3. SOP Activity

3.1 Action Plan for SOP Activity

SHARKIA POTABLE WATER
AND SANITATION COMPANY
(SHAPWASCO)

JAPAN INTERNATIONAL
COOPERATION AGENCY
(JICA)

THE PROJECT
FOR
IMPROVEMENT OF MANAGEMENT CAPACITY
OF
OPERATION AND MAINTENANCE FOR SHAPWASCO
IN THE ARAB REPUBLIC OF EGYPT

Action Plan for SOP Activity

March 2007

Project Team
SHARKIA POTABLE WATER
AND SANITATION COMPANY
(SHAPWASCO)

Action Plan for SOP Activity

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Abbreviations

SHAPWASCO	Sharkia Potable Water and Sanitation Company
HCWW	Holding Company for Water and Wastewater
NOPWASD	National Organization for Potable Water and Sanitary Drainage
JICA	Japan International Cooperation Agency
WTP	Water Treatment Plant
BPS	Booster Pump Station
Fe/Mn Plant	Fe/Mn Removal Treatment Plant
O&M	Operation and Maintenance
DMZ	District metering zone
SOP's	Standard Operations procedures
WG	Working Group
OJT	On the Job Training

Introduction

In order to develop and establish SOPs for the operation and maintenance of water supply facilities in SHAPWASCO, SOP/HQ Team conducted site surveys with Expert Team from December 2006 to January 2007. For the formulation of Action Plan for SOP Activity, SHAPWASCO organized Taskforce hereunder listed and held a workshop from February 26 to 28, 2007 at Zagazig Head Office. Actions to be taken to achieve the purpose of the project have been discussed actively including the selection of model facilities for the activity and results were compiled as "Draft Action Plan for SOP activity". This draft action plan will be submitted to Technical Committee of the project for approval.

Task-Force for Action Plan formulation

Mr. Amier Rezk Yousseif	Water Department Manager, Head Office
Mr. Nagi Labib Abd El Sayed	Hihya WTP Manager
Mr. Mohamed El Saied Abd El Kader	Kafr Saqr WTP Manager
Mr. Samir Ghareib	Abbasa WTP Manager
Mr. Ibrahim Noufal	El Hussinia WTP Manager
Mr. Mohamed Osama Ahmed	Chemist, Head Office
Mr. Aly El Mosalamy	Well Stations Manger in Zagazig City
Mr. Emam Abd El Mawgoud	Menia Al Qamah Fe/Mn Plant Manager
Mr. Gamal Abd El Hameed Morsi	Well Stations Department, Head Office
Mr. Mohamed El Sayed Abd El Hameed	Bilbais BPS
Mr. Abd El Shafi Abd El Aziz	Head of SOP/HQ team
Mr. Mohamed Mesbah	SOP/HQ team, Data Base

JICA Expert Team

Mr. Masahiro Takeuchi	Chief Advisor/Water Supply Planning
Mr. Masatoshi Seno	Expert/Unaccounted for Water Reduction
Mr. Noboru Saeki	Expert/SOP Activity for Water Supply Facilities
Mr. Keizo Kimura	Expert/SOP Activity for Water Supply Facilities
Mr. Mitsuhito Omori	Coordinator/Hydraulic Analysis for Network
Mr. Mohamed Nagi	Project Facilitator
Mr. Mohamed Sobhy	Expert/Unaccounted for Water Reduction
Mr. Mahmoud Khalaf	Expert/SOP Activity for Water Supply Facilities
Ms. Reem Abd El Rahman	Interpreter

Chapter 1. Current Situation

Existing Facilities

Site surveys on existing water supply facilities of SHAPWASCO were conducted by SOP/HQ Team and expert team and are summarized as attached Annex-4, **"SOP-G-001 List of Water Supply Facilities of SHAPWASCO"** and their categories of the facilities are;

- Water Treatment Plant (WTP)
- Fe/Mn Removal Plant (Fe/Mn)
- Booster Pump Station (BPS)
- Wells
- Laboratories
- Network

Here, conventional type "Compact Unit" is excluded from the target facilities of activities due to the policy that they are to be cancelled according to their plant life. New "Modified Compact Unit", if any, may be included in the activity with full cooperation of plant designer, equipment suppliers and contractor for engineering documents, specifications, manuals and drawings.

Current Issues

Current issues to be addressed in the operation and maintenance of these water supply facilities are considered as follows;

- Facilities of SHAPWASCO are operated and maintained but there is no clear target of O&M seen based on the design or plan of the facilities where there are no comprehensive design documents, system drawings or manuals for the facilities.
- There is no proper recording and reporting system for facility operation and maintenance prepared as standard procedures. Especially measurement and recording system of the basic production volume of the facility shall be unified in SHAPWASCO.
- Regarding water quality control system there is an uniform recording and reporting system from SHAPWASCO to Holding Company but an effective recording and reporting system inside SHAPWASCO covering whole SHAPWASCO water supply facilities shall be reviewed and improved as required.
- Handing over from NOPWASD operation to SHAPWASCO are expected soon and establishment of organization with the trained staff is urgently required for the autonomous O&M by SHAPWASCO.
- Shortage of staff is claimed from some facilities while aging rate of the O&M staffs of SHAPWASCO is high.
- Performance Indicators appeared in the Quarterly Report are not based on accurate O&M data.

2. Project Purpose and Outputs

Management capacity of operation and maintenance of water supply facilities is improved.

Operation and maintenance capacity of water supply facilities is strengthened through development of SOP's and O&M Plans.

3. Organization of SOP Activities

For the implementation of the project, a project team headed by Chairman was organized in SHAPWASCO with counterpart members to Japanese Experts.

For the SOP activities, SOP/HQ Team headed by Eng. Shafi has been organized in Zagazig headquarter and started actual condition survey on existing facilities.

In the first stage of SOP activities, model facilities will be selected and SOP teams organized inside the facilities shall play the main role with specific working groups (WG).

There are two special SOP activities agreed as "Water Quality Control System" and "Well Monitoring". During these activities, two special purpose SOP teams will be organized separately.

In the second stage of expanding the activities to whole SHAPWASCO facilities, each one SOP team shall be organized at each facilitu and Branch.

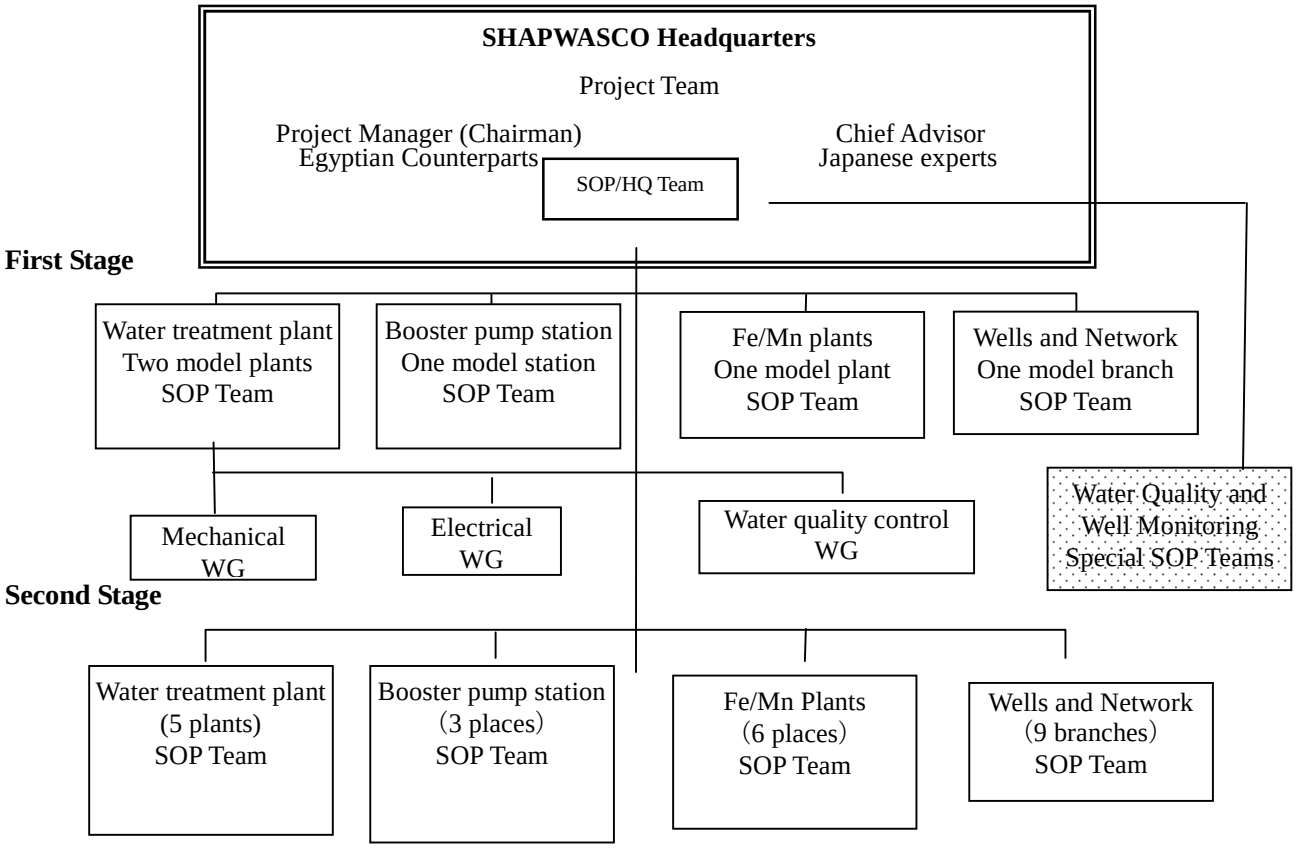

Figure-1 Organizational Structure for SOP Team

SOP Team at Abassa Model WTP (preliminary)

1. Manager of the Plant
2. Mechanical Engineer
3. Electrical Engineer
4. Laboratory Manager
5. Member, SOP/HQ Team
6. Representative of Zagazig WTP
7. Representative of Huseinia WTP
8. Representative of Old Faqus WTP

SOP Team at Zeraa Model Well Sataion (preliminary)

1. Manager of Well Stations, Zagazig City Branch
2. Well Station Manager
3. Mechanical Supervisor
4. Electrical Supervisor
5. Mechanical Engineer, SOP/HQ Team
6. Electrical Engineer, SOP/HQ Team
7. Chemist, SOP/HQ Team
8. Representative of BilBais Branch
9. Representative of Ibrahimiya Branch
10. Representative of Zagazig Branch

Figure-2 Anticipated Members of SOP Teams

4. Method and Timeframe of SOP and O&M Plan Preparation

Model facilities

As a methodology of establishing SOP and Operation Plan and Maintenance Plan of each facility, staged developing method will be taken. Models of each facility-category were selected carefully considering the situations and features of the facilities as listed. Effort of activity will be concentrated to the model facilities and after the completion of these, knowledge and experiences will be extended over to the remaining facilities. Representatives of the remaining facilities shall participate in the activities of relevant model facilities.

Model facilities in case of WTP, Abassa and New Faqus WTPs were selected due to the reasons of each WTP having two different representing sedimentation processes. Other model facilities are Kafr Farag Fe/Mn Plant, Bilbais BPS, and Zeraa Well Station. (refer the attached **Annex-3, Selection of Model Facilities for SOP Activities**).

- Abassa WTP/Laboratory, Abu Hamad Markaz
- New Faqus WTP, Faqus Markaz
- Kafr Farag Fe/Mn Plant, Minea Al Qamah Markaz
- Bilbais BPS. Bilbais Markaz
- Zeraa Well Station, Zagazig City
- Network in Hihya for Distribution Control and Hydraulic Analysis

Timeframe

Operation Plan and Maintenance Plans of facilities may be formulated at the last stage of the project when component equipment of the facilities concerned will be examined, all the SOP documents of the equipment will be prepared and therefore any obstacle or conditions will be clarified for these future plans .

5. Contents of Actions

Targets

Considering the current issues and project purpose and expected outputs, targets of the activities to be adopted in the project are establishment of the following items;

- Preparation of basic system drawings
- Preparation of unified forms of O&M records and reports
- Development of SOP for Model Facilities
- Water Distribution Control in the Network
- O&M applying the SOPs
- Preparation of O&M Plans
- Development of Water Quality Control System
- Development of Well Monitoring

Actions

Action-1 Preparation of basic system drawings

For the first step of the activities, system drawings of the facilities shall be prepared while some of them are already available in some facilities and they are;

- Overview of the facility
- Layout
- Flowchart
- Schematic hydraulic drawings
- P&ID
- Electrical oneline diagram

Practical method of preparation shall be considered in the activities. For example, basic technical information will be collected at sites through the brainstorming between engineers of facilities and HQ and drawings/technical information are prepared in digital form by the specialist in HQ.

- Survey

- Collection of existing documents (manual, specifications design documents etc.)
- Confirmation of design capacities, figures and specifications of equipment

Action-2 Preparation of unified forms of O&M records and reports

Unified form of O&M records and reports shall be carefully prepared for each kind of facility with the standardization of calculation method of production or transmission volume of water or other record items..

- Examination of current systems
- Clarification/determination of recording purposes
  - Production volume of WTP, Fe/Mn, and Wells
  - Consumption volume at each Markaz
  - Production cost of WTP, Fe/Mn, and Wells
- Items and extent of record/report
- Method of measurements
  - Permanent measurement
  - Calibration measurement
  - Alternative method of measurement for record such as operation period/hours

Action-3 Measurement/records of Intake and Production Water Volume at Seven WTPs

For the water supply management of SHAPWACO, grasping the production and transmission water volume from the major WTPs is quite important. In this project actual improvement of measurement/record of raw water intake and production and transmission water volume at seven WTPs are to be practiced including repair and new installation of bulk flow meters. Numbers of flow meters for each WTP are determined considering the intake conditions and inter-Markaz transmission from the WTP concerned. Required repair and new installation at each WTP are summarized in the table below and proposed locations of measurement at WTPs and points of Markaz/ City transmission are shown in Attached **Annex – 7**.

Records of measurements shall be reported to Headquarter according to the unified form prepared in the above action plan and summarized in actual production/consumption volume of each Markaz as well as the well water production.

Table-1 Bulk Flow Meter Installation for Raw Water Intake and Transmission Pipes

Water Treatment Plant (WTP)	Intake Side	Transmission Side
Zagazig WTP	2(1)	3(1)
Abassa WTP	2(2)	10(2)
Kafr Saqr WTP	1	2
New Faqus WTP	0	1
Old Faqus WTP	1	1
Huseiniya WTP	1	3
Hihya WTP	0	0
Total	7(3)	20(3)

Note; Figures in ( ) show number of flow meters to be repaired and for Hihya WTP, flow meters are already installed.

Action-4 Development of SOPs for Model Facilities

SOP of the facilities can be prepared based on the basic system drawings established in Action-1 and by the following steps;

- To breakdown into the component equipment (as the example of WTP shown below)
- Determination of the SOP activities considering the horizontal collaboration of three areas (as the anticipated SOPs of WTP, BPS, Fe/Mn and Well facilities shown in matrix form of attached **Annex-1 Preliminary List of SOPs**)
  - Operation
  - Maintenance
  - Water Quality Control
- Preparation of SOP documents describing;
  - Clarifying the system
  - Required operation steps detailed as possible
  - Required judgments in normal and contingency conditions of O&M
  - Utilizing pictures and sketches
- Assessment of required staff and qualification of O&M and quality control works for each component equipment

Example of Component Equipment of WTP

WTP1	Raw water intake
WTP2	Raw water pump
WTP3	Receiving well
WTP4	Flocculation basin
WTP5	Sedimentation basin
WTP6	Sludge collector
WTP7	Sludge drainage
WTP8	Rapid sand filter
WTP9	Filter washing facility
WTP10	Clear water reservoir
WTP11	Alum dosing facility
WTP12	Chlorination facility
WTP13	Transmission pump
WTP14	Drainage facility
WTP15	Piping & valve
WTP16	Instrumentation
WTP17	Electrical power supply
WTP18	Diesel generator
WTP19	Crane facility
WTP20	Laboratory

Consecutively to the activities in the model facilities, SOPs in the remaining facilities shall be prepared, utilizing the documents of models, by the representatives of the facilities who participated in the preparation of SOPS in model facilities.

Action-5 SOP activities for Water Distribution Control in the Network

Maintenance capacity of the piping of the network is developed specially through the UFW reduction activities and therefore water distribution control is considered as SOP activities for the network. The flow rate within the supply area including the areas covered by well water shall be desirably managed by the production and distribution management department at the branch. The distribution management capacity at the branch will be able to be improved based on the basic water supply data measured for each water distribution area/block.

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A-5-1 Pilot Project for Distribution Control in Small Areas

As a capacity development of water distribution management, practice of the distribution control in a pilot area is recommended with installation of area flow meters and measurements of actual water supply and consumptions to manage flows in small areas after main branch such as villages and communities. For the pilot area of this activity, Hihya Markaz is regarded as an optimal model area because Hihya Water Treatment Plant and the distribution network in the area has been developed recently according to the ”Three-Markaz Master Plan in Hihya, Ibrahimiya and Diarb Nigm”. Water distribution plan to the inside small areas are clear in the Master Plan and actual water supply and difference from the plan can be easily examined.

In the case of Hihya area, installations at the four locations (A to D) shown in the map below are considered, whereby the volume of distributed water in the three Areas can be confirmed. Further, in order to ascertain the water volume supplied from or taken to Zagazig City to Hihya Markaz, an additional one location (E) shall be chosen, totaling up to five locations. The installation locations of flow meters shall be determined by discussion with the Hihya branch office and SOP/HQ Team.

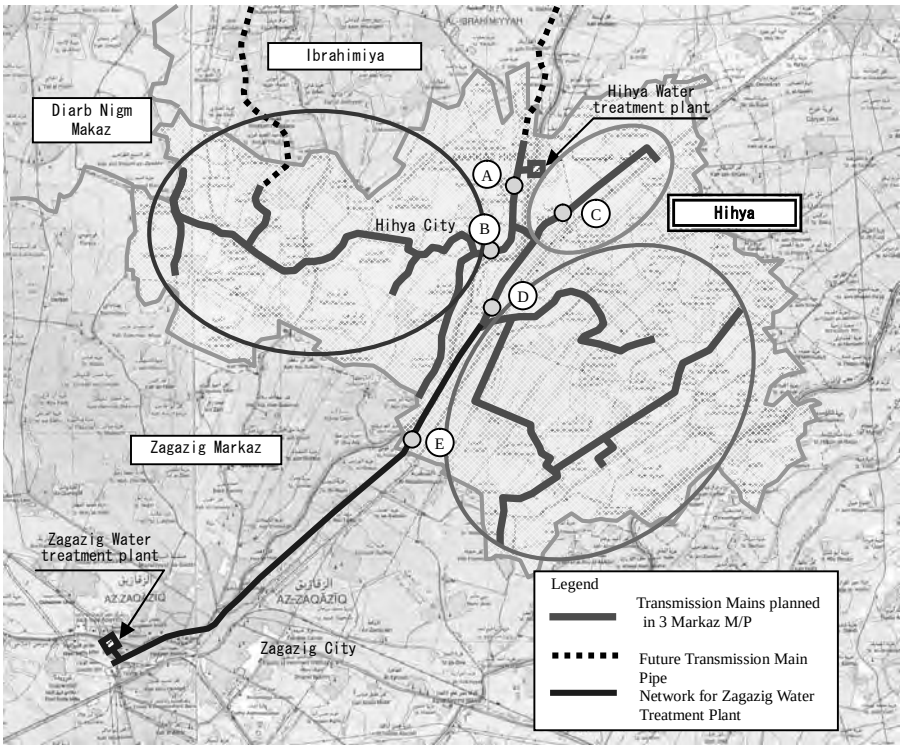


Figure-3 Proposed Distribution Control Pilot Project in Hihya Markaz

A-5-2 Hydraulic analysis of water supply and distribution network (mains) and examination on current situation and required modification for the future demand increase

By conducting a hydraulic analysis of the water supply and distribution mains in the network concerned, the current situation whether there is any area where target pressure of water supply service at consumers are not satisfied or whether there is any abnormal pressure area and remedial measures, such as increasing pipe diameter, new booster pumping equipment etc for the future demand increase. For the water supply management, efficiency of water distribution and adequate district metering zone (DMZ) can be examined.

A series of hydraulic analysis/works in Zagazig City and Hihya Markaza are proposed in the project and they include preparation of water distribution network maps, preparation for piping and flow rates data and hydraulic analysis by "WaterCAD".

Application to the overall SHAPWASCO networks can be planed and executed by SHAPWASCO staff after the trial analysis and technology transfer at the selected area.

More specifically, the analysis and training by expert shall simultaneously be carried out according to the steps in Table .

Table-2 Procedures for Hydraulic Analysis

Item	Contents
(1) Selection of the trial analysis area	Considering importance of the network, and availability of the technical information, Zagazig City and Hihya Markaz are proposed.
(2) Confirmation of analysis conditions	・Preparation of water distribution network drawings ・Confirmation of transmitted water volume and other information from water treatment plant and wells
(3) Analysis of actual situation	Confirmation of the current situation of water distribution
(4) Examination of water optimal distribution block	Proposing effective water allocation and appropriate district-meeting-zone（DMZ）plan including examination on optimum pipe diameters and necessity for new reservoir
(5) Verification of distribution block	Checking the appropriateness of the analysis in accordance with the data for existing district-metering-zone

(6) Application Planning to the overall SHAPWASCO networks	Identifying the applicable areas, examining priorities and setting implementation schedule

Action-6 O&M applying the SOP

Once the SOPs will be prepared, they shall be applied in the actual O&M and examined their applicability. Any defect shall be modified and monitored.

In the actual application of SOP, prior training using text books and SOP documents and On the Job Training (OJT) to the operators concerned shall be conducted by the members of SOP/HQ, SOP/MF teams and Experts.

Action-7 Development of SOPs for the Remaining Facilities

Consecutive to the activities in the model facilities, SOP teams for the remaining facilities shall be organized featuring representatives of the facilities who participated in the preparation of SOPs in model facilities. SOPs in the remaining facilities shall be prepared with assistance of SOP/HQ, utilizing the documents prepared in model facilities.

Action-8 Preparation of O&M Plan

For the last step of the project, Operation Plan and Maintenance Plan shall be prepared for each facility based on the results/experiences of the SOP activities which may include;

Operation Plan

- Targets of operation
  - Improvement of operation efficiency
  - Production volume
  - Water quality
  - Cost reduction
- Training of operators
- Chemical dosage and consumptions

Maintenance Plan

- Targets of maintenance
  - Minimum shutdown period for maintenance
  - Labor Cost

- Spare parts and Consumable Cost

- Preventive maintenance plan
- Future maintenance/replacement plan of each equipment
- Future Quality Control plan
- Training

Action-9 Development of Water Quality Control System

Under the project, SHAPWASCO is expected to establish the water quality control system and prepare a manual for water quality control with the support by the Japanese expert.

As a part of actual condition survey in Phase-1 activities, a preliminary survey of two laboratories were conducted at Zagazig and Abassa WTPs and small analysis rooms belonging to the water supply facilities and it was found that significant difference in the capability between the two said WTPs and the others. Water quality control system integrating the full capacity shall be considered including the concept of "Central laboratory".

In Phase-2 and 3, the project supports with dispatching an expert of water quality control and assist SHAPWASCO SOP Teams.

Figure shows the proposed work flow for establishing the water quality control system.

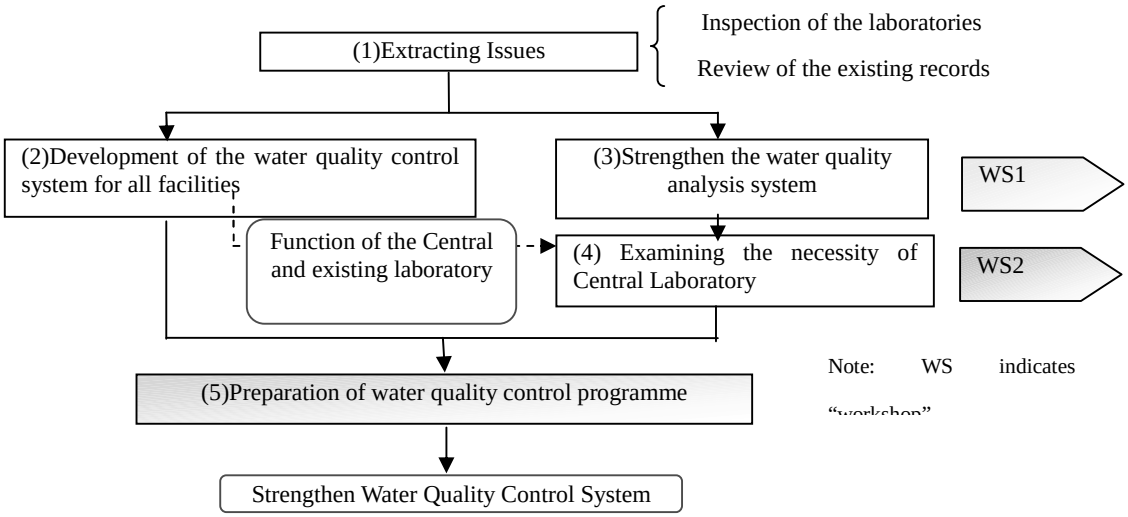


Figure-4 Work flow for strengthening the water quality control system

(1) Extracting issues regarding water quality control

The current laboratory practice and the existing data shall be reviewed for identifying the

problems regarding water quality control in the laboratories of SHAPWASCO. The gap analysis will also be undertaken between the current procedures and analytical items vs. the latest edition of WHO guidelines for drinking water quality. The analysis will clarify what SHAPWASCO can do now and what SHAPWASCO has to do for providing the customers with safe water under several constraints.

(2) Strengthening of the Water Quality Control System

It is expected for the strengthening the water quality control system of SHAPWASCO;

Locally

1) to establish a channel with operating sections of water treatment plants to share water quality/analysis data with them and to receive feed-back,
2) to establish a communication channel with branch offices for emergencies such as accident/abnormal water quality,
3) to clarify the responsibility for water quality control at each stage of treatment process,

Whole SHAPWASCO

1) to activate a system for assuring daily water quality analysis (raw water and treated water) of all water supply facilities,
2) to establish a system for providing technical assistance regarding water quality, and operation of all water supply facilities,
3) to review the current system for recording, reporting and compiling water quality information in HQ as a part of Management Information System
4) to establish for quick response to any claims from the customers
5) to activate public awareness for water service and environmental conservation.

(3) Strengthening the capacity of water quality analysis

Reviewing the existing unified manual/SOP for analytical procedures by HC and application practices in SHAPWASCO, improvement or modification will be done if necessary.

(4) Central Laboratory

Central Laboratory for establishing the water quality control system of SHAPWASCO may be considered fulfilling the requirements of local water supply facilities by either independent or strengthening the existing laboratory of Zagazig or Abassa. The Japanese expert will advise SHAPWASCO on the establishment of the Central Laboratory.

Action-10 Well Monitoring

Groundwater quality deterioration and drawdown of the groundwater table have been discussed in the well water supply management of SHAPWASCO. For the first step of addressing to these issues, development of a "groundwater monitoring system" and its practice are essential.

As a part of actual condition survey in Phase-1 activities, a base inventory of all the approx. 300 wells registered by SHAPWASCO was prepared in one city and ten Markaz branches, except three Markazes, namely, Huseinia, Kafr Saqr and Awlad Saqr Markazs, where underground water is not used today and it includes;

- Name of well field, code number, Markaz
- Number of wells used and not in service
- Location (GPS coordinate information)
- Pump specification

In Phase-2 and 3, the project supports with dispatching an expert of hydrogeology for the practice of the monitoring starting preparation of full scale well inventory and data collection in the field. Well monitoring shall take place targeting all the wells of SHAPWASCO.

The purposes of the monitoring are to grasp;

(i) Specifications of the each well; i.e. location and elevation, depth of well, diameter and material of casing and screen, aquifer used, water table, safe yield capacity, current production, pumping equipment
(ii) Change in the groundwater level
(iii) Change in water quality, mainly salinization of groundwater in the northern area and iron and manganese contents in the southern area

Based on the results of the well monitoring in the Project, four locations will be selected as effective survey points for constructing a future monitoring system and level recorders provided in the Project will be installed

The Japanese expert will advise SHAPWASCO on the groundwater resource development in Sharquiya according to the information obtained through well monitoring activity.

- Well developing areas
- Well Specification (aquifer, depth)

Table-3 summarizes items for well and groundwater monitoring.

Table-3 Contents of Well Monitoring

Method	Purpose	Subject and Analysis Items
Data collection and interview survey	・Confirmation of specifications of existing wells ・Confirmation of the concerned aquifer	Collection and sorting-out of well profiles Preparation of well inventory
Measurement at well	Monitoring of groundwater level fluctuation	Measurement of groundwater level by water level gauge Preparation of groundwater contour map of main aquifers
	Monitoring of groundwater quality	[General items] Water temperature, pH, Turbidity, Electric Conductivity (items regarding saltwater intrusion), DO Preparation of groundwater conductivity or TDS, Fe and Mn contour map according to the results of well monitoring by SHAPWASCO
Water sampling and Analysis at laboratory	Monitoring of groundwater quality	**[Items of general water quality analysis]** Total Hardness, Iron, Manganese, Sulfate Ion, Chlorine Ion, Alkalinity **[Items of water quality analysis regarding human contamination]** Coliform group, Ammonia, Nitrite-Nitrogen, Nitrate-Nitrogen **[Items of water quality analysis regarding saltwater intrusion]** Total Dissolved Solid

6. Monitoring

In management improvement activity through HC, it is encouraged to calculate performance indicators from the standpoints of evaluation of progress of improvement. The indicators are set forth in four different areas, namely costs, finance, sales management, and technology, to be quarterly reported. Although cost and technical indicators are to be used to measure improvement effects by the SOP activities regarding facility operation and maintenance, in order to clarify and simplify the actual situation of the activities, it is necessary to consider additional indicators during the project period as follows;

- Number of manuals and SOPs for operation and maintenance activities
- Calculation of Actions achieved
- Improvement of facility operation rates
- Calculation of labor amount that only the personnel assigned to the works included in SOPs and does not cover all the personnel engaged in running the entire facility.

7. Implementation of Actions

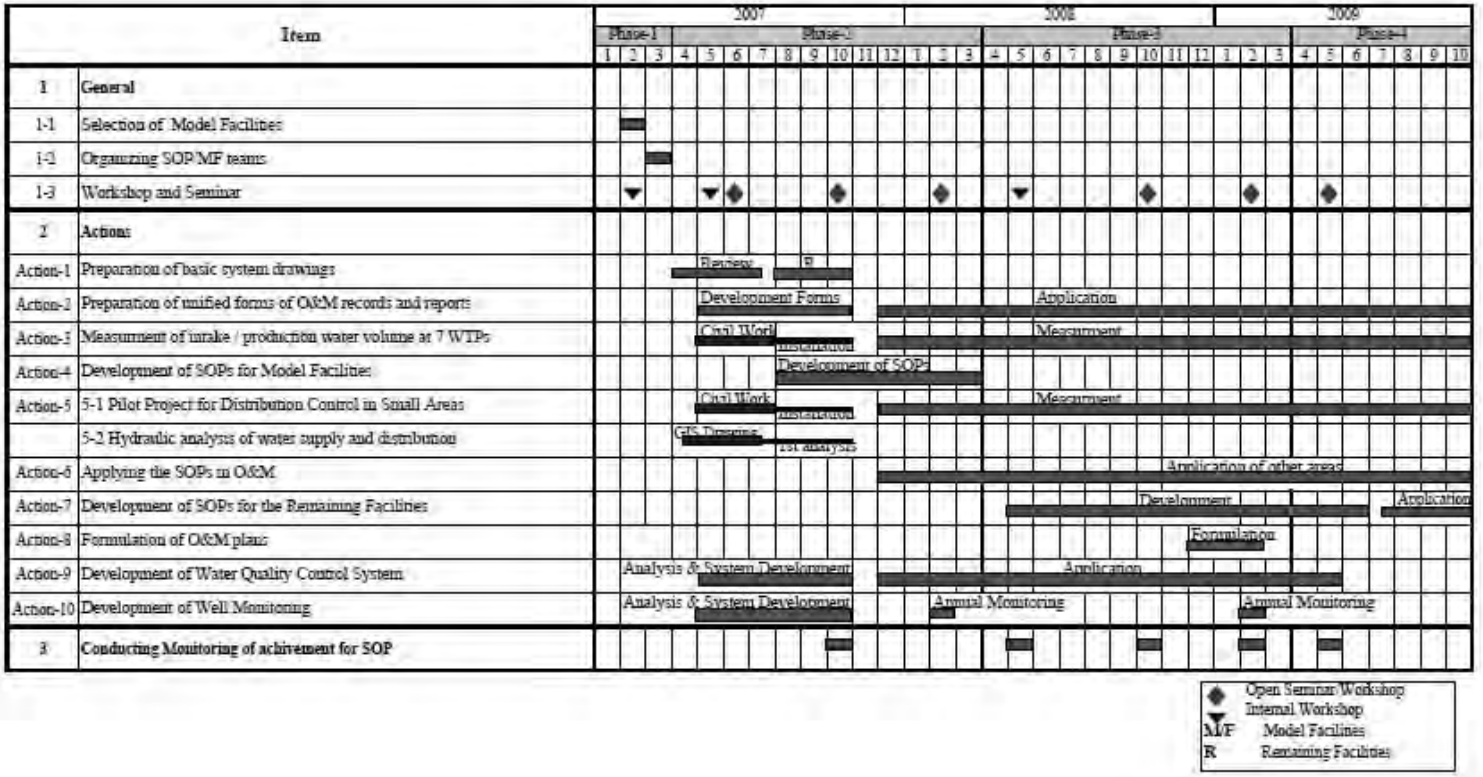
Implementation schedule of the above ten actions is as Figure-5 and may be modified according to the progress if necessary. Basic mile stones are as follows:

Development of SOPs in model facilities: **to March 2008**

Extension of the activities to the remaining facilities: **from April 2008**

Monitoring of the Activities: **from April 2009**

Implementation Schedule for SOP activity



Annex-1(WTP)

List of SOPs (Preliminary list in case of WTP)

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WTP1	Raw water intake		screen, gate, basin		screen, gate, basin	WTP1-LB-01	Monitoring & record
		WTP1-0P-01	Monitoring & record	WTP1-MT-01	Periodical inspection		・raw water quality
			・water level	WTP1-MT-02	Change of oil & grease	WTP1-LB-02	Emergency action
			・removal of waste	WTP1-MT-03	Periodical change of parts	WTP1-LB-03	Trouble shooting
		WTP1-0P-02	Control of gate opening	WTP1-MT-04	Record & report	WTP1-LB-04	Required staff and qualifications
		WTP1-0P-03	Emergency action	WTP1-MT-05	Emergency action		
		WTP1-0P-04	Trouble shooting	WTP1-MT-06	Trouble shooting		
		WTP1-0P-05	Required staff and qualifications	WTP1-MT-07	Required staff and qualifications		
WTP2	Raw water pump/motor	WTP2-0P-01	Start up & Shut down		pump, motor, flow rater, primary pump, basin		
		WTP2-0P-02	Control of flow rate				
		WTP2-0P-03	Monitoring & record	WTP2-MT-01	Periodical inspection		
			・discharge volume	WTP2-MT-02	Change of oil & grease		
			・discharge pressure	WTP2-MT-03	Periodical change of parts		
			・temperature, etc.	WTP2-MT-04	Record & report		
		WTP2-0P-04	Emergency action	WTP2-MT-05	Emergency action		
		WTP2-0P-05	Trouble shooting	WTP2-MT-06	Trouble shooting		
		WTP2-0P-06	Required staff and qualifications	WTP2-MT-07	Required staff and qualifications		
WTP3	Receiving well		Flush mixer		Flush mixer	WTP2-LB-01	Monitoring & record
		WTP3-0P-01	Monitoring & record	WTP3-MT-01	Periodical inspection		・raw water quality
			・driving condition of mixer	WTP3-MT-02	Change of oil & grease		(in case that intake is far from WTP)
				WTP3-MT-03	Periodical change of parts		
		WTP3-0P-02	Emergency action	WTP3-MT-04	Record & report	WTP2-LB-02	Emergency action
		WTP3-0P-03	Trouble shooting	WTP3-MT-05	Emergency action	WTP2-LB-03	Trouble shooting
		WTP3-0P-04	Required staff and qualifications	WTP3-MT-06	Trouble shooting	WTP2-LB-04	Required staff and qualifications
				WTP3-MT-07	Required staff and qualifications		
WTP4	Flocculation basin		Flocculator		Flocculator & basin	WTP4-LB-01	Monitoring & record
		WTP4-0P-01	Start up & Shut down	WTP4-MT-01	Periodical inspection		・coagulation condition
		WTP4-0P-02	Control of rotation number	WTP4-MT-02	Change of oil & grease		・coagulate water quality
		WTP4-0P-03	Monitoring & record	WTP4-MT-03	Periodical change of parts	WTP4-LB-02	Emergency action
			・driving condition of flocculator	WTP4-MT-04	Periodical clean up	WTP4-LB-03	Trouble shooting
				WTP4-MT-05	Record & report	WTP4-LB-04	Required staff and qualifications
			・coagulation condition	WTP4-MT-06	Emergency action		
		WTP4-0P-04	Emergency action	WTP4-MT-07	Trouble shooting		
		WTP4-0P-05	Trouble shooting	WTP4-MT-08	Required staff and qualifications		
		WTP4-0P-06	Required staff and qualifications				
WTP5	Sedimentation basin			WTP5-MT-01	Periodical inspection	WTP5-LB-01	Monitoring & record
				WTP5-MT-02	Periodical clean up		・outlet water quality
				WTP5-MT-03	Record & report	WTP5-LB-02	Emergency action
				WTP5-MT-04	Emergency action	WTP5-LB-03	Trouble shooting
				WTP5-MT-05	Trouble shooting	WTP5-LB-04	Required staff and qualifications
				WTP5-MT-06	Required staff and qualifications		

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WTP6	Sludge collector	WTP6-0P-01	Start up & Shut down	WTP6-MT-01	Periodical inspection		
		WTP6-0P-02	Monitoring & record	WTP6-MT-02	Change of oil & grease		
		WTP6-0P-03	Emergency action	WTP6-MT-03	Periodical change of parts		
		WTP6-0P-04	Trouble shooting	WTP6-MT-04	Periodical clean up		
		WTP6-0P-05	Required staff and qualifications	WTP6-MT-05	Record & report		
				WTP6-MT-06	Emergency action		
				WTP6-MT-07	Trouble shooting		
				WTP6-MT-08	Required staff and qualifications		
WTP7	Sludge drainage	WTP7-0P-01	Start up & Shut down		drainage pump,		
		WTP7-0P-02	Monitoring & record		drainage valve		
		WTP7-0P-03	Emergency action	WTP7-MT-01	Periodical inspection		
		WTP7-0P-04	Trouble shooting	WTP7-MT-02	Change of oil & grease		
		WTP7-0P-05	Required staff and qualifications	WTP7-MT-03	Periodical change of parts		
				WTP7-MT-04	Periodical clean up		
				WTP7-MT-05	Record & report		
				WTP7-MT-06	Emergency action		
				WTP7-MT-07	Trouble shooting		
				WTP7-MT-08	Required staff and qualifications		
WTP8	Rapid sand filter		filter basin, filter media		filter basin, filter media	WTP8-LB-01	Monitoring & record
		WTP8-0P-01	Start up & Shut down	WTP8-MT-01	Periodical inspection		・inlet water quality
		WTP8-0P-02	Washing of filter media	WTP8-MT-02	Periodical change of parts		・filtered water quality
		WTP8-0P-03	Monitoring & record	WTP8-MT-03	Periodical clean up		・waste water turbidity
			・loss head	WTP8-MT-04	Record & report	WTP8-LB-02	Emergency action
			・wash water volume	WTP8-MT-05	Emergency action	WTP8-LB-03	Trouble shooting
			・wash water pressure	WTP8-MT-06	Trouble shooting	WTP8-LB-04	Required staff and qualifications
			・wash time, etc.	WTP8-MT-07	Required staff and qualifications		
		WTP8-0P-04	Emergency action				
		WTP8-0P-05	Trouble shooting				
		WTP8-0P-06	Required staff and qualifications				
WTP9	Filter washing facility		back wash pump, blower		back wash pump, blower		
		WTP9-0P-01	Start up & Shut down	WTP8-MT-01	Periodical inspection		
		WTP9-0P-02	Control of flow rate	WTP8-MT-02	Change of oil & grease		
		WTP9-0P-03	Monitoring & record	WTP8-MT-03	Periodical change of parts		
			・discharge volume	WTP8-MT-04	Periodical clean up		
			・discharge pressure	WTP8-MT-05	Record & report		
			・temperature, etc.	WTP8-MT-06	Emergency action		
		WTP9-0P-04	Emergency action	WTP8-MT-07	Trouble shooting		
		WTP9-0P-05	Trouble shooting	WTP8-MT-08	Required staff and qualifications		
		WTP9-0P-06	Required staff and qualifications				

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WTP10	Clear water reservoir		reservoir, valves WTP10-0P-01 Valve operation ・open & close ・control of opening WTP10-0P-02 Monitoring & record ・water level ・valve opening condition ・no breaking or deterioration, etc. WTP10-0P-03 Emergency action WTP10-0P-04 Trouble shooting WTP10-0P-05 Required staff and qualifications	WTP10-MT-01 WTP10-MT-02 WTP10-MT-03 WTP10-MT-04 WTP10-MT-05 WTP10-MT-06	Periodical inspection Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications	WTP10-LB-01 WTP10-LB-02 WTP10-LB-03 WTP10-LB-04	Monitoring & record residual chlorine of ・inlet water quality ・outlet water quality Emergency action Trouble shooting Required staff and qualifications
WTP11	Alum dosing facility		solution tank, dosing device, agitator, etc. WTP11-0P-01 Making of solution WTP11-0P-02 Start up & shut down of dosing WTP11-0P-03 Control of dosing rate WTP11-0P-04 Monitoring & record ・dosing rate ・storage of alum quantity ・solution level (alum consumption volume) ・condition of dosing device ・dosing pressure, etc WTP11-0P-05 Emergency action WTP11-0P-06 Trouble shooting WTP11-0P-07 Required staff and qualifications		solution tank, dosing device, agitator, etc. WTP11-MT-01 Periodical inspection WTP11-MT-02 Change of oil & grease WTP11-MT-03 Periodical change of parts WTP11-MT-04 Periodical clean up WTP11-MT-05 Record & report WTP11-MT-06 Emergency action WTP11-MT-07 Trouble shooting WTP11-MT-08 Required staff and qualifications	WTP11-LB-01 WTP11-LB-02 WTP11-LB-03 WTP11-LB-04	Monitoring & record ・alum solution quality Emergency action Trouble shooting Required staff and qualifications

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WTP12	Chlorination facility		chlorinator, booster pump, chlorine gas neutralization facility		chlorinator, booster pump, chlorine gas neutralization facility		
		WTP12-0P-01	Store & handling of chlorine	WTP12-MT-01	Periodical inspection		
		WTP12-0P-02	Change of container	WTP12-MT-02	Change of oil & grease		
		WTP12-0P-03	Start up & shut down of chlorinator	WTP12-MT-03	Periodical change of parts		
				WTP12-MT-04	Periodical clean up		
		WTP12-0P-04	Control of dosing rate Monitoring & record ・dosing rate ・chlorine gas pressure ・weight of chlorine (chlorine consumption) ・water supply pressure ・leakage of chlorine, etc.	WTP12-MT-05	Record & report		
				WTP12-MT-06	Emergency action		
				WTP12-MT-07	Trouble shooting		
				WTP12-MT-08	Required staff and qualifications		
		WTP12-0P-05	Emergency action				
		WTP12-0P-06	Trouble shooting				
		WTP12-0P-07	Required staff and qualifications				
WTP13	Transmission pump	WTP13-0P-01	Start up & Shut down		pump, motor, flow rater, primary pump, basin	WTP13-LB-01	Monitoring & record ・clear water quality
		WTP13-0P-02	Control of flow rate				
		WTP13-0P-03	Monitoring & record ・discharge volume ・discharge pressure ・temperature, etc.	WTP13-MT-01	Periodical inspection	WTP13-LB-02	Emergency action
				WTP13-MT-02	Change of oil & grease	WTP13-LB-03	Trouble shooting
				WTP13-MT-03	Periodical change of parts		
				WTP13-MT-04	Record & report		
		WTP13-0P-04	Emergency action	WTP13-MT-05	Emergency action		
		WTP13-0P-05	Trouble shooting	WTP13-MT-06	Trouble shooting		
				WTP13-MT-07	Required staff and qualifications		
		WTP13-0P-06	Communication with booster pump station ・Water supply volume to the booster pump station ・Water supply pressure of transmission ・Coordinaton of water supply volume ¥ pressure with the source			WTP13-LB-04	Communication with booster pump station ・Water quality final residual chlorine
		WTP14-0P-07	Required staff and qualifications			WTP13-LB-05	Required staff and qualifications

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WTP14	Drainage facility		pump, gate basin WTP14-0P-01 Start up & Shut down WTP14-0P-02 Control of flow rate WTP14-0P-03 Monitoring & record ・discharge volume ・discharge pressure ・temperature, etc. WTP14-0P-04 Emergency action WTP14-0P-05 Trouble shooting WTP14-0P-06 Required staff and qualifications		pump, gate basin WTP14-MT-01 Periodical inspection WTP14-MT-02 Change of oil & grease WTP14-MT-03 Periodical change of parts WTP14-MT-04 Periodical clean up WTP14-MT-05 Record & report WTP14-MT-06 Emergency action WTP14-MT-07 Trouble shooting WTP14-MT-08 Required staff and qualifications	WTP14-LB-01 WTP14-LB-02 WTP14-LB-03 WTP14-LB-04	Monitoring & record ・waste water quality Emergency actionTrouble shooting Trouble shooting Required staff and qualifications
WTP15	Piping & valve		valve operation WTP15-0P-01 Control of valve opening WTP15-0P-02 Monitoring & record WTP15-0P-03 Emergency action WTP15-0P-04 Trouble shooting WTP15-0P-05 Required staff and qualifications		piping, valve WTP15-MT-01 Periodical inspection WTP15-MT-02 Change of oil & grease WTP15-MT-03 Periodical change of parts WTP15-MT-04 Periodical clean up WTP15-MT-05 Record & report WTP15-MT-06 Emergency action WTP15-MT-07 Trouble shooting WTP15-MT-08 Required staff and qualifications		
WTP16	Monitoring room and Instrumentation				flow meter, water level meter, pressure gauge, weighing scale, etc. WTP16-MT-01 Periodical inspection WTP16-MT-02 Periodical calibration WTP16-MT-03 Change of oil & grease WTP16-MT-04 Periodical change of parts WTP16-MT-05 Periodical clean up WTP16-MT-06 Record & report WTP16-MT-07 Emergency action WTP16-MT-08 Trouble shooting WTP16-MT-09 Required staff and qualifications		
WTP17	Electrical power supply		power transformer, switch board. WTP17-OP-01 Start up & Shut down WTP17-OP-02 Monitoring & record ・power receiving & supply condition ・electrical current ・power consumption, etc. WTP17-OP-03 Emergency action ・power failure or down WTP17-OP-04 Trouble shooting WTP17-OP-05 Required staff and qualifications		power transformer, switch board. WTP17-MT-01 Periodical inspection WTP17-MT-02 Periodical calibration WTP17-MT-03 Periodical change of parts WTP17-MT-04 Periodical tightening of contact point WTP17-MT-05 Record & report WTP17-MT-06 Emergency action WTP17-MT-07 Trouble shooting WTP17-MT-08 Required staff and qualifications		

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WTP18	Diesel generator		oil tank, generator, auxiliary device		oil tank, generator, auxiliary device		
		WTP18-OP-01	Start up & Shut down	WTP18-MT-01	Periodical inspection		
		WTP18-OP-02	Monitoring & record ・periodical test run ・oil storage volume (oil consumption)	WTP18-MT-02	Periodical change of parts		
				WTP18-MT-03	Periodical clean up		
				WTP18-MT-04	Record & report		
				WTP18-MT-05	Emergency action		
		WTP18-OP-03	Emergency action ・power failure or down	WTP18-MT-06	Trouble shooting		
		WTP18-OP-04	Trouble shooting	WTP18-MT-07	Required staff and qualifications		
		WTP18-OP-05	Required staff and qualifications				
WTP19	Crane facility	WTP19-OP-01	Operation ・power supply ・handling of switch ・lifting & transfer, stop		crane, guarder, rail auxiliary device		
		WTP19-OP-02	Emergency action	WTP19-MT-01	Periodical inspection		
		WTP19-OP-03	Trouble shooting	WTP19-MT-02	Periodical change of parts		
		WTP19-OP-04	Required staff and qualifications	WTP19-MT-03	Periodical clean up		
				WTP19-MT-04	Record & report		
				WTP19-MT-05	Emergency action		
				WTP19-MT-06	Trouble shooting		
				WTP19-MT-07	Required staff and qualifications		
WTP20	Laboratory					WTP20-LB-01	Water analysis
						WTP20-LB-02	Jar test
						WTP20-LB-03	Break point test
						WTP20-LB-04	Evaluation of above result
						WTP20-LB-05	Maintenance of equipment/devices & adjustment of chemical agent

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
			Supply of information to booster pump station		Receiving of information from booster pump station		
WTP21	Communication with booster pump station	WTP22-SP-01	Water treatment condition ・Water supply volume to the booster pump ・Water supply pressure of distribution pump outlet ・Water quality especially final residual chlorine value	WTP22-RC-01	Demand from BPS ・Water supply volume ・Water supply pressure ・Water quality especially residual chlorine (sufficient or insufficient)		
		WTP22-SP-01	Water treatment plan ・Coordinaton of water supply volume ¥ pressure with the source				

Note Emergency action: Urgent activities in case of serious accident or trouble of facilities, water quality, affect people's lives or continuos operation of WTP.
Example of emergency action: Emergency situation 1- Leakage of chlorine gas → start up of neutralization system, stop of master valve of container, investigation of leakage room and part of facility and leakage degree, communication with people concerned, etc.
Trouble shooting : Procedures for specifing cause of trouble to recover from trouble, accident and other unusual conditions.
Examle of trouble shooting: Trouble－Stop of dosing pump → check; Electircal trouble？Circuit trouble? Motor trouble? Mechanical trouble? Other? Etc.

List of SOPs (Preliminary list in case of Fe/Mn removal plant)

Eq. No.		SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
FMR1	Water well	FMR1-0P-01	Monitoring & record ・water level ・water quantity	FMR1-MT-01 FMR1-MT-02 FMR1-MT-03 FMR1-MT-04 FMR1-MT-05	Periodical inspection Record & report Emergency action Trouble shooting Required staff and qualifications	FMR1-LB-01 FMR1-LB-02 FMR1-LB-03 FMR1-LB-04	Monitoring & record ・raw water quality Emergency action Trouble shooting Required staff and qualifications
		FMR1-0P-02	Emergency action				
		FMR1-0P-03	Trouble shooting				
		FMR1-0P-04	Required staff and qualifications				
FMR2	Well pump	FMR2-0P-01	Start up & Shut down	FMR2-MT-01	pump, flow meter, motor Periodical inspection		
		FMR2-0P-02	Control of flow rate				
		FMR2-0P-03	Monitoring & record ・discharge pressure ・temperature, etc. ・volts & amps	FMR2-MT-02 FMR2-MT-03 FMR2-MT-04 FMR2-MT-05 FMR2-MT-06 FMR2-MT-07	Change of oil & grease Periodical change of parts Record & report Emergency action Trouble shooting Required staff and qualifications		
		FMR2-0P-04	Emergency action				
		FMR2-0P-05	Trouble shooting				
		FMR2-0P-06	Required staff and qualifications				
FMR3	Oxidation tower	FMR3-0P-01	Monitoring & record ・clogging of hole ・waste removal	FMR3-MT-01 FMR3-MT-02 FMR3-MT-03 FMR3-MT-04 FMR3-MT-05 FMR3-MT-06	Periodical inspection Periodical change of parts Record & report Emergency action Trouble shooting Required staff and qualifications	FMR3-LB-01 FMR3-LB-02 FMR3-LB-03 FMR3-LB-04	Monitoring & record ・water quality of outlet Emergency action Trouble shooting Required staff and qualifications
		FMR3-0P-02	Emergency action				
		FMR3-0P-03	Trouble shooting				
		FMR3-0P-04	Required staff and qualifications				
FMR4	Sedimentation basin	FMR4-0P-01	Start up & Shut down	FMR4-MT-01 FMR4-MT-02 FMR4-MT-03 FMR4-MT-04 FMR4-MT-05 FMR4-MT-06 FMR4-MT-07	Periodical inspection Periodical change of parts Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications	FMR4-LB-01 FMR4-LB-02 FMR4-LB-03 FMR4-LB-04	Monitoring & record ・water quality Emergency action Trouble shooting Required staff and qualifications
		FMR4-0P-02	Monitoring & record ・Operating condition				
		FMR4-0P-03	Emergency action				
		FMR4-0P-04	Trouble shooting				
		FMR4-0P-05	Required staff and qualifications				
FMR5	Filter		filter tank, filter media		filter tank, filter media	FMR5-LB-01	Monitoring & record ・inlet water quality ・filtered water quality ・waste water turbidity
		FMR5-0P-01	Start up & Shut down	FMR5-MT-01 FMR5-MT-02 FMR5-MT-03 FMR5-MT-04 FMR5-MT-05 FMR5-MT-06 FMR5-MT-07	Periodical inspection Periodical change of parts Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications	FMR5-LB-02 FMR5-LB-03 FMR5-LB-04	Emergency action Trouble shooting Required staff and qualifications
		FMR5-0P-02	Washing of filter media				
		FMR5-0P-03	Monitoring & record ・loss head ・wash water volume ・wash water pressure ・wash time, etc.				
		FMR5-0P-04	Emergency action				
		FMR5-0P-05	Trouble shooting				
		FMR5-0P-06	Required staff and qualifications				

Eq. No.		SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
FMR6	Filter Pumps	FMR6-0P-01 FMR6-0P-02 FMR6-0P-03 FMR6-0P-04 FMR6-0P-05 FMR6-0P-06	Start up & Shut down Control of flow rate Monitoring & record ・discharge pressure ・temperature, etc. ・volts & amps Emergency action Trouble shooting Required staff and qualifications	FMR6-MT-01 FMR6-MT-02 FMR6-MT-03 FMR6-MT-04 FMR6-MT-05 FMR6-MT-06 FMR6-MT-07	pump, flow meter, motor Periodical inspection Change of oil & grease Periodical change of parts Record & report Emergency action Trouble shooting Required staff and qualifications		
FMR7	Chlorination facility		chlorinator, booster pump, chlorine gas neutralization facility FMR7-0P-01 FMR7-0P-02 FMR7-0P-03 FMR7-0P-04 FMR7-0P-05 FMR7-0P-06 FMR7-0P-07	Store & handling of chlorine Change of container Start up & shut down of chlorinator Control of dosing rate Monitoring & record ・dosing rate ・chlorine gas pressure ・weight of chlorine (chlorine consumption) ・water supply pressure ・leakage of chlorine, etc. Emergency action Trouble shooting Required staff and		chlorinator, booster pump, g, chlorine gas neutralization facility FMR7-MT-01 FMR7-MT-02 FMR7-MT-03 FMR7-MT-04 FMR7-MT-05 FMR7-MT-06 FMR7-MT-07 FMR7-MT-08	FMR7-LB-01 FMR7-LB-02 FMR7-LB-03 FMR7-LB-04	Monitoring & record ・Resedual Chlorine Emergency action Trouble shooting Required staff and qualifications
FMR8	Drainage facility	FMR8-0P-01 FMR8-0P-02 FMR8-0P-03 FMR8-0P-04 FMR8-0P-05 FMR8-0P-06	Start up & Shut down Control of flow rate Monitoring & record ・discharge volume ・discharge pressure ・temperature, etc. Emergency action Trouble shooting Required staff and qualifications	FMR8-MT-01 FMR8-MT-02 FMR8-MT-03 FMR8-MT-04 FMR8-MT-05 FMR8-MT-06 FMR8-MT-07 FMR8-MT-08	Periodical inspection Change of oil & grease Periodical change of parts Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications		

Eq. No.		SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
FMR9	Piping & valve		valve operation		piping, valve		
		FMR9-0P-01	Control of valve opening	FMR9-MT-01	Periodical inspection		
		FMR9-0P-02	Monitoring & record	FMR9-MT-02	Change of oil & grease		
		FMR9-0P-03	Emergency action	FMR9-MT-03	Periodical change of parts		
		FMR9-0P-04	Trouble shooting	FMR9-MT-04	Periodical clean up		
		FMR9-0P-05	Required staff and qualifications	FMR9-MT-05	Record & report		
				FMR9-MT-06	Emergency action		
				FMR9-MT-07	Trouble shooting		
				FMR9-MT-08	Required staff and qualifications		
FMR10	Instrumentation and Monitoring room				flow meter, water level meter, pressure gauge, weighing scale, etc.		
				FMR10-MT-01	Periodical inspection		
				FMR10-MT-02	Periodical calibration		
				FMR10-MT-03	Periodical change of parts		
				FMR10-MT-04	Periodical clean up		
				FMR10-MT-05	Record & report		
				FMR10-MT-06	Emergency action		
				FMR10-MT-07	Trouble shooting		
				FMR10-MT-08	Required staff and qualifications		
FMR11	Electrical power supply		power transformer, switch board.		power transformer, switch board.		
		FMR11-OP-01	Start up & Shut down	FMR11-MT-01	Periodical inspection		
		FMR11-OP-02	Monitoring & record ・power receiving & supply condition ・electrical current ・power consumption, etc.	FMR11-MT-02	Periodical calibration		
				FMR11-MT-03	Periodical change of parts		
				FMR11-MT-04	Periodical tightening of contact point		
		FMR11-OP-03	Emergency action ・power failure or down	FMR11-MT-05	Record & report		
				FMR11-MT-06	Emergency action		
		FMR11-OP-04	Trouble shooting	FMR11-MT-07	Trouble shooting		
		FMR11-OP-05	Required staff and qualifications	FMR11-MT-08	Required staff and qualifications		

Eq. No.		SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
FMR12	Diesel generator		oil tank, generator, auxiliary device		oil tank, generator, auxiliary device		
		FMR12-OP-01	Start up & Shut down	FMR12-MT-01	Periodical inspection		
		FMR12-OP-02	Monitoring & record ・periodical test run ・oil storage volume (oil consumption)	FMR12-MT-02 FMR12-MT-03 FMR12-MT-04 FMR12-MT-05 FMR12-MT-06 FMR12-MT-07	Periodical change of parts Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications		
		FMR12-OP-03	Emergency action ・power failure or down				
		FMR12-OP-04	Trouble shooting				
		FMR12-OP-05	Required staff and				
FMR13	Crane facility	FMR13-OP-01	Operation ・power supply ・handling of switch ・lifting & transfer, stop		crane, guarder, rail auxiliary device		
		FMR13-OP-02	Emergency action	FMR13-MT-01	Periodical inspection		
		FMR13-OP-03	Trouble shooting	FMR13-MT-02 FMR13-MT-03 FMR13-MT-04 FMR13-MT-05 FMR13-MT-06 FMR13-MT-07	Periodical change of parts Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications		
		FMR13-OP-04	Required staff and qualifications				
FMR14	Laboratory					FMR14-LB-01	Water analysist
						FMR14-LB-02	Chlorine dose
						FMR14-LB-03	Evaluation of above result
						FMR14-LB-04	Maintenance of equipment/devices & adjustment of chemical
						FMR14-LB-05	reagent

Note Emergency action: Urgent activities in case of serious accident or trouble of facilities, water quality, affect people's lives or continuos operation of WTP.
Example of emergency action: Emergency situation 1- Leakage of chlorine gas → start up of neutralization system, stop of master valve of container, investigation of leakage room and part of facility and leakage degree, communication with people concerned, etc.
Trouble shooting : Procedures for specifing of cause of trouble to recover from trouble, accident and other unusual conditions.
Examle of trouble shooting: Trouble－Stop of pump → check; Electircal touble？Circuit touble? Motor touble? Mechanical trouble? Other? Etc.

List of SOPs （Preliminary list in case of BPS）

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
BPS1	Clear water reservoir		reservoir, valves	BPS1-MT-01	Periodical inspection	BPS1-LB-01	Monitoring & record residual chlorine of ・inlet water quality ・outlet water quality
		BPS1-0P-01	Valve operation ・open & close ・control of opening	BPS1-MT-02	Periodical clean up		
		BPS1-0P-02	Monitoring & record ・water level ・valve opening condition ・no breaking or deterioration, etc.	BPS1-MT-03	Record & report	BPS1-LB-02	Emergency action
				BPS1-MT-04	Emergency action	BPS1-LB-03	Trouble shooting
				BPS1-MT-05	Trouble shooting	BPS1-LB-04	Communication with WTP ・Water quality final resiudual chlorine
				BPS1-MT-06	Required staff and qualifications	BPS1-LB-05	Required staff and qualifications
		BPS1-0P-03	Emergency action				
		BPS1-0P-04	Trouble shooting				
		BPS1-0P-05	Required staff and qualifications				
		BPS1-0P-06	Communication with WTP water treatment condition ・Water supply volume from WTP ・Water supply pressure of reservoir inlet ・Reducing plan of transmission volume or pressure				
BPS2	Booster pump		suction basin, pump, primary pump, residual chlorine meter		suction basin, pump, primary pump, residual chlorine meter		
		BPS2-0P-01	Start up & Shut down	BPS2-MT-01	Periodical inspection		
		BPS2-0P-02	Control of flow rate	BPS2-MT-02	Change of oil & grease		
		BPS2-0P-03	Monitoring & record ・discharge volume ・discharge pressure ・residual chlorine ・temperature, etc.	BPS2-MT-03	Periodical change of parts		
				BPS2-MT-04	Record & report		
				BPS2-MT-05	Emergency action		
				BPS2-MT-06	Trouble shooting		
				BPS2-MT-07	Required staff and qualifications		
		BPS2-0P-04	Emergency action				
		BPS2-0P-05	Trouble shooting				
		BPS2-0P-06	Required staff and qualifications				

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
BPS3	Chlorination facility		chlorinator, booster pump, chlorine gas neutralization facility		chlorinator, booster pump, g, chlorine gas neutralization facility		
		BPS3-0P-01	Store & handling of chlorine		Periodical inspection		
		BPS3-0P-02	Change of container	BPS3-MT-01	Change of oil & grease		
		BPS3-0P-03	Start up & shut down of chlorinator	BPS3-MT-02	Periodical change of parts		
				BPS3-MT-03	Periodical clean up		
		BPS3-0P-04	Control of dosing rate	BPS3-MT-04	Record & report		
			Monitoring & record ・dosing rate ・chlorine gas pressure ・weight of chlorine (chlorine consumption) ・water supply pressure ・leakage of chlorine, etc.	BPS3-MT-05	Emergency action		
				BPS3-MT-06	Trouble shooting		
		BPS3-0P-05	Emergency action	BPS3-MT-07	Required staff and qualifications		
		BPS3-0P-06	Trouble shooting				
		BPS3-0P-07	Required staff and qualifications				
BPS4	Piping & valve		valve operation		piping, valve		
		BPS4-0P-01	Control of valve opening	BPS4-MT-01	Periodical inspection		
		BPS4-0P-02	Monitoring & record	BPS4-MT-02	Change of oil & grease		
		BPS4-0P-03	Emergency action	BPS4-MT-03	Periodical change of parts		
		BPS4-0P-04	Trouble shooting	BPS4-MT-04	Periodical clean up		
		BPS4-0P-05	Required staff and qualifications	BPS4-MT-05	Record & report		
				BPS4-MT-06	Emergency action		
				BPS4-MT-07	Trouble shooting		
				BPS4-MT-08	Required staff and qualifications		
BPS5	Instrumentation				flow meter, water level meter, pressure gauge, weighing scale, etc.		
				BPS5-MT-01	Periodical inspection		
				BPS5-MT-02	Periodical calibration		
				BPS5-MT-03	Change of oil & grease		
				BPS5-MT-04	Periodical change of parts		
				BPS5-MT-05	Periodical clean up		
				BPS5-MT-06	Record & report		
				BPS5-MT-07	Emergency action		
				BPS5-MT-08	Trouble shooting		
					Required staff and qualifications		

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
BPS6	Electrical power supply		power transformer, switch board.		power transformer, switch board.		
		BPS6-OP-01	Start up & Shut down	BPS6-MT-01	Periodical inspection		
		BPS6-OP-02	Monitoring & record ・power receiving & supply condition ・electrical current ・power consumption, etc.	BPS6-MT-02 BPS6-MT-03 BPS6-MT-04	Periodical calibration Periodical change of parts Periodical tightening of contact point		
		BPS6-OP-03	Emergency action ・power failure or down	BPS6-MT-05 BPS6-MT-06	Record & report Emergency action		
		BPS6-OP-04	Trouble shooting	BPS6-MT-07	Trouble shooting		
		BPS6-OP-05	Required staff and qualifications	BPS6-MT-08	Required staff and qualifications		
BPS7	Diesel generator		oil tank, generator, auxiliary device		oil tank, generator, auxiliary device		
		BPS7-OP-01	Start up & Shut down	BPS7-MT-01	Periodical inspection		
		BPS7-OP-02	Monitoring & record ・periodical test run ・oil storage volume (oil consumption)	BPS7-MT-02 BPS7-MT-03 BPS7-MT-04	Periodical change of parts Periodical clean up Record & report		
		BPS7-OP-03	Emergency action ・power failure or down	BPS7-MT-05 BPS7-MT-06	Emergency action Trouble shooting		
		BPS7-OP-04	Trouble shooting	BPS7-MT-07	Required staff and qualifications		
		BPS7-OP-05	Required staff and qualifications				
BPS8	Crane facility	BPS8-OP-01	Operation ・power supply ・handling of switch ・lifting & transfer, stop		crane, guarder, rail auxiliary device		
		BPS8-OP-02	Emergency action	BPS8-MT-01	Periodical inspection		
		BPS8-OP-03	Trouble shooting	BPS8-MT-02	Periodical change of parts		
		BPS8-OP-04	Required staff and qualifications	BPS8-MT-03 BPS8-MT-04	Periodical clean up Record & report		
				BPS8-MT-05	Emergency action		
				BPS8-MT-06	Trouble shooting		
				BPS8-MT-07	Required staff and qualifications		
BPS9	Elevated tank		reservoir, valves	BPS9-MT-01	Periodical inspection	BPS9-LB-01	Monitoring & record residual chlorine of ・inlet water quality ・outlet water quality
		BPS9-0P-01	Valve operation ・open & close ・control of opening	BPS9-MT-02 BPS9-MT-03	Periodical clean up Record & report		
		BPS9-0P-02	Monitoring & record ・water level ・valve opening condition ・no breaking or deterioration, etc.	BPS9-MT-04 BPS9-MT-05 BPS9-MT-06	Emergency action Trouble shooting Required staff and qualifications	BPS9-LB-02 BPS9-LB-03 BPS9-LB-04	Emergency action Trouble shooting Required staff and qualifications
		BPS9-0P-03	Emergency action				
		BPS9-0P-04	Trouble shooting				
		BPS9-0P-05	Required staff and qualifications				

Note Emergency action: Urgent activities in case of serious accident or trouble of facilities, water quality, affect people's lives or continuos operation of WTP.

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory

Example of emergency action: Emergency situation 1– Leakage of chlorine gas → start up of neutralization system, stop of master valve of container, investigation of leakage room and part of facility and leakage degree, communication with people concerned, etc.

Trouble shooting : Procedures for specifing of cause of trouble to recover from trouble, accident and other unusual conditions.

Examle of trouble shooting: Trouble—Stop of pump → check; Electircal touble？Circuit touble? Motor touble? Mechanical trouble? Other? Etc.

List of SOPs (Preliminary list in case of WPS)

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WP1	Well		Valves	WP1-MT-01	Periodical inspection	WP1-LB-01	Monitoring & record
		WP1-0P-01	・non return valve	WP1-MT-02	Periodical clean up		・water quality control
			Chlorination of well	WP1-MT-03	Record & report	WP1-LB-02	Emergency action
			・Chlorination on pipe	WP1-MT-04	Emergency action	WP1-LB-03	Trouble shooting
		WP1-0P-02	Monitoring & record	WP1-MT-05	Trouble shooting	WP1-LB-04	Required staff and qualifications
			・water level	WP1-MT-06	Required staff and qualifications		
			・well discharge				
			・construction year				
		WP1-0P-03	Emergency action				
		WP1-0P-04	Trouble shooting				
		WP1-0P-05	Required staff and qualifications				
WP2	Well pump		pump		pump, flow meter, basin	WP2-LB-01	Monitoring & record
			Start up & Shut down		Periodical inspection		・resuidal chlorine
		WP2-0P-01	Control of flow rate	WP2-MT-01	Change of oil & grease		
		WP2-0P-02	Monitoring & record	WP2-MT-02	Periodical change of parts		
		WP2-0P-03	・discharge volume	WP2-MT-03	Record & report		
			・discharge pressure	WP2-MT-04	Emergency action		
			・temperature, etc.	WP2-MT-05	Trouble shooting		
			Emergency action	WP2-MT-06	Required staff and qualifications		
		WP2-0P-04	Trouble shooting				
		WP2-0P-05	Required staff and qualifications				
WP3	Diesel pump		oil tank, engine, auxiliary device		oil tank, generator, auxiliary device		
		WP3-OP-01	Start up & Shut down	WP3-MT-01	Periodical inspection		
		WP3-OP-02	Monitoring & record	WP3-MT-02	Periodical change of parts		
			・periodical test run	WP3-MT-03	Periodical clean up		
			・oil storage volume (oil consumption)	WP3-MT-04	Record & report		
				WP3-MT-05	Emergency action		
		WP3-OP-03	Emergency action	WP3-MT-06	Trouble shooting		
			・machine damage	WP3-MT-07	Required staff and qualifications		
		WP3-OP-04	Trouble shooting				
		WP3-OP-05	Required staff and qualifications				
WP4	Piping & valve		valve operation		piping, valve		
		WP4-0P-01	Control of valve opening	WP4-MT-01	Periodical inspection		
		WP4-0P-02	Monitoring & record	WP4-MT-02	Change of oil & grease		
		WP4-0P-03	Emergency action	WP4-MT-03	Periodical change of parts		
		WP4-0P-04	Trouble shooting	WP4-MT-04	Periodical clean up		
		WP4-0P-05	Required staff and qualifications	WP4-MT-05	Record & report		
				WP4-MT-06	Emergency action		
				WP4-MT-07	Trouble shooting		
				WP4-MT-08	Required staff and qualifications		

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WP5	ientation and Monitorir				flow meter, water level meter, pressure gauge, weighing scale, etc. WP5-MT-01 Periodical inspection WP5-MT-02 Periodical calibration WP5-MT-03 Change of oil & grease WP5-MT-04 Periodical change of parts WP5-MT-05 Periodical clean up WP5-MT-06 Record & report WP5-MT-07 Emergency action WP5-MT-08 Trouble shooting WP5-MT-09 Required staff and qualifications		
WP6	Chlorination facility		chlorinator, booster pump, chlorine gas neutralization facility WP6-0P-01 Store & handling of chlorine WP6-0P-02 Change of container WP6-0P-03 Start up & shut down of chlorinator WP6-0P-04 Control of dosing rate Monitoring & record ・dosing rate ・chlorine gas pressure ・weight of chlorine (chlorine consumption) ・water supply pressure ・leakage of chlorine, etc. WP6-0P-05 Emergency action WP6-0P-06 Trouble shooting Required staff and qualifications		chlorinator, booster pump, g, chlorine gas neutralization facility WP6-MT-01 Periodical inspection WP6-MT-02 Change of oil & grease WP6-MT-03 Periodical change of parts WP6-MT-04 Periodical clean up WP6-MT-05 Record & report WP6-MT-06 Emergency action WP6-MT-07 Trouble shooting WP6-MT-08		
WP7	Electrical power supply		power transformer, switch board. WP7-OP-01 Start up & Shut down WP7-OP-02 Monitoring & record ・power receiving & supply condition ・electrical current ・power consumption, etc. WP7-OP-03 Emergency action ・power failure or down WP7-OP-04 Trouble shooting WP7-OP-05 Required staff and qualifications		power transformer, switch board. WP7-MT-01 Periodical inspection WP7-MT-02 Periodical calibration WP7-MT-03 Periodical change of parts WP7-MT-04 Periodical tightening of contact point WP7-MT-05 Record & report WP7-MT-06 Emergency action WP7-MT-07 Trouble shooting Required staff and qualifications		

Eq. No.	Equipment	SOP No.	Operation	SOP No.	Maintenance	SOP No.	Laboratory
WP8	Elevated Tank		reservoir, valves WP8-0P-01 Valve operation ・open & close ・cntrol of opening WP8-0P-02 Monitoring & record ・water level ・valve opening condition ・no breaking or deterioration, etc. WP8-0P-03 Emergency action WP8-0P-04 Trouble shooting Required staff and qualifications	WP8-MT-01 WP8-MT-02 WP8-MT-03 WP8-MT-04 WP8-MT-05 WP8-MT-06	Periodical inspection Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications	WP8-LB-01 WP8-LB-02 WP8-LB-03 WP8-LB-04	Monitoring & record residual chlorine of ・inlet water quality ・outlet water quality Emergency action Trouble shooting Required staff and qualifications
WP9	Crane facility	WP9-OP-01 WP9-OP-02 WP9-OP-03 WP9-OP-04	Operation ・power supply ・handling of switch ・lifting & transfer, stop Emergency action Trouble shooting Required staff and qualifications	WP9-MT-01 WP9-MT-02 WP9-MT-03 WP9-MT-04 WP9-MT-05 WP9-MT-06 WP9-MT-07	crane, guarder, rail auxiliary device Periodical inspection Periodical change of parts Periodical clean up Record & report Emergency action Trouble shooting Required staff and qualifications		

Note Emergency action: Urgent activities in case of serious accident or trouble of facilities, water quality, affect people's lives or continuos operation of WTP.
Example of emergency action: Emergency situation 1– Leakage of chlorine gas → start up of neutralization system, stop of master valve of container, investigation of leakage room and part of facility and leakage degree, communication with people concerned, etc.
Trouble shooting : Procedures for specifing cause of trouble to recover from trouble, accident and other unusual conditions.
Examle of trouble shooting: Trouble－Stop of dosing pump → check; Electircal trouble？Circuit trouble? Motor trouble? Mechanical trouble? Other? Etc.

Measurement/Records of Intake and Production Water Volume at Seven(7) WTPs

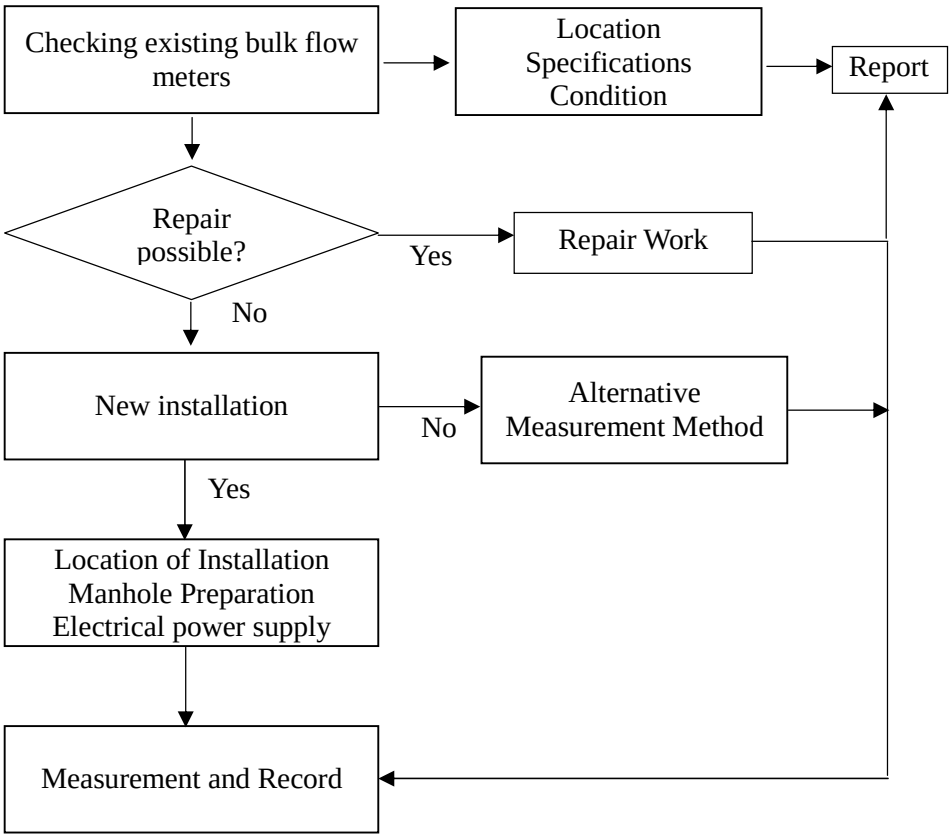
For the water supply management, grasping the production/transmission water volumes from the WTPs are very important.

In the six WTPs except newly constructed Hihya WTP, most bulk flow meters do not function. We must restore the function by repair or new installation. As a pilot project of SOP activity, actual "Measurements/Records of Intake and Production/Supply Water Volume" is proposed in the project. Repair work of some flow meters have been started by SHAPWASCO and the project may provide flow meters and a measurement system covering major inter-Markaz water supply from all WTPs may be established. Locations of bulk flow meters proposed according to the preliminary field survey, are shown in the sketches of each WTP in following pages. Table-1 is summery of flow meter quantity and Figure-1 is flow chart of this pilot project.

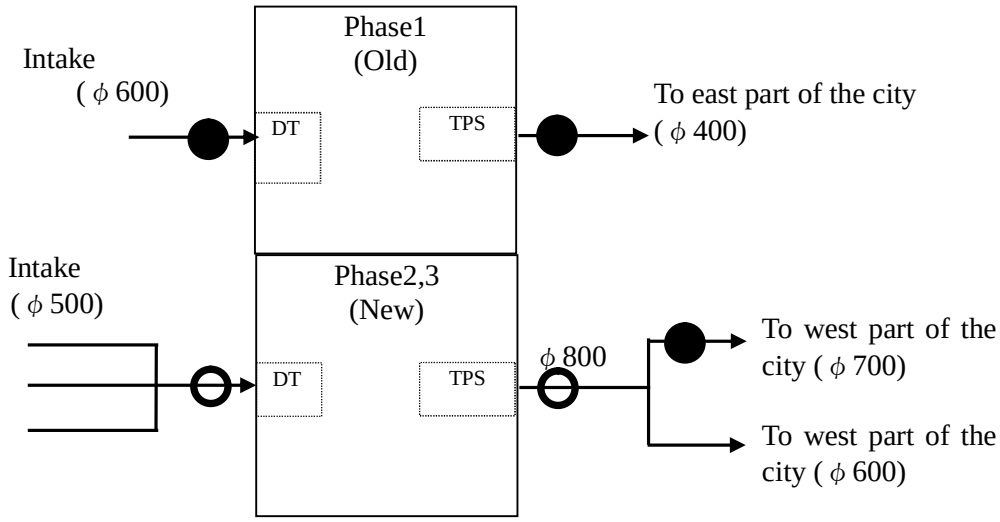
Table-1 Flow Meter Quantity

Name of WTP	Raw Water	Treated Water	Notes
1)Zagazig	2(1)	3(1)	Figures in ( ) are numbers of flow meters repaired
2)Abassa	2(2)	10(2)	
3)New Faqus	1	2	
4)Old Faqus	0	1	
5)Husainia	1	1	
6)Kafr Saqr	1	3	
7)Hihya	0	0	Not required
Total	7(3)	20(3)	

Fig-1 Flow of Measurement and Record Activity



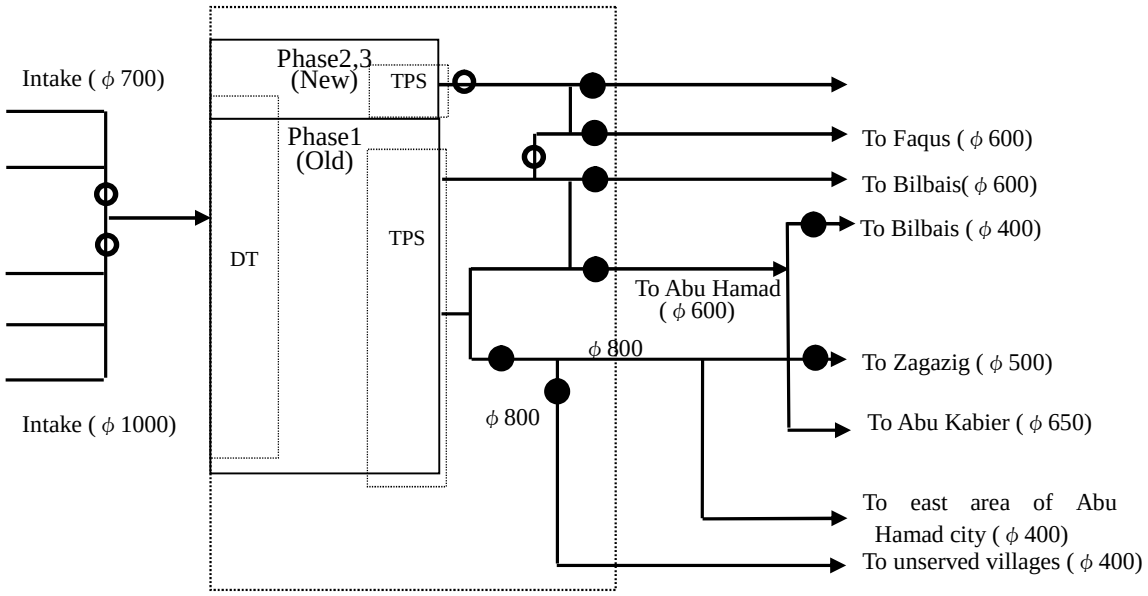
1) Zagazig WTP



○ : Flow Meter(repair)
● : Flow Meter(new)
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 1(repair)+1(new)
Production Water:1(repair)+2(new)

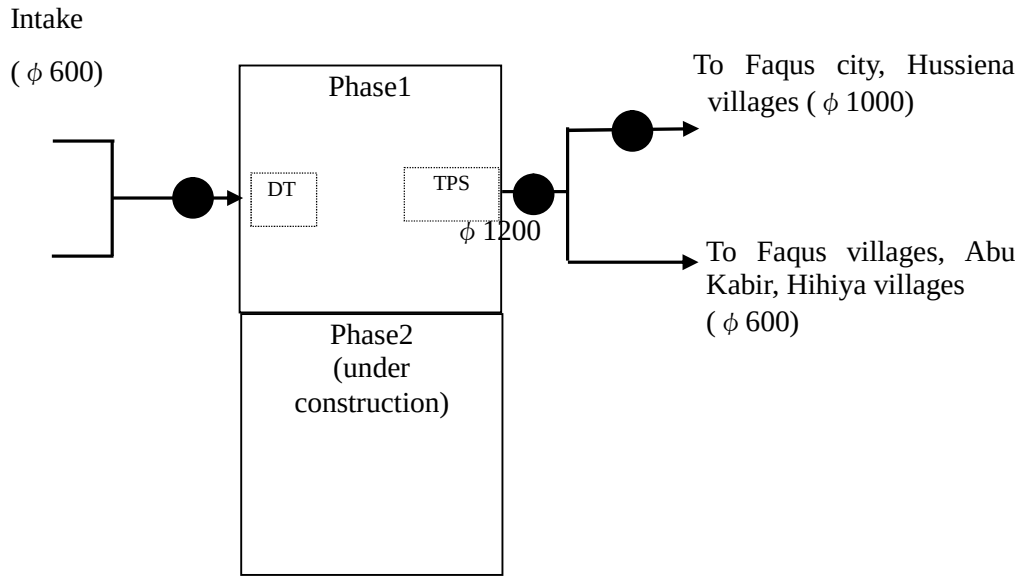
2) Abassa WTP



○ : Flow Meter(repair)
● : Flow Meter(new)
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 2(repair)
Production Water:2(repair)+8(new)

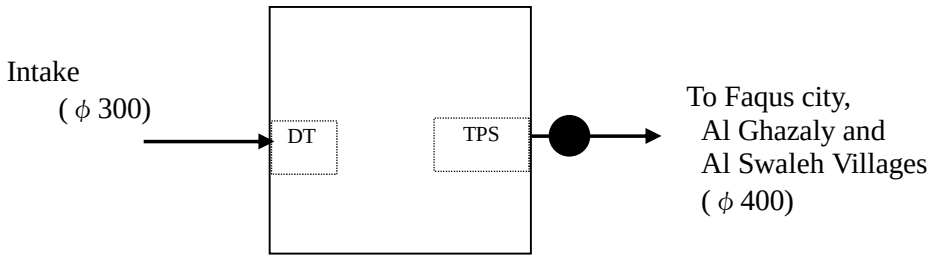
3) New Faqus WTP



● : Flow Meter
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 1
Production Water:2

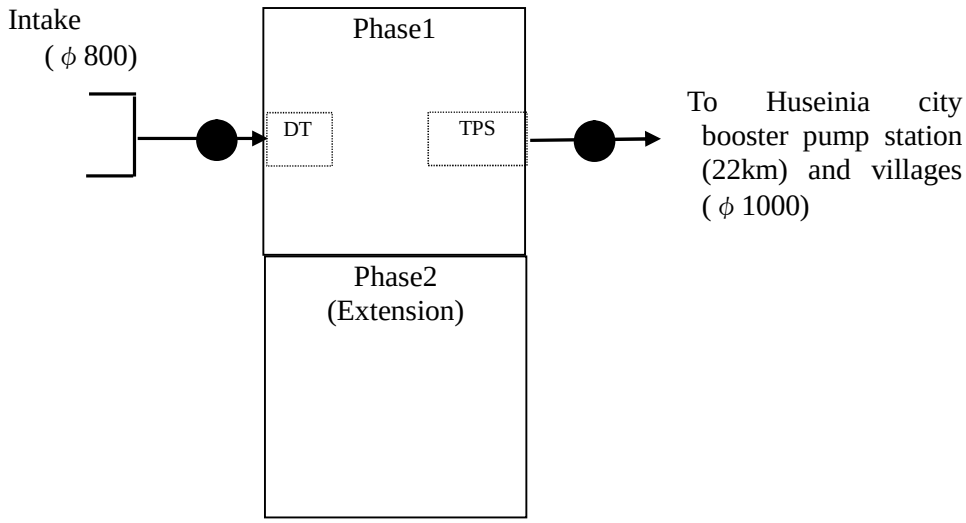
4) Old Faqus WTP



● : Flow Meter
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 0
Production Water:1

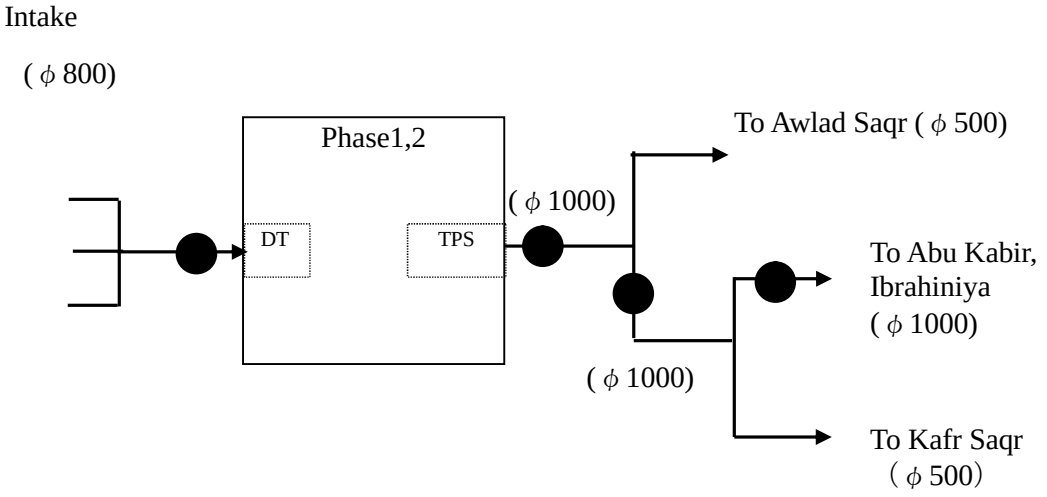
5) Husainia WTP



● : Flow Meter
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 1
Production Water:1

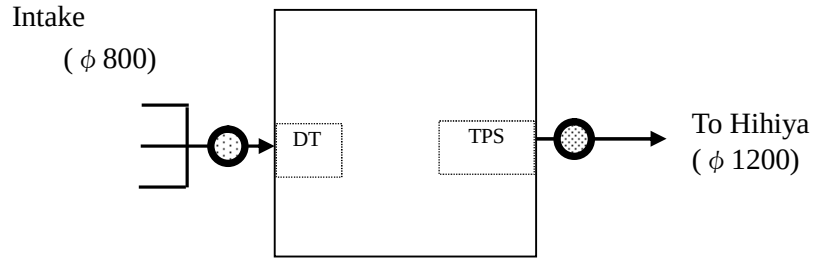
6) Kafr Saqr WTP



● : Flow Meter
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 1
Production Water:3

7) Hihya WTP



: Flow Meter(existing)
DT : Distribution Tank
TPS : Transmission Pump Station

Raw Water : 0
Production Water:0

Selection of Model Facilities for SOP Activity

1. Water treatment plant (WTP)

Plant Name		Location
1	Zagazig	Zagazig City
2	Abassa	Abu Hamad
3	New Faqus	Faqus
4	Old Faqus	Faqus
5	El Husainia	El Huseinia
6	Sangaha	Kafr Saqr
7	Hihya	Hihya

Water treatment plants in SHAPWASCO are shown as above list and two model facilities for the first stage SOPs activity should be selected from these water treatment plants.
We recommend Al Abassa WTP and New Faqus WTP as model facility for SOPs activity by reasons as below;

Model facility shall satisfy the following four (4) criteria.

1) System of selected two (2) model facilities are different each other to cover the whole WTP in SHAPWASCO.
2) Model WTP is not specialized system as compared with other water treatment facility in SHAPWASCO.
3) Facilities in model facility are working without trouble at present.
4) Effective improvement should be performed by SOPs activity of model WTP.

Selection Criteria-1

Systems of water treatment plants in SHAPWASCO are classified into two types by shape of sedimentation basin. One type is circle shaped type, and another type is rectangular shaped type.

Circle shaped type: Zagazig, Abassa, El Husainia

Rectangular type : New Faqus, Old faqus, Kafr Saqr, Hihiya

We recommend model facility will be selected 1 plant from above each type.

Selection Criteria-2

Circle shaped type group

Zagazig, Al Abassa and El Husainia water treatment plants are not specialized system.

Generally, plant constitution, process and system are same on 3.

Old Faqus WTP is different from facility constitution.

We recommend excluding of Old Faqus WTP.

Rectangular shaped type group

New Faqus and Kafr Saqr water treatment plants are not specialized system, but Hihiya water treatment plant is different from other water treatment plant in SHAPWASCO as following points;

- Washing system for rapid sand filter is consisting of back wash and surface wash.
  (Other plants in SHAPWASCO, washing system is consisting of back wash and air wash)
- Back wash water is supplied directly from other filters without back wash pump
  (Other plants in SHAPWASCO, back wash water supplied from back wash pumps)

We recommend excluding of Hihiya WTP as model facility.

Selection Criteria-3

In AL Abassa, Zagazig & El Husainia WTP we cannot find out big operation problem on facilities.

In Kafur Saqr WTP we had confirmed several floculators are not working and these troubles are causing to frequent back washing of filters.

We recommend excluding of Kafur Saqr WTP as model facility.

Selection Criteria-4

We recommend Al Abassa WTP as model facility by reasons as below;

- The biggest WTP in SHAPWASCO
- Distribution system from WTP to the network is complex.

Accordingly we recommend following 2 water treatment plants as model facility for the first stage SOPs activity.

1. Al Abassa water treatment plant from circle shaped type sedimentation basin
2. New Faqus water treatment plant from rectangular shaped sedimentation basin

2. Booster pump station.

We recommend West Bilbeis booster pump station as the first stage SOPs model facility by reasons as below;

- The biggest booster pump station in SHAPWASCO
- Constituted facilities in booster pump station are more than other stations.
- Zagazig Markaz booster pump station is now under construction work, and it needs some months to be completed.

3. Fe/Mn removal facility.

We recommend Kafr Farag Fe/Mn removal plants as the first stage SOPs model facility.

In SHAPWASCO, 6 Fe/Mn removal plants are working at present.

Generally, plant constitution, process and system are same on 6 Fe/Mn removal plants.

Therefore, any Fe/Mn removal plant can be selected as the first stage SOPs model facility.

SOPs activity will be implemented in parallel with BPS, WTP and .Fe/Mn removal plant.

Kafr Farag Fe/Mn removal plant is located near by West Bilbeis booster pump station. It will be better to implementation of SOPs activity in parallel with West Bilbeis booster pump station.

List of Water Supply Facilities in SHAPWASCO (as of 27/12/2007)

Water Supply Facilities in SHAPWASCO

Water Treatment Plant
Iron and Manganiz Removal Plant
Booster Pump Station
Compact Unit (excluded from this list)
Wells

Notes

- Information regarding facilities, i.e. locations, layouts, pronciple system configurations, basic capacities of the equipment were collected and will be compiled in a simple database in the project.
- List will be renewed regularly and interval and method will be determined in due cource.
- List of wells contains a part not verified and will be finalized in January 2007

1. List of Water Treatment Plants

	Plant Name	Markaz
1	Zagazig	Zagazig City
2	Abassa	Abu Hamad
3	New Faqus	Faqus
4	Old Faqus	Faqus
5	El Husainia	El Huseinia
6	Sangaha	Kafr Saqr
7	Hihya	Hihya

List of Iron and Manganiz Plants and its Capacity

	Plant Name	Markaz
1	Qinayat	Zagazig Markaz
2	Mashtool El Sooq	Mashtool El Sooq
3	Shanan (closed)	Abu Kabier
4	El Adlia	Bilbais
5	Kafr Farag	Menia Alqamah
6	Melames	Menia Alqamah
7	El Seds	Ibrahimiya
8	Abu Metanna	Diarb Nigm

List of Booster Pump Station
related to WTPs and Compact Units

Zagazig Markaz

1	El Zerra (booster)	

Bilbais

1	West Bilbais	

Faqus Markaz

1	Misr Bank (booster)	2001
2	Faqus Al Motawer (booster)	1995
3	Abu Shalaby intake	1985
4	Meet El Ezz (booster)	1985
5	Al Kabari (booster)	1988
6	Aum Egrem (booster)	1990
7	Ezbat Helmy (booster)	1990
8	El Nwafee (booster)	1990
9	Al Refayeen (booster)	1998
10	El Tarabeya (booster)	1998
11	Saad Abu Khaleel (booster)	2001
12	Saada Abu Khalefa	
13	Al Moalmeen(booster + well)	
14	Arrab Darwish (booster)	
15	Meniat Al Makarem Algadida (booster+well)	

Abu Kabier Markaz

1	Rafee Al Mashala	2002
2	Harbeet El Ekera	1993

Ibrahimiya Markaz

1	Al Mayah El Ekrra (booster)	

Kafr Saqr Markaz

1	Abu Ragab (booster)	

Awlad Saqr Markaz

1	Motawea (booster)	
2	Aum Saadoon (booster)	
3	Zawar El leil (booster)	
4	Kassaseen Al Azhar* (booster)	

*under construction

El Huseinia Markaz

1	El Huseinia (booster)	
2	Sood (booster)	
3	El Nazea (booster)	
4	Bard (booster)	
5	Ezbet Al Monagaa (booster)	
6	El Akayla (booster)	

List of Production Wells in SHAPWASCO

Total number of well	Working	Not in Service
	279	59

	Name of Well Fields	Working	Not in Service	Year
1	**El Huseinia**	0		
2	**Awlad Saqr**	0		
3	**Kafr Saqr**	0		

4 **Faqus Markaz**

4	1	Abu Shalaby	4	3	1990
4	2	Al Said Hussein Well		4	1975
4	3	Meniat Al Makaram Alkadima		1	
4	4	El Salehya El Kadeema	1		1987
4	5	El Daydamoon		6	
4	6	Al Kanadla	1		1985
4	7	Al Moalmeen	1	1	1985
4	8	Al Rawda		1	
4		Total Number of Wells	7	16	

5 **Abu Kabier Markaz**

5	1	Madeena Abu Kabier		1	1980
5	2	Mehatet Tereat El Raml		2	1980
5	3	Shann		2	1994
5	4	Harbeet		1	1992
5	5	Al Dahtamoon	1		1988
5	6	Bany Ayad		1	1990
5	7	El Haswa	1		1990
5	8	Monshaa Radwan		1	
5		Total Number of Wells	2	8	

6 **Ibrahimiya Markaz**

6	1	Sharkia Mobasher Al Gadeida	2		1984
6	2	Mobasher Al Kadeema	1		1994
6	3	Mobasher Algadida	1		2000
6	4	Al Reif Well	2		1976
6	5	Al Madeena Well	1		1948
6	6	Sharkia Mobasher Alkadima		1	
6		Total Number of Wells	7	1	

Diarb Nigm Markaz

7	1	El Sooq Al Gadid (1)	2		1980
7	2	El Sooq Al Gadid (2)	2		1997
7	3	El Saha El Shabeya (1)	1		1986
7	4	El Saha El Shabeya (2)	1		1993
7	5	Saft Zoreek	2		1997
7	6	El Asaeed	4		1992
7	7	Yabees	1		1997
7	8	Dbeeg	1		1998
7	9	Barmkeem	1		1981
7	10	Safoor	2		1985
7	11	Diarb El Sooq	1		1987
7	12	Bahanya	1		1980
7	13	Shobra Sora	1		1989
7	14	Monshaet Sahbra		1	
7	15	Al Hwaber	1		1980
7	16	Sahbra	1		1982
7	17	Kafr El Ekal	1		1978
7	18	Heset El Rohban	3		1995
7	19	Ekwa	2		2003
7	20	Shenbara Mankla	1		1980
7	21	Kafr El Basha	1		1989
7	22	Al Mogafef	1		1987
7	23	Al Genaidy	1		1997
7	24	Karadees	2		1989
7	25	Taha El Marg	2		1987
7	26	Abu Metana	3		1989
		Abu Metana (Fe/Mn Plant)	3		
7	27	Diarb El Bald	2		1993
7	28	Al Sanya	2		1997
7		Total Number of Wells	46	1	

Hihya Markaz

8	1	Hihya Al Raessa	4		1952
8	2	El Saha	1		1977
8	3	Al Faridia	0		1999
8	4	Al Edwa	1		2000
8	5	Al Awasga	2		1978
8	6	El Alakma	1		1993
8	7	El Mahmodeya	2		1960
8	8	Manzel Hayan	1		1960
8		Total Number of Wells	12		

9 **Abu Hamad Markaz**

9	1	El Mezayneen	1		1995
9	2	El Saraseya	1		1989
9	3	Awlad Zeid	1		1993
9	4	Khazan Land in Qoureen	2		1985
9	5	El Sawa	1		
9	6	El Sanagra	1		1987
9	7	Taba	1		1993
9		Total Number of Wells	8		

10 **Zagazig Markaz**

10	1	Tal Houwain	2		1975
10	2	El Taiba	1		1998
10	3	Douwaida	2		1986
10	4	Tahlet Burdien	1	2	1952
10	5	Meet Abu Ali	2		1956
10	6	Meet Abu Araby	1		1952
10	7	Kafr Abaza	2		1956
10	8	Neshwa	1	1	1952
10	9	Sefita	1		1986
10	10	Burdien	1	1	1990
10	11	Bani Amer	1	1	1987
10	12	Benious	2		1987
10	13	Beshat Kayed	2		1985
10	14	Kafr El Hamam	1	1	1990
10	15	Shoubak Basta	3		2000
10	16	Behanbai	1	3	1990
10	17	Mashtool Alkadi	1	1	1990
10	18	Shambart El Maimouna 1	1		1970
10	19	Albayoum	2	1	1960
10	20	Rafeaa El Zeraa	1	2	
10		El Zeraa (Zagazig City)			
10	21	Alaa El Deen	2		2000
10	22	Mawqaf El Mansoura	1		2001
10	23	Ezbat El Doctor	2		2002
10	24	El Aslougi	1	2	1987
10	25	Tarout	1		1985
10		Total Number of Wells	36	15	

11 **Menia Alqamah Markaz**

11	1	Waboor El Nour	4		1979
11	2	Kafr Farag Alkadima	3		1981
11	3	Al Sadat	1		1979
11	4	El Markaz		1	1970
11	5	Al Zeraa	1		1979
11	6	El Azezya Elgadida	1	2	1979
11	7	Kafr El Saeidy	1	1	1984
11	8	Kamrona	1		1954
11	9	Kafr El Ghonemy	2		1954
11	10	Al Godaida	3		1997
11	11	Meet Bashar	2	1	1983
11	12	Meet Rabea	1		1992
11	13	Al Teleen	2		1995
11	14	Abu Tawala	1		1954
11	15	Bany Helal	2	1	1983
11	16	Besha Amer	1		1983
11	17	Kafr El Tobgi	1		1983
11	18	Al Walga	1		1954
11	19	Al Mohamadya	1		1954
11	20	Al Koba	1		1954
11	21	Al Sadeyeen	2		1954
11	22	El Okda	1		1954
11	23	Banadf	2		1995
11	24	Shambart El Maimouna(Bani Korish)	1		1954
11	25	Al Sanafeen	2		1954
11	26	Zahr Sharb	1		1954
11	27	Senhowa	2		1954
11	28	Meet Soheil	2		1995
11	29	Shalshalmoon	2	1	1995
11	30	Kafr Shalshalmoon	1		1954
11	31	El Hamdeya	1		1954
11	32	Al Aarass	1		1954
11	33	Senhawt	2	1	1995
11	34	Shobra El Enab	1		
11	35	Meet Yazid	1		1995
11	36	Kafr Farag Al Gadida	2		2002
11	37	Al Azezya Alkadima	1	1	2001
11		Total Number of Wells	55	9	

12 **Bilbais Markaz**

12	1	El Bar El Gharbi	8		1979
12	2	El Bar El Sharki	3		1993
12	3	El Saha	2		1979
12	4	El Sianna	3		1993
12	5	El Adlia	1		1958
12	6	Meet Hamal	2		1948
12	7	Meet Habib	1		1958
12	8	Awlad Seif	1		1974
12	9	Meet Rabiaa	1		1956
12	10	El Manshia	1		1956
12	11	Kafr Ibrahim	1		1997
12	12	El Kharakhasha	2		1985
12	13	Galfina	2		1985
12	14	Anshas El Raml	3		1984
12	15	El Saeidia	1		1984
12	16	El Tahaweya	1		
12	17	Salmant	1		1956
12	18	New Shobra El Nakhla	1		1956
12	19	Old Shobra El Nakhla	1		1950
12	20	El Gawseq	0		
12	21	Awlad Seif (1)	1		1954
12	22	Sndnhoor	2		1948
12	23	Al Salam	1		1986
12	24	Gheita	1		1986
12	25	Tal Rozen	3		1988
12	26	Al Ahmadeya	1		1958
12	27	Al Zawamel	1		1948
12	28	Meet Gaber	1		1952
12	29	Al Blashoon	1		1953
12	30	Karmala	2		1998
12	31	Meet Maala	0		1952
12	32	Al Reeshat	1		2002
12		Total Number of Wells	51		

13 **Mashtool El Sooq Markaz**

13	1	Magles Al Madeena	1		1989
13	2	Masaken El Sooq	1		1987
13	3	Al Moror	1		1992
13	4	Al Sahafa Al Raeesea	1		1970
13	5	Al Bahr El Shbeeny	1		1992
13	6	Al Ghafareya	1		1989
13	7	Kafr Abrash	2		2000
13	8	Abu El Magd	2		1992
13	9	Abrash	2		1989
13	10	Kafr El Sharabya	2		1965
13	11	El Betya	1		1989
13	12	Nabteet			1986
13		Total Number of Wells	15		

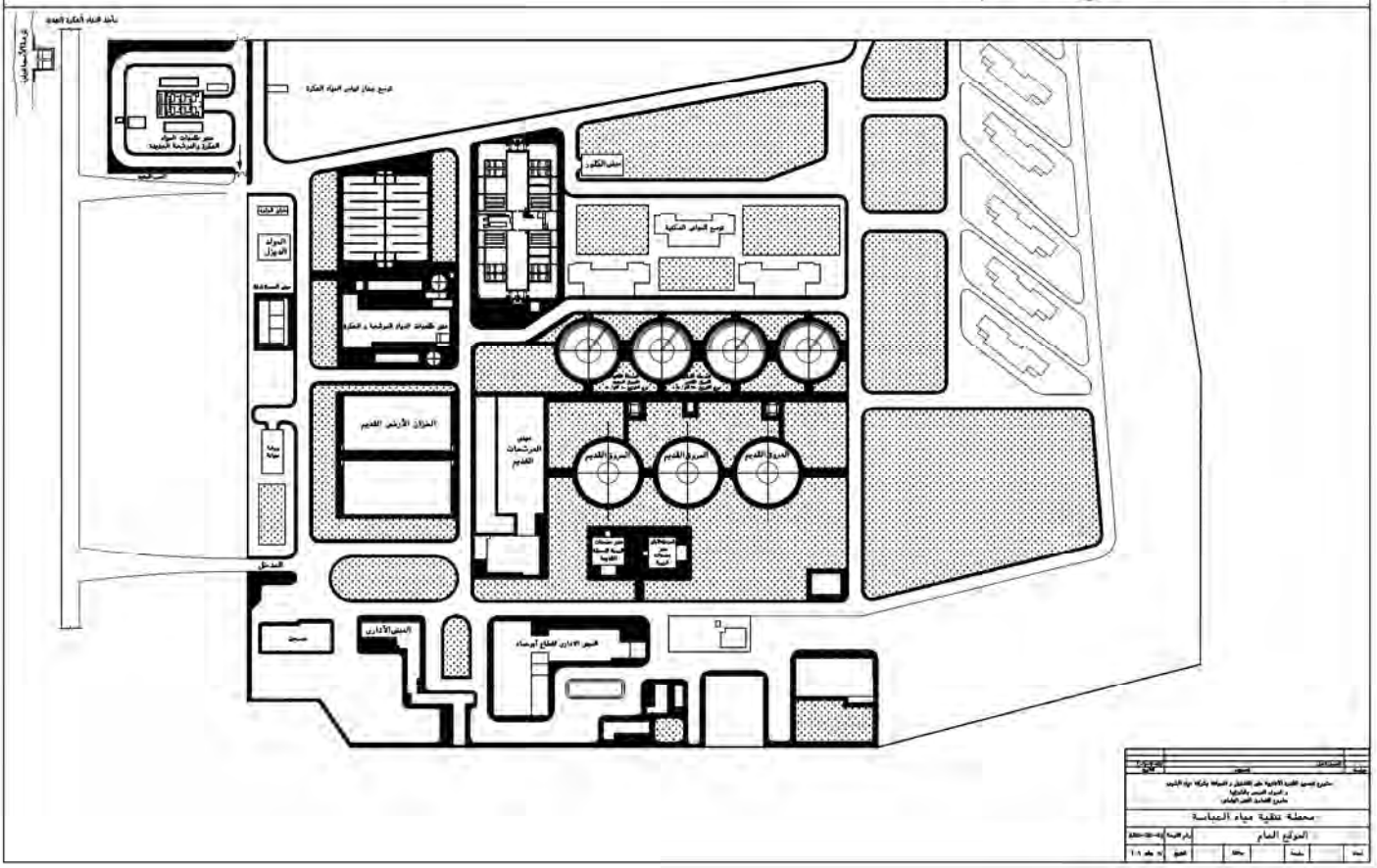
14 **Zagazig City**

14	1	Mogamaa El Zeraa*	9	1	1965
14	2	El Magzar El Alee	2	1	1981
14	3	Sooq El Talat	1		1973
14	4	El Mahad El Deni 1	2		1990
14	5	El Mahad El Deni 2	2		1990
14	6	El Galaa 1&2	2		1989
14	7	El Galaa 3	2		1990
14	8	El Sagha	1		1985
14	9	Amn El Dawla	1	2	1993
14	10	El Qawmia	1		2002
14	11	Gamal Abd El Naser	1	1	1986
14	12	El Sadat	1		1990
14	13	Mawqaf El Mansoura	2		1990
14	14	Abu Amer	1	1	1996
14	15	El Shams	1		1969
14	16	El Hamla	1		1987
14	17	El Moalimat	1	1	1989
14	18	El Moasasa	1		1987
14	19	El Mabara	1		1969
14	20	El Zagazig El Bahari	1		1990
14	21	Abd Alah Fekri	1		1988
14	22	Kafr Abd El Aziz	1		1989
14	23	Mawqaf Faqus	2		1990
14	24	Qouta (inside Zagazig WTP)	2		1974
14	25	El Tagneed	0	1	
14	26	Makhazen Magles El Madina	0	1	
14		Total Number of Wells	40	9	

*Magamaa El Zeraa includes; Zeraa 1, 2 and 3 and Tank well 1and 2 and Rafeea El Z

3.2 Basic Drawings for Model Facilities (Action S1)

العباسة (الموقع العام)



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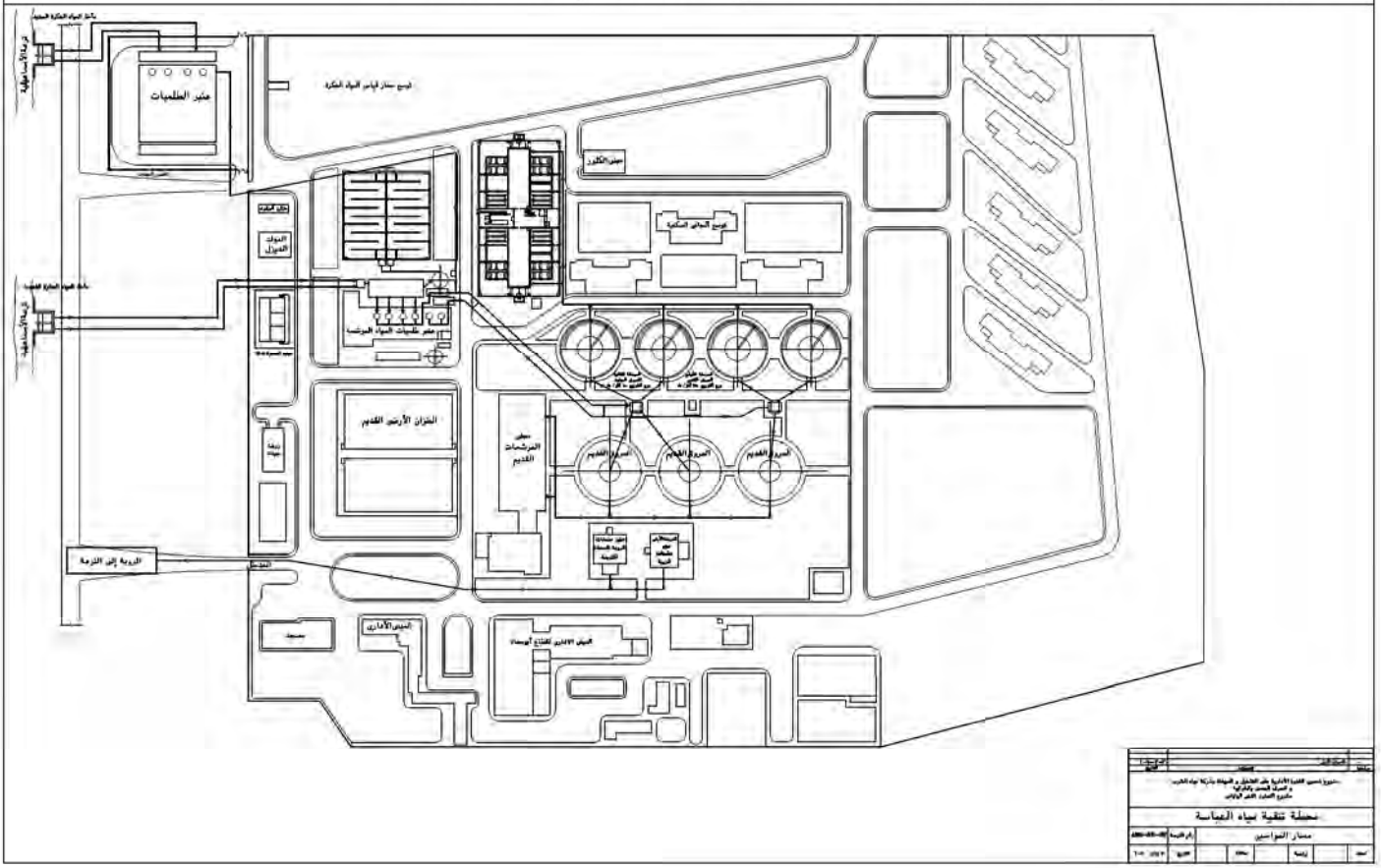

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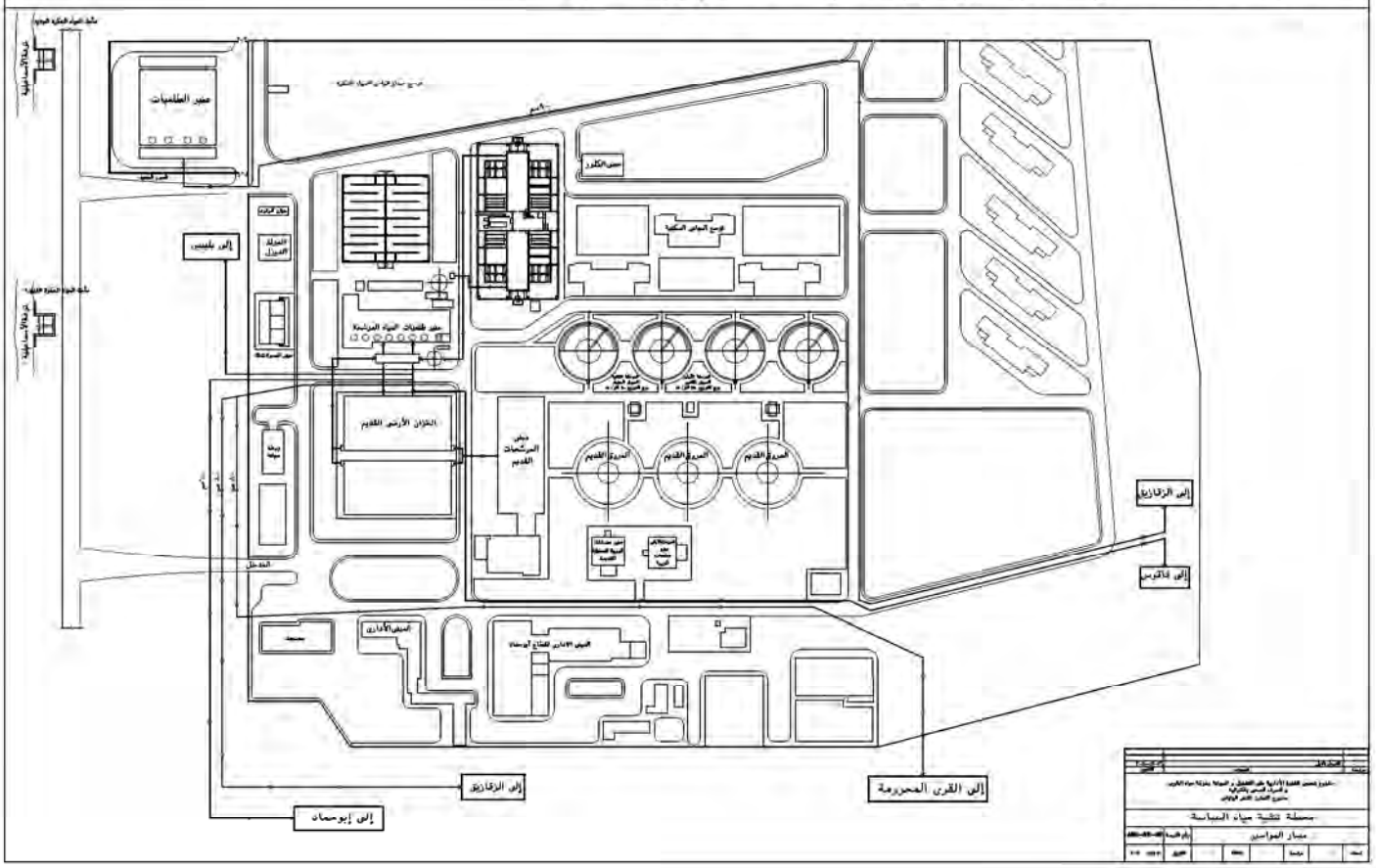

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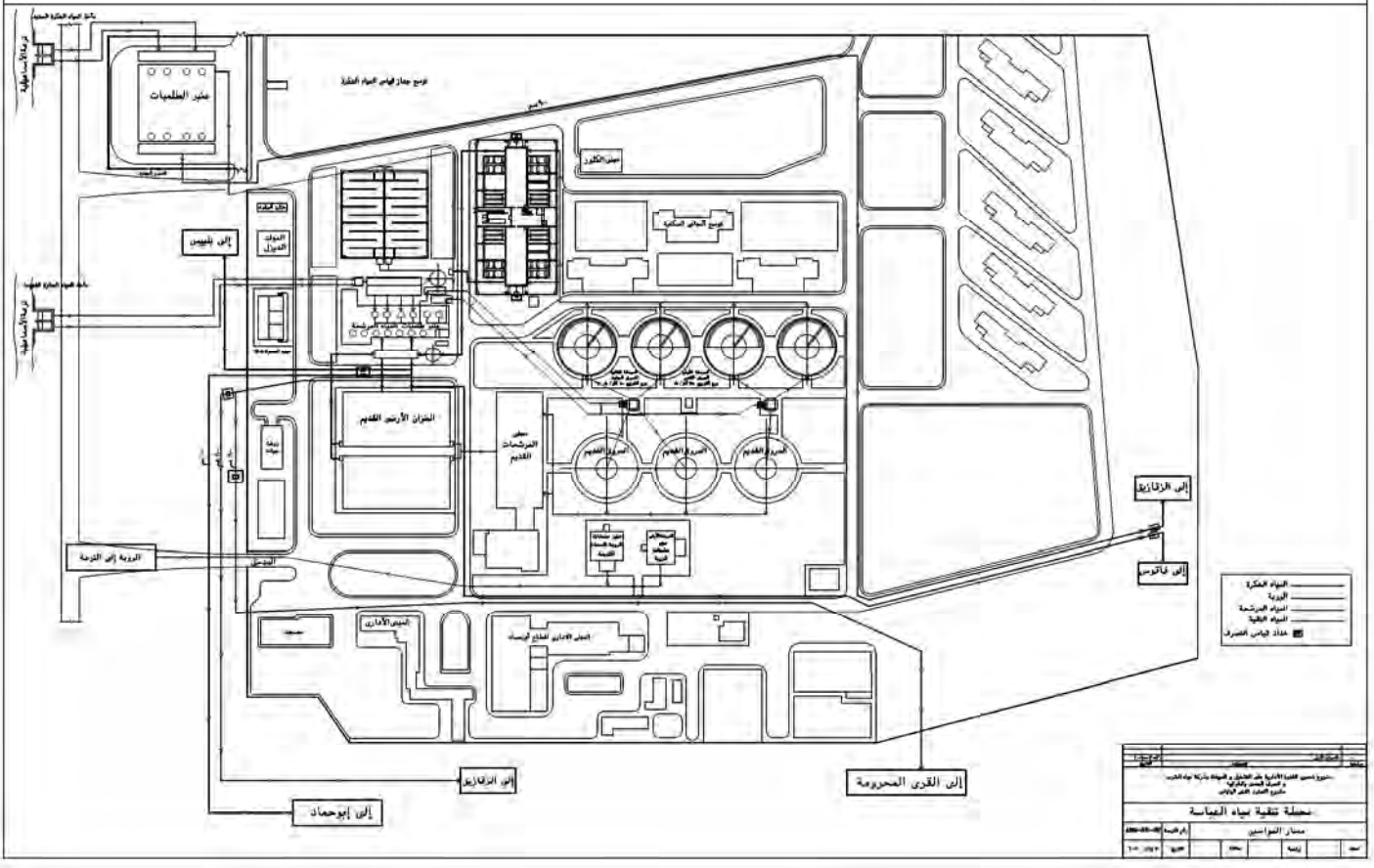

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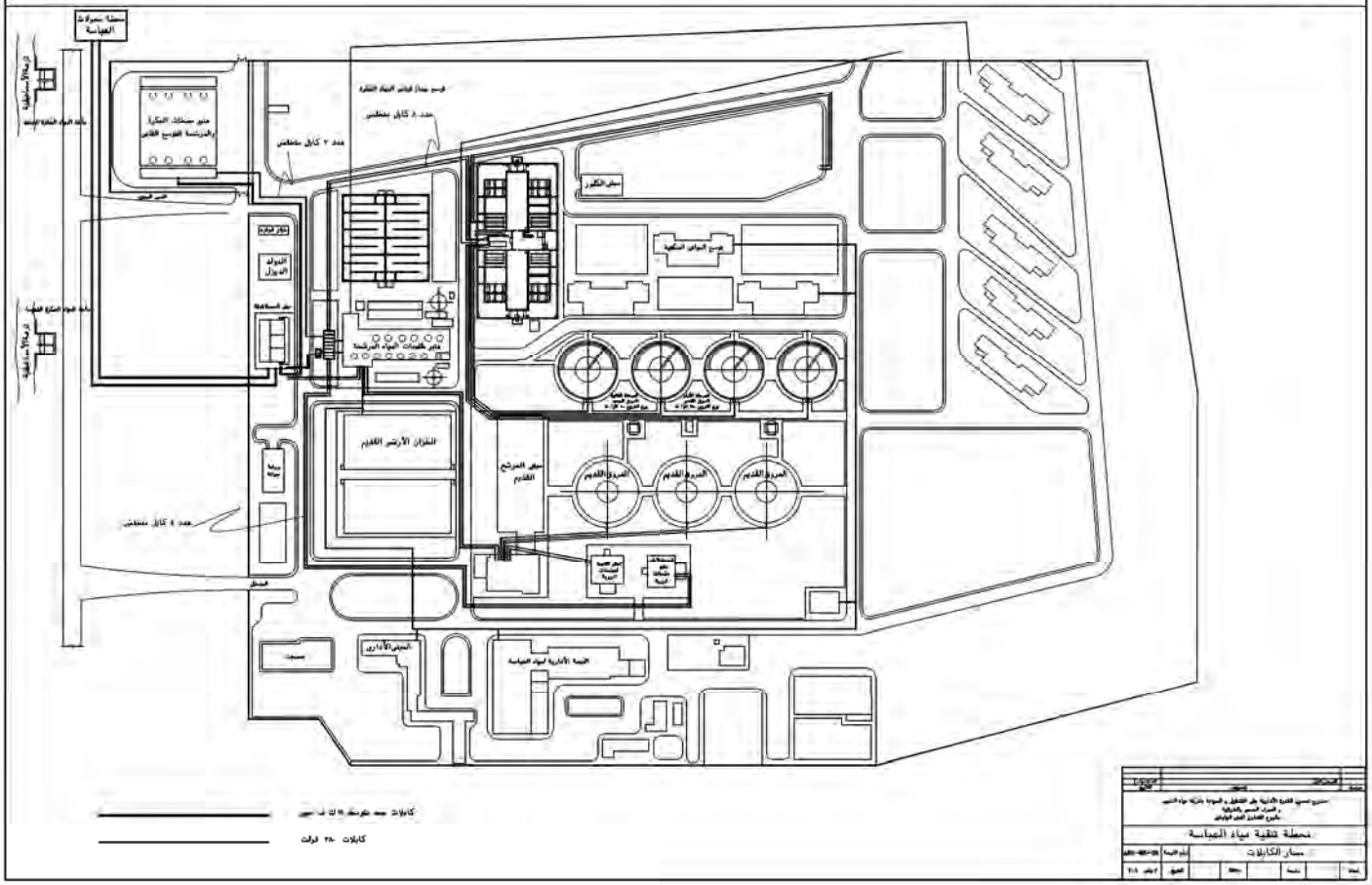

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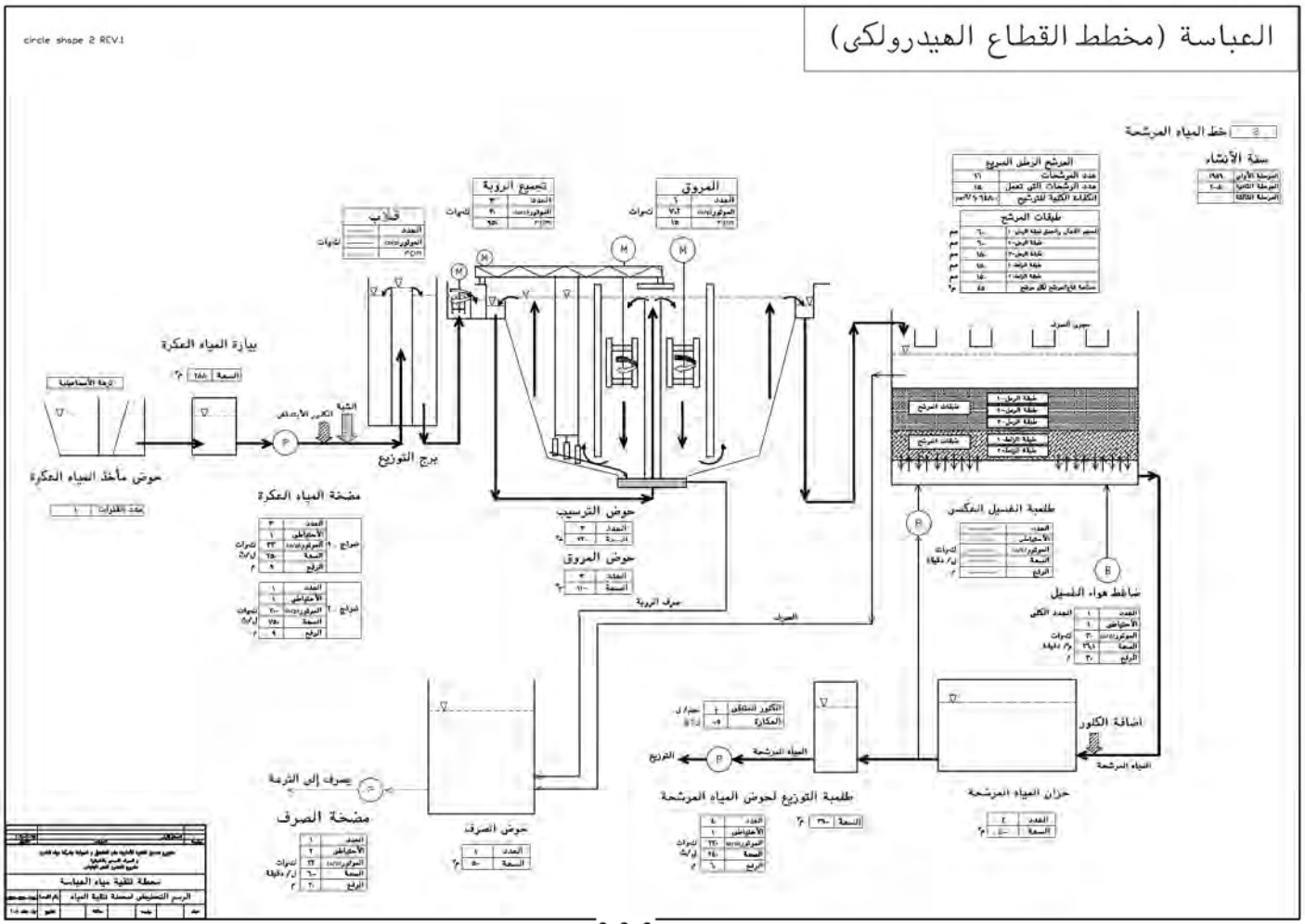

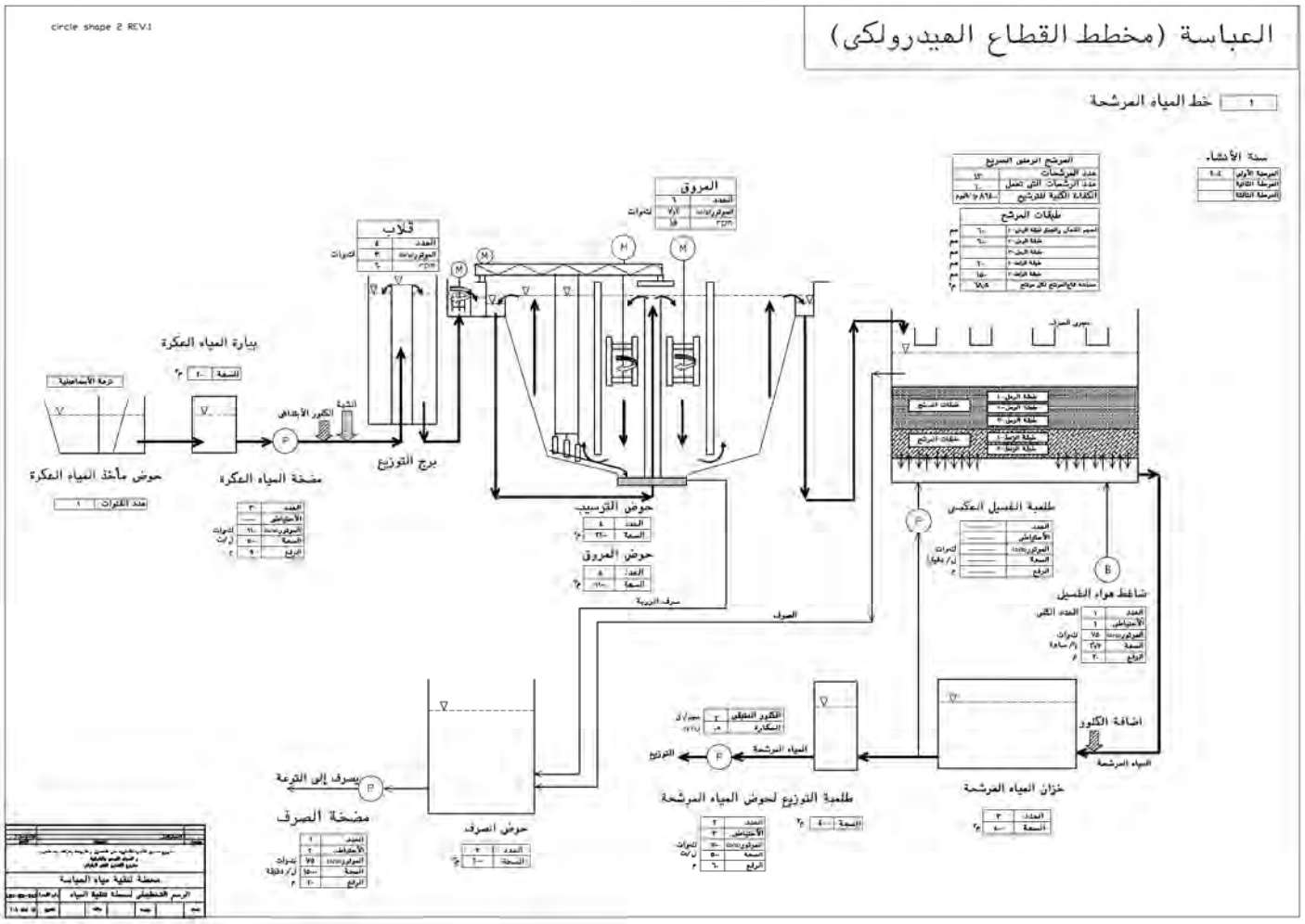
circle shape 2 REV.1
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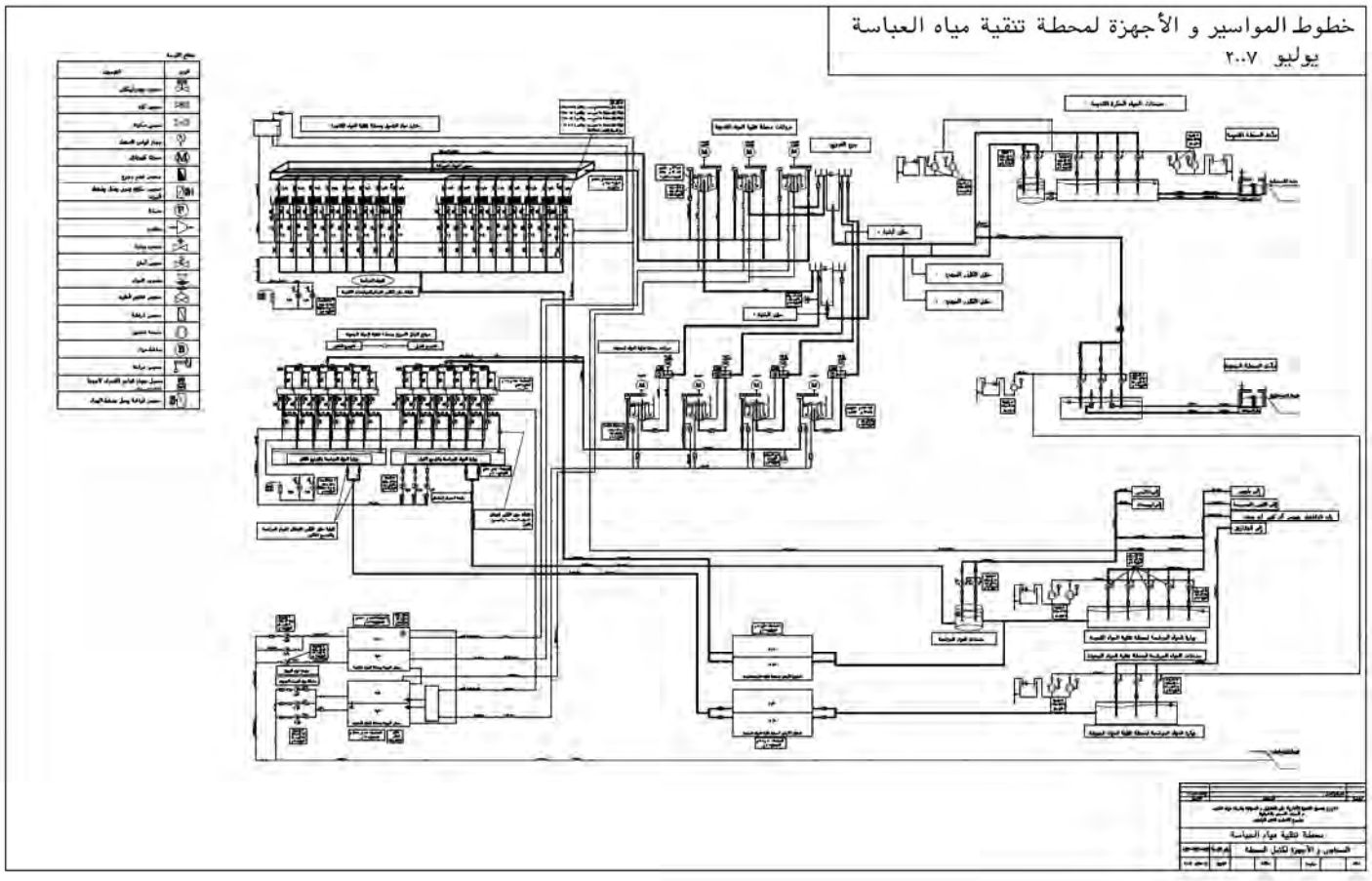
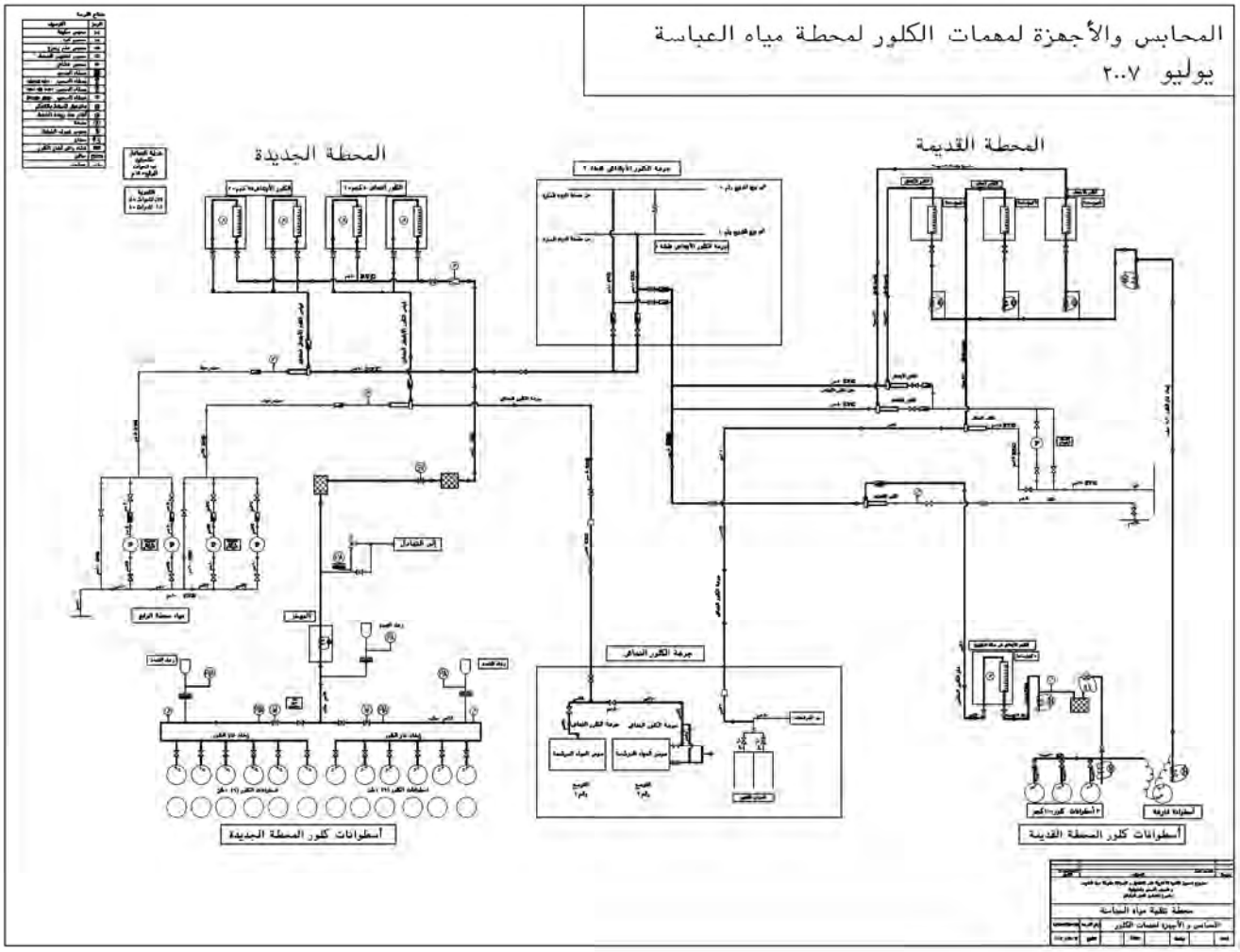
محطة تنقية مياه العباسة


خطوط المواسير و الأجهزة لمحطة تنقية مياه العباسة
يوليو ٢٠٠٧
محطة تنقية مياه العباسة

المحابس والأجهزة لمهمات الكلور لمحطة مياه العباسة
يوليو ٢٠٠٧



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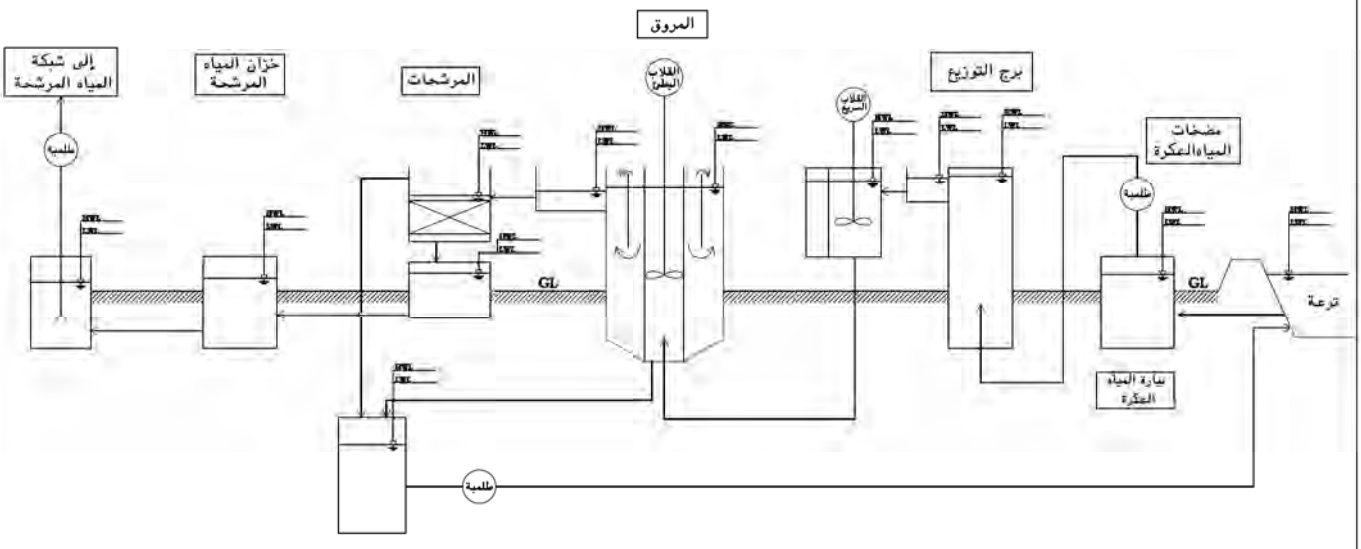
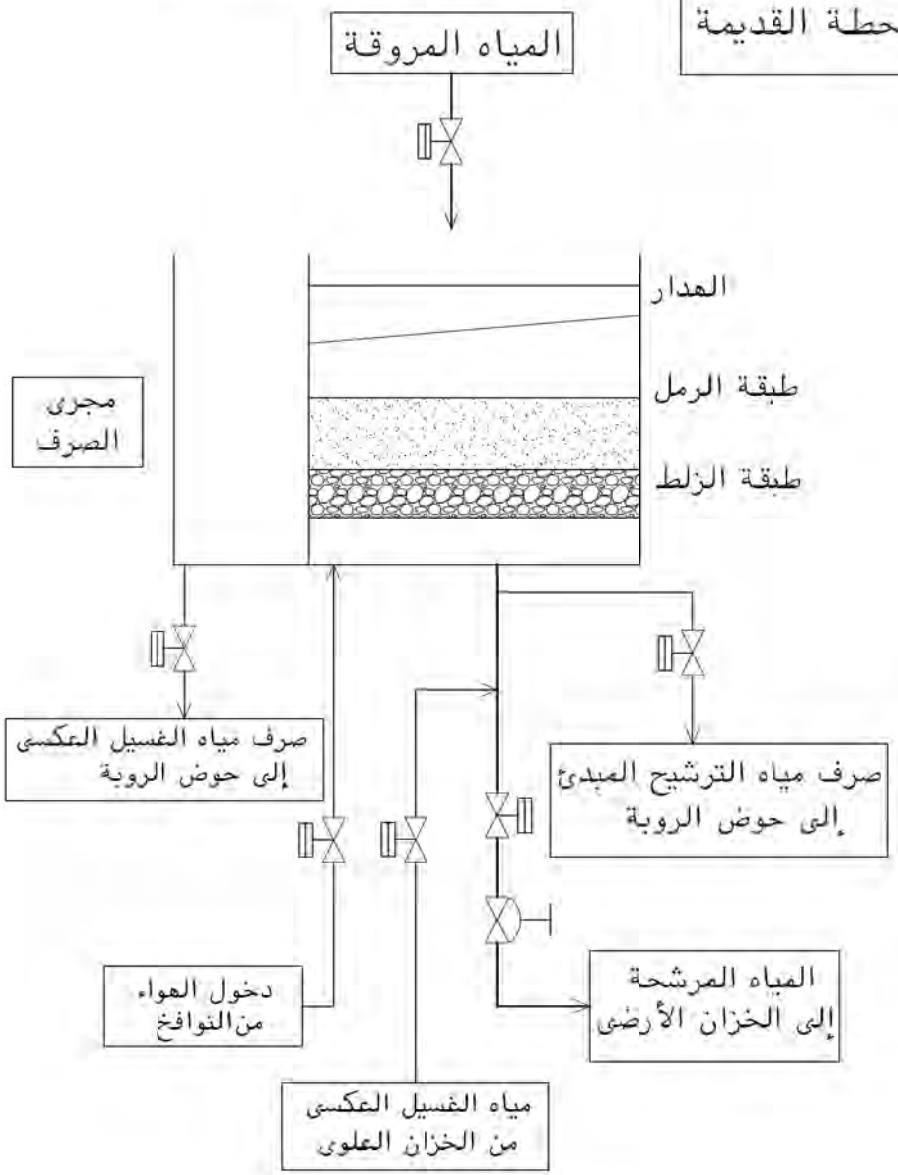


العباسة (المرشح الرملى السريع)

المحطة القديمة



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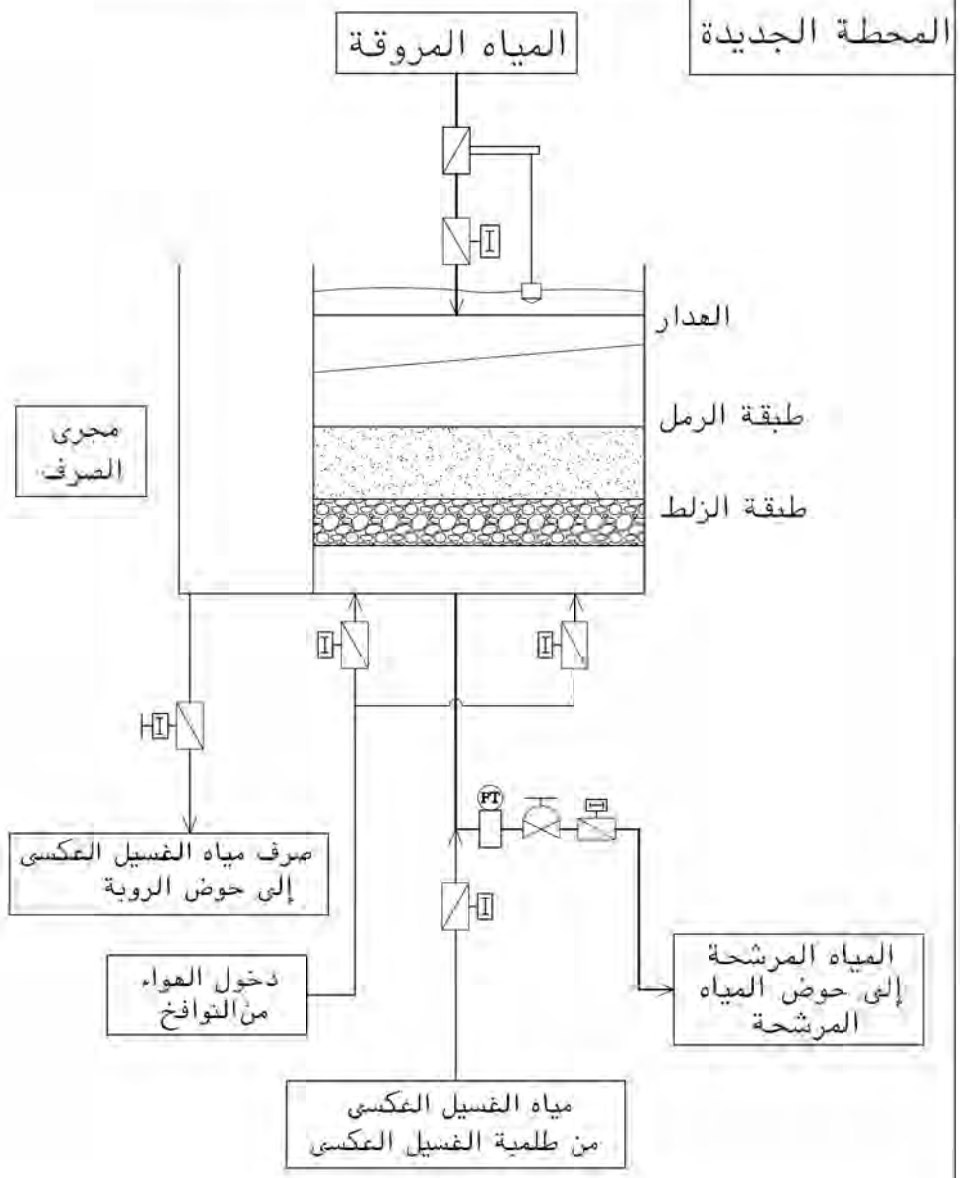
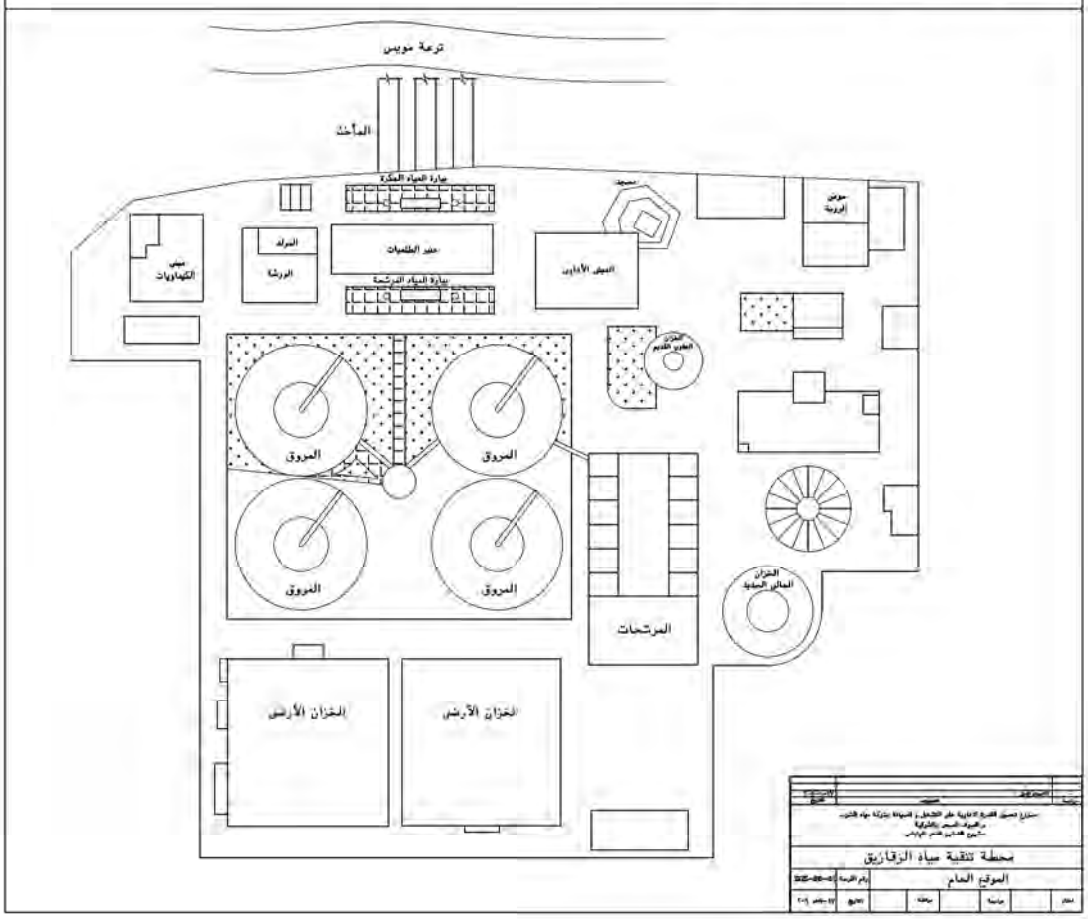
المحطة الجديدة



الزقازيق (الموقع العام)



خطوط المواسير و الأجهزة لمحطة تنقية مياه الزقازيق
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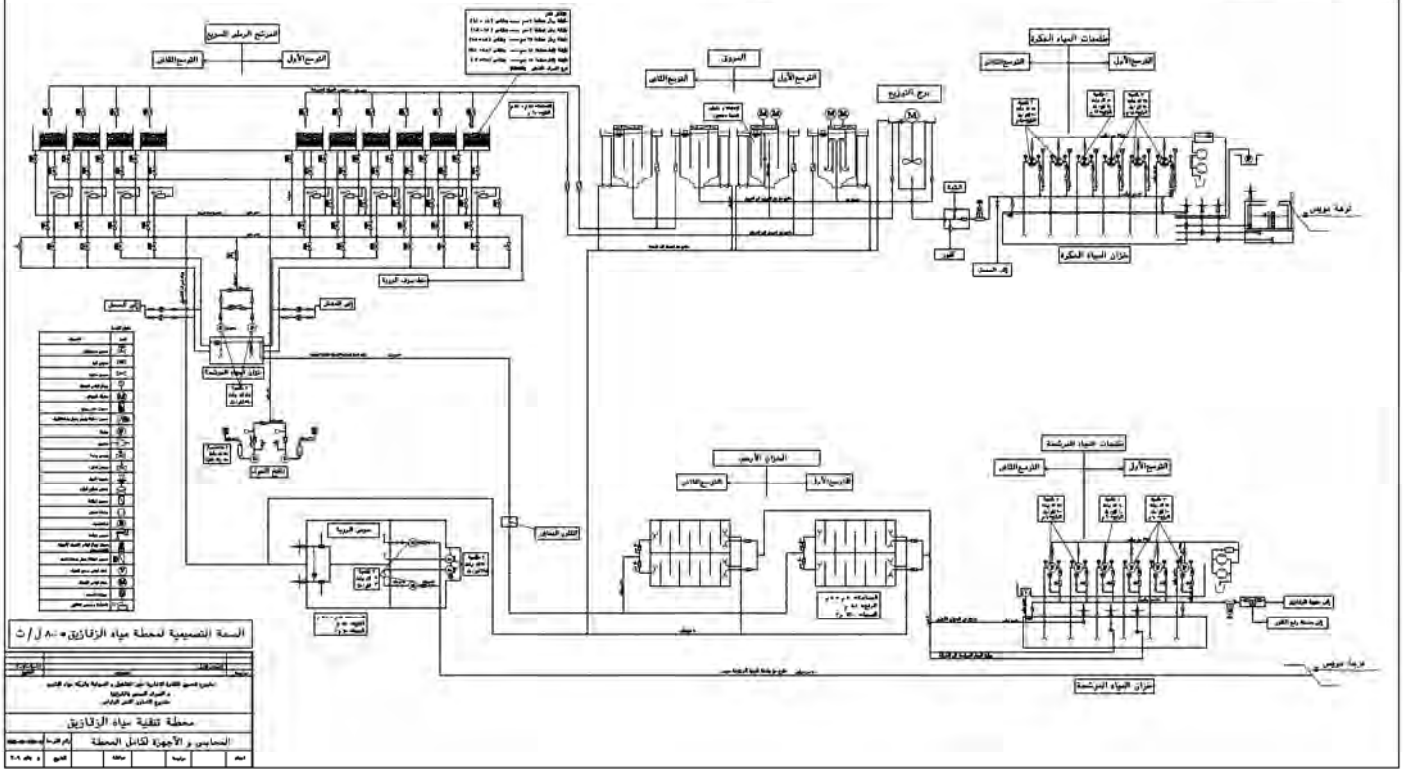

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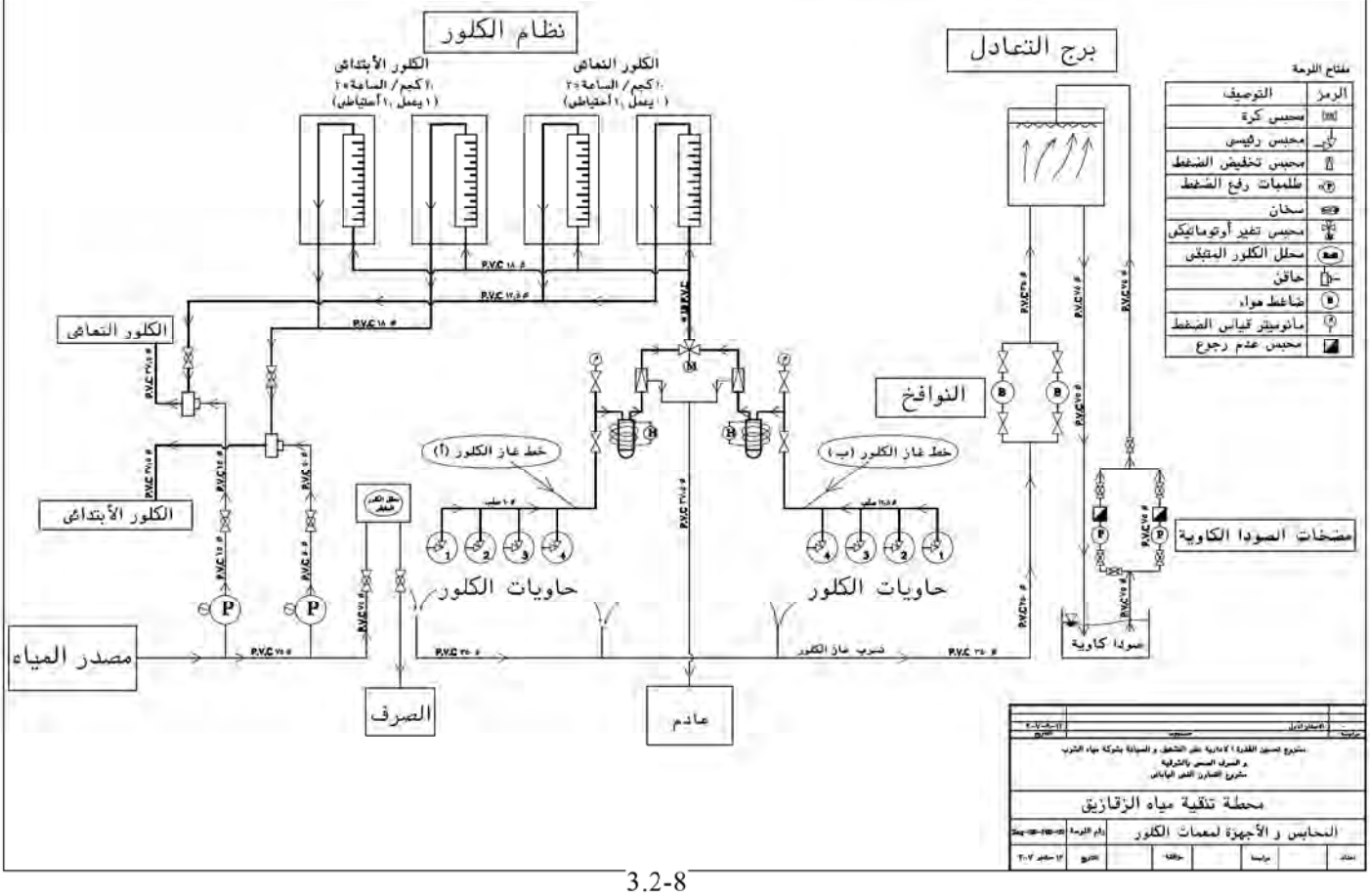
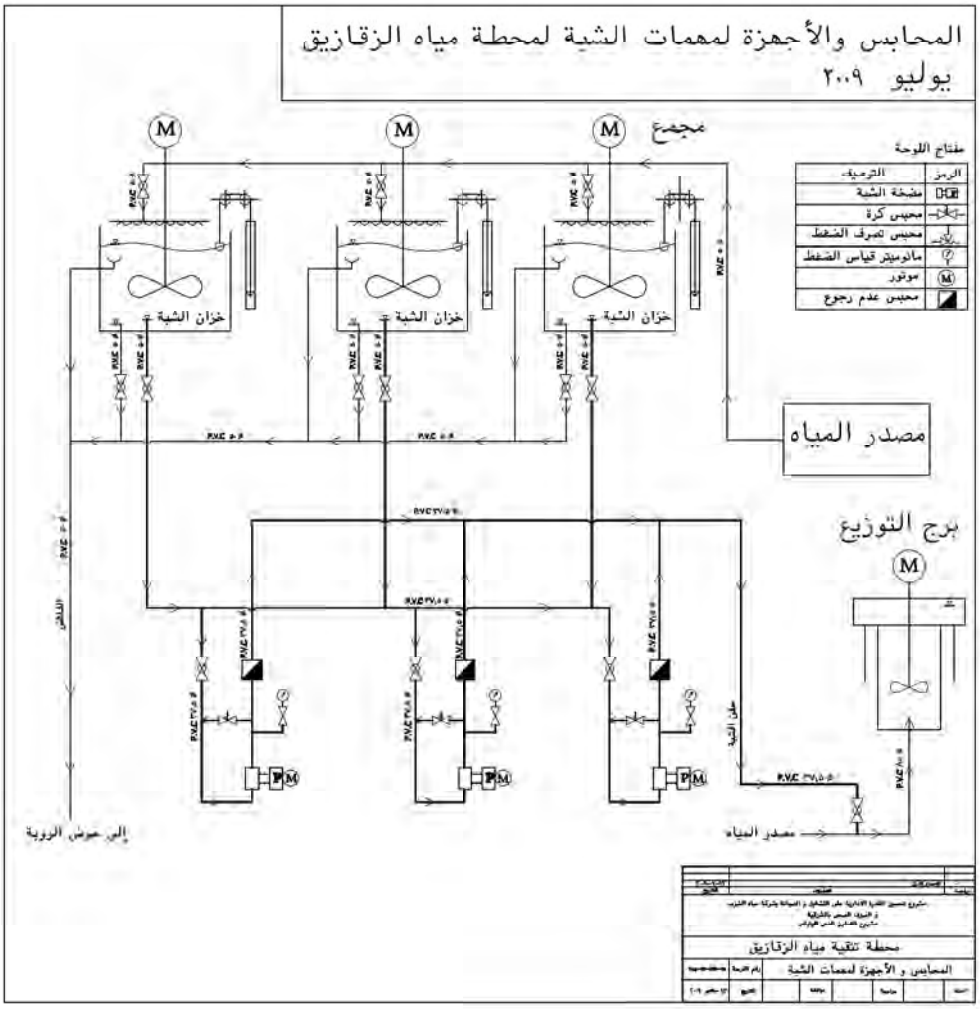
يوليو ٢٠٠٧

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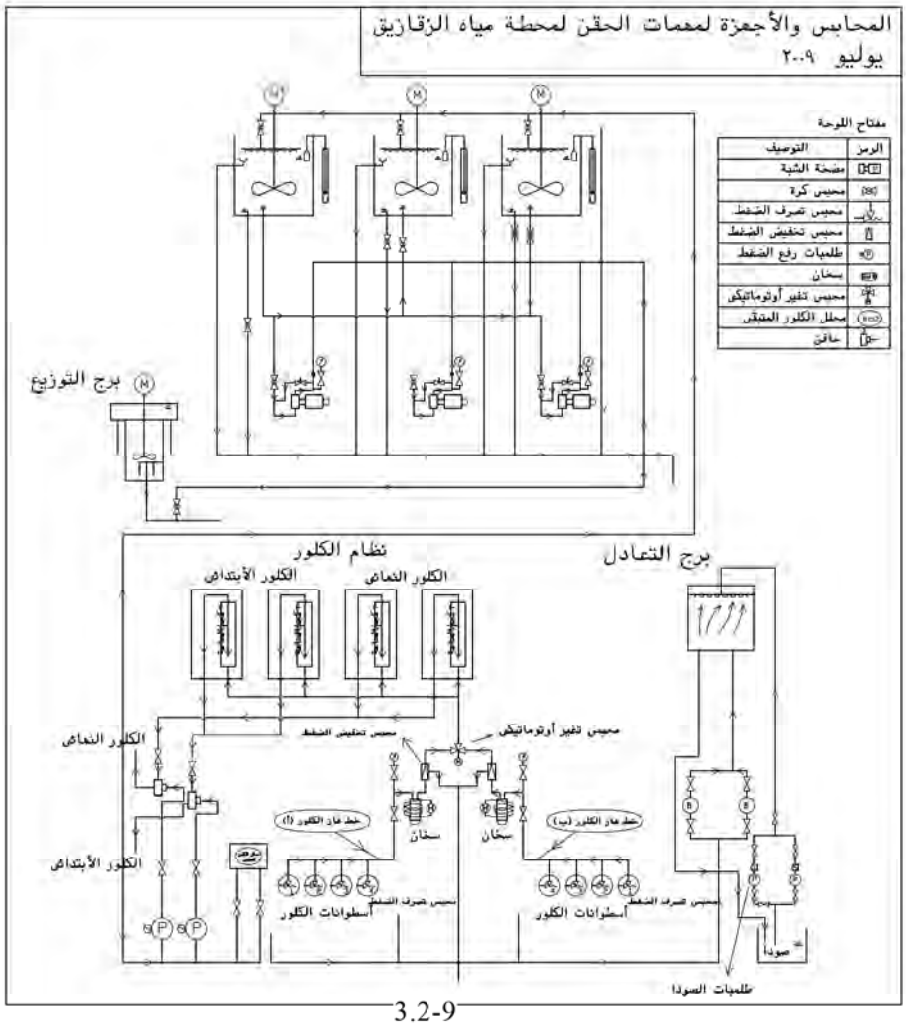
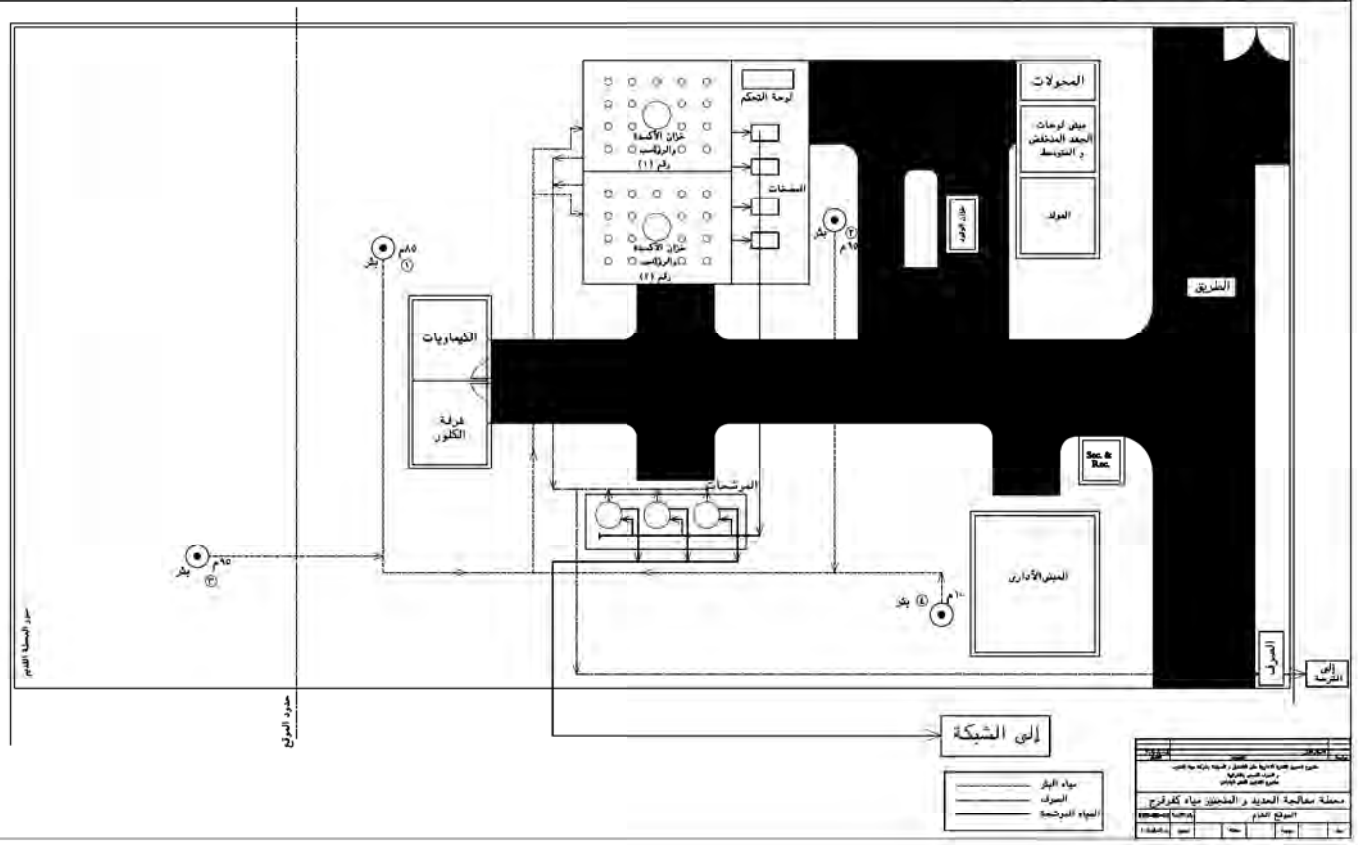
يوليو ٢٠٠٩
مجمع
مفتاح اللوحة
الرمز
الترميز
مضخة الشبة
محبس كرة
محبس تصرف الضغط
مانومتر قياس الضغط
موتور
محبس عدم رجوع
خزان الشبة
خزان الشبة
خزان الشبة
مصدر المياه
برج التوزيع
إلى حوض الرويه
مصدر المياه
محطة تنقية مياه الزقازيق
المحابس و الأجهزة لمهمات الشبة


المحابس والأجهزة لمهمات الحقن لمحطة مياه الزقازيق
يوليو ٢٠٠٩
مفتاح اللوحة
الرمز
التوصيف
مضخة الشبة
محبس كرة
محبس تصرف الضغط
محبس تخفيض الضغط
طلمبات رفع الضغط
سخان
محبس تغير أوتوماتيكى
محلل الكلور المتقن
حاقن
برج التوزيع
نظام الكلور
برج التعادل
الكلور الأبتداءى
الكلور النهائى
الكلور النهائى
الكلور الأبتداءى
محبس تخفيض الضغط
محبس تغير أوتوماتيكى
خط غاز الكلور (أ)
خط غاز الكلور (ب)
سخان
سخان
أسطوانات الكلور
أسطوانات الكلور
محبس تصرف الضغط
محبس تصرف الضغط
صودا
طلمبات الصودا

كفرفرج (الموقع العام)



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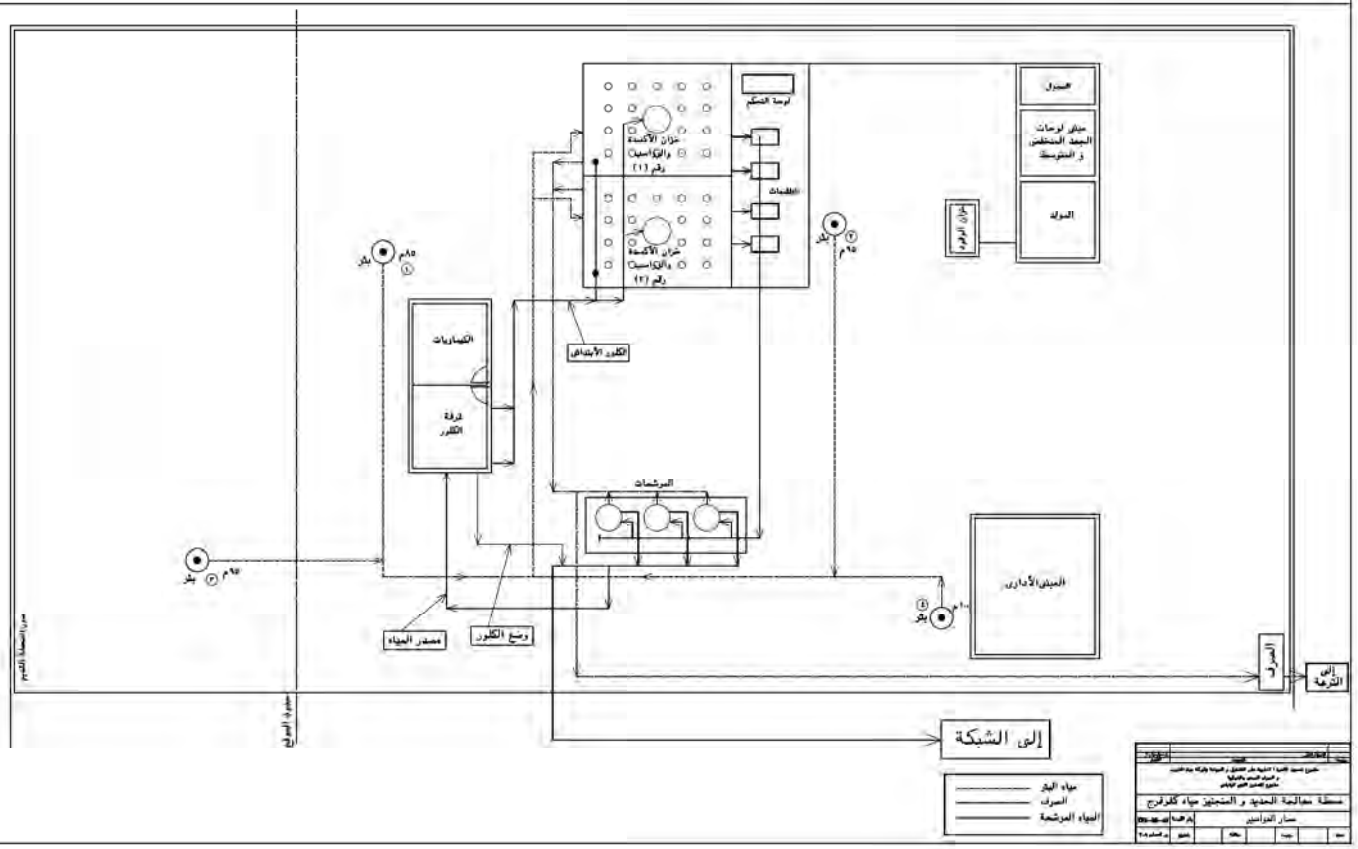

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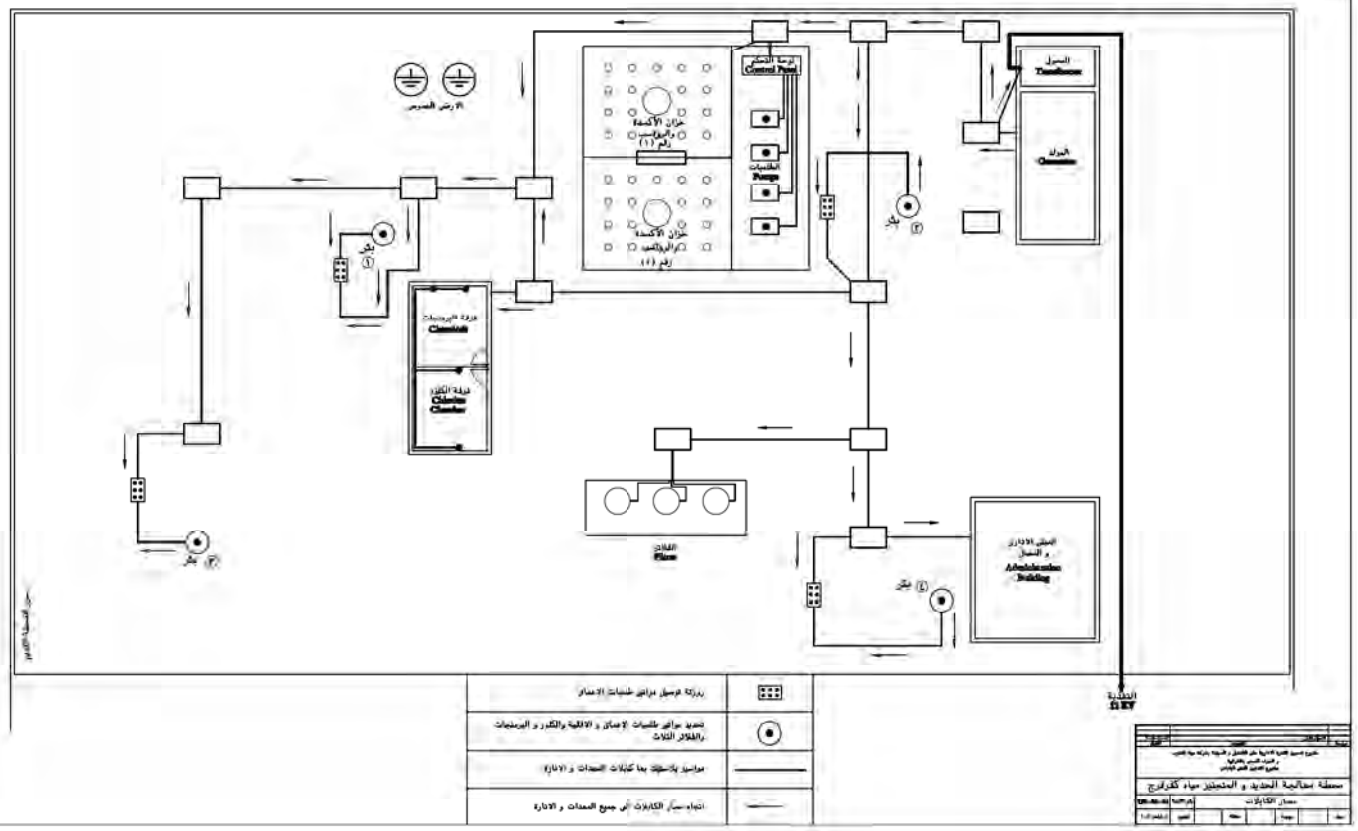

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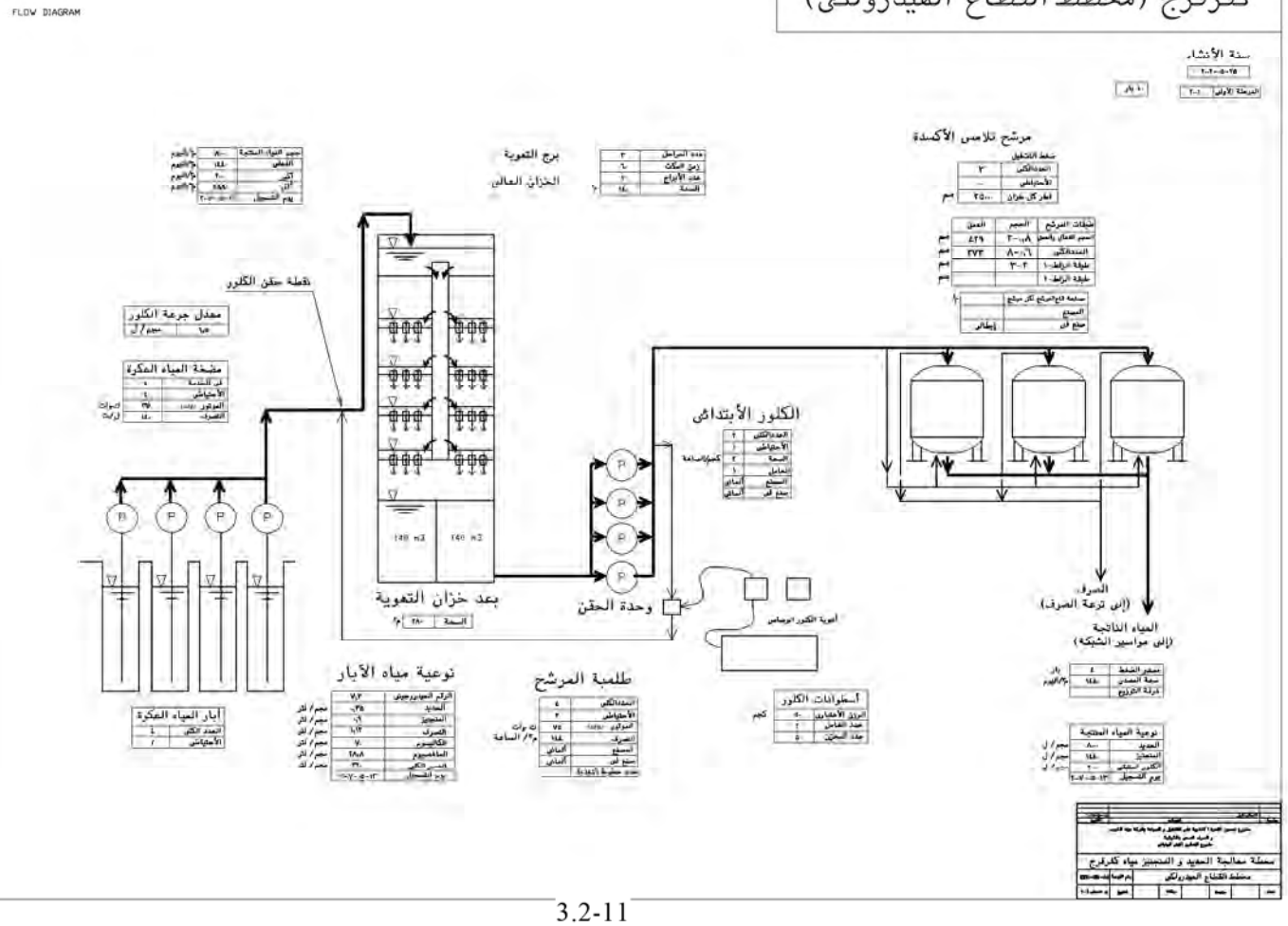
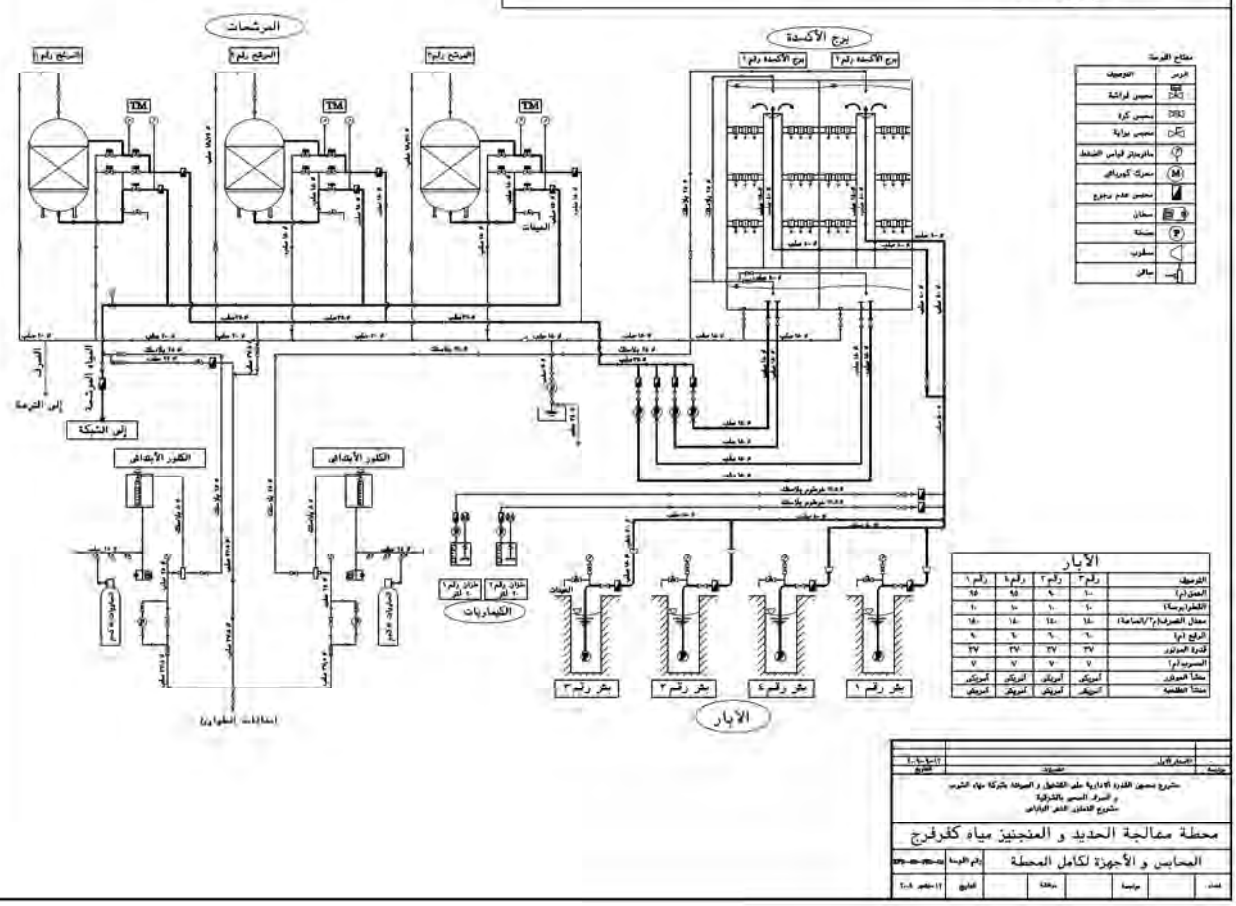


خطوط المواسير و الأجهزة لمحطة تنقية مياه كفر فرج
ستمبر ٢٠٠٩



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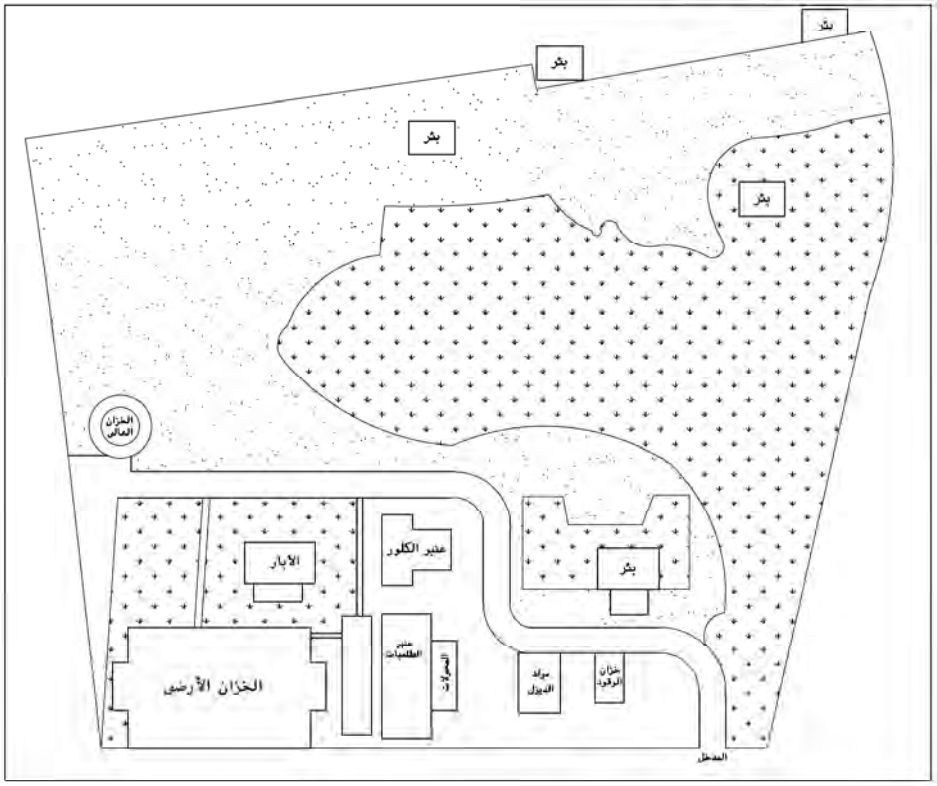
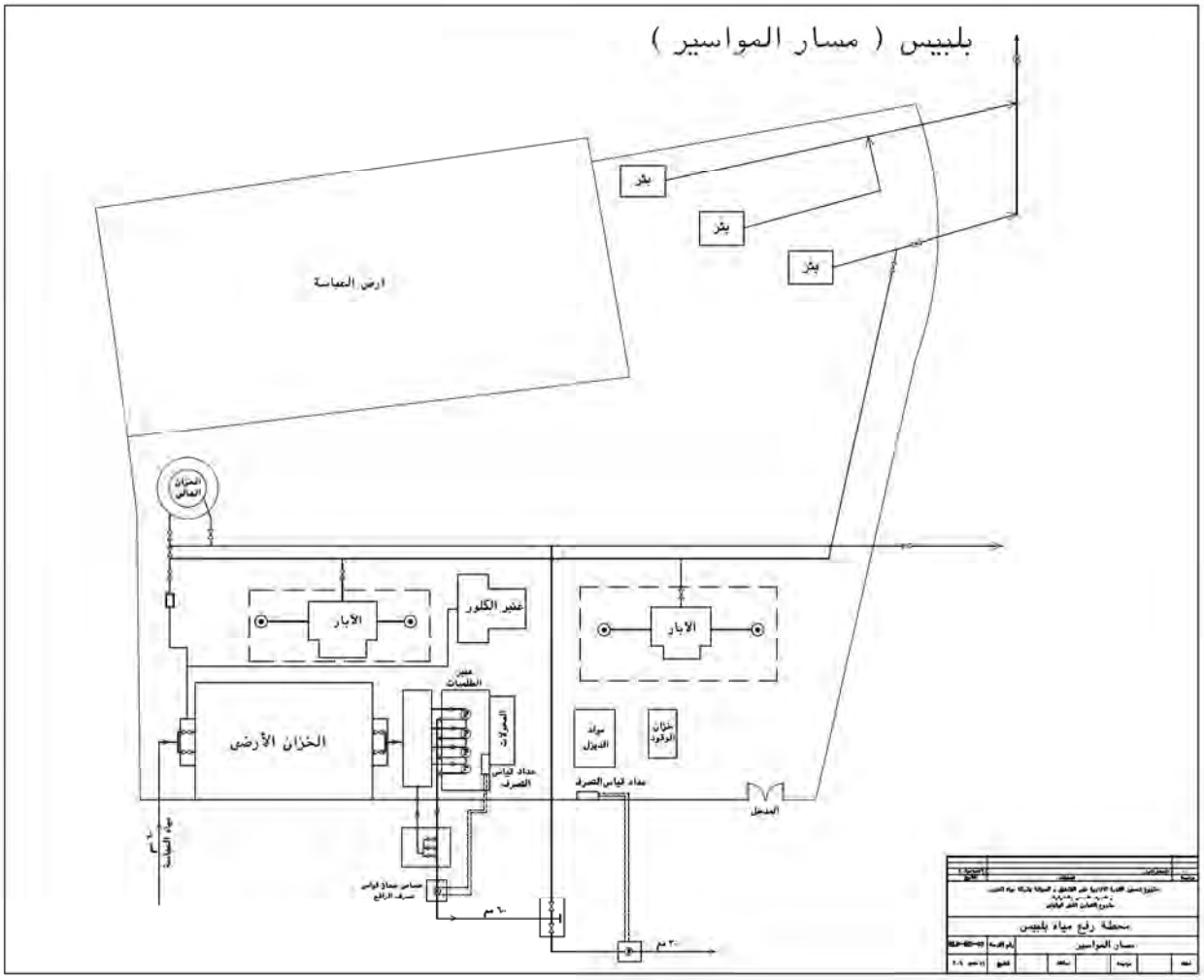
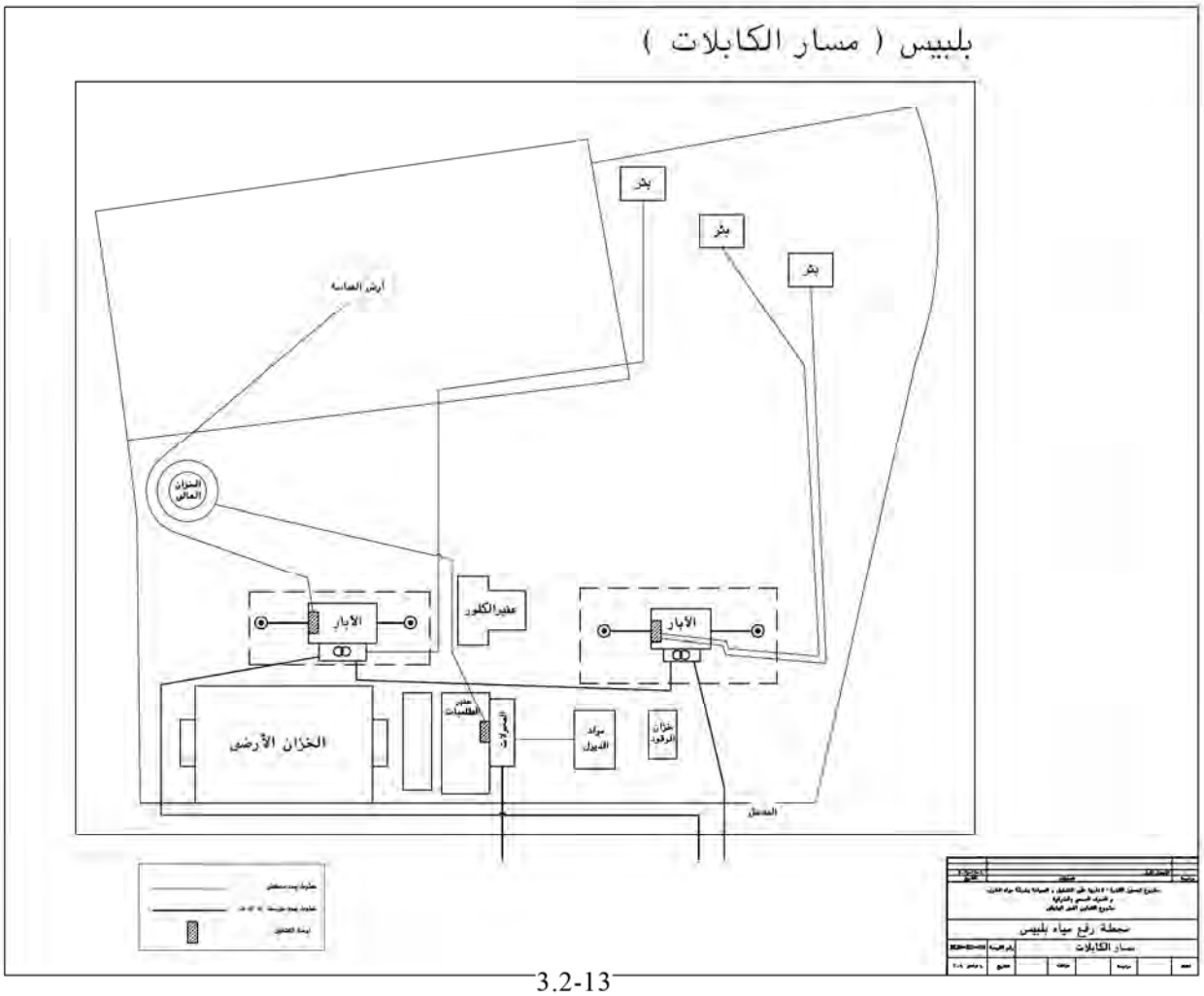



بلبيس (مسار المواسير)
بئر
بئر
بئر
ارض العساسة
الخزان العالي
الآبار
عنبر الكلور
الآبار
عنبر الطلمبات
الخزان الأرضي
المحروقات
مولد الديزل
خزان الوقود
عداد قياس الضرف
عداد قياس الضرف
المدخل
مياه العساسة
٦٠ مم
٣٠٠ مم
محطة رفع مياه بلبيس
مسار المواسير


بلبيس (مسار الكابلات)
بئر
بئر
بئر
أرض العساسة
الخزان العالي
الآبار
عنبر الكلور
الآبار
عنبر الطلمبات
الخزان الأرضي
المحروقات
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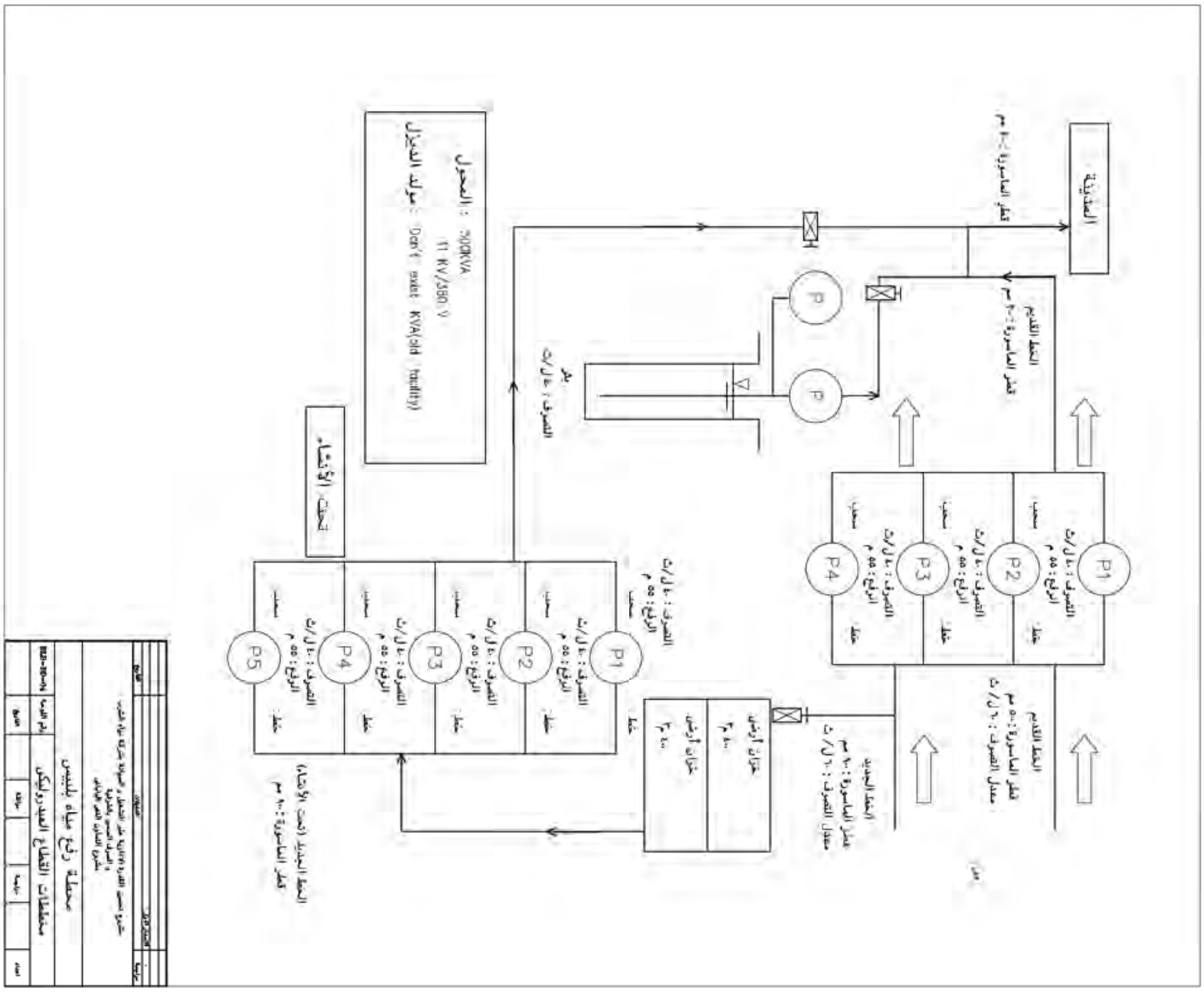
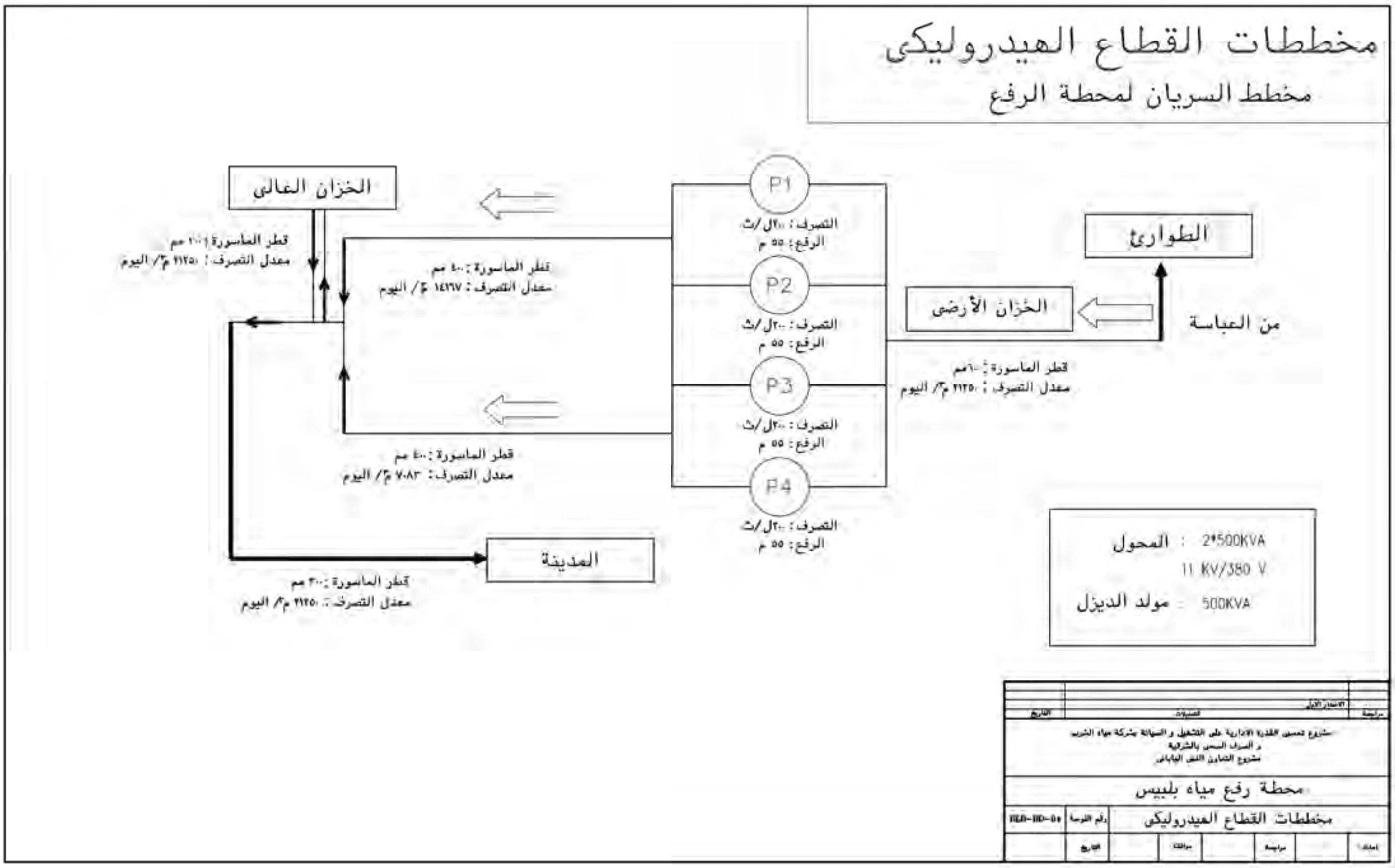
المدخل
محطة رفع مياه بلبيس
مسار الكابلات





مخططات القطاع الهيدروليكى
مخطط السريان لمحطة الرفع
الخزان العالى
الطوارئ
الخزان الأرضى
من العباسة
المدينة
P1
P2
P3
P4
الرفع: ٥٥ م
المحول : 2*500KVA
11 KV/380 V
مولد الديزل : 500KVA
محطة رفع مياه بلبيس
مخططات القطاع الهيدروليكى


Image © 2007 DigitalGlobe
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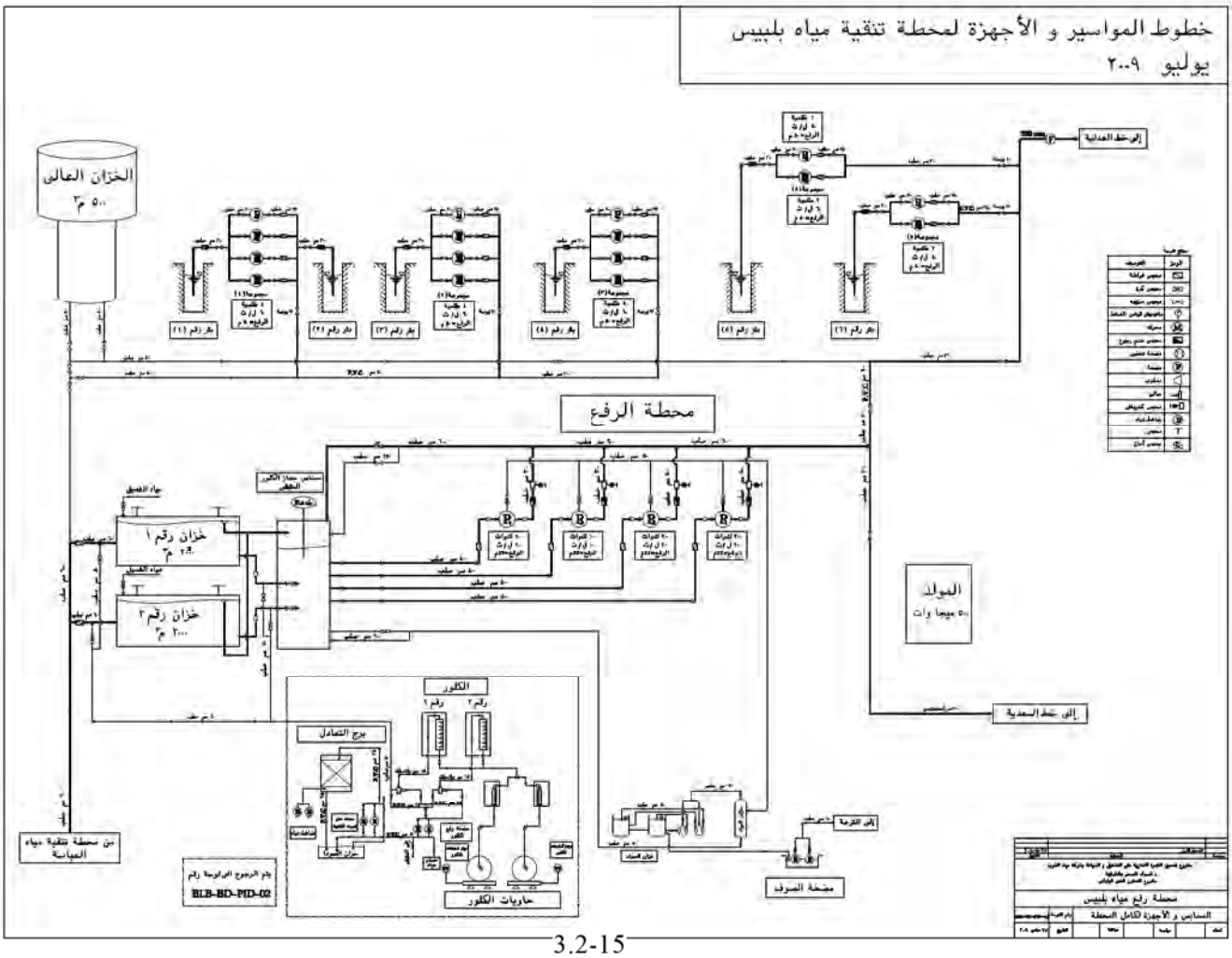
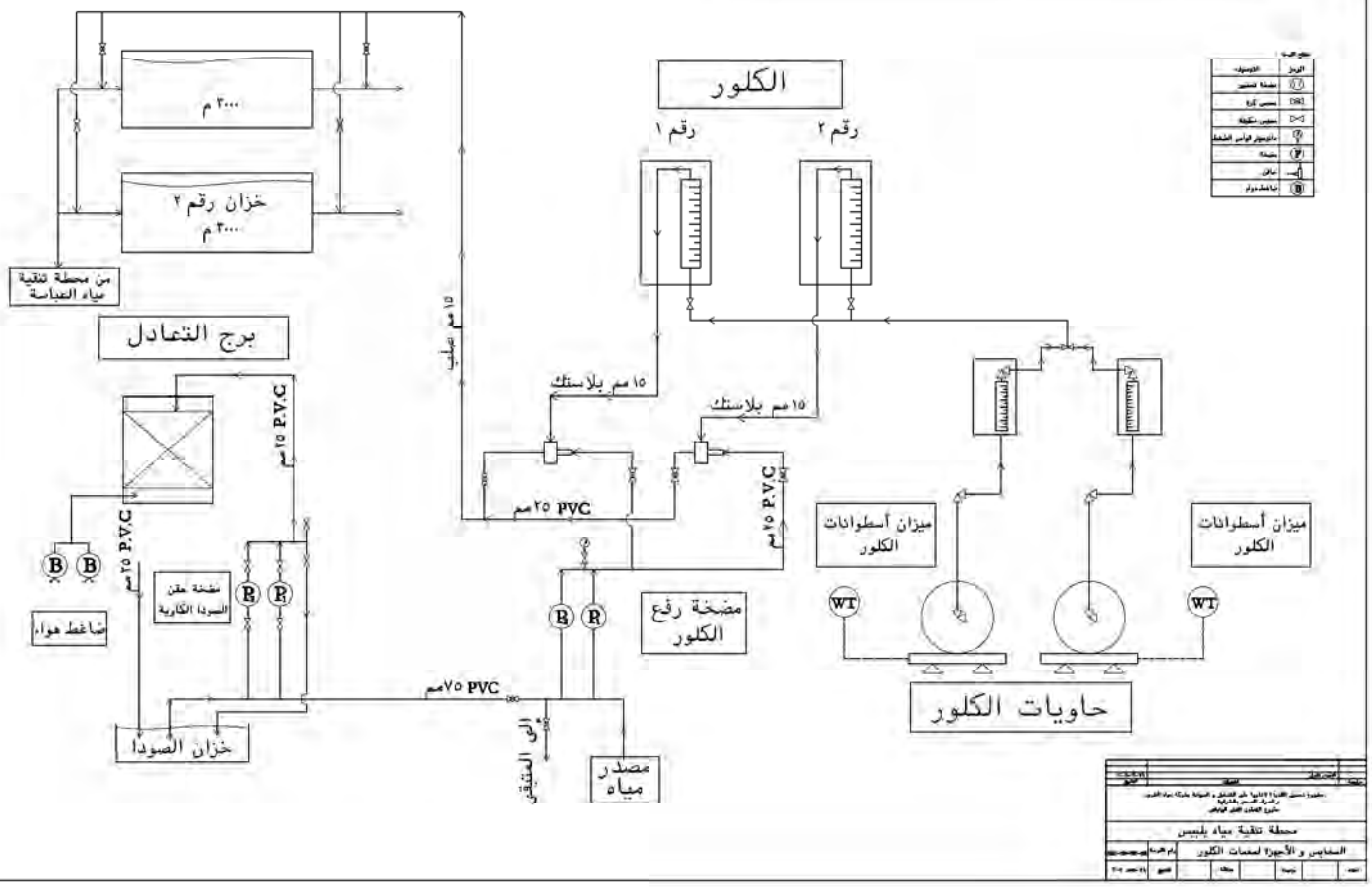
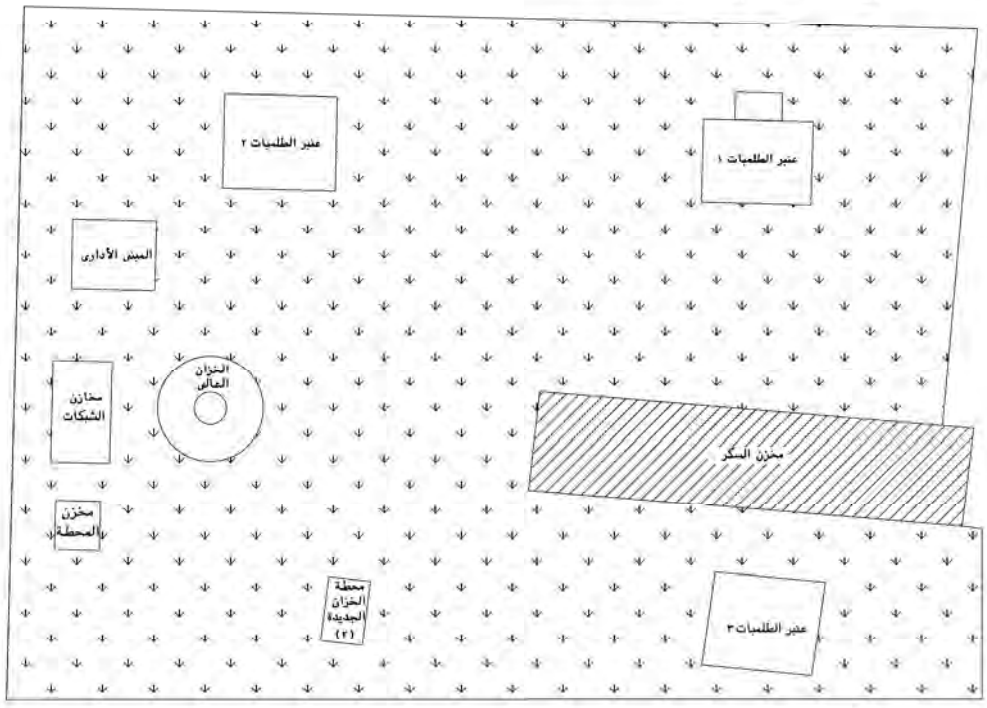
©2007 Google
Pointer 30°24'25.89" N 31°33'37.98" E elev 13 m
Streaming 100%
Eye alt 282 m


خطوط المواسير و الأجهزة لمحطة تنقية مياه بلبيس
يوليو ٢٠٠٩
الخزان العالى
٥٠٠ م٣
إلى خط العدالية
محطة الرفع
خزان رقم ١
٢٥٠ م٣
خزان رقم ٢
٢٠٠٠ م٣
المولد
٥٠٠ ميجا وات
الكلور
برج التعادل
إلى خط السعدية
من محطة تنقية مياه العباسة
مضخة الصرف
محطة رفع مياه بلبيس

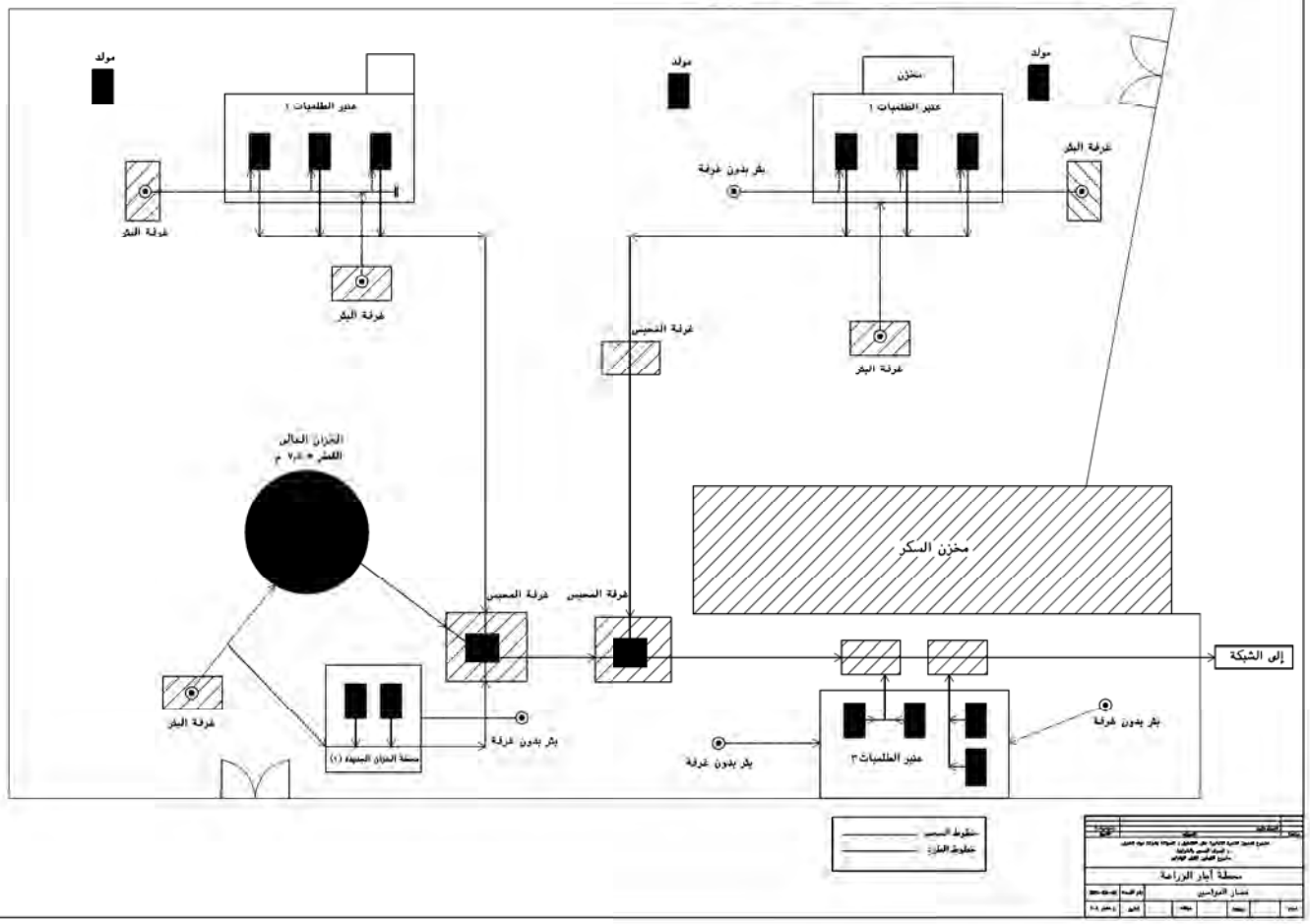
المحابس والأجهزة لمهمات الكلور لمحطة مياه بلبيس
يوليو ٢٠٠٩



الزراعة (الموقع العام)



الزراعة (مسار المواسير)



الزراعة (مسار الكابلات)

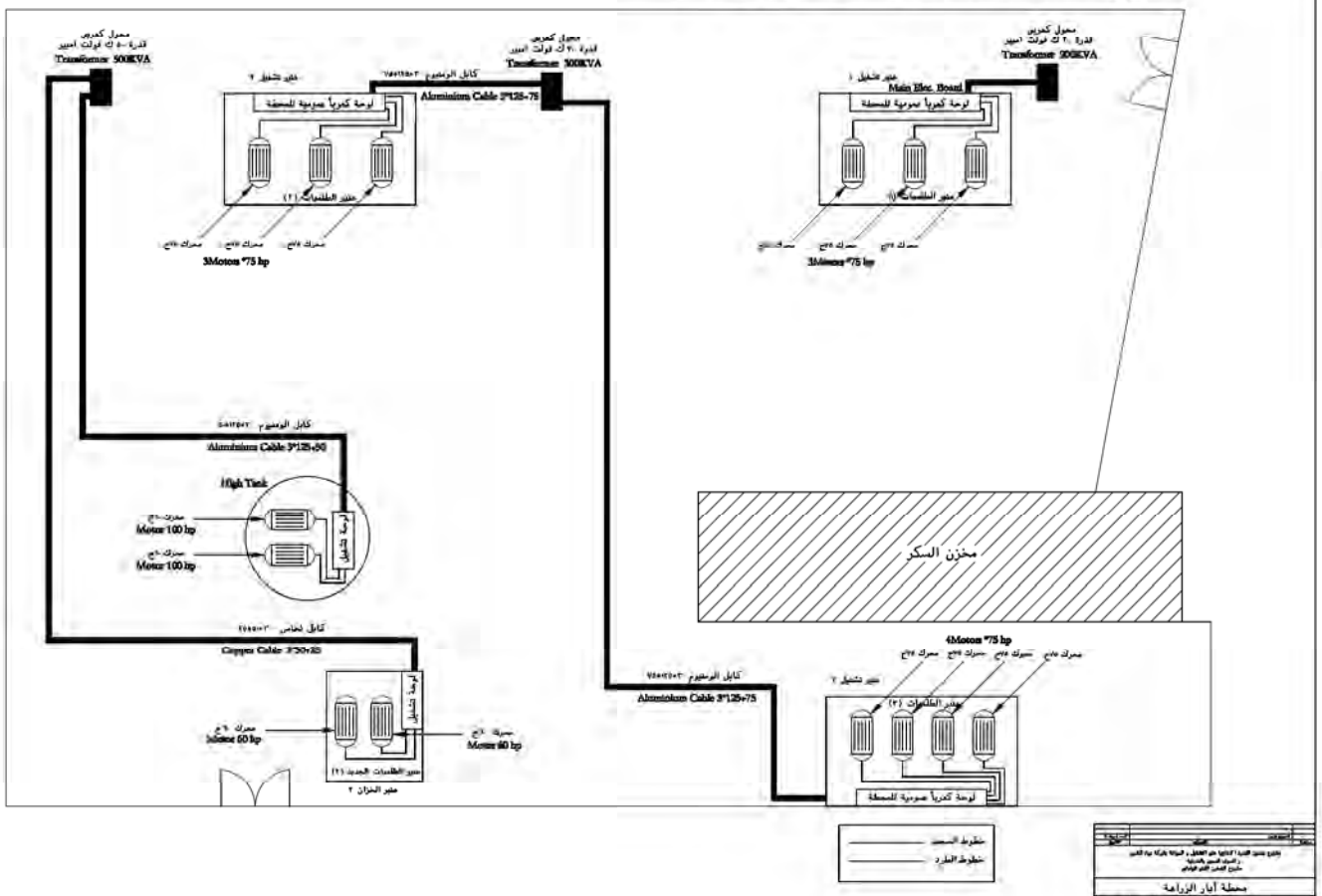
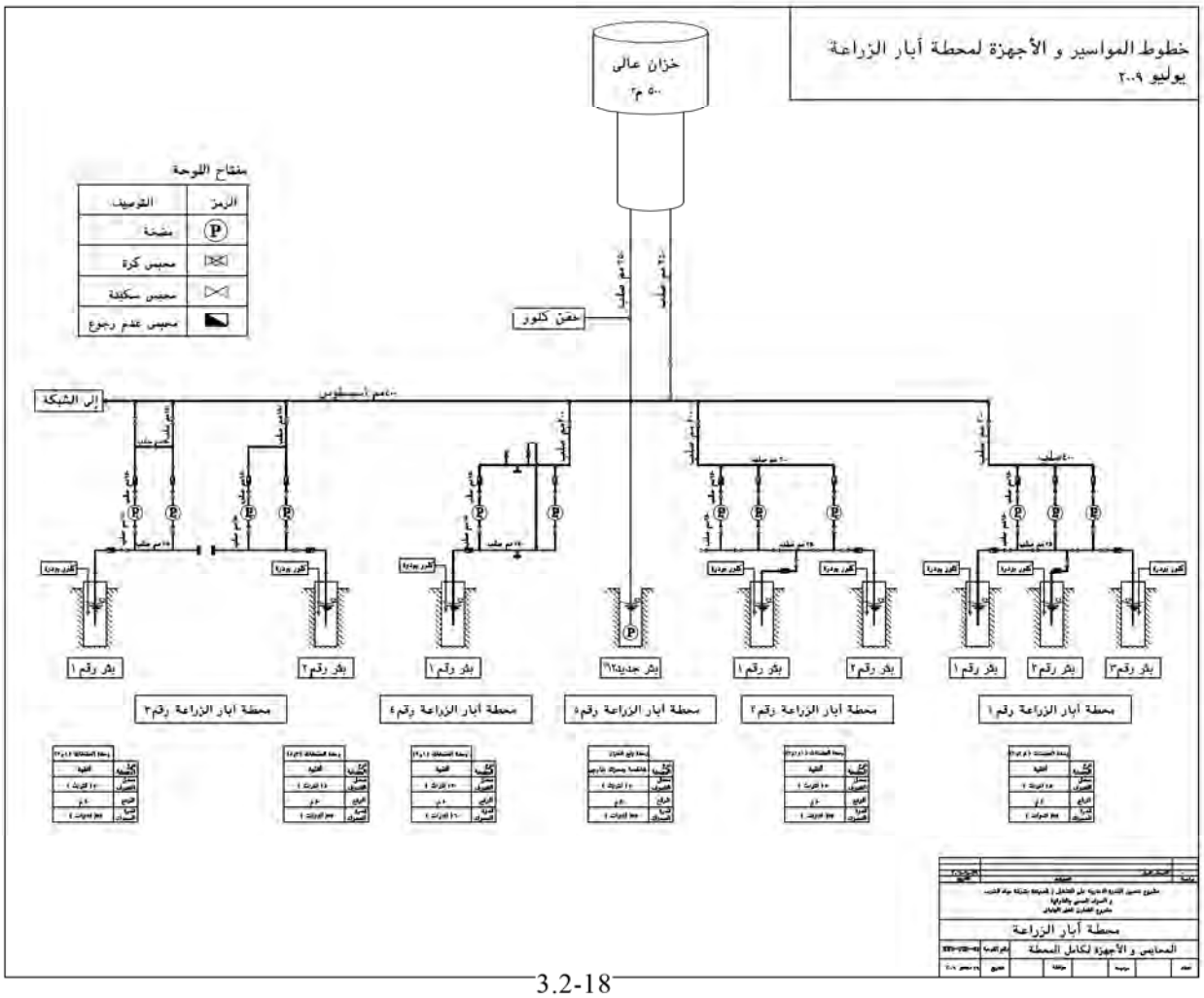
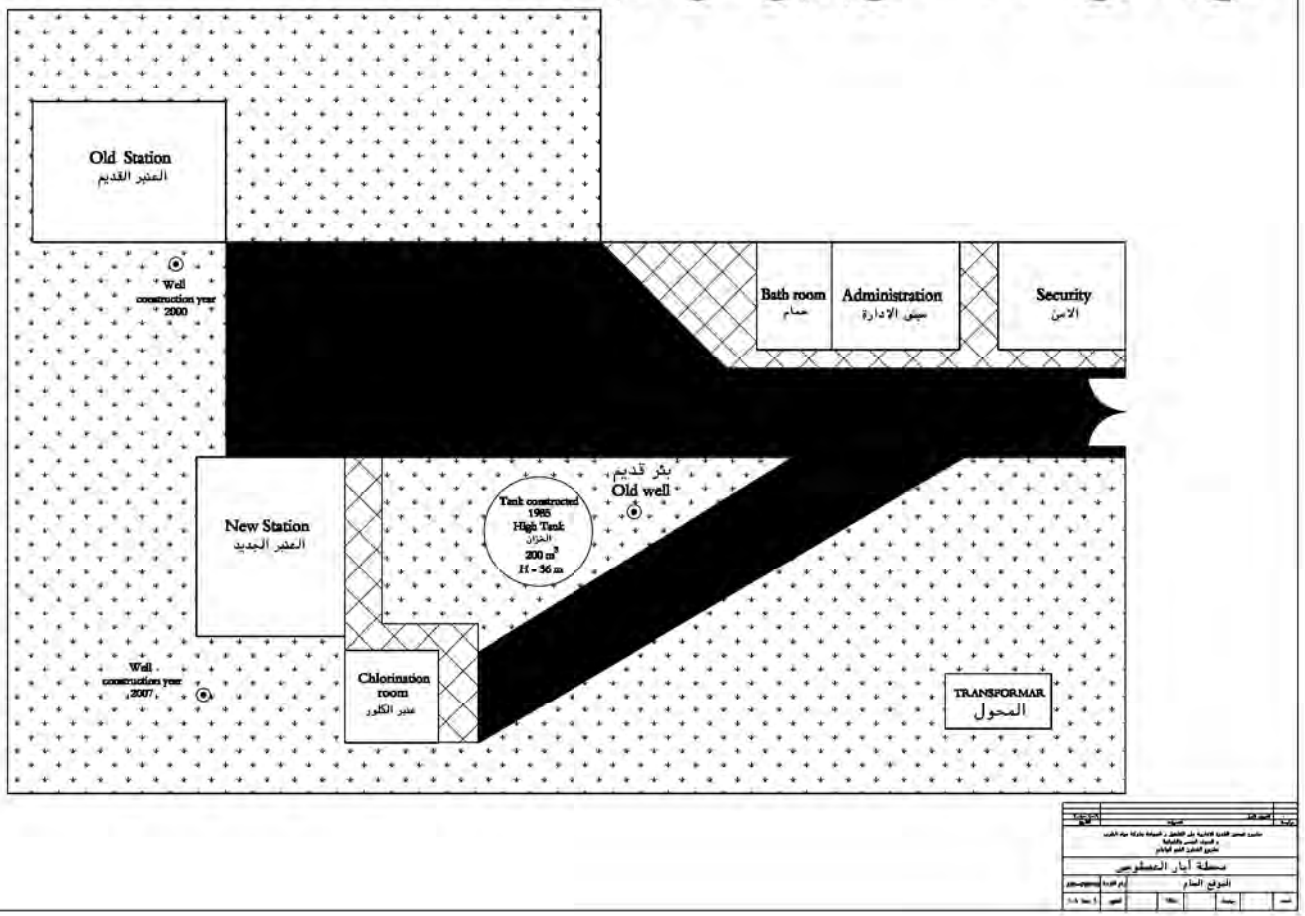


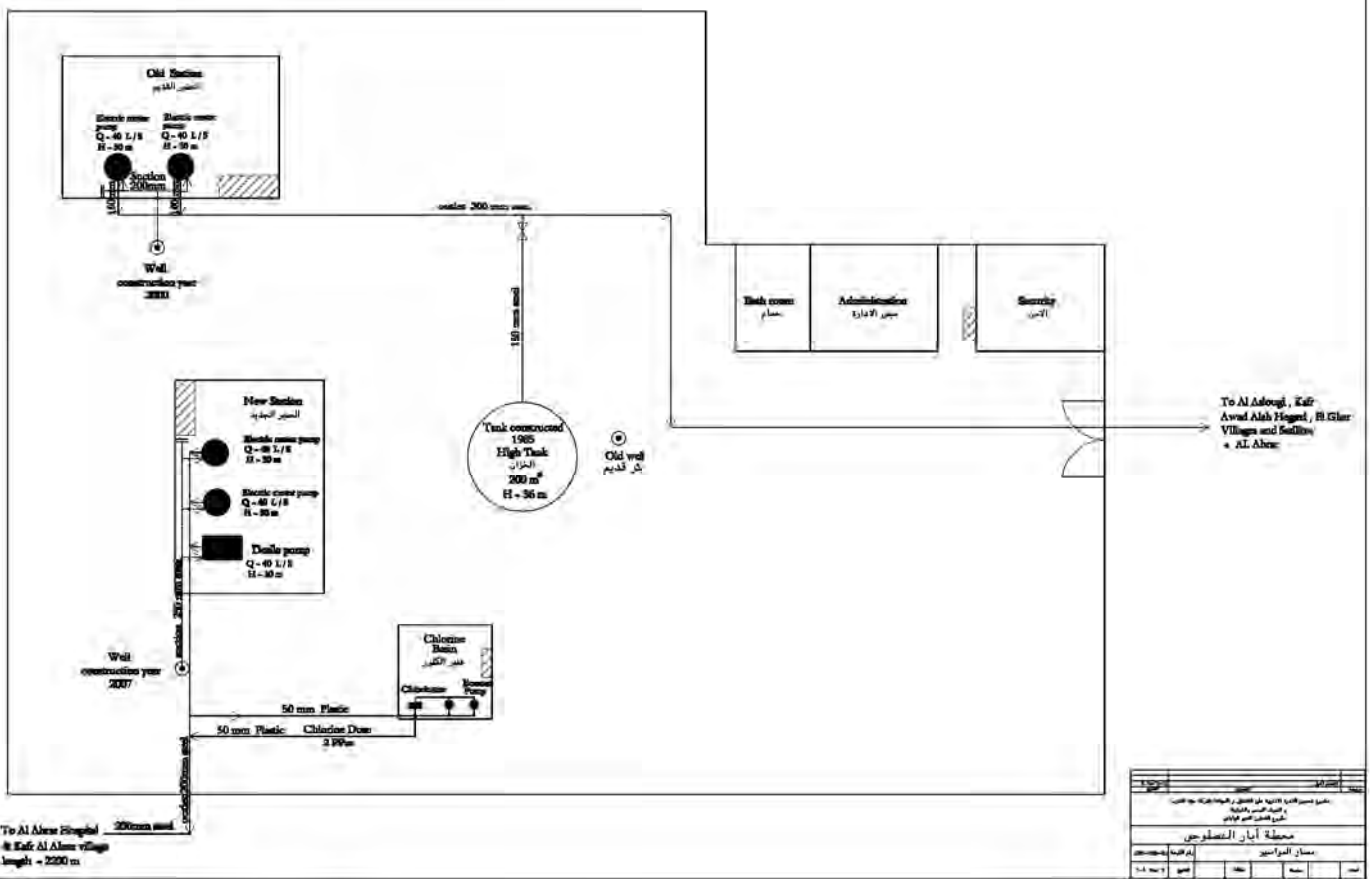

Image © 2007 DigitalGlobe
© 2007 Europa Technologies
©2007 Google
Pointer 30°35'04.23" N 31°31'26.42" E elev 14 m
Streaming 100%
Eye alt 249 m


خطوط المواسير و الأجهزة لمحطة آبار الزراعة
يوليو ٢٠٠٩
خزان عالى
٥٠٠ م٣
مفتاح اللوحة
الرمز
التوصيف
مضخة
محبس كرة
محبس سكينة
محبس عدم رجوع
حقن كلور
إلى الشبكة
بئر رقم ١
بئر رقم ٢
بئر رقم ١
بئر جديد٢٠٠٩
بئر رقم ١
بئر رقم ٢
بئر رقم ١
بئر رقم ٢
بئر رقم ٣
محطة آبار الزراعة رقم٣
محطة آبار الزراعة رقم٤
محطة آبار الزراعة رقم٥
محطة آبار الزراعة رقم٢
محطة آبار الزراعة رقم١
المحابس و الأجهزة لكامل المحطة
محطة آبار الزراعة

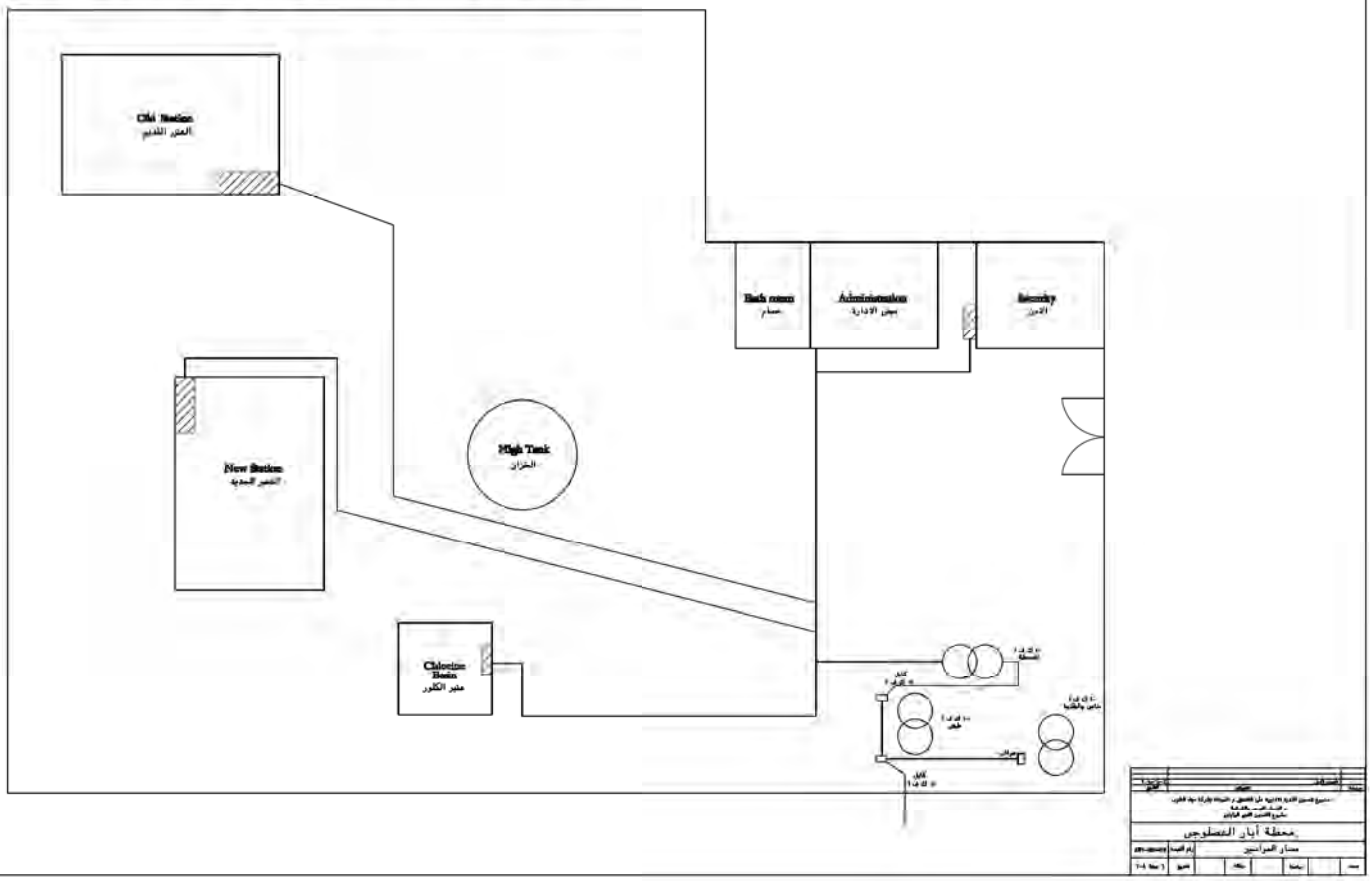
(الموقع العام) محطة آبار العصلوجي



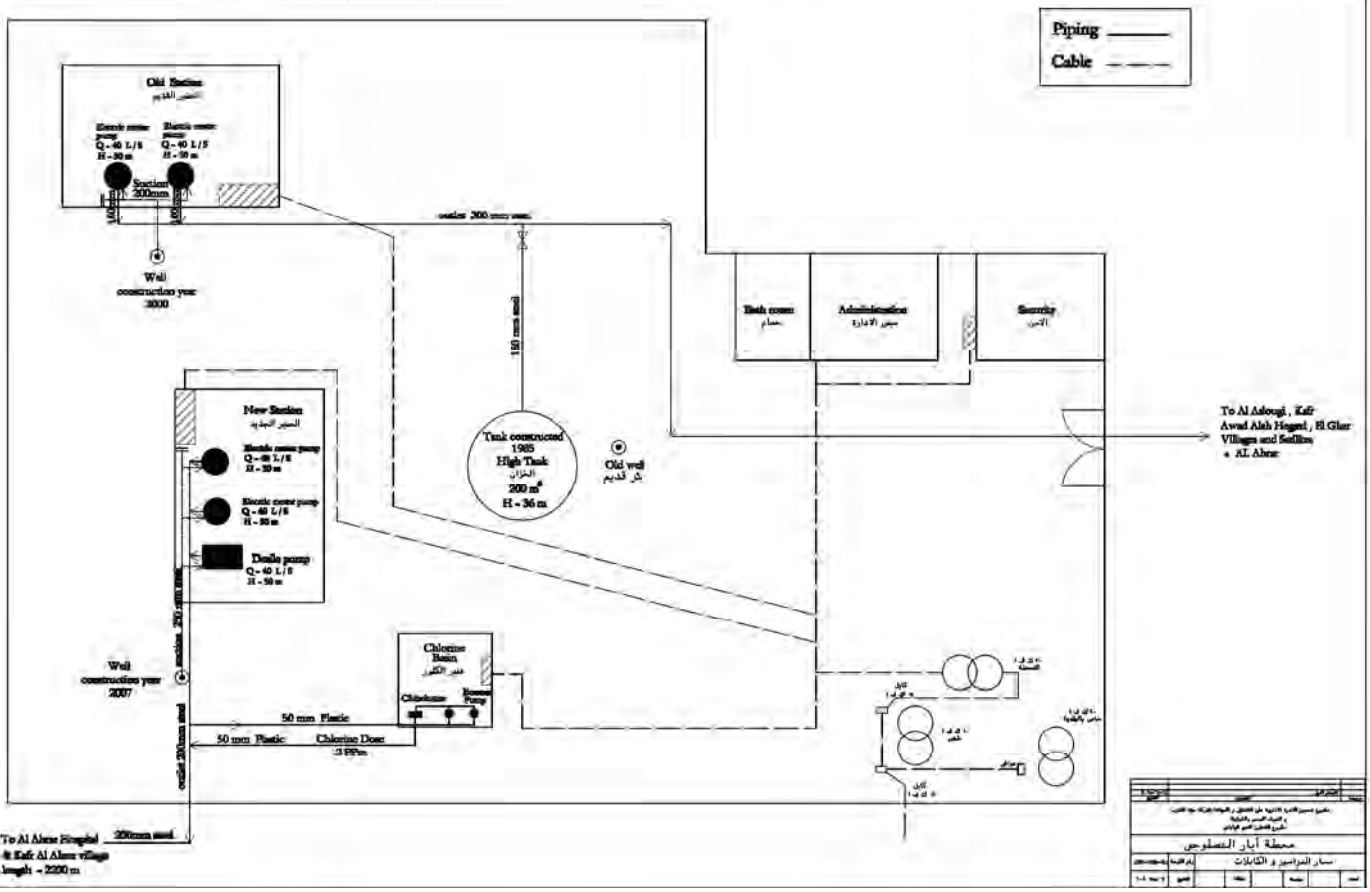
El Aslougi (Piping Route)

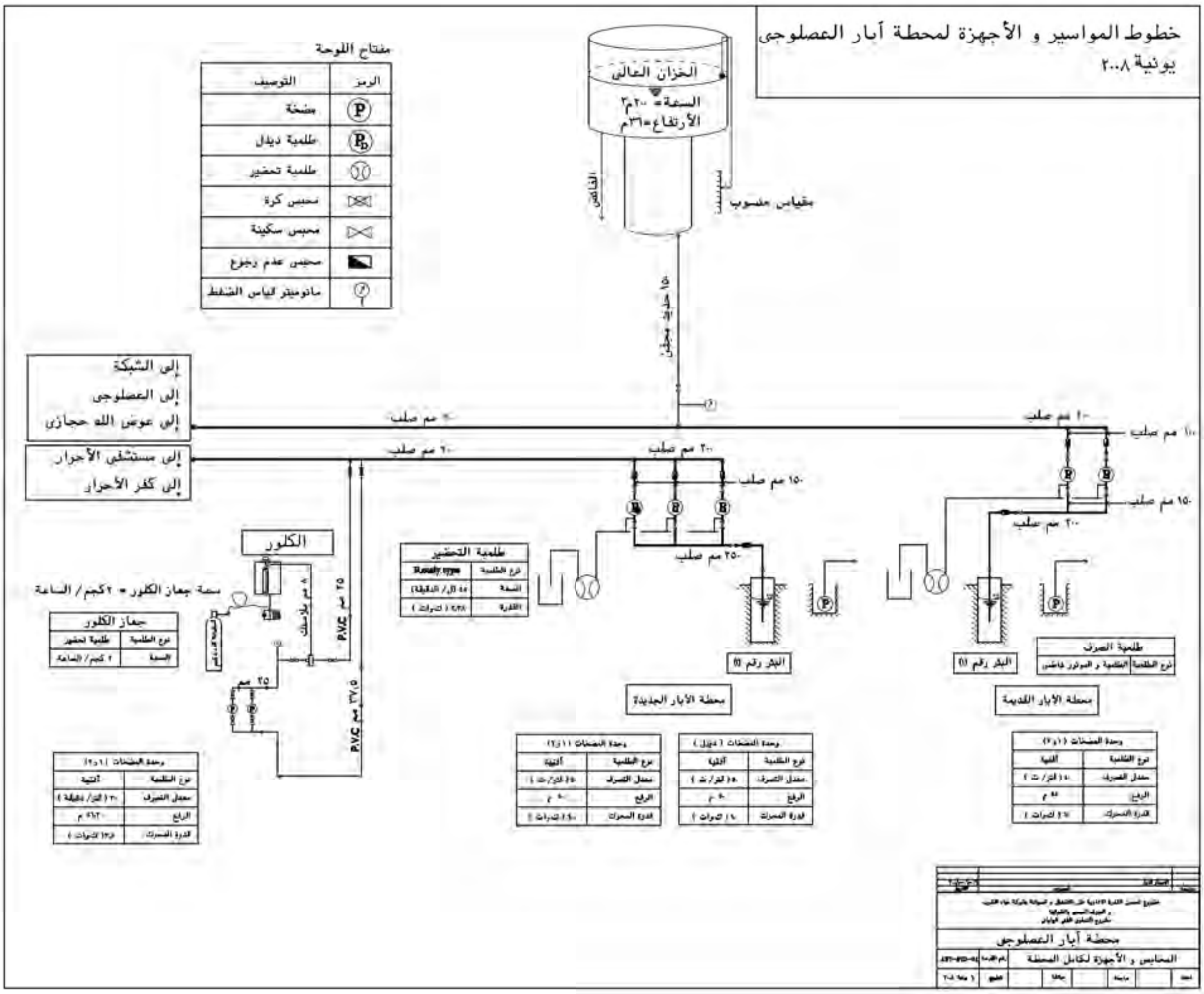


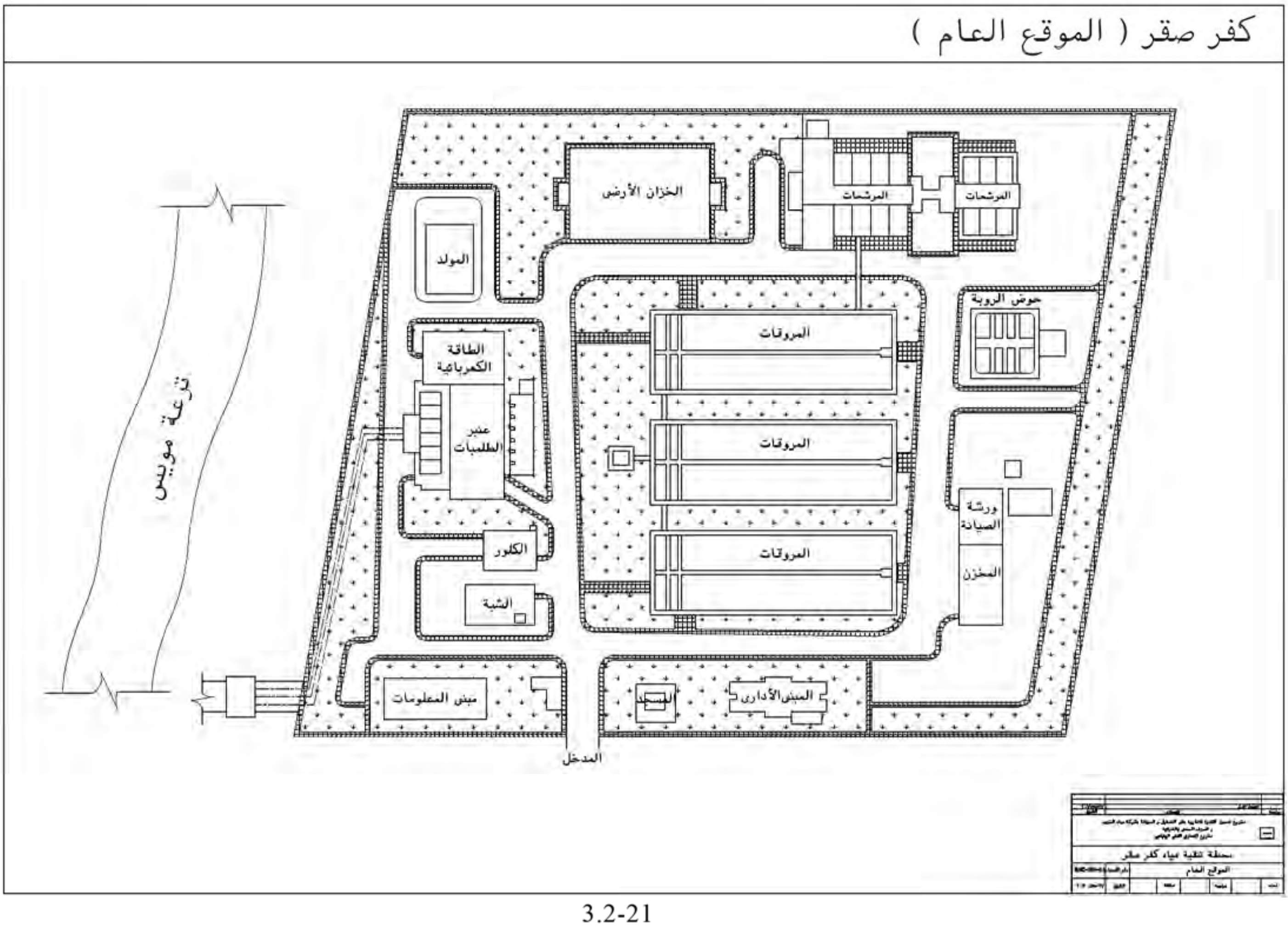
El Aslougy (Cable Route)



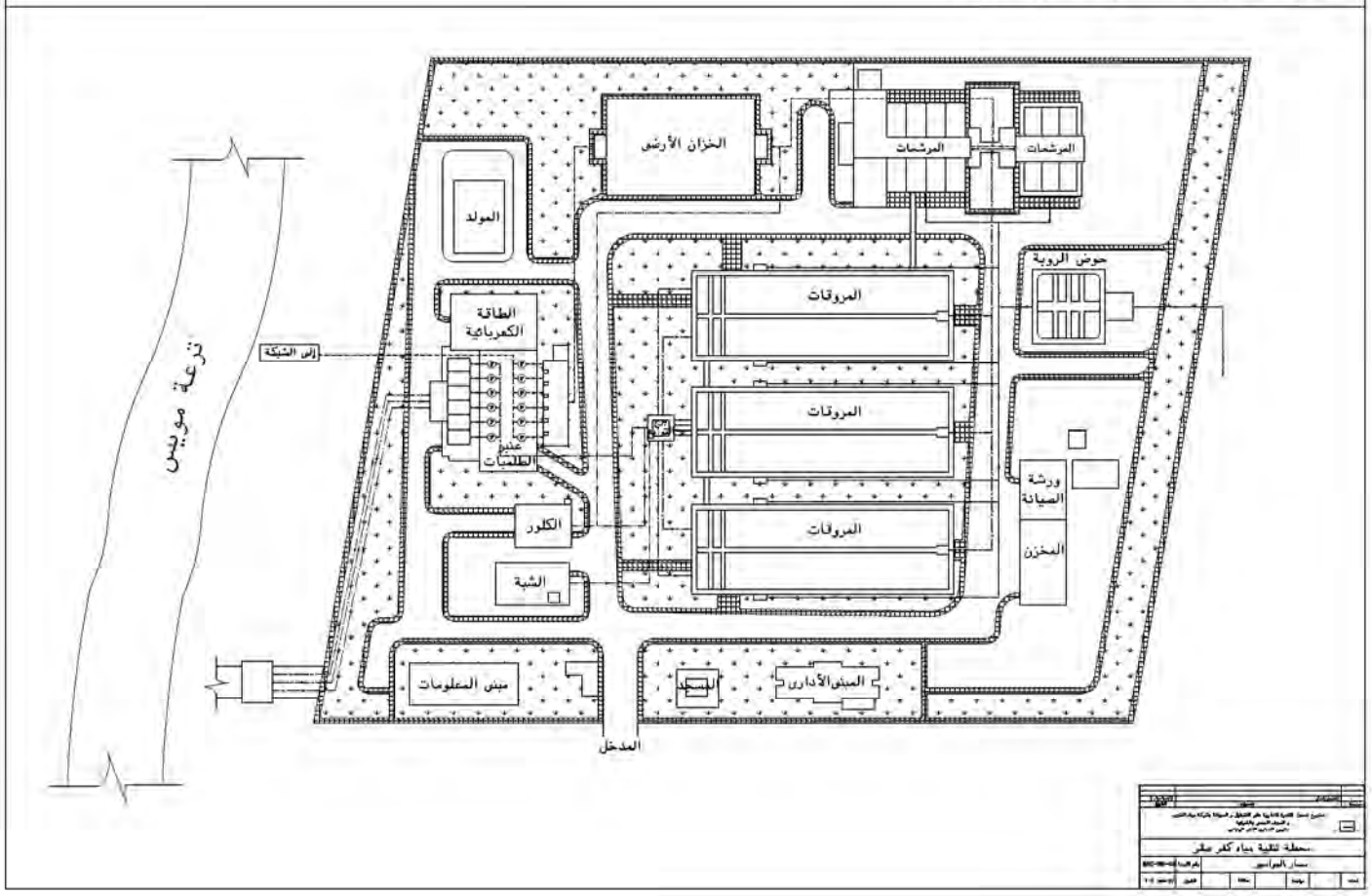
El Aslougi (Piping & Cable Route)

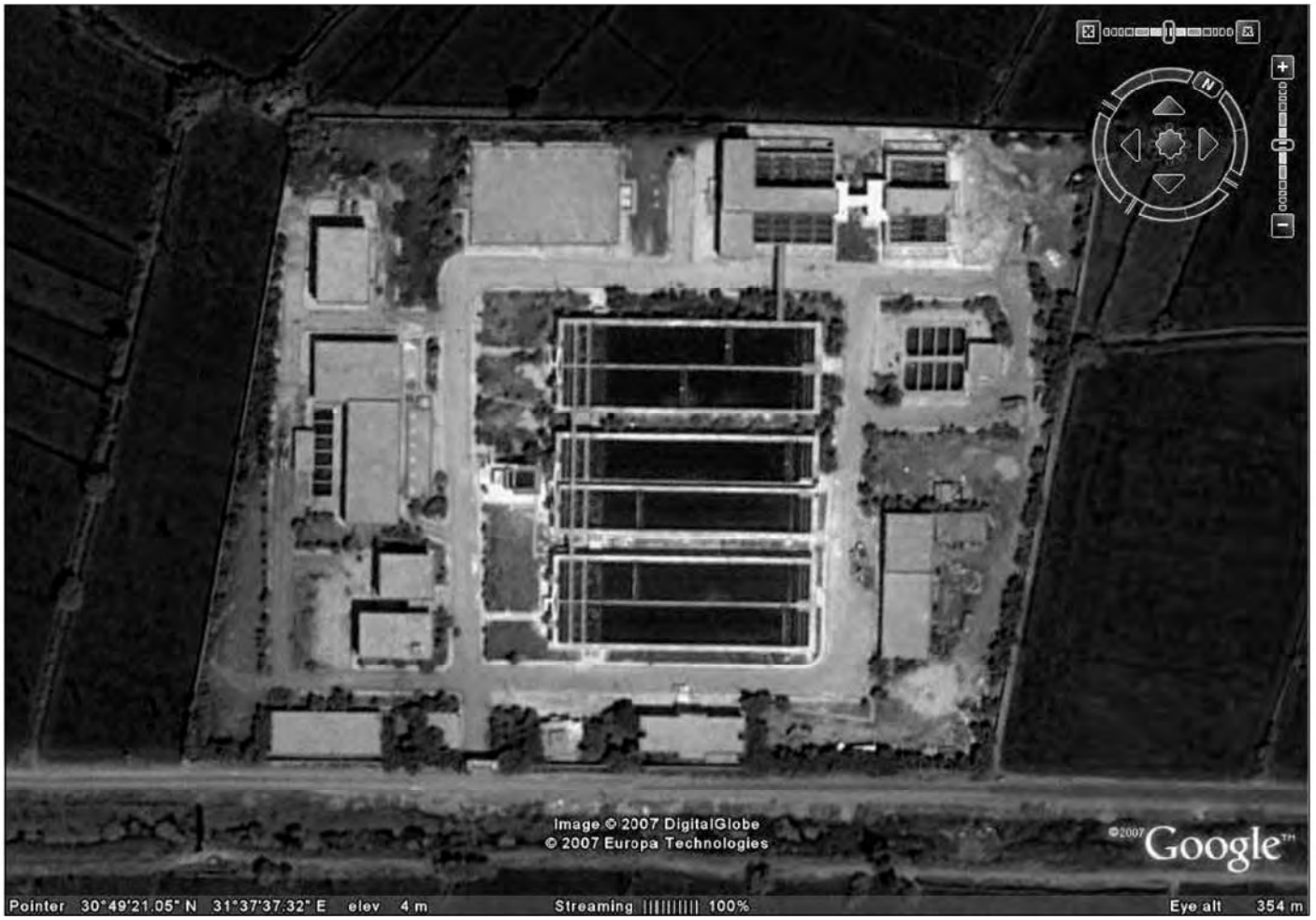


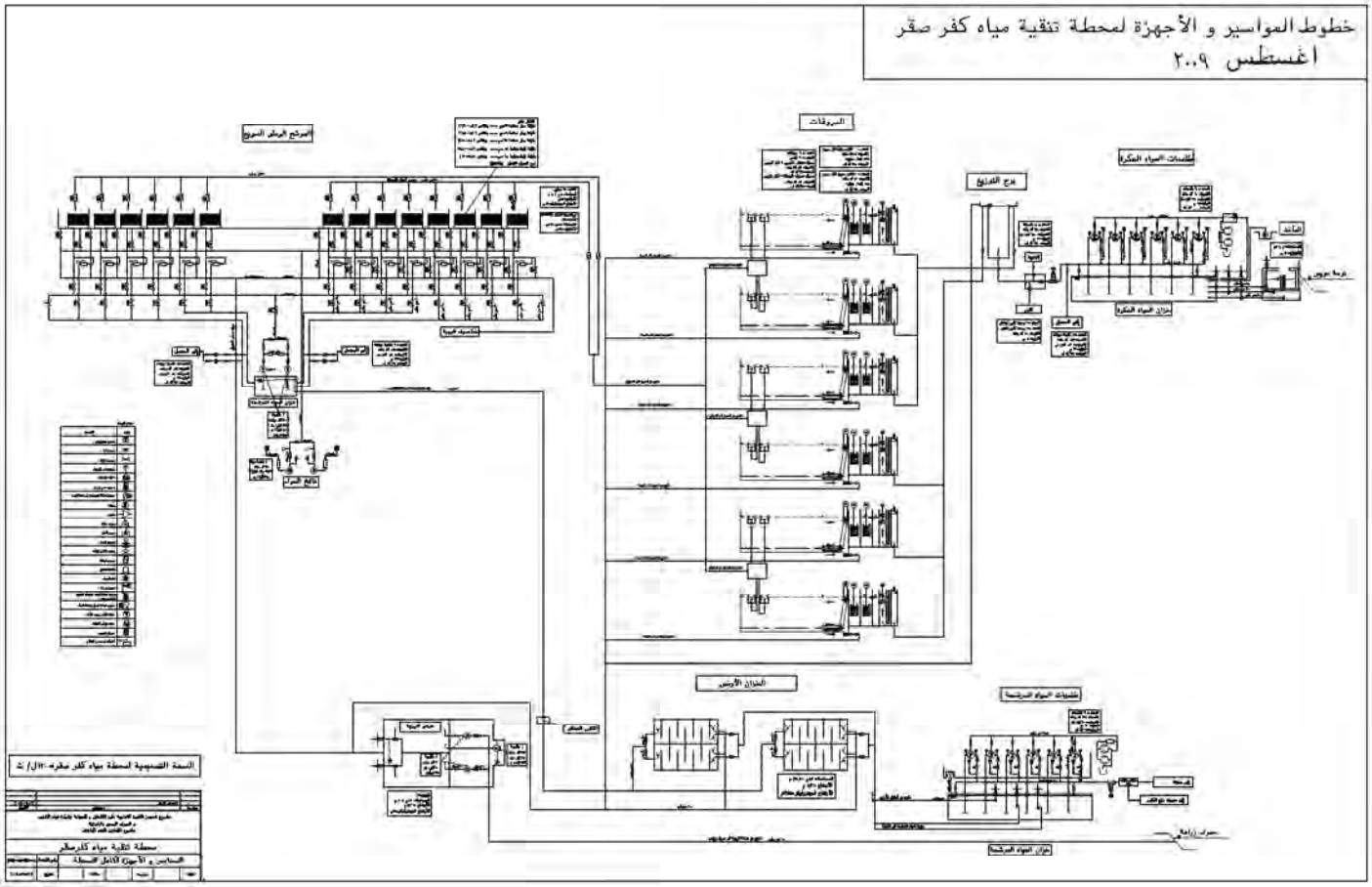

خطوط المواسير و الأجهزة لمحطة آبار العصلوجى
يونية ٢٠٠٨
مفتاح اللوحة
الرمز
التوصيف
مضخة
طلمبة ديذل
طلمبة تحضير
محبس كرة
محبس سكينة
محبس عدم رجوع
مانومتير لقياس الضغط
الخزان العالى
السعة= ٢٠٠م٣
الأرتفاع=٣٦م
مقياس منسوب
الناقص
إلى الشبكة
إلى العصلوجى
إلى عوض الله حجازى
إلى مستشفى الأحرار
إلى كفر الأحرار
الكلور
سعة جهاز الكلور = ٢كجم/ الساعة
جهاز الكلور
طلمبة التحضير
طلمبة الصرف
البئر رقم (١)
محطة الآبار الجديدة
محطة الآبار القديمة
محطة آبار العصلوجى
المحابس و الأجهزة لكامل المحطة

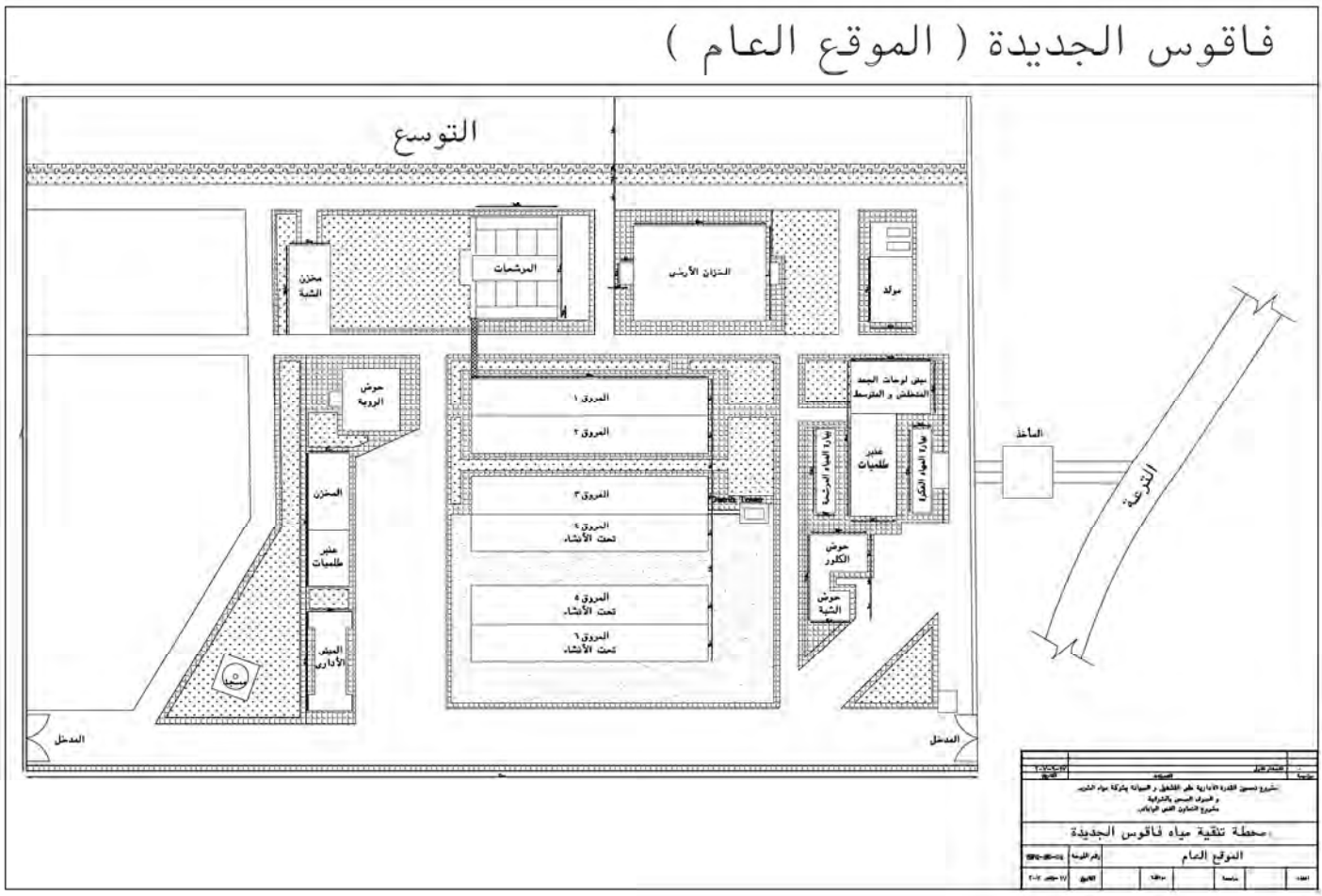

كفر صقر (الموقع العام)
الخزان الأرضى
المرشحات
المرشحات
المولد
حوض الروبة
الطاقة الكهربائية
المروقات
المروقات
المروقات
عنبر الطلمبات
ورشة الصيانة
المخزن
الكلور
الشبة
مبنى المعلومات
المبنى الأدارى
المسجد
المدخل
ترعة مويس
محطة تنقية مياه كفر صقر
الموقع العام

كفر صقر (مسار المواسير)

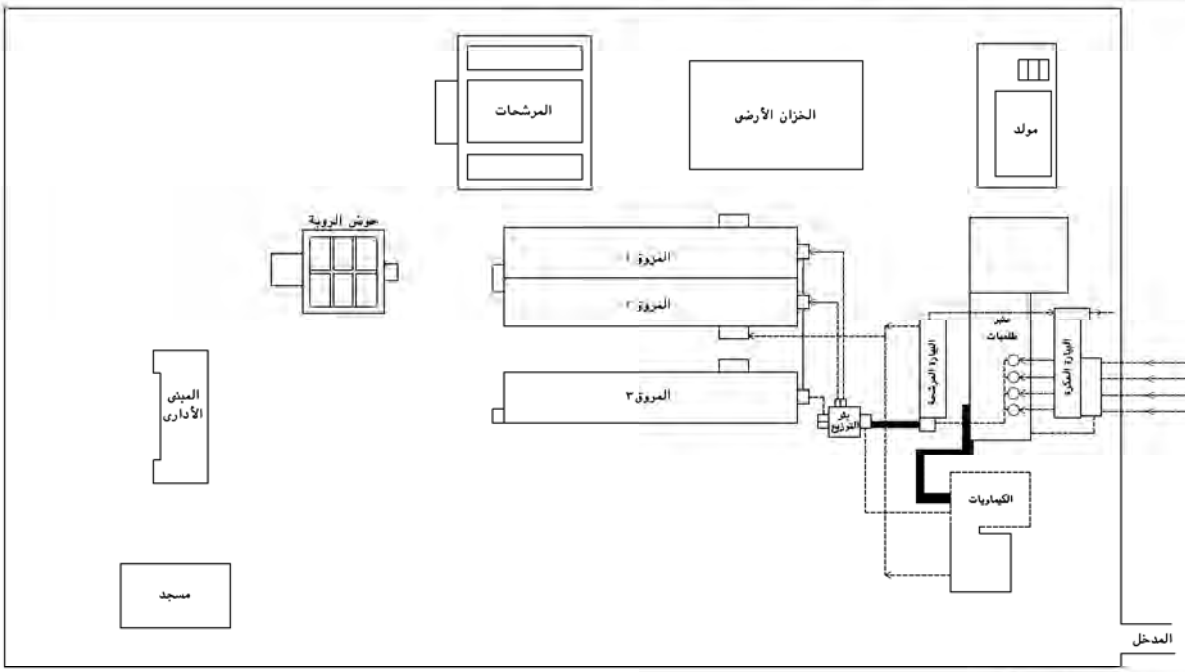





خطوط المواسير و الأجهزة لمحطة تنقية مياه كفر صقر
اغسطس ٢٠٠٩


فاقوس الجديدة (الموقع العام)
التوسع
المرشحات
المزان الأرضي
مولد
مخزن الشبة
حوش الزوبة
المخزن
معمل طلمبات
المبنى الأداري
المدخل
المروق ١
المروق ٢
المروق ٣
المروق ٤ تحت الأنشاء
المروق ٥ تحت الأنشاء
المروق ٦ تحت الأنشاء
بيض لوحات البعد المتخلص و المترسط
معمل طلمبات
حوش الكلور
حوش الشبة
الساحة
الترعة
المدخل
محطة تنقية مياه فاقوس الجديدة
الموقع العام

فاقوس الجديدة (مسار المواسير للمياه العكرة)

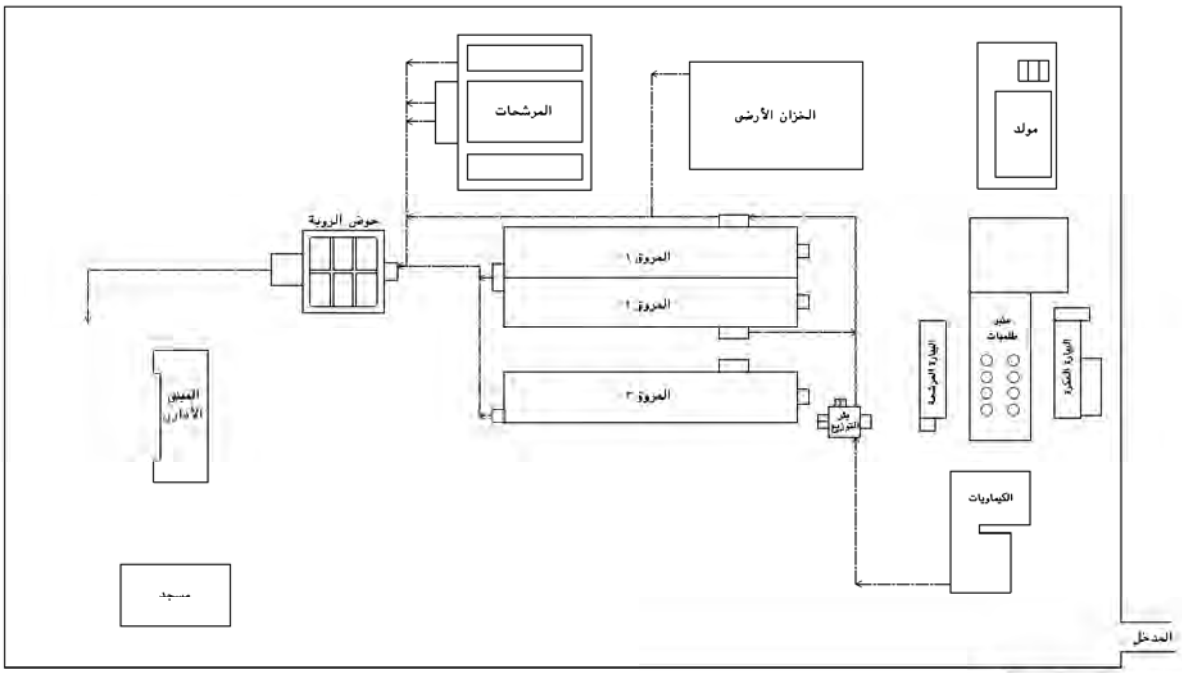


مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب
و الصرف الصحى بالشرقية
مشروع التحسين الثمن الثالث

محطة تنقية مياه فاقوس الجديدة

مسار المواسير

فاقوس الجديدة (مسار المواسير للروبة)

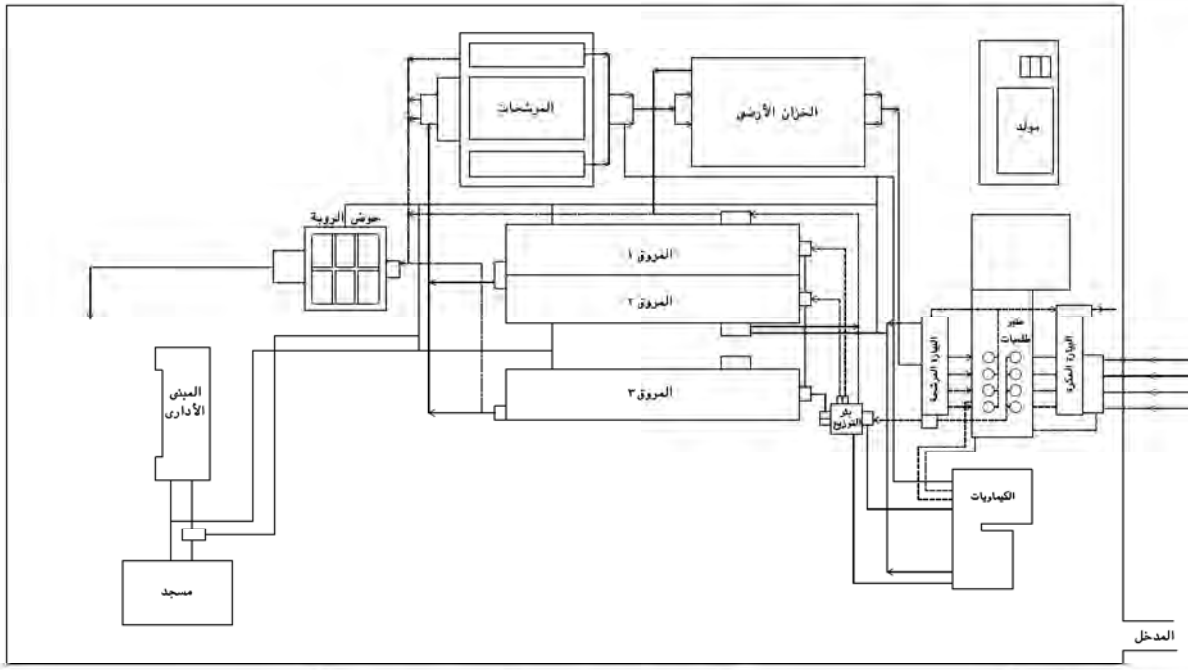


مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب
و الصرف الصحى بالشرقية
مشروع التحسين الثمن الثالث

محطة تنقية مياه فاقوس الجديدة

مسار المواسير

فاقوس الجديدة (مسار المواسير)



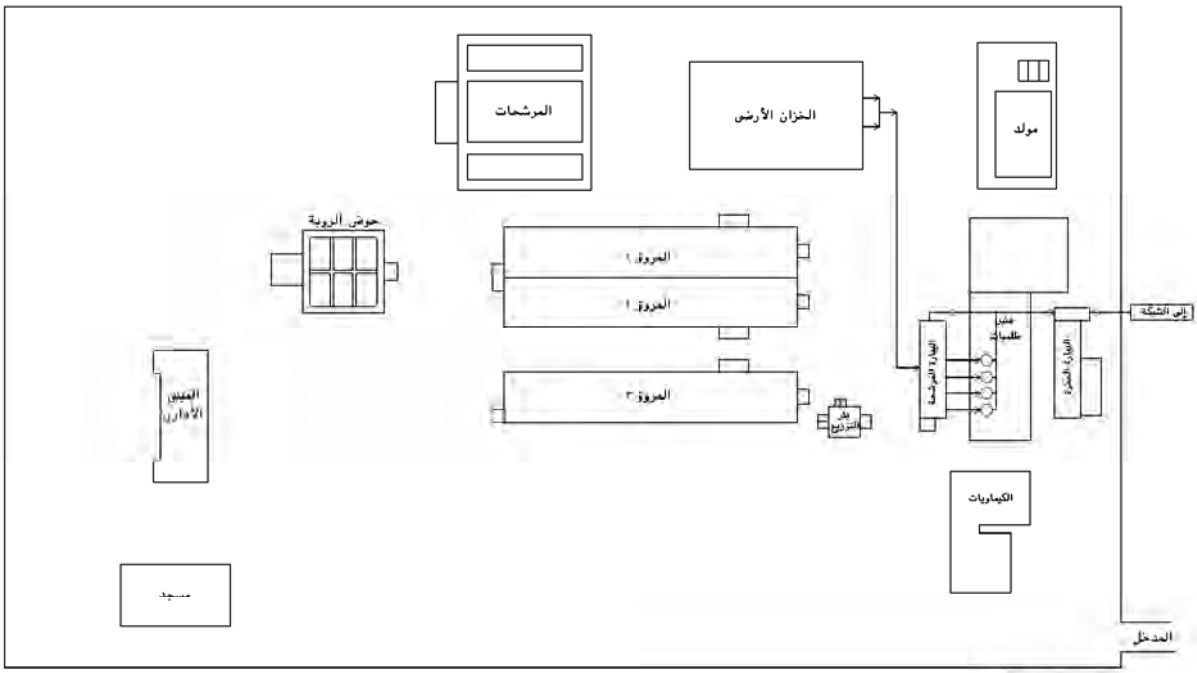
خطوط المواسير الأتية غير واضحة :-
- ماسورة مصدر المياه
- ماسورة حقن الشبة
- وضع الكلور الأبتدائى
- أتجاه السريان

مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب
و الصرف الصحى بالشرقية
مشروع الخمسين الفدان الوايلى

محطة تنقية مياه فاقوس الجديدة

رقم اللوحة	مسار المواسير
تاريخ	مراجعة

فاقوس الجديدة (مسار المواسير للمياه النقية)

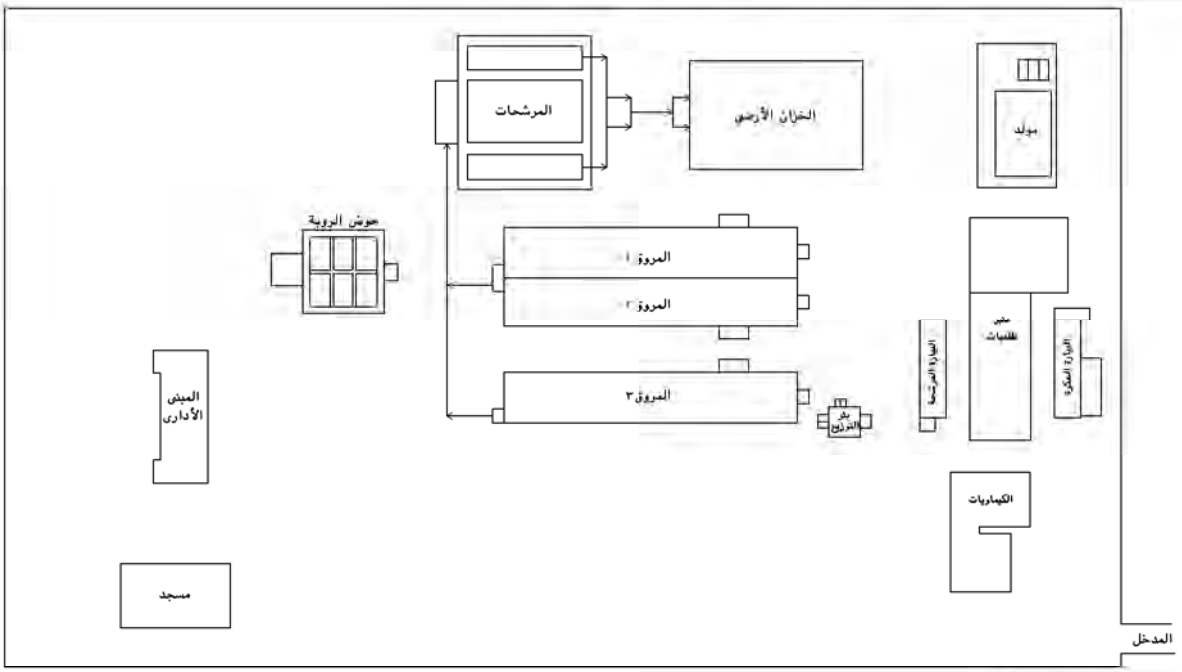


مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب
و الصرف الصحى بالشرقية
مشروع الخمسين الفدان الوايلى

محطة تنقية مياه فاقوس الجديدة

رقم اللوحة	مسار المواسير
تاريخ	مراجعة

فاقوس الجديدة (مسار المواسير للمياه المرشحة)

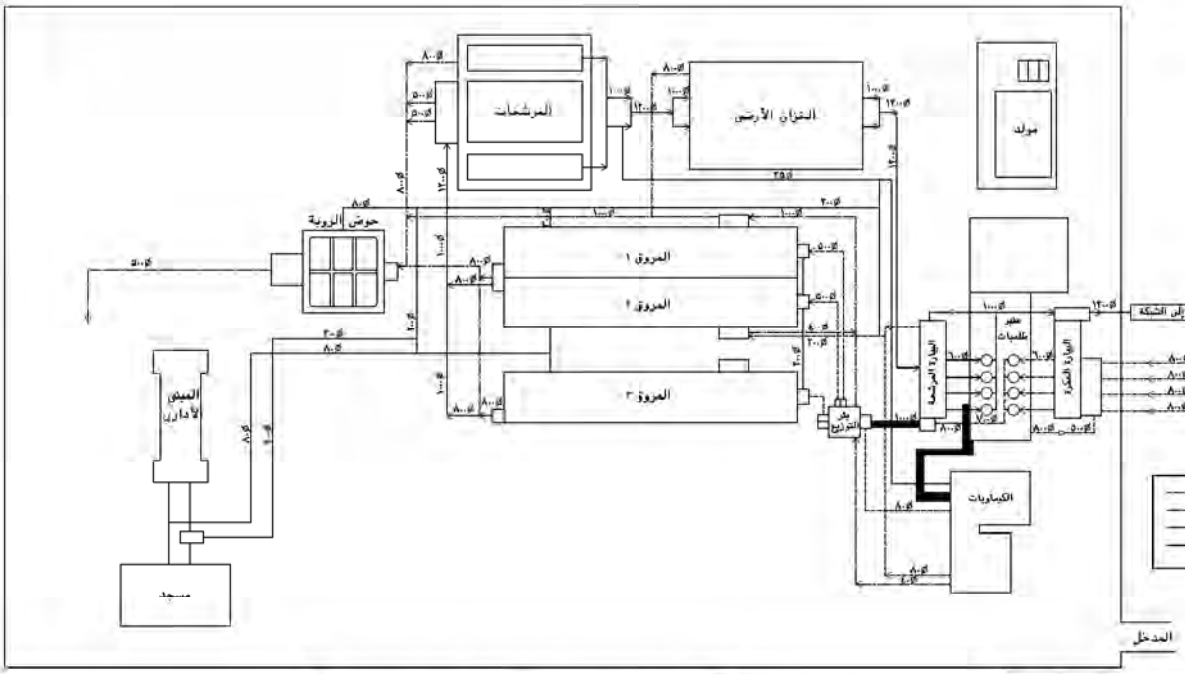


مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب
و الصرف الصحى بالشرقية
مشروع التحسين الفنى الثالث

محطة تنقية مياه فاقوس الجديدة

مسار المواسير

فاقوس الجديدة (مسار المواسير)



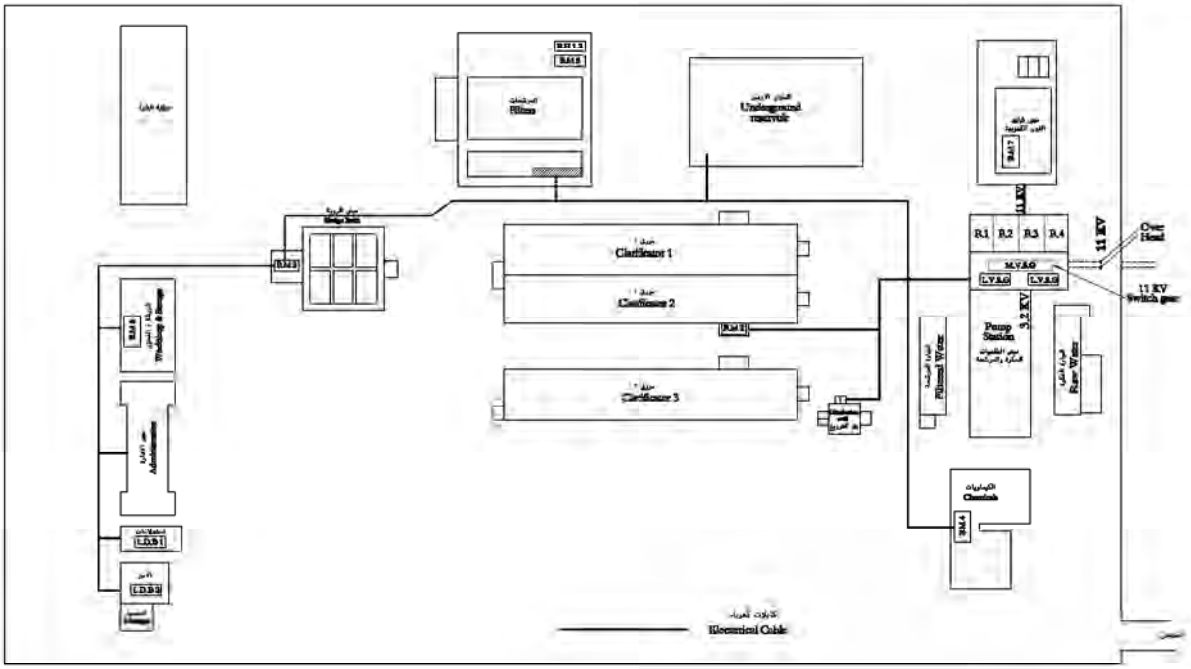
خطوط المواسير الآتية غير واضحة :-
- ماسورة مصدر المياه
- ماسورة حقن الشبة
- وضع الكلور الأبتدائى
- أتجاه السريان

مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب
و الصرف الصحى بالشرقية
مشروع التحسين الفنى الثالث

محطة تنقية مياه فاقوس الجديدة

مسار المواسير

فاقوس الجديدة (مسار الكابلات)



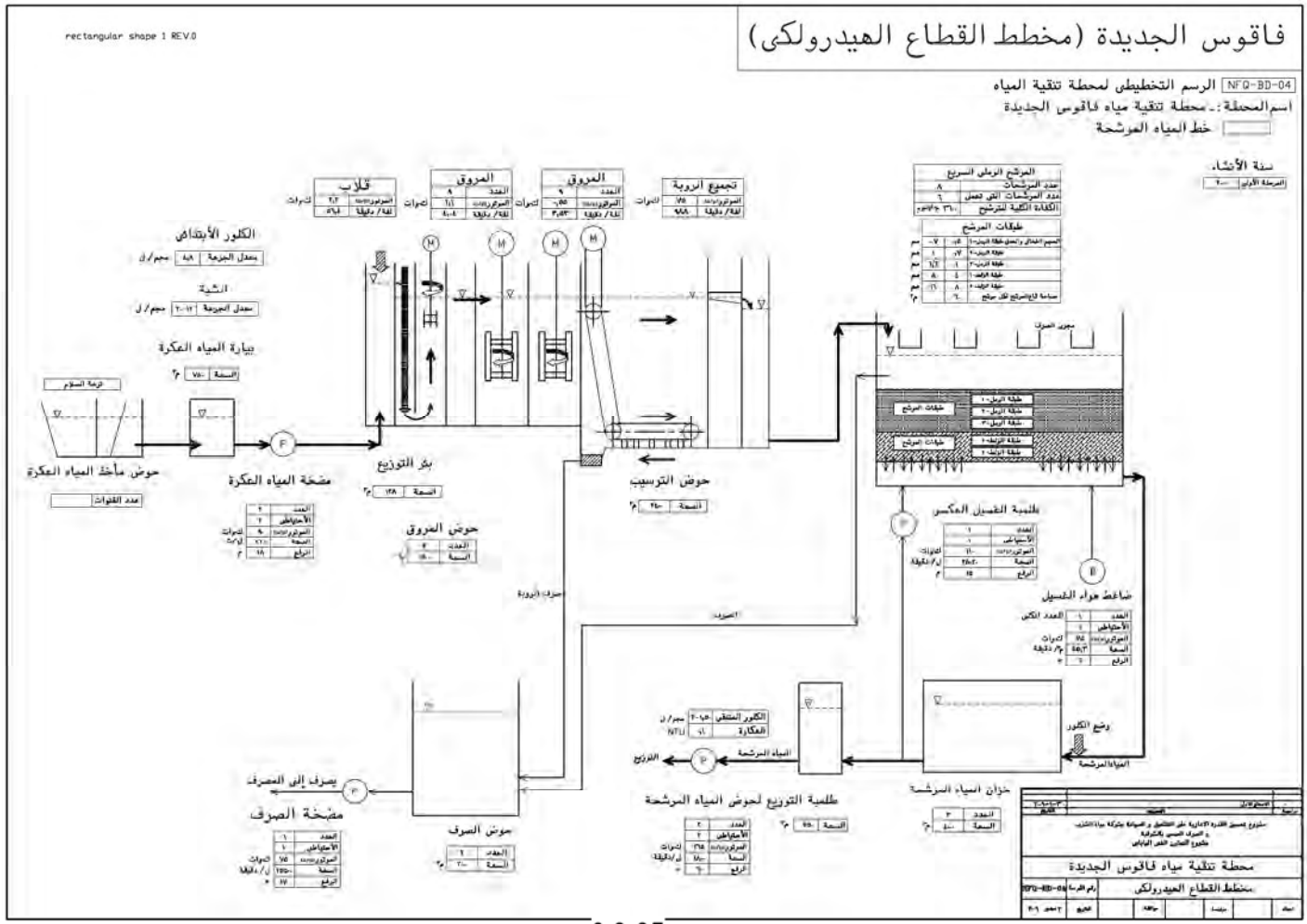
مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب و الصرف الصحي بالشرقية
مشروع التمديدات الغير الهياكل

محطة تنقية مياه فاقوس الجديدة

مسار الكابلات

NFQ-BD-03

فاقوس الجديدة (مخطط القطاع الهيدرولكى)



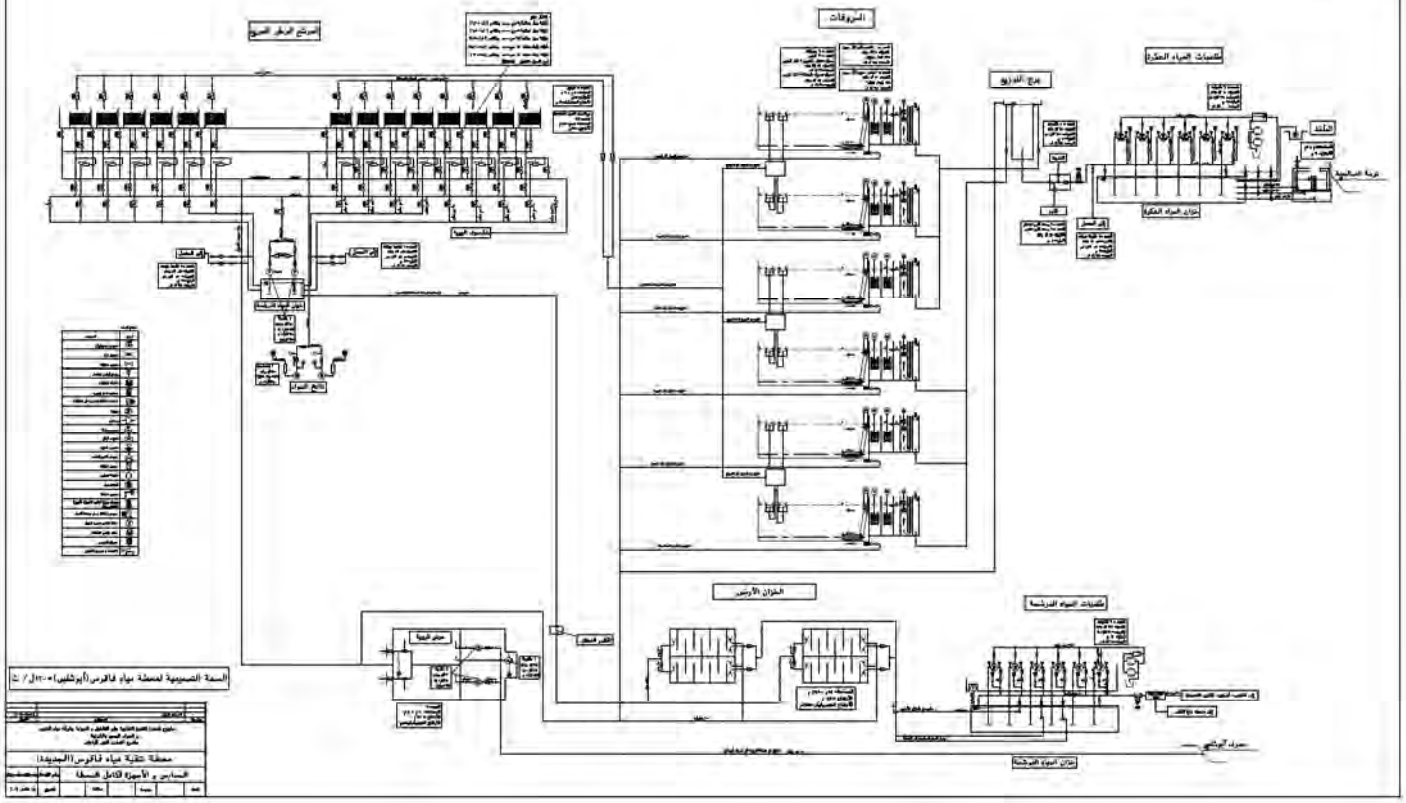
مشروع تحسين القدرة الانتاجية على التشغيل و الصيانة بشركة مياه الشرب و الصرف الصحي بالشرقية
مشروع التمديدات الغير الهياكل

محطة تنقية مياه فاقوس الجديدة

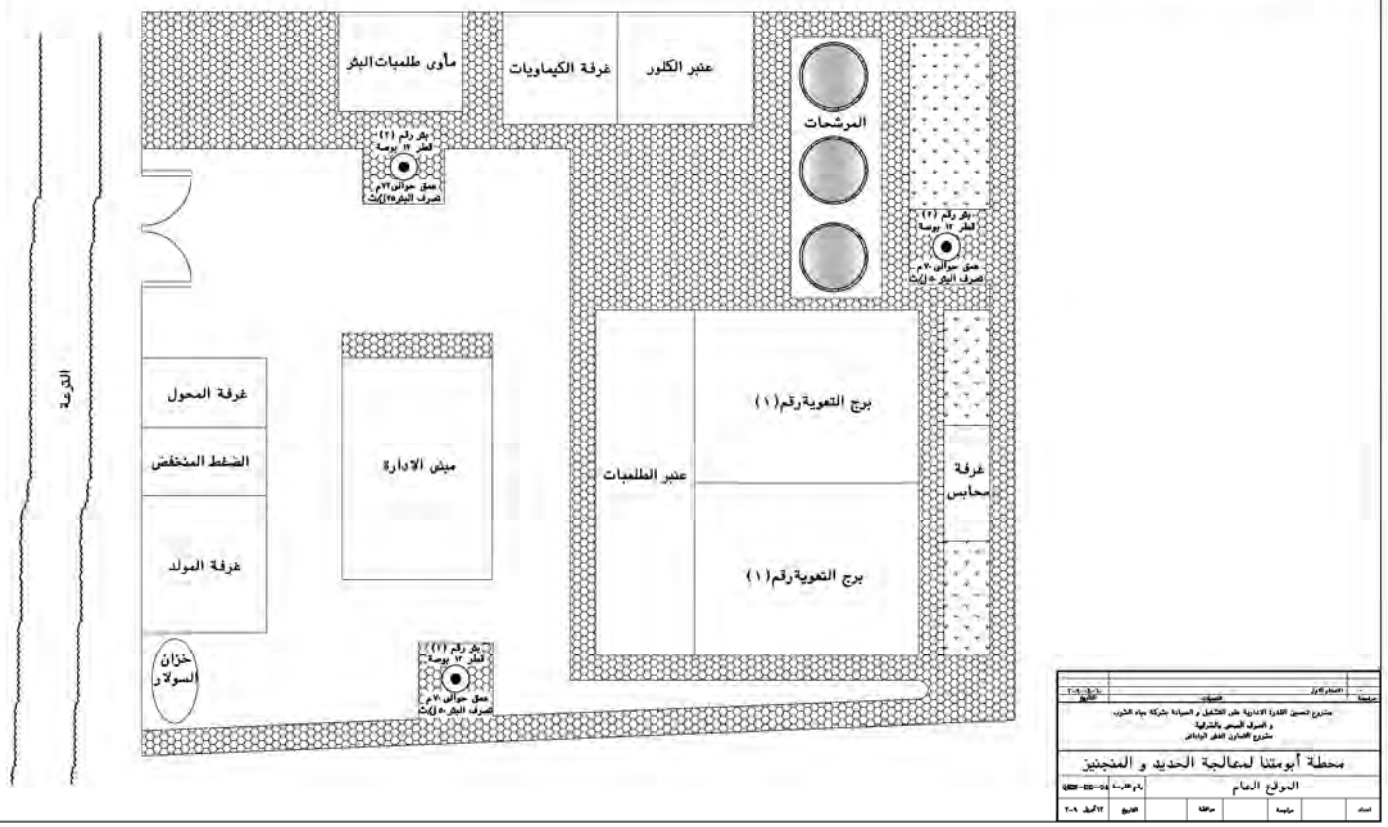
مخطط القطاع الهيدرولكى

NFQ-BD-04

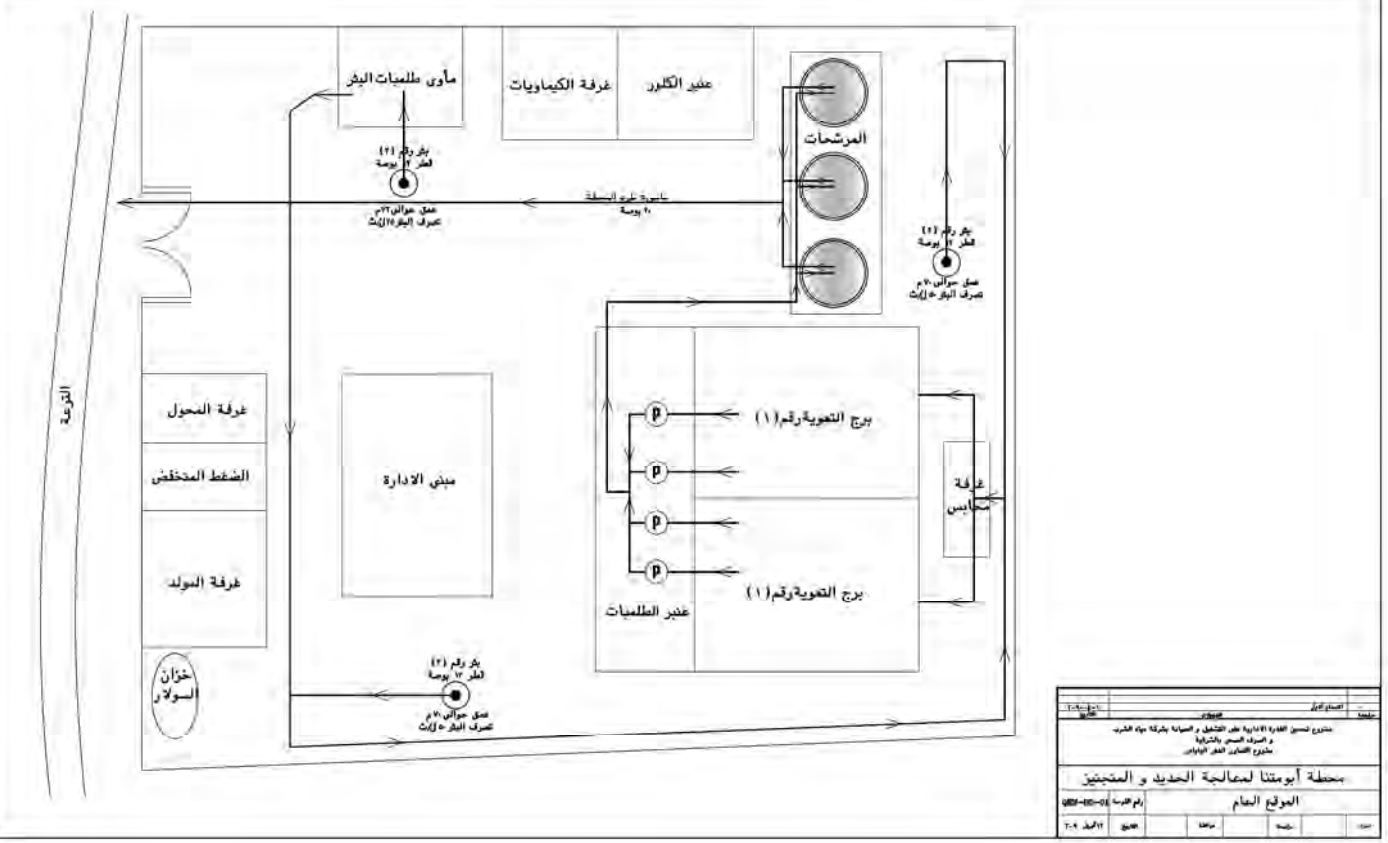
خطوط المواسير و الأجهزة لمحطة تنقية مياه فاقوس(أبوشلبى)
سبتمبر ٢٠٠٩



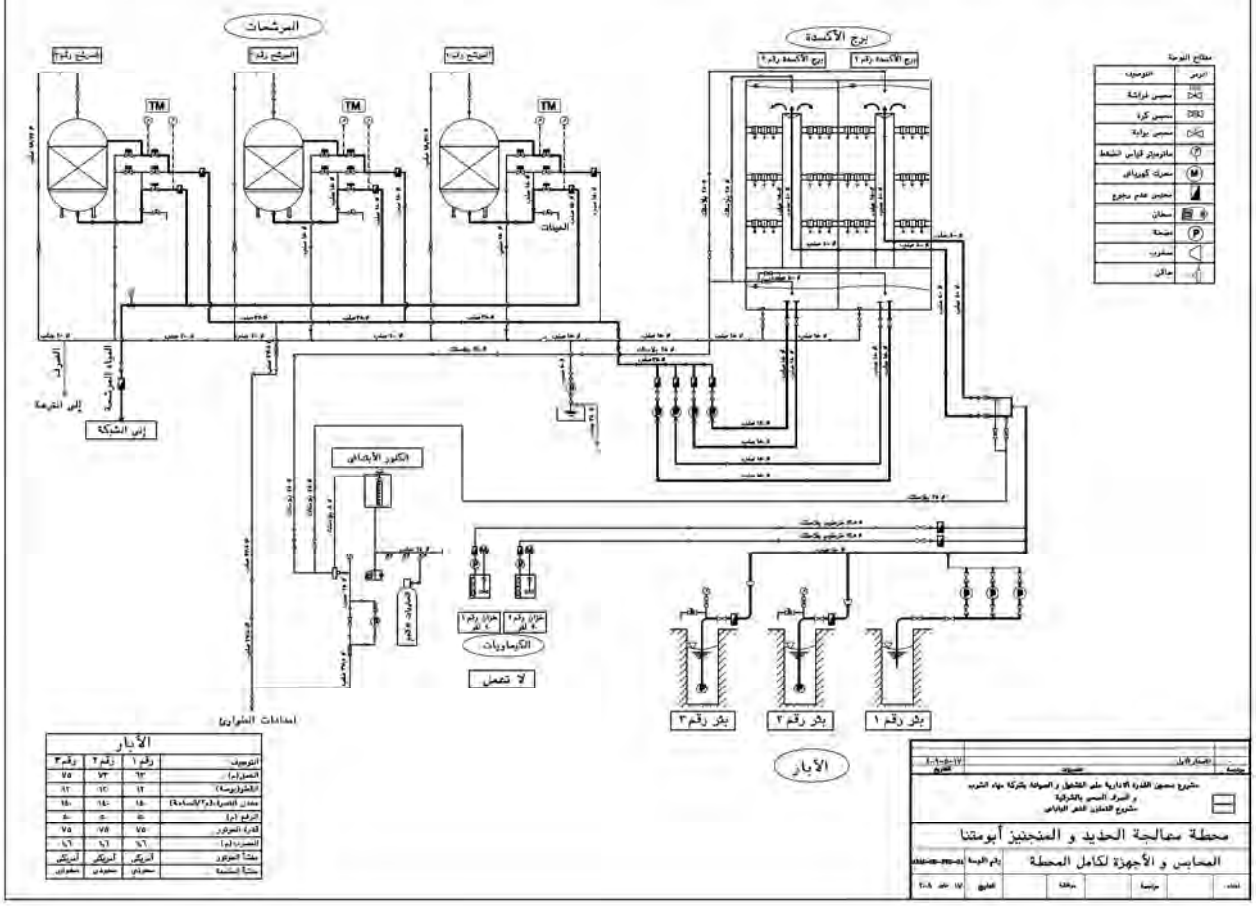
محطة أبومتنا لمعالجة الحديد و المنجنيز (الموقع العام)



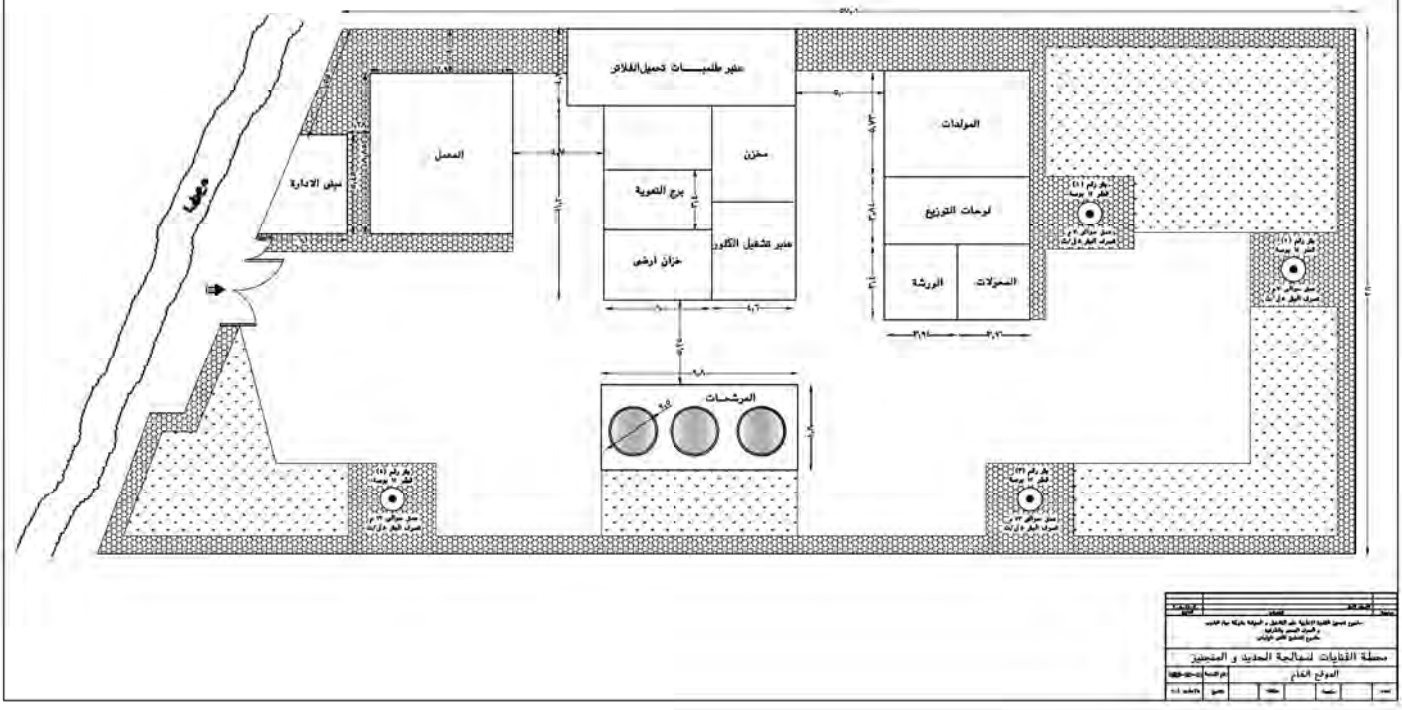
محطة أبومتنا لمعالجة الحديد و المنجنيز (مسار المواسير)



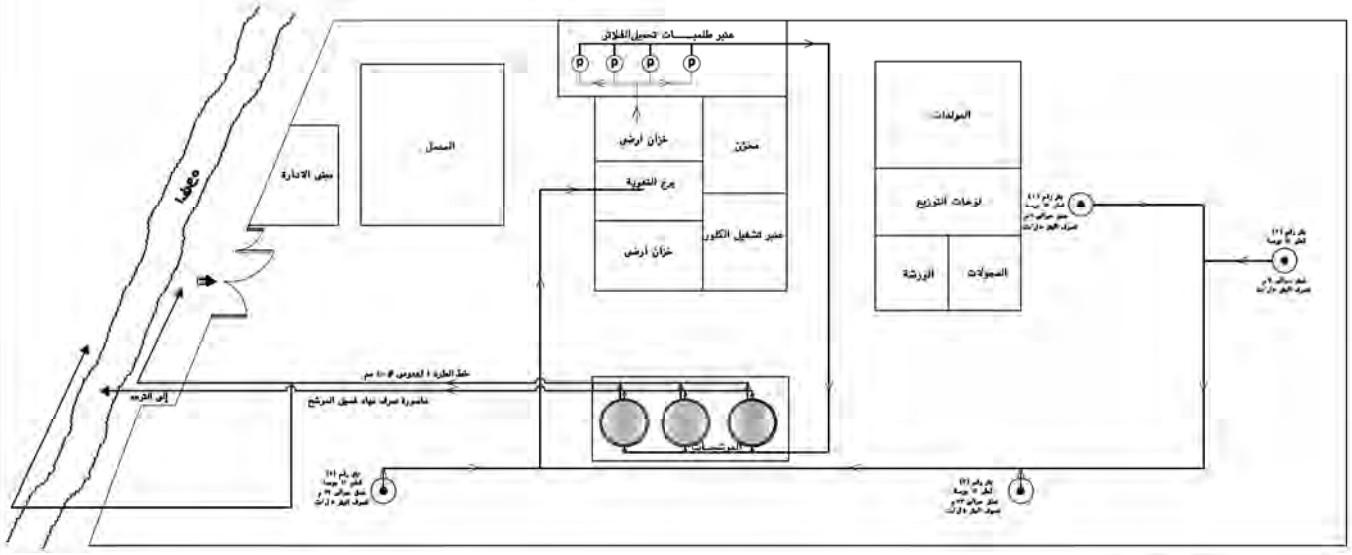
خطوط المواسير و الأجهزة لمحطة تنقية مياه أبومتنا



محطة القنايات لمعالجة الحديد و المنجنيز (الموقع العام)



محطة القنايات لمعالجة الحديد و المنجنيز (مسار المواسير)



خطوط المواسير و الأجهزة لمحطة تنقية مياه القنايات
نوفمبر ٢٠٠٨