

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
CONSTRUCTION OF FOODGRAIN STORAGES
IN
DHAKA
THE PEOPLE'S REPUBLIC OF BANGLADESH

SEPTEMBER, 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

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マイクロ
フィルム作成

PREFACE

In response to a request of the Government of the People's Republic of Bangladesh, the Government of Japan has decided to conduct a basic design study on the Project for Construction of Foodgrain Storages in Dhaka and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Bangladesh a study team headed by Mr. Yoshihiro Nakamura, Senior Officer for Storage Technique, Purchase Division of Food Agency, Ministry of Agriculture, Forestry and Fisheries, from March 23 to April 13, 1991.

The team held discussions with the officials concerned of the Government of Bangladesh and conducted a field study at the Project area as well as the Project site. After the team returned to Japan, further studies were made, a draft report was prepared, and for the explanation and discussions of it, a mission headed by Mr. Takeshi Naruse, Deputy Representative, JICA Bangladesh Office, was sent to Bangladesh from July 13 to July 22, 1991. As a result, the present report has been completed.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the People's Republic of Bangladesh for their close cooperation extended to the teams.

September, 1991

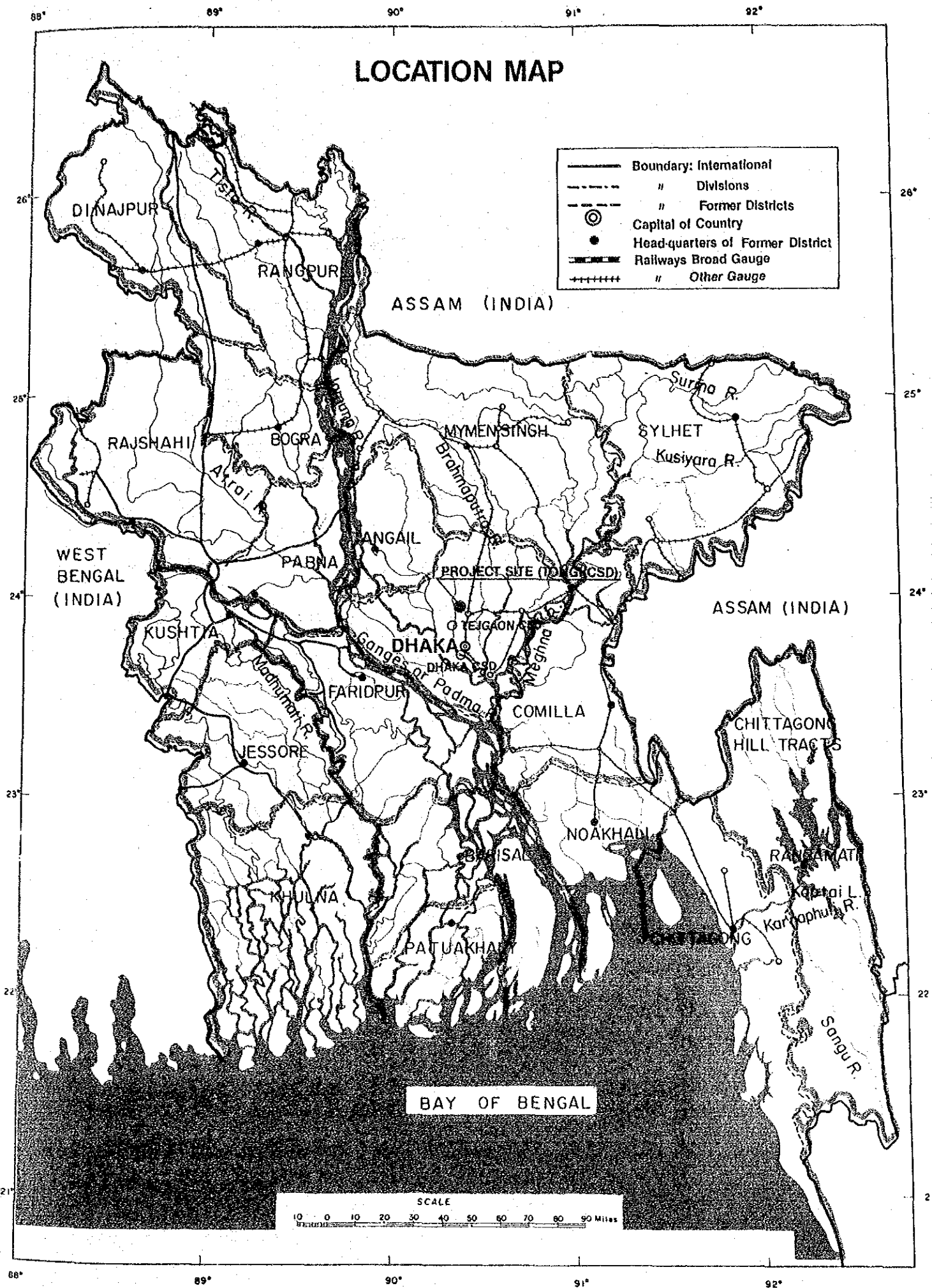
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Kensuke Yanagiya

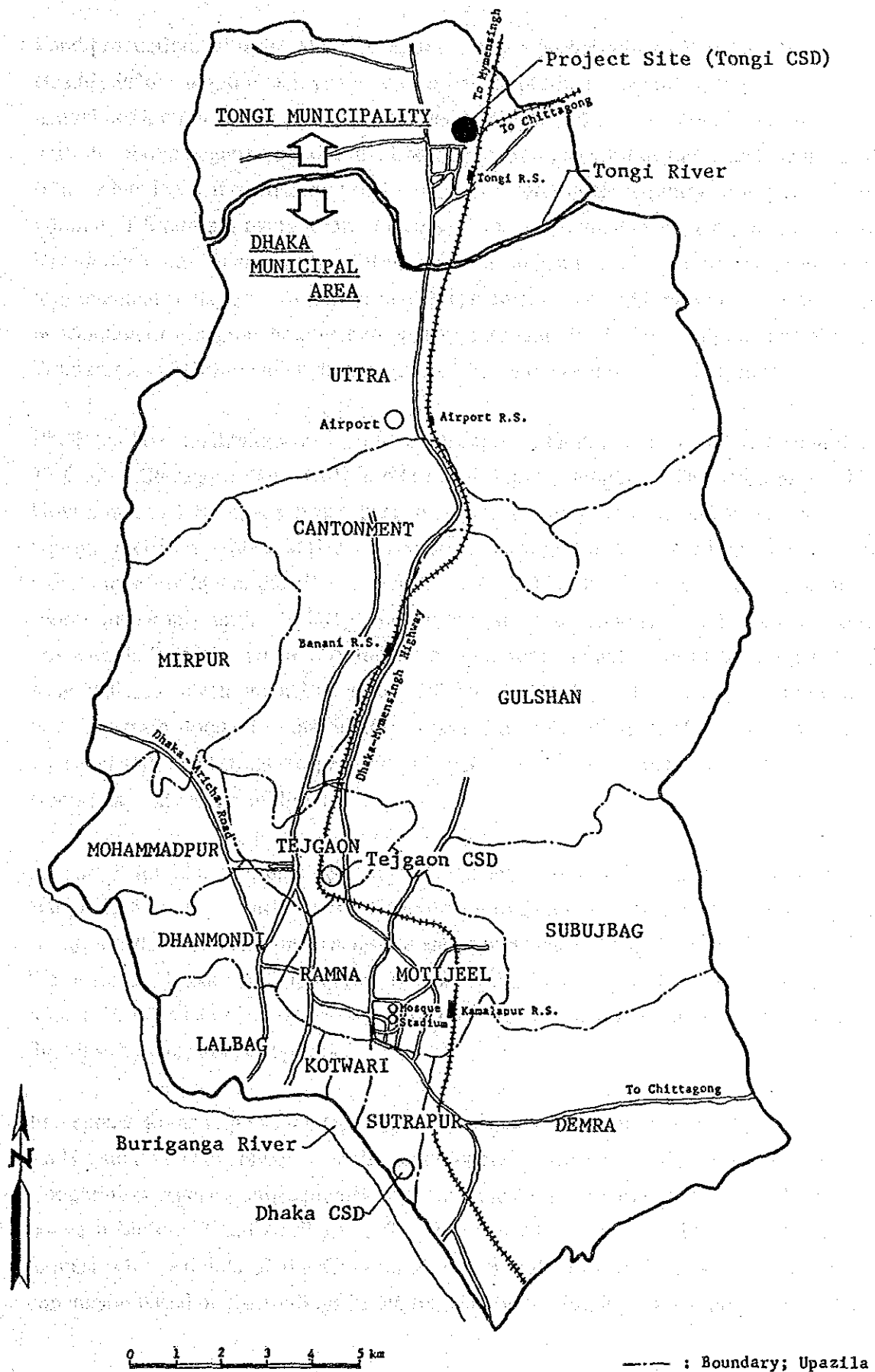
President

Japan International Cooperation Agency

LOCATION MAP



MAP OF THE PROJECT AREA (DHAKA FOODGRAIN DISTRIBUTION AREA)



SUMMARY

Food production, with rice at the core, in the People's Republic of Bangladesh has been steadily increasing in recent years. Nevertheless, productivity still remains low and the annual production is unstable due to the geographical and climatic conditions. Together with the above negative conditions, high population growth has prevented Bangladesh from achieving self-sufficiency of food supply, forcing the country to import a large volume of foodgrain every year. In view of these circumstances, the Government of Bangladesh has been implementing various measures for foodgrain production improvement in its successive National Development Plans and trying to ensure the fair distribution of foodgrain among the population through the Public Foodgrain Distribution Programme (PFDP) in which the rationing of rice and wheat is the main component.

PFDP has been maintained by such foodgrain storage facilities as the national network of 13 Central Storage Depots (CSDs), 622 Local Supply Depots (LSDs) and 5 Silos. The Government of Bangladesh has been trying to increase and expand these foodgrain storage facilities with a series of foreign aid programmes, including those of the Government of Japan, the IDA, ADB, EC and CIDA, etc., in order to ensure a stable foodgrain supply under PFDP. The present storage capacity of 1.87 million tons, however, is far from satisfactory for the smooth implementation of PFDP and the 4th 5 Year National Development Plan (fiscal 1990/91 - 1994/95) calls for the construction of a new foodgrain storage to store 600,000 tons and the rehabilitation of existing storages to create an additional storage capacity of 400,000 tons to increase the nationwide foodgrain storage capacity to 2.5 million tons.

As part of the plan to create new storage capacity of 600,000 tons, the Government of Bangladesh made a request to the Government of Japan to construct 50 new foodgrain storages with ancillary facilities and necessary equipment at Tongi Municipality, located to the north of Dhaka Municipal Area (Dhaka MA), to serve the Dhaka MA in order to relieve the unusual operation pressure on the Dhaka CSD and the Tejgaon CSD caused by their insufficient storage capacities.

In response to the request, the Government of Japan decided to conduct the basic design study with a view to constructing the new foodgrain storages and the Japan International Cooperation Agency subsequently sent the study team to Bangladesh for the period between March 23 and April 13, 1991. The study team discussed the contents of the request with officials of the Government of Bangladesh and reached the following conclusion based on the findings of the field study, the findings of the domestic analysis

of the collected data and information and the results of the meetings which took place in Bangladesh between July 13 and 22, 1991 to explain the contents of the draft report to the Bangladesh side.

The annual foodgrain supply by the Government of Bangladesh to Dhaka MA which has an estimated population of more than 6.5 million has been some 0.2 - 0.25 million tons in recent years, of which some 40% consists of rice from the north and some 60% consists of wheat imported via Chittagong Port.

Approximately one-third and two-thirds of this government foodgrain are moved to and temporarily stored at the Dhaka CSD (storage capacity of 7,500 tons) and the Tejgaon CSD (storage capacity of 33,200 tons) respectively before distribution for consumption. Since neither of these depots has sufficient storage capacity, extremely high annual turnovers are recorded, i.e. 7 - 16 turnovers for the Dhaka CSD and 5 - 8 turnovers for the Tejgaon CSD. Such tight operation is not capable of fully responding to the emergencies caused by frequent floods and transportation strikes. At these two CSDs, the storages are 40 - 50 years old except for those which were constructed by the Japanese grant aid in recent years and are not suitable for the long-term storage of foodstuffs accordingly. Both CSDs face difficulties in expanding their facilities due to their location in urban areas and the worsening traffic situation (serious traffic congestion) has made transportation in and out of the CSDs particularly difficult in recent years.

The above situation appears to justify the construction of a new CSD at Tongi Municipality which is conveniently located for railway and truck transportation in accordance with the request in view of achieving the smooth and appropriate operation of foodgrain storages and a stable foodgrain supply to the population of Dhaka Foodgrain Distribution Area (Dhaka FDA), which is increasing annually, under an emergency. Following examination of the diverse aspects of the foodgrain storage requirements, such as (1) the national policy on a security reserve of food, (2) the required volume of such a security reserve, (3) an appropriate stock level, (4) the required storage capacity and its current shortage and (5) the diversifications of food supply bases, etc., it is concluded that the construction of 35 foodgrain storages with a 1,000 ton storage capacity each and ancillary facilities as well as storage management equipment is appropriate despite the original request of the Government of Bangladesh for the construction of 50 such storages.

With regard to the size and structure of these new storages, the adoption of the standard type storage which was introduced during Phase IV of the storage construction project

with Japanese grant aid is found appropriate by the basic design study in view of the current situation of storage management in Bangladesh. The specifications of the storages to be constructed under the Project are given in the following table.

	Item	Specifications
General Specifications	Storage capacity	1,000 tons
	Floor size	30.0 m x 24.0 m
	Building height (upto roof slab top) (upto roof slab bottom)	GL + 6.810 m FL + 5.791 m (19 feet)
	Floor height	GL + 0.900 m
Structure	Main structure Exterior walls Foundation	Reinforced concrete Brick masonry Continuous footing combined with independent footing
Finish	Roof Interior & exterior walls Floor Ceiling	Lime terracing Mortar with vinyl paint Trowelled concrete finish Concrete with vinyl paint
Storage Performance	Floor damp-proofing Ventilation Dunnage Pest control Heat insulation	Polyethylene sheet Natural ventilation through windows Wooden dunnage Insect nets, screen doors Lime terracing

The facilities of which the construction is required by the Japanese grant aid under the Project are listed below.

- 1) Foodgrain storages 35 (storage capacity: 1,000 tons each)
- 2) Office building 1 (579.6 m²)
- 3) Equipment storage 1 (105 m²)
- 4) Workers' toilets 2 (27.3 m²/building)
- 5) Substation 1 (28 m²)
- 6) Truck scale house 1 (20 m²)
- 7) Check post 1 (20m²)
- 8) Sentry posts 11 (2.25m²/post)
- 9) Internal roads 19,550 m²
- 10) Internal paving 15,100 m²

- | | |
|----------------------------------|--|
| 11) Security walls | 1,664 m |
| 12) Storage management equipment | 1 set (platform scales, grain thermometers, power sprayers, fumigation sheets, etc.) |

Two years will be required for the construction of these facilities and the provision of equipment. The work involved must be divided into two stages for project implementation based on the Japanese grant aid system. The first stage will involve the construction of (1) 18 foodgrain storages, (2) one office building, (3) one equipment storage, (4) one workers' toilet, (5) one substation, (6) one truck scale house, (7) one check post, (8) six sentry posts, (9) part of the internal roads, (10) part of the internal paving, (11) part of the security walls, and the provision of storage management equipment. Consequently, the second stage will involve the remaining construction of (1) 17 foodgrain storages, (2) one workers' toilet, (3) five sentry posts, (4) part of the internal roads, (5) part of the internal paving and (6) part of the security walls. The Project cost to be borne by the Bangladeshi side is estimated to be approximately Taka 201,000,000 (approx. ¥746,000,000). The construction period will be 12 months for each stage.

The Directorate General of Food under the Ministry of Food, which is the implementation body for the Project, will also be responsible for the operation and maintenance of the new facilities. The maintenance of the Tongi CSD will require skilled maintenance staff and a constant power supply, etc. and the annual operation cost is estimated to be Taka 2,610,000 (approx. ¥9,680,000). Compared to other types of buildings, foodgrain storages see more frequent movement of heavier storage items. As a result, damages to the storage can occur earlier than normally anticipated, indicating the particular importance of conducting preventive maintenance. Regular repainting and repair every 4 - 5 years is the minimum requirement. For other buildings, the painting interval may be 5 - 6 years. The annual maintenance and repair expenses are estimated to be Taka 1,390,000 (approx. ¥5,140,000).

The construction of the Tongi CSD will almost double the foodgrain storage capacity of the government in the Dhaka FDA, achieving a regular stock level of approximately 2.5 months' demand equivalent and offering some 20 days' emergency foodgrain supply to entire residents therein. The Tongi CSD will also reduce the burden on the existing CSDs in the Dhaka MA and is expected to greatly contribute to the achievement of a stable food supply. In view of the significance of the Project, its implementation by the Japanese grant aid is deemed viable.

The following recommendations are made for the effective implementation of the Project.

The Government of Bangladesh is currently proceeding with the land acquisition of the Project site with a target date of February, 1992. Since such acquisition of land is essential for the implementation of the Project, this target date must be adhered to. With regard to the maintenance of the new foodgrain storages and other facilities, a maintenance programme should be prepared and full-time maintenance staff should be appointed to conduct regular inspection so that damage can be prevented or repaired before becoming serious.

Furthermore, in view of the anticipated use of railway transportation together with truck transportation by the Government of Bangladesh must consult with the Railway Department of the Ministry of Communication regarding the construction of railway sidings on the Project site prior to the completion of the Project and proceed with the actual construction work.

MAP OF THE PROJECT AREA

SUMMARY

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BASIC DESIGN STUDY REPORT ON THE PROJECT FOR CONSTRUCTION OF FOODGRAIN STORAGES IN DHAKA THE PEOPLE'S REPUBLIC OF BANGLADESH

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ABBREVIATIONS, WEIGHTS AND MEASURES

1. ABBREVIATIONS

ADB	:	Asian Development Bank
BPMI	:	Bangladesh Project Management Institute
CIDA	:	Canadian International Development Association
CSD	:	Central Storage Depot
DGF	:	Directorate General of Food
DIT	:	Dhaka Improvement Trust
EC	:	European Community
ECNEC	:	Executive Committee for the National Economic Council
ERD	:	External Resources Division
HYV	:	High Yielding Variety
IDA	:	International Development Association
JICA	:	Japan International Cooperation Agency
LSD	:	Local Supply Depot
OMS	:	Open Market Sale
PFDP	:	Public Foodgrain Distribution Programme
PCP	:	Project Concept Paper
PWD	:	Public Works Department
TPC	:	Temporary Procurement Centre
USAID	:	United States Agency for International Development

2. WEIGHTS AND MEASURES

1 foot (ft)	÷	0.3048 meters (m)
1 pound (lb)	÷	453.6 grams (g)
1 ounce (oz)	÷	28.3 grams (g)
1 maund (md)	÷	37.3 kilograms (g)
1 square foot (sft)	÷	0.0929 square meters (m ²)
1 square inch	÷	0.0006 square meters (m ²)
1 hectare	=	100 ares = 10,000 square meters (m ²)

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

The annual foodgrain supply by the Government of the People's Republic of Bangladesh to Dhaka MA which has an estimated population of more than 6.5 million has been some 0.2 - 0.25 million tons in recent years, of which some 40% consists of rice from the north and some 60% consists of wheat imported via Chittagong Port.

Approximately one-third and two-thirds of this government foodgrain are delivered to and temporarily stored at the Dhaka CSD (storage capacity of 7,500 tons) and the Tejgaon CSD (storage capacity of 33,200 tons) respectively before distribution for consumption. Since neither of these depots has sufficient storage capacity, extremely high annual turnovers are recorded, i.e. 7 - 16 turnovers for the Dhaka CSD and 5 - 8 turnovers for the Tejgaon CSD. Such tight operation is not capable of fully responding to the emergencies caused by frequent floods and transport strikes. At these two CSDs, the storages are 40 - 50 years old except for those which were constructed by the Japanese grant aid in recent years and, therefore, are not suitable for the long-term storage of foodgrain. Both CSDs face difficulties in expanding their facilities due to their location in urban areas and the worsening traffic situation (serious traffic congestion) has made transportation in and out of the CSDs particularly difficult in recent years.

To solve these difficulties, the Government of Bangladesh planned the Project to construct 50,000 ton class foodgrain storages in Tarabo Municipality (located south of Dhaka) and Tongi Municipality (located north of Dhaka) and requested the Government of Japan's provision of grant aid for the construction of these storages as well as ancillary facilities. The initial request was followed by an urgent request via the diplomatic channel by the Government of Bangladesh, appealing for the Government of Japan's early decision to construct the foodgrain storages at Tongi Municipality.

In response to these requests, the Government of Japan decided to conduct the basic design study for the Project. According to the decision by the Government of Japan, Japan International Cooperation Agency sent the basic design study team led by Mr. Yoshihiro Nakamura, Senior Officer for Storage Technique, Purchase Division of Food Agency, Ministry of Agriculture, Forestry and Fisheries, to Bangladesh for the period between March 23 to April 13, 1991, in order to examine the viability of the Project as a grant aid project of the Government of Japan and to carry out the basic design to determine the appropriate contents for Japanese cooperation.

The study team discussed the contents of the request with officials of the Government of Bangladesh (counterpart officials) and conducted a series of activities to obtain the necessary information and data for the basic design. These activities included a field study of the Project area as well as the Project site, the collection of data relating to foodgrain distribution and storage construction, interviews with related people and a technical study to plan the most appropriate Project contents. The basic items agreed upon by the study team and counterpart officials were compiled as the Minutes of Discussions which were duly signed on April 8, 1991 at the Ministry of Food.

After its return to Japan, the study team conducted the domestic work to analyze and examine the field study findings, prepared a draft plan for the Project and the basic design for the planned facilities, estimated the Project cost and evaluated the viability of the Project.

The findings of the domestic work were then compiled as the draft report and JICA sent the explanatory mission led by Mr. Takeshi Naruse, Deputy Representative, JICA Bangladesh Office, to Bangladesh for the period between July 13 and July 22, 1991 to explain the contents of the draft report to the counterpart officials. With the consent of the counterpart, the basic design study report has now been completed.

Member Lists of the Study Teams, the Study Schedules, List of the Officials Concerned in Bangladesh and the Minutes of Discussions, etc. can be found as Appendices to this report.

CHAPTER 2

BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 General Situation of Agriculture and Foodgrain Production

2.1.1 National Economy and Agriculture

Bangladesh is one of the most densely populated countries in the world with 114 million people (as of 1990) living in an area of 144,000km². Most parts of the country are fertile flat land and the ratio of cultivable land is as high as 65%. With a subtropical monsoon climate prevailing in most of the area, farming is tenable all year round provided that adequate water management is conducted. As the jute industry is the only notable industry in the country, agriculture commands important status in the economy of Bangladesh, accounting for some 60% of the working population and 37% of the GDP (fiscal 1988/89). 90% of the exports consist of such agricultural products as jute, jute products, tea and livestock products including hides. Jute and jute products in particular are the most important export items, accounting for 75% of the total export earnings.

While agriculture is the largest and most important industry in Bangladesh, its productivity is extremely low as shown by the unit yield of 1.5 tons/ha (unhulled) of rice which is the country's most important crop. Despite strenuous efforts to achieve food self-sufficiency over the years, it is still necessary to import some 1.5 million tons of foodgrain annually in addition to cooking oil and other agricultural products. The import value of food accounts for one-quarter of the total import, further squeezing Bangladesh's difficult foreign reserve situation. The average farming plot per farm household is very small and 70% of these households have only one ha or less (36a on average). Consequently, the presence of the poor, including farmers without their own farmland, in the rural area poses an important policy issue for both the national and local governments.

2.1.2 Trends of Foodgrain Production

There are 3 rice crops (Aus, Aman and Boro) and the employment of these crops is determined by such cultivation conditions as the geographical characteristics and availability of irrigation facilities, etc. Either a high yielding variety (HYV) or a traditional variety can be planted for each crops. At present, Boro is almost dominated by HYVs and Aus and Aman are seeing the popularity of HYVs increase.

	Seeding (Transplanting)	Harvesting	Remarks
Aus	Mar - Apr (end of dry season)	Jul - Aug (rainy season)	mainly upland rice; seeding and transplanting
Aman	Aug - Sep (rainy season)	Oct - Nov (dry season)	mainly floating rice; seeding and transplanting
Boro	Dec - Jan (dry season)	May - Jun (early rainy season)	mainly irrigated paddy rice; transplanting
Wheat	Nov - Dec (dry season)	Mar - Apr (end of dry season)	competes with Boro cultivation

(Aus)

The production of Aus is declining because of its dependence on unreliable rain during the seeding (transplanting) season and also because of harvesting in the rainy season which is unsuitable for the drying of paddy. No government procurement is practiced for this crop.

(Aman)

As the transplanted Aman is cultivated in easy areas for water management, its yield is stable, accounting for approximately half of the total rice production in Bangladesh. Harvesting during the dry season makes the rice quality fairly high and, until recently, government procurement dominantly focused on Aman.

(Boro)

Boro takes place during the dry season with the assistance of irrigation. The easy control of fertilizer application results in a high yield. Consequently, the production has been rapidly increasing in line with the improvement of irrigation facilities. The main focus of government procurement has shifted from Aman to Boro since fiscal 1986/87. One remaining problem of Boro is drying as harvesting takes place at the beginning of the rainy season.

(Wheat)

Since the planting season converges with Boro, the production of wheat, which fetches a lower price than rice, has been stagnant.

The overall production of rice and wheat was stagnant around the 16 million ton level for some time as shown in Table 2-1. The favourable weather in fiscal 1989/90, however, resulted in a large production increase to the 19 million ton level and the estimated production for fiscal 1990/91 is currently at the same level, indicating a rapid improvement of the foodgrain supply situation despite dependence on the weather.

Table 2-1. Rice and Wheat Production and Government Procurement

(Unit: 1,000 tons)

Fiscal Year	1985/86	1986/87	1987/88	1988/89	1989/90
Aus	2,828 (-)	3,130 (-)	2,993 (-)	2,856 (-)	2,487 (-)
Aman	8,542 (139)	8,267 (23)	7,690 (49)	6,857 (58)	9,500 (419)
Boro	3,671 (79)	4,010 (115)	4,731 (239)	5,831 (305)	6,200 (499)
Sub-Total	15,041 (218)	15,407 (138)	15,414 (288)	15,544 (363)	18,187 (918)
Wheat	1,042 (130)	1,091 (51)	1,048 (87)	1,022 (52)	890 (42)
Total	16,083 (348)	16,498 (189)	16,462 (375)	16,566 (415)	19,077 (960)

Note: Figures in brackets show the government procurement.

2.2 Foodgrain Supply/Demand Situation and Distribution

2.2.1 Foodgrain Supply/Demand Situation

Foodgrain production in Bangladesh has favourably increased with Boro being the driving force for production growth and the net supply of domestically produced foodgrain reached the 17 million ton level in fiscal 1989/90. However, self-sufficiency of food supply has been prevented by the continuously high population growth rate (2.4% in 1985 and 2.2% in 1990). In both fiscal 1987/88 and fiscal 1988/89, the import of a large amount of food was necessitated by natural disasters and the import level was still as high as 1.5 million tons in fiscal 1989/90.

Table 2-2 Population and Foodgrain Supply

(Units: million persons; 10,000 tons)

Fiscal	1985/86	1986/87	1987/88	1988/89	1989/90
Population	100.3	102.5	104.1	109.5	111.9
Food Demand	1,687	1,697	1,723	1,813	1,853
Net Supply	1,447	1,485	1,482	1,491	1,709
Shortage	240	212	241	322	144
Imports	120	177	292	214	153

Source : Food Situation Report, Ministry of Food

Notes : 1. The food demand is obtained by multiplying the daily requirement per person (16 oz or 450g) by the population.

2. The net supply is obtained by deducting the amount of foodgrain to be used as seeds and loss (10%) from the gross production.

2.2.2 Foodgrain Distribution

(1) Distribution System

In principle, foodgrain distribution in Bangladesh is based on the free market system, except for imports which are exclusively managed by the government, and government procurement and the distribution of domestically produced rice and wheat are the responsibility of the Public Foodgrain Distribution Programme (PFDP). In view of the chronic food shortage, however, there are inventory ceilings for wholesalers and retailers in order to prevent artificial price increases due to hoarding by these dealers. The ceiling for a wholesaler is 500 maunds (approximately 18.5 tons) while the ceiling for a retailer is 50 maunds). In theory at least, no large inventory is possible by anyone in the private sector. This arrangement in turn requires that the government maintain a reasonable inventory level to ensure a stable

supply. The reality, however, is that large grain dealers are very powerful in terms of storage, transportation and inventory finance capacities. As a result, the government finds it difficult to ensure that the government manipulation of the supply and demand situation achieves the objective of a stable foodgrain supply.

(2) Distribution

No statistics are available in Bangladesh on foodgrain distribution by the private sector, making it extremely difficult to quantify the foodgrain distribution situation in the country. In his book, Bangladesh Rice (1982), Dr. A. Alim suggests that domestically produced rice is destined as seeds (5%), food and wages in kind for farm workers (5%), self-consumption by farm households (50 - 55%) and general distribution (35 - 40%). If these ratios are still valid today, some 10 million tons are consumed by farming households, leaving only some 5 million tons for distribution. The government procurement largely varies from year to year depending on the overall harvest. Assuming an average of some 300,000 tons, PFDP of the government handles approximately 6% of the total distribution. In the case of wheat, the government procurement of domestically produced wheat is minimal. Consequently, distribution under PFDP mainly deals with imported wheat which accounts for some 60% of the total consumption.

2.2.3 Public Foodgrain Distribution Programme (PFDP)

PFDP has its origins in the food rationing which was introduced in 1943 before Independence as an emergency measure to combat famine and has gradually reached its present form in subsequent years with a series of revisions. PFDP has the following main objectives.

Main Objectives of PFDP

1. To stabilize producer as well as consumer prices.
2. To ensure foodgrain distribution to the poor.
3. To ensure priority foodgrain distribution to such important sectors as the military, police and government departments.
4. To provide emergency relief for people hit by a disaster.

The items subject to PFDP are rice, wheat, sugar, cooking oil and salt. Rice and wheat are distributed through the 13 channels (32 channels based on detailed classification) shown in Table 2-3 and divided into monetized (some 60%) and non-monetized (some 40%) distribution or into regular distribution (some 85%) and released onto the market (some 15%).

Table 2-3 Foodgrain Distribution by Channel Under PFDP (Fiscal 1989/90)

(Unit: 1,000 tons)

Distribution Channel	Rice	Wheat	Total
Statutory Rationing	7	149	156
Palli Rationing *1	386	46	432
Palli Chakki *2	—	111	111
Essential Priority	95	46	141
Other Priority	62	217	279
Large Employers	1	34	35
Open Market Sale	16	31	47
Flour Mills	—	168	168
Auction *3	3	—	3
Monetized Total	570	802	1,372
Food for Works	28	429	457
Test Relief	36	60	96
Gratuitous Relief	13	15	28
Vulnerable Group Development	6	181	187
Special Test Relief	22	2	24
Non-monetized Total	105	687	792
Total	675	1,489	2,164

Source : Food Situation Report, FPMU, Ministry of Food

Notes : * 1; Rationing for poor farmers

* 2; For wheat crushers

* 3; Sale of inferior quality wheat

While the distribution for poor farmers and vulnerable groups under PFDP is expected to increase in the future, the distribution for statutory rationing and other priority channels are expected to decline due to the reduced gap between the ration price and the market price, in turn caused by the reduced government subsidy. The importance of the market release of foodgrain by the government to stabilize the market price, especially open market sale which is a statutory requirement whenever the market price reaches the set level, is expected to increase. Table 2-4 and Figs. 2-1 and 2-2 show the changes of trigger prices to release government held rice and wheat onto the market and also the changes of market prices. The price control attempts of the government have been successful for wheat for some time. In the case of rice, the government largely achieved its objective with rises in the ration price in July, 1989 and in subsequent years.

Table 2-4 Trigger Prices for Release of Government Held Foodgrain onto the Market

(Unit: Taka/10kg)

Market Price	Government Sales Price	Retail Price
~ 1,100	1,050	1,050 + 40 = 1,090
1,101 ~ 1,200	1,098	1,098 + 40 = 1,138
1,201 ~ 1,300	1,148	1,148 + 40 = 1,188
1,301 ~ 1,400	1,202	1,202 + 40 = 1,242

Note: Taka 40 for the retail price indicates the profit margin for dealers.

Fig. 2-1 Monthly Changes in Market Price of Rice

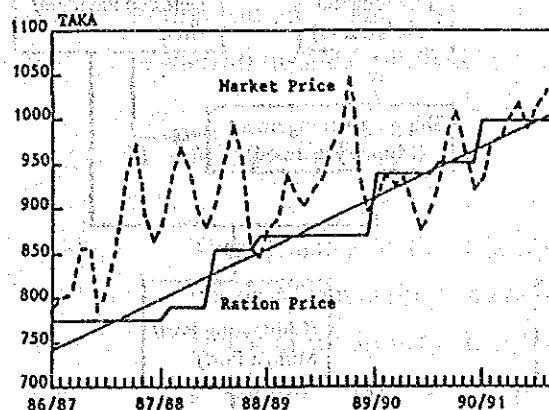
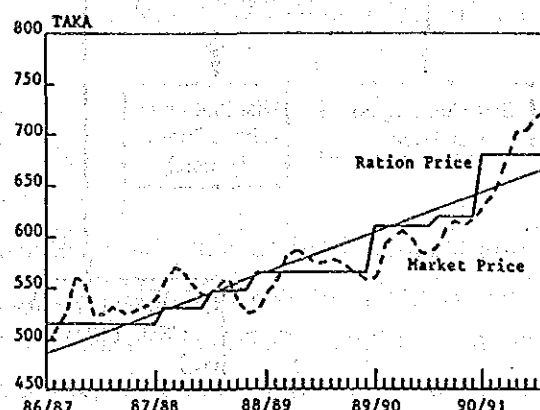


Fig. 2-2 Monthly Changes in Market Price of Wheat

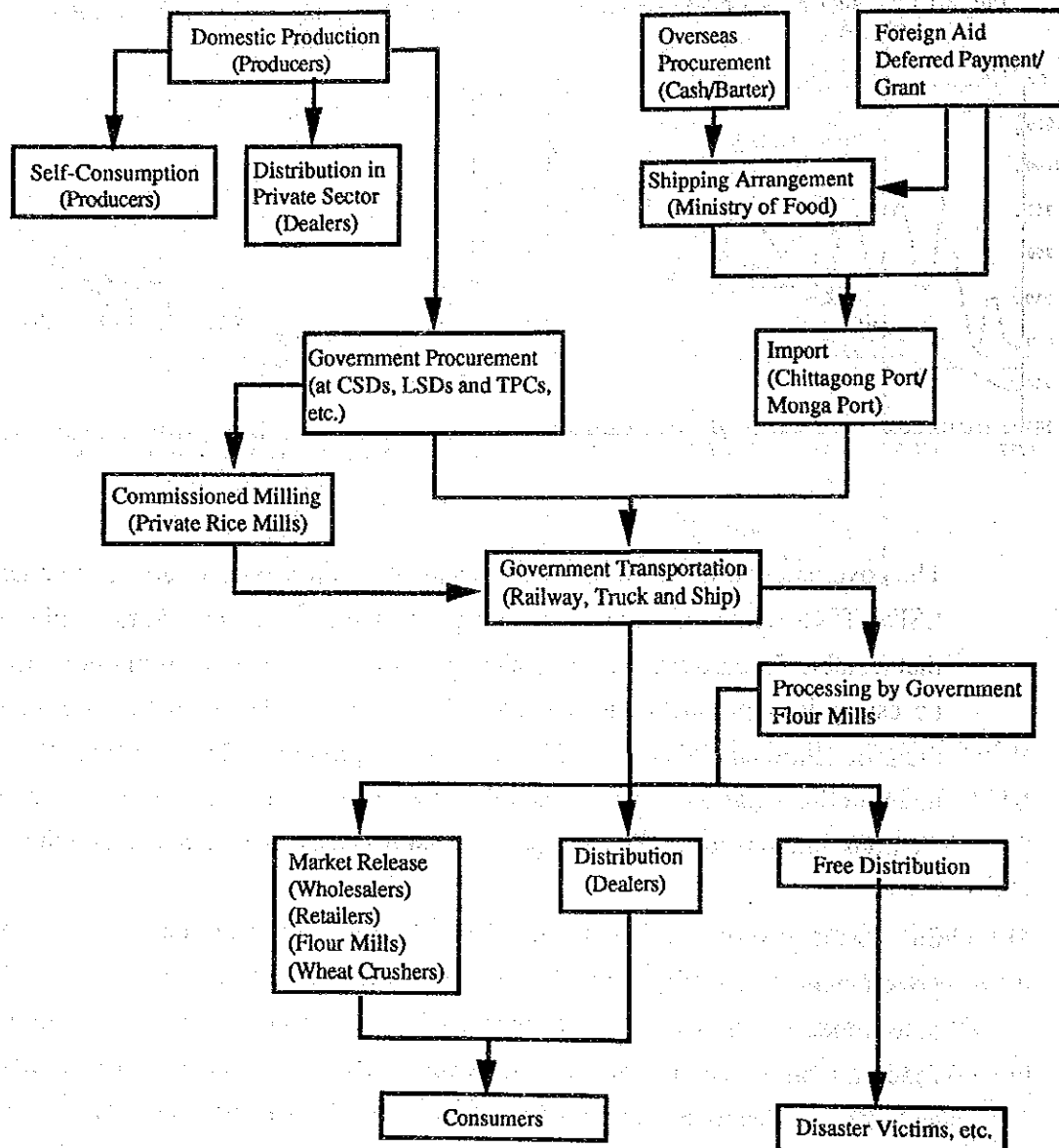


The government offers an unlimited rice and wheat procurement service at CSDs, LSDs, TPCs (temporary procurement centres) and privately owned rice mills so that a stable foodgrain supply is achieved by PFDP and that the minimum price necessary for reproduction is guaranteed for products. The procurement price is the production cost plus 10 - 15% profit for the producer. Taka 5 (Taka 13 for main producing areas) per 1 maund (37.3kg) is added to the above price to cover the transportation cost. The latest price is announced every year at a certain time.

Sale to the government is not compulsory. Since the procurement price of the government is generally lower than the market price, the actual sales are largely determined by the harvest performance. The government imports additional foodgrain on a cash or barter basis to cover a shortage in domestic procurement and also receives food assistance from abroad on a deferred payment basis or on a grant aid basis. Imported foodgrain is unloaded in either Chittagong Port or Mongra Port. The procured foodgrain is transported by the government by means of rail (some 20% of the volume), truck (some 45%) and ship (some 35%) to the CSDs and other storage facilities before distribution to consumers. Most wheat is distributed unprocessed while a small proportion is processed by the two government owned flour mills. Paddy is milled by private rice mills

commissioned by the government before distribution to consumers. The flow of wheat and rice is shown in Fig. 2-3.

Fig. 2-3 Food Flow Under PFDP



2.2.4 Food Administration

The competent organizations for food administration in Bangladesh are the Ministry of Food and the Directorate General of Food, the only department of the Ministry. PFDP is operated under the joint management of these two organizations. The Ministry of Food is generally responsible for the planning and management of food administration while the Directorate General of Food conducts the actual management through its branch network which covers the entire country. The organizational structures and fields of activities of these organizations are described below.

(1) Ministry of Food

The Ministry of Food is responsible for all areas of food administration, ranging from supply and demand, manipulation price control, import/export and facility improvement to statistics, except issues relating to actual production. As Fig. 2-4 shows, the organizational hierarchy is headed by the Minister, followed by the Secretary who is in charge of the practical administration of Ministry work and who is assisted by two Joint Secretaries who are responsible for administration/supply and procurement/development respectively.

(Administration and Supply)

- Administration and Establishment: Internal personnel affairs, including those of the Directorate General of Food and budget
- Supply: Food administration in terms of import, transportation, processing and price control
- Food Cell: Dealing with public complaints relating to food administration

(Procurement and Development)

- Development: Planning of facility development and relevant procedures; control of collateral funds for food aid
- Procurement: Domestic and overseas procurement of food; negotiations with outsiders
- Planning Cell: Administration of facility development projects and liaison with other related government agencies and ministries

- **Food Planning and Monitoring Cell:** Secretariat of the Food Council, collection of information; planning of food policies

(2) Directorate General of Food

The Directorate General of Food is responsible for the execution of food policy determined by the Ministry of Food, ranging from food inspection and procurement to distribution, including storage and transportation. It also collects the information required for the smooth running of food administration and for the implementation of facility development projects. As Fig. 2-5 shows, the Director General of Food directly controls (1) Administration, (2) Accounts and Finance, (3) Inspection, Development and Technical Services, (4) Internal Audit and (5) Management Information System while the Additional Director General (Chief of Operations) controls (1) Movement, Storage and Silo, (2) Procurement, (3) Supply, Distribution and Marketing, (4) Government Flour Mill and (5) Chief Controller of Dhaka Rationing. The statutory number of personnel is 13,607. The silos, CSDs and LSDs throughout the country are under the jurisdiction of the Movement, Storage and Silo.

Fig. 2-4 Organization of Ministry of Food

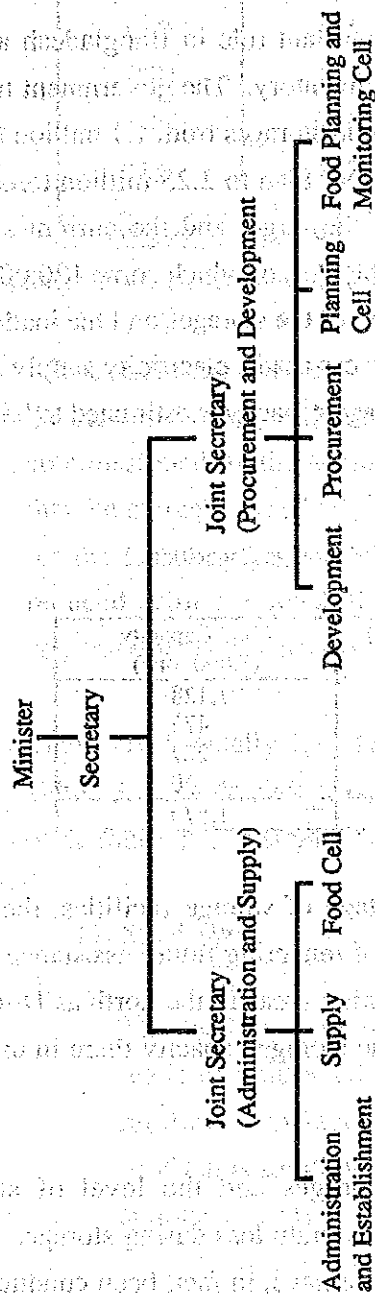
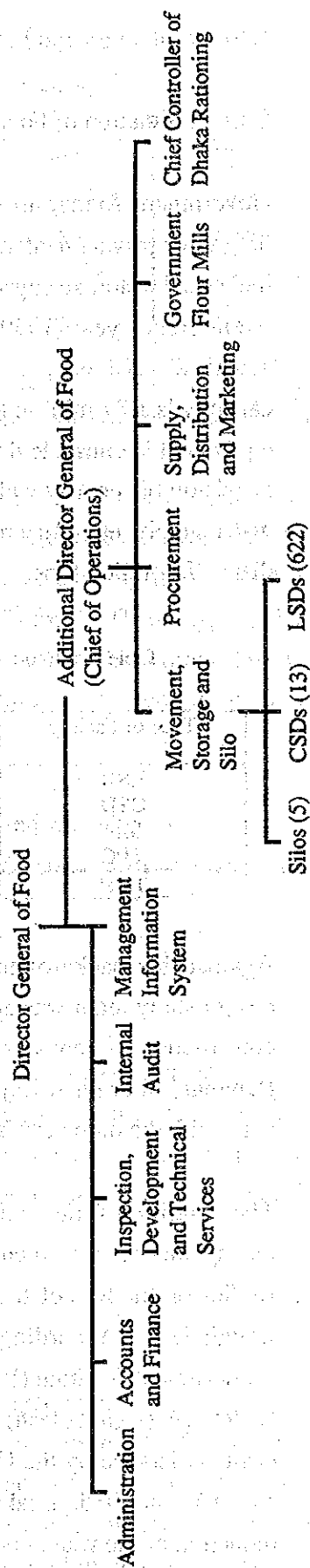


Fig. 2-5 Organization of Directorate of Food



2.3 Current Situation and Problems of Foodgrain Storages

2.3.1 Current Situation of Foodgrain Storages

Government foodgrain storages play an important role in Bangladesh as it is illegal for private dealers to possess a large inventory. The government tried to increase the storage capacity of public foodgrain storages from 1.1 million tons in the reference year (1979/89) for the 2nd 5 Year Plan to 2.25 million tons. The actual achievement, however, fell short of the target and the current storage capacity is 1.87 million tons as shown in Table 2-5, of which some 120,000 tons equivalent is unusable due to the deterioration of the storages and the inadequate provision of security walls, staff quarters, access roads, electricity supply and/or water supply, etc. As a result, the actual storage capacity is estimated to be lower than 1.75 million tons.

Table 2-5 Foodgrain Storage Facilities and Storage Capacities

Type of Facility	Number (Nationwide)	Total Capacity (1,000 tons)
LSD	622	1,128
CSD	13	475
Silo	5	227
TPC	159	40
Total	799	1,870

Against this background of a general shortage of storage facilities, the basic design study team was approached in view of rendering future assistance to the construction of new storages in such production areas in the north as Dinajpur, Rangpur, Bogra and Rajshahi to improve the storage capacity there in order to cope with the high harvest season.

The quality of the existing foodgrain storages and the level of storage management is indicated by the degree of foodgrain loss during storage. Many studies on the loss of foodgrain during storage have, in fact, been conducted in Bangladesh. According to the studies conducted by the Bangladesh Project Management Institute (BPMI) between fiscal 1978/79 and fiscal 1980/81 and by EUREKA (Bangladesh) Ltd. in 1985, commissioned by the Ministry of Food (with assistance by the USAID), loss during storage gradually declined but was still 0.5% in 1985. Leakage of rainwater, disease and harmful insects, theft and reduction of the water content during storage were pointed out by these studies as causes of loss.

Table 2-6 Loss of Foodgrain by Type of Storage

(Unit: %)

Fiscal	1978/79	1979/80	1980/81	1985
LSD	2.15	4.29	2.10	0.63
CSD	0.51	0.45	0.58	0.68
Silo	0.0006	0.0	0.003	0.0
TPC	0.22	0.54	0.48	0.28
Average	0.72	1.32	0.79	0.50

Source: Study on Subsidies in Public Food Grain Distribution System in Bangladesh (1986)

While there are several types of foodgrain storages in use in Bangladesh as described below, the study conducted by EUREKA Ltd. which was commissioned by the Ministry of Food (with assistance by the USAID) found that the storage loss (rice) was as diverse as 0.6% for the Dhaka type and 3.31% for the Calcutta type. Such a wide gap suggests that the storage loss can be reduced with the rehabilitation of the deteriorated storages as well as the construction of modern storages.

There are basically four types of storages based on their plan and structure although more detailed classification is possible if required. The main features of these four types of storages are as follows:

1) Shell Type

The shell type storage greatly varies in size. Its columns and beams are made of reinforced concrete. With brick walls, a concrete floor and a reinforced concrete roof, it has a shell structure. The special structure roof tends to allow the infiltration of rainwater and the current usable storage capacity is very small.

2) Calcutta Type

The Calcutta type storage has a storage capacity of 750 tons with a length of 150 feet, a width of 40 feet and a height of 16 feet (internal dimensions). The columns and beams are made of reinforced concrete while the walls are made of bricks. The floor is concrete and the roof has a steel frame truss structure which is covered by galvanized sheets. As

the roof structure does not provide a high storage performance in terms of airtightness and heat insulation, the Calcutta type storage is not particularly suitable for the storage of foodgrain.

3) Twin Nissen Type

The Twin Nissen type storage has a storage capacity of 800 tons with a length of 83.6 feet, a width of 65.4 feet and a height of 18 feet (upto the roof top). While the floor is concrete, the structure is a steel frame covered by U-shaped galvanized corrugated steel sheets. These types of storage were originally built as temporary buildings in the late 1940's and are now largely deteriorated. The use of steel sheets in a U-shape does not provide proper airtightness or heat insulation and are no longer used for the storage of foodgrain.

4) Dhaka Type

The Dhaka type of storage is the latest type of foodgrain storage. The columns, beams and roof are all made of reinforced concrete while the walls are brick and the floor is concrete. There are 2 sizes in terms of storage capacity. The dimensions of the 500 ton storage type are 100 feet in length, 40 feet in width and 16 feet in height (internal dimensions) while those of the 1,000 ton storage type are 100 feet in length, 80 feet in width and 16 feet in height (internal dimensions). This type of storage is the best among conventional storages from the viewpoints of building technologies (structure and materials) and storage performance. There is still room for improvement, however, in terms of the manufacturing precision of the locally produced windows and doors, finishing of both the interior and exterior walls and the use of an insect prevention net or screen doors. The Ministry of Food is planning to adopt this type of storage as the standard foodgrain storage for Bangladesh. Some of the existing storages, however, already show signs of bad storage performance due to building deterioration, in turn caused by such inferior construction work in respect of concrete mixing, concrete casting and mortar finish, etc.

2.3.2 Current Situation of Foodgrain Storages in Dhaka

There are two CSDs in Dhaka, i.e. the Dhaka CSD and the Tejgaon CSD and the current situation of their operation are described below.

(1) Dhaka CSD

The Dhaka CSD consists of following three godowns located in the densely populated Old Dhaka.

Mill Barrak : Capacity 500 tons x 15 storages = 7,500 tons

Siddique Bazar : Capacity 500 tons x 2 storages = 1,000 tons

Kalta Bazar : Capacity 500 tons x 2 storages = 1,000 tons

Ship transportation (simultaneous unloading from two 1,000 ton class ships) is available in Mill Barrak Godown located at the riverside of Buriganga River. The access road to these godowns are very narrow and heavily congested. It is extremely difficult for these godowns to handle bulky cargoes like bagged foodgrain in an efficient manner.

Moreover, the storages at both Siddique Bazar and Kalta Bazar have ceased to function as foodgrain storages due to the general deterioration of the buildings. Those at Siddique Bazar are leased to the Customs Office for the storage of goods other than foodstuffs. Those at Kalta Bazar are supposedly used to store salt but in reality are hardly used at all. As a result, the actual storage capacity of the Dhaka CSD is 7,500 tons. Despite these adverse circumstances, the volume of foodgrain handled by the Dhaka CSD is fairly large with an annual turnover of 7 - 8 times for a normal year and as high as 16 times for a disaster hit year. Because of the concentrated use of the storages, the inventory level at the beginning of the month often exceeds 80% which is generally considered to be the limit for reasonable storage management. In an extreme case, the inventory level is 50% higher than the capacity, implying that there is no empty space within the storages. All these facts indicate that the Dhaka CSD can be considered a distribution centre rather than a foodgrain storage facility. There is no room for expansion of the facility under the present conditions. Movement of the entire facility to a new site which provides easy access by trucks and boats appears necessary in the future.

(2) Tajgaon CSD

The Tajgaon CSD is located in an industrial quarter of the newly developed district. It is not far from the trunk road but the neighbouring roads are very congested. As the area sees frequent industrial disputes, such as strikes (at least once a month), the access road is often blocked, disrupting the operation of the CSD. Consequently, there is talk of reducing the operation scale or moving elsewhere. The present storage capacity is 33,200 tons against the nominal storage capacity of 37,100 tons as six storages (total storage capacity of 3,900 tons) have been demolished due to deterioration. The number of annual turnovers at the Tejgaon CSD is not as high as that of the Dhaka CSD but is still 5 - 8 times, indicating the heavy use of the storages. The average monthly inventory rate often exceeds 80% but is generally between 50% and 60%.

The total storage capacity of the above two CSDs is calculated below assuming that the capacity to store foodgrain is equivalent to approximately 90% of the total capacity on the basis of past performance results.

Dhaka CSD	total	7,500 tons	grain only	6,500 tons
Tejgaon CSD	total	33,200 tons	grain only	31,200 tons
Grand Total		40,700 tons		37,700 tons

2.3.3 Current Situation of Storages Built by Japanese Grant Aid

(1) Historical Background

Grant aid by the Government of Japan to build foodgrain storages in Bangladesh commenced in fiscal 1977 and the overall picture of such aid is outlined in Table 2-7.

During the Phase IV period, the general specifications of the storages built during the Phase I - III periods were thoroughly reviewed in terms of the dimensions (storage capacity, floor size, building height and ceiling height), structure (main structure, exterior wall and foundation type), finish (roof, interior and exterior walls, floor and ceiling) and storage performances (damp-proof floor, ventilation, dunnage, pest control and thermal insulation).

As a result of this review, a new 1,000 ton class storage (hereinafter referred to as the Japanese standard type) was designed, incorporating the findings of the survey on general warehouse and building conditions in Bangladesh.

This new design was, in fact, in line with the policy of the Government of Bangladesh to standardize storage design. During the Phase V (A) and Phase V (B) periods, Japanese standard type storages, designed during the Phase IV period, were constructed.

Table 2-7 Outline of Foodgrain Storages Constructed by Japanese Grant Aid

	Phase I	Phase II	Phase III	Phase IV	Phase V (A)	Phase V (B)	Total
Fiscal Year	1977	1979	1980	1982	1985	1986	-
Basic Design Study Period (Field Study Period)	Dec. 6~19, 1976	Nov. 13~ Dec. 9, 1978	-	Apr. 8~24, 1982	Jul. 4~17, 1985	Jul. 4~17, 1985	-
Construction Period	Oct. 1977 ~Dec. 1978	Sep. 1979 ~Mar. 1981	Sep. 1980 ~Oct. 1981	Dec. 1982 ~Mar. 1984	May 1986 ~Mar. 1987	Jan. 1987 ~Feb. 1988	-
Number of Storages	Maheswarpasha	11	-	-	-	-	11
	Halishahar	2	5	-	4	-	11
	Dewanhat	2	-	-	-	-	2
	Santahar	-	5	6	6	-	17
	Boyra	-	13	-	10	25	58
	Tejgaon	-	-	6	6	-	12
	Mymensingh	-	-	-	4	-	4
Total Number of Storages	15	23	12	30	10	25	115
Storage Capacity (tons)	15,000	23,000	12,000	30,000	10,000	25,000	115,000

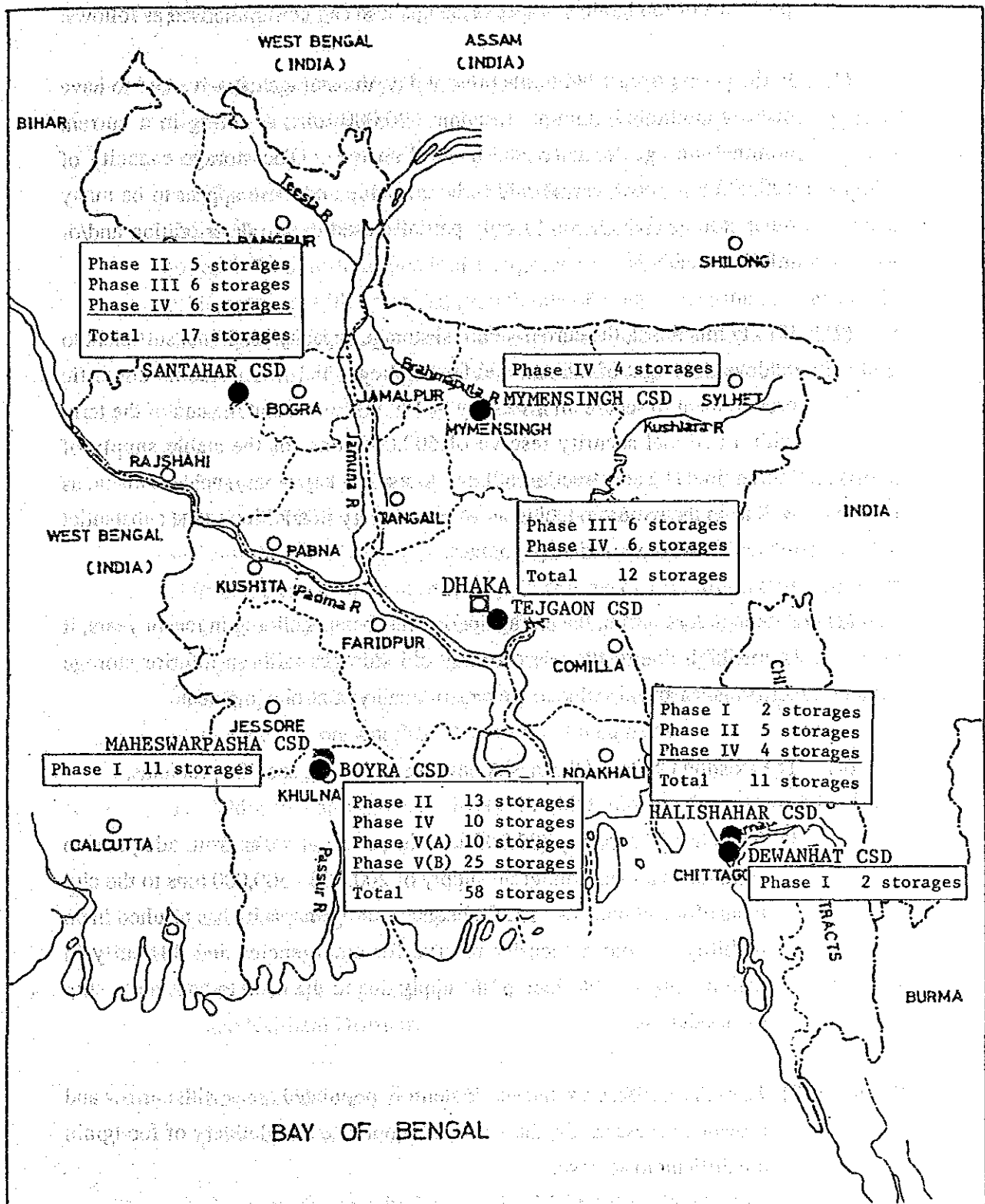
(2) Storage Management and Storage Performance

Storage management at the storages built by Japanese grant aid is conducted in the following manner (example of Tejgaon CSD).

- 1) Up to 17 grain bags may be piled up (approximately 3 - 3.5 m high). In exceptional cases, however, 21 bags may be piled up (approximately 4 - 4.5 m high). 21 bags are the maximum number from the viewpoint of technical safety.

- 2) Windows and doors (incorporating security features as well as pest control features, such as lattices and nets) are usually kept open for ventilation purposes except in the rainy season when they are kept closed for moisture-proofing.
- 3) Fumigation is regularly conducted, either by sealing all openings of the storage or by covering individual lots with vinyl sheets. The latter method is the most efficient. As the storages built by Japanese grant aid have a high degree of airtightness, fumigation with the openings sealed achieves some 40% efficiency of fumigation inside vinyl sheet covers. (The fumigation efficiency at other storages is some 15%.)
- 4) The principle of "First Come, First Go" is adopted.
- 5) Although sugar, salt and cooking oil are also designated as storage items, foodgrain is the predominant storage item.

Fig. 2-6 Distribution of Foodgrain Storages Built by Japanese Grant Aid



2.3.4 Problems of Foodgrain Storages

The problems of foodgrain storages in Bangladesh can be summarised as follows:

- (1) In the period from 1984 to the present day, the storage capacity said to have been rehabilitated amounts to some 620,000 tons, resulting in a current nominal storage capacity of 1.87 million tons. The storage capacity of 120,000 tons, however, is said to be unusable and there appear to be many other storages which can be only partially used due to deterioration and/or inferior standards.
- (2) If fully functional, the current nominal storage capacity is still not sufficient to achieve the target of the national food policy which seeks smooth domestic procurement to secure an inventory of 1.5 million tons at the end of the term with a national security reserve of 600,000 tons for the stable supply of foodgrain. The construction of new storages in key areas, such as Dhaka, as well as in the main producing areas is necessary in addition to the substantial rehabilitation of the existing storages.
- (3) Although loss during the storage period has been declining in recent years, it is still high due to the use of many old storages with an inferior storage performance and also due to the lack of quality control equipment.
- (4) The existing CSDs in Dhaka MA have the following specific problems.
 - 1) The storage capacity (37,700 tons in practice) is far from adequate to conduct an annual foodgrain supply of 200,000 - 300,000 tons to the city in an efficient manner. The inadequate storage capacity has resulted in an inability to hold a security reserve for emergencies and difficulty in maintaining a stable foodgrain supply due to the need to constantly ship the foodgrain.
 - 2) As both the CSDs are located in densely populated areas with narrow and crowded access roads, the smooth acceptance and delivery of foodgrain are difficult to achieve.
 - 3) Many of the storages are old and their storage performance is inferior, causing a problem in the maintenance of foodgrain quality during storage.

2.4 Outline of Foodgrain Storage Construction Programme

(1) Foodgrain Storage Construction Programme

In the 3rd 5 Year Plan (fiscal 1985/86 - 1988/90), the Government of Bangladesh considered the achievement of self-sufficiency of food supply as one of the main objectives and planned the construction of new storages to stabilize the foodgrain price through efficient distribution and stable supply.

During the above plan period, the production of rice and wheat was expected to reach 20.6 million tons in the target year from 16.08 million tons in the reference year with an annual growth rate of 1.5%. The actual production in the target year, however, remained at 18.5 million tons. Similarly, the actual increase of the storage capacity was 1.1 million tons to only 1.87 million tons instead of the planned 2.25 million tons.

The Government of Bangladesh then announced the 4th 5 Year Plan (fiscal 1990/91 - 1994/95) in November, 1990 in which the early achievement of self-sufficiency of food supply was again called for. In addition, the 4th Plan aims at the establishment of foodgrain reserve of 1.5 million tons. To make such a vast reserve possible, the Plan calls for the construction of new storages (extra 600,000 tons) and the rehabilitation of existing storages (extra 400,000 tons). The new storages to store 600,000 tons of foodgrain include those under the present Project and are outlined below.

1) Additional storage capacity of 100,000 tons in Dhaka (two 50,000 ton class storage depots in north Dhaka and south Dhaka).

2) A 50,000 ton class silo at Chalna Port.

3) New storage capacity of 150,000 tons in the Borgra, Rangpur, Dinajpur and Rajshahi Districts.

4) New storage capacity of 150,000 tons in Upazilas* where the government leases private storages or has no storage of its own.

5) One new silo each in the capitals of 10 Districts (a total of 150,000 tons).

* Administrative units of Bangladesh consist of Divisions, Districts, Upazilas, Unions and Villages.

(2) Construction of Foodgrain Storages by Foreign Aid

Bangladesh owes much to foreign aid, including IDA and ADB loans, for the construction of foodgrain storages. The organizations and countries which provided aid for the Foodgrain Storage Construction Programme during the 2nd and 3rd 5 Year Plan periods are listed below.

IDA	164,000 tons	(July, 1978 - June, 1984)
ADB	62,500 tons	(July, 1979 - June, 1984)
EC	48,000 tons	(Jan., 1981 - June, 1985)
Netherlands	11,500 tons	(Aug., 1979 - June, 1983)
Canada (CIDA)	26,500 tons	(Jan., 1981 - June, 1992)
Japan	115,000 tons	(Oct., 1977 - Feb., 1988)
Sub-Total	427,500 tons	
Bangladesh Government	192,000 tons	(July, 1980 - June, 1991)
Total	619,500 tons	

Foreign aid accounted for some 69% of the Programme's achievement and aid from abroad, other than Japan, has the following characteristics.

- 1) The project contents were diverse as some projects not only involved the construction of new storages but also the rehabilitation of existing storages, improvement of ancillary facilities and the provision of equipment.
- 2) The subject of the aid was overwhelmingly LSDs except EC aid for five storages at the Boyra CSD. Consequently, the project areas were scattered throughout the country.
- 3) All the projects were forced to upwardly adjust the project budget due to under-estimation in the initial budget. The adjustment ratios were 33.6% for the IDA, 55.8% for the ADB, 5.9% for the EC, 90.8% for the Netherlands and 2.1% for Canada.

4) The ratio of foreign aid in an individual project varied from 68% for the IDA, 77.6% for the ADB, 96% for the EC and 98.4% for the Netherlands to 91.9% for Canada.

5) The storages constructed were either 1,000 ton class Dhaka types (EC project) or 500 ton class Dhaka types (for other projects).

The actual implementation process of a foodgrain storage construction project involving foreign aid, other than Japan, had the following characteristics.

1) **Consultants:** Bangladesh consultants were employed in accordance with their fields of speciality (such as the preparation of tender documents and tender evaluation, etc.) in all the projects except the Canadian project where Canadian consultants were appointed.

2) **Design and Specifications:** The design standards and specifications adopted by the Public Works Department (PWD) were used by all the projects except the CIDA project where parts of the specifications were altered (particularly, the exterior walls are finished with exposed bricks).

3) **Contractors:** Bangladesh builders were appointed in all the projects for different parts of the construction work and different sites.

4) **Contracting Method:** The above contractors in all the projects were appointed by tender. The turn-key system was not used.

5) **Equipment and Materials Procurement:** Excepting the IDA project, equipment and materials were domestically procured via multiple contractors to cover different types of equipment and materials and different project sites through tender.

6) **Construction Period:** The construction period varied. In most projects, completion was delayed and the initial plan contents were revised, including an increased construction cost.

7) **Construction Cost:** The PWD estimation formed the basis of cost calculation. The original cost was upwardly revised in all the projects.

Since 1985, the emphasis of the aid provided by the IDA, ADB, EC, Netherlands and Canada has changed from the construction of new foodgrain storage (mainly LSDs) to the rehabilitation of existing storages. The Government of Bangladesh is in the process of reviewing all existing storages (total nominal storage capacity of 1.87 million tons) and plans to complete the rehabilitation master plan with a target completion year of 2000 by August this year (1991). The Government of Bangladesh intends to request the above organizations and countries to conduct the rehabilitation work, including rebuilding work, envisaged in the new master plan.

(3) Design Standards and Specifications Adopted by PWD

The design standards and specifications adopted by the PWD for the Dhaka type storage are used not only by the Government of Bangladesh but also by foreign organizations and countries in the building of a standard foodgrain storage in Bangladesh.

While there are two Dhaka types of storage (500 ton class and 1,000 ton class), the specifications for the 1,000 ton class Dhaka type foodgrain storage are described below in view of the use of this type under the present Project.

1) Dimensions

Plan	100 feet x 80 feet (approx. 743.2m ²)
Height :	
(Ground to Floor Top)	3 feet (approx. 0.914m)
(Floor Top to Roof Slab Bottom)	19 feet (approx. 5.791m)
(Ground to Roof Slab Top)	22 feet 4 - 1/2 in. (approx. 6.818m)

2) Structure

Foundation	:	Reinforced concrete independent footing at the bottom of columns Reinforced concrete foundation beam Brick independent-stepped wall footing
Columns, Beams	:	Reinforced concrete
Roof Slab	:	Reinforced concrete
Floor Slab	:	Slab-on-earth
Walls	:	Bricks

3) Finish

Roof	:	Lime terracing (3 - 7" thick)
Exterior Walls	:	Water soluble paint on mortar
Interior Walls	:	Water soluble paint on mortar
Floor	:	Trowelled concrete finish with joints
Ceiling	:	Water soluble paint on mortar

4) Storage Performance Control

Damp-proofing	:	Polythylene sheet under floor slab
Ventilation	:	Windows
Airtightness	:	No specific arrangements for airtight windows
Wooden Dunnage	:	Provided

5) Structural Calculation Conditions

Concrete Compressive Strength	$f_c=2,000 \text{ psi (140kg/cm}^2\text{)}$
Reinforced Concrete Tensile Strength	$f_s=18,000 \text{ psi (1,265kg/cm}^2\text{)}$
Bearing Capacity of Soil	1,600 lbs/sft (8.2 tons/m ²)

The government budget in Bangladesh for the construction of foodgrain storages is based on the estimation method used by the PWD and, therefore, estimates with a certain degree of uniformity are prepared at the planing stage. As the separate order placement system is employed for the selection of contractors and others at the project implementation stage and also as the PWD quoted prices are generally lower than the ongoing market prices, successful tender prices after several tenders are usually higher than the planned prices. The separate order placement system makes it difficult to strictly observe the construction schedule as contractors and material suppliers, etc. are only decided in accordance with the progress of the work.

