- Drought Relief Project, 9 out of 13 : 69%

The above rates include boreholes which yield less than 0.5 cu.m/hr, and it should be considered in the plan that groundwater development is becoming harder to harder as the time. The success rate for the Project, however, is to be taken at 70 percent considering the above results.

5 - 2 - 4 Site Selection

Site selection is one of the most important factors for the successful construction of boreholes. The methods of siting are mainly composed of geophysical prospecting such as GEP and E-M prospecting. However, it is also important to make a judgment based on local conditions such as vegetation, lithofacies and microtopography together with human experience in the area.

The DWD has geophysicists and hydrogeologists at its Headquater and in its Provincial Offices. The site selection will be executed by Japanese engineer with assistance from the siting team of DWD who are well versed in local conditions.

The siting methods are as follows;

- Analysis by Airphotos:
  Using airphotos, preliminary siting by airphoto survey will be carried out in the geography concerned with hydrogeology, the pattern of distribution of lineaments and so forth.

- E-M Prospecting:
  E-M prospecting will be carried out for the rough field survey for further prospecting by GEP prospecting.

- GEP Prospecting:
  GEP prospecting will be conducted at the sites selected by E-M survey results. The some kinds of GEP prospecting methods will be applied for the judgment of thickness of weathered zone and/or detection of fissured

zone which are able to form aquifers. Based on the results obtained from some kinds of prospecting such as Wenner's, Schlumberger's, dipole-dipole, etc., the most effective method for the area will be determined.

5 - 3 BASIC DESIGN OF FACILITIES

5 - 3 - 1 Design of Boreholes

The borehole should be deeper than 30 m and have a six meters grout sealing zone at the minimum so as to secure safe and stable water and to protect water quality from contamination caused by the infiltration of surface water.

The borehole diameter is to be 100 mm for the holes constructed by the Japanese side and 150 mm for the holes constructed by the Zimbabwean side.

The borehole types are designed as shown in Figure 5-3-1.

5 - 3 - 2 Design of Headworks

The type of headworks for each borehole is standardized in Zimbabwe, and the same design will be adopted by the Project. This type is almost similar to others prevailing in other African countries and can be judged as appropriate.

The design of the headworks is given in Figure 5-3-2.

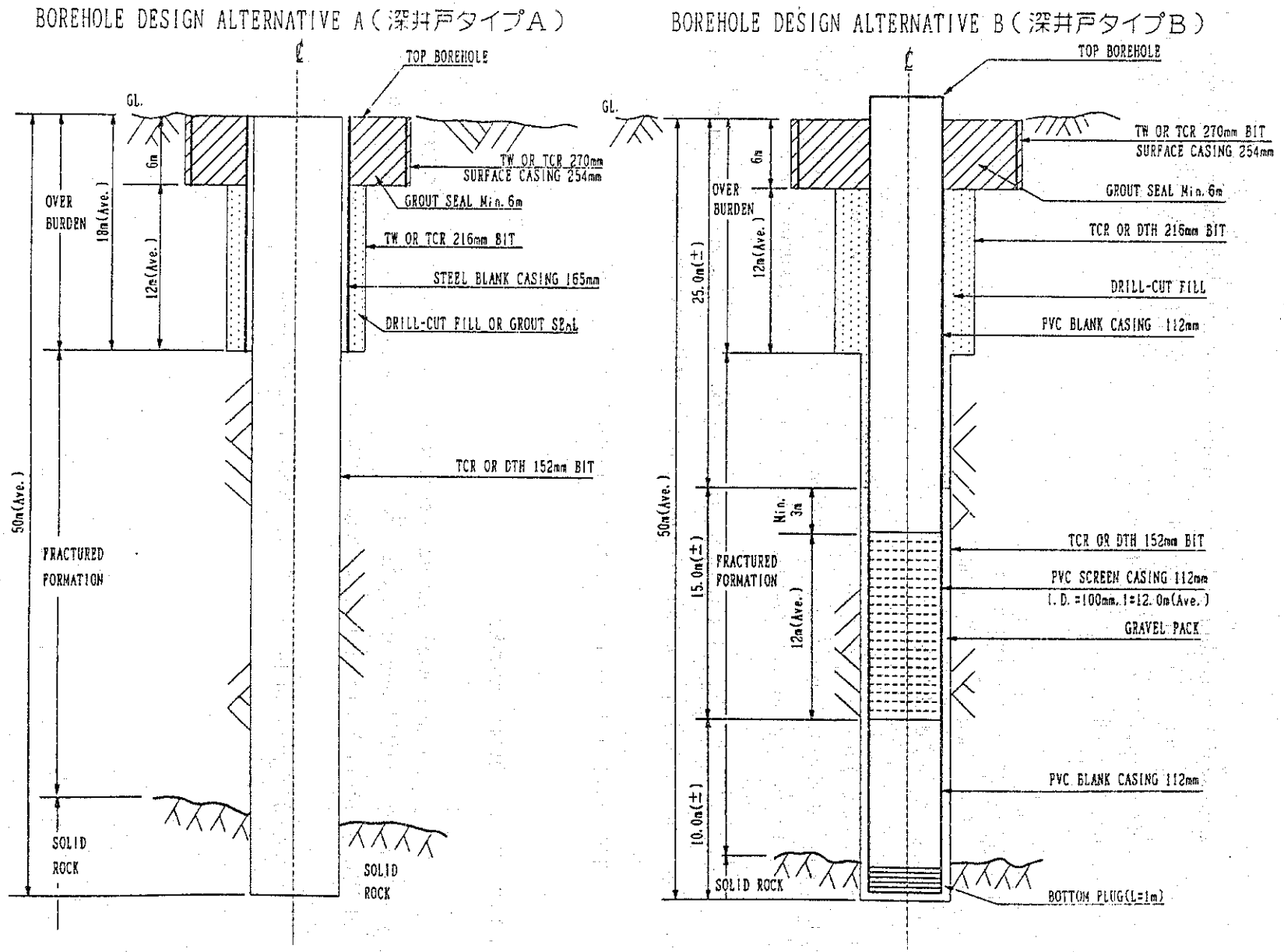


Figure 5-3-1 Typical Borehole Design

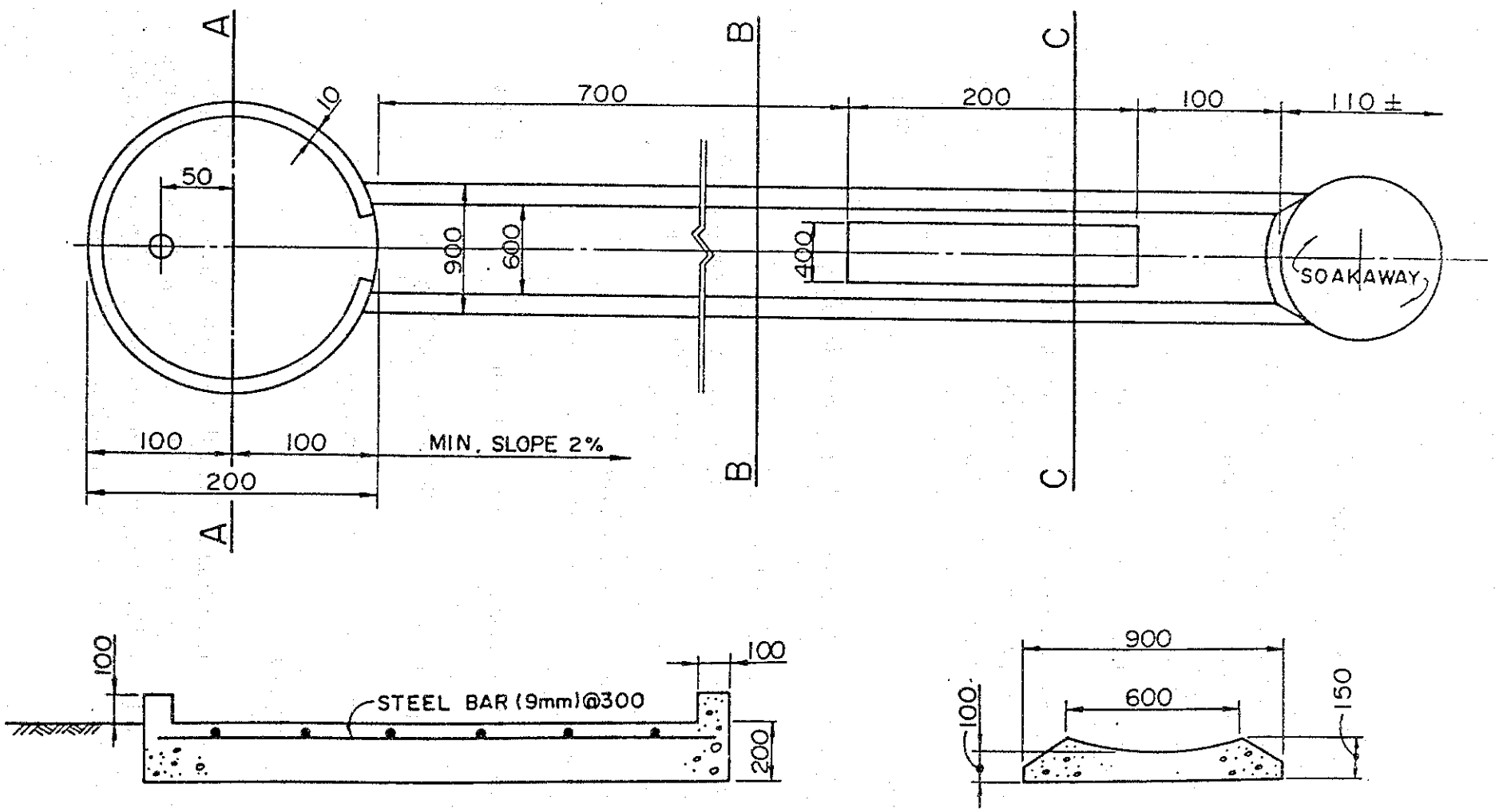


Figure 5-3-2 Plan and Section of Head Works

5 - 4 Basic Plan of Equipment and Materials

The outline of the equipment and materials to be procured is shown in section 4-3-3. In this section, the quantity and specifications of the selected equipment are provided;

And, the origin of the equipment and materials is as follows.

- Third-country products : Steel casing and air-compressor in a case
- Zimbabwean products : Handpump
- Japanese products : Others

(1) Drilling Rigs 2 units

The technical specifications for the rig are as follows;

a) Top-drive Rotary and DTH type,
   Hold back capacity : 6,000 kg, rated capacity : 200 m with 117 mm drill pipes,
   Mudpump capacity : 600 ℓ./min
b) Standard accessories and tools,
c) Truck-mounted model, engine output : 160 HP

(2) Air-compressors, product f Japan or a third country 2 units

An air-compressor will be provided for each drilling rig.

a) Air-compressor, capacity : 19 cum./min. at 18.0 kg/cm^2

(3) Supporting Vehicles

The borehole construction works will be done by the teams for drilling (2), testing (1), construction of headworks (1), management (1) and geophysical prospecting (1), total 6 teams. The types and/or model, numbers and purpose of vehicles used by the above teams are shown in Table 5-4-1.

TABLE 5-4-1 LIST OF SUPPORTING VEHICLES

Type / Model	No.	Specifications and Purpose
Tool Truck	2	4 × 4, with 3-ton crane, GVW : 15 ton
Cargo Truck	2	4 × 4, with 3-ton crane, GVW : 15 ton
Recovery Truck	1	Pulling capacity : 20 ton
Pick-up	4	4 × 4, management, headworks construction, borehole test, transport for staff/goods
Station Wagon	2	4 × 4, transport for staff, prospecting

(4) Geophysical Instruments 2 sets

a) E-M Instrument :

portable type with battery-source power,
frequency, 0.5 - 6.0 kHz or equivalent

b) GEP Instrument :

prospecting depth, 100 m

(5) Borehole Logger 2 units

The logger is as follows:

Items to be measured	:	resistivity, caliper and temperature
Recording method	:	automatic recorder
Depth to be measured	:	100 m

(6) Radio-telephone System 2 lots

The radio-telephone systems are provided for the communication between the job sites and camp/Provincial Office, Harare.

- Base stations (2 units) : 100 W
- Mobile stations (6 units) : 30 W

(7) Trailor-mounted Mobile Workshop 2 lots

- Trailor-mounted workshop for warehouse, 2.4 × 6.0 × .20 m
- Container with working table, etc.
- Equipment and tools for the above

(8) Handpump (40) units

40 handpumps are included in the construction works by the Japanese side.

(9) Submersible-motor Pump 3 units

- Submersible-motor pump : 1.5 kw for 100 mm diameter
- Diesel Generator : 20 PS, 390 V
- Water Table Detector : 100 m

(10) Steel Casing (third country product) 1,080 Nos.

Steel casing for 360 boreholes, 3 numbers to each, to be constructed by the Zimbabwean side will be procured.

- Casing : 6.0 m length, 7 mm thickness, API 5A H40 or equivalent, plain ends

(11) Air-foam and Mud Agents 1 lot

The following agents are provided.

- Air-foam : 1,000 kg
- CMC : 260 kg
- Rester : 3,000 kg

(12) Spare Parts 1 lot

Spare parts for the above equipment are provided. The quantities of spare parts are for 2-years' operation, equivalent to an amount of 10 to 15 percent of the prices for equipment itself.

Spare parts for Phase-2 equipment are also provided. The list of items is attached in Annex-7.

5 - 5 Implementation Programme

5 - 5 - 1 Implementation Policy

Project execution under Japanese grant aid, the borehole construction will be executed by a Japanese Contractor under the supervision by the DWD and/or a Japanese Consultant.

Borehole construction by the Japanese Contractor is aiming to facilitate technical transfer for maintenance and operation of equipment, which are newly introduced to the Zimbabwean staff on the occasion of the Project, through on-the-job training. The major responsibilities of the Japanese Contractor are shown below.

The construction works will be done in UMP District with the following contents;

TABLE 5 - 5 - 1 PLANNED CONSTRUCTION WORKS

District	No. of Boreholes	No. of Drilling	Drilling Length (m)	Length of Casing/Screen
UMP	40	57	3,190	1,500 / 500
Hwedza	-	-	-	- / -
Total	40	57	3,190	1,500 / 500

Note: Drilling length is based on : 50 m for successful boreholes (40 Nos.) and 70 m for dry holes (17 Nos.)

The above work can be divided into following seven items. And, ( ) shows the name of responsible body.

(1) Project Management:

- Coordination with related authorities, (DWD, Consultant)
- Schedule management and coordination, (Consultant, Contractor)
- Management of equipment, spare parts (Contractor)
- Construction report, arrangement of test data, (Contractor)

- Other project management, (DWD, Consultant)

(2) Construction Management:

- Control of schedule, staff and employees, (Contractor)
- Supply and storage of materials, (Contractor)
- O & M for base/site camps, (Contractor)

(3) Site Selection:

- Pre-siting, (DWD, Consultant)
- Prospecting, arrangement of access road, (Contractor)
- Technical transfer on prospecting, (Contractor)
- Decision of site, (DWD, Consultant)

(4) Drilling:

- Preparation of construction materials, (Contractor)
- Drilling, logging, (Contractor)
- Casing installation, development, (Contractor)
- Water quality check for pH/Ec, (Contractor)
- Technical transfer on drilling, (Contractor)

(5) Borehole Test (pumping test):

- Borehole test, (DWD)

(6) Construction of Headworks:

- Supply of handpumps, (Contractor)
- Supply of construction materials, (Contractor)
- Installation of handpumps, (DWD)
- Construction of headworks, (DWD)

(7) Maintenance:

- Daily maintenance of equipment, (Contractor)
- Technical transfer on maintenance, (Contractor)
- Maintenance of the completed boreholes, (ZW side)

5 - 5 - 2 Remarkable Points on Construction

The borehole tests and the construction works for headworks of 40 boreholes to be drilled by the Japanese Contractor are to be executed by DWD, as no technical transfer is required. However, the costs on fuel, construction materials such as cement, gravel, wooden poles, etc., except form, are to be provided by the Contractor.

The remarkable point for the borehole construction works is siting. The siting work should be careful and detailed with enough flexibility in its schedule due to difficulty for development.

Finally, it is suggested that close attention should be paid to health control because the area is affected by Malaria.

5 - 5 - 3 Supervising Programme

This Project will be executed with the Japanese grant aid. In this case, a Japanese Consulting firm recommended by JICA will enter into contract with the DWD for the following consultant services based upon the Japanese grant aid system.

a) Detailed Design and services on Tender

- Preparation of detailed design and tender documents for the procurement of equipment and materials.

- Tendering on behalf of DWD and tender evaluation of the offered tenders.
- Witnessing and advising on the negotiations between DWD and the successful tenderer.
- Supervision of procurement of equipment and materials, transportation to Zimbabwe and construction works. Supervision of procurement will be done for factory inspection and of construction work for the period required for completion.
- Coordination, discussion and confirmation of selected sites with the Zimbabwean side and the Contractor.
- Other necessary consulting services.

b) Supervision of the Construction Work

The Consultant will dispatch his resident engineer to Zimbabwe and carried out the following services during the construction period.

- Coordination and discussions with the concerned authorities of Zimbabwe.
- Discussions and confirmations on the selected site.
- Supervision of the technical transfer carried out by the Contractor.
- Control and management of the construction report, record submitted by the Contractor.

5 - 5 - 4 Procurement and Construction Programme

The Contractor/Supplier will conduct the following procurement of equipment and materials and the construction work required for the on-the-job training based upon the contract awarded by DWD.

There will be no difficulty in procurement of equipment and materials. The normal transportation route to Zimbabwe is to be to the Port of Durban by sea and to Harare by road through Beitbridge, even if the route will be entrusted to the Contractor;

- procurement of equipment and materials and their transportation to Harare, by the Supplier
- dispatch of staff to Zimbabwe for the construction work, by the Contractor
- execution of the construction work, by the Contractor
- on-the-job training through the construction work, the Contractor and/or the Supplier

The staff to be despatched to Zimbabwe are composed of the following engineers and/or experts.

- Contractor's representative in Zimbabwe,
- Two senior drilling engineers,
- Mechanical engineer,
- Hydrogeological engineer r geophycist.

5 - 5 - 5 Implementation Schedule

Based upon the construction quantities for 40 boreholes and conditions of the job sites and Japanese living conditions, the plan of the implementation schedule is formulated as follows;

(1) Days Necessary for Drilling Works

a) for successful Boreholes,

Moving in, preparation	1.0 day
Drilling (Ave. depth 50 m)	3.5
Logging, casing installation	0.7
Graveling, development	0.5
Moving out, finishing up	0.3
Total	6.0

b) for Dry Holes,

Moving in, preparation	1.0 day
Drilling (Ave. depth 70 m)	3.8
Moving out, finishing up	0.3
Total	5.1

(2) Days Necessary for Borehole Test

Moving in, preparation	0.3 day
Borehole (pumping) test	1.0
Moving out, finishing up	0.2
Total	1.5

(3) Days Necessary for Headworks Construction

Moving in, pump installation	0.5 day
Placing of concrete	1.0
Moving out, finishing up (test)	0.5
Total	2.0

(4) Working Day and Period

Working days in a year for the construction work are estimated as follows;

- Work condition	8 hours per day (8:00 ~ 17:00) 6 days per week 14 national holidays per year
- Climatic conditions	50 percent of progress rate in rainy season (Dec. to Mar.)

Under the above mentioned conditions, the total holidays and time loss during rainy season in a year are computed as follows;

- Weekly holidays : 52 weeks × 1 day = 52 days
- National holidays : = 14 days
- Time loss in rainy season: 4 months × (30 - 66/12) × 50% = 49 days

Total 115 days

Thus the annual working days are estimated at 250 days (365 - 115)

The time required for drilling :

Mobilization and preparation works	= 0.4 month
Drilling for successful borehole (40 Nos. × 6.0 days/(250/year) × 12 ÷ 2 units)	= 5.8
Drilling for dry boreholes (17 Nos. × 5.1 days/(250/year) × 12 ÷ 2 units)	= 2.1
Total	7.9 months

And, necessary periods for Borehole test and Headworks construction of 40 boreholes are 2.9 and 3.8 months, respectively, these periods are shorter than the ones for drilling.

Period required for Site Selection is subject to the schedule for prospecting works, and is estimated at 1.0 month for pre-siting and about 4.0 months for prospecting works for both E-M and GEP survey.

(2) Implementation Schedule

In the case of the Implementation schedule of the Project with Japanese grant aid, the Project schedule shall be divided into two stages due to the restriction of the single fiscal year system of the Government of Japan. The components of each stage are as follows;

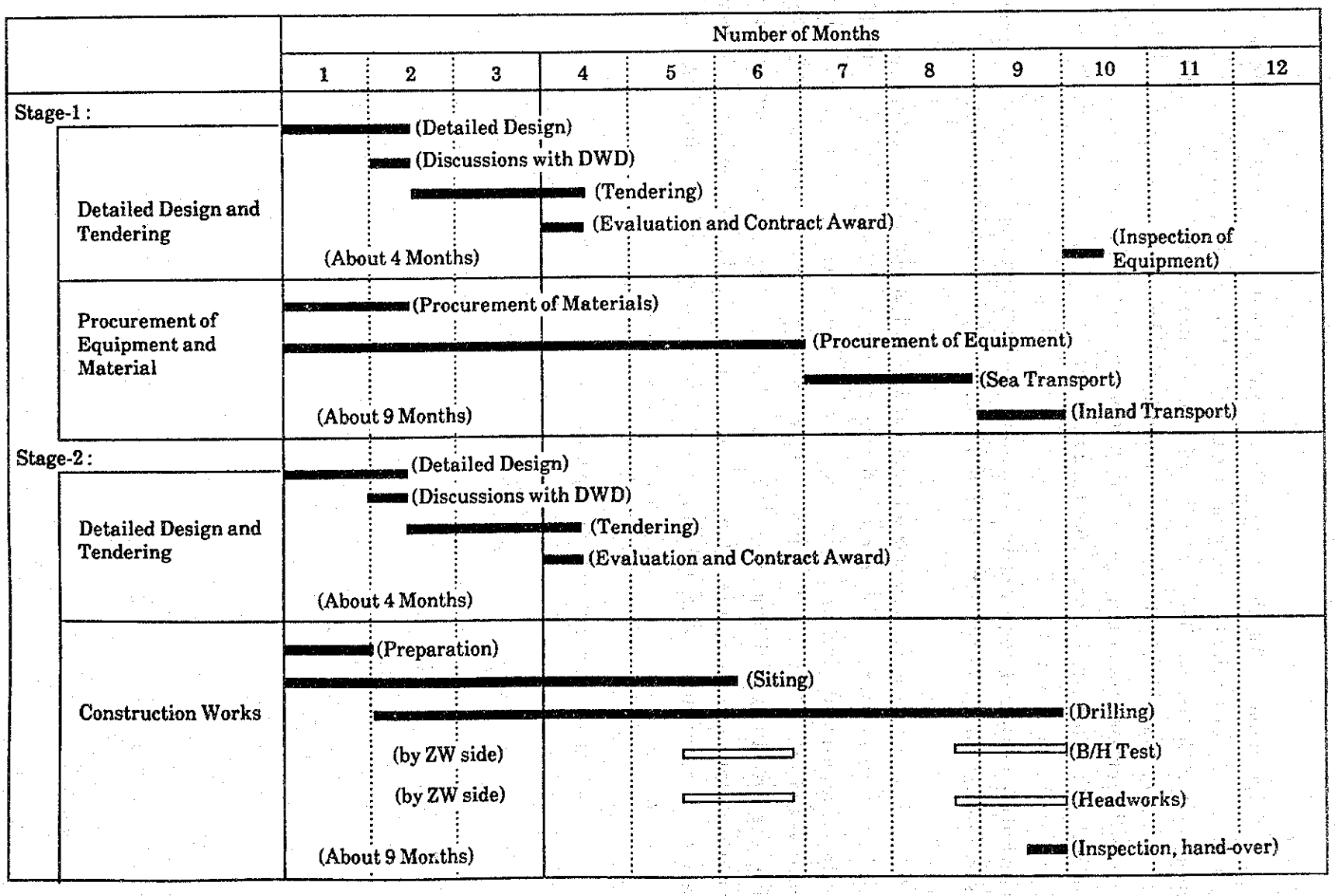
- First Stage : Procurement of equipment and materials.
- Second Stage : Siting of the boreholes,
  Borehole construction for 40 boreholes,
  On-the-job training for siting, drilling and operation and maintenance of the equipment.

The schedule for the first stage will take about four (4) months from the signing of E/N, after the Consultant agreement, detailed Design and Tendering, to the Supplier Contract. The Supplier will commence his duties specified in the contract documents, after the contract becomes in effective. It will take another six (6) months for the procurement and manufacturing of the equipment and materials, and about 2.5 months for ocean and inland transportation. The equipment will arrive in Harare and will follow the formalities such as registration and/or insurance contract(s) required in Zimbabwe, and afterwards the equipment and materials to be used for the construction will be transported to the job site.

The schedule for the second stage will also take four (4) months from the signing of second-stage E/N to the contractor's contract through the consultant's contract, detailed design and tendering. E/N will be exchanged in the following fiscal year from E/N for the first stage. The construction works will start 6 months after the E/N and it will take about nine months to compete borehole construction including preparation, pre-siting works, geophysical prospecting, drilling, headworks construction and finishing up of the equipment and handing over of the completed facilities and used equipment and materials.

The above implementation schedule is shown in Figure 5-5-1.

FIGURE 5 - 5 - 1 IMPLEMENTATION SCHEDULE FOR THE PROJECT



5 - 6 Rough Cost Estimate of the Project

(1) Undertakings by both Governments

In the case of implementation of the Project with Japanese grant aid, the undertakings of the Governments of Japan and Zimbabwe are as follows;

a) Undertakings of the Government of Japan

- Procurement, transport and handing-over of the equipment and materials described in the basic plan of equipment and materials, section 5-3-3.
- Construction of Borehole Facilities, aiming at technical transfer through on-the-job training by the construction work equivalent to 40 successful boreholes.
- On-the-job training to Zimbabwean staff.
- Handing-over of the equipment and remaining materials after completion of the construction work.

b) Undertakings of the Government of Zimbabwe

- To confirm the proposed borehole sites and execute the pre-siting together with the users.
- To secure the necessary number of Zimbabwean personnel for Project implementation and to bear all expenses.
- To secure the necessary number of Zimbabwean staff to be rendered on-the-job training and to bear all expenses.
- To execute the construction works such as borehole test, headworks, pump installation, other than those to be executed by the Japanese Contractor.
- To procure all the equipment and materials necessary for the Project implementation and bear all expenses other than those to be borne by Japanese grant aid.
- To provide the workshop facilities to the Japanese Contractor when required.

- To acquire land for Base camp, site camp etc., and rights-of-way for the Project works.
- To ensure tax exemption and customs clearance at port in Zimbabwe to facilitate the import of equipment and materials and the local equipment and materials for the Project implementation.
- To ensure the exemption from taxes and duties on all personal goods, equipment and effects which are to be brought into Zimbabwe by Japanese personnel related to the Project.
- To ensure the safety of Japanese personnel related to the Project.
- To accord Japanese personnel related to the Project such facilities as may be necessary for their entry and/or reentry into Zimbabwe and stay therein for the Project.
- To bear the bank commissions based upon the banking arrangements.
- To maintain the completed facilities.
- To operate and maintain the equipment supplied under the Project.

(2) Rough Cost of the Project

The Project implementation costs for Zimbabwean side's works are roughly estimated as follows;

a) Conditions of cost Estimation

1) Date of Estimate : October 1993
2) Exchange Rate : 1 US$ = 6.439 Z$
3) Project Period : 2 Stages

b) Estimated Costs

Costs for the Construction of 360 Boreholes;

- Siting	:	360 × Z$1,000	=	360,000
- Successful Holes	:	360 × Z$25,000	=	9,000,000
- Dry Holes	:	154 × Z$10,000	=	1,540,000
Sub-total				10,900,000

- 10% Contingency	:	1,090,000
- 15% Price Increase	:	1,800,000
Total		Z$13,790,000

Note: Success rate is estimated at 70% for the overall Project

Maintenance Costs:

The cost paid by the DDF for the 325 Boreholes and Deep Wells in 1992 was Z$116,300 (Z$358 per borehole). The additional costs for the Project is proportionally calculated as follows, however all maintenance costs for Boreholes and Deep Wells are to be paid by the users before completion of this Project, except supervising and/or monitoring costs which will be continuously responsible of the DDF.

400 boreholes × Z$358 = $143,200

CHAPTER 6. PROJECT EVALUATION AND CONCLUSION

6 - 1 Project Evaluation

The Project is a part of the "Integrated Rural Water Supply and Sanitation (IRWSSP)" which is on going in UMP and Hwedza districts in Mashonaland East Province in Zimbabwe. It has a target for completion in fiscal 1996. The Project shares procurement of the Equipment and Materials necessary for the construction of 400 boreholes and the Construction Work for 40 boreholes ensuring the On-the-Job Training for the Zimbabwean Counterparts in the IRWSSP which covers the construction work for a total of 432 boreholes and 267 wells.

The direct benefits of the Project is composed of the following factors;

(1) To achieve the project target, to provide villagers with 30 lit./day/person of safe water through the construction of one (1) borehole for every two hundred and fifty (250) persons.

(2) To suppress diseases owing in unsafe drinking water, and

(3) To utilize the labour force which is otherwise utilized in fetching water for other activities.

The population benefiting from the construction of 400 boreholes of this Project is estimated below, with the an estimate of 250 persons per borehole. This population is equivalent to 64 percent of the area's population, according to the 1992 census.

District	P: Population, 1992	Present Condition, P: rate	Benefited Population by the Project	
			B/H No.	P: rate
UMP	86,302	15,500 (18%)	280	70,000 (99%)
Hwedza	69,981	32,000 (46%)	120	30,000 (89%)
Total	156,283	47,500 (30%)	400	100,000 (94%)

Note: Present conditions: persons currently served by safe water and the rate.

Furthermore, many more people will be benefited by further borehole construction after the Project, which will be carried out by the DWD's Staff having learnt the technical knowledge through the on-the-job training using equipment supplied for this Project as in Phase-1 and 2 Projects.

For past experience, it is justifiable to believe that the completed boreholes will be properly maintained. The maintenance costs for the completed boreholes are estimated at Z$143,200, which is scheduled to be transferred to the users in the near future. This new system, maintained by the users, is a familiar system to other African countries. This new scheduled will be carried out successfully due to the eager efforts of the Government of Zimbabwe.

6 - 2 Conclusions and Recommendations

(1) Conclusions

The conclusions reached as a result of the field survey in Zimbabwe, the discussions with DWD and the basic design study in Japan are as follows.

From the following conclusions and the facts described in the previous section 6-1, it is considered that grant aid assistance for the Project is justifiable from both objective and political points of view.

a) Construction of 400 boreholes by the Project is a key part of the overall project for the Integrated Rural Water and Sanitation (IRWSSP) being executed in Zimbabwe. IRWSSP is an on-going National Project. The IRWSSPs for five (5) districts have been completed and are on-going in twenty seven (27) districts. After the completion of IRWSSP, Zimbabwe can reach the target described in the Master Plan Report which has the aim of constructing one borehole for every 250 persons in rural areas.

b) The population directly benefiting from by the construction of the Project's 400 boreholes is estimated to be 100,000 people, equivalent to 64 percent of the population in the Project Area. Furthermore, after

this Project, the DWD will continue the IRWSSP using the equipment supplied under this Project through its lifetime. In this way many more people will be benefited.

c) The improvement of rural water supply facilities is the basis of improvement of the lives of the rural people, so the inhabitants can experience a healthy life and improved economic conditions by utilizing the labour force for other activities.

d) The Project has already been started by the Government of Zimbabwe, however there are another 370 remaining boreholes which will require two sets of equipment to achieve the Project by the target year of 1996.

e) The external assistance for IRWSSP is composed of NORAD, Dutch, KFW, etc. at the moment, and the EC and Great Britain will join in the near future.

f) It has been confirmed by the study team that the equipment supplied under the past Projects is properly and satisfactorily maintained by the DWD.

(2) Recommendations

The following can be recommended to the Government of Zimbabwe as a result of the basic design study for the Project.

a) The Project Area will achieve its target by the completion of this Project. However, further efforts in this sector will be continuously required along with monitoring of the users how they utilize the completed boreholes.

b) To ensure the budget to be used for the equipment supplied under the Project for further execution of the IRWSSP in other districts.

c) The maintenance of the completed boreholes is the responsibility of the DDF at the moment. However, in the near future this maintenance system will be transferred to the users including the payment for the pump-minders and spare parts. To assure this planning, it would be required to make periodic inspections by the Government and to consider assistance if it is deemed necessary.

Appendix - 1:

MEMBER LIST OF THE STUDY TEAM

In Charge	Name	Office/Firm
Team Leader	Hiroshi NISHIDA	Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Chief of the Consultant	Yoshio MATSUMURA	Sanyu Consultants Inc.
Hydrogeology	Izumi KATO	Sanyu Consultants Inc.
Equipment Planning	Shin-ichi ARAI	Sanyu Consultants Inc.

Appendix - 2:

LIST OF OFFICIALS CONTACTED BY THE TEAM

Embassy of Japan,
Mr. Haruo OKAMOTO, Minister
Mr. Takumi OHASHI, Counselor

J. O. C. V. Office,
Takeshi INADA, Director
Hosui SASAKI, Coordinator

Ministry of Finance, Economic Planning and Development (MFEPD):
Mr. O. M. MATSHALAGA, Under Secretary
Domestic and International Finance

Ministry Land, Agriculture and Water Development (MLAWD):
Mr. K. LANDING, Director for Department of Water Development, (DWD)
Mr. V. CHOGA, Deputy Director, Operations, (DWD)
Mr. G. NHUNHAMA, Chief Hydrogeologist, (DWD)
Mr. S. SUNGURO, Hydrogeologist, (DWD)
MRS. O. ZIMBA, Hydrogeologist, (DWD)

Provincial Water Engineer's Office (DWD):
Mr. CHATORA, Provincial Water Engineer,
Mr. F. JASPERS, Ares Engineer for Mashonaland
Mr. J. RASHIRAYI, Drilling Superintendent
Mr. D. MUSHANDU, Executive Officer, Administration

Mashonaland East Provincial Administrator's Office:
Mr. J. MURWISI, Deputy Provincial Administrator
Mr. . MEDA, Provincial Administrative Officer

Mr. D. GRONINGEN, Provincial Water and Sanitation Coordination Advisor
Mr. D. CHINYOWA, Provincial Officer of DDF (District Development Fund)
Miss. JARAWAZA, Deputy Provincial Officer of DDF
Mr. B. MACHE, Principal Agricultural Extension Officer of AGRITEX

Provincial Medical Director's Office, Ministry of Health:
Mr. MANGWADU, Provincial Environmental Health Officer

Zvataida (UMP) District Administrator's Office:
Mr. C. GATSI, District Administrator
Mr. J. MAKUNDE, Administrative Officer
Mr. N. NYAMAZANA, Supervisor of Water Division of DDF
Mr. ZINYAMA, Field Officer of DDF
Mr. E. GUZHA, Principal Environmental Health Officer for UMP Water and Agriculture Project

Hwedza District Administrator's Office:
Mr. C. NDARUWA, District Administrator
Mr. A. T. NGORIMA, Water Officer of DDF

Appendix - 3 :

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY FOR IMPROVEMENT OF
RURAL WATER SUPPLIES IN MASHONALAND EAST PROVINCE IN
THE REPUBLIC OF ZIMBABWE

At the request of the Government of the Republic of Zimbabwe, the Government of Japan have agreed to conduct Basic Design investigations of the Project for the Improvement of Rural Water Supplies in the Mashonaland East Province (hereinafter referred to as "the Project"), and the latter has entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent a study team known as the Basic Design Study Team headed by Mr. Hiroshi NISHIDA, from the Japanese Ministry of Foreign Affairs, to the Republic of Zimbabwe during the period from the 24th August, 1993 to the 23rd September, 1993.

The Basic Design Study Team held discussions with the relevant officials of the Government of the Republic of Zimbabwe and conducted a field survey in the study area.

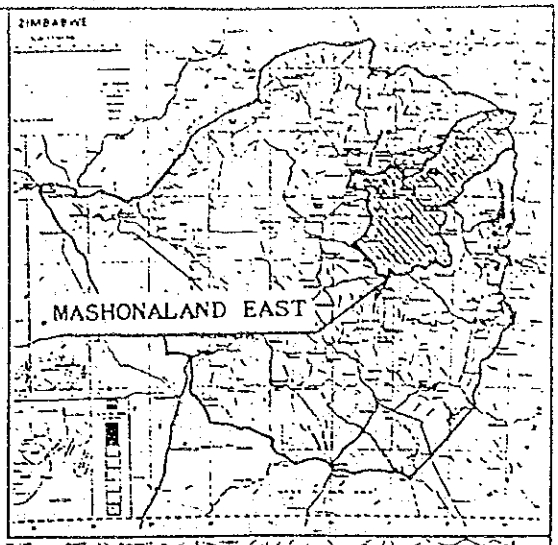
As a result of the discussions and field survey, both parties have confirmed the main items described in the attached sheets. The Team will proceed to prepare the Basic Design Study report.

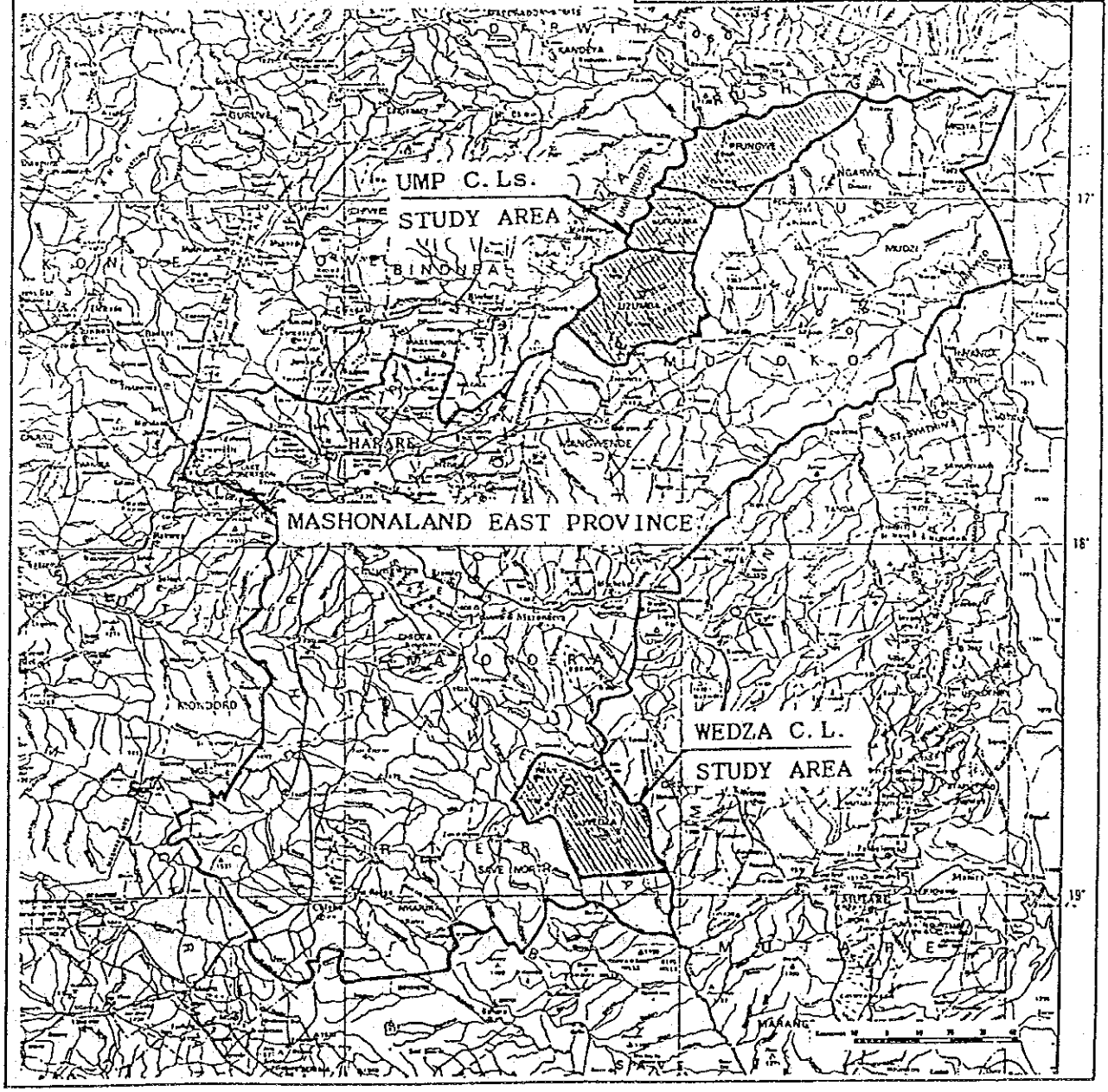
Harare, 1st September, 1993.

西田 寛		
Mr. Hiroshi NISHIDA, Leader, Basic Design Study Team, JICA	Mr. K. LANDING, Director of Department of Water Development, (MLAWD)	Ministry of Finance

LOCATION MAP OF THE STUDY AREA
FOR
RURAL WATER SUPPLY PROJECT (PHASE-3)

Scale 1:2,000,000





ATTACHMENT

1. Objective

The objective of the Project is to provide the necessary equipment, materials and services in order to accelerate the rural water supply programme in certain parts of the Mashonaland East Province in the Republic of Zimbabwe.

2. Project Area

The Project Area is composed of the following Communal Lands (C.L.) in the Mashonaland East Province.

1) Uzumba C.L. (Zvataida District)
2) Maramba C.L. (Zvataida District)
3) Pfungwe C.L. (Zvataida District)
4) Hwedza C.L. (Hwedza District)

3. Executing Agency

The executing agency is the Department of Water Development (DWD) in the Ministry of Lands, Agriculture and Water Development of the Government of Zimbabwe.

4. Items requested by the Government of Zimbabwe

After discussions with the Basic Design Study Team, the following items were requested by the Government of Zimbabwe:

(1) Provision of Equipment and Materials for borehole construction.
(2) Provision of services for the implementation of the project

Provisional details of the items required are listed in ANNEX-I.

The final components of the Project will be determined by the Basic Design Study Team, after further studies and consultation with officials of the Departmnet of Water Development.

5. Japanese Grant Aid System

(1) The Government of Zimbabwe has understood the Japanese Grant Aid System as explained by the Basic Design Study Team.

(2) The Government of Zimbabwe will take the necessary measures, described in ANNEX-II for the smooth implementation of the Project, on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Schedule of the Study

(1) The Consultant will continue field survey work in Zimbabwe until September 23, 1993.

(2) Based on the Minutes of Discussions and technical examination of the study results, JICA will complete the final report and send it to the Government of Zimbabwe by February, 1994.

ANNEX-I.

The following items have been requested by the Government of Zimbabwe.

1. Procurement of Equipment and Materials

(1)	truck-mounted top-head-drive rotary drilling rig;	2 units
(2)	standard accessories and tools for the above;	2 lots
(3)	high-pressure air-compressor;	2 units
(4)	cargo truck with 4-ton crane (4x4);	4 units
(5)	break-down recovery truck	1 unit
(6)	pick-up truck (4x4);	4 units
(7)	station wagon (4x4);	2 units
(8)	geophysical equipment;	2 lots
(9)	borehole test equipment;	2 lots
(10)	radio-telephone system;	2 lots
(11)	drilling supporting equipment;	2 lots
(12)	trailer-mounted mobile workshop with necessary equipment and tools;	2 lots
(13)	hand pumps;	400 units
(14)	submersible-motor pump with diesel generator;	3 units
(15)	spare parts for the above equipment good enough for 3 years operation;	2 lots
(16)	plastic casing and screen pipes for 100 B/H and steel casing for 300 B/H;	1 lot
(17)	drilling agent;	1 lot
(18)	spare parts for the equipment procured under the Japanese Grant Aid for the Rural Water Supplies Project (Phase 2)	1 lot

2. Services necessary for the construction of 40 boreholes in the Project Area, including on-the-job training of Zimbabwean staff for siting, drilling and maintenance of drilling equipment.

ANNEX-II.

Necessary measures to be taken by the Government of Zimbabwe in the event that Japanese Grant Aid is extended to the Project.

1. To provide data and information necessary for the Project.
2. To secure land for the sites of the Project.
3. To clear the sites prior to commencement of the construction.
4. To bear commissions to the Japanese foreign exchange bank to execute the banking Services based upon the Banking Arrangement.
5. To ensure prompt unloading and customs clearance at port(s) of disembarkation in Zimbabwe and facilitate internal transportation therein of the products purchased under the Grant.
6. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Zimbabwe with respect to the supply of the products and services under the Verified Contract(s).
7. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the Verified Contract(s), such facilities as may be necessary for their entry into Zimbabwe and stay therein for the performance of their work.
8. To assign the necessary staff for operation and maintenance of the equipment purchased under the Grant.
9. To maintain and use properly and effectively the equipment and materials purchased and facilities constructed under the Grant.
10. To bear all the expenses other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and the installation of the equipment in the Project area.

Appendix - 4:

FIELD SURVEY ITINERARY

Date	Day	Activities
Aug. 24	Tue.	Arrived in Harare. Courtesy call on Embassy of Japan, Ministry of Finance and Department of Water Development of (DWD) in the Ministry of Lands, Agriculture and Water Development (MLAWD)
25	Wed.	Discussion on Inception Report with DWD
26	Thu.	Reconnaissance survey guided by DWD Officers for UMP
27	Fri.	Reconnaissance survey guided by DWD Officers for Hwedza
28	Sat.	Data arrangement and preparation works for further study
29	Sun.	Inner meeting
30	Mon.	Field survey for Hwedza
31	Tue.	Discussion on Minutes
Sep. 1	Wed.	Exchanged the Minutes of Discussion
2	Thu.	Leader left Harare for Tokyo Meeting with DWD Head Office
3	Fri.	Field survey for Pfungwe C.L.
4	Sat.	Office work
5	Sun.	Inner meeting
6	Mon.	Field survey for UMP Meeting with DDF District Office and Data collection for UMP
7	Tue.	- do -
8	Wed.	Field survey for UMP Meeting with DDF District Office and Data collection for Hwedza
9	Thu.	Field survey for UMP Meeting with DDF District Office and Data collection for Hwedza
10	Fri.	Meeting with DWD Head Office Data collection for the Province

Date	Day	Activities
Sep. 11	Sat.	Inspection for Boreholes constructed under Phase-1 Project in Chilimanzi C.L. in Midlands Province
12	Sun.	Returned to Harare
13	Mon.	Meeting with Provincial Office of DDF Field survey for Hwedza
14	Tue.	Meeting with DWD Head Office Field survey for Hwedza
15	Wed.	Inspection of Drilling Rig under Phase-2 Project in Gokuwe District in Midlands Province
16	Thu.	Meeting with Provincial Agritex Office and Provincial Medical Director Office
17	Fri.	Meeting with District Administrator Office in Hwedza and office work
18	Sat.	Office work
19	Sun.	Inner meeting
20	Mon.	Meeting with DWD Head Office and supplemental Field Survey
21	Tue.	- do -
22	Wed.	- do -
23	Thu.	Courtesy call on Embassy/DWD. Left Harare to Tokyo

Appendix - 5 (5 - 1):

LIST OF BOREHOLES AND WELLS INSPECTED (1/2)

No.	Location/Name	Grid Reference		Type of Water Source
		S. Latit. E. Longit.	Grid Ref.	
Pf - 1	near KAFURA Sch.	16-51-36, 32-15-37	VS 220 359	Pvt. Well
Pf - 2	NYANZOU Sch.	16-46-57, 32-18-16	259 446	B/H
Pf - 3	NYANZOU Clinic	16-46-50, 32-18-56	269 447	Deep Well
Pf - 4	KAFURA Sch.	16-51-16, 32-15-39	212 366	B/H
Pf - 5	KAFURA Clinic	16-46-57, 32-18-16	207 378	B/H
Pf - 6	MAGUDA Sch.	16-55-59, 32-09-33	100 277	B/H
Pf - 7	near DINDI Mission	16-52-32, 32-06-09	045 342	B/H
Pf - 8	near SOWA Sch.	17-00-10, 32-06-15	046 200	B/H
Ma - 1	near BORERA Missi.	17-01-37, 31-59-19	US 924 174	B/H
Ma - 2	BORERA Mission	17-01-26, 31-58-46	914 177	Shallow Well
Ma - 3	BORERA Sec.Sch.	17-01-19, 31-58-12	907 179	B/H
Ma - 4	GOYU Township	17-00-46,3 2-01-30	968 189	B/H
Ma - 5	GOYU Sch.	17-00-40, 32-01-53	967 191	B/H
Ma - 6	SAPARANYAMBUYA Sch.	17-07-28, 32-02-05	972 065	B/H
Ma - 7	MUTAWATAWA B.C.	17-06-57, 31-58-41	913 075	B/H
Uz - 1	KATIYO B.C.	17-13-05, 31-50-36	UR 770 961	Deep Well
Uz - 2	MASANHI Sec.Sch.	17-24-20, 31-58-50	UR 917 755	B/H
Uz - 3	MUGABE Sec.Sch.	17-22-53, 31-56-50	UR 822 783	B/H
Uz - 4	MANYIKA B.C.	17-21-28, 31-54-27	UR 840 807	B/H
Uz - 5	UZUMBA High Sch.	17-21-50, 31-53-42	UR 827 799	B/H
Uz - 6	MATSENGE Sch.	17-19-58, 31-51-56	UR 788 834	B/H
Uz - 7	DDF Office	16-46-57, 32-18-16	UR 755 907	Deep Well
Uz - 8	MORIS Sch.	17-19-43, 31-48-40	UR 736 838	B/H
Uz - 9	NAKIWA B.C.	17-22-24, 31-48-04	UR 727 789	Deep Well
Uz - 10	MAGUNJE Sch.	17-24-05, 31-47-27	UR 718 757	B/H
Uz - 11	CHITIMBE Sch.	17-26-42, 31-47-04	UR 713 710	B/H
Uz - 12	NYAGANDE Sch.	17-09-24, 31-51-06	US 777 029	B/H
Uz - 12'	near NYAGANDE Sch			Deep Well
Uz - 13	NYAGANDE Campsite	17-09-23, 31-50-48	US 772 029	B/H
Uz - 14	CHIKUHWA Sch.	17-12-33, 31-50-57	UR 776 970	Deep Well
Uz - 15	Village	17-12-03, 31-50-04	UR 761 980	Deep Well
Uz - 16	near DDF Office	17-16-06, 31-49-45	UR 755 905	Deep Well

LIST OF BOREHOLES AND WELLS INSPECTED (2/2)

No.	Location/Name	Grid Refference		Type of Water Source
		S. Latit. E. Longit.	Grid Ref.	
H - 1	CHIGWEDERE Sch.	18-41-4, 31-34-23	UQ 495 336	B/H
H - 2	near CHIGWEDERE	18-38-48, 31-35-42	519 386	B/H
H - 3	GARABA Store	18-43-22, 31-32-01	454 293	B/H
H - 4	RAMBANAPASI Sch.	18-44-03, 31-32-57	471 280	B/H
H - 5	MUREMBA Dam	18-37-57, 31-35-46	519 393	B/H
H - 6	MARATA Sch.	18-38-39, 31-36-57	540 381	B/H
H - 7	MKUNDWA Sch.	18-38-39, 31-36-57	568 362	B/H
H - 8	NHEKAIRO B.C	18-39-26, 31-41-36	622 366	B/H
H - 9	MATSINE Sch.	18-39-57, 31-44-05	666 359	B/H
H - 10	MAKWARIMBA	18-41-04, 31-45-15	338 686	B/H
H - 11	DENDENYORE	18-41-31, 31-41-56	330 628	B/H
H - 12	ST.MARFS Mission	18-43-30, 31-40-41	606 292	B/H
H - 13	ST.AUGUSTINE Sch	18-47-21, 31-39-38	447 220	B/H
H - 14	MUKWANA Sch.	18-49-08, 31-43-06	649 187	B/H
H - 15	CHIGONDO B.C.	17-06-57, 31-58-41	646 140	B/H
H - 16	MAGUNI Sch	18-54-03, 31-41-36	623 098	B/H
H - 17	ST.JOSEPH Sch.	18-56-21, 31-43-28	056 657	B/H
H - 18	ST.PETER's Sch.	18-41-33, 31-46-11	702 329	B/H
H - 19	ZVIDENDE Dip	18-42-57, 31-47-26	725 303	B/H
H - 20	GOTO near St.Annes	18-44-03, 31-49-21	759 283	Deep Well
H - 21	MORIS Bridge	18-44-14, 31-50-00	377 280	River
H - 22	CHISASIKE B.C.	18-46-28, 31-49-18	758 239	B/H
H - 23	St.STEPHEN's Sch.	18-46-10, 31-51-50	802 249	B/H
H - 24	St.BARNABAS Sch.	18-49-01, 31-49-28	761 191	B/H
H - 25	Village	18-49-44, 31-49-47	766 178	B/H
H - 26	St.JOHN's Sch.	18-51-34. 31-49-26	762 144	B/H
H - 27	St.MATHIAS Sch.	18-50-21, 31-47-32	728 148	B/H
H - 28	MUKUMBA B.C.	18-52-31, 31-49-06	756 127	B/H
H - 29	CHIHAVE B.C.	18-54-25, 31-51-25	797 095	B/H
H - 30	Village	18-55-48, 31-52-39	818 066	B/H

Note: Latitude and longitude are taken from G.P.S. and plot them on the map. Then, Grid Ref. is read from the map.

Appendix - 5 (5 - 2):

RESULT OF SIMPLIFIED WATER QUALITY TEST (1/2)

No.	Type of Source	T (℃)	pH	Ec	Coliforms	M-organisms	Remarks
Pf - 1	Shallow Well	24.0	7.5	310	many	many	Pvt. Well
Pf - 2	B/H	26.2	7.6	740	0	2	
Pf - 3	Deep Well	26.6	8.5	610	2	many	Pump damaged
Pf - 4	B/H	-	-	-	-	-	
Pf - 5	B/H	26.7	7.1	980	1	0	
Pf - 6	B/H	26.5	7.3	ok	0	0	
Pf - 7	B/H	26.6	7.5	-	0	0	Salty
Pf - 8	B/H	25.7	7.6	ok	0	7	
Ma - 1	B/H	27.1	7.7	900	0	0	
Ma - 2	Shallow Well	21.8	7.9	460	3	24	
Ma - 3	B/H	26.2	7.4	ok	0	0	
Ma - 4	B/H	26.3	7.5	ok	0	0	
Ma - 5	B/H	25.9	7.6	ok	4	21	
Ma - 6	B/H	26.7	7.4	ok	0	0	
Ma - 7	B/H	26.4	7.4	250	0	2	
Uz - 1	Deep Well	24.8	7.6	310	0	0	
Uz - 2	B/H	24.2	7.5	320	6	10	
Uz - 3	B/H	23.9	7.7	600	0	0	
Uz - 4	B/H	24.7	7.6	330	0	0	
Uz - 5	B/H	23.0	7.7	510	0	0	
Uz - 6	B/H	24.1	7.6	320	0	0	
Uz - 7	Deep Well	25.2	8.3	280	6	16	
Uz - 8	B/H	25.0	7.2	170	0	0	
Uz - 9	Deep Well	23.7	8.1	240	5	60	
Uz - 10	B/H	23.9	7.5	290	0	0	
Uz - 11	B/H	23.7	7.7	250	0	0	
Uz - 12	B/H	25.8	7.5	310	0	0	
Uz - 12'	Deep Well	26.5	7.5	460	12	10	
U z - 13	B/H	26.5	7.5	360	0	0	
Uz - 14	Shallow Well	23.0	9.0	410	8	11	
Uz - 15	Shallow Well	25.2	7.7	300	5	6	
Uz - 16	Shallow Well	22.0	7.4	105	17	many	

RESULT OF SIMPLIFIED WATER QUALITY TEST (2/2)

No.	Type of Source	T (℃)	pH	Ec	Coliforms	M-organisms	Remarks
H - 1	B/H	24.4	7.8	590	1	2	
H - 2	B/H	21.5	7.4	90	1	23	
H - 3	B/H	24.2	7.4	160	10	0	
H - 4	B/H	-	-	-	-	-	Pump damaged
H - 5	B/H	23.8	7.6	110	0	0	
H - 6	B/H	24.4	8.2	90	0	0	
H - 7	B/H	24.3	6.7	79	5	0	
H - 8	B/H	23.1	7.0	69	0	0	
H - 9	B/H	22.5	7.5	65	8	7	
H - 10	B/H	25.4	6.3	60	5	5	
H - 11	B/H	-	7.1	240	0	0	
H - 12	B/H	23.1	6.8	86	0	0	
H - 13	B/H	-	-	-	-	-	Pump damaged
H - 14	B/H	23.4	7.5	84	0	0	
H - 15	B/H	23.5	6.7	100	2	10	W/ e. pump
H - 16	B/H	22.8	7.6	150	0	4	
H - 17	B/H	23.5	7.5	280	0	0	
H - 18	B/H	23.2	8.2	112	0	0	
H - 19	B/H	24.5	7.2	74	0	0	
H - 20	Deep Well	25.0	7.6	170	1	12	W/ m. pump
H - 21	River	19.2	8.1	65	many	many	
H - 22	B/H	23.5	7.2	170	0	0	
H - 23	B/H	24.2	7.5	290	many	19	
H - 24	B/H	-	-	-	-	-	Pump damaged
H - 25	B/H	25.1	8.1	270	1	9	
H - 26	B/H	24.4	7.8	210	0	0	
H - 27	B/H	25.0	7.4	280	0	0	
H - 28	B/H	25.7	7.4	400	0	6	
H - 29	B/H	25.9	7.7	370	0	2	
H - 30	B/H	26.1	7.9	410	1	4	

Note: W/ e. pump: with engine pump, m. pump: motor pump

ok in EC means no extraordinary findings by taste, while is done during machine trouble.

Appendix - 6 : DATA OF ZIMBABWE

(1) GDP, GNP and Domestic Product

TABLE 7.1: REAL GROSS DOMESTIC AND NATIONAL PRODUCT PER CAPITA AT MARKET PRICES[1]

Z$ million
(at market prices)

Period	Current prices			Constant prices[3]		Constant prices[3,4]	
						Per capita	
	Gross domestic product	Net investment income paid to other countries[2]	Gross national product	Gross domestic product	Gross national product	Gross domestic product	Gross national product
1975	1 998	— 45	1 953	3 266	3 159	520	503
1976	2 166	— 58	2 108	3 230	3 123	498	481
1977	2 198	— 48	2 150	3 064	2 984	457	445
1978	2 359	— 42	2 317	2 998	2 937	433	424
1979	2 822	— 53	2 769	3 112	3 055	436	428
1980	3 441	— 47	3 394	3 441	3 394	468	461
1981	4 433	— 115	4 318	3 872	3 756	509	494
1982	5 197	— 194	5 003	3 974	3 778	522	496
1983	6 306	— 248	6 058	4 037	3 824	522	495
1984	6 404	— 195	6 209	3 960	3 812	498	479
1985	7 297	— 284	7 013	4 235	4 049	518	496
1986	8 376	— 384	7 992	4 347	4 106	517	488
1987	9 273	— 355	8 918	4 302	4 108	498	475
1988	10 925	— 478	10 447	4 696	4 473	529	504

1. Source: Central Statistical Office.
2. Gross domestic product less net investment income paid to other countries equals gross national product.
3. At 1980 prices.
4. Z$.

TABLE 7.2: DOMESTIC PRODUCT AT FACTOR COST BY INDUSTRY[1]

Z$ million
(at current prices)

Period	Agriculture and forestry	Mining and quarrying	Manufacturing	Electricity and water	Construction	Finance and insurance	Real estate	Distribution, hotels and restaurants	Transport and communication	Public administration and defence	Education services	Other services[2]	Total
1975	323	131	447	50	94	86	44	258	145	130	65	129	1 902
1976	350	152	480	57	88	92	47	262	159	163	73	141	2 064
1977	334	149	460	56	84	102	47	242	166	204	76	149	2 069
1978	289	156	515	62	67	105	45	356	178	239	86	157	2 255
1979	321	226	625	71	92	123	44	425	188	270	98	167	2 650
1980	451	285	802	70	91	159	43	451	211	291	169	201	3 224
1981	640	252	1 016	78	138	185	55	603	306	309	215	252	4 049
1982	669	217	1 121	73	190	228	55	741	365	367	309	322	4 657
1983	544	393	1 441	195	258	275	59	783	403	398	343	340	5 432
1984	748	320	1 475	142	205	282	60	742	434	444	416	381	5 649
1985	1 316	335	1 488	144	154	343	68	777	431	476	520	453	6 505
1986	1 202	446	1 832	229	168	366	75	971	582	518	610	432	7 431
1987	1 061	686	2 043	276	225	476	94	1 001	669	614	676	439	8 256
1988	1 263	824	2 346	288	256	530	100	1 078	780	810	822	545	9 642
1989	1 390	1 001	2 932	367	253	633	105	1 273	856	895	925	642	11 272
1990	1 686	1 071	3 436	434	289	740	111	1 499	978	977	1 069	739	13 029

1. Source: Central Statistical Office
2. Includes health, private domestic service and allowance for imputed banking service charges.

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(2) External Financing Requirements

(Source: A. Framework for Economic Reform (1991 - 95))

Table 5. EXTERNAL FINANCING REQUIREMENTS
(Millions US$)

	1991	1992	1993	1994	1995	1991-95
REQUIREMENTS:						
Imports (GNFS)	2097	2274	2429	2600	2779	12179
Factor Payments	307	341	376	410	441	1875
(Interest)	167	191	217	241	262	1078
Amortization	235	259	242	265	313	1314
Change in Reserves	136	114	123	108	114	595
Total	2775	2987	3170	3383	3647	15963
SOURCES:						
Exports (GNFS)	2028	2207	2409	2640	2900	12184
Factor receipts	48	60	69	79	88	344
Current Transfers	-20	-25	-31	-35	-37	-148
Foreign investment	19	26	28	32	33	138
Total Primary Sources	2076	2267	2475	2717	2984	12518
TOTAL FINANCING REQUIRED	700	720	696	666	663	3444
Disbursment on Existing Commitments	360	380	167	79	77	1063
IBRD	29	31	35	36	36	168
Other Multilateral	95	86	66	40	39	326
Bilateral	83	90	66	2	2	244
Commercial Banks (incl. IFC)	152	173	0	0	0	325
ADDITIONAL FINANCING REQUIRED	340	340	528	587	586	2382

(3) Budget Allocation for Water Sector

PRO REMENT PREPARATION SCHEDULE

	MINISTRIES/ORGANIZATION List of Contracts	Procurement Method	Contract Amount (Estimate US$)	Contract Amount (Actual US$)	Contractor	Comments	Disbursement Forecast (US$m) May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	'94	Proposed Ship. Date
1	DDF Heavy Truck Spares	LCB	450,000.00	891,124.90	OTC Ossenhandels, Germany	Awaiting delivery of goods	0.1									30/11/93
2	MLAWD geophys equipt	ICB	1,500,000.00	444,071.56	Atlas Copco, Sweden	Awaiting delivery of goods			0.1		0.2	0.1				30/09/93
3	MLAWD Computers	LCB	150,000.00	161,763.68	Infotech, Zimbabwe	Awaiting delivery of goods				0.2						31/07/93
4	RWA Submersible Pumps	LCB	250,000.00	160,228.00	BV Kim, Holland	Goods delivered	Goods received									
5	DDF Light Pick-up Spares	LCB	400,000.00	97,160.00	Kjaer & Kjaer, Denmark	Awaiting delivery of goods				0.1						31/08/93
6	DDF/MLAWD Raw Materials	ICB	3,000,000.00	1,784,715.00	Kjaer & Kjaer/EB Exports	Part contract delivered	0.2			1.4	0.2					31/08/93
7	DDF Water Bowsers (	LCB	100,000.00	171,866.78	OTC Aussenhandels, Germany	Awaiting delivery of goods							0.2			30/11/93
8	DDF Compressor Spares	LCB	150,000.00	253,388.00	Atlas Copco Geotechnical	Application for LC with Reserve Bank					0.3					30/09/93
9	DDF/MWD Pumps + Engine	ICB	4,500,000.00	1,966,132.00	* Awarded, awaiting contract signing					0.2	1.6	0.2				30/09/93
10	DDF/MWD Siting + Drill Supervisio	LCB	2,000,000.00	2,000,000.00	* Awarded, DWD preparing contracts						0.2				1.8	28/02/94
11	DDF/MWD Pumps+Eng Spares	LCB	500,000.00	1,391,234.00	Technology Supply Co	Awaiting delivery of goods	0.1			1.2	0.1					31/03/94
12	DDF/MWD Drilling tender	ICB	8,000,000.00	8,000,000.00	* With World Bank for review								0.8		7.1	31/03/94
13	DDF New Tractors (Tender)	ICB	3,000,000.00	2,694,845.13	* With World Bank for review						0.3	2.4	0.3			31/10/93
14	DDF Tractor Spares	ICB	2,500,000.00	2,457,800.00	Lots 1,2,3 awaiting delivery, lot 4 with Tender Board			0.3	1.8	0.3						31/07/93
15	MLAWD Ford Tractor Spares	LCB	500,000.00	23,872.00	Duly's	With MIC for import licence					0.02					30/09/93
16	MLAWD Spares for Percussion Rig	ICB	250,000.00	351,804.70	Leegold, UK	Awaiting delivery of goods			0.1	0.2						31/07/93
17	MLAWD Diesel Testing Equipment	LCB	50,000.00	224,402.14	Lucas Assembly, UK	Awaiting delivery of goods				0.2						31/07/93
18	MLAWD Spares for Drill Equipmen	LCB	500,000.00	413,161.00	Atlas Copco, Sweden	Awaiting delivery of goods			0.1	0.2	0.1					31/01/93
19	MLAWD Large Drill Rigs Spares	ICB	1,500,000.00	2,627,067.68	Mitsui, Japan	Awaiting delivery of goods			0.3			2.00	0.3			31/10/93
20	MLAWD Small Drill Rigs Spares	LCB	300,000.00	313,510.30	Atlas Copco, Sweden	Awaiting delivery of goods			0.1	0.1	0.1					31/07/93
21	DDF/MWD Drill Consumables	ICB	2,000,000.00	1,401,200.00	Halifax Tool Company	Awaiting delivery of goods				0.2	1.2	0.2				30/09/93
	TOTAL		31,600,000.00	27,829,346.87			0.40	0.30	2.50	4.30	4.32	4.90	1.60	0.00	8.90	

* Estimated value

DATE: 20/08/93

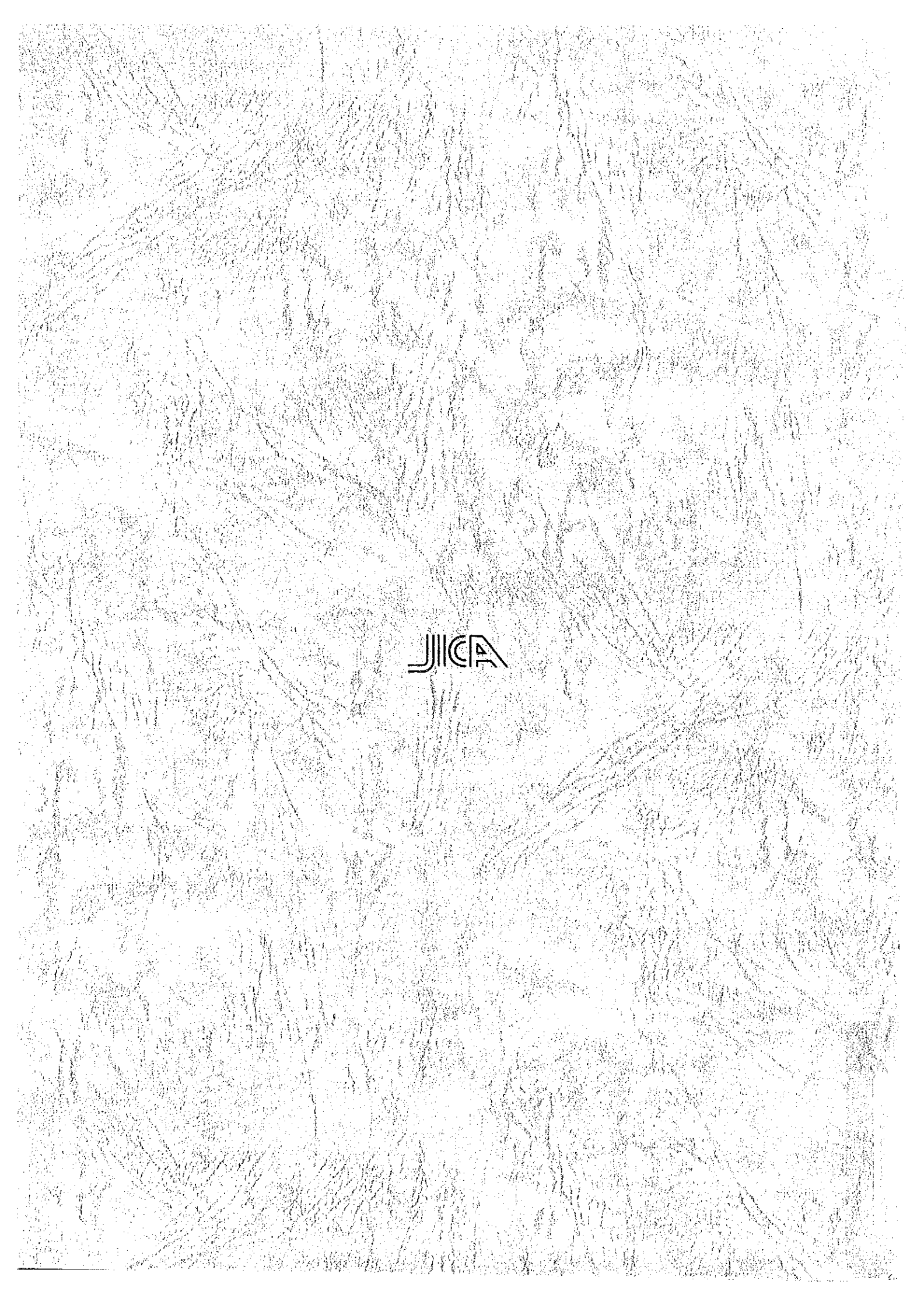
Appendix - 7 :

List of Spare Parts for Phase-2 Equipment

Item No.	Description		Q'ty
1)	INJECTION PUMP, MODEL "NAS-1"		
	Hydraulic motor,		1 pc.
2)	VALVE BOX ASSEMBLY,		
	Rubber,	E2702-023	3 pcs.
	Liner,	E2705-049	3
	Piston rod,	A2841-034	6
	Seat ball valve,	E2916-011	8
	Piston body,	E0337-018	6
	Nut	E2160-214	6
	Piston rubber,	E2161-004	12
	Spring, SC2-016-04,	SC201604	8
	V-packing, H18,	RKV0018	24
	Steel ball,	BBB0254	8
3)	GEARING ASSEMBLY,		
	Oil seal, SB 70x90x12	SEA07003	4 pcs.
	Oil seal, SB 85x110x13,	SEA08502	4
	Oil seal, SB 120x150x14,	SEA12001	4
	HIGH TORQUE LOW SPEED HYDRAULIC MOTOR,		MB00001
	Oil motor, GR-H-350-567-10-D-JA-J		2 pcs.
4)	AIR WATER SWIVEL ASSEMBLY,		
	Grand packing,	D1150-355	6 pcs.
	Grand packing,	D1150-356	3
	Grand packing,	D1150-427	3
	Grand packing,	E1150-428	3
	Packing,	D2528-386	16
	Sleeve,	D2958-572	3
	O-ring, G130	RRG0130	6
	O-ring, G85	RRG0085	3
	Oil seal, SB.95.115.13,	SEA09501	3

Item No.	Description		Q'ty
14)	OPERATION ASSEMBLY,		
	Relief valve,	BAB1005	2 pcs.
	Manual valve,	BAC0021	2
	Multi valve,	BAD0011	2
	Multi valve,	BAD0040	2
	Needle valve,	BAZ2002	2
15)	LEVER ASSEMBLY, ENGINE GOVERNOR,		
	Control cable, (V700-33100-B-7900)		1 pc.
	Clevis with pin (CLE3205)		4 sets
16)	GENERATOR ASSEMBLY, MODEL "PWD280SBL"		
	Hand fuel pump for ISUZU engine (complete),		2 pcs.
	Injector pump for ISUZU engine (complete),		1 pc.
	Injectors for ISUZU engine (complete)		16 pcs.
17)	ENGINE MODEL "PD6"		
	Fan	21060-96002	1 pc.
	Pulley,	21051-96061	1
	Oil seals,	12278-96006	6
	Water pump ass'y	21010-96004	2
	Manual pump feed fuel,	16640-96000	2
	Fuel injection pump,	16640-96064	1
	Injector nozzles,	16600-96001	12
	Oil filter element,	15274-99227	36
	Fuel filter element,	16444-99028	36
	Oil filter element,	15274-99025	36
	Gasket cylinder,	11044-96007	3
	Gasket cylinder,	32001-90326	3
	Gasket cylinder,	11121-97500	3

Item No.	Description	Q'ty
5)	DRILL HEAD DAMER ASSEMBLY,	
	Drill head saver sub, 3-1/2" IF box to 3-1/2" IF pin	2 pcs.
6)	THREE WING BITS HEAD METAL INSERTS,	
	10-5/8" wing bit with 3-1/1" IF box	5 pcs.
	8-5/8" wing bit with 3-1/1" IF box	6
7)	ROLLER BITS,	
	10-5/8" soft formation roller bit	6 pcs.
	Extra soft formation roller bit	6
8)	DOWN THE HOLE HAMMER,	
	DTH hammer, (To suit 6" bit),	4 sets
	6" DTH hammer bits	6 pcs.
9)	LUBRICATOR ASSEMBLY,	
	Pump, KSP 502L,	2 pcs.
10)	HIGH PRESSURE AIR HOSE,	
	Hose (70K x 50 mm) Length	100 m
	High pressure hose fittings complete	6 sets
	Nipple, E2196-385	4 pcs.
	50 mm quick release valve,	6
11)	LIGHTING ASSEMBLY,	
	Lamp, DAA0001, (HSS-MA-3)	12 pcs.
12)	DRUM ASSEMBLY MODEL "MA-3",	
	Gear 1,	1 pc
	Gear 2,	1
	Motor, 3 PH, 200V,	1
13)	OIL COOLER ASSEMBLY,	
	Fan and motor,	1 set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