BASIC DESIGN STUDY REPORT
ON
THE CONSTRUCTION PROJECT
OF
MATERNITY HOSPITAL
IN
THE REPUBLIC OF LIBERIA

APRIL 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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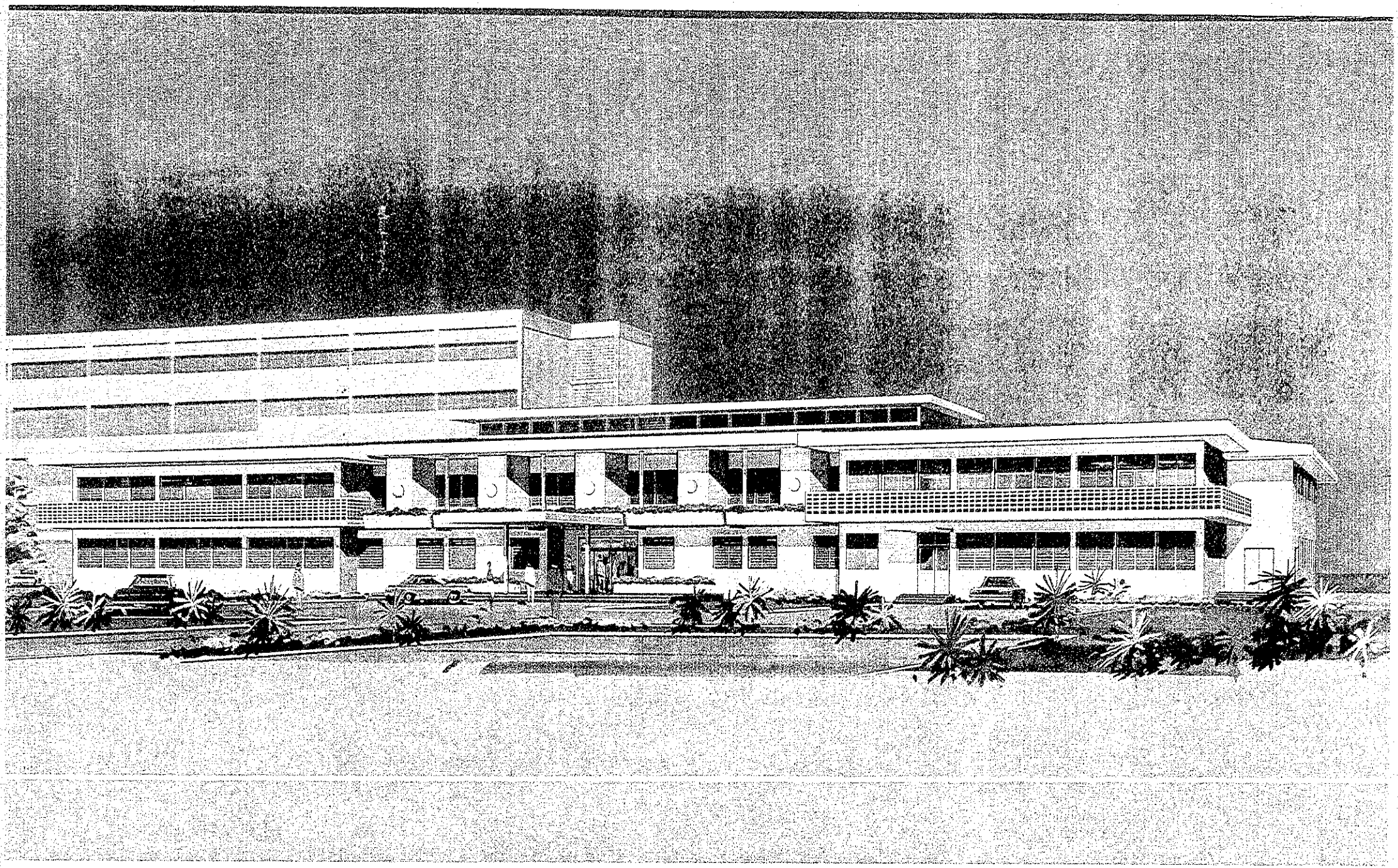
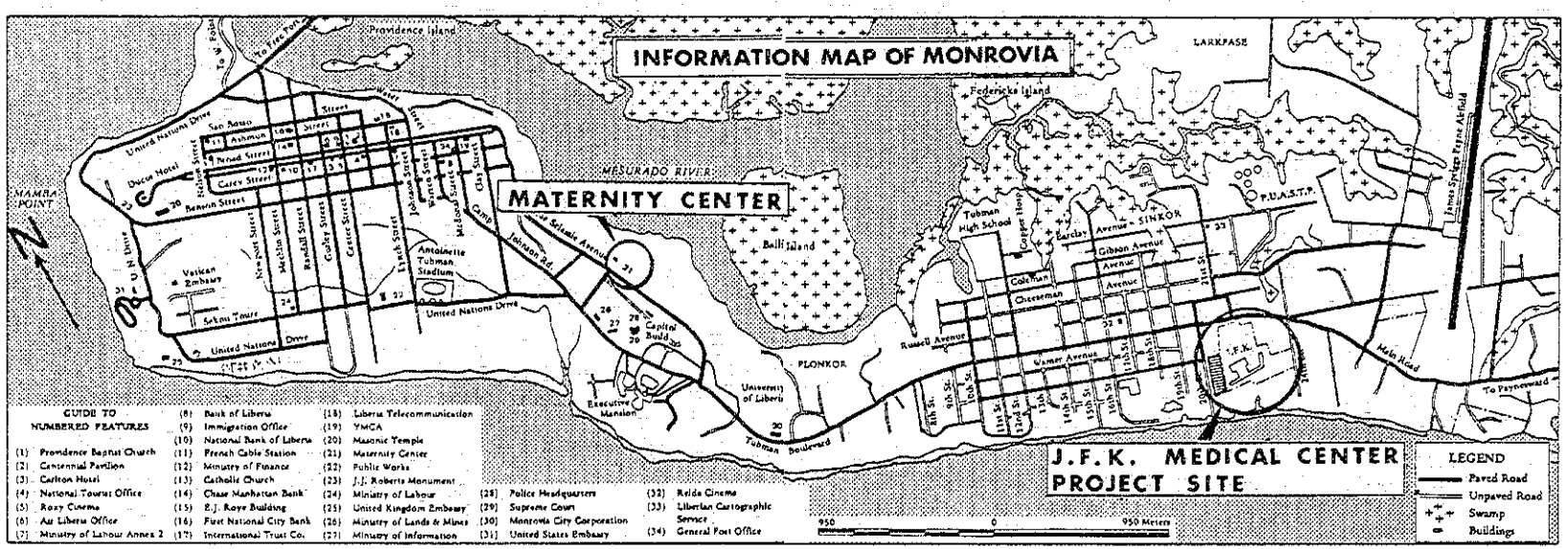
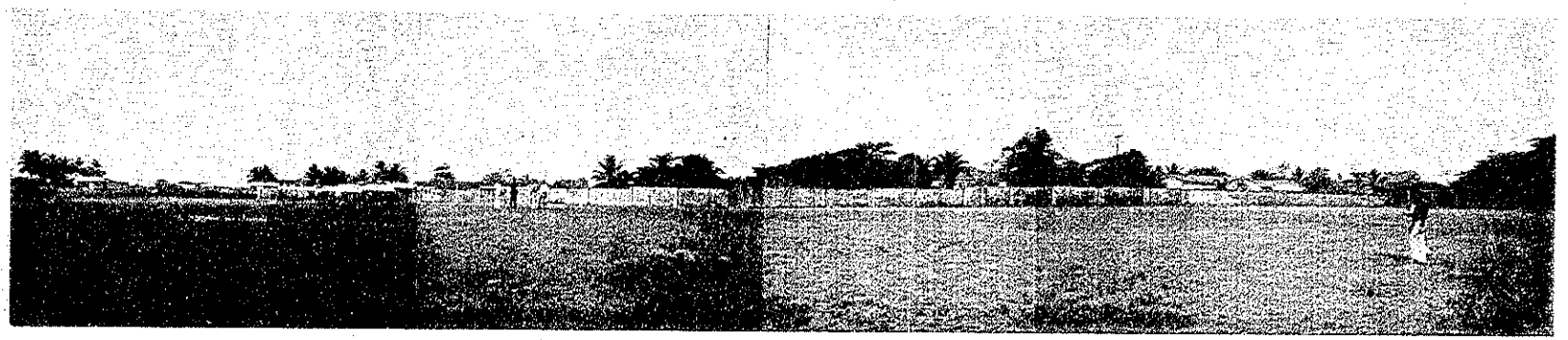


THE CONSTRUCTION PROJECT OF MATERNITY HOSPITAL IN THE REPUBLIC OF LIBERIA

REPUBLIC OF LIBERIA





PICTURE OF PROJECT SITE

PREFACE

In response to a request of the Government of the Republic of Liberia, the Government of Japan decided to conduct a survey on the project to construct a maternity hospital in Liberia and entrusted the Japan International Cooperation Agency (JICA) with the survey.

The J.I.C.A. has sent to Liberia all together three teams to carry out the basic design survey, the first one, headed by Dr. Yoshihiko Amenomori, Head, Obstetrics and Gynecological Department, Medical Center, Japan Red Cross, the second one, headed by Mr. Yasuyoshi Komizo, the Ministry of Foreign Affairs, and the third one, headed by Dr. Yoshihiko Amenomori, starting from 8th December, 1980, 26th January, 1981, and 23rd March, 1981 respectively.

The teams consulted with the officials concerned of the Government of Liberia and conducted the field survey in Monrovia.

After the teams returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of Liberia for their close cooperation extended to the teams.

April, 1981

Keisuke Arita

Keisuke Arita,
President,
Japan International Cooperation Agency

TABLE OF CONTENTS

SUMMARY

SUMMARY

Japan's economic relations with Liberia have been expanding in recent years, importing iron ores and exporting manufactured goods, and quite a number of Japanese ships are registered at Liberia. On the official level, Japan has already provided a number of development assistance to Liberia, notably the 1975 loan for telecommunication facilities expansion project and the 1979 loan for the implementation of the road development project.

The upgrading of the health sector is currently considered one of the primary objectives of social development in Liberia. Great emphasis is being placed on expanding the coverage of the National Health Delivery System, eventually to cater to the needs of the country's entire population of over 1.8 million. One of the six major health programs identified by the Government of Liberia is a new Maternity Hospital in Monrovia, the nation's capital, to replace the old one. The existing facilities at the J.F.K. Maternity Center are becoming inadequate in servicing the City's growing population of 0.3 million.

The Government of Liberia accordingly requested the Government of Japan for a grant aid to establish a Maternity Hospital. In response to the request, the Government of Japan entrusted Japan International Cooperation Agency (JICA) to organize three basic design survey teams, which respectively visited Liberia in December of 1980 and January and March of 1981, in order to conduct technical feasibility study of the requested project.

The survey teams during their visits closely conferred with the representatives of the Liberian Government on the current status of the country's health care institutions and construction industries and reconnoitered the proposed site. Through repeated meetings and site visits, decisions were made on the location of the proposed hospital in the premise of the J.F.K. Medical Center and the prospective structure and functions of the hospital, including details of the required physical facilities and equipment. The Minutes of the discussions were then prepared and duly signed by the official representatives of the Government of Liberia and the survey team at the end of the last visit. The Government

of Liberia subsequently allocated a budget for the local portion of the project costs and started to plan the staffing of the hospital.

The present report is based on the findings during the three surveys and the agreements detailed in the Minutes. And the proposed Maternity Hospital will be planned by following basic concept (i) to be designed to reflect the local conditions, such as climate and standard construction practice, (ii) to be integrated with the existing J.F.K. Memorial Hospital, (iii) and the facilities will be arranged, taking into account their functional relationships, to ensure efficient operation of the hospital, (iv) to be designed for easy maintenance and efficient utilization after its completion. The findings of the surveys show that it is technically feasible to take up the proposed project, as defined in the Minutes of discussions, in the frame work of the Japanese grant aid program.

The establishment of the proposed Maternity Hospital will help upgrade the health services in the country and in order to guarantee its contribution, it will be necessary for the Government of the Republic of Liberia (i) to allocate sufficient funds for the operation of the hospital, (ii) to provide competent medical personnel, and (iii) to ensure effective maintenance and repairs of the equipment and facilities. The Government of Liberia is requesting the Japanese Government to consider the possibility of technical cooperation for the training of the hospital staff.

Chapter 1 GENERAL DESCRIPTION OF THE PROJECT

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1-1 BACKGROUND

The Republic of Liberia is situated in the West African coast and has a total land area of 112,000 km^2, one-third the size of Japan. The country borders Sierra Leone, Guinea and Ivory Coast, sharing a typically humid tropical climate.

The current population is estimated to be approximately 1.8 million with an annual growth rate as high as 3 ∿ 4 %. The death as well as birth rates are very high, and according to the statistics available at the J.F.K. Maternity Center, the mortality rate of new-born babies was 2.3 and 2.4% in 1978 and 1979 respectively, while that of mothers was 0.4%.

Although the coverage of the National Health Delivery System (NHDS) has been improving in recent years due to the government efforts, the availability of health facilities is yet extremely inadequate. The problem is especially exacerbated in urbanized areas like Monrovia where the population (0.3 million) has been growing at an annual rate of 7.63%.

The urban shortage of facilities is especially pronounced in the sphere of maternity care, being compounded by the increasing reliance on hospital services as well as rapid population growth. At the John F. Kennedy Medical Center in Monrovia, by far the country's largest medical complex, its Maternity Center annually handles about 10,000 deliveries (30 per day), but has the capacity of only 107 beds. Due to the shortfalls of the bed-capacity, two to three obstetric patients have to share one bed. Although the newly constructed ward annex will provide additional 37 beds, the capacity will be still far from satisfying the demand for admission.

The Maternity Center that has kept expanding through a number of extention works since opened in 1926, has no space available to provide for additional extention to be utilized. It is not realistic to consider the method of remodeling and extending aged Maternity Center for the reason that there is no way to provide medical services during its construction period.

In view of the dire need to expand the bed capacity, the Government of Liberia decided to construct a modern maternity hospital in the compound of the Memorial Hospital, the central facility at the J.F.K. Medical

Center in Sinkor, Monrovia,and requested a grant from the Japanese Government.

And the government of Liberia has a plan to use the exsisting Maternity Center for primary and secondary health care inorder to expand and improve NHDS after completion of proposed Maternity Hospital.

1-2 PROJECT DESCRIPTION

1-2-1 Objective

The proposed Maternity Hospital is one of the six major health programs identified in the current National Socio-economic Development Plan (1976-1980) and aims to meet the increasing demand for maternity care (obstetrics and gynecology)in Monrovia.

1-2-2 Administration

The proposed Hospital shall be established in Sinkor, Monrovia, and subject to the supervision and administration by the Ministry of Health and Social Welfare.

Through the construction of the proposed Maternity Hospital in the compound of J.F.K. Memorial Hospital, the following merrits are expected, (i) it is possible to provide high-technology services which proposed Maternity Hospital does not provide, in utilizing facilities and mobilizing hospital staffs of the Memorial Hospital, (ii) it can avoid overlapping in arranging facilities and staffs through utilizing part of administrative and operative and service functions of the Memorial Hospital.

In meeting to these points mentioned above, the Memorial Hospital is expected to provide a further integration of medical service as a general hospital.

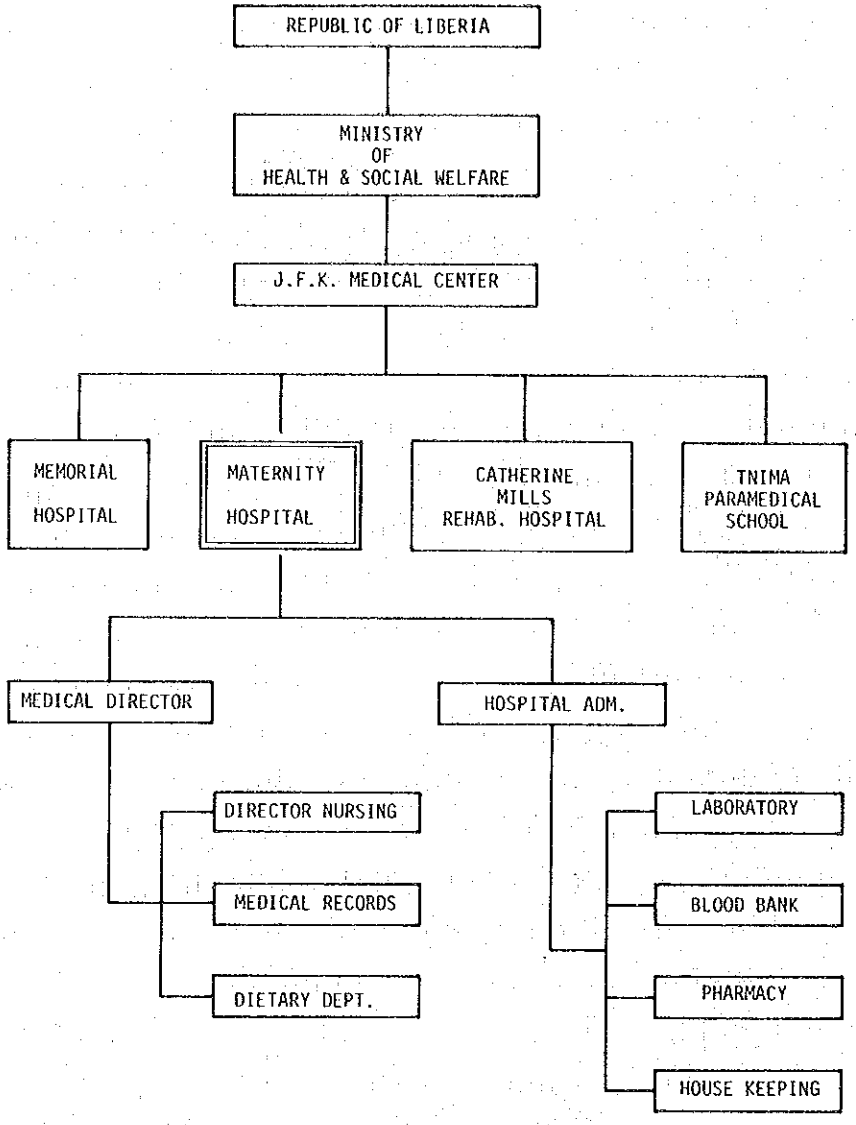

Fig. 1-1 ORGANIZATION STRUCTURE

1-2-3 Composition of the Maternity Hospital

The proposed Maternity Hospital will provide obstetric and gynecological services with a capacity of 167 beds and administrative quarters. The composition of the Hospital will be as follows;

1) Clinical Departments

a. Out-patient Department: examination rooms, a waiting hall and other related facilities for out-patients.

b. Emergency Unit: a treatment room, a small operating room, a short-stay bed rooms and other related facilities.

c. Labor/Delivery Unit: a delivery room, a labor room and other related facilities.

d. Radiology Unit: a X-ray room, a control room and a dark room.
e. Clinical Diagnostic Laboratory: a laboratory equipped to conduct blood tests and uroscopy.
f. Surgical Suite: Operating rooms, a central sterilization room. and other support facilities.

2) In-patient Care Unit: Wards, nurse stations and other related facilities.

3) Administration and Hospital Supporting Service

a. Administration: admission and registration counters, a cashier, medical records room and office and conference room for doctors, nurses and other hospital staff.
b. Hospital Supporting Service: a dispensary (pharmacy), a kitchen, a cafeteria, storage rooms, lounge/locker rooms for hospital personnel, and other facilities.

1-2-4 Physical Facilities and Equipment

1) Buildings

a. Hospital building (167 Beds): a two-story building of reinforced concrete. The ground floor is allocated to the out-patient department and the administration functions and the first floor to the wards and clinical facilities for in-patients. An elevated water tank is placed in the upper part of the ramp connecting the ground and the first floors.
b. Power house (equipment facilities): a one-story building of reinforced concrete.
The power house consists of a mechanical room, an electrical room, a city water reservoir tank and others.
c. Connecting corridor: a roofed corridor connecting to the J.F.K. Memorial Hospital.

2) Medical Equipment

Equipment necessary for the prospective hospital functions.
(See Section 3-3 for details)

Chapter 2 BASIC DESIGN SURVEY

Chapter 2 BASIC DESIGN SURVEY

2-1 OUTLINE OF SURVEY

JICA sent basic design survey team* to Liberia three times, respectively in December 1980, January and March 1981.

1) The first basic design survey team had meetings with the Liberian authorities to discuss the details of agreement to be included in the Minutes, the current status of the country's health services and construction industries, the conditions at the proposed project site, etc. The team and the representatives from the Government of Liberia subsequently agreed upon the major objective, functions and composition of the proposed Maternity Hospital, which were duly recorded in the Minutes. The project proposal prepared by the Liberian authorities was annexed to the Minutes and the team agreed to convey the details of the Liberian request. The Minutes were then signed by the representatives of the two parties.

2) The second basic design survey team had meetings with the Liberian representatives to exchange views over the proposed project including construction costs and materials, physical characteristics of the project site, availability of utilities (Power, Public sewerage, city water, telephone), etc. The discussions were centered on the two alternative concept plans prepared in advance by the team. The Liberian representatives accepted the plan with a capacity of 200 beds over the other with a smaller capacity of 150 beds. During the meetings, the two parties conferred further over the details of the functions and composition of the Hospital and the medical equipment thereof, and the necessary measures to be taken by the respective Governments in expediting the implemention of the project. Through these discussions, it was agreed on the request from the Liberian side that the Hospital should be provided with greater clinical functions than indicated in the concept plan, with the bed-capacity accordingly reduced to 167 beds. At the end of the

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* AZUSA SEKKEI CO., LTD: F. Kiyota and associates architectes & engineers, participated as team member of basic design survey for this project.

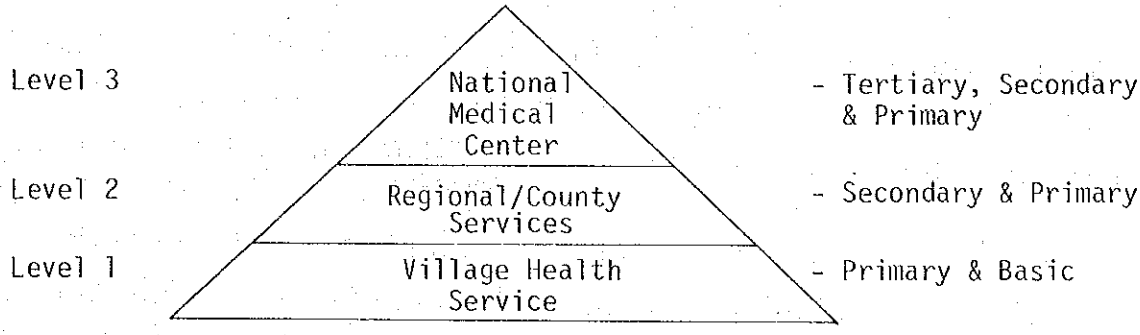
visit, the Minutes were prepared and signed by the representatives of the two parties.

3) The third basic design survey team conferred with the Liberian representatives over the draft basic design prepared by the team on the basis of the Minutes and findings by the previous teams, and exchanged views on the prospective implementing schedule of the project.

2-2 MEDICAL SERVICES IN LIBERIA

2-2-1 General

The National Health Delivery System in Liberia is pyramidal, comprising three major levels of referral, as shown below.



The first level provides the primary health care and consists of the health posts, clinics and other such facilities located in villages which cater to the medical needs of the rural population. The secondary level comprises County Hospitals in each of the country's nine counties and provide secondary as well as primary health care, offering the back-up and support services to the rural health facilities and organizing out-reach activities in isolated villages where rural health services are not available. The tertiary level services are provided at the National Medical Center Complex (the J.F.K. Medical Center) in Monrovia which is the hub of the country's health referral system. The Complex provides primary, secondary and tertiary medical services to the people of Greater Monrovia and outlying communities and is equipped to treat specialized cases in the areas of radiology, surgery, internal medicine, pediatrics, etc.

The National Health Delivery System as presently organized reaches only 30 ∿ 35 % of the country's population. In other words, the greater majority of the population is yet deprived of access to the health resources. The Government has been implementing the program to widen the coverage of the NHDS, with greater emphasis on the improvement of primary health care.

2-2-2 Outline of J.F.K. Medical Center

Located in Monrovia, the Center is at the apex of the health care referral system in Liberia, and consists of the Memorial Hospital, the Maternity Center, Catherine Mills Rehabilitation Hospital and Tubman National Institute of Medical Arts (TNIMA PARAMEDICAL SCHOOL). The functions of the Center's respective components are as follows;

1) Memorial Hospital

The Hospital provides clinical services in internal medicine, surgery, plastic surgery, pediatrics, urology and dentistry and has facilities for radiology, operations, physical therapy, emergency treatment, dispensary, etc. Its five-story building of reinforced concrete was built in 1969 with a capacity of about 300 beds and an aggregate floor space of 27,000 m^2.

2) Maternity Center

The Center provides obstetric and gynecological services. Originally built in 1926,it has undergone expansions and renovations since its establishment and now has the capacity of 107 beds, with eventual addition of 37 beds in the ward annex which has been completed recently.

3) Catherine Mills Rehabilitation Hospital

The Hospital is located in the outskirts of Monrovia, several miles off from the Medical Center, and specializes in psychiatry with facilities for vocational therapy.

4) Tubman National Institute of Medical Arts

Established 34 years ago, the Institute trains various medical technicians who serve in the National Health Delivery System.

2-2-3 Current Use of Maternity Center

The Center is located 3.5 km to the west of the J.F.K. Memorial Hospital. It was originally built and operated by the American Baptist Missionary Convention with a capacity of 25 beds, added 40 beds in 1942 and started the out-patient department in 1950 with another addition of 75 beds. The Center was fully turned over to the Government in 1952 and became a component of the newly established J.F.K. Medical Center in 1971.

The Center currently provides obstetric and gynecological services to out-patients and has about 100 beds(90 for obstetrics and 10 for gynecology). The ward annex has been completed recently to add 37 beds.

The number of deliveries at the Center has increased from about 200 live births per month to over 600 during the decade of 1969-79, with the current obstetric bed occupancy rate being well in excess of 100 %. The average length of stay is 3.5 days for obstetrics and 5.7 days for gynecology. The number of out-patients has increased from 25.6 per day in 1973 to 217 in 1979 (Table 2-1).

The existing bed-capacity of the Center is extremely inadequate to meet the increasing reliance on hospital services among the rapidly growing population of Monrovia. Two to three patients normally have to share one obstetric bed, while a cot accommodates two babies. Although the facilities are on the whole effectively utilized and the hospital operation is quite efficient, the building is visibly outworn and most of the equipment is becoming obsolete.

Table 2-1 MATERNITY HOSPITAL: STATISTICS - JANUARY-DECEMBER, 1979

	1978	1979	% OF CHANGE
TOTAL PATIENTS DISCHARGED & DEATHS	18,316	20,425	+ 11.5%
Adults	10,360	11,599	+ 12.0"
Infants	7,956	8,826	+ 10.9"
DAYS OF CARE TO PTS DISCHARGED:	63,984	68,375	+ 6.9%
Adults	41,332	44,988	+ 8.8"
Infants	22,652	23,387	+ 3.2"
AVERAGE LENGTH OF STAY:	3.5 dys	3.3 dys	- 5.7%
Adults	4.0 dys	3.9 dys	- 2.5"
Infants	2.8 dys	2.6 dys	- 7.1"
TOTAL DEATHS:	235	269	+ 14.5%
Deaths under 48 hours	141	138	- 2.1"
Deaths over 48 hours	94	131	+ 39.4"
Gross Death Rate	1.3%	1.3%	0.0"
Net Death Rate	0.5 "	0.6 "	+ 20.0"
Maternal Deaths	40	48	+ 20.0"
Maternal Death Rate	0.4%	0.4%	0.0"
Infant Deaths	195	221	+ 13.3"
Infant Death Rate	2.3%	2.4%	+ 4.3"
Post Operative Deaths	12	24	+100.0"
Fetal Deaths (Still-Brith)	313	320	+ 2.2"
TOTAL PATIENTS ADMITTED:	18,382	20,378	+ 10.9%
Adults	10,394	11,552	+ 11.1"
Infants	7,988	8,826	+ 10.5"
TOTAL IN-PATIENTS SERVICE DAYS:	64,668	69,798	+ 7.9%
Adults	39,934	45,983	+ 15.1"
Infants	22,734	23,815	+ 4.8"
AVERAGE DAILY CENSUS:	177	191	+ 7.9%
Adults	109	126	+ 15.6%
Infants	62	65	+ 4.8%
AVERAGE PERCENT OF OCCUPANCY:	101.2%	107.5%	+ 5.9%
Adults	109.4%	117.8"	+ 7.3"
Infants	106.3"	109.4"	+ 2.8"

To be continued

	1978	1979	% OF CHANGE
TOTAL OPERATIONS (pts. operated upon)	1,589	1,816	+ 14.3%
Major	473	432	- 8.7"
Minor	1,116	1,384	+ 24.0"
TOTAL CASEAREAN SECTIONS PERFORMED:	347	322	- 7.2%
Caesarean Section Rate	4.2%	3.5%	- 16.7"
TOTAL DELIVERIES:	8,296	9,131	+ 9.0%
Live Births	7,901	8,810	+ 11.5"
Twins (Sets)	149	150	+ 0.7"
Triplets	3	1	- 66.7"
TOTAL OUT-PATIENT VISITS:	50,378	56,370	- 11.9%
New	7,155	10,324	- 44.2"
Old	33,131	36,602	+ 4.1"
Emergencies	8,092	9,444	+ 16.7"

2-3 CURRENT PRACTICES OF BUILDING CONSTRUCTION

2-3-1 General

Most of the buildings in Monrovia are around two stories, but the number of multi-floor buildings which rise to 6-8 stories has been on the increase among the hotels and government and commercial buildings. A 10-story building with a basement floor is now under construction and several others of similar scale have been recently completed or nearing completion in the city. Judging from the on-going activities at these sites,the construction industry in Monrovia possesses technical skills and capabilities required for the proposed Hospital.

During the wet season of the year (May-October), rainy days average 150 days and the precipitation over 4,000 mm. It is recommendable therefore to undertake such outdoor works as detailed topographic and geological surveys, preparations like construction of temporary huts, site works, concrete structure and concrete block works, exterior finishing works, etc. during the dry season. Outdoor works are not impossible in the wet season but should be avoided as far as possible, because rains will sharply reduce the progress of construction and seriously damage the un-finished exposed parts of the building.

Considering the shortage of skilled workers as well as the unfavorable climate, the construction schedule will have to be longer than is normally the case in Japan.

2-3-2 Construction Methods

With respect to the structural system, common practices in Monrovia are to use reinforced concrete for columns,beams and a limited part of walls. Most of the walls are built with domestic concrete blocks. Roofs are made of wooden trusses finished with corrugated metal sheets or slate boards.

Exterior walls are generally finished with mortar and emulsion paint, and interior walls with mortar and paint. Flooring is done with standard terrazzo tiles, while ceilings are made of plywood with paint finish.

Aluminum framed window with glass louver are commonly used for exterior windows and interior doors are mostly made of wood finished

with oil-stain varnish. Generally speaking, materials available for finishes are limited in variety and construction methods commonly practiced are relatively simple in Monrovia.

2-3-3 Construction Materials

Domestic construction materials are limited to timber, aggregates (crushed stone, sand, etc.), cement (made from imported clinker), wooden window frames and doors, aluminum window frames (assembled from imported components), etc. Practically all of the manufactured construction materials (for reinforcing bar, structural steel, electric wiring and divce, plumbing and other pipe works, air condioning equipment and divce, etc.) are imported from EC countries and the United States.

Although a wide variety of construction materials are marketed in Monrovia, it is deemed difficult to procure those materials in large quantities at a short notice, except for cement, reinforcing bars, concrete blocks, terrazzo blocks and the like. Although several of the basic commodities such as cement and gasoline are under government price control, the prices of the construction materials are generally higher than in Japan, especially with respect to the imported manufactures or domestic products with higher import content. Considering the country's high inflation rate (general consumer price index rose 25-30 % in 1980), it will be necessary to consider the possibilities of importing secondary (=manufactured) construction materials from Japan and other countries.

2-4 SITE CONDITIONS

2-4-1 General

The Republic of Liberia is located in the West African coast (N.Lat. 4°20'∿8°30', W.Long. 7°40'∿11°20'). The climate is classified as tropical rainy forests, with annual precipitation reaching 4,000∿5,000 mm in Monrovia. The country has a total land area of 112,000 km^2, one-third the size of Japan, and borders Sierra Leone, Guinea and Ivory Coast.

Topographic characteristics change from coast to inland and four major zones are distinguishable: coastal plains, hilly areas, high plateau and northern highlands. A number of rivers originate in the northern mountains and flow into the Atlantic Ocean.

The population is estimated to number 1.8 million in 1980, and comprises about 16 major tribes and the Americo-Liberians (approx. 3 % of the total). The official language is English, and each tribe has its own language for daily use.

Agriculture (including forestry) is the mainstay of the economy, accounting for 30 % of GNP in 1976 and 70 % of the economically active population in 1979, but in terms of foreign exchange earnings, the contribution of the mining sector is substantial. Major export commodities are rubber, coffee, cocoa, timber and iron ores. The country's annual output of iron ores ranks eighth in the world and its export earnings are equivalent to one-third of GNP. The export of timber is expected to increase in the future and become the third major export commodity next to iron ores and rubber.

2-4-2 Project Location

Monrovia is the primate city of Liberia and has a rapidly growing population of 0.3 million. The nation's capital is located close to the coast line in the altitude ranging from 0 ∿ 50 m.

The project site is within the premises of the J.F.K. Memorial Hospital located in the southeastern part of the city (Figure 2-1). The proposed site has an area of 20,000 m^2 and faces the 20th Street in the west. The northern half is flat, but the rest gently slopes down toward the coast line. The site conditions are on the whole favorable for the construction

of the Hospital.

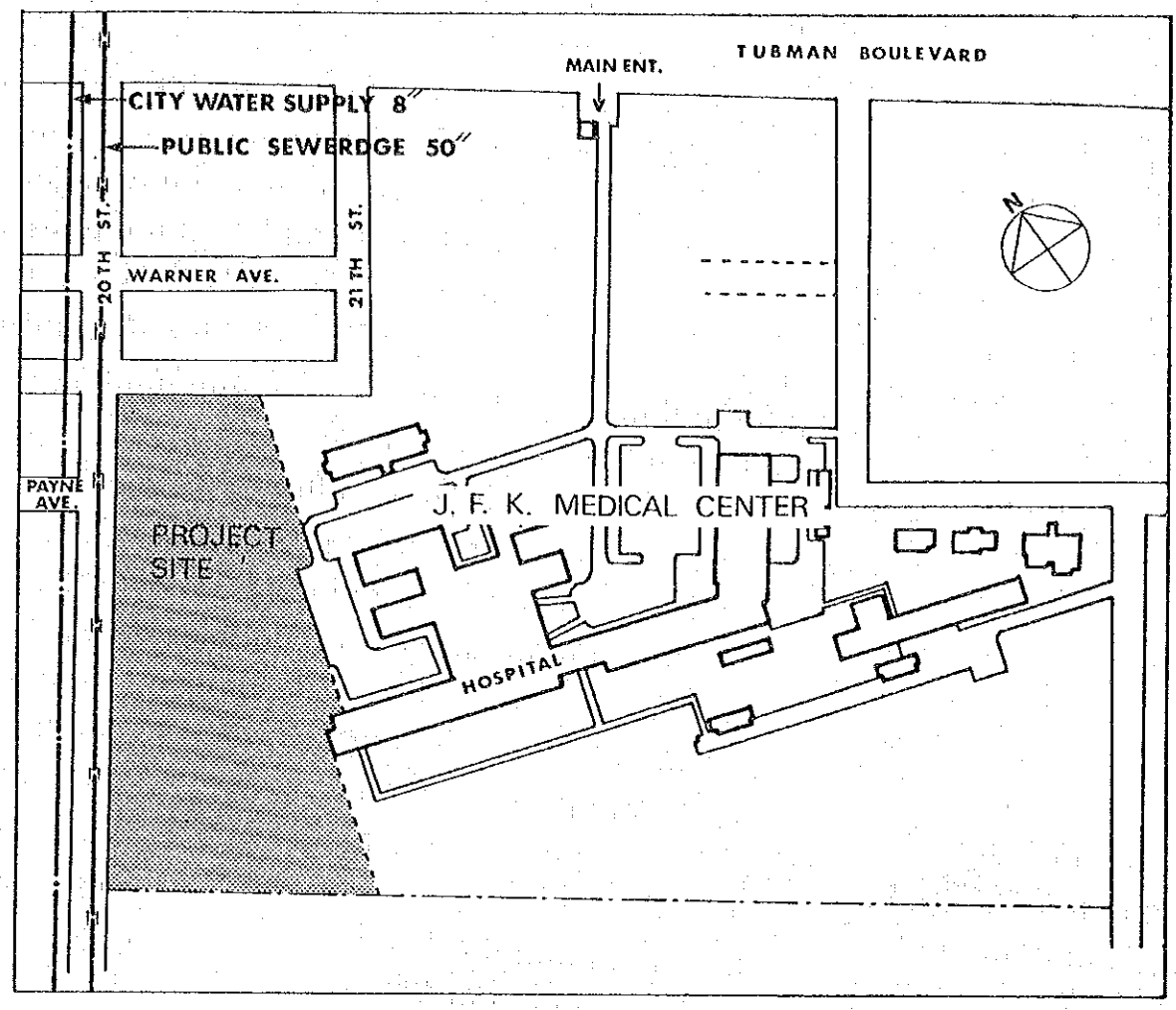


Fig. 2-1 PROJECT SITE AREA

2-4-3 Geological Conditions

1) Topographic Survey

The elevation within the site has been measured by the Ministry of Public Works as shown in Figure V-1. Supposing that the hospital be built without land levelling, the relative difference of elevation vis-a-vis the entrace of the propósed Hospital ranges from -75 cm at the southern end of the building and +60 cm and -90 cm respectively in the eastern and western ends. The difference does not seriously hamper either construction works or use of the building after construction, but costs of foundation works will be probably larger.

2) Geological Survey

The Ministry of Public Works conducted test borings at eight sample points (Nos. 1 through 8 in Figure VI-1) to measure the dry density (Table VI-1 & VI-2), the level of water table and the feature of the soils (Table VI-3). The ground of the site is predominantly fine to medium sand down to 15ft. in depth, with some granules and pebbles appearing on the surface. Although the test borings were not dose deeper than 15ft., it is judged that there is no unstable strata underneath to cause soil consolidation, in view of the durability of foundation of the J.F.K. Memorial Hospital building nearby.

The Ministry of Public Works estimated soil bearing capacity of 8.6 t/m^2 on the basis of the soil texture and composition. However in the project of the J.F.K. Memorial Hospital, the bearing capacity was estimated 24 t/m^2. The survey team matched the test results obtained at the site with Japanese data with similar texture, dry density and compaction of soils and level of water table and found that the corresponding bearing capacity was 15 t/m^2 at maximum.

3) Earthquake

Meteological station in Monrovia city has no record of earthquake, nor seismic recorder.

2-4-4 Climatic Conditions

The climate in Monrovia has dry and rainy seasons. During the months of dry season (Nov.∿Apr.), sunshine is stronger and temperature higher than in the rainy season. Especially during the months of December and January, the desert-hot wind of harmattan blows down from the north and pushes up the day temperature to well over 30°C, sometimes reaching over 40°C (Table VII-1). The mean humidity is 79.4 % in the dry season which is higher than elsewhere in the country and often reaches 100% in wet season. The most dominant wind direction around Monrovia is southwest.

The annual precipitation is high along the coast, reaching 4,000 ∿ 5,000 mm in Monrovia, and decreases toward inland. The mean annual temperature varies from coast to inland, ranging 21 ∿ 32°C. The annual variation is relatively small except for the period of harmattan. The national mean annual humidity is about 80 %, but varies from 95 % in the coastal region

to 65 % further inland.

2-4-5 Availability of Utilities

1) City Water Supply and Public Sewerage

Water supply and sewerage in Monrovia are administered by the Liberian Water and Sewage Corporation. At the project site, supply and drainage pipes run along the 20th Street on the west (Figure 2-2).

a. Water Supply

The cast iron pipe of 8" in diameter is buried along the 20th Street and the water pressure is reported to be 70 ∿ 90 PCI (4.9 ∿ 6.3 kg/cm^2). The available capacity can supply the estimated water requirement of 90 m^3/day at the proposed Hospital, but with occasional hazards of failure. The intake pipe to the Hospital is required to be of 6" in diameter at maximum.

b. Sewage

The drainage pipe of 50" in diameter is buried along the street with sewage treatment plant. Therefore, the Hospital can drain directly to the pipe. Because the drainage pipe is 15 ∿ 20 ft. (4.5 ∿ 6.0 m) deep, it will be easy to connect the outlet pipe from the Hospital.

2) Power

The Liberian Electricity Corporation is responsible for power supply in Monrovia and operates two distribution networks, one of low voltage (110V) for lighting (electric lights and outlets) and the other of high voltage (220V) for single-phase motor circuits (e.g. air conditioners). The J.F.K. Memorial Hospital, and large commercial Buildings as well, takes in high-voltage 12.5 KV, 3ø3W and low-voltage 208 V/120 V, 3ø4W/1ø3W. The maximum receiving capacity of a new building is allowed up to 5,000 KVA and the capacity requirement is approximately 450 KVA at the proposed Hospital. The frequency of power failures is 6 times per month, with the annual average duration of 30 minutes per failure. The fluctuation of voltage is reported to be ±10 %, and that of frequency ±3 %. However, the fluctuation of voltage could be as high as ±20 %, judging from the available

studies. Accordingly, it may be necessary to install a induction voltage regulator (IVR) at the Hospital.

With respect to emergency power supply, the J.F.K. Memorial Hospital has a stand-by generator of 150 KVA and is currently installing another of 500 KVA. The proposed Maternity Hospital is estimated to require a generating capacity of 200 KVA in emergency, which can be met by the two stand-by generators at the Memorial Hospital. The survey team therefore requested Mr. J.K. Jallah, Director of the Maintenance and Operation Department, to consider the possibility of such assistance to the Maternity Hospital.

3) Telephone

The Liberian Telecommunication Corporation is in charge of telephone services in Monrovia. The connection is inadequate and the government agencies and military establishments often use hand talkies. The telephone network system is made by Erickson in Sweden and is reportedly able to accommodate 10 circuits for the Hospital.

4) Gas

Because there is no public gas supply, the Hospital will rely on butane-gas cylinders.

Chapter 3 BASIC DESIGN

Chapter 3 BASIC DESIGN

3-1 DESIGN POLICY

The master planning for the Maternity Hospital to be financed by the Japanese grant aid program will be undertaken with the following basic concepts.

1) The proposed Maternity Hospital will conform to the agreements reached during the basic design surveys.

2) The plan will comprise architectural, mechanical, and, electrical facilities and medical equipment required thereof.

3) The proposed Maternity Hospital will be designed to reflect the local conditions, such as climate and standard construction practices in Monrovia.

4) The proposed Maternity Hospital will be integrated with the existing J.F.K. Memorial Hospital.

5) The facilities will be arranged, taking into account their functional relationships, to ensure efficient operation of the hospital.

6) The building will be designed for easy maintenance and efficient utilization after its completion.

3-2 BUILDING DESIGN

3-2-1 Site Planning*

The site planning will be undertaken with the following considerations,

1) Circulation Planning

a. The major access to the proposed Maternity Hospital will be from the intersection of Payne Ave. and 20th St. and connected to the existing paths within the site (Figure 3-1).

b. Various access circulations will be separated clearly according to their functions and properly maintained.

c. The connecting corridor between the new building and the existing one will be short in distance and located in such a way as to pose no difficulty against future extensions of the building.

2) Land Use Planning

a. The major functions of the new Hospital will be organized to form a compact block in order to:

i) enable the optimum use of the land,
ii) provide shortest connection to the interior circulation of the new building.

b. The orientation of the new building will be east-west in order to;

i) minimize the solar heat gain,
ii) provide effective natural ventilation, and
iii) integrate with the existing building.

c. The new building will be located to avoid the sloping portion of the site.

d. Parts of the site, south and west of the new building, will be left vacant for future constructions.

e. Various mechanical facilities will be located in a separate building to the south of the new building in order to;

---

* Site planning is the responsibility of the Liberian Government and this section is prepared to offer suggestions.

i) prevent unexpected disasters from reaching the Hospital,
ii) enable its use by future extensions, and
iii) protect the Hospital from hazards such as noise, heat and exhausts of the power house.

3-2-2 Architectural design

1) Overall planning

The proposed Maternity Hospital will be planned as follows;

a. The interior of the building will be clearly separated by function into three major zones: 1) clinical zone 2) in-patient zone 3) administration and service zone.

b. The zones will be connected functionally to ensure shortest circulation.

c. The related functions of the building will be closely placed for effective administration and at the same time the consideration will be given to providing easy access by patients.

d. Each department will be organized in a compact and simple form to enable an optimum use of the available floor space.

e. The interior of the new building will be designed to provide sufficient spaciousness.

f. The ramp will be provided in the center of the building to connect the ground and the first floors.

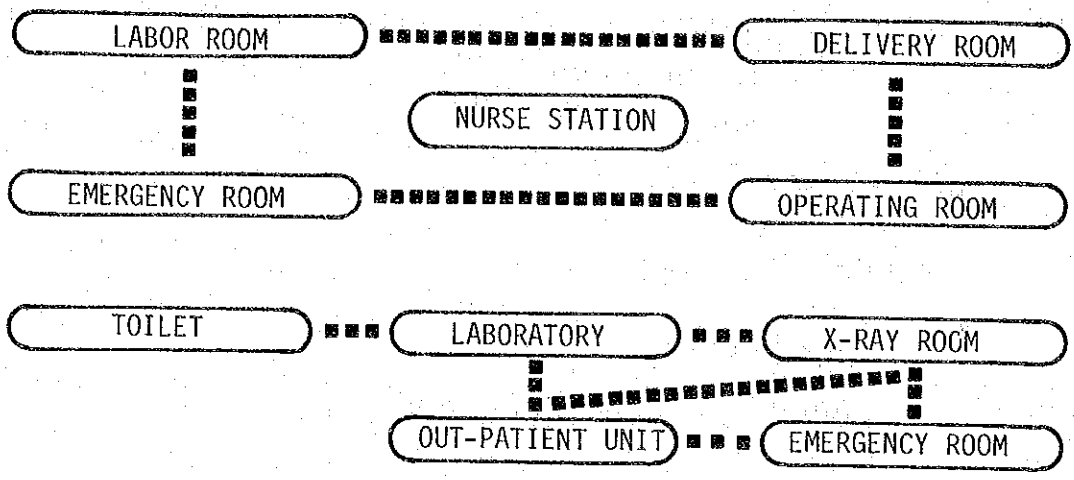
2) Zone planning

a. Clinical zone

i) The clinical zone, excluding the Operating Dept.,will be located in the western half of the first floor (Figure 3-2).

ii) Outpatients, emergency patients and inpatients will have separate access.

iii) Each dept. and room are located considering its functions and its relationship to the other departments.



iv) The clinical zone of outpatients will be clearly separated from that of inpatients.

v) The waiting hall will be spacious and two-story high to provide an open and cheerful atmosphere for the users of the building.

b. Inpatient zone

i) Wards will be arranged to be serviced by two nursing units rather than three, because;

- it will require less people for effective administration,
- it will enable an optimum use of the floor space by requiring less space for nurse stations, and
- it will provide more space for beds.

ii) Wards will be of large room system.
A maternity ward requires no separation of obstetric patients unlike other clinical treatment. The large room system will provide;

- more beds per available floor space,
- better supervision by nurses,
- good ventilation to each room, and
- a feeling of openess to the patients to reduce their psychological stress.

iii) Nurse stations will be placed in the central area for convenience of supervision.

c. Administration and service zone

i) The administration and service zone will be placed compactly in the eastern half of the ground floor.

ii) Administration-related rooms will be located along the northern part.

iii) The supply receiving area will be located facing the kitchen, general storage and central stores.

3) Finish Works

a. Major exterior finishes

Roof	:	Aluminum roof decking
Wall	:	Mortar with paint finish
Window	:	Aluminum window and steel window
Door	:	Steel door and Aluminium door

b. Major interior finished

Floor	:	Terrazzo block tiles
Base	:	Terrazzo block
Wall	:	Mortar with paint finish
Ceiling	:	Asbestos board with paint finish

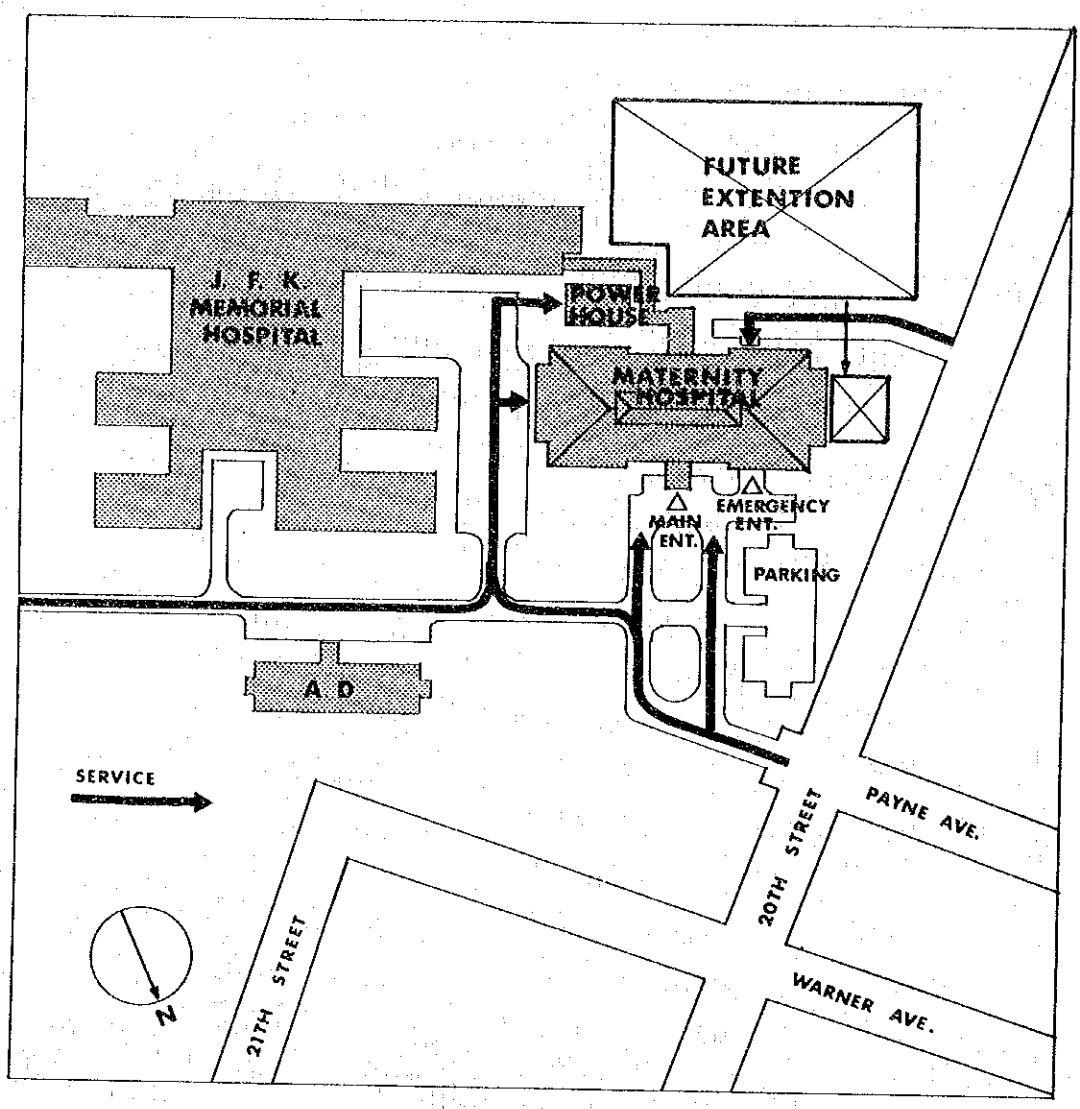


Fig. 3-1 ACCESS TO THE NEW MATERNITY HOSPITAL

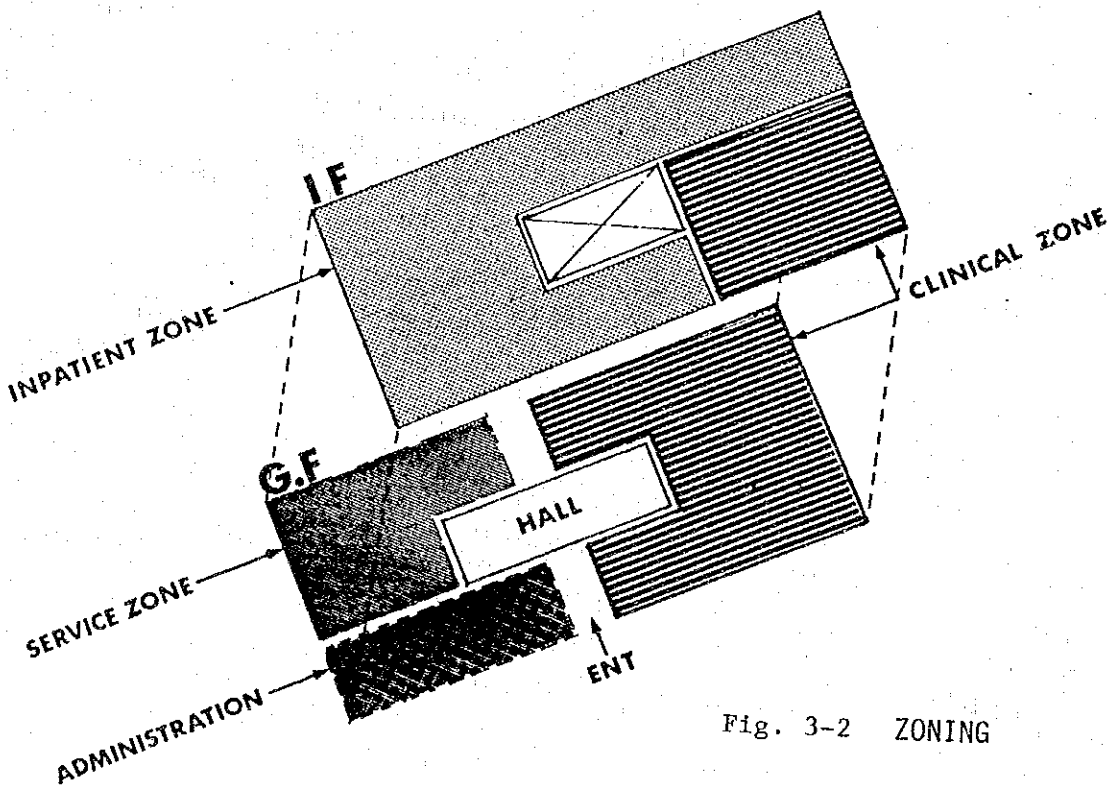


Fig. 3-2 ZONING

3-2-3 Structural design

1) Structural planning

In the Republic of Liberia, the reinforced concrete structural system and the timber framed system are normally employed for buildings.
Reinforced concrete skeletal frames will be used for the buildings of this project and the roof will be constructed with timber trusses.

2) Design criteria

Stress Analysis	: Elastic Analysis
Member Design	: ACI[1] Standards 318-77
Materials	: ASTM[2] Standards or JIS
Loads	: UBC[3] Standards

3) Materials

Reinforcement : Hot drawn Round Bar
JIS - JIS. G 3112 SD 30
ASTM - ASTM A 615 Gr 40

Concrete : Normal weight concrete

Class'A' 3000 PSI Frame, slab
Class'B' 2500 PSI Footing, Ground slab
Specific gravity γ = 2.3
Slump 5 cm - 10 cm
Air content percent age: less than 4 %

Structural steel : JIS[4] G 3192 SS 41 or Equivalent
ASTM A 449 325

Notes: 1) ACI : American Concrete Institute
2) ASTM : American Society for Testing and Materials
3) UBC : Uniform Building Code
4) JIS : Japanese Industrial Standards.

4) Seismic Load

Seismic load will not be considered.

5) Wind Load

According to the records of wind velocity in the past, maximum instantaneous wind velocity is 30 Knots.
Wind pressure is calculated as follows:

$q = 20\ h$ h : Height (m)
$W = c.q.$ q : Velocity pressure (Kg/m^2)
c : Coefficient of wind force
W : Wind pressure (Kg/m^2)

6) Live Load

Rm. name	Live Load	
	PSF	Kg/m^2
Roof	20	100
Wards, Nurseries, Toilets, ICU premature	40	200
Offices, Rms., Nurse Sts.	50	250
Storage	125	625
Operating Rms., Delivery Rms.	50	250
Corridors, Balconies, Stairs	100	500

7) Soil bearing capacity

The building will be supported by direct foundations on the sandy layer, 1 meter in depth or more from the surface ground.

$fe = 15\ ton/m^2$ (for permanent load)
$fe = 20\ ton/m^2$ (for temporary load)

4 Mechanical works design

1) Mechanical Works Planning

Designs and material standards and code of practice will refer to the Japanese Industrial Standards (JIS), Heating and Air Conditioning and Sanitary Standards in Japan (HASS) and local conditions.

2) Plumbing

a. Design Conditions

° Hospital staff 150 persons
In-patient 170 persons
Out-patient 200 persons
Clerical and other workers appropriate number

° Water Consumption (potable water) 450 l/bed

b. Potable water supply

Water from the town main will be led to the proposed site and joined to the water reservoir tank to be pumped up to the elevated tank and distributed to the plumbing fixture and equipment which use the gravity flow system (Figure 3-3). The branch line to the proposed site will be attached with a water meter encased in a box by the Liberian Water & Sewage Corporation.

Volume of water consumption	90 m^3/day
Size of the branch line to the building	80 A
Required water pressure	2 kg/cm^2

c. Medium pressure steam supply

Medium pressure steam will be generated by steam boilers and distributed to the hot water storage tank, the auto clave and some kitchen equipment which require steam (Figure 3-4).

d) Domestic hot water supply

Hot water will be accumulated in the hot water storage tank and distributed to the plumbing fixture and equipment which require hot water.

e) Drainage

Drainage will be divided into two separate systems, one for sewage and waste water, and the other for waste water from operation, delivery, utility and laboratory rooms. The sewage and waste water from the building will be collected in the catch basin and led into the final manhole and discharged to the public drainage system.

The waste water from operation, delivery and other rooms will be led into the final manhole and discharged to the public drainage system.

f) Plumbing fixture

Western-style water closets, wash basins, slope sinks, service sinks will be installed as requred. Shower sets, hose bibbs and drains will be installed as required.

g) Gas supply

To be installed in the laboratory room and the kitchen.

h) Fire protection

An interior hydrant (hose cabinet) system will be installed in the hospital building in accordance with the Japanese Fire regulations.

i) Food Service Equipment

Food Service Equipment will be installed for inpatients and hospital staff to prepare standard Liberian food, and will be operated with electricity or steam. All equipment for cooking, washing and storing will have adequate capacities as follows:

In-patients	for 170 persons
Hospital staff	for 150 persons

Following food service equipment will be provided:

- Walk-in refrigerator
- Walk-in freezer
- Reach-in refrigerator
- Griddles
- Bake oven
- Gas range
- Electric range
- Steam cooker
- Fryer
- Steam kettles
- Mixer
- Meat chopper
- Meat slicer
- Coffee maker
- Sinks
- Tables
- Wagon for in-patient meal

10) Medical gas supply & vacuum pump system

This system will consist of vacuum pump and vacuum pipe, nitrous oxide supply pipe, oxigen supply pipe, control panel, etc. Outlets of oxigen and vacuum will be installed in three bed rooms and examination & treatment rooms.

Outlets of oxigen, nitrous oxide and vacuum will be installed in treatment rooms, emergency room, short stay room, operating rooms, delivery room, anaesthesia room, ICU rooms and ICU premature rooms.

3) Air conditioning and Ventilation

a. Design Condition

External design conditions for cooling

Dry bulb	30°C
Relative humidity	80%

Indoor design conditions for cooling

Dry bulb	27°C
Relative humidity	60%

b. Air conditioning

Following areas will be air-conditioned by packaged air conditioners with remote condenser (Figure 3-5 & 3-6).

- Treatment room
- Examination rooms
- Offices
- Medical records room
- Emergency room
- Pharmacy
- Operating rooms
- X-Ray room
- Laboratory
- Delivery room
- Nurseries
- Anaesthesia room
- Conference room
- I.C.U. rooms
- I.C.U. premature rooms

c. Ventilation

- Following areas will be ventilated by mechanical devices.

  Toilets, shower rooms, bath rooms, dirty utility, dark room, kitchen, laboratory, waiting hall.

- The rest of the areas will be naturally ventilated.

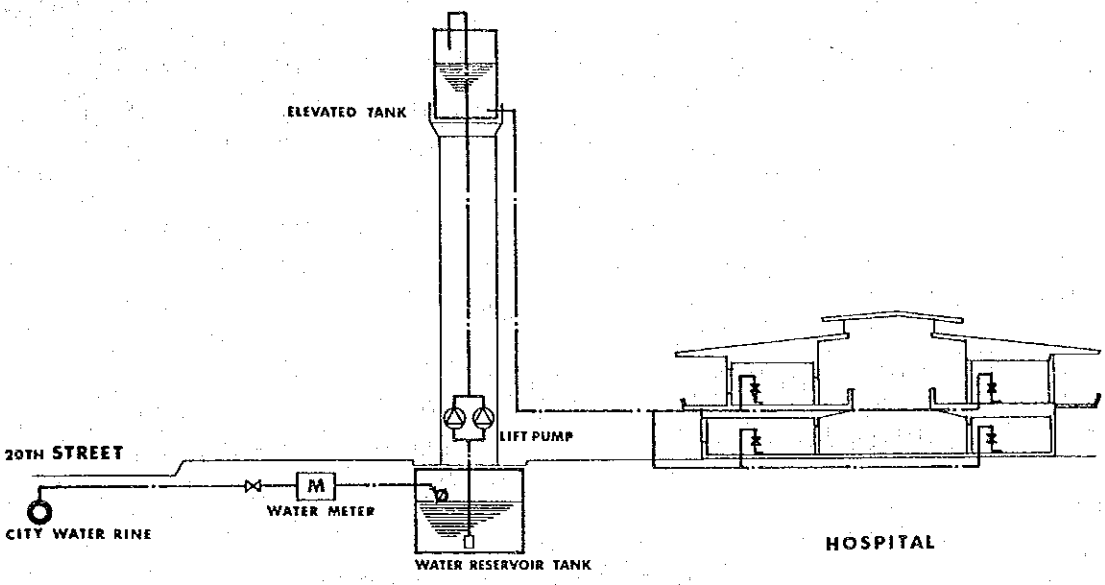


Fig. 3-3 DIAGRAM OF POTABLE WATER SUPPLY

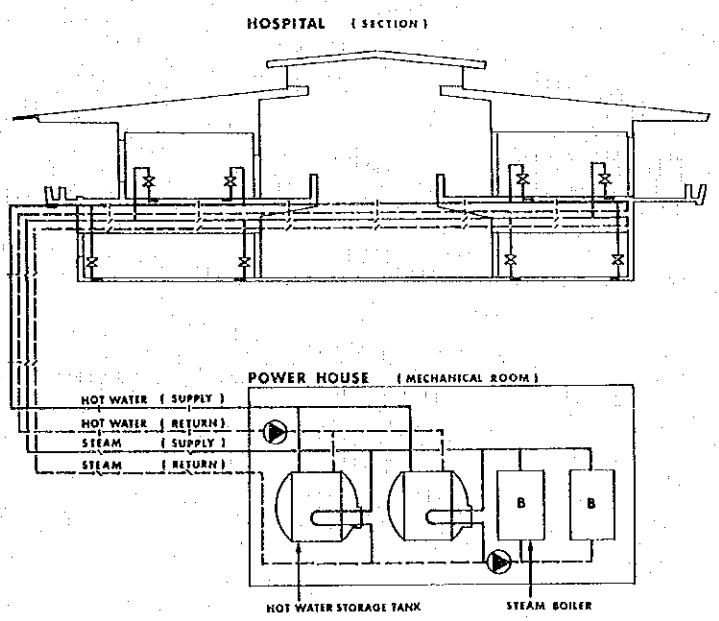


Fig. 3-4 DIAGRAM OF HOT WATER SUPPLY & STEAM SUPPLY

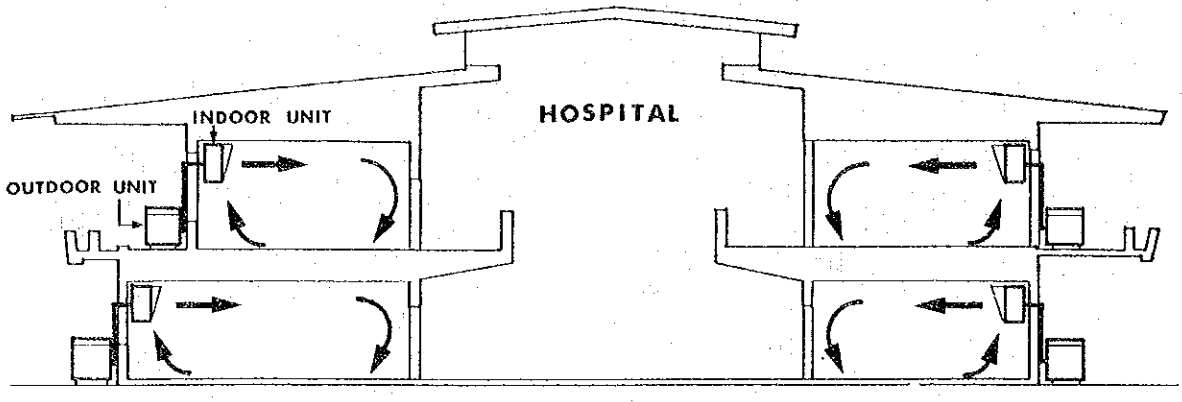


Fig. 3-5 COOLING SYSTEM

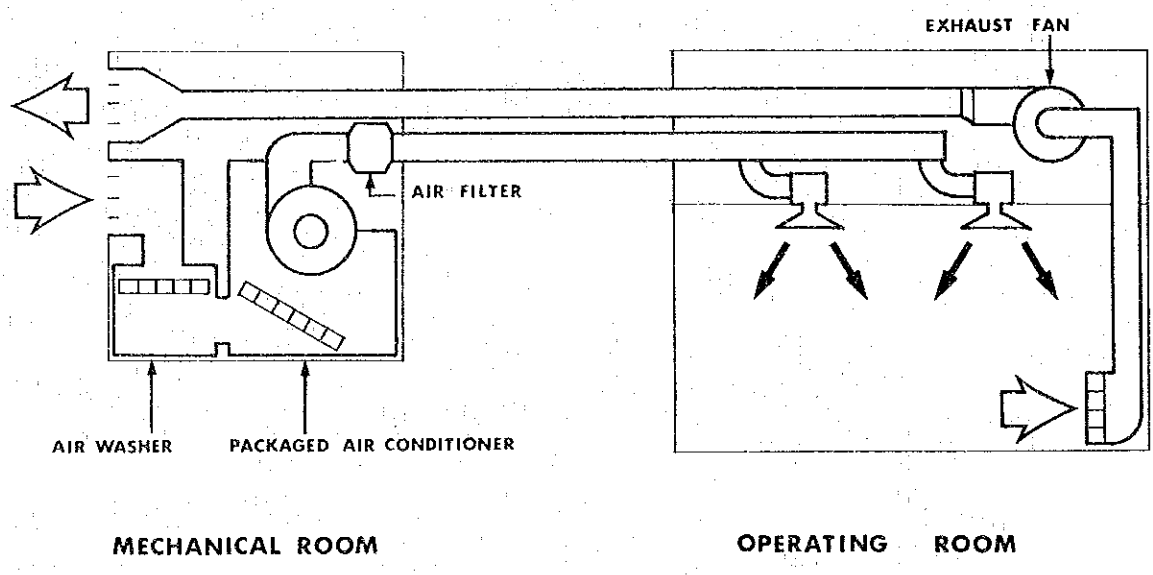


Fig. 3-6 AIR CONDITIONING SYSTEM FOR OPERATING ROOM

3-2-5 ELECTRICAL WORKS DESIGN

1) Electrical Works Planning

Designs and materials standards and codes of pratice will refer to the Japanese Industrial Standards (JIS), Japanese Electrotechnical Committee (JEC) and the Standard of Japan Electrical Manufacturer's Association (JEM) and local conditions.

2) Lighting

Typical room lighting will be as follows:

Administration offices	250 lx
Examination rooms	300 lx
Delivery room	300 lx
Toilets, storage and corridors	100 lx
Ward and bed rooms	150 lx

3) Power intake: electrical power receiving and substation facilities will be supplied as follows;

Voltage, Phase	: 12.5 KV	3Ø 3W
Frequency	: 60 HZ	
Distribution transformer	: 450 KVA, 3Ø 4W 12.5 KV/208 - 120 V	

Induction Voltage Regulators, if considered necessary, will be installed between the step-down transformer and the main distribution panel.

4) Power distribution

Feeders wiring will be through the cables from the main distribution panel in the electric room to the power control panels, lighting panels and branch panels (Figure 3-7).

3Ø 4W 208 V, 3Ø 3W 208 V	: for power & medical equipment.
1Ø 3W 208 V/120 V, 1Ø 2W 115 V	: for lighting, receptacles, medical equipment and other equipment.

5) Lighting fixture

Fluorescent lamps will be mainly used in each room and bed rooms with incandescent lamps in some places.

6) Power and control system

Motors of the lift pump and fire pump will be automatically controlled. Package air conditioners and ventilation fans will be manually operated.

7) Intercom and telephone system

Intercom instruments will be installed in the X-Ray room, operating room, entrance, nurse stations (Figure 3-8). Cross-bar telephone exchange equipment will be installed in one of the offices and internal telephone instruments as required with at least 7 external circuits and a total of about 50 internal circuits (Figure 3-9).

8) Public address system

Several loudspeakers will be installed in a hall, corridors and other places (Figure 3-10).

9) Nurse call intercom system

Nurse call push buttons will be installed in the wards, ICU, ICU premature, toilets and bath rooms (Figure 3-11).

10) TV antennas

Outlets for televisions will be installed in the waiting hall, conference room, doctors' rooms, offices and day rooms (Figure 3-12).

11) Grounding of medical equipment

Grounding of medical equipment will be done as required.

12) Electrical clock system devices

Electrical clocks will be installed in the administration office, conference room, nurse stations, waiting hall, day rooms and operating rooms.

13) Emergency alarm

Emergency bells and push buttons will be installed in a fire hydrant cabinet and some places in the corridors.

14) Lightening system

A lightening conductor will be installed on the roof of the hospital building.

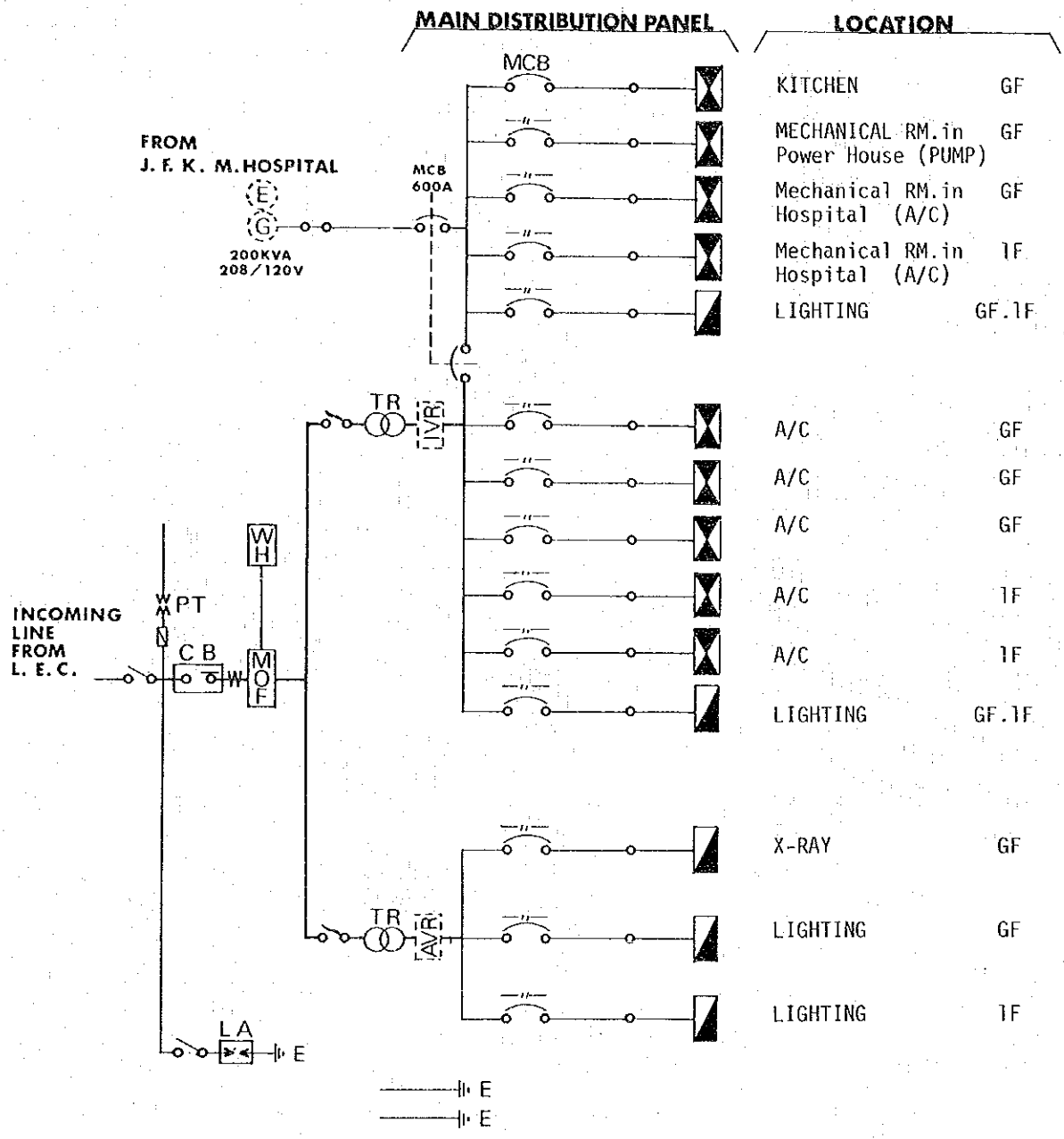


Fig. 3-7 POWER DISTRIBUTION SYSTEM

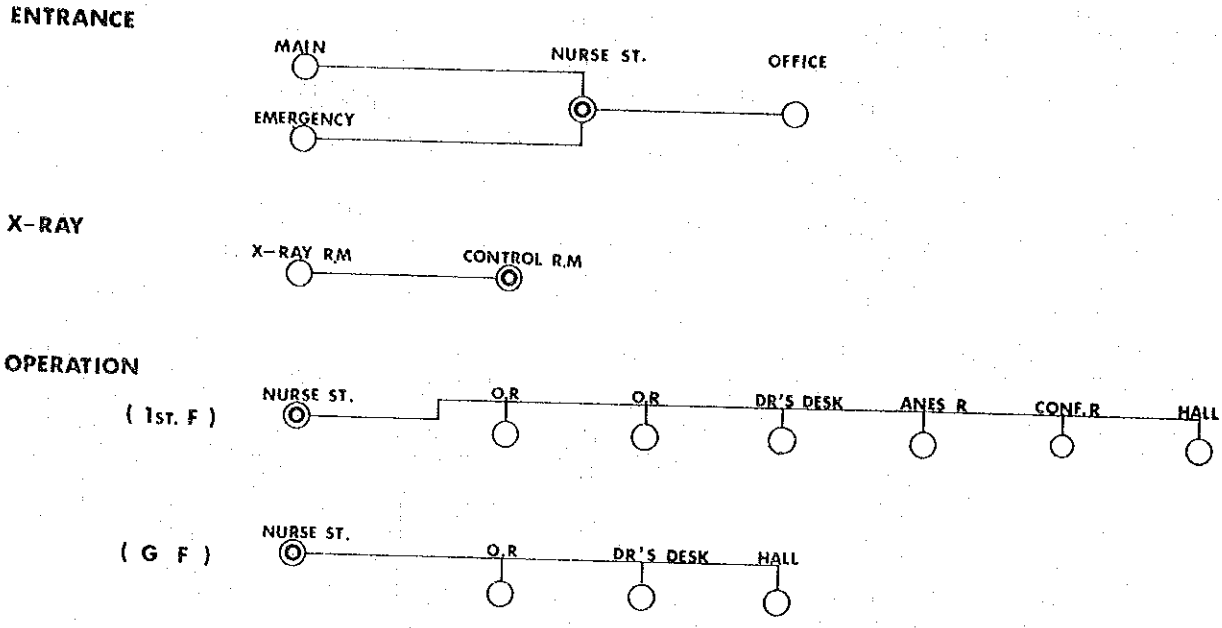


Fig. 3-8 INTERCOM SYSTEM

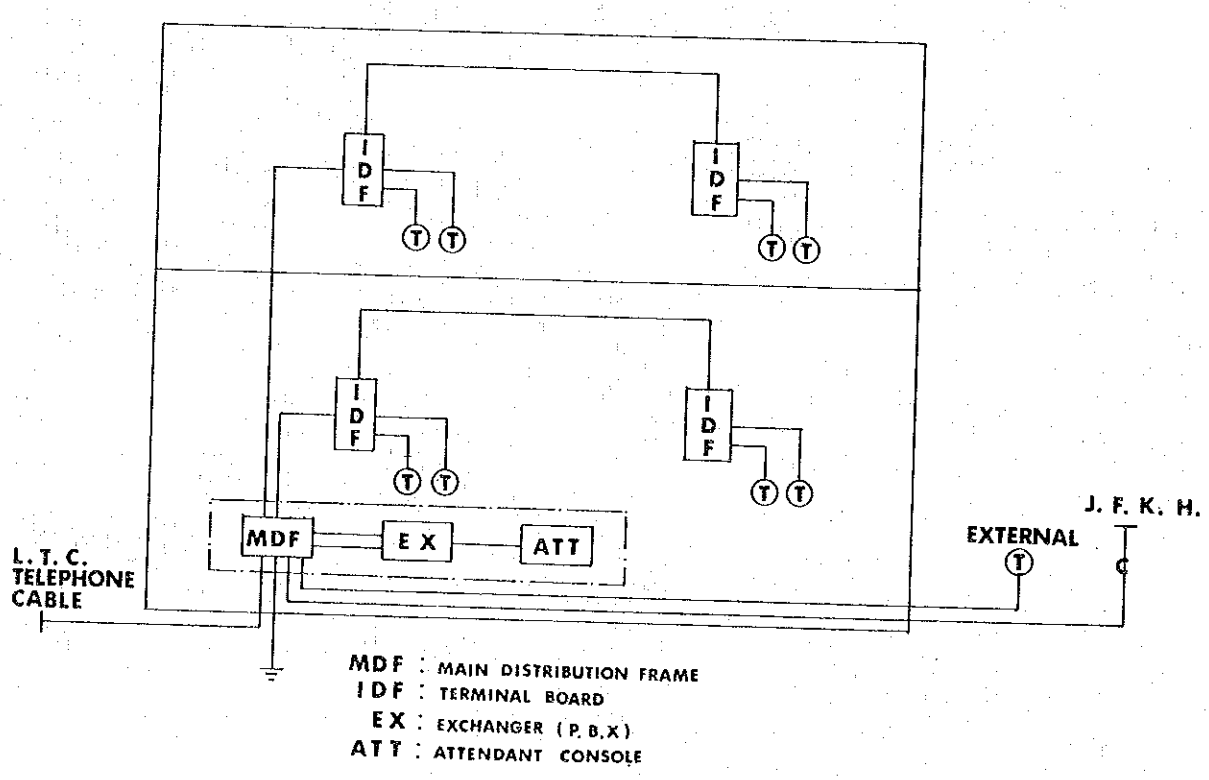


Fig. 3-9 TELEPHON SYSTEM

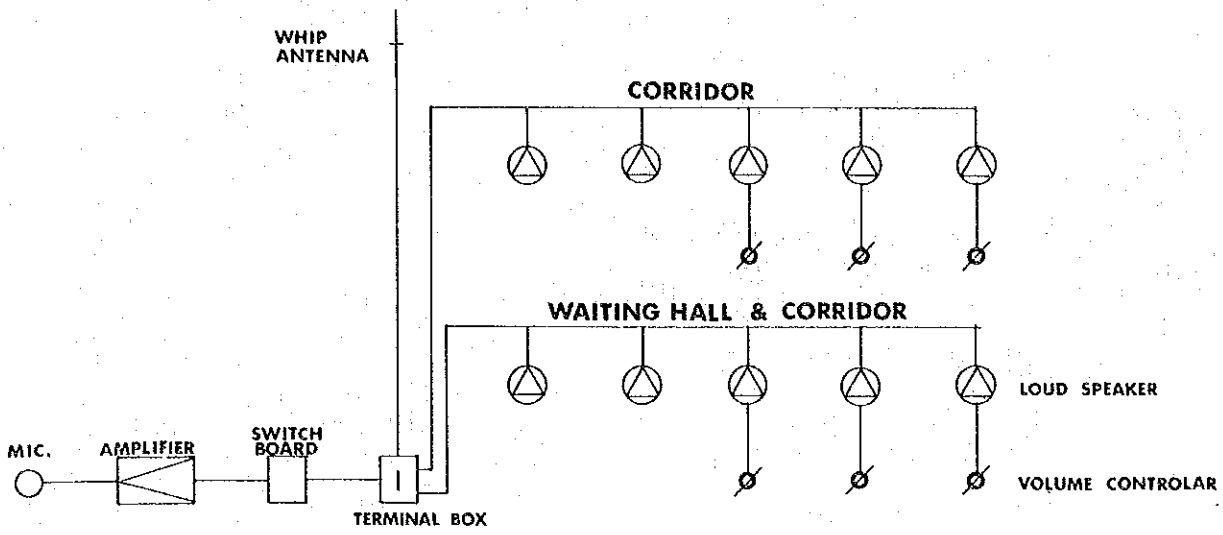


Fig. 3-10 PUBLIC ADRESS SYSTEM

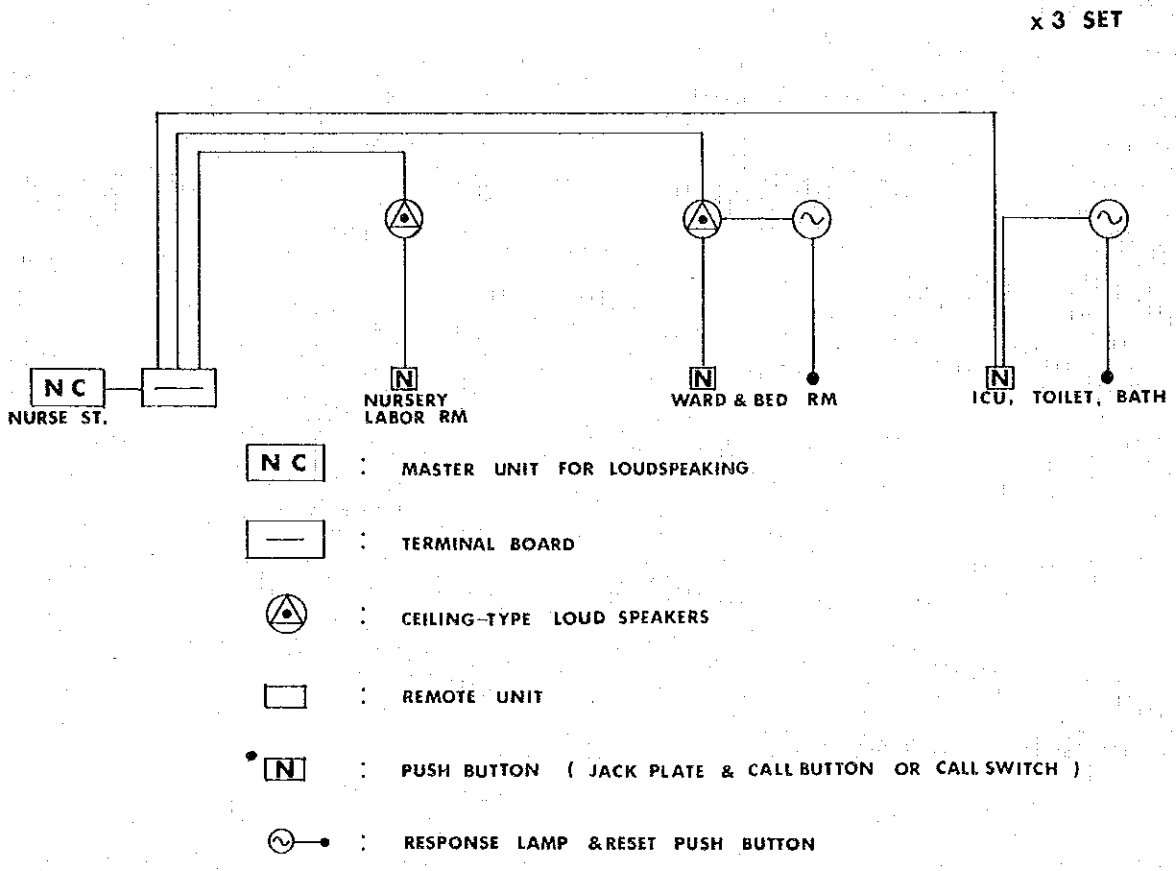


Fig. 3-11 NURSE CALL INTERCOM SYSTEM

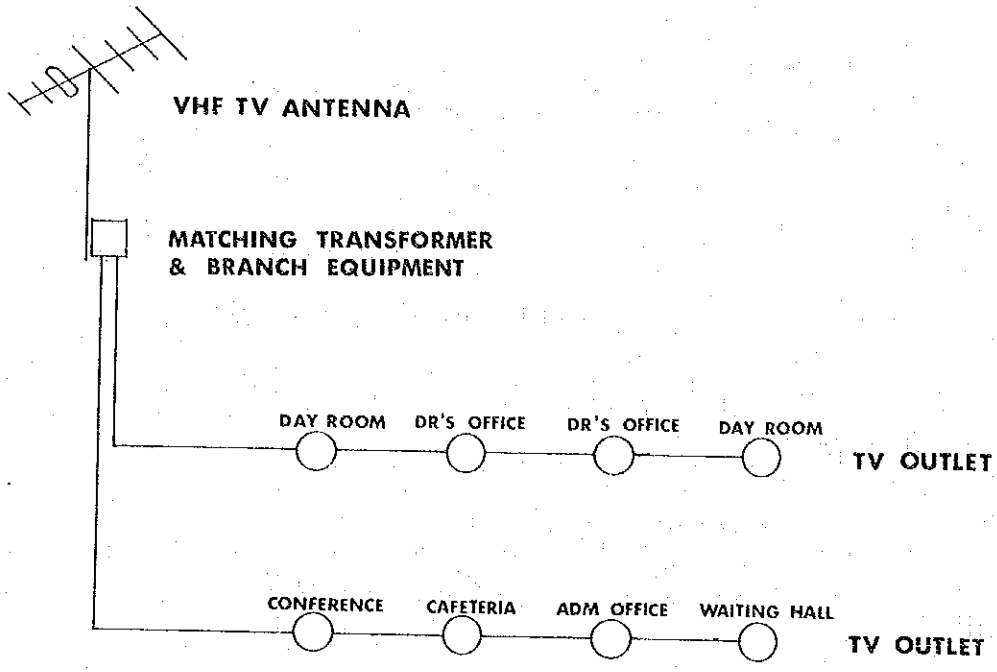


Fig. 3-12 T.V. ANTENNA SYSTEM

3-3 PROVISIONS OF MEDICAL EQUIPMENT AND MATERIALS

3-3-1 General

Medical equipment and materials to be provided by the Japanese grant aid program for the proposed Maternity Hospital are determined by taking note of the following requirements.

1) The selection of equipment and materials will conform to medical standards and conditions in Liberia.

2) Upon completion of the proposed Maternity Hospital, the Government of Liberia will bear the costs of repair and maintenance of equipment and continued supplies of various materials.

3-3-2 List of Medical Equipment

Ward

- Adult beds with side & safety rail
- Overbed table
- Bedside chair
- Incubator
- Bassinet with dresser
- Scales (Adult & Infant)
- Medicine cupboard
- Instrument table
- Bed-pan
- Auto clave
- Kreislem resuscitating cribs

Out-patient Department

- Examination table
- Footstool two-steps
- Examination couch
- Chair
- Scale (infant)
- Bassinet with dresser
- Medicine cupboard
- Instrument table
- Auto clave

X-Ray Room

- X-Ray apparatus
- X-Ray Film Developing Tank

Laboratory

- Blood analyzer
- Blood Banking Refrigerator
- Microscope
- Centrifuge

Delivery and Labor

- Delivery Bed
- Operating overhead light
- Resuscitating machine
- Kreislem resuscitating crib
- Ultra-violet light
- Anesthesia machine
- Instrument cupboard
- Auto clave
- Operating stool
- Step-on can
- Dressing table on wheel
- Suction machine
- Bassinet with dresser
- Scale (infant)
- Labor bed

Operating theaters and Central Supply

- Operating table
- Operating overhead light
- Anesthesia machine
- Sterilizer
- Auto clave
- Instrument cupboard
- Instrument table
- Step-on can

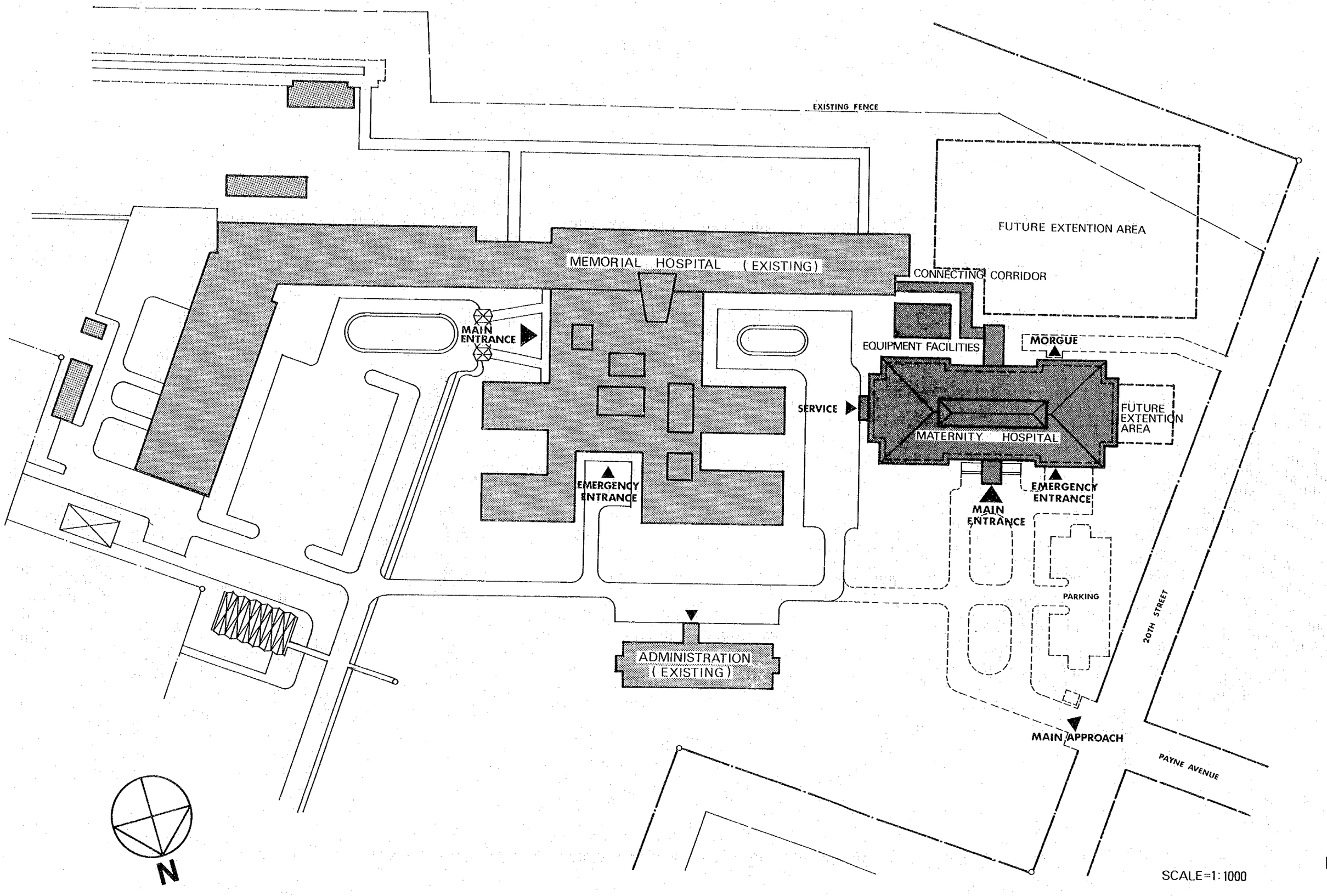
Emergency Unit

- Adult bed with side and safety rail
- Operating overhead light
- Operating table
- Chair
- Instrument cupboard
- Examination table
- Auto clave
- Step-on can

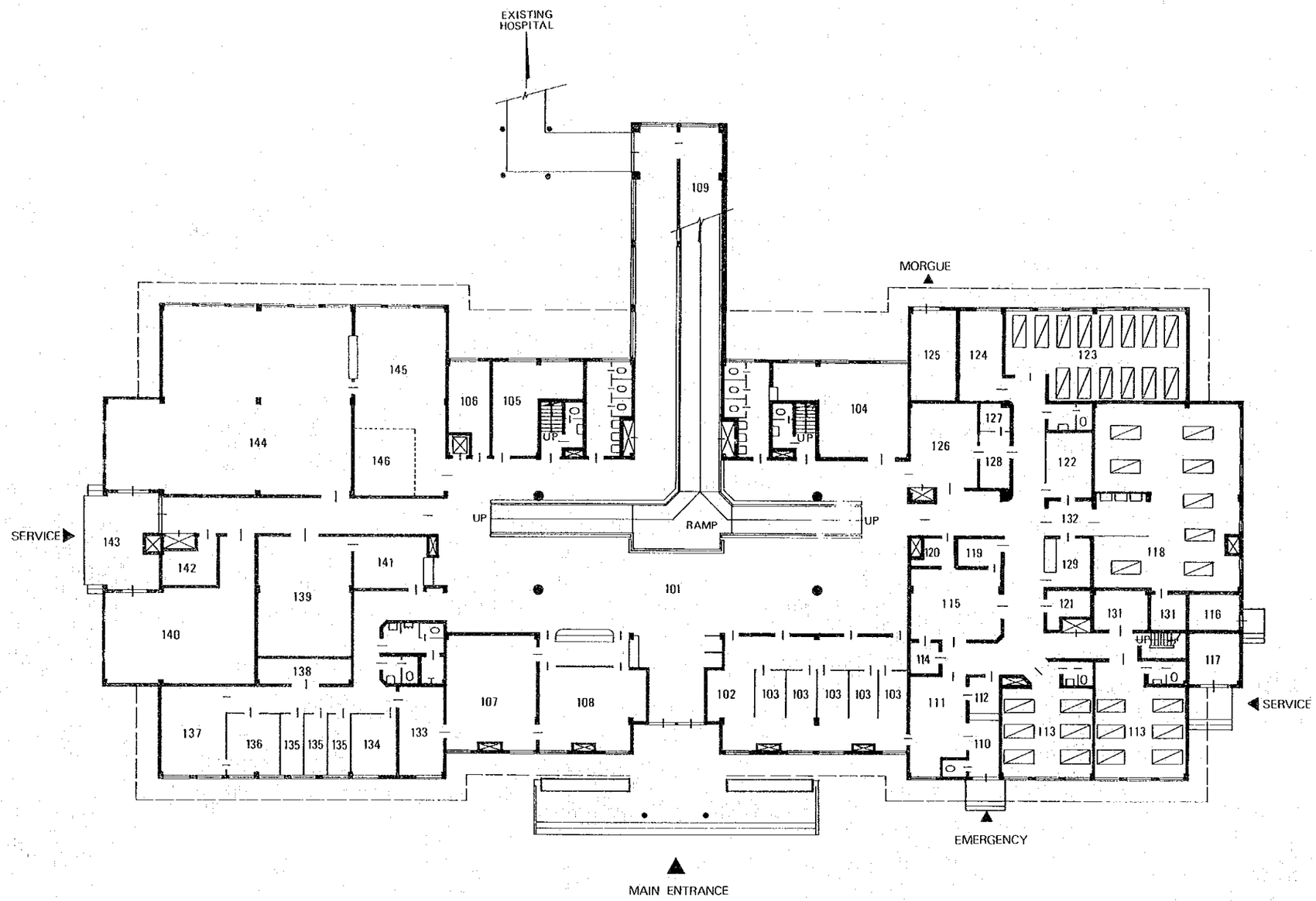
Morgue and Autopsy

- Refrigerator (2 bodies)

3-4 DRAWINGS


EXISTING FENCE
FUTURE EXTENTION AREA
MEMORIAL HOSPITAL (EXISTING)
CONNECTING CORRIDOR
MAIN ENTRANCE
EQUIPMENT FACILITIES
MORGUE
SERVICE
FUTURE EXTENTION AREA
MATERNITY HOSPITAL
EMERGENCY ENTRANCE
EMERGENCY ENTRANCE
MAIN ENTRANCE
PARKING
20TH STREET
ADMINISTRATION (EXISTING)
MAIN APPROACH
PAYNE AVENUE
N
SCALE=1:1000

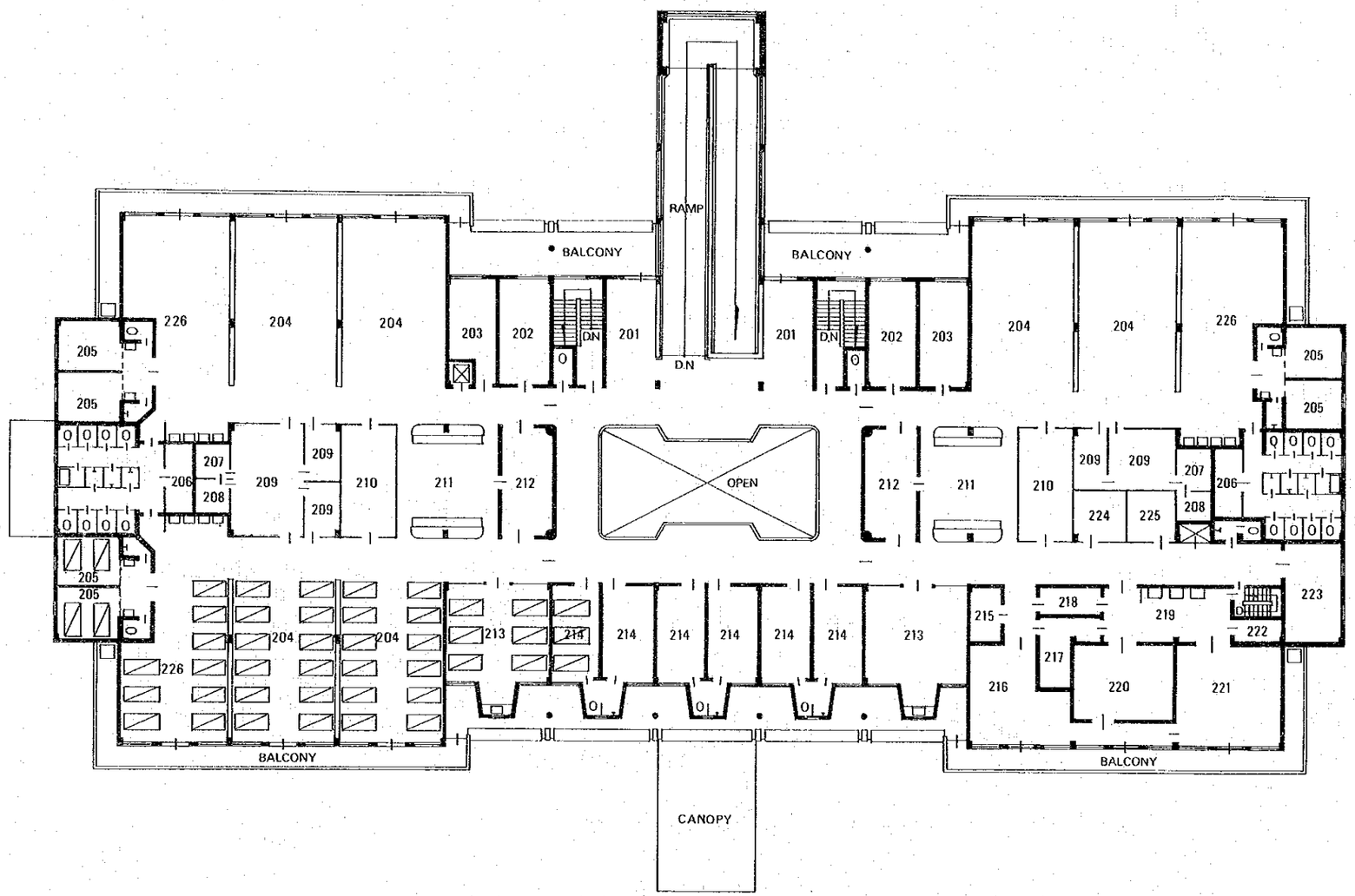
SITE PLAN



NO.	ROOM NAME
101	WAITING HALL
102	TREATMENT ROOM
103	EXAMINATION ROOM
104	LABORATORY
105	NURSES' LOUNGE & LOCKERS
106	HELPERS' LOUNGE & LOCKERS
107	MEDICAL RECORDS
108	OFFICE
109	STORAGE
110	WAITING ROOM
111	EMERGENCY ROOM
112	REGISTRATION OFFICE
113	6 BEDS (SHORT STAY) ROOM
114	SCRUB
115	OPERATING ROOM
116	OXYGEN SUPPLY ROOM
117	MECHANICAL ROOM
118	DELIVERY ROOM
119	ANESTHESIA ROOM
120	DOCTORS' LOCKERS
121	DIRTY UTILITY
122	NURSERY
123	LABOR ROOM (14 BEDS)
124	DOCTORS' OFFICE
125	MORGUE/AUTOPSY
126	X-RAY ROOM
127	DARK ROOM
128	CONTROL ROOM
129	NURSE STATION
130	DELETED
131	STORAGE
132	ANTE ROOM
133	ADMINISTRATOR'S OFFICE
134	OFFICE OF NURSE'S SUPERVISOR
135	SLEEPING ROOM
136	MEDICAL DIRECTOR'S OFFICE
137	CONFERENCE
138	STORAGE
139	GENERAL STORAGE
140	CENTRAL STORE
141	DISPENSARY (PHARMACY)
142	MAINTENANCE OFFICE
143	RECEIVING AREA
144	KITCHEN
145	CAFETERIA
146	CLASSROOM

SCALE=1:300

GROUND FLOOR PLAN

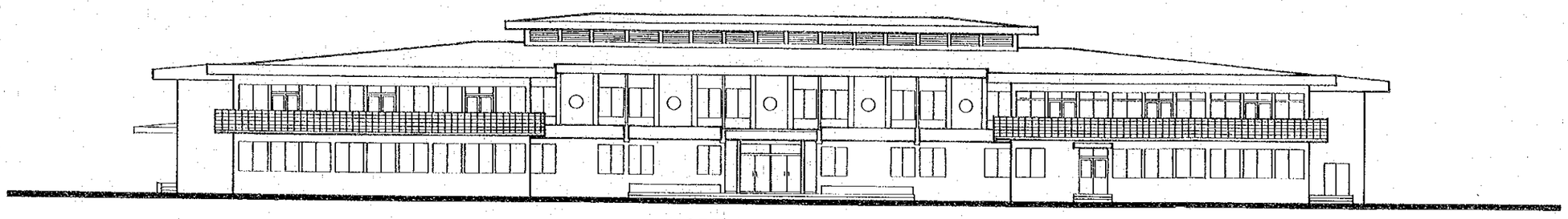


BED LIST			
FLOOR	NO.	ROOM NAME x QTY'	BEDS
FIRST FLOOR	204	12 BEDS RM.x 6	72
	226	9 BEDS RM.x 3	27
	213	6 BEDS RM.(ICU)x 2	12
	214	3 BEDS RM.x 6	18
	205	2 BEDS RM.x 6	12
		TOTAL	141
GROUND FLOOR	113	6 BEDS (SHORT STAY) RM.x 2	12
	123	14 BEDS(LABOR)RM.x 1	14
		TOTAL	26
		GRAND TOTAL	167

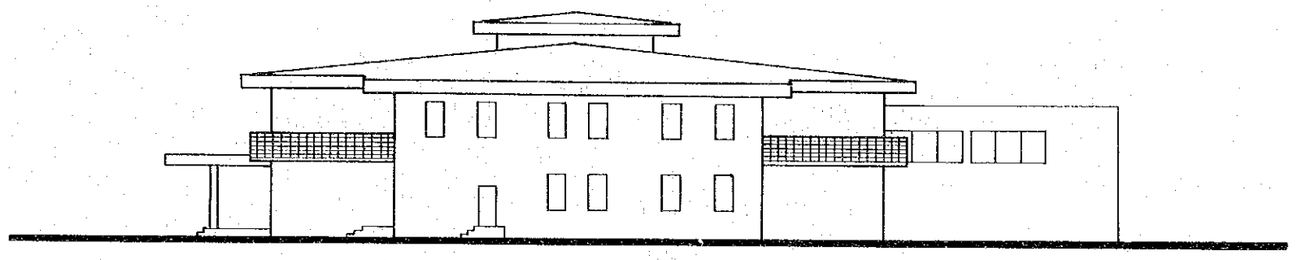
NO.	ROOM NAME
201	DAY ROOM
202	STORAGE
203	DOCTORS' OFFICE
204	12 BEDS ROOM
205	2 BEDS ROOM
206	DIRTY UTILITY
207	BABIES' BATH ROOM
208	KITCHEN
209	NURSERY
210	NICU, PREMATURE
211	NURSE STATION
212	TREATMENT ROOM
213	6 BEDS (ICU) ROOM
214	3 BEDS ROOM
215	STORAGE
216	CENTRAL STERILIZATION
217	DOCTORS' LOCKERS
218	NURSES' LOCKERS
219	PREPARATION HALL
220	OPERATING ROOM (SEPTIC)
221	OPERATING ROOM (CLEAN)
222	DIRTY UTILITY
223	MECHANICAL ROOM
224	CONFERENCE ROOM
225	ANESTHESIA ROOM
226	9 BEDS ROOM

SCALE=1:300

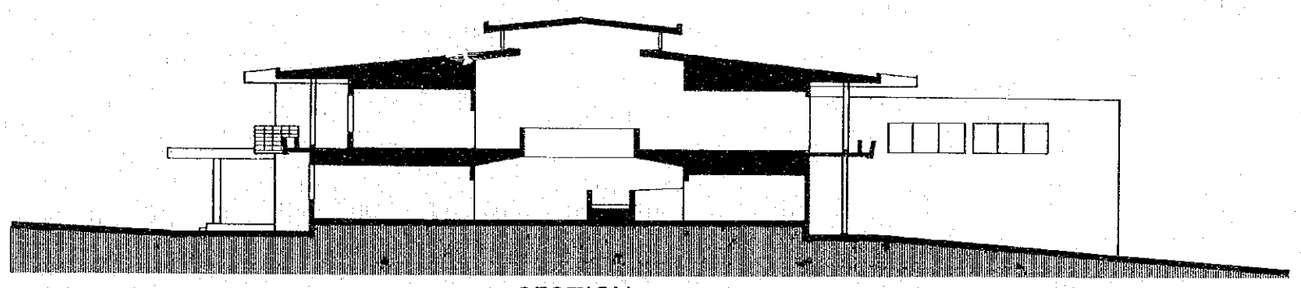
FIRST FLOOR PLAN



NORTH ELEVATION



WEST ELEVATION



SECTION

SCALE = 1:300

ELEVATION , SECTION

Chapter 4 IMPLEMENTATION SCHEDULE AND SCOPE OF THE PROJECT

Chapter 4 IMPLEMENTATION SCHEDULE AND SCOPE OF THE PROJECT

4-1 TENTATIVE IMPLEMENTATION SCHEDULE

Supposing that the project is to be implemented under the Japanese grant aid program, the schedule is tentatively set as shown below.

The overall schedule is divided into (1) the present basic design survey by technical cooperation, and (2) the detailed design, construction works, and supervision. Subsequent to the present basic design survey, the detailed design is to be started, comprising preparations of drawings and specifications necessary for construction, preparations of tendering, and construction contract documents. Among the work to be undertaken by the Government of Liberia, the changing of the direction of the existing gutter is to be completed prior to the commencement of the construction works by the Japanese Contractor.

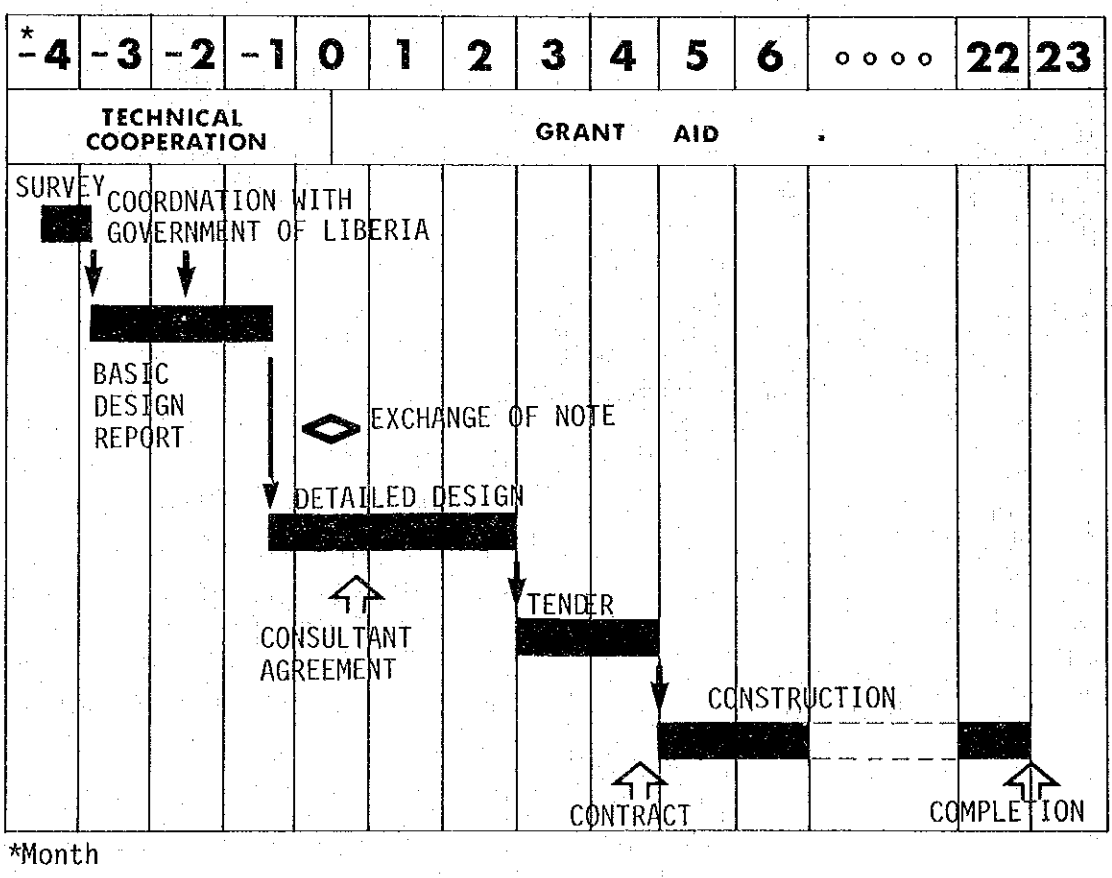


Fig. 4-1 IMPLEMENTATION SCHEDULE

4-2 SCOPE OF THE PROJECT

The scope of the project and sharing of responsibilities were discussed between the basic design survey team and Liberian authorities on several occasions and agreed by the two Governments as stipulated in the Minutes of Discussion (See Appendix II-1) and as restated below.

4-2-1 The works are to be taken by the Government of Japan: (within the scope of Japanese grant program)

1) Consulting service
   Detailed design and supervision of construction

2) Construction of the buildings and supply of equipment

   a. Buildings (See Chapter 6)

      i. Maternity Hospital
      ii. Equipment Facilities (Power house)
          Mechanical room
          Electrical room
          City water reservoir tank
          Elevated water tank
      iii. Connecting corridor

   b. Medical equipment (See section 3-3)

4-2-2 The works are required to be taken by the Government of Liberia:

1) General

   a. To ensure prompt unloading and customs clearance of imported materials and equipment for the proposed Maternity Hospital and also to facilitate their internal transportation in the Republic of Liberia.

   b. To exempt Japanese nationals concerned from customs duties, internal taxes and charges which may be imposed in the Republic of Liberia on the occasion of the supply of goods and services for the construction of the proposed Maternity Hospital.

c. To provide and authorize necessary permissions, licenses and other authorizations required for the construction of the proposed Maternity Hospital.

2) Site preparation

a. Demolition and removal of laying

b. Site cleaning and levelling

3) Utility service

a. Electric power supply to the site on a temporary basis during the period of construction and to the main electric panel of the forth-coming Maternity Hospital.

b. City water supply to the site for temporary use during the period of construction and to the main water meter of the submain branch leading to the forth-coming Maternity Hospital.

c. Drainage and sewage to the city main and/or sewage system during the period of construction and to the main pipe to the forth-coming Maternity Hospital.

d. Telephone wiring to the site on a temporary basis during the period of construction and to the M.D.F. of the forth-coming Maternity Hospital.

4) Site work

Incidental civil works of the Maternity Hospital such as planting, roads within the site, fences, gates, a gate office, parking lots and exterior lighting.

5) Furnishing

Furniture, except for those which are of medical use.

Chapter 5 CONCLUSION

Chapter 5 CONCLUSION

5-1 Suitability of the Project

The proposed Maternity Hospital is intended to meet the increasing needs in Greater Monrovia for medical services in the areas of obstetrics and gynecology. It is one of the six major health programs identified in the current National Socio-economic Development Plan.

The present report is based on the findings by the previous survey teams and reflects the details of the agreements reached with the Liberian authorities after repeated conferences over the functions and composition of the Hospital and equipment and personnel thereof.

The proposed site is on the whole flat and suitable for the construction of the Hospital. Site preparation works, which are the responsibility of the Government of Liberia, will not amount to much, considering the favorable topographic and geological conditions of the site. Moreover, the access to utilities at the site is good, requiring no major works to expand the existing facilities of water supply, sewerage and power.

Contrary to the initial projection, the construction schedule can be set to fit the Japanese single-year budget allocation system for official development assistance, as long as the starting date is appropriately chosen and the progress is closely monitored during the construction. The Government of Liberia has already started to estimate the necessary budget allocation for the operation of the Hospital and examine the staffing of the hospital personnel.

Judging from the foregoing, the proposed Maternity Hospital will be most timely vis-a-vis the needs in Liberia and suitable for the financing by the Japanese grant aid program.

2 RECOMMENDATIONS

Concerning the project implementation, it is desirable that the Government of Liberia undertakes the following measures;

1) The facilities and equipment at the proposed Maternity Hospital will be selected with the assumption that the J.F.K. Memorial Hospital will supply high-technology services such as pathological analysis, mixing of medicines, radiology, etc., and laundry services. In order to ensure the effective operation of the Maternity Hospital, therefore, it is requisite to agree on the terms of cooperation acceptable to both of the institutions before the commencement of services at the Maternity Hospital.

2) The Government should allocate a sufficient amount of funds for the effective operation of the Hospital, notably for the maintenance and repairs of the equipment and adequate supplies of medicines and other medical materials.

3) The works and administrative measures to be done by the Government of Liberia, as detailed in Section 4-2, should be carried out as stipulated in accordance with the construction schedule of the Hospital.

APPENDIX

MINUTES OF DISCUSSIONS ON THE PRELIMINARY STUDY FOR THE CONSTRUCTION PROJECT OF MATERNITY HOSPITAL IN THE REPUBLIC OF LIBERIA

In response to a request made by the Government of the Republic of Liberia for the Construction Project of the Maternity Hospital of the Ministry of Health and Social Welfare in the Republic of Liberia (hereinafter referred to as "the Project"), the Government of Japan has sent, through the Japan International Cooperation Agency, a team headed by Dr. YOSHIHIKO AMENOMORI, Head, Obstetrics and Gynecological Department, Medical Center, Japan Red Cross, to conduct preliminary study on the Project for 9 days from December 8th, 1980.

The Team had a series of discussions and exchanged views with the Liberian authorities concerned as to the Project. As the result of the discussions and the study, both sides confirmed the minutes of discussions attached herewith.

December 16, 1980

Dr. Yoshihiko Amenomori
Leader of the Japanese
Survey Team on the Construction
Project of Maternity Hospital.

Dr. Kate C. Bryant
Minister
Health and Social Welfare

MINUTES OF DISCUSSIONS

1. The Liberian side understood the system of grant aid program of the Government of Japan.

2. The Government of Republic of Liberia has already acquired the land as the proposed site for the new Maternity Hospital of the Ministry of Health and Social Welfare (hereinafter referred to as "the Hospital"). The address of the proposed site is Compound of JFK Memorial Hospital situated on Tubman Boulevard, Sinkor, Monrovia.

3. The objective of the Project is to construct the new buildings and install facilities for the Hospital in order to meet the increasing requirements of services and activities in the field of Maternity and Gynecology.

4. The Hospital will have the following functions:
   a) Maternity
   b) Gynecology

5. The Hospital will be composed of the buildings and facilities as listed in Annex I, the priority of the Government of Republic of Liberia for them is shown in parentheses respectively.

6. All running expenses necessary for operation and maintenance of the Hospital are to be borne by the Government of Republic of Liberia

7. The Team will convey the request of the Government of Republic of Liberia to the Government of Japan that the latter will take necessary measures to send a basic design study team as soon as possible.

8. The Team will also convey to the Government of Japan suggestions and proposals, designs and other specifications from the Liberian team for incorporation into this originally proposed project. These proposals are included in Annex II.

ANNEX I

The buildings and facilities composing Maternity Hospital and the requirement priority presented by the Government of the Republic of Liberia are as follows:

a) Administration Area
b) Inpatient Care Units
c) Outpatient Departments
d) Labor-Delivery Unit
e) New Born and Premature Baby Unit
f) Radiology Unit
g) Clinical Diagnostic Laboratories
h) Surgical Suite
i) Pharmacy
j) Service Facilities

ANNEX II (Appendix II)

INTRODUCTION

During the fiscal year 1978/79 the Liberian Government entered into negotiations with the Government of Japan on the construction of a new Maternity Hospital within the existing compound of the John F. Kennedy Memorial Hospital in Sinkor, Monrovia. The Government of Japan, having accepted in principle the construction of this Maternity Hospital, sent a Team in December 1980 to hold preliminary technical discussions with their Liberian counterparts and officials of the Liberian Government. Following is a report of that discussion as presented by the Liberian Team:

1. The construction of the Maternity Hospital shall be undertaken by the Government of Japan as a Grant in Aid to the Government of Liberia.

2. The architectural designing, planning and technical drafting shall be undertaken by experts of the Government of Japan in consultation with experts of the Government of Liberia during all phases of planning and construction.

3. Based on available data which has been presented to the Japanese Team by the JFKMC, there is a definite need not only for a Maternity Hospital, but a hospital complex which incorporates the clinical services for the management and treatment of obstetrical, gynaecological as well as newborn infants (age 0-12 months). This suggestion for the modification of the original project plan is based on the following indicators:

   i) Cultural factors - normal newborn babies need to be housed with their mothers to encourage "demand breast-feeding, bonding and rooming-in".

   ii) Staff shortage demands that maternity and infant care facilities be in close proximity of one another to provide concentration of medical and nursing staff under one roof, easy accessibility

of personnel to cover both services and efficient emergency coverage of both services.

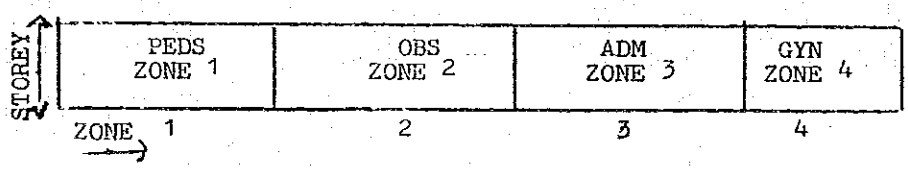
iii) peri-natal morbidity - there is a definite correlationship between the rising trend in peri-natal morbidity as observed in the Hospitals of the John F. Kennedy Medical Center and the strict physical separation of maternal and neonatal care services. To avoid this rising trend with all its grave consequences, it is proposed that a neonatal section be incorporated into the Maternity Hospital.

4. Based on data presented, it is proposed that the Maternity Hospital be planned to have a total in-patient capacity of 300 beds (250 adult beds for OBS/GYN and space for the remaining 50 beds could be utilized to accommodate at least 100 paediatric cots for patients in the 0-12 months age bracket).

5. The architectural plans should consider re-inforcement of the building's foundation to accommodate future vertical expansion and consequent addition of more storeys as the need arises.

6. The architectural plans and designs should be so simplified to take into consideration the shortage of medical manpower - doctors, nurses, midwives, technicians, etc., and the functional requirements of a Maternity Hospital and complementary in design and aesthetics to the existing John F. Kennedy Memorial Hospital.

7. The suggestion that the structure be planned and designed to accommodate two (2) additional storeys in addition to the proposed design of two (2) storeys (making a total of four (4) storeys when completed); designed for vertical expansions as the need arises and that the proposed project building be arranged into four (4) vertical zones to accommodate Obstetrics, Gynaecology, Paediatrics and Administration. (see below)



a. The ground floor is to house the out-patient department, Emergency Unit with 20 short-stay beds/cots - (10 for maternity, 10 for peds), special clinics and all other auxiliary facilities for both maternity and paediatrics. It should also include the main entrance to the hospital providing admission, and related administrative facilities.

b. The 1st two floors should house the four zones shown above, stacked with all facilities and support systems as specified in the general data, so that when the need arises for vertical expansion, said facilities would already be provided for.

NOTE: On the top floor, the Administration Area now becomes the area where the three (3) operating theatres and their auxiliary facilities are to be provided.

THE PROPOSED JFK MATERNITY HOSPITAL SHALL CONTAIN THE FOLLOWING:

I. On the Ground Floor Services

1. Out-patient Department
   - i. OBS cases - 60/pts/day
   - ii. GYN " - 200/pts/day
   - iii. paediatrics - 300/pts/day
2. Administrative Offices for OPD
3. Waiting Room Space for each Service above
4. Admitting and Registration Rooms
5. Short-stay Unit for OB/GYN and ped cases (about 10 beds and 10 cots respectively)
6. Emergency Room for OB/GYN
7. Small Emergency Room for Operation
8. Dispensary for Each Service
9. Nursing Office
10. Medical Records
11. 2 classrooms (student nurses, medical students)
    1 Conference Room & Library
12. X-ray Unit
13. Dietary facilities (kitchen, cafeteria, etc.)
14. Central Supply Room
15. 1 Classroom for teaching parents (i.e. maternal child health clinic)
16. Laundry units
17. Morgue/Autopsy
18. Laboratory facilities

II. Obstetrics Service - approx. 180 beds

1. Standard functional units inclusively (see general data)
2. Staff working units
3. Nurses Station

OB Service cont'd

4. Doctors Office and Consultation Rooms
5. Examination and Treatment Rooms
6. Storage Rooms
7. Utility Rooms
8. 4 General Wards (40 patients ea.)
9. private & Semi-private Wards (20 patients)
10. Operating Theatres (3 rooms)
    2 Sterile
    1 Septic
11. Examination Rooms
12. Labor Room - 15 patients
13. Delivery Room - 10 patients at a time
14. Neonates:
    ICU - 5 bassinets/isolets
    Nursery - 50 bassinets
    premature - 10 bassinets
    post-natal - 25 bassinets
    Ante-natal - 25 bassinets
    Isolation - 5 cots

Total number of beds - 180 (adult)

III. Gynaecology Department - Total no. of patients - 80

1. 2 General Wards - 30 patients ea.
2. 1 Septic - 10 beds
3. 4 private & 3 Semi-private rooms - 10 patients
4. Other units as listed 1 - 7 under Obstetric Services

IV. Paediatric Department

1. Isolation Unit - 10 bassinets
2. Tetanus Unit - 10 bassinets
3. Respiratory Unit - 4 bassinets
4. Rehydration Unit - 10 bassinets
5. General Unit - 10 bassinets

ped Department cont'd

6. Recovery Room - 10 bassinets
7. private/semi-private
8. All other units as listed 1-7 under OB Services

V. Additional Facilities/Space

1. physicians sleeping rooms
2. 1st Floor - students, laboratory technicians
3. 2nd Floor - Interns, x-ray technicians
4. 3rd Floor - Residents, anaesthesiologists

The need for a new Maternity Hospital has arisen from facts based on present conditions and statistics. The present day Maternity Hospital was built in 1926. It has long since out-grown its maximum capacity. Besides the tremendous patient overload, the present facilities are inadequate and, for the most part, deteriorated. Consequently, relatively much has to be spent on supporting the electrical and plumbing systems and maintaining the building generally.

The following statistics confirm the trend and give credibility and support to the cause for a new Center. We cite for the last three years:

	1977-78	1978-79	1979-80
Total No. of Admissions (adults & neonates)	18,382	20,166	31,572
Total No. of deliveries	8,296	9,125	9,812
" " " Maternal deaths	40	50	55
" " " peri-natal mortality	472	565	574
" " " Stillbirths	265	342	348
*Total " " Operations	1,448	1,759	2,008
Major	408	488	519
Minor	1,040	1,271	1,489

*Operations do not include those performed at the JFK Memorial Hospital. About 400 operations and procedures are performed yearly at JFKMH.

	1977-78	1978-79	1979-80
Total No. of out-patients include ante-and post-natal patients	50,378	56,986	55,048
Total births	7,502	8,411	9,812
Bed occupancy	103.3%	104.4%	108.0%

	Bed Capacity	Actual Census '80
OBS - I	47 beds	80 pts
OBS - II	60 "	106 "
Labor Ward	11 "	20 "
Nursery	71 bassinets	96 "
	189	302 "

PROPOSAL FOR INFANTS TO BE INCORPORATED INTO THE NEW MATERNITY HOSPITAL

Since we recomend building a modern neonatal unit with an up-to-date ICU that can serve our population for better care and serve as the teaching units for personnel taking care of neonates in Liberia, then the new Maternity Hospital should include:

I. Neonatal Service

a. Normal newborn babies to be housed with their mothers to encourage 'demand' breast-feeding and 'bonding'

b. A 50-bed Nursery to house normal newborns - this is necessary in case mother is ill or mother needs a rest and sometimes at visiting hours if mother's ward is overcrowded.

2. A premature unit to accommodate 10 premature babies born in hospital and 2 or 3 side rooms to accommodate 2 - 3 mothers in each who come in with premature babies born out of hospital and to accommodate mothers for a few days to teach them the care of the premature baby before the baby goes home. This unit could also serve as the Special Care Unit (SCU) for "high risk infants" such as babies born to diabetic mothers, babies highly asphyciated at birth, etc.

3. NICU - Neonatal Intensive Care Unit - At least 5 incubators
   a. to accommodate extremely premature babies (under 1500 gms)
   b. Babies with life threatening congenital abnormalities
   c. Sick newborns

4. Isolation section for infected cases - about 5 cots

In order to incorporate a more comprehensive medical care to include preventive services, the field of peri-natal medicine must develop hand-in-hand with neonatology. This requires close cooperation between Obstetrician and paediatrician in order to lower premature deliveries and identify "At-Risk Infants" during prenatal life. These facilities are to be an integral part of the Obstetric Department.

II. In addition, the Maternity Hospital should include space for babies age 0-12 months. As proposal I above, but now we have a general ward with compartments to house

1. Tetanus babies and their mothers in a quiet end of the ward - about approx. 10 cots.
2. Isolation or infections section for measles, hepatitis, infective diarrhoeas, whooping cough, etc., - approx. 10 beds/ cots
3. Section for respiratory cases - 5 - 10 beds/cots

4. Rehydration Unit - approx. 10 beds
5. Miscellaneous - " 10 "
6. Surgical & Recovering cases - approx. 10 beds/cots
7. 2 private rooms, 2 Semi-private

III. Emergency Room/OPD Space on Ground Floor

The ER should be spacious and have short-stay open cubicles (about 10 beds) mainly for rapid rehydration and observation. The OPD should be spacious and well ventilated to accommodate about 300 out-patients/day. This area should be sectionalized to include special clinics such as malnutrition, prematurity and other peri-natal morbidities.

ARCHITECTURAL CONSIDERATIONS

OXYGEN SUPPLY

If oxygen and suction outlets are provided in certain 1-bed rooms, Intensive Care Unit and Isolation rooms for critically-sick patients, then provisions should be made for central oxygen supply. However, consideration should be given to existing pertinent factors, i.e. correction of pipelines from highly humidified ocean wind, explosions, fire hazards and poisonous oxides.

Hence, from the aforementioned data, a tentative planning and programming proposal is hereby formulated by the Ministry of Public Works based on the needs of the Ministry of Health & Social Welfare and the John F. Kennedy Medical Center and the fundamental principles of modern hospital planning, namely, circulation and the 4 related principles:

1. protection of the patient from unnecessary disturbances and contamination.

2. Short traffic routes, with as much separation as feasible to assist in the assurance of asepsis and efficiency.

3. Separation of dissimilar activities - separating the "clean" from the "dirty" operations of a hospital, separating different types of patients - OBS vs GYN, separating quiet and noisy operations, separating pleasant and unpleasant functions, etc.

4. Control for supervision of patients, corridors and wards, infants against germs brought in by visitors or even doctors, etc.

GENERAL DATA

A. 300 Bed Maternity Hospital

I. EMERGENCY UNIT

a. Emergency Room
b. Emergency O.R.
c. " Observation
d. " Office (Doctor's)
e. " Treatment
f. " Support Facilities
g. " Waiting Room
h. Public Toilets

II. OUTPATIENT DEPARTMENT

a. Lobby/Waiting Area
b. Information/Records
c. Dressing Rooms
d. Examination Rooms
e. Treatment/Injection Rooms
f. Short-stay Area with 10 beds
g. Doctor's Office

III. Obstetrics Ward (1st Floor) - 180 Beds

a. Ante-natal - 40 beds
b. post-natal - 70 "
c. Labor - 25 "
d. Delivery - 15 "
e. Septic - 20 "
f. ICU - 10 "

180 beds

g. OBS Waiting Room

IV. OPERATING ROOMS/THEATRES (1st Floor

a. 2 for sterile cases
b. 1 for Septic "
(with all the support facilities, i.e.)
c. Scrub rooms
d. Clean-up
e. Sub-sterilization
f. Anaesthesia

V. GYNAECOLOGICAL WARDS (2nd Floor)

a.	4 private Rooms	4
b.	3 Semi-private rooms	6
c.	2 - 30 Bed Ward	60
d.	1- 10 ~~wards~~ Bedwards (Septic)	10
		80

e. Day Rooms
f. public Baths

B. ADMINISTRATION

a) Lobby/Waiting
b) Admission/Information/Registration
c) Records
d) Cashier/Business Office

e) Doctors' Office
f) " Lounge & Locker Rooms
g) Administrator's Office
h) Supervisor or Nurses' Office
i) Teaching Classrooms (2)
j) Conference Room & Library

C. DIAGNOSTIC FACILITIES

a) Dispensary (pharmacy) & Storage
b) Laboratory
c) Emergency x-ray units with facilities
d) Mobile Oxygen Supply
e) Morgue/Autopsy
f) EKG BMR

D. GENERAL SERVICE FACILITIES

a) Kitchen & Kitchen Storage
b) Staff Dining Room/Cafeteria
c) Help Lounge & Locker Rooms
d) Nurses' Lounge & Locker Rooms
e) Laundry & Facilities
f) Central Stores
g) Central sterilization
h) General Storage
i) Receiving Areas
j) Maintenance
k) Mechanical Room

AMENITIES

A. - parking
- Landscaped open spaces

B. Facilities for Newborn (Neonatal Service)
- 100-bed paediatric Unit (age 0-1 yr)

I. a) 50-Bed Nursery for normal newborns

b) 10 incubators for hospital-born prematures with (3) 3-bed wards to accommodate mothers bringing in "premies" born out of the hospital, and also to accommodate said mothers during teaching of post-natal care of the premies. This may also serve as "SCU" (Special Care Units) for "High Risks" infants.

c) 5 bassinets for (NICU) neonatal intentive care units to accommodate:

1. Extremely premature babies - 1500 gms or less
2. Babies with life threatening congenital abnormalities
3. Sick newborns

d) 5 Cribs/cots - rehydration unit

e) 10 Cribs/cots for isolation "

f) 5 Cribs/cots for tetanus babies and accommodation for their mothers

g) 5 Cribs/cots for respiratory cases

5 Cribs/cots for miscellaneous cases

h) 10 Cribs/cots for surgical and recovery

i) 2 Cribs/cots for 2 private patients

j) 4 Cribs/cots for 2 semi-private patients

II. Emergency Unit - Short-stay open cubicles - 10 Cribs/cots

OPD - capacity - 300 persons to be sectionalized to include special clinics for mal-nutrition, rehabilitation unit, etc.

III. Nurses Stations

IV. Play room

V. Utility Room

VI. Storage Room

VII. Examination and Treatment Rooms (OPD & Wards)

VIII. Waiting & Consultation Rooms (OPD & Wards)

From past experiences, we have observed that architectural standards, in terms of minimum space requirements differ from country to country, due to the difference in climate, cultural life-style and other pertinent factors. Hence, we deem it necessary and expedient to recommend the below minimum space requirements in terms of area in square feet (S.F.), for basic spaces found in the proposal identified as ANNEX I (APPENDIX I). The space requirements for other spaces can also be determined by the type of equipment to be used, and the suggested space requirements or clearances by the manufacturer (s) as guidelines in the preliminary design and design development of this project:

SPACE	Approx. Minimum Area in Square Feet
A. 300-BED MATERNITY UNIT	
I. Emergency Unit	
a) Emergency Room	240
b) Emergency Operating Room	320
c) " Observation Room	192
d) " Doctor's Office	160
e) " Treatment Room	176
f) " Treatment Support Facilities	160
g) " Waiting Room	320
h) public Toilets	
Toilet Stalls - 3' x 5'	
Shower 3' x 3'	
Lavatories 1'-8" c/c	

	Approx. Minimum Area in Square Feet
II. Out-patient Department	
a) Lobby/Waiting Area	1800
b) Information/ Records	375
c) Dressing Room (s)	150
d) Examination Rooms	120
e) Treatment/Injection Room	150
f) Short-Stay Area with 10 Beds	660
g) Doctors Office	150
III. Obstetrics Ward (180 Beds)	
a) Ante-natal	
b) Post-natal	
- Private Rooms	160
- Semi-private	192
- 40-bed General Ward	2500
- 10-bed Septic Ward	660
Alternate:	
- 4-bed Ward	286
- 8-bed Ward	528
- 12-bed Ward	858
c) Labor	
- one Table	160
- two-Table	195
d) Delivery	440
e) Septic	
- One Bed	160
- Two Bed	192
- Four Bed	260
- Ten Bed	660
f) Intensive Care Unit (Same as above)	
g) OBS Waiting Room	330

		Approx. Min. Area in Sq. Ft.
IV.	Operating Rooms/Theatres	
	a) Sterile Cases	350-440
	b) Septic Cases	350-440
	c) Scrub Rooms	70
	d) Clean-up	120
	e) Sub.sterilization	80
	f) Anaesthesia Room	100
V.	Gynaecological Ward	
	a) Private Room	160
	b) Semi-private Room	192
	c) 10-bed Septic	660
	d) 30-bed Ward	1875
	ALTERNATE (Same as OBS Ward)	
	e) Day Room	500
	f) public Toilets & Baths	
	- toilet stalls 3' x 5'	
	- shower 3' x 3'	
	- lavatories 1'-8" c/c	
B.	ADMINISTRATION	
	a) Lobby/Waiting	1800
	b) Admission/Information/Registration	300
	c) Records	1200
	d) Cashier/Business Office	450
	e) Doctor's Office	180
	f) " Lounge & Locker Room	350
	g) Administrator's Office	250
	h) Supervisor of Nurses Office	180
	i) Teaching Classrooms	300
	j) Conference Room & Library	360

	Approx. Min. Area in Sq. Ft.
C. DIAGNOSTIC FACILITIES	
a) Dispensary (pharmacy) & Storage	300
b) Laboratory	432
c) Emergency x-ray Unit with facilities	468
d) Mobile Oxygen Supply	120
e) Morgue/Autopsy	500
f) EKG BMR	100
D. GENERAL SERVICE FACILITIES	
a) Kitchen & Kitchen Storage	1800
b) Staff Dining Room/Cafeteria	500
c) Help Lounge & Locker Rooms	450
d) Nurses Lounge & Locker Room	500
e) Laundry & Facilities	600
f) Central Stores	1000
g) " Sterilization	450
h) General Storage	1200
i) Receiving Area	600
j) Maintenance	400
k) Mechnical Room	500

AMENITIES

** Parking - 9' x 19' parking stall/care
- Landscaped open spaces

E. ADDITIONAL FACILITIES/SPACE

A. Physicians Sleeping Rooms

1st Floor - Students	160
2nd Floor - Interns & x-ray Technicians	160
3rd Floor (Residents & Anaesthesiologist	160

B. 100-BED/CRIB PAEDIATRIC UNIT (Age 0-1 year)

I.	NURSERY	
	a) 50 Bed Nursery	1.5 to 4.5 S.F./Bassinet
	b) 10 Incubators	1.5 S.F./Incubator
	3-Bed Ward (Mothers, etc.)	250 Sq. Ft.
	c) 5 Bassinets	1.5 S.F./Bassinet
	d) 5 Cribs/cots	4.5 S.F./Cribs
	e) 10 " "	" " "
	f) 5 " "	" " "
	g) 5 " "	" " "
	h) 10 " "	" " "
	i) Private Room	125 Sq. Ft.
	j) Semi-private Rooms	190 " "
II.	EMERGENCY UNIT	
	a) 10 Cribs/Cots	1.5 to 4.5 Sq.Ft./Bassinet
	b) OPD (300 persons Capacity	
	1. Lobby/Waiting	1500 Sq. Ft.
	2. Information/Records	250 " "
	3. Dressing Rooms	120 " "
	4. Examination Rooms	120 " "
	5. Treatment Rooms	150 " "
	6. Doctor's Office	150 " "
	7. Special Clinics	250 " "
III.	NURSES STATION	180
IV.	PLAYROOM	300
V.	UTILITY	150
VI	STORAGE ROOM	180
VII	EXAMINATION & TREATMENT ROOMS	150
VIII.	WAITING & CONSULTATION ROOM	180

PREPARED AND COMPILED BY THE LIBERIAN TEAM, REPRESENTED BY:

MEDICAL

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TECHNICAL

MS. ALPHA BROWNELL
ASST. CHIEF, ARCHITECTURE
MINISTRY OF PUBLIC WORKS
MONROVIA, LIBERIA

Dec. 5
- Departure from Tokyo by JL-421

6
- Arrival in London

7
- Departure from London by BR-353
- Arrival in Monrovia

8 Morning
- Courtesy call and briefing at the Embassy of Japan
- A visit to the Health Committee of P.R.C.

  Unable to meet Bdg/Gen. Thomas Podier, Speaker of P.R.C.
- Courtesy call to and briefing from Dr. Kate, Minister of Health & Social Welfare, regarding the purpose and schedule of the survey team. Briefing from the Minister regarding the medical services in Liberia, especially the need for the construction of a new Maternity Hospital

Afternoon
- A visit to the J.F.K. Medical Center

  Survey of the proposed site after the first meeting.
- A visit to J.F.K. Maternity Center

9 Morning
- A visit to J.F.K. Medical Center
- Second meeting and a visit to the Clinical Dept. of Memorial Hospital.

Afternoon
- A visit to the Service Dept. of the Memorial Hospital
- Dinner party by the Ministry of Health & Social Welfare.

10 Morning
- A visit to the J.F.K. Medical Center, the third meeting

Afternoon
- A visit to the Ministry of Public Works
- Survey of construction materials and costs.

Dec. 11 Morning

- Courtesy call and briefing at the Ministry of Finance and the Ministry of Planning & Economic Affairs.

Afternoon

- Courtesy call to and briefing from Mr. Thomas Podier, Speaker of P.R.C., Health Committee of P.R.C. and at the Ministry of Public Works.

12 Morning - Afternoon

- A visit to Phebi Hospital, Bong County.

13

- Survey of the clinical services at J.F.K. Maternity Center (Dr. Amenomori)

14 Morning - Afternoon

- Meeting of team members

15 Morning

- A visit to the Embassy of Japan for a report and discussion.

Afternoon

- A visit to the J.F.K. Medical Center. Fourth meeting for confirmation of the contents of the Minutes.

16 Morning

- A visit to the Ministry of Health & Social Welfare
- Signed & exchanged the Minutes by Dr. Kate Bryant, the Minister of Health & Social Welfare and Dr. Amenomori.
- Courtesy call to and briefing from Mr. Samuel K. Doe, Head of State and P.R.C. Chairman.

Afternoon

- Departure from Robert field, Monrovia by BR-358

17

- Arrival at Gatwick, London

18

- Departure from Heathrow Airport by JL-424

19

- Arrival in Tokyo

MINUTES OF DISCUSSIONS

ON

THE CONSTRUCTION PROJECT OF MATERNITY HOSPITAL

IN THE REPUBLIC OF LIBERIA

In response to the request made by the Republic of Liberia for the basic design study on the construction project of the maternity hospital in the Republic of Liberia (hereinafter referred to as "the project"), the Government of Japan has dispatched, through Japan International Corporation Agency, a survey team headed by Mr. Yasuyoshi Komizo, official of the Ministry of Foreign Affairs, to carry out the basic design study from 26 January, 1981.

The team has conducted the field survey and held a series of discussions and exchanged views with the Liberian authorities concerned as to the project.

As a result of the survey and discussions, the Japanese Survey Team and the Liberian authorities concerned agreed to recommend to their respective governments to examine the results of the discussions attached herewith toward the realization of the project.

February 5, 1981

Mr. Yasuyoshi Komizo
Leader of the Japanese
Basic Design Survey Team
on the Construction Project
of Maternity Hospital

Mr. J. Robert Ellis, Jr.
Acting Minister
Health and Social Welfare

MINUTES OF DISCUSSIONS

1. The proposed site of the Maternity Hospital is in the compound of JFK Memorial Center, Tubman Boulevard, Sinkor, Monrovia as per attached in Annex I.

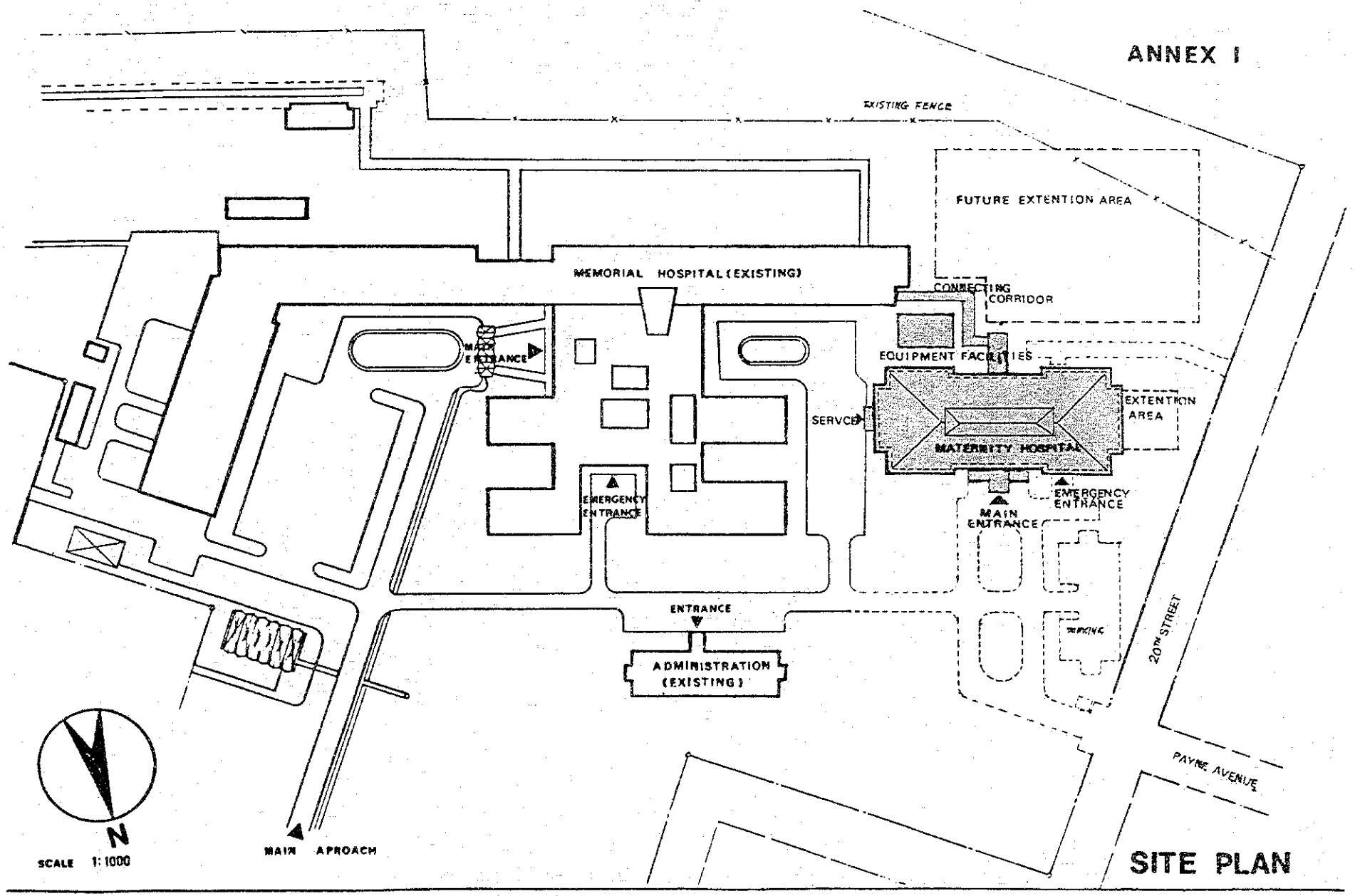
2. The principal composition and description of the Maternity Hospital is as given in Annex II.

3. The Japanese Team will convey the desire of the Liberian authorities concerned to the Government of Japan that the Government of Japan will take necessary measures to cooperate in implementing the Project and provide the Government of Liberia with building and other items as listed in Annex III within the scope of Japanese Economic Cooperation in grant form.

4. The Japanese Team will complete the Basic Design Study Report on the Project.

5. Liberian authorities concerned have confirmed that in the course of implementing the Project, the Liberian Government will take necessary measures such as those listed in Annex IV.

ANNEX I



SITE PLAN

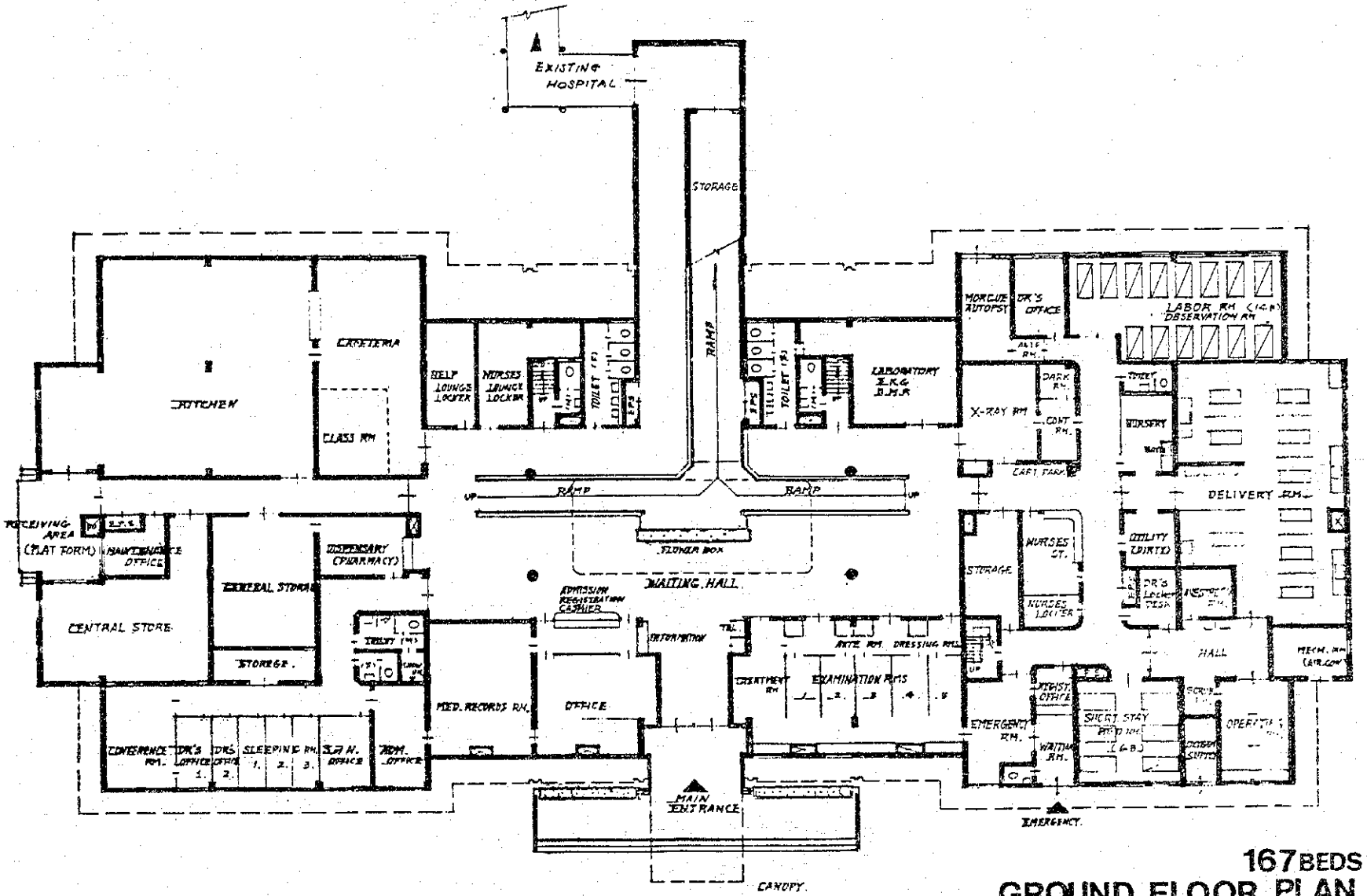
ANNEX II

A. The Maternity Hospital will have the following composition:
   a. Administration
   b. In-patient Care Unit
   c. Outpatient Department
   d. Emergency Unit
   e. Labor-Delivery Unit
   f. Radiology
   g. Clinical Diagnostic Laboratory
   h. Surgical Suite
   i. Hospital Supporting Service including Pharmacy

B. The said composition will be contained in one block building.

C. The said building has two stories and vertical extension of the building is not taken into consideration due to possible various troubles and inconveniences.

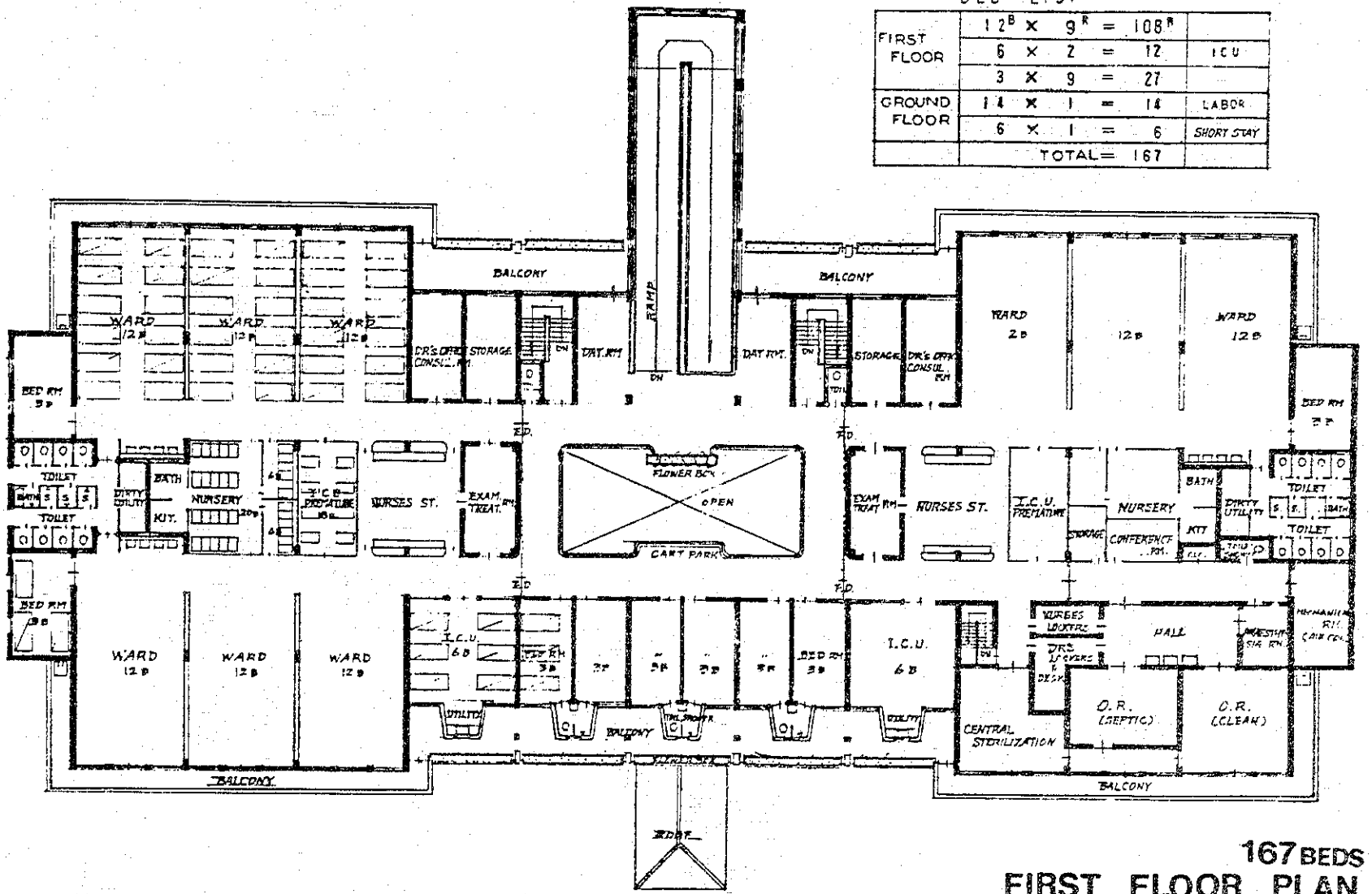
D. The Basic Design Report is to be completed based upon the items mentioned above and the attached concept plan herewith.



167 BEDS
GROUND FLOOR PLAN

BED LIST

FIRST FLOOR	12B × 9R = 108R		
	6 × 2 = 12		ICU
	3 × 9 = 27		
GROUND FLOOR	14 × 1 = 14		LABOR
	6 × 1 = 6		SHORT STAY
	TOTAL = 167		



167 BEDS
FIRST FLOOR PLAN

ANNEX III

A. Buildings

a. Maternity Hospital

b. Equipment Facilities (Power house)

Mechanical Room

Electrical Room

City Water Reservoir

Elevated Water Tank

c. Connecting corridor

B. Medical Equipment

Wards:

Patient-beds:

Adult beds with side & safety rails

Bassinettes with dresser

Overbed tables

Chairs:

Bedside (ward) Chairs

Examination tables

Scales:

Adult

Infant

Medicine Cupboards

Medication Tray/trolleys on wheels

Bed-pans:

Female

Out-patient Department:

Examination Tables

Chairs

Scales:

Adult

Infant

X-Ray Room:

An X-Ray Unit (including an x-ray machine, a developer and a processor)

ANNEX III – continued

Delivery and Operating Theaters:

- OB/GYN Operating tables
- Operating overhead lights
- Portable operating spot light
- Oxygen Machines (Piped-in Oxygen)
- Resusitating Machines
- Kreislem resusitating cribs
- Ultra-violet lights
- Anesthesia machine
- Instrument cupboards
- Autoclaves
- Operating (swirling) stools
- Step-on (waste) cans
- Delivery (OB) tables
- Dressing tables on wheels
- Suction machines
- Sterilizers
- Pressure Broilers

Basically Furnished Laboratory:

- Blood analyzer
- (Blood Banking sets)
- Blood Banking Refrigerators
- Microscope (binocular with illuminator)
- Centrifuge (electric & manual)

ICU:

- Incubators
- (Oxygen Machines (Respirators))
- Dreislem resusitating cribs
- ICU Beds

Kitchen:

- Industrial-size stove
  - Gas & electric 2 each

ANNEX III - continued

Walk-in Freezers
Walk-in Coolers
Ice-maker
Water-fountains/coolers

Kitchenettes:

Stoves/hot plates
Refrigerators

ANNEX IV

Following measures are required to be taken by the Government of Liberia:

A. General

a. To ensure prompt unloading and customs clearance of imported materials and equipment for the proposed Maternity Hospital and also to facilitate their internal transportation in the Republic of Liberia.

b. To exempt Japanese nationals concerned from customs duties, internal taxes and charges which may be imposed in the Republic of Liberia on the occasion of the supply of goods and services for the construction of the proposed Maternity Hospital.

c. To provide and authorize necessary permissions, licenses and other authorizations required for the construction of the proposed Maternity Hospital.

B. Site Preparation

a. Demolition and removal of laying

b. Site cleaning and levelling

C. Utility Service

a. Electric power supply to the site on a temporary basis during the period of construction and to the main electric panel of the forth-coming Maternity Hospital.

b. City water supply to the site for temporary use during the period of construction and to the main water meter of the submain branch leading to the forth-coming Maternity Hospital.

c. Drainage and sewage to the city main and/or sewage system during the period of construction and to the main pipe to the forth-coming Maternity Hospital.

d. Telephone wiring to the site on a temporary basis during the period of construction and to the M.D.F. of the forth-

d. Telephone wiring to the site on a temporary basis during the period of construction and to the M. D. F. of the forthcoming Maternity Hospital.

D. Site Work

Incidental Civil works of the Maternity Hospital such as planting, roads within the site, fences, gates, a gate office, parking lots and exterior lighting.

E. Furnishing

Furnitures, except those which are of medical use.

II-2 DAILY REPORT Jan. 1981

January 23 ◦ Departure from Tokyo by JL-421

24 ◦ Arrival in London

25 ◦ Departure from London by BR-353

◦ Arrival in Monrovia

26 Morning

◦ A visit to the Embassy of Japan
Briefing of outline and schedule of the survey.

Afternoon

◦ A visit to the Ministry of Public Health and Social Welfare for the first meeting.
Briefing of outline and schedule of the survey.

◦ Courtesy call to and briefing from Bdg/Gen. Thomas Podier, Speaker and P.R.C.

27 Morning

◦ A visit to the J.F.K. Medical Center
The first technical meeting for briefing of contents of survey and schedule.
Surveying the project site and Memorial Hospital.

Afternoon

◦ A visit to the J.F.K. Maternity Hospital.

28 Morning

◦ A visit to the construction site of the new commercial complex.

◦ A visit to a contractor.

29 Morning

◦ A visit to the Ministry of Public Health and Social Welfare.
Presentation of data on boring result of the proposed construction site by the Liberian engineer and briefing on technical matter.

◦ Mr. Komizo arrived in Monrovia by WT 914

◦ A visit to the Embassy of Japan

Afternoon

- Arrangement and adjustment of gathered information.

January 30 Morning

- A visit to Monrovia Bay and survey its facilities.
- A visit to the metal factory.
- Courtesy call and briefing to the Ministry of Economic Planning by Mr. Komizo, explaining the schedule and purpose of the survey.
- Courtesy call and briefing to the Ministry of Foreign Affairs.

Afternoon

- A visit to the Ministry of Public Health and Social Welfare for the second meeting.
  Mr. Komizo addressing purpose and schedule of the survey and concept plans (plans of 200 beds and 150 beds) of the project.

31 Morning

- A visit to the Ministry of Public Works
  The second meeting for technical matter on the concept plan of the project.
- Survey of the project site and J.F.K. Maternity Center

February 1 Morning

- Internal discussion and meeting

2
- A visit to the Ministry of Public Works.
- A visit to the Liberian Water and Sewage Corporation receiving the information on utilities of the project site.
- A visit to the tile factory.
- A visit to the lumber manufacturer
- A visit to the Liberian Electricity Corporation.
- A visit to the Ministry of Health and Social Welfare.
  Meeting with Mr. J. Robert Ellis Jr., Acting Minister of Health and Social Welfare and others about the draft of the Minutes.

Afternoon

- A visit to the Ministry of Public Work for the third meeting on technical matter.

Submitting the revised plans and conformation by the Liberian sides.
Request made by Liberian sides for revision for second time and agreement by Japanese side.

February 3 Morning

- A visit to the Ministry of Public Works.
  Receiving the information on the weather data in Monrovia.
- A visit to the J.F.K.
  Receiving the information at the maintenance and Operation Department on the condition of utility, electricity, telephone and stand-by generator and others.

4 Morning

- A visit to the J.F.K. Medical Center for the forth meeting on technical matter
  Submitting the revised plan for the second time and obtaining agreement to be a final.
- Survey of a condition of the project site and the area around
- Luncheon held by the Ministry of Health and Social Welfare

Afternoon

- A visit to the Ministry of Health and Social Welfare for the third meeting.
  Explanation of the final plan, and Discussion on content of the minutes and agreement for some part to be revised.

5 Morning

- A visit to the Ministry of Health and Social Welfare
- Sign and exchanged the minutes at the Ministry of Health and Social Welfare
- A visit to the Embassy of Japan

Afternoon

- A visit to the Meteorogical Station and receiving information on weather data of Monrovia.

6
- A visit to Phebi Hospital of Bong County.
- A visit to the Hotel Africa.

February 7 ◦ Internal meeting and briefing

8 ◦ Internal meeting and briefing

9 ◦ A visit to the Ministry of Finance Receiving an information on tax rate for importing construction materials.

◦ Departure from Monrovia by SN-422

10 ◦ Arriving in Brussel

11 ◦ Departure from Brussel by SN-261

12 ◦ Arrival in Tokyo

III. THE THIRD SURVEY

III-1 MINUTES

Monrovia, March 26, 1981

MINUTES OF DISCUSSIONS
ON
THE CONSTRUCTION PROJECT OF MATERNITY HOSPITAL
IN THE REPUBLIC OF LIBERIA

In response to the request made by the Government of the Republic of Liberia for the basic design study on the construction project of maternity hospital in the Republic of Liberia (hereinafter referred to as "the Project"), the Government of Japan has dispatched, through Japan International Cooperation Agency, survey teams twice, respectively headed by Dr. Yoshihiko Amenomori, Head, Obstetrics and Gynecological Department, Medical Center, Japan Red Cross, at the first time, then by Mr. Yasuyoshi Komizo, Official of the Ministry of Foreign Affairs, to carry out the basic design survey from 8th December 1980, and 26th January 1981 respectively.

In accordance with the "Minutes of Discussions" signed on 5th February, 1981, between Mr. Komizo, leader of a Japanese basic design survey team and Mr. J. Robert Ellis, Jr., Acting Minister of the Ministry of Health and Social Welfare of Liberia, the Japanese survey team, headed by Dr. Yoshihiko Amenomori, Head, Obstetrics and Gynecological Department, Medical Center, Japan Red Cross, submitted the draft report to the Liberian authorities concerned for joint confirmation as to the project, on 26 March, 1981.

Team has held a series of discussions and scrutinized the details of the content of the draft report with Liberian authorities concerned and both sides agreed to complete the final report based upon the said draft report, which is attached herewith, as well as the discussions held and submit it to their respective Governments after its completion.

Dr. Kate Bryant
Minister of Health & Social Welfare
Republic of Liberia

Dr. Yoshihiko Amenomori
Leader of the
Japanese Basic Design Team

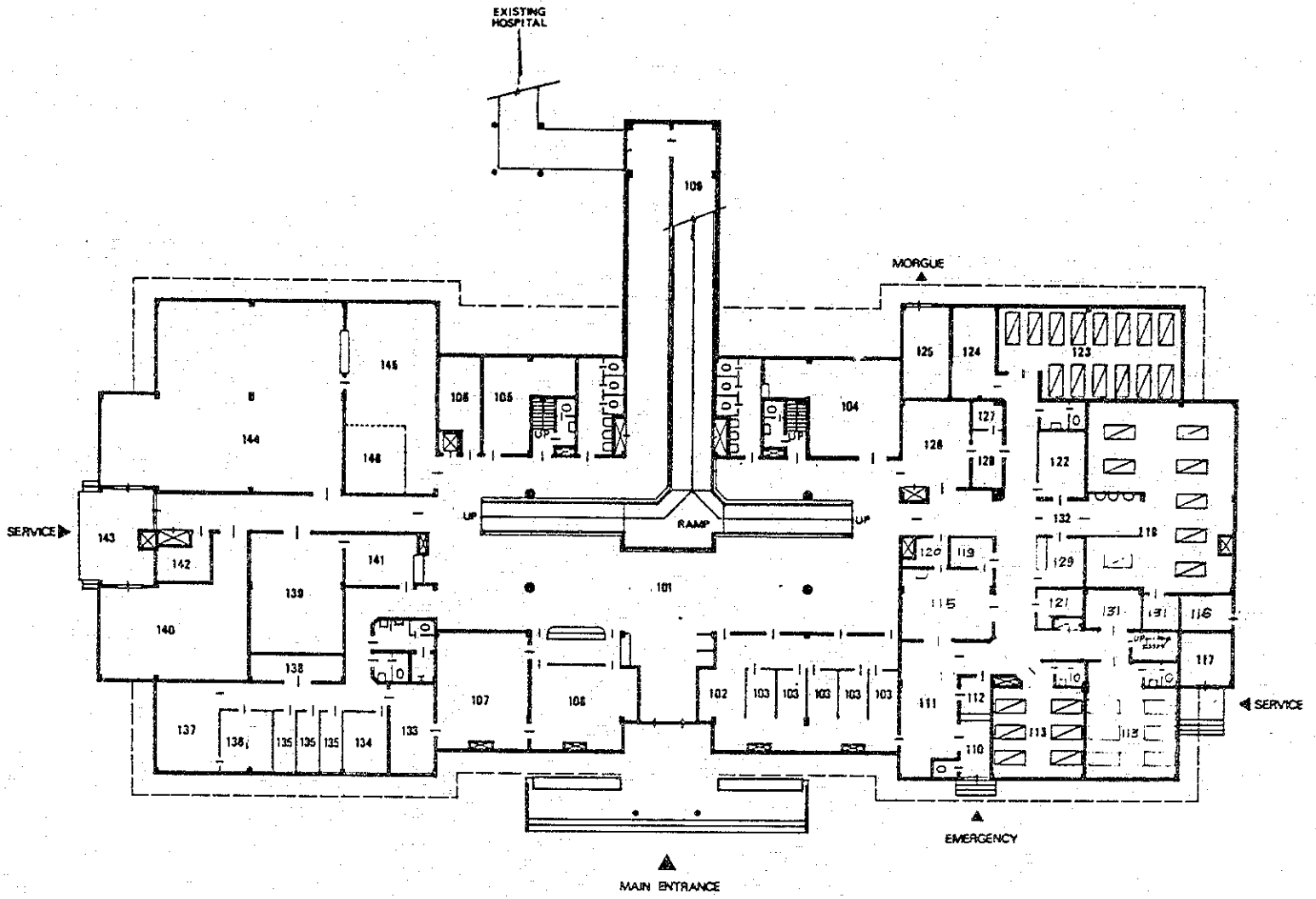
March 26, 1981

MINUTES OF DISCUSSIONS

The three days discussions held between the Japanese and Liberian Teams on the Construction Project of the Maternity Hospital in the Republic of Liberia were basically concerned with general discussions of the architectural plan with proposed minor changes and detailed discussion of following:

1. The need to increase the short-stay capacity from 6 to12 beds.
2. Providing the appropriate basic equipment for both laboratory and X-ray.
3. Installation of kitchen equipment suitable for the preparation of Liberian food.
4. Provision of private accomodation was made by converting semi-private units to obtain 12 private beds.
5. Suitable paint finishings to be provided, e.g. oil or enamel paint.
6. Asbestos ceiling instead of plywood.
7. The Morgue should include a refrigerator (repository) to accommodate at least 2 bodies.
8. The request for training laboratory & equipment technicians in Japan.

Agreement was reached on the need for these proposals or changes which will be incorporated into the basic design survey project.



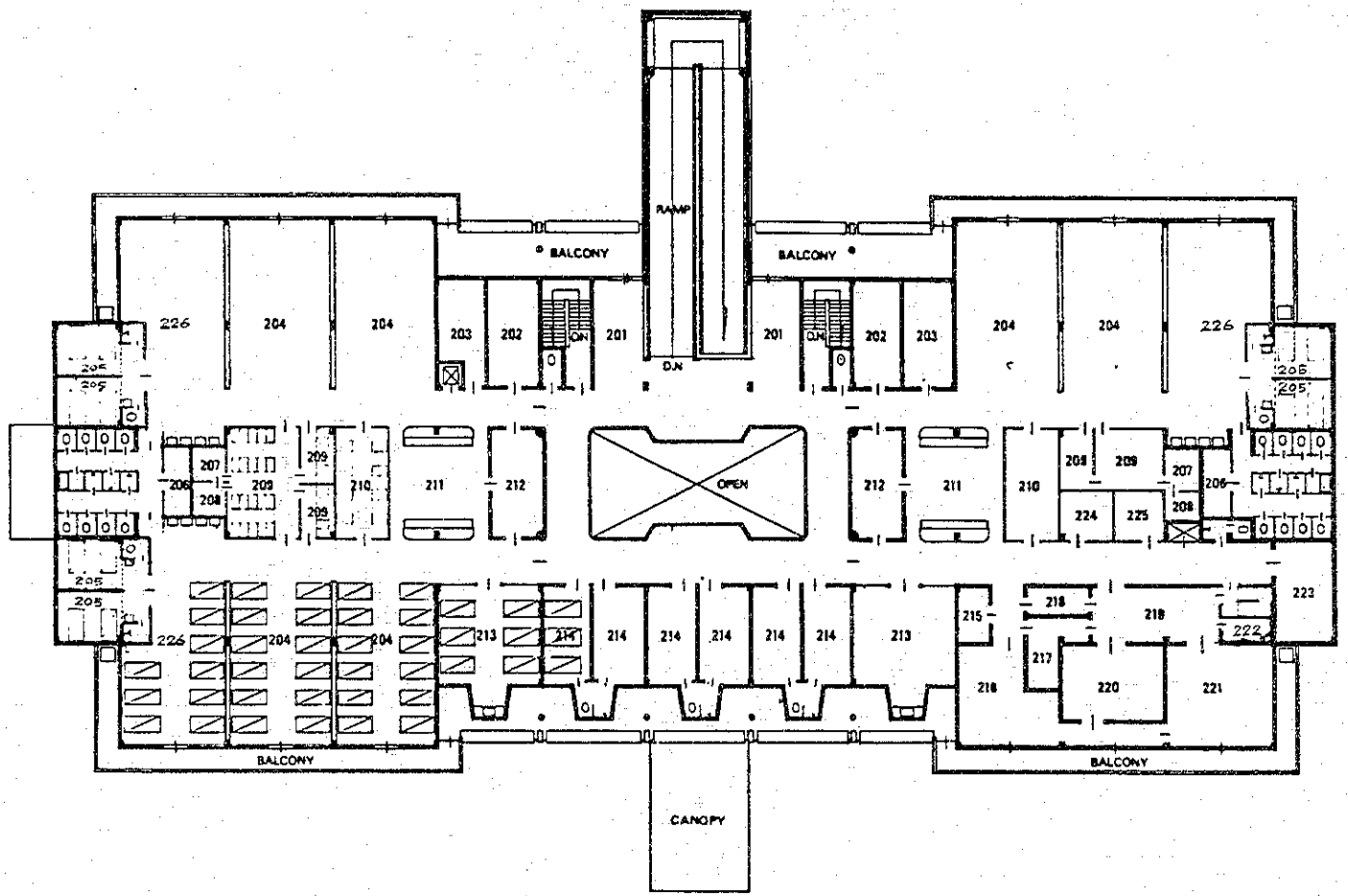
NO.	ROOM NAME
101	WAITING HALL
102	TREATMENT ROOM
103	EXAMINATION ROOM
104	LABORATORY ROOM
105	NURSES' LOUNGE & LOCKERS
106	HELPERS' LOUNGE & LOCKERS
107	MEDICAL RECORDS
108	OFFICE
109	STORAGE
110	WAITING ROOM
111	EMERGENCY ROOM
112	REGISTRATION OFFICE
113	6 BEDS (SHORT STAY) ROOM
~~114~~	~~SCRUB~~
115	OPERATING ROOM
116	OXYGEN SUPPLY ROOM
117	MECHANICAL ROOM
118	DELIVERY ROOM
119	ANESTHESIA ROOM
120	DOCTORS' LOCKERS
121	DIRTY UTILITY
122	NURSERY
123	LABOR ROOM (14 BEDS)
124	DOCTORS' OFFICE
125	MORGUE/AUTOPSY
126	X-RAY ROOM
127	DARK ROOM
128	CONTROL ROOM
129	NURSES' STATION
~~130~~	~~NURSES' LOCKERS~~
131	STORAGE
132	AMTE ROOM
133	ADMINISTRATOR'S OFFICE
134	OFFICE OF NURSE'S SUPERVISOR
135	SLEEPING ROOM
136	~~DOCTORS' OFFICE~~ MEDICAL DIRECTOR'S
137	CONFERENCE OFFICE
138	STORAGE
139	GENERAL STORAGE
140	CENTRAL STORE
141	DISPENSARY (PHARMACY)
142	MAINTENANCE OFFICE
143	RECEIVING AREA
144	KITCHEN
145	CAFETERIA
146	CLASSROOM

A-41

FINAL REVICED 26 MARCH '81
REVISED 25 MARCH '81

SCALE = 1:300

GROUND FLOOR PLAN



BED LIST

FLOOR	NO.	ROOM NAME x QTY	BEDS
FIRST FLOOR	204	12 BEDS RM. x 6	72
	226	9 BEDS RM. x 3	27
	213	6 BEDS RM.(ICU) x 2	12
	214	3 BEDS RM. x 6	18
	205	2 BEDS RM. x 6	12
	TOTAL		141
GROUND FLOOR	113	6 BEDS (SHORT STAY) RM. x 2	12
	123	14 BEDS (LABOR) RM. x 1	14
	TOTAL		26
GRAND TOTAL			167

NO.	ROOM NAME
201	DAY ROOM
202	STORAGE
203	DOCTORS' OFFICE
204	12 BEDS ROOM
205	2 BEDS ROOM
206	DIRTY UTILITY
207	BABIES' BATH ROOM
208	KITCHEN
209	NURSERY
210	NICU, PREMATURE
211	NURSES' STATION
212	TREATMENT ROOM
213	6 BEDS (ICU) ROOM
214	3 BEDS ROOM
215	STORAGE
216	CENTRAL STERILIZATION
217	DOCTORS' LOCKERS
218	NURSES' LOCKERS
219	PREPARATION HALL
220	OPERATING ROOM (SEPTIC)
221	OPERATING ROOM (CLEAN)
222	SCRUB
223	MECHANICAL ROOM
224	CONFERENCE ROOM
225	ANESTHESIA ROOM
226	9 BEDS ROOM

FINAL REVISED 26 MARCH '81
REVISED 25 MARCH '81

SCALE = 1:300

FIRST FLOOR PLAN

A-42

III-2 DAILY REPORT March, 1981

March 20
° Departure from Tokyo by JL-421

21
° Arrival in London

22
° Departure from London by BR-353
° Arrival in Monrovia

23 Morning
° Courtesy call and briefing at the Embassy of Japan
° A Visit to the Ministry of Health and Social Welfare for the first meeting.

Briefing of outline and schedule of the survey.

A submit to Draft Report of Basic Design Study, and explanating of contents of draft report.

Afternoon
° A visit to the J.F.K. Medical Center

The first technical meeting for briefing and discussion on contents of draft report.

24 Morning
° Courtesy call to Ministry of Health and Social Welfare.

Meeting with Dr. Kate Bryant, Minister and Liberian counterparts, regarding to the draft report and survey schedule.

Afternoon
° A visit to the J.F.K. Medical Center for second technical meeting.

Request made by Liberian sides for revision of architectural plan.

25 Morning
° Internal discussion and meeting

Afternoon
° A visit to the J.F.K. Medical Center for third meeting.

Submmitting the revised architectural plan and obtaining agreement to be a final, and discussion on content of the minutes

26 Morning

° A visit to the Ministry of Health and Social Welfare.

Briefing of result of survey and content of minutes.

Afternoon

° A visit to the Ministry of Health and Social Welfare.

° Signed & exchanged the Minutes by Dr. Kate Bryant, the Minister of Health & Social Welfare and Dr. Amenomori.

27 Morning

° A visit to the Ambassador of Japan to report the surveyed results.

° Departure from Monrovia by UT 852

° Arrival at Paris

28 ° Departure from Paris by JL 426

29 ° Arrival in Tokyo

Ⅳ TEAM MEMBERS AND LIBERIAN REPRESENTATIVES

IV-1 JAPANESE TEAM MEMBERS:

1) THE FIRST SURVEY TEAM

Dr. Yoshihiko Amenomori	Head Dept. of Obstetrics & Gynecological Medical Center, Japan Red Cross
Dr. Hiroshi Akamatsu	Department of Neonatology Medical Center, Japan Red Cross
Mr. Seiji Kaiho	Coordinator Japan International Cooperation Agency
Mr. Susumu Takahashi	Architect, AZUSA SEKKEI CO., LTD.

2) THE SECOND SURVEY TEAM

Mr. Yasuyoshi Komizo	Head Official of the Ministry of Foreign Affairs
Mr. Seiji Kaiho	Coordinator Japan International Cooperation Agency
Mr. Susumu Takahashi	Architect, AZUSA SEKKEI CO., LTD.
Mr. Tsuneo Safu	Mechanical Engineer, AZUSA SEKKEI CO., LTD.
Mr. Mikio Kosugi	Structural Engineer, AZUSA SEKKEI CO., LTD.
Mr. Osamu Kaneko	Quantity Surveyor, AZUSA SEKKEI CO., LTD.

3) THE THIRD SURVEY TEAM

Dr. Yoshihiko Amenomori	Head Dept. of Obstetrics & Gynecological Medical Center, Japan Red Cross
Mr. Masaru Hiratsuka	Coordinator Japan International Cooperation Agency

Mr. Susumu Takahashi	Architect, AZUSA SEKKEI CO., LTD.
Mr. Tsuneo Safu	Mechanical Engineer, AZUSA SEKKEI CO., LTD.

IV-2 LIBERIAN REPRESENTATIVES:

1) THE FIRST MEMBERS

MINISTRY OF HEALTH & SOCIAL WELFARE

Dr. Kate C. Bryant	Minister
Mr. J. Robert Ellis,Jr.	Deputy Minister

J.F.K. MEDICAL CENTER

Dr. V. Kanda Golakai	Chief of Medical Officer
Dr. Emile T. Woods	Medical Director, Maternity Center
Dr. Charles Harding	Professor of OB/GY, Maternity Center
Mr. Alston N. Sajery	General Administrator
Mr. Alfred Goaneh	Deputy General Administrator
Mr. Archibald Bing	Administrator, Maternity Center
Dr. Roseda E. Marshall, M.D.	Head of Dept. of Paediatrics
Ms. Mae Bea Maximore Keller	Director Nursing Service, Maternity Center
Mr. J. Kpanqoi Jallah	Director, Maintenance & Operation Dept.

MINISTRY OF PUBLIC WORKS

Ms. Alpha Brownell	Asst. Chief, Architecture Division

Mr. Hermann Stark	Asst. Chief, Engineering Division and Road Supervisor

2) THE SECOND MEMBERS

MINISTRY OF HEALTH & SOCIAL WELFARE

Mr. J. Robert Ellis,Jr.	Acting Minister
Dr. Wilfred S. Boayue	Deputy Minister, Chief Medical Officer

J.F.K. MEDICAL CENTER

Dr. Ambrose Wotorson	Deputy Chief Medical Officer
Mr. Alston N. Sajery	General Administrator
Mr. Alfred Goaneh	Deputy General Administrator
Mr. Archibald Bing	Administrator, Maternity Center
Mr. J. Kpanqoi Jallah	Director Maintenance & Operation Dept.
Mr. Michael Tucker	Engineering Dept.

MINISTRY OF PUBLIC WORKS

Mr. Chenier Durand	Architecture Division
Mr. Hermann Stark	Asst. Chief Engineering Division and Road Supervisor

MINISTRY OF FINANCE

Mr. Isaac Grigsby	Deputy Coordinator, Division of Fiscal Planning & Investment Analysis.

3) THE THIRD MEMBERS

MINISTRY OF HEALTH & SOCIAL WELFARE

Dr. Kate C. Bryant	Minister
Mr. J. Robert Ellis,Jr.	Deputy Minister

J.F.K. MEDICAL CENTER

Dr. V. Kanda Golakai	Chief Medical Officer
Dr. Emile T. Woods	Medical Director Maternity Center
Mr. Alston N. Sajery	General Administrator
Mr. Alfred Goaneh	Deputy General Administrator
Mr. Archibald Bing	Administrator, Maternity Center
Mr. William Cox	Construction Supervisor
Mr. B. Matthews	Supervisor, Med. Equipment

MINISTRY OF PUBLIC WORKS

Mr. Chenier Durand	Architecture Division

MINISTRY OF FINANCE

Mr. Emmanual O. Akinselure	Director, Division of Public Corporation
Mr. Isaac Grigsby	Deputy Coordinator, Division of Fiscal Planning & Investment Analysis

V TOPOGRAPHICAL MESH OF PROJECT SITE

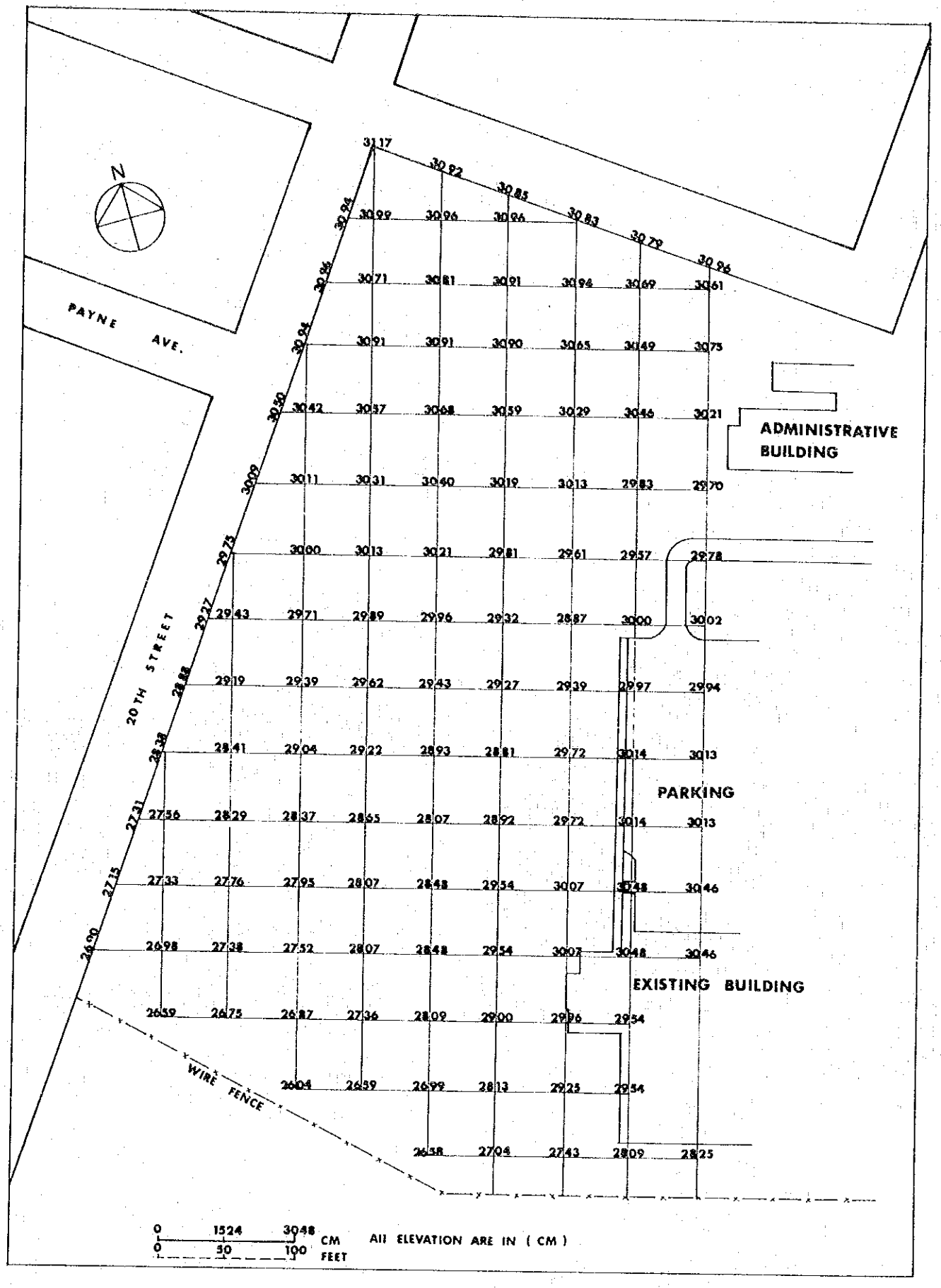


Fig. V-1 TOPOGRAPHICAL MESH

VI BORING DATE OF PROJECT SITE

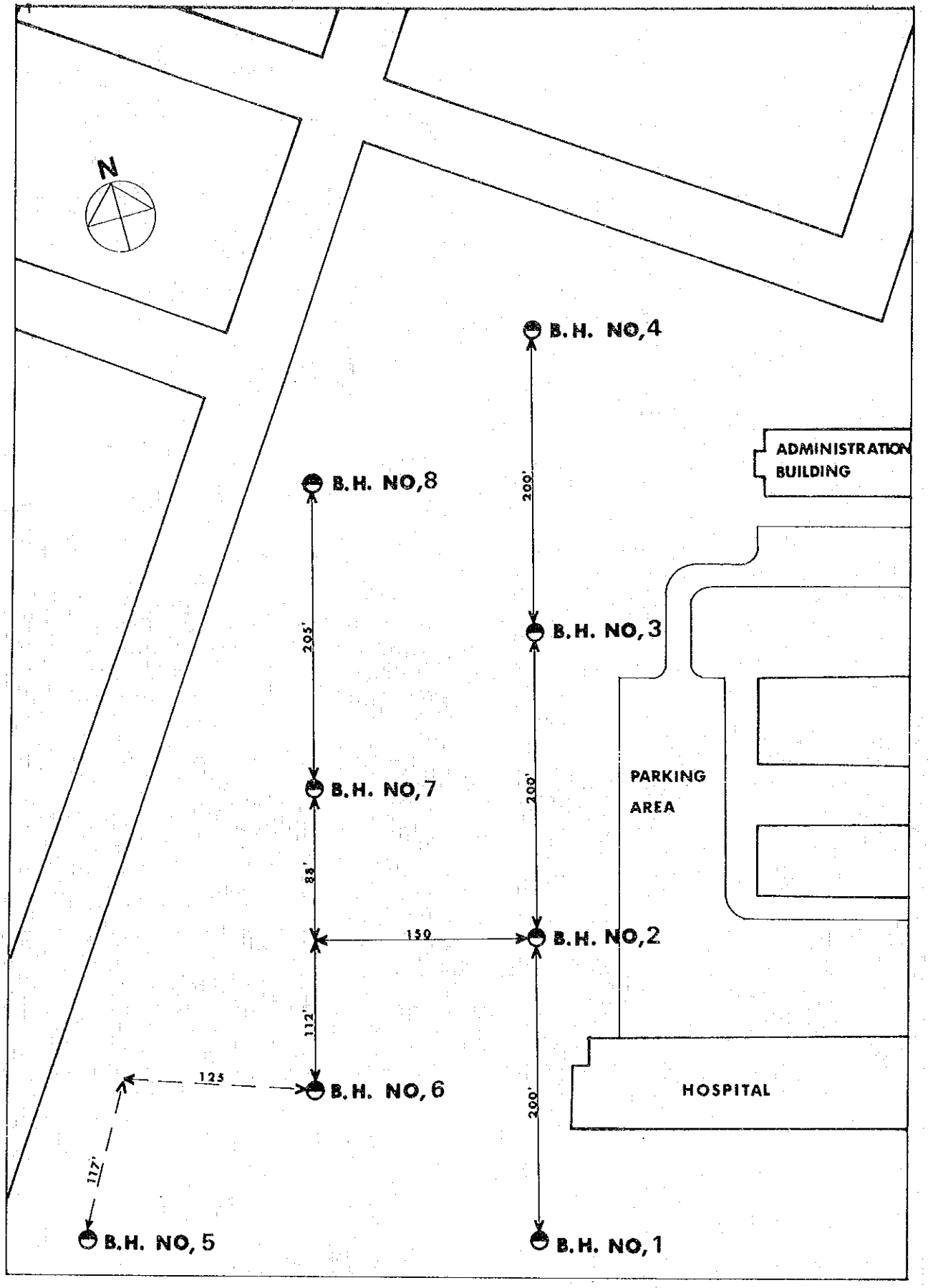


Fig. VI-1 BORING POINTS

Table VI-1 NATURAL MOISTURE CONTENT (%)

BORE HOLE NUMBER	DEPTH	MOISTURE CONTENT	BORE HOLE NUMBER	DEPTH	MOISTURE CONTENT
BH-1	0.0' - 6.0'	4.8%	BH-6	0.0' - 3.0'	4.6%
BH-2	0.0' - 5.0'	6.3%	BH-6	3.0' - 6.0'	6.2%
BH-2	5.0' - 8.0'	7.6%	BH-7	0.0' - 5.0'	5.3%
BH-3	0.0' - 5.0'	5.2%	BH-7	6.0' -14.0'	8.6%
BH-3	5.0' - 9.0'	8.0%	BH-8	0.5' - 5.0'	4.0%
BH-4	0.67'- 5.0'	4.1%	BH-8	5.0' -10.0'	5.9%
BH-4	5.0' -10.0'	5.8%	BH-8	10.0' -15.0'	7.6%
BH-5	None	None			

Table VI-2 DENSITY & GRADATION

BOREHOLE NOS. 1, 2, & 3 MIX		DEPTH 3.0 ' - 10.0'
Maximum Dry Density	=	111.9 PCF (1.79 g/cm^3)
Optimum Moisture Content	=	13.1%
Liquid Limit	=	None-plastic
Plastic Limit	=	None
Specific Gravity	=	2.48

GRADATION

No. 1, 2, 3 DEPTH 0' - 10'			No. 4, 7, 8 DEPTH 5' - 15'		
SIEVE SIZE	% RETAINED	% PASSING	SIEVE SIZE	% RETAINED	% PASSING
3/8"(9.5mm)	0.0	100.0	No.10(2.00mm)	0.0	100.0
No.4(4.75mm)	0.73	99.27	No.40(425μm)	54.07	45.93
No.10(2.0mm)	0.87	98.40	No.60(250μm)	32.67	13.26
No.40(425μm)	75.40	23.00	No.100(150μm)	7.47	5.79
No.60(250μm)	13.30	9.73	No.200(75μm)	2.27	3.52
No.100(150μm)	4.67	5.06	Finess Modulus =		3.32
No.200(75μm)	1.67	3.39			
Finess Modulus =		3.61			

Table VI-3 BORING LOG

BORE HOLE NUMBER	DEPTH (FT.)	MATERIAL DESCRIPTION	REMARKS
1	0.0' to 5.0'	Tanish brown moist fine to medium sand, little silt.	Caving stopped boring, due to water table at 8.0' below the existing ground.
	5.0' to 10.0'	Light brown wet fine to coarse sand, trace of silt.	
2	0.0' to 5.0'	Dark brown moist fine to medium sand, trace of silt.	Due to lock of extension roads, boring was terminated at the water table was at 9.58' below the existing ground.
	5.0' to 15.0'	Tanish brown wet medium to fine sand, trace of silt.	
3	0.0' to 5.0'	Light brown moist fine to medium sand, trace of silt.	Boring was terminated at the above depth, due to caving and lock of extension rods. Water table was also at 10.2' below the existing ground.
	5.0' to 15.0'	Tanish brown medium to fine sand, trace of silt.	
4	0.0' to 0.67'	Reddish brown mist clayey silt, some fine to medium gravel and fine to medium sand (Fill).	At completion of boring, hole dry
	0.67' to 5.0'	Brown moist fine sand, trace silt.	
	5' - 15'	Tanish brown wet fine to medium sand with little silt.	

To be continued

BORE HOLE NUMBER	DEPTH (FT.)	MATERIAL DESCRIPTION	REMARKS
5	0.0' - 3.5'	Fine to medium sand, little silt, bricks block and rock fragments (Fill).	After 5 off sets attempt at depth of 1.5' to 3.5' we terminated the boring, due to the above reasons.
6	0.0' - 3'	Dark brown moist fine to medium sand, trace of silt.	Caving started at 6.0' to 6.5' due to water table, at such depth.
	3' to 6'	Tanish brown wet fine to medium sand, some silt.	
7	0.0' - 0.67'	Reddish brown moist fine to medium gravel, some clay and silt and fine to coarse sand (Fill).	At completion of boring, water table was 15' below the existing ground.
	0.67' to 5.0'	Dark brown moist fine to medium sand, same silt.	
	5' to 15'	Tanish brown wet fine to medium sand, some clayey silt.	
8	0.0' to 0.5'	Tanish brown moist fine to medium gravel, some coarse to fine sand, little silt (Fill).	At completion of boring hole dry.
	0.5' to 5.0'	Tanish brown moist fine to medium sand, some silt.	
	5' to 15'	Tanish brown fine to medium sand, some silt.	

VII ANNUAL METOROGICAL DATA IN MONROVIA(from 1979 to 1980)

Table VII-1

Temperature in °C												
Month	1	2	3	4	5	6	7	8	9	10	11	12
Monthly mean temperature	28.1	27.9	28.1	28.4	27.7	26.6	25.5	25.7	26.7	27.3	28.3	28.4
Monthly mean of daily maximum temperature	29.5	29.5	29.4	29.2	28.6	27.5	26.7	26.5	27.6	28.1	29.2	30
Monthly mean of daily minimum temperature	25.5	25.6	26.5	27.1	26.5	25.9	25	24.9	26.1	26.6	27.1	25.7
Maximum temperature over 2 years	31	32	32	32	31	30	29	29	30	32	32	32
Minimum temperature over 2 years	22	23	24	22	22	21	22	21	23	22	24	22
Relative humidity in %:												
Month	1	2	3	4	5	6	7	8	9	10	11	12
Monthly mean humidity	79.1	78.9	78.6	79.4	82.2	85.4	87	75.2	72.4	82	79.3	73.8
Precipitation in mm:												
Month	1	2	3	4	5	6	7	8	9	10	11	12
Cumulated mean monthly precipitation	81.7	8.1	50.2	154.8	372.2	781.3	811.2	1011.4	756.6	652.1	198.5	61.3
Maximum precipitation in a day	130.5	10.6	54.3	163	513.5	803.4	894	1032.2	819.9	808.2	269.4	66.8
Velocity and Direction of Wind in m/s: (from 1966 to 1977)												
Month	1	2	3	4	5	6	7	8	9	10	11	12
Mean: Most frequent wind direction	SW	SW	W	WSW	WSW	SSW	SSW	SW	SW	SW	SW	SW
Mean: Wind velocity	3.9	3.9	4.1	4	3.9	4.5	5.1	4.8	4.4	4.2	3.9	3.6
Maximum Wind velocity	10.2	10.2	9.2	15.4	10.2	10.8	10.2	9.7	12.8	12.8	10.2	12.8