

CHAPTER IV: THE PROJECT

The proposed construction sites and proposed number of storages for construction in the basic design are shown below (storing capacity per storage: 1,000 tons):

Mymensingh CSD (Dacca)	4 storages (4,000 tons)
Tejgaon CSD (Dacca)	6 storages (6,000 tons)
Boyra CSD (Khulna)	10 storages (10,000 tons)
Santahar CSD (Bogra)	6 storages (6,000 tons)
Halishahar CSD (Chittagong)	4 storages (4,000 tons)
Muladuli CSD (Pabna)	5 storages (5,000 tons)
Total	35 storages (35,000 tons)

1. Basic Policy of Design

- 1) The storage layout should be planned allowing collective construction in each site as much as possible, utilizing vacant land free of obstacles.
- 2) The storage should be designed in conformity with the Dacca type (designed by PWD).
- 2) The storing performance specification should be in conformity with those of storages constructed under the Japanese aid in the past.
- 4) Sufficient consideration should be given to the structure and construction method to reduce the construction cost.

2. Site Layout Plan

2-1. Present Conditions of Requested Project Sites

(1) Mymensingh CSD (Refer to Appendix III-1)

Land has been secured enough for five storages. Among them, in the lands for three storages there is no obstacles except brick kept in the open air. For the land for remaining two storages, the land adjacent to the Mymensingh CSD has to be partly used. While there is no problem in acquiring this piece of land since it is owned by the Ministry of Food, the temporary huts (made of bamboo) of the CSD employees have to be removed.

(2) Tejgaon CSD (Refer to Appendix III-2)

There is no land for construction of a new storage left in the premises of the Tejgaon CSD. The existing old TWIN-NISSEN storages of structural steel frame covered with corrugated steel sheet in the Tejgaon CSD is becoming quite old and decrepit now. To secure enough land for construction of storages, some of these TWIN-NISSEN type storages have to be demolished. Demolition of eight TWIN-NISSEN type storage (total capacity of 6,000 tons) will provide the land necessary to construct the proposed 6 new storages (capacity of 6,000 tons).

(3) Boyra CSD (Refer to Appendix III-3)

There is a vacant lowland in the southwestern part of the premises of this CSD, but this area cannot be used as the site for storage construction as the CSD has a plan to use it for other purpose. Majority of the existing storages in this CSD are of TWIN-NISSEN type storage and some of them have to be demolished for construction of new storages. In the second phase of storage construction under the Japanese aid, eleven of these old TWIN-NISSEN type storages were demolished and thirteen new storages were constructed in the land after demolition. To construct ten proposed storages (capacity of 10,000 tons), twelve of these TWIN-NISSEN type storages (total capacity of 9,000 tons) have to be demolished.

(4) Santahar CSD (Refer to Appendix III-4)

In the next lands to the storages constructed in the second and third phases of construction under the Japanese aid, there is land enough for four storages. However, the land is about 1 m lower than the designed ground level and accordingly earth filling is necessary. In addition, there is a land in the size of three storage construction in the northwestern corner of the CSD premises, but in order to use it for storage construction, the existing railway tracks which are not being used at present, must be removed. If three storages are to be built in this land, a part of one storage among the three is overlapped with the tank, and the ground for the part must be filled with earth. When however, the total number of storages to be newly constructed in the Santahar CSD is six, there is no need of such earth filling in the ground.

(5) Halishahar CSD (Refer to Appendix III-5)

A vacant land for four storages has already been arranged, and there is no problem in constructing the storages other than the necessity of removing an electric pole.

(6) Muladuli CSD (Refer to Appendix III-6)

A land adjacent to the original CSD premises has already been purchased, and belongs to the CSD and most of the land is kept vacant. Therefore, there is no problem in securing a space for construction of eight storages, but a part of the land, which is lower than the designed ground level, requires earth filling.

There is no other obstacle in the land which is kept optimum condition for storage construction.

2-2 Site Layout Plan

It was necessary to select the land for construction on the first condition of no obstacles. However, since availability of such land completely free from obstacles is limited to meet the proposed number of storages, in some land storages have to be built after demolishing existing storages, filling earth, or removal of temporary huts in the premises. The following outlines the storage layout plan on each CSD.

(1) Mymensingh CSD (Refer to Appendix III-1)

While the proposed number of storages to be constructed is four, the land for constructing five storages can be secured in this CSD. Since the land for three storages has no problem as mentioned in VI, 2-1, it can be recognized to construct them in this area. For the remaining one storage, the land after demolishing the existing temporary houses for workers will be utilized. The four storages in the plan face the inside road of the premises, providing convenience in receipts and issues of foodgrains. Furthermore, for the two storages that will be constructed in parallel with the existing storages, both facilities of railway tracks and road are available, if the existing railway track is extended.

(2) Tejgaon CSD (Refer to Appendix III-2)

To construct all six storages facing the railway tracks is more advantageous at this CSD in high utilizing ratio. Therefore, if they are replaced with new storages of higher storing performance, the substantial storage capacity will greatly be increased. In this layout, the storages at the opposite side of the railway face a road which will provide chances of more effective use of storages. Since the road must be at least 9 m wide to allow two-way traffic of trucks, the storages have to be constructed in parallel with the railway and road, and because of this the existing storages must be demolished and the storages must be designed in two types; gable-side entry type and ridge-side entry type.

(3) Boyra CSD (Refer to Appendix III-3)

It is considered that, the same as in the Tejgaon CSD, the existing TWIN-NISSEN type storages have to be demolished and that the most effective position of new storages will be along the railway. Also it is considered that the new storages should be placed in a row with the storages that were constructed under the aid of the Government of Japan to minimize the loss on the land and for beauty of the view.

(4) Santahar CSD

The four storages out of the proposed six ones will be constructed in parallel with the storages constructed under the aid of the Government of Japan. As mentioned in VI, 2-1, it is necessary to fill the land and to construct the access road to the storages. The remaining two storages, which can be constructed in the north-west corner of the CSD premises, needs to remove the railway tracks and to construct the access road.

(5) Halishahar CSD (Refer to Appendix III-5)

The proposed five storages will be constructed at the vacant land which have been secured. Since these land face the CSD inside road, the new storages can be operated efficiently.

(6) Muladuli CSD (Refer to Appendix III-6)

The land for the proposed five storages have been secured. Since there is an access road, though not paved yet, to the inside of the CSD from the external road, effective layout of new storages is along the access road and starting from the external road side. The access road has to be paved at the expenses of the Government of Bangladesh.

3. Design of Foodgrain Storage

The Government of Bangladesh has a policy to standardize the design of storages and at present, the Dacca type storages of 500 tons and 1,000 tons designed by PWD are adopted as the standards. However, standardization is on unification of the dimensions only yet and structural standards have not been fully established. All storages to be built in this project must be designed along the policy of standardization.

3-1. Design Conditions

(1) General plan

The plan of 30 m x 24 m (100 ft x 80 ft) is adopted to conform with the standard Dacca type storage (for 1,000 tons) and the storages that were constructed under the aid by the Government of Japan. However, there are some differences, as explained in the following, on the structural details. In the standard Dacca type storages and storages constructed under the aid by the Government of Japan, the internal post are laid in one row for the purpose of effective use of the space. In this plan, consideration is given to economical span of the posts and the internal posts are placed in two rows at positions where two rows would not inconvenience the operation at all. Also, two types having different entry directions are adopted to match the entry/exit direction with the construction site shapes (refer to Appendix III-7, Type A and Appendix III-8, Type B).

Here, while the dimensions, structure and specifications are the same, the entry/exit is placed in the gable side and ridge side.

The height is in conformity with the Dacca type storage, that is, the height from the ground to the floor top is 3 ft (about 0.9 m) and the distance from the floor top to the roof slab bottom is 19 ft (about 5.79/m). The review of utilizing condition of the storages constructed under the aid by the Government of Japan (Refer to II, 3-3) indicates that sacked foodgrain is normally

piled up to 3.5 m. Therefore, even if the ceiling is lowered, a space of 1.4 to 1.8 m is obtainable from the bottom beams, and there should be no problem in using the storages.

(2) Structural design

The body will be structured with foundation, posts, beams and floor slab of reinforced concrete. Continuous footing will be applied to the foundation under the outer wall and the foundation of the internal posts will be independent. In the past, the vertical load was supported by posts only, but in this design, the load is supported by the columns and brick walls. On the load conditions, for the horizontal load, estimation of seismic force is reduced to half of the past one and set to $K=0.05$. 66 m/sec of the wind load is kept as it was. By reducing the resistance to seismic force, reducing the storage height, the load will be saved against the foundation, resulting in a smaller foundation. Also, by adopting economical post span, the sections of each members (large and small beams) can be made smaller, and the load will be dispersed and imposed to the foundation, helping to make the foundation smaller, ultimately enabling to reduce the construction cost.

(3) Design on ancillary facility and storing performance

The foodgrain storages constructed under the aid by the Government of Japan are highly evaluated of their ancillary facility and storing performance, especially on the air-tight, by all related parties of the Government of Bangladesh. They made a special request for maintaining the storing performance as it is in the storages constructed under the Japanese aid in the storages to be newly constructed in this project. The specifications are as follows;

- 1) To maintain the air-tight, the grade of windows and doors and the finishing of walls follow those of the storages constructed under the Japanese aid.

- 2) For the ceiling height as mentioned in the above Item (1), 6.62 m of storages constructed under the Japanese aid was changed to 5.79/m following the specification of the Dacca Type Storages.
- 3) The insulation material used in the storages constructed under the Japanese aid is not adopted for reasons as follows;

The heat insulation of the ceiling can be rather given by increasing the lime terracing wider than those of storages constructed under the Japanese aid. It has been approved that the influence of temperature inside the new storages are almost the same as the one of the storages where the heat insulation material was used.

In the dry season, natural ventilation by keeping the windows and doors open will be effective in maintaining the inside temperature at a low level. Based on the air-conditioning load estimation the maximum temperature inside the storage will not rise in the season, since the atmospheric temperature is lower and the insolation is less than the maximum in the dry season, the maximum temperature inside the storage will not rise by keeping the windows and doors closed by about 6°C. The maximum temperature rises with insulation materials applied to the ceiling inside the storage are about 2°C and 5°C in the dry and rainy seasons, respectively, higher than the outside.

3-2 Foodgrain Storages Design

In this survey, designs are prepared in three types of storage, and these three types are outlined in the following.

(1) 1,000-ton Dacca type storages

This is the design adopted in this project (refer to Appendix III-7 and III-8 for details design adopted in this project). In the initial plan, the height up to the beam bottom from the floor top was 16 feet (about 4.88 m), but in the final plan adopted upon discussion with the PWD officers, the standard

height is specified to 19 feet (about 5.791 m) between the floor top and bottom of the roof slab.

(2) 1,000-ton storage with folded steel sheet roof

The plan is the same as the aforementioned initial plan (1) but some changes made in the structure are that some of the posts and beams are steel-framed and the roof is covered with corrugated steel sheets. The wall is to be bricks, the same as the initial plan (1). In this design, the construction cost will be comparatively lower but the storing performance will not be too good.

(3) 500-ton Dacca type storage

The structure and specifications are the same as those in the initial plan (1) with the plan being cut into half. This type has the advantage of easy placement matching to the site shape since it is small in the plan. When compared with the initial plan (1), the construction cost will be higher than the proportion.

Upon consultation with the Government of Bangladesh, after partial revision, the initial design (1) is adopted in this project (for details of the adopted design, refer to Appendix III-7 and III-8).

Also, in the final design, two types of plan are prepared in consideration of the utilizing method of these storages; gable-side entry (Type A) and ridge-side entry (Type B) (refer to Appendix III-7 and III-8).

Thus, some revisions have been made on the aforementioned initial plan (1) in the basic design in this project, and the comparison between these design contents and those on the Dacca type storages that are the standard types in the Government of Bangladesh and the storages constructed under the aid by the Government of Japan is shown on a page after the next page.

The following points must be noted when comparing these three types of the design:

- (a) In the final design in this report, the height from the floor top to the bottom of the roof slab is set to 19 feet (about 5.791 m) conforming to the Dacca type storage.
- (b) In the structure of this design, independent and continuous footings are concurrently adopted.
- (c) The seismic force used for criteria for the structure analysis in this design was reduced to half of the previous force (from 0.1 to 0.05).
- (d) According to the test results, the bearing capacity of subsoil used for the criteria for the structure analysis in this design is kept the same as previous, or 6 tons/m².

Comparison of Foodgrain Storage Designs

Contents	Standard Design by PHD	Design Constructed under the Japanese Grant	Proposed Design in the Project
1) Dimension	a) Floor area	100 ft x 80 ft (= 733.2m ²) (See Fig. II-4)	30.15m x 24.15m = 728 m ² (See Appendix II-7)
	b) Height: Floor to roof slab bottom GL to roof slab top	3 ft (= 0.914 m) 19 ft (= 5.789 m) 22 ft = 4 1/2" (= 6.818 m)	GL + 0.9 m 6,620 m 7,620 m
2) Structure	a) Foundation	Reinforced concrete independent footing Reinforced concrete foundation beam Brick independent stepped wall footing	Reinforced concrete continuous footing under wall Reinforced concrete independent footing under interior posts
	b) Post and beam		Reinforced concrete
3) Finish	c) Roof slab		- do -
	d) Floor slab		Reinforced concrete on ground
4) Quality	e) Wall		Brick
	a) Roof	Lime terracing (3" to 7" thick)	Lime terracing
5) Criteria for structural analysis	b) Exterior wall	Mortar, distemper plastering	Mortar, vinyl paint
	c) Interior wall	- do -	- do -
6) Control	d) Floor	Trowelled concrete finish with expansion joint	
	e) Ceiling	Mortar, distemper plastering	Styrofoam, vinyl
7) Quality	a) Damp proof	Polyethylene paper	Polyethylene film
	b) Ventilation		Window
8) Quality	c) Air tight	Not considered in window or door	Aluminium sash Installed
	d) Timber dunnage		Window sash
9) Quality	e) Insect prevention		Screen door
	f) Roof heat insulation		Styrofoam
10) Quality	a) Compression strength of concrete	$f_c = 2,000$ psi at 28 days (= 140 kg/cm ²)	$f_c = 180$ kg/cm ² at 28 days
	b) Tensile strength of mild steel bar	$f_s = 18,000$ psi (= 1,265 kg/cm ²)	MS $f_s = 1,265$ kg/cm ² SD $f_s = 2,000$ kg/cm ²
11) Quality	c) Bearing capacity of soil	1,680 lbs/sft (= 8.2 t/m ²)	6 tons/m ²
	d) Lateral seismic coefficient		K = 0.10
12) Quality	e) Wind velocity		66 m/sec K = 0.05
	Remarks: Soil bearing test was conducted by Royra CSD 6.4 tons/m ² Soilteck Co., Bangladesh, and the Santahor CSD 6.1 tons/m ² results of which were; Halistakar CSD 6.5 tons/m ²		

4. Project Implementation Plan

4-1 Consultant and Construction Contractor

This project is prepared on conditions that a consultant and construction contractor to implement this project are of the Japanese nationality. It is preferable that the consultant have thorough understanding on the aid system of the Japanese government as well as having enough experience in the same or similar projects. The essential condition for selecting the construction contractor is the experience in construction works in overseas and the most appropriate method is to select a construction contractor through a tender out of several firms having extensive experience and good results in overseas. The implementation plan in this project is based on the turn-key type contracting in which one contractor engages in the whole work from start to completion. Subcontractors, if they are to be used, may be either Japanese or Bangladesh firms.

4-2 Procurement of Construction Materials, Equipment and Labor

Principally, as much Bangladesh materials and equipment as possible will be used, but some of them may be imported if they are needed or are advantageous in the function or cost.

(1) Bangladesh materials and equipment

Materials such as cement, reinforcing bars, bricks, sand, gravel, glass sheets and lumber are produced and can be procured in Bangladesh. There are cement producing mills in Sylhet and Chittagong and the annual production amounts to about 320,000 tons (in one year of 1978/79). The production, however, is not enough to manage the domestic demand which is rapidly increasing in recent years and the supply situation is unsteady. Some amount of imported cement is in the market but direct import is the most safest plan for this project. The situation on other materials in Bangladesh is as follows:

Reinforcing bars : While there are mills in Chittagong and Dacca, the annual production is only 62,000 tons (in a year of 1978/79) and the types are limited. Also, the quality, especially the strength, is uncertain and import is recommended to make sure of using stabilized quality bars.

Timber : While Chittagong teak, Tal Suck, Sil Koral and Chamkli are available, they are not suitable as dunnage (sleeper) since they cannot be manufactured easily.

Glass sheets : Transparent glass sheets are available but the quality is not stabilized. No large size sheets are available.

Paint : Water-soluble types such as distemper or emulsion paint, are available, but water-proof paints must be imported.

Aggregate : Sand and gravel are collected in the Sylhet and Domar regions, but grain sizes of natural gravel are not uniform and are not too easy to obtain, and the cost is high. Since the gravels are collected in the dry season and transported on barges through rivers in the rainy season, depending on the timing, sometimes they are very difficult to obtain. Accordingly, use of crushed gravels of granite or limestones or brick chips out of overburnt bricks coming out of brick production process must be considered as the concrete aggregate.

Bricks : Since bricks are typical construction materials and there are many mills in Bangladesh, bricks are easily available. However, since brick production concentrates in the dry season, care must be paid to the order timing when a large quantity is needed. There are two types of bricks; machine-made and hand-made.

(2) Imported materials and equipment
As described in the preceding (1), while cement and reinforcing bars are produced in Bangladesh, import is more advantageous from the viewpoints of quality, available quantity and price. Other materials that must be imported are as follows:

Special window and door : Entrance/exit doors of large dimensions and sashes that require air-tight cannot be manufactured in Bangladesh, and these must be imported.

Water-proof paints : Water-soluble paints of emulsion type are available in Bangladesh, but water-proof paints must be imported.

Dunnage : It is preferable to use as much domestic wood as possible, but if good quality goods for manufacturing is not available, imported wood must be used.

(3) Labour

Since there is no work type requiring special skill in constructing storages, implementation of this construction is possible with skill available in Bangladesh, and the plan for this project is made on the premise of employing Bangladesh labour. Shortage of labour forces resulting from active migration of skilled labourers into overseas areas like the Middle East, as the reflection of the national policy, is occurring these days, but the influence of it to this project will not be seen.

4-3 Project Schedule

FIG. IV-1 shows the implementation schedule of this project. The construction period is scheduled for 15 months, but this is based on starting at an as early date of the dry season as possible for use of the season, and in this meaning, starting at some time in October - November is preferable. Since the earthworks at the beginning and finishing works at the end of construction are greatly influenced by the weather, the key point is to start the construction in a dry season and complete the construction in the next dry season.

5. Scope of Project and Items to Be Done by the Government of Bangladesh

5-1 Scope of Project

The range of the construction project in the Mymensingh CSD, Tejgaon CSD, Boyra CSD, Santahar CSD and Haliashahar CSD and Muladuli CSD outlined in this basic design is as shown below:

- (a) Development of land for foodgrain storage construction (including demolition of existing facilities and removal of obstacles)
- (b) Construction of foodgrain storages (including electrification within storage)
- (c) Construction of ancillary facilities to storages, such as drainage
- (d) Installation of power supply facilities to storages
- (e) Construction of access roads (and railway track if necessary) to storages
- (f) Construction of necessary CSD facilities such as drainage ditches and boundary walls, if necessary.

Table IV-1 shows all these items for each work content by CSD.

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

The items to be done by the Government of Bangladesh during implementation of this project, as discussed with the Government of Bangladesh, are as shown below:

- (a) To prepare necessary documents, maps, drawings and other informations when necessary.
- (b) To secure a lot of land necessary for the construction of facilities and to clear, fill and level the site as needed before the commencement of construction.
- (c) To extend utility services such as electric power, water, and other incidental facilities to the site before the commencement of construction in the sites.
- (d) To provide exterior construction work such as back filling of soil, access road, drainage ditch and trench etc. during the construction and before the completion of construction.
- (e) To ensure prompt unloading and customs clearance in Bangladesh of imported materials and equipment for the construction and also to facilitate the internal transportation for them.
- (f) To exempt Japanese nationals concerned from customs duties, internal taxes and other fiscal levies which may be imposed in Bangladesh on the occasion of the supply of materials and services for construction.
- (g) To provide and accord necessary permissions, license and other authorization required for carrying out the project.
- (h) To co-ordinate with the officials and organizations concerned.
- (i) To maintain and use properly and effectively the facilities constructed under the grant.

"Minutes of Discussion" on the above items has been exchanged between the Government of Bangladesh and the survey team (Refer to Appendix II).

5-3 Object Items of Aid by Japanese Government

Out of the items listed in IV, 5-1, (b) and (c) are set as the objects of the aid by the Japanese government. In other words, construction of the storages and drainage proposed in IV, 3 are to be implemented based on the CSD layout plan proposed in IV, 2. The contents of project under the Japanese aid for these construction works are as follows:

(1) Construction project

- 1) Procurement of materials and equipment necessary for the construction
- 2) Procurement of labour necessary for the construction
- 3) Operation and management of the construction
- 4) Transportation of imported construction materials and equipment up to the port of disembarkation in Bangladesh

(2) Consultation services

- 1) Preparation of detailed design drawings and specifications
- 2) Preparation of tender documents and assistance in floating tender
- 3) Supervision of storage construction
- 4) Assistance in adjustment in differences among related organizations and other plans
- 5) Inspection of procured materials and equipment

Supervision of construction shall be conducted by a consultant and the consultation services offered by the Japanese side is to help the Bangladesh government for efficient implementation of the project.

6. Rough Estimate of Project Cost

6-1 Rough Cost Estimate of Items to Be Done by the Government of Bangladesh

Among the items to be done by the Government of Bangladesh, the followings fall in the category of construction works:

- (1) Securing and development of land for the construction (Item (a) of IV, 5-1, and Item (b) of IV, 5-2)
- (2) Installation of facilities for electricity, water and other necessary utilities (Item (d) of IV, 5-1 and Item (c) of IV, 5-2)
- (3) Necessary external construction works (Items (e) and (f) of IV, 5-1 and Item (d) of IV, 5-2)
- (4) Customs duties, internal taxes, other fiscal levies and inland transportation of imported materials and equipment (Item (e) and (f) of IV, 5-2)

Refer to Items (a), (d), (e) and (f) of Table IV-1 for information on the contents of works to be done by the Government of Bangladesh in each CSD. The rough cost estimate of works to be done by the Government of Bangladesh is shown in the next page.

Cost Estimate of Works to be Done by the Government of Bangladesh

(Unit: Thousand Yen)

CSD	Nos. of Storages to be Constructed	Duties & Tax, etc.	Transportation of Imported Material	Land preparation, Access road, Depot, Facility, etc.	Total
Mymensingh CSD	4	50,000	5,200	500	55,700
Tejgaon CSD	6	75,000	7,800	-	87,000
Boyra CSD	10	125,000	5,000	-	130,000
Santahar CSD	6	75,000	7,800	4,200	87,000
Halishahar CSD	4	50,000	2,000	-	52,000
Muladuli CSD	5	62,500	6,500	1,000	69,000

- Note: 1) The above costs indicate the direct construction costs.
- 2) The cost of demolishing existing storages in offset by the income acquired in selling demolished materials.
- 3) The costs of electric line installation and electric pole removing can be neglected.
- 4) The transportation cost is estimated as truck transport from Khulina Port to Santahar CSD, Muladuli CSD and Boyra CSD, and from Chittagong Port to Tejgaon CSD, Mymensingh CSD, Halishahar CSD.

6-2 Rough Cost Estimate of Construction under Aid
by the Government of Japan

The rough cost estimate and premized of the calculation of
construction works under the aid by the Government of Japan, specified
in "IV, 5-3", are as shown below:

(1) Rough cost estimate of storage construction

1) Building construction	¥2,020,000,000
a. Mymensingh CSD	4 storages
b. Tejgaon CSD	6 storages
c. Boyra CSD	10 storages
d. Santahar CSD	6 storages
e. Halishahar CSD	4 storages
f. Muladuli CSD	5 storages
2) Detailed design and supervision of construction	¥120,000,000
3) Contingency	¥28,700,000
Total	¥2,168,700,000

(2) Premises for construction cost calculation

- 1) The consultant and contractor shall be of Japanese nationality.
- 2) Construction materials and equipment that are not available locally and materials on which import is more advantageous shall be imported.
- 3) The labor shall be locally acquired.
- 4) All the construction sites shall be in the state ready for construction.
- 5) The project shall be processed as shown in FIG. IV-1.

(3) Comparison of construction cost with previous storages
constructed under the aid by the Government of Japan

Comparison between the details of average construction cost per
1,000-ton storage of this basic design and that of the storage

constructed under the aid from the Government of Japan is shown in the following table.

Comparative Construction Cost Estimate of 1000-ton Storage
(Unit: Thousand Yen)

Items	Design Constructed under the Japanese Aid	Proposed Design	Reasons
Earth Work	4,517,650	3,815,250	Decrease of excavated material owing to the reduction of foundation
Form Work	9,371,280	8,325,600	Decrease of forms owing to the reduction of skelton
Reinforced Concrete Work	20,316,000	14,582,710	Decrease of concrete owing to the reduction of skelton and ceiling height
Brick Work	3,357,300	2,944,500	Decrease of the wall area owing to the reduction of the ceiling height
Plastering	1,629,326	1,716,600	Increase of the finish area owing to the alteration of the ceiling finish area
Metal Door, Window and Joiner's Work	6,631,800	5,693,400	Decrease of the cost owing to the design alteration of this work
Painting	2,098,440	1,994,400	Decrease of the painting area owing to the reduction of the wall area
Miscellaneous Work	4,305,000	1,920,600	Decrease of the cost owing to the omission of ceiling insulation material
Total	52,226,796	40,993,140	

Note: The above comparative costs indicate the construction costs.

6-3 Rough Estimate of Project Cost

Cost of items to be done by the Government of Bangladesh and cost of object items of the aid by the Government of Japan are shown in the following:

Project Cost

(Unit: Thousand Yen)

CSD/LSD	Project Cost on Items to be done by Gov. of Bangladesh (A)	Project Cost on Object Items of Japanese Aid (B)	Total (A) + (B)
MYMENSINGH CSD	55,700	230,800	286,500
TEJGAON CSD	87,000	345,600	432,600
BOYRA CSD	130,000	576,000	706,000
SANTAHAR CSD	87,000	349,300	436,300
HALISHAHAR CSD	52,000	230,400	282,400
MULADULI CSD	69,000	287,900	356,900
Total	480,700	2,020,000	2,500,700
Contingencies	-	28,700	28,700
Detail Design Tender document & supervision of construction		120,000	120,000
Grand Total	480,700	2,168,700	2,649,400

Note) All costs in the above table are construction costs.

7. Maintenance and Management Plan

7-1 Present Conditions of Maintenance and Management

The Ministry of Food makes a budget for maintenance and management of existing foodgrain storages every year, but the storages are not always maintained and managed sufficiently. The following shows the budgets and actual expenses of food storage maintenance and management.

Fiscal Year	Budget		Actual Expenses	
	'000 TK	(¥ '000)	'000 TK	(¥ '000)
1975 - 76	3,000	(36,000)	3,025	(36,300)
1976 - 77	5,000	(60,000)	4,070	(48,840)
1977 - 78	6,000	(72,000)	6,254.5	(75,054)
1978 - 79	5,000	(60,000)	2,684.7	(32,216)
1979 - 80	7,500	(90,000)	2,402.8	(28,833)
1980 - 81	7,500	(90,000)	6,299.3	(75,591)
1981 - 82	8,000	(96,000)	7,945.5	(95,346)

7-2 Maintenance and Management Plan Construction Project under Foreign Aid

Table IV-2 shows the foodgrain storage maintenance and management plan (annual) in the construction project under the foreign aid. The only project that has a plan of directly using the aid fund for food storages maintenance and management is the IDA project, and all other projects use the Government of Bangladesh fund. The budgets assigned to the plans of storage maintenance and management in the projects under the foreign aid are shown below:

IDA project	TK 5,000,000	(about ¥60,000,000)
ADB project	TK 1,800,000	(about ¥36,000,000)
EC project	TK 2,000,000	(about ¥32,000,000)
Netherlands project	TK 200,000	(about ¥2,400,000)
CIDA (Canada) project	TK 100,000	(about ¥1,200,000)

7-3 Maintenance and Management Plan and Estimation

Constant care to building conditions is more important than repair given after they are damaged. This is even more important with foodgrain storage as they are apt to be damaged earlier than the other kinds of building because of the nature of handling and storing articles, and maintenance work should be given in a shorter cycle than that of the other kinds of building.

(1) Maintenance and management plan

Painting of external wall	:	Every 5 years
Painting of internal wall and ceiling	:	Every 7 years
Painting of steel fixtures	:	Every 4 years
Repair of uneven floor and others	:	As soon as unevenness is detected
Repair of mortar of internal and external wall	:	As soon as the mortar is peeled off

(2) Estimated maintenance and management expenses (per repair work)

Internal painting (vinyl paint)	:	95,850 TK/storage	(about ¥1,150,000)
External painting (vinyl paint)	:	40,850 TK/storage	(about ¥490,000)
Steel fixture painting (oil paint)	:	12,500 TK/storage	(about ¥150,000)
Floor repairing (reinforced concrete)	:	220 TK/m ²	(about ¥3,960)
Internal and external wall mortar repairing (mortar)	:	58 TK/m ²	(about ¥696)

(3) Operation expenses (per year)

Wages (1 person/storage): TK5,400 x 35 storages
= TK189,000 (about ¥2,268,000)

Electricity (fluorescent lamp, 40W, 4 lamps/storage):

TK250 x 35 storages

= TK8,750 (about ¥105,000)

Fumigating and other expenses:

TK4,160 x 35 storages

= TK145,600 (about ¥1,750,000)

FIG. IV-1 Schedule of Project

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1. Consultant Agreement	▬																						
2. Detailed Design and Tender Documents		▬																					
3. Tendering				▬																			
4. Evaluation of Tender					▬																		
5. Supervision of Construction																							
6. Preparation for Construction						▬																	
7. Construction																							

Exchange of Notes
 Verification by
 Government of Japan

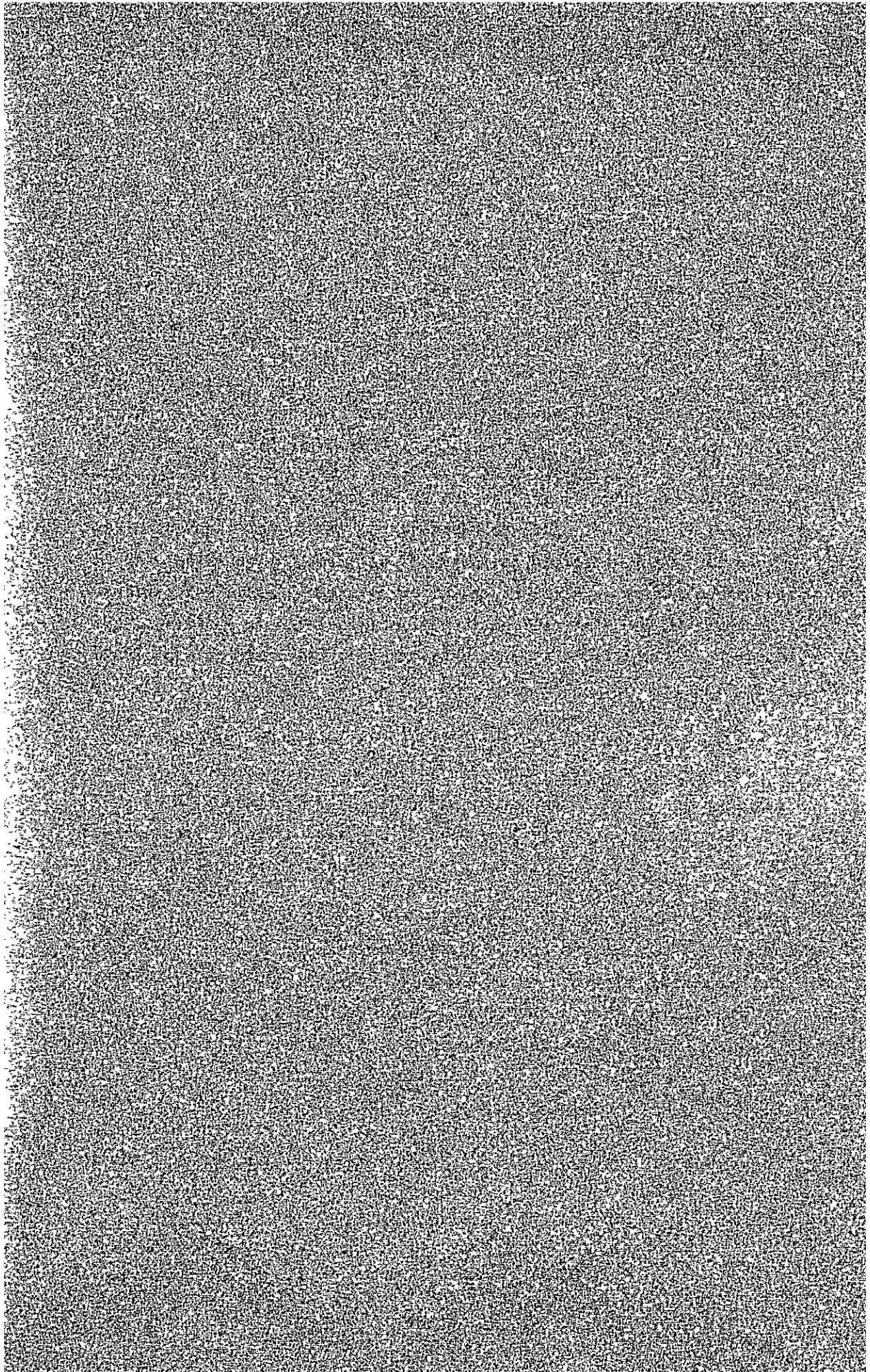
Verification by Government of Japan
 Construction Contract

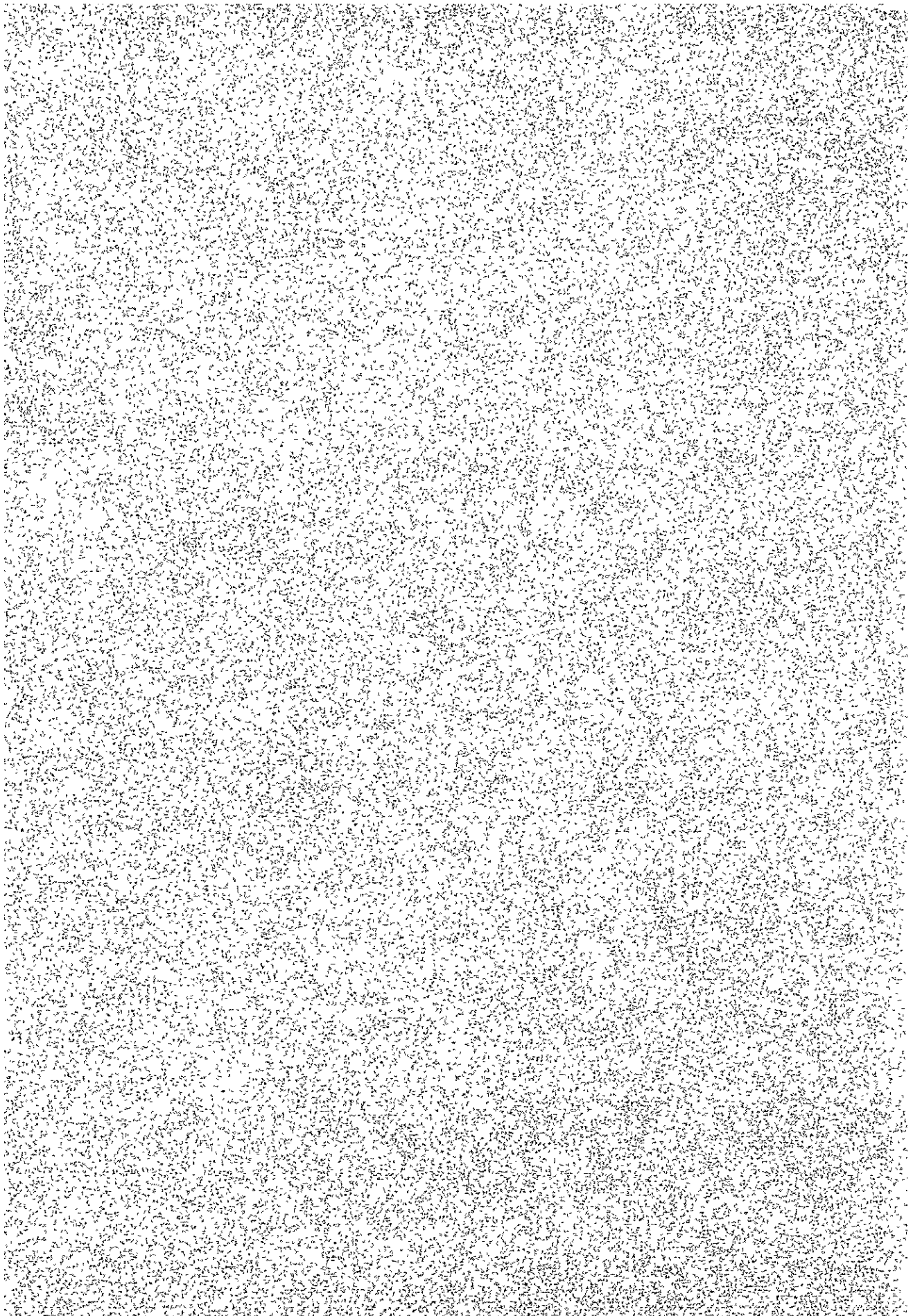
Table IV-1 Items of Construction for the Project

Name of CSD/LSD	(a) Land Preparation	(b) Storage Construction (incl. Electrification)	(c) Drainage and Other Construction	(d) Electric Supply Facility Installation	(e) Access road (if necessary, rail) Construction	(f) Depot Facility Construction
Mymensingh CSD	Evacuation of obstacles	4 storages	Rain water drainage	Electric line installation	Rail (if necessary)	Boundary wall
Tejgaon CSD	Demolition of 8 existing TWIN-NISSEN storages	6 storages	Rain water drainage	Electric line installation	-	-
Boyra CSD	Demolition of 12 existing TWIN-NISSEN storages	10 storages	Rain water drainage	Electric line installation	-	-
Santahar CSD	Land development and evacuation of obstacles	6 storages	Rain water drainage	Electric line installation	Access road	Drainage ditch
Halishahar CSD	Removal of electric line and pole	4 storages	Rain water drainage	Electric line installation	Rail (if necessary)	-
Muladuli CSD	Land development	5 storages	Rain water drainage	Electric line installation	Access road	Boundary wall and drainage ditch

Table IV-2 Annual Operating/Recurring/Maintenance Expenditure (in Lakh Taka)

	IDA Project		ADB Project		EC Project		Netherlands Project		CIDA (Canada) Project	
	Local	F.E.	Local	F.E.	Local	F.E.	Local	F.E.	Local	F.E.
I. Raw material and supply	11.20	—	11.20	—	11.20	—	11.20	—	—	—
a) Locally produced raw material, supplies and spares	11.20	—	11.20	—	11.20	—	11.20	—	—	—
II. Fuel	7.30	—	7.30	—	7.30	—	7.30	—	—	—
a) Local fuel and power	7.30	—	7.30	—	7.30	—	7.30	—	—	—
III. Labour cost	30.00	—	30.00	—	30.00	—	30.00	—	—	—
a) Local technical and administrative staff	30.00	—	30.00	—	30.00	—	30.00	—	—	—
b) Skilled labour	—	—	—	—	0.60	—	0.60	—	—	—
c) Unskilled labour	—	—	—	—	2.40	—	2.40	—	—	—
IV. Other cost	21.50	30.00	51.50	—	22.00	26.75	26.75	2.50	11.00	11.00
a) Maintenance	20.00	30.00	50.00	—	18.00	20.00	20.00	2.00	10.00	10.00
b) Contingencies	1.00	—	1.00	—	3.00	6.75	6.75	0.50	1.00	1.00
c) Taxes	0.50	—	0.50	—	1.00	—	—	—	—	—
	70.00	30.00	100.00	—	35.00	33.83	33.83	3.00	19.00	19.00





CHAPTER V: PROJECT EVALUATION

1. Method of Project Evaluation

In Bangladesh, foodgrain storages are social facilities for fair distribution of food needed for people's life basically. We consider that, when evaluating justification of a construction project of facilities in such nature, quantitative study of benefit obtainable from implementation of the project is not necessary, and in this project, we qualitatively evaluate the project effect and economical justification.

Firstly, we evaluate the effect brought by constructing foodgrain storages in each of the proposed construction sites. The effect of the additional capacity to the required capacity is evaluated by studying the storing capacity of foodgrain storages to be constructed and the effect of CSD function improvement is evaluated by studying the foodgrain distribution and current situation of foodgrain storage use.

Secondly, we evaluate justification of this design by making comparisons in the engineering and economical aspects between the foodgrain storages to be constructed in accordance with the employed design policy and the designs of foodgrain storages constructed under the Japanese aid and the foreign aid in the past.

Thirdly, we economically evaluate justification of the operation, maintenance and management plans of the constructed foodgrain storages. The justification is evaluated by studying whether or not the Government of Bangladesh can manage without much obstacle the techniques and expenditures needed for effective operation, maintenance and management of the constructed foodgrain storages.

The justification of this project is evaluated based on the study results on all these points.

2. Effect of Foodgrain Storage Construction.

According to the additional storage construction programme of the Government of Bangladesh, foodgrain storages in the total capacity of 2,504,000 tons are needed by the end of 1984/85 fiscal year end (end June, 1985) for the forecasted population of 102 million. Against this total capacity, the construction of foodgrain storages in the capacity of 1,858,006 tons by the end of 1982/83 fiscal year (end June, 1983) is being planned. This still leaves a shortage of capacity for 645,030 tons, and foodgrain storages for that much must be constructed in the two years of 1983/84 and 1984/85 (refer to II, 2 and Table II-10).

Breakdown of the required capacity of foodgrain by the districts of the proposed construction sites is given in column (c) of Table V-1. Accordingly, the necessity of adding the foodgrain storage is recognized in all requested construction sites of this project. In this project, while the plan calls for construction of total 35 storages (35,000-ton capacity), since reconstructing of some existing decrepit storages is included, expansion of the capacity is 20,000 tons. In the Tejgaon and Boyra CSDs, the plan is made to demolish total 20 (15,000-ton capacity) existing decrepit storages and to construct total 16 (16,000-ton capacity) storages. Therefore, in these CSDs, the capacity can be increased by 1,000 tons. Actual increase of the capacity is expected to be greater than what these figures express since the storing performance and the functions of issue and receipt of these storages will be improved by the reconstruction.

At the same time, geographical importance of each requested construction site was studied from the distribution aspect of production, consumption and transportation of foodgrains. As the result, the importance was recognized especially in the Mymensingh CSD, Tejgaon CSD and Santahar CSD. On the otherhand, while the importance was recognized in Muladuli CSD, the necessity of immediately constructing foodgrain storages was not recognized (refer to III, 2). Also, the utilizing condition of foodgrain storages was studied from the utilizing frequencies and stock condition and we found that the

storages in the Tejgaon CSD had been used most actively but those in the Muladuli CSD had not been used much (refer to III, 3). Our evaluation result, therefore, is that all requested construction sites with an exception of the Muladuli CSD are important in the distribution aspect with the foodgrain storages being used sufficiently.

Based on the above review results, we judge that this project is contributive to the additional storage construction programme in the effects of storing capacity increase and improvement of foodgrain distribution function. In the Muladuli CSD, however, effect of the construction is recognizable but the construction does not seem to be needed in the earliest time.

3. Justification of the Design

Based on the review of utilizing condition of the existing foodgrain storages on their actual storing volume and control, the size of the Dacca type storage, which is prepared by PWD as the standard type storage of Bangladesh, is determined to be appropriate (refer to II, 2-3). On this determination, the basic design can be made in accordance with the structure method of the Dacca type storage which employs independent footing (refer to IV, 3). On the other hand, since the specifications of the Dacca type storage are not effective enough for storing foodgrain in the performances of airtightness, insulation and ventilation, the storing performance specifications of foodgrain storages constructed under the Japanese aid in past are followed in this design (refer to IV, 3). Following these design principles, and while giving due consideration to using construction materials, techniques, construction methods and labor of Bangladesh, we attempted to reduce the construction cost as much as possible. There is no construction condition that requires extra expenses like piles in the present conditions of the construction sites. Also, since use of tracks is planned for transportation of construction materials, no obstacle in transportation of construction materials, no obstacle in transportation that would create extra expenses is foreseen (refer to IV, 4). As the result, reduction of the construction cost by about 30 % from that of foodgrain storages constructed under the Japanese aid is possible (refer to IV, 6-2).

Thus, the design has been prepared realizing appropriate storing performance accommodating itself to the utilizing condition of foodgrain storages. No technical and economical differences are recognizable between this design and those of foodgrain storages constructed on the Japanese and other foreign aid, and the construction cost is reduced sufficiently. Accordingly, we consider that this design is justifiable enough to be adopted.

4. Justification of Operation, Maintenance and Management Plans

One person per one storage is enough for effective operation of the foodgrain storage. Fumigating and ventilation are necessary for storing foodgrains, but both of these are easy and the current Bangladesh techniques can manage these operations successfully. The expenses needed for these are estimated to be about 4.1 million Yen per year (refer to IV, 7-3) as the total of salaries to the 35 employees, recurring expenses for electricity, material costs for fumigating chemicals, etc. for the planned 35 foodgrain storages, making the expenses per storage (1,000 tons) about 110 thousand Yen a year.

For maintenance and management of the buildings, periodical painting and repair of the concrete and mortar as needed must be given. Works of these types can be easily managed by the Bangladesh techniques with materials available in the country. Since these works are not implemented all at a time, these expenses can be averaged out annually, and the calculation result is about 10.5 million Yen for the 35 storages (refer to IV, 7-3), or about 300 thousand Yen per storage (1,000 tons).

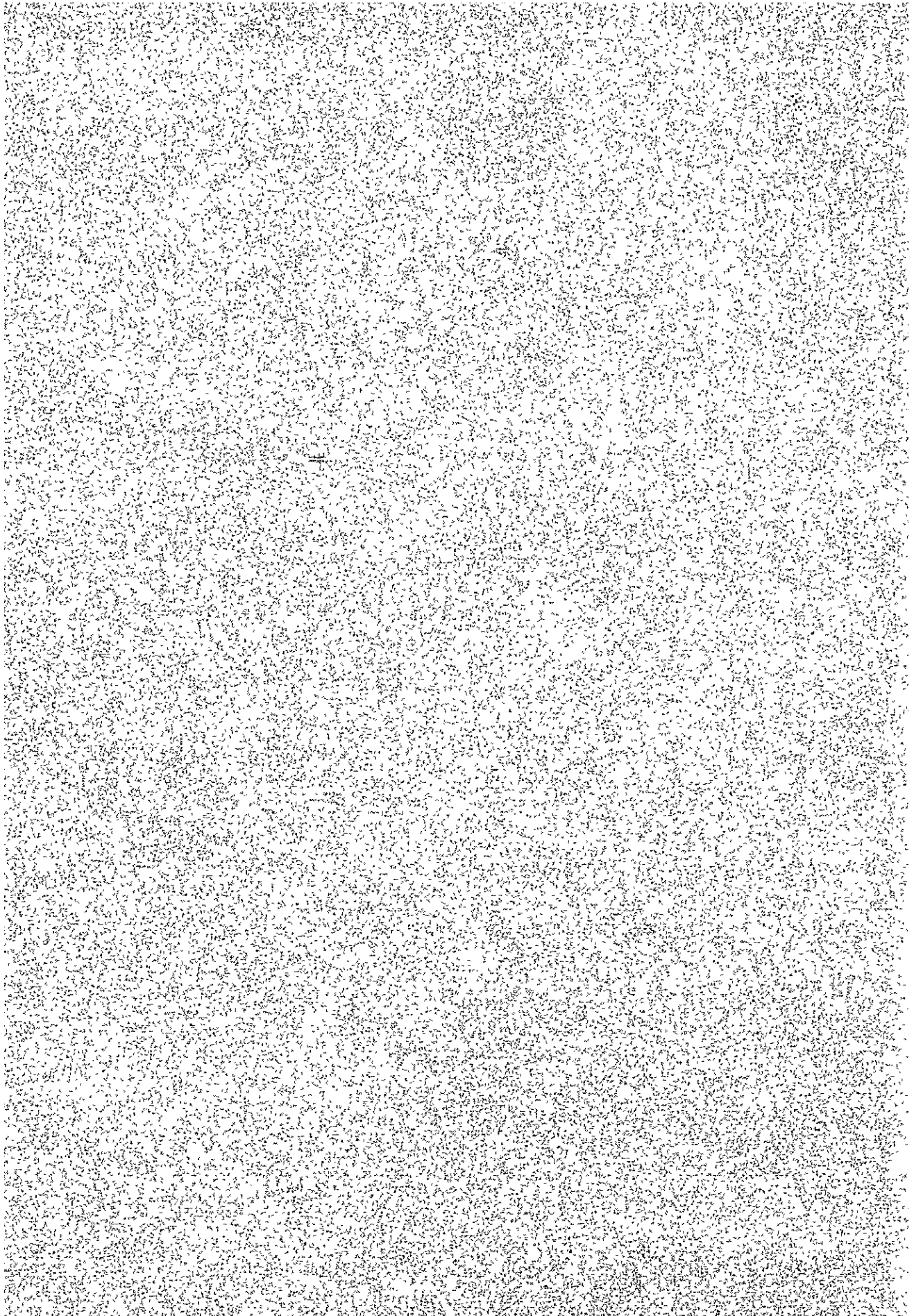
The total of these operation, maintenance and management expenses is about 14.6 million Yen to the 35 foodgrain storages per year as an average, or about 410 thousand Yen per storage (1,000 tons). On foodgrain storage construction plans of other foreign aid, the annual operation, maintenance and management expenses per 1,000-ton capacity are estimated in the range of 650 - 850 thousand Yen, much higher than the operation, maintenance and management expenses of this plan (refer to IV, 7-2). The annual budget of the Government of Bangladesh for maintenance and management of foodgrain storages is about 100 million Yen (refer to IV, 7-1). Since there is no need of implementing the above works to all foodgrain storages at a time recurrently, it can be seen that the Government of Bangladesh can implement the operation, maintenance and management of the foodgrain storages within the budget.

Thus, it can be judged that operation, maintenance and management of the 35 foodgrain storages can be implemented by the Government of Bangladesh with Bangladesh techniques and materials and out of the expenses of the Government, and justification of this plan is well recognized.

Table V-1 Existing Foodgrain Circulation and Storage Construction Programme

CSD (District)	Storage Construction Programme in District by 1984/85			(d) Mode of Transportation to/from CSD	(e) Storage Utilizing Ratio in a Year (1981) (times)
	(a) Surplus (+) & Deficit (-) of Foodgrain (ton)	(b) Total Storage Requirement (ton)	(c) Storage Deficit (ton)		
Mymensingh CSD (Mymensingh)	+ 719,000	220,000	111,270	Road, Rail and River	2.7
Tejgaon CSD (Dacca)	- 787,000	265,000	73,010	Road and Rail	5.2
Boyra CSD (Khulna)	- 142,000	192,000	3,380	Road, Rail and River	(Not surveyed)
Santahar CSD (Boyra)	+ 350,000	146,000	39,210	Road, Rail and River	1.6
Halishahar CSD (Chittagong)	- 173,000	290,000	8,520	Road and Rail	1.6
Muladuli CSD (Pabna)	+ 129,000	88,000	7,160	Road and Rail	1.3





CHAPTER VI: RECOMMENDATION AND CONCLUSION

1. Recommendation

1-1 Recommendation of Priority for Implementation

The expenses for projects shared by the Government of Bangladesh in foodgrain storage construction including this project occupy a very large portion of the expenditures for national development plans. Under such circumstances, it is undesirable to put the economic burden of constructing all numbers of proposed storages at a time. Accordingly, we propose that the construction is implemented in several stages.

On the requested construction sites of this project, an examination point is given to each of the following items. These points are totalled for each construction site and priority for implementing the construction is determined by comparing the totals (refer to Table VI-3).

(1) Effect (benefit of storage construction from distribution viewpoint)

All points are in positive.

(a) Effect to storing capacity increases (refer to Table II-10 and Column-(b) of Table VI-11)

The effect is studied from the necessity degree of storage expansion by the district contained in the additional foodgrain storage programme of the Government of Bangladesh. A mark point of "10" is given to the district where there is a requirement of storage construction at a rate of 50 % or more. A mark point of "5" or "0" is given to the requirement category of 10 - 50 %, or up to 10 %, respectively.

(b) Effect of new construction or reconstruction of storages to improvement of current situation (refer to III, 2, III,3 and Column-(d) of Table VI-1)

The following can be considered as effects to increase of storing capacity:

(i) Reduction of loss on foodgrains in storage by improvement of storing performance

(ii) Improvement of CSD/LSD functions by new layout.

In consideration of these effects, "10" is given to the Tejgaon and Boyra CSDs since the projects in these CSDs are for reconstructing storages from old ones to new ones with better storing performances, greatly contributing to the CSD function improvement as well. "0" is given to the Muladuli CSD since the existing storages are comparatively new and the new storages are to be constructed in a newly acquired site, hardly contributing to improvement of the CSD functions. "5" is given to all other construction sites.

(2) Easiness of works to be conducted by the Government of Bangladesh

The Mark points used in this evaluation are "-10" on items of extreme difficulty, "-5" on items of some difficulty, and "0" on items where difficulty is small.

(c) Easiness of works
(refer to IV, 1-1, IV, 4-2 and Column-(c) of Table VI-2)

Technical difficulty, length of work period and difficulty coming from organizational reasons are reviewed. Since land development is a difficult project in Bangladesh, "-10" is given to the Santahar and Muladuli CSDs. "-5" is given to the Tejgaon and Boyra CSDs since the existing storages can be demolished in a short period of time once the required procedures are completed and the ground conditions of these sites are comparatively favorable. "0" is given to the other two CSDs as no particular difficulty is foreseen there.

(d) Burden of expenses for the works shared

The expenses for the works have been recognized as justifiable through comparison with those in other projects and no difference in the work expenses is recognized among all construction sites. Since trucks are scheduled

as inland transportation means, hardly any difference is recognizable in the advantage coming from location of the construction sites. "0" is given to all requested food-grain storage construction sites.

(e) Easiness of maintaining constructed storages

"0" is given to all requested foodgrain storage construction sites since no difference is recognizable in the advantage among all construction sites.

(3) Burden of expenses on objective works of Japanese aid

(f) In all requested foodgrain storage construction sites, there is no special construction condition (pile driving for example) and all works can be completed with ordinary technical force, materials and labor of Bangladesh (except some materials to be imported). Therefore there is no particular difference on this subject among all construction sites and they are given "0" equally.

Advantage of construction in all these sites can be compared each other by adding these mark points for each construction site. The priority sequence of implementing the construction project in these sites resulting from the review is Mymensingh CSD, Tejgaon CSD, Boyra and Haliashahar CSDs (the same order), Santahar CSD and Muladuli CSD.

1-2 Recommendation on Project Implementation

(1) Setting up of project implementation system

Since the work of project implementation will have various items in the Government of Bangladesh and the project sites are distributed in several places, a responsible personnel in the Ministry of Food for project implementation and a responsible technical staff at each field of the project must be established for a liaison system between the Government and responsible persons in the Government organ and the project sites.

(2) Preparation of construction lands :

This project schedule is prepared based on the premise that the Government of Bangladesh will develop the construction sites to the state of being ready for construction start at the expenses of the Government of Bangladesh before the tender notice to contractors. Based on this schedule, the following works must be completed in advance;

Removal of bricks piled in the land, removal of temporary huts and boundary walls in the Mymensingh CSD,

Demolition of existing storages and removal of demolished materials in the Tejgaon and Boyra CSDs,

Land development and removal of existing railway tracks in the Santahar CSD,

Removal of electric poles in the Haliashahar CSD, and

Land development in the Muladuli CSD.

In the Tejgaon and Boyra CSDs, since the existing storages must be demolished after moving the stocks into the other storages, the schedule of demolishing these storages must be made in consideration of the schedule of stock movement. If the preparatory works in these sites are delayed, the succeeding construction will accordingly also be delayed that much. If this happens, the premises established in the project plan cannot be satisfied and the justifiability of the project implementation will be lessened.

(3) Construction of ancillary facilities in project sites

All necessary facilities in the project sites to be constructed at the expenses of the Government of Bangladesh, as set in the project plan, must be completed according to the schedule matching to the storage construction project schedule and before the project will be completed. The construction works referred to in this paragraph are as follows:

Construction of boundary walls accompanying the expansion of the storage site in the Mymensingh CSD,

Construction of an access road to the storages to be built in the Santahar CSD,

Pavement of the access road, construction of boundary walls and drainage ditch in the Muladuli CSD, and

Electric cables to the storages newly built in all project sites.

If any one of these is missed, the storage cannot work the functions.

(4) Promotion of necessary procedures

All procedures required for implementing all works contained in this project must be completed as quickly as possible. Customs clearance of imported materials and equipments, payment of necessary taxes, duties and fiscal levies for import, transportation from the importing port to the pertinent construction site, all of which are to be implemented at the expenses of the Government of Bangladesh, are especially important for smooth progress of the construction schedule. Necessary procedures for these items must be completed as quickly as possible.

1-3 Recommendation on Maintenance and Management

(1) Preparation of maintenance and management programme

Since the Government of Bangladesh makes a budget for maintenance management of foodgrain storages, a budget will be made for the storages to be built in this project as well. For effective use of the budget, it is recommended that a maintenance and management programme is completed so that these storages are periodically checked and effective repair is given periodically before damages become apparent.

(2) Securing of maintenance and management staff

There will be a really large number of storages as the total of CSDs and LSDs, and personnel exclusively assigned for maintenance and management of these storages are needed. At present, the storages are repaired only when damages become apparent and this seems to cost more, not to mention of the loss of stocks

during the period. Accordingly, the storages must be checked periodically and exclusive personnel must be secured for the purpose.

(3) Securing of repair materials

According to any programme which specifies periodical repair, certain amounts of repair materials must always be kept.

In this basic design, water-proof vinyl paint is used as a finishing material of walls, and the soluble paints or distemper (a kind of plaster) that are commonly used in Bangladesh do not have good enough water resistance property. If these are used in the repair, the storing performance will be lowered.

Waterproof vinyl paints are not easily available in Bangladesh. Therefore, care must be paid to use plastic paints, which are not as good as vinyl paints in the water resistance property but are easily available in Bangladesh, for recoating in good conformity of the specifications.

2. Conclusion

The storing capacity of existing foodgrain storages is not enough in all requested foodgrain storage construction sites for the demand of the 1984/85 fiscal year forecasted by the Government of Bangladesh. Construction of foodgrain storages as planned in this project is found effective in increasing the storing capacity against the required storing capacity. Also, all requested construction sites are important in the foodgrain distribution and all existing foodgrain storages except a few are being used actively. With such situation, it is recognized that foodgrain storage construction would greatly contribute to improvement of foodgrain storing performance within each CSD. However, construction of foodgrain storages in the Muladuli CSD does not seem to be too pressing.

Effect of the foodgrain storage construction has thus been recognized, and these storages are designed in the following manner: The foodgrain storage design has been prepared to fit to the utilizing condition of foodgrain storages by following the size of the Dacca type storage which is set as the standard type by the Government of Bangladesh, and to have appropriate storing performance by adopting the storing performance specifications of the foodgrain storages constructed under the Japanese aid in the past. Also, saving of the construction cost is realized by planning use of construction materials, techniques, methods and labor of Bangladesh. As the result, there is no technical and economical difference between this design and designs of foodgrain storages constructed under the Japanese and other foreign aid in the past. Accordingly, this design is found justified to be adopted.

The constructed foodgrain storages can be operated by one person per storage well enough and, since the operation does not require difficult techniques, the storages can be operated smoothly with currently available Bangladesh techniques and materials. The operation expenses per storage are about ¥100,000 a year, or about ¥4,100,000 are needed to operate all 35 storages. Maintenance and management of the buildings require no difficult techniques and

they can be managed with currently available techniques and materials also. The average of these expenses necessary for maintenance and management is estimated to be about ₹300,000 a year for each storage, or about ₹10,500,000 a year for all 35 storages. This amount is much lower than any of those in projects of other foreign aid, and it is recognized that the Government of Bangladesh can manage the expenses. Accordingly, this plan is judged to be justifiable for adoption.

The effect and justification of this project have thus been recognized. However, since the expenses for foodgrain storage construction, including those for this project, to be shared by the Government of Bangladesh, occupy a large portion of expenditures for national development plans, it is not preferable to have the Government imposed with the economic burden of implementing storage construction at a time. Step-wise implementation of the project is recommended for this reason. The priority sequence of implementing this project is: (1) Mymensingh CSD, (2) Tejgaon CSD, (3) Boyra and Haliashahar CSDs, (5) Santahar CSD, and (6) Muladuli CSD. Also, we are proposing that the Government of Bangladesh implements the works to be shared by the Government as quickly as possible for smooth progress of this project and establishes an appropriate maintenance and management system and implements it for effective operation of the constructed foodgrain storages.

Based on the reviews thus have been described, this project can be judged as one playing a very important role of the additional foodgrain storage programme of the Government of Bangladesh and one effectively contributing to improvement of the foodgrain distribution function, thereby confirming justifiability of the implementation.

Table VI-1. Construction Target and Proposal of Requested CSD

CSD (District)	(a) Storage Deficit in District ('000 tons)	(b) Ratio of Storage Deficit in District (%)	(c) Existing Capacity of CSD (tons)	(d) Proposed Capacity to be Constructed in CSD (tons)	(e) Total Capacity in CSD after Completion of Project (tons)
Mymensingh CSD (Mymensingh)	111.27	50.6	22,000	4,000	26,000
Tejgaon CSD (Dacca)	73.01	27.6	35,600	6,000	35,000
Boyra CSD (Khulna)	3.38	1.8	67,100	10,000	68,100
Santahar CSD (Bogra)	39.21	26.9	31,000	6,000	37,000
Halishahar CSD (Chittagong)	8.52	2.9	69,700	4,000	73,700
Muladuli CSD (Pabna)	7.16	8.1	32,500	5,000	37,500

Table VI-2 Expected Works to be Done by the Government of Bangladesh

CSD (District)	(a) Land Preparation for New Construction	(b) Works to be Done by GOB for Project	(c) Easiness of Works by GOB	(d) Rough Cost Estimate of Expenditure by GOB for Project (Yen)	(e) Easiness of Maintenance of Completed Storages
Mymensingh CSD (Mymensingh)	Brick boundary wall, small bamboo huts to be demolished	Electric line installation, boundary wall construction	Not difficult	55,700,000	Not difficult
Tejgaon CSD (Dacca)	8 storages to be demolished	Electric line installation	Not very difficult	87,000,000	Not difficult
Boyra CSD (Khulna)	12 storages to be demolished	Electric line installation	Not very difficult	130,000,000	Not difficult
Santahar CSD (Bogra)	Land development and evacuation of rail	Electric line installation, access road and drainage ditch construction	Difficult	87,000,000	Not difficult
Halishahar CSD (Chittagong)	Removal of electric line and pole	Electric line installation	Not difficult	52,000,000	Not difficult
Muladuli CSD (Pabna)	Land development	Electric line installation, access road and drainage ditch construction	Difficult	69,000,000	Not difficult

GOB: Government of Bangladesh

Table VI-3 Examination of Advantage of Foodgrain Storage Construction

CSD		Mymensingh CSD	Tejgaon CSD	Boyra CSD	Santahar CSD	Halishahar CSD	Muraduli CSD
Items of Examination		<1>	<2>	<3>	<4>	<5>	<6>
Priority by GOB							
Advantage by improving foodgrain circulation	(a) Advantage by increasing capacity in District	10	5	0	5	0	0
	(b) Advantage by improving utilization by new or rebuilding of storages	5	10	10	5	5	0
Easiness of works by GOB for project	(c) Easiness of works to be done by GOB	0	-5	-5	-10	0	-10
	(d) Unusual expense by GOB for project	0	0	0	0	0	0
	(e) Easiness to maintain completed storages	0	0	0	0	0	0
(f) Unusual expense under Japanese aid for project		0	0	0	0	0	0
(g) Total advantage from examination		15	10	5	0	5	-10
(h) Advantage order		<1>	<2>	<3>	<5>	<3>	<6>

GOB: Government of Bangladesh

