

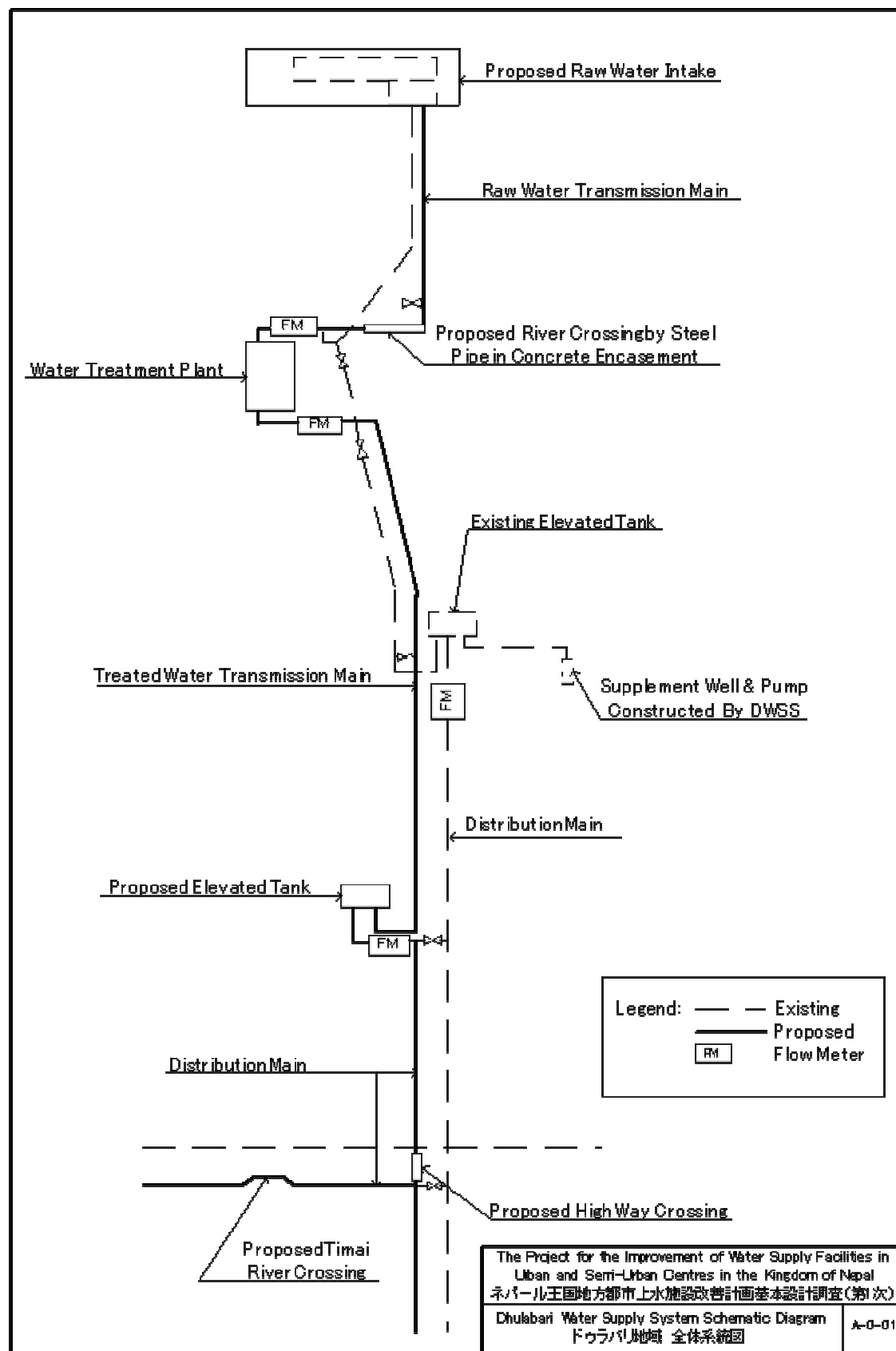
2-2-3 Basic Design Drawings

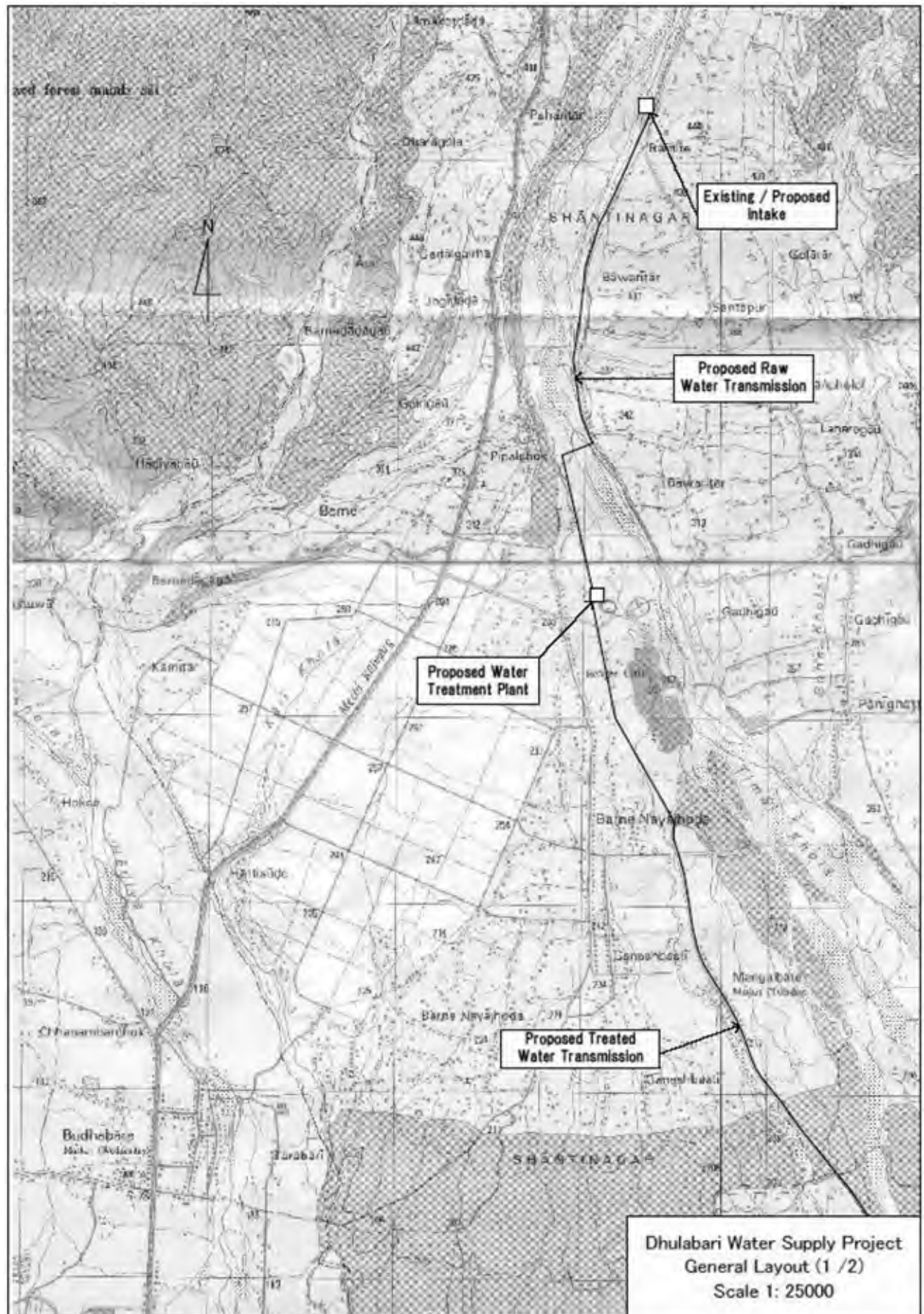
No.	DWG No.	Title	Scale
		A. Dhulabari	
1	A-0-01	System Flow Diagram	-
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2	A-1-01	Intake Weir Plan & Section	1:100
		< Raw Water Transmission Pipeline >	
3	A-2-01	Raw Water Transmission Pipe Plan & Profile	
		< Dhulabari WTP >	
4	A-3-01	General Layout	1:1000
5	A-3-02	Hydraulic Profile	-
6	A-3-03	Process Flow Diagram -1	-
7	A-3-04	Process Flow Diagram -2	-
8	A-3-05	Receiving Well Plan & Section	1:100
9	A-3-06	Plain Sedimentation Basin Plan & Section	1:100
10	A-3-07	Rough Filter Plan & Section	1:100
11	A-3-08	Slow Sand Filter Plan & Section	1:100
12	A-3-09	Clear Water Reservoir Plan & Section	1:200
13	A-3-10	Wastewater Treatment Lagoon Plan & Section	1:200
14	A-3-11	Wash-Water Tank Plan & Section	1:100
15	A-3-12	Administration Building Plan & Section	1:100
16	A-3-13	Filter Sand Storage House Plan & Section	1:100
17	A-3-14	Guard House Plan & Section	1:100
18	A-3-15	Yard Pipe Plan	1:1000
19	A-3-16	Yard Work Plan	1:1000
20	A-3-17	Earth Work Plan	1:1000
21	A-3-18	Single Line Diagram	-
22	A-3-19	Outline of Panel	-
23	A-3-20	Layout & wiring	-
		< Elevated Tank >	
24	A-5-01	General Layout	1:1000
25	A-5-02	Elevated Tank Plan & Section	1:200
26	A-5-03	Single Line Diagram & Outline of Panel	-
		< Well Facility >	
27	A-6-01	Generator House Plan & Section	1:100
		< Distribution Pipeline >	
28	A-7-01	Distribution Main Pipe Plan & Profile	

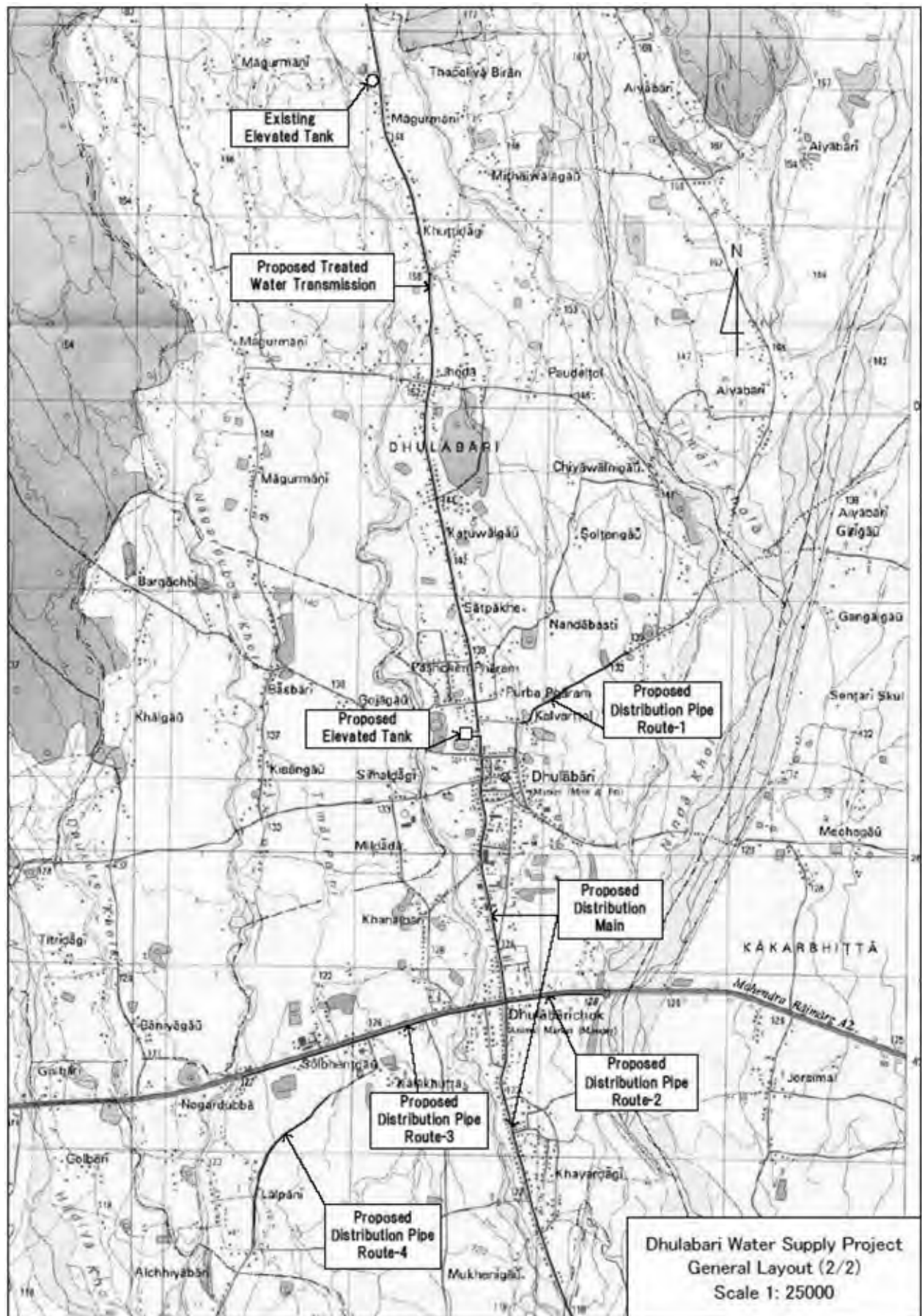
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		< Gauradaha WTP >	
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30	B-1-02	Hydraulic Profile	-
31	B-1-03	Process Flow Diagram	-
32	B-1-04	Iron Removal Facility Plan & Section	1:100
33	B-1-05	Clear Water Reservoir Plan & Section	1:100
34	B-1-06	Yard Work Plan	1:1000
35	B-1-07	Single Line Diagram	-
36	B-1-08	Outline of Panel	-
37	B-1-09	Layout & wiring	-
38	B-1-10	Generator House Plan & Section	1:30
		< Distribution Pipeline >	
39	B-2-01 ~ 9	Distribution Pipe(Route-1) Plan & Profile	
		C. Mangadh	
		< Mangadh WTP >	
40	C-1-01	General Layout	1:1000
41	C-1-02	Hydraulic Profile	-
42	C-1-03	Process Flow Diagram	-
43	C-1-04	Iron Removal Facility Plan & Section	1:100
44	C-1-05	Clear Water Reservoir Plan & Section	1:100
45	C-1-06	Yard Work Plan	1:1000
46	C-1-07	Single Line Diagram	-
47	C-1-08	Outline of Panel	-
48	C-1-09	Layout & wiring	-
49	C-1-10	Generator House Plan & Section	1:75

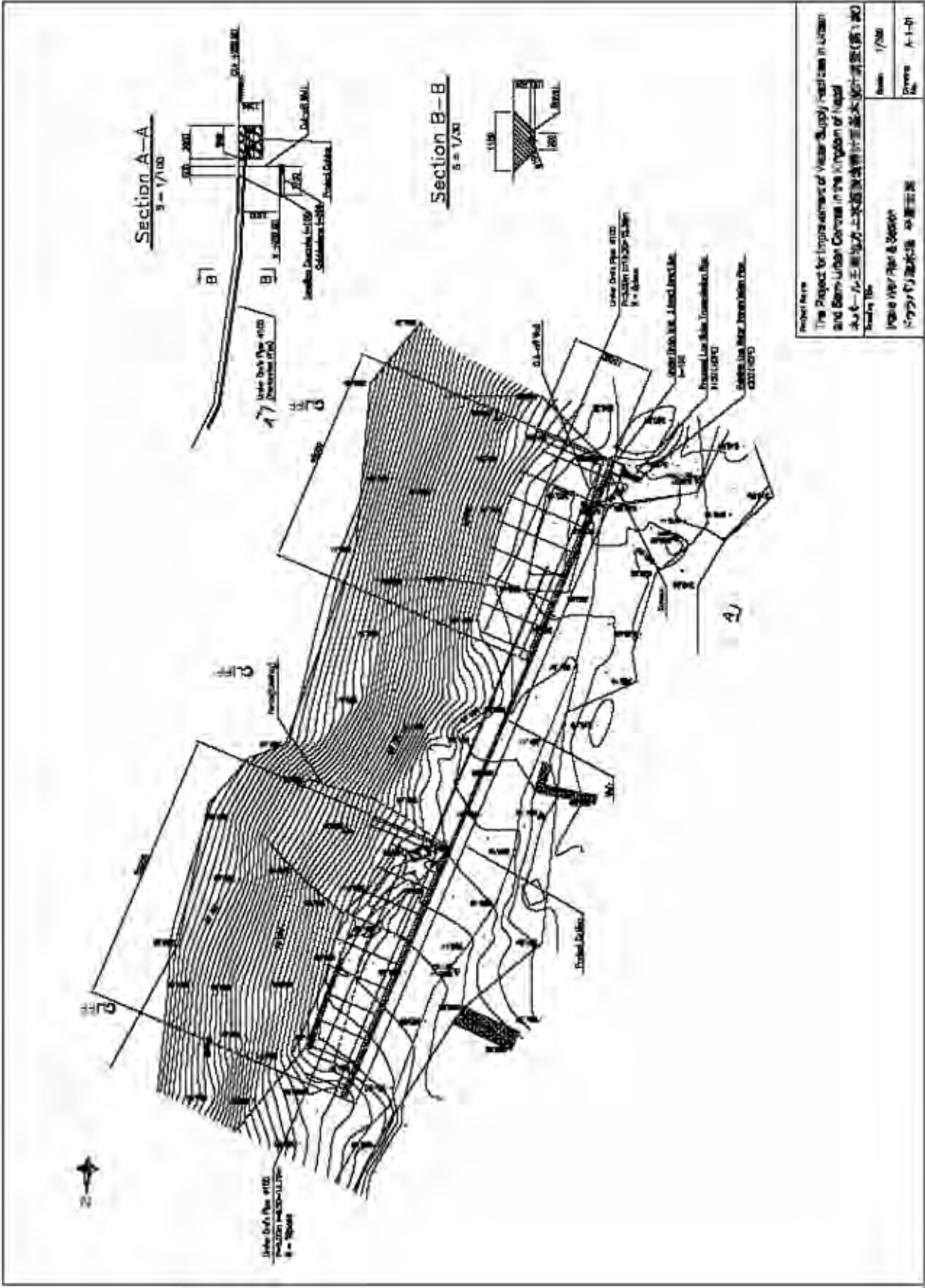
A. Dhulabari

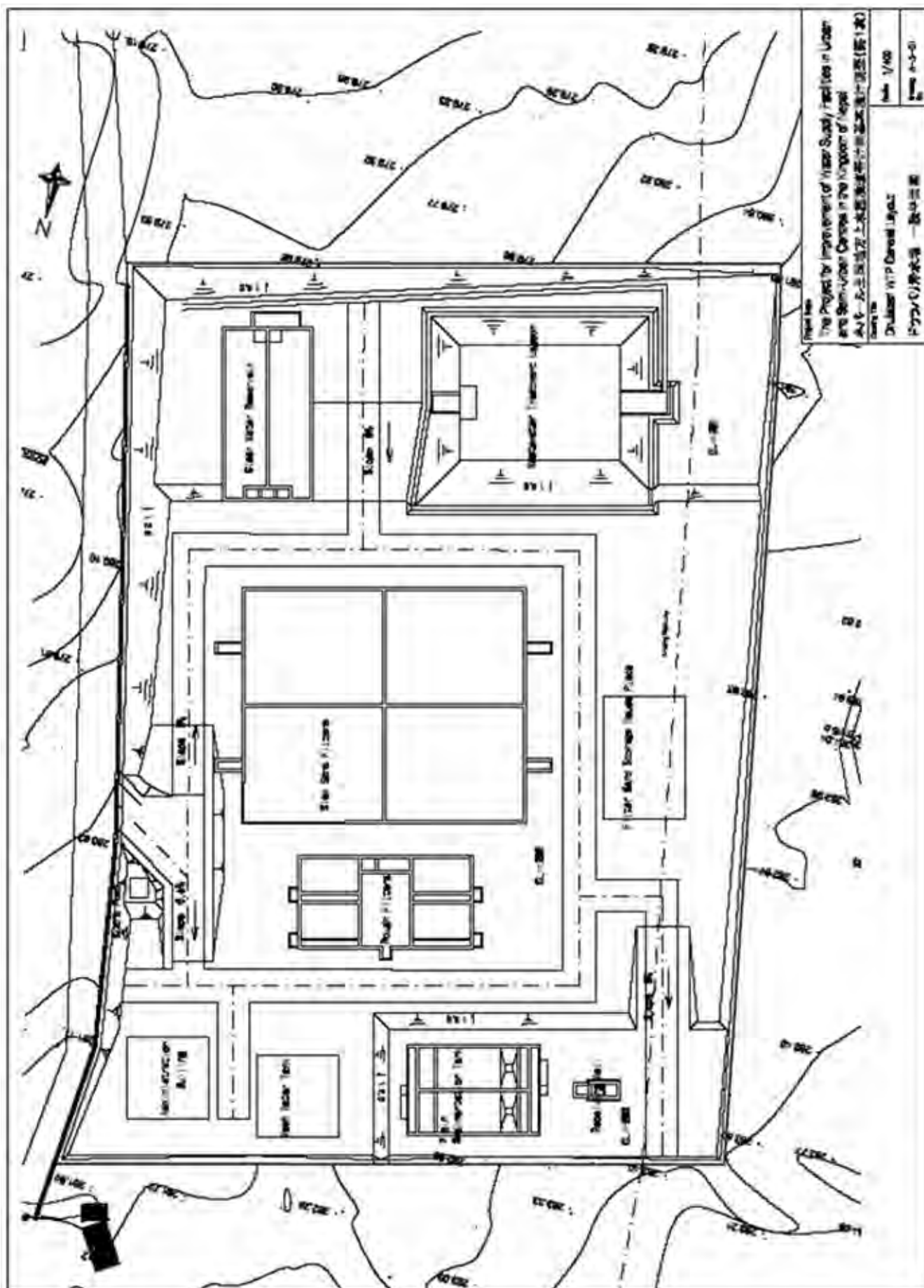
【System Flow Diagram】

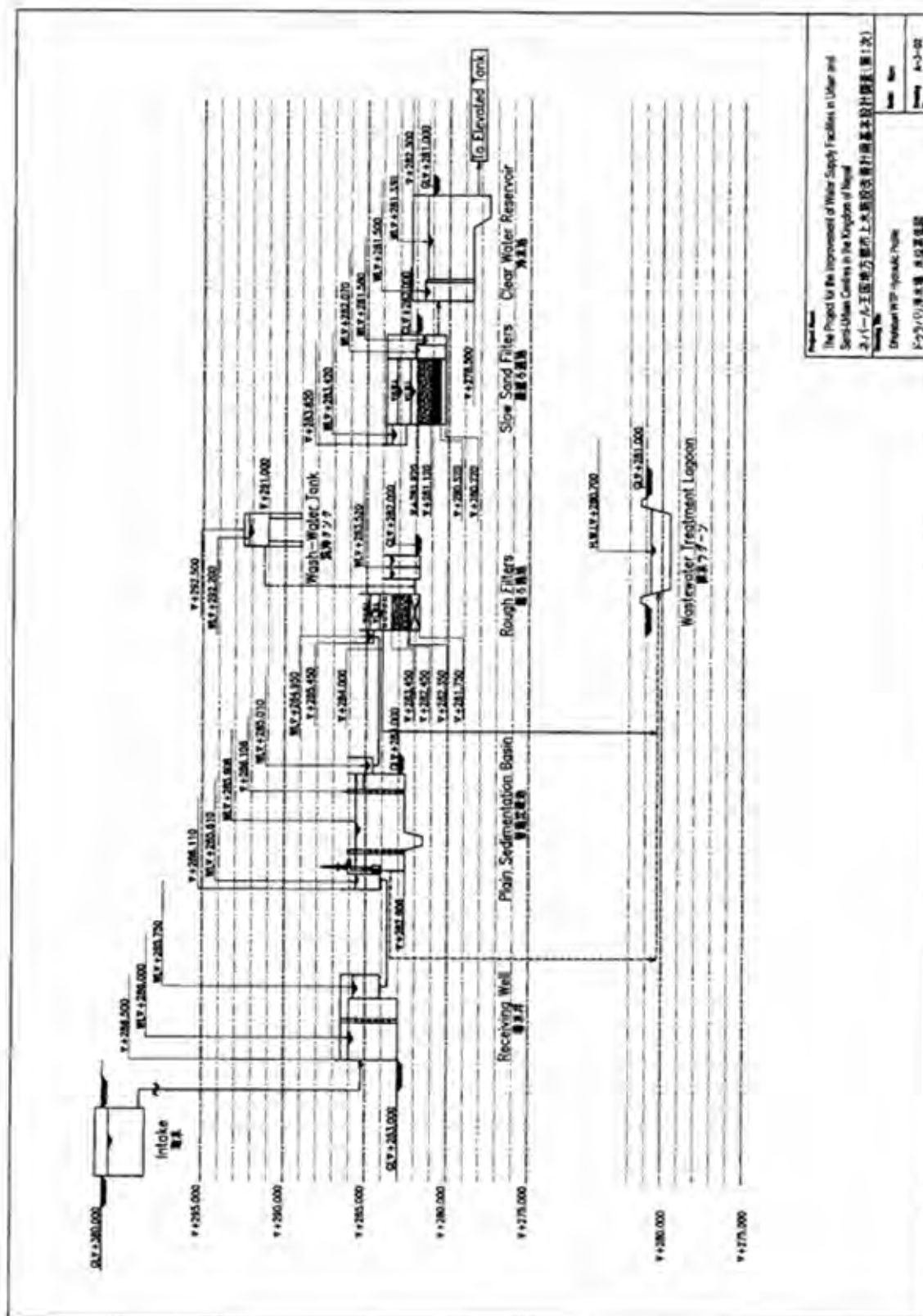


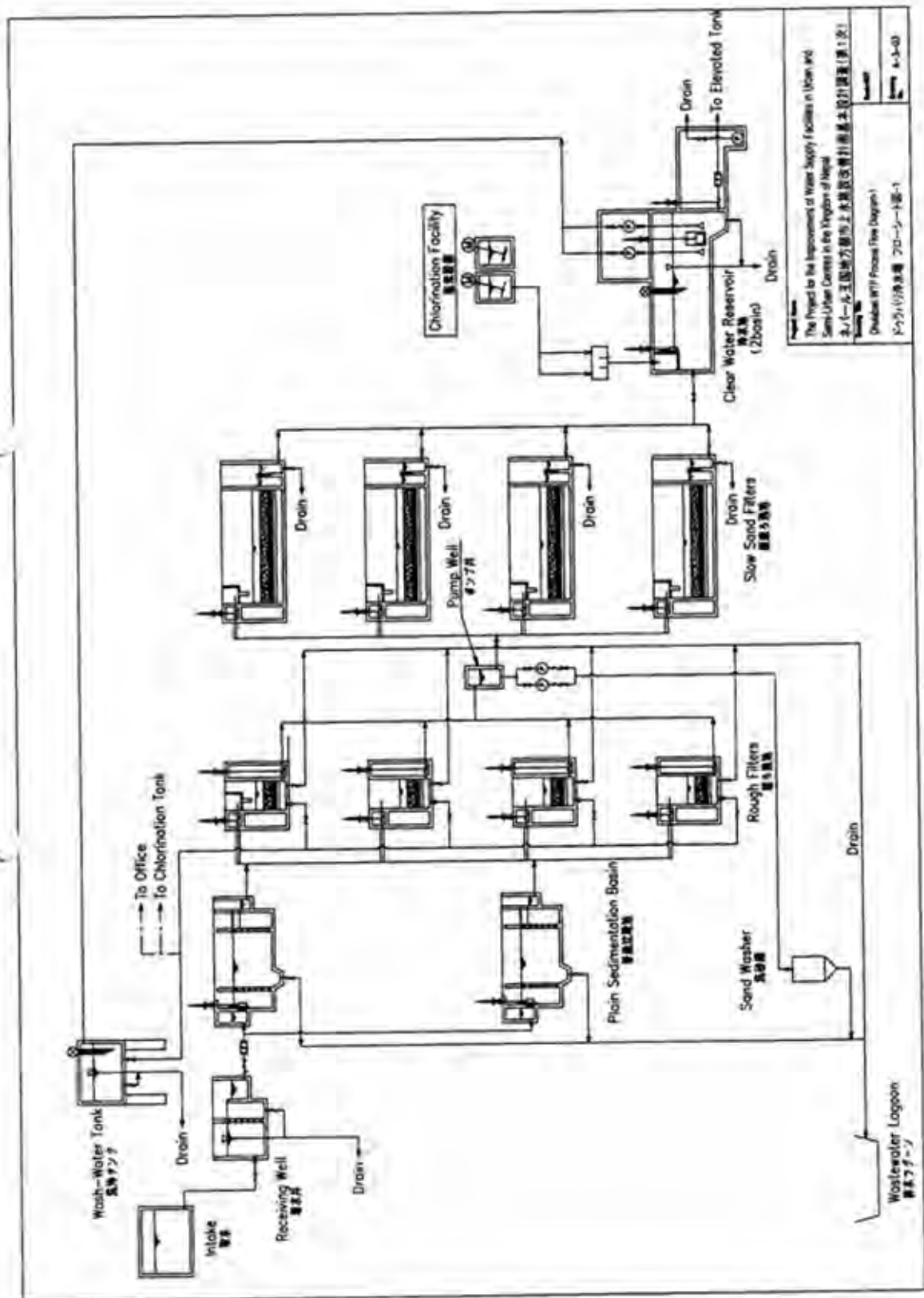


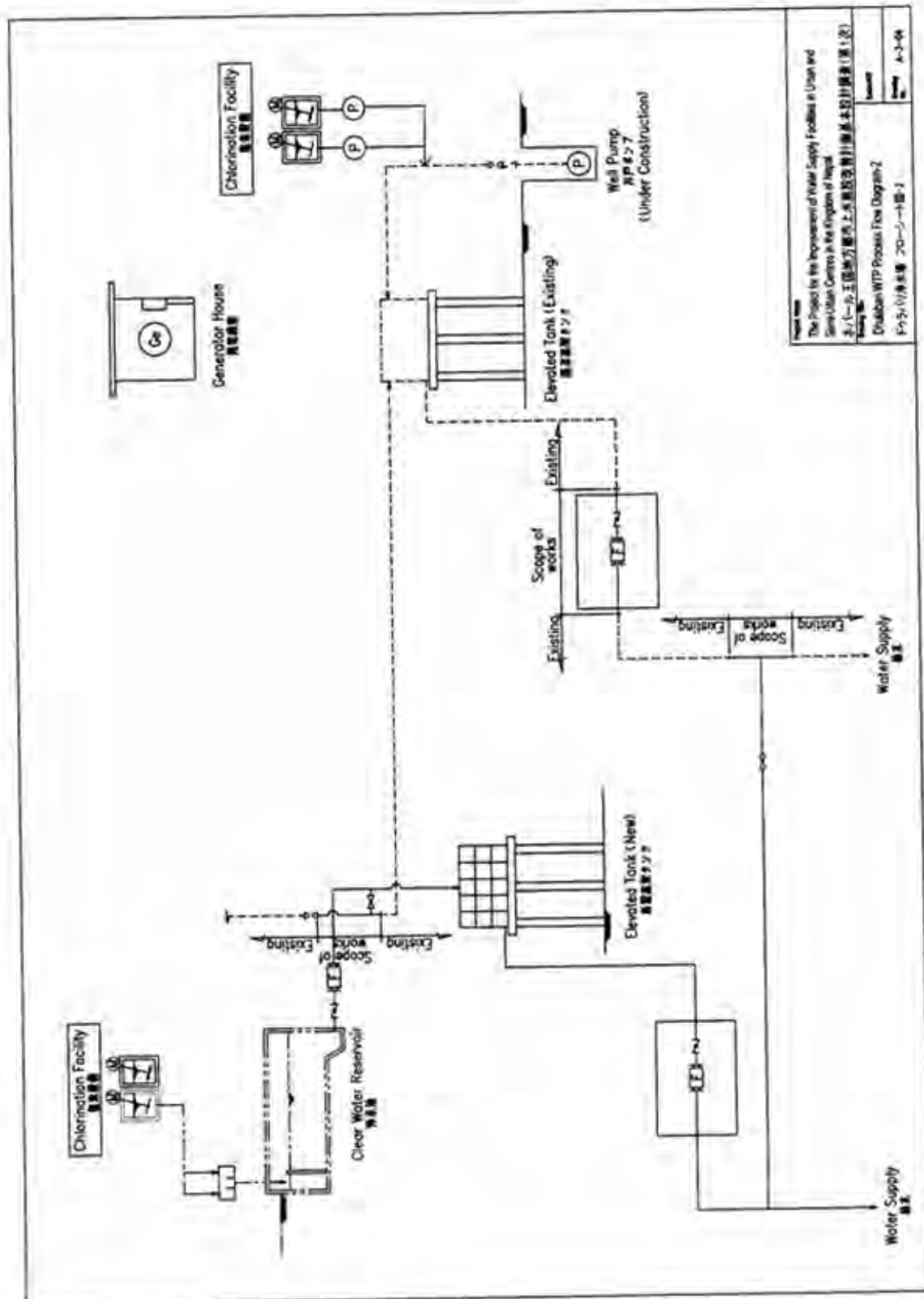


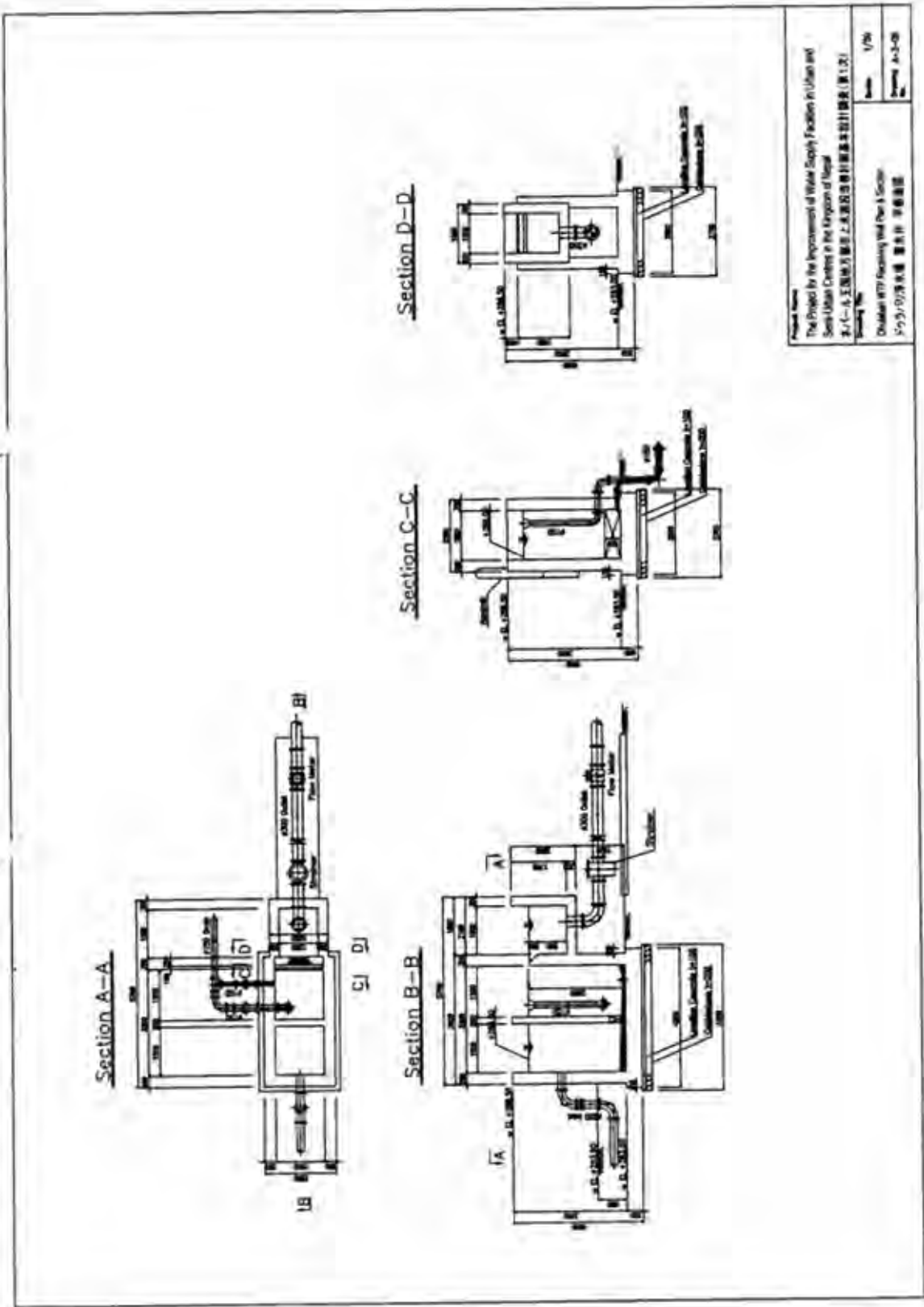


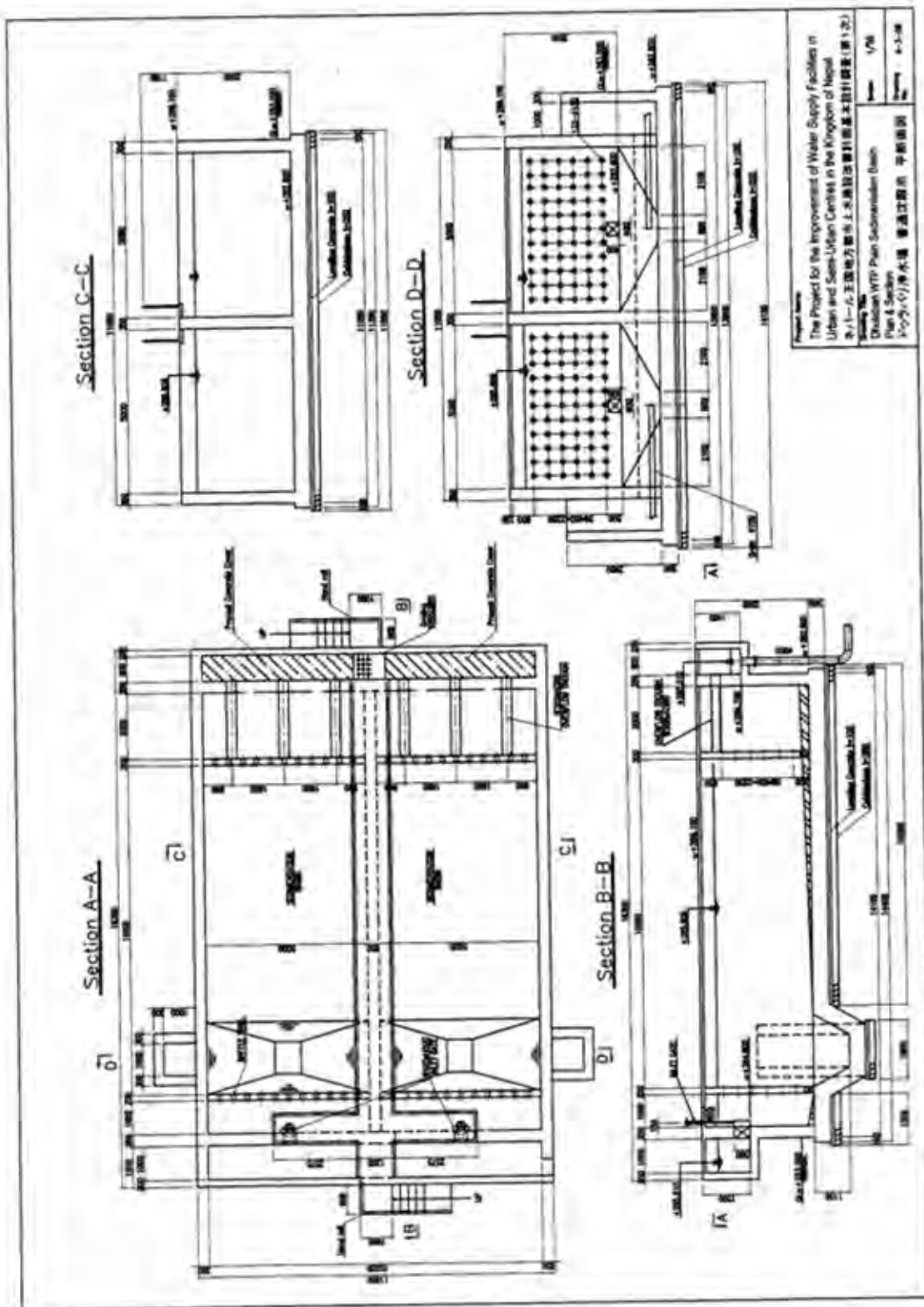


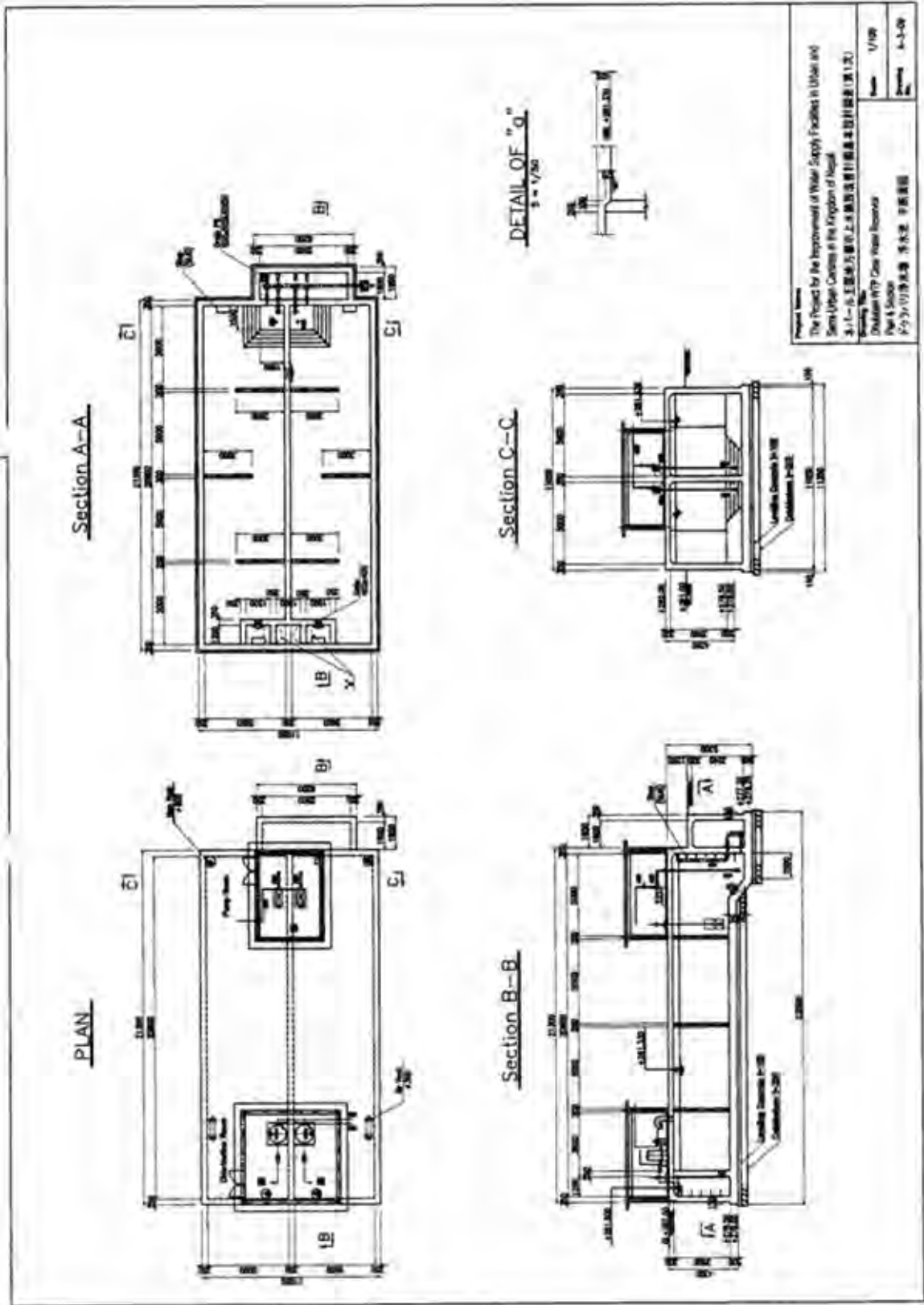


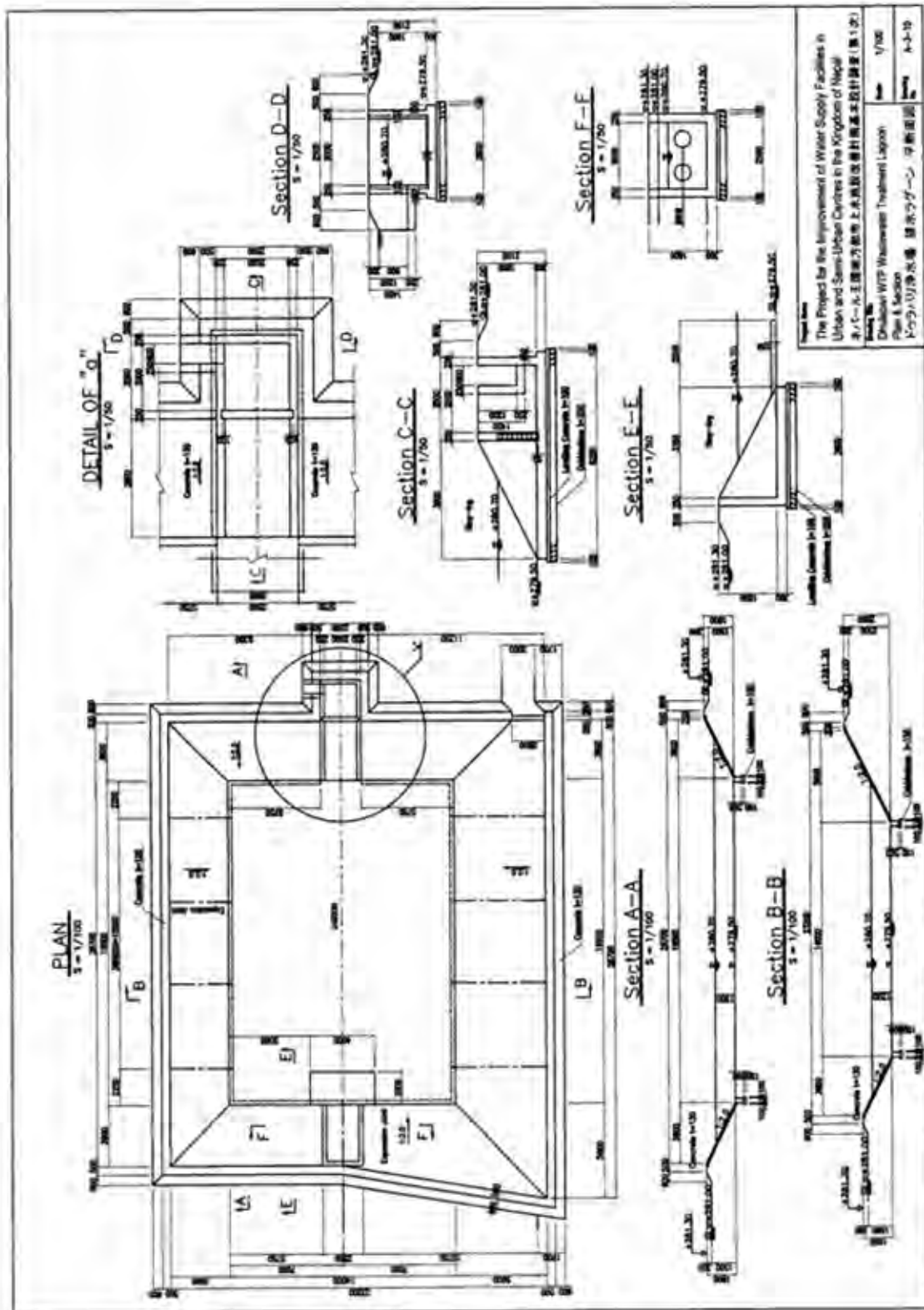




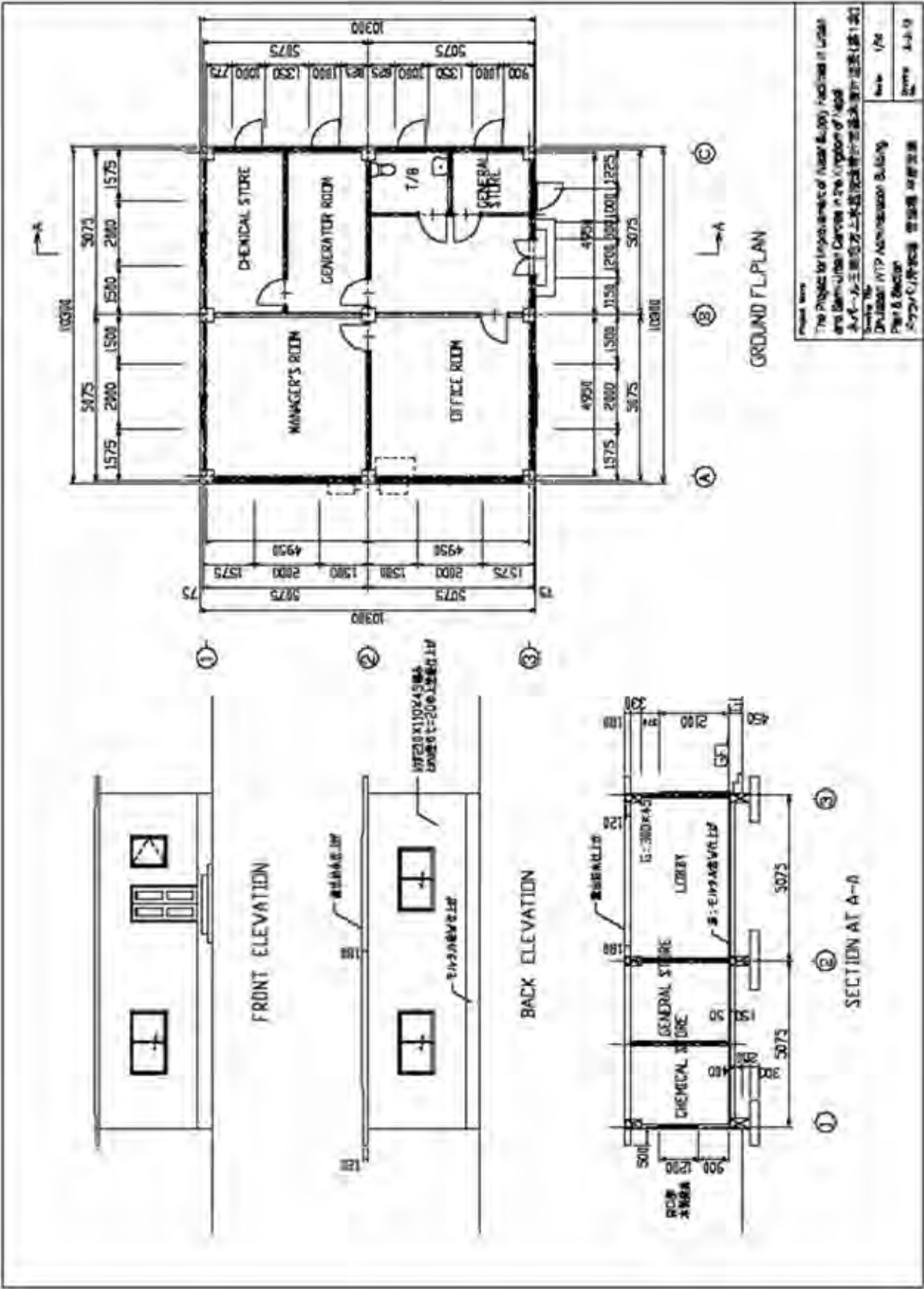


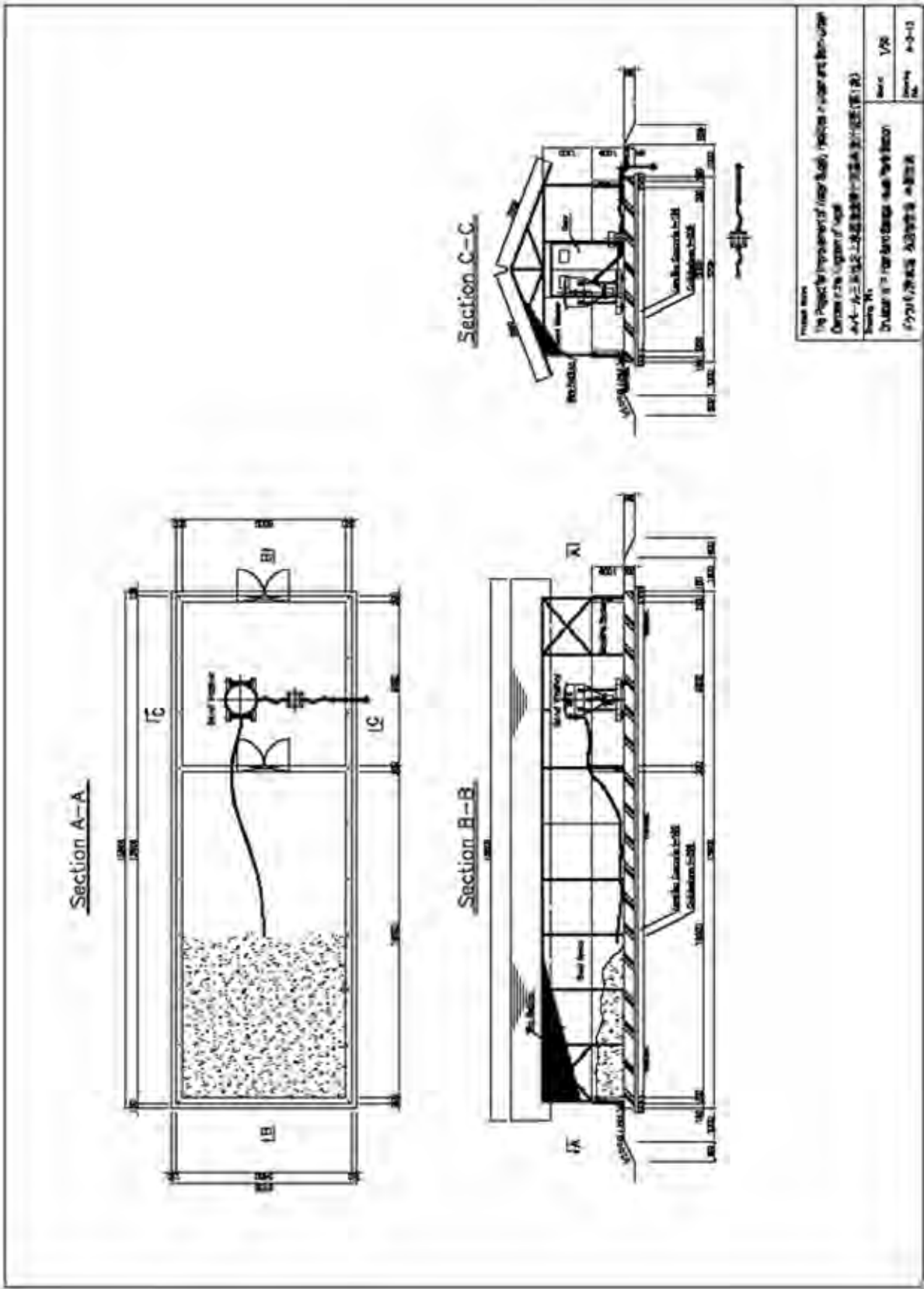


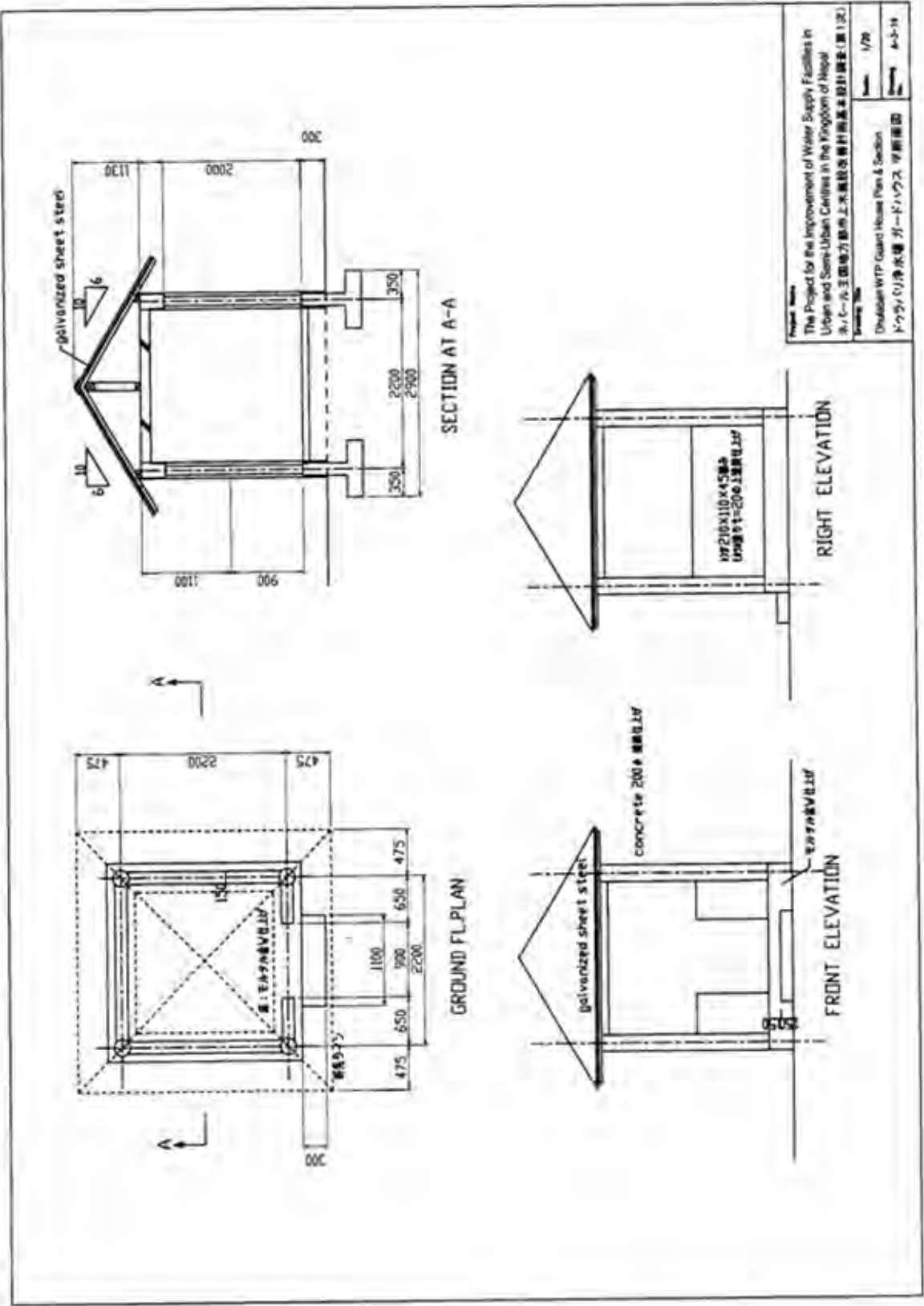


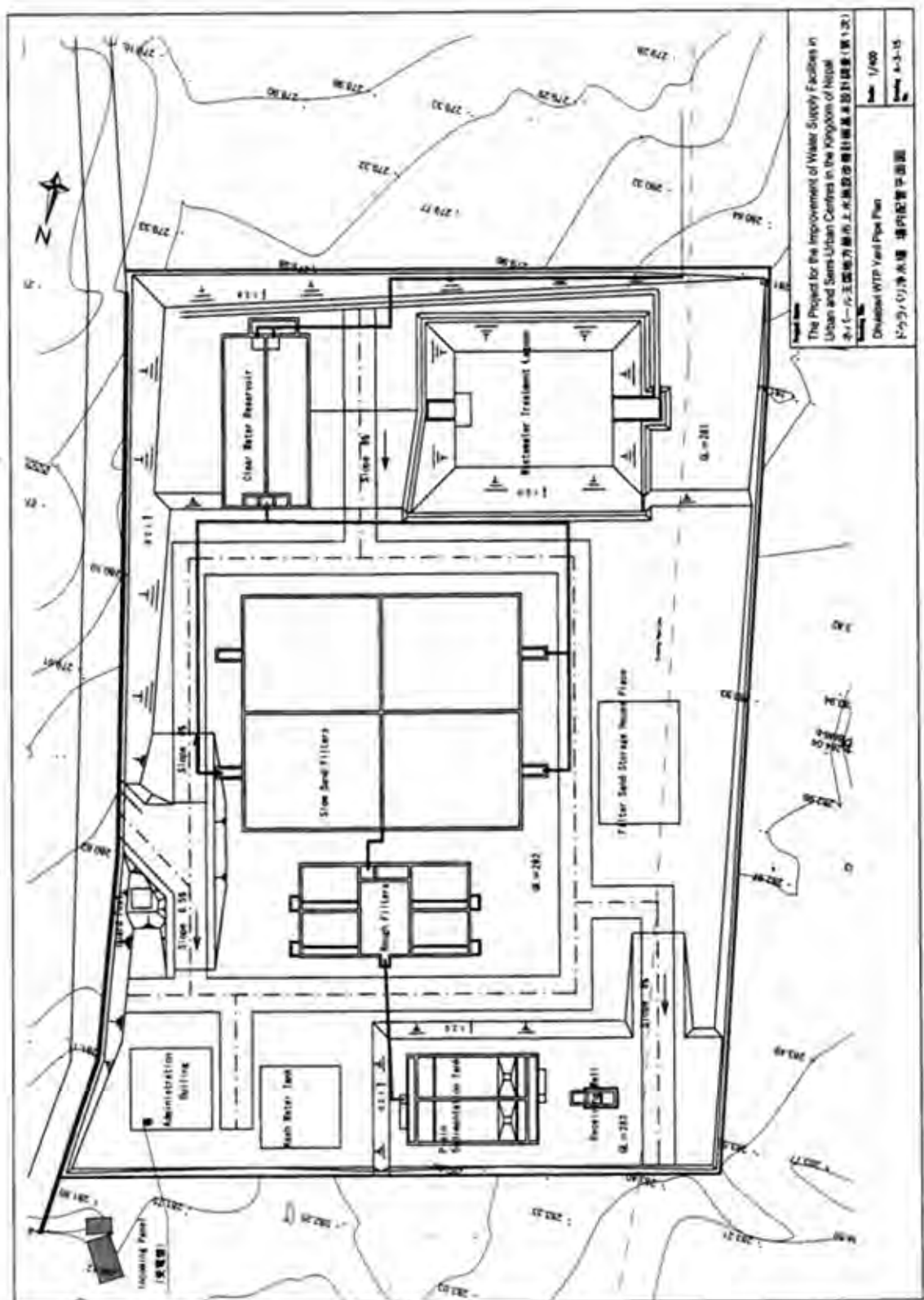


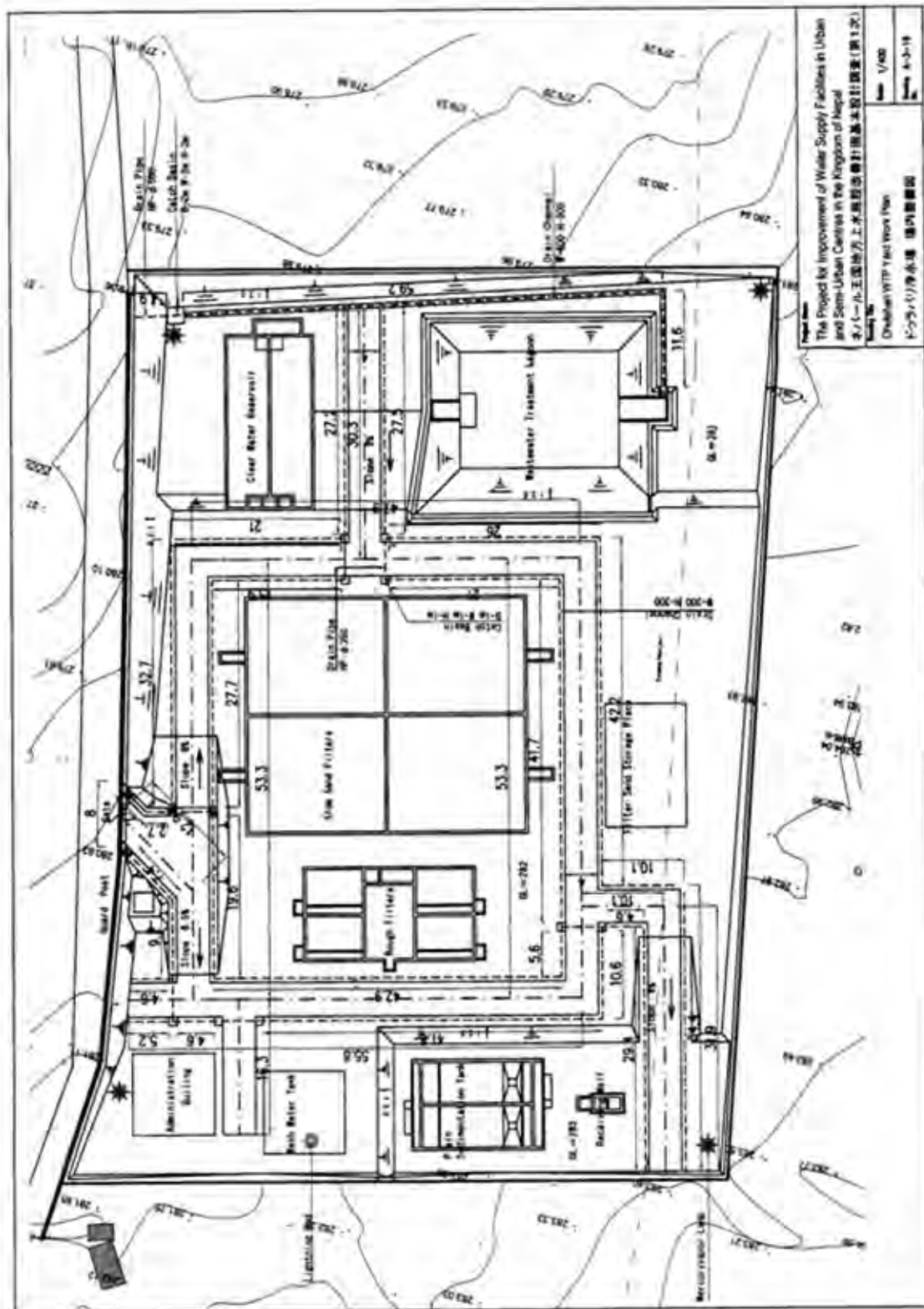


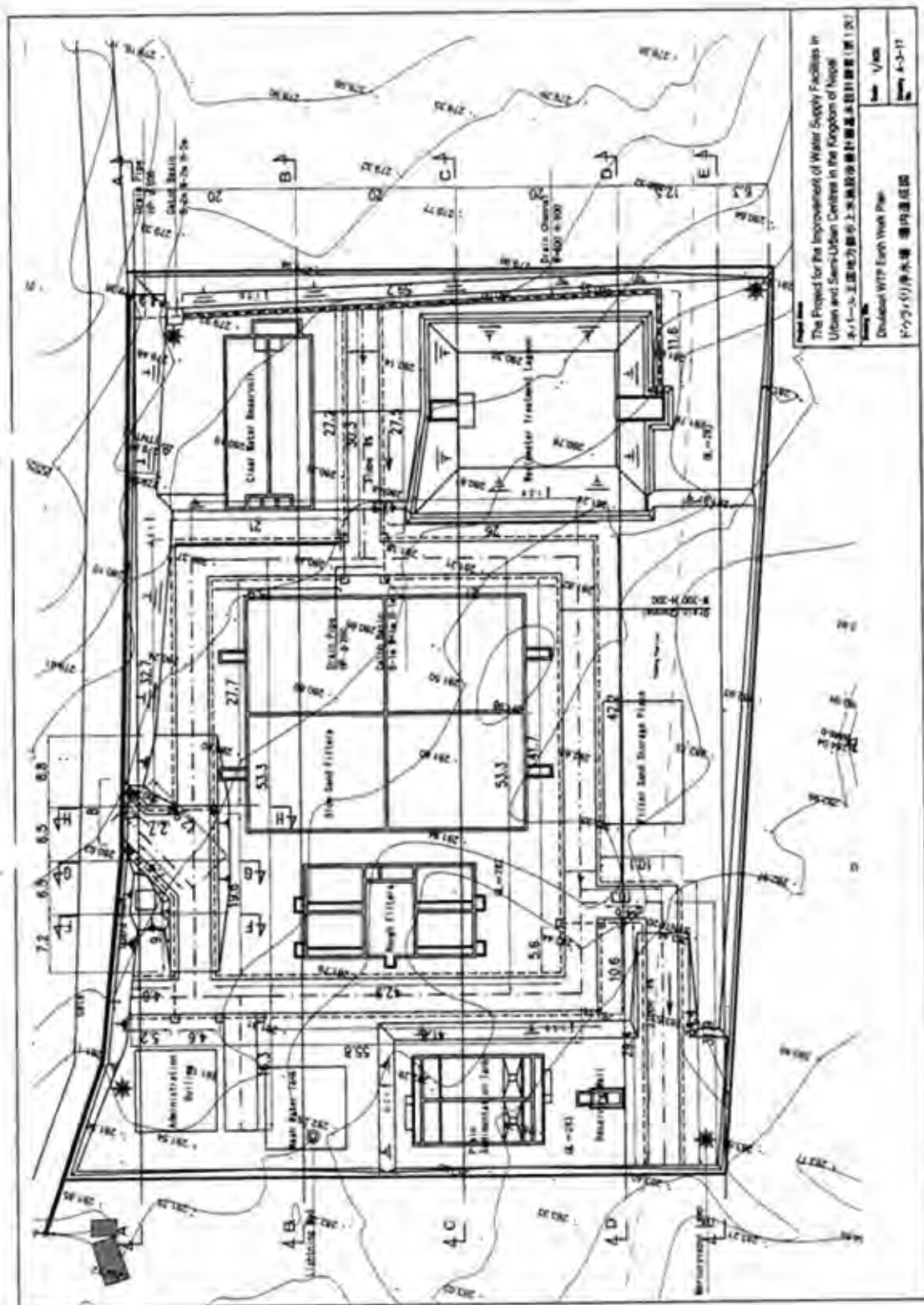


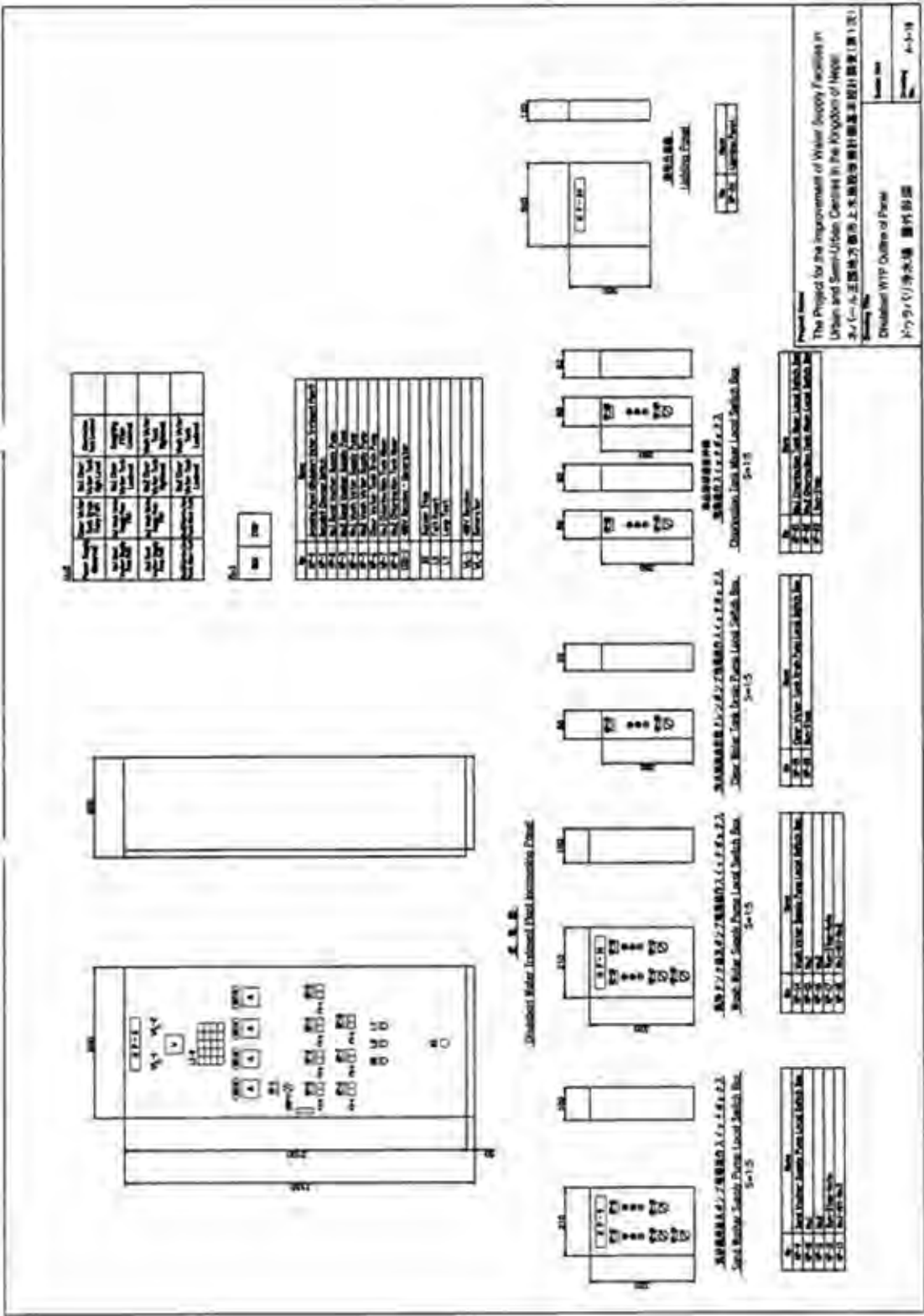


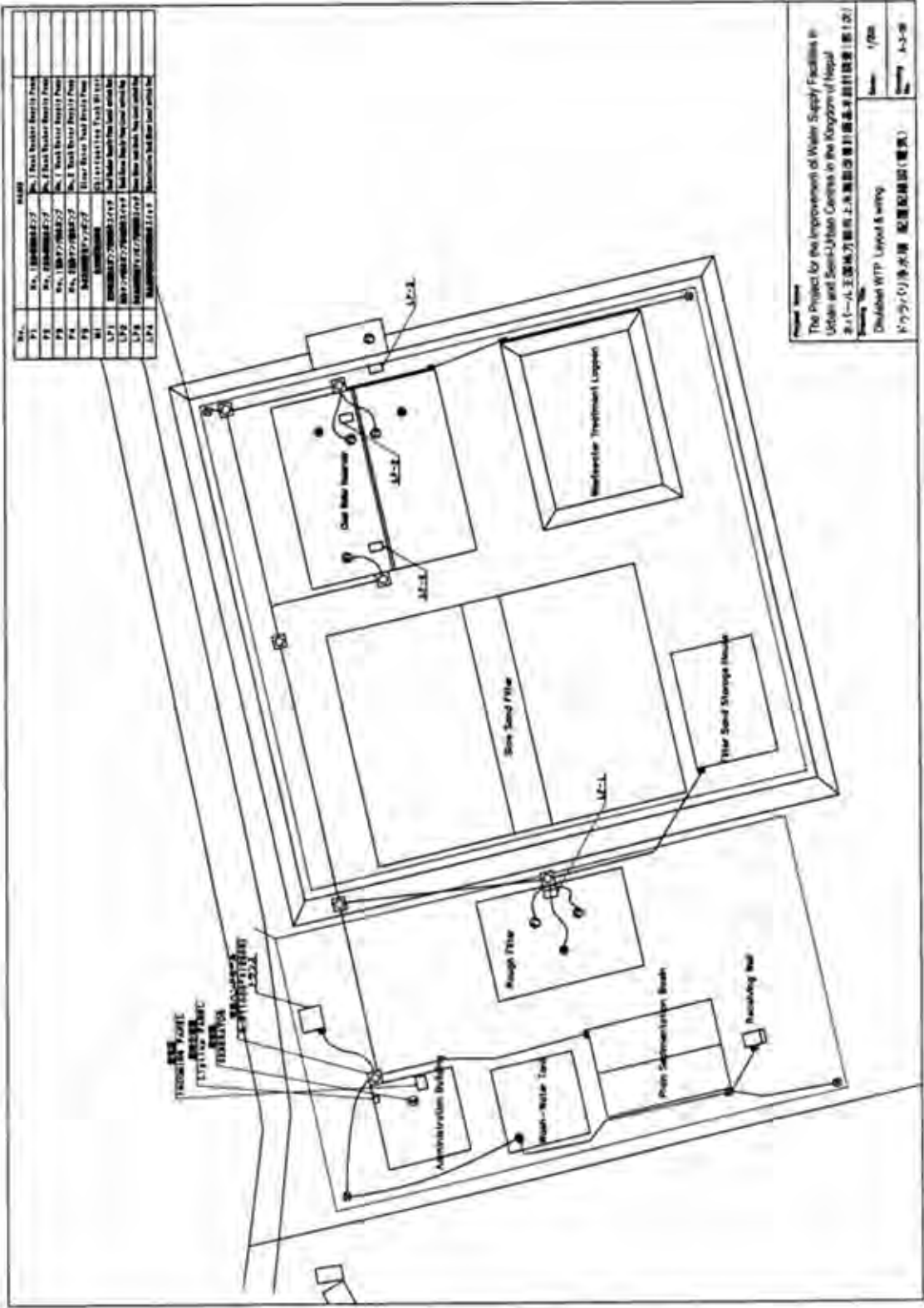


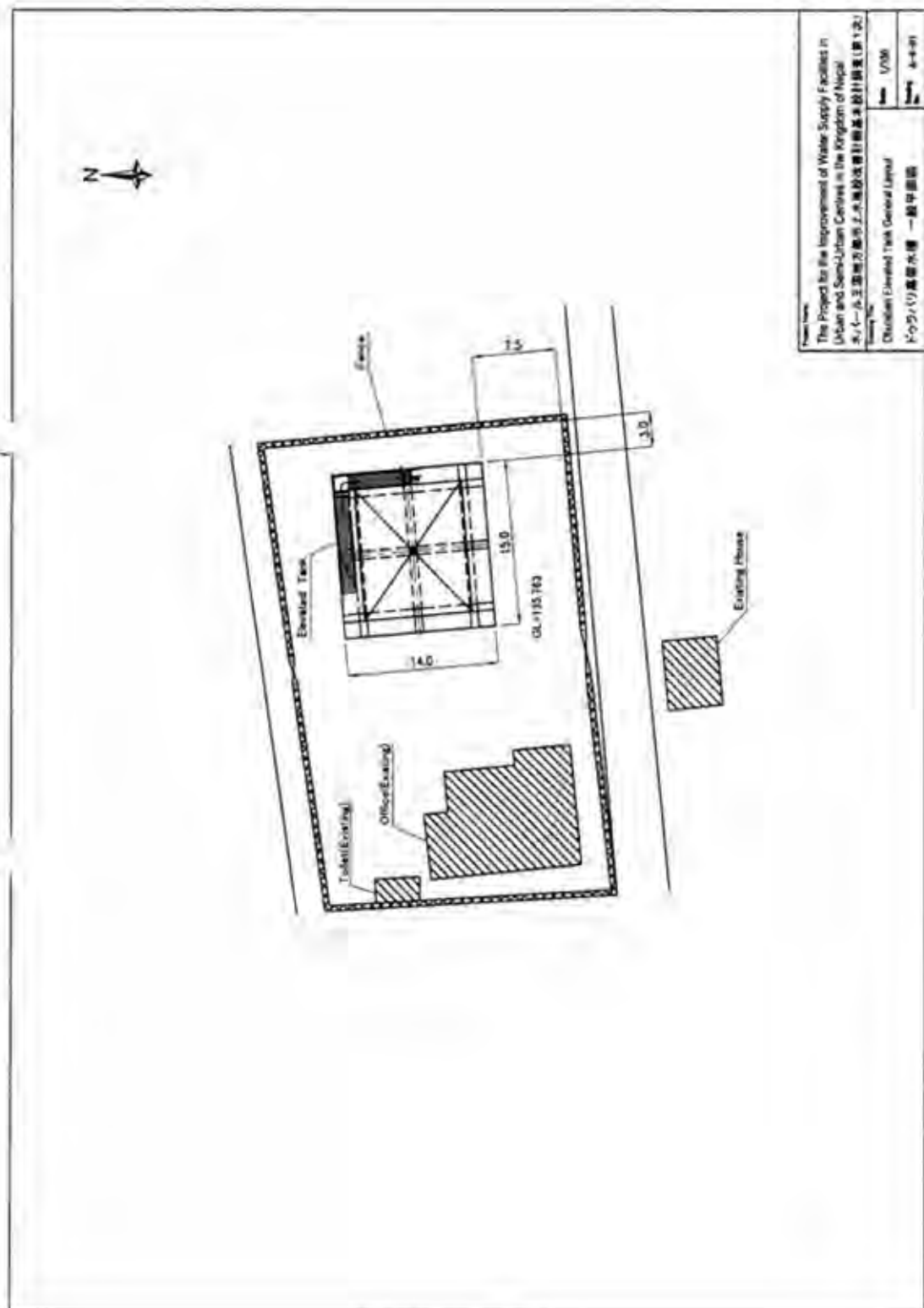


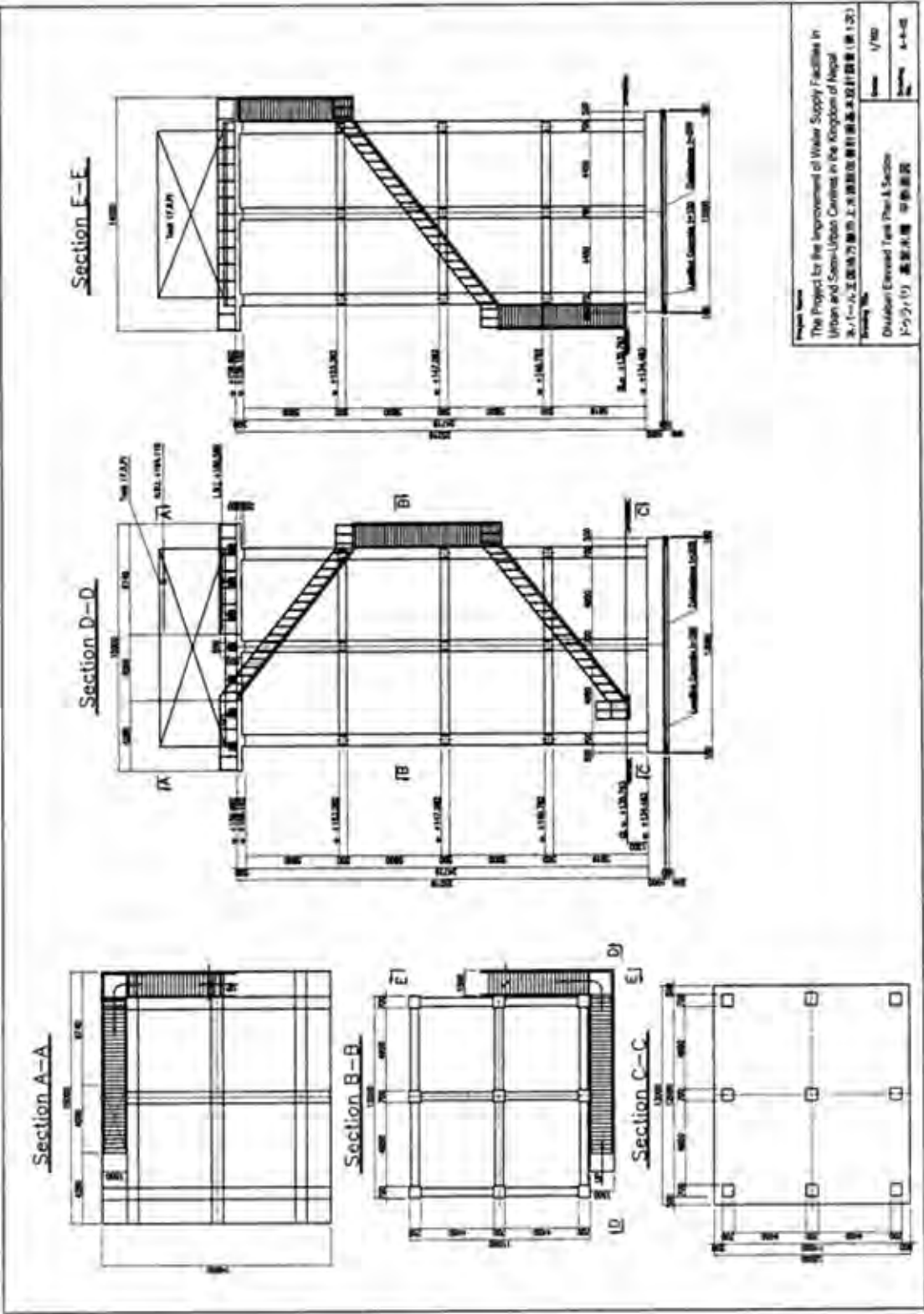


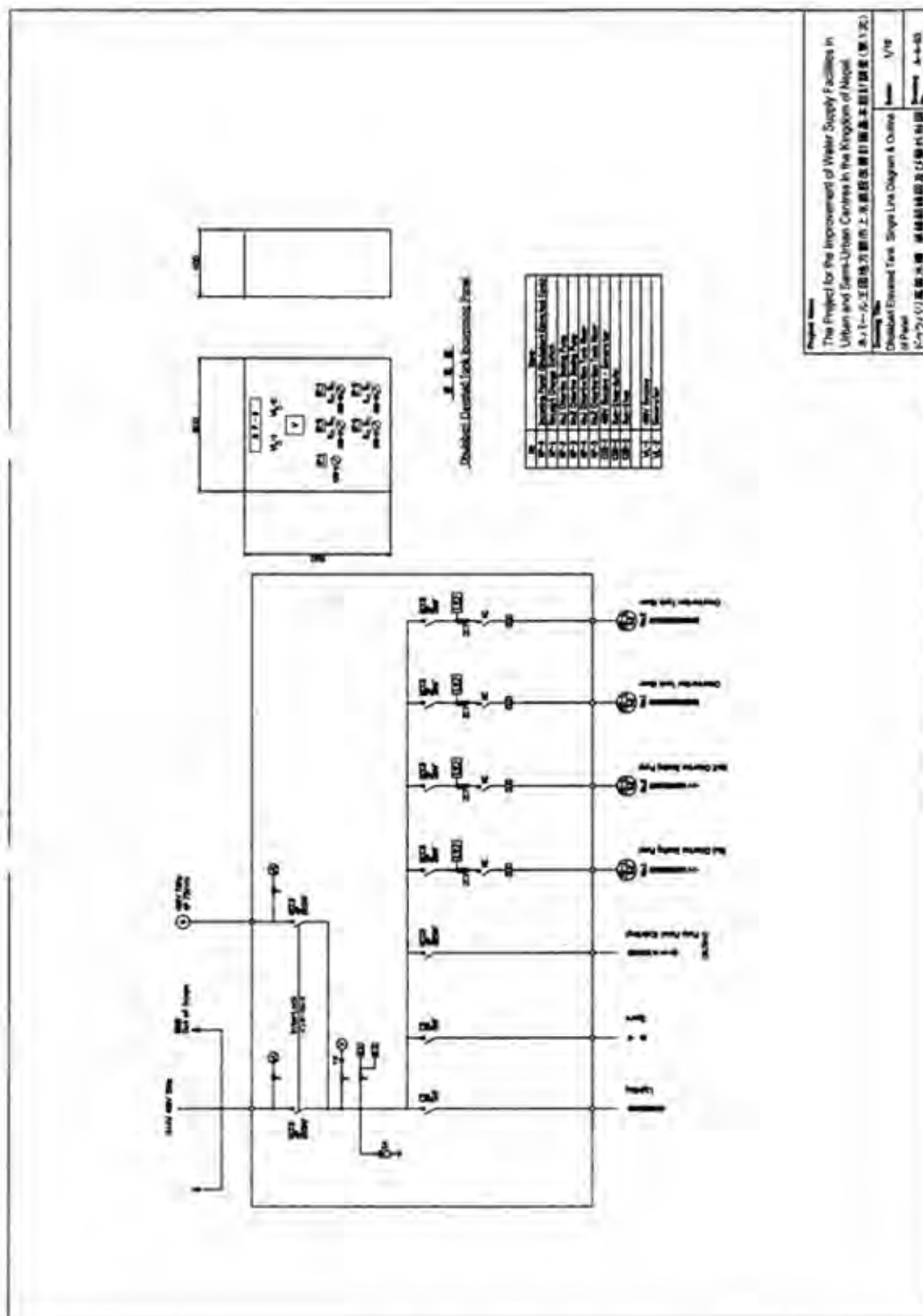


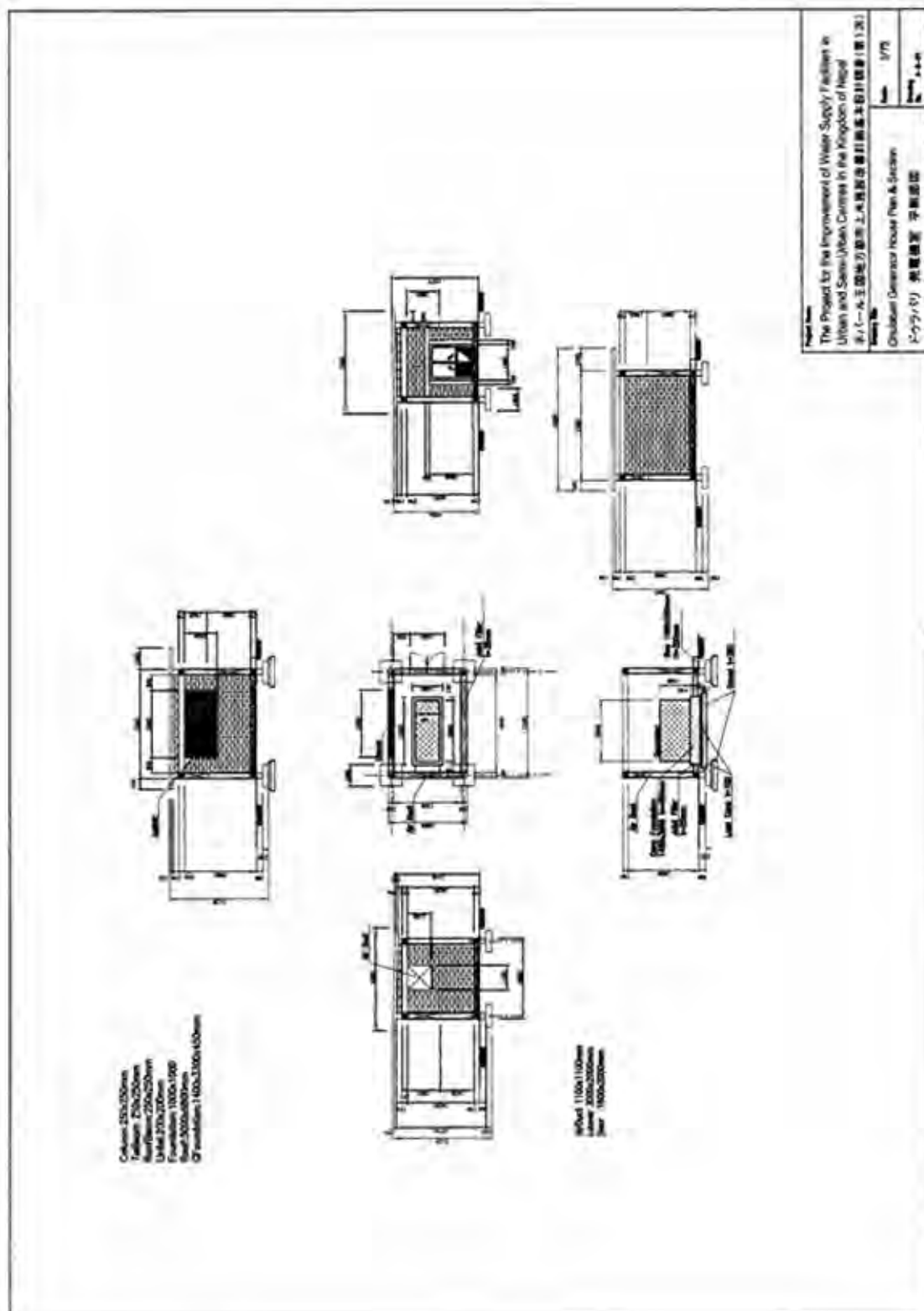


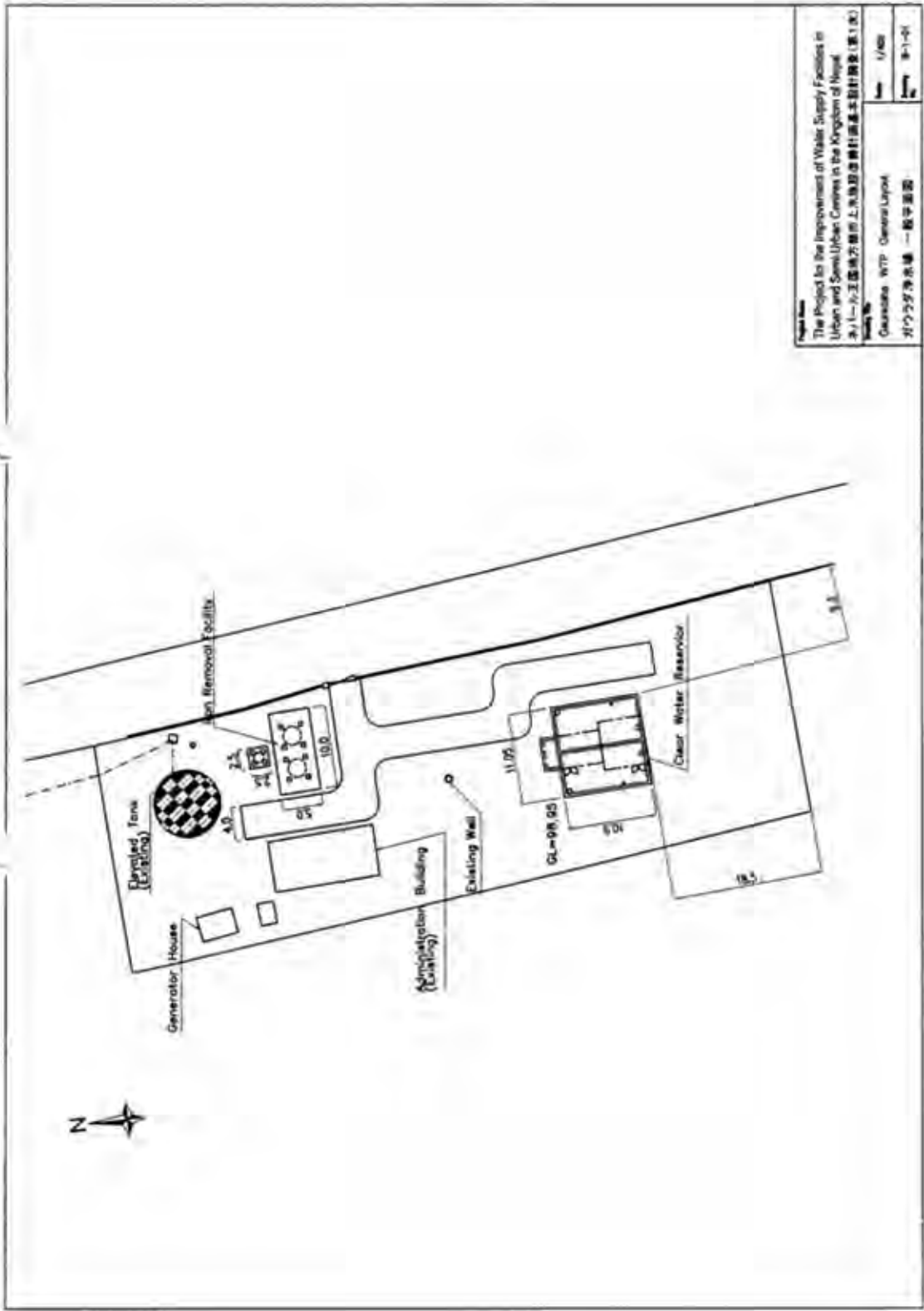


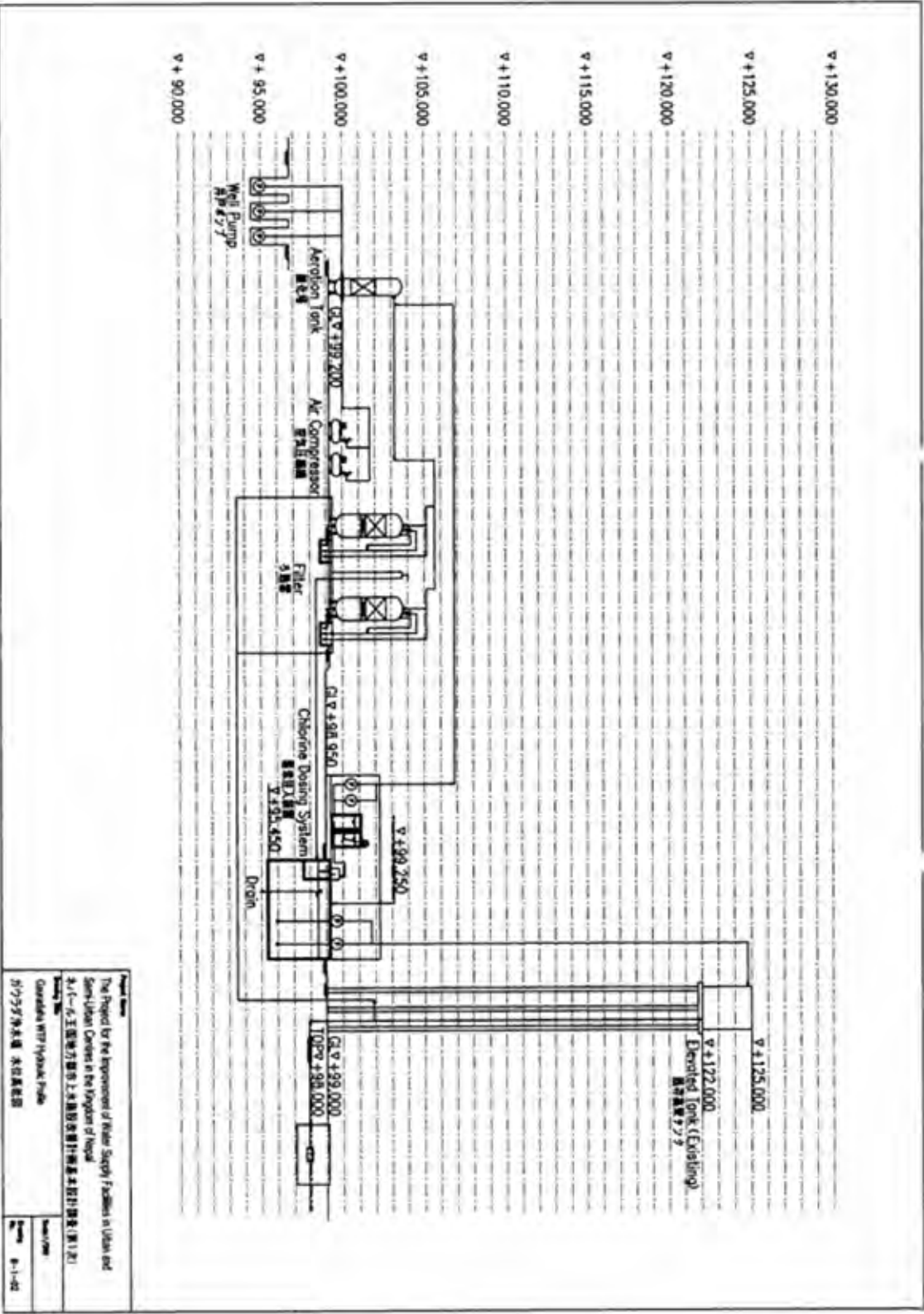


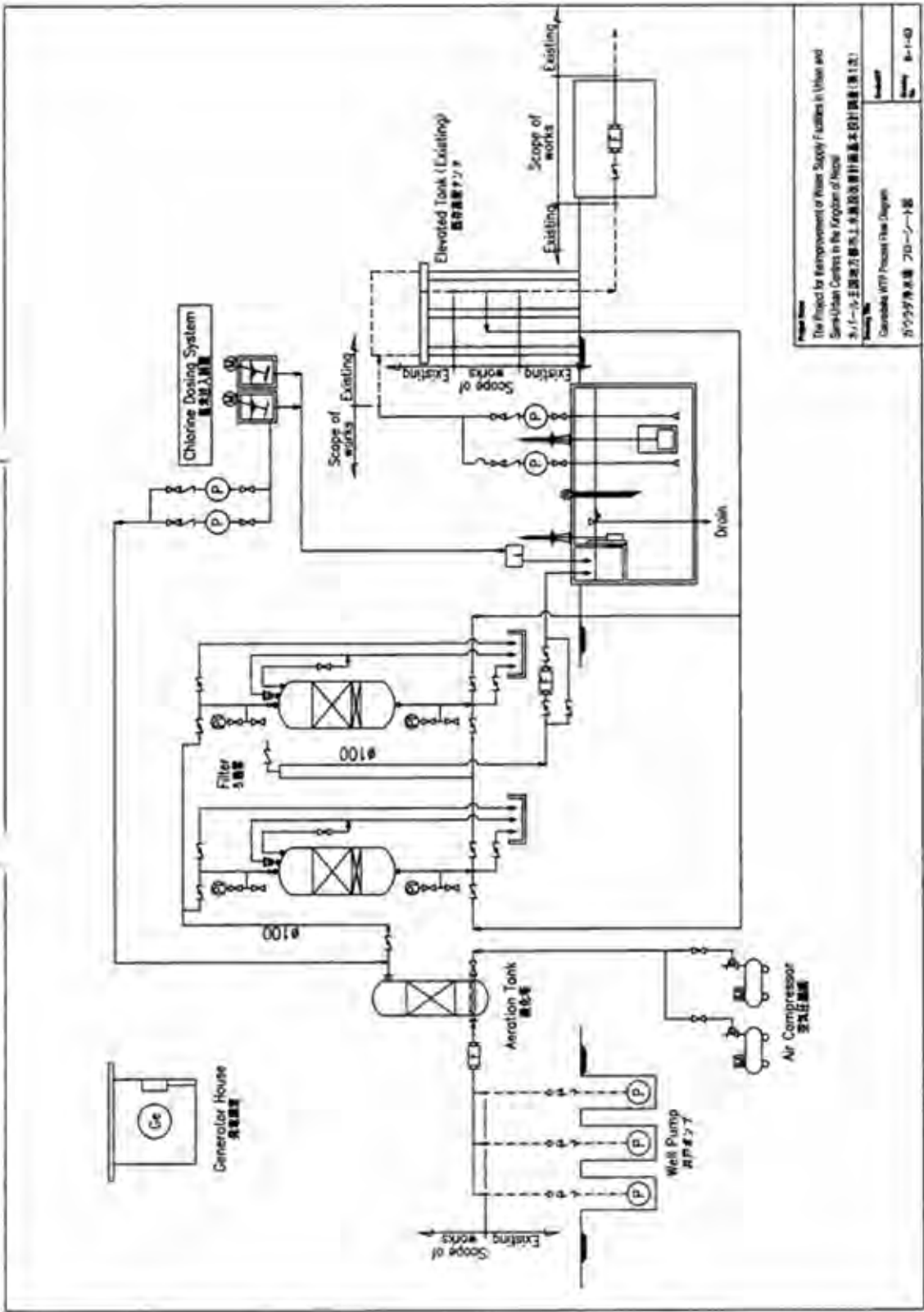


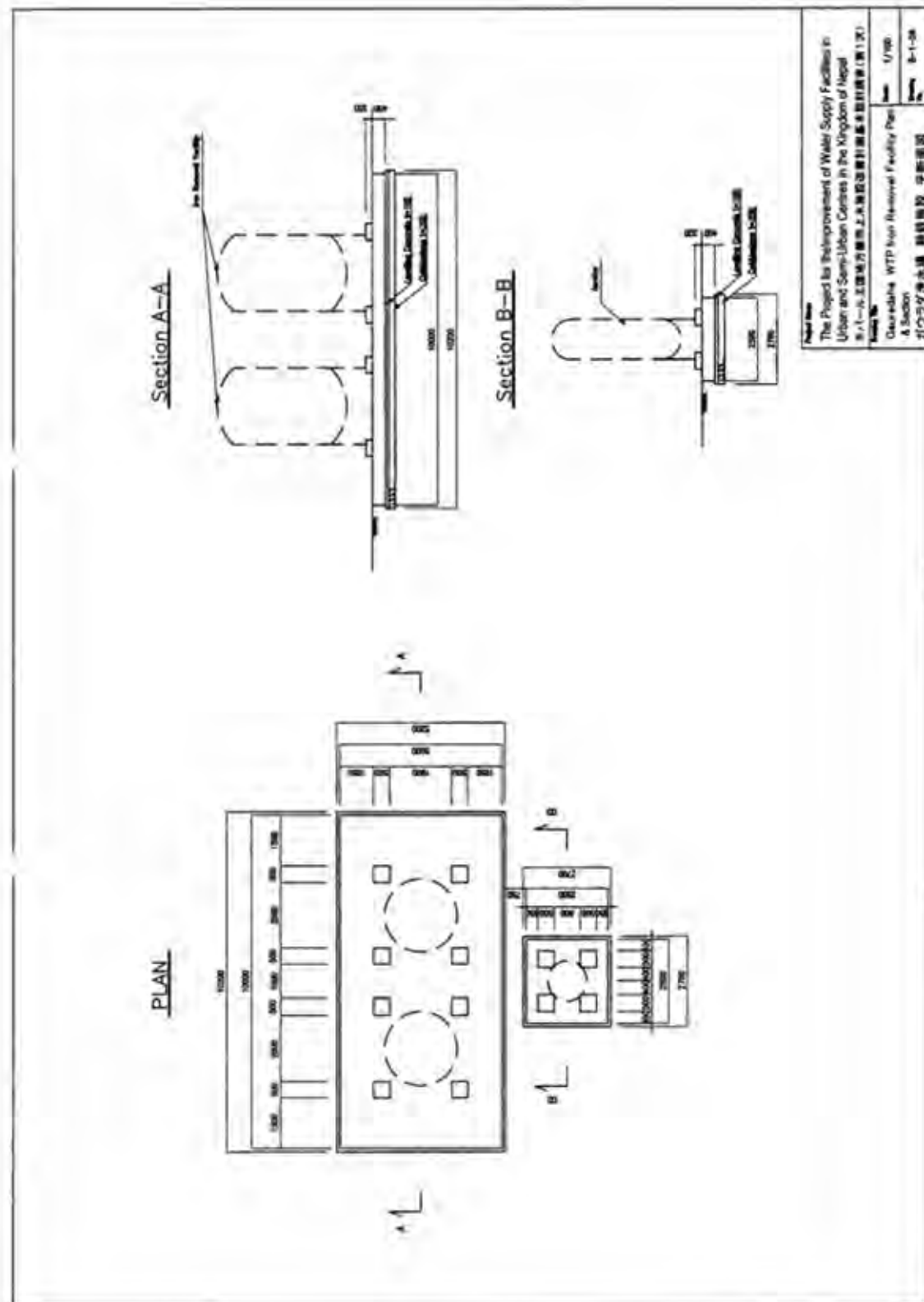


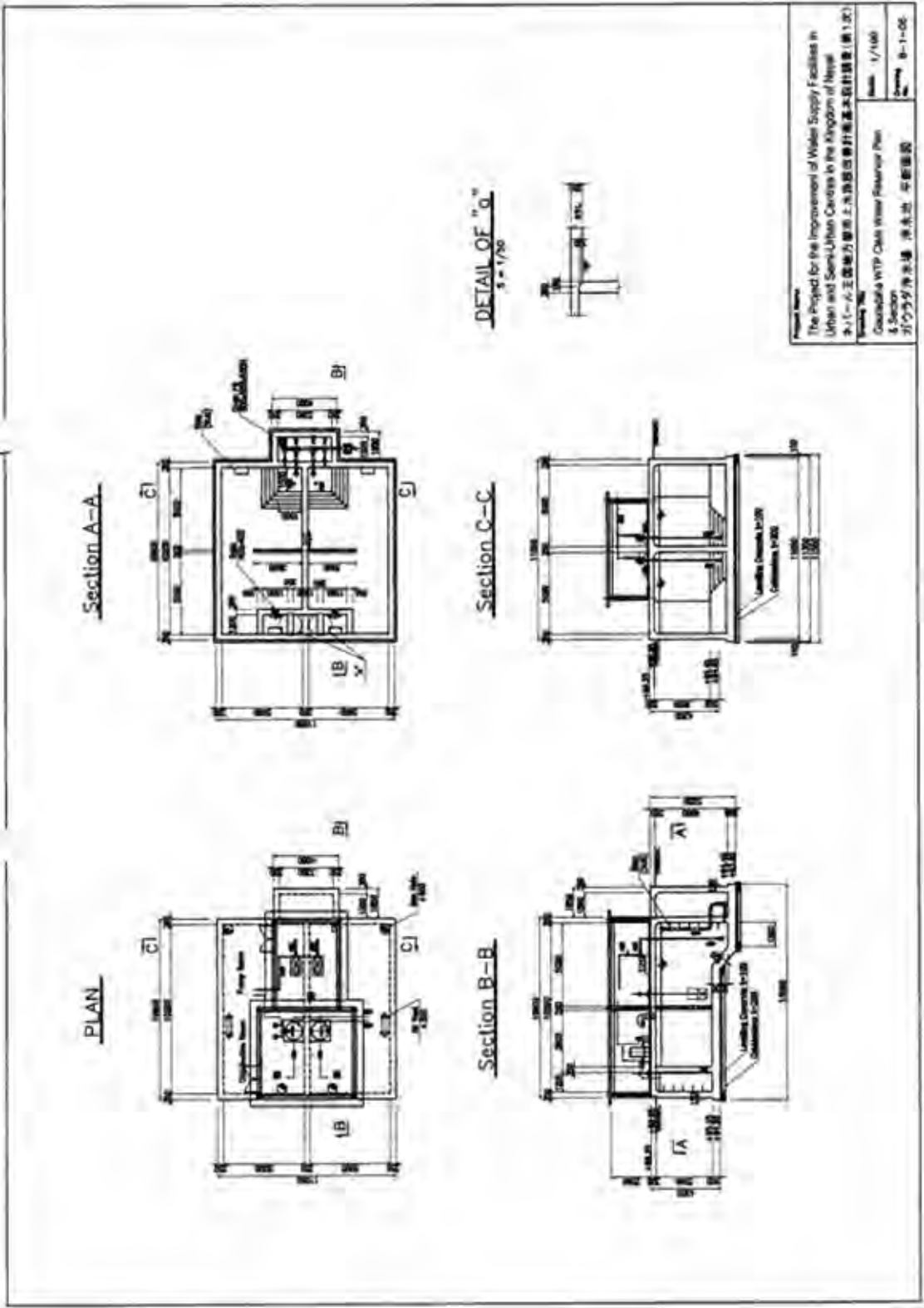


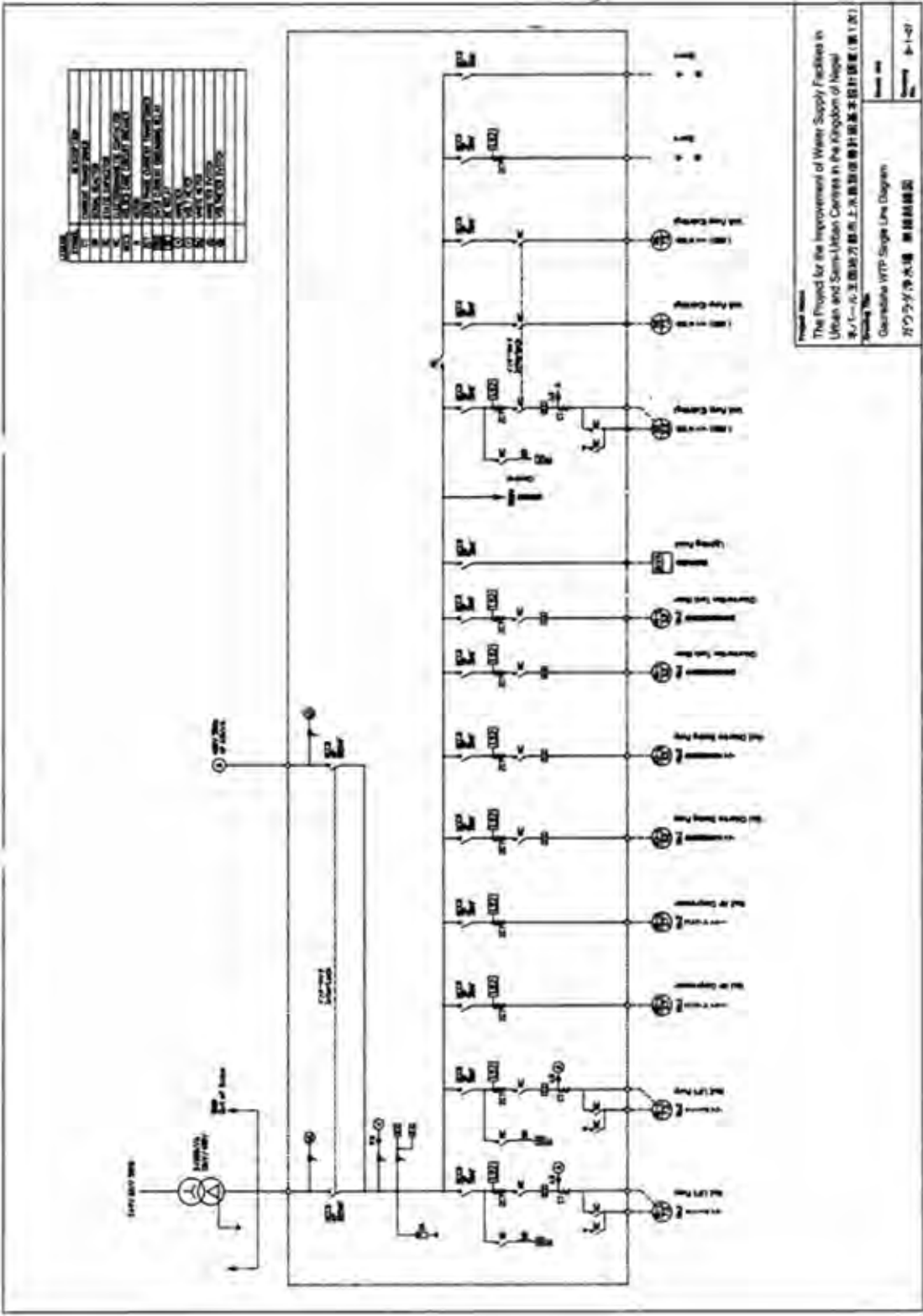


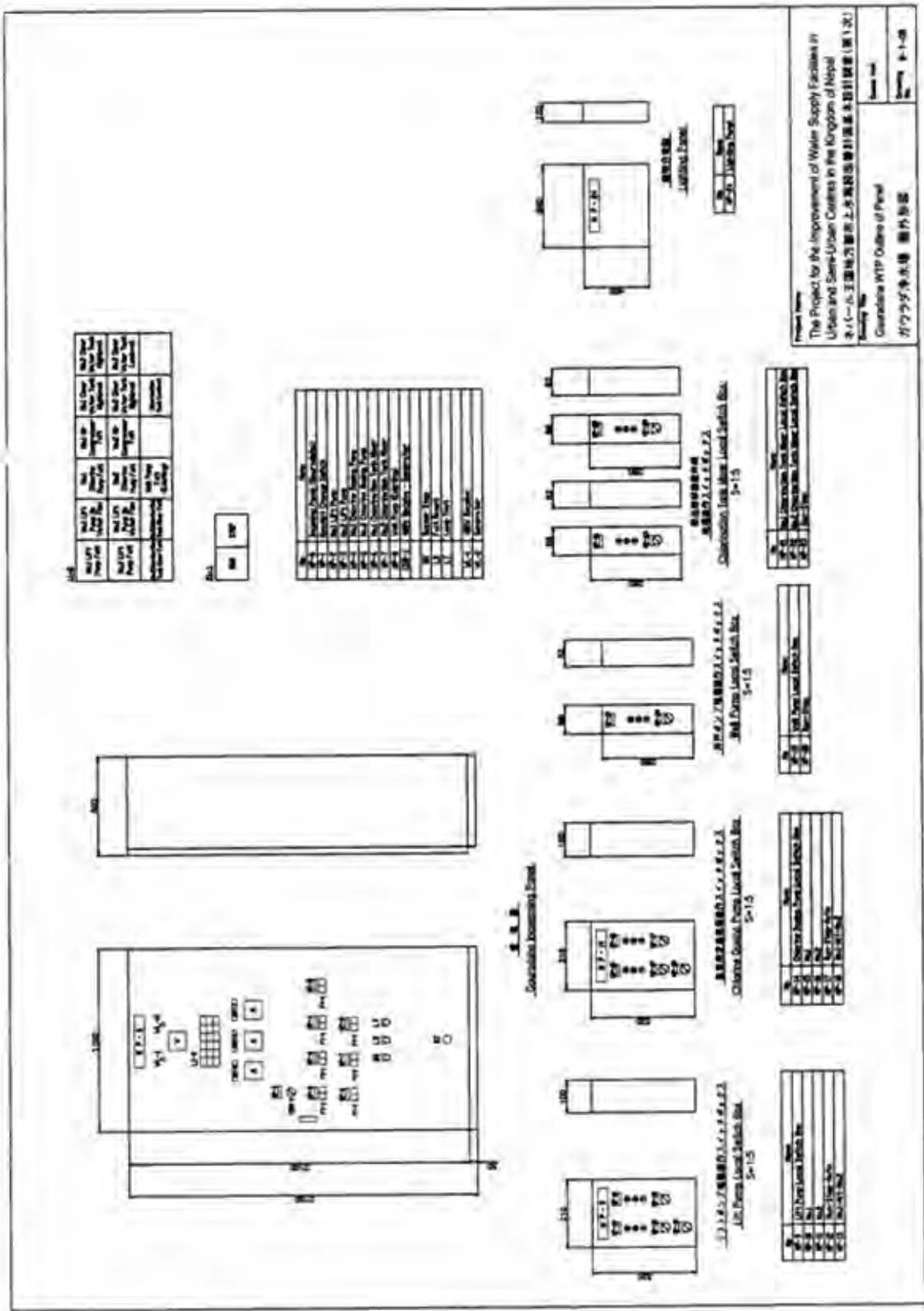


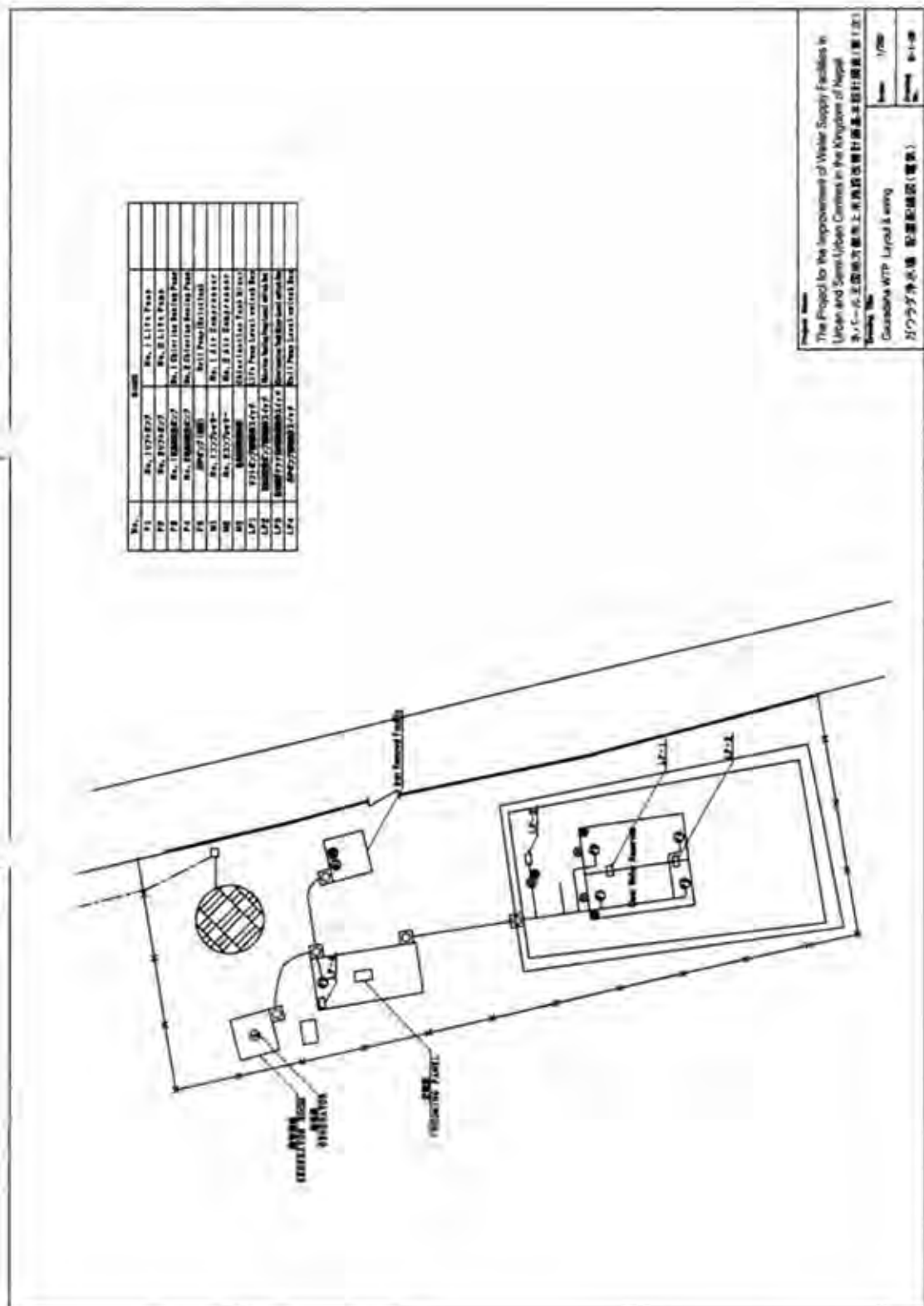


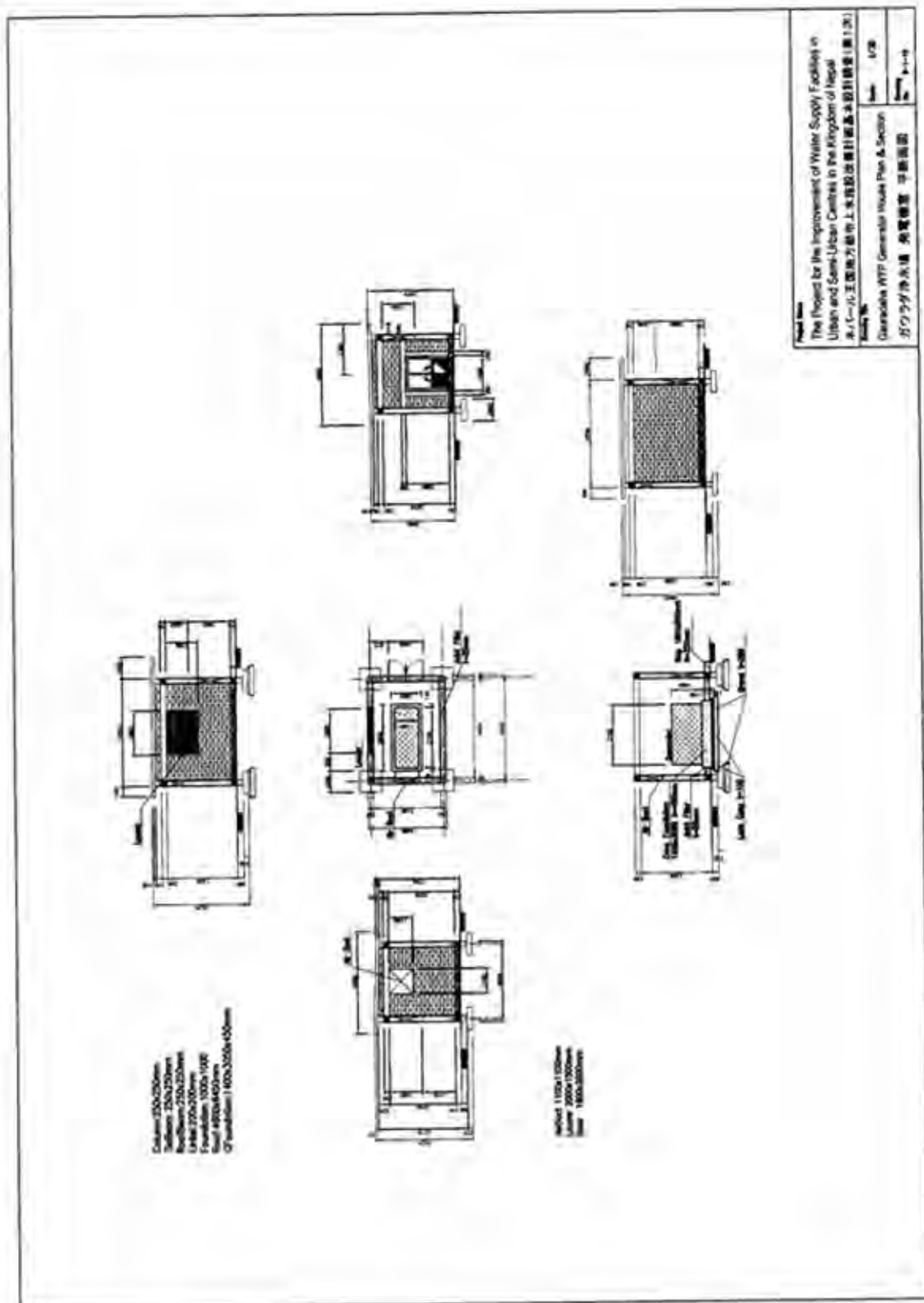


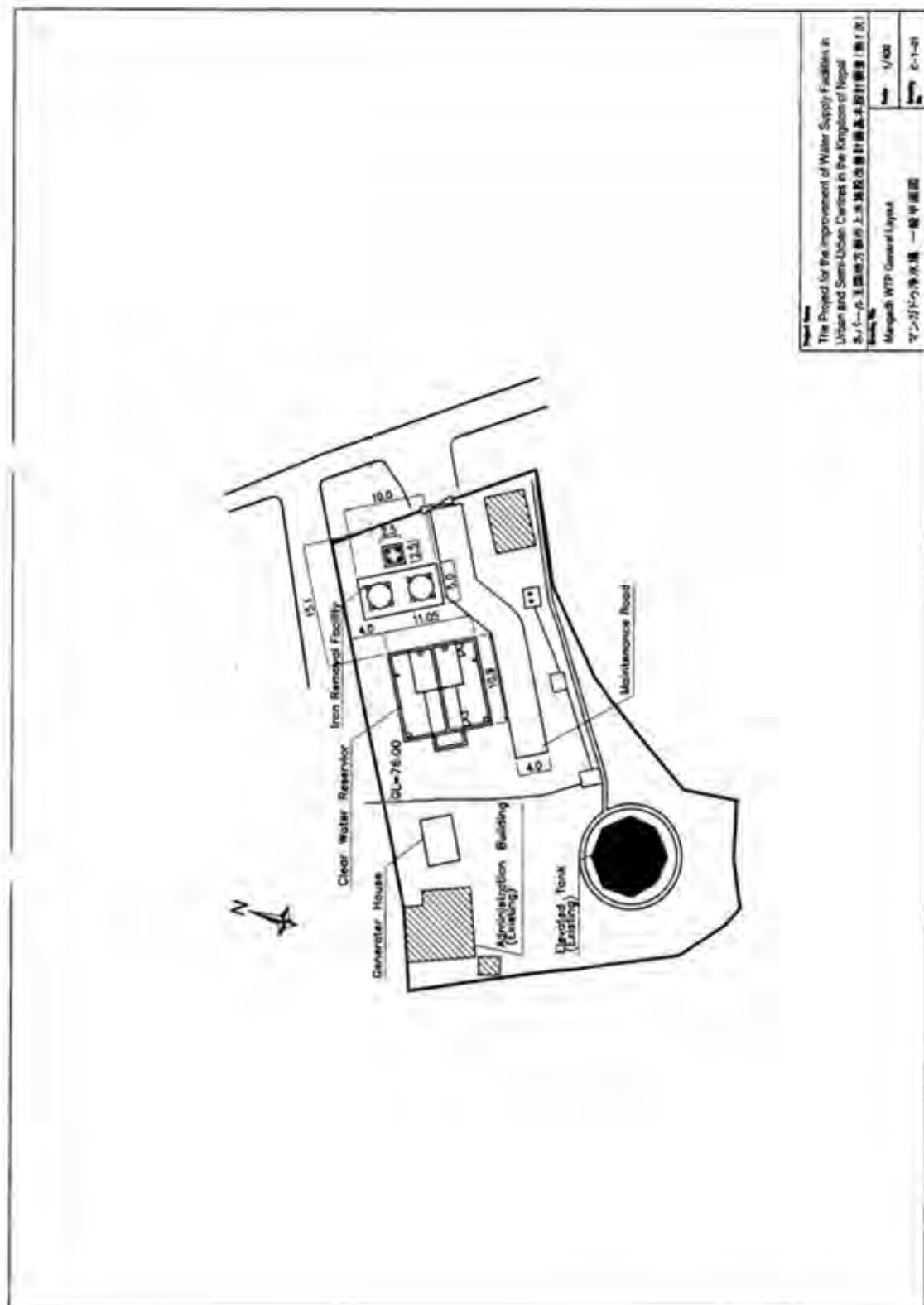


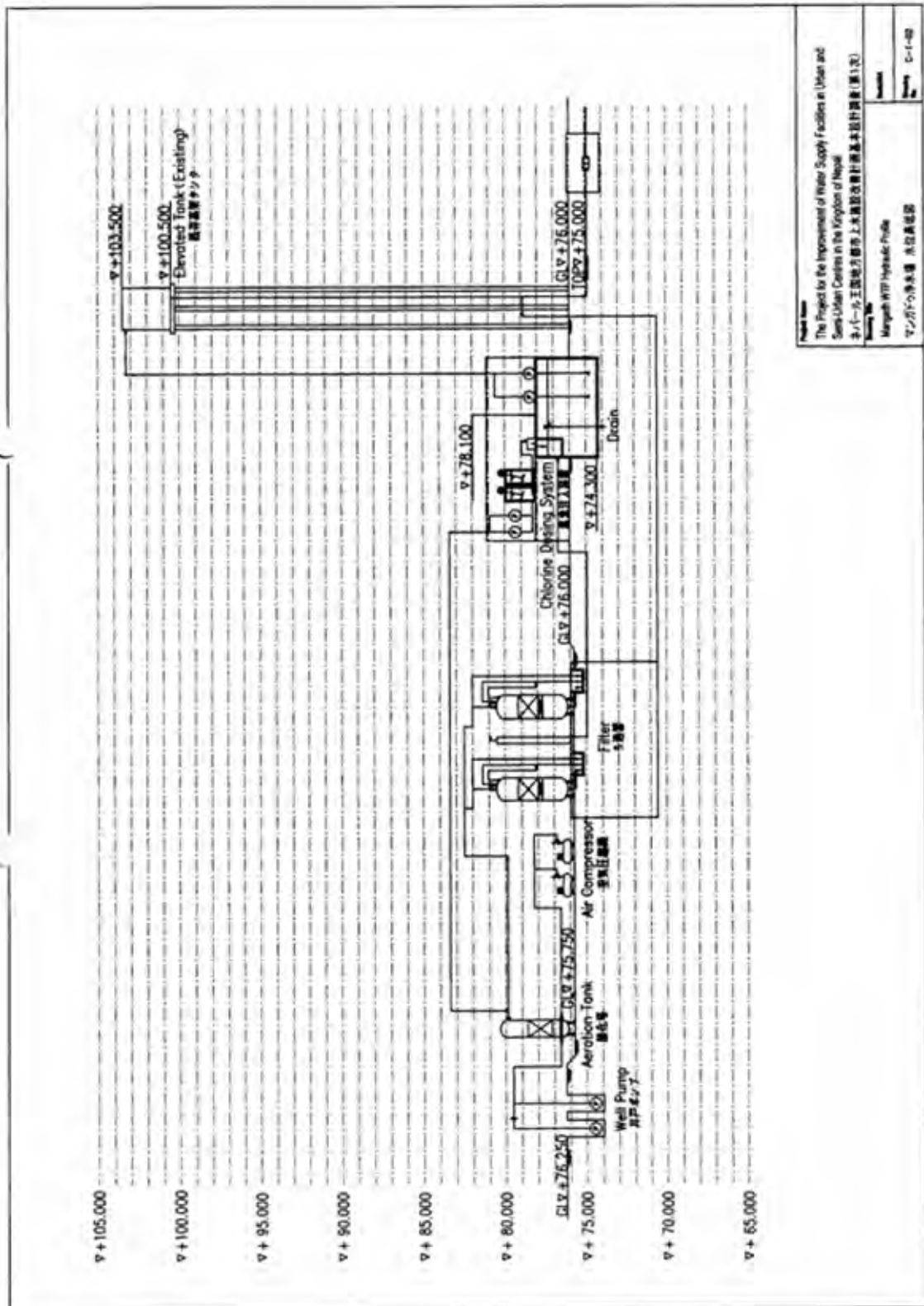




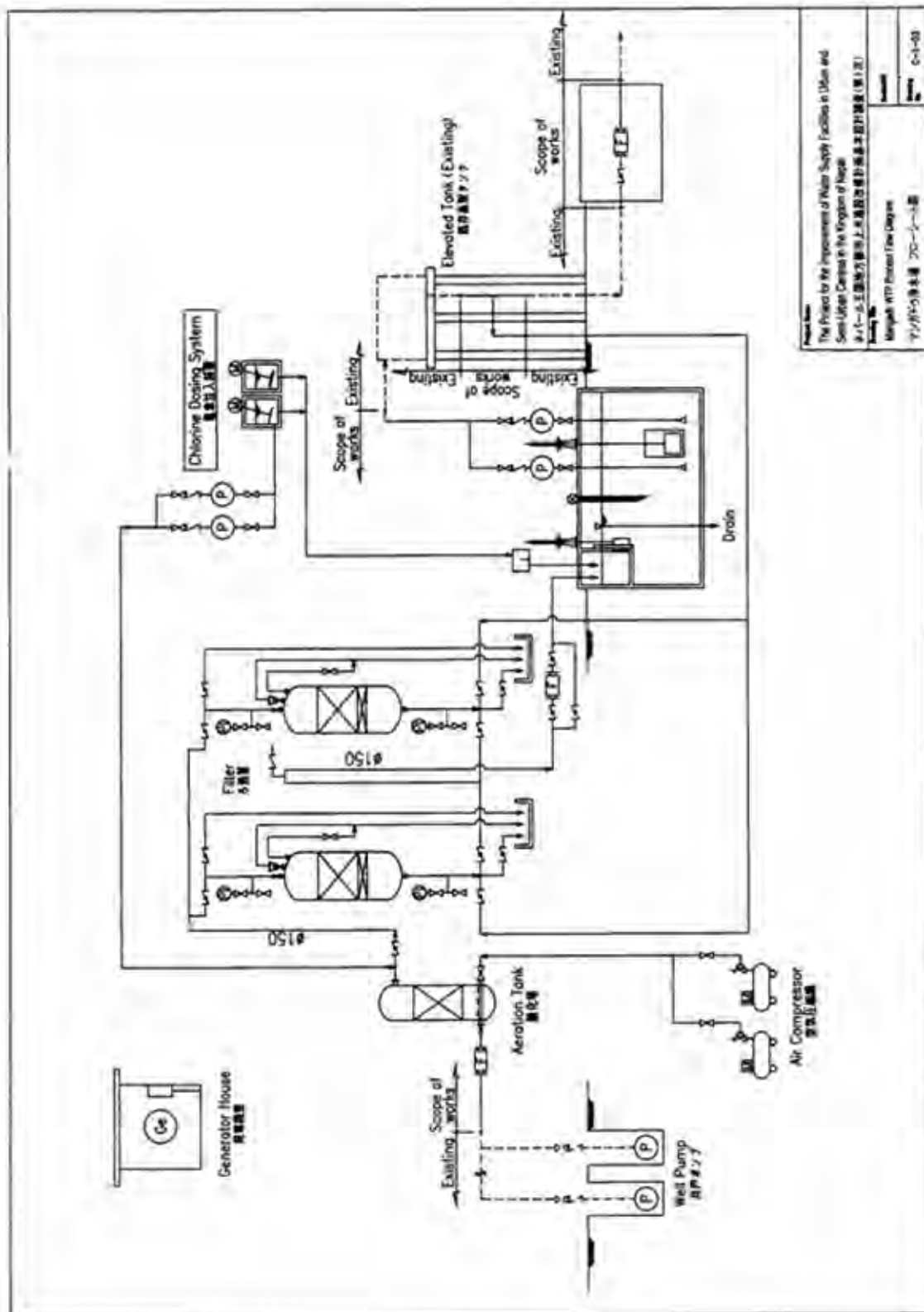


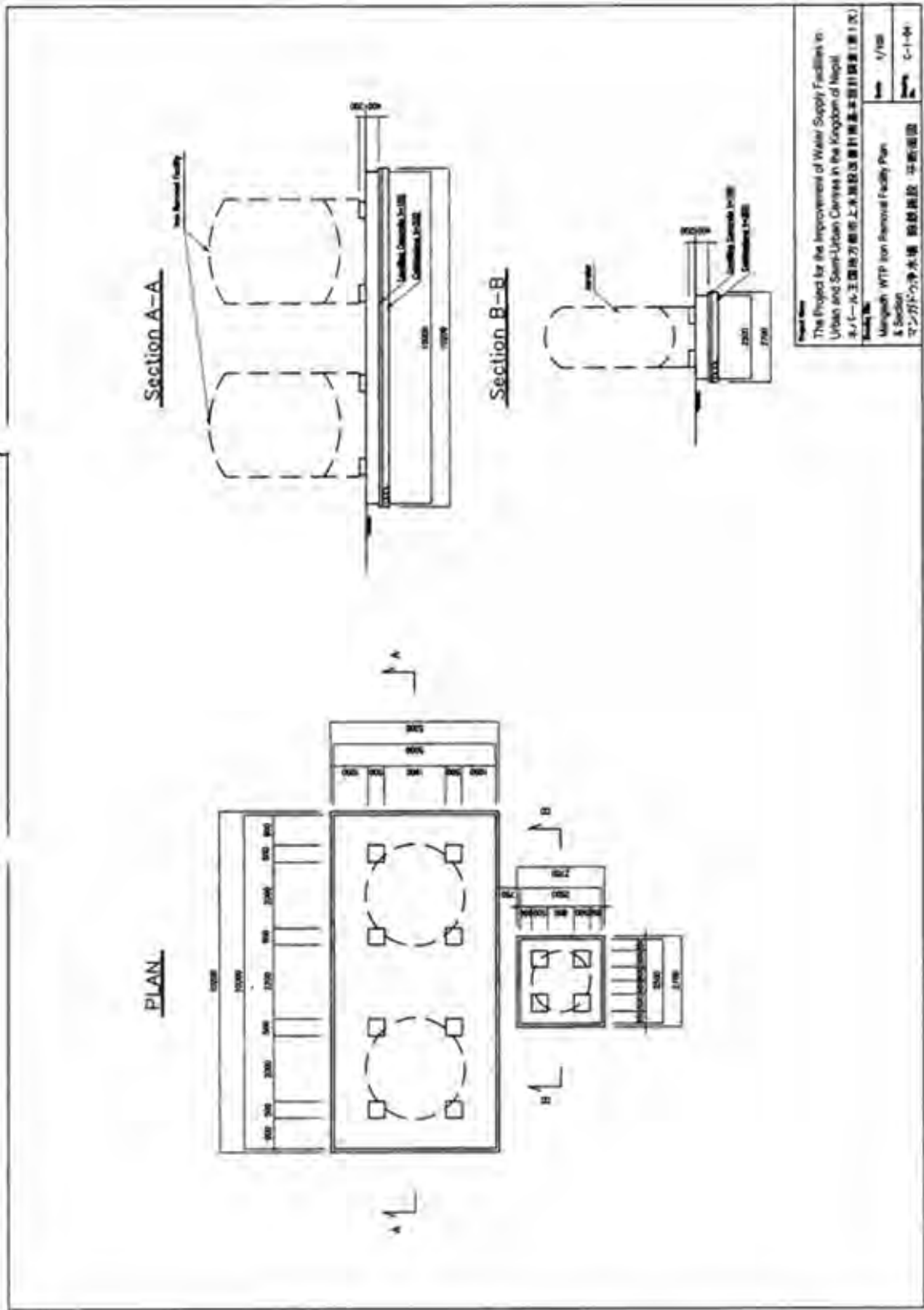




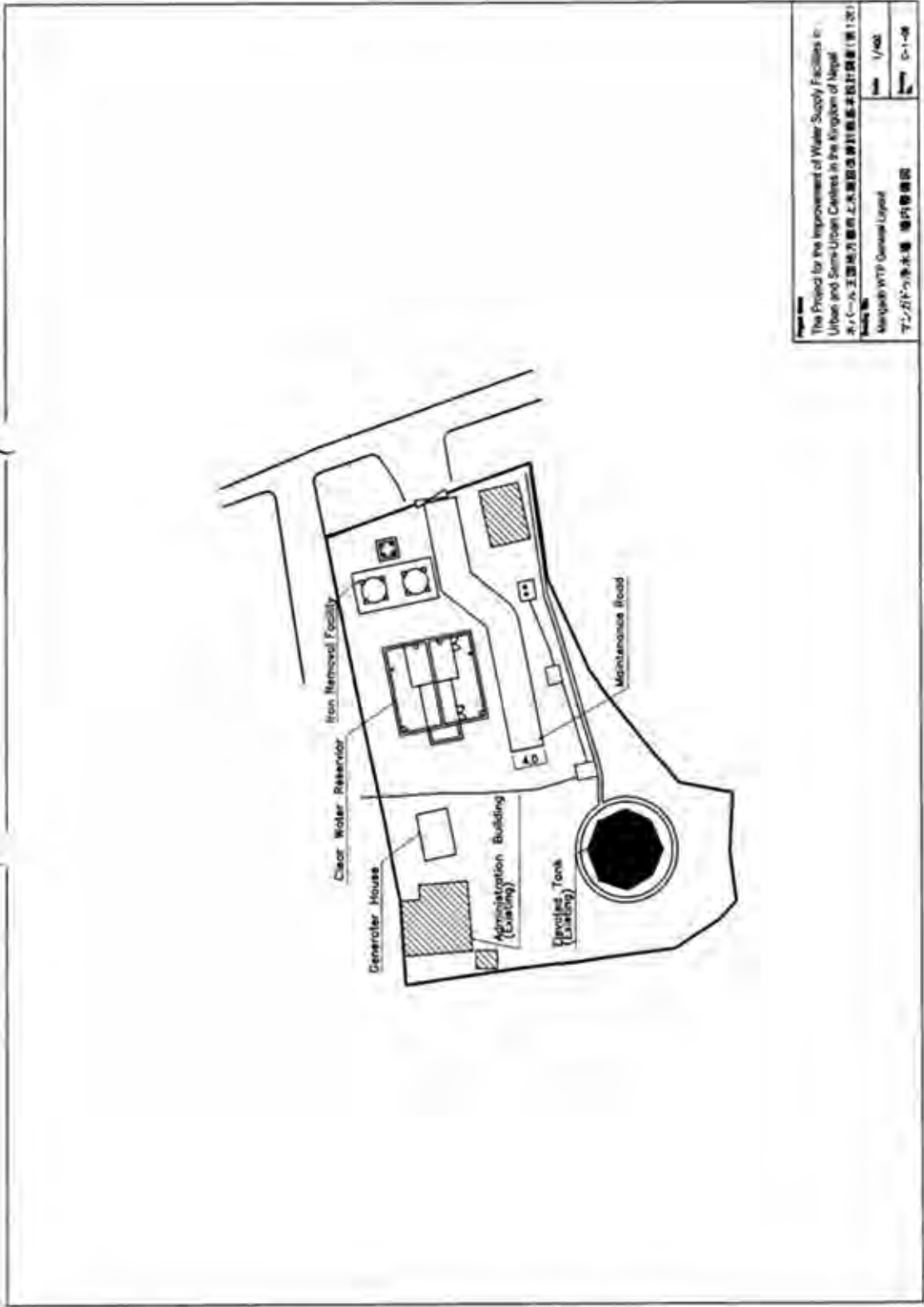


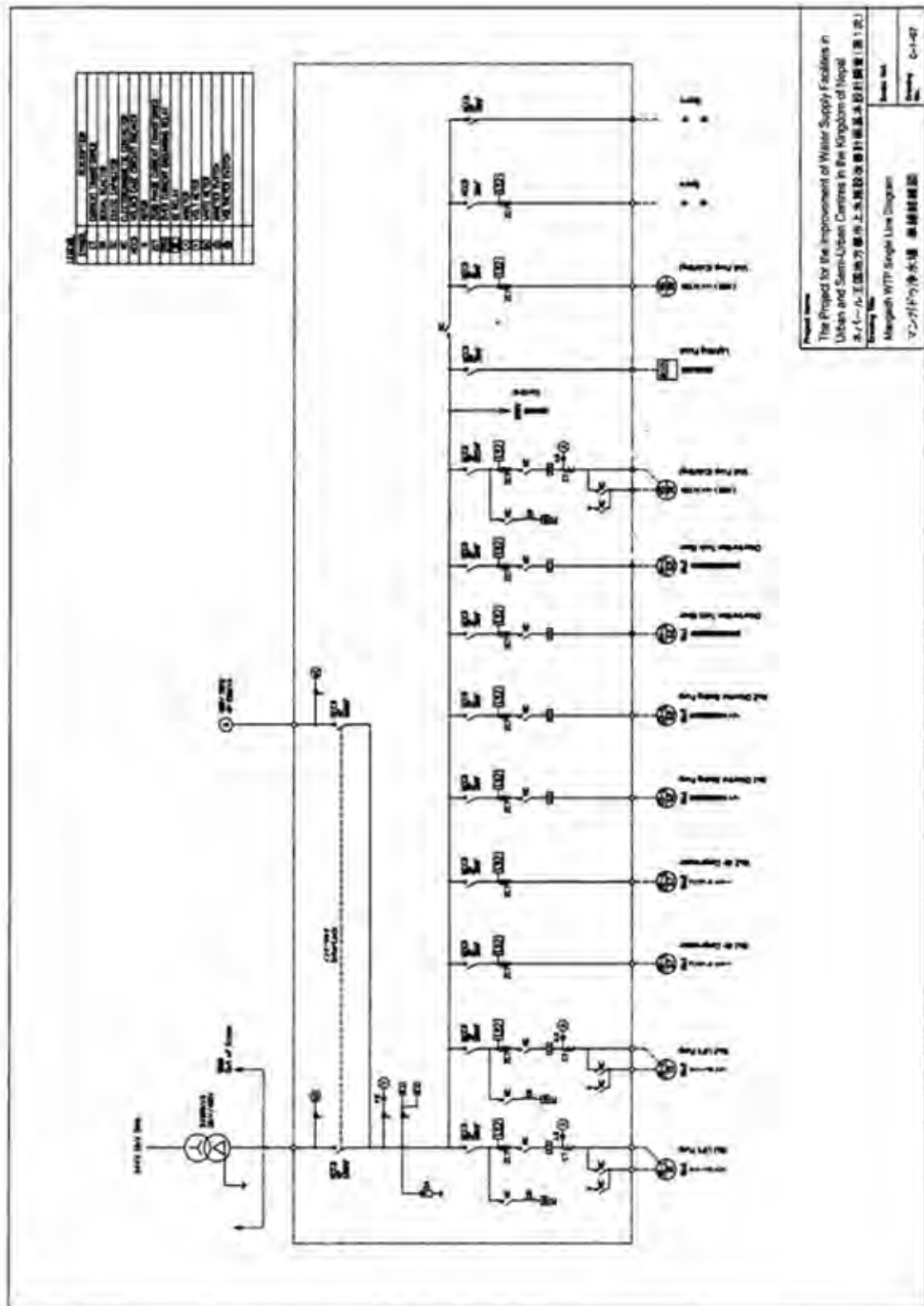
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The Project for the Improvement of Water Supply Facilities in Urban and Semi-Urban Centres in the Kingdom of Nepal	
ネパールの王都地方都市上水道改善計画基本設計調査(第1次)	
Working Title	Managhat Water Hydruleic Profile
Scale	マンガットの分水嶺 高低差図
Sheet No.	C-1-02

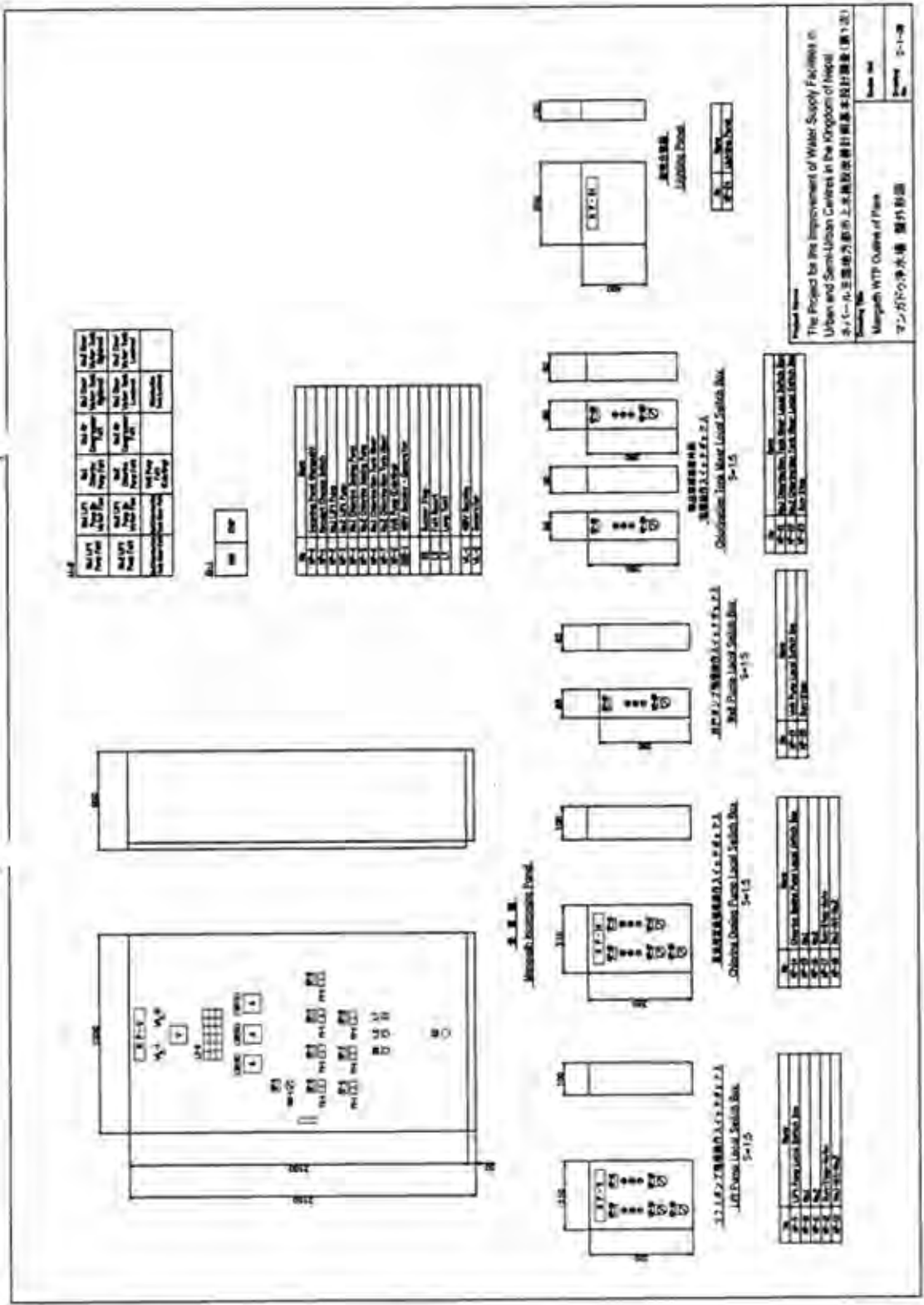


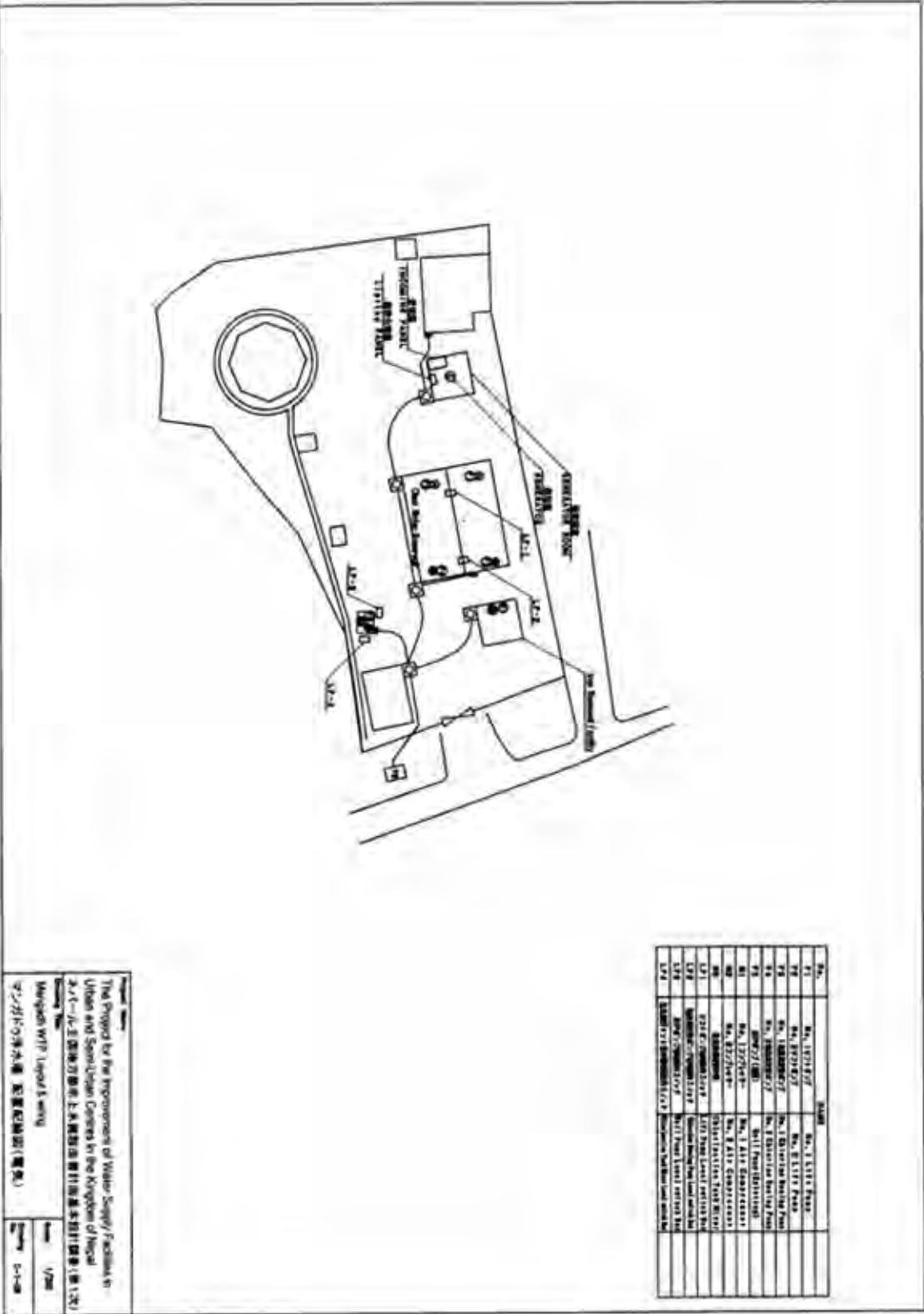


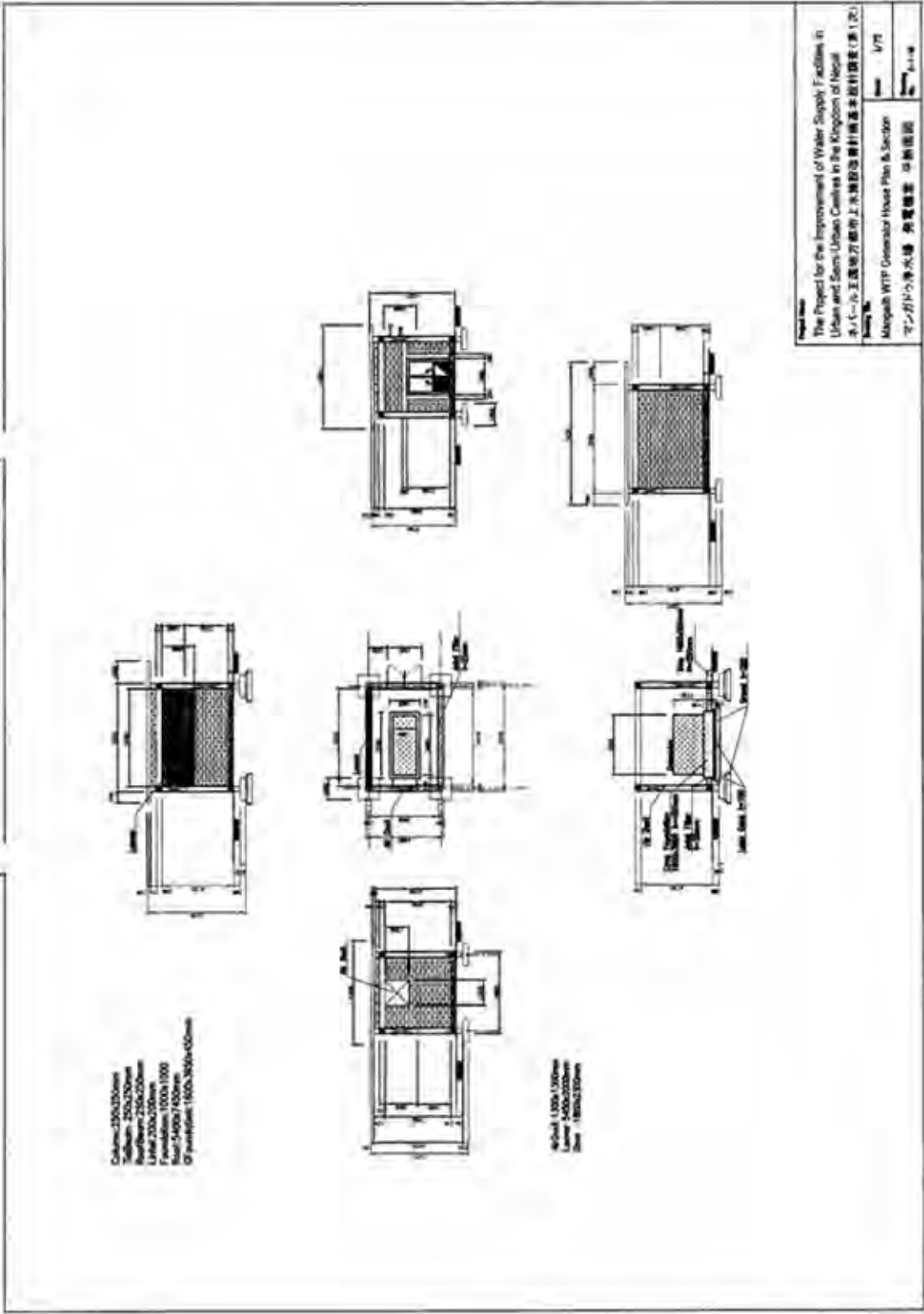












2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

Implementation agency of the project is Department of Water Supply and Sewerage (DWSS) and Nepal Water Supply Corporation (NWSC) under the Ministry of Physical Planning and Works of The Kingdom of Nepal (MPPW). Project Implementation Diagram is shown below.

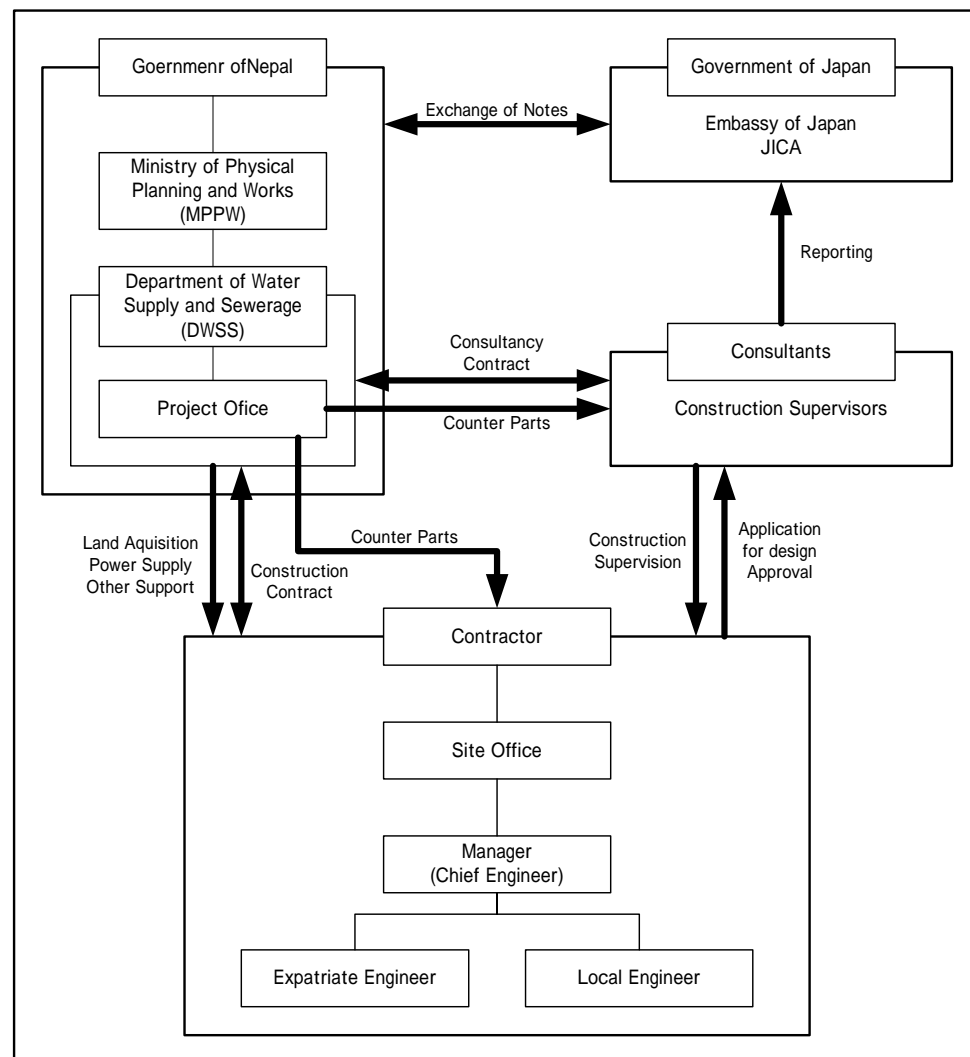


Figure 2-12 Project Implementation Diagram

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

- To represent DWSS for the project implementation
- To liaise with and coordinate between Dhulabari, Gauradaha, Mangadh and Nepal Government Agencies
- To liaise with and coordinate the related external agencies
- To work as counter parts for consultants in designing and tendering
- To secure manpower for additional survey and tests, if required

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

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

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

2-2-4-2 Implementation Conditions

Construction works include reservoir construction, transmission/distribution pipe laying, mechanical and electrical equipment for elevated tank and pump. Open space for a site office and stockyards is available around each city through DWSS and WUSC. The followings will require special attention during the construction works and security control.

(1) Construction works

Almost all people in Nepal are Hindu. Two big Hindu festivals are held in October and November. It is considered that construction work will be stopped about three weeks in October and November because many labours will go back to their home town.

Nepal has two seasons, wet season in June to September and dry season in October to May. Construction work for intake facility and transmission pipe river crossing shall be completed in dry season. Other work will be constructed in wet season even if the efficiency will be down.

Special construction method for renewal of transmission pumps will be selected to minimize disruption of water supply.

Installation of pumps and elevated tank panel and test run will be done under the strict supervision of the Japanese engineers.

Nepal VAT will be waived for the construction works upon official applications.

Although this project does not require EIA, implementation plan shall give due consideration for the surrounding environment. If necessary, IEE will be done by DWSS.

(2) Security control

JICA Nepal Office has already investigated security conditions of the intake in Dhulabari. Then, the officer suggested taking measures for security control during the construction works.

- In principle, WUSC will be hired as counterpart by the Japanese contractor, the Japanese contractor will ask WUSC for advice regarding safety for a smooth implementation of the project. Specially, during construction of intake facility and part of raw water transmission facility (between the intake and the river crossing), the local sub-contractor should work together with WUSC. The participation of the Japanese contractor should be kept to a minimum.
- The Japanese contractor should gather information and consider possible events like strikes or road blockading. Then, the contractor has to carefully judge implementation of construction.
- The Japanese contractor should keep contact and share information regarding safety with the donor who is in and around Dhulabari site.
- Plates indicating Japanese aid project will be attached to the vehicles of construct work.
- The Japanese contractor should submit Basic Operating Guideline (BOG) to the concerning persons in order to be prepared for the unforeseen.

2-2-4-3 Scope of Works

The scope of works for both Japanese and Nepal governments is shown in Table 2-23. The scope of undertakings of Nepal side has been discussed and accepted by the Nepal Government, which follows the Japanese grant aid policy as shown in Table 2-24.

Table 2-23 Project Scope for Nepal and Japanese Governments

Item	Works	To be undertaken by Nepal Gov.	To be undertaken Japanese Gov.
Construction of Intake Facility, Water Treatment Plant, Elevated Tank and Transmission / distribution Pipelines	Equipment procurement		
	Civil construction works		
	Equipment installation		
	Land acquisition		
	Fencing		
	Installation of Power transmission lines		
	Obtaining construction approval		

Table 2-24 Major Undertakings to be taken by Each Government

No.	Items	To be covered by	
		Grant Aid	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		
	To construct roads		
5	1) Within the site		
	2) Outside the site		
6	To construct the building		
	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	Electricity		
1)	a. The distributing line to the site		
	b. The drop wiring and internal wiring within the site		
	c. The main circuit breaker and transformer		
	Water Supply		
2)	a. The city water distribution main to the site		
	b. The supply system within the site		
	Drainage		
3)	a. The city drainage main (for storm sewer and others to the site)		
7	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site		
	Gas Supply		
4)	a. The city gas main to the site		
	b. The gas supply system within the site		
	Telephone System		
5)	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		
	Furniture and Equipment		
6)	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 (Phase 1), the project is subject to the cabinet approval of GOJ. Upon approval, Japanese and Nepal Governments will sign the Exchange of Notes on grant aid for the project.

1) Detailed Design

Based on the Exchange of Notes, DWSS 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 DWSS approval. After the approval, the consultants will immediately proceed with tendering activities as follows;

- To allow one week for bidders to prepare an application for prequalification,
- To evaluate prequalification submissions of the bidders,
- To allow one and half months for prequalified bidders to prepare bidding documents after providing tender documents to each prequalified bidder,
- To recommend the lowest qualified bidder for DWSS as a successful bidder and assist DWSS in contract negotiation

3) Construction Supervision

Construction works include civil works, plumbing works, mechanical/electrical works. Aside from a resident civil engineer, the consultants will dispatch, civil, plumbing, structural, mechanical and electrical engineers intermittently to the construction site. The consultants will hire local engineers to support their works.

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

2-2-4-5 Quality Control Plan

With reference to facilities construction, the Consultant will direct the Contractor to conduct analyses and tests for the following items, the results of which shall be reflected in the quality control documents.

Table 2-25 Analysis and Testing for Quality Control

Classification of Works	Test Item
1. Concrete Work	Slump Test
	Grading Test
	Mixture Water Test
	Compressive Stress Test
2. Reinforcing Bar Fabrication Work	Tensile Stress Test
3. Structure	Plain-board Loading Test
	Geological Survey
4. Plumbing Work	Water Pressure Test
5. Others	Water Quality Test

2-2-4-6 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 Nepal as much as possible. Some items that are not available in Nepal, 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. India and China will be considered for procuring locally unavailable items.

2) Civil Materials

Major civil works materials, such as cement, reinforcing bars, aggregate (sand and gravel) are readily available in Nepal and these materials will be procured within Nepal.

3) Pipes

HDPE pipes are produced and available at the local market in Nepal.

Indian ductile iron pipes are in circulation in Nepal but the quality is questionable and the supply is not stable. Ductile iron pipes may be procured in Japan or any third countries except India.

4) Mechanical and Electrical Equipment

Water supply equipment in Nepal has seldom fixed when it is broken due to insufficient maintenance budget. Reliable Japanese mechanical and electrical equipment shall be adopted in this project.

5) Elevated Tank Panel

FRP product elevated tank panel is procured in Japan, considering quality, reliance and construction schedule.

6) Filter Sand

Filer sand using for slow sand filter in Dhulabari WTP is required high specification such as sand diameter, specific gravity and uniformity coefficient. Filter sand in Nepal is not satisfied this specification. Result of price preparation including transportation cost, Indian filter sand is adopted.

7) Construction Machinery

A leasing market of construction machinery is not sufficient in Nepal. Some of these machineries will be procured in Nepal.

Procurement plan of construction materials is shown in Table 2-26.

Table 2-26 Procurement Plan

Construction Material		Expected Country of Origins		
Category	Item	Nepal	Japan	Third Countries
Civil Materials	Cement			
	Reinforcing bars			
	Forms			
	Aggregate, Bricks			
	Gasoline			
Pipe	HDPE Pipe			
	Ductile Iron Pipes			
Mechanical Equipment and Others	Pump			
	Chlorine Dosing Equipment			
	Elevated Tank Panel			
	Filter Sand			
Construction Machinery				

2-2-5 Plan of Soft Component (Technical Assistance)

2-2-5-1 Necessity and Subjects of Soft Component

(1) Dhulabari

1) Operation and Maintenance of Waterworks Facilities

Rehabilitation of intake facility and the new water treatment plant make the water supply system entire. The WUSC Dhulabari needs to operate and maintain the system of “Raw water Intake → Raw water transmission → Water treatment → Drinking water transmission → Drinking water distribution”. Gravity flow system is applied to these facilities.

The existing system flow and the subjects are as follows:

- Collecting of spring water out from rock surface → High turbidity of water in rainy season
- Direct transmission of spring water to the existing elevated tank → Incomplete disinfection
- Distribution from the existing elevated tank to consumers → Insufficient water supply

The project scope includes rehabilitation of the intake facility, improvement of transmission and distribution pipelines, new disinfection facility for ground water into the existing elevated tank, new water treatment plant and new elevated tank.

Mechanical equipment and electrical equipment are installed in the new water treatment plant.

WUSC staffs need to master the new water supply system and how to operate and maintain the facilities. Basic operation and control method of facilities and equipment is instructed by the contractor of this project.

On the “Soft Component”, the technical assistance for the WUSC Dhulabari during the construction period is required to help ensure the long term successful operation and maintenance of the water supply system, based on the contractor’s instruction. The technical assistance about water supply system is also required to WSSDO and WUSC from Detailed Design period.

The target group and activities of the Soft Component are shown in Table 2-27.

2) Buildup of WUSC Organization

Each WUSC is the public enterprise and controls water supply and sanitation of each area. The WUSC is organized by consumers and has the resolution committee. The committee members are elected by consumers of each area every three years.

Planning, design and construction of water supply facilities is executed by the DWSS. The DWSS is the organization in upper position than the WUSC. Each division office of the DWSS (this office is called WSSDO) supervises and manages the construction works of water supply facilities. After completion of the construction works, water supply facilities are transferred to each WUSC. WUSC, a public-interest enterprise, manages and operates and maintains water supply facilities.

The WUSC Dhulabari has started water supply service from 1994. And almost all of consumers have paid water tariff. Extra fine against delayed payment is defined. However, financial condition of The WUSC is not so

good.

Table 2-27 The target group and activities of the Soft Component (Dhulabari)

Target Group	Contents of Activities
WSSDO and WUSC	Kickoff meeting for the Soft Component, Review of the existing water supply system
WSSDO and WUSC	Preparing forms for monitoring water level of the elevated tank, Starting the monitoring the water level continuously
WSSDO and WUSC	Basic information for operation and control of water supply system (explanation at the office)
WSSDO and WUSC	Basic information for operation and control of water supply system (explanation at the site)
WSSDO and WUSC	Collecting the monitoring data of water level of the elevated tank
WSSDO and WUSC	Preparing forms for operation records of the water treatment plant, Discussion about the method of accumulation of records
WSSDO and WUSC	Review of valve operation on the transmission line and the distribution line, Measurement of distribution water pressure and distribution water quality
WSSDO and WUSC	Chemical dosing method (explanation at the office, explanation at the site), Preparing forms, Discussion about the method of accumulation of records
WSSDO and WUSC	Preparing the operation schedule of the tube well pump depending on the water level of the elevated tank
WSSDO and WUSC	Preparing forms for operation records of pumps and disinfection facilities, Discussion about the method of accumulation of records
WSSDO and WUSC	Preparing forms for maintenance records of each equipment, Discussion about the method of accumulation of records
WSSDO and WUSC	Extraction of points of troubles, repairs and spare parts, Preparing forms, Discussion about the method of accumulation of records
WSSDO and WUSC	Discussion about the activation method of each accumulated record
WSSDO and WUSC	Discussion about the arrangement of data on the computer
WSSDO and WUSC	Exchange of views with the target group
WSSDO and WUSC	Completion report to the Soft Component

The improvement of the water supply facilities by this project will make the rate of service pervasion and the amount of water supply increased. At the same time, operation and maintenance cost such as power cost, chemical cost and maintenance cost of facilities will be increased. And labor cost will increased by stuff increase of the WUSC.

Basically, all expenses for the operation of waterworks shall be covered by water tariff. Managing system for financial analysis of waterworks and administrative improvement shall be executed adequately. It is also important that the WUSC makes the budget and procurement planning for materials and spare parts of the facilities.

On the soft component for this project, technical assistance will be executed for establishment of WUSC organization and stabilization of waterworks management during the construction period.

The technical assistance about water supply system is also required to WSSDO and WUSC from Detailed Design period.

The target group and activities of the Soft Component are as follows;

Table 2-28 The target group and activities of the Soft Component(Dhulabari)

Target Group	Contents of Activities
WSSDO and WUSC	Kickoff meeting for the Soft Component, Review of the existing water supply system
WSSDO and WUSC	Training and instruction about general waterworks
WSSDO and WUSC	Instruction about cost calculation for the management of waterworks such as the idea of unit cost of water production
WSSDO and WUSC	Instruction about method of financial analysis
WSSDO and WUSC	Instruction and advice about setting up water tariff
WSSDO and WUSC	Instruction about the management method of meter-reading data and collection of water tariff on the computer etc.
WSSDO and WUSC	Instruction and advice about preparation and management of books of claim of payment, paying-in-books etc.
WSSDO and WUSC	Instruction and advice about preparation of accounting books, stock books of equipment and materials, etc.
WSSDO and WUSC	Instruction of the method of discovering meter loss to meter readers, Preparing manuals of meter reading and collection of water tariff
WSSDO and WUSC	Preparing the plan of management and maintenance of waterworks
WSSDO and WUSC	Exchange of views with the target group
WSSDO and WUSC	Completion report to the Soft Component

(2) Gauradaha

1) Operation and Maintenance of Waterworks Facilities

Ground water into the existing elevated tank is transmitted by three tube well pumps. Now, ordinary water supply service is not executed because of high density of iron in the ground water. After completion of the improvement of water supply facilities by this project, drinking water will be able to supply to consumers for 24 hours by controlling water level in the existing elevated tank.

WUSC staffs need to master the new water supply system and how to operate and maintain the facilities such as tube well pumps. Basic operation and control method of facilities and equipment is instructed by the contractor of this project.

On the “Soft Component”, the technical assistance for the WUSC Gauradaha during the construction period is required to help ensure the long term successful operation and maintenance of the water supply system, based on the contractor’s instruction.

The technical assistance about water supply system is also required to WSSDO and WUSC from Detailed Design period.

The target group and activities of the Soft Component as shown in Table 2-29.

Table 2-29 The target group and activities of the Soft Component(Gauradaha)

Target Group	Contents of Activities
WSSDO and WUSC	Kickoff meeting for the Soft Component, Review of the existing water supply system
WSSDO and WUSC	Preparing forms for monitoring water level of the elevated tank, Starting the monitoring the water level continuously
WSSDO and WUSC	Basic information for operation and control of water supply system (explanation at the office, explanation at the site)
WSSDO and WUSC	Preparing forms for operation records of pumps and the iron removal facility, Discussion about the method of accumulation of records
WSSDO and WUSC	Collecting the monitoring data of water level of the elevated tank
WSSDO and WUSC	Preparing the operation schedule of the tube well pump and the lift pump depending on the water level of the elevated tank
WSSDO and WUSC	Chemical dosing method (explanation at the office, explanation at the site), Preparing forms, Discussion about the method of accumulation of records
WSSDO and WUSC	Review of valve operation on the transmission line and the distribution line, Measurement of distribution water pressure and distribution water quality
WSSDO and WUSC	Preparing forms for maintenance records of each equipment, Discussion about the method of accumulation of records
WSSDO and WUSC	Extraction of points of troubles, repairs and spare parts, Preparing forms, Discussion about the method of accumulation of records
WSSDO and WUSC	Discussion about the arrangement of data on the computer
WSSDO and WUSC	Exchange of views with the target group
WSSDO and WUSC	Completion report to the Soft Component

2) Buildup of WUSC Organization

The WUSC is also organized in Gauradaha. The WUSC Gauradaha as well as the WUSC Dhulabari is supported by the WSSDO Chandragadhi (Jhapa).

The WUSC has started water supply service from 2002. But, ordinary water supply management can not be executed because of high density of iron in the ground water.

Financial condition of The WUSC runs a surplus due to “Incentive by DWSS” of about 0.2 million Nrs in Income. And almost all of consumers have paid water tariff. Extra fine against delayed payment is defined. However, financial condition of The WUSC is not so good.

The improvement of the water supply facilities by this project will make the rate of service pervasion and the amount of water supply increased. At the same time, operation and maintenance cost such as power cost, chemical cost and maintenance cost of facilities will be increased. And labor cost will increased by stuff increase of the WUSC.

On the soft component for this project, technical assistance will be executed for establishment of WUSC organization and stabilization of waterworks management during the construction period.

The technical assistance about water supply system is also required to WSSDO and WUSC from Detailed Design period.

The target group and activities of the Soft Component are as shown in Table 2-30

Table 2-30 The target group and activities of the Soft Component(Gauradaha)

Target Group	Contents of Activities
WSSDO and WUSC	Kickoff meeting for the Soft Component, Review of the existing water supply system
WSSDO and WUSC	Training and instruction about general waterworks
WSSDO and WUSC	Instruction about cost calculation for the management of waterworks such as the idea of unit cost of water production
WSSDO and WUSC	Instruction about method of financial analysis
WSSDO and WUSC	Instruction and advice about setting up water tariff
WSSDO and WUSC	Instruction about the management method of meter-reading data and collection of water tariff on the computer etc.
WSSDO and WUSC	Instruction and advice about preparation and management of books of claim of payment, paying-in-books etc.
WSSDO and WUSC	Instruction and advice about preparation of accounting books, stock books of equipment and materials, etc.
WSSDO and WUSC	Instruction of the method of discovering meter loss to meter readers, Preparing manuals of meter reading and collection of water tariff
WSSDO and WUSC	Preparing the plan of management and maintenance of waterworks
WSSDO and WUSC	Exchange of views with the target group
WSSDO and WUSC	Completion report to the Soft Component

(3) Mangadh

1) Operation and Maintenance of Waterworks Facilities

The construction by DWSS of water supply facilities will be completed within 2005. Now, one of the tube well pumps and the elevated tank are completed and are transferred to the WUSC. The WUSC has started water supply service partially. However, ordinary water supply service is not executed because of high density of iron in the ground water. The other tube well pump is now under the construction.

After completion of the improvement of water supply facilities by this project, drinking water will be able to supply to consumers for 24 hours by controlling water level in the existing elevated tank.

WUSC staffs need to master the new water supply system and how to operate and maintain the facilities such as tube well pumps. Basic operation and control method of facilities and equipment is instructed by the contractor of this project.

On the “Soft Component”, the technical assistance for the WUSC Mangadh during the construction period is required to help ensure the long term successful operation and maintenance of the water supply system, based on the contractor’s instruction.

The technical assistance about water supply system is also required to WSSDO and WUSC from Detailed Design period.

The target group and activities of the Soft Component are as shown in Table 2-31.

Table 2-31 The target group and activities of the Soft Component(Mangadh)

Target Group	Contents of Activities
WSSDO and WUSC	Kickoff meeting for the Soft Component, Review of the existing water supply system
WSSDO and WUSC	Preparing forms for monitoring water level of the elevated tank, Starting the monitoring the water level continuously
WSSDO and WUSC	Basic information for operation and control of water supply system (explanation at the office, explanation at the site)
WSSDO and WUSC	Preparing forms for operation records of pumps and the iron removal facility, Discussion about the method of accumulation of records
WSSDO and WUSC	Collecting the monitoring data of water level of the elevated tank
WSSDO and WUSC	Preparing the operation schedule of the tube well pump and the lift pump depending on the water level of the elevated tank
WSSDO and WUSC	Chemical dosing method (explanation at the office, explanation at the site), Preparing forms, Discussion about the method of accumulation of records
WSSDO and WUSC	Review of valve operation on the transmission line and the distribution line, Measurement of distribution water pressure and distribution water quality
WSSDO and WUSC	Preparing forms for maintenance records of each equipment, Discussion about the method of accumulation of records
WSSDO and WUSC	Extraction of points of troubles, repairs and spare parts, Preparing forms, Discussion about the method of accumulation of records
WSSDO and WUSC	Discussion about the arrangement of data on the computer
WSSDO and WUSC	Exchange of views with the target group
WSSDO and WUSC	Completion report to the Soft Component

2) Buildup of WUSC Organization

The WUSC is also organized in Mangadh. The WUSC Mangadh is supported by the WSSDO Biratnagar (Morang).

The WUSC has just started water supply service from June 2005. The improvement of the water supply facilities by this project will make the rate of service pervasion and the amount of water supply increased. At the same time, operation and maintenance cost such as power cost, chemical cost and maintenance cost of facilities will be increased. And labor cost will increased by stuff increase of the WUSC.

On the soft component for this project, technical assistance will be executed for establishment of WUSC organization and stabilization of waterworks management during the construction period.

The technical assistance about water supply system is also required to WSSDO and WUSC from Detailed Design period.

The target group and activities of the Soft Component are shown in Table 2-32.

Table 2-32 The target group and activities of the Soft Component (Mangadh)

Target Group	Contents of Activities
WSSDO and WUSC	Kickoff meeting for the Soft Component, Review of the existing water supply system
WSSDO and WUSC	Training and instruction about general waterworks
WSSDO and WUSC	Instruction about cost calculation for the management of waterworks such as the idea of unit cost of water production
WSSDO and WUSC	Instruction about method of financial analysis
WSSDO and WUSC	Instruction and advice about setting up water tariff
WSSDO and WUSC	Instruction about the management method of meter-reading data and collection of water tariff on the computer etc.
WSSDO and WUSC	Instruction and advice about preparation and management of books of claim of payment, paying-in-books etc.
WSSDO and WUSC	Instruction and advice about preparation of accounting books, stock books of equipment and materials, etc.
WSSDO and WUSC	Instruction of the method of discovering meter loss to meter readers, Preparing manuals of meter reading and collection of water tariff
WSSDO and WUSC	Preparing the plan of management and maintenance of waterworks
WSSDO and WUSC	Exchange of views with the target group
WSSDO and WUSC	Completion report to the Soft Component

2-2-5-2 Objectives of the Soft Component

The objectives of the Soft Component are as follows:

(1) Operation and Maintenance of Waterworks Facilities

- To establish smoothly adequate operation and maintenance of water supply system at the completion of this project

(2) Buildup of WUSC Organization

- To establish the efficient function of the WUSC organization
- To understand the adequate management of waterworks
- To make the future management plan and the future plan for operation and maintenance of water supply facilities

The aim of the Soft Component is to support the smooth start-up of the improved water supply system and to support the longer term efficiency and sustainability of the system.

In Gauradaha and Mangadhs, each WUSC will be able to make adequate operation and maintenance of water supply facilities by the Soft Component. However, in Dhulabari, the Soft Component cannot cover the know-how that the WUSC shall master to operate and maintain the water treatment plant. The water treatment plant will be constructed firstly in this area. Therefore, further technology transfer such as “Technical Assistance Project” following to this project is effective for the long term successful operation and maintenance of the plant.

2-2-5-3 Expected Benefits of the Soft Component; and Evaluation of these Benefits

The Soft Component aims to achieve the benefits listed in the table below. The table also indicates how to evaluate the progress towards attaining those benefits.

Table 2-33 The Soft Component aims to achieve the benefits (Dhulabari)

Field	Subject	Objective	Expedient	Benefit	Aspects of Benefit Evaluation
Operation and Maintenance of Waterworks Facilities	WUSC implements the waterworks on an ad hoc basis because of no established working plan. The improvement of maintenance ability of WUSC to the adequate level is necessary.	1.WUSC can operate and maintain the water supply facilities smoothly. 2. Operation of the facilities at the beginning can be started smoothly after the completion of the project.	1.Introduction of Soft Component 2.Technology transfer such as continuous technical cooperation project after the completion of the project	1. The chief and staff of the water treatment plant can understand the water treatment system and acquire operation and maintenance of facilities. After that, they can make adequate operation and maintenance of the plant. 2. The operators of the facilities in the existing elevated tank can understand the disinfection system and acquire adequate operation and maintenance of facilities. 3. The manager and operators of the WUSC can understand the transmission and distribution system and acquire adequate procedure of water supply. After that, they can make adequate operation and maintenance of transmission and distribution facilities.	1. Plant operations including water quantity (raw, filtered, distributed), water quality (raw, treated), quantity of chemical fed, number of operated and duration of pump operations can be daily recorded. 2. Chemical feeding rate is determined by daily water quality analysis. The chemical feeding will be executed accordingly. 3. Daily, weekly, monthly, and yearly operation and maintenance items can be assembled and check sheets can be made. Routine work can be executed according to the expected plans. 4. A form for recording problems and repairs will be made and used on the troubles. Historical data of problems and repairs can be stored. 5. Monthly operation reports containing the above mentioned records can be checked by the chief of the water treatment plant and be provided to the WUSC office. 6. Operation including water quantity (distributed), water quality (raw, treated), quantity of chemical fed, duration of tube well pump operation of facilities in the existing elevated tank can be daily recorded. 7. Hourly and daily water levels can be recorded for the elevated tanks. (During the first week of every month) 8. A transmission operation plan can be made based on the water level data at the elevated tanks

Table 2-34 The Soft Component aims to achieve the benefits (Dhulabari)

Field	Subject	Objective	Expedient	Benefit	Aspects of Benefit Evaluation
					9. All integrated data can be stored on a personal computer and be established and be used. 10. Adequate operation and maintenance of waterworks can be shown by submitting the integrated data to the WSSDO Chandragadhi (Jhapa) that is the organization in upper position than the WUSC.
Buildup of WUSC Organization	Financial condition of the WUSC is not so good that the WUSC is necessary to keep stable financial condition.	1.WUSC's organization can be functioned efficiently. 2.WUSC can understand ideal management of waterworks and make the implementation plan of management and operation of waterworks.	Introduction of Soft Component	1. Adequate operation and maintenance of improved water supply facilities can be executed by establishment of WUSC organization (organization structure and manpower) 2. The WUSC can make the future plan of management, operation and maintenance of water supply facilities, including revision of the water tariff. 3. The WUSC can analyze the management condition in accordance with the business analysis manual and find out the managerial problems. After that, they can make the administrative improvement plan and establish the stable management of waterworks	1. The WUSC organization can be established. And each staff can work functionally in accordance with the rules of job. 2. Revision of the water tariff (Planned) can be prepared. 3. The WUSC can analyze the management condition in accordance with the business analysis manual and managerial problems can be understood. 4. The future plan of management, operation and maintenance of water supply facilities can be made.

Table 2-35 The Soft Component aims to achieve the benefits (Gauradaha)

Field	Subject	Objective	Expedient	Benefit	Aspects of Benefit Evaluation
Operation and Maintenance of Waterworks Facilities	WUSC implements the waterworks on an ad hoc basis because of no established working plan. The improvement of maintenance ability of WUSC to the adequate level is necessary.	<ol style="list-style-type: none"> 1. WUSC can operate and maintain the water supply facilities smoothly. 2. Operation of the facilities at the beginning can be started smoothly after the completion of the project. 	Introduction of Soft Component	<ol style="list-style-type: none"> 1. The operators of the facilities in the existing elevated tank can understand the iron removal system and acquire adequate operation and maintenance of facilities. After that, they can make adequate operation and maintenance of facilities. 2. The manager and operators of the WUSC can understand the transmission and distribution system and acquire adequate procedure of water supply. After that, they can make adequate operation and maintenance of transmission and distribution facilities. 	<ol style="list-style-type: none"> 1. Operation including water quantity (distributed), water quality (raw, treated) of iron removal facility, quantity of chemical fed, duration of tube well pump operation of facilities in the existing elevated tank can be daily recorded. 2. Hourly and daily water levels can be recorded for the elevated tanks. (During the first week of every month) 3. A transmission operation plan can be made based on the water level data at the elevated tanks. 4. Chemical feeding rate is determined by daily water quality analysis. The chemical feeding will be executed accordingly. 5. Daily, weekly, monthly, and yearly operation and maintenance items can be assembled and check sheets can be made. Routine work can be executed according to the expected plans. 6. A form for recording problems and repairs will be made and used on the troubles. Historical data of problems and repairs can be stored. 7. Monthly operation reports containing the above mentioned records can be checked by the chief of the water treatment plant and be provided to the WUSC office. 8. All integrated data can be stored on a personal computer and be established and be used.

Table 2-36 The Soft Component aims to achieve the benefits (Gauradaha)

Field	Subject	Objective	Expedient	Benefit	Aspects of Benefit Evaluation
					9. Adequate operation and maintenance of waterworks can be shown by submitting the integrated data to the WSSDO Chandragadhi (Jhapa) that is the organization in upper position than the WUSC.
Buildup of WUSC Organization	Financial condition of the WUSC will become not so good under the present condition that the WUSC is necessary to keep stable financial condition.	1.WUSC's organization can be functioned efficiently. 2.WUSC can understand ideal management of waterworks and make the implementation plan of management and operation of waterworks.	Introduction of Soft Component	1. Adequate operation and maintenance of improved water supply facilities can be executed by establishment of WUSC organization (organization structure and manpower) 2. The WUSC can make the future plan of management, operation and maintenance of water supply facilities, including revision of the water tariff. 3. The WUSC can analyze the management condition in accordance with the business analysis manual and find out the managerial problems. After that, they can make the administrative improvement plan and establish the stable management of waterworks	1. The WUSC organization can be established. And each staff can work functionally in accordance with the rules of job. 2. Revision of the water tariff (Planned) can be prepared. 3. The WUSC can analyze the management condition in accordance with the business analysis manual and managerial problems can be understood. 4. The future plan of management, operation and maintenance of water supply facilities can be made.

Table 2-37 The Soft Component aims to achieve the benefits (Mangadh)

Field	Subject	Objective	Expedient	Benefit	Aspects of Benefit Evaluation
Operation and Maintenance of Waterworks Facilities	WUSC implements the waterworks on an ad hoc basis because of no established working plan. The improvement of maintenance ability of WUSC to the adequate level is necessary.	1.WUSC can operate and maintain the water supply facilities smoothly. 2. Operation of the facilities at the beginning can be started smoothly after the completion of the project.	Introduction of Soft Component	1. The operators of the facilities in the existing elevated tank can understand the iron removal system and acquire adequate operation and maintenance of facilities. After that, they can make adequate operation and maintenance of facilities. 2. The manager and operators of the WUSC can understand the transmission and distribution system and acquire adequate procedure of water supply. After that, they can make adequate operation and maintenance of transmission and distribution facilities.	1. Operation including water quantity (distributed), water quality (raw, treated) of iron removal facility, quantity of chemical fed, duration of tube well pump operation of facilities in the existing elevated tank can be daily recorded. 2. Hourly and daily water levels can be recorded for the elevated tanks. (During the first week of every month) 3. A transmission operation plan can be made based on the water level data at the elevated tanks. 4. Chemical feeding rate is determined by daily water quality analysis. The chemical feeding will be executed accordingly. 5. Daily, weekly, monthly, and yearly operation and maintenance items can be assembled and check sheets can be made. Routine work can be executed according to the expected plans. 6. A form for recording problems and repairs will be made and used on the troubles. Historical data of problems and repairs can be stored. 7. Monthly operation reports containing the above mentioned records can be checked by the chief of the water treatment plant and be provided to the WUSC office. 8. All integrated data can be stored on a personal computer and be established and be used. 9. Adequate operation and maintenance of waterworks can be shown by submitting the integrated data to the WSSDO Bratnagar (Morang) that is the organization in upper position than the WUSC.

Table 2-38 The Soft Component aims to achieve the benefits (Mangadh)

Field	Subject	Objective	Expedient	Benefit	Aspects of Benefit Evaluation
Buildup of WUSC Organization	WUSC starts the waterworks recently. Financial condition of the WUSC will become not so good under the present condition that the WUSC is necessary to keep stable financial condition.	1.WUSC's organization can be functioned efficiently. 2.WUSC can understand ideal management of waterworks and make the implementation plan of management and operation of waterworks.	Introduction of Soft Component	1. Adequate operation and maintenance of improved water supply facilities can be executed by establishment of WUSC organization (organization structure and manpower) 2. The WUSC can make the future plan of management, operation and maintenance of water supply facilities, including revision of the water tariff. 3. The WUSC can analyze the management condition in accordance with the business analysis manual and find out the managerial problems. After that, they can make the administrative improvement plan and establish the stable management of waterworks	1. The WUSC organization can be established. And each staff can work functionally in accordance with the rules of job. 2. Revision of the water tariff (Planned) can be prepared. 3. The WUSC can analyze the management condition in accordance with the business analysis manual and managerial problems can be understood. 4. The future plan of management, operation and maintenance of water supply facilities can be made.

2-2-5-4 Activities of the Soft Component (Input Plan)

1) Operation and Maintenance of Waterworks Facilities

A Japanese Engineer who has experience covering all aspects of operation and maintenance of waterworks facilities will be assigned to the project. Adequate operation and maintenance of water supply system will be established smoothly on the Soft Component at the completion of this project.

2) Buildup of WUSC Organization

A Japanese Engineer who has experience covering all aspects of financial affairs and economic analysis of waterworks will be assigned to the project. On implementation of the Soft Component, the WUSC organization will be effectively functioned and the WUSC can understand the ideal way of waterworks management and make the future management plan and the future plan for operation and maintenance of water supply facilities.

2-2-5-5 Consultants Services for Soft Component

Implementation of this Soft Component is executed by Japanese consultants on the direct support plan. It is not expected that there would be any local consulting firms that have the skills or experience required to successfully implement the Soft Component of this project. Therefore, the Soft Component will be implemented by Japanese consultants who have extensive experience in adequate operation and maintenance of waterworks facilities and the buildup of the WUSC organization.

2-2-5-6 Implementation Schedule of Soft Component

The purpose of the Soft Component is to ensure that the WUSC staff can operate the constructed facilities adequately. Therefore, the Soft Component will be implemented at the end of the project period, once the major facilities have been completed. Each activity on the Soft Component will be planned by Japanese consultants.

2-2-5-7 Outputs of Soft Component

The outputs of the Soft Component are as follows:

1) Operation and Maintenance of Waterworks Facilities

Each recording form, Operation schedule plan of pumps, Operation control manual including control of pumps and valves, Operation and maintenance manual including the flow sheet of storage of data and information

2) Buildup of WUSC Organization

Text book of waterworks management, Manual of meter reading and collecting water tariff, Manual for the waterworks management plan and the operation and maintenance plan of waterworks facilities

The following two reports will be prepared with regards to the Soft Component.

- Progress Report
- Completion Report

These reports will be prepared in accordance with JICA's "Soft Component Guidelines for Consultants" (April 2004). The progress report will be submitted to the DWSS and JICA as a part of the project's Monthly Progress Report.

2-2-5-8 Obligations of Recipient County Concerning Soft Component

The WUSC must identify and assign the staff who will be the very important target group for the Soft Component.

And the WUSC must procure a desktop type personal computer in order to improve collection of water tariff and accountancy and to use the accumulated data effectively.

The target group including a PC operator must be assigned and the procurement of a PC must be prepared before the Soft Component can start.

2-2-6 Implementation Schedule

5.5 months are required for detailed design and tendering (3.5 months and 2.0 months respectively) and 10.5 months are required for construction. In total 16.0 months are required for this project (Phase 1).

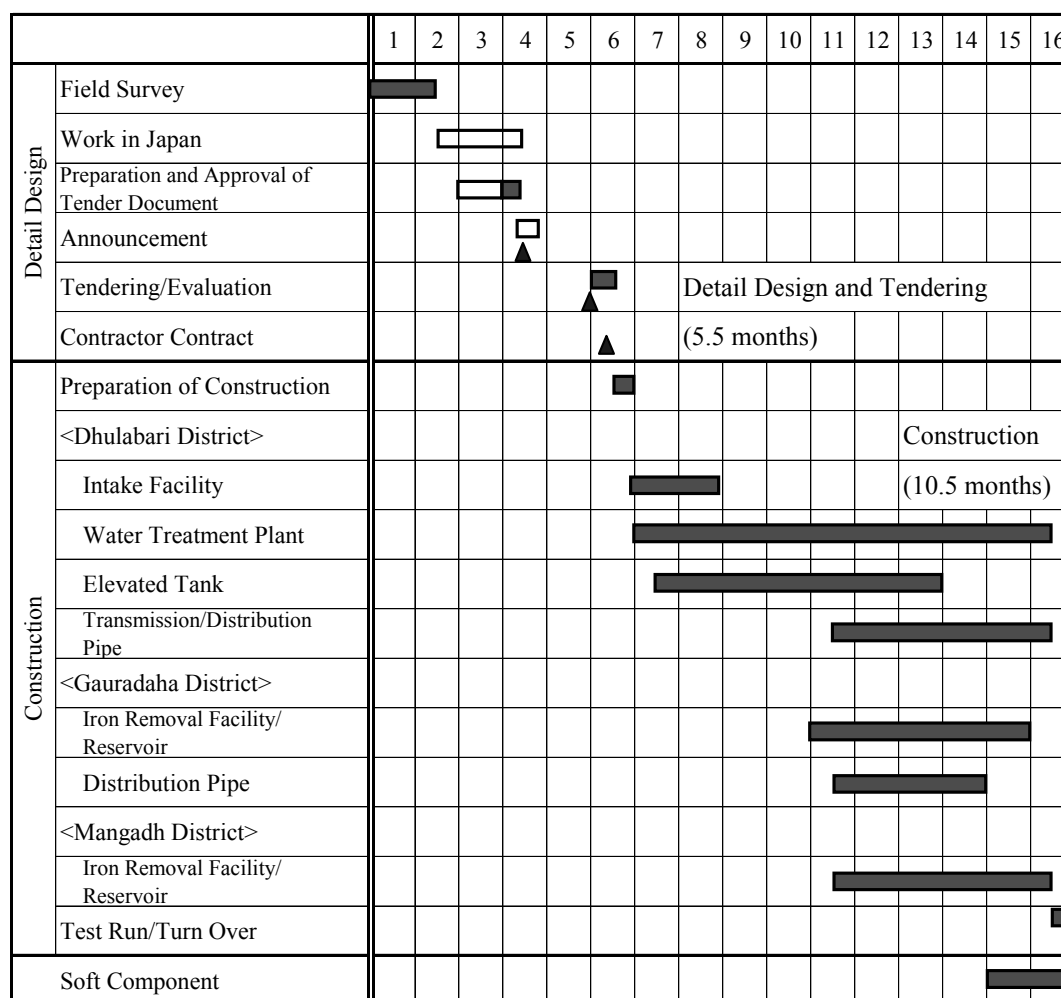


Figure 2-13 Project Implementation Schedule

2 - 3 Obligation of Recipient Country

The Nepal Government and DWSS will undertake the works described in Table 2-23 for the completion of the project. Those works are Table 2-39 below in details.

Table 2-39 Obligation of Recipient Country

Items	Facility	Quantity
1. Land Acquisition	Dhulabari WTP	W 80m × L 110m = 8,800m ²
2. Fencing	Dhulabari WTP	Fence Length: 380m
3. Fencing	Dhulabari Intake	Fence Length: 200m
4. Installation of Power Transmission Lines	Dhulabari WTP	Power Transmission Lines: 900m

1WTP:Water Treatment Plant

2 - 4 Project Management and Operation Plan

2-4-1 Dhulabari

Additional manpower to be improved of WUSC organization is as follows:

- Staff for operation and maintenance of new water treatment plant (4,200 m³/day)
- Staff for operation and maintenance of a tube well pump on the construction by DWSS, disinfection facility and a generator unit for emergency by this project in the existing elevated tank
- A PC operator for a desktop type personal computer procured by the WUSC in order to improve collection of water tariff and accountancy and to use the accumulated data effectively

A person in charge of water quality management should be the manager. The manager must recognize importance of water quality control. By the reason, the manager must perform daily water examination.

Planned organization chart of WUSC Dhulabari is shown in Figure 2-14.

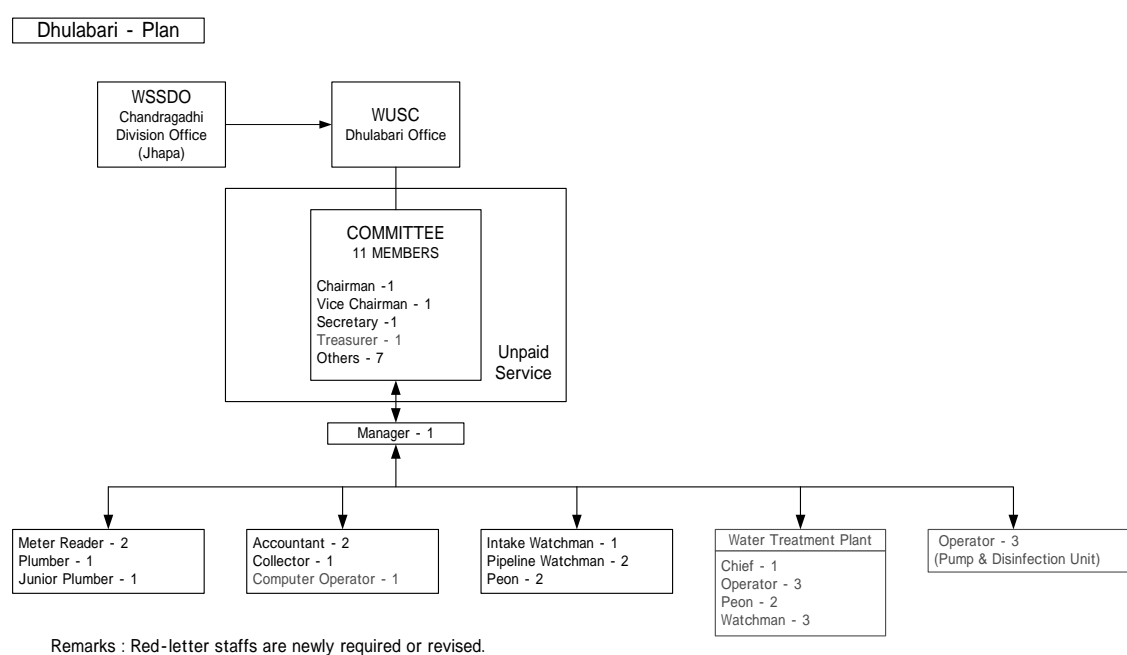


Figure 2-14 Planned Organization Chart of WUSC Dhulabari

The committee members of WUSC Dhulabari are elected by consumers every three years. The members work without pay as volunteer activity. This system will be maintained in the future.

One of the members must be in charge of accountancy to maintain sound finance.

The working form for the staff of the water treatment plant and of the existing elevated tank must be third shifts system with 24 hours water supply.

Now, WUSC Dhulabari operates waterworks by 11members of Committee and 12 staff. After the project, the waterworks is planned to be operated by 11members of Committee and 26 staff (14 staff are increased) as described above. The number of 26 staff against the number of 4,801 water taps is 5.4 staff per 1,000 water taps which is less than from 6 to 7 in case of the general developing country. Therefore, the manning is considered appropriate.

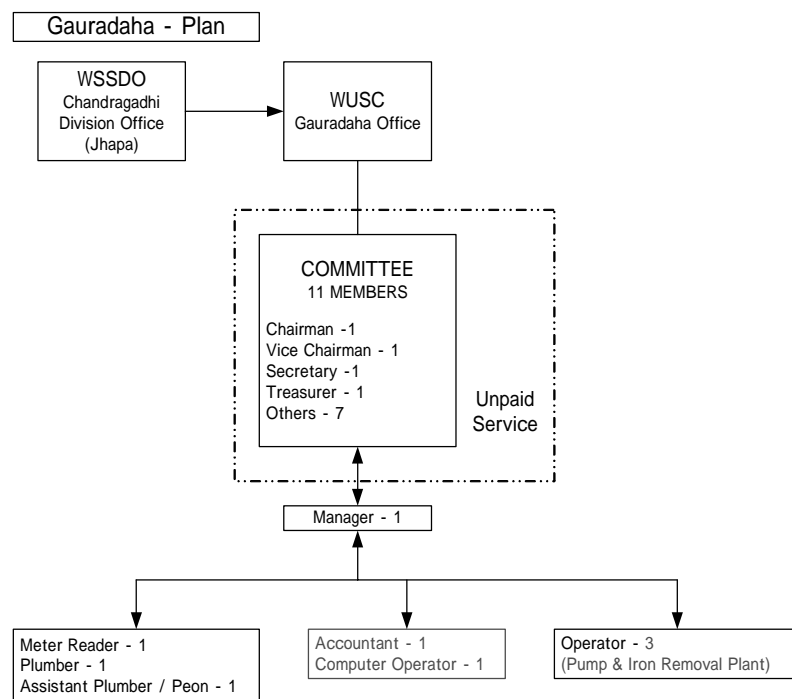
2-4-2 Gauradaha

Additional manpower to be improved of WUSC organization is as follows:

- Staff for operation and maintenance of iron removal facility, lift pump facility, disinfection facility and a generator unit for emergency by this project in the existing elevated tank
- An accountant in charge of collection of water tariff and accountancy
- A PC operator for a desktop type personal computer procured by the WUSC in order to improve collection of water tariff and accountancy and to use the accumulated data effectively

A person in charge of water quality management should be the manager. The manager must recognize importance of water quality control. By the reason, the manager must perform daily water examination.

Planned organization chart of WUSC Gauradaha is shown in Figure 2-15.



Remarks : Red-letter staffs are newly required or revised.

Figure 2-15 Planned Organization Chart of WUSC Gauradaha

The committee members of WUSC Gauradaha are elected by consumers every three years. The members work without pay as volunteer activity. This system will be maintained in the future.

The working form for the staff of the water treatment plant and of the existing elevated tank must be third shifts system with 24 hours water supply.

Now, WUSC Gauradaha operates waterworks by 11members of Committee and 5 staff. After the project, the waterworks is planned to be operated by 11members of Committee and 9 staff (4 staff are increased) as described above. The number of 9 staff against the number of 1,520 water taps is 5.9 staff per 1,000 water taps which is less than from 6 to 7 in case of the general developing country. Therefore, the manning is considered appropriate.

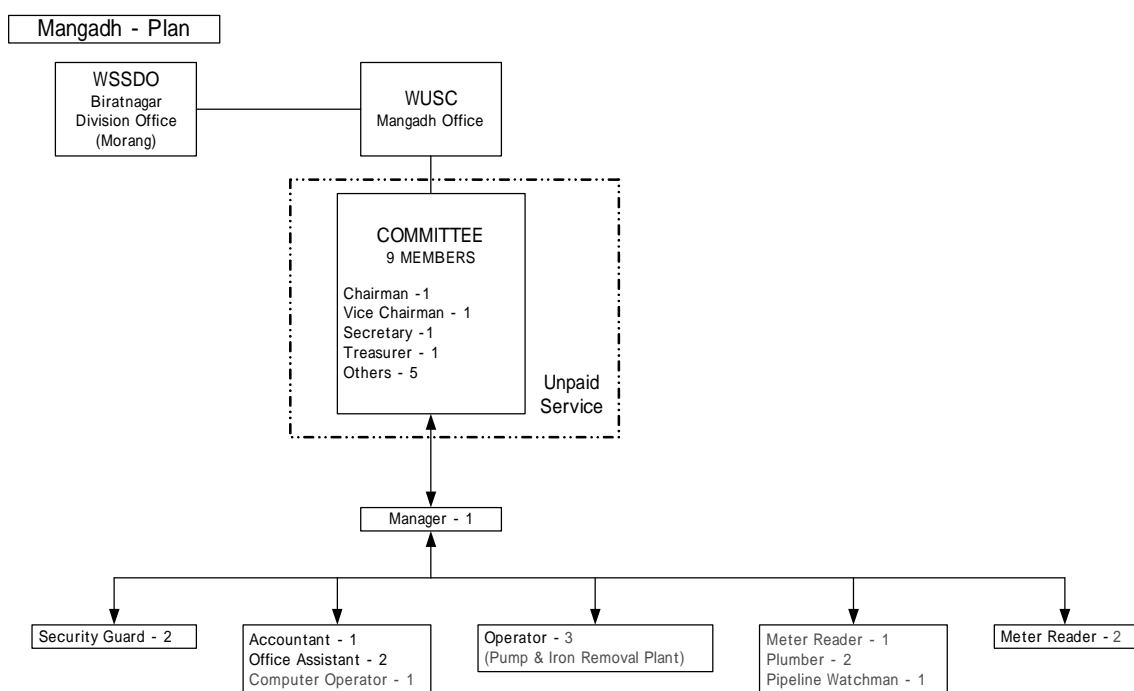
2-4-3 Mangadh

Additional manpower to be improved of WUSC organization is as follows:

- Staff for operation and maintenance of iron removal facility, lift pump facility, disinfection facility and a generator unit for emergency by this project in the existing elevated tank
- A staff for water meter reading
- A staff for maintenance of pipeline
- A PC operator for a desktop type personal computer procured by the WUSC in order to improve collection of water tariff and accountancy and to use the accumulated data effectively

A person in charge of water quality management should be the manager. The manager must recognize importance of water quality control. By the reason, the manager must perform daily water examination.

Planned organization chart of WUSC Mangadh is shown in Figure 2-16.



Remarks : Red-letter staffs are newly required or revised.

Figure 2-16 Planned Organization Chart of WUSC Mangadh

The committee members of WUSC Mangadh are elected by consumers every three years. The members work without pay as volunteer activity. This system will be maintained in the future.

The working form for the staff of the water treatment plant and of the existing elevated tank must be third shifts system with 24 hours water supply.

A pipeline watchman is organized newly for reduction of non revenue water such as leakage in transmission and distribution pipeline. And meter readers are increased for rapid increase of consumers near future.

Now, WUSC Mangadh operates waterworks by 9members of Committee and 11 staff. After the project, the waterworks is planned to be operated by 9 members of Committee and 16 staff (5 staff are increased) as described above. The number of 16 staff against the number of 2,834 water taps is 5.6 staff per 1,000 water taps which is less than from 6 to 7 in case of the general developing country. Therefore, the manning is considered appropriate.

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 1,119 million Yen. The contributions from the Japanese and Nepal Governments, following the scope of works in Section 2-2-4, 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: 1,112 million Yen

Construction of one Water Treatment Plant, Improvement of two Water Treatment Plant, Transmission / Distribution pipe length 25 km

Table 2-40 Project Costs borne by the Japanese Government

Item			Cost (Million Yen)	
Facility	Dhulabari District	Intake Water Treatment Plant Elevated Tank Transmission/Distribution pipe	723	1,006
	Gauradaha District	Water Treatment Plant Distribution pipe	144	
	Mangadh District	Water Treatment Plant	139	
Detailed design, Construction Supervision and Soft Component			106	

(2) The Project Cost borne by the Nepal Government

1) Land Acquisition (Dhulabari WTP)	3,100 thousand Nrs (Approx. 4.65 million Yen)
2) Fencing (Dhulabari WTP)	970 thousand Nrs (Approx 1.46 million Yen)
3) Fencing (Dhulabari Intake)	110 thousand Nrs (Approx 0.17 million Yen)
4) Installation of Power Transmission Lines (Dhulabari WTP)	800 thousand Nrs (Approx 1.20 million Yen)
Total	4,980 thousand Nrs (Approx 7.47 million Yen)

(3) Estimate Conditions

Costing Date: July 2005

Exchange Rate Yen/US\$: 1 US\$ = 107.13 Yen

Yen/Local Currency: 1 Nrs = 1.50 Yen

Implementation Period: Shown in Project Implementation Schedule

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

2-5-2 Management, Operation and Maintenance Cost

The present financial condition of the WUSC in Dhulabari, Gauradaha and Mangadh is not so good. Therefore, the WUSC must make the future plan including revision of water tariff in order to execute management and operation and maintenance of water supply facilities after completion of the project in sound and stable condition.

On the planned loss and profit, profit will be supposed to increase so gradually because the rate of service pervasion after year 2014 which is the target design year will increase gradually.

As the project is implemented on Japanese grant aid, expenditure for new water supply facilities will not occurred without the cost of land procurement for the water treatment plant. Therefore, depreciation cost for new water supply facilities of the project is not included in the budget on the future plan. The legal financial useful life of equipment of water supply in Japan is 12 years. In Nepal, the useful life of the equipment is expected as the same as in Japan.

As renewal cost and expansion cost of facilities shall be paid by profit accumulated year by year, revision of water tariff is planned to be able to cover the expenditure of equipment at the renewal period.

2-5-2-1 Dhulabari

The main income is water tariff in Dhulabari. Unfortunately, the WUSC Dhulabari has been running at a loss from 2001. Following cost will increase after completion of the project in this condition.

- Electricity Cost
- Chemical Cost
- Fuel Cost
- Labor Cost for staff increase

Therefore, the WUSC Dhulabari must adopt following measures in order to execute management and operation and maintenance of water supply facilities after completion of the project in sound and stable condition.

- Saving water campaign
- Optimization of member of public water tap
- Decrease of leakage rate
- Revision of water tariff

Regarding the optimization of member of public water tap, the WUSC Dhulabari must decrease the member of public water tap and install water meters on public water tap against wasteful water.

The WUSC Dhulabari must execute following works for decrease of leakage rate. Two meter readers must discover leakage of water from service pipe of consumers on water meter reading. And four members for maintenance of pipeline must discover leakage of water by a survey of distribution pipeline

The WUSC Dhulabari is proposed the revision of water tariff by the result of following study about the cost for management and operation and maintenance of waterworks.

The present water tariff is shown in Table 2-41 and the water supply condition (2003 – 2004) is shown in Figure 2-17, Figure 2-18 and Figure 2-19 .

Table 2-41 Water Tariff (Present)

Water Tariff of WUSC Dhulabari

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	20	Basic Water Tariff
2	8< - 30	6/unit	
3	30< - 50	7/unit	
4	50< - 70	8/unit	
5	70< - 100	9/unit	
6	100<	10/unit	

Source : Site Survey on June 2005

(Revised on 2001)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 3 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By one months delay of payment after due date of payment : Extra Fine of 10 %
- (4) By two months delay of payment after due date of payment : Extra Fine of 20 %
- (5) More than three months delay of payment after due date of payment : Disconnection
- (6) Charge for Reconnection : 200 Nrs / Connection

Numbers of Consumers per Water Consumption on Year 2003-2004 of WUSC Dhulabari

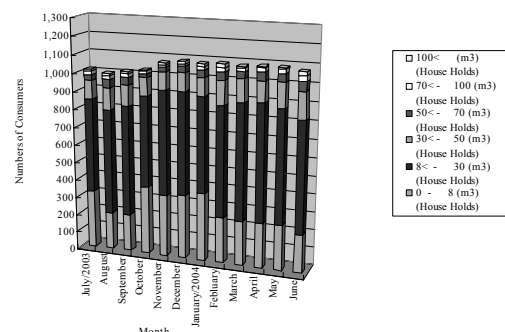
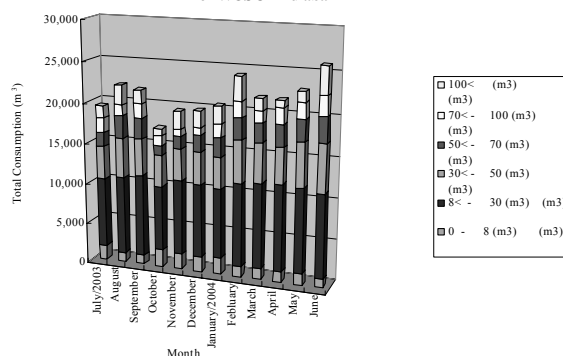


Figure 2-17 Component Ratio of Number of Consumers

Total Consumption per Water Consumption on Year 2003-2004 of WUSC Dhulabari



Total Water Tariff per Water Consumption on Year 2003-2004 of WUSC Dhulabari

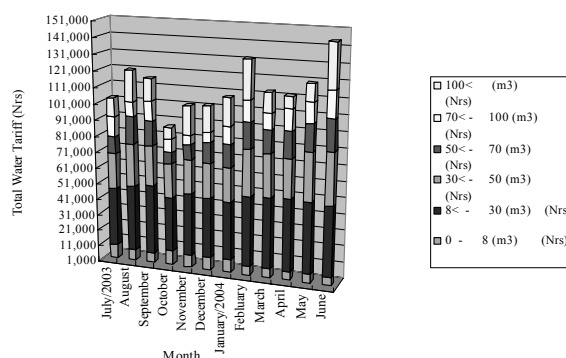


Figure 2-18 Component Ratio of Total Consumers (By the Consumption Range) (2003-2004)

Figure 2-19 Component Ratio of Total Water Tariff (By the Consumption Range) (2003-2004)

Now, the present water tariff is kept low by the benefit of gravity flow system applied to the facilities with no electricity cost for water supply.

The water supply condition (2003 – 2004) is summarized in Table 2-42.

Table 2-42 Component Ratio of Number of Consumers, Total Consumption and Total Water Tariff (By the Consumption Range) (2003-2004)

Water Consumption (m ³)	Number of Consumers (%)	Total Consumption (%)	Total Water Tariff (%)
0 - 8	26.6	7.3	6.7
8< - 30	55.5	44.6	35.9
30< - 50	11.0	21.3	22.1
50< - 70	3.7	10.7	12.4
70< - 100	1.8	7.4	9.5
100<	1.2	8.8	13.5
Total	100.0	100.0	100.0

The number of consumers in the water consumption range of “ 0 - 50 m³ /month “ accounts for about 93 % of all consumers. In the same way, the total consumption accounts for about 73 % and the total water tariff accounts for about 65 %. This condition says that there are big consumers and the water tariff of ordinary consumers is low.

Therefore, the WUSC Dhulabari must execute revision of water tariff. Especially, the water tariff in the water consumption range of “ 0 - 50 m³ /month “ must be revised mainly.

Big revision of water tariff will be necessary from the present condition. The result of the study of income and expenditure in future is shown in Table 2-43. This study is based on the revisions of water tariff as follows:

Table 2-43 Planned Water Tariff

Water Tariff of WUSC Dhulabari (2007)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	30	Basic Water Tariff
2	8< - 30	10	/unit
3	30< - 50	11	/unit
4	50< - 70	12	/unit
5	70< - 100	13	/unit
6	100<	14	/unit

(Revised on 2007)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 5 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By one months delay of payment after due date of payment : Extra Fine of 10 %
- (4) By two months delay of payment after due date of payment : Extra Fine of 20 %
- (5) More than three months delay of payment after due date of payment : Disconnection
- (6) Charge for Reconnection : 300 Nrs / Connection

Water Tariff of WUSC Dhulabari (2009)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	40	Basic Water Tariff
2	8< - 30	10	/unit
3	30< - 50	11	/unit
4	50< - 70	12	/unit
5	70< - 100	13	/unit
6	100<	14	/unit

(Revised on 2009)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 5 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By one months delay of payment after due date of payment : Extra Fine of 10 %
- (4) By two months delay of payment after due date of payment : Extra Fine of 20 %
- (5) More than three months delay of payment after due date of payment : Disconnection
- (6) Charge for Reconnection : 300 Nrs / Connection

Water Tariff of WUSC Dhulabari (2013)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	50	Basic Water Tariff
2	8< - 30	11	/unit
3	30< - 50	12	/unit
4	50< - 70	13	/unit
5	70< - 100	14	/unit
6	100<	15	/unit

(Revised on 2013)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 5 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By one months delay of payment after due date of payment : Extra Fine of 10 %
- (4) By two months delay of payment after due date of payment : Extra Fine of 20 %
- (5) More than three months delay of payment after due date of payment : Disconnection
- (6) Charge for Reconnection : 400 Nrs / Connection

Loss & Profit of the Financial Year

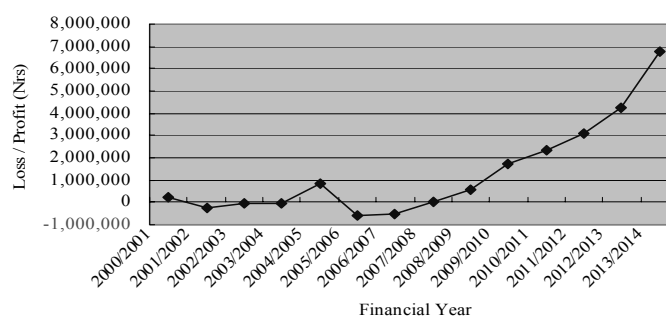


Figure 2-20 Planned Loss and Profit

Operating Ratio	
Ratio of Ordinary Profit	0.0%
Ratio of Fixed Cost	46.7%
Ratio of Gross Margin	46.8%
Ratio of Prime Cost	53.2%
Loss & Profit Break-even Point	7,103,980
Ratio of Loss & Profit Break-even Point	99.9%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent :	< 60%
Superior :	60% < - > 80%
Normal :	80% < - > 90%
Risky :	90% < - > 100%
Deficit :	100%<

Operating Ratio	
Ratio of Ordinary Profit	8.0%
Ratio of Fixed Cost	43.2%
Ratio of Gross Margin	51.2%
Ratio of Prime Cost	48.8%
Loss & Profit Break-even Point	6,170,142
Ratio of Loss & Profit Break-even Point	84.4%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent :	< 60%
Superior :	60% < - > 80%
Normal :	80% < - > 90%
Risky :	90% < - > 100%
Deficit :	100%<

Operating Ratio	
Ratio of Ordinary Profit	45.5%
Ratio of Fixed Cost	24.4%
Ratio of Gross Margin	69.9%
Ratio of Prime Cost	30.1%
Loss & Profit Break-even Point	5,217,252
Ratio of Loss & Profit Break-even Point	34.9%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent :	< 60%
Superior :	60% < - > 80%
Normal :	80% < - > 90%
Risky :	90% < - > 100%
Deficit :	100%<

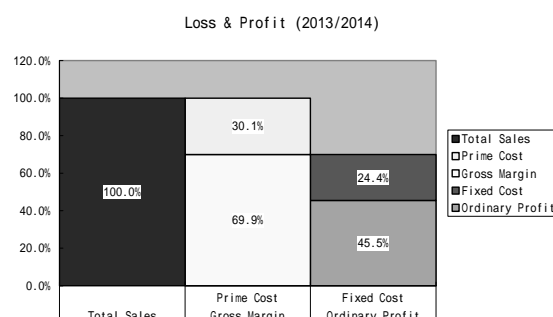
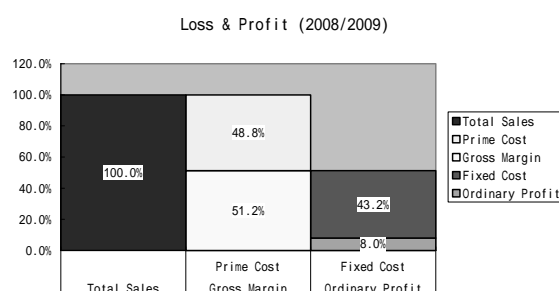
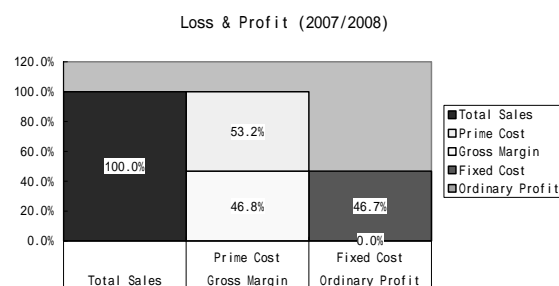


Figure 2-21 Financial Analysis of the Future Plan

The cost of equipment which are necessary to be renewed on the estimated project cost is about 35,353,000 Nrs (about 53,030,000 Japanese Yen). At the renewal period of equipment, the equipment which are probably made in Nepal or in third country will be procured. Therefore, the renewal cost of equipment shall be covered.

The time when new facilities will be put into operation is year 2007. The retention money is supposed to be about 52,774,000 Nrs (about 79,161,000 Japanese Yen) after 12 years (Year 2019). Since year 2014, annual profit is almost same as the profit in year 2014.

The renewal cost for tube well pumps must be also covered. WUSC Dhulabari should advance repayment for the loan of the land procurement for the water treatment plant, considering high interest on a bank loan. The total amount of repayment for 20 year loan with annual interest of 11% is about 12,337,000 Nrs.

As described above, the proposed plan of the revision of water tariff can be considered acceptable because the renewal cost can be covered by the accumulated profit.

Furthermore, trial calculation of the feasibility of water tariff payment made by the use of the result of above study in the target year of 2014 is as follows:

Ordinary Family Structure :	6.4 persons/household	
Design Daily Average Usage per capita :	100 Litters/person/day	
Water Tariff :	6.4 (persons/household) x 100 (Litters/person/day) x 30 (days)	
	= 19.2 (m ³ /month)	
	50 (Nrs) x 11 (Nrs) x (19.2 – 8) (m ³ /month)	173 (Nrs/month)
Feasible Average Payment on the survey of social condition (2005):	92 Nrs/month	
Annual Income on the survey of social condition (2005):	Average -	118,600 Nrs/year
	Minimum -	30,000 Nrs/ year
	Maximum -	1,000,000 Nrs/ year

On the other hand, the feasible average payment for water supply service on the economic evaluation technique by JICA is 4 % of the disposable income of family.

The trial calculation of the feasible average payment depending on average annual income in this area is as follows:

$$118,600 \text{ (Nrs/ year, Average Annual Income)} \times 4 \text{ (\%)} \div 12 \text{ (months)} = 395 \text{ Nrs/month}$$

Therefore, the study can say that consumers can pay the revised water tariff as specified hereunder:

Model Family	173 Nrs/month
Feasible Average Payment	92 Nrs/month
Feasible Average Payment calculated	395 Nrs/month

Table 2-44 Planned Income and Expenditure of the WUSC Dhulabari

Annual Financial Analysis of WUSC Dhulabari

Income														
Financial Year	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
1 Water Tariff	1,081,835.56	1,133,810.83	1,180,810.00	1,351,354.33	1,788,219.00	2,125,829.00	2,487,437.00	5,007,966.00	5,683,245.00	6,788,400.00	7,598,188.00	8,469,018.00	9,395,275.00	11,718,900.00
2 Membership Fee	59,200.00	63,400.00	67,500.00	67,000.00	327,000.00	267,000.00	286,000.00	534,000.00	337,000.00	360,000.00	383,000.00	410,000.00	437,000.00	465,000.00
3 Meter Fee	105,500.00	100,800.00	92,000.00	54,400.00	228,900.00	186,900.00	200,200.00	427,200.00	269,600.00	288,000.00	344,700.00	369,000.00	393,300.00	418,500.00
4 New Connection Charge	32,000.00	50,800.00	46,400.00	26,800.00	163,500.00	133,500.00	143,000.00	534,000.00	337,000.00	360,000.00	383,000.00	410,000.00	437,000.00	465,000.00
5 Extra Fine	66,852.08	52,079.73	44,955.30	67,934.78	89,410.00	106,290.00	124,370.00	200,320.00	227,330.00	271,540.00	303,930.00	338,760.00	375,810.00	468,760.00
6 Reconnection Charge	37,775.00	32,676.00	33,450.00	41,325.00	53,650.00	63,770.00	74,620.00	150,240.00	170,500.00	203,650.00	227,950.00	254,070.00	281,860.00	351,570.00
7 Application Fee	2,360.00	1,915.00	1,740.00	855.00	1,790.00	2,130.00	2,490.00	5,010.00	5,680.00	6,790.00	7,600.00	8,470.00	9,400.00	11,720.00
8 Card Fee	3,415.00	4,390.00	5,065.00	5,800.00	7,150.00	8,500.00	9,950.00	20,030.00	22,730.00	27,150.00	30,390.00	33,880.00	37,580.00	46,880.00
9 Extra Meter	83,300.00	104,800.00	51,200.00	78,215.00	107,290.00	127,550.00	149,250.00	200,320.00	227,330.00	271,540.00	303,930.00	338,760.00	375,810.00	468,760.00
10 Bank Loan			150,000.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 Bank Interest	57,165.00	50,158.00	40,248.00	46,183.22	38,890.00	73,780.00	51,270.00	31,540.00	31,660.00	55,060.00	124,030.00	218,450.00	343,080.00	512,860.00
12 Advance Clearance	7,521.62	382,678.14	197,011.48		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 Deposit		2,115.36			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14 Others	14,775.00	3,200.00	5,876.00	16,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 Others			1,200.00	26,143.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 Others				76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,551,699.26	1,982,823.06	1,917,455.78	1,782,586.79	2,805,799.00	3,095,249.00	3,528,587.00	7,110,626.00	7,312,075.00	8,632,130.00	9,706,718.00	10,850,408.00	12,086,115.00	14,927,950.00

Expenditure

Financial Year	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
1 Salary	358,107.75	443,135.95	515,401.15	530,682.54	548,947.50	557,233.50	575,186.50	1,537,320.00	1,582,170.00	1,627,020.00	1,672,560.00	1,725,000.00	1,771,230.00	1,840,230.00
2 Assignment	208,986.80	220,318.50	230,677.35	320,150.93	329,755.00	339,648.00	349,837.00	384,821.00	396,366.00	408,257.00	420,505.00	433,120.00	446,114.00	459,497.00
3 Dress	7,284.00	8,610.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	13,000.00	1,500.00	1,500.00	1,500.00	1,500.00	13,000.00	1,500.00
4 Electricity	9,065.00	6,703.66	9,570.23	12,652.57	11,998.00	1,182,243.00	1,182,243.00	1,335,452.00	1,335,452.00	1,335,452.00	1,481,607.00	1,481,607.00	1,481,607.00	1,481,607.00
5 Telephone	13,845.28	11,560.65	7,983.31	9,000.91	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	20,000.00
6 Other Service	17,820.00	7,100.00	12,705.00		15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
7 Return of Membership			1,600.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 House Lend	34,750.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 Travel Cost	10,335.00	13,000.00		28,541.50	30,000.00	50,000.00	50,000.00	50,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00
10 Maintenance	83,757.00	74,105.00	57,827.00	55,347.00	60,000.00	75,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
11 Office Use (Office Purpose)	52,793.98	6,550.00	6,435.00	499,297.53	51,500.00	51,500.00	161,500.00	151,500.00	52,500.00	52,500.00	52,500.00	161,500.00	52,500.00	52,500.00
12 Medical Facility			10,815.10		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 Medicine (Calcium Hypochlorite)				12,300.00	59,860.00	70,080.00	89,060.00	131,400.00	147,830.00	180,680.00	198,930.00	244,920.00	271,010.00	299,120.00
14 Building Construction			135,902.50	114,635.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 Pipe Procurement	60,000.00				247,150.00	220,150.00	228,700.00	485,400.00	367,200.00	381,000.00	449,800.00	547,500.00	567,750.00	588,750.00
16 Other Materials		196,551.48			0.00	0.00	0.00	300,000.00	300,000.00	300,000.00	350,000.00	350,000.00	350,000.00	350,000.00
17 Water Meter Procurement		172,500.00			305,630.00	285,860.00	317,680.00	570,470.00	451,750.00	508,670.00	589,660.00	643,420.00	699,190.00	806,600.00
18 Printing	59,964.50	31,535.00	26,927.00		28,320.00	32,370.00	36,410.00	44,500.00	48,550.00	52,590.00	56,640.00	60,690.00	64,730.00	68,780.00
19 Magazine	12,778.50	11,925.00	11,689.00		13,000.00	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00
20 Others	114,634.37	57,587.17	143,135.50	61,326.46	150,000.00	65,000.00	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00	175,000.00	200,000.00
21 Others	141,409.00		34,204.30	2,579.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22 Subsidy				9,711.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23 Land Procurement		478,077.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24 Loan Payment				150,000.00	0.00	616,836.00	616,836.00	616,836.00	616,836.00	616,836.00	616,836.00	616,836.00	616,836.00	616,836.00
25 Interest to Bank				7,233.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 Audit Fee	4,000.00	5,000.00			5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
27 Transportation	8,464.00	63,510.00	33,149.00	12,981.00	50,000.00	50,000.00	100,000.00	100,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
28 Tariff Discount		6,857.10	7,758.47	8,595.06	10,730.00	12,750.00	14,920.00	125,200.00	85,250.00	101,830.00	113,970.00	127,040.00	140,930.00	175,780.00
29 Maintenance	9,345.00	7,760.00		550.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 Ramu Brothers				14,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31 Advance Clearance	147,300.00	382,678.14	730,114.71		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Fuel (Light Oil)								963,620.00	963,620.00	963,620.00	963,620.00	963,620.00	963,620.00	963,620.00
Total	1,354,640.18	2,205,064.65	1,975,894.62	1,851,083.50	1,933,390.50	3,658,170.50	4,021,872.50	7,107,519.00	6,727,024.00	6,907,955.00	7,346,128.00	7,734,753.00	7,841,517.00	8,137,820.00

Loss/Benefit

Financial Year	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
Loss/Benefit for the Year	197,059.08	-222,241.59	-58,438.84	-68,496.71	872,408.50	-562,921.50	-493,285.50	3,107.00	585,051.00	1,724,175.00	2,360,590.00	3,115,655.00	4,244,598.00	6,790,130.00

2-5-2-2 Gauradaha

The main income is water tariff with the exception of “Incentive by DWSS” in Gauradaha. Fortunately, the finance of the WUSC Gauradaha is balanced, depending on a subsidy from DWSS. The subsidy is applied for three years after the transfer to the WUSC. However, Supply of the subsidy was over, there will be possibility of running at a loss from 2005. Following cost will increase after completion of the project in this condition.

- Electricity Cost
- Chemical Cost
- Fuel Cost
- Labor Cost for staff increase

Therefore, the WUSC Gauradaha must adopt following measures in order to execute management and operation and maintenance of water supply facilities after completion of the project in sound and stable condition.

- Saving water campaign
- Optimization of member of public water tap
- Decrease of leakage rate
- Revision of water tariff

Regarding the optimization of member of public water tap, the WUSC Gauradaha must decrease the member of public water tap and install water meters on public water tap against wasteful water.

The WUSC Gauradaha must execute following works for decrease of leakage rate. A meter reader must discover leakage of water from service pipe of consumers on water meter reading. And two members for maintenance of pipeline must discover leakage of water by a survey of distribution pipeline

The WUSC Gauradaha is proposed the revision of water tariff by the result of following study about the cost for management and operation and maintenance of waterworks.

The present water tariff is shown in Table 2-45 Water Tariff (Present) and the water supply condition (2004 – 2005) is shown in Figure 2-22 Component Ratio of Number of Consumers, Figure 2-23 and Figure 2-24.

Table 2-45 Water Tariff (Present)

Previous Water Tariff - WUSC Gauradaha

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	45	Basic Water Tariff
2	8< - 30	7/unit	
3	30< - 50	11/unit	
4	50< - 100	12/unit	
5	100<	13/unit	

Source : Site Survey on June 2005

(Upto April 2005)

Present Water Tariff - WUSC Gauradaha

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	55	Basic Water Tariff
2	8< - 25	8/unit	
3	25<	10/unit	

Source : Site Survey on June 2005

(Revised on May 2005)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 2 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By 15 days delay of payment after due date of payment : Extra Fine of 5 %
- (4) By one months delay of payment after due date of payment : Extra Fine of 10%
- (5) By two months delay of payment after due date of payment : Extra Fine of 25%
- (6) More than three months delay of payment after due date of payment : Disconnection
- (7) Charge for Reconnection : 300 Nrs / Connection

Number of Consumers per Consumption on Year 2004-2005 of WUSC Gauradaha

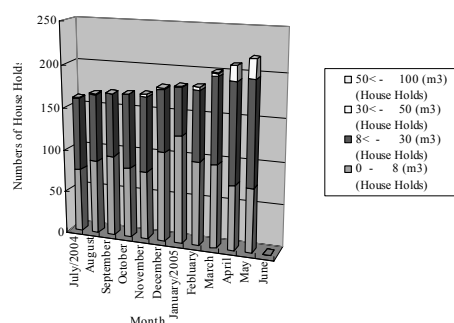


Figure 2-22 Component Ratio of Number of Consumers (By the Consumption Range) (2004-2005)

Water Product per Month of WUSC Gauradaha on 2004/2005

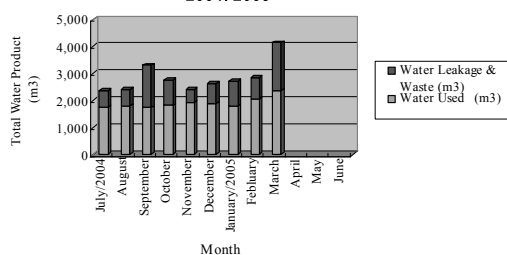


Figure 2-23 Component Ratio of Total Consumption (2004-2005)

Billed Amount per Month of WUSC Gauradaha on 2004/2005

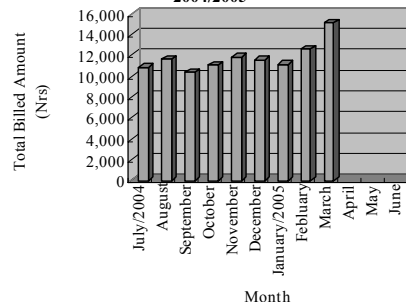


Figure 2-24 Component Ratio of Total Water Tariff(2004-2005)

Now, ordinary water supply service is not executed because of high density of iron in the ground water. The present water tariff is kept low for the reason that the electricity cost for water supply is small.

The water supply condition (2003 – 2004) is summarized in Table 2-46.

Table 2-46 Component Ratio of Number of Consumers (By the Consumption Range) Total Consumption and Total Water Tariff (July - 2004)

Water Consumption (m ³)	Number of Consumers (%)	Total Consumption (%)	Total Water Tariff (%)
0 - 8	46.3	31.7	30.8
8< - 30	53.1	66.1	66.5
30< - 50	0.6	2.2	2.7
50< - 100	0	0	0
100<	0	0	0
Total	100.0	100.0	100.0

The number of consumers in the water consumption range of “0 - 30 m³/month” accounts for about 99 % of all consumers. In the same way, the total consumption accounts for about 98 % and the total water tariff

accounts for about 97 %. This condition says that there are no big consumers and the water tariff of ordinary consumers is low.

Therefore, the WUSC Gauradaha must execute revision of water tariff. Especially, the water tariff in the water consumption range of “ 0 - 30 m³ /month “ must be revised mainly.

Big revision of water tariff will be necessary from the present condition. The result of the study of income and expenditure in future is shown in Table 2-48. This study is based on the revisions of water tariff as follows:

Table 2-47 Planned Water Tariff

Previous Water Tariff - WUSC Gauradaha (2007)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	80	Basic Water Tariff
2	8< - 30	14/unit	
3	30< - 50	15/unit	
4	50< - 100	16/unit	
5	100<	17/unit	

(Revised on 2007)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 3 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By 15 days delay of payment after due date of payment : Extra Fine of 5 %
- (4) By one months delay of payment after due date of payment : Extra Fine of 10%
- (5) By two months delay of payment after due date of payment : Extra Fine of 25%
- (6) More than three months delay of payment after due date of payment : Disconnection
- (7) Charge for Reconnection : 300 Nrs / Connection

Previous Water Tariff - WUSC Gauradaha (2010)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	80	Basic Water Tariff
2	8< - 30	15/unit	
3	30< - 50	16/unit	
4	50< - 100	17/unit	
5	100<	18/unit	

(Revised on 2010)

Discount & Extra Fine :

- (1) Payment by 7 days after meter-reading : Discount of 5 %
- (2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)
- (3) By 15 days delay of payment after due date of payment : Extra Fine of 5 %
- (4) By one months delay of payment after due date of payment : Extra Fine of 10%
- (5) By two months delay of payment after due date of payment : Extra Fine of 25%
- (6) More than three months delay of payment after due date of payment : Disconnection
- (7) Charge for Reconnection : 300 Nrs / Connection

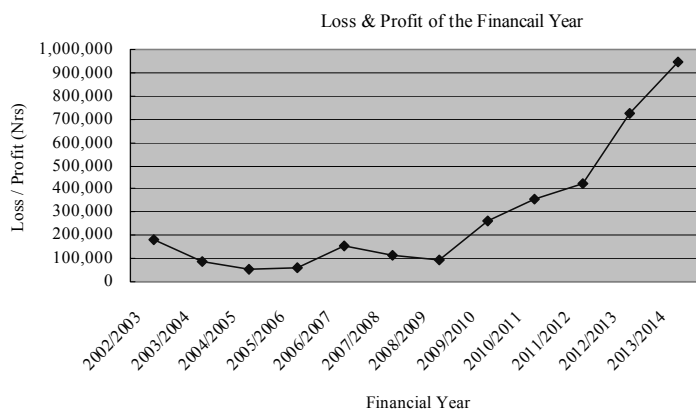


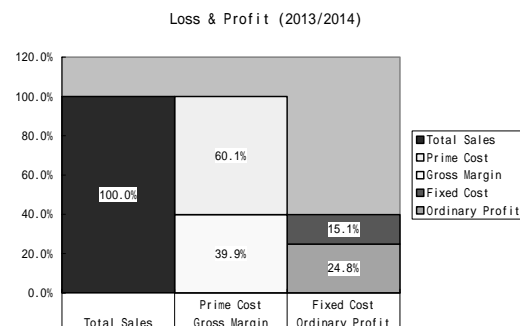
Figure 2-25 Planned Loss and Profit

Operating Ratio	
Ratio of Ordinary Profit	24.8%
Ratio of Fixed Cost	15.1%
Ratio of Gross Margin	39.9%
Ratio of Prime Cost	60.1%
Loss & Profit Break-even Point	1,439,854
Ratio of Loss & Profit Break-even Point	37.8%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent : < 60%
 Superior : 60% < - > 80%
 Normal : 80% < - > 90%
 Risky : 90% < - > 100%
 Deficit : 100%<

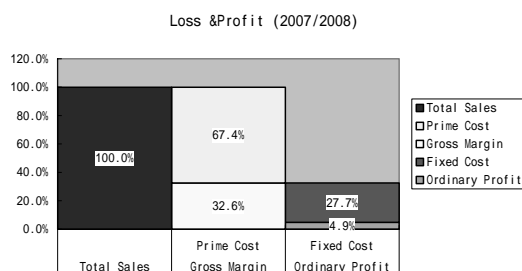


Operating Ratio	
Ratio of Ordinary Profit	4.9%
Ratio of Fixed Cost	27.7%
Ratio of Gross Margin	32.6%
Ratio of Prime Cost	67.4%
Loss & Profit Break-even Point	1,964,086
Ratio of Loss & Profit Break-even Point	84.9%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent : < 60%
 Superior : 60% < - > 80%
 Normal : 80% < - > 90%
 Risky : 90% < - > 100%
 Deficit : 100%<



Operating Ratio	
Ratio of Ordinary Profit	4.4%
Ratio of Fixed Cost	23.0%
Ratio of Gross Margin	27.5%
Ratio of Prime Cost	72.5%
Loss & Profit Break-even Point	1,775,293
Ratio of Loss & Profit Break-even Point	83.9%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent : < 60%
 Superior : 60% < - > 80%
 Normal : 80% < - > 90%
 Risky : 90% < - > 100%
 Deficit : 100%<

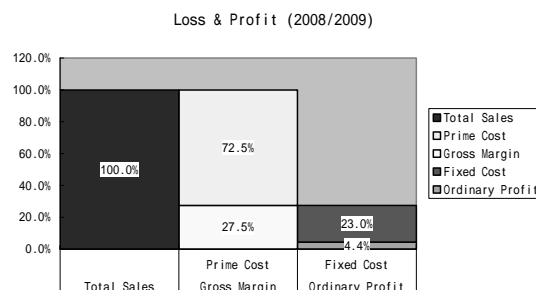


Figure 2-26 Financial Analysis of the Future Plan

The cost of equipment which are necessary to be renewed on the estimated project cost is about 10,306,000 Nrs (about 15,460,000 Japanese Yen). At the renewal period of equipment, the equipment which is probably

made in Nepal or in third country will be procured. Therefore, the renewal cost of equipment shall be covered.

The time when new facilities will be put into operation is year 2007. The retention money is supposed to be about 7,632,000 Nrs (about 11,448,000 Japanese Yen) after 12 years (Year 2019). Since year 2014, annual profit is almost same as the profit in year 2014. The renewal cost for tube well pumps must be also covered.

As described above, the renewal cost cannot be covered by the accumulated profit. However, the proposed plan of the revision of water tariff can be considered acceptable on condition that further revision of water tariff after year 2014 will be carried out.

Furthermore, trial calculation of the feasibility of water tariff payment made by the use of the result of above study in the target year of 2014 is as follows:

Ordinary Family Structure :	5.67 persons/household	
Design Daily Average Usage per capita :	100 Litters/person/day	
Water Tariff :	5.67 (persons/household) x 100 (Litters/person/day) x 30 (days) = 17 (m ³ /month)	
	80 (Nrs) x 15 (Nrs) x (17 – 8) (m ³ /month)	215 (Nrs/month)
Feasible Average Payment on the survey of social condition (2005):	144 Nrs/month	
Annual Income on the survey of social condition (2005):	Average -	116,300 Nrs/ year
	Minimum -	30,000 Nrs/ year
	Maximum -	850,000 Nrs/ year

On the other hand, the feasible average payment for water supply service on the economic evaluation technique by JICA is 4 % of the disposable income of family.

The trial calculation of the feasible average payment depending on average annual income in this area is as follows:

$$116,300 \text{ (Nrs/ year, Average Annual Income)} \times 4 \text{ (}\%) \div 12 \text{ (months)} = 388 \text{ Nrs/month}$$

Therefore, the study can say that consumers can pay the revised water tariff as specified hereunder:

Model Family	215 Nrs/month
Feasible Average Payment	144 Nrs/month
Feasible Average Payment calculated	388 Nrs/month

Table 2-48 Planned Income and Expenditure of the WUSC Gauradaha

Annual Financial Analysis of WUSC Gauradaha

Income

Financial Year	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
1 Water Tariff	44,873.80	90,474.00	152,597.00	266,760.00	460,420.00	1,189,792.00	1,383,284.00	1,591,610.00	1,867,875.00	2,108,775.00	2,362,570.00	2,635,075.00
2 New Membership Fee	4,641.00		41,000.00	81,000.00	181,000.00	282,000.00	116,000.00	125,000.00	132,000.00	140,000.00	148,000.00	158,000.00
3 Meter Deposit	138,752.00	60,300.00	28,700.00	56,700.00	126,700.00	197,400.00	81,200.00	100,000.00	105,600.00	112,000.00	133,200.00	142,200.00
4 New Connection Charge	27,300.00	20,400.00	41,000.00	81,000.00	181,000.00	282,000.00	116,000.00	125,000.00	132,000.00	140,000.00	148,000.00	158,000.00
5 Extra Fine	2,709.80	1,920.98	7,630.00	13,340.00	23,020.00	59,490.00	69,160.00	79,580.00	93,390.00	105,440.00	118,130.00	131,750.00
6 Reconnection Charge			4,580.00	8,000.00	13,810.00	35,690.00	41,500.00	47,750.00	56,040.00	63,260.00	70,880.00	79,050.00
7 Application Fee	475.00	340.00	1,070.00	1,870.00	3,220.00	8,330.00	9,680.00	11,140.00	13,080.00	14,760.00	16,540.00	18,450.00
8 Card Fee	920.00	1,490.00	2,750.00	4,800.00	8,290.00	17,850.00	20,750.00	23,870.00	28,020.00	31,630.00	35,440.00	39,530.00
9 Extra Meter			7,630.00	13,340.00	23,020.00	59,490.00	69,160.00	79,580.00	93,390.00	105,440.00	118,130.00	131,750.00
10 Form Fee	1,820.00	1,420.00	4,580.00	8,000.00	13,810.00	35,690.00	41,500.00	47,750.00	56,040.00	63,260.00	70,880.00	79,050.00
11 Saving Account Interest	2,987.00	4,286.21	5,810.00	6,660.00	7,670.00	25,350.00	29,880.00	33,630.00	44,030.00	58,150.00	75,110.00	104,020.00
12 Advance Clearance	45,000.00	85,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 Incentive by DWSS	225,000.00	187,162.00	135,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14 Pond (Given on Lease)	2,007.00	4,000.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 Service Fee	27,300.00	20,400.00	30,520.00	53,350.00	69,060.00	118,980.00	138,330.00	159,160.00	93,390.00	105,440.00	118,130.00	131,750.00
16 Gross	750.50	450.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17 Other Commission	7,300.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 Others	700.00	3,468.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	532,536.10	481,111.93	466,867.00	594,820.00	1,111,020.00	2,312,062.00	2,116,444.00	2,424,070.00	2,714,855.00	3,048,155.00	3,415,010.00	3,808,625.00

Expenditure

Financial Year	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
1 Salary	115,000.00	127,400.00	130,800.00	150,420.00	150,420.00	306,480.00	316,200.00	326,040.00	336,000.00	346,080.00	357,000.00	373,080.00
2 Assignment			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 Dress			0.00	0.00	0.00	9,000.00	500.00	500.00	500.00	500.00	4,500.00	500.00
4 Electricity (Power)	34,242.23	34,561.10	72,270.00	111,250.00	186,960.00	606,970.00	697,130.00	801,830.00	951,890.00	1,060,420.00	1,188,740.00	1,325,100.00
5 Telephone			0.00	0.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
6 Fuel		1,782.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 Return of Membership		4,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 House Lend			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 Travelling Allowance	185.00	3,722.00	5,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00
10 Maintenance of Pipeline	2,785.00	6,865.00	5,000.00	5,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
11 Stationary	13,022.10	2,857.39	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00
12 Procurement of Office Goods	5,924.00	312.00	50,000.00	50,000.00	160,000.00	150,000.00	51,000.00	51,000.00	51,000.00	160,000.00	51,000.00	51,000.00
13 Medical Facility			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14 Medicine			4,380.00	5,840.00	10,220.00	25,550.00	29,200.00	32,850.00	38,330.00	46,170.00	52,200.00	58,220.00
15 Building Construction			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 Extension of Distribution Line	117,344.00		6,150.00	12,150.00	27,150.00	112,800.00	46,400.00	50,000.00	52,800.00	70,000.00	74,000.00	79,000.00
17 Pipe Procurement		58,000.00	0.00	0.00	0.00	55,000.00	110,000.00	110,000.00	120,000.00	120,000.00	120,000.00	120,000.00
18 Water Meter Procurement	14,540.00	51,940.00	26,090.00	51,550.00	115,180.00	179,450.00	73,820.00	90,910.00	96,000.00	101,820.00	121,090.00	129,270.00
19 Printing			1,100.00	1,570.00	2,620.00	4,190.00	4,710.00	5,240.00	5,760.00	6,290.00	6,810.00	7,330.00
20 Magazine			6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
21 Others	700.00	2,395.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22 Others	1,688.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23 Subsidy			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24 Land Procurement			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 Loan Payment			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 Interest to Bank			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27 Audit Fee			5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
28 Transportation		800.00	50,000.00	50,000.00	100,000.00	100,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
29 Tariff Discount			610.00	1,070.00	0.00	17,850.00	12,450.00	14,320.00	28,020.00	31,630.00	35,440.00	39,530.00
30 Maintenance			50,000.00	50,000.00	50,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
31 Ramu Brothers			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Advance Clearance	45,000.00	91,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33 Fuel (Light Oil)			0.00	0.00	0.00	378,880.00	378,880.00	378,880.00	378,880.00	378,880.00	378,880.00	378,880.00
Total	350,430.33	390,634.49	413,900.00	531,350.00	956,890.00	2,198,670.00	2,022,790.00	2,164,070.00	2,361,680.00	2,624,290.00	2,692,160.00	2,864,410.00

Loss/Benefit

Financial Year	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
Loss/Benefit for the Year	182,105.77	90,477.44	52,967.00	63,470.00	154,130.00	113,392.00	93,654.00	260,000.00	353,175.00	423,865.00	722,850.00	944,215.00

2-5-2-3 Mangadh

The construction by DWSS of water supply facilities will be completed within 2005. Now, one of the tube well pumps and the elevated tank are completed and are transferred to the WUSC. The WUSC has started water supply service partially. However, ordinary water supply service is not executed because of high density of iron in the ground water. Fortunately, the finance of the WUSC Mangadh will be balanced, because the subsidy will be supplied to the WUSC Mangadh for three years after the transfer of facilities from DWSS. Following cost will increase after completion of the project in this condition.

- Electricity Cost
- Chemical Cost
- Fuel Cost
- Labor Cost for staff increase

Therefore, the WUSC Mangadh must adopt following measures in order to execute management and operation and maintenance of water supply facilities after completion of the project in sound and stable condition.

- Saving water campaign
- Optimization of member of public water tap
- Decrease of leakage rate
- Revision of water tariff

Regarding the optimization of member of public water tap, the WUSC Mangadh must decrease the member of public water tap and install water meters on public water tap against wasteful water.

The WUSC Mangadh must execute following works for decrease of leakage rate. Two meter readers must discover leakage of water from service pipe of consumers on water meter reading. And Three members for maintenance of pipeline must discover leakage of water by a survey of distribution pipeline

The WUSC Mangadh is proposed the revision of water tariff by the result of following study about the cost for management and operation and maintenance of waterworks.

The present water tariff is shown in Table 2-49 and the water supply condition (June – 2005) is shown in Figure 2-27, Figure 2-28 and Figure 2-29.

As shown in Figure 2-27, the number of consumers in the water consumption range of “ 0 - 10 m³ /month ” accounts for about 47 % of all consumers. In the same way, the total consumption accounts for about 20 % and the total water tariff accounts for about 13 %. This condition says that there are many big consumers.

The water supply condition (June – 2005) is summarized in Table 2-50.

Table 2-49 Water Tariff (Present)

Water Tariff of WUSC Mangadh (Present) (2005)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 10	45	Basic Water Tariff
2	10< - 15	8/unit	
3	15< - 20	10/unit	
4	20< - 30	12/unit	
5	30<	14/unit	

Source : Site Survey on June 2005

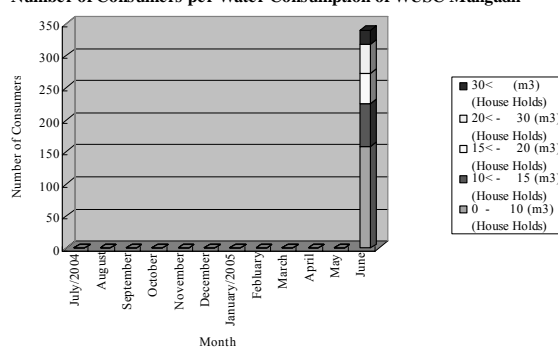
(Established on 2005)

Resistration Fee : Total Nrs 2,000

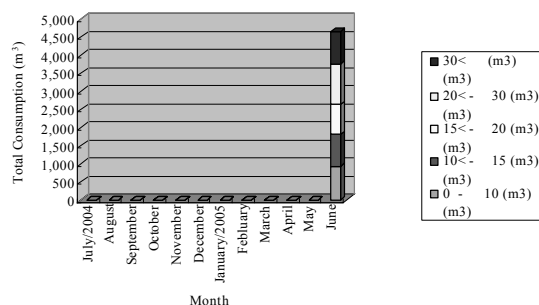
(1) Membership Charge : Nrs 1,000 / connection

(2) Participation Charge : Nrs 1,000 / connection

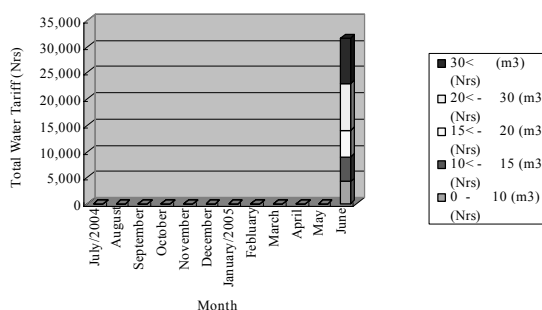
Number of Consumers per Water Consumption of WUSC Mangadh

Figure 2-27 Component Ratio of Number of Consumers
(By the Consumption Range)(2005)

Total Consumption per Water Consumption of WUSC Mangadh

Figure 2-28 Component Ratio of
Total Consumption(2005)

Total Water Tariff per Water Consumption of WUSC Mangadh

Figure 2-29 Component Ratio of
Total Water Tariff(2005)Table 2-50 Component Ratio of Number of Consumers, Total Consumption and Total Water Tariff
(By the Consumption Range) (June – 2005)

Water Consumption (m ³)	Number of Consumers (%)	Total Consumption (%)	Total Water Tariff (%)
0 - 10	46.8	20.2	13.4
10< - 15	19.7	18.7	14.6
15< - 20	13.8	17.8	16.5
20< - 30	13.2	24.3	27.9
30<	6.5	19.0	27.6
Total	100.0	100.0	100.0

The number of consumers in the water consumption range of “0 - 15 m³ /month “ accounts for about 67 % of all consumers. In the same way, the total consumption accounts for about 39 % and the total water tariff accounts for about 28 %. This condition says that there are many big consumers and the water tariff of ordinary consumers is low.

Table 2-51 Planned Water Tariff

Water Tariff of WUSC Mangadh (2007)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 10	70	Basic Water Tariff
2	10< - 15	13/unit	
3	15< - 20	15/unit	
4	20< - 30	17/unit	
5	30<	19/unit	

(Revised on 2007)

Resistration Fee : Total Nrs 2,000

(1) Membership Charge : Nrs 1,000 / connection

(2) Participation Charge : Nrs 1,000 / connection

Discount & Extra Fine :

(1) Payment by 10 days after meter-reading : Discount of 5 %

(2) Payment by 15 days after meter-reading : No Extra Fine (Due date of Payment)

(3) By One months delay of payment after due date of payment : Extra Fine of 10%

(4) By two months delay of payment after due date of payment : Extra Fine of 20%

(5) More than two months delay of payment after due date of payment : Disconnection

(6) Charge for Reconnection : 500 Nrs / Connection

Water Tariff of WUSC Mangadh (2010)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 10	90	Basic Water Tariff
2	10< - 15	14/Unit	
3	15< - 20	16/Unit	
4	20< - 30	18/Unit	
5	30<	20/Unit	

(Revised on 2010)

Resistration Fee : Total Nrs 2,000

(1) Membership Charge : Nrs 1,000 / connection

(2) Participation Charge : Nrs 1,000 / connection

Discount & Extra Fine :

(1) Payment by 10 days after meter-reading : Discount of 5 %

(2) Payment by 15 days after meter-reading : No Extra Fine (Due date of Payment)

(3) By One months delay of payment after due date of payment : Extra Fine of 10%

(4) By two months delay of payment after due date of payment : Extra Fine of 20%

(5) More than two months delay of payment after due date of payment : Disconnection

(6) Charge for Reconnection : 500 Nrs / Connection

Previous Water Tariff - WUSC Mangadh (2013)

No.	Consumption (Unit=m ³)	Water Tariff (Nrs/Month)	Remarks
1	0 - 8	100	Basic Water Tariff
2	8< - 30	14/unit	
3	30< - 50	16/unit	
4	50< - 100	18/unit	
5	100<	20/unit	

(Revised on 2010)

Discount & Extra Fine :

(1) Payment by 7 days after meter-reading : Discount of 5 %

(2) Payment by 30 days after meter-reading : No Extra Fine (Due date of Payment)

(3) By 15 days delay of payment after due date of payment : Extra Fine of 5 %

(4) By one months delay of payment after due date of payment : Extra Fine of 10%

(5) By two months delay of payment after due date of payment : Extra Fine of 25%

(6) More than three months delay of payment after due date of payment : Disconnection

(7) Charge for Reconnection : 300 Nrs / Connection

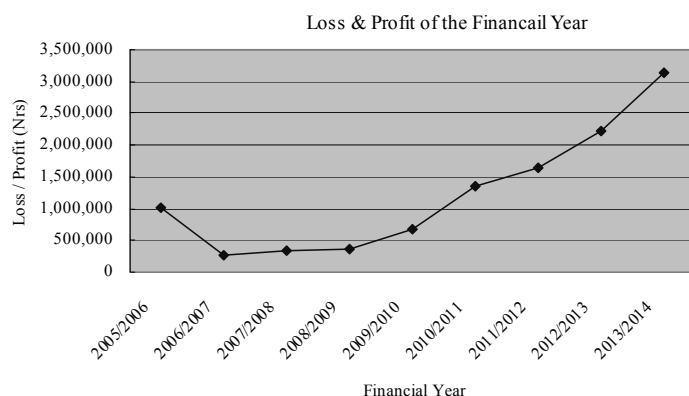


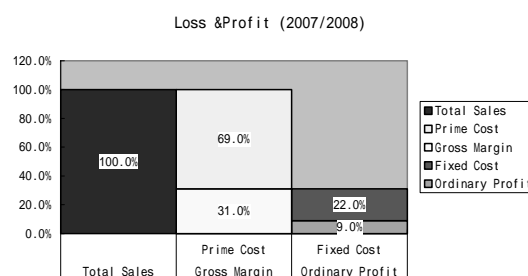
Figure 2-30 Planned Loss and Profit

Operating Ratio	
Ratio of Ordinary Profit	9.0%
Ratio of Fixed Cost	22.0%
Ratio of Gross Margin	31.0%
Ratio of Prime Cost	69.0%
Loss & Profit Break-even Point	2,747,045
Ratio of Loss & Profit Break-even Point	71.0%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent :	< 60%
Superior :	60% < - > 80%
Normal :	80% < - > 90%
Risky :	90% < - > 100%
Deficit :	100% <

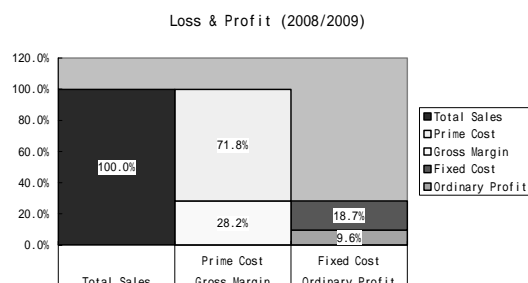


Operating Ratio	
Ratio of Ordinary Profit	9.6%
Ratio of Fixed Cost	18.7%
Ratio of Gross Margin	28.2%
Ratio of Prime Cost	71.8%
Loss & Profit Break-even Point	2,538,727
Ratio of Loss & Profit Break-even Point	66.2%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent :	< 60%
Superior :	60% < - > 80%
Normal :	80% < - > 90%
Risky :	90% < - > 100%
Deficit :	100% <



Operating Ratio	
Ratio of Ordinary Profit	35.7%
Ratio of Fixed Cost	10.3%
Ratio of Gross Margin	46.0%
Ratio of Prime Cost	54.0%
Loss & Profit Break-even Point	1,962,575
Ratio of Loss & Profit Break-even Point	22.4%

Loss & Profit Break-even Point = Fixed Cost / (Gross Margin / Total Sales)

Ratio of Loss & Profit Break-even Point

Excellent :	< 60%
Superior :	60% < - > 80%
Normal :	80% < - > 90%
Risky :	90% < - > 100%
Deficit :	100% <

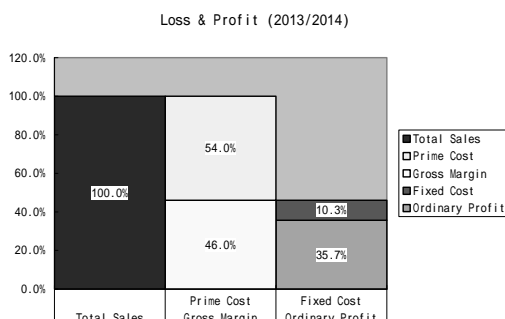


Figure 2-31 Financial Analysis of the Future Plan

The cost of equipment which are necessary to be renewed on the estimated project cost is about 13,404,000 Nrs (about 20,107,000 Japanese Yen). At the renewal period of equipment, the equipment which is probably made in Nepal or in third country will be procured. Therefore, the renewal cost of equipment shall be covered.

The time when new facilities will be put into operation is year 2007. The retention money is supposed to be about 25,370,000 Nrs (about 38,055,000 Japanese Yen) after 12 years (Year 2019). Since year 2014, annual profit is almost same as the profit in year 2014.

The renewal cost for tube well pumps must be also covered.

As described above, the proposed plan of the revision of water tariff can be considered acceptable because the renewal cost can be covered by the accumulated profit.

Furthermore, trial calculation of the feasibility of water tariff payment made by the use of the result of above study in the target year of 2014 is as follows:.

Ordinary Family Structure :	5.8 persons/household	
Design Daily Average Usage per capita :	100 Litters/person/day	
Water Tariff :	5.8 (persons/household) x 100 (Litters/person/day) x 30 (days)	
	= 17.4 (m ³ /month)	
	100 (Nrs) x 14 (Nrs) x (17.4 – 8) (m ³ /month)	231 (Nrs/month)
Feasible Average Payment on the survey of social condition (2005):	121 Nrs/month	
Annual Income on the survey of social condition (2005):	Average -	110,200 Nrs/ year
	Minimum -	30,000 Nrs/ year
	Maximum -	700,000 Nrs/ year

On the other hand, the feasible average payment for water supply service on the economic evaluation technique by JICA is 4 % of the disposable income of family.

The trial calculation of the feasible average payment depending on average annual income in this area is as follows:

$$110,200 \text{ (Nrs/ year, Average Annual Income)} \times 4 \text{ (\%)} \div 12 \text{ (months)} = 367 \text{ Nrs/month}$$

Therefore, the study can say that consumers can pay the revised water tariff as specified hereunder:

Model Family	231 Nrs/month
Feasible Average Payment	121 Nrs/month
Feasible Average Payment calculated	367 Nrs/month

Table 2-52 Planned Income and Expenditure of the WUSC Mangadh

Annual Financial Analysis of WUSC Mangadh

Income

Financial Year	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
1 Water Tariff	641,151.00	884,331.00	2,089,810.00	2,523,504.00	2,982,546.00	4,047,964.00	4,655,522.00	5,298,962.00	6,315,898.00
2 New Membership Fee	524,000.00	199,000.00	400,000.00	233,000.00	247,000.00	264,000.00	280,000.00	297,000.00	316,000.00
3 Meter Deposit	366,800.00	139,300.00	280,000.00	163,100.00	197,600.00	211,200.00	224,000.00	267,300.00	284,400.00
4 New Connection Charge	524,000.00	199,000.00	400,000.00	233,000.00	247,000.00	264,000.00	280,000.00	297,000.00	316,000.00
5 Extra Fine	19,230.00	26,530.00	62,690.00	75,710.00	89,480.00	121,440.00	139,670.00	158,970.00	189,480.00
6 Reconnection Charge	6,410.00	8,840.00	20,900.00	25,240.00	29,830.00	40,480.00	46,560.00	52,990.00	63,160.00
7 Application Fee	4,490.00	6,190.00	14,630.00	17,660.00	20,880.00	28,340.00	32,590.00	37,090.00	44,210.00
8 Card Fee	11,540.00	15,920.00	31,350.00	37,850.00	44,740.00	60,720.00	69,830.00	79,480.00	94,740.00
9 Extra Meter	32,060.00	44,220.00	104,490.00	126,180.00	149,130.00	202,400.00	232,780.00	264,950.00	315,790.00
10 Form Fee	19,230.00	26,530.00	62,690.00	75,710.00	89,480.00	121,440.00	139,670.00	158,970.00	189,480.00
11 Saving Account Interest	3,600.00	19,750.00	59,850.00	73,780.00	88,440.00	115,390.00	169,220.00	234,700.00	323,220.00
12 Advance Clearance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 Incentive by DWSS	225,000.00	187,162.00	135,000.00	0.00	0.00	0.00	0.00	0.00	0.00
14 Pond (Given on Lease)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 Service Fee	128,230.00	132,650.00	208,980.00	252,350.00	298,250.00	202,400.00	232,780.00	264,950.00	315,790.00
16 Gross	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17 Other Commission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2,505,741.00	1,889,423.00	3,870,390.00	3,837,084.00	4,484,376.00	5,679,774.00	6,502,622.00	7,412,362.00	8,768,168.00

Expenditure

Financial Year	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
1 Salary	306,000.00	315,170.00	460,710.00	474,560.00	488,760.00	503,440.00	518,580.00	534,110.00	550,090.00
2 Assignment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 Dress	0.00	0.00	15,000.00	1,000.00	1,000.00	1,000.00	1,000.00	7,500.00	1,000.00
4 Electricity (Power)	361,230.00	498,560.00	1,191,060.00	1,438,220.00	1,701,130.00	2,141,600.00	2,462,650.00	2,803,840.00	3,165,680.00
5 Telephone	0.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
6 Fuel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 Return of Membership	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 House Lend	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 Travelling Allowance	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00
10 Maintenance of Pipeline	5,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
11 Stationary	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	0.00
12 Procurement of Office Goods	50,000.00	160,000.00	150,000.00	51,000.00	51,000.00	51,000.00	160,000.00	51,000.00	51,000.00
13 Medical Facility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14 Medicine	17,520.00	23,360.00	45,630.00	54,750.00	65,700.00	74,830.00	96,360.00	108,410.00	122,460.00
15 Building Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 Extension of Distribution Line	157,200.00	59,700.00	160,000.00	93,200.00	98,800.00	105,600.00	140,000.00	148,500.00	158,000.00
17 Pipe Procurement	100,000.00	110,000.00	110,000.00	110,000.00	110,000.00	120,000.00	120,000.00	120,000.00	120,000.00
18 Water Meter Procurement	333,450.00	126,640.00	254,550.00	148,270.00	179,640.00	192,000.00	203,640.00	243,000.00	258,550.00
19 Printing	10,480.00	13,970.00	20,960.00	24,450.00	27,950.00	31,440.00	34,930.00	38,430.00	41,920.00
20 Magazine	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
21 Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22 Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23 Subsidy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24 Land Procurement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 Loan Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 Interest to Bank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27 Audit Fee	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
28 Transportation	50,000.00	100,000.00	100,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
28 Tariff Discount	12,820.00	17,690.00	52,250.00	63,090.00	74,560.00	101,200.00	116,390.00	132,470.00	157,900.00
29 Maintenance	50,000.00	50,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
30 Ramu Brothers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31 Advance Clearance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 Fuel (Light Oil)	0.00	0.00	709,560.00	709,560.00	709,560.00	709,560.00	709,560.00	709,560.00	709,560.00
Total	1,496,200.00	1,627,590.00	3,522,220.00	3,470,600.00	3,810,600.00	4,334,170.00	4,865,610.00	5,199,320.00	5,637,160.00

Loss/Benefit

Financial Year	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
Loss/Benefit for the Year	1,009,541.00	261,833.00	348,170.00	366,484.00	673,776.00	1,345,604.00	1,637,012.00	2,213,042.00	3,131,008.00

3. Project Evaluation and Recommendation

3 - 1 Project Effect

The implementation of the project will produce effects shown in Table 3-1 on the people live in Dhulabari, Gauradaha and Mangadh.

Table 3-1 Effects Produced by Project Implementation and Improvement Degrees of Current Situation

Current Situation and Issues		Project Measurements	Effects and Improvement Degrees
A : Direct Effect			
Dhulabari	Water supply capacity is not enough to meet population increase.	<ul style="list-style-type: none"> To extend water intake facility to increase water supply capacity to 4,200 m³/day. In accordance with increase of water supply amount raw water transmission, treated water transmission and elevated tank are to be newly constructed. Main distribution pipes will dedicate to strengthen distribution networks. 	<ul style="list-style-type: none"> Current water supply capacity of approx. 700m³/day will increase to 4,200 m³/day in 2014 in accordance with increase of water supply capacity. Current average water supply hour of 8.6 hours will increase to approx. 15 ~ 24 hours. Secure water supply will be achieved.
	Turbidity of water from spring water resource is too high to drink in rainy season.	<ul style="list-style-type: none"> To construct a water treatment plant in order to reduce turbidity of water. 	<ul style="list-style-type: none"> Water quality will be improved by the construction of a water treatment plant.
Gauradaha	Iron concentration of water from existing well is too much to drink.	<ul style="list-style-type: none"> To construct iron removal facility to reduce iron concentration of water. 	<ul style="list-style-type: none"> Water supply quality will improve due to the reduction of iron concentration.
Mangadh	Iron concentration of water from existing well is too much to drink.	<ul style="list-style-type: none"> To construct iron removal facility to reduce iron concentration of water. 	<ul style="list-style-type: none"> Water supply quality will improve due to the reduction of iron concentration.
3 Areas	Water works management and Operation & Maintenance are poorly managed.	<ul style="list-style-type: none"> Implementation of soft components with technical assistance will contribute to improve water works management and operation and maintenance, strengthen organization. 	<ul style="list-style-type: none"> Water works management and operation and maintenance will become managed soundly. The organization of water management will become effectively and capable to manage water management planning and operation & maintenance planning.
B : Indirect Effect			
3 Areas	Due to the lack of safety and sanitation of drinking water water borne diseases spread frequently.	<ul style="list-style-type: none"> To construct water treatment plant and disinfection facilities 	<ul style="list-style-type: none"> Due to the improvement of drinking water quality water borne diseases (such as diarrhea, typhoid) will decrease and people's health will improve.
	Due to the insufficient water supply amount water taking tasks people's life	-	<ul style="list-style-type: none"> Increased and secured water supply will reduce hard work of water taking tasks by women and children.

Among effects and improvement mentioned in Table 3-1 specific details of effects on water quality improvement are as follows.

(1) Water Quality Improvement

Area-wise current issues and effects produced by implementation of the project are shown in Table 3-2.

Table 3-2 Necessity of Improvement of Water Quality of Water Resource and Effect of Improvement

Area	Current Issues	Improvement by Project Implementation
Dhulabari,.	Turbidity of spring water resource in rainy season becomes 220 NTU while heavy raining, and after raining in two hours it becomes 38 NT. The water is not suitable to drink.	Due to the construction of new treatment plant turbidity of the supplied water will be improved below 5 NTU.
Gauradaha	Iron concentration of 2.6 ~ 8.64 mg/L is too high to utilize for drinking.	Iron concentration will be reduced at the level of WHO guidelines requires (below 3 mg/L) and water quality will be improved.
Mangadh	Iron concentration of 2.2 ~ 5.7 mg/L is too high to utilize for drinking.	

3 - 2 Recommendations

To achieve the project effectively and efficiently the recipient country government is required following initial involvements.

- a) Currently each WUSC is managing tariff collection and accounting tasks, however, the management is vulnerable. Even though as things are, if they become competent to plan water works management and operation maintenance sustainable management could be achieved. Therefore to organize appropriate tariff system and to restructure organization eligible to sustainable operation and maintenance and collect necessary tariff and run sound management.
- b) Corresponding to the increasing population appropriate water distribution extension scheme should be implemented to uncovered service areas.
- c) Appropriate regulations for illegal encroachment, solid waste disposal and etc. in surrounding peripheral areas of water resources should be taken to prevent contamination.
- d) After the implementation of the project promotion of new house connection supply should be taken utilizing increased water supply amount.
- e) Requirement for the implementation of the project
 - The Nepalese side takes appropriate actions to arrange budget for the allocated project cost (regarding land acquisition, fence works for the sites of water intake facility and water treatment plant, power supply line works).
 - The Nepalese side takes appropriate actions to arrange regulatory permissions and approvals required

fort construction of project components.

- DWSS, WSSD and WUSC involve in the detailed design and understand the planning contents and try to acquire technical skills.

4. Appendix

4 - 1 Appendix 1 Member of the Team

Name	Position	Organization
Mr. Y. FUKUDA	Team Leader	JICA
Mr. H. FUJIWARA	Chief Consultant/Water Supply Planning	NJS Consultants Co., Ltd.
Mr. K. SAKAEBARA	Hydrology/Water Source Development	
Mr. T. HAMANO	Facility Planning/Design	Nihon Suido Consultants Co., Ltd.
Mr. T. YAGI	Construction Planning/Cost Estimator	NJS Consultants Co., Ltd.
Mr. K. OBARA	Operation & Management Planning	Nihon Suido Consultants Co., Ltd.
Mr. S. ONIKI	Coordinator	NJS Consultants Co., Ltd.

4 - 2 Appendix 2 Itinerary of the Team

No.	Date	Activity	Team Member						
			Fukuda	Fujiwara	Sakaebara	Hamano	Yagi	Obara	Oniki
1	11-June/Sat.	Movement (Narita – Bangkok)							
2	12-June/Sun.	Movement (Bangkok – Kathmandu)							
3	13-June/Mon.	Meeting at JICA Office; Courtesy Call to EOJ; Meeting with MPPW, DWSS & NWSC; Meeting with Local Consultants							
4	14-June/Tue.	Meeting with MPPW, DWSS & NWSC; Meeting with Local Consultants Mr. Yagi's Movement (Narita – Bangkok)							
5	15-June/Wed.	Signing for M/D; Meeting with Local Consultants; Field Survey on Existing Water Supply Facilities at KTM; Mr. Yagi's Movement (Bangkok – Kathmandu)							
6	16-June/Thu.	Movement (Kathmandu – Bhadrapur)							
7	17-June/Fri.	Data Collection, Filed Survey, etc. (Dhulabari)							
8	18-June/Sat.	Mr. Fukuda's Movement (Kathmandu – Bangkok); Team Meeting, Data Filing, etc. (Day Off)							
9	19-June/Sun.	Mr. Fukuda's Movement (Bangkok – Narita); Data Collection, Field Survey, etc. (Dhulabari)							
10	20-June/Mon.	Data Collection, Field Survey, etc. (Dhulabari)							
11	21-June/Tue.	Data Collection, Field Survey, etc. (Dhulabari); Mr. Obara's Movement (Narita – Bangkok)							
12	22-June/Wed.	Data Collection, Field Survey, etc. (Dhulabari); Mr. Obara's Movement (Bangkok – Kathmandu)							
13	23-June/Thu.	Data Collection, Field Survey, etc. (Gauradaha); Mr. Obara's Movement (Kathmandu – Bhadrapur)							
14	24-June/Fri.	Data Collection, Field Survey, etc. (Gauradaha, Dhulabari)							
15	25-June/Sat.	Team Meeting, Data Filing, etc. (Day Off)							
16	26-June/Sun.	Data Collection, Field Survey, etc. (Gauradaha, Dhulabari)							
17	27-June/Mon.	-ditto-							
18	28-June/Tue.	-ditto-							
19	29-June/Wed.	Movement (Bhadrapur – Kathmandu)							
20	30-June/Thu.	Movement (Kathmandu – Biratnagar)							
21	1-July/Fri.	Data Collection, Field Survey, etc. (Mangadh)							
22	2-July/Sat.	Team Meeting, Data Filing, etc. (Day Off)							
23	3-July/Sun.	Data Collection, Field Survey, etc. (Mangadh)							
24	4-July/Mon.	Data Collection, Field Survey, etc. (Mangadh); Mr. Yagi's Movement (Bhadrapur – Kathmandu)							
25	5-July/Tue.	Movement (Biratnagar – Kathmandu); Mr. Yagi's Movement (Kathmandu – Kolkata)							
26	6-July/Wed.	Meeting with MPPW, DWSS & NWSC							
27	7-July/Thu.	Team Meeting, Preparation of Report, etc. (Day Off); Mr. Yagi's Movement (Kolkata – Kathmandu)							
28	8-July/Fri.	Report to JICA/EOJ; Meeting with MPPW, DWSS & NWSC							
29	9-July/Sat.	Movement (Kathmandu – Bangkok)							
30	10-July/Sun.	Movement (Bangkok – Narita)							
31	11-July/Mon.	Data Collection etc. (Mr. Yagi)							
32	12-July/Thu.	Mr. Yagi's Movement (Kathmandu – Bangkok)							
33	13-July/Fri.	Mr. Yagi's Movement (Bangkok – Narita)							

Remarks: EOJ: Embassy of Japan, M/D: Minutes of Discussion

No.	Date	Activity	Team Member		
			Fukuda	Fujiwara	Hamano
1	11-Sep/Sun.	Movement (Narita – Bangkok)			
2	12-Sep/Mon.	Movement (Bangkok – Kathmandu) Meeting at JICA Office			
3	13-Sep/Tue.	Meeting at EOJ Meeting at MPPW/DWSS/WSSDO/WUSC			
4	14-Sep/Wed.	Meeting at MPPW/DWSS/WSSDO/WUSC			
5	15-Sep/Thu.	Signing on M/D			
6	16-Sep/Fri.	Movement (Kathmandu – Birganj)			

Remarks: EOJ: Embassy of Japan, MPPW: Ministry of Physical Planning and Works, DWSS: Department of Water Supply and Sewerage, WSSDO: Water Supply and Sanitation Division Office, WUSC: Water Use and Sanitation Committee, M/D: Minutes of Discussion

4 - 3 Appendix 3 List of parties concerned in the recipient country

1. Ministry of Physical Planning & Works (MOPPW)

- | | | |
|----|-------------------------|----------------------|
| 1) | Mr. Janak Raj Joshi | Secretary |
| 2) | Mr. P.D. Shrestha | Joint Secretary |
| 3) | Mr. Madan Maleku | Joint Secretary |
| 4) | Mr. T.L.Yadan | Joint Secretary |
| 5) | Mr. V.R.Yami | Undersecretary |
| 6) | Mr. R.R.Kenfle | V.Secretary |
| 7) | Mr. I.P.Paudyal | Senior Div. Engineer |
| 8) | Mr. Bishnu Bahadur G.C. | Section Officer |
| 9) | Mr. H. Ishihara | JICA Expert |

2. Department of Water Supply and Sewerage (DWSS)

- | | | |
|----|-------------------------|-------------------------|
| 1) | Mr. Hari Ram Koirala | Director General |
| 2) | Mr. Raj Kumar Malla | Deputy Director General |
| 3) | Mr. Ishwar Man Tamrakar | Deputy Director General |

3. Nepal Water Supply Corporation (NWSC)

- | | | |
|----|---------------------------|---------|
| 1) | Mr. Narendra M.Pradhan | DGM |
| 2) | Mr. Gyanesh N.Bajracharya | Manager |

4. Water Supply and Sanitation Division Office, Jhapa (WSSDO, Jhapa)

- | | | |
|----|-----------------------|----------------|
| 1) | Mr. Janak K. Adhikari | Division Chief |
| 2) | Mr. D.K.Keshri | Engineer |
| 3) | Mr. Sushil Karna | Overseer |

5. Water Supply and Sanitation Division Office, Morang (WSSDO, Morang)

- | | | |
|----|-------------------------|----------------|
| 1) | Mr. Manoj Ghimire | Division Chief |
| 2) | Mr. Ram Chandra Kafle | Engineer |
| 3) | Mr. Surat Lal Chaudhary | Overseer |

6. Dhulabari Water Useres and Sanitation Committee (Dhulabari, WUSC)

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|----|-----------------------|----------|
| 1) | Mr. Mani Kumar Uprety | Chairman |
|----|-----------------------|----------|

7. Gauradaha Water Useres and Sanitation Committee (Gauradaha, WUSC)

- | | | |
|----|-----------------|----------|
| 1) | Mr. Pador Deher | Chairman |
|----|-----------------|----------|

8. Mangadh Water Useres and Sanitation Committee (Mangadh, WUSC)

1) Mr.Ram Bahadur Ghimire Chairman

9. Jhapa District Administration Office

1) Mr.Prem Narayan Sharma Assistant Chief District Officer

10. Embassy of Japan

1) Takeshi Osaka First Secretary

11. JICA Nepal Office

1) Mr. S. YOSHIURA Resident Representative

2) Mr. F. IMAI Deputy Resident Representative

3) Mr. K. UMETSU Assistant Resident Representative

4) Ms. S. TOKUDA Assistant Resident Representative

5) Mr. Sourab Rana Program Officer