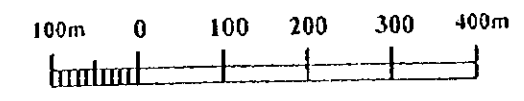


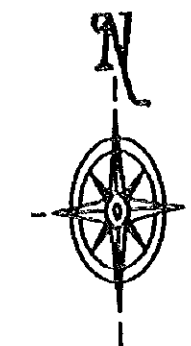
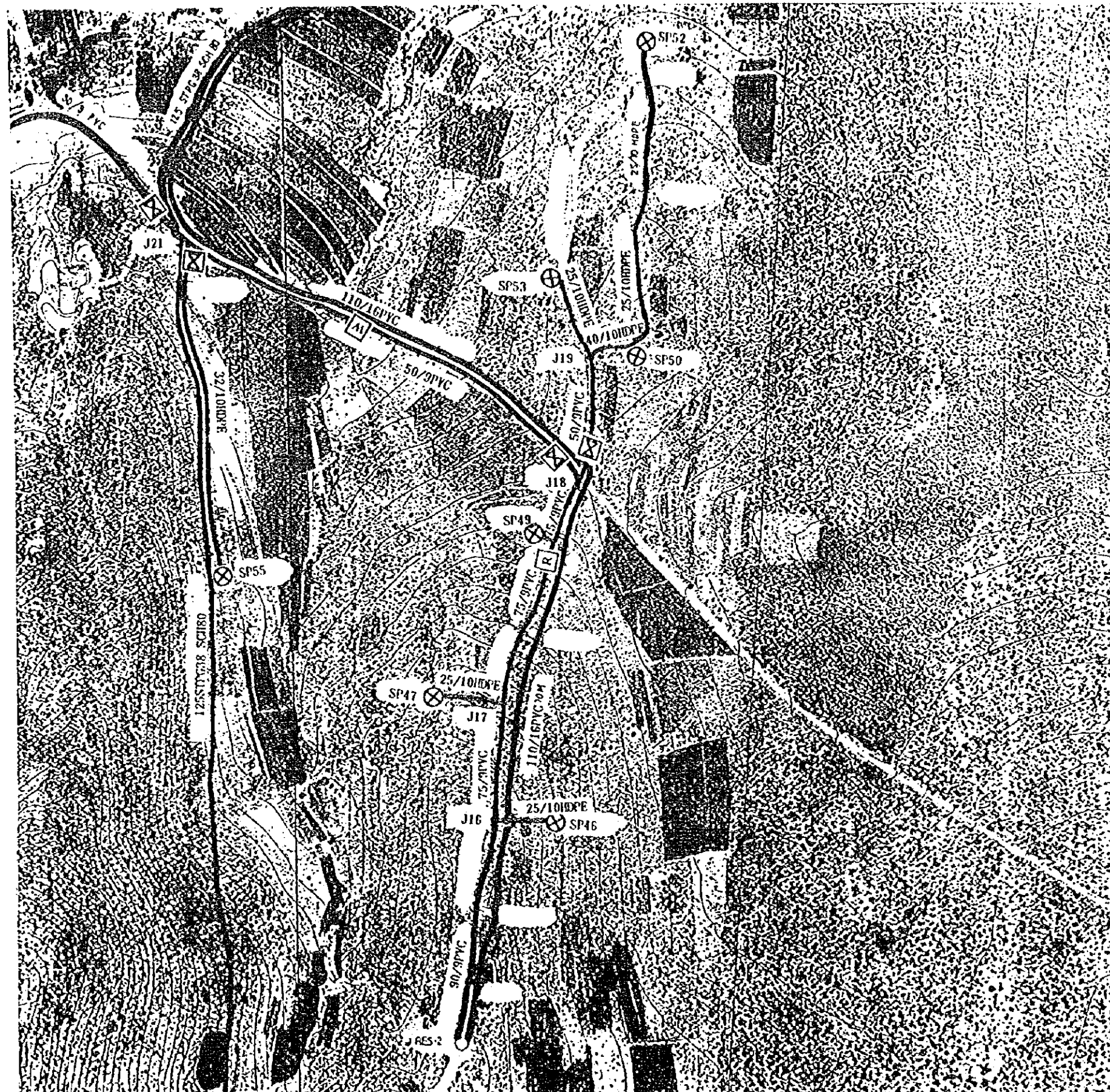
Legend

R	: Break Pressure Tank
A	: Air Valve Chamber
W	: Wash out Chamber
⊠	: Maintenance Valve Chamber
⊗	: Standpipe
J	: Junction

		BQ41
BR39	BR40	BR41
BS39	BS40	BS41
BT39	BT40	



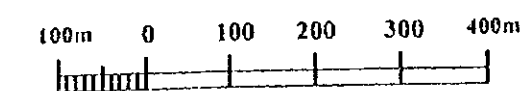
THE KINGDOM OF SWAZILAND Ministry of Natural Resources & Energy Rural Water Supply Branch		
The Rural Water Supply Project		
Title SOMNTONGO COMMUNITY Supply Water Pipe Line(7)		
September 1995	Scale 1/10,000	Draw No. 65
JAPAN INTERNATIONAL COOPERATION AGENCY		



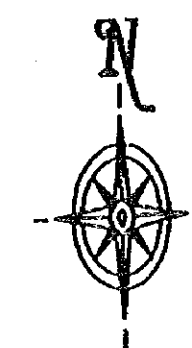
Legend

- [R] : Break Pressure Tank
- [A] : Air Valve Chamber
- [W] : Wash out Chamber
- [X] : Maintenance Valve Chamber
- ⊗ : Standpipe
- J : Junction

		BQ41
BR39	BR40	BR41
BS39	BS40	BS41
BT39	BT40	



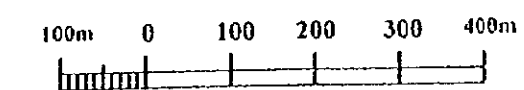
THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title SOMNTONGO COMMUNITY		
Supply Water Pipe Line(8)		
September 1995	Scale 1/10,000	Draw No. 66
JAPAN INTERNATIONAL COOPERATION AGENCY		



Legend

[R]	: Break Pressure Tank
[A]	: Air Valve Chamber
[W]	: Wash out Chamber
[X]	: Maintenance Valve Chamber
⊗	: Standpipe
J	: Junction

		BQ41
BR39	BR40	BR41
BS39	BS40	BS41
BT39	BT40	



THE KINGDOM OF SWAZILAND		
Ministry of Natural Resources & Energy		
Rural Water Supply Branch		
The Rural Water Supply Project		
Title	SOMNTONGO COMMUNITY Supply Water Pipe Line(9)	
September 1995	Scale 1/10,000	Draw No. 67
JAPAN INTERNATIONAL COOPERATION AGENCY		

Appendices

1. MEMBER LIST OF THE SURVEY TEAM

Mr. K. NAKABAYASHI	Team Leader	Development Specialist, JICA
Mr. S. MASUDA	Coordinator	Grant Aid Study & Design Dept., JICA
Mr. Y. YAMASAKI	Chief Consultant	Pacific Consultants International
Mr. N. YAMAMOTO	Hydrogeologist	Pacific Consultants International
Mr. H. MIYAKOSHI	Water Supply Planner	Pacific Consultants International
Mr. M. KOBAYASHI	Geophysical Surveyor	Mitsui Mineral Development Engineering Co., LTD.
Mr. T. SUZUKI	Equipment/Maintenance & Operation Planner	Mitsui Mineral Development Engineering Co., LTD.

2. SURVEY SCHEDULE

(1) Field Survey for Basic Design

No.	Date		Activities
1	Mar. 24	Fri	Arrive in South Africa, Courtesy call to Embassy of Japan
2	25	Sat	Arrive in Swaziland, Inner Meeting
3	26	Sun	
4	27	Mon	Courtesy call to Ministry of Natural Resources and Energy, and UNDP and discussions.
5	28	Tue	Site Survey
6	29	Wed	Discussions
7	30	Thu	Discussion on M/M, Field Survey
8	31	Fri	Signing of M/M. Leaving to Japan (Nakabayashi and Masuda), Field Survey
9	Apr. 1	Sat	Field Survey
10	2	Sun	
11	3	Mon	Field Survey
12	4	Tue	Field Survey
13	5	Wed	Field Survey
14	6	Thu	Field Survey
15	7	Fri	Collection of Questionnaire
16	8	Sat	Inner Meeting
17	9	Sun	
18	10	Mon	Discussion with RWSB
19	11	Tue	Discussion with RWSB
20	12	Wed	Field Survey
21	13	Thu	Field Survey
22	14	Fri	Field Survey
23	15	Sat	Inner Meeting
24	16	Sun	
25	17	Mon	Discussion with RWSB
26	18	Tue	Leave to Japan (Miyakoshi), Field Survey
27	19	Wed	Field Survey
28	20	Thu	Field Survey
29	21	Fri	Field Survey
30	22	Sat	Field Survey
31	23	Sun	
32	24	Mon	Field Survey
33	25	Tue	Field Survey
34	26	Wed	Field Survey
35	27	Thu	Field Survey
36	28	Fri	Field Survey
37	29	Sat	Inner Meeting
38	30	Sun	Inner Meeting
39	May 1	Mon	Discussion with RWSB
40	2	Tue	Discussion with RWSB
41	3	Wed	Leave to Japan (Yamasaki, Yamamoto and Kobayashi)
42	4	Thu	Field Survey
43	5	Fri	Move to South Africa (Suzuki), Courtesy call to Embassy of Japan
44	6	Sat	Survey on Equipment & Materials
45	7	Sun	
46	8	Mon	Survey on Equipment & Materials
47	9	Tue	"
48	10	Wed	"
49	11	Thu	"
50	12	Fri	" , Courtesy call to Embassy of Japan
51	13	Sat	Leave to Japan (Suzuki)

(2) Explanation of Draft Basic Design

No.	Date		Activities
1	Aug. 8	Tue	Arrive in South Africa, Courtesy call to Embassy of Japan
2	9	Wed	Arrive in Swaziland
3	10	Thu	Courtesy call to Ministry of Economic Planning & Development Discussion with RWSB
4	11	Fri	Courtesy call to UNDP and field survey on Msumpe
5	12	Sat	Field survey on Somntongo
6	13	Sun	Inner Meeting
7	14	Mon	Discussion with RWSB
8	15	Tue	Discussion with RWSB
9	16	Wed	Signing of M/M.
10	17	Thu	Leaving to South Africa, Reporting to Embassy of Japan
11	18	Fri	Leaving to Japan
12	19	Sat	Arriving in Japan

3. LIST OF PARTY CONCERNED IN THE RECIPIENT COUNTRY

(1) Ministry of Economic Planning & Development

Ephraim M. Hlophe	Principal Secretary
A.O. Hauge	External Assistant Unit

(2) Ministry of Natural Resources & Energy

Sishayi Nxumalo	Vice Prime Minister/Minister
A. M. C. Dlamini	Minister
Joshua T. Mkashwa	Principa Secretary

(3) Rural Water Supply Branch

Stephen Dlamini	Senior Water Engineer
Melvyn Mayisela	Planning and Costruction Engineer
Cyril Kanya	Planning Engineer
T.M. Mabusela	
Thabile Dlamini	
N.P.M. Ginindza	Community Development Officer
Poppy S.V. Dlamini	Public Health Engineer/Inspector
Zanele Sigwane	Laboratory Technologist
Phillip Gwebu	Assistant Engineer
Vusie Walter Sukati	Water Technician
Richard Ginindza	Water Technician
Ola Busari	Water Relie Coordinator (UNDP)
L.C. Dlamini	Clerk of Works, Manzini Region
Guy Mazibuko	Assistant Clerk of Works, Maintenance
E.Z. Lwehele	Clerk of Works, Hhohho Region
J. Ntul	Clerk of Works, Lubombo Region
S.P. Mamba	Clerk of Works, Shiselweni Region
Phila Mthimkhulu	Community Development Officer, Manzini Region
Henry Zikalala	Community Development Officer, Hhohho Region
Zeblon simelane	Community Development Officer, Lubombo Region
Elijaw Sikhonaze	Community Development Officer, Shiselweni Region

(4) Department of Geology & Mines

Aron M. Vilakati	Director/Commissioner of Mines
Richard M. Maphalala	Deputy Director
Obed M. Ngwenya	Hydrogeologist
Simon N. Maphanga	Senior Geologist

(5) Ministry of Education

Arthur Khoza

Minister

(6) UNDP

Gary E. Davis

Resident Representative

Tomoko Nishimoto

Deputy Resident Representative

4. MINUTES OF DISCUSSION

MINUTES OF DISCUSSIONS
ON
BASIC DESIGN STUDY
ON
THE RURAL WATER SUPPLY PROJECT
IN
THE KINGDOM OF SWAZILAND

Based on the results of the Preliminary Study, the Japan International Cooperation Agency (JICA) decided to conduct a Basic Design Study on the Rural Water Supply Project (hereinafter referred to as "the Project").

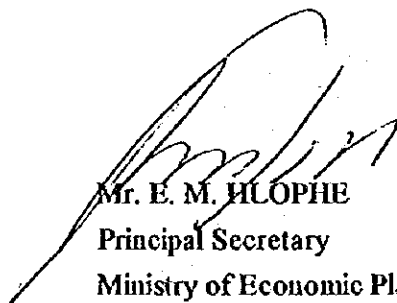
JICA has sent to Swaziland a study team, which is headed by Mr. Kazuo NAKABAYASHI, Development Specialist, JICA, and is scheduled to stay in the country from 25th of March to 5th of May, 1995. The team held discussions with the officials concerned of the Government of the Kingdom of Swaziland.

In the course of discussions and field survey, both sides have confirmed the main items described on the attached sheets. The team will proceed with further investigations and prepare the Basic Design Study Report.

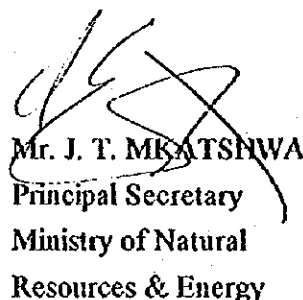
Mbabane, March 31, 1995



Mr. Kazuo NAKABAYASHI
Leader
Basic Design Study Team
JICA



Mr. E. M. HLOPHE
Principal Secretary
Ministry of Economic Planning &
Development



Mr. J. T. MKATSHWA
Principal Secretary
Ministry of Natural
Resources & Energy

1. Objective

The objective of the Project is to provide potable water in rural communities by the construction of facilities and provision of necessary equipment.

2. Project sites

The project sites will be selected among communities listed in Annex I, after consideration in detail through the Basic Design Study. Both sides confirmed that the following criteria will be adopted to select the Project sites.

- 1) accessibility to the site
- 2) land ownership
- 3) present availability of potable water
- 4) situation of groundwater (level, quantity, quality)
- 5) situation of sanitation
- 6) water rights
- 7) community mobilization
- 8) security and safety of the site
- 9) urgency of need
- 10) priority by the Rural Water Supply Branch
(hereinafter referred to as "the RWSB")

3. Executing agency of the Government of the Kingdom of Swaziland

The RWSB of the Ministry of Natural Resources and Energy is responsible for the administration and execution of the Project in close coordination with the Department of Geological Survey and Mines and the Ministry of Health.

4. Scope of Cooperation

As a result of discussions with the Team, the request for the following was confirmed by the Government of the Kingdom of Swaziland:

- 1) construction of macro schemes for 2 communities (sources from a stream and bore holes with necessary facilities) and micro schemes for 35 communities (sources from bore holes with handpumps), which are described in Annex I. As for Somtongo, provided that the existing bore hole is confirmed as appropriate for a macro scheme by the date of 7th of April in 1995, the construction of a macro scheme and necessary micro schemes will be examined.

2) provision of equipment and materials necessary for the implementation of the Project, which are described in Annex II.

3) construction of public latrines to protect the water source of the water supply facilities, which are subject to the contamination, of the Project.

5. Maintenance and Operation of facilities

1) The RWSB has responsibilities to establish a water committee in every site before the field survey of the Basic Design Team ends.

2) During the construction of facilities, technical guidance will be provided to the communities. After the completion of facilities, the Government of the Kingdom of Swaziland is requested to provide training to the communities.

3) The RWSB will take necessary measures to propagate the knowledge of public health in order to encourage the communities to use facilities properly.

4) Water and sanitation committees are responsible for the routine operation and maintenance of minor repairs of the water supply facility. The RWSB has responsibility for monitoring and maintenance of major repair of the water supply facility.

6. Japan's Grant Aid system

1) The Government of the Kingdom of Swaziland has understood the system of Japan's Grant Aid, as described in Annex IV, explained by the Team.

2) The Government of the Kingdom of Swaziland will take necessary measures, as described in Annex III for the smooth implementation of the Project on condition that Japan's Grant Aid is extended to the Project.

7. Schedule of the Study

1) JICA will prepare the draft report in English and dispatch a mission in order to explain contents of the report in July, 1995.

- 2) In case that the contents of the report are accepted in principle by the Government of Swaziland, JICA will complete the final report and send it to the Government of the Kingdom of Swaziland by August, 1995.

8. Other relevant issues

On condition that Japan's Grant Aid is extended to the Project:

- 1) The Government of the Kingdom of Swaziland subsequently committed itself to ensuring concomitant budgetary and personnel allocation for the operation/maintenance of facilities constructed and equipment procured in the Project.
- 2) JICA expressed its desire that the Government of the Kingdom of Swaziland should procure the standard materials for pit latrines for each household
- 3) The Government of the Kingdom of Swaziland desires the technical transfer on drilling and geophysical survey during the implementation of the Project.
- 4) The Government of the Kingdom of Swaziland expressed its desire to receive equipment and supplies consistent with local standards and/or the prevailing after-service environment.
- 5) The Government of the Kingdom of Swaziland expressed its desire to receive the technical cooperation in groundwater development for the smooth implementation of National Development Strategy (1994/95-1997/98).
- 6) The RWSB will construct some portion of micro schemes of the Project using the procured equipment.

ANNEX I LIST OF PROJECT COMMUNITIES

1) MACRO SCHEMES

No.	Community	Region
1	Ngwazini/Bekhinkosi	Manzini
2	Msumpe	Hhohho

2) MICRO SCHEMES

i) HHOHHO REGION

No.	Community
1	Mbasheni
2	Ngobodzi
3	Zinyane
4	Nsangwini
5	Mcuba
6	Nyakatho

ii) LUBOMBO REGION

No.	Community
1	Mahlabatsini
2	Bhelebane
3	Mampembeni
4	Mahhoshe
5	Letindze
6	Lomvovo
7	Vimbabelungu
8	Nokwane
9	Sagula
10	Shewcila
11	Matjemadze

iii) MANZINI REGION

No.	Community
1	Mbekeliweni
2	Ludzeludze
3	Mahlabane West
4	Mbhadlane
5	Emnyokantoka
6	Emsindza
7	Ethunzini
8	Sihhoye
9	Emnjoli
10	Manzana

iv) SHISELWENI REGION

No.	Community
1	Makhava
2	Msuzaneni
3	Somntongo
4	Bambitje
5	Sigwe
6	Kathumbela
7	Ndlambuti
8	Ngamudze

ANNEX II: LIST OF EQUIPMENT AND MATERIALS

1) SITING/DRILLING

Item No.	Description	Unit	Qty
1	Truck Mounted Drilling Rig, Max. 150m depth	Unit	1
2	Standard Accessories and Operating Tools for Mud/Air Drilling	Lot	1
3	Truck Mounted High Pressure Air compressor	Unit	1
4	Cargo Truck 10 ton Payload 6 ton Cab Back Crane	Unit	1
5	Water Tank Lorry (9000 l)	Unit	1
6	Fuel Tank Lorry (4500 l)	Unit	1
7	Pick-up Type Light 4WD Vehicles	Unit	2
8	Station-wagon Type Light 4WD Vehicles	Unit	2
9	Pumping Test System including - 25kw Generator (high yield) - 7.2kw Generator (low yield/rugged terrain) - Submersible Pumps	Set	1
10	Pumping Test Appurtenances	Set	1
11	Geophysical Survey Equipment (including Global Positioning System)	Set	1
12	Radio Telephone Equipment	Set	1

2) CONSTRUCTION

- macro schemes for 2 communities and micro schemes for 35 communities.

i) WATER SUPPLY

Item No.	Description	Unit	Qty
1	Distribution Pipes & Fittings for Macro Schemes	Lot	2
2	Cement & Reinforcement for Macro Schemes	Lot	2
3	Handpumps	Lot	1
4	Cement, Fence Mesh, Gates & Pipes	Lot	1
5	Vertical Turbine Pump with Diesel Engine or Submersible Motor Pump	Set	2

	15m ³ /hr x 150 mH		
6	i) Camping Facilities	Set	1
	ii) 45kw 3-Phase Generator	Unit	1
7	Casing & Screen Pipes	Lot	1
8	Drilling Agent (Forming Agent, Bentonite, CMC)	Lot	1
9	Drilling Bit	Lot	1
10	Other necessary supplies	Lot	1

ii) SANITATION

Item No.	Description	Unit	Qty
1	Materials for Public Latrines	Lot	1

3) LABORATORY

Item No.	Description	Unit	Qty
1	Water Quality Analysis Equipment (Central Laboratory)	Lot	1
2	Portable Kits for Water Analysis (4 Regional Offices)	Set	4

4) MAINTENANCE WORKSHOP

Item No.	Description	Unit	Qty
1	Equipment for Workshop	Lot	1
2	Drilling Spare Parts	Lot	1
3	Handpumps Spare Parts	Lot	1

ANNEX III

Necessary measures to be taken by the Government of the Kingdom of Swaziland on condition that Japan's Grant Aid is extended;

1. To provide data and information necessary for the Project.
2. To secure, clear, level and reclaim the sites for the Project.
3. To construct the access roads to the site 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, customs clearance at port of disembarkation in Swaziland and 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 Swaziland with respect to the supply of the products and services under the verified contracts.
7. To accord Japanese Nationals, whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into Swaziland and stay therein for the performance of their work.
8. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant.
9. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment.

ANNEX IV

ON JAPAN'S GRANT AID PROGRAM

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.

- **Application**
(request made by a recipient country)
- **Study**
(Preliminary Study / Basic Design Study conducted by JICA)
- **Appraisal & Approval**
(Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- **Determination of Implementation**
(Exchange of Notes between the both Governments)
- **Implementation**
(Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grant Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preliminary Study is conducted prior to a Basic Design Study.

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

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Contents of the Study



1) Contents of the Study

The purpose of the Study (Preliminary Study/Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

- a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
- b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
- c) to confirm items agreed on by the both parties concerning a basic concept of the project,
- d) to prepare a basic design of the project,
- e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

2) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is repeated.

3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process (appraisal and approval).

It is important to notice that at the stage of Preliminary Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant etc. are confirmed.

3) "The period of the Grant Aid" means one Japanese fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed.

4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

5) Necessity of the "Verification"

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

6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

- i) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,
- ii) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- iii) to secure buildings prior to the installation work in case the Project is providing equipment,
- iv) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- v) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
- vi) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their

operation and maintenance as well as to bear all expenses other than those to be borne 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 shall 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 Government of the recipient country or its designated authority under the contracts verified.
- (b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

MINUTES OF DISCUSSIONS
ON
BASIC DESIGN STUDY ON THE RURAL WATER SUPPLY PROJECT
IN
THE KINGDOM OF SWAZILAND

In March 1995, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for The Rural Water Supply Project (hereinafter referred to as "the Project") to Swaziland, and through discussion, field survey, and technical examination of the results in Japan, JICA has prepared a Draft Basic Design Report of the Study.

In order to explain and to consult Swaziland on the components of the Draft Basic Design Report, JICA sent to Swaziland a Draft Basic Design Report Explanation Team, headed by Mr. Kazuo NAKABAYASHI, Development Specialist, JICA, from 9th of August to 17, 1995.

As a result of discussions, both parties confirmed the main items described on the attached sheet.

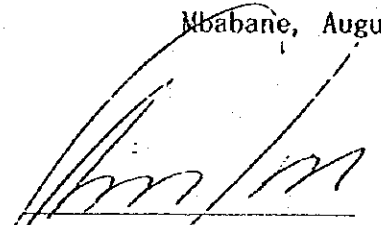
Mbabane, August 16, 1995



Mr. K. NAKABAYASHI

Leader

Draft Basic Design Study Explanation Team
Japan International Cooperation Agency


Mr. E. M. HLOPHE

Principal Secretary

Ministry of Economic Planning &
Development


Mr. J. T. MKATSHA

Principal Secretary

Ministry of Natural Resources &
Energy

ATTACHMENT

1. Components of Draft Report

The Government of Swaziland has agreed and accepted in principle the components of the Draft Basic Design Report explained by the Team.

2. Japan's Grant Aid system

- (1) The Government of Swaziland has understood the system of Japan's Grant Aid Scheme described in Annex II explained by the Team.
- (2) The Government of Swaziland will take necessary measures, described in Annex I, for the smooth implementation of the Project on condition that Japan's Grant Aid is extended to the Project.

3. Further Schedule

The Team will make the Final Report in accordance with the confirmed items, and send it to the Government of Swaziland in and around September 1995.

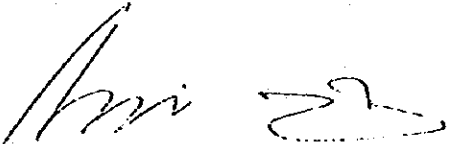
4. Other Relevant Issues

- (1) The JICA Mission strongly recommends that electricity be supplied to the Somntongo Scheme to ease the operation & maintenance cost burden of the scheme on the community.
- (2) The Government of Swaziland has a planned project to supply electricity in Somntongo area. The Government of Swaziland will inform the study team about the realization of the planned Project by the end of August, 1995.
- (3) RWSB will reinforce the existing boreholes planned to be used for macroschemes in Ngwazini, Bekhinkosi and Somntongo by installing the PVC casings and screens.
- (4) Government of Swaziland proposed that the connection of Ndabazewe school in the macroscheme of Somntongo should be taken into consideration in the design.

ANNEX 1

Necessary measures to be taken by the Government of Swaziland on condition that Japan's Grant Aid is extended;

1. To secure the sites for the Project
2. To clear, level and reclaim the sites prior to the commencement of the construction
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the sites
4. To exempt taxes and to take the necessary measures for customs clearance of the materials and equipment brought for the Project at the port of disembarkment
5. To exempt Japanese Nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Swaziland with respect to the supply of the products and services under the verified contracts
6. To accord Japanese Nationals, whose services may be required in connection with the supply of products and services under the verified contracts, such facilities as may be necessary throughout duration of their work
7. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant
8. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment

中村 

ANNEX II

ON JAPAN'S GRANT AID PROGRAM

1. Japan's Grant Aid Procedures after the Study

- (1) The Japan's Grant Aid Program is executed by the following procedures.
 - Study (Preliminary Study / Basic Design Study conducted by JICA)
 - Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
 - Determination of Implementation (Exchange of Notes between the both Governments)
 - Implementation (Implementation of the Project)
- (2) The Government of Japan appraises to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted for approval by the Cabinet.

The Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the two Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant etc. are confirmed.

3) "The period of the Grant Aid" means one Japanese fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed.

4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

5) Necessity of the "Verification"

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

6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

- ① to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,

- ② to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- ③ to secure buildings prior to the installation work in case the Project is providing equipment,
- ④ to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- ⑤ to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
- ⑥ to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne 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 shall 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 Government of the recipient country or its designated authority under the contracts verified.

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

① *Am E*

APPENDIX 5 : COST ESTIMATION BORNE BY SWAZILAND

Unit : 1,000 Emalangeni

No	Item	Unit	Quantity	Account
1	Acquisition of the land	m2	0	0
2	Construction of intake wells	pcs	0	0
3	Construction of access roads	set	1	230
4	Primary electric wiring works	set	1	360
5	Construction of infiltration pits	set	1	598
Total				1,188

[Breakdown of Above Cost Estimation]

Unit : 1,000 Emalangeni

No	Item	Unit	Quantity	Unit Cost	Account
1	Acquisition of the land	m2	0		0
2	Construction of intake wells	pcs	0		0
3	Construction of access roads	set	1		230
1)	Ngwazini	set	1		
	(1) for intake facility	m	0		0
	(2) for distribution reservoir	m	200	0.2	40
2)	Bekhinkosi				
	(1) for intake facility	m	100	0.2	20
	(2) for distribution reservoir	m	0		0
3)	Msumpe				
	(1) for intake facility & roughing filter	m	400		70
	(2) for water purification treatment facility	m	0		0
	(3) for distribution reservoir	m	0		0
4)	Somntongo				
	(1) for intake facility	m	200	0.2	40
	(2) for distribution reservoir	m	300	0.2	60
4	Primary electric wiring works	set	1		360
1)	Intake facility of Ngwazini	set	1		60
2)	Intake facility of Bekhinkosi	set	1		120
3)	Intake facility of Somntongo	set	1		180
5	Infiltration pits	set	1		598
1)	Ngwazini	pcs	60	2.5	150
2)	Bekhinkosi	pcs	32	2.5	80
3)	Msumpe	pcs	32	2.5	80
4)	Somntongo	pcs	40	2.5	100
5)	Micro scheme	pcs	75	2.5	188
TOTAL					1,188

6. OTHER RELEVANT DATA

- (1) Pumping Test Data**
- (2) Observation Result of Flow Rate**
- (3) Design Condition of Civil Works**
- (4) Calculation Sheet of Facility Design**

(1) Pumping Test Data
(Ngwazini)
(Bekhinkosi)
(Somntongo)

Community Name ; Ngwazini

Date ; Feb. 14, 1995 (1/2)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Pumped Well NGWAZINIDraw down ☒

Observations in

Description NGWAZINI REGIONRecovery ☐Sheet - 1 of 2Test 24 HOURS

PROJECT NO.

Time			No.	Depth (m)	Time			Flow Measure		BOREHOLE DEPTH = 60.00	Gauge = 102
Day	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(L/S)		
					(H)	(I)	(II)			STATIC WATER LEVEL = 29.800	
										PUMP INTAKE = 57.000	
										FINAL DRAWN DOWN LEVEL = 37.540	
14	13	38		29.80	0			0	0		
		39		32.67	1			3	3.33	TURBID WATER (GATE VALVE FULL OPEN)	
		40		35.43	2			3	3.33	"	
		41		36.10	3			3	3.33	"	
		42		36.37	4			3	3.33	"	
		43		36.42	5			3	3.33	PARTIALLY CLEANING WATER	
		44		36.48	7			3	3.33	"	
		45		36.50	9			3	3.33	CLEAR WATER	
		46		36.50	11			3	3.33	"	
		47		36.55	13			3	3.33	"	
		48		36.60	16			3	3.33	"	
		49		36.62	20			3	3.33	"	
14	02			36.62	24			3	3.33	"	
		06		36.70	28			3	3.33	"	
		10		36.70	32			3	3.33	"	
		15		36.72	37			3	3.33	"	
		20		36.75	42			3	3.33	"	
		25		36.77	47			3	3.33	"	
		30		36.78	52			3	3.33	"	
		40		36.80	62			3	3.33	"	
		50		36.80	72			3	3.33	"	
15	00			36.80	82			3	3.33	"	
		15		36.85	97			3	3.33	"	
		30		36.88	112			3	3.33	"	
		45		36.92	127			3	3.33	"	
16	00			36.94	142			3	3.33	"	
		15		36.98	157			3	3.33	"	
		30		37.00	172			3	3.33	"	
		45		37.02	187			3	3.33	"	
17	00			37.09	202			3	3.33	"	
		30		37.08	232			3	3.33	"	
18	00			37.10	260			3	3.33	"	
		30		37.15	290			3	3.33	"	
19	00			37.17	322			3	3.33	"	
20	00			37.18	387			3	3.33	"	

Community Name ; Ngwazini

Date ; Feb. 14, 1995 (2/2)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Observations in

Pumped Well Ngwazini

Draw down ☒

Sheet 2 of 2

Description MANZINI REGIONAL

Recovery ☒

Test 24 Hours

PROJECT NO.

Time			No.	Depth	Time			Flow Measure		BORING DEPTH = 60.000 GAUGE = 102 STATIC WATER LEVEL = 29.800 PUMP INTAKE = 57.000 FINAL DRAW DOWN LEVEL = 29.540	
Oy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(L/S)		
				(m)	(I)	(I')	(VI')				
14	21	00		37.19	542			3	3.33	CLEAN WATER GATE VALVE FULL OPEN	
	22	00		37.22	502			3	3.33	"	"
	23	00		37.24	562			3	3.33	"	"
15	24	00		37.28	622			3	3.33	"	"
	01	00		37.30	682			3	3.33	"	"
	02	00		37.35	742			3	3.33	"	"
	03	00		37.40	802			3	3.33	"	"
	04	00		37.45	862			3	3.33	"	"
	05	00		37.40	922			3	3.33	"	"
	06	00		37.47	982			3	3.33	"	"
	07	00		37.50	1042			3	3.33	"	"
	08	00		37.54	1102			3	3.33	"	"
	09	00		37.54	1162			3	3.33	"	"
	10	00		37.54	1222			3	3.33	"	"
	11	00		37.54	1282			3	3.33	"	"
	12	00		37.54	1342			3	3.33	"	"
	13	00		37.54	1402			3	3.33	"	"
	21			37.54	1429			3	3.33	"	"
RECOVERY											
	13	23		31.29	1						
		29		30.10	2						
		25		30.15	3						
		26		30.10	4						
		27		29.8	5						
		28		29.8	6						
* FULL RECOVERY OCCURED IN 7 (SEVEN) MINUTES.											

Community Name; Ngwazini

Date; Mar. 9, 1995 (1/2)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Observations in

Pumped Well NGWAZINI

Draw down ☒

Sheet 1 of 2

Description MANEINI REGIONAL

Recovery ☐

Test 24 HOURS

Time			No.	Depth	Time			Flow Measure											
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(L/S)										
				(m)	(h)	(l)	(lt)												
09	13	45		29.10	0			0	0										
		46		33.15	1			3	3.3										
		47		35.15	2			3	3.3										
		48		36.25	3			3	3.3										
		49		36.50	4			3	3.3										
		50		36.18	5			3	3.3										
		51		36.11	6			3	3.3										
		52		36.09	7			3	3.3										
		53		36.09	10			5	3.3										
		54		36.05	12			3	3.3										
		59		37.00	14			3	3.3										
14	01			37.03	16			3	3.3										
		04		37.09	19			3	3.3										
		07		37.10	22			3	3.3										
		10		37.11	25			3	3.3										
		15		37.11	30			3	3.3										
		20		37.15	35			3	3.3										
		25		37.17	40			3	3.3										
		30		37.19	45			3	3.3										
		40		37.22	55			3	3.3										
		50		37.25	65			3	3.3										
15	00			37.29	75			3	3.3										
		15		37.31	90			3	3.3										
		30		37.31	105			3	3.3										
		45		37.34	120			3	3.3										
16	00			37.37	135			3	3.3										
		15		37.40	150			3	3.3										
		30		37.43	165			3	3.3										
		45		37.50	180			3	3.3										
17	00			37.59	195			3	3.3										
		30		37.57	225			3	3.3										
18	00			37.54	255			3	3.3										
		30		37.64	285			3	3.3										
19	00			37.65	315			3	3.3										
		30		37.41	345			3	3.3										

BOREHOLE DEPTH = 60.000 GAUGE = 10.0

STATIC WATER LEVEL = 29.800

PUMP INTAKE = 51.000

FINAL DRAW DOWN FOR 24 HOURS

REMARKS

TURBID WATER / VALVE FULLY OPEN

PARTIALLY CLOSING WATER

CLOSING WATER

Community Name ; Ngwazini

Date ; Mar. 9, 1995 (2/2)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Observations in

Pumped Well MAHATLAHDraw down ☒Sheet 2 of 2Description MAHATLAH REGIONRecovery ☒Test 24 HOURS

Time			No.	Depth	Time			Flow		BOREHOLE DEPTH = 60.000 GAUGE = 10L STATIC WATER LEVEL = 29.800 PUMP INTAKE = 57.000 FINAL DRAIN DOWN DEPTH = 57.000					
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	Measure							
				(m)	(l)	(l)	(l/l)	(Secs)	(L/S)						
09	20	00		37.71	375			3	3.3	CLEAR WATER (VALUE FULLY OPENED)					
		30		37.75	405			3	3.3						
	21	00		37.77	435			3	3.3						
	22	00		37.80	495			3	3.3						
	23	00		37.83	555			3	3.3						
10	24	00		37.85	615			3	3.3						
	01	00		37.87	675			3	3.3						
	02	00		37.89	735			3	3.3						
	03	00		37.90	795			3	3.3						
	04	00		37.91	855			3	3.3						
	05	00		37.92	915			3	3.3						
	06	00		37.93	975			3	3.3						
	07	00		37.94	1035			3	3.3						
	08	00		37.96	1095			3	3.3						
	09	00		37.98	1155			3	3.3						
	10	00		37.96	1215			3	3.3						
	11	00		37.97	1275			3	3.3						
	12	00		37.97	1335			3	3.3						
	13	00		37.98	1395			3	3.3						
	14			37.99	1440			3	3.3						
RECOVERY															
	46			31.00	1										
	48			30.53	2										
	48			30.48	3										
	50			30.35	4										
	50			30.30	5										
	55			30.28	10										
14	00			20.10	15										
	10			20.11	25										
11	16			11.0 level	1113										

Community Name; Bekhinkosi

Date; Apr. 5, 1995 (1/2)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Observations in

Pumped Well BHEKINKOSI

Draw down ☒

Sheet 1 of 2

Description MALIBI REGION

Recovery ☐

Test 22 HOURS

PROJECT NO.

Time			No.	Depth	Time			Flow		Borehole Depth = 55.000	Gauge = 20.0
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	Measure			
				(m)	(I)	(I)	(W)	(Secs)	(L/S)	Static Water Level = 18.600	
05	13	40		18.60	0			0	0	PUMP IN TAKE = 53.000	
										FINAL DRAW DOWN LEVEL = 20.580	
		41		19.17	1			5	4	PARTLY CLEAR WATER (VALVE FULLY OPEN)	
		42		19.24	2			5	4		
		43		19.36	3			5	4		
		44		19.44	4			5	4		
		45		19.56	5			5	4		
		46		19.65	6			5	4		
		47		19.67	7			5	4		
		48		19.69	8			5	4		
		49		19.71	9			5	4		
		50		19.71	10			5	4		
		52		19.72	12			5	4	CLEAR WATER	
		54		19.78	14			5	4		
		56		19.80	16			5	4		
		58		19.83	18			5	4		
14	00			19.87	20			5	4		
		05		19.92	25			5	4		
		10		19.96	30			5	4		
		15		20.00	35			5	4		
		20		20.01	40			5	4		
		25		20.03	45			5	4		
		30		20.07	50			5	4		
		40		20.09	60			5	4		
		50		20.12	70			5	4		
15	00			20.15	80			5	4		
		15		20.19	95			5	4		
		30		20.20	110			5	4		
		45		20.21	125			5	4		
16	00			20.24	140			5	4		
		30		20.27	120			5	4		
17	00			20.30	200			5	4		
		30		20.34	230			5	4		
18	00			20.38	260			5	4		
		30		20.40	290			5	4		
19	00			20.41	320			5	4		

Community Name ; Bekhinkosi

Date ; Apr. 5, 1995 (2/2)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Pumped Well BKHXH201
Description MANUAL REGION

Draw down ☒
Recovery ☒

Observations in
Sheet 2 of 2
Test 22.110111

PROJECT NO.

Time			No.	Depth (m)	Time			Flow Measure		BOREHOLE DEPTH = 55.000 GAUGE = 20.6 STATIC WATER LEVEL = 18.600 PUMP INTAKE = 55.000 FINAL DRAW DOWN LEVEL = 20.5580									
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(L/S)										
05	19	30		20.42	350			5	4	CLEAN WATER (VALVE FULLY OPENED)									
	20	00		20.48	410			5	4	"	"	"	"	"	"	"	"	"	"
	21	00		20.49	410			5	4	"	"	"	"	"	"	"	"	"	"
	22	00		20.50	530			5	4	"	"	"	"	"	"	"	"	"	"
	23	00		20.50	540			5	4	"	"	"	"	"	"	"	"	"	"
06	20	00		20.50	670			5	4	"	"	"	"	"	"	"	"	"	"
	01	00		20.50	730			5	4	"	"	"	"	"	"	"	"	"	"
	02	00		20.52	780			5	4	"	"	"	"	"	"	"	"	"	"
	03	00		20.55	850			5	4	"	"	"	"	"	"	"	"	"	"
	04	00		20.55	910			5	4	"	"	"	"	"	"	"	"	"	"
	05	00		20.58	970			5	4	"	"	"	"	"	"	"	"	"	"
	06	00		20.58	1030			5	4	"	"	"	"	"	"	"	"	"	"
	07	00		20.58	1080			5	4	"	"	"	"	"	"	"	"	"	"
	08	00		20.58	1150			5	4	"	"	"	"	"	"	"	"	"	"
	09	00		20.58	1210			5	4	"	"	"	"	"	"	"	"	"	"
	10	00		20.58	1270			5	4	"	"	"	"	"	"	"	"	"	"
	11	00		20.58	1330			5	4	"	"	"	"	"	"	"	"	"	"
RECOVERY																			
	01			19.34															
	02			19.34															
	03			19.55															
	04			19.48															
	05			19.44															
	06			19.40															
	08			19.36															
	10			19.33															
	15			19.27															
	20			19.20															
	30			19.04															

Community Name ; Somntongo
Date ; May.25,1995 (1/6)

PUMP TEST FIELD SHEET										(SHEET PA-4)		Observations In	
Pumped Well <u>BOREHOLE</u>										Draw down <input checked="" type="checkbox"/>		Sheet <u>1</u> of <u>2</u>	
Description <u>SHIRIMWI REGION</u>										Recovery <input type="checkbox"/>		Test <u>4 HOURS</u>	
Time			No.	Depth (m)	Time			Flow Measure		BOREHOLE DEPTH = 98.000 GAUGE = 20.2 STATIC WATER LEVEL = 5.400 PUMP INTAKE = 58.000 FINAL DRAW DOWN LEVEL = 11.210			
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(L/S)				
25	11	55		5.40	0			0	0.0				
		55.5		6.30	1/4			10	2.0	TURBID WATER (VALVE 1/4 OPEN)			
		56		7.27	1			10	2.0				
		56.5		8.05	1 1/4			12	1.6	PARTIALLY CLEARING WATER			
		57		8.05	2			12	1.6				
		57.5		8.05	2 1/4			12	1.6	CLEAN WATER			
		58		8.05	3			12	1.6				
		58.5		8.05	3 1/4			12	1.6				
		59		8.05	4			12	1.6				
		59.5		8.05	4 1/4			12	1.6				
12	00			8.05	5			12	1.6				
		01		10.23	6			6	3.3	VALVE 1/2 OPEN			
		02		10.30	7			6	3.3				
		03		10.30	8			6	3.3				
		04		10.30	9			6	3.3	PARTLY CLEAN WATER			
		05		10.55	10			6	3.3				
		06		10.40	11			6	3.3				
		07		10.40	12			6	3.3	CLEAN WATER			
		08		10.40	13			6	3.3				
		09		10.41	14			6	3.3				
		10		10.42	15			6	3.3				
		11		10.43	16			6	3.3				
		12		10.44	17			6	3.3				
		13		10.45	18			6	3.3				
		14		10.49	19			6	3.3				
		15		10.50	20			6	3.3				
		16		10.57	21			6	3.3				
		17		10.60	22			6	3.3				
		18		10.63	23			6	3.3				
		19		10.70	24			6	3.3				
		20		10.80	34			6	3.3	VALVE FULLY OPEN			
		30		11.30	44			7	2.8				
		40		11.36	54			7	2.8				
		50		11.40	64			7	2.8				
13	00			11.49	74			7	2.8				

Community Name : Somntongo
Date : May 25, 1995 (2/6)

PUMP TEST FIELD SHEET										(SHEET PA-4)		Observations in	
Pumped Well <u>BONGHOLU</u>										Draw down <input checked="" type="checkbox"/>		Sheet <u>2</u> of <u>2</u>	
Description <u>SHIGIWEH REGION</u>										Recovery <input checked="" type="checkbox"/>		Test <u>11 HOURS</u>	
										BONGHOLEPEPIN = 88.000		GANGE = 201	
										STATIC WATER LEVEL = 5.400			
										PUMP INTAKE = 56.000			
										FINAL DRAIN DOWN LEVEL = 2.10			
										CLEAR WATER (VALVE BUMP OPEN)			
Dy.	Hr.	Min.	No.	Depth (m)	Time (h)	Time (m)	Ratio (V)	Flow Measure (Secs)	Flow Measure (L/S)				
25	13	10		11.20	74			1	2.8				
		20		11.20	84			1	2.8				
		30		11.20	114			8	2.5				
	14	20		11.20	124			8	2.5				
		30		11.21	134			8	2.5				
	15	20		11.21	144			8	2.5				
		30		11.21	214			8	2.5				
	16	00		11.21	240			8	2.5				
RECOVERY													
		01		10.40									
		02		10.25									
		03		8.30									
		04		8.11									
		05		8.30									
		06		7.80									
		08		6.15									
		10		6.10									
		15		6.01									
		20		5.40									
		25		5.87									
		30		5.80									
		40		5.80									
		50		5.80									
		60		5.51									

Community Name ; Somntongo
Date ; May.25,1995 (3/6)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Pumped Well BONGHLO

Draw down ☒

Observations in
Sheet 1 of 2

Description SHIGLWEH REGION

Recovery ☐

Test WATER

Time			No.	Depth (m)	Time			Flow Measure		
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(L/S)	
					(I)	(I')	(V')			
25	14	15		5.46	0			0	0.0	
				5.57	1			20	1.0	
				5.57	2			15	1.0	
				5.58	3			20	1.0	
				6.37	4			20	1.0	
				6.53	5			20	1.0	
				6.67	6			20	1.0	
				6.68	7			20	1.0	
				6.90	8			20	1.0	
				7.06	9			20	1.0	
				7.06	10			20	1.0	
				7.06	11			20	1.0	
				7.06	12			20	1.0	
				7.06	13			20	1.0	
				7.06	14			20	1.0	
				7.06	15			20	1.0	
				7.06	16			20	1.0	
				7.06	17			20	1.0	
				7.06	18			20	1.0	
				7.06	19			20	1.0	
				7.06	20			20	1.0	
				7.06	21			20	1.0	
				7.06	22			20	1.0	
				7.06	23			20	1.0	
				7.06	24			20	1.0	
				7.06	25			20	1.0	
				7.06	26			20	1.0	
				7.06	27			20	1.0	
				7.06	28			20	1.0	
				7.06	29			20	1.0	
				7.06	30			20	1.0	
				7.06	31			20	1.0	
				7.06	32			20	1.0	
				7.06	33			20	1.0	
				7.06	34			20	1.0	
				7.06	35			20	1.0	
				7.50	40			10	2.0	
				8.05	45			10	2.0	
15	00			8.05	50			10	2.0	
				8.05	55			10	2.0	
				8.05	60			10	2.0	
				8.05	70			10	2.0	
				8.05	80			10	2.0	
				8.51	90			5	3.3	
				8.69	100			6	3.3	
				9.11	115			6	3.3	
16	10			9.15	130			6	3.3	
				9.50	145			6	3.3	

BONGHLO DEPTH = 98.000 GAINU = 20.2

STATIC WATER LEVEL = 5.400

PUMPING RATE = 56.000

FINAL DRAIN DEPTH LEVEL = 11.190

CLEAR WATER (PRESSURE 2300 Kpa)

(PRESSURE 1250 Kpa)

(PRESSURE 400 Kpa)

Community Name : Somntongo
 Date : May.25,1995 (4/6)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Observations in

Pumped Well BOREHOLE

Draw down ☒

Sheet 2 of 2

Description SHISIGWENI REGION

Recovery ☒

Test LI HONIA

PROJECT NO.

Time			No.	Depth	Time			Flow Measure		
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(US)	
				(m)	(I)	(I)	(VI)			
25	16	40		10.33	160			9	2.5	BOREHOLE DEPTH = 88.000 GAINGE = 20.8 STATIC WATER LEVEL = 5.470 PUMP INTAKE = 56.000 FINAL DRAW DOWN LEVEL = 11.140 CLEAR WATER (HAIRY FLY) PAPA
	18	10		10.17	140			8	2.5	
		40		11.16	220			8	2.5	
	19	00		11.19	240			8	2.5	
RECOVERY										
		01		10.55						
		02		10.29						
		03		9.33						
		04		8.30						
		05		7.10						
		06		6.35						
		08		6.10						
		10		6.05						
		15		6.03						
		20		6.01						
		30		5.49						
		40		5.41						
		50		5.14						
		60		5.12						

Community Name ; Somntongo
Date ; May.25,1995 (5/6)

PUMP TEST FIELD SHEET							(SHEET PA--3)		Observations In	
Pumped Well <u>BOREHOLE</u>							Draw down <input checked="" type="checkbox"/>		Sheet <u>1</u> of <u>2</u>	
Description <u>SHISELWALI REGION</u>							Recovery <input type="checkbox"/>		Test <u>24 HOURS</u>	
Time		No.	Depth	Time			Flow Measure		BOREHOLE DEPTH = 98.000 GANGE = 20.0 STATIC WATER LEVEL = 5.400 PUMP INTAKE = 56.000 FINAL DRAW DOWN LEVEL = 11.13	
Dy.	Hr.	Min.	(m)	Mins. (t)	Mins. (t')	Ratio (t/t')	(Secs)	(L/S)		
25	20	00	5.46	0			0	0.5		
		01	6.40	1			6	3.3	CLEAR WATER (NAIVE FULLY OPEN)	
		02	7.33	2			6	3.3		
		03	7.44	3			6	3.3		
		04	8.36	4			6	3.3		
		05	8.56	5			6	3.1		
		06	8.77	6			6	3.3		
		07	9.24	7			6	3.3		
		08	9.35	8			6	3.3		
		09	10.11	9			7	2.8		
		10	10.34	10			7	2.8		
		15	10.48	15			7	2.8		
		20	10.52	20			7	2.8		
		25	10.68	25			8	2.5		
		30	10.72	30			8	2.5		
		35	10.76	35			8	2.5		
		40	10.76	40			8	2.5		
		50	10.77	50			8	2.5		
	21	00	10.76	60			8	2.5		
		10	10.76	70			8	2.5		
		20	10.76	80			8	2.5		
		30	10.76	90			8	2.5		
		45	10.78	105			8	2.5		
	22	00	10.78	120			8	2.5		
		15	10.78	135			8	2.5		
		30	10.78	150			8	2.5		
		45	10.78	165			8	2.5		
	23	00	10.79	180			8	2.5		
		30	10.79	210			8	2.5		
	24	00	10.81	240			8	2.5		
		30	10.86	270			8	2.5		
		01	10.91	300			8	2.5		
		02	10.97	360			8	2.5		
		03	10.99	420			8	2.5		
		04	10.99	480			8	2.5		

Community Name : Somntongo
Date : May.25,1995 (6/6)

PUMP TEST FIELD SHEET

(SHEET PA-4)

Pumped Well BOREHOLE
Description SHIELDRUM REGION

Draw down ☒
Recovery ☒

Observations in _____
Sheet 2 of 3
Test 24 Hours Ret.

PROJECT NO.

Time			No.	Depth	Time			Flow Measure		Borehole Depth = 88.00m Change = 20m Static Water Level = 5.100 Pumping Rate = 56.000 Final Draw Down 18/22 = 9.130	
Dy.	Hr.	Min.			Mins.	Mins.	Ratio	(Secs)	(US)		
				(m)	(l)	(l)	(W)				
26	06	00		10.98	600			9	2.2	CLEAN WATER (VALVE FULLY OPEN)	
	07	00		11.04	660			9	2.2		
	08	00		11.06	720			9	2.2		
	09	00		11.08	780			9	2.2		
	10	00		11.08	840			9	2.2		
	11	00		11.07	900			9	2.2		
	12	00		11.08	960			9	2.2		
	13	00		11.09	1020			9	2.2		
	14	00		11.11	1080			9	2.2		
	15	00		11.13	1140			9	2.2		
	16	00		11.11	1180			9	2.2		
	17	00		11.13	1240			9	2.2		
	18	00		11.13	1300			9	2.2		
	19	00		11.13	1360			9	2.2		
	20	00		11.13	1400			9	2.2		
REMOVE											
	01			10.41							
	02			10.41							
	03			9.11							
	04			8.94							
	05			8.30							
	06			7.71							
	08			6.41							
	10			6.16							
	15			6.02							
	20			5.94							
	30			5.88							
	40			5.85							
	50			5.61							
	60			5.53							

(2) Observation Result of Flow Rate

Appendix 2

Results of Flow Measurement in Msumpe Source

Date	Flow (l/sec)	Required Flow (l/sec)	Observer
94.12.14	3.53		RWSB
94.12.29	3.88		RWSB
95.01.10	2.87		RWSB
95.01.25	3.53		RWSB
95.02.09	3.88		RWSB
95.02.24	3.53		RWSB
95.03.17	2.26		RWSB
95.03.29	5.78		RWSB
95.04.14	2.58		JICA
Average	3.54	1.41	

(Note-1) RWSB : Rural Water Supply Branch

(Note-2) The survey had measured in rain season (Oct. to Apr.)

(3) Design Condition of Civil Works

1 Loads

1.1 Dead Loads

Table-1 Weight of Materials, Unit Volume (kgf/m^3)

Material	Unit Weight	Material	Unit Weight
Steel, Cast Steel, Malleable Steel	7,850	Concrete	2,350
Cast-Iron	7,250	Cement Mortar	2,150
Aluminum	2,800	Timber	800
Reinforced Concrete	2,500	Bitumen (Waterproofing)	1,100
Pre-stressed Concrete	2,500	Asphalt Pavement	2,300

Table-2 Weight of Soils, Unit Volume (tf/m^3)

Ground / Classification	Loose	Dense
Natural Ground		
Sand/Sand and Gravel	1.8	2.0
Sandy Soil	1.7	1.9
Cohesive Soil	1.4	1.8
Embankment		
Sand/Sand and Gravel	2.0	
Sandy Soil	1.9	
Cohesive Soil	1.8	

- Note
- (1) The unit weight of the soil located below the ground water level shall be obtained by subtracting 0.9 from each of the above figures.
 - (2) The weight of crushed stones shall be the same as that of gravels. For mucks and rock masses, the weight shall be determined in consideration of the kind, shape and void, etc. thereof.
 - (3) The weight of sandy soil with gravel or cohesive soil with gravel shall be determined appropriately according to the mix-proportion and the condition thereof.
 - (4) The water level shall be considered the mean value which comes after construction.

1.2 Earth Pressure

(1) Active and Passive Earth Pressures

In principle, the Coulomb's Formula shall be applied for the earth pressure acting against movable walls. However, the earth pressures acting against easy-to-warp structures, e.g. steel sheet-piles, shall be treated in a separate manner.

(2) Earth Pressure at Rest

The coefficient of earth pressure acting against fixed walls shall be: $K_0 = 0.5$.

1.3 Loads on Ground Surface

(1) Where the load cannot be specified:

$$Q = 1.0 \text{ t/m}^2$$

(2) Road-crossing Portion

$$Q = 1.0 \text{ t/m}^2 \text{ or T-10}$$

1.4 Service Load

300 kg/m² shall be used for the control house among the intake facility. However, where large loads are to be brought in, the matter shall be treated in a separate way.

1.5 Loads of Piping and Equipment

To be considered.

1.6 Water Pressure

Hydrostatic pressure due to water-level of the pond or groundwater level shall be considered.

1.7 Buoyancy

Buoyancy acting to the floor slab shall be considered.

1.8 Wind Load

Not to be considered.

1.9 Seismic Road

Not to be considered.

1.10 Combination of Loads

In the structural calculation, the most disadvantageous combination of loads shall be considered long-period-wise as well as short-period-wise.

2. Design in General

2.1 Physical Constants of Materials to be Used

Table-3 Physical Constants

Kind	Young's Modulus
Concrete (Design Standard Strength 210 kg/cm ²)	2.35×10^5 kg/cm ²
Steel bars (SD295A, Equivalent)	2.1×10^6 kg/cm ²

Note: The Young's Modulus Ratio to be used in the calculation of the unit stress of the reinforced concrete members shall be: $n = 15$.

2.2 Allowable Unit Stress

(1) Structural Concrete

- Design Standard Strength $\sigma_{ck} = 210$ kg/cm²
- Compressive Unit Stress
 - Bending Compressive Unit Stress $\sigma_{ca} = 70$ kg/cm²
 - Axial Compressive Unit Stress $\sigma_{ca} = 55$ kg/cm²
- Shearing Unit Stress
 - Where the shearing force is to be borne by only concrete $\tau_{a1} = 3.6$ kg/cm²
 - Where the same is to be borne by combination with oblique tension-bars $\tau_{a2} = 16.0$ kg/cm²
 - Punching Shearing Unit Stress $\tau_{a3} = 8.5$ kg/cm²
- Bonding Unit Stress
 - Round Bars 7 kg/cm²
 - Deformed Bars 14 kg/cm²
- Bearing Unit Stress

$$\sigma_{ba} = \left(0.25 + 0.05 \frac{A_c}{A_b} \right) \sigma_{ck}$$

However, $\sigma_{ba} \leq 0.5 \sigma_{ck}$

- Where, σ_{ba} : Allowable bearing unit stress of concrete (kgf/cm²)
 A_c : Total area of the concrete surface where local loading is applied (cm²)
 A_b : Total area of the concrete surface to bear the local load (cm²)
 σ_{ck} : Design standard strength of concrete (kgf/cm²)

(2) Concrete for Paving

- Design standard bending strength $\sigma_{bk} = 45 \text{ kg/cm}^2$

(3) Reinforcement Bars

- Standard JIS/SD 295A or Equivalent
- Tensile Unit Stress
 - General Members $\sigma_{sa} = 1,800 \text{ kg/cm}^2$
 - For calculation of lap-joint length and anchorage length $\sigma_{sa} = 1,800 \text{ kg/cm}^2$
- Compressive Unit Stress $\sigma_{sa} = 1,800 \text{ kg/cm}^2$

(4) Extra Allowable Unit Stress

- Long period (general) Factor for increase 1.0
- Short period (typhoon) Factor for increase 1.5

2.3 General Condition

The ground condition shall be set from the results of borings and laboratory tests.

2.4 Safety Factor

The following safety factors shall apply in the calculation of the structural stability.

Table-4 Safety Factors

Item			Safety Factors	
			Long Period	Short Period
Direct Foundation	Bearing		3.0	2.0
	Sliding		1.5	1.2
	Over turning		$e \leq B/6$	$e \leq B/3$
Pile Foundation	Pushing-in	Bearing Pile	3.0	2.0
		Friction Pile	4.0	3.0
	Pulling-Out		6.0	3.0
Floating			1.05	—