BASIC DESIGN STUDY REPORT

ON

THE EXPANSION PROJECT

OF

CAIRO UNIVERSITY PAEDIATRIC HOSPITAL

IN

ARAB REPUBLIC OF EGYPT

PACIFIC CONSULTANTS INTERNATIONAL

JAPAN INTERNATIONAL COOPERATION AGENCY

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DECEMBER 1986

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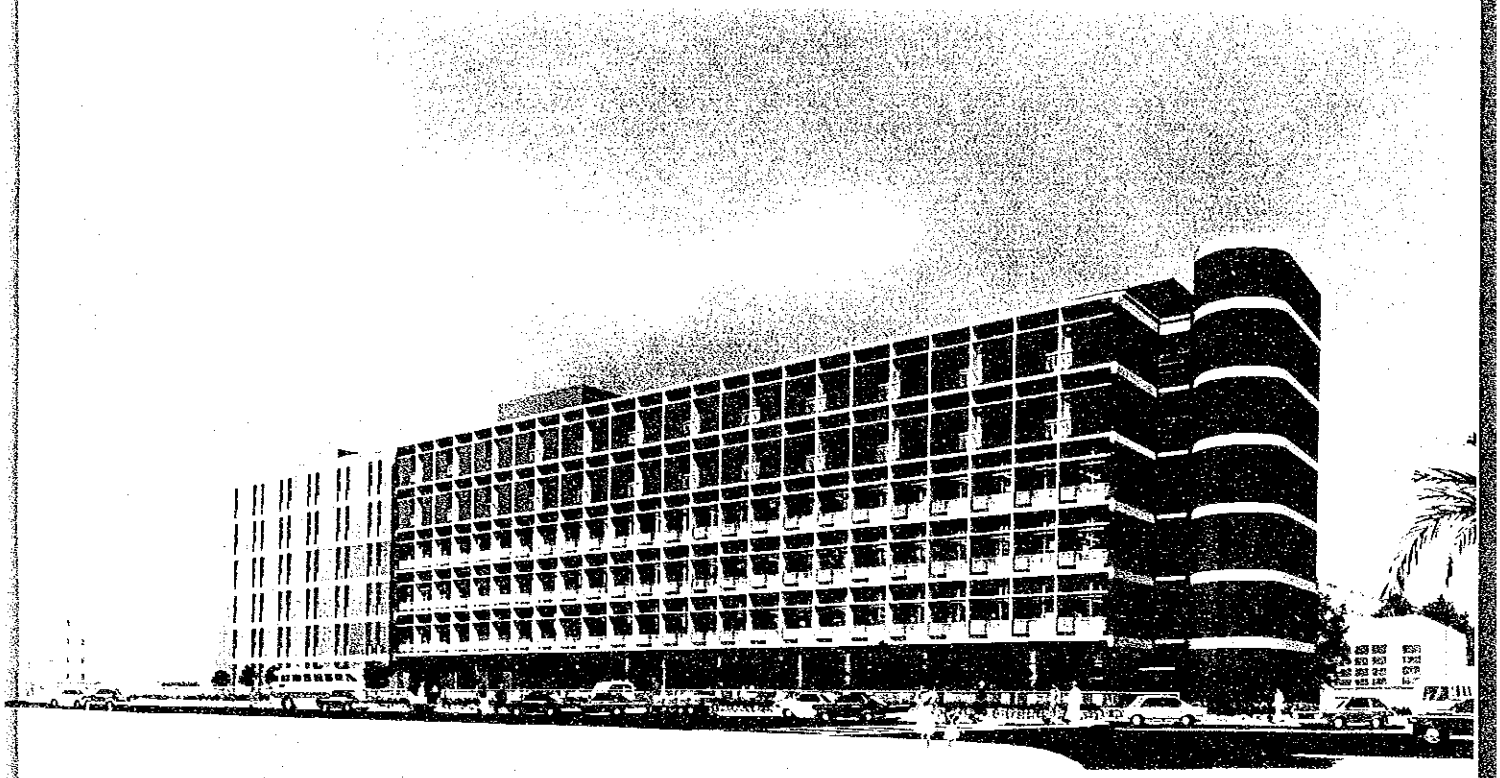


PREFACE

In response to the request of the Government of the Arab Republic of Egypt, the Government of Japan has decided to conduct a basic design study of the Expansion Project of Cairo University Paediatric Hospital and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Egypt a survey team headed by Mr. Ryoji Noda, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs from 27th September to 16th October, 1986.

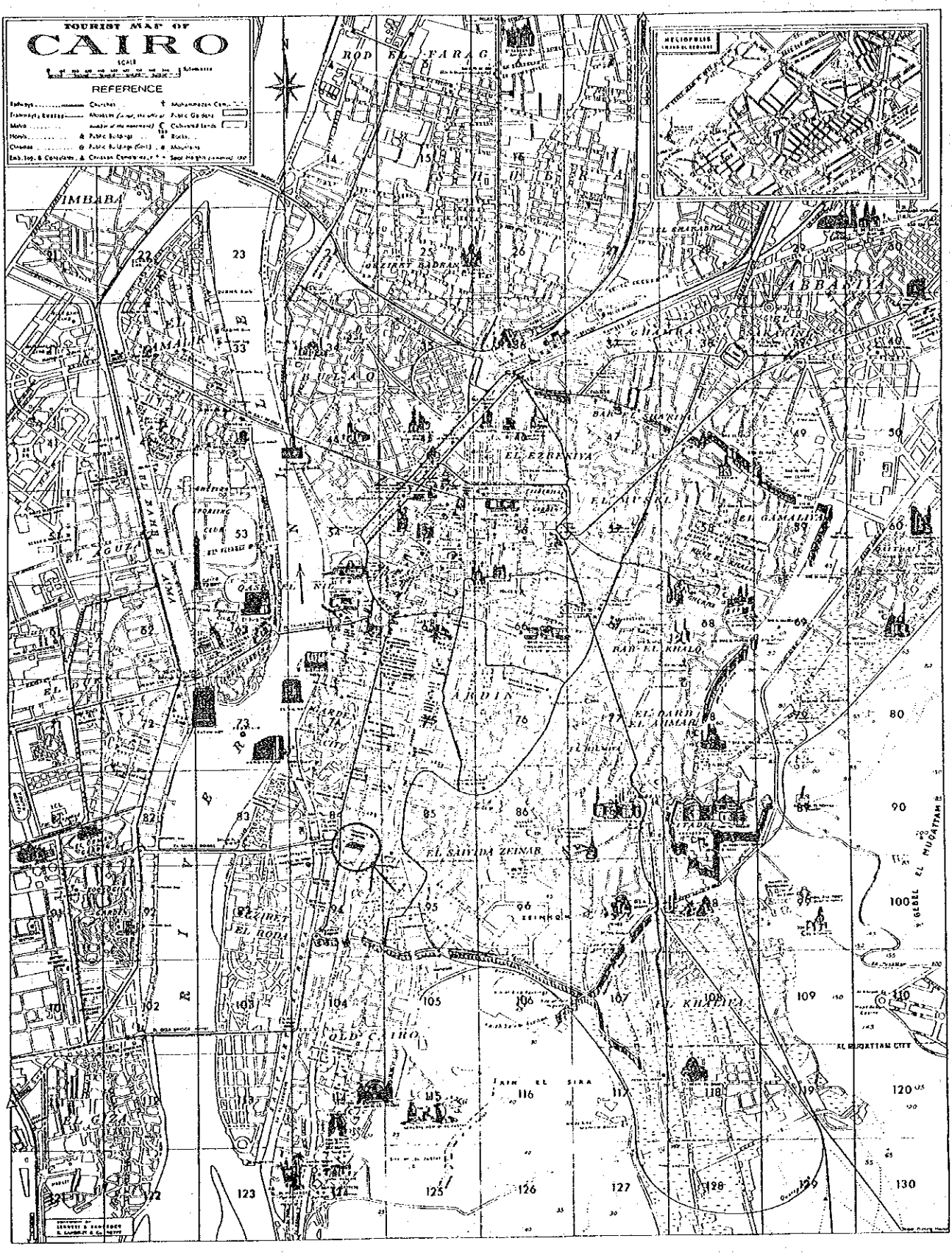
The team had a series of discussions with the officials concerned of the Government of Egypt and conducted a field survey in the project area. After the team returned to Japan, further studies were made, a draft report was prepared and, for the explanation and discussion of it, a mission headed by Mr. Koichiro Shikida, Nikken Sekkei Ltd was sent to Egypt from 27th November to 7th December, 1986. As a result, 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.

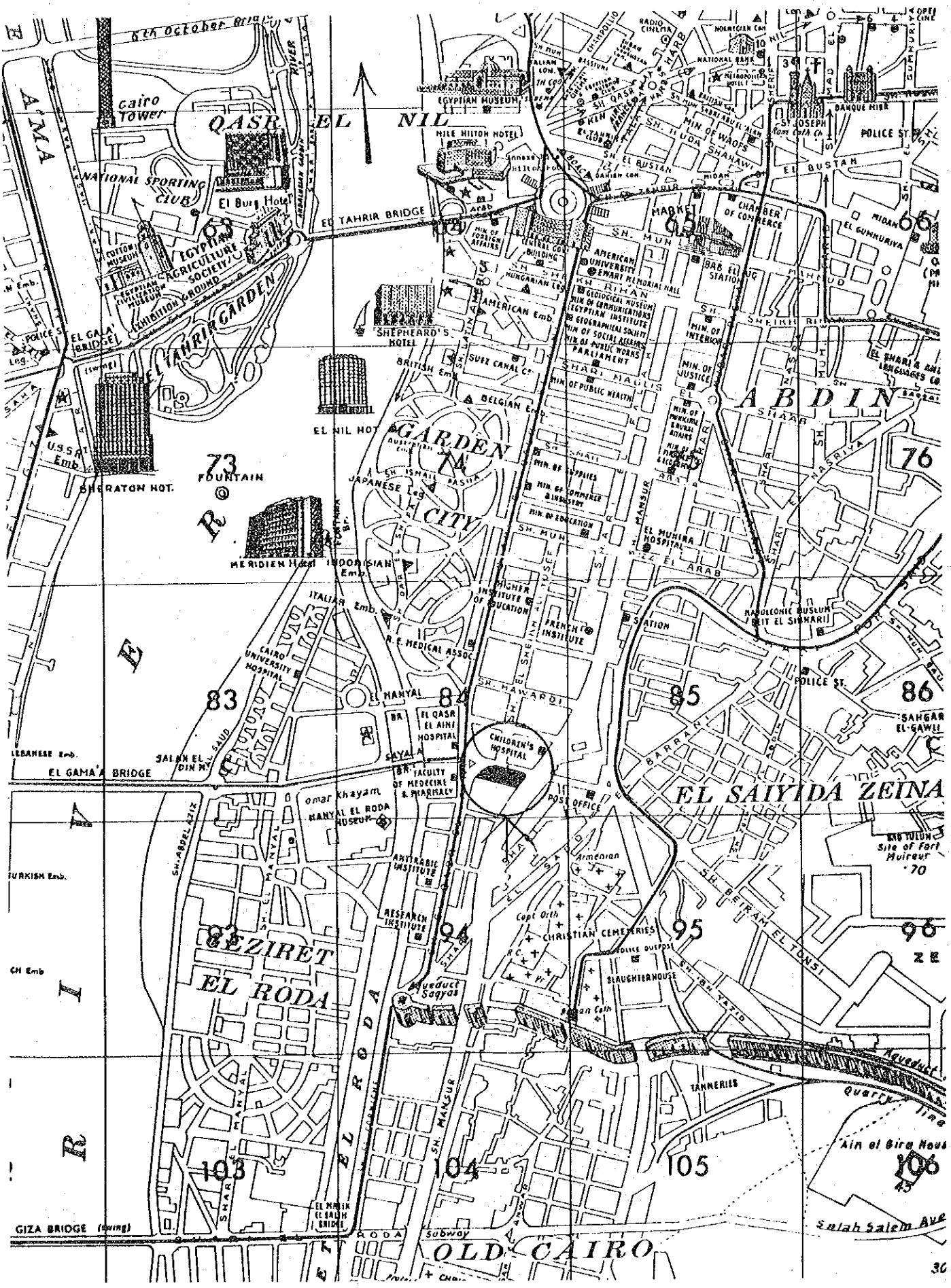
I wish to express my deep appreciation to the officials concerned of the Government of the Arab Republic of Egypt for their close cooperation extended to the team.

December, 1986

Keisuke Arita
President
Japan InternationalCooperation Agency



Map of Cairo (1)



Map of Cairo (2)

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SUMMARY

BACKGROUND

The Cairo University Paediatric Hospital (CUPH) was constructed as a grant aid project of the Government of Japan and has been playing a major role as a central facility for paediatric medical services in Egypt since its completion in December 1982. It is well-known and much depended upon by the people of Cairo as the "Japanese Hospital". The technical cooperation extended by the Government of Japan to the CUPH since 1983 is also making remarkable progress.

As outlined above, the CUPH, which was completed through effective execution of grant aid and technical cooperation by the Government of Japan and substantial efforts of the Government of the Arab Republic of Egypt for its implementation, is regarded as a symbol of fruitful collaboration between Japan and Egypt, and is one of the most successful cases in Egypt as well as Japan of a joint project between the two countries.

OBJECTIVES AND CONCEPTS

The purpose of the current Project is to renovate and expand the existing facilities of the CUPH in order to upgrade the level of medical services and educational training provided there and to cope with the increasing and changing social needs. The scope of work covered by the Project consists of adding 2 floors to the existing 4-story building in order to provide facilities for diagnosis, treatment, training and research for cardiac and neurological paediatric disorders, and their surgical management and to reinforce the functions of the CUPH. The Project also calls for renovation of related facilities in the existing building and provision of medical equipment for the newly-expanded facilities.

SCALE OF THE PROJECT

The total floor area to be covered by the expansion plan is 7,251.2 m^2, broken down into 6,292.8 m^2 for the expanded facilities (2 floors for the building and 1 floor for the penthouse) and 958.4 m^2 for the part of the existing facilities to be renovated. By adding the floor area of the existing CUPH building (4 floors + 2-story penthouses: 11,789.3 m^2), the total floor area of the entire facility after completion will be 18,081.2 m^2.

The plan will also include increasing the number of hospital beds by 55 (46 in Private Wards, 5 in ICU and 4 in IMCU including the number of incubators). Together with the 250 beds in the existing facility, the total number of beds after expansion will amount to 305.

PROGRESS OF STUDY

The Government of the Arab Republic of Egypt, which had secured its own fund of 3 million LE to cover the construction work for the Project, requested the Government of Japan to extend a grant aid for the costs that will not be covered by the Egyptian side and also to provide the necessary medical equipment. In response to this request, the Government of Japan dispatched

to Egypt a Preliminary Study Team in July 1986 and a Basic Design Study Team from September to October of the same year through the Japan International Cooperation Agency (JICA). Based on the result of the studies JICA drew up a Draft Final Report and sent a mission to Egypt during November to December of the same year to explain it. After the mission returned to Japan, further studies were made and the present Report has been prepared.

SCOPE OF WORK TO BE CARRIED OUT BY THE TWO COUNTRIES

Of all the facilities and equipment to be provided for the Project, the Goernment of Japan will undertake tasks that are indispensable to medical activities and tasks that are technically difficult to be separated from the works carried out by the Japanese side, and the Government of the Arab Republic of Egypt will take charge of the remaining work. To be more specific, the Japanese side will be assigned to provide the main structure and external walls and windows of the 5th and 6th floors and the interior and installation works required for all of the 5th floor and part of the 6th floor, to provide major medical equipment for the newly expanded facilities and carry out the necessary renovation work on the existing facilities. The Egyptian side will be assigned to carry out the interior and installation works for the remaining part of the 6th floor and to provide general furniture, etc.

It was confirmed that the execution period of the 3 million LE appropriated for the Project by the Government of the Arab Republic of Egypt for its 1987/88 Fiscal Year (July 1, 1987 to the end of June 1988) can be extended to the period scheduled for implementation of the works to be carried out by the Egyptian side.

IMPLEMENTATION PROGRAMME

The tasks assigned to the Government of Japan will be implemented in three separate budgets of the grant aid for detailed design, construction work and provision of medical equipment. The detailed design will be conducted in 1987 within the budget of fiscal year 1986 which can be brought forward to fiscal year 1987 and the construction work will be carried out during the two Fiscal Years of 1987 and 1988. The medical equipment will be provided during 1987 and 1988 within the budget of fiscal year 1987 which can be brought forward to fiscal year 1988. The period required for detailed design, construction and medical equipment installation in each stage is 3 months for detailed design, 16 months for construction work and 10 months for provision of medical equipment. If the approval of the E/N by the People's Assembly of the Arab Republic of Egypt is obtained on schedule (by the middle of March 1987 for detailed design, by the end of June 1987 for the construction work and by the end of December 1987 for the provision of medical equipment), the detailed design will be completed by the end of June 1987, and the construction work and the medical equipment installation will be completed by the end of December 1988. The Egyptian side said that the approval on the E/N would be obtained on schedule.

In order to clarify the scope of responsibilities of the two parties, the works to be undertaken by the Egyptian side will be started only after the work of the Japanese side has been completed and handed over to the Egyptian side.

The executing organisation on the Egyptian side for this Project is the Cairo University headed by its President Prof. Dr. Helmy Nammer. An official committee presided over by Prof. Dr. Hussein Kamel Baha El Din, General Director of the CUPH was appointed in 1985 as the implementation agency for the Project within the University. As a result, the Egyptian side is regarded to have sufficient organization and capacity for the successful implementation of the Project.

SYSTEMS FOR OPERATION AND ADMINISTRATION

About four years have passed since the completion of the CUPH, so it has already established its operation and administration systems and is highly evaluated both internally and from outsiders for its excellence. As a result, no change is required in its current systems to correspond to the expansion programme except for further reinforcement of the organisation.

The CUPH is also regarded to have sufficient technology to perform paediatric cardiosurgical operations in view of the generally high standard of medical services in the Cairo University today. As for the high costs for performing such operations, the Cairo University has taken full consideration of this problem and has promised to take necessary countermeasures, so the CUPH will have no difficulties in carrying out this Project.

The plan based on government policies for charging fees for some of the medical services provided at the CUPH is expected to bring about many fruitful results including alleviation of financial burdens, provision of high level medical treatment, employment of competent staff and upgrading the level of maintenance of equipment, etc.

CONCLUSIONS AND SUGGESTIONS

The CUPH will play a crucial role in upgrading the level of medical care and welfare of children in Egypt, and is also regarded as a symbol of goodwill and collaboration between Egypt and Japan. Studies have shown that the contents of the Project and its implementation plan are both appropriate and urgently required.

In consideration of all the above study results, it is concluded that this Expansion Project requested by the Government of the Arab Republic of Egypt has sufficient reasons and significance to be immediately implemented under the grant aid programme of the Government of Japan.

Implementation of technical cooperation for the Project is also suggested to the Government of Japan since such aid is indispensable for the effective realization of diagnosis, treatment, education and research for cardiac paediatric disorders which are the central functions of the Project.

To satisfactorily fulfill the objectives of the Project the Government of the Arab Republic of Egypt is required to perform the tasks of administration, maintenance and operation of this Project assigned in this Report.

CHAPTER 1 INTRODUCTION

CHAPTER 1: INTRODUCTION

1-1 BACKGROUND AND OBJECTIVES OF THE BASIC DESIGN STUDY

The Cairo University Paediatric Hospital (CUPH) was constructed as a Japanese grant aid project and has played a vital role as the central facility for paediatric medical services in Egypt since its completion in December 1982. Japan has also been extending technical cooperation to the CUPH since 1983, and this is producing remarkable results.

The current Project involves the construction of new facilities that are lacking from the current CUPH building: facilities for diagnosis, treatment, training and research for cardiac and neurological paediatric disorders, and their surgical management. The functions of the CUPH as a medical organization will be substantially reinforced with the addition of these new facilities. The new facilities will be constructed above the existing 4-story building, and renovation work of the existing facilities will be carried out concurrently.

The Government of the Arab Republic of Egypt, which has secured its own fund of 3 million LE for construction work for the Project, has requested from the Government of Japan a grant aid with for the provision of construction work and medical equipment which cannot be covered by their own fund.

In response to this request, the Government of Japan dispatched a Preliminary Study Team headed by Ryoji NODA, an official of the Grant Aid Division, Economic Cooperation Bureau, the Ministry of Foreign Affiars for the period of July 4 to July 17, 1986, for the purpose of confirming the details of the request, the scope of work to be covered by the two parties, conceptual design, implementation schedule and budgetary situations and also examining the adequacy of the Project and the possibility for cooperation.

Based on the results of the above Preliminary Study, the Government of Japan decided to conduct a Basic Design Study through the Japan International Cooperation Agency (JICA) for the purpose of making on-site surveys, holding further detailed and specific discussions on the Project, the executing agency, systems for its operation, maintenance and administration, re-examining the adequacy of the Project and drawing up the Basic Design Report.

1-2 BASIC DESIGN STUDY

The Government of Japan dispatched a Basic Design Study Team headed by Mr. Ryoji NODA, an official of the Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs to Egypt for the period of September 27 to October 16, 1986.

The following is an outline of the discussions the Team held with the Egyptian side and the studies they conducted.

(1) Scope of Work

The draft proposal submitted by the Basic Design Study Team on the scope of work to be covered by the two parties was partially revised and subsequently approved by both parties. The priorities of all works to be covered by the Japanese side were evaluated and the items were ranked Priority A, B or C according to their necessity and urgency. The two parties agreed that the final scope of work to be covered by the Japanese side would be determined according to these priorities after comprehensive studies have been made by the Japanese side on their necessity, urgency and budget, etc.

(2) Budgetary Measures of the Government of Egypt

The General Director of CUPH reconfirmed that the Government of Egypt has appropriated the budget of 3 million LE for this Project in their budget for 1987/88 Fiscal Year, and that execution of this budget can be extended to 1988/89 Fiscal Year in which the works to be covered by the Egyptian side will actually be carried out.

The Egyptian side also promised to adopt special financial measures to cope with the high costs of performing cardiovascular operations.

(3) Implementation Schedule

The two parties approved the Implementation Schedule proposed by the Basic Design Study Team. The Egyptian side said they would complete the following procedures required for carrying out the Implementation Schedule on time.

1) To obtain by the end of March 1987 the approval of the People's Assembly of the E/N for the Detailed Design. (Detailed Design will be drawn up by the end of June 1987)

2) To obtain by the end of June 1987 the approval of the People's Assembly of the master E/N for the construction work. (Construction work will be commenced at the beginning of September 1987)

(4) Floor Planning

Although the two parties reconfirmed the floor plans they agreed upon at the time of the Preliminary Study, further discussions revealed the need to revise

the floor plans for the Operation Theatres, ICU and IMCU on the 5th floor after the Minutes of Discussions had been signed.

The Study Team drew up newly revised floor plans and obtained the approval of the relevant people. It was decided however, to put off the final decision on this matter until the revision had been reviewed in Japan.

(5) Facilities Planning

Based on the results of the Preliminary Study, the Study Team submitted a draft report of the design concept, conditions, criteria, proposed systems and outline of the architectural, structural, electrical and mechanical systems as well as the systems for vertical transportation and food services. Discussions were held by the two parties and, after some revisions and additions, the proposal was approved by the Egyptian side.

(6) Medical Equipment Planning

Based on the results of the Preliminary Study, the Study Team also submitted an outline of the Equipment Plan, Lists of Equipment for all rooms, and Equipment Specifications. The proposed equipment plan was approved by the Egyptian side after discussions held between the two parties. It was decided that the Whole Body CT Scanner, which is ranked Priority A, can be excluded from the items to be provided by Japan depending on the budgetary status of the Japanese side.

(7) Forecast on the Number of Paediatric Cardiovascular Operations

In response to an inquiry by letter from the JICA Cairo Office, the Hospital gave their estimation of the number of paediatric cardiovascular operations to be held annually: 100 operations during the initial year and approximately 300 to 500 per year after five years.

(8) Countermeasures for Existing Facilities and Equipment

In relation to the expansion programme, the Egyptian side strongly requested Japanese cooperation for solving the problems which have occured, and may occur in future, in the existing facilities and equipment. The Study Team promised to recommend to the Japanese Government to extend cooperation in these areas.

(9) Countermeasures for Maintenance of the Equipment (Medical and Non-medical)

The Study Team promised to pay special attention to the availability of maintenance services in Cairo when selecting equipment, as strongly requested by the Egyptian side.

(10) Renovation of the Main Kitchen

Although the renovation plan for the Main Kitchen was initially approved by the two parties, further discussions revealed the need to add some equipment to the plan. The Study Team drew up a revised proposal, which was subsequently approved by the Egyptian side. It was decided however, that the final conclusion on this matter be made after the subject has been reviewed in Japan.

(11) Renovation of Drainage Piping System in the Existing Examination Dept. on the 3rd Floor

Although this item was initially included in the scope of work to be covered by the Japanese side (Priority A), both parties agreed after further discussions, that the best solution would be to remove the sanitary bowl in the Urine Sampling Room and use the room as a Sample Receiving Room instead (as it is being used now). As a result, it was confirmed that only partial renovation would be conducted on the drainage piping system.

Furthermore, the Study Team made an on site survey including visits to 6 hospitals in Cairo to collect necessary materials for drawing up the Basic Design Report.

The findings and results of the discussions were summarized and signed by the representatives of both parties in the form of the Minutes of Discussions on October 5, 1986. A document listing the members of Basic Design Study Team and officials concerned, the diary of the study and copies of the Minutes are attached to this Report.

After conclusion of the discussions the Study Team visited the Ministry of Planning and International Cooperation (MOPIC) and reported the results of the discussions to it.

1-3 SUBMISSION OF DRAFT FINAL REPORT

As a result of the on-site survey by the Basic Design Study Team, the Japan International Cooperation Agency (JICA) prepared a Draft Final Report of the Study and sent a Study Team headed by Mr. Koichiro SHIKIDA, Assistant General Manager of International Operations Office, Nikken Sekkei Ltd to Egypt from November 27 to December 7, 1986 to submit and explain it.

The following are the main suggestions made by the Japanese side in the Draft Final Report.

(1) Scope of Work to be carried out by the two parties

Out of the rankings of Priority A, B and C applied to the items to be covered by the Japanese side, all items ranked A (including Whole Body CT Scanner) and those ranked B will be carried out by the Japanese side, while items ranked "Priority C" will be covered by the Egyptian side. The priority level of the Pocket Bell Calling System will be dropped from A to C.

As a result, the following "Priority C" work will be provided by the Egyptian side.

a) New lavatory for outpatients

b) Monitoring system in the existing ICU on the 4th floor

c) Audio-visual equipment

d) Transceivers for maintenance

e) Battery-powered clocks (excluding the clocks for new Operation Theatres)

f) Pocket bell calling system

g) Medical equipment ranked C (medical furniture excluding patient beds ranked A)

(2) Implementation Schedule

Completion of the work to be covered by the Japanese side will be advanced by three months to the end of December 1988. In this case, the Egyptian side will be able to commence its work from January 1989.

The above schedule has been drawn up on the presupposition that approval of the E/N can be obtained from the People's Assembly on schedule (by the end of March 1987 for detailed design and the end of June 1987 for construction and provision of medical equipment).

(3) Procedures for Construction Work

Procedures and scheduling that will have as little affect as possible on the medical activities of the existing building will be adopted.

The Cairo University will take responsible countermeasures against the tentative and partial closure of the existing building which will be inevitable in the course of the construction and renovation works.

Countermeasures should be adopted in advance, particularly for the Operation Dept. which will be closed for a minimum of 2.5 months.

(4) Floor Plan of the 5th Floor

The Study Team has agreed to the final revisions proposed after the conclusion of Minutes of Discussions for the Basic Design Study, and has approved it as the final plan of the Basic Design.

(5) Operation of the Newly-provided ICU and IMCU

It is reconfirmed that the newly provided ICU will be used only for post-operative and non-infectious patients convalescing from cardiac or other ultra clean operations, and that the ICU and IMCU will be operated as separate units.

(6) Number of Paediatric Cardiosurgical Operations

The CUPH plans to start conducting paediatric cardiosurgical operations, centering on relatively simple ones, at a pace of about 100 operations per year, and hopes to increase the number to about 300 - 500 a year from the fifth year onward. The facility and equipment plans drawn up for this Project will enable the CUPH to accomplish this goal.

However, the number of operations will be largely influenced by how the facilities will be operated (including rotation of ICU, etc.) as well as the status of the medical staff; so the Study Team considers it more practical at this stage to hold down the target number of operations to approximately 150 to 200 per year in future, too.

(7) Guaranty of Import of Materials and Equipment

Since a major part of the materials and equipment to be used for the Project will be imported from abroad (mainly from Japan), the Project will not be successfully implemented unless these items can be procured smoothly. The Government of the Arab Republic of Egypt is therefore requested to guarantee the import of materials and equipment to be used for the Project, in connection with the Egyptian Law "List of Commodities Prohibited to be imported" (M.D. No. 333/1986, Amending Certain Provisions of the Minister of Trade Decision No. 1036/1978, in Respect of the United Decisions).

(8) Exemption from Social Insurance

The Government of the Arab Republic of Egypt is also requested to take necessary measures so that the Project will be exempted from the insurance fee imposed on construction works stipulated by the Egyptian Law (Law No. 79,

Ordinance No. 222 of 1975, enforced in 1982), in view of the fact that the Project is executed under a grant aid.

(9) Storage Yard for Building Materials and Concrete Plant

In addition to the two storage yards for building materials (on the sites of the Kasr El Aini Hospital and the Faculty of Pharmacy), the Egyptian side is requested to provide a yard for a concrete plant near the construction site.

The Cairo University wholely agreed on the Draft Final Report after thorough review by the Committee of the Cairo University. Concerning the above mentioned main suggestions made by the Japanese side, the Egyptian side agreed upon items (1) ~ (6) and promised to secure items (7) and (8). As to item (9) the Egyptian side also promised to secure the following 3 spaces for the storage yards for building materials and the concrete plant instead:

- Southern road (Ismail Sabry Street)
- Eastern site of the CSPM
- A part of the Old Paediatric Hospital

In addition to the above,

- A part of the site of the Faculty of Pharmacy, if possible
  (The site of the Kasr El Aini Hispital can not be used)

The findings and results of the discussions were summarized and signed by the representatives of both parties in the form of the Minutes of Discussions on December 4, 1986.

A document listing the members of the Study Team, the diary of the study and copies of the Minutes are attached to this Report.

The Study Team visited the Ministry of Planning and International Cooperation (MOPIC), accompanied by the administrative director of the CUPH and the representative of JICA Cairo Office, and reported the results of the disucssions to it.

After the team returned to Japan, further studies were made and the present Report has been drawn up.

CHAPTER 2 PROJECT BACKGROUND

CHAPTER 2: PROJECT BACKGROUND

2-1 CIRCUMSTANCES OF PAEDIATRIC, CARDIAC DISEASES AND EXPANSION OF THE CUPH

2-1-1 Circumstances of Paediatric Cardiac Diseases in Egypt

Rheumatic valvular diseases are prelavent and account for about 25% of paediatric cardiac diseases in Egypt. In cases of serious desolation and damages of the valves, they must be replaced with artificial ones. As to congenital heart deformities, the number of VSD patients numbered ten times that of ASD patients. This is probably because VSD can be easily detected with a single stethoscope and also because very few cases of ASD are referred to the Cairo University Paediatric Hospital (CUPH). Upgraded diagnostic skills of doctors engaged in early-stage medical examinations and diffusion of periodical medical check-ups for children are therefore required in Egypt.

Examinations using cineangio system (diagnostic equipment for cardiovascular system employing a high-speed 35 mm film) are being promoted in Cairo University Hospital. The current equipment has the capacity to conduct only 3 or 4 examinations per day. The Paediatric Cardiac Unit headed by Prof. Dr. Fawsan however has handled a total of 6,123 cases during the period from October 1983 to September 1986, out of which 2,100 cases were diagnosed by means of the so-called "closed" tests, and their efforts should be highly evaluated.

2-1-2 Necessity and Prospects of the Project

The target number of cardiac surgeries to be conducted per year at the Hospital is 100 to 150. The number of children requiring cardiac operations in Egypt is estimated to be more than several times as large as the above figures. Furthermore, a considerable number of patients may be sent to the CUPH from other hospitals in Cairo.

Actually, patients have no choice but to visit the CUPH, since there are no hospitals in Cairo that have a paediatric cardiosurgical department. Paediatric cardiosurgical operations are not practiced in Egypt at present, and only very wealthy patients can afford to go abroad for such operations. Ordinary citizens who are not particularly wealthy will be able to undergo operations in this Hospital. The government will cover the cost for those who are incapable of paying the actual expenses for the openheart operation.

It is obvious that this expansion project is much awaited by the people of Egypt and good news to children suffering from cardiac disorders.

The effect will be further enhanced if continuous cooperation, including technical cooperation, is extended from Japan.

2-1-3 Costs for Cardiosurgical Operations in Egypt

Open heart operation fees in private hospitals in Cairo cost 5,000 to 8,000 LE, which is about one-third of what it costs in Japan, partly because of the recent strength of the Yen.

The main reason for the above, however, is that special equipment such as disposable lung and extra corporeal blood circuit are comparatively inexpensive (800 to 1,500 LE whereas they cost 3,800 to 41,200 LE in Japan). Moreover, drugs, transfusion fluid etc. are surprisingly cheap compared with the same products used in Japan.

As a result, the total cost for surgical operations is relatively inexpensive in Egypt.

In some private hospitals in Cairo, operation fees paid to doctors, equivalent to about 1,500 LE to 1,900 LE, take up a large part of the total costs. In public hospitals such as the Cairo University Hospital therefore where the wages of doctors and nurses are relatively low, the total cost for a cardiosurgical operation is no more than 3,100 - 3,300 LE.

In Japan, for example, in the case of a nine-year-old patient, the cost for a surgical operation for complete cure of ASD interauricular septal defect and hospitalisation for one month will total 20,000,000 LE. The breakdown is 11,000 LE for the surgical operation and anesthesia, 3,000 LE for drugs and injections, 2,500 LE for examinations, 2,100 LE for hospitalisation and meals, 400 LE for diagnosis and 1,000 LE for others.

2-2 DESCRIPTION OF THE EXISTING CUPH

Cairo University Paediatric Hospital (CUPH) was constructed under a grant aid of the Government of Japan as the key project of the Infantile Health Promotion Program to commemorate the International Children's Year (1979).

As the first project to be realized from the "Kasr El-Aini Reconstruction Programme" (a plan to renovate a number of medical service facilities centering on the Faculty of Medicine of the Cairo University) being promoted by the Government of the Arab Republic of Egypt, major responsibilities were bestowed on the CUPH as the nucleus organization for the paediatric medical service in the country. It has accomplished remarkable results in upgrading the educational and research level of the country as an educational hospital affiliated with the Cairo University.

The CUPH consists of a four story building and a two story penthouse and has a total floor area of 11,789 m^2. The facilities are divided into the following six departments.

(1) Administration Department

(2) Outpatients and Emergency Department (Referral Clinics, Special Clinics, First Aid Medical Examination, etc.)

(3) Inpatient Department (Medical and Surgical Wards, ICU, etc. 250 beds in total)

(4) Supporting Department (X-ray, Clinical Laboratory, Physical Examination, Operation Theatres, etc.)

(5) Service Department (Machine Room, Kitchen, Laundry, Sterilization Room, etc.)

(6) Education/ Research Department (Lecture Rooms, Professors' Rooms, rooms for staffers)

Facilities of high grade and large scale are usually demanded of educational hospitals affiliated with universities because they must serve all three functions of medical treatment, education and research. However, the scale of the CUPH is considerably smaller than those of other educational hospitals.

This is because the concept drawn up during the Basic Design Study for the CUPH conducted from 1979 to 1980, suggested that the CUPH be used not as an independent institution but as part of the integrated medical service facilities consisting of the old Paediatric Hospital, the newly-constructed hospital (CUPH), and the Nurse Training Center.

According to this basic concept, the old Paediatric Hospital was to take charge of outpatients and day care and its facilities included infectious diseases wards, administration department, doctors dormitories, etc.

The newly-expanded hospital (CUPH) was to function mainly as a referral clinic and it was supposed to provide the facilities for high level diagnosis and treatment,

hospitalization, education and research. At that time, there were plans that USAID would construct a Nurse Training Center adjacent to the CUPH so that it would complement the functions of the CUPH by providing facilities for nurses as well as a library and meeting rooms which were not included in the CUPH.

The following are the major issues raised when the basic design of the CUPH was drawn up (1979-1980).

(1) The number of beds totalling 250 was barely sufficient for meeting the current demand (The Cairo University had originally requested 500 beds) and the shortage would be even more serious in future.

(2) The dormitories for doctors and nurses were not only insufficient in terms of scale but were also superannuated to a degree that would require renovation in the near future.

(3) The facilities for cardiosurgical operations were insufficient.

Both parties carefully studied the priorities in the construction of the CUPH, and agreed on the following design to counter the above three problems. For problems (1) and (2), they decided to adopt a design that would allow a future addition of 2 floors to the planned building. As for problem (3), they agreed to leave it as a future issue to be considered in line with the overall technological progress in the medical area.

2-3 CURRENT CIRCUMSTANCES OF THE EXISTING CUPH

2-3-1 Status of Medical Activities

The following are the main annual statistics for 1984 and 1985 concerning the medical activities of the CUPH .

		1984	1985
(1)	No. of outpatients in specialized areas	28,095	73,551
(2)	No. of inpatients	5,850	6,022
(3)	No. of surgical operations	*1,518	1,954
	* (excluding the number of orthopedic and neurosurgery operations)		
(4)	X-ray	4,747	5,548 (CT Scan:602)
(5)	Physical treatment	7,234	—
(6)	No. of biochemical tests	42,713	—
(7)	No. of deaths	607	409

The above statistics show that the CUPH provides intensive medical services and that it is virtually overflowing with patients.

Another reason why the CUPH is so crowded is because clinical lectures on paediatrics are given here for approximately one thousand students of the Faculty of Medicine of the Cairo University.

The departments that support these activities by providing laundering, sterilization and catering services are also in full operation. The number of meals prepared daily amounts to a total of 1,070 meals (Refer to Table 4-7-1 for details.).

In view of the fruitful results steadily achieved by JICA through its technical cooperation extended to the CUPH since 1983, the CUPH seems to be playing its role perfectly as the central facility for paediatric medical treatment in Egypt. The CUPH, which has been called the "Japanese Hospital" since its opening, has won the overwhelming confidence of the Egyptian people.

2-3-2 Current Circumstances of Operation and Administration

The current levels of operation and administration of the CUPH continue to be the highest among similar facilities in Egypt. This is due to the powerful leadership of its General Director, Prof. Dr. Hussein Kamel, Baha El Din and the excellent teamwork and efforts of his aides including Prof. Dr. Salah Nassar, Administrative Director Mr. Mounir

Hafez and the hospital staff. The substantial contribution of the technical cooperation team of JICA headed by its leader Ms. Kyoko Tateyama should also be mentioned.

The total number of hospital staff as of July 1986 was 475, including 38 professors and 30 staffers working for the administrative divisions.

The expenditure of the CUPH is entirely funded by the Government of the Arab Republic of Egypt. Incidentally, all services including medical care, hospital fees, drugs and meals (including those for attending mothers) are provided free of charge.

As stated above, all medical services at the CUPH are provided on a non-paid basis, and the heavy financial burden bestowed on the CUPH as a result has triggered the following problems:

(1) It is not easy to recruit the necessary numbers of excellent nurses and paramedicals who are indispensable for an upgraded level of medical service.

(2) It is also not easy to employ the necessary numbers of experienced engineers and technicians who are required for the maintenance of facilities and equipment.

Consequently, the most crucial problem for the operation and management of the CUPH is what vital financial measures can be adopted for recruiting enough excellent staffers and paying the necessary maintenance costs.

2-3-3 Present Circumstances of Facilities and Equipment

The CUPH facilities are being fully utilized and are functioning quite adequately. Seven years have already passed however, since the establishment of the project conditions and four years since the completion of the CUPH. The following problems have surfaced with respect to its facilities and equipment:

(1) The CUPH lacks adequate facilities and equipment for conducting such high-level medical treatment as cardiosurgery.

(2) Facilities and equipment for Rehabilitation Unit, surgical ICU, etc. are also insufficient.

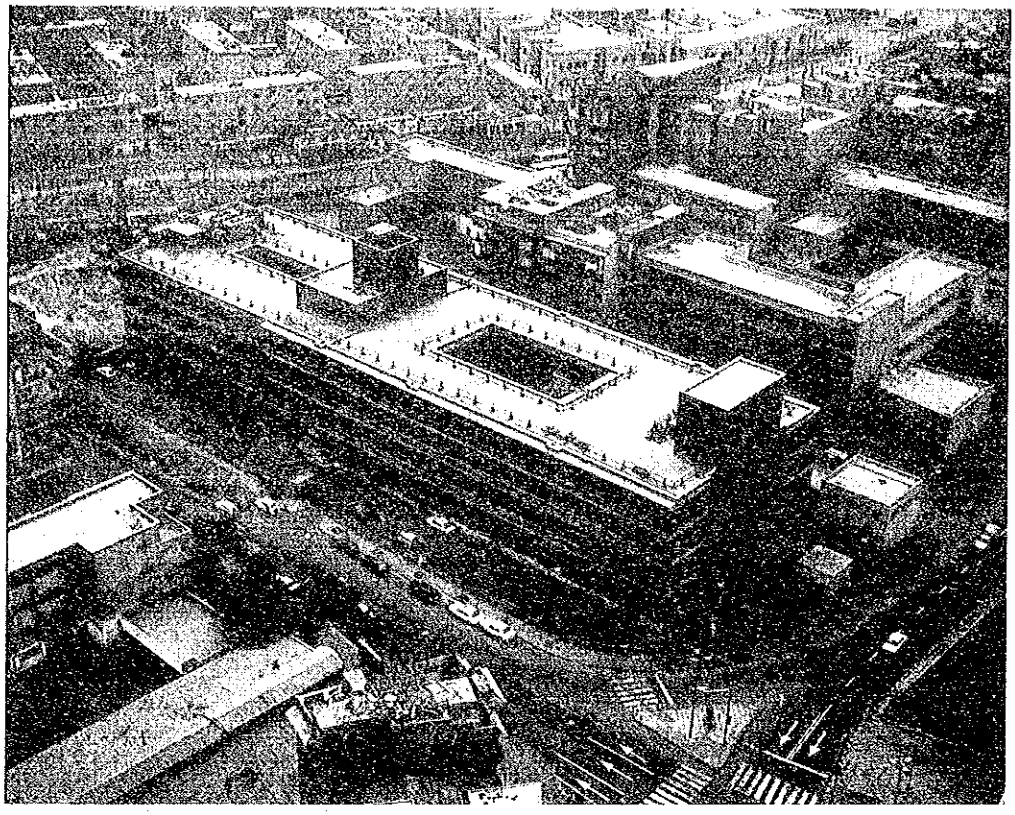
(3) Facilities for services that support the hospital's medical activities, including facilities for doctors and nurses and meeting rooms, are insufficient. The result is that medical facilities are used for these purposes, and this in turn is hampering the smooth implementation of medical activities. Moreover, the facilities as a whole are extremely crowded.

(4) Because of the rapid progress of medical technology and equipment, the equipment installed in the CUPH is becoming relatively obsolete and some of the equipment that is used intensively is approaching the end of its life span.

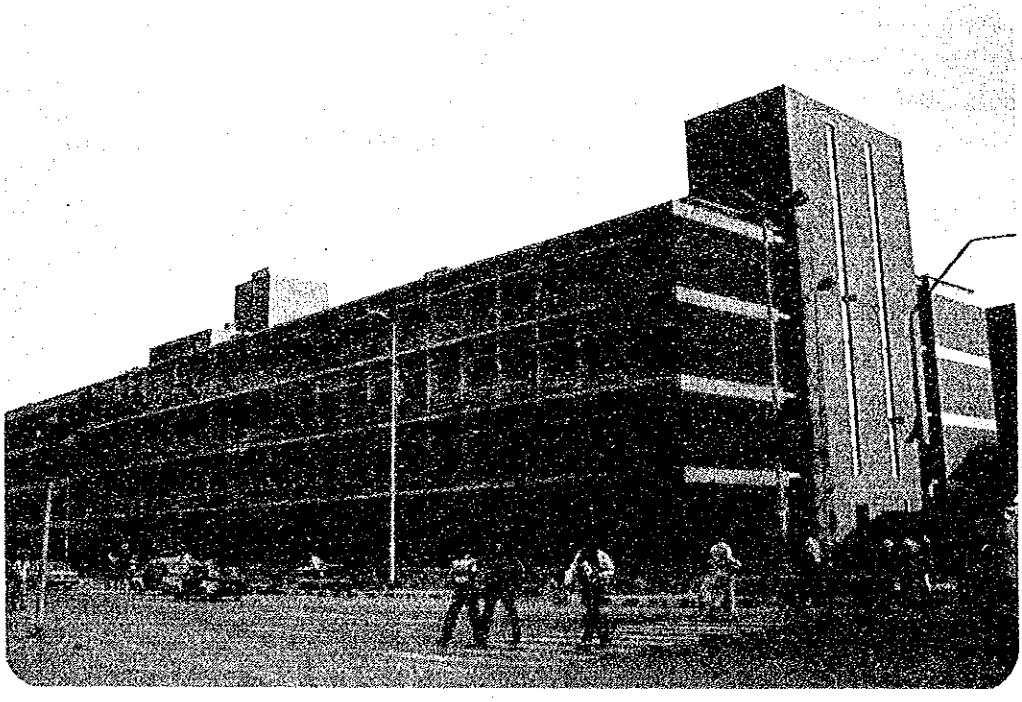
(5) There are frequent problems with the airconditioning system and drainage pipes in the Supporting Department.

Despite all the problems heretofore outlined, the CUPH holds a top ranking standard among public hospitals in Egypt today. In view of the drastic progress and innovation of medical technology currently taking place, however, the CUPH will find it increasingly difficult to maintain the standard expected of it as the central facility for paediatric medical services in Egypt and meeting growing demands at the same time.

The relative decline in the standard of the CUPH facilities caused by the emergence of major high grade private hospitals being completed one after another in Cairo is making matters even more serious.



Bird's-eye View of CUPH



Northeast Elevation of CUPH

CHAPTER 3 PROJECT OUTLINE

CHAPTER 3. PROJECT OUTLINE

3-1 WORK OUTLINE

The work consists of the addition of floors to the existing CUPH building and the renovation of existing CUPH facilities. The following is the outline of the work to be covered by the two parties.

3-1-1 Addition of 2 floors to the existing 4-story building and new construction of 1-story penthouses.

(1) Paediatric Cardiac Surgery and Ultra-Clean Surgery Operation Dept. (5th Floor)
Priority "A" Floor area 559.3 m²

Two Operation Theatres will be provided. The Cardiac Surgery Operation Theatre specialized in cardiosurgery operations and the Ultra Clean Surgery Operation Theatre is mainly for paediatric cerebral operations.

Washing and sterilization facilities to be newly installed in this Dept. will also serve the ICU and the IMCU.

(2) ICU (5th Floor). "A" 218.6 m²

The ICU will be used only by post-operative and non-infectious patients convalescing from operations conducted in the adjacent Cardiac Surgery Operation Theatre or Ultra Clean Surgery Operation Theatre. The ICU will be equipped with 4 beds and 1 incubator. Sufficient space shall be provided for medical treatment, particularly to allow transfer and storage of devices. In addition, Laboratory, Doctor's Room, Nurse's Room, Preparation Room and Soiled Utility will be provided within the unit. Laboratory will be located between ICU and IMCU so that it can be used by the both units.

(3) IMCU (Intermediate Care Unit) (5th Floor) "A" 145.0 m²

The IMCU, which mainly provides post-operative patients with intermediate care between ICU and ordinary surgical patient wards, will be equipped with 3 beds and 1 incubator, and will have the same attached facilities as the ICU.

(4) Cardiac Diagnostic Unit (5th Floor) "A" 179.0 m²

A cardiac diagnostic system necessary for diagnosis of heart diseases shall be newly installed.

(5) Private Wards (5th Floor) "A" 1,449.0 m²

Surgical Private Ward (9 one-bed rooms and 6 two-bed rooms, totalling 21 beds) and Medical Private Ward (7 one-bed rooms and 9 two-bed rooms, totalling to 25 beds) will be provided.

Shower booth and lavatory will be attached to each bed room, and the room will have sufficient space and equipment to accommodate both patient and mother attending the patient.

A Lounge (to be shared by Surgical and Medical wards) will be provided for visitors and refreshment will be served there.

(6) New Rehabilitation Unit (6th Floor) "A" 281.0 m²

A new Rehabilitation Unit (private) will be newly built because there are too many patients requiring treatment and exercise to be covered by existing facilities, and also because of the large potential needs. The existing Rehabilitation Unit will be relocated on the 1st floor so as to be more convenient for patients.

(7) Audio-Visual Production Room (6th Floor) "A" 86.4 m²

A TV camera incorporated into the operation light in the Cardiac Surgery Operation Theatre makes it possible to monitor the proceedings of an operation in the Meeting Room in Operation Dept. on the 5th floor and the Meeting Room, Large Meeting Room, and also the Audio Visual Production Room on the 6th floor. The control unit for this monitoring system will be installed in this room. The room will also be furnished with VTR devices for monitoring the patient rooms, as well as the main amplifier which will transmit BGM to the Patient Ward Corridor and Hall, etc. Other educational materials will also be produced here.

(8) Doctor's Dormitories and Living/Dining Room (6th Floor)
"Egyptian side work" 339.6 m²

5 twin bedrooms (with shower and lavatory) each for male and female doctors (for a total of 10) will be prepared. A Living/Dining Room, where refreshment may be served will be shared by male and female doctors.

(9) Nurse's Rest Room (6th Floor) "Egyptian side work" 81.4 m²

One large room will be prepared for resting, and refreshments may be served there. The Kitchenette for (8) and (9) will be shared.

(10) Medical Record Room (6th Floor) "Egyptian side work" 80.1 m²

A new Medical Record Room furnished with a personal computer will be created to cover patients in both existing and expanded wards. The current Medical Record Room will be used as a Public Relations Office instead.

(11) Library (6th Floor) "Egyptian side work" 183.3 m²

Although a library is an important facility for an educational hospital, the existing building did not have one. A library will therefore be created.

(12) Large Meeting Room (6th Floor) "Egyptian side work" 254.0 m²

A multi-purpose Meeting Room to be used for conferences, lectures, etc. will be provided. The room will be furnished with a movable stage and audio-visual equipment for lecture and conference. A TV for monitoring cardiac operations will also be furnished. It will have a flat floor and approximately 200 movable seats.

(13) Meeting/Monitoring Room (6th Floor) "Egyptian side work" 56.0 m²

One small Meeting/Monitoring Room furnished with a TV for monitoring cardiac operations will be provided.

(14) General Storage, Work Shop and Pharmacy (6th Floor)
"Egyptian side work" 334.2 m²

General Storage and Workshop to serve both the existing and expansion areas, which were misssing from the existing hospital building will be created. A Pharmacy to serve the private sections will also be provided.

(15) Electrical Room/Airconditioning Machine Room (6th Floor) "A" 332.3 m²

A Sub Electrical Room for providing electricity to the expansion area on the 5th and 6th floor, and an Airconditioning Machine Room to mainly serve the Operation Dept., ICU and IMCU on the 5th floor will be provided.

(16) Increased Number of Elevators "A"

In order to cope with increased volume of transportation resulting from the expansion of 2 floors, 3 new elevators will be installed; one within the existing building for patients and two in the expanded facilities (to be exclusively used for Private Sections on the 5th and 6th floors). Together with the existing three, the total number of elevators will be increased to six.

(17) New Construction of Entrance Deck and Entrance Halls to Private Wards (1st/2nd Floor) "A"

An elevator shaft and exclusive Entrance Halls (Sub Hall on the 1st floor, Main Hall on the 2nd) will be newly constructed on the western side of the existing

building in order to provide access to the Private Sections on the 5th and 6th floors.

An Entrance Deck leading from the road to the south of the building to the Main Entrance Hall on the 2nd floor will also be newly constructed.

As a result, the current kitchen service route will be used concurrently for carrying corpses out of the building.

(18) New Construction of Lavatory for Outpatients (outdoor)
"Egyptian side work" "C" 33.8 m^2

The existing Outpatient Dept. (1st and 2nd floors) has one lavatory each on the 1st and 2nd floors. However, the lavatory on the 1st floor is exclusively used by doctors and the hospital staff, so there is actually only one lavatory on the 2nd floor for patients. The lavatory is therefore very crowded and is causing great inconvenience to patients. A lavatory to be exclusively used by outpatients will be newly prepared outdoors as a solution.

(19) New Construction of Liquid Oxygen Tank Yard (outdoor) "A" 33.8 m^2

The existing oxygen gas cylinders will be replaced with a liquid oxygen tank to cope with increased demand for liquid oxygen resulting from the expansion of facilities.

(20) Others

Partial removal, renovation and reinforcement of the existing building necessary for new construction, expansion and renovation of the facilities.

3-1-2 <u>Renovation and partial expansion of the existing CUPH building</u>

(1) Relocation of Rehabilitation Unit. (from Penthouse to 1st floor)
Priority "A" Floor area 213.4 m^2

Because of the expansion work required for the existing building, the current Rehabilitation Unit. will be removed from the Penthouse and relocated on the 1st floor.

(2) Relocation of Lecture Room and Public Relations Office
(from 1st floor to 1st floor) "A" 148.8 m^2

This change is required as a result of (1) above. Part of the Hall will be used as space for constructing a Lecture Room after the existing Storage and Preparation Room have been cleared away. The existing Medical Record Room will be turned into Public Relations Office. The equipment inside the Dark Room affiliated with existing Medical Record Room will be cleared away and the room will be used as the Chief's Office for Public Relations Office.

(3) Renovation and Partial Expansion of Operation Dept. on the 4th floor

"B" 33.7 m²

With the new construction of Cardiac Surgery and Ultra-Clean Surgery Operation Theatres, the existing Operation Dept. on the 4th floor will be required to undertake operations for general surgery. Based on the experience of the Japanese technical cooperation currently being concentrated on this department, this project plan will aim at improving the functions and reinforcing the educational effects of the department by newly providing facilities that are currently missing (Nurse's Rest Room, Meeting Room for doctors), installing partitions and doors to enhance the clean level of cleanliness.

(4) Renovation of Main Kitchen on the 1st Floor "A" 18.0 m²

The Milk Kitchen will be removed and the current Kitchen facility will be expanded so as to cope with the increased number of meals, resulting from the expansion of the 5th and 6th floor, as well as for preparing special menus to be served in the Private wards.

No. of meals currently prepared	1,070 meals/day
No. of meals after expansion	1,517 meals/day (increase of 447 meals or 42%)

(5) Increased Equipment and Renovation of Central Laundry on the 1st Floor

"A" 6.0 m²

The size of washing machines and drying machines will be upgraded to accommodate the increased volume of laundry resulting from the expansion of facilities. Some renovation work will also be necessary.

(6) Change in Partition between Entrance and Waiting Hall on the 1st Floor

"A" 52.7 m²

The partition will be removed and newly prepared to readjust to the changes in the Administration Dept. and traffic line division resulting from items (1) and (2), and to provide security to patients and students.

(7) Renovation of Drainage System "A"

Renovation of drainage pipes of the Urine Sampling Room on the 3rd floor, which have frequently caused water leakage.

(8) Improvement of Airconditioning System "A"

Immediate measures are urgently called for because of serious damages, both in system and equipment, in the following facilities completed four years ago.

1) Adjustment of airconditioning units (total of 9)

2) Flushing of cold-water pipes

3) Adjustment of automatic control devices

4) Adjustment of the draft from duct system

5) Installation of new air-cooled chillers

(9) Improvement of Electrical System "A"

1) Inspection/repair of AVR (Automatic Voltage Regulator)

The reactor within the AVR burnt out in mid-September 1986 and the device has been out of use since then. Inspection by manufacturer and repair of the system are required.

2) Overhauling of Power Generator

Operation tests conducted every week indicate that readjustment is necessary; the frequency is a little low although the voltage is normal. Diesel power generators usually need to be overhauled every 5 to 7 years, so the generator will be overhauled concurrently with the renovation work.

3) Replacement of bulbs for indicator lamps

Some of the bulbs for indicator lamps on the power switch panel which burnt out will be replaced.

3-1-3 Scale of the Project

(1) Construction Floor Area of the Project

1)	Expansion Work	6,292.8 m²
2)	Renovation and Modification Work	958.4 m²
	Total	7,251.2 m²

(2) Total Floor Area of the Hospital

1)	Existing	11,789.3 m²
2)	Expansion	6,292.8 m²
	Total	18,082.1 m²

(3) Number of Patient's Beds (including the number of incubators in ICU and IMCU)

		Wards	ICU	IMCU	Total
1)	Existing	237 (non-paying)	13	0	250
2)	Expansion	46 (paying)	5	4	53
	Total	283	18	4	305

(4) Floor Area Schedule

	Existing (m²)			Expansion (m²)			Total (m²)	
	Renova-tion	Existing	Total	Main Bldg.	Annex	Total	Main Bldg.	Annex
PH	-	-	-	312.6	-	312.6	312.6	-
6F	128.4	-	128.4	2,826.6	-	2,826.6	2,955.0	-
5F	332.8	-	332.8	2,635.8	-	2,635.8	2,968.6	-
4F	6.4	2,767.9	2,774.3	106.0	-	106.0	2,880.3	-
3F	-	2,774.3	2,774.3	78.7	-	78.7	2,853.0	-
2F	24.8	2,772.5	2,797.3	113.4	-	113.4	2,910.7	-
1F	466.1	2,516.2	2,982.3	127.7	92.0	219.7	2,973.6	228.4
Total	958.4	10,830.9	11,789.3	6,200.8	92.0	6,292.8	17,853.8	228.4

(5) Floor Area Schedule by Department

m²

Dept. \ Floor	1		2		3		4		5		6		P		Total	
	Exist.	After Exp.	Exist.	After Exp.	Exist.	After Exp.	Exist.	After Exp.	Exist.	After Exp.	Exist.	After Exp.	Exist.	After Exp.	Exist.	After Exp.
Wards			1,221	1,221	1,221	1,221	1,221	1,221		1,534					2,662	5,197
Out Patient	838	677	879	879											1,717	1,556
Operation							457	457		535					457	992
ICU/IMCU							420	420		402					420	822
X-Ray					450	450				179					450	629
Laboratory					404	404									404	404
Rehabilitation	0	141							135			291			135	432
Mortuary	57	57													57	57
Administration	867	867	269	269	269	269	269	269	34			1,561			1,708	3,235
Services	488	488													488	488
Elv., Corr., Elec., Mech.	734	972	428	541	430	509	407	513	163	320	128	1,103		312	2,290	4,270
Total	2,984	3,202	2,797	2,910	2,774	2,853	2,774	2,880	332	2,970	128	2,955		312	11,789	18,082

3-2 MEDICAL EQUIPMENT PLAN

The outline of the Medical Equipment Plan for the expanded area are as follows.

(1) Cardiac Diagnostic Unit

An angio X-ray system with DSA, blood gas analyzer relating catheterization examination, echocardiograph and the other related equipment will be provided. Especially, the angio X-ray system with DSA (bi-plane system) will be provided as the advance of cardiac surgery operation technic for getting more exact analyzed data recently. The bi-plane system with digital subtraction apparatus can provide sufficient high quality imaging, wide flexibility, simultaneous bi-angle radiography (especially suitable for paediatric diagnosis).

(2) Cardiac Surgery Operation Theatre

The Cardiac Surgery Operation Theatre which needs more critical environmental conditions than a general surgery operation theatre, it is essential to facilitate both open-heart operation with the assistance of extra-corporeal technology and special medical equipment to monitor the patient.

As the speciality of cardiac surgery operation, the following additional equipment will be provided with the general operation theatre equipment, such as artificial heart lung machine, cardiac polygraph system, hyper- hypo-thermia apparatus, defibrillator, etc. It means to apply congenital and acquired cardiac operation.

An operating light needs attached TV camera for education purposes for both medical staff and medical students.

(3) Ultra Clean Surgery Operation Theatre

The medical equipment plan in this theatre is arranged mainly to facilitate brain surgery for pediatric patients. So, in addition to the regular general operation apparatus, the following special equipment is planned: for example, microsurgical medical instrument, polygraph system, multi-purpose head-frame, pneumatic skull surgery set, air drill set, electroencephalograph, operating binocular microscope, etc.

This equipment can be applied for the operation of V-P Shunt / V-A Shunt for paediatric hydrocephalus, hematoma from traffic accident and craniotomy for brain abscess, brain tumors.

(4) Sterilizing Room

Necessary medical equipment for washing, packing and sterilizing of the instruments used in the Operation Theatres, ICU and IMCU on the 5th floor will

be provided. Washing machine for linen used in these area will also be provided.

(5) Preparation Hall

Scrub unit for three persons and relating of hand washing process will be provided.

(6) I.C.U.

Medical equipment is arranged for intensive care from new-born babies to Infants with the combination of medical equipment in cardiac surgery and paediatric intensive care in this I.C.U. as follows:

1) Special equipment for paediatric intensive care

Incubator for I.C.U., patient monitoring system, ventilator for paediatrics, phototherapy unit etc.

2) Special equipment as special cardiac care center

defibrillator, portable X-ray apparatus, cardiac out-put apparatus, pacemaker etc.

They will not face any practical problems in daily activities for the post-operative control purpose.

In Laboratory under the control of I.C.U. blood gas analyzer, blood-chemical analyzer and related equipment will be provided to assist patient vital sign data catching during and after operation period. Their function is to get proper data from the patient on oxygen, ventilation of alveoli and acid-base balance, etc. Through the judgement of medical staff from these examination results, the treatment effectiveness can be improved by controlling artificially patient's metabolic function.

(7) Intermediate Care Unit (I.M.C.U.)

This is located between I.C.U. and Wards, and its purpose is to provide intermediate treatment after that of I.C.U. to patient for his recovery. The content of equipment will be almost same as I.C.U., but the following equipment such as patient monitoring system, artificial ventilator, phototherapy unit, defibrillator, portable X-ray apparatus will be excluded.

(8) Wards: Nurse Stations/Treatment Rooms/Patient Rooms

There is no special function such as cardiac surgery in this facility. They are ordinary nurses stations and treatment rooms as general wards. In this area, equipment will provide both nursing care in general wards and regular diagnosis and treatment purpose.

(9) New Rehabilitation Unit

This Unit's purpose is to provide a rehabilitation function to post-operative patients and accelerate to return them home and to society as soon as possible.
Electric therapy equipment such as high-frequency therapy apparatus, ultra-violet therapy apparatus, micro-wave therapy apparatus, ultra-sonic apparatus and exercise therapy equipment such as parallel bar, bicycle-exerciser, quadriceps-table will be provided. A large habard tank bath will also be provided.

CHAPTER 4 BASIC DESIGN

CHAPTER 4: BASIC DESIGN

4-1 DESIGN PRINCIPLES

4-1-1 Basic Design Policies

The design of the facilities will be prepared in accordance with the following aims and guidelines:

(1) To design facilities that satisfy the needs of the local people and are also attractive and convenient to users.

(2) To design facilities that are both safe and easy to use and maintain based on experiences with the existing facilities.

(3) To adopt a rational design to enable smooth operation of high-grade medical services provided in the facilities.

(4) To take into account local construction practices, methods and skills, and adopt a design that uses locally procurable materials and equipment wherever possible.

(5) To choose systems, equipment and materials that will allow simple operations, energy saving and ease of maintenance.

(6) To adopt an efficient design that exerts as little influence as possible to existing facilities and one which makes the most of the systems of the existing facilities.

4-1-2 Establishing the Grade of Facilities

Since the Project consists of the works necessary for expanding and renovating existing CUPH facilities, the newly provided areas shall conform to the grade of the existing facilities. However, the newly-provided Cardiac and Ultra Clean Surgery Operation Dept., ICU, IMCU, Private Wards and new Rehabilitation Unit on the 5th and 6th floors should be of a higher grade compared with other parts of the existing CUPH, because of the highly specialized functions of these departments and also because of the high standard of the facilities in private hospitals in Cairo.

Mainly cardiosurgical and other ultra clean operations are carried out in the Operation Theatres in this department, so the rooms are of high grade in terms of floor area, finish material and airconditioning systems. Cardiosurgical operations are usually conducted by a team of 8, consisting of main and supporting surgeon, anesthetist and nurses, but there may be occasions when several others will be present during the operation since the CUPH is also an educational institution. The Cardiac Surgery Operation Theatre will also hold many large pieces of equipment including a heart-lung machine and monitoring devices, so a floor area of 57.8 m^2 (7.6 m x 7.6 m) should

be alloted to this theatre, making it approximately 28% larger than the Main Operation Room in the existing CUPH facilities. The floor area for the Ultra Clean Surgery Operation Theatre to be mainly used for cerebral surgical operations shall have a floor area of 38.5 m^2 (7.7 m x 5.0 m), which is smaller than the Main Operation Room but larger than the other Operation Rooms of the existing facilities.

The clean level of the Operation Theatres shall be established at class 10,000 (NASA standard), and airconditioning systems and finishing materials that enable the rooms to maintain this clean level will be selected.

4-1-3 Codes, Regulations and Specifications

(1) The design will comply in principle with the relevant Egyptian codes and regulations to the utmost extent. However, when these are non-existent, the regulations and standards in Japan or internationally established regulations and practices shall be applied instead.

(2) The Codes, Regulations and Specifications to be applied are as follow:

1) Architectural Design and Work:

a) A.R.E. Building and Housing Laws

b) A.R.E. Building Code, Municipal Laws

c) A.R.E. New Laws for the Basics of Design and Execution of Building Works

d) Egyptian Standard Specifications (ESS)

e) Japanese Industrial Standard (JIS)

2) Structural Design and Work:

a) Piles: A.R.E. Code of Practice (Pile)

b) Concrete: A.R.E. Code of Practice (Reinforced Concrete), American Concrete Institute (ACI) ACI-318

c)) Egyptian Standard Specifications (ESS)

3) Electrical, Mechanical and Medical Equipment Design and Works:

a) A.R.E. Building Code (Service)

b) Japanese Industrial Standard (JIS)

c) Japanese Electrotechnical Committee's Standards (JES)

d) Standards for the Japan Electrical Manufacturer's Association (JEM)

e) Japanese Elevator Association Standard (JEAS)

f) Japanese Heating, Airconditioning and Sanitary Standard (HASS)

4-2 ARCHITECTURAL DESIGN

4-2-1 Constitution of the Components

The expansion area of the 5th and 6th floors will comprise the following departments and access to this area is provided by the existing and new elevators and the stairways.

6th floor
- New Rehabilitation Unit
- Doctor's Dormitories, Nurse's Rest Room, Medical Record Room, General Storage, Meeting Rooms, Audio-Visual Production Room, ancillary facilities such as Library, etc.
- Electrical Room, Airconditioning Machine Room

5th floor
- Cardiac Surgery Operation Theatre and Ultra-Clean Surgery Operation Theatre
- ICU.
- IMCU.
- Cardiac Diagnostic Unit
- Private Wards (Surgical Ward, Medical Ward)

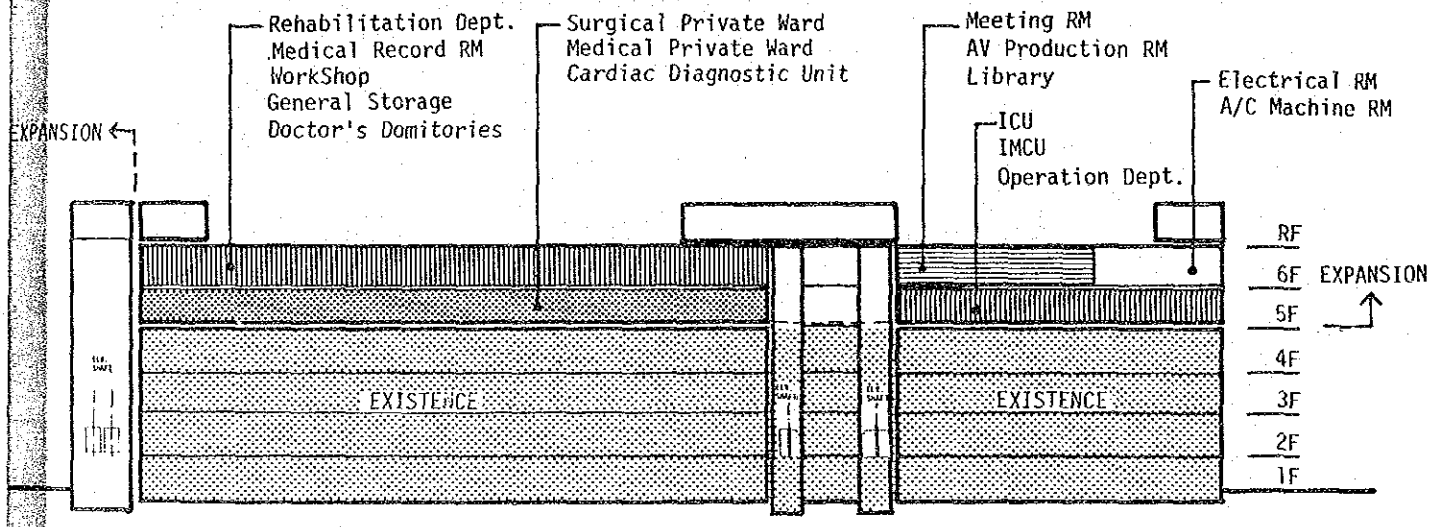


Fig. 4-2-1 Building Section

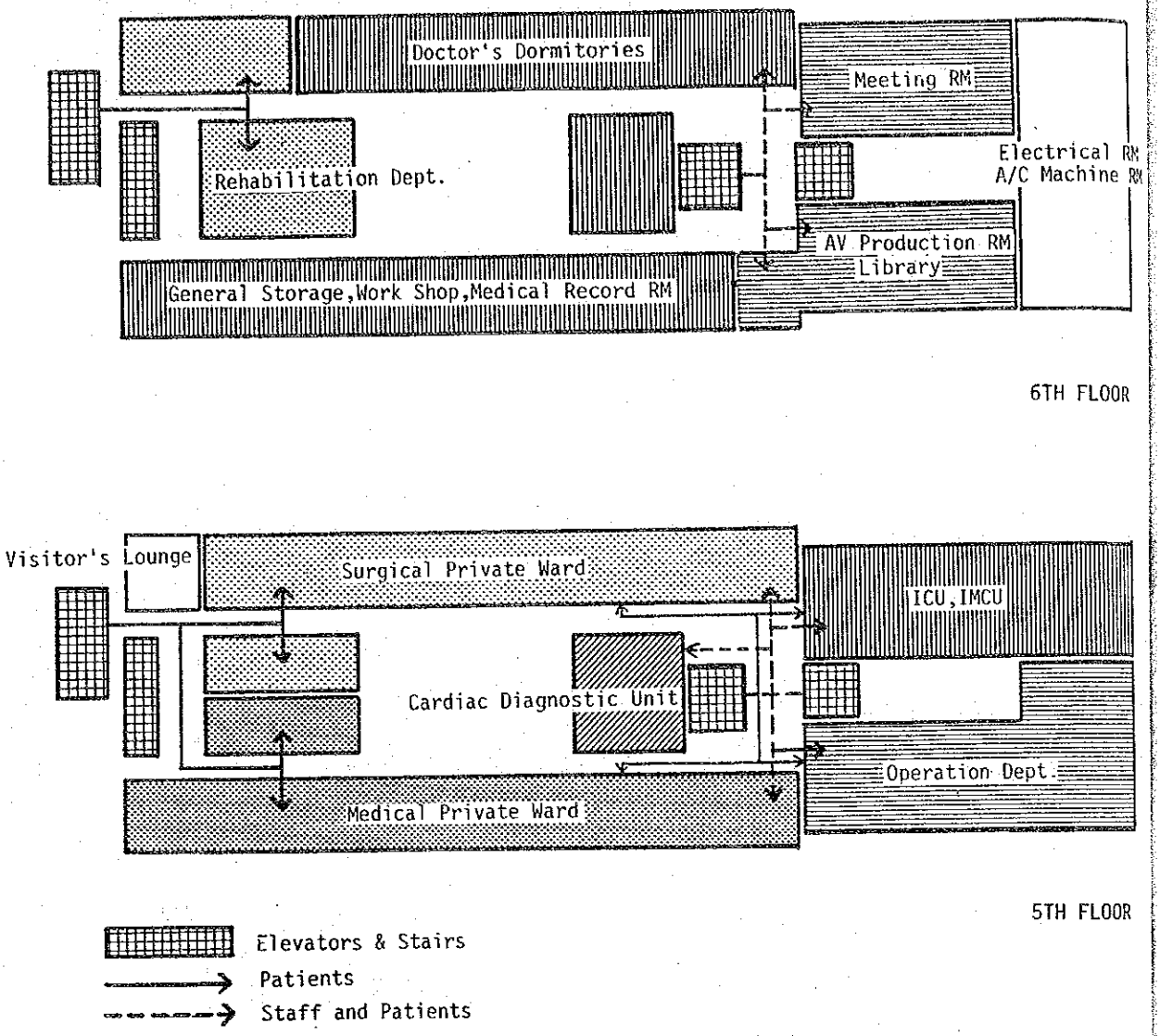


Fig. 4-2-2 5th and 6th Floor Plans

4-2-2 Constitution of Diagnostic Departments and Wards

(1) Private Wards

The Private Wards will consist of Surgical Ward (9 one-bed rooms and 6 two-bed rooms, totalling to 21 beds) and Medical Ward (7 one-bed rooms and 9 two-bed rooms, totalling to 25 beds). They will be located in completely separate blocks although they will share the Reception and Lounge, etc. Patients, their attendants and visitors can have access to the Private Wards with the newly-installed elevators at the western end of the building, hospital staffers can use the central elevator (elevator No. 1) or the stairway, and meals and linen supply will be delivered in the service elevators to the western end of the building. The Pantry, Linen Storage and Soiled Utility will be located near the entrance, while the Nurse Stations will be situated in a more central location, next to the Treatment Rooms. One Treatment Room in Medical Ward and two in Surgical Ward (one each for clean and soiled treatment) will be provided.

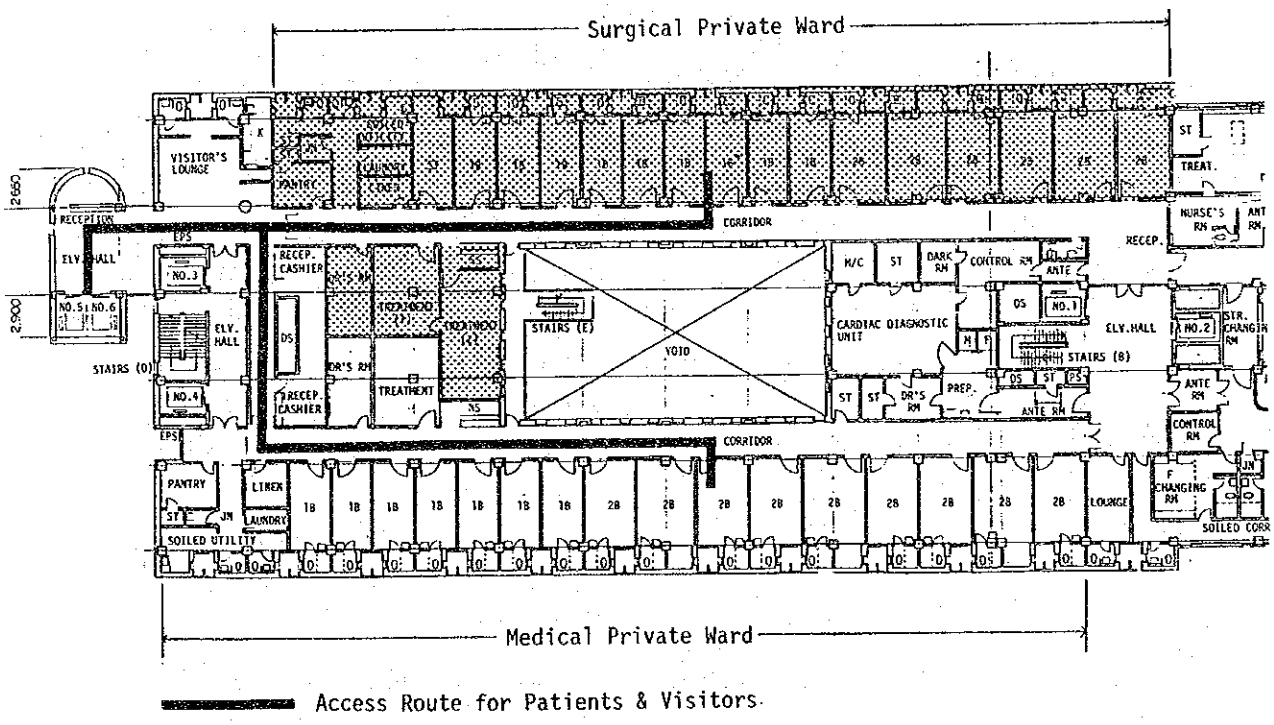
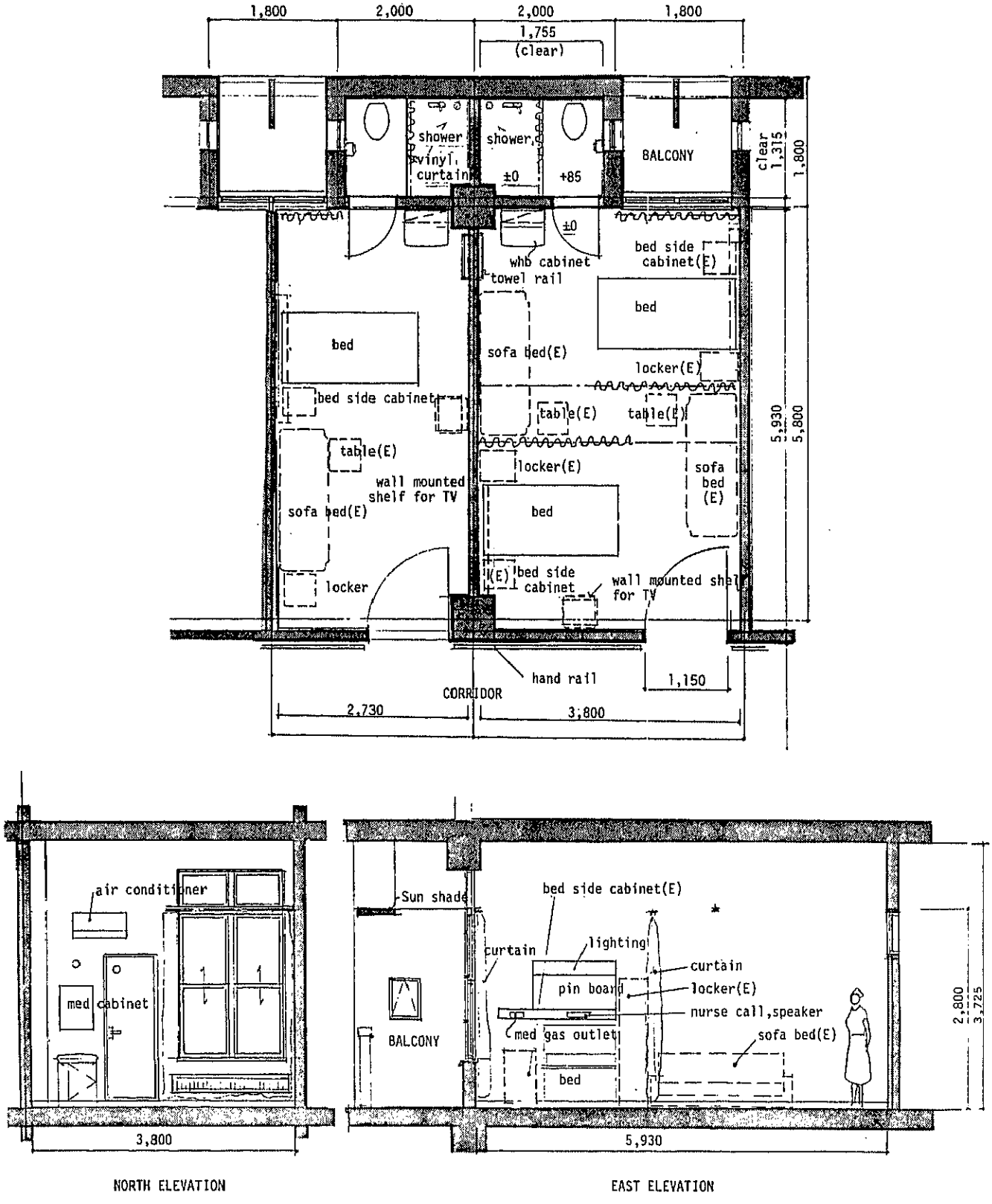


Fig. 4-2-3 Access Route to Private Wards



Patient wards will consist of one-bed rooms and two-bed rooms and each room will be furnished with a shower and lavatory. The beds will be located so as to allow space for additional sofa beds for those attending to the patients (usually their mothers), as typically required of paediatric hospitals in Egypt.

Fig. 4-2-4 Bed Room Plan & Sections

(2) Operation Department and ICU

1) Access

Patients will be carried to the Stretcher Changing Room from the Corridor facing the IMCU, where they will be transferred to a stretcher that will take them to the Operation Dept.

Doctors, nurses and other staffers working in the Operation Dept. will enter from the Soiled Corridor on the southern side and change their shoes and gowns before they go into the clean zone. Disposable goods, linen supply, drugs and other goods will be brought to the Ante Room and then stocked in the relevant Store or Operation Theatres by Operation Dept. staffers.

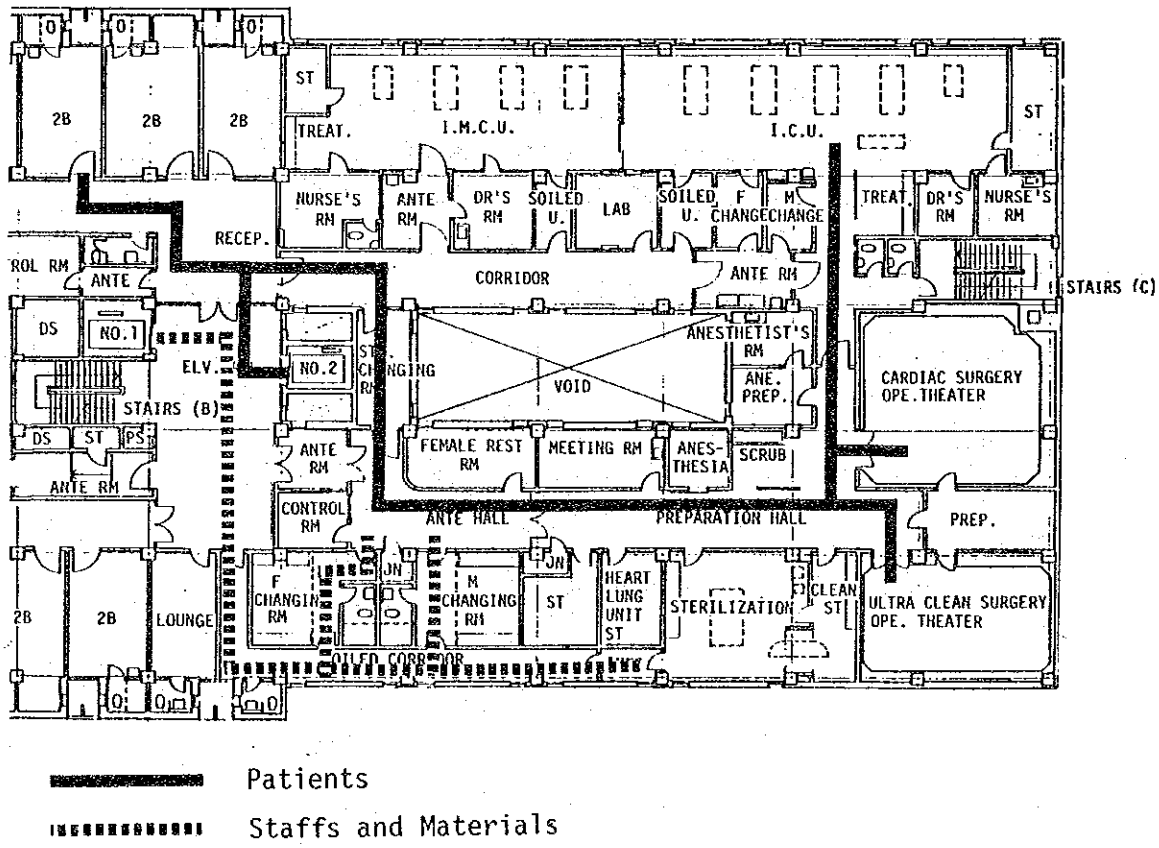


Fig. 4-2-5 Operation Dept., ICU and IMCU

2) Clean Level

The clean level established for the Cardiac Surgery Operation Theatre and the Ultra-Clean Surgery Operation Theatre (to be chiefly used for cerebral surgeries) is class 10,000 (NASA standard), and the number of air changes required for maintaining this level is 30 times/hour. The clean level of the Operation Theatres is determined as level 1, and this figure increases as the clean level progressively goes down to the Preparation Hall, Ante Hall, Changing Room and finally to soiled area (which is level 5). Each time a person enters a room which has a different "clean level" from the one he came from, he is obliged to change his shoes and gown.

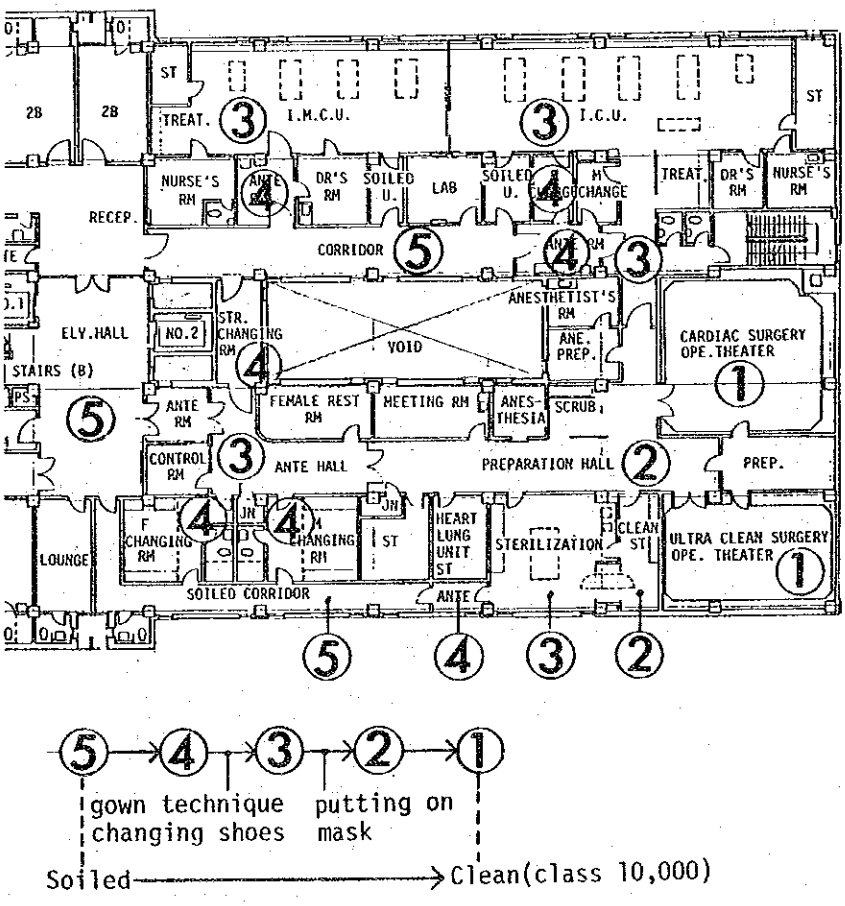


Fig. 4-2-6 Clean Level

3) Connection to ICU

After an operation, the patient is transferred to an ICU bed and carried to the ICU. Since the clean level of the ICU is 3, there will be no need to change gowns.

4) IMCU

IMCU is a unit that provides an intermediate treatment between the treatment provided in the ICU and in the Patient Wards. However, the CUPH intends to use the IMCU for patients requiring emergency care after X-ray diagnosis. The auxiliary rooms will be provided so that the ICU and IMCU can be operated independently by separate teams.

(3) Cardiac Diagnostic Unit

The X-ray Room will have the same clean level as the Operation Theatres (class 10,000). In order to maintain this level, patients, nurses and doctors will be required to enter this area from a different entrance as the one prepared for the technical staff. They will also be obliged to change their shoes in the Ante Room, and change their gowns and wash their hands in the Preparation Room before stepping into the X-ray Room. Anesthesia will be administered to patients in the Preparation Room, and the room will also be used as a convalescence ward for patients after the x-ray.

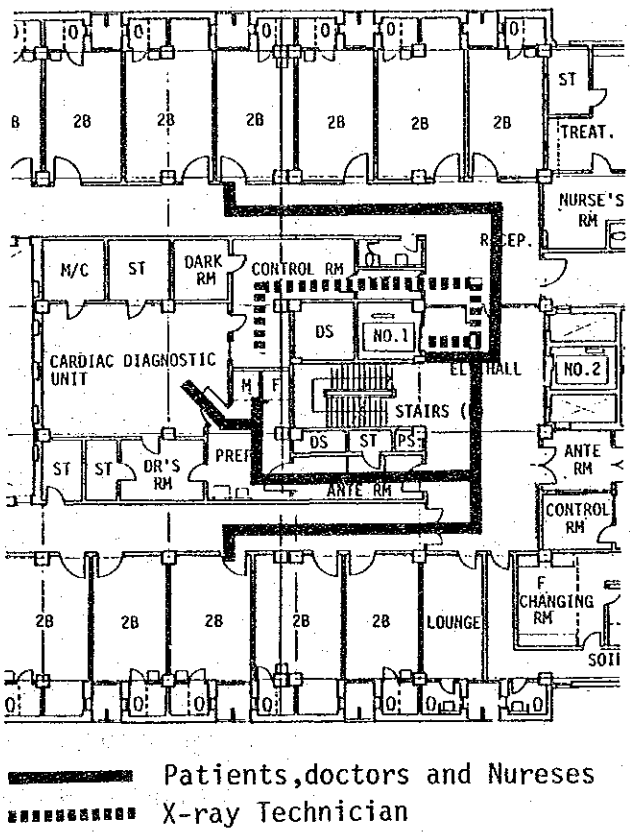


Fig. 4-2-7 Cardiac Diagnostic Unit

4-2-3 General Finishing materials

(1) Exterior Finishes

1)	Roof:	cement tile 200 x 200 x 15 waterproof membrane with thermal insulating materials (Celton)
2)	Parapet Coping:	pre-cast concrete
3)	Wall:	exposed face bricks, fitiesa, ceramic tiles
4)	Balcony Floor:	waterproof cement mortar
5)	Doors and Windows:	aluminum windows with stainless steel insect screens, steel doors
6)	Entrance deck and stairs for Private Sections Floor:	marble
7)	Others	
a)	Liquid Oxygen Tank Yard:	exposed face brick fencing, steel doors, cement tile floor
b)	Patient's Lavatory	
	Roof:	cement tiles, waterproof membrane with Celton
	Wall:	exposed facing bricks
	Doors:	steel doors
	Windows:	aluminum windows

(2) Interior Finishes

1) Entrance Halls (1F, 2F), EV Halls (3F, 4F) in Elevator Tower

a)	Floor:	terrazzo tiles, marble
b)	Wall:	cement plaster, painted
c)	Ceiling:	cement plaster, painted

2) EV Halls (5F, 6F)

a)	Floor:	sheet vinyl flooring
b)	Wall:	cement plaster, painted
c)	Ceiling:	cement plaster, painted

3) Bed Rooms

a)	Floor:	sheet vinyl flooring
b)	Wall:	cement plaster, painted
c)	Ceiling:	cement plaster, painted

4) Operation Theaters

a)	Floor:	sheet vinyl flooring
b)	Wall:	ceramic coating asbestos cement board (Glasal)
c)	Ceiling:	asbestos cement board. , painted

5) ICU, IMU

a)	Floor:	sheet vinyl flooring
b)	Wall:	cement plaster, painted
c)	Ceiling:	acoustic board

6) Cardiac Diagnostic Unit

a)	Floor:	sheet vinyl flooring
b)	Wall:	plywood with Pb sheets 1.5 mm for X-ray proof, painted
c)	Ceiling:	asbestos cement board. , painted

7) Corridor in Private Ward

a)	Floor:	sheet vinyl flooring
b)	Wall:	cement plaster, painted
c)	Ceiling:	acoustic board

8) Exercise Room in New Rehabilitation Unit

a)	Floor:	strip flooring
b)	Skirting:	plywood

c) Wall: cement plaster, painted

d) Ceiling: acoustic board

9) Meeting Rooms

a) Floor: terrazzo tiles

b) Wall: cement plaster, painted

c) Ceiling: acoustic boards, cement plaster, painted (concrete beam)

(3) Renovation and Modification Work will be carried out, generally using the same finishing materials as for the existing parts, except for the following rooms.

1) Waiting Halls, Reception, Clinic, Technician's Office, Changing Room Exercise Rooms

a) Floor: terrazzo tiles

b) Wall: cement plaster, painted

c) Ceiling: acoustic boards

2) Hydro Therapy

a) Floor: mosaic tile

b) Wall: glazed porcelain tiles (below 2,140)
cement plaster, painted (above 2,140)

c) Ceiling: Asbestos cement boards, painted

3) Lecture Room

a) Floor: terrazzo tiles

b) Wall: cement plaster, painted

c) Ceiling: acoustic boards

4-3 STRUCTURAL SYSTEM DESIGN

4-3-1 Geological Conditions of the Site

The site of the CUPH was presumably amidst the stream of the Nile and in the 13th or 14th Century it could be found about 300 meters away from the bank.

Two boring tests at the site were conducted at the time of the construction of the existing CUPH building and results of N-value of standard penetration tests are shown in Fig. 4-3-2.

Some considerations were given as follow, together with the geological test of the neighbouring site; 2-4 m from the ground surface is a filling layer and 2-5 m under this layer is a silty sand. The deeper, the more predominant the sand layer becomes with lens-shaped silt layers at places.

The sand particles are not uniform in size.

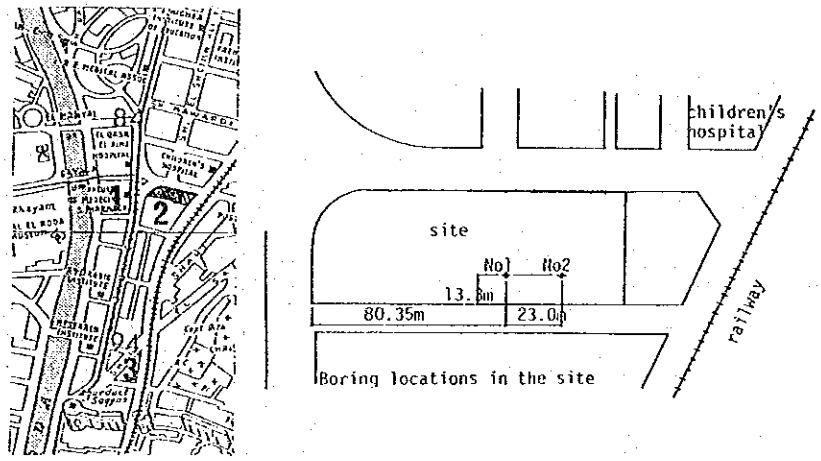


Fig. 4-3-1 Boring locations in the Site

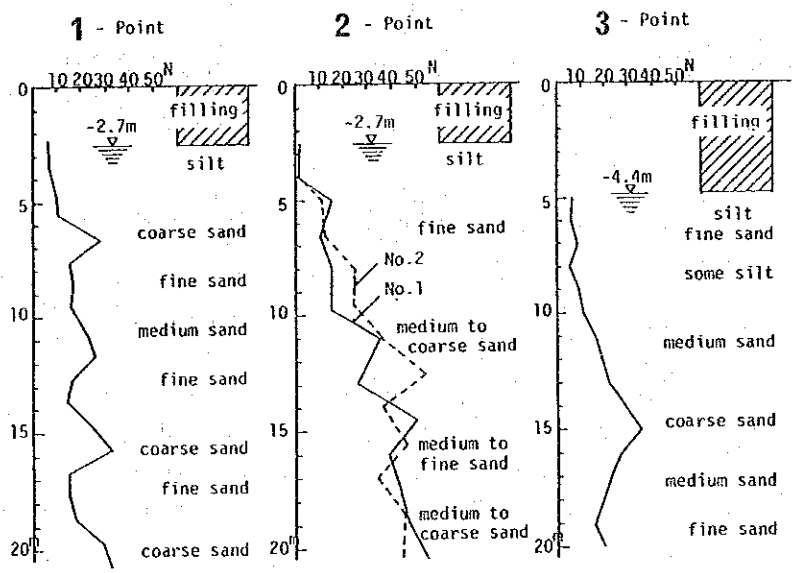


Fig. 4-3-2 Boring Data

4-3-2 Basic Concept

(1) The building of the existing CUPH is of reinforced concrete construction with a flat slab system. Since most parts of this expansion project are to be built on the existing structures, the same structural system will be adopted. In some parts of the project, where the column spacing exceeds 6.0 m, reinforced concrete beams will be provided so that the increased load of the extension will be safely carried by the existing building structure.

(2) Since the existing building is divided into two parts by expansion joints to cope with the shrinkage in concrete, thermal stress and differential settlement, the extension also will be divided into two corresponding parts.

(3) Wherever practical local products will be used.

4-3-3 Design Standards and Conditions

Taking into account the structural design policy and the result of discussions held with the Egyptian Authorities for the former projects, the structural design of this expansion project will be based on the followings.

(1) As a principle, structural design will be made in accordance with Egyptian "Code of Practice for the Use of Reinforced Concrete in Buildings", although ACI-318 will be referred to for the parts where there is no clear description in the Egyptian Code or where the adoption of Egyptian Code contradicts the concept of structural design of the existing building which was made basically in accordance with ACI-318.

(2) As a principle, main structural materials to be used will be in conformance to A.S.T.M.

Adopted allowable stresses will be as follows:

1)	Reinforcement	Round bar (steel 37) ft = 1,400 kg/cm^2	
		Deformed bar (steel 52) ft = 2,000 kg/cm^2	
2)	Concrete	Fc = 245 kg/cm2 (3,500 PSI) 28 days	
		fc = 80 kg/cm^2	
		Fs = 8 kg/cm^2	
3)	Cement	Underground:	Sulphate Resisting Portland Cement
		Others:	Ordinary Portland Cement

(3) The foundation system of this expansion project will be the same as that in the former project. Cast-in-place vibro-type piles will be provided to support the Elevator Tower and the Entrance Deck of the expansion. Piles will be supported by a well consolidated medium to coarse sand layer approximately 15 meters below ground level.

4-3-4 Establishment of External Forces and Loads

Dead loads and live loads which directly relate to the structural design are established as follows:

(1) Dead Loads

1)	Reinforced Concrete		:	2.5 t/m^3
2)	Brick	(light weight)	:	0.75 t/m^3
		(normal)	:	2.0 t/m^3

(2) Live Loads

The following live loads are established referring to the building standards and codes of Egypt, G.B., U.S.A. and Japan. Some considerations will be given on extraordinary heavy loads such as machines etc.

1)	Roof:	150 kg/m^2
2)	Court:	200 kg/m^2
3)	Ward, Nurse's Station, Office, Operation Theatre:	300 kg/m^2
4)	Laboratory, Treatment Room, Meeting Room, Corridor, Staircase:	350 kg/m^2
5)	Waiting Hall, Lobby, Cardiac Diagnostic Unit:	400 kg/m^2
6)	A/C Machine Room, Library, Storage:	500 kg/m^2
7)	Machine Room:	600 kg/m^2

(3) Other Loads

Earthquake load may be negligible. Wind load is to be taken into account in accordance with U.A.R. Code of Practice as follows.

$$pw = C \cdot q$$

Pw : normal wind pressure (kg/m^2)
C : coefficient of wind
q : basic wind pressure (kg/m^2)

Basic wind pressure depends on the height of the building as assumed below.

Height of Building (m)	Basic Wind Pressure (kg/m^2)
0~8	50
8~20	75
20~100	100

Coefficient of wind is to be determined as follows,

- Windward walls 0.8 (positive pressure)
- Horizontal roof – 0.4 (suction)
- Leeward Walls – 0.4 (suction)

4-3-5 Materials

(1) Structural material

1) Cement: Underground Structure ..... ASTM type - V
Structure ..... ASTM type - I

2) Reinforcement: Deformed bar ..... STEEL 52

3) Pile: Vibro Pile or others which can be obtained locally.

4-4 ELECTRICAL SYSTEM DESIGN

4-4-1 Electrical System

(1) Power Supply and Distribution Systems

1) Normal Power Supply

Since the existing substation has insufficient capacity to supply electricity in the summer season, the proposed addition will provide a new substation on the 6th floor to serve the expansion area. The service power mains in the existing Electrical Room will be branched off to supply electricity at an extra high-tension of 11 KV to the new substation.

a) Major equipment provided in the new substation will be:

1.	Main circuit breakers:	Vacuum type
2.	Transformers:	Molded and oil-less type
3.	Low-voltage circuit breakers:	Air circuit breaker, Molded case circuit breaker

b) The voltage distributed to the loads across the new substation will be:

1.	Power loads:	3 ø 3W, 380 V, 50 Hz
2.	Lighting receptacles:	3 ø 4W, 220 V, 50 Hz

c) All load equipment and facilities will be divided into two groups according to their importance.

1.	Ordinary loads:	Loads which can be suspended at power failure.
2.	Important loads:	Loads to which electricity will be supplied at power failure. (Power will be suspended for a short time until it can be switched to supply from generator.)

d) The estimated total load of equipment and facilities provided in the expansion area will be as follows:

1.	Lighting receptacles:	200 KVA
2.	Power for HVAC system, etc.:	500 KVA

e) The total contract demand after expansion of the facilities will be 1,500 KVA.

2) Power Generator System

A power generator system will be provided as a support for the important and emergency loads at power failure. The generator to be provided will be an outdoor cubicle type and will be employed gas turbine engines. The generator unit will be provided on the expanded rooftop. The estimated capacity of the generator covering the expanded area will be around 375 KVA with a sound emission of approximately 85 db. The generator will be driven with heavy oil or kerosen. The capacity of the fuel tank will be 1,500 liters.

3) Automatic Voltage Regulater

An automatic voltage regulator will be provided for important loads, particularly to ensure the loads against voltage fluctuations. The device will be provided to individual equipment such as medical equipment wherever required.

One-line diagram for power supply is shown in Fig. 4-4-1.

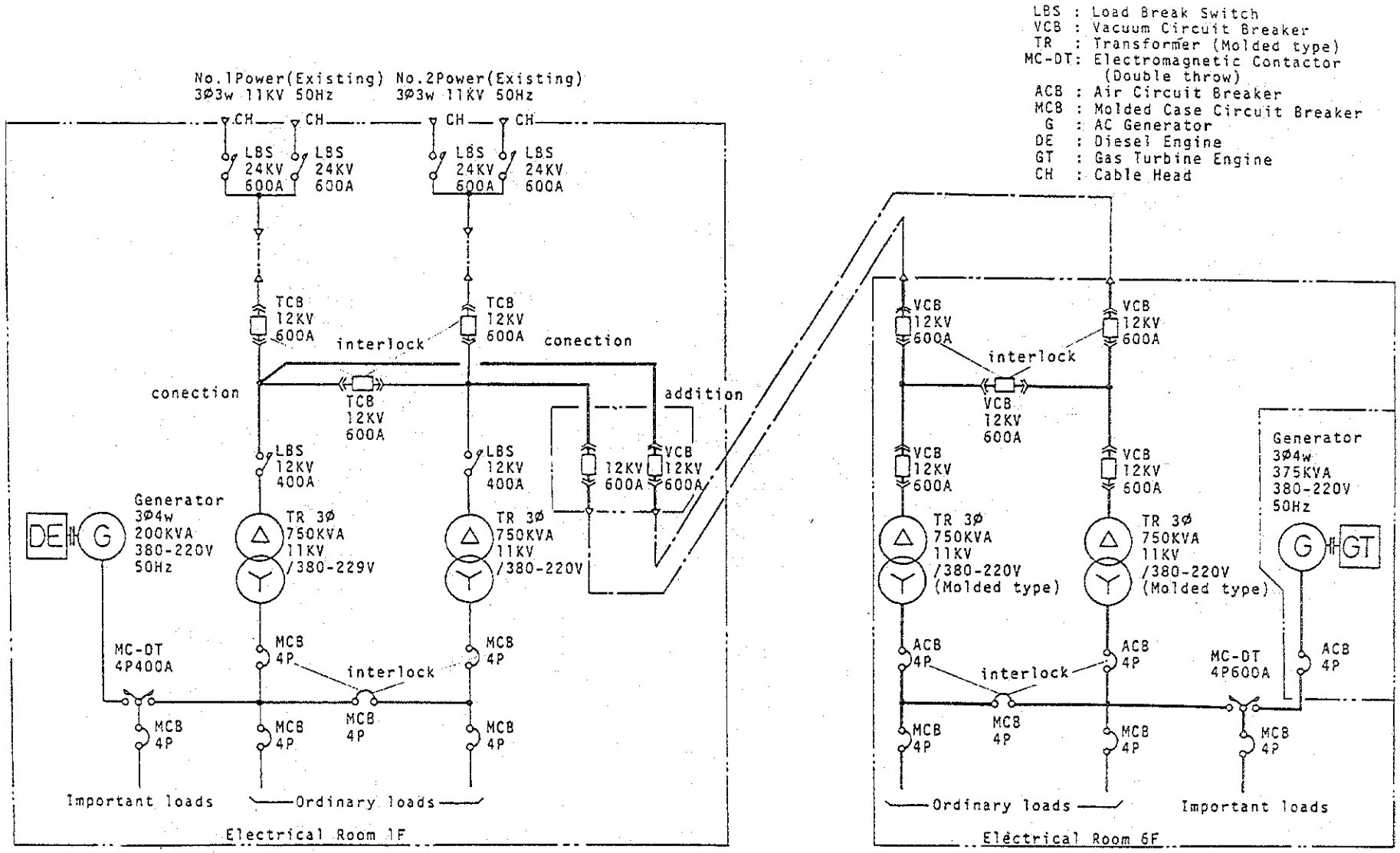


Fig. 4-4-1 One-line Diagram for Power Supply

4) *Main Line System*

An Electrical Room for the additional floors (5th and 6th floor) will be created on the 6th floor.

Power mains and lighting mains will be provided from the panelboards in the new Electrical Room to the power control panels and lighting panels. These mains will use CV cables, indoor type PVC wires, etc. The mains will be contained in cable racks or conduit pipes.

The existing grounding mains will be used for grounding mains for electricity, telephone lines and medical equipment.

Power riser diagram is shown in Fig. 4-4-2.

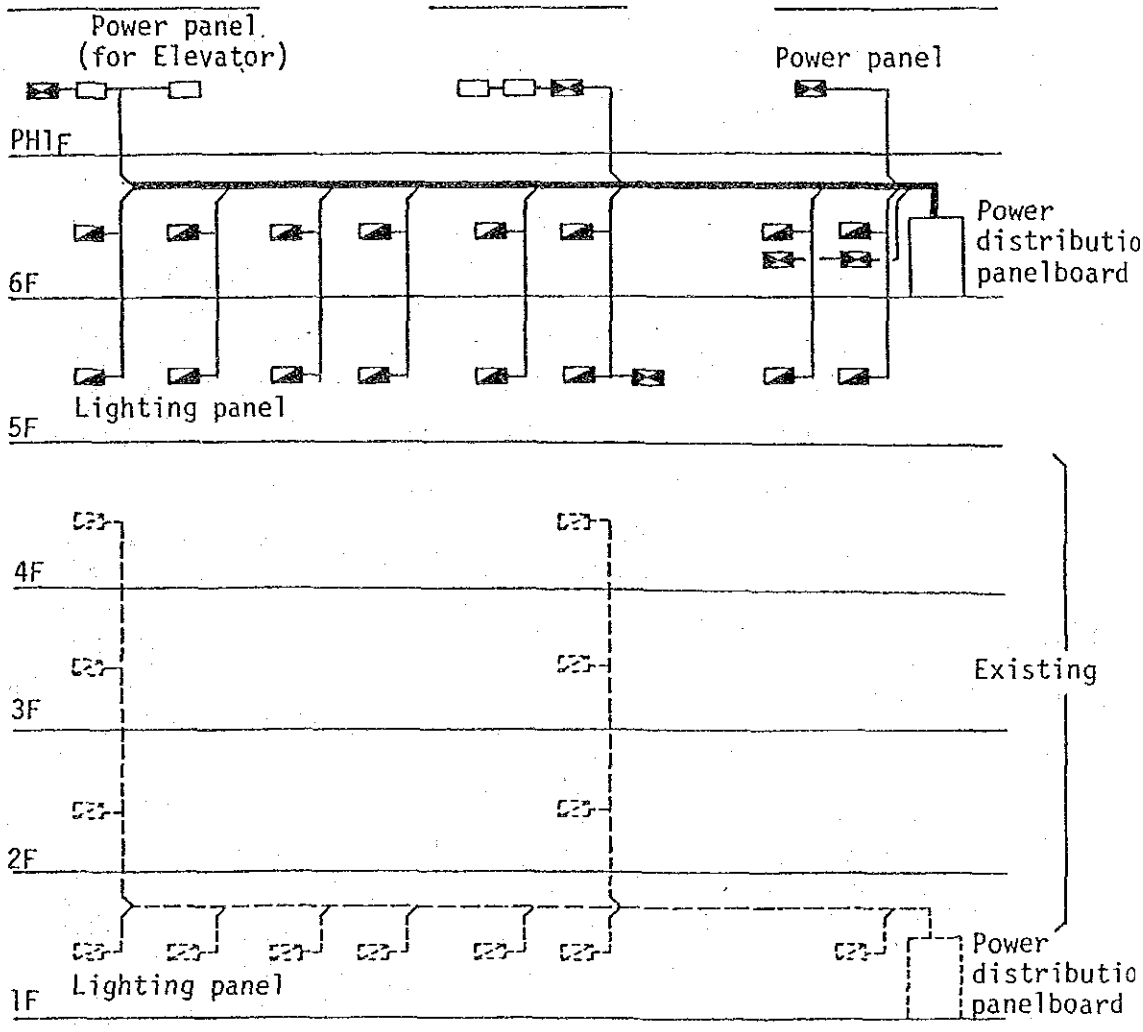


Fig. 4-4-2 Power Riser Diagram

(2) Power Load System

1) Power System

Power panels will be provided to supply electricity to the HVAC system, plumbing system, elevators and medical equipment for the expanded area. Conduits and wiring will be provided between the power panels and the individual systems and equipment.

2) Lighting and Receptacle System

a) Lighting

Lighting will mainly use highly efficient fluorescent fixtures, but incandescent fixtures will also be partly used. Lighting fixtures in the Operation Theatres, etc. will be arranged effectively, taking into consideration the location of the medical equipment.

The design luminous intensity for major rooms will be as follows:

1.	Operation Theatre	:	1,000 luxes
2.	Cardiac Diagnostic Unit	:	1,000 luxes
3.	Doctor's Room	:	300 luxes
4.	Nurse Station	:	300 luxes
5.	Treatment Room	:	500 luxes
6.	Patient Ward	:	150 luxes
7.	Meeting Room	:	500 luxes
8.	Workshop	:	300 luxes

Luminous intensity of other rooms will be equal to the present.

b) Receptacles

Two types of receptacle, one for general use and the other for special medical use, will be provided to meet the demand of individual rooms. Receptacles for special medical use will be earthed. Receptacles for important loads will have an identification plate.

The types of receptacles are shown in Fig. 4-4-3.

for medical use　　for general use

Fig. 4-4-3 Types of Receptacles

(3) Information Communication System

1) Telephone System

A new telephone exchanger to serve the expansion area will be added to the existing telephone exchange room on the 1st floor. Telephone calls between existing and new switchboards will be made possible by dialing. However, the telephones to be installed in the Private Wards will only be able to exchange calls with extension lines and to receive (but not make) outside calls.

a) Installation locations of equipment

1.	MDF:	Telephone Exchange Rm.
2.	Telephone exchanger:	Telephone Exchange Rm.
3.	Operator console:	Telephone Exchange Rm.
4.	Direct-telephone set:	5th floor - Doctor's Rooms in Cardiac Diagnostic Unit, ICU and IMCU, Meeting Room in Operation Dept., 2 Nurse Stations in Private Wards. 6th Floor - Doctor's Room in Rehabilitation Unit, Medical Record Room, Library
5.	Extension telephone set:	All rooms on 5th and 6th floors (with the exception of Linen St., Lavatories, Laundry, Operation Theatres.) 1 set each will be installed in Patient Bed Rooms and Living/Dining Room.

b) Installation of Trunk Lines

The estimated number of additional trunk lines will be approximately 20.

The telephone system diagram is shown in Fig. 4-4-4.

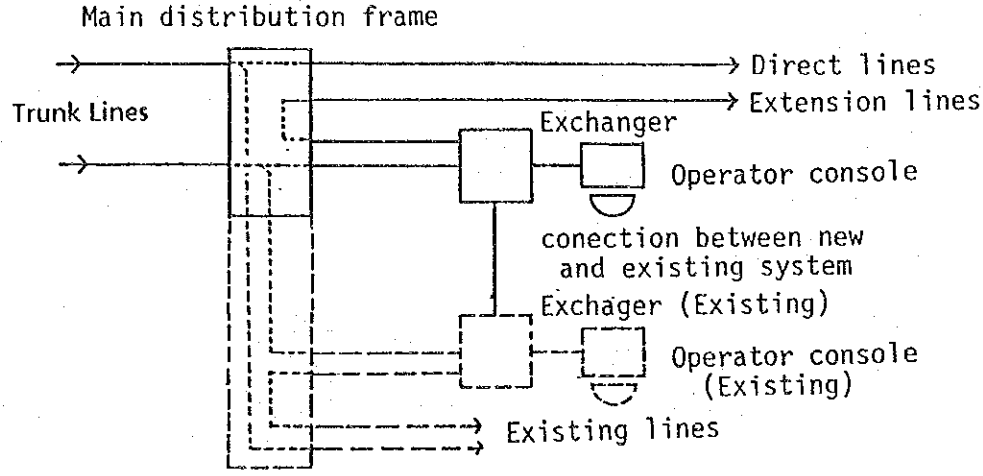


Fig. 4-4-4 The Telephone System Diagram

2) Pocket Bell Calling System (Egyptian side work)

A pocket bell calling system will be provided for calling doctors and some others within the building. The master device will be installed in the Secretary's Room in the Administration Dept. on the 1st floor.

3) Public Address System

A new amplifier will be installed for paging in the expansion floors. The new amplifier will be connected to the existing public address system to enable paging throughout the building. A repeater will also be provided in the Telephone Exchange Room on the 1st floor so that paging will be possible even after regular hours. Additional speakers will be installed in corridors and halls.

The public address system diagram is shown in Fig. 4-4-5.

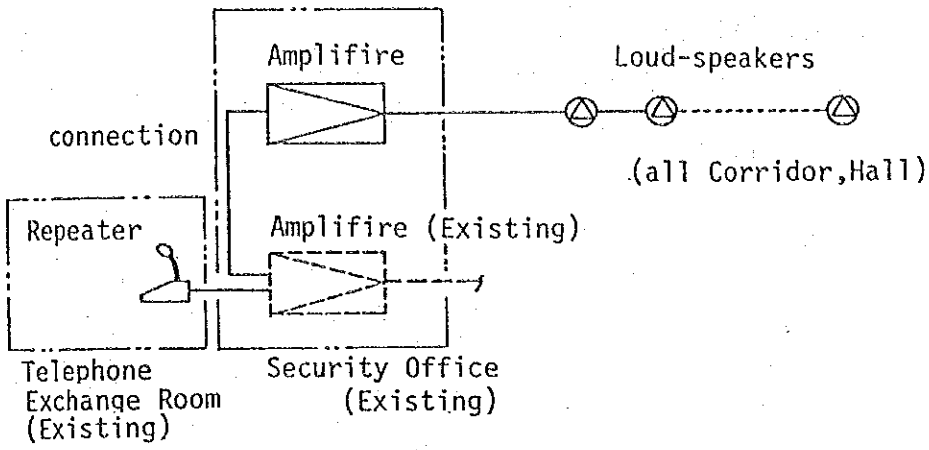


Fig. 4-4-5 The Public Address System Diagram

4) Interphone System

Interphone system will be installed for communication purposes as well as for checking entry to the new Operation Department.

a) Door phone for control check of entry to Operation Department (simultaneous communication through a loudspeaker)

1. Master door-phone (3-station) : Control Room
2. Sub door-phone at the entrance : Soiled Corridor, Ante Room 2, Stretcher Changing Room

b) Door-phone for checking entry to and exit from ICU (simultaneous communication through a loudspeaker)

1. ICU (5th floor)
   master door-phone : inside ICU
   sub door-phone : Ante Room 3
2. IMCU (5th floor)
   master door-phone : inside IMCU
   sub door-phone : Ante Room 4
3. ICU (4th floor)
   master door-phone : ICU
   sub door-phone : Corridor

c) Inter-phone for communication with Operation Theatre (12-station, mutual communication type)

1. Cardiac Surgery Operation Theatre
2. Ultra-Clearn Surgery Operation Theatre
3. Control Room
4. Preparation Room
5. Sterilization
6. Anesthesia
7. Meeting Room

d) Inter-phone for communication with Audio-Visual Production Room (3-station, mutual communication type)

1. Audio-Visual Production Room
2. Operation Theatre (Cardiac Surgery Operation Theatre)
3. Meeting Room on the 6th floor

5) Audio Visual System for VTR, TV and BGM

a) TV and VTR System

All private wards in the expansion area will receive a TV broadcasting service (simultaneously providing three VTR channel programs).

b) BGM System

BGM service will be provided to corridors and halls of the expanded area, as well as to ICU, Operation Theatres and Cardiac Diagnostic Unit.

System diagram for TV, VTR and BGM is shown in Fig. 4-4-6.

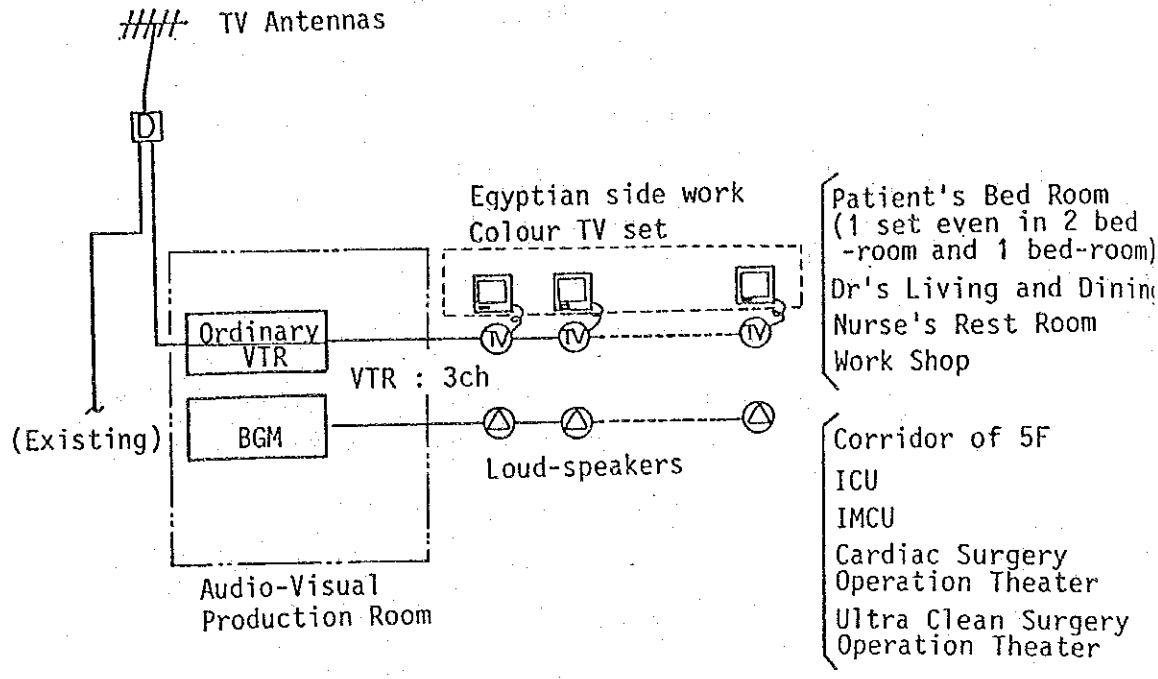


Fig. 4-4-6 TV, VTR System and BGM System Diagram

6) CCTV Monitor System

a) CCTV System in ICU and IMCU (5th floor)

TV monitoring system will be provided in these areas so that visitors will be able to see ICU patients from the Ante Room. 2 TV cameras (monochrome) will be installed in the ICU and IMCU, while 2 monitor TV sets each (monochrome) will be provided in the Ante Rooms for ICU and IMCU. The TV cameras will be mounted on a turntable.

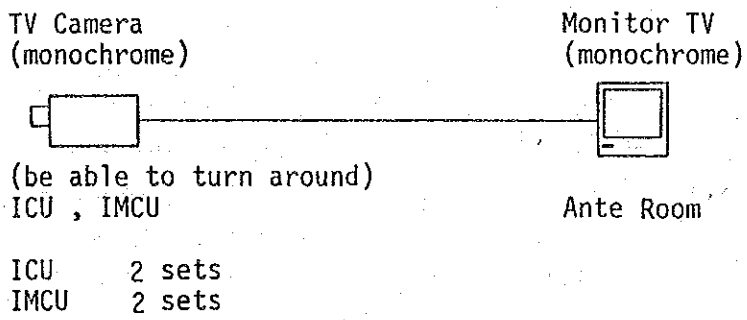


Fig. 4-4-7 CCTV System Diagram in ICU and IMCU

b) CCTV System for existing ICU (4th floor) (Egyptian side work)

The system will serve the same purpose as that for a). 3 TV cameras (monochrome) will be installed on the ICU, and 3 monitoring TV sets (monochrome) will be provided in the ICU corridor. The TV cameras will be mounted on a turntable.

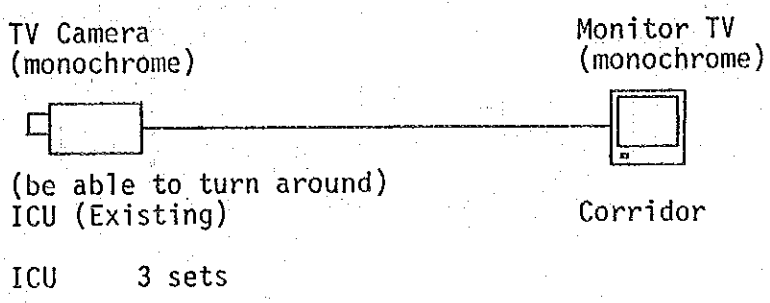


Fig. 4-4-8 CCTV System Diagram for Existing ICU

c) CCTV System for Monitoring Entry to Operation Dept.

A TV camera (monochrome) will be installed in the entrance of the Stretcher Changing Room, and a monitoring TV (monochrome) will be provided in the Control Room.

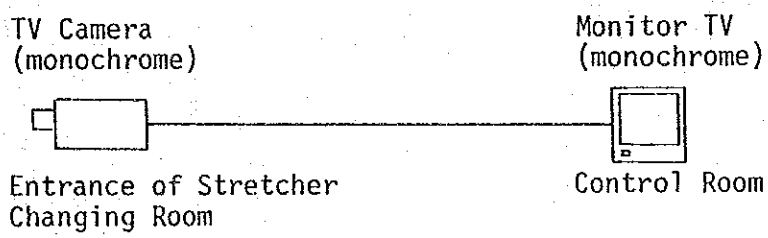
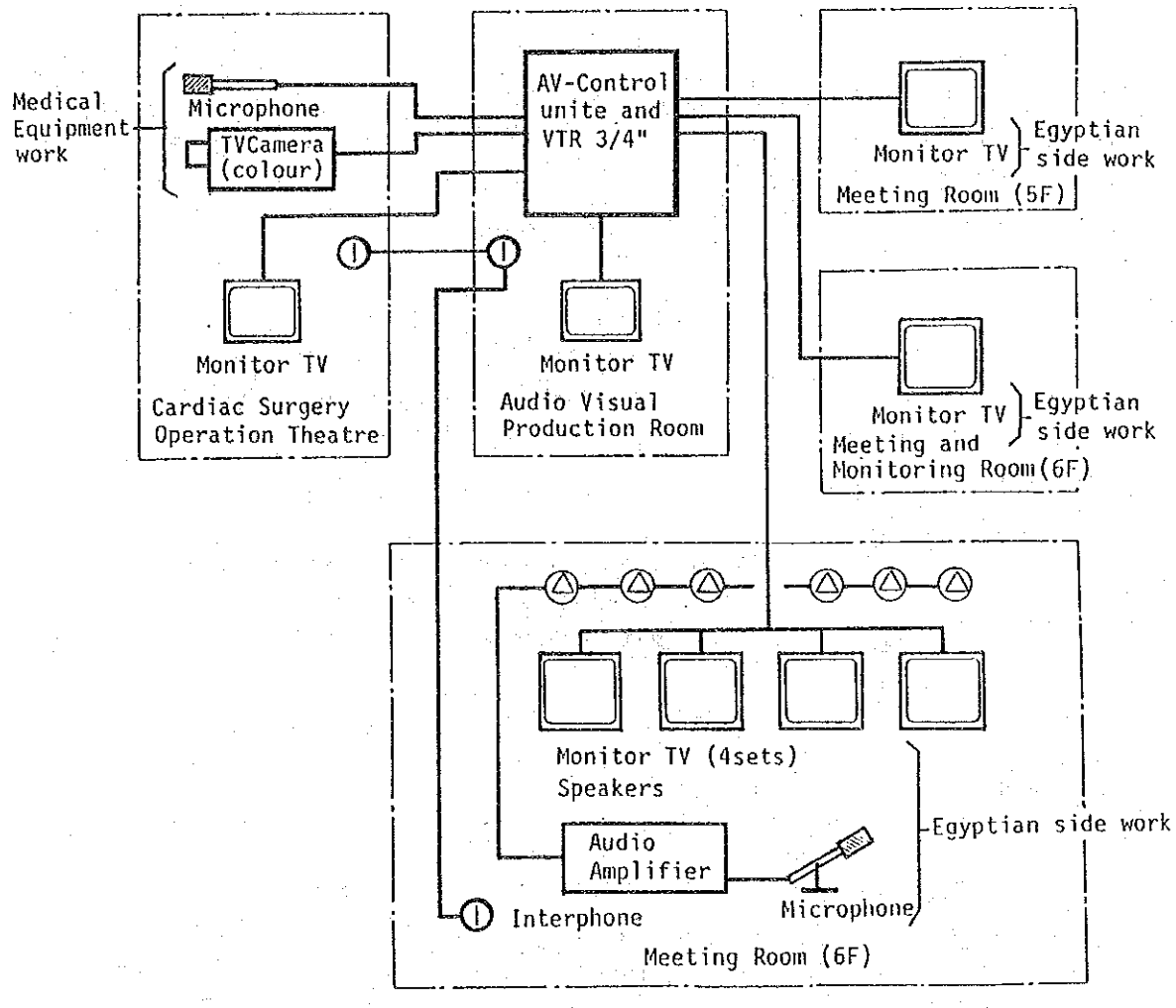


Fig. 4-4-9 CCTV System Diagram for Monitering to Operation Dept.

d) CCTV System for Cardiac Surgery Operation Theatre

The system will be provided so that the proceedings of an operation can be videotaped with a TV camera (color) and monitored in the Meeting Room, etc. All controlling units for VTR recording will be installed in the Audio Visual Production Room on the 6th floor.

The CCTV system diagram for Cardiac Surgery Operation Theatre is shown in Fig. 4-4-10.



All conduits and wiring for the above shoud be Japanese side work.

Fig. 4-4-10 CCTV System for Cardiac Surgery Operation Theatre

7) Nurse Calling System

A nurse calling system will be provided to enable communications between individual beds in the wards and the nurse stations. An emergency-call button will be provided for each bed in the wards and an indicating panel in the nurse stations will confirm the calls.

8) Electric Clock

a) For Operation Theatre

An Operation Clock will be provided in each Operation Theatre on the 5th floor.

b) Others (Egyptian side work)

Electric Clock (battery-powered type) will be provided in the Elevator Halls, Nurse Stations and Doctor Room, etc.

(4) Fire Alarm and Power Trouble Alarm Systems

The proposed fire alarm system will consist of smoke detectors and heat detectors conforming to the applicable Egyptian codes and standards, except that detectors conforming to the requirements of the Fire Services Act of Japan will be used if they are not prescribed in the applicable Egyptian codes and standards. A power trouble alarm system will be provided for monitoring the conditions and troubles of the power load.

The fire alarm system and power trouble alarm system will be installed in the Security Room on the 1st floor (where existing fire alarm system and power trouble alarm system is already installed). The indication panel to represent of all fire alarms and power trouble alarms will be installed in the Telephone Exchange Room on the 1st floor.

(5) Entry Check System for Doorway to Operation Dept.

Electric locks will be provided in the 3 doorways to the operation department (Anteroom 2, Soiled Corridor and Stretcher Changing Room) to restrict entry to the area. Each doorway will be furnished with a CCTV monitoring system or interphone system.

The diagram for entry check system for doorways to the operation department is shown in Fig. 4-4-11.

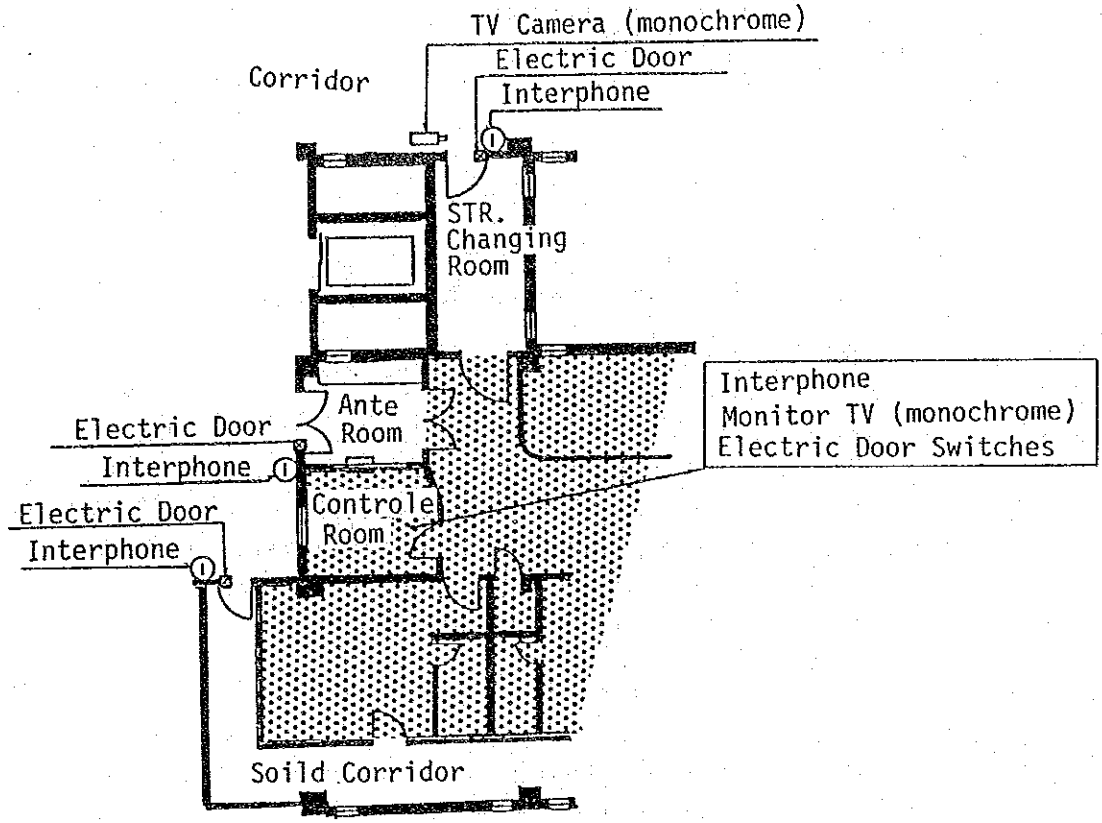


Fig. 4-4-11 Entry Check System for Doorway to Operation Dept.

(6) Audio-Visual Equipment (Egyptian side work)

The following equipment will also be installed.

1) Audio-Visual Equipment

a)	TV camera (1/2", color)	1
b)	VTR (1/2", color)	1
c)	Monitor TV (color)	1
d)	Cassette tape recorder	1
e)	Slide projector	1
f)	16 mm movie projector (portable type)	1
g)	Screen (portable type)	1

2) Others

a)	Wireless radio (handy type)	2

(7) Renovation of Existing Equipment and Facilities

1) Power supply equipment

Power will be supplied across existing panelboards and existing power panels. Where existing panels or panelboards are not of sufficient capacity, new panelboards or panels will be provided.

2) Lighting and receptacles

New lighting equipment will be furnished in the renovation area. Receptacles will be furnished wherever necessary.

3) Telephone equipment

Piping will be connected to the existing terminal boards or the nearest existing outlet and then connected to the existing telephone exchange.

4) Public address system

Additional speakers will be connected to existing speaker circuit.

5) Fire alarm equipment

Additional detectors will be connected to the existing fire alarm circuit.

6) Renovation Incidental to Expansion of Facilities

a) TV antenna

To be provided on the rooftop after addition of the 5th and 6th floors has been completed.

b) Power supply to elevators

Power will be supplied from the new substation to be provided on the 6th floor. While construction work is in progress, existing mains will be connected to a panel in the new Elevator Machine Room to enable power supply to the elevators.

c) Exhaust fans

Power control panels will be provided on the rooftop to supply power to individual fans.

d) Elevated tank etc.

The level relay in new elevated tanks will be connected to the existing wiring.

7) Batteries for Operating the Facilities of Electrical Room

Batteries for operating the existing electrical system are currently out of use so they will be replaced with new batteries.

8) AVR (Automatic Voltage Regulator) System

The AVR device was out of order because the reactor inside the AVR had burnt out. The inspection and repair by the manufacturer of the device is indispensable.

9) Power Generator

The existing power generator can still function. Power generators need to be overhauled once every 5 or 7 years. Since the existing power generator would be 7 years old by the time the expansion work is completed, it will be overhauled concurrently.

4-5 MECHANICAL SYSTEM DESIGN

4-5-1 Heating, Ventilating and Airconditioning System

(1) Heat Source System

For the expansion area, air-cooled heat pump packaged air conditioner (incorporating electric heaters) or room airconditioner (with electric heaters) will be provided where required. These systems are easy to maintain and are capable of performing individual airconditioning for energy conservation.

The existing air-cooled chiller unit will be removed and 4 x 50 USRT units (including 1 spare) will be newly installed on the roof above the 6th floor. The replacement will be conducted speedily so that the temporary suspension of the airconditioning will not affect the operations of the existing facilities.

(2) Airconditioning System

1) Conditions

a) Temperature inside the room

	Summer	Winter
Operation Theatre, ICU, IMCU Cardiac Diagnostic Unit	24° - 26°C	24° - 26°C
Other rooms	26° - 28°C	22° - 24°C

b) Humidity inside the room

	Summer	Winter
Operation Theatre, ICU, IMCU Cardiac Diagnostic Unit	50 - 60%	50 - 60%
Other rooms	Humidity level not controlled	Humidity level not controlled

c) Conditions outside the room

	Summer	Winter
Temperature	37.8°C	3.4°C
Humidity	59%*	53%**

* Standard humidity for summer: Average humidity for July + 5%

** Standard humidity for winter: Average humidity for January - 5%

2) Airconditioning system

Operation Theatre, ICU, IMCU and Cardiac Diagnostic Unit will be provided with a packaged air conditioner connected through a single duct, and small rooms such as wards will be provided with room airconditioners.

3) The cleanness of the air

Operation Theatre, Cardiac Diagnostic Unit	equivalent to class 10,000 (NASA)
ICU, IMCU	equivalent to class 200,000 (NASA)

4) Frequency of ventilation

Operation Theatre, Cardiac Diagnostic Unit	about 30 times/hour
ICU, IMCU	about 10 times/hour

5) Intake of fresh air

Operation Theatre, Cardiac Diagnostic Unit	about 5 times/hour
ICU, IMCU	about twice/hour

6) Airconditioning zone

The room zones to be provided with airconditioning or air cooling/heating systems are as shown as follows.

Table 4-5-1 List of Airconditioning Zones

	Air-conditioning	Cooling	Heating
1F			
Rehabilitation Unit	-	-	-
Lecture Room	-	-	○
4F			
Nurse's Rest Room	○	-	-
Meeting Room	○	-	-
5F			
(Operation Dept.)			
Operation Theatre	○	-	-
Anesthetist's Room	○	-	-
Preparation Hall	○	-	-
Anesthesia Room	○	-	-
Ane. Prep. Room	○	-	-
Meeting Room	○	-	-
Female Rest Room	○	-	-
Control Room	○	-	-
Preparation Room	○	-	-
Sterilization Room	○	-	-
(ICU, IMCU)			
ICU	○	-	-
IMCU	○	-	-
Nurse's Room	○	-	-
Doctor's Room	○	-	-
Soiled Utility	○	-	-
Laboratory	○	-	-
Ante Room	○	-	-
(Cardiac Diagnostic Unit)			
Cordiac Diagnostic U.	○	-	-
Control Room	○	-	-
Preparation Room	○	-	-
Doctor's Room	○	-	-
Machine Room	-	○	-
(Private Ward)			
Treatment room	-	○	○
Doctor's Room	-	○	○
Private Ward	-	○	○
Visitor's Lounge	-	○	○
6F			
A. V. Production . Rm.	-	○	○
(New Rehabilitation Unit)	-	○	○
Exercise Room	-	○	○
Technician's Room	-	○	○
Clinic	-	○	○
Waiting Hall	-	○	○
Doctor's Room	-	○	○

(3) Ventilating System

The Electricity Room will be ventilated with intake fans and exhaust fans. (However, package unit will be installed to counter the heat during the summer season.) Storage, Lavatories, etc. will be ventilated with exhaust fans. (Natural ventilation through windows however, will be utilized for Lavatories and Shower Rooms with windows that can intake fresh air.)

(4) Sand Control System

Highly efficient filters will be operated for as many hours as possible and dust-guard devices will be attached to all systems using these filters (including existing systems) in order to keep down the maintenance cost.

(5) Transfer and Renovation of Existing Equipment

The equipment (exhaust fans, chillers and pumps) on the existing roof will be relocated on the rooftop of the building after the expansion of the 5th and 6th floors will be completed.

This equipment will be newly installed so that the suspended operation of the ventilation system will not affect the function of the existing building.

Piping and ducting will also be renovated to accommodate to this change. In the existing facilities, ventilation systems will be renovated wherever necessitated by altered functions and addition of rooms.

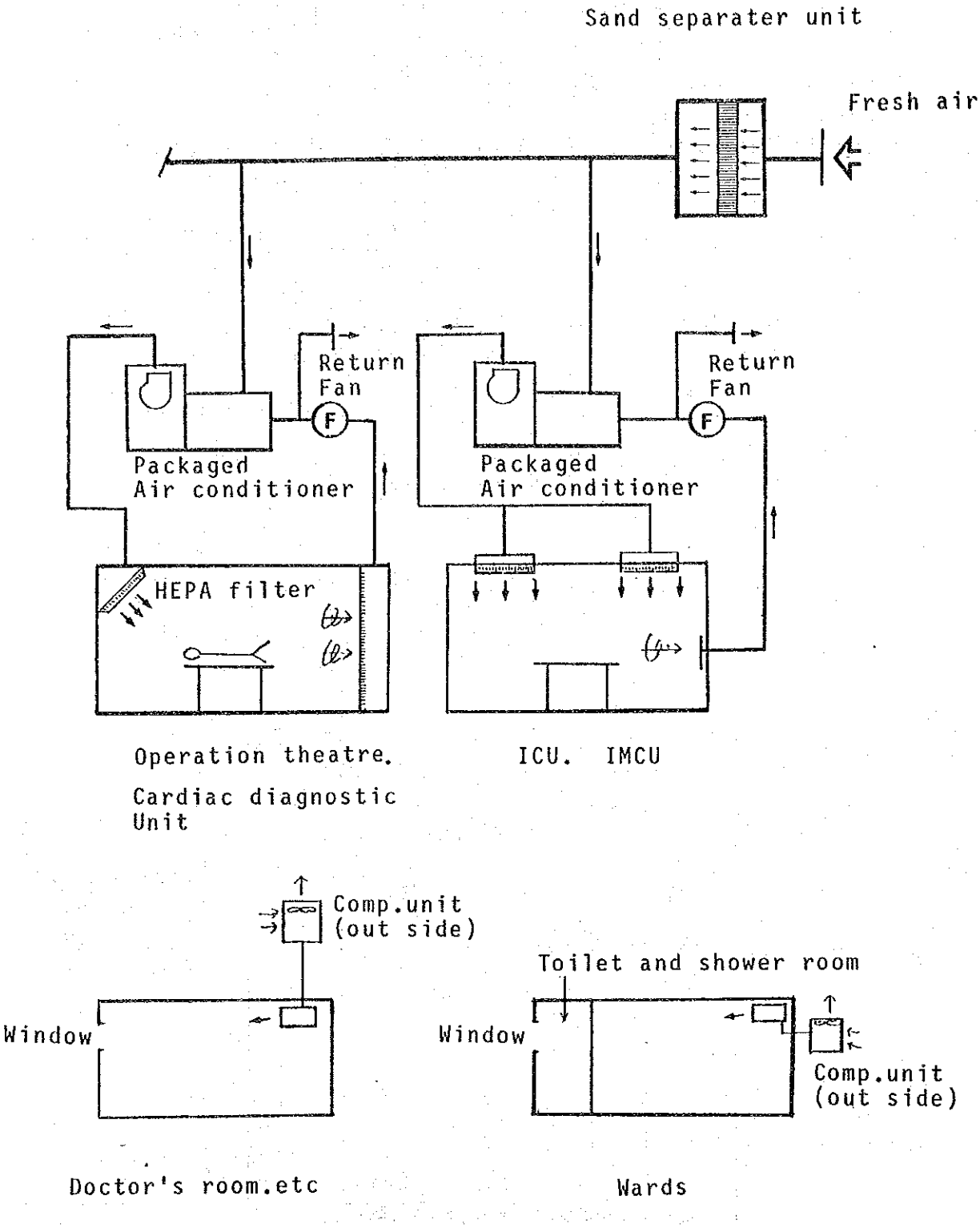


Fig. 4-5-1 Airconditioning System Diagram

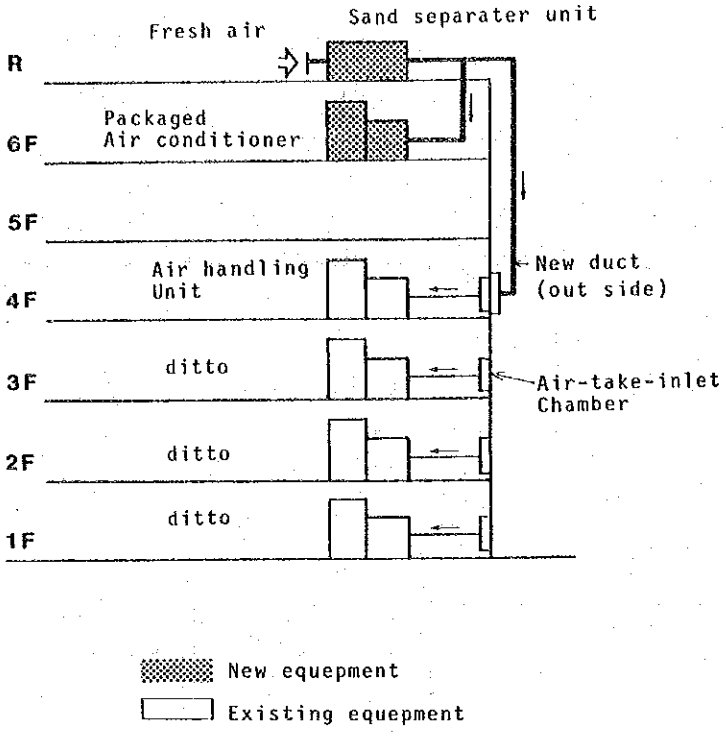
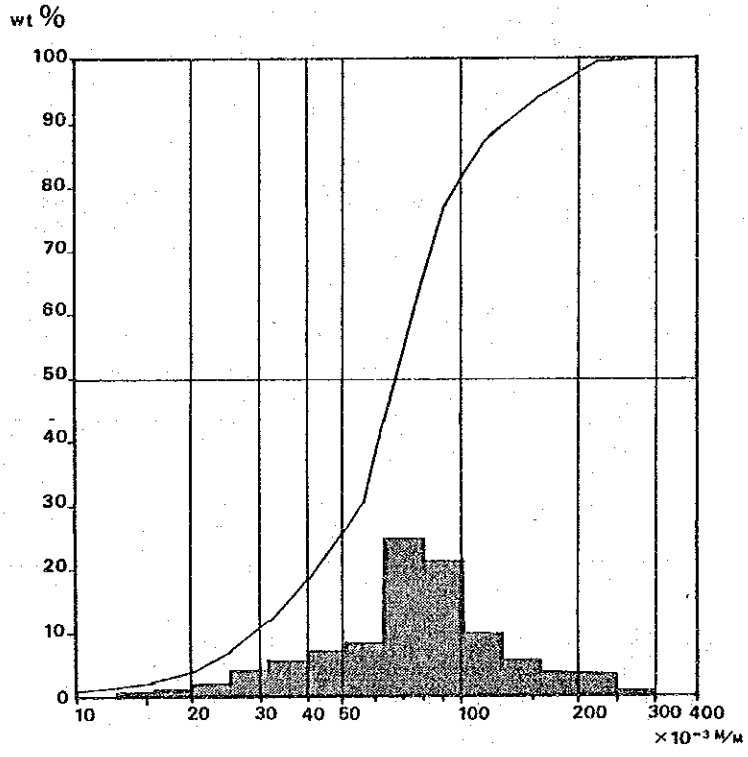


Fig. 4-5-2 Air Intake System for Expansion Area and Existing Area



This data shows the particle size of the dust sampled at the front yard of Cairo Marriott Hotel on October 1. 1986. (sand storm day)

Fig. 4-5-3 Particle Size of Sand Storm

4-5-2 Plumbing System

(1) Water Supply System

A part of the system, from the existing lift pump to the existing elevated water tank, will be removed and replaced with a new lift pump, lift pipe and elevated water tank, in order to supply water from the new elevated tank by the gravity water supply system.

(2) Hot Water Supply System

Hot water supply pipes and return pipes will be provided from Machine Room to the 5th and 6th floors. A central supply system will be adopted. A new expansion tank will be provided in the penthouse.

(3) Drainage System

Drainage pipes for the 5th and 6th floors will be newly provided and connected to existing drain pits outdoors.

(4) Fire Fighting System

Indoor-type fire hydrants will be provided on the 5th and 6th floors. Existing risers will be branched off to supply water to the new hydrants. The existing pump will be replaced.

(5) Compressed Air System

An air compressor unit will be installed and new piping will be provided from the Machine Room to the 5th floor.

(6) Vacuum Suction System

A vacuum suction unit will be installed and new piping will be provided from the Machine Room to the 5th floor. The capacity of the vacuum tank will be upgraded.

(7) Liquid Oxygen Supply System

The existing manifold system will be removed, and a new liquid oxygen tank (capacity: 5,000 litre) will be provided outdoors. About 10 spare manifolds (cylinders) systems will be prepared. Piping will be newly provided from the liquid oxyten tank to the 5th floor.

(8) Kitchen equipment

The Milk Kitchen in the existing Main Kitchen will be removed to provide a larger area for washing dishes. Since the number of meals per day will increase from the current 1,070 to 1,517, the existing kitchen equipment will be renovated and additional equipment will be installed. (Refer to Clause 4-7-1 on

food service system) Two Pantries will be provided in the Private Wards on the 5th floor and three Kitchenettes will be provided on the 5th and 6th floor.

(9) Laundry Equipment

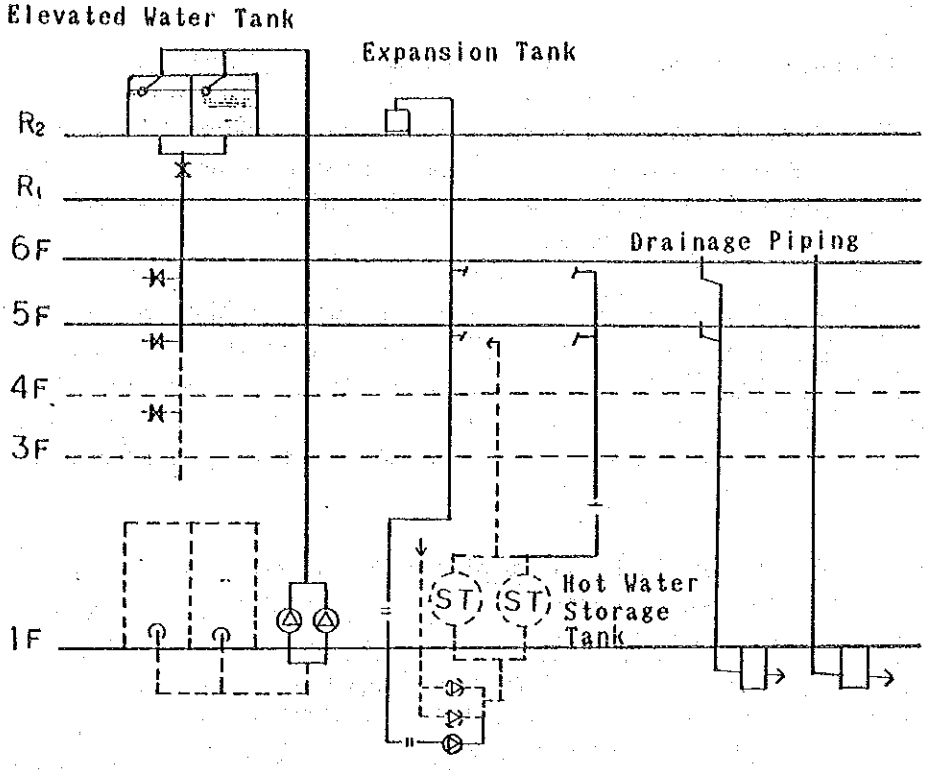
The current 2 sets of washer sand dryers will be replaced with those with an upgraded capacity to cope with the increased volume of laundry.

(10) Transfer and Renovation of Existing Equipment

The equipment and piping provided on the roof of the current building will be removed so as to enable addition of the 5th and 6th floors.

Existing equipment will also be renovated along with the renovation of the building interiors.

(broken line is existing equipment)



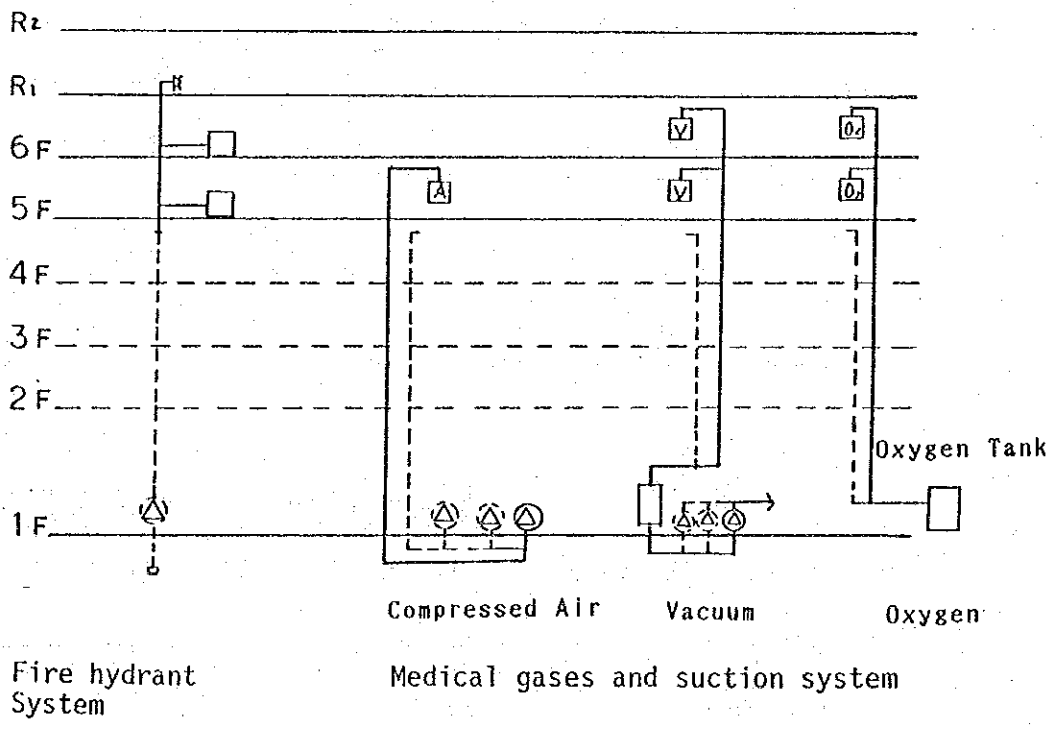


Fig. 4-5-4 Plumbing System Diagram