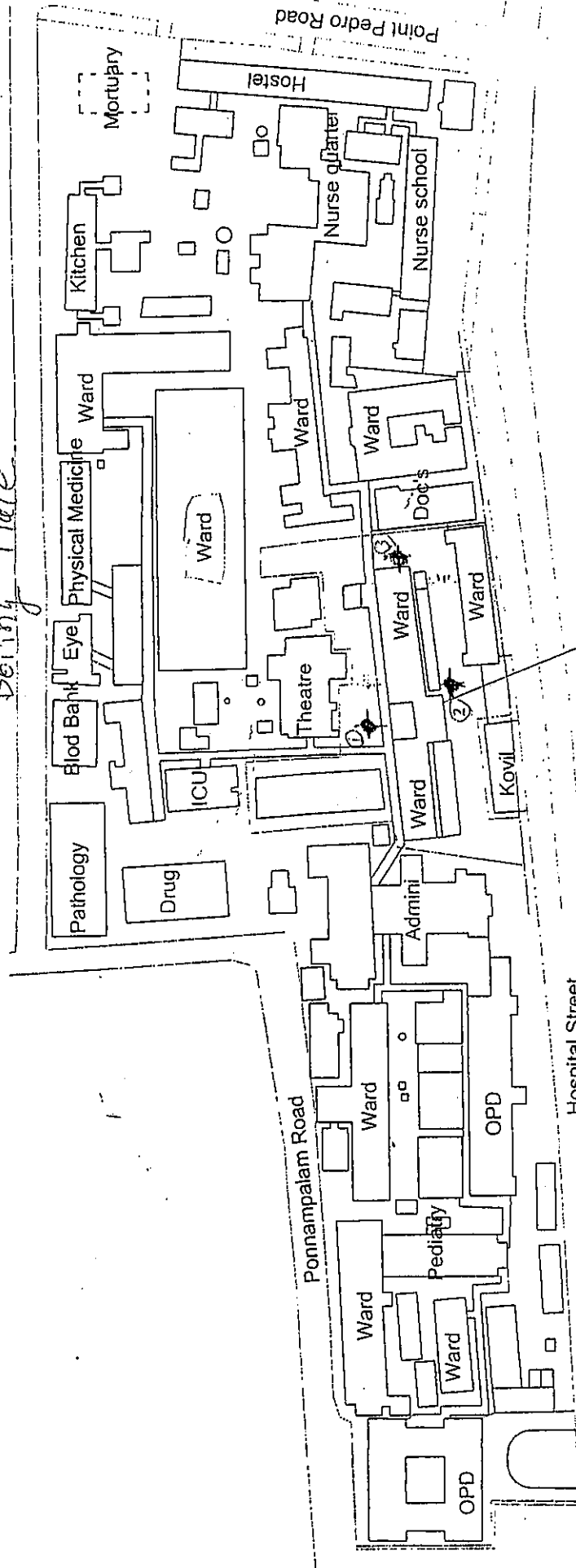
L.P. Jayasinghe  
Geotech Limited



# Annex 5

Fig. 1a -

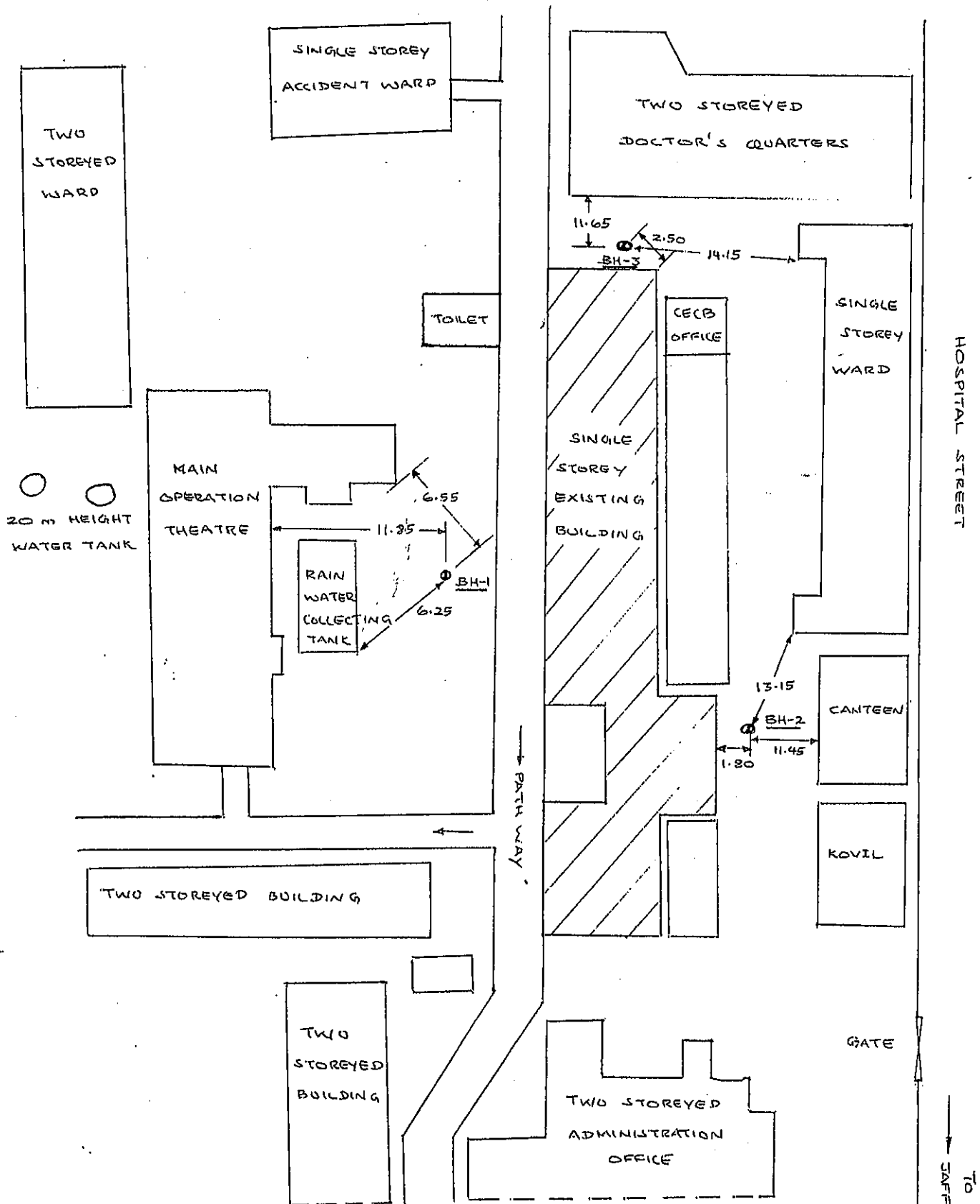
*Bering Place*



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.



( NOT TO SCALE )

\* ALL DIMENSIONS ARE IN METRES.

TO  
JAFFNA TOWN

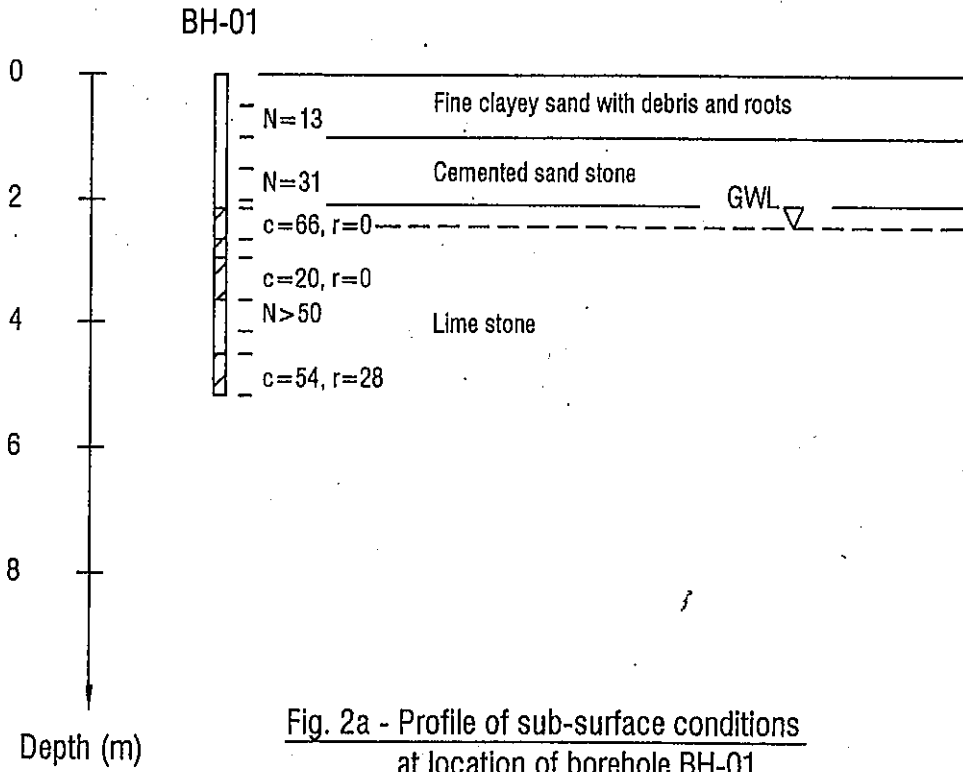


Fig. 2a - Profile of sub-surface conditions at location of borehole BH-01

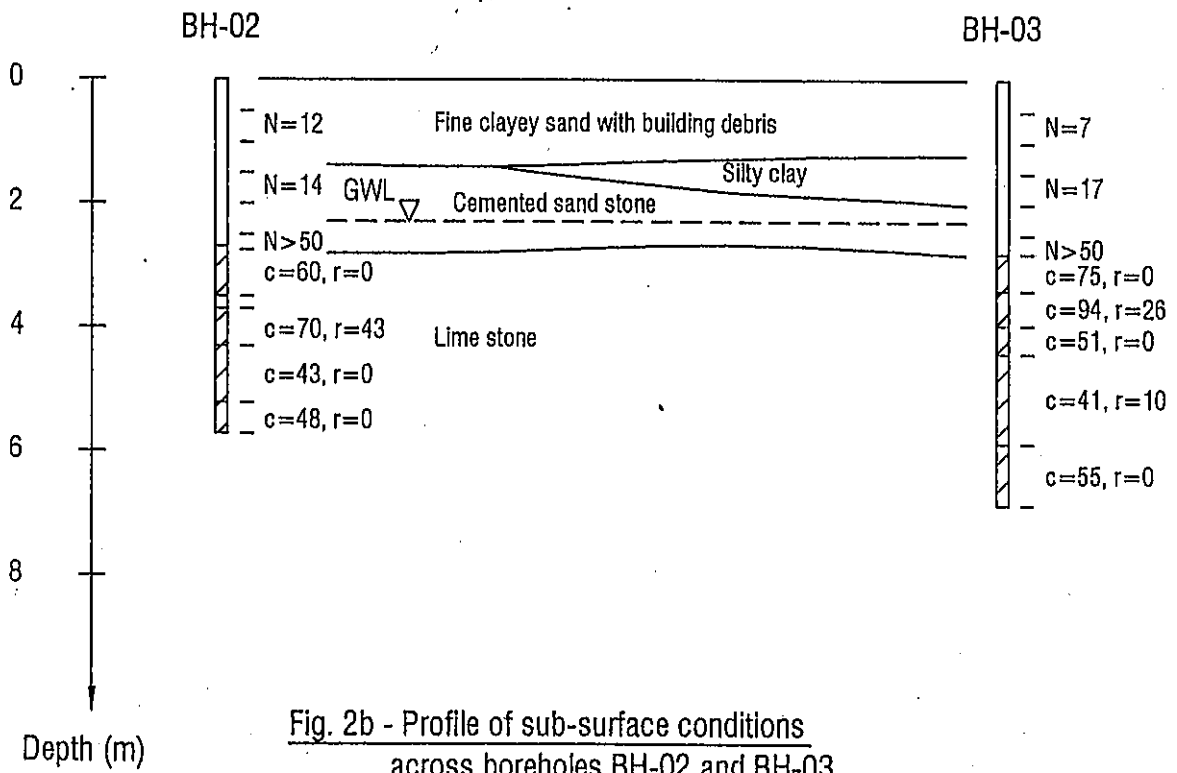


Fig. 2b - Profile of sub-surface conditions across boreholes BH-02 and BH-03

<b>BOREHOLE LOG</b>		Job No: G/1823	Sheet : 1 of 1
Client : Japan International Cooperation Agency (JICA)		B.H. No: BH-1	Level : MSL
Consultant : Yamashita Sekkei Inc.		Duration : 2005.03.03 TO 2005.03.03	
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	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						1.1														
02			GWL 2.5m		Yellow to White Highly cemented sand stone						2.2														
03			3.70 - 4.15 SPT	>50	Yellow to White Hard Lime stone						3.7														
04					Yellowish White Soft Lime stone						4.4														
05		NW			Yellow to White Hard Lime stone						5.15														
BH Terminated																									
<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>2.20-2.70</td> <td>66</td> <td>Nil</td> </tr> <tr> <td>2.70-3.00</td> <td>40</td> <td>Nil</td> </tr> <tr> <td>3.00-3.70</td> <td>20</td> <td>Nil</td> </tr> <tr> <td>4.50-5.15</td> <td>53.8</td> <td>27.7</td> </tr> </tbody> </table>											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
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																							
06											06														
07											07														
08											08														
09											09														
10											10														

**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)					B.H. No: BH-2	Level : MSL					
Consultant : Yamashita Sekkei Inc.					Duration : 2005.03.02 TO 2005.03.02						
Project : Soil Investigation for proposed four storeyed building at Jaffna Teaching Hospital.					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
03			2.50 - 2.95 SPT	>50	Yellowish Brown Hard sand stones						2.7
04					Yellow to White Hard Lime stone						04
05											05
06		NW			BH Terminated						5.7
07											07
08											08
09											09
10											10
Comments:		Weather Condition: Dry	Rock level: 2.70m BH terminated: 5.70m	GWL: 2.30m	Completely water loss from 1.10m, BGL.						
GEOTECH LIMITED, 13/1, Pepiliyana Mawatha, Kohuwala, Nugegoda. Tel/Fax: 823881											

# BOREHOLE LOG

Job No: G/1823

Sheet : 1 of 1

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

B.H. No: BH-3

Level : MSL

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

Duration : 2005.03.01 TO 2005.03.01

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	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			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																	
<p>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.</p>																												
Comments:		Weather Condition: Dry		Rock level: 2.80m BH terminated: 7.85m		GWL: 2.35m																						

# 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
Location :		Sample No.	2
		Depth/m.	3.20-3.31
		Date of report	09.03.2005

Soil description : Rock

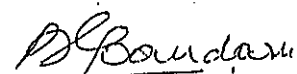
Specimen No.		1
Specimen diameter	cm	5.450
Specimen Length	cm	10.880
Sectional area of the Specimen	cm <sup>2</sup>	23.33
Volume of Specimen	cm <sup>3</sup>	253.812
Weight of specimen	g	577.78
Unit Weight	g/cm <sup>3</sup>	2.276
Failure Load	kN	24.3
Measured Compressive Strength	N/mm <sup>2</sup>	10.42
Correction Factor for height diameter ratio		1.00
Corrected Compressive Strength	N/mm <sup>2</sup>	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
		Client ref :	
Project :	Jaffna Teaching Hospital Project	Borehole No.	03
		Sample No.	2
Consultant :		Depth/m.	4.06-4.17
		Date of report	09.03.2005
Location :			

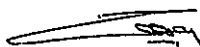
Soil description : Rock

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

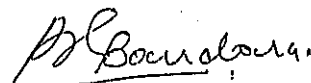
Mode of Failure



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



Tested By



Manager Operation

15 - 03 - 2005



# GROUP ENGINEERING LABORATORIES LIMITED

996 A, Maradana Road, Colombo 08

Tel: 2692482, 071 4735745

Fax: 2823881

"Quality Assurance for Construction"

## Laboratory Test Results

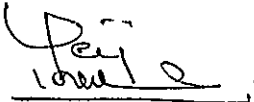
Project: Teaching Hospital – Jaffna

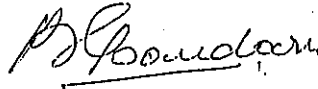
### Result of Atterburg Limits Tests:

<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

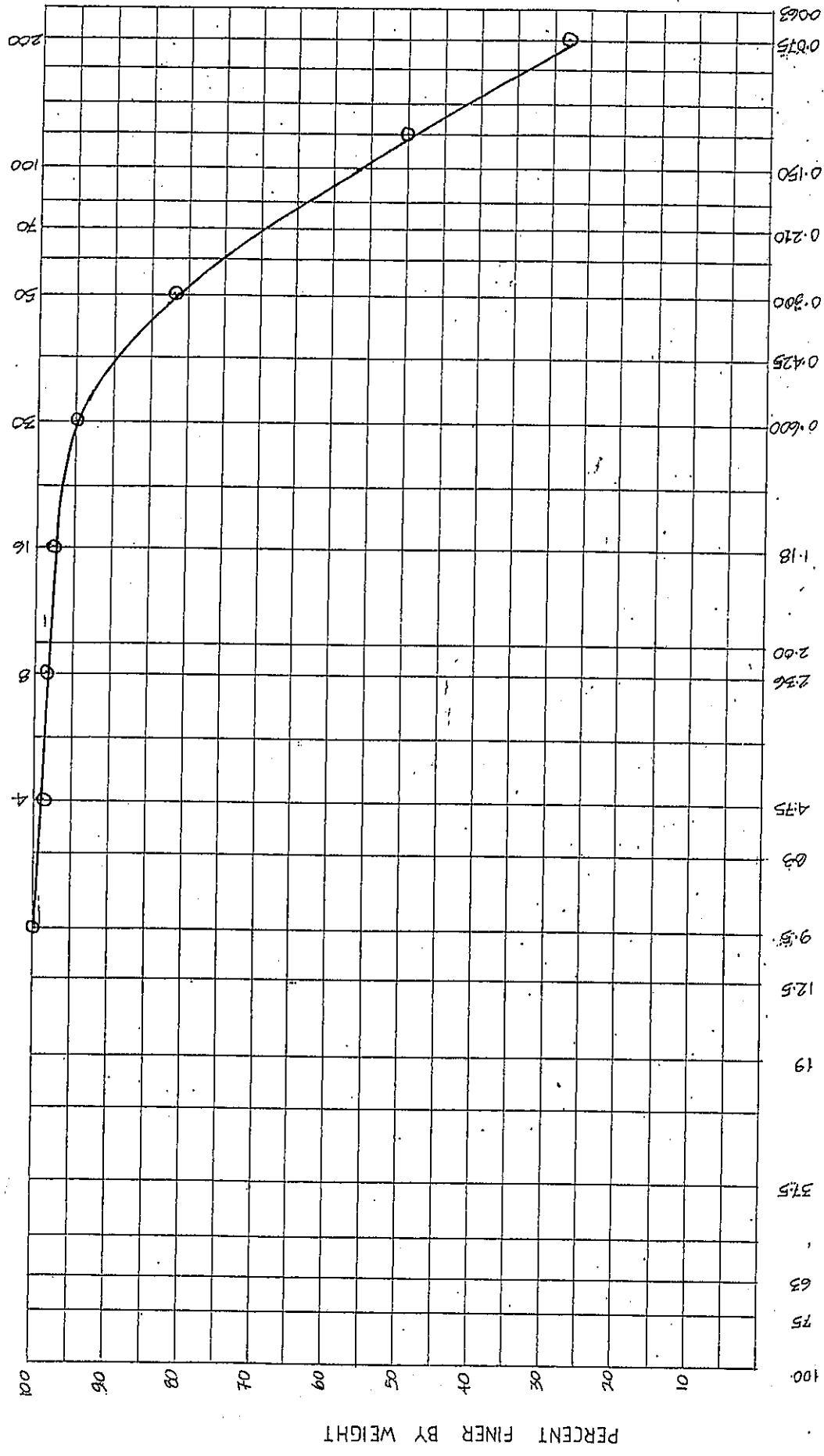
### Result of Sieve Analysis Tests:

<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



GRAIN SIZE IN MILLIMETERS

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

PROJECT Teaching Hospital - Jaffna

BORE HOLE NO. 1 SAMPLE NO.

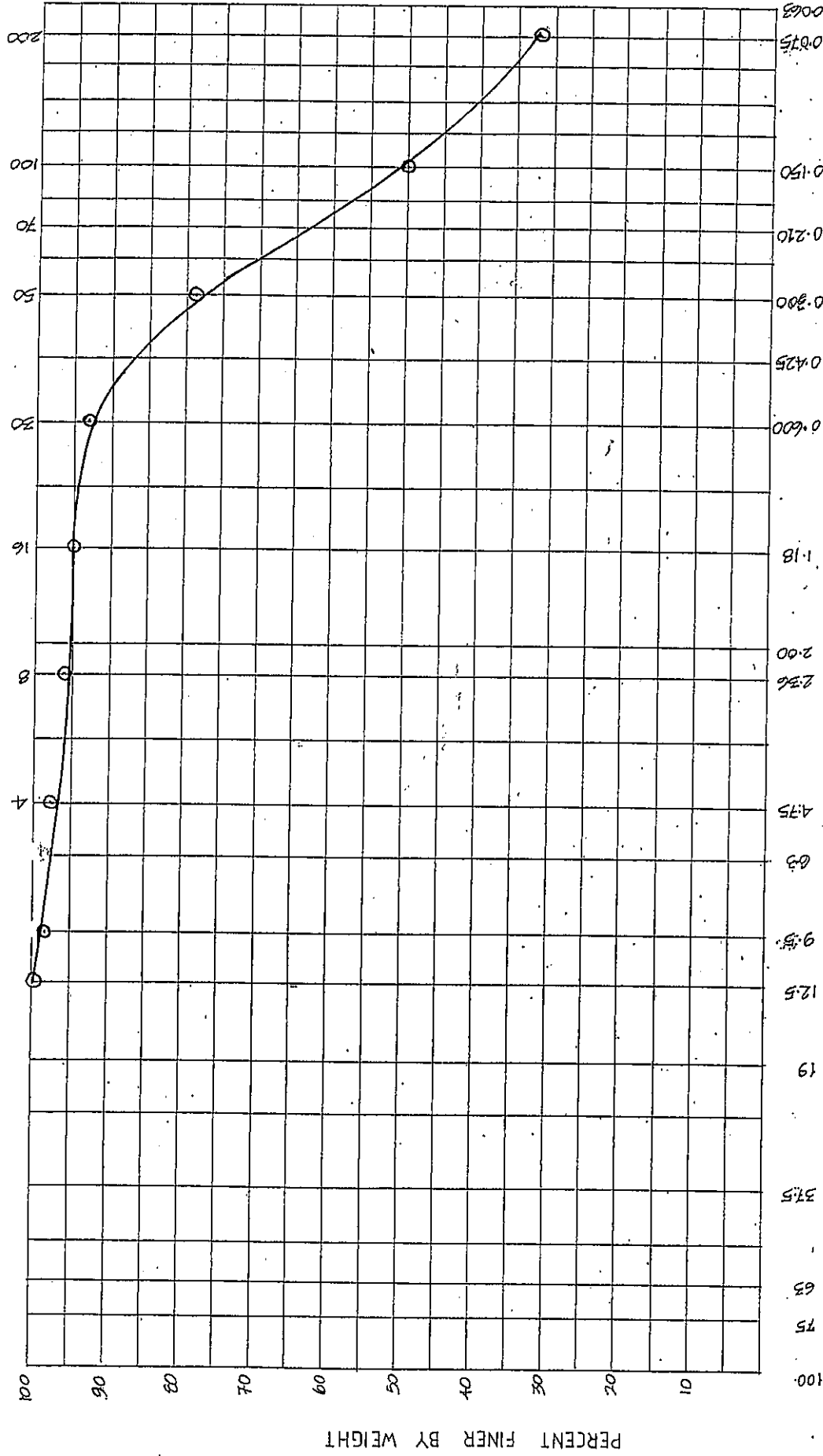
DEPTH 0.50m ELEVATION

REMARKS

wet Sieving

GRAIN SIZE DISTRIBUTION DIAGRAM

TYLER STANDARD SIEVE NUMBERS



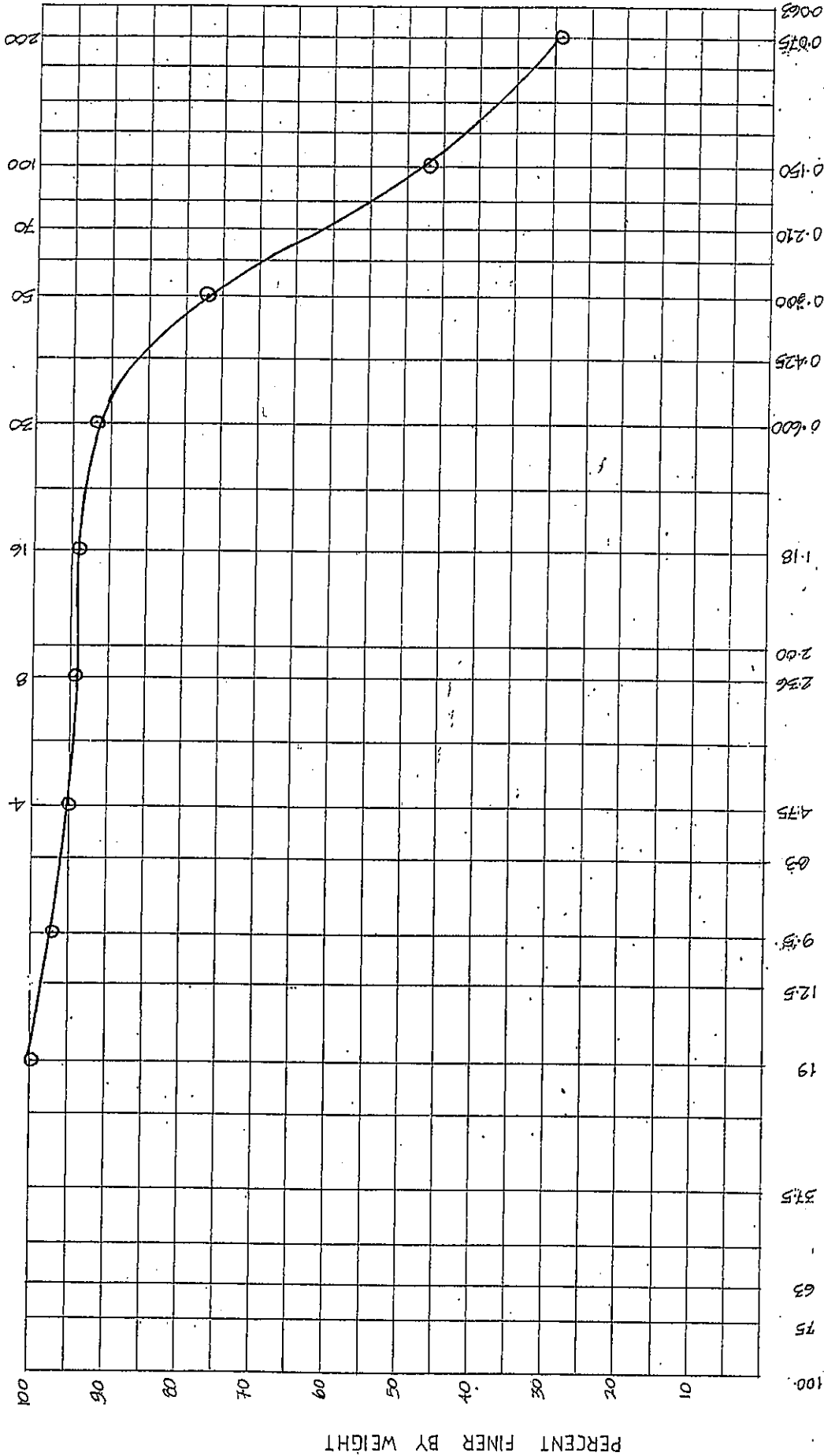
		GRAIN SIZE IN MILLIMETERS					
ASTM	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	% /	
B.S	COARSE GRAVEL	MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	

PROJECT Teaching Hospital - Jaffna. BORE HOLE NO. 2 SAMPLE NO.

DEPTH 0.50 m ELEVATION \_\_\_\_\_ REMARKS Coet 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	MEDIUM GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND

PROJECT Teaching Hospital - Jaffna.

DEPTH 0.50m <sup>to</sup> 0.95 ELEVATION \_\_\_\_\_ REMARKS \_\_\_\_\_

COET Sieving

GRAIN SIZE DISTRIBUTION DIAGRAM

## **14. 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, 20<sup>th</sup> edition.  
  
GC-ECD-Gas Chromatography-Electron Capture Detector  
  
GE-NPD-Gas Chromatography-Nitrogen Phosphorous Detector

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.	$\alpha$ -HCH	<0.2	<0.2	$\mu\text{g/L}$
ii.	$\beta$ -HCH	<0.2	<0.2	$\mu\text{g/L}$
iii.	$\gamma$ -HCH ( Lindane)	<0.3	<0.3	$\mu\text{g/L}$
iv.	$\delta$ -HCH	<0.2	<0.2	$\mu\text{g/L}$
v.	Aldrin	<0.2	<0.2	$\mu\text{g/L}$
vi.	Diealdrin	<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** : 03<sup>rd</sup> March, 2005 at 11.00 a. m

**Temperature of samples at collection** : 28°C

**Date & time of reception of samples at ITI** : 03<sup>rd</sup> 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 26<sup>th</sup> February, 2005

Date of analysis – 03<sup>rd</sup> - 19<sup>th</sup> 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 <sup>+</sup> 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 <sub>3</sub> ),	mg/L	APHA 2320 B	1% (200 mg/L) 2% (20 mg/L)
Free Ammonia (as NH <sub>3</sub> ),	mg/L	SLS 614 Part I 1983	-
Total Residual Chlorine *	mg/L	APHA 4500 Cl - G	-
Albuminoid Ammonia (as NH <sub>3</sub> ),	mg/L	SLS 614 Part I 1983	-
Nitrate (as N),	mg/L	APHA 4500 – NO <sub>3</sub> B	
Nitrite (as N),	mg/L	APHA 4500 – NO <sub>2</sub> 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 <sub>4</sub> ),	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 <sub>3</sub> ),	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 <sub>4</sub> ),	mg/L	Modified APHA SO <sub>4</sub> <sup>2-</sup> 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 <sup>0</sup> C	-	7.60	9.00	7.50
# ❖ Electrical Conductivity at 25 <sup>0</sup> C,	μS/cm	1274	112	2370
# ❖ Chloride (as Cl),	mg/L	178	1	520
# ❖ Total Alkalinity (as CaCO <sub>3</sub> ),	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 <sub>3</sub> ),	mg/L	0.01	0.05	0.04
Albuminoid Ammonia (as NH <sub>3</sub> ),	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 <sup>0</sup> C,	mg/L	Less than 0.10	Less than 0.10	0.21
❖ Total Phosphate (as PO <sub>4</sub> ),	mg/L	Less than 1.0	Less than 1.0	Less than 1.0
# ❖ Total Solids at 103-105 <sup>0</sup> C,	mg/L	861	82	1495
# ❖ Total Hardness (as CaCO <sub>3</sub> ),	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 <sub>4</sub> ),	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 20<sup>th</sup> 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 03<sup>rd</sup> 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.