CHAPTER 6 OPERATION AND MAINTENANCE PLAN

6-1 Operation and Maintenance of the Facility and of the Research Equipment

6-2 Operation and Maintenance Cost

CHAPTER 6 OPERATION AND MAINTENANCE PLAN

6-1 Operation and Maintenance of the Facility and of the Research Equipment.

6-1-1 Operation and Maintenance of the Facility

It is desirable for a full-time engineer of this research institute to perform operation and maintenance of the facility. Further, support from maintenance personnel of the Department of Works in Port Moresby is expected.

To operate and maintain the facility, however, it is important for engineers well informed about the facility and its equipment to accurately perform equipment inspection activities in accordance with guidelines in the daily maintenance inspection and equipment handling manuals and to take action in case of an emergency. Therefore, it is necessary to secure and train engineers well informed about the construction of this facility and the facility contents.

(1) Securing of Practical Experience for the Person in Charge of Facility Operation and Maintenance

The service life of the facility is greatly influenced by the degree of understanding on the port of the facility engineer regarding the entire facility as a system, the methods of operation and maintenance, actions in emergencies, etc., which directory affect its functions.

If the building and facility engineers who will be in charge of operation and maintenance of this facility participate in the construction meetings during the construction period and gain practical experiences, they will be able to cope quickly and appropriately with failures of the building and facility system which might occur in the future after completion of the building. Further, technical transfer regarding the operation

and maintenance methods of the facility and its equipment by the Japanese side can also be arranged.

Since knowing the design policies and details of the construction helps to plan for appropriate operation and maintenance of the facility, the best method is to transfer maintenance technology to the operation and maintenance engineers during the construction period. It is necessary to establish a system for selecting the engineers to be in charge of the buildings of this research institute, and of operation and maintenance of the facility by the start of its construction, and to arrange for them to receive technical guidance simultaneously with the start of the construction.

(2) Securing of Expendable Supplies

Most of the expendable suppling and equipment parts used in the water feed and drainage hygiene facilities will be procured from Japan. Therefore, for the management side to be able to easily confirm the spec. numbers of items when needs arise to obtain expendable supplies and equipment parts, the equipment agents and the names of the persons in charge at the manufacturers office, and the communication routing shall be made clear.

6-1-2 Operation and Maintenance of Research Equipment

To maintain the facility's intended functions a system for performing daily operation and maintenance and speedy repairs in the case of failure and further more to continuously supply replacement parts and expendable supplies must be established.

(1) Since most of the research equipment introduced at the execution of this Project is not produced in PNG, it will be imported from Japan. Further, currently there is a shortage of personnel and equipment for the maintenance and repair network of research equipment in the entire country of PNG. Completing the

operation and maintenance division of only one research institute will not solve these problems.

The problem is how to proceed with improvement of the operation and maintenance system for the research equipment of the entire country.

(2) Measures against Initial Trouble

In the case of PNG, the operators and technical staff members are not used to operating the research equipment. The number of operational errors as a result of this and the occurrences of initial trouble within one year from the start of operation shall be seemed to be much more than Japan, are much more frequent than in Japan. Most of these cases can be easily treated if a simple action such as replacement of repair parts is taken at an early stage, and so the Research Equipment Maintenance needs to start its work at the same time as the opening of this research institute as a measure against initial trouble.

(3) Mastery of Equipment Operation and Sure Implementation of Daily Maintenance

Daily maintenance must be performed not by the person in charge from the maintenance division but by the engineer or the operator who actually operates the equipment. To prevent operational errors which are the greatest cause of equipment trouble and to regularly perform appropriate maintenance in accordance with operation manuals sufficient technical guidance from the Japanese side for these persons is indispensable.

Therefore, the following guidance must be given by the Japanese side upon transfer of the research equipment to ensure its proper maintenance:

① To present and give guidance to the PNG side on the storage methods of the supplied repair parts and expendable items.

② To prepare well-defined manuals on the equipment repair methods and to present and give guidance to the PNG side on utilization methods and storage methods.

③ To present an explanation of equipment operation and repair method by a Japanese engineer who has a good related experiences.

Considering the above situation, one or two spares shall be provided for those pieces of equipment that seem to occasionally require replacement parts.

6-2 Operation and Maintenance Cost

Each necessary expense item for operation and maintenance are as follows:

(1) Personnel Expenses

Suggest structure of staff and personnel expenses in 1989 are in Table 6-1.

Table 6-1 Structure of Staff and Personnel Expenses

(K=Kina)

Position	Mumber of Persons	Salary (K/man-month)	Total (K/month)
Head	1	1,500	1,500
Branch Office	4	1,000	4,000
Scientific Officer	18	700	12,600
Researcher	23	500	11,500
Ordinary Officer	17	350	5,950
Total	63	4,050	35,550

This 426,600 Kina has been calculated based on 10% up of estimation and including increase of staff upto 1989. Formulated 731,400 Kina x 0.53 x 1.1.

(2) Fuel and Light Expenses

1) Electricity expenses

Lighting	:	260 KVA x 20% = 52 KVA
Power for laboratory work	:	200 KVA x 30% = 60 KVA
Other Power	:	480 KVA x 30% = 144 KVA
		Total = 256 KVA

Amount used : 256 KVA x 25 day x 55% x 7 h = 24,640 KWH

24,640 KVA x 0.08 K/KWH = 1,971.2 K/month = 23,654.4 K/year

≒ 24,000 K/year

2) Water expenses

Quantity of Water used : 1,000 m^3/month

Amount used : $15\ K + \frac{1,000,000L-200,000L}{200,000L} \times 2.5\ K + 1.5\ K = 26.5\ K$

26.5 K x 12 month = 318 K/Year ≒ 320 K/year

3) LPG expenses

Quantity of LPG used : 2,000 Kg/year

Amount used: 2,000 Kg/year x 2.205 Lb/Kg ÷ 100 Lb/pcs = 44.1 pcs.

44.1 pcs. x 64 K/pcs. = 2,822 K ≒ 2,900 K

1)	Electricity expenses:	24,000 K/year
2)	Water expenses:	320 K/year
3)	LPG expenses:	2,900 K/year
		27,220 K/year

(3) Telephone Charges: 5,000 K/year

(4) Building Maintenance Expenses

① Labor expenses: 1,000 K/year

② Equipment parts and expendable supplies

The equipment parts and expendable supplies will be included in the main construction as spare parts for the first year. However, from the second year on those must be supplied by the PNG side.

o Equipment parts

Electrical	500 K/year
Water feed and drainage	300 K/year
Air-conditioning and ventilation	200 K/year
Total:	1,000 K/year

o Expendable supplies

Building	500 K/year
Electrical	2,500 K/year
Water feed and drainage	500 K/year
Air-conditioning and ventilation	500 K/year
Total:	4,000 K/year
Grand Total:	6,000 K/year

(5) Research Equipment Maintenance Expenses

o Chemicals, equipment parts, expendables: 3,000 K/year

The expendable will be included in the main construction for the first year. Therefore, they will be necessary from the second year on.

Operation and Maintenance Expenses Table

	1st year after establishment (K/Y)	2nd year on (K/Y)
		increase in 2nd yr
① Personnel expenses	426,600	447,930
② Fuel and light expenses	27,220	27,220
③ Telephone charges	5,000	5,000
④ Building maintenance expenses	6,000	6,000
⑤ Research equip. maintenance expenses	3,000	5,000
⑥ Office expenses	1,000	3,000
⑦ Others	1,000	1,000
Total ②-⑦	43,220	47,220
Grand Total ①-⑦	469,820	495,150

The whole budget of Department of Forest is 918,400 Kina in 1987 and out of this budget 731,400 Kina can be used for Division of Research.

Following items and figures can be suggested as the budget for operation and maintenane of FRI.

a. Personnel expenses: 388,100 Kina
b. Utilities: 21,000 Kina Fuel and light expenses
c. Communication expenses: 6,700 Kina
d. Repair and supply expenses: 17,000 Kina
e. Others: 3,300 Kina

Total of b. to e. above is 48,000 Kina

Therefore, it can be considered that this FRI will be able to maintein within their estimated budget.

CHAPTER 7 PROJECT EVALUATION

CHAPTER 7 PROJECT EVALUATION

7-1 Expected Results of the Project

The socioeconomic benefits expected from the establishment of the Institute are evaluated below in terms of direct and indirect effects.

(1) Direct effects

① Advancement of Research Efficiency

Centralization and integration of facilities and personnel at the Institute will encourage the exchange of information and research results. This will avoid redundant studies and effectively accumulate research achievements.

② Efficient Use of Research Budget

Duplication of operation and maintenance expenses, equipment and publications due to the separate locations of the various forestry institutes will be ended through the Project. More efficient use of the research budget as a result of the Project will alleviate the financial burden of the PNG Government which is now experiencing severe economic restraints.

③ Upgrading of Research Quality

The introduction of various instruments and equipment will make possible more precise studies and experiments in forestry research. This will contribute to upgrading the level of forestry research in PNG.

④ International Contribution

The Institute is expected to serve as an internationally valued institute providing high grade facilities for minute and comprehensive studies on South Seas timber.

(2) Indirect Effects

① Improvement in forestry resources preservation

The major targets of the Institute consist of innovation and improvement of methods for natural forest silviculture and plantation silviculture. Such achievements, if realized, will certainly bring about improvement in PNG's preserving and regenerating capacity for forestry resources, which will then be utilized as permanent resources. The results will not only benefit PNG but also contribute to developing forestry resources in other countries which are in a similar situation.

② Promotion of forestry products and increased employment opportunities

The Institute will be engaged in the study of silviculture, entomology and forest management, which will have a direct impact on the development of forestry in PNG. At the same time, the Institute will deal with research activities related to forest products. Advancement in forestry technology as a result of such study will bring about diversification in forest products and their use and consequently the expansion of the market. This will contribute to increasing job opportunities.

③ Development of industries related to forestry and forest products

Once the forestry and forest product industries are activated, they will trigger chain reactions first in-directly related industries and then in more remote industries. In the meantime, more job opportunities will be created for the country's workforce.

④ Improvement of PNG's financial situation

Economic progress brought about by the development of the forestry and forest product industries will contribute to the improvement of the financial situation in the country.

⑤ Diffusion of information on politics, economics, culture and education to upcountry areas

With the expansion of forestry, new routes for the exchange of people and goods will be developed. Through these routes will be diffused various information concerning politics, economics, culture and education, which will eventually improve the living conditions and welfare of the people.

7-2 Appropriateness of the Implementation of the Project

The Forest Research Institute will be established with a view to the following two goals; 1) to restore decreasing forestry resources in PNG through appropriate silviculture technology and utilize them as permanent regenerative resources, and 2) to provide job opportunities to the ever-increasing workforce generated by PNG's steady population growth through development of the forestry and forest product industries.

The Institute will centralize the functions of the various forestry research institutes now dispersed in PNG at the Botanical Garden in Lae, where an adequate research environment is provided. It will consist of four divisions; namely, Silviculture, Botany, Protection and Forest Products.

The establishment of the Institute will enable efficient use of the research budget and enhance research quality and efficiency. It is accordingly expected that the above two goals will be achieved. Successful operation of the Institute will have a favorable impact not only on the socioeconomic development of PNG but also on other countries in a similar situation. The Project is therefore regarded as highly significant and appropriate to be implemented with Japan's grant aid.

With implementation of the Project, the facilities involved in forestry research, administration and industry which are now dispersed around PNG will be integrated into the Institute. This will greatly facilitate raising the efficiency of research work for forest development and conservation by enabling close cooperation and coordination between respective divisions of the Institute. It is furthermore expected that the Institute will provide opportunities for researchers from other countries which are experiencing a situation similar to PNG to collaborate with the PNG staff.

In view of the favorable results expected from the Project as mentioned above, it is concluded that the Project is highly significant and appropriate to be implemented with grant aid from the Japanese Government. Accordingly, it is highly recommended that the Project be implemented with dispatch.

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

8-1 Conclusion

8-2 Recommendations

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

8-1 Conclusion

The Project for the establishment of a Forest Research Institute has been planned as part of PNG's efforts to modernize its research in forestry. The PNG Government places considerable emphasis on the promotion of forestry and overall policies for forestry development are indicated in the National Development Plan. They include promotion of forest management for successful utilization and replenishment of forestry resources, research aimed at community development, forestry training, etc. In order to achieve these goals, it is necessary to carry out basic studies in forestry, disseminate the results and increase exports of forestry products.

The Research Division of the Department of Forests is responsible for the studies but its branches are scattered over several locations. This unfavorable situation has caused inconsistency and inefficiency in the research. Integration of these branches is essential to achieve the above-mentioned objectives.

The Institute will also provide foreign researchers from both developing and industrialized countries with opportunities to join in collaborative studies. This will contribute to the progress of PNG's research output and standards.

The Project, which has been worked out with consultations between PNG and Japan, can be evaluated as appropriate in terms of its proposed contents, scale, operation system and other aspects. The Project has been designed so as to accomplish its initial objectives. In compliance with the government's policies for modernization of its forestry sector, the Project will greatly contribute to the advancement of forestry technology, conservation of forestry resource and development of related industries and communities.

8-2 Recommendations

1) The Forest Research Institute will be a central institute in PNG between other relevant bodies both domestic and international in the field of forestry. All forestry research activities in PNG will be coordinated by the Institute.

   The Institute has great roles in not only research activities but dissemination of it and technical advice to other Divisions of Department of Forestry from the view of importance of utilizing the results of research activities.

   The publication of research reports and seminars for the forestry officers and private firms, etc. will be conducted by the Institute for dissemination, and other Divisions will have close relationships with the Institute so that they can execute their own work effectively.

2) The objectives of the Institute will be accomplished only when the results of research work are utilized for the benefit of society. To realize an effective return of benefits to society, comprehensive activities regarding research, education, training and technology diffusion are necessary.

   Therefore, the FRI should work closely with other sister institutes such as TITC and Forestry of UNITEC in the country for better output and maximum benefits.

3) The Institute will include facilities which require round-the-clock surveillance. Proper operation and maintenance are the clue to successful functioning and achievement of the initial goals of the Institute. In consideration of the above particular situations, an administrative system which entails periodic inspections of the facilities, such as the glass house for biological control and mushroom laboratory, should be assured.

4) It is to be desired that both the PNG Government and the Japanese Government make their concerted efforts to realize viable technical cooperation to ensure this project achieves the maximum impact on the socio-economic welfare of the PNG nation and its people.

APPENDICES

Appendix - I - 1

MINUTES OF DISCUSSIONS

ON

THE BASIC DESIGN STUDY ON THE PROJECT FOR THE ESTABLISHMENT OF FOREST RESEARCH INSTITUTE

IN

PAPUA NEW GUINEA

In response to the request of the Government of Papua New Guinea, the Government of Japan has decided to conduct a basic design study on the project for the establishment of a Forest Research Institute and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Papua New Guinea the study team headed by Mr Masao Tsujioka, Deputy Head, First Basic Design Study Division, Grant Aid Planning and Survey Department, JICA, from 18th July to 10th August, 1987.

The team had a series of discussions on the Project with the officials concerned of the Government of Papua New Guinea headed by Dr. P. Srivastava, Acting First Assistant Secretary, Research Division of Department of Forests and conducted a field survey in the areas relevant to the Project.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, would be examined towards the realization of the Project.

Port Moresby
28th July 1987

Mr. Masao Tsujioka
Team Leader
Basic Design Study Team
Japan International Cooperation Agency

George Paru
A/Assistant Secretary
Foreign Aid Mgt. Dn.
Department of Finance & Planning
Papua New Guinea

ATTACHMENT

1. The Japanese side explained the inception report of the Basic Design Study and the Papua New Guinea side understood it.

2. Both parties confirmed the objective of the Project with regard to the establishment of Forest Research Institute (FRI), the executing body and the areas of research as mentioned in the articles 1, 3 and 4 of the Minutes of Discussions of the Preliminary Study mission signed on the 6th March, 1987.

3. The site for FRI building is to be in the National Botanical Garden and accommodation in the compound of Timber Industry Training College in Lae as shown in the attached site map (Annex. 1).

4. The organization of FRI would be as shown in Annex II.

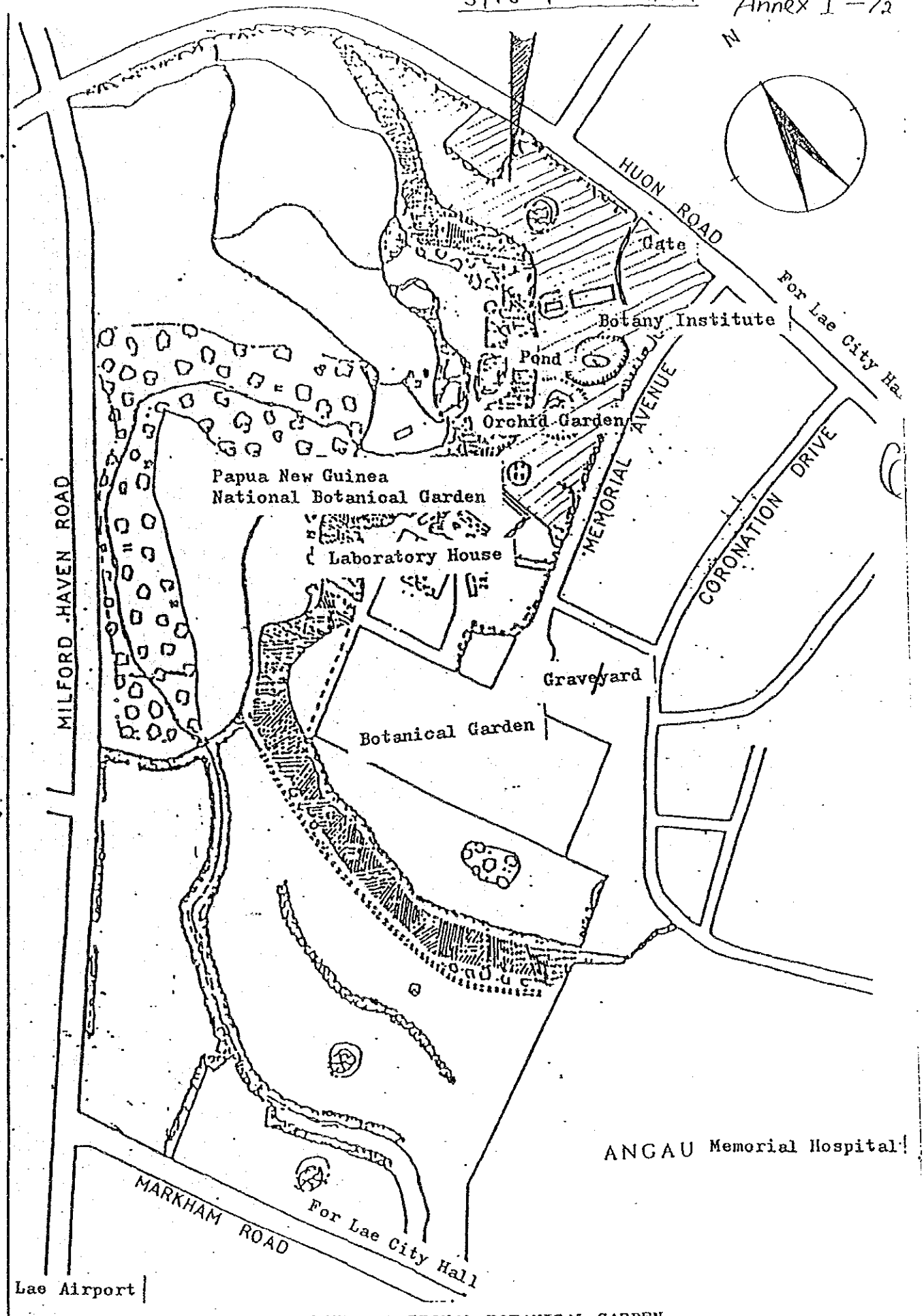
5. The Papua New Guinea side has understood Japan's Grant Aid System explained by the Team which includes a principle of use of a Japanese consultant firm recommended by JICA and Japanese contractor selected by the open tendering.

6. The team will convey to the Government of Japan the request of the Government of Papua New Guinea that the Former takes necessary measures to cooperate by providing the facilities and equipment listed in Annex III within the scope of Japanese economic cooperation programme in grant form.

7. The Government of Papua New Guinea will take necessary measures as listed in Annex IV on condition that grant assistance by the Government of Japan is extended for the Project.

8. Both sides agreed that the status, vis-á-vis other relevant bodies both domestic and international, of F.R.I. as central institute in P.N.G. and future course of its activities should be more clearly defined. The matter will be further discussed for inclusion in the final report.

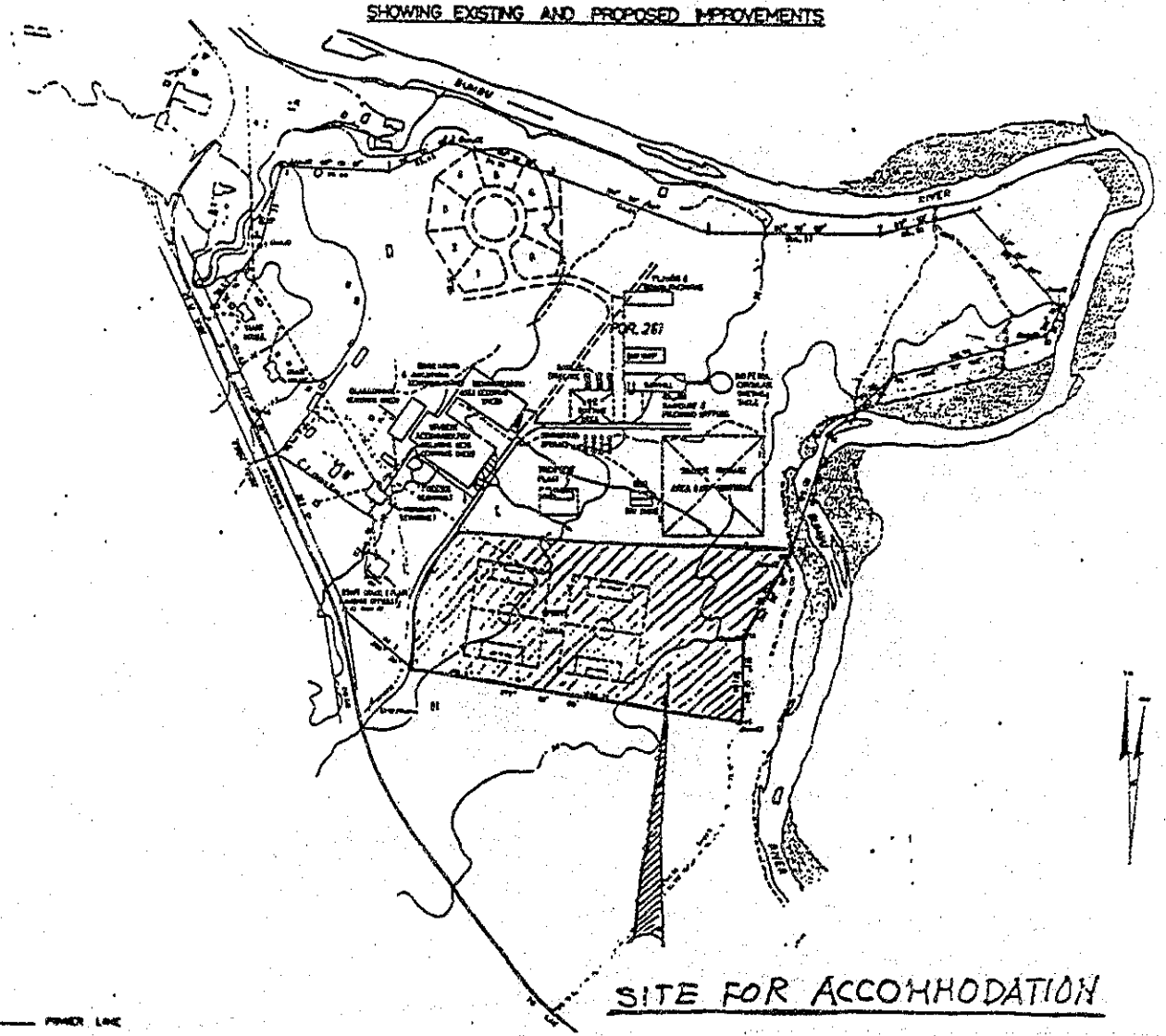
SITE FOR F.R.I. Annex I - ½



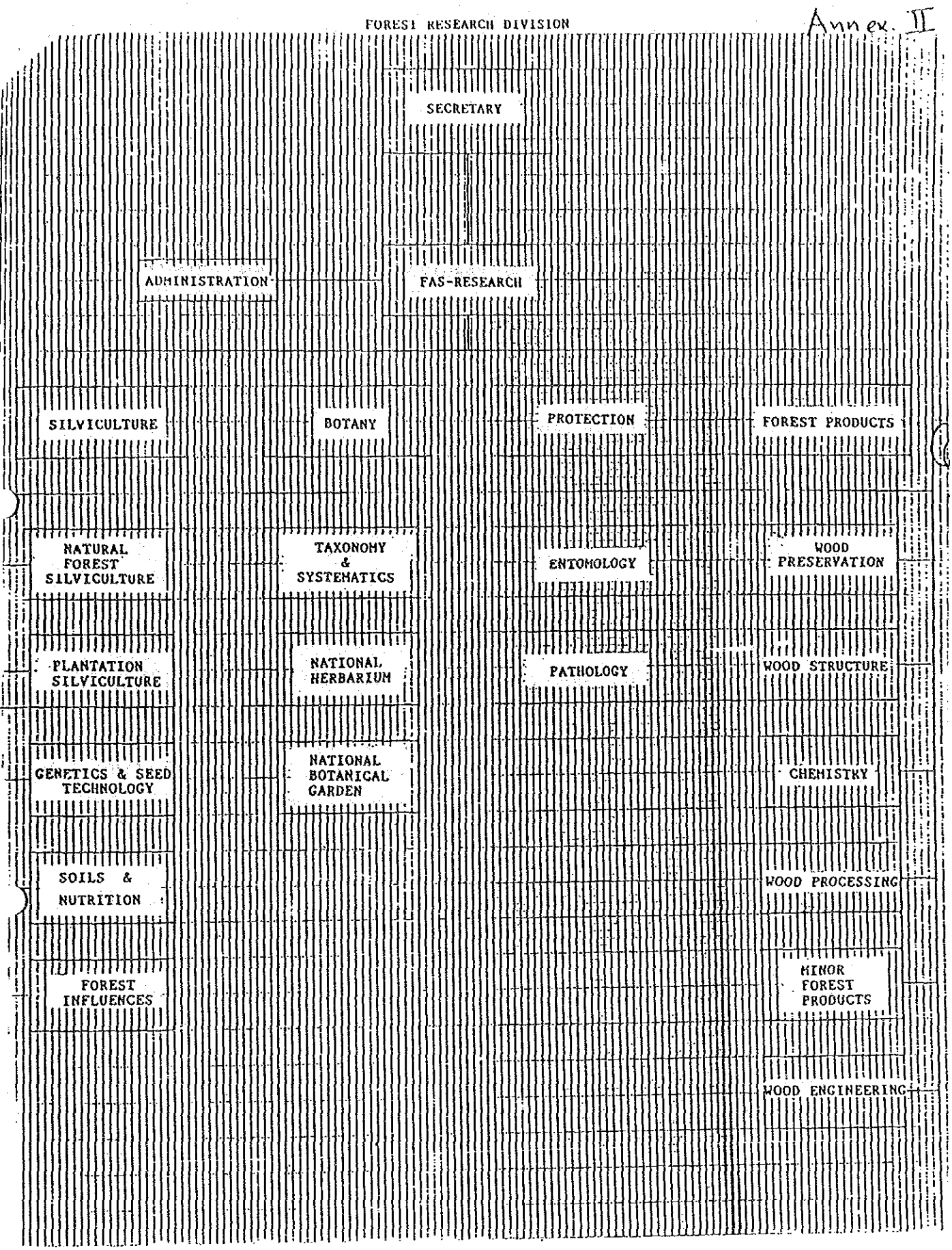
PAPUA NEW GUINEA NATIONAL BOTANICAL GARDEN

Annex I - 2/2

FOREST INDUSTRIES TRAINING CENTRE
LAE
SHOWING EXISTING AND PROPOSED IMPROVEMENTS



Annex. II


FOREST RESEARCH DIVISION
SECRETARY
ADMINISTRATION
FAS-RESEARCH
SILVICULTURE
BOTANY
PROTECTION
FOREST PRODUCTS
NATURAL FOREST SILVICULTURE
TAXONOMY & SYSTEMATICS
ENTOMOLOGY
WOOD PRESERVATION
PLANTATION SILVICULTURE
NATIONAL HERBARIUM
PATHOLOGY
WOOD STRUCTURE
GENETICS & SEED TECHNOLOGY
NATIONAL BOTANICAL GARDEN
CHEMISTRY
SOILS & NUTRITION
WOOD PROCESSING
FOREST INFLUENCES
MINOR FOREST PRODUCTS
WOOD ENGINEERING

THE REQUEST MADE BY THE GOVERNMENT OF PAPUA NEW GUINEA

1. Construction of the Forest Research Institute and its attached accommodations with the following facilities shall be carried out in full consultation with the PNG Government.

   1.1 The Forest Research Institute

   (1) Office Space
   (2) Laboratories
   (3) Library
   (4) Stores/Workshop
   (5) Specimen Rooms

   1.2 Accommodations

   (1) Accommodations for indispensable Staff members (Director, 4 Branch Heads and their immediate assistant officers).

   (2) Guest Houses for guest researchers including Japanese experts (Plan of acceptance of guest researchers will be given to the study team).

2. Provision of equipment related to the abovementioned facilities such as:

   (1) Office Equipment
   (2) Meteorological Equipment
   (3) Laboratory Equipment
   (4) Nursery Equipment
   (5) Field Equipment
   (6) Training Equipment
   (7) Vehicles and Transport
   (8) Maintenance Workshop and Machine Tools

Annex IV

Following arrangements will be required to be taken by the Government of Papua New Guinea.

1. To provide necessary data for smooth completion of the study.

2. To carry out site preparation such as clearing, filling, levelling and access road before commencement of construction works.

3. To provide facilities for distribution of electricity, water supply, drainage, telephone lines and other incidental facilities to the Project Site.

4. To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Papua New Guinea of the products purchased under the grant.

5. To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in Papua New Guinea with respect to the supply of the products and services under the verified contracts.

6. To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contracts, with such facilities which may be necessary for their entry into Papua New Guinea and stay therein for the performance of their work.

7. To maintain and use properly and effectively the facilities constructed and equipment purchased under the grant.

8. To undertake incidental civil works such as gardening, fencing, gates, guard house and exterior lighting.

MINUTES OF DISCUSSION

ON

THE DRAFT FINAL REPORT OF THE BASIC DESIGN STUDY

OF

THE ESTABLISHMENT OF FOREST RESEARCH INSTITUTE

IN

PAPUA NEW GUINEA

In response to the request of the Government of Papua New Guinea, the Government of Japan conducted a basic design study on the project for the establishment of Forest Research Institute and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Papua New Guinea the study team headed by Mr. Masao Tsujioka, Deputy Head, First Basic Design Study Divison, Grant Aid Planning and Survey Department, JICA, from 18th July to 10 August, 1987.

The team had a series of discussions on the Project with the officials of the Government of Papua New Guinea representing the Department of Forests, Works and Finance and Planning. As the result of the surveys and discussions, JICA prepared a Draft Final Report on the study and despatched a mission to explain and discuss the report starting from 28th October to 8th November, 1987.

Both parties had a series of dicussions on the Report and have agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Mr. Masao Tsujioka
Team Leader
Basic Design Study Team
Japan International Cooperation Agency

Ms. Fiu Williame
Assistant Secretary
Foreign Aid Management Division
Department of Finance and Planning
Papua New Guinea

6/11/87

ATTACHEMENT

1. The Japanese side explained the Draft Final Report to the Papua New Guinea side and Papua New Guinea side principally agreed with the concept of the project but requested to the Japanese side to finalise the report so as to meet Papua New Guinea requirements as in Annex I, II and III; and within the current budgetary provisions for this activity. The Papua New Guinea side also explained to the Japanese side that additional staff accommodation still has to be resolved internally. The rest of the Papua New Guinea's views on the consultancy proposal, building contract, supply of equipment contract and other matters will be communicated to the Japanese side as soon as possible.

2. The Final Report (10 copies in English) on the Project will be submitted to the Government of Papua New Guinea by the beginning of January 1988.

3. The Papua New Guinea side noted the system of Japan's Grant Aid programme and confirmed the arrangements to be taken by the Government of Papua New Guinea for the realization of the Project.

4. The Government of Papua New Guinea will facilitate the necessary inputs to the project at the proper time upon the signing and exchanging of Notes for the Project by both Governments.

6/11/87

CHANGES IN THE MAIN BUILDING

I. FOREST PRODUCT RESEARCH WING

(1) To be completely dropped:

12	-	6.0	x	5.50
27	-	12.0	x	5.50
73	-	6.0	x	7.75
34	-	3.0	x	5.50
36	-	6.0	x	5.50
77	-	12.0	x	7.75

(2) Reduction in Size:

28	-	-2.0	x	5.50
76	-	-6.0	x	7.75
79	-	-6.0	x	7.75
33	-	-2.0	x	5.50

(3) Other Suggestions:

(i) Rooms 74, 75, 76 become one Lab after reducing the area by 6 x 7.75.

(ii) Timber testing machine is fixed into Lab 72 while 73 is dropped.

(iii) Chemical balance room (33) renamed as Electronic Microscope Room.

(iv) Two fume chambers are erected in Chemistry Lab while 36 is dropped.

(v) Room 30 is renamed as chemical store.

(vi) Room 24 is renamed as chemical balance room.

(vii) Microscopes are placed in Lab 78 while Room 34 is omitted.

(viii) Room 37 is renamed as Xylarium while 77 is dropped.

II. SILVICULTURE RESEARCH WING

(1) To be completely dropped:

25	-	6.0	x	5.50
33	-	3.0	x	5.50
22	-	6.0	x	5.50
55	-	3.0	x	7.75
52	-	15.0	x	7.75

(2) Reduction in Size:

54	-	-3.0	x	7.50

(3) Other Suggestions:

(i) Small seed store will be mde in Lab 53 while 22 is dropped.

(ii) Lab 54 will also have Forest Influence research facilities while 55 is dropped even though its (54) size is reduced by 3.0 x 7.75.

(iii) Micro-propagation research will be carried out in Tree Physiology Lab (51) while 52 is dropped.

(iv) Room 10 is converted into a general store.

(v) Room 11 is renamed as Camping equipment store while room 29 is dropped.

(vi) Room 48 is dropped.

III. PROTECTION RESEARCH WING

(1) To be completely dropped:

31	-	3.0	x	5.50
30	-	3.0	x	5.50
29	-	6.0	x	5.50
57	-	6.0	x	7.75

(2) Reduction in Size:

62	-	-3.0	x	7.75
63	-	-3.0	x	7.75

(3) Other Suggestions:

(i) Room 58, 59, 60, 61 to be converted into one Lab - mushroom Lab with a separate portion (3 x 7.75) for autoclaves.

(ii) Fungi herbarium (Room 56) should be located in front of National Insect Collection Room (68) with no change in area.

(iii) Insect incubator Room (66) should be separated from 67.

IV. GENERAL SUGGESTIONS

(1) The breadth should be:-

70 instead of 7.75.
2.0 instead of 2.50 (corridor).
5.0 instead of 5.50.

(2) Need only one set of Toilet including shower (near the stairs) on the ground-floor besides toilet 38 and 39.

(3) No need for separate showers. Should be accommodated in toilet room.

(4) The end stairs in both the Wings should be dropped.

(5) Sizes of Room 2, 3, 13 and 14 may be proportionately reduced.

(6) Number of Scientific Officers room may be reduced in relation to the length of the laboratory wings.

The minimum requirements for officers and Scientists are:

Director	-	1
Asst. Director	-	1
Branch Heads	-	3
Section Heads; and		
Scientific Officers	-	20
Guest Researchers	-	10

~~(7) The lecture room with a capacity of about 100 seats should tiered.~~

(8) Doors for male & female toilets (Room 38, 39) should be separated.

(9) No need for gas pipe in the building. Each Lab. will have its own gas cylinder.

(10) Upper Verandah to be retained, however the outside doors (on the upper floor) should be dropped for security reasons.

(11) Meeting room (19) shoudl have entrance door from the Director's room as well as from his Secretary's room besides a door in the corridor.

(12) Automatic security light to be provided.

(13) Ancillary facilities to be sited as discussed in Lae.

(14) Reinforced tinted glass should be used.

(15) Solar heating systems in Chemistry, seed, Tree physiology and Pathology Labs to be provided.

ACCOMMODATION

1. We would prefer separte or duplex (semi-detached) for many reasons (privacy, security, fire, ventilation, etc.).

2. All the houses are to be provided solar heating system to conserve energy (Govt. policy).

~~3. Since Lae is high rainfall town, all the houses are to be provided with concrete floor.~~

4. Proper ventillation in all the rooms.

5. Security light to be provided.

6. Each house will have separate bathroom and toilet (Not in the same room).

P. Srivastava

*

Appendix

EQUIPMENT LIST

A : Additional
R : Replace
N : New

Office Equipment

No	Item Descriptions	Rev. Quantity	Quantity	Manual	Operation	A.R.N
1	Copier (big unit)		1 unit	○		N
2	Book Cabinets		25 sets	○		N
3	Filing Cabinets		25 sets	○		N
4	Map Cabinets		5 sets	○		N
5	Wall Clocks		5 units	○		N
6	First Aid Kit		2 sets	○		N
7	Walkie-Talkie Set		2 sets	○		N
8	Word Processor(MICRO COMPUTER)	4	4 units	○	○	N
9	Keyboard Lettering System		1 unit	○		N
10	Planimeter	1	2 units	○		N

11 ~~safe~~ 1 unit

Meteorological Equipment

No	Item Description	Rev. Quantity	Quantity	Manual	Operation	A.R.N
1-1	Meteorologic Observation Box		1 set	○	○	N
1-2	Spare Parts		1 set	○		N
2	Thermometer		1 piece	○		N
3	Thermohygrometer	4	1 piece	○		N
4	Pluviometer		1 piece	○		N
5	Rain Guage		3 pieces	○		N
6	Anemometer		1 piece	○		N
7	Sunshine Recorder (Jordan'type)		3 pieces	○		N
8	Soil Thermometer		3 sets	○		N
9	Evaporimeter		3 pieces	○		N
10	Barometer		3 pieces	○		N
11	Max-Min.Thermometer		1 pieces	○		N
12	Instrument Shelter		1 piece	○		N
13	Anemometer		1 piece	○		N
14	Assman's Psychrometer		2 piece	○		N

Laboratory Equipment

No	Item Descriptions	Rev. Dec. 77	Quantity	Manual	Operation	A.R.N
1	Drying Ovens		5 units	O		A
2	Hot Air Circulation Drying Oven		3 units	O		N
3-1	Incubators	3	5 units	O		A
3-2	Incubators	3	5 units	O		A
4-1	Centrifuge-Table Type Top		1 units	O		N
4-2	Centrifuge-Table Type Top		2 units	O		N
5	Leaf Area Meter		1 unit	O		N
6	Pressure Chamber		1 unit	O		N
7-1	Thermostatic Germinator		2 units	O		N
7-2	Thermostatic Germinator		2 units	O		N
7-3	Thermostatic Germinator		2 units	O		N
8	Freezer		4 units	O		2N+2R
9-1	Refrigerator	4	9 units	O		7N+2R
9-2	Refrigerator	4	8 units	O		N
10	Soil X-Ray Apparatus		1 units	O		A
11-1	Microtome Large Sledge,Automatic Sharpener		1 units	O		A
11-2	Microtome Large Sledge,Automatic Sharpener		1 units	O		A
12	Soil Sterilizer		1 units	O		A
13-1	Chemical Balance		4 units	O		A
13-2	Chemical Balance		4 units	O		N
14	Double Beam Spectrophotometer		1 unit	O		N
15	Atomic Absorption Emission Spectrophotometer		1unit	O		N
16-1	PH-Meter		2 unit	O		R
16-2	PH-Meter		3 unit	O		N
17	Glass Apparatus		various			A
18	Air Screen Seed Selector		1 unit	O		N
19-1	Shaking Incubator		1 unit	O		N
19-2	Shaking Incubator		1 unit	O		N
20-1	Autoclave	1	2 units	O		A
20-2	Autoclave	1	2 units	O		N
21-1	Vacuum Pump		1 unit	O		A
21-2	Rotary Vacuum Pumpm		1 unit	O		A
22-1	Desicator ø 240 mm		12 unit			N
22-2	Desicator ø 180 mm		12 unit			N

No	Item Descriptions	Qty	Quantity	Manual	Operation	A.R.N
23	Soil Tube Sampler		12 units	○		N
24	Soil Testing Kit		2 sets	○		N
25	Soil Color Chart		3 units	○		N
26-1	Standard Testing Seves		1 set			N
26-2	Standard Testing Seves (mesh)		1 set			N
27-1	Kjeldhal Analyzer System		1 set	○	○	N
27-2	Kjeldhal Analyzer System		1 set	○	○	N
28	Indoor Seeding Cabinets	2	3 units	○		N
29	Muffle Furnance		1 set	○		N
30	Universal Wood Testing Machine		1 unit	○		N
31	Scanning Election Microscope		1 unit	○	○	N
32-1	Ice Making Machine		1 unit	○		N
32-2	Ice Making Machine		2 units	○		N
33	De-ionizer		2 units	○	○	N
34-1	Hot Plates		3 units	○		A
34-2	Hot Plates		3 units	○		A
35-1	Rotary Evaporator		1 unit	○		N
35-2	Rotary Evaporator		1 unit	○		N
36	Electromagnetical Seive Shaker		2 units	○		N
37-1	Pressure Cooker		1 unit	○		N
37-2	Pressure Cooker		1 unit	○		N
37-3	Pressure Cooker		1 unit	○		N
38	Drying Cabinet		1 unit	○		N
39	Xylometer		1 unit	○		N
40	Oliver Gravity Separator		1 unit	○		N
41	Compactus		2 units			N
42	Gas Chormatagraphy		1 unit	○		N
43	Moisture Meter		2 units	○		N
44	Universal Thermo-Bath	3	6 units	○		N
45	Culture Bath Shaker	3	6 units	○		N
46	Labo Dispenser		1 unit	○		N
47	Multi Dispenser		1 unit	○		N
48	Muni-Sonic Homogenizer		1 unit	○		N
49	Ace Homogenizer		1 unit	○		N
50	Incubator		2 units	○		N

Laboratory Equipment

No	Item Descriptions	Quantity	Manual	Operation	A.R.N
51	Zoom Stereo Microscope	3 units	O		N
52	Zoom Stereo Microscope	4 units	O		N
53	High Power Microscope BHTU	3 units	O		N
54	High Power BH-PM-10AD Microscope	1 unit	O		N
55	Automatic Glass Apparatus Cleaner with 8 Test Tube Rack for Micro Prop	1 unit	O	O	N
56	Hot Air Sterilizer for Micro Prop	1 unit	O	O	N
57	Balance for large cubic volume for Forest Influence (Plate:20cm x 20cm)	1 pcs	O		N
58	Stereo Scope for Areal Photograph for Map & Survey	1 unit	O		N
59	Drying Case for Microscopes	13 units			N

Nursery Equipment

No	Item Description	Quantity	Manual	Operation	A.R.N
1	Fencing Tool Kit	2 units	O		N
2	Pocket Caliper	6 units	O		N
3	Sprayer	6 units	O		A
4	Sprinkler	2 sets	O		A
5	Peristaltic Pump	1 unit	O		A
6	Automatic Misting System	2 units	O		N

FIELD EQUIPMENT

No	Item Description	per Dwnt	Quantity	Manual	Operation	A.R.N
1	Clinometer		12 units	○		A
2	Compass		12 units	○		A
3	Core diameter 12mm		3 sets	○		
4	Wood Handled Barle Gauge		4 units			
5	Diameter Tapes		12 units	○		A
6	50m Tapes		12 units			A
7	100m Chains Wire Rope w / Drum		6 units			A
8	Dendrometer		2 units	○		
9	Pentapism Calliper		4 units	○		
10	Chain Saws		6 units	○		A
11	Pocket Magnifier (20X)		12 units	○		A
12	Aluminium Rolls		100 units			A
13	Forest Survey Equipment		10 sets			A
14	Mist Blower Spray Machine		2 units	○		N
15	Cameras (35mm SLR) with Macrozoom Lenses and other Accessaries		2 sets	○		A
16	Binoculars		3 units	○		A
17	Tree Climbing Spurs		10 sets			A
18	Tree Height Measuring Rods		4 sets	○		A
19	Haga Altimeters		6 units	○		A
20	Relascope		1 unit	○		N
21	Wedge Prisms		6 sets	○		A
22	Bark Guages		2 sets	○		N
28	Aluminium Callipers		3 sets	○		N
29	Aluminium T-Squares		3 sets			N
25	Pocket Altimeter (Barometer)		2 units	○		N
26	Sleeping Bags		6 units	○		N
27	Folding Stools		12 units			A
28	Folding Tables		12 units			A
29	Canvas Havery Sacks		6 units			A
30	Staff Compass (Forestry model)		2 units	○		N
31	Tent		12 sets			A

FIELD EQUIPMENT

No	Item Description	Rev. Quantity	Quantity	Manual	Operation	A.R.N
32	Safety Caps		12 units			A
33	Portable Illumihometer		12 units			N

Training and Meeting Equipment

No	Item Description	Rev. Quantity	Quantity	Manual	Operation	A.R.N
1	Color TV-Video Set (VCR)		1 set	○	○	N
2	16mm Film Projector		1 unit	○	○	N
3	8mm Camera Projector for Editin		1 unit	○		N
4	Slide Projector		2 units	○		A
5	Slide Viewer		2 units	○		N
6	Overhead Projector		2 units	○		A
7	Tape Recorder		2 units	○		N
8	Screen		2 units			N

Vehicles and Tranport

No	Item Description	Rev. Quantity	Quantity	Manual	Operation	A.R.N
~~1~~	~~Passenger Car Van Type (6 Passengers)~~ Office Support Vehicle		~~1 unit~~	○		A
2	Wagon Type Land Cruiser (6 Passengers)		1 unit	○		A
3	Tractor		1 unit	○		A
4	Verge Mower Attachment		2 units	○		A
5	Slasher Attachment		1 unit	○		N
6	Grader Attachment		1 unit	○		N
7	Trailer		1 unit	○		A
8	Tipper Truck (2 Ton),		1 unit	○		N
9	Cherry Picker		1 unit	○		A
10	Self-propelled Lawnmowers	2	1 unit	○		A

Maintenance Workshop and Machine Tools

No	Item Description	Quantity	Manual	Operation	A.R.N
1	Pliers 10 pcs/set	2 sets			N
2	Chisels 16 pcs/set	2 sets			N
3	Hammers 10 pcs/set	3 units			N
4	Single Speed Light Duty Electronic Light	1 unit			N
5	Tool Box	3 units			N
6	Electric Welder	1 unit	○		N
7	Crocodile Jack	1 unit	○		N
8	Electric Drills	1 unit	○		N
9	Cement Mixer	1 unit	○		N
10.	Electric Saw	2 units			N
11.	Hand saw	2 units			N

Laboratory Small Wares

No	Item Description	Per Quantity	Quantity
1	Beakers,Criffin (Refer to 5001)		
	100ml		120pcs
	200ml		90pcs
	300ml	50	90pcs
	500ml	40	72pcs
	1,000ml	20	36pcs
	2,000ml		8pcs
2	Beakers, Berzelius (Refer to 5002)		
	100ml		20pcs
	200ml		20pcs
	300ml	30	40pcs
	500ml		10pcs
3	Beakers, Phillips (Refer to 5003)		
	100ml		20pcs
	300ml		50pcs
	500ml		10pcs
4	Flasks, Flat Bottom (Refer to 5004)		
	200ml		10pcs
	300ml		10pcs
	500ml		5pcs
	1,000ml		3pcs
	2,000ml		3pcs
5	Flasks, Round Bottom (Refer to 5004)		
	200ml		10pcs
	300ml		10pcs
	500ml		5pcs
	1,000ml		3pcs
	2,000ml		3pcs
6	Flasks, Erlenmeyer (Refer to 5005)		
	100ml		120pcs
	200ml		60pcs
	300ml	60	120pcs
	500ml		48pcs
	1,000ml	20	30pcs
7	Flasks, Erlenmeyer,with Stopper (Refer to 5006)		
	50ml		30pcs
	100ml		40pcs
	200ml		30pcs
	300ml		48pcs
	500ml		30pcs
	1,000ml		5pcs

Laboratory Small Wares

No	Item Description	Rev. Quantity	Quantity
8	Flasks, Kjeldahl,Short Neck (Refer to 5009)		
	100ml		10pcs
	200ml		10pcs
	300ml		10pcs
	500ml		5pcs
9	Flasks, Kjeldahl, (Refer to 5008)		
	100ml		10pcs
	300ml		10pcs
	500ml		5pcs
10	Flask, Distilling (Refer to 5011)		
	500ml		5pcs
	1,000ml		3pcs
11	Dishes, Culture, Petri (Refer to 5042)		
	ø60m/m		50pcs
	75m/m		50pcs
	90m/m		100pcs
12	Dishes,Evaporating, Flat Bottom (Refer to 5036)		
	ø 45m/m		20pcs
	60m/m		20pcs
	75m/m		20pcs
	90m/m		10pcs
	100m/m		10pcs
13	Dishes, Crystallizing (Refer to 5039)		
	ø75m/m		30pcs
	90m/m		10pcs
	100m/m		10pcs
	120m/m		5pcs
14	Test Tubes (Refer to 5051)		
	ø12 x 75m/m	100	200pcs
	12 x 120m/m	100	200pcs
	15 x 150m/m		200pcs
	16.5 x 165m/m	100	300pcs
	18 x 180m/m		100pcs
15	Test Tubes, with Glass Stopper (Refer to 5053)		
	10ml		50pcs
	20ml		50pcs
	25ml		50pcs
16	Color Comparison Tubes, Nessler (Refer to TR-105)		
	50ml		
	100ml		30pcs
			30pcs

No	Item Description	Qty	Quantity
17	Bottles, Reagent, Narrow Mouth, White (Refer to 5072)		
	60ml		50pcs
	120ml	5°	100pcs
	250ml		50pcs
	500ml		30pcs
	1,000ml		12pcs
	2,000ml		5pcs
	3,000ml		3pcs
	5,000ml		2pcs
	10,000ml		1pcs
18	Bottles, Reagent, Narrow Mouth, White (Refer to 5073)		
	60ml		50pcs
	120ml	50	100pcs
	250ml		50pcs
	500ml		30pcs
	1,000ml		12pcs
	2,000ml		5pcs
	3,000ml		3pcs
	5,000ml		2pcs
19	Bottles, Reagent, Wide Mouth, White (Refer to 5074)		
	30ml	30	50pcs
	60ml	30	50pcs
	120ml	50	100pcs
	250ml		50pcs
	500ml		30pcs
	1,000ml		12pcs
20	Bottles, Reagent, Wide Mouth, Amber (Refer to 5075)		
	30ml	30	50pcs
	60ml	30	50pcs
	120ml	30	50pcs
	250ml		50pcs
	500ml		30pc
	1,000ml		12pcss
21	Bottles, Syrup (Refer to 5080)		
	250ml		5pcs
	500ml		3pcs
22	Bottles, Either (Refer to 5079)		
	250ml		5pcs
	500ml		3pcs
23	Bottles, Dropping, with Rubber Bulb, White (Refer to 5089)		
	30ml		10pcs
	60ml		20pcs
	120ml		20pcs
	250ml		10pcs

Laboratory Small Wares

No	Item Description	Prev. Quant	Quantity
24	Bottles, Dropping, with Rubber Bulb, Amber (Refer to 5089)		
	30ml		10pcs
	60ml		20pcs
	120ml		20pcs
	250ml		10pcs
25	Bottles, Dropping White (Refer to 5087)		
	30ml		10pcs
	60ml		10pcs
	120ml		20pcs
26	Bottles, Dropping Amber (Refer to 5087)		
	30ml		10pcs
	60ml		10pcs
	120ml		10pcs
27	Bottles, Aspirator, for Rubber Stopcock, White (Refer to 5077)		
	3,000ml		5pcs
	5,000ml		5pcs
	10,000ml		3pcs
28	Bottles, Aspirator, for Rubber Stopcock, Amber (Refer to 5077)		
	3,000ml		5pcs
	5,000ml		5pcs
	10,000ml		3pcs
29	Flask, Filtering (Refer to 5506)		
	300ml		10pcs
	500ml		10pcs
	1,000ml		10pcs
	2,000ml		3pcs
30	Desiccators (Refer to 5851)		
	ø15cm		3pcs
	18cm		3pcs
	21cm		2pcs
	24cm		2pcs
	30cm		1pcs
31	Desiccators, with Tubulation in Lib (Refer to 5853)		
	ø21cm		2pcs
	24cm		2pcs
	30cm		1pcs
32	Bell Jars, Filtering (Refer to 5502)		
	ø12 x 18cm		2pcs
	15 x 21cm		2pcs
	18 x 24cm		1pcs
33	Troughs, Pneumatic (Refer to 5103)		
	ø18cm		5pcs
	24cm		5pcs
	30cm		3pcs

Laboratory Small Wares

No	Item Description	Quantity
34	Gas Generators, Kipp (Refer to 6402)	
	500ml	2pcs
	750ml	3pcs
	1,000ml	1pcs
35	Condensders, Liebig, Sealed (Refer to 5190)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	2pcs
36	Condensers, Allihn (Refer to 5192)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	2pcs
37	Condensers, Dimroth (Refer to 5194)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	2pcs
38	Funnels, Ribbed on Inside and Outside (Refer to 5111)	
	ø60cm	10pcs
	75cm	10pcs
	90cm	10pcs
	110cm	10pcs
39	Shakers (Refer to 5707)	
	ø60cm	20pcs
	75cm	30pcs
	90cm	20pcs
	105cm	10pcs
	120cm	10pcs
40	Glass Filters Crucible Type, 1G (Refer to 5511)	
	Filter No. 1	10pcs
	2	10pcs
	3	10pcs
	4	10pcs
41	Glass Filters Funnel Type, 3G (Refer to 5512)	
	Filter No 1	10pcs
	2	10pcs
	3	10pcs
	4	10pcs
42	Glass Filters Funnel Type, 11G (Refer to 5512)	
	Filter No 1	10pcs
	2	10pcs
	3	10pcs
	4	10pcs

Laboratory Small Wares

No	Item Description	Per Unit	Quantity
43	Funnels, Separatory (Refer to 5124)		
	100ml		10pcs
	200ml		10pcs
	300ml		10pcs
	500ml		5pcs
	1,000ml		2pcs
44	Funnels, Separatory,Squibb, Pear-Shaped (Refer to 5125)		
	100ml		10pcs
	200ml		10pcs
	300ml		10pcs
	500ml		5pcs
	1,000ml		2pcs
45	Funnels, Separatory,Squibb, Pear-Shaped (Refer to 5126)		
	50ml		5pcs
	100ml		5pcs
	200ml		5pcs
	300ml		5pcs
46	Stopcocks, Straight (Refer to 5152)		
	ø 6m/m		10pcs
	7.5m/m		10pcs
	9m/m		10pcs
	10m/m		5pcs
47	Stopcocks, Three Way (Refer to 5153)		
	ø 6m/m		5pcs
	7.5m/m		5pcs
	9m/m		5pcs
48	Tubes, Y Shape (Refer to 5182)		
	ø 6m/m		20pcs
	7.5m/m		20pcs
	9m/m		20pcs
49	Tube, T Shape (Refer to 5181)		
	ø 6m/m		20pcs
	7.5m/m		20pcs
	9m/m		20pcs
50	Bottles, Weighing (Refer to 5148)		
	ø20x20m/m		20pcs
	30x30m/m		30pcs
	40x40m/m		30pcs
	50x50m/m		10pcs
51	Bottles, Specific Gravity,Gay-Lussac,for Liquid (Refer to 5139)		
	10ml		5pcs
	25ml		10pcs
	50ml		5pcs
	100ml		3pcs

Laboratory Small Wares

No	Item Description	Rev. Quantity	Quantity
52	Bottles, Specific Gravity,with Thermometer (Refer to 5140)		
	25ml		5pcs
	50ml		5pcs
53	Drying Tubes, Straight, One Bulb (Refer to 5183)		
	ø12ml		10pcs
	15ml		5pcs
	18ml		5pcs
54	Drying Jars, Glass Stoppered (Refer to 5137)		
	L.24cm		5pcs
	30cm		5pcs
	36cm		3pcs
55	Bottles, Gas Washing Drechsel (Refer to 5129)		
	250ml		5pcs
	500ml		2pcs
56	Bottles, Gas Washing Walter (Refer to 5128)		
	250ml		5pcs
	500ml		2pcs
57	Bottles, Gas Washing Ichihose (Refer to 5130)		
	250ml		5pcs
	500ml 2pcs		
58	Bottles, Gas Washing Muencke (Refer to 5131)		5pcs
	250ml		
	500ml		2pcs
59	Volumetric Flasks, White (Refer to 1101)		
	50ml		10pcs
	100ml		30pcs
	200ml		20pcs
	250ml		20pcs
	500ml		10pcs
	1,000ml		5pcs
60	Volumetric Flasks, Amber (Refer to 1102)		
	50ml		5pcs
	100ml		10pcs
	200ml		10pcs
	250ml		10pcs
	500ml		5pcs
	1,000ml		2pcs

Laboratory Small Wares

No	Item Description	Per Dept	Quantity
61	Measuring Cylinders (Refer to 1171)		
	10ml		5pcs
	25ml		10pcs
	50ml		10pcs
	100ml	18	30pcs
	250ml	5	10pcs
	500ml		5pcs
	1,000ml		3pcs
	2,000ml		2pcs
62	Measuring Cylinders, with Stopper (Refer to 1172)		
	50ml		10pcs
	100ml		10pcs
	250ml		5pcs
	500ml		5pcs
63	Graduates, Cylindrical (Refer to 1177)		
	50ml		5pcs
	100ml		5pcs
	500ml		3pcs
	1,000ml		2pcs
64	Graduate, Cohical (Refer to 1179)		
	10ml		5pcs
	20ml		5pcs
	50ml		5pcs
	100ml		5pcs
	200ml		5pcs
65	Burets, with Stopcock, White (Refer to 1118)		
	10ml	5	10pcs
	25ml	5	10pcs
	50ml		5pcs
66	Burets, with Stopcock, Amber (Refer to 1119)		
	10ml	5	10pcs
	25ml	5	10pcs
	50ml		5pcs
67	Burets, with Stopcock, Schellback (Refer to 1120)		
	10ml	5	10pcs
	25ml	5	10pcs
	50ml		5pcs
68	Micro Burets, White, (Refer to 1144)		
	2ml		2pcs
	5ml		3pcs
	10ml		1pcs
69	Micro Burets, Amber (Refer to 1145)		
	2ml		2pcs
	5ml		3pcs
	10ml		1pcs

Laboratory Small Wares

No	Item Description	Rec. Qty	Quantity
70	Automatic Burets, White (Refer to 1135)		
	25ml		2pcs
	50ml		3pcs
71	Automatic Burets, Amber (Refer to 1136)		
	25ml		2pcs
	50ml		2pcs
72	Measuring Pipets (Refer to 1147)		
	0.5ml		10pcs
	1ml		30pcs
	2ml		30pcs
	3ml		10pcs
	5ml		20pcs
	10ml		20pcs
	20ml		10pcs
	25ml		5pcs
73	Volmetric Pipets (Refer to 1155)		
	0.5ml		10pcs
	1ml		20pcs
	2ml		20pcs
	3ml		20pcs
	5ml		20pcs
	10ml		20pcs
	15ml		10pcs
	20ml		10pcs
	25ml		10pcs
	40ml		5pcs
	50ml		5pcs
	100ml		3pcs
74	Pipets with rubber (Refer to 1161)		
	1ml		10pcs
	2ml		20pcs
	3ml		10pcs
	5ml		10pcs
	10ml		10pcs
75	Glass Rod (Refer to 5199)		
	ø 4m/m		10pcs
	6m/m		10pcs
	8m/m		10pcs
	9m/m		10pcs
76	Glass Tubing (Refer to 5189)		
	ø 6m/m		50pcs
	8m/m		50pcs
	10m/m		30pcs

No	Item Description		Quantity
77	Rubber Tubing Black (Refer to 5402)		
	No. 4		50m
	5		50m
	6		50m
	7		30m
	8		20m
	9		20m
	10		10m
78	Rubber Tubing, Red (Refer to 5403)		
	Gas ø 9 x 13m/m		30m
	Burner 8 x 12m/m		30m
	Aspirator 6 x 12m/m		10m
	Channe 115 x 21m/m		30m
79	Rubber Tubing, Vaccum (Refer to 5405)		
	ø 6 x 15m/m		10m
	7.5 x 8m/m		10m
	9 x 21m/m		5m
80	Vinyl Tubing (Refer to 5411)		
	ø 6 x 8m/m		30m
	8 x 10m/m		30m
	10 x 12m/m		30m
81	Silicone Tubing (Refer to 20-08)		
	ø 4 x 6m/m		30m
	6 x 8m/m		30m
	8 x 10m/m		30m
82	Polyethylene Tubing (Refer to 20-11)		
	ø 4 x 6m/m		20pcs
	6 x 8m/m		20pcs
	8 x 10m/m		20pcs
	12 x 15m/m		10pcs
	15 x 18m/m		10pcs

No	Item Description	per Quotation	Quantity
83	Rubber Stoppers (Refer to 5401)		
	No. 1		50pcs
	2		50pcs
	3		50pcs
	4		50pcs
	5		50pcs
	6		50pcs
	7		50pcs
	8		30pcs
	9		30pcs
	10		30pcs
	11		30pcs
	12		30pcs
	13		20pcs
	14		20pcs
	15		20pcs
	16		10pcs
	17		10pcs
	18		10pcs
	19		10pcs
	20		10pcs
84	Rubber Stoppers (Refer to 6948)		
	No. 1		50pcs
	2		50pcs
	3		50pcs
	4		30pcs
	5		30pcs
	6		30pcs
	7		20pcs
	8		20pcs
	9		20pcs
	10		20pcs
85	Polyethylene Bottles, Narrow Mouth (Refer to 5413)		
	100ml		120pcs
	250ml		60pcs
	500ml		48pcs
	1,000ml		20pcs
86	Polyethylene Bottles, Narrow Mouth (Refer to 5414)		
	100ml		150pcs
	250ml		120pcs
	500ml		60pcs
	1,000ml		30pcs
87	Polyethylene Beakers (Refer to 5418)		
	100ml		30pcs
	300ml		20pcs
	500ml		20pcs
	1,000ml		10pcs

No	Item Description	per Quantity	Quantity
88	Polyethylene Bottles,Aspirator (Refer to 5416)		
	5,000ml		5pcs
	10,000ml		3pcs
	20,000ml		2pcs
89	Polyethylene Bottles,Washing (Refer to 5417)		
	250ml		12pcs
	500ml		12pcs
	1,000ml		12pcs
90	Watch Glasses (Refer to 5045)		
	ø60m/m		50pcs
	75m/m		50pcs
	90m/m		50pcs
	110m/m		30pcs
	120m/m		30pcs
91	Aspirators (Shibaki's) (Refer to 6645)		5pcs
92	Crucibles, Porcelain,with Cover, B-type (Refer to 5354)		
	10ml	20	50pcs
	30ml	10	30pcs
	50ml	6	20pcs
	100ml		10pcs
93	Mortars, with Peste, Porcelain (Refer to 5391)		
	90ml		5pcs
	120ml		5pcs
	150ml		3pcs
94	Funnels, Bucher Type, Porcelain (Refer to 5383)		
	ø 90m/m		10pcs
	110m/m		10pcs
95	Dishes, Evaporating, Round Bottom Procelain (Refer to 5351)		
	ø 60m/m		10pcs
	90m/m		10pcs
	110m/m		10pcs
	150m/m		5pcs
96	Safty Pipeter (Refer to 12-01)		5pcs
97	Hydrometer Set, Normal, 19 pieces set (Refer to 1305)		
	0.700-1.850		1pcs
98	Hydrometer, for Liquid Heavier than Water (Refer to 1331)		
	1.000-2.000		3pcs
99	Hydrometer, for Liquid Lighter than Water (Refer to 1332)		
	1.000-0.700		3pcs
100	Thermometers Set, Normal (Refer to 1404)-50-360 C		

Laboratory Small Wares

No	Item Description	Per Month	Quantity
101	Thermometers, Engrave Stem, Alcohol (Refer to 1407)		
	0-100 C		30pcs
	-30-50 C		10pcs
	-20-100 C		10pcs
102	Thermometers, Engrave Stem, Hydragyrum(Refer to 1408)		
	0-150 C		10pcs
	0-200 C		10pcs
	0-300 C		10pcs
	0-360 C		10pcs
103	Thermometers, Maximum and Minimum, Six, U-Type (Refer to 1433)		
	-20-+50 C		2pcs
104	"Toyama-Type"Toyama-Type 2 (Refer to No.1020)		
	-10-+50 C		2pcs
105	Burners, Alcohol Lamps (Refer to 6001) 90ml		5pcs
106	Brushes (Refer to 6947)		
	a. Test Tube	5	24pcs
	b. Buret	5	12pcs
	c. Flask L.	5	12pcs
	M.	5	24pcs
	S.	5	24pcs
	d. Pipet	5	24pcs
	e. Beaker	5	12pcs
108	Qualitative Filter Papers No.1 (Refer to 5541)		
	ø 9cm		5pcs
	ø 11cm		10pcs
	Qualitative Filter Papers No.2 (Refer to 5541)		
	ø 9cm		5pcs
	ø 11cm		10pcs
109	Qualitative Filter Papers No.5A (Refer to 5542)		
	ø 9cm		5pcs
	ø 11cm		10pcs
	Qualitative Filter Papers No.5B (Refer to 5542)		
	ø 9cm		5pcs
	ø 11cm		10pcs
	Qualitative Filter Papers No.5C (Refer to 5542)		
	ø 9cm		5pcs
	ø 11cm		10pcs
110	Spatulas Stainless (Refer to 6983)		
	L. 150m/m		10pcs
	180m/m		10pcs
	210m/m		10pcs

Laboratory Small Wares

No	Item Description	Per Quan	Quantity
111	Spoons Stainless (Refer to 6980)		
	L. 150m/m		10pcs
	165m/m		10pcs
	180m/m		10pcs
112	Forceps Stainless (Refer to 6976)		
	L. 120m/m	5	10pcs
	150m/m	5	10pcs
	180m/m	5	10pcs
113	Cork Borers 12 pieces Set (Refer to 6952) ø5-22m/m		3pcs
114	Glass Tubing Cutter (Refer to FLG-20)	10	20pcs
115	Pinch Cocks (Refer to 6956)		
	S.		20pcs
	M.		20pcs
	L.		20pcs
116	Pinch Cocks (Refer to 6957)		
	S.		30pcs
	M.		30pcs
	L.		30pcs
117	Burners, Gas (Refer to 6019) L.P Gas		5pcs
118	Tripods (Refer to 6941) ø 120m/m		5pcs
119	Asbestos Wire Gauze (Refer to 6963) 150x150m/m		30pcs
120	Tongs, Crucible (Refer to 6904) L-210m/m		6pcs
121	Clamp, Test Tube, Wooden (Refer to 6909)		10pcs
122	Hose Band, Hand fastened (Refer to 6-475-01)		
	ø 20-32m/m		5pcs
	14-25m/m		10pcs
	10-19m/m		10pcs
123	Clamps, Flask (Refer to 6935)		
	S ø 15-35m/m		10pcs
	M 25-45m/m		10pcs
	N 40-70m/m		10pcs
124	Clamp (Refer to FLC-380) Condenser		5pcs
125	Bossheads (Refer to FLC-390) L. ø 15m/m		10pcs
126	Bossheads (Refer to FLC-391) L. ø 13m/m		15pcs
127	Bossheads (Refer to FLC-392) L. ø 9m/m		10pcs
128	Rings (Refer to FLR-6922)		
	L. ø 90m/m		10pcs
	M. 75m/m		10pcs
	S. 60m/m		10pcs

Laboratory Small Wares

No	Item Description	per Quantity	Quantity
129	Support, Square Base with rod (Refer to 246) Base 130x210m/m Support rod 13x750m/m		10pcs
130	Support, Buret 2-place (Refer to 6928)		3pcs
131	Supports, Funnel 2-place (Refer to 6920) Wooden		3pcs
132	Supports, Test Tube 12-place (Refer to 6916) Wooden		5pcs
133	Support, Separating Funnel 10-place (Refer to BR-12) Plastic		2pcs
134	Color Comparision Tubes, Nessler 10-place (Refer to TR-109) 50ml 100ml		1pcs 1pcs
135	Burner, Blast L.P Gas (Refer to 6034) Glass Work		2pcs
136	Burner,Gas. L.P Gas (Refer to 6029) Handy Type		1pcs
137	Bellows, Foot Power (Refer to 6659) ø 180m/m		2pcs
138	Glass-Blowers' Tools (Refer to 5800-01)		1pcs

ADDITIONS TO LABORATORY EQUIPMENTS

60.	Portable Generator	- 2 Units
61.	Shigometer	- 2 Units
62.	Bio-photo Chamber	- 2 Units
63.	Wind Tunnel Unit	- 1 Unit
64.	Pylodin Tester	- 2 Units
65.	Complete Dark Room Facilities	
66.	Card index metal cabinets (13x8x50cm) double drawers	- 10 Units
67.	Card index metal cabinets (15x8x50cm) double drawers	- 10 Units
68.	Maggylamp (magnifying lamp -12cm) biconvex lens 400 diopetri focal length 24cm with flexible arms	- 2 Units
69.	Digital micrometer with statistics and computer interface	- 2 Units
70.	Laminar Flow Bench	- 2 Units
71.	Experimental Kiln Dryer	- 1 Unit
72.	Experimental Pressure Treatment Plant	- 1 Unit
73.	Digital Thermometers	- 2 Units
74.	Micro-computer	- 4 Units

Appendix - II - 1

MEMBER LIST OF BASIC DESIGN STUDY TEAM
FOR
THE PROJECT FOR ESTABLISHMENT
OF
THE FOREST RESEARCH INSTITUTE
IN
PAPUA NEW GUINEA

Mr.Masao Tsujioka	Team Leader	Dupty Head First Basic Design Study Div. Grant Aid Planning & Survey Dpt. JICA
Mr.Eiji Kakizawa	Architectural Planner	Director Sozosha Co., Ltd.
Mr.Hirotomo Ohuchi	Architectural Designer	Sozosha Co., Ltd.
Dr.Ryozaburo Yamai	Forest Industry Study Planning	Dupty Managing Director Japan Housing & Wood Technology
Mr.Hajime Fukuhara	Building Equipment Planning	Sozosha Co., Ltd.
Dr.Mamoru Yoshimoto	Equipment Planning	Principal Researcher Japan Forest Technical Association
Mr.Yasunari Baba	Cost Estimation	Sozosha Co., Ltd.

Appendix - II - 2

MEMBER LIST OF DRAFT MISSION TEAM
FOR
THE PROJECT FOR ESTABLISHMENT
OF
THE FOREST RESEARCH INSTITUTE
IN
PAPUA NEW GUINEA

Mr.Masao Tsujioka	Team Leader	Dupty Head First Basic Design Study Div. Grant Aid Planning & Survey Dpt. JICA
Mr.Eiji Kakizawa	Architectural Planner	Director Sozosha Co., Ltd.
Dr.Ryozaburo Yamai	Forest Industry Study Planning	Dupty Managing Director Japan Housing & Wood Technology
Mr.Yasunari Baba	Cost Estimation	Sozosha Co., Ltd.

Appendix - III - 1

LIST OF ATTENDANTS AT THE MEETING (Basic Design Study)

Mr. A. Tagamasau	Forestry HQ
Mr. J. Mantu	Forestry HQ
Dr. P. Srivastava	Acting/ First Asst.Secretary, D.O.F
Dr. A. Amoako	Wood Scientist and Technologist, Food Products Research Center
Dr. H. Robert	In Charge, Sen. Entomologist, Forest Insects, Forest Management Research Branch
Dr. J. Croft	Official in charge, Botany, Department of Forests
Mr. D. Gole	Chief Architect, Department of Works
Mr. D. Smith	Architect, Department of Works
Mr. G. Paru	Department of Finance & Planning
Dr. M. Siriga	Principal of T.I.T.C
Mr. W. Mawapom	Engineer, Building Board, Lae
Mr. Chusaku Nomura	Ambassador, Japanese Embassy
Mr. Korenari Kai	Counsellor, Japanese Embassy
Mr. Osamu Takazawa	First Secretary, Japanese Embassy
Mr. Akihisa Watanabe	Third Secretary Japanese Embassy (in charge of the project)
Mr. Katsuyasu Nakano	Director, JICA, PNG

Appendix - III - 2

LIST OF ATTENDANTS AT THE MEETING (Draft Mission)

Mr. A. Tagamasau	Forestry HQ
Dr. P. Daur	Acting/ Official in charge, Bulolo
Dr. C. Konabe	Acting/ Official in charge, FPRC
Dr. M. Komtagaron	Forestry HQ
Dr. P. Srivastava	Acting/ First Asst.Secretary, D.O.F
Dr. J. Croft	Official in charge, Botany, Department of Forests
Mr. K. McClelland	Principal Quantity Surveyor, Department of Works
Mr. D. Smith	Architect, Department of Works
Ms. F. William	Asst. Secretary, Department of Finance & Planning
Mr. M. Opa	Department of Finance & Planning
Mr. Chusaku Nomura	Ambassador, Japanese Embassy
Mr. Korenari Kai	Counsellor, Japanese Embassy
Mr. Hiroaki Takashima	Japanese Embassy
Mr. Akihisa Watanabe	Third Secretary Japanese Embassy (in charge of the project)
Mr. Katsuyasu Nakano	Director, JICA, PNG

Appendix - IV - 1

ITINERARY FOR BASIC DESIGN STUDY OF THE PROJECT
FOR ESTABLISHMENT OF FOREST RESEARCH INSTITUTE

Date	Time			
Jul. 18 Sat.	20:00	Leave Narita (JL771)		
Jul. 19 Sun.	6:15	Arrive Sydney. Observation tour of the city		
Jul. 20 Mon.	8:15	Leav Sydney (PX004)		
	13:25	Arrive Port Moresby (via Brisbane)		
	15:00	Courtesy visit to Japanese Embassy		
Jul. 21 Tue.	9:00	Joint meeting with concerned government agencies (at the Dept. of Finance)		
	13:00	Meeting with the Department of Forests		
Jul. 22 Wed.	9:30	Observation visit to Sogeri High School and its accommodations for instructors		
	12:35	Leave Port Moresby (PX104)		
	13:15	Arrive Lae		
	14:30	Joint meeting with related agencies (at ITIC)		
Jul. 23 Thu.	8:30	Leave for Bulolo		
	11:00	Arrive Bulolo. Observation visit to the Forestry College and the Forest Research Station		
Jul. 24 Fri.	8:30	Observation visit to the Forestry College		
	10:30	Leave Bulolo for Lae		
	13:30	Field survey at the proposed project site, meeting with related agencies (at the Botanical Garden)		
Jul. 25 Sat.	11:40	Leave Lae for Bulolo (PX274)	10:00	Meeting with Mr. Jim Croft (at Botany Garden)
	12:15	Arrive Madang	13:30	Site survey
	14:00	Observation visit to the Forest Research Station		

Jul. 26 Sun.	10:55	Leave Madang (PX279) Arrive Port Moresby Team meeting (at hotel)		Team meeting & data arrangement at hotel
Jul. 27 Mon.	9:00	Meeting with Dept. of Forests	9:00	Rough measurement of the proposed site Site infrastructure
	13:00	Meeting at Embassy	15:00	Survey result analysis
Jul. 28 Tue.	9:00	Joint meeting with concerned agencies Exchange of the Minutes of Discussions	9:00	Research of construction situation in Lae
	16:00	Report to Embassy		
Jul. 29 Wed.	9:00	Meeting with the Dept. of Works	9:00	Research on construction situation in Lae
	12:35	Leave Port Moresby	15:00	Team meeting
	13:20	Arrive Lae		
	15:30	Team leader Tsujioka leaves for Japan		
Jul. 30 Thu.	9:00	Team meeting at hotel		
	10:00	Meeting with the Department of Works		
	13:00	Meeting with the Department of Works		
Jul. 31 Fri.	9:00	Survey of construction situation in Lae	9:00	Study of requested & discussed contents
Aug. 1 Sat.	9:00	Survey of construction situation Lae	9:00	Facility planning
Aug. 2 Sun.		Team meeting and data arrangement		
Aug. 3 Mon.	9:00	Survey on construction situation in Lae		
Aug. 4 Tue.	8:30	Leave Lae (PX243)		
	9:15	Arrive Port Moresby		
	14:00	Meeting with the Department of Forests		
Aug. 5 Wed.	9:00	Survey of construction situation in Port Moresby (to 16:00)		

Aut. 6 Thu.	9:00	Meeting with the Dept. of Forests	9:00	Survey of construction situation in Port Moresby
	16:00	Team meeting		
Aug. 7 Fri.	9:00	Meeting with the Dept. of Works		
	15:00	Report to Embassy & JICA office		
Aug. 8 Sat.		Data arrangement and team meeting		
Aug. 9 Sun.		Data arrangement		
	16:25	Leave Port Moresby (QF096)		
	20:00	Arrive Sydney		
Aug. 10 Mon.	9:00	Leave Sydney (JL772)		
	18:30	Return to Narita		

Appendix - IV - 2

Schedule of Basic Design Study Team (Draft Mission)

Date	Time	
Oct. 28 Wed.	13:00	Leave Narita (JL719)
	18:45	Arrive Singapore
Oct. 29 Thu	23:50	Leave Singapore (PX093)
Oct. 30 Fri	08:30	Arrive Port Moresby
	09:30	Visit to Japanese Embasy
	10:30	Visit to JICA
	14:00	Joint meeting with concerned agencies at Department of Forests
Oct. 31 Sat.	10:45	Leave Port Moresby for Lae
	11:30	Arrive Lae
	14:00	Boundary and Topographic Survey at the Site
		Meeting with Mr. Jim Croft
Nov. 1 Sun.	10:00	Report to Mr. Jim Croft
Nov. 2 Mon.	09:30	Visit to Botany
	16:20	Leave for Port Moresby (PX789)
	17:30	Arrive Port Moresby
Nov. 3 Tue.	09:00	Meeting with Department of Forests
	13:00	Meeting with Department of Finance
Nov. 4 Wed.	09:00	Meeting with Department of Works
	13:00	Meeting with Department of Forests
Nov. 5 Thu.	09:00	Team Leader visit to Department of Finance
	09:00	Meeting with Local Consultant (Cameron McNamara Kramer Pty. Ltd.)
	13:00	Meeting with Department of Finance
Nov. 6 Fri.	09:00	Joint Meeting with concerned agencies Exchange of the Minutes of Discussions at Department of Finance
		Report to Japanese Embasy
		Report to JICA Office
	15:30	Team leader Tsujioka leaves for Japan

Nov 7	Sat.	09:00	Visit to Cameron McNamara Kramer Pty. Ltd.
			Survey on construction situation
		15:20	Leave Port Moresby (PX092)
		19:40	Arrive Singapore
		23:00	Leave Singapore for Japan (JL710)
Nov 8	Sun.	06:15	Arrive Narita

APPENDIX - V

COLLECTED DATA LIST

Abbreviations

1.	NSCPNG	National Standards Council of Papua New Guinea
2.	SAA	Standards Association of Australia
3.	SAA	Published by the standards association of Australia Standards House, 80 Arthour St, North Sydney, N.S.W.
4.	BPNG PM	Bank of Papua New Guinea Port Moresby
5.	PNG OOF	Papua New Guinea: Office of Forests
6.	PNG FPRC DF	Papua New Guinea Forest Products Research Centre, Department of Forests
7.	BO PNG	Bank of Papua New Guinea

Architectual Regulation

1.	THE INTERNATIONAL SYSTEM OF UNITS (SI) AND ITS APPLICATION	NSC PNG
2.	TECHNICAL DRAWING Part 101 -- GENERAL PRINCIPLES	SAA
3.	TECHNICAL DRAWING Part 501 -- STRUCTURAL ENGINEERING DRAWING	SAA
4.	TECHNICAL DRAWING Part 601 -- STRUCTURAL ENGINEERING DRAWING Structural Engineering Drawing	SAA
5.	TECHNICAL DRAWING Part 401 -- ENGINEERING SURVEY AND ENGINEERING SURVEY DRAWING	SAA
6.	TECHNICAL DRAWING Part 401 -- ENGINEERING SURVEY AND ENGINEERING SURVEY DESIGN DRAWING Sewerage and Water Supply	SAA
7.	GENERAL STRUCTURAL DESIGN AND DESIGN LOADINGS FOR BUILDINGS Part 1 -- General Design Requirements Part 2 -- Dead and Live Loads	NSCPNG
8.	GENERAL STRUCTURAL DESIGN AND DESIGN LOADINGS FOR BUILDINGS Part 3 -- WIND LOADS	NSCPNG
9.	GENERAL STRUCTURAL DESIGN AND DESIGN LOADINGS FOR BUILDINGS Part 4 -- Earthquake Loadings	NSCPNG

10.	DESIGN MANUAL to assist in application of the code of practice for general structural design and design loadings for buildings	NSCPNG
11.	REINFORCED CONCRETE STRUCTURES	NSCPNG
12.	STEEL STRUCTURES	NSCPNG
13.	REINFORCED MASONARY STRUCTURES	NSCPNG
14.	APPROVAL AND TEST SPECIFICATION -- DEFINITIONS AND GENERAL REQUIREMENTS FOR ELECTRICAL MATERIALS AND EQUIPMENT	SA
15.	SAA WIRING RULES	SAA
16.	RULINGS TO THE SAA WIRING RULES	SAA
17.	Notes on Changes in the SAA Wiring Rules -- 9th Edition (As 3000-1986) as compared with the 8th Edition (As 3000-1981)	SAA
18.	Papua New Guinea Building Permits -- Details of proposed new building	
19.	Papua New Guinea building act 1971 application for approval	

Geology

1. GEOLOGICAL SURVEY OF PAPUA NEW GUINEA

   (1) LAE CITY AREA, LOADING FOR STRUCTURAL DESIGN

   (2) SETSMICITY OF THE NEW GUINEA REGION

   (3) METEOROLOGICAL INFORMATION SERVICES SECTION YEARLY EXTREMES OF MAXIMUM WIND GUST

2. Site investigation report for the Forest Research Institute, Botanical Gardens Lae

3. Seismic zones for building construction in Papua New Guinea

Rule

1. Lae common rule

2. Rules for the Interpretation of the Traffic 1981

3. Minimum rates of pay for centres designated

Economics

1. QUARTERY ECONOMIC BULLETIN — B PNG PM

2. Quarterly Economic Bulletin — BOPNG

   (1) Table 9.4 exchange rates
   (2) Table 10.1 indicators of economic activity

Relative Data

1. Department of Forests
   Facts & Figures 1986

2. List of FPRC. staff

3. Forest Products Research Centre — PNG OOF

4. Kiln drying schedules of PNG timber species — PNG FPRC DF

5. Timber industry training college

6. PNG forestry college hand book Forkol

7. Welcome to the national library of
   Papua New Guinea

8. Papua New Guinea
   Bell Trade & Business Directory 1986

Appendix - VI - 1

Main Commodities Traded - Exports and Re-exports
(Kina mn fob)

	1981	1982	1983	1984	1985	Jan-Sep 1986
Total exports[a]	565.9	570.4	687.4	822.0	926.2	765.2
of which:						
cocoa	34.1	31.8	41.4	67.0	62.5	45.2
coffee	74.2	77.8	94.7	110.7	117.5	173.2
tea	7.1	6.7	10.4	17.1	11.5	5.5
copra oil	12.5	12.1	20.0	39.4	23.7	7.2
copra	19.3	12.9	24.0	49.1	33.4	8.0
palm oil	14.2	21.7	23.7	75.7	61.6	21.5
forest products	43.9	61.7	54.7	81.7	67.3	51.9
tuna fish	20.0	1.4	0.3	0.6	5.1	-
cray fish & prawns	6.8	6.4	8.8	9.4	7.0	4.9
rubber	3.4	1.4	2.2	2.4	3.9	2.1
gold	158.9	171.8	200.9	183.3	318.8	297.8
silver	7.0	7.5	11.2	9.1	7.0	5.2
copper	134.6	122.8	161.0	135.5	164.2	122.4

a Including re-exports.

Source: Quarterly Economic Bulletin, Bank of Papua New Guinea.

Appendix - VI - 2

Total Net Overseas Development Aid Receipts
($ mn)

	1981	1982	1983	1984	1985
DAC countries total	304.0	276.3	274.4	294.9	240.6
of which:					
Australia	285.3	263.5	264.2	275.2	226.9
West Germany	7.4	4.8	2.1	8.9	3.4
Japan	2.4	3.7	3.5	6.2	4.0
New Zealand	3.0	2.0	1.6	2.1	2.9
USA	-	-	1.0	1.0	1.0
Multilateral total	31.7	34.4	58.7	27.1	18.6
of which:					
Asian Development Bank	16.0	4.2	8.7	4.2	4.4
EC	0.9	18.0	30.1	4.3	4.2
IDA	9.8	8.9	16.6	13.5	3.5
UNDP	2.1	1.7	1.6	1.3	1.3
Total	335.7	310.7	332.8	321.8	258.9

Source: OECD Geographical Distribution of Financial Flows to Development Countries.

Appendix - VI - 3

Current Status & Planning for Future concerning the Existing Main Laboratory Equipment

No.	Item Description	Capacity	Faults	Future Planning
1	Dryer(Small type)	Standard	Few	Consecutive use after removed
2	Cultivator	Standard	Few	Consecutive use after removed
3	Freezer	Low	Few	Diposed to new ones
4	Refrigerator	Low	Often	Diposed to new ones
5	Microscope	Standard	Few	Consecutive use after removed
6	Microtome	Standard	Few	Consecutive use after removed
7	Soil Sterilizer	Standard	Few	Consecutive use after removed
8	Chemical Balance	Low	Few	4 units (disposed)
9	Spectrophotometer	Low	Often	Changed to Atomic Absoption Emission Spectrophotometer
10	PH Meter	Low	Often	2 units (disposed to new ones)
11	Distillatory Equipment	Standard	Few	Consecutive use after removed
12	High Steam-pressure Sterilizer	Standard	Few	Consecutive use after removed
13	Vcuum Pump	Standard	Few	Consecutive use after removed
14	Rated Hot Water Bathing	Standard	Few	Consecutive use after removed
15	Clean Bench	Standard	Often	2 units (disposed to new ones)
16	Hot Plate	Standard	Few	Consecutive use after removed
17	Zoom Stereo Microscope	Standard	Few	Consecutive use after removed
18	High Power Microscope	Standard	Few	Consecutive use after removed

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Status Quota on the Acquisition of Staff's Official Residence

Title	Number	Acquisition No.	Acquisition in Lae	Befitting to Title	Not befitting to Title	Own House in Lae	Shortage
Head	1	1	0	-	-	0	1
Branch Officer	4	2	0	-	-	1	4
Scientific Officer	18	18	6	3	3	0	12
Researcher	23	15	6	6	0	1	17
Ordinary Officer	17	10	5	5	0	1	12
Total	63	46	17	14	3	3	46
Agregated Researcher	46	36	12	9	3	2	34

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STRATEGY FOR THE HOUSING

FOR F.R.I. STAFF

Housing is an acute problem in the country. Because of the shortage of funds, it has not been possible to build the houses for all the government staff.

As a result, there is shortage of government accommodation throughout the country but specially in big towns, such as, Port Moresby, Lae, Madang, etc.

I have been advised by the Department of Finance and Planning that a few houses can be built every year starting from 1989 onwards as capital works under normal budgetary process for the remaining staff of F.R.I.

A L TAGAMASAU
A/Secretary for Forests

27th July 1987

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Schedule of Guest Researcher

No.	Country	Period of Research						
		19 89		19 90		19 91		1992
			Jun.	Dec.	Jun.	Dec.	Jun.	Dec. May.
1	Australia							
2	New Zealand							
3	South Korea							
4	Canada							
5	U.K.							
6	Malaysia							
7	Australia & New Zealand							
8	Solomon Island		a)	b)				
9	Fizi			c)	d)			
10	UNDP/FAO							
11	Vanuatu				e)	f)		
	Applicable Personnel	0	6	7	7	7	6	4

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Dispatch of Japanese Experts

	Year				
	1st	2nd	3rd	4th	5th
Long-term experts	3 (1)	4 (1)	3 (1)	3 (1)	3 (1)
Short-term experts	4 (1)	9 (1)	9 (1)	6 (1)	7 (1)

(1) above indicates one coordinator.

The dispatch plan of long and short-term experts by year is as follows:

Research item	Year	1	2	3	4	5
Natural forest	Long	1	1	1	1	1
	Short	1	1	1	1	1
Planted forest	Long		1	1	1	1
	Short		1	1	1	1
Seed	Long	1	1	1		
	Short		1	1	1	1
Nursery	Short	1	2	2	1	1
Computer	Short	1	1			
Heartwood	Short	1		1		1
Natural enemy & microorganism	Short		1	1	1	1
Soil	Long	1	1		1	1
	Short		2	2	1	1
Total	Long	3	4	3	3	3
	Short	4	9	9	6	7

Country	No. of persons to be accepted	Content of research and plan	Period
Australia	1	Research on meristems for vegetative propogation	12 months
New Zealand	1	Rot specialist	12 months
South Korea	1	Drying and packaging of mushrooms	12 months
Canada	1	Insect thermo-isolation	12 months
U.K.	1	Lymentria virus	3 months
Malaysia	1-2	Silviculture	3-6 months
Australia & New Zealand	1-2	Soils & Nutrition	6-12 months
Solomon Island	1 2	a) Silviculture b) Timber identification & preservation	3-6 months 6 months
Fizi	1 1	c) Protection d) Timber preservation	3-6 months 6 months
UNDP/FAO	3	Silviculture	1-3 years
Vanuatu	1 1	e) Timber identification and preservation f) Timber identification	6 months 6 months

Deployment Patterns of Laboratory

	Deployment of Facilities				Relations with Living Room				Name of Country	Examples
	Box	Island Type	Peninsula Type	Writing Desk	Isolated Installed	Installed Next	Installed Inside	Sandwich		
Large Room	○	○	○			○			West Germany	1 2 3
	○	○	○		○				West Germany	4
		○							Japan(Senbai Central Labolatory)	31
		○	○						Education & training in various countries	
2-3 Units		○						○	West Germany. Switzerland	7 21
		○			○				West Germany. Japan	6
			○		○				Japan Soviet	30 33
		○				○			West Germany. Japan	5
		○					○		Japan(Science & Technology Laboratory)	34
			○						USA	13 14
1 Unit		●			●				West Germany. Switzerland	17 24 25 26 28 29 31 32 36
			●		●				Japan. USA. Soviet	8
			●					○	USA.German Democratic Rep.	10 18
		●						○	Switzerland. USA	19 20 22 27
			●			●			USA.	15 16
		●					○		Japan(Science & Technology Laboratory)	35
		●		○					USA. Japan	11 12 37
			●	○					USA. Japan	

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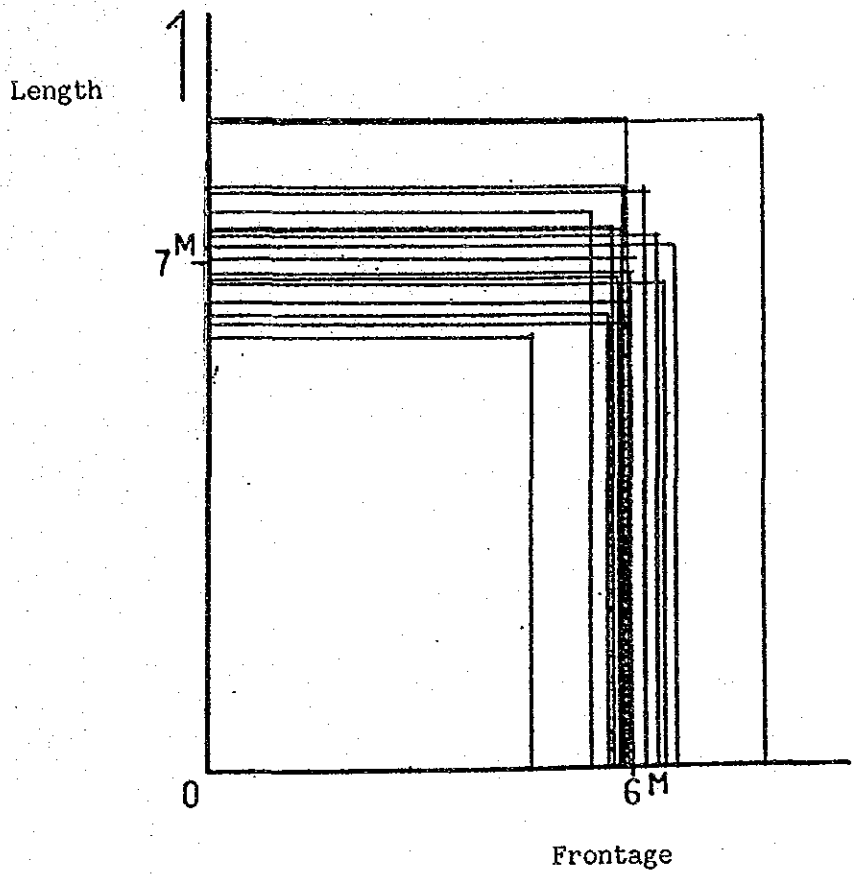
Space of Standard Laboratory



Inside Dimensions of Standard Laboratory

Inside dimensions are indicated in the chart.
(Pipe-space and living room excluded)

Classification of Laboratory Space

Primary Space	Standard Laboratory	Equipped with experimental table, service,drafts etc. No air-conditioning facility.
	Laboratory for Special Use	Room for special purpose i.e. equipped with a darkroom, chromatography, balance, standardization, cleaning.
	Specially Airconditioned Room	Special room adjustable for environment. i.e. a room kept in constant temp. & humidity and other specialy devised airconditioning
	Laboratory with big spans	Large animals, Glass room, Chemical science, Pilot plant
Secondary Space	Laboratory (Office)	Control room, Doctors' living room, Libraly, Meeting room, Lecture room,
	Warehouse	Warehouse with no use of scientific works
	Service Space	Boiler room, Plant room, Big ducts, Transformer station, Machine room
	Accommodation	Common space, Rest room, Cooking room, Locker room, Lavatory, Stand
	Trafic	Passage, Stairs, Elevator, Entrance & Exit space
	Others	Garage, Tool room

Style of British Laboratory (Primary space & secondary space)

Name	Total space	Classification	Primary space				Secondary space						Total	
			Standard Lab.	Special Lab.	Special airconditioning	Big span Lab.	Shop room Meeting Room	Warehouse	Machine room Pipe, shaft	Dining room Rest room Locker room	Trafic	Others (Garage)	Primary	Secondary
Datchet Radio Research Station	5.049	Physics	19.7	2.3	-	7.9	26.1	9.5	8.2	9.0	14.2	3.1	29.9	70.1
Stevenage Water Pollution Research Station	4.42	Physics Chemistry Biochemistry	17.2	7.1	1.0	11.2	12.7	12.5	13.8	6.7	13.8	4.0	36.5	63.5
Weybridge Therapeutic Substances Laboratory	2.767	Microorganism	11.5	17.7	6.8	-	1.7	5.2	26.0	6.2	24.9	-	36.0	64.0
Hurley Grasslands Research Station	3.795	Chemistry Biochemistry Biology	20.9	5.3	-	15.9	12.6	5.9	7.8	10.8	20.8	-	42.1	57.9
Wellesbourne National Vegetable Research Station	3.14	Botany Entomology	30.5	12.3	4.0	-	15.3	6.7	3.5	7.1	20.6	-	46.8	53.2
Conventry Acetate & Synth. Fibers Building	7.772	Physics Biochemistry Chemistry	23.5	14.2	2.6	0.2	13.1	8.5	12.6	6.2	19.1	-	40.5	59.5
Derby British Railways Laboratory	1.358	Metallurgical Engineering Chemistry	26.6	5.0	1.3	18.8	18.8	4.9	2.7	2.7	19.2	-	51.7	48.3
Enfield Colour Television Laboratory	2.639	Electronics Chemistry	37.1	0.4	4.6	5.0	11.9	6.5	7.4	7.1	20.0	-	47.1	52.9
Farnham Forest Research Station	2.139	Entomology Pathology	14.3	11.7	10.1	-	17.9	10.2	10.0	3.8	22.0	-	36.1	63.9
Welwyn Research Build.Plastics Division	3.274	Chemistry Physical chemistry Physics	27.8	8.6	5.6	-	17.7	5.7	5.2	3.6	25.8	-	42.0	58.0
Levington Fisons Research Station	3.607	Chemistry Biochemistry Botany	16.9	11.7	2.6	-	19.0	7.5	15.3	4.1	22.9	-	31.2	68.8
Welwyn T.S.& D. Building I.C.I	7.381	Chemistry Chemical engineering Physics	12.1	-	-	34.8	20.0	6.6	3.7	3.8	19.0	-	46.9	53.1
Average			21.5	8.0	3.0	7.5	15.5	7.5	10.5	6.0	20.0	0.5	40.5	59.5

Adapted value