# CHAPTER 3 IMPLEMENTATION PLAN

# CHAPTER 3 IMPLEMENTATION PLAN

## 3-1 Implementation Plan

### 3-1-1 Concept for Implementation

There is no significant changes on Implementation Plan, except tendering stage will be started after new Exchange of Notes signed.

The Project will be implemented in accordance with the framework of the grant aid scheme of the Government of Japan after the conclusion of the Exchange of Notes (E/N) by both Governments of Japan and Yemen following a cabinet decision on the implementation of the Project by the Government of Japan. The Government of Yemen will then select a Japanese consultant firm as the Consultant for the Project to proceed with the detailed design work on the facilities and equipment. Following finalization of the detailed design documents, a Japanese construction company and a Japanese equipment supplier, selected on a tender basis respectively, will conduct the construction work and the equipment supply and installation. All of the consultancy, construction and equipment supply / installation contracts will become valid once they have been verified by the Government of Japan.

The work management system will be established by the Project Implementation Body, the Consultant, the Contractor and the Equipment Supplier under the control of the related organizations of the two governments involved. The basic issues and points to note for the implementation of the Project are described below.

(1) Project Implementation Body

The responsible agency for the Project on the Yemeni side is the Ministry of Public Health and Population (MOPHP) which is expected to sign the contract on behalf of the Government of Yemen. Meanwhile, the Health Office of the Aden Governorate will act as the implementation agency and will be responsible for the general coordination of the work during the project implementation period. As the planned construction site of the ATCC is located in the Mansoura area of Aden, the MOPH will be required to submit the general architectural drawings and structural drawings, etc. to the Al Mansoura District Office via the Aden Office of the Ministry of Construction to apply for the necessary building permit.

In view of the above division of work, the establishment of the Project Implementation Committee is desirable to act as the project implementation body on Yemeni side to manage all processes from the detailed design to the handing-over of the various facilities and equipment. The members of this Committee should preferably include

representatives of the MOPH, the Health Office in Aden, Aden PHC Office, Ministry of Planning and Development (MOPD) and the member of JICA Technical Cooperation.

(2) Consultant

Following the conclusion of the E/N, the Government of Yemen will sign a consultancy agreement on the detailed design for the Project with a Japanese consultant firm and this agreement must be verified by the Government of Japan. For the smooth progress of the detailed design stage, the prompt sign of the consultant agreement after the conclusion of the E/N is crucial.

After verification of the agreement, the Consultant will prepare the detailed design documents based on the present basic design study report through consultations with the MOPH and will have the documents approved by the Government of Yemen.
At the tender and construction stages, the Consultant will conduct the tender and construction supervision based on the detailed design documents/drawings. The Consultant will also supervise the equipment-related work, ranging from the tender for equipment to supply and installation, test operation and final handing-over.

(3) Contractor

The Contractor will be selected through tender to open among Japanese construction companies which satisfy certain qualifications, he / they will construct the planned facilities within the contracted period in accordance with the detailed design documents prepared by the Consultant and will hand them over to Yemeni side.

The main components of the construction work will comprise building construction, water supply and sanitation, air-conditioning & ventilation, electrical installation and external work, all of which will be conducted by the Contractor using subcontractors, engineers and workers from Yemen and/or Japan.

(4) Equipment Supplier

The equipment supplier will be selected through tender to open among Japanese trading companies which satisfy certain qualifications and will procure and install the equipment which will meet the specifications set forth by the Consultant and approved by the project implementation body within the contracted period. At the installation stage, the Equipment Supplier will dispatch engineers specializing in the procured equipment to Yemen to supervise the work and to also explain how to operate the equipment to Yemeni side.

### 3-1-2 Implementation Conditions

(1) Local Construction Industry

There is no significant changes on Implementation Conditions from the Basic Design.

The general conditions of the local construction industry in the Yemen are described below.

- Main construction companies will have their local office around the capital city of Sana'a or main city of Aden or Hodeidah. Most of large constructions will be done by foreign invested companies and many skilled craftsman belong to these foreign invested construction companies. On the contrary, native Construction companies are not specialized for each category, and there are many small companies who are in charge of building such size of houses and apartments, and the number of the integrated construction company is small. As a result the order itself also becomes small.

- Carpentry, plastering, reinforcing bar and masonry, etc. are established as special trades (vocations) but, other labourers such as finishers or water proofing labourers are not established as special trades. Also, labourers are often temporary workers and tend to lack specialist knowledge. After averaging the job efficiency, carpenters, plasters, craftsmen of reinforcing bar, and finishers, it requires 3 - 4 times of labor in the case of Japan.

- Owing to the depreciation of local currency before 1996, the price of construction material and labor cost have escalated. Under the influence of this matter contracts and trade with US dollar basis are generalized.

- A value-added tax (VAT) has not yet introduced as of now and near future.

(2) *Important Points for Project Implementation*

<On the Construction Work>

- The rainy season in Aden is from November to March, however, because the difference of rainfall between the rainy season and the dry season is small, there are few risks in earth work and foundation work regarding these seasons.

- Generation of electric power in Aden is by thermal power, therefore the condition of power supply is relatively stable. However, short time of power failure or planning power cut is often caused of lack of total capacity of generation. Generators are required to keep the continuous power for the construction work.

- The planned facility is two-story with reinforcement concrete structure and it is common method in Aden. Meanwhile, the quality and construction schedule are dominated by skills of local labors, therefore it is necessary to dispatch the skilled labor such as finishers or water proofing labourers and the quality and the construction schedule must be carefully controlled to avoid any unnecessary repetition or waiting.

- In Aden the sand containing salt is commonly used even the collection points are located inland. Therefore, strict quality control for the concrete will be required during concrete works on the construction site.

- As the project site is within the compound of existing facilities of PHC and adjacent to the Mansoura Polyclinic at the north side of the site, protection and safety measures to ensure the users of the existing facilities will be required for the planning of temporary structures.

<On the Equipment-Related Work>

- The regular checks and maintenance of laboratory equipment are conducted by the users while equipment which has broken down is sent to the maintenance office in Jumhuriyah Hospital for checking and repair. This means that guidance on checking methods and trouble-shooting will also need to be provided for the staff of maintenance office in Jumhuriyah Hospital in addition to the guidance of operation and maintenance for the users.

- In Yemen there are many maintenance staff who understand only Arabic language, therefore at the time of handing over it is necessary to prepare manuals in Arabic as the need arises.

- For the special checking and of repairing of laboratory equipment, at the stage of equipment selection, it is necessary for manufacturers to be initiated the nomination of local agent. This can promote the technical interchange between maintenance staff and staff of local agent.

(3) On the Work Schedule

- A reasonable and adequate work schedule must be planned.

- The dispatch of staff and expert engineers from Japan will be kept to a minimum and their appropriate number and assignment periods should be determined in accordance with the work progress.

- Although the scope of local construction materials (industrial products) which can be used for the Project is limited, local materials should be used where possible. In addition, materials and finishings which are easy to maintain should be selected.

(4) Work Supervision

For the efficient construction work of the facilities meeting the specifications set forth in the detailed drawings / documents within the planned construction period, the Japanese Contractor must be capable of smoothly conducting the joint work with local construction companies while providing appropriate technical guidance and implementing strict schedule control. It is, therefore, desirable that the Contractor appoints work staff conversant with the local conditions to achieve high quality facilities based on a precise understanding of the nature of the planned facilities.

Given the contents and scale of the facilities planned under the Project, the following full-time work staff will be required.

< Building Work >

- Field Representative: 1 person
  General management, total coordination, others.
- Architectural Engineer: 1 person
  Guidance on construction works, schedules control, guidance on working drawing preparation, etc.
- Services Engineer: 1 person
  Guidance on mechanical/electrical equipment installation and test operation, technical guidance, schedule control, others.
- Administrator: 1 person
  Administrative work, labor control, import procedure, others.

< Equipment Work >

As required installation and test operation of equipment, technical guidance and instructions on operation manuals are to be done by the supervisor of general equipment because of no sophisticated equipment.
List of major maintenance items should be prepared and delivered to the Aden Health Office at handing over of the work.

### 3-1-3 Scope of Works

There is no changes on the scope of works from the Basic Design.
The following scope of works between the two governments for implementation of the Project appears reasonable.

(1) Works to be undertaken by the Government of Japan

1) Facilities

a) Administration rooms : Director room, Administration room, Storage, Staff room (Supervisor/Statistic & Lab. staff), others.

b) Rooms for examination : X-Ray room, Reference Lab. Sterilization room, others.

c) Rooms for training : Classroom, Seminar room, Library, others.

d) Trainee's rooms : Multi-purpose room, Kitchen/Dining, Trainee's room

e) Other rooms : Maintenance room, Machine room, WC, others.

2) Equipment

a) Administration equipment : Desktop computer, Printer, Overhead projector, Medical refrigerator, Maintenance tools, others.

b) Examination equipment : X-Ray unit, Automatic film developer, Centrifuge, Safety cabinet, Incubator, Biological Microscope, Autoclave, Instrument cabinet, others.

c) Training equipment : Object projector, Microscope with teaching head, Safety cabinet, others.

d) Other equipment : 4 wheel driving car

(2) Works to be undertaken by the Government of Yemen

1) To remove trees within a planned construction site.
2) To supply electric power, water, and drainage facilities, etc. to the construction site.
3) Procurement of common office furniture, fixtures and fittings.
4) To supply consumable and spare parts required for facility and equipment maintenance.
5) Other appurtenant works not included in the scope of works of Japanese side.

### 3-1-4 Consultant Supervision

There is no significant changes on the Consultant Supervision from the Basic Design.
In accordance with the policy on Grant Aid laid down by the Government of Japan, an appointed Consultant will organize a project implementation team to carry out detailed design and supervising services that are in line with the basic design policies. This will ensure appropriate coordination among concerned parties and the smooth construction of the Project facilities.

At the construction stage, the Consultant will dispatch a resident supervisor with ample technical capabilities to issue instructions to contractors and to communicate with them. Also, the Consultant will assign technical experts in each construction stage on a short-term basis in accordance with the progress of the work, in order to carry out inspection, attendance and guidance on execution.

(1) Basic Policies of Supervision

Punctual completion of the facilities based on the construction schedule will be aimed at through close communication with and reporting to the related organizations and those in charge in Japan and Yemen.

- Prompt and appropriate guidance and advice will be provided for those involved in the work to ensure that the constructed facilities meet the specifications set forth by the design documents.
- Priority will be given to the use of local construction methods using local materials as much as possible.
- Sufficient instruction of operation and maintenance for mechanical and electrical equipment.
- Appropriate guidance and advice will be provided in regard to post-handing-over maintenance and economical operation to facilitate the smooth operation of the facilities.

(2) Contents of Work Supervision

- Assistance to sign the construction contract:

  Selection of the Contractor through tender (determination of the contract such as consortium, preparation of the draft contract, confirmation of the contents of the specifications and witnessing of the construction contract, etc.).

- Inspection and approval of shop drawings, etc.:

  Inspection and approval of the shop drawings, samples and materials, etc. submitted by the Contractor.

- Work guidance:

  Examination of the schedule plan and work outline, etc., provision of guidance for the Contractor and reporting of the work progress to the Owner.

- Assistance in the payment authorization procedure:

  Assistance in the payment authorization procedure through examination of the contents of invoices and the work progress in regard to the construction cost to be paid during the construction work and upon completion of the said work.

- Inspection and approval:

According to necessity, to conduct inspections on each work in terms of quality and workmanship and provide guidance to the contractor during the construction period.

The Consultant shall confirm the completion of the work in accordance with the conditions of the contract, attend the handing over of the completed work, and obtain acceptance from the owner. Also, it shall report to the Government of Japan any important matters related to the progress of the construction work, payment procedures and handing over of the completed work.

The construction supervision system and related agencies described above are shown in the following diagram.(Figure 3-1)

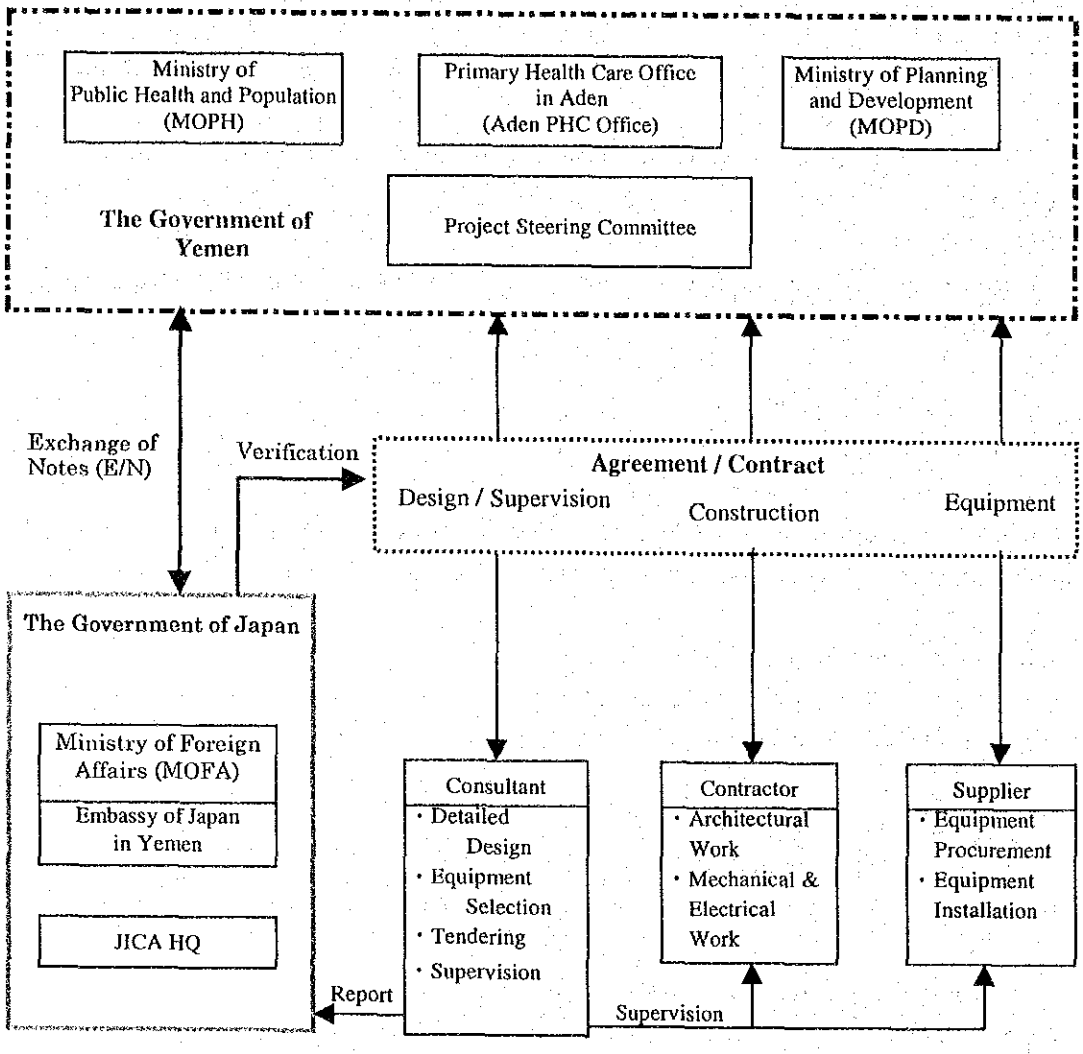



**Figure 3-1 Construction Supervision Plan**

### 3-1-5 Procurement Plan

There is no significant changes on the Procurement Plan from the Basic Design.
The following items should be taken to consideration when procuring construction materials and equipment to be used in construction of the Project facilities.

(1) Procurement Policy

Most of the construction materials can be procured locally. Hence, the procurement policy is to procure materials in a reasonable manner by considering supply capabilities and quality vis-à-vis local manufacturers and supplies.

Materials to be procured from Japan should be kept to minimum, and should be restricted to items which cannot be procured locally due to cost, special specifications, poor performance or simply an insufficient local supply capacity.

(2) Procurement in Japan

In the case of equipment and materials of which local procurement is difficult, their procurement in Japan will be considered. In the case of mechanical equipment and electrical equipment which will require special ordering, timely orders in accordance with the work progress will be required as a long time is required to complete the process from initial order placement to design approval, manufacture and shipment from the manufacturer.

(3) Local Procurement

Since some construction materials of high quality imported from neighbor countries such as Saudi-Arabia, Egypt or European countries can be locally procured, the facilities can be maintained without any particular difficulties and, even if equipment and materials suffer damage, they can be easily repaired. Therefore, practical use of these materials shall be considered even if the procurement cost is comparatively high.

(4) Cost

Upon comparing materials that can be procured both locally and in Japan, lower procurement cost will be employed. Procurement from Japan includes packing, transportation and insurance expenses on top of the market prices, but import duties in Yemen are exempt.

(5) Procurement Schedule

Based on the above-mentioned factors, materials and equipment to be used in construction of the Project facilities will be procured in the manner described below.

1) Construction of building frames

Almost all the materials required in the construction of building frames, namely sand, gravel, cement, concrete, concrete blocks and bricks are locally available in Yemen. Anti-sulfate cement made in Saudi-Arabia is also locally available. However, it can sometimes be difficult to obtain as a result of the boom in the construction sector and high cost. Reinforcing bars and structural steel made in Turkey or Qatar is locally available and they can be used normally without any problem.

2) *Interior and exterior finishing work and external work*

Including imported materials paints, tiles and stones are locally available in Yemen. Aluminum fittings, steel fittings, waterproofing materials, timber and boards of good qualities are difficult to procure locally. Therefore, they shall basically be procured from Japan or third countries.

3) Air-conditioning and sanitary work

Imported pipes for plumbing of high quality level of materials are available at the local market. Mechanical apparatus of high quality are difficult to procure locally. Therefore, they shall basically be procured from Japan or third countries. However, in view of maintenance for air-conditioning units and fans priority shall be given to local procurement as much as possible.

4) Electrical work

Imported electrical work materials such as illumination lamps and PVC pipes are available at the local market. These materials shall be locally procured in view of maintenance. Electric wires and cables of high quality level of materials are difficult to procure locally. Therefore, they shall basically be procured from Japan or third countries. Procurement country of power distribution boards, feeder connection boards, power control boards etc., for which order-made items are suitable, are to be decided, after first comparing costs including the third country procurement.

5) Equipment work

The medical equipment market in Yemen is not well established and that equipment manufactured by semi-industrialised countries is often marketed. Judging from the contents of the planned equipment under the Project and the equipment currently in use at existing TB Centres, the use of the local agents of Japanese medical equipment manufacturers for the procurement of consumables and spare parts and for maintenance/repair services appears possible. Accordingly, the procurement of equipment from a third country is not planned under the Project. In the case of the following OA equipment, this equipment will be procured from either Japan or a third country, taking the ease of procurement, cost of procurement and availability of maintenance services after procurement, etc. into consideration.

- Desktop computers, Printer
- Copying machines

- Floor cleaner, Floor polisher
- TV with console box, Video recorder / Player

6) Transportation plan

In principle, maritime transportation will be used for the transportation of equipment and materials from Japan to Aden port. This Maritime transportation usually takes one month and custom clearance at Aden port takes usually 2 weeks although the actual time depends on the bulk of containers.

For the swift customs clearance of the imported equipment and materials, etc., it will be necessary for the Contractor and the Equipment Supplier to submit the respective master lists of items for import prior to the commencement of the construction work to the Ministry of Planning and Development, the Ministry of Finance, the Tax Affairs Bureau and the Customs Office to obtain the necessary permit for import without tax. After shipment, the lading documents required for customs clearance should be submitted to the MOPH. As a permit for the import of equipment, etc. without tax must be obtained through the above-described route, the actual customs clearance can be a lengthy process. Prior arrangement will, therefore, be essential.

Estimating 10 days for ex-factory to loading in Japan, there should need at least 2 months time by maritime and inland transportation to the site.
According to procurement policy mentioned above, the result of study of major construction materials and procurement plan is shown in table 3-1.

## Table 3-1 Study of Major Construction Materials and Procurement Plan

### (1) Building materials

| Works | Materials | Place of procurement | | | Remarks |
|---|---|---|---|---|---|
| | | Local | Japan | Others | |
| Concrete work | Portland Cement | ○ | | | Available at local market. |
| | Anti-Sulfate Cement | ○ | | | Ditto |
| | Sand/Crushed Stone | ○ | | | Ditto |
| | Admixture | | ○ | | High quality should be imported. |
| | Reinforcement bars | ○ | | | Available at local market. |
| | Wooden forms | ○ | | | Veneer is available at local market. High quality should be imported. |
| Steel work | Structural Steel | | ○ | ○ | Not available at local market. |
| | Sheet Metal | | ○ | ○ | Ditto |
| Masonry work | Concrete block | ○ | | | 200mm×200mm×400mm |
| | | ○ | | | 200(150)mm×200mm×300mm |
| Water-proof Work | Asphalt W/Proofing | | ○ | ○ | High quality should be imported. |
| | Ceiling | | ○ | ○ | Ditto |
| Tile work | Ceramic tile | ○ | | | Imported material is available at local market. |
| | Semi-Porcelain tile | ○ | | | |
| Wooden work | Wood | | | ○ | Imported finishing wood is available. |
| | Plywood | ○ | | ○ | Plywood is available at local market. |
| Roof work | Color metal sheet | | ○ | | Not available at local market. |
| | Special metal sheet | | ○ | | Ditto |
| | Galvarium sheet | ○ | | | Available at local market. |
| Metal work | Light steel ceiling frame | | ○ | ○ | Delivery time is unstable. |
| | Aluminum Louvers | | ○ | ○ | Ditto |
| Metal Sash Work | Alum window frame | | | ○ | High quality should be imported. |
| | Steel door | | | ○ | Ditto |
| Wooden Sash Work | Wooden door | | | ○ | High quality should be imported. |
| | Wooden door frame | | | ○ | Ditto. |
| Ironmongery | Door handle, lock | | ○ | | High quality should be imported. |
| | Door closer | | ○ | | Ditto. |
| Glass work | Plane glass | ○ | | | Local material is widely used. |
| | Pane glass | | | ○ | Ditto |
| Paint work | Interior paint | ○ | | | Imported material is available. |
| | Exterior paint | ○ | | | Not available at local market. |
| Interior work | Rockwool Acc. Board | ○ | | ○ | Imported material is available. (600mm×600mm) |
| | Form Polystyrene | | ○ | ○ | Not use commonly locally. |
| | CSA Board | | ○ | ○ | Not available at local market. |
| Furniture work | Kitchen sink | ○ | | | Imported material is available. |
| | Table/Chairs(wooden) | ○ | ○ | ○ | High quality should be imported. |
| | Table/Chairs(steel) | | ○ | ○ | Ditto. |
| External work | Pavement block | ○ | | | Local material is available. |

### (2) Mechanical work

| Works | Materials/Equipment | Place of procurement | | | Remarks |
|---|---|---|---|---|---|
| | | Local | Japan | Others | |
| A/C & Fan work | Separate type A/C | ○ | | ○ | Imported material is available depend on numbers and types. |
| | Exhaust Fan | ○ | | ○ | |
| | Insulation Material | ○ | | ○ | Ditto |
| Sanitary work | Pump & Tank | ○ | | ○ | Imported material is available depend on numbers and types. |
| | Sanitary Ware | ○ | | ○ | |
| | Pipe (Steel) | ○ | | ○ | Ditto |
| | Pipe (PVC) | ○ | | | Imported material is available. |

(3) Electric equipment work

| Works | Materials/Equipment | Place of procurement | | | Remarks |
|---|---|---|---|---|---|
| | | Local | Japan | Others | |
| Lighting & Cabling work | Lighting Fixtures | ○ | ○ | ○ | Imported material is available depend on numbers and types. |
| | Wire/Cables | ○ | ○ | ○ | |
| | Panel | | ○ | ○ | High quality should be imported. |
| Equipment work | Telephone set | ○ | ○ | | Small quantities are available. |
| | Fire alarm | | ○ | ○ | High quality should be imported. |

(4) Equipment work

| Equipment | Place of procurement | | | Remarks |
|---|---|---|---|---|
| | Local | Japan | Others | |
| Overhead Projector | | ○ | | It is not possible to procure locally. Equipment shall be imported. |
| Medical Refrigerator | | ○ | | |
| Maintenance Tools | | ○ | | |
| Biological Microscope | | ○ | | |
| Microscope with Teaching Head | | ○ | | |
| Safety Cabinet | | ○ | | |
| Bunsen Burner | | ○ | | |
| *Reagent Cabinet* | | ○ | | |
| Incubator | | ○ | | |
| Centrifuge | | ○ | | |
| Inspissator (Coagulator) | | ○ | | |
| Water Distiller | | ○ | | |
| Analytical Balance | | ○ | | |
| Water Bath | | ○ | | |
| Glassware | | ○ | | |
| Autoclave | | ○ | | |
| Pipette Washer(ultra-sound) | | ○ | | |
| Glassware Dryer | | ○ | | |
| X-ray unit with accessory | | ○ | | |
| Automatic Film Developer(Roll) | | ○ | | |
| Manual Film Developer | | ○ | | |
| Dark Room Equipment | | ○ | | |
| Pass Box | | ○ | | |
| Film Illuminator | | ○ | | |
| Object Projector | | ○ | | |
| 4WD Vehicle | | ○ | | |
| Desktop Computer | ○ | | | Equipment shall be procure locally. |
| Printer | ○ | | | |
| Floor Cleaner | ○ | | | |
| Copy Machine with sorter | ○ | | | |
| TV with Console Box | ○ | | | |
| Video Recorder/Player | ○ | | | |

### 3-1-6 Implementation Schedule

The Detailed Design Stage has been completed on the Exchange of Notes signed in fiscal year 2000, there will be continued from reconfirmation of detailed design and tendering stage after the new Exchange of Notes signed in fiscal year 2002.

When this project is implemented under the Japan's Grant Aid System, the following procedures are to be taken :

① Conclusion of an Exchange of Notes (E/N) between the two governments,
② Recommendation of a Japanese consulting company for design and supervision by the Government of Japan,
③ Signing of a design and supervision agreement between the Government of Yemen and the recommended consulting company,
④ Three preparatory steps including preparation of detail design documents, tendering, and signing of a contracts (facilities and equipment) with the successful tenderers,

After the E/N is concluded, MOPH will act as the implementation agency of Yemeni Government for Consultant Agreement, Construction Contract, Equipment Contract, Certificates for Payments, etc..

(1) Detailed design stage

Tender documents will be prepared based on the basic design, and these will consist of detailed design drawings, specifications, estimations and budget statements, etc. Close discussion are held with related agencies of the Government of Yemen in the initial, middle and final stages of the detailed design preparation stage. After the final results are approved by the agencies concerned, tendering procedures will be undertaken.

(2) Tendering stage

Tendering for the construction work and for the equipment work will be held separately. After the detailed design work is completed, pre-qualification (PQ: preliminary review for qualification of applying contractors) is announced and carried out in Japan for the construction work. In accordance with the review, the MOPH, as the implementing agency, will invite tenderers for the Project, and the tendering will be done in Japan under the supervision of the concerned parties. The tenderer which offer the lowest price will become the successful one if the contents of its tender are judged to be appropriate, and it will sign a construction contract with the MOPH.

(3) Construction and procurement stage

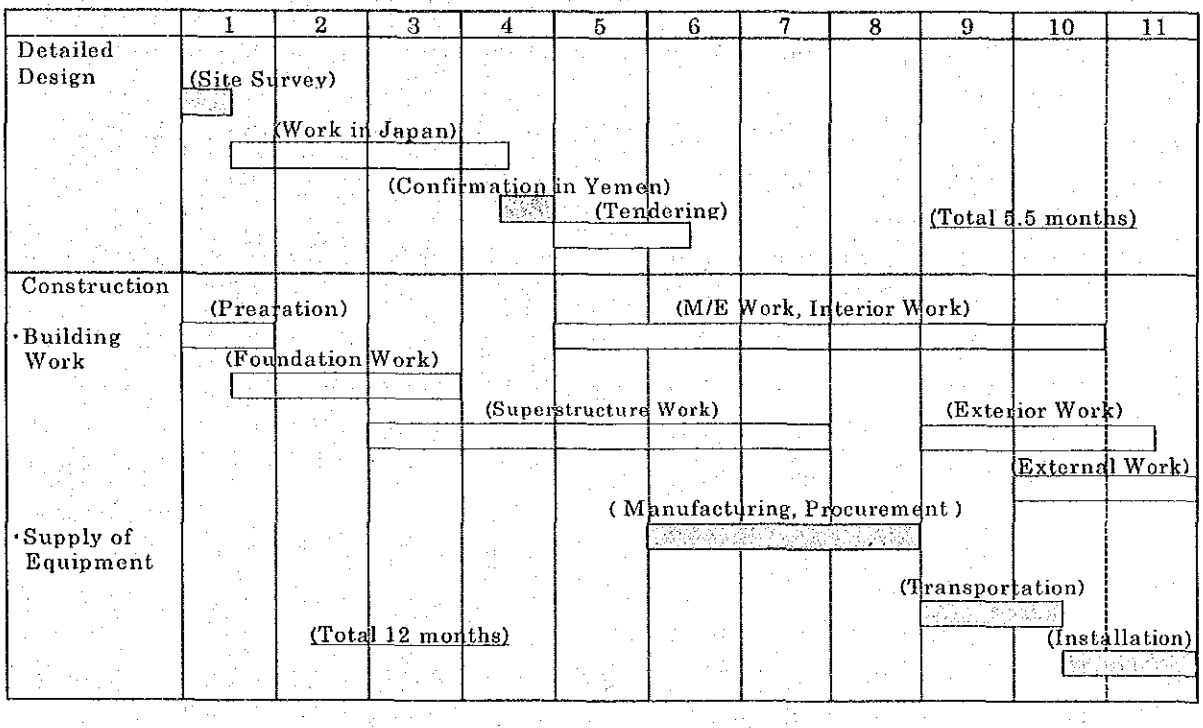
After the construction contract is signed, the construction work will be commenced following verification by the Government of Japan. Judging from the scale and contents of the Project facilities, the construction period is expected to be roughly 12 months. This, however, is condition on the following:

a) construction materials and equipment are smoothly procured,

b) smooth progress is seen in Yemen on administrative procedures and reviews, and preliminary work within the scope of responsibility of Yemeni side, in special tax exemption and customs clearance procedures,

c) the one-year budgetary system of the Government of Japan is applied correctly.

**Table 3-2 Implementation schedule**



### 3-1-7 Obligations of Recipient Country

There is no significant changes on the Obligations of Recipient Country from the Basic Design.

(1) Items to be done by Yemeni side

In the case where the Project is implemented in accordance with the guidelines of Japan's Grant Aid System, the necessary measures to be taken by the Government of Yemen are as follows.

1) To remove trees within a planned construction site.
2) Provision of sites for temporary facilities and material storage for construction work within Aden PHC compound.
3) To supply electric power, water, drainage and telephone facilities, etc. to the construction site.
4) Procurement of common office furniture, fixtures and fittings.
5) Supply of consumable and spare parts required for facility and equipment maintenance.
6) Banking arrangement and payment of bank commission for Authorization to Pay.
7) Applications for physical planning and building permit and payment of various fees, if necessary.
8) Swift arrangement of landing, tax exemption facilities and customs clearance of the equipment and materials to be procured within the scope of the grant aid.
9) Exemption of Japanese companies and Japanese nationals involved in the Project from customs duty, domestic taxes and any other levies imposed in Yemen.
10) Provision of all conveniences for the Japanese nationals referred to in 9) above in relation to their entry to and stay in Yemen to perform their assignments under the Project.
11) Appropriate and effective use and maintenance of the facilities constructed and equipment procured under the Project.
12) Smooth move of existing equipment to the new building.
13) Payment of all expenses required for the implementation of the Project which are not covered by the grant aid.

(2) Cost estimates of Works to be done by Yemeni side

In addition to the items to be addressed by the Government of Yemen in relation to the construction work under the Project, the related items during the construction works refer to "APPENDICES 6. Cost Estimation Borne by the Recipient Country". While these items directly affect the commencement of the construction of the Project, timely arrangements are essential and effective for project implementation.

## 3-2 Operation and Maintenance Plan

### 3-2-1 Facility Operation and Maintenance Plan

(1) Buildings

For a maintenance and control plan of buildings, the following 3 points are main subjects:

① Daily cleaning
② Repair against wearing down, damages and aging
③ Guards, which aim at security and prevention of crimes

Daily cleaning is essential for preventive maintenance and it is assumed that they treat facilities and equipment more carefully. In addition, cleaning is important for equipment for medical examinations to keep good in condition. Also, it can detect damages and disorders in an early stage so that repairs can be done as early as possible. These actions will elongate the life of apparatus and equipment for medical examinations.

As for repair, mending and repairing the interior and the exterior materials which protect the structure are main subjects. In addition, (judging from the Japanese case), the necessity of repair and renovation, due to changes of activities and the increase of staff, will be executed every 10 years. The details of the periodical check and repair, which decide the life of buildings, are submitted at the time of handing over buildings by the contractor as "Maintenance Manual". And at this time, the method of checking and periodical cleaning will be described. The outline of them is as follows:

**Table 3-3 Outline of Regular Building Inspections**

| | |
|---|---|
| Exterior | |
| - Repair or repainting of exterior finishes | every 5 years |
| - Inspection or repair of metal roof | inspection: every year |
| - Periodical cleaning of downspouts and drains, etc. | every month |
| - Inspection and repair of sealing of doors/windows | every year |
| - Periodical inspection and cleaning of drainage | every year |
| Interior | |
| - Changes in interior finishes | as required |
| - Repair and repainting of interior walls | as required |
| - Repairing of ceiling | as required |
| - Retightening or changing of fittings | every year |

Note: Guards must check the entering and exiting of facility customers.

(2) Building Service Equipment

As for building service equipment such as mechanical and electrical equipment, daily "preventive maintenance " is neccessary before repairing disorders and changing parts. Mechanical equipment life can definitely be elongated by

adequate operation, daily check, supplying oil, adjustment, cleaning and repairing, as well as operating time. These daily checks can prevent disorder and accident and expansion of accidents.

With the periodical check, exchange of consumable and cleaning of filters are executed according to the maintenance manual.

In this plan, there are no mechanical equipment which have complicated systems, but it is important to organize maintenance and control systems when employing full-time maintenance and control staff, and it is also important when we make a contract with an outside company to commit a periodical check.

Operating and control manuals are submitted at the time of handing over, and the general definition of life for the main mechanical equipment is as follows:

**Table 3-4 Lives of Major Building Service Equipment**

| | |
|---|---|
| Electrical equipment | |
| Generator | 15 to 20 years |
| Panel boards | 20 to 30 years |
| Fluorescent lamps | 5,000 to 10,000 hours |
| Incandescent lamps | 1,000 to 1,500 hours |
| Plumbing equipment | |
| Pumps, Pipes and valves | 10 to 15 years |
| Tanks | 15 to 20 years |
| Sanitary fixtures | 20 years |
| Infiltration pit | 10 to 20 years |
| Air-conditioning and ventilation | |
| Pipes | 10 to 15 years |
| Fans | 10 to 15 years |
| Air conditioners | 10 years |

(3) Medical Equipment

Maintenance and control for medical equipment is important for the activities of the planned facilities to be well functioned. Facing the Arabian sea the climate of Aden city is hot and humid, and in terms of maintenance and control of equipment for medical examinations, the condition is not so good.

Generally, maintenance and control of equipment contains two items. One is daily check done by the operator, and the other is both detection and repair done by experts through 1-2 periodical checks per year.

These planned equipment contain X-ray apparatus which require high and special repair knowledge. In order to improve the knowledge of the maintenance staff, it is necessary for maintenance staff, staff of MOPH and a local agent to work together for the periodical check and repairing.

Table 3-5 shows the outline of maintenance and control for each of the equipment.

Table 3-5 Outline of Required Equipment Maintenance

| | Self check | Service agent (recommended) |
|---|---|---|
| X-ray apparatus | Every time after operation | Once / Year, Defect Repair |
| Safety cabinet | Every time before and after operation | Twice / Year, Defect Repair |
| Other equipment | Every time before and after operation | Twice / Year, Defect Repair |

### 3-2-2 Estimation of Operation and Maintenance Cost

The following sections describe trial calculations of the annual operating expenses and maintenance cost of Project facilities following commencement of operation.

(1) Facilities Operation Expenses

The operating expenses of Project facilities and equipment have been calculated in the following manner according to ① electricity charge, ② water supply charge, ③ sewerage charge, ④ fuel for generator.

The maintenance expenses of building and mechanical equipment have been calculated in the following manner according to ① building maintenance , ② mechanical equipment maintenance charge, ③medical examination equipment maintenance charge.

The operating expenses and maintenance of Project facilities and equipment estimated as condition of following Table 3-6.

Table 3-6 Trial Calculation of Facilities Operating Expenses (YR / year)

| | Annual cost (1,000 YR) |
|---|---|
| 1) Operating expenses | 1,450 |
| ① Electricity | 1,200 |
| ② Water supply | 101 |
| ③ Sewerage | 76 |
| ④ Gas supply | 33 |
| ⑤ Diesel Oil | 40 |
| 2) Maintenance expenses | 2,809 |
| ① Building | 240 |
| ② Mechanical equipment | 150 |
| ③ Medical equipment | 2,419 |
| Total | 4,259 |

1) Building operation expenses

Maximum operation hours of one day of each room is assumed 6.0 hours. Supply by commercial electrical power is assumed 5 days a week and 240 days in a year. Supply by the generator is half day a week.

① Electric charge :
Power load×Demand of each Room×Consumption hours of each Room/year = Power Consumption / year
100,000 Kw/year × 12 YR / Kw 1,200,000 YR / year

② Water charge :
7 $m^3$ / day × 240 days / year = 1,680 $m^3$ / year
1,680 $m^3$ / year × 60 YR / $m^3$ 100,800 YR / year

③ Sewerage charge :
Follow the above ②. 1,680 $m^3$ / year
1,680 $m^3$ / year × 45 YR / $m^3$ 75,600 YR / year

④ Gas charge :
15 cylinder / year × 220 YR / cylinder 33,000 YR / year

⑤ Diesel charge :
20 litter / hour × 200 hours / year = 4,000 litter / year
4,000 litter / year × 10 YR / litter 40,000 YR / year

As a building operation expenses, Electric charge, Water charge, Sewerage charge, Gas charge and Diesel charge for generator will be needed. Based on the above calculation estimated operation expenses are 1,450,000 YR in one year.

2) Facilities and equipment maintenance cost

① Building maintenance cost
The annual building maintenance cost significantly increases in accordance with the passing of time The period in which major repair is unnecessary is approximately 30 years after building completion. Based on actual past examples of buildings of a similar scale, the average annual repair cost is approximately 0.08% of the direct construction cost. This is translated to approximately 150 YR/$m^2$.

1,600 $m^2$ × 150 YR 240,000 YR / year

② Building services equipment maintenance cost
The building services equipment maintenance cost is low for the first five years or so after building completion and the replacement of parts and equipment due to secular deterioration will be required thereafter. The

average annual repair cost for a span of 10 years is estimated to be approximately 0.1% of the building services installation cost.

150,000,000 YR × 0.001 — 150,000 YR / year

③ Equipment maintenance cost

Although the maintenance service cost, including the cost of repair parts, depends on the frequency of use, the maintenance cost of the main equipment (X-ray apparatus, automatic film developer and safety cabinets) after their procurement under the Project is estimated here.

a) Maintenance service cost and cost of repair parts (estimate)

The annual equipment maintenance cost is assumed to consist of the maintenance service cost (technical service fee and cost of simple parts based on inspection approximately once a year) and the cost of the repair parts assumed to be required. In the case of those parts which are replaced every few years, their annual cost is calculated based on their prices and frequency of replacement. The items listed in Table 3-7 are used as the basis for estimation.

**Table 3-7 Estimation of Cost for Maintenance Service and Repair-parts (J¥1,000)**

| Equipment Name | Maintenance Contract (a) | Cost of repair parts | | | Total (a+b) |
|---|---|---|---|---|---|
| | | Frequency of replacement (year) | Unit price | Annual Cost | |
| X-ray apparatus | 200 | X-ray lamp 5years | 1,000 | 200 | 400 |
| Automatic film | 50 | Roller kit 5years | 50 | 10 | 70 |
| Developer | | Gear kit 5years | 50 | 10 | |
| Safety Cabinet | 100 | Hepa filter 3years | 150 | 50 | 150 |
| Total | 350 | - | - | 270 | 620 |

The resulting estimated annual maintenance cost is ¥620,000 (approximately 885,700 YR/year; 1 YR = ¥0.7).

b) Cost of consumables

This relates to the cost of consumables which are required to conduct testing/operations. The unit price is estimated based on their general specifications and prices. The items shown in the table are used as the basis for estimation of the overall cost.

Table 3-8 Estimation of X-ray Related Consumable Cost

| Equipment Name | Consumable | Unit price (J¥) | Cost for one scene (J¥) |
|---|---|---|---|
| X-ray apparatus | Film for one scene | 450 / scene | 450 |
| | Roll film | 21,170 / roll (100 scenes) | 212 |
| Automatic film Developer | Development / Fixer | 10 | 10 |

Table 3-9 Estimation of Annual X-ray Filming Cost

| | | Sub total (J¥) |
|---|---|---|
| Indirect filming | Based on 10 indirect filmings a day, the annual cost (based on 200 working days) is calculated as follows.<br>*10 scenes×200 days ÷ 100 scenes/roll×¥21,170*<br>= ¥423,400 | 423,000 |
| Direct filming | Based on five a day, the annual cost (based on 200 working days) is calculated as follows.<br>5 scenes x 200 days x ¥450 = ¥450,000 | 450,000 |
| Development | 5 scenes x 200 days x 20 roll of films x ¥10<br>= ¥200,000 | 200,000 |
| | Total | 1,073,000 (J¥) |

Consequently, the annual cost of consumables is approximately 1,533,000 YR (1 YR = ¥0.7).

# CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATIONS

# CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATIONS

## 4.1 Project Effects

### 4.1.1 Verification of Project Suitability

There is no significant change on project suitability by this study.

(1) Necessity of the Project for TB Control in Yemen

The nationwide extension and maintenance of the DOTS Strategy based on the NTP are essential for the TB control measures of the Government of Yemen to achieve positive results. In particular, based on the belief that the establishment of a nationwide TB control network is essential to achieve the WHO targets, i.e. the curing of 80% of TB patients and improvement of the TB patient discovery rate to 70%, the work of appointing a GTC in each district has commenced to establish the required nationwide TB control system.

At present, activities based on the DOTS Strategy are in progress in 16 out of the country's 18 governorates or 66 districts out of the 226 districts in these 16 governorates. In areas where the DOTS Strategy has been introduced, the cure rate has improved from some 40% to as high as 89% as of 1998.

Meanwhile, the NTI, the Hodeida TBCC and the Taiz TBCC, all of which were established in North Yemen prior to the unification of South Yemen and North Yemen, have been recording good TB control results in the former North Yemen area through cooperation activities under the Tuberculosis Control Project in Yemen, a technical cooperation project of Japan, since 1983.

Since unification in 1990, the subject population and area of TB control activities have increased by 1.5 times and three times respectively. However, extension of the NTP in southern governorates has been slow. The materialisation of the Project which will establish a base for TB control activities in southern Yemen is, therefore, urgently required if the patient cure rate, the biggest task for TB control measures in Yemen, is to be improved. As the Project based on the DOTS Strategy is expected to improve the TB control performance in the southern and eastern parts of Yemen, the implementation of the Project is judged to be highly suitable.

(2) Management System

It is planned to run the facilities to be established under the Project with 32 staff members, including the transfer of five staff members from the Jumhuriyah

Hospital in addition to the existing staff members of the PHC. The appointment of all 18 engineers and 10 out of 14 administrative staff members has already been provisionally made. It is planned to transfer existing staff members from other health and medical facilities instead of the recruitment of new staff members for the new facilities because of the fact that a sufficient number of health workers is available at existing facilities in the governorate and no problems are anticipated in regard to securing the required number of staff members.

As the provisionally appointed personnel have practical experience of TB control measures at existing medical facilities, no management problems are anticipated in regard to the implementation of the Project.

(3) Finance

The budget to operate the planned facilities will be allocated from the budget of the Health Department of the Aden Governorate which is requested to the Ministry of Public Health and Population by the Government of Yemen.
To cover the personnel cost of the 32 staff members, YR 5.76 million (approximately ¥4 million) will be allocated by the Ministry of Public Health and Population. As the staff members of the new facilities will be transferred from existing medical facilities, the share of the personnel cost in the budget of the Ministry of Public Health and Population will not significantly increase because of the establishment of the new facilities under the Project.

As far as the maintenance cost is concerned, a cost will be incurred by the regular replacement of the air-conditioning filters and others. The parts replacement and repair cost will increase after 3 - 5 years. The regular maintenance and inspection of the air-conditioning nits and generator, etc. is desirable by means of service agreements with local agents.

As the scale of the original request for the Project has been reduced to lower the maintenance cost, the required annual maintenance cost after the handing over of the facilities to the Yemeni side is expected to be approximately YR 4.26 million (approximately ¥3 million). The operation of the new facilities will commence in March, 2000 and the Ministry of Public Health and Population is expected to provide annual budget allocation of some YR 5 million to cover the operating cost. This amount is only some 0.16% of the total budget of the Ministry and can be easily appropriated without causing any budgetary problem. The Government of Yemen has been promoting decentralisation since 1995 and the health department of each governorate has discretionary power in regard to the personnel cost, procurement cost of goods, drugs and equipment and development cost. Any budgetary shortage for future activities will be supplemented by the government of the Aden Governorate.

(4) Maintenance System

At present, the PHC has two maintenance engineers each for the building, plumbing and electrical sections. Two out of the seven night security guards currently working at the PHC will be transferred to the new facilities. The maintenance of the medical equipment and building service equipment will be conducted by the Central Workshop of the Jumhuriyah Hospital. This Central Workshop conducts the maintenance of all health and medical facilities in the Aden Governorate and its maintenance staff members are judged to have sufficient technical capability to maintain and repair the building service as well as medical equipment. No problems are, therefore, anticipated in regard to the maintenance system for the new facilities provided that training on the operation and maintenance of the building service equipment and X-ray and other medical equipment is provided after the completion of the new facilities.

At existing medical facilities, the maintenance of medical examination equipment is conducted by those using the facilities in each examination department. If the equipment breaks down, it is sent to the Central Workshop at the Jumhuriyah Hospital for repair. In the case of equipment such as X-ray equipment with electronic circuits, it is often difficult to clarify the cause of break down. Even if the cause can be found, replacement of the circuit board may be necessary. This type of work is assigned to a manufacturer's engineer even in Japan. Accordingly, it appears advisable to request the engineers of local agents or manufacturers to repair examination and laboratory equipment.

### 4.1.2 Project Effects

The Project anticipates the smooth implementation of the NTP, supervised by the TB Control Section of the Ministry of Health, in southern Yemen to achieve positive effects through the establishment of the Aden Tuberculosis Control Centre.

The Aden Tuberculosis Control Centre will function as the base for TB control activities in southern Yemen and the ATCC is expected to strengthen various functions, including the formulation of a national TB control plan, training of TB control workers, epidemological surveying and analysis, medical research and health education. It is hoped that such improvements will assist the achievement of the NTP targets, i.e. a TB patient cure rate of 85% and a TB positive patient discovery rate by means of sputum smear examination of 70%. The activities of the ATCC are also expected to contribute to the early discovery and treatment of TB patients, improvement of the nationwide TB control efforts, including prevention and education, in Yemen and the general improvement of health conditions in the country.

It is also expected that the training and upgrading of health personnel engaged in TB control activities will be promoted by the effective use of the new facilities and equipment provided under the Project. The implementation of TB prevention activities is expected to have the following direct and indirect effects.

(1) Direct Effects

1) Training of DOTS Personnel

Through training activities, one doctor, one DTC and one medical laboratory technician and two public health workers to serve each of 108 districts in the Project Area, totalling 540 persons, will be trained to run the DOTS system. In addition, the re-training (upgrading) of approximately half (270) of such personnel every year will be possible to maintain the functions and accuracy control of the said system.

2) Improvement of Examination Function and Establishment of Examination Network

The regular cross-checking of the sputum smear examination results of some 108 HCs, HUs and PCs equipped with an examination unit (some 2,000 cases a year) will improve the examination accuracy. The establishment of such an examination network is expected to improve the TB patient discovery and cure rates in the Project Area.

3) Improvement of Travelling Guidance

Regular travelling guidance will improve the patient management and drug management at medical facilities in villages where the DOTS is implemented and the treatment failure and drop-out rates in southern Yemen will be improved.

4) Improvement of Research and Evaluation

The preparation of more effective TB control activities will become possible through monitoring, evaluation and analysis relating to the discovery and treatment of TB patients in the selected model areas.

(2) Indirect Effects

1) Spread of TB Control Activities to Community Level

The effective training and qualitative improvement of PHC workers and village volunteers will enable the discovery of patients and medication control at the community level, increasing the access of local people to the TB Control Service.

2) Knock-On Effects on Public Health, Control of Infectious Diseases and PHC Activities

As the neighbouring PHC Office conducts various training and seminars on public health and the control of infectious diseases for health workers and medical students, it is expected that expertise regarding TB control will spread to such

personnel engaged in public health and/or research work on infectious diseases control activities using the training and accommodation facilities at the ATCC.

3) Knock-On Effects on Nationwide Network and Pending Tasks

Once the TB control network is established not only in southern Yemen but also nationwide through ATCC activities and assistance under the project-type technical cooperation, it is expected that TB control activities in Yemen will significantly improve on all fronts. To realise such improvement, however, self-help efforts on the Yemeni side will be essential, including the continuance of training programmes, implementation of travelling guidance and regular monitoring, assignment of TB control workers to public health facilities, increase of regional health workers based in the community and the regular supply of anti-TB drugs, re-agents and consumables, etc.

(3) Benefitting Population

The implementation of the Project will have the direct effect of improving the quality and abilities of some 540 public health staff members engaged in TB control activities in southern Yemen. Indirectly, the Project is expected to save some 2,200 TB patients a year based on a TB patient rate of 80 in every 100,000 and will also benefit some 15,200 family members of these patients.

## 4.2 Recommendations

The implementation of the Project with grant aid provided by the Government of Japan is judged to be appropriate because of the expected considerable effects described above and also because of its wide contribution to improving the health of local people. In addition, the Yemeni side appears to have sufficient manpower and funds to properly manage the Project. However, the Project will be implemented more smoothly and effectively if the following improvements as well as developments are made. While the ultimate objective of the Project is the prevention of TB, sufficient collaboration with and the efforts of all related organizations in Yemen in regard to the following issues will be essential.

(1) Improvement of Training Programmes and Upgrading of Technical Expertise of Advisors

The training of personnel working in the field of TB control will be an important function of the ATCC. The establishment of an examination unit in each district will also be important through the training of doctors, DTCs, medical laboratory technicians and public health workers to establish a TB control network. The training of microscopists to conduct sputum smear examinations and validators to control the accuracy of the examination results will be particularly important.

Improvement of the training techniques is highly desirable in view of the implementation of training in line with the NTP.

(2) Establishment of Operation and Maintenance System for Facilities and Equipment

The ATCC will be constructed next to the existing PHC Office. Although some 120 people currently work at the PHC Office, the maintenance of the facilities and equipment is inadequate because of the lack of maintenance staff. Moreover, there is no budgetary allocation to cover the maintenance cost. In order for the new ATCC to properly function, the establishment of an appropriate maintenance system and sufficient budgetary allocation for maintenance will be essential.

(3) Establishment of User Fee System

The sources of the operating funds for the ATCC will be the budget of the Ministry of Health, a grant provided by the government of the Aden Governorate and user fees for examinations, etc. In addition to appropriate budgetary allocation by the central government, it will be necessary for the ATCC to collect user fees in line with the beneficiary pays principle advocated by the central government.
It is also to be a considerable matter to built a collection system of user fees by lending out the dormitory to the outside organizations.

(4) Budgetary Allocation to Cover Project Cost to be Borne by Yemeni Side and Control of Implementation Schedule

For the smooth implementation of the Project, appropriate budgetary allocation and control of the implementation schedule for the work to be conducted by the Yemeni side will be essential. Particularly important will be the proper completion of the facilities to supply the required level of electricity to the Project Site and paving of the approach road to the boundary of the Project Site.