Chapter 3 Implementation Plan

3-1. Implementation Plan

3-1-1. Implementation Concept

This project involves the procurement of equipment and materials for water transmission facilities to be connected from the water source to the existing reservoirs in four districts, which mainly include the pumping and electric equipment and pipe materials. The Syrian Government undertakes the detail design of the structure as well as the electrical facility, civil works and equipment installations.

A similar project has been implemented under the Phase I Project. Main components of the Phase I Project are the procurement of pipes (φ400～150mm, 60.3km), submersible motor pumps (φ125～80mm, 21units) and diesel generators (7units) for 8 service districts. In this case, local contractors carried out pipe laying works and the studies and execution section of the Establishment supervised these works. The operation and maintenance section of the Establishment installed mechanical and electrical equipment directly. The construction was a little behind the schedule and has been completed in 1998.

This new project includes more facilities than the Phase I project, eventually among them, a transmission pumping station, a booster pumping station, a grand reservoir and 6 sets of pressure reducing facilities. This is primarily due to the longer distance and the large elevation difference between the water source and the existing reservoirs in the districts. Even though the water source is far from the beneficiary districts, the whole facilities have to be designed to function and be operated and maintained as a single system. With this new set of equipment and facilities, it is hope that this project would not repeat the unfavorable incidents of failure in pumps and motors. It will be assured that the necessary equipment and materials for the water supply facility shall be procured in this project and these equipment and materials shall be installed properly. Likewise, there is a strong commitment that the project shall be operated and maintained efficiently by the Syrian Government.

As for the construction works, local contractors will execute civil works and pipe laying works under close supervision by the studies and execution section of the Establishment. On the other hand, the operation and maintenance section of the Establishment will install the necessary mechanical and electrical equipment, as same as the Phase I project.

The construction schedule shall be studied in consideration of the ability of local contractors, the number of staff in the studies and execution section of the Establishment and its capacity for supervision, as well as the installation techniques for the mechanical and electrical equipment by the operation and maintenance section of the Establishment in order to properly execute the construction works within a short period.

Technical supervision by presenting standard drawings and examining the methodology and constraints will be required in the installation of major equipment and rare reducing valves. Discussions on important aspects of the mechanical and electrical system with the Establishment and adjustment among civil, mechanical and electrical works shall also be undertaken. Understanding of the significance of these facilities to the Syrian Government is considered quite important for the effective management of construction, operation and maintenance of the project facilities.

3-1-2. Implementation Conditions

The number of local contractors and their ability to undertaken construction works are very important in order to implement the project efficiently. This is because the transmission pipeline by gravity will be carried out by 6 local contractors at the same time considering the long distance to be covered and short construction period. Thus, local contractors must have adequate experience in pipe laying work and maintain the construction machinery, engineers and labor force.

Pipes, fittings and valves of different diameters will be laid at different locations depending on the design pressure and therefore the pipe shall carefully be laid by regularly verifying the confirmed standard drawings.

Equipment such as pumps, transformers, valves, etc. shall be installed after the pumping stations, pressure control tanks and other civil works have been satisfactorily completed. Therefore the Syrian Government must ensure that after delivery at the port, these equipment and facilities are transported to a weather-proof warehouse where these have to be packed and properly stood together with the spare parts and manuals for installation and operation until such time when they are needed.

Upon installation of the equipment and in order to ensure smooth operation of the equipment, it is quite important to undertake adjustments in civil, mechanical and electrical works, and provide supervision and guidance on adherence to standard drawings and work

quality. The Syrian Government will fully undertake the electric works including the manufacturing of control panels for pumps. In order to protect the pumps and motors from possible damages, key portions of these works such as circuits for safety or protection shall be designed and manufactured in accordance with the design standards provided by the Japanese experts and confirmed by the Syrian Government.

3-1-3. Scope of Works

The Japanese Government will grant the major equipment and materials of the transmission facilities under the project. The demarcation for major facilities and the civil works and equipment installation to be undertaken by the Syrian Government is shown below.

Table 3-1-1 Demarcated Contents of Major Facilities

Contents	By Japan	By Syria
1. Submersible pump: φ150mm, 9 units	○	—
2. Well houses: RC-made, 22m2, 9 units	—	○
3. Collection pipes: φ350mm～φ200mm, 1,156m	○	—
4. No.1 Receiving tank: RC-made, 500m3, 1 unit	—	○
5. Transformer: 1,750KVA, 1 unit	○	—
6. Transmission pumps: φ200xφ150mm, 4 units	○	—
7. Water hammer prevention work: pressure tank, 30 m3	○	—
8. Diesel generator: 700KVA, 2 units	—	○
9. Transmission pump house: RC-made, 300m2, 1 unit	—	○
10. Fuel tank: 25 m3, 1 unit	—	○
11. Transmission pipes: φ150mm～φ600mm, 52,926m	○	—
12. Ground reservoir: RC-made, 2,000 m3, 1 unit	—	○
13. Pressure control tanks: RC-made, 100 m3, 6 unit	—	○
14. Pressure reducing valve chambers: φ450mm, 6 units	○	—
15. No.2 Receiving tank: RC-made, 50m3, 1 unit	—	○
16. Transformer: 75KVA, 1 unit	○	—
17. Booster pumps: φ150xφ125mm, 2 units	○	—
18. Diesel generator: 75KVA, 1 unit	—	○
19. Booster pump house: RC-made, 40m2, 1 unit	—	○
20. Pump protection unit	○	—

Similar to Phase I Project, the FRP reservoir may be substituted with RC tank and /or steel fuel tank which can be built by the Syrian Government. As such these are not included in the list. Supplemental items to the major facilities have been included, while those intended for emergency purposes have been excluded under the project. For instance, submersible pump with a riser pipe, air valve and check valve, and pipe materials such as

fittings and valves for curves in the road and crossing structures are included, while a diesel generator for transmission and booster pumps are excluded because these will be used only in case of emergency.

The costs incurred for acceptance, inland transportation, etc. will be totally borne by the Syrian Government, while the costs of freight and to same extent part of insurance inland transportation will be borne by Japan.

3-1-4. Consultant Supervision

Project supervision to be provided by the Japanese Government mainly consists of consultation/meeting with the Syrian Government concerning the detailed design of civil structures prepared by the Syrian Government, approval of mechanical/electrical drawings submitted by the supplier, and inspection of the procured equipment and materials before shipping and after arrival at Tarturs port. In the inspection before shipping, only those meeting the required appearance, function, number and parts provided in the bidding documents and contracts shall be approved. All goods which arrived at the appointed port shall be thoroughly inspected, verified and confirmed.

Likewise, the installation and operation of major equipment such as transmission pumps, water hammer protection facilities, pressure reducing valves, etc. may require some guidance and staff training by the supplier and such necessity must be provided in the tender documents.

3-1-5. Procurement Plan

In order to make the best use of the equipment in the project, supplementary equipment in addition to the major ones have been included under the grant. These equipment and materials will be selected among the spare parts available in the Syrian market and as much as possible those which are easy to operation and maintain. The prerequisite equipment and materials for the project but are hardly possible for procurement in the local market, will be offered together with a reasonable quantity of spare parts.

The procurement of major equipment and materials is programmed as follows.

(1) Well pump (submersible pump)

The submersible pumps being used by the Establishment are these produced in Germany, Denmark, Britain, Italy, Sweden, USA, etc. and are of bid specifications. In addition, those supplied under the Phase I Project are also in operation.

The pumps under this project require specific design and manufacturing to meet the specific conditions of the wells. Therefore, the generally popular products may not be selected and the procurement of appropriate ones may not be made in a short period. Considering the delivery period and from operation and maintenance points of view, pumps made in Japan will be selected.

(2) Transmission pump and booster pump

Not many pumps of horizontal axis type for transmission or boosting are used by the Establishment, and these are made in Czechoslovakia. The pumps for the project shall be those specifically designed and manufactured in meeting the capacity, head and other specific conditions requiring precise technology that include measures against water hammer. Considering the delivery period and operation and maintenance aspects, pumps made in Japan will be selected.

(3) Transformer

Two transformers will be installed; one at the transmission pumping station and another at the booster pumping station. Considering convenience in transportation along with other equipment and by comparing economy in manufacturing and freight, delivery period, etc., Japanese products will be more advantageous.

(4) Pipe

The project shall employ ductile iron pipes (DIP). DIP presently used in Syria are those imported from France, Sweden, etc. and no specific types of pipe are dominant. The quantity of DIP to be procured for the project is so large and exceeds 10,000 m3. The procurement, therefore, is examined not only in terms of economy including transportation costs but also the delivery period of prospective suppliers in Japan and the third nations. Japanese goods are more expensive than products made in third nations, but were still strongly favored in the Phase I project by the Establishment. Japanese suppliers can produce many pipes similar to those used in this project. Therefore, Japanese products will be more advantageous.

(5) Pressure reducing valve

The pressure reducing valves used in the existing pressure control facilities are

those of small bores as φ200mm or less and of Poland or Korea made. The pressure control valves to be used for the project are of φ450mm in diameter with a large capacity, and require high technology as compared with the existing small ones. High technology for protection against corrosion and damage by water hammer and prolonged durability to withstand continuous and long-term use, are required. By taking account of past performance under similar conditions as well as functionality and durability, Japanese products will be selected.

The major ports of Syria are Latakia port and Tarturs port. Latakia port is slightly larger than Tarturs but the latter is advantageous because of its shorter distance from Damascus city. The equipment and materials to be procured under the project such as pipes, valves, pumps for wells, transmission and boosting, etc., are many in terms of category and number. Therefore they will have to be unloaded in Tarturs port due to shorter inland transportation and consequently, lower transport cost.

3-1-6. Implementation Schedule

The detailed design and construction works to be undertaken by the Syrian Government will be scheduled over a 38-month period for the first phase and over 25-month period for the second phase. The procurement by the Japanese Government will be divided into two phases based on such schedule by the Syrian Government and each phase is expected to complete in one fiscal year.

Materials for well pumps at the water source to supply district in Moadamiya excluding that area to be supplied by booster pumps will be procured during the first phase and others will be in the second phase. The main equipment and materials to be procured at each phase are as follows;

First phase: submersible pump (2 sets), transmission pump (1 set), transformer for transmission pumping house (1 set), water hammer prevention work (1 set), collection pipe (1 line), transmission pipe (approx. 36.0 km), pressure reducing valve (6 sets)

Second phase: submersible pump (7 sets), transmission pump (2 sets), booster pump (2 sets), transformer for booster pumping house (1 set), collection pipe (2 lines), transmission pipe (approx. 16.5 km)

The project implementation schedule for each phase, in accordance to the Exchange

of Note (E/N) is as presented below.

(1) Preparation of tender documents

After E/N, the Syrian Government and the consultant will conclude a contract for consulting services within a month. The consultant will discuss and verify the detailed drawings prepared by the Syrian Government for review of the design made during the basic design stage and preparation of tender documents. Then, tendering and tender evaluation will follow and the suppliers of the equipment and materials will be selected. This will require approximately a 4.0-month period for the first phase and approximately a 3.5-month period for the second phase.

(2) Procurement

The suppliers, after award of contract, will execute the design, manufacture and transport the equipment approximately within a 10.0-month period for the first phase and approximately within a 8.5-month period for the second phase. The Consultant shall check the drawings submitted by the suppliers, recalculate the water pressure caused by water hammer and inspect the equipment and materials before shipping.

(3) Technical assistant and training

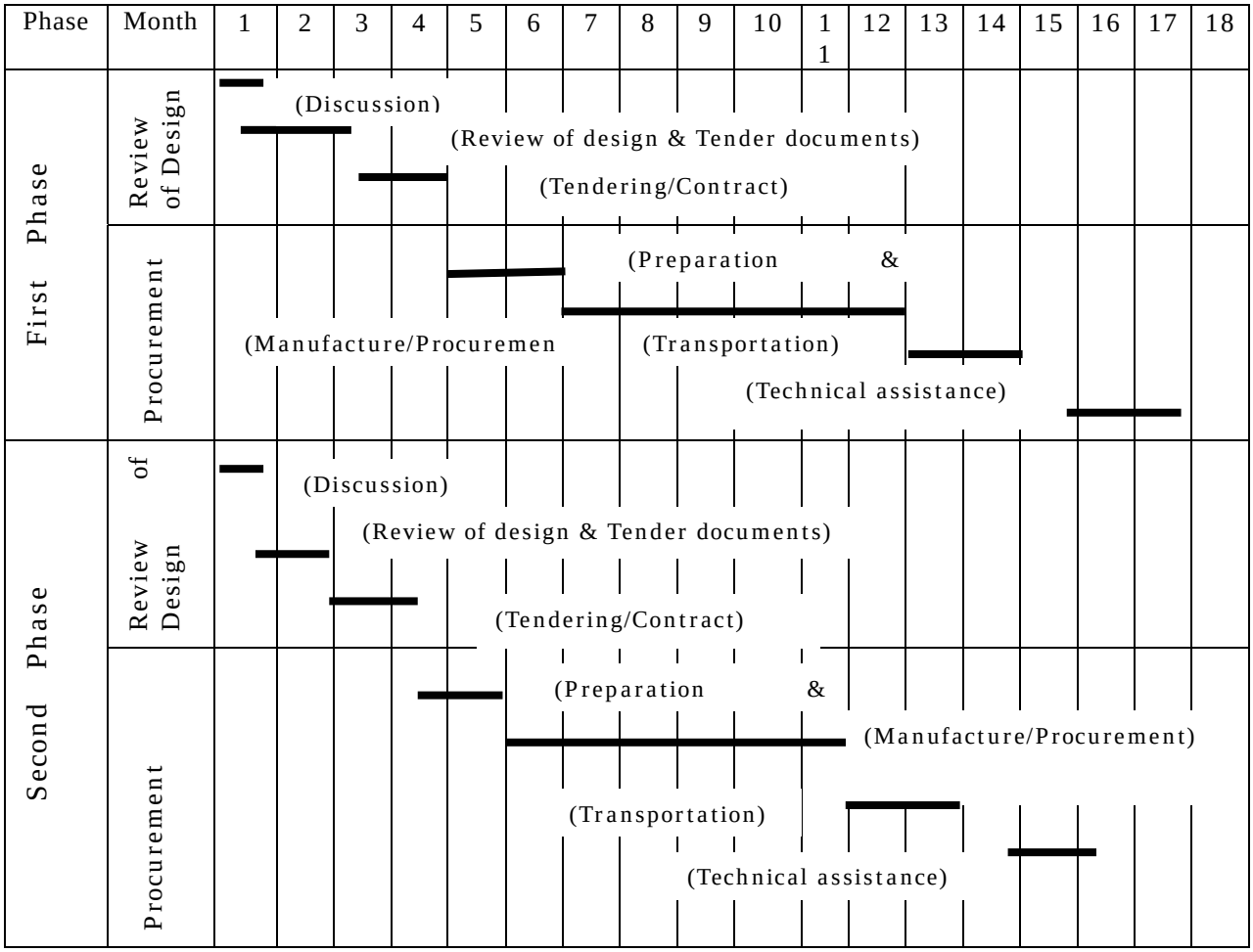
Some troubles with submersible pumps caused by poor installation works of the pumps, non-installation of pump protection devices, etc. by the Syrian Government in the Phase I Project have been experienced. Therefore, Japanese engineers for pump and pressure reducing valve installation work will have to be dispatched to inspect whether the pump and valves are in the proper position during the installation works. In case of pressure reducing valve, it may be the first time for the Establishment to use such large size pressure reducing valve and technical assistance is critical.

In addition this, the Syrian Government has wished training their staff for maintenance and daily checking of transmission and booster pumps. Other engineers from supplier will be dispatched to the site before starting pump operation in the second phase.

The consultant shall carry out the final inspection, advice the installation work and submit discuss progress with the Establishment.

The overall schedule is shown in the table below.

Implementation schedule after Signing of E/N



3-1-7. Obligations of the Syrian Government

The Syrian Government is obliged to carry out the following to complete the project under Japan's grant aid scheme;

① To facilitate customs clearance and inland transportation of imported equipment and materials for the project,
② To undertake domestic duties related to landing, customs clearance and inland transportation for the items imported for the Project,
③ To carry out the detailed design for the civil works,
④ To allocate budget for the implementation of the project and immediately install or lay equipment and materials procured by the project according to the prescribed schedule,
⑤ To assign necessary staff and provide budget for the operation and maintenance of equipment and materials procured by the project,
⑥ To facilitate embarkation and disembarkation and staying procedures in Syria for Japanese experts involved in the implementation of the project,
⑦ To pay bank commissions based on the banking arrangement,
⑧ To issue authority to pay based on the arrangement between banks, and
⑨ To bear all other project expenses not covered by Japan's grand aid.

3-2. Project Cost Estimation

The breakdown of the project cost to be borne by the Syrian Government for each phase is estimated below.

Table 3-2-1 Project Cost Unit: Thousand Syrian Pound

Item	Phase I	Phase II	Remarks
Detail design (structures, electric panel, etc.)	100	90	10
Civil works			
Well houses (RC-made、9 lots、20m2)	2,744	610	2,134
No.1 receiving tank (RC-made、1 lot、600m3)	4,995	4,995	—
Transmission pumping station (RC-made, 1 lot, 300m2)	4,241	4,241	—
Reservoir (RC-made、1 lot、2,000m3)	13,595	13,595	—
Pressure reducing tanks (RC-made、6lots、100m2)	7,357	7,357	—
Pressure reducing chambers (RC-made、6lots)	1,917	1,917	—
No.2 receiving tank (RC-made、1 lot、50m3)	1,215	—	1,215
Booster pumping station (RC-made、1 lot、40m2)	554	—	554
Pipe laying works			
Collection pipelines (DIP 350～200mm、L＝1,156m)	1,186	357	829
Pumped transmission pipeline (DIP 500mm, L＝2,604 m)	5,625	5,625	—
Main transmission pipeline (Gravity) (DIP 600mm/450mm、L＝29,378m)	58,278	58,278	—
Transmission pipeline (Gravity) (DIP 500～150mm、L＝20,953m)	28,229	4,911	23,318
Installation works (executed by the Establishment)			
Port fee	2,881	1,277	1,604
Custom clearance	2,187	1,713	474
Inland transportation	4,046	3,122	924
Total	139,150	108,088	31,062

3-3. Operation and Maintenance Plan

(1) Water supply facilities to be constructed

Water pumped up from the deep wells is transmitted to existing elevated reservoirs in four supply districts. Water supply facilities to be constructed under the project consist of 9 deep wells, collection pipes of nearly 1 km length, one transmission pumping station, transmission pipeline of approximately 53 km, one ground reservoir, 6 pressure reducing facilities and one booster pumping station.

After the project implementation, these water supply facilities except the existing elevated reservoirs and distribution pipelines in four supply districts have to be maintained by the Establishment. Considering the number of working hours that maybe required, cost for operation and maintenance will increase.

(2) Organization for operation and maintenance

Operation and maintenance of the facilities after project completion will be the concern of 24 Water Units, the Quatana Water Unit which is in charge of the area for water source and transmission pipeline facilities, the Daraya Water Unit which is in charge of Maodamiya and Daraya and the Sehnaya Water Unit which is in charge of Sehnaya and Ashrafia. In addition, the branch office of Daraya Water Unit in Moadamiya will also participate in operation and maintenance activities.

These Water Units are composed of a chief, engineers, technicians, accountants and general staff. The number of staff in the Water Units concerned with the project is as follows.

Table 3-3-1 Number of Personnel

Name of Water Unit	Chief	Technician	Accountant & general staff	Temporary staff
Quatana Water Unit	1	15	8	50
Daraya Water Unit	2	9	4	30
Sahnaya Water Unit	1	3	2	8

Incidentally these Water Units are also undertaking the operation and maintenance of the existing facilities and toll collection. After project completion, the present staff of Daraya Water Unit and Sehnaya Water Unit will continue to manage the operation and maintenance of the existing reservoir tanks and the system therefrom. Quatana Water Unit, on the other hand, will require staff reinforcement in order to perform additioanl tasks for operation and maintenance of well pumps, transmission pumps, booster pumps, transmission pipeline with pressure reducing facilities.

(3) Management and maintenance

As for the management of the facilities, Water Units shall perform the field works under the instruction of the Director General. The cost of management and maintenance shall be financed by the collection of water tariff unified in the country. These Water Units shall carry out the same management and maintenance of the facilities as the present condition and even after the implementation of the project. As mentioned above, the organization of the Water Unit is made of sections in charge of repairs, operation, and collecting water charges. The section in charge of repairs shall perform the daily checking water leakage and providing temporary repairs mainly done by civil engineers. Staff reinforcement will be required in order to perform additional tasks of operation and maintenance.

As for maintenance of facilities, the ductile iron pipe procured under the project has a life of 50 years but as the life of the pump differs depending on the nature of soil and water. When repairs are needed due to leakage, the regulating valve of the reservoir or the elevated reservoir should be closed, and dealt with by cut pies and the joint rings. Pumps with ten years of guaranteed durability may be worn away in just several years or may require change of parts. Repairs due to abrasion and replacement of parts shall be performed by the warehouse staff using the stored parts in the sites. As for the transformer, the guaranteed 20 year life can be forecasted, and the products made in Japan may need no repairs. Whenever repairs are needed, warehouse staff can proceed with the required works.

Finally, approximately 10 staff will be needed for the operation and maintenance as much as to perform additional works in the project.

(4) Cost of operation and maintenance

The yearly operation and maintenance cost tends to increase and estimated as follows.

(a) Personnel expenses

7,000 SP/person/month×12month×10person＝840,000 SP

(b) Operation and maintenance cost

① Operation cost

Well pumps	30 kW×9 units
Transmission pumps	280 kW×3 units
Booster pumps	37 kW×1 units
Total	＝ 1,147.0 kW

1147.0 kW × 24 hrs × 365 days × 60% × 1.5 S.P/kWH × 1.05

= 9,495,095 S.P

② Repairing cost

Repairing cost of equipment is estimated 1% of initial cost of mechanical and electrical equipment.

¥405,894,000 × 1% × 0.43536 S.P/¥ = 1,765,639 S.P

Repairing cost of pipelines and structure is estimated 0.5% of structures and pipeline construction cost.

130,036,000 x 0.5% = 650,180 S.P

(c) Total expenditure cost

840,0000 + 9,495,095 + 1,765,639 + 650,180 = 12,750,914 S.P

(d) Water charge by new facility

(247,000 × 94%[*1]) × 0.083m3/d × 365dayd × 70%[*2] × 2.6 S.P/m3 = 12,801,685 S.P

(*1: percentage of population by new facility, *2:percntage of collecting water charge)

Total expenditure cost of operation and maintenance and water charge by new facility are estimated 12,751 thousand Syrian pounds and 12,802 thousand Syrian pounds, respectively. The balance of 51 thousand Syrian pounds will become increasing revenue of the Establishment.