2-2-3 Basic Design Drawings

(1) General Plan of the Proposed Facilities (Figure 2-9 General Plan)

(2) Water Distribution and Hydraulic Profile (Figure 2-10 Water Distribution and Hydraulic Profile)

(3) Wells

1) Borehole Structure (Figure 2-11 Borehole Structure)

2) Borehole Equipment (Figure 2-12 Borehole Equipment)

(4) Welezo Station

1) Layout（Figure 2-13 Welezo Station Layout）

2) Reservoir No.2 Structure（Figure 2-14 Welezo Station）

3) Reservoir No.3 Structure（Figure 2-15 Welezo Station Reservoir No.3 Structure）

(5) Dole Station

1) Layout（Figure 2-16 Dole Station Layout）

2) Reservoir Structure（Figure 2-17 Dole Station Reservoir Structure）

(6) Kinuni Station

1) Layout（Figure 2-18 Kinuni Station Layout）

2) Reservoir Structure（Figure 2-19 Kinuni Station Reservoir Structure）

(7) Saateni Station

1) Layout（Figure 2-20 Saateni Station Layout）

2) Transmission Pump House Plan（Figure 2-21 Saateni Station Transmission Pump House Plan）

3) Transmission Pump House Section（Figure 2-22 Saateni Station Transmission Pump House Section）

4) Transmission Pump House Flow Diagram（Figure 2-23 Saateni Station Transmission Pump Flow Diagram）

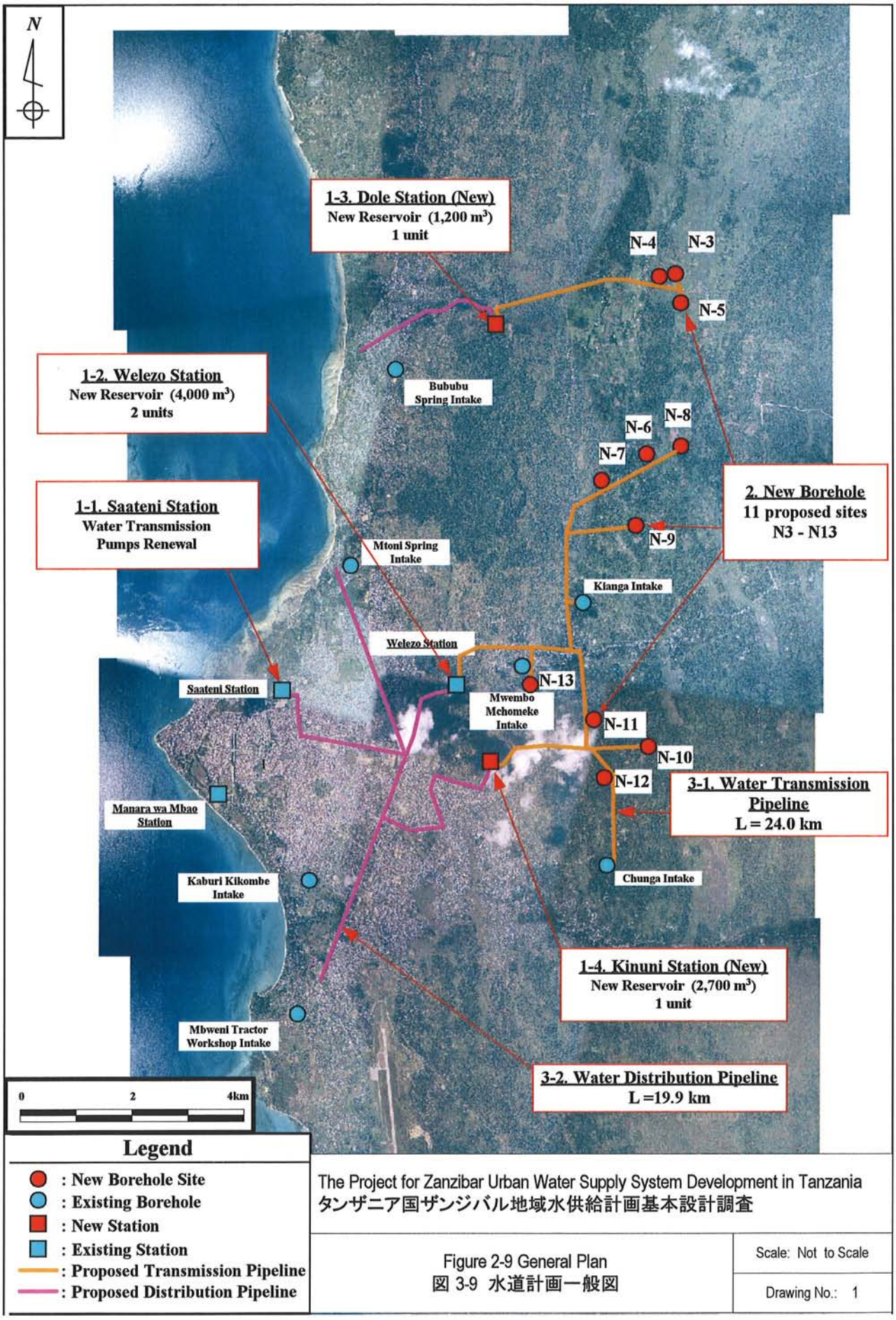
5) Transmission Pump House Plan Single Line Diagram（Figure 2-24 Saateni Station Transmission Pump House Plan Single Line Diagram）

(8) Transmission/Distribution Pipeline

1) Plan（Figure 2-25 Transmission/Distribution Pipeline Plan）

(9) Chlorine Dosing House

1) House Structure（Figure 2-26 Disinfection House Structure）

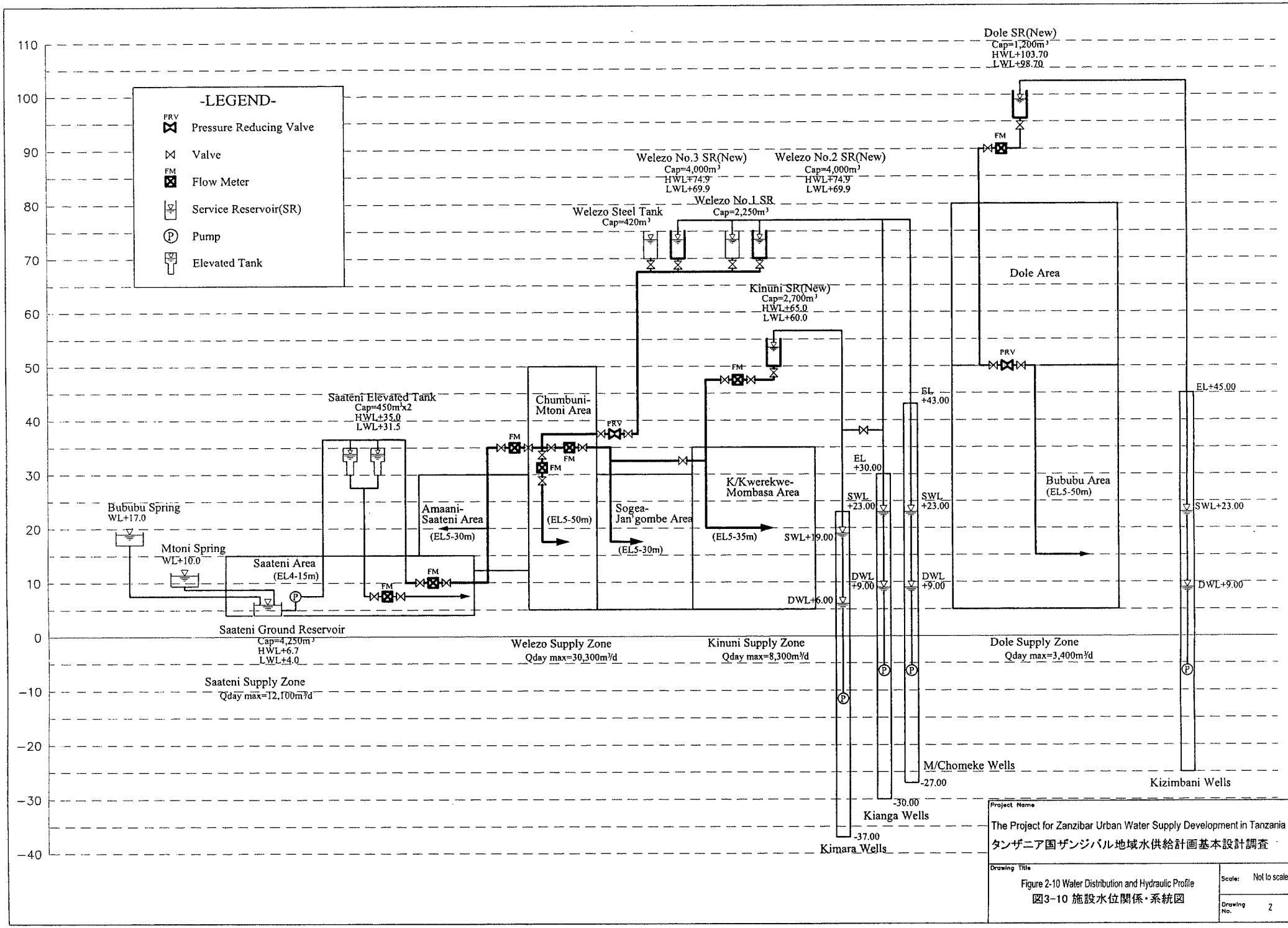


The Project for Zanzibar Urban Water Supply System Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査

Figure 2-9 General Plan
図 3-9 水道計画一般図

Scale: Not to Scale

Drawing No.: 1

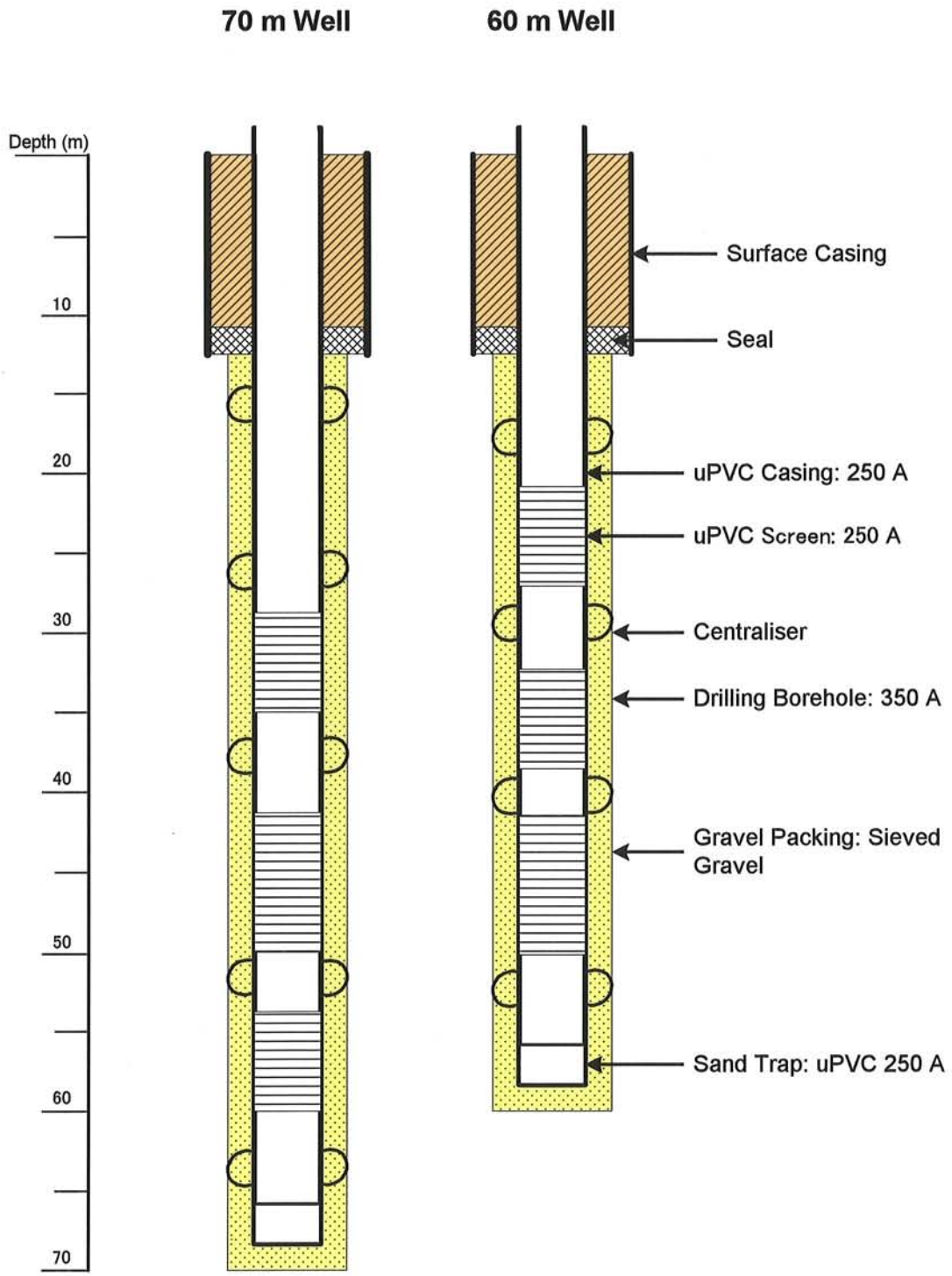


Project Name
The Project for Zanzibar Urban Water Supply Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査

Drawing Title
Figure 2-10 Water Distribution and Hydraulic Profile
図3-10 施設水位関係・系統図

Scale: Not to scale

Drawing No. 2

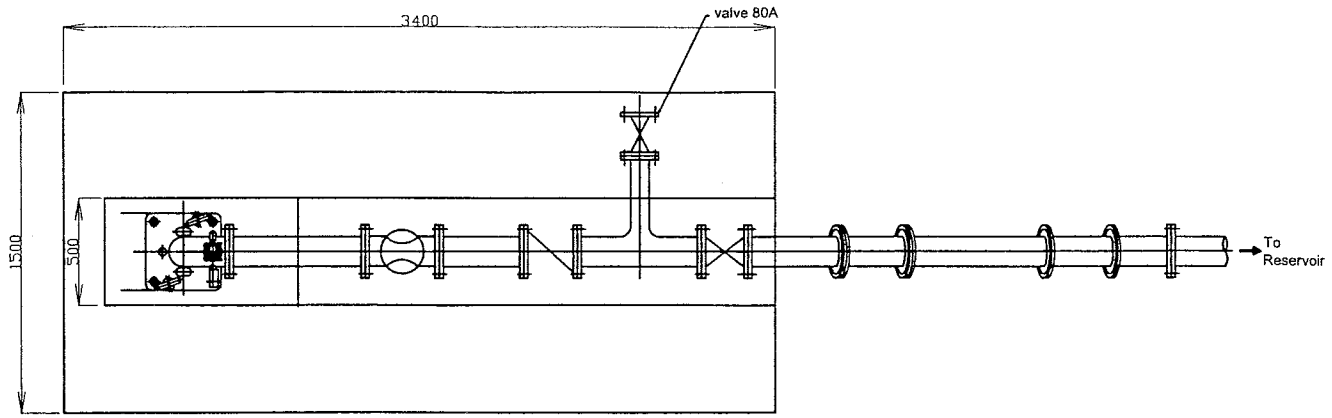


The Project for Zanzibar Urban Water Supply System Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査

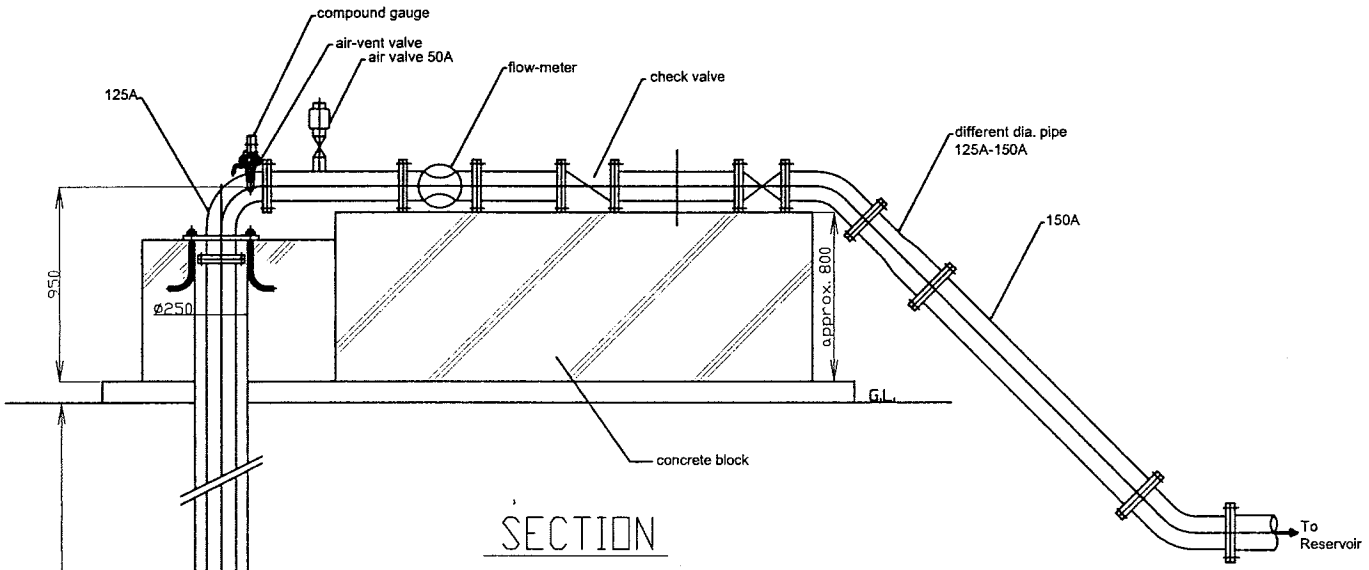
Figure 2-11 Borehole Structure
図 3-11 計画水源井の構造図

Scale: Not to Scale

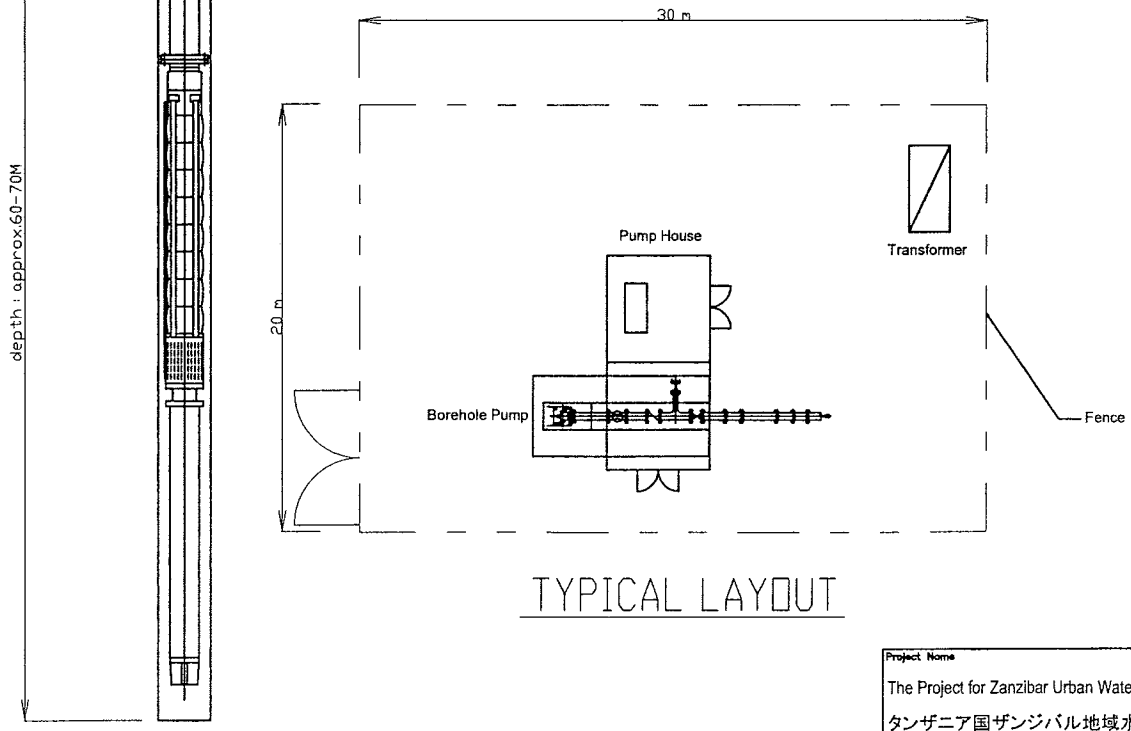
Drawing No.: 3



PLAN

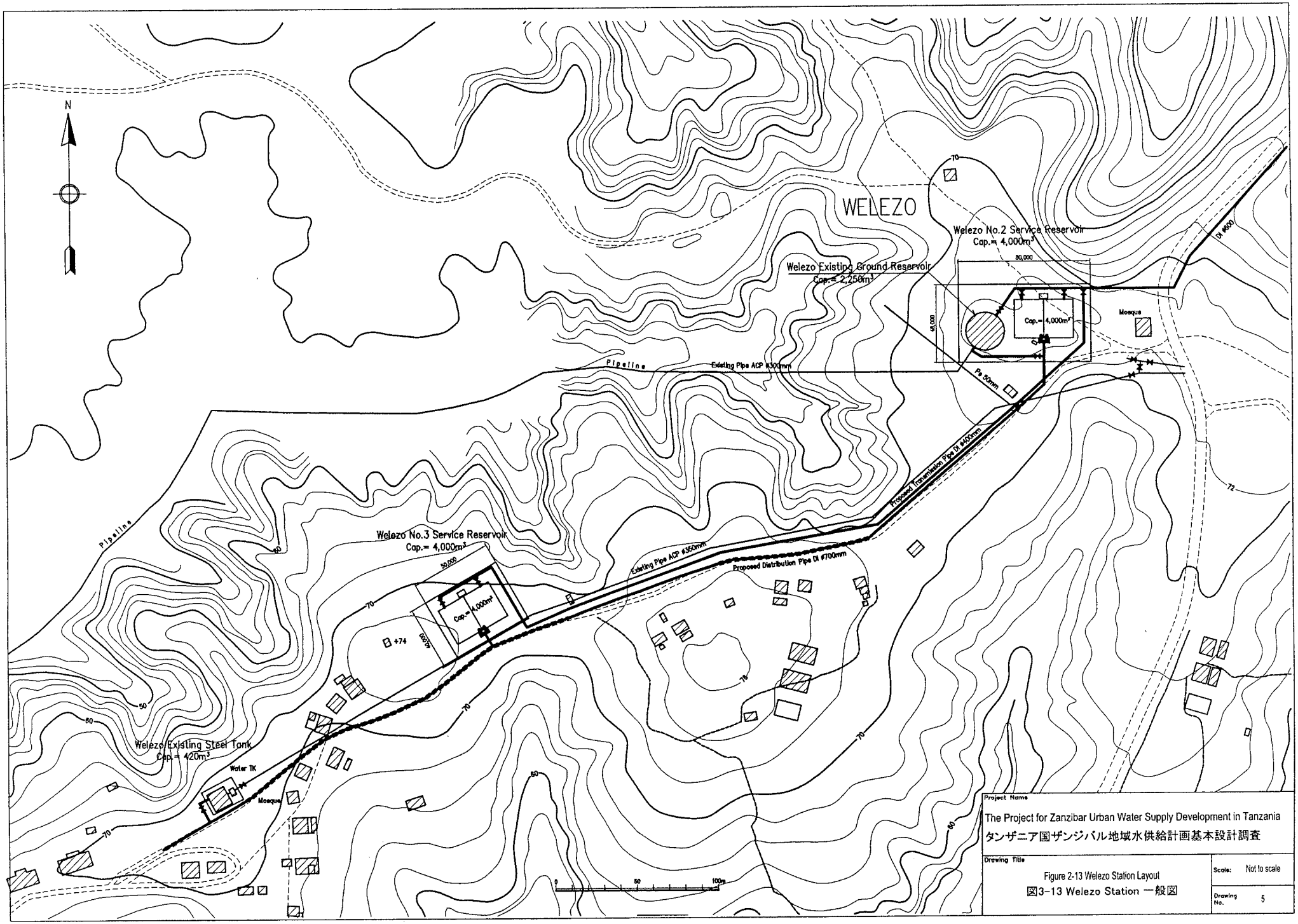


SECTION

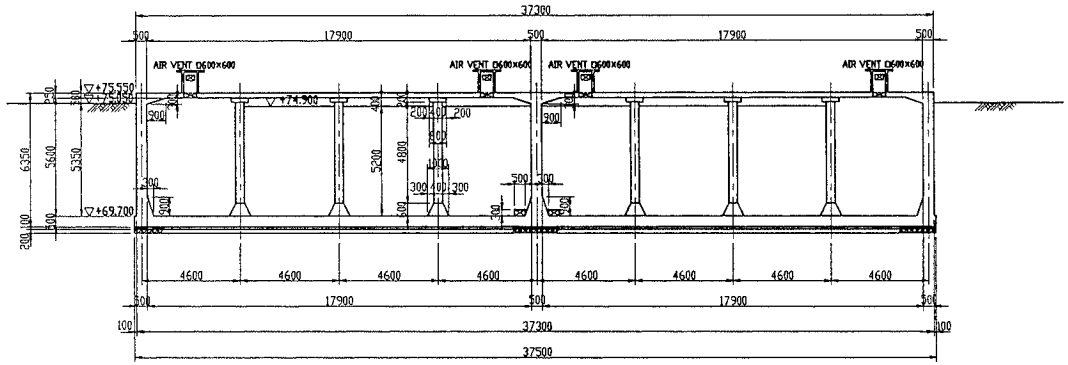


TYPICAL LAYOUT

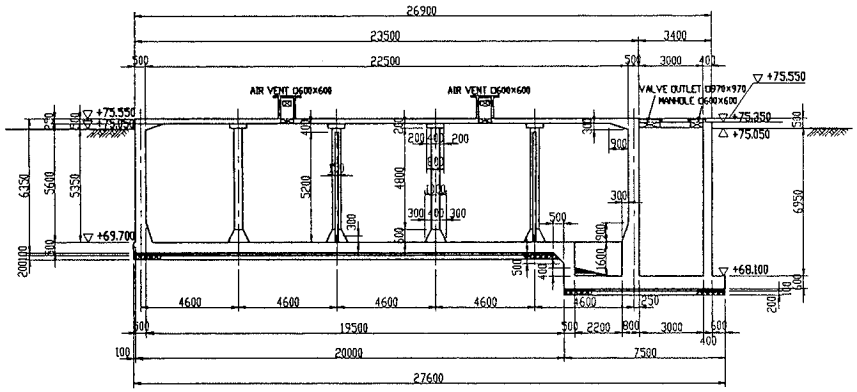
Project Name: The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査	
Drawing Title: Figure 2-12 Borehole Equipment 図3-12 井戸設備図	SCALE: Not to scale
	Drawing No. 4


N
WELEZO
Welezo No.2 Service Reservoir
Cap.= 4,000m³
Welezo Existing Ground Reservoir
Cap.= 2,250m³
Cap.= 4,000m³
Mosque
Pipeline
Existing Pipe ACP ϕ300mm
Pipeline
Welezo No.3 Service Reservoir
Cap.= 4,000m³
Cap.= 4,000m³
Existing Pipe ACP ϕ350mm
Proposed Transmission Pipe DI ϕ400mm
Proposed Distribution Pipe DI ϕ700mm
Welezo Existing Steel Tank
Cap.= 420m³
Water TK
Mosque
Project Name
The Project for Zanzibar Urban Water Supply Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title
Figure 2-13 Welezo Station Layout
図3-13 Welezo Station 一般図
Scale: Not to scale
Drawing No. 5

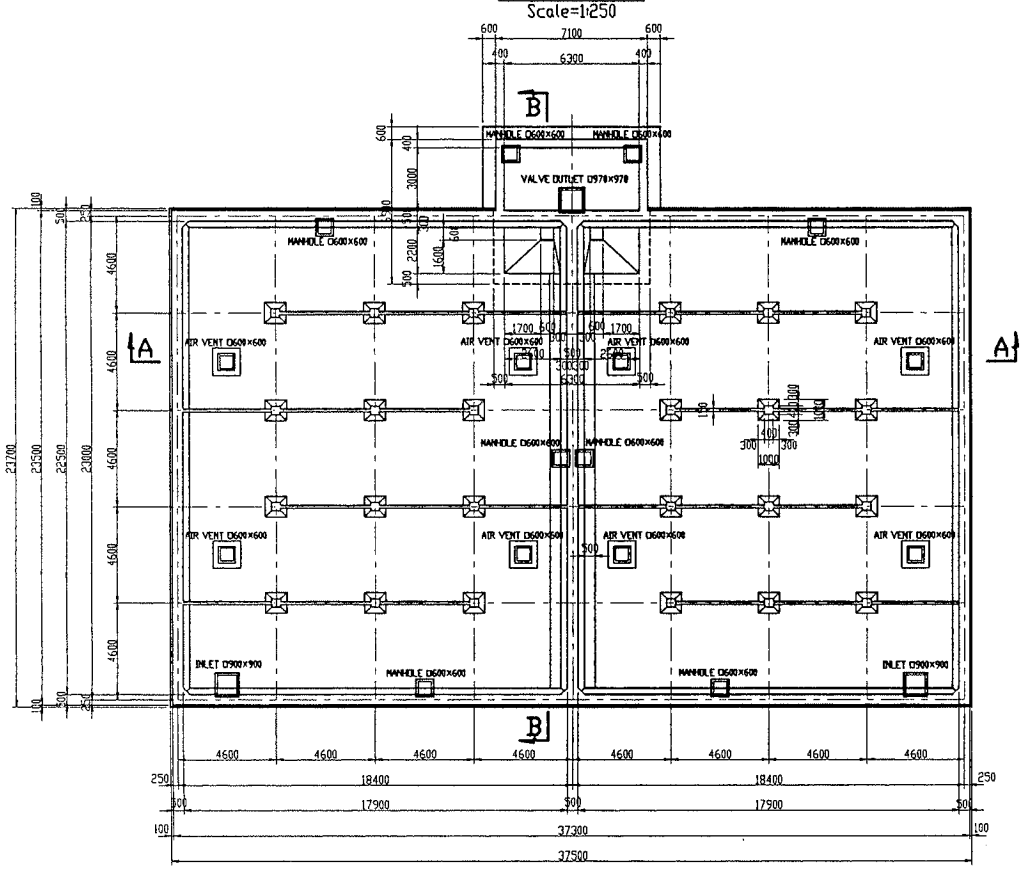
WELEZO No.2 Service Reservoir



SECTION A-A
Scale=1:250



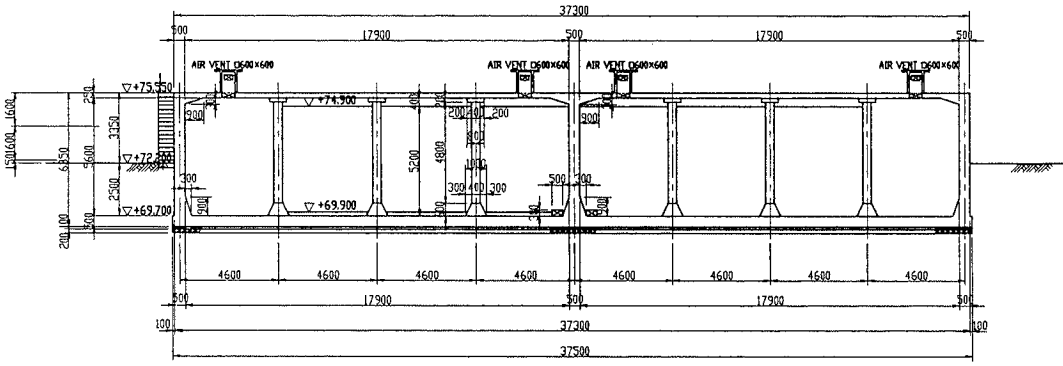
SECTION B-B
Scale=1:250



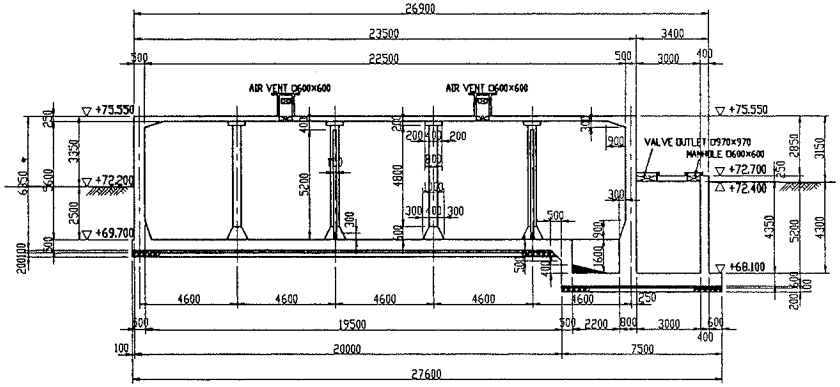
BOTTOM PLAN
Scale=1:250

Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-14 Welezo Station Reservoir No.2 Structure 図3-14 Welezo Station配水池No.2 構造図
Scale:	Not to scale
Drawing No.	6

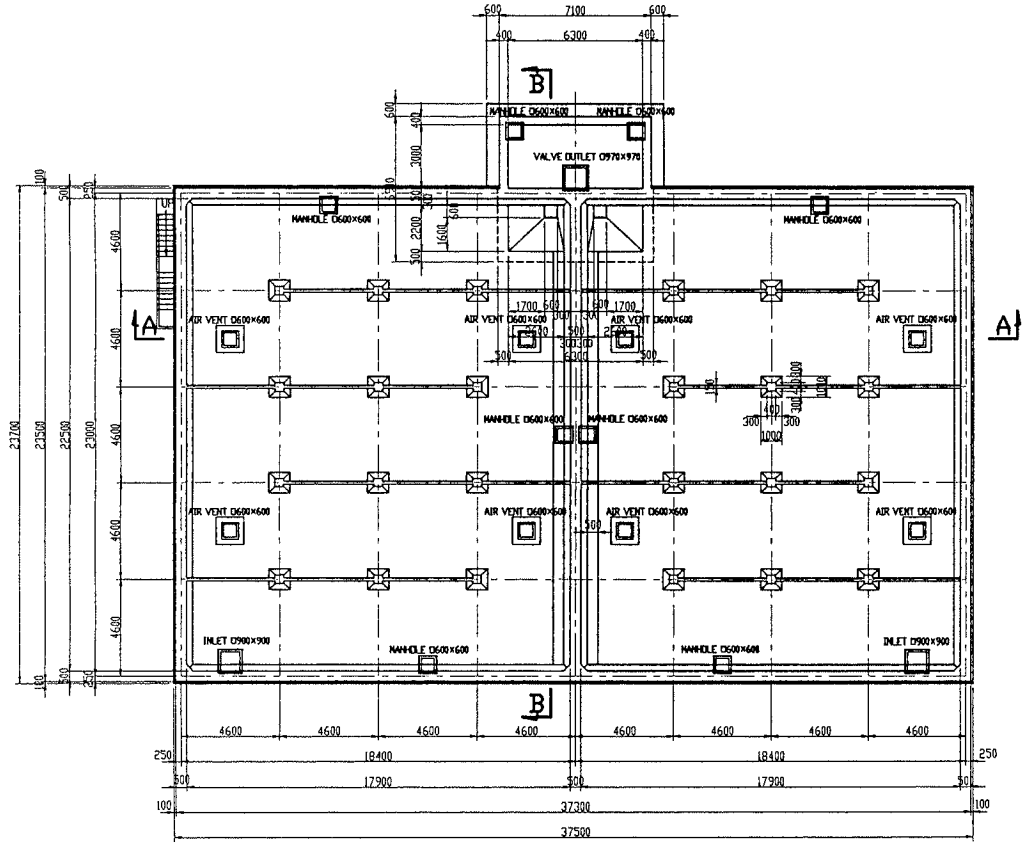
WELEZO No.3 Service Reservoir



SECTION A-A
Scale=1:250

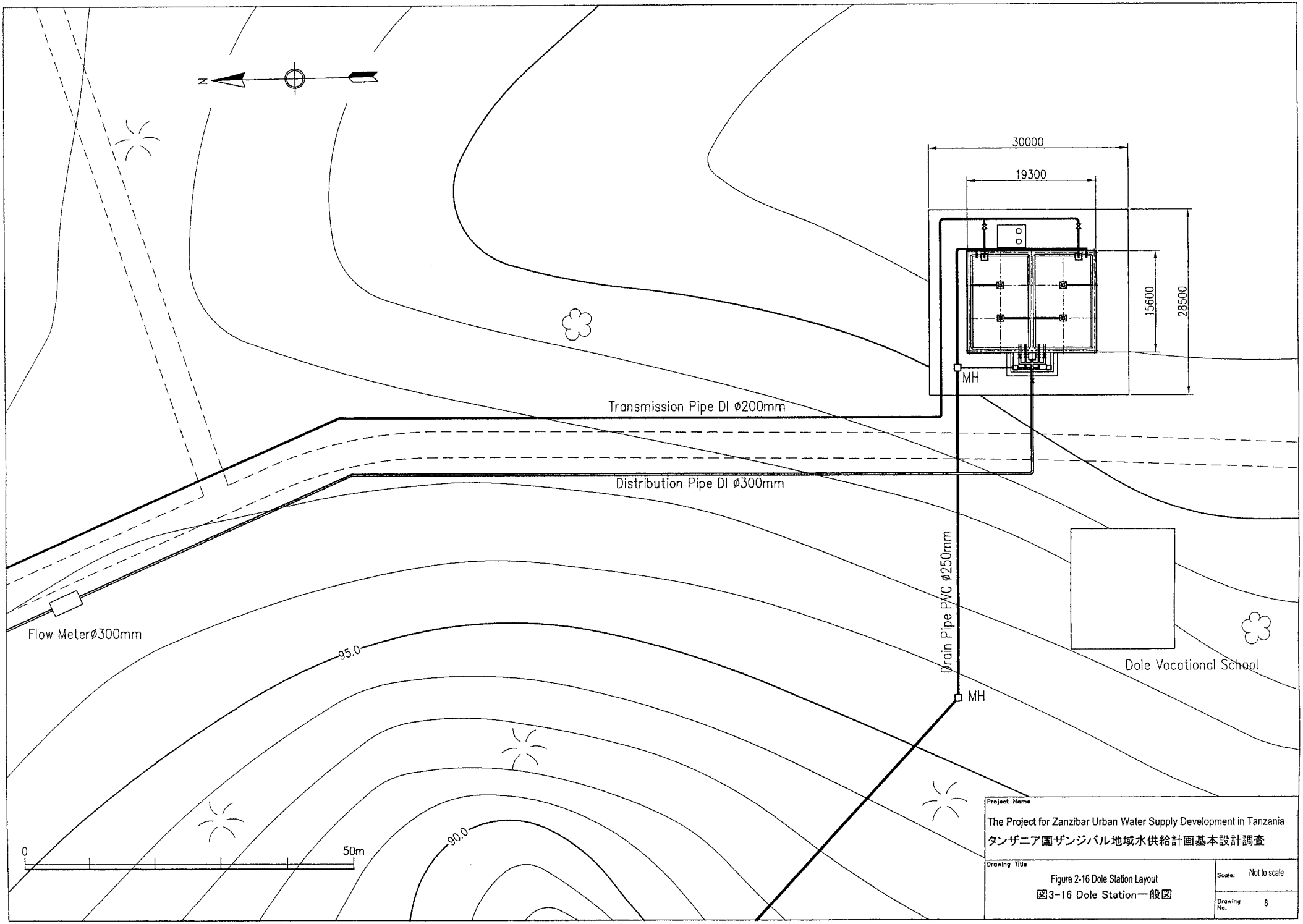


SECTION B-B
Scale=1:250

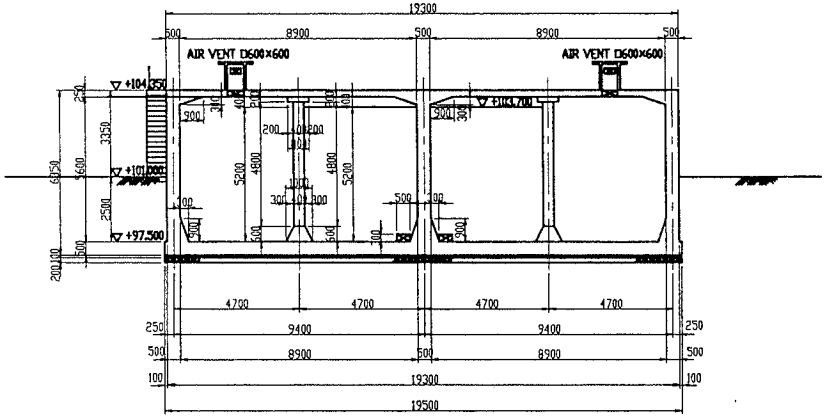


BOTTOM PLAN
Scale=1:250

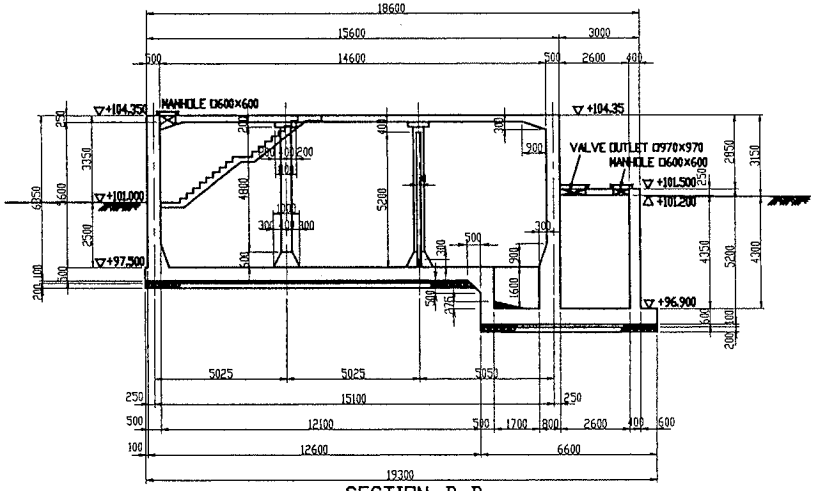
Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-15 Welezo Station Reservoir No.3 Structure 図3-15 Welezo Station配水池 No.3 構造図
Scale:	Not to scale
Drawing No.	7


N
30000
19300
15600
28500
MH
Transmission Pipe DI ø200mm
Distribution Pipe DI ø300mm
Drain Pipe PVC ø250mm
MH
Flow Meterø300mm
95.0
90.0
Dole Vocational School
0
50m
Project Name
The Project for Zanzibar Urban Water Supply Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title
Figure 2-16 Dole Station Layout
図3-16 Dole Station一般図
Scale: Not to scale
Drawing No. 8

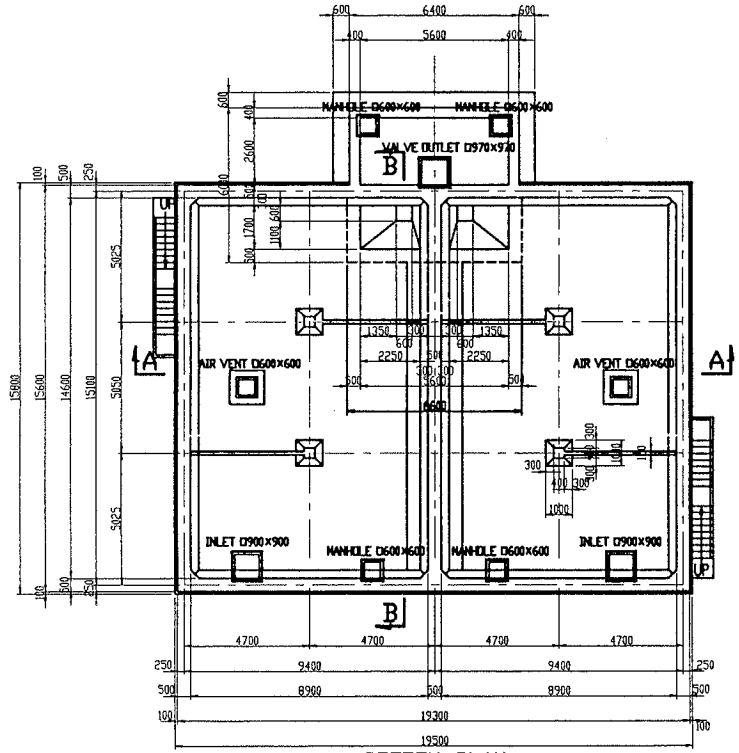
Dole Service Reservoir



SECTION A-A
Scale=1:200

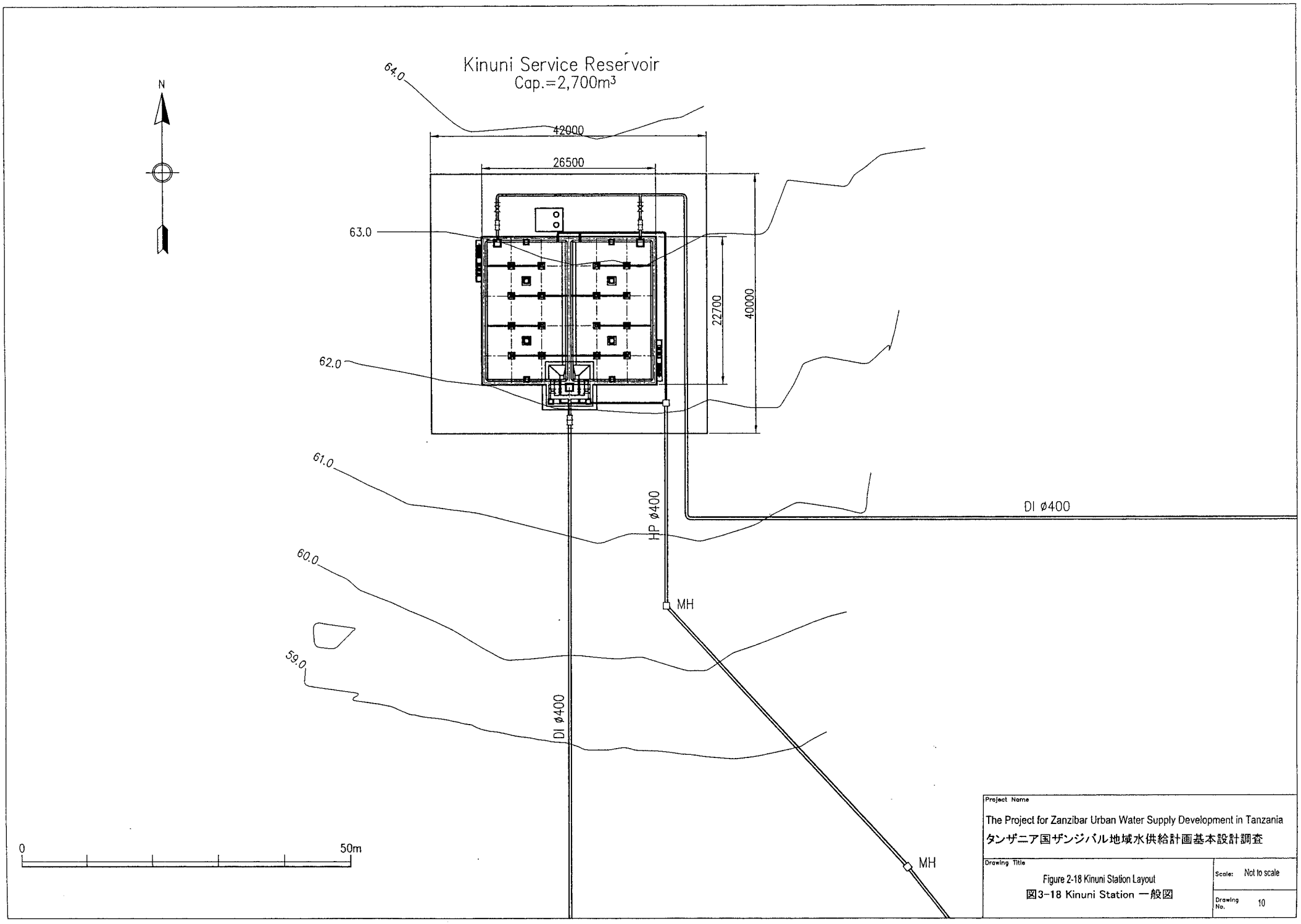


SECTION B-B
Scale=1:200

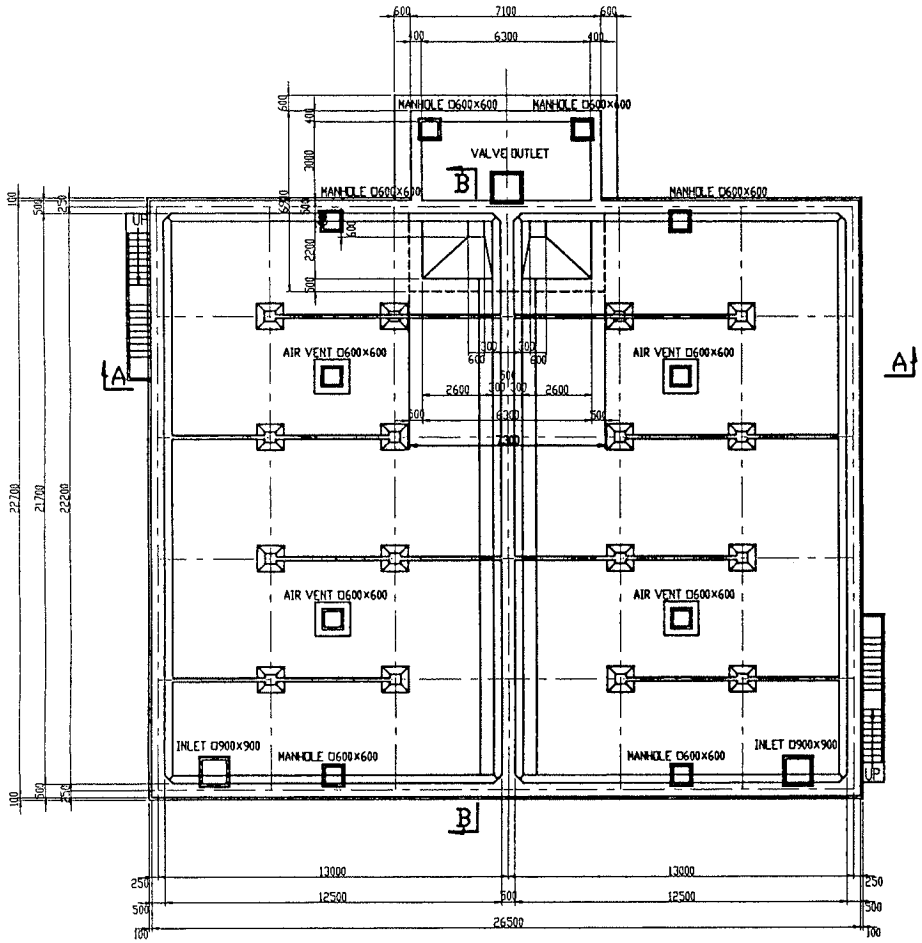


BOTTOM PLAN
Scale=1:200

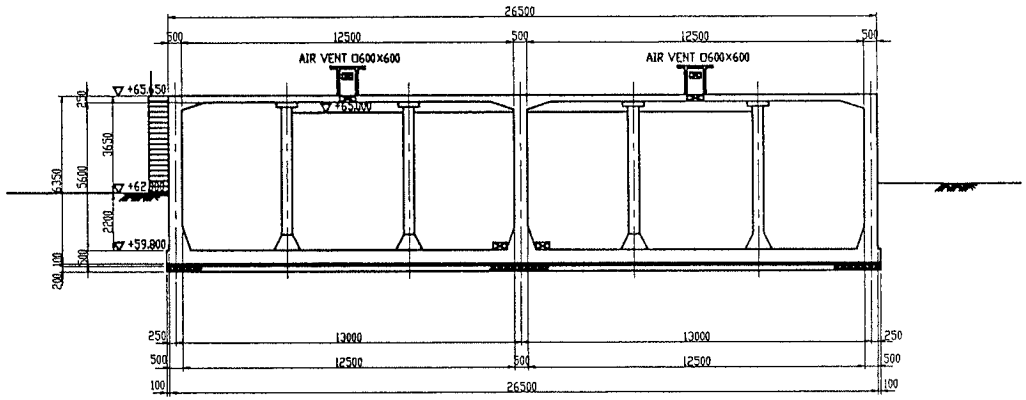
Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-17 Dole Station Reservoir Structure 図3-17 Dole Station 配水池 構造図
Scale:	Not to scale
Drawing No.	9


Kinuni Service Reservoir
Cap.=2,700m3
64.0
42000
26500
63.0
22700
40000
62.0
61.0
HP ø400
DI ø400
60.0
MH
59.0
DI ø400
MH
N
0
50m
Project Name
The Project for Zanzibar Urban Water Supply Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title
Figure 2-18 Kinuni Station Layout
図3-18 Kinuni Station 一般図
Scale: Not to scale
Drawing No. 10

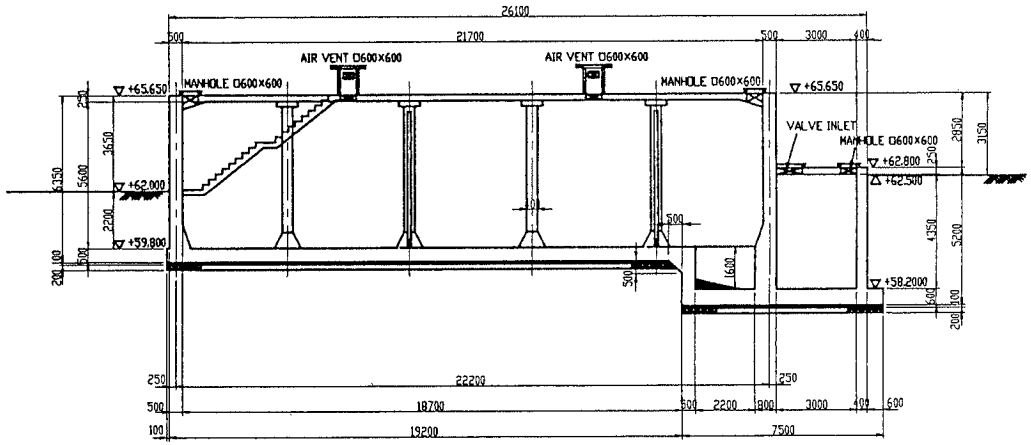
KINUNI Service Reservoir



BOTTOM PLAN
Scale=1:200

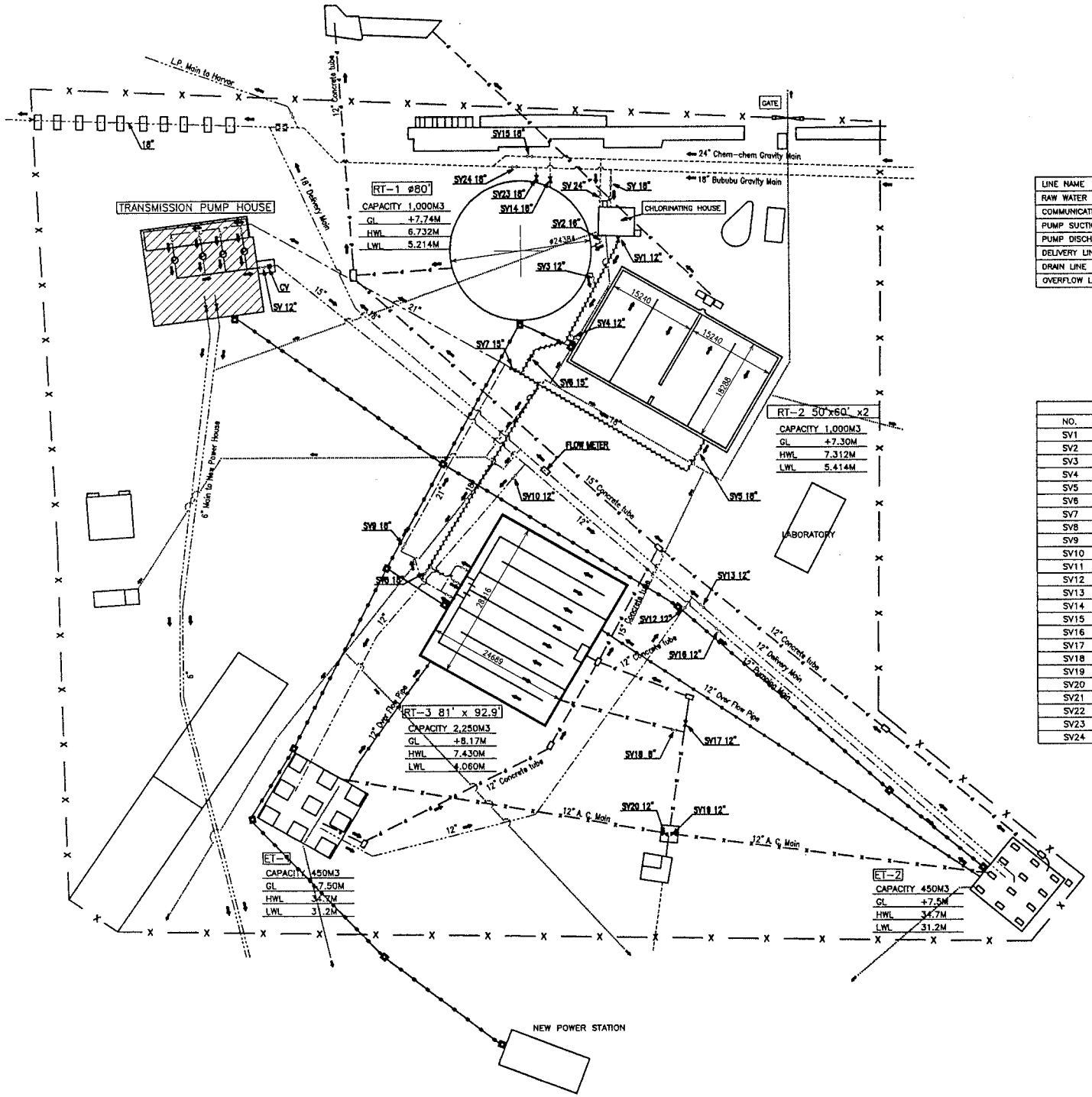


SECTION A-A
Scale=1:200



SECTION B-B
Scale=1:200

Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-19 Kinuni Station Reservoir Structure 図3-19 Kinuni Station配水池 構造図
Scale:	Not to scale
Drawing No.	11



LINE NAME	LINE TYPE
RAW WATER LINE	
COMMUNICATING LINE	
PUMP SUCTION LINE	
PUMP DISCHARGE LINE	
DELIVERY LINE	
DRAIN LINE	
OVERFLOW LINE	

ELEVATED TANK	ET
RESERVOIR TANK	RT

VALVE LIST		
NO.	POSITION	SIZE
SV1	CLOSED	12"
SV2	OPEN	16"
SV3	OPEN	12"
SV4	OPEN	12"
SV5	OPEN	18"
SV6	CLOSED	15"
SV7	CLOSED	15"
SV8	OPEN	18"
SV9	OPEN	18"
SV10	OPEN	12"
SV11	OPEN	9"
SV12	OPEN	12"
SV13	OPEN	12"
SV14	CLOSED	18"
SV15	OPEN	18"
SV16	OPEN	12"
SV17	CLOSED	12"
SV18	OPEN	8"
SV19	CLOSED	12"
SV20	CLOSED	12"
SV21	CLOSED	
SV22	OPEN	12"
SV23	CLOSED	18"
SV24	OPEN	18"

Project Name

The Project for Zanzibar Urban Water Supply Development in Tanzania

タンザニア国ザンジバル地域水供給計画基本設計調査

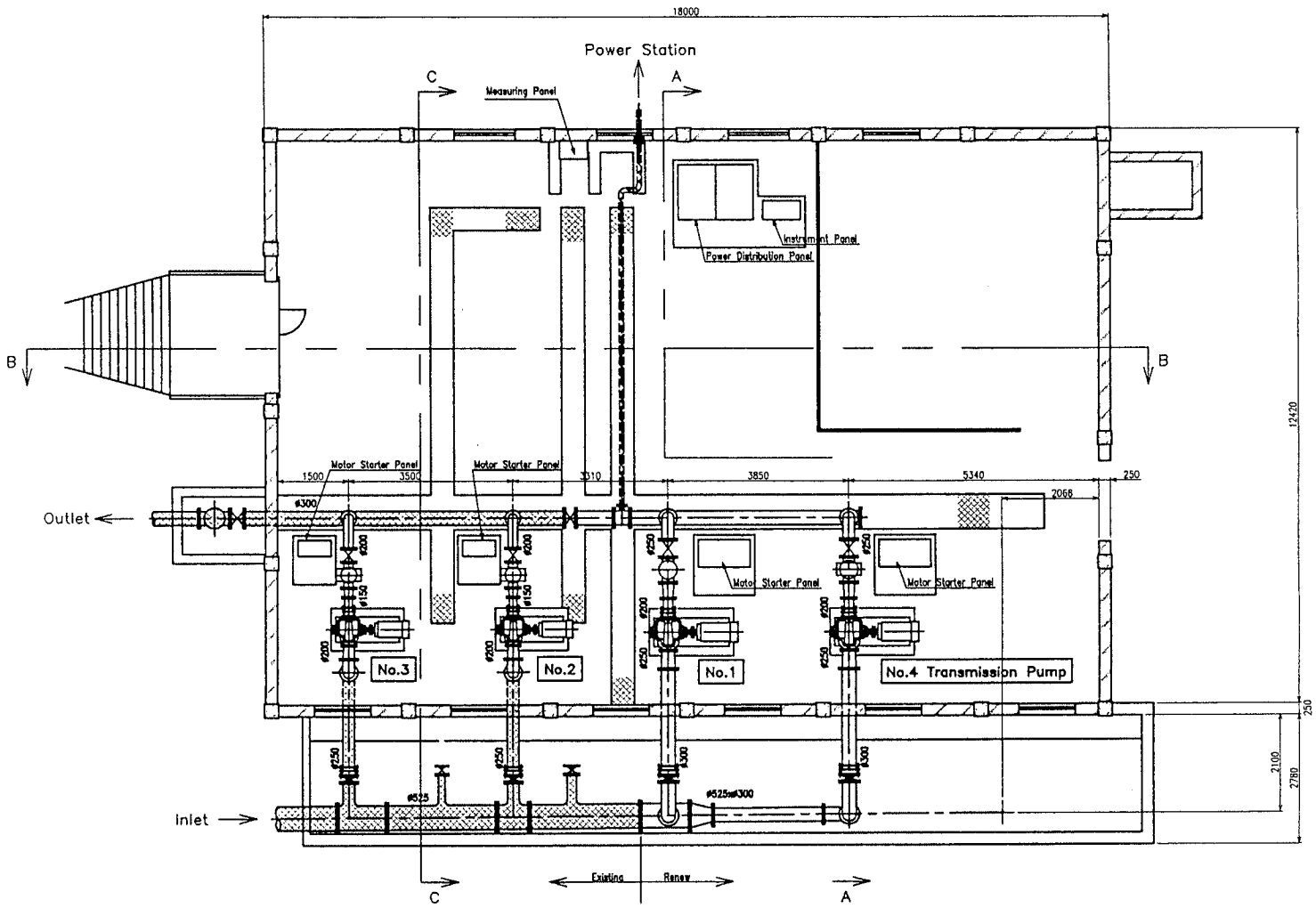
Drawing Title

Figure 2-20 Saateni Station Layout

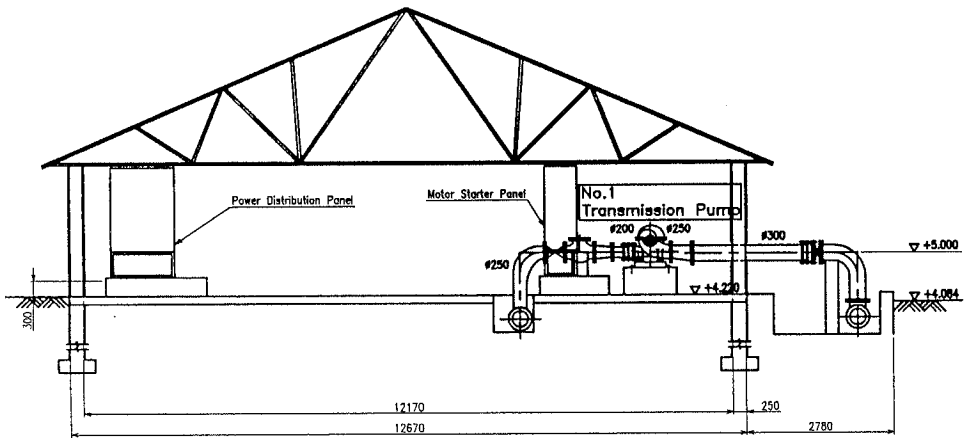
図3-20 Saateni Station 一般図 (既設)

Scale: Not to scale

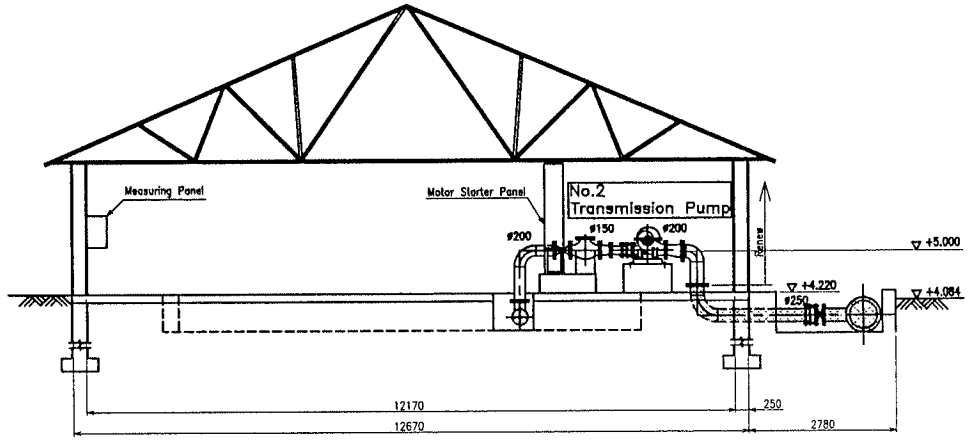
Drawing No. 12



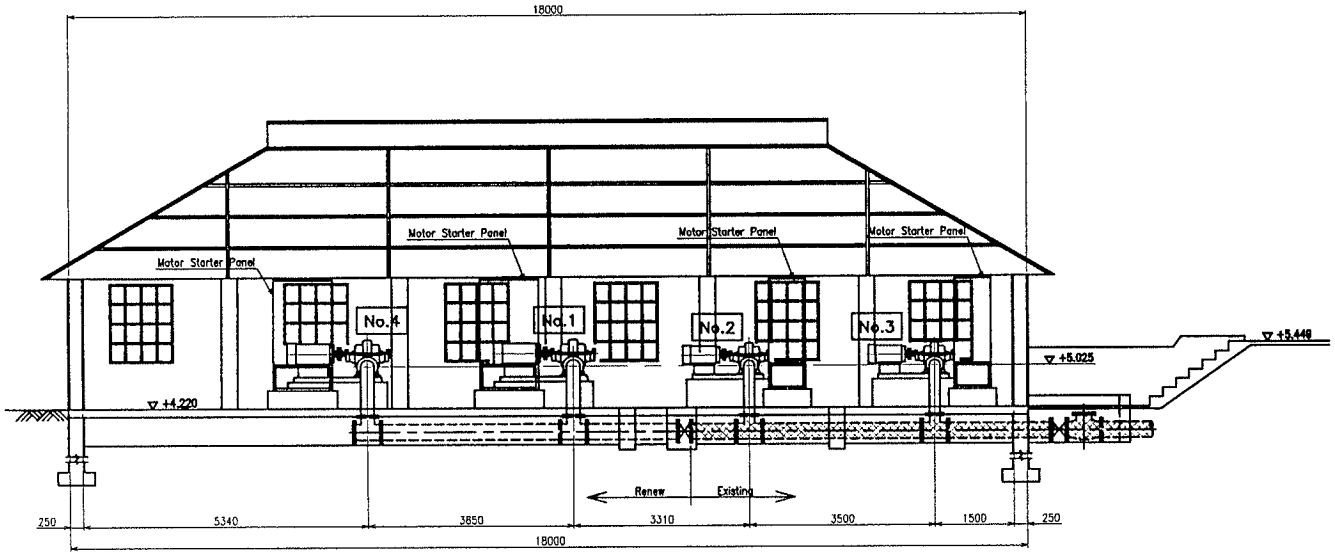
Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-21 Saateni Station Transmission Pump House Plan 図3-21 Saateni Station送水ポンプ場平面図
SCALE:	Not to scale
Drawing No.	13



SECTION A – A

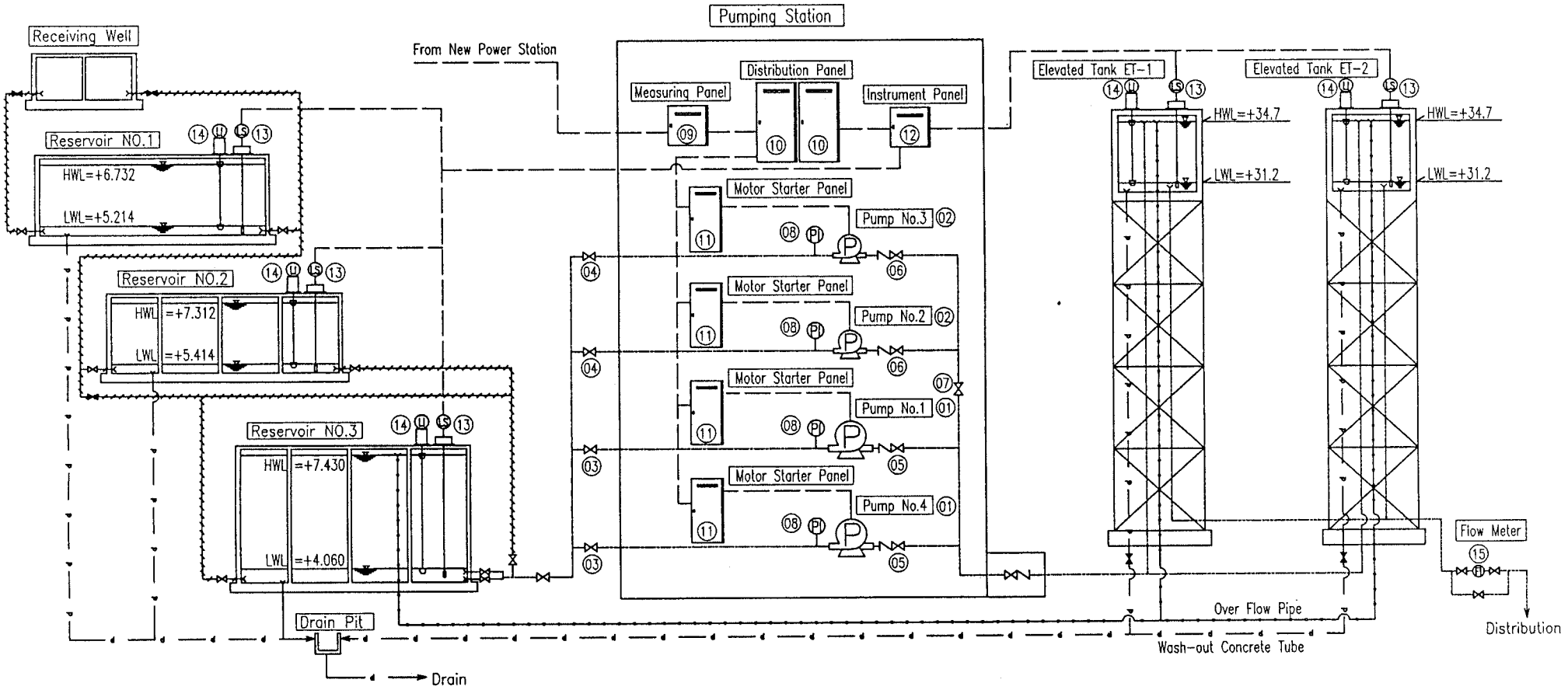


SECTION C – C



SECTION B – B

Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-22 Saateni Station Transmission Pump House Section 図3-22 Saateni Station送水ポンプ場 断面図
SCALE:	Not to scale
Drawing No.	14



NO.	01	02	03	04	05	06	07	08
NAME	PUMP	PUMP	SUCTION VALVE	SUCTION VALVE	DISCHARGE VALVE	DISCHARGE VALVE	DISCHARGE HEADER VALVE	PRESSURE INDICATOR
TYPE	DOUBLE SUCTION VOLUTE PUMP	DOUBLE SUCTION VOLUTE PUMP	SLUICE VALVE	SLUICE VALVE	SLUICE VALVE	SLUICE VALVE	SLUICE VALVE	MECHANICAL TYPE
SPECIFICATION	ϕ300/250×400m3/h×40m	ϕ250/200×200m3/h×40m	ϕ300	ϕ250	ϕ250	ϕ200	ϕ300	-----
REMARKS	-----	-----	MANUAL OPERATION	MANUAL OPERATION	MANUAL OPERATION	MANUAL OPERATION	MANUAL OPERATION	-----

NO.	09	10	11	12	13	14	15	
NAME	MEASURING PANEL	DISTRIBUTION PANEL	MOTOR STARTER PANEL	INSTRUMENTS PANEL	LEVEL SWITCH	LEVEL INDICATOR	INTEGRATING FLOW METER	
TYPE	WALL-MOUNTED	SELF-STAND	SELF-STAND	WALL-MOUNTED	SUBMERGIBLE TYPE	MECHANICAL TYPE	MECHANICAL TYPE	
SPECIFICATION	-----	-----	-----	-----	-----	-----	-----	
REMARKS	-----	-----	-----	-----	-----	-----	-----	

LINE NAME	LINE TYPE
RAW WATER LINE	
CONNECTING LINE	
PUMP SUCTION LINE	
PUMP DISCHARGE LINE	
DELIVERY LINE	
DRAIN LINE	
OVERFLOW LINE	

Project Name

The Project for Zanzibar Urban Water Supply Development in Tanzania

タンザニア国ザンジバル地域水供給計画基本設計調査

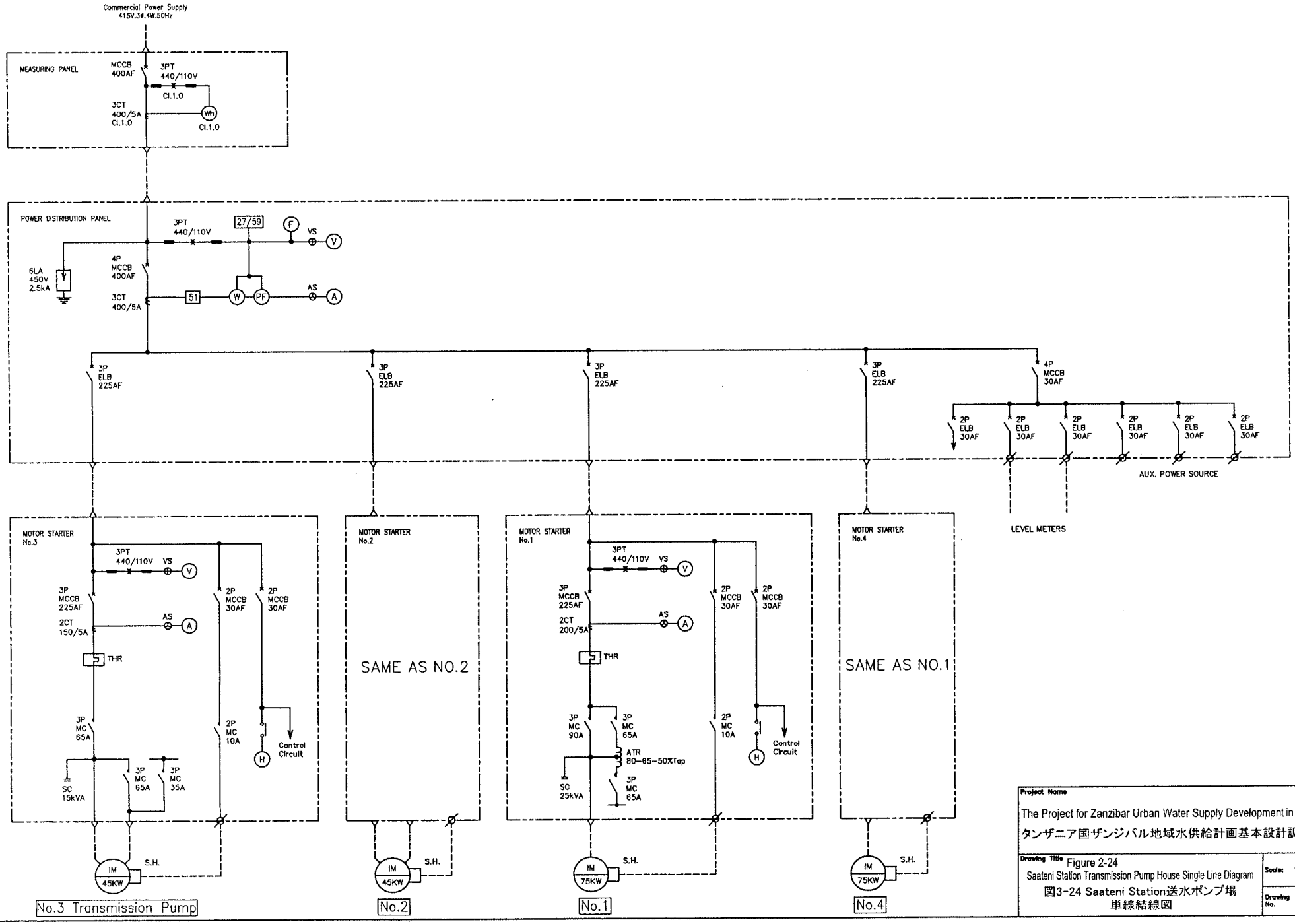
Drawing Title

Figure 2-23 Saateni Station Transmission Pump Flow Diagram

図3-23 Saateni Station送水ポンプ場 フローダイアグラム

SCALE: Not to scale

Drawing No. 15

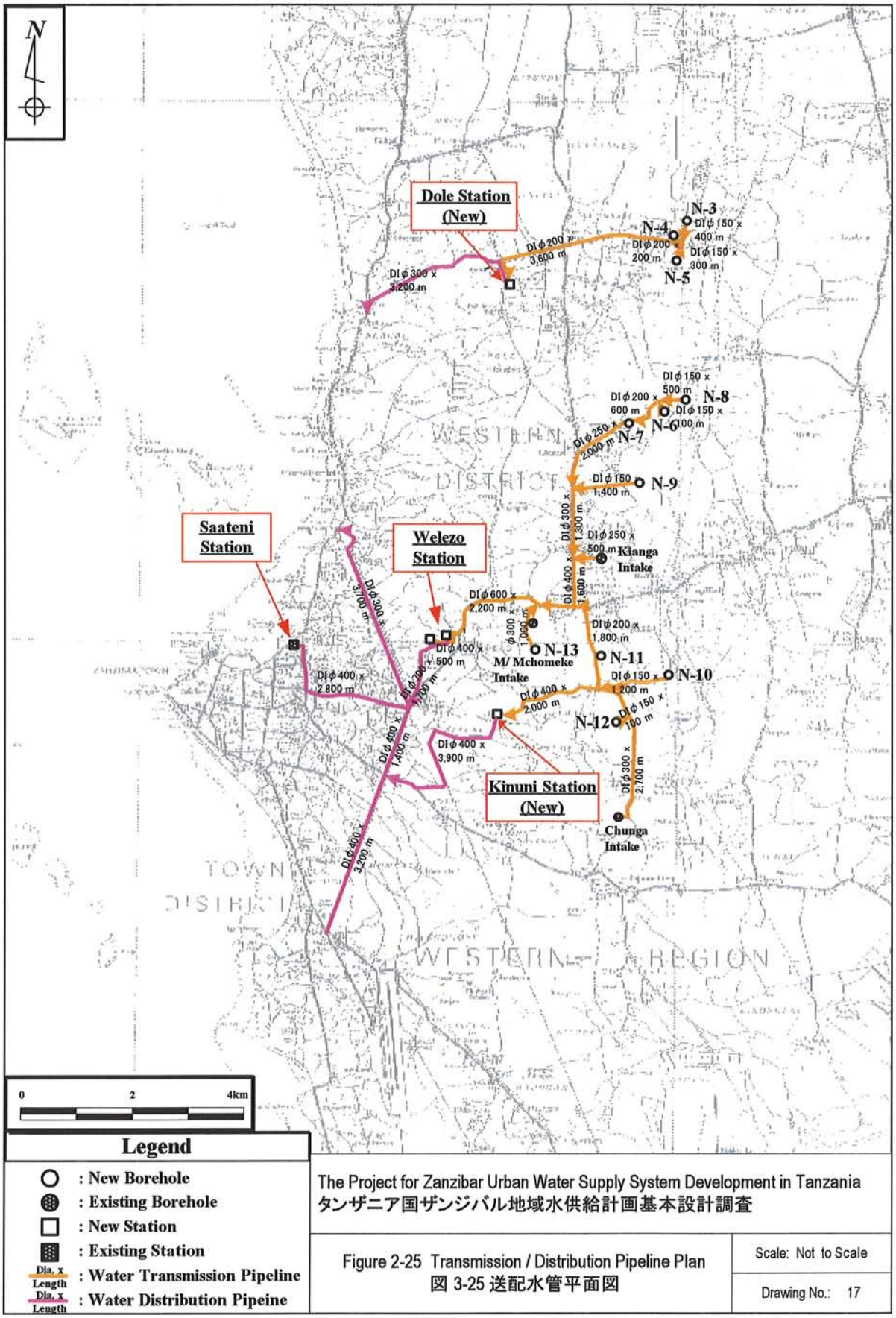


Project Name
The Project for Zanzibar Urban Water Supply Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査

Drawing Title
Figure 2-24
Saateni Station Transmission Pump House Single Line Diagram
図3-24 Saateni Station送水ポンプ場 単線結線図

Scale: Not to scale

Drawing No. 16

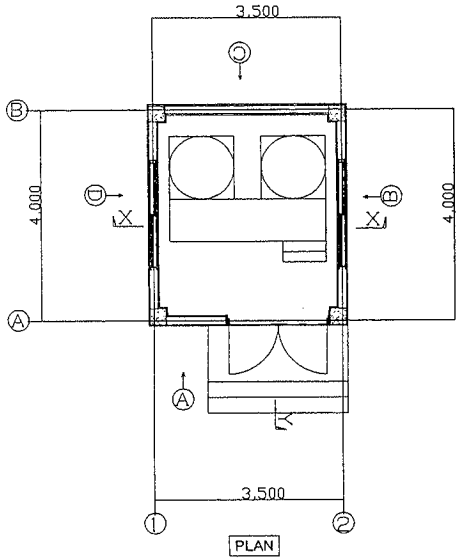


The Project for Zanzibar Urban Water Supply System Development in Tanzania
タンザニア国ザンジバル地域水供給計画基本設計調査

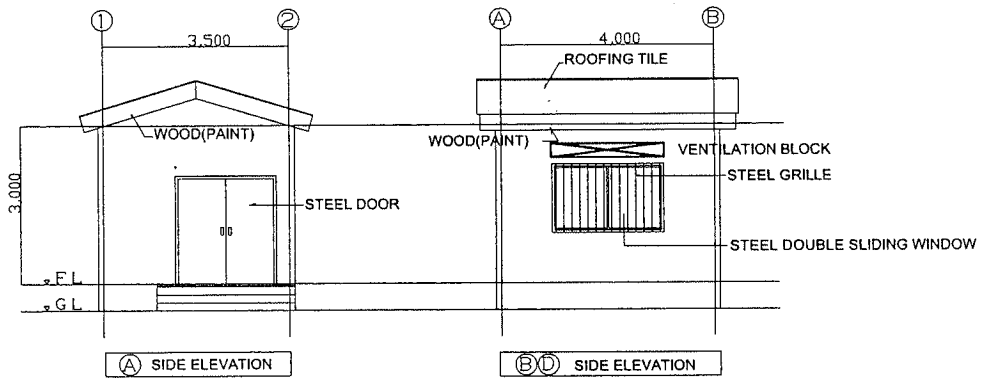
Figure 2-25 Transmission / Distribution Pipeline Plan
図 3-25 送配水管平面図

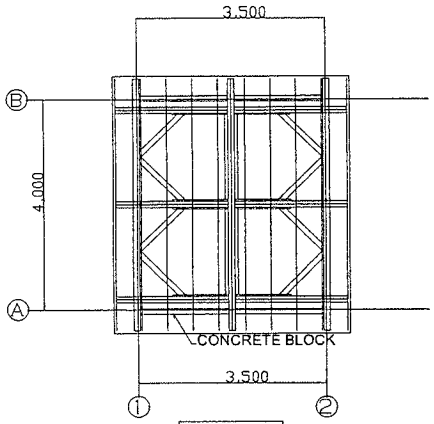
Scale: Not to Scale

Drawing No.: 17

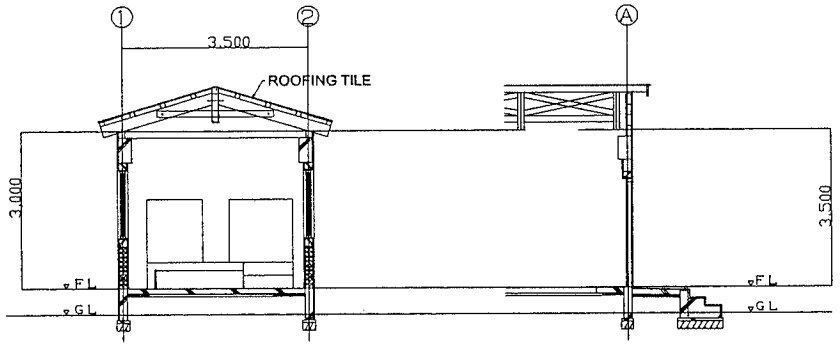


PLAN





ROOF PLAN



Project Name	The Project for Zanzibar Urban Water Supply Development in Tanzania タンザニア国ザンジバル地域水供給計画基本設計調査
Drawing Title	Figure 2-26 Chlorine Dozing House 図3-26 消毒小屋構造図
Scale:	Not to scale
Drawing No.	18

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

Implementation agency of the project is Department of Water Development under the Ministry of Water, Construction, Energy and Lands of The Revolutionary Government of Zanzibar. Project Implementation Diagram is shown in Figure 2-27.

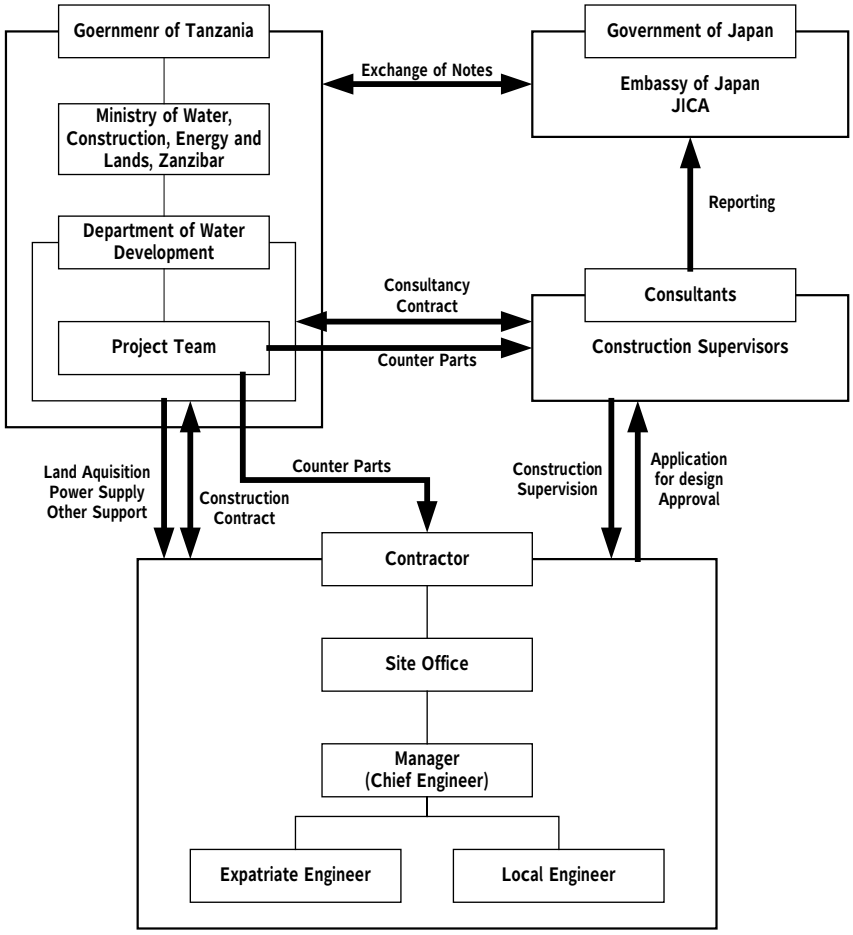


Figure 2-27 Project Implementation Diagram

The project team to be organized in DWD will be in charge of the project implementation from the detailed design stage. The project team will be responsible for the following works:

a. To represent DWD for the project implementation
b. To liaise with and coordinate Zanzibar and Tanzania Government Agencies
c. To liaise with and coordinate the related external agencies such as UNDP
d. To work as counter parts for consultants in designing and tendering
e. To secure manpower for additional survey and tests, if required.

The selected Japanese Consultants will undertake detailed design, tendering, construction supervision, aiming for project completion within the given time frame. Thus the consultants will dispatch a resident engineer who will supervise construction works on behalf of DWD. The consultants will also dispatch borehole, civil, mechanical and

electrical engineers for construction supervision.

As the project consists of drilling works, civil works, plumbing works and mechanical/electrical works, it is considered appropriate that a Japanese civil contractor with experience in the similar construction works will undertake the works. The public bidding system will be used for selection of the contractor. The consultants, in consultation with DWD, will prepare bidders' qualification requirement and selection criteria for contractor.

During the construction works, the Japanese contractor will dispatch resident engineers at site, and supervise and instruct the local sub-contractors. The construction industry in Tanzania is well matured and the local construction companies can work on this project as sub-contractors.

2-2-4-2 Implementation Conditions

Construction works include borehole drilling, reservoir construction, transmission/distribution pipe laying, and mechanical and electrical equipment renewal at the transmission pump house. Open space for a site office and stockyards is readily available around the Stone Town through DWD. The followings will require special attention during the construction works.

- Manual labour is readily available in Zanzibar, while skilled engineer, some construction materials and heavy machineries are to be procured in the mainland Tanzania.
- The average annual rainfall is 1,600 mm. They have rainfall every month. Days with more than 10 mm rainfall will be regarded as off days for construction.
- Special construction method for renewal of transmission pumps will be selected to minimize disruption of water supply.
- No ready mixed concrete is available in Zanzibar. Thus concrete will be mixed at the construction sites.
- Drilling, pump installation and test run will be done under the strict supervision of the Japanese engineers.
- Tanzania VAT will be waived for the construction works upon official applications.
- The proposed well sites have normal soil and sand in the surface layer, and limestone at the depth over 5 meters. The appropriate drilling machines will be selected for this condition. The limited construction period may make procurement of drilling machines difficult.
- All the proposed well sites are in the government owned lands. There are some private owned lands around the sites and confirm the land availability with DWD counter parts.
- Although this project does not require EIA, implementation plan shall give due consideration for the surrounding environment.

2-2-4-3 Scope of Works

The scope of works for both Japanese and Tanzania governments is shown in Table 2-27. The scope of undertakings of Tanzania side has been discussed and accepted by the Tanzania Government, which follows the Japanese grant aid policy shown in Table 2-28.

Table 2-27 Project Scope for Tanzania and Japanese Governments

Item	Works	To be undertaken by Tanzania Gov.	To be undertaken Japanese Gov.
Construction of new wells, reservoirs and transmission/distribution pipelines	Equipment procurement		○
	Civil construction works		○
	Equipment installation		○
	Land acquisition	○	
	Fencing	○	
	Installation of Power transmission lines	○	
	Obtaining construction approval	○	
	Removal of the existing pipes	○	
Renewal of transmission pumps	Disposal of the replaced pumps	○	
	Procurement		○
	Installation/Adjustment		○
	Disposal of replaced roofing materials	○	

Table 2-28 Major Undertakings to be taken by Each Government

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

Remarks B/A: Banking Arrangement, A/P: Authorization to Pay

2-2-4-4 Consultant Supervision

After the completion of this basic design study, the project is subject to the GOJ cabinet approval of GOJ. Upon the cabinet approval, Japanese and Tanzania Governments will sign the Exchange of Notes on grant aid for the project.

1) Detailed Design

Based on the Exchange of Notes, MWCEL will hire consultants for detailed design works for the project. After the GOJ verification of the detailed design contract, the consultants will perform detailed site survey and prepare detailed design, cost estimate and tender documents in Japan. .

2) Tendering and Evaluation

All the tender documents are subject to MWCEL approval. After the approval, the consultants will immediately proceed with tendering.

a. To allow one week for bidders to prepare an application for prequalification
b. To evaluate prequalification submissions from the bidders immediately
c. To allow one and half months for prequalified bidders to prepare bidding documents after providing tender documents to each prequalified bidder.
d. To recommend the lowest qualified bidder for MWCEL as a successful bidder and assist MWCEL in contract negotiation.

3) Construction Supervision

Construction works include civil works, well drilling works, plumbing works, mechanical/electrical works. Besides a resident civil engineer, the consultants will dispatch, civil engineers for drilling, plumbing and structures, mechanical and electrical engineers to the construction site in a few occasions, as construction works requires supervision by the above specialists. The consultants will hire local engineers to support their works.

The resident engineer of the consultants will maintain close contact with DWD and the contractors throughout the project implementation. The resident engineer will submit progress reports to the JICA Tanzania Office and to the JICA headquarters at the agreed interval.

2-2-4-5 Procurement Plan

1) The Countries of Origins

For grant aid projects, the countries of origins are limited to Japan and the recipient country in principle. Materials and equipment required for this project shall be procured in Tanzania as much as possible. Some items that are not available in Tanzania, or whose supply and price is not consistent in the local market will be procured in Japan or the third countries with due consideration for cost effectiveness, ease of maintenance, and reliability of suppliers. Kenya, South Africa and EU will be considered for procuring locally unavailable items.

a) Civil Materials

Civil construction industry in Zanzibar is not matured and supply of civil materials such as sand, timber is not consistent in regard to quality, quantity and delivery time. Reinforcing bars, cement, aggregate (sand and gravel) are readily available in Tanzania mainland, so those civil materials will be procured within Tanzania.

b) Equipment for Transmission Pump Station

The existing transmission pumps are made in EU, which are regarded as reliable, serviceable and economical. Thus Japanese products will be compared to EU products.

c) Equipment for Wells

PVC casing and screens are made locally in Tanzania and has been used for most of the existing wells. Submersible pumps for wells are manufactured and imported by the EU companies.

d) Pipes

PVC pipes and ductile iron pipes to be used in this project follow the standard specifications of JIS and ISO, thus those pipes could be procured in any countries. PVC pipes are readily available in Tanzania. Ductile iron pipes are usually imported from Kenya, South Africa, and EU.

e) Pickup Trucks

Most of the operating trucks in Zanzibar are second hand Japanese cars and spare parts and mechanics are readily available. Thus pickup trucks will be procured in Japan.

Table 2-29 Procurement Plan

Category	Item	Expected Country of Origins		
		Tanzania	Third Countries EU	Japan
Civil Materials	Cement, Aggregate,	○		
	Bricks,	○		
	Reinforcing bars: .	○		
Equipment for Transmission Pump Station	Pump, Valve		○	○
	Electrical Equipment		○	○
Equipment for wells	Casing	○		
	Screens	○		
	Submersible Pumps		○	○
	Electrical Equipment		○	○
Pipes	PVC Pipes	○		
	Ductile Iron Pipes		○	△
Trucks	Pickup Trucks			○

2) Delivery and Storage of Trucks

Procured pickup trucks will be delivered to and stored at DWD head quarters.

2-2-4-6 Soft Component Plan

(1) Background

DWD provides water supply to urban and rural areas of Zanzibar. DWD has 793 staff and provides water supply to around 230 business customers and 34 thousand household customers and public faucet users. However, they collect water charges from only business customers and do not collect from resident users. In addition, they charge water tariff to only 6 customers based on consumption counted by an attached water meter. They charge flat rates to other customers. This project plans to supply water to around 80 thousand households, hotels, restaurants and other industry users. Presently, only 4 staff work on revenue collection and they must perform customer management, meter readings, billing and collection manually without standardized business process or guidelines.

Zanzibar Water Supply Authority (ZWSA) will plan to be established based on the Water Policy and this Authority aim to provide water supply with a cost recovery policy. To achieve the objectives of this project, ZWSA should recruit a sufficient number of qualified staff to carry out operations and maintenance work. However, several problems and issues exist regarding management skills for collect the necessary information to make effective analysis of system operations. Therefore, strengthening senior management skills and knowledge with this projects soft component program as well as doing a technical transfer of the total system is required.

(2) Objectives

The objectives of this project is to provide safe and sustainable water supply to the people of Zanzibar Urban/West districts with sufficient facility operation and management based on sound water supply business management. This soft component program will provide support for ZWASA to achieve the above project objectives by strengthening its management system, providing knowledge and technology for operation of the new facility, conducting public education to involve people of Zanzibar as an active customer, and creating a sustainable business situation.

(3) Outputs of Soft Component Programme

This Soft Component Program will expect the following outputs:

1) Engineering training

The proposed water supply system will be properly operated and maintained by the staff of ZWASA.

2) Training for organizational strengthening

The water supply system will be managed by the institutionally and financially healthy organization.

3) Training for developing public education programme

People of Zanzibar will have sufficient knowledge about drinking water and hygiene.

People of Zanzibar will have the willingness to connect to the water supply system and pay water tariff.

People of Zanzibar will have sufficient knowledge for water resource and water quality protection.

(4) Expected Results and Evaluation Criteria

Instructors of the engineering training and management training will check the training results using the output columns of Table 2-30 and evaluate trainees of their knowledge and understanding of transferred technology. The instructors for public education will evaluate and analyze the results of the questionnaire surveys distributed to the attendees and confirm the result of public education.

(5) Activities

The following activities will be conducted in this soft component programme.

1) Engineering Training

The program will transfer the basic knowledge and technology for operation and maintenance of the proposed water supply system including wells, water transmission/distribution network. Japanese engineering consultants will develop the operation and maintenance guideline as training material, will conduct basic training to understand the structure and objectives of the proposed water supply system, and will conduct theoretical training and OJT with the proposed equipment/facilities. Main activities are as follows:

- Teach structure and objectives of the proposed water supply system including wells, reservoirs and water

transmission/distribution facilities,

- Teach hydraulic capacity of each process unit, including wells, reservoirs and water transmission/ distribution systems,
- Conduct O&M trainings on the water supply system depending on production capacity fluctuations.

The Contractor/Supplier of equipment/facility will provide operation and maintenance manuals and conduct OJT training for each equipment/facility.

2) Management Training

Management training aims to provide management knowledge to DWD staff, which is required for DWD to become a self-supporting water company. Japanese consultants will develop training manuals. The training will focus on developing problem finding skills through discussion among participants and problem solving skills.

- Teach necessary knowledge and techniques on organizational management including accounting and human resources management and development
- Teach how to read management information using Management Information System (MIS) monthly report
- Teach communication and leadership skills of organization management

3) Training for Developing Public Education Programme

- Teach how to organise workshops to promote mutual understanding of importance of public education for proper hygiene, roles and responsibilities of stakeholders with their mission, vision, objectives, target and issues
- Discuss possibility of cooperation and commitment for working together to public education of proper hygiene
- Promote understanding of the present state of drinking water sources and sustainable use of water resources in Zanzibar
- Analyze questionnaire filled by the participants on the workshop and willingness for commitment in public education. Ask willing participants to join promotional campaigns to be organised by ZWSA.

Details of the Soft Component Plan are summarised in Table 2-31.

(6) Implementation Methods

This soft component program will be conducted by experienced Japanese consultants in a classroom training, exercise training, on-the-job training, field training and system development. As there are not sufficient engineering experts of water supply system in Zanzibar, Japanese consultants will be dispatched.

The basic roles and responsibility of Japanese consultants are as follows:

1) Basic Roles of Japanese Consultants

a) Chief consultant for soft component

- Supervise implementation of the soft component programme
- Plan training programme
- Plan management staff staining programme
- Plan workshop and public education programs.

b) Engineers

- Operation and maintenance training on mechanical and electrical facilities.

2) Training Style and Modules

a) Engineering training

Target: engineering and management staff of ZWASA

Training: classroom training using the design documents, field training and OJT using new facilities.

b) Management training

Target: managers of ZWASA

Training Style: classroom training with exercise and discussion

c) Training for developing public education programme

Target: managers of ZWASA to organise workshops attended by stakeholders and people concerned about water supply system in Zanzibar including Ministry of Health, Ministry of Water, Construction, Energy and Lands, Ministry of State, Regional Administration and Local Government and/or Zanzibar Municipal Council, NGO, representative of water users (ex. managers of hotels and restaurants and residents)

Training Style: workshop including presentation and discussion

(7) Schedule

The training for management should be conducted first, followed by the training for engineering staff. As construction of the proposed water supply system will be completed at the beginning of the year 2008, preparation for the management training will start in May 2007, and followed by the actual training from June 2007. The engineering training, especially OTJ, may coincide with the completion of the first phase construction works. The workshop and public education should be started immediately after the management training; public education will be taken up by ZWAS thereafter.

(8) Outputs

1) Engineering Training

Training plan, Training material, O&M guideline, Evaluation report by trainers

2) Management Training

Management training plan, Training material, Evaluation report by trainers

3) Training for Developing Public Education Programme

Training material (Water supply and tariff system, water resources protection and sanitation education), Evaluation report by trainee

Table 2-30 Modules of Soft Component

Module	Objectives	Expected Output
1. Engineering Training		
	Engineering personnel of ZWASA can properly operate and maintain the proposed water supply system based on the understanding of structure and design objective of each facility (wells, water transmission/distribution pipe network) and can install the consumer flow meters.	Trainees can do following activities: ・ Understand structure of well, materials, intake water volume, and allocation of wells facility. ・ Understand diameter of pipe, pipe material and hydraulic capacity. ・ Understand function of chlorine facility. ・ Find distribution and leakage volume of water in each service area. ・ Plan the quantity of raw water intake to meet the water demand. ・ Operate the well pumps dependent on the water demand. ・ Operate the chemical feed facilities dependent on the water demand and raw water quality. ・ Distribute the required water amount into each service area. ・ Understand the installation method of consumer flow meter. ・ Operate the tools for installation of consumer flow meter.
2. Management Training		
	Management of ZWASA can manage the organization, including financial management (e.g. budget control and cost analysis) and human resources management (e.g. personnel evaluation) using IT system based on the transferred management knowledge.	Trainees can do following activities: ・ Make financial report and report to top management ・ Understand how to control the budget and do budget control ・ Understand how to analyze cost and do cost analysis for proper water tariff structure ・ Manage human resources based on the labour laws, rules and regulation for employee and other internal regulation ・ Manage the activities of public relation, risk communication, public education and extension
3. Training for developing public education programme		
	ZWASA can organise workshops to obtain from attendees the consensus and commitment for the people of Zanzibar to understand the necessity of proper hygiene and the roles/ importance of water supply and sewerage	・ Share the knowledge about public education and promotion of hygiene ・ Acquire commitment of cooperation of public education about proper hygiene, roles/importance of water supply system and sewerage from the people of Zanzibar.

Table 2-31 Details of Soft Component Plan

Activities	Outputs	Methods	Inputs	Remarks
1.Engineering Training				
• Teach structure of the proposed water supply system including wells, reservoirs, and transmission/distribution pipelines. • Teach hydraulic capacity of wells and reservoirs. • Conduct training on O&M for transmission/distribution system, including control of transmission/distribution amount.	Training plan, Training material, O&M guideline, Evaluation by trainers	Classroom training using detail design drawings and documents. Field training on the proposed water supply system OJT using new equipment/facility Target: engineering staff of ZWSA	Water engineer and distribution network engineer (Japanese consultants) Preparation of training and development of training materials: 1 Engineers x 0.5 months Training: 1 Engineers x 1.5 months	
2. Training for management: transfer management knowledge to management staff of ZWSA				
• Teach knowledge and techniques for managing the organization • Teach accounting and financial management including cost analysis and budget control • Teach human resources management including recruiting, personnel evaluation promotion, payment, incentives, human resources development, and motivation • Teach operational management including procurement, public education, water supply system and risk management • Teach public relations and risk communications • Teach facilitation and mentoring • Teach how to read information for management using MIS monthly report	Management training plan, Training material, Evaluation by trainers	Classroom training Target: ZWASA middle management staff	Japanese Consultants Preparation of training and development of training materials: 1 Engineers x 1.0 month Training: 2 Engineers x 1.0 month	
3. Training for Developing Public Education Programme for the People of Zanzibar				
• Teach how to organise workshop for public education on water supply and hygiene • Share knowledge about the present condition of water resources and the benefits of proper hygiene • Teach necessary actions for sanitation improvement in Zanzibar.	Training material, Evaluation report by trainee	Classroom training Target: ZWSA management staff	Japanese Consultants Preparation of training and development of training materials: 1 Engineers x 0.5 months Training: 1 Engineers x 0.5 months	

2-2-4-7 Implementation Schedule

Total 9.5 months are required for detailed design and tendering (6.5 months and 3 months respectively), thus the project could not be implemented as a single-fiscal-year project (implementation period up to 2 years). The project will be divided into 2 phases (2 single-year projects) with separate benefits will be brought in each phase. As the recipient country requested early implementation, 2 single-year projects approach is more appropriate than one project funded by the Japanese Government Bonds, whose approval process is expected to delay the project by one fiscal year.

Table 2-32 Phasing of the Project

Phase	Saateni Service Area	Welezo Service Area	Dole Service Area	Kinuni Service Area	Pickup Trucks
First Phase	・Transmission Pumps Renewal 400m^3/hr x 2 200m^3/hr x 2 ・Disinfection Equipment Renewal ・Roofing Renewal for Pump House	・Reservoir Construction 4,000m^3 x 2 ・Disinfection Facility ・Well Constriction 58.4m^3/hr x 6 ・Transmission Pipes φ150～600: 13.0km ・Distribution Pipes φ300～700: 9.6km			・Pickup Trucks 4 Nos.
Second Phase			・Reservoir Construction 1,200m^3 x 1 ・Disinfection Facility ・Well Construction 58.4m^3/hr x3 (1 standby) ・Transmission Pipes φ150～200: 4.5km ・Distribution Pipes φ300: 3.2km	・Reservoir Construction 2,700m^3 x 1 ・Disinfection Facility ・Well Construction 58.4m^3/hr x 2 ・Transmission Pipes φ150～400: 6.5km ・Distribution Pipes φ400: 7.1km	

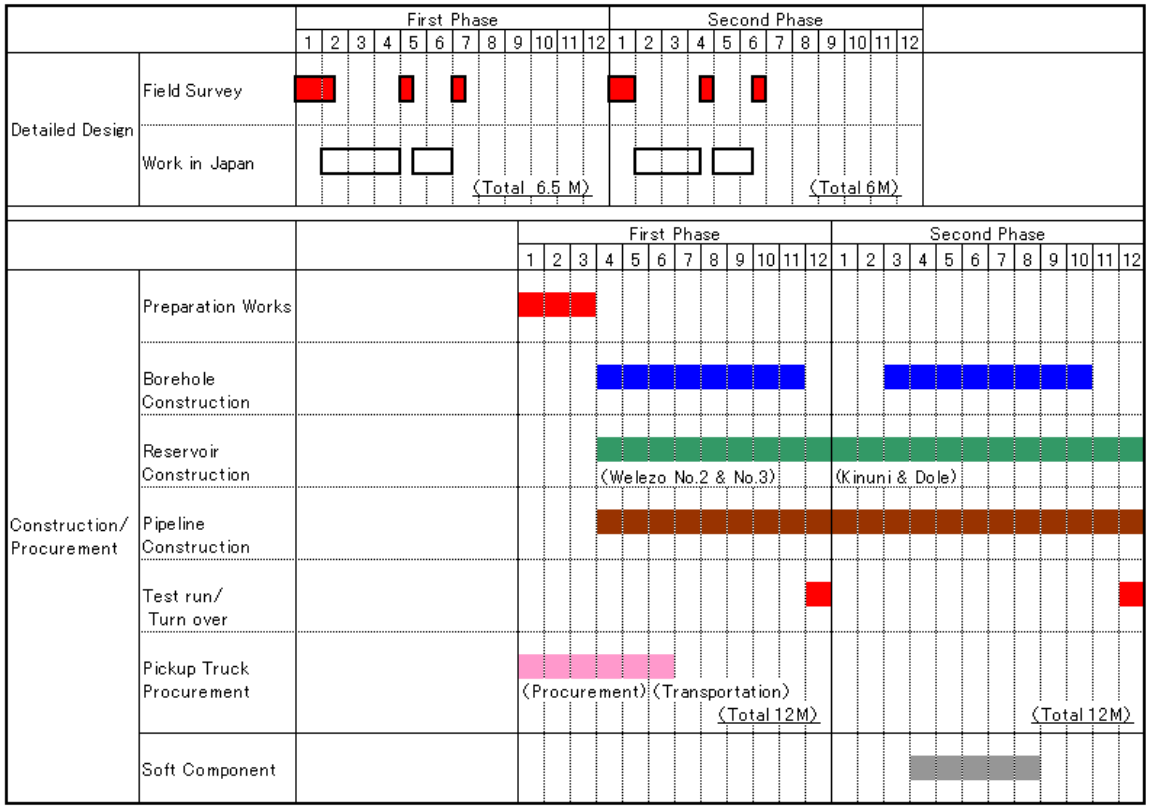


Figure 2-28 Project Implementation Schedule

2-3 Obligation of Recipient Country

The Tanzania Government and DWD will undertake the works described in Section 2-4-3 for the completion of the project. Those works are listed below in details.

a.	Land Acquisition	Reservoirs	4
		New Wells	11
		Transmission/Distribution Pipelines	
b.	Fencing	Reservoirs	4
		New Wells	11
c.	Power Lines for	New Wells	11
		Reservoirs (Welezo, Kinuni, Dole)	4
d.	Disposal of replaced existing pumps		4 sets

2-4 Project Operation Plan

The Government of Zanzibar has plans to establish ZWSA as an autonomous body for executing water policy and draft acts that are submitted to the House of Representatives. Regardless whether ZWSA is established or not, the following O&M staff increases are necessary for this projects operation and maintenance of the newly constructed facilities.

2-4-1 Organization Strengthening Plan

Table 2-33shows a brief summary of support from UNDP including the strengthening capacity on revenue collection supported, soft components of this projects and other suggested support from donor agencies. Details shown in Table 2-34 focus on recommendations and suggestions for present organizational situation of DWD and expected function for ZWSA that is planned to be established in the near future.

The soft component of this project aims to support ZWSA's sound operation and management of the new water supply facilities by providing basic management, technical knowledge and skills as well as promoting the necessity of a safe water supply to people in Zanzibar. This could also contribute to ZWSA's financial stability by increasing income from water tariffs. This soft component does not replace any support from any other donor agencies including support from UNDP.

Table 2-33 Summary of Organization Strengthening

	UNDP	**Soft Component**	**Required Future Strengthening***
(1) Organization Design and establishment of the organization for water supply			
Prepare draft acts for establishment of ZWSA	○		
Prepare internal rules, operation manual and guideline for business operation			○
Hire staff			
Training		○	○
Transfer business from DWD to ZWSA			○
Management			○
(2) Strengthening of Management Capability			
Management information system			○
Management capability		○	○
Human Resources Planning		○	○
Internal Training			○
(3) Strengthening of Accounting and Financial Management Capability			
Revenue increase	○		
Cost reduction		○	○
Strengthening accounting capability		○	○
(4) Strengthening of Customer Services capability			
Water charge rate structure	○		
Revenue collection	○		
Water meter			○
Revenue collection units	○		
Promotion of public hygiene and water supply system		○	○

* Items require future strengthening after implementation of UNDP programme and soft-component of this Project.

Table 2-34 Present Situation and Recommendations of Organization Strengthening for DWD and ZWSA

	Present situation	Future	Recommendation	Support from this Project
(1) Organizational issues:				
Establish ZWSA as autonomous body for executing water supply policy	DWD is one department in the Ministry of Water, Construction, Energy and Land. Therefore, DWD does not have much empowerment.	ZWSA, autonomous body for executing water supply policy has been established and manages the water supply system with cost recovery policy.	UNDP has been supporting establishment of ZWSA.	—
Organization design of ZWSA (organizational structure, determination of necessary quality of staff, development of rules and regulation, guidebook and operation manuals.)	Present executing organization structure of DWD is engineering oriented for focus on operation and maintenance of water supply system. However, ZWSA is required to manage with cost recovery policy. It may need to strengthen function of customer services as well as business administration.	Established executing organizational structure for executing all necessary activities within the organization. Strengthening customer services function is very important in order to earn enough income to cover all necessary expenditures to keep operation and maintenance of water supply system.	The Government of Zanzibar should maintain establishment of ZWSA and hire necessary staff. However, it is recommendable to provide some advisory service support by senior consultant in the preparation of the operation manual, rules and regulation for staff and other organizational strengthening in cooperation with UNDP's assistance for strengthening of revenue collection.	—
Recruit or transfer of necessary staff for ZWSA	Presently staff is government officer work for DWD	Recruited or transferred from DWD to ZWSA. Salary structure may be different from the present one.	The Government of Zanzibar should hire necessary staff.	—
Human Resources Development (Training)	DWD does not conduct much staff training because of limited budget. Mainly they use external training sponsored by foreign donor agencies.	Conduct more internal training or OJT cooperation with other water supply authority in Tanzania.	The soft component of this project will conduct training for engineers and management regarding improving total efficiency of facility system operations, and basic knowledge and skill for senior management officer for managing their organization more effectively. However, it is recommended to dispatch senior advisor and transfer knowledge and	△

	Present situation	Future	Recommendation	Support from this Project
			technology for managing water supply system including inventory of necessary skills and knowledge.	
Transform from DWD to ZWSA		ZWSA will select necessary staff from present DWD staff and hire other staff. After establishment of executing organization and transfer of facilities, ZWSA start managing water supply.	The Government of Zanzibar should maintain establishment of ZWSA and hire necessary staff or transfer staff from DWD to ZWSA. However, it is recommended to dispatch senior advisor and provide advise for administration area including evaluation of fixed assets and necessary qualification for staff.	―
Manage Water Supply System by ZWSA			It is recommended to dispatch senior advisor and provide skill and technology transfer of water supply system management.	―
(2) Business administration				
Lack of integrated management information	Senior and middle management are not required integrated management information presently for they can only manage activities as rules and regulation in the ministry.	Senior and middle management required to maintain all necessary activity within revenue and will be required to make total decision-making based on integrated management information.	The soft component of this project will provide technique of decision making based on MIS: Management Information System in the senior management-training course.	△
Lack of management skills and knowledge for middle management	Senior and middle management are not required professional management skills and knowledge presently. They only requested to manage activities within the budget.	Both senior and middle manager will require professional skills and knowledge.	The soft component of this project will provide basic skills and knowledge in the senior management-training course.	△
Human Resources Planning	DWD does not have or required human resources management plan based on the	ZWSA will need to formulate human resources management plan based on the	The soft component of this project will provide basic human resources management	△

	Present situation	Future	Recommendation	Support from this Project
	business plan.	business plan.	knowledge in the senior management-training course.	
Internal Training	DWD do not conduct training because of budget constraints. They mostly use external training when donors offer training courses.	Recommend conducting internal training program, OJT and job rotation based on the human resources management plan.		—
(3) Accounting and Financial				
Shortage of revenue	Present revenue from water sales covers less than 15% of necessary expenditure because DWD does not collect water tariff from household users.	ZWSA must collect water tariff from sufficient number of household users. Also, they may consider increasing the water tariff rate to recover costs in the future.	It is recommended to dispatch senior experts in the future to advise about change in water tariff structure to make cost recovery.	—
Cost reduction	DWD does not have a cost reduction plan. They only care to manage within the budget as a governmental organization. Also, they do not have the necessary budget for maintaining all necessary activities.	ZWSA must maintain operation within revenue. It may require cost reduction for less necessary activities as well as keeping the necessary budget for all necessary activities.	The soft component of this project will provide basic knowledge about cost analysis. However, it is recommended to dispatch senior advisor for technical transfer of cost analysis and financial management.	△
Strengthening of accounting skills	DWD do not required much accounting and financial management skills presently.	ZWSA required doing all activities of accounting and financial management including bookkeeping, financial reporting, cost analysis and financial planning.	The soft component of this project will provide basic knowledge about accounting and financial management. However, it is recommended to provide accounting software package and several microcomputers.	△
(4) Water Tariff Structure and customer services				
Sufficiency of water tariff structure	It is insufficient not to collect water tariff from household users.	It is recommended that ZWSA decide water tariff level and structure to cost recovery of water supply.	It is recommended to dispatch senior experts in the future to advise about changing water tariff structure to ensure cost recovery.	—

	Present situation	Future	Recommendation	Support from this Project
Revenue collection	DWD does not collect water tariff from household users.	ZWSA should collect water tariff from household users.	UNDP has plan to support strengthening the revenue collection capability of ZWSA	―
Water meter	Very few water meters are attached presently.	Attaching water meters to every customer is recommended to establish accountability and equality.	The UNDP plan does not include attaching water meters to every user; however, attaching water meters to every user is recommended. It is also recommended to provide water meters to ZWSA as a technical support project.	―
Unit of revenue collection	DWD does not have a sufficient number of staff for revenue collection from household users, presently. It may be enough because they do not collect water tariff from household users. However, they should improve this situation in the future.	ZWSA should prepare a stronger revenue collection structure including regional offices, increase the customer services staff, and establish a revenue collection unit from household users.	UNDP has a plan to support strengthening the revenue collection capability of ZWSA.	―
Public education for hygiene and promotion of water supply	DWD does not conduct either public education for hygiene or the promotion of clean water supply.	ZWSA should conduct public education and promotion of water supply in cooperation of the Ministry of health and related government organizations.	The soft component of this project will offer workshops on public education and promotion of a clean water supply through the introduction of cases and experiences of another countries.	△

(1) Recommendations for organizational structure

The Ministry of Water, Construction, Energy and Land is waiting for the House of Representatives to approve the Bill establishing the Zanzibar Water Supply Authority. If this bill is approved, ZWSA will be established as an autonomous body of water supply in Zanzibar directly under the Minister. Representatives of the Minister, representatives of ministries and other users would be appointed as Board members. The Board will make necessary decisions independently from the Government. ZWSA is required to manage operation of water supply system within revenue from water sales.

The Government of Zanzibar will establish ZWSA after approval of the bill followed by the selection of DWD staff to be transfered to ZWSA. The Ministry of Water, Construction, Energy and Land will continue to plan and supervise the execution of the water supply policy by ZWSA. The water supply facilities constructed in this project will be provided to ZWSA. Detail of the organizational structure of ZWSA is not yet decided, however, the existing

facility and almost all DWD staff will be transferred to ZWSA.

As previously mentioned, present organizational structure of DWD is not sufficient for executing water supply policy with cost recovery and self organized. Therefore, the transfer of DWDs present organizational structure to ZWSA is not recommendable. DWD needs a large number of staff to monitor and dispatching to every water intakes and distribution facilities. The facility must also be protected 24 hours a day; nevertheless, the present number of staff is too large. In addition, it is unbalanced with very little customer service support and too many engineering oriented positions. From a financial standpoint, these imbalances make it difficult to provide sufficient salaries. UNDP will propose a plan for strengthening revenue collection capacity. They already submitted their plan in 2003 and awaiting the chance to submit an updated version to the Board of ZWSA after the Authority is established. However, their proposal will be limited by the capacity of revenue collection. Furthermore, the bill mentions only structure of the Board. The bill does not determined details of executing organization under controlled by the Board of ZWSA. The following recommendations may help the newly established ZWSA in the near future.

In addition, sewerage is managed by communities and not planned by ZWSA. Moreover, as GTZ recommended, ZWSA should manage the sewerage from the point of view that the water supply and sewage policy is best executed by the same agency. Therefore, merging the water supply and sewerage organization in the future is recommendable.

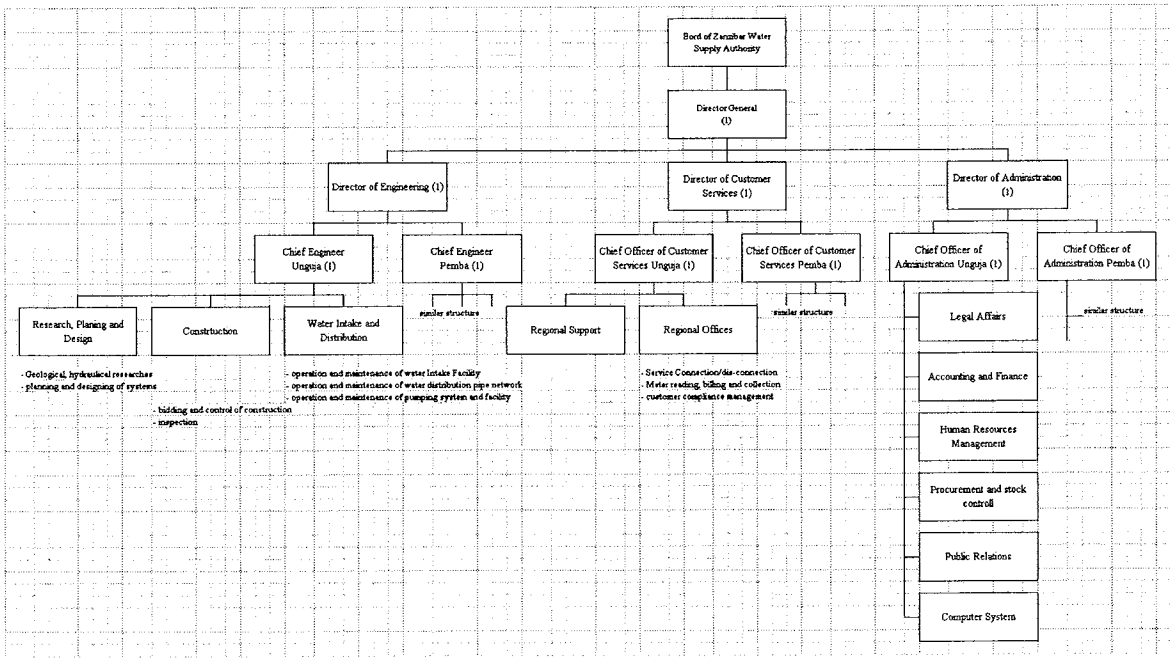


Figure 2-29 Recommended New Organization Structure

(2) Recommendations for administration

Presently, almost all clerical jobs in DWD are conducted manually including accounting, billing and management reporting. Manual work may delay and contribute to inaccuracies reported to management. The present business process is not designed to collect the necessary information of regular daily activities of staff. DWD managers do not have experience using information technology in their managerial duties. It is recommended that the newly established management of ZWSA be trained in the necessary skills of effectively using information technology.

Secondly, ZWSA staff rules and regulations are not yet ready. Preparing the necessary operation manuals including the rules and regulation of staff, awards and disciplinary action, guideline for performance evaluation for staff, accounting standard and guideline, procurement guideline, budgeting guideline, accounting manual, operation manual of water supply system and contingency plans is recommended.

Finally, customer information management, revenue collection, accounting, human resources management including payroll and personal performance management by clerical workers needs to be completed in an accurate and timely manner. It is therefore recommended that computerization of business administration work includes those activities.

Because establishing ZWSA is like setting up a new business, designing a new organizational business structure and calculating the necessary number of staff to effectively operate the new organization is recommended. Based on this new organizational design, they can effectively transfer DWD staff to ZWSA and recruit the necessary new staff for enforcing new functionality.

During this transformation, ZWSA must prepare new rules and regulations, operation manuals and financial resources. DWD and the Ministry of Water, Construction, Energy and Land must also prepare for activities. However, it is receomendable for provide advisery suppor for business process and activities to newly established ZWSA.

1) Support for strengthening management capability of ZWSA

It is recommended to dispatches senior volunteers or management consultants who have experience in establishing branch offices or factories abroad, have business administration skills, which includes human resource management and accounting, as well as self-improvement of the so called Kaizen.

a) Accounting and financial management

Providing an accounting package system and advising them on how to use this software is also strongly recommended. Simple software package does not cost as much as:

- Accounting software package: approximately 400US$
- Installation and operator training: approximately 100US$
- Hardware: 2 microcomputers and one printer: approximately 3,000US$

Total cost possibly 4,000 – 5,000 US$ at most.

By using this accounting software package, senior adviser can provide technical transfer for financial management including budget control, cost analysis and other financial managements based on financial statements. Preparing an amount of 4,000 - 5,000 US$ from donor’s budget is not difficult; however, please understand that the accounting software package does not including a billing system. It is impossible to create water bills for more than 34 thousand customers with cheap accounting software package in the $40 range. Accounting software is purely designed for book keeping and financial reporting. Moreover, one objective of accounting software is to provide financial information to management. The billing system proposed from UNDP is completely different from this accounting system.

b) Human resources management

DWD did not conduct a great deal of human resource management to include recruiting, OJT and rotation based on a long term human resource management plan because it wasn’t necessarily required in the present governmental organization. However, ZWSA may be required to introduce in such concept on human resources management.

Due to an insufficient budget, DWD did not conduct internal training and relied on international donor agencies to perform training seminars. Under the new authority, establishing a human resource development system to include OJT, internal training, and job rotation is vital in building staff capabilities. To improve human resources management transferring and sharing knowledge by senior advisors is recommended.

Secondly, DWD staff is unwilling to initiate self-improvement activities and would rather rely on external assistance. The introduction of Kaizen or QC activities to identify and improve areas of need is recommended. FINNIDA proposed a new organizational structure in their master plan nearly 10 years ago. The basic concept mentioned in this master plan is still effective today; though it needs to be adjusted to newly emerged areas such as computer and revenue collection. In addition, UNDP already supports the establishment of ZWSA and is preparing a new proposal to strengthen the revenue collection capabilities. Continued support in establishing the Authority by providing regulations and rules will help the organizations management. Senior advisors or senior volunteers are focus on strengthening the capability of routine work with knowledge and skills transfer to staff of the Authority.

In the soft component program of this project, we will provide simple EXCEL based MIS: Management Information System and senior management training for transfer management knowledge and skills of:

- Business administration including accounting and finance, and human resources management
- Leadership skills including motivating staff, communication and risk management

However, this training is conducted in a classroom type setting and skills transferred by senior advisor by way of field training and OJT is proposed.

(3) Recommendation for customer services

1) Project Type Technical Assistance

It is suggested to provide assistance to customer services capacity strengthening, if UNDP assists with strengthening the revenue collection capacity. There are different characteristics for strengthening the revenue collection capability under the objectives of the Zanzibar water supply project. Strengthening the revenue collection capability is a matter for all organizations of the water supply system; however, this project mainly targets the urban and west district of Zanzibar only. Therefore, assistance with revenue collection may need more funds to develop a billing and collection system, providing more than 20 microcomputers and servers, vehicles and bicycles; water meters and other needed items. There is difficulty in covering the assistance needed under the soft components of this project. The proposed plan from UNDP regarding strengthening revenue collection capability does not including providing water meters. If other donor provides assistance in this area, a type of technical assistance project to include a certain number of water meters is recommended.

As DWD did not collect water tariff from household users at all, the first step is of course to start collecting water tariff from household users. They must adequately collect from water sales to household customers, businesses customers, and ships to cover the necessary operational and maintenance expenditures; to include salaries, electricity charges, chemicals and construction for expand water supply pipeline. Attaching water meters and charging on the basis of consumption will ensure consistency. Poverty is a key element of concern as many Zanzibar residents live on a dollar per day. A revolving fund may be one option for providing low price water meters to cover the long-term cost. The projects technical assistance team should collect water charges from a sufficient number of customers; improve on the water tariff structure and covering the necessary costs of operating the water supply system in a sustainable way.

2-4-2 Project Management Plan

The proposed water supply facilities will be divided into water intake facilities (wells) and water transmission/distribution facilities. Operation and maintenance for facilities are described below. New staff will belongs to the proposed new technical department. O&M works will be performed under supervision of the DWD supervisors.

(1) Water Intake Facilities

Water intake facilities consist of wells and well pump equipment. Well flow and water quality will be recorded. Water flow will be measured by flow meters. Water samples will be taken and analyzed by staff of the DWD laboratory.

Ten new intake facilities are newly constructed and 40 additional staff (10 teams with 4 staff per team) for monitoring and controlling this new facility is necessary.

Table 2-35 Additional Staff for Intake Facility

Facility	New/Renew	Current Staff	Additional Staff
New Intake 10 Wells	New	0	40 (4 staff x 10 teams)
Total Additional Staff			40

(2) Transmission/Distribution Facilities

The proposed facilities include new reservoirs, renewed pumping station, new transmission pipelines and new distribution pipelines. The transmission and distribution facilities will be extended and renewed in the future according to a long-term maintenance plan. Replacement schedule of the existing pipes shall be developed according to pipe material, construction year, leakage records and actual observation of the pipes.

DWD has now dispatch 6 staff for existing facility in Welezo. New reservoir and pumping station will be constructed; add 2 additional staff for the operation and maintenance of this new facility.

Table 2-36 Additional Staff for Transmission/Distribution Facilities

Facility	New/Renew	Current Staff	Additional Staff
Welezo Station and Pipelines	New reservoirs/new disinfection facilities	6	2 additional staff Total 8
Saateni Station and Pipelines	Renew transmission pumps/ disinfection facilities	26	-
Kinuni Station and Pipelines	New reservoir/new disinfection facility	-	2 additional staff
Dole Station and Pipelines	New reservoir/new disinfection facility	-	2 additional staff
Total Additional Staff			6 additional staff

(3) Financial Plan

According to the “Bill for an Act of Water Supply Rules and Procedures” proposed to the Government of Zanzibar House of Representatives, water tariff and deposit amount increase for planned water supply is shown in Table 2-37 and Table 2-38.

Table 2-37 Water Tariff

Unit: Tanzanian Shilling

Category	Present Water Tariff	New Water Tariff
A. Water Charges		
House connection		
(1) No meter		
Flat monthly charge	0	1,035
Flat monthly charge of pubic standpipe	0	1,035
(2) With meter	N/A	
～5m3		200/m3
6m3～10m3		206/m3
11m3～		215/m3
(3) Others		200/m3
Business use		
(1) Without meter	Depends on pipe caliber	Depends on pipe caliber
(2) With meter	2,000/m3	500/m3
Government and Public		300/m3
B. Connection Fee	Depends on pipe caliber and cost of civil work	10,000
C. Disconnection due to violence against water law	0	5,000
D. Disconnection with application	0	5,000

Table 2-38 Deposit Amount for Water Supply

Pipe calibre	Urban	Rural
0.5” – 1.5”	20,000	10,000
2” - 6”	25,000	20,000
8” - 12”	30,000	20,000

Under this project, electric charges will increase for water pumps, cost of chemicals, cost for operation and maintenance. Also, DWD does not pay electric charges for water pumps; however, newly established ZWSA may need to pay this electric charge. Those cost assumed as 317,792 thousands Tanzanian Shilling. In addition, PVC pipes may need to be replaced within 20 years. A 5% inflation rate is assumed.

Hopefully, UNDP can provide assistance and capacity to ZWSA on revenue collection and new connection are strengthened until fiscal year 2005/2006; ZWSA could collect water charges from presently recorded 35 thousand household customers with flat rate. Subsequently, they could increase around 9 thousand new house connections yearly. Public standpipe starts around 500 connections, increased to around 200 connections annually.

Even when this challengeable target is settled, ZWSA could experience an unprofitable situation because the number of household connections is small and water tariff is priced to low.

If the Government of Zanzibar does not increase water tariff to more than 1,035 Tanzanian Shillings, ZWSA will need to increase number of connections to more than 150 thousand households. Nevertheless, increasing so many household connections may prove to be impossible. More time is needed for recruiting and training staff for customer services. Therefore, a water tariff increase of 2,200 Tanzanian Shillings is recommended as well as strengthening the capacity of customer service representatives as soon as possible.

The first priority is not necessarily the collection of water tariff from household customers because no water tariff is currently being collected from user. ZWSA must work diligently to account for customers, recruit and train staff for customer services, establish branch offices to monitor water supply, in addition to the billing and collection of water charges.

Table 2-39 Projection of Trial Income Statement

	approved 2003/2004	estimate 2006/2007	estimate 2007/2008	estimate 2008/20009	estimate 2009/2010	estimate 2010/2011	estimate 2011/2012
target population		225,000	290,000	355,000	420,000	485,000	545,000
target customer		35,500	44,700	53,900	63,100	72,300	80,500
Revenue	61,200,000	1,002,200,000	1,346,280,000	1,589,160,000	1,832,040,000	2,074,920,000	2,280,400,000
Water Sales	61,200,000	1,002,200,000	1,245,080,000	1,487,960,000	1,730,840,000	1,973,720,000	2,190,200,000
New connection		0	101,200,000	101,200,000	101,200,000	101,200,000	90,200,000
Expenditure	486,040,000	1,652,713,308	1,729,698,973	1,810,533,922	1,895,410,618	1,984,531,149	2,078,107,707
Direct cost	62,460,000	1,008,014,308	1,058,415,023	1,111,335,775	1,166,902,563	1,225,247,691	1,286,510,076
Electricity	14,000,000	910,817,208	956,358,068	1,004,175,972	1,054,384,770	1,107,104,009	1,162,459,209
Chemical	0	43,205,050	45,365,303	47,633,568	50,015,246	52,516,008	55,141,809
Other O&M	48,460,000	53,992,050	56,691,653	59,526,235	62,502,547	65,627,674	68,909,058
Indirect Cost	423,580,000	531,699,000	558,283,950	586,198,148	615,508,055	646,283,458	678,597,630
Salaries	398,540,000	505,407,000	530,677,350	557,211,218	585,071,778	614,325,367	645,041,636
Other management cost	25,040,000	26,292,000	27,606,600	28,986,930	30,436,277	31,958,090	33,555,995
Depreciation	0	113,000,000	113,000,000	113,000,000	113,000,000	113,000,000	113,000,000
Interest and others	0	0	0	0	0	0	0
Profit/Loss	-424,840,000	-650,513,308	-484,618,973	-322,573,922	-164,570,618	-10,811,149	112,092,293
							112,092,293
household customers	0	35,000	44,000	53,000	62,000	71,000	79,000
public faucet customers	0	500	700	900	1,100	1,300	1,500
water charge	0	2,200	2,200	2,200	2,200	2,200	2,200

unit; Tanzanian Shilling
target customer:
2005/2006: 35,000 household customer and 500 public faucet customer
2010/2010: 50,000 household customer and 1,000 public faucet customer
average 5% cost increase

Furthermore, in the future, shifting to a water meter and charging based on consumption rather than a flat rate is recommended. ZWSA cannot expect any substantial income under a flat rate, which is unfair to both customers and the supplier. Attaching water meters ensures water supply planning and accurate financial planning.

If ZWSA is established in fiscal year 2005/2006 without hand over liability from DWD, the first 5 years of operation are seen as deficit years, while the 6th year of operation is seen as a profitable year. Accumulated deficit continued to the fiscal year 2013/2014 even though cost increase for capacity strengthening of customer services, which is not scope of this project, is not taken into consideration.

2-5 Project Cost Estimate

2-5-1 Project Costs

The total project costs of the project to be implemented under Japanese Grant Aid Scheme amount to 1,990 million Yen. The contributions from the Japanese and Tanzania Governments, following the scope of works in Section 2-4-2, are shown below. The cost estimates were made based on the condition shown in (3) below. This estimate does not guarantee the amount to be agreed in the Exchange of Notes

(1) The Project Costs borne by the Japanese Government

The Total Estimated Cost

Saateni/Welezo Service Area	Approximately 1,178 million Yen
Kinuni/Dole Service Area	Approximately 810 million Yen
Total	Approximately 1,988 million Yen

Table 2-40 Project Costs borne by the Japanese Government

Item		Cost （Million Yen）					
		First phase		Second phase		Total	
Facility	Borehole Construction Reservoir Construction Pipeline Construction	1,052	1,062	706	706	1,758	1,768
Equipment	Pickup truck	10		0		10	
Detailed design, Construction Supervision and Soft Component		116		104		220	

(2) The Project Cost borne by the Tanzania Government

1) Fencing	19,965 thousand Tsh	(Approx. 2.02 million Yen)
2) Power Line	1,500 thousand Tsh	(Approx. 0.15 million Yen)
Total	21,465 thousand Tsh	(Approx. 2.17 million Yen)

(3) Estimate Conditions

Costing Date	October 2004
Exchange Rate	
Yen/US$	1 US$ = 110.29 Yen
Yen/Local Currency	1 Tsh = 0.101 Yen

Implementation Period: Phasing plan is shown in Figure 2-28.

Others: The project implemented will follow strictly the rules of Japanese Grant Aid.

2-5-2 Operation and Maintenance Costs

(1) Operation and Maintenance Costs

The increment of operation and maintenance costs by the implementation of the project is calculated for labour, electricity, disinfection chemical and repair costs. The electricity costs for well pumps are calculated for the increment of flow by this project (Daily average 14,000 m^3/d x 1/1.35 = 10,370 m^3/d). The disinfection chemicals are calculated for daily average flow.

Table 2-41 Increment of Operation and Maintenance Costs by the Project

Item	Calculation	O&M Costs (thousand Tsh/year)	Remarks
Labour costs (Increment)	O&M staff for wells and transmission/distribution pipes: 46 46 x 1,800,000 Tsh/year/person = 82,800 thousand Tsh/year/person	82,800	
Electricity costs (Increment)	Unit cost: 130 Tsh/kWH Well pumps (increment: 10 wells) Operation hours: 10,370 m^3/d x 1/(60 x 24 x 10) x 24 (daily average) =17.2 hrs/d Electricity costs: (37 kW x 6 + 30kW x 2 + 22 kW x 2) x 0.75 (loading rate) x 17.3 hrs/d x 365d/yr x 130 Tsh/kWH = 199,546 thousand Tsh/year	199,546	
Disinfection Chemical (Increment)	Unit cost: 1,000 Tsh/kg (Powder Chlorine) Chlorine dosing rate: 2 mg/l Chemical consumption (daily average) Kinuni: 6,128 m^3/d x 2 mg/l x 1/0.7 x 10^{-3}= 17.5 kg/d Dole: 2,540 m^3/d x 2 mg/l x 1/0.7 x 10^{-3}= 7.3 kg/d Welezo: 22,453 m^3/d x 2 mg/l x 1/0.7 x 10^{-3}= 64.2 kg/d Total: 89 kg/d = 32,485 kg/yr Disinfection Chemical Costs: 32,485 kg/yr x 1,000 Tsh/kg = 32,485 thousand Tsh/yr	32,485	Exclude Saateni Station where disinfection chemical is injected now.
Equipment Repair (Increment)	Mechanical / Electrical Equipment x 0.3% /yr 987,000,000 Tsh x 0.3%/yr = 2,961 thousand Tsh/yr	2,961	
Total (Increment)		317,792	

Table 2-42 shows the actual cost of operation and maintenance in fiscal year 2003 is 998, 259 thousand Tsh. Annual operation and maintenance cost will be increase 317,792 thousand Tsh (32%) with this project. Revision of the water tariff in the future may consider in this increase of operation and maintenance cost.

Table 2-42 Actual Cost of DWD Operation (2003)

Item	Actual 2003	%
Salary and administration	321,510,984	32
Electricity	659,898,960	66
Chemical	0	0
Fuel and others	800,000	0
Maintenance	16,050,000	2
Total	998,259,944	100

Unit: Tsh
Electricity including electric charges indirectly paid by DWD

2-6 Other Relevant Issues

2-6-1 Water Source preservation

The water source of this project consists of boreholes and springs. According to the geotechnical feature of Unguja island, the surface water infiltrates easily to the underground water level. So the groundwater may easily contaminated if the surface water is polluted.

To prevent the water sources from the contamination by livestock, fencing is necessary for the intake from boreholes and/or springs. And more, to restrict the garbage disposal not only the borehole /spring but also wide spread of the catchment of water sources.

2-6-2 Operation of water source facilities

1）Continuous operation of borehole pumps

Borehole pump should be operated continuously. An intermittent operation may cause filler disarrangement and it may cause screen blockage.

2）Prevention from salt water pumping

The new borehole sites are located out of the salt water detected areas, however, the risk of salt water pumping is still remain when extremely dry season/year.

Not to draw salt water, the borehole pumps should be stopped when the pumping water level is below averaged sea water level. The water level meter will be installed in the boreholes and the borehole pumps can be stopped as the signal from the meter. The pump stop level should not be set below averaged sea water level.

2-6-3 Disinfection

To provide safe water is essential for water works. The chlorine dosing equipment will be installed by this project for each station, disinfection of supply water should be conducted everyday. To estimate the proper dosing rate, water quality should be examined periodically.

2-6-4 Distribution Pressure Adjustment

Pressure reducing valves are installed at Welezo and Dole distribution area to prevent the pipe breakage and water leakage causing from the high pressure. Water leakage increases as the inner pressure increase, the lower pressure operation is desirable while the distribution is performed.

The recommended pressure for Welezo area is ranged 5 m to 10 m as the ground level of valve is about 40 m. For Dole area, recommended pressure is not larger than 5 m as the ground level of valve is about 45 m.

2-6-5 Water Management Considerations

2-6-5-1 Transmission from Welezo to Saateni

The main water source of Saateni is spring of Mtoni and Bububu, the intake from these two springs are reduced in dry season. Saateni area needs water from Welezo reservoir in dry season, conduit pipe from Welezo station to

Saateni station is planned in this project and it flows by gravity up to the overhead water tank. Flow control vales and flow meter are installed for proper operation.

2-6-5-2 Welezo and Kinuni

To supply water to the southern areas, two distribution tanks, Welezo and Kinuni, and one transmission line is planned in this project. The distribution pressure of these area is varied depend on the setting of the pressure reduce valve and/or the water demand fluctuation. Gate valves and pressure reduction valve should be operated properly monitoring the flow meter.

Chapter 3 Project Evaluation and Recommendation

Chapter 3 Project Evaluation and Recommendation

3-1 Project Effect

The expected project effects are shown in Table 3-1.

Table 3-1 Expected Project Effects

Present Condition	Measures	Project Effects
A: Direct Effects		
The water supply capacity is much smaller than the water demand increasing by population growth.	・Develop 14,000 m^3/day of raw water by construction of new 11 boreholes.	・The water supply capacity will be equal to the water demand of 2010 as much as 54,100 m^3/day including existing water source of approx. 40,100 m^3/day.
Distributed water has problem in quality because of low pipe pressure and an intermittent distribution.	・Review the water distribution networks, construction/renewal of water distribution stations and pipelines. ・Construct disinfection facilities for each distribution stations.	・The minimum distribution pressure will be assured and stable water supply will be realised. ・The water supply quality will be improved.
The existing water supply facilities are aged. The pump equipment of Saateni Station looks difficult to operation and the leakage from the network pipes are estimated as 30 % as distributed.	・Renewal of four (4) sets of transmission pump. ・Renewal of 6.5 % of pipeline.	・The transmission capacity will be equipped. ・The leakage rate will be reduced.
Operation and maintenance, business management are not evaluated as sufficient level.	・Soft Component for these items.	・Water business management and the operation and maintenance will be improved.
B: Indirect Effects		
High morbidity of water caused disease because of the poor water supply system.	—	・Morbidity of water caused disease will be reduced by the water supply system improvement.
Tourism is not well developed because of the poor water supply system.	—	・Tourism will be promoted by the water supply system improvement.

3-2 Recommendations

For further effective display and sustain of project effects, the DWD, the execution agency, shall undertake the following items to improve the water supply system management.

a. To establish the new water authority and build the organization for tariff collection, operation and maintenance. Then collect enough money to maintain the water supply system and manage the water works properly.

b. To repair/replace the existing facilities including borehole pumps, roof of Saateni Station, pipelines made of asbestos. Especially to conduct a non revenue water reduction measures.

c. To expand the distribution network to meet the population growth and urban expansion.

d. To make necessary measures to protect the water sources, such as the prohibition of building construction and garbage disposal near the water source.

e. To treat or discharge the wastewater increased by this project in accordance with the Ministry of States, Regional Administration and local Government and/or Zanzibar Municipal Council.

f. Items related to this project;

- To prepare the budget for the cost undertaken by Tanzanian side. They shall be disbursed based on the implementation schedule.
- To obtain/issue necessary permission/licence for the implementation of the works for the project.
- To organize the implementation team for the project from the beginning of the detailed design to understand the project components and to master technology.

g. Secure budget for providing new house connections to new users.

Appendices

Appendix 1
Member List of the Study Team

Appendices

Appendix 1 Member List of the Study Team

No.1: Basic Design Study

Name	Assignment	Position
Mr. Yoshio Fukuda	Team Leader	JICA
Mr. Hiroki Fujiwara	Chief Consultant/Water Supply Planning	NJS Consultants Co., Ltd.
Mr. Nobuki Abe	Water Supply Facility/Equipment Planning	
Mr. Kenji Takayanagi	Hydrogeology/Groundwater Development	
Mr. Toru Suetake	Waterworks Management	
Mr. Koji Yoshina	Pipeline Network pPlan/Leakage Survry/Socio-environmental Cosideration	
Mr. Shusaku Ueno	Cost estimation/Procurement Planning	

No.2: Explanation on Draft Report

Name	Assignment	Position
Mr. Toshihiro Obata	Team Leader	JICA Tanzania Office
Mr. Hiroki Fujiwara	Chief Consultant/Water Supply Planning	NJS Consultants Co., Ltd.
Mr. Nobuki Abe	Water Supply Facility/Equipment Planning	
Mr. Toru Suetake	Waterworks Management	

Appendix 2

Study Schedule

Appendix 2 Study Schedule

No.1: Basic Design Study

No.	Month/Date		Activities
1	10/23	Sat	Move (Japan-Dubai
2	10/24	Sun	- Dar es Salaam)
3	10/25	Mon	Discussion with JICA Tanzania Office/EOJ, Move (Dar es Salaam-Zanzibar)
4	10/26	Tue	Discussion with MWCEL, DWD/Filed visit
5	10/27	Wed	Field visit
6	10/28	Thu	M/D Signing
7	10/29	Fri	Report to JICA/EOJ
8	10/20	Sat	Internal meeting
9	10/31	Sun	Holiday
10	11/1	Mon	Data collection/Field survey, etc.
11	11/2	Tue	Data collection/Field survey, etc.
12	11/3	Wed	Data collection/Field survey, etc.
13	11/4	Thu	Data collection/Field survey, etc.
14	11/5	Fri	Data collection/Field survey, etc.
15	11/6	Sat	Internal meeting
16	11/7	Sun	Holiday
17	11/8	Mon	Data collection/Field survey, etc.
18	11/9	Tue	Data collection/Field survey, etc.
19	11/10	Wed	Data collection/Field survey, etc.
20	11/11	Thu	Data collection/Field survey, etc.
21	11/12	Fri	Data collection/Field survey, etc.
22	11/13	Sat	Internal meeting
23	11/14	Sun	Holiday
24	11/15	Mon	Data collection/Field survey, etc.
25	11/16	Tue	Data collection/Field survey, etc.
26	11/17	Wed	Data collection/Field survey, etc.
27	11/18	Thu	Data collection/Field survey, etc.
28	11/19	Fri	Data collection/Field survey, etc.
29	11/20	Sat	Internal meeting
30	11/21	Sun	Holiday
31	11/22	Mon	Data collection/Field survey, etc.
32	11/23	Tue	Technical notes signing
33	11/24	Wed	Move (Zanzibar-Dar es Salaam)/ Report to JICA Tanzania Office
34	11/25	Thu	Report to EOJ/ Move (Dar es Salaam-Dubai
35	11/26	Fri	-Japan)

No.2: Explanation on Draft Report

No.	Month/Date		Activities
1	3/7	Mon	Move (Japan-Dubai
2	3/8	Tue	-Dar es Salaam)/ Discussion with JICA Tanzania Office
3	3/9	Wed	Discussion with UNDP Dar es Salaam/EOJ, Move (Dar es Salaam-Zanzibar)
4	3/10	Thu	Discuusion with MWCWL/DWD
5	3/11	Fri	Discussion with DWD, Field survey
6	3/12	Sat	Field survey
7	3/13	Sun	Field survey/Data collection
8	3/14	Mon	Seminar for DWD, Discussion with DWD, Field survey
9	3/15	Tue	Discussion with MWCWL, Field survey
10	3/16	Wed	Discussion with Department of Roads, Field survey
11	3/17	Thu	Visit to UNDP Zanzibar, Move (Zanzibar-Dar es Salaam)
12	3/18	Fri	Report to EOJ/JICA Tanzania Office
13	3/19	Sat	Discussion with Contractors (Soil survey, Electric resistivity survey)
14	3/20	Sun	Move (Dar es Salaam-Dubai
15	3/21	Mon	-Japan)

Appendix 3

Lists of Parties Concerned in the Recipient Country

Appendix 3 List of Parties Concerned in the Recipient Country

Organization	Name	Position	Notes
Ministry of Water, Construction, Energy and lands (MWCEL)	Mr. Yasser De Costa	Principal Secretary	
	Mr. Silima M. Khamis	Deputy Principal Secretary	
	Mr. Muhammad Salim Sulaiman	Advisor to Minister	
	Mr. Juma Kh. Juma	Director of Planning	
Ministry of Finance (MOF)	Mr. Joyce K. G. Mapunjo	Commissioner of External Finance	
	Mr. Audifax Choma	Assistant Commissioner of External Finance	
	Ms. M.N. Ngingite	Japan Desk Officer	
	Mr. A. Mololo	Assistant Desk Officer	
Ministry of Finance and Economic Affairs (MFEA)	Mr. Julian B. Raphael	Principal Secretary	
	Mr. Joseph A Meza	Deputy Principal Secretary-Expenditure	
	Ms. Amina Kh. Shaaban	Deputy Principal Secretary-Economic Affairs	
	Mr. Hussein S. Khatib	Commissioner External Finance	
Department of Water Development (DWD)	Mr. Salim Hemed Salim	Director of DWD	
	Mr. Ilyasa	Executive Engineer	
	Mr. Mohamed Salim Msabah	Administrative Officer	
	Mr. Mzec Mpatan Ali	Executive Engineer	
	Mr. Juma Zubeir	Executive Engineer	
	Mr. Said Saleh Sureiman	Executive Engineer	
	Mr. Hafidh S. Makame	Executive Engineer (Revenue)	
	Ms. Mariyam Hassan	Senior Hydrogeologist	
	Mr. Haji Shaaban	Hydrogeologist	
	Mr. Juma Zubeir	Water Supply Engineer	
	Mr. Maulid Haji Kinange	Revenue Officer	
	Mr. Ali Mkali	Accountant	
Department of Roads (DR)	Mr. Cosmas Masolwa	Road MaintenanceEngineer	
UNDP Dar es Salaam Office	Ms.G. Lyatuu	Task Manager, Environmental and Poverty Environmental & Gender	
	Mr. Murusuri N.K.	Task Manager UNDP Small Grants Program	
	Ms. Yuko Suzuki	Junior Program Officer	
UNDP Zanzibar Office	Mr. Mahadhi J. Maalim	Programme Analysist	
KfW	Dr. Jorg Hartmann	Director KfW Office Dar es Salaam	
	Dr. Gerd S. Bethke	Senior Project Manager, Water and Sanitaton Div., Sub-Sahara Africa	
	Mr. Alexander Grieb	Technical Supervisor	
Zanzibar Municipal Council	Mr. Mzee Khamis Juma	Head of Dept. of Urban Construction and Environment	
	Mr. Ramadham Juma Mukshin	Executive Engineer	