添 付 資 料

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８．要請機材による計画作業量と必要台数の検討

MINUTES OF DISCUSSION
ON
THE PREPARATORY STUDY
ON
PROJECT FOR THE RETRIEVAL OF SEWAGE AND DRAINAGE SYSTEM IN LAHORE CITY
IN
THE ISLAMIC REPUBLIC OF PAKISTAN

In response to a request for Grant Aid from the Government of the Islamic Republic of Pakistan (hereinafter referred to as "the Government of Pakistan"), the Government of Japan decided to conduct a Preparatory Study on Project for the Retrieval of Sewage and Drainage System in Lahore City (hereinafter referred to as "the Project") and entrust the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Pakistan the Preparatory Study Team (hereinafter referred to as " the Team "), which is headed by Mr. Shigetada KAYUMI, Senior Advisor, Institute for International Cooperation, JICA and is scheduled to stay in the country from February 22 to March 12,2004.

The Team held a series of meetings and discussion with the officials concerned of the Government of Pakistan and conducted field survey at the study area.

In the course of discussions and field survey, the Government of Pakistan explained the main items and its necessity as described on the attached sheets. The Team will continue further study as to the viability of the Project in Japan and report the findings to the Government of Japan.

Lahore, March 11, 2004

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ATTACHMENT

1. BACKGROUND OF THE PROJECT

1-1. Water & Sanitation Agency of Lahore Development Authority (hereinafter referred to as " WASA") has improved a part of Sewerage System in Lahore city through provision of equipments and technical training that had been procured through the assistance of DFID, the United Kingdom as parallel financing of the World Bank's Punjab Urban Development Project and Lahore Water Supply and Sanitation Project.

1-2. WASA conducted the study including preparation of map of the sewage system in Lahore city through the assistance of DFID from 1996 to 1998.

1-3. Government of the Punjab prepared a master plan for the sewerage and drainage development for Lahore city in 2002 and will draw up 10-year development plans for establishing separable system of sewerage and drainage with the proper waste water treatment plant.

1-4. The Government of Pakistan has requested the grant aid to the Government of Japan based on the background above mentioned to continue its effort for cleaning and desilting of existing sewerage and drainage system as well as to augment pumping capacity of the existing pumping stations.

2. OBJECTIVE OF THE PROJECT

The objective of the Project is to retrieve the capacity of the sewerage and storm water disposal system in Lahore city through provision of desilting and cleaning machinery and replacement of disposal pumps.

3. PROJECT SITE

The sites of the Project (A, B, G, H1) are located in Lahore city as shown in ANNEX-1.

4. RESPONSIBLE AGENCY AND IMPLEMENTATION AGENCY (ANNEX-2(1))

4-1. The Sponsoring Agency: Government of the Punjab

4-2. The Responsible Agency: City District Government Lahore

4-3. The Implementing Agency: WASA (WASA has established "Project Management Unit"(hereinafter referred to as "PMU") as shown in ANNEX-2(2))

4-4. Steering Committee: Government of the Punjab will establish the Steering Committee that will consist of Government of the Punjab and City District Government Lahore for smooth implementation / completion of the project, in case the Government of Japan decides to start Basic Design Study.

5. JAPAN'S GRANT AID SCHEME

5-1. The Government of Pakistan understood the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-3. The Team reconfirmed the objectives of the Preparatory Study mentioned in the Inception Report and the Government of Pakistan understood them.

5-2. The Government of Pakistan will take necessary measures described in ANNEX-4, for smooth implementation of the Project, as a condition for the Japan's Grant Aid to be implemented.

5-3. The Government of Pakistan will be responsible for clearance of the custom duties and other taxes for the machinery, equipments and materials etc. at dry-port Lahore. The Government of Pakistan will bear the cost for the internal transportation of the machinery, equipments and materials from dry-port Lahore to the Project Site, as well as other Counterpart Funding for accomplishment of the tasks to achieve the objectives.

6. COMPONENTS REQUESTED BY THE GOVERNMENT OF THE PAKISTAN

After discussion with the Team, the Government of Pakistan explained the revised requested components (including technical supports) with priority described in ANNEX-5. JICA will assess the appropriateness of the request and will report the finding to the Government of Japan. The final components of the Project will be decided after Basic Design Study.

7. OTHER RELEVANT ISSUES

7-1. Sanitary Conditions of the Project Site

Both sides understood sanitary conditions in Lahore city and Project Site as followings:

(1) The existing sewerage and drainage system

The existing sewerage and drainage system was developed before creation of Pakistan and it was originally designed as separate system of municipal sewer and storm water drainage. After creation of Pakistan, a huge population migrated into Lahore city and overloaded the system. In addition, inadequate financial resources for timely augmentation and upgrading rendered the system ineffective. Furthermore, siltation in sewer pipelines over several decades causes the blockade at many portions of the sewer pipelines due to incapacity of solid waste management of the city. Flooding is owing to all these conditions.

The blockade forced to install more than 60 numbers of intermediate lift stations and to lift sewage into the open drainages. Storm water, thereby, is mixed with sewage like semi-combined sewer system. The discharge capacity of sewerage pumps at Shad Bagh, Gulshan-E-Ravi and Multan Road outfall pumping stations are inadequate. Therefore, increase of the discharge capacity is necessary for respective pump stations, in order to sustain the benefit of cleaning of the project zones as shown in ANNEX-1 and etc.

The drainage system, itself, has inadequate carrying capacity even due to ingress of solid waste etc. and untimely cleaning of the drains because of lack of proper machinery with WASA, when rainy season and the drainage pumps at all outfall drainage pump stations are operated only when water level at Ravi river is higher than that at the pump stations.

(2) Flooding, waterborne disease and the concerned claims by the inhabitant

Flooding has occurred at twenty or more locations even the rainfall is around 15mm and traffic, thereby, has been heavily disturbed for several hours. Claims by nearby inhabitant and drivers were incessant during heavy rainfall.

Waterborne diseases are increased slightly year by year. The relation between the increase and the flooding is not clear. However, there is the possibility that the polluted water during flooding ingresses into the deteriorated old and deep water supply pipeline and cause the waterborne disease, despite ensuring system chlorination during rainy season and adopting other safety measures etc..

7-2. Necessity of Monitoring of Sewage Pipeline

(1) The Team pointed out (a) monitoring of sewage system, especially of siltation at manholes and pipelines where possible, is necessary in order to obtain information of the sewage pipeline siltation and blockade for prevention of flooding occurrence and (b) the monitoring also is quite useful to keep sustainability of function of the pipeline because it is easy to prepare countermeasure beforehand.

(2) WASA will improve its monitoring works for the sewage system in Lahore city especially as regards:

(a) creation of PMU with specially entrusting scheduling, implementing and monitoring of the sewer and drains cleaning,

(b) mechanizing cleaning and desilting of operation and maintenance through procuring cleaning equipment of specification and capacity suiting to the Lahore conditions,

(c) ensuring continuation of cleaning and desilting activities with sustainability of the procured machinery and equipments etc.,

(d) framing effective rehabilitation of sewer and drainage system program and thereafter closely monitoring its implementation,

(e) adapting an effective cleaning / desilting methodology, suiting to the Lahore environment.

7-3. Conditions of Existing Machinery and Equipment

Through the data provided by Government of the Punjab and field survey, the Team understood conditions of existing machinery and equipment concerned with sewerage and drainage system in Lahore city as shown in ANNEX-6.

7-4. Action Plan for Retrieval Work and Implementation System

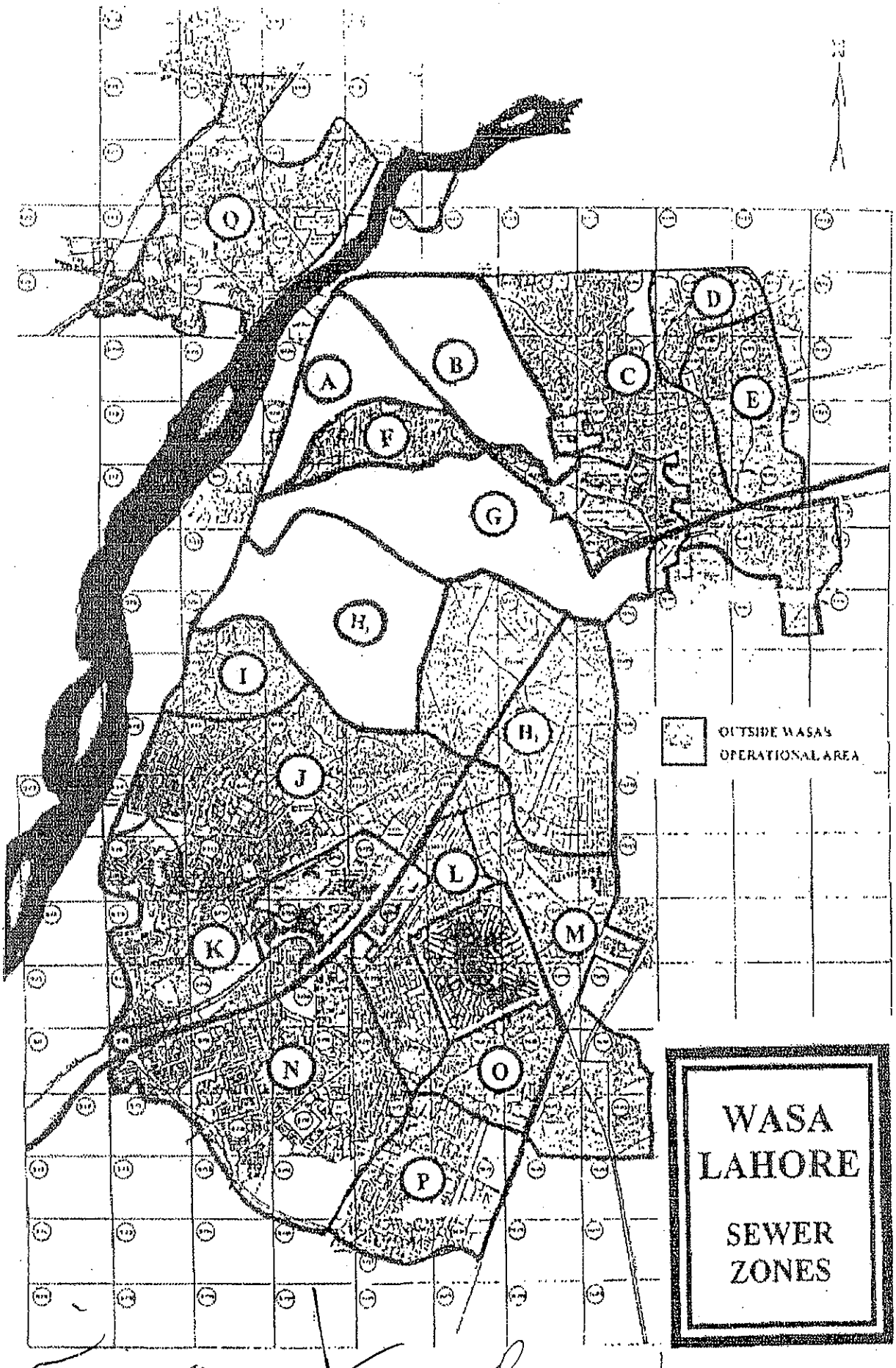
The Government of Pakistan explained the draft of the Action Plan for Retrieval Work and Implementation System including transportation and disposal of sludge with an ultimate aim to have sanitary disposal with the time and solid waste removed from sewer pipes and open channels in the Project Site as shown in ANNEX-7(1) and ANNEX-7(2). The Government of Pakistan will finalize it and send it to the Japanese Government through JICA Pakistan Office by end of May 2004.

7-5. Initial Environmental Examinations (IEE)

(1) The Government of Pakistan explained that as per policy the necessity of IEE for the Project and the process of IEE (ANNEX-8). WASA will report the progress and the result of IEE to the Government of Japan through JICA Pakistan Office basically according to the schedule as shown in ANNEX-8.

(2) The Team explained the concept of the "Draft of JICA Guideline for Environmental and Social Consideration" as shown in Inception Report and the Government of Pakistan understood it.

Project Site (zone A, B, G and H1)



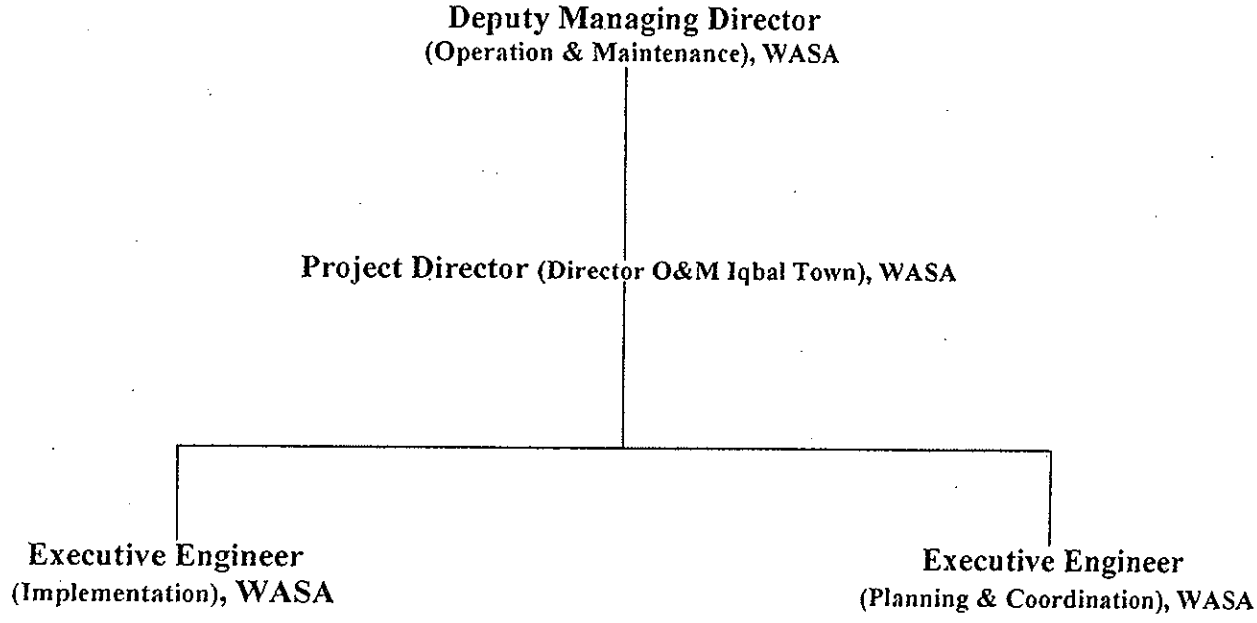
CONCERNED AUTHORITIES INVOLVED IN WASA PROJECTS

Administration		Non-Development Project	Development Project	For This Project
Govt. of Punjab	i) P&D Dept.	-	- Approval for Schemes upto Rs. 200Million. - In case more than Rs. 200Million, P&D Dept. examines and clear it then sends it to the Fed. Gov. for approval - In case where 25% or more of the total cost of the project is in foreign exchange or foreign assistance, the approving forum will be needed at CDWP/ ECNEC	- Liaison with Fed.Govt. - Provision for Counterpart funding (If required for Govt.) - Request to Fed.Gov. for exemption of duties/Taxes etc. for import of machinery in collaboration with implementing Agency. - Follow up of the project to ensure prompt implementation and sustainability. - Funding arrangement establishment of PMU set up for the projects. - Approval of Revision PC-1 at ECNEC with Fed.Gov.
	ii) HUD&PHED	-	- Forwarding of Schemes to P&D Dept. For approval. - Issuance of approvalsafter receiving from P&D Dept.	- Liaison with P&D Dept. to achieve above, mentioned objectives.
iii) CDG Lahore		- Approval of Budget for the Financial Year	- Approval for projects upto Rs. 200 Million for which funding is available.	- Liaison with concerned Dept. (GOP). - Provision of security and conceived atmosphere for the Japanese counterparts. - Help implementing Agency (WASA) for effective implementation of the project.
iv) LDA		-	- Liaison with HUD&PHED where required. - Institutional Support to WASA.	- Liaison with CDG & HUD&PHED. - Institutional Support to WASA.
v) WASA		- Identification of needs. - Approvals and execution. - Implementation Monitoring,, control and follow up.	- Identification of needs keeping of approvals and funds. - Implementation monitoring control and follow up.	- Liaison with all concerned Departments. - Implementation. - Monitoring, control and follow up include establishment of PMU.

P&D: Planning & Development Department
CDG: City District Government Lahore
WASA: Water & Sanitation Agency
HUD & PHED: Housing, Urban Development & Public Health Engineering Department
LDA: Lahore Development Authority

PROJECT MANAGEMENT UNIT (PMU)
FOR
PROJECT FOR THE RETRIEVAL OF SEWERAGE AND DRAINAGE SYSTEM IN LAHORE CITY

1. Organization Chart



2. Responsibilities of PMU

- Coordination with respective Govt. Agencies and JICA Teams for maturation of the Project.
- Planning for implementation.
- Organizing the activities for implementation.
- Implementation of the Project
- Monitoring of the project
- Reporting of the progress and feedback.

JAPAN'S GRANT AID

【Japan's Grant Aid Scheme】

The Grant Aid Scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request. If necessary, JICA send a Preparatory Study Team to the recipient country to confirm the contents of the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Programme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;

b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;

c) confirmation of items agreed on by both parties concerning the basic concept of the Project;

d) preparation of a basic design of the Project; and

e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to

maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Project and to clear the site;

b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;

c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;

d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;

e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;

f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and

g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

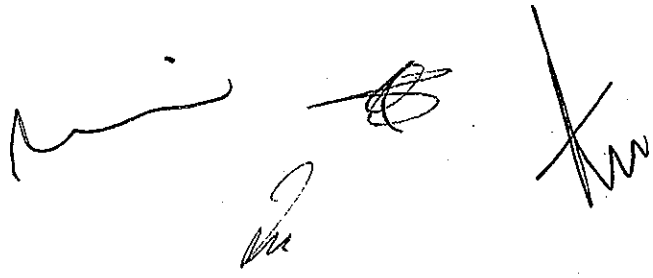
9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority.

9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.



ANNEX-4

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land when needed		●
2	To clear level and reclaim the site when needed		●
3	To construct gates and fences in and around the site when need		●
4	To construct the parking lot when need		●
5	To construct roads (Within the site & Outside the site)		●
6	To construct the building		●
7	To provide facilities for the distribution of electricity, water supply , drainage and other incidental facilities		
	1) Electricity		
	a) The distributing line to the site		●
	b) The drop wiring and internal wiring within the site		●
	c) The main circuit breaker and transformer		●
	2) Water Supply		
	a) The city water distribution main to the site		●
	b) The supply system within the site (receiving and elevated tanks)		●
	3) Drainage		
	a) The city drainage main(for storm sewer and others to the site)		●
	b) The drainage system (for toilet sewer, ordinary waste, storm drainage and others)		●
	4) Gas Supply		
	a) The city gas main to the site		●
	b) The gas supply system within the site		●
	5) Telephone System		
	a)The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b) The MDF and the extension after the frame/panel		●
	6) Furniture and Equipment		
	a) General furniture		●
	b) Installation of equipments		●
8	To bear the following commissions to the Japanese foreign exchange banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure unloading and customs clearance at port of disembarkation in recipient country		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
10	To accord Japanese nationals whose services may be required in connection with the supply of the products under the verified contract their entry into the recipient country and stay therein for the performance of the their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		●
12	To maintain and use properly and effectively equipment provided under the Grant		●
13	To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for installation of the equipment		●

ANNEX-5

Requested Components

(Figures shown on the following table or the nearest equivalent specification are acceptable.)

Requested Components	PC-I	Revised Request
Sewer cleaning and jetting machine (Truck mounted)	8 ton class, 300 L/min 4 units	8 ton class, 300 L/min 4 units Priority I
Sludge sucker (Truck mounted)	8 ton class, 6000 L 4 units	8 ton class, 6000 L 4 units Priority I
Water tanker	8 ton class, 7000 L 2 units	8 ton class, 7000 L 2 units Priority II
Truck for multipurpose transportation	4 ton class 6 units	Pick-up truck (Double cabin) 12units Priority I
Dump truck for sludge transportation	8ton class 8units	8ton class 8units Priority I
Crane type excavator	Drag line Bucket size 0.7-0.8 m3 2 units	Clam Shell, Wheel type Bucket size 0.7-0.8 m3 2 units Priority II
Submersible sludge pump	Non clogging type 4 units	Non clogging type 4 units Priority I
Generator for submersible pump	2 units	2 units Priority I
Hydraulic excavator	Crawler type Engine Horsepower 54 HP Bucket size 0.28 m3 class Boom length 3710 mm Arm length 1650 mm 2 units	Wheel type Engine Horsepower 54 HP Bucket size 0.28 m3 class Boom length 3710 mm Arm length 1650 mm 2 units Priority II
Hydraulic excavator	Wheel type Engine Horsepower 153 HP Bucket size 0.8 m3 class Boom length 5700 mm Arm length 2410 mm 1 unit	Wheel type Engine Horsepower 153 HP Bucket size 0.8 m3 class Boom length 5700 mm Arm length 2410 mm 1 unit Priority III
Wheel Loader	Engine Horsepower 85 HP Bucket size 1.2 m3 class With Bolt on teeth Rops canopy 8 ton class 2 units	Engine Horsepower 85 HP Bucket size 1.2 m3 class With Bolt on teeth Rops canopy 8 ton class 2 units Priority III

Vertical type volute sewage pump with intermediate shaft Vertical type squirrel cage induction motor Suction manual operated sluice valve with extension handle Swing type check valve Discharge motor operated sluice valve with extension handle Pipes and fittings	Main Outfall Disposal Station Pump (Q:34m3/min (20cusec) H:12m (36feet)) Motor (115kW 400V 50Hz) Suction valve (500mm (20 inch)) Check valve (500mm (20inch)) Discharge valve (500mm (20 inch)) Pipes (350-500mm (14-20 inch)) respectively 6 units	Shad Bagh Pump Station Pump (Q:68m3/min (40cusec) H:12m (36feet)) Motor (180kW 415V 50Hz) Suction valve (700mm (28 inch)) Check valve (600mm (24 inch)) Discharge valve (600mm (24 inch)) Pipes (600mm (24 inch)) respectively 2 units Priority I Multan Road Pump Station Pump (Q:68m3/min (40cusec) H:12m (36feet)) Motor (180kW 3300V 50Hz) Suction valve (700mm (28 inch)) Check valve (600mm (24 inch)) Discharge valve (600mm (24 inch)) Pipes (600mm (24 inch)) respectively 2 units Priority II Gulshan-E-Ravi Pump Station Pump (Q:68m3/min (40cusec) H:12m (36feet)) Motor (180kW 3300V 50Hz) Suction valve (700mm (28 inch)) Check valve (600mm (24 inch)) Discharge valve (600mm (24 inch)) Pipes (600mm (24 inch)) Respectively 2 units Priority III
Automatic trash rake system	Main Outfall Disposal Station	Main Outfall Disposal Station Priority I
Electrical Panel	Main Outfall Disposal Station Low voltage panel 8 units Local control panel 8units	Shad Bagh Disposal Station Low voltage panel 2units Priority I Multan Road Disposal Station High voltage panel 2 units Priority II Gulshan-E-Ravi Disposal Station High voltage panel 2 units Priority III
Instruments	Main Outfall Disposal Station Level meter 1 unit	Shad Bagh Disposal Station Level meter 1 unit Priority I
Technical training	3 month	1 month training on the field of operation & maintenance and safety management for the requested cleaning equipment and pump facilities

ANNEX-6

Conditions of Existing Machinery and Equipment on Sewerage and Drainage

Machinery / Pump Station	Donor	Year of introduction	Specification	No.	Conditions
Sewer cleaning and jetting machine (Truck mounted)	Gov. of Punjab	1992	210 L/min, 7000 L	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
				5	Operatable
				6	Operatable
	DFID, UK	1998	210 L/min, 7000 L	1	Operatable
	World Bank	1982	1500 PSI (105kg/cm2), 8000 L	1	Operatable
			2000 PSI (140kg/cm2), 8000 L	1	Operatable
				2	Operatable
				3	Operatable
Sludge sucker (Truck mounted)	Gov. of Punjab	1992	Air10000 L/min, 7000 L	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
				5	Operatable
				6	Operatable
				7	Operatable
				8	Operatable
				9	Operatable
				10	Operatable
				11	Operatable
				12	Operatable
	DFID, UK	1998	Air10000 L/min, 7000 L	1	Operatable
Sucker with tractor	Gov. of Punjab	1986	4000 L	1	Operatable
				2	Operatable
Water tanker	Gov. of Punjab	1996	8 ton class, 7000 L	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
Submersible sludge pump	DFID, UK	1998	1.7 m3/min (1cusec)	1	Operatable
				2	Operatable
Self priming engine pump	DFID, UK	1998	5.1 m3/min (3cusec), radiator	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
				5	Operatable
				6	Operatable
				7	Operatable
				8	Operatable
				9	Operatable
Generator	DFID, UK	1998	40 kVA 415V	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable

Dump truck	Gov. of Punjab	1997	8ton class	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
		1987	8ton class	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
		1997	8ton class	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
		1988	8ton class	1	Operatable
				2	Operatable
		1987	8ton class	1	Operatable
				2	Operatable
			8ton class	3	Operatable
Crane type excavator	Gov. of Canada to HUD&PHED	1966	Clam shell	1	Operatable
Hydraulic excavator	World Bank	1997	Long boom	1	Operatable
	Gov. of Punjab	1985	Long boom	1	Operatable
				2	Operatable
	World Bank	1996	Medium boom	1	Operatable
				2	Operatable
	Gov. of Punjab	1985	Small size	1	Operatable
				2	Operatable
Tractor trolley	Gov. of Punjab	1996	85 HP	1	Operatable
		1985	65 HP	1	Operatable
				2	Operatable
				3	Operatable
				4	Operatable
				5	Operatable
				6	Operatable
				7	Operatable
				8	Operatable
				9	Operatable
Tractor	Gov. of Punjab	1985	65 HP	1	Operatable
Shad Bagh Disposal Station	World Bank	1982	4 pumps total 272 m3/min (160 cusec)		Everyday operation
Multan Road Disposal Station	World Bank	1993	4 pumps total 272 m3/min (160 cusec)		Everyday operation
Gurushen-E-Ravi Disposal Station	World Bank	1982	12 pumps total 816 m3/min (480 cusec)		Everyday operation
Main Outfall No.1 Disposal Station	Gov. of UK (Pre-Pakistan)	1945	6 pumps total 359 m3/min (211 cusec)		Everyday operation
Lift up Station	Gov. of Punjab		61 places in Lahore 3.4～126m3/min (2～74 cusec)		Everyday operation
Warehouse	Gov. of Punjab	1980	In Main Outfall Disposal Station		Well -managed

ACTION PLAN BY WASA

i) Setting up of PMU (Project Management Unit) for planning coordination, organizing, implementation and control of the project.
The proposed organizational set-up of PMU is enclosed.

ii) The vehicles are to be placed with respective zones according to the enclosed distribution plan.(ANNEX-7(2)) The parking areas owned by WASA also indicated. There is no need for new construction of parking areas or Warehouses.

iii) The silt and solid waste extracted from open drains with the help of excavators. and Clam Shells shall be disposed off to the prescribed landfill sites of SWM Department of CDG Lahore, by using dump trucks.

iv) Sludge, Silt and Solid Waste removed from main roads shall be accumulated during cleaning operations will be loaded to dump truck by wheel loader for onwards shifting to landfill sites.

v) Silt and Solid Waste removed from small sewer drains lines in streets shall be shifted to Landfill sites via Pick-up Trucks and in some cases by SWM Department of CDG, Lahore. The job is to be mainly done by SWM but to be supplemented by WASA.

vi) The work will be carried out as per schedules mentioned in PC-I and will be monitored by PMU.

vii) The functioning of PMU and its reports will be monitored by DMD (O&M) under intimation to MD WASA.

viii) The detailed organization of PMU will be established according to the progress of the project.

ix) Community participation and public awareness to improve the condition of sanitary and sewerage conditions will be considered.

Abbreviations:

- SWM: Solid Waste Management Department
- CDG: City District Government
- WASA: Water & Sanitation Agency
- PMU: Project Management Unit
- DMD: Deputy Managing Director
- O&M: Operation and Maintenance
- MD: Managing Director

ANNEX-7(2)

ALLOCATION OF THE REQUESTED EQUIPMENT

SR.	EQUIPMENT	ALLOCATION	PARKING YARD
01.	Jetting Machine	Zone A = 1 Zone B = 1 Zone G = 1 Zone H = 1	Mainoutfall Disposal Station XEN (O&M-II) Ravi Town/XEN O&M-I GB-Town, Rehmanpura Reservoir
02	Sludge Sucker	Zone A = 1 Zone B = 1 Zone G = 1 Zone H/1= 1	Mainoutfall Disposal Station XEN (O&M-II) Ravi Town XEN O&M-I (GBT) Rehmanpura Reservoir
03	Water Tanker	Zone A/G/H-I/1 Zone B=1	XEN O&M-I (GBT) Director Ravi Town
04	Pickups for Transportation.	Zone-A=1 Zone-B=2 Zone-G=6 Zone-H/1=3	Mainoutfall Disposal Station XEN (O&M-II) RT/SDO (Data Nagar) SDOs Office Islampura, Shimla Hill, Mustafabad SDOs Office (Mozang, Ichhra)
05	Dump Trucks	Zone-A=1 Zone-B=2 Zone-g=3 Zone-H/1=2	Mainoutfall Disposal Station Shadbagh Disposal Station Mainoutfall/Upper Mall (XEN O&M-II GBT Gulshan-E-Ravi Disposal Station
06	Drage Line (Clam Shell)	Zone-G/H-1=1 Zone-A/B=1	WASA Training Center Shadbagh/Bagh Munshi Ladha, Revenue Office.
07	Submersible Sullage Pump	Zone-A=1 Zone-B=1 Zone-G=1 Zone-H/1=1	SDO Office (Ravi Road) SDO Office (Data Nagar) SDO Office ((Islampura/Shimla Hill/Mustafabad SDO Office (Ichhra/Mozng)
08	Excavator Small	Zone-G/H/1=1 Zone-A/B=1	WASA Training Center/Gulshan-e-Ravi Shad Bagh / Mainoutfall
09	Excavator Large	Zone-A/B/G/H=1	Shad Bagh / Mainoutfall Disposal Station
10	Generator	Zone-A/B=1 Zone-G/H=1	SDO Office Ravi Road/Data Nagar SDO Office Islampura/Shimla Hill/Ichhra.
11	Wheel Loader	Zone G/H=1 Zone A/B=1	WASA Training Center/Gulshan-e-Ravi Shad Bagh Disposal Station
12	Pump Sets		Respective Disposal Station

Note: Ware-House for spare parts is located at Mainoutfall compund.

ANNEX-8

PROCESS OF INITIAL ENVIRONMENTAL EXAMINATIONS (IEE) FOR THE PROJECT

1. IEE & EIA in Pakistan

(1) "Pakistan Environmental Protection Act (1997)" describes to implement Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) on the project having possibility to arise negative impact on environment in accordance with its significance.

(2) "Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations (2000)" designates a type and a scale of project that needs to implement IEE or EIA. Additionally, the regulation designates that environmental protection agency may direct a proponent of the project to implement IEE or EIA as necessary.

2. IEE for the Project

(1) WASA discussed with the Punjab Environmental Protection Department (PEPD), Punjab on February 27 and March 5, 2004 to clarify whether IEE or/and EIA is/are necessary or not for the Project. Based on the examination of PC-1 of the Project, PEPD instructed that the Project needs IEE study, and WASA has responsibility to implement IEE study before commencement of cleaning and construction activities in Lahore.* PEPD also represented that Environmental Impact Assessment (EIA) is unnecessary.

* The components of the Project themselves are mainly procurement of machinery and equipment to clean sewerage and drainage. But through cleaning activities of the Project, silt, sludge and debris will be removed from sewer and drain and they may cause negative impact on environment without appropriate disposal method.

(2) PEPD represented that following items should be focused in the IEE for the Project.

- Disposal method of silt, sludge and debris generated by cleaning of sewerage and drainage system
- Wastewater treatment plan during coming 5 years

(3) WASA will implement analysis of toxic substances derived from industrial activities in the sludge, silt and debris to be disposed in the Project Site.

(4) The IEE study will be implemented under the procedure shown in the below figure.

Procedure of IEE under Pakistani Environmental Legislation

Procedure	Tentative Schedule proposed by WASA
Preparation of TOR for IEE by WASA	By end of March, 2004
↓	
Selection of consultants by WASA	By first week of April, 2004
↓	
Field survey and preparation of IEE report by WASA	By end of April, 2004
↓	
Submission of IEE report to Punjab EPA	By first week of May, 2004
↓	
Sending of acknowledgement of receipt from Punjab EPA to WASA within 10days after submission of IEE report	By 2nd week of May, 2004
↓	
Notice of approval on IEE report with necessary comments within 45 days after submission of IEE report	By first week of June, 2004

調査団員リスト

Job Title	Name / Position	Period
団長 Leader	**家弓　重正** **独立行政法人国際協力機構** **国際協力総合研修所　国際協力専門員** Mr. Shigetada KAYUMI Senior Advisor, Institute for International Cooperation, Japan International Cooperation Agency (JICA)	4/Mar？13/Mar
計画管理 Coordinator	**高樋　俊介** **独立行政法人国際協力機構** **無償資金協力部　業務第４課** Mr. Shunsuke TAKATOI 4th Project Management Division, Grant Aid Management Department, Japan International Cooperation Agency (JICA)	4/Mar？16/Mar
下水・雨水排水計画／維持管理計画 Sewerage and Drainage Planner/Operation and Maintenance Planner	**野沢　逸男** **ＯＹＯインターナショナル株式会社** **技術部シニアマネージャー** Mr. Itsuo NOZAWA Senior Manager, Civil & Structural Engineer P.E. Jp (Civil Engineering) OYO INTERNATIONAL CORPORATION	22/Feb？13/Mar
機材計画 Equipment Planner	**高橋　徹** **株式会社　三祐コンサルタンツ** **海外事業本部　技術部第２課　主幹** Mr. Toru TAKAHASHI Project Operation Div. International Department SANYU CONSULTANTS INC.	22/Feb？13/Mar
環境衛生／環境配慮 Public Health Engineer / Environmental and Social Surveyor	**長沼　研午** **日本工営株式会社** **コンサルタント海外カンパニー** **環境技術部　技師** Mr. Kengo NAGANUMA Environmental Specialist, Environmental Science & Engineering Dept., Consultant Overseas Company, Registered Professional Engineer NIPPON KOEI CO.,LTD.	22/Feb？13/Mar

添付資料

現 地 調 査 日 程

日数	月/日	曜日	官団員		コンサルタント団員
			高樋　俊介 （計画管理）	家弓　重正 （団長）	
1	2/22	日			成田→バンコク→カラチ
2	2/23	月			カラチ→イスラマバード：JICA 事務所打合せ、日本大使館・EAD 表敬訪問 イスラマバード→ラホール
3	2/24	火			①パンジャブ州の P&D、LDA 及び WASA 表敬訪問とインセプションレポートの説明②HUD&PHE 表敬訪問
4	2/25	水			WASA と調査工程、打合せ及び現地視察
5	2/26	木			①廃棄物処理打合せ　②ポンプ場視察 Multan Road ポンプ場下流の開渠視察 ③CDG 表敬訪問
6	2/27	金			WASA 及び関係機関と打合せ、現場視察
7	2/28	土			WASA 及び関係機関と打合せ、現場視察
8	2/29	日			団内打合せ、収集資料整理
9	3/1	月			WASA 及び関係機関と打合せ、現場視察
10	3/2	火			WASA 及び関係機関と打合せ、現場視察
11	3/3	水			WASA 及び関係機関と打合せ、現場視察
12	3/4	木	成田→バンコク→カラチ		WASA 及び関係機関と打合せ、現場視察 3/5 日官団員に合流するため、下水・雨水排水計画団員イスラマバードへ。
13	3/5	金	カラチ→イスラマバード：JICA 事務所打合せ、日本大使館・EAD 表敬訪問 イスラマバード→ラホール		WASA 及び関係機関と打合せ、現場視察 資料整理
14	3/6	土	①HUD&PHE 表敬訪問、②CDG 表敬訪問、③LDA 及び WASA 表敬訪問とインセプションレポートの説明、WASA 及び関係機関と打合せ、現場視察		
15	3/7	日	団内打合せ、現場視察、資料整理		
16	3/8	月	P&D 表敬訪問、WASA 及び関係機関と打合せ、現場視察		
17	3/9	火	WASA 及び関係機関と打合せ、現場視察		
18	3/10	水	WASA と M/D 内容打合せ（WASA から関係機関に M/D 内容配布）、WASA と質問書の回答打合せ、現場視察		
19	3/11	木	HUD&PHE、CDG, LDA、WASA と M/D 内容の協議及び署名 計画管理担当の高樋団員を除き、団長以下イスラマバードへ		
20	3/12	金	高樋団員は別案件（グジュラート下水 B/D）のため引き続きラホールに滞在（3 月 13 日まで滞在の予定）	EAD と M/D の署名、JICA 事務所、日本大使館に現地調査結果を報告 イスラマバード→カラチ→バンコク	
21	3.13	土		バンコク→成田	

主要面談者リスト

Ministry of Economic Affairs & Statistics

Economic Affairs Division (EAD)

Mr. Muhammad Ashraf Khan	Joint Secretary
Ms. Yasmin Masood	Deputy Secretary
Mr. Muhammad Arshad Sultan	Deputy Secretary

Government of the Punjab

Planning & Development Board

Mr. Humayun Farshori	Chairman, Civil Secretariat
Mr. Sohail Ahmad	Secretary
Mr. Nasim Riaz	Chief, ECA
Mr. Amjad Duraiz	Assistant Chief, ECA-II
Mr. M H Mhchi	Assistant Chief, PPH/VO

Housing & Urban Development (HUD) & Public Health Engineering Department (PHED)

Mr. Chaudry Riaz Ahmed	Secretary, Civil Secretariat
Mr. Syed Imran Raza Zaidi	Chief Engineer (North Punjab)
Mr. Ch. Safdar Ali Cheema	Technical Advisor

Environment Protection Department (EPD)

Mr. Shabir Ahmed Zureshi	Director, Planning & Coordination (North)

Minorities Advisory Council

Ms. Jacqueline Tressler	General Secretary

City District Government, Lahore (CDGL)

Mr. Mian Amer Mahmood	Zila Nazim
Mr. Ch. Mohammad Arif	Executive District Officer (EDO), Works & Services
Dr. Abdul Qayyum	Executive District Officer (EDO), Health
Mr. Muhammad Rafiq Jatoi	District Officer, Solid Waste Management (SWM)
Mr. Khalid Majeed	Deputy District Officer, Planning, Solid Waste Management
Mr. Ghhiyas Maliq	Assistant Director, Planning, Solid Waste Management

Lahore Development Authority (LDA)

Mr. Ikhlaq Ahmad Tarrar	Director General
Mr. Imtiaz Abid	Director, Planning & Evaluation

Water & Sanitation Agency (WASA)

Mr. Anam Qadir	Managing Director
Mr. Pervaiz Iftikhar	Deputy Managing Director, Operation & Maintenance
Mr. Riaz Hakeem	Deputy Managing Director, Finance Revenue and Administration
Mr. Abdu Rchman Siddigui	Deputy Managing Director, Engineering
Mr. Ghulam Haiden Zaidi	Director, Operation & Maintenance (Allama Iqbal town) (Coordinator of this preparatory study)
Mr. A. Farooq Mirza	Director, Operation & Maintenance (Ravi town)
Mr. Muhammed Mausha	Director, Operation & Maintenance (Gunj Bukhsh town)
Mr. Anwar Ali	Director, Operation & Maintenance (Nishtar town)
Mr. Mirza Tahirbaig	Director, Operation & Maintenance (Shalamar town)
Mr. Asif Javed Qurbshi	Director, Finance Directorate
Mr. Haroon Mukhtar	Director, Procurement & Store
Mr. M. Sarmon Mirza	Director, Construction
Mr. Shazada J. M. Akbar	Deputy Director, Plan & Design
Mr. Jamshed Butt	Deputy Director, Leal detection cell (Unaccounted For Water)
Mr. Hyaz Qmeshi	Deputy Director, Training
Mr. Syed Zahid Aziz	Executive Engineer (Head Quarters)
Mr. M. Pervaiz Naveed	Executive Engineer (Shalamar town)
Mr. Iqtidar Shah	Executive Engineer (Allama Iqbal town)
Mr. Afthb Ahmed	Executive Engineer II (Gunj Bukhsh town)
Mr. Tariq Mahmood	Executive Engineer II (Ravi town)
Mr. Zamir Ahmad Soddiqi	Assistant Design Officer, Plan and Design
Mr. Saeed M	Sucker driver, Complaining-monitoring Centor (Head Quarters)

Environmental Protection Department Punjab

Mr. Shabir Ahmed Zureshi	Director, Planning and Coordination

Solid Waste Management Department Lahore

Mr. Muhammad Rafiq Jatori	Director, Planning and Coordination

BUNYAD Literacy Community Council (BLCC) & NGO's Resource Center

Ms. Shaheen Ahiqun Rahman	Representative

KSB Pumps Co. Ltd.

Mr. Arif Ijaz	Managing Director
Mr. Alauddin Ahmad	Branch Manager

Pakistan Environmental Protection Agency (EPA)　(環境保護庁)

楢原覚	**JICA 専門家（固形廃棄物管理）**

在パキスタン日本国大使館

松永健	**一等書記官　経済協力班班長**
小林輝夫	**二等書記官**

JICA パキスタン事務所

山浦信幸	**所長**
高橋亮	**副参事**
Mr. Mohamood A.Jilani	Deputy Resident Representative/Chief Programme Officer

添付資料　　協議議事録

日時：　2004 年 2 月 23 日（月）10：00～11:40

場所：　JICA パキスタン事務所

面会者：　JICA パキスタン事務所：　山浦信幸所長、高橋亮副参事

調査団：　野沢逸男（下水・雨水排水計画／維持管理計画）、高橋　徹（機材計画）、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について意見交換

協議内容要旨：

１．調査団よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目等について概要を説明、

２．JICA パキスタン事務所より以下のような意見および提案があった。

①ラホールでは最近無償資金協力は行われていない。

②今回の計画に関する、マスタープランの入手と評価をしてほしい。

③過去に世銀とイギリスが約 20 億円ずつ機材供与と技術協力を行っているので、それらでは、まだ機材や技術が不足しているのかどうか、確認が必要である。

④問題となっている点はどこにあるのか確認が必要である。

１）下水の計画時の能力と現在の人口の差か

→　そうであれば、下水システムの拡張が必要か

２）清掃機材が未だ不足しているのか

→　そうであれば、清掃機材を供与すればある程度の効果は出るのか

３）ごみの不法投棄が根本の原因としてあるのか

→　そうであれば、ごみの投棄を改善しないと機材供与の効果が出ないのか

⑤今回の要請内容が実施された場合、不足分のどれほどが解消されるのか、効果指標があればそれを用いて、現状に対する問題解消の達成度合いを示すことが必要である。

⑥ラホールの雨水排水量には、季節変動があるためこれを考慮する必要がある。

⑦今回の機材がどのような処理計画及び処理量の算定に基づいて、選定されたのか確認が必要である。

⑧機材のスペアパーツ流通について、パキスタンではドル建ての口座を開けないため、外国製品をドルで買うことができない。

⑨ポンプ場のスクリーンの掻上げ方式及び、維持管理状況や据付工事の必要を確認する必要がある。

３．その他

①3 月 1 日、2 日は　パキスタン国全体で、アシュラの休日となるため日程の調整検討が必要である。

日時：　2004 年 2 月 23 日（月）11：00～11:40

場所：　在パキスタン日本大使館

面会者：　小林輝夫二等書記官

調査団：　JICA パキスタン事務所：高橋亮副参事、予備調査団員：野沢逸男（下水・雨水排水計画／維持管理計画)、高橋　徹（機材計画)、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について意見交換

協議内容要旨：

１．大使館より、以下のような提案があった。

①下水管路の能力には問題がないのか、汚泥が除去されれば問題は解決するのか、確認が必要である。

②要請された機材は、更新なのか、追加なのか確認が必要である。

③機材供与後の状況として、除去した汚泥の最終処分場までを確認して、計画時に考慮しておくことが必要である。日本の援助のために、新たに汚泥投棄が生じて住環境が悪化するなど、「垂れ流し」のイメージをもたれることは絶対に避けなければならない。

２．調査団としては、同様な方針で臨むつもりである旨伝えた。

日時：　2004 年 2 月 23 日（月）12：00～12:40

場所：　EAD オフィス（EAB: Economic Affairs Division）

面会者：　EAD：Mr. Muhammad Ashraf Khan (Joint Secretary（Japan/ADB）)

Deputy Secretary,　Ms. Yasmin MASOOD

Secretary Staff,　Mr. Muhammad Arshad Sultan

日本側：　JICA パキスタン事務所：　高橋亮副参事／Deputy Resident Representative, Mr. Mahmood A. Jilani、調査団：　野沢逸男（下水・雨水排水計画／維持管理計画)、高橋　徹（機材計画)、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について意見交換

協議内容要旨：

１．日本側よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目等について概要を説明、

２．EAD より以下のような質問があった。

①今回の要請金額はいくらか。機材購入、輸送、維持管理費用などにおける、日パの負担区分はどうなっているか。

②既存のごみ収集システムの調査が必要である。

③ごみ収集活動に対する、収集側とコミュニティの関係が大切である。

④Public Awareness が大切である。

⑤調査報告では、無償資金協力の範囲にこだわらず、望ましいごみ処理システムを提案してほしい。

３．EAD からの質問要望事項に対して、日本側より以下のように回答。

①PC-1 の内容を先方に説明確認

②ごみ収集に対しては同様に考えており、現地調査結果を踏まえて、必要ならば、報告書の中でコメントする。

日時：　2004 年 2 月 24 日（火）9：40～10:20

場所：　パンジャブ州政府 PHED オフィス

面会者：　**HUD&PHED（Housing & Public Health Engineering Department）**

Mr. Chaudry Riaz Ahmed	Secretary, Civil Secretariat
Mr. Syed Imran Raza Zaidi	Chief Engineer (North Punjab)
Mr. Ch. Safdar Ali Cheema	Technical Advisor

WASA（Water & Sanitation Agency)

Mr. Pervaiz Iftikhar	Deputy Managing Director, Operation & Maintenance
Mr. Ghulam Haiden Zaidi	Director, Operation & Maintenance (Allama Iqbal town)
Mr. Syed Zahid Aziz	Executive Engineer, Head Quarters

日本側：　JICA パキスタン事務所：　高橋亮副参事／Deputy Resident Representative, Mr. Mahmood A. Jilani、調査団：　野沢逸男（下水・雨水排水計画／維持管理計画）、高橋　徹（機材計画）、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について協議

協議内容要旨：

１．日本側よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目等について概要を説明、

２．パキスタン側からの以下のような意見がでた。

①本要請の緊急度は高い。早急な案件実現を求める。本要請に係る衛生環境の劣悪さは現地踏査により確認できる。

②ラホール市の急速な拡大に下水網整備が追いつかないのが現状である。

③写真撮影の可否については現在、調整中。

④WASA は雨水及び下水排水施設の清掃は行っているが、ラホール市の清掃、廃棄物収集及び最終処分には携わっていない。

日時：　2004 年 2 月 24 日（火）10：30～11:40

場所：WASA（Water & Sanitation Agency)

面会者：　WASA（Water & Sanitation Agency)

Mr. Anam Qadir	Managing Director
Mr. Pervaiz Iftikhar	Deputy Managing Director, Operation & Maintenance
Mr. Riaz Hakeem	Deputy Managing Director, Finance Revenue and Administration
Mr. Ghulam Haiden Zaidi	Director, Operation & Maintenance (Allama Iqbal town)
Mr. Asif Javed Qurbshi	Director, Finance Directorate
Mr. Shazada J. M. Akbar	Deputy Director, Design
Mr. Syed Zahid Aziz	Executive Engineer, Head Quarters
Mr. M. Pervaiz Naveed	Executive Engineer (Shalamar town)

日本側：　JICA パキスタン事務所：　高橋亮副参事／Deputy Resident Representative, Mr. Mahmood A. Jilani、調査団：　野沢逸男（下水・雨水排水計画／維持管理計画)、高橋　徹（機材計画)、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について協議

協議内容要旨：

１．日本側よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目等について概要を説明、

２．WASA より以下の説明・意見があった。

①WASA より業務内容、組織、予算に関するプレゼンテーション（JICA 高樋氏所有のものと同様のプレゼンテーション資料による発表）

②ラホール市の便益のために本要請の早急な実現を望む。

③ラホール市の WASA 管轄区域の飲料水源は 100%地下水である。

④現状で、216 million Rp/年の赤字。

⑤O&M コストの増加は電力料金の増加が要因である。

⑥現在、水道料金の値上げを申請中。今週中に州政府により承認される見込み。

日時：　2004 年 2 月 24 日（火）12：20～12:50

場所：　ラホール開発局（Lahore Development Authority)オフィス

面会者：　**Lahore Development Authority (LDA)**

Mr. Ikhlaq Ahmad Tarrar	Director General
WASA（Water & Sanitation Agency)	
Mr. Ghulam Haiden Zaidi	Director, Operation & Maintenance (Allama Iqbal town)
Mr. Shazada J. M. Akbar	Deputy Director, Design

日本側：　JICA パキスタン事務所：　高橋亮副参事／Deputy Resident Representative, Mr. Mahmood A. Jilani、調査団：　野沢逸男（下水・雨水排水計画／維持管理計画)、高橋　徹（機材計画)、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について協議

協議内容要旨：

１．日本側よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目等について概要を説明、
　また、WASA 事業の民営化について質問した。

２．LDA より以下の説明・意見があった。

①ラホール市の便益のために本要請の早急な実現を望む。

②JICA 調査団の目的、調査内容は極めて妥当と思う。

③LDA として、必要な協力は惜しまない。

④WASA 事業の民営化については、検討は行っている。個人的には、民営化は現在抱えている問題をより、複雑化する可能性があると思っている。

日時： 2004 年 2 月 24 日（火）15：30～16:10

場所： パンジャブ州計画開発委員会（Government of the Punjab, Planning & Development Board)

面会者： **Government of the Punjab, Planning & Development Board**

Mr. Sohail Ahmad	Secretary
Mr. Nasim Riaz	Chief, ECA
Mr. Amjad Duraiz	Assistant Chief, ECA-II
Mr. M H Mhchi	Assistant Chief, PPH/VO

Lahore Development Authority (LDA)

Mr. Imtiaz Abid	Director, Planning & Evaluation

Water & Sanitation Agency (WASA)

Mr. Anam Qadir	Managing Director
Mr. Pervaiz Iftikhar	Deputy Managing Director, Operation & Maintenance
Mr. Ghulam Haiden Zaidi	Director, Operation & Maintenance (Allama Iqbal town) (Coordinator of this preparatory study)
Mr. Asif Javed Qurbshi	Director, Finance Directorate
Mr. Haroon Mukhtar	Director, Procurement & Storement
Mr. Syed Zahid Aziz	Executive Engineer (Head Quarters)

日本側： JICA パキスタン事務所： 高橋亮副参事／Deputy Resident Representative, Mr. Mahmood A. Jilani、調査団： 野沢逸男（下水・雨水排水計画／維持管理計画)、高橋　徹（機材計画)、長沼研吾（環境衛生／環境配慮）

協議骨子：表敬訪問および本件調査方針・方法について協議

協議内容要旨

１．日本側よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目等について概要を説明、

２．先方より以下の説明・意見があった。

①ラホール市の便益のために本要請の早急な実現を望む。本案件の実現に向け、WASA は本予備調査に全面的な協力を行うべきである。P.D.もバックアップを惜しまない。

②ラホール市の 1981 年～1998 年にかけての人口増加率は 5～6%/年(流入人口も含む)。これはパキスタン国の平均より高い値である。

③最も重要なことは早急に本案件に係る Project Implementation Unit (PMU)を立ち上げることである。100 million Rp 以上の案件については、PMU が必要。3～4 人で構成されることになる。本 PMU 運営に追加的な予算が必要であれば、WASA が small PC-1 を作成、提出すれば早急に認可する。

④上記要請に対し、WASA は現状の対応を説明（質問書に対する回答書を作成済みであること、コーディネーターを配置したこと）。また、早急に PMU 立ち上げ作業を開始することを約束。

⑤将来的には本案件の実施に向けて関係機関による協議の場としてステアリング・コミッティーを立ち上げることが必要である。

日時：　2004 年 3 月 8 日（月）11：30～12:10

場所：　パンジャブ州計画開発委員会（Government of the Punjab, Planning & Development Board)

面会者：　**Government of the Punjab, Planning & Development Board**

Mr. Muhammad Humayun Farshori	Chairman、Civil Secretary
Mr. Nasim Riaz	Chief, ECA
Dr. Ahmed Kamal	Additional Secretary P & D
Mr. Rahim Bakhsh	R & D (ECA)

Water & Sanitation Agency (WASA)

Mr. Pervaiz Iftikhar	Deputy Managing Director, Operation & Maintenance
Mr. Syed Zahid Aziz	Executive Engineer (Head Quarters)

日本側：　調査団：　団長；家弓重正、計画管理；高樋俊介、下水・雨水排水計画／維持管理計画団員；野沢逸男

協議骨子：表敬訪問および本件調査方針・方法、調査途中経過についての説明・協議

協議内容要旨

１．日本側よりインセプションレポートに沿って、予備調査の目的、調査工程、本調査にあたってパキスタン国への要望事項、調査項目、調査途中経過等について概要を説明、

２．先方より以下の説明・要望があった。

①ラホール市の便益のために本要請の早急な実現を望む。WASA は本案件の実現に向けて全面的な協力を行うべきであり、P.D.はバックアップを惜しまない。

②パ国の会計年度は 7 月から 6 月となっている。カウンターパート人員のアサインや予算措置の問題もあるので、もし、基本設計調査に進んでいくとなれば、何時ごろ調査団が派遣されるのか教えて欲しい。

REVISED WASA COMMENTS

QUESTIONNAIRE

FOR

PROJECT FOR THE RETRIEVAL SEWAGE AND DRAINAGE SYSTEM IN LAHORE CITY

IN

THE ISLAMIC REPUBLIC OF PAKISTAN

FEBRUARY/MARCH 2004

JAPAN INTERNATIONAL COOPERATION AGENCY

PREPARATORY STUDY TEAM

(Revised)

Questions	*WASA Comments on Questions*
1. Confirmation of the contents of the requested project (Project for Retrieval of Sewage and Drainage System in Lahore)	WASA confirms the contents of the project except following changes due to working site conditions. Crawler type excavators should be replaced with same capacity wheel type excavators and truck for equipment transportation with 12 Nos. of diesel pickups to transport silt from congested areas of thickly populated project. Area with high mobility. The capacity of sewage pumps is also changed to mach the requirements at Shadbagh, Gulshan-e-Ravi and Multan Road Disposal Stations. The requirement has been prioritized.
1-1 Background of the project (1) The reason why this project is high priority The reason, however, is described as mentioned after in your request PC-1, please explain the reason more clearly in regard to sanitation issue, environmental issue, etc. in order to understand the urgent needs of the Project. Together with the above, please show the background, originator institution and approval procedure of PC-1 Form, superior plan or master plan for the Project.	The equipment included in the project comprises of pumps, clam shells, & other sewer and drain cleaning machines equipment. The Monsoon in this region is of high intensity and heavy rains cause flooding of major part of the city. The objective is to enhance carrying capacity of drains and sewers through desilting operation and reduce ponding / flooding time which creates obstruction in city life in the months of July & August.
Description of the reason in PC-1; "The silted/choked sewerage lines and open channels are big hazard and threat to environment of Lahore City. The situation aggravates in Monsoon season causing flooding in the area resulting in big damages to lives and property. The situation demands emergency measures to desilt the sewage lines and open drainage channels to protect the lives and properties of the inhabitants of Lahore City. However, shortage of local funds to procure the necessary machinery/equipment is a big hindrance."	The sewage in Lahore carries enormous quantities of solid waste which get deposited in sewers; as a result, the flow velocity in smaller pipes also get reduced causing siltation in lateral sewers and, often, it is causing blockages of the sewer lines in streets which is health hazard. Similar is the case of open channel. The Map showing ponding areas is Annexed.
(2) Possibility of other allocation of local fund by the Punjab Province or the Pakistan Government. The Japanese Government cooperation requires local cost. Any local cost other than shown in item 19 of **PART-B** in your request PC-1, such as for inland transportation and installation of machinery and equipment to be supplied for the Project, has to be covered by the Pakistan Government. Is there any other local fund allocation for this Project?	1. The cost of inland transportation from Lahore Dry Port to WASA works and installation of equipment will be borne by WASA through their own resources. Necessary provision will be made in the WASA Budget 2004 – 05.
(3) Justification of the project from environmental viewpoint please briefly explains existing significant environmental issues due to lack of equipment for sewer system cleaning.	To enhance carrying capacity of drains and sewers through desilting operation and reduce ponding / flooding time which creates obstruction in city life in the months of July & August.
1-2 Outline of the project (1) Project area: Please clarify in detail the location and the project area and the reason why those are selected.	1-2 Outline of the project.

(2) Requested component for the Project: 1) Please clarify the requested component for the Project in detail, because several descriptions regarding the scope of the project are shown in your request PC-1 as listed in the followings but there is no cost estimate for installation of equipment and no description about location, capacity and restrictions, if any of disposal area.	The Project will be carried out in Zones A, B, G & H-1 of Lahore which are most congested and are inundated specially during rainy season. The cost estimates for installation of the equipment alongwith the capacities are provided.
i. Item 9, Location of the Project in **PART-B**, Project description and financing The project consists of two activities; one is to clean sewers and drains and another is to replace pumps. The project site of cleaning sewers and drains is A, B, G and H1, and the project site of replacing pumps is the Main Outfall pumping station No.1 in Lahore city.	The silt and waste will be dumped at landfill sites specified by SWM Department Lahore. These sites includes official site of Mehmood Booti as well as temporary sites of Saggian and Kahna. However the SWM Deptt. Is also acquiring lands for its new official sites at Sunder and Kahna Kacha.
ii. Sub-item, e) of Item 28 in **PART-C,** Project Requirement The model implementation is included in the project for transfer of technical staff of WASA for management and operation of new equipment to be employed for retrieval sewerage and drainage. The activity will be implemented at zone G during the first three months.	Being most affected area in the selected Zones for the project, the work is to be commenced from Zone-G.
iii. Item 33 in **PART-D,** Environmental Aspects Debris and silt will be disposed off at a far place just after removing it from drains/sewers pipes.	The silt and waste will be dumped at landfill sites specified by SWM Department Lahore. These sites includes official site of Mehmood Booti as well as temporary sites of Saggian and Kahna. However the SWM Deptt. Is also acquiring lands for its new official sites at Sunder and Kahna Kacha.
iv. Equipment and machinery list and cost estimate in ANNEXURE VII, VIII, XI, X.	
2) Please explain why equipment & machinery for cleaning and pump replacement are requested as listed in the table in Annex-VII with quantitative supporting information in respect to removal silt volume from sewer and drainage, discharge volume of sewage at the pumping station, and collection, transportation and disposal volume of usual solid waste.	OK. The requisite information is Annexed.
(3) Benefits of requested component Referring to description of the item 24(a) of **PART-B** in your request PC-1, "50% of population within the jurisdiction of Metropolitan City of Lahore would be benefited."	The extent of siltation in sewers is mentioned in Annex-III, IV & V of the PC-I. Further supporting Data is also Annexed.
i. Please clarify the contents of benefits expected (ex. reduce of water bone disease occurrence, decrease of flooded area etc.) and the number of beneficiary (if possible, with social and economic status).	i. The flooding of the areas will be decreased thereby improving environment.
ii. Please explain the available monitoring indicator to identify the benefits and how to Monitor the indicator.	ii. The available monitoring indicators are ponding time of various sites, Data about Water borne diseases, No. of sewerage blockage complaints within the City. The improvement can be measured through observation of the time required to evacuate these areas. The monitoring indicators are ponding times and down time of the machinery.

(4) Disposal plan of debris and silt generated Referring to description of the item 33 of **PART-D** in your request PC-1, "Debris and silt will be disposed off at a far place just after removing it from drains / sewer pipes," please explain collecting and disposal plan of debris and silt generated by sewerage cleaning activity with comparison of existing collection method, responsible and relevant organization, number of staff, and relevant regulation.	2. Disposal Plan of Debris and silt generated. The existing arrangement of collection of debris is that the silt removed from drains and sewers is loaded on the dumpers by WASA and carried away tof ar off places. When the silt increases WASA requests Solid Waste Management to extend their cooperation and removal of silt, which they mostly agreed.
(5) Please explain and provide the material of the master plan for water supply, sewerage and drainage prepared in 1973 and the Phase, I II and III of the project completed 1995 with the financial assistance of the World Bank.	3. Copy of relevant reports Annexed at 1.
(6) Relevant request for financial assistance to international donors Please explain relevant request for financial assistance to improve wastewater management to international donors both submitted and planned with regard to year/terms, donors, content of request, results obtained, etc. in a chronological order.	4. WASA has acquired land measuring 7300 kanals for construction of waste water treatment plan covering flow from Central and South West Lahore. The construction of South West Waste Water Treatment Plan was included in Punjab Urban Development Project (PUDP) funded by Govt. of Punjab and World Bank. However due to cost escalation of the other projects, the construction could not proceed and it was included in Punjab Urban Environmental Project (PUEP) which was to be funded by World Bank but could not materialize
2. Questions on Counterpart organization (1) Please explain the role and responsibility concerning the Project in financial, institutional and personnel, regarding Housing, Urban Development and Public Health Engineering Department (HUD & PHED) of Punjab Province, City District Government (CDG), Lahore Development Authority (LDA) and Water & Sanitation Agency (WASA) in sewage and storm water disposal works. (Refer to item 2 in table of Required Data and Information)	1) WASA is an Organization under the administrative control of HUD & PHE Department (Govt. of Punjab). All the projects costing more than Rs. 20.0 million are routed to the P&D Department through HUD & PHED for approval. All the projects costing upto Rs. 20.00 million are approved by City District Government, Lahore (CDGL) and the financing of all works is also the responsibility of the CDGL. However in certain exceptional cases, Govt. of Punjab also provides funds. LDA is headed by the Director General and Managing Director, WASA reports to DG, LDA. WASA is creating a PMU for Planning Coordinating and Implementation of the Project.
3. Questions on sewage and drainage system Please explain the following questions in detail and provide the related material, if any: (1) When did you recognize the silted/choked problem in the existing sewage and Drainage system? Is there any chronological data/information and maintenance record in this regard? (2) Is there any other problem such as institutional problem, managerial problem, shortage of electrical supply	1. The siltation/choked problem was identified years ago. Proper study on the extent of siltation of sewers was carried out in year 1998. Copy of the report will be provided to the Mission. 2. There seems to be no institutional problem, managerial problem and shortage of electricity, which causes sewerage system not to function.

which causes the sewage and drainage system not to function?	
(3) What kind of countermeasures was ever performed to solve or mitigate the above problem?	3. Continuous desilting of sewers and drains is carried out by WASA.
(4) Is there a master plan of sewage and drainage system in Lahore?	4. Yes. There is Master Plan for sewerage and drainage. Copy will be provided to the Mission.
(5) How do you relate the sewage and drainage system to the urban development plan, if any, of Lahore city?	5. The sewerage and drainage system as well as urban development plan are included. Copy of the Integrated Master Plan prepared by M/s NESPAK for LDA will be provided to the Mission.
(6) How is the demarcation of watershed between this project and other sewage and drainage system in Lahore city?	6. By execution of this project there will be a positive effect on the Sewerage & Drainage System for rest of the City areas.
(9) What kind of malfunction is there and where is it in the existing sewage and drainage system, such as malfunction of mechanical and electrical equipment, deterioration of concrete structure, deterioration of sewer pipeline & manholes, leakage, etc.	9. Some of the sewers have outlived their useful life. Moreover, the existing sewerage and drainage equipment is insufficient to meet the requirements in addition to be very old.
(10) Is there any ground water contamination due to the existing sewage and drainage system?	10. No there is no ground water contamination. The source of water i.e. tubewell are constantly monitored with reference to water quality and there is no contamination in Lahore are attached.
4. Questions on requested equipments 4-1 Present conditions on cleaning equipment	4.1
(1) Referring to the description, "manual labour--- is getting scarce---" on item 8 of **PART-A** in **PC-1**	
1) How many operators and labour working with the existing cleaning equipment are in WASA at present? Please show the number of them level by level, with explanation of what kind of skill is required on each level. ex. Cleaning supervisor :___ persons, manage cleaning team Machine operator :___ persons, drive and operate jetting machine and sludge sucker Ordinary labour :___ persons, do cleaning work as a ordinary Staff	1. The list of equipment is mentioned at Anne-VI. There are 62 units of existing machinery and for each unit of machinery 2-skilled persons, one semi skilled labour are available and the entire machinery is operative.
(2) Please explain about formation of the cleaning team consisting of cleaning equipment and staff.	2. The team of Jetters comprises of one Driver-cum-operator, one semi skilled person and a

	sewerman. The team of suction machine is similar to the jetting team. The team of excavator is similar to the team of jetting machine. Dump truck team consists of one driver and one helper.
(3) Please explain about work shift on the cleaning work in a week.	3. The work shift on the cleaning continuous 7-days a week with rest on Sunday and Gazetted holidays.
(4) According to the law of Lahore city or regulation of WASA, is any driving license or certification of training on operating the cleaning equipment required?	4. According to the Govt. regularization Mobile equipment operators are required to qualify operating test of mobile equipment and after qualifying the test they are awarded with a License to move the equipment in the city.
(5) How is the tendency of accident on the cleaning work? Please explain safety management and public health management for the labour on that work.	5. Few accidents took place during cleaning work in the part but now after more than 3-years no such instance has taken place in view of improvement of safety arrangements.
(2) Referring to Annex-VI on page 42 in PC-I	**2. Referring to Annexure (6) page 42 in PC-1.**
1) What is the cause of "not operable" equipment and which parts are damaged?	1. Some opertable equipments has become off road after long operation and detoriated/damaged parts but WASA has now managed repair of not operatable equipment.
2) Please explain about dealer network and procurement of spare parts for the existing cleaning equipment.	2. The dealers Network is available in Lahore for procurement of spare parts for existing cleaning equipment.
3) Please explain about detail specifications of the existing cleaning equipment. Are there any difference of specifications between the existing machines and the newly requested machines? If there are, what was the determining factor of the requested specifications?	3. The existing equipment has tank capacity of 5000 to 7000 Liters and newly requested machine have same size and specification. Flow rate of jetter 210/Liters per minutes and maximum pressure is 190 bar. The suction machines have free air delivery of 300 cubic meter per hour.
4) What is the underground level of the deepest sewer? (How many meters below the ground level, is the bottom of the deepest sewer located on?) Is the existing sludge sucker able to suck that sludge the deep to the ground?	4. Maximum deepest sewer is 20 feet and existing Sludge Suckers are able to suck the sludge from deep to the ground.
5) The composition of sludge in sewer is not clear on the request. Is hydro pressure of the existing jetting machine enough for break the sludge at present?	5. The existing machine is able to break the sludge with hydro static pressure.
4-2 Necessity of technical training for cleaning equipment (1) Referring to the description, "trained staff members are available with WASA," on item 28 of **PART-C** in **PC-I,**	**4.2 Necessity of Technical Training for cleaning equipment**

1) Please explain the training menu for operation of the existing cleaning equipment, such as; year, training period, trainer's organization, trainee's organization (or department in WASA that the trained staff was belonged to)	1. The staff on existing cleaning machine was trained by the Trainer provided by the manufacturer there after the staff was attached with the trained personal to learn the skill of operating cleaning equipment. Normally the attached staff is provided a 3 years training after which he qualify the driving test with the City District Govt. and attains the License to move mobile equipment for cleaning purposes.
2) Are the trained staff members remained with WASA? They are still engaged in the cleaning work, teaching junior staff promoted and gone away from the practical work etc.	2. The trained staff remained with WASA and continue to teach Junior Staff. They do not go away from the practical work and serve WASA as a regular staff member.
3) Please show your recommendation or request on the technical training menu for the requested cleaning equipment	3. WASA recommends training of staff on the requested equipment.
4-3 Present Condition and Plan of Warehouse, Ware yard, Parking Shed and Operation and maintenance system.	**4.3 Present condition and plan of warehouse, ware yard, parking shed and operation maintenance system.**
(1) Please clarify location and dimension of the existing warehouse, ware yard and parking shed and , if any, plan of those for the requested machinery and equipment.	1. WASA has a big ware yard where number of parking sheds are available for the requested machine.
(2) Please clarify the operation, maintenance and management method, and required Staff for the planned organization level by level with personnel cost.	2. WASA has organizational set up at Town level having complete set up of Division and Sub Division to conduct operation maintenance and management of the equipment. They have fully planed organizational set up in each Division of a Town. This Division is headed by a Senior qualified Engineers two junior engineers and four sub engineers alongwith allied technical staff at his command.
(3) Please explain about the plan of management system for record and custody of information on operation and maintenance of the requested cleaning equipments, after they are procured and used.	3. There is a complete management system with WASA who would maintain record and custody of information on operation and maintenance of requested cleaning machine after they are procured and used.
4-4 Present condition of main Outfall Pumping Station No.1 (If the requested pumps are planned to be installed in other Pumping Station(s), please answer present condition of that (those). Referring to the requested items.	**4.4 Present Condition of Mainoutfall Pumping Station No.1** The pumps at Mainoutfall had already been replaced and requested pumps are planned to be installed on other Pump Station where the slots for installation of these pumps are available, but the pumps could not be installed so far due to non availability of functions.
(1) What is the main reason of pump replacement? (ex. Lack of ability to convey sewage water, degradation of equipment, or both of them).	1. Replacement of pump is not required rather the requested pump will be installed at other Pump Station where slots are available but the full capacity pumping units were not installed due to non availability of funds.

(1) What kind of water is flowing into the pumping station in ordinary period and in flood season? (ex. Sewerage water or storm water)	2. The water flowing into the Pumping Station is Municipal sewerage during ordinary period and combined sewage (Municipal + Storm Water) during rains.
(3) Where is discharge point of this pumping station? (e.g. River or sewerage treatment plant)	3) The discharge point of these pump stations is River Ravi.
(4) How many hours does the pumping station operation a day?	4) The available operating hours of these pumping stations is 16 hours a day.
1) Is water flowing into the pumping station enough to start pump dry season?	1) A number of pumping units are installed on the pump stat ion. These pumping units are operated in configuration depending upon effluent coming of the Pump Stations. During peak season the units are operated but during dry season only few units are operated depending upon volume of effluent coming to the Pumping Station.
2) Is there any case that they cannot discharge water, because the water level of the discharge point is high than the designed water level?	2) There is no case where the pumps can not discharge water because of discharge point being higher then the designed water level.
(5) How much of trash are caught by trash rake in a day? (m3/day or kg/day)	5) The quantity of trash coming to different pump station is different. The maximum trash is confronted on the Pump Station serving Walled City area the quantity ranges from 5 to 15 tons.
(6) What kind of trash is flowing to the pumping station?	6) The trash coming to the pump station is mainly organic material with same percentage of organic material i.e. polythene etc.
(7) Please explain about the method of trash disposal from the pumping station to disposal site. Where is the disposal site?	7) The trash from the Disposal Station is lifted by Dumper Truck and Tractor Trolly for disposal at sites which are located away from the inhabited area.
(8) Please explain the organization, technical level, personnel cost of staff in the pumping station at present and after the requested equipments are installed and used.	8) The staff at Pumping station consists of operators in 3 shifts working 8 hours per shift for operation pumping units and sewermen also in three shifts of 8 hours for removal of solid wastes. The skilled supervisor staff for repair and maintenance is also available at big pumping stations and moves to the stations from where complaint is received regarding any break down.
(9) Are excess and shortage of staff expected in point of number and technical level for the requested equipments? If shortage, is there any necessity of pump operator training and electrician training?	9) No excess and shortage staff is expected at technical level for requested equipment.
(10) Please explain about the plan of management system for record and custody of information on operation and maintenance of the requested equipments in pumping station, after they are installed and used.	10) Complete management system for record and custody of information on operation and maintenance of the requested equipment in pump station is available with WASA.

4-5 Fulfilling of inventory form of the existing machinery and equipment Please fulfill of the attached sheet as follows; (1) Existing equipment owned by WASA (February,2004) (2) Conditions of pumping station (February, 2004)	**4-5 Inventory Form is filled in and attached.** Attached Attached
5. Questions on social and environmental issues 5-1 General information relating with solid waste management in target site of requested component (1) Referring to item 33 or **PART-D** in **PC-I** disposal site of debris and silt collected is unclear. Please clarify location, name and capacity of the disposal site utilized, and also clarify the status of permission to utilize the disposal site. (2) Please explain following basic information relating with above disposal site. 1) Responsible organization to manage the disposal site. 2) Number of staff and existing equipment to manage the disposal site 3) Solid waste collection service area related with the disposal site 4) Responsible organization to collect solid waste and transfer to the disposal site 5) Number of staff and existing equipment to collect solid waste and transfer to the disposal site. 6) Relevant regulation for disposal of debris and silt generated	5-1 General information relating with solid waste management in target site of requested component (1) There are disposal sites for solid wastes namely Mehmood Booti, Sugian and Kahna (Nishter) Town. WASA is authorized to utilize the disposal sites. (2) 1) Solid Waste Management of City Distt. Govt. is responsible to manage disposal site. 2) The Solid Waste Management of City Distt. Govt. has 108 No. Vehicles with required staff. 3) The solid waste collection areas of the project are related to Sugian disposal site. 4) Solid Waste Dept. is responsible to collect solid waste and transfer is to disposal site, WASA also assist in collection and disposal of solid waste extracted from its system for disposal to the dumping place. 5) Same as at serial no. 2 above. 6) City Distt. Govt. regulate disposal of solid waste to the nearest bin from where solid wastes vehicle lift the material and dispose it to the ultimate location.
5-2 Complaint or serious hygienic matter regarding waste management (1) Please explain about following matters relating with illegal dumping of solid waste into open channels in Lahore city. 1) Existing monitoring and control system to decrease illegal dumping into open channels 2) Existing educational activities to decrease illegal dumping into open channels, if any.	5-2. 1) WASA has a special magistrate to proceed against illegal dumping into open channels. 2) WASA has a Public Relation officer who educates the public through electronic and print media to discourage illegal dumping

3) Ordinary people's activities for improvement of illegal dumping if any.	into open channels. 3) There is no ordinary peoples activity for improvement of illegal dumping.
(2) Was there any complaint or hygienic issues occurred in the solid waste disposal site that is planned to use for disposal of debris generated by sewer system cleaning? What kind of measure did you take to solve the matters when occurred?	2) There was no complaint or hygienic issues occurred in the solid waste disposal site due to the disposal debris generated by sewer system cleaning.
5-3 Disease and Public Health (1) What kind of and how many water borne diseases were occurred in the past five year?	1) No serious water bound disease has occurred in the past five years within WASA service area.
(2) What kind of preventive measures against water borne disease are taken?	2) WASA monitors quality of drinking water by a regular sampling, testing, dis-infecting and flushing of its water supply system.
(3) Please explain about following matters if you have any information. 1) Occurrence of water borne disease in frequent flooded area in Lahore city. 2) Occurrence of water borne disease in the area without solid waste collection service	3) 1) Information is not available with WASA. 2) Information is not available with WASA.
5-4 Status of environmental impact assessment (EIA) According to the Pakistan EIA regulation," Review of IEE/EIA Regulations, 2000," it is considered that EIA or initial environmental examination (IEE) is necessary for actualization of requested components in PC-I, because the requested components relate with wastewater treatment field and necessary budget for the component is estimated as approximately 79 million Rs., that is more than 250 million Rs.	5-4. This project aimed at improving the quality of environment and is not expected to adversely effect warranting the EIA.
(1) Please clarify whether EIA or IEE is necessary or not based on the discussion with EPA.	1) IEE is required.
(2) Please explain EIA or IEE schedule, if necessary.	2) Schedule provided
(3) Please prepare EIA or IEE report, if any.	3) IEE report will be prepared before arrival of BD mission.
5-5 Fulfilling of Screening Form of Draft JICA Guideline Please fulfill the attached sheet, "Appendix 3. Screening Format", which is an environmental screening forms of the "Draft JICA Guideline for Environmental and Social Consideration."	5-5 Form filled in.

Required Data and Information (1/7)

No.	Item	Availability (Y/N)	Agency of Information Source	Name of Materials
1.	**Development Plan**			
1.1	**National and regional development plan**			
	1) National development plan for water supply and sanitation sector.	-	P&D Pakistan	Annexed
	2) Regional development plan for Punjab Province and Lahore city.	YES	P&D Punjab/WASA	Integrated Master Plan Lahore/-
	3) Land use plan of Lahore city.	YES	WASA	Integrated Master Plan Lahore/Study Reports.
1.2	**Sewage and drainage system development plan of the project area.**			
	1) Feasibility study report, if any.	YES	WASA	Integrated Master Plan Lahore.
	2) Any report concerning sewage and drainage system development of the project area, if you have.	YES	WASA	Integrated Master Plan Lahore.
1.3	Solid waste management plan of the project area.			
	1) National plan for solid waste management sector	-	EPA	-
	2) Regional development plan for Punjab Province and Lahore city.	YES	SWM, CDG, LHR	For Lahore City Annexed
	3) Feasibility study report, if any	-	SWM, CDG, LHR/EPA	NO
	4) Any report concerning development of solid waste collection and disposal.	-	SWM, CDG, LHR/EPA	Annexed
2.	**Counterpart Agency**			
2.1	**Housing, Urban Development and Public Health Engineering Department (HUD & PHE) of Punjab Province.**			
	1) Organization chart.	YES	HUD&PHED	No
	2) Number of personnel	YES	HUD&PHED	No
	3) Budgetary arrangement.	YES	HUD&PHED	No
2.2	**City District Government (CDG)**			
	1) Organization chart.	YES	CDG	-
	2) Number of personnel	YES	CDG	-
	3) Budgetary arrangement.	YES	CDG	Annexed
2.3	**Lahore Development Authority (LDA)**			
	1) Organization chart.	YES	LDA/Web Site	Website
	2) Number of personnel	YES	LDA/Web Site	Website
	3) Budgetary arrangement.	YES	LDA	-
2.4	**Water & Sanitation Agency (WASA)**			
	1) Organization chart.	YES	WASA	Annexed
	2) Number of personnel	YES	WASA	Annexed
	3) Budgetary arrangement.	YES	WASA	Annexed
	4) Income and expenditures in water	YES	WASA	Annexed

	supply and sanitation/drainage works in the past three years.			
3.	**Data and information regarding natural conditions of the project area.**			
3.1	**Maps and other information.**			
	1) Topographic maps; scale 1/500, 1/1,000 or 1/5,000.	YES	WASA	No
	2) Geological maps; scale 1/50,000 and 1/10,000	YES	WASA	No
	3) Land use maps and vegetation maps.	YES	WASA	No
	4) Population distribution map.	YES	WASA	Figure 6.1
	5) Earthquake data.	-	WASA	N/A
3.2	**Meteorological and Hydrological data**			
	1) Meteorological data near the project area for the last 10 years.	YES	MET Off./WASA	Annexed
	2) Hydrological data of Ravi River and small River in Lahore city.	YES	WASA/I&P	Study Reports
	a. Discharge – daily, monthly & annual.			
	b. Water level – daily & monthly.			
	c. Water Quality – SS, COD, BOD.			
	d. Measurement stations and maps.		Airport Center	Annexed
4.	**Sewage and drainage system.**			
4.1	**General**			
	1) Map of the coverage of the sewage and drainage system (present and future)	YES	WASA	Integrated Master Plan
	2) Population covered by the system (present and future).	YES	WASA	Integrated Master Plan
	3) Sewage discharge quantity.	YES	WASA	Integrated Master Plan
	a. Domestic sewage (per capita and total)			
	b. Liquid industrial effluents.			
	4) Map of inundation area and record of inundated days in the past 5 years.	YES	WASA	Annexed
	5) Organization and the budget of WASA for sewage and drainage system.	YES	WASA	Integrated Master Plan
	6) Demarcation of sewage and drainage improvement.	YES	WASA	Integrated Master Plan
	a. Present condition.			
	b. Future plan.			
	7) Future plan for the application of combined / separated sewer system.	YES	WASA	Annexed
4.2	**Facilities of Sewage and Drainage system.**			
	1) Location map of the existing sewage and drainage system including river, channel, pipelines and manholes, drainage pump stations, etc.	YES	WASA	Integrated Master Plan
	2) Inventory sheets of sewerage and storm water disposal facilities such sewer collector, drainage pipes, storm water disposal pumping station, etc.	YES	WASA	HAISTE Consultant (UK) Drawing

Required Data and Information (3/7)

	3) Brief specification, general layout, typical sectional drawings, construction cost and year of construction of the facilities.	YES	WASA	Plan, Drawings Ok
	4) Detailed drawings of sewer collector and drainage pipes including plan, longitudinal and sectional drawings.	YES	WASA	HAISTE Consultant(UK) Drawing
	5) History of improvement or rehabilitation of the facilities, or inspection record. (see the attached sheet)	YES	WASA	Annexed
	6) Operation and maintenance record of the system including pumping facilities, maintenance equipment and machinery for sewage pipelines and drainage channel, etc. , electric power consumption, manpower arrangement, etc.	YES	WASA	Sample Annexed
	7) List of available equipment for cleaning and maintenance of sewerage pipelines and open drainage channels. (see the attached sheet).	YES	WASA	Annexed
	8) Design standard to be applied for sewage and drainage systems such as rainfall intensity and coefficient of run-off, average daily waste water flow, maximum daily waste water flow, peak hourly maximum waste water flow, design velocity.	YES	WASA	Design Criteria
	9) Design code and standard or design criteria to be applied for pumping station such as design high/low water levels, structural code, mechanical and electrical code, etc.	YES	WASA	Design Criteria
	10) Present conditions and Plans for warehouse, ware yard, parking shed for the requested machinery and equipment.	YES	WASA	Annexed
	11) Present conditions and plans of operation and management staff organization, technical level, personnel cost for cleaning equipments and pumping station respectively.	YES	WASA	Annexed
	12) Detail of the past technical training and necessity of technical training for the requested items regarding cleaning equipments and pumping station respectively.	YES	WASA	Annexed
	13) Management system for record and custody of information on operating and maintenance of the requested items regarding cleaning equipments and pumping station respectively.	YES	WASA	Not yet
4.3	**Data and information regarding water quality control.**			
	1) Water Quality standard for municipal and liquid industrial effluents.	YES	WASA	Annexed

Required Data and Information (4/7)

	2) Inventory (name, location, kind of industry, and quantity and quality of waste water) of factories in the project area which discharge waste water into municipal sewerage system or rivers.	YES	WASA/EPA	Partially provided
	3) Location map of discharge point of municipal sewerage and storm water drainage into the river.	YES	WASA	Annexed
	4) Organization for water quality control of the project area.	YES	WASA	-
	5) Present water quality monitoring system and water quality analysis record:	YES	EPA	EPA
	a. Waste Water from factory.	YES	EPA	-
	b. River Water.	YES	I&P	-
	c. Ground Water.	YES	WASA	-
	6) Chemical analytical results of debris and silt in the waste water system heavy metals, COD or TOC, and other general characteristics.	YES	WASA/EPA	For Debris & WW Annexed
	7) Present collection and disposal system of raw sewage of the area located outside the existing sewerage system.	YES	WASA	Integrated Master Plan
	8) Location map of the planned pumping station and sewage treatment plant.	YES	WASA	Integrated Master Plan
5.	**Data and information regarding solid waste management in Lahore city.**			
	1) Municipal regulations concerning solid waste management.	YES	SWM/EPA	-
	2) Coverage map of municipal solid waste collection services.	YES	SWM/EPA	-
	3) Present solid waste collection and disposal system:	YES	SWM	-
	a. Map of solid waste collection route.			
	b. Frequency of solid waste collection.			
	c. Quantity/quality of solid waste.			
	d. Location map of open dumping site and capacity of open dumping site.			
	e. Collection system of solid waste management fee.			
	4) List of equipment used for solid waste collection.	YES	WASA/SWM	-
	5) Organization and budget for solid waste management.	YES	WASA/SWM	-
	6) Information on illegal dumping	YES	SWM	-
	7) Complaint on solid waste management from resident.	YES	SWM	-
6.	**Data and information regarding water supply system in Lahore.**			
	1) Water supply system of Lahore	YES	WASA	Annexed
	a. Map of service area.			
	b. Served population (present and future) and coverage ratio.			

Required Data and Information (5/7)

	c. Water supply capacity and water demand (present and future). d. Per capita water consumption.			
	2) Location map of tubewells and other water sources, and water production capacity by kind of water source.	YES	WASA	Annexed
	3) Location map of water supply facilities such as water intake, reservoir tanks and distribution pipeline network.	YES	WASA	N/A
	4) Organization and budget for water supply works.	YES	WASA	N/A
	5) Mid-term or Long term plan for water supply.	YES	WASA	Integrated Master Plan
7.	**Tariff for public services and income per household.**			
	1) Annual average income per household (Upper class, Middle class and Lower class).	YES	WASA	No.
	2) Tariff for public services. a. Water tariff per household per month. b. Tariff for sewerage per household per month. c. Tariff for solid waste collection per household per month.	YES	WASA	Annexed
	3) Collection system and collection conditions (actual collections ratio).	YES	WASA	Bills to consumer collection through Banks
8.	**Data and information regarding social and environmental issues.**			
	1) Public health. a. Statistical data of epidemic disease including water-borne disease in Lahore city and Punjab province (for the last five years.	YES	Health Department	Annexed
	b. Statistical data of flooded period during year in study area.	YES	WASA	Annexed
	c. List of hospital in Lahore.			
	2) Social environment.	YES	WASA/EPA	Integrated Master Plan
	a. Administrational border map.	YES	WASA	
	b. Information on distribution of low income people settlement.	YES	WASA	Annexed
	c. List of NGOs in Lahore.	YES	Social Welfare Deptt.	Annexed
	3) Natural environment. a. Statistical data of monthly precipitation during last tem year.	YES	WASA/MET Office	Annexed
	b. Location of particular area officially protected for natural conservation in and around Lahore city.	YES	CDG	No
9. **9.1**	**Others** **Statistic data**			Integrated Master Plan
	1) Census report of Lahore City.	YES	WASA	
9.2	**Capable Consultants list.**			
	1) Sewerage/drainage engineering.	YES	WASA	Provided
	2) Topographic survey.	YES	WASA	Provided
	3) Soil investigation.	YES	WASA	Provided
	4) Environmental study.	YES	WASA	Provided
	5) Social survey.	YES	Social Welfare Deptt.	Provided

Required Data and Information (6/7)

9.3	**Capable construction contractor and erection contractor.**			
	1) List of Local construction contractor capable of sewage and drainage works.	YES	WASA	-
	2) List of Local erection contractor capable of sewage and drainage works.	YES	WASA	-
9.4	**Machinery and equipment.**			
	1) List of typical domestic productions of machinery and equipment with fittings with regard to sewage and drainage facility.	YES	WASA	KSB Catalogue
	2) List of agents dealing the above mentioned equipments and spare parts for them in Lahore or Islamabad.	YES	WASA	KSB
9.5	**Construction materials.**			
	1) List of typical domestic productions of pipe materials for sewerage/drainage works.	YES	WASA	No
	2) Any custom restriction on import of the possible construction materials.	YES	WASA	N/A
9.6	**Installation cost for equipment and machinery in pumping station.**			
	1) Scaffold work and check of crane.	YES	WASA	Annexed
	2) Removal work for pumps and motors.	YES	WASA	Annexed
	3) Adjustment of machine base.	YES	WASA	Annexed
	4) Installation work for pumps and motors.	YES	WASA	Annexed
	5) Replacement work for valves.	YES	WASA	Annexed
	6) Auxiliary pipe work.	YES	WASA	Annexed
	7) Replacement work for trash rake system.	YES	WASA	Annexed
	8) Replacement work for electric panels and instruments.	YES	WASA	Annexed
	9) Wiring work.	YES	WASA	Annexed
	10) Test run and adjustment work.	YES	WASA	Annexed
9.7	**Unit Price for construction.**			
	1) Unit price regarding construction material for sewerage/drainage works.	YES	WASA	N/A
	2) Unit price regarding construction equipment, vehicles etc.	YES	WASA	N/A
	3) Unit price for engineers for design and construction of sewerage/drainage works.	YES	WASA	N/A
9.8	**Work conditions.**			
	1) Accessibility to the work site in the city (with of road, withstand load of road, paving and puddle in rainy season).	YES	WASA	Yes
	2) Water source for water tanker (location, distance, time for filling and carry to the site).	YES	WASA	Everywhere
	3) Disposal or treatment place of sludge (location, distance, time for waste & back).	YES	WASA	Provided

Required Data and Information (7/7)

	4) Average of actual working hour in a day (staying time at the site in a day)	YES	WASA	0800 Hrs to 1500 Hrs
	5) Working efficiency of cleaning sewer (actual machine operating hour for actual team working hour in a day).	YES	WASA	Annexed
	6) Working team for one site. ex. Jetting machine: 3 persons (technician, worker, operator) Sludge Sucker : 2 persons (worker, operator) Water tanker : 1 person (driver) Total 3 vehicles & 6 persons for a team.	YES	WASA	Annexed
	7) Working staff covering A,B,G, H1 area and main outfall pumping station No.1 (Number of staff and technical skill (level-by-level) who in charge of the project site, and working shift in a week.			
9.9	**Safety management.**			
	1) Safety management for underground work against oxygen deficiency & noxious fume in sewer (guideline / safety standard, /license or training menu for worker, past accidents and countermeasures).	YES	WASA	No
	2) List of safety equipment owned by WASA. (light & stand, ventilation fan, head lamp, hose mark, oxygen detector, gas detector).	YES	WASA	Annexed (DFID List)
	3) Safety management for public health. (guideline and work standard for worker as a measure against epidemic, regulation of cleaning boots & uniform, tetanus vaccination).	YES	WASA	No

Attached sheet (1/4)

Existing Equipment owned by WASA (February, 2004)

Equipment	No.	Specification	Required skill or driving license	Sewer type size, depth to be applied	Donor	Year of intordu-ction	Operation & Maintenance Condition								
							Operatable or not	Damaged part at present	Repair Record (year & repaire d part)	Diesel (Litre / year)	Oil (Litre / year)	Operation Cost (PK R)	Periodical Maintenance Item	Spare parts to be changed periodical ly	Mainte-nance Cost (PK R. / year)
Excavator Long Boom	1		Skilled	N/A		1997				50,000	500	1.5 M	Filters	Batteries	0.1 M
	1					1985									
	2					1985									
Excavator Long Boom	1		Skilled	N/A		1996				50,000	500	1.5 M	Filters	Batteries	0.1 M
	2					1996									
Excavator Small Size	1		Skilled	N/A		1985				50,000	500	1.5 M	Filters	Batteries/ Tires	0.1 M
	2					1985									
Excavator Large Size	1	Drag line	Skilled	N/A		1966				67,000	500	2.0 M	Filters	Batteries	0.1 M
Tractor Trolly	1	MF - 240	Skilled	N/A		1996				13,000	100	0.275 M	Filters	Batteries/ Tires	0.05 M
	2					1985									
	3					1985									
	4					1985									
	5					1985									
	6					1985									
	7					1985									
	8					1985									
	9					1985									
	10					1985									

Attached sheet (2/4)

Existing Equipment owned by WASA (February, 2004)

Equipment	No.	Specification	Required skill or driving licence	Sewer type size, depth to be applied	Donor	Year of intordu-ction	Operation & Maintenance Condition								
							Operatable or not	Damaged part at present	Repair Record (year & repaire d part)	Diesel (Litre / year)	Oil (Litre / year)	Operation Cost (PK R	Periodical Maintenance Item	Spare parts to be changed periodical ly	Mainte-nance Cost (PK R. / year)
Tractor	1					1985									
Dump Truck	1	8 tons	HMD	N/A		1997				22,000	200	0.480 M	Filters	Batteries/ Tires	0.1 M
	2					1997									
	3					1997									
	4					1997									
	1					1987									
	2					1987									
	3					1987									
	4					1987									
	1					1997									
	2					1997									
	3					1997									
	4					1997									
	1					1988									
	2					1988									
	1					1987									
	2					1987									
	3					1987									

Attached sheet (3/4)

Existing Equipment owned by WASA (February, 2004)

Equipment	No.	Specification	Required skill or driving licence	Sewer type size, depth to be applied	Donor	Year of intordu-ction	Operation & Maintenance Condition								
							Operatable or not	Damaged part at present	Repair Record (year & repaire d part)	Diesel (Litre / year)	Oil (Litre / year)	Operation Cost (PK R	Periodical Maintenance Item	Spare parts to be changed periodical ly	Mainte-nance Cost (PK R. / year)
Sludge Sucker	1		HMD	2400 mm & 6m		1992	Operatable			22,000	190	0.470 M	Filters	Suction pipe	0.1 M
	2					1992									
	3					1992									
	4					1992									
	5					1992									
	6					1992									
	7					1992									
	8					1992									
	9					1992									
	10					1992									
	11					1992									
	12					1992									
Jetting Machine	1	210 lit/min	HMD	Upto 525 mm & 6m		1992	Operatable			27,000	192	0.570 M	Filters	Pipe	0.1 M
	2					1992									
	3					1992									
	4					1992									
	5					1992									
	6					1992									
						1992									

Attached sheet (4/4)

Existing Equipment owned by WASA (February, 2004)

Equipment	No.	Specification	Required skill or driving licence	Sewer type size, depth to be applied	Donor	Year of intordu-ction	Operation & Maintenance Condition								
							Operatable or not	Damaged part at present	Repair Record (year & repaire d part)	Diesel (Litre / year)	Oil (Litre / year)	Operation Cost (PK R	Periodical Maintenance Item	Spare parts to be changed periodical ly	Mainte-nance Cost (PK R. / year)
Sewer Cleaner	1					1982									
	2					1982									
	3					1982									
	4					1982									
Generator	1	56 KVA to 1000 KVA	Skilled	N/A		1999	Operatable			2000/ 5000	100/ 500	0.5 to 1.5	Filters	Batteries	0.02 to 0.1 M
	2					1999									
	3					1999									
	4					1999									

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Pump No.	1	2	3	4
General Information				
year of start operation	1983	1983	1983	1983
total operation hours (h)				
Design Water Level				
design high water level in intake (EL.m)	6	6	6	6
design low water level in intake (EL.m)	0.5	0.5	0.5	0.5
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.
Pump				
(specification)				
year of manufacture	1979	1979	1979	1979
name of manufacture	APE ALLEN	APE ALLEN	APE ALLEN	APE ALLEN
country of origin	England	England	England	England
diameter of suction side (mm)	700	700	700	700
diameter of discharge side (mm)	600	600	600	600
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical
pump type: centrifugal / mixed flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor
discharge capacity (ft3/sec)	40	40	40	40
total head (m)	36	36	36	36
rotation speed (min-1)	490	490	490	490
(operating condition)				
suction pressure gauge (Mega Pascal)	Defective	Defective	Defective	Defective
discharge pressure gauge (Mega Pascal)	Not Available	Not Available	Not Available	Not Available
vibration (by touch)	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Normal	Normal	Normal	Normal
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal
leakage from shaft seal (visual check)	Leaking	Leaking	Leaking	Leaking
appearance: paint detachment / rust / dent	Paint detachment	Paint detachment	Paint detachment	Paint detachment

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Pump No.	1	2	3	4
Motor				
(specification)				
year of manufacture	1996	1996	1996	1996
name of manufacture				
country of origin				
motor output (kW)	240	240	240	240
rated voltage (V)	415	415	415	415
frequency : 50Hz / 60Hz	50	50	50	50
number of pole	12	12	12	12
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical
motor type: squirrel-cage / wound-rotor	wound rotor	wound rotor	Squirrel-cage	Squirrel-cage
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor
(operating condition)				
voltage meter (V)	Ok	Ok	Ok	Ok
ampere meter (A)	Ok	Ok	Ok	Ok
vibration (vibrometer or by touch)	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Yes (Hearing)	Yes (Hearing)	Yes (Hearing)	Yes (Hearing)
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal
terminal box (visual check)	Repairable	Repairable	Repairable	Repairable
wiring (visual check)	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Rust	Rust	Rust	Rust
insulation resistance (Mega ohm)	1000	1000	1000	1000
(O&M for Pump and Motor)				
power consumption per year (kWh)	4,10,000	4,10,000	4,10,000	4,10,000
operation cost per year (PK Rs.)	29,15,000	29,15,000	29,15,000	29,15,000
spare parts changed at the past periodical check	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding
major trouble and repair record (year, parts, repair expense)	2003 Volute Leackage	2003 Volute Leackage	2003 Volute Leackage	2003 Volute Leackage
maintenance cost per year (PK Rs.)	175,000	175,000	175,000	1,750,000

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Pump No.	1	2	3	4
Suction Valve				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	700	700	700	700
rated pressure (kgf/cm2)				
valve type: sluice / butterfly	Sluice	Sluice	Sluice	Sluice
operation: manual / motor drive	Manual	Manual	Manual	Manual
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)				
operation of open&close	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Rust	Rust	Rust	Rust
leakage from shaft seal (visual check)	Nil	Nil	Nil	Nil
Discharge Valve				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	600	600	600	600
rated pressure (kgf/cm2)				
valve type: sluice / butterfly	Sluice	Sluice	Sluice	Sluice
operation: manual / motor drive	Manual	Manual	Manual	Manual
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
motor output (kW)	Not Installed	Not Installed	Not Installed	Not Installed
rated voltage (V)	Not Installed	Not Installed	Not Installed	Not Installed
rated time for opening (sec)				
(operating condition)				
operation of open&close	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Rust	Rust	Rust	Rust
leakage from shaft seal (visual check)	Nil	Nil	Nil	Nil
abnormal noise (hearing)	Nil	Nil	Nil	Nil
terminal box (visual check)	N.A.	N.A.	N.A.	N.A.
wiring (visual check)	N.A.	N.A.	N.A.	N.A.

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Pump No.	1	2	3	4
Non-return valve				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	600	600	600	600
rated pressure (kgf/cm2)				
valve type: swing / butterfly	Swing	Swing	Swing	Swing
number of plate: single / double	Single	Single	Single	Single
operation device: normal / slow / rapid	Nil	Nil	Nil	Nil
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)				
appearance: paint detachment / rust / dent	Rust	Rust	Rust	Rust
leakage from shaft seal (visual check)	N.A.	N.A.	N.A.	N.A.
chattering noise (hearing)	Normal	Normal	Normal	Normal
Pipe				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	600	600	600	600
rated pressure (kgf/cm2)				
material: carbon steel / stainless / ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron
standard of flange joint	British Standard	British Standard	British Standard	British Standard
number of bolt hole on flange joint	20	20	20	20
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)				
appearance: paint detachment / rust / dent	Rust	Rust	Rust	Rust
leakage from joint part (visual check)	Nil	Nil	Nil	Nil
damage of thrust concrete (visual check)	Nil	Nil	Nil	Nil

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

General Information			
volume of trash in a day (m3/day)	4		
maximum size of trash (mm)	2000		
major component of trash	Plastic Bages, Plastic Components, Cotton Waste etc.		
Automatic Trash Rake System	Trash Rake System Does not Exist, Mechanical Screens are installed for removal of Waste.		
year of manufacture			
name of manufacture			
country of origin			
Equipment No.	1	2	3
Trash Rake			
(specification)			
type			
dimension (height, width)			
width of rake opening (mm)			
capacity (m3/h , kg/h etc.)			
motor output (kW)			
rated voltage (V)			
frequency : 50Hz / 60Hz			
(operating condition)			
lifting operation (visual check)			
vibration (visual check)			
abnormal noise (hearing)			
appearance: paint detachment / rust / dent			
Horizontal Conveyor			
(specification)			
type			
dimension (length, width)			
capacity (m3/h , kg/h etc.)			
motor output (kW)			
rated voltage (V)			
frequency : 50Hz / 60Hz			

trash rake Attached sheet (2/3)

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

(operating condition)	
conveying operation (visual check)	
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	
Inclined Conveyor	
(specification)	
type	
dimension (length, width)	
capacity (m3/h , kg/h etc.)	
motor output (kW)	
rated voltage (V)	
frequency : 50Hz / 60Hz	
(operating condition)	
conveying operation (visual check)	
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	
Hopper	
(specification)	
type	
height of stand (m)	
dimension of hopper (height, width)	
storage capacity (m3)	
motor output (kW)	
rated voltage (V)	
frequency : 50Hz / 60Hz	

trash rake Attached sheet (3/3)

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

(operating condition)			
shoot operation (visual check)			
abnormal noise (hearing)			
appearance: paint detachment / rust / dent			
(O&M for Trash Rake System)			
power consumption per year (kWh)			
operation cost per year (PK Rs.)			
changed spare parts based on the past periodical check			
major trouble and repair record (year, repaired or changed parts, repair expense)			
maintenance cost per year (PK Rs.)			
(emergency system stop)			
frequency of emergency stop			
cause of stop and part			
measure for restart			
preventive measure			
(conveying trash to disposal site)			
disposal site and distance			
conveying method			
frequency of conveying out			
conveying cost for each time (PK Rs.)			
disposal cost for each time (PK Rs.)			
convey & disposal cost (PK Rs./year)			

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Crane		
(specification)		
year of manufacture	1979	
name of manufacture	Morris	
country of origin	England	
crane type	Over head	
rated load (ton)	5-Ton	
dimension (girder height, girder span, rail length)	9, 0.5, 25-Meter	
hoist	main hoist	sub hoist
hoist operation: manual / motor drive	Motor Drive	Motor Drive
hoist speed (high speed) (m/min)	8-m/min	1-m/min
hoist speed (low speed) (m/min)		
hoist motor output (kW)	6.5-kW	0.5-kW
crossing operation: manual / motor drive	Motor Drive	Motor Drive
crossing speed (m/min)		
crossing motor output (kW)	0.75-kW	0.75-kW
running operation: manual / motor drive	Motor Drive	Motor Drive
running speed (m/min)		
running motor output (kW)	0.75-kW	0.75-kW
(operating condition)		
hoist	main hoist	sub hoist
hoist up&down move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
crossing right&left move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
running go&back move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
vibration (visual check)	Normal	Normal
abnormal noise (hearing)	Nil	Nil
appearance: paint detachment / rust / dent	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Equipment No.	1	2
Sealing Water Pump	No Sealing Pump is Installed	
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of suction side (mm)		
diameter of discharge side (mm)		
axis: vertical / horizontal		
pump type:		
pump setting: on the floor / in water		
discharge capacity (m3/m)		
total head (m)		
rotation speed (min-1)		
motor output (kW)		
rated voltage (V)		
frequency : 50Hz / 60Hz		
number of pole		
motor type:		
motor setting: on the floor / in water		
(operating condition)		
(pump)		
suction pressure gauge (Mega Pascal)		
discharge pressure gauge (Mega Pascal)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
leakage from shaft seal (visual check)		
appearance: paint detachment / rust / dent		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(motor)		
voltage meter (V)		
ampere meter (A)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
terminal box (visual check)		
wiring (visual check)		
appearance: paint detachment / rust / dent		
insulation resistance (ohm)		
Strainer		
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of pipe to be attached (mm)		
type: single / dual / auto strainer		
mesh number		
(operating condition)		
appearance: paint detachment / rust / dent		
leakage (visual check)		
damage of support (visual check)		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Equipment No.	1	2
Drain Pump		
(specification)		
year of manufacture	1996	1996
name of manufacture	Victoria	Victoria
country of origin	Pakistan	Pakistan
diameter of suction side (mm)	80	80
diameter of discharge side (mm)	80	80
axis: vertical / horizontal	Vertical	Vertical
pump type:		
pump setting: on the floor / in water	in water	in water
discharge capacity (m3/m)	1/4 Cusec	1/4 Cusec
total head (m)	12	12
rotation speed (min-1)	2900-Rpm	2900-Rpm
motor output (kW)	2.3	2.3
rated voltage (V)	400	400
frequency : 50Hz / 60Hz	50	50
number of pole	2	2
motor type:	Submersible Star Delta in water	Submersible Star Delta in water
motor setting: on the floor / in water	in water	in water
(operating condition)		
(pump)	Ok	Ok
suction pressure gauge (Mega Pascal)	Not Installed	Not Installed
discharge pressure gauge (Mega Pascal)	Not Installed	Not Installed
vibration (vibrometer or by touch)	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal
leakage from shaft seal (visual check)	N.A.	N.A.
appearance: paint detachment / rust / dent	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(motor)		
voltage meter (V)	Not Installed	Not Installed
ampere meter (A)	Not Installed	Not Installed
vibration (vibrometer or by touch)	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal
terminal box (visual check)	Ok	Ok
wiring (visual check)	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok
insulation resistance (Mega ohm)	1000	1000

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Equipment No.	1	2
Vacuum Pump	Not Installed	Not Installed
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of suction side (mm)		
diameter of discharge side (mm)		
pump type:		
max air rate (m3/min)		
max vacuum rate (mmHg, kPa etc.)		
motor output (kW)		
rated voltage (V)		
frequency : 50Hz / 60Hz		
number of pole		
motor type:		
(operating condition)		
(pump)		
suction pressure gauge (Mega Pascal)		
discharge pressure gauge (Mega Pascal)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
leakage from shaft seal (visual check)		
appearance: paint detachment / rust / dent		
(motor)		
voltage meter (V)		
ampere meter (A)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
terminal box (visual check)		
wiring (visual check)		
appearance: paint detachment / rust / dent		
insulation resistance (ohm)		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Electrical Panel							
General Information							
year of start operation	1995						
elapsed service years	09-Years						
Supplied Power	11-Kv						
phase, voltage (V), frequency (Hz)	50-Hz						
demarcation point to power company	Step-down Transformer 11-Kv / 415V						
conditions of power failure							
month of high frequency	February, July, August						
etc.	Once a day						
period of power failure: seconds / hours etc.	10- Minutes – 30- Minutes						
out	Once for 6-Hours in a month						
countermeasure: none / generator	Diesel generator available						
low voltage power system							
phase, voltage (V), frequency (Hz)	415-V 50-Hz						
control system							
phase, voltage (V), frequency (Hz)	415-V 50-Hz						
lighting system							
phase, voltage (V), frequency (Hz)	415-V 50-Hz						
others							
lightning rod of outside (visual check)	OK						
lightning arrester in the panel (visual check)							
grounding resistance (ohm)	1.3 Ohm						
cable conditions (visual check)	OK						
cable pit, rack, duct (visual check)	OK						

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Panel No.	1	2	3	4								
Incoming Panel												
(specification)												
year of manufacture	1995											
name of manufacture	Local											
country of origin	Pakistan											
installation site: outdoor / indoor	Indoor											
transformer type	Step-down											
transformer capacity (kVA)	1500-Kva											
input voltage (V)	11-Kv											
output voltage (V)	415-V											
(operating condition)												
dent	Rust											
voltage meter (V)	Ok											
ampere meter (A)	Ok											
watt hour meter (kWh)	Ok											
indication lamp (visual check)	N/A											
switch (operation check)	Ok											
mark	Burn Mark											
dust and dirt (visual check)	Dust & Dirt											
terminal box (visual check)	Ok											
wiring (visual check)	Needs Replacement											
space heater (visual check)	N.A.											
light inside panel (visual check)	Nil											
burnout of some parts in the panel	Nil											
other trouble or accident record	Nil											
record of changed parts lamp / fuse / switch / relay / circuit breaker / terminal / cable	Nil											

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Panel No.	1	2	3	4								
Pump Starter Panel												
(specification)												
year of manufacture	1995	1995	1995	1995								
name of manufacture	Local	Local	Local	Local								
country of origin	Pakistan	Pakistan	Pakistan	Pakistan								
installation site: outdoor / indoor	Indoor	Indoor	Indoor	Indoor								
starting system: star-delta / reactor	Slipring	Slipring	Slipring	Slipring								
load (kW)	180 KW	180 KW	180 KW	180 KW								
(operating condition)												
start&stop operation (operation check)	Ok	Ok	Ok	Ok								
dent	Rust	Rust	Rust	Rust								
ampere meter (A)	Defective	Defective	Defective	Defective								
indication lamp (visual check)	NIL	NIL	NIL	NIL								
switch (operation check)	Ok	Ok	Ok	Ok								
inside conditions: noise / smell / burn	Burn Mark	Burn Mark	Burn Mark	Burn Mark								
dust and dirt (visual check)	Dirt	Dirt	Dirt	Dirt								
terminal box (visual check)	Ok	Ok	Ok	Ok								
wiring (visual check)	Ok	Ok	Ok	Ok								
space heater (visual check)	N/A	N/A	N/A	N/A								
light inside panel (visual check)	NIL	NIL	NIL	NIL								
past troubles of pump operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp	Un-Startable No Reaction	Un-Startable No Reaction	Un-Startable No Reaction	Un-Startable No Reaction								
burnout of some parts in the panel	YES	YES	YES	YES								
record of changed parts lamp / fuse / switch / relay / circuit breaker / terminal / cable	Contactor, Relay	Contactor, Relay	Contactor, Relay	Contactor, Relay								

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Panel No.	1	2	3	4	5	6	7	8	9	10	11	12
Local Control Panel for Main Pump												
(specification)	There is no separate Local Control Panel.											
year of manufacture	Starter Panel of each motor is installed and detail is as on previous page.											
name of manufacture												
country of origin												
installation site: outdoor / indoor												
panel type:self stand/stem support/wall hung												
load (kW)												
(operating condition)												
start&stop operation (operation check)												
dent												
ampere meter (A)												
indication lamp (visual check)												
switch (operation check)												
inside conditions: noise / smell / burn												
dust and dirt (visual check)												
terminal box (visual check)												
wiring (visual check)												
space heater (visual check)												
light inside panel (visual check)												
past troubles of pump operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp												
burnout of some parts in the panel												
record of changed parts lamp / fuse / switch / relay / circuit breaker / terminal / cable												

electrical panel Attached sheet (5/6)

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

Panel No.	Trash Rake No.1	rash Rake No	Trash Rake No.3	Horizontal Conveyor	Inclined Conveyor	Hopper						
Local Control Panel for Trash Rake System												
(specification)												
year of manufacture												
name of manufacture	There is no Trash Rack System installed											
country of origin												
installation site: outdoor / indoor	Mechanical screens are available for removal of trash.											
panel type:self stand/stem support/wall hung												
load (kW)												
(operating condition)												
start&stop operation (operation check)												
dent												
ampere meter (A)												
indication lamp (visual check)												
switch (operation check)												
inside conditions: noise / smell / burn												
dust and dirt (visual check)												
terminal box (visual check)												
wiring (visual check)												
space heater (visual check)												
light inside panel (visual check)												
past troubles of motor operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp												
burnout of some parts in the panel												

Conditions of Pumping Station (February, 2004)

Pumping Station name: Shad Bagh Pumping Station, Lahore

record of changed parts lamp / fuse / switch / relay / circuit breaker / terminal / cable												

name of Instruments and No.	Level Meter No.1											
Instrument												
(specification)	LEVEL CONTROLER ARE NOT INSTALLED											
year of manufacture												
name of manufacture												
country of origin												
installation place in pumping station												
install condition: in air / in water												
type of instruments: float / electrode etc.												
output signal: digital / analog												
(operating condition)												
dent												
dust and dirt (visual check)												
wiring (visual check)												
operation and output signal												
past troubles and cause&measure of them	Out of order Relay Defective											
record of changed parts fuse / switch / relay / circuit breaker terminal / cable	Relay											

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Pump No.	1	2	3	4
General Information				
year of start operation	1992	1992	1993	1993
total operation hours (h)				
Design Water Level				
design high water level in intake (EL.m)	6	6	6	6
design low water level in intake (EL.m)	0.5	0.5	0.5	0.5
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.
Pump				
(specification)				
year of manufacture	1979	1979	1979	1979
name of manufacture	APE ALLEN	APE ALLEN	APE ALLEN	APE ALLEN
country of origin	England	England	England	England
diameter of suction side (mm)	700	700	700	700
diameter of discharge side (mm)	600	600	600	600
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical
pump type: centrifugal / mixed flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor
discharge capacity (ft3/sec)	40	40	40	40
total head (m)	36	36	36	36
rotation speed (min-1)	490	490	490	490
(operating condition)				
suction pressure gauge (Mega Pascal)				
discharge pressure gauge (Mega Pascal)	Not Available	Not Available	Not Available	Not Available
vibration (by touch)	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Normal	Normal	Normal	Normal
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal
leakage from shaft seal (visual check)	Normal	Normal	Normal	Leaking
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Pump No.	1	2	3	4
Motor				
(specification)				
year of manufacture	1979	1979	1979	1979
name of manufacture	Laurence Scott	Laurence Scott	Laurence Scott	Laurence Scott
country of origin	England	England	England	England
motor output (kW)	163	163	163	163
rated voltage (V)	3300	3300	3300	3300
frequency : 50Hz / 60Hz	50-Hz	50-Hz	50-Hz	50-Hz
number of pole	12	12	12	12
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical
motor type: squirrel-cage / wound-rotor	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor
(operating condition)				
voltage meter (V)	Ok	Ok	Ok	Ok
ampere meter (A)	Ok	Ok	Ok	Ok
vibration (vibrometer or by touch)	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal
terminal box (visual check)	Ok	Ok	Ok	Ok
wiring (visual check)	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok
insulation resistance (Mega ohm)	5000	5000	5000	5000
(O&M for Pump and Motor)				
power consumption per year (kWh)	4,50,000	4,50,000	4,50,000	4,50,000
operation cost per year (PK Rs.)	32,00,000	32,00,000	32,00,000	32,00,000
spare parts changed at the past periodical check	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding
major trouble and repair record (year, parts, repair expense)	Nil	Nil	Nil	Nil
maintenance cost per year (PK Rs.)	150,000	150,000	150,000	150,000

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Pump No.	1	2	3	4
Suction Valve				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	700	700	700	700
rated pressure (kgf/cm2)				
valve type: sluice / butterfly	Sluice	Sluice	Sluice	Sluice
operation: manual / motor drive	Manual	Manual	Manual	Manual
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)				
operation of open&close	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	Nil	Nil	Nil	Nil
Discharge Valve				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	600	600	600	600
rated pressure (kgf/cm2)				
valve type: sluice / butterfly	Sluice	Sluice	Sluice	Sluice
operation: manual / motor drive	Manual	Manual	Manual	Manual
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
motor output (kW)	Not Installed	Not Installed	Not Installed	Not Installed
rated voltage (V)	Not Installed	Not Installed	Not Installed	Not Installed
rated time for opening (sec)				
(operating condition)				
operation of open&close	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	Nil	Nil	Nil	Nil
abnormal noise (hearing)	Nil	Nil	Nil	Nil
terminal box (visual check)	N.A.	N.A.	N.A.	N.A.
wiring (visual check)	N.A.	N.A.	N.A.	N.A.

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Pump No.	1	2	3	4
Non-return valve				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	600	600	600	600
rated pressure (kgf/cm2)				
valve type: swing / butterfly	Swing	Swing	Swing	Swing
number of plate: single / double	Single	Single	Single	Single
operation device: normal / slow / rapid	Nil	Nil	Nil	Nil
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)				
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	N.A.	N.A.	N.A.	N.A.
chattering noise (hearing)	Normal	Normal	Normal	Normal
Pipe				
(specification)				
year of manufacture	1979	1979	1979	1979
country of origin	England	England	England	England
diameter (mm)	600	600	600	600
rated pressure (kgf/cm2)				
material: carbon steel / stainless / ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron
standard of flange joint	British Standard	British Standard	British Standard	British Standard
number of bolt hole on flange joint	20	20	20	20
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)				
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok
leakage from joint part (visual check)	Nil	Nil	Nil	Nil
damage of thrust concrete (visual check)	Nil	Nil	Nil	Nil

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

General Information			
volume of trash in a day (m3/day)	2		
maximum size of trash (mm)	2000		
major component of trash	Plastic Bages, Plastic Components, Cotton Waste etc.		
Automatic Trash Rake System	Trash Rake System Does not Exist, Manual Screens are installed for removal of Waste.		
year of manufacture			
name of manufacture			
country of origin			
Equipment No.	1	2	3
Trash Rake			
(specification)			
type			
dimension (height, width)			
width of rake opening (mm)			
capacity (m3/h , kg/h etc.)			
motor output (kW)			
rated voltage (V)			
frequency : 50Hz / 60Hz			
(operating condition)			
lifting operation (visual check)			
vibration (visual check)			
abnormal noise (hearing)			
appearance: paint detachment / rust / dent			
Horizontal Conveyor			
(specification)			
type			
dimension (length, width)			
capacity (m3/h , kg/h etc.)			
motor output (kW)			
rated voltage (V)			
frequency : 50Hz / 60Hz			

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

(operating condition)	
conveying operation (visual check)	
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	
Inclined Conveyor	
(specification)	
type	
dimension (length, width)	
capacity (m3/h , kg/h etc.)	
motor output (kW)	
rated voltage (V)	
frequency : 50Hz / 60Hz	
(operating condition)	
conveying operation (visual check)	
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	
Hopper	
(specification)	
type	
height of stand (m)	
dimension of hopper (height, width)	
storage capacity (m3)	
motor output (kW)	
rated voltage (V)	
frequency : 50Hz / 60Hz	
(operating condition)	
shoot operation (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

(O&M for Trash Rake System)			
power consumption per year (kWh)			
operation cost per year (PK Rs.)			
changed spare parts based on the past periodical check			
major trouble and repair record (year, repaired or changed parts, repair expense)			
maintenance cost per year (PK Rs.)			
(emergency system stop)			
frequency of emergency stop			
cause of stop and part			
measure for restart			
preventive measure			
(conveying trash to disposal site)			
disposal site and distance			
conveying method			
frequency of conveying out			
conveying cost for each time (PK Rs.)			
disposal cost for each time (PK Rs.)			
convey & disposal cost (PK Rs./year)			

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Crane		
(specification)		
year of manufacture	1979	
name of manufacture	Morris	
country of origin	England	
crane type	Over head	
rated load (ton)	5-Ton	
dimension (girder height, girder span, rail length)	9, 0.5, 25-Meter	
hoist	main hoist	sub hoist
hoist operation: manual / motor drive	Motor Drive	Motor Drive
hoist speed (high speed) (m/min)	8-m/min	1-m/min
hoist speed (low speed) (m/min)		
hoist motor output (kW)	6.5-kW	0.5-kW
crossing operation: manual / motor drive	Motor Drive	Motor Drive
crossing speed (m/min)		
crossing motor output (kW)	0.75-kW	0.75-kW
running operation: manual / motor drive	Motor Drive	Motor Drive
running speed (m/min)		
running motor output (kW)	0.75-kW	0.75-kW
(operating condition)		
hoist	main hoist	sub hoist
hoist up&down move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
crossing right&left move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
running go&back move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
vibration (visual check)	Normal	Normal
abnormal noise (hearing)	Nil	Nil
appearance: paint detachment / rust / dent	Ok	Ok

auxiliary pump Attached sheet (1/5)

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Equipment No.	1	2
Sealing Water Pump	No Sealing Pump is Installed	
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of suction side (mm)		
diameter of discharge side (mm)		
axis: vertical / horizontal		
pump type:		
pump setting: on the floor / in water		
discharge capacity (m3/m)		
total head (m)		
rotation speed (min-1)		
motor output (kW)		
rated voltage (V)		
frequency : 50Hz / 60Hz		
number of pole		
motor type:		
motor setting: on the floor / in water		
(operating condition)		
(pump)		
suction pressure gauge (Mega Pascal)		
discharge pressure gauge (Mega Pascal)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
leakage from shaft seal (visual check)		
appearance: paint detachment / rust / dent		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(motor)		
voltage meter (V)		
ampere meter (A)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
terminal box (visual check)		
wiring (visual check)		
appearance: paint detachment / rust / dent		
insulation resistance (ohm)		
Strainer		
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of pipe to be attached (mm)		
type: single / dual / auto strainer		
mesh number		
(operating condition)		
appearance: paint detachment / rust / dent		
leakage (visual check)		
damage of support (visual check)		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Equipment No.	1	2
Drain Pump		
(specification)		
year of manufacture	1996	1996
name of manufacture	Victoria	Victoria
country of origin	Pakistan	Pakistan
diameter of suction side (mm)	80	80
diameter of discharge side (mm)	80	80
axis: vertical / horizontal	Vertical	Vertical
pump type:		
pump setting: on the floor / in water	in water	in water
discharge capacity (m3/m)	1/4 Cusec	1/4 Cusec
total head (m)	12	12
rotation speed (min-1)	2900-Rpm	2900-Rpm
motor output (kW)	2.3	2.3
rated voltage (V)	400	400
frequency : 50Hz / 60Hz	50	50
number of pole	2	2
motor type:	Submersible Star Delta in water	Submersible Star Delta in water
motor setting: on the floor / in water	in water	in water
(operating condition)		
(pump)	Ok	Ok
suction pressure gauge (Mega Pascal)	Not Installed	Not Installed
discharge pressure gauge (Mega Pascal)	Not Installed	Not Installed
vibration (vibrometer or by touch)	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal
leakage from shaft seal (visual check)	N.A.	N.A.
appearance: paint detachment / rust / dent	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(motor)		
voltage meter (V)	Not Installed	Not Installed
ampere meter (A)	Not Installed	Not Installed
vibration (vibrometer or by touch)	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal
terminal box (visual check)	Ok	Ok
wiring (visual check)	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok
insulation resistance (Mega ohm)	1000	1000
Vacuum Pump	Not Installed	Not Installed
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of suction side (mm)		
diameter of discharge side (mm)		
pump type:		
max air rate (m3/min)		
max vacuum rate (mmHg, kPa etc.)		
motor output (kW)		
rated voltage (V)		
frequency : 50Hz / 60Hz		
number of pole		
motor type:		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(pump)		
suction pressure gauge (Mega Pascal)		
discharge pressure gauge (Mega Pascal)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
leakage from shaft seal (visual check)		
appearance: paint detachment / rust / dent		
(motor)		
voltage meter (V)		
ampere meter (A)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
terminal box (visual check)		
wiring (visual check)		
appearance: paint detachment / rust / dent		
insulation resistance (ohm)		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Electrical Panel							
General Information							
year of start operation	1992						
elapsed service years	12-Years						
Supplied Power	11-Kv						
phase, voltage (V), frequency (Hz)	50-Hz						
demarcation point to power company	Step-down Transformer 11-Kv / 3.3Kv						
conditions of power failure							
month of high frequency	February, July, August						
frequency: once a day / week / month etc.	Once a day						
etc.	10- Minutes – 30- Minutes						
planned black out / unexpected black out	Once for 6-Hours in a month						
countermeasure: none / generator	Diesel generator available						
low voltage power system							
phase, voltage (V), frequency (Hz)	3.3-Kv 50-Hz						
control system							
phase, voltage (V), frequency (Hz)	3.3-Kv 50-Hz						
lighting system							
phase, voltage (V), frequency (Hz)	415-V 50-Hz						
others							
lightning rod of outside (visual check)	OK						
check)							
grounding resistance (ohm)	1.3 Ohm						
cable conditions (visual check)	OK						
cable pit, rack, duct (visual check)	OK						

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Panel No.	1	2	3	4	5	6	7	8	9	10	11	12
Incoming Panel												
(specification)												
year of manufacture	1979											
name of manufacture	Johnson and Philips											
country of origin	Pakistan											
installation site: outdoor / indoor	Indoor											
transformer type	Step-down											
transformer capacity (kVA)	1500-Kva											
input voltage (V)	11-Kv											
output voltage (V)	11-Kv											
(operating condition)												
appearance: paint detachment / rust / dent	Ok											
voltage meter (V)	Ok											
ampere meter (A)	Ok											
watt hour meter (kWh)	Ok											
indication lamp (visual check)	Ok											
switch (operation check)	Ok											
inside conditions: noise / smell / burn mark	Ok											
dust and dirt (visual check)	Dust											
terminal box (visual check)	Ok											
wiring (visual check)	Ok											
space heater (visual check)	N.A.											
light inside panel (visual check)	Nil											
burnout of some parts in the panel	Nil											
other trouble or accident record	Nil											
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable	Nil											

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Panel No.	1	2	3	4								
Pump Starter Panel												
(specification)												
year of manufacture	1979	1979	1979	1979								
name of manufacture	Laurence Scott	Laurence Scott	Laurence Scott	Laurence Scott								
country of origin	England	England	England	England								
installation site: outdoor / indoor	Indoor	Indoor	Indoor	Indoor								
starting system: star-delta / reactor	Start	Start	Start	Start								
load (kW)	163 KW	163 KW	163 KW	163 KW								
(operating condition)												
start&stop operation (operation check)	Ok	Ok	Ok	Ok								
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok								
ampere meter (A)	Ok	Defective	Ok	Defective								
indication lamp (visual check)	Defective	Ok	Ok	Defective								
switch (operation check)	Ok	Ok	Ok	Ok								
inside conditions: noise / smell / burn mark	Ok	Ok	Ok	Ok								
dust and dirt (visual check)	Dust	Dust	Dust	Dust								
terminal box (visual check)	Ok	Ok	Ok	Ok								
wiring (visual check)	Ok	Ok	Ok	Ok								
space heater (visual check)	NIL	NIL	NIL	NIL								
light inside panel (visual check)	NIL	NIL	NIL	NIL								
past troubles of pump operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp	Un-Startable No Reaction	Un-Startable No Reaction	Un-Startable No Reaction	Un-Startable No Reaction								
burnout of some parts in the panel	YES	YES	YES	YES								
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable	Fuse, Relay	Fuse, Relay	Fuse, Relay	Fuse, Relay								

electrical panel Attached sheet (4/6)

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Panel No.	1	2	3	4	5	6	7	8	9	10	11	12
Local Control Panel for Main Pump												
(specification)	There is no separate Local Control Panel.											
year of manufacture	Starter Panel of each motor is installed and detail is as on previous page.											
name of manufacture												
country of origin												
installation site: outdoor / indoor												
hung												
load (kW)												
(operating condition)												
start&stop operation (operation check)												
appearance: paint detachment / rust / dent												
ampere meter (A)												
indication lamp (visual check)												
switch (operation check)												
inside conditions: noise / smell / burn mark												
dust and dirt (visual check)												
terminal box (visual check)												
wiring (visual check)												
space heater (visual check)												
light inside panel (visual check)												
past troubles of pump operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp												
burnout of some parts in the panel												
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable												

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

Panel No.	Trash Rake No.1	rash Rake No	Trash Rake No.3	Horizontal Conveyor	Inclined Conveyor	Hopper						
Local Control Panel for Trash Rake System												
(specification)												
year of manufacture												
name of manufacture	There is no Trash Rack System installed											
country of origin												
installation site: outdoor / indoor	Mechanical screens are available for removal of trash.											
hung												
load (kW)												
(operating condition)												
start&stop operation (operation check)												
appearance: paint detachment / rust / dent												
ampere meter (A)												
indication lamp (visual check)												
switch (operation check)												
inside conditions: noise / smell / burn mark												
dust and dirt (visual check)												
terminal box (visual check)												
wiring (visual check)												
space heater (visual check)												
light inside panel (visual check)												
past troubles of motor operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp												
burnout of some parts in the panel												
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable												

Conditions of Pumping Station (February, 2004)

Pumping Station name: Multan Road Pumping Station, Lahore

name of Instruments and No.	Level Meter No.1											
Instrument												
(specification)	LEVEL CONTROLER ARE NOT INSTALLED											
year of manufacture												
name of manufacture												
country of origin												
installation place in pumping station												
install condition: in air / in water												
type of instruments: float / electrode etc.												
output signal: digital / analog												
(operating condition)												
appearance: paint detachment / rust / dent												
dust and dirt (visual check)												
wiring (visual check)												
operation and output signal												
past troubles and cause&measure of them	Out of order Relay Defective											
record of changed parts fuse / switch / relay / circuit breaker terminal / cable	Relay											

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	1	2	3	4	5	6
General Information						
year of start operation	1983	1983	1983	1983	2001	2001
total operation hours (h)						
Design Water Level						
design high water level in intake (EL.m)	8	8	8	8	8	8
design low water level in intake (EL.m)	1	1	1	1	1	1
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Pump						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
name of manufacture	APE ALLEN	APE ALLEN	APE ALLEN	APE ALLEN	KSB	KSB
country of origin	England	England	England	England	Germany	Germany
diameter of suction side (mm)	700	700	700	700	700	700
diameter of discharge side (mm)	600	600	600	600	600	600
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
pump type: centrifugal / mixed flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor
discharge capacity (ft3/sec)	40	40	40	40	40	40
total head (m)	36	36	36	36	36	36
rotation speed (min-1)	490	490	490	490	490	490
(operating condition)						
suction pressure gauge (Mega Pascal)	Defective	Defective	Defective	Defective	Defective	Defective
discharge pressure gauge (Mega Pascal)	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
vibration (by touch)	Normal	Normal	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Normal	Normal	Normal	Normal	Normal	Normal
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal	Normal	Normal
leakage from shaft seal (visual check)	Normal	Normal	Normal	Leaking	Normal	Normal
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	1	2	3	4	5	6
Motor						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
name of manufacture	Laurence Scott	Laurence Scott	Laurence Scott	Laurence Scott	Siemens	Siemens
country of origin	England	England	England	England	Germany	Germany
motor output (kW)	163	163	163	163	180	180
rated voltage (V)	3300	3300	3300	3300	3300	3300
frequency : 50Hz / 60Hz	50-Hz	50-Hz	50-Hz	50-Hz	50-Hz	50-Hz
number of pole	12	12	12	12	12	12
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
motor type: squirrel-cage / wound-rotor	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor
(operating condition)						
voltage meter (V)	Ok	Ok	Ok	Ok	Ok	Ok
ampere meter (A)	Ok	Ok	Ok	Ok	Ok	Ok
vibration (vibrometer or by touch)	Normal	Normal	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil	Nil	Nil	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal	Normal	Normal
terminal box (visual check)	Ok	Ok	Ok	Ok	Ok	Ok
wiring (visual check)	Ok	Ok	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
insulation resistance (Mega ohm)	5000	5000	5000	5000	5000	5000
(O&M for Pump and Motor)						
power consumption per year (kWh)	2,34,346	2,09,940	2,34,400	2,34,400	2,34,400	2,34,400
operation cost per year (PK Rs.)	16,67,000	14,94,000	16,67,000	16,67,000	16,67,000	16,67,000
spare parts changed at the past periodical check	Sleeve, Neck ring, Bush, Bearing, Motor	Sleeve, Neck ring, Bush, Bearing, Motor	Sleeve, Neck ring, Bush, Bearing, Motor	Sleeve, Neck ring, Bush, Bearing, Motor	Nil	Nil
major trouble and repair record (year, parts, repair expense)	Nil	Nil	Nil	Nil	Nil	Nil
maintenance cost per year (PK Rs.)	150,000	150,000	150,000	150,000	30,000.00	30,000.00

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	1	2	3	4	5	6
Suction Valve						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
country of origin	England	England	England	England	England	England
diameter (mm)	700	700	700	700	700	700
rated pressure (kgf/cm2)						
valve type: sluice / butterfly	Sluice	Sluice	Sluice	Sluice	Sluice	Sluice
operation: manual / motor drive	Manual	Manual	Manual	Manual	Manual	Manual
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)						
operation of open&close	Ok	Ok	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	Nil	Nil	Nil	Nil	Nil	Nil
Discharge Valve	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed
(specification)						
year of manufacture						
country of origin						
diameter (mm)						
rated pressure (kgf/cm2)						
valve type: sluice / butterfly						
operation: manual / motor drive						
setting: on the base / suspension						
motor output (kW)						
rated voltage (V)						
rated time for opening (sec)						
(operating condition)						
operation of open&close						
appearance: paint detachment / rust / dent						
leakage from shaft seal (visual check)						
abnormal noise (hearing)						
terminal box (visual check)						
wiring (visual check)						

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	1	2	3	4	5	6
Non-return valve						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
country of origin	England	England	England	England	England	England
diameter (mm)	600	600	600	600	600	600
rated pressure (kgf/cm2)						
valve type: swing / butterfly	Swing	Swing	Swing	Swing	Swing	Swing
number of plate: single / double	Single	Single	Single	Single	Single	Single
operation device: normal / slow / rapid	Nil	Nil	Nil	Nil	Nil	Nil
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)						
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
chattering noise (hearing)	Normal	Normal	Normal	Normal	Normal	Normal
Pipe						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
country of origin	England	England	England	England	England	England
diameter (mm)	600	600	600	600	600	600
rated pressure (kgf/cm2)						
material: carbon steel / stainless / ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron
standard of flange joint	British Standard	British Standard	British Standard	British Standard	British Standard	British Standard
number of bolt hole on flange joint	20	20	20	20	20	20
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)						
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
leakage from joint part (visual check)	Nil	Nil	Nil	Nil	Nil	Nil
damage of thrust concrete (visual check)	Nil	Nil	Nil	Nil	Nil	Nil

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	7	8	9	10	11	12
General Information						
year of start operation	1983	1983	2001	2001	1983	1983
total operation hours (h)						
Design Water Level						
design high water level in intake (EL.m)	8	8	8	8	8	8
design low water level in intake (EL.m)	1	1	1	1	1	1
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
design high water level in canal (EL.m)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Pump						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
name of manufacture	APE ALLEN	APE ALLEN	KSB	KSB	APE ALLEN	APE ALLEN
country of origin	England	England	Germany	Germany	England	England
diameter of suction side (mm)	700	700	700	700	700	700
diameter of discharge side (mm)	600	600	600	600	600	600
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
pump type: centrifugal / mixed flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow	Mixed Flow
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor
discharge capacity (ft3/sec)	40	40	40	40	40	40
total head (m)	36	36	36	36	36	36
rotation speed (min-1)	490	490	490	490	490	490
(operating condition)						
suction pressure gauge (Mega Pascal)	Defective	Defective	Defective	Defective	Defective	Defective
discharge pressure gauge (Mega Pascal)	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
vibration (by touch)	Normal	Normal	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Normal	Normal	Normal	Normal	Normal	Normal
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal	Normal	Normal
leakage from shaft seal (visual check)	Normal	Normal	Normal	Normal	Normal	Normal
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	7	8	9	10	11	12
Motor						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
name of manufacture	Laurence Scott	Laurence Scott	Siemens	Siemens	Laurence Scott	Laurence Scott
country of origin	England	England	Germany	Germany	England	England
motor output (kW)	163	163	180	180	163	163
rated voltage (V)	3300	3300	3300	3300	3300	3300
frequency : 50Hz / 60Hz	50-Hz	50-Hz	50-Hz	50-Hz	50-Hz	50-Hz
number of pole	12	12	12	12	12	12
axis: vertical / horizontal	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
motor type: squirrel-cage / wound-rotor	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage	Squirrel-cage
setting: on the floor / in water	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor	On the Floor
(operating condition)						
voltage meter (V)	Ok	Ok	Ok	Ok	Ok	Ok
ampere meter (A)	Ok	Ok	Ok	Ok	Ok	Ok
vibration (vibrometer or by touch)	Normal	Normal	Normal	Normal	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil	Nil	Nil	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal	Normal	Normal	Normal	Normal
terminal box (visual check)	Ok	Ok	Ok	Ok	Ok	Ok
wiring (visual check)	Ok	Ok	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
insulation resistance (mega ohm)	5000	5000	5000	5000	5000	5000
(O&M for Pump and Motor)						
power consumption per year (kWh)	2,34,346	2,09,940	2,34,400	2,34,400	2,34,400	2,34,400
operation cost per year (PK Rs.)	16,67,000	14,94,000	16,67,000	16,67,000	16,67,000	16,67,000
spare parts changed at the past periodical check	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Nil	Nil	Sleeve, Neck ring, Bush, Bearing, Motor Winding	Sleeve, Neck ring, Bush, Bearing, Motor Winding
major trouble and repair record (year, parts, repair expense)	Nil	Nil	Nil	Nil	Nil	Nil
maintenance cost per year (PK Rs.)	150,000	150,000	30,000.00	30,000.00	150,000	150,000

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	7	8	9	10	11	12
Suction Valve						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
country of origin	England	England	England	England	England	England
diameter (mm)	700	700	700	700	700	700
rated pressure (kgf/cm2)						
valve type: sluice / butterfly	Sluice	Sluice	Sluice	Sluice	Sluice	Sluice
operation: manual / motor drive	Manual	Manual	Manual	Manual	Manual	Manual
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)						
operation of open&close	Ok	Ok	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	Nil	Nil	Nil	Nil	Nil	Nil
Discharge Valve	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed
(specification)						
year of manufacture						
country of origin						
diameter (mm)						
rated pressure (kgf/cm2)						
valve type: sluice / butterfly						
operation: manual / motor drive						
setting: on the base / suspension						
motor output (kW)						
rated voltage (V)						
rated time for opening (sec)						
(operating condition)						
operation of open&close						
appearance: paint detachment / rust / dent						
leakage from shaft seal (visual check)						
abnormal noise (hearing)						
terminal box (visual check)						
wiring (visual check)						

Conditions of Pumping Station (February, 2004) Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Pump No.	7	8	9	10	11	12
Non-return valve						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
country of origin	England	England	England	England	England	England
diameter (mm)	600	600	600	600	600	600
rated pressure (kgf/cm2)						
valve type: swing / butterfly	Swing	Swing	Swing	Swing	Swing	Swing
number of plate: single / double	Single	Single	Single	Single	Single	Single
operation device: normal / slow / rapid	Nil	Nil	Nil	Nil	Nil	Nil
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)						
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
leakage from shaft seal (visual check)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
chattering noise (hearing)	Normal	Normal	Normal	Normal	Normal	Normal
Pipe						
(specification)						
year of manufacture	1979	1979	1979	1979	1979	1979
country of origin	England	England	England	England	England	England
diameter (mm)	600	600	600	600	600	600
rated pressure (kgf/cm2)						
material: carbon steel / stainless / ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron	Ductile iron
standard of flange joint	British Standard	British Standard	British Standard	British Standard	British Standard	British Standard
number of bolt hole on flange joint	20	20	20	20	20	20
setting: on the base / suspension	Suspension	Suspension	Suspension	Suspension	Suspension	Suspension
(operating condition)						
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok
leakage from joint part (visual check)	Nil	Nil	Nil	Nil	Nil	Nil
damage of thrust concrete (visual check)	Nil	Nil	Nil	Nil	Nil	Nil

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

General Information			
volume of trash in a day (m3/day)	2		
maximum size of trash (mm)	2000		
major component of trash	Plastic Bages, Plastic Components, Cotton Waste etc.		
Automatic Trash Rake System	Trash Rake System Does not Exist, Mechanical Screens are installed for removal of Waste.		
year of manufacture			
name of manufacture			
country of origin			
Equipment No.	1	2	3
Trash Rake			
(specification)			
type			
dimension (height, width)			
width of rake opening (mm)			
capacity (m3/h , kg/h etc.)			
motor output (kW)			
rated voltage (V)			
frequency : 50Hz / 60Hz			
(operating condition)			
lifting operation (visual check)			
vibration (visual check)			
abnormal noise (hearing)			
appearance: paint detachment / rust / dent			
Horizontal Conveyor			
(specification)			
type			
dimension (length, width)			
capacity (m3/h , kg/h etc.)			
motor output (kW)			
rated voltage (V)			
frequency : 50Hz / 60Hz			

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

(operating condition)	
conveying operation (visual check)	
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	
Inclined Conveyor	
(specification)	
type	
dimension (length, width)	
capacity (m3/h , kg/h etc.)	
motor output (kW)	
rated voltage (V)	
frequency : 50Hz / 60Hz	
(operating condition)	
conveying operation (visual check)	
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	
Hopper	
(specification)	
type	
height of stand (m)	
dimension of hopper (height, width)	
storage capacity (m3)	
motor output (kW)	
rated voltage (V)	
frequency : 50Hz / 60Hz	
(operating condition)	
shoot operation (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

(O&M for Trash Rake System)			
power consumption per year (kWh)			
operation cost per year (PK Rs.)			
changed spare parts based on the past periodical check			
major trouble and repair record (year, repaired or changed parts, repair expense)			
maintenance cost per year (PK Rs.)			
(emergency system stop)			
frequency of emergency stop			
cause of stop and part			
measure for restart			
preventive measure			
(conveying trash to disposal site)			
disposal site and distance			
conveying method			
frequency of conveying out			
conveying cost for each time (PK Rs.)			
disposal cost for each time (PK Rs.)			
convey & disposal cost (PK Rs./year)			

Conditions of Pumping Station (February,

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Crane		
(specification)		
year of manufacture	1979	
name of manufacture	Morris	
country of origin	England	
crane type	Over head	
rated load (ton)	5-Ton	
dimension (girder height, girder span, rail length)	9, 0.5, 50-Meter	
hoist	main hoist	sub hoist
hoist operation: manual / motor drive	Motor Drive	Motor Drive
hoist speed (high speed) (m/min)	8-m/min	1-m/min
hoist speed (low speed) (m/min)		
hoist motor output (kW)	6.5-kW	0.5-kW
crossing operation: manual / motor drive	Motor Drive	Motor Drive
crossing speed (m/min)		
crossing motor output (kW)	0.75-kW	0.75-kW
running operation: manual / motor drive	Motor Drive	Motor Drive
running speed (m/min)		
running motor output (kW)	0.75-kW	0.75-kW
(operating condition)		
hoist	main hoist	sub hoist
hoist up&down move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
crossing right&left move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
running go&back move	Ok	Ok
brake	Ok	Ok
limit switch	Ok	Ok
vibration (visual check)	Normal	Normal
abnormal noise (hearing)	Nil	Nil
appearance: paint detachment / rust / dent	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Equipment No.	1	2
Sealing Water Pump	No Sealing Pump is Installed	
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of suction side (mm)		
diameter of discharge side (mm)		
axis: vertical / horizontal		
pump type:		
pump setting: on the floor / in water		
discharge capacity (m3/m)		
total head (m)		
rotation speed (min-1)		
motor output (kW)		
rated voltage (V)		
frequency : 50Hz / 60Hz		
number of pole		
motor type:		
motor setting: on the floor / in water		
(operating condition)		
(pump)		
suction pressure gauge (Mega Pascal)		
discharge pressure gauge (Mega Pascal)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
leakage from shaft seal (visual check)		
appearance: paint detachment / rust / dent		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(motor)		
voltage meter (V)		
ampere meter (A)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
terminal box (visual check)		
wiring (visual check)		
appearance: paint detachment / rust / dent		
insulation resistance (ohm)		
Strainer		
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of pipe to be attached (mm)		
type: single / dual / auto strainer		
mesh number		
(operating condition)		
appearance: paint detachment / rust / dent		
leakage (visual check)		
damage of support (visual check)		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Equipment No.	1	2
Drain Pump		
(specification)		
year of manufacture	1996	1996
name of manufacture	New Hadenu Pumps Ltd.	New Hadenu Pumps Ltd.
country of origin	England	England
diameter of suction side (mm)	80	80
diameter of discharge side (mm)	80	80
axis: vertical / horizontal	Vertical	Vertical
pump type:	Submersible	
pump setting: on the floor / in water	in water	in water
discharge capacity (m3/m)	1/4 Cusec	1/4 Cusec
total head (m)	12	12
rotation speed (min-1)	2900-Rpm	2900-Rpm
motor output (kW)	2.3	2.3
rated voltage (V)	400	400
frequency : 50Hz / 60Hz	50	50
number of pole	2	2
motor type:	Submersible Star Delta in water	Submersible Star Delta in water
motor setting: on the floor / in water	in water	in water
(operating condition)		
(pump)	Ok	Ok
suction pressure gauge (Mega Pascal)	Not Installed	Not Installed
discharge pressure gauge (Mega Pascal)	Not Installed	Not Installed
vibration (vibrometer or by touch)	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal
leakage from shaft seal (visual check)	N.A.	N.A.
appearance: paint detachment / rust / dent	Ok	Ok

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(motor)		
voltage meter (V)	Not Installed	Not Installed
ampere meter (A)	Not Installed	Not Installed
vibration (vibrometer or by touch)	Normal	Normal
abnormal noise (noise meter or hearing)	Nil	Nil
bearing temperature (gauge or by touch)	Normal	Normal
terminal box (visual check)	Ok	Ok
wiring (visual check)	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok
insulation resistance (Mega ohm)	1000	1000
Vacuum Pump	Not Installed	Not Installed
(specification)		
year of manufacture		
name of manufacture		
country of origin		
diameter of suction side (mm)		
diameter of discharge side (mm)		
pump type:		
max air rate (m3/min)		
max vacuum rate (mmHg, kPa etc.)		
motor output (kW)		
rated voltage (V)		
frequency : 50Hz / 60Hz		
number of pole		
motor type:		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Equipment No.	1	2
(operating condition)		
(pump)		
suction pressure gauge (Mega Pascal)		
discharge pressure gauge (Mega Pascal)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
leakage from shaft seal (visual check)		
appearance: paint detachment / rust / dent		
(motor)		
voltage meter (V)		
ampere meter (A)		
vibration (vibrometer or by touch)		
abnormal noise (noise meter or hearing)		
bearing temperature (gauge or by touch)		
terminal box (visual check)		
wiring (visual check)		
appearance: paint detachment / rust / dent		
insulation resistance (ohm)		

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Electrical Panel							
General Information							
year of start operation	1983						
elapsed service years	20						
Supplied Power	11-Kv						
phase, voltage (V), frequency (Hz)	50-Hz						
demarcation point to power company	Step-down Transformer 11-Kv / 3.3-Kv						
conditions of power failure							
month of high frequency	February, July, August						
frequency: once a day / week / month etc.	Once a day						
etc.	10 Minutes to 30-Minutes						
planned black out / unexpected black out	Once for 6-Hours in a month						
countermeasure: none / generator	Diesel Generator Available						
low voltage power system							
phase, voltage (V), frequency (Hz)	3.3-Kv, 50-Hz						
control system							
phase, voltage (V), frequency (Hz)	3.3-Kv, 50-Hz						
lighting system							
phase, voltage (V), frequency (Hz)	415-V, 50-Hz						
others							
lightning rod of outside (visual check)	Ok						
check)	N.A.						
grounding resistance (ohm)	1.3 Ohm						
cable conditions (visual check)	Ok						
cable pit, rack, duct (visual check)	Ok						

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Panel No.	1	2	3	4	5	6	7	8	9	10	11	12
Incoming Panel												
(specification)		Incoming Panel is same for All 12-Nos. Pumps.										
year of manufacture	1979											
name of manufacture	Johnson and Philips											
country of origin	Pakistan											
installation site: outdoor / indoor	Indoor											
transformer type	Step-down											
transformer capacity (kVA)	1500-Kva											
input voltage (V)	11-Kv											
output voltage (V)	3.3-V											
(operating condition)												
appearance: paint detachment / rust / dent	Ok											
voltage meter (V)	Ok											
ampere meter (A)	Ok											
watt hour meter (kWh)	Ok											
indication lamp (visual check)	Ok											
switch (operation check)	Ok											
inside conditions: noise / smell / burn mark	Ok											
dust and dirt (visual check)	Dust											
terminal box (visual check)	Ok											
wiring (visual check)	Ok											
space heater (visual check)	N.A.											
light inside panel (visual check)	Nil											
burnout of some parts in the panel	Nil											
other trouble or accident record	Nil											
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable	Nil											

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Panel No.	1	2	3	4	5	6	7	8	9	10	11	12
Pump Starter Panel												
(specification)												
year of manufacture	1979	1979	1979	1979	2001	2001	1979	1979	2001	2001	1979	1979
name of manufacture	Laurence Scott	Laurence Scott	Laurence Scott	Laurence Scott	ALSTOM	ALSTOM	Laurence Scott	Laurence Scott	ALSTOM	ALSTOM	Laurence Scott	Laurence Scott
country of origin	England	England	England	England	PAKISTAN	PAKISTAN	England	England	PAKISTAN	PAKISTAN	England	England
installation site: outdoor / indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor
starting system: star-delta / reactor	Start	Start	Start	Start	Start	Start	Start	Start	Start	Start	Start	Start
load (kW)	163 KW	163 KW	163 KW	163 KW	180 KW	180 KW	163 KW	163 KW	180 KW	180 KW	163 KW	163 KW
(operating condition)												
start&stop operation (operation check)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
appearance: paint detachment / rust / dent	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
ampere meter (A)	Ok	---	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
indication lamp (visual check)	Ok	Defective	Ok	Defective	Defective	Ok	Defective	Defective	Ok	Defective	Ok	Ok
switch (operation check)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
inside conditions: noise / smell / burn mark	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
dust and dirt (visual check)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
terminal box (visual check)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
wiring (visual check)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
space heater (visual check)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
light inside panel (visual check)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
past troubles of pump operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp / emergency stop	Un-Startable No Reaction	Un-Startable No Reaction	Un-Startable No Reaction	Un-Startable No Reaction	NIL	NIL	Un-Startable No Reaction	Un-Startable No Reaction	NIL	NIL	Un-Startable No Reaction	Un-Startable No Reaction
burnout of some parts in the panel	YES	YES	YES	YES	NIL	NIL	YES	YES	NIL	NIL	YES	YES
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable	Fuse Switch Relay	Fuse Switch Relay	Fuse Switch Relay	Fuse Relay	Fuse	Fuse	Fuse Switch Relay	Fuse Relay	Fuse	Fuse	Fuse Switch Relay	Fuse Switch Relay

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Panel No.	1	2	3	4	5	6	7	8	9	10	11	12
Local Control Panel for Main Pump												
(specification)	There is no separate Local Control Panel.											
year of manufacture	Starter Panel of each motor is installed and detail is as on previous page.											
name of manufacture												
country of origin												
installation site: outdoor / indoor												
hung												
load (kW)												
(operating condition)												
start&stop operation (operation check)												
appearance: paint detachment / rust / dent												
ampere meter (A)												
indication lamp (visual check)												
switch (operation check)												
inside conditions: noise / smell / burn mark												
dust and dirt (visual check)												
terminal box (visual check)												
wiring (visual check)												
space heater (visual check)												
light inside panel (visual check)												
past troubles of pump operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp / emergency stop												
burnout of some parts in the panel												
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable												
Panel No.	Trash Rake No.1	Trash Rake No.2	Trash Rake No.3	Horizontal Conveyor	Inclined Conveyor	Hopper						

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

Local Control Panel for Trash Rake System												
(specification)												
year of manufacture												
name of manufacture	There is no Trash Rack System installed											
country of origin												
installation site: outdoor / indoor	Mechanical screens are available for removal of trash.											
hung												
load (kW)												
(operating condition)												
start&stop operation (operation check)												
appearance: paint detachment / rust / dent												
ampere meter (A)												
indication lamp (visual check)												
switch (operation check)												
inside conditions: noise / smell / burn mark												
dust and dirt (visual check)												
terminal box (visual check)												
wiring (visual check)												
space heater (visual check)												
light inside panel (visual check)												
past troubles of motor operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp / emergency stop												
burnout of some parts in the panel												
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable												

Conditions of Pumping Station (February, 2004)

Pumping Station name: Gulshan-e-Ravi Pumping Station, Lahore

name of Instruments and No.	Level Meter No.1											
Instrument												
(specification)												
year of manufacture	1979											
name of manufacture	Abbkent & Taylor											
country of origin	England											
installation place in pumping station	Wetwell											
install condition: in air / in water	Wetwell											
type of instruments: float / electrode etc.	Electrode											
output signal: digital / analog												
(operating condition)												
appearance: paint detachment / rust / dent	Ok											
dust and dirt (visual check)	Dust											
wiring (visual check)	Ok											
operation and output signal	Defective											
past troubles and cause&measure of them	Out of order Relay Defective											
record of changed parts fuse / switch / relay / circuit breaker terminal / cable	Relay											

Conditions of Pumping Station (February, 2004)

Pumping Station name: Main Out Fall Pumping Station, Lahore

General Information				
volume of trash in a day (m3/day)	4			
maximum size of trash (mm)	2000			
major component of trash	Plastic Bages, Plastic Components, Cotton Waste etc.			
Automatic Trash Rake System				
year of manufacture	1944			
name of manufacture	Hartleys Stoke on Trent			
country of origin	England			
Equipment No.	1	2	3	4
Trash Rake				
(specification)				
type				
dimension (height, width)	4.5, 2 m	4.5, 2 m	4.5, 2 m	4.5, 2 m
width of rake opening (mm)	1780 mm	1780 mm	1780 mm	1780 mm
capacity (m3/h , kg/h etc.)	300 kg/h	500 kg/h	500 kg/h	500 kg/h
motor output (kW)	1.75 kW	1.75 kW	1.75 kW	1.75 kW
rated voltage (V)	415	415	415	415
frequency : 50Hz / 60Hz	50	50	50	50
(operating condition)				
lifting operation (visual check)	Ok	Ok	Ok	Ok
vibration (visual check)	Normal	Normal	Normal	Normal
abnormal noise (hearing)	Nil	Nil	Nil	Nil
appearance: paint detachment / rust / dent	rust	rust	rust	rust

Conditions of Pumping Station (February, 2004)

Pumping Station name: Main Out Fall Pumping Station, Lahore

Horizontal Conveyor	
(specification)	
type	Horizontal
dimension (length, width)	31, .5 m
capacity (m3/h , kg/h etc.)	1200 kg/h
motor output (kW)	4 kW
rated voltage (V)	415
frequency : 50Hz / 60Hz	50
(operating condition)	
conveying operation (visual check)	Ok
vibration (visual check)	Normal
abnormal noise (hearing)	Nil
appearance: paint detachment / rust / dent	Rust
Inclined Conveyor	
(specification)	
type	
dimension (length, width)	
capacity (m3/h , kg/h etc.)	1200 kg/h
motor output (kW)	5.5 kW
rated voltage (V)	415
frequency : 50Hz / 60Hz	50
(operating condition)	
conveying operation (visual check)	Defective
vibration (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	Deteriorated

Conditions of Pumping Station (February, 2004)

Pumping Station name: Main Out Fall Pumping Station, Lahore

Hopper	
(specification)	
type	
height of stand (m)	4 m
dimension of hopper (height, width)	3, 1.5 m
storage capacity (m3)	
motor output (kW)	5.5 kW
rated voltage (V)	415
frequency : 50Hz / 60Hz	50
(operating condition)	Defective
shoot operation (visual check)	
abnormal noise (hearing)	
appearance: paint detachment / rust / dent	Deteriorated

Conditions of Pumping Station (February, 2004)

Pumping Station name: Main Out Fall Pumping Station, Lahore

(O&M for Trash Rake System)				
power consumption per year (kWh)	8000	8000	8000	8000
operation cost per year (PK Rs.)	60,000	60,000	60,000	60,000
changed spare parts based on the past periodical check	Finger rake, Head Pin, Links, Flanges, Pully etc.			
major trouble and repair record (year, repaired or changed parts, repair expense)	Replacement of Links Flanges and Pines etc. 2003 Rs.150000/=	---	Replacement of Links Flanges and Pines etc. 2003 Rs.150000/=	---
maintenance cost per year (PK Rs.)	70,000	70,000	70,000	70,000
(emergency system stop)	Not Installed			
frequency of emergency stop	Very Rare	Very Rare	Very Rare	Very Rare
cause of stop and part	Breakdown of flanges a links			
measure for restart	Replacement of parts.			
preventive measure	Parts are kept ready in stock			
(conveying trash to disposal site)				
disposal site and distance	Mehmood Booti Seven kM from Pumping Station			
conveying method	By Dump Truck			
frequency of conveying out	On every alternate day.			
conveying cost for each time (PK Rs.)				
disposal cost for each time (PK Rs.)				
convey & disposal cost (PK Rs./year)				

Conditions of Pumping Station (February, 2004) Pumping Station name: Main Out Fall Pumping Station, Lahore

Panel No.	Trash Rake No.1	Trash Rake No.2	Trash Rake No.3	Trash Rake No.4	Horizontal Conveyor	Inclined Conveyor	Hopper
Local Control Panel for Trash Rake System							
(specification)							
year of manufacture	1944	1944	1944	1944	1944	1944	1944
name of manufacture	Ganz	Ganz	Ganz	Ganz	Ganz		
country of origin	Germany	Germany	Germany	Germany	Germany		
installation site: outdoor / indoor	Indoor	Indoor	Indoor	Indoor	Indoor		
panel type:self stand/stem support/wall hung	Stem Support	Stem Support	Stem Support	Stem Support	Stem Support		
load (kW)	1.75 kW	1.75 kW	1.75 kW	1.75 kW	4 kW	5.5 kW	5.5 kW
(operating condition)						Defective	Defective
start&stop operation (operation check)	Ok	Ok	Ok	Ok	Ok		
appearance: paint detachment / rust / dent	Rust	Rust	Rust	Rust	Rust		
ampere meter (A)	N.A.	N.A.	N.A.	N.A.	N.A.		
indication lamp (visual check)	N.A.	N.A.	N.A.	N.A.	N.A.		
switch (operation check)	Ok	Ok	Ok	Ok	Ok		
inside conditions: noise / smell / burn mark	Ok	Ok	Ok	Ok	Ok		
dust and dirt (visual check)	Dirt	Dirt	Dirt	Dirt	Dirt		
terminal box (visual check)	Ok	Ok	Ok	Ok	Ok		
wiring (visual check)	Ok	Ok	Ok	Ok	Ok		
space heater (visual check)	N.A.	N.A.	N.A.	N.A.	N.A.		
light inside panel (visual check)	N.A.	N.A.	N.A.	N.A.	N.A.		

Conditions of Pumping Station (February, 2004) Pumping Station name: Main Out Fall Pumping Station, Lahore

past troubles of motor operation and cause&measure of them ex. unstartable / no reaction / failure indication lamp / emergency stop	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points		
burnout of some parts in the panel	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points		
record of changed parts lamp / fuse / switch / relay / circuit breaker terminal / cable	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points	Burning of Coils and contact points		

Screening Format of Japan International Cooperation Agency guidelines for Environmental and Social Considerations (Draft)

Name of a Proposed Project:
Project for the Retrieval of Sewerage and Drainage System in Lahore City

Project Executing Organization:
Water and Sanitation Agency, Lahore Development Authority

Name, Post, Organization and Contact Point of a Responsible Officer:

Name: **Mr. Anam Qadir**

Post: **Managing Director**

Organization: **Water and Sanitation Agency**

Tel: **92-42-5756739**

Fax: **92-42-5752960, 92-42-5871018**

E-Mail: **amarper@wol.net.pk (Address of DMD (O&M))**

Date: 10th March, 2004

Signature: Anam Qadir

Check Items

Item 1 Location of a project site

The project site of cleaning sewerage and drainage is zone A, B, G and H1, and the project site of replacing pump and screen is Main Outfall Pump Station No.1, Shad Bagh Pump Station, Multan Road Pump Station, and Gulshan E Ravi Pump Station in Lahore city. All of the sites are managed by Water and Sanitation Agency (WASA).

Item 2 Outline of the project

2-1 Does the project come under following sectors?

■ YES ☐ NO

If yes, please mark corresponding items.

- ☐ Mining development
- ☐ Industrial development
- ☐ Thermal power (including geothermal power)
- ☐ Hydropower, dams and reservoirs
- ☐ River/erosion control
- ☐ Power transmission and distribution lines
- ☐ Roads, railways and bridges
- ☐ Airports
- ☐ Ports and harbors
- ■ Water supply, sewage and waste treatment
- ■ Waste management and disposal
- ☐ Agriculture involving large-scale land-clearing or irrigation
- ☐ Forestry
- ☐ Fishery
- ☐ Tourism

2-2 Is the project planned to deal with following items?

☐ YES ■ NO

If yes, please mark following items.

- ☐ Remarkable involuntary resettlement (scale: household/ persons)
- ☐ Remarkable groundwater pumping (scale: m^3/year)
- ☐ Remarkable land reclamation, land development and land-clearing (scale: hectors)
- ☐ Remarkable logging on a massive scale (scale: hectors)

2-3 Outline of Project (Scale and scope of project)

The sewerage system in Lahore city was originally built in early twentieth century with the construction of egg-shaped sewers and a sewerage pumping station at Main Outfall Road. Water and Sanitation Agency (WASA) is the agency of Lahore Development authority (LDA) which was established in 1975. WASA has responsible for sewerage system in downtown of Lahore City.

A master plan for water supply, sewerage and drainage was prepared in 1973, and implemented with the financial assistantce of the World Bank. Phase-I, II, and III of the sewerage project was completed in 1995.

However due to rapid increase in the population of Lahore city and inefficient work for cleaning sewers and drains, the sewerage system in Lahore city does not function properly. In heavy rains the city will be flooded which would give a negative impact to the city and cause heavy loss of lives and property.

Major problems with the existing system of flood and wastewater disposal relates to the silting up of sanitary sewers and storm water channels over the years. The system has become highly silted/clogged causing floods in Monsoon and polluting the environment in general. At present, desilting operations are carried out mostly by manual labor due to lack of adequate machinery and equipment for this purpose. Through some equipment had been procured through the assistance of UL ODA, but it is insufficient when those capability is compared with the total necessary work.

The aim of this project is to desilt the sewerage and drainage system for floods and wastewater of Lahore city through mechanization.

2-4 How do you identify necessity of the project? Does the plan formulate based on a master plan?

■ YES: Please note name of the master plan.
(Pilot Sewer Cleaning and Rehabilitation Scheme (1999) DFID)
☐ NO

2-5 Did you examine any alternative project?

■ YES: Please note name of the alternative project.
(Installation of new sewerage system in respective zones)
☐ NO

2-6 Did you have any discussion with stakeholders to identify necessity of the project?

■ YES ☐ NO

If yes, please mark corresponding stakeholders.

☐ Relevant governmental organization
■ Local people
☐ NGO
■ Others (Public representatives)

Item 3

Is the project a new one or an on-going one? In the case of an on-going one, have you received strong complaints etc. from local residents?

☐ New
☐ On-going (there are complaints)
☐ On-going (there are no complaints)
■ Others (A part of cleaning activities of sewerage and drainage have been implemented based on people's complain in existing condition.)

Item 4

Please note name of a law or a guideline related with Environmental Impact Assessment.

(Pakistan Environmental Protection Act (1997), Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations (2000))

Environmental Impact Assessment (EIA) including Initial Environmental Examination (IEE) is required for the project according to a law or a guideline in a host government?

■ Necessity ☐ Not necessity

In the case of necessity, please mark following items.

■ Only IEE is necessary
(☐ finished ☐ under implementation ■ under planning)
☐ Both IEE and EIA is necessary
(☐ finished ☐ under implementation ☐ under planning)
☐ Only EIA is necessary
(☐ finished ☐ under implementation ☐ under planning)
☐ Others ( )

Item 5

In the case of that environmental impact assessment was taken steps, was EIA approved by relevant laws in a host country? If yes, please mark date of approval and the competent authority.

☐ Approved (without a supplementary condition)
☐ Approved (with a supplementary condition)
(Date of approval: Competent authority:)
☐ Under appraisal
■ Not yet started an appraisal process
☐ Others ( )

Item 6

If it is requested to another authorization regarding the environment and society other than EIA, please indicate a name of authorization.

☐ Already authorized
☐ Need authorization but not yet done
(Name of authorization:)
■ Not requested
☐ Others ( )

Item 7

Is there a sensitive area inside or the surrounding project site?

☐ YES ■ NO ☐ UNCLEAR

If yes, please mark corresponding items.

☐ National park, protection area designated by the government (coast line, wetlands, reserved area for ethnic or indigenous people, cultural heritage)
☐ Virgin forests, tropical forests
☐ Ecological important habitat area (coral reef, mangrove wetland, tidal flats)
☐ Habitat of valuable species protected by a domestic law or an international treaty
☐ Likely salts cumulus or soil erosion area on a massive scale
☐ Remarkable desertification trend area
☐ Archaeological, historical or cultural valuable area
☐ Living area of ethnic, indigenous people or nomads who have a traditional lifestyle, or special socially valuable area

Item 8

Does the project have any possibility to arise environmental and social impact?

☐ YES ☐ NO ■ UNCLEAR

Reason (To prevent environmental impact, it is necessary to implement appropriate disposal of generated sludge, silt, and debris by cleaning activities. Principle of the disposal method is already determined. Detail of disposal method will be planed hereafter.)

Item 9

Please mark related the environmental and social impact.

☐ Air pollution
☐ Water pollution
☐ Soil pollution
■ Solid waste
☐ Noise and vibration
☐ Ground subsidence
☐ Offensive odors
☐ Toporogy and geology
☐ Bottom sediment
☐ Biota and ecosystem
☐ Water usage
☐ Accidents
☐ Greenhouse gas
☐ Involuntary resettlement
☐ Local economy such as employment and livelihood etc.
☐ Land use and utilization of local resources
☐ Social institutions such as social infrastructure and local decision-making institutions
☐ Existing social infrastructures and services
☐ The poor, indigenous of ethnic people
☐ Equality of benefit and losses
☐ Geographical features
☐ Gender
☐ Children's rights
☐ Cultural heritage
☐ Infectious diseases such as HIV/AIDS etc.
☐ Others

Outline of environment and environmental and social impact

(Impact of solid waste disposal may occur if appropriate disposal method is not adopted. To

prevent environmental impact, it is necessary to implement appropriate disposal of generated sludge, silt, and debris by cleaning activities. Principle of the disposal method is already determined. Detail of disposal method will be planed hereafter.)

Item 10

10-1 When environmental and social conditions are requested, do you agree to secure information disclosure to local stakeholders and a meeting with them?

■ YES ☐ NO

10-2 If no, please explain reason of disagreement.

(

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収 集 資 料 リ ス ト

		プロジェクトID		調査団番号			
地域	南西アジア	調査団名	ラホール市下水管路清掃機材整備計画予備調査	調査の種類	予備調査	担当部課	無償資金協力部
国名	パキスタン	配属機関名	ラホール市開発公社 水･公衆衛生局	現地調査期間	04/2/22？04/3/13	担当者名	高樋俊介

番号	資料の名称	形態	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分	図書館記入欄	備考
パキスタン国 政策 ・ 統計 資料										
S-1	Master Plan for Urban Wastewater (Municipal and Industrial) Treatment Facilities in Pakistan: Final Report, June 2002	オリジナル	X				Government of Pakistan, ministry of Environment, Local Government and Rural Development			
ラホール市 政策 ・ 統計 資料										
L-1	Integrated Master Plan for Lahore 2021, Draft Report (Revised), Volume-Ⅰ: Existing Scenario	コピー	X				Lahore Development Authority			
L-2	Integrated Master Plan for Lahore 2021, Final Report, Volume-Ⅱ: Analysis and Proposals	コピー	X				Lahore Development Authority			
L-3	District Map of Lahore: Scale 1:75,000 1st Edition 2001	オリジナル	X				Survey of Pakistan			
L-4	Rising to the Challenge	オリジナル	X				Zila Nazim Lahore			
L-5	Budget 2003 - 2004	オリジナル	X				City District Government Lahore			
ラホール市 開発公社 水･公衆衛生局 資料										
W-1	Design Criteria: Water Distribution System, Sanitary Sewers, Sewage Pumping Station and Storm Water Drainage	オリジナル	X				Water And Sanitation Agency Lahore Development Authority			
W-2	TEN YEARS DEVELOPMENT PLAN(2004-2014)	コピー	X				Water And Sanitation Agency Lahore Development Authority			
W-3	Lahore Guide Map: Scale 1:30,000 surveyed 2002-2003	オリジナル	X				Survey of Pakistan			
W-4	Budget Estimates 2003-2004 & Revised Estimates 2002-2003	コピー	X				Water And Sanitation Agency Lahore Development Authority			

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W-5	Private Sector Participation Lahore Water &Sanitation Services：Briefing Memorandom	コピー	X				Water And Sanitation Agency Lahore Development Authority			
W-6	Drawing of Existing Surface Drainage System(General Plan)	コピー	X				Ditto above			
W-7	Drawing of Sewerage	コピー	X				Ditto above			
W-8	Drawing of Drainage	コピー	X				Ditto above			
W-9	Drawing Allocation Map	コピー	X				Ditto above			
W-10	Matching Drawing-1	コピー	X				Ditto above			
W-11	Matching Drawing-2	コピー	X				Ditto above			
W-12	Sewer pipe layout drawing (6/19A, B, C, E, F)	コピー	X				Ditto above			
W-13	Sewer pipe layout drawing (6/20B, C, D)	コピー	X				Ditto above			
W-14	Sewer pipe layout drawing (6/24A to F)	コピー	X				Ditto above			
W-15	Sewer pipe layout drawing (6/25A to F)	コピー	X				Ditto above			
W-16	Sewer pipe layout drawing (7/12B, C, E, F)	コピー	X				Ditto above			
W-17	Sewer pipe layout drawing (7/13C, E, F)	コピー	X				Ditto above			
W-18	Sewer pipe layout drawing (7/14A to C)	コピー	X				Ditto above			
W-19	Sewer pipe layout drawing (7/16/aA, B, C, D, E, F)	コピー	X				Ditto above			
W-20	Sewer pipe layout drawing (7/17A, B, C, D)	コピー	X				Ditto above			
W-21	Sewer pipe layout drawing (7/18A, B, C, D, E, F)	コピー	X				Ditto above			
W-22	Sewer pipe layout drawing (7/19A to H	コピー	X				Ditto above			
W-23	Sewer pipe layout drawing (7/20A to F)	コピー	X				Ditto above			
W-24	Sewer pipe layout drawing (7/21A to F)	コピー	X				Ditto above			
W-25	Sewer pipe layout drawing (7/22A to F)	コピー	X				Ditto above			
W-26	Sewer pipe layout drawing (7/23A to F)	コピー	X				Ditto above			

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W-27	Sewer pipe layout drawing (7/24A to F)	コピー	X				Water And Sanitation Agency Lahore Development Authority			
W-28	Sewer pipe layout drawing (7/25A to F)	コピー	X				Ditto above			
W-29	Sewer pipe layout drawing (8/21/A to F)	コピー	X				Ditto above			
W-30	Sewer pipe layout drawing (11/4A to F)	コピー	X				Ditto above			
W-31	Sewer pipe layout drawing (11/5B to F)	コピー	X				Ditto above			
W-32	Sewer pipe layout drawing (11/9 A to F)	コピー	X				Ditto above			
W-33	Sewer pipe layout drawing (11/10 A to F)	コピー	X				Ditto above			
W-34	Sewer pipe layout drawing (12/1A to F)	コピー	X				Ditto above			
W-35	Sewer pipe layout drawing (12/2 A to F)	コピー	X				Ditto above			
W-36	Sewer pipe layout drawing (12/3 A to F, J)	コピー	X				Ditto above			
W-37	Sewer pipe layout drawing (12/4A to H, J, K, L)	コピー	X				Ditto above			
W-38	Sewer pipe layout drawing (12/5 A to F)	コピー	X				Ditto above			
W-39	Sewer pipe layout drawing (12/6A to F)	コピー	X				Ditto above			
W-40	Sewer pipe layout drawing (12/7A to F)	コピー	X				Ditto above			
W-41	Sewer pipe layout drawing (12/8A to G)	コピー	X				Ditto above			
W-42	Sewer pipe layout drawing (12/9A to H)	コピー	X				Ditto above			
W-43	Sewer pipe layout drawing (12/11A, C to F)	コピー	X				Ditto above			
W-44	Sewer pipe layout drawing (12/13A to F)	コピー	X				Ditto above			
W-45	Sewer pipe layout drawing (12/14A to E)	コピー	X				Ditto above			
W-46	Sewer pipe layout drawing (13/1A to F)	コピー	X				Ditto above			
W-47	Water and Sanitation Agency (LDA) Lahore 4-A Gulberge-V Jail Road Office Order (for Project management Unit Cell)	コピー	X				Ditto above			
W-48	Major Quantity of sewerage and Drainage	コピー	X				Ditto above			

番号	資料の名称	形態	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分	図書館記入欄	備考
W-49	Population Trend	コピー	X				Water And Sanitation Agency Lahore Development Authority			
W-50	Zone Population and Sewer Volume	コピー	X				Ditto above			
W-51	No. of Consumers	コピー	X				Ditto above			
W-52	WASA-LDA: Revenue and Expense Statement-(10 Years at a Glance)	コピー	X				Ditto above			
W-53	LDA: Water Rates and Sewerage/Drainage Rate	コピー	X				Ditto above			
W-54	Detail of Six Towns in Lahore City District	コピー	X				Ditto above			
W-55	UFW for The Month of November/December(2003)	コピー	X				Ditto above			
W-56	Hourly Situation Report of Critical Ponding Areas during Rain-Fall and Till Clearance Priority I	コピー	X				Ditto above			
W-57	Hourly Situation Report of Critical Ponding Areas during Rain-Fall and Till Clearance Priority II	コピー	X				Ditto above			
W-58	Year wise Rain Fall Data	コピー	X				Ditto above			
W-59	Detail of Staff employed in WASA	コピー	X				Ditto above			
W-60	Water & Sanitation Agency (LDA) Department wise Employees Summary, dated March 10 2004	コピー	X				Ditto above			
W-61	Minutes of the Lahore Development Authority Meeting held on December 11, 2004	コピー	X				Ditto above			
W-62	River Ravi, site Shahdara (ラビ川流量記録)	コピー	X				Ditto above			
W-63	Drawing of Tube Wells	コピー	X				Ditto above			
W-64	Existing Water Supply System	コピー	X				Ditto above			
W-65	Water Supply: Phase III Works Program (Existing Main Grid & Tube Wells)	コピー	X				Ditto above			
W-66	Lithological Cross Section & Typical Design and Construction of Tube Well	コピー	X				Ditto above			
W-67	Present Situation	コピー	X				Ditto above			

番号	資料の名称	形態	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分	図書館記入欄	備考
W-68	Newspaper Scrap on Power Tariff Reduction	切り抜き	X				The Nation			
W-69	Lahore Town wise & WASA Jurisdiction Population	コピー	X				Water And Sanitation Agency Lahore Development Authority			
W-70	Zone Population Trend	コピー	X				Ditto above			
W-71	Organization Chart WASA(LDA)	コピー	X				Ditto above			
W-72	Illustration: WASA Jurisdiction Area Limit	コピー	X				Ditto above			
W-73	Specifications of the requested Equipment	コピー	X				Ditto above			
W-74	Allocation of the requested Equipment	コピー	X				Ditto above			
W-75	Capacity of U.K. Supplied Equipment / Details	コピー	X				Ditto above			
W-76	Daily report of Shalamar Town (Desilting and other works)	コピー	X				Ditto above			
W-77	Progress achieved through DFID supplied Machinery / Equipment	コピー	X				Ditto above			
W-78	Vehical log sheet and maintenance register for WASA L.D.A	コピー	X				Ditto above			
W-79	Calculation of No. of Machinery required for cleaning of Sewers / Drains	コピー	X				Ditto above			
W-80	Sewage pumping station WASA Tariff increase 40%	コピー	X				Ditto above			
W-81	WASA Tariff increase 40%	コピー	X				Ditto above			
W-82	Supplementary Data (for Questionnaire)	コピー	X				Ditto above			
W-83	Presentation on WASA (LDA)	CD	X				Ditto above			
W-84	Materials of WASA Water Quality Laboratory	コピー	X				Ditto above			
W-85	Location and Details of Katchi Abadis	コピー	X				Ditto above			
他ドナー、NGO資料										
D-1	Water and Sanitation Agency (WASA), Lahore, Department for International Development, Pilot Sewer Cleaning and Rehabilitation Scheme, Draft Final Report, Volume I, April 1999	コピー	X				Department for International Development, UK			

番号	資料の名称	形態	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分	図書館記入欄	備考
D-2	Water and Sanitation Agency (WASA), Lahore, Department for International Development, Pilot Sewer Cleaning and Rehabilitation Scheme, Draft Final Report, Volume II Appendices, April 1999	コピー	X				Department for International Development, UK			
D-3	List of NGOs in the Filed of Environment in Punjab	コピー	X				Social Welfare Department of Punjab			
その他										
O-1	Locational Sketch and List of Industrial Units	コピー	X				Environment Department of City District Government			
O-2	Pakistan 's Environmental Laws and Their Compliance	オリジナル	X				Pakistan Environmental Protection Agency, Islamabad			
O-3	Environmental Profile of Lahore City	コピー	X				Environmental Protection Department, Punjab			
O-4	Organization Chart of Environmental Protection Department, Punjab	コピー	X				Environmental Protection Department, Punjab			
O-5	Application Form for Environmental Approval under Pakistan Environmental Protection Act 1997	コピー	X				Environmental Protection Department, Punjab			
O-6	Presentation Material of Solid Waste Management in Lahore	コピー	X				Solid Waste management Department of Lahore			
O-7	Organization Chart of Solid Waste management Department in Lahore	コピー	X				Solid Waste management Department of Lahore			
O-8	Number of Vehicles for Solid Waste management Department in Lahore	コピー	X				Solid Waste management Department of Lahore			
O-9	Report of Disposal Amount in Mahmood Booti Solid Waste Dumping Site (January and February, 2004)	コピー	X				Solid Waste management Department of Lahore			
O-10	Environmental Impact Assessment of Mahmood Booti Municipal Solid Waste Dumping Site, Lahore	コピー	X				Solid Waste management Department of Lahore			
O-11	Final Report for Domestic Solid Waste management in Pakistan	オリジナル		X			JICA Pakistan Office			
O-12	Zero Waste Pakistan (Brochure)	オリジナル		X			WWF, Lahore City, Waste Busters			
O-13	Presentation Material of Waste Busters	CD	X				Waste Busters			

番号	資料の名称	形態	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分	図書館記入欄	備考
O-14	Belgium, CDG ink pact to set up Rs 250M Compost Plant (article of "The Nation", Newspaper)	コピー	X				The Nation			
O-15	Statistic Data of Water Born Diseases in Lahore	コピー	X				Public health Department of Lahore			
O-16	Presentation Material of Public health Department of Lahore	コピー	X				Public health Department of Lahore			
O-17	Data of Water Sampling for Bacteriological Examination from Year 2001, 2002 and 2003	コピー	X				Public health Department of Lahore			
O-18	List of Environmental Consultant	コピー	X				Environmental Protection Department, Punjab			

要請機材による計画作業量と必要台数の検討

１．除去対象：　下水管渠、雨水排水暗渠
使用機材：　高圧ポンプ車、汚泥吸引車、給水タンク車、水中ポンプ（汚泥用）、発電機

表1. 計画地域の除去対象汚泥量と作業計画

		a	b=a×50%	c=a+b	d	e=d×870日	f　c÷e
作業区分	Zone	汚泥量*1 (m^3)	噴射水*2 (m^3)	吸引量 (m^3)	汚泥吸引車1台あたりの1日の除去量*3 (m^3/日･台)	汚泥吸引車1台あたりの3年間の除去量*4 (m^3/3年間･台)	汚泥吸引車の配置（既存機材5台＋要請機材4台による3年間の除去作業の場合）
下水管渠φ900㎜以上	A	1,219.23	609.62	1,828.85			
	B	2,344.35	1,172.18	3,516.53			
	G	6,071.89	3,035.95	9,107.84			
	H1	2,225.84	1,112.92	3,338.76			
小計		11,861	5,931	17,792	8	6,960	2.5台
下水管渠φ900㎜未満	A	1,985.83	992.92	2,978.75			
	B	2,180.09	1,090.05	3,270.14			
	G	2,300.10	1,150.05	3,450.15			
	H1	2,748.96	1,374.48	4,123.44			
小計		9,215	4,608	13,823	10	8,700	1.5台
下水管渠小計		21,076	10,539	31,615			4.0台
雨水排水暗渠	B	50,043		50,043			
	H1	2,904		2,904			
雨水排水暗渠小計		52,947		52,947	12	10,440	5.0台
合計		74,023		84,562			9.0台

＊1：　下水管渠の汚泥量は当初要請（PC-I）による。　雨水排水暗渠の汚泥量は、予備調査時にWASAが提示した値。

＊2：　汚泥吸引車による吸引量のうち、高圧ポンプ車による噴射水の量を汚泥量の50%とする。
雨水排水暗渠の汚泥は、高圧ポンプ車を用いず、人力で切り崩す計画とする。

＊3：
「建設省都市局下水道部監修 下水道施設維持管理積算容量 ―管路施設編―
社団法人 日本下水道協会 1999」 による次の標準作業量を準用。
「φ800㎜～1500㎜未満では10m^3/日,φ1500㎜～2000㎜以下では12m^3/日」
下水管渠口径φ900㎜未満　については同資料により、
「φ600㎜土砂深40%では7.9m^3/日，φ600㎜土砂深50%では9.2m^3/日」を参考として、8m^3/日とする。

＊4：　予備調査時にWASA維持管理部局が示した年間作業日数290日／年×3年=870日により算出。

表1のc列に示すように、計画地域の下水管渠、及び雨水排水暗渠の除去対象汚泥量は、
高圧ポンプ車による噴射水を含めて、　84,562 m^3である。

（1）　1日あたりの汚泥除去作業量（除去対象となる汚泥量から求めた計画作業量）
1年間の作業日数を290日として、3年間で除去する計画とする。
1日あたりの除去量は、　84,562　m^3÷（3年×290日）＝　98　m^3／日

（2）　清掃機材の能力
高圧ポンプ車と汚泥吸引車の能力と組み合わせを以下とする。
既存高圧ポンプ車の平均吐出水量：　150 リットル/分
既存汚泥吸引車のタンク容量　：　7,000 リットル

要請高圧ポンプ車の平均吐出水量：　170 リットル/分
要請汚泥吸引車のタンク容量　：　6,000 リットル

（3）　汚泥吸引車のタンクを満たす時間

高圧タンク車の吐出量の約60%が汚泥吸引車に回収されるとすると、

汚泥吸引車のタンクが一杯になる時間は、中断時間を含めた作業効率を2.0として、

既存機材の組み合わせ：7000リットル÷（150リットル/分×60%）×2.0＝　　156 分／台となる。

要請機材の組み合わせ：6000リットル÷（170リットル/分×60%）×2.0＝　　118 分／台となる。

（4）　汚泥吸引車を満たす回数

1日の勤務時間を8時間とし、そのうちの汚泥吸引作業時間を以下のように1日4時間（＝240分）とした場合、

始業前点検･準備	0.5	時間	
現場への往復時間	1.0	時間	
汚泥吸引作業時間	4.0	時間	
排泥時間	1.0	時間	
現場での準備･片付け	1.0	時間	（水位低下作業を含む）
作業後点検･記録整理	0.5	時間	

1日に、汚泥吸引車を満たす回数は、

既存機材の組み合わせ：	240 分	÷	156 分／台	＝	1.5　回/日となる。
要請機材の組み合わせ：	240 分	÷	118 分／台	＝	2.0　回/日となる。

（5）　1日あたりの汚泥除去作業量（清掃機材の能力から求めた除去可能量）

上項により、各組み合わせにつき、高圧ポンプ車と汚泥吸引車１組あたりの1日の汚泥除去作業量は、

既存機材の組み合わせ：	1.5 回/日	×	7,000 リットル/台	＝	10.5　m^3／日･台
要請機材の組み合わせ：	2.0 回/日	×	6,000 リットル/台	＝	12.0　m^3／日･台

となり、「表１　計画地域の除去対象汚泥量と作業計画」 の「ｄ列　汚泥吸引車1台あたりの1日の除去量」

に示した、8～12㎥／日･台　に対して十分と考えられる。

既存機材、要請機材のそれぞれにつき、台数分の作業量を計算する。

WASWAが現在、所有している高圧ポンプ車は11台、汚泥吸引車は13台である。

このうち、計画対象地域である、Ravi Town　と Gunj Buksh Town　から既存機材5組と

今回要請された機材4組を使用する。

合計9組を使用した場合（表1.f列を参照）の1日あたりの除去作業量は、

既存機材の組み合わせ：	10.5 m^3／日	×	5 組	＝	52.5　m^3／日
要請機材の組み合わせ：	12.0 m^3／日	×	4 組	＝	48.0　m^3／日
合計					100.5　m^3／日

となり（1）で求めた、　98 m^3／日　に対して十分である。

（6）　給水タンク車の必要台数

給水タンク車の容量は、既存機材、要請機材とも、1台あたり7,000リットルである。

（4）に示した、1日の汚泥吸引作業時間、4時間のうち、中断時間を含めた作業効率を2.0とすると

高圧ポンプ車が稼働する時間は、　4時間　÷　2.0　＝　2時間（＝120分）　となる。

従って、1日の噴射水の量は、

既存高圧ポンプ車：	150 リットル/分	× 120分/日	×5台 ＝	90,000 リットル/日
要請高圧ポンプ車：	170 リットル/分	× 120分/日	×4台 ＝	81,600 リットル/日
合計				171,600 リットル/日

これを、補給するには、　171,600 リットル/日 ÷ 7,000リットル/台＝　24.5 台/日

1日にのべ24.5台の給水タンク車が必要である。

1回の給水に要する時間を40分～1時間とすれば、汚泥吸引作業時間、4時間で、給水タンク車1台につき、
1日に、4～6回の補給が可能である。

4時間（240分）/日 ÷ 40～60分/回 ＝ 4～6 回/日

従って、必要となる給水タンク車の台数は、

24.5 台/日 ÷ 4～6回/日 ＝ 4～6台/日 となる。

給水にかかる時間によっては、給水タンク車が不足することが考えられるため、こうした場合には
Ravi Town, Gunj Bukhsh Town以外の他地区からの既存機材の流用あるいは、要請機材数の増量が必要となる。

（7） 水中ポンプ･発電機の配置計画

水中ポンプは、汚泥除去作業の際に人孔内の水位を下げるために使用する。
発電機は、上記の水中ポンプを駆動するのに使用する。
高圧ポンプ車と汚泥吸引車の組み合わせ1組に対して、水中ポンプと発電機を1台ずつの1組を使用するものとする。
既存の清掃機材（高圧ポンプ車＋汚泥吸引車）の組み合わせ5組に対しては、Main Outfall Disposal Stationにある、Dewatring Shopで保管しているエンジンポンプ5台を使用する。この場合、発電機は用いない。
要請の清掃機材（高圧ポンプ車＋汚泥吸引車）の組み合わせ4組に対しては、要請の水中ポンプ4台と発電機2台を使用する。
不足する発電機2台は、Nishter Town の SDO for Sewer Cleaning から流用するか、要請機材数の増量を検討する。

（8） 機材の配置計画

既存機材の流用を含め、汚泥除去作業に対する各機材の配置を以下のように計画する。
Zone BとZone Aの西側は、Ravi Town に属している。
Zone Aの東側と Zone G、H1の大部分は、Gunj Bukhsh Town に属している。
既存機材の仕様と管轄については、本文の「表4.1.1 WASAが所有する現況機材」を参照。
要請機材の仕様については、本文の「表4.1.5 当初の要請機材と予備調査時の要請機材の比較」 を参照。
要請機材の作業対象地域については、本文の「表4.3.2 要請対象の清掃機材に対する作業対象と保管場所」 を参照。

表2. 機材配置計画

対象地域	Zone B	Zone A 西側	Zone A 東側	Zone G	Zone H1	合計
機材						
既存 高圧ポンプ車	Ravi Townから2台		Gunj Bukhsh Townから3台			5台
要請 高圧ポンプ車	1台	1台		1台	1台	4台
既存 汚泥吸引車	Ravi Townから2台		Gunj Bukhsh Townから3台			5台
要請 汚泥吸引車	1台	1台		1台	1台	4台
既存 タンク車	Ravi Townから1台		Gunj Bukhsh Townから1台			2～4台*1
要請 タンク車	1台	1台				2台
既存 エンジンポンプ	Dewatering Shopから5台					5台
要請 水中ポンプ	1台	1台		1台	1台	4台
既存 発電機	Nishter Town の SDO for Sewer Cleaning から2台					2台*2
要請 発電機	1台			1台		2台

*1： 給水に要する時間によっては、Ravi Town他地区の既存給水タンク車の流用または、
要請機材数の増量が必要となる。

*2： Nishter Town の SDO for Sewer Cleaning からの流用または、要請機材数の増量が必要となる。

２．除去対象：　雨水排水開渠
　　使用機材：　油圧式掘削機（バケット容量0.28m^{3}級）、油圧式掘削機（バケット容量0.28m^{3}級）
　　クラムシェル（バケット容量0.7－0.8m^{3}級）

表3. 計画地域の除去対象汚泥量と必要となる掘削機材の台数

			a	b	c	d=a×b×c	e=d÷870÷f
作業区分　*1	Zone	排水路名称	水路底の幅 (m)　*2	土砂深 (m)　*2	延長 (m)　*2	汚泥量 (m^3)　*2	必要となる掘削機材の台数
油圧式掘削機（バケット容量0.28m^{3}級） 水路幅4.0m未満の水路を対象	G	Central Drain	2.74	0.75	1,311	2,694	
		Lower Mall	0.91	0.50	1,219	555	
		Lake Road	0.91	0.50	701	319	
		Edward Road	1.52	0.50	1,829	1,390	
		Alfalah Drain	2.74	0.75	1,067	2,193	
	H1	Governor House	2.13	0.75	3,353	5,356	
		Garhi Shahu	0.91	0.50	1,311	597	
		Mainout Fall	4.88	1.00	1,524	7,437	
		Central Drain	4.57	1.00	1,981	9,053	
	小計					29,594	0.8台
油圧式掘削機（バケット容量0.8m^{3}級） 水路幅4～10mの水路を対象	A	Chotta Ravi Drain	6.10	1.50	914	8,363	
			4.88	1.00	2,202	10,746	
	H1	Central Drain	6.71	1.50	1,219	12,269	
	小計					31,378	0.1台
クラムシェル（ﾊﾞｹｯﾄ容量0.7－0.8m^{3}級） 水路幅10m以上の水路を対象		Mian Mir Drain *3	12.19	2.00	6,553	159,762	
			18.29	2.50	5,486	250,847	
	小計					410,609	1.8台
合計						471,581	

＊1：　作業区分に示した適用水路幅は、参考値。
＊2：　雨水排水開渠の寸法、土砂深、汚泥量は、予備調査時にWASAが提示した値。
＊3：　Mian Mir Drainは、他の排水路に比べて規模が大きく、汚泥量も多いと考えられるが、
　　さらなる調査に基づき、正確な汚泥量と除去の必要性を検討することが望ましい。

表3　d列に示すように、計画地域の雨水排水開渠の除去対象汚泥量は、　471,581 m^{3}である。

（1）　1日あたりの汚泥除去作業量（除去対象となる汚泥量から求めた計画作業量）
1年間の作業日数を290日として、3年間で除去する計画とする。
1日あたりの除去量は、　471,581　m^3÷（3年×290日）＝　543 m^3／日となる。

（2）　掘削機材の能力
掘削機材の掘削積込能力を以下とする。

表4.　掘削機材の掘削積込能力

掘削機材	1日あたりの施工量*1 (m^3/日)	要請台数	合計 (m^3/日)
油圧式掘削機（バケット容量0.28m^{3}級）	44	2台	88
油圧式掘削機（バケット容量0.8m^{3}級）	310	1台	310
クラムシェル（バケット容量0.7-0.8m^{3}級）	260	2台	520
1日あたりの掘削積込能力　合計			918

*1：　国土交通省大臣官房技術調査課　監修　国土交通省土木工事積算基準　平成15年度版
　　財団法人建設物価調査回　発行　による

表4　h列に示すように、要請された掘削機材の能力は、（1）で求めた除去対象量に対して十分である。

表3　e列で求めた、必要となる掘削機材の台数は、表4　g列に示す要請台数に比べて少ない。
計画対象地域の水路は、進入道路が狭かったり、周囲の建物が込み入っているため、
要請機材による実際の施工量は、表4　f列に示す施工量より少ないと考えられる。
掘削機材の作業条件と必要台数については、さらに詳しく調査を行ったうえで検討することが望ましい。

３．積込･運搬対象：　ポンプ場の流入ごみ
　　使用機材：　ホイールローダ（1.2m^3級）、ダンプトラック（4トン積）

ホイールローダは、Shad Bagh Disposal Station　と　Gulshan-E-Ravi Disposal Station　に配置する。
Main Outfall Disposal Station では、既存機材を用いて積み込み作業を行う。
ダンプトラックは、Main Outfall Disposal Station　を含めて　3箇所に1台ずつ配置する。
各ポンプ場では、ポンプ場のスクリーンから掻き上げたごみを、ダンプトラックに積み込んで処分場へ運搬する。
各ポンプ場の敷地には、複数のポンプ場が配置されており、それぞれのポンプ場からごみが排出される。

表5　ポンプ場に流入するごみの量と積込･運搬作業計画

	a	b=a÷2.7	c	d=2×c/20	e=30/60+d+10/60	f
ポンプ場	流入するごみの量（m^3/日）*1	ダンプトラックによる処分場までの運搬回数	Mahmood Booti処分場までの片道距離（km）	Mahmood Booti処分場までの往復時間（hr）	1サイクルあたりの積込･運搬時間（hr）	1日あたりの作業時間（hr）
Shad Bagh Disposal Station	10.8	4回/日	5	0.5	1.2	4.8
Gulshan-E-Ravi Disposal Station	7.2	3回/日	15	1.5	2.2	6.6
Main Outfall Disposal Station　*2	3.6	2回/日	12	1.2	1.9	3.8

＊1：　ポンプ場に流入するごみの量は、予備調査時にWASAが提示した値。
＊2：　既存機材による積込作業

積込･運搬に要する時間を以下の式に従って求める。
（積込･運搬に要する時間）＝　（ダンプトラックへによる処分場までの運搬回数）×
　　｛（ダンプトラックへの積込時間）＋（処分場までの往復時間）
　　＋（処分場での積み下ろしに要する時間）｝

ホイールローダのバケット容量：	1.2 m^3	
積み込みに要する時間：	10 分/回	（ホイールローダによる1回の積み込み、推定値）
ダンプトラックの速度：	20 km/hr	（推定値）
ダンプトラックの積載量：	2.7 m^3	（4トン積トラックの荷台容積を考慮　*1）
積み下ろしに要する時間：	10 分/回	（推定値）

*1：「建設省都市局下水道部監修 下水道施設維持管理積算容量 ―管路施設編―
社団法人 日本下水道協会 1999」 による

ダンプトラックによる処分場までの運搬回数を表5のb列に示す。
各ポンプ場に流入するごみの量を、ダンプトラックの積載量で除した数値である。

ダンプトラックへの積み込み時間は、次の式で求められる。
（ダンプトラックの積載量）÷（ホイールローダの積込量）　×　（1回あたりの積み込みに要する時間）

すなわち、　　（2.7㎥　÷　1.2㎥/回）×　10分/回　　30分

各ポンプ場のごみは、ラホール市公認の処分場であるMshmood Booti処分場へ運搬する計画とする。
Mahmood Booti処分場までの往復時間を表5のd列に示す。
（処分場までの往復時間）＝　（処分場までの往復距離）÷（ダンプトラックの速度：20㎞/hr）

1サイクルあたりの積込･運搬時間は、次の式で求められる。これを表5のe列に示す。
（1サイクルあたりの積込･運搬時間）＝　（ダンプトラックへの積み込み時間：30分）+（処分場までの往復時間）
＋（処分場での積み下ろしに要する時間：10分）

1日あたりの作業時間は、次の式で求められる。これを表5のf列に示す。
（1日あたりの作業時間）＝　（ダンプトラックによる処分場までの運搬回数）
×（1サイクルあたりの積込･運搬時間）

以上により求められた、1日あたりの作業時間は最大で6.6時間となり、表6に示す機材配置により搬出可能である。
また、Multan Road Disposal Station では、既存の積込機材と運搬機材によってごみの搬出を行う計画であり、
新規機材は要請されていない。同ポンプ場においても既存機材でごみの搬出が可能であるかどうか確認しておく
ことが望ましい。

表6　ポンプ場のごみ積込･運搬に要する要請機材の配置計画

ポンプ場	積込機材	台数	運搬機材	台数
Shad Bagh Disposal Station	ホイールローダ	1台	ダンプトラック	1台
Gulshan-E-Ravi Disposal Station	ホイールローダ	1台	ダンプトラック	1台
Main Outfall Disposal Station　*2	既存積込機材	―	ダンプトラック	1台

４．運搬対象：　小口径下水管渠の閉塞物、汚泥
　　使用機材：　ピックアップトラック

ピックアップトラックは、小口径下水管渠から除去した閉塞物や汚泥を人力により積み込んで、
付近の清掃局（CDGL）コンテナ、あるいは廃棄物処分場へ運搬するために用いる。
ピックアップトラックの積載量は、最大500kg程度である。
要請されたピックアップトラックの配置計画を表7に示す。

表7　ピックアップトラックの配置計画

対象地域	台数
Zone A	1台
Zone B	2台
Zone G	6台
Zone H1	3台
合計	12台

５．運搬対象：　下水管渠･雨水排水暗渠･雨水排水開渠の汚泥

使用機材：

（積込）　油圧式掘削機（バケット容量0.28m^{3}級）、油圧式掘削機（バケット容量0.28m^{3}級）
クラムシェル（バケット容量0.7－0.8m^{3}級）

（運搬）　ダンプトラック（4トン積）

表8　汚泥運搬機材の必要台数

	a	b	c=b÷870÷7	d	e=60+d+10	f=2.7÷60/e	g
作業対象	積込機材 *2	必要運搬量 (m^3)	1時間あたりの必要運搬量 (m^3/hr)	積込時間 (分)	1サイクルあたりの積込･運搬時間 (分)	1時間あたりの運搬量 (m^3/hr)	必要台数
下水管渠･雨水排水暗渠*1	油圧式掘削機(S)	84,562	13.9	20	90	1.8	8台
雨水排水開渠	油圧式掘削機(S)	29,594	4.9	20	90	1.8	3台
	油圧式掘削機(L)	31,378	5.2	10	80	2.0	3台
	クラムシェル	410,609	67.4	10	80	2.0	34台
合計	－						48台

*1：　下水管渠･雨水排水暗渠の汚泥は、汚泥吸引車から、現場近くに仮置きされたものとする。

*2：　油圧式掘削機（S)はバケット容量0.28m^{3}級、（L)はバケット容量0.8m^{3}級

必要となる運搬量は、表1、表3で求めた数値であり、これを表8のb列に示す。
作業計画により、3年間の作業日数を870日、1日の積込･運搬作業時間を7時間とすると、1時間あたりの必要運搬量は表8のc列に示すように求められる。この必要作業量に対して各積込機材の能力から以下のように必要台数を求める。

積込機材の時間当たり作業量を以下のように求め、表8のc列に示す。

$Q = 3600 \times q \times f \times E \div Cm$

Q：運転1時間当りの積み込み量　(m^3/hr)
q：バケット容量　(m^3)
K：バケット係数　0.98（バックホウ）、0.9（クラムシェル）
f：土量換算効率　1.0
E：作業効率　　0.6
Cm：１サイクルあたりの所要時間　30秒

油圧式掘削機（バケット容量0.28m^{3}級）

$Q = 3600 \times 0.28m^3 \times 0.98 \times 1.0 \times 0.6 \div 30秒 =$　20 (m^3/hr)

油圧式掘削機（バケット容量0.8m^{3}級）

$Q = 3600 \times 0.8m^3 \times 0.98 \times 1.0 \times 0.6 \div 30秒 =$　56 (m^3/hr)

クラムシェル（バケット容量0.7-0.8m^{3}級）

$Q = 3600 \times 0.75m^3 \times 0.9 \times 1.0 \times 0.6 \div 30秒 =$　49 (m^3/hr)

ダンプトラック1台の積載容量を2.7m^{3}として、積込機材の能力から積込時間を求めると、
それぞれの機材につき、8分、3分、3分となる。
積み込みに要する待ち時間等を考慮して、積込時間を、表8のｄ列に示す値とする。

Mahmood Booti処分場までの平均距離を10kmとすると、往復に要する時間は、60分となる。
（処分場までの往復時間）＝　（処分場までの往復距離）÷（ダンプトラックの速度：20km/hr）

1サイクルあたりの積込･運搬時間は、次の式で求められる。これを表5のe列に示す。
（1サイクルあたりの積込･運搬時間）＝　（ダンプトラックへの積み込み時間）+（処分場までの往復時間）
＋（処分場での積み下ろしに要する時間：10分）

1時間あたりの運搬量は、4トン積ダンプトラックの積載容量を2.7m^3として、1サイクルあたりの必要時間から、
表8のf列に示すように求められる。
表8のc列に示した「1時間あたりの必要運搬量」を、表8のf列に示した「1時間あたりの運搬量」で除して、
必要台数を求め、表8のg列に示す。
下水管渠･雨水排水案渠からの汚泥を運搬するには、ダンプトラック8台が必要であり、
クラムシェルの適用対象であるZone H1のMian Mir Drainを除いた雨水排水開渠の汚泥を含めると、14台が
必要となる。また、Mian Mir Drainの汚泥を含めると、合計48台が必要となる。

WASAは現在、17台のダンプトラックを保有しており、このうち計画対象地域である Ravi Town から2台、
Gunj Bukhsh Town　から4台、合わせて既存機材を最大で6台、作業に充てるものとする。
要請されたダンプトラックは8台であるが、そのうち3台を表6に示すようにポンプ場のごみ搬出に割り当てるため、
残りは5台であり、既存機材6台と合わせて計11台を計画作業のために稼働可能とする。

表9に、除去した汚泥の運搬に関する、必要機材、要請機材、不足台数を示す。
雨水排水開渠の汚泥を運搬の対象とする場合は、機材が不足するため既存機材の流用あるいは、要請機材の増量が
必要である。特に、Mian Mir Drainを対象に含めると機材数が大きく不足するため、この排水路の汚泥については、
さらなる調査に基づいて、汚泥の量を把握するとともに除去の必要性について検討することが望ましいと考えられる。

表9　運搬車両（4トン積ダンプトラック）の投入に対する検討（必要機材･要請機材･不足台数）

作業対象	必要台数	既存機材のうちの利用台数	要請機材のうちの利用台数	不足台数
下水管渠･雨水排水暗渠	8	3	5	0台
下水管渠･雨水排水暗渠＋雨水排水開渠（Mian Mir Drainを除く）	14	6	5	3台
下水管渠･雨水排水暗渠＋雨水排水開渠（Mian Mir Drainを含む）	48	6	5	37台

また、予備調査でWASAが示した要請機材の優先順位（本文の「表4.1.4 当初要請機材と予備調査時の要請機材の比較」
を参照）によれば下水管渠の汚泥除去機材を優先する計画であるため、汚泥除去対象の優先順位は表9に示すような
順となる。

WASAの要請では、掘削積込機材に比べて、運搬車両の数量が少ないと考えられるので、さらなる調査に基づき、
汚泥除去対象、掘削・積込･運搬に関する作業計画を確認することが必要と考えられる。


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