2.2.4 Implementation Plans for the Expansion of Kallyanpur Pumping Station

2.2.4.1 Implementation Policy

The Project is to be implemented as a Japan's Grant Aid Project after the approval by GOJ and the conclusion of the Exchange of Notes (E/N) between it and the GOB. The basic implementation method of the Project is as described below.

(1) Construction Term

The main work item of the Project is the construction of a new pumping station (intake structure, surge tank, culvert, pump room and electrical room). In consideration of the scale of this project, the present condition of the construction area and others, the construction period is estimated to be 17 months. The detailed design service stage will be commenced in November of this year 2006 after the first E/N, and the bidding for construction will commence in May 2007 after the second E/N.

(2) Bidding Method

The method of construction and procurement of this grant aid project will be the open bidding (general competitive bidding) where bid participants are limited to pre-qualified independent Japanese construction firms or pre-qualified consortiums formed by Japanese manufacturers and construction firms.

(3) Project Implementation Method

The Project will be implemented by DWASA, as the implementing agency, and administered by LGD of MLGRD&C.

(4) Procurement Policy on Materials and Equipment

As described in Subsection 2.1.1(4), basically, construction materials and equipment will be procured in Bangladesh. However, some construction materials and equipment shall be procured in third countries or in Japan, because such materials, equipment and facilities are not produced in Bangladesh. As for the pump and facilities, the supplier shall be able to provide a total system of installation and O&M for mechanical and electrical equipment, including incidental equipment and spare parts, as well as their assembly and installation at the site. The Japan’s grant aid policy will be applied to the Project to ensure that the proposed technical specifications will be met and that high quality equipment guaranteed by various inspection institutions will be procured.

2.2.4.2 Implementation Conditions

The following conditions shall be followed in the implementation of the Project:

(1) Since the equipment and facilities of pump are to be installed in the building during the construction work, the implementation plan of installation of equipment shall be carefully considered in planning the construction schedule.

(2) The contractor shall apply for tax exemption of equipment, facilities and materials for the Project. In this connection, it is important for the contractor to manage Customs clearance in cooperation with the Bangladesh side so as not to cause delay in the construction work.

(3) In the monsoon season, the existing pumping station shall be operated to drain the rainfall water. Hence, the new pumping station shall be constructed taking operation of the existing pumping station into consideration.

(4) Underground structures such as water intake, surge tank and box culvert shall be constructed in the dry season.

2.2.4.3 Scope of Work

The construction and installation costs of the pumping station, surge tank, culvert, pump equipment (pump, motor, control panel), and building will be borne by the Japanese side. The local government will be responsible for arranging the construction area (removal of trees, demolition of retaining wall, etc.). (Refer to Section 2.4.)

Table 2.28 Undertakings of Japanese and Bangladesh Sides on the Construction of Kallyanpur Pumping Station

Responsibilities of Japanese Side	Responsibilities of Bangladesh Side
1. Construction of Pumping Station (Intake Structure, Surge Tank, culvert, etc.); 2. Procurement and Setting of Pump Equipment; 3. Adjustment and Test-Run after Setting; 4. Initial guidance on operation of pump equipment installed in the project;	Arrangement of the construction area (Removal of trees, demolition of retaining wall, etc)

2.2.4.4 Quality Control Plan

Quality control and test items with their frequencies shall be adopted as discussed below.

(1) Concrete Works

Since there are manufacturers of ready-mixed concrete, ready-mixed concrete will be employed for the construction work in accordance with the requirements shown in Table 2.29.

Table 2.29 Required Concrete Tests

Item	Method	Frequency	Total No. of Tests
1. Compressive Test	JIS A 1108	1 test/50m^3 or 1 test/concreting	40
2. Slump Test	JIS A 1101		40
3. Air Content	JIS A 1116		40
4. Temperature	Thermometer		40
5. Chloride Ion	3 pieces/test		40

(2) Earth Works

There is no road and embankment work in the Project. However, the Contractor shall carry out surface excavations and backfill works to the lines, grades and dimensions shown on the Drawings or as instructed in accordance with the specification.

2.2.4.5 Procurement Plan for Materials and Equipment

(1) Procurement Plan

In accordance with the policy on construction or the procurement condition described in Section 2.1, Design Policy, the procurement plan for the New Kallyanpur Pumping Station is as explained below.

(a) Local Procurement

Electrical Equipment

Electric cables for pump facilities, electrically insulated wires and 36kV high voltage cable made in Bangladesh shall be procured locally.

Materials for Civil and Construction Works

In principle, basic materials, cement, reinforcing bars, clayware, aggregates and others shall be procured locally. It should be mentioned that steel products are available in limited quantities locally.

Materials for Building Work

The following items are available in the local market as imported merchandise:

- PVC pipe
- Gas pipe
- Asphalt Waterproofing Material
- PVC waterstop
- Glass
- Floor tile
- Steel shutter
- Steel door

- In-door wiring equipment
- Lighting equipment
- Exhaust fan

Construction Equipment

Construction equipment shall be prepared on lease-basis from local contractors/suppliers. However, the following equipment shall be procured in Japan or in other third countries such as Thailand and Singapore.

- Water Jetting Machine for SSP driver
- Jacked pile driver
- Earth auger boring machine

(b) Procurement from Third Country

Materials for Civil and Construction Works

There is an irregular supply of steel products such as steel sheet piles and wide flange beams in the local market, so that procurement on lease basis would be difficult. Therefore, procurement of such materials shall be made from neighboring third countries, for example, Singapore and Thailand, or Japan, but reinforcing bars shall be procured essentially on-site.

Besides, it is necessary to pay attention to international steel prices, as previously described.

Construction Equipment

As described above, the following equipment shall be procured in Japan or in other third countries such as Thailand and Singapore.

- Water Jetting Machine for SSP driver
- Jacked pile driver
- Earth auger boring machine

(c) Procurement from Japan

Pump and Accessory Equipment

Pump and accessory equipment shall be procured from Japanese manufacturers and manufactured, pre-tested and assembled as one unit in Japan before delivery to Bangladesh and the construction site.

The manufacture of some other parts in another foreign factory may be considered by the entities concerned; however, the pump and accessories shall be manufactured and assembled in Japan by Japanese manufacturers in view of the following reasons:

- Other countries' manufacturers/suppliers, such as the United States of America, Europe and China, do not provide total and after-sales service including the provision of incidental equipment and spare parts, and the assembly and installation of equipment, so that their responsibility with regard to the pump or the plant is not clear.
- The existing pump and equipment installed under the former project and procured from a Japanese manufacturer/supplier have not malfunctioned for 13 years due to sufficient maintenance service, so that DWASA's confidence in Japanese manufacturer is very high.
- If the pump and accessories are to be procured from another third country, the construction schedule could be longer because skilled personnel of another third country manufacturers could hardly be secured for the assembly and installation work.
- Confidence of the Drainage Circle on the existing Kallyanpur Pumping Station is very high because the pumps have not malfunctioned for 13 years.
- The Dutch and Chinese equipment and facilities installed at the Dholai Khal Pumping Station and completed in 1996 have malfunctioned frequently.
- The Chinese equipment and facilities installed at the Gran Chatobari Pumping Station in 1999 and operated by BWDB malfunctioned in 2004 due to the deterioration of electrical facilities. Operation of the pumping station is continuing even if the facilities have not been repaired, because it is difficult to procure the necessary spare parts due to the absence of an agent of the supplier in Bangladesh and there is also no aftercare service by the manufacture. This situation would cause operation troubles in maintenance and emergency cases.

Others

In case that some materials and equipment available locally or in a third country are more expensive than materials and equipment available in Japan, procurement from Japan shall be considered. However, if the above option is considered there may be a problem on the implementation of the grant aid project in Bangladesh, because the implementation agency has to pay the import tax to the local Customs office. Hence, procurement analysis shall be done with consideration on time loss and trouble with Customs procedures if the materials are imported.

(2) Procurement Sources

Procurement sources of main materials and equipment are as shown in Table 2.30.

Table 2.30 List of Construction Materials from Eligible Country

Material	Local	Japan	Third Country	Remarks
Cement	○			
Aggregate	○			
Re-bar	○			
Mold Steel	○			
Brick	○			
Plywood	○			
Materials for Formwork & Supporting	○			
Fuel	○			
Ordinary Construction Equipments	○			
Steel Sheet Pile &Rental Steel Products			○	Singapore
Special Construction Equipments		○		
Parts for Pump Facilities		○		
Glass	○			
Steel Joinery	○			
Wood Joinery	○			
Paint	○			
Air Fan	○			
Supporting Steel	○			
Electric Transformer	○			
Distribution Panel	○			
Light	○			
Steel Conduit	○			
Plastic Conduit	○			
Connection Box	○			
Electric Cable	○			
Hand Hole	○			
Expansion Joint		○		

2.2.5 Procurement Plan for Sludge Removal Equipment

2.2.5.1 Implementation Policy

The Japan's grant aid policy will be applied to the Project so that the proposed technical specifications would be met and high-quality equipment guaranteed by various inspection institutions could be procured for the Kallyanpur Pumping Station. As described in Subsection 2.1.2(5), the equipment and facilities to be procured will have their origin in Japan or in other third countries. The selection of equipment and facilities shall take into consideration not only cost and quality but also their usefulness and the satisfaction of the recipient. In other words, the equipment that could be easily operated and maintained by the staff of DWASA shall be selected with reference to the existing equipment and its management and maintenance system.

2.2.5.2 Implementation Conditions

Procured materials and equipment will be transported by ship from Japan and disembarked at the Chittagong Port in Bangladesh. Unloaded materials and equipment will be transported to the

project site by road after Customs clearance and the preparation of the bonding area. The distance from Chittagong Port to the site is about 270km through the national highway.

2.2.5.3 Scope of Procurement and Installation

Dredging equipment will be transported to the storage space to be provided at the Lalmatia Office, as suggested in this Basic Design Study. In this connection, the following items are necessary before placing the order for procurement:

Securing and arrangement of storage space by the Bangladesh side.

Schedule of arrangement of equipment placement according to this project's proposal.

As for the Project, the cost for procurement of materials and equipment as well as transportation to the delivery site and their construction/installation will be borne by the Japanese side. Equipment test-run and primary on-the-job training will be done on equipment assembled at each site (parking space and pumping station). The responsibilities of the Japanese side and the Bangladesh side regarding the installation of dredging equipment are as shown in Table 2.31.

Table 2.31 Undertakings of Japanese and Bangladesh Sides on the Procurement of Sludge Removal Equipment

Responsibilities of Japanese Side	Responsibilities of Bangladesh Side
1. Procurement and Setting of Sludge Removal Equipment; 2. Adjustment and Test-Run after Setting; 3. Initial Guidance on operation of equipment installed in the project	1. Ensuring of Space/Garage for Equipment Setting 2. Assignment of the appropriate number of staff to the Project to deal with project operation and management.

2.2.5.4 Quality Control Plan

Before manufacturing sludge removal equipment as well as pump facilities and equipment, the contractor and manufacturer(s) shall be called to a meeting to discuss the details of the specifications and the quality control method for each item of equipment.

It should be noted that factory inspection shall be conducted before shipment to ensure the quantity, quality and performance of the equipment, and particular attention needs to be paid to the packing method in order that no damage is given to the equipment during transportation. With regard to inland transportation from the port of disembarkation to the final destination, the supplier shall submit to the consultant the transportation method and schedule in advance.

Since the equipment is sensitive to dust and high temperature, they shall not be stored under the blazing sun. A responsible person from the supplier shall stay constantly with the equipment to keep careful watch over them.

Necessary arrangements are required to take an immediate action if some defective equipment is found by the inspection and test-run, which will be conducted after the installation of equipment.

2.2.5.5 Procurement Plan and Sources

(1) Procurement Plan

In accordance with the policy on construction or the procurement condition described in Section 2.2.5.1, Implementation Policy, the procurement plan for Sludge Removal Equipment is as explained below.

Basically, sludge removal equipment for the Project will be procured from Japan on the following considerations:

- The manufacturer of the body (chassis frame) of vehicles has to have a local branch or a service branch easily available for after-sales service.
- For the Project, Japanese vehicles are of the right-hand drive type and shall be procured in principle because they are adaptable to the driving condition in Bangladesh.
- The equipment has to satisfy the specifications for ordinary sludge removal work (e.g., High Water Pressure Jetting Machine: 19Mpa; Sludge Suction Vacuum Loader: 20m^3/mm; Sludge Transportation Truck: 5m^3).
- There are more than three (3) competitive manufacturers of equipment in the Japanese market.
- The Bangladesh side had requested the procurement of Japanese equipment and facilities.

Sludge removal equipment procured with ADB assistance and made in India is available in DWASA, such as High Water Pressure Jetting Machine (15Mpa) and Sludge Suction Vacuum Loader (7m^3/mm). However, it will be inconvenient for DWASA to carry out the sludge removal work because the jetting machine could not remove the sludge in pipes very well and the vacuum loader could not suck sludge from more than 4 meters in depth.

(2) Procurement Sources

Procurement sources of main materials and equipment for sludge removal are as shown in Table 2.32.

Table.2.32 Procurement Plan of Sludge Removal Equipment

Class	No.	Equipment	Japan	Third Country	Local
Sludge Removal Equipment	1	Sludge Vacuum Loader : 1	○		
	2	High Water Pressure Jetting Machine : 1	○		
	3	Sludge Removal Truck with Crane : 1	○		
	4	Sludge Removal Truck : 3	○		

2.2.5.6 Technical Guidance Service (Soft Component)

The Project will consist mainly of the construction of the New Kallyanpur Pumping Station and the provision of sludge removal equipment for drainage facilities. As for the technical guidance service, the Contractor's staff will carry out the initial operation guidance for pump and sludge removal equipment. Since DWASA already owns and uses equipment of the same kind as those to be procured for the Project, the operation and maintenance of the newly procured ones will be no problem with the support to be provided by the manufacturer's technicians.

2.2.6 Consultant's Supervision

2.2.6.1 Principal Guidelines

The Project is to be implemented as a Japan's Grant Aid Project. GOB shall contract with a Consultant firm after the conclusion of the Exchange of Notes (E/N) between both governments. The principles for consultant's supervision are as described below.

To take the responsibility for expeditious project implementation and supervision, in accordance with the guidelines of Japan's Grant Aid Assistance and the basic design.

To communicate closely with responsible organizations and personnel of both countries, and complete the Project in time in accordance with the implementation schedule.

To provide appropriate advise to personnel of DWASA and the contractor.

To ensure the Project places top priority on public safety

2.2.6.2 Points to Remember about Supervision

The Consultant shall provide supervision services for appropriate quality and schedule control, as well as services for the procurement and suitable equipment installation.

A Construction/Procurement Manager with special technical and judgment skills is required to keep a close relationship with the counterpart personnel of Bangladesh for the smooth implementation of the Project. The main tasks of the Construction/Procurement Manager shall be as follows:

- To conduct meetings with DWASA and various institutions concerned

- On-site confirmation of counterpart's responsibilities
- Inspection and confirmation concerning construction work
- Inspection and quality control test of pump equipment, and confirmation of procurement state of dredging equipment
- Follow-up and confirmation of progress of Customs procedure on each material and equipment
- Observation of inspection
- Issuance of certificates of inspection and completion
- Issuance and submission of reports

2.2.6.3 Consultancy Services

The management system of construction and procurement supervision shall be strengthened especially for the four (4) months of detailed engineering design services and the construction supervision term of seventeen (17) months. In the construction stage, the Consultant shall provide a Japanese resident manager and a local assistant civil engineer. In addition, each engineer to be assigned in the Project will be sent in the immediate term of his assignment for the smooth implementation of the services. Dispatched engineers and periods are as shown in Table 2.33 and Table 2.34.

Table 2.33 Consultancy Services for the Detailed Design

Staff	M/M	Contents
Project Manager	3.41	Signing of consultancy contract; Meeting, adjustment, and reporting of technical aspects with DWASA and other institutions concerned
		Arrangement of detailed design and final check of specification of each equipment; Preparation of tender documents
		Explanation and securing of approval of Detail Designs and tender documents
		Explanation and conference regarding the schedule of tendering
		Formulation, guidance and estimation of Pre-Qualification Documents; Preparation of tendering and replying to questions by tenderers
		Setup of tendering; Opening of tenders; Acceptance of successful tenderer and execution of contract with the supplier/contractor
Civil Engineer	3.17	Detailed design of civil works of pump station and preparation of specifications for civil works
Building Engineer	3.17	Detailed design of building of pump station and preparation of specifications of building works
Electrical Equipment Engineer	3.58	Detailed design of electrical equipment of pump station and preparation of specifications of electrical works
Mechanical Engineer	0.50	Detailed design of mechanical equipment of pump station and preparation of specifications of mechanical works
Cost Estimator	1.00	Review of cost of construction and procurement of dredging equipment
Specialist on Tender Documents	1.50	Preparation of tender documents for the construction and the procurement of dredging equipment
Total	16.33	

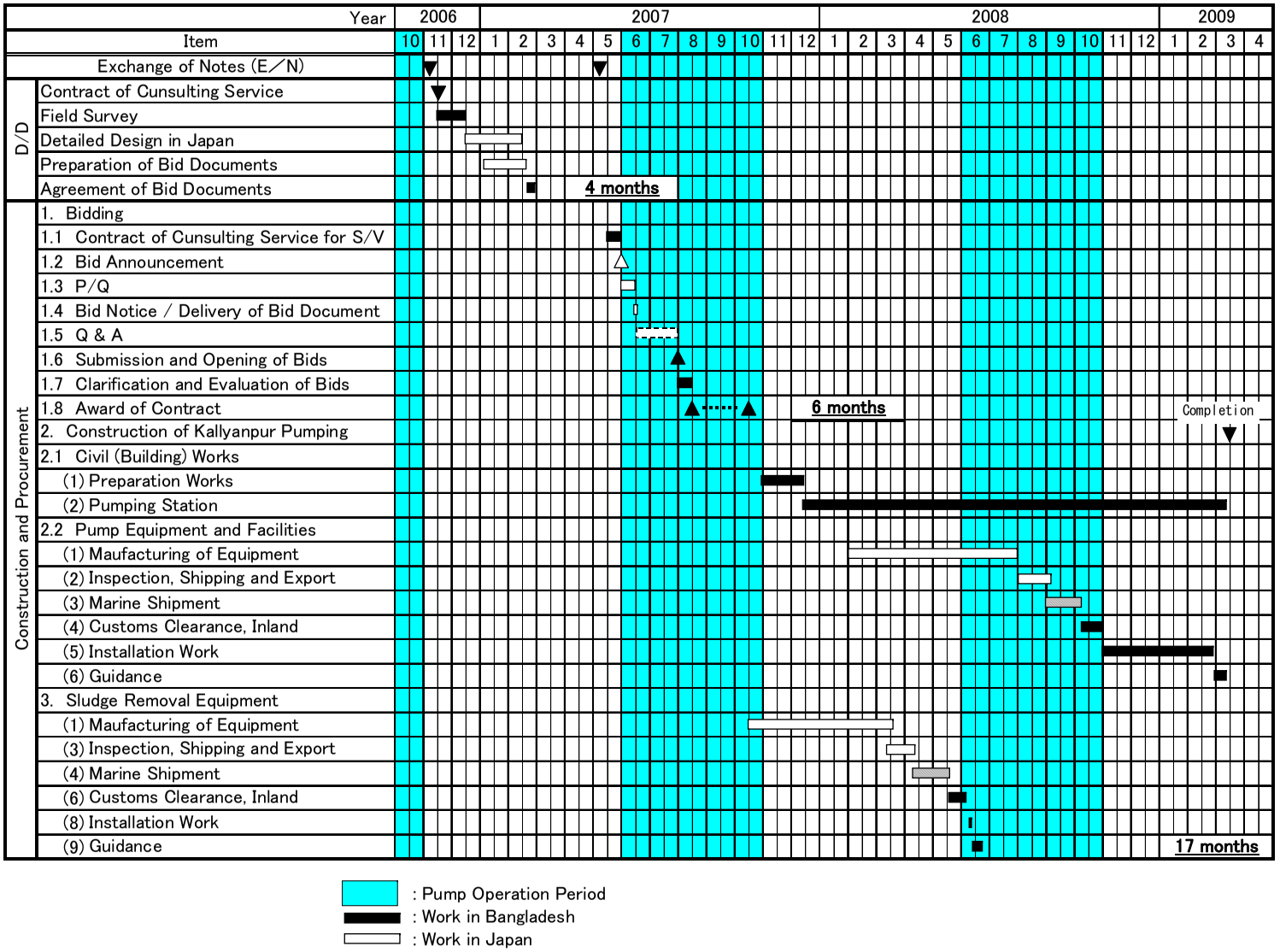
Table 2.34 Consultancy Services for the Construction Supervision and Procurement

Staff	On Site (month)	Contents
Project Manager	1.00	Kick-off meeting with DWASA and institutions concerned before construction; Consultation and confirmation regarding construction schedule and safety measures by tripartite council; Administration for promotion of procurement and construction efficiency
		Observation of completion inspection; Preparation of completion report and completion certificate and holding of maintenance meeting
Inspection Engineer-1	0.23	Implementation of defects inspection (March 2010)
Inspection Engineer-2	0.46	Inspection and cross-check of sludge removal equipment
		Inspection and cross-check of pump equipment and facilities
Building Engineer	1.00	Confirmation, adjustment and direction regarding the construction schedule before construction
		Supervision of building works and adjustment of pump installation
Electrical/Mechanical Equipment Engineer	1.50	Supervision and direction regarding electrical/mechanical works, control teaching and transfer of maintenance manual; Confirmation of state of test-run
Procurement Officer	0.50	Management of procurement state on site; Preparation and management of maintenance training by procurement agent
Resident Construction Manager	17.00	Management of construction quality, schedule, etc.; Direction on safety of construction; Preparation and submission of periodic reports to JICA and the client; Consultation for approval regarding design changes
Total	21.69	

2.2.7 Implementation Schedule

The Implementation Schedule of this Japan's Grant Aid Project shall be as mapped out in Table 2.35.

Table 2.35 Implementation Schedule of the Project



(In the event the E/N is executed in November 2006)

2.3 Obligations of the Recipient Country

2.3.1 Undertakings Required of Bangladesh

Based on the Minutes of Discussions agreed upon by the JICA Study Team and the Bangladesh side on July 13, 2006, as well as the Minutes of Discussions on February 20, 2006 and the Technical Notes between the Consultant and the DWASA on March 11, 2006, the undertakings required of the Bangladeshi side for the smooth implementation of the Project have been confirmed, as follows:

(1) General Requirements

(a) To provide all data and information necessary for the Project.

(b) To ensure prompt unloading and Customs clearance at the port of disembarkation in Bangladesh and internal transportation of the equipment procured under the Grant Aid.

(c) To exempt Japanese nationals from Customs duties, internal taxes and other fiscal levies which may be imposed in Bangladesh with respect to the procurement of products and services under the Project.

(d) To arrange the acquisition of visa and other formalities that may be necessary for the entry of Japanese nationals into Bangladesh and stay therein for the performance of the work.

(e) To maintain and use the equipment properly and effectively with suitable number of staff assigned for the operation and maintenance and to bear all expenses other than those covered under the Grant Aid.

(f) To procure required spare parts for maintenance timely and sufficiently.

(g) To use the equipment exclusively for the Project and shall not be re-exported from Bangladesh.

(h) To bear the advising commission of the Authorization to Pay (A/P) and payment commission to the Japanese bank for banking services based upon the Banking Arrangement (B/A).

(2) Others

(a) To take due procedures at its own expense so as to accord all the necessary permissions, approvals, licenses, admissions or any other authorizations required in connection with the construction and the procurement of equipment.

(b) To clear obstructions such as trees, fences, etc., in the Kallyanpur Pumping Station before the commencement of construction.

(c) To provide and make available, at no cost, the vacant upland lot at the south-side adjacent to the Pumping Station as a temporary construction yard (A=40m x 35m = 1,400m2) during the construction period.

(d) To provide and make available, at no cost, a space at the existing administration building in the Kallyanpur Pumping Station to be used as the Client and Consultant's Office for the construction supervision services on the new pumping station.

(e) To provide and make available, at no cost, a disposal area in the north-side adjacent to the Pumping Station for surplus soil during the construction period.

(f) To rehabilitate prior to the commencement of construction work the West Bypass Road being used by the Bangladeshi side as an access road to the pumping station, for the smooth transportation of construction materials and equipment, because some portions of the asphalt pavement have been damaged.

(g) To prepare and make available additional funds for operation and maintenance cost after the completion of the new pumping station.

(h) To negotiate with the Dhaka Electric Supply Authority (DESA) regarding the necessary rehabilitation of DESA's electric pole/s to ensure uninterrupted power supply.

(i) To prepare and make available a suitable warehouse, garage or parking space with roof and car-wash facilities at the Pagla Central Storage Yard or the Lalmatia Office, at least, before the shipment of procured equipment and facilities.

(j) To obtain permission from the Dhaka City Corporation (DCC) for the dumping of sludge and sediment dredged from Mirpur Khal of 1.7km long and the drainage pipes of about 60km long in Drainage Zone H to the proposed Matuail and Mirpur dumping sites.

(k) To prepare and make available the budget for CDST of the Project due to the procurement of equipment and consumables from abroad, which may be subject to taxes and customs duties upon arrival in Bangladesh.

(l) To prepare and approve the DPP of the Project.

2.3.2 Obligations and Allocation of Bangladesh Side

Basically, there are four (4) specific and important obligations of the Bangladeshi side for the smooth implementation of the Project, namely; (1) the preparatory works for the construction of the New Kallyanpur Pumping Station; (2) the preparatory works for the procurement of sludge removal equipment and facilities; (3) the preparation of sufficient funds and making it available for the sludge

removal activity; and, (4) management of the funds provided for the procurement of materials, equipment, facilities, vehicles and consumables for the Project. The details are as described below.

(1) Preparatory Works for the Construction of New Kallyanpur Pumping Station

For the construction of the New Kallyanpur Pumping Station, some or part of the DWASA properties at the existing Kallyanpur Pumping Station, such as the lot, trees, fences, etc., shall be cleaned or cleared before the commencement of the construction work. The expenses for this work are estimated to be around TK 500,000 in total.

In addition, the rehabilitation of the West Bypass Road between the Mirpur Road and the temporary construction yard of about 650m should be undertaken by the Bangladeshi side to serve as the access road to the pumping station because some parts of the asphalt pavement have been damaged. The rehabilitation work shall be undertaken by the Bangladesh side prior to the commencement of the construction for the smooth transportation of construction materials and equipment to the site.

The above preparatory works/activities shall have been completed by the middle of August 2007 when the construction work is expected to start.

(2) Preparatory Works for the Procurement of Sludge Removal Equipment

DWASA is planning to prepare a suitable facility (garage or car park with roof) for the safekeeping of procured equipment and facilities at the Lalmatia Office. This is also one of the obligations of the Bangladesh side. The procurement of equipment and facilities shall be as scheduled from October 2007 to June 2008. The expenses for the preparation of the facility shall come from DWASA's own funds hence it was excluded from the running and maintenance expenses allocated for the Project. It is expected that a suitable facility shall have been provided by the time of shipment of equipment and facilities to Bangladesh, and regular confirmation of the progress of work is desired.

(3) Security of Sufficient Budget for the Sludge Removal Activity

Budget to be allocated for the sludge removal activity in Drainage Zone H shall cover the running and maintenance expenses for the Project. However, it is an important obligation before commencement of the Project to secure the budget for the smooth implementation of sludge removal activity. Therefore, it is imperative for the Bangladesh side to appropriate a sufficient budget in the DPP to cover the construction of the New Kallyanpur Pumping Station.

(4) Security of Budget for CDST and Banking Arrangement Fee

As indicated in Section 3.1, the Bangladeshi side shall appropriate a budget for the CDST in DPP for the Project because the procurement from Japan and other third countries of

permanent materials, equipment and consumables, such as pump and accessories, steel sheet piles, steel H-beams, sludge removal vehicles and equipment/facilities, may be subject to Customs duties and sales taxes upon arrival in Bangladesh.

The cost of the commission for banking arrangement, as well as the commission for the issuance of Authorization to Pay (A/P), is estimated to be 1~2% of the Grant Aid amount.

All expenses explained above have been agreed upon by the JICA Study Team and the Bangladesh side on July 13, 2006, and summarized together with the costs/prices in Section 2.5.

2.4 Project Operation Plan

2.4.1 Project Operation System

(1) Dhaka Water Supply and Sewerage Authority (DWASA) and the Drainage Circle as Executing Agency

DWASA, which is under the Local Government Division (LGD), Ministry of Local Government and Rural Development (MLGRD&C), has been designated as the agency responsible for the management and operation of water supply, sewage and drainage systems in Dhaka City. At the time of the basic design study, the total number of staff was 3,735.

As shown in Fig. 2.22, DWASA is structurally composed of three departments under the Managing Director, namely; Research/Planning/Development (RPD), O&M, and Finance/Administration, each of which are under a Deputy Managing Director. The Drainage Circle under the RPD is practically more concerned in the Project because it has 132 personnel involved in drainage services in the whole of Dhaka City.

The Drainage Circle is structurally composed of three drainage divisions, as shown in Fig. 2.23, based on the drainage boundary in the City, namely; Drainage Division 1, which manages the east-area including Drainage Zone C (Segunbagicha Khal); Drainage Division 2, which manages the south-area including Drainage Zone B (Dholai Khal Pumping Station); and Drainage Division 3, which manages the west-area including Drainage Zone H (Kallyanpur Pumping Station).

Recently, it has become essential for DWASA to deal with the increasing public service requirements due to the rapid economic growth and city expansion. In this connection, DWASA has proposed a reorganization plan to MLGRD&C to enhance its functions and responsibilities.

According to the reorganization plan, the Drainage Circle will also be restructured to consist of three (3) divisions, namely, (1) the R&D Circle with 43 personnel and (2) the

P&D Circle with 16 personnel; and (3) the O&M Circles with 120 personnel, as shown in Fig. 2.24. The total number of personnel involved in urban drainage sector will increase from 132 to 179. When this reorganization plan is approved, further effectiveness of DWASA's service is expected due to improvement of coordination and adjustment among the water supply, sewerage and drainage sectors.

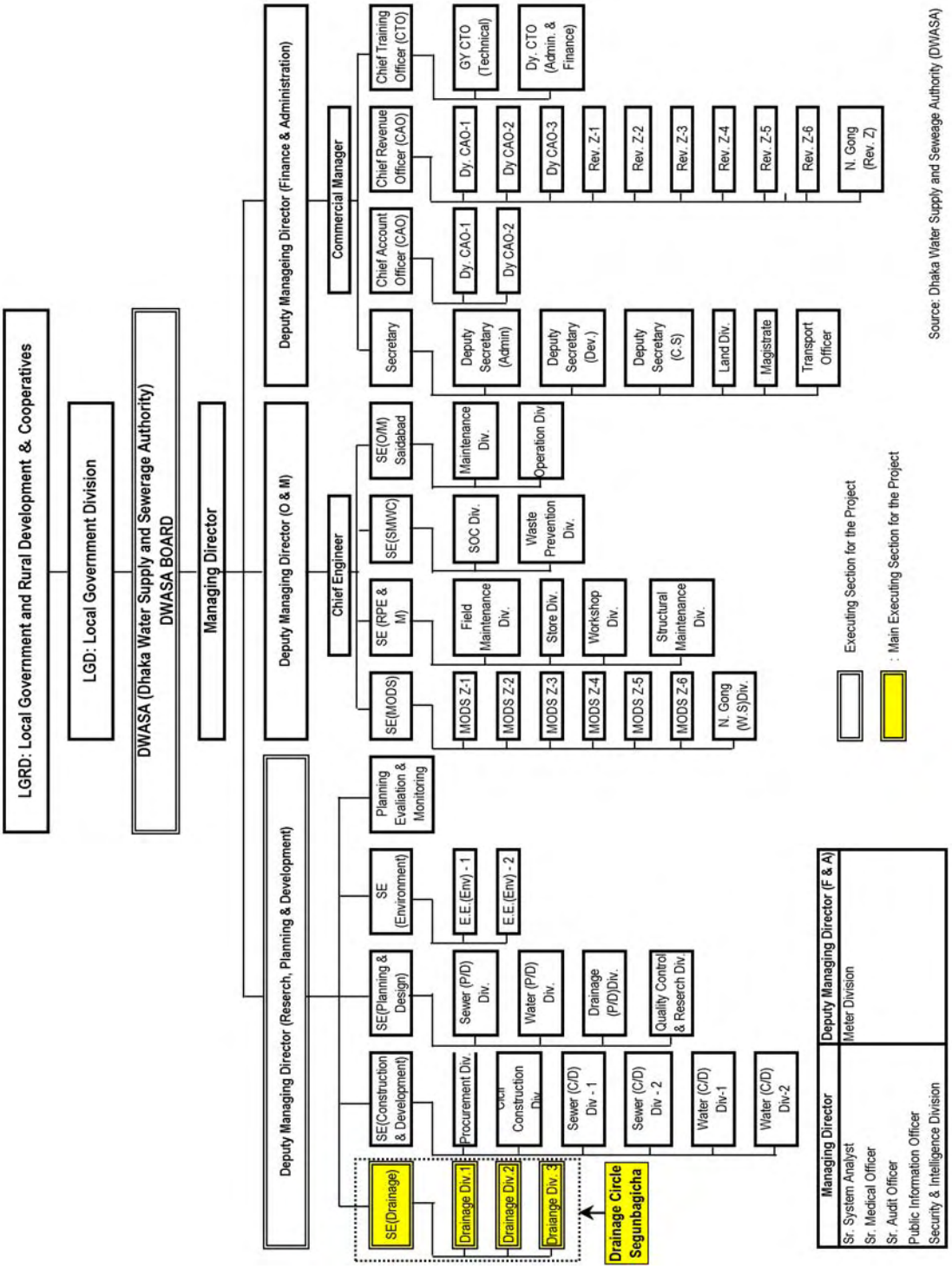
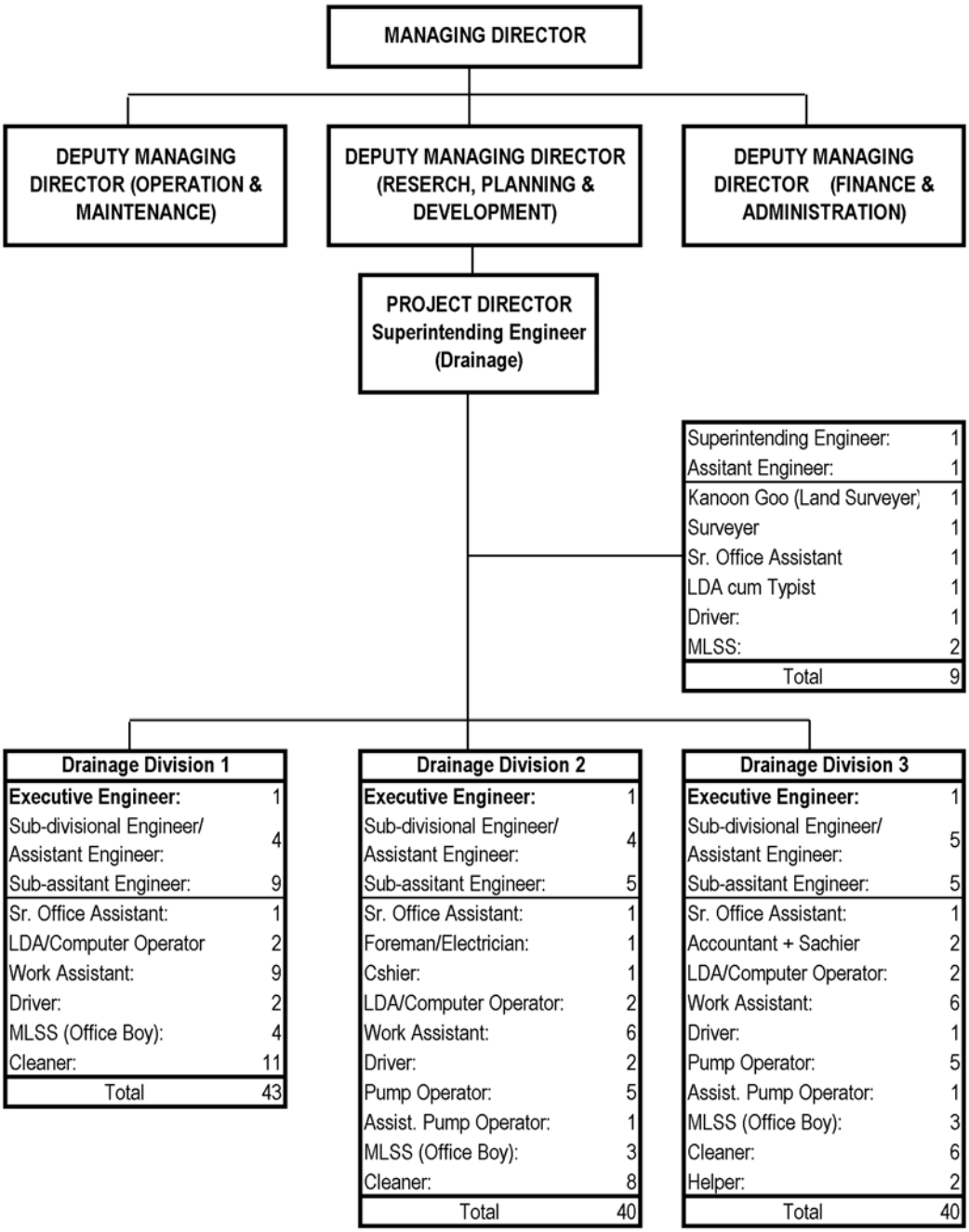


Fig. 2.22 Present Organization Chart of DWASA



Note: DWASA will provide the enough budget to emply additionally 11 Operators, 11Helpers and 10 Divers for operation and maintenance of the whole equipment procured by JICA.

Source: Dhaka Water Supply and Seweage Authority (DWASA)

Fig. 2.23 Organization Chart of the Drainage Circle

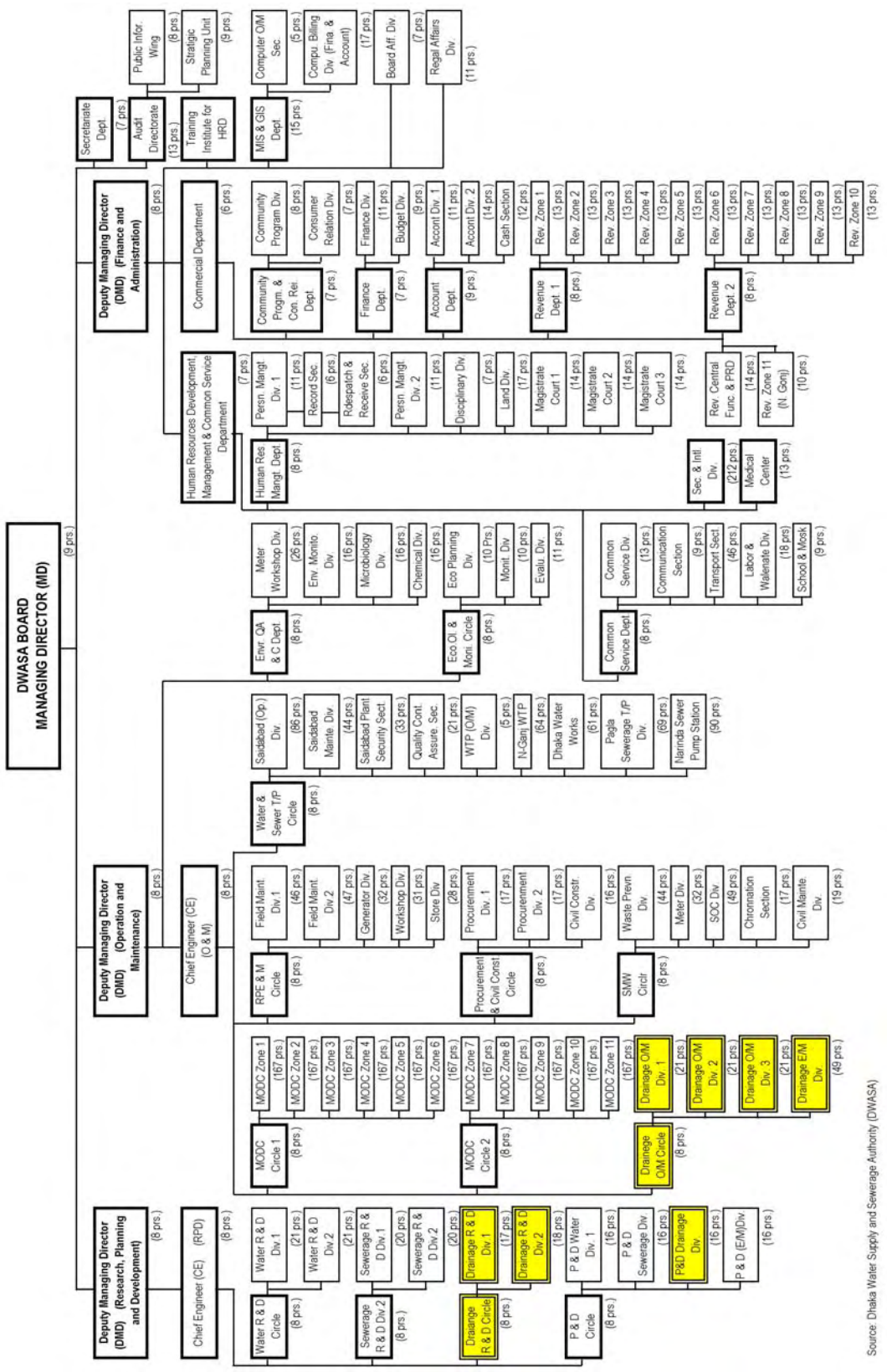


Fig. 2.24 Proposed Organization Chart of DWASA

(2) Financial Situation and O&M Budget of DWASA

According to the revenue and expenditure statement in DWASA's Annual Auditor's Report for four years (2001-2004), the principal sources of income are composed of water and sewer charges as shown in Table 2.36. These revenues have been increasing annually and steadily by 15% since 2001.

On the other hand, major expenses are composed of salary & wages, repair & maintenance, administration, bad debts, and others. In such expenses, approximately 50% was for repair & maintenance.

The balance of DWASA's financial situation has run in the black. In 2004, DWASA had a financial surplus of TK 2.8 million, as shown in the table below.

Table 2.36 DWASA's Revenue and Expenditure from 2001 to 2004

Item	2001	2002	2003	2004
A. Income				
A.1 Water rate	950.0	1,092.8	1,206.3	1,489.1
A.2 Sewer rate	390.3	463.7	538.4	558.1
A.3 Street hydrant	29.2	33.6	36.2	40.0
A.4 Others	154.9	166.9	180.4	169.3
Sub-Total	1,524.5	1,757.0	1,961.3	2,256.5
B. Expenditure				
B.1 Salary and wages	209.5	250.0	268.0	267.0
B.2 Repairs & maintenance	727.1	866.8	753.0	947.9
B.3 Administration	0.0	0.0	222.3	212.9
B.4 Provision for bad debts	288.8	318.3	360.0	444.7
B.5 Others	277.0	320.8	107.8	120.5
Sub-Total	1,521.1	1,756.0	1,711.1	1,993.0
C. Operating Margin (A-B)	3.4	1.0	250.2	263.5
D. Interest Expenses	0.0	0.0	240.9	235.5
Net Margin for the Year (C-D)	3.4	1.0	9.3	28.0

Source: DWASA Finance & Account
Unit: (million Taka)

Repair and maintenance, composed of power and generator fuel, chemical and purification, drainage line, building maintenance and others, correspond to about 50% of the whole expenditures.

As for the Drainage Circle budgetary sources, since the fiscal year of 2003~2004 MLGRD&C has been providing subsidies to the Drainage Circle for the rehabilitation works and cleaning of drainage pipes, repair and replacement of electrical facilities of Dholai Khal Pumping Station, etc., as shown in the table below:

Table 2.37 Budget of the Drainage Circle as Subsidized by LGRD

Fiscal Year	Subsidy from LGRD
2003~2004	16,000,000
2004~2005	53,326,000
2005~2006	25,000,000
Total for 3 years	94,326,000

Source: Drainage Circle, DWASA
Unit: (Taka)

In addition, the Drainage Circle has commenced in the year of 2001 the Project for Removal of Water Logging in Dhaka City (hereinafter referred to as "Water Logging Removal Project"), aiming at the mitigation of flooding conditions in Dhaka City out of local funds. The Water Logging Removal Project includes construction of temporary drainage pumping stations, improvement works of city drainage channel, construction of box culverts, installation of drainage pipes, and procurement of drainage improvement equipment (such as movable drainage pumps, movable generators, pick-up cars, etc.). The construction period has been set during 2001-2006, but this was revised and extended up to 2008. The revised schedule and the budget have been approved, and the project is now under construction. The implemented budget outline of the Water Logging Removal Project is tabulated, as follows:

Table 2.38 Budget of the Water Logging Removal Project

Fiscal Year	Planned Budget	Working Budget
2001~2002	39,878,000	41,805,000
2002~2003	150,000,000	171,075,000
2003~2004	127,900,000	136,201,000
2004~2005	216,811,000	185,508,000
2005~2006 (January)	100,000,000	43,710,000
Total	634,589,000	578,299,000

Source: Drainage Circle, DWASA
Unit: (Taka)

2.4.2 Operation and Maintenance Activities

As described in Section 2.4.1 facilities and equipment constructed or procured under the Japan's Grant Aid shall be managed and maintained by the Drainage Circle of DWASA.

The New Kallyanpur Pumping Station will be constructed at the vacant lot on the north adjacent to the existing pumping station. After completion of construction, the existing and new facilities can be utilized as one unit of pumping station. Therefore, it is not necessary to change the present O&M activities (8-hour work of 2 personnel in 3 shifts per day, or 6 personnel in total).

On the other hand, the procured equipment and facilities for sludge removal work on 1.7km of Mirpur Khal and drainage pipes of about 60km in Drainage Zone H shall be kept in safe custody at a parking lot with roof in the Lalmatia Office situated near Drainage Zone H, and operated and

maintained properly with the newly approved budget for DPP. Repair of the procured equipment and facilities, basically, shall be made in DWASA Mirpur Workshop; however, large-scale repair will have to be undertaken by an outside private repair shop.

The sludge removal work shall be carried out in combination with High Water Pressure Machine, Sludge Vacuum Car, Wheel Type Oil Pressure Shovel, Dump Trucks for Sludge Removal, and many workers. As for daily activities, the supervisor (Subdivision Engineer) shall direct the preparation work of the day to personnel concerned such as operators, foreman and others at first. Safety and quality control of the work, site cleaning after work, as well as daily maintenance and inspection of equipment, shall also be directed and checked.

The sludge removal works shall be implemented according to the volume shown in Table 2.39 below, by equipment and facilities procured under the grant aid and other equipment and manpower procured under DWASA's own funds. The work schedule shall be prepared before the commencement of work, and shall indicate the removal sequence, deployment schedule of equipment, and safety management procedure plan.

Table 2.39 Preliminary Sludge Removal Plan for Drainage Zone H

Drainage Zone	Facility	Sludge Volume (m^3)	Required Materials & Number of Personnel	Required Number of Days (days)
Drainage Zone-H	Mirpur Khal	12,000	Oil Pressure Shovel: 1car	About 90
			Dump Truck for Sludge Removal: 3 cars (*)	
			Worker: Several Persons	
		3,700	Worker: 100 persons	About 50
			Oil Pressure Shovel: 1 car	
			Dump Truck for Sludge Removal: 2 cars (*)	
	Drainage Pipe (D > 800mm)	5,680	Worker: 50 persons	About 380
			Dump Truck with crane for Sludge Removal: 1 car (*)	
	Drainage Pipe (D < 800mm)	1,429	Sludge Vacume Car: 1 car (*)	About 95
			High Water Pressure Machine (*)	
			Water Tank Car: 1 car	
			Worker: Several persons	

Note: Equipment or Facilities marked (*) will be procured under Japan's Grant Aid.

The preliminary sludge removal plan for Drainage Zone C, in which sludge removal equipment and facilities procured for Drainage Zone H are planned to be utilized as much as possible, is also given below as reference information.

Table 2.40 Preliminary Sludge Removal Plan for Drainage Zone C

Drainage Zone	Facility	Sludge Volume (m^3)	Required Materials & Number of Personnel	Required Number of Days (days)
Drainage Zone C	Segunbagicha Khal	18,500	Sludge removal works is not recommended due to its low effectiveness.	-
	Segunbagicha Box Culvert	18,200	Dump Truck for Sludge Removal: 1 cars (*4)	About 300
			High Water Pressure Machine: 1 car (*2)	
			Water Tank Car	
			Dump Truck with crane for Sludge Removal: 2 cars (*3)	
			Worker: Several staffs	
		18,200	Worker: 100 persons	About 300
			Dump Truck with crane for Sludge Removal: 1 car (*4)	
	Drainage Pipe (D > 800mm)	5,680	Worker: 100 persons	About 380
			Dump Truck with crane for Sludge Removal: 12 cars (*3)	
	Drainage Pipe (D < 800mm)	1,429	Sludge Vacuum Car: 1 car (*3)	About 140
			High Water Pressure Machine (*)	
			Water Tank Car	
			Worker: Several staffs	

(Note) 1. Equipment or Facilities marked (*2) and procured for Drainage Zone H could be shared with Zone C without any adjustment in their work schedule.
2. Equipment or Facilities marked (*3) and procured for Drainage Zone H could be shared with Zone C, provided that adjustment is made in their work schedule.
3. Equipment or Facilities marked (*4) shall be procured additionally by DWASA.

2.4.3 Operation and Maintenance Cost (Project Cost)

After the completion of construction of the Kallyanpur Pumping Station, DWASA will be obliged to increase its budget for O&M of the pumping station and for electrical charges, as well as for maintenance and inspection fees, due to the increased basic sanctioned load and change of L.W.L. of the regulation pond and the increased number of pumps (from 3 to 5). Based on the recent 5-year electrical charges and maintenance fees for the existing Kallyanpur Pumping Station, which is estimated at TK 1.7 million and TK 0.4 million on average, respectively, the annual costs will increase by about TK 1.0 million and TK 0.3 million respectively. Therefore, the total annual operation and maintenance cost will be TK 3.4 million.

On the other hand, for the sludge removal work at Mirpur Khal and the drainage pipes in Drainage Zone H, it will be necessary to consider the employment cost of driver/operator, operation cost (fuel cost), maintenance and repair cost, labor cost of workers, and rental cost of excavator for three (3) years. Therefore, these costs shall be appropriated in the DPP and the required budget shall be secured.

Table 2.41 Expected Cost Increase of O&M Items

Item		Description	Remarks
Construction of New Kallyanpur Pumping Station	Electricity Charges	Increase of annual electricity charge due to raising of the basic sanctioned load and lowering of the maintenance water level	Change of Maintenance water level: Lowered from EL+4.0m to EL+3.0m
	Maintenance & Repair Cost	Increase of annual maintenance & repair cost due to additional pump equipment	Existing: 3 pumps Additional: 2 pumps
Procurement of Sludge Removal Equipment & Facilities	Maintenance Cost	Maintenance & Repair Cost	Drainage Zone H
	Operation Cost	Salary of driver and operator	
		Fuel cost	
		Rental cost of sludge removal equipment for Mirpur Khal	
	Sludge Removal Cost	Labor cost of workers	

As mentioned above, the sludge removal equipment and facilities procured for Drainage Zone H are to be utilized also for the sludge removal work in Drainage Zone C. In case that sludge removal work in Drainage Zone C is implemented in parallel with the work in Drainage Zone H, operation and maintenance cost will be about TK 9.8 million in total.

2.5 Cost Estimate of the Project

2.5.1 Project Cost

The total project cost is estimated at 1,473 million Japanese Yen (about 837 million TK). The contents of cost based on the scopes of work by Japan and Bangladesh as mentioned in Section 2.4, could be allocated as follows:

(1) Japanese Side

The Japanese side shall prepare the following costs as Japan's Grant Aid:

Table 2.42 Scope of Work for Japan and Its Cost

Item			Cost (million Yen)	
Facility	Expansion of Pumping Station	Sub-structures of pumping station, inlet & outlet, Super-structure of pumping station, Mechanical and electrical facilities	794	794
Equipment	Sludge Removal Equipments		74	74
D/D and S/V			85	
Total			953	

Exchange Rate: 1 TK = 1.76 yen and 1 US$＝117.11 yen (as of March 2006)

This cost estimate is provisional and will be examined further by GOJ in connection with the approval of the Grant Aid.

(2) Bangladesh Side

The Bangladesh side shall prepare and make available the following costs before the commencement of the Project:

Table 2.43 Scope of Work for Bangladesh and Its Cost

Item	Details	Cost (million Taka)	
Cost for the Whole Project	(1) Clearing of construction site for the New Kallyanpur Pumping Station	0.5	281.5
	(2) Provision of car park with roof for procured equipment and vehicles in Lamlatia Office	1.0	
	(3) Local Taxes and Duties (VAT and CDST)	270	
	(4) Commission Fees for Banking Arrangement (B/A) and Authorization to Pay (A/P)	10	
O&M Cost for Sludge Removal Work in Drainage Zone H	(1) Fuel Cost for Sludge Removal Equipment & Facilities	2.8	13.8
	(2) Maintenance and Repair Cost of Sludge Removal Equipment & Facilities	0.8	
	(3) Salary of Driver (Permanent Employee) for Sludge Removal Equipment & Facilities	2.1	
	(4) Wage of Laborer (Temporary Employee) for Sludge Removal Works	5.4	
	(5) Rental Cost of Sludge Removal Equipment for Mirpur Khal (Wheel Type Shovel Car)	2.7	
Total		295.3	

The sludge removal work for 1.7km of Mirpur Khal and for 60km of drainage pipes in Drainage Zone H is estimated to take about three (3) years. As shown in the above table, the project cost for sludge removal work in Drainage Zone H is estimated at about TK 13.8 million (about 24 million Japanese Yen) in total, which corresponds to about TK 4.6 million per year (about 8 million Japanese Yen per year). This cost shall be appropriated in the DPP in addition to the construction cost of the New Kallyanpur Pumping Station and procurement cost of the sludge removal equipment by the Japanese side.

Some of the sludge removal equipment and facilities procured for Drainage Zone H could be utilized jointly and at the same time in priority Drainage Zone C. If DWASA can secure an additional budget of about TK 98.0 million (about 172 million Japanese Yen) to cover the project cost of TK 33.0 million (about 58 million Japanese Yen), including the procurement cost for widely used equipment (wheel type or oil type power shovel) and the employment cost of workers, the sludge removal work for the 3.0km Segunbagicha box culvert and the 60km drainage pipes in Drainage Zone C could be completed within three (3) years.

2.5.2 Operation and Maintenance Cost

As mentioned before, it shall be necessary for DWASA to provide, additionally, an annual budget of about TK 3.2 million (about 5.6 million Japanese Yen) per year as the O&M cost for the New Pumping Station and sludge removal equipment. This cost could increase by almost 0.28% for "B.2 Repair and Maintenance" and 0.35% for "B.1 Salary and Wages" respectively in Table 2.36, which will not much constrain the whole management by DWASA.

Table 2.44 Expected Cost Increase for O&M of Kallyanpur Pumping Station

Item	Detail	Item No. in Table 2.36	Annual Cost (million TK)	
Additional O&M Cost for Kallyanpur Pumping Station	Additional Electrical Charges for the New Kallyanpur Pumping Station	B.2	1.0	1.3
	Additional Maintenance Cost for Kallyanpur Pumping Station	B.2	0.3	
O&M Cost for Sludge Removal Equipment (after the Project)	Fuel Cost for Sludge Removal Equipment & Facilities	B.2	0.9	1.9
	Maintenance and Repair Cost for Sludge Removal Equipment & Facilities	B.2	0.3	
	Salary of Operator	B.1	0.7	
Total		3.2		

Based on the existing facilities of the Kallyanpur Pumping Station, the service life is estimated to be 10 to 20 years under proper maintenance and repair. Hence, it is presumed that the facilities of the Project can be used for more than 10 years, while the structures can be used for more than 30 years. During those periods and provided that proper maintenance and repair are carried out, there will be no need to procure new equipment and facilities.

Similarly, the sludge removal equipment to be procured under the Project can be used, with proper maintenance, for several years. The analytical equipment can be used for 8 to 10 years.

2.6 Issue on Environmental Clearance Certificate (ECC) and the Mitigation and Abatement Measures undertaken by the Bangladeshi Side

An Initial Environmental Examination (IEE) was carried out for the Project based on the EIA Guidelines for Industry, 1997 and the Guidelines for Environmental Assessment of Water Management (Flood Control, Drainage and Irrigation) Projects, 2005. According to the IEE results, all of the possible adverse impacts are not significant. Therefore, it is confirmed that an Environment Impact Assessment is not necessary for the Project.

In this connection, the Department of Environment (DOE) issued an Environmental Clearance Certificate (ECC) for the Project on 31 August 2006. Based on the recommendations in the ECC, it is confirmed that DWASA will comply with all of the terms and conditions of the ECC with proper

monitoring and reporting, and DWASA will also apply for renewal of the ECC in the operation stage of the Project.

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

3.1 Project Effect

To be benefited directly with the implementation and realization of the Project are about 870,000 people in Drainage Zone H (about 17.60km^2) where the drainage system improvement is to be implemented. The indirect benefit of the drainage system improvement will be felt by the whole population of about 9.91 million in Dhaka City due to the improvement of traffic and environmental conditions in flood time.

The new Kallyanpur Pumping Station in the Project will be constructed to improve drainage conditions by securing the water level of the regulating pond in Drainage Zone H. Sludge removal work will be executed by DWASA with equipment procured under the Japan's Grant Aid with sufficient staffing arrangement.

The following direct benefits are to expected:

Kallyanpur Pumping Station

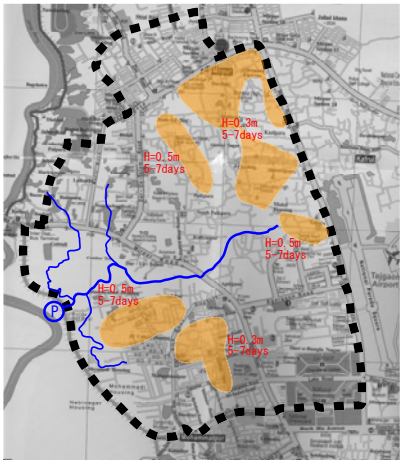
(1) Drainage Zone H will be free from 5-year probability rainfall floods caused by the insufficient capacity of pump-drainage and the regulating pond. The pumping capacity of 20m^3/s and regulating capacity of 2,000,000m^3 could be secured after the completion of construction of the new Kallyanpur Pumping Station.

(2) Flood damage by more than 5-year probability rainfall will be mitigated (e.g., Flood duration will be decreased from 6 days under existing conditions to 3 days after the completion of the Project under the 2004 flood condition.)

Sludge Removal Work

(1) Inundation duration in the flood prone area in Drainage Zone H will decrease from 7 days to 4 or 5 days because the flow capacity of the drainage channel and rainfall drain pipes will be increased by 30% after the completion of the sludge removal work.

(2) Pump drainage will be enhanced by the sludge removal work due to the 30% increment of flow capacity of the drainage channel and drain pipes upstream of the regulating pond.



It is expected that the flood condition illustrated above will be decreased by the Project.

Fig. 3.1 Present Flood Prone Areas in Drainage Zone H

Indirect effects to be expected with the realization of the Project, including the drainage improvement in Dhaka City, are as listed below.

(1) Traffic interruption will be minimizes.

(2) The prevalence of waterborne diseases in the rainy season in Drainage Zone H will decrease because the environmental conditions will improve due to the mitigation of flooding conditions.

(3) Economic loss due to floods will fall.

(4) The safety of workers in sludge removal can be assured with the procurement of sludge removal equipment and the mechanization of sludge removal in drainage channels and pipes.

The project effects will come out in the target year 2010, namely; after the completion of construction of the new Kallyanpur Pumping Station and the sludge removal work in Drainage Zone H. It can be indicated by the observation results on the regulating pond and the daily rainfall data, the sludge thickness survey in drainage channels and pipes, and the mapping of the transition of flood prone area by DWASA, which could be compared with the present flood prone area map in Fig. 3.1 above. If the Project is properly implemented, the present situation will definitely improve.

The project effects are as summarized in Table 3.1.

Table 3.1 Project Effect and Improvement

Present Status and Issues	Project Target (Grant Aid Scheme)	Project Effect & Improvement
1. Drainage Zone H in Dhaka City has frequently suffered from flood damage due to geological and climatic conditions and rapid development. In addition, the existing pump capacity is insufficient even against a storm rainfall of 5-year probability.	To construct the additional/new Kallyanpur Pumping Station (addition of $10m^3/s$ of drainage capacity).	Drainage in Zone H will improve because pump drainage capacity will increase up to $20m^3/s$. Flood time will be reduced by 50%.
2. Flood occurs in many places in Drainage Zone H due to storm water in the rainy season. Floods are attributed to the reduction of flow capacity of drainage channels and drainage pipes, which are silted up and clogged with solid wastes.	To procure equipment for sludge removal in drainage channels and drainage pipes.	Flow capacity of drainage channels and drainpipes in Drainage Zone H will increase by 30%. Flooding situation will improve, because flood damage will be mitigated.

3.2 Recommendations

In order to realize the expected sustainable effects, the Bangladesh side shall undertake as follows: 1) To secure sustainable costs for operation and maintenance for the Kallyanpur Pumping Station and sludge removal equipment; and 2) To recruit and sustain the necessary staff for operation of equipment and to give them necessary trainings. These issues have been discussed and agreed upon between the Japanese side and the Bangladesh side, and no serious problem is foreseen.

The Bangladesh side had approved the local budget amounting to TK 295.3 million for the implementation of the Project and TK 3.2 million/year for additional operation and maintenance costs after the completion of the Project as described above. These issues also have been discussed and agreed upon between the two countries. However, unexpected expenses might occur due to accidents and failures. With regard to this issue, the MLGRD&C has already been providing subsidies to the Drainage Circle for the rehabilitation works and cleaning of drainage pipes, and the repair and replacement of existing facilities, as shown Table 2.37. It is essential that MLGRD&C shall continue its full support to DWASA for the sustainable operation of the completed Project.

In addition, it is recommendable that DWASA shall report and periodically provide the Japanese side with the operation and maintenance records of facilities and equipment procured/constructed under the Project in order to keep sustainable cooperation between both governments.

DWASA has been operating other pumping stations and it also plans to construct new pumping stations to mitigate flood damage in the whole of Dhaka City and sludge removal in drainage channels, drainage pipes and box culverts. DWASA could use the technical knowledge obtained through the implementation and construction of the Project for the operation of other pumping stations and sludge removal works.

Since sludge removal work and the maintenance of drainage facilities are deeply concerned with the solid waste carelessly thrown into these facilities, public awareness activities are essential to keep the channels clean and free from garbage. These activities shall be implemented beyond sectors and implementing agencies in the future, in accordance with the results of "The Study on the Solid Waste Management in Dhaka City" conducted by JICA 2005. Public awareness and educational campaigns to enlighten the public regarding DWASA's functions and roles in the maintenance of drainage facilities are extremely effective for the reduction of total sludge volume in drainage facilities, resulting in the environmental improvement in Dhaka City. Correspondingly, it should be one of the alternatives DWASA's staff and personnel to participate in seminars, workshops and educational campaigns regarding the policy on solid waste management in collaboration with DCC.

In spite of the efforts of DWASA and the other agencies concerned against flood damage, Dhaka City will still suffer from floods due to its basic geological and climatic conditions. In this connection, the requests for succeeding flood control and urban drainage improvement projects for other drainage areas shall be considered based on the effects and outcomes of the Project and the policy on self-help effort for sustainable development. In order to implement the Project smoothly, the following matters should be given urgent consideration and carried out with certainty by the Bangladesh side:

(1) The Development Project Proposal (DPP) of the Project should be approved in October 2007.

(2) Based on the approved DPP, the appropriate number of staff should be assigned to the Project and the personnel should be competent enough to deal with project operation and management.

(3) Based on the approved DPP that should contain a sufficient amount of budget, and the flawless work by the Bangladesh side, the preparatory works for the construction of the New Kallyanpur Pumping Station and the parking lot for sludge removal equipment, as well as the budget for CD&VAT should be completed by the end of August 2007 for the prompt commencement of construction and procurement. Formalities of Banking Arrangement (B/A) and Authorization to Pay (A/P) for the detailed design and construction/construction supervision should be completed by the end of November 2006 and the end of August 2007 respectively.

(4) Based on the approved DPP, the sludge removal work for 1.7km of Mirpur Khal and for 60km of drainage pipes in Drainage Zone H shall be implemented after procurement of sludge removal equipment.

(5) In accordance with recommendations of the Environmental Clearance Certificate (ECC) for the Project, DWASA shall comply with the terms and conditions of the ECC through proper monitoring and reporting, and by applying for renewal of the ECC as needed.

APPENDICES

1. Member List of the Study Team

(1) Field Study of the Basic Design

Name	Designation	Affiliation
Mr. Akio ARAI	Team Leader	Resident Representative, JICA Bangladesh Office
Ms. Hiroko KAMATA	Planner for Rainwater Drainage Management	Senior Advisor, Institute for International Cooperation, JICA
Ms. Sonoko IWAMOTO	Project Coordinator	ICT and Governance Team, Project Management Group I, Grant Aid Management Department, JICA
Mr. Toshiaki TOKUMASU	Project Manager / Cleaning Equipment Planner / Operation and Maintenance Planner	CTI Engineering International Co., Ltd.
Mr. Kazuto SUZUKI	Drainage Planner / Drainage Facilities Designer (Civil Work)	CTI Engineering International Co., Ltd.
Mr. Naoto TAKATOI	Equipment Designer (Mechanical and Electrical Work)	TOKYO SEKKEI JIMUSYO Co., Ltd.
Mr. Tsuyoshi ITO	Environmentalist Evaluation Support	CTI Engineering International Co., Ltd.
Mr. Masaki ISHII	Cost Estimator / Construction and Procurement Planner	CTI Engineering International Co., Ltd.

(2) Briefing of Draft Basic Design Report

Name	Designation	Affiliation
Mr. Eiichiro CHO	Team Leader	Additional Resident Representative, JICA Bangladesh Office
Mr. Akiko BUSHIMATA	Project Coordinator	Deputy Resident Representative, JICA Bangladesh Office
Mr. Toshiaki TOKUMASU	Project Manager / Cleaning Equipment Planner / Operation and Maintenance Planner	CTI Engineering International Co., Ltd.
Mr. Kazuto SUZUKI	Drainage Planner / Drainage Facilities Designer (Civil Work)	CTI Engineering International Co., Ltd.

2. Study Schedule

(1) Field Study of the Basic Design Study

No.	Date		Leader	Planner for Rainwater Drainage Management	Project Coordinator	Project Manager / Cleaning Equipment Planner / Operation and Maintenance Planner	Drainage Planner / Drainage Facilities Designer (Civil Work)	Equipment Designer (Mechanical and Electrical Work)	Cost Estimator / Construction and Procurement Planner	Environmentalist Evaluation Support
			ARAI Akio (Mr.)	KAMATA Hiroko (Ms.)	IWAMOTO Sonoko (Ms.)	TOKUMASU Toshiaki (Mr.)	SUZUKI Kazuto (Mr.)	TAKATOI Naoto (Mr.)	ISHII Masaki (Mr.)	ITO Tsuyoshi (Mr.)
1	10-Feb	fri				Tokyo (JAL717/10:55) ⇒ (15:55)Bangkok (TG321/10:30) ⇒ Dhaka (12:00)				
2	11-Feb	sat	JICA Office							
3	12-Feb	sun	ditto			Courtesy Call on JICA, DWASA Survey Preparation		Tokyo (JAL717/10:55) ⇒ (15:55)Bangkok (TG321/10:30) ⇒ Dhaka (12:00)		
4	13-Feb	mon	ditto	★ Tokyo ⇒ Singapore ⇒Dhaka		Survey Preparation				
5	14-Feb	tue	Courtesy Call on JICA and EOJ (with Ambassador), Courtesy Call on ERD, LGRD and DWASA							
6	15-Feb	wed	Internal Team Meeting							
7	16-Feb	thu	Discussion on M/M with DWASA							
8	17-Feb	fri	Field Survey							
9	18-Feb	sat	Discussion on M/M with DWASA							
10	19-Feb	sun	Discussion on M/M and Procedure for finalization							
11	20-Feb	mon	Report to JICA Signing of the M/M at ERD							
12	21-Feb	tue	Report to EOJ							
13	22-Feb	wed	JICA Office	◆ Dhaka ⇒ Bangkok ⇒Tokyo		Data Collection				
14	23-Feb	thu	ditto			ditto				
15	24-Feb	fri				Data Arrangement				
16	25-Feb	sat	ditto			Data Collection, Survey Inspection				
17	26-Feb	sun	ditto			ditto				
18	27-Feb	mon	ditto			ditto				
19	28-Feb	tue	ditto			Data Analysis				▲
20	1-Mar	wed	ditto			Team Meeting and Confirmation of Schedule & TOR				
21	2-Mar	thu	ditto			Data Analysis				Data Collection
22	3-Mar	fri				ditto				ditto
23	4-Mar	sat	ditto			Establishment of Planning Policy				ditto
24	5-Mar	sun	ditto			ditto				Data Arrangement
25	6-Mar	mon	ditto			Planning & Design				ditto
26	7-Mar	tue	ditto			ditto				Data Collection
27	8-Mar	wed	ditto			ditto				Data Analysis
28	9-Mar	thu	ditto			ditto				Evaluation
29	10-Mar	fri				ditto				ditto
30	11-Mar	sat	ditto			ditto				
31	12-Mar	sun	Discussion with DWASA, LGRD			Discussion on Result of Site Survey with DWASA, LGRD and ERD				
32	13-Mar	mon	JICA Office			Report to JICA and EOJ		●		JICA and EOJ
33	14-Mar	tue	ditto			● Dhaka ⇒ Bangkok ⇒Tokyo				●

ERD: Economic Relations Division, Ministry of Finance

DWASA : Dhaka Water Supply and Sewerage Authority

LGRD : Ministry of Local Government, Rural Development and Cooperatives

★Tokyo (JL719/11:00) ⇒ (17:35)Singapore (SQ436/20:30) ⇒Dhaka (22:35)

◆Dhaka (TG322/13:10) ⇒ (16:25) Bangkok (JL718/22:30) ⇒ Tokyo (6:15)

▲Tokyo (JL717/10:55) ⇒ (15:55) Bangkok (TG321/10:30) ⇒ Dhaka (12:00)

●Dhaka (TG322/13:10) ⇒ (16:25) Bangkok (JL708/8:20) ⇒ Tokyo (16:05)

(2) Briefing of Draft Basic Design Report

No.	Date		Leader	Project Coordinator	Project Manager / Cleaning Equipment Planner / Operation and Maintenance Planner	Drainage Planner / Drainage Facilities Designer (Civil Work)
			Eiichiro CHO (Mr.)	Akiko BUSHIMATA (Ms.)	TOKUMASU Toshiaki (Mr.)	SUZUKI Kazuto (Mr.)
1	7-Jul	fri			Tokyo (JAL717/10:35) ⇒ (15:55)Bangkok	
2	8-Jul	sat			(TG321/10:30) ⇒Dhaka (12:00)	
3	9-Jul	sun	AM: Courtesy Call on JICA Office and Japanese Embassy PM: Courtesy Call on ERD			
4	10-Jul	mon	AM: Courtesy Call on DWASA, Briefing on Basic Design PM: Courtesy Call on LGD and LGRD&C			
5	11-Jul	tue	AM: Discussion on M/D at JICA Office, Discussion on M/D with DWASA PM: Discussion on M/D with DWASA			
6	12-Jul	wed	AM: Courtesy Call on Ministry of Environment and Forest, Environmental Agency PM: Dicussion on DPP with DWASA			
7	13-Jul	thu	AM: Signing of the M/D at ERD with DWASA, LGD, LGRD&C PM: Report to JICA and Japanese Embassy regarding Result of DBD			
8	14-Jul	fri			Data Arragement	
9	15-Jul	sat			DPP Constitution with DWASA	
10	16-Jul	sun			DPP Constitution with DWASA	
11	17-Jul	mon			Dhaka (TG322/13:10) ⇒ (16:30)Bangkok	
12	18-Jul	tue			(JAL322/13:10) ⇒Tokyo (15:40)	

3. List of Parties Concerned in the Recipient Country

Name	Designation
Economic Relations Division, Ministry of Finance	
Mr. M. Emdadul Haque	Deputy Secretary
Mr. Krishna Gayen	Senior Assistant Chief
Mr. Sirajul Haq Talukder	Senior Assistant Chief
Local Government Division, Ministry of Local Government, Rural Development and Cooperation	
Mr. Md. Talebar Rahman	Director General
Mr. Syed Mamunul Alam	Senior Assistant Chief
Mr. Md. Azizur Rahman Siddique	Project Manager, Sirajganj Local Governance Development Fund Project
Mr. Md. Tasharuf Hossain Farazi	Senior Assistant Chief
Dr. Mohammad Jahirul Islam	Deputy Chief
Dhaka Water Supply & Sewerage Authority (DWASA)	
Mr. Kazi Ali Azam	Managing Director
Mr. Hedayetullah Al-Mamoon	Joint Secretary, Managing Director（In-Charge）
Mr. Shahidur Rahman Prodhan	Deputy Managing Director
Mr. Md. Zaki Mostafa Chowdhury	Staff Officer & Executive Engineer
Mr. M.A. Jalil	Deputy Chief (Planning), Planning & Monitoring Division
Mr. Md. Shamsul Alam	Assistant Chief
Mr. Ramjan Ali	Superintending Engineer
Mr. Zahurul Alam	Project Director (SE), Drainage Circle
Mr. Quamrul Alam Chowdhury	Project Director (Preservation of Kallyanpur Retarding Pond Project)
Mr. Mossaraf Hossain Furuque	Executive Engineer, Pagla Central Storage Yard
Mr. Saidul Islam	Executive Engineer, MODS Zone-3
Mr. Bahrul Islam	Executive Engineer, Mirpur Workshop
Mr. Shausul Alam	Executive Engineer, Drainage Circle (Division III)
Mr. Md. Nurul Haque	Chief Engineer
Mr. Kazi Habib Ullah	Assistant Engineer, Drainage Circle
Mr. Mieza Golam Kibria	Assistant Engineer, Drainage Circle (Electrical & Electronic Engineer)
Mr. Momin Sarker	Assistant Engineer, Drainage Circle
Mr. Mukhlesur Rahman	Sub-assistant Engineer, Drainage Circle
Mr. A. Mannan	Sub-assistant Engineer, Drainage Circle
Mr. Saiful Islam	Sub-assistant Engineer, MODS Zone-6
Department of Environment, Ministry of Environment & Forest	
Mr. Mohammad Reazuddin	Director (Technical)
Mr. Mohamood Hasan Khan	Deputy Director (Technical)
Mr. Md. Shaljahan	Deputy Director (Environmental Clearance)
Mr. Mozaharal Alam	Research Fellow, Bangladesh Centre for Advanced Studies (BCAS)
Mr. Mirza Shawhat Ali	Deputy Director (Research)
Embassy of Japan	
Mr. Matsusiro HORIGUCHI	Ambassador Extraordinary and Plenipotentiary

Mr. Masahiro KIYA	Counselor for Development Cooperation and Economic Affairs
Mr. Koji NITTA	First Secretary
Mr. Shinya TSURUDA	Second Secretary

JICA Bangladesh Office

Mr. Noriaki NAGATOMO	Additional Resident Representative
Mr. Takuya SUGAWARA	Deputy Resident Representative
Ms. Sonia Tahera Kabir	Staff

Bangladesh University of Engineering & Technology

Prof. Dr. Md. Mujibur Rahman	Professor of Civil Engineering, Environmental Engineering Division

Bangladesh Water Development Board

Engr. Md. Salim Bhuiyan	Executive Engineer (Flood Forecasting & Warning Centre)
Mr. Mohiuddin Ahmed	System Analyst, Processing & Flood Forecasting Circle

Bangladesh Meteorological Department

Mr. Md. Shah Alam	Deputy Director

4. Minutes of Discussion (M/D)

(1) M/D (Field Study of the Basic Design)

Minutes of Discussion
of the Basic Design Study
on the Project for the Improvement
of Storm Water Drainage System in Dhaka City (Phase II)
in the People's Republic of Bangladesh

In response to the request from the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a Basic Design Study on "The Project for the Improvement of Storm Water System in Dhaka City (Phase II)" (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA dispatched the Basic Design Study Team (hereinafter referred to as "the Team") to Bangladesh, headed by Mr. Akio Arai, the Resident Representative of the JICA Bangladesh Office, and is scheduled to stay from February 11, 2006 to March 13, 2006.

The Team held a series of meetings and discussions with the officials concerned of the Government of the People's Republic of Bangladesh. During the course of the discussions, both sides have confirmed the main items described in the attached sheets. The Team will proceed to further study and prepare the Basic Design Study Report.

Dhaka, February 20, 2006

新井明男

AKIO ARAI
Leader
Basic Design Study Team
Japan International Cooperation Agency

M EMDADUL HAQUE
Deputy Secretary
Economic Relations Division
Government of the People's Republic of Bangladesh

ATTACHMENT

1. Objective

The objective of the Project is to mitigate the floods and improve environmental and sanitation conditions of the first priority drainage zone, C of 10.92 km^2 and H of 17.60 km^2.

2. Project Site

The sites of the Project are located in Dhaka City as shown in **Annex-1**.

Bangladesh side explained to the Team that the site for construction of pumping station is property of Dhaka Water Supply and Sewerage Authority (hereinafter referred to as "DWASA")

3. Responsible and Implementing Organizations

(1) The responsible ministry is the Ministry of Local Government, Rural Development and Cooperatives.

(2) The implementing organization is the DWASA (the organization chart of implementing agency is shown in **Annex-2**).

4. Items Requested by the Bangladesh Government

After discussions with the Team, the items described in **Annex-3** were finally requested by Bangladesh side. JICA will further assess the appropriateness of the request and will make necessary recommendation to the Government of Japan for approval.

In case that the Team has confirmed the pertinence and viability of procuring the equipments for securing the flow capacity with the examination of the Action Plan for Dredging and Retrieval Works submitted by Bangladesh side, the Team will proceed to design the details of the equipments and soft component, if necessary.

5. Japan's Grant Aid Scheme

(1) Bangladesh side understands the Japan's Grant Aid scheme and the necessary measures to be taken by the Government of Bangladesh, as explained by the Team which is described in **Annex-4**.

(2) Bangladesh side will take necessary measures, as described in **Annex-5**, for smooth implementation of the Project, in order to meet a condition for the Japan's Grant Aid.

6. Schedule of the study

(1) The consultants will continue to conduct the further study in Bangladesh by March 13, 2006.

(2) JICA will prepare the draft report in English and dispatch a mission to Bangladesh in order

to explain its contents around the middle of June, 2006.

(3) In case, the contents of the report are accepted in principle by the Government of Bangladesh, JICA will complete the final report and send it to the Government of Bangladesh by the end of August, 2006.

7. Other Relevant Issues

(1) Bangladesh side shall submit answers of Questionnaire given by the Team by February 28, 2006.

(2) Bangladesh side shall complete necessary procedure of Initial Environmental Examination (IEE) by the end of April and report the result to JICA Bangladesh Office.

(3) Bangladesh side explained that the land acquisition process for the regulating pond adjacent to the Kallyanpur Storm Water Pumping Station will be completed within June, 2007 and total available land to be preserved will be approximately 100 hectare.

(4) Once the draft report has been submitted, Bangladesh side shall proceed to Development Project Proposal (DPP) procedure.

(5) Bangladesh side agrees to allocate sufficient budget and qualified staff for proper and effective operation & maintenance of the equipment and the facilities to be provided under the Grant Aid.

(6) Comments of Local Gouvernment Division attached in Annex – 6