BASIC DESIGN STUDY REPORT
ON
THE DISTRIBUTION PROJECT OF MEDICAL EQUIPMENT
IN
THE SOCIALIST REPUBLIC OF THE UNION OF BURMA

MARCH, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Socialist Republic of the Union of Burma, the Government of Japan decided to conduct a Study on the Distribution Project of Medical Equipment and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Burma a study team headed by Dr. Kanji Torizuka, Professor, Faculty of Medicine, Kyoto University from July 29th to August 15th, 1984.

The team had discussions with the officials concerned of the Government of Burma and conducted a field survey in Rangoon and Mandalay.

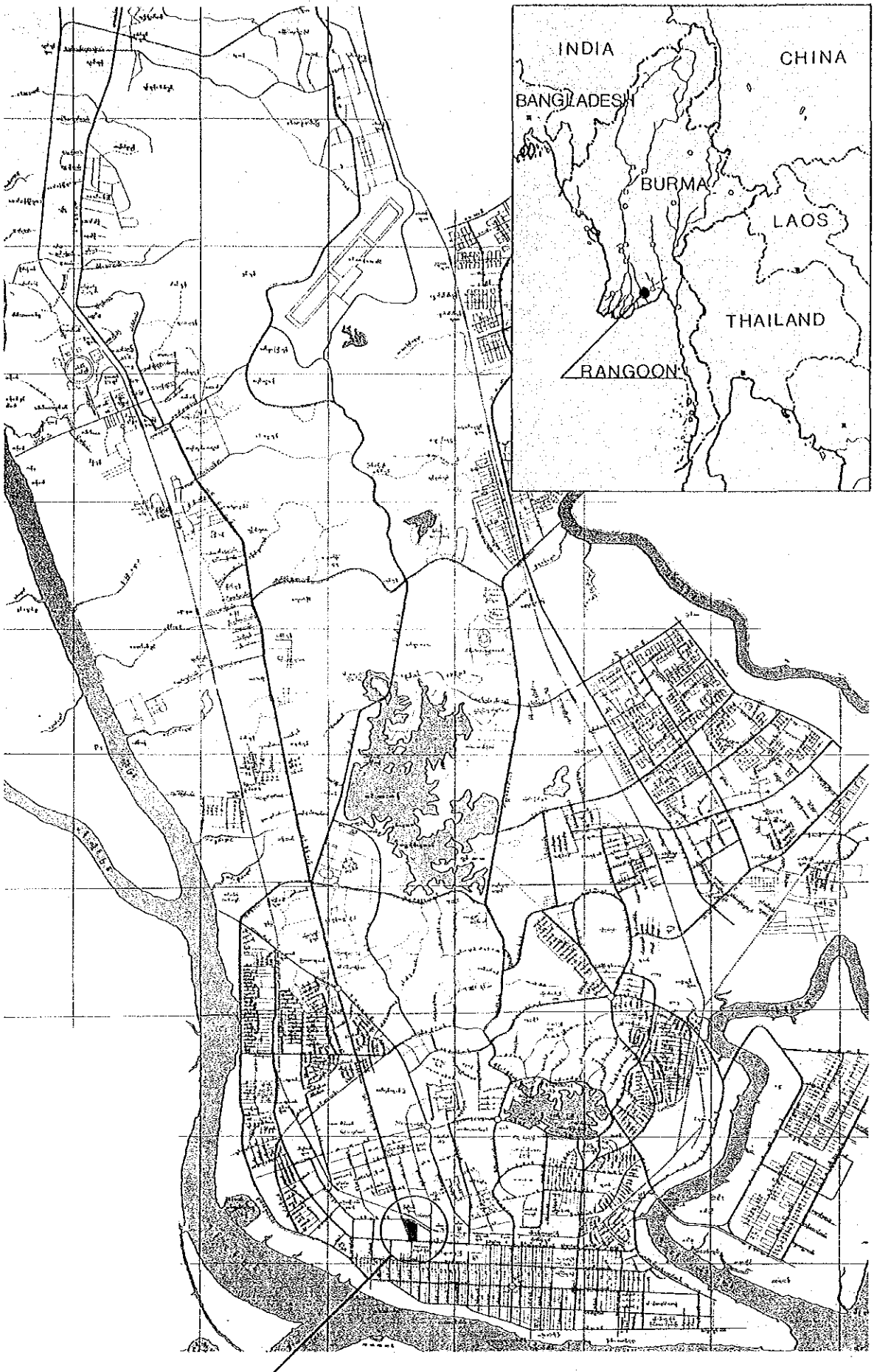
After the team returned to Japan, further studies were made and the present report has been prepared.

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

I wish to express may deep appreciation to the officials concerned of the Government of the Socialist Republic of the Union of Burma for their close cooperation extended to the team.

March, 1985

Keisuke Arita
President
Japan International Cooperation Agency



MAP OF RANGOON

SUMMARY

In order to improve the underdeveloped health care and medical services of the country, the Socialist Republic of the Union of Burma has been vigorously working to implement the People's Health Programme (P.H.P). However, there is a limit to what can be achieved by independent efforts of their own under the present socio-economic situation - in that the level of medical services at present is far from satisfactory both in terms of quality and quantity.

Against this background, the Burmese government made an improvement project of medical equipment covering five major hospitals including the New Rangoon General Hospital, as well as ophthalmic and dental mobile units for divisional hospitals, and requested grant aid for Japanese government to implement this project.

In response to this request, the Japanese government dispatched a basic design study team to Burma over an 18-day period from July 29 to August 15, 1984, through the Japan International Cooperation Agency. The team held discussions with Burmese government officials, had a look at medical facilities, and studied the background, objectives, and contents of the request.

And the team had prepared the Basic Design Study Report on the Distribution Project of Medical Equipment for Rangoon General Hospital, Central Women's Hospital, Rangoon Children's Hospital, and Mandalay General Hospital, as well as Dental Mobile Services and Ophthalmic Mobile Surgical Units in October, 1984.

The Project of this time aims at upgrading the capacity and capability of diagnoses for digestive diseases in Radiology and Clinical Laboratory Department of New Rangoon General Hospital, for which assitance was newly requested by the government of Burma when the above field survey was executed in August, 1984. The study team, for above request, had come to a conclusion that it was indispensable to supply the additional medical equipment and to improve its related facilities not only for above purpose, but for the Technical Cooperation undergoing at present.

The Basic Design Study on this Project is made only through the home office work in Japan, based on the previous materials as follows; the Basic Design Study on the Distribution Project of Medical Equipment in October 1984, the Basic Design Study on the Construction Project of General Hospital in 1980.

The contents of the Project are as follows.

Medical Equipment

Radiology	X-Ray Diagnosis	Whole Body CT Scanner; Remote-Controlled Cassetteless X-ray T.V. System; Cerebral Angiographic System
	Nuclear Mecicine	Gamma Camera System; Auto Multi Gamma Counter
Clinical Laboratory	Biochemistry	Autoanalyzer; Blood Gas Analyzer

* Essential equipments described above and related equipment necessary for diagnosis will be supplied.

Medical Facilities

Construction of annex for installing radiology equipment mentioned above and for performing diagnosis -- one-story ferro-concrete building (approximately 380 m^2 for main quarters) and R.I sewage disposal facility.

Period of Construction

Estimated to be approximately 14 months; after the construction contract.

Estimated Project Cost

Construction Cost to be covered by Burma--13,000 Kyats (373,000 yen)

The Burmese agency for implementing this Project is the Department of Health under the Ministry of Health. After the completion of construction, the expenses required for administration, maintenance, and management, assessed to be approximately 21,700 kyats/month (624,000 yen/month), will be covered by the budget of the Department of Health. Furthermore, in relation to the necessary personnel, such as doctors, technicians, it is believed that there will be no significant management and maintenance problems, due to the execution of the personnel distribution program by the Department of Health and the Technical Cooperation by the Japanese government for New Rangoon General Hospital.

New Rangoon General Hospital is the modern general hospital in Burma built with Japan's grant aid and was opened in October 1984. With the implementation of this Project, one of the hospital's important objectives, to be a diagnostic centre for digestive diseases, will be virtually accomplished. It is believed this will contribute immensely to raise the level of medical services in Burma, when supplemented by the previous Distribution Project of Medical Equipment to other major hospitals, which is scheduled to be executed at much the same time with Japan's grant aid.

CONTENTS

CHAPTER 1. INTRODUCTION

CHAPTER 1 INTRODUCTON

For the purpose of improving the country's medical care, which is largely dominated by communicable and infectious diseases, the Socialist Republic of the Union of Burma has been implementing the People's Health Programmes (P.H.P.) as derived from the country health programming in 1976. At present, the government is aggressively conducting the implementation of the Second Phase (1982-1986) of the programme. This programme is made up of four basic programmes and a support service programme, or a total of five.

1. Community Health Care Programme
2. Hospital Care Programme
3. Disease Control Programme
4. Environmental Health Programme
5. Support Services Programme

The Burmese government is pouring approximately 8% of the national budget into health sector, including the P.H.P. However, due to the severe financial strain the country is experiencing, the situation has deteriorated significantly and is affecting the ability of the country to implement the programmes on its own. For this reason, assistance for health and medical activities has been offered in various forms from overseas, emphasis has been placed on health care (Nos. 1, 3, and 4 of P.H.P. mentioned above) and the construction of new hospitals, therefore few assistance are targeted at existing hospitals.

Against this background, the Burmese government has focused on No. 2, or the Hospital Care Program, of the People's Health Programme and requested grant aid for the Japanese government to execute its distribution project of medical equipment for existing hospitals.

To comply with the request, the Japanese government, through the Japan International Cooperation Agency, dispatched a basic design study team to Burma over an 18-day period from July 29 to August 15, 1984 to make the content of the project clear and study its feasibility. The results of the study at that time have been complied into the report summarized below.

Objective of the Project (Request)		Project Feasibility
Distribution Project of Medical Equipment	1. New Rangoon Genaral Hospital	x
	2. Rangoon General Hospital	o
	3. Central Women's Hospital	o
	4. Rangoon Children's Hospital	o
	5. Mandalay General Hopsital	o
	6. Development of ICU & CCU at the Strategically Located General Hospitals	x
	7. Development of Dental and X-Ray Mobile Services	o
	8. Prosthetic/Orthotic Services--Community Programme for Disability Prevention and Rehabilitation Project	x
	9. Development of Kidney Unit in Rangoon General Hospital	x
	10. Essential Equipment and Instruments for Ophthalmic Mobile Surgional Unit	o

* Above are in the order of priority requested by Burma.

o: Judged as feasible

x: Excluded due to problems

Among these excluded programmes, the study team has sufficiently recognized the necessity of equipment for New Rangoon General Hospital (N.R.G.H.) given top priority, but was forced to exclude it from the project due to a number of problems that were expected to occur with the installation of the equipment.

The equipment requested for N.R.G.H. and the accompanying problems were as follows,

Department	Equipment	Reason for Exclusion
Radiology	1. Whole Body CT Scanner 2. Remote-Controlled Cassetteless X-Ray Diagnostic T.V. System 3. Film Drive System 4. Gamma Camera System 5. Auto Multi Gamma Counter	* Large-scale construction for building and facilities will be necessary to install. * There are fears that safety and environmental contamination problems may occur after installation
Clinical Laboratory	6. Autoanalyzer 7. Blood Gas Analyzer	

New Rangoon General Hospital with 220 beds, built and opened in October, 1984 under Japan's grant aid programme, is a modern hospital in Burma. Its role as a diagnosis center for digestive diseases is also expected to be important. Because the team came to the conclusion that the equipment requested is indispensable to fulfil this role, the team had recommended the improvement of medical equipment covering facility renovation in its previous report.

The Burmes government has accepted this recommendation, and once again requested Japan's grant aid for N.R.G.H. development project, including construction of building. In response to this request, the Japanese government decided to conduct a basic design study for N.R.G.H.

This report shows the result of study which covers the appropriate improvement plan of medical equipment, building and facilities, as well as estimated project cost; based on following studies.

1) Basic Design Study on the Distribution Project of Medical Equipment, October 1984
2) Basic Design Study on the Construction Project of General Hospital, March 1981
3) Hearing from Burmese and Japanese officials concerned with N.R.G.H.

CHAPTER 2.
BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGOUND OF THE PROJECT

2-1 Social Backgound

2-1-1 Social Factors

Until the middle of the 1970s, Burma suffered a chronic economic recession under its economic socialism system, which enforced an extremely isolationist policy toward foreign countries. Due to such setbacks, the government switched to a new policy of aggressively introducing foreign aid -- although in a limited sense -- and of reforming its economic system: placing the national goal on independence as an "agro-industrial country with its foundation on agriculture," by making effective use of its agricultural and forestry resources, as well as its aboundant mineral resources such as oil, as laid down in the "New 20-Year Socio-Economic Development Plan (74/75 - 93/94)" started in 1974. Consequently, Burma was able to achieve an average annual growth rate of 5% in GDP during its second and third four-year plans, setting the economy on the road to recovery. For the following fourth plan currently being implemented, the goal is set at a high average rate of 6.2% a year spurred by this achievement.

However, the expansion of public investment and the rapid introduction of foreign capital to achieve the target have at the same time exacerbated problems such as the increase of the budgetary deficit, the trade deficit, and the burden of debts to foreign creditors.

The economic structure of the country, the greater part of which is dominated by agriculture has not yet to show signs of change; the GNP per capita income is still lingering a low level of $190 (1981).

2-1-2 Medical Factors

The top ranks of the statistical data on prevalent diseases and causes of death in Burma, as is the case for other developing countries, are occupied by infectious diseases such as malaria,

pneumonia, and tuberculosis (Table 2-1). In order to improve this situation, the "People's Health Programme" has been in operation since 1978 in line with the four-year development plan. The second phase (82/83 - 85/86) of the programme is currently in progress. The programme is made up of five pillars.

1. Community Health Care Programme
2. Hospital Care Programme
3. Disease Control Programme
4. Environmental Health Programme
5. Support Services Programme

Of the total budget request for this programme, 63% will be spent on the Hospital Care Programme, and 23% on the Community Health Care Programme. Yet most of the new projects under the programme are directed chiefly toward the bottom level of health care programmes, such as expansion of station hospitals and rural health centres, so existing hospitals are barely able to maintain and repair obsolete facilities and equipment. Hence, in spite of the efforts for improvement made by Burma, the present situation witnesses a yearly reduction in the rate of increase of hospital beds and the per capital number of beds.

The country's development plan places emphasis on infrastructure and production sector, therefore, the development of non-productive sectors exemplified by health and medical services depends mainly on foreign assistance. Assistance from International Organization such as UNICEF, however, focus on health care activities in regional areas and assistance for existing hospitals comes only sporadically in the form of bilateral assistance.

New Rangoon General Hospital, which is the target of this project, is, as indicated in Table 2-2-3, the same teaching hospitals with the highest standards in Burma, as Rangoon General Hospital, Central Women's Hospital, Rangoon Children's Hospital, and Mandalay General Hospital for which a basic design study was conducted last year. Of these, the Rangoon General Hospital, is

the largest medical centre in Burma, with 1,500 beds and covering all of the medical departments. Even this hospital suffers from deterioration and shortage of medical equipment. This is evidenced in the reference data on the Hospital's budget obtained during the previous study (Table 2-4). To summarize, up to 63% of the annual budget of approximately ¥278 million is spent on the personnel expences, with only 25%, and roughly ¥70 million expended on purchases of goods wages and services including medical equipments. In view of the fact that a substantial portion of this share is dominated by expenditure on drugs and other consummables, the budget for new equipments is believed to be only a few tens of million yen. Therefore, we can easily imagine that it is extremely difficult even for R.G.H. to purchase radiology equipment and autoanalyzers, which are especially expensive.

2-2 Present Situation in Radiology and Nuclear Medicine

As in Japan, radiology in Burma can be roughly classified into X-ray diagnosis, Radiotherapy, and nuclear medicine. In the field of radiology, except for nuclear medicine, Radiologists number only 25 in the entire country. Of the estimated 500 graduators per year from the three institutes of medicine in Rangoon and Mandalay, about four or five enter the School of Radiology in Post-graduate Schools. In addition, from the Institute of Paramedical Science located within the compound of Rangoon General Hospital, six X-ray technicians graduate every year.

As for nuclear medicine, there are only four specialists in the entire nation; Postgraduate schools do not have courses in this field, and -- all of these nuclear medicine experts are said to have been trained in England. Hospitals with nuclear medicine department number three -- Rangoon General Hospital, Mandalay General Hospital, and the general hospital located in Taunggyi (200 beds). Of these, diagnoses utilizing unsealed sources are conducted only at Rangoon General Hospital, with the two other hospitals only dispensing radiotherapy using sealed sources. At

R.G.H.'s radiotheraphy department, more than 100 partients are being treated every day with two old cobalt-60 machines manufactured in 1957 and 1963. M.G.H. also had two cobalt-60 machines, of which one was a new Gammatron (year acquired unknown).

Next, for the radiology department of R.G.H., equipment related to the current request are as follows, based on the results of interviews with two Burmese doctors currently undergoing technical training at Kyoto University Hospital and a study of other sources:

(1) The only CT scanner in Burma purchased from Japan in 1982 is installed at R.G.H., is for the head. During the first year after installation, the machine worked without any serious trouble, because a Japanese engineer was assigned to do maintenance. There had been a few minor problems after the first year, which were solved by a Burmese engineer trained in Japan. The machine is still functioning in good condition. At present, six patients are diagnosed by the CT scanner per week, who are mainly Brain tumour, Neuro trauma, an Vascular lesions. They are diagnosed weekly through the joint efforts of four doctors -- two neurosurgeons, a neuro-pathologist, and a neuro-radiologist.

(2) There are approximately 15 X-ray diagnostic machines -- most of which are old and worn-out. The newer machines, mostly Japanese-made, play the central role in diagnosis. (Photo 1)

(3) Abdominal Angiography is only carried out at R.G.H. The only equipment is a Philips machine purchased ten years ago. This is used for Angiographic diagnosis chiefly of the renal artery and portal vein of the spleed for three to four patients per week. About one to two days each week are spent on cardio-vascular while three to fours days on abdominal vascular. Although the number of patients is on the increase, worn-out equipment along with limits imposed on the use of X-ray film, have made it impossible to increase the number of patients. While, diagnoses of the G.I.

examination are conducted at a rate of 10 patients per day. (Photo 2)

Therefore, if the modern equipment such as CT or Angiographic System can be supplied to N.R.G.H., at least the same number of cases can be diagnosed, improving diagnosis capacity dramatically.

(4) Radio-Isotopes (RI) are currently being purchased from India (believed to be made in Great Britain supplied via India). Scintigraph for diseases of Thyroid, kidney and Liver is done with ^{99m}Tc, ^{131}I, and ^{113m}In for in vivo testing. One Japanese Scintillation-scanner made in 1979 has been installed. For therapy utilizing unsealed sources, some ten patients with thyroid cancer are treated with ^{131}I, therapy making use of radium needles is dispensed to between 50 any 60 patients per year. (Photos 3 and 4)

(5) In the past, X-ray film made in the U.S. was used, but now only Japanese-made film is available. Because of film shortages, a limit is being set on the number of films allocated to each hospital. For this reason, the number of patients who can be diagnosed is naturally restricted.

(6) Radiation protection is administred by the Radiation Protecton Department of R.G.H, at which the irradiation level is checked every month the film badges worn by doctore and X-ray technicians. Although there is no codified regulations in this field, various notices issued by this department are considered to be the standards of radiation protection in Burma.

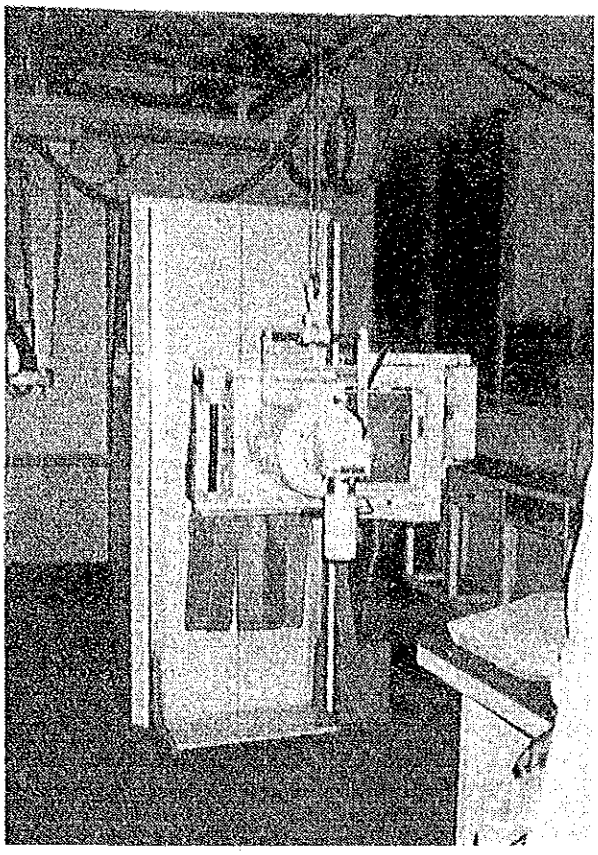


Photo 1 X-Ray for G.I Examination in Radiology Department of R.G.H.

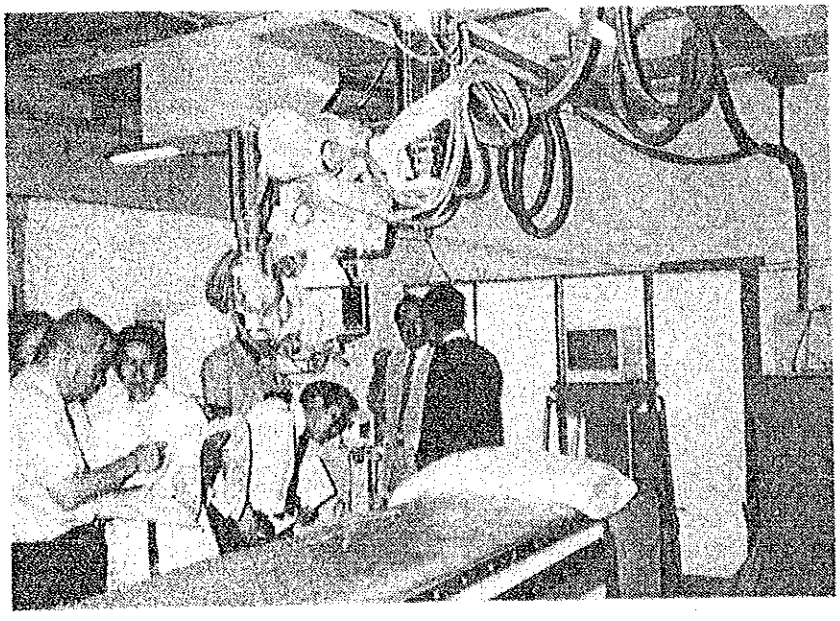


Photo 2 X-Ray Apparatus for Angiography

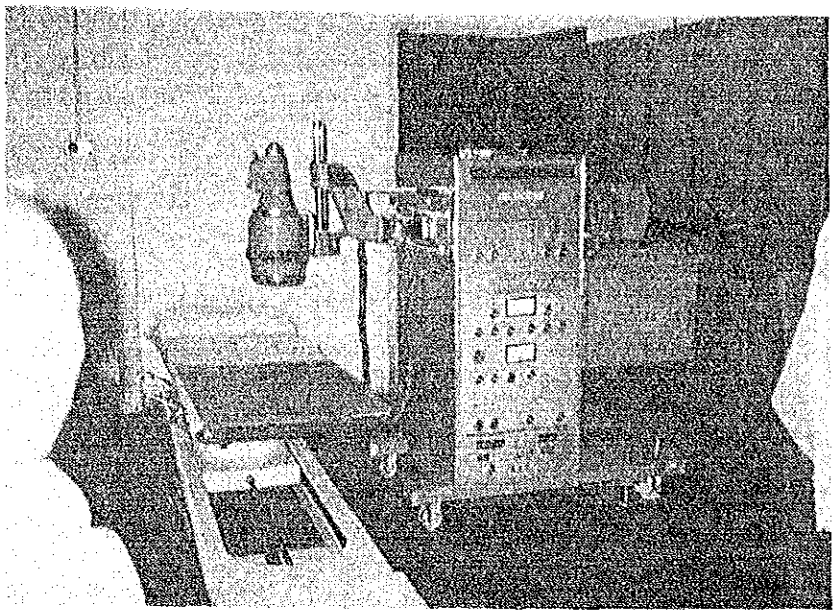


Photo 3 Schintillation Scanner in R.I in vivo Test Room

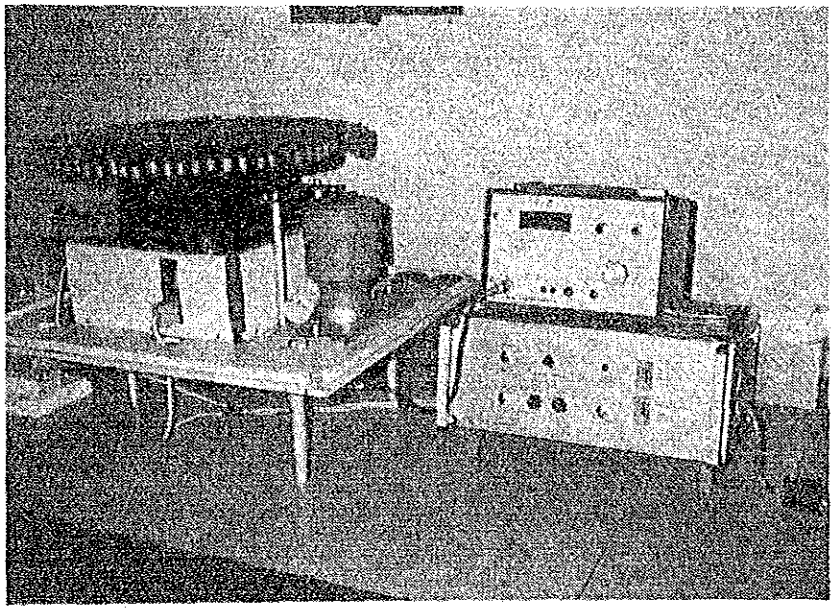


Photo 4 Well-type Gamma Counter in R.I in vitro Test Room

2-3 Present Situation of New Rangoon General Hospital

2-3-1 Objective of Hospital Construction

The 220 bed New Rangoon General Hospital (N.R.G.H.) was built with grant aid from Japan as the most advanced hospital in Burma. The request for grant aid to the Japanese government for the Project to construct a general hospital with an function of diagnostic centre for digestive diseases in Rangoon was made in 1980. In response to this request, Japanese government decided to offer grand aid in 1981; the construction project was carried out from 1981 to 1984 -- in two phases. -- The hospital was completed in March 1984 and started operation in October of the same year.

The Burmese government plans, not simply to repair the existing Rangoon General Hospital (R.G.H.) but to create a large-scale medical complex around R.G.H. New Rangoon General Hospital, completed ahead of the Nursing School presently under construction with Japan's Grant Aid and the project of a 660-bed general hospital and medical college to be financed by the Asian Development Bank (ADB), was the first step toward the realization of this plan.

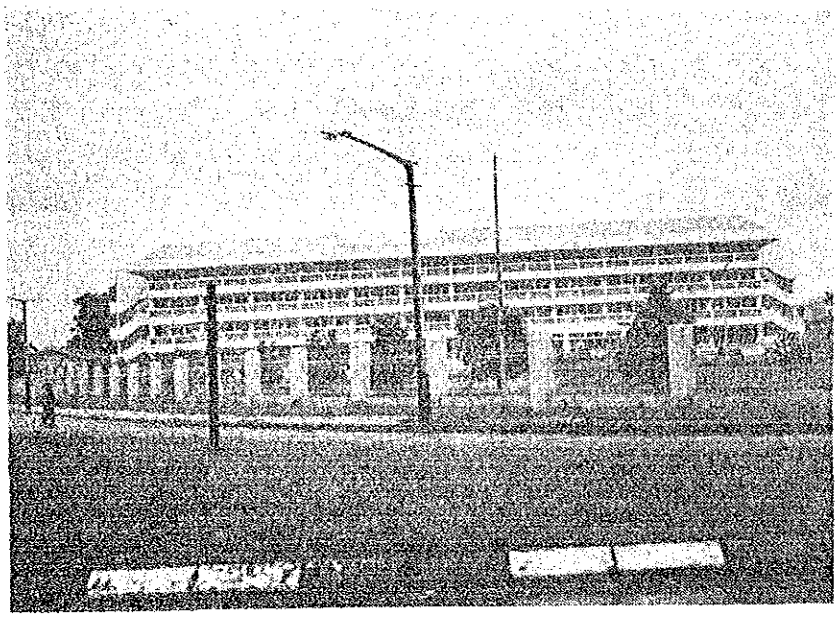


Photo 5 External View of N.R.G.H (Main Words)

2-3-2 Present Situation

In the front of approximately 10 hectare site neighboring to the Institute of Medicine, is a four-story building consisting of out-patient, administration, and inpatient dept.. To its north are two two-story building with the radiology, operation theatre, and with the ICU and laboratory dept., and the one-story service block, made up of the laundry and the kitchen. These blocks are linked by two-story passageway, to form a pavilion-type hospital (Figure 2-1).

There are seven medical departments -- Medicine, Surgery, Gynecology, Pediatrics, Anaesthesia, Radiology, and Pathology. The hospital does not have an emergency unit, and out-patients are accepted only with a recommendation. The hospital staff in the initial schedule was to total 377, with a medical superintendent, deputy medical superintendent, 7 consultant physicians, with 33 civil assistant surgeons -- a total of 40 doctors -- as well as 65 nurses and others workers such as technicians. However, as little time has passed since the opening of the hospital, the outpatient department has not yet been in operation, and the in-patients have been sent to this hospitl through R.G.H. And, most of doctors serve concurrently with R.G.H.; the hospital is not yet functioning fully as an independent institution. Furthermore, as for the content of its medical service, its function as a general hospital is said to be increasingly emphasized rather than the diagnostic centre for digestive diseases, because no other hospital has such advanced facilities. Nevertheless, more time seems necessary for the hospital to develop in the direction of its initial purpose.

2-4 Problems and Direction for Improvement of New Rangoon General Hospital

In consideration of the initial purposes for establishing this hospital -- for a diagnostic centre for digestive diseases, and of aims in Technical Cooperation by the Japanese Government -- to raise the diagnostic capacity especially for digestive diseases, it can be pointed out as problems that there are deficiencies of the set-up of medical equipment in the radiology department and clinical laboratory. The equipment lacking are, namely, X-ray Television System for the digestive organs and abdominal blood vessels, CT scanner, and some equipment in nuclear medicine for the radiology department, and analyzers for biochemistry in the clinical Laboratory.

The radiology department, at present, has only two ordinally X-ray Television Systems and one tomograph as relatively advanced equipment. There is no nuclear medicine equipment which makes use of radioisotopes (RI) for in vivo and in vitro measurement. In the biochemistry room of the clinical laboratory, there are only one autoanalyzer and blood gas analyzer.

Apart from analyzers, the level of the ragiology equipment in N.R.G.H are much the same as those presently installed in R.G.H as seen in 2-2. And so the present equipment can hardly be judged as sufficient to serve as a diagnostic centre.

2-5 Contents of the Request

The current request for New Rangoon General Hospital had been made based on the problems above from the Burmese government.
The following equipment are requested:

Radiology	X-Ray Diagnosis	1. Whole Body CT Scanner
		2. Remote-Controlled Cassetteless X-Ray TV System
		3. Film Drive System
	Nuclear Medicine	4. Gamma Camera System
		5. Auto Multi Gamma Counter
Clinical Laboratory		6. Autoanalyzer
		7. Blood Gas Analyzer

Purposes of the equipment above are:

1. Whole Body CT Scanner -- used to get a cross-section X-Ray images of the human body and very effective in diagnosing organ diseases in combination with plane images by the X-ray Television System.

2. Remote-Controlled Cassettelessd X-Ray TV System -- Contract radiography of digestive organs can be done continuously. Technical training to operate has been already done for Burmese technicians in Japan.

3. Film Drive System -- a high-speed, continuous X-ray film changer used in combination with No. 2 above to get abdominal blood vessels radiograph.

4. Gamma Camera System -- photographic scanning to study static or slow kinetic effects on whole body, including liver, kidney, or pancrease, etc., using radioactive compounds as tracers.

5. Auto MultiGamma Counter -- the well-type scintillation counter, used to measure very small amount of ingredients in biological specimens (usually of excreta or blood) using radioactive conpounds.

6&7. Autoanalyzer & Blood Gas Analyzer -- There is only one of each and these are used for emergency diagnosis during surgical operation. If they breakdown, the operation of the biochemical diagnosis will come to a halt. Hence, a set of two for each device is necessary.

Most of these equipment had been already included in the project for establishing the diagnostic centre requested by Burma in February 1980. However, in the preparatory study and the basic design study for this project conducted in the same year, these facilities, particularly the radiological equipment, were excluded as they were too advanced. The decision at that time is believed to have been appropriate with regard to the medical situation in Burma: and the equipment are considered to be still advanced.

Nevertheless, the study team came to the conclusion that the current request justifiable for the following reasons.

1. Circumstances have changed in comparison to those in 1980. In other words, Technical Cooperation for N.R.G.H has entered on the execution phase.

2. The CT scanner, which did not exist in Burma at that time, had already been installed at R.G.H. and is still working in good condition.

3. Abdominal angiography and diagnostic applications of radionuclide have been done at R.G.H., and the equipments used have already worn-out.

4 New R.G.H. has a reliable, larg-capacity electrical power facility, essential for the installation of advanced equipment such as CT., Angiographic System.

In short, the request can be judged as reasonable on next two assumptions; the equipments above should be installed only at New R.G.H., and measures should be taken for radiation protection and prevention of R.I contamination.

CHAPTER 3.
CONTENTS OF THE PROJECT

CHAPTER 3 CONTENTS OF THE PROJECT

3-1 Basic Policy

In planning the medical equipment, building and facilities, the following items constitute the basic policy:

1) Medical equipment and its composition should not be extremely advanced for the standards in Burma.

2) With respect to the new facilities plan, we will consider locations which allow smooth communication with existing radiology departments and the integrated management.

3) With respect to countermeasures for radioactive contamination in nuclear medicine, we will structure our plan as a model both in terms of equipment and facilities.

4) The construction and facilities system will be identical to those of existing building, so that the integrated maintenance and administration can be carried out easily.

3-2 Medical Equipment Improvement Plan

The following seven items have been requested by the Burmese government; and as shown in 2-5-2, the contents of the request is basically valid.

Radiology department	X-Ray Diagnosis	1. Whole Body CT Scanner
		2. Remote-Controlled Cassetteless X-Ray TV System
		3. Film Drive System
	Nuclear Medicine	4. Gamma Camera System
		5. Auto Multi Gamma Counter
Clinical Laboratory department		6. Autoanalyzer
		7. Blood Gas Analyzer

Based on this request, we will make the equipment plan based on the following policy:

1) The level of equipment should be appropriate for the existing level in Burma, and Equipments should be easy to maintain and operate.

2) With respect to the five items of radiological equipment requested, we will also prepare the related equipment required for effective diagnosis.

3) With respect to equipment in nuclear medicine, we will include equipment and materials for drainage, ventilation, and radiation monitoring, all of which are necessary to monitor radioactive contamination.

As far as planning is concerned, one problem is presented by item 3) above, namely the Film Drive System. This equipment is used for the abdominal angiography in combination with the diagnostic table of item 2): X-ray Television System.

However, in order to perform an X-ray diagnosis of blood vessels, it is necessary to have a sanitary, independent area much the same as an operating room, and a large amount of electrical power is needed for a short time period. (Three-phase 150-200 KVA is required for biplane radiograph, which is three to four times the amount required for X-ray Television System). Because of these factors, it will be difficult to combine the Film Drive System with the X-ray Television System for the purpose of angiography. And we will plan the Angiographic System including the Film Drive System besides the X-ray Television System.

In the field of nuclear medicine, because of the need for control and monitoring of radioactive contamination, equipment can not be shared with other areas. This means that a complete set of laboratory equipment must be provided just for this area.

As for item 5) the Auto Multi Gamma counter, we will designate a small-sized unit which will be able to simultaneously measure about 100 samples. In relation to item 4) Gamma Camera System, while it is usual in Japan to process data with a computer, given

the number of tests that are expected, it will not be necessary to have a computer in this case.

Of the additional radiological equipment, the abdominal angiography and radiography of digestive organs, requires that the X-ray films are developed immediately to ascertain whether the images are of sufficient quality. While there was no specific request made, we will include automatic processing equipments, film processing room, and related equipment and materials. This will also make it possible for the nuclear medicine department to use the processing equipment, and so significantly improve diagnostic efficiency.

With respect to item 6) autoanalyzer, the Burmese side requested a large-sized, floor-standing model with fully automated functions. However, there would be many problems in maintaining and operating such an equipment, and therefore we will plan simple, table-top model which combines an unit for measuring Na and K ions, and another unit for measuring Cl.

Based on the above considerations, we have made a plan for each room where the equipment are to be installed. The list of equipment and materials is shown in 3-7-1.

3-3 Facility Improvement Plan

3-3-1 Present Conditions of Buildings and Facilities

New Rangoon General Hospital, which was completed last spring, consists of a four-story main building, and an X-ray/OPE building and laboratory building and others to the north. Various components of the complex are connected by passageways. Pipes, gutters, etc., are installed around each of the buildings. This is how the buildings are arranged at the present time.

3-3-2 Installation Proposal

Additional floor of about 300 square meters is needed to install the new equipment with achieving their proper function.

1) Renovate the existing radiology department area, or construct an extension;

2) Build a new building near the existing radiology department.

The first alternative involves a numbe of disadvantages because it would necessitate construction works while the hospital is in operation; it would be time consuming; and it would be inefficient.

The second alternative, on the other hand, will not interfere with medical treatment, and it would be possible to make an efficient plan. It is clear, therefore, that for this project, the second alternative should be adopted. For the actually implementation of this plan, there are two possibilities, as shown in the separate layout diagram.

Plan A: The extension will be built next to the connecting corridor, and since it will be an integral part of the radiology department, it will be efficient. One disadvantage of this plan is that sections of the drain pipes and gutters must be re-laid.

Plan B: Under this plan, the main room of the present radiology department is to become a corridor, connected to the new building. In addition to lack of space, this plan would adversely affect the lighting of existing buildings and make changes to the gutters necessary.

Thus, based on an overall consideration of space, ease of construction, the need to alter drainage channels, etc., we can state that Plan A is the more viable of the two alternatives.

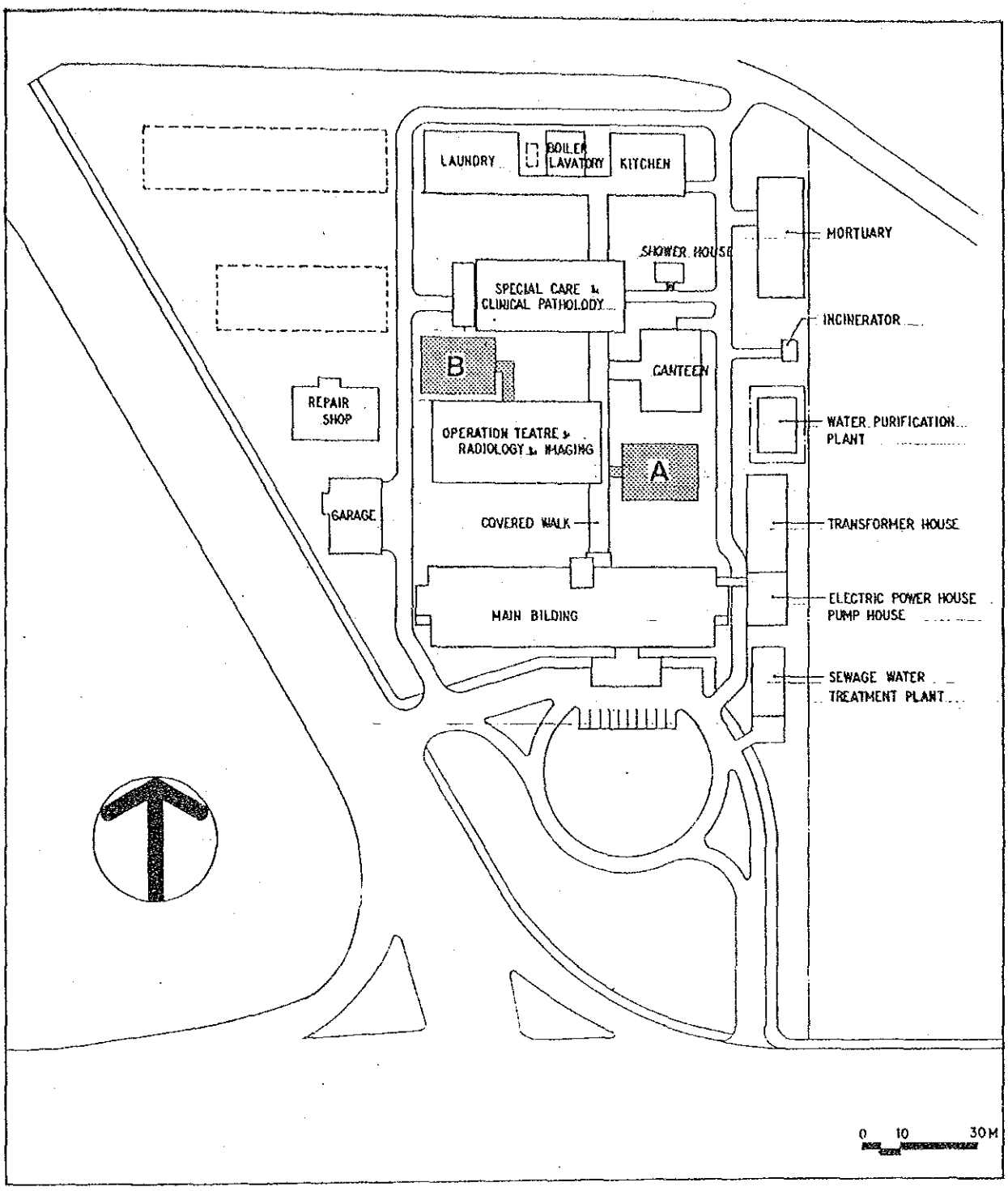


Fig. 3－1 INSTALLATION PROPOSAL PLAN

3-4 Construction Planning

If it is to take the form of an extension to the newly built Rangoon General Hospital, the new addition should be viewed as a part of the same design theme as the existing main building, as well as the X-ray and OPE building, and laboratory building connected by the corridor.

The main structure should have a rigid frame construction, with concrete interior and exterior walls to prevent X-ray radiation and contamination; other walls are to be made of bricks.

Finishing should adopt methods that can be carried out with local technology, with the exception of the floors of the RI department.

3-5 Facility Planning

3-5-1 Water Supply and Drainage Planning

a) Water suply

Water will be supplied from the existing hospital piping, and will be connected to the various sanitary fixture and medical euqipment. Furthermore, along with the construction of new buildings, some of the existing water supply pipes will be replaced.

b) Drainage

Ordinary drains will be connected to the existing drainage pipes. Special RI drain water will be stored in a storage tank first, and water quality will be monitored. Depending on the RI concentration contaminated the water will either be discharged untreated, or discharged after dilution. Sewage water from the RI area will be treated in the sewage treatment tank, and after treatment, it will be leaded to the storage tank.

The storage tank and sewage treatment tank will be considered to make sure that they do not have any leaks.

RI special drainage pipes will be considered for anti-corosion, no-leaking, and no-clogging.

Along with the construction of new buildings, some of the existing drainage pipes will be replaced.

c) Sanitary fixtures made of ceramics will be used.

d) Fire fighting

As the existing indoor fire hydrants and outdoor fire hydrants cover the new buildings to be built, no additional fire fighting equipment is necessary.

Along with the construction of new buildings, some of the existing fire hydrant pipes will be replaced.

e) Drainage water treatment facility

The equipment for storing and diluting RI special drain and sewage treatment tank wil be installed.

3-5-2 Air Conditioning Planning

a) Ordinary air conditioning

The ordinary air conditioning areas such as the CT scanner room, X-ray TV room, etc., will be cooled and ventilated by the air-cooled package system.

b) RI special air conditioning

The RI special area will be cooled by the air-cooled package system. As for exhaust system, all air will be exhausted after treatment by the high efficiency RI filter. It will be necessary to keep the RI area at a minus pressure compare with ordinary air conditioning areas in order to prevent any discharge of RI contaminated air.

Medical gas equipment planning

Oxygen and suction pipes will be branched from the existing hospital piping to each new outlet.

3-5-3 Electrical Planning

a) Line system

Main and submain power for motor lighting, and electricity for medical equipment, will be supplied from the existing transformer substation at 3ϕ4W 400V/230V. The motor control should be simple to operate and maintain.

b) Lighting & Receptacle facility

The lighting will be provided mainly be fluorescent lights. Incandescent lights & Receptacle will use single-phase 230V.

c) Telephone system

Internal extensions and outside connections will be made using the existing switchboard.

d) Broadcasting system

Using the existing broadcasting system, we will make it possible to broadcast to individual location as well as generally throughout the facility.

e) Emergency alarm system

An alarm system activated by push-buttons is installed for fire evalucation purposes.

3-6 Measures for Radiation Protection

3-6-1 X-Ray Protective Measures

With respect to the CT scanner rooms, X-ray Television room, and Angiography room, it is necessary to take protective measures against external exposure to X-ray radiation. To accomplish this the wall of each room must be concrete and more than 150 mm thick. (A concrete wall with the thickness of 150 mm and a density of 2.35 g/cm^3 is equivalent of 2 mm of lead at the tube voltage of 150 KV.) The windows must be lead glass with more than lead equivalent thickness 1.5 mm; doors (including the frame) must be steel covered with lead plates more than 1.5 mm thick. At the

entrance to each room, there will be an X-ray "ON" display lamp in order to prevent anyone from entering during radiography or fluoroscopy. Furthermore, in the X-ray Television room and the Angiographic room, there should be protective equipment and clothings, because staff spend a long time for fluoroscope.

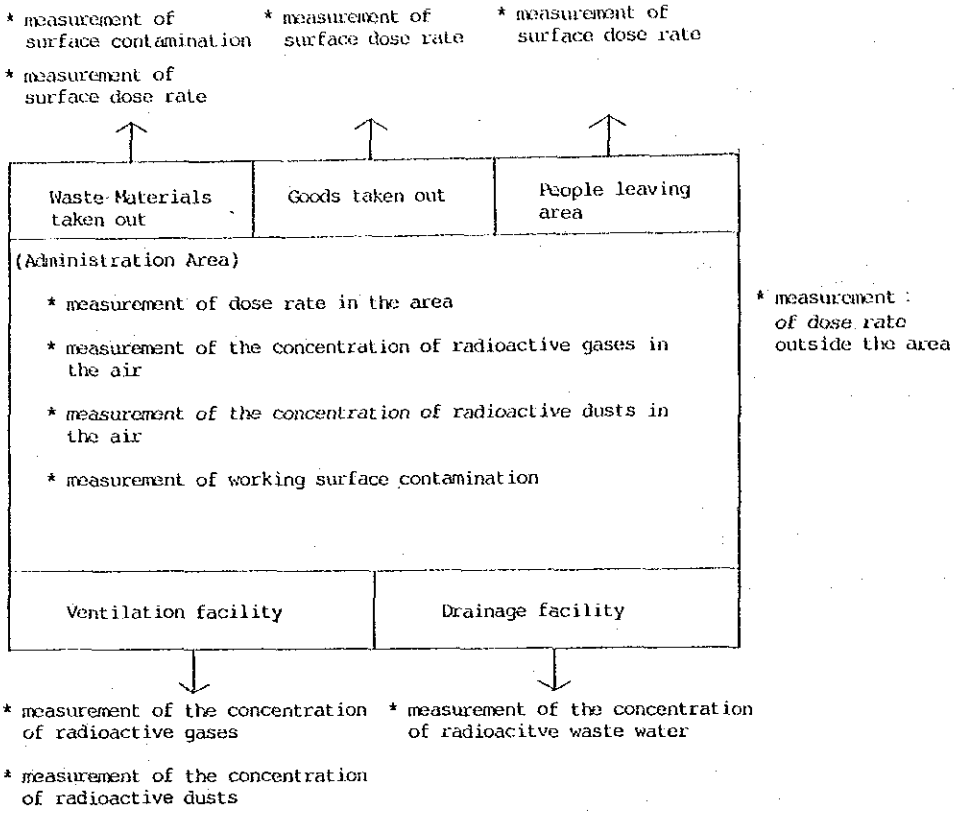
3-6-2 Measures for Radioactive Contamination

In the field of nuclear medicine, where unsealed sources are used, everything including staff and patients, air, drainage, and other objects are in danger of contamination risks. It is therefore not only important to constantly monitor, it is also necessary to take countermeasures immediately when contamination beyond the permissible level is detected.

In R.I diagnosis, the following radionuclides are expected to be used in the daily use amounts indicated. (The list includes future possibilities as well.) The permissible levels of concentration for drainage and ventilation are the regulation values used in Japan.

Tests	Radionuclide	Daily use Amount	Permissible Concentration level for Drainage ($\mu Ci/cm^3$)	Permissible Concentration level for Ventilated Air ($\mu Ci/cm^3$)
in vitro	^{125}I	200 Ci	2×10^{-6}	3×10^{-10}
in vivo	^{67}Ga	10 mCi	3×10^{-4}	5×10^{-8}
	^{99m}Tc	30 mCi	3×10^{-3}	5×10^{-7}
	^{113m}In	10 mCi	1×10^{-3}	2×10^{-7}
	^{131}I	200 Ci	2×10^{-6}	3×10^{-10}

Furthermore, the permissible dose rate for radiation (mainly γ-rays) is set at 100 m rem/w inside the administration area, and 30 m rem/w outside the control area. In relation to these, the following environmental items must be monitored.



According to this list, there are four large categories of environment to be measured.

1) Dose rate in space

2) The concentration level of radioactive materials in the air

3)The concentration level of radioactive materials in water

4) Surface contamination

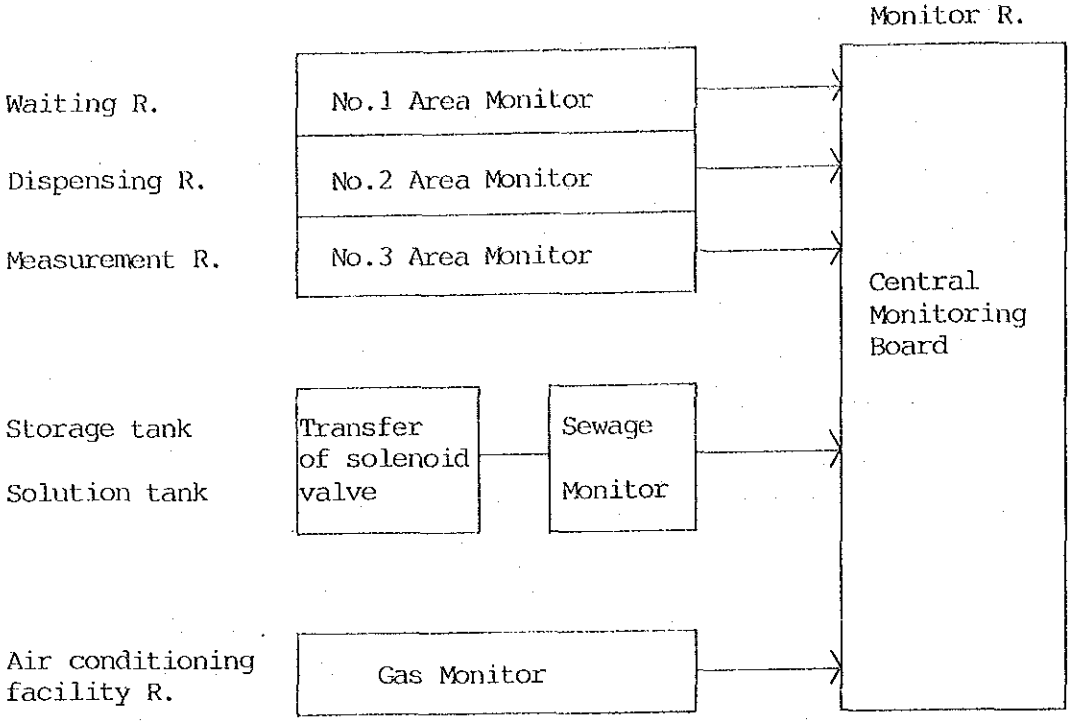
Given the situation in Burma, the following equipment should be set up in order to measure four items above. Items 1) through 3) will be monitored at all times by the central monitoring board which is installed in the waiting room.

Measurement Items	Equipment	Location
1 Dose rate in space	γ-ray area monitor	Waiting room, measurement room, dispensing room
2 Concentration level of radioactive dust	γ-ray gas monitor	Air conditioning facility room
3 Concentration level of radioactive materials in water	γ-ray sewage monitor	Drainage storage tank, diluting tank
4 Surface contamination	Survey meter	Waiting room

The dose rate in space is expected to reach the highest level in the storage room where a large volume of radioactive medicines will be stored, and waste material store room. However, since human traffic does not always pass through these areas no monitors will be installed. Nevertheless, in the storage room, there will be a shielded store refrigerator, and in the waste storage room, there will be shielded cabinet for highly concentrated waste liquids etc., and the room itself will have a shield structure.

Also, when a heavy contmination of personnel is detected by the survey meter, the person should be decontaminated by washing using the specially prepared detergent provided in the dressing, wash room.

The disposal of drainage water which has the widest impact on the surrounding environment is already mentioned in 3-5-1. The key point is to make certain that highly concentrated waste liquids, such as the remains of administred solutions and primary rinsing water for test tubes, injectors, etc., are not discharged into the sink. All these liquids must be stored in the waste storare room, and disposed of after the radiation falls to a safe level.



RI Monitoring System

3-7 Basic Design

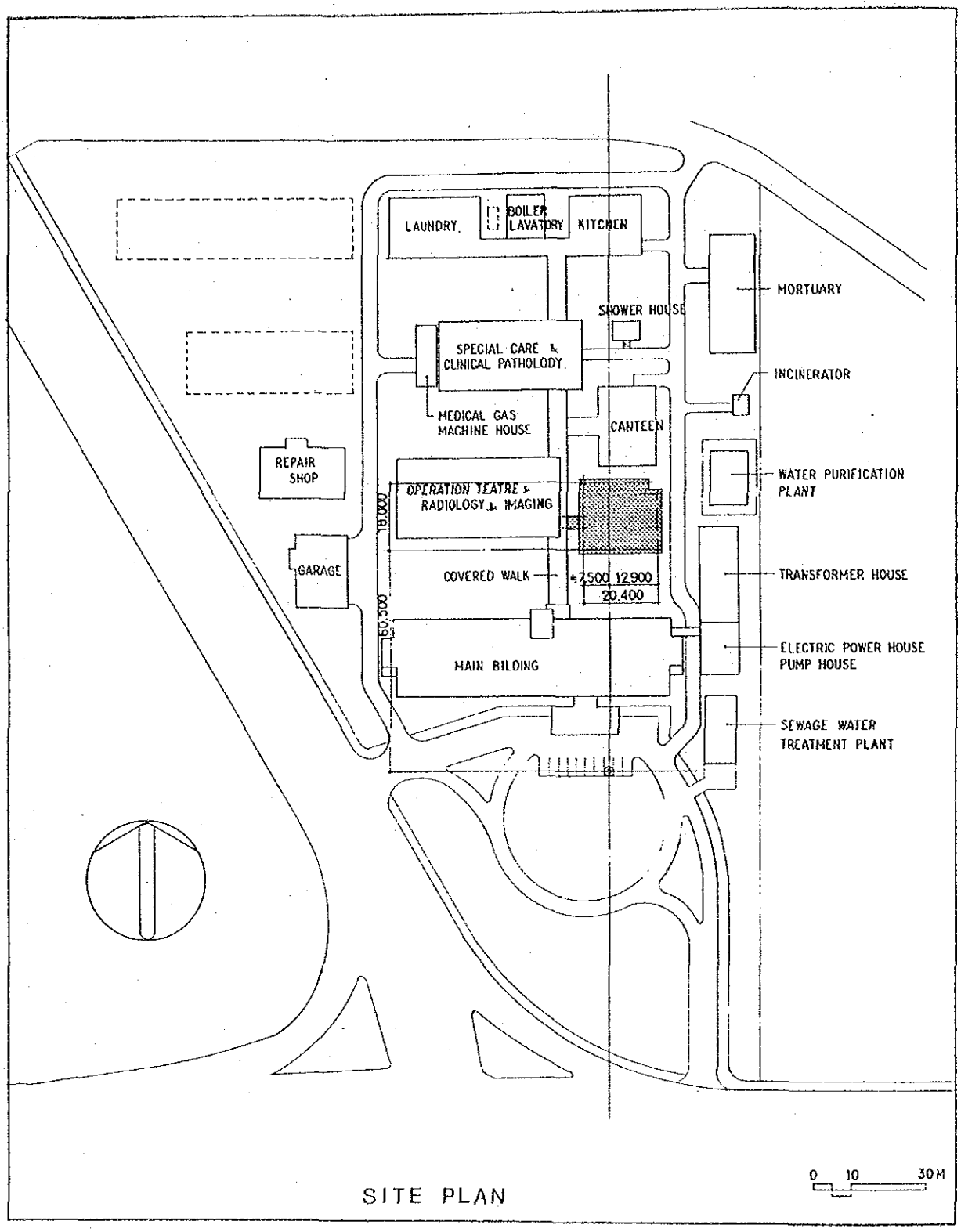
3-7-1 Medical Equipment List

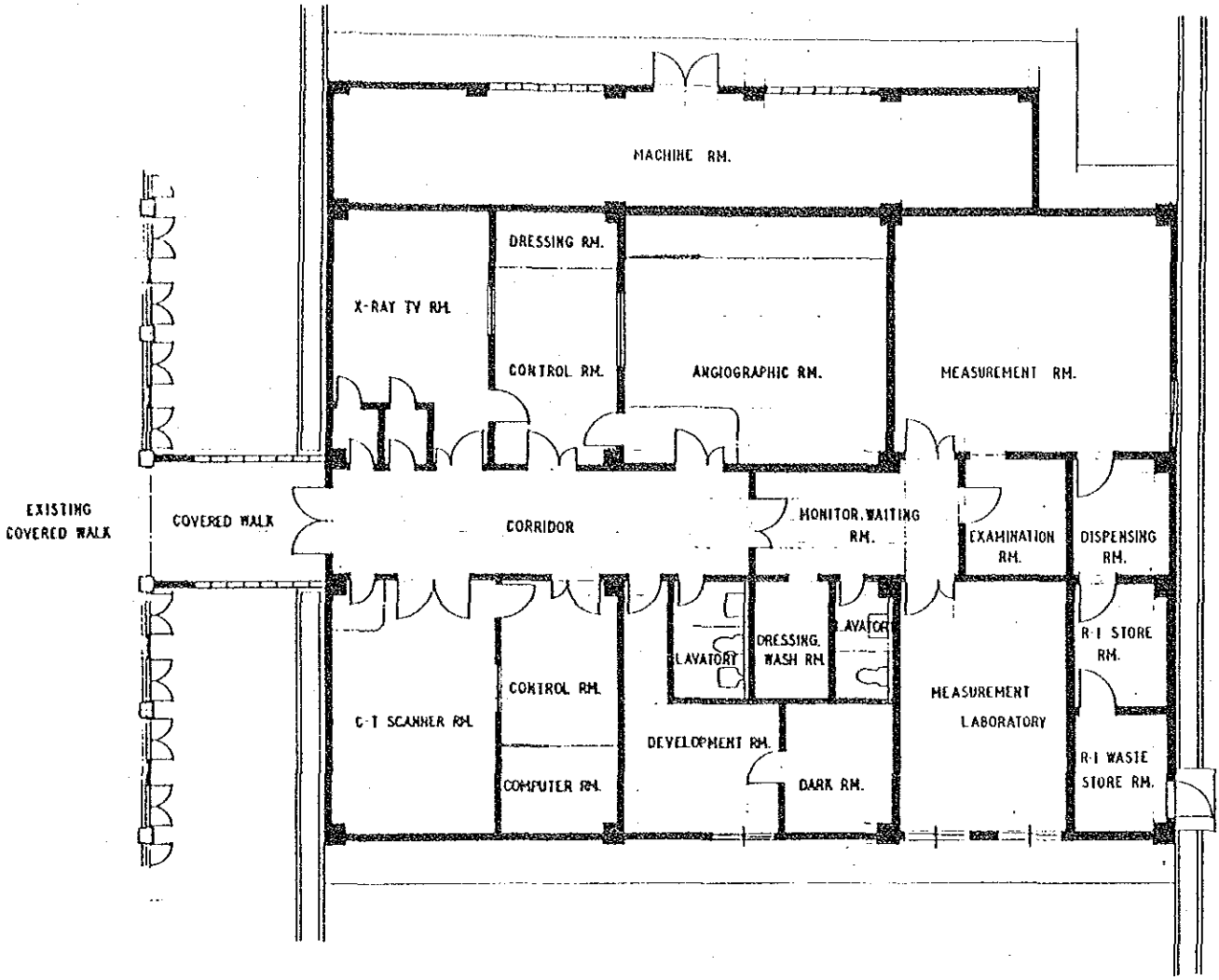
ROOM	EQUIPMENT	Q'TY
I. DEPARTMENT OF RADIOLOGY		
A. CT Scanner R.	A-1.Whole Body CT Scanner	1 unit
	1. X-ray Film Viewer	1
	2. Diagnostic Instruments	1 unit
B. X-ray TV R.	B-1.Remote controlled X TV System	1 unit
	1. X-ray Film Viewer	1
	2. Diagnostic Instruments	1 unit
C. Angiographic R.	C-1.Cerebral and Abdomial Angiographic System	1 unit
	1. Anesthesia Apparatus	1
	2. Operating Light	1
	3. U.V. Scrub Unit	1
	4. X-ray Film Viewer	1
	5. Instrument Cabinet	1
	6. Diagnostic Instruments	1 unit
II. DEPARTMENT OF NUCLEAR MEDICINE		
D. Measurement R.	D-1.Gamma Camera System	1 unit
	1. X-ray Film Viewer	1
	2. Diagnostic Instruments	1 unit
E. Measurement Labo.	E-1.Auto Well Gamma System	1
	1. Refrigerated Centrifuge	1
	2. Water Bath	1
	3. Balance	1
	4. pH meter	1
	5. Magnetic Stirrer	1

ROOM	EQUIPMENT	Q'TY
E. Measurement Labo.	6. Water Purifier	1
	7. Shaker	2
	8. Water Pomp	1
	9. Ice Maker	1
	10. Ultrasonic Cleaner	1
	11. Ultrasonic Pipet Washer	1
	12. Sterilizer	1
	13. Mixer	1
	14. Deep Freezer (-20°C)	1
	15. Centre Table	1
	16. Side Table	4
F. Examination R.	1. Couch	1
	2. X-ray Film Viewer	1
	3. Diagnostic Instruments	1 unit
G. Dispensing R.	1. Side Table	1
	2. Lead Blocks	1 unit
	3. Sink	1
	4. Degital Curie-meter	1
H. R·I Store R.	1. Deep Freezer (-20°C)	1
	2. Shielded Freezer	1
	3. Side Table	1
	4. R·I Store Locker	1 unit
I. Waiting, Wash R.	I-1. Monitoring System for R.I Pollution	1 unit
	1. Survey Meter	2
	2. Locker	2
	3. Sundries, decontamination	1 unit
	4. Sundries, Radiation Protection	1 unit

ROOM	EQUIPMENT	Q'TY
III. DEVELOPMENT ROOM		
J. Development R.	J-1. Automatic Processor	1
	1. X-ray Film Viewer	2
	2. Film Loading Desk	1
	3. Sink, Table	4
	4. Sundries, Development	1 unit
IV. DEPARTMENT OF CLINICAL PATHOLOGY		
K. Biochemistry R.	K-1. Analyzer (Na, K)	1
	K-2. Analyzer (Cl)	1
	K-3. Analyzer (Blood Gas)	1

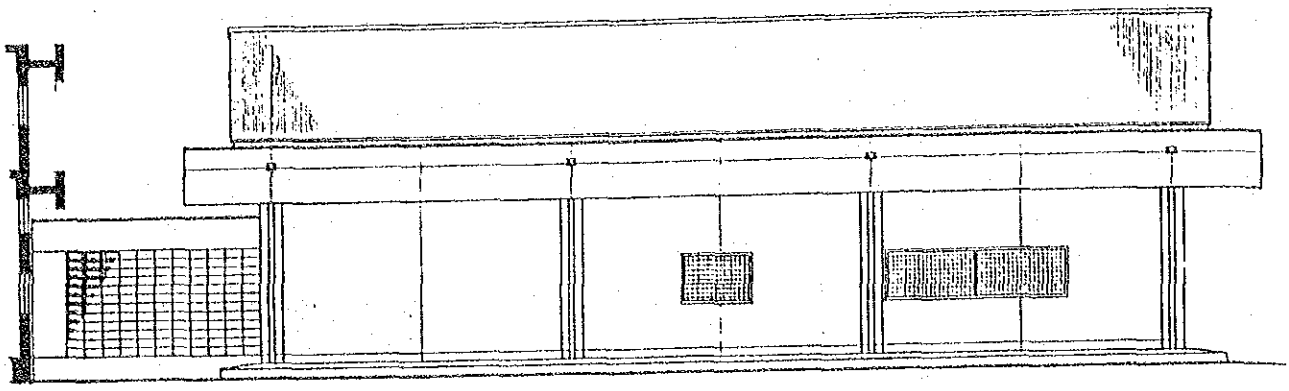
3-7-2 Basic Design Plan for Construction



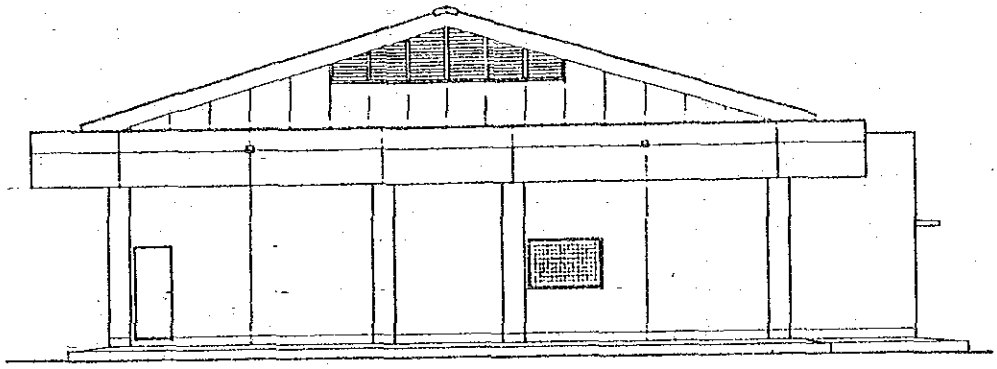

MACHINE RM.
DRESSING RM.
X-RAY TV RM.
CONTROL RM.
ANGIOGRAPHIC RM.
MEASUREMENT RM.
EXISTING COVERED WALK
COVERED WALK
CORRIDOR
MONITOR. WAITING RM.
EXAMINATION RM.
DISPENSING RM.
LAVATORY
DRESSING. WASH RM.
LAVATORY
R-I STORE RM.
CONTROL RM.
C-T SCANNER RM.
DEVELOPMENT RM.
MEASUREMENT LABORATORY
COMPUTER RM.
DARK RM.
R-I WASTE STORE RM.

PLAN

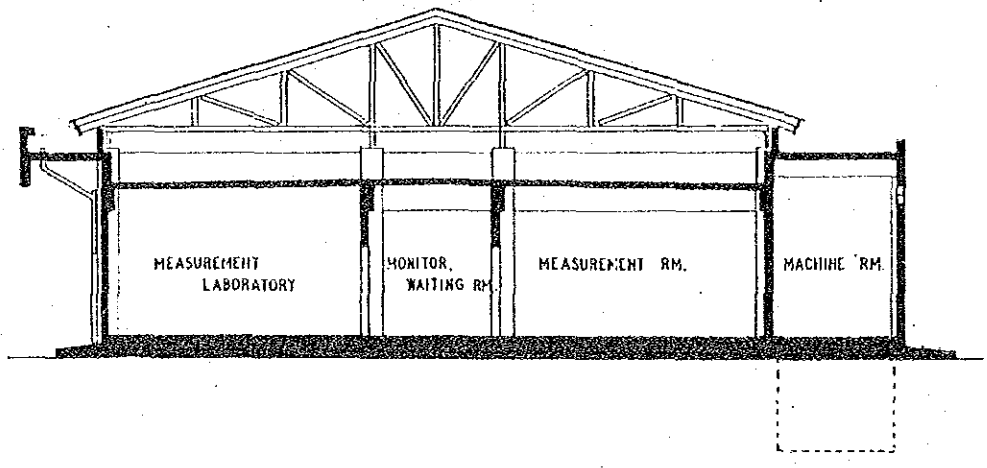
0 1 2 3 5M



SOUTH ELEVATION



WEST ELEVATION



SECTION

0 1 2 3 4 5M

3-8 Estimated Project Cost

3-8-1 Conditions

1) Date estimate Prepared: February 1985

2) Exchange rate used for the estimate: The rates at the same point in time: US$1 = 8.6 Kyats = ¥248.0.

3-8-2 Estimated Project Cost

The amount of construction costs to be borne by the Burmese side = 13,000 kyats.

Note: With respect to the scope of construction work by the Burmese side, see 4-2-2.

CHAPTER 4.
IMPLEMENTATION PROGRAM

CHAPTER 4 IMPLEMENTATION PROGRAM

4-1 Implementing Organization

The organization that is responsible for this Project is the Department of Health under the Ministry of Health of the Burmese government.

The government agency in charge of dealing with bilateral assistance is the Foreign Economic Relations Department (FERD) under the Ministry of Planning and Finance.

4-2 Scope of Work

4-2-1 Scope of Work for Japan

1) Construction work for the extensions (radiology department and nuclear medicine department)

2) Construction work for the storage tank for radioactive, contaminated waste water

3) Construction work to replace the existing plumbing and drainage pipes

4) Provision and installation of medical equipment

5) Training on handling of medical equipment after installation

4-2-2 Scope of Work for Burma

1) Outside construction work other than that by the Japanese side (replacing the rain gutter, landscaping, etc.)

2) Supply of electric power and water for the construction work

3) Other items listed in E/N

4-3 Procurement of Equipments and Materials

4-3-1 Medical Equipment

In view of the present medical situation in Burma, it will be necessary to import a large proportion of the equipment from Japan. However, some equipment may have to be imported from other country besides Japan, because of some conditions; these conditions are as follows.

(1) The equipment to be provided is not manufactured in Japan;

(2) A non-Japanese product is clearly cheaper and more satisfactory in capability than the equivalent Japanese product.

4-3-2 Construction Materials

The construction of buildings under this Project will be carried out by a Japanese general constructor. This general constructor, however, will appoint one of the limited numbers of construction organizations in Burma, Construction Corporation, as the subconstructor. Burmese production materials and labor shall be obtained through this subconstructor. The materials to be procured locally are concrete, terazzo, bricks, corrgated asbestos cement sheets, wooden doors and windows, and so on. Other items such as steel rods, metal doors and windows, paints and miscellaneous metal materials will have to be imported from Japan.

4-4 Implementation Schedule

After the Exchange of Notes, a consultant contract should be completed, and then, tender documents, and other documents necessary for the construction contracts must be drawn up. The Japanese firm who becomes the successful bidder will make a construction contract with the Burmese government, and upon getting the approval of the Japanese government will set about the

construction work. The initial Earth and Foundation work, as well as the Plaster, Finishing work and transporting of medecal equipment in the last phase of the work, should not be carried out in the rainy season, if at all possible. Due to these considertions, it will probably take about five months to move from E/N to construction contract, and about eleven months to complete the local construction work. Therefore, it should be expected the progress from E/N to completion of the construction to take about nineteen months all together. These implementation schedule is as follows.

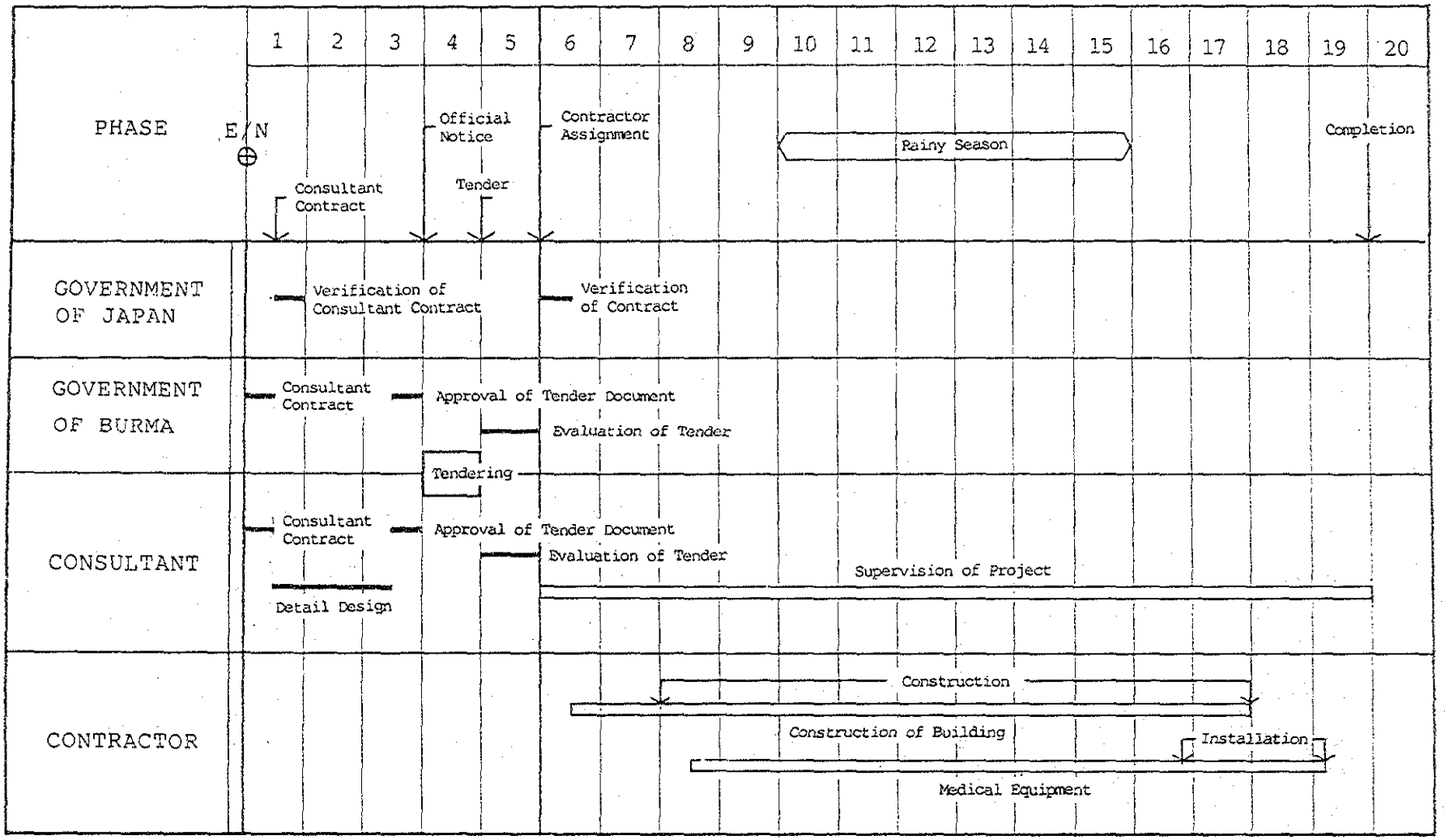
4-5 Maintenance and Operation

4-5-1 Maintenance and Operation of Medical Equipment

The medical equipment to be provided in this Project are intended to be additions to the existing equipment in the radiology department and the clinical laboratory. Of this equipment, the three items for the clinical laboratory are small, table-top units, and so there is no necessity at all to have additional personnel for testing. Also, the level of the equipment is either the same as existing equipment, or a little lower. Therefore, since we will include spare parts with the equipment, the staff will be able to handle them quite adequately.

The field of radiology is divided into the department of radiology and the department of nuclear medicine. The same staff cannot work in both departments simultaneously. At the present time, the hospital does not have a department of nuclear medicine, and this Project necessitates the establishment of such a department. The total staff of this new department would consist of approximately six persons: two physicians and four technicians. As far as the department of radiology is concerned, if the two physicians who are presently studying in the Kyoto University are added, the existing staff will be able to handle the work effectively.

As far as the operation of the equipment is concerned, with



IMPLEMENTATION SCHEDULE

respect to CT scanner, angiography, and the equipment for nuclear medicine, there are similar equipment and materials already in use at Rangoon General Hospital. With the training which will be implemented after the equipment are in place, the present staff will be fully capable of operating them. In relation to the remote controlled X-ray diagnostic system, Burmese technicians had been trained in Japan, and so there are no special problems.

In the area of maintaining the equipment, there may be some problems, in particular with whole body CT scanner. As stated earlier, CT scanner for the head exists already in Rangoon General Hospital, and Burmese technicians have been dispatched by the manufacturer. However, we do not believe that the training that is planned to be provided after the installation of the euqipment will be adequate to meet the requirements, because whole body CT scanner is considerably more complicated than that for the head.

Therefore, we would like to see a Burmese effort to implement a regular inspection at least once a year by engineers from the Japanese manufacturer. In this case, if two Japanese X-ray engineers are brought to Burma to do the inspection over two weeks, it would cost approximately 55,600 Kyats (or ¥1,600,000).

4-5-2 Maintenance and Operation of Buildings an Facilities

In order to manage the buildings smoothly, it is most important to ensure good maintenance and operation of the facilities, for if any laxity or shortcomings exist in this area, it would immediately bring about a lowering of the equipment's capacity, or even breakdowns. While this Project is no exception to the general rule, there are no special or unusual equipments involved. Therefore, it will be quite adequate if this task is carried out as a part of the ongoing maintenance and administrative system at New Rangoon General Hospital.

One of the points on which careful attention should be paid concerns the air conditioning facilities. High temperatures and

high humidity will adversely affect all the medical equipments. In particular, the computer in the CT scanner and the collimator in the gamma camera system are extremely vulnerable to temperature changes, and they must not be subjected to temperature changes of more than 3°C/H. Also, the large amount of X-ray film in the film changer of the X-ray system can stick to each other and get stuck inside because of high humidity. Therefore, when such temperature changes are anticipated or likely (that is, when the air conditioning equipment starts operating, or stops operating, or in the rainy season), it will be necessary to run air conditioning even at night.

4-5-3 Maintenance and Administrative Cost

The following represent the main expense items in maintenance and administration, and the estimated amounts per month.

Item	Particulars	Expense Per Month
Personnel expenses	2 physicians and 4 laboratory technicians in the department of nuclear medicine	3,440 Ks.
Electricity and water	Water-approximately 100 cubic meters Electricity-approximately 9,600 kwh/month	Obtained from the well 4,200 Ks.
Consumables	Cost of equipment x 1.5 per cent/ 12 months	14,100 Ks.
	Total	21,740 Ks.

CHAPTER 5. PROJECT EVALUATION

CHAPTER 5 PROJECT EVALUATION

This Project is a part of the effort to extend the People's Health Programmes. More specifically, it seeks to reduce losses caused by illnesses and injuries of the Burmese people, by helping to qualitatively improve the basic medical treatment provided at hospitals. As such, this Project can be evaluated in the following manner.

With the provision of the additional equipment and consolidation of medical facilities that are planned, we can expect a number of positive outcomes. To begin with, the difficulty of making a diagnosis, or the possibility of an erroneous diagnosis, based in a lack of medical equipment will be elminated. Treatment of higher precision will also become possible, more an accurate and appropriate treatment system will be adopted, and the quality of medical services overall can expected to be improved.

New Rangoon General Hospital, which is the most advanced and central medical institution in Burma today, was constructed with the Japan's Grant Aid as an institution with special capabilities in the early detection, diagnosis and treatment of diseases of the digestive organs. However, from the standpoint of providing a modern system of diagnosis and treatment, the present equipment cannot necessarily be described as adequate, and leaves something to be desired from the viewpoint of improving the quality of medical services.

With the implementation of this Project, it will of course be possible to improve medical services, but, more important, by increasing the level of medical technology and training more personnel, it will be possible to improve the qualitative content of the medical equipment still further.

The expenditures necessary for operating and maintaining the equipment will be about 21,700 Kyats per month, according to our estimates. This expenditure is expected to be covered by the budget of the Ministry of Health. While some equipment consumes relatively large quantities of electricity and water, it is possible to cut down on the consumption levels by operating the equipment efficiently without waste

and by maintaining them adequately. Therefore, we do not anticipate any problems in the area of operating costs.

We have already touched on the technical aspects of maintenance and operation in "Maintenance and Operation" above. Given the detailed nature of the plan, our judgment is that there will be impediments in the technical aspects of maintenance and operation.

As we have already stated, this Project will not only directly improve medical treatment and public health, it will also contribute to the further development of the New Rangoon General Hospital as a central medical institution, especially in the area of diseases of digestive organs. From this standpoint, too, we believe this Project is quite significant.

CHAPTER 6.
CONCLUSIONS AND RECOMMENDATION

CHAPTER 6 CONCLUSIONS AND RECOMMENDATION

6-1 Conclusions

In order to improve its medical care services, Burma has been energetically promoting the People's Health Programme since 1978. The largest part of the budget for this programme is taken up by the Hospital Care Programme. However, most of the money invested is spent on personnel expenses, maintenance of the facilities, equipment, and consumables, and there is not enough allowance for the expansion of facilities or modern equipment.

Along with the previous project (October, 1984), that is, the distribution project of medical equipment for Rangoon General Hospital, Women's Hospital, Children's Hospital, and Mandalay General Hospital, it is believed the current Project for New Rangoon General Hospital (N.R.G.H) makes a large qualitative and quantitative contribution to improve the diagnostic services in Burma. In addition, these hospitals are at the highest level in both facilities and personnel, therefore, to direct medical equipment strategically to on them will produce much less burden on the Burmese government in comparison to construction new hospitals.

With this Project for N.R.G.H, a general equipment required for the digestive disease diagnosis, will be made available. Although the equipment to be installed is still higher and complicated, no serious problems of operation or maintenance are expected in that similar ones installed at R.G.H have been in operation. Along with this, technical cooperation to raise skill levels required for the operation of the equipment and for diagnosis is also under way; in this sense, this Project is a timely one.

From these facts above, the implementation of this Project with Japan's grant aid is judged to the appropriate.

6-2 Recommendation

As mentioned above, the necessity and the significance of the Project, as well as the feasibility are confirmed to be adequately well-founded. Nevertheless, the following problems in present conditions at the Hospital and in the medical situation in Burma must be solved if Project is to be implemented.

(1) The hospital was opened only last October, or less than six months ago, and not all the departments are in operation. Although some of the deficiencies are inevitable due to the short history of the hospital, it is imperative to establish an independant hospital operation as quickly as possible.

(2) Despite the fact that improvement of medical equipment will be carried out at other hospitals almost simultaneously, the level of N.R.G.H is still higher than other hospitals. Hence, to pass the benefits of the investment in this hospital to the community, there must be co-operation with other hospitals.

(3) It is essential for the Burmese government to establish a firm maintenance system to ensure prompt repair of the equipment, because the equipment of this Project are very complicated and expensive.

It is hoped to accomplish the objectives of this Project by resolution of the problems above and smooth management of the Project.

APPENDIX

CONTENTS

1. DATA OF BACKGROUND OF THE PROJECT

(Figures and Tables)

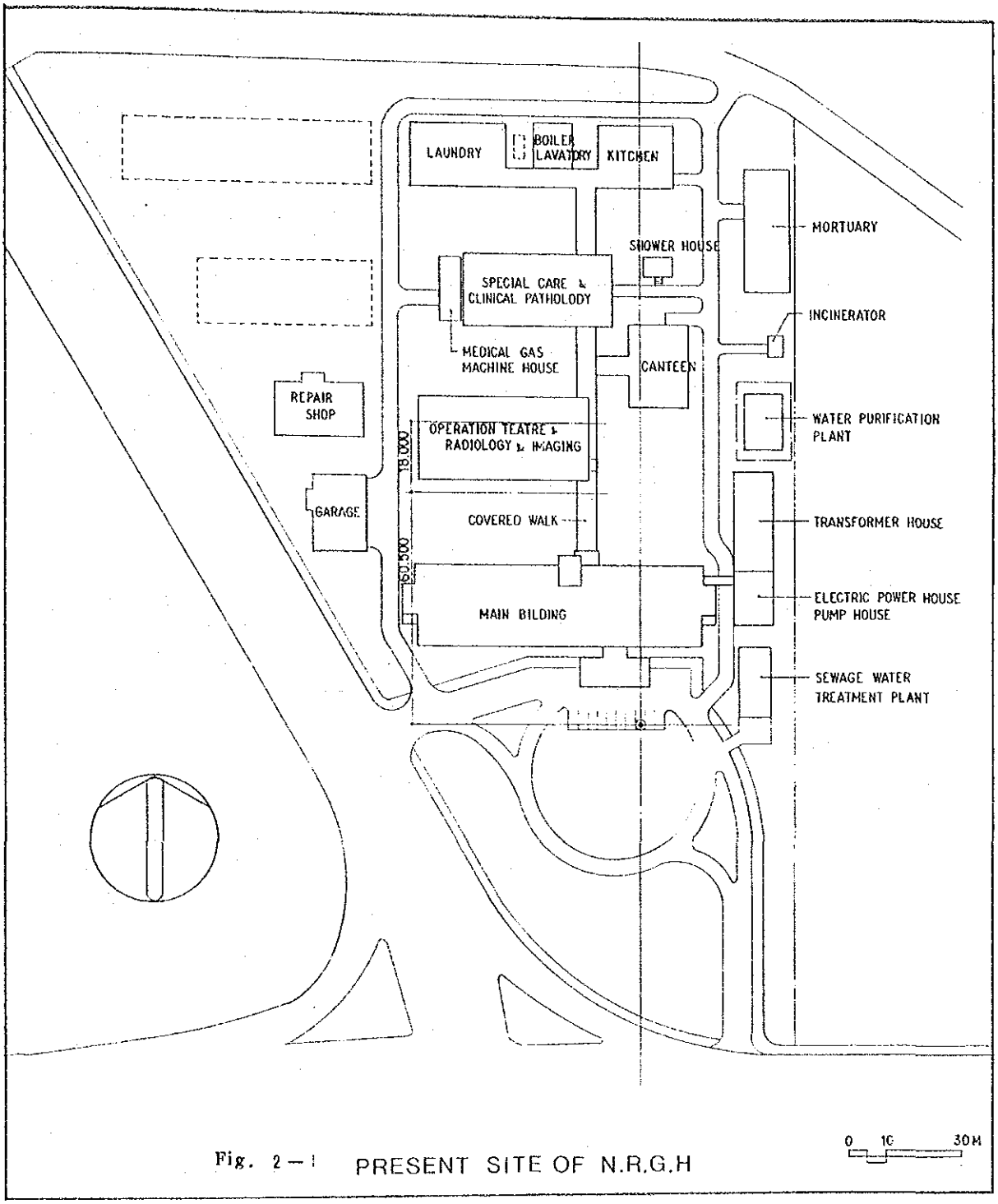


Fig. 2 – 1 PRESENT SITE OF N.R.G.H

Table 2 — 1 MORBIDITY PATTERNS

Single leading causes of out-patient morbidity from all outpatient departments in each of three seasons (summer, rainy, winter) for 1981 based on 10% samples were in the order of the following:

	Causes of Morbidity	No. of Cases	Per Cent
1	Pyrexia of unknown origin	1,794	8.3
2	Ill-defined intestinal infections	1,373	6.3
3	Supervision of pregnancy and puerperium	1,201	5.5
4	Other and unspedified anaemias	1,181	5.5
5	Bronchitis, chronic and unspedified emphysema and asthma	1,014	4.7
6	Malaria	994	4.6
7	Pulmonary tuberculosis	700	3.2
8	Debility unspecified	673	3.1
9	Other helminthiasis	646	3.0
10	Infections of skin and subcutaneous tissue	622	2.9
	All other causes	11,451	52.9
	Total:	21,649	100.0

Based on 10% samples of in-patients of 435 township Hospitals in 1981, single leading causes of morbidity were as follows:

	Causes of Morbidity	No. of Cases	Per Cent
1	Malaria	110,775	14.5
2	Normal delivery	59,589	7.8
3	Ill-defined intestinal infections	49,907	6.5
4	Pyrexia of unknown origin	32,392	4.2
5	Unspecified abortion	28,106	3.7
6	Penumonia	19,220	2.5
7	Certain traumatic complication and unspecified injuries	18,244	2.4
8	Other diseases of respiratory system	17,986	2.4
9	Other diseases of the digestive system	16,650	2.2
10	Bronchitis, Chronic & unspecified emphysia and Asthma	15,315	2.0

Table 2 — 2 SUMMARY OF HOSPITALS — 1 (1980)

Administrative Level	Number of Beds	General Hospital		Specialist Hospital	TOTAL
		Under D.O.H.	Others	Under D.O.H	
Central State/Division	Over 200 beds	20	2	13	35
State/Division	200 "	1		4	5
Township	150 "	5	-		5
	100 "	27	-		27
	50 "	30	3		33
	25 "	51	2		53
	16 "	154	7		161
Village Tracts	Station/H.	195	-		195
TOTAL		483	14	17	514

Table 2 — 3 BUDGET OF RGH

· Budget (1984 - 85 budget allotment)

	Kyats
1. Pay and Allowances	58,50,000
2. Travelling Allowances	35,000
3. Expenditure on Purchases of goods wages and services	23,70,800
4. Maintenances of buildings and equipment, etc.	10,20,850
5. Transfer Payment	2,000
6. Entertainment, Expenditure	1,000
Total:	92,79,650

Table 2 – 4 LIST OF TEACHING HOSPITALS

Institutes of Medicine	Main teaching hospitals	Affiliated teaching hospitals
Institute of Dental Medicine 1. Institute of Dental Medicine 2. Rangoon General Hospital, Wards 15, 16 and Dental Out-patient Department.		
Institute of Medicine (1)	1. Rangoon General Hospital and Teaching Complex 2. Central Women's Hospital, Rangoon. 3. Children's Hospital, Rangoon.	1. Workers' Hospital, Rangoon. 2. People's Hospital (East Rangoon) 3. People's Hospital (West Rangoon) 4. Women & Children Hospital (South Okkalapa) 5. Eye, Ear, Nose & Throat Hospital, Rangoon. 6. Contaguous Diseases Hospital, Rangoon. 7. Psychiatric Hospital, Rangoon. 8. No.(2) Military Hospital, Rangoon.
Institute of Medicine (2)	1. Defence Services General Hospital, Mingaladon. 2. North Okkalapa General Hospital.	1. Insein General Hospital.
Institute of Medicine, Mandalay	1. Mandalay General Hospital.	1. Base Military Hospital, Maymyo. 2. Eye, Ear, Nose and Throat Hospital, Mandalay.

2. DATA OF THE OBJECTIVE HOSPITALS

2-1. RADIOISOTOPE DEPT. OF R.G.H

RE The Improvement Project of Medical Equipment.
Radioisotope Department, Rangoon General Hospital.

1. Number of out patient.
   About 80 - 100 patients/day.
   1600 - 2000 patients/month.

2. Number of Bed.
   10 beds attached to Cancer Ward.

3. Disease Pattern.
   (i) Diseases of thyroid - Goitres, Thyrotoxicosis, Hypothyroid, Cancer thyroid. (50 - 60pts/day)
   (ii) Diseases of Kidney - Renal Function Test (Renogram) Kidney Scan. (15 - 20pts/day)
   (iii) Diseases of Liver - Liver Scan - (8 - 10pts/day)
   (iv) Diseases of Brain - Brain Scan & dynamic study, (3 - 5pts/day)
   (v) Diseases of Bone - Bone scan, (3 - 5pts/day)
   (vi) Disease of Lung - Perfusion Lung Scan - Pulmonary Enbolism.
   (vii) Diseases of Heart - Cardiac scan for evidence of Pericardial Effusion.
   (viii) Hematological Diseases.
      (a) Anaemias - ^{51}Cr study; Ferrokinetic study; Vitamin B_{12} absorption study.
      (b) Blood volume measurement.

4. Number of staff.
   1. Doctors.
      (a) Head of the Department.
         Dr. Soe Myint - (1) M.B., B.S. (1955)
         (2) Training in Nuclear Medicine U.K. 1960 One year.
         (3) Advance training course Bangok 1968 One month.
         (4) Advance training course Canada 1968
         (5) D.S. (Diploma in statistics) 1969-1971 Two years.
         (6) Training in Quality Control Programme & Nuclear Medicine Equipment. Bombay 1979 One month.

      (b) 1st. Assistant.
         Dr. Saw Aung Hla - (1) M.B., B.S. (1960)
         (2) Training in Nuclear Medicine U.K. 1973. One year.

      (c) 2nd. Assistant.
         Dr. Win Mar - (1) M.B., B.S. (1968)
         (2) M.Sc. Nuclear Medicine U.K. 1976-1978. Two years.

      (d) 2nd. Assistant.
         Dr. Khin Aye Myint (1) M.B., B.S. (1977)
         (Proposed for permanent assigment)

2. Nurses.

(1) Daw Myint Myint - Nursing Graduate 1968. Care of Radioactive patient, India 1977, 7-months.

(2) Naw Beh Paw - Nursing Graduate 1970.

(3) Daw Kyi Mar Swe (Rotatory) - Nursing Graduate 1981.

3. Technician.

(1) Assistant Physicist U Win Maung - (1) B.Sc.Physics (1968), M.Sc.Final II.1975
(2) Physicist training U.K.1975-76 One year.

(2) U San Tin - (1) B.Sc.(1965)
(2) Nuclear Medicine Technician Training U.K.1978-79 One year.

(3) U Soe Myint Mg - (1) DPMS (Diploma in Medical Technology)1968.
(2) B.Sc.(Chemistry)M.Sc.Q.1974.
(3) RIA Training leading to M.Phil U.K. 1978-1980 Two years.

(4) Daw Nyunt Nyunt Win - B.Sc.(Chemistry).M.Sc.Q.1978.

(5) Daw May Saw Oo - (1) B.Sc.(Physics), M.Sc.Q.1977
(2) DPMS (Radiography) 1977.

4. Administrator.

Head of the Department acting as administrator.

5. Others.

(1) Clarical staff - Two.

(2) Mineals - Three.

5. Organisation of the Department.

With the present staff mentioned in No.4, the department is organised to excute various application of Radioisotopes in Medicine, both In-vivo and In-Vitro studies.

In-Vivo includes organ imaging, dynamic studies including various vascular flow measurements. In-Vitro includes mainly haematological (conventional techniques). Together with it the department gradually developed Radioimmunoassay techniques to measure various hormones to cover common Endocrine diseases.

6. Main Medical Equipment list.

Equipment	Model/Year	Quantity	Condition	Utility Value	Utility Frequency /day /month	Maintainance & Spare Parts.
1. Thyroid Uptake Unit	Echo 1968 M.5024B	One	Out of order	10 years 1968-1978	15/day. 180/month	Not available.
2. Schimadzu Scanner	SCC-30/1960	One	Out of order	11 years 1965-1976	15/day. 250-300/mth.	Not available.
3. Selo three Channel Machine	STS-AB1-DR1 1964	One	Only one channel operating	1968-till now	15/day. 250-300/mth.	Not available. Chart recorder paper rolls not in production since 1975.
4. Gamma Camera	Pho Gamma HP 1960	One	Out of order	7 years 1975-1982	25-30/day. 400/mths	Not available.
5. Rectilinear Scanner	Hitachi RSL IBS-520, 1968.	One	Still operating Paper recorder out of order.	1979-till now	10/day. 200-300/mth.	Available.
6. Gamma Movic three channell	NZ-136/1980	One	Good	1982-till now	Two channel for renogram - 20/day. 480/month. One channel for thyroid uptake 30/day. 250/month.	Available.
7. Gamma Counter	Beckman Bio-Gamma 1974.	One	Out of order	6 years 1974-1980	100/week. 400/mth.	Not available.
8. Liquid Scintillation Counter	Beckman LS-100/1975	One	Still operating	9 years 1975-till now	75/week. 300/month.	Beckman (Singapore).
9. Micro Processor Gamma Counter	IAEA Dudley modification 1980	One	Still operating	4 years 1980-till now	700/week. 2800/mth.	I.A.E.A.(Vienna).

7. Medical Equipment list (Similar and Related, Request One).

Only one rectilinear scanner is in service to support the working programme.

Requesting Gamma Camera with computerised read-out system with priority.

8. Usually assistant Physicist U Win Maung is taking charge of all major equipments, particularly quality control and performance check made once a month. If there is any unsatisfactory performance noted, counter check made again and if major repairs require Hospital Electronic Engineer (Daw Khin Ma Ma) is called for repaired services.

Condition of X-ray Machines at the Rangoon General Hospital, July 1984

No:		Date of installation	Condition
1.	G.E. 700 MA	1970	1. Fluoroscopy Tube is out of order. 2) Radiography Tube is being used.
2.	Heliophos 5. Siemens 500 MA	1961	Radiography tube, fine focus only is working. New tube 400 MA will be fitted soon.
3.	Ergophos 300 MA Siemens	1960	Fluoroscopy out of order. Radiography tube. Only fine focus is working.
4.	Roentgen (5) 500 MA Watson,	1970	Fluoroscopy out of order. Radiography is in fairly good condition.
5.	Hitachi 500 MA with T.V. Monitor.	1979	In good condition.
6.	Phillips 1000 MA	1974	Cardiovascular Studies. AOT and plane and cine Angiography are out of order.
7.	Heliophos (5) 500 MA Siemens	1961	Fluoroscopy out of order. Radiography tube, Only broad focus is working. HT cables are very old.
8.	Ultrasound EUB 3	1979	Out of order since January 1983.

Radiological Service at e Rangoon General Hospital

Examination	Main Department				Outpatient Department			
	1980	1981	1982	1983	1980	1981	1982	1983
Chest	8953	9184	11083	14965	1504 Small Film 9755	1996 Small Film 9952	2444 Small Film 8188	2823 Small Fil 1948
Skull	2229	2026	2760	2337	1121	1584	2239	3515
Abdomen & Pelvis	1201	1227	1109	1002	1252	1614	1831	2447
Spine	1788	1365	1662	1711	586	752	921	671
Extremities	3917	1945	1562	1728	13096	19019	19416	19187
K.U.B.	1592	1755	1788	1966				
G.B.A.	734	515	773	844				
Contrast Studies	2450	2650	3178	3511				
Total	22864	20697	23915	28062	26925	33973	35049	30791

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