Ministry of Education

The Kingdom of Lesotho

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR INFRASTRUCTURAL SUPPORT
AND
EDUCATIONAL EQUIPMENT SUPPLY
TO
NATIONAL TEACHER TRAINING COLLEGE
IN MASERU
IN THE KINGDOM OF LESOTHO

OCTOBER 2000

JAPAN INTERNATIONAL COOPERATION AGENCY

PACIFIC CONSULTANTS INTERNATIONAL

INTEM CONSULTING, INC.

PREFACE

In response to a request from the Government of the Kingdom of Lesotho, the Government of Japan decided to conduct a basic design study on the Project for Infrastructural Support and Educational Equipment Supply to National Teacher Training College in Maseru, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Lesotho a study team from 5 April to 1 May, 2000. The team held discussions with the officials concerned of the Government of Lesotho, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Lesotho in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Kingdom of Lesotho for their close cooperation extended to the teams.

October 2000

Kunihiko Saito
President
Japan International Cooperation Agency

October 2000

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Infrastructural Support and Educational Equipment Supply to National Teacher Training College in Maseru in the Kingdom of Lesotho.

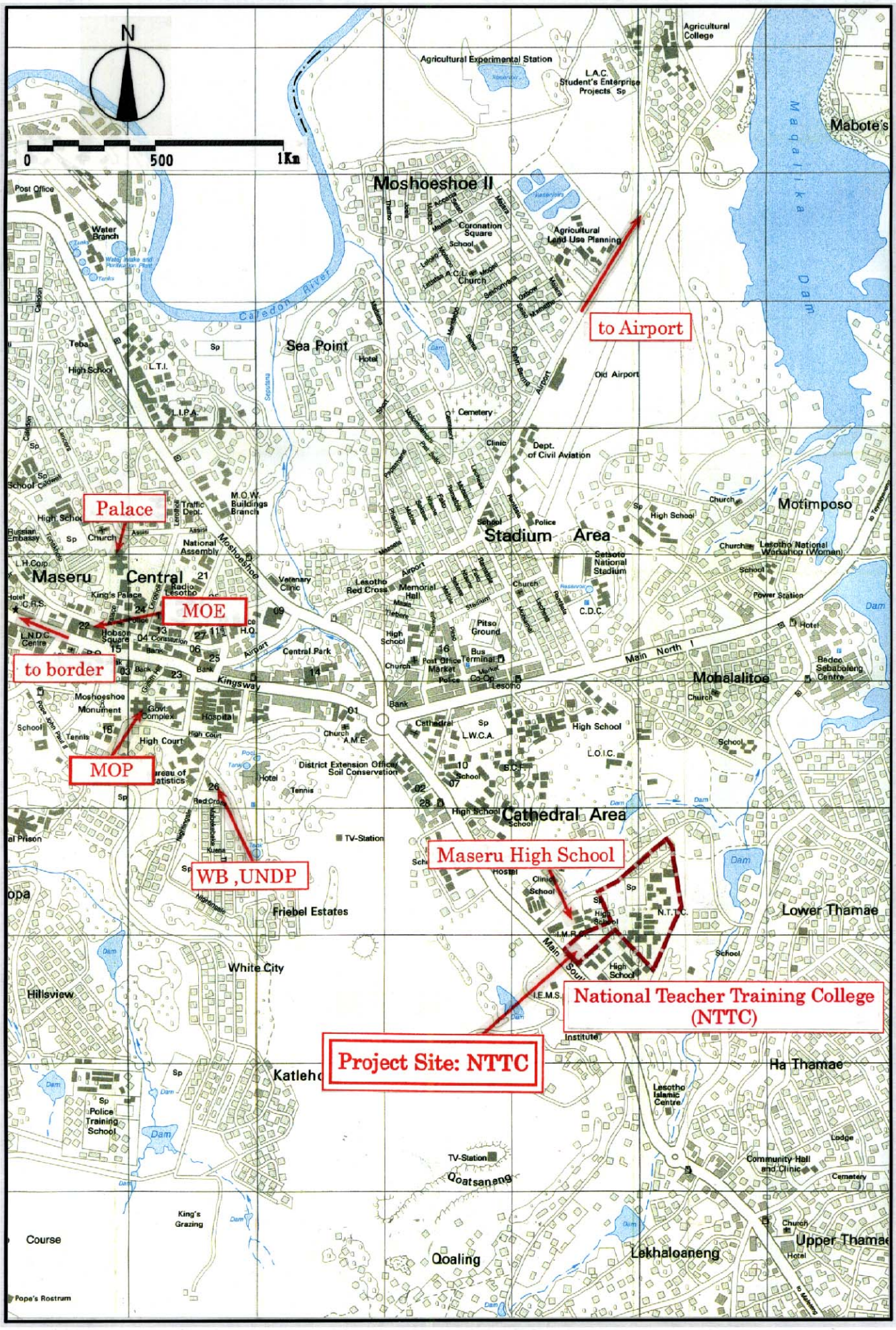
This study was conducted by Pacific Consultants International in association with Intem Consulting, Inc., under a contract to JICA, during the period from 5 April, 2000 to 1 May, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Lesotho and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

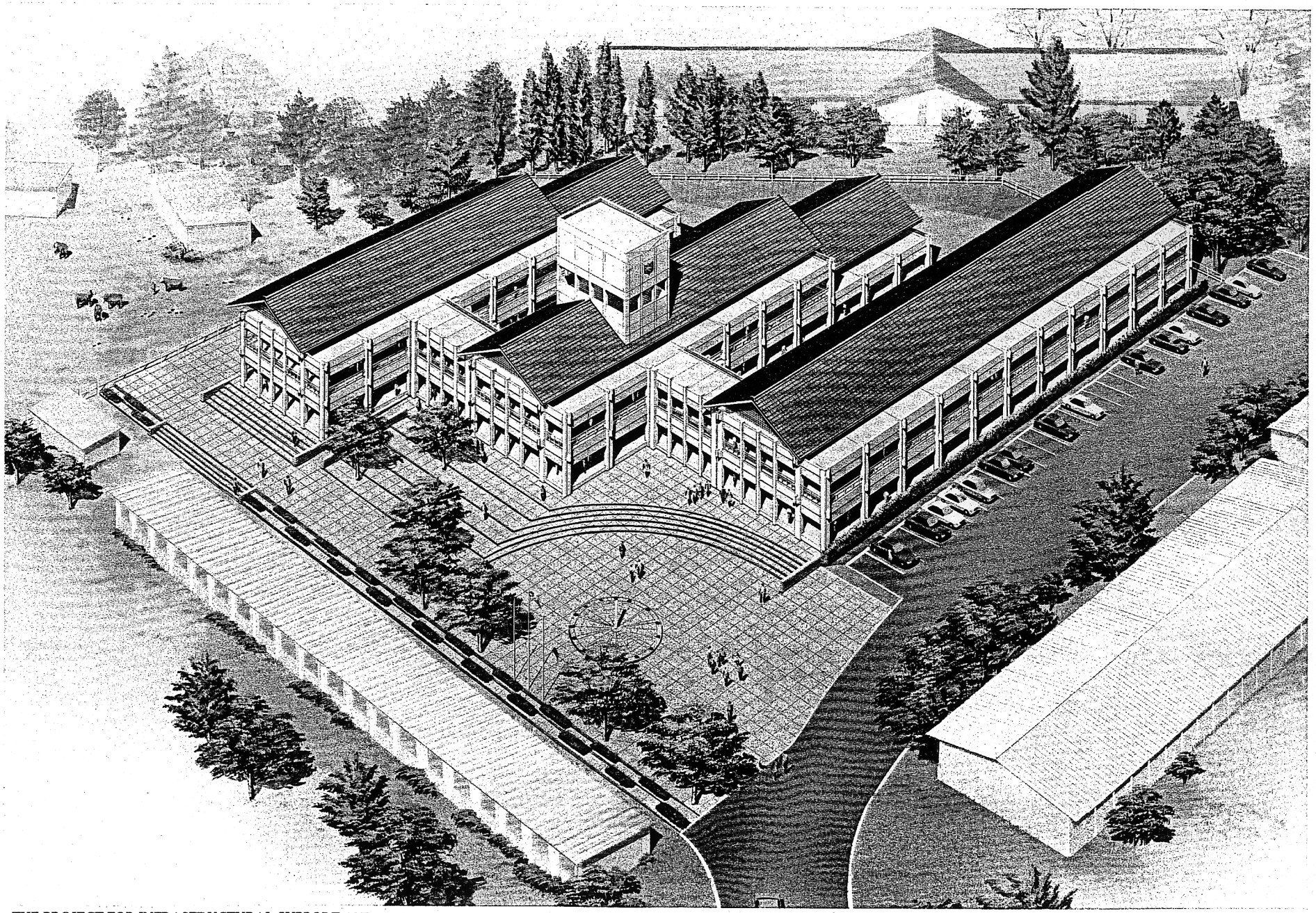
Very truly yours,

Takatsugu Shimada
Project Manager
Basic Design Study Team on
The Project for Infrastructural Support and
Educational Equipment Supply to
National Teacher Training College in Maseru
in the Kingdom of Lesotho
Pacific Consultants International
in association with Intem Consulting, Inc.

Location Map of the Project Area - 1



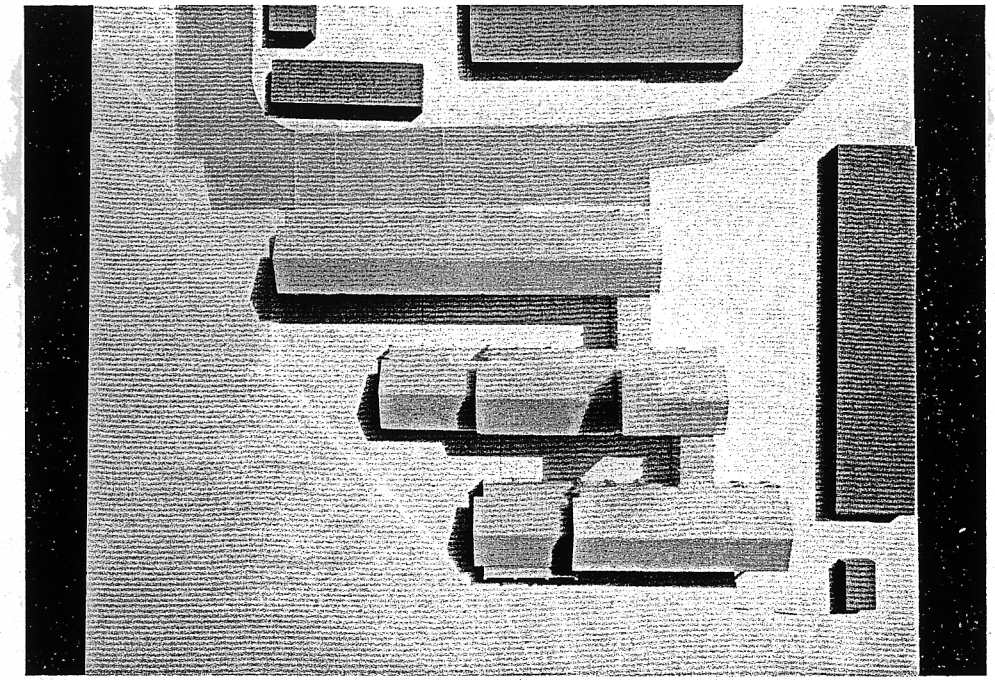
Location Map of the Project Area - 2

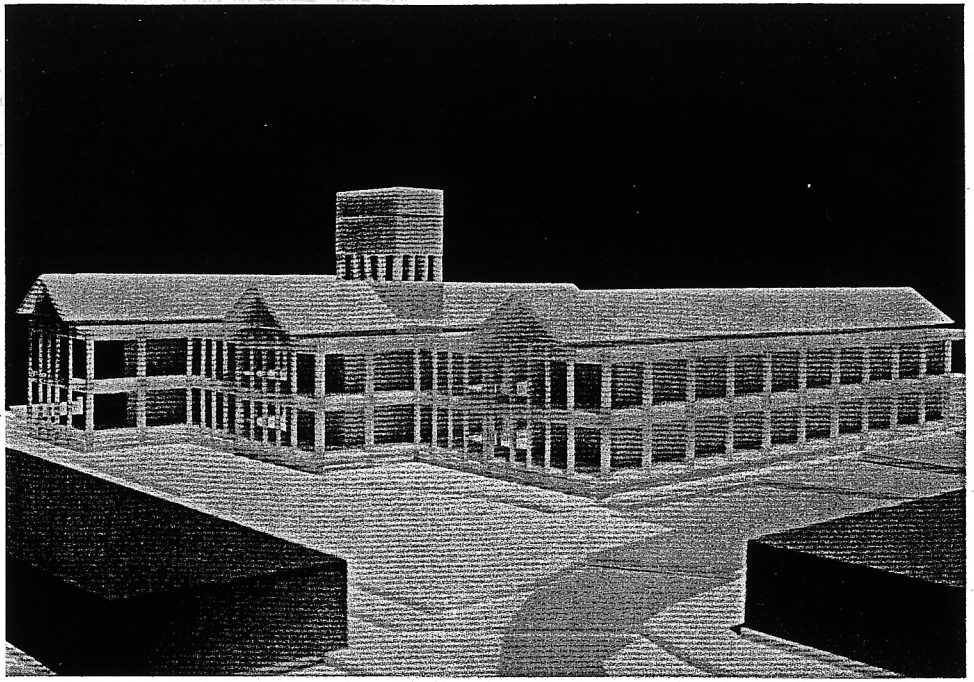


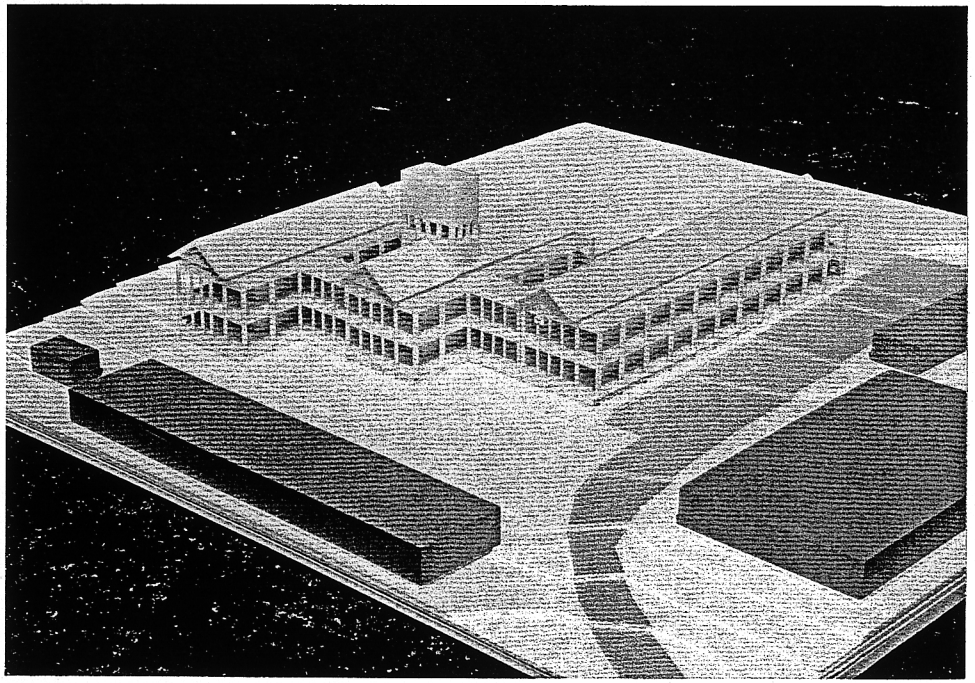
THE PROJECT FOR INFRASTRUCTURAL SUPPORT AND
EDUCATIONAL EQUIPMENT TO
NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

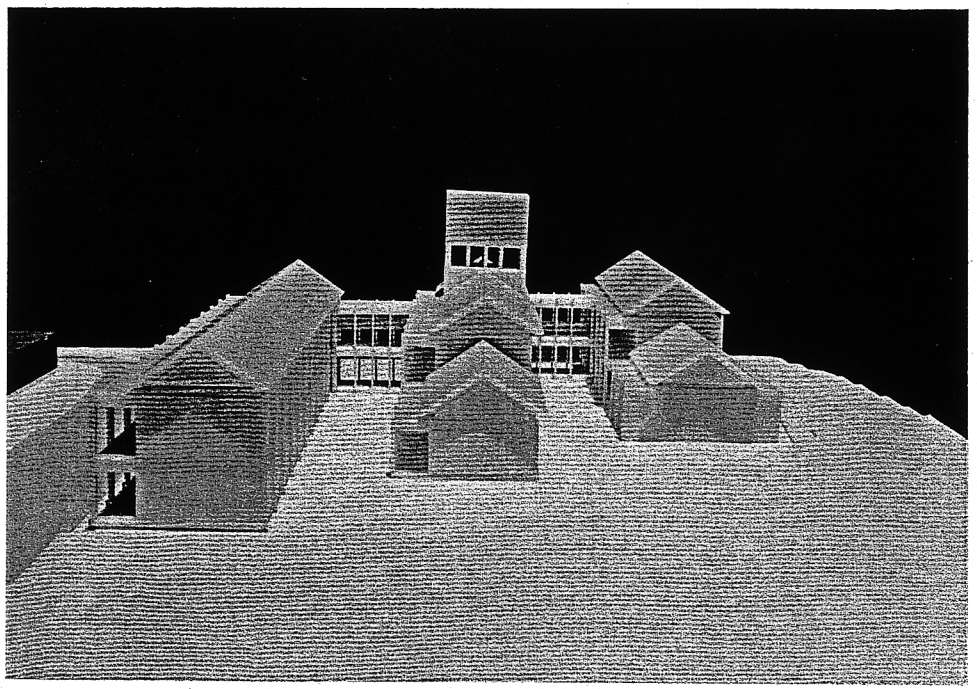
PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING, INC.

PERSPECTIVE







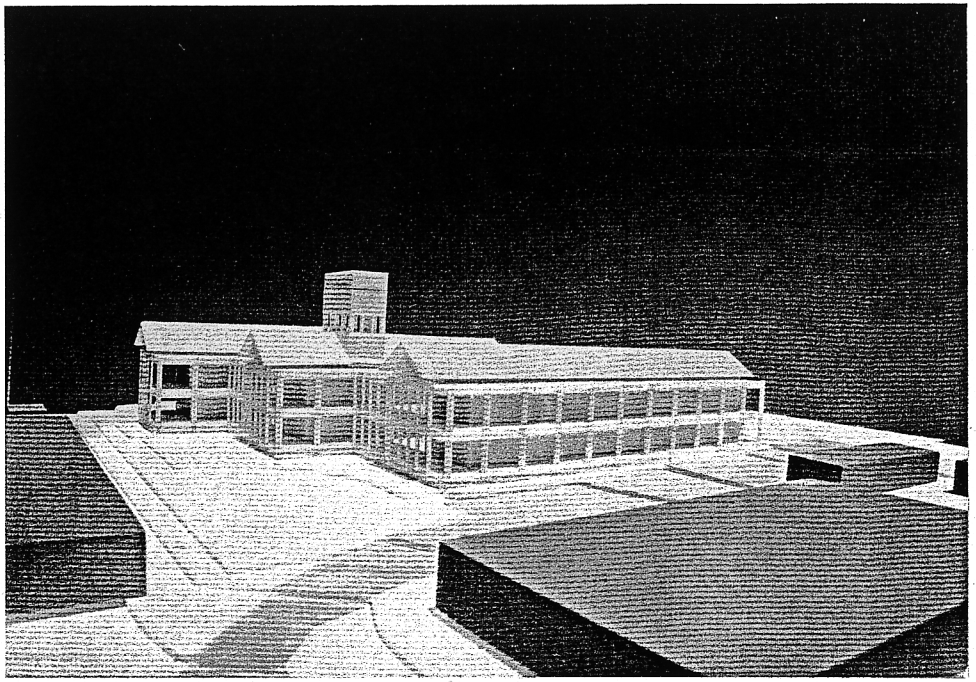


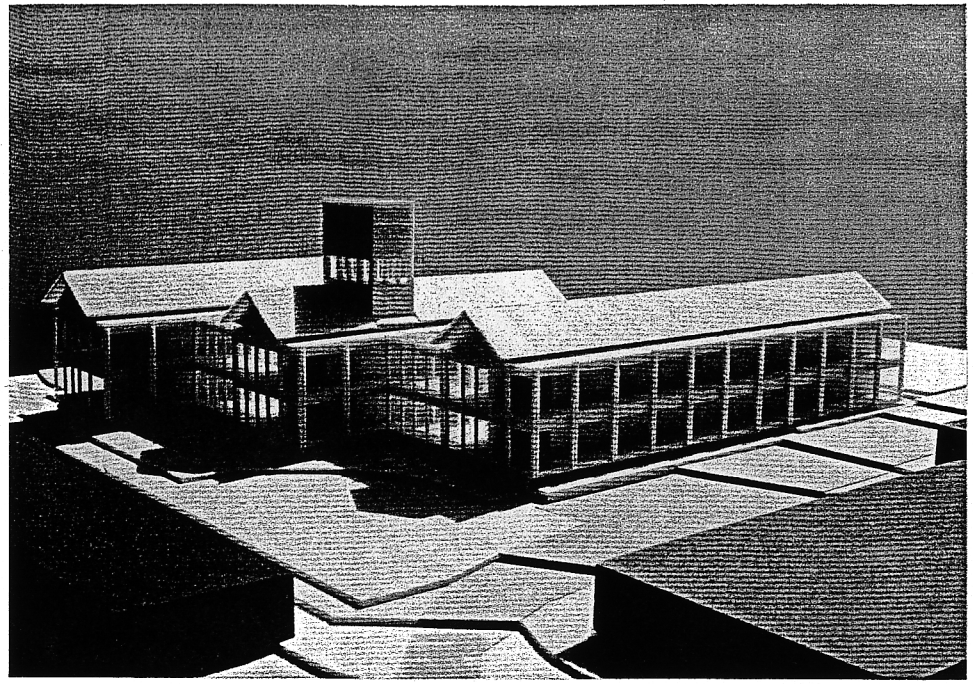
THE PROJECT FOR INFRASTRUCTURAL SUPPORT AND
EDUCATIONAL EQUIPMENT TO
NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

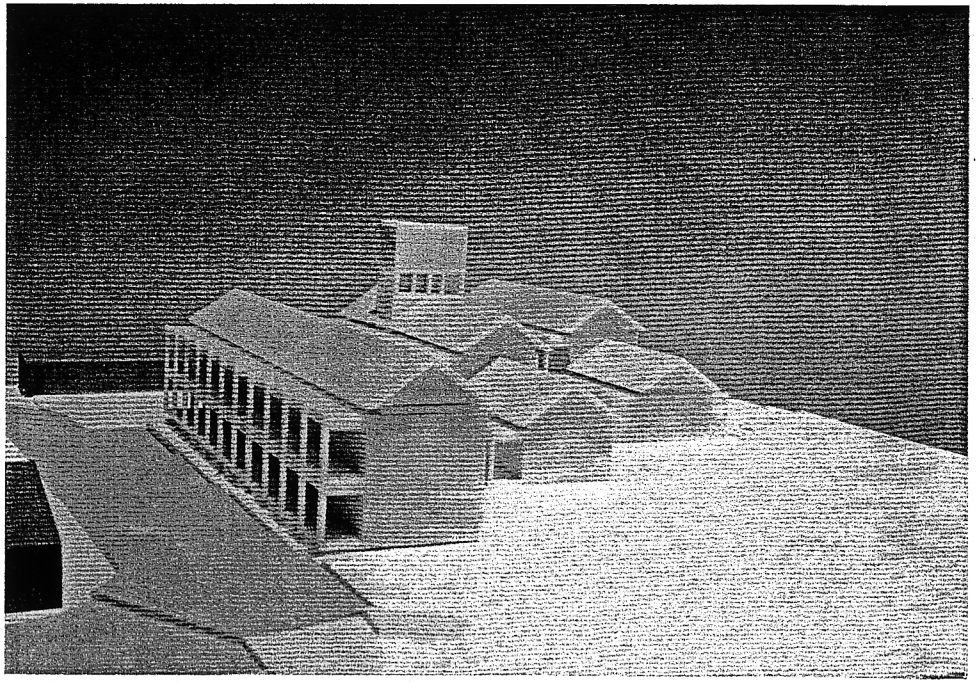
PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING, INC.

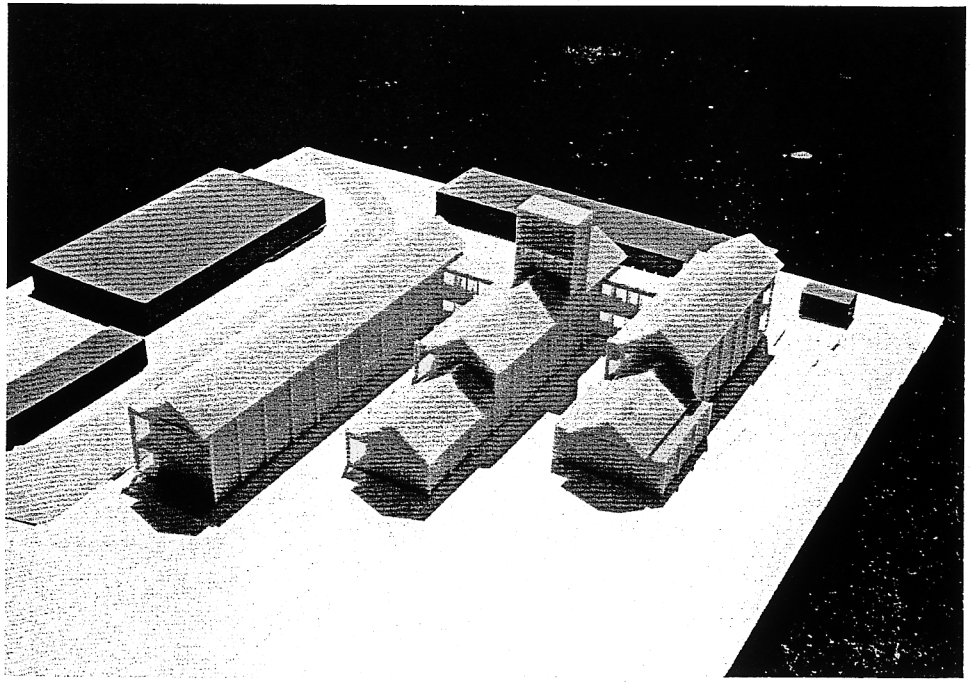
MODEL PHOTOS 1

Model and Photo by PCI









THE PROJECT FOR INFRASTRUCTURAL SUPPORT AND
EDUCATIONAL EQUIPMENT TO
NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING, INC.

MODEL PHOTOS 2

Model and Photo by PCI

ABBREVIATION

AfDB	African Development Bank
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
COSC	Cambridge Overseas School Certificate
DEP	Diploma in Education - Primary
DES	Diploma in Education - Secondary
Dip.Tech.	Diploma in Technology Education
DPE	Diploma in Primary Education
E/N	Exchange of Notes
EU	European Union
FPE	Free Primary Education Program
GDP	Gross Domestic Product
GTZ	German Agency of Technical Cooperation
IDA	International Development Agency
ILO	International Labor Organization
JC	Junior Certificate
JICA	Japan International Cooperation Agency
LAC	Lesotho Agricultural College
LHS	Lesotho High School
MDF	Main Distribution Frame
MOE	Ministry of Education
NGO	Non-Governmental Organization
NHTC	National Health Training College
NTTC	National Teacher Training College
NUL	National University of Lesotho
PABX	Private Automatic Branch Exchange
PSLE	Primary School Leaving Examination
PTC	Primary Teacher Certificate
PTTC	Project Type Technical Cooperation
SACU	The Southern African Customs Union
STC	Secondary Teacher Certificate
TOR	Terms of Reference
UNDP	United Nations Development Program
UNICEF	UN International Children's Emergency Fund
USAID	The U.S. Agency for International Development
WASA	Water And Sewage Authority
WB	World Bank
WFP	World Food Program

Contents

APPENDICES

CHAPTER 1
BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

1-1 Background of the Request

In Lesotho, a high priority has been given to Human Resource Development, and the Government of Lesotho (GOL) has been developing a strong educational system at a remarkable rate since the beginning of reforming the educational system in the early 1970's. The sixth National Development Plan (1996/97 – 1998/99) focused on the improvement and development of Education, with special attention being paid to Primary Education.

As a result of their efforts, the net enrollment rate of primary schools has increased rapidly from 58% in 1990 to 71% in 1995, and Lesotho's adult literacy rate (male 62%, female 84%) has become one of the highest in the Southern African region. However, as a consequence of this rapid development, the present educational system is suffering from several serious problems in quality such as low level of teaching staff, shortage of school facilities, high drop-out rates (7.5% at every primary standard), high repetition rates (20%), insufficient management and budget, and inadequate monitoring and supervision system. Furthermore, the enrollment rate of primary schools is expected to increase further due to the introduction of free school fees in the future.

Under these conditions, the Ministry of Education (MOE) has a plan to strengthen the training for school teachers, with a target to improve the teacher-student ratio to 1:25 from 1:46 in 1997, and to solve the problems in the educational sector.

The National Teacher Training College (NTTC), established by GOL in 1975, provides Pre-service training for teachers of Primary, Secondary and Vocational/Technical Schools and In-service training for Primary School teachers, and it is the only provider of Primary School teachers in Lesotho.

Under these circumstances, GOL requested NTTC to expand and refurbish the facilities of NTTC in accordance with the "Grobbelaar Plan 1993", which was formulated with the support of the World Bank(WB) in 1993 as a Master Plan for physical planning for the future development of the NTTC Campus. Based on the Grobbelaar Plan, it is planned to expand and improve their facilities according to an assumption of increasing its enrollment to 1,100 by 1997, and this figure was expected to increase to 1,350 by 1999, with the support of several donors, such as USAID and Irish Aid.

As a continuation of this support, GOL requested to the Government of Japan for construction of buildings and procurement of equipment in NTTC. In response to this request, the Basic Survey Team visited Lesotho from April 5th to May 1st 2000, and

subsequently the Study Team prepared the Draft Report of Basic Design Study, and the Draft Explanation Study Team visited from July 18th to August 2nd 2000.

1-2 Components of the Request

The outline of the Request from the GOL to the Japanese Government is as follows:

1) Infrastructural Support	:	Applied Science Block (1,600sqm), Library (1,600sqm), Multi-purpose Hall (2,400sqm)
2) Educational Equipment	:	Equipment for Science(Chemistry, Biology, Physics), Home Economics, Art & Craft, Agriculture and Computing

These components have been carefully examined for their propriety and necessity, and it was decided to concentrate the project on the construction of the Applied Science Block and the procurement of related equipment.

Basic Design Study has also examined and analyzed the request submitted by NTTC, MOE and GOL, and the outline of the project has been summarized as follows:

[Outline of the Project]		
1) Overall Goal	:	To contribute to improve the qualitative situation of education in Lesotho.
2) Project Goal	:	To supply highly qualified primary school teachers and improve the quality of classes
3) Output of the Project	:	To strengthen and expand the academic capacity of the NTTC and improve the nature and quality of its service.
4) Activities of the Project	:	
a) Contents of the Request		
Facilities	:	- Laboratory and Workshop Building (1,600sqm)
Equipment	:	- Equipment for Science(Chemistry, Biology, Physics), Home Economics, Art & Craft, Agriculture and Computer Education
b) Undertaking by the Cambodian participants	:	- Budgets related to the project - Secure manpower - Establishment of Administration and Management System
5) Project site	:	In the compound of the National Teacher Training College in the City of Maseru.

6) Direct and Indirect Beneficiaries	:	Direct beneficiaries :	All 1,350 students in NTTC, All 4,340 teachers in primary schools.
		Indirect beneficiaries :	410,000 students (includes 360,000 primary students) taught by teachers graduated from NTTC

According to the request shown in the project application form in regard to the provision of facilities, only rough drawings which show rough contents and approximate size of each facility without well-grounded details were attached. Through the discussions at the Basic Design Survey and the Draft Explanation Study on the rooms required for the target subjects, detailed request for facilities were made in regard to facility planning as stated hereinafter.

As for provision of equipment, the request list was attached to the project application form. However, based on the discussions regarding the outline of the project, detailed discussions were carried out between the JICA Study Team and NTTC side, and equipment lists were rearranged as described hereinafter.

CHAPTER 2
CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Objectives of the Project

The objectives of the Project are to improve the physical infrastructure for NTTC through constructing a facility and providing the educational equipment for the Laboratory and Workshop Building in the premises of NTTC, in order to strengthen and expand the academic capacity of NTTC in Lesotho.

It is envisaged that the ultimate goal of the Project is to contribute to the improvement of the education in Lesotho by increasing the number of highly qualified school teachers.

2-2 Basic Concept of the Project

2-2-1 Policy of the Cooperation

(1) Contents of the Project and Basic Concept

Results of a series of discussions with MOE and NTTC during Basic Design Study and Draft Report Explanation Mission are contained within the Minutes of Discussions (M/D) signed on 19th of April and 26th of July, 2000. The following points have been confirmed to be the basic direction for the implementation of this Project.

1) According to the Request Form, the construction of facilities and supplying of equipment to the Applied Science Block, Multi-purpose Hall, and Library buildings were requested. However, as a result of the discussions, it was agreed that the target of the Project would be only the Applied Science Block, for it is better to focus on the facility and equipment which is directly related to both the quality and the quantity of lectures.

2) Regarding the name of the requested facilities, it was agreed to change the name from “Applied Science Block” to “Laboratory and Workshop Building”.

3) The construction site for the Project is confirmed as shown in ANNEX-1 of M/D signed on 19th of April, 2000. The site was selected based on the site survey and discussions with NTTC regarding the relationship with the existing facilities, security, and execution of the construction work. This project site conforms to the zoning plan shown in the “Grobbelaar Plan”.

4) In compliance with the basic policy of Japanese Grant Aid Projects, preparation work of the site and preparation of necessary infrastructure shall be dealt with by the

Lesotho Side. The following undertakings shall be completed by the commencement of the construction: clearance and leveling of the land, preparation of necessary infrastructure and re-location of the electric pole to a suitable location.

5) As a result of the series of discussions in Japan, it is proposed that the facilities in the new Laboratory and Workshop Building will be only for experiments. The lecturing will be held in the existing laboratories and classrooms, and the existing laboratories will be converted to lecture rooms basically used for Science, Agriculture, Home Economics, Art & Craft, and Computing.

6) The necessity for, and the appropriate number of Agriculture laboratories and Computer rooms has been studied based on the documents prepared by NTTC. As the result of further studies in Japan, it was tentatively concluded that the appropriate number of Agriculture laboratories and Computer rooms will be two and one respectively.

(2) Items to be noted for Basic Design

1) It is confirmed that the Lesotho side is responsible for the Development Budget for the preparation work of the Project. This will include the cost of land preparation such as clearance and leveling of the land, preparation of necessary infrastructure and re-location of the electric pole to a suitable location, etc. The tentative estimation of the Development Budget has been prepared by the JICA Study Team and the related authorities, and has been confirmed with NTTC during the Draft Explanation Study. Especially for the existing electric pole and electric wire in the Project Site, it is confirmed that they will be re-located to outside of the Project Site by the Lesotho side.

2) As to the operation and management of the Laboratory and Workshop Building after the completion of construction, the following points will be discussed and confirmed with the Lesotho side.

   a) Running Cost: The operation budget of NTTC has been prepared by MOE. However, NTTC is planned to be autonomous in the near future. The running cost of electricity and water supplies presented in paragraph 3-2-2 of the "Operation and Management Plan" has to be prepared by MOE.

   b) Staff arrangement: NTTC is planning to rearrange the organization and to strengthen the administration after becoming autonomous. As to the academic staff, it is planned that the number of tutors for primary education and secondary education will be increased respectively after the completion of this project.

3) In order to prevent excessive operation and maintenance costs, consideration shall be given to "low maintenance" or "maintenance-free" in the facility and equipment design.

2-2-2 Study Result and Examination of the Contents of the Request

The request for the Project from the Lesotho side is a) Construction of facilities, and b) Procurement of Education Equipment for the improvement of NTTC. The study result and examination of the contents of the request are reported as follows.

(1) Facility Plan

1) Confirmation of the Contents of the Request

The following buildings and equipment were requested in the initial application for Grant Aid by the Lesotho Government.

Applied Science Block (1,600 sqm) ,	Library (1,600 sqm)
Multi-purpose hall (2,400 sqm),	General use Classrooms (750 sqm)

In addition to the above mentioned buildings, drawings of the proposed plan for each buildings were attached without any explanation on the necessity of each room.

The components of this project have been discussed based on the policy of focusing on the Applied Science Block in this project during the Basic Design Study.

2) Issue of the Contents of the Request

a) The proposed floor plan for each building was attached to the application. However, the necessity of the rooms and required floor area of each room were not described, so that the basis for the selection of rooms and computation of the size of each room was unclear.

b) Three sites were proposed for three buildings respectively in the Application. Though they did not match the zoning plan in the "Grobbelaar Plan", the Master Plan of NTTC, there was no description regarding the selection of proposed project sites.

c) The name of one building was the Applied Science Block, however some rooms shown in the drawings were not for the subject of applied Science.

d) Though the basis of selecting rooms was not described, preparation rooms, stores, common spaces such as corridors and toilets, in addition to the laboratories and workshops, should also have been reconsidered.

3) Study of the contents of the Request

The request revised by NTTC based on the discussions during the Basic Design Survey was summarized in the M/D Annex-I, signed on 19th of April, 2000.

Subsequently the Study Team and NTTC have continued detailed discussions and studies in order to clarify the size and function of each room in each section. Important issues are summarized as follows:

a) Library, Multi-purpose hall, and General classroom are out of this project scope.

b) The name of the building is changed from the "Applied Science Block" to the "Laboratory and Workshop Building".

c) The target subjects were agreed as Physics, Chemistry, Biology, Agriculture, and Computing. The necessity of most of the rooms were confirmed. However, as a result of the study based on each curriculum and the projected number of students and classes, it was decided that the Auxiliary Agriculture Laboratory will be excluded and only one Computer room will be included in this project.

   As mentioned above, the laboratories and workshops in the new Laboratory and Workshop Building are proposed to be used only for experiments and practice.

   Detailed Study:

a) Study of Building Components:

   As the result of detailed studies of the contents and scale of each required room, considering the contents of teaching classes, student numbers, staff numbers, and paying careful attention to avoid any over-estimate of size, the total floor area required for the new building was estimated as approximately 2,636 sqm including common spaces.

b) Study of Detailed Plan:

   Study of detailed plans for each room (using 1/100 scale drawings) has been carried out in order to confirm the layout of equipment and furniture, and the scope of the Lesotho side for procurement. The appropriate size of each room has also been confirmed through the discussions that were held with lecturers and laboratory technicians of each subject, as far as was practicable.

(2) Design of Equipment

1) Confirmation of Requested Equipment

As a result of discussions with NTTC, the contents of the request were concluded as supplying equipment to NTTC covering the following workshops and laboratories, which are the same as original request.

a)	Science:	Biology laboratory, Chemistry laboratory and Physics laboratory
b)	Home Economics:	Sewing workshop and Cooking workshop
c)	Art and Craft:	Pottery workshop and Art room
d)	Agriculture:	2 Agricultural laboratories and 1 Spare laboratory
e)	Computing:	2 Computer rooms

NTTC is deploying one department head in each department in each division of Primary Education, Secondary Education and In-service Training excluding Computer Department, and Art and Craft Department. They do not have enough knowledge and information regarding other divisions and do not know even the number of students in other divisions. Therefore, the discussion was done with three assistant directors in charge of Primary Education Division, Secondary Education Division and In-service Training Division respectively, but they also do not know the details in each department.

The requested equipment was noted in the Minutes of Discussion of April 20, 2000 but the additional equipment was requested by the department head who did not participate in the discussion for equipment. The details of equipment are mentioned below.

Additional Request

Biology	**Chemistry**
1. Aquarium Set 2. Water Bath 3. Oven 4. Photometer 5. Micrometer 6. Soil Testing Kit 7. pH Meter with electrode 8. Radiant Heater 9. Hand Lens (Magnifier) 10. Prepared Slides for Animal Structure 11. Barometer Aneroid 12. Barometer Aneroid wall mount 13. Chart, several kinds for Aids, Annelides, Arachnida, Bird, Crustacea, Earth Worm, Fish, Green Grasshopper, Hydra, Mouusca, Threathened Environment, Tuberculosis 14. Mercury Thermometer –10 to 110 degree C 15. Simple Pendulum Set 16. Tape Measure	1. Hand Centrifuge with 4 caps 2. Hofmann Voltmeter Set with electrodes with stand 3. Analytical Balance 0.1mg 4. Balance 0.1g **Physics** 1. Mini-telescope **Agriculture** 1. Hot Plate 2. Water Bath 3. Analytical Balance 4. Hydrometer 5. Models of Cow, Pig, Hen, Sheep, Goat, Horse, Rabbit, Fish 6. Trolley 7. Flame Photometer 8. Centrifuge 9. Draft Chamber

2) Investigation of Requested Equipment

It was discovered during the field survey that the equipment in the request is almost a duplicate of the equipment in the existing workshops and laboratories. The equipment listed in the Minutes of Discussion and the additional request were duplication or additional equipment while little new equipment was included.

A) Science Dept.

a) General Science

In General Science, 6 kinds of general-purpose equipment are requested for common use. The water distillation and waste water treatment bath are suitable for common use. However, other equipment should be allocated to the laboratories.

b) Biology

The equipment is almost a duplicate of the existing equipment and the basic equipment is not properly included. The balance necessary for measuring chemicals and the basic measuring instrument are not included.

c) Chemistry

Many of the requested equipment are tools and instruments. The requested equipment is not sufficient for basic and systematic experiments.

d) Physics

Some experiment equipment are included but many of them are measuring instruments.

The equipment requested for science is a duplicate of the existing equipment and not sufficient for the basic experiments. Therefore they do not contribute to the quality improvement of experiments. The addition of new laboratories may contribute to the improvement of education by decreasing the number of students per class to about 30 students.

The requested equipment is indispensable for experiments based on the curricula but not sufficient for the experiments based on each syllabus in the curricula.

Some experiments in Biology are carried out by borrowing the facility and equipment of the Lesotho Agricultural College located in Maseru City.

B) Home Economics

a) Cooking

The original request included not only cooking equipment but also table ware, but the newly requested equipment is mostly cooking tools and machines.

b) Sewing

The sewing machines are the main equipment in this field. The contents of the request gave priority to the kinds of sewing machine that can fit into the limited space available.

C) Agriculture

The requested equipment were selected from existing equipment and do not include any specific item for handling and operation. Some experiments are implemented by borrowing the facility and equipment of the Lesotho Agricultural College. In the campus, some cattle, chickens and goats are raised and several kinds of vegetable and grains are cultivated in the farmland.

D) Art & Craft

The main equipment requested is for pottery, painting and design. There is nothing in the existing workshop except a kiln and some potter's wheels. Some equipment for art education with the pottery equipment are requested. At present there is no art room in NTTC.

E) Computer

Lesotho side has a policy to strengthen computer education in the future and requested strongly the equipment necessary for two computer rooms in the original request. However it is vague in several matters such as securing the teachers and the future curricula, so the equipment for one computer room are requested finally.

3) Priority of equipment

The requested equipment is almost a duplicate of the existing equipment. The purpose of the request is to develop the new workshops and laboratories to the same level as the existing ones. Moreover the indispensable equipment for practice/experiments are selected from the existing equipment. The standards for selection of equipment in NTTC are as follows.

a) Low operation cost
b) High frequency of use
c) Safe in operation
d) Low consumption of consumables
e) Easy maintenance
f) High durability

Equipment which does not comply with the above standard is excluded, even if it is important for practical and experiment work. Therefore it is considered that the remaining equipment requested is the minimum required, and all items are high priority.

4) Curricula and method of practice and experiment

The curricula in NTTC are graded as higher education level but the equipment requested does not comply fully with curricula syllabi. In science and agriculture on primary teacher training courses, the use of models and charts or experiments demonstrated by teachers are conducted due to the large number students per class. In science and agriculture on secondary teacher training courses, experiments demonstrated by teachers or the basic group experiments are carried out.

Therefore the requested equipment list includes many kinds of models and charts and consider the equipment for the group rather than for individuals.

In home economics, cooking equipment requested is a substitution or the expansion of existing equipment, and sewing equipment requested is aimed at providing the basic skills to the students. The equipment for embroidery included in the curricula is not requested.

In art and craft, several potter's wheels and an electric kiln for pottery exist in the present workshop and also the request is mainly for pottery equipment.

In computing, the existing equipment is out-dated so the request is aiming to substitute new computers.

The Project is to provide a new facility without existing equipment, but the requested equipment list is not prepared based on the curricula.

5) Operation and maintenance system of equipment

The equipment requested in the Project is almost a duplicate of the existing equipment, and does not include any items difficult to operate or maintain, although daily maintenance is indispensable.

NTTC is deploying a specialized technician in each section of Science, Agriculture and Home Economics in charge of daily maintenance.

The repairing of equipment is generally to be ordered outside. However, Science and Agriculture sections of NTTC sometimes request the Lesotho Agricultural college for repair if it is impossible to repair in NTTC because of the limited budget.

In Lesotho, there are few equipment agents so it is very difficult to have repairs carried out. The equipment should be repaired in NTTC.

2-3 Basic Design

2-3-1 Design Concept

The basic design of the facilities and equipment in the Project is based on the following design policies with due consideration of the result of the field survey, the environmental and social conditions of Lesotho, the construction and procurement conditions, the maintenance and management ability of the facility and equipment and construction schedule under Japan's Grant Aid assistance.

(1) The new facilities and equipment should be planned based on Basic Design Study, and must give consideration to the level and quality of the facilities and equipment required to fulfil NTTC's functions as a center of teacher training in Lesotho, and the only institution for training of primary school teachers.

(2) The new facilities and equipment will be a part of the existing NTTC. The new facilities and equipment should be arranged to meet the functional concept of the existing facilities so as to coexist effectively as a whole. Therefore, they should be planned in coordination with the existing facility and equipment.

(3) Especially for the facility planning, the site layout should be planned with consideration of functional layout and effective flow of the students and lecturers, following the "Grobbelaar Plan", the Master Plan of NTTC.

(4) Good design points of other similar facilities in Lesotho should be incorporated into the design of this facility. Any poor design points should be improved.

(5) The new facilities should be designed giving consideration to the local weather conditions (rain, sun and wind). Natural ventilation and natural lighting should be provided as much as possible in order to minimize running costs of electrical lighting, air-conditioning and mechanical ventilation . Also, local customs should be considered in the design of new facilities (e.g. toilets).

(6) The design of facilities and utilities, and selection of equipment should be carried out with due consideration to reduce the maintenance and operation costs.

(7) Construction methods and materials in Lesotho, South Africa and a neighboring country of Lesotho should be considered and used as much as possible. Long-term recurrent costs as well as the initial cost should also be minimized.

2-3-2 Study of Design Criteria

(1) Basic Concept for the Determination of Contents and Scale of the Facilities and Equipment

The determination of the contents, size of the facilities and numbers of equipment are not only dependent on the function of the facilities, but it will have an important effect on the future operational budget as well as on the activities of NTTC.

The contents and size of the facilities and numbers of equipment are studied based on the request from NTTC, which is summarized in M/Ds. These studies are carried out based on the projected number of students and classes of NTTC for 2002, because the construction of new buildings and supply of the equipment are planned to be completed by the end of March 2002.

Basic concepts for the study of the contents and size of the facilities, and items and numbers of equipment are as follows:

1) Target courses of this project

The courses offered by NTTC in 2000 are 5 full-time courses shown as follows, and one In-service course. However, the PTC course will finish in 2001, and in 2002, 4 full-time courses and 1 part-time course are planned to be offered in NTTC. The full-time course programs planned to be offered in 2002, which will be covered by this project, are DPE, DEP, STC and Dip.Tech.

– PTC (Primary Teachers' Certificate)
– DPE (Diploma in Primary Education)
– DEP (Diploma in Education - Primary)
– STC (Secondary Teachers' Certificate)
– Dip.Tech. (Diploma in Technology Education)

NTTC has a plan to convert STC to DES (Diploma in Education - Secondary), and DES is planned to be started in August 2001 and the last intake for STC will be in January 2001. When the new building is completed, in March 2002, both the STC and DES students will be in NTTC.

Though the number of students and classes are shown in their plan, the curriculum is still under preparation. Therefore, the study on the teaching hours was carried out based on the STC curriculum.

2) Projected Number of students and classes for 2002

The projected number of students and classes is shown in Appendix-12. The numbers of students and classes in 2000 are the existing figures, and the projected student numbers from 2001 to 2004 are the numbers prepared by NTTC. The number of classes from 2001 to 2004 is calculated as 48, based on 30 students per class. This number of students per class was confirmed by lecturers of NTTC during the Basic Design Survey, because the existing number of students in each class is almost 30 except for the STC course, and 30 is an appropriate size for experiments and practice.

3) Number of Teaching Hours per Week

The time-table of NTTC is arranged with a maximum of 9 hours per day, from 8:00 to 17:00. However, the actual operating hours is 8 hours, excluding the lunch hour. Therefore this study is based on a maximum number of teaching hours of 8 hours per day, 5 days per week, and 40 hours per week maximum.

4) Rate of Teaching Hours using Laboratories/Workshops

The existing ratio of Practical to Experiment work is around 20 – 30%, and NTTC has a plan to increase this ratio to 40% in 2002. However, the Practical and Experiment work and Lectures are all combined together. It is very difficult to separate Experiment or Practical work from Lectures. Therefore, the number of laboratories and workshops for Science, Agriculture and Home Economics are studied based on the teaching hours which will be held in Laboratories or Workshops, which is calculated based on the analysis of curriculum and syllabi.

The formula for calculating the operation rates of each subject is as follows;

$$\text{Operation Rate} = \frac{\text{Number of lectures to use laboratories and workshops per week}}{\text{Number of rooms} \times \text{Maximum teaching hours per week}^{*}}$$

*Maximum teaching hours per week = 8 hours/day x 5 days = 40 hours

The operational rate of classrooms and laboratories in the Japanese national universities is around 40 to 50 % as instructed by the Ministry of Education in Japan. It is said that the maximum rate that the rooms can be operated is 80%, in which case all lecturers have to stay in the university from Monday to Saturday, the preparation and tidying up should be done in each teaching hour, and the laboratories are also used for lectures.

5) Basic concept of use of existing building

During the Basic Design Survey, the number of rooms required was studied based on the idea that the laboratories and workshops will be used for both experiments and lecturing. However, as a result of a series of discussions with JICA and NTTC, the new laboratories and workshops will be used only for teaching hours including the experiments and practical work, and lecturing will be held in the existing laboratories and classrooms.

Therefore, the necessity of the rooms and the number of rooms are studied, based on the concept that the rooms in the new Laboratory and Workshop Building will be used only for experiments and practical work.

(2) Study for the Number of Rooms

Based on the request submitted by NTTC summarized in M/D, the above mentioned basic concept, and the analytical data of NTTC's curricula, the necessity of the rooms and room numbers are as follows.

Projected teaching hours, in particular for the teaching hours using the Laboratories / Workshops in 2002 calculated based on the curriculum analysis, is shown in Form 2-1 and 2-2.

Form 2-1 Teaching hours using Laboratories and Workshops (per week)

(unit: hours/week)

	Science		Agriculture		Home Economics		Art & Craft		Computing	
	Term 1	Term 2	Term 1	Term 2	Term 1	Term 2	Term 1	Term 2	Term 1	Term 2
DEP	33.9	58.9	28.3	57.8	33.8	31.6	38.8	29.3	0	27.0
DPC	14.7	5.9	0	6.3	0	6.7	0	6.4	3.3	0.0
STC	37.5	16.7	23.4	8.7	24.2	14.3	0	0	14.0	9.9
Dip.Tech.	4.5	3.4	0	0	0	0	0	0	4.1	1.5
Total	90.6	84.9	51.7	72.8	52.1	52.6	38.8	35.7	21.4	38.4

Form 2-2 Operational Rate of Laboratories and Workshops (2002)

	Science		Agriculture		Home Economics		Art & Craft		Computing	
Room	Term 1	Term 2	Term 1	Term 2	Term 1	Term 1	Term 2	Term 1	Term 2	Term 1
1 room	227%	212%	129%	182%	145%	131%	97%	89%	53%	96%
2 rooms	113%	106%	65%	91%	73%	66%	49%	45%	27%	48%
3 rooms	76%	53%								

Notes: Operational Rate after the completion of this project。 Maximum Operational Rate per subjects

In the request from NTTC, a staff room, a preparation room, and a storage room are requested for each laboratory and workshop. However, the staff room and the preparation room will be combined into one room as far as possible, because the lecturers have their desks in the Staff Room Buildings.

1) Science (Physics, Chemistry and Biology)

The rooms required for the Science department consist of: Laboratories for Physics, Chemistry and Biology, Staff room, Preparation room and Storage.

There are only two laboratories in the existing building, and they are used for all three subjects, and most of the experiments and the lectures are carried out in these rooms. However, the normal classrooms are also used for some classes, such as Biology, because of the shortage of laboratories . Even in the lecturing hours, some equipment and models are used for demonstration, and this equipment is carried out from the laboratories after the demonstration.

NTTC has been using the laboratory in the Agriculture College in the Lesotho University for the classes for Soil Science of Biology.

The projected teaching hours for Science calculated based on the curriculum is shown in Appendix-14.

As for the staff room and preparation room, they will be combined to one room as a staff-preparation room, because each teaching staff has a room in the Staff Room Buildings, and only one laboratory technician is in charge of the Science laboratories' operation. The staff-preparation room and small storage will be placed next to each laboratory.

2) Agriculture

The Agriculture department requires two laboratories, one auxiliary laboratory, three preparation rooms, three staff rooms, and three storage rooms.

There are two existing laboratories for Agriculture, one is mainly used for primary and the other is for secondary. Their facilities are not adequate for experiments and it is proposed to convert them to lecture rooms. In the case of study of horses and fish, students visit the Agriculture College in the Lesotho University.

The projected teaching hours for Agriculture calculated based on the curriculum is shown in Appendix-14.

Therefore, two Agriculture laboratories will be planned and an auxiliary laboratory will be out of the scope of this project.

3) Home Economics

For the Home Economics department, 2 workshops for cooking and sewing, two preparation rooms, two staff rooms, and two store rooms were requested.

Though there are a cooking workshop and a sewing workshop, they are too small to accommodate all students in the class. Therefore teachers' demonstration has been carried out in place of practice by students, and if necessary the students are divided into several groups and each group has practice one after another. The time without any classes or these workshops is used for supplementary practical work for students.

In this project, these existing facilities will be converted into a room which will be used mainly for lectures. The projected teaching hours for Home Economics calculated based on the curriculum as is shown in Appendix-14.

As for the staff rooms and preparation rooms, they will be combined to one staff-preparation room as for other subjects. A staff-preparation room and a store room are planned to be located next to each workshop.

4) Art & Craft

As for the Art & Craft department, one Art and Craft Workshop, one preparation room, one staff room, and one storage room were requested. There is only one Art & Craft room, with a size of 56.0sqm, in the existing buildings. They contain some kilns and potters wheels and other materials for practice. Practice is carried out in the other normal classrooms or outside.

Therefore, the practical class will be held in the new workshops, and the existing workshop will be converted into a lecture room, although it will be smaller than the other rooms.

The projected teaching hours for Art & Craft calculated based on the curriculum is shown in Appendix-14.

According to the curriculum, it seems better to have rooms specialized for Art and Craft respectively. Therefore, a workshop for Art and a workshop for Craft are planned.

As for the staff room and preparation room, they will be combined to a staff-preparation room. One staff-preparation room and one storage room are located between the two workshops.

5) Computing

Two computer rooms, one staff room, and one store room were requested for Computing.

Though there is one existing computer room, it is not adequate. The study on the number of computer rooms is based on the assumption that the existing computer room will continue to be used as a computer room after this project.

The projected teaching hours of Computing calculated based on the curriculum is shown as follows.

In addition, according to the document prepared by NTTC, it is anticipated that some topics in Science e.g. Mechanics and Environmental Science will be taught through computer CD-ROM. NTTC is also intending to introduce the Internet facility for research projects in order to obtain information on the most recent Science discoveries/advances. Accounting and statistics are also subjects for which computers will be used if possible in the future.

As for the staff room and storage, they will be combined to one staff room, and located next to the Computer room.

6) Teaching Material Room

Though there is no request for a printing room, the printing machine and computer for teaching material preparation were requested. In order to store this equipment, one teaching material room will be located next to the computer staff room.

As a result of these studies, the numbers of rooms are summarized as follows:

Rooms	Existing Facility (Rms)	New Facilities (Rms)	Total (Rms)
Classrooms	22	-	22
Lecture Room	-	-	7
Science Laboratories	2	3	3*
Agriculture Laboratories	2	2	2*
Home Economics Workshops	2	2	2*
Arts & Craft Workshops	1	2	2*
Computer room	1	1	2
Secondary Technology Workshops	5	-	5
Total	35	10	45

Note: * Existing laboratories and workshops are to be used for lectures.

(3) Determination of the Size of Each Room

The size of the facility will be determined in consideration of the existing facilities, other similar facilities (projects) undertaken by Japan's Grant Aid, the standard data of the Architectural Institute of Japan and so on.

1) Science (Chemistry, Biology and Physics)

It was requested that three laboratories for science should be equipped in the same style. Layout of the laboratory equipment will be based on consideration of the activities in the laboratories. As a result of further discussions, it is planned to be installed with the same experiment tables in Chemistry Laboratories and Biology Laboratory, but specific tables for its own use in the Physics Laboratory.

Preparation Rooms are also used as the staff rooms for laboratory technicians and lecturers. A dark curtain will be installed only in Physics Laboratory for experiments.

a) Chemistry Laboratory and Biology Laboratory

These laboratories should be equipped in the same style because chemicals will be used in both laboratories.

The size of these laboratories is determined to be 108sqm (8.0m x 13.5m) in consideration of space for the activities. There are 8 experiment tables for 4 students each, each with a sink, two gas taps and two electrical outlets. It is to be used for over 30 students at one time, so side tables with a sink, gas taps and outlets are installed by the walls.

A draft chamber is to be installed in the wall between the Chemistry Laboratory and Preparation Room. Students in the laboratory watch the demonstrations conducted by a lecturer in Preparation Room.

Each laboratory has its own store which has cabinets for the equipment and chemicals. As to the treatment of the waste fluid, a treatment device should be installed.

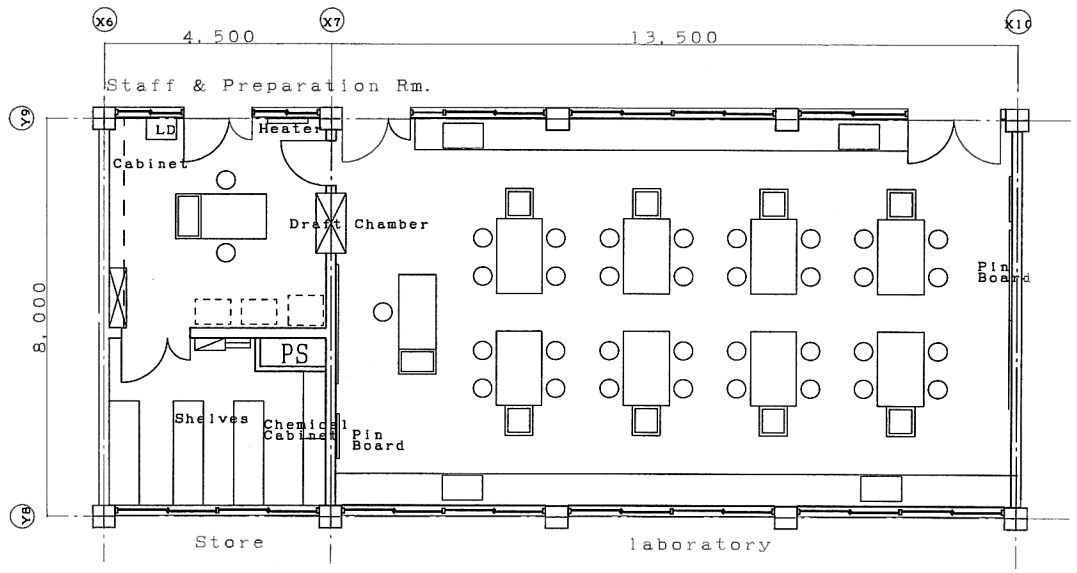


Fig. 2-3-1 Chemistry Laboratory

b) Physics Laboratory

It is the same size as the Chemistry Laboratory and Biology Laboratoryand also should be installed with 8 experiment tables for 4 students each. These tables have only electrical outlets without a sink and gas taps. There should be occasional cases to use this laboratory for other subjects, therefore, sinks, gas taps and electrical outlets are to be installed on the side tables.

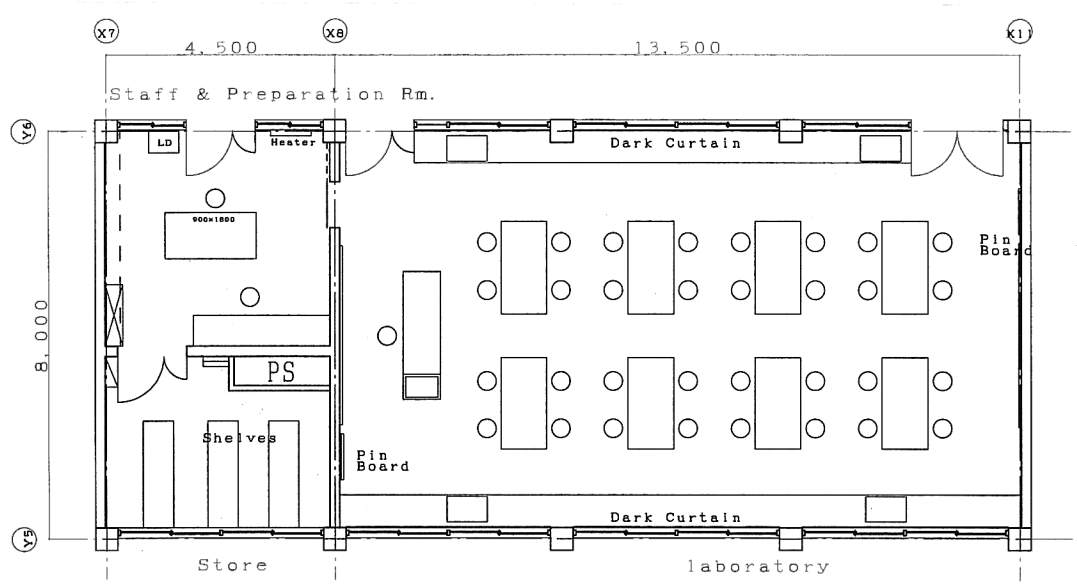


Fig. 2-3-2 Physics Laboratory

2) Agriculture

It was requested that one laboratory should be equipped especially for animal-study and the other should be for crop-study. As a result of further discussions, two laboratories are planned to be in the same style as the Biology Laboratory. As for a draft chamber, it is to be installed only for one laboratory.

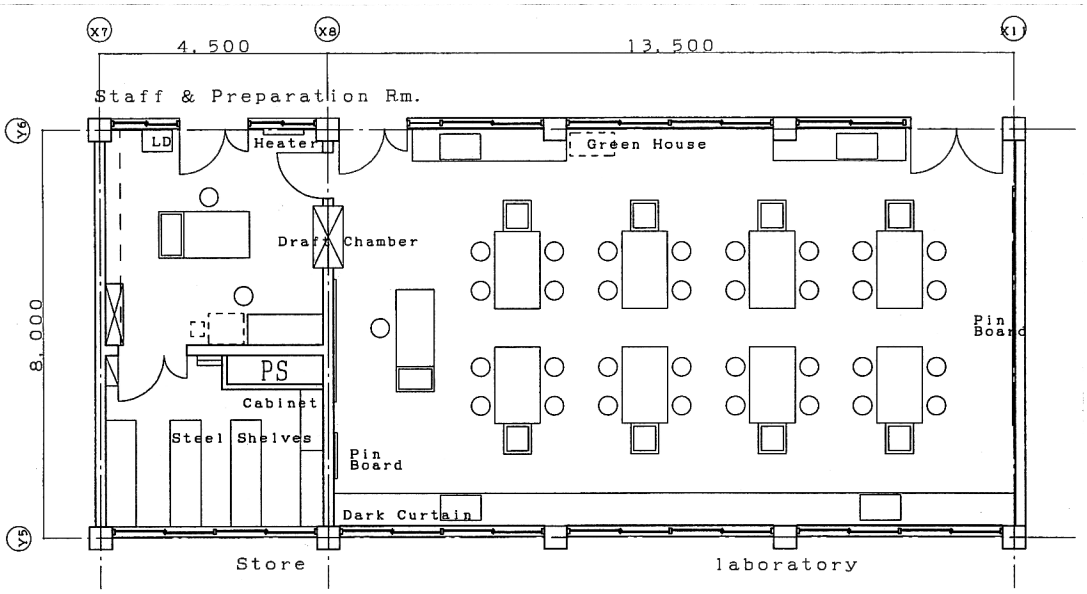


Fig. 2-3-3 Agriculture Laboratory

3) Home economics

a) Cooking Workshop

The floor area of this laboratory is calculated as 8.0m x 13.5m = 108.0sqm for 30 students, which is 3.6sqm/person, the same as the above laboratories. The cooking tables have sinks and electricity outlets and cabinets to keep cooking tools, and the table top is made of stainless steel.

A cooking table is also installed in the Preparation Room. A fridge and some shelves to keep cooking materials and tools will be installed in a storage.

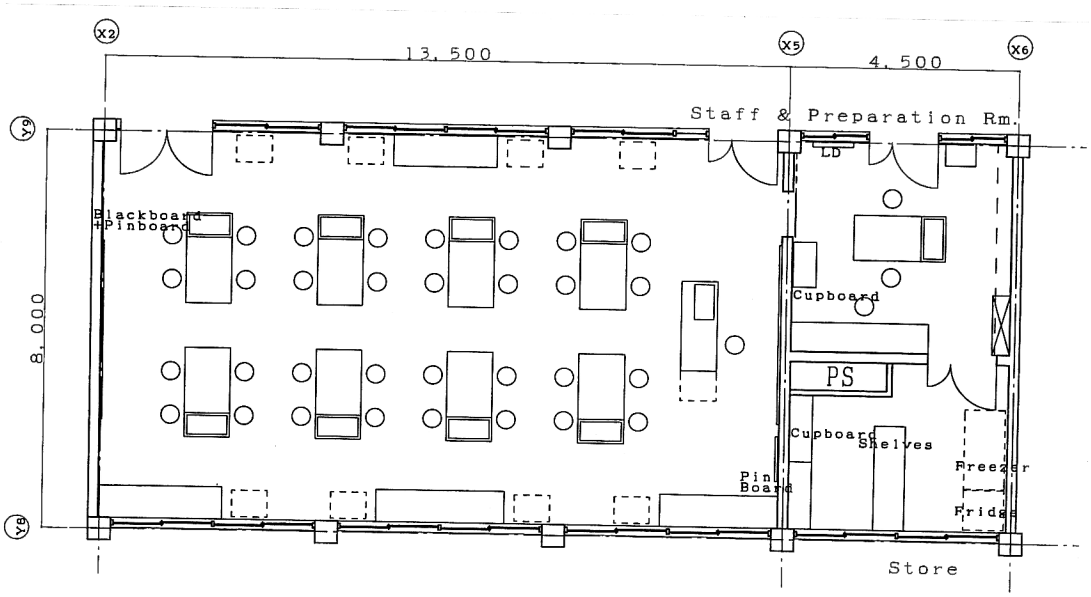


Fig. 2-3-4 Cooking Workshop

b) Sewing Workshop

The floor area of this laboratory is calculated as 8.0m x 13.5m = 108.0sqm for 30 students, same as the Cooking Workshop. 8 laboratory tables for 4 persons will be placed in the center of the room and one in the Preparation Room. Sewing machines are located beside the wall and boards to display some works are located at the back of the room.

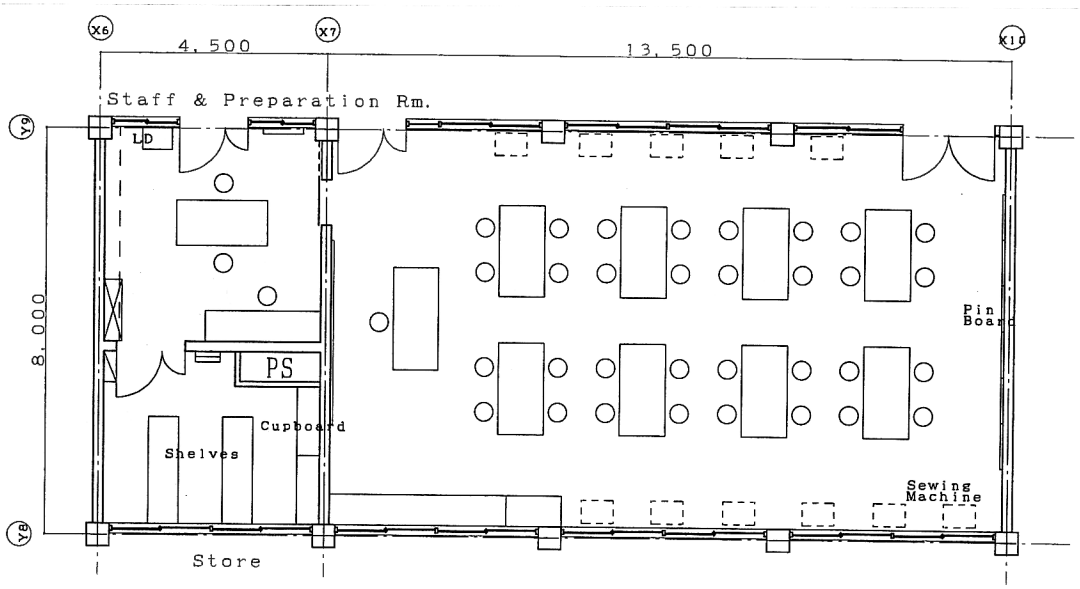


Fig. 2-3-5 Sewing Workshop

4) Art & Craft

The Preparation Room and the Store are located between the Art Workshop and the Craft Room, and these rooms and the Preparation Room are divided by glass. Therefore, activities in these rooms can be seen from the Preparation Room.

a) Art Room

The floor area is calculated as 8.0m x 9.0m = 72.0sqm for 30 students, which is 2.4sqm per person. 15 working tables are installed and the side tables have two sinks which have 300mm deep.

b) Craft Workshop

Pottery is the main activity in this room. The floor area is 82.8sqm for 30 students, which is 2.76sqm per person. 6 tables for 5 persons each are placed in the center of the room. Potter wheels, large sinks and shelves to display the works by students are placed by the wall.

Both a new kiln and an existing one are located in the extra space by the Craft Room, and this space should be separated from the Craft Room by a fence for safety. The ceiling of this space should be higher for natural ventilation.

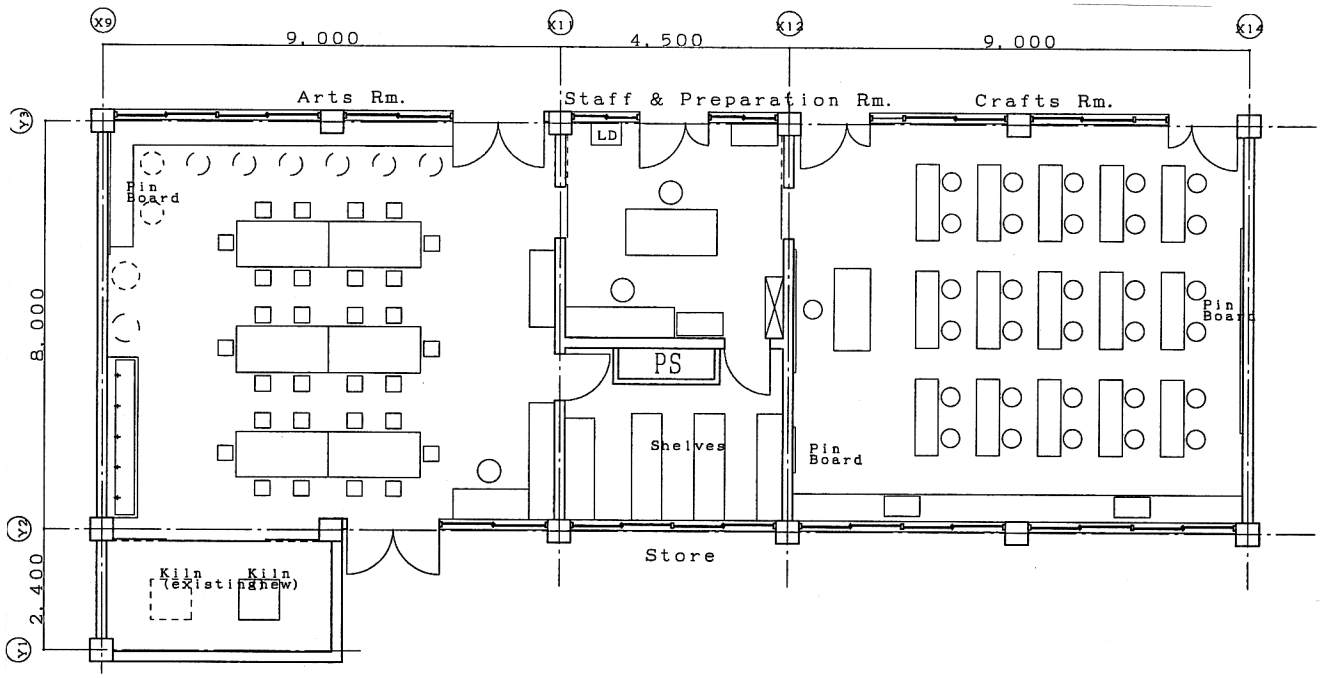


Fig. 2-3-6 Art Room and Craft Room

5) Computer Room

The size of the Computer Room is 8.0m x 11.25m = 90.0sqm for 30 students, 3.0sqm per person. 30 computers for students and one for a teacher should be installed. The layout of these computers is as shown in the drawing below, some are at the center of the room and the others are by the walls.

Printers should be placed in front of the room. One computer for a teacher and four computers in front should be connected to the printer.

The Preparation Room is also used as a store which has a table for teachers and cabinets for the teaching materials and computer software.

A free access floor should be adopted for both the Computer Room and the Preparation Room to correspond to any changes of a computer layout.

6) Teaching Material Production Room

This room is located next to the Preparation Room for Computing, which makes it possible to prepare and print teaching materials. It is divided into two areas to prepare the materials with a computer and a printer and to print and bind some documents.

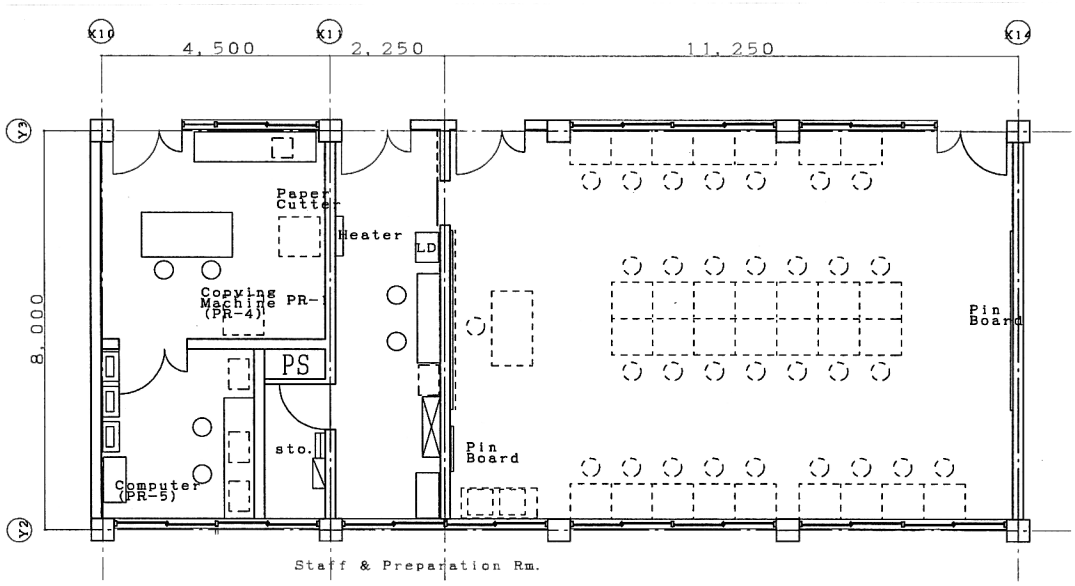


Fig. 2-3-7 Computer Room and Teaching Material Production Room

Comparison of the floor area of each room for the new facility with other examples is summarized as follows:

Form 2-3 The Comparative Table of floor area

Subject		Floor Area of the new facility	Examples
Science	Physics	- Physics Lab 108sqm (13.5m×8m) 32 seats (3.375sqm/seat)	Physics Lab in the National University of Lesotho (NUL): (88.5sqm) 2.95sqm/seat Tokyo Univ. of Pharmacy & Life Science：3.0sqm/seat IKIP-Bundung, Indonesia: 3.5sqm/seat British Standards: 3.7sqm/seat
	Chemistry	- Chemistry Lab 108sqm (13.5m×8m) 32 seats (3.375sqm/seat)	Chemistry Lab in the Lesotho High School (LHS): (180sqm) 4.5sqm/seat IKIP-Bundung, Indonesia: 3.5sqm/seat British Standards: 3.7sqm/seat
	Biology	- Biology Lab 108sqm (13.5m×8m) 32 seats (3.375sqm/seat)	Biology Lab in NUL: (75.2sqm)2.5sqm/seat IKIP-Bundung, Indonesia: 3.5sqm/seat British Standards: 3.7sqm/seat
Agriculture		- Agriculture Lab (1)(2) 108sqm (13.5m×8m) 32 seats (3.375sqm/seat)	
Home economics		- Cooking Workshop 108sqm (13.5m×8m) 32 seats (3.375sqm/seat) - Sewing Workshop 108sqm (13.5m×8m) 24 seats (4.5sqm/seat)	LHS Cooking Workshop: 150sqm 10 sewing machines Sewing Workshop: (81sqm) 4.05sqm/person Cooking Workshop in Yokohama City Culture Center: 4.75sqm/person High School attached to Japan Women's Univ. Cooking Workshop: 3.3sqm/person Sewing Workshop: 3.9sqm/person
Art & Craft		- Art Room 82.8sqm (2.76sqm/seat) - Craft Room 72sqm (2.4sqm/seat)	Oil-painting Room in Aichi Prefectural Univ. of Fine Arts & Music: 5.8sqm/seat Craft Room in High School attached to Japan Women's Univ.: 3.3sqm/seat British Standards: 4.6sqm/seat
Computing		- Computer Room 90sqm (11.25m×8m) 30 seats (3.0sqm/seat)	IKIP-Bundung, Indonesia Computer Room: 4.8sqm/seat

(4) Facilities Required and Area of Each Facility

Based on the discussions and study, the floor area of each room is summarized as follows.

Subject	Request from NTTC		Result of Study		
	Facilities	No. of Rms	Facilities	No. of Rms	Area (sqm)
1. Computing		4		2	114
	Computer Room	2	Computer Room	1	90
	Staff Room	1	Staff & Preparation Room	1	24
	Storage	1	Store		
2. Home economics		8		6	288
	Workshop	2	Cooking Workshop	1	108
	Preparation Room	2	Sewing Workshop	1	108
	Staff Room	2	Staff & Preparation Room	2	38.6
	Storage	2	Store	2	33.4
3. Agriculture		12		4	252
	Agricultural laboratory	2	Laboratory （1）	1	108
	Ancillary laboratory	1	Laboratory （2）	1	108
	Preparation Room	3	Staff & Preparation Room	1	19.3
	Staff Room	3	Store	1	16.7
	Storage	3			
4. Art & Craft		4		4	190.8
	Art & craft room	1	Art Room	1	72
	Preparation Room	1	Craft Workshop	1	82.8
	Staff Room	1	Staff & Preparation Room	1	19.3
	Storage	1	Store	1	16.7
5. Physics		4		3	144
	Laboratory	1	Laboratory	1	108
	Preparation Room	1	Staff & Preparation Room	1	19.3
	Staff Room	1	Store	1	16.7
	Storage	1			
6. Biology		4		3	144
	Laboratory	1	Laboratory	1	108
	Preparation Room	1	Staff & Preparation Room	1	19.3
	Staff Room	1	Store	1	16.7
	Storage	1			
7. Chemistry		4		3	144
	Laboratory	1	Laboratory	1	108
	Preparation Room	1	Staff & Preparation Room	1	19.3
	Staff Room	1	Store	1	16.7
	Storage	1			
8. Others					1359.3
			Lavatory	4	144
			Teaching Material Production Rm.	1	30
			Store	1	6.6
			Machine Room	1	105.9
			Corridors and Stairs etc.		1072.8
Total				**2,636.1㎡**	

(5) Design of Equipment

The equipment requested is intended to develop the level of practical and experiment work in the new facility to the same level as the existing facility.

However, as mentioned in 2-3-2 (1) – (2), it is possible to implement most practical and experiment work in the new facility.

It is appropriate to avoid duplication of the existing equipment and to provide the equipment necessary for the basic and systematic practical and experiment work, in order to upgrade the educational quality in NTTC. In this respect, the requested equipment list was reconsidered as follows.

1) It is necessary to develop NTTC so that basic and systematic education may be implemented, as the Project is a very rare chance for NTTC to significantly develop its equipment.

2) The practical and experiment rate in NTTC is presently low due to the shortage of facilities but it is planned to be expanded in the future. Even in that case, it is possible to implement practical and experiment work in the new facility and lectures in the existing practical and experiment rooms. Therefore, in the Project, duplication of the existing equipment should be avoided as much as possible.

3) New equipment introduced into NTTC can be utilized effectively through the cooperation of several foreign volunteers, with experience in developed countries, staying in NTTC as teachers.

4) The operation cost should be controlled by eliminating equipment which has high operation and maintenance costs.

5) In Agriculture, equipment based on the curricula will be considered, but mainly the equipment necessary for animal husbandry and plant cultivation, which are very important industries in Lesotho, will be provided.

6) The Project is intended to concentrate on the workshops and laboratories, so the audio-visual equipment to be used in lecturing room should be excluded.

7) The quantity of equipment should be determined based on use by demonstration, groups and individuals.

8) Teaching material production equipment should be planned for common use.

2-3-3 Basic Plan

(1) Site Layout Plan

The layout plan has been prepared on the basis of the existing condition (the environment, site conditions and conditions around the site): with due consideration of the result of site analysis and analysis of NTTC's existing facility structure as well as the points listed below.

1) The site was selected with due consideration of the zoning, functional layout, effective flow plan of the whole campus of NTTC and coordination with the existing facilities, as well as the "Grobbelaar Plan", the Master Plan of NTTC.

2) The site layout plan of the new facilities should be arranged in consideration of accessibility from the existing facilities especially for the existing laboratories and workshops, general classrooms, administration building, staff rooms and relevant facilities. In order to keep a safe and easy approach for students from the other laboratories and classrooms, a student plaza is planned to be located at the North-East corner of the project site as an entrance area to the new building.

3) There is one restriction of the site layout plan because of the triangular shape of the site. The buildings are to be oriented to the North in order to secure good sunlight and ventilation throughout the year. Louvers will be installed on the outside wall to protect the facility from the tropical sunshine and heavy rain.

(2) Architectural Plan

1) Floor plan

The floor planning of the facility has been studied in consideration of the floor area required for each room, the function of each room and the site layout plan. Each floor plan was established based on the following criteria.

a) Circulation Plan has been studied based on the classification into 4 categories of user of this facility; a) students from the existing classroom buildings; b) lecturers and staff from the new administration building and staff room buildings; c) students and lecturers from existing laboratories of target subjects and relevant facilities such as livestock houses; and d) services such as delivery of LPG cylinders.

The North-East corner of the site is planned as a major approach route, and the North-West corner of the site is planned as a sub-approach route (see to Fig. 2-3-8).

b) To avoid direct sunshine and to keep rooms in good condition, all the rooms are directed to North and South, and the three buildings are located in an echelon. An open corridor system enclosing an inner garden is adopted (instead of center corridor type) so as to maintain a comfortable environment in the rooms using natural light and ventilation and to reduce running costs. To provide ease and safety to the users of the facility, a composite layout of rooms, corridors, and entrance/exit surrounding an inner court has been arranged.

c) The Students' Plaza located in the North-East Corner of the project site and Balcony at East side corridor of the first floor are planned as a waiting space for students where the students can gather and talk.

d) The design to accommodate the requested laboratories and workshops has been carried out considering the accessibility from the other relevant facilities, such as live stock huts for Agriculture, a model house for Home Management, etc. Therefore laboratories for Science (Physics, Chemistry and Biology) and Computer room are planned to be located at the first floor, and laboratory for Agriculture, workshops for Art & Craft and Home Economics (Cooking and Sewing) are at the ground floor.

e) The unnecessary duplication of facilities (meeting rooms, libraries, toilets, etc.) must be avoided at the planning stage. These facilities must be integrated into the overall development, in order to establish the most reasonable facility plan.

f) The building has been planned on a module concept to increase flexibility, reduce operating and managing cost, and rationalize construction. An economical 8m x 4.5m module will be adopted for the floor planning of the project.

g) Local material will be selected wherever possible considering maintenance and operation cost of the facilities after construction and the physical conditions of Lesotho. Furthermore, architectural and utility design should be easy maintenance, and running costs such as water and electricity fees should be as low as possible.

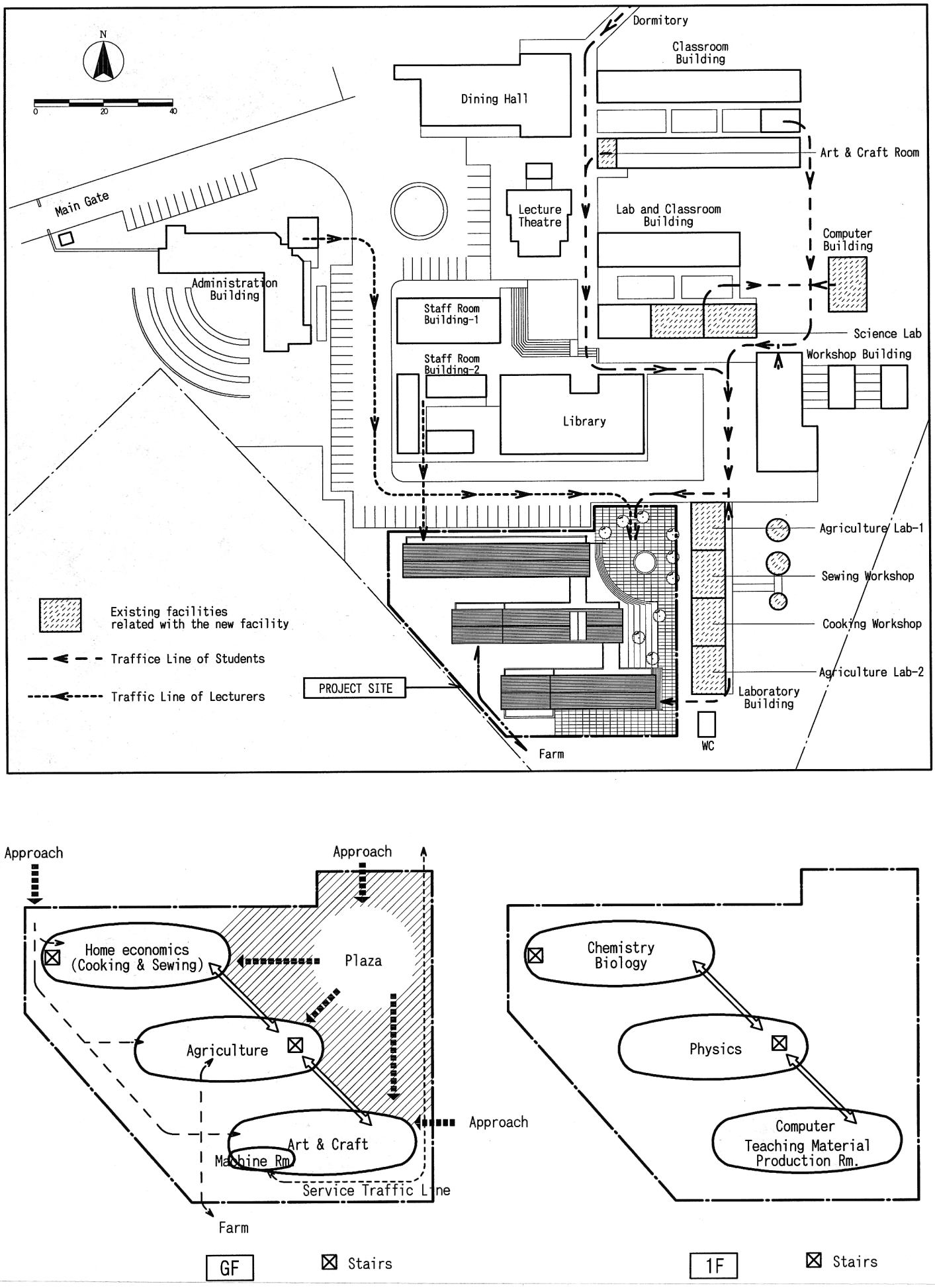


Fig. 2-3-8 Zoning and Circulation Line Plan

2) Elevation and Cross-Section

a) The level of the project site gradually becomes lower from the west to the east, with a level difference of approximately 3 meters. The Design GL(±0) will be the median level of the existing site and the ground floor level is GL+250.

b) A two-story building (including one-story sections) should be considered so as to avoid a sense of oppression to existing buildings as much as possible. Also, it is planned to locate the open space at the east-end of the building where we get a panoramic view.

c) The roof will be sloped in order to discharge the rain quickly.

d) The eaves will protrude, and louvers will be installed to protect rooms from direct sunlight and rainfall.

e) Ventilation louvers which allow the sunlight and the air to pass through are considered for use in the façade in order to protect the rooms from sunlight and rain water.

f) Wall surfaces will have adequate openings in order to enhance room ventilation and provide a balanced intake of sunlight. This will also reduce the running cost of equipment.

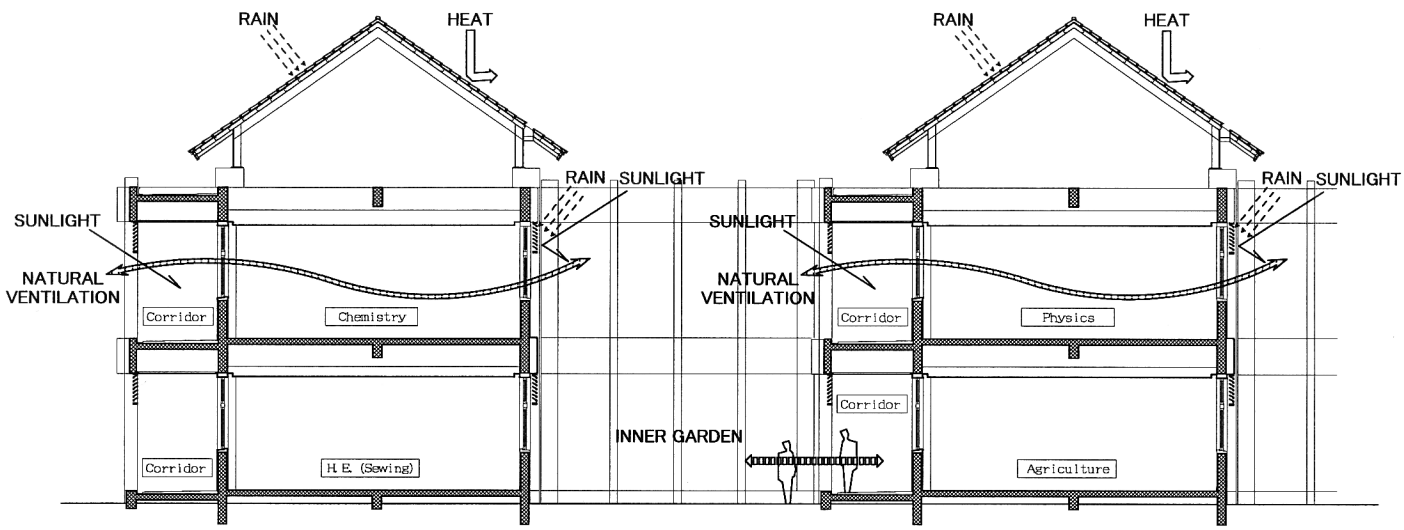


Fig. 2-3-9 Cross-Section

3) Cost Reduction Measures

The various cost reduction factors which have to be considered in the course of design works for the NTTC buildings are as follows. The running costs and the maintenance costs must be taken into account.

a) It is advisable that planning is systematical based on both the area necessary for each laboratory and the economical structure span. Modular construction should reduce the construction cost.

b) Based on the result of review and investigation of the planning and construction of the existing buildings, study on the cost-versus-benefit are to be considered in rational architectural planning for the Project.

c) The function of the whole facility must be considered so as to enhance the utilization rate of rooms and to promote the effective use of rooms, utilities and equipment.

d) Local construction materials should be effectively used so as to reduce the cost not only for construction but also for maintenance. Finishing materials will be selected in consideration of their anticipated life, and their maintenance characteristics to reduce long-term maintenance costs.

e) Consideration is to be given to the introduction of high energy-efficient equipment and insulation material in order to reduce operation expenses.

f) Natural ventilation and lighting is to be used as much as possible. Mechanical ventilation and artificial lighting is to be minimized in order to reduce maintenance costs. However, some laboratories will need mechanical systems. In this case, individual systems will be used in place of a central system.

g) As mentioned above, cost reduction measures are to be considered in the course of design works. Furthermore, reduction of the initial cost shall be considered carefully so as not to cause any cost increase in operation and maintenance and deterioration in quality.

4) Architectural Design Criteria

a) Architectural design should be studied after all floor, section and cost planning have been well considered, and after the function, durability, and economy of the building have been considered. It will be necessary to consider how much the building style in Lesotho can be reflected in the design and how the building can be harmonized with the surrounding buildings.

b) Further studies of climate, culture and traditional architectural design is important to grasp the basic concept of how to present the buildings using modern architecture, local materials and modern construction methods.

c) Consideration should be given to the fact that the Project is under Japan's Grant Aid, and the building design should not be too ostentatious.

(3) Structural Plan

1) Basic Policy

The structural design for the project should be formulated after a full review of the existing site conditions. The structure will be designed for long-term loads, short-term loads such as wind loading, and serviceability factors such as deflection and vibration.

2) Standard for Structure Design

"Building Control (Building Operations and Building Design and Construction) Regulations 1999" was enacted in 1999 based on the Building Control Act established in 1995. Items such as structural design, sanitation, fire services and so on are covered by this code. However, Buildings in Lesotho are mostly designed according to the code in South Africa, "South African Building Regulations and Codes of Practice".

As to materials regulations, "Model Preambles for Trades, 1999" issued by The Association of South African Quantity Surveyors is applied to practical matters, though "Standard Specification July 1975 edition" was enacted in Lesotho. In this study, the structural calculations are to be based on both regulations in Lesotho and South Africa. In addition, other relevant codes and standards such as AIJ (Architectural Institute of Japan) shall be referred to at the detail design stage.

3) Methods and Material

Superstructure is to be a rigid frame structure, and the walls are to be made of bricks. As to the roof, a steel structure frame will be used in some areas. For concrete work, cast-in-place concrete is to be used. Reinforcing steel bars and structural steel will be procured from third countries, and bricks are to be obtained locally.

Foundation：	Spread foundation (Isolated footing and strip footing)
Concrete：	Design strength (fc) = 21 N/mm^2
	(28 days compressive strength of cylinder test piece)
	Design bearing capacity of soil = 30.0 t/m2 (Long-term load)
Reinforcement：	SD295A(D10～D16), SD345(D19～D25)
Steel：	SS400 (steel sections, steel plate), SSC400(light gauge steel)

4) Geological condition and Foundation

The results of the soil investigations indicate that the layer from ground level to a depth of 1.5 meters is silty clay, and from that level to a depth of 2.5 meters is weathered sand stone. From that level there is a layer of hard sand stone which is considered as the supporting layer. As hard sand stone is not evenly distributed, lean concrete shall be used to make the foundation level flat.

According to the domestic regulations, the permitted bearing load is 20.0 t/m^2 for weathered sand stone and 40.0 t/m2 for non-weathered sand stone. In this study, 30.0 t/m^2 shall be adopted as the bearing load for weathered sand stone to be on the safe side.

5) Design Load

a) Dead Load： In order to keep the comfortable space, the dead load is calculated in consideration of the special thickness of wall and slab as well as the structural member.

b) Live Load ： As there is no standard for live load in Lesotho, design live load will be based on the weight of the furniture, equipment and machines for facilities.

c) Seismic Load ： There are very few earthquakes in Lesotho. As a result of careful consideration of the safety of the buildings, the base shear coefficient can be reduced to 50% of the appropriate value(Co＝0.1) in the Building Standard Law of Japan.

d) Wind Load ： As there are no regulations for wind load in Lesotho, the calculation is to be based on the Architectural Institute of Japan in this study.

(4) Utility Plan

It should first be remembered that this facility is for NTTC. Facility planning and equipment planning should be coordinated so that each facility, such as laboratory, workshop and so on, can be operated effectively. Consideration should be given to the condition of existing infrastructure (electric power, telephone, water supply and drainage, etc.). Operation and maintenance system costs need to be considered.

1) Basic Concept

a) The following items need to be considered for the utility plan.

i) Building planning should consider the number of persons using the facility based on the educational curriculum. It is important that the laboratory reviews the educational experiments which are likely to be conducted. These can then be coordinated with facility and equipment planning for effective use of facilities.

ii) As there will be a lot of laboratory equipment, consideration should be given to the consistency and/or interface with facility and equipment plans and problems with piping and electricity distribution.

b) In order to clarify the scope of the work to be borne by the Japanese and Lesotho project participants, the facility plan should be prepared so that existing facilities at the Project site are not affected. New facilities for the project should be independent from the existing. In addition, the function of existing facilities and new facilities to be built by the Project should be clarified. New facilities should function together with existing facilities.

c) From the view point of easy procurement of spare parts, easy facility maintenance and repair, and easy facility operation and management, equipment and materials for the Project should be locally standardized products.

d) The codes and standards used for materials, design, etc., should basically be relevant Lesotho codes and standards, “Lesotho Government Gazette Extraordinary”. If there are no applicable codes and standards in Lesotho, other internationally recognized codes and standards should be applied.

e) As low utility costs are very important for facility maintenance and operation, the facility plan should take into consideration energy saving measures.

2) Electrical Works

a) Power and Transformer Facilities

As for the power source for the new facility, medium voltage line (3 phase, 3 wires, 11kv, 50Hz) located in NTTC has been extended to the campus. This will provide the power source for the new facility.

According to the series of discussions with NTTC and the Lesotho Electricity Corporation (LEC) in Lesotho, the existing electric pole and electric supply line can be relocated within the site. It has been confirmed that relocation of the existing electric pole and electric supply line and distribution/extension works (as stated in the Minutes of Discussion) should be carried out by the Lesotho side.

The power supply condition has not yet improved. Both power failures and voltage fluctuation sometimes occur in the rainy season. Stabilizers are to be provided for the Computer equipment.

The estimated power demand is approximately 190kw as shown in the following calculation:

Contents	Load density w/m^2	Building area $\mathbf{m}^2$	Total load kw	Demand factor %	Demand kw
Lighting, Electrical Outlets	45	2,500	112	50	56
Heater	100	1,500	150	70	105
Pump etc	30	2,500	75	20	15
Air-conditioner	100	100	10	100	10
(sub-total-1)	—	—	(347)		(186)
Total			347		190

b) Generator and Main Feed Wiring

Power failures were experienced once during the B/D Survey period but according to NTTC, power failures occur occasionally during the rainy season. However, a class was interrupted by power failures. An emergency generator should be provided for the new facility and consideration should be given to maintain minimum loading for operation of building utilities and for security.

Outline capacity of the main emergency generator is approximately 100kw as follows.

Total load(347kw) x 30% 104kw
According to the above calculation, a generator with a capacity of at least

100kw is required. A diesel engine is more economical, and easily maintained. Reliable equipment should be selected. The main emergency generator should be stopped at night in order to economize on fuel.

Main feed wiring capacity should be adequate for the equipment to be connected. Wiring method should be basically a cable truck system in shafts and for other locations wiring should be a piping system.

c) Lighting Fixtures and Outlets

Existing facilities have large openings, so during the daytime almost no lighting is used in the laboratories. However, the lighting level was found to be relatively low, which is not an ideal condition. Furthermore, during the rainy season, each room is even darker. A minimum lighting level should be maintained in order not to affect training.

The lighting level for each room is established as follows, based on the mean "JIS" standard lighting level and taking NTTC's requirements into consideration. For each room in particular, an efficient lighting layout is required, using local switch circuits, in order that the electrical running cost can be reduced.

Lighting Level / Room	JIS Standard Lighting Level	Design Lighting Level Lx	remarks
Laboratory, Preparation room	750～200	300	
Computer Room	750～200	400	
Work Shop	750～300	500	
WC	300～75	75	
Corridor	300～75	75	
Storage	75～30	50	

Security lighting has been considered since expensive equipment is to be installed in the new facility. It is proposed that mercury lighting fixtures are to be provided at the entrance and around the buildings.

d) Telephone System

According to the series of discussions with Lesotho Telecommunication Corporation(LTC), main telephone lines are installed along the road in front of NTTC. Connections can be made at any time upon request. Cabling works/wiring and piping works from the existing main link transmitter to Point Distribution at the site should be the undertaking of the Lesotho Side.

Supply and installation of new MDF/PABX, cabling works/wiring and piping works from Point Distribution to new MDF/PABX should be the scope of the Japanese project participant.

In order to utilize a small number of circuits and to minimize the maintenance, the introduction of a PABX should be considered as being the most appropriate telephone system. The proposed number of telephone circuits and the rooms where telephones are to be installed are as follows:

Extension Lines Connected to PABX

Rooms and No. of Telephones to be Installed

1F:	- Staff & Preparation for Sewing
	- Staff & Preparation for Cooking
	- Staff & Preparation for Agriculture(1)
	- Staff & Preparation for Agriculture(2)
	- Staff & Preparation for Art & Crafts
2F:	- Staff & Preparation for Biology
	- Staff & Preparation for Chemistry
	- Staff & Preparation for Physics
	- Staff & Preparation for Computing
	- Teaching material Production

Among the above 10 telephone lines, telephones at the following locations should be able to make and receive external calls as well as internal calls. Remaining telephones should be set for internal call use only.

- Computer room(for internet)

- Teaching Material Production

e) Fire Alarm System

The fire alarm system will be designed according to the Lesotho regulations. Fire hydrant box equipped with bells, red lights and buttons should be installed at areas only where there is danger of a fire. Boards (with bell, light and buttons) should be installed at the locations where a fire hydrant box is not installed. Fire alarm board should be equipped with battery and battery charger (30 minutes assured), to ensure operation during periods of power failure

f) Lightning Protection System

It was requested by NTTC that a lightning protection system should be provided to protect the whole building, because there would be many lightning strikes during the rainy season.

4) Water Supply and Sewerage System

a) Water Supply Systems

As for scope of works for water supply systems, it was explained and confirmed that connections from the main pipe to a water supply meter at the site boundary should be the undertaking of the Water and Sewerage Authority (WASA). Piping from the water meter to the new water reservoir, and further piping and connections should be carried out by the Japanese project participant.

After discussions with NTTC, it was determined that the quality of the water supply is satisfactory, and therefore it will not be necessary to provide filtration equipment.

An elevated water tank is to be provided in order that sufficient water pressure can be maintained in all rooms within the facility. As the above system has few pumps, it will be easy to maintain.

The water reservoir tank should be the above ground type. Both the water reservoir tank and elevated water tank should be of the 2-tank type. Piping materials should be polyvinyl chloride pipe PVC which is strong, low cost, and easy to install.

i) Water Consumption

Based on the number of persons and each room's operational rate, the number of persons using the facility is calculated as follows:

- Staff : 1 person/class (Teacher), 1 person/class(Lab-Technician)
- Students: 30 people/class

As such,
- Staff: 2 people/class x 10 classes x 9 classes/day x 0.7 (working rate) = 126 people
- Students: 30 people/class x 10 classes x 9 classes/day x 0.6 (working rate) = 1,620 people

Thus, the daily water consumption is approximately 20m^3/day as follows;

- Staff: 126 people x 20 ltr./day/person = 2,520 L/day
- Students: 1,620 people x 10 ltr./day/class =16,200 L/day

Total: 18,720 ltr./day $\rightarrow$ 20 m^3/day

ii) Capacity of Water Reservoir

Daily Water Consumption : 20 m^3/day
Capacity of Water Reservoir for Fire Fighting: 20m^3 x 0.5 = 10 m^3
→ (2m x 3m x 2.0 mH, FRP)

iii) Elevated Water Tank

Elevated water tank should have a capacity of 10% of daily water consumption.
10 m^3 x 10% = 1.0 m^3 → 1.5 m^3 (1m x 1m x 1.5 mH, FRP)

b) Fire Fighting Facility (including fire extinguishers)

The fire hydrant and fire extinguisher will be designed according to the Japanese regulations. The fire hydrant and fire extinguisher should be provided for immediate fire danger, so that people can be quickly evacuated from the buildings and fire fighting action can promptly be taken.

c) Sewerage System

As public sewage lines are provided around NTTC, sewage is disposed of to public sewage lines. Chemical waste water includes waste water from experiments, water used to wash equipment and cooling water. As for heavy waste water and waste water from experiments using acid, alkaline and organic solvent, these should be collected first in a tank/bottle, and after that diluted by adding to second stage wash water, and transferred to public sewage lines.

d) Sanitary Equipment

Western type water closets are mainly used in the existing facilities. According to the request by NTTC, water closets should be western types considering Lesotho lifestyle and hygienic view points.

Since sanitary equipment is locally available, maintenance including procurement of spare parts would be easy.

e) Air Conditioning (A/C) and Ventilation System

In Maseru city, air conditioners are not necessary because of the warm temperature and annual precipitation of about 700-1000mm. However, a minimum number of air conditioners should be provided in Computer rooms.

There is some snowfall in Maseru city, and therefore heating equipment is required. As for the heating system, electrical fan convectors are mainly used in the existing facilities. According to the request by NTTC, the heating system should consist of a electrical fan convectors.

Rooms should, wherever possible, have sufficient openings to provide natural ventilation so that air conditioners can be shut down when appropriate and the building running costs can be minimized

As for the ventilation, the basic policy should be to use natural ventilation. However, a mechanical ventilation system is considered for Lavatory, Preparation,Store, Electrical Rooms, Generator Room and Pump Room.

g) Propane Gas System

The gas supply should be a central supply system. 50kg cylinders, which are easily available, should be selected and located in the gas cylinder room where such cylinders can be changed easily.

Gas supply is required in the following rooms:
- Cooking
- Agriculture(1)
- Agriculture(2)
- Art & Craft
- Biology
- Chemistry

(5) Equipment Plan

In the Project, the equipment necessary for the basic and systematic practice and experiment are selected.

1) Science section

a) General Science for common use

Water distillation set and wastewater treatment bath are included in the equipment of General Science used for Biology, Chemistry and Physics. Wastewater treatment bath is important in considering the environment and water distillation set is necessary for providing the distilled water to each laboratory. Other equipment should be included in each laboratory. The glassware and consumables for biology and chemistry should be of minimum variety and quantity necessary for the initial stage because the facility is to be newly constructed.

b) Science (Biology, Chemistry and Physics)

The equipment, which do not need much consumables, are selected from the basic and systematic experimental equipment based on the Standard of Science Education Development Law in Japan. In Biology, some kinds of chart are duplicated with some kinds of models so the basic models are selected while the charts are deleted. The specimen in Biology are selected from the basic ones, avoiding the duplication with the existing ones. In Chemistry and Physics, the basic and systematic equipment used in Japanese secondary schools are selected.

2) Home Economics

According to the curricula, the practices tend to sometimes concentrate in some weeks. The new workshop will be used for practice but the existing workshops may be also used for the same purpose in some weeks in the year.

a) Cooking

The contents of requested equipment consists of cooking equipment and instruments based on the contents of practical work implemented at present in NTTC, therefore there is no difficulty in operation. Thus the contents of request are adequate. The kind of equipment and quantity of cooking equipment are held at a minimum. 2 units of gas stove with oven, which have just been introduced in the existing workshop, are to be moved to new building. The existing workshop may also be used continuously, so other electric stoves are to be left in the existing workshop.

b) Sewing

In existing sewing workshop, there are three home sewing machines which are too old and are improper for skills training. So several basic sewing machines are selected.

3) Agriculture

The curricula in Agriculture intend mainly to experiment on animal husbandry and plant cultivation. The curricula related to cultivation, harmful insects and pathology in plant cultivation and related to cattle breeding, pathology and milk in animal husbandry are picked up. In addition, the curricula related to soil and weather are picked up. The equipment are selected from the experimental equipment based on the Standard of Science Education Development Law in Japan and the Standard of Teaching Material for Industrial Art and Home Economics in Japan.

4) Art and Craft

The contents of request are almost concentrated in the equipment for pottery. Several statues and fruit replicas are included for art. 6 units of potter wheel, electric type, are installed in the existing workshop, so 2 units of potter wheel, foot operated, are included in the Project.

5) Computing

The Ministry of Education and NTTC are planning to encourage computer education, increase the practical hours and expand into mathematics and science fields. The scale of equipment is planned for one computer room and computer related equipment includes printer and scanner etc., which are limited to minimum.

6) Quantity of Equipment

The number of students per one class is set at 30 and the quantity is settled as follows:

Method of Practice and Experiment	Quantity
Equipment for demonstration purpose or exhibition for the whole class	1
Equipment to be used by a group of 3 or 4 students in a class (8 tables)	8
Equipment to be used by a group of 2 students in a class	15
Equipment to be used individually	30
Equipment to be used in science section or commonly in some workshops/laboratories	1～6

One spare equipment will be added to above quantity for the use of the teacher.

7) Procurement of Equipment

Almost all equipment in the Project cannot be procured in Lesotho but can be purchased in South Africa. The equipment which are not manufactured in South Africa are imported.

There are two manufacturers in science and agriculture in South Africa which are producing some items and are importing many items. There is no problem on specification but the durability of many products is not reliable in comparison to Japanese products. The procurement from third countries should be considered from the OECD countries.

The equipment for home economics can be procured in South Africa though some items are imported. It is proper to procure mainly the products manufactured in South Africa.

Many items in computer and printing are imported but some are knocked down or assembled in South Africa.

8) Transportation

The container vessels are only available in Japan/South Africa transportation routes, inland transportation is by rail to Maseru and then by road to the site is available on Conference members.

The equipment agents in South Africa are sometimes making the service including transportation to Lesotho and many of them have the experience of exemption of import tax through tender by the Ministry of Education in Lesotho.

(6) Building Material Plan

1) Basic Policy

The building materials to be proposed shall be selected taking into consideration the climatic conditions, the location of the site, the local construction situation, construction period, construction cost, and maintenance and operation costs. Particularly, the following matters shall be considered:

a) The local procurement of construction materials shall be considered to reduce construction costs and shorten the construction period.

b) The maintenance and operation costs shall be reduced by considering materials that are suitable for the local climate and easy to maintain.

c) The essential functions for the experiment and workshop in the Teacher Training College, together with the building layout and equipment plans, must be considered when studying possible building construction materials.

d) Selection and determination of the building materials shall be based on studies of local procurement or application of local construction methods.

e) The control of quality during the construction phase shall be taken into consideration when selecting the construction materials.

2) Main Materials

In the selection of the main finishing materials, the local construction situation and construction schedule as well as operation and maintenance costs should be considered.

a) Structural Materials

Reinforced concrete for the main frames with brick work for the walls are the usual materials for this type of construction.

As to ready mixed concrete, there is one batch plant in Maseru but it is difficult to get the required quantities there. Usually site-mixed concrete is used in Lesotho, so basically it is also to be used for this project. It is necessary to consider the quality and supply of materials such as aggregate, cement, sand and bricks. For the roof structure, a steel frame will be considered.

b) Exterior Finishing

Bituminous membranes and sheet metal should be used as weather-proofing finishing materials. The exterior wall of classrooms will be finished with sand stone or painted with long-lasting weatherproof paint.

Roofs

Corrugated iron sheets are commonly used for roofs in Lesotho. For the new building, to make the appearance of the new building's roof match the surrounding landscape, a zinc sheet roof will be used.

Window and Doors

In order to provide fresh air and light, aluminum windows are a better choice than wooden windows. Aluminum windows are popular in Lesotho because of their low maintenance costs and durability. It was confirmed at the Basic Design Study that security grills should be installed in the new building for security.

Floors

Ceramic tiles will be used for the Project, because of the excellent wearing characteristics. Corridor floors are best finished with non-slip ceramic tile.

c) Interior Finishing

Interior finishing materials will be selected to match room functions and space use.

Floors

Flooring material should be durable and easy to maintain. Ceramic tiles in combination with plastic tile will be used. Access flooring will be selected for the Computer Room taking convenience into consideration.

Walls

Interior walls will be plastered with a paint finish, which is popular in Lesotho. It is desirable that the interior walls should be easy to clean especially in laboratories and rooms for Art & Craft.

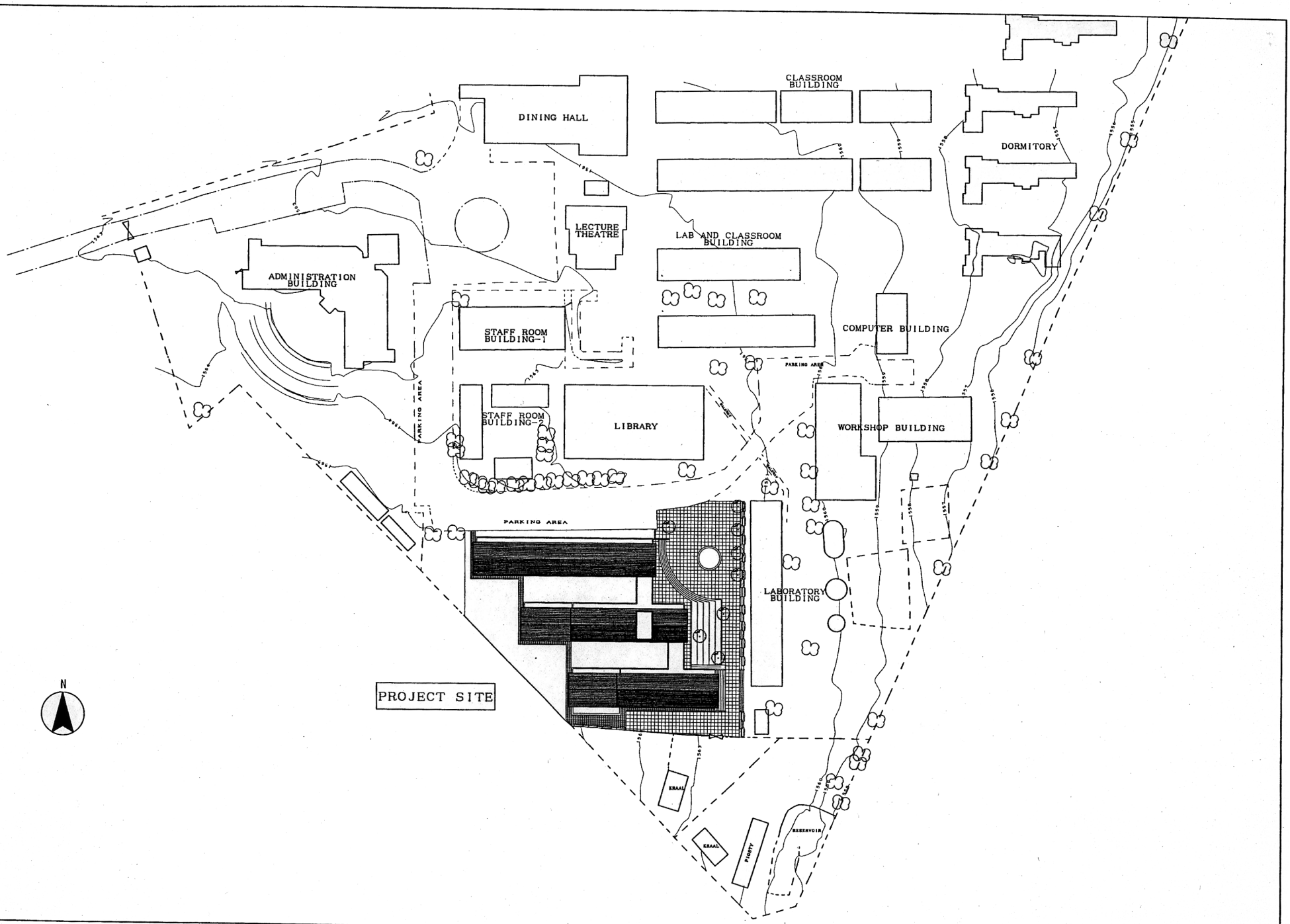
Ceilings

It is popular to use a plaster ceiling for the rooms of the existing buildings. The same idea will be applied to the new building and it is considered to use a plaster board with paint finish or a rock wool acoustic board.

Form 2-4 Proposed Materials

Structure			Reinforced concrete and steel structure					
Floor height			4,000 mm					
Exterior Finishing	Roof		Zinc sheet tiles with acrylic paint finish, paint water proofing for flat roof					
	Eaves		Non-asbestos cement board, epoxy painting					
	Exterior walls		Trowelled mortar with sprayed epoxy painting Paint on louvers					
	Door & Windows 1) Windows 2) Doors		Aluminum (Steel doors for M/E Room, LPG Room and Pipe Spaces)					
	Exterior Floor		Terracotta tile with mortar bed					
Interior Finishing	Rooms		Computer Rm.	Craft Rm.	Laboratories, Art Rm., H/E Rms.	Staff & Prep. Rm.	Store	Corridor
	Floor		Mortar bed Access flooring Carpet tile	Mortar bed Ceramic tile	Mortar bed Ceramic tile	Mortar bed Ceramic tile	Mortar bed	Mortar bed Ceramic tile
	Wall		Mortar bed Epoxy paint Skirting tile	Mortar bed Epoxy paint Skirting tile	Mortar bed Epoxy paint Skirting tile	Mortar bed Epoxy paint Skirting tile	Mortar bed with paint —	Mortar bed Epoxy paint Skirting tile
	Ceilings		Rock-wool board (EP)	Rock-wool board (EP)	Rock-wool board (EP)	Rock-wool board (EP)	Plaster board with paint	Plaster board with paint
	WC	Floor	Ceramic tile					
		Walls	Mortar bed, ceramic tile					
		Ceilings	Plaster board with paint					

(7) Basic Design Drawings and Equipment List



PROJECT

THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

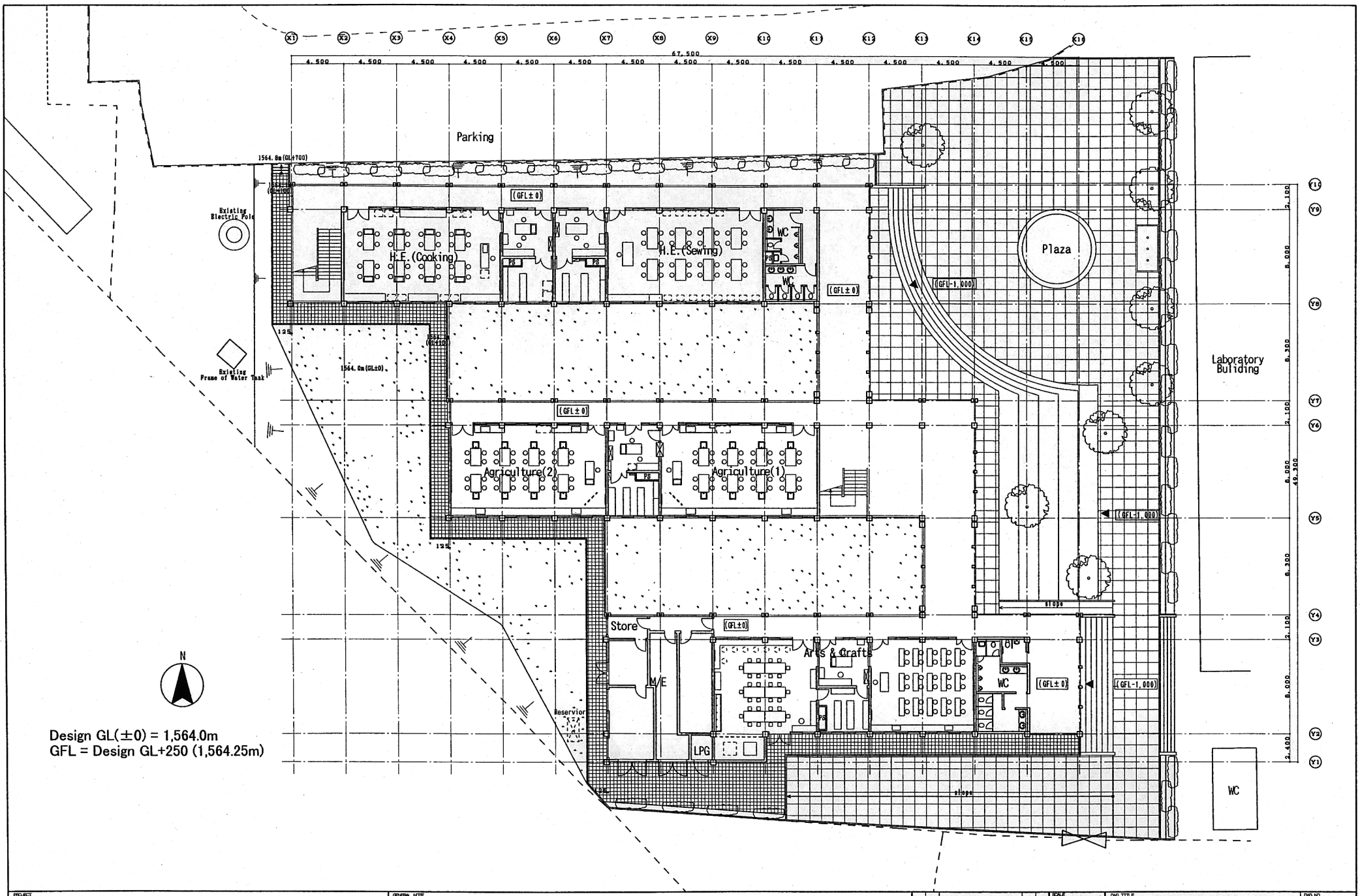
GENERAL NOTE

NO.	DATE	DESCRIPTIONS REVISIONS	BY	APP'D

SCALE 1/1000
DATE
DRAWING BY JICA
CHECKED BY

DWG TITLE: SITE LAYOUT PLAN
DWG NO: A-001

DESIGNED BY: PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING , INC.



N

Design GL(±0) = 1,564.0m
GFL = Design GL+250 (1,564.25m)

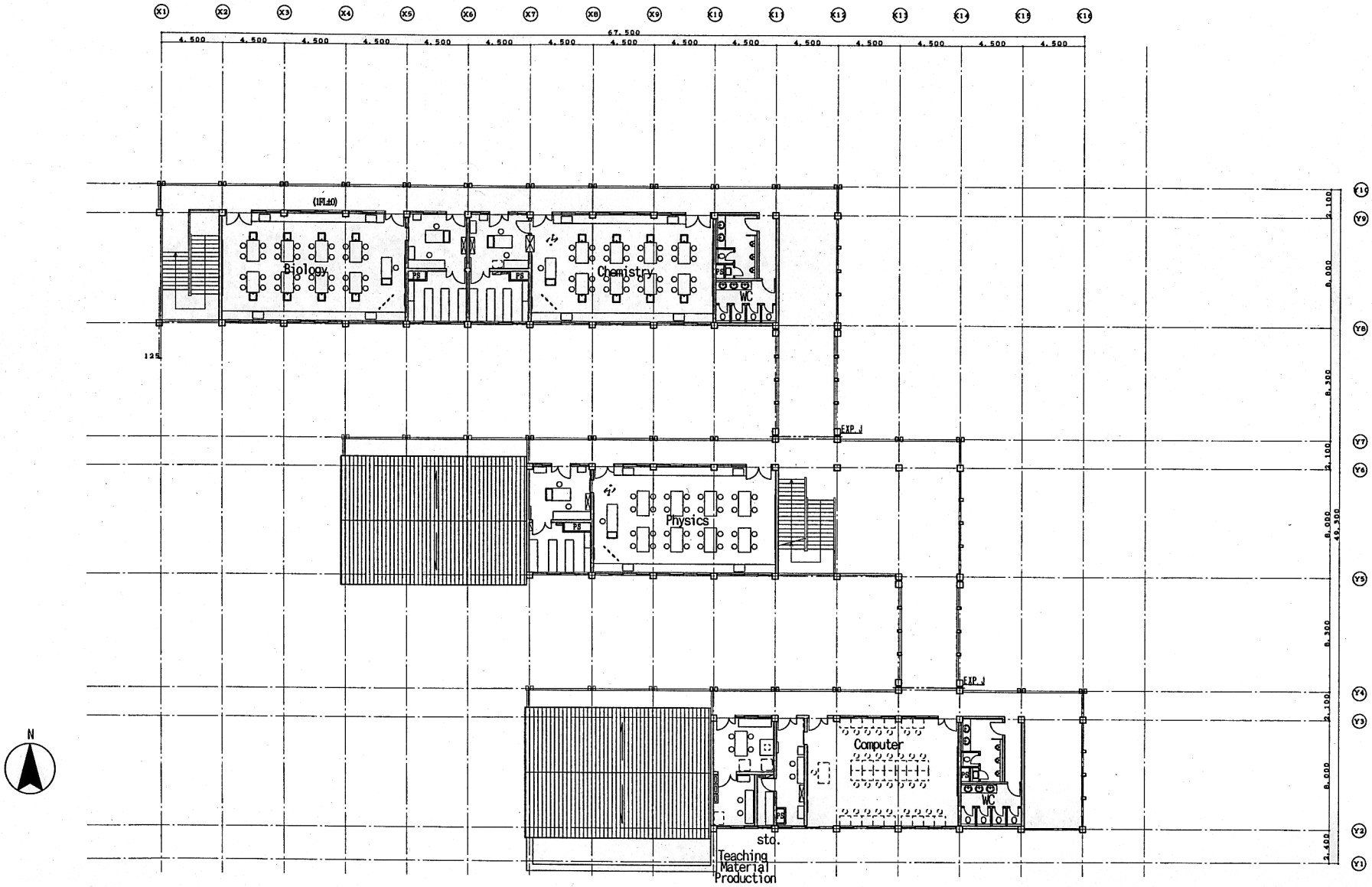
PROJECT
THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

GENERAL NOTE

NO.	DATE	DESCRIPTIONS REVISIONS	BY	APP

SCALE 1/300
DATE
DRAWING BY
CHECKED BY

DWG TITLE GROUND FLOOR PLAN
DWG NO. A-002
DESIGNED BY PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING , INC.



PROJECT

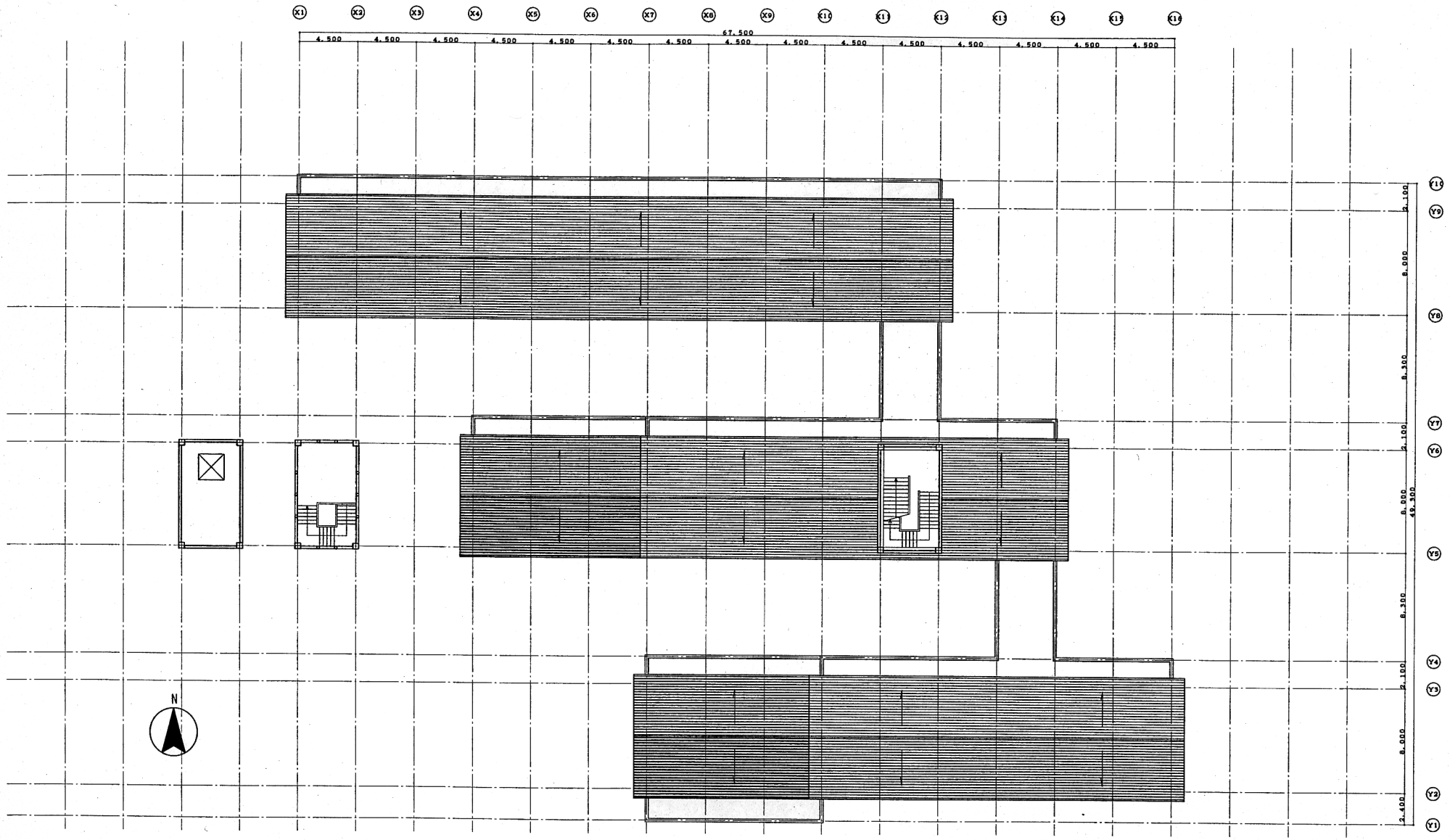
THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

GENERAL NOTE

NO.	DATE	DESCRIPTIONS REVISIONS	BY	APP'D

SCALE 1/300
DATE
DRAWING BY
CHECKED BY

DWG TITLE: 1ST FLOOR PLAN
DWG NO: A-003
DESIGNED BY: PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING, INC.



PROJECT

THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

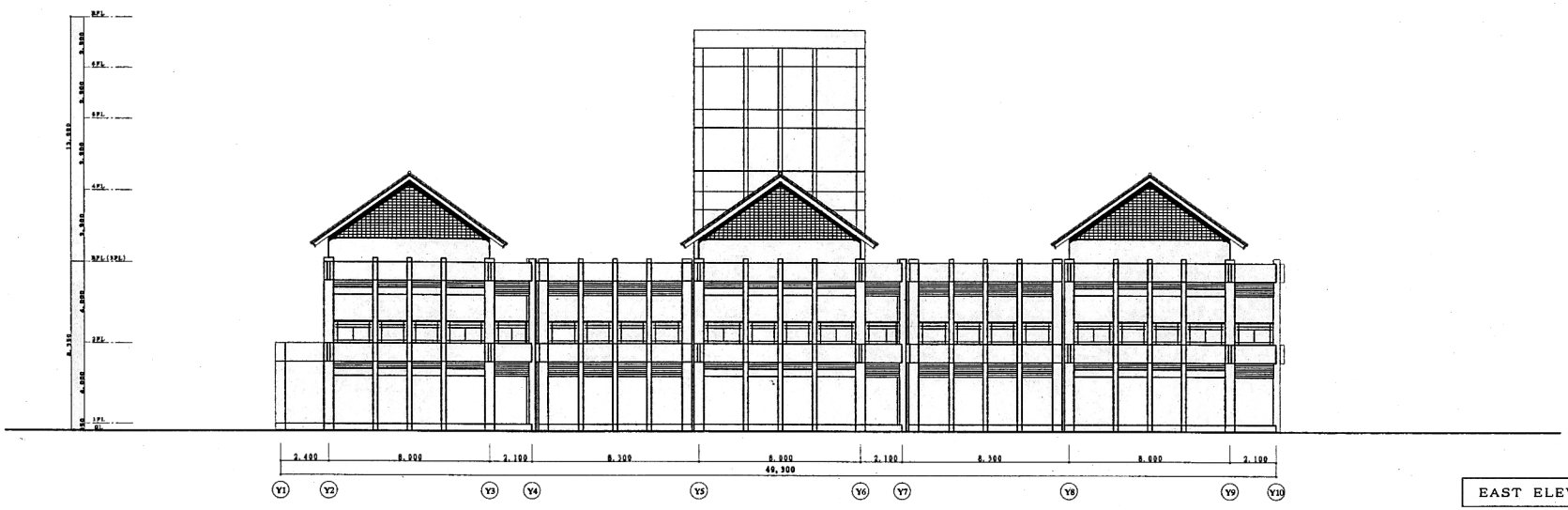
GENERAL NOTE

NO	DATE	DESCRIPTIONS REVISIONS	BY	APP

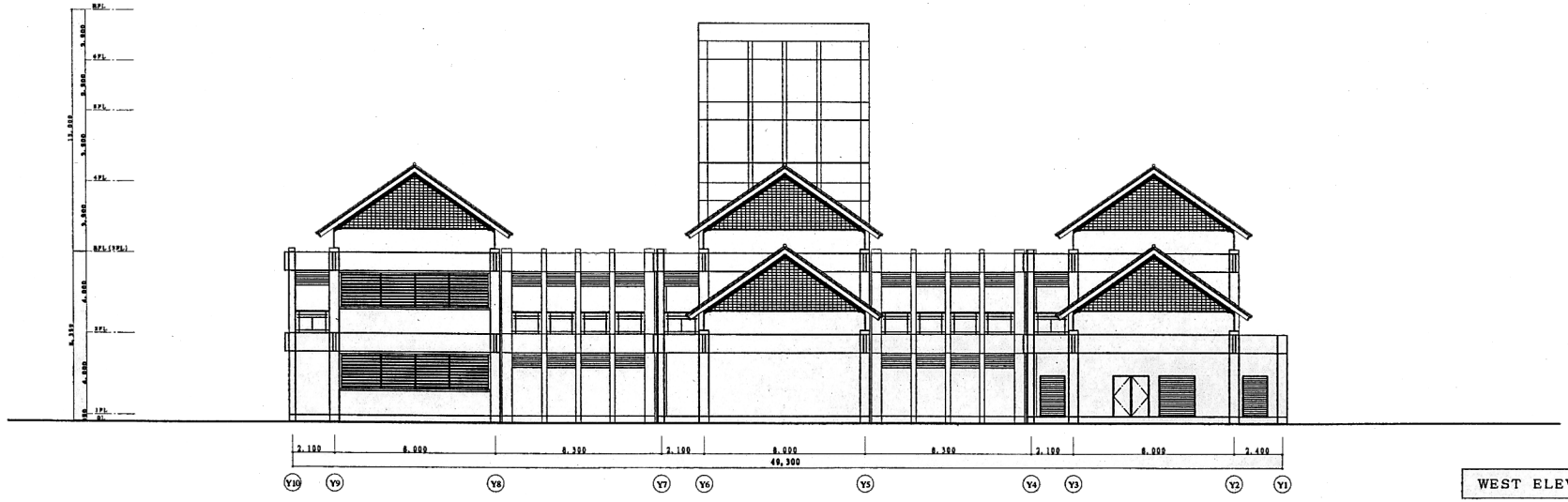
SCALE 1/300
DATE
DRAWING BY
CHECKED BY

DWG TITLE: ROOF FLOOR PLAN
DWG NO: A-004

DESIGNED BY: PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING , INC.



EAST ELEVATION



WEST ELEVATION

PROJECT

THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

GENERAL NOTE

ONLY FOR REFERENCE

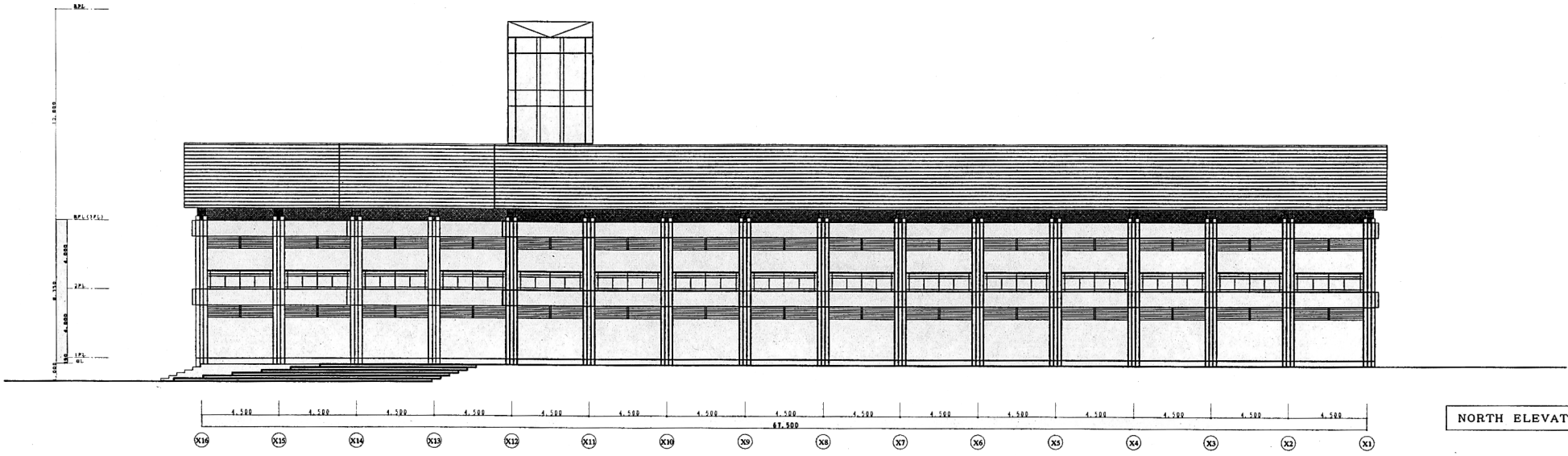
NO.	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		

SCALE 1/250
DATE 18 JUL. 2000
DRAWING BY AC1
CHECKED BY

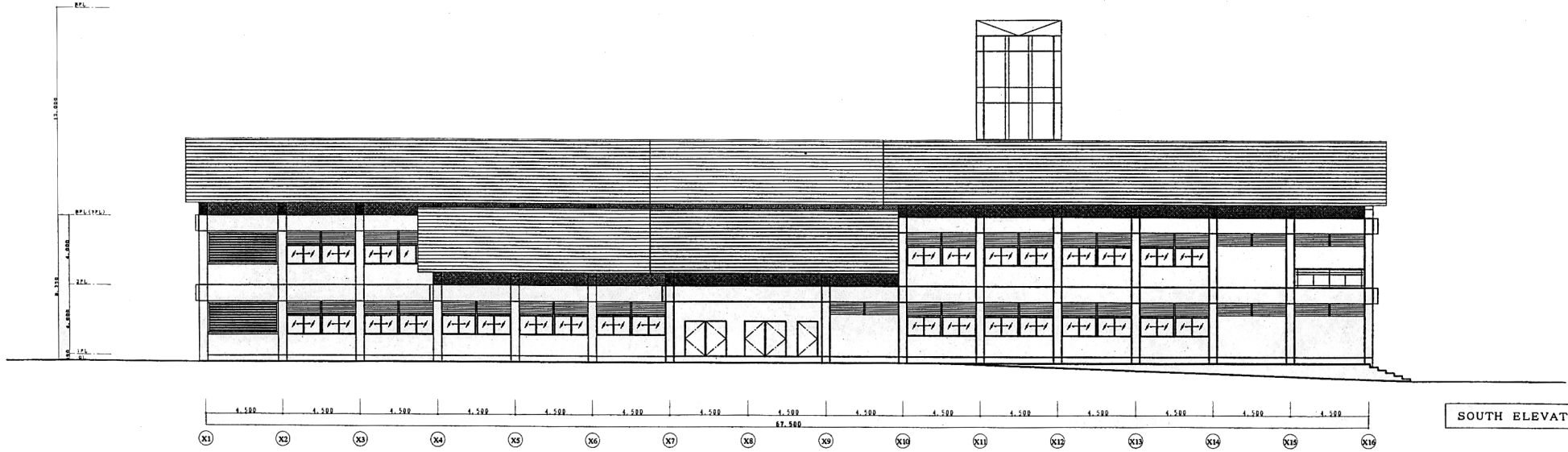
DWG TITLE
EAST ELEVATION
WEST ELEVATION

DWG NO. A-005

DESIGNED BY
PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING , INC.



NORTH ELEVATION



SOUTH ELEVATION

PROJECT

THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

GENERAL NOTE

NO	DATE	DESCRIPTIONS REVISIONS	BY	APP'D

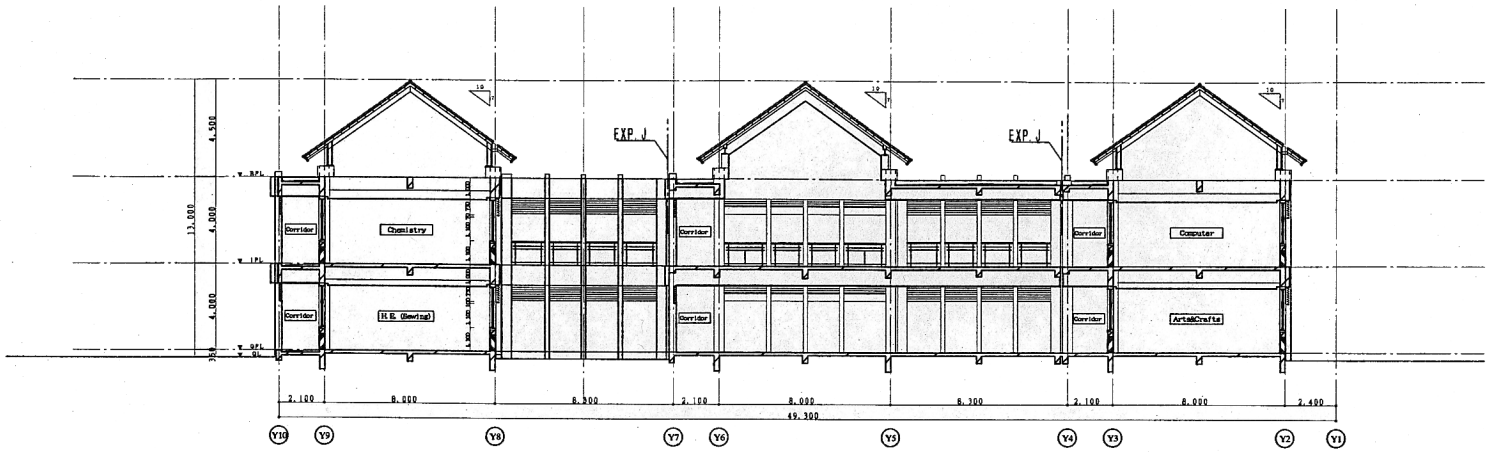
SCALE 1/250
DATE 16 JUL 2000
DRAWING BY ACI
CHECKED BY

DWG TITLE: NORTH ELEVATION
SOUTH ELEVATION

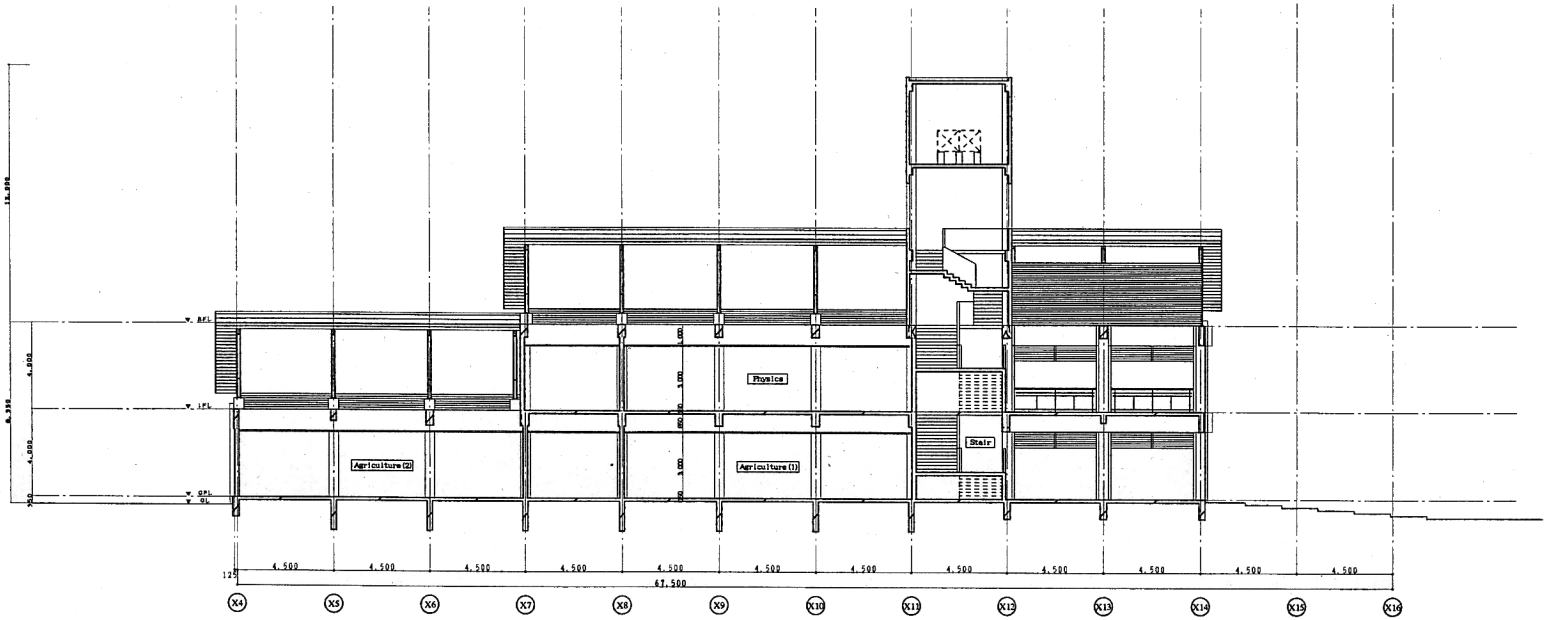
DWG NO. A-006

DESIGNED BY

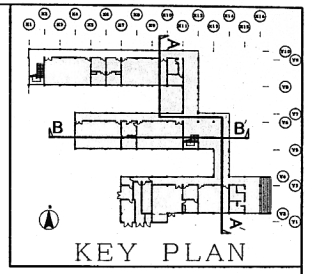
PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING , INC.



A-A' SECTION



B-B' SECTION



PROJECT

THE PROJECT FOR
INFRASTRUCTURAL SUPPORT AND EDUCATIONAL EQUIPMENT SUPPLY
TO NATIONAL TEACHER TRAINING COLLEGE IN MASERU
IN THE KINGDOM OF LESOTHO

GENERAL NOTE

NO.	DATE	DESCRIPTIONS REVISIONS	BY	APP'D

SCALE 1/250
DATE
DRAWING BY
CHECKED BY

DWG TITLE: A-A' SECTION, B-B' SECTION
DWG NO. A-007

DESIGNED BY
PACIFIC CONSULTANTS INTERNATIONAL
INTEM CONSULTING, INC.

Equipment List

No.	Description	Q'ty	Specification	Purpose of Use
Computer Studies				
CI- 1	Personal computer with desk & chair	31	300MHz,128MB,20GB with desk/chair	Computer Practice
CI- 2	U.P.S. system	1	20kw, 3phase	Against voltage fluctuation and electric suspension
CI- 3	Laser printer with table	2	A3, black and white	Printing computer data
CI- 4	Scanner with table	1	A4	Converting letters and pictures into data
CI- 5	Computer projector with screen	1	XGA, 1300ANSI with screen	Projecting computer data to screen
CI- 6	Local network & net work software	1	Network with 31 computers	Education of LAN and network
CI- 7	Educational software	1	AutoCAD Release 14、Mathcad2000	Drawing and education for mathematics
Printing Equipment for Common Use				
PR- 1	Printing machine	1	Duplicating machine type	Prining teaching material
PR- 2	Book binder	1	A4	Bining teaching material
PR- 3	Paper cutter	1	A3	Cutting teaching material
PR- 4	Photocopy machine	1	A3	Duplicating teaching material
PR- 5	Personal computer with desk & chair	1	300MHz,128MB,20GB with desk/chair	Making and editing teaching material
PR- 6	Printer with table	1	A4 , color dot matrix	Prining computer data
PR- 7	Scanner	1	A4	Converting letters and pictures into data
PR- 8	Digital camera for computer	1	More than 2,000,000 pixels	Converting picture into data
General Science				
GC- 1	Water distillation	1	1.8 litre per hour	Production of pure water
GC- 2	Waste water treatment	1	Neutralized type, 60 litre per hour	Treatment of waste water
GC- 3	Chemicals	1	Chemistry and biology	For experiment
GC- 4	Glasswares	1	Chemistry and biology	For experiment
Biology				
BI- 1	Stereoscopic microscope	30	20x,40x,Illumination incident,transmitted	Low powered microscope for observation of actual object
BI- 2	Microscope for student	15	40,100, 400,Illumination harogen or mirror	Low powered microscope for student
BI- 3	Microscope	2	40 to1000,Illumination harogen bulb	High powered microscope for bio sample
BI- 4	Microscope with camera	1	40 to1000,with Camera unit	High powered microscope with camera
BI- 5	Dissecting kit	30	15 pcs.,	Dissecting tool for observing structure of small animal
BI- 6	Dissecting tray set	8	320×250mm,210×130mm	Container for dissected parts
BI- 7	Simple microtome	8	Cylinder type, 0.01mm	Slicing sample into thin specimen for microscope
BI- 8	Magnifier	8	10x	For magnified observation
BI- 9	Paraffin specimen apparatus	1	Ambient to 70℃,Thermistor control	Straightening and fixing specimen using paraffin
BI- 10	Slide preparation kit	1	20 kinds of tool	Preparation of specimen for microscope
BI- 11	Dyeing tray	1	Vertical type,glass made	Dyeing specimen
BI- 12	Desicator with vacuum pump	3	Dia.,240×170(H)mm,with vacuum pump	Container and pump for vacuum dry
BI- 13	Colony counter	8	4 or 5 digit indicator, handy type	Aid for counting colony on microscope
BI- 14	Models, several kinds	1	Human, animal, division, plant etc.,	Explanation of structure of animal and plant
BI- 15	Specimen, several kinds	1	Vertebrate, invertebrate etc.,	Explanation of animal and plant
BI- 16	Prepared slide, several kinds	1	Plant and microbe	Specimen prepared for microscope
BI- 17	RNA protein synthesis kit	1	RNA Protein Synthesis Kit	Explanation of molecular structure
BI- 18	DNA molecular kit	1	DNA Molecular Kit	Explanation of DNA molecular structure
BI- 19	Incubator	1	Desktop type, 90 litre, 5 to 60℃	For constant temperature
BI- 20	Sterilizer	1	Disk top type, 10 litre	For high pressure sterilizing
BI- 21	Sterile box	1	Box type, fluorescent,sterilizera lamp	For experiment in sterilized condition
BI- 22	Mixer	1	200W	For stiring and mixing
BI- 23	Water bath	1	18 litre, stainless	For warming in hot water
BI- 24	Stopwatch	15	1/100 sec.,	Measuring time
BI- 25	Thermometer, mercury and alchol types	8	Mercury and alchol type, each 5 kinds	Measuring temperature
BI- 26	Min-max thermometer	2	-30 ～50℃	Measuring max and min temperature in a day
BI- 27	Hygrometer	2	-10 ～50℃	Measuring humidity
BI- 28	pH Meter with electrode	8	pH0 to 14, Accuracy pH±0.05	Measuring pH
BI- 29	Micrometer	8	Digital	Measuring micro length
BI- 30	Aneroid barometer	1	2kinds of portable and wall type	Measuring atmospheric pressure
BI- 31	Hydrometer	1	0.7 to 2.0, 500ml	Measuring specific gravity of liquid

Equipment List

No.	Description	Q'ty	Specification	Purpose of Use
BI- 32	DO meter	1	DO and O^2	Measuring density of oxigen in liquid
BI- 33	Soil analyzer kit	8	10 elements analysis	Detecting and measuring nourishment in soil
BI- 34	Refrigerator	1	450 litre	Preservation of sample in low temperature condition
BI- 35	Photoelectric colorimeter	1	Digital, 4 kinds of filter	For specific color
BI- 36	Experimental tools	1	Several kinds of tools	Tools for experiment
Chemistry				
CH- 1	Hoffman apparatus	1	Electrolysis device with electrode	Electrolysis of liquid
CH- 2	Water colorimeter	1	Copper container	Measuring liquid calorie
CH- 3	Gas generator	8	250ml, glassware	Generating gas
CH- 4	Eudiometer	1	Graduated tube with stopper	Measuring electric volume using electrolysis
CH- 5	Electrophoresis apparatus	1	DC0～300V	Understanding and utilizing electrophoresis
CH- 6	Electriciity generation kit	8	Volta cell and activated carbon cell	Understanding mechanizm of battery
CH- 7	Osmotic pressure apparatus	1	Dia.,50mm、Acryl	Osmotic pressure experiment by semitransparent membrane
CH- 8	Molecular weight apparatus	1	Beckman type	Measuring boiling point and coagulating point
CH- 9	Soxhlet extractor	8	Soxhlet type	Extraction of oil by distilled and cooling system
CH- 10	Liebig condenser	8	Glassware	Tube of distillation for cooling gas
CH- 11	pH Meter with electrode	8	pH 0 to 14, accuracy pH±0.05	Measuring pH
CH- 12	Conductivity meter	8	Conductivity measuring, 0 to 199mS/cm	Measuring conductivity
CH- 13	DO meter	1	DO, O2	Measuring density of oxigen in liquid
CH- 14	Polari-sacchari meter	1	Brix 0 to 90%、3 ranges	Measuring sugar content
CH- 15	Colorimeter	1	Digital, with 4 kinds of filter	For analysis of specific color
CH- 16	Salinometer	1	0 to 10%	Measuring density of salt
CH- 17	Magnetic stirrer	8	10 litre, 10－120 sec.,	For stirring
CH- 18	Autoclave	1	Desktop type、10 litre	High pressure bath
CH- 19	Centrifuge	1	Desktop type, 3500rpm	Separation of sample by rotating power
CH- 20	Thermostatic water bath	1	10－80℃, 18litre	Warming in hot water
CH- 21	Drying oven	1	40－260℃, 70litre	Drying of glasswares and tools
CH- 22	Hot plate	1	250×300mm, max 400℃	Heating sample
CH- 23	Cork borer machine	1	Tabel fixed type, dia., 5－12mm	Boring hole in cork
CH- 24	Glass working tool	2	File, glass tube cutter, glass cutter	Processing grass wares
CH- 25	Thermometer, mercury and alchol types	8	Mercury, Alchol type, each 5 kinds	Measuring temperature
CH- 26	Stopwatch	8	1/100 sec.,	Measuring time
CH- 27	Balance	2	600g、0.1g	Measuring weight of chemical etc
CH- 28	Analytical nalance	1	300g、0.01g	Measruign weight of chemical etc
CH- 29	Molecular structure model	1	Inorganic and organic models	Explanation of molecular structure
CH- 30	Refrigerator	1	450 litre	Preservation of sample in low temperature condition
CH- 31	Experimental tools	1	Several kinds of tools	Tools for experiment

Equipment List

No.	Description	Q'ty	Specification	Purpose of Use
Physics				
	Motion & Force			
PH- 1	Lever and inclined experimental apparatus	1	Inclined:1000x150mm, lever:10 pcs., of weight	For experiment on slope
PH- 2	Wheel & axle	1	Fourfold type	Balancing experiment of wheel and axle
PH- 3	Pulley set	8	Single pulley and double pulley	For experiment of pulley
PH- 4	Spring balance set	8	100、200、500g、2N graduation	Balance for force experiment
PH- 5	Recording timer with tape	8	Pulse signal (50u)	Recording experiment result
PH- 6	Dynamics rail and cart	1	With 2 carts	Experiment of relation between motion and force
PH- 7	Linear air track with accessories	1	With stroboscope, brower, etc.,	Experiment for law of force
PH- 8	Inertia experimental apparatus	1	With cart for launching and falling	Experiment for law of inertia
PH- 9	Rotary table with accessories	1	Dia 500mm, 3.5 to 50 rpm	Rotation experiment
PH- 10	Gyroscope	1	Core ring 70mm approx.,	Experiment of force nature using top-spinning
PH- 11	Spiral spring	8	2 kinds of sprial spring	Experiment for spring
PH- 12	Stopwatch	15	1/100 sec.,	Measuring time
	Wave and Vibration			
PH- 13	Ripple tank	1	With simple projector	Experiment by generating ripple
PH- 14	Standing wave experimental app.,	1	Frequency 50～200Hz	Experiment by generating standing wave
PH- 15	Pendulum set	8	Metal ball 300g	Experiment of pendulum
	Liquid			
PH- 16	Pascal's principle apparatus	1	Injection type	Experiment of pascal's law
PH- 17	Water pressure apparatus	8	4 water holes	Experiment of water pressure
PH- 18	Hydrometer	1	7kinds, 0.7 to 2.0	Measuring specific gravity of liquid
	Gas			
PH- 19	Mardeburg h]emisphrers	1	Outer dia., 100 to 120mm	Experiment for atmospheric pressure
PH- 20	Vacuum experimental apparatus	1	With manometer	Vacuum experiment using vacuum pump
PH- 21	Mercury manometer	1	0 to 180mmHg approx.,	Measuring atmospheric pressure
PH- 22	Vacuum pump	1	40 litre per minute, 10^{-2}Pa	Pump for vacuum container
PH- 23	Boyle's & charles' law apparatus	1	Graduatged glass tube	Experiment of Boyle's & Charles' law
	Heat			
PH- 24	Water colorimeter	1	Copper made	Measuring liquid calorie
PH- 25	Linear expansion apparatus	1	with 3 kinds of specimens	Linear expansion experiment of iron, copper and aluminum
PH- 26	Solid expansion apparatus	1	20 to 30mm metal	Expansion experiment by heating metal
PH- 27	Thermometer (min-max)	2	-20～50℃	Measuring max and min temperature in a day
PH- 28	Thermometer	8	Mercury, Alchol type, each 5 kinds	Measuring temperature
	Light			
PH- 29	He Ne laser	1	632.8mm wave length, 0.5mW	Light source
PH- 30	Optical apparatus	4	Optical Bench and Cistern	Experiment for principle of light
PH- 31	Optical set	1	凹凸Lens, Prism, Semiconductor Laser	Tool for experiemnt of light
PH- 32	Young's experimental set	1	Light source and diffraction grating	Experiment for Young's law
PH- 33	Lux meter	1	0～19999lx, 5 ranges	Measuring illumination of light
PH- 34	Spectroscope, direct vision	1	Slit adjustable, comparative prism	Getting spectrum of light
PH- 35	Grating	2	500 grating per 10mm	Experiment of diffractive phenomenon of light
PH- 36	Polarizing plate	2	Dia100mm 2pcs., in set	Experiment of diflection of light
	Sound			
PH- 37	Tuning fork set	1	1 to 1.5 octave, 13 kinds	Generating sound of fixed frequency
PH- 38	Resonant column apparatus	1	0.75kH～1ｋH	Measuring speed of sound
PH- 39	Audio amplifier	1	Output 5W, 2 channel, 50Hz～20KHz	Amplification of sound

Equipment List

No.	Description	Q'ty	Specification	Purpose of Use
	Magnetic			
PH- 40	Magnetic set	8	U shape, round and ring type	Several magnets for experiement
PH- 41	Magnetizing coil	1	Dia., 0.5mm, 1500 turns	Generating magnetic force
PH- 42	Compass	8	Dia., 45mm	Confirmation of direction
PH- 43	Gauss meter	1	Portable type, 0～0.003, 0.03, 0.3Wb/M2	Measuring DC magnetic field
	Static Electricity			
PH- 44	Electrostatic apparatus	1	Leaf electroscope, friction rod & electrostatic pendulum	Generating electrostatic
PH- 45	Leyden jaar	1	Hard glass, dia., 95mm	One kind of storage batteries
PH- 46	Parallel plate condenser apparatus	1	Pararell plate, induced plate and electrostatic meter	Experiment for specific electric charge ratio
PH- 47	Electrostatic generator	1	Van De Graf type	Generating static electricity
	Electric Current			
PH- 48	Hand generator set	8	Max. 10V, 3 kinds of experimental parts	Hand generator
PH- 49	Circuit experimental apparatus	1	IC, electric and resistant circuits	Practice of electric circuit
PH- 50	Rheostat	8	0～30ohm, 2A	Variable resistor
PH- 51	Resistor	8	2 kinds of resistor	Experiment for resistor
PH- 52	Ohm's law experimental apparatus	1	With voltmeter and current meter	Experiment for Ohm's law
PH- 53	Voltage-current apparatus	1	With volt and current meter, and resistor	Experiment for voltage-current law
PH- 54	Fleming's law apparatus	2	Coil, U-shaped magnet	Experiment for Fleming's law
PH- 55	Motor set	8	Ferrite magnet type	Experiment for motor
PH- 56	Coil set	2	Prmary & secondary coils, and Induction coil	Experiment using coil
PH- 57	Variable autotransformer	2	AC0 to 130V variable	Adjusting output voltage
	Electriciity			
PH- 58	Voltmeter, AC,DC	8	Taut-band type, meter protection circuit, DC0～300V-3 ranges, AC0～150V-2 ranges	Measuring AC/DC voltage
PH- 59	Ammeter, AC,DC	8	Taut-band type, meter protection circuit, AC0～10A-2 ranges, DC0～5A-2 ranges	Measuring AC/DC currency
PH- 60	Galvanometer	8	500mA/5A 2 ranges, accuracy± 2.5%	Measuring micro current
PH- 61	Electricity kit	8	With miniature bulb, motor	For simple experiment of electricity
PH- 62	Oscilloscope	2	5mV/div to 5V/div, DC～20MHz	Measuring wave, AC/DC voltage, cycle and frequency
PH- 63	Circuit tester	8	DC/V 6 ranges、 AC/V 5 ranges	Measuring voltage, currency and resistance in circuit
PH- 64	Multimeter, digital	8	DC/V 5 ranges, AC/V 4 ranges, DC/A 5 ranges, AC/A 5 ranges, resistance 6 ranges	Measuring currency, voltage and resistance
PH- 65	Function generator	1	Sine, triangular, square, lamp, pulse waves	Generating signal of sine, triangle and square waves
PH- 66	Frequency counter	1	1250MHz,500Mhz,10MHz	Measuring frequency
PH- 67	LCR meter	2	4mH～40H, 5 ranges	Measuring each element in AC circuit
PH- 68	Lead & wire sets	15	6 kinds, each 15 pcs.,	For simple experiment of electricity
	Electron			
PH- 69	e/m measuring apparatus	1	Helmholtz coil dia., 300mm	Measuring specific electric charge of electron
PH- 70	Milikan apparatus	1	Microscope x 30 with scale	Measuring electric load of electron
PH- 71	Photoelectric effect apparatus	1	Sensor :Phototube, Cds andphototransistor	Experiment using photoelectric phenomenon
PH- 72	Radiation detector	1	Handy type, digital display, 0 to 60000cpm	Detecting radioactivity

Equipment List

No.	Description	Q'ty	Specification	Purpose of Use
	Electric Power			
PH- 73	Electric power supply	8	0 to 20VDC, 0 to 24VAC	Adjusting output voltage and currency
PH- 74	Voltaic cell	8	Copper plante and Zinc plate	Battery using zinc and copper with dilute sulfuric acid
	Measuring Instrument			
PH- 75	Balance	2	600g, 0.1g	Measuring weight of chemical etc.
PH- 76	Analytical balance	4	300g, 0.01g	Measuring weight of chemical etc.
PH- 77	Vernier caliper	8	200mm、minimum0.05mm	Measuring length
Agriculture				
	Plant			
AG- 1	Conductivity meter	8	Conductivity measuring, 0 to 199mS/cm	Measuring conductivity
AG- 2	Hydrometer	8	0.7 to 2.0, 7 kinds, 500ml	Measuring specific gravity of liquid
AG- 3	Fertilizer densitometer	8	0.1～7.0mm mol	Measuring density of fertilizer
AG- 4	Lux meter	8	0 to 19999 lux, 4 ranges	Measuring illumination of light
AG- 5	Digital balance	4	0.01g, 300g	Measuring weight of chemical etc
AG- 6	Thermometer	8	Mercury and alchol type each 5 kinds	Measuring temperature
AG- 7	Hygrometer	8	-10 to +50°C	Measuring humidity
AG- 8	Thermometer (min-max)	1	-10 to +50°C	Measuring max and min temperature in a day
AG- 9	Barometer	1	Portable and wall mount type, 1500m	Measuring atmospheric pressure
AG- 10	Anemometer	1	Hand grip type, measuring from1 to 15m/s	Detecting wind direction and measuring wind speed
AG- 11	Rain gauge	1	Copper made, 200ml	Measuring rainfall
AG- 12	Soil thermometer	8	Steel pipe, chain and thermometer	Measuring temperature in the soil
AG- 13	Electrical scale	8	2,000g, 1g	Measuring weight
AG- 14	Soil auger	8	Steel made, 1m	Samling soil
AG- 15	Soil pH meter	8	pH3.0 to 8.0	Measuring pH in the soil
AG- 16	Soil humidity meter	8	0 to 100%	Measuring humidity in the soil
AG- 17	Soil sieves set	1	Dia., 150mm, 6 kinds of sieve	Electric sieve
AG- 18	Soil analysis kit	8	Measuring set for 10 elements	Analysis of nourishment in the soil
AG- 19	Soilless culture set	2	Bath, fertilizer container, pump and heater	Water culture kit
AG- 20	Green house indoor use	1	Aluminum made, heater and exhaust fan	Portable green house for plant
AG- 21	Model (Plants)	1	Bud, ear and flower of plant	Explanation of plant structure
	Animal			
AG- 22	Lactometer	2	Bubcock type	Measuring density of milk
AG- 25	Model (Animals)	1	Cattle, pig, sheep, chicken and rabbit	Explanation of structure of animals
	Common use			
AG- 26	pH Meter	8	pH0 to 14, accuracy pH±0.05	Measuring pH
AG- 27	Centrifuge	1	Desktop type, 3500rpm	Separation of sample by rotating power
AG- 28	Stereoscopic microscope	15	20×, 40×, with illuminator	Low powered microscope for observation of actual object
AG- 29	Microscope for student	8	40x, 100x, 400x, with illuminator and mirror	Low powered microscope for student
AG- 30	Analytical microscope	2	40～1000×, trinocular type	High powered microscope for bio sample
AG- 31	Dissecting kit	15	15 pcs., stainless	Dissecting tool for observing structure of small animal
AG- 32	Dissecting tray	8	320×250,210×130	Container for dissected parts
AG- 33	Simple microtome	4	Cylinder type, 0. 01mm	Slicing sample into thin specimen for microscope
AG- 34	Colony counter	8	4 or 5 digid digital, handy type	Aid for counting colony on microscope
AG- 35	Dyeing tray	4	Vertical type, for 10 pcs., glass made	Dyeing specimen
AG- 36	Desicator vacuum for microscope	3	Dia.,240×170(H)mm	Container for vacuum dry
AG- 37	Vacuum pump	1	20 litres per minute, 10^{-1}Pa	Vacuum pump for desicator
AG- 38	Electrical hot plate	1	250×300mm, Max 400°C	Heating sample
AG- 39	Incubator	1	Desktop type, 90 litre, 5 to 60°C	For constant temperature

Equipment List

No.	Description	Q'ty	Specification	Purpose of Use
AG- 40	Drying oven	1	40 to 260℃, 70Litres	Drying of glasswares and tools
AG- 41	Paraffin specimen apparatus	1	Upto70℃、Thermista type	Straightening and fixing specimen using paraffin
AG- 42	Slide preparation kit	1	20 kinds of tool	Preparation of specimen for microscope
AG- 43	Magnifier	8	x10	Magnifying for observation
AG- 44	Photoelectric colorimeter	1	Digital, 4 kinds of filter	For analysis of specific color
AG- 45	Ion distollatory apparatus	1	Ion exchang-resin type	Producing pure water for experment
AG- 46	Refrigerator	1	450 litres	Preservation of sample in low temperature condition
AG- 47	Chemicals etc.,	1	Several kinds of chemicals	Chemicals for agricultural experiment
AG- 48	Glasswares	1	Several kinds of glasswares	Glasswares for agricultural experiment
AG- 49	Experimental tools	1	Several kinds of tools	Tools for experiment
Home Economics				
	Sewing Workshop			
HE- 1	Sewing machine, foot operated	5	Foot operated	For foot operated straight sewing
HE- 2	Sewing machine, electric, straight	2	Electric straight	For electric straight sewing
HE- 3	Sewing machine, multi-type	2	Electric, multi-sewing type	For multi-sewing
HE- 4	Sewing machine, straight stitch	2	Electric stitch type	For stitching
HE- 5	Steam electric iron	4	1000W, steam type, with iron board	Ironing out wrinkles of cloth
HE- 6	Shear, 4 kinds	30	Stainless steel, sus304	Cutting cloth
HE- 7	Dressmaker's full length mirror	1	Square steel, with caster	Full length mirror
	Cooking workshop			
HE- 8	Table top gas burner	2	2 burners, for LPG, automatic ignition	Cooking by heat
HE- 9	Stove, gas with oven	5	4 burners, with oven, for LPG, automatic	Cooking by heat
HE- 10	Stove electric oven	2	4burners, with oven, electric	Cooking by heat
HE- 11	Microwave oven	1	1300W, 100～300℃	Cooking by heat
HE- 12	Refrigerator	1	350 litres	Storage of food under low temperature
HE- 13	Deep freezer	1	350 litres	Freezing storage of food
HE- 14	Kitchen set	9	Measuring instument, whetstone, pot, basket etc.,	Cooking tools
HE- 15	Cooking set	9	Frying pan, chopping board, knives etc.,	Cooking tools
HE- 16	Pudding steamer	9	Dia., 260mm	Steaming food
HE- 17	Pressure cooker	4	6 litre	Heating food under high pressure
HE- 18	Trolley	2	600×400×800mm	Transportation and storage of cooking tools
HE- 19	Reflective mirror	1	2500×7000×2600mm	For demonstration
HE- 20	Dish rack	4	3 shelves, 450×450×1200	Storage of cooking tools
Art and Craft				
AC- 1	Display board	2	1200×1700mm, with casters	For exhibision and demonstration
AC- 2	Model, 7 kinds	1	Human gypsum models	Models for art
AC- 3	Color samples	1	Color samples, color samples on steel plate	Color sample for art
AC- 4	Easel and board	15	450×600mm board, F15 easel	For painting
AC- 5	Cutting set	15	900×620mm cutting mat and cutters (L,M)	For art design
AC- 6	Glaze etc.,	1	3 kinds of clay, each 10kg, 1kg of glaze	Glaze for crafting
AC- 7	Apron for protection with grobe	31	Fire-proof	For crafting
AC- 8	Kiln with temperature control	1	for LPG gas and with thermometer	Kiln for crafting
AC- 10	Potters wheel , foot operated	2	Foot operated	Potter for crafting
AC- 11	Crafting tools	15	Painting, moulding and firing instrument	Tool for crafting
AC- 12	Crafting accessories	1	Transporting board, grazing container, painting instrument	Accessories for crafting
AC- 13	Pug milling machine	1	150kg/hour	Tempering clay

CHAPTER 3
IMPLEMENTATION PLAN

CHAPTER 3 IMPLEMENTATION PLAN

3-1 Implementation Plan

3-1-1 Implementation Concept

Understanding of the basic procedure of this project under Japan's Grant Aid is important prior to the implementation of the Project. The procedure for the Project and the matters to be considered and confirmed are as follows:

(1) Basic Items

1) The Exchange of Notes (E/N) shall be concluded between the Government of Japan and the Kingdom of Lesotho after the completion of the Basic Design Study in 2000.

2) With the E/N, the Government of Japan shall commit itself officially to implement the Project.

3) After the E/N, a consultant contract shall be concluded between a Japanese consultant and the Government of the Kingdom of Lesotho, and detailed design work shall be started immediately.

(2) Detailed Design and the Tendering Process

1) For the Detailed Design, full details of facilities and equipment plans as developed during the Basic Design Study should be discussed with the implementation agency, and confirmed.

2) The consultant shall discuss the technical matters through meetings with the relevant authorities in Japan and Lesotho during the final confirmation stage of detailed design.

The Detailed Design will probably require approximately 4 months to complete after the conclusion of the E/N.

(3) Tender

1) The tender for the construction work and procurement and installation work shall be conducted in accordance with the guidelines of JICA.

2) The Tender/Contract shall be conducted either as one package with a single Contractor or split into two packages with a Contractor to carry out the construction work and a Supplier for the procurement and installation of the equipment.

3) The Consultant will assist the implementation agency with the tender procedure in accordance with the guidelines of JICA.

(4) Construction of Facilities and Procurement and Installation of Equipment

1) According to the survey, most of the materials will be procured through sub-contractors in Lesotho, even though most of them are third country products. In order to reduce the cost and allow easy maintenance, materials should be procured in Lesotho as much as possible.

2) In Lesotho, there are several large local contractors, and some branch offices of South African contractors. It seems that they have sufficient capability for this project, though foreign engineers from South Africa might be engaged as foremen or skilled engineers. The Prime Contractor for the Project will be a Japanese contractor who will undertake the construction work, supported by local contractors sub-contracted to the Prime Contractor.

3) The procurement and installation of the equipment should be coordinated with the Construction so that the implementation schedule and technical management can be controlled smoothly. Most of the equipment will be procured from third countries. Procurement schedule including transportation schedule should be planned carefully.

(5) Implementation Organization

The organizations involved in this project are as shown below:

1) The Ministry of Education, the Government of the Kingdom of Lesotho is the Responsible Agency for the administration of the Project.

2) The National Teacher Training College, the Ministry of Education (NTTC) is the Implementation Agency for the Project.

The following diagram shows the relationship between the Government of Lesotho, and the Japanese Consultant and Contractor.

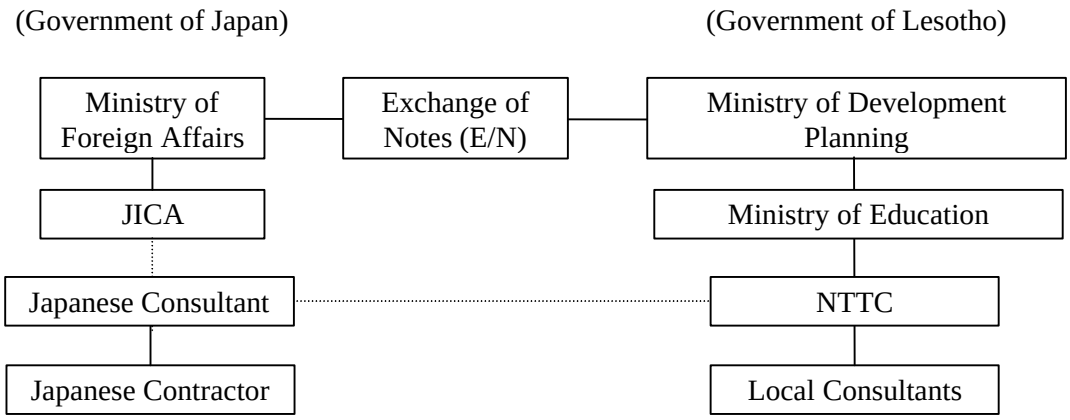


Fig. 3-1 Implementation Organization

3-1-2 Implementation Conditions

(1) Contractors and Workers

There are several large contractors in Lesotho, and the new Administration Building and Dormitories were built by these contractors. Some foreign contractors mainly from South Africa also have been undertaking big construction projects in the town.

Most workers are Lesothians, however, in order to maintain the construction schedule and the quality of construction work, it might be necessary to employ foremen and skilled workers from South Africa or other countries. This will be especially necessary for the fixing of reinforcing bars, installation of windows, interior finishing, electrical work, mechanical work and plumbing work.

For this project, a Japanese contractor will be the main contractor because it is a Grant Aid scheme. It is expected that the Japanese contractor will transfer technology to the local contractors and workers.

(2) Important notice for construction work

The construction situation in Maseru, and the points to be considered during the construction stage are as follows.

1) The project site is a small triangular area within the NTTC campus. The temporary office and contractors operations should be planned with consideration of efficient use of the limited space.

2) It is confirmed with NTTC that extra space in the campus shall be set aside for the temporary office and storage of the construction materials.

3) The construction method shall avoid any vibration which may disturb existing classrooms, workshops, library buildings and so on.

4) For access to the project site from outside, the approach road from the main gate passes in front of the Administration Building, and the existing Laboratory Building and Library are located around the site. When construction materials and machines are carried in to the site, careful attention should be paid to the safety of the students, lecturers, and staff.

5) Before the commencement of construction work of any building in Maseru, Planning Permission and Building Regulation approval by Maseru City Council are required. The application form and some drawings are required to be submitted to Maseru City Council, and they obtain the approval from 6 organizations, such as WASA (Water and Sewerage Authority), LEC (Lesotho Electricity Corporation), LSPP (Land, Survey and Physical Planning), Ministry of Health, Fire Department and Environment. The above procedure normally takes more than one month.

3-1-3 Scope of Works

The portions to be dealt with by the Japanese side and by the Lesotho side for the implementation of Japan's Grant Aid Program are shown in Form 3-1. The project cost for the portions to be dealt with by the Lesotho side is in the process of preparations.

Form 3-1 Scope of Works

Portions by the Japanese Side	Portions by the Lesotho Side
(1) Building Works Structure works, finishing works (2) Electrical Works Power trunk facilities, lighting, power outlets, P/A systems (3) Utilities and Facilities a) Water Supply Construction works for the Water supply from the valve at the water supply meter to the building and all the related internal works for the water supply. b) Sewerage system including piping works up to the connection manhole c) Sanitation facilities (waste water treatment facility) d) Elevated tank and reserve tank e) Fire-extinguishing facilities f) Electrical Cabling works g) Generator Works h) Telecommunications system Cabling works from MDF/PABX to the facilities, and installation of conduit from the site border line to MDF. i) Lightning Protection System j) External Lighting system in the site (4) Exterior Work Road, path and parking lots within the site (5) Equipment Equipment for the Project (6) Electric Room, Electric Generator Room, Pump Room (7) Incinerator	(1) <u>Site Preparation</u> a) Ground preparation including the clearance and leveling of the land, demolition of existing facilities and repair of the existing fence. b) Temporary power and water supply for construction (2) <u>External Works and Approach Roads</u> Landscaping, planting, and fence, etc within the Site. (3) <u>Utilities and Facilities for New Buildings</u> a) Water Supply Construction from the main feeder to the water valve at the water supply meter including the water supply meter. b) Sewerage Piping works from the connection manhole at the site to the existing sewerage line including the repair work of the existing ditch. c) Storm Drainage Drainage line from the site to the existing line including the expansion work of the existing drainage line. d) Electrical Work Cabling works from the existing power supply point to the new Electrical room in the new Building. Relocation work of the existing electrical cable and poles in the site to suitable locations (using underground cable). e) Telecommunication Work Cabling works (for Direct/Extension) from the MDF/PABX in the existing Administration building to Point Distribution in the new building. f) The provision of gas (LPG) cylinders for the Lab. (4) <u>Others</u> a) Governmental works including the application for and obtaining of Governmental approvals and permissions b) Smooth custom clearance, tax exemptions and prompt internal transportation for the imported construction materials and equipment c) Commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement namely the advising commission of the "Authorization to Pay" and payment commission (5) Management, operation and maintenance cost for the new building and facilities (6) Tax exemptions and necessary preferential treatment for the construction staff from Japan or other countries (7) Smooth entry , re-entry and departure to/from Lesotho for the Japanese technical staff (8) Installation of General Furniture (9) All the expenses, other than to be borne by Japan's Grant Aid within the scope of the Project

3-1-4 Consultant Supervision

The scope of the supervision works by the Consultants during the construction phase is as follows:

(1) Check and approval of the construction plans and drawings

To check and approve the construction plans, construction schedules, shop drawings, materials, samples, equipment list and specifications, etc., submitted by the Contractor.

(2) Management of the construction schedule

To give instructions to the Contractor and review the progress report submitted by the Contractor in order to complete the construction work as scheduled. In the event that the construction work being carried out by the Government of Lesotho is delayed, the Consultant may urge a faster schedule for the construction work.

(3) Quality control

To check and give approval for the quantity of materials and construction works in accordance with the specifications. However, the materials and equipment which are imported from Japan or third countries will be checked by architects and engineers in the head office or branch offices of the Consultant.

(4) Check of the finished product

To check the finished products and confirm the quantity.

(5) Assistance with payment procedure and issuance of certificates

To assist with the procedures of checking bills, etc., relating to the payment of construction expenditure and issuance of certificates such as the certificate of practical completion, the completion certificate, etc., if necessary.

(6) Check and submission of monthly progress reports

To check and approve monthly progress reports, completion documents and photos of works from the contractor and to report the progress of the construction work to the Government of Lesotho and JICA.

The Consultant shall also prepare and submit the completion report to the Japanese Government in accordance with the Grant Aid Program guidelines.

(7) Others

To manage and coordinate the schedule and works, if necessary, in order to achieve smooth integration with the works executed by the Government of Lesotho.

3-1-5 Procurement Plan

(1) Procurement Plan for Construction Materials

Materials which can be produced in Lesotho are limited to sand, stone, bricks, concrete blocks, etc. As for the bricks, there is a big semi-governmental corporation producing bricks of good quality.

Though there is a batching plant for ready mixed concrete at 3 km distance from the site, because of the limited capacity of production, most contractors use their own batching plant at the site.

Most of the other materials, such as reinforcing steel bar, structural steel, ceramic or porcelain tiles, windows etc, which are produced in third countries, can be procured through sub-contractors or local agencies in Lesotho.

Lesotho is a member of The Southern African Customs Union (SACU), and customs has been exempted among the members of this Union. Therefore, it is not difficult and not expensive to get materials produced in South Africa.

It is proposed that materials used in this project will be procured from the locations as shown in Form 3-2.

Form 3-2 Procurement of Construction Materials

Name of material	From Lesotho	From Japan	From Third Country	Remarks
[Bldg. work]				
Sand/Gravel	○			
Cement	○			
Bricks	○			
Timber	○		○	
Re-bar			○	
Concrete Blocks	○			
Roof Tile			○	
Tiles			○	
Plastic Tiles			○	
Wood Fittings			○	
Metal Fittings			○	
Waterproof Agent			○	
Ceiling Board			○	
Paint			○	
Miscellaneous Hardware			○	
[Elec. work]				
Distribution Panel Board			○	

Name of material	From Lesotho	From Japan	From Third Country	Remarks
Lighting Appliances			○	
Electric Cable/Conduit			○	
Wiring Equipment	○		○	
Control Panel			○	
Generator			○	
[Mech. work]				
PVC pipes	○		○	
Sanitary Fixtures			○	
Elevated Reservoir Tank			○	
Pumps			○	

Form 3-3 Procurement of Construction Equipment

Name of equipment	From Lesotho	From Japan	From Third Country	Remarks
Backhoe shovel ($0.6m^3$)	○			
Truck (4t, 10t)	○			
Vibrating roller	○			
Rammer	○			
Compactor	○			
Re-bar Cutter	○			
Re-bar Bender	○			
Concrete Mixer ($0.3m^3$, $0.9m^3$)	○			
Generator (3.5KVA)	○			
Generator (2.2KVA)	○			
Electrical Welder	○			
Tanker	○			
Scaffolding frame	○			
Batching Plant	○			
Dump Truck (4t, 10t)	○			

(2) Procurement Plan of Equipment

Almost all equipment in the Project cannot be procured in Lesotho but can be purchased in South Africa. The equipment which is not manufactured in South Africa is imported.

There are two manufacturers of Science and Agriculture equipment in South Africa which produce some items and import many others. There is no problem with specification but the durability of many products is not reliable in comparison to Japanese products. Procurement from third countries should be considered from OECD countries.

The equipment for Home Economics can be procured in South Africa though some items are imported. It is reasonable to procure mainly the products manufactured in South Africa.

Many computing and printing items are imported but some are imported in parts or assembled in South Africa.

(3) Transportation Plan

As mentioned above, most of the materials and equipment for construction are considered to be procured from South Africa through local contractors or agents. The Transportation Plan should be studied in consideration with the Construction schedule.

1) Transportation by land

Materials or equipment procured from South Africa can be transported by land. The transportation route from Johannesburg is shown as follows, and it takes 5 to 6 hours.

Johannesburg ⟶ Bloenfontein ⟶ Maseru
(4 – 5 hours) (1.5 – 2 hours)

2) Transportation by sea

There are only a few items that will be procured from Japan, but in that case, Durban Port in South Africa will be mainly used.

Container vessels are only available on Japan/South Africa transportation routes. Inland transportation from Durban to Maseru is by rail or by road, and it takes 5 to 6 hours.

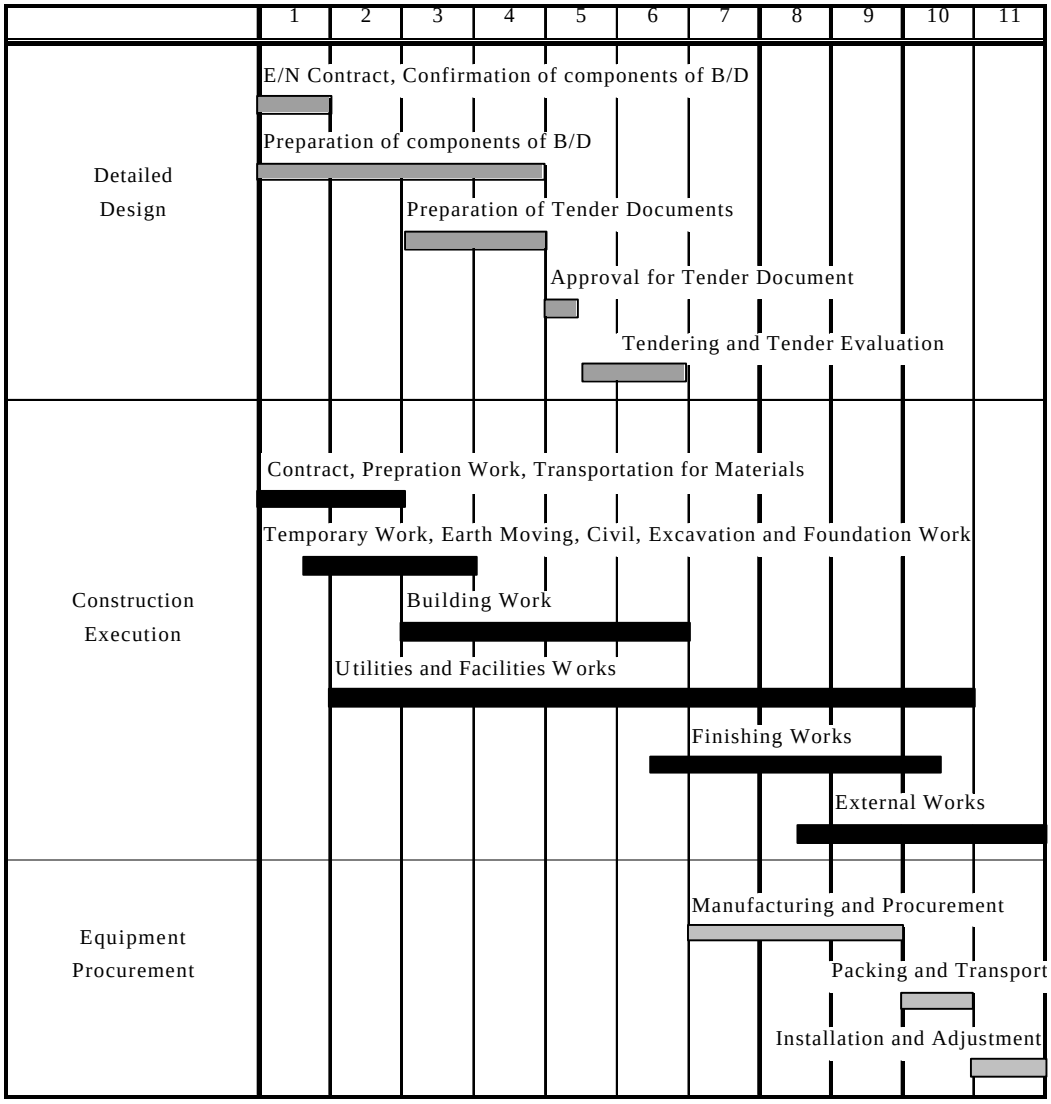
Japan —(By Sea, 1 month)→ Durban —(By rail or by car, 5 – 6 hours)→ Maseru

The agents in South Africa sometimes provide a service including transportation to Lesotho and many of them have experience of exemption of import tax through tender by the Ministry of Education in Lesotho.

3-1-6 Implementation Schedule

The tentative implementation schedule for the Project is as shown in Table 3-4.

Form 3-4 General Project Schedule

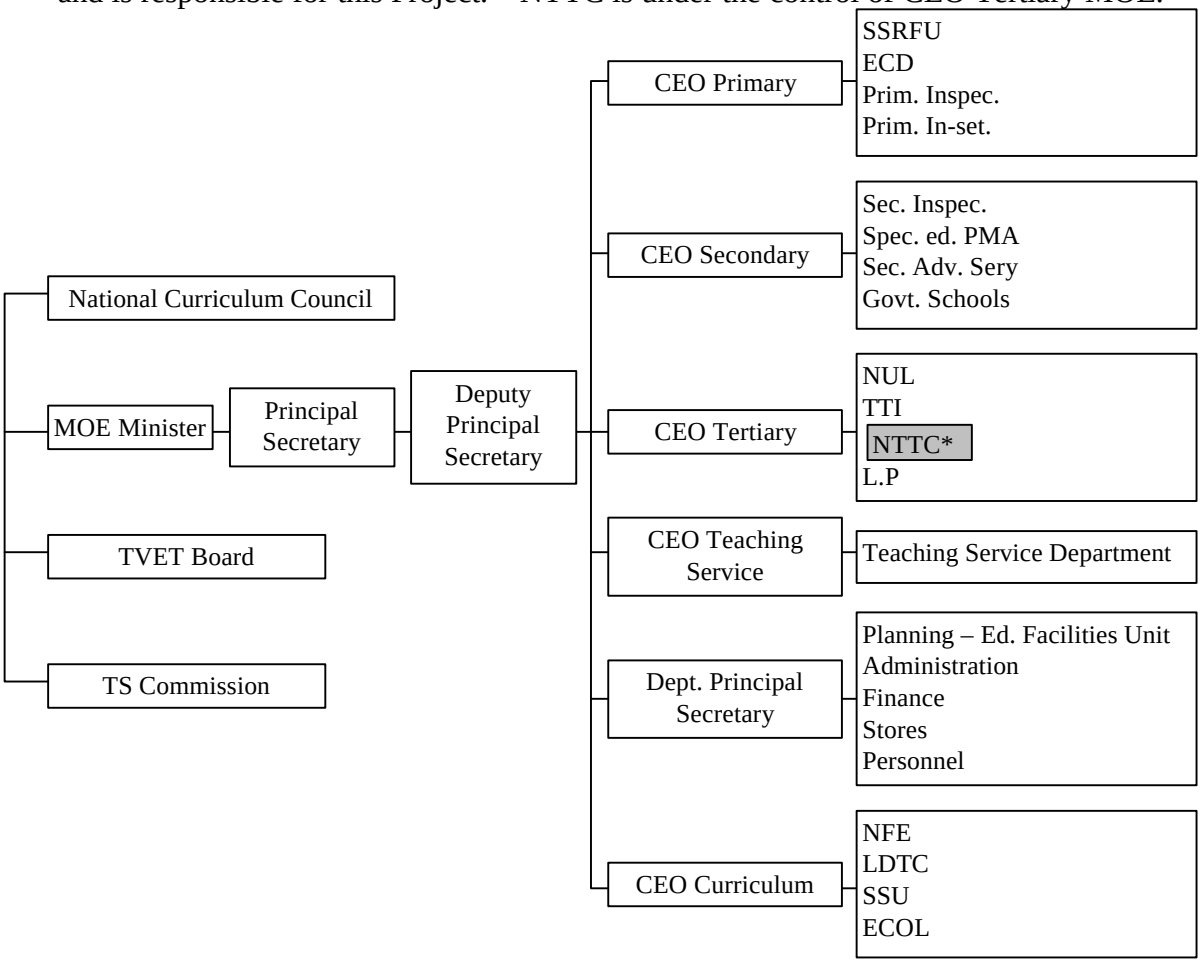


3-2 Operation and Maintenance Plan

3-2-1 The Implementing Organizations of the Project

(1) The Responsible Organization: Ministry of Education

Ministry of Education (MOE) is in charge of formal educational organizations in Lesotho, and is responsible for this Project. NTTC is under the control of CEO Tertiary MOE.



* Implementing agency of the Project: NTTC

Fig. 3-2 Organization Chart of MOE

Notes:

TVET: Technical and Vocational Education	TTI: Technical Teaching Institution
SSRFU: School Self-reliance and Feeding Unit	TSD: Teaching Service Department
ECD: Early Childhood Development	NFE: Non Formal Education
NTTC: National Teacher Training College	LDTC: Long Distance Teaching Center
NUL: National University of Lesotho	SSU: Schools Supply Unit
LP: Lerotholi Polytechnic	SCOL: Examination Council of Lesotho

(2) Implementing Organization: National Teacher Training College (NTTC)

NTTC, which is the implementing organization, will execute the Project.

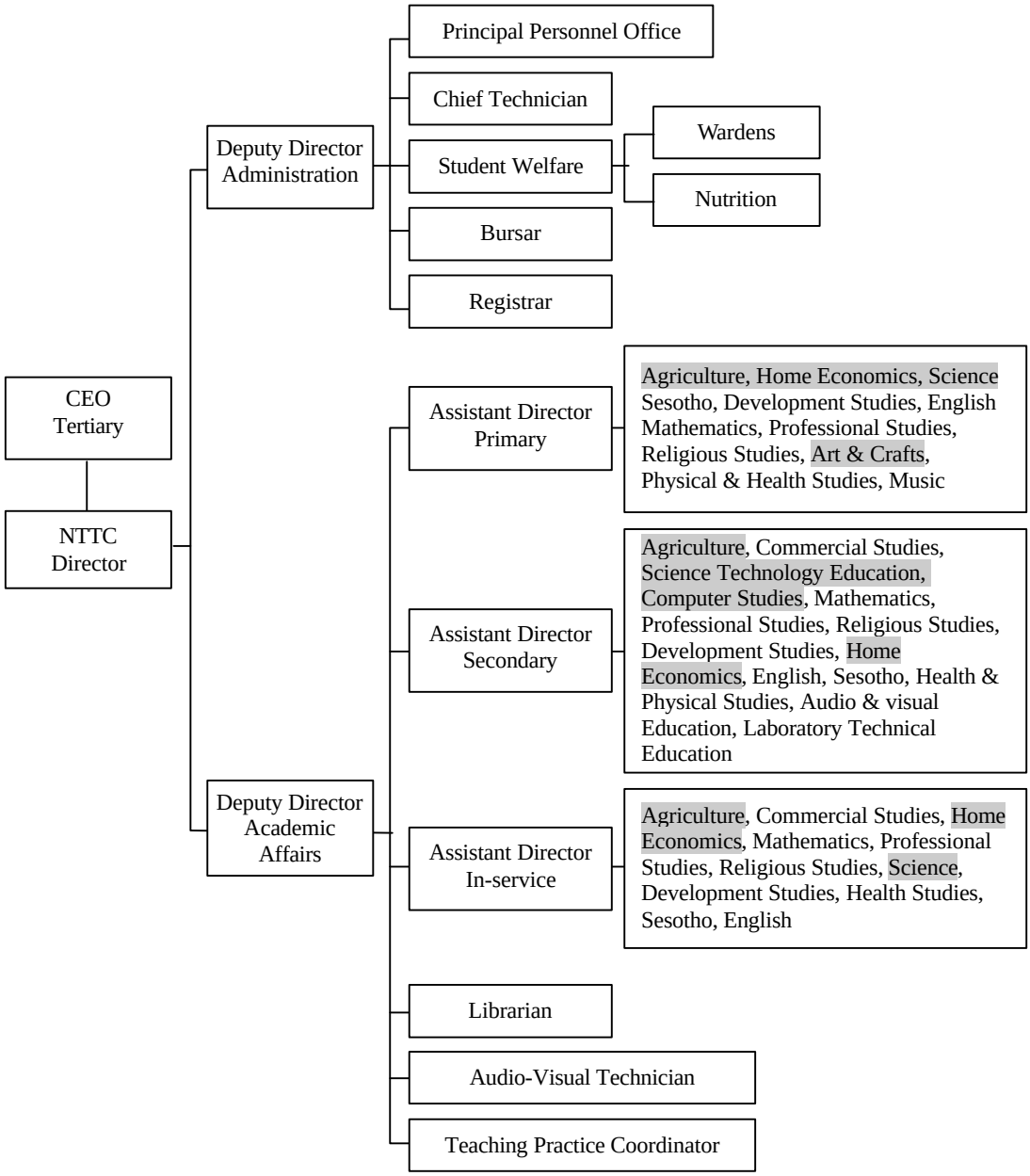


Fig. 3-3 Organization Chart of NTTC

Subjects going to use the new Laboratory and Workshops
Section in charge of maintenance of facilities

Divisions and departments participating in this project are lecturers of Science, Agriculture, Home Economics, Art & Craft and Computing, who are under the control of Primary, Secondary and In-service Assistant Directors, and the Deputy Director of Academic Affairs.

(3) Management System of the Project Implementation

The Operation and Management System of the Project is shown in the following chart. NTTC, Education Facilities Unit and Planning Unit are mainly implementing the Project under the control of the MOE, with cooperation assistance of Ministry of Development Planning.

Due to the absence of the Director for study abroad, persons in charge of the Project implementation as his representatives are two Deputy Directors of NTTC. Two Assistant Directors of Primary and Secondary Divisions assist the execution as directors of the target division.

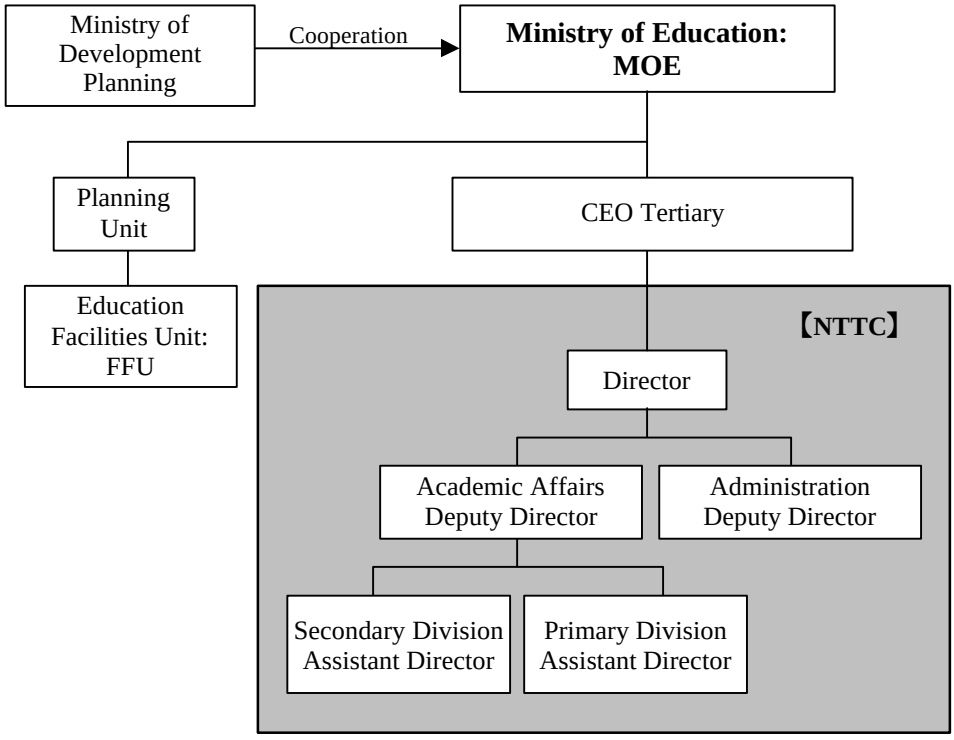


Fig. 3-4 Implementation Organization and Management System

3-2-2 Operational Budget of NTTC

(1) Actual Budget

The Budget of NTTC is prepared by MOE, and the amount is decided based on the current conditions. Lesotho's fiscal year starts in April. Unfortunately, the budget for this project should be prepared in this fiscal year, so that a special budget for this project is required.

The following table shows the actual budget from the fiscal years 95/96 to 99/00. The actual budget for the education sector has increased around 20 - 30% every year during the period. Personnel emoluments are as much as 47% of the total.

Form 3-5 Actual budgetary data of NTTC

Year		Personnel	Travel	Operating	Special	Total
1995/96	Budget	3,699,470	167,230	3,632,200	103,000	7,601,900
	Actual	3,723,170	177,480	3,759,600	103,000	7,763,250
1996/97	Budget	4,843,390	205,300	4,365,800	405,220	9,819,710
	Actual	4,548,390	198,300	4,365,800	405,220	9,517,710
1997/98	Budget	6,113,290	221,500	5,065,220	274,000	11,674,010
	Actual	6,113,290	230,300	5,065,220	274,000	11,682,810
1998/99	Budget	7,858,540	238,810	5,890,000	727,260	14,714,610
	Actual	7,188,380	238,810	5,890,000	727,260	14,044,450
1999/00	Budget	6,800,400	553,470	6,383,888	371,880	14,099,068
	Actual	-	-	-	-	-

Source：NTTC data (Unit:Maloti)

(2) Future Projection

Additional academic staff are needed in accordance with the increase of students and class numbers, along with social demands for teachers in primary and junior secondary schools. NTTC should implement more budgetary allocation for Personnel emoluments. The rate of the budgetary growth for Operating costs shown in the Form below, which seems to be planned for sustainable strategies for the NTTC Project, is feasible and will be able to cover the additional operating costs because of the addition of the new facility and equipment by the Project. This future budget has been confirmed based on the calculation of the operating cost for the new facility and equipment.

NTTC is in the process of becoming autonomous and they are waiting for the MOE's approval. It is not sure that it will be approved within this year, but it is required to increase staff and strengthen the system in case it becomes autonomous.

Form 3-6 Budget for NTTC from the fiscal year 2000 to 2004

Type of Cost	2000/01	2001/02	2002/03	2003/04
Personnel emoluments	**7,800,017**	**8,543, 612**	**9,397,973**	**10,337,770**
Compared to Previous	115.9%	108.6%	110.0%	110.0%
① Salary (Established)	-	8,401,481	9,241,629	10,165,792
② Allowances	-	87,131	95,844	105,428
③ Local Training Budget	-	55,000	60,500	66,550
Travel	**589,325**	**879,153**	**967,068**	**1,063,775**
Compared to Previous	106.5%	152.2%	107.8%	110.0%
① Vehicle Maint. Repairs	-	303,160	333,476	366,824
② Fuel and Lubricants	-	42,284	46,512	51,163
③ Short Term Hire	-	43,890	48,279	53,107
④ Motor Mileage	-	14,399	15,839	17,423
⑤ Fares (Local)	-	23,430	25,773	28,350
⑥ Subsistance (Local)	-	451,990	497,189	546,908
Operating Costs	**6,958,741**	**7,877,925**	**8,655,718**	**9,532,290**
Compared to Previous	109.0%	113.2%	110.0%	110.0%
① Power	1,659,500	1,825,450	2,007,995	2,208,795
② Maintenance	837,430	921,173	1,013,290	1,114,619
③ Administration	4,259,303	4,908,541	5,389,396	5,939,336
④ Counterparts	202,508	222,761	245,037	269,540
Special Expenditure	**235,763**	**222,200**	**244,420**	**268,862**
Compared to Previous	45.4%	131.7%	110.0%	110.0%
① Office Equipment	-	102,500	112,750	124,025
② Office/Residential Furniture	-	0	0	0
③ Books and Publications	-	11,000	12,100	13,310
④ Other Office Equipment	-	108,700	119,570	131,527
⑤ Vehicles, Cycles & Equines	-	0	0	0
Grand Total	**15,583,846**	**17,522,890**	**19,275,179**	**21,202,697**
Compared to Previous Year	108.1%	112.5%	109.89%	110.00%

Source: NTTC data (Unit: Maloti)

3-2-3 Technical Level of the Staff of the Implementing Agency

(1) Actual Conditions of NTTC Staff

NTTC staff in the fiscal year 2000 are 187 in total, 74 in the Administration section and 113 in the Academic section. Additional staff have been planned for this year, in accordance with the increase of students and classes.

Form 3-7 NTTC Staff for the year 2000

Staff		Administration			Academic				
		Execution	Senior Staff	General Staff	Senior Lecturer	Lecturer	Assistant Lecturer	Technician	Total
Executive	Director								
	Deputy Director	2							2
	Assistant Director	1							1
	Assist. Deput. Dir.	3							3
	total	6	0	0	0	0	0	0	6
Office・ Management	Accounting		2	5					7
	Personnel		1	2					3
	Student welfare		3	13					16
	Library		1	2					3
	Registrar		3	15					18
	Nutrition		3	16					19
	Wardens			10					10
	Driver			5					5
	Chief Technician		3	7					10
	total	0	16	75	0	0	0	0	91
Educational section	Primary Division				18	23	10	0	51
	Secondary Division				31	17	2	5	55
	In-service Division				12	10	0	0	22
	total	0	0	0	61	50	12	5	128
		6	16	75	**61**	**50**	**12**	**5**	
	Grand Total	97			**Academic Staff : 128 persons**				**225**
	Previous year ;1999	74						**113**	**187**

Source：NTTC data

NTTC is being transformed into an autonomous college of education, and it will be named as Lesotho College of Education, although it is under the control of MOE at present. Therefore, NTTC must apply to MOE to get the budget necessary for new personnel.

The Director of NTTC is the senior person responsible in the institution followed by the Deputy Director of Administration (DDA) and Deputy Director of Academic Affairs (DDAA) who are in charge of the vice directors.

Additional staff have been planned for this year, in accordance with the increase of students. The following is the number of lecturers which NTTC is planning to increase in 2002.

	Science	Agriculture	Home Economics	Art & Craft
Primary	2 tutors	1 tutors	1 tutors	-
Secondary	2 tutors	2 tutors	1 tutors	2 tutors

(2) Technical Level of the Staff in NTTC

1) Academic Staff

a) Senior Lecturer: Minimum requirement for a Senior Lecturer is Bachelor's Degree. Most senior lecturers in NTTC have a Master's Degree in their specialties, while the remainder have Bachelor's Degrees.

b) Lecturer: Minimum requirement for a Lecturer is also Bachelor's Degree. More than half of the lecturers have a Bachelor's Degree, some have Master's Degrees but some have only a Diploma of Education.

c) Assistant Lecturer: An assistant Lecturer must have a Bachelor's Degree or at least a Diploma of his or her specialty.

d) Technician: A technician principally has to possess at least the same qualification as a lecturer. All technicians in NTTC have a Bachelor's Degree.

2) Administration Staff

a) Executives: Minimum requirement for Director, Deputy Director, and Assistant Director is a Bachelor's Degree. All Directors in NTTC have a Master's Degree.

b) Senior staff: Senior staff in the Personnel, Student welfare, Bursar, Library, Canteen and Register offices, must have a Diploma or Certificate of their profession.

c) General Staff: General Staff of Administration such as wardens, maintenance technicians, nutrition and so forth, have at least Form B (junior secondary) graduate qualification up to COSO of senior secondary education. Technicians who take charge of maintenance of facilities must have a Certificate of their profession.

In order to improve the quality of education and the curriculum, NTTC has carried out long-term training for improving and strengthening teachers qualifications. It is planned that lecturers are to go to the University or abroad to study a Master's course or Ph. D. course by 2006.

Training of NTTC staff has been supported by fellowships awarded by the National Manpower Development section under the Manpower Division of the Ministry of Finance, and by some donors, such as Irish AID, USAID, World Bank, British Council and so on.

3-2-4 Operation and Maintenance Plan

(1) Maintenance and Management Plan for Facility

1) Education Facility Unit, MOE, which is staffed by 35 Architects and Civil Engineers and 1 foreign advisor, takes charge of MOE's facility construction and repair. However, colleges and universities are usually maintained by the maintenance unit of each institute, and EFU give advice in complicated cases.

2) NTTC has a maintenance section which has 7 staffs. This complement includes one chief technician, technicians for electrical work and plumbing work, and four workers. Basically this section takes change of all maintenance of buildings and utilities. However, this section is understaffed to maintain all facilities in NTTC. Their work is limited to the basical daily maintenance only, and engagement of private companies is sometimes required.

3) In order to cut down their maintenance cost, NTTC is upgrading their maintenance organizational structure, including the level of engineer, to cover all the maintenance categories, i.e. electrical, plumbing and carpentry.

(2) Maintenance and Management Plan for Equipment

The requested equipment in the Project is almost the same as the existing equipment and does not include any item difficult to operate or that needs special maintenance, though daily maintenance is indispensable.

NTTC is deploying a specialized technician in each section of Science, Agriculture and Home Economics in charge of daily maintenance.

The repair of equipment is generally to be ordered outside. However, Science and Agriculture sections of NTTC sometimes request the Lesotho Agricultural college for repair if it is impossible to repair in NTTC because of the limited budget.

In Lesotho, there are very few equipment agents, and so it is very difficult to have repairs made. The equipment should be repaired in NTTC.

(3) Utility Running Cost / Project Budget for Utilities

1) Electricity Cost

a) Conditions Maximum Demand 190 kw
Load Factor 0.3

b) Schedule of Electricity Charge by LEC
Demand Charge: 49.31 M/kw
Energy Charge: 0.2677 M/kwh

c) Monthly Electrical Cost

Demand	190 kw x 49.31 M/kw	=9,368
Winter: Energy	190 kw x 230 H/Month x 0.3 x 0.2677 M/kwh	=3,509.5
Other Seasons: Energy	90 kw x 230 H/Month x 0.3 x 0.2677 M/kwh	=1,662.4
	Winter TOTAL (A)	12,877.5
	Other Seasons TOTAL (B)	11,030.4
		(M/Month)

d) Annual Electrical Cost

Winter:	12,877.5 M/Month x 2.5M/Year	=	32,193.75
Other Seasons:	11,030.4 M/Month x 6.5 M/Year	=	71,697.6
	TOTAL		103,891.35(M/Year)
			→ 104,000(M/Year)

2) Water Cost

a) Category of Water Tariff

$1m^3 – 5\ m^3$/month:	1.56 M/m^3
$6m^3 – 10\ m^3$/month:	2.34 M/m^3
$10m^3 – 23\ m^3$/month:	3.12 M/m^3
Over $24m^3$/month:	5 M/m^3

b) Conditions 20 m^3/day

c) Monthly Water Cost

Monthly water use:	$20m^3$/day x 23 days/month	= $460m^3$/month
Water Rate:	$5m^3$ x 1.56 M/m^3	= 7.8 M/month
	$5m^3$ x 2.34 M/m^3	= 11.7 M/month
	$14m^3$ x 3.12 M/m^3	= 43.66 M/month
	$436m^3$ x 5 M/m^3	= 2,180 M/month
	Sub-TOTAL	2,243.16(M/month)
Waste Water Rate:	$460m^3$/month x 85% x 3 M/ m^3	= 1,173 M/month
	TOTAL	3,416.16(M/month)

d) Annual Water Cost
3,416.16 M/month x 9 months/year = 30,745.44 M/year
TOTAL 31,000 (M/Year)

3) Telephone Cost

a) Conditions Direct Line: 2 Lines

b) Schedule of Telephone Charge by LTC
Minimum: 1.95 M/call
Standard Direct: 0.6 M/minute

c) Monthly Telephone Cost
Minimum Charges: 1.95 M/call x 10 calls/day x 23 days/month x 2 Lines = 897
Telephone Charges:
0.6M/minute x 3 minutes/call x 10 calls/day x 23 days/month x 2 Lines = 8,280
TOTAL 9,177

d) Annual Electricity Cost
9,177 M/M x 9 M/Year = 82,593(M/Year)
→ 83,000(M/Year)

4) Fuel Cost

a) Conditions Standby Generator 100 kw 3ϕ220V 50Hz 1 1 No.
Fuel Consumption: 20 L/hr
Assuming one 1 hr power outage a week

b) Fuel Cost Diesel Fuel 2.9 M/L

c) Annual Fuel Cost 20 L/hr x 36 Weeks x 2.9 M/L = 2,088(M/Year)
→ 2,100(M/Year)

5) LPG Cost

a) Conditions LPG Consumption for 5.0 kg/day
Laboratory Equipment, etc.

b) LPG Cost 168 M/50 kg → 3.36 M/kg

c) Monthly LPG Cost 14.36 kg/day x 23 Days/Year x 3.36 M/kg=1,109.7(M/month)
→ 1,110 (M/month)

d) Annual LPG Cost 1,110 kg/day x 10 months/Year = 11,100 (M/Year)

6) Draft of Running Cost

Electricity Cost	104,000
Water Cost	31,000
Telephone Cost	83,000
Fuel Cost	2,100
LPG Cost	11,100
Consumables(*1)	59,030
TOTAL	290,230
	→ 290,000
	(M/Year)

(*1): The prices in Japan were applied for the prices of consumables, but the prices of some items may be lower than those in Japan.

The operating cost of NTTC is scheduled to increase by 13.2% in the year 2001/2002, by 10.0% in the year 2002/2003 and 2003/2004 shown as Form 3-6. The above amount can be absorbed by the operating cost.

CHAPTER 4
PROJECT EVALUATION AND RECOMMENDATIONS

CHAPTER 4 PROJECT EVALUATION

4-1 Project Effect

(1) The expected effects of the Project

1) Direct effects

a) The current situation is that a lot of practical and experiment work cannot be carried out because of a shortage of equipment and congestion in the rooms in NTTC. This project provides the infrastructural support and equipment supply for the experiments and practical work in Science, Agriculture, Home Economics, Art & Craft and Computing. It means that many syllabi in the curricula, which cannot be carried out at present, can be conducted in the laboratory and workshop and that basic and systematic education will be available in NTTC.

b) The implementation of the Project will contribute much to the upgrading of the quality of education in the concerned fields.

c) In 2000, the number of classes in NTTC is 35 while the total number of classrooms including workshops and laboratories is 35. In 2002, the number of classes, according to NTTC's future plan, is to increase to 49. It means that the facilities in NTTC are already overloaded. This project provides 10 new laboratories and workshops and conversion of the existing ones to general classrooms, which will contribute to ease the shortage of classrooms and laboratories in NTTC.

d) NTTC has a plan to increase the number of students to 1,329 in 2002. The Project allows more students to be accepted, and improves the level of education of the graduates from NTTC.

2) Indirect effects

a) Effective education in NTTC will provide better skilled teachers to primary and junior secondary schools, and it therefore improves the quality of education in these schools.

b) The shortage of primary and junior secondary school teachers in Lesotho will be improved through the Project.

c) The improvement of the quality of education in NTTC will have an effect on reducing the high drop out and repetition rates and improvement of the overall quality of education in Lesotho.

d) The improvement of the circumstances in the educational sector in Lesotho through the Project leads to the development of human resources related to the national policy, economy and society. Therefore, the Project is expected to have a nationwide effect.

4-2 Collaboration with other donors and Technical Cooperation

NTTC was assisted by other donors and NGO with teaching staff. The GOL has the intention to request for the strengthening of the teaching staff and improvement of education. However at present, the GOL has not made any concrete request.

4-3 Recommendation

(1) NTTC is one of the organizations under the Ministry of Education. NTTC does not have any authority for budget allocation, staff employment, the development of basic curricula and syllabi, intake of students, issue of graduation certificates and diplomas and future plan, etc. at present.

NTTC is now applying to the MOE to become an autonomous College such as the National University of Lesotho, but their application has not been approved yet. When NTTC has autonomy, it could be helpful to secure staff and additional budget for the new building.

(2) Even though NTTC has a plan to increase their staff and budget in the future, it is strongly recommended that NTTC should secure a certain number of teaching staff and budget to operate the new Laboratory and Workshop Building in any case.

(3) NTTC has some foreign teaching staffs, who have experience and have been sent under the assistance of other donors or NGOs. They are working as advisors as well as indispensable teaching staff. Therefore, the skill of teaching staff has to be developed through the technical transfer from these foreign teaching staff and the quality of education should continue to be improved.

(4) Since few equipment dealers and agents exist in Lesotho, it is very difficult to get after-sales service, repair and maintenance services for the equipment and facilities, and in addition, the cost for these services is very high. Therefore, an internal maintenance system by its own staff is indispensable. Although there are several engineers for facility maintenance and a technician in each section of Science, Agriculture and Home Economics at present, the retraining and strengthening of maintenance staff may be needed.

APPENDICES

Member List
of
Basic Design Study
on
The Project for Infrastructural Support and Educational Equipment Supply
to
National Teacher Training College in Maseru
in
the Kingdom of Lesotho

1.	Katsuo SHOJI Team Leader	Deputy Director, Planning Division Grant Aid Management Department Japan International Cooperation Agency (JICA)
2.	Kazuaki HASHIMOTO Project Coordinator	First Project Management Division Grant Aid Management Department Japan International Cooperation Agency (JICA)
3.	Takatsugu SHIMADA Project Manager/Architect/ Utility Planner	PACIFIC CONSULTANTS INTERNATIONAL
4.	Soichi TAKAI Educational Planner	INTEM CONSULTING Co., Ltd.
5.	Kenzo MIYOSHI Equipment Planner	INTEM CONSULTING Co., Ltd.
6.	Yuko SASA Procurement Planner/Cost Estimator	PACIFIC CONSULTANTS INTERNATIONAL
7.	Yoshiharu MATSUDA Coordinator/Architect	PACIFIC CONSULTANTS INTERNATIONAL

Member List
of
Explanation Team for Draft Report of Basic Design Study
on
The Project for Infrastructural Support and Educational Equipment Supply
to
National Teachers Training College in Maseru
in
the Kingdom of Lesotho

1.	Toshio MURATA Team Leader	Development Specialist Institute for International Cooperation Japan International Cooperation Agency (JICA)
2.	Kazuaki HASHIMOTO Project Coordinator	First Project Management Division Grant Aid Management Department Japan International Cooperation Agency (JICA)
3.	Takatsugu SHIMADA Project Manager/Architect/ Utility Planner	PACIFIC CONSULTANTS INTERNATIONAL
4.	Soichi TAKAI Educational Planner	INTEM CONSULTING Co., Ltd.
5.	Kenzo MIYOSHI Equipment Planner	INTEM CONSULTING Co., Ltd.
6.	Yuko SASA Procurement Planner/Cost Estimator	PACIFIC CONSULTANTS INTERNATIONAL
7.	Yoshiharu MATSUDA Coordinator/Architect	PACIFIC CONSULTANTS INTERNATIONAL

2. Survey Schedule

Basic Design Study (5 / Apr. / 2000 ～ 1 / May / 2000)

No	Date	Member & Movement	Activity
1.	Apr. 5 (Wed)	(C, F, G) NRT12:00→17:50 SIN (SQ997) (D, E) NRT11:35→17:25 SIN (JL719)	
2.	Apr. 6 (Thu)	(C, D, E, F, G) SIN 1:20→ 5:45 JNB(SQ406) JNB16:00→17:10MSU (SA8056)	Courtesy calls on JICA SA office
3.	Apr. 7 (Fri)	(C, D, E, F, G) (Stay in Bloemfontein)	Survey of Project Site & Meeting with •NTTC •MOE(Ministry of Education) Planning Unit
4.	Apr. 8 (Sat)	(C, D, E, F, G) (Stay in Bloemfontein)	Internal Meeting & Data analysis
5.	Apr. 9 (Sun)	(C, D, E, F, G) (A, B) NRT18:55→22:25HKG (JL739) HKG 23:40(SA7801)→	Internal Meeting & Data analysis
6.	Apr. 10 (Mon)	(A, B) →6:50 JNB (SA7801) (C, D) MSU9:00→10:10JNB (SA8051) (A, B, C, D) (E, F, G)	Join with JICA Members Courtesy call on and meeting with JICA SA office Survey of Project Site
7.	Apr. 11 (Tue)	(A, B, C, D) JNB16:00→17:10MSU (SA8056) (E, F, G)	Courtesy call on Embassy of Japan in SA Survey of Existing Facilities & Meeting with each section
8.	Apr. 12 (Wed)	(All Members)	Courtesy call on, Explanation of Inception Report and discussion on the Application with • MOE • EFU(Education Facilities Unit) Survey of 2 Primary Schools
9.	Apr. 13 (Thu)	(All Members) (E,G)	General Meeting with NTTC Meeting with LDTC(Long Distance Teaching Center)
10.	Apr. 14 (Fri)	(B,C,G) (A,D) (E,F) (All Members)	Meeting with • Irish Aid • EU Meeting with MOE Detail Discussion with NTTC General Meeting with NTTC
11.	Apr. 15 (Sat)	(All Members)	Visit Long Distance Training in LERIBE
12.	Apr. 16 (Sun)	(All Members)	Internal Meeting & Data analysis
13.	Apr. 17 (Mon)	(A,B,D) (C,E,F,G)	Meeting with MOE Detail Discussion with NTTC
14.	Apr. 18 (Tue)	(D) (A,B,C,G) (All Members)	Meeting with MOF(Ministry of Finance) Consultation of Minutes of Discussion with • MOE • MODP(Ministry of Development Planning) • NTTC Detail Discussion with NTTC
15.	Apr. 19 (Wed)	(All Members)	Visit Lesotho High School Ceremony for signing on M/D at MOE (Extended)

No	Date	Member & Movement	Activity
16.	Apr. 20 (Thu)	(All Members) (A, B) MSU12:15→13:25JNB(SA8053) (D, E) (F) (C,G)	Ceremony for signing on Minutes of Discussion at MOE Report to • Embassy of Japan in SA • JICA SA office Meeting with • NTTC • MOE Meeting with MOF Meeting with • WASA (Water And Sewage Authority) • LEC (Lesotho Electricity Cooperation) • LTC (Lesotho Telecommunications Cooperation)
17.	Apr. 21 (Fri)	(A, B) JNB17:25→(SA286) (C, D, E, F, G)	Internal Meeting & Data analysis
18.	Apr. 22 (Sat)	(A, B) →12:15HKG(SA286) HKG14:15→19:45NRT(JL732) (C, D, E, F, G)	Internal Meeting & Data analysis
19.	Apr. 23 (Sun)	(C, D, E, F, G)	Detail Discussion with NTTC
20.	Apr. 24 (Mon)	(C, D, E, F, G)	Detail Discussion with NTTC Overall meeting with NTTC
21.	Apr. 25 (Tue)	(D, E, F) MSU9:00→10:10JNB (SA8051) (C, G) (D) JNB14:15→ (SQ405)	Procurement survey Meeting with • WASA • LEC • LTC
22.	Apr. 26 (Wed)	(D) →8:10SIN (SQ405) SIN23:15→ (SQ012) (C, G) (E, F,)	Meeting with • WASA • LEC • LTC Procurement survey
23.	Apr. 27 (Thu)	(D) →6:40 NRT (SQ998) (C, E, F, G)	Procurement survey
24.	Apr. 28 (Fri)	(C, E, F, G)	Final report to JICA SA office
25.	Apr. 29 (Sat)	(C, E, F, G)	Internal Meeting & Data Analysis
26.	Apr. 30 (Sun)	(C, E, F, G) JNB14:15→(SQ405)	
27.	May 1 (Mon)	→8:10SIN(SQ405) SIN9:40→17:05NRT(SQ012)	

Remarks:
A: Mr. Shoji, B: Mr. Hahimoto, C: Mr. Shimada, D: Mr. Takai, E: Mr. Miyoshi, F: Ms. Sasa, G: Mr. Matsuda

Draft Final Report Explanation Mission (18 / Jul. / 2000 ～ 2 / Aug. / 2000)

No	Date	Member & Movement	Activity
1.	Jul. 18 (Tue)	(A,B,C, F, G) NRT12:00→17:50 SIN (SQ997) (D, E) NRT11:00→16:15 BKK (JL717)	
2.	Jul. 19 (Wed)	(A,B,C, F, G) SIN 1:20→ 7:30 JNB(SQ406) (D, E) BKK 0:50→7:00 JNB (TG7501) (All Members) JNB16:00→17:10MSR (SA8056)	9:00 JICA SA Office, Mr. Takahashi 10:30 EDJ, Mr. Ishizuka
3.	Jul. 20 (Thu)	(All Members)	8:30 Ministry of Development Planing: PS 9:30 Ministry of Education: Principal Secretary 11:00 NTTC: Acting Director 14:30 NTTC (Discussion+DF Report)
4.	Jul. 21	(All Members)	Meeting with NTTC 8:30 NTTC Discussion of Draft Report
5.	Jul. 22 (Sat)	(All Members)	Internal Meeting & Data analysis
6.	Jul. 23 (Sun)	(All Members)	Internal Meeting & Data analysis
7.	Jul. 24 (Mon)	(All Members)	8:30 Meeting with NTTC Study and Discussion NTTC
8.	Jul. 25 (Tue)	(A,B,C,D,E) (F,G)	8:30 NTTC: Consultation of Minutes of Discussion • Meeting with NTTC and relevant authorities
9.	Jul. 26 (Wed)	(All Members) (F,G)	8:30 NTTC: Consultation of M/D and signing on M/D 14:30 Signing Ceremony of Minutes of Discussion Meeting with NTTC and relevant authorities
10.	Jul. 27 (Thu)	(A,B) MSR12:15→13:25JNB(SA8053) (C,D,E,F,G)	• Report to Embassy of Japan in SA and JICA SA office • Meeting with NTTC, MoE and relevant authorities
11.	Jul. 28 (Fri)	(A,B) JNB14:15→ (SQ405) (C,D,E,F,G)	• Meeting with NTTC, MoE and relevant authorities
12.	Jul. 29 (Sat)	(A,B) →6:15SIN (SQ405) SIN9:50→17:35 NRT (SQ012) (C,D,E,F,G)	Internal Meeting & Data analysis
13.	Jul. 30 (Sun)	(C,D,E,F,G)	Internal Meeting & Data analysis
14.	Jul. 31 (Mon)	(C,D,E,F,G) MSR10:55→12:10JNB(SA8053) (C,D,E) (F,G) (D,E) JNB19:55→ (TG7500)	15:00 JICA SA office 16:30 Embassy of Japan • Procurement survey
15.	Aug. 1 (Tue)	(D,E) →11:50BKK(TG7500) (C,F,G) JNB14:15→ (SQ405)	• Procurement survey
16.	Aug. 2 (Wed)	(D,E) BKK6:10→14:20NRT(NW002) (C,F,G) →6:15 SIN(SQ405) SIN9:50→17:35NRT(SQ012)	

Remarks:
A: Mr. Murata, B: Mr. Hashimoto, C: Mr. Shimada, D: Mr. Takai, E: Mr. Miyoshi, F: Ms. Sasa, G: Mr. Matsuda

3. List of Persons Concerned in the Recipient Country

Basic Design Study (5 / Apr. / 2000 ～ 1 / May / 2000)

1. Embassy of Japan

Mr. Hayato Ishizuka	:	First Secretary

2. JICA South Africa Office

Mr. Yoshiyuki Takahashi	:	Director
Mr. Toshiyuki Nakamura	:	Deputy Resident Representative
Mr. Koichi Kito	:	Assistant Resident Representative

3. Ministry of Development Planning (MODP)

Mr. C.M. Mohapi	:	Principal Economic Planner, Planning Unit
Mr. T. Motsusi	:	Assistant Economic Planner, Dept. of Sectoral Programming
Mr. Motooa Rammoneng	:	Economic Planner, Department of Economic Cooperation
Ms. Lineo Ramabele Smith	:	Assistant Economic Planner, Dept. of Sectoral Programming

4. Ministry of Education (MOE)

Mr. Tlohang Sekhamane	:	Principal Secretary
Mr. Paul K. Motholo	:	Deputy Principal Secretary
Mr. Moshapane	:	Chief Education Officer
Mr. O.M. Makara	:	Chief Education Officer
Ms. N.I. Kokome	:	Chief Education Officer - Primary
Mr. Monyau	:	Principal of Economic Planner, Planning Unit
Ms. L. Selokoma	:	Assistant Economic Planner
Ms. M. Letsunyane,	:	Chief Inspector Field Services

5. Ministry of Public Works (MOPW)

Mr. Masile Ramasike	:	Materials Testing Laboratory, Road Department Materials Engineer, Chief Technical Officer
Mr. Motlatsi Litsibe,	:	Materials Testing Laboratory, Road Department Materials Engineer, Senior Technical Officer

6. Ministry of Finance (MOF)

Mr. A.S.Phali	:	Chief Customs Officer, Department of Customs and Excise
Mr. E.M.Matlosa	:	Principal Customs Officer, Department of Customs and Excise

7. National Teachers Training College (NTTC)

Mr. Sehloho Mothae	:	Acting Director
Ms. Malebona Mphalane	:	Deputy Director, Academic Division
Mr. Masimole	:	Assistant Director for Primary Education
Ms. Majoalane Mokete	:	Assistant Director Secondary
Ms. Maseapa Moeletsi	:	Acting Assistant Director, In – Service Division
Ms. Mamoiloa	:	Bursar
Ms. Mamokheseng Mpooa	:	Registrar

Ms. Christine Moepi	:	Teaching Practice Coordinator
Mr. Tseliso Morojele	:	Principal Personnel Officer (P.P.O), Human Resources Dept.
Mr. Khalane	:	Secondary Personnel Officer (S.P.O), Human Resources Dept.
Mr. Moorosi Matela	:	Technical Assistant of Planning
Mr. A.T.Talanyane	:	Chief Technical Officer (C.T.O)
Mr. T.S.G. Mosehle	:	Head of Science – Secondary
Dr. Ed Ball	:	Academic Development Advisor
Dr. Hesseke	:	Science Secondary
Mr. Samuel Oforasane	:	Lecturer, Art & Crafts
Mr. D. Siehl	:	Lecturer, Science Secondary
Ms. M. Billy	:	Laboratory Technician, Home economics
Ms. L. Khaka	:	Tutor, Home economics
Mr. Joel Pii	:	In-Service Lecturer
Mr. Retseletso Raleche	:	Assistant Lecturer
Ms. Lebohang Letsie	:	Librarian

8. Education Facilities Unit (EFU)

Mr. M.K. Mokete	:	Senior Architect
Mr. M. Ramakatane	:	Contracts Manager
Mr. M. Rabokinyane	:	Assistant Procurement Officer
Mr. E. Konna	:	Unit Coordinator
Mr. A.S. Sivarm	:	Contract Advisor

9. Long Distance Teaching Center (LDTC)

Ms. Idda M. Matooane	:	Director
Mr. Tisia Senoko	:	Executive Officer
Ms. Jane Malefane	:	Deputy Director

10. Qoaling Primary School

Ms. Mampiti	:	Principal

11. Semphetenyane Community Primary School

Mr. Kamotoane Molete	:	Principal

12. Irish AID

Mr. Paul O'Donoghue	:	Attache (Development)
Ms. Mathakane Lerothdli	:	Accountant
Ms. Limakafso Morhothu	:	Advisor Education
Ms. Mannete Ramaili	:	Health Advisor

13. European Union (EU)

Mr. Richard Zink	:	Ambassador, Head of Delegation

14. National University of Lesotho (NUL)

Ms. M.N. Makara	:	Dean of Faculty
Mr. O.A. Aoeola	:	Deputy Dean of Faculty
Mr. E.O. Odubunmi	:	Professor, Dept. of Science Education
Mr. Z.A. Matsela	:	Professor
Mr. N.P. Liphoto	:	Dept. of Science Education
Ms. T. Mphuthi	:	Dept. of Educational Foundation
Ms. Sehapi	:	Development of Planning
Ms. M.Nhekhe	:	Administration of Faculty

15. Lesotho Electricity Corporation （LEC）

Ms. Fobo	:	MD's Secretary
Mr. G.S. Lehloenya	:	Chief Engineer

16. Water And Sewage Authority （WASA）

Mr. Borotho	:	Director of Finance
Mr. Tsotang Moeti	:	Distribution Engineer

17. Lesotho Telecommunications Corporation （LTC）

Mr. Moeketsi Mochada	:	Sales Supervisor
Mr. Tlali N. Tlali	:	External Plant Manager

18. ZMCK

Mr. Ardian G Aukland	:	Resident Partner

19. FLASH

Mr. A. Arcangeli	:	Director
Mr. Glenn Keun	:	

Draft Final Report Explanation Mission (18 / Jul. / 2000 ～ 2 / Aug. / 2000)

1. Embassy of Japan

Ms. Yoko Doi	:	Special Assistant for Development

2. JICA SA Office

Mr. Yoshiyuki Takahashi	:	Resident Representative
Mr. Yoshihiro Imamura	:	Assistant Resident Representative
Ms. Kazumi Larhed	:	Project Formulation Advisor

3. Ministry of Development Planning (MODP)

Mr. C.M. Mohapi	:	Principal Economic Planner, Planning Unit
Mr. T. Motsusi	:	Assistant Economic Planner, Dept. of Sectoral Programming
Mr. Motooa Rammoneng	:	Economic Planner, Department of Economic Cooperation

4. Ministry of Education (MOE)

Mr. Tlohang Sekhamane	:	Principal Secretary
Mr. C. Moshapane	:	Deputy Principal Secretary
Mr. O.M. Makara	:	Chief Education Officer, Tertiary
Mr. Monyau	:	Principal of Economic Planner, Planning Unit
Ms. T. Maphalala	:	Senior Project Officer, Planning Unit
Ms. L. Selokoma	:	Assistant Economic Planner, Planning Unit

5. Ministry of Works

Mr. F. M. N. Moshoeshoe	:	Senior Structural Engineer
Mr. K. Litlhakanyane	:	Electrical Engineer

6. Ministry of Finance (MOF)

Mr. P. Chene	:	Operation Supervision of Sales TAX

7. Ministry of Local Government

Ms. M. Makhetha	:	Senior Physical Planner, Dept. of Lands, Surveys & Physical Planning

8. National Teachers Training College (NTTC)

Mr. Sehloho Mothae	:	Acting Director
Mr. Masimole	:	Assistant Director for Primary Education
Ms. Majoalane Mokete	:	Assistant Director Secondary
Mr. M. Mokhethi	:	Assistant Lecturer, Physics, Primary
Mr. A.T.Talanyane	:	Chief Technical Officer (C.T.O)
Mr. Makhakahe	:	Laboratory Technician, Chemistry and Physics
Mr. T.S.G. Mosehle	:	Head of Science, Secondary
Ms. P. Mapuru	:	Lecturer, Biology, Secondary
Mr. T. Molshethi	:	Acting Head of Science, Primary
Mr. N. Sehalahala	:	Lecturer, Science, Primary

Ms. M. Seleso	:	Lecturer, Science, In-service
Dr. Hesseke	:	Lecturer, Chemistry, Secondary
Mr. Samuel Oforiasane	:	Lecturer, Art & Crafts
Ms. M. Billy	:	Laboratory Technician, Home economics
Ms. M. Moeho	:	Head of Home Economics, Secondary
Ms. A. Khoro	:	Home economics, In-service
Ms. M. N. Mopeli	:	Head of Home economics, Primary
Ms. B. Moeti	:	Home economics, Primary
Ms. L. Khaka	:	Ass. Lecturer, Home economics
Mr. Raphael Lephoto	:	Head of Computer Studies
Mr. Retseletso Raleche	:	Assistant Lecturer, Computer Studies
Mr. S. Qhobela	:	Lecturer, Agriculture
Mr. Lieketseng Pheko	:	Head of Agriculture, Secondary
Mr. Mamatlou Ramaseli	:	Head of Agriculture, Primary
Mr. P. Phenethi	:	Lecturer, Agriculture, Primary
Mr. Leneko Mihutlane	:	Lecturer, Agriculture, Primary

9. Lesotho Electricity Corporation （LEC）

Mr. G.S. Lehloenya	:	Chief Engineer
Mr. J. Motsoikha	:	Planning Engineer
Mr. T. Phate	:	Planning Engineer

10. Water And Sewage Authority （WASA）

Mr. Mathealira P. Lerotholi	:	Director of Engineering Planning and Development
Mr. B. Mohoarryarre	:	Senior Technical Officer

11. ZMCK

Mr. Ardian G Aukland	:	Resident Partner
Ms. Mathabang Ramoeti	:	Electrical / Mechanical Engineer

12. FLASH

Mr. Glenn Keun	:	Director

Minutes of Discussions
on
the Basic Design Study
on
the Project for Infrastructual Support and Educational Equipment to National Teacher Training College in Maseru in the Kingdom of Lesotho

In response to a request from the Government of the Kingdom of Lesotho (hereinafter referred to as " Lesotho "),the Government of Japan has decided to conduct a Basic Design Study on the Project for Infrastructual Support and educational Equipment to National Teacher Training College in Maseru (hereinafter referred to as "the Project"), and entrusted the study to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Lesotho the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr.Katsuo SHOJI, Deputy Director, Planning Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from April 6 to April 26, 2000.

The Team held a series of discussions with the officials concerned of the Government of Lesotho and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare a Basic Design Study Report.

Maseru April 19, 2000

小路克雄

Mr. Katsuo SHOJI
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mr. TLOHANG SEKHAMANE
Principal Secretary
Ministry of Education

Witness

Mr.C.M.MOHAPI
Principal Economic Planner
Ministry of Development Planning

ATTACHMENT

1. Objective of the Project

The objectives of the Project are to improve the physical infrastructure for National Teacher Training College (hereinafter referred to as N.T.T.C.) through constructing a building and providing educational equipment.

2. Project Site

2-1The project site is secured by N.T.T.C.

2-2 It was confirmed by the both sides that the site is located in N.T.T.C. as described in ANNEX 1 and the boundary line of the project area shall be clarified by the Lesotho side.

3. Responsible and Implementing Agency

3-1 The Responsible Agency is Ministry of Education

3-2 The Implementing Agency is National Teacher Training College (N.T.T.C.).

4. Items requested by the Government of Lesotho

4-1 After discussions with the Team, the Lesotho side requested the items shown in ANNEX 2 and 3. However, final items to be executed under Japan's Grant Aid will be decided after further studies in Japan.

4-2 With regard to name of requested facilities, both sides agreed to change the original name, Applied Science Block into new name, Laboratory and Workshop Building.

5. Japan's Grant Aid Scheme

5-1 The Lesotho's side understood the Japan's Grant Aid Scheme explained by the Study Team, as described in ANNEX 4.

5-2 Lesotho side will take the necessary measures, as described in ANNEX 5 and 6 for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

6-1 The consultants will proceed to further studies in Lesotho until April 26, 2000.

6-2 Based on the outlines of Discussion and technical examination of the study, JICA will prepare the draft report in English and dispatch a mission in order to explain its contents in the end of July, 2000 on the present schedule.

6-3In case that the contents of the report is accepted in principle by the Lesotho's side, JICA will complete the final report and send it to the Government of Lesotho around October, 2000.

7. Other relevant issues

7-1 Projects implemented by the Japan's Grant Aid, the own government or any international / bilateral donors and any organization shall not duplicate each other on this project.

7-2 The Lesotho side will answer the questionnaires, which the Study Team handed to the Lesotho side by April 24,2000.

7-3 Each facilities and equipment on the project shall be related to compulsory or elective subjects in the curriculum in teacher training, or be crucial to teaching methodology.

7-4 The Lesotho side agreed to complete the implementation of the following undertaking by the commencement of the construction.

7-4-1) Clearance of the existing facilities and utilities within the proposed site for construction as shown in ANNEX 5.

7-4-2) Leveling of ground in the site for construction and,

7-4-3)Relocation of the existing electric cable and poles from existing place to suitable places.

7-5 The building should satisfy the minimal functions complied with the curriculum for teacher training at present and near future.

7-6The number of laboratories, workshops and other rooms in the building should accommodate the minimal necessity complied with circumstances such as the educational system, students' population, etc.

7-7The building should secure enough durability against the climate and predictable natural disaster.

7-8 The most portion of the building should be able to be built with materials procured in Lesotho or imported easily and cost-effectively from South Africa.

7-9 The building should be able to be built and maintained with locally procurable techniques.

7-10Each equipment should satisfy the minimal requirement complied with the curriculum for teacher training related to primary and junior secondary education .

7-11 Each equipment should have enough durability against the climate and proper use.

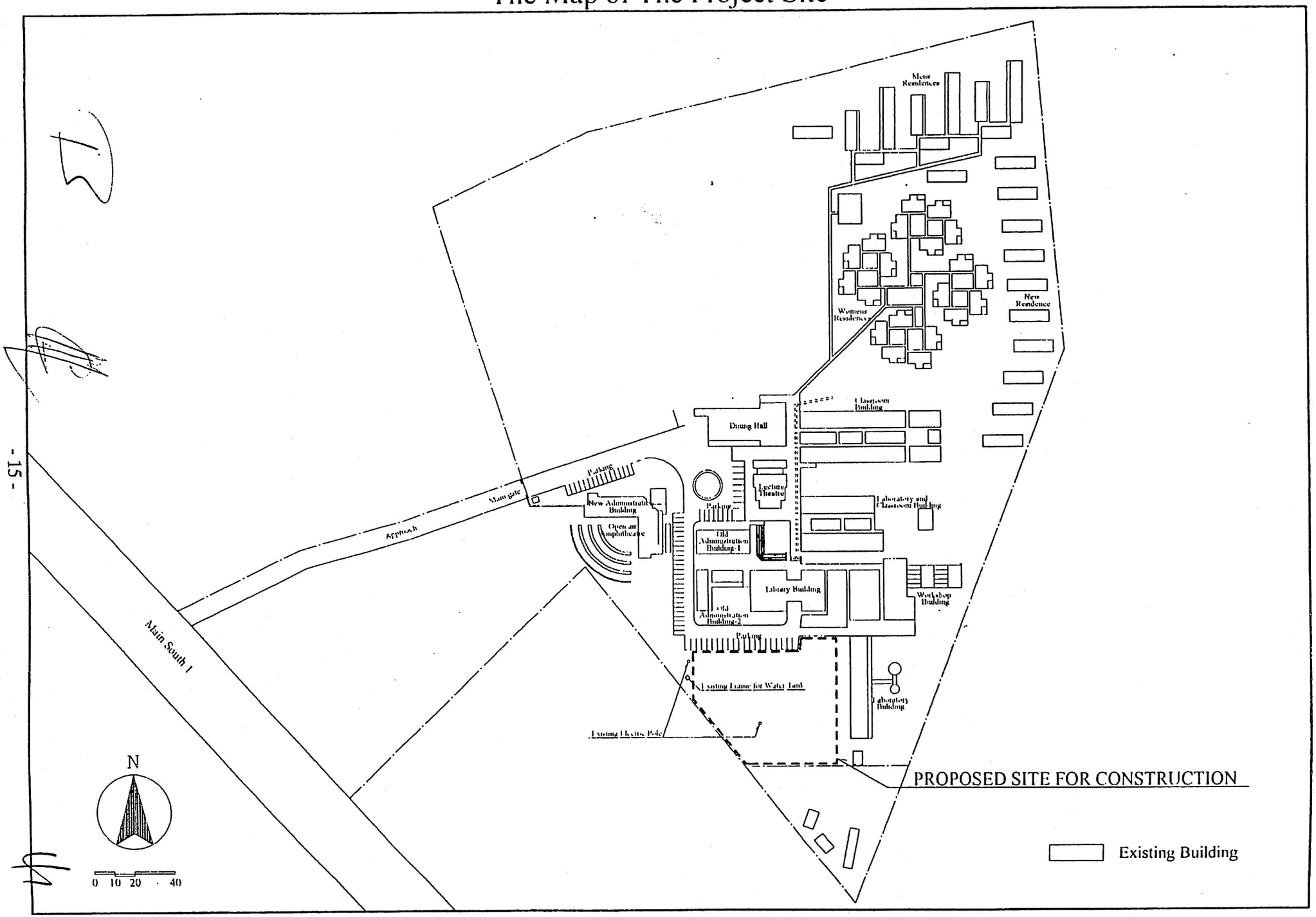
7-12Each equipment should be maintained locally procured or imported easily and cost effectively in Lesotho and South Africa, and its consumable materials must be supplied easily and continuously.

7-13 Each equipment should not need much consumables for operation and experiment.

7-14 Equipment for teaching material production and printing will be included.

7-15 Equipment should be operated and experimented at low cost.

The Map of The Project Site



Note : Dimension and shape of the site, and layout and scale of existing buildings

ANNEX-2

Requested Facility Items for the Project

The contents of the request finally submitted by the Lesotho Government regarding the facilities at Lesotho College of University.

Subjects / Fields	Facilities
1. Computer Studies	- Computer Room - Staff Room - Store Room
2. Home Economics	- Home Economics Workshop - Preparation Room - Staff Room - Store Room
3. Agriculture	- Agriculture Laboratory - Auxiliary Agriculture Laboratory - Preparation Room - Staff Room - Store Room
4. Art & Crafts	- Art & Crafts Workshop - Preparation Room - Staff Room - Store Room
5. Physics	- Laboratory - Preparation Room - Staff Room - Store Room
6. Biology	- Laboratory - Preparation Room - Staff Room - Store Room
7. Chemistry	- Laboratory - Preparation Room - Staff Room - Store Room

Note 1. Both sides confirm that the facility mentioned above includes the related common spaces such as corridors, storage and machine room and the necessary utilities such as electricity, water supply, sewage, gas system and telecommunication etc. The details of such common spaces and utilities will be discussed further between the Japanese and Lesotho side.

2. The size and capacity of the facility will be determined after further studies.

ANNEX - 3

REQUESTED EQUIPMENT FOR THE PROJECT

No.	Description	Q'ty
Computer Studies / Teaching Material Production		
CI- 1	Personal Computer in full set and desk/chair	31
CI- 2	U.P.S. System	1
CI- 3	Printer, Laser (Black)	6
CI- 4	Printer(Color Dot Matrix)	2
CI- 5	Scanner	1
CI- 6	Computer Projector with screen	1
CI- 7	Educational Software	1
CI- 8	Air Condition Unit	1
Printing Equipment for Common Use		
PR- 1	Duplicating Machine including printing block making	1
PR- 2	Book Binder	1
PR- 3	Paper Cutter	1
PR- 4	Photocopy Machine	1
PR- 5	Personal Computer in full set and desk/chair	1
PR- 6	Scanner	1
PR- 7	Digital Camera for Computer	1
Audio Visual Equipment for Common Use		
AV- 1	Slide Projector	2
AV- 2	Overhead Projector	6
AV- 2	Screen, portable	6
AV- 3	TV Monitor with movable stand	2
AV- 4	Video Recorder	2
AV- 5	Video Camera	2
General Science		
GC- 1	Centrifuge	1
GC- 2	Drying Cupboard, Electric	1
GC- 3	Vacuum Pump, Electric	1
GC- 4	Water Distillation	1
GC- 5	Waste water treatment	1
GC- 6	Thermostatic Bath	1
Biology		
BI- 1	Chart, several kinds	1
BI- 2	Dissecting Kit	31
BI- 3	Pin, 10 pc., of different sizes	15
BI- 4	Scalpel Handle with razor blade	15
BI- 5	Biobit	1
BI- 6	Enzyme Module	1

BI- 7	Gene	1
BI- 8	Germination and Grouth	1
BI- 9	Instant Pond	1
BI- 10	Osmiroid Smoker	4
BI- 11	Osmosis and Diffusion	1
BI- 12	Plant Genetics	1
BI- 13	Respirometer	1
BI- 14	Stethoscope	16
BI- 15	LEM Observing and Magnifying Set	9
BI- 16	Microscope Cover Slip (100pcx10 Set)	1
BI- 17	Microscope Kit	9
BI- 18	Microscope, Stereo, Dissecting	16
BI- 19	Microscopes, Light, Electric, for student	31
BI- 20	Microscope, Analytical	3
BI- 21	Prepared Slide, several kinds each 10 pcs.,	1
BI- 22	Plant Anatomy, Various	1
BI- 23	Blood Circulation	1
BI- 24	Brain Model	1
BI- 25	Animal Anatomy, Various	1
BI- 26	Human Model, Various	1
BI- 27	Monocotyledonous Root Section	1
BI- 28	Nephron Model	1
BI- 29	Specimen, several kinds	1
BI- 30	Chemicals	1
BI- 31	Glasswares	1
BI- 32	Refrigerator	1

Chemistry

CH- 1	Borer Set	2
CH- 2	Connector, Y and T Shape, inner dia., 6mm	1
CH- 3	Cork Borer, Machine	1
CH- 4	Cutter Glass Diamond	3
CH- 5	Glass-Working Tool, 45 cutting wheel	1
CH- 6	Mohr Clip	1
CH- 7	Periodic Table	1
CH- 8	Stopper,, 12, 16,18,20mm, each 100 pcs.,	1
CH- 9	Test Tube Rack, wood	60
CH- 10	Beehive Shelf	8
CH- 11	Bunsen Burner, Big	31
CH- 12	Clay Cylinders, Various	15
CH- 13	Crucible Tong	16
CH- 14	Crucible with Lid	16
CH- 15	Deflagrating Spoon	15
CH- 16	Electrodes, Various	1
CH- 17	Evaporating Dish, 100ml and 200ml	16
CH- 18	Goggle	31
CH- 19	Mortar, 100mm and 130mm	16
CH- 20	Orbit Molecular Building System, BAS and ORG	15
CH- 21	Orbital Models	1

CH- 22	Pestle, Big and Small	16
CH- 23	pH Meter with electrode	16
CH- 24	Pipe Clay Triangle	30
CH- 25	Platinum Electrode	1
CH- 26	Retort Stand with ring, cramp etc.,	31
CH- 27	Spatula, stainless	31
CH- 28	Tripod Stand	31
CH- 29	Draft Chamber	1
CH- 30	Refrigerator	1
CH- 31	Chemicals etc.,	1
CH- 32	Glasswares	1

Physics

PH- 1	Electric Blower, for Air Track with inertia balance	1
PH- 2	Linear Air Track with accessories	1
PH- 3	Ticker Timer with tape	8
PH- 4	Ammeter, AC,DC	16
PH- 5	Capacitor, Pair of Plates	1
PH- 6	Cathode Ray Tube	3
PH- 7	Circuit Board, Large and Small with Accessories	8
PH- 8	Galvanometer, Center Zero	9
PH- 9	Multimeter, Digital	9
PH- 10	Power Supply, AC, DC, 0-12V	9
PH- 11	Power Supply, High Tension, 5kV	1
PH- 12	Resistors	9
PH- 13	Rheostat	1
PH- 14	Solar Panel, Electric	1
PH- 15	Voltmeter, AC,DC	9
PH- 16	Bell, Electric	3
PH- 17	Coil, several kinds	1
PH- 18	Electromagnetic Kit	1
PH- 19	Generator, AC, DC	1
PH- 20	Motor and Gear Kit	1
PH- 21	Motor Model	1
PH- 22	Solenoid on Perspex	1
PH- 23	Wire, Straight, on Perspex	1
PH- 24	Magnet, several kinds	8
PH- 25	Balance, Analytic, Digital	2
PH- 26	Balance, Double Beam, Dial-0-Gram	4
PH- 27	Balance, Triple Beam, 610g (2610g)	4
PH- 28	Bimetallic Strip, Small	8
PH- 29	Blocks and Cylinders, Various	1
PH- 30	Displacement Can, Metal	8
PH- 31	Forcemeter, several kinds, 10N, 20N an 50N in set	8
PH- 32	Mass, Slotted for Hanger, 100g	8
PH- 33	Oscilloscope, CRO	2
PH- 34	Scaler-Timer Digital	1
PH- 35	Stop Clock, Hand, Digital	31
PH- 36	Thermometer, Alcohol, -10 to 110C	16

PH- 37	Thermometer, Min/Max	1
PH- 38	Geiger-Mueller Tube and Counter + Radioactive Source	1
PH- 39	Binocular, 7x50	1
PH- 40	Light Box, 12V, Halogen	8
PH- 41	Optical Bench Set and Accessories	1
PH- 42	Pinhole Camera Kit	8
PH- 43	Barometer, Aneroid	1
PH- 44	Bourdon Gauge	1
PH- 45	Liquid Level App., Mounted	1
PH- 46	Manometer, Water, Long and Short	1
PH- 47	Pump Fitter Suction	1
PH- 48	Pump Model, Force	1
PH- 49	Pump, Two Way	1
PH- 50	Rubber Suckers	8
PH- 51	Sensor, Liquid Pressure	1
PH- 52	Pulley Set	8
PH- 53	Wheels and Gears Assorted	1
PH- 54	Electrostatic Kit and Accessories	8
PH- 55	Van De Graf Generator, Manual with accessories	1
PH- 56	Ball and Ring App.	8
PH- 57	Bar Breaking App.	1
PH- 58	Boyles Law App.	1
PH- 59	Convection in Gas Model	1
PH- 60	Expansivity Apparatus	1
PH- 61	Immersion Set	8
PH- 62	Joulemeter Block Set	8
PH- 63	Joulemeter Digital	1
PH- 64	Calorimeter	8
PH- 65	Kinetic Theory Model, Electric	1
PH- 66	Smoke Cell	8
PH- 67	Steam Engine, Wilesco	1
PH- 68	Thermocouple	1
PH- 69	Loudspeaker	2
PH- 70	Microphone	2
PH- 71	Ripple Tank with accessories	1
PH- 72	Signal Generator	2
PH- 73	Spring, several kinds	8
PH- 74	Stroboscope	1
PH- 75	Turing Fork, 10 pcs.,	1
PH- 76	Refigerator	1
PH- 77	Chemical & Probes etc.,	2

Agriculture

AG- 1	Bunsen Burner	17
AG- 2	Tensiometer	9
AG- 3	pH Meter	9
AG- 4	Digital Balance, 0.g, 200g	2
AG- 5	Thermometer	30
AG- 6	Dry Wet Bulb Thermometer	9

AG- 7	Maximum and Minimum Thermometer	1
AG- 8	Medium Oven Dryer, 1g, 1000g	1
AG- 9	Electrical Scale, 1 g graduation upt o 1000g	9
AG- 10	Soil Auger	4
AG- 11	Electrical Hot Plate	1
AG- 12	Tripod Stand	17
AG- 13	Retort Stand	17
AG- 14	Binocular Microscope	8
AG- 15	Student Microscope	8
AG- 16	Analytical Microscope	3
AG- 17	Dissecting Kit	17
AG- 18	Hand Lens	31
AG- 19	Four Stroke Engine Model	1
AG- 20	Two Stroke Engine Model	1
AG- 21	Auxanometer	1
AG- 22	Slide, Transverse Section, several kinds, each 10 pcs.,	1
AG- 23	Plant Preservation Presser	1
AG- 24	Burdizzo	1
AG- 25	Egg-Candler	1
AG- 26	Incubator	1
AG- 27	Model for Ruminant, Non Ruminant and Birds, several kinds 1	1
AG- 28	Lactometer	1
AG- 29	Shaker	1
AG- 30	Soil Analysis Kit	1
AG- 31	Aquarium Set, 1m x 80cm	1
AG- 32	Refrigerator	1
AG- 33	Chemicals etc.,	1
AG- 34	Glasswares	1

Home Economics

HE- 1	Sewing Machine, Foot Operated	10
HE- 2	Sewing Machine, Treadle	2
HE- 3	Sewing Machine, Electric	4
HE 4	Sewing Machine, Multi-type	4
HE 5	Sewing Machine, Straight Stitch	2
HE 6	Sewing Machine, Buttonhole	2
HE- 7	Steam Electric Iron with Iron board	4
HE- 8	Pinking Shear	9
HE- 9	Buttonhole Scissor	31
HE- 10	Dressmaker's Scissor	31
HE- 11	Paper Cutting Scissor	31
HE- 12	Dressmaker's Full Length Mirror	1
HE- 13	Table Top Gas Burner	2
HE- 14	Stove, Gas & Electric	8
HE- 15	Microwave Conventional / Microwave Oven	1
HE- 16	Refrigerator	1
HE- 17	Deep Freezer	1
HE- 18	Kitchen Scale	9
HE- 19	Saucepan	9

HE- 20	Frying Pan	9
HE- 21	Chopping Board	17
HE- 22	Rolling	9
HE- 23	Stainless Round Bowl, Large and Middle	9
HE- 24	Measuring Spoon	9
HE- 25	Measuring Cup	9
HE- 26	Basting Spoon	9
HE- 27	Knife Sharpner	2
HE- 28	Bread Knife	2
HE- 29	Vegetable Knife	31
HE- 30	Kitchen Knife	31
HE- 31	Potato Peeler	9
HE- 32	Egg Beater	9
HE- 33	Tin Set, 8 kinds	9
HE- 34	Putting Steamer	9
HE- 35	Biscuit Cutter	9
HE- 36	Pot Stainless for coffee or tea	9
HE- 37	Potato Masher	9
HE- 38	Sieve	9
HE- 39	Colander	9
HE- 40	Pressure Cooker	4
HE- 41	Basket, stainless	9
HE- 42	Trolley	2
HE- 43	Reflective Mirror	1
HE- 44	Dish Rack	4

Art and Craft

AC- 1	Modeling Board	1
AC- 2	Apron for protection	35
AC- 3	Drawing & Painting Kit, several kinds	35
AC- 4	Kiln(Gas)	1
AC- 5	Potters Wheel (foot type and electric type each half)	6
AC- 6	Crafting Kit, several kinds	35
AC- 7	Crafting Equipment, several kinds	35
AC- 8	Pug Milling Machine	1
AC- 9	Drawing Canvas	2
AC- 10	Cutter	35
AC- 11	Cutting Board	35
AC- 12	Chemicals etc.,	1

ANNEX 4

Japan's Grant Aid System

1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

- Application (A request made by the recipient country)
- Study (Basic Design Study conducted by JICA)
- Appraisal &Approval
  (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- Determination of Implementation
  (Exchange of Notes between the Government of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study Report prepared by JICA, and the results are then submitted to the Cabinet for an approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and recipient country.

Finally, for the implementation of the project, JICA will assists the recipient country in such matters as preparing tenders, contract and so on.

2. Basic Design Study

1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows :

a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
d) Preparation of a basic design of the Project.
e) Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA select (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3.Japan's Grant Aid Scheme

1) Grant Aid

The Grant Aid Programme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and

transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) Period

"The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Purchase of the Products and or Services

Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely, consulting constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5)Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of the Recipient Country
(As described in Annex-6)

7) Proper Use
The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

8) Re-export
The products purchased under the Grant Aid should not be re-exported from the recipient country.

9) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

ANNEX 5 Major Undertakings for Construction of the Block to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The gas supply to the facility		●
	b.The gas supply system within the facility	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	

10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

ANNEX 6 Major Undertakings for Educational Equipments to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		●

Minutes of Discussions
on
the Basic Design Study
on
the Project for Infrastructural Support and Educational Equipment to National Teacher Training College in Maseru in the Kingdom of Lesotho
(EXPLANATION ON DRAFT REPORT)

In July 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Infrastructural Support and educational Equipment to National Teacher Training College in Maseru (hereinafter referred to as "the Project") to the Kingdom of Lesotho (hereinafter referred to as "Lesotho"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the Study.

In order to explain and to consult with the Lesotho on the components of the draft report, JICA sent to Lesotho the Draft Report Explanation Team (hereinafter referred to as " the Team "), which is headed by Mr. Toshio MURATA, Development Specialist, Institute for International Cooperation, JICA, from July 19 to July 31, 2000.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Maseru, July 26, 2000

Mr. Toshio MURATA
Leader
Draft Report Explanation Team
Japan International Cooperation Agency

Mr. C. MOSHAPANE
Deputy Principal Secretary
Ministry of Education

Witness

Mr.C.M.MOHAPI
Principal Economic Planner
Ministry of Development Planning

ATTACHMENT

1. Components of the Draft Report

The Lesotho side agreed and accepted in principle the components of the draft report explained by the team.

2. Contents of the Project

Both of the Japan and the Lesotho sides have confirmed the requested contents of the Laboratory and Workshop Building, and educational items, which will be constructed or procured under the Japanese Grant Aid attached as Annex- Ⅰ, -Ⅱ and -Ⅲ.

3. Responsible and Implementing Agency on the project

3-1 The responsible agency is the Ministry of Education

3-2 The implementing agency is the National Teacher Training College(N.T.T.C.)

4. Japan's Grant Aid scheme

The Lesotho side understands the Japan's Grant Aid Scheme as explained by the team and described in Annex- 4 of the Minutes of Discussions signed by both parties on April 19, 2000.

5. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the Lesotho side by November, 2000.

6. Other relevant issues

6-1 The Lesotho side agreed to complete the implementation of the major undertaking for Laboratory and Workshop Building, and Educational Equipment, as explained by the team and described in Annex- 5 and - 6 of the Minutes of Discussions signed by both parties on April 19, 2000.

6-2The Lesotho side agreed to complete the implementation of the following undertakings until the end of March, 2001, when the construction will commence.

6-2-1) Relocation of the existing electric cable and poles from existing place to suitable places,

6-2-2) Leveling of ground in the site for construction

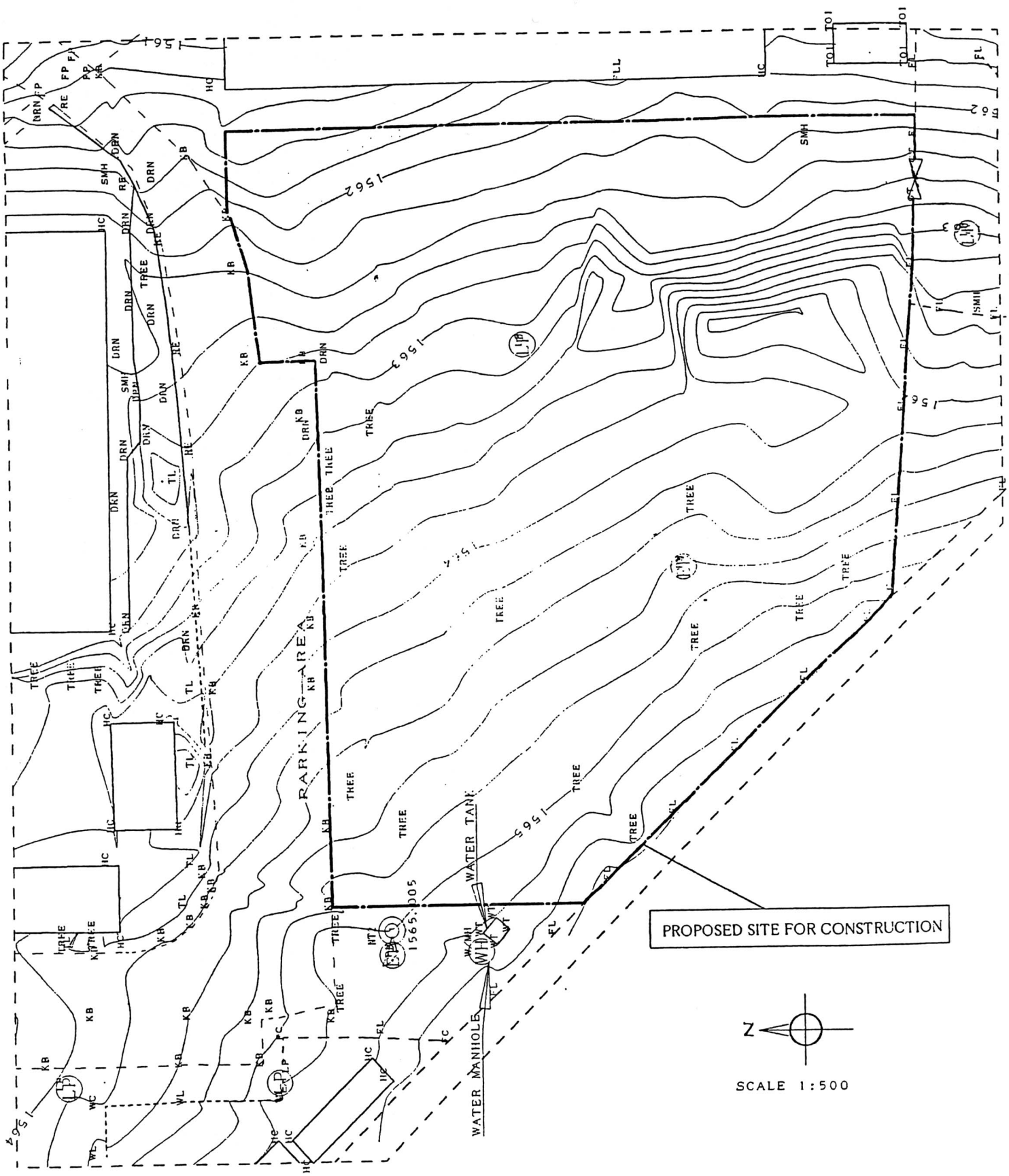
6-3 The Lesotho side agreed to provide the site for construction with necessary facilities and utilities such as distribution of electricity, water supply, drainage, telephone line at the adequate time during construction work.

6-4 The Lesotho side agreed to take any measures for customs clearance, exemption of internal tax, import tax and other fiscal levies as explained by the team and described in Annex- 5 and -6 of the Minutes of Discussions signed by both parties on April 19, 2000.

6-5 The Lesotho side agreed to allocate appropriate budget and teaching staff to ensure proper and effective operation and maintenance of the facility and equipment provided under the project.

6-6 Both the Japan and Lesotho sides confirmed that the site for construction as described in Annex 1 has been secured for the project and the boundary line of the site has been clarified.

ANNEX- I



Note : This Project Site Map is based on the topographic survey in May 2000.

ANNEX- II

Requested Facility Items for the Project

Subjects / Fields	Components of Facilities
1. Computer Studies	- Computer Room - Staff & Preparation Room - Store Room
2. Home Economics	- Cooking Workshop - Sewing Workshop - Staff & Preparation Room - Store Room
3. Agriculture	- Laboratory (1) - Laboratory (2) - Staff & Preparation Room - Store Room
4. Art & Crafts	- Art Room - Craft Workshop - Staff & Preparation Room - Store Room
5. Physics	- Laboratory - Staff & Preparation Room - Store Room
6. Biology	- Laboratory - Staff & Preparation Room - Store Room
7. Chemistry	- Laboratory - Staff & Preparation Room - Store Room
8. Others	- Teaching Material Production Rm. - Machine Room

Note 1. Both sides confirm that the facility mentioned above includes the related common spaces such as corridors, stairs and storage and the necessary utilities such as electricity, water supply, sewage, and telecommunication etc.

2. The size and capacity of the facility will be determined after further studies.

ANNEX-III

No.	Description	Q'ty
Computer Studies		
CI- 1	Personal computer with desk & chair	31
CI- 2	U.P.S. system	1
CI- 3	Printer, laser with table	2
CI- 4	Scanner with table	1
CI- 5	Computer projector	1
CI- 6	Local network and network soft	1
CI- 7	Educational software	1
Printing Equipment for Common Use		
PR- 1	Printing machine	1
PR- 2	Book binder	1
PR- 3	Paper cutter	1
PR- 4	Photocopy machine	1
PR- 5	Personal computer with desk & chair	1
PR- 6	Printer with table	1
PR- 7	Scanner	1
PR- 8	Digital camera for computer	1
General Science		
GC- 1	Water distillation	1
GC- 2	Waste water treatment	1
GC- 3	Chemicals	1
GC- 4	Glasswares	1
Biology		
BI- 1	Stereoscopic microscope	30
BI- 2	Microscope for student	15
BI- 3	Analytical microscope	2
BI- 4	Microscope with camera	1
BI- 5	Dissecting kit	30
BI- 6	Dissecting tray set	8
BI- 7	Simple microtome	8
BI- 8	Magnifier	8
BI- 9	Paraffin specimen apparatus	1
BI- 10	Slide preparation kit	1
BI- 11	Dyeing tray	1
BI- 12	Desicator with vacuum pump	3
BI- 13	Colony counter	8
BI- 14	Models, several kinds	1
BI- 15	Specimen, several kinds	1
BI- 16	Prepared slide, several kinds	1
BI- 17	RNA protein synthesis kit	1
BI- 18	DNA molecular kit	1
BI- 19	Incubator	1
BI- 20	Sterilizer	1
BI- 21	Sterie box	1
BI- 22	Mixer	1
BI- 23	Water bath	1
BI- 24	Stopwatch	15
BI- 25	Thermometer, mercury and alchol types	8
BI- 26	Min-max thermometer	2
BI- 27	Hygrometer	2
BI- 28	pH Meter with electrode	8
BI- 29	Micrometer	8
BI- 30	Aneroid barometer	1
BI- 31	Hydrometer	1

No.	Description	Q'ty
BI- 32	DO meter	1
BI- 33	Soil analyzer kit	8
BI- 34	Refrigerator	1
BI- 35	Photoelectric colorimeter	1
BI- 36	Experimental tools	1
Chemistry		
CH- 1	Hoffman apparatus	1
CH- 2	Water colorimeter	1
CH- 3	Gas generator	8
CH- 4	Eudiometer	1
CH- 5	Electrophoresis apparatus	1
CH- 6	Electriciity generation kit	8
CH- 7	Osmotic pressure apparatus	1
CH- 8	Molecular apparatus	1
CH- 9	Soxhlet extractor	8
CH- 10	Liebig condenser	8
CH- 11	pH Meter with electrode	8
CH- 12	Conductivity meter	8
CH- 13	DO meter	1
CH- 14	Polari-sacchari meter	1
CH- 15	Colorimeter	1
CH- 16	Salinometer	1
CH- 17	Magnetic stirrer	8
CH- 18	Autoclave	1
CH- 19	Centrifuge	1
CH- 20	Thermostatic water bath	1
CH- 21	Drying oven	1
CH- 22	Hot plate	1
CH- 23	Cork borer machine	1
CH- 24	Glass working tool	2
CH- 25	Thermometer, mercury and alchol types	8
CH- 26	Stopwatch	8
CH- 27	Balance	2
CH- 28	Analytical nalance	1
CH- 29	Molecular structure model	1
CH- 30	Refrigerator	1
CH- 31	Experimental tools	1
Physics		
Motion & Force		
PH- 1	Lever and inclined experimental app.,	1
PH- 2	Wheel & axle	1
PH- 3	Pulley set	8
PH- 4	Spring balance set	8
PH- 5	Recording timer with tape	8
PH- 6	Dynamics rail and cart	1
PH- 7	Linear air track with accessories	1
PH- 8	Inertia experimental apparatus	1
PH- 9	Rotary table with accessories	1
PH- 10	Gyroscope	1
PH- 11	Spiral spring	8
PH- 12	Stopwatch	15
Wave and Vibration		
PH- 13	Ripple tank	1
PH- 14	Standing wave experimental app.,	1
PH- 15	Pendulum set	8

No.	Description	Q'ty
Liquid		
PH- 16	Pascal's principle apparatus	1
PH- 17	Water pressure apparatus	8
PH- 18	Hydrometer	1
Gas		
PH- 19	Mardeburg h]emisphrers	1
PH- 20	Vacuum experimental apparatus	1
PH- 21	Mercury manometer	1
PH- 22	Vacuum pump	1
PH- 23	Boyle's & charles' law app.,	1
Heat		
PH- 24	Water colorimeter	1
PH- 25	Linear expansion apparatus	1
PH- 26	Solid expansion apparatus	1
PH- 27	Min-max thermometer	2
PH- 28	Thermometer, mercury and alchol types	8
Light		
PH- 29	He Ne laser	1
PH- 30	Optical apparatus	4
PH- 31	Optical set	1
PH- 32	Young's experimental set	1
PH- 33	Lux meter	1
PH- 34	Spectroscope, direct vision	1
PH- 35	Grating	2
PH- 36	Polarizing plate	2
Sound		
PH- 37	Tuning fork set	1
PH- 38	Resonant column apparatus	1
PH- 39	Audio amplifier	1
Magnetic		
PH- 40	Magnetic set	8
PH- 41	Magnetizing coil	1
PH- 42	Compass	8
PH- 43	Gauss meter	1
Static Electricity		
PH- 44	Electrostatic apparatus	1
PH- 45	Leyden jaar	1
PH- 46	Parallel plate condenser app.,	1
PH- 47	Electrostatic generator	1
Electric Current		
PH- 48	Hand generator set	8
PH- 49	Circuit experimental apparatus	1
PH- 50	Rheostat	8
PH- 51	Resistor	8
PH- 52	Ohm's law experimental app.,	1
PH- 53	Voltage-current apparatus	1
PH- 54	Fleming's law apparatus	2
PH- 55	Motor set	8
PH- 56	Coil set	2
PH- 57	Variable autotransformer	2
Electriciity		
PH- 58	Voltmeter, AC,DC	8
PH- 59	Ammeter, AC,DC	8
PH- 60	Galvanometer	8
PH- 61	Electricity kit	8

No.	Description	Q'ty
PH- 62	Oscilloscope	2
PH- 63	Circuit tester	8
PH- 64	Multimeter, digital	8
PH- 65	Function generator	1
PH- 66	Frequency counter	1
PH- 67	LCR meter	2
PH- 68	Lead & wire sets, 10 pcs.,	15
Electron		
PH- 69	e/m measuring apparatus	1
PH- 70	Milikan apparatus	1
PH- 71	Photoelectric effect apparatus	1
PH- 72	Radiation detector	1
Electric Power		
PH- 73	Electric power supply	8
PH- 74	Voltaic cell	8
Measuring Instrument		
PH- 75	Balance, analytical	2
PH- 76	Balance, double beam	4
PH- 77	Vernier caliper	8
Agriculture		
Plant		
AG- 1	Conductivity meter	8
AG- 2	Hydrometer	8
AG- 3	Fertilizer densitometer	8
AG- 4	Lux meter	8
AG- 5	Digital balance	4
AG- 6	Thermometer,mercury and alchol types	8
AG- 7	Hygrometer	8
AG- 8	Max-mini thermometer	1
AG- 9	Barometer	1
AG- 10	Anemometer	1
AG- 11	Rain gauge	1
AG- 12	Soil thermometer	8
AG- 13	Electrical scale	8
AG- 14	Soil auger	8
AG- 15	Soil pH meter	8
AG- 16	Soil humidity meter	8
AG- 17	Soil sieves set	1
AG- 18	Soil analysis kit	8
AG- 19	Soilless culture set	2
AG- 20	Green house indoor use	1
AG- 21	Plant models, several kinds	1
Animal		
AG- 22	Lactometer	2
AG- 25	Animal models, several kinds	1
Common use		
AG- 26	pH Meter	8
AG- 27	Centrifuge	1
AG- 28	Stereoscopic microscope	15
AG- 29	Microscope for student	8
AG- 30	Analytical microscope	2
AG- 31	Dissecting kit	15
AG- 32	Dissecting tray set	8
AG- 33	Simple microtome	4
AG- 34	Colony counter	8

No.	Description	Q'ty
AG- 35	Dyeing tray	4
AG- 36	Desicator, vacuum type	3
AG- 37	Vacuum pump	1
AG- 38	Electrical hot plate	1
AG- 39	Incubator	1
AG- 40	Drying oven	1
AG- 41	Paraffin specimen apparatus	1
AG- 42	Slide preparation kit	1
AG- 43	Magnifier	8
AG- 44	Photoelectric colorimeter	1
AG- 45	Ion distollatory apparatus	1
AG- 46	Refrigerator	1
AG- 47	Chemicals etc.,	1
AG- 48	Glasswares	1
AG- 49	Experimental tools	1
Home Economics		
Sewing Workshop		
HE- 1	Sewing machine, foot operated	5
HE- 2	Sewing machine, electric, straight	2
HE- 3	Sewing machine, multi-type	2
HE- 4	Sewing machine, straight stitch	2
HE- 5	Steam electric iron	4
HE- 6	Shear, 4 kinds	30
HE- 7	Dressmaker's full length mirror	1
Cooking workshop		
HE- 8	Table top gas burner	2
HE- 9	Stove, gas with oven	7
HE- 10	Stove electric oven	2
HE- 11	Microwave oven	1
HE- 12	Refrigerator	1
HE- 13	Deep freezer	1
HE- 14	Kitchen set	9
HE- 15	Cooking set	9
HE- 16	Pudding steamer	9
HE- 17	Pressure cooker	4
HE- 18	Trolley	2
HE- 19	Reflective mirror	1
HE- 20	Dish rack	4
Art and Craft		
AC- 1	Display board	2
AC- 2	Model, 7 kinds	1
AC- 3	Color samples	1
AC- 4	Easel and board	15
AC- 5	Cutting set	15
AC- 6	Chemicals etc.,	1
AC- 7	Apron for protection with grobe	31
AC- 8	Kiln with temperature control	1
AC- 9	Potters wheel electric type	6
AC- 10	Potters wheel , foot operated	2
AC- 11	Crafting tools	15
AC- 12	Crafting accessories	1
AC- 13	Pug milling machine	1

Extent of Works (DRAFT)

Portions by the Japanese Side	Portions by the Lesotho Side	Rough Cost Estimation (Rand)
(1) Building Works Structure works, finishing works (2) Electrical Works Power trunk facilities, lighting, power outlets, P/A systems (3) Utilities and Facilities a) Water Supply Construction works for the Water supply from the valve at the water supply meter to the building and all the related internal works for the water supply. b) Sewerage system including piping works up to the connection manhole c) Sanitation facilities (waste water treatment facility) d) Elevated tank and reserve tank e) Fire-extinguishing facilities f) Electrical Cabling works g) Generator Works h) Telecommunications system Cabling works from MDF/PABX to the facilities, and installation of conduit from the site border line to MDF. i) Lightning Protection System j) External Lighting system in the site (4) Exterior Work Road, path and parking lots within the site (5) Equipment Equipment for the Project (6) Electric Room, Electric Generator Room, Pump Room (7) Incinerator	(1) Site Preparation a) Ground preparation including the clearance and leveling of the land, demolition of existing facilities and repair of the existing fence. b) Temporary power and water supply for construction (2) External Works and Approach Roads Landscaping, planting, and fence, etc within the Site. (3) Utilities and Facilities for New Buildings a) Water Supply Construction from the main feeder to the water valve at the water supply meter including the water supply meter. b) Sewerage Piping works from the connection manhole at the site to the existing sewerage line including the repair work of the existing ditch. c) Storm Drainage Drainage line from the site to the existing line including the expansion work of the existing drainage line. d) Electrical Work Cabling works from the existing power supply point to the new Electrical room in the new Building. Relocation work of the existing electrical cable and poles in the site to suitable locations (using underground cable). e) Telecommunication Work Cabling works (for Direct/Extension) from the MDF/PABX in the existing Administration building to Point Distribution in the new building. f) The provision of gas (LPG) cylinders for the Lab.	(1) Site Preparation a) — b) — (2) External Works and Approach Roads R 30,000.00 (3) Utilities and Facilities a) R 30,829.31 b) R 30,836.10 c) — d) R 148,254.00 (Connection Charge R 32,000) (Consumer Deposit R 100) e) R 5,252.14 f) R 170.00

Portions by the Japanese Side	Portions by the Lesotho Side	Rough Cost Estimation (Rand)
	(4) Others a) Governmental works including the application for and obtaining of Governmental approvals and permissions b) Smooth custom clearance, tax exemptions and prompt internal transportation for the imported construction materials and equipment c) Commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement namely the advising commission of the " Authorization to Pay" and payment commission (5) Tax exemptions and necessary preferential treatment for the construction staff from Japan or other countries (6) Smooth entry , re-entry and departure to/from Lesotho for the Japanese technical staff (7) Installation of General Furniture (8) Management, operation and maintenance cost for the new building and facilities (9) All the expenses, other than to be borne by Japan' s Grant Aid within the scope of the Project	(4) Others a) (0.5% of Construction Cost) b) c) (5) (6) (7) (8) (9)

① Enrolment Performance in Primary Education

Form 1 Enrolment in Primary School by Age and Standard of March in the year

Year / Age	Standard 1	Standard 2	Standard 3	Standard 4	Standard 5	Standard 6	Standard 7	Number of pupils
< 6	695							695
6	9,323	573						9,896
7	20,507	4,690	318					25,515
8	17,798	12,335	2,963	161				33,257
9	10,438	14,925	8,492	2,210	233			36,298
10	5,310	11,986	11,622	5,891	1,662	141		36,612
11	2,703	8,284	11,876	10,330	4,553	1,538	207	39,491
12	1,361	4,555	8,550	9,748	7,397	4,061	1,454	37,126
13	742	2,717	6,058	9,153	8,716	6,820	3,821	38,027
14	411	1,478	3,942	7,125	8,409	8,006	6,171	35,542
15	188	792	2,247	4,604	6,456	7,328	7,564	29,177
16	190	320	1,156	2,639	4,229	5,582	6,920	21,036
17		304	585	1,411	2,526	3,735	5,738	14,299
18			337	545	1,110	1,845	3,246	7,083
19				343	481	891	1,799	3,514
20					250	342	772	1,364
> 20						174	409	583
計	69,666	62,959	58,146	54,160	46,022	40,463	38,099	369,515
* Population of school age	59,203	58,618	57,940	57,147	56,229	55,218	54,107	398,462
** Percentage of appropriate age pupils	15.7%	8.0%	5.1%	3.9%	3.0%	2.8%	2.7%	*** **5.98 %**
**** Net enrolment rate								**54.75 %**

Source: Education Statistics of MOE 1998

Note: Ages for each standard were truncated at the high end, e.g., the age 16 for Standard 1 includes all those 16 and over.

*Appropriate age for Primary Education means from 6 years old up to 12 years old.

** Rate of pupils who study in the appropriate standard, e.g.,

15.74 % (Appropriate enrolment rate for standard 1) =

9,323（Pupils of age 6 ）÷ 59,203 (Population of school enrolment age)×100

*** Appropriate gross enrolment rate in whole country

5.98 % = 23,840 (Total of pupils who studies in appropriate standard from standard 1 through 7 ）

÷398,462 (Population of appropriate school age)×100

****Net enrolment rate (%) =

Pupils of appropriate age 218,195 ÷ Population of school age 398,462 ×100

②Drop-out Rates in Primary Schools

Form2 Drop-out rates in Primary Schools by grade and sex from the year 1988 to 1997（%）

Standard	1		2		3		4		5		6		7	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1992	14.1	11.9	7.8	6.2	9.6	6.2	10.9	6.7	11.9	9.0	12.6	9.9	5.4	3.7
1993	9.7	7.6	2.1	- 0.2	4.9	0.2	6.6	2.9	7.9	4.1	8.9	6.4	- 1.6	2.3
1994	10.1	7.9	3.1	1.1	5.3	1.8	8.6	3.8	9.3	5.0	9.0	5.2	1.9	- 1.9
1995	13.7	10.6	7.8	4.2	8.8	5.1	10.9	6.5	11.3	7.1	10.5	10.0	11.2	7.2
1996	10.7	9.1	6.0	3.6	6.9	4.7	9.6	5.6	9.7	6.7	10.7	8.8	5.3	7.6
1997	8.7	5.5	6.2	1.8	6.7	3.5	8.6	5.5	8.2	3.8	11.3	7.9	6.8	6.4

Source: Education Statistics of MOE 1998

③Performance for Primary School (Primary School Leaving Examination）

Form3 Standard 7 PSLE Examination Results for the Period 1992 to 1998

Year	Enrolment in Std. 7	Number of Candidates	Pass Total	Number of Failures	Percent Passing	Percent of Enrolment Passing
1992	31,647	30,387	26,623	3,764	87.6%	84.1%
1993	31,776	30,776	29,034	1,742	94.3%	91.4%
1994	32,532	31,396	27,042	4,354	86.1%	83.1%
1995	35,798	35,018	25,157	9,875	71.8%	70.3%
1996	39,271	38,216	30,280	7,936	79.2%	77.1%
1997	38,418	36,885	28,630	8,255	77.6%	74.5%
1998	38,099	37,607	27,802	9,805	73.9%	73.0%

Source: Education Statistic of MOE 1998

④ Conditions of Schools, Classrooms, Pupils and Teachers in Primary Education

Form 4 Number of Primary Schools, Classrooms, Pupils and Teachers

Year	Schools	Classrooms	Total number of Pupils	*Qualified Teachers	Qualified teacher ： Pupils Ratio
1992	1,201	4,139	362,657	5,573	1 : 65
1993	1,209	4,312	354,275	5,688	1 : 62
1994	1,232	4,464	366,569	5,702	1 : 64
1995	1,240	4,869	378,011	5,919	1 : 64
1996	1,249	4,947	374,628	5,861	1 : 64
1997	1,259	5,179	368,895	6,272	1 : 59
1998	1,264	5,377	369,515	6,385	1 : 58

Source: Education Statistics of MOE 1998, Census of GOL 1996

Note: * Unqualified teachers, in short, teachers without certificate are not included here.

Form 5 Class Size Distribution in Primary Schools for the Period 1994 to 1998

Class Size	< 15	15-24	25-34	35-44	45-54	55-64	65-74	75-99	100-149	150	Total	Average Class Size
1994	191	552	970	1,438	1,479	1,113	661	707	194	11	7,316	50.1
1995	190	577	1,051	1,469	1,520	1,250	716	734	207	12	7,726	48.9
1996	190	567	1,100	1,582	1,735	1,110	619	607	165	10	7,685	48.7
1997	214	639	1,295	1,809	1,585	1,085	591	495	140	16	7,869	46.9
1998	224	662	1,331	1,821	1,598	1,101	604	477	130	8	7,956	46.4

Source: Education Statistics of MOE 1998

⑤ Teachers in Primary Education

Form 6 Number of Qualified and Unqualified Teachers

Year	Qualified Teachers	(%)	Unqualified Teachers	Total number of Teachers
1992	5,573	79.0	1,478	7,050
1993	5,688	78.0	1,604	7,292
1994	5,702	76.8	1,726	7,428
1995	5,919	74.7	2,004	7,923
1996	5,861	74.2	2,037	7,898
1997	6,272	77.5	1,817	8,089
1998	6,385	78.2	1,785	8,170

Source: Education Statistics of MOE 1998

⑥ Enrolment in Secondary Schools

Form 7 Enrolment in Secondary Schools by Grade for the Period 1990 to 1998

Year	Number of Enrolment M	F	Total	Population of school age (13～17 of age)	*Net Enrolment Rate
1990	18,630	27,671	46,301	191,928	-
1992	21,106	30,789	51,895	199,841	-
1994	25,020	36,595	61,615	208,081	-
1996	27,742	39,712	67,454	216,661	32.0 %
1998	29,540	41,692	71,232	254,313	30.0 %

Source: Education Statistics of MOE 1998

Note: * Percentage of student of appropriate age in secondary schools

Form 8 Enrolment in Secondary Schools by Age for the Period 1989 to 1998

Age	1990	1992	1994	1996	1997	1998
< 12	21	341	43	78	40	19
12	266	997	339	680	226	125
13	1,580	2,843	1,629	2,500	1,107	740
14	3,456	5,280	4,557	6,201	3,192	2,736
15	6,423	7,868	7,881	8,613	6,844	6,177
16	8,256	9,089	10,134	11,412	11,000	10,127
17	8,475	8,513	10,680	11,949	11,758	12,044
18	7,487	6,857	9,511	10,033	11,795	11,851
19	4,523	4,615	7,256	6,858	9,864	10,035
20	3,058	2,673	4,676	4,416	6,872	7,370
21	1,388	1,417	2,404	2,337	4,417	4,673
22	784	670	1,200	1,048	2,201	2,660
23	294	319	658	497	1,111	1,322
24	161	176	284	381	504	597
> 24	201	237	363	451	814	756
Total	46301	51,895	61,615	67,454	71,475	71,232

Source: Education Statistics of MOE 1998

⑦ Performance for Secondary Education （Junior Certificate)

Form 9 Junior Certificate Examination Results for the Period 1990 to 1998

Year	*Number of Candidates	Total Passed	Number Failed	Percent Who Sat Passed	** Percent Form A Intake
1990	7,462	4,421	3,041	59.2%	27.7%
1992	7,935	4,485	3,450	56.5%	27.0%
1994	10,593	6,536	4,057	61.7%	35.2%
1996	11,732	8,436	3,296	71.9%	37.3%
1997	11,832	6,111	5,721	51.6%	26.9%
1998	11,716	7,108	4,608	60.7%	33.7%

Source: Education Statistics of MOE 1998

Note: * Only schools candidates are included in this table

** Form A means the first grade of junior secondary school (standard 8), so the percent indicates percent of student JC passing who finished all three standard of junior secondary (Form A through Form C) as well.

Form 10 Loss of Students in Secondary School from 1990 to 1998

Year	Loss Percent from Form A to C (standard 8 to 10: junior secondary)	Loss Percent from Form D to E (standard 11 to 12: senior secondary)
1990	44.9 %	32.9 %
1992	39.4 %	20.7 %
1994	38.4 %	24.3 %
1996	41.4 %	31.8 %
1998	36.2 %	35.6 %

Source: Education Statistics of MOE 1998

Note: Loss percent is the loss of students expressed from the first Form (standard)

⑧Teachers in Secondary Education

Form 11 Teachers in Secondary Schools by Qualification and by Form of 1998

Qualification / Form(standard)	Degree or higher	STC or equivalent	PH + COSC**	Unqualified
Junior Secondary* 8/A	808	580	137	372
9/B	881	594	149	343
10/C	941	560	129	254
Total*	2,630*	1,734*	415*	969*
Senior Secondary 11/D	934	158	48	77
12/E	936	142	44	60
None	28	13	3	25
Gross Total	**4,528**	**2,047**	**510**	**1,131**
Rate among all teachers	55.1%	24.9%	6.2%	13.8%

Source: Education Statistics of MOE 1998

Note：Teachers may be counted more than once in this table

* NTTC supplies the teacher for the junior secondary level

** PH+COSO means the certificate of high school graduates, so the qualification is not sufficient for the Secondary School Teachers.

⑨ Conditions of Secondary Schools (junior and senior school), Classrooms and Class Size

Form 12 Number of Secondary Schools, Classrooms, Students, Teachers

Year	Number of Schools	Number of Classrooms	Number of Students	Population of School Age (13–17 of age)	Students / Class
1990	175	1,318	46,301	-	35.1
1992	186	1,419	51,895	-	36.6
1994	193	1,576	61,615	-	39.0
1996	203	1,802	67,454	245,711	37.4
1997	204	1,845	71,475	250,090	38.7
1998	205	1,866	71,262	305,708	38.2

Source: Education Statistics of MOE 1998, Census of GOL 1996

⑩ FEP Program and the Enrolment Projections Generated for Primary and Secondary Education

Form 13 Enrolment of Actual 1996 and Projection for Primary Education

Standard	Pupils of	1996/97 Actual	**2001/02**	**2006/07**	**2011/12**
1	New pupils	91.4%	95.0%	97.5%	100 %
	Repetition	24.1%	15.0%	7.5%	1.0%
	Promotion	66.0%	80.0%	90.0%	99.0%
	Drop Out	9.9%	5.0%	2.5%	0.0%
2	Repetition	23.3%	15.0%	7.5%	1.0%
	Promotion	72.2%	82.0%	91.0%	99.0%
	Drop Out	4.8%	3.0%	1.5%	0.0%
3	Repetition	21.1%	15.0%	7.0%	1.0%
	Promotion	73.1%	82.0%	90.0%	99.0%
	Drop Out	5.8%	3.0%	1.5%	0.0%
4	Repetition	20.8%	15.0%	7.0%	1.0%
	Promotion	71.7%	80.0%	90.0%	99.0%
	Drop Out	7.5%	5.0%	3.0%	0.0%
5	Repetition	16.0%	10.0%	5.0%	1.0%
	Promotion	75.9%	85.0%	92.5%	99.0%
	Drop Out	8.1%	5.0%	2.5%	0.0%
6	Repetition	12.5%	8.0%	4.0%	1.0%
	Promotion	77.9%	88.0%	94.0%	99.0%
	Drop Out	9.6%	4.0%	2.0%	0.0%
7	Repetition	16.2%	11.0%	5.0%	1.0%
	Promotion to Secondary	54.0%	56.0%	52.0%	55.0%

Source: Education Statistics of MOE 1998

Form 14 Enrolment of Actual from 1996 to 1999 and Projections for Secondary Education

	1996/97	1998/99	2001/02	2006/07	2011/12
Enrolment in last standard 7	40,428	40,428	44,047	62,423	79,697
Entrants to Junior Secondary	21,799	22,582	24,495	32,755	43,808
Transition Rate	54%	56%	56%	52%	55%
Population of school age 13 to 15	136,432	144,741	158,162	183,353	212,557
Net enrolment rate in Junior Secondary	41%	40%	39%	44%	52%
Population of school age of 16 to 17	85,229	90,419	98,804	114,541	132,784
Net enrolment rate in Senior Secondary	19%	14%	15%	17%	23%
Population of school age of 13 to 17	221,661	235,160	256,966	297,894	345,341
Net enrolment rate in all Secondary	32%	30%	30%	34%	41%

Source: Education Statistics of MOE 1998

7. 19 Strategies for Educational Sector in
The Sixth National Development Plan, 1996/97 – 1998/9

Form 15 Education Policy Framework by Programs (Unit:Maloti)

	Policy and Strategy	Agency in charge	1996/97	1997/98	1998/99
1	Provide children of 2.5 years with appreciation skills. Integration of disabled children at this level, monitoring and training of providers.	ECD	346,040	397,946	449,852
2	Provide basic education and make it accessible to all school age children, improve quality and efficiency. Provide classrooms and furniture, etc.	Primary Education	166,150,922	170,080,181	195,592,000
3	Diversify curriculum, improve instructional material, teacher's guides and skills assessment, etc.	NCDC	4,377,530	5,379,160	6,080,789
4	Subsidize books, science equipment, instructional and supplementary reading materials, etc.	SSU	9,713,030	11,169,985	12,626,939
5	Provide mid-day meals for primary and day scholars, provide practical subjects and basic skills for survival, policy for drop-outs and low achievers, etc.	SSRFU	1,941,110	2,232,277	2,523,443
6	Hire and train specialized teachers to guide and supervise teachers with large class sizes, etc.	PIEP	1,513,600	1,740,640	1,967,680
7	Appraise industrial needs and training. Train for self-employment, women's marketable skills, low level accounting skills, etc.	TVE	1,953,210	2,246,191	2,583,000
8	Improve teacher career structure, condition of service and hire 260 primary teachers every year, etc.	TSD	236,027,690	271,431,843	306,005,000
*9	Obtain autonomy, increase intake and train unqualified teachers, increase in-service program, improve teaching and learning, raise level of lecturers to PHD and improve research, etc.	NTTC	9,819,710	11,292,667	12,986,000

10	Obtain autonomy, operate evening classes, train for local and export labor, increase specialization.	L P	8,385,660	9,643,509	10,901,300
11	Maintain non-academic expenditure at low level, improve research capacity, maintain subject system, and improve academic excellence.	NUL	1,140,000	1,311,000	1,507,650
12	Increase literacy to improve health and nutrition. Provide literacy and numeracy for disadvantaged groups, etc.	LDTC	3,306,950	3,802,299	4,299,033
13	Improve *NTTC curriculum to include disabled children's courses. Sensitize and educate parents and communities on disability issues, etc.	Special Education	766,480	881,452	1,103,669
14	Reorganization and restructuring of MOE administration. Decentralization of educational services, establishment of tiers of decision making level, negotiation of funds for MOE administration, etc.	Administration	9,210,840	110,770,160	124,131,492
15	Advises on policy formulation. Initiates and write development project proposals, monitor educational performance, and build research capacity to assess social impact of the program.	Planning Unit	356,280	409,722	471,180
16	Improve physical facilities, provide professional and technical supervision of MOE, etc.	EFU	2,541,880	2,923,162	3,361,636
17	Collect, computerize and analyze data for resource allocation, social and political decisions.	Statistics	182,916	210,353	3,361,636
18	Enforce legislation, strengthen inspection, hire subject specialists, improve timetables and increase student/teachers ratios to 25:1 Envisaged building schools in the region without secondary schools, etc.	Secondary Education	89,212,250 7,601,160	102.594.088 8,741,337	133,372,314 9,881,508
19	Provide quality and reliable assessment of educational achievement, analyse examination, and improve liaison with COSO, etc.	ECOL	760,000	874,000	988,000

Source: *The Sixth National Development Plan 1996/97-1998/99* of Ministry of Economic Planning

Note: * The Implementing Agency of the Project US1$ = Maloti

(1) Primary Education Program

Diploma in Education of Primary, Pre-service

D.E.P Time Allocation Per Subject/Per Week

Subject Name	Year 1		Year 2		Year3		Year4	Total
semester	1	2	1	2	1	2	1	h/w
Sesotho	**5**	**3**	**3**	**3**	**3**	**3**	**3**	**23**
Language & Literature								
English	**5**	**3**	**3**	**3**	**3**	**3**	**3**	**23**
Language & Literature								
Mathematics	**5**	**3**	**3**	**3**	**3**	**3**	**3**	**23**
Math. concepts								
Math. skills								
Math. applications								
Math. modelling								
Science	**5**	**3**	**3**	**3**	**3**	**3**	**3**	**23**
Chemistry								
Physics								
Biology								
Education(Prof.studies)	**0**	**3**	**3**	**3**	**3**	**3**	**3**	**18**
Philosophy								
Psycology								
Sociology								
Micro teaching								
T.P. pre.								
Curriculum studies								
Information Tech.								
Early Prim.Edu.								
Special Edu.								
Teaching method								
Research method								
Testing & evaluation								
Classroom Manag.								
Edu. Resources								
Guidance & Counsell.								
Applied Science	**0**	**3**	**3**	**3**	**3**	**3**	**3**	**18**
Agriculture								
Home Economics								
Health Education								
Expressive Arts	**0**	**3**	**3**	**3**	**3**	**3**	**3**	**18**
Arts and Craft								
Music								
Physical Education								
Drama								
Social & Development	**0**	**3**	**3**	**3**	**3**	**3**	**3**	**18**
(Socail Dev. Studies)								
Study Skills	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
Reading, writing, note-taking								
Computer literacy	(2)							(2)
Library skills								
Teaching Practices	-	-	-	-	**T.P***	-	**T.P**.**	
	24	**24**	**24**	**24**	**24**	**24**	**24**	**168**

Note: * The 10 weeks of rest is for Teaching Practices, ** the 5 weeks is for Teaching Practices.

Entry Requirements; COSO with credits in four subjects and a pass in a fifth.

Duration; 3 and a half years

Diploma in Primary Education, In-service

D.P.E. Time Allocation Per Subject/Per Week

Subject Name	Year 1		Year 2		Year3		Total
semester	1	2	1	2	1	2	h/w
Mathematics	**3**	**3**	**3**	**0**		**0**	**9**
Sesotho	**3**	**3**	**3**	**0**		**0**	**9**
English	**3**	**3**	**3**	**0**	**A**	**0**	**9**
Development Studies	**3**	**3**	**3**	**0**		**0**	**9**
Science	**3**	**3**	**3**	**0**	**T**	**0**	**9**
Professional Studies	**3**	**3**	**3**	**0**		**3**	**12**
					T		
Special subjects A*	**6**	**6**	**4**	**4**		**5**	**25**
English					**A**		
Mathematics							
Development stud.					**C**		
Special subjects B*	**6**	**6**	**4**	**4**	**H**	**5**	**25**
Sesotho							
Science					**M**		
Edu. Administration	**0**	**0**	**6**	**9**	**E**	**3**	**18**
Statistics	**0**	**0**	**4**	**0**		**0**	**4**
H1 ＋ PE	**0**	**0**	**0**	**3**	**N**	**0**	**3**
Religious Education	**0**	**0**	**0**	**3**	**T**	**0**	**3**
Music	**0**	**0**	**0**	**3**		**0**	**3**
Arts & Craft	**0**	**0**	**0**	**3**		**0**	**3**
Project	**0**	**0**	**0**	**0**		**5**	**5**
			(4)**	**(4)****			**(9)**
Technical Education	**0**	**0**	**0**	**0**		**3**	**3**
Agriculture	**0**	**0**	**0**	**0**		**3**	**3**
Home Economics	**0**	**0**	**0**	**0**		**3**	**3**
Computer skill	**(2)**						2
(as study skill)							
Total	**30 (32)**	**30**	**30/ 36****	**33**		**30**	**153(155)/ 159(161)**

Note:* Two subject are chosen (each one from A and B) from all special subjects

**** Exemption from core course if one specializes in the subject**

Entrants requirements; At least a 2nd class pass in one of following

(i) PTC (ii) APTC (iii) LIET VI(Headteachers Program)

(iv) Plus 2 years experiences

Duration; 3 years

(2) Secondary Education Program

Secondary Teacher Certificate, Pre-service

S.T.C Time Allocation Per Subject /Per Week

Subject Name	Year 1		Year 2		Year3		Total
semester	1	2	1	2	1	2	h/w
Sesotho	**3**	**3**	**3**		**3**	**3**	**15**
English	**3**	**3**	**3**	**T**	**3**	**3**	**15**
Professional Studies	**3**	**3**	**3**		**3**	**3**	**15**
				E			
				A			
Special subject A	**7.5**	**7.5**	**7.5**		**7.5**	**7.5**	**37.5**
English				**C**			
Mathematics							
Agriculture				**H**			
Religious Educ.							
Bookkeeping				**I**			
Geography							
				N			
				G			
Special subject B	**7.5**	**7.5**	**7.5**		**7.5**	**7.5**	**37.5**
Sesotho				**P**			
Science							
Home Economics				**R**			
Development studies							
Commercial				**A**			
Ancillary subject	**3**	**3**	**0**	**C**	**3**	**3**	**12**
Computer study							
Agriculture				**T**			
				I			
				C			
Teaching Practice Preparation	**0**	**0**	**3**	**E**	**0**	**0**	**3**
Total	**27**	**27**	**27**	**-**	**27**	**27**	**135**

Note: *Whole the 10 weeks is for Teaching Practices

Entrants requirements; COSO with 4 credits or equivalent

Duration; 3 years with teaching practice

Teaching Practice; Second full semester of Year 2

Diploma in Technology Education, Pre-service

D.T.E. Time Allocation Per Subject/Per Week

Subject Name	Year 1		Year 2		Year3		Total
semester	1	2	1	2	1	2	h/w
Specialization subjects				**T**			
Material Science	3	3	3		2	2	**13**
Wood Technology	6	6	6	**E**	6	6	**30**
Metal Technology	6	6	6		6	6	**30**
Graphic Communication	6	6	6	**A**	5	5	**28**
Final Years Res. Project							
				C			
Education							
Professional Studies	3	3	3	**H**	2	2	**13**
Teaching Practice Prep.	0	0	4*		0	0	**4**
Teaching Methodology	0	3	3*	**I**	3	3	**12**
Mathematics/Science				**N**			
Mathematics	2	2	2		2	2	**10**
Engineering Science	0	0	2	**G**	2	2	**6**
Chemistry	2	0	0		0	0	**2**
Electricity & Electronics	0	2	0	**P**	0	0	**2**
Communication				**R**			
Sesotho	2	2	2		0	0	**6**
English	2	2	2	**A**	0	0	**6**
Safety and First Aid				**C**			
Health and Safety	1	1	0		0	0	**2**
				T			
Computer study (as study skills)	(2)	0	0	**I**	0	0	2
				C			
				E			
Total	**36 (38)**	**36**	**39**		**28**	**28**	**167 (169)**

Note: Entrants requirements; COSO with 4 credits plus one of the following:

(i) A pass in a technical subject at JC or COSO or relevant craft certificate from recognized Technical Institute

(ii) STTC, Part 2 or equivalent

(iii) A pass in Maths & Science (7s & 8s) at COSO if they are not included in the 4credits mentioned above.

Duration; 3 years with teaching practice.

Teaching Practice; Second full semester of Year 2

*** The subjects are offered at the same time per week-that is when the students are not in Teaching Methodology.**

1) Science

DEP pre-service

Components/ Topics	Concepts
Biology	1.Definition 2.Life process 3.Cell as a basic unit of life 4.Properties and role of enzyme 5.Classification of living organisms **6.Practicals** for #5 7.Interdependence, relationships and human impact on ecosystems 8.Autotrophic and heterotrophic nutrition 9.Transport in plants and animals 10.Practicals 11.Breathing mechanisms in animals and plants 12.Aerobic and anaerobic respiration 13.Structure and function of excretory organs in mammals 14.Homeostatic control of temperature, pH, sugar and water **15.Practicals** for #14 16.Sexual and asexual reproduction in animals and plants 17.Inheritance, variation and selection **18.Practicals** for #17 19.Nervous and endocrine system 20.Tactic, nastic, and tropic responses in plants
Chemistry	1.Introduction to Chemistry 2.Mtter, Elements, and Compounds 3.The Periodic Table 4.Laboratory experiment 5.Principles of Chemical Bonding 6.The Redox reactions 7.Environment as a complex system with special emphasis on air and water **8.Practicals** for #7 9.The Structure, properties and use f Acids, Bases and Salts 10.The principles of electrolysis and its Applications **11.Practicals** for #10 12.Introduction to Organic Chemistry 13.Functional groups, Homologous series, Type of organic reaction
Physics	1.Measurement 2.Forces 3.Work, energy, power **4.Practicals** for #3 5.Balance 6.Stabiity 7.Simple Machines 8.Laboratory experiment 9.Thermal Physics: Expansion 10.Measurement of temperature 11.Transfer of thermal energy 12.Static electricity 13.Current electricity 14.Magnetism 15.Applications
Methodology	1.History 2.Dimension of Science 3.Teaching science: various approaches 4.Methods 5.Resources 6.Planning 7.Assessment 8.Methods of teaching Science

	9.Pupil centered Methods versus teacher centered methods 10.Application to selected topics 11.Curriculum Studies: curriculum analyses 12.Curriculum Interpretation 13.Teaching of selected topics 14.Reflection on teaching practice 15.Problems encountered 16. Practicability of methods 17.Any other issues raised 18.Classroom organization 19.Contemporary issues 20.Concept formation

DPE in-service

Components/ Topics	Concepts
General Science	1.Difinition of Science 2.Life process 3.Ecology 4.Methods of Teaching Science 5.Electricity and Magnetism 6.Child development, Leaning and Concept Formation 7.Common Substances 8.Curriculum Design 9.Evaluation 10.Heat and Light 11.Simple Machines 12.Teaching Aids
Biology	1.Cell structure and Organization 2.Modification of cell structure for specific function 3.Diffusion and Osmosis 4.Enzymes 5.Digestion 6.Transport in human: Circulatory system 7.Respiration 8.Excretion 9.Photosynthesis 10.Transport in flowering plants 11.Homeostasis 12.Support, Movement and Locomotion in Animals 13.Co-ordination in human 14.Co-ordination on plants 15.Reproduction 16.Inheritance 17.Diversity of Organisms 18.Relationships of organisms with one another and with the environment
Chemistry	1.Difinition of Chemistry 2.Atoms, elements and compounds 3.Pure substances and mixtures 4.Periodic table and periodicity of elements 5.Bonding 6.Chemical equations 7.Stoichiometry and the mole concept 8.Non-metals 9.Metals 10.Acids, bases and salts 11.Electrochemistry 12.Organic chemistry
Physics	1.Mearsurement 2.Matter 3.Termal Physics 4.Transfer of Thermal energy 5.Energy 6.Forces 7.Machines

	8.Motion 9.Balance and stability 11.Electricity 12.Magnetism 13.Waves and Light
Methodology	1.Difinition of Science 2.Approaches to Teaching Science 3.Child Development 4.Curriculum Design 5.Assessment and Evaluation 6.Audio-Visual aids

STC pre-service

Components/ Topics	Concepts
Biology	1.Life process – Definition of Biology, Characteristics of living things 2.Cell structure and function – Plant and animal cells Unicellular organism 3.Classification of living things – Characteristics of the classification system Species e.g. human Major kingdoms of living things 4.Ecology and evolution – Ecosystems Theory of evolution Course of evolution 5.Nutrition – Autototrophic Heterotrophic 6.Rspiration – Breathing Cellular 7.Excretion – The excretory system of plants and animals 8.Transport in living things – The circulatory system 9.Senses and coordination – Sense organs Nervous system 10.Support and movement – The skeletal system The muscular system Turgor in plants 11.Reproduction – Cell division Asexual reproduction Sexual reproduction Heredity 12. Health and society Diseases Self inflicated problems
Chemistry	1.Theory of atomic structure and the periodic table of the elements - Bohr's theory of an atom Scroedinger's orbital theory Elements Periodic table 2.Chemical bonds and valencies – Octet rule Types of bonds Valencies 3.Chemical reactions and equations – Types of reactions Exothermic and endothermic reactions Law of multiple proportions

Chemistry	Law of conservation of mass Catalytic reactions Balancing of equations 4.Chemical and physical properties of common metals – Extraction of metals from ores and minerals Chemical properties Physical properties 5.Dispersion systems and methods of separation – Solutions and suspensions Concentration of a solution Separation of mixtures 6.Redox reactions - Oxidation and reduction Oxidation numbers 7.Cehmistry of the atmosphere and common gasses- Composition of the air Chemical properties and uses of oxygen, nitrogen, hydrogen, carbon dioxide 8.Acids bases and Salts – Common inorganic and organic acids Strength of an acid Broensted definition Bases and their properties Neutralisation 9. Energy resources and nuclear energy – Concept of chemical energy Energy resources Radioactivity 10. Basic Organic chemistry – Characteristics of organic compounds Homologous series, radicals and functional groups Structural formulas and nomenclature Relevant organic compounds 11.The earth and introduction of basic space science – Stars and the solar system Structure and composition of the Earth Soil 12.Electrochemistry I – Standard electrode potential Daniel cell Electrolysis Application of electrolysis 13.Electrochemitry II- Application of electrolysis Energy resources and nuclear energy 14.Organic Chemistry – Division inorganic – inorganic chemistry Hydrocarbons Functional groups (alcohol, aldehydes, acids) Relevant organic compounds
Physics	1.Measurement – SI system Length, area and volume Time, Mass, Temperature Force, Density, Errors Principle of Archimedes, law of flotation 2.Energy -Types of energy: mechanical energy (PE and KE), electrical , chemical, light, sound heat and atomic Energy changes, The world energy crisis Work, power and energy ,Simple machines 3.States of matter – Particulate theory of matter; evidence The kinetic theory, Expansion of solids, liquids and gases Changes of state Pressure The ideal gas laws 4.Forces and Motion – The concept of a force Weight and its measurement , Friction Centre of gravity and the moment of a force Force and motion Measuring velocity

	Acceleration Newton's laws of motion,Graphs of motion Equations of motion, Force, mass and acceleration Momentum and its conservation 5.Heat - Heat transfer (conduction etc) Measuring heat energy, Specific latent heat 6.Electricity & Magnetism One – Magnets Electrostatics with the concept of the electric field Simple electric circuit and its components (cells, bulbs, switches, resistors, rheostats ,ammeters and voltmeters) Measuring voltage and current Series and parallel circuits 7.Waves, Light and Sound – Characteristics of wave motion Differences between transverse and longitudinal waves Frequency, wavelength and velocity; their relationship Reflection and refraction of waves Diffraction and interference of wave Rectilinear motion of light Reflection of light; plane mirrors Refraction of light; Snell's law Lenses, Ray diagrams and the lens formula Optical instruments Defects of vision and correction by lenses Colour and the spectrum Wavelength, frequency and velocity of light The electromagnetic spectrum **(Visit to LTC installation at Lancer's Gap)** The nature of sound, Transmission of sound Loudness and pitch of sound music 8.Electericity & Magnetism Two – Electrostatics, Charge, current and voltage Variation of resistance of wire with length and thickness OHM's law, Resistors in series and parallel Internal resistance of a cell Electrical safety, Electrical energy and power Direct current (DC) and alternating current(AC) Theory of magnetism Magnetic effects of an electric current Electromagnetic induction, Transformeters Transmission of electricity **(Visit to Katse to Highlands Water Scheme dam)** The cathode ray oscilloscope(CRO)
Methodology	1.Science Teaching Methodology – Why teach science? Different approaches to teaching science Teaching skills Class management and lab safety Preparing and producing written materials 2.Curriculum studies - The lesson plan Scheming and recording One section from form A & B on each of Biology, Chemistry and Physics 3.Evaluation & Assessment - The place of evaluation and assessment in education in Lesotho Different modes of assessment Objective questions Written questions: short and long answers Junior Certificate Science Examination Evaluation of a demonstration lesson 4.The Science Department – Management of department Ordering, storage and maintenance of equipment Audio-Visual aids

2) Agriculture

DEP pre-service (included in Applied Science)

Components/ Topics	Concepts
Crop Science and Production (Crop management)	1.Importance of crops 2.Requirements for plant growth & development 3.Land preparation 4.Maintaining crops 5.Management of crops 6.Soil formation, types, management & conservation
Animal Science and Production (Animal husbandry)	1.Types of domestic Animals 2.Importance of domestic animals 3.Management of domestic animals 4.Animal selection and breeding 5.Rearing pigs, small ruminants and poultry 6.Parts and diseases of animals 7.Animal nutrition
Agriculture Teaching Methods (Methodology)	1.Methods of teaching 2.Course content 3.Instructional objectives 4.Lesson plan 5.Instructional materials 6.Mesure and evaluate
School Farm Management (Farm management)	1.Economic system in food production 2.The teacher and school farm 3.Management practices 4.Farm labor 5.School farm records 6.Land tenure 7.Agricultural produce marketing
Farm Workshop (Farm Mechanics)	1.Farm tools and equipment 2.Irrigation practices 3.Irrigation equipment 4.Uses of farm tools & equipment

STC pre-service

Components/ Topics	Concepts
Introductory Agriculture	1.Meaning of agriculture 2.Economic importance 3.Effects of environment on crop and animals 4.Soil formation – texture, types, structure, fertility, soil water and soil reaction (pH) 5.Seedbet preparation 6.Plant propagation (sexual and asexual) 7.Irrigation effects of weeds 8.Pest and diseases 9.Control of weed (cultural and chemical) 10.Control of diseases (cultural and chemicl) 11.Soil erosion - causes and control measure 12.Animal production 13. Feeding – types of feed 14.Animals' health
Farm Practicals	1.Growing of swish chard, peas, tomatoes and beetroot 2.Care of garden tools and management of piggery unit, rabbitry unit and poultry unit.

Intensive Small Stock Production	1.Orgin 2.Economic importance 3.Breeds 4.Breeding 5.Feeding 6.Housing 7.Common diseases 8.Common parasites and marketing of pigs, rabbits and poultry (layer and broilers)
Vegetable Production	1.Origin 2.Economic importance 3.Characteristics 4.Climatic requirements 5.Soil requirements 6.Seedbed preparations 7.Varieties of vegetable 8.Planting 9.Manuring 10.Weeding 11.Common pests 12.Common diseases 13.Irrigation 14.Harvesting 15. Marketing and crop improvement
Cattle Husbandry	1.Origin 2.Economic importance 3.Characteristics of each breed, common breeds in Lesotho 4.Feeding 5.Breeding management 6.Housing parasites in Lesotho 7.Mardeting and improvement practices
Farm Practicals	1.Feeding cows and calves 2.Cattle ration computing 3.Milking 4.Care of calves and at least one field trip to observe some of the practices that are not available at college
Agricultural Teaching Methods	1.Review of learning cycle and factors that promote learning 2.Teaching methods – demonstration, problem based learning, problem solving method, practicals and discussion 3.Preparation and selection of teaching aids 4.Lesson planning –theory & practical 5.Macro teaching
Fodder Production and Range Management	1.Fodder crops- origin, botanical characteristics, economic importance, soil requirements, seedbed preparation, fertilizer application, varieties, planting, weed control, pest control, disease control, harvesting, processing marketing 2.Range management- definition, terms, natural principals grazing systems effects of noxious plants ant their control measures in Lesotho signs of retrogression signs of improvement practices and economic importance
Farm Practicals	1.Planting and looking after wheat crop, broadbeans, lucerne, barley, oats, eragrostic, and triticale 2.At least one field trip to study the tools used in large scale crop production practices e.g. ploughs, harrows, mowers, balers etc.

Agricultural Economics	1.Marketing- definition; nature of agricultural products, processing of agricultural products, type of markets and price determination theory 2.Farm management- definition, factors of production, costs(fixed, variable and opportunity) and budgeting 3.Farm accounts – types of records (physical and financial), cash analysis, record book, profit and loss A/c and balance sheet 4.Agricultural co-operatives – definition importance and principle
Deciduous Fruit and Forestry Production	1.Origin 2.Economic importance 3.Botanical characteristics 4.Climatic requirements 5.Site selection 6.Orchard layout 7.Seedbed preparation 8.Varieties 9.Nurserybed management 10.Transplanting 11.Fertilizer application 12.Weed control 13.Common diseases 14.Common pests 15.Irrigation 16.Other managerial practices 17.Harvesting 18.Mrketing of these fruits and crop improvement 19.Forestry
Field Crop Production	1.Origin 2.Botanical characteristics 3.Climatic requirements 4.Soil requirements 5.Seedbedpreparattion 6.Manuring 7.Varieties 8.Planting 9.Weed control 10.Pest control 11.Desease control 12.Harvesting 13.Marketing of these fruits and crop improvement
Animal Production	1.Origine 2.Economic importance 3.Types and their characteristics 4.Common breeds in Lesotho and their characteristics 5.Breeding 6.Feeding 7.Housing 8.Handling and constraining 9.Diseases 10.Parasites and predators 11.Special management practices 12.Marketing (products & animals) of goats and fish

Soil and Soil Conservation	1.Soil - definition, formation, profile, texture, types, fertility, structure, drainage, manuring (organic and inorganic), soil reaction, liming 2.Soil erosion – definition, agents, factors that encourages, types, control measures(vegetation, structures, and other conservation measures) , economic importance
Firm Instructions	1.Growing: swish chard, onion, cabbage and legumes(peas and broadbeans) 2.Livestock duties: feeding, housing, disease control, breeding(where applicable), milking(where applicable) calf rearing 3.Educational trips
Ancillary for Social & Development Studies	1.Nature of soil- its production and potential and dangers of erosion 2.Basic vegetables production skills 3.Basic livestock management skills 4.Basic fruit production and management skills

3) Home Economics

DEP pre-service (included in Applied Science)

Components/ Topics	Concepts
Food and Nutrition	1.Kitchen plan 2.Kitchen/household equipment 3.Kitchen hygiene and safety 4.Reasons/methods of cooking 5.Methods of heat transfer 6.Dry and moist heat methods of cooking 7.Methods of measuring and weighing 8.Meal planning and food presentation 9.Food preservation
Clothing and Textiles	1.Classification of fibres 2.Properties of fibres 3.Fabric construction 4.Application of colour and finishes 5.Care labels 6.Needlework equipment, choice, care and use 7.Commercial patterns 8.Basic pattern drafting 9.Needlework processes 10.Kniting and crocheting
Home Management	1.Setting goals and decision making 2.Economy of resources 3.Rights and responsibilities of a consumer 4.Methods of teaching Home Economics 5.Practicals lesson plan

For Year 1 of STC pre-service

Components/ Topics	Concepts
Food and Nutrition 1	1.Nutrition and nutritional concepts 2.The relationship of diet and health 3.Food storage and preservation Assignment – collect information from different sources on issues showing relationship between diet and health given after topic 3 : practice methods of preserving
Nutrients	1.Definition 2.Functions 3.Sources 4.Deficincy results Assignment - identify, list, survey
Textile Studies **Clothing & Textiles**	1.Needlework equipment i.e. small equipment, large equipment, asses sources Assignment – identify, sort, describe, draw
Fibres and Fabrics	1.Definition 2.Classification 3.Identification Assignment – identify fibres through burning tests another methods classify according to type characteristics
Knitting and Crocheting	1.From fibres to yarns treatment of fibres,fabric making and the construction methods, fabric treatment Assignment – to make doyles and knit baby's article using chart of different colours practice different methods of fabric construction Excursion to fabric-making firm – Bloemfontein
Fabric making continued	Assignment – collect sample of fabrics identify differences between fabrics by their (a) fibre content (b) construction methods

Colour and Colour Schemes	1.The colour wheel 2.Primary colours 3.How secondary colours are made 4.Intermediate colours 5.Transfer of colour onto fabrics 6.Methods of transferring colour onto fabrics Assignment – make tie and dye or printing on fabrics, mix dyes of primary colours to produce secondary colours or intermediate colours
Garment Construction	1.Sewing stiches 2.Decorative stitches 3.Seams: french, run & fell, open and overlaid, 4.Disposal of fullness: (a) gathers (b) pleats (c) darts Assignment – make a folder of stitches, seams and openings
Openings	1.Faced 2.Bound 3.Continuous wrap Assignment - practice and mount in folder
Commercial Pattern	1.Pattern making - symbols and their meaning 2.Transfer of pattern – markings onto fabric methods of transferring them 3.Care labels and symbols Assignment – practice methods of transferring the pattern symbols make child top/ dress identify care labeling and their meaning
Food and Nutrition 2	1.Meal planning 2.The three food groups 3.The food pyramid 4.The balanced diet 5.Factors in planning meals 6.Food hygiene
Practical Exam in cookery	Revision

For Year 3 of STC pre-service

Components/ Topics	Concepts
Experiences from Teaching Practice	1.Presentations (oral) 2.Lecture 3.Demonstration 4.Practicals Assignment – make oral presentation
Recycling clothes	1.Mending techniques 2.Patchwork (a) print patch (b) calico patch Assignment – make samples and mount them
Darning and Dyeing	1.Hedgetear darn 2.Darling a thin place 3.Dyeing Assignment – make tie and dye
Style alternattion Thrift garment and Commercial pattern	1.Thrift garment 2.Commercial patterns and their symbols Assignment – make tie and dye make a thrift garment make a blouse with colar and appropriate fasterners
Food and Nutrition	1.Nutrients (a) micronutrients (b) macronutrients 2.Their function in the foody
Meal planning and Food service	1.Designing meal for breakfast, lunch and dinner 2.Food service – table setting Assignment – plan, prepare and serve meals for people with different needs, special diet
Child care and development	1.The importance of child spacing - decision making Assignment - questioning
The pre-natal care	1.Research through visits to clinics

	Assignment – write reports and tests
Family & Resources Management	1.Resources management Assignment – collect pictures and make folder files for interiors of different rooms
Revision	Revision

Diploma in Home Economics

Components/ Topics	Concepts
Food and Nutrition	1.Definition of nutrition terms 2.List the major nutrients 3.Name the three food groups 4.Give examples of foods from each of the three food groups 5.Explain the functions of food in growth and maintenance of the body(relationship between diet and health)
Food Preparation	1.Reason for cooking food 2.Reasons for not cooking food 3.Importance of not overcooking certain foods(e.g. vegetables) 4.Improtance of adequately cooking some foods (e.g. pork) 5.Difinition and demonstration of the methods of food preparation (e.g. boiling, steaming, shallow frying, baking and roasting) 6.Compare the advantage and disadvantage of different methods of cooking of various foods 7.Given appropriate criteria, evaluate food products 8.Correct methods of measuring/weighing liquid and dry ingredient 9.Proper use and care of kitchen equipment (i.e. knives, cutting board, common types of stoves, peelers, grates)
Meal Planning	1.Difine a balanced diet 2.Plan balanced menus for one day 3.List and explain the factors to consider in meal planning (e.g. cost, three food groups, preparation time, family size and preferences, seasonal availability, variety of shapes, colours, textures, temperatures, flavours)
Food Service	1.List good manners 2.Discuss appropriate ways of serving large groups (e.g.school lunch) 3.Given a food service situation (e.g. meal, tea), demonstrate the appropriate table setting.
Food Hygiene, Preservation and Storage	1.Reasons for preserving food 2.Identify the signs of food spoilage 3.Classify the causes of food spoilage and explain how to retard spoilage. 4.List the most common methods of food preservation (i.e. drying, boiling, pressure canning, salting and refrigeration) 5.Describe the proper procedures to follow in each method of food preservation 6.Give the advantages and disadvantages of each food preservation method 7.List factor to consider when storing food 8.Describe the characteristics of good storage facilities for various foods 9.Consequences of poor or inadequate food storage facilities
Malnutrition	1.Definition of malnutrition 2.Name nutritional disorders common to Lesotho (i.e. marasmus, pellegra, kwashiorkor, obesity, goiter, anemia) 3.Causes and effects of malnutrition 4.Identify the symptoms of nutritional disorders common to Lesotho 5.Prevention and treatment of nutritional disorders 6.Compare the characteristics of well-fed and malnourished children
Care of the Body and Personal Health Habits	1.Importance of personal cleanliness (regular bathing, clean hair,etc) 2.Proper way of cleaning teeth, using a tooth brush or sehlatsoameno 3.Suggest ways in which personal cleanliness can be practiced and reinforced at school 4.Ways of teaching feminine hygiene 5.List good health habits or the components of a healthy life style(i.e. physical exercise, adequate sleep, regular meals, balanced diet, etc.) 6.Discuss factors which contribute to mental and emotional well-being

Grooming	1.Characteristics of a well-groomed person 2.Importance of grooming 3.Name commercial grooming aids (e.g.deodrant) 4.Care of feet 5.Contribution of posture and poise to overall appearance
Substance Abuse	1.Identify the substances most common abused in Lesotho (i.e. alcohol, tobacco, glue, dagga, benzine) 2.Discussion of reasons for substance abuse 3.Effects and consequences of abuse of each substance 4.Identify local sources for substance abuse education and rehabilitation
Childhood Diseases, illnesses, and immunizations	1.List the most common illnesses and diseases (e.g.whooping cough, measles, diptheria, tetanaus, coic, colds, rashes, constipation) 2.Symptons, proper treatment and ways of prevention 3.Name the illnesses against which immunizations are available 4.Outline the proper sequence and timing of these immunizations 5.Causes and consequences of dehydration 6.Identify the symptoms of dehydration 7.Prepare the ORT (oral dehydration therapy) mixture 8.Demonstrate correct methods for sterilizing feeding utensils and explain why these methods are important (e.g. baby, sick person)
Environmental Sanitation	1.Importance of a clean environent 2.Demonstrate cleanliness in the classroom environment 3.Demonstrate cleanliness in the school kitchen 4.Explain what is included in proper sanitation (e.g. pest control, waste disposal, safe water, disease control) 5.Name common household pests and rodents(e.g. flies, roach, feas, bedbugs, mice, rats)
Demonstrate a variety of appropriate teaching methods	1.List and define methods commonly used in teaching health/nutrition at the primary level (e.g. step-by-step, child-to-child, discussion, demonstration, role piay) 2.Describe the advantages and disadvantages of the various methods 3.Observe at least one twenty minute demonstration lesson in health/nutrition
Promote community involvement in Health and Nutrition	1.Discuss teacher identification of pupils with suspected nutrition and health problems 2.Suggest ways of promotion community support and involvement in Health and Nutrition Education 3.Develop a plan for school/ community activity in some area of health and nutrition and a clean-up campaign.
Manage and utilize subject resources	1.List health resources available in Lesotho and tell how to contact them (e.g. public health nurses, hospitals, flying doctors, village health workers, health inspectors, ambulances) 2.Tell what services are available in local clinics and how to use these services 3.List nutrition resources available in Lesotho and how to contact them (e.g. MOA nutrition assistants, FNCO, women's organizations) 4.Suggest ways of consulting and cooperating with local health and nutrition resource persons
Supervise School Feeding	1. Describe the minimum facilities and equipment required for preparation and storage of foods for the school feeding progrmme 2.Given a sample case, suggest ways of providing security for food commodities and equipment. 3.SFU forms and sample figures, correctly complete orders and records 4.List factors to consider in obtaining volunteers or hiring cooks for the school feeding programme e.g. Standard 6 healthy, clean , suitable age) 5. Identify ways of utilizing produce from the school garden in the school-feeding menu. 6.Ways in which the school feeding programme can be used as a resource in teaching health/nutrition 7.Develop a lesson plan using the resources of the school feeding programme
Teaching Strategies	1.Several Teaching Methods; lecture, demonstration, laboratory, case study, role play, field trip, and guest speaker

4) Art & Crafts

DEP pre-service (included in Expressive Arts)

Components/ Topics	Concepts
Art Education (History/Foundation)	1.History of Art in other countries 2.History of Art in Lesotho 3.Why teach art in schools 4.Definition of terms 5.Integrating art with other subjects
Forms of Art	1.Drawing - favorite object and figures in motion 2.Painting – blow/straw painting and blot painting 3.Print making – string prints and junk prints 4.Cooage – paper collage and picture collage 5.Puppetry – stick puppets and socks puppets 6.Modelling – bowls and mugs 7.Contraction – kites, toys 8.Crafts –brooms and mat making and fabric art
Art Education (Advance)	1.Suitable activities 2.Methodology/schemes planning 3.Media- materials and tools 4.Pupil's assessment 5.Educational trips/ motion of art 6.Who should teach art? 7.Colour theory

DPE in-service

Components/ Topics	Concepts
What is Art?	1.Art Disciplinary 2.Art branches and principles
Basic Concepts of Art and Crafts Instruction	1. Discussion of stages of creative growth in Child Development
Developing Practical Skills	1.Methods of Drawing using pencils, pens, etc. **2.Practicals** – trainee are to come with pencils, back pens, etc. 3.Trainees are to work on their own drawings in a chosen Media, and mount them appropriately.
Safety in the art-classroom	1.Hand outs on Positive and Negative suggestions in an Art class to be handed out.
Integration of Art (with other subjects)	**1.Practical** 2.Assignment on integration through creation of an A4 size teaching Aid in any chosen subject. 3.Ideas of integration to be discussed by the trainees. 4. Art assignment to be Mounted and handed in 3 weeks.
Teaching Methodologies	1.Schemes 2.Lesson plans
Display area and bulletin boards	1.Demonstrations of proper mounting of pupils art works 2.Effective use of display area and bulletin boards
Developing of Crafts skills	1.Materials for traditional Basotho 2.Hand crafts to be discussed 3.Discussion of the advantages of teaching local crafts in schools 4.Broom, and mat making in group work.
Practical application on colour	1.Group work 2.Creation of colour – Charts.
Contents of Primary Syllabus	1.Discussion
Continuation of unfinished works	**1.Practicals**
Assessment and Evaluation	1.Discussion
Revision	Revision

Note: This course outline is only for Semester 3, Year 2 of DPE

5) Computer Studies

For Semester 1,Year 1 of DEP pre-service (computer literacy in Study Skills)

Components/ Topics	Concepts
Basic computer skills	1.Discription of computer terms 2.Introducation to word processing including **Practice** 3.Using the file management system- **Practice** 4.Using printers- **Practice**

For Year 1 of DPE in-service, STC pre-service, DTE in-service

Components/ Topics	Concepts
Introduction to word-processing and the NTTC network	1.Difinition of Computer – advantage of computers, uses of computers 2.Computer Hardware & Software 3.Basic computer terminology 4.The computer system **5.Practical** – Introduction to Windows 3 x environment. 6.The startup & shutdown procedures on the NTTC network. **7.Practical** – The mouse & windows tutorials **8.Practical** – The windows tutorial, starting & closing applications in windows 9.Introduction to word-processing using Word Perfect **10.Practical-** Word-processing features: knowing the keyboard operations **11.Practical** –Word-processing features: creating & editing a document. 12.Classification of Computers **13.Practical** – Word-processing features: block operations 14.Saving a document in Word Perfect **15.Practical-** Opening a document in Word Perfect 16.Word-processing features: spell check **17.Practical-** Word-processing features: centering, spacing, emphasis, font. **18.Practical-** Word-processing features: justification, margins, indent. **19.Practical-** Printing a document, using the print preview, reserch by using CD ROM

For Semester 1, Year 3 of STC pre-service

Components/ Topics	Concepts
Introduction to Computing	1.Computers Introduced- (total theory; 3 hours) ①What is computer? ②What are computers used for? ③Evolution of computers; types of computers in use today ④A micreocomputer **Practical** – Keyboard familiarity **(2 hours)** (a)Starting up and shutting down procedures on the NTTC network (b) Introducing the Mouse and Windows Environment (c) Using the Mouse Tutorial 2.Computer Hardware (8 hours) ⑤Input Hardware: categories of input hardware (keyboard & non-keyboard) and their application in today's world e.g.terminals, scanning devices, smart cards, voic input, pointing devices. ⑥ Processing Hardware: primary and secondary storage, bits and bytes, files & directories, data storage

	hierarchy sequential, random access and indexed storage, tape and disk storage devices e.g. magnetic tape, diskettes, hard disks, optical storage ⑦ Output Hardware: categories and types of output hardware and their uses e.g. VDHs, printers, plotters, etc. **Practical–**Using the Windows Tutorial **(1 hour)** 3.Comuter Software (4 hours) ⑧ System Software: difinition, categories, common systems software for microcomputers, multi processing, maltitasking (all elementary level), introductory level to DOS commands ⑨ Applications Software: definition, types and uses with reference to a variety of working environments including schools **Practical** – Introduction to DOS commands (1.5 hours) Introduction to Windows 95/98 4.Word Processing (1hour) ⑩ Advantages of word processors ⑪ Who uses word processors and why? ⑫ Word processing features: fonts, margings, justification, ideating, tabs, page numering, headers/ footers, tables, columns, etc. **Practical – (13 hours)** Word Processing using Word Perfect 5.2 for Windows Evaluation of two different word processors e.g. MS Word 6.0, VS Word Perfect 5.2 File manipulation in DOS and Windows environment 5.Comuters in Society (3 hours) ⑬ Computers in the workplace: industrial, technical and scientific uses of computers, data processing e.g. banks, hospitals, personnel, etc. ⑭ Computers in communications and information systems e.g. library, e-mail, data base systems Computers in education, training, etc. **Practical** – **(1.5 hours)** Research on some of the above topics using CD ROM

Number of Students in NTTC (1997-1999)

Year 1997

Teaching Year	Number of Students	Educational Courses						Total
		Dip.Ed.(Pr.)	PTC	PTC(in-ser.)	STC	Dip.P. Ed.	Dip.Tech.(Ed.)	
1st	Male		21		24	4	9	58
	Female		133		95	52	1	281
	Total	0	154	0	119	56	10	339
2nd	Male		20		35	10	8	73
	Female		114		61	40	2	217
	Total	0	134	0	96	50	10	290
3rd	Male		17		29	7	12	65
	Female		113		56	39	2	210
	Total	0	130	0	85	46	14	275
Total	Male	0	58	0	88	21	29	196
	Female	0	360	0	212	131	5	708
	Total	0	418	0	300	152	34	904

Year 1998

Teaching Year	Number of Students	Educational Courses						Total
		Dip.Ed.(Pr.)	PTC	PTC(in-ser.)	STC	Dip.P. Ed.	Dip.Tech.(Ed.)	
1st	Male		44		40	7	15	106
	Female		148		71	53		272
	Total	0	192	0	111	60	15	378
2nd	Male		16		16	4	9	45
	Female		151		64	52	1	268
	Total	0	167	0	80	56	10	313
3rd	Male		19		57	10	8	94
	Female		103		32	40	2	177
	Total	0	122	0	89	50	10	271
Total	Male	0	79	0	113	21	32	245
	Female	0	402	0	167	145	3	717
	Total	0	481	0	280	166	35	962

Year 1999

Teaching Year	Number of Students	Educational Courses						Total
		Dip.Ed.(Pr.)	PTC	PTC(in-ser.)	STC	Dip.P. Ed.	Dip.Tech.(Ed.)	
1st	Male	30	2		29	8	15	84
	Female	77	7		55	40		179
	Total	107	9	0	84	48	15	263
2nd	Male		38		35	8	14	95
	Female		156		76	54		286
	Total	0	194	0	111	62	14	381
3rd	Male		17		16	4	9	46
	Female		127		64	51	1	243
	Total	0	144	0	80	55	10	289
Total	Male	30	57	0	80	20	38	225
	Female	77	290	0	195	145	1	708
	Total	107	347	0	275	165	39	933

(Source: NTTC)

Staff

		Execution	Senior Staff	General Staff	Senior Lecturer	Lecturer	Assistant Lecturer	Technician	Total
Executive	Director								
	Deputy Director	2							2
	Assistant Director	1							1
	Assist. Deput. Dir.	3							3
	Total	6	0	0	0	0	0	0	6
Office・ Management	Accounting		2	5					7
	Personnel		1	2					3
	Student welfare		3	13					16
	Library		1	2					3
	Registrar		3	15					18
	Nutrition		3	16					19
	Wardens			10					10
	Driver			5					5
	Chief Technician		3	7					10
	Total	0	16	75	0	0	0	0	91
Educational section	Primary Division				18	23	10	0	51
	Secondary Division				31	17	2	5	55
	In-service Division				12	10	0	0	22
	Total	0	0	0	61	50	12	5	128
Grand Total		6	16	75	61	50	12	5	225

Lecturers

Educational Section	Subject	Senior Lecturer	Lecturer	Assistant Lecturer	Technician	Total
Primary Division	Agriculture	1	2	1		4
	English	3	2	0		5
	Home Ecoonmics	0	2	1		3
	Science	2	3	1		6
	Sesotho	1	3	1		5
	Social Development	2	3	1		6
	Math	1	3	1		5
	Music	1	0	0		1
	Professional Studies	2	4	1		7
	Religious Education	1	1	1		3
	Art & Craft	2	0	1		3
	Health & Phisical Education	2	0	1		3
	Total	18	23	10		51
Secondary Division	Agriculture	2	1	0		3
	Commercial Studies	1	2	1		4
	English	5	1	0		6
	Health & Phisical Education	1	0	0		1
	Home Ecoonmics	0	2	0		2
	Math	3	2	0		5
	Professional Studies	4	2	0		6
	Religious Education	2	1	0		3
	Science	5	0	0		5
	Sesotho	3	1	0		4
	Social Development	1	3	0		4
	Technology Studies	3	2	1		6
	Computer Studies	1	0	0		1
	Experiment Methods	0	0	0	4	4
	LEC Education				1	1
	Total	31	17	2	5	55
In-service Division	Agriculture	0	2	0		2
	Commercial Studies	1	1	0		2
	English	1	3			4
	Home Ecoonmics	1				1
	Health	1				1
	Math	1	1			2
	Professional Studies		2			2
	Religious Education	2				2
	Science	2				2
	Sesotho	2	1			3
	Social Development	1				1
	Total	12	10	0		22
	Grand Total	61	50	12	5	128

Projected Number of Students and Classes(Year 2000 - 2004）

Course	Grade	Year 2000*1		2001		2002		2003		2004	
		No. of Students	No. of Classes	No. of Students*2	No. of Classes*3	No. of Students*2	No. of Classes*3	No. of Students*2	No. of Classes*3	No. of Students*2	No. of Classes*3
DEP pre-service	Ⅰ	150	5	181	6	193	7	206	3	221	8
	Ⅱ	101	3	150	5	181	6	193	7	206	7
	Ⅲ	0	0	101	4	150	5	181	6	193	7
	Ⅳ	0	0	0	0	101	4	181	6	181	6
PTC pre-service	Ⅰ	0	0	0	0	0	0	0	0	0	0
	Ⅱ	18	1	0	0	0	0	0	0	0	0
	Ⅲ	172	5	18	1	0	0	0	0	0	0
DPE in-service	Ⅰ	44	2	48	2	52	2	56	2	60	2
	Ⅱ	48	2	44	2	48	2	52	2	56	2
	Ⅲ	62	2	48	2	44	2	48	2	52	2
STC pre-service	Ⅰ	130	4	185	6	193	7	207	7	221	8
	Ⅱ	86	3	134	5	185	6	193	7	207	7
	Ⅲ	100	3	85	3	134	5	185	6	193	7
DTE pre-service	Ⅰ	16	1	16	1	17	1	18	1	19	1
	Ⅱ	16	1	15	1	16	1	17	1	18	1
	Ⅲ	14	1	16	1	15	1	16	1	17	1
Total Number of Students		957	33	1041	39	1329	49	1553	51	1644	59

Note：＊**1** Numbers of students and classes in 2000 are the present data. (Source: NTTC)

＊2 DATA is provided by NTTC.

＊3 Number of Classes is calculated based on 30 students per class.

Projected Number of Lectures to Use Laboratories and Workshops per Week in Each Courses in Year 2002

（unit：lectures/week）

Course	Grade	No. of Classes		Science				Agriculture				Home Economics				Art & Craft				Computer			
				Sem.1		Sem.2		Sem.1		Sem.2		Sem.1		Sem.2		Sem.1		Sem.2		Sem.1		Sem.2	
				Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment	Total	Experiment
DEP	Ⅰ	7	Compulsory			35.0	26.1			28.0	22.4			21.0	15.4							30.0	27.0
	Ⅱ	6	Compulsory	18.0	14.8	18.0	14.4	18.0	13.2	18.0	14.4	18.0	12.6	18.0	16.2	20.0	15.0	20.0	18.0				
	Ⅲ	5	Compulsory	15.0	10.0	15.0	10.0	15.0	11.3	15.0	15.0	15.0	12.0			16.7	12.5						
	Ⅳ	4	Compulsory	12.0	9.1	12.0	8.4	12.0	3.7	6.0	6.0	12.0	9.2			13.3	11.3	13.3	11.3				
Total				45.0	33.9	80.0	58.9	45.0	28.3	67.0	57.8	45.0	33.8	39.0	31.6	50.0	38.8	33.3	29.3	0.0	0.0	30.0	27.0
DPE	Ⅰ	2	Compulsory	6.4	4.0	6.4	1.1													3.8	3.3		
		1	Selective	6.1	4.1	4.7	2.5																
	Ⅱ	2	Compulsory	6.4	4.0													24.0	6.4				
		1	Selective	4.0	2.6	3.9	2.3																
	Ⅲ	2	Compulsory							10.0	6.3			8.0	6.7								
		1	Selective			5.4	3.4																
Total				22.9	14.7	15.0	5.9	0.0	0.0	10.0	6.3	0.0	0.0	8.0	6.7	0.0	0.0	24.0	6.4	3.8	3.3		
STC	Ⅰ	1	Selective	6.3	4.9	7.5	5.3	7.2	5.2	7.5	5.1	7.5	6.4	7.7	5.5					2.0	1.6		
		1	Additional					3.0	2.1					3.0	4.3							7.7	5.8
	Ⅱ	3 or 2 *1	Selective	27.6	19.2		0.0	15.2	10.0			15.0	11.8							14.0	8.0		
		1	Additional					3.0	1.2														
	Ⅲ	2 or 1 *2	Selective	18.5	13.3	15.0	11.5	7.7	4.9	7.5	3.7	7.6	6.0	7.3	4.5					5.0	4.3	5.0	4.1
		1	Additional				1.2	3.0	1.8	3.0	1.5												
Total				52.4	37.5	22.5	16.7	39.0	25.3	18.0	10.3	30.1	24.2	18.0	14.3	0.0	0.0	0.0	0.0	21.0	14.0	12.7	9.9
Dip.Tech.	Ⅰ	1	Compulsory			3.0	2.3															5.0	1.5
	Ⅱ	1	Compulsory	45.0	2.5		0.0																
	Ⅲ	1	Compulsory	40.0	2.1	2.0	1.1													35.0	4.1		
Total				85.0	4.5	5.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.0	4.1	5.0	1.5
Grand Total			0.00	205.3	90.6	122.5	84.9	84.0	53.5	95.0	74.4	75.1	58.0	65.0	52.6	50.0	38.8	57.3	35.7	59.8	21.4	47.7	38.5

Note: ***1** :3 lectures for Science, 2 lectures for Agriculture, Home Economics and Computer
***2** :2 lectures for Science, 1 lectures for Agriculture, Home Economics and Computer

Total Number of Lectures in Each Course and Subject

Course	Subject	Semester 1			Semester 1			Total		
		Total	Experiments	Experiment Ratio(%)	Total	Experiments	Experiment Ratio(%)	Total	Experiments	Experiment Ratio(%)
DEP	Science	135	101	74.8	165	123	74.5	300	224	74.7
	Agriculture	135	81	60.0	65	52	80.0	200	133	66.5
	Home Economic	90	68	75.6	60	49	81.7	150	117	78.0
	Art & Craft	60	47	78.3	40	35	87.5	100	82	82.0
	Computer	0	0		30	27	90.0	30	27	90.0
	Total	420	297	70.7	360	286	79.4	780	583	74.7
DPE	Science	184	121	65.8	199	117	58.8	383	238	62.1
	Agriculture	0	0		60	38	63.3	60	38	63.3
	Home Economic	0	0		60	50	83.3	60	50	83.3
	Art & Craft	0	0		60	48	80.0	60	48	80.0
	Computer	15	13	86.7	0	0		15	13	86.7
	Total	199	134	67.3	379	253	66.8	578	387	67.0
STC	Science	371	270	72.8	255	183	71.8	626	453	72.4
	Agriculture	351	226	64.4	202	154	76.2	553	380	68.7
	Home Economic	256	208	81.3	216	185	85.6	472	393	83.3
	Computer	117	84	71.8	91	72	79.1	208	156	75.0
	Total	1,095	788	72.0	764	594	77.7	1,859	1,382	74.3
Dip. Tech.	Science	85	68	80.0	65	45	69.2	150	113	75.3
	Computer	35	29		25	23	92.0	60	52	86.7
	Total	120	97	80.8	90	68	75.6	210	165	78.6
Grand Total		1,834	1,316	71.8	1,593	1,201	75.4	3,427	2,517	73.4

Total Number of Lectures in Each Subject

Subject	Semester 1			Semester 1			Total		
	Total	Experiments	Experiment Ratio(%)	Total	Experiments	Experiment Ratio(%)	Total	Experiments	Experiment Ratio(%)
Science	775	560	72.3	684	468	68.4	1,459	1,028	70.5
Agriculture	486	307	63.2	327	244	74.6	813	551	67.8
Home Economics	346	276	79.8	336	284	84.5	682	560	82.1
Art & Craft	60	47	78.3	100	83	83.0	160	130	81.3
Computer	167	126	75.4	146	122	83.6	313	248	79.2
Grand Total	1,834	1,316	71.8	1,593	1,201	75.4	3,427	2,517	73.4

15. Number of Lectures of General Subjects in Year 2002

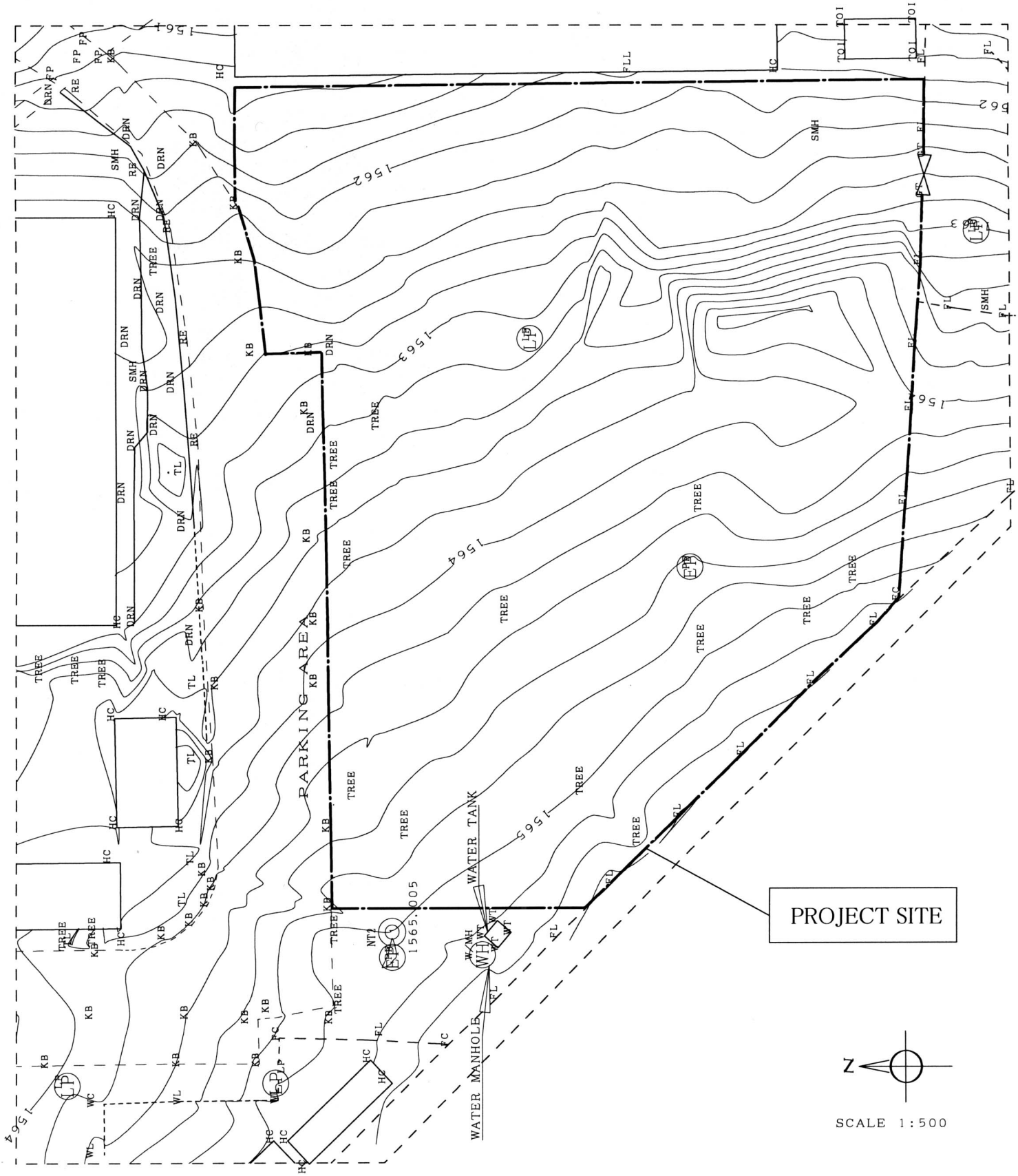
Number of Lectures of General Subjects in Year 2002

	Grade	No. of classes	No. of lectures /week	The subjects which are held in Labs and Workshops					Other lectures	
				Science	Agriculture	Home Economics	Art & Craft	Computer	Total	No. of lectures
DEP：	Ⅰ	7	24	5	3	3	3	2	8	56
	Ⅱ	6	24	3	3	3	3	0	12	72
	Ⅲ	5	24	3	3	3	3	0	12	60
	Ⅳ	4	24	3	3	3	3	0	12	48
DPE：	Ⅰ	2	30	3(6) *1	(6) *2	0	0	6	9(12)	30
	Ⅱ	2	30	3(4) *1	(4) *2	0	3	0	20(8)	48
	Ⅲ	2	30	(5) *1	(5) *2	3	0	0	27(10)	64
STC：	Ⅰ	7	27	(7.5) *1	3(7.5) *2	(7.5) *2	0	2	9(15)	101.5
	Ⅱ	6	27	(7.5) *1	(7.5) *2	(7.5) *2	0	0	12(15)	109.5
	Ⅲ	5	27	(7.5) *1	3(7.5) *2	(7.5) *2	0	3	6(15)	52.5
Dip.Tech.：	Ⅰ	1	36	4	0	0	0	10	7*3	7
	Ⅱ	1	39	3	0	0	0	6	15*3	15
	Ⅲ	1	28	3	0	0	0	6	5*3	5
Total		46								668.5

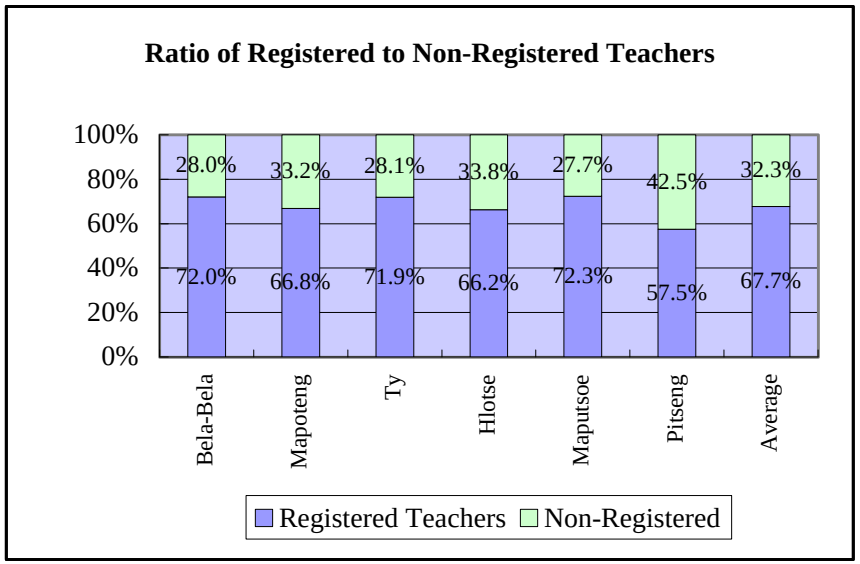
Note： *1 Numbers in （） are the numbers of special subjects, and one subject is selected between two.

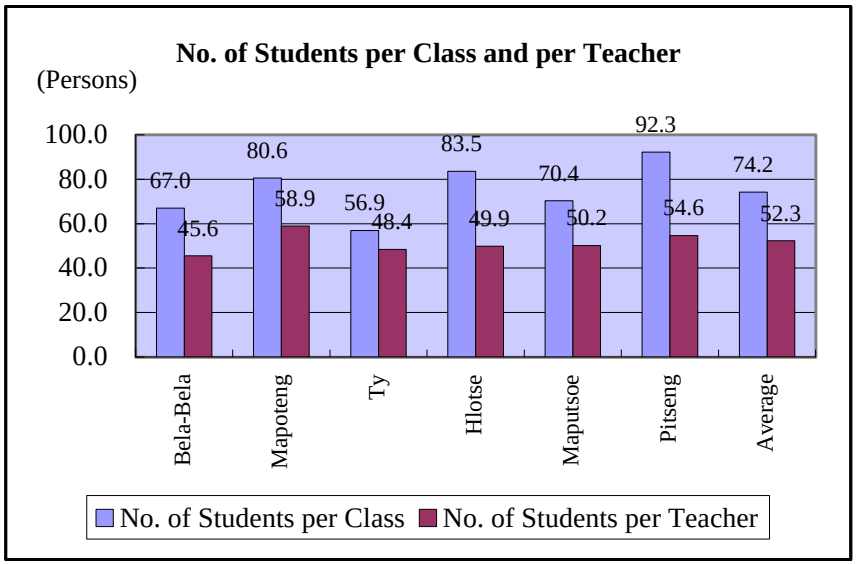
*2 Numbers in （） are the numbers of special subjects, and one subject is selected among three.

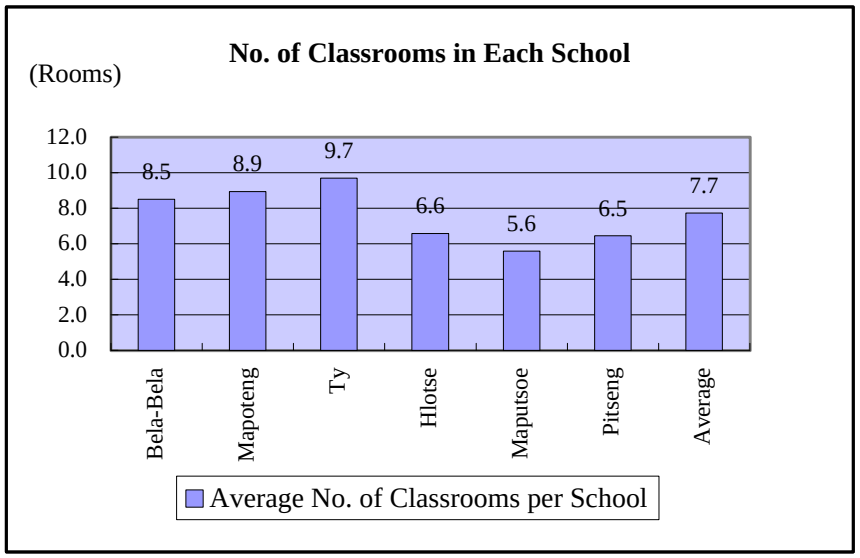
*3 Numbers of lectures which are held in Technology Studies Workshop are reduced.

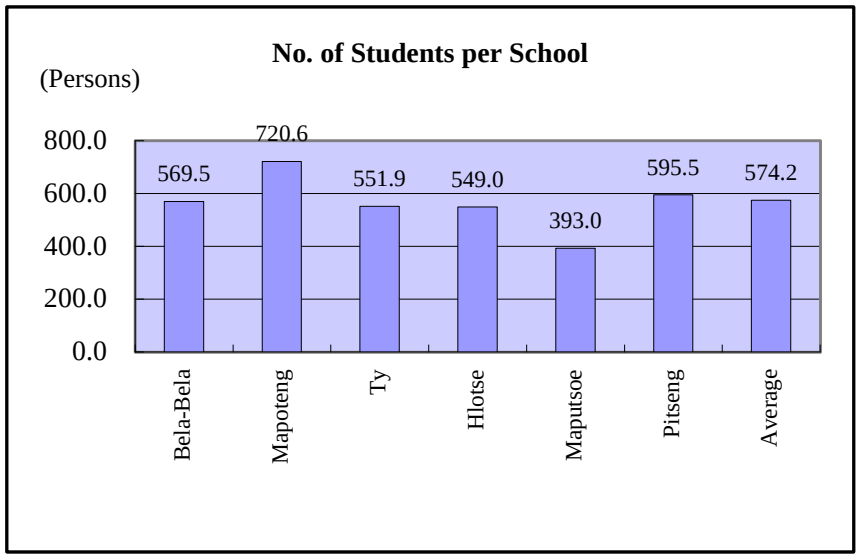

PROJECT SITE
PARKING AREA
WATER TANK
WATER MANHOLE
1565.005
N
SCALE 1:500

Analysis of the Questionnaire Survey to Trainees in the In-Service Programme (64 Samples, 15th Apr. 2000)









Basic Design Study (5 / Apr. / 2000 ～ 1 / May / 2000)

No.	Name
National Teacher Training College	
NT-1	Staff Profile - Primary Pre-service Division - NTTC 2000
NT-2	STAFF LIST
NT-3	STAFF LIST - SECONDARY DIVISION
NT-4	National Teacher Training College (Organizational Structure)
NT-5	Suggested Academic Organizational Structure
NT-6	TARIFF (Electricity)
NT-7	TARIFF (Water)
NT-8	BASIC REQUIREMENTS FOR THE PROJECT (JAPANESE)
NT-9	Tentative Plan For New Building Use (Science, H.E.)
NT-10	Estimate Of Cost For Telephone Provision To New Buildings At NTTC
NT-11	Time Tables (Agriculture, Science, Computer, Laboratory 41/42)
NT-12	RECURRENT ESTIMATES 2000/2001 NATIONAL TEACHER TRAINING COLLEGE
NT-13	RECURRENT ESTIMATES 1999/2000 NATIONAL TEACHER TRAINING COLLEGE
NT-14	LESOTHO Government Gazette EXTRAORDINARY Vol. XLIII Friday - 27th March, 1998 No.20
NT-15	BUDGET INFORMATION (Expenditure, Revenue)
NT-16	NTTC CALENDER 2000
NT-17	Number of Student (2001-2004)
NT-20-1	Answers to Questionnaire 2.1.3(8)
NT-20-2	Answers to Questionnaire 2.1.4
NT-20-3	Answers to Questionnaire 2.2.6
NT-20-4	Answers to Questionnaire Chapter 7
NT-21	The Lesotho College of Education- Calender 2000 (Copy)
NT-22	Project Progress Report Summary (Education) (Copy)
NT-23	Projected Mid-year Population by Age and Sex (Numbers) 1996 to 2020 (Copy)
NT-24	National Teacher Training College Revised Proposal for Diploma in Education (Secondary) (Copy)
NT-25	Ministry of the Republic Circular Notice No. 9 of 1998 (Copy)
NT-26	Lesotho College of Education, Terms and Conditions of Service (Copy)
NT-27	Lesotho Government Gazette Extraordinary VOLXLIII Feb-27th March, 1998 No. 20 (Copy)
NT-28	National Teacher Training College Application Form
Ministry of Education	
ME-1	Estimates of the Kingdom of Lesotho for the year from 1st April 1998 to March 31, 1999(Copy) Part 1 Revenue and Expenditure Account
ME-2	Estimates of the Kingdom of Lesotho for the year from 1st April 1998 to March 31, 1999(Copy) Part 2 Development Account
ME-3	Ministry of Education Strengthening Secondary Education Project Progress Quarterly Progress Report April-July 1999 (Copy)
ME-4	AfDB, Appraisal Report, Education II Project (Basic Education Improvement) August 1998 (Copy)
ME-5	Strengthening Secondary Education Project, Status of the Project, Ministry of Education, Planning Unit (Copy)
ME-6	Project Appraisal Doc. on a Proposed Credit in the Amount of SDR 15 million to the Kingdom of Lesotho for a Secondary Education Sector Development Project
Lands and Survey Phisical Planning	
LS-1	TOWN MAP OF MASERU
LS-2	Aerial Photograph (NTTC)
Ministry of Works	
MW-1	MINISTRY OF WORKS EXTERNAL CIRCULAR NOTICE No.5 of 1996
Lesotho Meteorogical Services	
MS-1	Meteorogical Data
Lesotho Telecommunications Corporation	
TC-1	TARIFFS
WASA	
WA-1	WASA TARIFF STRUCTURE

Europian Union	
EU-1	NATIONAL INDICATIVE PROGRAMME
World Bank	
WB-1	OVERVIEW - Lesotho and the World Bank
ZMCK	
ZM-1	The Steeledale Lattice Beam Slab Structure
ZM-2	
FLASH	
FL-1	BIDDING DOCUMENTS - ALTERATIONS TO EXISTING STUDENT HOSTELS
(Drawings)	
DR-1	Hostel Type A (Floor Plans - GF)
DR-2	Hostel Type A (Floor Plans - 1F,2F)
DR-3	Hostel Type A (Sections and Elevations) -1
DR-4	Hostel Type A (Sections and Elevations) -2
DR-5	Type A Hostel Slab Layout - 1st Floor
DR-6	Type A Hostel Slab Layout - 2nd Floor
DR-7	Type A, B & C Hostels Beam Reinf -1
DR-8	Type A, B & C Hostels Beam Reinf -2
DR-9	New Student Hostels (Site Plan : Mech & Electrical Services)
DR-10	New Student Hostels (Site Plan : Foul Sewer Layout)
DR-11	NTTC Photographic Viewpoints and Site Plan
DR-12	NTTC Site Plan
DR-13	New Office for NTTC (Ground Floor Plan)
DR-14	New Office for NTTC (Extrernal Works Layout)
DR-15	New Office for NTTC (Foundation Layout)
DR-16	NTTC Campus (Topography)
Others	
OT-1	LESOTHO business directory 2000
OT-2	LESOTHO REVIEW 2000 - A REVIEW OF COMMERCE, INDUSTRY AND TOURISM