

CHAPTER 3 CONTENTS OF THE PROJECT

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3-1 Objectives

This project will be executed with the purpose of contributing to improvement of the tuberculosis situation in Nepal by disseminating high level tuberculosis control technology nationwide through training activities, and improving the standards of research on tuberculosis. Equipment and materials will be provided by the Japanese government.

3-2 Study on the Request Contents

3-2-1 Concept for NTC and RTC

(1) Positioning of NTC and RTC

No precise statistical figures are available regarding the situation of prevailing diseases, but it is known that the mortality of infants is high and most of the causes are digestive and respiratory infections. Tuberculosis, leprosy and malaria are also prevalent, showing a typical pattern of infections and parasitic diseases. Among these, tuberculosis is the disease most frequently confronted in daily medical treatment, and the smear-positive rate is estimated to be 0.12%~0.3%.

At present, expenses for health care in Nepal is \$8 U.S. per head. This amount has to cover all requirements from medical treatment to prevention. Under such stern circumstances, tuberculosis control measures must be promoted in a system integrated into the general health services by utilization of health posts. For this purpose, a simple and yet effective procedure which is practicable in all of Nepal must be devised on an actual basis. Results of this should be spread throughout the country through training.

Conventionally, tuberculosis control measures have been promoted by the CCC and TBCP as the centres in Nepal, but there is a somewhat lack of countermeasures from a nationwide and long-term perspective. At present, decentralization of the nation's health programme is being promoted and strengthening of the network of health posts and integration of the TBCP's activities into general health services are desired. The CCC is undertaking clinical activities in a temporary building in the compound of the Kalimati Hospital as a result of having been transferred there along with the

expansion of Bir Hospital. It is desirable that NTC will be set up with the functions shown in the following list by the unification of the activities of CCC and TBCP.

NTC's Functions

- 1) Planning of tuberculosis control measures on a nationwide scale; preparation and distribution of personnel, equipment and drugs required for taking the measures, and surveillance of and guidance in administration of tuberculosis control measures at lower system levels.
- 2) Collection and analysis of epidemiological data required for tuberculosis control.
- 3) Planning and execution of research regarding practicing and administration of tuberculosis control measures.
- 4) Training of the personnel engaged in tuberculosis control activities and providing them with a dormitory.
- 5) Capability of performing tubercle bacteriological examinations including culture of the bacillus, resistance test and assaying.
- 6) Capability of performing model therapy at outpatient facilities.

Decentralization of administration of all control measures is intended in Nepal at present, and each region must cope with this policy. In this regard, the setting up of an RTC in the western district as a model for a district centre would be very effective in propagating tuberculosis control measures nationwide.

RTC's Functions

- 1) Planning of tuberculosis control measures on a regional scope; preparation and distribution of personnel, materials and drugs required for administering the measures, and surveillance of and guidance for administering tuberculosis control measures at lower system levels.
- 2) Collection and analysis of epidemiological data required for tuberculosis control.
- 3) Planning and execution of research regarding practicing and administration of tuberculosis control measures.
- 4) Training of the personnel engaged in tuberculosis control activities.

- 5) Capability of performing tubercle bacteriological examinations including culture of the bacillus, resistance tests.
- 6) Capability of performing model therapy at outpatient facilities.

3-2-2 Activities

3-2-2-1 Activities of Outpatient Treatment

In principle, treatment of tuberculosis is centered on outpatients without accommodating them in hospitals because diagnosis and treatment of tuberculosis patients will be made at health posts in future.

In this case, the procedure of outpatient registration and management, particularly countermeasures against their dropout will be vital issues in deciding the success or failure of tuberculosis treatment in Nepal. NTC's outpatient department will be the centre for diagnosis and treatment of tuberculosis patients from Kathmandu and Bhaktapur. It must also be a model of outpatient treatment for the nationwide health posts and a place to provide practical education for the health post staff. This also applies to RTC.

Luckily, the sites intended for construction of NTC and RTC are locations suitable for attracting many outpatients. It is considered to be a very important function of NTC and RTC not only to investigate the way outpatient treatment should be handled by promoting diagnosis and treatment of many patients, but to provide guidance and education to health post staff by deciding the principles for treatment of the patients for whom treatment at health posts failed and for patients with complications difficult to treat. The concerned parties in Nepal have a strong volition to have NTC and RTC play a role as centres for tuberculosis treatment in the country.

3-2-2-2 Research and Guidance Activities

Tuberculosis control measures in a country or area depend upon 1) the prevalent situation of tuberculosis in the area, 2) study of tuberculosis epidemiology, 3) the political, social and economic situation in the country and 4) the needs of patients or inhabitants. To make the measures decided by these factors effective and efficient, the measures must be assessed and improved constantly, which requires that diversified studies be made in line with the manner of improvements of such measures being made in the developed nations.

In developing countries, information required for advancing research is insufficient and the research is difficult to perform in human and material aspects. For this reason, the developing countries should learn the basic principles from the experiences of tuberculosis control measures in other countries, leaving the task of making basic studies to the developed countries, and they should build up a system for tuberculosis control measures based on the basic principles outlined in Table 10, below. These principles have already been made clear by WHO.

Table 10 Principles of Tuberculosis Control Measures

1. The measures must cover the entire country.
2. The measures must be permanent.
3. The measures must be taken so as to comply with the inhabitants' demands.
4. The measures should be taken by its intergration into the health structure in the relevant area.
5. The personnel to be engaged in primary health care must be trained and assigned to the task.
6. The measures must be simplified, standardized, acceptable and economic.

However, even in cases when an NTP is established, generally, definite measures which are deemed to be highly adequate according to the prevalent tuberculosis and social situation must be decided. The research on tuberculosis is divided into several aspects, such as basic study, epidemiology, clinical study and operational research. Of these, basic study, basic clinical study and epidemiology can be left to the developed nations. However, epidemiology, which clarifies the prevalent situation of tuberculosis and its characteristics and transition, and the operational research (which becomes the basis and evaluates the definite measures) are indispensable even in developing nations. Without this research, planning of effective and efficient measures on an academic basis is not possible, nor is making persuasive assessment or providing education possible. Based on these aspects, Nepal is planning to proceed with the following research which includes statistics to be gathered routinely. Some of the research cannot commence immediately, but a group of physicians specializing in tuberculosis are strongly hoping to begin research at a point where it is possible to establish effective and efficient tuberculosis control measures.

1. Epidemiological research

- 1) Research concerning the prevalent tuberculosis situation in Nepal
 - (1) Observations on positive tuberculin reaction rates in children who do not received BCG vaccination.
 - (2) Research concerning the risks of tuberculosis infection in Nepal.
 - (3)* By sex, age, class, district, number of newly registered tuberculosis patients, bacterial discharge situation.
 - (4)* Sex, age, class, district, type of disease of newly registered patients.
 - (5)* Sex, age class, district, number of tuberculosis patients at year end, bacterial discharge situation.
 - (6)* Sex, age, class, district, number of tuberculosis patients at year end.
- 2) Research concerning drug-resistant frequency in tuberculosis patients in Nepal
 - (1) Initial resistance in phthitis patients.
 - (2) Drug-resistance in re-treated phthitis patients.
 - (3) Drug-resistance in treatment-failed cases.
 - (4) Drug resistance in chronic bacteria-discharging patients.
- 3) Research concerning the epidemiologic situation of tuberculosis in Nepal
 - (1) Observation on family history and BCG-vaccination history of infant tuberculosis patients.
 - (2) Tuberculosis infection situation of members of the family living with the chronic bacteria-discharging patients.

* Indicates statistics to be prepared regularly.

2. Operational research

Research of items 1) and 4) below can be carried out under the project through technical cooperation by medical experts from Japan. Item 5) and the others are research themes separate from these.

- 1) Research concerning case-holding method
 - (1) Development of registration card.
 - (2) Improvement and handling of case card at outpatient department.

- (3) Method for preparing morbidity statistics by the use of registration cards.
- 2) Research concerning prevention of dropping out from treatment
 - (1)* Condition of disease, therapy, district, sex, age, treatment-discontinuing rate.
 - (2) Investigatory research concerning reasons for discontinuance of treatment.
 - (3) Health educational method.
- 3) Research concerning introduction of short-period chemotherapy
 - (1) Decrease in dropout rate by introduction of short-period chemotherapy.
 - (2) Effects of short-period chemotherapy on Nepalese.
 - (3) Adverse effects of short-period chemotherapy on Nepalese.
- 4) Analysis of costs and profits of conventional standard chemotherapy and short-period treatment.
- 5) Research concerning detection of tuberculosis patients
 - (1) Actual circumstances involving the process up to diagnosis of the tuberculosis patient.
 - (2) 'Patient's delay' among patients with respiratory symptoms.
 - (3) Roles of traditional medicine and therapist in diagnosis of tuberculosis.
 - (4) 'Doctor's delay' in diagnosis of tuberculosis.
- 6) Research concerning precision of bacteriological examinations in detection of patients
 - (1) Precision of tubercle bacillus test at health posts.
 - (2) Comparison of results between tubercle bacillus test and culture test at health posts.
- 7) Research regarding precision of BCG vaccination
 - (1) Post-vaccination allergy after BCG vaccination in sucklings.
 - (2) Assessment on BCG vaccinating technique by observation on tuberculin allergy in primary school children.

* indicates statistics to be prepared regularly

3-2-2-3 Training Activities

To actively advance high quality treatment nationwide, training of health personnel is indispensable. These training activities can be said to be imminent undertakings, particularly in line with the prevailing circumstances under which nationwide tuberculosis control measures are to be planned. The existing tuberculosis control measures are to be reorganized based on new principles.

It is difficult to undertake training activities with a shortage of health personnel, with insufficient budget for travelling and living expenses for trainees and with a shortage of lecturers. Reflecting on these difficulties, conventional type training provided was limited to two types: 1) sending physicians and other trainees abroad, (e.g. to India and Japan) to receive training with the help of international funds or funds from the country where the training is given and 2) to hold seminars once a year in local areas for trainees centering on TBCP's staff.

However, new measures cannot be undertaken unless health personnel are re-educated, and many difficulties remain. This point is well understood by the parties concerned in Nepal and the following four training programmes are now being considered by the parties concerned.

- a. 'Tuberculosis training' for general physicians; re-education of private physicians engaged in diagnosis and treatment of tuberculosis patients.
- b. Training for the staff of health posts where tuberculosis control measures are taken.
- c. Training for NTC, RTC management staff.
- d. Training of health guidance staff.
- e. Training of the microscopists.

Since tuberculosis control measures must be undertaken systematically by unifying them into the general health and medical activities at nationwide health posts in future, the necessity for training will further increase, and the number of staff for training will increase. The present numbers and estimates of the number health personnel to undergo training in the future are as shown in Tables 11 and 12.

At present, there are no facilities to train staff in anti-tuberculosis measures in Nepla. Enhancement of training activities is inevitable for

spreading new, high-level and national anti-tuberculosis measures throughout the land. It is considered necessary for NTC to provide training facilities comprising a hall and 2 training rooms. When these facilities are made available, they will surely be utilized effectively as facilities directly controlled by the Ministry of Health in Kathmandu. As mentioned already, Thimi is quite conveniently located in terms of traffic from Kathmandu, and is quite suited for conducting the above-mentioned training. It is also expected that the facilities will be also utilized actively for trainings other than those described above.

To perform this training, a hall which can accommodate 100 persons is considered necessary, along with two training to accommodate 30 persons and separate dormitories for lecturers and trainees at NTC.

It was decided to prepare a training which can accommodate 30 persons. Equipping RTC at Pokhara with dormitories was strongly requested by the Nepal parties concerned, but an existing dormitory was annexed to the western district health research laboratory in 1978, So a three-unit guest house is to be constructed for visiting instructors and experts.

Table 11 No. of Medical Staff, Ministry of Health Breakdown of Medical Staff

Breaddown of medical staff		Subject for training
1.Doctor	573*	○
2.Nurse☆	238*	△
3.Public Health Nurse★	51*	△
4.Auxiliary Nurse Midwife(Senior ANM)	1284*	—
5.Health Inspector	49*	○
6.Health Assistant(Senior ANW)	770**	○
7.Auxiliary Health Worker	1064*	○
8.Pharmacist	19*	—
9.Radiographer	36*	—
10.Health Laboratory Staff	70*	△
11.Sanitarian	8*	—
12.Health Educator	15*	○
13.Ayurvedic Kaviraj/Vaidya	282	—
14.Physiotherapist	5*	—
15.Social Volunteer		—
16.Non-governmental Organization		—

*Manpower under the Ministry of Health

**Manpower under the Central Helth Laboratory and its branches

☆Staff Nurse

★Matron and Sister

○ All subjects

△ 1/2 of subjects

If the research plans, described in 3-3-2-2, are carried out by organizations of the staff of NTC and RTC or health posts, the staff who participate this research will experience very effective results as they experienced in the training. In the process of the research, the staff will have repeated discussions so that the effect of the training will be consciously heightened.

The largest of the trainings for physicians carried out in the past years in Nepal were the "Tuberculosis Seminar" held in 1978 and 1980, and the "Eastern Region Conference of IUAT (International Union Against Tuberculosis)" in 1985. In addition to these, mainly overseas trainings were carried out, such as the dispatch of a mission to the National Tuberculosis Research Institute in Bangalore, India, and participant in anti-tuberculosis courses in Japan.

Table 12 Transition of Personnel Engaged in Medicine and Their Number Required for Long-term Health Programme

	1965	1970	1975	Personnel required for long-term health program		
				1980	1985	1990
Physician	224	294	336	421	638	928
Dentist	4	8	12	26	49	137
Pharmacist	1	—	1	45	114	165
Health Assistant (Senior Auxiliary Health Worker)	?	72	232	814	1,283	1,775
Auxiliary Health Worker	?		590	753	2,114	2,725
Nurse	61	129	262	412	741	1,433
Assistant Nurse and Midwife	47	247	572	1,131	2,261	2,538
X-ray technician	4	11	14	47	113	153
Clinical test technician	2	17	52	133	266	342
Kaviraj Vaidyas	?	?	172	237	280	310
Rural Health Worker	—	—	—	2,100	3,000	3,500

(1981)

The largest training for health personnel other than doctors is the "Tuberculosis Training" held once a year in a local city by TBCP. In addition, the trainees are given opportunities to go abroad and get training, though few in numbers.

As Nepal declared that the country would act as the tuberculosis control centre of SAARC (South Asia Association for Regional Conference), it will become necessary to open an international training course for this purpose within several years. Intensification of training activities is being considered to enrich local training courses and accumulation of experience will become a necessary task.

3-2-2-4 Drug Supply

In Nepal, distribution and supply of anti-tuberculosis drugs to governmental organizations such as the nationwide health posts have been undertaken by TBCP. Drugs are to be supplied by this organization when health posts report their consumption of drugs and apply for re-supply to the branches of TBCP. Each branch reports to the Kathmandu headquarter on the consumption of anti-tuberculosis drugs, and the required amounts of drugs are supplied from TBCP headquarter to its branches. As the newly-constructed NTC and RTC are to take over all the functions of TBCP and the western district branch, respectively, both NTC and RTC will accept roles as supply centres for anti-tuberculosis drugs. The RTC to be set up at Pokhara will not only have to undertake the supply of drugs to the western district, but to play a role as a relay station for the western-most and midwest districts.

Nepal had received supply of anti-tuberculosis drugs from UNICEF until 1983, but as supply was discontinued in 1984, the Nepalese government now has to purchase the drugs directly. As mentioned previously, many tuberculosis patients in Nepal drop out of treatment, yielding unsatisfactory therapeutic results, which is one of the major factors delaying lowering of the incidences of tuberculosis. It is said that if all the tuberculosis patients would take drugs as instructed by their physicians, anti-tuberculosis drugs would be in short supply and pose a large supply problem. Therefore, supply and distribution of drugs is an essential item for effective tuberculosis control in Nepal.

As a result of having this function, much information is acquired at RTC and NTC from each health post, for which such reports can be said to be

an important source of information. With this function available, it will become possible for these organizations to provide health posts with guidance and supervision. For these reasons, the drug supply department is not simply a drug warehouse, but a very important department. With such a background, the Nepalese government made an earnest request to Japan for a drug warehouse and asked us to provide the warehouse with a warehouse supervisor's office.

3-2-3 Facilities and Equipment

3-2-3-1 Facilities

The facilities which the Nepalese government requested to be set up can be classified roughly into the following departments in both NTC and RTC:

- i. Administration department
- ii. Outpatient department
- iii. Research and Supervision department
- iv. Training department
- v. Dormitory
- vi. Drug supply department

The responsibilities of the activities of each of these departments are as described previously. To carry out the activities smoothly, each department needs the following room space:

1) NTC

i) Outpatient treatment department

Rooms for preliminary examination, medical treatment, surgical treatment, injections, BCG vaccination sputum sampling and treatment of outpatients.

- o Pharmacy
- o X-ray room and relevant rooms
- o Room for testing specimens
- o Medical equipment washing and sterilization room
- o Medical card recording and storage room
- o Other required rooms

ii) Research & Supervision Department

- o Statistical research
- o Epidemic research

- o Diagnosis and treatment research
- o Bacterial research
- o Other
- iii) Training Department
 - o Training hall : A training hall is provided with approx. 100 seats; international conferences can be held in the hall.
 - o Training rooms: There are two training rooms seating approx. 30 persons.
 - o Others : Other required rooms for administrative work of the training office.
- iv) Dormitory Department: dormitories are provided to accommodate 30 people and include dormitories for lecturers.
 - o Dormitories for lecturers: 4 single rooms
 - o Dormitories for trainees : 13 twin rooms
 - o Other : Dining room/lounge and kitchen
- v) Drug Supply Department
 - o Warehouse: Storage to house six month's drug supply for NTC.
Storage to house three month's drug supply for RTC.
 - o Other : Storage supervisory room.
- vi) Administration Department
Director's room, Deputy director's room, office for visiting Japanese medical experts, physician's offices and other offices, etc., required to administer the above departments.

2) RTC

- i) Outpatient treatment department
 - o Rooms for preliminary examination, medical treatment, surgical treatment, injections, BCG vaccination sputum sampling and treatment of outpatients.
 - o Pharmacy
 - o X-ray room and relevant rooms
 - o Room for testing specimens
 - o Medical equipment washing and sterilization room

- o Medical card recording and storage room
 - o Other required rooms
 - ii) Research & Supervision Department
 - o Statistical research
 - o Epidemic research
 - o Bacterial research
 - o Others
 - iii) Training Department
 - o Training room: A training hall is provided which seats up to 30 persons.
 - o Others : Rooms for lecturers
 - iv) Drug Supply Department
 - o Storage Facilities : Storage to house three month's drug supply.
 - o Others
 - v) Guest houses
 - o Guest facilities: 3 units to accommodate visiting specialists and lecturers.
 - vi) Administration Department

Director's room, physician's offices, and other offices, etc., required to manage the above departments.
- * The scale of facilities for RTC as the Western Regional Centre is smaller as the population it will administer is approx. one half that of the NTC area.

3-2-3-2 Equipment

In order to ensure smooth operation of the planned NTC/RTC centres, each department will require the following equipment.

- A) Equipment required by both NTC/RTC
 - i) Outpatient Treatment Department
 - o Diagnostic equipment
 - o BCG vaccination equipment
 - o Equipment for pharmaceutical prescription
 - o Equipment for X ray apparatus
 - o Equipment for respiratory examination

- o Equipment for Blood/biochemical examination
- o Equipment for bacteriological examination
- o Equipment for urinary examination
- o Fluorescent microscopes (NTC only)
- o Refrigerator
- o Washing and sterilization equipment
- o Others
- ii) Research and Supervision Department
 - o Equipment for data processing (NTC only)
 - o Equipment for blood/biological examination
 - o Equipment for bacteriological examination
 - o Equipment for urinary examination
 - o Fluorescent microscope (NTC only)
 - o Microscope
 - o Refrigerator
 - o Washing and sterilization equipment
 - o Others
- iii) Training Department
 - o Projector equipment (16 mm film projector, slide, overhead projector, etc.)
 - o Training equipment, printers, etc.
 - o Experimental apparatus for training. (NTC only)
 - o Microscopes for training (NTC only)
 - o Others
- iv) Dormitories
 - o Washing machines and other equipment for self-servicing (NTC only)
 - o Others
- v) Drug Supply Department
 - o Medicine cabinet
 - o Medicine refrigerator
 - o Others
- vi) Administration Department
 - o Office equipment such as typewriters, copy machines, etc.
 - o Others

3-2-4 Operation and Estimate

After completion of NTC, the number of the present staff of CCC and TBCP are going to move to NTC. At minimum, the total present budget of CCC and TBCP is guaranteed. Although the estimates for NTC at the time of normal operation is unknown, the fixed staff and budget will be guaranteed for the above reason.

In addition, since the centre will function as the host country in charge of tuberculosis control for SAAC, an increase of number of staff and budget will be expected.

On the other hand, although RTC will take over the number of staff and budget of the TBCP region, it is not enough to supervise and guide the entire west region because there are only 10 staff. Since RTC is constructed as a model for the 5 regions of the country and, in addition, as a base of supply for medicine to three regions (west, middle west and the westernmost) an increase of the number of staff and budget at present is expected because the supply area is over half of Nepal.

Because RTC has no set function, a concrete budget is not shown. The necessity for increase of number of staff and budget, and the necessity of function improvement were often pointed out at the time of survey in December 1986, and the Government of Nepal showed a full understanding of these needs.

Table 14 Budget CCC and TBCP for current 5 years

CCC

Fiscal Year	Amount (RS)
1982/83	889,690
1983/84	845,362
1984/85	1,036,857
1985/86	1,023,840
1986/87	1,133,000

Table 15 Estimate budget of TBCP for current 5 years

TBCP

Fiscal Year	Amount (RS)
1982/83	5,192,000
1983/84	5,093,000
1984/85	5,839,000
1985/86	7,086,000
1986/87	7,786,000

Table 16 Present number of staff of CCC and TBCP

	Present Number of Staff	
	CCC	TBCP
Doctor	5	1
Temporary Doctor	2	-
X-ray Technician	2	-
Dark Room Assist.	1	-
Lab. Technician	2	-
Lab. Assistant	-	-
Senior Health Worker	1	3
Publior Health Nurse	1	-
Nurse	1	1
Statistic Officer	-	1
Statistic Assistant	-	2
Assist. Health Worker	24	2
Junior Medical Leader	1	-
Administrative Officer	2	2
Officer Worker	4	9
Store Keeper	-	1
Assist. Store Keeper	-	2
Sub-Total	47	24
Others	13	21
Total	60	45

3-3 Outline of the Project

3-3-1 Executing Agencies and Operating system

3-3-1-1 Executing Agencies

Three governmental agencies in Nepal, CCC, TBGP and health posts; NATA, and BNMT and other foreign aids agencies, each appeared to have been operating rather separately without much contact between each other and did not seem to perform their functions effectively. Therefore, in the 2nd "Tuberculosis Seminar" held from 1978 through 1980 with participants including WHO and IUAT and a number of specialists from other countries, it was emphasized repeatedly that a nationwide tuberculosis control programme, the National Tuberculosis Programme, be established to carry out regular T.B. control measures. These would not be of a campaign type, and a government agency would have to take responsibility to plan, lead and control these.

Following this, the Tuberculosis Coordinating Committee (TCC) was established in December, 1981, and was expected to operate as a reporting agency to the government. The activities of TCC, however, were not sufficient and it was decided that tuberculosis control measures would be promoted by the initiative of NTC.

The deployment system of NTC, after its establishment, was to position it directly under the Secretary, Ministry of Health and technically it controls the RTC and administratively bears responsibility under the control of the Secretary for areas which are covered by Regional Directorate and controls health & medical care and RTC. This system is illustrated in the following chart:

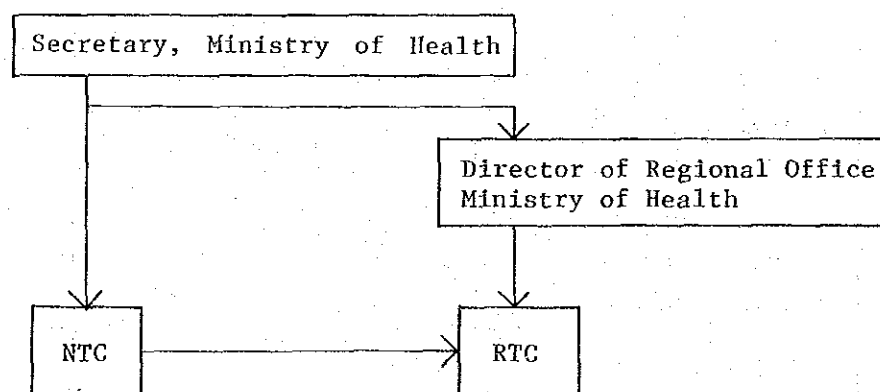
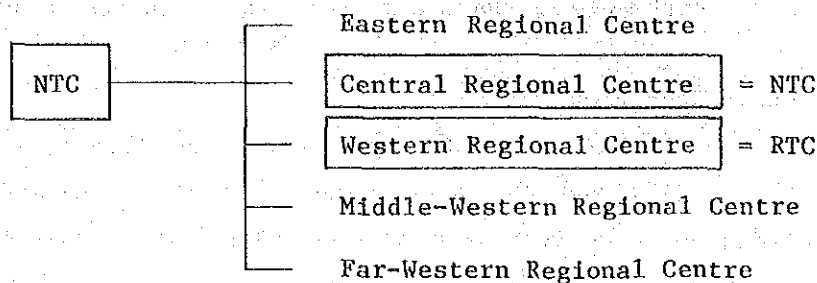


Fig. 21

3-3-1-2 Operation System

The general concept of NTC is as follows:



The scope of the grant aid cooperation from Japan for NTC and RTC are shown above, and it is considered that each will be operated as follows:

1) NTC

The operational system of NTC comprises an administrative department, outpatient department, research and supervision department, training/dormitory department and drug supply department (5 departments in total).

1. Administration Department

Performs practical operation and administration of the entire NTC by the chief administrator and his staff under the direction of the director, and handles details of the operation of RTC.

2. Outpatient Department

Doctors, Senior Health Workers (SHW) and nurses administer medical care for outpatients. Their work includes injections, sputum sampling, lungs inspection and BCG vaccination. Physical examination is done by examination engineers and assistants. X-ray work is done under the initiative of X-ray specialists and by cooperation of picturing and developing engineers to conduct indirect, direct and tomogram picturing and diagnosis. The pharmacist's office is operated by SHW and Auxiliary Health Workers (AHW).

3. Research Supervision Department

Under the initiative of 4 laboratories (epidemiological research, statistic research, diagnostic research and bacteriological research laboratories) specialist researchers perform research with assistance of SHW and AHW. In order to propagate the results, instructors are commissioned to RTC.

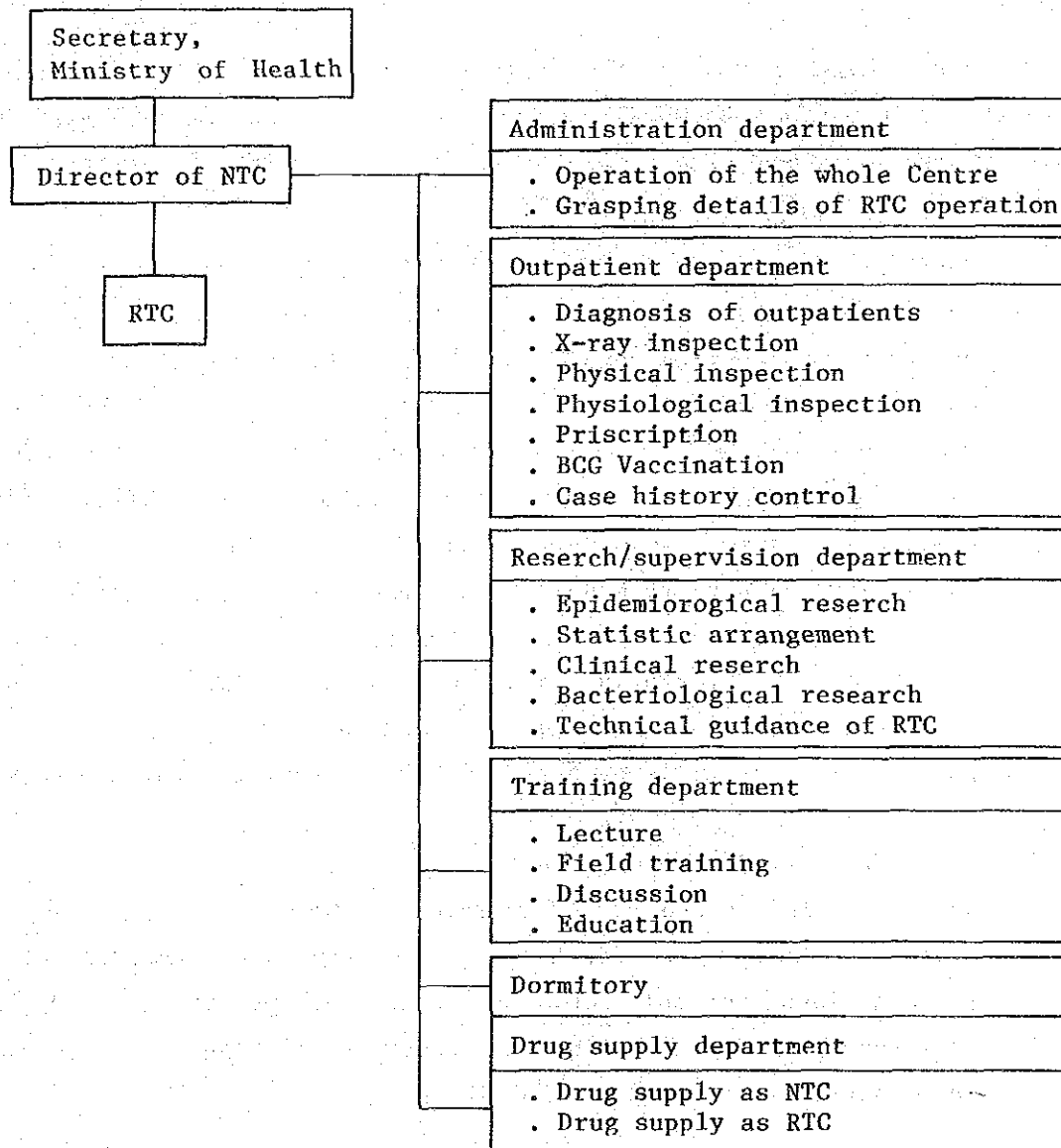
4. Training/Dormitory Department

Staff of the administrative department operate training/accommodation facilities according to the contents of trainings to be held. Short-term extra-staff are also required from time to time.

5. Drug Supply Department

Since the department functions at 2 different levels, one as the facility of NTC, and the other as the facility of RTC (as the Central Regional Centre) there is a need to conduct operations from the individual standpoint of both.

The above-mentioned administrative operating system is illustrated as follows:



2) RTC

The administrative operation system of RTC is as explained in the following:

1. Administration Department

The Chief administrator and staff perform the operation and management of the RTC under the guidance of the director.

2. Outpatient Department

Doctors and Public Health Nurses (PHN) perform medical care for outpatients. In the examination room, examination engineers perform phlegm examination. X-ray engineers stay regularly and perform direct and indirect picturing.

3. Research/Supervision Department

Experts of immunology and statistical arrangement collect data from medical agencies in the West Region and supply information to NTC. Under the instructions from NTC, they give technical guidance to sub-organizations.

4. Training/Dormitory Department

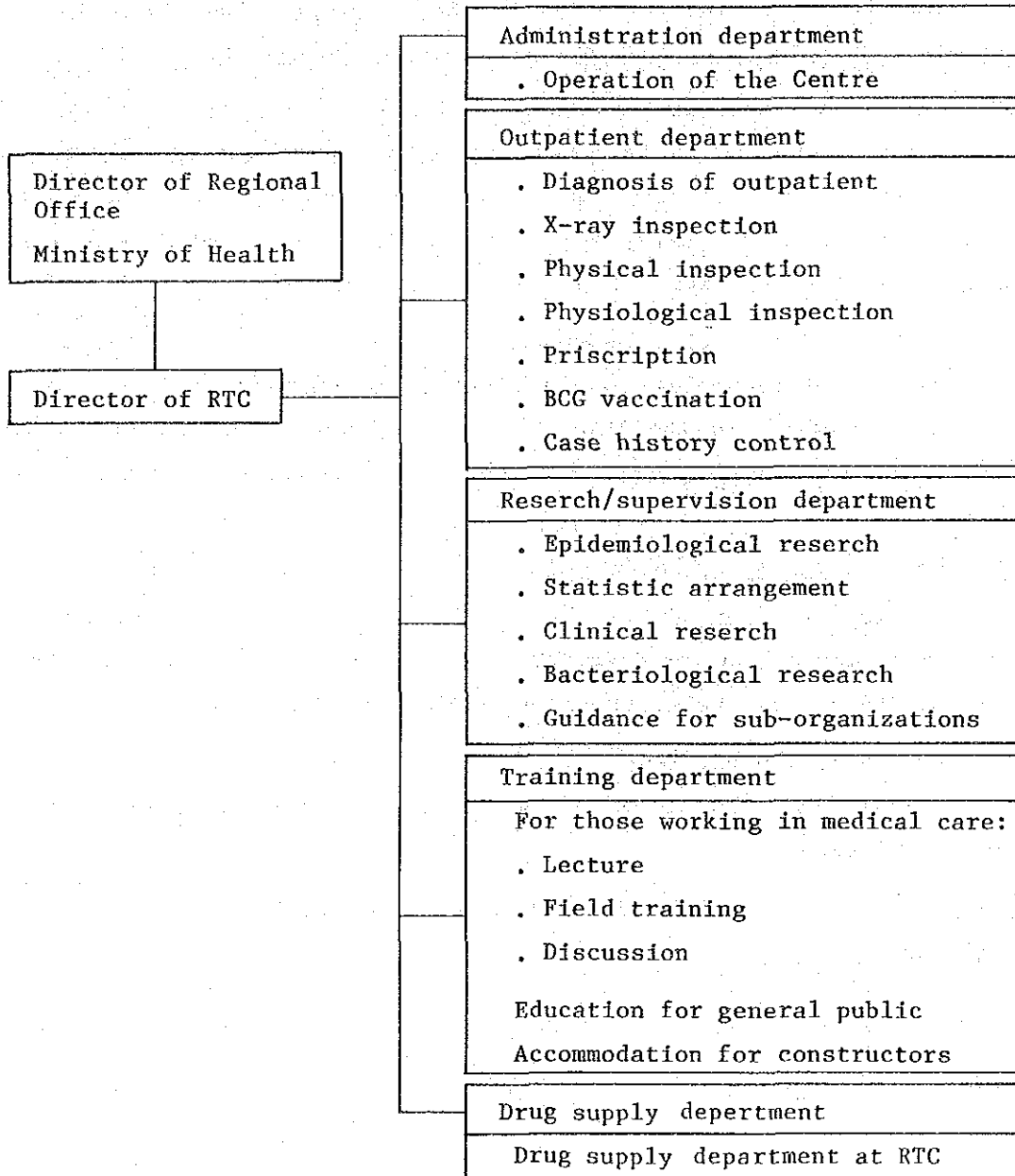
Control of accommodation facilities for lecturers and trainees from the West Region and for instructors dispatched from the Central Region is carried out by the staff of the Administrative Division.

5. Drug Supply Department

Carries out the supply of medicines to sub-organizations of the Western Region.

The above-mentioned administrative operation system is illustrated as follows:

Director of RTC



3-3-1-3 Personnel

In order to achieve smooth operation of NTC and RTC, as mentioned above, each require the following personnel.

1) Personnel of NTC

Table 17 Personnel of NTC

Occupation	Number of persons
Doctor	8
X-ray technician	2
Dark room assist	2
Lab. technician	2
Lab. assistant	2
Senior health worker	8
Public health nurse	1
Nurse	2
Statistic officer	1
Statistic assistant	2
Assistant health worker	11
Administrative officer	1
Countant	1
Office worker	13
Store keeper	2
Assistant store keeper	2
Others	20
Total	80

2) Personnel of RTC

Table 18 Personnel of RTC

Occupation	Number of persones
Doctor	1
X-ray technician	1
Dark room assist	2
Lab. technician	2
Senior health worker	2
Microscopist	1
Public health nurse	1
Statistic officer	1
Statistic assistant	3
Assistant health worker	6
Head Official	1
Office worker	3
Accountant	1
Store keeper	1
Assistant store keeper	1
Others	10
Total	37

3-3-2 Project Plan

3-3-2-1 Outpatient Department

Conventionally, the CCC functioned as the centre of tuberculosis consultation, but since 1984, when its building was demolished as part of the enlargement programme of the Bir Hospital, it has been carrying out consultation work in a temporary clinic on the premises of NATA in kalimati. This temporary clinic, however, was not sufficient to serve as the central facility of Nepal's tuberculosis control measures in terms of location, facilities and function, and so construction of a new CCC has been eagerly sought. When the new NTC is constructed in Thimi, which is quite convenient for commuting to Bhaktapur and Kathmandu, its geological advantage will naturally bring more outpatients to the new NTC than the present temporary clinic or previous CCC.

Here, the NTC will not merely administer medical care to outpatients but it will play a role as the core facility for tuberculosis consultation and medical care, with provision for the following functions:

(1) Research for improving the methods of medical care for T.B. outpatients at health posts and other clinics nationally.

(2) Function as the site for field training of trainees who will work at health posts.

(3) Function to set medical care policies for difficult cases at health posts and give instructions to staff working in the field.

For these purposes, the new NTC will provide X-ray picturing equipment to allow indirect and direct picturing (which are not provided in Nepalese medical agencies, health posts and others), and it will further provide tomogram picturing equipment to allow examination of particularly difficult cases. Also, in order to perform discerning diagnoses between tuberculosis and other respiratory diseases and to give instructions to doctors of

hospitals and night clinics; it will also provide basic respiratory examination equipment.

When the staff who are working in CCC/TBCP at present gather at NTC, it will have doctors of the highest standards and the largest number in the region together with health assistants. It will surely be the most thoroughly equipped facility of those related to tuberculosis diagnosis in Nepal. Since its geological location is extremely good, at least 120 cases and possibly more than 200 outpatient cases will be attended in a day, thus, the outpatient department is expected to function quite actively in treating large numbers of outpatients.

3-3-2-2 Research and Supervision Department

When the outpatient department becomes busy, the drug supply department will also become busy, and consequently a much of research data on tuberculosis will be collected by the operation of these departments. Different from the cases often seen in developing countries in which research work is rather neglected because the staff is mostly occupied with daily work and has budget shortages, research planned by NTC/RTC is to include epidemiological research (to understand the present conditions of tuberculosis in Nepal) and operational research to clarify better deployment methods of measures. Thus, the basic thought is that research can continue smoothly only when a system to guide such research activities is established, without requiring much research funding.

Guidance and supervision provided to health posts in the handling of diagnosis/treatment/registration cards of tuberculosis patients, and in preparing statistic cards is also an important function of NTC/RTC. In order to perform the work smoothly, it is necessary to visit health posts to obtain a grasp of the situation, to research better measures grasped from the work and to bring up personnel to dispatch to health posts based on the results obtained by this research.

The research described below is not simply for the purposes of research itself, but is aimed to spread the results of research nationally in order to improve the quality and efficiency of national tuberculosis control measures. Therefore, research and supervision are conducted under the same department. Each research activity is as described as follows.

1) Operational research

As already mentioned in 3-2 "Study of the nature of the request", there are a lot of research ideas for which there is a strong desire to deploy immediately and it is actually possible to do so. Of these projects, the "research planned under Japan's technical cooperation project" and "research related to detecting of tuberculosis patients" are expected to be deployed as soon as possible. A practical research plan is being studied at the moment concerning these ideas, and they are expected to be deployed in the very near future. The research plans includes the following:

a. Outline of research plans for the anti-tuberculosis measures project studied by Japanese specialists

According to the "Report of the Preliminary Survey Mission for the Nepal Tuberculosis Control Project", research and/or activities considered by the Japanese team include the following items:

- (1) Developing a registration card to facilitate effective registration control of tuberculosis patients, and studying methods of case holding at health posts.
- (2) Attempting effective, efficient short-term treatment in Nepal and conducting research to clarify problems and find suitable control measures.

For this purpose, research activities are carried out with objective patients, including the patients who come to the outpatient department of NTC/RTC and a total of 1,050 patients who are extracted from 6 fields (each having about 50,000 population), 2 fields each being located in the mountainous flatlands and intormediate areas. By classifying these patients into the following 3 groups, their dropout conditions and results of treatment are compared:

- (i) Groups administered enhanced treatment by RFP, INH and SM.
- (ii) Groups administered standard treatment with INH, Tbl, SM-INH and Tbl and given exhaustive education to prevent dropping out from treatment.
- (iii) Groups administered the same treatment as in (ii) above, but not given any special education.

This research allows operational research on a number of items as follows:

- (i) Research related to case holding methods
 - . Development of registration cards
 - . Research related to handling of outpatient case cards
 - . Observation of dropout ratios of different treatment methods
- (ii) Research related to prevention of dropout from treatment
 - . Research related to methods of health education
 - . Research related to effects of health education
 - . Survey and research related to reasons for dropout
- (iii) Research related to introduction of short-term enhanced chemical treatment methods
 - . Research on decrease of dropout ratios by introduction of short-term chemical treatment methods
 - . Research on effects of short-term chemical treatment method of Nepalese patients
 - . Research on side-effects of short-term chemical treatment of Nepalese patients
- (iv) Cost-benefit analysis between conventional standard chemical treatment methods and short-term treatment methods

b. Research related to detecting tuberculosis patients in Nepal

With new patients at NTC/RTC as the objective, actual delay in diagnosis is clarified by oral questioning of the patient's delay, doctor's delay and total delay using a questionnaire card. Further, with patients whose patient's delay or doctor's delay is 2 months or more selected as the objective, the reasons are clarified by taking a survey to clarify the problems in Nepalese measures for finding tuberculosis patients and measures for solving these problems. Items to be clarified by this survey are the following:

- (i) Processing of tuberculosis patients to receive diagnosis
- (ii) Situations of patient's delay, doctor's delay and total delay of tuberculosis patients
- (iii) Situation of traditional Nepalese medical science and its role

(iv) Factors causing delay in consultation at health posts

(v) Research on factors causing delay in diagnosis

(vi) Research on the background of heavy case findings

2) Epidemiological research

Though it will be some time until research results are obtained, research plans for the following epidemiological research items in stages need to be implemented immediately and deployed little by little. Plans are to provide all equipment and materials necessary for implementing this research at NTC and the research is also technically feasible. Thus, it is desired that the research progresses while the tuberculosis project is being implemented by the Japanese visiting specialists. Additionally, undermentioned research items b. and c. are those which Dr. Crofton strongly recommended deploying while he was commissioned in Nepal as the advisor for tuberculosis measures in 1980. Their deployment has been keenly desired among Nepalese tuberculosis specialists, thus, this research should be started immediately, irrespective of the number of relevant cases.

a. Analysis of trends of tuberculosis infection ratios and carrier ratios.

In terms of clarifying the situation about case finding and treatment presently conducted as routine work at health posts, it is an important research plan to prepare a uniform statistics table, prepare statistics both regionally and nationally and to clarify trends of tuberculosis infection ratios and carrier ratios.

b. Research related to initial resistance frequency of drugs.

To clarify the INH and SM resistance frequency of untreated newly found cases is important both in terms of evaluation of the conventional tuberculosis treatment program and in establishing the future tuberculosis treatment policy.

c. Research related to chemical resistance frequency in re-treated cases.

In Nepal, there are many who suspend treatment midway, and the return ratio is high due to incomplete treatment. So the frequency of obtained resistance is assumed to be extremely high, but actually the situation is quite unknown. Since the number of re-treated cases is large in Nepal, it is quite important to know the frequency

of INH, SM resistance in re-treated cases for treatment of these cases.

The above-mentioned research items are relatively simple and do not require sophisticated techniques. As the results obtained will be quite useful as basic data for carrying out tuberculosis control measures, this research is not only necessary for establishing tuberculosis control measures on a scientific basis, but is also quite important in terms of practical aspects, including treatment of cases and supervision of cases and their families.

3) Research related to evaluation of tuberculosis control measures

In order to make tuberculosis control measures effective, the control measures must be carried out while they are being evaluated in terms of their technical aspects. In this sense, evaluation research is closely related to training activities. Research which can be deployed relatively easily and directly connected with improvements on measures are the following:

a. Bacteriological research

Research on accuracy and forecast values of bacteriological examination at health posts.

b. Observation of tuberculin allergy after BCG vaccination

Although BCG vaccination has been conducted by EPI, it is desirable, in terms of technical evaluation, that tuberculin allergies following BCG vaccination be studied.

3-3-2-3 Training Department

So far as it is judged from the above situation in 3-2-2-3, conventional training activities can be said to be insufficient. Therefore, various plans are now being studied about future training activities, including those mentioned in the following:

a. Tuberculosis training for general doctors

At present, treatment of tuberculosis patients is to be conducted mainly by health posts, but actually it appears that there are a considerable number of patients who are under treatment by private clinics. Since treatment by private clinics has many related problems, it is important to upgrade the level of treatment at these. To hold tuberculosis trainings for doctors in private clinics

thus also has a large significance. After NTC/RTC are constructed, plans are to hold tuberculosis trainings for general doctors twice a year by NTC, and once a year by RTC.

b. Training for Directors of Health Posts (health assistants)

Now there are about 745 Health Posts in Nepal, and the number is increasing year by year. In Nepal, location of tuberculosis patients and their treatment is to be done mainly through health posts. Therefore, the quantity and quality of tuberculosis treatment measures at health posts reflects the trend of the tuberculosis treatment measures in the country, and so education of personnel is an important mission of NTC/RTC. Concerning education for these personnel, training for Directors of Health Posts and health assistants, is of most importance. These trainings are planned to be held twice a year, with 30 trainees at a time for a 10-day period.

c. Training of auxiliary health workers of health posts

Education of health workers who actually contact and give instructions to patients at health posts is also quite important. As there are large numbers of expected trainees, trainings for 30 persons for 10-day periods twice a year at the NTC level, (and nearly the same for the RTC level), are desirable. The same can be said for auxiliary nurses and midwives.

Additionally, the number of present medical staff of the Nepalese Ministry of Health is as shown previously on page 34.

d. Training for executive staff

In the initial stages of the National TB Programme, training for the staff includes NTC staff and those who work as the key persons in NTC & RTC handling tuberculosis control measures. This training is largely given by Japanese visiting specialists and board members.

e. Education for general inhabitants

On "TB Day" (implimented by the Nepal Tuberculosis Prevention Association in 1963) education for Panchayat instructors will be conducted at NTC. This training will be useful for solving the patient's delay in discovering tuberculosis patients. It is planned to be held twice in November using about 100 persons daily, as previously.

Besides this, regular guidance, daily health education for patients visiting the centre and their families is also an effective means of education since it enlightens them about the difficulties of tuberculosis as a disease.

f. Re-education of microscopists

As re-education is accompanied with field training, trainings each containing several trainees will be performed repeatedly, most likely in groups of 8 trainees for 10-day periods 4 times a year. For this purpose, use of one of NTC's training rooms will be required to provide facilities for basic experiments.

The above-mentioned training by NTC are summarized as follows:

	persons/day	days	time/yr
. General doctors	70	2	2
. Health assistants	30	10	2
. Auxiliary health workers	30	10	2
. Auxiliary nurses & midwives	30	10	2
. Regional health instructors	100	1	2
. Microscopists	8	10	4

At RTC, trainings are held on a smaller scale than NTC follows:

	Persons/days	Days	Times/yr
. General doctors	20	2	1
. Health assistants	30	10	2
. Auxiliary health workers	30	10	2
. Auxiliary nurse & midwives	30	10	2
. Regional health instructors	30	1	2
. Microscopists	8	10	1

Function as TB centre of SAARC

The Nepalese government announced that it would play a role as the leader of anti-tuberculosis measures for SAARC member countries, and has planned to make NTC its base. Though a concrete plan has not been made clear yet, it is necessary to proceed with the plan for completion within a few years.

At present, there are no facilities to train staff in anti-tuberculosis measures in Nepal. Enhancement of training activities is inevitable for spreading new, high-level and national anti-tuberculosis measures throughout the land. It is considered necessary for NTC to provide training facilities comprising a hall and 2 training rooms. When these facilities are made available, they will surely be utilized effectively as facilities directly controlled by the Ministry of Health in Kathmandu. As mentioned already, Thimi is quite conveniently located in terms of traffic from Kathmandu, and is quite suited for conducting the above-mentioned training. It is also expected that the facilities will be also utilized actively for trainings other than those described above.

Additionally, accommodation facilities, for both visiting lecturers and trainees, are also indispensable for carrying out this training.

3-3-2-4 Drug supply department

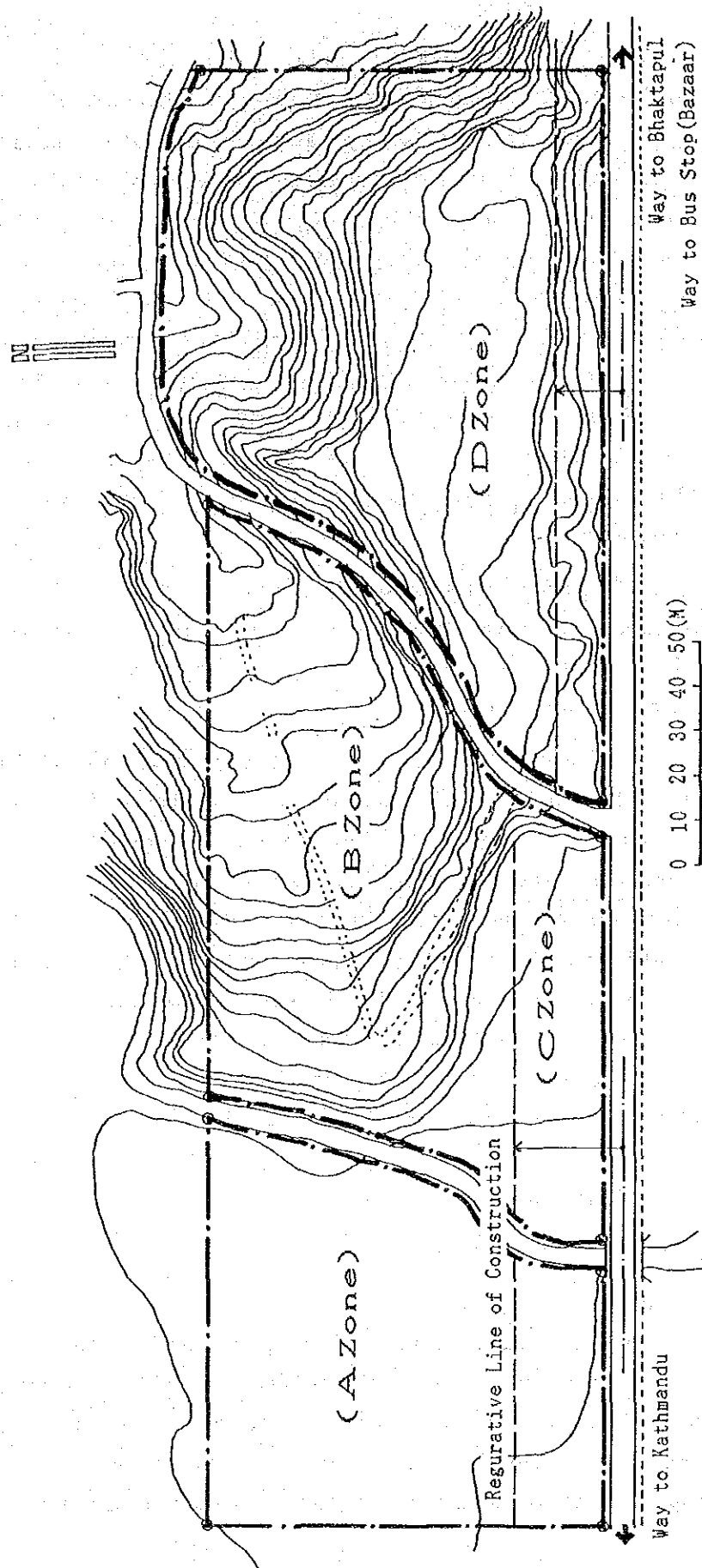
As mentioned already in the preceding section, supervising work of supply, distribution and use conditions of anti-tuberculosis medicine is one of the most important mission of the Nepalese NTC/RTC, and it is also possible to supervise regional staff based on the data obtained. Also, NTC's basic statistical data are inevitable in preparing the medicine purchase plan which requires the largest sum for implementing national anti-tuberculosis measures. Although this sort of department is not seen in other countries, its installation is essential to meet special circumstances in Nepal. It is considered that, based on the experience of TBEP, this will be deployed as routine work immediately.

3-3-3 Location and situation of planned site

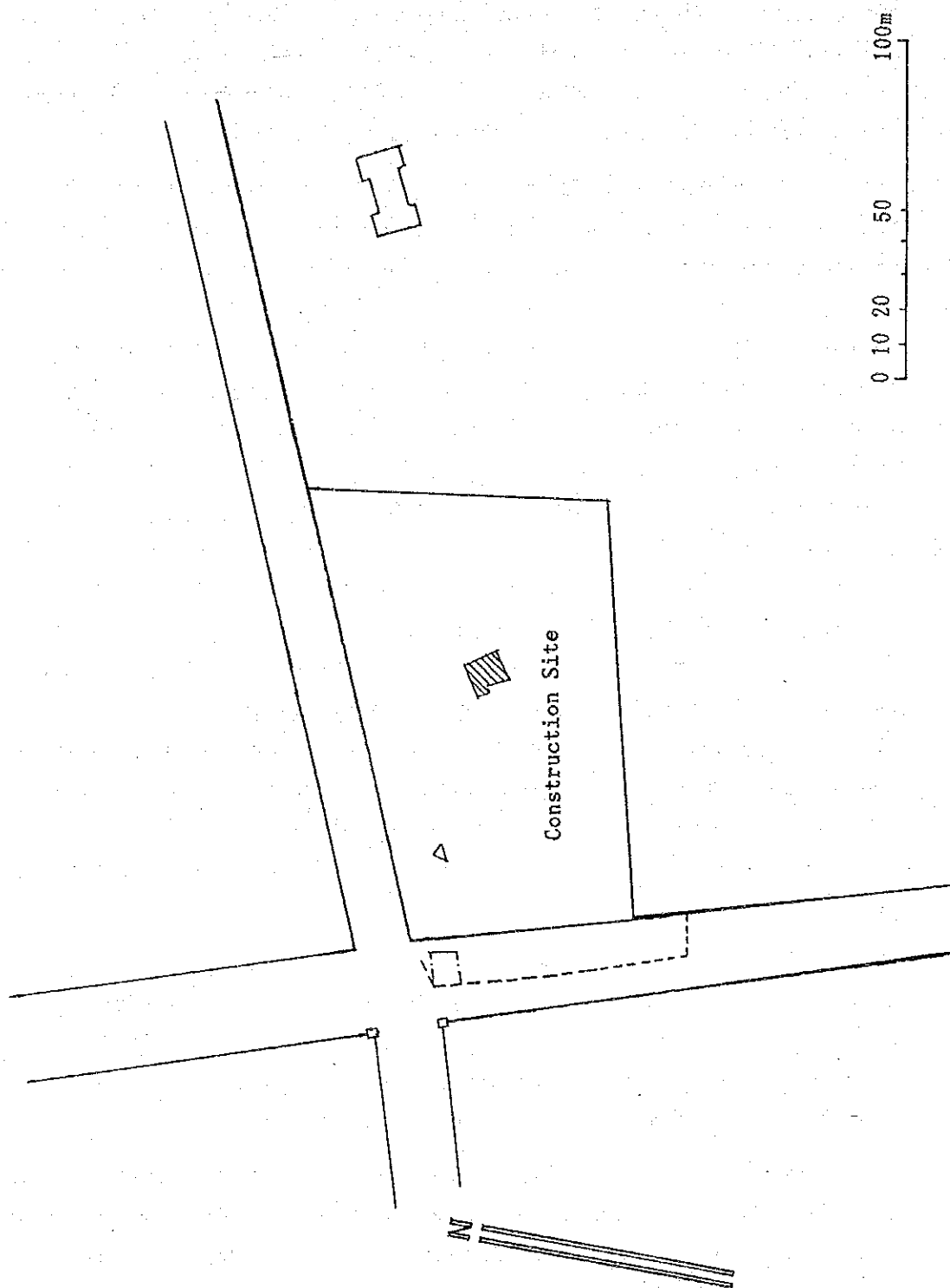
3-3-3-1 Proposed construction site

a. NTC (Kathmandu)

The planned construction site of NTC is located in the suburbs of Thimi (approximately 10,000 in population), about 10 km east of the centre of Kathmandu (approximately 240,000 in population), and along the highway connected Kathmandu to Bhaktapur, an old town. Bhaktapur, like Kathmandu and Patan, has many remains of old palaces



NATIONAL TUBERCULOSIS CENTRE (Kathmandu) Construction Site



Regional Tuberculosis Centre (Pokhara) Construction Site

which once flourished in Kathmandu valley and is popular as a tourist spot today. The highway running to the south of the construction site is a trunk line running through Bhaktapur and Dhulikhel and further northward crossing the Himalayas into China. It carries heavy traffic including trolley buses between Kathmandu and Bhaktapur constructed by the aid of China.

The construction site is topographically a projected portion of Thimi heights in a paddy field having a gentle undulation (see attached reference drawing), comprising hills and paddy fields and is approximately 28,000 m² in area. The hills which occupy approximately 2/3 of the site at the east side are separated into two parts by a branch road from the highway which climbs up and runs into the centre part of Timi. On the east side of the road, there is flat land approximately 35 m (S-N) x 90 m (E-W) and approximately 4 to 5 m above the highway (D district). The remaining 3 sides are surrounded by woods along steep slopes. The hill on the west side of the road (B district) is a field for seed breeding owned by the Ministry of Forestry, where seed breeding is carried out in terraced fields 3 to 4 m in width and 1 to 1.5 m in rise. A rill, flowing in Hanumanti River which flows on the south side of the highway, flows at the west foot of the hill where the seed garden is located, and divides a part of the paddy fields. Since it is not possible to plan one building on a site with such complicated topography, a plan will be put forth to construct 3 buildings by function, as detailed in the layout plan.

b. RTC (Pokhara)

Located approximately 200 km from Kathmandu, the main city of the Western Region Pokhara, with a population of about 48,000, 5th largest of the Nation, has a slender layout extending along the Seti Gandaki River which flows from south to north.

The highway from Kathmandu, called Prithavi Chowk, leads to the south end of the urban area where the terminal for long-distance buses is located. The city has developed to the south as major traffic points such as an airport have been constructed at the south end.

The construction site of the RTC in Pokhara is located in the east suburbs, approximately 1 km in the north from Prithavi Chowk Ave.. Additionally, the front road runs over Mahendra Bridge to the centre of Pokhara. The site is planned to be assigned partly from the lot of a veterinary hospital controlled under the Ministry of Agriculture, which is flat land, approximately 6,500 m² in area.

To the west of this site, there are many medical facilities including Gandaki Zonal Hospital and Western Region health Laboratory established with assistance from Japan.

3-3-3-2 Natural conditions

Nepal is divided into 3 regions by altitude as follows:

- (1) Himalayan (mountainous) Region: 4,877 m and above in altitude, (the height of this region is determined bases on the altitude of continous snow cover).
- (2) Hill Region: Intermediate mountainous region between 610 m and 4,877 m in altitude, occupies about 42% of Nepalese land. Both Kathmandu and Pokhara where construction is planned are included in this region.
- (3) Terrain Region (Flatlands): 26 up to 32 km wide plain area running along the border with India on the south.

Weather conditions differ depending on altitude, but the land belongs to the continental monsoon zone in general. Though there is considerable difference in height between Kathmandu (at approximately 1,300 m) and Pokhara (at approximately 800 m), both belong to the Hill Region. In Pokhara, the mean temperature is approximately 2.4°C higher than Kathmandu. It is nearer to the subtropical zones in terms of plants, and the annual precipitation of 3,500 mm is 3 times more than that of Kathmandu. For both, there is a rainy season between June and September, when more than 80% of the annual precipitation is reached.

The area is not in a frequent seismic zone but it belongs to the Eurasia seismic zone. There have been rather frequent big earthquakes in the past. The major earthquakes were the following:

1834 Large earthquake which damaged houses in Kathmandu

1939 through 1951

Relatively frequent earthquakes, but with slight damage

1980 Large earthquake occurred in Western Region of Nepal in July, (150 deaths, many villages collapsed and were damaged).

From the above mentioned data, in the structural design of facilities, seismic resistant design is to be adopted.

3-3-3-3 Conditions of infrastructure

1) NTC (in Kathmandu)

Water supply: Extends approximately 400 m from the 3-inch main pipe running in the north-south direction through the town area of Timi to the site.

Drainage : Discharge effluent into a river running south to north on the site.

Electricity : Will run from a branch line from the high-voltage suspended wires, 11Kv 3 phase and 3 wire passing in an east-west direction along a road in front of the site.

Telephone : Not available at the moment, but a minimum of 2 lines will be made available by December, 1987 in time for construction.

Gas supply : Municipal gas supply is not provided. LPG imported from India will be used.

2) RTC (in Pokhara)

Water supply: Will run from a branch from the 4-inch main pipe running south-north under the road in front of the site. Presently water supply is restricted in Pokhara, but restrictions will be withdrawn by November, 1987, so at the construction start, there is to be no restrictions of water supply.

Drainage : Penetration tanks will be provided for internally treating effluence.

Electricity : Provided from a branch from the high-voltage suspended wires, 11Kv 3 phase and 3w passing south-north along the road in front of the site.

Telephone : A telephone cable is installed running south-north along the road in front of the site, there is no free line, but one can be used temporarily. Extension of the cable is planned in June, 1988, when branching of 2 circuits is possible, so it will be in time for the completion of construction.

Gas supply : Municipal gas is not available and LPG is imported and marketed from India will be used.

3-3-4 Outline of facilities and equipment

3-3-4-1 Facilities

From the contents of the project plan for this centre, the outline of facilities which are to be accordingly constructed by Japan's grant aid are as follows:

1) NTC (Kathmandu)

The centre will function as the National TB Centre (NTC), and the Regional TB Centre (RTC) in Kathmandu Region (Central Region), and is composed of the following subdivisions:

(1) Administration department

A Director's room and deputy-Director's room, and private rooms for a team leader and doctors commissioned from Japan Following the request from the Nepalese party, private rooms for doctors and chief engineers for X-ray and examination are provided, and large rooms, one each for men and women staff related to medical treatment, are planned. Also, a private room is provided for the head official separately from the general office room.

(2) Outpatient department

When opened, the number of outpatients is expected to be more than 200 persons. Four consultation rooms are provided to cope with the number of patients. Also, pre-consultation/injection and treatment rooms, and phlegm sampling/examination room are provided attached to the 4 above-mentioned consultation rooms.

In order to provide more exact diagnosis the picturing rooms for direct/indirect and tomographic picturing operations are attached to the X-ray picturing apparatus which is essential for checking tuberculosis.

Also, in order to enlighten patients with basic knowledge about tuberculosis, a health education room is provided.

(3) Research and supervision department

In order to provide enhanced operational research, laboratories are provided for software aspects such as epidemiological

statistics and diagnostic research, and a bacteriological laboratory for hardware aspects.

(4) Training department and dormitory

As facilities for bringing up manpower, two rooms will be provided with a capacity of 30 trainees, and one of the two will be equipped to allow training practice.

Also, in line with the continued desire of the Ministry of Health, a training room with fixed seats is provided. Considering that Nepal is now a country in charge of anti-tuberculosis counter measures for SAARC members which recently have been noticed in the field, a facility with a capacity of 100 persons and available for international conferences.

Besides training rooms, preparation rooms and lecturer rooms are also required.

It is obvious that training will take some days including boarding, therefore, 4 private rooms for lecturers, 13 twin-rooms for trainees, plus a common dining room and a kitchen are provided.

(5) Drug Supply Department

As facilities for securing a stable supply of medical goods and equipment, mainly medicine, to Health Posts and other medical facilities, warehouses suitable for each level, (namely one each) are provided for both NTC and RTC. An existing warehouse for medical goods and equipment provided in the Central Hygienic Research Institute in Kathmandu is about 84 m² in area, so nearly the same size or more is required for NTC's use.

And for the performance of RTC of Central Region, a somewhat smaller ware house is required.

2) RTC (Pokhara)

This is the Western Region TB Centre and is composed of the following subdivisions:

(1) Administration Department

Besides the Director's room and doctors' rooms, rooms for instructors and specialists dispatched from NTC are provided.

For other medical staff, few in number, a large room is provided including a space as the general office room.

(2) Outpatient Department

Since it is planned that, in regional centres, each health post attends only in cases which require high technics in principle, the number of outpatients will be small. Therefore, assuming 30 up to 50 outpatients daily, a consultation room, and a pre-consultation room are provided. For X-ray operation, one room is provided to allow direct and indirect picturing.

(3) Research and Supervision Department

As research themes are limited compared with NTC, one room is used jointly for medical care, statistics and diagnostic research. For bacteriological study, a laboratory is provided adjacent to the outpatients inspection room, taking into consideration manpower savings.

(4) Training Department

A training room with a capacity of 30 persons is provided for training trainees in the Western Region.

One guest house for a training instructor, and two guest houses for specialists to be dispatched from NTC are provided.

These accommodation facilities are essential particularly taking the Nepal situation into account. Namely, insufficient allowances for dispatched staff and high prices of commodities in Pokhara due to being a known tourist spot.

(5) Drug supply Department

A medical warehouse is provided as warehouse enables securing a stable supply of medical goods to health posts and other sub-organizations in the Western Region.

3-3-4-2 Equipment

For both NTC and RTC, necessary equipment for smooth operation are planned according to the line of Grant Aid. Planned equipment are as follows:

i) Equipment for administration department

Typewriters, copying machines and personal computers (NTC only) for effective carrying out of office work.

- ii) Equipment for outpatient department
 - . Diagnostic equipment for outpatient diagnosis and others
 - . Indirect X-ray picturing apparatus, tomographic/direct picturing apparatus (NTC only) and all related equipment for X-ray picturing.
 - . Lung examination equipment, equipment for blood/biochemical examination, for bacteriological examination and for urinary examination and microscopes; for detecting tuberculosis
 - . Washing sterilizing equipment and others
- iii) Research and supervision department
 - . Personal computers for data processing
 - . Equipment for blood/biochemical examinations, bacteriological examinations and urinary examinations and others for bacteriological research
- iv) Training department
 - . Projectors (16 mm movie, slide, overhead) for training and AV purposes
 - . Printing equipment (NTC only) for preparing education materials
- v) Dormitory
 - . Washing/drying machines (NTC only) for self-servicing
 - . Cooking equipment
- vi) Drug supply department
 - . Refrigerators and medicine racks for storing medicine

3-4 Technical Cooperation

This plan contains deployment of 4 major activities, namely the outpatient treatment, research and supervision, training and drug supply. Deployment of technical cooperation from Japan especially for two activities (including research supervision and training) is now being studied.

The research activities at the centre are as shown in 3-3-2-2. Each of these items is considered indispensable for promoting anti-tuberculosis measures in Nepal. Technical cooperation is to be deployed based on Japan's Technical Cooperation Project System.

CHAPTER 4 BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Basic Principles

The main functions of the centres is to provide tuberculosis care and treatment and practical training for people engaged in the medical services. The basic design was written out in concrete terms based on the following principles.

- (1) The centres are designed so as to furnish the facilities and functions necessary and appropriate to central facilities engaged in tuberculosis treatment and control.
- (2) The centres should also be designed to incorporate the facilities and function to further cooperation efforts between Japan and Nepal under Japan's Technical Cooperation Project System in the future.
- (3) In order to facilitate operation and maintenance of the facilities, building materials used in the project are chosen from local sites as much as possible; also, preference is given to use of local construction methods as much as possible.
- (4) Nepalese setting in natural environment like climate and ecological factors should be amply considered in facilities planning, as well as social environment like history and culture.
- (5) Due consideration should be given to low expense for operation and maintenance in the planning, not to make Nepalese side bear the excessive economical burden.

4-2 Establishment of Basic Design Conditions

Conditions for implementing the basic design are established based on both research and training plans. The composition of building equipment and design conditions are structured as follows from the viewpoint of the necessary functions involved, the scale of the facilities and the make up of the building equipment.

1. Functions

(1) NTC

NTC is made up of the following three buildings.

- 1) Main building
- 2) Training building
- 3) Dormitory facilities

1) Main building

The main building will house the following departments

- a) Administration department
- b) Outpatient department
- c) Research & Supervision department

a) Administration department

Building facilities for the administration department are to include offices for the director and visiting medical experts (staying for long periods of time). As a rule the experts are to have office space in the administration department. However, much of their work will be in the individual research rooms dealing in actual research. Meeting rooms are also provided for the administration department and the room scale is to be made as large as possible to accommodate use by the entire research and outpatient staff of 30 persons.

In addition, office rooms are to be provided for accounting as well as for the other departments in the building, plus a waiting lobby, doctor's offices and so forth.

The details of room make up are as follows.

Table 1 National Anti-Tuberculosis Centre (Administration Department)

Department	Kind of Room	Contents
Administration	Director's room	Direction for each branch (RTC) and management of head office are performed. Corners for secretaries (typists) and reception are provided.
	Deputy Directors room	Assistant director's room with space for secretaries.
	experts (1)	Rooms for experts from Japan on long term stays.
	experts (2)	Rooms for visiting experts from SAARC.
	Chief administrator's room	Room for general administrative affairs management and for office affairs of each department.
	Office room	General office rooms for general affairs, accounting, etc.
	Doctor's offices	Private room for 5 doctors.
	Technicians office	For examination technicians
	General staff rooms	Separate rooms for male and female medical staff.
	Meeting room (large)	For about 30 persons.
	Meeting room (small)	For about 10 persons.
	Staff canteen	For staff of centre (25 seats).
	Storage	Supplies for office goods.
	Laborers	Waiting room/lounge room for janitor's, messenger's, etc.
	Laundry	Washing of white overalls and linen, etc.

b) Outpatient department

In order to register, examine, and inspect outpatients (examination: BCG, tuberculin, sputum) and to prescribe medicine,

the following rooms are provided: reception rooms, pre-consultation rooms, consultation rooms, BCG vaccination rooms, pharmacist's office, etc. And in order to examine the following items (sputum, biology, culture, medicine resistance, etc.), clinical examination rooms are provided. For X-ray examination, X-ray rooms, which have X-ray apparatus, a tomogram room and darkroom are provided.

A patient education room is provided, and then advanced medical information is given by. Each facility is used for training for examination techniques, besides use for outpatients treatment.

The number of CCC patients is currently 80~90 persons per day, while the number of patients at the previous hospital was 100~150 persons per day. The reason for decrease is not a decrease in the number of tuberculosis patients, but the treatment capacity of the hospital. Because of the convenience of the centre location and expansion of treatment capacity, the number of patients will certainly increase (150~200 persons per day).

The main rooms and their details are shown in Table 2.

Table 2 National-Tuberculosis Centre

Department	Name of room	Contents
Outpatient	Reception room	Reception for outpatients
	Waiting lobby	Waiting Lobby for outpatients
	Chart room	Room for patients' charts
	Pre-consultation room	To detect tuberculosis patients
	Consultation room (1)-(4)	Diagnosis or guidance for patients
	Treatment room	To give medical treatment to patients (examination corners for allergic patients are provided)
	X-ray room	Direct-indirect photographing, etc. (2 rooms)

Department	Name of Room	Contents
	Changing room	Changing room for X-ray photographing (2 rooms)
	Film room	To keep and arrange film
	Dark room	Processing laboratory
	X-ray control room	To control X-ray photographing
	Film examination room	To examine and to analyze with X-ray films
	Room for taking sputa	To take sputa
	Examination room	For clinical examination
	Injection room	For injections
	Health education room	To guide patients to health
	Pharmacy	To fill prescriptions
	BCG Vaccination room	Because the vaccination is not related directly with outpatients, the room is separated from the outpatient area.

c) Research supervision department

Rooms providing epidemiology information, statistics, treatment research and bacteriology research are to be constructed based on research plans, and the data on operational research by various medical institutions are accumulated and analyzed. In addition, training of various clinical examinations is performed.

It was reported that although the number of health posts as mentioned in the preceding article are 745, there are only 450 health posts where clinical staff are permanently stationed. Consequently, if 5 RTCs are established and each centre takes charge of 10 district hospitals, each centre can guide about 100 medical service centres because 5 RTCs have 90 health posts each. If the number of guidance activities to be are provided twice a year, each RTC is to cover 17 places a month ($2 \times 100 \div 12 = 17/\text{month}$).

It is expected that network for tuberculosis control will be strengthened by such guidance activities. The contents of main rooms are shown in Table 3.

Table 3 National Tuberculosis Centre

Department	Name of Room	Contents
Research supervision	Epidemiological research room	To summarize reports from each branch
	Statistical research room	Report work for epidemiology
	Bacteriological research room	For specialized experiments (examinations) by doctors
	Treatment research room	Offices for patrol guidance
	Library	For staff and trainees in centre

2) Training building

In addition to serving as the building facility for the training department, due to site space limitations, this building will also house the drug supply department.

a) Training department

The training department at NTC is charged with general training of medical doctors and nurses working at hospitals from various locations throughout the country and also trains medical personnel dispatched from SAARC countries. (RTC of in the central region is charged with training various examination technicians and health workers.) Two training rooms will be provided for the NTC training department, each with the capacity of seating 30 trainees. There will also be meeting rooms, a staff room for lecturers and a large training hall with a seating capacity of 100.

The main rooms are shown in Table 4.

Table 4 National Anti-Tuberculosis Centre

Department	Name of Room	Contents
Training	Training hall (large meeting room)	For national and international meetings (100 seat capacity) with AV equipment
	Training room	Two 30-seat capacity Training room (total 60-seat capacity) with AV equipment
	Meeting room	Meeting room for trainees and lecturers
	Lecturer staff room	Private room for 3 lecturers
	Materials Preparation room	Room for preparing lecture materials
	Reception room	Training department reception room (used only during training)

b) Drug supply department

The drug supply department at NTC is charged with the supply and distribution medical drugs, goods and equipment to the various regions and also serves as the supplier of medical drugs, goods and equipment as an RTC in the central region.

Table 5 National-Tuberculosis Centre

Department	Name of room	Contents
Drug supply	Storage (1)	Storage of medicine and medical goods for NTC
	Storage (2)	Storage of medicine and medical goods for RTC
	Storage keeper's room	Management of storage of medicine and medical goods
	Garage	For 6 cars
	Driver's room	For 6 drivers

3) Lecturer and Trainee Dormitories

Dormitories consisting of lodging facilities for trainees and lecturers are to be provided. A common dining room with kitchen is provided which doubles as a common lounge area. Other necessary rooms are also provided such as laundry facilities.

Table 6 National Tuberculosis Centre

Facility	Name of Room	Contents
Dormitories	Lodging for trainees	Twin room x 13 (total capacity of 26 persons) with shower and toilet
	Lodging for lectures	Single rooms x 4 with shower and toilet.
	Dining room/ lounge	For lectures and trainees doubles as lounge with tea making facilities (seats 28)
	Kitchen	For meal preparation.
	Laundry	One in each building for common use by lecturers and trainees.
	Attendant/ catering room	Opened only when the dormitories are in use (for catering and cleaning staff)
	Food storage room	For storing food supplies
	Linen room	For storage of linen supplies.

(2) RTC

RTC consists of the following six departments.

- 1) Administration department
- 2) Outpatient department
- 3) Research & supervision department
- 4) Training department
- 5) Guest houses
- 6) Drug supply department

The RTC is smaller than the NTC in scale and the main building houses all departments, except for guest house facilities for lecturers.

1) Administration department

Facilities for the administration department are to include offices for the director and visiting medical experts dispatched for long periods of time from NTC. As a rule the experts are to have office space in the administration department, however, much of their work will be performed in actual research in the research rooms. A meeting room is also to be provided for the administration department and designed on a scale large enough to accommodate use by the entire center research staff and outpatient staff of 15 persons.

In addition, office rooms are to be provided for accounts as well as for the other departments in the building, plus a waiting lobby, doctor's offices and so forth.

The details of room make up are as follows.

Table 7 Region-Tuberculosis Centre (Administration)

Department	Name of Room	Contents
Administration	Director's office	Management of RTC Corners for secretaries (typist) are provided.
	expert's office	For experts from NTC.
	Office	General office works: general affairs, accounting, reception of centre.
	Doctor's office	For one medical doctor.
	Medical Staff room	For medical staff
	Meeting room	For 15 persons.
	Laborer's room	For janitor and office boys.
	Storage	Supplies of office goods.
	Laundry	Washing of white overalls and linen, etc.
	Garage	for 2 cars and motorcycles (separate building)

2) Outpatient department

In order to register, examine, and inspect outpatients (examination: BCG, tuberculin, sputum) and prescribe medicine, the following rooms are provided: reception rooms, pre-consultation rooms, consultation rooms, BCG vaccination rooms, pharmacists' offices, etc. In order to examine the following items (sputum, biology, medicine resistance, etc.), a clinical examination room is constructed. For X-ray examination, X-ray rooms, which have X-ray apparatus, and darkroom are constructed.

For patient education, medical information is provided in an display corner in the waiting room lobby.

It is presumed that the number of outpatients will be 50-100 persons. Main rooms and their details are shown in Table 8.

Table 8 Region-Tuberculosis Centre

Department	Name for Room	Contents
Outpatient	Reception	Reception for outpatients
	Waiting room	Waiting room for outpatients
	Chart room	Room which stores patients' charts
	Pre-consultation room	To find tuberculosis patients
	Consultation room	Diagnosis and treatment for patients
	X-ray room	Direct and indirect photographing (1 room)
	Changing room	Changing room for X-ray photographing (2 rooms)
	Film room	Keeping and arrangement of film
	Dark room	Processing laboratory
	X-ray control room	To control X-ray photographing
	Film examination room	To examine and to analyze with X-ray film

Department	Name of Room	Contents
	Room for taking sputa	To taking sputa
	Examination room	For clinical examination
	Pharmacy	To fill prescriptions
	Injection room	To inject patients
	BCG vaccination room	Because this is not directly related to outpatients, the room is separated from the outpatient area

3) Research supervision department

Rooms for bacteriology and epidemiology information (both statistics and treatment research) are provided and data on operational research by various medical institutions are accumulated and analyzed.

Details of the main rooms are shown in Table 9.

Table 9 Region-Tuberculosis Centre

Department	Name of Room	Contents
Research supervision	Bacteriology research room	Practice and laboratory works for trainees
	Epidemiology research room	To summarize reports from each branch. Office room for statistical and patrol guidance.
	Library	For staff and trainees in centre

4) Training department

Training for medical staff who work at health posts in the western areas is performed. The details of main rooms are shown in Table 10.

Table 10 Region Tuberculosis Centre

Department	Room Name	Contents
Training	Training room	30 trainees
	Lecturer staff room	For one lecturer (private room)

5) Guest houses for lecturers

Guest houses for lecturers, who stay for short periods during training, are provided. For specialists from Japan and instructors from NTC (Kathmandu), three units, with kitchenette in order to service simple meals, are provided.

The main rooms are shown in Table 11.

Table 11 Region Tuberculosis Centre

Facility	Room Name	Contents
Guest houses	Lecturer unit (1)	Bedroom, living room with shower and kitchenette
	Lecturer units (2)	Bedroom with shower and kitchenette

6) Drug supply department

The Drug supply department functions as drug and medical goods supplier at the RTC level for the Western region.

Table 12 Region Tuberculosis Centre (Medicine Management)

Department	Room Name	Contents
Drug Supply	Storage	Storage of medicine and medical goods for western regions
	Storage keeper's room	Management of storage of medicine and medicine goods

2. Calculation of Scale

The required rooms and calculations of their space area are listed as follows.

(1) NTC

1) Main building

a) Administration dept

Name of room	Number	Planning area (m ²)	Base for calculation (m ²)
Director's office	1	48	36 m ² space for director, plus secretarial space, WC, wash basin
Deputy director's office	2	70	36 m ² space for deputy director
Visiting expert's room (1)	1	48	36 m ² space, plus secretarial space, WC, wash basin
Visiting expert's room (2)	1	30	20 m ² space for expert, plus 10 m assistant space
Chief Administrator's office	1	18	20 m ² office manager's space (span: 12 m x 5 m = 60 m ²)
Offece	1	60	20 m ² manager's space, plus accountant, general office space (7.2 m ²) x 4 = 29 m ² , Receptionist's space (span: 12 m x 5 m = 60 m ²)
Doctor's offices	5	90	20 m ² doctor's space (span: 3 m x 6 m = 18 m ²)
Technical staff office	2	36	20 m ² technician's space (span: 3 m x 6 m = 18 m ²)
General staff room	2	60	Research staff space (7.2) x 4 persons = 29 m ² (span 6 m x 5 m = 30 m ²)
Meeting room (1)	1	45	1.6 m ² /person x 30 persons = 48 m ² (span: 5 m x 9 m = 45 m ²)
Meeting room (2)	1	15	1.6 m ² /person x 10 persons 16 m ² (span: 5 m x 9 m = 45 m ²)

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Laborer	1	18	Approx. 5 people including cleaning man, messenger, etc. (span: 3 m x 6 m = 18 m ²)
Staff canteen	1	52	1.5 m ² /person x 25 persons = 38 m ² Service room: 12 m ² (span: 4 m x 13 m = 52 m)
Storage room	1	18	A storage for supplies (span: 3 m x 6 m = 18 m ²)
Laundry	1	18	For washing white uniforms and linen for the staff. (span: 3 m x 6 m = 18 m ²)

b) Outpatient department

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Reception	1	36	A reception for outpatients (2 4 persons) (span: 4 m x 6 m = 24 m ²)
Chart room	1	24	2 persons, a storage for chart filing cabinet. (span: 4 m x 6 m = 24 m ²)
Pre-consultation room	1	12	Check for tuberculosis patients. (span: 4 m x 3 m = 12 m ²)
Consultation room	4	48	Doctor (1) and health nurse (1) and a patient (span: 4 m x 3 m = 12 m ²)
Treatment room	1	8	Respiratory examination of allergic patients 2 m x 4 m = 8 m ²
Injection room	1	6	Injections for patients, one staff + patients 2 m x 3 m = 6 m ²

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Room for taking sputa	1	12	Space for taking Patients sputa. (span: 3 m x 4 m = 12 m ²)
Examination room	1	36	Researcher (7.2 m ²) x 2 = 14.4 m ² Assistant researcher (7.2 m ²) x 2 = 14.4 m ² (span: 6 m x 6 m = 36 m ²)
X-ray room (indirect)	1	20	Indirect X ray 5 m x 4 m = 20 m ²
X-ray room (direct, tomogram)	1	30	Direct and tomogram 6 m x 5 m = 30 m ²
Changing room	3	9	1.2 m x 2.5 m = 3 m
Dark room	1	10	With a separate room (in front)
Film storage room	1	7	A storage for film storage boxes 2.5 m x 2.7 m = 7 m ²
X-ray control room	1	33	Control for indirect, direct and tomogram X ray. With a Film examination area and a passage way.
Sterilization room	1	15	A storage for sterilization equipment (span: 3 m x 5 m = 15 m ²)
Pharmacy	1	24	Pharmacy; filing prescriptions 7.2 m x 3 = 22 m ² (span: 6 m x 4 m = 24 m ²)
Health education room	1	54	Health guidance for patients and family 1.3 m ² /person x 30 persons = 40 m ² , with display space, AV equipment space (span: 6 m x 9 m = 54 m ²)
BCG vaccination room	1	18	For BCG vaccination (span: 3 m x 6 m = 18 m ²)
Microscopic examination room	1	9	Black out curtain 3 m x 3 m = 9 m ² With separate room (9 m ²)

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Equipment Storage	1	18	A storage for equipment and machines (span: 3 m x 6 m = 18 m ²)
Storage	1	9	A storage for cleaning and maintenance equipment 3 m x 3 m = 9 m ²

c) Research and supervision department

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Bacteriology research room	1	36	Bacteriology research and training. Director (20 m ²) x one person + staff 7.2 m x 2 persons = 34.4
Epidemiology research room	1	36	Regional reports to General Director (20 m ²) x 1 person + staff 7.2 m x 2 persons = 34.4 m (span: 6 m x 6 m = 36 m ²)
Statistics research room	1	36	Reports regarding epidemiology research (20 m ²) x 1 person + staff and director (7.2 m ²) x 2 persons = 34.4 m ² (span: 6 m x 6 m = 36 m ²)
Treatment research room	1	36	Office for regional patient education Director (20 m ²) x 1 person + Staff 7.2 m x 2 persons = 34.4 m ² (span: 6 m x 6 m = 36 m ²)

Name of room	Number	Planning area (m ²)	Base of Calculation (m ²)
Library	1	45	2000 books, 2000 magazines 5 persons to read (staff and trainees) $(2000 + 2000)/160/m^2 = 25 m^2$ $2 m^2/person \times 5 persons = 10 m^2$ $25 m^2 + 10 m^2 = 35 m^2$ Librarian (7.2 m ²) (span: 5 m x 9 m = 45 m ²)
Data preparation room	1	18	Storing data materials and copy materials and other materials. (span: 3 m x 6 m = 18 m ²)

2. Training building

a) Training department

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Training hall (for large meetings)	1	120	A large meeting room which can be used for international conferences $1.2 m/person \times 100 persons = 120 m^2$
Training room	2	144	30 persons/room $2.1 m^2 \times 30 = 63 m^2$ Designed with areas for practice, etc. (span: 6 m x 12 m = 72 m ²)
Preparation room	1	36	Storing and preparing training equipment (span: 6 m x 6 m = 36 m ²)
Meeting room	1	36	$2.1 m/person \times 15 persons = 31.5 m^2$ (span: 6 m x 6 m = 36 m ²)
Lecturer's room (1)	1	18	Director (20 m ²) x 1 person = 20 m ² (span: 3 m x 6 m = 18 m ²)

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Lecturer's room (2)	1	36	Director(20 m ²) x 2 persons = 40 m ² (span: 6 m x 6 m = 36 m ²)
Reception	1	18	Reception for the training department Includes simple hot water supply equipment (span: 3 m x 6 m = 18 m ²)

b) Drug supply department

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Medical storage (1) (NTC)	1	108	Storage of 6-months medical drugs and goods supply for NTC. The scale of the medical storage facilities at the Central Health Institute in Katmandu, a similar facility is 8 m x 10.5 m = 84 m ² . According, to the preliminary study, actual storage conditions were determined to be considerably crowded and 25% additional space was added making the NTC storage (84 x 1.25 = 105) (span; 6 m x 18 m = 108m ²)
Medical storage (2) (RTC)	1	72	Storage of 3-months medical drugs and goods supply for RTC. (108 - 2 = 54 m ²) Disposal space was included (span: 6 m x 12 m = 72 m ²)

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Storage keeper's room	1	18	10 m ² space for assistant keeper + 7.2 m ² stack space. (span: 3 m x 6 m = 18 m ²)
Driver's room		18	For 6 drivers. (span; 3 m x 6 m = 18 m ²)
Parking area		108	2.5 m x 6 m = 15 m ² ; 15 cm/car x 6 = 90 m ² (span: 6 m x 18 m = 108 m ²)

3. Dormitories

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Dormitories for trainees	13	40	12.5 m ² /person x 1.25 = 16 m ² Wash basin area: 0.58 m ² /person Toilet : 0.53 m ² /person Shower area : 1.5 m ² /person 2.61 m ² /person (16 + 2.61) x 2 person + Passage (4 m ²) = 40 m ²
Dormitories for lecturers	4	24	Hotel-type single room for short stays
Dining room/lounge	1	70	2.3 m ² /seat x 28 = 64 m ² 7.0 m ² /seat x 7 = 49 m ² 64 + 7 = 71 m ²
Kitchen	1	35	Dining area (70 m ²) x 1/2 = 35 m ²
Catering/Attendant's room	1	15	Bedroom 10 m + wash basin, toilet, shower area (5 m) = 15 m ²
Laundry	3	35	Because of the height differences in the dormitory buildings, the laundry facilities were spread out in all three buildings. 3 m x 4 m = 12 m ² /laundry

2. RTC

1) Main building

a) administration department

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Director's room	1	35	20 m ² space for director, plus typist area (span: 7 m x 5 m = 35 m ²)
Visiting's room (1)	1	35	36 m ² managerial space (span: 7 m x 5 m = 35 m ²)
Office	1	35	20 m ² manager's space + assistant's space (7.2 m x 2) = 34 m ² (span: 12 m x 5 m = 35 m ²)
Doctor's office	1	25	20 m ² doctor's space (5 m x 5 m = 25 m ²)
Medical staff room	1	20	For six persons (5 m x 4 m = 20 m ²)
Meeting room	1	33	For research and outpatient staff use 2.1 m x 15 m = 31.5 m ²
Storage	1	25	Storage room for supplies (span: 7 m x 7 m x 1/2 = 25 m ²)

b) Outpatient department

Name of room	Number	Planning area (m ²)	Base of Calculation (m ²)
Reception	1	23	A reception area for outpatients assuming 100 outpatients/day.
Chart room	1	25	Contains cabinets for filing charts of individual patients. (span: 7 m x 3.5 m = 25 m ²)
Pre-consultation room	1	25	Check for tuberculosis patients. (span: 3.5 m x 7 m = 25 m ²)
Consultation room	1	25	Space for doctor and health nurse including treatment area. (span: 3.5 m x 7 m = 25 m ²)
Examination room	1	58	Clinical examination of outpatients. (span: 10.5 m x 5.5 m = 58 m ²)
Room for taking sputa	1	12	For taking patients sputa. (span: 3 m x 4 m = 12 m ²)
Injection room	1	10	For injections 2.5 m x 4 m = 10 m ²
BCG Vaccination room	1	18	BCG vaccination (span: 4 m x 4.5 m = 18 m)
X-ray room	1	27	For direct and indirect X-ray. 4.5 m x 5 m = 23 + 4 m ²
Changing room	2	6	1.2 m x 2.5 m = 3 m ²
Dark room	1	6	2.5 m x 2.5 m = 6 m ²
X-ray control room	1	33	Control direct and indirect X-ray; Storage for films 3 staff; 6.5 m x 5 m = 33 m
Film examination room	1	18	3.5 m x 5 m = 18 m ²
Pharmacy	1	24	For fulfilling prescriptions (span: 7 m x 3.5 m = 24 m ²)
Sterilization room	1	15	3 m x 5 m = 15 m ²

c) Research & supervision

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Statistical and epidemiological research room	1	74	Director (20 m ²) x 2 + Researcher (7.2 m ² x 4) = 70 m ² (span: 7 m x 10.5 m = 74 m ²)
Bacteriological research room	1	45	Research on bacteria and practice Director (20 m ²) + Research (7.2 m ² x 2 persons) = 34 m ² Space for practice table: Approx. 10 m ²
Library	1	19	Capacity for 2000 books Space for 4 persons to read $2000/160/m^2 = 12 m^2$ $2 m^2/person \times 4 persons = 8 m^2$ $12 + 8 = 20 m^2$

d) Training department

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Training room	1	74	2.3 m/person x 30 persons = 69 7 m x 10.5 = 74 m ²
Lecturer's room	1	19	3.5 m x 5.5 m = 19 m ²
Preparation room	1	19	Storing training equipment 3.5 m x 5.5 m = 19 m ²

e) Drug supervision

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Medical storage	1	72	This storage is calculated referring to the medical storage of the Central Health Institute in Katmandu which has the same scale as RTC storage in central region for NTC medical storage.
Storage keeper's room	1	20	$7.2 \text{ m}^2/\text{person} \times 2 = 15 \text{ m}^2$ $3.5 \text{ m} \times 6 = 20 \text{ m}^2$

f) Guest houses for lecturers

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Lodging unit (1)	1	70	A combination living room and bed room with shower, washroom and kitchenette
Lodging unit (2)	2	96	A bed room with shower, washroom and kitchenette: 48 m^2

g) Others

Name of room	Number	Planning area (m ²)	Base for Calculation (m ²)
Garage	1	77	$2.5 \text{ m}^2 \times 6 = 15 \text{ m}^2/\text{car}$ $15 \times 4 = 60 \text{ m}^2$ Parking space for motorbicycle, etc.

3. Planning of Water, Electrical (supply) and Other Building Equipment Supply

Plans for securing basic building (supply) and equipment supply are as follows:

NTC

1) Water supply

Presently there is city water supply in Thimi. Recently, along with installation of tube wells as a water source, the number of reservoirs has also been increased. To ensure sufficient water supply in the future, water supply will be obtained from those facilities.

Volume of water source : $10,000 \text{ m}^3/\text{day}$

Reservoir tank capacity: 500 m^3 (500 m^3 during construction)

No. of wells : 4

2) Hot water

Recently hot water supply is spreading to average household showers. However, in this plan, hot water is supplied only to the dormitories for lecturers, the dormitory kitchen and staff canteen, but hot water will not be supplied for direct drinking.

3) Sewerage

As there is no public sewerage in Thimi, dirty water will be drained in the river after treatment in the septic tank. However, water used in chemical research will contain tuberculous bacteria and is not safe for drainage in the river. This will be drained in a soak pit after treatment in a sterilization tank. General sewerage drainage will be disposed of in the river.

4) Gas supply

There is no city gas supply. One possibility is to use liquid propane gas (LPG). However, this would depend on supply from India which is unstable. Because of this, use will be limited the minimum necessary for burners in research rooms.

5) Fire fighting equipment

There are no fixed fire fighting codes in Nepal and the necessary fire fighting equipment will be provided in accordance with Japanese fire protection codes.

6) Kitchen

As light lunches are generally taken in Nepal, only basic kitchen equipment will be provided for the kitchens of the staff canteen and the dinning room of the training dormitories, based on Japanese fire prevention regulations.

7) Incinerator

Because garbage treatment is limited, incineration equipment will be installed in each building for processing of garbage.

8) Air conditioning facilities

In principle, air conditioning facilities will not be provided; however, the minimum necessary for rooms requiring air conditioning will be provided, and also in rooms for which the Nepal side has requested such facilities.

9) Ventilation fans

Ventilation fans will be provided as requested.

10) Ceiling fans

In Nepal, ceiling fans are commonly used. These will be provided for all rooms with no air conditioning facilities.

11) Electrical supply

Stable electrical power supply will be provided in accordance with the Kathmandu electrical distribution improvement plan.

12) Emergency electrical supply

Although electrical supply is stable, an emergency electrical generator will be installed in event of power failure to maintain important equipment, including medical equipment and water pumps.

13) Lighting

The Nepalese officials generally keep lighting off in the day time to conserve electricity. In this plan, lighting for the centre will be kept to minimum required levels.

14) Telephones

While telephone lines are increasing in Nepal, at present even for official use, only 2 or 3 trunk lines are provided and there is a need for increased extensions.

RTC

1) Water supply

There are city water mains in Pakhara. But at present the water supply volume is insufficient and is being used to the limit. However, there is a plan secure water supply from the Mardi river (which will be completed in Nov. 1987). Thus, by the completion of this project, it will become possible to get sufficient water from city water supply.

2) Hot water

Showers for the lecturer guest houses

3) Sewerage

In Pokhara there is no public sewerage or nearby rivers. For this reason, used water will be disposed of in a soak pit after treatment in the septic tank. Chemical waste water will be disposed of in soak pit after treatment in a sterilization tank. General drainage will be disposed of in a soak pit.

4) Gas

Same as NTC.

5) Fire fighting equipment

Same as NTC.

6) Incinerator

Same as NTC.

7) Air conditioning facilities

Same as NTC.

8) Ventilation fans

Same as NTC.

9) Ceiling fans

Same as NTC.

10) Electrical supply

In Pokhara there are power shut offs daily for 2 3 hours. For this reason electrical power supply is unstable

11) Emergency electrical supply

As electrical supply is unstable, an emergency electrical generator will be installed to maintain important equipment, including medical equipment and water pumps in event of power failure.

12) Lighting

Same as NTC.

13) Telephones

Same as NTC.

4-3 Basic Planning

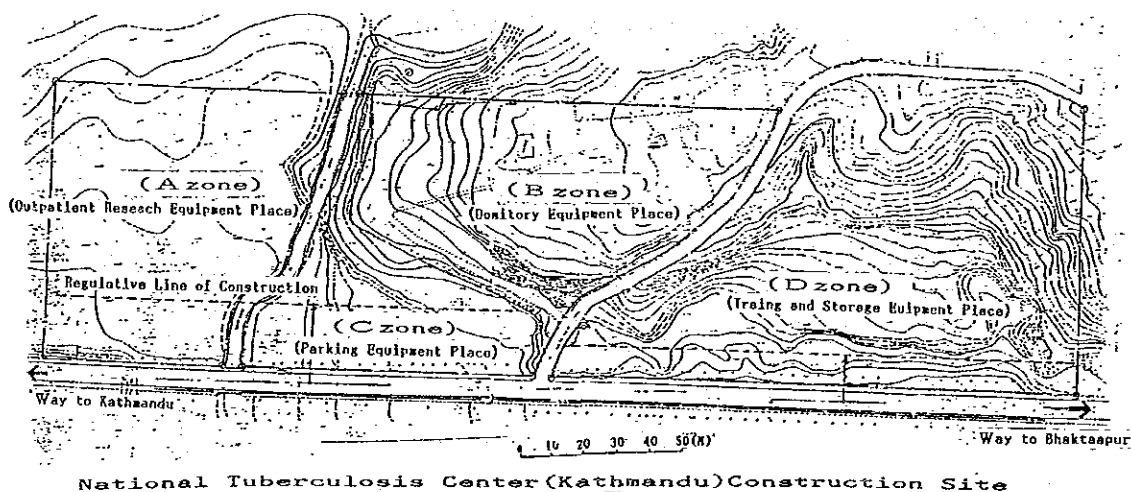
4-3-1 Site Plot Plan

4-3-1-1 Building Plot Plan

(1) NTC (Kathmandu)

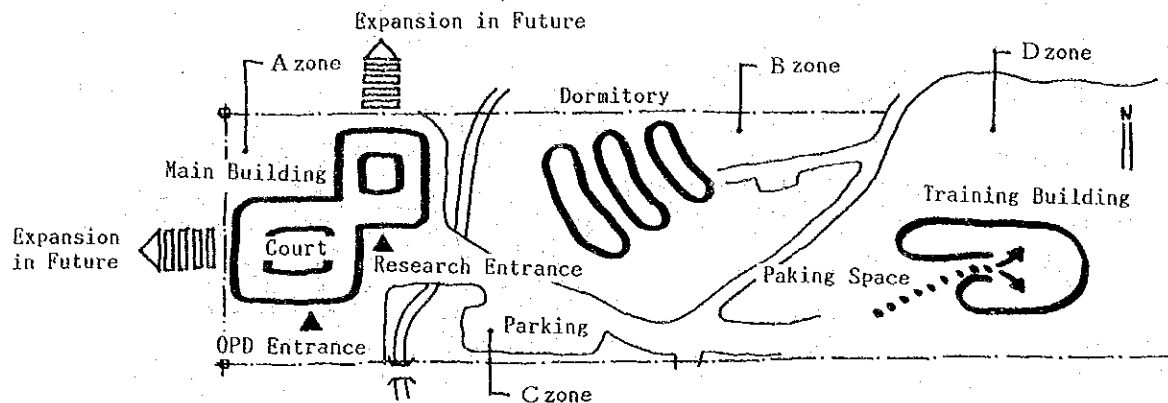
The site is located near mid-point between Kathmandu and Bhaktapur, 400 m west from the Thimi bazar which has stops for trolley buses. Consequently, it is estimated that most of the outpatients will approach this way. The site, which was provided by Nepal, consists of four zones. At A zone, the main building containing the outpatient department, research & supervision department and administration department are arranged so as to offer an easy approach. At B zone, dormitories are constructed because the site is uphill. At C zone, a parking lot is arranged because of building regulations (a building cannot be constructed within 25 m from the centre of the main road.)

From the viewpoint of land efficiency and management, the arrangement of buildings seems to be not so good. However, in considering ease of approach for patients, the building arrangement was planned in this way. Extension telephones are provided for facility management. And, closely related departments are situated in the same area to improve efficiency.



1) Main building (A zone)

The building consists of the following three departments: outpatient, research & supervision, and administration. Both the outpatient department and research department have courtyards and separate entrances. The building is a two-storied building; the administration department is located over the outpatient department.



Since the west and north sides of the site connect with rice fields, building extension will be easy in the future.

2) Training building (B zone)

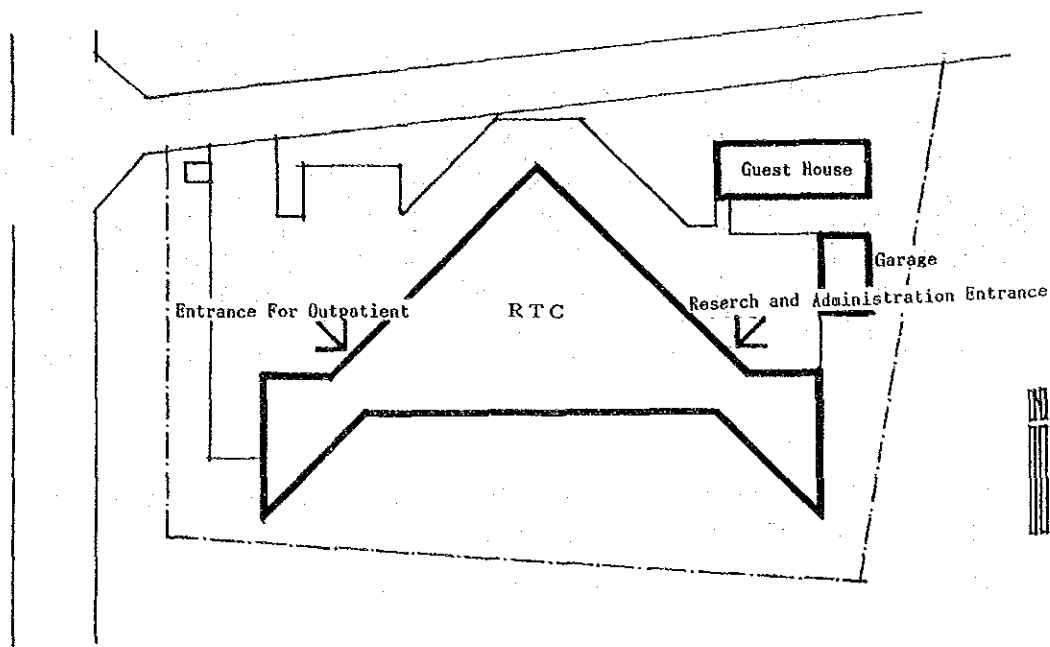
The training building includes the training department and drug supply department. Since the site is elongated, running east-west, and approach for cars and people is limited to the west side, the building has to be constructed toward the east side. The rest of the site is used for a parking space, and cargo handling space for transporting medical drugs and goods.

3) Dormitories for trainees (C zone)

Because the site has three terraces up a steep hillside, three dormitories are divided into three blocks. At the top level, a dormitory with a dining room / lounge was arranged; the location is easy to approach and has a nice view.

(2) RTC (Pokhara)

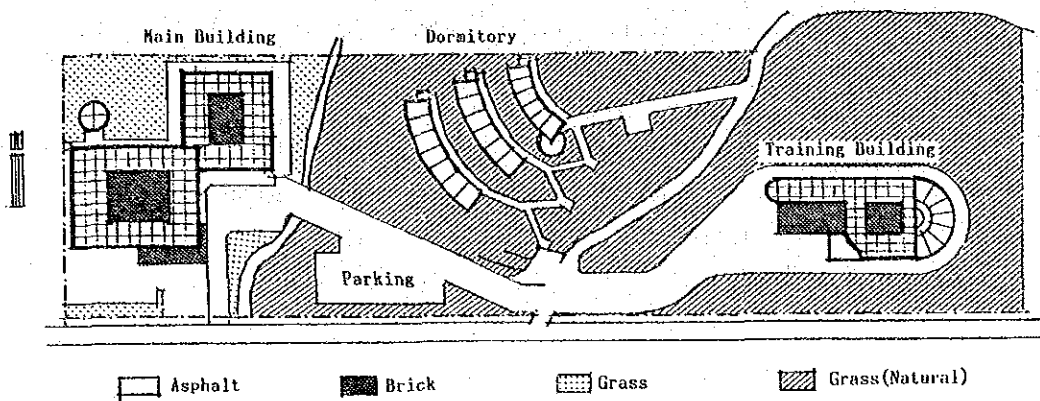
The site, which is located opposite Gandaki Hospital, is almost flat, although the centre part is low, about 1 metre. Since there is private land between main roads and the site, the main gate was arranged at the branch road on the north. The outpatient department, research & supervision department and administration departments were arranged, respectively, east and west of the site and each department has it's own seperate entrance. Guest houses and garages are arranged at the east-north side of the site apart from outpatient approach.



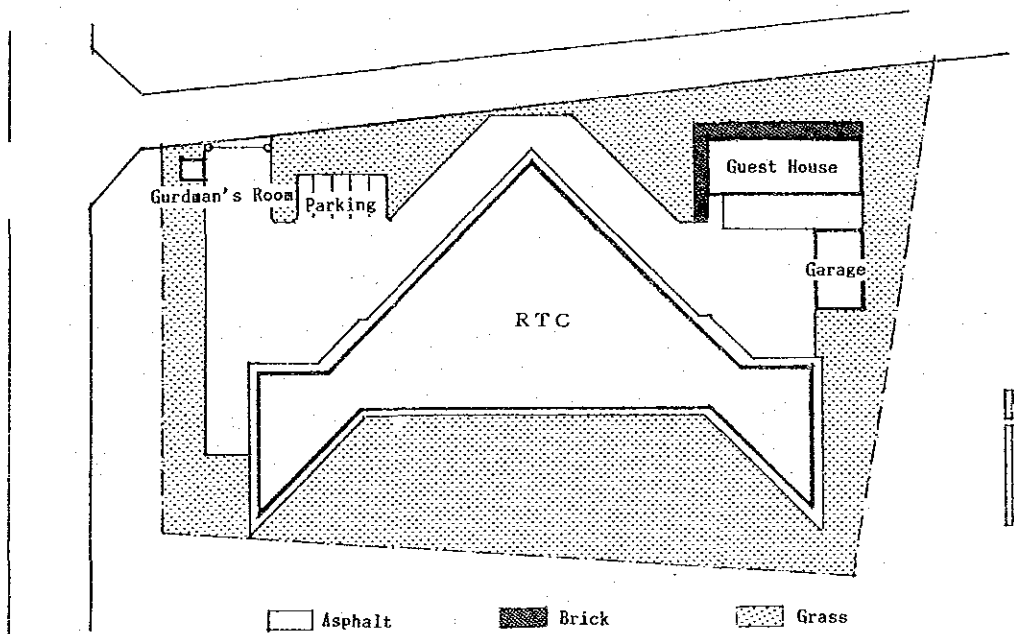
4-3-1-2 Landscape Plan

Landscape plans of NTC and RTC are as follows.

- (1) Since the buildings for NTC are spread out, passageways to connect facilities have been provided.
- (2) The conservation of trees was considered as a many trees stand on the hill where dormitories of the NTC are constructed.



N T C Landscape Plan



R T C Landscape Plan

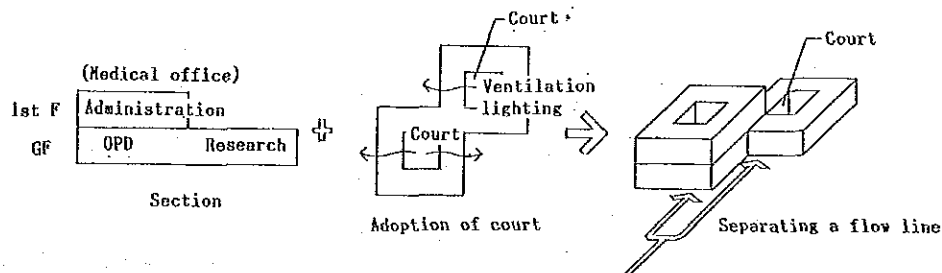
4-3-2 Building Plan

4-3-2-1 Functional Design

1. NTC

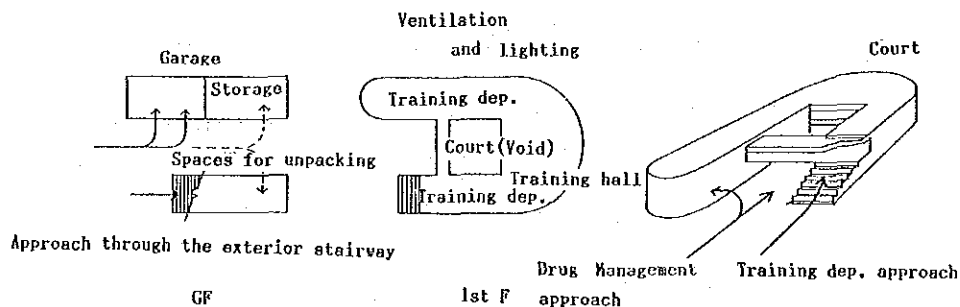
1) Main building

Because of their close relationship, the outpatient and research departments are to be situated on the ground floor. The administration department (including doctors' private office rooms) is to be situated on the first floor. In order to keep running costs down, a courtyard is planned in the centre. The entrances of the outpatient department and research & supervision department are divided to provide separate passage for researchers and outpatients. For the above reasons, a double, square-shaped structure is employed.



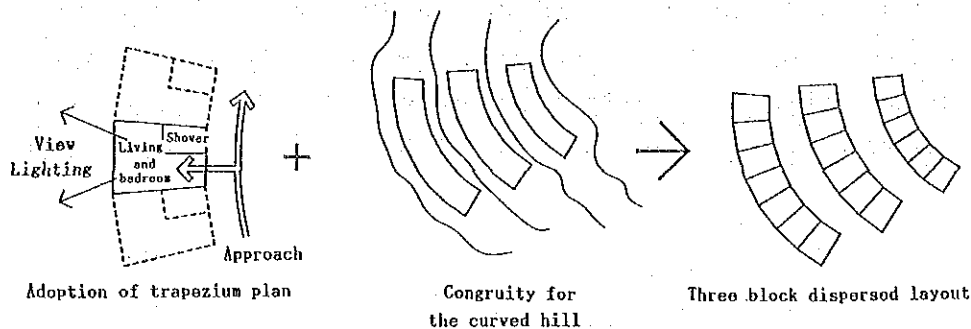
2) Training building

Because the entrance is narrow and the building is oblong-shaped in relation to usable flat space, the ground floor includes storage for NTC/RTC and working space for unpacking and loading/unloading of goods from lorries. The training department is approached directly by outside stairs. This building was also designed with a courtyard in the centre to keep running costs down.



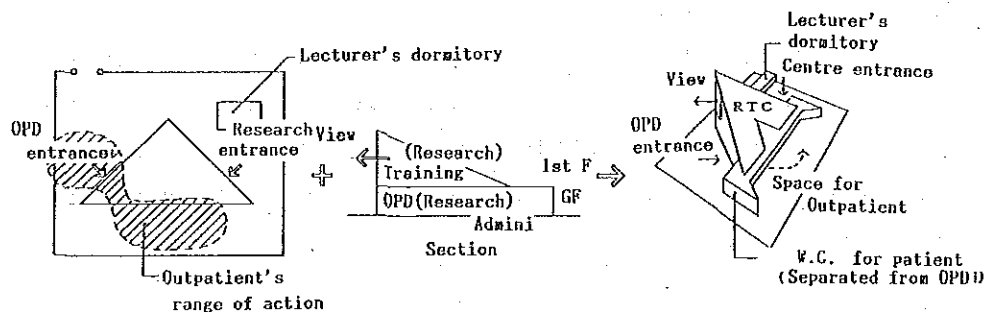
3) Dormitories

Dormitories were planned on a slope and the buildings are to be built with a curved shape. This enables combined living and bedroom space for each room to be made large; shower and W.C. plumbing space is compactly designed and optimized to afford a good view.



2. RTC

The passages for the outpatient and research departments are to be separated within the limited space available and the garage and the guest house are to be isolated as much as possible from the outpatient area. For this reason the building was designed in a triangular shape notated at a half right angle in relation to the site boundaries. To provide optimum functional use for the scale of the site and because a portion of the building has two floors, a large-roof structure was used and large windows on the north side are installed to offer a view.



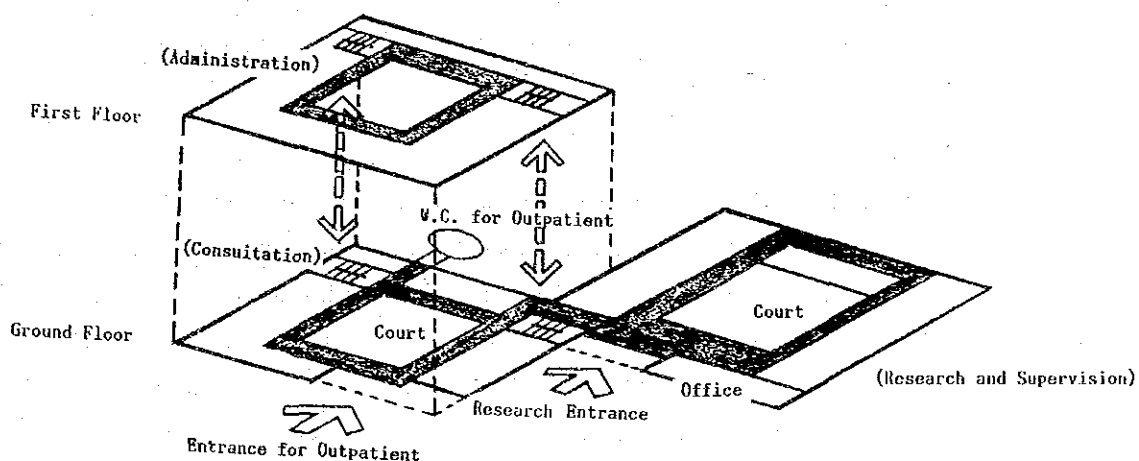
4-3-2-2 Floor Plan

1. NTC (Kathmandu)

1) Main building

The main building houses the outpatient and research departments (which are the busiest areas of the centre, providing diagnosis and

treatment for patients along with research and guidance, etc.). To ensure smooth operation for these busy areas, the administration department was included in the same building. As in the following drawing, the entrances for the outpatient and the research & supervision departments are divided. The building has a courtyard for ventilation and lighting and is square-shaped. The administration department is located on the first floor. The outpatient and administration departments are connected by two stairs in order to facilitate relations and communications between the two departments.



a) Administration department

Although a great part of the administration department is located on the first floor, the office rooms and head administrative office are arranged beside the research & supervision department entrance on the ground floor because they are in charge of reception, too.

b) Outpatient department

In coping with the approach by walking or by car, the entrance is constructed at the south-east side of the building. Since the corridor goes around the courtyard, it is easy for patients to understand the facility arrangement. The courtyard and front yard function effectively as waiting spaces for patients and their families. Toilets for patients and their families were planned in a detached building for sanitation reasons. Spaces for health

education of patients and their families were planned with movable partitions in corridors as an open display corner.

c) Research supervision department

In order to avoid congestion in the hospital, the research & supervision department has a separate entrance. The department is located opposite the outpatient department; careful consideration was given to the importance of communications between the research & supervision department and outpatients.

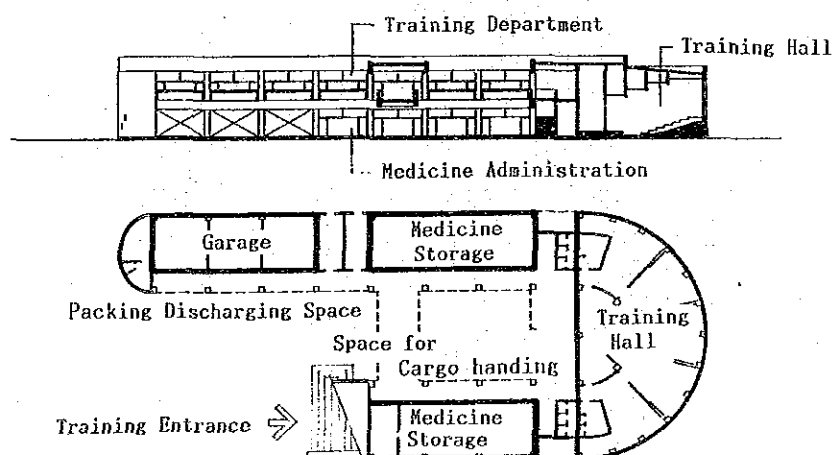
d) Others

With due regard to locational conditions, a staff canteen is planned in a corner of the research & supervision department.

2) Training building

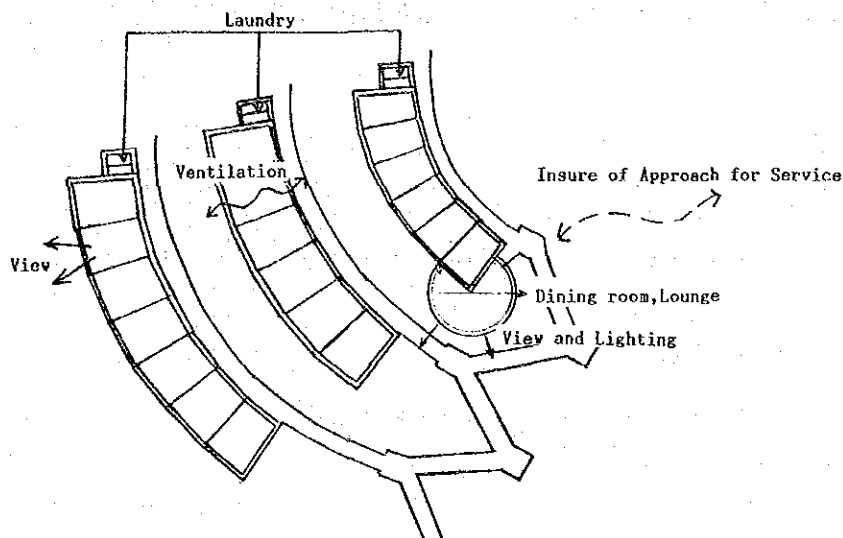
Because the training building houses both the training department and drug department, the two departments each have an independent entrance; the ground floor consists of garages and medicine storage facilities. The front yard and courtyard function as working spaces for unpacking and unloading of goods from lorries.

The training department can be directly approached by outside stairs, and each training room is connected by corridors. With due regard to evacuation, a training hall, which can seat 100 persons, is located between the ground floor and the first floor because of evacuation considerations.



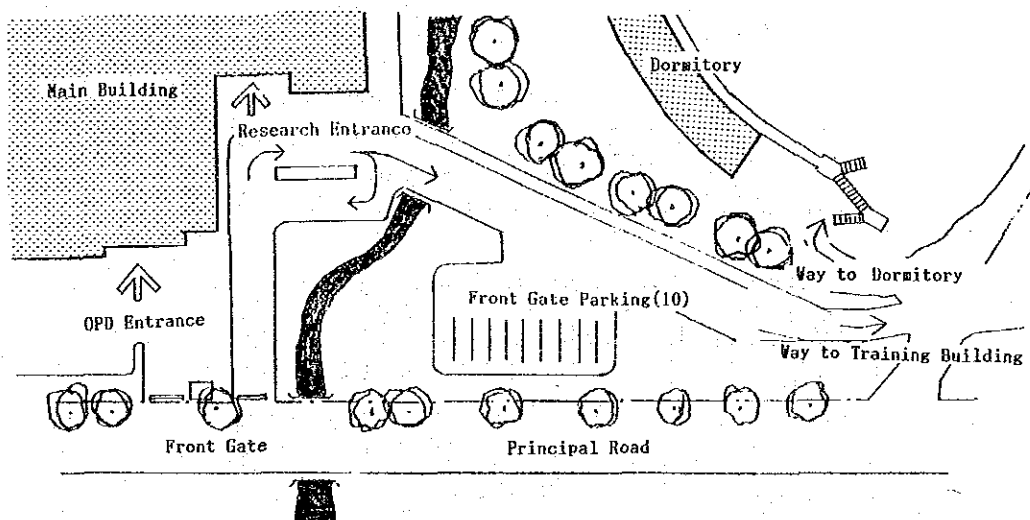
3) Dormitories

Because of an easy slope toward the west, three scatters dormitories are planned. A dining room is located toward the south on the uppermost land. The dormitories are laid out with due regard to the view, ventilation and lighting and, especially, with due regard to slope. Laundries are planned in each dormitory. It is possible from the eastside road for cars to approach the uppermost dormitory for management or services.



4) Parking space

Since enough parking spaces are not provided around the main buildings, the flat part of B zone, on which buildings cannot be constructed because of building regulations, was planned for use as outpatient's parking zone. Parking space is connected with main buildings by road, bridge and stairs.



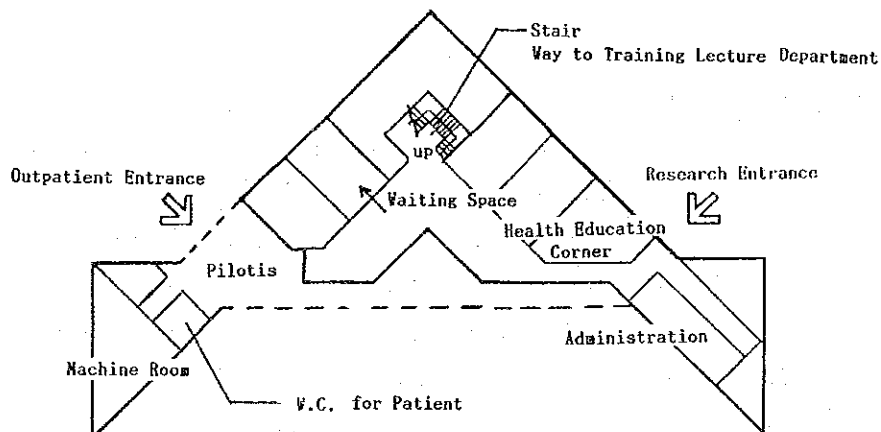
(2) RTC (Pokhara)

1) Main building

The building is flat and L-shaped. Since there is a space for waiting patients and health education in the middle of the building, the rooms were arranged so that patients can find rooms easily. Since the weather of Pokhara is subtropic because it is 800 meters above sea level, main rooms were planned facing north-east or north-west, and a waiting area is planned toward the south.

Machine rooms and patient's toilets were planned separately from the outpatient department. The entrance of the administration department was planned to the east separately from the patient's entrance.

The training and research & supervision departments were planned on the first floor. However, the bacteriological laboratory related with the inspection room for the outpatient department was planned next to the examination room on the ground floor.



2) Guest houses for lectures

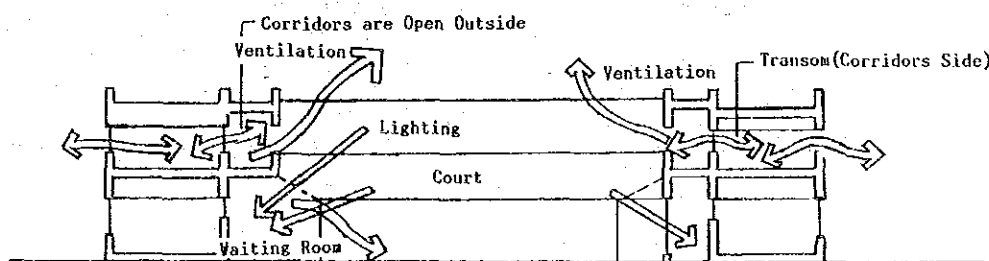
Since there are no specialists in the western region, guest houses for lecturers and instructors, who are from Kathmandu etc., were planned. There are two types of guest houses with kitchenettes: one type with a bedroom and living room (1 unit) and a small apartment type (2 units).

4-3-2-3 Cross-sectional planning

1. NTC (Kathmandu)

A story height of 4.0 m was planned. Except for the outpatient section on the ground floor, the corridors are open as shown in the figure and there is a courtyard in the centre of the building to provide ample ventilation and lighting.

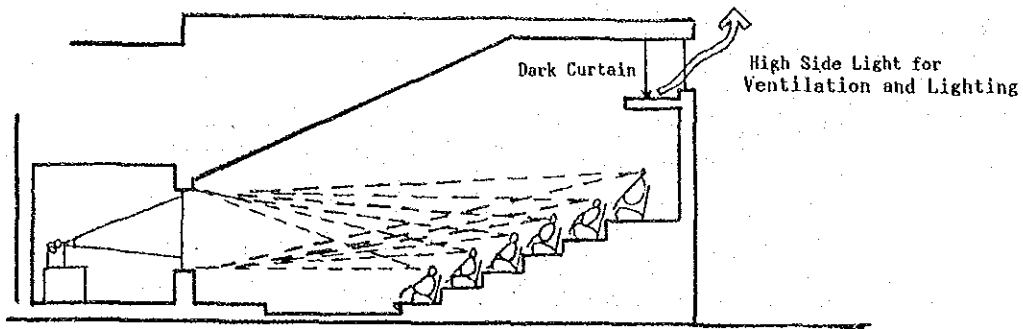
Corridors and waiting rooms are to be constructed without finished ceilings. A 3 m ceiling height was planned with due regard to air conditioning, heating equipment fixings, etc. On the corridor side, each room basically has transoms to provide both vertical ventilation and lighting.



Training Centre Section

2) Training building

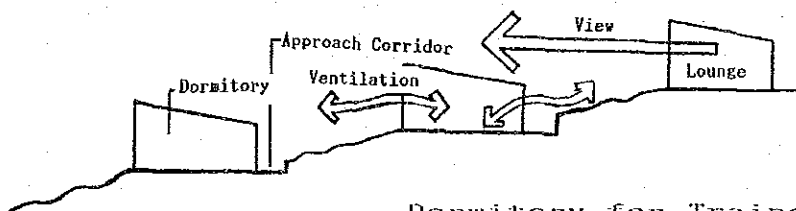
The training building is constructed with externally open corridors and courtyards in the centre in a similar manner to the main building, so as to facilitate ventilation and lighting. As training building facilities are not used as frequently as the main building, basically hung ceilings are not provided for each room. As audio/visual facilities are provided, tiered seats were provided for the training hall which has a seating capacity of 100. High windows were planned for ventilation in conjunction with A/V use.



Training Hall (Large Meeting Room)

3) Dormitories

Dormitories were planned on a slope with the cross-section shown in the following figure so there will be enough ventilation, lighting and view.



Dormitory for Trainees Section

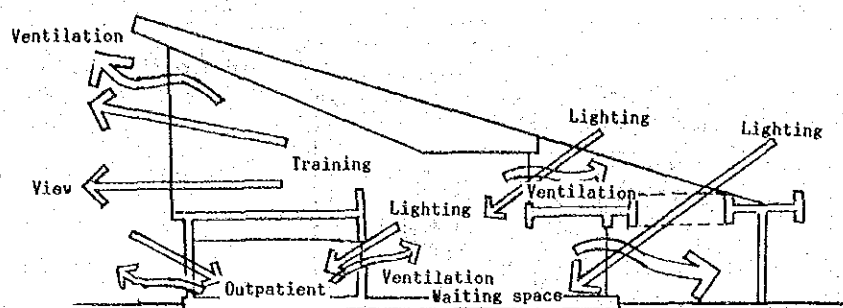
2. RTC

1) Main building

With due regard to the partial two-storied design and to provide adequate ventilation lighting and view, the cross-section showed in the figure was employed. Basically, a hung ceiling is not provided. The back of the sloping roof has a smoothed finish for direct use as a ceiling. High windows facilitate lighting and ventilation for corridors and waiting rooms.

2) Guest houses

The guest house consists of three small lodging units utilizing a simple cross-section.

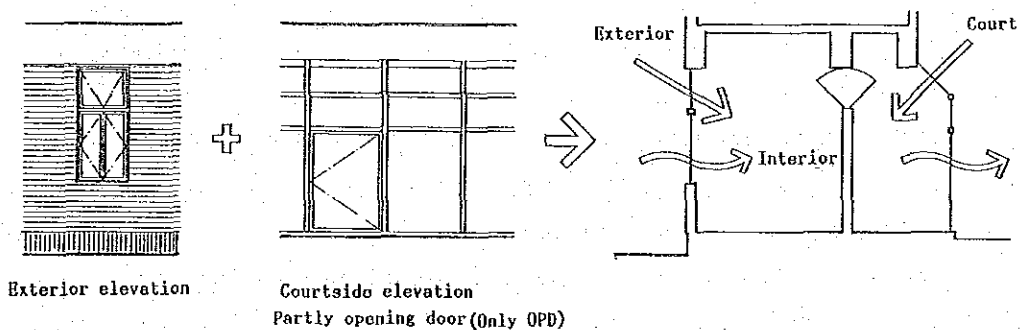


RTC Main Building Section

4-3-2-4 Elevation planning

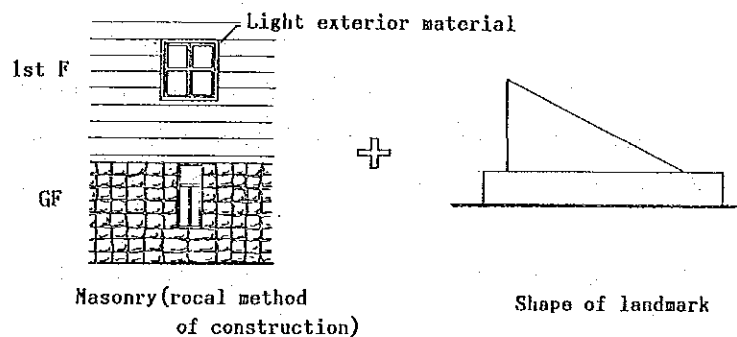
1. NTC

The exterior of the buildings will be finished with bricks which are generally used for building finishes in Nepal. Windows are used to facilitate ventilation and lighting where necessary. Courtyards are planned in the centre of the main building and training building also to facilitate lighting and ventilation. Ventilation and lighting openings such as transoms, etc., are installed on sides facing the courtyard to create an open feeling and a closed design is employed on the sides of the building facing the outside.



2. RTC

The outside exterior of the ground floor employs a stonelayed wall structure made of local materials and fitted with the necessary windows and ventilation openings. Waiting space is provided on the side of the building facing south and partially includes sashes so as to form a continuation of space for the educational training area. The first floor has a shed roof and lightweight materials are used for the external finish. Due consideration was paid to creating harmony with the environmental surroundings in the overall design, along with providing an easy walking approach for patients.



4-3-2-5 Structural Planning

1. Principles

- 1) Reinforced concrete will be used as frame for the principle construction material. The structural frame will use a rigid frame structure. Basically, the outer walls and partition walls will be brick or concrete block.
- 2) The quality of the ground in Kathmandu is relatively good and its use as a support layer for the foundation in the NTC construction can be expected. Thus, the foundation system will be a direct foundation system.

The Pokhara region where the RTC is to be constructed sits on stone layers and offers no problem for use as a foundation, rather could require quite a lot of labor for excavation.

- 3) Nepal is not in a frequent earthquake belt. However relatively earthquakes have occurred there in the past, and there is a need to consider earthquake resistant construction for all of the structures.

- 4) In this project, expansion joints are to be provided in proper parts of buildings to avoid differential settlement and to prevent damage by earthquakes.

2. Structural Design Policy

The structural design for this project will be based on Japanese building standards. However, depending on local circumstances, Indian Standards will be applied for portions where deemed effective.

1) Fixed load

The fixed load will be calculated on the basis of actual building in relation to materials used, the weight of finish materials, etc.

2) Live Load

The live load will be based on Japan Architectural Standards in line with the planned uses for the buildings, the types of rooms and other related circumstances.

3. Structural materials, etc.

With due regard to building scale, structure, use, supply capacity, goods and processing quality, construction method, transportation conditions from foreign countries and price, etc., the following materials are considered for use in this plan.

1) Concrete

Because there are supply problems with cement made in Nepal actual circumstances depend on imported cement from Korea. Sand and gravel will be supplied locally. Concrete plants will be set up on site for on-site mixing.

With regard to the quality of aggregate supplied on site, a concrete strength of 180 kg/cm^2 (four weeks) is considered suitable. However, it is desired move flexibility in strength in deciding final concrete strength.

2) Reinforcing bars

With due regard to local production capacity of twist bars, main reinforcing bars and deformed bars made in Japan (SD30) will be used.

Since main materials are made in Japan, the allowable unit stress is applied corresponding to Japanese building regulations.

Floor load table for different rooms in different cases

Kind of Room	For floors and beams	For columns girdors and foundations	For earthquakes
General living room	180	130	60
Office, laboratory	300	180	80
Classroom	230	210	110
Meeting room (fixed seat)	300	270	160
Meeting room	360	330	210
Storage	500	400	200

unit: kg/m^2

3) Seismic force

According to Indian Standards, the base shear coefficient in case of earthquakes at Katmandu, zone V, is 0.08.

4) Wind load

$P = c \times q$ where P = wind pressure kg/m^2

c = wind pressure coefficient

(depending on shapes and parts of buildings)

q = speed pressure

According to Indian Standards, $q = 150 \text{ kg/m}^2$,

c = according to Japanese building regulations

5) Bearing capacity of soil

Bearing capacity of soil is determined based on soil boring tests.

4-3-2-6 Building Equipment Planning

(1) Plumbing work

1) Water supply

a) Water supply system

After storing in a receiving water tank from the city water main pipe, the water is to be pumped in to an elevated water tank and then supplied to buildings.

b) Water supply volume

The planned water supply volume is as follows.

NTC . Staff	100 l /man.day x 50persons	= 5,000 l /day
. Researcher	150 l /man.day x 20persons	= 3,000 l /day
. Trainee	150 l /man.day x 30persons	= 4,500 l /day
. Outpatient	10 l /man.day x 200persons	= 2,000 l /day
Total		14,500 l /day

RTC . Staff	100 l /man.day x 25persons	= 2,500 l /day
. Researcher	150 l /man.day x 10persons	= 1,500 l /day
. Trainee	150 l /man.day x 6persons	= 900 l /day
. Outpatient	10 l /man.day x 100persons	= 1,000 l /day
Total		5,900 l /day

2) Hot-water

a) Hot-water supply

With regard to maintenance and running cost, independent equipment is used. Electricity is used as a heat source in view of circumstances in Nepal.

b) Place supplied

NTC: Dormitories lecturers and trainees, staff canteen

RTC: Guest houses for lecturers

3) Sewerage

a) Sewerage

Used water and waste water treated separately.

b) Sewerage

The sewerage is as follows: Soil water system, general waste water system, and laboratory waste water system.

c) Sewerage treatment system

NTC Soil water ——— Septic tank ——— Discharge

General waste water ———

Laboratory waste water ——— Sterilization tank ——— Soak pit

RTC Soiled water ——— Septic tank ——— Soak pit

General waste water ———

Laboratory waste water ——— Sterilization tank ———

4) Sanitary fixtures

. Water closet Eastern type: for outpatients, for staff, for trainees, for laboratory workers

Western type: for director, for deputy director, for experts

. Urinal

. Wash basin

. Shower

. Slop sink

5) Gas

An LPG cylinder is set up and it is applied to the outpatient bacteriological examination room.

6) Fire fighting equipment

NTC Main building Fire extinguisher, fire hydrant

Training building Fire extinguisher

Dormitories for trainees Fire extinguisher
lecturers

RTC Fire extinguisher

7) Kitchen equipment

Simple kitchen equipment is supplied for a staff canteen for staffs the dormitory kitchen at NTC.

8) Incinerator

An incinerator, which can burn garbage from buildings without fan and burner oil, is set up.

(2) Cooling, heating and ventilating equipment

1) Air conditioning fixture

a) Cooling and heating system

Because of the small area for air conditioning and easy maintenance, separate air-conditioners by air cooled heat pumps are adopted.

b) Rooms for cooling

- . Director room
- . Deputy director's room
- . Expert's room
- . Bacteriology research room
- . Examination room
- . Epidemiology, statistics, and medical treatment laboratories

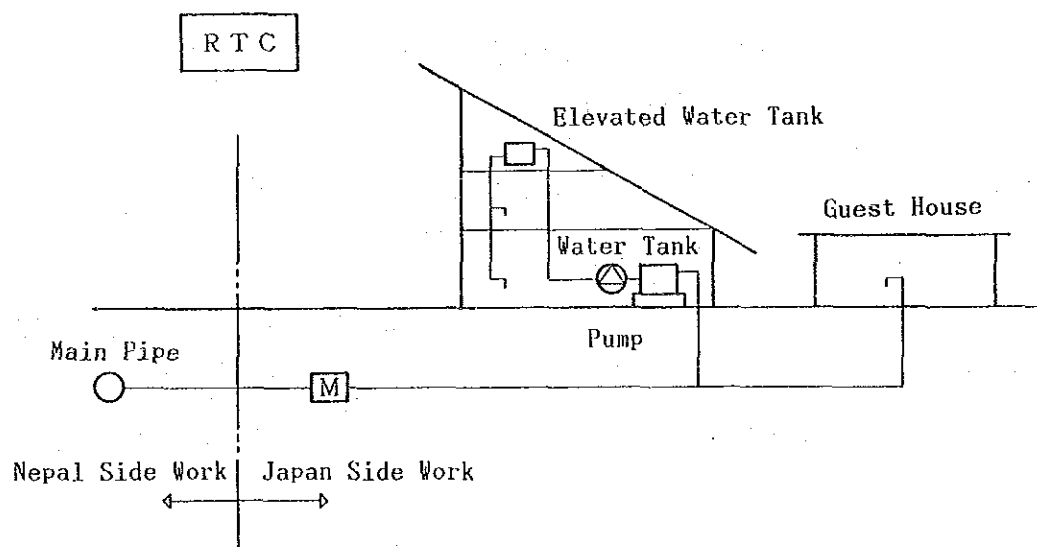
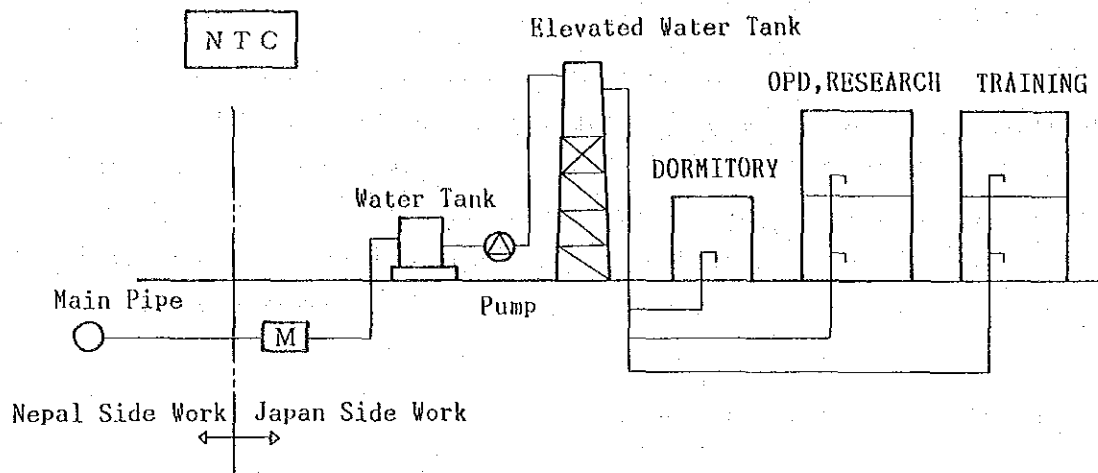
2) Ventilation fixtures

Although natural ventilation is basically applied, mechanical ventilation is adopted as needed.

3) Ceiling fans

Ceiling fans are set up in the following necessary places: administration department, outpatient department, training room, dormitories and so on.

Fig.



Water Supply Network

1. Electric supply

1) Lead-in

Electricity is led in from the suspended wires, 3Ø 3W 11kV supplied by the Nepalese Electric Corporation, which run along the roads in front of both NTC and RTC. Using underground cables, electricity is led to a transformer in the substation at NTC.

At RTC, electricity is led into transformers in the substations using suspended electrical power lines. Supply and installation of transformers and 11 kV cable comes under to the Nepal side works.

2) Assumed of transformer capacity

a. NTC

Lighting and smaller supply	90 kVA
Cooling and heating	100 kVA
Sanitary, Medical equipment	70 kVA
<hr/>	
Transformer capacity	300 kVA

b. RTC

Lighting and smaller supply	30 kVA
Sanitary, cooling and heating	60 kVA
Medical equipment	30 kVA
<hr/>	
transformer capacity	150 kVA

3) Emergency generator

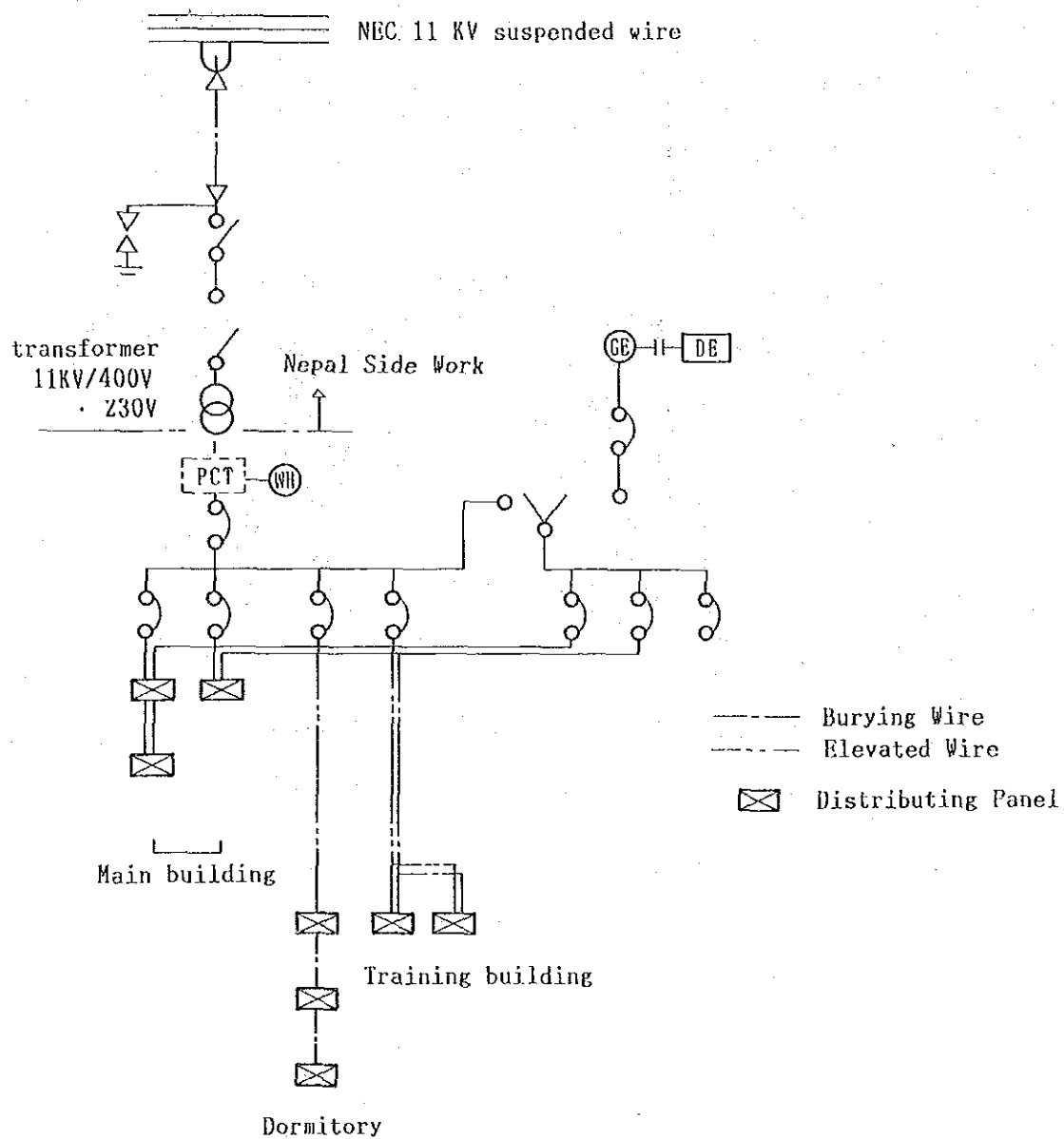
To cope with stopage of electric power, both NTC and RTC will have a package type generator with a fuel tank for use inside buildings.

- a) Load emergency lighting
 water supply/drainage pump
 fire pump
 certain medical appliances (refrigerators, freezers,
 incubators, etc.)

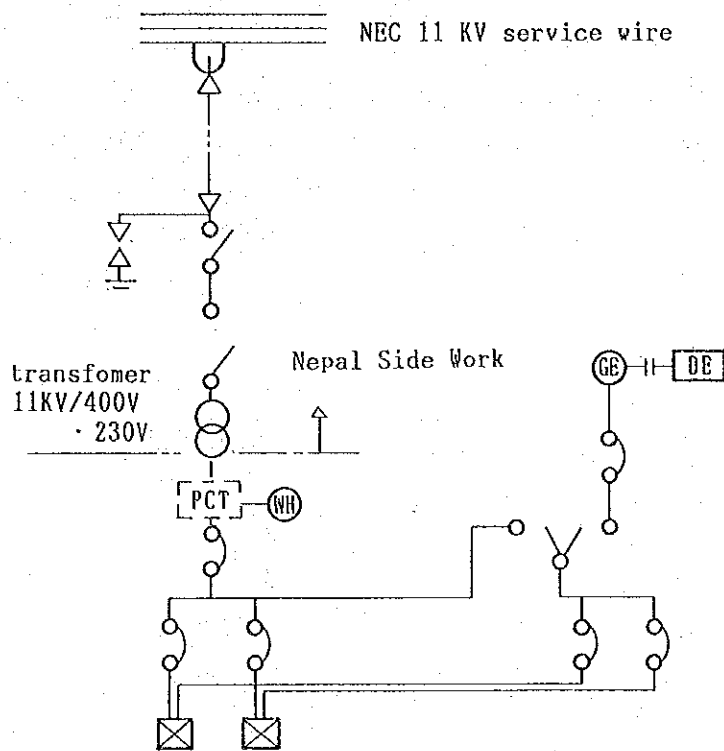
b) Capacity

NTC	3 Ø 4 w	400V/230V	50 KVA
RTC	3 Ø 4 w	400V/230V	40 KVA

4) Electric power distribution diagram



NTC Electric Power Distribution Diagram



RTC Electric Power Distribution Diagram

5) Lighting

a. Voltage for lighting and socket outlets is 220 V, single phase. Mainly, fluorescent lamps are used, and ordinary lamps and germicidal lamps are used as needed.

b. Illumination standard

300 lx diagnosis examination room, inspection room,
office, meeting room

500 lx entrance, lounge

50 lx toilet, storage, corridor, dormitory

c. With due regard to use of AV equipment at the health education room in the main building and at the training hall at the training building, dimmers are installed.

d. Some outdoor lamps with automatic switches are installed at the access to the dormitories.

6) Telephones

a. NTC: Electronic automatic telephone exchange (about 40 extensions), relay stand, and batteries are installed in office rooms of the main building.

b. RTC: Electronic button telephones (about 20 sets) are installed, main switch board is installed in office room.

c. Trunk lines

Telephone works to the switchboard in buildings for both NTC/RTC belong to the Nepal side.

7) Interphones

An Interphone between X-ray room and control room is installed.

8) Speaker system

A speaker system for lectures is installed in the training hall.

9) Safety Equipment

- a. NTC Main building: emergency illumination, emergency exit light,
manual fire alarm
Dormitories : security illumination, manual fire alarm
- b. RTC security illumination, emergency exit light, manual fire alarm

10) Lightning rods

Lightning rods or lightning conductor on the building ridges are installed for each building.

4-3-2-7 Construction Materials Planning

Construction materials are chosen according to the following principles.

- 1) Materials easy to maintain.
- 2) For materials produced in Nepal, materials stable in cost, quality, and supply are used as much as possible.
- 3) Materials, which are in harmony with natural features and offering reasonable construction methods are chosen.
- 4) Materials are to be clean, durable and difficult to soil.

The following materials for buildings are based on the above principles.

1. External finishing materials

i) NTC (Kathmandu)

1) Main building and training building

roof : asphalt water-proof, insulating blocks
external wall: brick made in Nepal is laid and partially
sprayed tile is applied to mortar finish.

2) Dormitory

roof : asphalt water-proof, insulating blocks
external wall: brick made in Nepal

11) RTC (Pokhara)

1) Main department

roof : asphalt-asbestos tiling, partially asphalt water-proof, insulating blocks.

external wall: masonry with stone produced in Nepal, partially asbestos cement board

2) Guest houses

roof : asphalt water-proof, insulating blocks

external wall: masonry with stone produced in Nepal.

2. Interior finishing materials

Interior finishing materials of main rooms of each building are as follows.

i) NTC (Kathmandu)

1) Outpatient building

Room name	Floor	Base	Wall	Ceiling
			EP (Emulsion painting)	
director's office	terazzo	terazzo	mortar EP	acoustic absorbing board
Expert's office	terazzo	terazzo	mortar EP	acoustic absorbing board
office	terazzo	terazzo	mortar EP	acoustic absorbing board
meeting room	terazzo	terazzo	mortar EP	acoustic absorbing board
entrance hall	terazzo	terazzo	mortar EP	EP
waiting room	terazzo	terazzo	mortar EP	EP
consultation room	terazzo	terazzo	mortar EP	acoustic absorbing board
X-ray room	terazzo	terazzo	mortar EP	acoustic absorbing board
bacilli laboratory	terazzo	terazzo	mortar EP	acoustic absorbing board
toilet	terazzo	terazzo	tile	EP
electric substation	troweled mortar	troweled mortar	troweled mortar	wood tip and cement mortar board

2) Training building

Room name	Floor	Base	Wall	Ceiling
training hall	terazzo	terazzo	tile acoustic absorbing board	
training room	terozzo	terazzo	mortar EP	EP
lecturer's room	terazzo	mortar VP	mortar EP	EP
meeting room	terazzo	mortar VP	mortar EP	EP
medicine storage	troweled mortar	mortar VP	mortar EP	EP
garage	troweled mortar	troweled mortar	troweled mortar	wood tip and cement mortar board

3) Dormitories

Room name	Floor	Base	Wall	Ceiling
lodging room (single)	terazzo	brick	brick	acoustic absorbing board
lodging room (twin)	terazzo	terazzo	brick mortar EP	acoustic absorbing board
dining room/ lounge	stone	stone	mortar EP	acoustic absorbing board
attendant's/ catering	terazzo	mortar VP	mortar EP	acoustic absorbing board

ii) RTC (Pokhara)

1) Main building

Room name	Floor	Base	Wall	Ceiling
director's office	terazzo	terazzo	mortar EP	acoustic absorbing board
expert's office room	terazzo	terazzo	mortar EP	acoustic absorbing board
office	terazzo	terazzo	mortar EP	acoustic absorbing board
meeting room	terazzo	terazzo	mortar EP	acoustic absorbing board
entrance hall	stone	stone	mortar EP	EP
waiting room	stone	stone	mortar EP	EP
consultation room	terazzo	terazzo	mortar EP	acoustic absorbing board
X-ray room	terazzo	terazzo	mortar EP	acoustic absorbing board
bacilli laboratory	terazzo	terazzo	mortar EP	acoustic absorbing board
toilet	terazzo	terazzo	tile	EP
training room	terazzo	terazzo	mortar EP	EP
medicine storage	troweled mortar	mortar VP	mortar EP	EP

2) Guest houses

Room	Floor	Base	Wall	Ceiling
room (single)	terazzo	terazzo	mortar EP	acoustic absorbing board
room (twin)	terazzo	terazzo	mortar EP	acoustic absorbing board

4-3-3 Medical Equipment Planning

1. Basic principles

Medical equipment for the centres is chosen on the following basic principles.

- 1) Necessary medical equipment chosen based on practical planning according to the basic design principles (4-1, 3).

- 2) With due regard to similar medical equipment in Nepal and practical technical cooperation by specialists from Japan, medical equipment with technical transfer capabilities is chosen according to the basic design principles (4-1, 3).
- 3) Medical equipment which is easy to operate and to maintain, and in addition is economical to operation is chosen.
- 4) Medical equipment which is supposed to be available at several sections is chosen so that the medical equipment can be shared.
- 5) In order to easily maintain medical equipment, the types equipment used are limited.

2. Equipment planning

The following is a list of medical equipment planned for use based on the basic policy outlined above for diagnosis, examination and training.

Materials list

1) NTC

Main building

.. Outpatient department

. Reception

Calculator (desk top)	1 unit
Manual typewriter (Nepalese)	1 unit

. Chart room

Chart Cabinet	1 unit
Card Cabinet (3 type)	2 unit(s)/type
X-Ray Film Cabinet	3 unit(s)

. Pre-consultation room

Examination Desk	1 unit
Examination Chair (Doctor)	1 unit
Examination Chair (Patient)	1 unit
Wash Basin (with frame)	1 unit
Stethoscope	2 unit(s)

. Consultation room

(allergy)

Examination Desk	1 unit
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(injection room)

Examination Chair (Doctor)	1 unit
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(treatment room)

Examination Chair (Patient)	1 unit
Examination Couch	2 unit(s)
Stethoscope	2 unit(s)
Sphygmomanometer (desk type)	1 unit
Injection desk (with two chairs)	1 set
Injection Set	1 set
Wash Basin (with frame)	1 unit
Height scale	1 unit
Weighing scale	1 unit
Clothing basket	1 unit
Instrument Cabinet	2 unit(s)
Medicine Cabinet	1 unit
Diagnostic Set	1 set

	Treatment Instrument Set	3 set(s)
	Waste Receptacle	2 unit(s)
	Analptics instrument	1 unit
	Oxygen Inhaler	1 unit
	Film illuminator	1 unit
	(2 section banks)	
	Spirometer with Table/chair	1 set
. Consultation room	Examination Desk	3 unit(s)
(3 rooms)	Examination Chair (Doctor)	3 unit(s)
	Examination Chair (Patient)	3 unit(s)
	Examination Couch	3 unit(s)
	Sphygmomanometer (desk type)	3 units
	Stethoscope	6 unit(s)
	Wash Basin (with frame)	3 unit(s)
	Height scale	3 Unit(s)
	Weighing scale	3 unit(s)
	Clothing basket	3 unit(s)
	Instrument Cabinet	3 unit(s)
	Diagnostic Set	3 set(s)
	Treatment Instrument Set	6 set(s)
	Waste Receptacle	3 unit(s)
	Analptics Instrument	3 set(s)
	Oxygen Inhaler	3 set(s)
	Film Illuminator	3 unit(s)
	(2 section banks)	
. X-Ray room	X-Ray Diagnostic System	1 set
	(Tomography, Direct)	
	X-Ray Diagnostic System	1 set
	(Mass Miniature)	
	Cassette Pass-Box	1 unit
. Dark Room	X-Ray Film Developer	1 set
	X-Ray Film Viewer	1 set
	X-Ray Film Dryer	1 unit