

CHAPTER 3
CONTENTS OF THE PROJECT

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3-1 Objective

The objective of this project is to construct the Central Forestry Development Training Center (CFDTC) on a 10.8ha site owned by the Forest Department located about 60km (38 miles) north of Rangoon City, adjacent to the premises of the Hmawbi Seed and Seedling Center and the Township Forest Office. This center will offer to the personnel of the Forest Department and local community leaders a forestry training courses aimed at promotion of the forestry industry and development of local community.

3-2 Examination of the Details of the Request Made by the Burmese Government

Since it is an urgent necessity for the Burmese Government to promote the development of the forestry and enhance the technical level of the nation's forestry staff, as well as train local community leaders in forestry and forestry technology so that they may contribute to the progress of community development through forestry promotion, the Burmese Government worked out a project to construct the Central Forestry Development Training Center and requested the Japanese Government to provide a grant-aid for its implementation.

The contents of the request made by the Burmese Government in February 1986 were discussed jointly by the Japanese Preliminary Study Team dispatched to Burma in November 1986 and representatives of the Burmese Government, and as a result all matters agreed on by both parties were included in the Preliminary Study Report prepared by the Japanese Study Team.

An outline of the above discussions is as shown below.

3-2-1 Definition of CFDTC

After completion of the construction of the CFDTC facilities, the vocational training course currently implemented at the Burma Forest School will be transferred to CFDTC, where it will be implemented as Course A (regular in-service training course). As a result, the Burma

Forest School will offer academic courses only. In other words, the Burma Forest School will orient itself as an educational institution. In this way, there will be a clear-cut division of functions and responsibilities between the Burma Forest School, as an educational institution, and the Forest Research Institute, as a research institution, and CFDTC, as a vocational training institution.

3-2-2 Examination of the Contents of the Request made by the Burmese Government

A. Contents of the Request made by the Burmese Government in February 1986

The request made by the Burmese Government in February 1986 focused on the objectives of the project to construct CFDTC. The objectives included training the personnel of the Forest Department and the Timber Corporation at the CFDTC facilities and securing ample equipment and machinery necessary for the training program to be offered at CFDTC, as well as increasing research and development efficiency through establishment of CFDTC, implementing research and experiments at the CFDTC and thereby improving the technical capabilities of Burmese forestry technical staff. The training courses and fields of applied research suggested by the Burmese Government were:

(1) Training courses

1. Local community development course (utilization of dendro-energy, agro-forestry)
2. In-service training course
3. Practical training course
4. Educational public relations course
5. Machine operator training course

(2) Applied research

1. Research on the methods of handling forestry products in the cutting process

2. Research on lops and tops utilizations
3. Research on waterway transportation of timber
4. Research on maintenance of quality of log stored in sea water
5. Research on elephant diseases

B. Examination of the Contents of the Request made by the Burmese Government in February 1986

The contents of the request made by the Burmese Government in February 1986 were discussed by members of the long-term experts study team and the preliminary study team which were dispatched to Burma in October 1986 and November 1986 respectively, and after consultations between them and representatives of the Burmese Government, all agreed matters were summarized as the final request by the Burmese Government. The main matters discussed are as shown below.

1. The Forest Department will be the sole beneficiary of the grant aid and at the same time will serve as the official organization to represent the Burmese Government in this project.
2. The training courses to be implemented at CFDTC will be formulated on the basis of the outline of training courses as itemized in Section 3-3-3.
3. Applied research work will not be included in this project.
4. The necessary development work will be planned and implemented as the training program proceeds.

The contents of the final request which the Japanese preliminary survey team and the Burmese government agreed on after the above-mentioned discussions and consultations are generally reasonable and acceptable. Some points were modified as a result of the joint confirmation of the matters discussed by the Japanese study team and the Burmese Government in the process of the basic design study. The results of these discussions will be discussed in the following section.

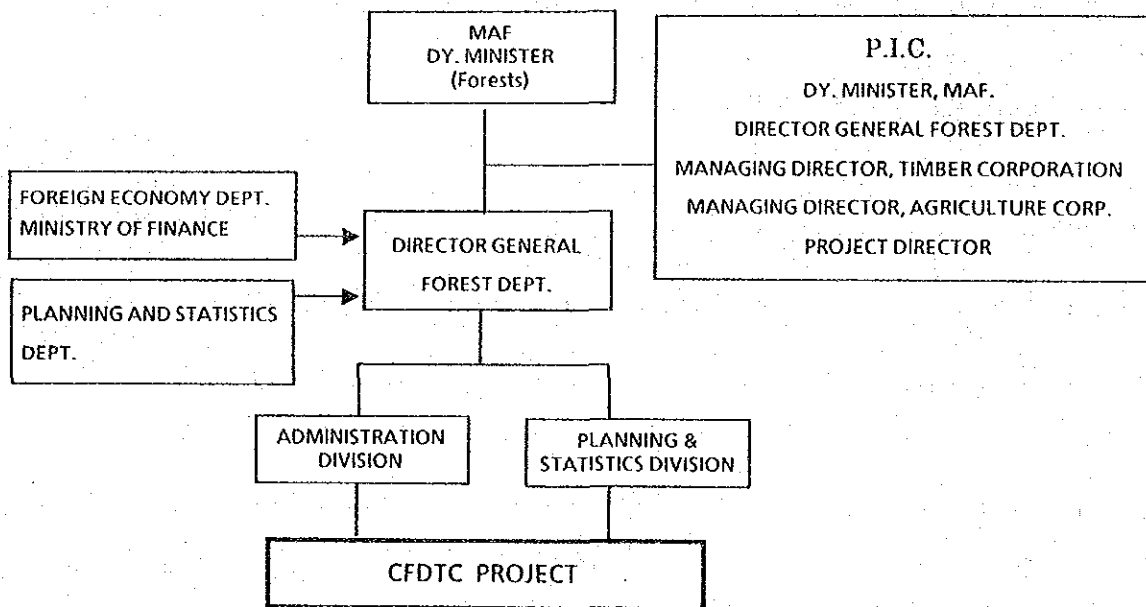
3-3 Outline of the Project

3-3-1 Organization responsible for the Project, Management of Administration System of the Project and Personnel Plan

A. Organization of the Project Implementation

The Forest Department of the Ministry of Agriculture and Forests is the organization in charge of this project. The Forest Department will be responsible for implementation of this project and at the same time serves as the official organization to coordinate with other Burmese Government agencies concerning this project, follows the necessary procedures and negotiates with them. Although this project comes under the direct control of the Director General of the Forest Department, the department's Planning and Statistics Division will actually be in charge, and the Administration Division will be responsible for personnel affairs.

The organization Chart of the project implementation is shown in Fig.3-1.



MAF: Ministry of Agriculture & Forests
PIC: Project Implementation Committee

Fig.3-1 Organization Chart of the Project Implementation

B. Management and Administration System of CFDTC

The management and administration system of CFDTC is shown in Fig. 3-2.

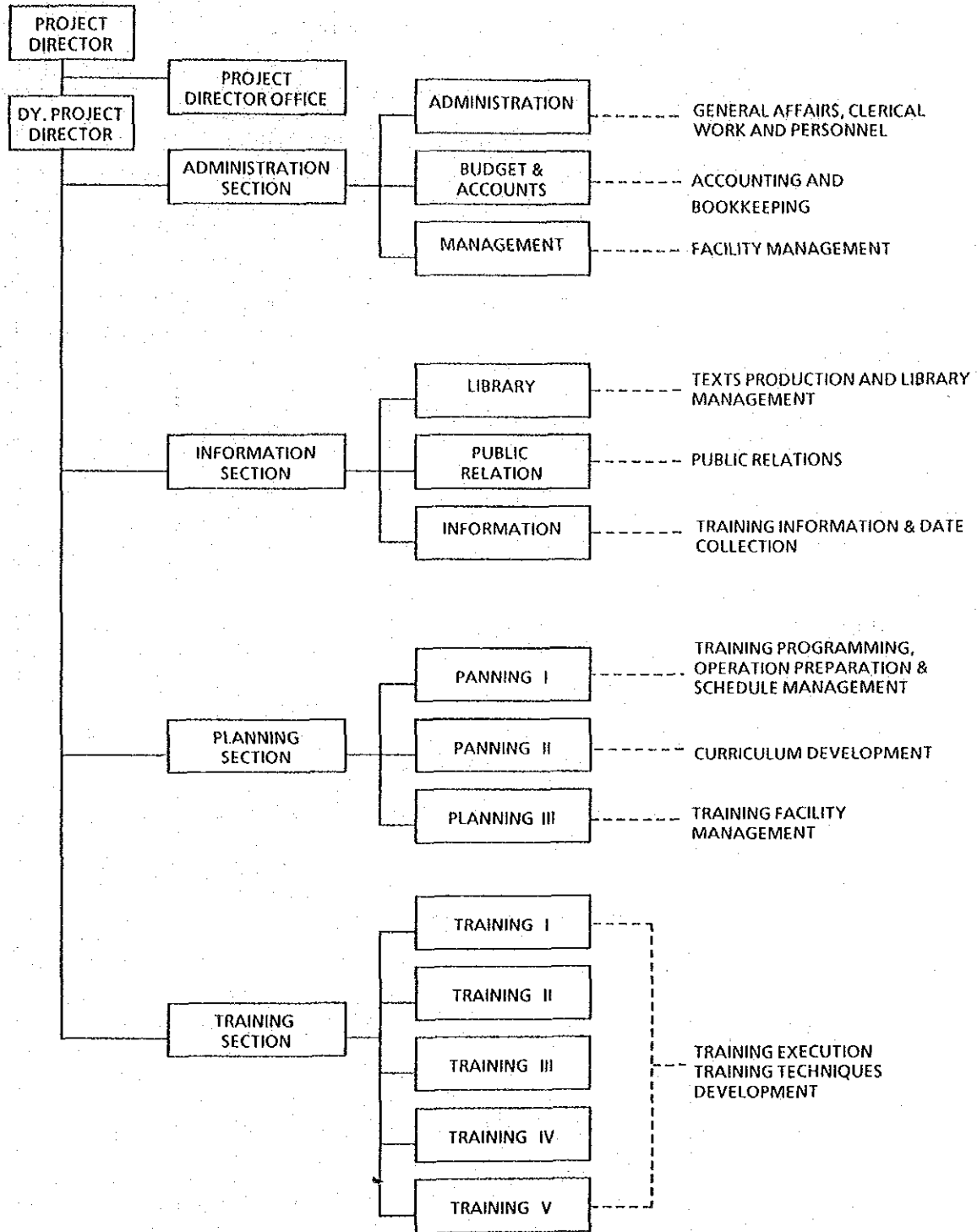


Fig.3-2 Organization for Operation and Administration of CFDTC

C. Personnel Plan

(1) Personnel

The number of full-time personnel required for operation and administration of the CFDTC facilities is shown below.

Table 3-1 CFDTC Recruitment Plan

SECTION STAFFS	PROJECT DIRECTOR OFFICE					
	ADMINISTRATION SECTION					TOTAL
	INFORMATION SECTION					
	PLANNING SECTION					
	TRAINING SECTION					
PROJECT DIRECTOR	1					1
DY. PROJECT DIRECTOR	1					1
DY. DIRECTOR		1	1	1	1	4
ASST. DIRECTOR		3	3	3	5	14
DY. ASST. DIRECTOR		2	2	3		7
MIDDLE GRADE STAFF	1	6	1			8
LIBRARIAN			1			1
HEALTH ASSISTANT		1				1
DEMONSTRATOR					31	31
LOWER GRADE STAFF		8	11	5	2	26
TYPIST	1	1	2	1	1	6
PHYSICAL TRAINING COACH					1	1
MECHANICAL & ELECTRIAN		3				3
OPERATOR		1				1
NURSE		2				2
OTHER RANKS		43				43
TOTAL	4	71	21	13	41	150

The 150 staff will be transferred to CFDC from the Forest Department. Although the Forest Department currently has a staff of 10,628, the Burmese Government adopted, in a recent cabinet meeting, a new personnel plan for the department. Under the new personnel plan, the department will increase the number of its full-time personnel to 14,751 after April 1987. Also under the new personnel plan, the number of full-time personnel of the department's Training Division, which the CFDC is positioned under, is 68 (10 managers and 58 clerks). Upon completion of construction of the CFDC facilities, however, its personnel will be increased by 150. This figure is equivalent to only about 1.0% of the Forest Department's total number of full-time personnel. In view of the fact that an increase of staff by about 4,000 was decided by the government, the allocation of CFDC staff will be able to be conducted smoothly.

It should be noted that in Burmese Government agencies there is no difference between the official number of full-time personnel and the actual number of personnel. So it is certain that the Forest Department will increase the actual number of its personnel to the newly set level.

(2) Instructor

Qualifications for instructors are summarized in the table below.

Table 3-2 Instructor's Qualifications

COURSE	INSTRUCTOR'S QUALIFICATIONS
A-1	College graduate 10 year experience in forestry work
A-2	ditto
A-3	ditto
B-1	College graduate more than 10 year experience in plantation work
B-2	ditto
B-3	Senior officers of territorial div. head-office and experts of FRI
B-4	Officials of FD and TC well experienced in forest road construction work
B-5	Officials of FD and TC well experienced in forestry machinery
B-6	Senior officials of local government bodies, experts of FRI
B-7	Senior officials college graduates 20 year experience of FD, FRI, NFI

C-1	Senior officials of FD
D-1	ditto
D-2	ditto

FD : Forest Department
TC : Timber Corporation
FRI : Forest Research Institute
NFI : National Forest Inventory

In this project the number of full-time instructors and lecturers is 31, but the final number of instructors and lecturers for each training course is not yet decided. As can be seen from the above table, most of the prospective instructors and lecturers will be selected from within the current organization of the Forest Department. Among them, eight of the lecturers at the Burma Forest School are scheduled to be transferred to CFDTC. This means that it will be relatively easy to recruit the 31 instructors and lecturers. In addition, there are many college graduates and those who have studied abroad in the staff of the Forest Department. In other words, most of the experts in forestry are on the staff of the Forest Department. Since the training program to be implemented at CFDTC is vocational training, the proposed method of selecting the instructors and lecturers to teach at CFDTC is considered to carry validity.

In principle, the term of office for instructors selected from within the Forest Department will be two years. After the term of two years expires, they may return to their previous position or remain at CFDTC as a instructor.

3-3-2 Functions of CFDTC

CFDTC's functions can be broadly divided into training and training support activities.

a. Training

The training function can be divided into training targeted at the

personnel of the Forest Department (in-service training) and that targeted at community leaders.

(1) In-service training (In-service training courses)

. Regular course

. Special course

(2) Training of community leaders (Public training courses)

. Regular course

. Special course

The outline of training function is shown in Section 3-3-3.

B. Training Support

(1) Development of the curriculum

. Need for a well-balanced curriculum

There is a need to develop CFDTC's own curriculum to serve the purpose of promoting forestry and at the same time modify its contents based on a justifiable method of evaluation. The improvement in quality and the satisfaction of the demands for modern technology are also major goals.

. Contents of the plan

CFDTC's Training Section will develop the curriculum and modify its contents. CFDTC's Planning Section will act as the executive office for this activity. Evaluation of the curriculum will be carried out by an outside organization (Teaching Committee).

(2) Developing training materials

. Need for training materials

An effective training program must be implemented as soon as possible. Also, the contents of the training program must be practical, and

therefore it is necessary to develop training materials that will help the entire training program proceed smoothly.

Moreover, there are few ready-made training materials available in Burma. This means that CFDTC must be equipped with facilities for production of training materials.

. Contents of the plan

CFDTC's Information Section in cooperation with the Training Section, will develop, print and produce necessary training materials.

(3) Collection, classification and distribution of information

. Need for collecting, classifying and distributing information

It will be necessary to distribute among the instructors relevant information related to the subject matters of the training program so that they may utilize such information in teaching. Such information will also serve as reference data for use in the development of teaching materials. Furthermore, there will be many occasions to exchange information with other organizations within and outside the Forest Department.

. Contents of the plan

The Information Section, in cooperation with the Planning and Administration Section and the Training Section, will collect, classify and distribute information related to the content of the training program.

Information to be handled in this plan can be classified as follows.

1. Training

..... Information for the instructors, statistics on training (budgeting, planning, evaluation, research), training materials, technical cooperation

2. Office management

..... Finance, accounting, payroll, schedules

3. Library

..... General books and documents, statistics on forests and forestry, overseas information retrieval

The process of gradually computerizing the information will enable CFDTC's staff to master the know-how of utilizing computers and also serve as a preparatory step to the introduction of computers at the Forest Department. Installation of personal computers at CFDTC is being considered.

3-3-3 Outline of the Training Program

Grouping of the CFDTC training courses to be implemented and the aim of each training course are shown below.

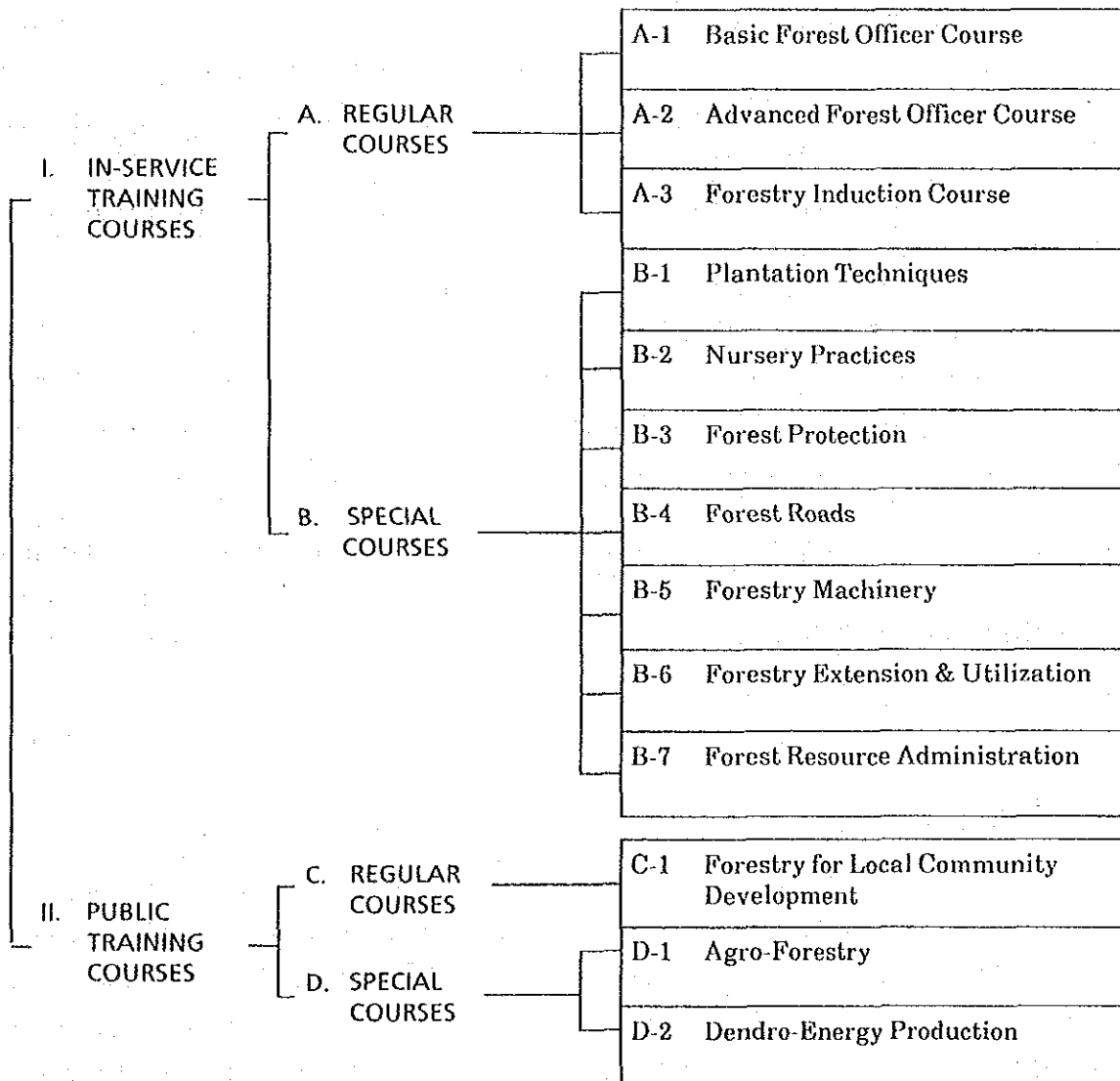


Fig.3-3 Grouping of Training Courses and Name of Each Training Course

A. In-service Training --- Regular Course

(1) Basic Forest Officer Course (A-1)

This course is designed to train the Forest Department's newly recruited employees who have majored in forestry in college, the basic procedures, rules and regulations of forestry. Emphasis is placed on how to draw up and implement effective forestry-related economic programs.

The training course will start the first week of January and continue for eight weeks. This course will be conducted only once a year for a class of 50 trainees.

In Burma the academic year begins in April and ends in March. The graduation examination ends in September of the last academic year and graduating students receive field training until December. Since the results of the graduation examination are announced at the end of December, it is possible to start this training course in the first week of January.

A similar training course has been implemented for college graduates who majored in forestry at the Burma Forest School. In the three-year period from 1984 to 1986 the training course was conducted three times, for eight weeks each time. 219 trainees completed the course.

Over the past five to ten years, the annual number of the Forest Department's new employees from college has been 45 to 55. When recruiting college graduates, the Forest Department is required to conduct physical examination and a 20-mile walking test.

(2) Advanced Forest Officer Course (A-2)

This is a training course for 3,007 Forest Department middle class staff managers, from Township Forest Officer down to Supervisor. The contents of this training course include the appropriate and effective method of implementing an annual forest maintenance program; effective organizing and educating of forest workers; personnel plan, supervising techniques, forestry policies, forestry laws and forestry accounting.

This course will be conducted twice a year, for 12 weeks each time, beginning in the first week of March and August respectively. Each session will be conducted for a class of 50 trainees. Instructors to teach this course are to be selected from forestry officials who are college graduates and have more than ten years experience in forestry work.

Prospective trainees are to be selected from among the middle class managers on the staff of the Forest Research Institute, the National Forest Inventory and other institutions. These prospective trainees will be middle class managers active in the nation's forestry administration. During the three-month period when they receive training, officials of equal rank will act as their deputies. How they have improved their knowledge and skills as a result of participating in this training course will be evaluated through a written test on each subject.

A similar training course has been implemented at the Burma Forest School. During the three-year period from 1984 to 1986 this training course was conducted twice. A total of 159 trainees completed this course.

(3) Forestry Induction Course (A-3)

This is a training course for 5,396 deputy supervisors, foresters and forest guards. The contents of this course include basic field operations, government regulations and operation of forestry machinery.

The course will be conducted twice a year, for eight weeks each time, beginning in the first week of June and November respectively. Each session will be conducted for a class of 100 trainees. Although the number of persons eligible for this training course is enormous, the scale of the course was decided taking into account the Forest Department's routine work requirements. In selecting the prospective trainees, applicants' rank and experience will be the decisive factors.

B. In-service Training --- Special Course

(1) Plantation Techniques (B-1)

This is a special training course for 3,007 staff members, the same number as the A-2 course. This course is designed to allow trainees to acquire professional knowledge of plantation techniques as well as improving their skills in various types of plantation work.

This course will be implemented twice a year, for eight weeks each time, beginning in the first week of January and August respectively. Each session will be conducted for a class of 50. Prospective trainees will be selected from among the staff of the Forest Department's Plantation Division, the Forest Research Institute, the National Forest Inventory and other institutions.

Instructors for this training course will be selected from officials who are college graduates and have more than ten year experience in plantation work.

The Forest Department is currently promoting the following four type of plantation projects.

1. Plantation of useful hardwood trees such as teak (*tectona grandis*), pyinkado (*xylia dalubrifomis*) and padauk (*pterocarpus marcocarpus*) aimed at increasing timber production for export and domestic consumption.
2. Plantation of subspecies of acacia, a fast-growing species, aimed at increasing timber production for household use, including fuelwood.
3. Plantation of subspecies of *eucalyputs* and *pinus khasya* aimed at increasing timber production as raw material of paper and pulp.
4. Plantation for the purpose of maintenance of dams and reservoirs.

In implementing these plantation projects, the plantation staffs are required to have a thorough knowledge of the growth patterns and adaptability to soil of each tree to be planted, as well as experience in plantation and plant techniques. Also, they are required to have basic knowledge of the methods of conducting research on soil and the analysis of the physiochemical properties of each tree.

(2) Nursery Practices (B-2)

This is a training course for 3,007 persons, the same number as the A-2 course. This course is designed to provide trainees with technique in maintaining and administering nursery, nursery techniques and sapling tending techniques.

This course will be implemented twice a year, for four weeks each time, beginning in the first week of March and October respectively. Each session will be conducted for a class of 30. Prospective trainees will be selected from staff of the Seed and Seedling Center, the Forest Department's Plantation Division, the Forest Research Institute and other institutions. Instructors for this course will be selected from officials who are college graduates and have more than ten years experience in nursery and plantation.

As stated earlier, the Forest Department has been promoting various types of artificial plantation projects and is therefore considered to have accumulated a considerable amount of knowledge and techniques on maintenance and administration of nursery. However, some of the seeds of tropical trees are difficult to reap and store, which is to be further investigated.

In regards to this problem, a biological laboratory, with various inspection equipment and instruments is to be installed at CFDTC, along with the projected technical development work, will prove instrumental in investigating this problem. Also, installation of various facilities, equipment and machinery necessary for training in nursery practices at CFDTC will contribute to the improvement of techniques necessary to solve this problem.

(3) Forest Protection (B-3)

This is a training course for 2,249 managerial officials such as the plantation assistants and supervisors. This course is designed to provide trainees with a knowledge of government rules and related techniques protecting forests from fires, harmful insects, beasts and human beings. This training course will be implemented twice a year, for six weeks each time, beginning in the first week of January and July respectively. Each

session will be conducted for a class of 30. Prospective trainees will be selected from the staff of the Township Forest Office, the Forest Department's Plantation Division and other institutions. Since this course is a very specialized one, the size of the class is limited to 30 trainees.

Research activities and the collection of data and information on this branch of forestry are being conducted at the Forest Research Institute. During 1914 and 1941 an entomologist was on the staff of the Forest Research Institute and its research activities were conducted mainly by the entomologist.

Currently the Institute consists of three departments, 1) Department of Entomology, 2) Department of Tree Diseases and 3) Department of Forest Fire Prevention. It also has a Forest Insect Laboratory and a Pathological Laboratory. Judging from the Institute's past achievements,, a training course on forest protection for middle-ranking forestry technical staff is considered feasible. Since it will be possible to collect various samples and audiovisual educational materials through this training course, a considerable expansion and improvement in training materials may be expected.

(4) Forest Roads (B-4)

This is a training course for 2,249 managerial officials such as the plantation assistant and supervisors the same as the B-3 course. This course aims to provide trainees with the knowledge and techniques necessary for forest road construction. This training course will be implemented twice a year, for six weeks each time, beginning in the first week of March and October respectively. Each session will be conducted for a class of 30. Prospective trainees will be selected from the staff of the Township Forest Office, the Forest Department's Plantation Division, the Seed and Seedling Center and other institutions. Since this training course is a very specialized one, a class of 30 is considered optimal.

Forest roads are indispensable for the transportation of cut trees, materials and machinery necessary for natural forest renewal operations, enrichment planting operations and artificial plantation. There have been serious shortages of forest roads in Burma and the problem has intensified

because of damage during the rainy season. In the Forest Development in the Arakan Range Project, a Japanese technical cooperation project, technologies on the construction of weatherproof forest roads have been transferred to Burma. In the technologies transferred to Burma through this project, the side ditch layer method is used in the process of felling tree with bulldozers, removing and transporting damaged trees, earth works with bulldozers and finishing the surface of the road. It is hoped that such technologies will be used throughout the country. Instructors for this course will be selected from among officials at the Forest Department and the Timber Corporation who are well experienced in the above-mentioned forest road construction work.

(5) Forestry Machinery (B-5)

This is a training course for 3,007 persons, the same number as the A-2 course. This course is aimed at teaching trainees forestry machinery operations and maintenance.

This course will be implemented twice a year, for eight weeks each time, beginning in the first week of April and November respectively. Each session will be conducted for a class of 20. Prospective trainees will be selected from the staff responsible for the operation and maintenance of the forestry machinery of the Township Forest Office, the Forest Department's Plantation Division, the Seed and Seedling Center, the Forest Research Institute and other institutions.

The improvement of the production of forestry products through mechanization is desirable, but in Burma which has a very large labor force and low wages, it is more advisable to begin with the mechanization of only those portions of forestry work which can be utilized most efficiently and most economically. It is also necessary to take into account the current shortages of spare parts, fuel and machinery operators. Machines which can be introduced easily into the Burmese forestry are bulldozers, tractors, trimmers, spiral screws and the above-mentioned forest road machines. Instructors for this course are to be selected from among the staff experienced in operating the above-mentioned forestry machinery from the Forest Department, the Timber Corporation and other organizations.

(6) Forestry Extension & Utilization (B-6)

This is a training course for 2,249 managerial officials such as the deputy township forest officer and supervisors. The purpose of this course is to teach the methods of organizing extension programs to obtain cooperation of the general public for planting and conservation of forests, as well as utilizing special products for the enhancement of farmers' standard of living.

This training course will be implemented twice a year, for eight weeks each time, beginning in the first week of April and September respectively. Each session will be conducted for a class of 50. Prospective trainees will be selected from applicants across the country. The size of each class will be expanded in the future.

Instructors for this course are to be selected from senior officials of local government bodies and experts on the staff of the Forest Research Institute.

In this course, trainees will study the method of education and guidance for community residents who have no knowledge of dendrology or forestry, with emphasis placed on audiovisual-aided education, field training and training trips.

(7) Forest Resource Administration (B-7)

This is a training course for 114 senior officials of deputy director of the Forest Department. In this course trainees will study forest administration, recent trends in forestry, results of research on the production of forestry products and the current state of forestry in foreign countries.

This course will be implemented twice a year, for two weeks each time, beginning in the first week of January and June respectively. Each session will be conducted for a class of 15. As all prospective trainees are executives of the Forest Department and are therefore working under tight schedules, the maximum size of each class is 15. Instructors for this course will be selected from senior officials who are college graduates and have more than 20 years experience in this field of the

Forest Department, the Forest Research Institute, the National Forest Inventory and other institutions.

C. Public Training --- Regular course

(1) Forestry for Local Community Development (C-1)

This is a general training course for members of the executive committees of mass organizations concerned with regional administration of farming and mountain villages in local communities. The total number of persons eligible for this training course is estimated at more than 50,000. In this training course, aimed at enhancing the standard of living and the level of social welfare in local communities through forestry promotion, trainees will study 1) the methods of conservation and administration of forests in and around villages, 2) the method of developing of village-owned fuelwood forests and the production of charcoal, 3) the mechanism of charcoal stove and production of special products. They will acquire through this training the ability to guide community residents in forestry promotion.

This training program will be implemented four times a year, in March, June, September and December, for two weeks each time. Each session will be conducted for a class of 30. The number of trainees to participate in this training course every year is small, compared to the large number of persons eligible for this course.

But the maximum size of each class was determined with the current instruction system of the Forest Department. In selecting prospective trainees, priority will be given to the actual situation of the applicants' communities and the attitude toward forestry among the residents of the applicants' communities. The number of trainees to participate in this course may increase in due course. Instructors for this course will be selected from senior officials who are well experienced in this field. The development of a social forestry program of this kind will not only contribute to an increase in the area of forestland and accumulation of forest resources through effective use of community residents' energy, but also increase in the number of employed persons and boost their income, consolidate the economic base of local communities'

village level organizations, and ensure an ample supply of expendables for general households and farmers while protecting the natural environment. However, in Burma, forests are all state-owned. In implementing social forestry programs, it will be necessary to promote 1) consultation between the Forest Department and the executive committees of local communities' village level organizations, and 2) for incentive measures promoting forestry and establishing a system for evaluation the social forestry programs implemented. This training course must function as a basis for such a system.

D. Public Training ---Special Course

(1) Agro-Forestry (D-1)

This training course is open to more than 50,000 persons, the same number as the C-1 course. In this course trainees will study a system of effective combined land use by agriculture and forestry in densely populated regions and undeveloped plateau regions. This course will be implemented four times a year, in February, May, August and November, for two weeks each time. Each session will be conducted for a class of 30. Prospective trainees will be selected in the same way as the C-1 course. Instructors for this course will be selected from senior officials of the Forest Department.

Forestry as part of diversified agriculture, which is the subject matter of this training course, is aimed at the production of medium-sized timber to be used in repairing private houses and fences and as a supplementary material for use in agriculture, rather than large-sized timber to be used as structural materials. It is desirable to use trees whose leaves and young buds can be utilized as manure and livestock feed. Also, it is imperative to prevent erosion of the soil of hilly regions and increase agricultural production by establishing windbreaks. Various types of agro-forestry systems are currently being worked out, but the final goal of agro-forestry should be to draw up and implement a system which will bring about the maximum environmental and economic benefits in a combined area of agriculture, forestry and stockbreeding. Many unknown problems are to be addressed in agro-forestry programs which are to be implemented in locations of differing environmental factors. It will be necessary for

this training course to educate trainees on the basic concept of agro-forestry and at the same time provide opportunities to materialize technical cooperation.

(2) Dendro-Energy Production (D-2)

This is a training course for more than 50,000 persons, the same number as the C-1 course. Although its purpose overlaps the C-1 and D-2 courses to some extent, this training course is aimed primarily at the study of problems to be overcome in ensuring the supply of dendro-energy and increasing production.

Accordingly, this course will provide trainees with the knowledge and techniques of selecting types of trees suited for the actual conditions and objectives of the local communities concerned, and to develop fuelwood forests with an efficient production of dendro-energy.

This training course will be implemented twice a year, in April and July and for two weeks each time. Each session will be conducted for a class of 30. Selection of prospective trainees and instructors will be the same as in the C-1 and D-2 courses.

Table 3-3 Training Courses and Eligible for Each Course

Course No. of Eligible Trainees Course Name		ELIGIBLE TRAINEES														
		RANK NO.	3	4	5a	5b	5c	6	7a	7b	8a	8b	9a			
		Director	Dy. Director	Asstt. Director G1	Asstt. Director G2	GA	GB	P.O.	Supervisor T.F.O.	Supervisor P.U.	Dy. Supervisor T.F.O.	Dy. Supervisor P.U.	Forester	New Recruits B.Sc.		
I. Inservice Training	Regular Courses	A-1 Basic Forest Officer 50													↕	
		A-2 Advanced Forest Officer 3,007					↔									
		A-3 Forestry Induction 5,396									↔					
	Special Courses		B-1 Plantation Techniques 3,007					↔								
			B-2 Nursery Practices 3,007					↔								
			B-3 Forest Protection 2,249						↔							
			B-4 Forest Roads 2,249							↔						
			B-5 Forestry Machinery 3,007						↔							
			B-6 Forestry Extension & Utilization 2,249								↔					
			B-7 Forest Resource Administration 114	↔												
II. Public Training Courses	Regular Courses	C-1 Forestry for Local Community Development	<p style="text-align: center;">PRASANTS ASIAYONE</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;">State Division</div> → <div style="border: 1px solid black; padding: 5px;">Township</div> → <div style="border: 1px solid black; padding: 5px;">Ward</div> → <div style="border: 1px solid black; padding: 5px;">Village-tract</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> 272 13,192 </div>													
	Special Courses	D-1 Agro-Forestry	<p>Note: No. of Eligible Trainees in the Peasants Asiayone are more than 50,000</p>													
		D-2 Dendro-Energy Production														

Note: No. of eligible trainees depend on the New Forest Department 14,751 manpower Organization.

3-3-4 Subjects of Training Course

The annual schedule of each training course as shown in Table 3-4.

Table 3-4 Training Schedule

Course No. No. of Eligible Trainees Course Name		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
I. Inservice Training	Regular Courses	A-1 Basic Forest Officer	50	50										50
	A-2 Advanced Forest Officer	3,007			50				50					100
	A-3 Forestry Induction	5,396					100					100		200
	Special Courses	B-1 Plantation Techniques	3,007	50					50					100
	B-2 Nursery Practices	3,007		30							30			60
	B-3 Forest Protection	2,249	30					30						60
	B-4 Forest Roads	2,249		30							30			60
	B-5 Forestry Machinery	3,007			20								20	40
	B-6 Forestry Extension & Utilization	2,249				50				50				100
	B-7 Forest Resource Administration	114	15					15						30
II. Public Training Courses	Regular Courses	C-1 Forestry for Local Community Development			30		30			30			30	120
	Special Courses	D-1 Agro-Forestry		30			30		30			30		120
	D-2 Dendro-Energy Production				30			30						60
Maximum No. of Trainees		145	190	140	150	150	145	160	160	180	160	180	150	1,100

Subjects and timetables in each training course are shown in following tables.

I. In-service Training

A. Regular Course

A.1 Basic Forest Officer Course

8 weeks x 25 hrs./week = 200 hrs.

8 Saturday x 4 hrs. = 32 hrs.

Total = 232 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	workshop	
	Class room	A. V. room					
1. Management and administration	5	3	--	--	--		8
2. Forest policy and law	20	--	--	--	4		24
3. Budget and accounts	30	--	--	--	8		38
4. Office procedure	25	--	--	--	8		33
5. Basic forestry operations	25	10	25	30	8		98
6. Ergonomics handling of tools and equipment	10	--	--	--	--	5	15
7. Others							
Exam.	12	--	--	--	--	--	12
Reserve	4	--	--	--	--	--	4
Total	131	13	25	30	28	5	232

Study tour - Prome, Taikkyi, Hmawbi and Rangoon To study Sr. Nos. 2,3,4,&5.

Maximum distance - 150 miles from the training center.

I. In-service Training

A. Regular Course

A.2 Advanced Forest Officer Course

12 weeks 25 hrs. = 300 hrs.

12 Saturday 4 hrs. = 48 hrs.

Total = 348 hrs.

Subjects	Allocation of time (Hrs.)					Total	
	Lectures		Lab.	Field	Study tour		work-shop
	Class room	A. V. room					
1. Forest policy and law	25	5	—	5	4	39	
2. Office procedure	25	—	—	—	4	29	
3. Organization and management	15	5	—	—	—	20	
4. Forestry planning	30	10	—	—	4	44	
5. Forest revenue	30	10	—	—	4	44	
6. Budget and accounts	30	10	—	—	—	40	
7. Forest procedure requiring major forest operations	35	20	25	10	—	90	
8. Govt. service rules & regulations	16	—	—	—	—	16	
9. Others	16	—	—	—	—	16	
Exam, Reserve	10	—	—	—	—	10	
Total	232	60	25	15	16	348	

Study tour — Taikkyi, Hmawbi and Rangoon to study Sr. Nos. 1, 2, 4 & 5.

Maximum distance — 36 miles from the training center.

I. In-service Training

A. Regular Course

A.3 Forestry Induction Course

8 weeks 25 hrs/week = 200 hrs.

8 Saturday 4 hrs. = 32 hrs.

Total = 232 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Forest policy and law	10	—	—	—	2		12
2. Office procedure	10	—	—	—	—		10
3. Forest mensuration	10	5	—	5	—		20
4. Silviculture	10	5	10	20	—		45
5. Forest survey	10	5	—	20	—		35
6. Forest engineering	10	5	—	15	—		30
7. Forest protection	10	5	10	10	—		35
8. Forest botany	10	5	5	5	—		25
9. First aid	5	5	—	—	—		10
10. Others	8	—	—	—	—		8
Exam, Reserve	2	—	—	—	—		2
Total	95	35	25	75	2		232

Study tour — Taikkyi to study township office and forest ofences.

Maximum distance — 25 miles.

I. In-service Training

B. Special Course

B.1 Plantation Techniques

8 weeks 25 hrs/week = 200 hrs.

8 Saturday 4 hrs. = 32 hrs.

Total = 232 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	workshop	
	Class room	A. V. room					
1. Site selection and survey	6	2	4	4	--	--	16
2. Soil	6	1	8	4	--	--	19
3. Climatic study	4	2	--	--	--	--	6
4. Types of plantations	2	3	--	4	8	--	17
5. Choice of species	4	2	4	--	4	--	14
6. Sowing and planting	4	4	--	8	--	--	16
7. Weeding and soil working	4	4	--	8	8	--	24
8. Thinning and pruning	4	4	--	8	8	--	24
9. Growth and yield study	6	2	--	--	4	--	12
10. Protection	4	4	8	8	8	--	32
11. Recruitment of workers	3	--	--	--	--	--	3
12. Selection and handling of equipment and machinery	4	4	--	8	--	4	20
13. Organization	3	--	--	--	--	--	3
14. Cost analysis	5	--	--	--	--	--	5
15. Maintenance of records	6	--	--	--	--	--	6
16. Monitoring and reporting	6	--	--	--	--	--	6
17. Others	2	--	--	--	--	--	2
Exam, Reserve	7	--	--	--	--	--	7
Total	80	32	24	52	40	4	232

Study tour - Toungoo, Pegu and Prome to study Sr.No.4,5,7,8,9 & 10.
 Maximum distance - 180 miles from the training center.

I. In-service Training

B. Special Course

B.2 Nursery Practices

4 weeks × 25 hrs. = 100 hrs.

4 Saturday × 4 hrs. = 16 hrs.

Total = 116 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Choice of nursery site	4	3	4	4	-	-	15
2. Site preparation	2	2	-	4	-	-	8
3. Design and layout	2	2	-	4	-	-	8
4. Seeds collection, storage, testing, germination and distribution	4	3	4	-	-	2	13
5. Water supply and irrigation	4	-	-	4	-	-	8
6. Soil, compost and fertilizer	4	3	8	-	-	2	17
7. Sowing transplanting, tending, and culling	2	2	-	8	-	2	14
8. Protection	4	2	8	4	-	-	18
9. Organization	2	-	-	-	-	-	2
10. Cost analysis	3	-	-	-	-	-	3
11. Maintenance of records	3	-	-	-	-	-	3
12. Monitoring and reporting	3	-	-	-	-	-	3
13. Others	2	-	-	-	-	-	2
Exam, Reserve	2	-	-	-	-	-	2
Total	41	17	24	28	-	6	116

I. In-service Training

B. Special Course

B.3 Forest Protection

6 weeks × 25 hrs. = 150 hrs.

6 Saturday × 4 hrs. = 24 hrs.

Total = 174 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Protection against fire	10	4	4	6	4	4	32
2. Protection against insect	10	4	8	7	4	2	35
3. Protection against Fungii	10	4	8	6	4	3	35
4. Protection against cattles and wild animals	10	4	—	10	4	5	33
5. Protection against man	10	4	—	10	4	3	31
6. Others	2	—	—	—	—	—	2
Exam, Reserve	6	—	—	—	—	—	6
Total	58	20	20	39	20	17	174

Study tour — FRI, Yezin.

Maximum distance — 250 miles from the training center.

I. In-service Training

B. Special Course

B.4 Forest Road

6 weeks × 25 hrs. = 150 hrs.

6 Saturday × 4 hrs. = 24 hrs.

Total = 174 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Planning and design	8	4	4	4	4	—	24
2. Road alignment	8	4	—	4	4	—	20
3. Road construction	10	5	—	14	8	—	37
4. Road maintenance	8	4	—	4	—	—	16
5. Use of modern road making machineries	12	5	—	4	8	10	39
6. Cost estimate and material estimate	8	1	—	—	—	—	9
7. Organization	4	—	—	—	—	—	4
8. Maintenance of records	8	—	—	—	—	—	8
9. Monitoring and reporting	6	—	—	—	—	—	6
10. Others	2	—	—	—	—	—	2
Exam, Reserve	9	—	—	—	—	—	9
Total	83	23	4	30	24	10	174

Study tour — Toungoo to study Sr. Nos. 1,2,3 & 5.

Maximum distance — 180 miles from the training center.

I. In-service Training

B. Special Course

B.5 Forestry Machinery

8 weeks × 25 hrs. = 200 hrs.

8 Saturday × 4 hrs. = 32 hrs.

Total = 232 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Choice of forestry machinery	8	12	--	--	--	--	20
2. Handling and operation	20	10	--	32	10	--	72
3. Maintenance	20	10	--	--	--	60	90
4. Store keeping of spare parts	12	8	--	--	--	10	30
5. Maintenance of records including log books etc.	8	2	--	--	--	--	10
6. Others:							
Exam,	2	--	--	--	--	--	2
Reserve	8	--	--	--	--	--	8
Total	78	42		32	10	70	232

Study tour - Toungoo to study handling and operation of forest machineries.

Maximum distance - 180 miles from the training center.

I. In-service Training

B. Special Course

B.6 Forestry Extension & Utilization

8 weeks × 25 hrs/week = 200 hrs.

8 Saturday × 4 hrs. = 32 hrs.

Total = 232 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	workshop	
	Class room	A. V. room					
1. Forestry education	30	10	—	10	20	—	70
2. Coordination with Government and non government Organizations	5	—	—	—	—	—	5
3. Technique of forestry extension	15	6	8	12	—	—	41
4. Use of audiovisual equipments both in the fields	15	6	4	10	—	—	35
5. Efficient Utilization of lesser known spp., bamboos, canes, etc. to improve the standard of living of peasants and workers.	22	8	8	15	20	—	73
6. Others	2	—	—	—	—	—	2
Exam, Reserve	6	—	—	—	—	—	6
Total	95	30	20	47	40	—	232

Study tour — Taikkyi, Pegu and Toungoo to study Sr. Nos. 1 & 5.

Maximum distance — 180 miles from the training center.

I. In-service Training

B. Special Course

B.7 Forest Resource Administration

8 weeks × 25 hrs. = 50 hrs.

8 Saturday × 4 hrs. = 8 hrs.

Total = 58 hrs.

* Includes 6 hrs. library

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Latest policy and guideline	4	1	--	--	--	--	5
2. Research findings of forest research institute and its application in the field	6	4	4	4	8	--	26
3. Up-to-date forestry situation abroad by sharing the experiences of forest officers returned from abroad	6	5	--	--	--	--	11
4. To be in touch with the latest international publication	8	--	--	--	--	--	8
5. To study the systems and facilities of CFDTC	1	--	--	--	3	--	4
6. Others	2	--	--	--	--	--	2
Exam, Reserve	2	--	--	--	--	--	2
Total	29	10	4	4	11	--	58

Study tour - FRI, Yezin to study Sr. Nos. 2 & 5.

Maximum distance - 250 miles from the training center.

II. Public Training Courses

C. Regular Courses

C. Forestry for Local Community Development

2 weeks × 25 hrs. = 50 hrs.

2 Saturday × 4 hrs. = 8 hrs.

Total = 58 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	workshop	
	Class room	A. V. room					
1. Conservation and Management of existing woodlots around the villages	3	2			5		10
2. Creation of new fuelwood resources by establishing village-owned fuelwood plantation, private-owned trees around the farmland and in private compound, etc.	3	2		5			10
3. Introduction of efficient wood stoves, etc.	2	2	4			1	9
4. Production of minor forest products like gums, resins, oils, mushrooms, medicine plants etc.	3	2	4		5	2	16
5. Handicrafts and household commodity using bamboos, canes and fancy-woods	2	2	2		5	2	13
Total	13	10	10	5	15	5	58

Study tour : Hmawbi, Taikkyi and Rangoon to study Sr. Nos. 1, 4 & 5.
Maximum distance:-36miles from the training center.

II. Public Training Courses

D. Special Courses

D.1 Agro-forestry

2 weeks × 25 hrs. = 50 hrs.

2 Saturday × 4 hrs. = 8 hrs.

Total = 58 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Integrating forestry and agriculture for rural community development	3	3		—	4	—	10
2. Choice of Multiple use tree species for fodder, fuelwood, green manure and small timber to suit local conditions	3	3	2	4	4	—	16
3. Agro-silvicultural practices for prevention of hillside erosion and for better crop production by growing wind breaks and shelter belts etc.	4	3	2	4	4	—	17
4. Transformation of shifting cultivation system to permanent agriculture using bench terraces, or strip terraces and hillside ditches	4	3	—	4	4	—	15
Total	14	12	4	12	16	—	58

Study tour — Prome and Toungoo to study Sr. Nos. 1,2,3 & 4.

Maximum distance — 180 miles from the training center.

II. Public Training Courses

D. Special Course

D.2. Dendro-energy Production

2 weeks × 25 hrs. = 50 hrs.

2 Saturday × 4 hrs. = 8 hrs.

Total = 58 hrs.

Subjects	Allocation of time (Hrs.)						Total
	Lectures		Lab.	Field	Study tour	work-shop	
	Class room	A. V. room					
1. Establishment of dendro-energy plantations	2			4	4		10
2. Choice of species to suit the local conditions and objectives	2	2		4	4		12
3. Production of fuelwood, charcoal and biogas	2	2		4	4		12
4. Introduction of efficient wood stove	2		4	4			10
5. Cost analysis and justification	4						4
6. Use of wood gasifier	2	2				2	6
7. Others	2	—	—	—	—	—	2
Exam, Reserve	2	—	—	—	—	—	2
Total	18	6	4	16	12	2	58

Study tour — Hmawbi and Taikkyi to study Sr. Nos. 1,2 & 3,
Maximum distance — 36 miles from the training center.

The daily timetable, shown below, is common to all training course.

Table 3-5 Daily Timetable

Time	Schedule
06:00-07:00	Physical exercise
07:00-08:00	Breakfast
08:00-12:00	Training
12:00-13:00	Lunch
13:00-15:00	Training
16:00-17:30	Physical exercise
18:00-19:00	Supper
19:30-21:30	Self-study

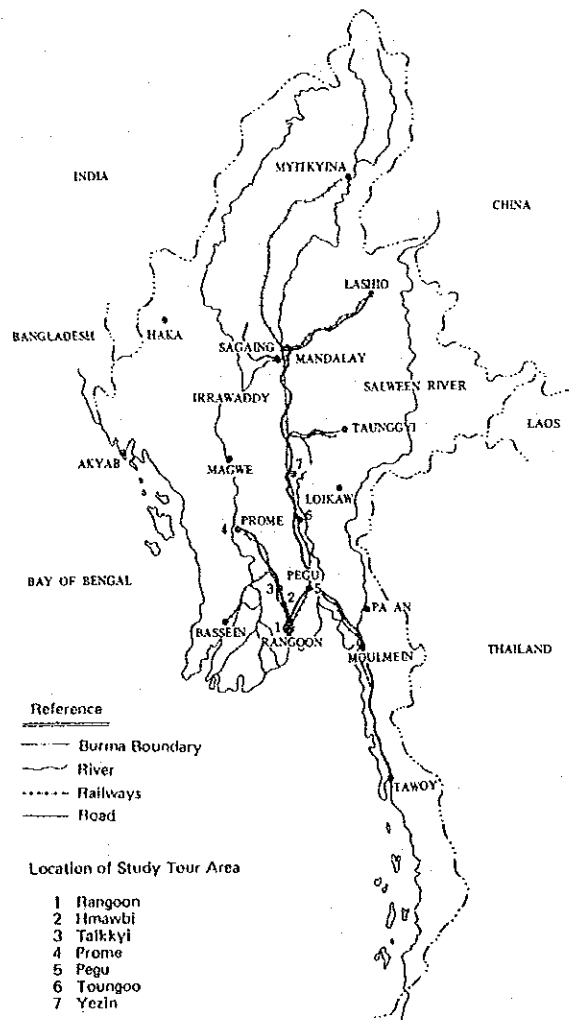


Fig. 3-4 Place for Study Tour

3-3-5 Location and Actual Situation of the Project Site

A. Location of the Project Site

The project site is located about 60km (38 miles) north of Rangoon City. It is about an 80 minutes drive on the Rangoon-Prome Road from Rangoon City. The project site is part of the Hmawbi Reserved Forest of the Forestry Department. It is currently being used as a place for tentative planting of trees used in landscape gardening.

At the initial stage of the basic design study of this project, the following three sites, all of which are part of the Hmawbi Reserved Forest of the Forest Department (total area: 746ha), were cited as alternative project sites. From these, the most suitable one for this project was to be selected.

Site A A flat area near the Rangoon-Prome road

Site B A plateau surrounding a pond in the central part of the reserved forest.

Site C A gently sloping plateau located to the south of the central part of the reserved forest

As a result of a survey of these sites, Site A was selected as a project site, judging to be best suited for this project in terms of the distance of the access road, the shape of available ground, possible publicity effects on the general public after completion of construction of the facilities.

The project site is adjacent to the premises of the Hmawbi Seed and Seedling Center and the Township Forest Office. The part of the site that faces the Rangoon-Prome Road is designated as an industrial area.

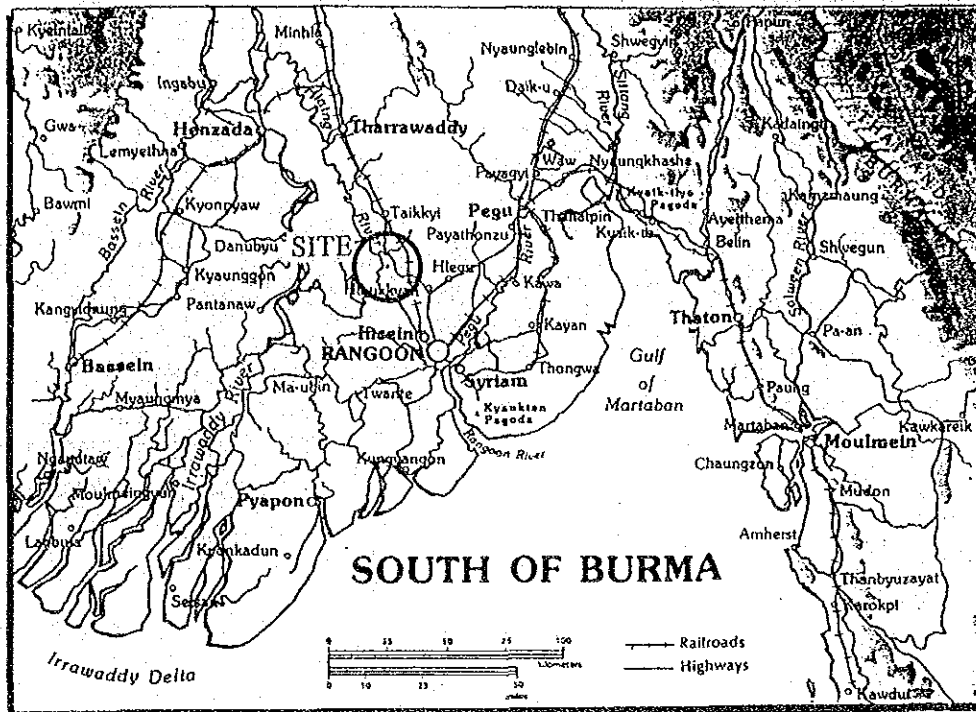


Fig.3-5 Location of Project Site

B. Actual Situation of the Project Site

(1) Topography

The project site is a rectangular piece of land about 650m long east to west and about 250m long south to north. Total area is about 10.8ha. The area where buildings will be constructed is a plateau gently sloping towards the west. The plateau has an elevation decline of about 10m. The site is currently being used for the planting of trees used in landscape gardening.

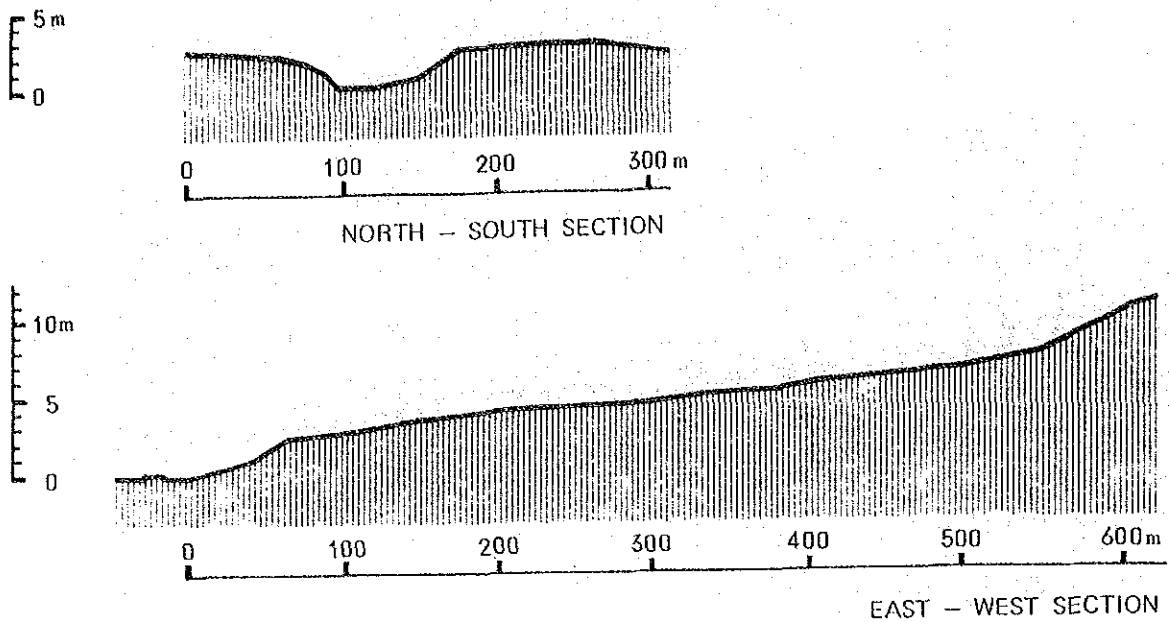


Fig. 3-6 Project Site Topography

(2) Ground

According to the boring data of the project site, the ground consists of a layer of dark brown sand and silt layer with trace of clay with N value of 10 to 12 (up to 0.5m deep under the ground), a layer of medium dense reddish brown sandy clay and silt with trace of laterite gravel with N value of 20 to 25 (0.5 to 2.5m below ground) and a layer of reddish brown or yellowish brown laterite clay with N value of more than 30. When low buildings of 2 or 3 stories are built, it will be both efficient and economical to use direct foundations, for which the second layer (0.5 to 2m below the ground, N value of more than 25) will serve as the supporting ground.

C. Infrastructure

(1) Electric Power

Electric Power will be supplied to the boundary of the project site through 11KV overhead line from the substation (33KV/11KV) which will be constructed adjacent to the existing substation, in front of the brick factory, located about 1km from and south side the project site. (see Fig.

3-7). The work to lead in the electric power to the site is to be executed by the Burmese side. The area surrounding the project site suffers frequent interruption of power supply and voltage regulation. So it is necessary to take measures against power failure and voltage regulation.

(2) Telephone

Since the existing overhead telephone line installed along the Rangoon-Prome Road on the western side of the project site does not allow for the addition of extra circuits, it is necessary for the Burmese side to install a new telephone line to the project site.

The Burmese side has a plan which links between Taikkyi station and the site by UHF radio communication system.

(3) Water Supply

Since there is no public water service available near the project site, deep tube wells within the project site will be used as the source of water supply. According to the data on the water pumped up from the existing wells on the premises of the Hmawbi Seed and Seedling Center, there is no problem with the quality of water in the area or the quantity of water required. It will be necessary to dig a total of three wells, two for supplying water to the buildings and one to nursery.

(4) Drainage

There is no public sewerage system near the project site.

The quality of waste water is not regulated. From the standpoint of maintenance and handling, as well as cost saving, it will be advisable to treat sewage in soil water tanks and let the treated soil water permeate into soil.

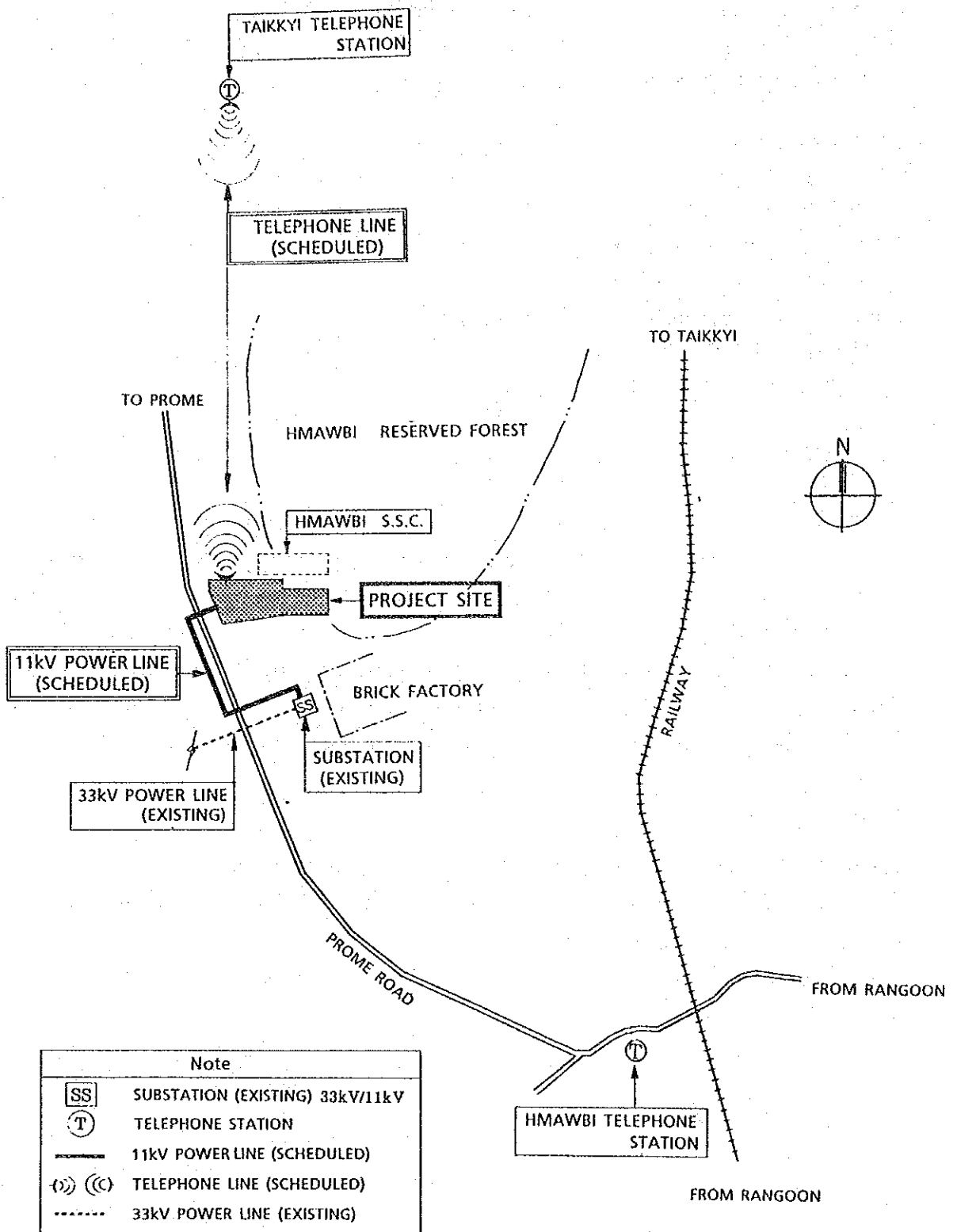


Fig.3-7 Current State of Infrastructure

3-3-6 Outline of the Facilities and Equipment

It is considered necessary to provide the following facilities and equipment to achieve the goals of this project.

A. Facilities

In consideration of the interrelation of the functions required of CFDTG, it is advisable to separate the building facilities into the main building, the workshop building and the dormitory building. Each building should comprise the following facilities.

(1) Main Building (reinforced concrete, 2-story building)

1. Lecture facilities

..... 4 seminar rooms
(seating capacity, 100, 50, 30 and 30 respectively)

2. Experimental training facilities

..... Biology laboratory, Chemistry laboratory, Drawing room

3. Training material production facilities

..... Audiovisual editing room, Printing room, Slide production room

4. Information facilities

..... Library, Sample presentation room

5. Meeting facilities

..... Training hall

6. Administration facilities

..... Offices, Instructors' rooms, Director's office, Conference room,
Clinic, Experts' rooms

(2) Workshop Building (reinforced concrete, single-story building)

1. Storage

..... Plantation machinery storage, Forest machinery storage, Nursery equipment and machinery storage

2. Workshop

(3) Dormitory Building (reinforced concrete, 3-story building, partially one-story building)

1. Dormitory

..... Dormitory rooms (3-bed rooms and single rooms, both for men only), Instructor's rooms (6 rooms)

2. Canteen

..... Canteen, Kitchen

B. Nursery Facilities

1. Nursery

..... nursery bed for potted seedling, Nursery bed for stump seedling

2. Attached facilities

..... Germination house, Glasshouse, Potting shed, etc.

One deep tube well to supply water to the nursery will be dug.

C. Equipment

1. Laboratory equipment

Equipment necessary in conducting germination experiments (biological experiments) and analysis of soil and so on under an artificial environment for the purpose of realizing forestation suited for soil.

2. Nursery equipment

Cultivators (to be used on the seedling growing fields), pot making machines and so on which are necessary in growing seedling to be used for pot forestation.

3. Silviculture equipment

tractor, chain saw and so on which are to be used in mechanized forestation.

4. Forest fire fighting equipment

Fire pump, tank lorry, siren and so on which are to be used for forest fire fighting and fire prevention training.

5. Forest and road survey equipment

Compass, measuring tape, hypsometer and so on which are to be used in harvest surveys, plant growth surveys and other training activities.

6. Forest road construction equipment

Angledozer, tractor shovel, hand breaker and so on which are to be used in training in construction of forest road (width:less than 4m).

7. Meteorological observation equipment

Barometer, thermometer, hygrometer, anemometer, rain gauge and so on which are to be used in training in collection of meteorological data necessary for forestation and seedling growing.

8. Repairing workshop equipment

Hot water car washer, parts washing stand, drum pump, garage jack and so on which are to be used in training in basics of repair and maintenance of heavy machines and motor vehicles.

9. Audiovisual equipment

Audio system, OHP, video monitor and so on will be installed in the seminar rooms and the training hall as supplementary equipment to help lecturers enhance lecturing efficiency.

10. Training materials production equipment

Printer, typewriter, word processor, personal computer, video editing equipment and so on which are to be used in teaching materials production.

11. Vehicle

Compact size bus, microbus, truck for transporting equipment and machinery, vans equipped with audiovisual equipment for recording data for training materials and so on which are to be used for transportation of trainees to participate in field surveys and outdoor training courses.

3-4 Technical Cooperation

In order that the CFDTIC facilities may be fully utilized, the Burmese Government has strongly requested that the Japanese government provide project-type technical cooperation in connection with this project. In response, the Japanese Government decided to conduct a survey to investigate the feasibility of such technical cooperation, and dispatched a long-term expert survey team to Burma through the Japan International Cooperation Agency. The survey team conducted the survey in Burma from October 10 to November 23 in 1986. After confirming the details of the Burmese request and investigating and evaluating the validity and feasibility of such technical cooperation, the survey team had consultations with representatives of the Burmese Government.

According to the views of the survey team and the Burmese Government, the contents of the project-type technical cooperation which will be possible to realized, at present, are summarized below.

1. Field of Technical Cooperation

. Plantation Techniques:

..... Survey of soil, selection of the trees varieties to be planted, planting, nursery, protection, cost accounting etc.

. Nursery Practices:

..... Designing nursery, selection of seeds, storage, germination testing, sowing, transplanting, manuring, weeding, sprinkling, protection, cutting, etc.

. Forest protection:

..... Harmful insects, forest fires, etc.

. Development and repair of forest roads:

..... Forest road network plan, design of forest roads, development of forest roads, etc.

. Forestry machinery

.... For forest road development, plantation, repair of machinery, etc.

2. Period of Technical Cooperation

Period necessary after signing the Record of Discussion concerning the technical cooperation, up to a maximum of 5 years .

3. Contents of Technical Cooperation

(1) Dispatch of Japanese experts to Burma

The Japanese side is considering the dispatch of Japanese experts.

(2) Dispatch of Burmese counterparts to Japan for training

During the period of technical cooperation, the Burmese counterparts will be invited to Japan for training.

(3) Supply of equipment and machinery

During the period of technical cooperation supplementary equipment and machinery will be supplied by Japan.

The basic points of the technical cooperation are now under consideration. However, it would be desirable that the technical cooperation should commence before construction of the CFDTTC facilities is completed, in order to ensure the efficient administration of the buildings and the efficient transfer of equipment and machinery.

CHAPTER 4
BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Design Policy

In working out the basic design, the following points should be comprised in the basic policy for designing the facilities.

1. To make the facilities compatible with the local climate.

In Burma the rainy season lasts from May to October. In July and August, in particular, many parts of the country are often hit by localized torrential downpours. The climate of Burma is characterized by high temperatures and humidity. During the dry season there is intense sunlight. These climatic conditions impose various restrictions on the use of the facilities as well as the selection of materials to be used for their construction. It is necessary, therefore, to work out an architectural plan which will fit in well with local environmental conditions.

2. To minimize the maintenance and operation costs of the facilities

The architectural plan should fully take into consideration adequate natural ventilation and lighting so that energy costs may be minimized. Also, the criteria for selecting construction materials should give priority to durability so that the facilities which are built may function satisfactorily for a long period with a minimum of repair works and lower costs for maintenance and operation.

3. To realize efficient use of the facilities.

The room layout and its structure plan and the equipment layout plan should be flexible enough so that they contribute to efficient use of the facilities. If designed in this way, the facilities will be flexible enough to cope with any changes in the types of training and other activities conducted in the facilities.

4. To have sufficient appropriateness in the design criteria of the facilities and equipment.

An extensive survey of the present situation of technical training in forestry and the local construction condition should be conducted and the curriculum of the technical training in forestry should be fully analyzed. And then a well-balanced architectural design for the facilities should be worked out on the basis of the results of such surveys and analyses.

In working out the basic design, the natural, economic and technological conditions of Burma should first be examined carefully and then an architectural planning for the facilities which will fit in with these conditions should be carried out so that the facilities may be fairly functional and economical.

4-2 Design Conditions

In drafting the basic design, the following design conditions should be examined carefully.

4-2-1 Functions Required of the Facilities

The major functions required of the center can be broadly classified into the following four functions. It is necessary to regard the following four functions as the basic design conditions to be satisfied in this project and then to determine the contents and scale of the facilities based on the result of minute examination of these basic functions.

1. Function as the Central Organization for Forestry Training in Burma

The center have a function as the pivotal organization for forestry training in Burma. At the CFDTTC, training programs for the personnel of the Forest Department, as well as the residents of local communities, will be worked out and implemented in close cooperation with related organizations. The center are to play a pivotal role in forestry training as the central organization to promote the development of forestry throughout the country. Therefore, the contents of the facilities must exactly match the purpose of this functions.

2. Function for Forestry Training

The training curriculum developed accurately reflects the methods and the contents of training activities to be conducted at the center, as well as the methods of evaluating the functions of the facilities. Accordingly, the scale of the facilities will be determined also by the training curriculum. The basic policy underlying the training curriculum is to offer training in all important branches of forestry under a rule requiring all trainees to live at the center. The contents of the training programs, the types of trainees eligible for the programs and the methods of training, all of which must conform to this basic policy, will be so varied. It is necessary, therefore, to determine the contents and the scale of the facilities on the basis of the training function required.

3. Function for Development and Production of Training Materials

In the training programs, emphasis will be placed on the development and production of training materials as a means to accurately communicate the contents of the training programs to trainees and at the same time disseminate information among the residents of local communities. It is necessary, therefore, to establish facilities which will make it possible to develop and produce training materials for the purpose of providing trainees technologies.

4. Function as a Living Environment

The training programs will be implemented under a rule requiring all trainees to live in the dormitory building. In other words, the projected training center will include lodging facilities where all trainees will live together during the whole training period. The lodging facilities will include a dormitory, canteen, playground, lounge and so on.

4-2-2 Natural Condition

The facilities to be constructed must be compatible with the natural conditions such as the climate of the locality where they are going to be constructed. The facilities can be fully functional and durable only when they fit in with such natural conditions, which in turn will lead to a reduction in costs for their maintenance and operation. In the case of this project, it is necessary to work out an architectural design taking into account the following natural conditions in Burma.

1. Heavy Rainfall

The project site is located in an area of tropical rain forest, where the year is divided into the rainy season (May to October) and the dry season (November to April). During the rainy season, in July and August in particular, this area is frequently hit by localized torrential downpours. Therefore, the architectural plan for the facilities must be worked out on the assumption that the facilities will be used even when it rains heavily. It is necessary to design the facilities taking into account their resistance to rain water and water leakage, as well as the resistance to secondary effects to the facilities caused by heavy rainfall

such as soundproofing for the time of heavy rainfall and measures against the rise of water level in surrounding areas.

2. High Temperatures

It is usually very hot in and around the project site. During the dry season the average monthly maximum temperature reaches 38°C (April). To ensure comfort, therefore, it is necessary to secure adequate natural ventilation for each room as well as to equip each room with an air conditioner where a natural ventilation cannot be secured functionally.

In and around the project site the wind blows south-southwest during the period from February to September and north-northeast from October to January.

3. High Humidity

In addition, the rainy season is characterized by high humidity. From June to August, relative humidity reaches 70 to 80%. This causes the facilities in this area to become very moldy and rusty. So it is necessary to select construction materials which are very resistant to corrosion. It is also necessary to take minute care in determining the methods maintaining of laboratory equipment.

4. Earthquakes

The western part of Burma belongs to the Eurasian earthquake zone. A large dislocation exists along the Sittang River which runs across the central part of Burma.

In Burma there were a number of big earthquakes in the past. It is necessary, therefore, to prepare an earthquake-resistant structural design for the facilities.

5. Thunder

During the rainy season it often thunders and many facilities are struck by lightning. Since the project site is in a flat area, it is necessary to incorporate measures against lightning in the architectural plan.

4-2-3 Construction Condition

In Burma the national system of construction activities is well organized. With some exceptions, almost all of the building construction projects for government agencies are carried out by the Construction Corporation. Also domestic production of specific construction materials is assigned to a specific public corporations. Under the above conditions, the following points should be specially noted in working out the basic design.

1. Construction Materials

The construction materials to be used in this project, those which are produced in Burma are limited both in type and shape. Finishing materials, in particular, are very limited in color and shape, which imposes many restrictions on architectural design. Also, the supply of construction materials is very limited. There are various restrictions on the method of supply of construction materials and the quantity supplied. It is essential to take great care in utilizing locally made construction materials.

Under these circumstances, it will be advantageous to use Japanese-made construction materials to ensure quality and punctual deliveries, as well as a long working life for the facilities and long-term economy.

2. Execution System

With those for the Ministry of Industry II being the only exception, almost all of the public construction projects in Burma are executed by the Construction Corporation. There is no other authorized construction organization, public or private. In the construction stage of this project, therefore, Japanese contractors must hire the Construction Corporation as a subcontractor. It should also be noted that without the cooperation of the Construction Corporation it is impossible to carry out any construction work in Burma. This means that it is essential to plan construction costs, construction schedule, etc. on the assumption that the Construction Corporation is the only authorized collaborator in any of the construction projects in Burma.

3. Necessary Office Procedures

It should be noted that in Burma it takes a time to complete the necessary office procedures for concluding a consultant agreement, construction contract and so on. Particularly, the procedures for concluding a construction contract, namely those for obtaining approval of tender documents, and the right to negotiate the construction contract, the construction contract and payment of contract money, are very time-consuming.

It is necessary, therefore, to allow sufficient time for these procedures in working out the entire construction schedule.

4-3 Basic Plan

4-3-1 Construction Site and Layout Plan

A. Construction Site

The construction site is located about 60km (38 miles) north of Rangoon, in the Hmawbi Reserved Forest which is under the control of the Forest Department, facing the Rangoon-Prome road. The total area of the forest is about 746 ha, of which about 200 ha is occupied by the Hmawbi Seed and Seedling Center and the Township Forest Office. The remaining area is an undulating and gently sloping hill where herbaceous plants and shrubs grow.

The construction site is located in a flat area near the Rangoon-Prome road. There is no likelihood of pools forming during the rainy season. Part of the site is used for growing trees to be used for landscape gardening by the Hmawbi Seed and Seedling Center.

The western end of the site faces the Rangoon-Prome road, one of the main trunk roads of Burma, which is now being expanded. The road provides easy access to the site, which is an advantage in planning and implementing the construction schedule. Also, after the construction is completed, one will have a clear view of the facilities from the road, which will have attractive effect on the general public. The northern end of the site faces a primary school across the access road to the Hmawbi Seed and Seedling Center. Its southern end faces the Township Forest Office. Behind its eastern end spreads a vast reserved forest which is under the jurisdiction of the Forest Department.

The area which comprises the construction site and the Rangoon-Prome road is now being developed as a major industrial complex. A brick manufacturing plant, a ball-point pen manufacturing plant and other plants are already operating here. However, noise, soot and smoke from these plants will have no adverse effects on the site.

Shown below are the basic data on the construction site.

Address : Hmawbi Township, Rangoon Division
Location : 17'06" north latitude, 96'04" east longitude
Height above sea level: 28 meters
Area : approximately 10.8 ha

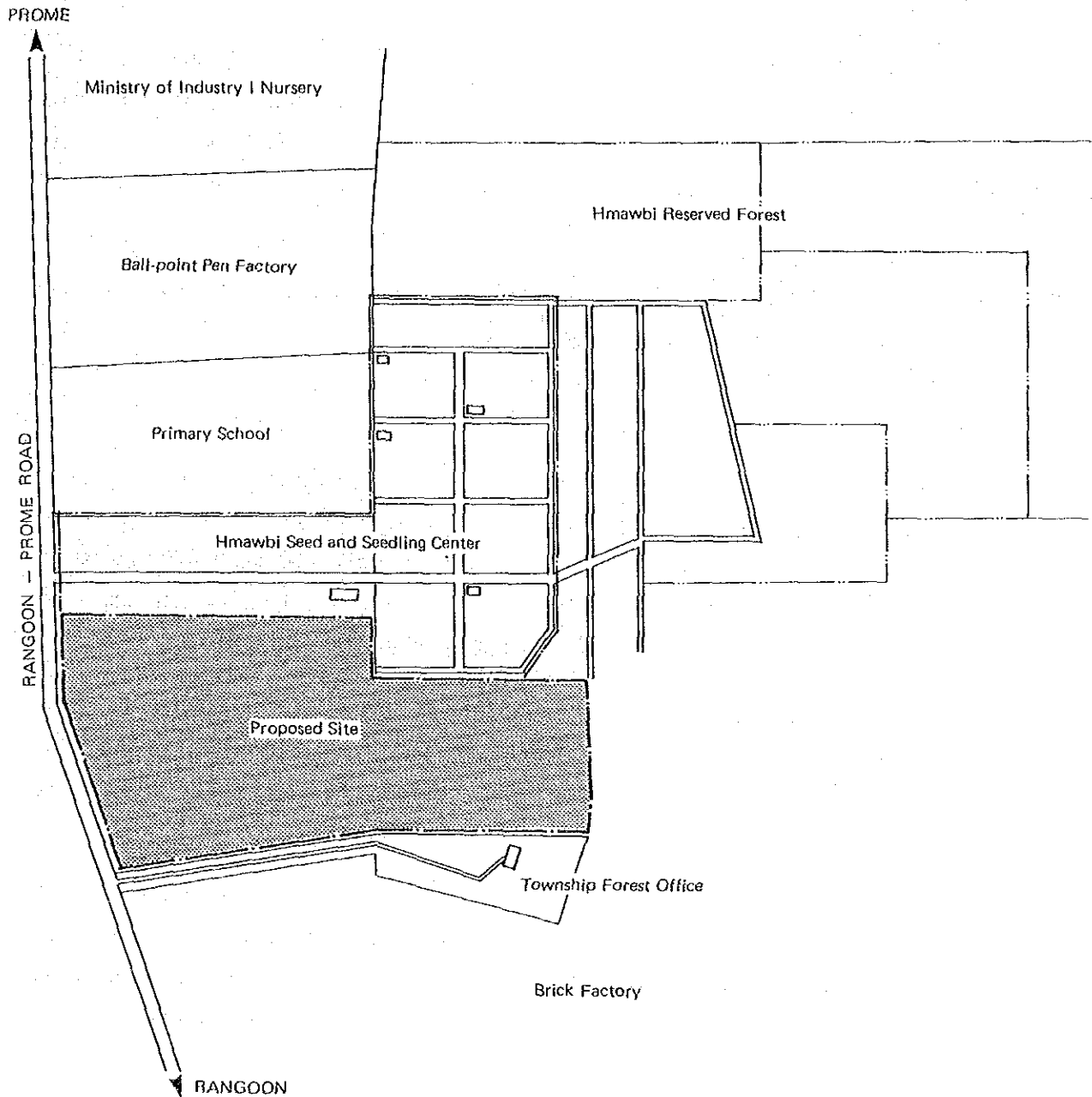


Fig. 4-1 Proposed Construction Site

B. Layout Plan

(1) Site Utilization Plan

Judging from the shape of the site, surrounding environment and the contents of the facilities to be constructed, it is advisable to divide the entire site into the following functional blocks for its optimal utilization.

1. The main building block which includes the seminar rooms, the training hall, the office rooms and so on should be located in the center of the tableland on the western side of the site, in consideration of the need to provide direct access to the site from the Rangoon-Prome road.
2. A sufficient distance should be secured between the main building block and the road in consideration of possible adverse effects of traffic noise from the road. The vacant lot in front of the building can be utilized as a forecourt, where a playground and an demonstration forest will be located.
3. The relatively spacious flat area in the northern part of the site which is near the main building block will be the location of a nursery and outdoor training facilities. Since this northern part of the site is adjacent to the premises of the Hmawbi Seed and Seedling Center, the outdoor training facilities can be shared with the Center.
4. The eastern side of the site adjacent to the vast reserved forest, which is located just behind the main building block, will be the residential block. It is possible to expand this area by utilizing part of the area of the existing reserved forest.
5. An area along the Rangoon-Prome road, which faces the southern end of the site across the Township Forest Office, is now being developed as an industrial area. It is advisable to create a buffer zone between that area and the construction site because of possible adverse effects from the industrial area. This buffer zone can be used as a demonstration forest.

The main building block, the outdoor training facilities block and the residential block will be connected by roofed passages or pilotis. Inner road will be provided around each block to facilitate access by vehicles.

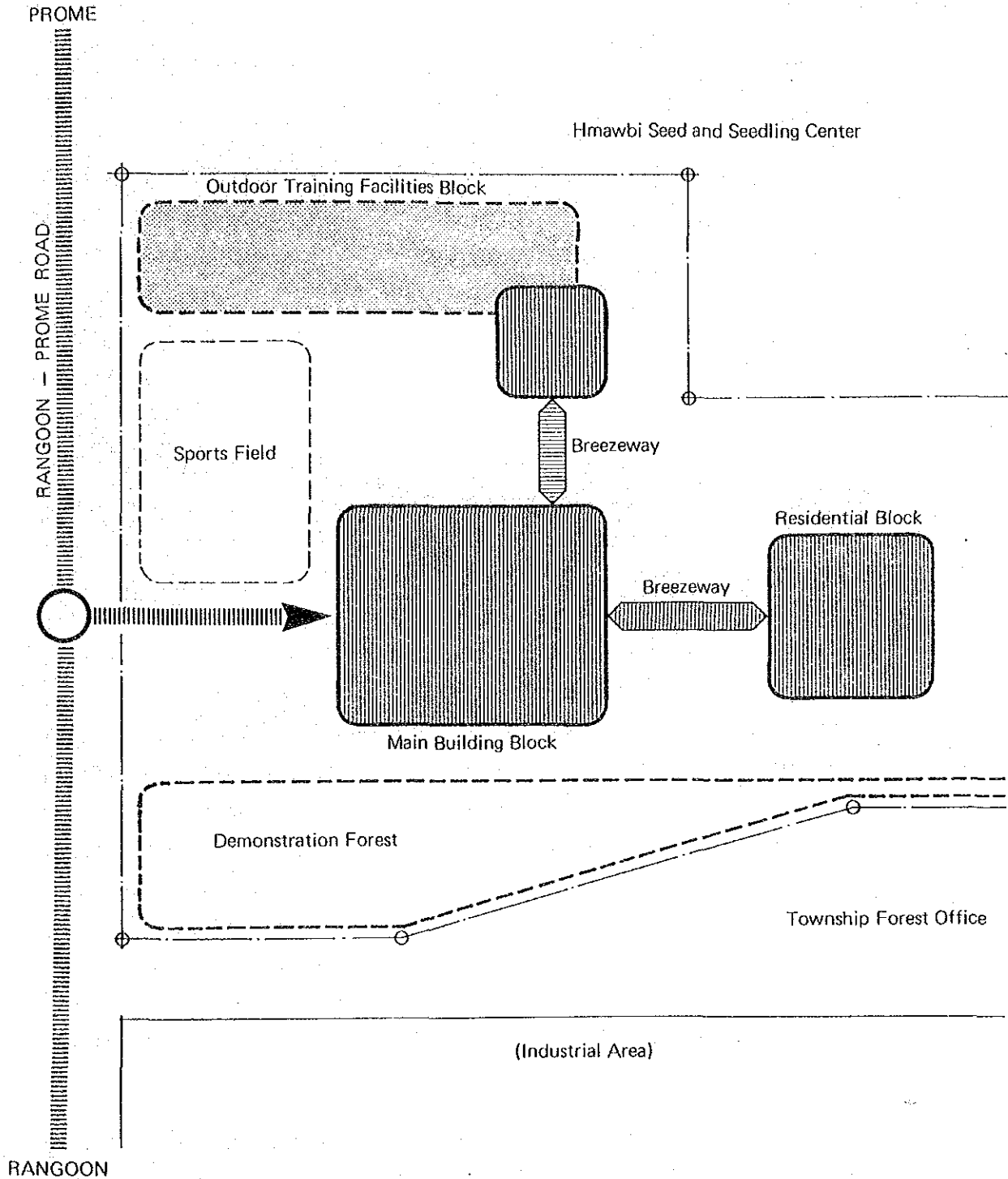


Fig. 4-2 Site Layout Concept

(2) Building Layout Plan

The above-mentioned three blocks will be further divided into the following groups of facilities.

1. Main building block:

- training facilities
- training hall
- office building

2. Outdoor training facilities block:

- workshop and storage
- nursery and its related facilities

3. Residential block :

- dormitory
- canteen

In the main building block the office building will be located just in front of the access road from the Rangoon-Prome road. The office rooms will be connected to the training facilities at its left end and the training hall at its right end. The training facilities, which will comprise seminar rooms, laboratories and a drawing room, will lie east to west to have ample natural lighting and ventilation. The office building, to be located in the center of the facilities, will include an entrance hall, a sample presentation room and office rooms. In designing the layout of the office rooms it is necessary to make part of the office rooms free from lighting on the western side. The training hall will be located close to the office building in the light of the close relationship between the two buildings. But the training hall will also be used independently as a place for various kinds of meetings. The external space surrounded on three sides by the training facilities, the training hall and the office building should serve as a place of recreation and relaxation for trainees as well as a place for the exchange of information among them, not as a formal forecourt.

The outdoor training facilities will include the workshop and storage for the installation of training and repairing equipment and machinery used in outdoor training such as forest road construction and plantation practices, as well as the nursery and its attached facilities. The

workshop and storage should be located in a position convenient for transportation of the equipment and machinery to and from the nursery and the reserved forest and it shall be connected to the training facilities with a roofed passage.

The residential block will include dormitories and canteen. This center will offer a curriculum on the assumption that all trainees will receive training while living at the dormitories. It is expected, therefore, that all trainees will frequently move between the dormitories and training facilities. In this connection, it will be necessary to connect the two facilities with a roofed passage so that it will be easy for trainees to utilize the training facilities even during the rainy season. The canteen should be located between the dormitories and training facilities so that trainees may gain easy access to the canteen either from the dormitories or the training facilities.

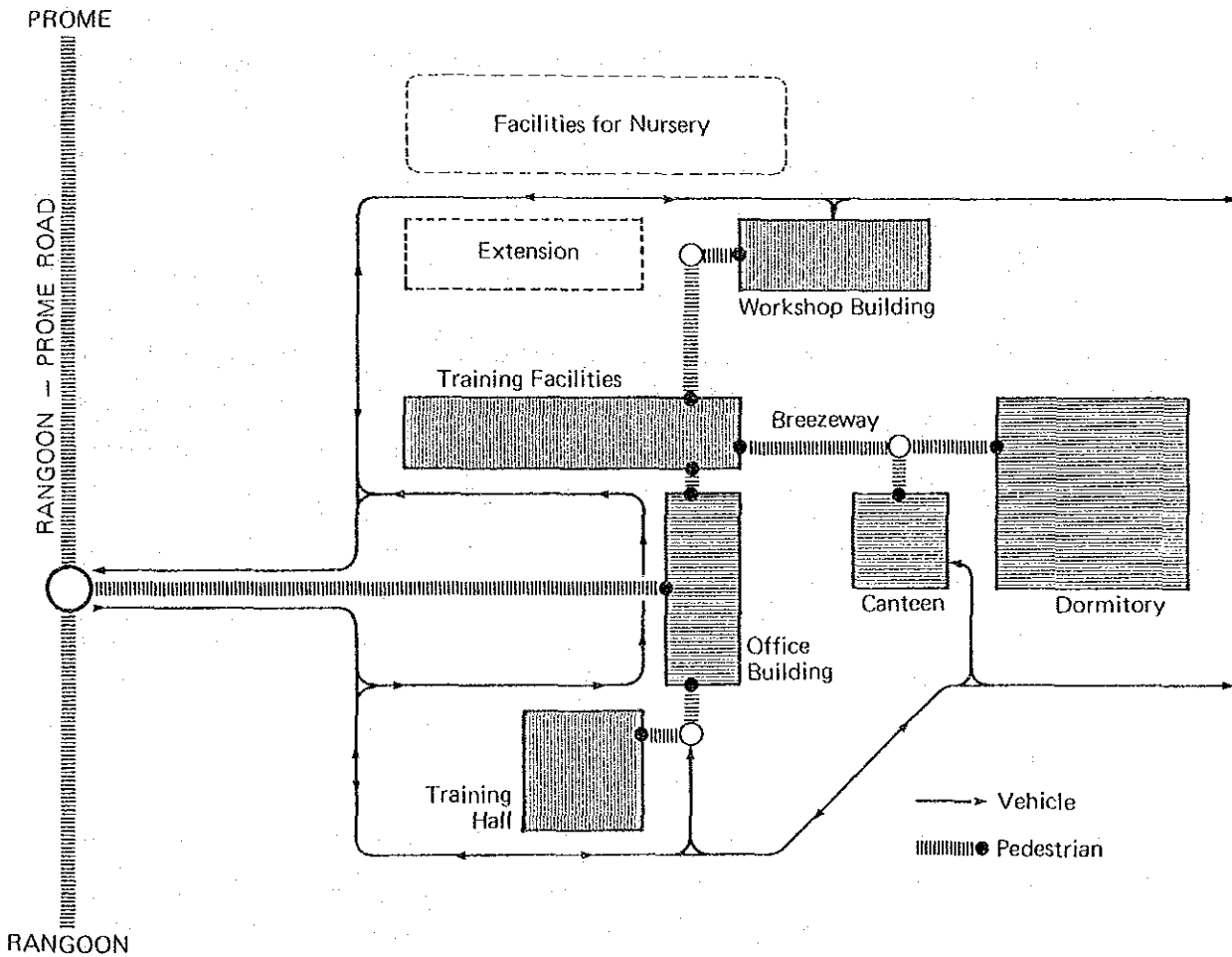


Fig.4-3 Facilities Layout Concept

4-3-2 Architectural Plan

A. Floor Plan

Outline and design of the major rooms of the facilities are as shown below.

(1) Main Building Block

① Seminar Rooms

The seminar rooms will be used for lecture type classes in each training course. According to the proposed training curriculum, the number of lecture hours in each course accounts for about 48% of the total annual training hours. Four seminar rooms of different sizes will be built. The number of rooms and the scale of each seminar room was determined in accordance with the contents of the training curriculum, as shown below.

The necessary floor area for each seminar room was calculated according to the furniture layout plan which employs the standard dimensions (68cm wide, 45cm deep and 76cm high) of the one-seat school desk manufactured by the Timber Corporation as the basic criterion.

1. Seminar Room (I)

This seminar room, with a seating capacity of 100 trainees, will be used mainly for the Forestry Induction Course (A-3). The room can be divided into two rooms with a movable soundproof partition and each room can be used as a lecture room with a seating capacity of 50. These lecture rooms will be used for lecture type classes in the Forest Roads Course (B-4), the Plantation Techniques Course (B-1) and the Forestry Extension & Utilization Course (B-6). The floor area of this seminar room covers 216m² (12m x 18m).

2. Seminar Room (II)

This seminar room will have a seating capacity of 50 and will be used mainly for the Basic Forest Officer Course (A-1) and the Advanced Forest Officer Course (A-2). It has a floor area of 108m² (9.0m x 12.0m).

3. Seminar Room (III), (IV)

Both of these seminar rooms will have a seating capacity of 30. Although each will be used primarily for lectures of 30-trainee classes, it will also be used for the Forestry Machinery Course (B-5, 20 trainees) and the Forest Resource Administration Course (B-7, 15 trainees). The floor area of each is 81m² (9.0m x 9.0m).

The estimated occupancy of seminar room as specified in the training curriculum is shown in the tables below.

Table 4-1 Estimated Occupancy of Seminar Room

SEMINAR RM	Nos. of Room	Seat Nos.	Course Name	Nos. of Occupant	Occupancy (mouths/session) × (session/year) = months/year
Seminar RM (I)	1	100	A-3	100	$2 \times 2 = 4$
			B-1	50	$2 \times 2 = 4^*$
			B-6	50	$2 \times 2 = 4^*$
			B-4	30	$1.5 \times 2 = 3^*$
			Total		9.5 months/year (Occupancy 79%)
Seminar RM (II)	1	50	A-1	50	$2 \times 1 = 2$
			A-2	50	$3 \times 2 = 6$
			Total		8 months/year (Occupancy 67%)
Seminar RM (III)	1	30	B-2	30	$1 \times 2 = 2$
			B-3	30	$1.5 \times 2 = 3$
			B-5	20	$2 \times 2 = 4$
			Total		9 months/year (Occupancy 75%)
Seminar RM (IV)	1	30	B-7	15	$0.5 \times 2 = 1$
			C-1	30	$0.5 \times 4 = 2$
			D-1	30	$0.5 \times 4 = 2$
			D-2	30	$0.5 \times 2 = 1$
			Total		6 months/year (Occupancy 50%)

*: When calculate the occupancy of room, the figure is assumed half

② Laboratories

Two laboratories will be planned for laboratory training in the fields of biology and chemistry, in accordance with the contents of the laboratory training courses detailed in the training curriculum. Each laboratory is designed to have a seating capacity of 50, on the assumption that laboratory training conducted at this center will be limited to the general and basic subjects of the two fields. According to the training curriculum, the cumulative number of hours of use of each laboratory per year is 373, which accounts for 8.5% of the total number of training hours (4,408).

1. Biology Laboratory

This laboratory will be used for all training courses. At this laboratory trainees will receive:

- . Laboratory training in classification, physiology and ecology of harmful insects, birds and wildlife, as well as analysis of the environmental factors and tolerable level of damages.
- . Laboratory training in methods of developing stable and high-quality forests, that is, basic laboratory training in methods of propagating species and tissue culture, as well as plant physiological training in artificial forestation.

2. Chemistry Laboratory

This laboratory will be used for all training courses. At this laboratory trainees will receive:

- . Laboratory training in soil formation, classification of forestry soil and soil fertilizers.
- . Basic Laboratory training in pharmacology related to the extermination of weeds and harmful insects.

Each laboratory will have about 180m² of floor area, which was calculated on the basis of the necessary per capital floor area of 3.25 to 3.75m² (U.S. School Building Code) and the actual equipment layout plan.

The two laboratories will have a preparation room, which will be used to store microscopes and other precision instruments, will be equipped with a dehumidifier.

③ Drawing Room

This will serve as the drawing room for the Forestry Induction Course (A-3), the Plantation Techniques Course (B-1), the Forestry Roads Course (B-4) and the Forestry Resource Administration Course (B-7). It will also be used as a space for drawing forestry maps to be used for training purposes. The A-3 course is offered to classes of 100 trainees and the B-1 course for classes of 50. Since, according to the training curriculum, it is expected that the drawing room will be used less frequently, the room is designed to have a seating capacity of 30 to increase the frequency of use.

④ Library

The library is designed to provide, in addition to ordinary library services, trainees with data and information which will be required in extracurricular studies of trainees. According to the training curriculum, the maximum number of trainees who will enroll in each training period will be 180. The average number of trainees for a training period will be 145. Assuming that 10% of trainees will utilize the library at a time (based on statistics in Japan), the library has been designed with a seating capacity of 15 to 18. In this project, it was decided to design the library with a seating capacity of 18 in anticipation of its use by instructors. Of the 18 seats, 10 are carrels and the remaining are chairs around a large table.

A recent survey on the number of books housed in the libraries of similar facilities in Burma shows that the Burma Forest School's library houses 700 books and CADTC's library 400 books. It is expected that some of the books housed in the libraries of the Forest Department and the Burma Forest School will be transferred to this library. It is also very likely that this library will house general books in addition to specialty books because this training center will be residential. In consideration of this condition, it is assumed that this library will house about 1,000

books. An office for one librarian and two clerks will be attached to this library.

Thus the necessary total floor area for this library will be about 120m².

⑤ Sample Presentation Room

It is very advantageous to exhibit data and samples of forest ecology, forestation technologies, soil, seeds, insects and trees in order to highlight the training to be offered to middle-level forestry engineers in Burma.

The sample presentation room with about 120m² of floor area will be located near the main entrance so that it may be fully utilized by trainees. It will also serve to publicize the importance of forestry technologies to visitors to training center.

⑥ Training Materials Production Rooms

The following training materials production rooms will be built.

1. Audiovisual Editing Room

In this room, video which were taken at the laboratories and outdoors will be edited for use as training materials. Also foreign-made audiovisual training materials will be dubbed here.

Five audiovisual engineers are on the staff of the Forest Department. Furthermore the audiovisual training materials are already used in VTR-aided training programs offered by the Timber Corporation's training facilities, CADTC's training facilities and other similar training facilities. In the light of this achievement, it is expected that this audiovisual editing room will be operated usefully.

2. Printing Room

This room will be utilized for the printing of training materials to be supplied to trainees or for supplying copies of foreign and domestic literature to trainees at cost as reference materials.

The necessary floor area, calculated on the necessary printing process

(preparing stencil paper, printing, binding and storing copies), is about 70m².

3. Slide Production Room

Burma is currently suffering from a shortage of color slide production facilities, and so most color slides are produced by order to overseas. The result is that it takes much time and money to obtain necessary color slides. Color slides can be used in a variety of ways as audiovisual training materials. In this project, since color slides are to be used frequently in the seminar rooms, it was decided to set up a slide production room to secure a ready and ample supply of color slides. The necessary floor space for this room, calculated on the basis of the equipment layout plan, the necessary working space and the place for storage of materials, is about 70m².

The above three training materials production rooms will be built in close proximity for optimum convenience.

⑦ Offices

The design of the offices will be based on such factors as the planned number of staffers, Burmese customs and the current state of the existing facilities. An open type large office room will be prepared for each section. The office rooms for the sections will be located on the same floor of the same building so that it may be easy to cope with future increases or decreases in the number of staffers.

In view of the Burmese method of allocating staff, it is assumed that 100% of the planned number of staffers for each section will actually be recruited. But the number of car drivers and underservants is not included in the table below. The total floor space for each office room was calculated on the basis of the necessary space per capita (12m² for a section manager, 8m² for a section chief and 4m² for a clerical worker). The floor area for each office room is shown in the table below.

Table 4-2 Office Floor Area for Each Section

Section	Design Occupant and Room Area			Total	
	Rank	Occupant	Room Area		
Project Director's Office	Project Director	1	1×30m ² /person	30m ²	70m ²
	Dy. PD.	1	1×20	20	
	Secretary	2		20	
Administration Section	Dy. Director	1	1×12	12	132m ²
	Asst. Director	3	3×8	24	
	Staff	24	24×4	96	
Information Section	Dy. Director	1	1×12	12	104m ²
	Asst. Director	3	3×8	24	
	Staff	17	17×4	68	
Planning Section	Dy. Director	1	1×12	12	72m ²
	Asst. Director	3	3×8	24	
	Staff	9	9×4	36	
Training Section	Dy. Director	1	1×12	12	192m ²
	Asst. Director	5	5×8	40	
	Staff	4	4×4	16	
	Instructor	31	31×4	124	
Total		107			570m ²

Ⓒ Training Hall

A Training hall will be built for the following activities:

- . Lectures: Lectures for all trainees and lecture meetings
- . VTR-aided classes: Lectures using VTR materials.

The training hall will be used as an A/V room.

. Meetings: Entrance and graduation ceremonies, lectures by guests, trainees' and staffers' meetings

Required floor area will be calculated on the assumption that the hall will have a seating capacity of about 250: 180 trainees (maximum), 31 full-time instructors, 20 staffers (about 20% of the total number of staffers) and 20 guests. To this will be added the floor area for the stage, the control room, the warehouse, the sitting room and so on. As a result, the total floor area for the training hall will be about 500m². The hall will be designed so as to be completely insulated from external disturbances, such as noises, rainwater and small animals.

(2) Outdoor Training Facilities Block

① Workshop

The workshop will be used for housing equipment for outdoor training, as well as for operating and inspecting the equipment. The workshop will have following rooms.

- . Forest road equipment storage:
 angledozer, tractor shovel, back hoe, etc.
- . Silviculture equipment storage:
 tractor, chain saw, earth auger, etc.
- . Fire fighting equipment storage:
 tank lorry, engine fire pump, collapsible water tank, etc.
- . Survey equipment storage:
 compass, hypsometer, transit, etc.
- . Meteorological observation equipment storage:
 aneroid barometer, thermo-hygrograph, barograph, etc.
- . Garage:
 compact size bus, microbus, truck, van, etc.
- . Repairing Workshop :
 hot water car washer, arc welder, bench drill, etc.

Since the workshop is likely to be a source of noise, it should be a separate, isolated building connected to the main facilities by a roofed passage.

② Facilities for nursery field

The following facilities should be attached to the nursery field.

- . Germination shed 10m x 8m
- . Potting shed 17m x 8m
- . Glasshouse 10m x 8m
- . Compost shed 4m x 8m
- . Storehouse 26m x 6m
(for nursery equipment, fertilizers and chemicals)

(3) Residential Block

① Dormitory

Since the training center is residential, it is necessary to build dormitory capable of accommodating as many as 180 trainees at a time. 50 single rooms and 44 triples will be built in consideration of the hierarchical system prevalent at the government office in Burma. The single rooms will be prepared for senior officers, such as deputy directors and assistant directors, who will receive training in the Advanced Forest Officer Course (50 trainees), the Plantation Techniques Course (50 trainees), the Nursery Practices Course (30 trainees) and the Forest Resource Administration Course (15 trainees). Other officers will be assigned to the triple rooms.

No female officers will receive training at this center.

The criteria for evaluating a trainee's achievements include items concerning his character. Thus a trainee's attitude during the whole training period is an important factor in his overall evaluation. Some of the instructors will live together with trainees at the dormitory to guide and evaluate them. There will be an instructor's room on each floor of each dormitory building. There will also be a lounge in dormitory

building which will be connected to the dormitory rooms by a corridor. It will serve as a place for relaxation and chatting.

② Canteen

Since this training center is residential and then all trainees will eat at the same time, the canteen will have to accommodate as many as 180 trainees. Besides trainees, staffers and instructors will also use the canteen. However, no extra space for them has been allocated on the assumption that they will eat before or after trainees. Meals will be offered on a single-menu (which changes daily), self-service, 3-meals-a-day basis. The necessary floor area for the canteen is about 300m² and that for the kitchen 130m². The attached facilities will include a washroom and lavatories.

Judging from the mutual relationships among the necessary rooms in each block, it is advisable to broadly divide the facilities into the following 3 major buildings.

1. Main building

seminar room, laboratories, drawing room, library, sample presentation room, training materials production rooms, office rooms, training hall, etc.

2. Workshop building

storages, workshop, garage, etc.

3. Dormitory buildings

dormitories, canteen, etc.

Since it is expected that there will be heavy traffic between these facilities, above 3 major buildings will be connected with roofed passages. Furthermore it will be necessary to build supplementary facilities, such as a germination shed, a glasshouse, an electric building and pump houses.

The scale of room area in each of the 3 major buildings, as well as the supplementary facilities, will be as follows:

(1) Main Building

Room Name		Room Area
Seminar RM (I)	(for 100 trainees)	216 m ²
Seminar RM (II)	(for 50 trainees)	108
Seminar RM (III)	(for 30 trainees)	81
Seminar RM (IV)	(for 30 trainees)	81
Biology Laboratory		189
Chemistry Laboratory		189
Preparation RM	(for 2 laboratories)	54
Drawing RM	(for 30 trainees)	135
Preparation RM	(for drawing room)	27
Library	(1000 books, 18 seats)	120
A/V editing RM		72
Printing RM		72
Slide Production RM		72
Project Director's Office		58
Dy. Project Director's Office		20
Secretary's RM		20
Office RM	(for 103 staff)	504
Experts' RM	(for 6 experts)	68
Conference RM	(30 seats)	63
Meeting RM	(24 seats)	45
Clinic	(2 beds)	40
Store	(for general purpose)	60
Sample Presentation RM		54
Presentation Lounge		72
Training Hall	(250 seats w/stage)	324
Control RM		36
Store	(for training hall)	45
Others	(corridor, toilets, staircases)	2,175
Total		5,000 m ²

(2) Workshop Building

Room Name	Room Area
Forest Road Equipment Storage	142 m ²
Sivilcultural Equipment Storage	95
Workshop	95
Garage	236
Fire Fighting Equipment Storage	54
Survey Equipment Storage	54
Meteorological Observation Equipment Storage	54
Office	27
Others (corridors, toilets)	253
Total	1,010 m ²

(3) Dormitory Building

Room Name	Room Area
Bed RM (3 beds type, 44 rooms)	770 m ²
Bed RM (1 bed type, 50 rooms)	450
Instructors' RM (6 rooms)	108
Superintendent's RM	36
Toilet and Shower RM	441
Lounge	60
Others (corridor, staircase)	1,245
(sub-total	3,110)
Canteen (180 seats)	290
Kitchen	135
Others (toilets)	25
(sub-total	450)
Total	3,560 m ²

(Sub-total of 3 major buildings 9,570 m²)

(4) Other Facilities

Room Name	Room Area
Glasshouse	80 m ²
Germination Shed	80
Compost Shed	35
Nursery Warehouse	155
Electric Building	120
Pump House	(3 buildings) 70
Breezeway	710
Total	1,250 m ²
GRAND TOTAL	10,820 m ²

B. Elevation and Section Plans

(1) Elevation Plan

The projected training center will comprise a number of low buildings scattered on a very spacious site. In working out the elevation plan of such facilities, it is important to harmonize the external appearance of all the buildings. So it was decided to limit the number of external wall finishing materials, colors and so on for the elevation plan of the facilities so that this may give a coordinated look to the whole site environment.

The outside appearance of the buildings will feature the "steeply sloping roofs and eaves" which are commonly seen in various parts of Burma. And some improvements will be added to this design method within the limits of architectural technologies available in Burma.

(2) Sectional Plan

In working out the sectional plan a number of factors were taken into consideration: (1) securing natural ventilation, (2) preventing rainwater from entering the building, (3) screening sunlight and (4) establishing flood emergency procedures.

The height of each floor is 4.0m for the training and administrative facilities and 3.6m for the dormitory facilities, allowing for sufficient natural ventilation. Furthermore, there will be openings in the both side walls of all rooms facing the corridor and the balcony. The suspended ceilings will be designed to each room on the uppermost floor of each building so that there will be layer of air between the ceiling and the roof slab. The layer of air will enhance heat insulation in each room.

A balcony will be attached to each room to prevent rainwater from entering the building. It will also provide natural ventilation on rainy days because the window can be kept open even on rainy days. No one can enter the balcony except for maintenance. Although the floor of the balcony may become wet when it rains, this will not be a problem unless rainwater reaches the opening in the wall of the building. Since there will be heavy traffic in the corridor, special care must be taken when designing to prevent rainwater from sweeping into the corridor.

The buildings will lie east to west in principle and their openings will face north or south. Some rooms which will face east will have a balcony and louver to screen sunlight, if necessary.

The area around the project site gently slopes toward the trunk road running near the western side of the site. Thus drainage is good in the whole area of the site. At the center part of the project site, however, lies a ditch with a depth of 1.5m. When it rains, rainwater discharged from the facilities flows through it. Open ditch will be constructed throughout the facilities, when the building works will be completed, but it will still be necessary to work out steps to prevent the facilities built near the ditch from being flooded. For this reason the height of the ground floor level of these buildings will be 75cm above ground level. This will also enhance the comfortableness of the living spaces on the ground floor.

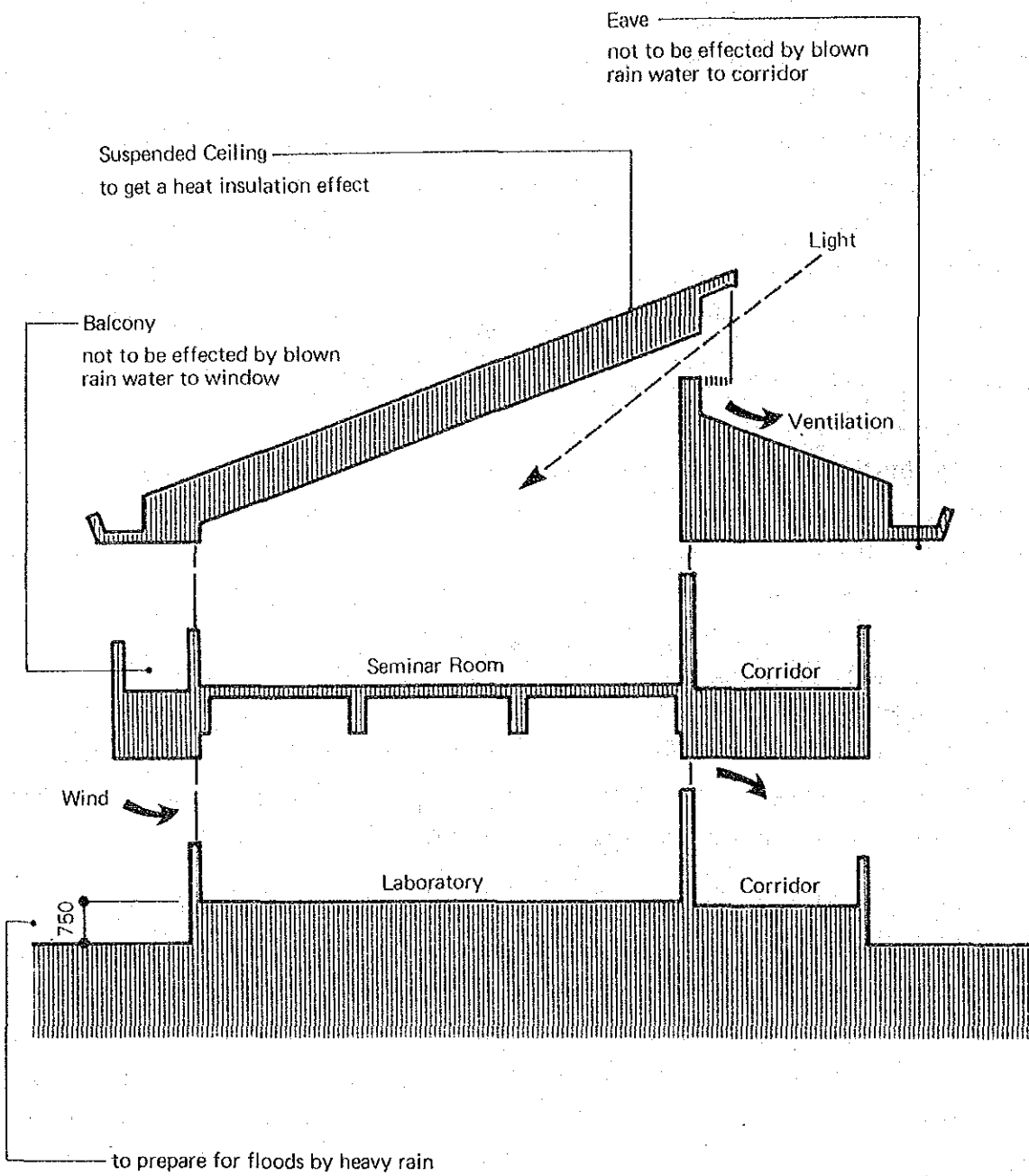


Fig. 4-4 Section

C. Structural Plan

(1) Outline of the Buildings

The project facilities consist of the main building, the workshop building and the dormitory building.

The scale of the facilities is as outlined below.

1. Main building

Number of stories	2 above ground
Height of each storey	4.0m
Area	Approx. 5,000m ²

2. Workshop building

Number of stories	1 above ground
Height	5.0m
Area	Approx. 1,010m ²

3. Dormitories

Number of stories	3 above ground, partially 1
Height of each storey	3.6m
Area	Approx. 3,560m ²

(2) Outline of the Structure

1) Structural System

Most of the buildings in the facilities are low, 2 or 3-storied buildings, which do not require any large span. The seismic intensity of earthquakes which occur in Burma is generally about half that measured in Japan and therefore has little effect on buildings. In consideration of these conditions, as well as local climate, construction methods and economic aspects of the project, it is advisable to adopt a rigid frame reinforced concrete structure. Concerning the walls of the buildings, reinforced concrete will be used for the external surface, and other surfaces will be brick. This will shorten the construction time and lower construction costs.

2) Foundation System

According to the boring data of the project site, the ground consists of a layer of dark brown sand and silt with trace of clay with N value of 10 to

12 (up to 0.5m deep under the ground), a layer of medium dense reddish brown sandy clay and silt with trace of laterite gravel with N value of 20 to 25 (0.5 to 2.5m deep under the ground) and layer of reddish brown or yellowish brown laterite clay with N value of more than 30. Since the buildings are to be mostly 2 to 3-storied low buildings, it is advisable to adopt a direct foundation, for which the second layer (1.5 to 2m deep under the ground, N value of more than 25) will serve as the supporting ground. As for the dormitory buildings, judging from their scale and wall arrangement, a mat or continuous foundation shall be planned.

(3) Structural Materials

Concrete: ordinary concrete $FC=180\text{kg/cm}^2$
(28day compressive strength)

Reinforcing rod: less than 16mm SD30, $F_y=3,000\text{kg/cm}^2$
more than 19mm SD35, $F_y=3,500\text{kg/cm}^2$

Structural steel: SS41, $F_y=2,400\text{kg/cm}^2$

(4) Criteria of Structural Design

There are no official criteria for structural design in Burma. Accordingly, the structural design in this project is based on the Standards of Structural Design Calculation of Japan.

(5) Design Load and External Force

1. Dead Load

The value of the dead load will be calculated on the basis of the weight of structural and finishing materials.

2. Live Load

The value of the live load will be calculated in compliance with the Building Standards Act of Japan.

3. Seismic Intensity

Burma is located in the Eurasian Earthquake Zone, and several earthquakes have been recorded in the past in Burma.

It is necessary, therefore, to apply an aseismic structural design.

Seismic intensity will be calculated in compliance with the "Draft Aseismic Design Standards of Burma".

Design Seismic Intensity (K)

$$K = \alpha \cdot \beta \cdot \gamma \cdot K_0$$

K: design seismic intensity

K_0 : standard design seismic intensity (0.1)

α : zone coefficient (Rangoon area: 1.0)

β : soil condition coefficient (laterite clay: 1.2)

γ : coefficient of usage (1.0)

Accordingly, the design seismic intensity to be used in this design is:

$$\begin{aligned} K &= \alpha \cdot \beta \cdot \gamma \cdot K_0 \\ &= 1.0 \times 1.2 \times 1.0 \times 0.1 \\ &= 0.12 \end{aligned}$$

D. Electrical Facilities Plan

(1) Power Receiving and Power Supply System

Electric power to the project site is 11kV 50Hz 3-phase 3-wire system through overhead line. After the 11kV power receiving point (near the west boundary of the site), power supply system work for the Project will be included in the scope of Japanese side work. A substation will be constructed near the training hall located on the south side of the project site, from which low voltage electric power (3-phase 400V and single phase 230V) will be supplied to each load. Except for the transformer and IVR (induction-type voltage regulator), the electric power supply equipment will be housed in the enclosure-type panel board. The capacity of the transformer will be 500kVA.

The outline of power supply system and construction demarcation are shown in Fig. 4-5.

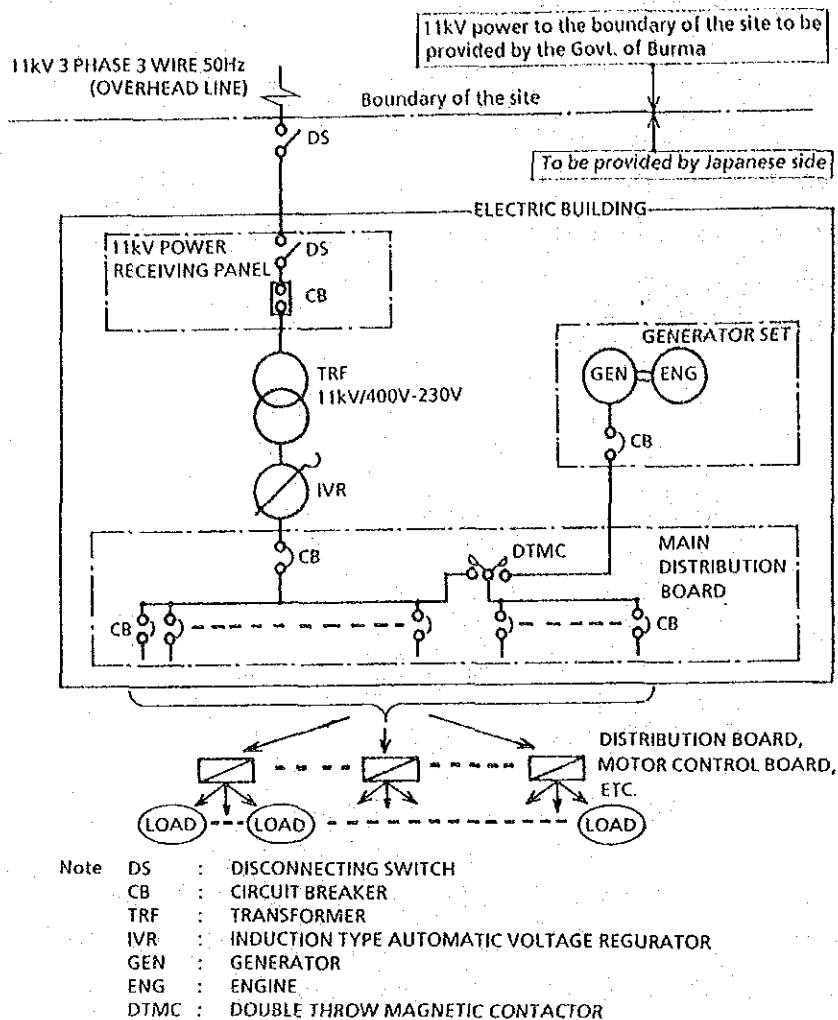


Fig.4-5 Outline of Power Supply System

(2) Emergency Generator

As a measure of city power failure, a diesel engine generator set will be provided. From the point of view of the training function and operation of facilities, generator power will be supplied to the equipment which requires the electric power in the event of city power failure. The capacity of the generator will be about 150kVA.

The generator power will be supplied to the following equipment.

- Lift pumps and drainage pumps

- . Fire hydrant pumps
- . Safety lighting (part of corridor lights and lighting fixtures in main rooms).
- . Personal computers
- . Laboratory equipment (conditioning chamber, refrigerators, etc.)

(3) Lighting

Lighting fixtures which will be surface-mounted or pipe-suspended types will mostly be fluorescent lights. Design target illumination level is set lower than JIS (Japanese Industrial Standard) illumination level in consideration of natural light from windows. The following table shows design target illumination level for each room.

Table 4-3 Design target illumination level

Room	Design target illumination level (Lux)	JIS illumination level (Lux)
Seminar room	250~350	400
Laboratory	400~500	500
Drawing room	450~550	1,000
Library	250~350	500
A/V editing room	200~300	—
Office	250~350	500
Conference room	200~300	500
Instructor's room	250~350	500
Workshop	150~200	200
Garage	50~100	—
Equipment storage	150~200	200
Canteen	50~100	300

- Note:
1. Design target illumination level does not include natural light from windows, and shows illumination from lighting fixtures only.
 2. The numerical value in the column of JIS illumination level shows average value between maximum and minimum of JIS.
 3. The illumination level for drawing room is set to approximately 50% of JIS illumination level, because task light which is included in the equipment plan will be provided to each drawing table.

(4) Socket outlets

Socket outlets for supplying electric power to equipment for use in training and small electric appliances will be installed at necessary places. A distribution board which supplies electric power to laboratory equipment will be installed in each laboratory. Furthermore, the laboratory equipment and audiovisual equipment which require constant voltage will be supplied electric power from AVR (automatic voltage regulator).

Note: AVR for laboratory equipment will be included in the equipment plan.

(5) Telephone System

For the communication between the training center and outside related facilities and among the rooms in the training center, telephone system will be provided. A PABX and a reception telephone will be installed in the administration office. Also, extension telephones will be installed in each of the following rooms.

Project director's office, Deputy project director's office, Secretary's room, Office room, Conference room, Instructor's room, Expert's room, Printing room, Photo room, A/V editing room, Preparation room, Library, Canteen, Superintendent's room (dormitory), etc.

The number of telephones for each office room will be determined on the following criterion:

- one telephone for one person (above the rank of Dy. Asst. Director)
- one telephone for approximately 5 persons.

The capacity of the PABX will be 5 trunk lines (COL) and about 60 extensions.

The type of PABX will be an electronic-PABX for the following reasons.

1. PTC has already started to adopt electronic PABX system.
2. The Agricultural Corporation, Rangoon Office of WHO and other organizations have already installed electronic PABX system.

3. Almost all telephone equipment manufacturers in Japan have stopped production of crossbar PABX.

(6) Public Address System

A public address system will be provided for general and emergency announcements in the training center. An amplifier (with microphone and selector switch) will be installed in the administration office to broadcast message to seminar rooms, laboratories, offices, corridors, nursery farm, etc.

(7) Fire Alarm System

Manual type fire alarm system will be provided. The control panel is installed in the administration office, and indication lamp, alarm bell and manual station (fire alarm push button) will be installed on the upper part of the fire hydrant box. A starting switch for the fire hydrant pump is to be provided in the inside of fire hydrant box in order to protect from mischief operation.

No fire-detecting sensors will be provided.

(8) Lightning Protection System

A lightning protection system will be installed to prevent damage due to lightning. The system will consist of elevation rod, lightning conductor, earth electrode, etc. Overhead ground wire system is not provided.

E. Air Conditioning Facilities

The local climatic conditions and the conditions of utilization of each main room make it necessary to air-condition part of the main facilities. In consideration of handling and maintenance, air-cooled type air conditioners will be installed individually in each required room.

Other rooms which do not require air conditioning will get natural ventilation and ceiling fans will additionally be installed to keep the comfortable environment in the rooms.

(1) Air Conditioning System

The air conditioner will be installed in project director's office, Dy. project director's office, conference room, expert's rooms, slide production room, training hall, etc.

The air conditioner will be an air-cooled, separate type room air conditioner. For the training hall, single duct system by the air-cooled packaged type air conditioner will be applied. Each room will be provided with temperature control only, but not with humidity control.

- . Design outside air temperature Temperature 34°C(DB)
Relative humidity 60%

- . Design room temperature Temperature 26°C±2°C(DB)

(2) Ducting System

A single duct system air supply/air circulation will be applied in the training hall.

(3) Pipes

Pipes to discharge condensed water from the air conditioners will be laid. The pipes will be polyvinyl chloride pipes (PVC).

(4) Ventilating System

Ventilating equipment will be installed in toilets, pantries, laboratories, kitchen, etc.

F. Plumbing and Sanitary Facilities

(1) Water Supply System

Since there is no public water service available near the project site, well water will be used for water supply within the project site.

Two deep tube wells for buildings will be installed in the project site, which will be used for supplying water to the main building and the dormitory building. The well water pumped up from the two deep tube wells will be sent to each water reservoir tank through the sand separator and

the water will be pumped up to each elevated tank. From the elevated tank, water will be supplied to the necessary places by gravity.

(2) Drainage and Air Vent System

Since there is no public sewerage system near the project site, soil water will be treated in septic tanks.

Treated soil water will be made to penetrate into soil. Ordinary waste water will be made to directly penetrate into soil. Since it is likely that during the rainy season rate of penetration will decrease, overflow pipes will be laid between penetration area and the rain water discharge gutter. Rainwater will be discharged through rainwater discharge gutter to ditch.

Draining pipes will be polyvinyl chloride pipes (PVC).

(3) Fire Extinguishing System

Indoor fire hydrant system and portable fire extinguishers will be installed in each of the main facilities. Outlets will be installed on a part of indoor fire hydrants for use by the fire-fighting team. The water supply inlet will be installed outdoors.

The fire extinguishing pumps will be installed in the pump house. Japanese Fire Prevention Law will be adopted for installation of fire extinguishing system, since there are no such legal regulations in Burma. Piping material will be galvanized steel pipes.

(4) Sanitary Fixture Installation

Sanitary fixture which fits in with the local customs will be installed. Each closet booth will be equipped with a faucet.

(5) Kitchen Equipment Installation

In consideration of the local fuel supply situation, firewood kitchen ranges and portable electric cooking heaters will be installed. In addition, refrigerators, dish racks, and so on will be installed.

(6) Incinerator

Natural draft type incinerator will be installed.

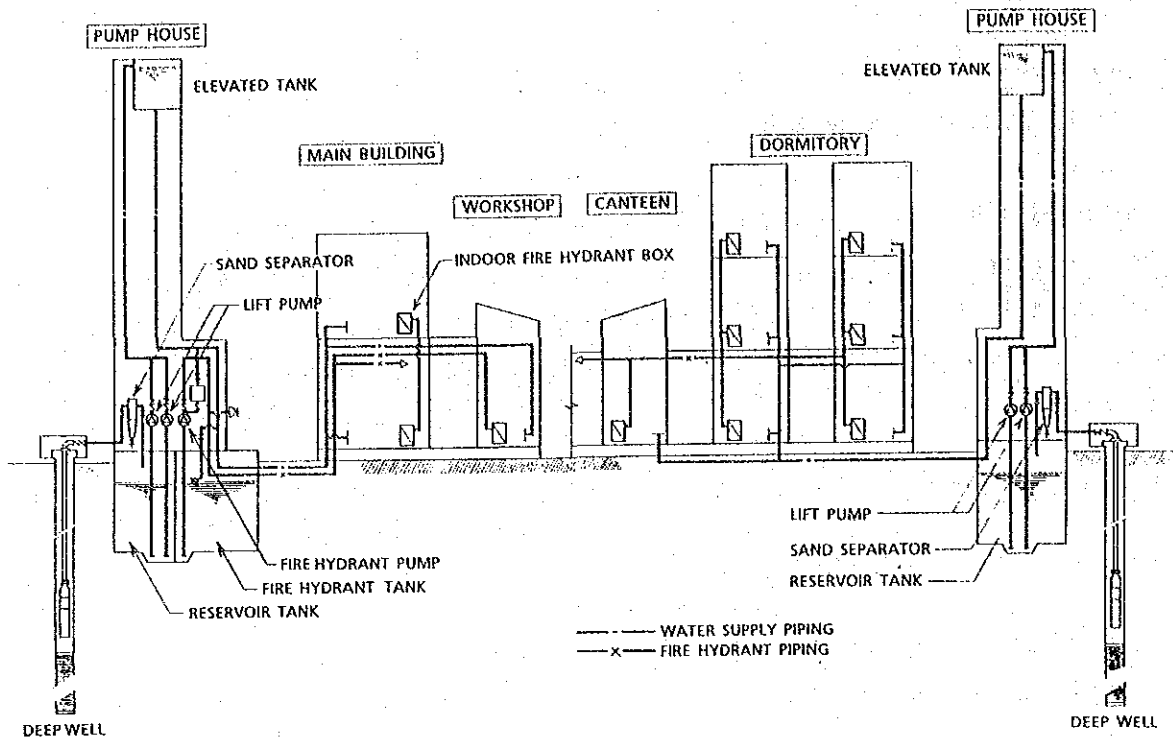


Fig.4-6 Schematic Diagram of Water Supply System and Fire Hydrant System

G. Building Materials Plan

Selection of the building materials to be used in this project will be done after a comprehensive examination of the local climatic conditions, required function, the local construction situation, the construction schedule, maintenance and administration costs and so on. In this project, in particular, it was decided to select building materials mainly from Japanese-made which are highly durable and therefore will considerably extend the building lives as well as help minimize maintenance and operation costs, in consideration of the current shortages of building materials, limitation of allotment and complexity in procurement procedure in Burma.

(1) Structural Materials

The structural materials will be those which can be manufactured locally and fit in well with the planned combination of the reinforced concrete structure and the brick walls. Locally manufactured cement, aggregate and bricks pose no problem in terms of product quality and quantity supplied. Locally manufactured reinforcing bars are mostly round bars. In this project, Japanese-made deformed bars will be used.

(2) External Finishing Materials

① Roof

Reinforced concrete will be used as the roof slab for the top story to enhance waterproofing capability of concrete. To this concrete roof slab, light-weight undercoating mortar will be applied and then designed asbestos slate roofing tile will be fixed by nail directly. This method, which eliminates the risk of deterioration caused by exposure to sunlight, erosion by termites and rusting through exposure to humidity, will be very effective, maximizing the building's durability. The concrete slabs of the roofed passages will be pitched high to allow rain water to drain quickly. They will be coated with waterproof coating material.

② External Walls

The external walls will be finished with porcelain tiles. In Burma the external walls of most new buildings are coated with cement mortar steel trowel and finishing paint. However, currently there is a serious shortage of paint in Burma. Accordingly, locally made paint is expensive, which makes it very difficult to do necessary maintenance on external walls. On the other hand, paint which is available in Burma has less waterproofing capability and is easily stained. As a result, it is necessary to repaint external walls every two or three years to keep up their good appearance. Repairing external walls requires additional costs such as scaffolding expenses. Therefore, it was decided to coat the external wall with porcelain tiles with high weatherproofing capability to reduce the necessary maintenance cost. Porcelain tiles do not require repairs for at least 10 years after construction.

(3) Internal Finishing Materials

① Floor

For the finishing materials of floor, terrazzos, steel troweled concrete and wash-out mortar will be adopted. These materials are commonly used in Burma and they are highly durable, easy to maintain and low-priced. Flooring materials for the seminar rooms, laboratories and office rooms will be terrazzos, there by making it possible to use various colors. It is highly durable with the appearance of a very high quality finishing material. Places such as passages which are likely to get wet with rain will be coated with wash-out mortar, one of the most commonly used methods in Burma. Wash-out mortar coated surfaces do not become slippery when it gets wet. When a large surface is coated with wash-out mortar, however, cracks will appear, so it will be necessary to provide control joints on the surface. Floors of the warehouses and the workshop will be coated with steel trowel concrete, which is both inexpensive and highly durable. Floors of some rooms, such as conference room, will be finished with wooden flooring materials, which will also serve to enlighten the variety of usage of wooden materials.

② Internal Walls

Reinforced concrete walls and brick walls will be coated with steel troweled mortar, on which paint will be applied. Japanese-made paint, from which it is easy to remove stains, will be used. Walls of lavatories and pantries will be coated with ceramic tiles, since ceramic tiles are highly waterproof. Walls of the workshop and large warehouses will be coated with mortar in consideration of its low-price and durability.

Finishing materials for the baseboards will be selected from among terrazzo, cement mortar and paint, taking into account the durability and waterproofings required.

Part of the walls of the conference room will be finished with wooden materials to take advantage of the quality and performance of wooden materials.

③ Ceilings

Suspended ceilings will be erected where necessary to maintain a good heat insulating or an acoustic environment or to conceal electric wires and water pipes. Ceilings for the main rooms will be light gauge steel bedded rock wool boards or plaster boards, and those for lavatories will be calcium silicate boards which are highly resistant to water. Ceilings for the roofed passages and the like will be concrete slabs on which sprayed tile coating materials will be applied directly.

④ Doors and Windows

In most of the existing facilities in Burma, wooden framed windows are used. However, these fittings are easily twisted or curved, which leads to frequent repairs. Furthermore, it is necessary to repaint them often. They are also inferior in terms of airtightness and watertightness. In view of these factors, it was decided to use aluminum-framed sliding windows for the outside windows of this center, similar to those used in many other grant aid projects. For security purposes, steel grille will be also installed in the major rooms on the ground floor. Insect screens will be installed in the dormitory rooms to prevent mosquitoes and flies from entering the rooms.

In principle, most doors will be wooden. Frequently used doors, however, will be made of aluminum or steel which are highly waterproof and durable.