

CHAPTER 3 IMPLEMENTATION PLAN

3-1 Implementation Plan

3-1-1 Implementation Concept

The Project for the Rehabilitation of Angat Afterbay Regulator Dam is to be implemented under the Japan's Grant Aid Program based on the following conditions:

(1) Execution of the Project

The project will be a large-scale river construction work across a 500-meter river channel involving the remodeling and repair of existing or newly constructed structures that constitute part of the Angat Afterbay Regulator Dam. With the procurement of a small proportion of maintenance equipment, the project will contain civil engineering works typically consisting of earthworks, sheet pile works, and concrete works. The works are to be executed by a general contractor under a contract for the whole work.

(2) Design and Supervision

The detailed design, tendering and supervision of construction services are to be undertaken by a qualified Japanese consulting firm under an agreement with NIA of the GOP.

(3) Construction Works

Construction works of this project are to be executed by a Japanese constructor, to be selected from short-listed and pre-qualified bidders, under a contract with NIA.

(4) Local Contractors

The participation of local contractors is to be expected since earthworks, sheet pile works, concrete works, and masonry works constitute a major portion of the project. Likewise, the required construction materials are to be procured from the local market, except the materials that are not locally available in the required quality and quantity and should be procured from Japan or neighboring third countries.

(5) Responsible Implementing Agency

NIA of the GOP will be the implementing agency responsible for the project. After the Exchange of Notes (E/N) between the Government of the Philippines and the Government of Japan, NIA will implemented the selection of a consulting firm and will subsequently implement the examination of detail designs, tendering of the works to constructors, and supervision of construction works.

(6) Services by the Consulting Firm

The selected consulting firm will carry out the on-the-job training on operational and maintenance management of dam facilities and effect technology transfer to local counterpart personnel during the construction period.

3-1-2 Important Considerations

(1) Legal Procedures before Execution of the Work

(a) Investment Coordination Committee (ICC) Clearance

In accordance with the modification of project expenditures, a new Investment Coordination Committee Clearance has to be requested from NEDA.

(b) Environmental Clearance Certificate (ECC)

This project is to be implemented under the Japan's Grant Aid scheme subsequent to "The Basic Design Study on the Project for Rehabilitation of the Apron of Angat Afterbay Regulator Dam" that was conducted in 1996. There are no substantial changes in the facilities subject to remodeling and in the range of impact on the surrounding environment due to the proposed construction works.

In September 1999, the Third Regional Bureau of NIA reported on IEE to the Third Regional Bureau of DENR and requested the issuance of ECC. In response to the request, the Third Regional Bureau issued the ECC for this project in October 1999 (Ref. Code No. 03BU 9909-01 0104-120A. Thus, this project complies with the Environmental Act of the Philippines.

(c) Site Acquisition

Although construction works pertaining to this project are to be implemented on the river course (national land) of Angat River, a part of the river course near the training dike in the downstream on the right bank runs along a privately owned land. Since the ground sill works and the land refilling works on the back of training dike will require partial use of the privately owned land, acquisition of the site must be completed with the consent of the landowner before the start of construction of the project.

(2) Precautions during the Construction Period

(a) Gate Operation during the Construction Period

If water overflows a spillway gate into a temporary closure area, construction works will be hampered. Accordingly, the gate operation must be performed in such a way that the reservoir water level does not exceed EL. 17.50 m during the construction period. The operating method should be such that the spillway gate on

the upstream side of the closure area is completely raised and the washout gate is fixed to closed state while the opposite side gate is controlled. Specifically, the air pressure of the rubber gate (opposite site) is decreased to lower the gate height to allow the water in the reservoir to overflow the gate, and the washout gate is raised to allow the water to underflow. If flood occurs by any chance and the reservoir water level cannot be maintained at EL. 17.50 m even if the washout gate is fully opened, one or two of the spillway gates are inverted to discharge the water.

Before starting the construction works, the NIA personnel in charge of the Angat regulator dam gate operation should be required to get themselves well versed on the gate operating methods described above.

(b) Restriction on Water Intake

The National Water Committee determines the intake rate of irrigation water from the regulator dam on a monthly basis. The data reveal that the maximum intake value is $40.0 \text{ m}^3/\text{s}$ and the period when the intake rate is decreased to zero are a full month in May and a half-month in November.

Since the construction works of this project can be carried out without lowering the reservoir level, there will be no particular need for requesting the restriction of irrigation water intake. Nevertheless, the execution of riverbank protection works in the upstream of right intake gate will involve the river bank facing the reservoir, so that a lower reservoir level would be preferable for the safety and economy of construction works. In this sense, the revetment works should be scheduled in May when irrigation water intake will be practically zero, and for one month the reservoir level should be lowered to EL. 15.00 m to facilitate the revetment works.

(c) Flood Countermeasures

By the nature of river construction works, this project will require closure of the river channel. In the same sense, construction works should not be attempted in the rainy season when flooding is likely, but should be executed in dry season only. Thus the construction period encompasses two dry seasons. When the river channel is closed twice, each structure within the closure range must be completed within each season to ensure safety during the subsequent rainy season. Also, floods may occur even during the dry season; hence, the following measures for flooding should be taken:

- i) Acquire data of upstream rainfall and rate of discharge from Angat Dam to roughly determine the flow rate in downstream river channel, and obtain the gate operation status information of the Angat Afterbay Regulator Dam from NIA.

- ii) When flooding due to gate discharge is envisaged, confirm the working form of the works immediately before the flooding.
- iii) In order to evacuate and remove personnel, operating machinery, and building materials in a safe and smooth manner in the event of unforeseeable flood, the operation manual for evacuation routes and place, and materials transportation methods must be prepared well beforehand.

(d) Spoil Bank

As a place for dumping sand and gravel generated from riverbed excavation, the river channel area on the back of right bank training dike is most favorable. However, since the area is privately owned, negotiation with the landowner regarding site acquisition is required. Also, the existing gabion mattress for riverbed protection need to be removed to dispose the cobblestones; however, they should be utilized in this work.

(e) Consideration of Water Right and Fishing Right

(i) Water Right

NIA's irrigation water right in the Angat Afterbay Regulator Dam pertains to a flow rate of 40 m³/s. In addition, water with a flow rate of 2 m³/s is to be discharged as river maintenance water to the downstream of the Angat River. Accordingly, a construction work plan with due consideration paid to the water right is to be formulated in the implementation of this project. In planning the temporary closure of the river, the constant discharge rate of 2 m³/s and surplus water discharge should be assured.

(ii) Impact on Fishing Right

According to the AMRIS Office, there is no person or organization that has a fishing right and lives on fishing in the Angat River. However, there are some people who fish carp (tilapia), catfish, river shrimp, etc. for daily food consumption. Since the facilities remodeling plan of this project ensures the maintenance of intake in the upstream of the gate and the river level in the downstream, no discernible adverse effect of the construction work on these levels is conceivable.

(iii) Other Issues

The direct downstream of the subject remodeling work site is popular with tourists enjoying river sightseeing. In this connection, a number of vendors are found. Since these vendors have no authorizations whatsoever, they may be removed under NIA's responsibility whenever required. Similarly, the subject work site and peripheral areas are free from illegal occupants.

(f) Quality Control of Concrete

The construction works will use either ready-mixed concrete or on-site batcher plant concrete. For the quality control of the concrete, sufficient guidance and supervision are to be executed to maintain the strength specified in the Design Standards.

(g) Environmental Measures during Construction Work

The following issues should be borne in mind in the implementation of this project:

- i) Since the river channel in the immediate downstream of Angat Afterbay Regulator Dam is closely involved in the daily life of the peripheral residents in their strolling, bathing, washing cloths, fishing, etc., the facilities design and construction works require utmost consideration on the actual status of river usage (particularly, assurance of access to the river course and water surface).
- ii) Since water quality of upstream and downstream of Angat Afterbay Regulator Dam is favorable, the construction works require adequate consideration on water quality of the river (water quality preservation).
- iii) The space in the periphery of Angat Afterbay Regulator Dam is noted as one of the scenic spots in the region and the park on the left bank is visited by many people. Accordingly, great care should be taken in the design and construction works to preserve the scenic beauty of the river.
- iv) Since the construction site is located near the urban area, adequate care should be taken to minimize adverse effects of noise and dust generated by dump trucks and concrete mixer lorries carrying sand and concrete.

3-1-3 Construction Plan

(1) Basic Conditions of the Construction Plan

(a) Construction Period and Number of Working Days

The construction period of this project is scheduled to be about 20 months from August 2001 to March 2003. Since a major portion of the construction works is to be performed within the river channel, temporary closure of the river channel is required. The cofferdam for river channel closure blocks the flow of a flood and the cofferdam itself is significantly affected by the flood. To avoid the adverse effect, construction works in the river channel should be limited within the dry season (7 months) from November to May in the following year. Nevertheless, manufacture of concrete blocks for the riverbed protection, which can be performed on a land area with a higher altitude, is to be carried out during rainy season as well.

On a day of great rainfall, construction works need to be suspended. The number of rainfall works suspension days is to be determined by referring to past rainfall records. Thus the mean values of the number of workable days calculated from the daily rainfall values specified in Table 3-1 are to be employed.

Table 3-1 Calculation Conditions of Workable Days

Work Type	Daily Rainfall
Earth Works	5 mm/day or less
Other Works	10 mm/day or less

(b) Flow Rate for Flood Measure and Height of the Crown of Dike in Temporary Cofferdam Closure during Construction Period

The 10-year probable flow rate during the dry season from November to May in the following year is roughly estimated to be 500 m³/s at the Angat Afterbay Regulator Dam. When a flood occurs, one of the rubber gate needs to be inverted to discharge the reserved water at a flow rate of 500 m³/s. Accordingly, when closing half of the river, the gate should be so designed that 500 m³/s of water would safely flow in the river channel. The dike crown height of temporary cofferdam to be installed during the construction period should be calculated by first obtaining the river stage at a flow rate of 500 m³/s. Then an allowance of 1.0 m is added, resulting in EL. 11.00 m. Since the flow velocity at this stage is approximately 2.8 m/s, the slope face and dike foot should be protected to prevent running water from eroding the temporary cofferdam.

(c) Concrete Procurement

The supply capacity of the four ready-mixed concrete suppliers currently operating nearby Angat Afterbay Regulator Dam was surveyed (Table 3-5). Each supplier has the daily output of ready-mixed concrete in the range of 60 to 250 m³ and transportation time from ready-mixed concrete plant to the dam site is within 45 minutes except when encountering heavy traffic.

In contrast, the total concrete requirement for the groundsill work is approximately 30,000 m³, of which cast concrete volume per block of the groundsill is estimated to be approximately 600 m³. This amount is unmatched by the total production capacity of the four local ready-mixed concrete suppliers. This means that it is unwise to totally rely on the local suppliers to supply ready-mixed concrete for the groundsill concrete work in view of supply stability.

Consequently, in order to complete the groundsill work as planned while maintaining concrete quality, it is required to supply concrete in a systematic manner by building a concrete batcher plant at the dam site. As to construction works other than groundsill, since concrete requirement is not so large as that for

groundsill work, the ready-mixed concrete from local suppliers may be used by conducting due guidance and supervision on quality control.

(d) Temporary Yard

The temporary yard for the temporary storage of fillers for concrete works, concrete block production, concrete batcher plant and the like is to be provided on the river course with an elevation of EL. 10.0 meters or more in the downstream 150 to 200 meters away from the existing second stage apron near the left bank. Additionally, temporary storage areas for construction materials should be provided at the first and second stage aprons.

(2) Temporary Works Planning

(a) Duration and Range of Temporary Cofferdam Closure

Temporary cofferdam closure of the river channel is to be performed twice, in the dry season of the first and second years, each time before starting the groundsill work. While there is a construction work duration of 7 months in the dry season of the first year, that of the second year is limited to 5 months because of the total planned duration of the work. Consequently, the groundsill work should cover the largest possible range in the dry season of the first year. To this end, the river closure in the dry season of the first year is to be intended for the left bank side portion and closure range should be limited to approximately two-thirds of the river width, and for the second year, the right bank side portion, and the remaining 1/3 is to be closed.

(b) Temporary Cofferdam Closure Work

Methods for temporary cofferdam closure are roughly classified into two types, namely, i) withstanding hydraulic pressure by means of the weight of cofferdam dike body itself, and ii) withstanding hydraulic pressure by means of the flexural resistance of sheet piles and sub-grade counterforce. Since the subject work site has a relatively shallow river water depth, a sub-grade with tight gravel, and a large operating yard, the gravity type closure method is advantageous. Moreover, since this method allows the construction work at a lower cost, the gravity type closure method is to be employed on the subject site.

Since the temporary cofferdam closure in the downstream river channel from the second stage apron will work as a closure in a channel with a stream, gabion mattresses and large sand bags are to be piled up on the riverbed to construct a temporary dike. The temporary dike will measure EL.11.0 m, crown dike width 2 m, slope gradient is a 1:1 trapezoidal cross section, and height 3 to 5.0 m or thereabouts. Waterproof sheets are to be inserted inside the closure dike to prevent infiltration of water from the river into the closure. The existing closure on the

apron is likewise constructed by piling up large-size sand bags to an approximate height of 1.5 m.

(c) Method for Excavation and Groundwater Treatment

The method for riverbed flattening excavation to facilitate the groundsill work should in principle be open grading excavation because the operating yard is sufficiently wide. Since the sub-grade consists of a gravel layer almost completely, the excavation is to be performed by using backhoes and bulldozers. Since soft tuffs are exposed on the riverbed on the left bank of groundsill, large-size breakers are used for excavation.

Since the excavated level within the temporary cofferdam closure is lower than the river stage by 2.5 to 3.0 m, when excavating a highly permeable sub-grade, there will be a high probability of groundwater inflow. Methods for treating groundwater can be classified into water-stopping work and water-discharge work. In this case, the water-discharge method is to be employed because of the simplicity and economy of the work. Specifically, a temporary drainage canal is to be excavated from the closure area to a low riverbed elevation point in the downstream river channel to allow the groundwater inflow to drain by itself. Also, auxiliary submersible pumps are used for shallow sump drainage.

(3) Construction Method

(a) Contents of the Work

Contents of the construction work are roughly classified as indicated in Table 3-2.

Table 3-2 CONTENTS OF THE WORK

Classification of Work		Item of Work
1.	Preparation work	
2.	Temporary work	- Concrete batcher plant - Gravel yard, materials yard - Roads and temporary bridges for work - Temporary drainage canal - River excavation, temporary closure dike
3.	River earthwork	- Removal of existing structures and land grading - River channel excavation and refilling
4.	New groundsill work	- Main groundsill work - Apron and riverbed protection work - Side wall revetment - Dike crown concrete
5.	Reinforcement of right bank training dike	- Removal of existing structures and land filling - Revetment work
6.	News end sill installation	- End sill of 1st stage apron - End sill of 2nd stage apron
7.	Improvement and repair of existing facilities	- Repair of cave-in area of 2nd stage apron - Revetment in immediate down stream of right-bank sediment discharge gate - Treatment of cavity in the subgrade beneath the apron - Repair of existing apron bed plate - Water flow control concrete wall - Repair of left-bank wet masonry revetment
8.	Revetment of river bank in the upstream of right bank water intake gate	- Sheet pile work, rubble-mound work, and slope covering work
9.	Installation of maintenance equipment	Discharge alarming system, Search light, Dedicated Radio system unit, and Boat for regulator dam operation

(b) Construction Procedure and Methods

The following describes procedure and methods for the subject construction works in dry and rainy seasons, respectively.

i) The first rainy season (August through October)

Preparatory construction works for offices and lodgments of contractors are performed.

Concrete plant, materials, and gravel yards are constructed and temporary works for construction roads, temporary drainage canals, and temporary cofferdam closures are carried out. The temporary cofferdam closures should be in the range of groundsill work in the downstream of the 1st through 4th flood discharge gates.

In the closure range, removal of riverbed protection work, wood cutting, roots removal, land grading, riverbed excavation, land filling of deeply excavated areas are performed.

ii) The first dry season (November through May in the following year)

Repair work for the of cave-in area of 2nd stage apron is implemented.

The body of groundsill in the downstream of the 1st through 4th sediment discharge gates is constructed. (piling of steel sheet piles, bar arrangement, concrete form setting, jointing, concrete casting, etc.)

The temporary cofferdam closure dike is to be removed to the middle zone of the river to limit the range of groundsill work to the right bank side. Concurrently, the river channel excavation and land filling on the right bank side are carried out.

The body of groundsill work in the downstream of the 5th and 6th sediment discharge gates is constructed. (piling of steel sheet piles , bar arrangement, concrete form setting, jointing, concrete casting, etc.)

Construction of the bank protection work in the upstream of right bank water intake gate is started. (Spreading of sand and gravel in the construction yard, piling of steel sheet piles)

The temporary cofferdam closure dike is moved to the right bank side (in the downstream of the 6th washout gate), and land filling and revetment of part of the side wall revetment of right bank of groundsill and the training dike are constructed.

Reconstruction of the retaining revetment in the immediate downstream of right bank washout gate and the repair of cave-in area of the second apron.

In compliance with the temporary cofferdam closure plan, the end sill of the second apron is constructed.

The temporary cofferdam closure dike is removed, and the temporary construction works as countermeasures for rainy season (refilling of groundsill work end area and installation of scour protection work) are implemented.

iii) The second rainy season (June through October)

Riverbed protecting concrete blocks and foundation consolidating blocks are produced in the temporary yard.

iv) The second dry season (November through March in the following year)

Closure of river channel on the left bank side, construction of apron riverbed plate and left bank side wall revetment, and laying of bed

protecting block are carried out to complete the left bank side of the groundsill.

Treatment of hollow/cavities in the sub-grade beneath the first stage apron is performed. Concurrently, the end sill on the left bank side is constructed.

The right bank side of the river channel is closed and apron bed plate and right bank side wall revetment work is executed. Also, riverbed protection blocks are laid to complete the right bank side of the groundsill.

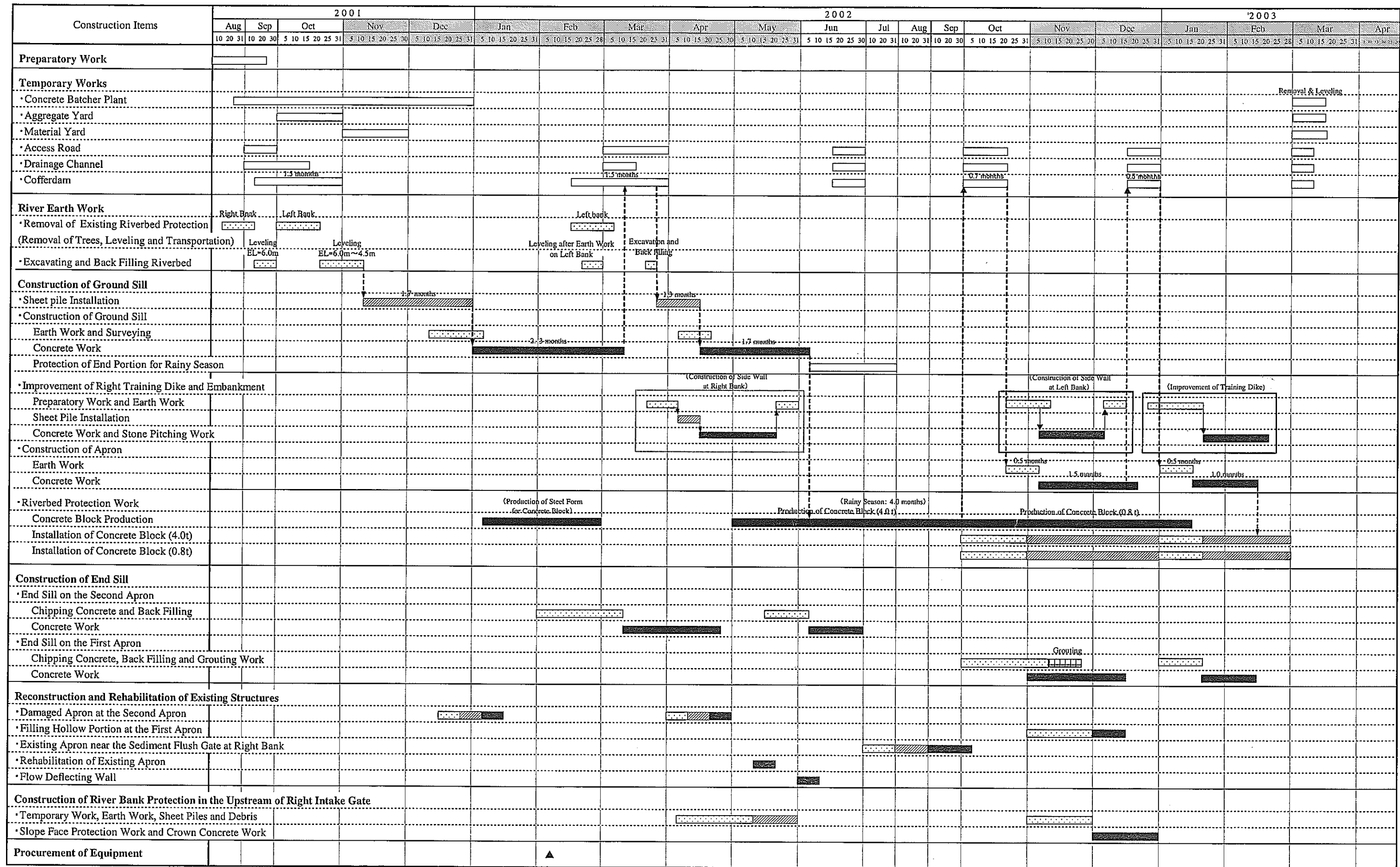
The protection work of the river banks in the upstream of right bank water intake gate is resumed, and dike crown protecting work, slope surface protecting work, rubble-mound work, and concrete block laying work are completed.

The temporary cofferdam closure dike, temporary roads, and temporary drainage canals are removed, and the construction yard is leveled.

(c) Construction Processes

Fig. 3-1 gives the process chart of the subject works.

Fig.3-1 CONSTRUCTION SCHEDULE ON THE PROJECT FOR REHABILITAION OF THE APRON AT ANGAT AFTERBAY REGULATOR DAM



3-1-4 Scope of Project Works

(1) Construction Works

All the construction works pertaining to the subject project are to be undertaken at the cost of GOJ. However, in the event the subject construction works damage any existing general road or public structure, repair work is to be executed at the cost of GOP.

(2) Materials Transportation Expenses

The expenses incurred by the transportation from Manila Harbor to the construction site of construction materials and equipment procured from Japan or any third country are to be borne by GOP. On the other hand, the materials and equipment to be procured domestically are to be delivered on site and the expenses are to be borne by GOJ.

(3) Procurement of Land

When privately owned land is required for construction works, the negotiation with landowners and acquisition of the land are to be conducted on the responsibility of GOP.

(4) Disposal Site of Waste Construction Materials and Spoil Bank

GOP is responsible for securing the site in the vicinity of Angat Afterbay Regulator Dam for the disposal of large quantities of concrete debris generated by the breaking work of existing apron and waste gabion mattresses and cobble stones generated by the removal of existing riverbed protection work. Similarly, the waste soil generated by the earthwork such as excavation and refilling of riverbed should be treated in the same way.

3-1-5 Construction Supervision Plan

A Japanese consulting firm (hereafter called the Consultant) will be responsible for the promotion of this project in lieu of GOP. Based on the consulting services plan, the Consultant will implement the detailed design services, tender-related services, construction supervising services, and technical guidance. Further, the Consultant will maintain close relationships with GOJ and GOP for exchange of views and information to ensure mutual, realistic coordination on the implementation of the overall construction plan.

(1) Details of the Services

(a) Detailed Design Services

Main elements of the implementation services to be undertaken by the Consultant are as follows:

- i) Consultation with executing authorities on the project implementation and on-site survey: (On the site)
- ii) Facilities detailed design (Design and calculation, drawings, and construction specifications, etc.): (in Japan)
- iii) Construction planning and expenses estimation: (in Japan)
- iv) Preparation of bidding documents: (in Japan)
- v) Acquisition of approval for implementation design and personnel dispatch: (On the site)
- vi) Comparison of B/D with D/D and examination: (in Japan)

Required period of time for the implementation design services is 4.0 months.

(b) Tender-Related Services

The Consultant is to consult with the executing authorities of GOP on the appointment of bidders and bidding method, and undertake the tendering services in lieu of the executing authorities. The Consultant will also review the results of bidding, report to the executing authorities, and promote the conclusion of the construction agreement. Main elements of the tendering services are as follows:

- i) Public tender notice
- ii) Preliminary qualification examination of bidders
- iii) On-site explanation and execution of tendering
- iv) Evaluation of the results of bidding
- v) Determination of successful bidder and agreement promoting services

Required period of time for the tender-related services is 2.0 months.

(c) Construction Supervision Services

The Consultant will dispatch a deputy on-site consultant to the Philippines to undertake or support the following services:

- i) Examination and approval of survey/construction drawings, construction plans prepared by construction contractors
- ii) Confirmation of construction status (processes management, quality control, and working form control)

- iii) Liaison and coordination with related authorities of GOP
- iv) Control and approval of construction work records
- v) Work results/working form inspection and delivery services
- vi) Issuance of certificates and submission of reports and other related documents

Required period of time for the construction supervision services is 20 months.

(d) Technology Transfer Services

Since the subject dam facilities are constructed across the river, sand sedimentation in the up and downstream of the facilities, riverbed fluctuation caused by flood, riverbed degradation and the like due to factitious acts such as gravel removal are the significant concern in the future. Consequently, the operation of dam reservoir and associated facilities (including gate operation) and maintenance and control of these facilities will be critical tasks from now on. Thus, technology transfer will be promoted by exercising on-the-job training for those concerned at work on the site during the construction period of the subject project with the emphasis placed on the operation and maintenance management of the reservoir and dam facilities. Methods for the technology transfer include holding technical seminars, site visits, technical meetings and the like.

(2) Construction Supervision System

To implement the above-mentioned construction supervision services, the Consultant is to practice the following system:

(a) Method for Construction Supervision

This project requires a total of about 20 months for the construction works including river earthwork, construction of new river structures, remodeling and repair of existing facilities, and materials procurement. Thus a civil engineer (in charge of river structures) is stationed on the site appointed to perform the services as an agent of the construction implementation organ for the whole construction works during the total construction period. In parallel, a services supervisor and engineers, each in charge of soil and foundation, will be dispatched to the site on an occasional basis when key construction works are initiated during the construction period so as to ensure effective construction control.

In conducting the construction supervision, the Consultant will perform services under close coordination with the main bureau and the responsible persons of NIA Central Office and the 3rd Regional Office of NIA, which are the executing

authorities, and simultaneously reports to the Philippine Office of JICA on a periodic basis.

(b) Personnel Recruiting Plan

Taking into consideration of the details and nature of this project, the personnel of the construction supervision have been determined as specified in Table 3-3.

Table 3-3 CONSTRUCTION SUPERVISION SYSTEM OF THE CONSULTANT

Type of service	Details of service	Personnel/Specialty
Implementation design services	On-site service, detailed design, and tendering documents preparation	Services supervision (overall river and civil engineering) Civil engineer (facilities design) Civil engineer (specifications)
Tender-related services	Public tender notice, preliminary examination, on-site explanation, and tender evaluation	Services supervision (overall river and civil engineering) Civil engineer (specifications)
Construction management services	Stationed construction control and Occasional construction control	Civil engineer (river structures) Services supervision (river) Civil engineer (soil/foundation)
Technology transfer services	Technical seminars, and site visit	Services supervision (river) Civil engineer (river structures)

3-1-6 Procurement Plan

(1) Basic Plan for the Procurement of Equipment and Materials

(a) Materials for the Construction

The purpose of the project is to rehabilitate the apron of Angat afterbay regulator dam. The main work is civil works construction, and materials such as cement, aggregate, etc. are to be procured.

The field survey in the Basic Design Study has confirmed that, generally, most of the materials are available in the Philippines and can be procured at reasonable prices and satisfactory quality for the Project. Therefore, such available materials for the civil works construction will be procured in the Philippines. Since the steel sheet piles that could satisfy the requirements for the Project are not manufactured in the Philippines, they will be procured in Japan.

Procurement places of main materials for the construction are given in Table 3-4:

Table 3-4 Procurement Place of Main Materials

Material	Procurement Place
Cement	Norzagaray, Bulacan; 15 km from the site
Aggregate	San Rafael, Bulacan; 5 km from the site
Ready Mixed Concrete	Baliuag, Bulacan; 15 km from the site
Steel Sheet Pile	Japan
Joint Sheet	Metro Manila
Water Stopper	Metro Manila
Vapor Barrier	Metro Manila
Lumber	Metro Manila
Scaffolding	Metro Manila
Boulder	Gapan, Nueva Ecija; 40 km from the site Penaranda, Nueva Ecija; 45 km from the site Floridablanca, Pampanga; 70 km from the site
Reinforcing Bar	Metro Manila

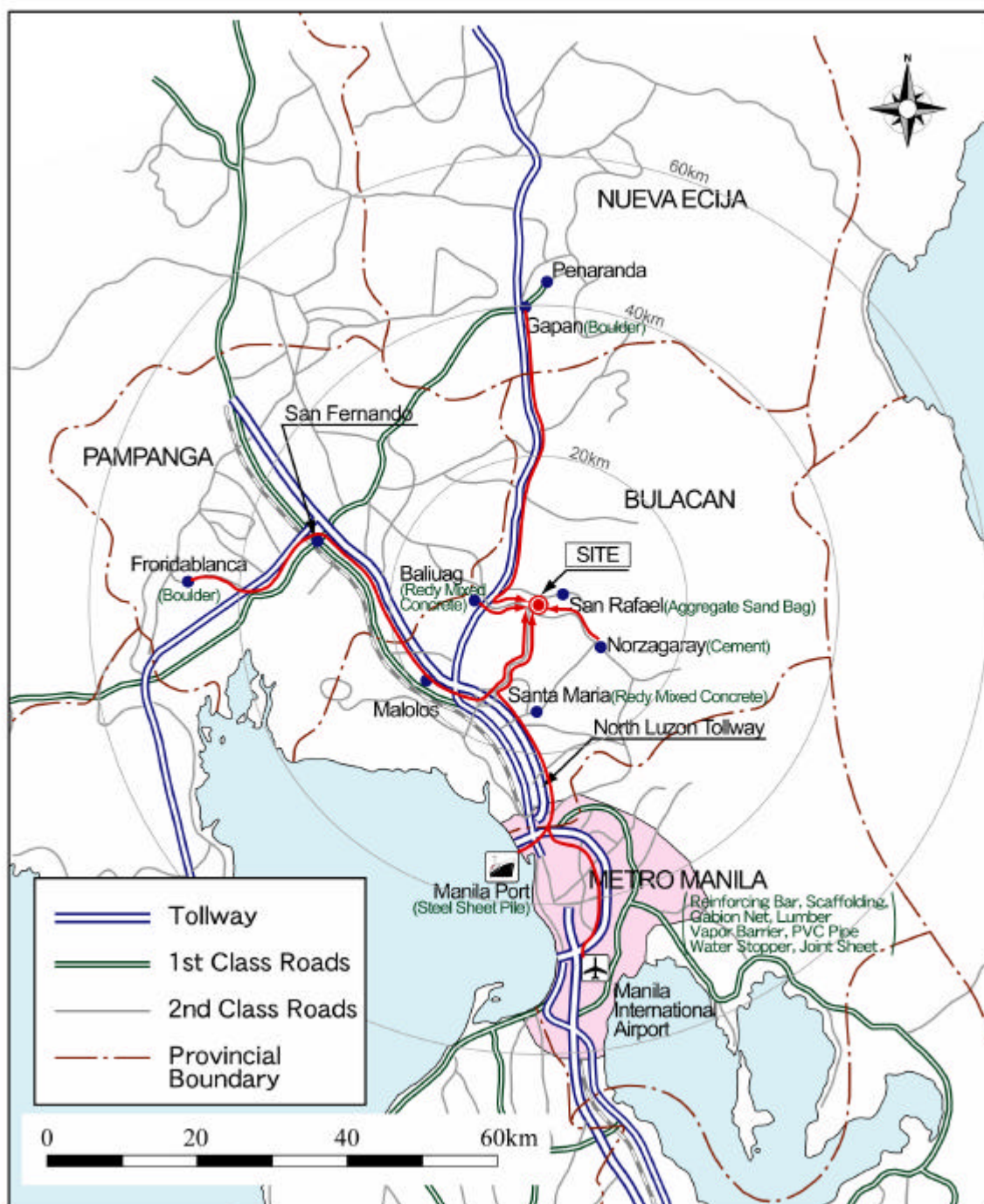


Figure 3-2 Location Map of Procurement Place of Materials

The procurement method for cement and ready mixed concrete could be either one of the following:

- (i) To purchase and/or have cement, aggregate and water; to bring them to the site; and to produce concrete at the site; or
- (ii) To purchase ready mixed concrete from a concrete factory and bring it to the site; or
- (iii) To combine the above two methods.

The amount of concrete is estimated to be more than 500 m³/day. The second method or (ii) could not be adopted for the project, because the total capacity for ready mixed concrete of concrete factories near the site is less than 500 m³/day as shown in Table 3-5. Therefore, the third method or (iii) will be adopted, i.e., the main concrete works will be covered by a concrete plant at the site and other concrete works will be covered by the concrete factories near the site.

Table 3-5 Comparison of Concrete Factories Near the Site

Concrete Factory	A	B	C	D
Distance from the Site	3 km	15 km	13 km	10 km
Maximum Production Amount	200 m ³ /day	200 m ³ /day	60 m ³ /day	60 m ³ /day
Number of Mixer Trucks	8	15	3	4
Number of Transportation a Day between Factory and the Site	6	2	2	3
Transportation Capacity to the Site*	200 m ³ /day	150 m ³ /day	30 m ³ /day	60 m ³ /day
Remarks				Construction in Progress

* Capacity of Mixer Truck: 5 m³

(b) Equipment for the Operational and Maintenance Management

The equipment procured under the project shall consist of four (4) items: boat, siren, searchlight and two-way radio necessary for the operational and maintenance management of Bustos Dam. The equipment will be procured in the Philippines, and the procurement plan is as follows:

- (i) Boat
 - The boat shall have a seating capacity of three (3): a crew, a NIA staff member and the space for monitoring equipment. Hence, length of the boat should be 3.0 to 3.7 meters or 10 to 12 feet.

- The purpose of the boat is for monitoring the Bustos Dam; the boat will be used upstream of the dam. The upstream of the dam has a generally gentle stream. However, fast stream occurs often around the intake gates and the sediment flash gates, and the width of Angat River is 500 meters. For these reasons, it is difficult to operate a boat without a motor engine, so that an outboard type boat will be procured. Outboard type boat is easier to maintain than the inboard type boat. Output of the engine shall be 5.9 to 7.3 kW or 8 to 10 PS.
- In consideration of safekeeping for the prevention of theft, it is recommendable to keep the boat on land at night even if operated everyday. Therefore, a particular stand for safekeeping of the boat on land will be involved in the procurement.
- Number of boat to be procured is one (1).

(ii) Siren

- One siren to alert discharge is currently installed only at the rooftop of the left side bank operation room. Therefore, another siren will be procured and installed at the rooftop of the right side bank operation room.
- The purpose of the siren is to alert discharge to inhabitants around the Bustos Dam, so that the sound of the siren should be audible for a radius of more than 500 meters. The siren shall have a single sound that is clearly audible at all directions there around.
- The siren will be located at the rooftop; hence, it should be waterproof.
- The materials for installing the siren will be involved in the procurement.

(iii) Searchlight

- Fixed type lights for monitoring the Bustos Dam are currently installed at the rooftop of both side bank operation rooms. However, the searchlight is installed in the left side bank operation room only. Therefore, another searchlight will be procured and installed in the right side bank operation room.

- The light beam of the searchlight should reach more than 250 meters, because 250 meters is only one-half of the width of the dam. The power of the searchlight shall be 1000 W.
- The searchlight will be located outside; therefore, it should be waterproof.
- The materials for installing the searchlight will be involved in the procurement.
- Spare lamp for the searchlight will be involved in the procurement.

(iv) Two-Way Radio

- The National Telecommunication Commission (NTC) controls radio wave and communications in the Philippines. For this reason, the two-way radios procured under the Project should be approved by the NTC as to output and wavelength. The wavelength of each two-way radio shall be the range not interfered in 400 MHz. Besides, each two-way radio shall have more than three (3) channels to prevent interference.
- Number of two-way radios is three (3) sets, i.e., one set each for the left and right side bank operation rooms and one for the Regional Office of NIA located at San Rafael (Region III; Central Luzon). The distance between both side bank operation rooms is 500 meters, and the distance of the dam and the regional office is 7 to 8 kilometers. Output of each two-way radio shall be more than 4W to reach a radius of 10 kilometers.
- The two-way radios shall be waterproof, because they are often used in the field.

(c) Labor for the Construction

In the Project for Rehabilitation of Angat Afterbay Regulator Dam implemented in 1997, labor for the construction work was procured near the site. Therefore, labor for the construction works of the Project for Rehabilitation of the Apron of Angat Afterbay Regulator Dam will also be procured near the site.

(2) Shipment Route

(a) Procurement of Domestic Products

Most materials and equipment for the construction will be procured near the site (the Province of Bulacan or Central Luzon Region) or in Metro Manila. The highway called North Luzon Toll Way with two or three lanes of traffic going each way connects near the site to Metro Manila. Main roads around the site are paved with two lanes. There is sometimes traffic on the roads; however, the transportation of materials will go on without hindrance. The road between the site and a main road is about 200 to 300 meters long and not paved, but it has enough width to transport materials. Totally, Metro Manila to the site takes around two hours; the distance is 40 kilometers. Therefore, it is possible to transport materials that are procured from the domestic market.

(b) Procurement from Japan

Steel sheet piles for the construction are planned for procurement in Japan. Hence, the transportation from the place of procurement to the Philippines is marine transportation. International ports for commerce near the site are located in Manila and Bataan. Considering the distance of inland transportation to the site, the Manila port is more suitable for the Project. Based upon the Minutes of Discussion signed on March 15, 2000, cost of taxes or levies, tax exemption and customs clearance at the port of disembarkation in the Philippines and inland transportation will be the responsibility of the Philippine side.

3-1-7 Implementation Schedule

The Project will be implemented under the Japanese Grant Aid Program just after the signing of the Exchange of Notes (E/N) between the Government of the Philippines and the Government of Japan.

After the E/N, the consulting contract will be made at an early time, subsequently the D/D including preparation of tender documents will be conducted. The D/D requires about 4 months to complete and the tendering works need another 2 months.

The construction will be commenced after the construction contract is exchanged. The whole construction work is assumed to require 20 months from the beginning to the completion.

The project implementation schedule is shown in Table 3-6.

Table 3-6 IMPLEMENTATION SCHEDULE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Detailed Design (4 months)																											
- Field Survey		▨																									
- Analysis			▨	▨	▨																						
- Confirmation					▨																						
Construction (20 months)																											
Rainy/Dry Season																											
- Preparatory Work								▨	▨	▨																	
- Temporary Work								▨	▨	▨	▨	▨	▨	▨	▨			▨			▨			▨			
- River Earth Work								▨	▨	▨	▨	▨	▨	▨	▨												
- Construction of Ground Sill											▨	▨	▨	▨	▨	▨	▨	▨				▨	▨	▨	▨	▨	▨
- Concrete Block Production												▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
- Concrete Block Installation																						▨	▨	▨	▨	▨	▨
- Improvement of Right Training Dike																											
- Construction of End Sill on the First Apron																						▨	▨	▨	▨	▨	▨
- Construction of End Sill on the Second Apron														▨	▨	▨	▨	▨									
- Rehabilitation of the Damaged Apron											▨	▨			▨	▨											
- Filling Hollow Portion																											
- Rehabilitation of Exsiting Apron near the Sediment Flush Gate at Right Bank															▨	▨	▨										
- Rehabilitation of the First Apron																▨	▨										
- Constuction of Riverbank Protection in the Upstream of Right Intake Gate															▨	▨	▨						▨	▨	▨		
- Removal and Leveling																											▨
Procurement of Equipment (6 months)																											

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3-1-8 Necessary Measures to be Taken by the Government of the Philippines

The Minutes of Discussion signed on March 15, 2000 in Manila specifies ten (10) items of necessary measures to be taken by the Government of the Philippines in case Japan's Grant Aid is extended, as follows:

- (1) To provide data and information necessary for the Project;
- (2) To secure the site for the Project;
- (3) To bear two kinds of commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement (B/A); namely, the advising commission of the Authorization to Pay (A/P) and the Payment Commission;
- (4) To ensure prompt unloading, tax exemption, and customs clearance at the port of disembarkation in the Philippines and prompt internal transportation therein of the materials and equipment for the Project procured under the Grant Aid;
- (5) To exempt Japanese nationals or staffs from a third country engaged in the Project from customs duties, internal taxes and other fiscal levies that may be imposed in the Philippines with respect to the supply of the products and services under the verified contracts;
- (6) To accord Japanese nationals or staffs from a third country, whose services may be required in connection with the supply of products and services under the verified contracts, such facilities as may be necessary for their entry into the Philippines and stay therein for the performance of their work;
- (7) To provide necessary permissions, licenses, and other authorizations for implementing the Project, if necessary;
- (8) To assign appropriate budget and staff members for proper and effective operation and maintenance of the facilities constructed under the Project;
- (9) To maintain and use properly and effectively the facilities constructed and equipment provided under the Project; and
- (10) To bear all expenses other than those to be borne by the Grant Aid within the scope of the Project.

3-2 Project Cost Estimate

For the smooth implementation of the Project, private land shall be secured at the site. Furthermore, prompt unloading, tax exemption and customs clearance at the port of disembarkation in the Philippines, as well as prompt internal transportation of the steel sheet piles, commissions to the Japanese foreign exchange bank, and the value added tax on the construction cost have to be undertaken without delay by the Philippine side. In this regard, the Government of the Philippines will bear the cost of 50,731,200 Philippine Pesos, as follows:

(1)	Private Land		
	Area	:	634 m ²
	Cost per Unit Area	:	300 Pesos/m ²
	Land Cost	:	190,200 Pesos
(2)	Steel Sheet Pile (488.16 tons)		
	Internal Transportation	:	475,000 Pesos
	Unloading, Port Charge, Handling Charge, etc.	:	276,600 Pesos
	Customs Charges (The cost of steel sheet piles is 16,239,000 Pesos and the customs rate for steel is 10%. However, in case of imports under the Japan Grant Aid, the Philippine Government will take necessary measures to exempt them from customs charges.)	:	(1,623,900 Pesos)
(3)	Commissions to the Japanese Foreign Exchange Bank (The amount of this cost depends upon the Banking Arrangement.)		
	Advising Commission on the Authorization to Pay (A/P)	:	---
	Payment Commission (If 1 Peso is equivalent to 2.76 Yen and the payment commission rate is 0.2% of the total grant cost.)	:	944,200 Pesos
(4)	Value Added Tax (Total cost for the Project is 472,213,000 Pesos and the rate of value added tax is 10%.)	:	47,221,300 Pesos
	Total Cost to be borne by the Philippine Government (Including customs charges for steel sheet piles)	:	50,731,200 Pesos

3-3 Cost for Operation and Maintenance

(1) Operation and Maintenance

The presently existing organization for operation and maintenance in the Regional Irrigation Office of NIA in Region III will still be available for the facilities after completion of this project. Operation and maintenance are to be carried out according to the O&M Manual and Operation Rule proposed in this report.

(2) Cost for Operation and Maintenance

The following O&M works will be necessary after the completion of the Project.

- Inspection of the facilities and repair works for minor damages of structure.
- Inspection of the reservoir and removal of obstacles floating in the reservoir.
- Removal of sediment and waterweeds in the stilling basin on the aprons.
- Operation of equipment and checking/maintenance of equipment.

Required cost for operation and maintenance is tentatively estimated as shown in Table 3-7.

Table 3-7 Required Cost for Operation and Maintenance

Items	Contents	Cost	Remarks
Personnel		-	No additional cost
Operation and Maintenance			
Cruising for Monitoring in and Clearing Trash from the reservoir	Fuel for boat	51,500	
Cleaning Stilling Basin	Fuel for equipment	20,500	
Operation, maintenance of equipment /facilities	Electricity, spare parts, repair cost	200,000	
De-silting	Subcontract	0	
Minor Repair for structural damages	Gabion, Sand bag, Concrete, Stone	200,000	
Total		472,000	

Cruising for Monitoring in and Clearing Trash from the reservoir

12 L/day × 13.66 Pesos/L × 314days/year 51,500 Pesos/year

Cleaning Stilling Basin (tractor shovel 0.8m³×2)

8 hrs/day × 5 days × 9 L/hrs × 9.55 Pesos/L × 2 × 3 times/year 20,500 Pesos/year