2) Furniture and Beds

There was a request for the supply of chairs and desks for the waiting rooms and medical beds for this pediatrics hospital. The request for the furniture such as chairs and desks was turned down as it is not included in the objects of assistance and the Pakistani participants agreed.

The team offered a free supply of beds with a special device (for the severely handicapped). The Pakistan side strongly requested the supply of all beds including ordinary beds, reasoning that beds made in Pakistan were not satisfactory for medical purpose and that other hospitals are using imported beds. The team just replied, "We will convey your request to the Japanese Government." (As per the attached materials)

3) Medical Equipment

Pakistan requested the provision of such basic goods as injectors, needles, scalpels, forceps, etc. for the reason that such materials are not produced in Pakistan. The team emphasized that grant aid by the Japanese Government was an approach by which a project would be accomplished, with an assisting country supporting the assisted country's self-support effort and suggested that Pakistan should acquire small items of equipment and supplies. Pakistan showed its understanding but again requested a supply of the minimum necessities when the facilities were opened. The team did not give an affirmative reply to this request.

(3) The following are the contents of the confirmation the team obtained from Pakistan.

To avoid any possible problems arising with Pakistan, the team confirmed the content of the materials and equipment acquisition plan described in the report on the study of the basic design (draft) to each agency concerned. Economic Affairs Division disclosed its intention of not objecting to the plan as long as the Ministry of Health and Social Welfare, the enforcement agency, agrees. The Ministry of Health and Social Welfare, the real decision-maker for this material and equipment acquisition plan

confirmed as follows:

"We would possibly consider the acquisition of construction materials and equipment here in Pakistan, but Japan shall supply such construction materials that may affect the length of the construction period or those of a quality that Japan may think may not be obtained locally. (As per the attached material)

(4) The team explained that the Japanese Government provides the grant aid on a single fiscal year budget which is limited and that this construction plan will be carried out in two phases, which Pakistan agreed to.

(5) The team asked for a specific account of the budgetary measures for the operation and management of the facilities and the measures for securing staff, both required after the completion of the Children's Hospital. Though no specific reply was obtained, the maintenance and management expenses would be covered by the non-development budget portion of the ordinary budget and the necessary staff would be secured by the ordinary procedure under the laws concerned; this was confirmed in writing. (As per the attached material)

(6) The team explained to the Pakistani parties the items described in the report on the study of the basic design which Pakistan is supposed to take responsibility for and Pakistan side agreed. The matters the team and Pakistan side agreed upon are:

1) Removal of obstacles within the construction site, reclamation and grading of the construction site, provision of roads in the neighboring areas, survey of the site, landscaping, equipment of the infrastructure (electricity, telephone, water supply, sewage, gas).

2) Execution of management and operation of the facilities after the completion of this hospital.

3) Expedition of unloading and customs clearance for the materials bought under the grant aid at a Pakistani part.

4) Exemption of Japanese from the customs duty, and domestic taxes

in Pakistan during the course of supplying the services and materials under the attested contract.

5) Consulting engineers on the Pakistan side shall supply the materials necessary for the completion of the project.

6) Bearing the expenses required for the construction of facilities which are not included in the grant aid agreement.

7) Supply of electric power and water during the construction.

8) Furniture and furnishings.

9) Securing the safety of the Japanese participating in this project at the time of entry or departure, movements and during stays in Pakistan for the execution of their task under the attested contract.

(7) The team suggested possible small changes to the content of the plan shown in the draft report at the stage of the final report and the Pakistan side agreed to this in principle. The Pakistan side requested the observance of the basic facilities functions and contents prepared in consultation with the previous team.

7-2 Report on the Visits to the Related Facilities

Visits were made to the following two facilities.

1) Children's Hospital in Karachi

National Institute of Child Health, Jinnah Post Graduate Hospital Center.

2) The I.H.C. 500-Bed Teaching Hospital

(1) Children's Hospital in Karachi

On Saturday July 17, the study team visited the hospital without an appointment to take advantage of the time of transit in Karachi. Unfortunately, as the hospital closed at 1.30 p.m. because of Ramadan (fasting), there were no administrative personnel available.

A physician and a surgeon who remained in the hospital answered our questions, showing their understanding of our unexpected visit.

Physician: Dr. Mrs. Zeena Isari
Surgeon: Dr. Saghir Ahmad

The facilities, constructed 10 to 20 years ago, are aging internally, if not on the exterior. Wards have passages in the center of the structure which are very dark as was the case with the other hospitals. Only major departments such as the operation department, ICU and NICU were air-conditioned. The doctors who took us around appealed that a total air-conditioning system was necessary.

In the outpatients department, a primary care system is adopted. The reception, dispensary and examination booths are arranged in a line, with the central waiting room in the center. It seemed that treatment within the both resulted in inefficiency. Outpatients, first visitors or returning visitors, were instructed stand in order in front of the examination booth every day. Even returning visitors do not receive treatment from the same doctor, forcing them repeat same procedures every time. No examination cards were used.

Inpatients were assigned to the internal disease ward and surgery ward depending on the date of hospitalization.

The medical operation divided process to permit the smooth movement of doctors and patients. Efforts were made to set up clean zone within the area.

The radiological department was equipped with a considerable quantity of new machinery, which resulted in a lack of efficiency and cleanliness.

One unit of the NICU was installed in each unit of the three internal disease wards. A half of the internal disease ward was devoted to new-born babies.

There was a burn unit of five beds near the operating theatre of the surgery ward.

The central supply, medical, examination and emergency departments were provided with equipment of a lower quality.

In particular, the emergency department dealing mainly patients visiting after office hours, sends patients requiring treatment to the main hospital.

An addition to the examination department is planned, which are not perfect in scale or content.

To our question, what would they want if they had the chance to construct a new children's hospital, the two doctors answered:

1) In this hospital, is a six-storied building, but lacks a sufficient number of elevators. Considering the daily management and safety, a children's hospital should be two or three-storied.

2) The air-conditioning System should be perfect.

3) In summer, the number of people suffering from diarrhea increases. The primary care of outpatients should be strengthened.

4) The quality of construction should be improved. The existing facilities are of inferior quality, making the preservation of cleanliness troublesome.

Because of the limits imposed on time, the team could not undertake a satisfactory study, but we gathered the impression that the functions and content of the hospital proposed and approved in the basic concept of the children's hospital of the I.H.C. would result in an appropriate institution.

(Facilities)

Official Name: National Institute of Child Health Jinnah Post Graduate Hospital Center

Scale:	Ferro-concrete building	Ward unit	six-storied
		Examination unit	two-storied
		Service unit	one-story

Number of Beds: 150

Nursing Unit: 30 beds/N.U.

Ward Construction:	Surgery wards	two units,	60 beds
	Internal medicine wards	three units,	90 beds
	Total	five units,	150 beds

Number of Outpatients:	Internal medicine:	800/day
	Surgery:	150/day
	Total	950/day

Bed Turnover:
An average of about 12 days per bed (sometimes two to three months) Because of the shortage of beds, patients are released from hospital as quickly as possible.

Office Hours: 8:30 a.m. ∿ 14:30
Outpatients who visit the hospital after 14:30 are treated at the emergency department.

Examination Facilities:
Outpatients examination department, dispensary, operation, ICU, NICU, new-born babies, cardiograph, Burn, central materials.

* The dispensary handles only dispensing. Central materials, examination and emergency departments are subsidiary institutions of the main hospital. The examination department is planned to be expanded.

Period of Construction: 1970 to 1972

(2) Construction Conditions of the IHC 500-Bed Teaching Hospital

The study team visited the 500-bed teaching hospital within the Islamabad Hospital Complex to see the progress of the construction work. During the two months since the visit of the previous study team, almost no progress was visible with the exception of the exteriors. Tiling of the wall surrounding the corridor was in progress. It seemed almost impossible that the building would be

completed by the end of this year, even if taking account of Ramadan at that time. This shows the weaknesses in the management ability.

7-3 Questionnaire of Japanese Basc Design Team

Questionnaire of Japanese Basic Design Team

(1) Procurement of the construction material

Consideration will be given to utilize local construction material as much as possible. However, if the Japanese side believes that use of certain local materials will affect the period for completing construction adversely, or affect the quality of construction, Japanese material shall be imported instead.

(2) Please indicate what plans have been made for meeting the expenditure on maintenance and operation of the hospital and its facilities. What concrete steps have been taken for this purpose so far?

(3) What are the procedures for obtaining the staff necessary for operating the hospital facilities in each department? Procedures may please be indicated specifically.

(4) What is the completion date of the service block? And by what time will it start functioning?

(5) Please confirm that Pakistan side will be responsible for all those tasks which have been agreed upon as their responsibility in Chapter 4-1.

(6) We would like to clarify that the plans related to the project as shown in the Draft Report may be reduced in scope at the stage of Final Report depending upon the provision of funds by the Japanese Government.

No.F.6-8/81-PD(IHC)
Government of Pakistan
Ministry of Health & Social Welfare

Ref: Questionnaire Of Japanese Basic Design Team

Dated 20 July 1982

This is to confirm:-

1. Agreed.

2. It is confirmed that funds for maintenance and operation will be provided in our normal budget on completion of the Children Hospital i e in March 1985 as committed by you in the meeting. It may however, be mentioned that in our budgeting system, development and non development(maintenance) funds are provided separately.

3. The procedure is to draw the staffing pattern relevant to the facility with job description and recruitment rules. The method of recruitment is normally through the Federal Public Service Commission for the posts of Doctors including specialists. It will be ensured that essential staff is in position before start of the hospital.

4. Expected to be completed by Dec 1983.

5. Agreed.

6. Agreed.

Brig (Retd)
(TANWIR UL HAQ)
Project Director
Islamabad Hospital Complex
20 July 1982

7-4 Japan's Grant Aid Programme

No F 6-8/81-PD(IHC)
Government of Pakistan
Ministry of Health & Social Welfare

CONSTRUCTION OF 200 BED CHILDREN HOSPITAL -
JAPAN'S GRANT AID PROGRAMME

Ref: Draft Report of Basic Design Study.

1. As discussed in the meeting with the Secretary Ministry of Health and Social Welfare and his Team on 20 July 82 at 10.00 Hrs, it is strongly recommended that hospital beds (general and specialised) should also be provided like the Medical and other equipment being provided under the grant aid programme for the above hospital.

2. Above request is made to justify that the manufacturers in Pakistan have not been able to attain perfection in the quality of beds as yet and therefore we have to import general as well as specialised beds from abroad for the Islamabad Hospital Complex and Sheikh Zayed Hospital, at Lahore.

3. Since the Government of Japan is building a monumental hospital in Islamabad on the request of Government of Pakistan, it is requested that Hospital beds be also supplied under in grant aid programme.

Brig (Retd)
(Tanwir Ul Haq)
Project Director
Islamabad Hospital Complex
20 July 82

Appendix Ⅱ

Ⅱ－1 Weather Conditions

Ⅱ－2 Geological Study Materials

Ⅱ－3 Water Quality Study Materials

Appendix Ⅱ－1 Weather Conditions

(1) Temperature (Table-1)

Average annual maximum temperature: 23.0°C
Average annual minimum temperature: 14.4°C
Maximum temperature: 45.1°C (June 10, 1960)
Minimum temperature: -2.8°C (January 16, 1962)

(2) Humidity (Table-1)

(3) Rainfall (Table 1)

(4) Direction and Wind Velocity (Table 1, 2)

Table-1 Meteorological Data of Islamabad

Month	Monthly avr. of lowest temperature in daytime	Monthly avr. of highest temperature in daytime	Air temp. at 8:00 AM	Air temp. at 5:00 PM	Relative humidity at 8:00 AM	Relative humidity at 5:00 PM	Rainfall (monthly total)	Wind vel. at 8:00 AM	Wind vel. at 5:00 PM
	°C	°C	°C	°C	%	%	mm	m/s	m/s
Jan.	-0.1	22.0	4.8	14.4	78	50	42.6	0.49	0.85
Feb.	0.1	24.0	7.3	16.5	79	51	57.2	0.49	1.12
Mar.	0.6	30.0	13.1	21.1	69	46	86.6	0.76	1.39
Apr.	10.0	38.0	19.8	28.1	64	42	105.2	0.89	1.25
May	15.0	40.0	26.9	35.3	43	26	48.8	0.94	1.88
June	16.0	42.0	30.3	37.4	37	21	26.2	1.25	2.06
July	16.0	40.0	28.7	35.1	69	53	332.5	0.98	1.52
Aug.	18.0	37.0	27.0	33.7	79	62	281.7	0.54	0.85
Sept.	15.0	36.0	24.3	33.7	74	53	193.5	0.49	0.85
Oct.	0.7	33.0	17.5	29.4	55	35	12.7	0.45	0.72
Nov.	0.4	29.0	9.1	22.3	60	40	28.4	0.40	0.67
Dec.	1.5	23.0	4.7	16.1	71	49	39.4	0.49	0.58
Aver-age	7.8	32.8	17.8	26.9	65	44	Average 106.3 Total 1,275.1	0.68	1.15

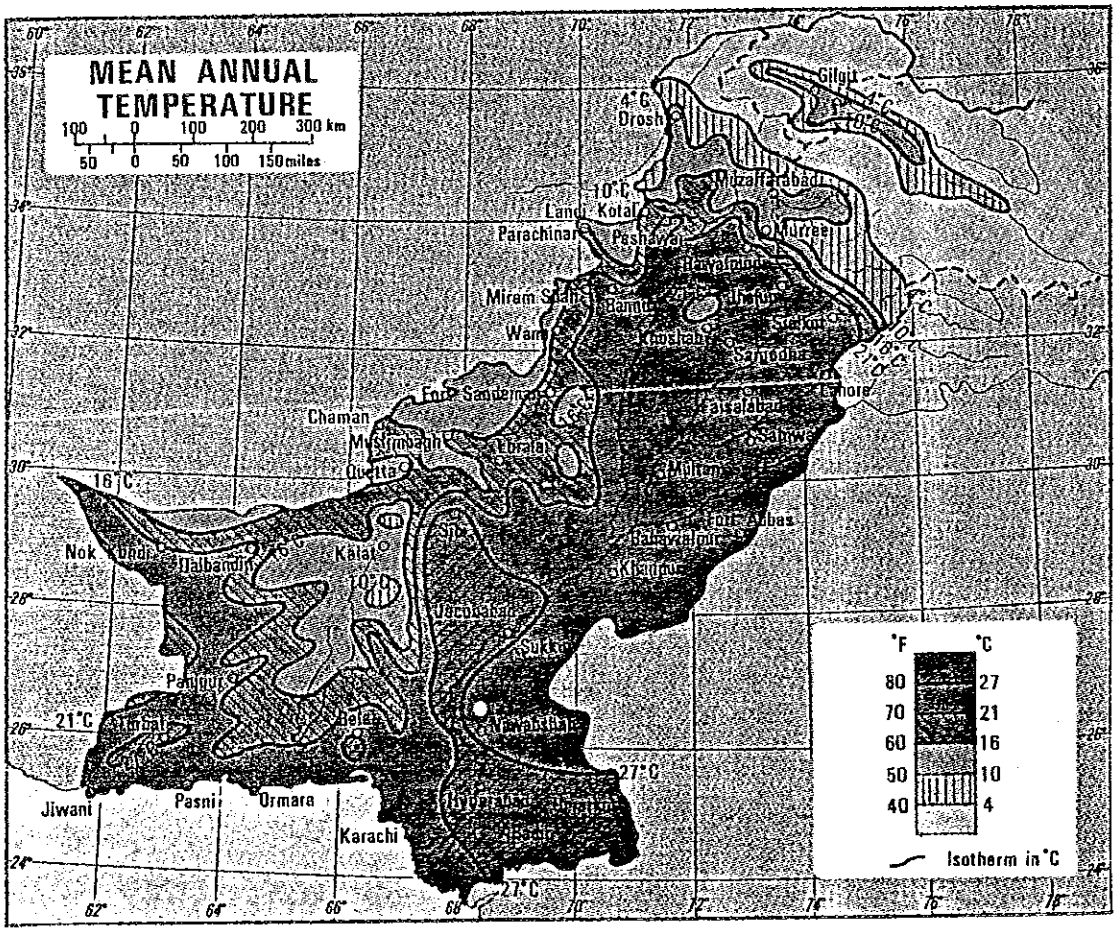
Table-2 Annual Percentage of Wind Direction (%)

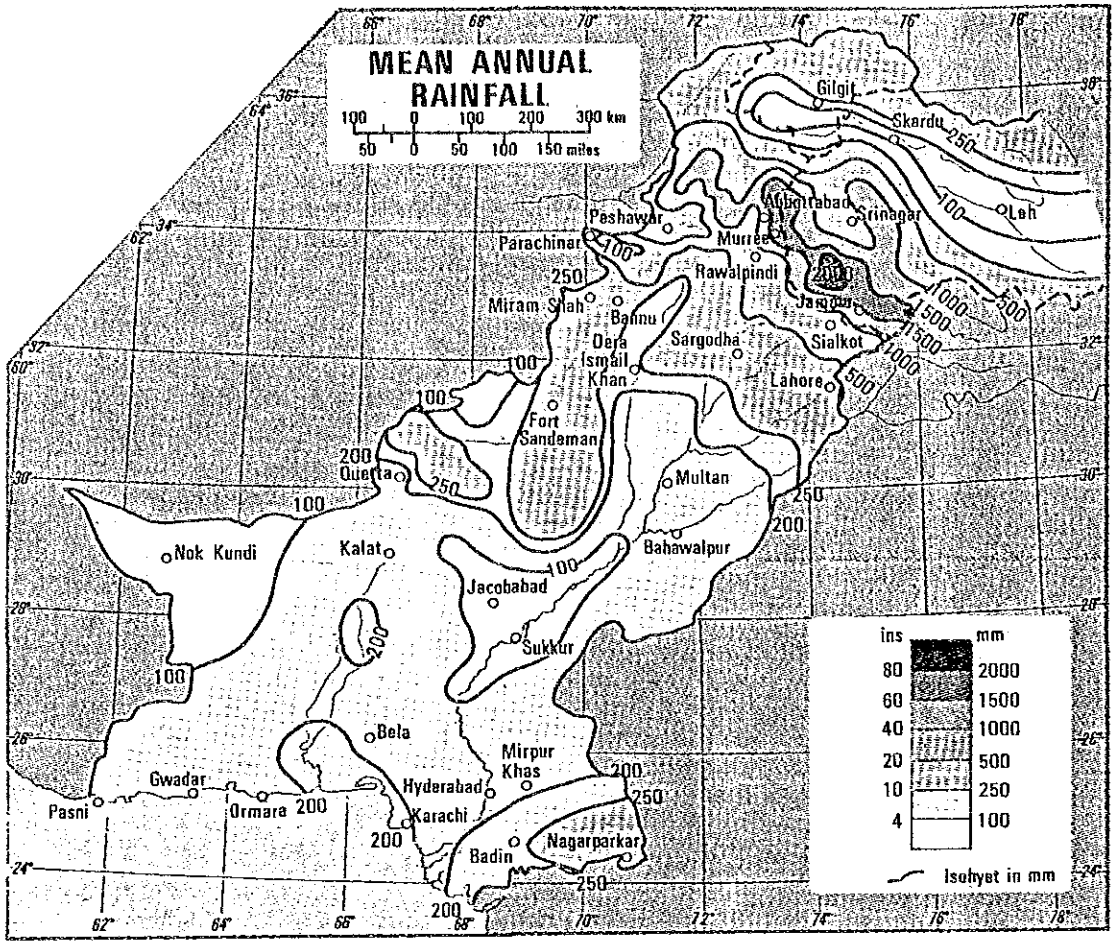
	North	North-east	East	South-east	South	South-east	West	North-west	Breeze
8:00AM	2	22	2	6	2	12	2	2	51
5:00PM	1	22	2	5	3	19	8	6	34

From Meteorological Data of Islamabad

Note: 1) Data for Islamabad in 1981 by the Pakistan Meteorological Department.

2) Data for Islamabad before 1981 based on the five-year record of the Pakistan Meteorological Department.

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Skardu
Leh
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Jammu
Miram Shah
Bannu
Dera Ismail Khan
Sargodha
Sialkot
Lahore
Fort Sandeman
Quetta
Multan
Bahawalpur
Nok Kundi
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60 1500
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20 500
10 250
4 100
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(Extracts from a Report on Sub-Soil Investigations for the Islamabad Hospital Complex)

FOUNDATION ENGINEERING LIMITED

CONTRACTORS FOR SPECIAL FOUNDATIONS & HYDRAULIC WORKS

FOUNDATION HOUSE,
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KARACHI PAKISTAN

AUGUST 6,1979.

REPORT ON
SUBSOIL INVESTIGATION FOR
ISLAMABAD HOSPITAL COMPLEX.

1. INTRODUCTION:

The Ministry of Health, Government of Pakistan, has planned construction of a teaching hospital in Islamabad, known as Islamabad Hospital Complex. M/s. Engineering Consultants are rendering consultancy services for this project.

For designing various structures of the complex, the consultants prepared a program of soil investigations at the proposed site of the Islamabad Hospital complex. The purpose of the investigations was to explore the subsoil conditions and to determine engineering properties of various subsoil materials encountered at the site, so that a proper design of foundations may be done.

It was proposed to carry out these investigations through drilling of bore holes, excavation of test pits, collection of disturbed and undisturbed soil samples and carrying out field and laboratory tests.

M/s. Foundation Engineering were entrusted the job which they got through tendering. The work was awarded to M/s. Foundation Engineering Ltd vide a letter dated March 5,1979, from the Ministry of Health, Government of Pakistan.

This report presents the results of the investigations. Various design aspects related to subsoil conditions have been discussed and an evaluation of engineering properties of various subsoil materials, encountered at the site have been made. Also recommendations for the design parameters and foundation tyons have been given in this report.

Cont'd/ P.2

2. DESCRIPTION OF WORK.

The work comprised of drilling 28 numbers exploratory bore holes, excavation of test pits, taking disturbed and undisturbed soil samples, carrying out penetration tests, testing of soil samples in the laboratory and preparation of report.

3. SUB-SOIL STRATIGRAPHY.

The subsoil stratigraphy of the site was determined through drilling of 28 nos. bore holes at locations as shown on drawing. Generally the bore holes were drilled to a depth of 25 ft. however, 5 bore holes were drilled to a depth of 50 ft. Disturbed soil samples were collected from different elevations of the bore hole for identification of the subsoil materials. Also standard penetration tests were performed at regular intervals and undisturbed samples were collected from various horizons. The record of materials description, the tests, and sampling has been presented in form of bore logs included in this report.

The study of these logs reveals that basically there exist two type of materials. One is the silty clay/clayey silt (CL-ML) with medium to coarse sand and gravels and the other is silty clay/clayey salt(CL-ML) having no coarse grined materials in its texture. It was also observed during drilling of bore holes that the grain size of coarse material as well as its percentage varied greatly.

The gravely silty clay/clayey silt was found to start almost at the existing surface level which continued to depth varying between 9 and 25 feet. Underneath this was a layer of silty clay/clayey silt extending upto 25 ft in all bore holes. However, in the bore holes drilled to 50 ft., it was found that the subsoil material again changes. It was found that at about 32 to 37 ft the silty clay/clayey silt retrieved from the bore holes contained gravels and pebbles and also boulders at places.

The analysis of stratigraphy indicates that the formation of layers at the site has been caused by mainly transported material which alternately settled and erroded at the site in different periods.

4. ENGINEERING PROPERTIES OF SUBSOIL.

The engineering properties of various subsoil materials at the site were determined through field and laboratory testings. In the field were carried out the standard penetration tests during drilling of bore holes. While various tests to evaluate physical as well strength parameters were conducted in the laboratory. The results of standard penetration tests are presented in the bore logs while the laboratory results are also appended to this report.

4.1 STANDARD PENETRATION TESTS:

The analysis of Standard Penetration Tests(SPT) record has been made in Table-1. The SPT blows provide very useful information about the bearing capacity of the subsoil. The proper interpretation of this test combined with experience in similar materials provides indicative strength parameters. The SPT is actually a test of resistance of soil to penetration of a standard spoon when driven with a standard energy.

From Table-1, it is observed that SPT blows vary from location to location as well as vary with depth. An average has been worked out for every 5 ft of elevation starting from EL 1815' to EL 1770'. While averaging, the very high blows have been excluded and it has been considered that such high values are due to presence of gravels. From this table it is observed that average 'N' value from EL 1815 to EL 1795' is 32 blows and from EL 1795' to EL 1775' it is, 24 blows. It is observed that beyond EL 1775' the 'N' blows are 35 (in bore hole No.1,only)

It is clear from above representation that the SPT blows are high in the upper strata, then these decrease in next strata and again increase in the lowest investigated strata. Such variation in SPT blows is due to different materials, although physically there appear to be in the same state of compactness/consolidation.

4.2 FIELD DENSITY TESTS.

Ten numbers field density tests were carried out at the locations shown. These tests were intended to find out insitu density as well as insitu moisture content of subsoil near the surface. Table-2 summarises these results. From this table it is observed that the insitu wet density ranges from 1.35gm/cc to 1.58 gm/cc with the average of 1.49, the insitu natural moisture content ranges from 3.7% to 8.5% with average value of 4.6%. The average of insitu dry density worked out from the values is 1.42 gm/cc.

P/4....

4.3 LABORATORY TESTS.

Several laboratory tests were carried out to evaluate the engineering properties of the subsoil materials. These tests included the tests to determine physical characterstics such as gradation, Atterberg limits etc and also to determine strength and consolidation characteristics of subsoil materials. Also tests were carried out to determine the severeness of the sulphates in the soil. The summary of laboratory test results have been presented in Table-3. The following parameters are deduced from the laboratory tests:

a) Natural moisture content, w_n =4 to 20%

b) Total Unit wt (i) near surface, γ_t = 1.5 gm/cc

(ii) 3' to 46' γ_t = 1.98 to 2.03 gm/cc.

c) Dry unit wt. (i) near surface, γ_d = 1.43 gm/cc(av)

(ii) 3' to 46' , γ_d = 1.72 gm/cc(av)

d) Unconfined Compressive strength, q_u = 1.21 to 2.45 kg/cm^2

Average q_u = 1.96 kg/cm^2

e) Compression Index C_c = 0.06 to 0.09

Average C_c = 0.08

f) Initial void ratio, e_o =0. 58 (av)

g) Sulphate contents, SO_4 = 0.01 to 0.03 %

h) p^H = 8.0 (av)

i) Compaction Test:

Maximum dry density = 1.86 gm/cc (av)

Optimum moisture content = 9.7% (av)

j) C.B.R. = 4%

k) Average SPT blows, N = 32 blows upto 6m depth

Average SPT blows, N = 24 blows from 6m and below

For Design take average SPT blows for shallow footing, N=30 blows.

5. GROUND WATER TABLE:

It was established that the ground water table at the site exists at an average level of EL.1776'(the depth varied from 28' to 37' in different bore holes).

P/S...

6. DESIGN OF FOUNDATIONS:

The selection of foundation types and design of foundations depend on the subsoil conditions and the type of structure (its loads) to be built. In the present case the loads of the building are not known at this stage, therefore, a general evaluation of bearing capacity has been made. For this purpose calculations has been made for various allowable loads on various sizes of footings. To check the safety of structure followings two requirements have been kept in view:

1. Safety against settlement failure.
2. Safety against shear failure.

In shear failure criterion the ultimate shear strength with a factor of safety of 3 has been utilized. The ultimate shear has been calculated both on the basis of unconfined compressive strength as well as on the basis of SPT. Based on unconfined compressive strength the allowable bearing capacity against shear has been computed to be 1.96 kg/cm^2, while based on SPT it has been found to be 3.5 kg/cm^2. However, keeping in view the type of subsoil material, i.e. clayesilt/silty clay with sand and gravels at places, obviously it should be expected that the settlement of foundation will govern the allowable bearing capacity of foundation.

Calculations have been done for computing allowable bearing capacity on the basis of settlement criterion. For this purpose consolidation test data has been used and computations of settlement for various sizes of footings under various pressures has been carried out. The following is the summary of these computations:

6.1 A) Individual footings placed at 1.5 m depth.

SIZE OF FOOTING m x m	SETTLEMENT IN cm FOR VARIOUS PRESSUREES 2.0 kg/cm^2	1.0 kg/cm^2	0.5 kg/cm^2
1 x 1	3.1	2.3	1.4
2 x 2	5.3	3.6	2.5
3 x 3	7.5	4.1	2.9
4 x 4	9.1	5.5	3.8

P/6...

6.2 B) Individual footings placed at 3.0 m depth.

SIZE OF FOOTING m x m	SETTLEMENT IN cm FOR VARIOUS PRESSURES 2.0 kg/cm^2	1.0 kg/cm^2	0.5 kg/cm^2
1 x 1	2.5	1.9	1.0
2 x 2	4.5	3.0	1.8
3 x 3	6.7	4.0	2.1
4 x 4	8.2	5.0	4.6

6.3 C) Raft foundations placed at 1.5 m . depth.

SIZE OF FOOTING m x m	SETTLEMENT IN cm FOR 0.5 kg/cm^2
20 x 20	6.2
30 x 30	6.7
50 x 50	6.9

6.4 D) Raft foundations placed at 3.0 m depth and providing a basement.

SIZE OF FOOTING m x m	SETTLEMENT IN cm FOR NET PRESSURE OF 0.5 kg/cm^2
20 x 20	4.9
30 x 30	5.2
50 x 50	5.5

As the ground water table is at a depth of about 35 ft. the construction of foundations at deeper depths will not pose any construction problem.

From the above summary of pressures and settlement for various sizes of footings placed at different depths a suitable size of footing may be selected for limiting the tolerable settlement.

P/7...

Normally for individual footings the criteria of one inch (2.54 cm) total settlement and for raft foundations the criterion of 2 inch (5 cm) total settlement is acceptable. One these criteria and from above summary the followings recommendations are deducted:

7. FOOTING; PLACED AT 1.5 M. DEPTH:

7.1 A 1m x 1m footing may be adopted for allowable load of 1.0 kg/cm^2.

7.2 A 2m x 2m footing may be adopted for allowable load of 0.5 kg/cm^2.

7.3 Any other size may be adjusted for other allowable pressures by interpolating the results in summary.

8. FOOTINGS PLACED AT 3.0 M DEPTH:

8.1 A 1m x 1m footing may be designed for a pressure of 2.0 kg/cm^2.

8.2 A 2m x 2m footing may be adopted for allowable load of 1.0 kg/cm^2 (Although this will result in total settlement of 3 cm which is a little higher than the limit).

8.3 A 3m x 3m footing may be designed for a pressure of 0.5 kg/cm^2.

9. RAFT FOUNDATIONS:

In case raft foundations are required to support heavier loads, the most economical way would be to place raft foundations at a depth of about 3 m and provide a basement. This basement may be used for parking or any other purpose. In this case a raft foundation of size from 20 m to 50 m width may be designed for allowable net pressure of 0.5 kg/cm^2.

10. CONCLUSIONS AND RECOMMENDATIONS:

The results of the subsoil investigations have been analysed and design parameters determined on the basis of field and laboratory tests. The Computations for evaluating bearing capacity of footings have been made. In the following is the summary of the report:

10.1 The topography of the site indicates a level difference from EL.1799.40' at Borehole No.11 to EL.1815.09' at Borehole No.22.

10.2 The Water-table at the site was found to be at a depth varying from 28' to 37' in different bore holes. However, the average elevation comes out to be EL.1776'.

10.3 The Sulphate contents in soil and also p^H

P/8...

tests indicate that the R.C.C. foundations Constructed in this soil shall not be affected by Sulphate attack.

10.4 The allowable bearing pressures may be adopted as recommended in section 6. However, this is pointed out that these recommendations have been based on assumption that the ground water will not rise in future near to the foundation level.

10.5 The Compaction tests show that maximum dry density of 1.86 gm/cc corresponding to optimum moisture content of 9.7% may be achieved in modified AASHTO density test. The CBR value of 4% is recommended for pavement design.

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ISLAMABAD HOSPITAL

SUB-SOIL INVESTIGATIONS

DESIGN OF FOUNDATIONS

The proposed type of structures and the loading conditions have not been provided. However, for analysis purpose it may be considered that most of the structures will be lightly loaded, hospital buildings of two or three storyed. Therefore, only shallow footing have been considered. For analysis purpose individual as well as raft foundations have been provided and bearing capacity for both type of foundations have been calculated.

To compute the allowable bearing capacity of these foundations, following two criteria have been kept in view:

1. Foundation failure due to shear failure of the subsoil. In this case the limiting value of undrained shear strength of insitu materials has been used with a safety factor of 3.

2. Foundation failure due to settlement of the subsoil. In this case consolidation settlement of various footings have been assessed for different loads. Normaly"one inch" (25 mm) settlement is taken to be the limit of tolerable settlement.

To arrive at the recommended value of allowable bearing capacity, the lower of the above two has been adopted.

DESIGN PARAMETERS.

1. The subsoil mainly consists of hard silty clay/ clayey silt (CL-ML)with medium to coarse sand and gravels. The sand and gravel contents, however, vary at different depths.

Contd P/2....

2. Average SPT blows N = 30. This value of SPT blows correspond to undrained shear strength of about 2.0 Kg/Cm^2.

3. However, on the basis of unconfined compression tests in the laboratory, the undrained shear strength is evaluated to be 0.98 Kg/Cm^2.

4. Based on laboratory tests the following parameters have been established :

   i) Total unit weight = 2.0 gm/cc
   ii) Compression Index C_c = 0.08
   iii) Initial void ratio e_o = 0.58

5. The ground water table at 35 ft.

6. Assume that the effective influence zone of stresses is approximately 1.5 times the footing size. At this depth the stresses transfer-ed to the subsoil are reduced considerably.

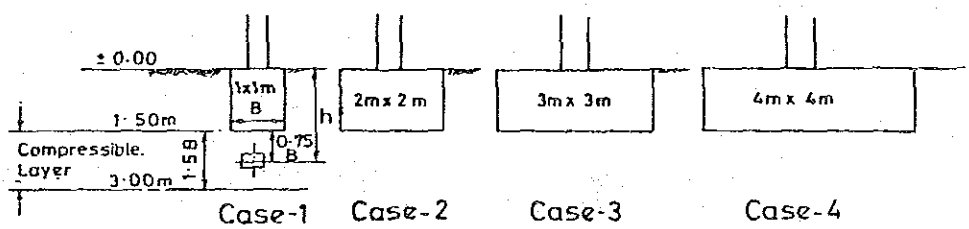
DESIGN FOR SHEAR FAILURE

a) On the basis of SPT blows (N = 30), the allowable capacity against shear failure will be about 4.0 Kg/Cm^2.

b) On the basis of Unconfined compression tests the allowable capacity against shear failure will be about 1.96 Kg/Cm^2.

DESIGN FOR SETTLEMENT FAILURE
SHALLOW FOOTINGS:

A. Consider footings of 1 m x 1m, 2m x 2m, 3m x 3m and 4m x 4m placed at a depth of 1.5 m below Ground level.



At the centre of the compressible layer:

** Insitu pressure, p_o = rh
where γ = effective unit weight (Total unit weight in this case)
h = 0.75 x width of footing.

P/3...

** Stresses due to imposed load, $\Delta p = 0.32\ p$
where p = Load per unit area at the foundation lavel.

To compute settlement use following relation :

$$S = \frac{Cc}{1+e_o} \quad H \log \frac{p1 + \Delta p}{Po}$$

Where S = Settlement of foundation under load p

Cc= Compression Index (0.08 av)

e_o =Initial void ratio (0.58 av)

H = Thickness of layer under consolidation compression(1.5 times width of footing).

po= insitu pressure at the centre of the compressible layer.

Δp= increase in stresses at the centre of the compressible layer due to load on foundation.

In Situ Pressures, po

Case 1 $po = \gamma h = 0.002 \times (2.25 \times 100) = 0.45\ Kg/Cm^2$ Where =unit weight =2.0 gm/cc =0.002 Kg/cc

Case 2 $P_o = = 0.002 \times (3 \times 100) = 0.60\ Kg/Cm^2$

Case 3 $p_o = 0.002 \times (3.75 \times 100) = 0.75\ Kg/Cm^2$

Case 4 $p_o = 0.002 \times (4.5 \times 100) = 0.9\ Kg/Cm^2$

Increase in stresses at the Centre of compressible layer, Δp.

$$\Delta p = \left(\frac{B}{B+z}\right)^2 p$$

Where

B = width of footing

Z = Depth of Centre of Compressible layer below foundation level = 0.75 B.

p = Foundation pressure.

$$\therefore \quad \Delta p = \left(\frac{1}{1.75}\right)^2 p = 0.33\ p$$

P/4...

FOUNDATION PRESSURE P, KG/CM^2	INCREASE IN PRESSURE P , KG/CM^2
2.0	0.66
1.0	0.33
0.5	0.17

SETTLEMENT.

(Footings placed at 1.5 m from Ground level)

A. Allowable pressure, p 2.0 Kg/Cm^2

$\Delta p = 0.66$ Kg/Cm^2

$e_o = 0.58$, $C_c = 0.08$

Case 1

$H = 1.5$m, $p_o = 0.45$ Kg/Cm^2

$$S = \frac{0.08}{1.58}(1.5 \times 100) \log \frac{1.11}{0.45} = 2.97 \text{ Cm.}$$

Case 2

$H = 3$ m, $p_o = 0.6$ kg /Cm

$$S = \frac{0.08}{1.58}(3 \times 100) \log \frac{1.26}{0.6} = 4.89 \text{ Cm}$$

Case 3

$H = 4.5$ m; $p_o = 0.75$ Kg/Cm^2

$$S = \frac{0.08}{1.58}(4.5 \times 100) \log \frac{1.41}{.75} = 6.24 \text{ Cm}$$

Case 4

$H = 6.0$ m, $p_o = 0.9$ Kg/Cm^2

$$S = \frac{0.08}{1.58}(6.0 \times 100) \log \frac{1.56}{0.9} = 7.25 \text{ Cm.}$$

B. Allowable pressure $p = 1.0$ Kg/Cm^2

$\Delta p = 0.33$ Kg/Cm^2

$e_o = 0.58$, $C_c = 0.08$

Case 1

$$S = \frac{0.08}{1.58}(150) \log \frac{0.78}{0.45} = 1.81 \text{ Cm.}$$

P/5....

Case 2

$$S = \frac{0.08}{1.58} (300) \log \frac{0.93}{0.6} = 2.89 \text{ Cm}$$

Case 3

$$S = \frac{0.08}{1.58} (450) \log \frac{1.08}{0.75} = 3.60 \text{ Cm}$$

Case 4

$$S = \frac{0.08}{1.58} (600) \log \frac{1.23}{0.9} = 4.12 \text{ Cm}$$

B. Allowable pressure $p = 0.5 \text{ Kg/Cm}^2$

$\Delta p = 0.17 \text{ Kg /Cm}^2$

$e_o = 0.58 \quad Cc = 0.08$

Case 1

$$S = \frac{0.08}{1.58} (150) \log \frac{0.62}{0.45} = 1.05 \text{ Cm}$$

Case 2

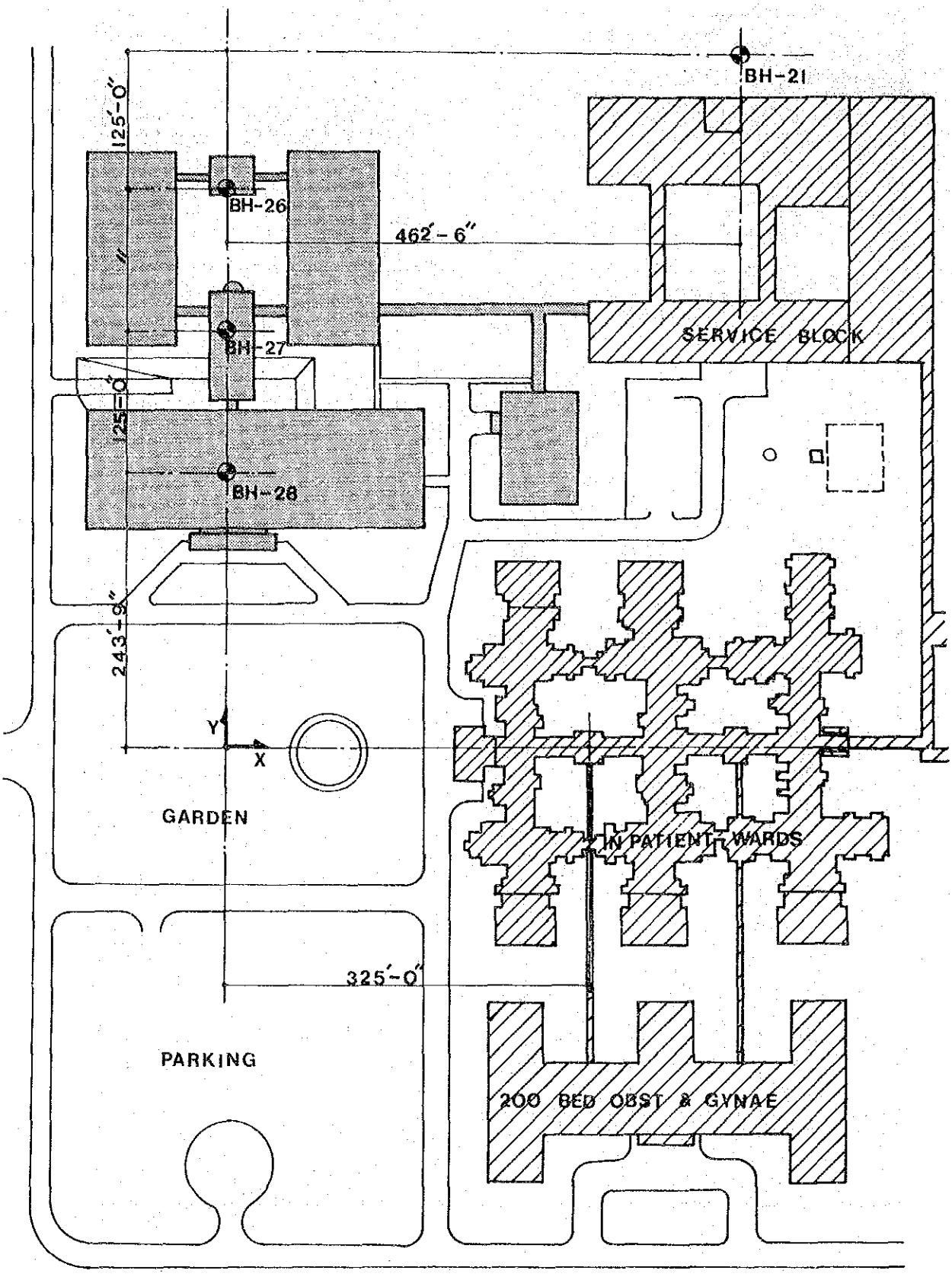
$$S = \frac{0.08}{1.58} (300) \log \frac{0.77}{0.6} = 1.64 \text{ Cm}$$

Case 3

$$S = \frac{0.08}{1.58} (450) \log \frac{0.92}{0.75} = 2.02 \text{ Cm.}$$

Case 4

$$S = \frac{0.08}{1.58} (600) \log \frac{1.07}{0.9} = 2.28 \text{ Cm.}$$


BH-21
125'-0"
BH-26
462'-6"
BH-27
SERVICE BLOCK
125'-0"
BH-28
243'-9"
Y
X
GARDEN
IN PATIENT WARDS
325'-0"
PARKING
200 BED OBST & GYNAE

Client : GOVT. OF PAKISTAN
MINISTRY OF HEALTH

Consultants ENGINEERING CONSULTANTS

Project ISLAMABAD HOSPITAL COMPLEX
SECTOR G-8/3 ISLAMABAD

BORING NO. 26
DATE OF EXECUTION 19-4-1979
PROCESS OF EXECUTION Percussion
GROUND ELEVATION 1810.58
GROUND WATER TABLE STRUCK AT Not Struck

REDUCED ELEVATION IN FEET	DEPTH IN FEET	THICKNESS IN FEET	STRATA ENCOUNTERED	LOG	DIAMETRE	SAMPLES	S.P.T. Blows/Ft.	CORE RECOVERY: Difference	Recovery in Feet	Recovery in %	PERCENT S.P.T. Blows/Ft. 10 30 50 70 90	SCALE
	1'-6"	1'-6"	A		6" Upto 8ft.							
	4'-0"	2'-6"	Yellowish-grey hard silty CLAY, gravel present.			3-0 S.P.T. U1 6-9	47					
	8'-6"	4'-6"	Greyish-yellow hard silty CLAY with fine gravel.									
	16'-0"	7'-6"	Light-greyish-brown hard silty CLAY.			12-0 U2 13-3	44					
	20'-8"	4'-8"	Light-greyish-brown hard silty CLAY with few fine gravel.				32					
	24'-10"	4'-2"	Brown stiff silty CLAY.			24-9/12	13 6				6 Blows for 9" only.	
1785.58	25'-0"	0'-2"	B									

LEGEND

A_____Light-grey silty CLAY with organic materials.

B_____Gravel & Pebbles with sandy silty clay.

KEY TO SAMPLES

DISTURBED.		UNDISTURBED.	
WATER SAMPLES.		S.P.T. BLOWS/FT.	●
CORE RECOVERY (%)		G.W.T.	

FOUNDATION ENGINEERING LTD.
CONTRACTORS FOR SPECIAL FOUNDATIONS AND HYDRAULIC WORKS.
K A R A C H I.

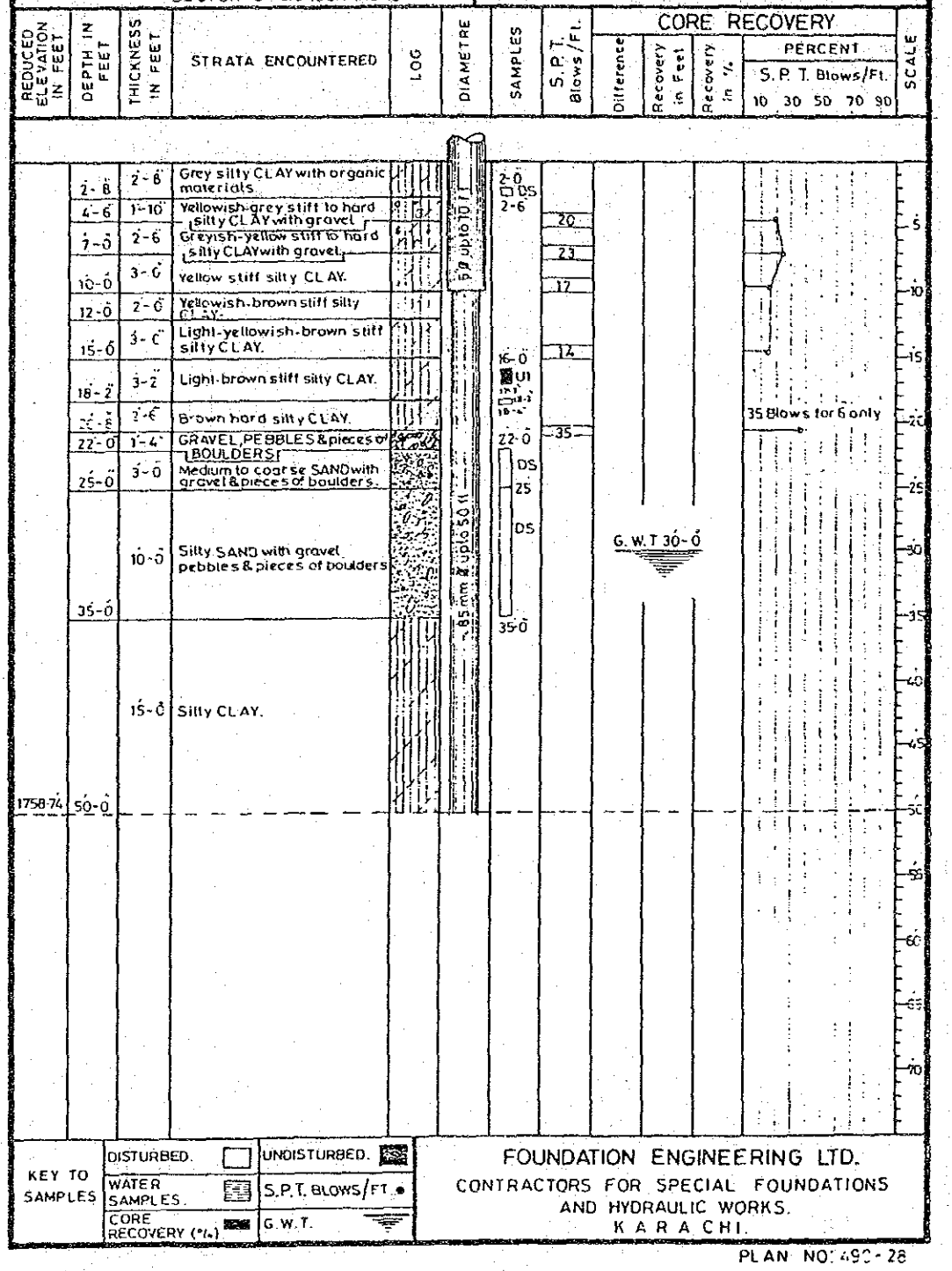
PLAN NO: 490-27

Client : GOVT OF PAKISTAN
MINISTRY OF HEALTH

Consultants ENGINEERING CONSULTANTS

Project ISLAMABAD HOSPITAL COMPLEX
SECTOR G- 8/3 ISLAMABAD

BORING NO. 27
DATE OF EXECUTION 22-4-1978/10-5-1978
PROCESS OF EXECUTION Percussion/Rotary
GROUND ELEVATION 1808.74
GROUND WATER TABLE STRUCK AT 30-0



KEY TO SAMPLES
DISTURBED.
UNDISTURBED.
WATER SAMPLES.
S.P.T. BLOWS/FT.
CORE RECOVERY (%)
G.W.T.

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CONTRACTORS FOR SPECIAL FOUNDATIONS AND HYDRAULIC WORKS.
KARACHI.

PLAN NO: 490-28

Client : GOVT. OF PAKISTAN
MINISTRY OF HEALTH

Consultants ENGINEERING CONSULTANTS

Project ISLAMABAD HOSPITAL COMPLEX
SECTOR G-8/3 ISLAMABAD

BORING NO. (28)
DATE OF EXECUTION 23-4-1979/2-5-1979
PROCESS OF EXECUTION Percussion/Rotary
GROUND ELEVATION 1806.52
GROUND WATER TABLE STRUCK AT Not Struck

REDUCED ELEVATION IN FEET	DEPTH IN FEET	THICKNESS IN FEET	STRATA ENCOUNTERED	LOG	DIAMETRE	SAMPLES	S.P.T. Blows/Ft.	CORE RECOVERY: Difference	Recovery in Feet	Recovery in %	PERCENT S.P.T. Blows/Ft. 10 30 50 70 90	SCALE
	4-0	4-0	Grey silty CLAY with organic materials.		6" upto 10 ft. 85mm upto 25 ft.							
	6-2	2-2	Light-greyish-yellow stiff to hard silty CLAY with gravel.									
	9-6	3-4	Yellow stiff silty CLAY with gravel.									
	13-0	3-6	Brownish-yellow stiff silty CLAY with gravel.									
	16-0	3-0	Greyish-brown stiff silty CLAY with gravel.									
	18-6	2-6	Light-brown stiff silty CLAY with gravel.									
1793.52	25-0	6-6	GRAVEL PEBBLES and BOULDERS.									

KEY TO SAMPLES
DISTURBED. UNDISTURBED.
WATER SAMPLES. S.P.T. BLOWS/FT.
CORE RECOVERY (%) G.W.T.

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CONTRACTORS FOR SPECIAL FOUNDATIONS AND HYDRAULIC WORKS
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PLAN NO: 490-29

GOVERNMENT OF PAKISTAN
MINISTRY OF HEALTH
M/S ENGINEERING CONSULTANTS
SUB-SOIL INVESTIGATIONS FOR
ISLAMABAD HOSPITAL COMPLEX
SECTOR G-8/3 ISLAMABAD

ABSTRACT OF DATA ON LABORATORY SOIL TESTS

BORE HOLE No.		24		25		26		27	28		PIT-1	PIT-2	PIT-3	—	—	—
SAMPLE No		U-1	U-2	U-1	U-2	U-1	U-2	U-1	U-1	U-2	—	—	—	—	—	—
DEPTH IN FEET		6'-0" 7'-5"	16'-0" 17'-5"	12'-0" 13'-5"	21'-0" 22'-3"	5'-6" 6'-9"	12'-0" 13'-3"	16'-0" 17'-5"	5'-0" 7'-5"	12'-0" 13'-5"	—	—	—	—	—	—
TOTAL UNIT WEIGHT Gm/cc.		—	—	2·03	—	—	—	—	—	—	—	—	—	—	—	—
MOISTURE CONTENT NATURAL (%)		—	20·2	17·1	—	—	—	—	—	—	—	—	—	—	—	—
SPECIFIC GRAVITY		—	—	2·69	—	—	—	—	—	—	—	—	—	—	—	—
PROCTOR COMPACTION TEST	MAXIMUM DRY DENSITY Gm/cc.	—	—	—	—	—	—	—	—	—	1·86	1·87	1·86	—	—	—
	OPTIMUM MOISTURE CONTENT (%)	—	—	—	—	—	—	—	—	—	9·2	10·8	9·2	—	—	—
ATTERBERG LIMIT	LIQUID LIMIT	27·5	30·1	27·7	36·5	32·3	29·9	34·5	31·5	32·6	—	—	—	—	—	—
	PLASTIC LIMIT	20·3	20·7	20·9	24·2	21·9	22·0	20·9	19·6	19·4	—	—	—	—	—	—
	PLASTIC INDEX	7·2	9·4	6·8	12·3	10·4	7·9	13·6	11·9	13·2	—	—	—	—	—	—
GRAIN SIZE ANALYSIS	CLAY %	—	—	17·00	—	—	—	—	—	—	—	—	—	—	—	—
	SILT %	—	—	79·90	—	—	—	—	—	—	—	—	—	—	—	—
	SAND %	—	—	2·70	—	—	—	—	—	—	—	—	—	—	—	—
	GRAVEL %	—	—	0·40	—	—	—	—	—	—	—	—	—	—	—	—
CONSOLIDATION TEST	INITIAL VOID RATIO e_o	—	—	0·555	—	—	—	—	—	—	—	—	—	—	—	—
	COMPRESSION INDEX C_c	—	—	0·06	—	—	—	—	—	—	—	—	—	—	—	—
	COEFFICENT OF CONSOLIDATION (%) cm^2/sec C_v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	COEFFICENT COMPRESSION cm^2/kg a_v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UNCONFINED COMPRESSION TEST	(%) STRAIN AT FAILURE	7·3	4·5	4·0	5·6	3·0	3·6	4·8	3·6	4·4	—	—	—	—	—	—
	UNCONFINED STRENGTH Tons/sq.ft.	1·11	2·15	2·36	2·73	1·21	2·45	2·32	2·16	2·77	—	—	—	—	—	—
	STRESS REMOLDED	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SENCITIVITY	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TRIAXIAL COMPRESSION TEST	KIND OF DRAINAGE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	ANGLE OF INTERNAL FRICTION ϕ EFFECTIVE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	APPARENT COHESION "C" kg/cm^2 EFFECTIVE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PH VALUE		—	—	—	—		—	—	—	—	—	—	—	—	—	—
SULPHATE AS SO_4 (%)		—	—	—	—	0·03	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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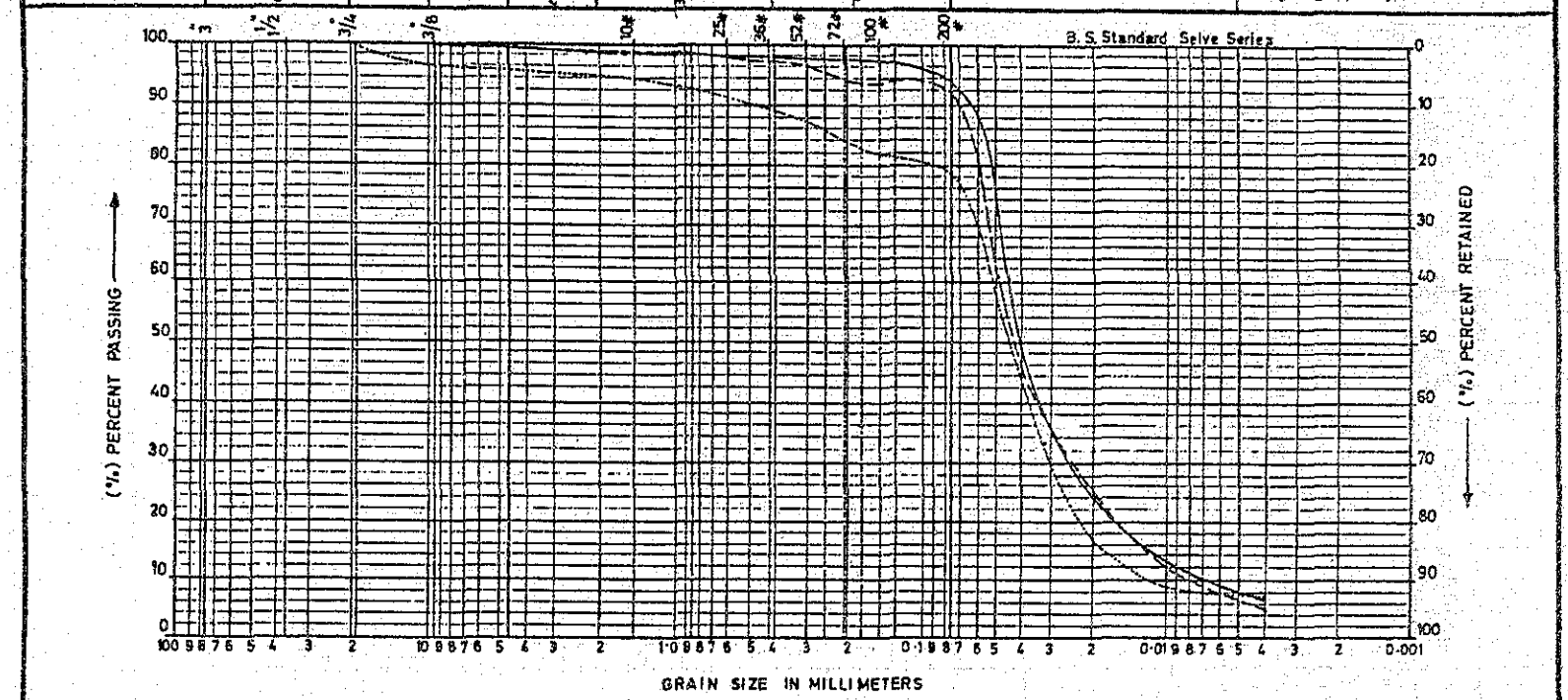
PLAN NO 450-30(A)

FOUNDATION ENGINEERING LTD.
SOIL MECHANICS & MATERIAL TESTING LABORATORY
KARACHI.

GRAIN SIZE DISTRIBUTION

Client :- GOVT. OF PAKISTAN MINISTRY OF HEALTH
Site :- ISLAMABAD HOSPITAL COMPLEX



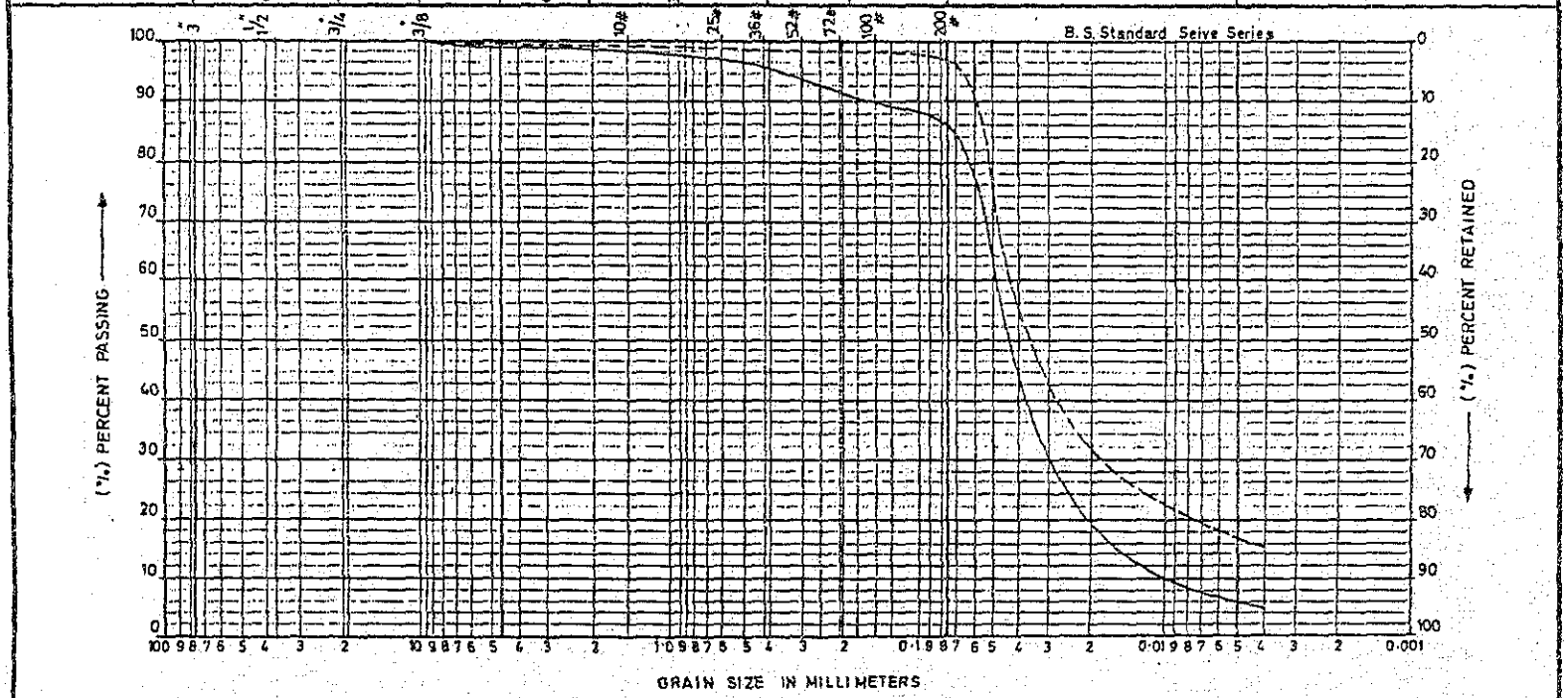
Lab. No	Symbol	Bore No	Sample No	Depth	Classification	Bould %	Gravel %	Sand %	Silt %	Clay %	Atterberg Limits	Ø 60 %	Ø 10 %	U	Remarks
	———	1	U-1	3'-0" to 4'-3"	Clayey SILT / Silty CLAY with little sand and gravel.	—	0·80	6·00	85·20	8·00		0·045	0·007	6·43	
	- - - - -	4	D-3	11'-0" to 12'-0"		—	0·80	7·40	85·30	6·50		0·049	0·008	6·13	
	.....	8	U-1	6'-0" to 7'-3"		—	4·80	16·50	71·20	7·50		0·052	0·0125	4·16	

PLAN No 490-32

FOUNDATION ENGINEERING LTD.
SOIL MECHANICS & MATERIAL TESTING LABORATORY
KARACHI.

GRAIN SIZE DISTRIBUTION

Client :- GOVT. OF PAKISTAN MINISTRY OF HEALTH
Site :- ISLAMABAD HOSPITAL COMPLEX



Lab. No	Symbol	Bore No	Sample No	Depth	Classification	Bould %	Gravel %	Sand %	Silt %	Clay %	Atterberg Limits	Ø 60 %	Ø 10 %	U	Remarks
	———	13	U-1	11'-0" to 12'-3"	Clayey SILT / Silty CLAY with little sand and gravel.	—	1·20	12·70	80·10	6·0		0·049	0·01	4·90	
	– – – –	25	U-1	12'-2" to 13'-5"		—	0·40	2·70	79·90	17·0		0·043	–	–	

PLAN No 490-31

SOILS AND MATERIALS TESTING LABORATORIES LTD.

CALIFORNIA BEARING RATIO TEST

Clinet:- M/S. FOUNDATION ENGINEERING LTD.
Project:- ISLAMABAD TEACHING HOSPITAL. Job No. FEL/ITH/2

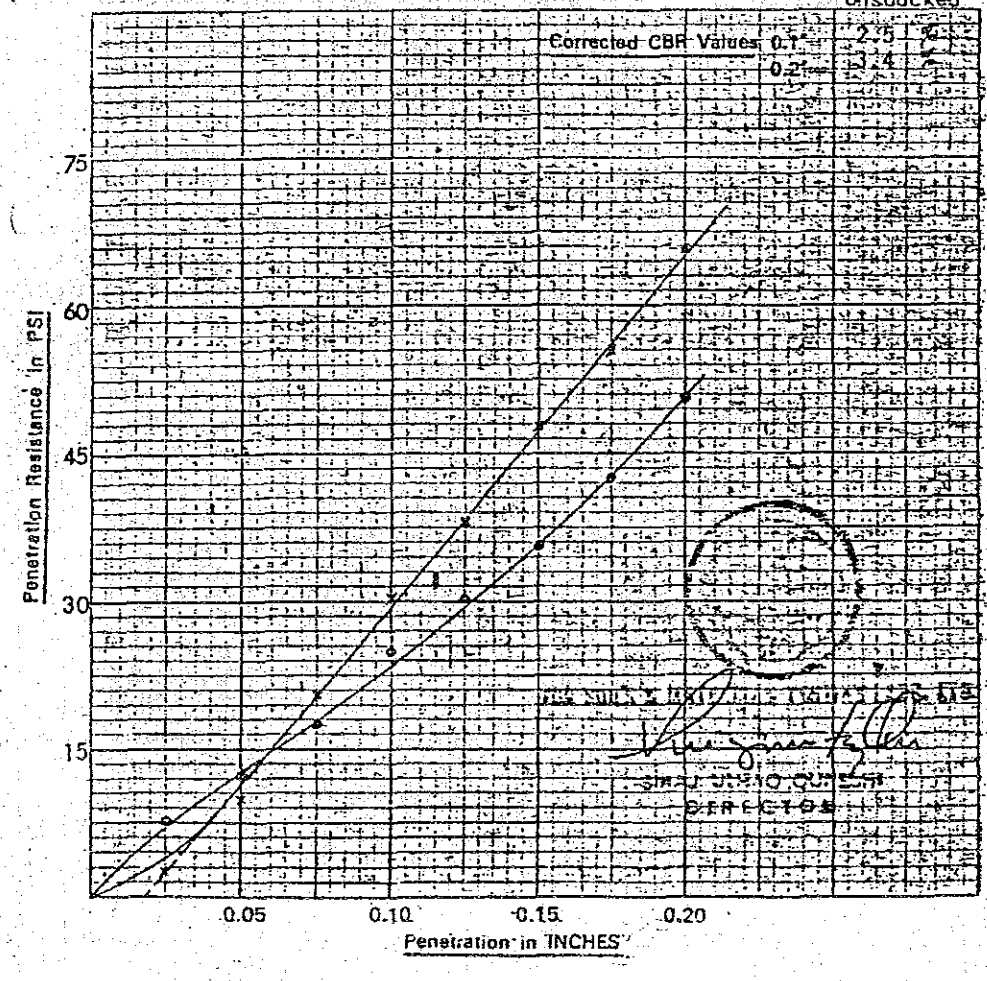
Location of Project _____ Boring No. - Sample No. -

Description of Soil Test Specimen Compacted at opt.M.C.& at Max.Density.

Tested by S. M. T. L. Date of Testing 18 JULY '79

Penetration in INCHES	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200
Load dial Reading	3	5	7	10	12	14	17	20
	1	4	8	12	15	19	22	26
Penetration Resistance PSI	7.6	12.6	17.6	25.2	30.2	35.2	42.8	50.3
	2.5	10.1	20.1	30.2	37.8	47.8	55.4	65.4
% C.B.R. Value				2.5%				3.4%
				3.0%				4.4%

~~% Swelling~~/subsidence (-) 0.52 %



SOILS AND MATERIALS TESTING LABORATORIES LTD.

CALIFORNIA BEARING RATIO TEST

CLIENT:- M/S. FOUNDATION ENG-INEERING LTD.

Project :- ISLAMABAD TEACHING HOSPITAL Job No. FEL/ITH/2

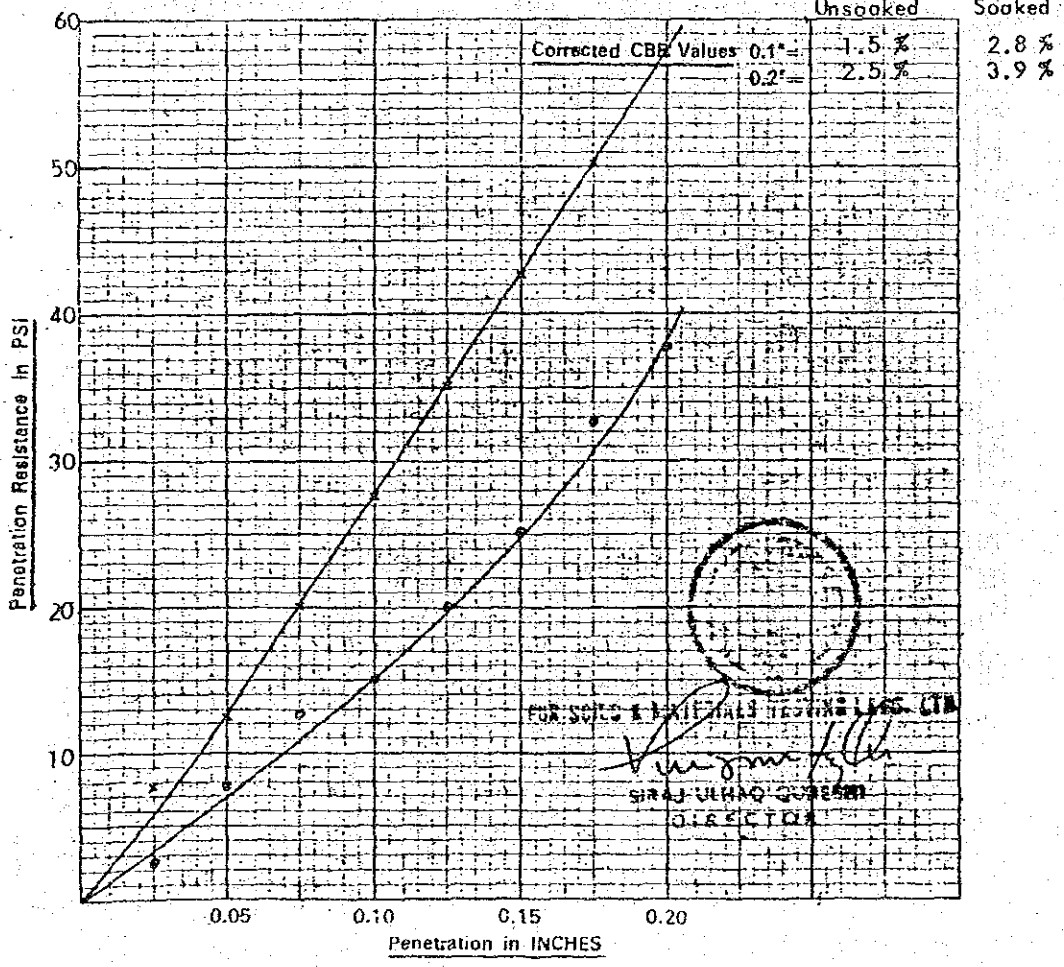
Location of Project _____ Boring No. _____ Sample No. _____

Description of Soil Test Specimen Compacted at opt.M.C.& at Max.Density.

Tested by : S. M. T. L. Date of Testing 18 JULY '79

Penetration in INCHES	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200
Load dial Reading	1	3	5	6	8	10	13	15
	3	5	8	11	14	17	20	23
Penetration Resistance PSI	2.5	7.6	12.6	15.1	20.1	25.2	32.7	37.8
	7.6	12.6	20.1	27.7	35.2	42.8	50.3	57.9
% C.B.R. Value				1.5%				2.5%
				2.8%				3.9%

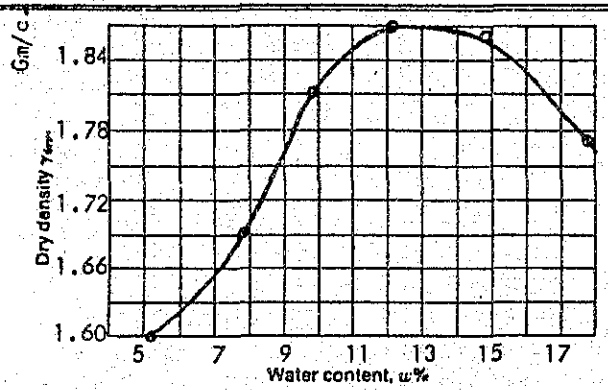
% ~~Swelling~~/subsidence (-) 0.50 %



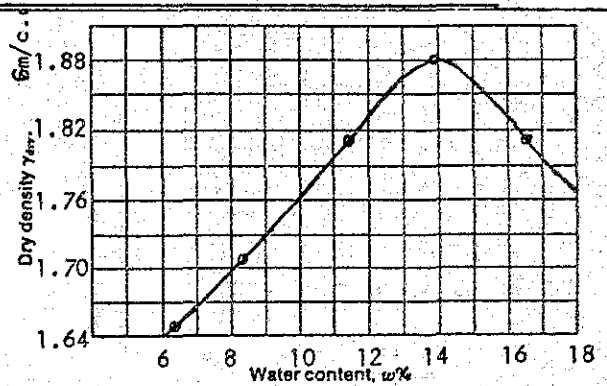
SOILS AND MATERIALS TESTING LABORATORIES LTD.

MOISTURE DENSITY RELATION SHIP CURVE OF SAMPLE RECEIVED FROM ISLAMABAD TEACHING HOSPITAL SITE

CLIENT:- M/S. FOUNDATION ENGINEERING LTD. REPORT NO: FEL/ITH/2 REPORTING DATE: 18 JULY '79



Optimum moisture = 12.6 % Maximum dry density = 1.87 Gm/c.c



Optimum moisture = 13.9 % Maximum dry density = 1.88 Gm/c

FOR SOILS & MATERIALS TESTING LABS. LTD.

SIRAJ ULHAQ QURESHI
DIRECTOR

Appendix Ⅱ —3 Water Quality Study Materials

CAPITAL DEVELOPMENT AUTHORITY
(SCIENSIFIC OFFICER)

NO.CDA/SC-W/An/82/8129 Islamabad,April,1982

SOURCE OF SAMPLE : MARKAZ F/7,ISLAMABAD

COLLECTION:PERIOD : *18.4.82(Farvaz Khan)

EXAMINATION:PERIOD : 18.4.82

1.	Temperature	24.0 ℃
2.	Appearance	Clear
3.	Odour	Unobjectionable
4.	Taste	"
5.	pH Value	7.0
6.	Free Residual Chlorine	0.25 PPM
7.	Free Carbon Dioxide	5.0 PPM
8.	Free Ammonis	Nil
9.	Chlorides	28 PPM
10.	Alkalinity(M)	113 PPM
11.	Total Hardness	210 PPM
12.	Calcium Hardness	122 PPM
13.	Magnesium Hardness	88 PPM
14.	Oxygen Consumed (½hrs. at 100-0)	0.6 PPM
15.	Total Solids	280 PPM
16.	Nitrites-N	Nil
17.	Nitrates-N	0.2 PPM

Remarks:- Satisfactory

Distribution.

1. Project Director (Simly Dam),CDA.
2. Director (W&S),CDA.
3. Dy. Director (W&S-VI),CDA.
4. Office copy

Appendix Ⅲ

Ⅲ－1. Current Medical Conditions

Ⅲ－2. Medical Programs in the Fifth Five-Year Plan 1978-83

Ⅲ－3. Materials Concerning the Causes of Death

Ⅲ－4. Materials Concerning Outpatients

Appendix Ⅲ－1 Current Medical Conditions

1. Medical Institutions

The data from the 1981 study showed that from 1970 to 1980, the number of hospitals increased from 495 to 602, the number of beds from 34,001 to 49,384, the number of health centers from 86 to 281 and the number of medical colleges from 6 to 16. But the 1980 data showed these figures per population unit of 10,000: 0.07 for the number of hospitals (0.8 in Japan); 5.7 for beds (112.9 in Japan) - evidence that Pakistan is still short of medical facilities.

(1) Trends, of Medical Facilities

Years	Hospitals	Dispensaries	M.C.H. Centres	Beds in Hospitals/ Dispensaries	Registered Doctors	Nurses Registered	*Registered Lady Health Visitor
1	2	3	4	5	6	7	8
1947	292	722	91	13,769	—	—	—
1948	300	741	96	14,117	1,360	88	4
1949	301	769	102	14,180	1,912	214	7
1950	304	807	107	14,524	2,298	418	76
1951	306	823	110	14,741	2,621	574	100
1952	311	860	153	15,324	2,860	674	123
1953	320	889	177	15,872	3,227	786	129
1954	329	928	183	17,092	3,598	862	138
1955	333	964	198	19,197	3,923	963	142
1956	335	980	224	19,398	4,270	1,054	159
1957	336	1,053	257	19,640	4,770	1,190	169
1958	338	1,112	284	21,169	5,387	1,269	181
1959	338	1,155	349	21,658	5,968	1,725	195
1960	343	1,195	358	22,100	6,485	1,929	230
1961	345	1,251	422	22,394	7,255	2,067	276
1962	365	1,374	449	22,775	7,894	2,238	314
1963	369	1,514	488	23,429	8,619	2,472	377
1964	371	1,626	524	23,664	9,418	2,641	501
1965	383	1,695	554	25,603	10,082	2,945	627
1966	393	1,754	585	26,200	10,845	3,183	712
1967	395	1,834	650	27,076	11,732	3,527	848
1968	402	1,951	650	27,112	12,369	3,813	970
1969	411	2,046	668	28,686	13,011	4,123	1,085
1970	495	2,136	668	34,001	14,109	4,543	1,169
1971	496	2,137	675	34,077	14,862	5,075	1,322
1972	521	2,566	677	35,337	15,789	5,504	1,458
1973	517	2,836	690	35,655	16,485	5,751	1,618
1974	518	2,908	696	35,866	17,194	6,010	1,627
1975	525	3,061	715	37,776	17,887	6,144	1,636
1976	525	3,063	715	39,129	18,757	6,685	1,688
1977	528	3,220	726	40,518	19,863	7,186	1,738
1978	536	3,306	748	42,469	20,931	7,768	1,823
1979	550	3,367(a)	772	44,367	21,938(b)	8,382	1,921
1980	602	3,466	812	47,412	23,594	9,098	2,009

Source : Health Division.

*Figures for registered L.H.V's while the figures for qualified L.H.V's is 4,355 (1980).

(a) Does not include rural health centres, sub-health centres and basic health units.

(b) Does not include 829 Dentists.

Note.—Figures in Col. 2—5 are as on 1st January and Col. 6—8 as on 31st December.

(2) Number of Beds in Some of the Main Hospitals

1)	Poly Clinic	250 Beds
2)	Central Government Hospital	430 "
3)	Combined Military Hospital	700 "
4)	Holy Family Hospital	250 "
5)	Fauji Center*	350 "
6)	Capital Hospital*	80 "
7)	District Head Quarters Hospital	120 "

*: Hospitals exclusive for the employees of some organizations concerned.

(3) Current Situation among Medical Personnel

The number of doctors with the exception of dentists registered as of 1980 reached 23,594, increasing 7.5 percent from the previous year. The number of nurses is 9,098, an 8.5 percent increase.

The figures per the population unit of 100,000 are 28.6 for doctors (140 in Japan) and 11.0 for nurses (423 in Japan), which shows a yearly gain. But there is a remarkable shortage of medical facilities and medical workers, particularly nurses. (Refer to Table (1) for the trend of medical personnel)

The table below shows the number of medical personnel in 1979.

	OUT PUT		REGISTERED	
	During 1979	Progressive total at the end of 1979	During 1979	Progressive total at the end of 1979
Doctors	1,164	18,666@	1,007	21,938
Dentists	68	942	62	829
Nurses	659	9,014	614	8,382
LHVs	312	4,013	98	1,921
Midwives	313	4,705	442	2,985
Nurse-Midwives	359	4,338		
Sister Tutors	34	266		
Ward Administrators ..	39	487		
Medical Technologists ..	27	459		
Physiotherapists	22	191	Registration is not done.	
Dispensers	729	16,161		
Sanitary Inspectors	43	1,902		
Malaria Inspectors	38	736		
Pharmacy Graduates ..	104	1,498		

@Includes 1,018 Licentiates qualified upto 1966.

2. Medical Education Institutions

(1) Medical Colleges and the Fixed Number of Staff

The total seats available in Medical Colleges during academic session 1979-80 were as under :—

(1) K. E. Medical College, Lahore..	277
(2) F. J. Medical College, Lahore	184
(3) Allama Iqbal Medical College, Lahore	322
(4) Punjab Medical College, Faisalabad	240
(5) Rawalpindi Medical College	240
(6) Nishtar Medical College, Multan	269
(7) Quaid-e-Azam Medical College, Bahawalpur	250
(8) Dow Medical College, Karachi	441
(9) Sind Medical College, Karachi	355
(10) Chandka Medical College, Larkana	313
(11) Liaquat Medical College, Hyderabad	430
(12) Nawabshah Medical College	200
(13) Khyber Medical College, Peshawar	304
(14) Ayub Medical College, Abbottabad	106
(15) Bolan Medical College, Quetta	134
Total ..	4,065

(2) Number of Graduates from Medical Colleges (1979)

Institution	Year of Establishment	Output during 1979	Progressive total at the end of 1979
1	2	3	4
Medical Colleges			
KEMC Lahore	1860	77	4,166+
DMC Karachi	1945	367	4,182
FJMC Lahore	1948	32	1,953
LMC Jamshoro	1951	219	2,653
NMC Multan	1951	65	2,508
KMC Peshawar	1955	179	1,727
QAMC Bahawalpur	1971	39	222
BMC Quetta	1972	42	72
CMC Larkana	1973	—	—
SMC Karachi	1973	155	155
RMC Rawalpindi	1974	—	—
PMC Faisalabad	1974	—	—
NMC Nawabshah	1974	—	—
AIMC Lahore	1975	—	—
AMC Abbottabad	1979	—	—
Total ..		1,164	17,648 plus 1,018 (Licentiates)

Appendix Ⅲ－2 Medical Programs in the Fifth Five-Year Plan 1978-83

1. Objective of the Plan

The final objectives of the medical programs are defined in the 5th 5-year plan as follows:

(1) To provide modern medical services within the two to four miles distance to 50 percent of the population.

(2) To decrease the mortality rate to 10.2 per 1,000 from the current 14 per 1,000.

(3) To reduce the infant mortaling rate to 79 per 1,000 from 105 per 1,000.

(4) To raise the average life span to 60 from 54 for men and to 59 from 53 for women.

2. Target for Medical Facilities

The following are the targets for medical facilities defined in the 5th 5-year plan.

Agency	BHUs/ Disps./ MCH Centres	RHCs	Hospital beds	Doctors/ Dental Surgeons	Nurses/ Auxi./ Para-Medicals	Community Health Workers
1. Federal :						
(a) Health Division	—	—	1,194*	—	580	—
(b) Federal Administered Tribal Areas	250	50	1,420	417	1,212	1,613
(c) Azad Kashmir ..	215	50	1,400	300	890	1,052
(d) Northern Areas	60	9	256	96	276	330
2. Baluchistan ..	300	40	1,400	430	1,262	1,360
3. North-West Frontier Province ..	539	129	4,000	1,100	2,966	10,506
4. Sind	1,232	147	6,150	4,988	5,190	19,680
5. Punjab	2,000	200	10,000	6,181	17,290	15,830
Total ..	4,596	625	25,820	13,512	29,666	50,371

*The province-wise distribution of the beds is :—

Islamabad	296
Clinical Wing, N.I.H., Islamabad	50
JPMC, Karachi..	200
Bolan]Medical College, Quetta ..	648

3. Current Situation

The Pakistan Government is paying special attention to the health issue and has allocated about 960 million rupees to the health sector in the 1980 ∿ 81 annual development budget to attain the policy target of the 5th 5-year plan. The sum has increased 32.6 percent over 1979 ∿ 80, proving the strong interest of the government.

The table below shows the relationship between the budget and GDP.

TOTAL EXPENDITURE ON HEALTH AND G.D.P. AT CURRENT FACTOR COST

(Million Rs.)

Years	Expenditure on health		Total	GDP	Total Expenditure as % of G.D.P.
	Development	Non-Development			
1960-61	8.70	57.00	65.70	18,349	0.36
1961-62	21.13	69.00	90.13	19,139	0.47
1962-63	34.10	78.00	112.10	20,489	0.55
1963-64	34.55	80.00	114.55	22,945	0.50
1964-65	75.22	78.00	153.22	26,202	0.58
1965-66	46.47	84.00	130.47	28,969	0.45
1966-67	35.31	86.00	121.31	32,622	0.37
1967-68	70.80	92.00	162.80	35,542	0.46
1968-69	59.79	99.00	159.79	37,985	0.42
1969-70	67.99	128.00	195.99	43,345	0.45
1970-71	61.70	151.70	213.40	45,702	0.47
1971-72	57.62	141.10	198.72	49,169	0.40
1972-73	95.55	171.90	267.45	60,795	0.44
1973-74	157.67	210.10	367.77	80,441	0.46
1974-75	309.00	278.00	587.00	104,640	0.56
1975-76	629.099	360.640	989.739	121,423	0.65
1976-77	590.809	439.200	979.009	135,686	0.72
1977-78	684.340	558.600	1242.940	157.171	0.79
1978-79 (R.E.) ..	647.500	641.599	1289.099	178,801	0.72
1979-80 (R.E.) ..	683.452	661.892	1345.344	212,471	0.63
1980-81 (R.E.) ..	906.026	794.820	1700.847	249,038	0.68

Source : Planning Division.

Appendix Ⅲ－3 Materials Concerning the Causes of Death

1. Causes of Death

Sl. No.	Name of Disease	Pakistan	Urban areas	Rural areas
	All causes	100·00	100·00	100·00
1.	Infective and parasitic diseases	63·84	67·64	63·07
2.	Malaria	10·44	7·86	10·96
3.	Congenital anomalies, birth-injury and causes of pre-natal mortality.	7·36	5·64	7·71
4.	Tuberculosis of all forms	5·55	2·86	6·09
5.	Bacillary dysentery and amoebiasis	2·51	2·88	2·44
6.	Accidents, poisoning and violence	1·88	1·05	2·03
7.	Diseases of heart and circulatory system	1·79	3·92	1·35
8.	Peptic ulcer, appendicitis, intestinal obstruction and hernia.	1·20	1·09	1·22
9.	Diabetes mellitus	1·14	0·75	1·22
10.	Complications of pregnancy and childbirth ..	1·13	1·39	1·08
11.	Tumours	0·34	0·00	0·41
12.	Unknown causes	2·85	4·91	2·44

Source : Statistical Division, Population Growth Survey, 1971, Karachi, 1974.

2. Causes of Death among Infants

Sl. No.	Name of Disease	Pakistan	Urban areas	Rural areas
	All causes	100·00	100·00	100·00
1.	Infective and parasitic diseases	59·68	67·09	58·05
2.	Congenital anomalies, birth-injury, difficult labour and causes of pre-natal mortality.	20·13	15·53	21·35
3.	Malaria	8·69	7·41	8·99
4.	Tuberculosis of all forms	3·08	0·00	3·75
5.	Bacillary dysentery and amoebiasis	2·06	2·55	1·50
6.	Accidents, poisoning and violence	0·47	0·88	0·37
7.	Diseases of heart and circulatory system	0·31	0·00	0·37
8.	Peptic ulcer, appendicitis, intestinal obstruction and hernia.	0·31	0·00	0·37
9.	Unknown causes	5·30	6·53	5·24

Source : Statistical Division, Population Growth Survey, 1971, Karachi 1974.

Appendix Ⅲ—4 Materials Concerning Outpatients

1. Number of Outpatients by Area (Punjab District)

Number of out-door patients treated in Hospitals, Dispensaries etc. by Districts.—The number of new and old out-door patients treated in hospitals and dispensaries and their daily average for each district for the year 1979 (other than Sind Province) is given below :—

District	Sex	New patients	Old patients	Total	Daily Average
1	2	3	4	5	6
Attock	M	147,325	173,869	321,194	
	F	139,733	173,018	312,751	
	T	287,058	346,887	633,945	2,113
Rawalpindi	M	323,649	187,949	511,598	
	F	311,300	224,309	535,609	
	T	634,949	412,258	1,047,207	3,491
Jhelum ..	M	159,836	163,586	323,422	
	F	149,288	161,946	311,234	
	T	309,124	325,532	634,656	2,115
Gujrat	M	216,618	235,929	452,547	
	F	215,528	271,149	486,677	
	T	432,146	507,078	939,224	3,131
Sargodha	M	298,349	391,116	689,465	
	F	326,743	486,589	813,332	
	T	625,092	877,705	1,502,797	5,009
Faisalabad	M	511,590	627,904	1,139,494	
	F	557,347	729,518	1,286,865	
	T	1,068,937	1,357,422	2,426,359	8,088
Jhang	M	295,378	360,996	656,374	
	F	302,894	378,146	681,040	
	T	598,272	739,142	1,337,414	4,458
Mianwali	M	184,733	316,801	501,534	
	F	161,420	314,352	475,772	
	T	346,153	631,153	977,306	3,258
Sialkot	M	206,037	392,459	598,496	
	F	228,080	406,021	634,101	
	T	434,117	798,480	1,232,597	4,109
Gujranwala . ..	M	227,630	245,243	472,873	
	F	275,938	298,576	574,514	
	T	503,568	543,819	1,047,387	3,491
Sheikhupura	M	131,205	185,410	316,615	
	F	152,163	209,409	361,572	
	T	283,368	394,819	678,187	2,261

1	2	3	4	5	6
Lahore	M	907,075	993,816	1,900,891	
	F	934,638	1,042,203	1,976,841	
	T	1,841,713	2,036,019	3,877,732	12,926
Kasur	M	165,846	192,127	357,973	
	F	167,064	201,328	368,392	
	T	332,910	393,455	726,365	2,421
Sahiwal	M	321,932	443,723	765,655	
	F	391,079	454,104	845,183	
	T	713,011	897,827	1,610,838	5,369
Vehari	M	116,592	156,497	273,089	
	F	114,504	186,792	301,296	
	T	231,096	343,289	574,385	1,915
Multan	M	380,573	574,055	927,628	
	F	380,855	655,175	1,036,030	
	T	761,428	1,202,230	1,963,658	6,545
Muzaffargarh ..	M	229,564	328,430	557,994	
	F	223,745	385,246	608,991	
	T	453,309	713,676	1,166,895	3,890
D. G. Khan	M	177,463	189,083	366,546	
	F	137,483	232,736	370,219	
	T	314,946	421,819	736,765	2,456
Bahawalpur	M	230,057	227,212	457,269	
	F	216,884	244,488	461,372	
	T	446,941	471,700	918,641	3,062
Bahawalnagar ..	M	172,397	255,164	427,561	
	F	143,832	235,936	379,768	
	T	316,229	419,100	807,329	2,691
Rahim Yar Khan ..	M	416,188	271,538	687,726	
	F	325,988	258,790	584,778	
	T	742,176	530,328	1,272,504	4,242
Total—Punjab ..	M	5,820,037	6,885,907	12,705,944	
	F	5,856,506	7,549,831	13,406,377	
	T	11,676,543	14,435,738	26,112,281	87,041

2. Number of Outpatients in Teaching Hospitals (Punjab District)

Such information is available from almost all the teaching institutions as detailed below :

Hospital	Sex	New	Old	Total	Daily Average
1	2	3	4	5	6
Mayo Hospital, Lahore.	M	179,408	251,514	430,922	
	F	131,989	242,167	374,156	
	T	311,397	493,681	805,078	2,683
Lady Willingdon Hospital, Lahore.	F	24,524	20,516	45,040	150
Services Hospital, Lahore.	M	49,701	48,675	98,376	
	F	46,879	65,816	112,695	
	T	96,580	114,491	211,071	703
Lahore General Hospital, Lahore.	M	44,823	44,732	89,555	
	F	42,677	37,083	79,760	
	T	87,500	81,815	169,315	564
Sir Ganga Ram Hospital, Lahore.	M	79,197	22,415	101,612	
	F	88,594	33,567	122,161	
	Children	15,430	1,000	16,430	
	T	183,221	56,982	240,203	801
D. Hqr. Hospital, Faisalabad.	M	59,507	55,036	114,543	
	F	53,846	56,812	110,658	
	T	113,353	111,848	225,201	751
D. Hqr. Hospital, Rawalpindi.	M	46,588	14,432	61,020	
	F	35,359	23,864	59,223	
	T	81,947	38,296	120,243	401
Holy Family Hospital, Rawalpindi.	M	20,123	10,408	30,531	
	F	41,913	17,318	59,231	
	T	62,036	27,726	89,762	299
Nishtar Hospital, Multan.	M	96,078	77,247	173,325	
	F	90,874	75,229	166,103	
	T	196,952	152,476	339,428	1,131
B. V. Hospital, Bahawalpur.	M	65,691	18,418	84,109	
	F	59,264	21,398	80,662	
	T	124,955	39,816	164,771	549
Total—Punjab ..	M	641,116	542,877	1,183,993	
	F	615,919	593,770	1,209,689	
	C	15,430	1,000	16,430	
	T	1,272,465	1,137,647	2,410,112	8,032

Appendix IV Medical Equipment and Material Plan

A List of Medical Equipment and Material

Department	Medical Equipment	Department	Medical Equipment
General Ward			
Internal ward		Surgical ward	
	Beds		Beds
	Beds for Attendants		Beds for Attendants
	Refrigerator + Freezer		Refrigerator + Freezer
	Sets of Ophthalmo and Otoscope		Surgical Treatment Sets
	Clinical Sets		Clinical Sets
	Blood Pressure Meter		Binocular Microscope
	Binocular Microscope		Standard Type Centrifuge
	Standard Type Centrifuge		X-ray Film Viewing Box
	X-ray Film Viewing Box		Vacuum Suction Device
	Body Wiping Trolley		Body Wiping Trolley
	Dressing Cart		Dressing Cart
	Vacuum Suction Device (portable)		Wheelchair (for child)
	Wheelchair (for child)		Stretcher
	Stretcher		Bedpan Washing and Sterilizing Apparatus
	Oxygen Tent		Urinal Bedpan Carrier
	Oxygen Analyzer		Ice-making Machine
	Oxygen Flowmeter		
	Ultrasonic Wave Nebulizer		
	Portable Electro cardiograph		
	Automatic Blood Transfusion Pump		
	Decubitus Protected Mattress		
	Bedpan Washing and Sterilizing Apparatus		
	Urinal Bedpan Carrier		
	Ice-making Machine		

Department	Medical Equipment
Isolation ward	
	Beds
	Refrigerator + Freezer
	Sets of Ophthalmo and Otoscope
	Clinical Sets
	Blood Pressure Meter
	Binocular Microscope
	Staydard Type Centrifuge
	X-ray Film Viewing Box
	Body Wiping Trolley
	Dressing Cart
	Vacuum Suction Device
	Wheelchair (for child)
	Stretcher
	Oxygen Tent
	Oxygen Analyzer
	Oxygen Flowmeter
	Ultrasonic Wave Nebulizer
	Portable Electro Cardiograph
	Automatic Blood Transfusion Pump
	Decubitus Protected Mattress
	Bedpan Washing and Sterilizing Apparatus
	Urinal Bedpan Carrier
	High Pressure Steam Sterilizer

Department	Medical Equipment
Outpatient Department	
	Ophthalmology
	Ophthalmoscope
	Ophthalmological Examination Unit
	Slit Lamp Microscope
	Funduscope
	Tonometer
	Fundus Camera
	Vision Chart
	Operating Table (minor)
	Otolaryngology
	Otolaryngological Clinical Unit
	Nebulizer
	Static Sensograph
	Vacuum Suction Device
	Simple Operation Bed
	Audiometer
	Bronchoscope
	Internal Medicine
	Blood Pressure Meter
	Refrigerator + Freezer
	Sets of Ophthalmo and Otoscope
	X-ray Film Viewing Box

Department	Medical Equipment
Surgery	
	X-ray Film Viewing Box
	Refrigerator + Freezer
	Surgical Treatment Sets
Special Clinic	
	X-ray Film Viewing Box
	Traction Equipment
	Blood Pressure Meter
	Refrigerator + Freezer
	Dental Clinical Unit
	Dental Radioscope
	Portable Automatic Developer
Nephrology and Urology	
	Dialysis Equipment
	Blood Pressure Meter
	Beds
Outpatients Filter Clinic	
	Projector
	Refrigerator
	Weight Measuring Scale
	Height Measuring Gauge
	Blood Pressure Meter
	Sets of Ophthalmo and Otoscope
	Emergency Cart
	Emergency Resuscitator
	Automatic Infusion Pump
	Nebulizer
	Vacuum Suction Device
	Refrigerator
Emergency	
	X-ray Film Viewing Box
	Clinical Sets
	Sets of Ophthalmo and Otoscope
	Blood Pressure Meter
	Wheelchair (for child)
	Stretcher
	Emergency Cart
	Shadowless light (standard type)
	Laryngoscope
	Minor Surgical Treatment Set
	Automatic Blood Transfusion Pump
	Emergency Resuscitator
	Anesthetizer
	Operating table
	Oxygen Tent
	Oxygen Analyzer
	Oxygen Flowmeter
	High Pressure Steam Sterilizer
	Bedpan Washing and Sterilizing Apparatus
	Beds

Department	Medical Equipment
Central Clinic	
Clinical Pathology Laboratory	
	Binocular Microscope
	Triocular Microscope
	Microscope Accessories
	Roberval Balance
	Chemical Balance
	Hydrometer
	Standard Centrifuge
	Centrifuge for Hematocrit
	Centrifuge for Cytodiagnosis
	Refrigerator
	Refrigerator + Freezer
	Incubator
	Temperature Stabilizer
	Pipette Purifier
	Mixing Pipette Purifier
	Ultrasonic Wave Purifying Apparatus
	Agitator
	Pouring Injection (hand operating)
	Sets of Electric Carpentry Tools
	Serum Protein Opto-meter
	Osmotic Pressure Meter
	Leukocyte Slecting Machine
	Automatic Blood Cell Counter
	pH Meter
	Bilirubinometer
	Na/K Analyzer
	Blood Gas Analyzer
Physiological Laboratory	
	Electrocardiograph
	Electromyograph
	Phonocardiograph
	Respiratory Resistance Meter
	Electroencephalograph
Radioscopic Department	
	Prediatric X-ray Apparatus (for child)
	X-ray Television Apparatus
	Portable X-ray Apparatus
	Automatic Developer
	X-ray Film Viewing Box
Surgical Operation Department	
	Operating Table
	X-ray Film Viewing Box
	High Frequency Surgical Equipment
	Vaporizer (flouthance)
	Ventilator
	Respiration Flowmeter
	Intermittent Positive Pressure Respirator

Department	Medical Equipment	Department	Medical Equipment
	Automatic Respiration Apparatus		Artifical Hip Joints Operating Equipment
	Heart Scope Monitor		Surgical Headlight
	Cardiac Inspection Revive Equipment		Anesthesia Table
	Automatic Transfusion Pump		Refrigerator + Freezer
	Heart Rate Respiration Monitor	Central Sterilize Supply	
	Shadowless Light (huliiple light)		Ultrasonic Wave Purifying Apparatus
	Microscope for Operation		High Pressure Steam Sterilizer
	Equipment Cabinet		EOG Sterilizer
	Equipment Table		EOG Air-rator
	Warmer Cabinet (infusion)		Bag Sealer
	Electronic Thermo-meter		Pure Water Making Apparatus
	Oxygen Tent		Bone Marrow Puncture Needle
	Ultrasonic Wave Nebulizer		Lumbar Puncture Needle
	Recovery Bed		Ventricle Puncture Needle
	Stretcher		Venotomy Sets
	Sterilizing Hand Washing Equipment		Exchange Blood Trans-fusion Sets
	Pediatrics Surgical Equipment		Syringe
	Micro Surgical Equipment	Pharmacy	
	Continuous Vacuum Suction Device		Automatic Medicine Packing Machine
	Dermathome		Electronic Precision Balance
	Electric Bone Surgi-cal Equipment		Cooling Cabinet
	Rent Drill		Anesthetic Safe-box
	Space Hemostatic Bandage		Drug Cabinet

Department	Medical Equipment
	Freezing Chemical Cabinet
Rehabilitation	
	Stiff Knee Exerciser
	Bicycling Exercising Machine
	Parallel Bars
	Rowing Machine
	Exercise Bed
	Wheelchair
	Walking Exercise Staircase
	Overhead Frame
	Hydrotherapy Tank
NICU	
	Incubator
	Automatic Infusion Pump
	Cardio Temp
	Transcutaneous Blood Gas Monitor
	Weight Measure Scale (for baby)
	Oxygen Flowmeter
	Oxygen Analyzer
	Neonatal Monitor
	Light Therapy Apparatus (Photo-therapy Apparatus)
	Respirator
	Respirator (CPAP system)
	(Intermitted positive pressure breathing for infant)
	Resuscitator (for infant)
	Oxymeter
	Cot
	Infant Warmer
	Milk Freezer
	Feeding Bottle Warmer
	Feeding Bottle Sterilizer
	Refrigerator + Freezer
	Infant Treatment Table
	Clinical Sets
ICU, Burn Ward	
	Medical Panel
	Collective Monitoring Apparatus
	Respirator
	Refrigerator + Freezer
	X-ray Film Viewing Box
	Oxygen Tent
	Oxygen Analyzer
	Oxygen Flowmeter
	Ultrasonic Wave Nebulizer
	Liquor Tub (bath tub)
Dissecting Room	
	Dissecting Table

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