

5-2 Project Implementation Plan

5-2-1 Consultant and Construction Contractor

This project is prepared on conditions that a consultant and a construction contractor to implement this project are of Japanese nationality. It is preferable that the consultant has thorough understanding on the grant aid system of the Japanese government as well as having enough experience in Bangladesh. The contractor should be selected through a tender out of several firms having sufficient experience of overseas project and sufficient ability to complete this project. This project can be divided into two kinds of the construction work and the pharmaceutical formulation equipment work, and the implementation plan in this project is based on the turn-key type contract in which one contractor will engage for the whole work including both the works from start to completion. Subcontractors may be selected out of either Japanese or Bangladesh firms and will have to be obtained the approval of consultant. Accordingly, it is necessary for the contractor to be able to conclude the turn-key type contract including both the construction work and the pharmaceutical formulation equipment work, and also to conclude the sub-contracts both with Bangladesh and Japanese sub-contractors.

5-2-2 Procurement of Construction Materials, Equipment and Labour

For the purpose of reducing the construction cost, Bangladesh material, equipment and labour as much as possible will be used, but some of material, equipment and labour will be imported if they are not available in Bangladesh or are advantageous in function or cost.

(1) Bangladesh Local Material and Equipment

Main construction materials, to be procured in Bangladesh, are shown in the following. The domestic production and supply, however, are not stable enough to meet the domestic demand because both the demand and the supply is extremely unsteady. Therefore, it may be essential for the client to secure the supply of required items and volume of construction materials to complete the project within the limited construction period.

- Reinforcing bars : It is necessary for the client to secure the supply of required type, quantity and quality of reinforcing bars.
- Cement : It is necessary for the client to secure the supply of required quality and quantity of cement.
- Aggregate : Crushed gravels of stones and brick chips out of overburnt bricks coming out of the production process will be mainly used.
- Bricks : It is desirable to secure machine-made and hand-made bricks in high quality during the dry season.
- Timber : Since all the local timbers are hard ones which are difficult to be processed and the production is limited, it is not suitable for construction material. Accordingly, timber has to be used at a minimum.
- Terrazzo : It is the most popular finish material.

(2) Imported Materials and Equipment

Main construction materials and equipment to be imported in this project are as follows:

- Sash and glass : Sashes of air-tight and waterproof are not manufactured in Bangladesh, and large glass of stable quality is not manufactured, either. Accordingly, those have to be imported.
- Paints : Water-soluble paints are available in Bangladesh, but waterproof paints have to be imported.
- Air conditioning equipment : It is very difficult to procure the equipments. Accordingly, those have to be imported.
- Electrical equipment : - do -
- Lighting equipment : - do -
- Pharmaceutical formulation equipment : - do -
- Construction machine and equipment : - do -

(3) Labour

All the other labour will be procured in Bangladesh than ones of special skills. For the works of the construction materials and equipment as mentioned in the preceeding (2), special skills are needed. For these works, only supervisors will be provided from Japan in order to instruct them.

5-3 Project Schedule

5-3-1 Schedule of Aid by the Japanese Government

Fig. III-18 shows the implementation schedule of the aid by the Japanese Government.

- (1) Design (3.5 months) : The period will include 0.5 months for which the client will approve the design. During the period, the detailed design and the tender document will be prepared.
- (2) Tender (2.0 months) : The tender is schedule for 2.0 months, after the client's approving the tender documents consisting of the drawings, specifications and the tender document. During this period, tender preparation, tender, tender evaluation will be made and the construction contract will be concluded between the client and the contractor.
- (3) Construction Work (13.5 months) : The construction work is scheduled for 13.5 months after concluding the construction contract. This period includes the preparatory work period (0.5 month) and the period for the procedures after completion of the construction work (0.5 month). Accordingly, the actual construction period comes to be 12.5 months. Since the work progress are greatly influenced by the weather, the key point is to start the construction during a dry season and complete the construction during the next dry season and to utilize as long a period during a dry season as possible.

5-3-2 Schedule of Items to Be Done by the Bangladesh Government

Fig. III-19 shows the schedule of items to be done by the Bangladesh Government. It is necessary to complete the security of the project site (including the transfer of the possession right), the land development of site, the construction of the boundary wall, gate, etc., the construction of the access road before commencement of the work under the Japanese Grant. Also, it is desirable for the Bangladesh engineers in charge to receive on-the-job training under the Japanese engineers during the period for operation and maintenance of the architectural equipment and pharmaceutical equipment.

Fig. I-18 PROJECT SCHEDULE UNDER JAPANESE GRANT

MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
PHASE		DESIGN			TENDER					CONSTRUCTION									
GOVERNMENT OF BANGLADESH			EXCHANGE OF NOTES - CONSULTANT AGREEMENT				CONSTRUCTION CONTRACT - COMMENCEMENT OF CONSTRUCTION										COMPLETION		
GOVERNMENT OF JAPAN			CONSULTANT AGREEMENT - APPROVAL OF TENDER DOCUMENT				APPROVAL OF TENDER AND CONSTRUCTION CONTRACT												
CONSULTANT			CONSULTANT AGREEMENT DETAIL DESIGN - APPROVAL OF TENDER DOCUMENT				VERIFICATION OF CONSULTANT AGREEMENT - VERIFICATION OF CONSTRUCTION CONTRACT												
CONTRACTOR										EVALUATION OF TENDER					SUPERVISION OF PROJECT				
											CONSTRUCTION CONTRACT								
												DRAWING MANUFACTURING OF MACHINE							
																		TRANSPORTATION	INSTALLATION

6. Rough Cost Estimate of Items to Be Done by the Bangladesh Government

The items to be done by the Bangladesh Government are as described in III, 5-1-2, and the rough cost estimate is as shown below:

(Unit: Yen)

Item of Work	Price
1) Works to be done before commencement of the Work	<u>18,500,000</u>
a. Site preparation (appr. 30,000 m ³)	6,000,000
b. Construction of the boundary wall and gate (appr. 660 m)	10,000,000
c. Construction of the access road (appr. 120 m)	2,500,000
2) Infrastructure	<u>20,000,000</u>
a. Installation of external telephone facilities (as required)	-
b. Installation of electric supply facilities	15,000,000
c. Installation of water supply and drainage facilities (appr. 200 m)	5,000,000
3) Other expenses in connection with the Construction Work	<u>591,500,000</u>
a. Bank Expenses (A/P, etc.)	17,300,000
b. Duties & taxes, etc.	574,200,000
4) Total	630,000,000

7. Management and Administration Plan

7-1 Execution Body and Management and Administration of the Project

7-1-1 Execution Body of the Project

The plan of improving the domestic production of essential drugs is included in the Second Five Year Plan (1980-1985). The project will be executed under the Ministry of Health and Population Control, and will be directly managed and administrated by Directorate General of Health Service (DGHS). After completion of the Project, the fund from Asian Development Bank (ADB) is to be applied for the management.

7-1-2 Management and Administration

(1) Management and Administration

The feasibility study by World Bank recommends the body which will be efficiently managed and administrated on no-profit and no-less basis (see II, 2-4-1). The Bangladesh Government has the plan that, according to this recommendation, the proposed Pharmaceutical Formulation Centre will be managed in a self paying by a company registered under the Companies Act whose shares will be subscribed wholly by the Bangladesh Government. All the directors to be dispatched by the Bangladesh Government will manage the proposed Pharmaceutical Formulation Centre under the management policy of the Bangladesh Government. In this plan, stock holders are not expected to receive a dividend. And all the products will be distributed to Central Medical Stores Depot (CMSD), Medical Stores Depot (MSD) and District Reserve Stores (DRS) and will not be supplied to the private market. Under this management, high profit will be expected, and as a result, the employment of capable engineers and the study and development of products will be realized and, furthermore, the management financially on a self-paying will be successful. In future, when the other pharmaceutical formulation centres will be established in Khulna Division and Chittagong Division and the existing P.P.U. is improved, the recommendation by World Bank will be visualized. Within these pharmaceutical formulation centres, the procurement of raw materials and the production of drugs and the

distribution of products will be centralizingly controlled by the Bangladesh Government according to the plan of the Bangladesh Government.

(2) Procurement of Raw Materials and Marketing Route of Products
(See II, 2-1-4)

According to the procurement programme of raw material by the Bangladesh Government, the raw materials and packing materials will be procured from the manufacturers or their agencies who will be awarded through international tender. In this way, the raw materials and packing materials will be secured in highest quality and at lowest price. All the products will be supplied to District Reserve Stores (DRS). When the Medical Stores Depot (MSD) is established in Rajshahi Division in future, all the products will be sold to MSD. Considering the financial basis on which a company is managed on a self-paying basis, it is indispensable to sell as much volume of products as possible and in as high price as possible. Accordingly, it is necessary to consider how the product will be sold in the advantageous cost and quantity, without the fixed price and volume for sale only to the public sector, DRS or MSD.

7-1-3 Function of Pharmaceutical Formulation Centre

The function of proposed Pharmaceutical Formulation Centre is assumed as shown below:

- 1) Production of drugs
- 2) Quality control of drugs
- 3) Packing of products
- 4) Inspection of products
- 5) Procurement of raw materials of drugs and packing materials
- 6) Storage and maintenance of raw materials of drugs and packing materials
- 7) Storage and maintenance of products
- 8) Marketing of products
- 9) Maintenance of pharmaceutical formulation equipment
- 10) Maintenance of equipment of quality control and inspection

- 11) Maintenance of buildings and sanitary, plumbing and electrical equipment
- 12) Production planning
- 13) Management of work and personnel
- 14) Management of financial affairs and accounting
- 15) Others

7-2 Manpower Plan

The organization, kinds of work and number of manpower required for managing and operating all the function of proposed pharmaceutical formulation centre is shown in Fig. III-20, and the accommodation of personnel is shown in Table III-2. However, typists, peons, guards, gardeners, sweepers and drivers, etc. are not planned in these chart and table, but has to be considered as required by the management.

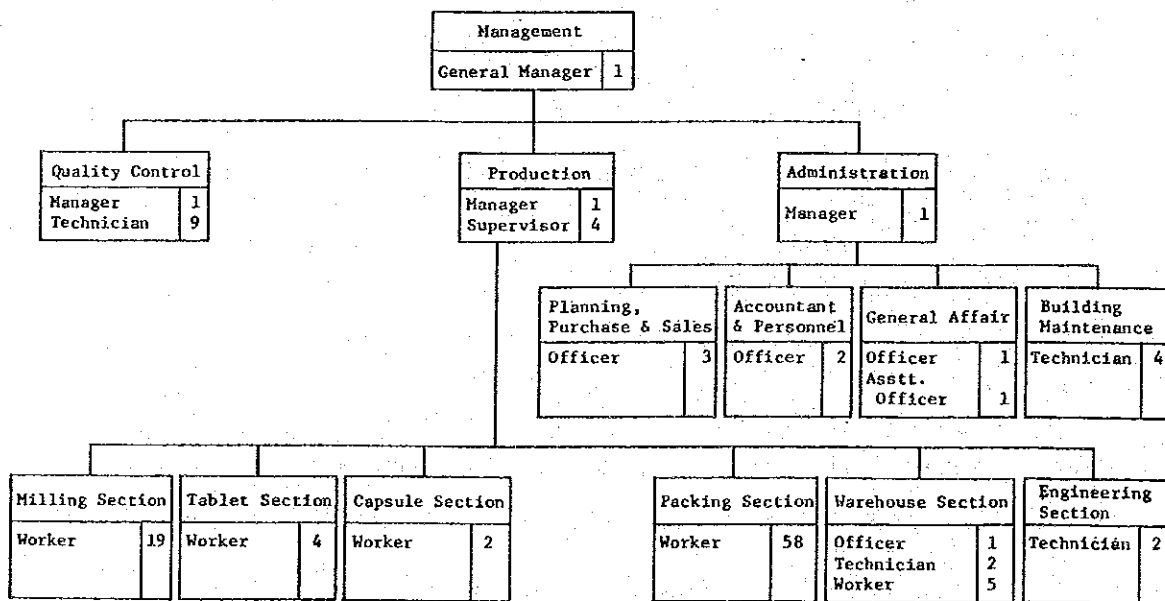


Fig. III-20 Proposed Organization Chart

Table III-2 Accommodation of Personnel

Room No.	Room	Personnel	No. of Personnel
Management			
101	Office Room	General Manager Secretary	1 (as required)
Administration			
101	Office Room	Manager Planning, Purchase & Sales Officer Accountant & Personnel Officer General Affair Officer General Affair Asst. Officer Typist Peon	1 3 2 1 1 (as required) (- do -)
	Sub-station	Building Maintenance Technician	4
	(Check Gate)	Guard Gardener Sweeper	(as required) (- do -) (- do -)
	(Garage)	Driver	(- do -)
Quality Control			
103	Quality Control Room	Manager Technician	1 9
Production			
219	Package Preparation Room	Manager	1
204	Processing Office	Supervisor	2
222	Processing Office	Supervisor	2
Mixing Section			
201	Weighing Room	Worker	3
202	Sifting Room	Worker	2
203	Milling Room	Worker	2
207	Dry Mixing Room	Worker	4
208	Wet Mixing Room	Worker	4
213	Liquid Preparation Room	Worker	2
214	Washing Room	Worker	2
Tablet Section			
210	Tableting Room	Worker	4
211			
212			
Capsule Section			
215	Capsule Filling Room	Worker	2
216			
Packing Section			
218	Packing Room	Worker	50
219	Package Preparation Room	Worker	8
Warehouse Section			
305	Office Room	Officer	1
306	Inspection Room	Technician	2
301	Warehouse	Worker	5
Engineering Section			
220	Machine Room	Technician	2
Total			121

7-3 Maintenance of Facilities

7-3-1 Maintenance of Buildings

Periodical inspections and repairs are necessary to utilize the buildings in the best condition. For this purpose, four special technicians for buildings, sanitary and plumbing, air-conditioning and electricity are required and belong to the section of building maintenance (see Fig. III-20).

(1) Criteria of Building Maintenance

1) Repainting is necessary as shown below:-

	Exterior	Interior
Ferrous part	Every 3 years	Every 5 years
Wooden part and Others	Every 5 years	Every 7 years

2) The following repairs are necessary:

Repair of uneven floor : As soon as unevenness is found
Repair of mortar of wall and etc. : As soon as mortar is peeled off

(2) Consideration for Maintenance of Building Equipment

- 1) To inspect and clean the equipment daily.
- 2) To adjust the electric equipment according to the voltage fluctuation as it is very heavy.
- 3) To repair the equipment promptly when it required.

7-3-2 Maintenance of Pharmaceutical Formulation Equipment

In order to drive the equipment for a long term and in the best condition, the proper operation, periodical inspection, adjustment and repair are indispensable. For this purpose, two special technicians are required and belong to the engineering section (see Fig. III-20).

Since the power supply is very unstable in Bogra, it is necessary to try to operate the equipment according to the voltage fluctuation. Particularly when the equipment stops, it is surely necessary quickly to take materials out of machines and clean up the machines for preventing the machines from the damage by material to remain in the machines.

7-4 Estimate of Maintenance Expenditure

7-4-1 Expenditure for Manpower

The estimate of annual expenditure for manpower set up in III, 7-2 is as follows:

Post	Average of Basic Pay per Month (TK)	No. of Post	Total Basic Pay per Annum (TK)
General Manager	2,550	1	30,600
Manager	2,350	3	84,600
Officer	2,112	7	177,408
Supervisor	1,812	4	86,976
Technician	1,255	17	256,020
Asstt. Officer	970	1	11,640
Worker	731	88	771,936
Sub-total		121	1,419,180
Pay except Basic Pay		(35% of TK1,419,180) TK 496,713	
Total		TK1,915,893	

- Remarks: 1) The basic pay and the pay except the basic pay refer to the Project Proforma (issued on Feb. 8, 1982) of the Ministry of Health and Population Control.
- 2) The expenditure for such manpower as typists, peons, guards, gardeners, sweepers and drivers is not included.

7-4-2 Expenditure for Maintenance of Facilities

The estimate of annual expenditure for maintenance of facilities is as follows:

	Conditions	Annual Expenditure
(1) Expenditure for energy		
1) Petroleum	None	-
2) Gas	None	-
3) Electricity	636,000 KW/year	TK1,590,000
(2) Building Repairing Expenditure	1 set	TK 113,000
(3) Total		TK1,703,000

Remarks: The above expenditure is exclusive of the expenditure for furniture and utensils.

IV. PROJECT JUSTIFICATION

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The proposed Pharmaceutical Formulation Centre could be evaluated and justified by analysis of economical benefit, based on the management of the Centre and the circulation system including the procurement of raw material of drugs and distribution of products. However now it is understood that the Bangladesh Government is studying the details of management and circulation system, which have not been presented, yet. And it is recognized by the Bangladesh Government that this Project is expected to bring forth not the economical benefit but the service benefits to the people in Bangladesh. In this consideration, this project will be justified in this report by discussion of the significance and effect to be expected by this project.

The significance and effect to be expected by this project are discussed as follows:

(1) Significance in Improvement Plan of Medical Service in Rural Areas

The Bangladesh Government is concentrating himself on establishment of Primary Health Care facilities such as Thana Health Complex (THC) and Family Welfare Centre (FWC), etc. to be enjoyed in the rural areas. In Primary Health Care Facilities, all the patients can enjoy medical service free of charge as described above. And all the essential drugs, chosen through the necessities in the Primary Health Care facilities, are also provided patients free of charge. If these medical services are charged for, it may be forecasted that more than 80 % of the patients will not be able to receive the medical services. By the proposed Pharmaceutical Formulation Centre, the drugs within the range of 45 items of essential drugs are planned to be produced, which will bear parts of stable supply of drugs. Therefore the proposed Centre will be expected greatly to contribute to the promotion of improvement of the medical services free of charge in the Primary Health Care facilities.

(2) Significance in Improvement of Medical Service in Bogra

Since the essential drugs are absolutely short in total quantity even by domestic production and import and the transportation system is not established or maintained yet, the drugs are not smoothly distributed. Particularly, Rajshahi Division where the project site is located at Bogra is geographically separated from the other three Divisions of Dhaka, Chittagong, Khulna, where most of industries and import ports are located, by two big rivers of the Jamna River and the Ganges River, and accordingly it is extremely difficult to transport commodities including drugs from these Divisions to Rajshahi Division.

In these circumstances, since by the project drugs will be produced and directly distributed without transportation difficulty to Primary Health Care facilities within area of this Division, it can be recognized that the proposed Pharmaceutical Formulation Centre will greatly contribute not only to the increase of supply of essential drugs but also to the improvement of medical service in the primary stage in Rajshahi Division.

(3) Significance in Increasing of Domestic Production of Drugs

According to the Feasibility Study by the World Bank, it is forecasted that the demand for 45 items of essential drugs in 1985 will reach more than TK 600 million in market price. And it is said that the self-supporting rate to the present demand amounts to approximately 25 %, and that the rest of the demand depends on the import. Therefore an enormous sum of foreign currency will be anticipated to be expended if this situation continues.

The Second Five Year Plan (1980 - 85) aims at increasing the self-supporting rate of essential drugs up to at least 50 %. It is recognized that the proposed Pharmaceutical Formulation Centre will be established as a part of the Plan, and will contribute to the increase of domestic production of essential drugs and therefore to savings of foreign currency.

(4) Significance in Domestic Production and Establishment of Circulation System of Drugs

For the purpose of the smooth distribution and stable supply of drugs to the people, the Bangladesh Government is concentrating himself on the establishment of pharmaceutical production facilities and circulation system. As for the pharmaceutical production facilities, a pharmaceutical formulation centre is planned to be established in each of 4 Divisions. As for the circulation facilities, Central Medical Stores Depot (CMSD) is planned to be established in Dhaka, Medical Stores Depot (MSD) in each Division and District Reserve Stores (DRS) in each District. The proposed Pharmaceutical Formulation Centre is one of planned four and is expected to contribute as an indispensable part of the domestic production to the establishment of circulation system of drugs.

(5) Significance in Increase of Domestic Production of Essential Drugs

Most of the essential drugs as planned to be produced by the proposed Pharmaceutical Formulation Centre have been generally used in the industrialized countries and therefore have presently had a low market value in general. Due to the un-established circulation system under the Government which is the main marketing route of the essential drugs in Bangladesh and the low fixed price, it is unstable for the Government to order the production and supply of essential drugs. Under these circumstances, it is very rare for private companies positively to produce the essential drugs. On the other hand, it is seen that, as found in the Primary Health Care facilities, the potential demand of essential drugs are very large. According to the plan of the Bangladesh Government if the essential drugs are produced at low cost by the management of company on non-profit/no-loss basis and the marketing route in the Government circulation system is established, the management of the production and distribution of essential drugs will be able to be financially supported. When the management as planned is successful, it is expected that the production of essential drugs will increase to meet the large amount of potential demand.

Besides, it is expected that the possibility to increase the production of essential drugs will promote the production enthusiasm, to private pharmaceutical production companies which are presently lacking in production enthusiasm of essential drugs due to the unstable demand by the Government order despite the existing condition that they have capability of production of the essential drugs.

(6) Effect to reduction of Production Cost

The Feasibility Study prepared by the World Bank presents the following methods for procuring the essential drugs for Primary Health Care;

- 1) Import of drugs through overseas manufactures or agents
- 2) Procurement of drugs through domestic manufactures or agents
- 3) Domestic production of drugs on no profit/no-loss basis

and recommends to the Bangladesh Government that, by domestic production on no-profit/no-loss basis, drugs can be produced at the lowest cost and be managed most economically.

In order to realize the method of domestic production on no-profit/no-loss basis, the proposed Pharmaceutical Formulation Centre is planned by the Bangladesh Government to be managed without profit by a company whose shares will be subscribed wholly by the Bangladesh Government only. In this plan, only the essential drugs will be produced and all the products will be distributed to District Reserve Stores (DRS), a government circulation organization of drugs. And consequently without such the indirect expenses as the expenses for new development and information service, etc., the proposed Pharmaceutical Formulation Centre will be managed by only the direct expenses and accordingly, will be able to reduce the production cost. Moreover when the raw material of drugs is procured from the private market through tender, it is expected that the procurement cost of raw material will be reduced in competition through tender, and the reduced procurement cost will make the production cost of drugs reduced. And moreover accordingly to the

Feasibility Study by the World Bank, on condition that the procurement of raw material, production of drugs and distribution of products through the proposed Pharmaceutical Formulation Centre and the other centres to be established will be centralizingly controlled by the Government, it is expected that the production cost will be reduced 20 % to 55 % compared with the existing cost.

(7) Effect to Security of Pharmaceutical Engineers

Since P.P.U. and I.V. Fluid Plant are regulated directly by the Government system, it is very difficult to employ satisfactory pharmaceutical engineers.

This may be one of the bottle necks by which the existing pharmaceutical equipments can not be fully operated or by which the improvement programme of facilities has not been progressed.

Since the proposed Pharmaceutical Formulation Centre is planned by the Bangladesh Government to be managed by a company on self-playing basis, the new company will be able to execute his own employment plan according to his own financial plan on condition of the marketing price within which the new company will be able to be managed. In this employment plan, pharmaceutical engineers of ability will be able sufficiently to be employed and fully to utilized the production capacity of the pharmaceutical formulation equipments. It is practically expected that the increase of employment conditions of pharmaceutical engineers will make the effective stimulus to the manpower development for pharmaceutical engineering.

As above seen, it is expected that the proposed Pharmaceutical Formulation Centre will attain a part of the national objective of of the improving of quality and stable supply of essential drugs, which will have a national significance by greatly contributing to the improvement of social life for the people in Bangladesh. Therefore, as a result, it can be justified for this project to be executed.

V. CONCLUSION AND RECOMMENDATION

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1. Conclusion

In Bangladesh, improvement of backward medical situation is essential for improving the basic human life. Therefore the Bangladesh Government is concentration himself on the improving of basic medical service through Primary Health Care in the rural areas, which needs the stable supply of required drugs. The Feasibility Study Report by the World Bank recommends that the increasing of domestic production of drugs is going to be the most economical for the stable supply. On understanding of the above circumstances and the necessity of establishing domestic pharmaceutical production, it is recognized that it will be gratly necessary to construct a new pharmaceutical formulation centre. And it is also evaluated that the increasing of domestic pharmaceutical production will become effective for saving the expenditure of foreign currency being presently used for the import and accordingly that the establishment of pharmaceutical formulation centres will be significant for the improvement of national economy.

On the other hand, on condition that the new pharmaceutical formulation centre will be managed on a self-paying by a company registered under the Companie's Act whose shares will be subscribed wholly by the Bangladesh Government only and that the procurement of raw material, production of drugs and distribution of products through the existing and new facilities will be centralizingly controled by the Government, it is practically expected that the cost of production will be reduced and the production volume will be accordingly increased. Therefore it is recognized that this project will be able to achieve parts of the national objective of stable supply of essential drugs in the low cost to people under the centralized control of production and circulation by the Government.

The facility proposed in this report involves the satisfactory function, size and prduction capacity which meet the strong request by the Bangladesh Government; "as simple as possible and minimized cost as far as possible". Therefore the proposed facility is expected to produce

a required volume of low cost essential drugs and is recognized satisfactorily to play a role of objective to realize the stable supply of low cost drugs.

In conclusion, it is sufficiently justifiable to execute this project under the Japanese Grant Aid.

2. Recommendation

As above mentioned, it is concluded that it will be significant and necessary to realize this project and that it is justifiable to implement this project under the Japanese Grant Aid. However, it can be seen that various problems are involved in the present medical situation of Bangladesh and that there will still exist the problems for executing the project.

The main problems for executing the project may be presented as follows:

- (1) The Bangladesh Government has the basic policy to manage the pharmaceutical formulation centre on a self-paying by a company registered under the Companies' Act whose shares will be subscribed wholly by the Bangladesh Government only. However, as of the day of basic design study, the company is not established yet and the functions of company and the management policy by the Government is not decided, either, yet. It is understood that, unless the company is established or the function and management are realized as planned, the justifiability to implement the project will basically disappear. Therefore, the Bangladesh Government is suggested to start the preparation at the earliest time for establishing the new company to be the executing body of project.
- (2) Most of locally produced essential drugs are presently produced in two government factories, which, however, do not seem to be efficiently managed. It may be recognized in this condition that the new pharmaceutical formulation centre will need the high managing technique in order to manage the centre financially on a self-paying. Therefore, the Bangladesh Government is suggested to study how to manage two existing government factories in link with the new pharmaceutical formulation centre and how to manage the procurement of raw material, production of drugs and distribution of products through the existing facilities and the new centre.
- (3) The proposed pharmaceutical formulation centre will need more than 120 persons to operate. In Bogra, it is seen that the new centre will find it difficult to employ the required manpower and

especially more than 40 technicians to work on the pharmaceutical processing. Since the employment of required manpower is essential for the practical operation of new centre, the new company is suggested to prepare and realize the manpower employment programme at the earliest time under the new management policy of company.

- (4) The Bangladesh Government has the plan for the new pharmaceutical formulation centre to procure raw material of drugs from private market through international tender. Even on this condition, raw material of drugs will have to be wholly imported. And the foreign currency exchange condition is extremely bad. Therefore it will be necessary for the Bangladesh Government to allocate the sufficient amount of foreign currency for the import or to find the other financial way in order efficiently to manage the new centre.
- (5) On condition that the smooth procurement of raw material of drugs and smooth distribution of products down to the Primary Health Care facilities are realized, it will be justified to execute the project of producing the essential drugs in the new pharmaceutical formulation centre. It is not found that such the existing government production and circulation facilities of drugs satisfactorily work as the existing two government factories and Central Medical Stores Depot (CMSD) and District Reserve Stores (DRS). At a same time when the new centre will be established, the Bangladesh Government is suggested to establish the circulation system at the earliest time from the procurement of required raw material of drugs down to the distribution of produced essential drugs in the Primary Health Care.

This project is expecting that the problems as above mentioned will be solved and is expected to be satisfactorily managed to achieve the initial objective.

REFERENCE DATA

APPENDIX-A OUTLINE OF SURVEYED MEDICAL TREATMENT
AND HEALTH CARE FACILITIES

A-1 Institute of Cardiovascular Diseases, Dhaka

A-2 Mohammed Ali Hospital, Bogra

A-3 Shibganj Thana Health Complex (THC), Bogra

A-4 Pirob Family Welfare Centre (FWC), Bogra

A-1 INSTITUTE OF CARDIOVASCULAR DISEASES
(SHAHEED SUHRAWARDY HOSPITAL COMPLEX, DHAKA)

(1) This Institute is one of the Specialized Health Care facilities as well as the Government special institute for cardiovascular diseases which is located in Dhaka city. In 1977, it was decided to establish this Institute with the budget of Tk 37,268,000. Since 1979, it has been operating in obtaining the Japanese financial assistance.

(2) Function

- 1) Remedy of cardiovascular diseases
- 2) Diagnosis and examination of cardiovascular diseases
- 3) Training of doctors and nurses for cardiovascular diseases
- 4) Development for the prevention of cardiovascular diseases
- 5) Study on cardiovascular diseases

(3) Organization

Director of Institute

[Academic department
	Hospital department
	Administration department

(4) Number of beds

General beds	100
(Non-paying 60, Paying 40)	
Cabins	10
Total	<u>110</u>

(5) Formulation of staff

Doctor	1
Nurse	35
Radiology technologist	2
Clinical lab. technologist	4
E.C.G. technologist	2
Electromedical technologist	1
Heart lungs machine technologist	2
Instrument care taker	1

Pharmacist	4
Administration (Officer, Clerical personnel, Kitchen, Dietetion, Wordboy, Sweeper, etc.)	97

(6) Situation of Remedy

	<u>1981</u>	<u>1982</u>
Admission in total	1,918	2,912
Coronary car unit	933	802
Intensive care unit	120	200
Out patients	13,991	16,718

A-2 MOHAMMED ALI HOSPITAL, BOGRA

- (1) This hospital is only a District Hospital containing 100 beds, managed by the Government. The description of the above 100 beds is shown as follows:-

Male surgical	24
Male medical	24
Female surgical	8
Female medical	8
Male eye	5
Female eye	5
Maternity	11
Family planning	5
Others (Emergency)	10

- (2) Formation of staff:-

(Doctor)	Sanctioned	Post-holder	Vacant
Superintendent	1	1	0
Senior consultant	1	0	1
Junior consultant	2	1	1
Resident medical officer	1	1	0
Radiologist	1	0	1
Pathologist	1	1	0
Medical officer	2	1	1
Anaesthetist	1	0	1
Dental surgeon	1	1	0
Hony. dentist	1	1	0
Sub. assitt surgeon	1	1	0
(Total)	13	8	5
(Nurse)	Sanctioned	Post-holder	Vacant
Junior Matron	1	1	0
Sister	5	2	3
Senior staff nurse	25	17	8
Nurse	-	13	-
(Total)	31	33	11

(3) Situation of remedy

	Out-patient	Admitted	Treated	Discharged	Death
1977	75,832	5,183	5,183	3,590	322
1978	50,590	4,574	4,574	2,423	249
1979	56,985	4,936	4,936	2,427	282
1980	65,724	5,199	5,199	3,976	312
1981	59,757	7,188	7,188	5,875	462
1982	68,492	7,571	7,571	7,198	457

(4) Budget (1983/83)

- Appr. 600,000 TK/year (appr. 5,740,000 Japanese Yen)
for medical and surgical requisit and drugs
(Demand; appr. 1,200,000 TK/year (appr. 11,500,000 Japanese Yen))
- Appr. 25,000 TK/year (appr. 240,000 Japanese Yen)
from Donation Funds and the Social Welfare.

A-3 SHIBGANJ THANA HEALTH COMPLEX (THC)

- (1) One thana consists of about ten Unions and Shibganj THC covers appr. 250,000 inhabitants.
- (2) Function of THC
 - 1) Domiciliary service
 - 2) Static centre
 - 3) Remedy of diseases and wounds (25 beds hospital)
10 beds are now utilizing
 - 4) Family planning (6 beds)
- (3) Number of patients : appr. 300 persons/day
- (4) Budget (1982/83)

Appr. 125,000 TK/year (appr. 1,200,000 Japanese Yen/year)
out of which, appr. 60,000 TK/year (appr. 60,000 Japanese Yen/year)
are used for drugs
(Demand; appr. 250,000 TK/year (appr. 2,400,000 Japanese Yen/year))
- (5) Shibganj THC facilities are shown as follows (See Fig.A-1 and A-2):
 - 1) Site area : appr. 5 acres
 - 2) Building
 - a. Administration block - 1 building
 - b. Hospital block - 1 building
 - c. Staff quarter - 3 buildings

Doctor - 4 units
Nurses - 4 units
Inspector, Pharmacist - 8 units
Worker, Peon, Driver - 4 units

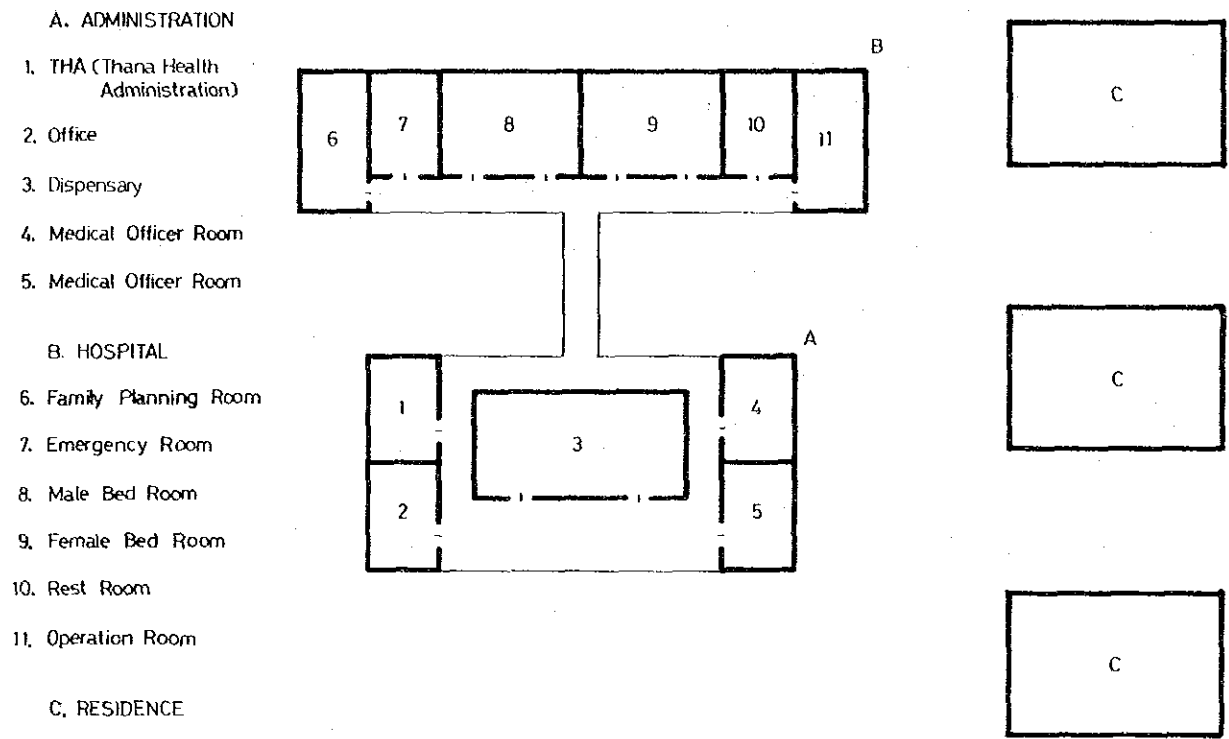


Fig. A-1 LAYOUT OF SHIBGANJ THC

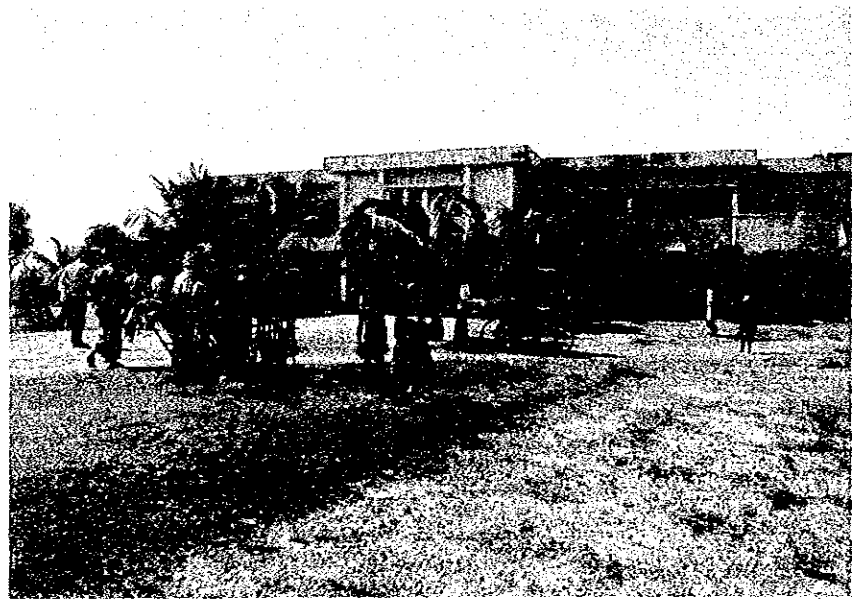
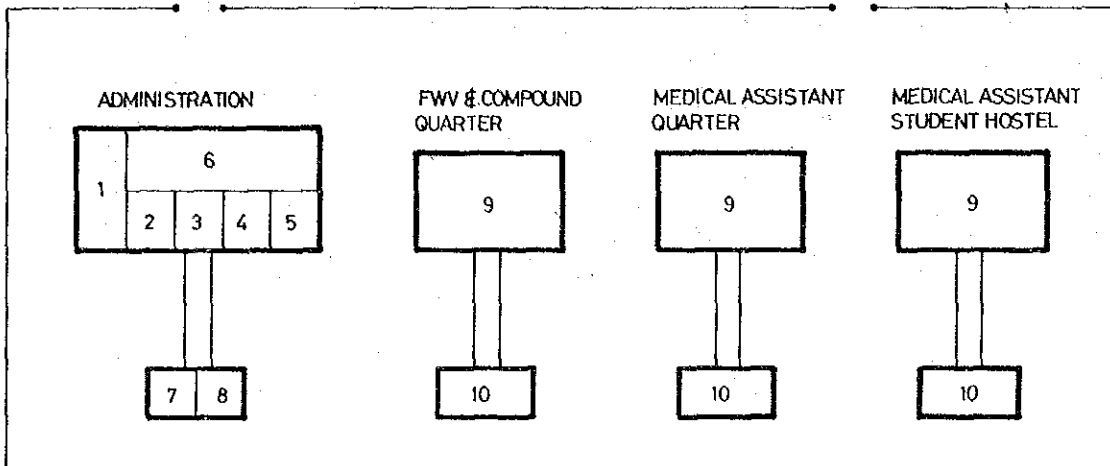


Fig. A-2 PHOTO OF SHIBGANJ THC

A-4 PIROB FAMILY WELFARE CENTRE (FWC)

- (1) There are 12 FWCs in Bogra District and one FWC covers appr. 20,000 inhabitants.
- (2) Function of FWC
 - 1) Prevention of diseases
 - 2) Remedy of diseases
- (3) Staff formation of Pirob FWC
 - 1) Medical assistant - 1
 - 2) Family Welfare Visitor (FWV) - 1
 - 3) Pharmacist - 1
 - 4) Peon - 2
 - 5) Sweeper - 1
- (4) Prob FWC facilities are as follows (See Fig. A-3 and A-4):
 - 1) Medical doctor and family planning 2 units
 - 2) Medical assistant 1 unit
 - 3) Medical assistant student 1 unit
(Bogra Medical Training School)
- (5) Budget (1982/83)
Appr. 20,000 TK/year (Appr. 191,600 Japanese Yen/year)



- | | | | |
|------------------|-----------------------------|--------------------|----------------------------------|
| 1. Medicine Room | 4. Dispensary Room | 7. Toilet (Male) | 10. Bath-room (Toilet & Kitchen) |
| 2. FWV Room | 5. Class Room (Black Board) | 8. Toilet (Female) | |
| 3. Store | 6. Class Room | 9. Bed Room | |

Fig. A-3 LAYOUT OF PIROB FWC

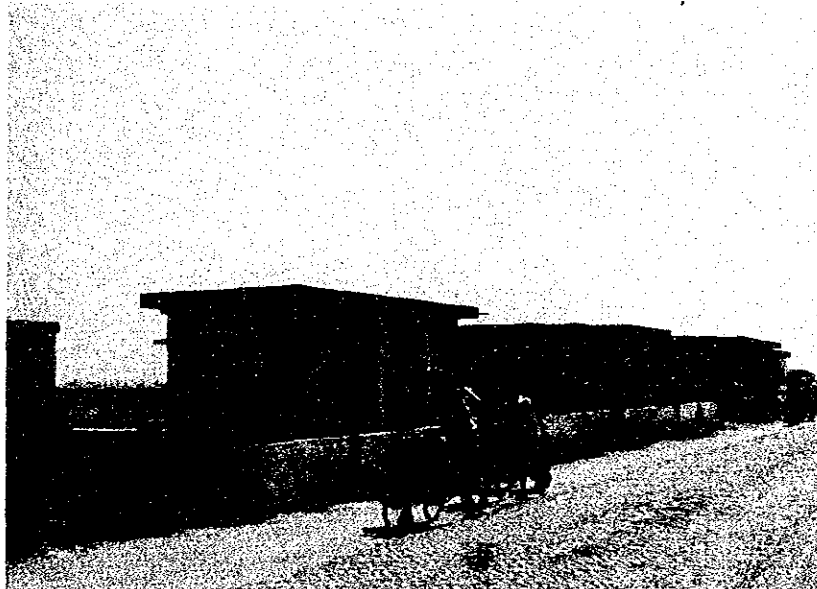


Fig. A-4 PHOTO OF PIROB FWC

APPENDIX-B EXISTING SITUATION OF PHARMACEUTICAL UNITS

- B-1 Pharmaceutical Production Unit (P.P.U.)
- B-2 Intravenous Fluid Plant (I.V. Fluid Plant).
- B-3 Gonoshasthaya Pharmaceuticals Ltd.

B-1 PHARMACEUTICAL PRODUCTION UNIT (P.P.U.)
(Government Pharmaceutical Laboratory)

This Unit was constructed, for 1962 to 1963, in the site adjacent to Central Medical Stores Depot (CMSD) which is located at Tejgaon in Dhaka. At the early time of completion, the building of Unit was one-storied (Building coverage area: 10,762 sft. (appr. 1,000 m²)). After then, it turned to three-storied building (Building coverage area: 14,400 sft. (appr. 1,340 m²)) through the extension work executed in 1975 with the budget of TK 13,725,000, including the foreign fund, TK 3,667,000. The object of Unit is to supply the essential drugs to CMSD.

B-1-1 Management

(1) Administration

This Unit is only a pharmaceutical production unit as well as non-commercial body directly administrated by the Ministry of Health and Population Control.

(2) Budget (1982/83)

Recurring Revenue Budget	TK 612,000
Non-recurring Development Budget	TK 14,454,000
Total	TK 15,066,000

(3) Administration organization (See Fig. B-1)

This Unit is a subordinate organization of Directorate General of Health Service (DGHS).

(4) Procurement of raw materials and market of products

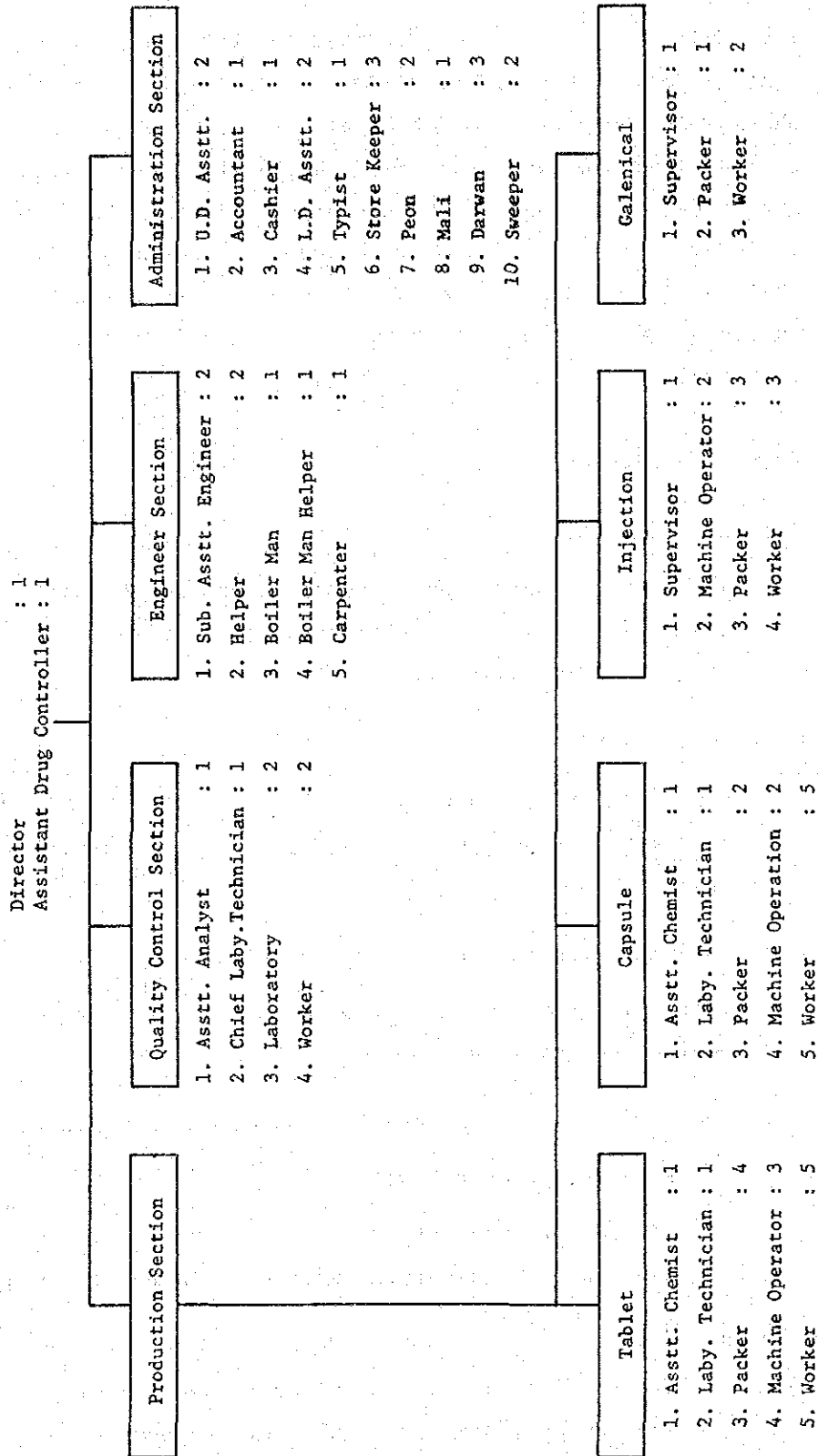
1) Procurement of raw materials

All the procurement are made through CMSD. The payments are made in book adjustment without transfer of money.

2) Market

All the products are supplied to CMSD. The payments are also made in book adjustment without transfer of money.

Fig. B-1 Administrative Set-up of Government Pharmaceutical Laboratory
Tejgaon, Dhaka



B-1-2 Existing Situation of Drug Production

(1) Items of Products

This Unit mainly produces Tablets, Capsules and Sachets and the items of products are seven, as follows:

- 1) Phalthalyl sylphathiazol tablet
- 2) Sulphadimidine tablet
- 3) Aspyrin tablet
- 4) Chloroquine phosphate tablet
- 5) Anti-acid tablet
- 6) Piperazine tablet
- 7) ORS (Oral Rehydration Salt)

(2) Volume of Production (actual) (1979/80 ~)

	<u>1980</u> July, '79 -June, '80	<u>1981</u> July, '80 -June, '81	<u>1982</u> July, '81 -June, '82	<u>1983 (9 months)</u> July, '82 -March, '83
<u>Tablet</u>	16 million	27 million	30.7 million	43 million
<u>Capsule</u>	-	1.95 million	3.28 million	4.9 million
<u>Distilled water</u>	0.12 million	0.1 million	-	-
<u>Tr. Iodine</u>	183 lbs.	2,285 lbs.	1,488 lbs.	-

B-1-3 Existing Situation of Pharmaceutical Formulation Equipments

(1) Outline

1) In the process of tableting, the wet-granulating method and the dry granulating method are adopted. Only aspyrin is produced in the dry-granulating method and most of drugs are made in the wet-granulating method.

2) Outline of the pharmaceutical formulation equipments are shown below:

Tableting room	Tableting: 5 Nos. (Capacity: 15,000 tabs./hr 2 Nos. 100,000 tabs./hr 3 Nos.)
Granulating room	(Granulating: 2 Nos., Mixer: 2 Nos.) (Mixer (300 l): 1 No., Dryer (Tray-type): (Mixer (Ribbon-type): 1 No.) 1 No.) (Fluid bed dryer 100 kg/B: 1 No.)
Capsule Filling room	(Capsule filling: 5 Nos. 25,000 caps./hr 1 No. and 12,000 caps./hr (Balance: 2 Nos.) 4 Nos.)

3) As seen in the plan of P.P.U., the flow from raw material to product is unefficiently planned and is intersected (see Fig. B-2).

4) The packing machine is very poor so that tablets are put into tin cans with vinyl bags packing in lots.

5) Sugar-coating and film coating machines are not utilized despite the fact that they have been installed.

(2) Types of pharmaceutical formulation equipment and its capacity as shown in Table B-1.

Table B-1 Production Capacity of Various Installed Machineries
at Govt. Pharmaceutical Laboratory

	Capacity mentioned in the manual	Normally run at the G.P.L. at a capacity /hr of tabs.	Daily production on daily 5 hrs working basis (single shift)	Annual capacity 20 working days x 12 months
A. Tablets Section				
1) D3A (16 stations)	10,560-47,760 tabs./hr	15,000 x 2 tabs./hr	15,000 x 5 x 2 = 150,000	150,000 x 20 days x 12 month = 360 lacs
2) BB3B (35 stations)	89,400-178,800 tabs./hr	100,000 x 3 tabs./hr	100,000 x 5 x 3 = 1,500,000	1,500,000 x 20 days x 12 month = 3,600 lacs
B. Processing Section				
1) Diffusion drier	Drying capacity of 60 kg/hr	Presently can dry 50 kg/2½ hrs x 1	50 x 2 = 100 kg (daily drying capacity)	100 kg x 20 x 12 = 24,000 kg
2) 10 Tray drying oven	Used as initial drying of the wet preparation period to placing at the diffusion drier			
3) Glatl diffusion drier (Installed but will be on operation when gas connection will be available)	100 kg/hr	100 kg/1½ hrs x 1	100 kg x 4 = 400 kg	400 kg x 20 x 12 = 96,000 kg
Total drying capacity=120,000 kg				
Other supporting machineries for Compression Section are as follows:				
1. Oscillating Granulator (Mark III) = 2 Nos.				
2. Oscillating Granulator (Mark IV) = 2 Nos.				
3. M Mixers = 2 Nos.				
4. 380 Mixer = 2 Nos.				
5. Batooc Gardner Mixing machine = 2 Nos.				

	Capacity mentioned in the manual	Normally run at the G.P.L. at a capacity /hr of tabs.	Daily production on daily 5 hrs working basis (single shift)	Annual capacity 20 working days x 12 months
C. Capsules Section				
GHF 602 - Automatic Capsule filling machine	40,000-50,000/hr	25,000 caps x 1/hr	25,000 x 5 = 125,000 /day	25,000 x 20 x 12 = 300 lacs
Semi Automatic Capsule making machine with insebter (4 Nos.)	x	12,000 caps x 4/hr	12,000 x 5 x 4 = 240,000 /day	240,000 x 20 x 12 = 576 lacs
Other supporting machineries for capsules section as follows:				
1. Drum Mixer = 1 No.				
2. M Mixer = 1 No.				
D. O.R.S. Section				
Oral Rehydration salt	3,200/hr	3,200/hr	3,200 x 5 = 16,000/day	16,000 x 20 x 12 = 36 lacs shfts.
40 tray drier to be used for drying of the raw materials for O.R.S.				
E. Injectable Section (Not in operation for want of service lines-water lines are being installed)				
Ample filling and sealing machine (Rota)	x	1,200/hr	1,200 x 5 = 6,000/day	6,000 x 20 x 12 = 1,440,000 amps.
Automatic filling & sealing machine (2 Nos)	x	1,200/hr	1,200 x 5 = 6,000/day	6,000 x 20 x 12 x 2 = 2,880,000
Other supporting machine for injection section are as follows:				
1) Distilled water Plant (panzins)	x	60 l./hr	60 x 5 = 300 l /day	300 x 20 x 12 = 72,000 l
2) Manesty distilled water plant	x	45 gallons/hr	300 gallons/day	300 x 20 x 12 = 72,000 gallons
Ample washing machine (supporting) (3 machines)	x	x	10,000 amps./day	10,000 x 20 x 12 x 3 = 7,200,000 amps.

B-1-4 Existing Situation of Building Facilities

(1) Water supply

- City water
- Volume of consuming water; 100,000 gallons/month
- Filtering and purifying equipment; not installed

(2) Drainage

- Direct dischargement to drainage ditch of road
- Water treatment equipment; not installed

(3) Fire extinguishing equipment

- Fire extinguisher

(4) Energy

- Natural gas
- Electricity

(5) Air-conditioning

- Partial use of window-type cooler (See Fig. B-2)
- Temperature and humidity control; not equipped
- Air-cleaning equipment; not installed

(6) Electric equipment

- Generator 1 No.

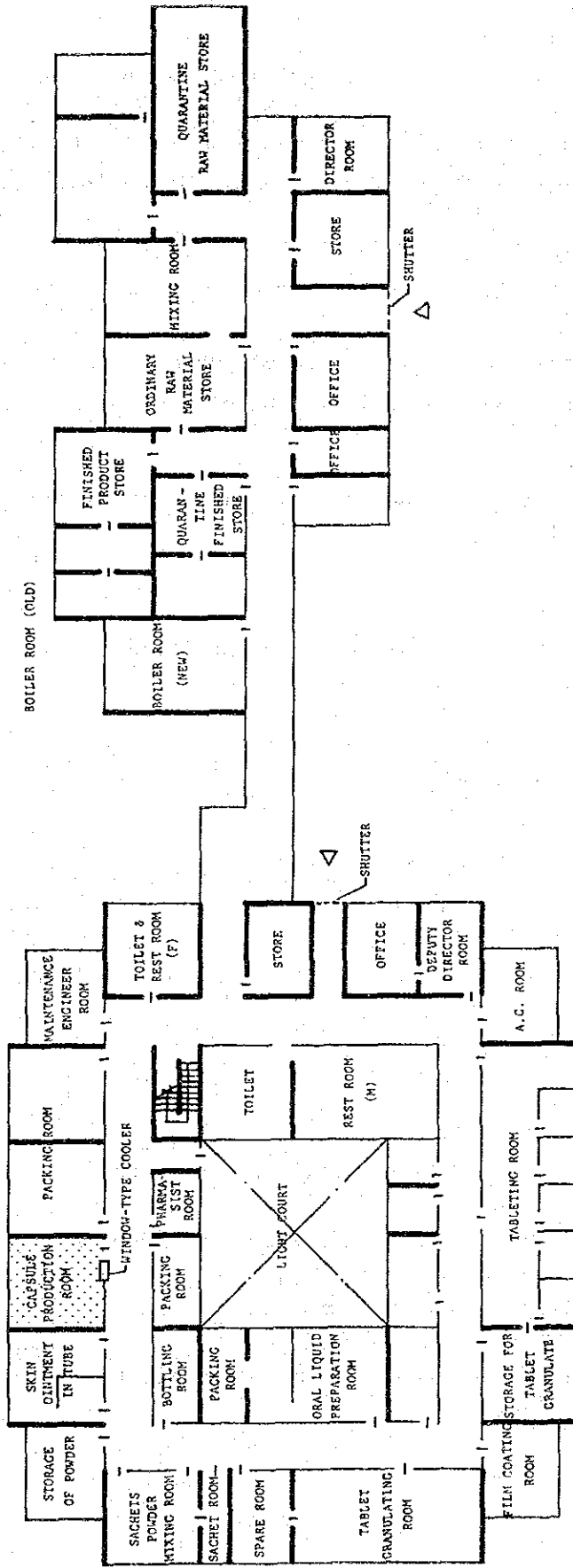
(7) Construction work

- Existing building outline as follows:
 - 1) Building coverage; appr. 1,340 m²
Total floor area; appr. 4,020 m² (3-storied)
 - 2) Commencement of construction 1975
 - 3) Cost: TK 13,725,000 ÷ 588,200,000Yen
Appr. 3,400 TK/m² ÷ 150,000 Yen/m²
(US\$ 1 = TK 7 = ¥ 300)

(8) Remarks

- 1) The building is now being wholly rehabilitated, but due to the limit of fund it is being made to the extent of rehabilitation of existing defect.

- Unfitness of finish of wall and floor
 - Unfitness of exposed piping
 - Deficiency of isolation between the inside and the out-side and, isolation between the clean zone and the dirty zone.
- 4) Only the ground floor of 3-storied building is utilizing, and the other floors are not equipped and utilized at all.



GROUND FLOOR

Fig. B-2 Outline of Pharmaceutical Production Unit (P.P.U.)

B-1-5 Future Plan

The building is now rehabilitated under the consultant dispatch from WHO. The future plan is made in 1980 and the outline is as follows:

(1) Contents of improvement

- 1) Central air-conditioning
- 2) Additional procurement and installation of pharmaceutical formulation equipment (See Table B-2) and quality control equipment (See Table B-3)
- 3) Supplying facilities for gas, hot water, cold water, steam, etc.
- 4) Fork lift (2 Nos)
- 5) Strengthening of staff (See Table B-4) and addition of attached facilities

(2) Plan of drug production

	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>
1) Tablet	360 million	500 million	500 million	600 million	-do-
2) Capsule	54 million	60 million	72 million	90 million	-do-
3) Liquid	15 million (litres)	16 million	12 million	25 million	-do-
4) Ointment	1.3 million	1.5 million	1.8 million	2.25 million	-do-
5) Sachet for Oral Rehydration	2 million	2.2 million	2.4 million	3 million	-do-
6) Sachet for Anthelmintic	2 million	2.2 million	2.4 million	3 million	-do-
7) Water for Injection	4 million (ampoules)	6 million	7.2 million	9 million	-do-

(3) Contents of plan

1) The following three types of air-conditioning are planned;

a. Window-type cooler

b. Package-type air conditioner

c. Central air-conditioning system for constant temperature and humidity

2) The plan is that the existing building will be improved and utilized as follows:

GF Production section of existing dosage forms of drugs

1F Production section of injection, ante-biotic, sterile and eye-ointment

2F Product development, and quality control

(4) Period of project: Supposed to be completed for 1980-1981

(5) Cost (See Table B-5)

Total cost: Local currency TK 29,204,000 (appr. ¥456,300,000)

and Foreign currency, TK 13,322,000

(appr. ¥208,200,000)

(US\$1 = TK16 = ¥250)

Table B-2 Additional Equipment/Machineries Required by Government
Pharmaceutical Laboratory, Tejgaon, Dhaka (P.P.U.)

Sl No	Item	Qty.	Value (TK)
1	Compression Machine BB3B	1 No.	574,000
2	Mixer 300 Manesty	1 No.	231,000
3	Granulator IV Manesty	1 No.	63,000
4	Tray Dryer "	1 No.	84,000
5	Fluid Bed Dryer 60 kgs Manesty	1 No.	280,000
6	Capsule filler B/B-6S-2	2 Nos.	238,000
7	Capsule Inserter, Model A/B-Is (Bonapace)	1 No.	
8	"v" type Mixer	1 No.	98,000
9	Capsule Polishing Machine	2 Nos.	21,000
10	Dehumidifier (Room Type)	2 Nos.	140,000
11	Air-Conditioner (Room Type)	4 Nos.	84,000
12	Sachet Machine "Rowena" Cap 60 sachet	1 No.	630,000
13	Weighing Machine Capacity 150 kg	2 Nos.	98,000
14	Powder Mixer Machine (Blender)	2 Nos.	112,000
15	Fluid Bed Dryer 100 kg, Manesty	1 No.	350,000
16	Dehumidifier	1 No.	70,000
17	Electrically heated Pan 160 kg	2 Nos.	42,000
18	Transfer pump	2 Nos.	33,600
19	Electric Stirrer 2 H.P.	2 Nos.	42,000
20	Ointment Mill 75 kg, per hour	5 Nos.	378,000
21	Platform scale capacity 200 kg	1 No.	56,000
22	Ointment filling machine cap. 2000 tubes/hour	4 Nos.	560,000
23	Sterilising oven	2 Nos.	42,000
24	Autoclave for ethylene oxide sterilization	1 No.	595,000
25	Laminar flow cabinet	1 No.	36,400
26	Jacketted stainless mixer with filter 500 lit. cap. Electrically heated	1 No.	84,000
27	Transfer pump 500 lit/hour	1 No.	16,800
28	Stainless steel vessels on castors with S/S tap 500 litres capacity	5 Nos.	80,500
29	Silverson mixer (emulsifier)	1 No.	21,000
30	Electric stirrer 2 H.P.	1 No.	21,000
31	Bottle washer 600/hour	1 No.	126,000
32	Gravfill filling machine 200 bot/hour	2 Nos.	50,000
33	Heating pans 100 kg. electrically heated	2 Nos.	42,000
34	Demineraliser R.O. System	1 No.	105,000
35	Ampoules sealing silling machine manning No. 41	3 Nos.	420,000
36	Thermo compression still capacity 300 lit/hour	1 No.	420,000
37	Stainless steel storage vessels for distilled water capacity 1000 lit	2 Nos.	56,000
38	Ampoule washing machine strunk model R.S.U. -200	1 No.	550,000
39	Electric mixer (Portable) 1.H.P.	1 No.	7,000
40	Stainless steel mixing vessel cap.100 litres	1 No.	7,000
41	Sterilizing oven about 60 cuft. capacity	2 Nos.	42,000
42	Sets of sterilizing trays, 4 trays per set, 16 transfer trays	30 sets	84,000
43	Ampoule printing machine	1 No.	112,000

Sl No.	Item	Qty.	Value (TK)
44	Carrier (Transport) Truck	1 No.	350,000
45	Vehicle small	1 No.	84,000
46	Vehicle (Jeep covered)	1 No.	84,000
47	Deep freeze		70,000
48	Cold room unit (floor space 10x12x10) Temperature not exceeding 15°C	1 No.	840,000
Total			8,530,300

Source: Ministry of Health & Population Control

Table B-3 Additional Equipment for Quality Control Section (P.P.U.)

Sl. No.	Item	Qty.	Value (TK)
1	PH Meter	1 No.	8,000
2	Boiling Point Tester (Distillator)	1 No.	8,000
3	Column Chromatograph	1 No.	10,000
4	Colorimeter	1 No.	40,000
5	UV-VIS Spectrophotometer	1 No.	200,000
6	Pyrogen Tester	1 No.	50,000
7	Rabbit Fixed Holder (6 set)	1 No.	5,000
8	Repid weighing Precision Balance	1 No.	2,500
9	Scale for Laboratory Animal (12 kg)	1 No.	8,000
10	Digstal Melting Point Tester	1 No.	17,000
11	Balance Semi-Micro	1 No.	50,000
12	Balance, Bable	1 No.	2,500
13	Kjeldahl Apparatus, Semi-Micro	1 No.	12,000
14	Tablet Abrasion Tester	1 No.	70,000
15	Flame Photometer	1 No.	70,000
16	Dust Counter	1 No.	40,000
17	Karl Fisher water Determination Apparatus	1 No.	40,000
18	Arsenic test apparatus	1 No.	500
19	Incubator, Mrk. IP-C4 up to 60 Degree Coinner size 40x40x40 cm	1 No.	25,000
20	Drying sterilizer, Mrk. KM-15 Gravity convection, up to 200 degree-C 60x50x50 cm	1 No.	30,000
21	Hot Air Drying Oven, Mrk. 16-37 up to 250 degree interior 150Wx420Lx420H.MM.	1 No.	48,000
22	Vacuum Drying Oven	1 No.	18,000
23	Gutzeit Tester	1 No.	8,000
24	Koch's Steam Sterilizer	1 No.	14,000
25	Asher	1 No.	11,000
26	Shaker	1 No.	10,000
27	Shaker Incubator	1 No.	40,000
28	Hygrometer, Portable	1 No.	5,500
29	Water bath	1 No.	4,500
30	Constant Temperature Water Bath	1 No.	7,000
31	Vacuum pump	1 No.	20,000
32	Distillation still	1 No.	23,000
33	Water Deionizer	1 No.	8,000
34	Thermostat	1 No.	16,000
35	Fraction Collector	1 No.	11,000
36	Crusher	1 No.	2,500
37	Infraed Spectrophoto-Meter	1 No.	280,000
38	Multipurpose Tablet Tester	1 No.	23,500
39	Karl Fisher Titrator	1 No.	70,000
40	TLC Scanner	1 No.	300,000
41	Ultrasonic Cleaner	1 No.	12,000
42	Rotary Evaporator	1 No.	19,000
43	Chymograph	1 No.	16,000
Total			1,680,500

Table B-4 Personnel Programme

Sl.No.	Name of the posts	No. of existing posts	No. of Additional posts	Total posts	Scale of pay	Average pay	House rent & other allowances
1	Director	1	-	1	2350-2750		
2	Dy. Director	-	2	2	2100-2600	2350x12x2 = 56,400	14,100 M. 1,080
3	Asstt. Director	-	6	6	1400-2225	1825x12x6 = 131,400	39,420 M. 3,240
4	Sr. Officer (for example Sr. officer production)	-	6	6	1150-1800	1475x12x6 = 106,200	31,860 M. 3,240
5	Jr. Officer (for example Jr. officer production)	2	10	12	750-1470	1110x12x12 = 159,840	47,952 M. 6,480
6	Services & Maintenance Officer	2	2	4	-do-		
					Sub Total:-	453,840	147,372
7	Supervisor	2	3	15	370-745		
8	Senior Office Asstt. (U.D.A.)	2	2	4	-do-	557x12x12 = 140,364	49,140
9	Sr. Lab. Tech.	1	3	4	-do-		M. 11,340
10	Sr. Store keeper	-	2	2	-do-		C. 5,040
11	Steno-typist	-	1	1	-do-		
12	Account Asstt.	1	1	2	300-540		
13	Cashier	1	-	1	-do-	420x12x9 = 45,360	15,876
14	Lab. Tech.	4	4	8	-do-		M. 4,860
15	Jr. Office Asstt.	2	2	4	-do-		C. 2,160
16	Typist	1	2	3	-do-		
17	Boiler man	2	-	2	-do-		
18	Boiler man helper	-	2	2	250-360	305x12x4 = 14,640	5,080
19	Carpenter	1	2	3	-do-		M. 2,160 C. 960

Sl. No.	Name of the posts	No. of existing posts	No. of Additional posts	Total posts	Scale of pay	Average pay	House rent & other allowances
20	Driver	1	1	2	325-610	467x12x1 = 5,604	1,956 M. 540 C. 240 R.A.-300
21	Machine operator	7	8	15	240-345	292x12x8 = 28,032	H.R. 102x12x8 = 9,792 MA 45x12x8 = 4,320 Conv. 20x12x8 = 1,920 R.A. 25x12x8 = 2,400
22	Packer	10	10	20	225-315		
23	Lab. Attendant	2	2	4	-do-		
24	Worker	17	8	25	-do-		
25	Darwan	3	1	4	-do-		
26	Peon	2	2	4	-do-		
27	Cleaner	1	-	1	-do-		
28	Mali	1	-	1	-do-		
29	Sweeper	2	2	4	-do-		
30	Animal care taker	-	1	1	-do-	270x12x27 = 87,480	95x27x12 = 30,780 MA 45x27x12 = 14,580 Conv. 20x27x12 = 6,480 T.A. 25x27x12 = 8,100
31	Animal Attendant	-	1	1	-do-		
					Total =	321,480	Total = 188,232

Pay of officer TK 453,840
 Allow. of officer TK 147,372
 Pay of Establishment TK 321,480
 Allow. of Establishment TK 188,232
 Grand Total: TK 1,110,924

Table B-5 Project Cost Estimate

Sl. No.	Work Specification	Cost (TK in lakh)	
		Local	Foreign
1	Installation of utilities (gas, cold water, hot water and steam) in the newly built 3-storied building	8.00	-
2	Internal Roads, levelling and dressing of compound	1.00	-
3	Garage 3 units: 240 sft. @TK 130 per sft.	0.31	-
	Sub-Total (1-3)	9.31	-
4	Contingency, work charge Establishment and Departmental charge @15 $\frac{1}{2}$ % of TK 13.58 lakh	1.44	-
5	Furniture for office Laboratory and workshop	9.85	-
Total (1-5)		20.60	-
Sl. No.	Foreign Equipments	Cost (TK in lakh)	
		Local	Foreign
6	Fork lift 2 Nos.	3.00	3.00
7	Central Air conditioning for the newly built 3-storied Building	33.00	28.00
8	Equipments for the production section	85.41	85.41
9	Equipment for the quality control section	16.81	16.81
	Total (Foreign Equipment)	138.22	133.22
10	Customs 60% of CIF value TK 133.22 lacks	79.93	-
11	Sales Tax 20% of CIF value and customs	42.63	-
12	Cost for Landing and Transportation to site @5% of CIF value	6.66	-
13	Installation of Equipment	1.00	-
14	Operating cost during the execution period of the scheme mainly for pay and salaries of the staff	3.00	-
Grand Total (1-14)		292.04	133.22

B-2 INTRAVENOUS FLUID PLANT (I.V. Fluid Plant)
(INSTITUTE OF PUBLIC HEALTH)

B-2-1 Management

I.V. Fluid Plant, a part of building of Institute of Public Health Complex, is located at Mohakali in Dhaka.

(1) Administration

Only this Plant is the non-commercial Fluid Plant directly managed by Ministry of Health and Population Control.

(2) Budget (1982/83)

The budget for procuring raw materials amounts to appr. TK 24,000,000, but the items are not known. All the raw material is procured through UNICEF and all the product is supplied through Central Medical Stores Depot (CMSD). The payment is made in book adjustment without transfer of money.

(3) Administrative organization

```
Ministry
|
Health Division
|
Institute of Public Health
|
I.V. Fluid Plant
```

Worker: appr. 60 persons (7.5 hrs/a working day)

(4) Procurement of raw materials and market of products

- 1) Procurement of raw materials - All the procurements are imported and are made once a year by the loan from UNICEF through UNICEF
- 2) Market of products - All the products are supplied to CMSD, but the payments are made in book adjustment without transfer of money.

B-2-2 Existing Situation of Drug Production

(1) Names of products

- 1) Glucose saline
- 2) Glucose aqua
- 3) Cholera saline
- 4) Normal saline
- 5) Peritoneal dialysis
- 6) Haemodialysis
- 7) Baby saline

(2) Consideration

- 1) As for sterilization, steam sterilization is only made.
- 2) Only the printing machine is automatically working and the others are simple and manually operated.
- 3) Quality control and inspection are hardly made.

B-2-3 Existing Situation of Production Equipment

Outline of production equipment is seen as follows:

- (1) Boiler room
 - Boiler 2 Nos.
 - Worker 3 persons
- (2) Solution preparation room
 - Tank with agitator (ϕ 2,000 x 2,000H) 2 Nos.
 - Tank with lid (ϕ 500 x 1,000H) 2 Nos.
- (3) Solution filling room
 - Filling machine (Old manual type) 5 Nos.
 - Worker 5 persons
 - Supervisor 1 person
- (4) Bag and infusion sets sterilization room
 - Sterilization (ϕ 1,500 x 2,500L) 2 Nos.
- (5) Over packing room
 - Heat sealer 2 Nos.
 - Worker 15 persons

Packing is made by 15 workers using 2 heat sealer.

Packed products are stored in cardboard boxes in the corner.
- (6) Main godown for finished products
 - Three-decker steel shelves are furnished and cardboard boxes are stocked on them.
- (7) PVC bag manufacturing room
 - 1) Printing machine (made in Switzerland) 2 Nos.
 - 2) Sealing machine 8 Nos.
 - 3) Worker 8 persons
- (8) Infusion sets manufacturing room
 - Worker 4 persons
- (9), (10) and (11) Store for raw materials
 - Many dram cans (appr. 200 cans) are used for stocking raw materials

* 1 can contains 200 g

B-2-4 Existing Situation of Building Facilities (See Fig B-3)

- (1) Water supply
 - Deep tube well
 - Volume of consuming water
75,000 litres/a working day
- (2) Purifying system
 - Distillatory equipment
- (3) Drainage
 - Closed drainage system
- (4) Fire extinguishing equipment
 - Fire extinguisher
- (5) Energy
 - 1) Natural gas
 - 2) Electricity
- (6) Air-conditioning equipment
 - Window-type cooler
(Air-cleaning equipment not installed)
- (7) Electric equipment
 - Voltage: 220V, 380V
 - Generator installed
- (8) Outline of building
 - 1) A part of Institute of Public Health Complex and constructed in 1973.
 - 2) A building used for I.V. Fluid Plant is reinforced concrete structure and single-storied.
 - 3) Extension plan for 5,000 sft will be executed in future and additional pharmaceutical equipments are beginning to be procured.
 - 4) Interior finish is as follows:

Floor	:	Terrazzo
Wainscot	:	Terrazzo
Wall	:	Mortar distemper
Ceiling	:	Mortar distemper
 - 5) Such interception from outside (dirty zone) as changing clothes and air-shower is not made at all.

B-3 GONOSHASTHAYA PHARMACEUTICALS LTD.

B-3-1 Management

This facility is located at Savar which is about 40 km northwest away from Dhaka. It is a complex including Administration Block, Residential Block, Factory Block, etc.

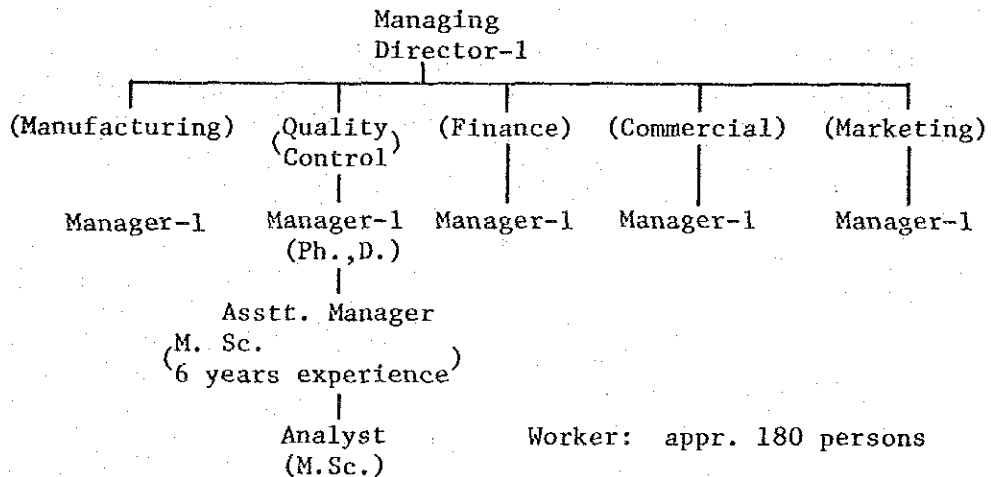
(1) Administration

The owner of this facility is Gono Shestha Kendra Trust and the facility is administrated by the Board of Directors composed of three members from the Trust and three members from the Government of Bangladesh.

(2) Budget (April 15, '83 to April 14, '84)

Administration overhead	TK 2,458,000
Sales overhead	TK 4,990,000
<hr/>	
Total	TK 7,448,000

(3) Administrative organization



(4) Procurement of raw materials and market of products

1) Procurement of raw materials

All the raw material are directly imported through local agents, foreign agents and foreign pharmaceutical companies.

However, they have to obtain the import license from the government.

2) Market

a. Central Medical Stores Depot (CMSD)

b. Population control

c. Defense

d. Semi-government, corporation, etc.

(Port, railway, airline, etc.)

B-3-2 Existing Situation of Drug Production

(1) Items of products (See Table B-6 for 22 items and prices)

- 1) Tablet
- 2) Capsule
- 3) Sachet
- 4) Liquid
- 5) Dry-syrup
- 6) Injection (in future)

(2) Volume of production

- | | |
|-------------------------|------------------------|
| 1) Dry-syrup (60 btls.) | 1.2 million btls./year |
| 2) Tablet | 80 million btls./year |
| 3) Capsule | 60 million caps./year |
| 4) Sachet | 2 million shts./year |
| 5) Bottle | 1.8 million btls./year |

Table B-6 Production Item and Price of Drugs
Formulated by Gonoshasthaya Pharmaceuticals Ltd.

Sl.No.	Item	Pack Size	Maximum Retail Price (TK)
1	G - Ampicillin Capsule 250mg	500	500.00
2	G - Ampicillin Dry Syrup 125mg/5ml	100 ml	24.00
3	G - Tetracycline Capsule 250mg	500	250.00
4	G - Cotrimoxazole Tablet	100	100.00
5	G - Cotrimexazole Suspension	100 ml	20.00
6	G - Amoxicillin Capsule 250mg	100	225.00
7	G - Metrenidazole Tablet 250mg	500	200.00
8	G - Paracetamol 500mg Tablet	1000	150.00
9	G - Aspirin 300mg Tablet	1000	75.00
10	G - Diazepam 5mg Tablet	500	62.50
11	G - Thalazol Tablet	1000	250.00
12	G - Piperazine Tablet	1000	100.00
13	G - Frusemide 40mg Tablet	1000	600.00
14	G - Antacid Tablet	500	100.00
15	G - Antacid Suspension	200 ml	14.00
16	G - Iron folic acid	1000	50.00
17	G - Chlorpheniramin 4mg Tablet	1000	75.00
18	G - Cetrimide Solution 40%	2.5 l	250.00
19	G - Benzyl Benzoate 25%	500 ml	40.00
20	Oral Rehydration Salt Sachet	20	50.00
21	G - Bephenium Tablet	1000	350.00
22	G - Amoxicillin Dry Syrup	100 ml	30.00

Source: Ministry of Health & Population Control

B-3-3 Existing Situation of Pharmaceutical Formulation Equipment

The facility is divided into three parts such as the pharmaceutical formulation block on the ground floor, the quality control block on the first floor and the new product development block also on the first floor.

(1) Pharmaceutical formulation block (GF)

The system of changing of a cap, clothes, shoes, is adopted.

1) Warehouse

Raw materials are stocked on shelves

Worker 3 persons

2) Weighing room

a. Scale (Dial) 3 Nos.

Max. capacity 250 kg, 50 kg, 50 kg

b. Scale (Balance) 2 Nos.

Max. capacity 5 kg

3) Drum store room

Raw materials in drums are stocked after weighing.

4) Penicillin capsule room

After weighing raw materials, they are put in a vinyl bag and then are filled in a filling machine.

a. Capsule filling machine 2 Nos.

Capacity 150,000 caps./8 hrs/day

b. Worker 6 persons (Female)

5) Mixing room

Mixer 1 No.

6) Washing room

Equipments are washed with water and steam.

7) Weighing room

Scale (Dial) 1 No.

Max. capacity 100 kg

- 8) Wet mixing room
- a. Ribon mixer 1 No.
Capacity: 80 kg/batch
 - b. Drum mixer 1 No.
 - c. Tray dryer 1 No.
 - d. Fluidizing bed dryer 1 No.
 - e. Sieve 1 No.
Meshes: 6, 8, 10, 12, 14, 16, 18, 20, 24-mesh
 - f. Milling machine 1 No.
 - g. Cleaner 1 No.
- 9) Semi-finished product store room
Semi-finished products are stocked in drums.
- 10) Tableting room
- a. Tableting machine 2 Nos.
Capacity 25,000 tabs./hr
80,000 tabs./hr
Tablet size 5/8 inches (max)
 - b. Worker 2 persons (Male), 3 persons (Female)
- 11) Milling room
- Milling machine 1 No.
Capacity 100 kg/hr
- 12) Blending room
- a. Drum blending for sachet 1 No.
 - b. Worker 2 persons (Female)
- 13) Sachet filling room
- Sachet filling machine 1 No.
Capacity 40 pacs./min.
- 14) Non penicillin capsule room
- Capsule machine 2 Nos.
Capacity 150,000 caps./hr
- 15) Capsule packing room
- a. Capsule filling machine 1 No.
 - b. Worker 7 persons
- 16) Packing room
- a. Labeling machine (old type) 2 Nos.
 - b. Heat sealer 1 No.
 - c. Conveyor 2 Nos.

(2) Quality Control Room and New Product Development Room

Main rooms and outline of equipment are shown as follows:

- 1) Media preparation room
 - Constant temperature water bath 1 No.
- 2) Manager room
- 3) Scale room
 - Balance 3 Nos.
- 4) Micro-biology room
 - Kutterman 2 Nos.
- 5) Sterilty room
- 6) Instrument room
 - a. Photo meter 1 No.
 - b. Moisture meter 1 No.
 - c. Microscope 1 No.
 - d. Viscometer 1 No.
- 7) Chemicals & apparatus room
- 8) Chemical Laboratory room
 - Reagent-bottle analysis are conducted.
- 9) Development of new product room
 - a. Small tableting machine 1 No.
 - b. Mixer 1 No.
 - c. Balance 1 No.
 - d. Grinder 1 No.
 - e. Ribon mixer 1 No.
 - f. Mill 1 No.
 - g. Coating machine 1 No.
- 10) Biological room
- 11) Shelf life room

B-3-4 Existing Situation of Building

- (1) Water supply
- 1) Deep tube well (D = 6")
 - 2) Volume of consuming water 50,000 gallons/day
 - 3) Deep tube well - (Pumping up) -
Underground water tank - (Pumping up)
- Concrete water tank on roof.
(12,000 gallons)

(2) Purification system (on roof)

- Concrete water tank
- 1) Normal water (for washing & drinking)
 - 2) Demineralized (liquid preparation)
 - 3) Distilled

(3) Drainage

- 1) Natural drainage
- 2) Septic tank (gravels), not chemically treated
- 3) Foul & waste water (Natural dischargement to underground drainage pit. No sewage system.)

(4) Fire extinguishing equipment

- 1) Hydrant
- 2) Fire extinguisher

(5) Energy

- 1) Natural gas
- 2) Electricity

(6) Air-conditioning equipment

- 1) Air-conditioning equipment (fuel: gas)
 - a. 30 tons - 2 systems
 - b. 19 tons - 3 systems
 - c. 5 tons - 1 system

Fresh air (15%) and circulating air (85%) are used.

(Fresh air (100%) is ideal.)

- 2) Air cleaning : 3 micron filter (6,000 cubic feet/minute)

3) Temperature and humidity

a. Capsule, dry-antibiotic syrup, oral-saline, tablet
compression

(Temperature: 20-24°C, Humidity: 40-45%)

b. Cool store for raw material (Temperature: 20-24°C)

c. Cold store for raw material (Temperature: 5°C)

d. Others (Temperature: 24-26°C, humidity 50-55%)

(7) Electric equipment

1) Existing electric demand: 500KVA (750KVA in full operation)

2) Generator, not installed

(Gas generator (250KVA) is to be installed for sterilizer.)

(8) Construction

1) Design : Bangladesh

2) Construction: Bangladesh

3) Period : 1979-1981 (2 years)

4) Cost : a. Building work; appr. 500 TK/sft \div 5,382 TK/m²
 \div 84,000
Japanese Yen/m²

b. Building equipment

(Electricity, Air-conditioning, sanitary and
plumbing)

appr. 500 TK/sft \div 5,382 TK/m² \div 84,000
Japanese Yen/m²

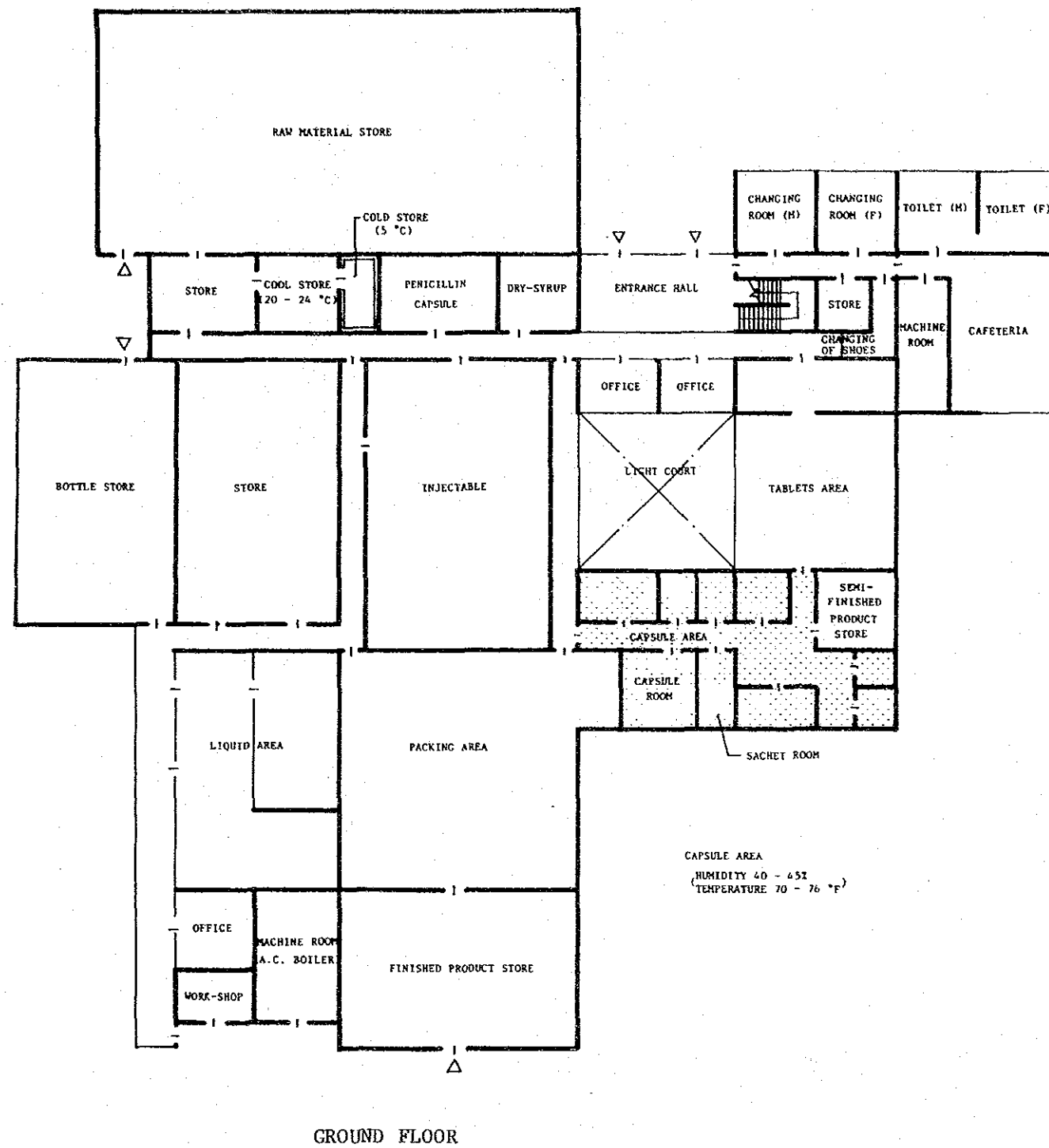
c. Total

appr. 1,000 TK/sft \div 10,764 TK/m² \div 168,800
Japanese Yen/m²

(US\$1 = TK16 = ¥250)

(9) Outline of Each Room (See Fig. B-4 for the Name of Rooms)

Name of Room	Floor	Wainscoat	Wall	Ceiling	Air-condition	Remarks
Raw-Material Store	Concrete	No	Mortar V.P.	Mortar V.P.	No	Ceiling height: 18 feet
Cool Store for Raw-Material	Concrete	No	Mortar V.P.	Mortar V.P.	Temperature: 20-24°C	
Cold Store for Raw-Material	Concrete	No	Board V.P.	Board V.P.	Temperature: 5°C	Finish: Heat insulation material
Penicilline Capsule (Temporary)	Terrazzo	Terrazzo	Mortar V.P.	Mortar V.P.	Cooling: 24-26°C	Windows
Tablet Area	Terrazzo	Terrazzo	Mortar V.P.	Mortar V.P.	Cooling: 24-26°C	Exposed dust for air-condition Washable floor Dust collector
- Capsule Area -						
Semi-finished Product Store	Concrete	No	Mortar V.P.	Mortar V.P.	Cooling: 24-26°C	
Milling Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Temperature: 22-24°C Humidity: 40-45%	Dust collector
Compression Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Temperature: 22-24°C Humidity: 40-45%	
Blending Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Temperature: 22-24°C Humidity: 40-45%	
Sachet Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Temperature: 22-24°C Humidity: 40-45%	
Capsule Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Temperature: 22-24°C Humidity: 40-45%	Dust collector
Capsule Packing Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Temperature: 22-24°C Humidity: 40-45%	
- Liquid Area -						Ceiling height: 16 feet
Interime Bottle Store	Concrete	No	Mortar V.P.	Mortar V.P.	No	
Sterilizer Room	Terrazzo	Terrazzo	Mortar V.P.	Mortar V.P.	Ceiling fan	Washable floor, Drain hole
Bottle Washing Room	Terrazzo	Terrazzo	Mortar V.P.	Mortar V.P.	Ceiling fan	Washable floor, Drain hole
Liquid Preparation Room	Terrazzo	Terrazzo	Mortar V.P.	Mortar V.P.	Ceiling fan	Washable floor, Drain hole
Filling Room	Terrazzo	Terrazzo	Mortar V.P.	Mortar V.P.	Cooling: 24-26°C	Ceiling height: 11 feet
- Injectable Area -	Terrazzo	No	Terrazzo	Mortar V.P.	Cooling Not humidity	Not operated
Changing Room (Air-Shower, Clouk Room)	Terrazzo	No	Terrazzo	Mortar V.P.	Air shower	
Packing Room	Concrete	No	Mortar V.P.	Mortar V.P.	Cooling	
Finished Product Store	Concrete	No	Mortar V.P.	Mortar V.P.	No	Ceiling height: 11 feet
- Quality Control Area (1st Floor)						Ceiling height: 11 feet
Manager Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Window-type cooler	
Microbiology Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Window-type Cooler	
Instruments Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Window-type Cooler	
Chemical & Apparatus Store	Terrazzo	No	Mortar V.P.	Mortar V.P.	No	
Media Preparation Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	No	
Balance Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Window-type Cooler	
Sterility Room	Terrazzo	No	Mortar V.P.	Mortar V.P.	Window-type Cooler	
General Chemical Laboratory	Terrazzo	No	Mortar V.P.	Mortar V.P.	Ceiling fan	



CAPSULE AREA
 HUMIDITY 40 - 45%
 TEMPERATURE 70 - 76 °F

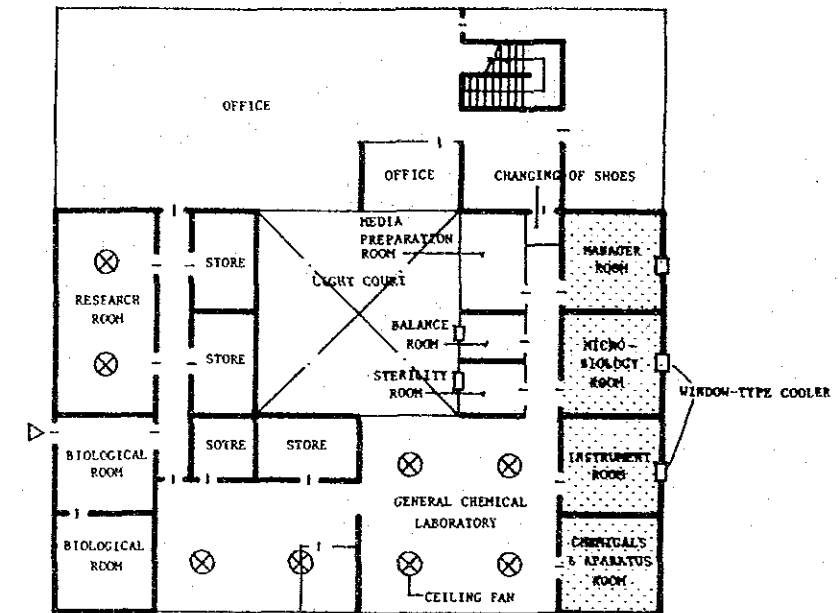


Fig. B-4 Outline of Gonoshasthaya Pharmaceuticals Ltd.

APPENDIX-C DEMAND AND SUPPLY OF DRUGS
IN THE MEDICAL FACILITIES CONCERNED

- C-1 Institute of Cardiovascular Diseases, Dhaka
- C-2 Mohammed Ali Hospital, Bogra
- C-3 Shibganj Thana Health Complex (THC), Bogra

C-1 ANNUAL REQUIREMENT OF DRUGS (1983-84), INSTITUTE OF CARDIOVASCULAR DISEASES (SHAHEED SUHRAWARDY HOSPITAL COMPLEX), SHE-E-BANGLA, NAGAR, DHAKA

Tablet Group		
Sl. No.	Item	Quantity
1	Tab. Aspirin	40,000
2	" Aminophylline	50,000
3	" Antacid	100,000
4	" Avlochlor	30,000
5	" Angised	20,000
6	" Aldomet	50,000
7	" Becomplex	100,000
8	" Daonil	10,000
9	" Diyoxin	70,000
10	" Dopegyt	50,000
11	" Seduxen 5 mg.	50,000
12	" Seduxen 2 mg.	20,000
13	" Flagyl/Kilon	30,000
14	" F. Sulph/Iron	100,000
15	" Frusemide	30,000
16	" Histacine	100,000
17	" Inderal 40 mg.	80,000
18	" Inderal 10 mg.	50,000
19	" Largactil	25,000
20	" Lasix	100,000
21	" Laxenna	25,000
22	" Oracyne -K	70,000
23	" Oradexon	20,000
24	" Paracetamol	200,000
25	" Phenargon	20,000
26	" Phenobarbiton	20,000
27	" Peritrate	50,000
28	" Talipaque	15,000
29	" Cotrim/Septrim	25,000
30	" Stemetil	10,000
31	" Segontin	50,000
32	" Sulphadizen	60,000
33	" Thalazol	50,000
34	" Terbolone	40,000
35	" Trimex	20,000
36	" Vitamin-c/Ascovit	60,000
37	" Avomine	25,000
38	" Vascardin	30,000
39	" Butazolinine	25,000
40	" Somotrolon	10,000

Capsul Group		
Sl. No.	Item	Quantity
1	Cap. Ampicilline/Pharmacilline/Penbretin	100,000
2	" Tetracycline	30,000
3	" Indocid	10,000
Syrup Group		
Sl. No.	Item	Quantity
1	Syp. Ampicilline	2,000 ph.
2	" Efeeco (EFEECO)	300 "
3	" Piperzine	200 "
4	" Crystapen " V "	400 "
5	" Paracetamol	300 "
6	" Flazyl	300 "
Injection Group		
Sl. No.	Item	Quantity
1	Inj. Amblosin	2,000 vils.
2	" Atropine	3,000 amps.
3	" Adrenaline	2,000 "
4	" A.C.D. Blood pack with set	4,000 bags
5	" Nikothamide	5,000 amps.
6	" Flaxidil	10,000 "
7	" Florauracid	500 "
8	" Cardinal Sodium	15,000 vils.
9	" 25% Glucose 25 cc	25,000 amps.
10	" Imferon 2 cc	2,000 "
11	" Imferon 5 cc	5,000 "
12	" Largactil	20,000 "
13	" Lasix	50,000 "
14	" Oradexon	20,000 "
15	" Solucortef	30,000 "
16	" Morphine	2,000 "
17	" Vitamine - C	15,000 "
18	" Diamine Penicillin	2,000 "
19	" Prostigmine	20,000 "
20	" Pethedine	15,000 "
21	" Pronaphen	15,000 vils.
22	" Procaine Penicillin	15,000 "
23	" Pot. Chlorid	200 amps.
24	" Cal. Chloride	200 "
25	" Reserpine	500 vils.
26	" Quinine	500 amps.
27	" Stemetil	30,000 "
28	" Sodi-bi-carb	10,000 "
29	" Steptomycine	5,000 vils.
30	" Saline set	20,000 sets
31	" 5% Dextrose in aqua 500 cc	30,000 bags
32	" 5% Dextrose saline 500 cc	25,000 "
33	" Normal saline 500 cc	2,000 "
34	" Cholera saline 500 cc	1,000 "

Sl. No.	Item	Quantity
35	Inj. Dinocil	200 amps.
36	" A.T.S. 1500/750 unit.	200 "
37	" Hypaque	2,000 "
38	" Heparine	1,000 "
39	" Monitol	300 "
40	" Insoline preparation	300 "
41	" Lignocaine without adreneline	2,000 "
42	" Dist. Water	60,000 "
43	" Anaroxyl	5,000 "
44	" Brevedyle - E.	4,000 "
45	" Vita. B. 12.	5,000 "
46	" Berin	5,000 "
47	" Calcium Gluconate	5,000 "

(Source : Ministry of Health & Population Control)

C-2 ANNUAL REQUIREMENT AND SUPPLY OF DRUGS (1982-83),
MOHAMMED ALI HOSPITAL, BOGRA

Group "A"			
Sl. No.	Description	Requirement	Supply
1	Cap. : Ampicillin 250 mg.	164,000 caps.	40,000 caps.
2	" : Tetracycline	175,000 "	51,000 "
3	" : Tetracycline Eye ointment	25,000 tabs.	3,050 tabs.
4	" : Tetracycline Skin ointment	8,500 "	2,900 "
5	Cap. : Biloptin	2,600 caps.	2,500 caps.
6	Syp. : Effeco	1,150 lbs.	35 lbs.
7	" : Sempicillin	3,000 ph.	590 ph.
8	" : Cotrim	1,500 "	200 "
9	" : Combintrin	500 "	X
10	" : Ketrex	450 lbs.	32 lbs.
11	Eardrop	500 ph.	X
12	Betnival Eye drop	100 "	X
13	Home atropen Eye drop	2,500 "	100 ph.
14	Coramine drop	500 "	X
15	Syp. : Pyepgrinehydrate	250 lbs.	50 lbs.
16	" : Paracetamol	1,350 "	100 "
17	Cap. : Fefudine	200	X
18	" : Orbinon	2,000	X
19	Syp. : Cystopen V	1,300 ph.	75 ph.
Group "I"			
Sl. No.	Description	Requirement	Supply
1	Inj. : Penicillin 5 lac.	51,000 vils.	6,000 vils.
2	" : Penicillin 10 lac.	18,000 "	5,000 "
3	" : Pronapen 4 lac.	53,000 "	27,000 "
4	" : Normal Saline 1000 ml.	9,400 bags	X
5	" : Normal Saline 500 ml.	8,100 "	130 bags
6	" : Cholera Saline 500 ml.	8,600 "	755 "
7	" : Cholera Saline 1000 ml.	11,800 "	525 "
8	" : 5% Dextrose Saline 500 ml.	11,300 "	610 "
9	" : 5% Dextrose Saline 1000 ml.	13,800 "	580 "
10	" : 5% Dextrose in aqua 500 ml.	10,700 "	580 "
11	" : 5% Dextrose in aqua 1000 ml.	9,100 "	1,010 "
12	" : 25% Glucose slution 20 cc	26,200	6,400 amps.
13	" : Inferon 5 cc	17,500	600 "
14	" : Inferon 2 cc	16,500	700 "
15	" : Largictil 50 mg.	5,600	1,220 "
16	" : Buscopen 1 cc	23,000	3,000 "
17	" : Amblocillin 250 mg.	1,600 vils.	520 vils.
18	" : Streptomycine	3,000 "	2,000 "
19	Lalix 2 cc	5,000 "	600 amps.
20	" : Ergomatrine	5,600 "	350 "
21	" : Sedexin 5 mg.	4,500 "	X
22	" : Menitral 500 ml.	75 lbs.	X
23	" : Insuline plain	400 vils.	300 vils.
24	" : Xylocain 50 ml.	300 "	X
25	" : Morephime sulph	1,100	400 amps.

Sl. No.	Description	Requirement	Supply
26	Inj. : Phenergram 2 cc	7,600 amps.	1,300 amps.
27	" : Fidaplex 10 cc	2,400 vils.	500 vils.
28	" : Beligafine	300 "	15 "
29	" : Pethedrine	4,900 amps.	1,400 amps.
30	" : A.D.S. 10,000 ut.	1,490 vils.	330 vils.
31	" : A.T.S. 1,500 ut.	13,500 amps.	470 amps.
32	" : Kcepline	1,500 "	300 "
33	" : Atropen sulph.	1,200 "	5,200 "
34	" : Flaxidyl	800 "	200 "
35	" : Cylame 1 cc	6,000 "	5,000 "
36	Intrval sodium	1,900 "	100 "
37	Oradexon	6,400 "	210 "
38	Guramson	350 "	X
39	" : Coramine	2,000 "	X
40	" : Stemetil 5 mg.	900 "	X
41	" : Tretcycline	1,800 "	50 amps.
42	" : Hypaque	1,300 "	429 "
43	" : Berine 10 cc	2,500 vils.	50 vils.
44	" : A.C.D. Blood bag	2,350 bags	459 bags
45	" : Saline Set	14,600 sets	435 sets
Group "S"			
Sl. No.	Description	Requirement	Supply
1	Tr. : Gentianco	150 lbs.	X
2	" : Nuxvomica	80 "	X
3	" : Hydrogenperoxide	200 ph.	X
4	" : Belladona	100 lbs.	X
5	" : Chloroform	100 "	X
6	Oil. : Clove	15 "	X
7	" : Chinammon	18 "	X
8	" : Cod liver	18 "	X
9	" : Castor (Receini)	230 "	X
10	Sprit. : Ammon Aromate	160 "	60 lbs.
11	" : Eatheris	20 "	X
12	" : Eather Nitrisi	150 "	70 "
13	" : Methylated	290 "	50 "
14	" : Rectified	290 "	50 "
15	EXT. : Ergot	25	X
16	Tr. : Hyocymas	50	50 "
17	" : Benzoinco	90 "	X
18	" : Iodine	160 "	X
19	Oil. : Eucalptas	60 "	X
20	Terpentine	60 "	X
21	Tr. : Zenzibaris	30 "	X

Group "P"			
Sl. No.	Description	Requirement	Supply
1	Plv. : Plaster of paris	1,800 kgs.	350 kgs.
2	" : Atropen	1,000 grams	25 grams
3	" : Magsulph	1 cwt.	X
4	" : Acacia Gum	112 lbs.	X
5	Acid. : Crysophanic	5 "	X
6	Plv. : Dusting	60 "	X
7	" : Ephedrine	6 "	X
8	" : Ferri-et Ammoncitras	15 kgs.	X
9	" : Quinine Sulph	2 $\frac{1}{2}$ lbs.	X
10	" : Acriflavin	1 $\frac{1}{2}$ "	X
11	" : Bismuth carb	23 "	X
12	Acid- Borice	100 "	X
13	Plv. : Sulphnilamide	20 "	X
14	" : Sodisalicy las	20 "	X
15	" : Mercurochrome	20 ph.	X
Group "C"			
Sl. No.	Description	Requirement	Supply
1	Benedicts solution	175 lbs.	15 lbs.
2	Savlon	75 lit.	25 lit.
3	Acid-Carbohic	30 lbs.	X
4	Savlon cream	450 tubs.	50 tubs.
5	Crytal Phenol	175 kgs.	125 kgs.
6	Methanol	130 lbs.	X
7	Bleaching powder	3 cwt.	X
8	Alcohol Absulate	70 lbs.	10 lbs.
9	Washing Soap	600	X
10	Sodium citrate	2 lbs.	X
11	Acid. : Nitrice	100 "	X
12	Glycerine pure	100 "	5 lbs.
13	Glouucose powder	300 "	X
Group "T"			
Sl. No.	Description	Requirement	Supply
1	Tab. : Aminophyline	6,000	X
2	" : Ventoline	27,000	2,800 tabs.
3	" : Fastion	3,000	X
4	" : Multivitamin	30,000	X
5	" : Guranson	3,700	X
6	" : Kemdrine 5 mg.	1,500	X
7	" : Avil 25 mg.	3,000	X
8	" : Diomox.	3,000	X
9	" : Decarise	9,000	X
10	" : Becadex	195,000	20,000 tabs.
11	" : Disallen	9,200	X
12	" : G-Presimide	22,000	6,000 "
13	" : Buscolycine	95,000	20,000 "
14	" : Kapiline	1,200	500 "
15	" : Histacine	109,000	3,000 "
16	" : Folfitab.	404,000	52,000 "

Sl. No.	Description	Requirement	Supply
17	Tab. : Antacid	210,000	32,000 tabs.
18	" : Inderal 40 mg.	26,000	1,700 "
19	Cap. : A and D	140,000	X
20	Tab. : Ribiflavin	30,000	X
21	" : Sulph dimidine	710,000	57,000 "
22	" : Trimex	48,000	15,000 "
23	" : Thionex	12,000	10,000 "
24	" : Sural	12,000	3,000 "
25	" : Sulphthiazole	130,000	15,000 "
26	" : Phenobarbiton $\frac{1}{2}$ gm	12,000	5,000 "
27	" : Stalabid	3,000	X
28	" : Stemeril 5 mg.	9,000	X
29	" : Striptybion	1,500	X
30	" : Laxina	14,000	500 tabs.
31	" : Oracyn-K 250 mg.	180,000	8,500 "
32	" : Paracitamol	290,000	8,000 "
33	" : Telepachque	5,500	1,500 "
34	" : Aldomet	20,000	2,000 "
35	" : Sedapum 5 mg.	81,000	20,500 "
36	" : Killion 250 mg.	65,000	8,000 "

(Source : Ministry of Health and Population Control)

C-3 ANNUAL REQUIREMENT OF DRUGS (1982-83),
SHIBGANJ THANA HEALTH COMPLEX (THC), BOGRA

Group "A"				
Sl. No.	Item	Unit	Quantity	Cost (TK)
1	Caps : Tetracycline	cap	20,000	7,600
2	" : Ampicillin	"	20,000	16,000
3	" : A + D	"	50,000	3,000
4	" : Mutivitamine	"	50,000	3,000
5	Syrup : Paracetamol	ph.	100	900
6	" : Ampicillin	"	100	1,500
7	" : Piperazine/Ketrex	"	100	2,000
8	" : Crystapen-V	"	100	1,000
9	Multivitamina Drop	"	100	500
10	Eye Ointment	tube	1,000	5,000
11	Skin Ointment	"	100	1,000
12	Ointment, Ben, Acid Sali-Acid	ph.	100	1,000
13	S.D.Z. Ointment	tin	100	12,000
Total				54,500
Group "I"				
Sl. No.	Item	Unit	Quantity	Cost (TK)
1	Inj. : Pronapen 4 lac	vial	10,000	18,000
2	" : Penicilline 5 lac	"	5,000	10,000
3	" : Imferon 2 cc	amp.	500	2,750
4	" : Buscopan 2 cc	"	200	400
5	" : Zasix 2 cc	"	200	400
6	" : Methergin	"	200	360
7	" : A.T.S.	"	500	1,500
8	" : Dextrose Saline 500 cc	bag	100	1,000
9	" : Cholera Saline 500 cc	"	100	1,000
10	" : Normal Saline 500 cc	"	100	1,000
11	" : Atropin Sulph	amp.	500	500
12	" : Garig Set	set	200	400
Total				37,310
Group "G"				
Sl. No.	Item	Unit	Quantity	Cost (TK)
1	Tr. : Cardomonco	lb.	50	600
2	" : Benzoinco	"	50	1,500
3	" : Bellodona	"	50	750
4	" : Iodine	"	50	1,000
5	Spt. : Ammon Arromate	"	50	750
6	" : Choroform	"	50	1,000
7	Tr. : Hyocymas	"	50	1,000
8	" : Zenzibaris	"	50	250
9	Methylated Spirit	"	50	600
10	Rectified Sprit	"	50	600
11	Nuxvomica	"	20	500
Total				8,550

Group "P"				
Sl. No.	Item	Unit	Quantity	Cost (TK)
1	Acid Boric	lb.	50	1,000
2	Sodi-by-Carb	"	50	500
3	Pot. Permagnade	"	50	1,500
4	Mag. Sulph	"	50	500
5	Ferriet Ammon Citrus	"	50	1,500
6	Zinc Oxide	"	20	500
7	Sodi-Benzo	"	20	500
8	Sulphanilamide	"	20	1,500
9	Bismath Carb	"	20	200
10	Ascaboil/B.B. Oil	ph.	200	1,400
11	Pot. Citrus	lb.	10	100
Total				9,200
Group "C"				
Sl. No.	Item	Unit	Quantity	Cost (TK)
1	Salvon	lit.	20	4,000
2	Benediets Solution	lb.	50	1,250
3	Liquid Paraffin	"	50	750
4	Glycerin	"	50	1,250
5	Phenyle	gal.	50	250
Total				7,500
Group "T"				
Sl. No.	Item	Unit	Quantity	Cost (TK)
1	Tab. : Aspirin	tab.	50,000	3,500
2	" : S.D.Z.	"	50,000	10,200
3	" : Thalazole	"	50,000	12,000
4	" : Piperzine	"	50,000	2,500
5	" : Ferous Sulphide	"	70,000	2,100
6	" : Laxenna	"	50,000	3,500
7	" : Oracyne - K	"	50,000	25,000
8	" : Decoris	"	20,000	20,000
9	" : Multivitamine	"	50,000	3,000
10	" : Avlochor	"	30,000	7,500
11	" : Antacid	"	50,000	10,000
12	" : Ergometrin	"	20,000	1,400
13	" : Largactil	"	20,000	2,400
Total				103,100

(Source: Ministry of Health and Population Control)

APPENDIX-D . OUTLINE OF "GUIDELINES AND RECOMMENDATIONS
FOR THE ESTABLISHMENT OF A LOW COST
PHARMACEUTICAL FORMULATION PLANT (LCPFP)
IN DEVELOPING COUNTRIES, WHO, 1980"

- D-1 LCPFP capacity
- D-2 GMP consideration
- D-3 Estimated cost of investment for a
model LCPFP
- D-4 Technical data
- D-5 Room programme list
- D-6 Production equipment

D-1 LCPPF capacity

- 200 - 300 million tablets
- 25 - 50 million capsules
- 2.5 - 5.0 million powder sachets
- 50 - 75 tons of liquids, ointments

The guidelines for capacity and cost calculation of buildings and equipment are based on the following assumptions:

- 240 effective working days per year are available for production (5 day week)
- 10 days for annual leave and general factory overhaul
- 11 days for public holidays.

working hours are 8 hours/day or 40 hours per week, i.e. a total of 1920 hours/year (one shift); effective machine hour is calculated at 6 hours/day or 1440 hours/year

it is important to know that the plant capacity can be substantially increased by introducing a second shift

average weight calculated for tablet/capsule of 300 mg

the average batch sizes of products are as follows:

- tablet & capsule = 100 kg
- liquids = 200 litres
- ointments/creams = 100 kg

standard pack size:

- tablet/capsule: 500s and 1,000s
- liquid: 60 ml or 100 ml
- topical cream/ointment: 15 g tube
- sachets: 5 - 30 g

The study showed that this volume of manufacturing activity may be accommodated in a physical plant of about 2 800 square metres which may be broken down into the following modules:

- Building for management and administration services: 540 sq. m.
- Building for production and packaging: 930 sq. m.
- Building for warehousing: 900 sq. m.
- Building for infrastructure: 430 sq. m.

The offices, quality control laboratory, canteen, reception, lockers, kitchen and toilets are located in the management services module. The production and packaging module includes the central dispensing area, manufacturing of tablets, liquids and semi-solids, intermediate stores, packaging and supervisors offices.

The warehousing module includes areas for receipt and shipment, quarantine for incoming shipments and released goods, storage of components, containers and closures, labels and labelling and finished drug products. There is also a facility for storing under different controlled temperatures.

D-2 GMP considerations

The GMP factor which most profoundly affects building construction is the need to prevent mix-ups and contamination, including contamination by different products, by operating personnel and by the environment. This concern is adequately provided for in the model presented.

There are areas provided for segregating untested materials, e.g. components, containers/closures, labels/labelling, in-process materials, finished bulk and finished drug products, from tested materials through quarantine areas and released materials areas.

The rooms in the processing areas, as described in a previous section, utilize the concept of dedicating for activity rather than for pieces of equipment.

The flow of materials is designed to prevent back-tracking, thus avoiding possibilities of mix-up. The flow of personnel working in the area is also designed to prevent personnel-originated contaminants from being introduced to products and vice-versa. Visitors are restricted to provide additional precaution against contamination.

The construction and finishing materials recommended were selected for their ease of cleaning. This is true of floor, wall and ceiling finishes as well as working counter surfaces.

If the manufacture of penicillin and penicillin derivatives is planned, additional safeguards by way of independent HVAC systems in the part of the module where this manufacture is planned should be seriously considered, together with penicillin-dedicated space and equipment in order to prevent any contamination of non-penicillin products (Reserved space for this has been included in the plant layout).

D-3 Estimated cost of investment for a model LCPFP

	<u>in 1000 US\$ minimum</u>	<u>in 1000 US\$ maximum</u>
Site work and surroundings	100	125
Buildings and structure	560	815
Services and auxiliary equipment	375	500
Production equipment	1100	1405
Installation and engineering	160	220
Architect's fees and duties	320	450
TOTAL COST:	<u>2615</u>	<u>3515</u>
AVERAGE: Approximately US\$ 3.0 million (1979 price)		

Specific figures:

Building cost including assembly, air-conditioning, power station, sanitary, electrical, site work and surroundings, waste water treatment plant (first three of above list) average: US\$ 1 237 500

Specific building costs: $\frac{\text{US\$ } 1\,237\,500}{2\,800 \text{ m}^2} = \text{US\$ } 442.-/\text{m}^2$

D-4 Technical data

Effective storey heights

Production building	3.5 m
Warehouse	6.0 m
Services	2.6 m

Imposed load on ground floor

Production	1000 kg/m ²
Main warehouse	1500 kg/m ²
Laboratories and kitchen	800 kg/m ²
All other rooms	300 kg/m ²

Compressed air supply

Pressure 6 bar for production and regulating appliances.
Consumption approximately 150 m³/day.

Power supply

The power requirement for the described model is approximately 400 kw/h.
The capacity of the connection must be 750 kw/h.

Light intensity

Production and control laboratories	800 lux
Offices, canteen and kitchen	600 lux
All other rooms	400 lux

Air conditioning for the production units

Temperature	22 °C + 3 °C
Air humidity	55% + 10%

Air conditioning of main warehouse

Temperature	max 25 °C (exhaust).
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Water requirements

The water requirements for the described model amount to the following quantities:

- Cold water	50-60 m ³ /day
- warm water	75 °C 4,5 bar
top consumption	2m ³ /h
max consumption	10m ³ /day
- de-ionized water	6 - 8 m ³ /day

The air-flow from the production process

The flow of air from the production process is effected by ventilators and special filters directly to the outside of the building.

Steam

For the first production phase, a small steam generator for the production of dry, filtered steam is recommended.

D-5 Room Programme List

<u>(1) Warehousing</u>		<u>m²/net</u>
No. 101	Main Warehouse, Receiving and Shipping	690,5
No. 102	Office	21,5
No. 103	Toilet	3,5
No. 104	Reference Samples Warehouse	14,5
No. 105	Walk-in Refrigerator, 6 °C	5,0
No. 106	Small Material Warehouse	35,0
No. 107	Controlled Room Temperature Warehouse 20 °C/60% r.h.	48,0
No. 108	Quarantine	57,5
<u>(2) Processing and packaging</u>		
No. 201	Airlock	21,0
No. 202	Dispensing	43,0
No. 203	Staging	30,0
No. 204	Mixing/Granulating/Drying	51,5
No. 205	Capsulating	17,5
No. 206	Compressing	33,0
No. 207	Technical Areas	7,0
No. 208	Sachets production	34,0
No. 209	Personnel and Material Airlock	12,5
No. 210	Products containing Penicillin (capsules + tablets)	37,5
No. 211	Liquids	51,5
No. 212	Office	12,5
No. 213	Technical Room	19,5
No. 214	Equipment Washing	11,5
No. 215	Equipment Storage	23,0
No. 216	In-process Control	8,5
No. 217	Packaging Material Control	17,0
No. 218	Clean Room	6,0
No. 219	Office	12,5
No. 220	Printing	21,5
No. 221	Packaging	242,0
No. 222	Workshop	30,0
No. 223	Bulk Quarantine	30,0
No. 224	Lounge	30,0

(3) Management services

No. 301	Office general manager	19,5
No. 302	Office secretary	13,5
No. 303	Entrance and reception	31,0
No. 304	Locker for visitors	4,0
No. 305	Clothes room	12,5
No. 306	Locker male	30,0
No. 307	Locker female	43,0
No. 308	Toilet female	8,5
No. 309	Toilet male	6,5
No. 310	Toilet male	4,5
No. 311	Toilet female	4,5
No. 312	Janitor's room	6,0
No. 313	Microbiological laboratory	8,5
No. 314	Physical laboratory	17,0
No. 315	First aid room	8,0
No. 316	Office	10,5
No. 317	Chemical laboratory	70,0
No. 318	Kitchen	26,0
No. 319	Canteen	52,0
No. 320	Office	15,0
No. 321	Office	11,0
No. 322	Office	15,0
No. 323	Office	11,0

(4) Infrastructure

m²/gross

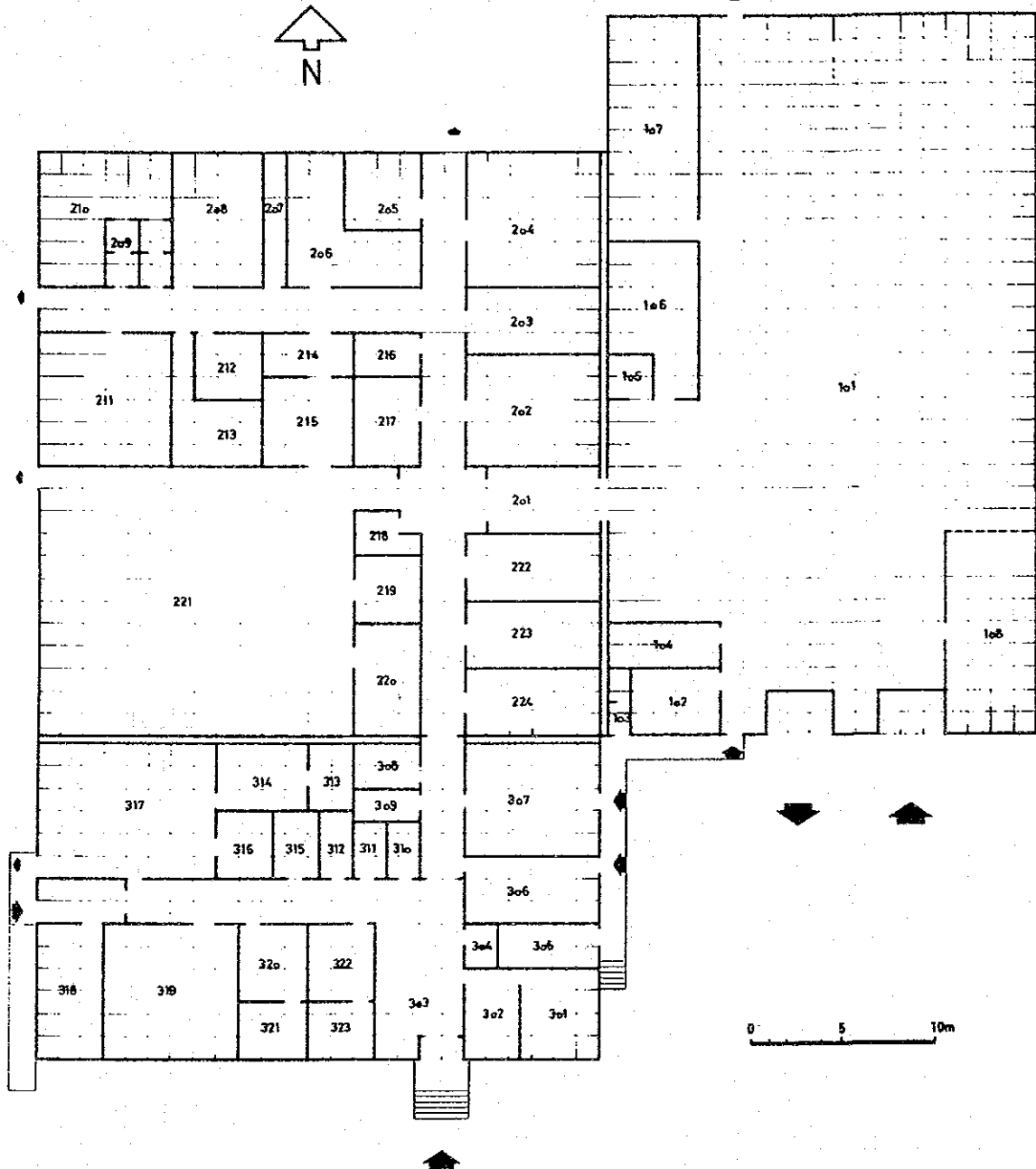
Security	12,0
Energy plant	150,0
Solvent storage	30,0
Oil tank	30,0
Raw water reservoir	45,0
Waste water treatment plant	150,0
Incinerator	6,0

(5) Total floor areas/gross

Warehouse	900 m ²
Production	930 m ²
Services	540 m ²
Infrastructure	430 m ²

Total gross area

approximately 2 800 m²



LOW COST PHARMACEUTICAL FORMULATION PLANT
(LCPFP)

LAYOUT ALTERNATIVE A

WHO N9 9842-002

1979

D-6 Production equipment

(1) Dispensing room

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Floor scale	0-260 kg + TARA
1	Table scale	0-30 kg
1	Top-loading balance	0-1200 g
1	Powder sieving machine	Ø 800 mm
1	Dedusting unit for room	17 m ³ /min
1	Fork lift	1 ton
1	Vacuum cleaner	550 W
Various	Accessories for weighing, spoons, containers, dust mask, etc.	

(2) Granulating room

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Crane	500 kg
1	Tumbler or Y Mixer (mixing of powders, granules)	up to 450 ltr.
1	Planetary mixer	150 ltr.
1	Planetary mixer	300 ltr.
1	Wet granulator	up to 500 kg/h
1	Dry granulator	up to 500 kg/h
2	Fluid bed dryer	100-150 kg/h
1	Paste preparation equipment with stirrer and water bath	40 ltr.
1	Fork lift	1 ton
1	Floor scale	0-260 kg + TARA
1	Table scale	0-30 kg
1	Top-loading scale	0-1200 g
1	Stirrer	
1	Vacuum cleaner (wet and dry)	550 W
1	Drying oven, including trucks and trays	2 m ³
2	Dedusting unit for room	17 m ³ /min
Various	Accessories for cleaning, granulating, sieve, etc.	

(3) Tabletting

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
2	Tabletting machine	100 000 pcs/h
1	Tabletting machine	40 000 pcs/h
Sets of	Punches and dies for tablets	
3	Tablet dedusting unit	
1	Vacuum cleaner (wet and dry)	550 W
1	Hardness tester	
1	Thickness measuring equipment for tablets	
1	Balance	0-160 g
1	Floor scale	0-260 kg
1	Fork lift	1 ton
1	Lifty Jack	
Various	Accessories, containers for tablets, granules, etc.	

(4) Capsuling

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Manual capsule filling machine	5 000/h
2	Capsule filling machine	10 000/h
2	Dehumidifier unit	150 m ³ air/h
2	Vacuum cleaner	550 W
2	Balance	0-160 g
Various	Accessories for capsule cleaning, filling, containers, etc.	

(5) Liquids/ointments room

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Storage tank, stainless steel	1 000 ltr.
2	Stainless steel vessel	250 ltr.
2	Stirrer	
1	Pressure pump	3 atv/2200 ltr/h
1	Multiplate filter	
1	Floor scale	0-500 kg + TARA
1	Table scale	0-30 kg
1	Top-loading balance	0-1200 g
1	Vacuum cleaner	550 W
1	pH meter	
1	Melting vessel	100 ltr.
1	Planetary mixer	250 ltr.
1	Fork lift	1 ton
Various	Accessories for liquid and ointment containers, filters, etc.	

(6) Washing room

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Bottle washing and drying machine	
1	Drying oven for bottles	2 m ³
1 set	Punches and dies, measuring, cleaning and polishing	
Various	Accessories for cleaning, washing, etc.	

(7) Packaging room

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Semi-automatic tube-filling machine	500 tube/h
3	Conveyor belt	6 m
4	Shadow-weight balance	
1	Semi-automatic syringe-type bottle filling machine for liquid	500/h
1	Semi-automatic Moyno pump	500/h
1	Automatic tube-filling machine for ointments	2000/h
1	Pilfer-proof capping machine	
2	Vacuum cleaner	550 W
4	Polyethylene-bag-sealing machine	
1	Fork lift	1 ton
2	Metal box crimper	
1	Sachet-sealing machine	2 400-3 000/h
Various	Accessories for packing, batch coder, glueing, etc.	

(8) Stores

<u>Quantity</u>	<u>Description of equipment</u>	<u>Capacity</u>
1	Floor scale	0-500 kg + TARA
1	Table scale	0-30 kg
1	Top-loading balance	0-1200 kg
2	Lifty Jack	
2	Fork lift	1 ton
1	Fork lift	2 ton
2	Vacuum cleaner (wet and dry)	550 W
1	Condition storage room 20 °C	250 m ³
1	Refrigerator	1 000 ltr.
Various	Storage (racks and shelves)	
Various	Accessories for packing and sealing, pallets, etc.	

APPENDIX-E METEOROLOGICAL DATA IN BOGRA
(TEMPERATURE, HUMIDITY AND RAINFALL)

Normal Temperature, Humidity and Rainfall by Station and by Month

Station	January						February					
	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain-fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain-fall in inches
			00-00 GMT	03-00 GMT	12-00 GMT				00-00 GMT	03-00 GMT	12-00 GMT	
Chittagong	78.7	55.8	93	78	68	0.41	81.5	60.5	92	75	69	0.30
Cox's Bazar	79.8	56.1	—	71	68	0.42	82.1	50.7	—	70	68	0.48
Sylhet	77.1	55.0	93	78	67	0.94	80.3	57.1	88	75	57	1.65
Srimangal	78.5	47.4	96	86	75	0.43	82.2	52.3	95	80	62	1.29
Rangamati	79.7	50.3	99	84	59	0.57	84.1	55.2	95	75	50	2.43
Majdee Court	78.2	55.3	92	76	67	0.83	82.3	60.4	91	75	52	0.59
Comilla	79.5	53.8	95	80	64	0.41	83.0	58.5	94	75	54	1.73
Brahmanbaria	78.4	54.1	93	77	66	0.40	82.5	47.7	91	72	56	0.97
Dacca	77.9	53.1	93	74	61	0.70	82.5	56.1	90	65	48	1.23
Narayanganj	79.5	55.9	91	75	60	0.56	83.1	60.3	88	71	52	1.12
Mymensingh	77.5	52.7	89	82	62	0.45	81.7	56.7	87	77	54	0.72
Faridpur	75.7	52.8	94	80	65	0.50	80.9	56.7	92	74	60	1.04
Khulna	79.3	56.4	90	73	62	0.47	84.1	60.5	91	71	55	0.66
Barisal	78.7	56.5	89	76	60	0.60	82.9	61.3	90	74	56	0.73
Jessore	77.9	50.6	92	81	67	0.54	83.2	55.5	92	77	59	0.85
Satkhira	79.8	53.5	91	77	62	0.61	84.2	58.6	90	74	58	0.77
Rangpur	75.9	51.9	92	83	67	0.49	80.6	55.1	89	75	54	0.58
Dinajpur	76.9	58.4	92	80	59	0.40	81.0	54.0	86	70	48	0.52
Pabna	78.3	52.7	91	77	68	0.43	82.9	56.7	89	71	55	0.81
Serajganj	76.8	53.5	94	77	76	0.53	82.4	56.2	90	69	60	0.65
Bogra	77.0	52.8	—	78	59	0.54	81.7	55.7	—	72	48	0.65

Max. Temp. °F	Mini. Temp. °F	March				Rain-fall in inches	Max. Temp. °F	Mini. Temp. °F	April			Rain-fall in inches
		Relative Hum. %			Rain-fall in inches				Relative Hum. %			
		00.00 GMT	03.00 GMT	12.00 GMT					00.00 GMT	03.00 GMT	12.00 GMT	
86.8	68.3	91	78	73	3.50	89.6	74.3	91	75	76	2.67	
86.8	67.2	—	73	73	1.27	89.5	74.0	—	73	75	3.15	
87.1	63.4	83	63	51	2.60	91.1	71.2	87	70	63	7.57	
89.7	61.9	93	75	57	3.29	92.3	69.8	92	76	65	9.00	
88.7	62.3	95	69	51	3.09	95.2	72.9	91	68	53	0.22	
88.1	67.4	89	72	61	2.11	90.7	75.6	90	73	69	3.51	
90.6	67.5	93	74	55	2.07	92.4	73.8	93	75	65	6.24	
89.9	65.3	89	72	53	2.75	93.3	72.6	91	73	62	5.55	
90.5	65.9	88	64	44	2.29	95.1	74.2	91	70	54	4.04	
91.1	68.8	85	69	45	1.81	93.0	74.2	85	73	62	6.46	
89.8	64.6	86	73	49	1.66	93.0	71.5	88	76	56	5.30	
90.4	64.6	89	68	49	1.43	94.0	73.1	90	73	58	5.04	
91.9	69.1	91	73	53	1.35	94.2	75.5	93	76	65	3.56	
90.5	69.8	90	74	56	1.49	93.0	75.7	91	74	66	3.94	
92.3	65.2	90	72	52	1.36	96.6	73.6	91	75	57	3.47	
93.0	68.4	92	74	53	1.40	96.3	75.3	91	75	61	2.60	
88.1	61.4	82	60	42	0.89	94.6	71.3	83	67	47	3.31	
92.2	61.7	78	57	36	0.63	96.0	69.9	75	60	39	1.86	
92.2	64.7	86	67	44	1.39	97.4	72.7	87	71	41	2.17	
90.1	64.5	89	64	50	1.45	96.4	72.4	89	68	50	3.44	
91.4	63.3	—	63	37	1.07	96.4	71.7	—	67	42	2.49	

Station	May						June					
	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain-fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain-fall in inches
			00:00 GMT	03:00 GMT	12:00 GMT				00:00 GMT	03:00 GMT	12:00 GMT	
Chittagong	89.7	76.9	93	77	79	11.17	87.9	77.4	93	83	85	22.41
Cox's Bazar	90.0	76.6	—	76	79	11.52	86.8	76.8	—	85	86	30.34
Sylhet	87.9	72.3	93	84	79	27.41	87.5	76.3	96	85	82	53.93
Srimangal	90.0	73.8	93	81	77	17.26	89.3	76.0	94	87	85	20.36
Rangamati	94.5	76.1	89	71	67	8.53	89.7	76.3	93	81	82	16.51
Majdee Court	89.7	77.9	89	77	75	12.96	87.2	77.8	92	85	83	28.27
Comilla	91.1	76.4	92	79	75	12.45	88.3	77.8	94	84	83	18.84
Brahmanbaria	91.3	75.0	91	78	75	11.16	89.2	76.7	93	84	84	14.60
Dacca	92.7	77.7	93	78	75	7.65	89.1	78.6	95	84	81	12.67
Narayanganj	91.7	76.9	89	76	74	9.47	89.9	78.5	91	82	80	13.71
Mymensingh	90.3	74.1	90	82	74	12.32	88.3	76.9	93	87	82	17.84
Faridpur	91.5	75.6	93	77	75	10.66	88.9	77.5	95	85	84	13.58
Khulna	93.4	77.8	93	78	74	7.25	90.8	78.9	94	83	82	12.20
Barisal	92.1	78.2	91	74	74	9.16	89.4	78.8	92	83	82	16.58
Jessore	95.0	76.6	91	79	71	7.44	91.3	78.0	95	85	82	10.81
Saikhira	95.3	77.9	90	76	70	7.40	91.8	78.7	93	84	79	11.59
Rangpur	92.5	74.4	90	78	65	11.93	89.5	76.3	95	86	81	20.44
Dinajpur	92.8	74.6	85	76	63	7.37	90.0	77.4	92	84	77	13.61
Pabna	95.2	76.3	91	79	61	7.12	91.8	78.0	95	85	81	11.52
Serajganj	92.5	76.2	93	80	71	9.27	88.9	77.9	96	87	86	12.98
Bogra	92.9	75.2	—	78	67	7.68	90.3	77.8	—	86	82	13.00

July						August					
Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain-fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain-fall in inches
		00:00 GMT	03:00 GMT	12:00 GMT				00:00 GMT	03:00 GMT	12:00 GMT	
86.9	76.7	94	84	86	24.57	86.4	76.6	95	85	86	22.23
85.5	76.5	—	88	88	36.75	85.5	76.4	—	89	88	30.71
88.1	77.6	97	86	83	23.37	88.5	77.6	95	85	84	20.91
89.7	76.8	94	87	85	13.26	89.3	76.6	95	88	86	13.52
87.7	76.5	95	86	89	26.75	88.8	76.9	95	81	85	15.65
85.9	77.8	93	87	83	25.32	86.4	78.1	93	87	84	22.15
87.6	77.6	94	86	84	15.91	87.9	77.6	95	86	83	16.43
88.5	77.6	92	83	83	12.01	88.6	77.9	92	84	82	11.58
87.3	78.8	95	87	82	17.20	87.9	79.1	94	86	83	12.00
88.5	79.0	91	84	80	13.66	88.6	79.1	90	83	79	14.36
88.4	78.2	94	87	81	14.82	88.5	78.1	94	88	81	15.97
87.2	78.2	96	87	85	13.31	87.2	78.9	93	86	84	12.30
88.1	79.1	95	86	84	14.95	88.4	79.0	95	85	84	11.76
87.1	78.5	94	87	83	18.54	87.5	78.5	94	85	83	17.03
88.5	78.1	96	86	86	12.38	88.9	78.2	96	88	87	12.09
88.6	78.6	96	87	84	14.05	88.6	78.4	95	88	84	12.33
89.2	79.0	95	85	81	16.96	89.1	79.3	95	86	82	13.67
88.9	78.8	93	86	79	15.35	89.3	78.7	93	85	80	13.93
89.3	78.7	96	86	85	10.52	89.2	79.1	95	85	84	11.37
87.3	78.9	95	87	85	12.29	87.4	79.5	94	86	86	12.64
88.6	79.0	—	86	81	12.50	88.8	78.9	—	87	82	13.80

Station	September						October					
	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain-fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain-fall in inches
			00-00 GMT	03-00 GMT	12-00 GMT				00-00 GMT	03-00 GMT	12-00 GMT	
Chittagong	87.7	77.0	95	83	85	12.04	87.4	74.6	96	82	82	11.45
Cox's Bazar	86.6	76.3	—	85	85	17.45	87.6	74.4	—	78	80	10.83
Sylhet	87.5	76.3	95	86	85	25.80	86.4	72.4	96	85	84	10.80
Scimangal	89.6	76.0	96	87	87	11.01	87.9	71.0	95	85	88	7.57
Rangamati	88.7	76.3	97	83	87	11.09	88.3	74.7	97	85	83	10.45
Majdee Court	87.3	77.9	93	85	82	17.52	87.1	75.6	95	82	81	10.04
Comilla	88.9	75.5	95	84	82	13.27	88.1	74.6	86	80	80	8.89
Brahmanbaria	89.3	87.1	92	83	82	9.05	88.0	75.3	93	79	81	6.89
Dacca	88.2	87.5	95	84	83	9.28	87.7	74.7	95	78	79	6.64
Narayanganj	89.7	79.2	90	81	79	9.57	89.4	75.9	92	76	75	5.78
Mymensingh	88.8	77.8	94	85	82	13.42	87.5	74.1	93	83	79	7.81
Faridpur	88.1	78.7	94	83	83	9.64	87.3	74.7	95	79	81	7.09
Khulna	89.2	78.7	95	83	83	8.78	88.2	75.6	94	78	78	6.01
Barisal	88.6	78.6	94	83	82	12.27	88.2	75.8	94	79	77	7.72
Jessore	89.8	77.6	96	87	86	7.40	88.9	73.1	95	84	83	5.35
Satkhira	89.4	78.1	95	84	84	9.14	89.3	74.5	96	80	80	5.84
Rangpur	89.0	78.2	95	84	82	12.03	87.4	72.8	93	83	77	6.53
Dinajpur	89.6	77.8	92	84	81	11.81	88.4	72.2	93	80	75	5.41
Pabna	90.2	78.6	95	84	85	9.24	89.4	74.0	95	79	81	6.64
Sirajganj	88.2	78.8	94	85	85	9.36	87.4	74.7	95	80	84	5.86
Bogra	89.4	78.5	—	85	82	10.83	87.8	73.8	—	81	76	7.07

Station	November						December					
	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain-fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain-fall in inches
			00-00 GMT	03-00 GMT	12-00 GMT				00-00 GMT	03-00 GMT	12-00 GMT	
Chittagong	84.5	65.9	95	79	76	1.97	79.4	59.7	95	83	73	0.41
Cox's Bazar	85.0	66.9	—	75	71	2.49	86.0	59.9	—	74	70	1.29
Sylhet	83.7	62.8	93	74	75	0.28	79.5	57.4	95	79	73	0.22
Scimangal	84.0	59.8	96	84	86	1.69	79.6	50.8	97	87	83	0.12
Rangamati	84.1	61.9	99	90	69	0.84	80.7	55.1	99	91	67	0.93
Majdee Court	82.8	66.0	93	76	79	1.80	79.2	57.9	93	77	73	0.01
Comilla	84.6	65.0	95	77	75	1.77	80.3	56.8	95	80	70	0.10
Brahmanbaria	84.2	66.3	93	76	75	1.33	79.8	57.8	94	79	72	0.11
Dacca	83.6	63.6	94	73	71	1.00	79.3	54.9	95	78	70	0.09
Narayanganj	85.6	66.6	91	73	69	1.21	80.9	58.6	91	76	66	0.08
Mymensingh	83.9	64.6	90	81	73	0.65	79.7	56.3	91	84	67	0.10
Faridpur	82.4	64.4	94	77	76	1.15	77.3	55.7	94	80	75	0.07
Khulna	84.2	66.2	91	72	69	1.28	80.0	58.4	91	72	67	0.09
Barisal	84.0	66.7	91	75	69	1.63	79.6	58.7	89	78	64	0.13
Jessore	84.4	61.5	95	80	74	0.88	79.7	52.3	93	82	74	0.06
Satkhira	84.5	63.6	93	75	70	1.23	80.2	55.6	92	77	66	0.09
Rangpur	83.5	61.7	93	80	74	0.44	77.9	55.5	94	86	77	0.08
Dinajpur	84.0	60.8	91	74	68	0.45	78.9	52.9	82	77	64	0.04
Pabna	84.8	63.3	94	75	76	0.74	79.8	55.1	95	76	75	0.06
Sirajganj	83.3	63.9	95	76	82	0.82	79.5	56.9	95	77	80	0.02
Bogra	83.5	63.5	—	78	69	0.53	78.5	55.6	—	79	65	0.08

Notes : Based on data for 1931-1960

Source : Bangladesh Meteorological Department.

APPENDIX-F OUTLINE OF STUDY

- F-1 Formation of Study Team
- F-2 Itinerary for Work in Bangladesh
- F-3 Interviewee
- F-4 List of Collected Information

F-1 FORMATION OF STUDY TEAM

Shozo Kamiya	Team Leader	Director Department of Synthetic Chemistry National Institute of Hygienic Sciences Ministry of Health and Welfare
Norio Shimomura	Projects Cordinator	Basic Design Division Grant Aid Department Japan International Cooperation Agency
Kiichi Kobayashi	Project Planner Chief of Works	Manager Architecture Division Japan Engineering Consultants Co., Ltd.
Tsutomu Shibata	Machinery Engineer	Technical Advisor Japan Engineering Consultants Co., Ltd.
Hiroaki Toba	Architect	Section Chief Architecture Division Japan Engineering Consultants Co., Ltd.
Takashi Muraoka	Building Engineer	Architecture Division Japan Engineering Consultants Co., Ltd.

F-2 ITINERARY FOR WORK IN BANGLADESH

Day in () indicates a holiday

	Date/Day	Schedule	Contents of Work
1	Apr 16 (Sat)	by air Tokyo → Bangkok	-
2	17 Sun	by air Bangkok → Dhaka	Meeting with E/O Japan and JICA Office Discussion on Itinerary
3	18 Mon	Dhaka ----- Kamiya, Shimomura; by air Tokyo → Bangkok	Discussion with M/O H & PC and CMSD, Visit to PPU
4	19 Tue	Dhaka ----- Kamiya, Shimomura; by air Bangkok → Dhaka	Discussion with M/O H & PC, Visit to I.P.H. and Shahid Shurwardy Hospital, Meeting with E/O Japan
5	20 Wed	Dhaka	Discussion with M/O H & PC, PWD and Titas Gas Visit to Gono Shasthaya Pharmaceuticals
6	21 Thu	Kamiya, Shimomura, Kobayashi; Dhaka ----- Shibata, Toba and Muraoka; by air by land Dhaka → Ishurdi → Bogra	Discussion with Governmental Organization Concerned - do -
7	22 (Fri)	Dhaka ----- by land Bogra → Dhaka	Preparation of Draft Minutes Visit to Shibgonj THC and Pirob Union FWC
8	23 (Sat)	Dhaka	Visit to Shahid Shurwardy Hospital Meeting in Team Arrangement of Draft Minutes
9	24 Sun	- do -	Visit to PPU and IPH Discussion with M/O H & PC Meeting in Team
10	25 Mon	- do -	Visit to PPU and IPH Signing of Minutes
11	26 Tue	Kamiya, Shimomura; Dhaka → Bangkok ----- Kobayashi, Shibata, Toba and Muraoka; by air by land Dhaka → Ishurdi → Bogra	Report to E/O Japan Discussion with M/O H & PC, Visit to Project Site
12	27 Wed	Kamiya, Shimomura; by air Bangkok → Tokyo ----- Kobayashi, Shibata, Toba and Muraoka; Bogra	- Discussion with Governmental Organization Concerned Visit to Mohammed Ali Hospital
13	28 Thu	by land by air Bogra → Ishurdi → Dhaka	Arrangement of Collected Information
14	29 (Fri)	Dhaka	Arrangement of Collected Information
15	30 (Sat)	- do -	Visit to Gono Shasthaya Pharmaceuticals and Shahid Shurwardy Hospital
16	May 1 Sun	- do -	Arrangement of Collected Information
17	2 Mon	- do -	Discussion with UNFPA, WHO and UNICEF Arrangement of Collected Information
18	3 Tue	by air Dhaka → Bangkok	Report to E/O and JICA Office
19	4 Wed	by air Bangkok → Tokyo	-

F-3 INTERVIEWEE

- (1) External Resources Division (ERD)
M. Khalid Shams : Director
- (2) Planning Commission
- (3) Ministry of Health and Population Control
A.B.M. Ghulam Mostafa : Secretary, Health Div.
Brigadier (Dr.) Mohamad Yunus Dewan : Joint Secretary
M.M. Reza : Deputy Secretary
Zakia A. Chowdhury : Section Officer
- (4) Directorate of Drugs Administration
Dr. Md. Nurul Anwar : Director
M.A. Mulek : Dy. Drugs Controller
Md. Matiur Rahman : Addl. Drugs Controller
- (5) Directorate General of Health Service and CMS
(Central Medical Stores)
Colonel M.A. Hakim Mia : Director of Store
Dr. B. Chowdhury : Dy. Director of
Health Service
- (6) Government Pharmaceutical Laboratory
(P.P.U.: Pharmaceutical Production Unit)
Dr. Abdul Quadir Khan : Director
LT. Col (Retd.) M.A. Awal : Dy. Director
A.C. Bhattacharyya : Consultant(WHO)
- (7) Institute of Public Health (I.V. Fluid Plant)
Dr. Munwara Binte Rahaman : Director
Dr. Md. Habibur Rahman : Asst. Director
Dr. Farida Hug : Head Microbiological
Laboratory
Dr. M. Abul Hossain : Superintendent of
Laboratory
A.K.M. Aminul Islam : Superintendent,
I.V. Fluid Plant

(8) Ministry of Health and Population Control
(in Bogra District)

Dr. Rahman	: Civil Surgeon
Dr. Tozammal Hossain	: Addl. Civil Surgeon
Dr. Md. Voynal Abedin	: Thana Health and Family Planning Officer (Shibganj)
Dr. A.B.M. Aminur Rahman	: Medical Officer (Shibganj)
Dr. Md. Abdullah-Al-Mahmud	: Medical Officer (- do -)
Dr. Ahmad Zillur Rahman	: Medical Officer (- do -)

(9) Bogra Minicipulity Office

Satya Narayom Goara	: Administrative Officer
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(10) Public Works Department (PWD)

Bahar	: Chief Architect
Mohammed Shamsur Rahman	: Superintending Engineer
A.K. Md. Nurul Huda	: - do -
Abdul Hamid	: Executive Engineer (Bogra)

(11) Power Development Board (PDB)

S.T.S. Mahmood	: Addl. Chief Engineer
Manusur Ur Rahman	: Resident Engineer (Bogra)

(12) Telephone & Telegraph Department (Bogra)

Mohd. Asaduzzaman	: Divisional Engineer
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(13) Titas Gas Transmission & Distribution Co., Ltd.

Musharraf Hussain Choudhury	: Director General Manager
M. Roushom Z. Zaman	: Chief Engineer

(14) Gonoshasthaya Pharmaceuticals

Dr. Qasem Chowdhury	: Managing Director
Golam Mohiuddin	: Production Manager

(15) Institute of Cardio Vascular Diseases
(Shahid Shurwardy Hospital)

Brig (Professor) Abdul Malik	: Director
Prof. R.X. Khandaker	: Chief Consultant Cardiologist
Dr. Shah Mohammed Altab Hossain	: Resident Physician

(16) Mohammed Ali Hospital (Bogra)

Dr. Md. Raihanuddin Choudhury : Principal Cum
Superintendent

Dr. A.K.M. Shamsuddin : Medical Officer

Dr. Md. Hajizur Rahman : Medical Officer

(17) UNICEF

Joe Judd : Senior Programme
Planning Officer

(18) WHO

Bijaya Lal Shrestha : Administrative Officer

F-4 LIST OF COLLECTED INFORMATION

- (1) Entire Project
 - 1) Activities of the Directorate of Drug Administration
 - 2) Project Proforma (Pharmaceutical Formulation Plant)
 - 3) Guidelines and Recommendations for the Establishment of a Low Cost Pharmaceutical Formulation Plant (LCPFP) in Developing Countries

- (2) Existing Situation of Drugs
 - 1) Cost of MSR with are supplied to the different DRS up to 27th March during the financial year 1982-83.
 - 2) List of 150 essential drugs
 - 3) Estimate of annual requirement of stores (ICD) for financial year 1983-84 (Institute of Cardiovascular Diseases)
 - 4) Existing situation of drugs (Shibganj THC, Bogra)
 - 5) Existing situation of drugs (Mohammad Ali Hospital, Bogra)

- (3) Administration of Drugs
 - 1) Organization chart (Integrated Thana Health Complex, Bogra)
 - 2) Organization chart (Bogra District)

- (4) Existing Pharmaceutical Formulation Units
 - 1) Project proforma of P.P.U.
 - 2) Organization chart of P.P.U.
 - 3) Production capacity of various installed machineries (P.P.U.)
 - 4) Number of staff and list of salaries (P.P.U.)
 - 5) Price list (Gono Shasthaya Pharmaceuticals)

- (5) Project Site
 - 1) Possession certificate for project site
 - 2) Site plan of Mohammad Ali Hospital & Proposed Medical College, Bogra (Project Site Survey Map)
 - 3) Plan of nurse training centre (adjacent to project site)
 - 4) Levelling survey map of project site
 - 5) Bogra town map
 - 6) District map (Bogra)

APPENDIX-G MINUTES OF DISCUSSION

MINUTES OF DISCUSSIONS

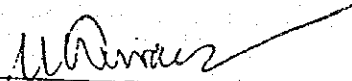
In response to the request by the Government of People's Republic of Bangladesh, the Government of Japan has sent, through Japan International Cooperation Agency (JICA), a team headed by Dr. Shozo Kamiya, Director, Department of Synthetic Chemistry, National Institute of Hygienic Sciences, Ministry of Health and Welfare (the Team), to conduct a basic design study on the Establishment Project of Pharmaceutical Formulation Centre of Essential Drugs in Bogra (the Project) for 19 days from 16th April to 4th May 1983.

The Team had a series of discussions and exchanged views with the authorities concerned.

This Minutes is the record of discussions held between both parties.

25th April 1983, Dhaka

神谷庄造



Dr. Shozo Kamiya
Leader, Japanese Study
Team

Brig. (Rtd.) Mond. Yunus Dewan
Joint Secretary,
Ministry of Health and
Population Control
Government of the People's
Republic of Bangladesh

ATTACHMENT.

1. The objective of the Project is to establish the Pharmaceutical Formulation Centre ^{the} (Centre) in Bogra for the purpose of formulating the essential drugs needed for primary Health Care.

The Centre will formulate the drugs within the range of 45 items of essential drugs listed in Annex I. The drugs will be supplied to Thana Health Complexes (THCs), Family Welfare Centres (FWCs), Rural Dispensaries and other public health institutions through the District Reserve stores of Bangladesh and will be delivered to patients free of charge.

2. The Project has been included in the current Five Year Plan and the Bangladesh side has assured that the Project will be included in the Annual Development plan (ADP) as a Core Project for the fiscal year '83/84 by the Government of Bangladesh.

3. Bangladesh side has strongly expressed the following guidelines for the execution of the basic design of the Project and the Team has agreed with that.

(1) Building(s) and facilities necessary for the Project ~~and the~~ should be simple and functional as much as possible.

(2) The Project should be not too big and not too sophisticated.

(3) The construction cost of the Project should be minimum as far as possible.

4. The Project will be managed by a Company registered under the Companies Act whose shares will be subscribed wholly by the Government only. The Board of Directors of the Company appointed by the Government will give overall policy directions for management. The Managing Director will be the Chief executive of the Company and will be responsible for the daily operation of the unit. No dividend will be given to the Government of Bangladesh.

Details of the functions of the Company will be defined in the form of the Articles of Association. The Team has pointed out that knowing the functions of the Company ^{is} ~~and~~ essential to the preparation of the Project, and unless it is defined, the basic design study will be not completed. Bangladesh side has assured that documents relating ^{to} the Draft of the Articles of Association will be submitted to the Japanese side until the end of May, 1983.

The Director ^{ate} General of Health Services will be the executing agency for the implementation of the Project.

5. At this moment, the Team is not able to confirm the financial feasibility of the Company in respect of operating and maintaining the Project in the whole system of drug supply by the Government of Bangladesh.

From this point of view

~~5.~~ Bangladesh side will make the total scheme for the procurement of raw materials and the distribution of drugs that covers the Project PPU and I.V. Fluid Plant and submit it to the Japanese side until the end of May 1983.

6. The Team will recommend to the Government of Japan and the authorities concerned to examine the result of the study and to cooperate in implementing the Project within the scope of Grant Aid of Japan on condition that all the data and information mentioned in item 4 and 5 is submitted to the Japanese side and the feasibility is confirmed throughout the Project.

7. The proposed site of the Project is the land acquired by the Ministry of Health and Population Control in Thanthania area near the city centre of Bogra. The Centre will be allocated in the area ~~into~~ into the consideration ^{of} future expansion of the Project or construction of another building(s) other than the Project.

The proposed site is shown in Annex II.

38. The project will be implemented in two phases. Phase I will cover the formulation of the drugs of tablets, capsules and powder sachets, and Phase II will cover liquids and ointment. The Team will carry out the basic design study for Phase I taking into consideration the further implementation of phase II. Measures to be taken by both Government are listed in Annex III on condition that the Grant Aid of Japan is extended to the Project. Regarding the construction of building(s), dormitory of the staff will be covered by the Bangladesh side.

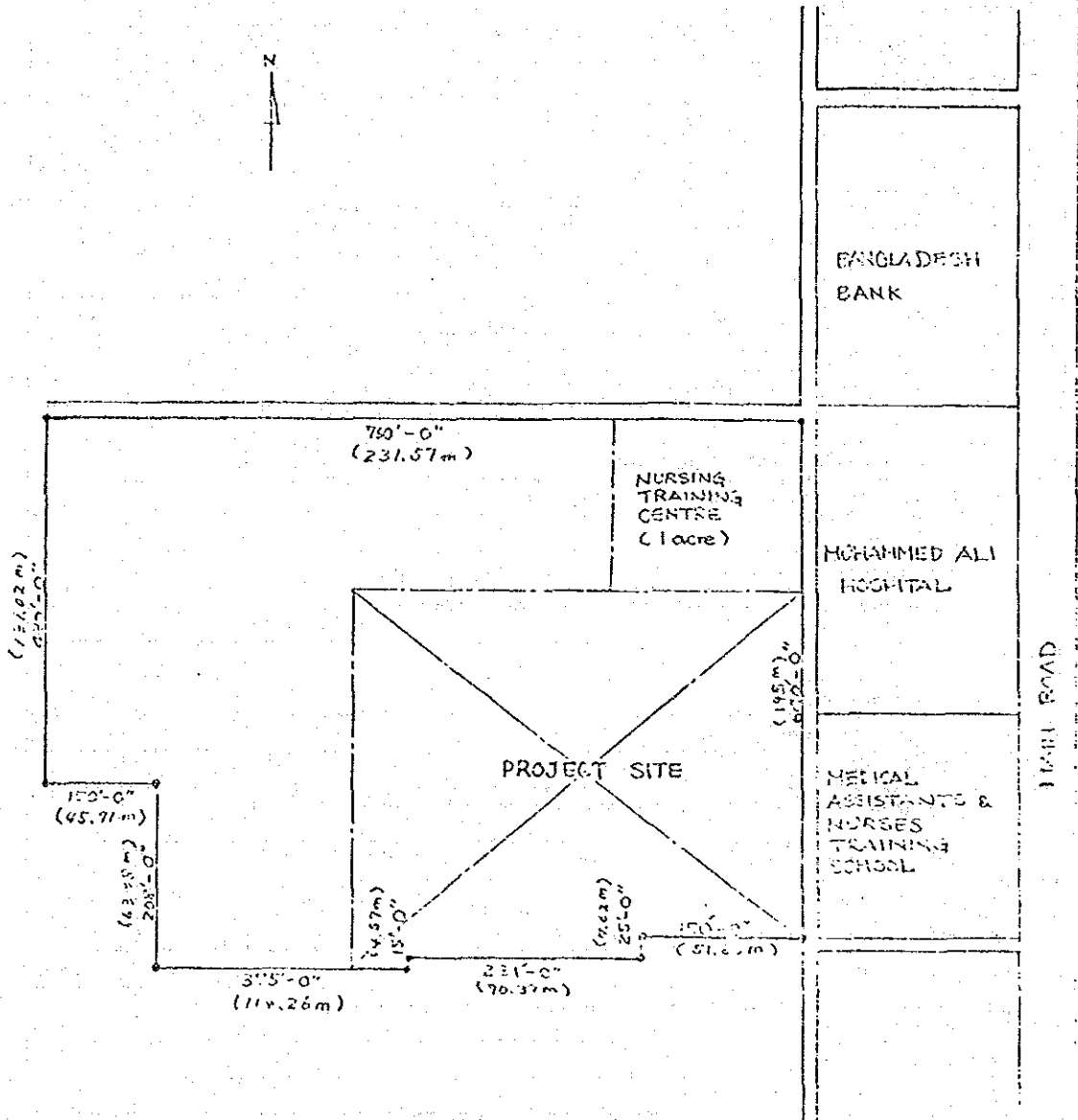
to 9. Break down of the building(s) and other items that will be covered by the Grant Aid of Japan are listed in Annex IV.

ANNEX I 45 ITEMS OF ESSENTIAL DRUGS

1. Aspirin Tab.
2. Chloroquine Phosphate Tab.
Choroquine Phosphate Syrup
3. Aluminium hydroxide gel Tab.
Aluminium hydroxide gel Suspension
4. Piperazine Tab.
Piperazine Elixir
5. Glucose electrolyte powder ORS
6. Phenoxymethyl penicillin (Penicillin V) Tab.
Phenoxymethyl penicillin (Penicillin V)
dry suspension.
7. Ampicillin Cap.
Ampicillin Syrup
Ampicillin Injection
8. Ergometrine/Methyl ergometrine maleate Tab.
Ergometrine/Methyl ergometrine maleate Inj.
9. Ferrous Sulphate Tab.
Ferrous Sulphate Syrup
10. Ephedrine Tab.
11. Vitamin A Cap.
12. Chloramphenicol eye/ear Oint.
Chloramphenicol eye/ear drop
13. Paracetamol Tab.
Paracetamol Elixir
14. Pethidine hydrochloride Inj.
15. Sulphadoxin with primethamine
16. Levamisole Tab.
Levamisole Elixir
17. Chlorpheniramine Tab.
Chlorpheniramine Elixir
Chlorpheniramine Inj.
18. Lidocaine 1%
19. Isoniazid with thioacetazone Tab.
20. Streptomycin Sulphate Inj
21. Metronidazole Tab.
Metronidazole Elixir
Metronidazole Inj.
22. Atropine Sulphate Inj.
23. Hyoscine-n-butyl bromide Tab.
Hyoscine-n-butyl bromide Inj.

<u>Sl.No.</u>	<u>Name of the item</u>
24.	Chlorohexidine/Chloroxylenol Soln.
25.	Procaine penicillin Inj.
26.	Tetracycline/Oxytetracycline Cap. Tetracycline/Oxytetracycline Inj. Tetracycline/Oxytetracycline Oint.
27.	Phenobarbitone Tab. Phenobarbitone Inj.
28.	Diazepam Tab. Diazepam Inj.
29.	Chlorpromazine Tab. Chlorpromazine Syrup Chlorpromazine Inj.
30.	I.V. Saline of various Strength (0.9% 0.25%, 0.18%) with 4% dextrose/0.9% Saline without dextrose.
31.	Dextrose in water 5%
32.	Redistilled water (Pyrogen free) amps.
33.	Cholera fluid
34.	Oxytocin
35.	Furosemide Tab. Furosemide Inj.
36.	Prednisolone Tab.
37.	Propranolol Tab. Propranolol Inj.
38.	Aminophylline Inj. Aminophylline Tab.
39.	Co-trimexazole Tab. Co-trimexazole Suspension
40.	Homatropine
41.	DT/SPT/POLIO/Tetanol
42.	Diphtheria anti-toxin.
43.	Tab. Vit. B-Complex Multi Vit. drop 15 ml.
44.	Ung. Salicylic Acid and Benzoic Acid 60% + 3%
45.	Benzyl Benzoate saponated

ANNEX II PROPOSED SITE OF THE PROJECT



Remarks : It is necessary to move a part of existing boundary wall of MEDICAL ASSISTANTS & NURSES TRAINING SCHOOL for the purpose of access road to the PROJECT SITE.

Major Undertakings To Be Taken By Both Governments

No.	Items		
1.	To secure a lot of land		○
2.	To clear, level and reclame the site when needed		○
3.	To construct the gate and fence in and around the site		○
4.	To construct the parking lot	○	
5.	To construct the road	○	
	1) Within the site	○	
	2) Outside the site		○
6.	To construct the building	○	
7.	To provide facilities for 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 elevated tanks)	○	
	3) Drainage		
	a. The drainage city 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 city gas main to the site		○
	b. The gas supply system within the site	○	
	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) Furnitures and Equipment		
	a. General furnitures (carpet, curtain, table, chair and others)		○
	b. Project equipment	○	
8.	To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the B/A		
	1) Advising commission of A/P		○
	2) Payment commission		○
9.	To ensure unloading and customs clearance at 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	○	
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 recipient country and stay therein for the performance of their work		○
11.	To maintain and use properly and effectively that the facilities constructed and equipment purchased under the Grant		○
12.	To bear all the expenses other than those to be bone by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment		○

ANNEX IV BUILDING(S) and EQUIPMENT

(BUILDING(S))

1. RAW MATERIALS AND PACKAGING STORAGE
2. PRODUCTS STORAGE
3. MILLING RM
4. SIFTING (SIEVING) RM
5. WEIGHING RM
6. WEIGHING MATERIALS STORAGE
7. GRANULATING RM
8. BLENDING RM
9. LIQUID PREPARATION RM
10. MIDDLE STAGE STORAGE
11. WASHING RM FOR EQUIPMENT
12. TABLETING RM
13. CAPSULE FILLING RM
14. PRINTING RM
15. PACKAGING RM
16. DEGOWN
17. QUALITY CONTROL (ANALYSIS) RM
18. MACHINE RM
19. PARTS STORAGE
20. OFFICE RM
21. OTHERS

(EQUIPMENT)

1. MILL
2. SIFTER (SIEVE)
3. SCALE
4. GRANULATOR
5. TANK WITH AGITATOR
6. KNEADER
7. FLUIDIZING BED DRYER
8. MIXER
9. FLUIDIZING BED GRANULATING DRYER
10. GRADING MACHINE
11. TABLETING MACHINE
12. CONVEYOR
13. CAPSULE FILLING MACHINE
14. NUMBERING MACHINE
15. PRINTER
16. SACHET MACHINE
17. MARKING TABLE
18. INSTRUMENT FOR QUALITY CONTROL
19. OTHERS

APPENDIX-H ALTERNATIVE DESIGNS PROPOSED BY BASIC DESIGN
STUDY TEAM

The Basic Design Study Team prepared and submitted to the Bangladesh Government the Supplementary Report, attached herewith, to discuss with the Bangladesh Government aiming at preparing the final basic design for the Project.

In this report, considering the strong request by the Bangladesh Government during the discussion in April, 1983; "as simple as possible and minimized cost as far as possible", three ideas of the design of buildings and pharmaceutical formulation equipments were presented; namely Idea-A, Idea-B and Idea-C. One was expected to be selected from three ideas by the Bangladesh Government after study and comparison of all of three.

The design proposed in this Basic Design Study Report is prepared considering the result of discussions on this Supplementary Report with the Bangladesh Government and the additional request to the original contents of Idea-A selected by the Bangladesh Government.

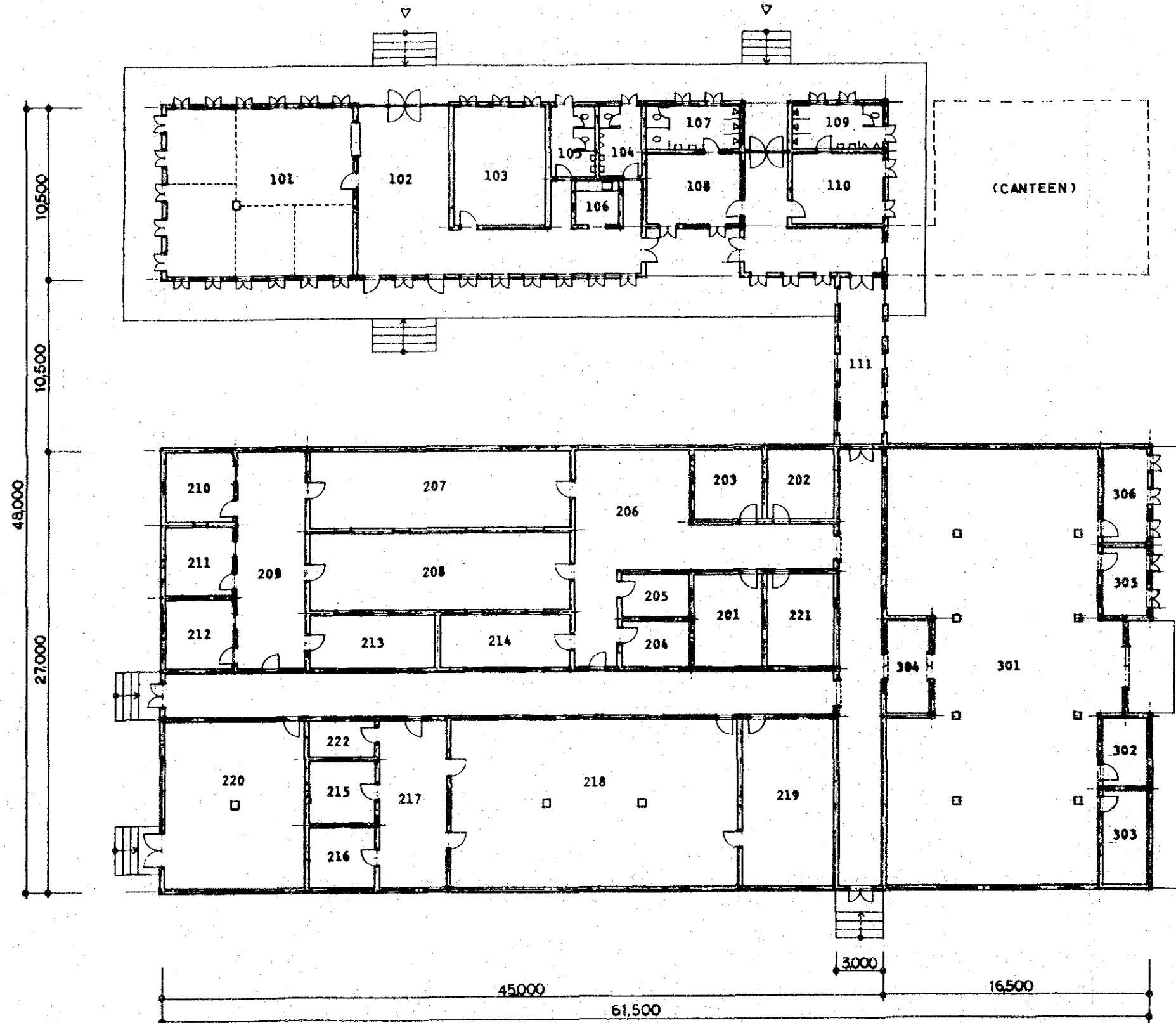
SUPPLEMENTARY REPORT
ON
THE ESTABLISHMENT PROJECT
OF
PHARMACEUTICAL FORMULATION CENTRE OF ESSENTIAL DRUGS
IN
THE PEOPLE'S REPUBLIC OF BANGLADESH

JAPAN INTERNATIONAL COOPERATION AGENCY

SUPPLEMENTARY REPORT
ON
THE ESTABLISHMENT PROJECT
OF
PHARMACEUTICAL FORMULATION CENTRE OF ESSENTIAL DRUGS

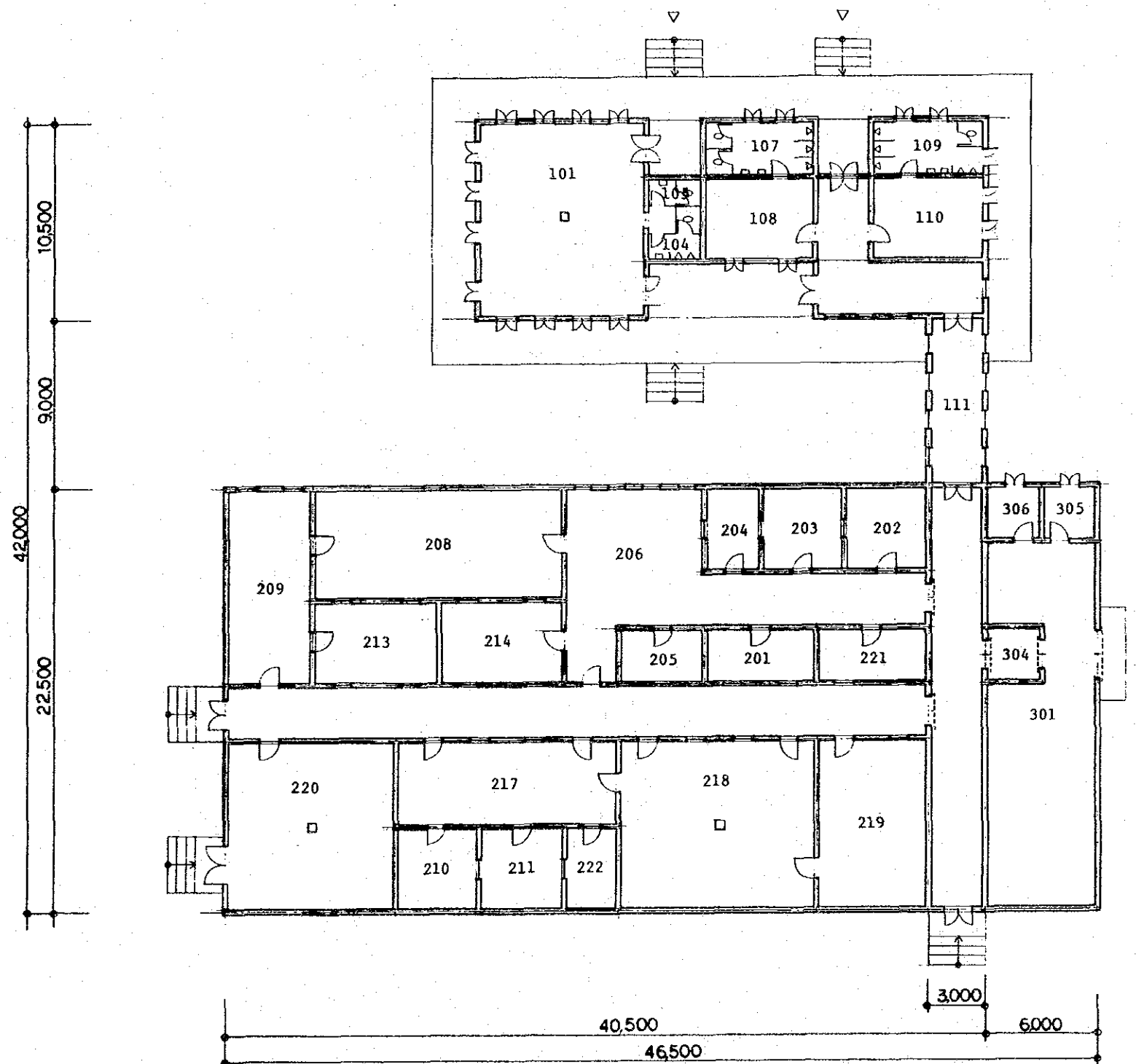
- S-1 : Idea-A and C
- S-2 : Idea-B
- S-3 : Designed Items and Scale of Construction
- S-4 : Required Rooms and Area
- S-5 : Water Supply System
- S-6 : Drainage System
- S-7 : Outline of Air-conditioning and Ventilation
- S-8 : Diagram of Main Power Feeder System
- S-9 : Production Capacity
- S-10 : Required Procurement Volume of Raw Materials
- S-11 : Outline of Pharmaceutical Formulation Equipment
- S-12 : Rough Cost Estimate of Items to Be Done
by the Government of Bangladesh
- S-13 : Rough Cost Estimate of Items to Be Done
by the Government of Japan
- S-14 : Proposed Organization Chart
- S-15 : Accommodation of Personnel
- S-16 : Expenditure for Manpower
- S-17 : Expenditure for Maintenance of Facilities

S-1 IDEA (A) AND (C)



NO.	ROOM NAME
101	OFFICE ROOM
2	ENTRANCE HALL
3	QUALITY CONTROL ROOM
4	TOILET (M)
5	DO (F)
6	KETTLE ROOM
7	TOILET/SHOWER ROOM (F)
8	LOCKER ROOM (F)
9	TOILET/SHOWER ROOM (M)
10	LOCKER ROOM (M)
11	AIR LOCK
201	WEIGHING ROOM
2	SIFTING ROOM
3	MILLING ROOM
4	PROCESSING OFFICE
5	TOOL ROOM
6	WEIGHING MATERIAL STORAGE
7	DRY MIXING ROOM
8	WET MIXING ROOM
9	MIDDLE STAGING STORAGE
10	TABLETING ROOM (1)
11	DO (2)
12	DO (3)
13	LIQUID PREPARATION ROOM
14	WASHING ROOM
15	CAPSULE FILLING ROOM (1)
16	DO (2)
17	MIDDLE STAGING STORAGE
18	PACKING ROOM
19	PACKAGE PREPARATION ROOM
20	MACHINE ROOM
21	RAW MATERIAL DRUM STORAGE
22	PROCESSING OFFICE
301	WAREHOUSE
2	MATERIAL STORAGE (1)
3	DO (2)
4	AIR LOCK
5	OFFICE ROOM
6	INSPECTION ROOM

S-2 IDEA (B)



NO.	ROOM NAME
101	OFFICE ROOM
2	---
3	---
4	TOILET (M)
5	DO (F)
6	---
7	TOILET/SHOWER ROOM (F)
8	LOCKER ROOM (F)
9	TOILET/SHOWER ROOM (M)
10	LOCKER ROOM (M)
11	AIR LOCK
201	WEIGHING ROOM
2	SIFTING ROOM
3	MILLING ROOM
4	PROCESSING OFFICE
5	TOOL ROOM
6	WEIGHING MATERIAL STORAGE
7	---
8	WET MIXING ROOM
9	MIDDLE STAGING STORAGE
10	TABLETING ROOM (1)
11	DO (2)
12	---
13	LIQUID PREPARATION ROOM
14	WASHING ROOM
15	---
16	---
17	MIDDLE STAGING STORAGE
18	PACKING ROOM
19	PACKAGE PREPARATION ROOM
20	MACHINE ROOM
21	RAW MATERIAL DRUM STORAGE
22	PROCESSING OFFICE
301	WAREHOUSE
2	---
3	---
4	AIR LOCK
5	OFFICE ROOM
6	INSPECTION ROOM

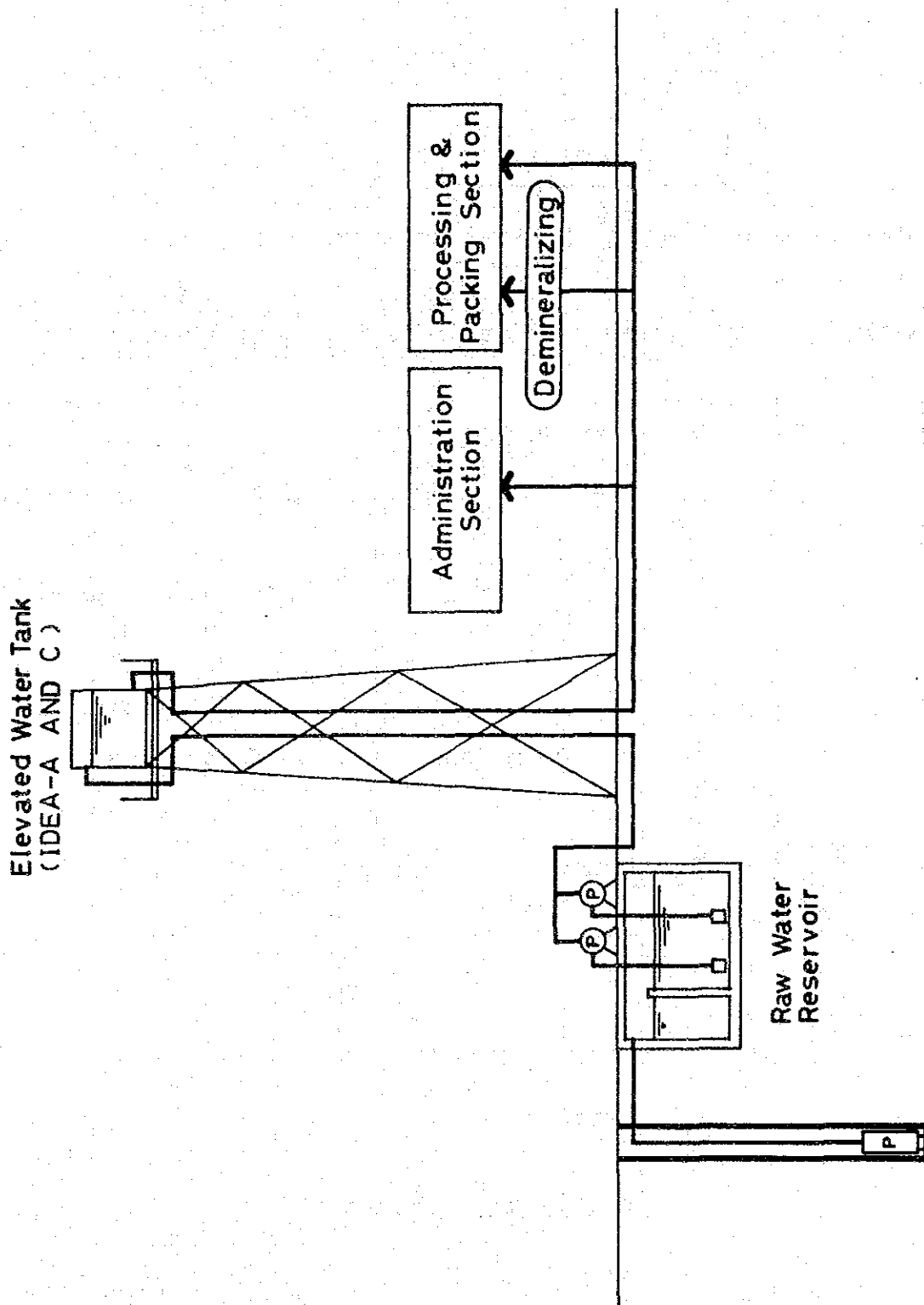
S-3 Designed Items and Scale of Construction

	Idea-A and C	Idea-B
1) Buildings		
a. Administration Block	504.000 m ²	310.500 m ²
b. Processing & Packing Block	1,215.000 m ²	911.250 m ²
c. Warehouse Block	445.500 m ²	135.000 m ²
Sub-total	2,164.500 m ²	1,356.750 m ²
d. Sub-station	84.000 m ²	84.000 m ²
e. (Check Gate) (to be borne by G.O.B.)	(24.000 m ²)	(24.000 m ²)
f. (Canteen) (to be borne by G.O.B.)	(144.750 m ²)	-
g. (Garage) (to be borne by G.O.B.)	(168.000 m ²)	-
Sub-total (() is excluded)	84.000 m ²	84.000 m ²
Grand Total (- do -)	2,248.500 m ²	1,440.750 m ²
2) External Work		
a. External Road within the Site	o	o
b. Raw Water Reservoir	o	o
c. Elevated Water Supply Tank	o	x
d. Drainage Ditch	o	o

Note: G.O.B.; the Government of Bangladesh

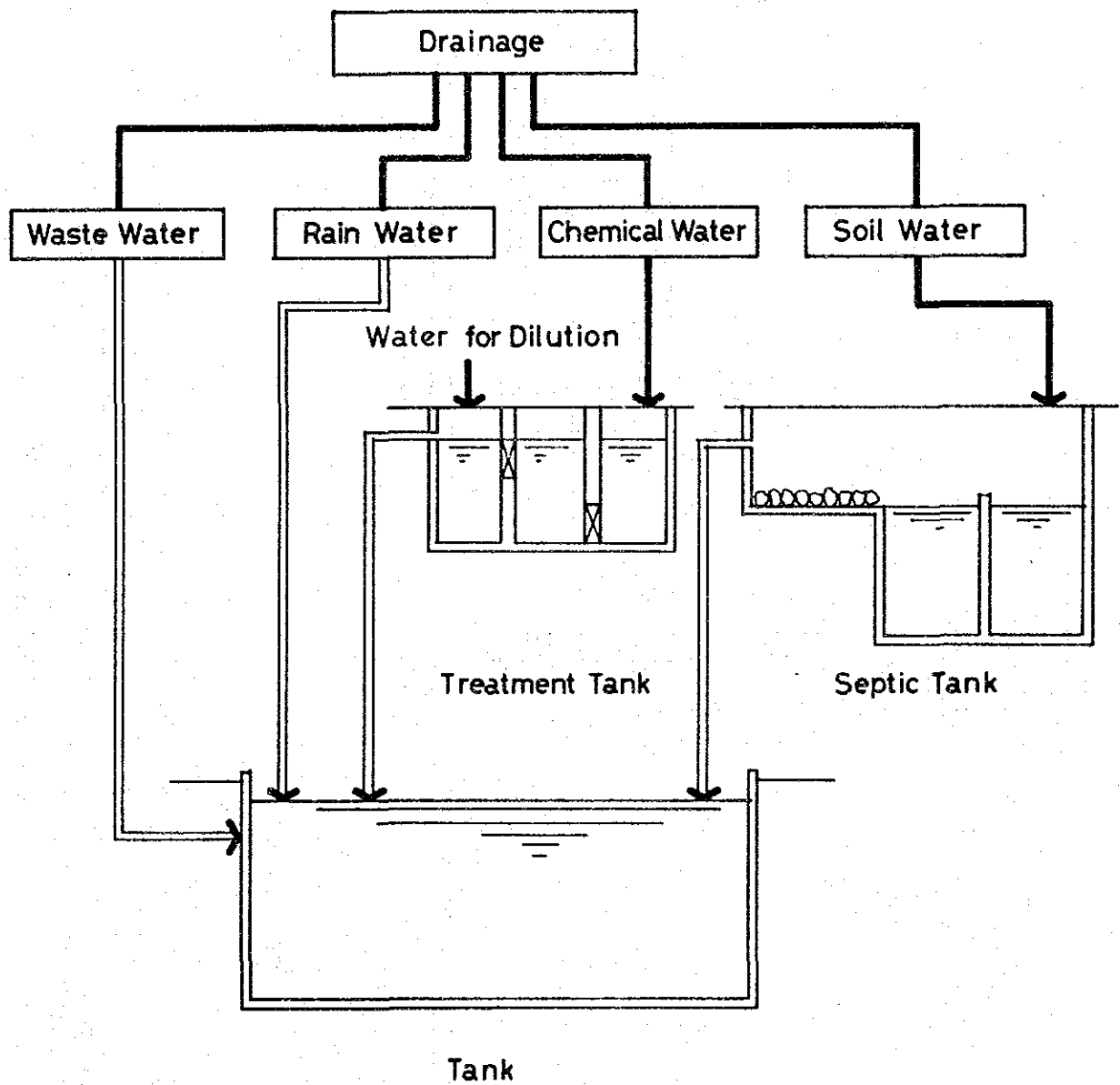
S-4 Required Rooms and Area

Room No.	Designation	Idea-A and C	Idea-B
(1)	Administration Block	504,000 m ²	310,500 m ²
101	Office Room	126,000 m ²	94,500 m ²
102	Entrance Hall	63,000	---
103	Quality Control Room	45,000	---
104	Toilet (M)	13,500	9,000
105	Toilet (F)	13,500	4,500
106	Kettle Room	9,000	---
107	Toilet/Shower Room (F)	18,000	18,000
108	Locker Room (F)	27,000	27,000
109	Toilet/Shower Room (M)	18,000	18,000
110	Locker Room (M)	27,000	27,000
111	Air Lock	31,500	27,000
	Others	112,500	85,500
(2)	Processing and Packing Block	1,215,000 m ²	911,250 m ²
201	Weighing Room	27,000 m ²	18,000 m ²
202	Shifting Room	20,000	20,250
203	Milling Room	20,000	20,250
204	Processing Office	13,500	13,500
205	Tool Room	13,500	13,500
206	Weighing Material Storage	101,250	101,250
207	Dry Mixing Room	82,500	---
208	Wet Mixing Room	82,500	81,000
209	Middle Staging Storage	60,750	47,250
210	Tableting Room (1)	20,250	20,250
211	Tableting Room (2)	20,250	20,250
212	Tableting Room (3)	20,250	---
213	Liquid Preparation Room	28,875	30,375
214	Washing Room	28,875	30,375
215	Capsule Filling Room (1)	18,000	---
216	Capsule Filling Room (2)	18,000	---
217	Middle Staging Storage	47,250	54,000
218	Packing Room	189,000	94,500
219	Package Preparation Room	63,000	54,000
220	Machine Room	94,500	81,000
221	Raw Material Drum Storage	22,000	18,000
222	Processing Office	11,250	13,500
	Others	212,500	180,000
(3)	Warehouse Block	445,500 m ²	135,000 m ²
301	Warehouse	355,500 m ²	180,000 m ²
302	Material Storage (1)	13,500	---
303	Material Storage (2)	18,000	---
304	Air Lock	18,000	9,000
305	Office Room	13,500	9,000
306	Inspection Room	18,000	9,000
	Others	9,000	---
(4)	Sub-Station	84,000 m ²	84,000 m ²
(5)	(Gate House) to be borne by the (Bangladesh Gov't)	(24,000 m ²)	(24,000 m ²)
(6)	(Canteen) (- do -)	(144,750 m ²)	---
(7)	(Garage) (- do -)	(168,000 m ²)	---
	Total (() is excluded)	2,248,500 m ²	1,440,750 m ²



S-5 WATER SUPPLY SYSTEM

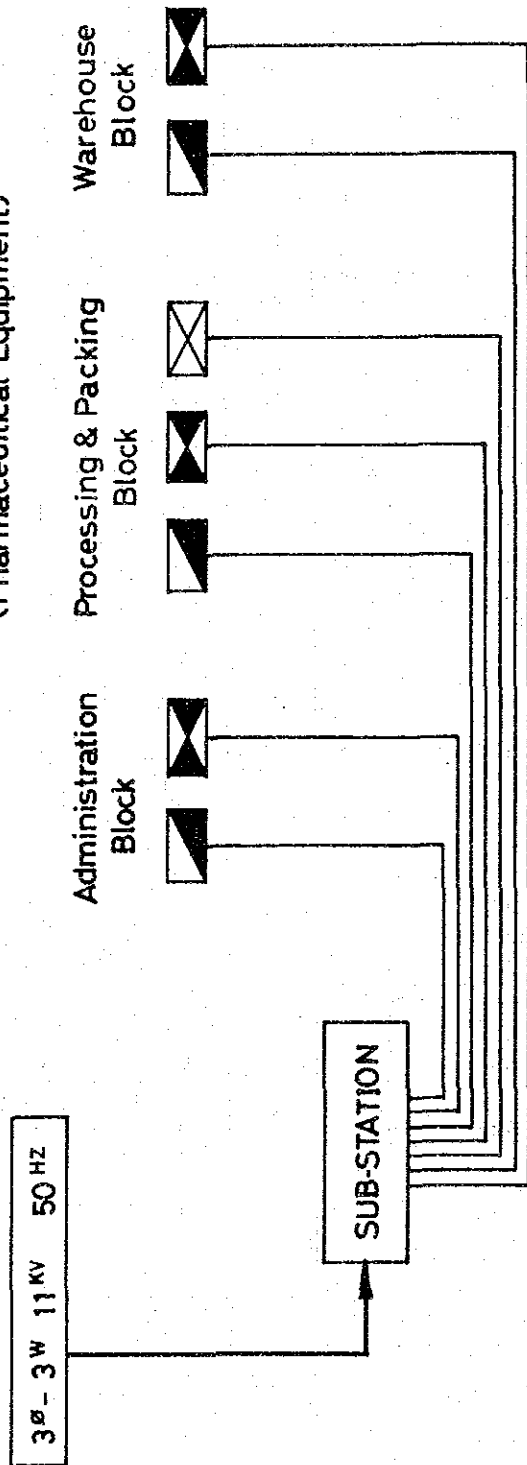
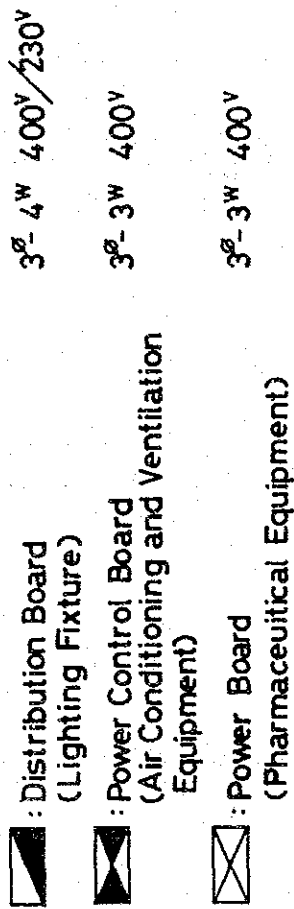
Deep Tube Well
(100-120 feet Depth)



S-6 DRAINAGE SYSTEM

S-7 Outline of Air-conditioning and Ventilation

	Idea-A	Idea-B	Idea-C	Remarks
(1) Administration Block				
101 Office Room	C	C	C	Air-Conditioning to be installed (to be borne by the Bangladesh Government)
102 Entrance Hall	X	X	X	
103 Quality Control Room	C	-	C	
104 Toilet (M)	X	X	X	
105 Toilet (F)	X	X	X	
106 Kettle Room	X	X	X	
107 Toilet/Shower Room (F)	X	X	X	
108 Locker Room (F)	C	C	C	
109 Toilet/Shower Room (M)	X	X	X	
110 Locker Room (M)	C	C	C	
111 Air Lock	X	X	X	
(2) Processing and Packing Block				
201 Weighing Room	P	X	P	
202 Shifting Room	P	X	P	
203 Milling Room	P	X	P	
204 Processing Office	P	X	P	
205 Tool Room	X	X	X	
206 Weighing Material Storage	P	X	P	
207 Dry Mixing Room	P	X	X	
208 Wet Mixing Room	P	X	P	
209 Middle Staging Storage	P	X	P	
210 Tableting Room (1)	P	X	P	
211 Tableting Room (2)	P	X	P	
212 Tableting Room (3)	P	X	X	
213 Liquid Preparation Room	X	X	X	
214 Washing Room	X	X	X	
215 Capsule Filtering Room (1)	P	X	X	
216 Capsule Filtering Room (2)	P	X	P	
217 Middle Staging Storage	P	X	P	
218 Packing Room	P	X	P	
219 Package Preparation Room	P	X	P	
220 Machine Room	X	X	X	
221 Raw Material Drum Storage	P	X	P	
222 Processing Office	P	X	P	
(3) Warehouse Block				
301 Warehouse	X	X	X	Cold store to be installed (to be borne by the Bangladesh Government)
302 Material Storage (1)	X	X	X	
303 Material Storage (2)	X	X	X	
304 Air Lock	X	X	X	
305 Office Room	C	C	C	
306 Inspection Room	C	C	C	
C: Ceiling Fan P: Package-Type X: Not installed				



S-8 DIAGRAM OF MAIN POWER FEEDER SYSTEM

S-9. Production Capacity

	Idea-A	Idea-B	Idea-C
(1) Production Capacity by Tableting Machine			
1) Capacity	100,000 tabs/hr x 1 No. 50,000 tabs/hr x 2 Nos.	0 50,000 tabs/hr x 2 Nos.	0 50,000 tabs/hr x 2 Nos.
2) Actual operating hours per month	5 hrs/day (20 days/month)	Same as left	Same as left
3) Rate of good quality product	90 %	Same as left	Same as left
4) Average weight of tablet	300 mg	Same as left	Same as left
5) Production Volume	18,000,000 tabs/month (216,000,000 tabs/year)	9,000,000 tabs/month (108,000,000 tabs/year)	9,000,000 tabs/month (108,000,000 tabs/year)
(2) Production Capacity by Capsule Filling Machine			
1) Capacity	20,000 cps./hr x 2 Nos.	-	20,000 cps./hr x 1 No.
2) Actual operating hours per month	5 hrs/day (20 days/month)	-	5 hrs/day (20 days/month)
3) Rate of good quality product	90 %	-	90 %
4) Average weight of capsule	300 mg	-	300 mg
5) Production volume	3,600,000 cps./month (43,200,000 cps./year)	0 (0)	1,800,000 cps./month (21,600,000 cps./year)
(3) Production Capacity by Sachet Sealing Machine			
1) Capacity	3,000 sachets/hr	-	3,000 sachets/hr
2) Actual operating hours per month	5 hrs/day (20 days/month)	-	5 hrs/day (20 days/month)
3) Rate of good quality product	90 %	-	90 %
4) Average weight of capsule	1 g	-	1 g
5) Production volume	270,000 sachets/month (3,240,000 sachets/year)	0 (0)	270,000 sachets/month (3,240,000 sachets/year)

Remarks: Pre-Condition for Calculating Production Volume.

- 1) Working day per month : 24 days/month (4 days for maintenance and adjustment of equipment)
- 2) Actual operating day per month : 20 days/month
- 3) Working hour per day : 7 hours/day
- 4) Actual operating hour per day : 5 hours/day
- 5) Rate of operating efficiency : 70 %

S-10 Required Procurement Volume of Raw Materials

	Idea-A	Idea-B	Idea-C
(1) Monthly Production Volume of Tablets, Capsules and Sachets			
1) Tablets	18,000,000 tabs/month (5,400 kg/month)	9,000,000 tabs/month (2,700 kg/month)	9,000,000 tabs/month (2,700 kg/month)
2) Capsules	3,600,000 cps/month (1,080 kg/month)	0 (0)	1,800,000 cps/month (540 kg/month)
3) Sachets	270,000 sachets/month (270 kg/month)	0 (0)	270,000 sachets/month (270 kg/month)
Sub-total (only in weight)	(6,750 kg/month)	(2,700 kg/month)	(3,510 kg/month)
(2) Raw Materials (Main materials and sub-materials)			
1) Volume of total production	6.8 ton/month	2.7 ton/month	3.5 ton/month
2) Volume of total raw materials	9.4 ton/month	3.8 ton/month	4.9 ton/month

Note: The rate of good quality product is assumed to be 90 % and the rate of raw materials 80 %.

S-11 Outline of Pharmaceutical Formulation Equipment

Production Capacity

Dosage Form		Idea-A	Idea-B	Idea-C
Tablet	per month (per annum)	18,000,000 ^{tbs} (216,000,000)	9,000,000 ^{tbs} (108,000,000)	9,000,000 ^{tbs} (108,000,000)
Capsule	per month (per annum)	3,600,000 ^{cps} (43,200,000)	0 (0)	1,800,000 ^{cps} (21,600,000)
Sachet	per month (per annum)	270,000 ^{shts} (3,240,000)	0 (0)	270,000 ^{shts} (3,240,000)
(Mixing Method)		Dry and Wet	Wet only	Wet only

Equipment List

Room	Equipment	Idea-A	Idea-B	Idea-C	
(1) Weighing Room	Scale	3	3	3	
(2) Sifting Room	Sifter	1	1	1	
(3) Milling Room	Milling	1	1	1	
(4) Dry/Wet Mixing Room	Fluidizing Bed Granulating Dryer	1	0	0	
	Grinding	2	1	1	
	Sifter	2	1	1	
	Blender	2	1	1	
	Scale	4	2	2	
	Kneader	1	1	1	
	Granulator	1	1	1	
(5) Tableting Room	Tableting	100,000 ^{tbs/hr}	1	0	0
		50,000 ^{tbs/hr}	2	2	2
(6) Liquid Preparation Rm.	Tank with Stage	2	1	1	
(7) Washing Room	Dryer	2	1	1	
(8) Capsule Filling Room	Capsule Filling 20,000 ^{cps/hr}	2	0	1	
(9) Packing Room	Packing	4	1	1	
	Powder Filling	1	0	1	
	Heat Sealer	1	1	1	
	Conveyer	5	1	1	
(10) Package Preparation Rm.	Label Printing	1	0	0	
	Printing	3	0	0	
(11) Machine Room	Demineralizer	1	1	1	
	Steam Generator	1	1	1	
	Dust Collector	0	0	0	
(12) Warehouse	Forklift	2	0	0	
(13) Quality Control Room	Quality Control Apparatus	1set	1set	1set	
(14) Others	Hand Palletter, Palette, etc.	1set	1set	1set	

S-12 Rough Cost Estimate of Items to Be Done by the Government of Bangladesh

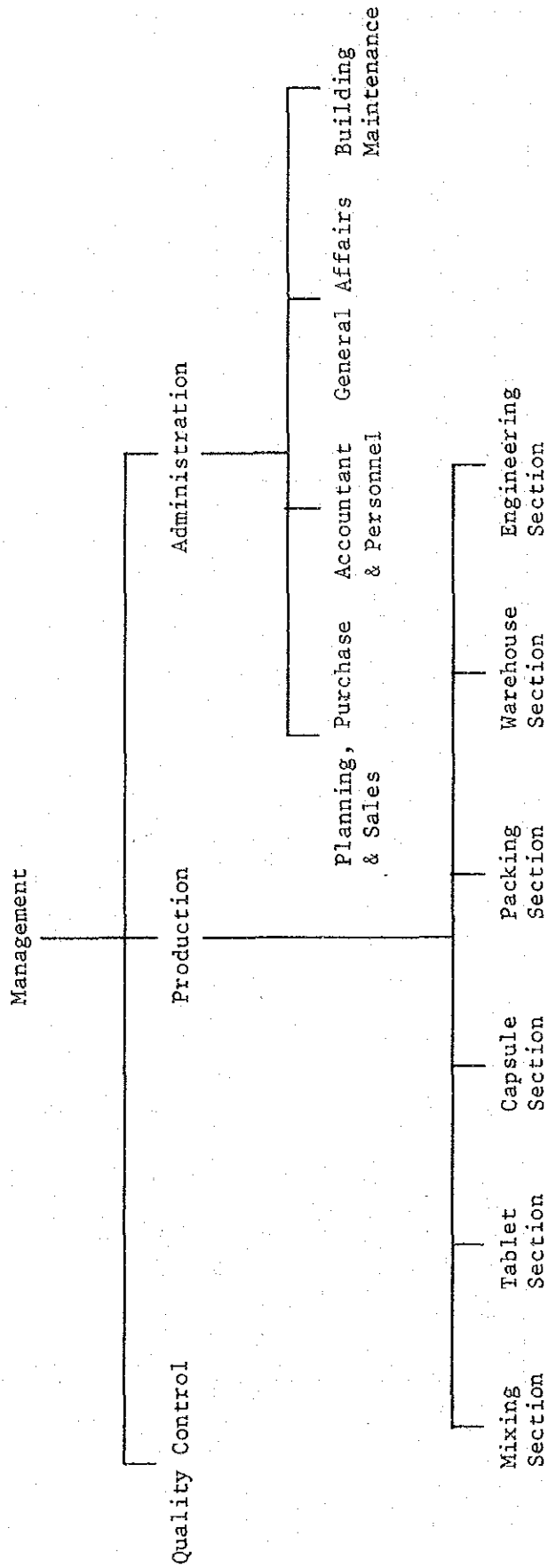
(Unit: Yen)

Item of Work	Idea-A	Idea-B	Idea-C
(1) Works to be done before commencement of the work			
a. Site preparation (appr. 30,000m ³)	<u>18,500,000</u>	<u>18,500,000</u>	<u>18,500,000</u>
b. Construction of the boundary wall and gate (appr. 660m)	6,000,000	6,000,000	6,000,000
c. Construction of the access road (appr. 120m)	10,000,000	10,000,000	10,000,000
	2,500,000	2,500,000	2,500,000
(2) Infrastructure			
a. Installation of external telephone facilities	<u>20,000,000</u>	<u>20,000,000</u>	<u>20,000,000</u>
b. Installation of power supply facilities	(as required)	(as required)	(as required)
c. Installation of water supply and drainage facilities (appr. 200m)	15,000,000	15,000,000	15,000,000
	5,000,000	5,000,000	5,000,000
(3) Other expenses in connection with the connection work			
a. Bank expenses (A/P, etc.)	<u>565,108,000</u>	<u>303,772,000</u>	<u>389,457,000</u>
b. Duties & taxes, etc.	16,518,000	9,772,000	13,057,000
	548,590,000	294,000,000	376,400,000
(4) TOTAL	603,608,000	342,272,000	427,957,000

S-13 Rough Cost Estimate of Items to Be Done by the Government of Japan

	IDEA-A	IDEA-B	IDEA-C
(1) Building Construction	314,300,000	186,900,000	309,100,000
a. Building and External Work	234,700,000	152,500,000	233,800,000
b. Air-conditioning	31,800,000	-	27,800,000
c. Plumbing	15,600,000	11,100,000	15,600,000
d. Electricity	32,200,000	23,300,000	31,900,000
(2) Infrastructure	101,100,000	68,450,000	94,800,000
a. Water supply	33,800,000	16,550,000	33,800,000
b. Power supply	67,300,000	51,900,000	61,000,000
c. Generator	-	-	-
(3) Pharmaceutical Equipment	574,790,000	310,070,000	364,740,000
I. Sub-total	990,190,000	565,420,000	768,640,000
II. Design and Supervision	99,000,000	78,000,000	90,000,000
III. Contingency	12,000,000	8,000,000	11,800,000
IV. Total	1,101,190,000	651,420,000	870,440,000

S-14 Proposed Organization Chart



S-15 Accommodation of Personnel

Room No.	Room Name	Personnel	No. of Personnel		
			Idea-A	Idea-B	Idea-C
Management					
101	Office Room	General Manager	1	1	1
		Secretary	(as required)		
Administration					
101	Office Room	Manager	1	1	1
		Planning, Purchase & Sales Office	3	1	1
		Accountant & Personnel Officer	2	1	1
		General Affair Officer	1	1	1
		General Affair and Assistant Officer	2	1	1
		Typist	(as required)		
		Peon	(do)		
	Sub-Station	Building Maintenance Technician	4	4	4
	(Check Gate)	Guard	(as required)		
		Gardener	(do)		
		Sweeper	(do)		
	(Garage)	Driver	(do)		
Quality Control					
103	Quality Control Room	Manager	1	1	1
		Technician	9	9	9
Production					
219	Package Preparation Room	Manager	1	1	1
204	Processing Office	Supervisor	2	1	1
222	Processing Office	Supervisor	2	2	2
Mixing Section					
201	Weighing Room	Worker	3	2	2
202	Shifting Room	Worker	2	2	2
203	Milling Room	Worker	2	2	2
207	Dry Mixing Room	Worker	4	-	-
208	Wet Mixing Room	Worker	4	4	4
213	Liquid Preparation Room	Worker	2	2	2
214	Washing Room	Worker	2	2	2
Tablet Section					
210	Tableting Room	Worker	4	3	3
211					
212					
Capsule Section					
215	Capsule Filling Room	Worker	2	-	2
216					
Packing Section					
218	Packing Room	Worker	50	30	32
219	Package Preparation Room	Worker	8	6	6
Warehouse Section					
305	Office Room	Officer	1	1	1
306	Inspection Room	Technician	2	1	1
301	Warehouse	Worker	5	3	3
Engineering Section					
220	Machine Room	Technician	2	2	2
Total			121	83	88

S-16 Expenditure for Manpower

(Unit: TK)

Post	Average of Basic Pay per Month	Idea-A		Idea-B		Idea-C	
		No. of Post	Total Basic Pay per Annum	No. of Post	Total Basic Pay per Annum	No. of Post	Total Basic Pay per Annum
General Manager	2,550	1	30,600	1	30,600	1	30,600
Manager	2,350	3	84,600	3	84,600	3	84,600
Officer	2,112	7	177,408	4	101,376	5	126,720
Supervisor	1,812	4	86,976	3	65,232	3	65,232
Technician	1,255	17	256,020	16	240,960	16	240,960
Assist. Officer	970	1	11,640	0	0	0	0
Worker	731	88	771,936	56	491,232	60	526,320
Sub-total		121	1,419,180	83	1,014,000	88	1,074,432
Pay except basic pay		(35% of 1,419,180 TK) 496,713 TK		(35% of 1,014,000) 354,900 TK		(35% of 1,074,432) 376,051 TK	
Total		1,915,893 TK		1,368,900 TK		1,450,483 TK	

Remarks: 1) The basic pay and the pay except the basic pay refer to the Project Proforma (issued on Feb. 8, 1982) of the Ministry of Health and Population Control.

2) The expenditure for such manpower as typists, peons, guards, gardeners, sweepers and drivers is not included.

S-17 Expenditure for Maintenance of Facility

	Idea-A		Idea-B		Idea-C	
	Condition	Annual expenditure	Condition	Annual expenditure	Condition	Annual expenditure
(1) Expenditure for energy						
1) Petroleum	None	-	None	-	None	-
2) Gas	None	-	None	-	None	-
3) Electricity	636,000KW/yr	1,590,000TK	452,000Kw/yr	1,130,000TK	591,000KW/yr	1,477,500TK
(2) Building repairing expenditure	1 set	113,000TK	1 set	72,000TK	1 set	113,000TK
(3) Total		1,703,000TK		1,202,000TK		1,590,500TK

Remarks: The above expenditure is exclusive of the expenditure for furniture and utensils.

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