Chapter 4 Project Evaluation and Recommendations

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATIONS

4-1 Project Effect

Execution of this project is expected to make such practical contributions as explained in the following 1) to 6) in the medical and health care service of Sabaragamuwa Province. This project is considered to bring about the following beneficial effects.

GHR is the only general hospital in Sabaragamuwa Province and serves as a top referral hospital of the province. Sabaragamuwa Province, consisting of Ratnapura District and Kegalla District, had a total population of 1.8 million as of 1997, or 1.01 million and 780 thousand, respectively.

GHR treats about 470,000 outpatients (270,000 general outpatients and 200,000 outpatients to clinics) and about 80,000 inpatients a year. Of which 57,000 outpatients per year are referral patients from lower medical institutions in the province; they represent about 12 percent of the total outpatients, or more than 200 out patients per day.

1) Integration of Medical Functions
   Presently, medical function of the Examination Departments and those of Department of Obstetrics & Gynecology are inefficiently located in the different place in GHR. Upon completion of this project, these distributed functions will be concentrated in one location, thereby increasing quality of medical services of these departments.

2) Improvement of GHR's Capacity to Accommodate Referral Patients
   Sabaragamuwa Province is the province which has one of the highest infant mortality rate in Sri Lanka. GHR needs to improve and better organize medical services in Obstetrics & Gynecology. The lower medical institutions in Sabaragamuwa Province are not equipped with facilities to cope with abnormal deliveries. Therefore a large number of patients are transferred to GHR. This project calls for installation of PBU and MHD next to the newly installed operation rooms and delivery rooms. This will significantly increase GHR's capacity to accommodate referral patients.

3) Expansion of the Building to Alleviate Congestion
   GHR is insufficiently equipped with consultation rooms for outpatients for particular departments and operation rooms. Accordingly, they are always very congested. The consultation room of clinics is used by more than one clinics on different days. This project

intends to increase consultation rooms for clinics and operation rooms to enable GHR to provide proper medical services, the extent of expansion determined by the number of patients and by the requirement to properly manage medical services. GHR will be able to provide proper medical services to an increasing number of patients.

4) Reduction of Bed Occupancy Rate

Bed occupancy rates for the Departments of Survey, Internal Medicine and Obstetrics and Gynecology are all more than 130 percent. The patients in excess of the wards' capacities are lying on the floors of the wards and corridor. This project will move the Examination Departments from the existing building to the new one. The space created in the existing building after transfer of the Examination Departments will be used for wards and this will alleviate the bed occupancy rates.

5) Prevention of Nosocomial Infection

The delivery room and PBU are not equipped with facilities to treat patients of infectious diseases. Therefore, risk of nosocomial infections is pointed out. The existing operation rooms are not sufficient; therefore, two operations are simultaneously done in the same operation room. Such a practice reportedly increases the rate of postoperative infection to more than 50 percent. Furthermore, mosquitoes breed in stagnant waters of the open sewage. This project will enable GHR to safely give proper medical services to patients of infectious diseases. In addition, the sewage will be changed to a closed type to improve the hygienic conditions. These measures combined are expected to reduce the rate of nosocomial infection.

6) Upgrading of Medical Services in Sabaragamuwa Province

This project will improve the functions of the medical services of Sabaragamuwa Province. This is expected to give a favorable impact on upgrading of medical services in Sabaragamuwa Province in general.

Table 4-1 summarizes improvements of GHR as a result of this project.

Table 4-1 Expected Improvement of GHR

	Major problems	Present condition	Problems in detail	Expected improvement
1	Insufficient number of operation rooms	GHR has four operation rooms, of which two have been renovated. Number of operations: 40 patients/day	The operation rooms are not sufficient. Two operations are done in the same operation room at the same time. This reportedly causes a high postoperative infection of more than 50 percent. 30 percent of the total operations concern the Department of Obstetrics and Gynecology.	Addition of operation rooms preferentially used by the Department of Obstetrics and Gynecology is expected to alleviate congestion of total operations.
2	Insufficient facilities for delivery	GHR treats 9,085 deliveries a year, 18 percent of which are abnormal deliveries. GHR has 18 obstetrical beds. GHR uses them for both labor and delivery.	The delivery rooms are apart from the operation rooms and GHR cannot adequately cope with the needs for emergency operations. Also, patients of infectious diseases cannot be isolated, which increases the risk of nosocomial infections.	GHR will become able to cope with the needs for emergency operations by placing delivery rooms next to the operation rooms. Installation of an isolated delivery room will enable GHR to adequately treat pregnant women with infectious diseases.
3	Ineffective CSSD	CSSD is remote from the operation rooms.	Sterilization facilities are installed in different rooms too apart to be effective.	Installation of CSSD next to the new operation rooms will integrate and streamline the sterilization functions.
4	Insufficient number of beds in ICU	GHR implements renovation of its own.	ICU lacks essential equipment.	In addition to provision of essential equipment, a MHD is installed next to the delivery rooms. This measure will enable prompt actions in an emergency.
5	PBU being too small	A temporary room is used to house 6 cots for premature babies and 4 incubators.	Imperfect isolation of babies with infectious diseases increases the risk of nosocomial infection. 40 percent of newly born babies, or 10 babies a day, are prematurely born.	PBU with an isolation room will be installed next to the delivery rooms. This measure will improve the efficiency of obstetrical functions and decrease the risk of nosocomial infection.
6	Congestion of outpatients	In 1998 GHR treated 266,435 general outpatients and 200,262 outpatients for clinics.	GHR is very congested with outpatients, because a suitable waiting space is not provided for outpatients. GHR's consultation rooms for outpatients to particular departments are small and are shared by different departments.	The project will provide consultation rooms for clinics with a suitable waiting space for the outpatients. These measures will alleviate the congestion.

	Major problems	Present condition	Problems in detail	Expected improvement
7	Inadequate X-ray machine	A 13-year-old X-ray machine in service. An additinal X-ray machine has been installed.	Radiation shielding walls are not installed. An number of persons walking on the coridor are exposed to radiation. The coridor are congested because of the absence of a waiting lounge.	On completion of the X-ray room, a suitable space will be provided for the waiting patients. Radiation shielding walls will be provided.
8	The examination room being too small.	GHR conducts 500 examinations a day.	In addition to the examination room being too small, it is remote from the medical service departments. Therefore, circulation lines of people and equipment of the examination room cross those of other works.	This project will secure an adequate space for examination and locate the examination room close to the outpatient functions.
9	Bed occupancy rate being too high	110% on average Departments of Internal Medicine and Surgery: 157% Department of Obstetrics and Gynecology: 137%	GHR is so crowded that patients are lying on the floors. Also, the patients of the Departments of Dermatology and Oral Surgery share the same ward, increasing the risk of nosocomial infection.	The project moves some functions of the existing building to the new building. The space thus created will be used for wards.
10	The number of extension telephone lines being insufficient	Six external telephone lines and 120 extension lines in service	The number of lines in the existing building is insufficient.	The project will install a telephone system which can hold a maximum of 400 extension lines. This will greatly improve the present conditions.
11	water supply capacity being insufficient	Water is supplied to the limit of the supply capacity. Water supplied to GHR is turbid.	A water treatment facility for the existing water supply system has been realized by the Grant Assistance for Grass-roots Project Scheme of Japan. There is no plan for water supply to the planned facilities.	The project will secure water supply from the river water to the planned facilities.
12	Waste water treatment capacity being insufficient	The waste water treatment facility treats the contaminated water only. General waste water is discharged to the river without treatment.	There is no plan for waste water treatment for the planned facilities. Also, the present sewerage system is open, permitting mosquitoes to breed.	The project will renovate the sewage system and newly install a waste water treatment facility for general waste water. These measures will greatly improve GHR's waste water treatment capacity.

4-2 Recommendations

The study team of the basic design already explained the system of Japan's Grant Aid to the officers in charge of the government of Sri Lanka. The construction work that will be implemented by the Sri Lanka side should be coordinated with the budgetary system of Sri Lanka. Demolition of the existing facilities, removal of the demolition debris and ground preparation on the construction site should have been completed prior to comencement of construction work by the Japan side.

For the sake of smooth and effective operation of the facilities provided by this project, the following improvements are desired.

1) The problem of GHR's patients congestion may be considered to be aggravated by unpaid medical cares, bypassing of the primary medical institutions, prolonged hospitalization as a result of nosocomial infection. It is therefore desired that the referral system be established and measures against nosocomial infection be implemented, in addition to expansion of GHR's medical service space. The staff working on such clean areas as the operation room and PBU should be given proper training on maintenance of clean conditions.

2) In GHR different clinics share the same consultation rooms. This project will enable each department to have its own consultation rooms. This will give each clinic more latitude to set its consultation days. Therefore appropriate measures, including increase of consultation days, should be taken to alleviate congestion of the Outpatients Department.

3) The medical equipment to be procured will be accompanied by manuals for maintenance and inspection, operation manual and circuit drawings, and training by the equipment supplier. BES should effectively utilize and properly archive them to carry out effective maintenance of the equipment.

4) BES should get hold of all pieces of medical equipment by maintaining a register recording receiving date, frequency of use by GHR, history of repair for each piece. BES should also plan procurement of spareparts and replacement of equipment. Based on all these, BES should formulate long- and medium-range budget for equipment management.

5) After this project has been completed, GHR should preferably prepare annual reports on its management including: numbers of inpatients and outpatients and their diseases, hospital bed occupancy rate, average period of hospitalization, in-hospital death rate, and the number of referral patients. GHR will be able to understand the management of the concerned facilities and use it as reference for improvement.

Appendices

5) After this project has been completed, GHR should preferably prepare annual reports on its management including: numbers of inpatients and outpatients and their diseases, hospital bed occupancy rate, average period of hospitalization, in-hospital death rate, and the number of referral patients. GHR will be able to understand the management of the concerned facilities and use it as reference for improvement.

Appendices

1. Member List of the Survey Team

Field Survey-1 (15 March 1999 ～ 26 March 1999)

Role	Name	Organization
Leader	Mr. Yasujiro SUZUKI	Grant Aid Project Study Department, Japan International Cooperation Agency
Technical Adviser	Dr. Hitoshi MURAKAMI	International Medical Center of Japan, Ministry of Health and Welfare
Coordinator	Mr. Yukio IWAKI	Grant Aid Project Study Department, Japan International Cooperation Agency
Project Manager/ Operation and Management Planner	Mr. Masahiro IKAWA	Nihon Sekkei, Inc.
Architectural Planner 1	Mr. Takeshi ENDO	Nihon Sekkei, Inc.
Facility Planner 1	Mr. Motohiro OKADA	Nihon Sekkei, Inc.
Facility Planner 2	Mr. Yoshihisa KATO	Nihon Sekkei, Inc.
Equipment Planner 1	Mr. Koichi MURAO	Nihon Sekkei, Inc.

Field Survey-2 (22 April 1999 ～ 12 May 1999)

Role	Name	Organization
Project Manager/ Operation and Management Planner	Mr. Masahiro IKAWA	Nihon Sekkei, Inc.
Architectural Planner 1	Mr. Takeshi ENDO	Nihon Sekkei, Inc.
Structural Planner 1	Dr. Tadaharu NAGAO	Nihon Sekkei, Inc.
Facility Planner 1	Mr. Motohiro OKADA	Nihon Sekkei, Inc.
Facility Planner 2	Mr. Yoshihisa KATO	Nihon Sekkei, Inc.
Equipment Planner 1	Mr. Koichi MURAO	Nihon Sekkei, Inc.
Cost and Procurement Planner 1	Mr. Takashi KANEKO	Nihon Sekkei, Inc.
Architectural Planner	Mr. Masaki FUJIISHI	Nihon Sekkei, Inc. (Supporting Staff)

Draft Report Explanation (21 July 1999 ～ 7 August 1999)

Role	Name	Organization
Leader	Mr. Yasujiro SUZUKI	Sri Lanka Office Japan International Cooperation Agency,
Technical Adviser	Dr. Hitoshi MURAKAMI	International Medical Center of Japan, Ministry of Health and Welfare
Coordinator	Mr. Yukio IWAKI	Grant Aid Project Study Department, Japan International Cooperation Agency
Project Manager/ Operation and Management Planner	Mr. Masahiro IKAWA	Nihon Sekkei, Inc.
Architectural Planner 1	Mr. Takeshi ENDO	Nihon Sekkei, Inc.
Structural Planner 1	Dr. Tadaharu NAGAO	Nihon Sekkei, Inc.
Facility Planner 1	Mr. Motohiro OKADA	Nihon Sekkei, Inc.
Facility Planner 2	Mr. Yoshihisa KATO	Nihon Sekkei, Inc.
Equipment Planner 1	Mr. Koichi MURAO	Nihon Sekkei, Inc.
Equipment Planner 2	Mr. Yo TAKAHASHI	Nihon Sekkei, Inc.
Cost and Procurement Planner 1	Mr. Takashi KANEKO	Nihon Sekkei, Inc.
Architectural Planner	Mr. Masaki FUJIISHI	Nihon Sekkei, Inc. (Supporting Staff)
Facility Planner	Mr. Takaaki ONIKI	Nihon Sekkei, Inc. (Supporting Staff)

Draft Final Report Explanation (19 October 1999 ～ 5 November 1999)

Role	Name	Organization
Leader	Mr. Yasujiro SUZUKI	Sri Lanka Office Japan International Cooperation Agency,
Project Manager/ Operation and Management Planner	Mr. Masahiro IKAWA	Nihon Sekkei, Inc.
Architectural Planner 1	Mr. Takeshi ENDO	Nihon Sekkei, Inc.
Facility Planner 1	Mr. Motohiro OKADA	Nihon Sekkei, Inc.
Cost and Procurement Planner 1	Mr. Takashi KANEKO	Nihon Sekkei, Inc.
Architectural Planner	Mr. Masaki FUJIISHI	Nihon Sekkei, Inc. (Supporting Staff)
Cost and Procurement Planner	Mr. Shimematsu NAKAYAMA	Nihon Sekkei, Inc. (Supporting Staff)

2. Survey Schedule

Field Survey-1 (15 March 1999 ~ 26 March 1999)

No.	Date	Stay	Activities
1	3/15 (Mon.)		Lev. Narita - Arr. Singapore
			Lev. Singapore - Arr. Colombo
2	3/16 (Tue.)	Colombo	Courtesy Call to JICA Sri Lanka Office
			Courtesy Call to Embassy of Japan
			Courtesy Call to MOH
			Courtesy Call to ERD
3	3/17 (Wed.)		Lev. Colombo - Arr. Ratnapura
		Ratnapura	Coutesy Call to GHR
			Inception Report Explanation
4	3/18 (Thu.)	Ratnapura	Site Survey at GHR
			Meeting with Telephone Corporation, Power Corporation
			Meeting with Ratnapura Municipality
			Survey at Waist Treatment Facility
5	3/19 (Fri.)	Ratnapura	Site Survey at GHR
			Meeting with Ratnapura Fire Station
6	3/20 (Sat.)	Ratnapura	Courtesy Call at Base Hospital Kahawatta, Pellmadulla Rural Hospital
			Lev. Ratnapura - Arr. Colombo
7	3/21 (Sun.)	Colombo	Team meeting
8	3/22 (Mon.)	Colombo	Meeting with MOH re. Meeting Minutes
			BES meeting
			Courtesy Call at Sri Jayewardenepura General Hospital
9	3/23 (Tue.)	Colombo	MOH meeting
			Meeting with Colombo Fire Station
10	3/24 (Wed.)	Colombo	Signing on Minutes of Meeting
			Report to JICA Sri Lanka Office
			Report to Embassy of Japan
11	3/25 (Thu.)		Lev. Colombo - Arr. Singapore
12	3/26 (Fri.)		Lev. Singapore - Arr. Narita

Field Survey-2 (22 April 1999 ~ 12 May 1999)

No.	Date	Stay	Activities
1	4/22 (Thu.)		Lev. Narita - Arr. Singapore
			Lev. Singapore -
2			Arr. Colombo
		Colombo	Courtesy Call to ERD
			Courtesy Call to Embassy of Japan
			Courtesy Call to JICA Sri Lanka Office
3	4/24 (Sat.)	Colombo	Team meeting
4	4/58 (Sun.)		Lev. Narita - Arr. Singapore (Messier. Okada, Nagao)
			Lev. Singapore -
5	4/23 (Fri.)		Arr. Colombo
		Colombo	MOH meeting
			Lev. Colombo - Arr. Ratnapura
		Ratnapura	Site Survey at GHR
			Meeting at GHR
			Market survey
6	4/27 (Tue.)	Ratnapura	GHR meeting
			Site survey
			Meeting with Water Treatment Plant
			Market survey
7	4/28 (Wed.)	Ratnapura	GHR meeting
			Site Survey
			Selection of Soil Investigation Company
			Survey on Waste Water Treatment Plant
8	4/29 (Thu.)	Ratnapura	GHR meeting
			Meeting with Telephone Corporation
			Meeting with Engineering Service Dept. at Ratnapura Municipality
9	4/30 (Fri.)	Ratnapura	GHR meeting
10	5/1 (Sat.)	Ratnapura	Courtesy Call to Peradenia University
			Market survey
11	5/2 (Sun.)	Ratnapura	GHR meeting
			Meeting with Engineering Service Dept. at Ratnapura Municipality
12	5/3 (Mon.)	Ratnapura	GHR meeting
			Meeting with CEB
			Meeting with Engineering Service Dept. at Ratnapura municipality
			Lev. Ratnapura - Arr. Colombo
13	5/4 (Tue.)	Colombo	BES meeting
			Courtesy Call to Sri Jayewardenepura General Hospital and construction site of Nursing School
14	5/5 (Wed.)	Colombo	BES meeting
			Meeting with MOH・ERD
			Market survey
15	5/6 (Wed.)	Colombo	Sinning on Technical Memorandum
			Market survey
16	5/7 (Fri.)	Colombo	Report to JICA Sri Lanka Office
			Report to Embassy of Japan
			Market survey
17	5/8 (Sat.)	Colombo	Team meeting
18	5/9 (Sun.)		Lev. Colombo - Arr. Singapore
19	5/10 (Mon.)	Singapore	Market survey
20	5/11 (Tue.)	Singapore	Market survey
21	5/12 (Wed.)		Lev. Singapore - Arr. Narita

Draft Report Explanation (21 July 1999 ~ 7 August 1999)

No.	Date	Stay	Activities
1	7/21 (Wed.)		Lev. Narita - Arr. Singapore
			Lev. Singapore -
2	7/22 (Thu.)		Arr. Colombo
		Colombo	Courtesy Call to JICA Sri Lanka Office
			Courtesy Call to ERD
			Courtesy Call to MOH
3	7/23 (Fri.)		Lev. Colombo - Arr. Ratnapura
		Ratnapura	Courtesy Call to GHR
4	7/24 (Sat.)	Ratnapura	Survey on GHR
5	7/25 (Sun.)	Ratnapura	Survey on GHR
6	7/26 (Mon.)	Ratnapura	Survey on GHR
			Lev. Ratnapura - Arr. Colombo
7	7/27 (Tue.)	Colombo	Meeting on Minutes of Meeting with MOH
8	7/28 (Wed.)	Colombo	Team meeting
9	7/29 (Thu.)	Colombo	Signing on Minutes of Meeting
10	7/30 (Fri.)	Colombo	Report to JICA
			Report to Embassy of Japan
11	7/31 (Sat.)	Colombo	JICA Officials leave
			Team meeting
12	8/1 (Sun.)		Lev. Colombo - Arr. Ratnapura
13	8/2 (Mon.)	Ratnapura	Survey on GHR
14	8/3 (Tue.)	Ratnapura	Survey on GHR
15	8/4 (Wed.)	Ratnapura	Survey on GHR
			Lev. Ratnapura - Arr. Colombo
16	8/5 (Thu.)	Colombo	Report to JICA Sri Lank Office
			Report to Embassy of Japan
17	8/6 (Fri.)		Lev. Colombo - Arr. Singapore
18	8/7 (Sat.)		Lev. Singapore - Arr. Narita

Draft Final Report Explanation (19 October 1999 ～ 5 November 1999)

No.	Date	Stay	Activities
1	10/19 (Tue.)		Lev. Narita – Arr. Singapore
			Lev. Singapore -
2	10/20 (Wed.)		Arr. Colombo
		Colombo	Courtesy Call to JICA Sri Lanka Office
			Courtesy Call to Embassy of Japan
			Courtesy Call to ERD
			Courtesy Call to MOH
3	10/21 (Thu.)	Ratnapura	Explanation of Draft Final Report (MOH)
			Lev. Colombo - Arr. Ratnapura
4	10/22 (Fri.)	Ratnapura	Courtesy Call to GHR
5	10/23 (Sat.)	Ratnapura	Survey on GHR
6	10/24 (Sun.)	Ratnapura	Team Meeting
7	10/25 (Mon.)	Ratnapura	Survey on GHR
8	10/26 (Tue.)	Ratnapura	Survey on GHR
9	10/27 (Wed.)	Ratnapura	Survey on GHR
10	10/28 (Thu.)	Ratnapura	Survey on GHR
11	10/29 (Fri.)	Ratnapura	Survey on GHR
12	10/30 (Sat.)	Ratnapura	Team Meeting
13	10/31 (Sun.)		Lev. Ratnapura - Arr. Colombo
14	11/1 (Mon.)	Colombo	Discussion on Minutes of Meeting (MOH)
15	11/2 (Tue.)	Colombo	Signing on Minutes of Meeting (MOH)
16	11/3 (Wed.)	Colombo	Report to JICA Sri Lank Office
			Report to Embassy of Japan
17	11/4 (Thu.)		Lev. Colombo - Arr. Singapore
18	11/5 (Fri.)		Lev. Singapore - Arr. Narita

3. List of Party Concerned in the Recipient Country

1) Ministry of Health & Indigenous Medicine

Mr.C.Abeygunawardana	Secretary
Dr.K.Fernando	Additional Secretary (Health)
Dr.K.E.S.Dalpatadu	Deputy Director General (Planning)
Mr.S.T.G.R.De Silva	Deputy Director General (Medical Service)
Mr.W.M.Piyasena	Deputy Director General (Logistics)
Dr.Y.Y.Thurusing	Director(Planning)
Dr.J.Bandava	Former Medical Superintendent of GHR

2) Ministry of Finance

Mr.J.H.J.Jayamaha,	Director (Japan Division)
Mr.M.D.U.K Mapa Pathirana	Assistant Director

3) General Hospital Ratnapura

Dr.A.K.S.B.De Alwis	Medical Superintendent
Dr.N.D.Jayasooriya	Consultant, Orthopedic Surgeon
Dr.K.I.N.Karunaratne	Visiting Surgeon, Dental/Maxilla
Dr.R.J.K.Seneviratne	Visiting Surgeon
Dr.Mrs.W.A.J.N.Tissera	Visiting Physician
Dr.Mrs.J.N.Gunawarddena	Visiting Physician
Dr.M.A.Chandrasekara	Visiting Physician
Dr.T.B.Dissanayake	Visiting Obstetrician & Gynecologist
Dr.G.H.K.K.Gunawarddena	Visiting Obstetrician & Gynecologist
Dr.Mrs.J.C.Sarathchandra	Pediatrician
Dr.J.K.J.S.K.Jayanetti	Rheumatologist
Dr.Mrs.T.D.Jayanetti	Consultant, Anesthetist
Dr.A.D.K.S.N.Yasawardana	ENT Surgeon
Dr.M.K.Kulathunge	Eye Surgeon
Dr.C.Wijekoon	Dermatologist
Dr.N.Wijewardana	Radiologist
Dr.Mrs.B.Jayaratne	Pathologist
Dr.M.A.N.Wijethileke	O.P.D.
Dr.V.Mahadeva	Chief Pharmacist
Dr.P.Mahanama	Pharmacist

Dr.Mrs.R.G.J.D.Ranatunga	Medical Officer (S.T.D.)
Dr.S.Rajugamuwa	Medical Officer (Psychiatry)
Dr.J.Alwitigala	Medical Officer (Psychiatry)
Mr.T.Mahadeva	Chief Medical Lab Technologist
Mrs.H.M.H.Gunawardena	Nursing Officer (Special Grade)
Mr.V.I.S.Piyasena	Nursing Officer (Special Grade)
Mr.P.M.Wickramasinghe	Administrative Officer

4) Base Hospital Kahawatta

Dr.P.M.Panditharatne	DDHS/MOH
M.K.K.Wichaunachu	Medical Officer
R.L.Weerawardane	Chief Clerk
P.M.Heemantha	Nursing Officer Special Grade
S.Sugathadasa	Nursing Sister

5) Pellmadulla Rural Hospital

Dr.G.J.Dissanayaka	Medical Officer
Dr.R.Godakumbura	R.M.O.

6) Biomedical Engineering Services

Mr.Jayatilaka	Director

7) Sri Jayawardenepura General Hospital

Dr.D.L.De Laueralle	Director

8) Sri Lanka Telecom (Head of Province)

Mr.Thissa Wijesinghe	DGM
Mr.S.A.N.C.Samarasighe	Engineer

9) Ceylon Electricity Board

Mr.G.W.Wijesundara	Electrical Engineer

10) Municipal Council Ratnapura

Mr.S.A.Athapathu	Municipal Commissioner
Mr.K.K.Gunaratne	Municipal Engineer
Mr.Nimal Premathilaka	Public Health Inspector
Mr.Shantha Wickramarachchi	Public Health Inspector

11) Provincial Engineering Service Ratnapura

Mr.A.D.K.A.Weeraratne	Deputy Director (Buildings)

12) Fire Service Deparment Colombo

Mr.J.Kannangara	Chief Fire Officer

13) National Water Supply & Drainage Board

Ms.V.P.I.Jayawardana	Regional Chemist
Mr.T.D.Pitigampola	Engineer

14) Road Development Authority

Mr.W.U.I.Rodrigo	Engineer
Mr.H.A.S.R.Darmapala	Technical Officer

4. Cost Estimation Borne by the Recipient Country

(1) Demolition of existing structures inside Project site. SL.Rs.1,000,000

(2) Demolition of existing substructure. SL.Rs.8,000,000
(including Underground pipes inside Project site.)

(3) Site clearance including Trees. SL.Rs.2,000,000

(4) Landscape work. SL.Rs.5,000,000
   a. Gardening and Planting.
   b. Drive way and passage outside of Project site.
   c. Gate, Fence and Guardhouse.

(5) Lead-in and connection works for M/E SL.Rs.6,000,000
   a. Lead-in and connection works for MDF.
   b. Each infrastructure such as electricity, City water supply, and Drainage.

(6) Furniture and utensils. SL.Rs.1,000,000
Curtain for windows (Curtain rail work will be done by Japanese side), blind, ordinary furniture.

(7) Move and installation of existing equipment to be used. SL.Rs.1,000,000

(8) Road and others. SL.Rs.6,000,000
Road in outside of Project Site, Gate, Fence and Parking.

5. Other Relevant Data

Soil Investigation Layout

Borehole Log No.-1

No.-2

No.-3

No.-4

No.-5

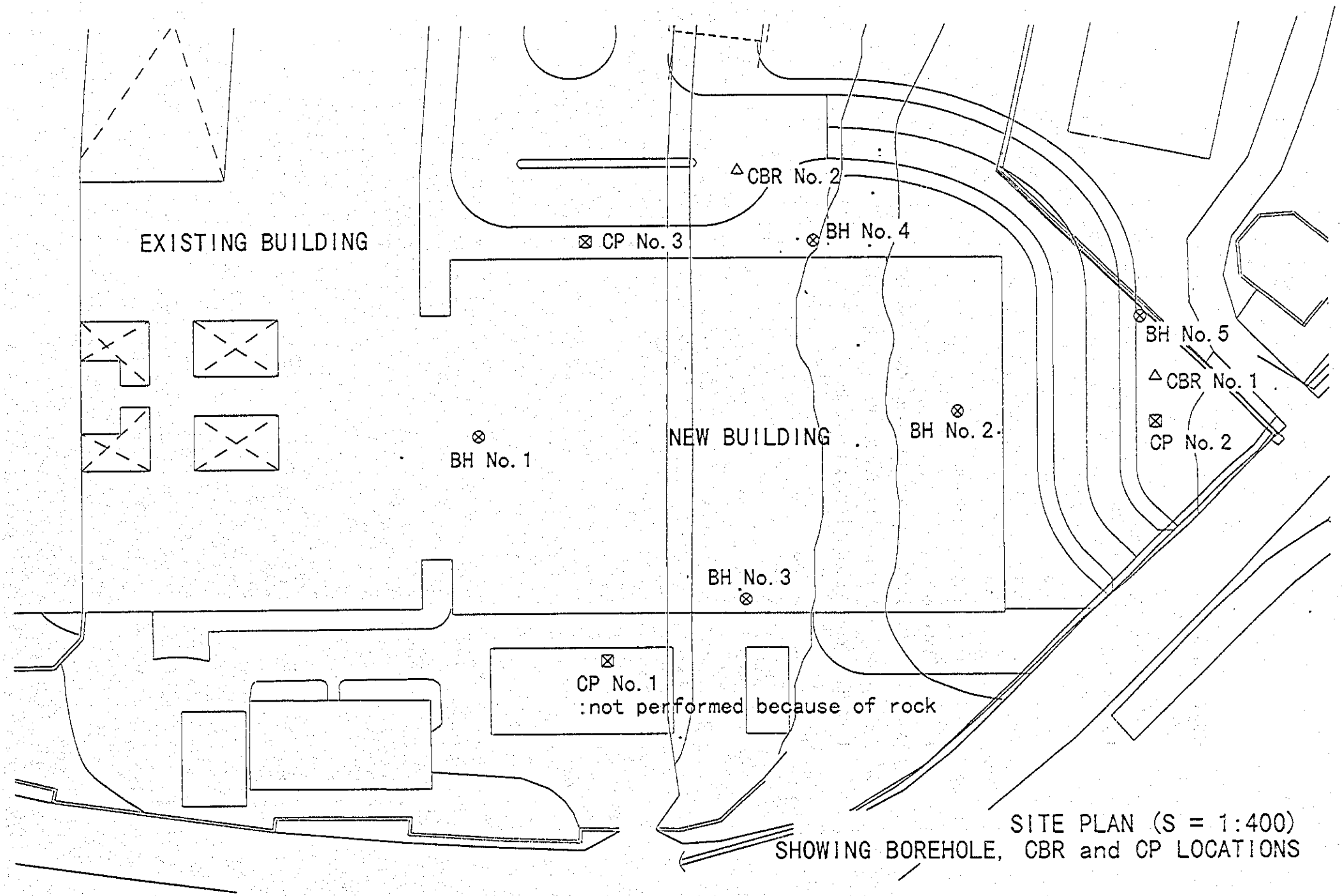
Corn Penetration Test (CP-Test) Results

Laboratory Test Results

Consolidated Drained Multistage Triaxial Test Results

California Bearing Ratio Test (CBR-Test)Results

Unconfined Crushing Strength of Rock Test Results



SITE PLAN (S = 1:400)
SHOWING BOREHOLE, CBR and CP LOCATIONS

BOREHOLE LOG

PROJECT	GEOTECHNICAL SURVEY WORKS GENERAL HOSPITAL RATNAPURA			BOREHOLE NO. BH-1
LOCATION	RATNAPURA			BOREHOLE DEPTH 11.91m
BORING EQUIPMENT & METHOD	LONGYEAR - 34 ROTARY DRILLING	DATE STARTED	4.5.99	ELEVATION 99.82m
		DATE COMPLETED	7.5.99	GWL on completion of BOREHOLE 8.65m below top of borehole

Depth below GL, m	Description of Soil & Classification		Type and Depth of sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	N-value graphical presentation
0.00	Tarred surface								
0.07	Reddish brown SANDY SILT with gravel particles (Lateritic Soils)	ML	D	1.00 1.45	7	6	5	11	
1.00									
1.33	MEDIUM DENSE pale yellow and greyish SILTY SAND with weathered rock fragments	SM	D	2.00 2.45	10	9	7	16	
2.00									
2.05	MEDIUMD ENSE red and yellow mottled SILTY SAND with little fines (Lateritic Soils)	SM	D	3.00 3.45	10	9	13	22	
3.00	- do -								
4.00	MEDIUM DENSE - reddish and pinkish SILTY SAND with pockets of pale yellowish clay (Lateritic soils)	SM	D	4.00 4.45	7	10	10	20	
5.00	MEDIUM DENSE - reddish brown and pale yellow mottled CLAYEY SILT with traces of quarts and gravel pieces (Lateritic Soils)	MH	D	5.00 5.45	4	5	9	14	
5.89									
6.00	DENSE pink, yellow, white and brown stratified SILTY SAND (completely weathered rock)	SM	D	6.00 6.45	9	19	17	36	
7.00	DENSE red, yellow, brown white and grey - mottled SILTY SAND with pockets of plastic fines (completely weathered rock)	SM	D	7.00 7.45	7	13	17	30	
8.00	VERY DENSE black, white and grey stratified SILTY SAND with(occasional brown patches), together with brogken rock fragments (completely weathered rock)	SM	D	8.00 8.40	10	33	27/ 10cm	60/ 25cm	
8.80			C	8.80	Core % Recovery		RQD %		
9.00	Fractured Gneiss with Garnets (2cm to 8cm pieces)				53		Nil		
9.55			C	9.55					
10.00	Fractured Quartzo Gneiss with Garnets (2.5cm to 9cm pieces)		C	10.05	96		66		

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BOREHOLE LOG

PROJECT	GEOTECHNICAL SURVEY WORKS GENERAL HOSPITAL RATNAPURA			BOREHOLE NO.	BH -1 cont'd
				BOREHOLE DEPTH	11.91m
LOCATION	RATNAPURA			ELEVATION	99.82m
BORING EQUIPMENT & METHOD	LONGYEAR 34 ROTARY DRILLING	DATE STARTED	4.5.99	G/L on completion of BOREHOLE	8.65m below top of borehole
		DATE COMPLETED	7.5.99		

Depth below GL, m.	Description of Soil & Classification	Type and Depth of sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	Core recovery	RQD %	graphical presentation 0 10 20 30 40
10.00 10.05		C	10.05							
	Gneiss with weathered bands							100	53	
11.00 11.15		C	11.15							
	Charnockite with Garnets							100	87	
11.91 12.00	Borehole terminated at 11.91m depth		11.91							

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BOREHOLE LOG

PROJECT	GEOTECHNICAL SURVEY WORKS GENERAL HOSPITAL RATNAPURA			BOREHOLE NO. BH-2
				BOREHOLE DEPTH 5.68m
LOCATION	RATNAPURA			ELEVATION 95.01m
BORING EQUIPMENT & METHOD	LONGYEAR- 34 ROTARY DRILLING	DATE STARTED DATE COMPLETED	12.5.99 13.5.99	GWL on completion of BOREHOLE 4.95m below top of borehole

Depth below GL, m	Description of Soil & Classification		Type and Depth of sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	graphical presentation
0.00	Reddish brown SILTY SAND with gravel	SM		0.00 1.00					
1.00	MEDIUM DENSE brick red SILTY SAND with pockets of yellow clayey silt	SM	D	1.00 1.45	7	11	10	21	
2.00			D	2.00	12	17	30	47	
2.10	Dense, reddish brown and pale yellow stratified SILTY SAND(completely weathered rock	SM		2.45	Core % Recovery		RQD %		
2.55			C	2.55 -	24		24		
3.00	Slightly weathered Gneiss		C	3.00 -	66		66		
3.45			C	3.45					
4.00	Gneiss				88		77		
4.83			C	4.83	100		59		
5.00	Charnockite with Gneiss bands		C	5.18					
5.18 5.33	Charnockite		C	5.33	100		100		
5.68				5.68	100		100		
6.00	Borehole terminated at 5.68m								

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BOREHOLE LOG

PROJECT	GLOTECHNICAL SURVEY WORK ; GENRAL HOSPITAL RATNAPURA		BOREHOLE NO. BH-3
LOCATION	RATNAPURA		BOREHOLE DEPTH 5.85m
BORING EQUIPMENT & METHOD	LONGYEAR - 34 ROTARY DRILLING	DATE STARTED 8.5.99 / DATE COMPLETED 9.5.99	ELEVATION 99.88m
			GWL on completion of BOREHOLE NIL

Depth below GL, m	Description of Soil & Classification		Type and Depth of sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	graphical presentation
0.00	Reddish brown SILTY SAND with gravel particles (Lateritic soils)	SM							0 10 20 30 40
1.00	LOOSE reddish brown SILTY SAND with gravel particles (Lateritic soils)	SM	D	1.00 - 1.45	3	3	4	7	
2.00	DENSE to VERY DENSE reddish brown and pale yellow SILTY SAND (with occasional pockets of brownish clay) and signifi -cant amount of gravel particles	SM	D	2.00 - 2.45	4	8	37	45	
2.70			D	2.70	50/4cm	Refusal to penetration			
2.74	Slightly weathered Gneiss		C	2.74 - 2.95	Core Recovery %		RQD %		
2.95			C	2.95	62		62		
3.00									
					77		75		
4.00	Gneiss								
4.50			C	4.50					
5.00	Gneiss with weathered bands				89		80		
5.85				5.85					
6.00	Borehole terminated at 5.85m depth								

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BOREHOLE LOG

PROJECT	GEOTECHNICAL SURVEY WORKS GENERAL HOSPITAL RATNAPURA			BOREHOLE NO.	BH-4
				BOREHOLE DEPTH	12.58m
LOCATION	RATNAPURA			ELEVATION	99.96m
BORING EQUIPMENT & METHOD	LONGYEAR -34 ROTARY DRILLING	DATE STARTED	10.5.99	GWL on completion of BOREHOLE	7.85m below top of borehole
		DATE COMPLETED	11.5.99		

Depth below GL, m	Description of Soil & Classification		Type and Depth of sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	graphical presentation
0.00	Reddish brown SITLY SAND with occasional gravel particles (Lateritic Soil Fill)	SM		0.00 – 1.00					
1.00	LOOSE reddish brown CLAYEY SILT with traces of sand and gravel particles (Fill)	MH	D	1.00 – 1.46	4	4	4	8	
2.00	---- do -----		D	2.00 – 2.45	3	3	4	7	
3.00	MEDIUM STIFF reddish brown LATERITIC CLAY with gravel particles (Fill)	CH	D	3.00 – 3.45	2	2	3	5	
4.00	--- do ----		D	4.00 – 4.05	3	3	3	6	
5.00	LOOSE pale yellow to greyish brown SANDY SILT with plastic fines and gravel particles (Fill)	ML	D	5.00 – 5.45	4	6	3	9	
6.00	VERY LOOSE yellowish brown CLAYEY SAND with gravel particles (Fill)	SC	D	6.00 – 6.50	4	1	1	2	
7.00	MEDIUM STIFF pale yellow, SANDY CLAY with weathered rock fragements (Fill)	CL	D	7.00 – 7.45	7	5	3	8	
8.00	MEDIUM DENSE greyish brown SILTY SAND with plastic fines and gravel particles (Fill)	SM	D	8.00 – 8.45	6	5	6	11	
8.78									
9.00	MEDIUM DENSE red and pale yellow mottled CLAYEY SILT	MH	D	9.00 – 9.45	3	4	6	10	
10.00									

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BOREHOLE LOG

PROJECT	GEOTECHNICAL SURVEY WORKS GENERAL HOSPITAL RATNAPURA		BOREHOLE NO. BH-4 cont'd
			BOREHOLE DEPTH 12.58m
LOCATION	RATNAPURA		ELEVATION 99.96m
BORING EQUIPMENT & METHOD	LONGYEAR- 34 ROTARY DRILLING	DATE STARTED 10.5.99 DATE COMPLETED 11.5.99	GWL on completion of BOREHOLE 7.85m below top of borehole

Depth below GL, m	Description of Soil & Classification		Type and Depth of sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	graphical presentation
10.00	MEDIUM DENSE reddish brown SILTY SAND with occasional gravel particles	SM	D	10.00 - 10.45	9	9	10	19	
10.87									
11.00	MEDIUM DENSE pink reddish brown, grey, brown yellow stratified SANDY SILT (completely weathered rock)	ML	D.	11.00 - 11.45	13	13	12	25	
12.00	VERY DENSE, grey, white and brown stratified SANDY SILT (completely weathered rock)		D.	12.00 - 12.45	8	19	31	50	
12.58	Borehole terminated at 12.58m depth								
13.00									

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BOREHOLE LOG

PROJECT	GEOTECHNICAL SURVEY WORKS GENERAL HOSPITAL RATNAPURA		BOREHOLE NO. BH-5
LOCATION	RATNAPURA		BOREHOLE DEPTH 6.12m
BORING EQUIPMENT & METHOD	LONGYEAR -34 ROTARY DRILLING	DATE STARTED 14.5.99 DATE COMPLETED 14.5.99	ELEVATION 94.24m GWL on completion of BOREHOLE m below top of borehole

Depth below GL, m	Description of Soil & Classification		Type and Depth of Sampling m		STANDARD PENETRATION TEST DATA number of blows 15 cm	15 cm	15 cm	N-value for 30cm	N-value graphical presentation 0 10 20 30 40
0.00	Reddish brown SILTY SAND with gravel particles (Lateritic Soils)	SM		0.0 1.00					
1.00	MEDIUM DENSE, red yellow and purple stratified SANDY SILT with traces of quarts particles (Lateritic Soils)	ML	D	1.00 1.45	7	9	11	20	
1.92 2.00	LOOSE pinkish brown CLAYEY SAND with traces of gravel	SC	D	2.00 2.45	4	3	6	9	
2.90 3.00	MEDIUM DENSE reddish brown and pale yellow SILTY SAND with fragments of rock	SM	D	3.00 3.45	8	10	7	17	
4.00	VERY DENSE reddish brown (with yellow patches) SILTY SAND with rock fragments (completely weathered rock)	SM	D	4.00 4.45	60/10cm	-	-	Refusal to penetration	
5.00	VERY DENSE yellowish to greyish brown SILTY SAND with pockets of clay	SM	D	5.00 5.23	32	51/8cm	-	51/8cm	
	Sample fallen							Refusal to penetration	
6.00	Borehole terminated at 6.12m		D	6.00 6.12	50/12cm	-	-	-	

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GEOTECHNICAL SURVEY WORK

General Hospital Ratnapura Site

Table 1: Location CP-2

Depth (m)	Cone Resistance, q_c (KN/m^2)	Lateral Friction, f_s (KN/m^2)	Friction ratio (f_s/q_c) (%)
0.6	480	21.79	4.54
0.7	720	18.68	2.59
0.8	580	18.68	3.22
0.9	580	23.45	4.04
1	560	20.52	3.66
1.1	680	17.59	2.58
1.2	600	17.59	2.93
1.3	650	20.52	3.15
1.4	610	17.59	2.88
1.5	520	17.59	3.38
1.6	370	17.59	4.75
1.7	380	14.66	3.85

Table 2: Location CP-3

Depth (m)	Cone Resistance, q_c (KN/m^2)	Lateral Friction, f_s (KN/m^2)	Friction ratio (f_s/q_c) (%)
0.6	1280	61.56	4.81
0.7	2320	76.22	3.28
0.8	2240	99.67	4.45
0.9	2300	96.74	4.21
1	1550	58.63	3.78
1.1	1530	43.97	2.87
1.2	1550	41.04	2.65
1.3	1660	35.18	2.12
1.4	1590	32.25	2.03
1.5	1590	35.18	2.21
1.6	1880	35.18	1.87

LABORATORY TEST RESULTS

Particle Size Distribution

Borehole No.	Depth (m)	Gravel (%)	Sand (%)	Fines (%)
BH1	2.00 - 2.45	37	61	2
BH1	3.00 - 3.45	24	75	1
BH1	8.00 - 8.45	15	83	2
BH2	2.00 - 2.45	5	92	3
BH3	2.00 - 2.45	36	63	1
BH4	6.00 - 6.45	32	67	1

Liquid Limit and Plastic Limit

Borehole No.	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
BH4	2.00 - 2.45	54	34	20
BH4	3.00 - 3.45	54	35	19
BH4	4.00 - 4.45	54	24	30
BH4	7.00 - 7.45	37	27	10

Specific Gravity

Borehole No.	Depth (m)	Specific Gravity
BH1	1.00 - 1.33	2.59
BH1	2.00 - 2.45	2.58
BH2	2.00 - 2.45	2.58
BH3	2.00 - 2.45	2.62
BH4	2.00 - 2.45	2.58
BH4	3.00 - 3.45	2.60
BH4	7.00 - 7.45	2.57

Consolidated Drained Multistage Triaxial Test Results

Client : Soil and Foundation (pvt) Ltd.
Project : General Hospital Site - Rathnapura

BH Number :	Depth (m):
BH 4	1.0 m

Description of Sample

Brown Lateretic Soil

Specimen Size :
Diameter (mm) : 38 height (mm): 85

Initial Conditions :			
Dry Unit Weight kg/m^3	1722.03	1722.03	1722.03
Moisture Content %	18.21	18.21	18.21
Failure Conditions :			
Cell Pressure kN/m^2	100.00	200.00	300.00
Deviator Stress kN/m^2	276.48	460.94	698.83
Axial Stress	376.48	660.94	998.83
Axial Strain %	10.70	10.70	14.90

Shear Strength Parameters

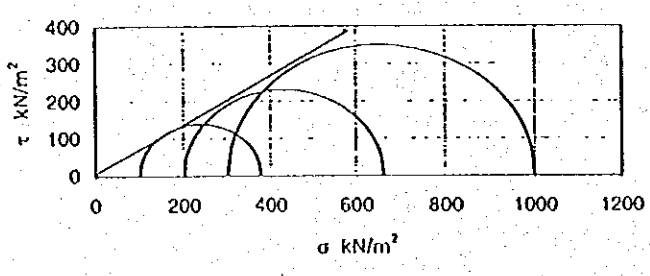
C_d = 0 kN/m^2 ϕ_d = 35°

Method of ILoading : Constant strain

Remarks

This was a multistage test. The specimen consolidated and sheared under a lower cell pressure was unloaded to be consolidated and sheared at next cell pressure.

Mohr Circle Plot BH 4 Depth 1.0 m



CALIFORNIA BEARING RATIO TEST

Sample Reference No.	Optimum moisture content	Dry density (Basis Proctor Compaction Test) kg/m^3	Penetration for CBR (soaked, recompacted, 5 kg surcharge)	CBR number
CBR 1 0.6 m	16.0%	1774.0	top 2.5 mm top 5.0 mm bottom 2.5 mm bottom 5.0 mm	8.8 11.9 8.6 10.6
CBR 1 1.0 m	17.4%	1720.0	top 2.5 mm top 5.0 mm bottom 2.5 mm bottom 5.0 mm	9.9 11.3 9.0 10.4
CBR 2 0.6 m	17.2%	1690.0	top 2.5 mm top 5.0 mm bottom 2.5 mm bottom 5.0 mm	12.1 14.5 11.8 13.0
CBR 2 1.0 m	18.4%	1700.0	top 2.5 mm top 5.0 mm bottom 2.5 mm bottom 5.0 mm	8.0 11.3 6.4 8.1

Note: CBR tests were conducted on 4-day soaked samples, under a surcharge of 5.0 kg. Samples were recompacted to the dry density obtained under Proctor Compaction Test conditions. CBR values are reported for both top and bottom penetrations of 2.5 and 5.0 mm.

UNCONFINED CRUSHING STRENGTH OF ROCK TEST

Borehole No.	Depth (m)	Diameter (mm)	Length (mm)	Unconfined crushing strength (N/mm^2)
BH – 1	9.74	54.5	109	30.27
BH – 2	3.08	54.5	136	32.59
BH – 3	2.95	54.4	122.3	25.74