

4.2 Minutes of Discussions for Preliminary Study (July 2004)

MINUTES OF DISCUSSIONS
ON THE PRELIMINARY STUDY
ON THE PROJECT FOR REHABILITATION OF THE WATER TRANSMISSION TUNNELS
IN DAMASCUS CITY
IN THE SYRIAN ARAB REPUBLIC

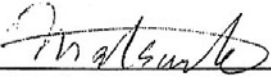
In response to the request from the Government of Syrian Arab Republic (hereinafter referred to as "Syria"), the Government of Japan decided to conduct a Preliminary Study on the Project for Rehabilitation of Water Transmission Tunnels in Damascus City (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Syria the Preliminary Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigeyuki Matsumoto, Water and Sanitation Team, Project Management Group I, Grant Aid Management Department, JICA, and is scheduled to stay in the country from June 19 to July 23.

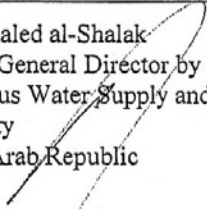
The Team held discussions with the officials concerned of the Government of Syria and conducted a field survey at the study area.

As a result of discussions and field survey, both parties confirmed the main items described on the attached sheets. Subject to the decision by the Government of Japan, JICA will conduct a Basic Design Study on the Project.

Damascus, July 22, 2004



Mr. Shigeyuki Matsumoto
Leader
Preliminary Study Team
Japan International Cooperation Agency
Japan



Eng. Khaled al-Shalak
Deputy General Director by authorization
Damascus Water Supply and Sewerage
Authority
Syrian Arab Republic

ATTACHMENT

1. Objective of the Project

The objective of the Project is to maintain the effective functioning of the water transmission tunnels from the Figeih Spring to Damascus city by rehabilitating them in order to ensure safe and stable water supply for people in the service areas of Damascus city and its vicinal villages.

2. Project sites

The sites of the Project are the Old Tunnel and the New Tunnel. The location of the sites is shown in Annex-1.

3. Responsible and Implementing Agency

3-1. The Responsible Agency is Ministry of Housing and Construction (MOHC).

3-2. The Implementing Agency is Damascus City Water Supply and Sewerage Authority (DAWSSA). The organization chart is shown in Annex-2.

4. Items requested by the Government of Syria

After discussions with the Team, the items described in Annex-3 were finally requested by the Syrian side. JICA will assess the appropriateness of the request and will report the findings to the Government of Japan.

5. Japan's Grant Aid Scheme

5-1. The Syrian side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-4.

5-2. The Syrian side will take the necessary measures for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

If the Project is found feasible as a result of the Preliminary Study, JICA will send the Basic Design Study Team around November, 2004.

7. Other relevant issues

7-1. Necessity of the water transmission tunnels for water supply to Damascus city

DAWSSA explained roles and necessity of the tunnels at present and in the future. The water transmission tunnels connect the Figeih Spring and the Wali Reservoirs (Old and New). Water from the Barada Spring well field and the Figeih Spring flows through the tunnels to Damascus City and accounts for more than 80 % of total production amount. Besides, water transmission pipelines diverge from the tunnels along the way to surrounding villages and facilities. Therefore, the tunnels

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are critically important lifelines for the people in Damascus.

DAWSSA plans to develop groundwater resources in Hermon area in order to cope with water shortage in dry season. The extracted groundwater will also flow through the tunnels. In addition, the water transmission project from the Mediterranean coastal basin and the Euphrates basin is now in the planning stage and a part of water conveyed by this project is planned to flow into the tunnels for the purpose of water distribution in western part of Damascus. Because of the above situation, to maintain appropriate function of the tunnels is indispensable continuously in the future.

DAWSSA suspects water quality degradation and water leakage mainly in the old tunnel. However, the Team confirmed that enough residual chlorine was kept in mid-course and at the end of the old tunnel and no major crack or damage to cause such large amount of leakage was found. DAWSSA pointed out the necessity of water quality investigation in wet season because of increase of infiltration inflow into the tunnels. The Team proposed to investigate water balance of the old tunnel more precisely during the Basic Design Study.

Considering the above-mentioned situation, the Team recognized the importance and necessity of keeping proper function and capability of the tunnels.

7-2. Justification of the Project

The Team investigated some alternatives to rehabilitation of the existing water transmission tunnels. The result is shown in Annex-5.

Comparing to the other alternatives, the rehabilitation of the existing tunnels seems to be the optimum solution, mainly because only a part of the tunnels shall be rehabilitated and it brings cost-effectiveness.

7-3. Actual conditions of deterioration in the tunnels and priority area of the Project

The Team inspected all along the tunnels and presented their findings, proposed sections to be prioritized and possible repair methods as shown in Annex-6 (Old Tunnel) and Annex-7 (New Tunnel).

The Team found damages such as exfoliation and fallings of concrete at the arch portion, exposed and corroded reinforcing bars, ingress of plant roots and cracks. Repair works are necessary at an early date to prevent further aggravation and prolong life of the tunnels. Causes of deterioration in the tunnels were presumed as follows;

Old Tunnel : aging,

New Tunnel : low quality concrete when constructed.

The preliminary inspection by the Team shows that deterioration to the lining has been brought by low quality concrete, not by excessive load or stress from outside. No fatal deformation was observed. Therefore, repair works shall be carried out so that they give lining concrete the original quality. The Team also explained their opinion that non-return drain valves for the New Tunnel were not necessary because water pressure was low and conditions were stable after 20 years from

the completion of construction.

The Team could not investigate the back siphon part of the Old Tunnel (TD 12,325m – 12,745m), because it was within military land and there had not been enough time to drain water. As for this part, DAWSSA has concern about water leakage from joints of the asbestos cement pipe. Actual condition shall be studied in the Basic Design Study.

The Team recognized the necessity of rehabilitating both tunnels considering the following reasons;

- (1) Both tunnels have deteriorated sections to be rehabilitated as shown in Annex-6 and 7,
- (2) Overall conditions of two tunnels are relatively sound and even the Old Tunnel can be used in the future after appropriate rehabilitation,
- (3) Both tunnels are necessary because each of them has branch pipes to supply water for surrounding villages and facilities and both of them will be used in the planned water transmission scheme from the Mediterranean coastal basin,
- (4) In case of an emergency stop or maintenance work of one tunnel, backup support by the other tunnel can be expected by keeping two tunnels, which minimizes inconvenience of people in Damascus, and
- (5) Deteriorated sections are localized so that the estimated project scale will not become excessive even if both tunnels are included.

The work methods shall satisfy following conditions considering that the tunnels serve as drinking water supply facilities;

- (1) The suspension of water supply service shall be minimized, and
- (2) Toxic materials shall not seep into water after conduction of water resumes.

DAWSSA mentioned that they would investigate how to ensure longer working period and one idea was to conduct works during winter when water consumption decreased and to use water from well fields in the city for compensation of cut in water supply by the tunnels.

The Team also explained that considering limited scale of the Japanese Grant Aid project, sections to be rehabilitated should be determined examining necessity, urgency and cost-benefit performance.

7-4. Envisioned outline of the successive study

If the Project is found feasible as a result of the Preliminary Study, items to be investigated in the Basic Design stage are supposed as follows;

- (1) Determine sections to be surveyed in detail based on the existing data and survey results of the Preliminary Study,
- (2) Analyze causes of deterioration,
- (3) Study rehabilitation methods,
- (4) Plan a rehabilitation work schedule, and
- (5) Estimate a construction cost.



Investigation methods shall be determined considering technical reasonableness and cost-effectiveness.

The Team explained that an electromagnetic radar method was applicable to measure thickness of lining concrete and to probe its rear situation when rehabilitation works were to be carried out as requested in the application form. The nondestructive tests cannot probe internal conditions of the lining concrete and its rear situation precisely, but they can give reference information to determine rough locations of rehabilitation works. The Team also explained that according to the result of preliminary survey, the electromagnetic radar method was not necessary for the entire length of the tunnels but required for a part of the tunnels where roads and houses existed above them.

7-5. Technical assistance

According to DAWSSA, there are few tunnels in Syria and no Syrian companies can inspect nor maintain tunnels.

Foreign engineering companies inspected the Old Tunnel and DAWSSA inspected the Old Tunnel and New Tunnel by itself. However, the Team recognized that more systematical inspection was necessary. Therefore, both sides recognized the necessity of technical support to enhance DAWSSA's capability in the following fields;

- (1) To record informative and accurate data by periodical inspections,
- (2) To instruct how to repair deteriorations found by the inspections, and
- (3) To repair slight deteriorations.

7-6. Visibility

The Team requested DAWSSA to take necessary measures to secure high visibility of the Project, though the tunnels, the Project sites, were underground structure and invisible to the people. DAWSSA explained that they would be able to make a TV report of the Project implementation and set up signboards in Fige, Wali and inside the city.

7-7. Status of the Preliminary Study

The Team explained that the purpose of the Preliminary Survey was to collect information to verify the appropriateness of the requested Project and no commitment was made from the Japanese side concerning the realization of the Project. DAWSSA understood this status of the Preliminary Study.



4.3 Minutes of Discussions for Inception (November 2004)

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR REHABILITATION OF THE WATER TRANSMISSION TUNNELS
IN DAMASCUS CITY
IN THE SYRIAN ARAB REPUBLIC

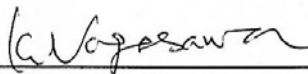
Based on the results of the Preliminary Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Rehabilitation of Water Transmission Tunnels in Damascus City (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Syrian Arab Republic (hereinafter referred to as "Syria") the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Kazuhide Nagasawa, Resident Representative, JICA Syria Office, and is scheduled to stay in the country from October 13 to December 26.

The Team held discussions with the officials concerned of the Government of Syria and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Damascus, November 21, 2004



Mr. Kazuhide Nagasawa
Leader
Basic Design Study Team
Japan International Cooperation Agency
Japan



Eng. Mwafak Khallouf
General Director
Damascus Water Supply and Sewerage
Authority
Syrian Arab Republic

ATTACHMENT

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4. Items requested by the Government of Syria

After discussions with the Team, the items described in Annex-3 were finally requested by the Syrian side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

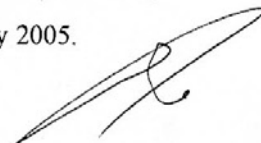
The Syrian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Syria as explained by the Team and described in Annex-4 of the Minutes of Discussions signed by both parties on July 22.

6. Schedule of the Study

6-1. The consultants will proceed to further studies in Syria until December 26, 2004.

6-2. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around March 2005.

6-3. In case that the contents of the report is accepted in principle by the Government of Syria, JICA will complete the final report and send it to the Government of Syria by July 2005.



7. Other relevant issues

7-1. Contents of the Inception Report

The Team explained the Inception Report, describing the study schedule, contents of the study and items to be discussed. The Syrian side understood it.

7-2. Sections to be investigated

Both sides agreed that the sections for detailed survey would be selected based on the results of the preliminary study and general exploratory investigation by the Team.

7-3. Replacement of the corroded gates in the Old Tunnel

The request includes the replacement of the corroded gate valves and related equipment in the Old Tunnel. DAWSSA explained that they would be necessary to control water flow in the tunnel after realization of the water transmission project from the coastal area in the future.

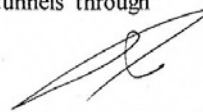
The Team will investigate the plan of tunnel operation and actual condition of the gates to assess the necessity of replacement in the Project.

7-4. Undertakings to be taken by the Syrian side

To facilitate the smooth implementation of the Study, the Syrian side will take necessary measures as follows:

- 1) To provide the Team with available relevant data, information and materials necessary for the execution of the Study,
- 2) To prepare the answers for the Questionnaires presented by the Team,
- 3) To assign full time counterparts to the Team during their stay in Syria, to act in the following roles as coordinators to the Team:
 - To make appointments, set up meetings with the authorities, departments and all other factories and firms or whatever the Team intends to visit,
 - To attend the site survey and any other place with the Team and to make any convenience on accommodation, working room, adequate transportation, getting the permissions if required, etc.,
 - To assist and to advise the Team for their collection of data and information as much as possible, and
 - To acquire knowledge and skill on inspection and rehabilitation of the tunnels through





collaboration work.

- 4) To secure permission to photograph and enter into private properties and restricted areas for the Team for the proper execution of the Study, if necessary,
- 5) To take any measures deemed necessary to secure the safety of the members of the Team,
- 6) To make arrangements to allow the Team to bring back to Japan any necessary data, maps and materials related to the Study, subject to the approval by the Government of Syria, in order to analyze the Project and prepare the reports,
- 7) To exempt the Team and its members from customs duties, internal taxes and other fiscal levies,
- 8) To provide the Team with office space equipped with office supplies such as desks and chairs, electricity, electric lights, telephone, air conditioner, photocopy machine etc., and
- 9) To stop or to control water flow in the tunnels during the tunnel inspection.

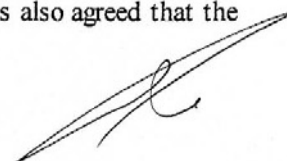
The Japanese side explained that the Project would contain construction work and be different from the previous projects with DAWSSA, which were defined as equipment procurement. In this context, the Japanese side requested the Syrian side to take the necessary measures described in Annex-4 for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented. Details of each item will be discussed in the course of the Study.

7-5. Visibility

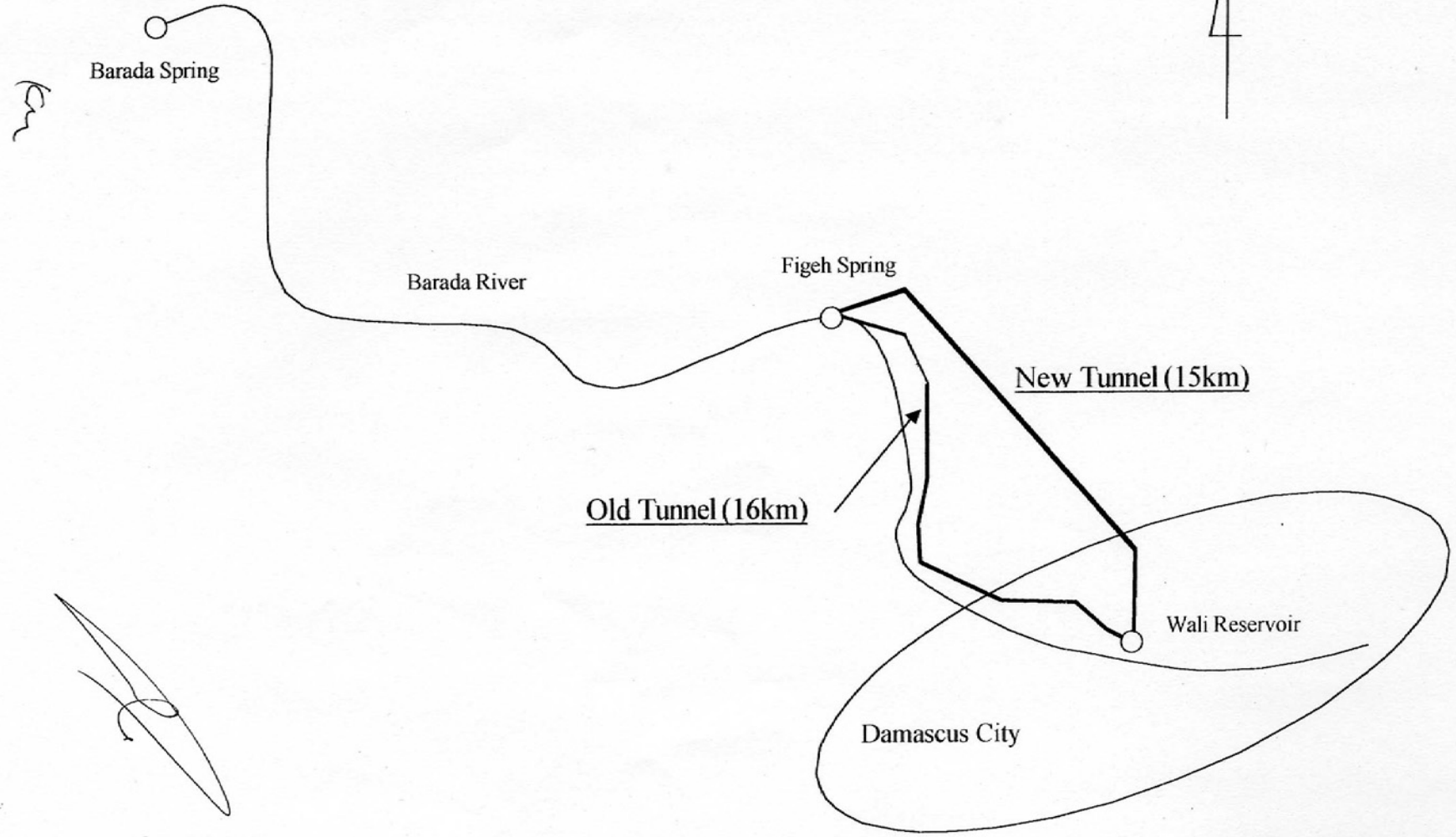
DAWSSA will disseminate the Project under Japan's grant aid for public awareness, through a television program and installation of billboards under the expense of DAWSSA. The Japanese side proposed to keep a record of the Project graphically by video not only for dissemination but also for training material on the tunnel rehabilitation. The Japanese side also expressed their expectation for high visibility of the overall Japanese cooperation for Damascus water supply including other previous and ongoing projects, because they were designed to cover the whole water supply system from the water sources to the distribution networks.

7-6. Training

DAWSSA requested the counterpart training in Japan on tunnel inspection and repair work. The Japanese side promised to convey the request to related authorities. Both sides also agreed that the Team would provide OJT in the course of the Study.

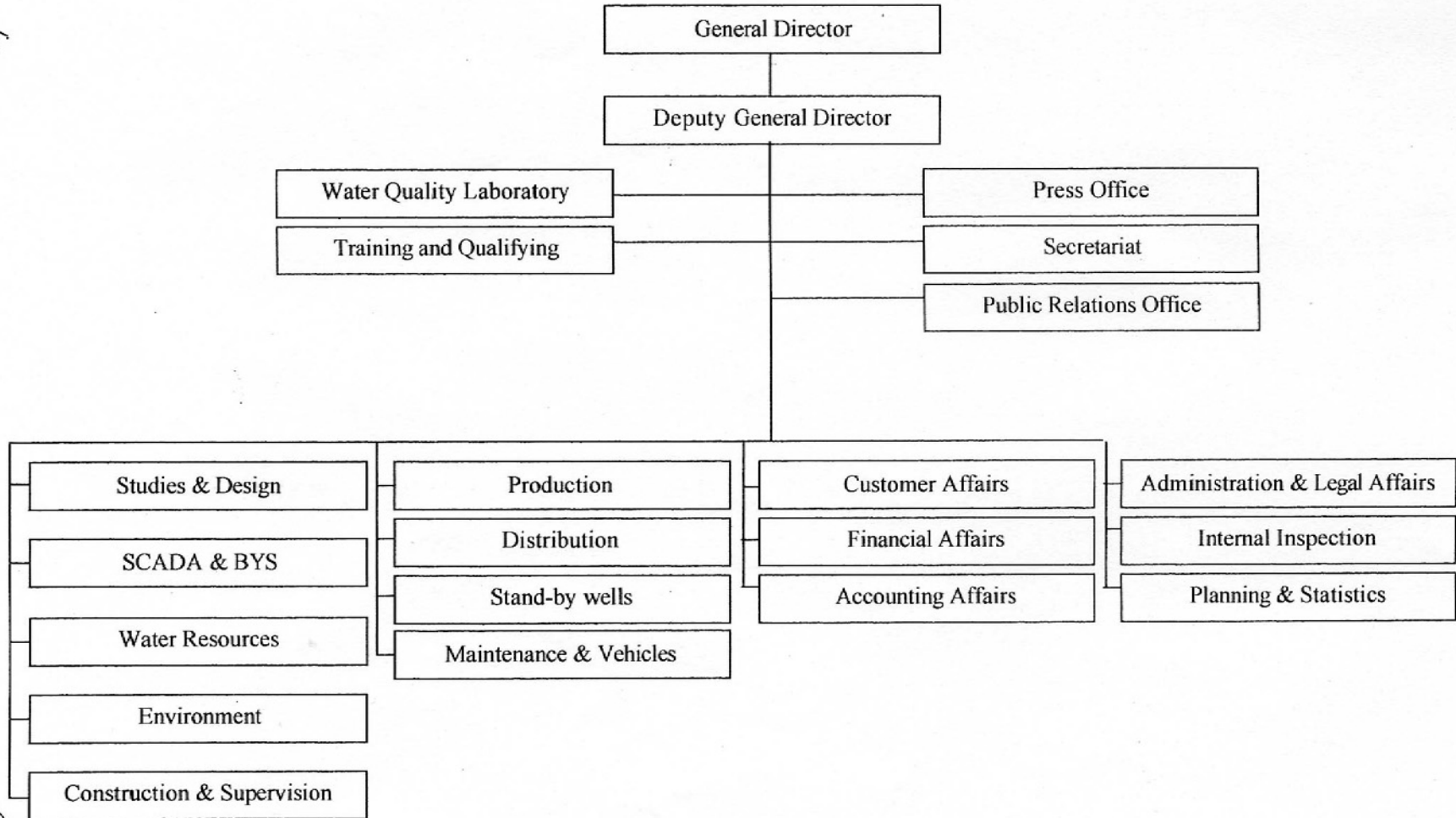


ANNEX-1 : Project Sites



ANNEX-2 : Organization Chart of the Damascus City Water and Sewerage Authority

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ANNEX-3 : Items requested by the Syrian side

The main requested component of the Project is as follows:

(1) Rehabilitation of the Old Tunnel

No.	TD (Total distance)		Length of the section	Condition of the deterioration	Possible mending methods
1	1,216			Ingression of roots into the tunnel	Clearing and protection for the ingress of roots; a) Steel plate .b) FRP
	1,465	1,670	205	Exfoliation and fallings at the arch portion. Corroded reinforcing steel exposes.	a) Internal repair *-1 or b) Repair from the outside of the tunnel or c) FRP lining
2	2,394	3,018	624	Reinforcing steel exposes. Exfoliation and dull sound by the hammer blow at the arch portion.	a) Internal repair *-1 or b) repair from the outside of the tunnel or c) FRP lining
	2,471	2,642	171	Ingression of roots from cracks 0.5-3mm wide	Clearing and protection for the ingress of roots; a) Steel plate or b) FRP
3	8,843	8,849	6	Ingression of roots into the tunnel	Clearing and protection for the ingress of roots; a) Steel plate .b) FRP
	9,555	9,561	6	Reinforcing steel exposures and exfoliation at the arch (3 points)	a) Internal repair *-1 or b) repair from the outside of the tunnel or c) FRP lining
	9,548			Ingression of roots into the tunnel	Clearing and protection for the ingress of roots; a) Steel plate or b) FRP
	9,641			Cracks 0.1mm wide	Repair of cracks
	9,764	9,841	77	Cracks of 0-0.25mm width	Monitoring should be continued.
	9,929	10,254	325	Surface corrosion of the round steel pipe.	Clearing rust and painting antirust
	10,549	10,590	41	Reinforcing steel exposures, falling and dull sound by hammer blow at the arch and wall of the tunnel.	a) Internal repair *-1 or b) FRP lining
	10,549	10,599	50	Cracks 0.2-0.3mm wide	Repair of cracks
	10,735	10,780	45	Reinforcing steel exposures, falling and dull sound by hammer blow at the arch and wall of the tunnel.	a) Internal repair *-1 or b) FRP lining
10,747	10,770	23	cracks 0.1-0.25mm wide	Repair of cracks	
4	12,325	12,745	420	Back siphon	Pipe renewal
5	13,740	13,938	198	Surface corrosion of the round steel pipe.	Clearing rust and painting antirust
6	15,721	16,071	350	Cracks 0.1-2mm wide	Repair of cracks Grouting at the section under the road
				Corroded gate valves and related equipment	Replacement
Total			2,541		

*-1: To remove corroded reinforcing steel, then set reinforcing material again and cover with concrete

(2) Rehabilitation of the New Tunnel

No.	TD (Total Distance)		Length of the section	Condition of the deterioration	Possible mending methods
1	0	218	218	The tunnel passes under the road and houses	Grouting
2	1,096			Cracks 0.25mm wide	Crack repair
	1,100			Falling (BH d 30×30× 4 cm)	Internal repair *-2
	1,160			Cracks 2mm wide	Crack repair
3	3,168			Falling (BH d 110×100× 3 cm)	Internal repair *-2
	3,169			Falling (BH d 30×100× 1 cm)	Internal repair *-2
	3,172			Falling (BH d 30×200× 2 cm)	Internal repair *-2
4	8,514			Cracks 0.2mm wide	Crack repair
5	9,376			Falling (BH d 60×80× 3 cm)	Internal repair *-2
	9,573			Cracks 0.7mm wide	Crack repair
6	11,127			Falling (BH d 40×40× 2 cm)	Internal repair *-2
	11,148			Falling (BH d 20×60× 3 cm)	Internal repair *-2

*-2: To remove low quality concrete and replace it with fresh concrete

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ANNEX-4 : Undertakings to be taken by the Syrian Government

[Construction Stage (Cooperation by the Japanese Grant Aid)]

1. To obtain necessary permissions, licenses, and other authorization for implementing the Project, if necessary;
2. To secure a lot of land necessary for the Project;
3. To provide a proper access road to the Project site;
4. To provide facilities for distribution of electricity and other incidental facilities necessary for construction work in and around the site;
5. To control traffic and secure safety of pedestrians and vehicles against construction traffic;
6. To take necessary measures to mitigate environmental impact caused by construction work;
7. To stop water flow in the tunnels in accordance with construction schedule;
8. To ensure prompt unloading and customs clearance of the construction materials and equipment purchased or brought under the Japan's Grant Aid at ports of disembarkation in Syria;
9. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into Syria and stay therein for the performance of their work;
10. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);
11. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in Syria with respect to the supply of the products and services under the verified contracts;
12. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project;
13. To allocate counterpart personnel;
14. To increase the visibility of the Project;

[Operation Stage]

15. To ensure that the facilities constructed under the Japan's Grant Aid be maintained and used properly and effectively for the Project; and
16. To conduct periodical inspection and repair work.

