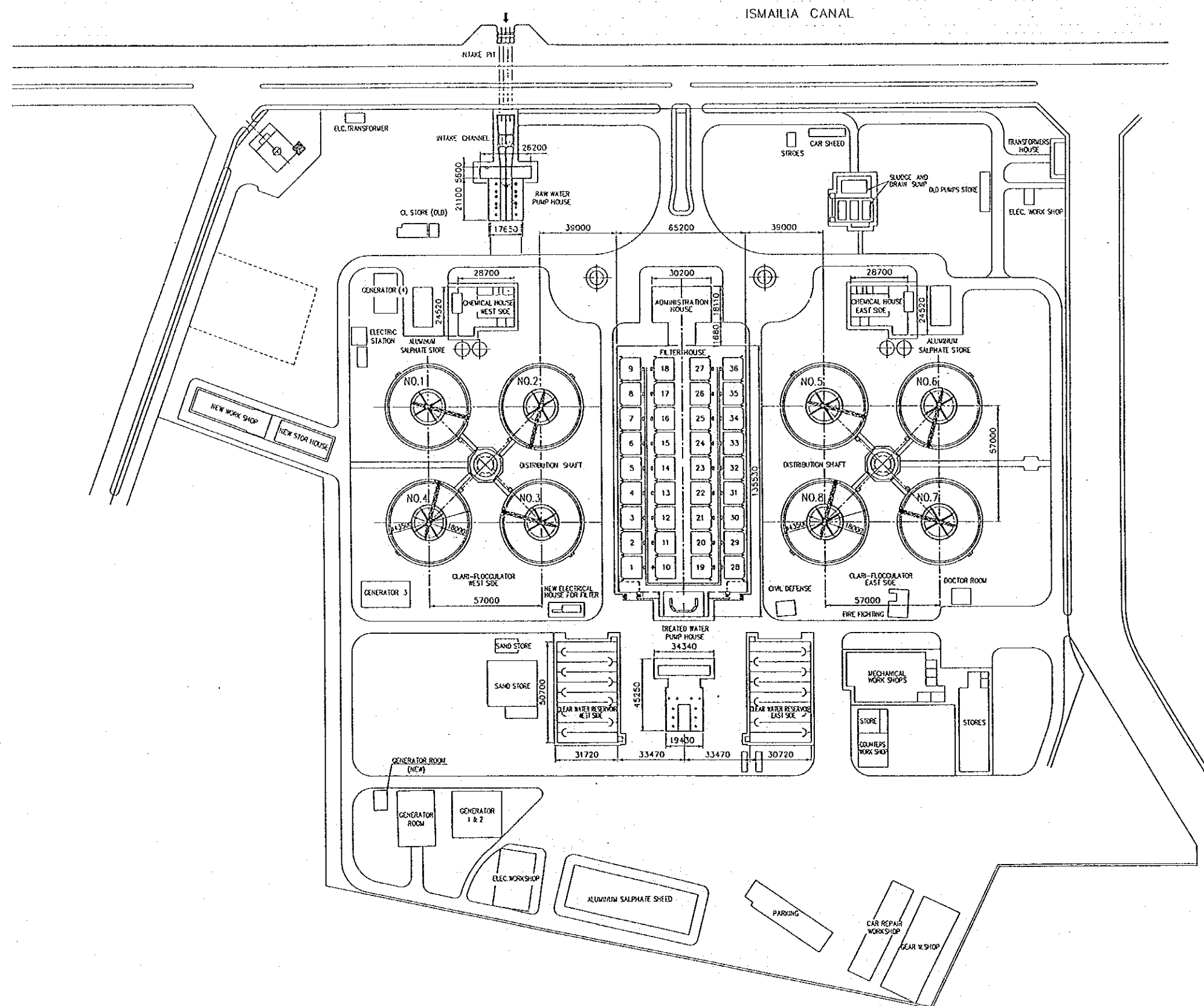
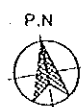


3 - 3 - 3 Basic Design Drawings

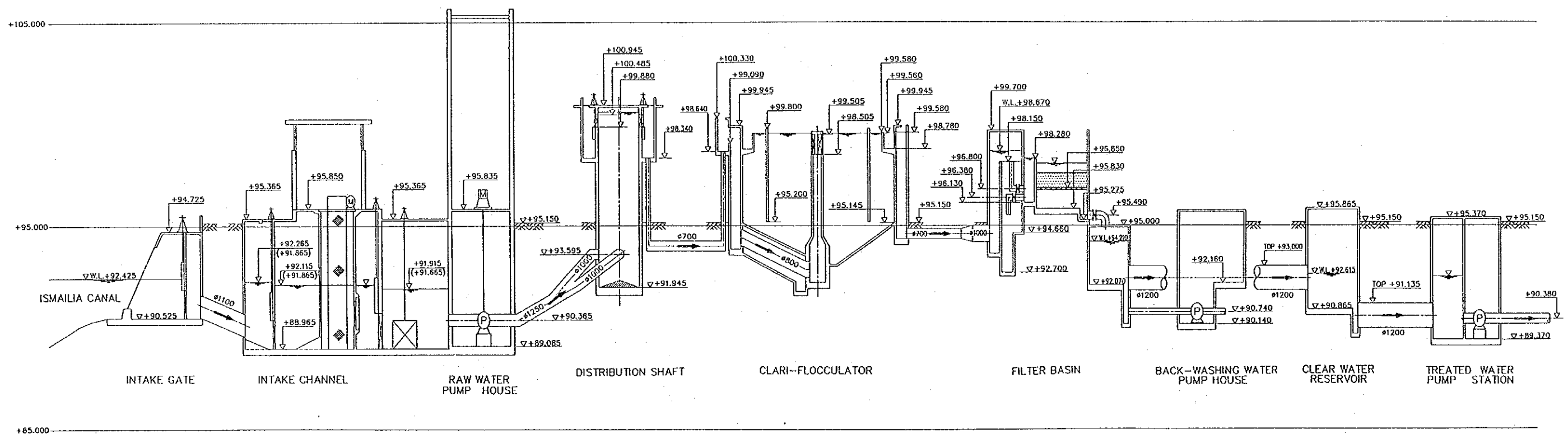
The basic design drawings are listed as follows.

TABLE 3 - 5 LIST OF DRAWING

No.	Name
M - 1	General Sight Plan
M - 2	Hydraulic profile (existing)
M - 3	Flow diagram (1/3) (existing)
M - 4	Flow diagram (2/3) (existing)
M - 5	Flow diagram (3/3) (existing)
M - 6	Hydraulic profile (rehabilitation plan)
M - 7	Flow diagram (1/3) (rehabilitation plan)
M - 8	Flow diagram (2/3) (rehabilitation plan)
M - 9	Flow diagram (3/3) (rehabilitation plan)
E - 1	Single line diagram (1/5)
E - 2	Single line diagram (2/5)
E - 3	Single line diagram (3/5)
E - 4	Single line diagram (4/5)
E - 5	Single line diagram (5/5)
E - 6	Instrumentation flow diagram (1/2)
E - 7	Instrumentation flow diagram (2/2)

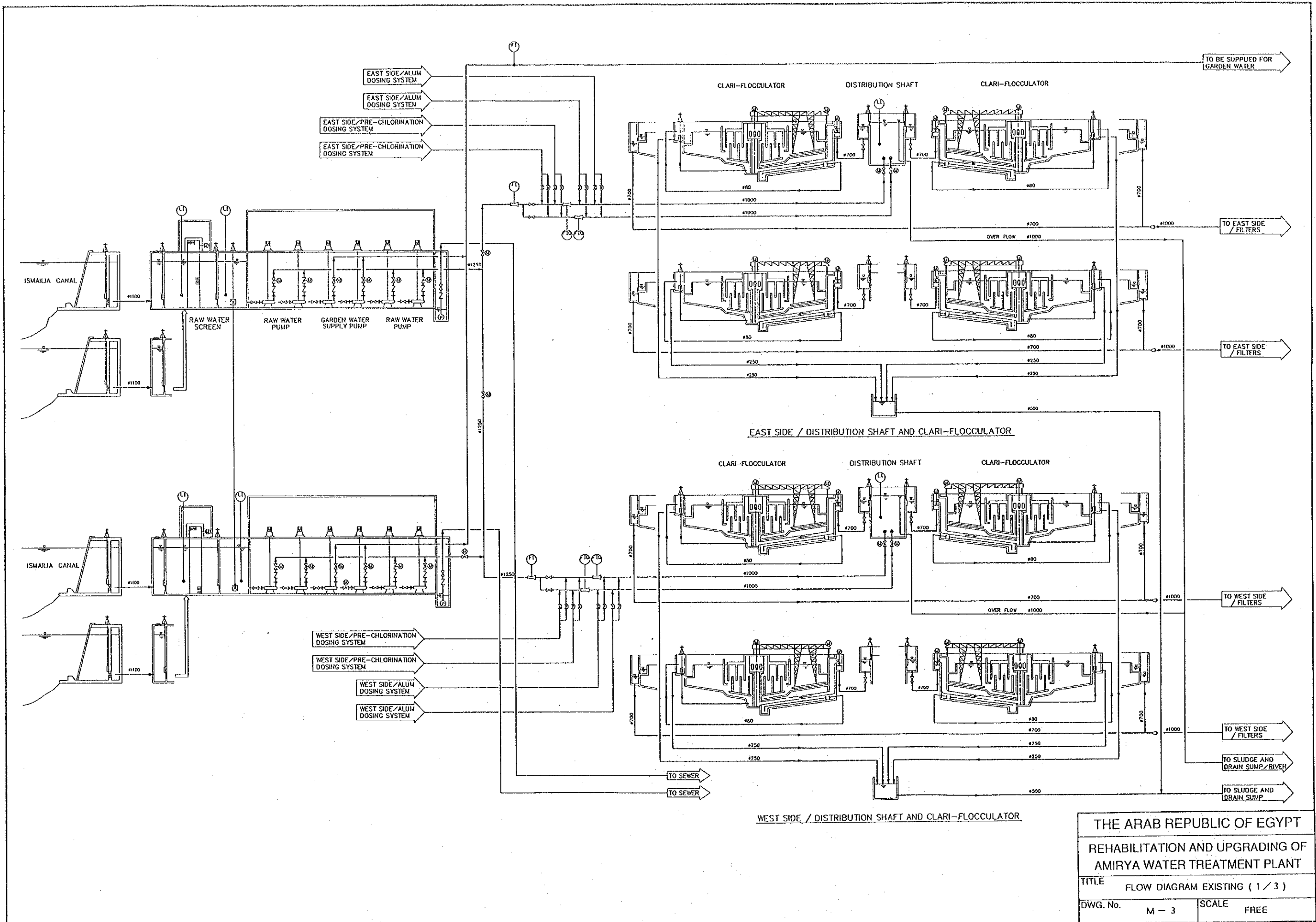


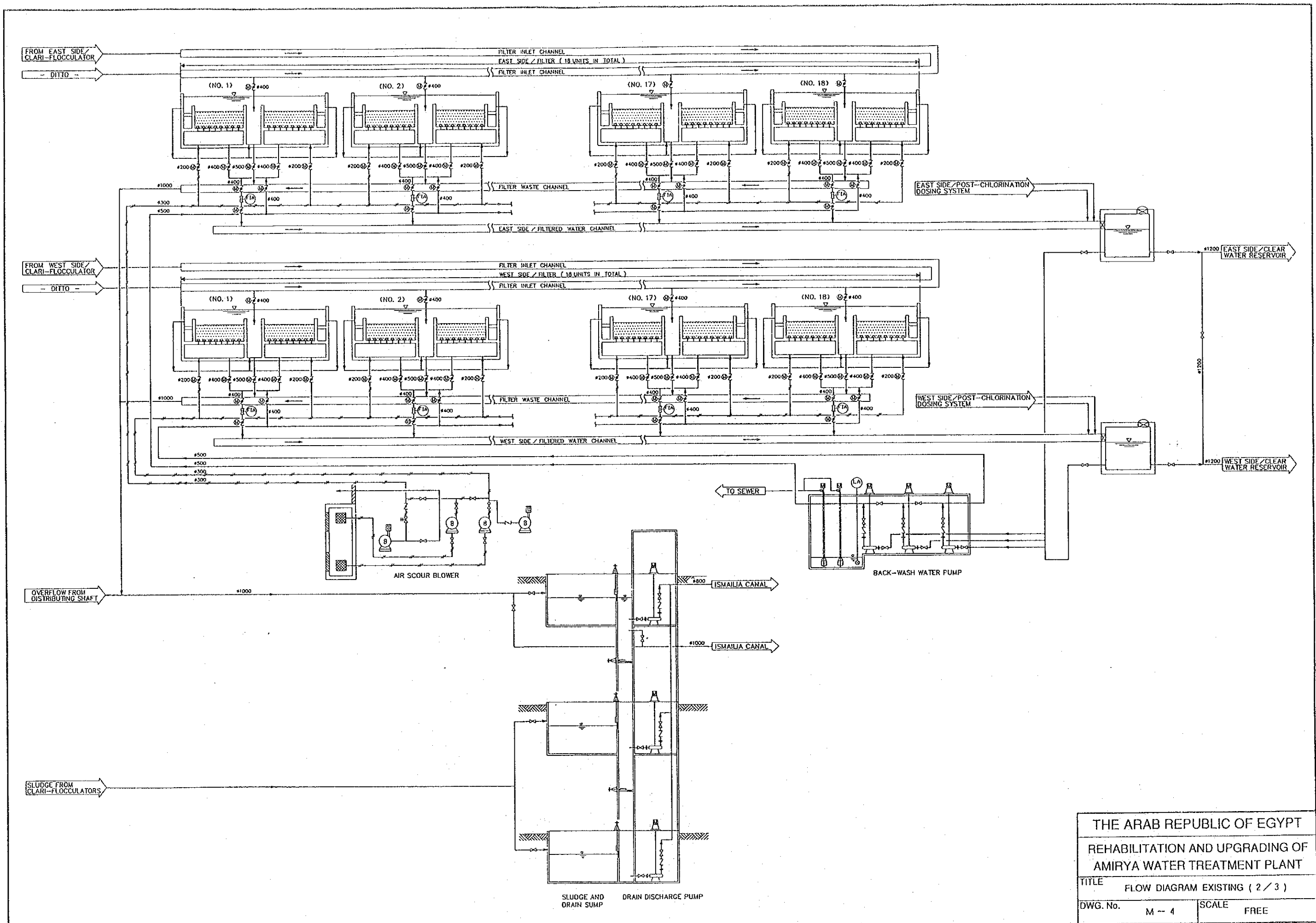
THE ARAB REPUBLIC OF EGYPT		
REHABILITATION AND UPGRADING OF		
AMIRYA WATER TREATMENT PLANT		
TITLE		GENERAL SITE PLAN
DWG. No.	M - 1	SCALE 1 : 1000

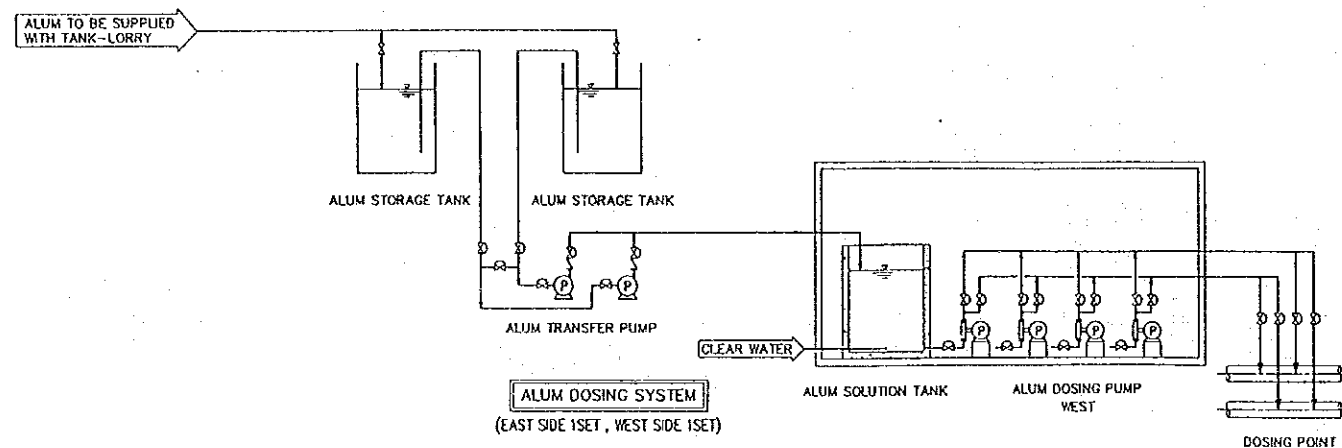
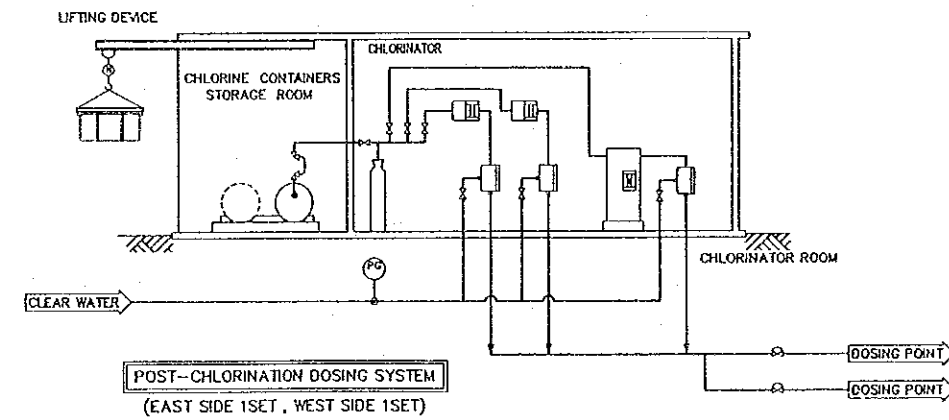
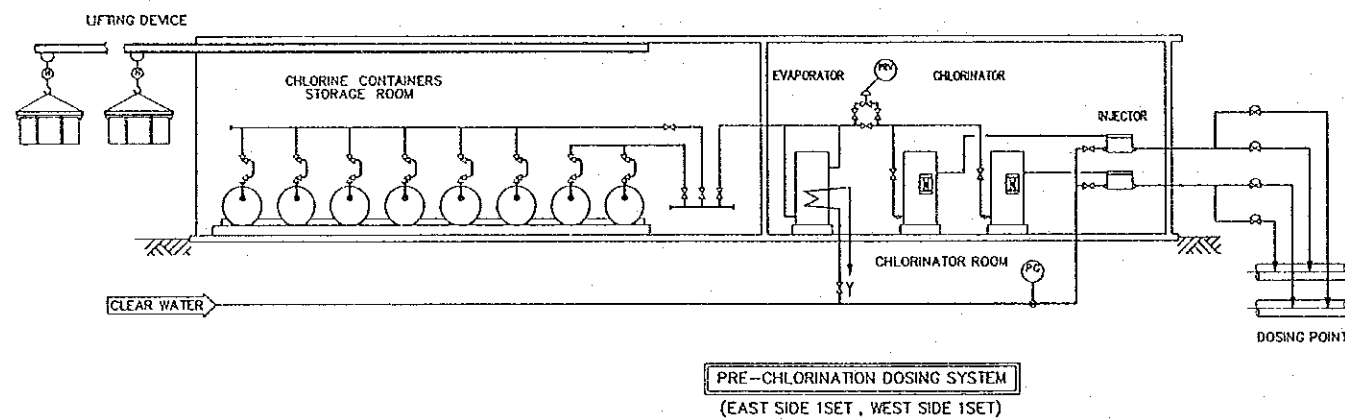
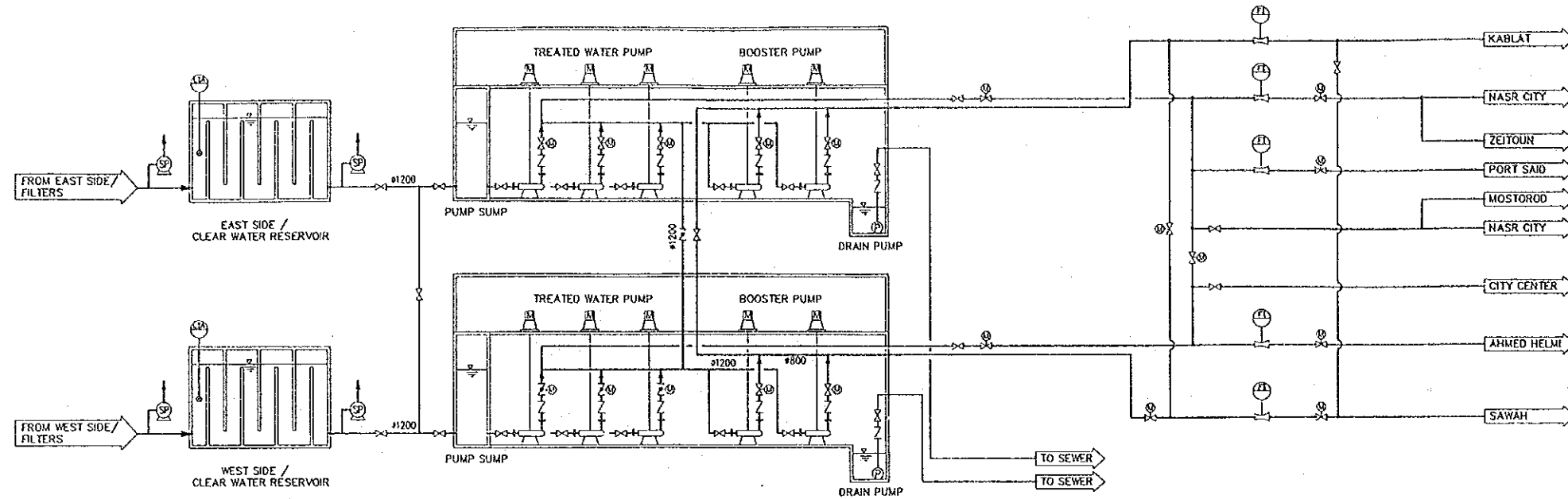


REMARKS:
EACH LEVEL IS TEMPORARY

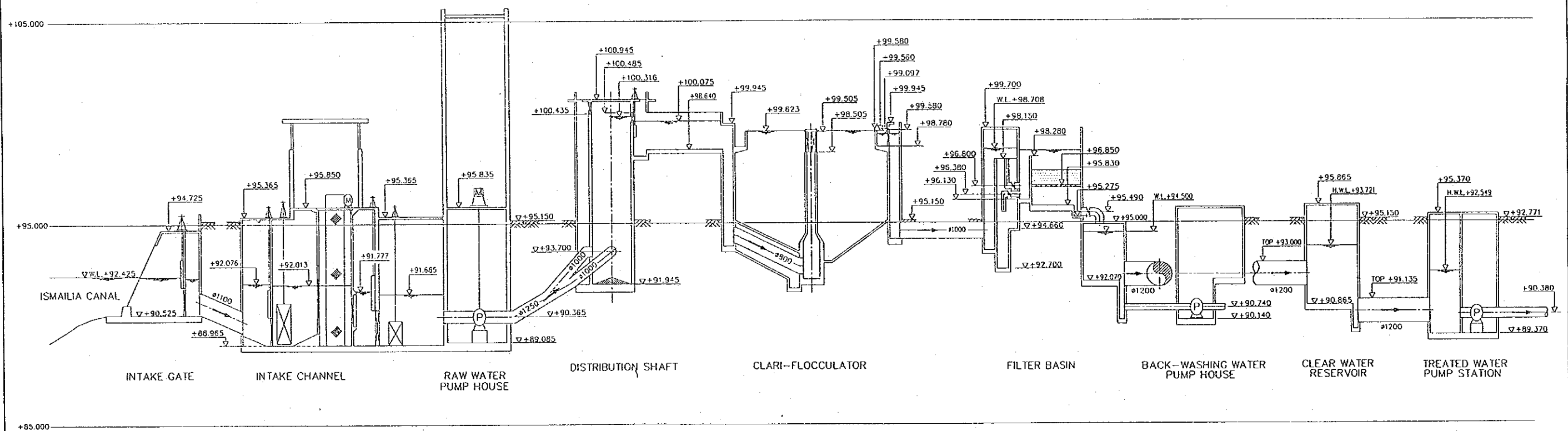
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TITLE HYDRAULIC PROFILE EXISTING	
DWG. No.	SCALE
M - 2	FREE





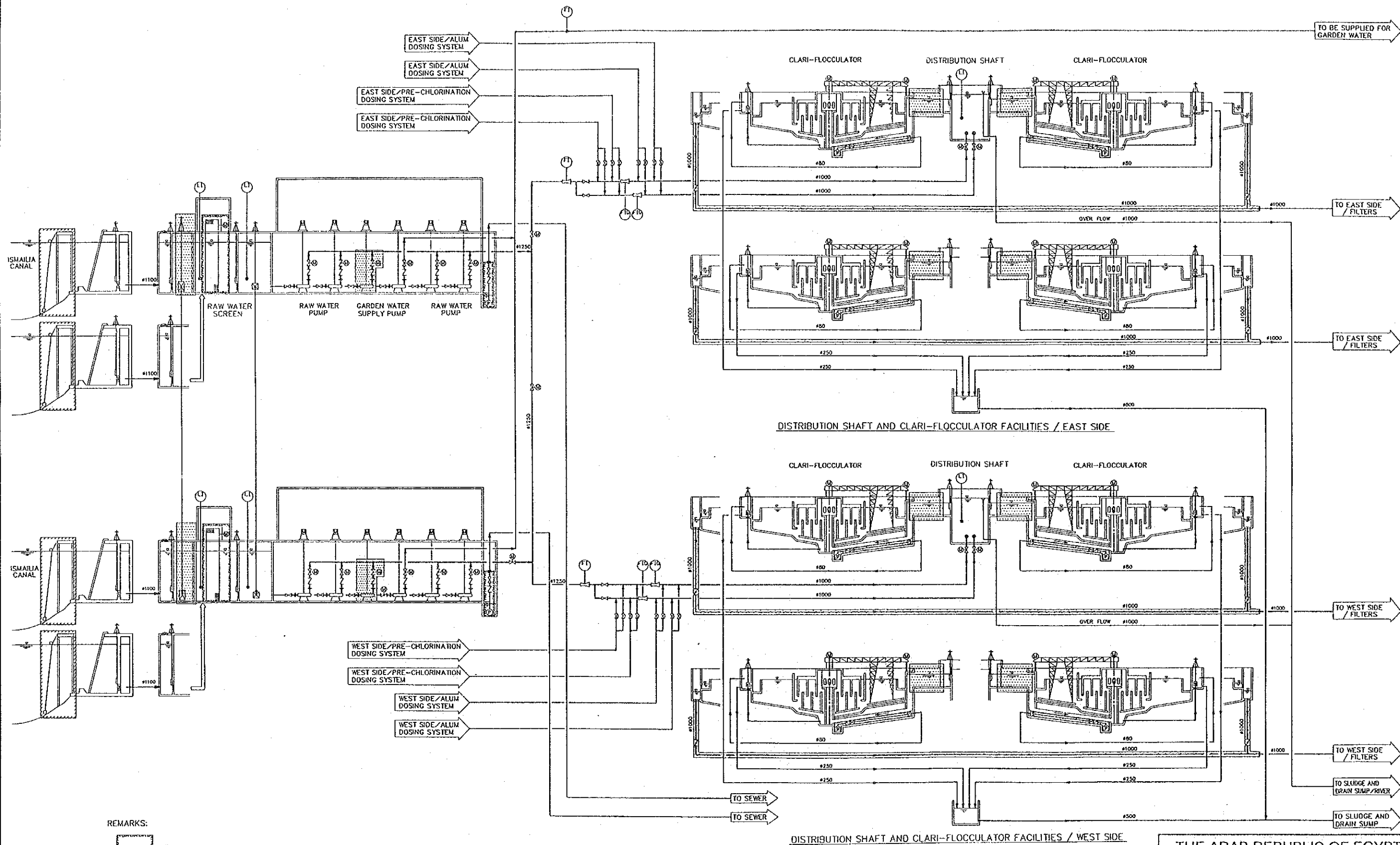


THE ARAB REPUBLIC OF EGYPT		
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT		
TITLE FLOW DIAGRAM EXISTING (3 / 3)		
DWG. No.	M - 5	SCALE FREE

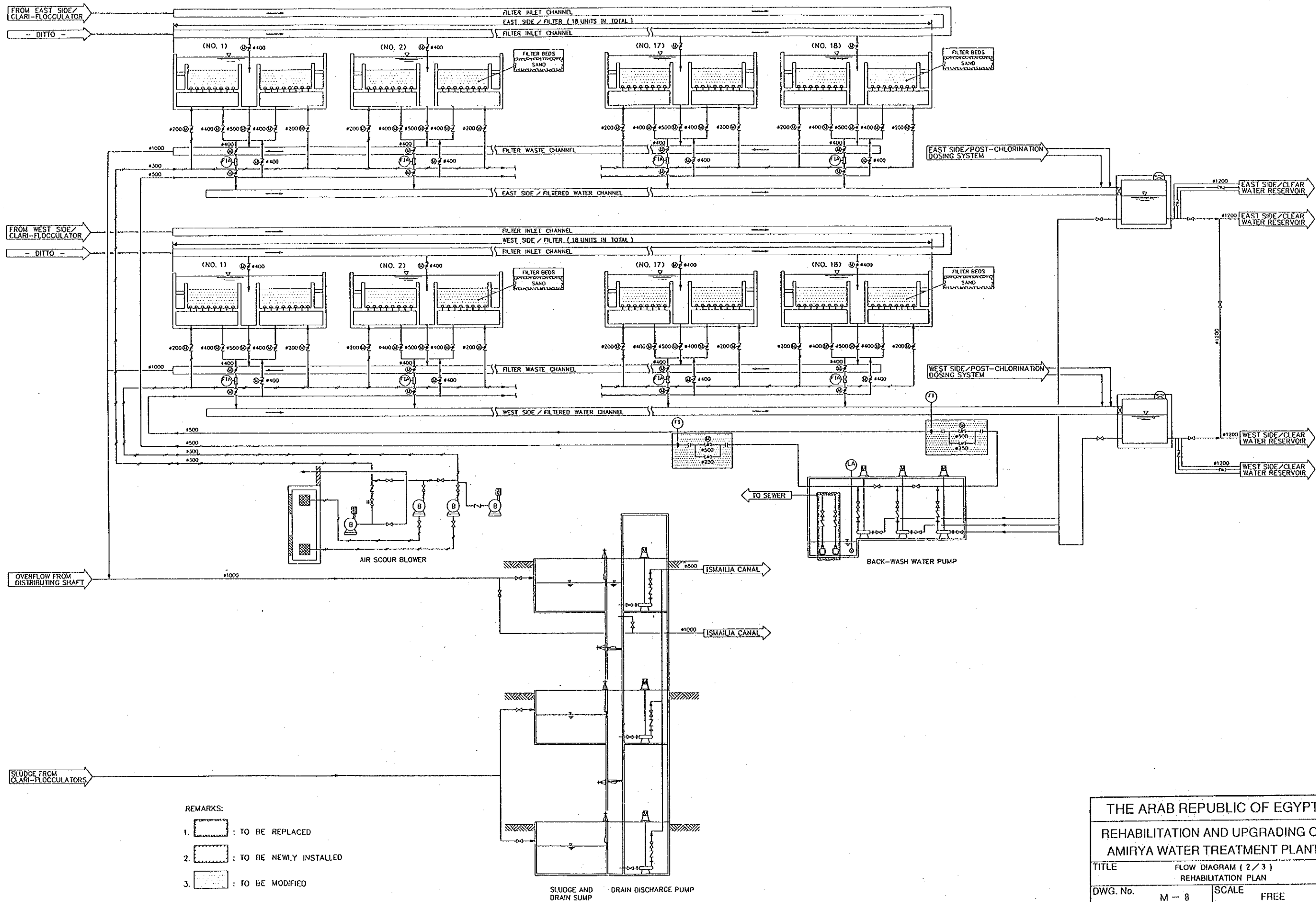


NOTE:
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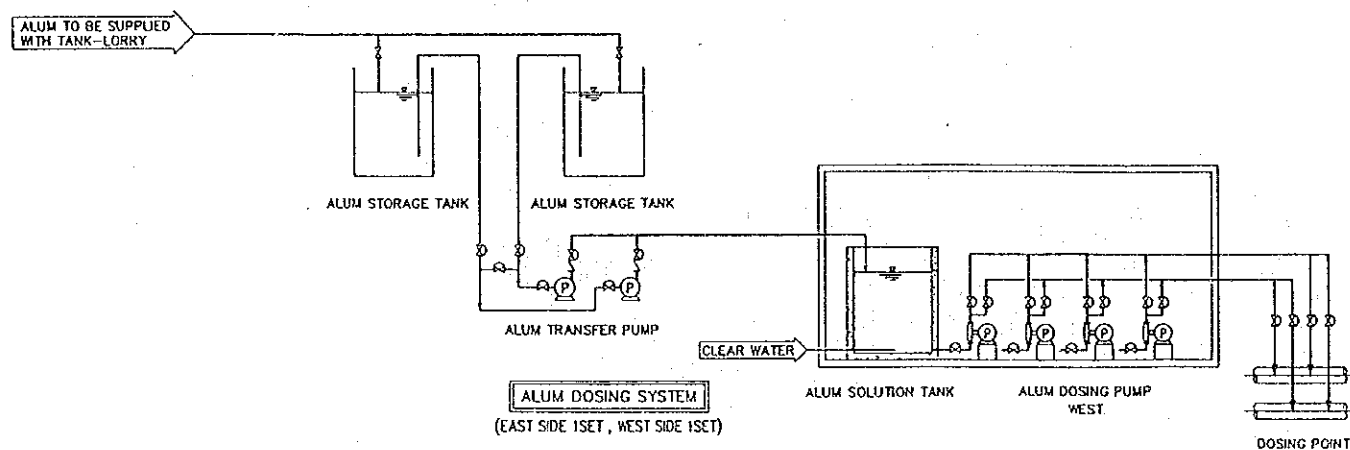
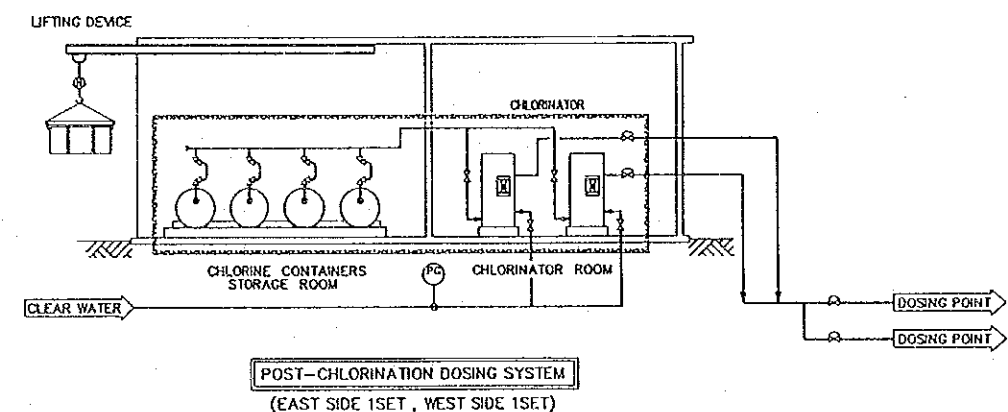
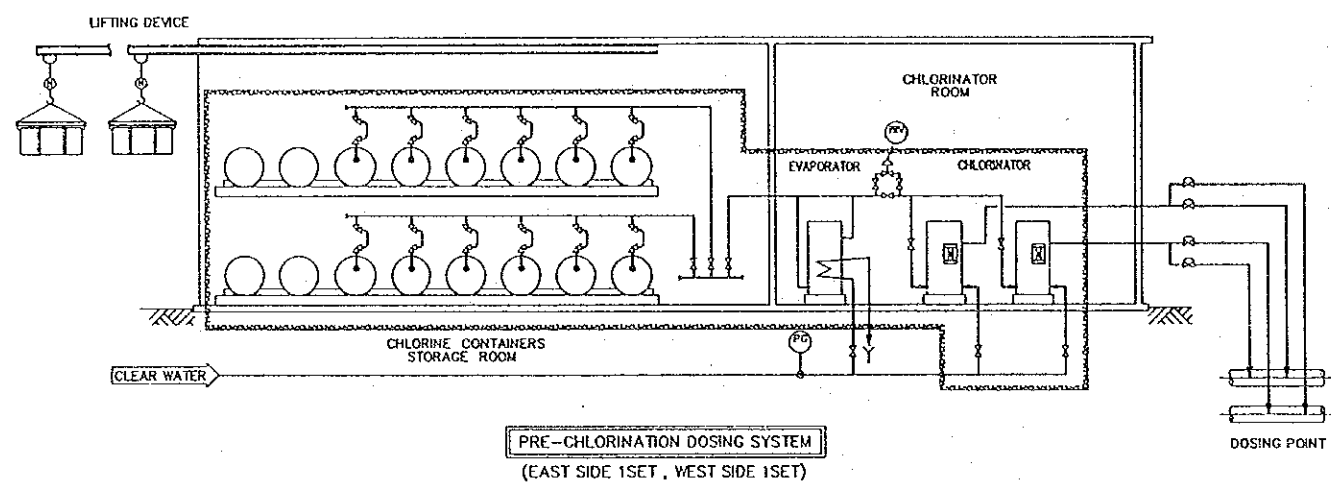
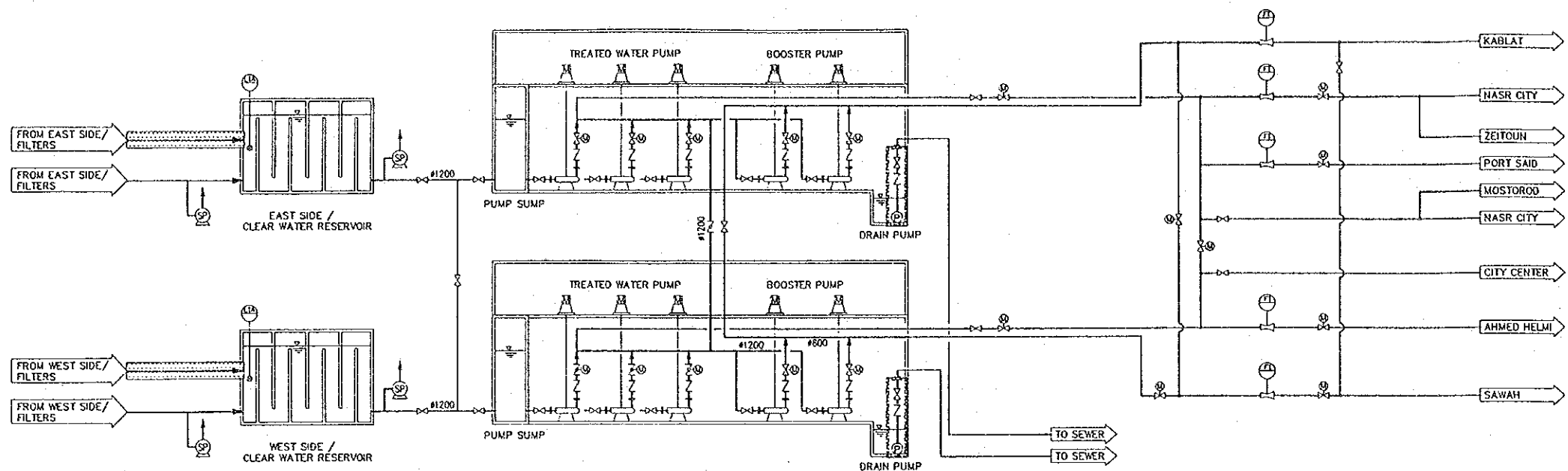
THE ARAB REPUBLIC OF EGYPT		
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT		
TITLE	HYDRAULIC PROFILE REHABILITATION PLAN	
DWG. No.	M - 6	SCALE FREE



THE ARAB REPUBLIC OF EGYPT		
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT		
TITLE		FLOW DIAGRAM (1 / 3)
		REHABILITATION PLAN
DWG. No.	M - 7	SCALE FREE



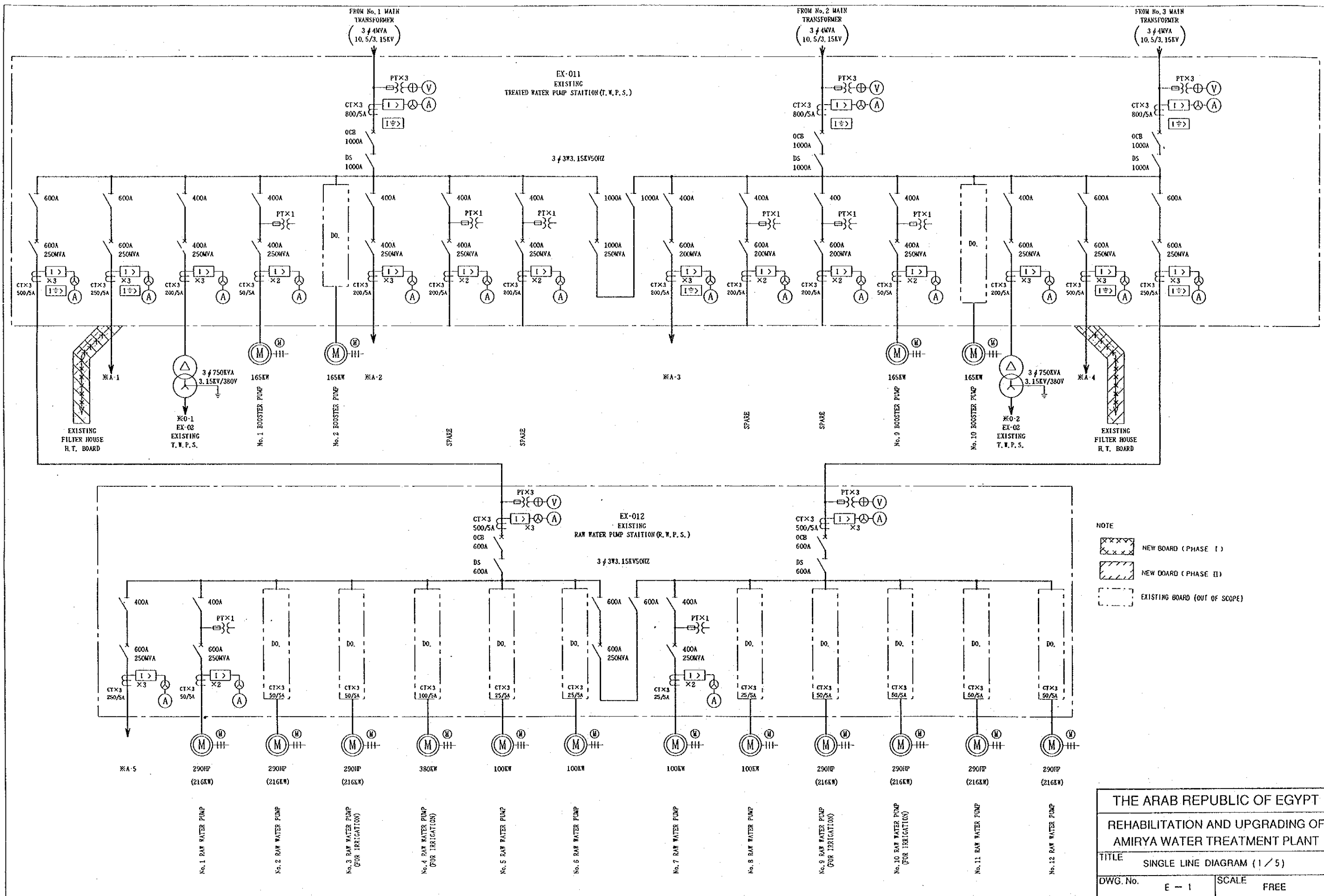
THE ARAB REPUBLIC OF EGYPT		
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT		
TITLE	FLOW DIAGRAM (2 / 3)	
	REHABILITATION PLAN	
DWG. No.	M - 8	SCALE FREE

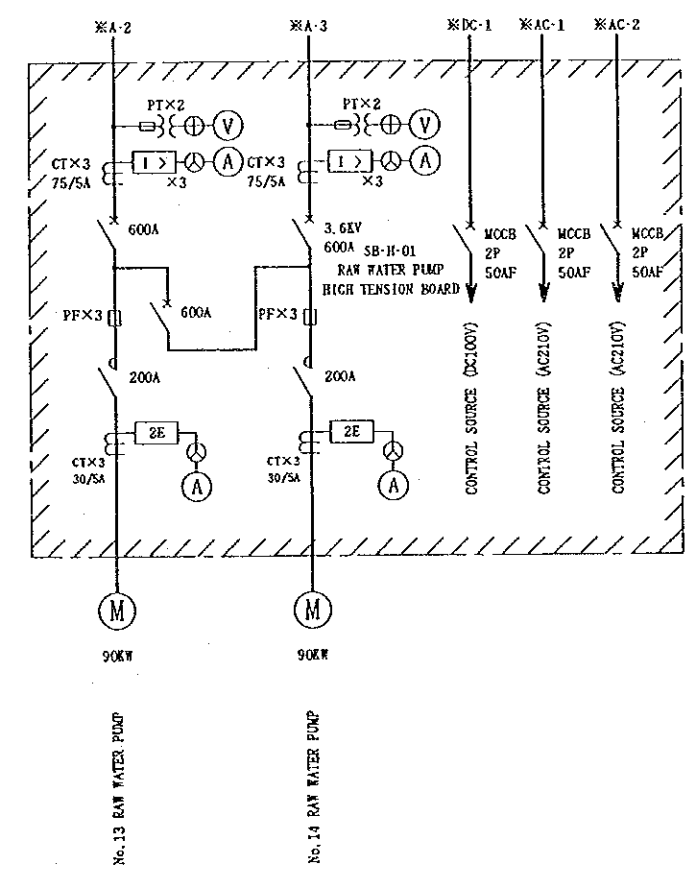
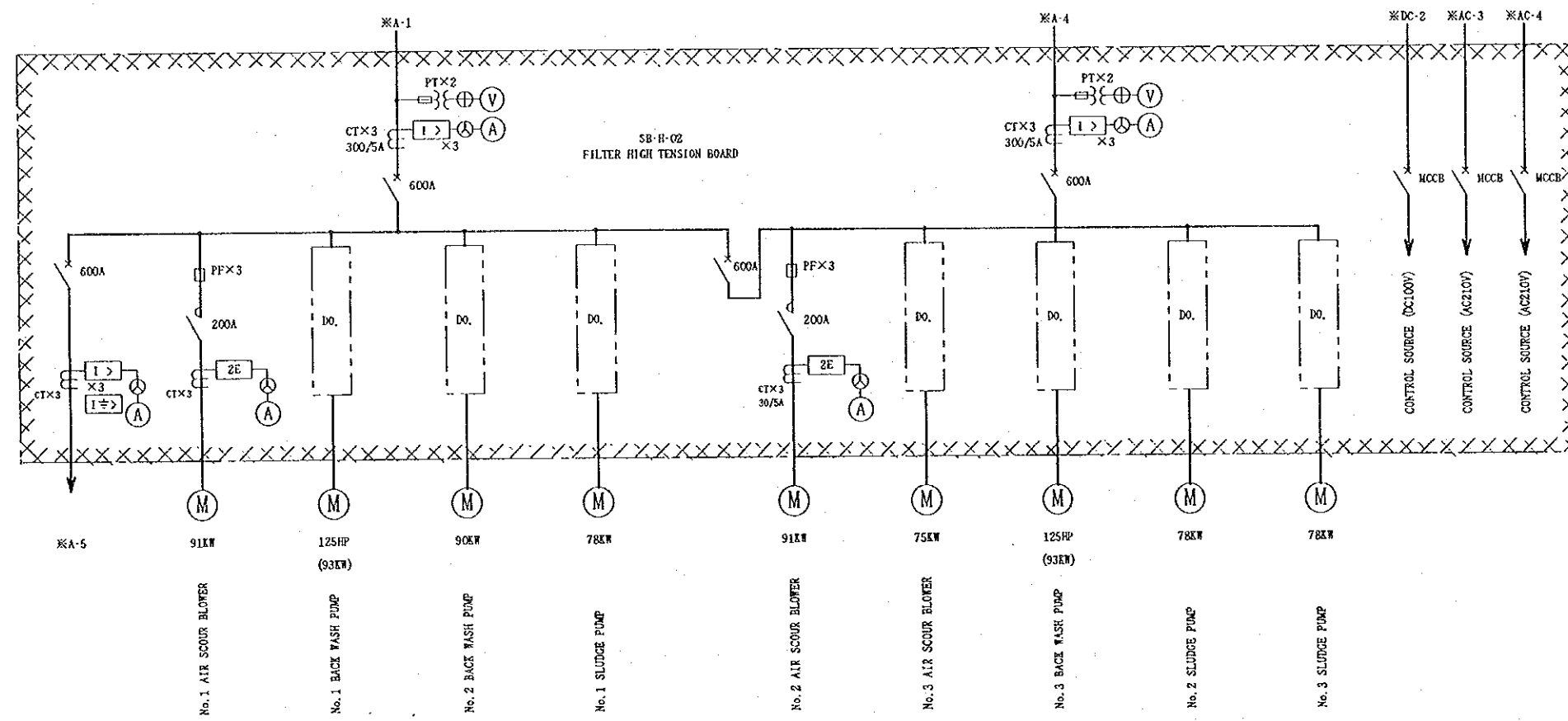


REMARKS:

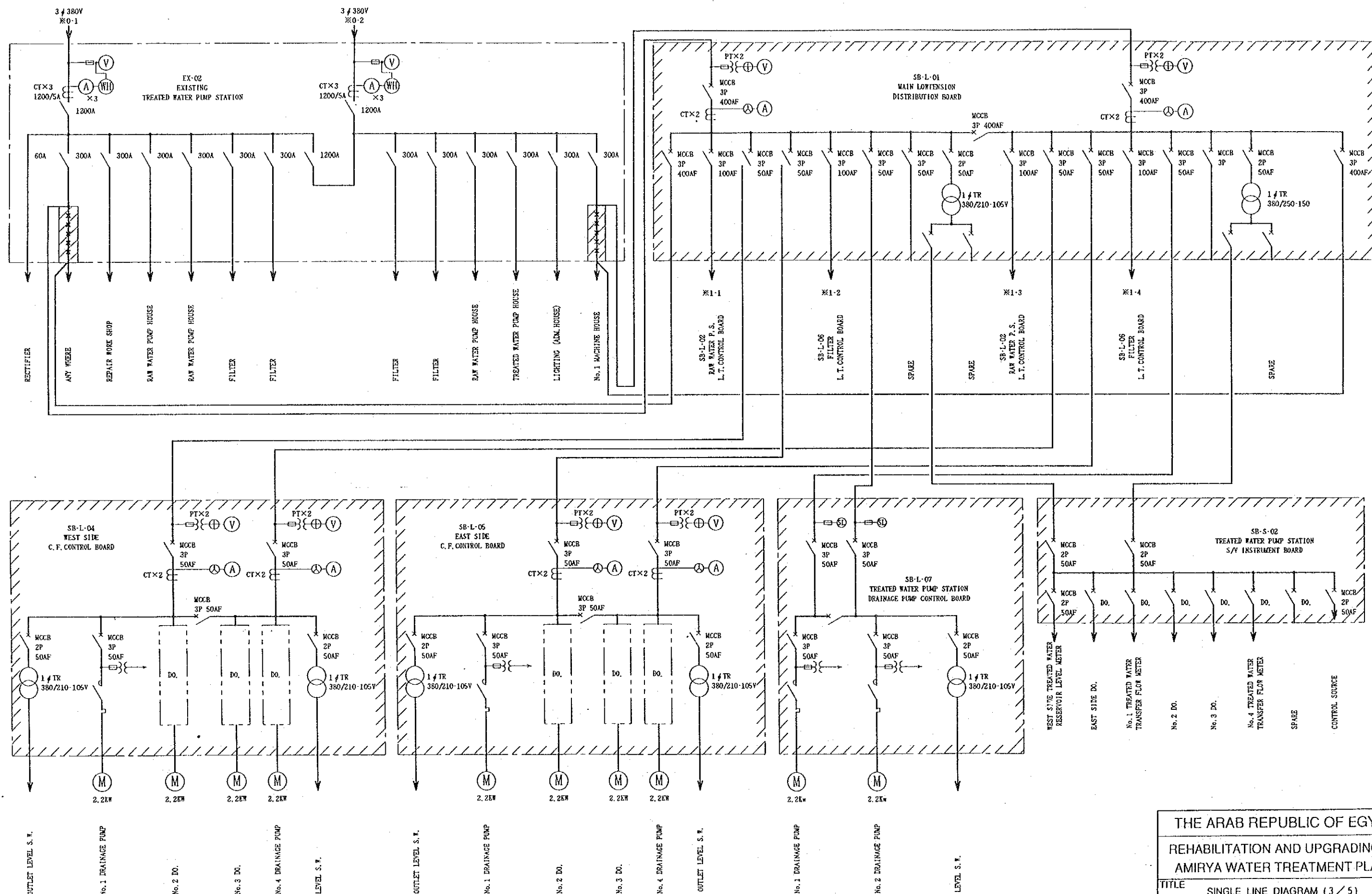
1. [Pattern 1] : TO BE REPLACED
2. [Pattern 2] : TO BE NEWLY INSTALLED
3. [Pattern 3] : TO BE MODIFIED

THE ARAB REPUBLIC OF EGYPT	
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT	
TITLE	FLOW DIAGRAM (3 / 3)
REHABILITATION PLAN	
DWG. No.	M - 9
SCALE	FREE

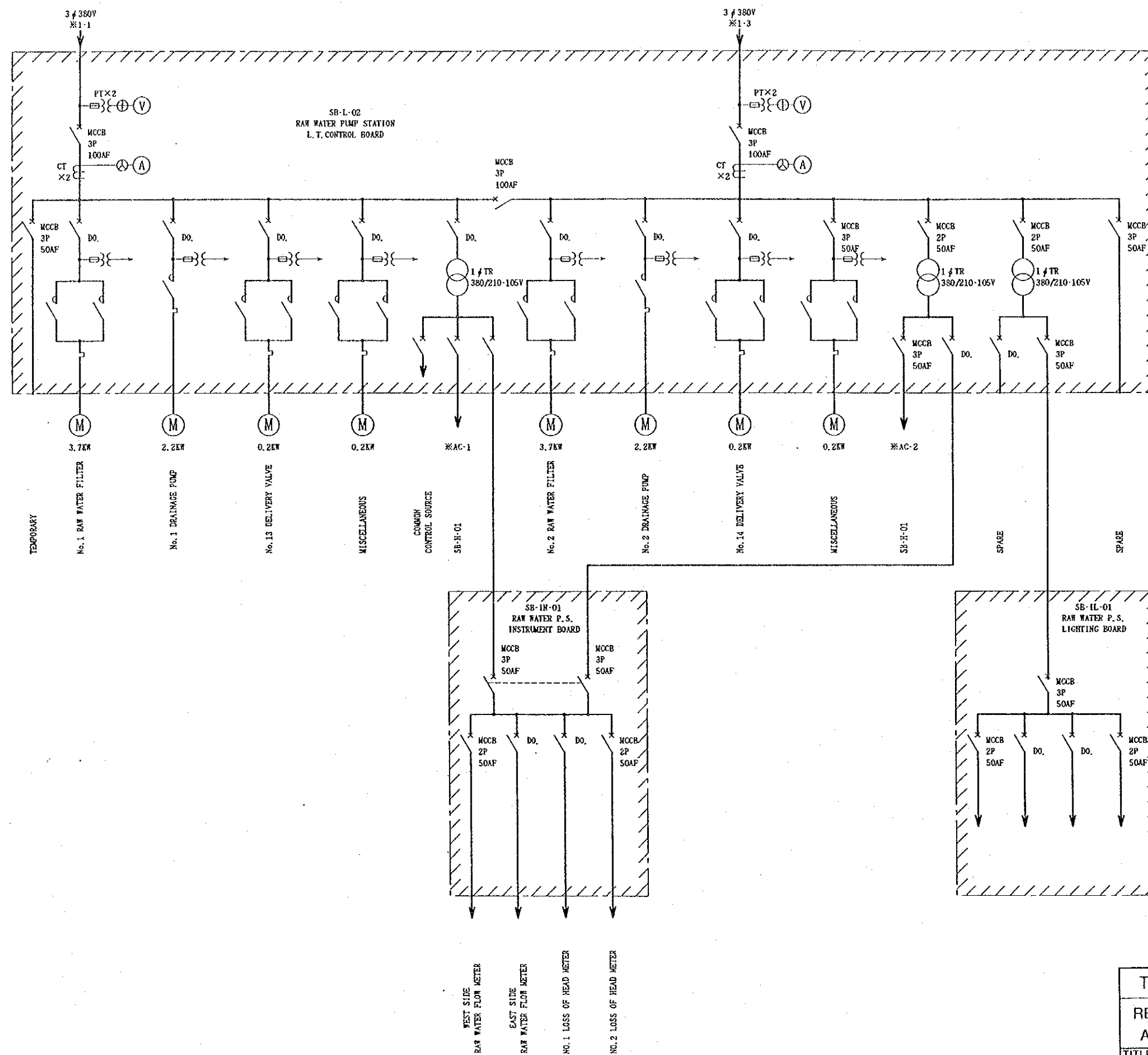




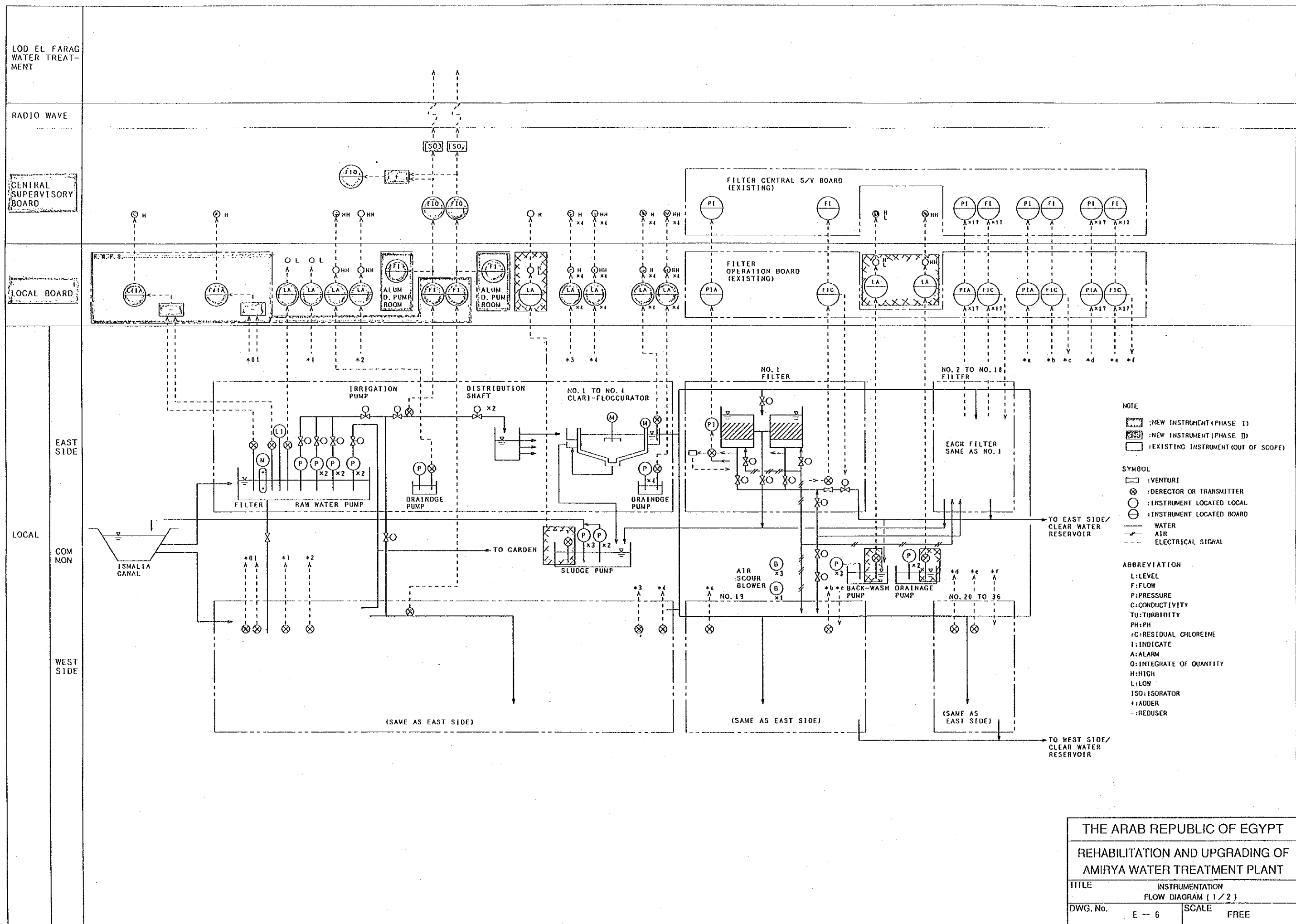
THE ARAB REPUBLIC OF EGYPT	
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT	
TITLE SINGLE LINE DIAGRAM (2 / 5)	
DWG. No. E - 2	SCALE FREE

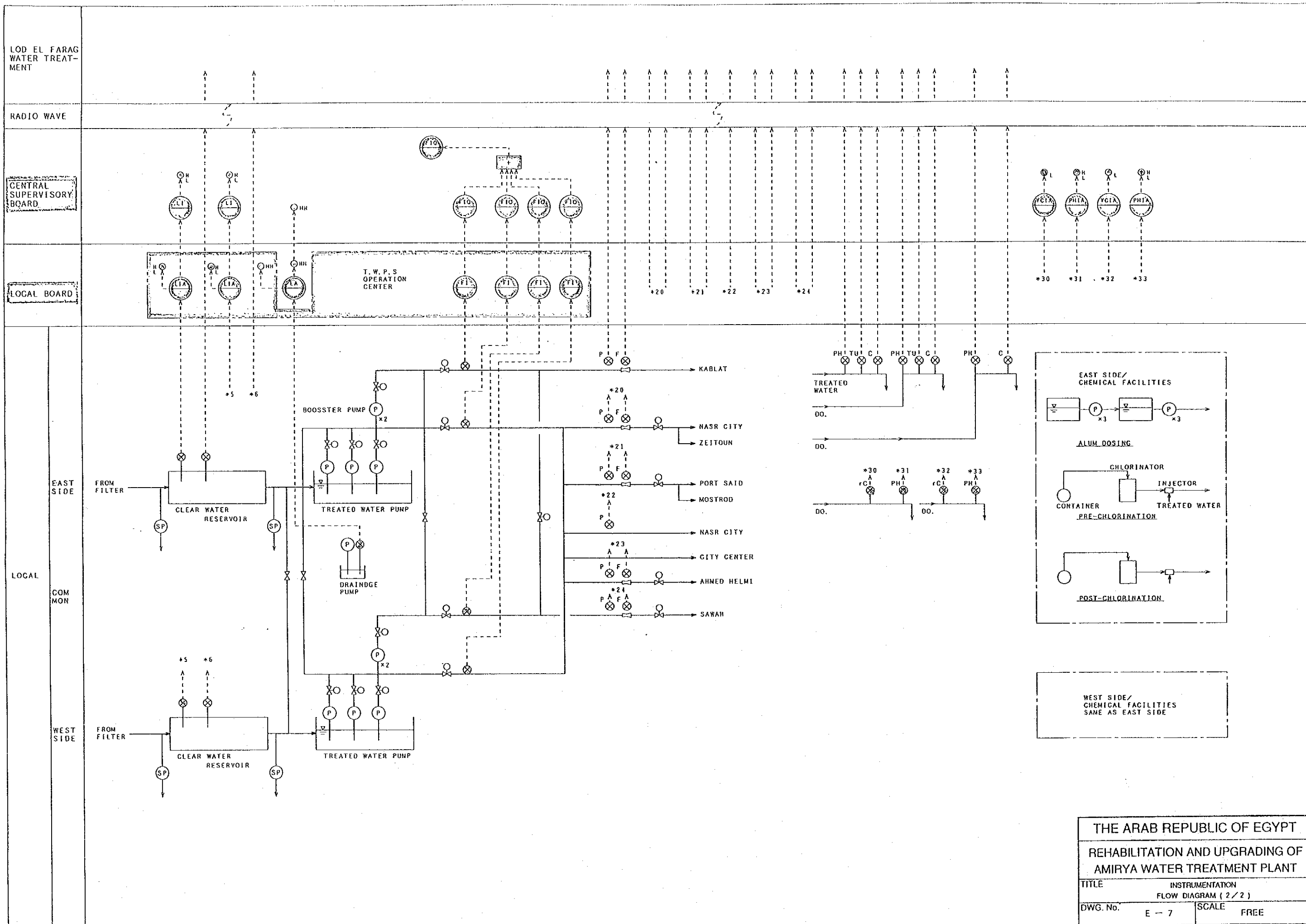


THE ARAB REPUBLIC OF EGYPT		
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT		
TITLE SINGLE LINE DIAGRAM (3 / 5)		
DWG. No.	E - 3	SCALE FREE



THE ARAB REPUBLIC OF EGYPT	
REHABILITATION AND UPGRADING OF AMIRYA WATER TREATMENT PLANT	
TITLE SINGLE LINE DIAGRAM (4/5)	
DWG. No. E - 4	SCALE FREE





3 - 4 Implementation Plan

3 - 4 - 1 Construction Condition

(1) Manner of construction works

Basically, such problems as interruption of the supply of water and reduction of the water supply pressure affecting the 1.51 million residents of the Amyria water supply area shall be kept to the minimum. Moreover, the method of execution of the works should be planned in such a way to indicate clearly that the Project is being carried out under the Japan's grant aid program. In particular, the work execution plan should be formulated by taking into consideration that the Project refers to rehabilitation and upgrading of existing facilities and equipment that are currently in operation, being therefore different from ordinary projects that consist of the donation of materials and equipment.

As things now stand, the consultancy business is not sufficiently developed in Egypt, but in connection with the civil construction field, the local firms have sufficient experience as subcontractors of foreign companies in such works as the Aswan High Dam project, Suez Canal project, and so on. Such being the case, local companies are perfectly qualified to take charge of the rehabilitation works under the supervision and orientation of Japanese contractors. However, since there are hardly local engineering firms possessing design know-how and manufactures with capacity to build the required machinery, it will be necessary to send Japanese experts of the various fields concerned.

The Egyptian counterpart in charge of the execution of the Project will be the Project Department, but the operation of the Amyria Plant will be taken charge by the Water Treatment Department, and the water quality control will be taken charge by the Laboratory & Quality Control Division. Such being the case, the plan should be formulated by taking into consideration the coordination between the various departments or divisions of GOGCWS mentioned above.

(2) Peculiarities of the Project execution

Since the Project is aimed at rehabilitation and upgrading of the facilities and equipment of the existing water treatment plant which is currently in operation, it is necessary to pay careful attention to prevent the occurrence of any period of time when the clear water supply capacity is decreased and to secure the supply of clear water of sound quality when planning the rehabilitation method and the work schedule. At the same time, special attention must be paid to the sanitary and environmental aspects. In other words, since the Amyria Plant is currently in operation, the supply of clear water can not be suspended by the partial paralyzation of the facilities due to the execution of the works.

Moreover, it is expected that many engineers and laborers will work in the water treatment plant, which is a place where the sanitary conditions must be maintained always satisfactorily. Such being the case, the concept of hygiene should be carried out by everybody working in this rehabilitation project, and special attention should be paid to the quantity, quality and location of such facilities as dormitories for laborers, temporary toilets, showers, etc. Since the space available in the water treatment plant site is limited, particular attention must be paid to the safety control. The plan for execution of the work must be formulated by taking into consideration these special conditions prevailing at the Project site.

In Egypt it is not necessary to take into consideration the restrictions imposed by the rain and other weather conditions, but it must be remembered that restrictions of religious nature, such as the Ramadan may exert influence on the progress of the work. Thus, the work schedule must be prepared in such a way that the busiest period does not coincide with the Ramadan.

As for the construction equipment and machinery to be used in this rehabilitation project, items of ordinary type are available on leasing or rental basis on the Egyptian market, and they should be utilized as much as possible. As for the special machinery required to execute the rehabilitation work without interrupting the supply of clear water, they must be brought from Japan, if any.

After the completion of the rehabilitation works, selected personnel of GOGCWS shall have a training course in Egypt which will be provided under the responsibility of the Japanese contractor aiming at knowledge transfer of the operational technics.

3 - 4 - 2 Implementation Method

Table 3-6 shows the implementation work items to be carried out within the Project.

TABLE 3 - 6 CONTENTS OF THE IMPLEMENTATION WORKS

Name	Item	Method
	Screen fence	Installed with the object of reducing the load of the raw water screen.
	Waterway	Interconnection gates and stop log will be provided with the object of reducing the hydraulic losses during the raw water screen inspection.
	Raw water screen	Obsolete raw water screen will be substituted
	Electric equipment	Electric equipment accompanying mechanical equipment will be rehabilitated.
	Raw water pump	Existing two small capacity irrigation pumps will be replaced and used as raw water pump.
	Floor drainage pump	To be installed with the object of improving the maintenance and control
	Electric equipment	Electric equipment accompanying mechanical equipment will be rehabilitated.
	Connection from distribution shaft	Water line will be changed by open channel in order to reduce of hydraulic loss.
	Flash mixer	To be removed in order to decrease hydraulic losses.
	Flocculator	Improving of the clari-flocculator unable wave and flocculation zone wooden arms.
	Floor drainage pump	To be installed with the object of improving the maintenance and control
	Connection pipe to filter basin	Substitution of the part corresponding to the additional distribution capacity with the object of reducing the hydraulic losses accompanying the additional water volume and preventing the sedimentation basin overflow.
	Electric equipment	Electric equipment accompanying mechanical equipment will be rehabilitated.

Name	Item	Contents
	Filter media	Filter sand should be substituted.
	Backwashing water mains	To be installed anew with the object of improving the backwashing functions
	Backwashing pump	New pump will be installed by GOGCWS
	Floor drainage pump	For improving the maintenance and control
	Connection pipe to clear water veservoir	Remodeling and addition. Reduction of the hydraulic losses accompanying the additional volume of water.
	Electric equipment	Substitution due to the deterioration of the filter basin high-voltage switchboard, and remodeling of the electric equipment accompanying the mechanical equipment.
	Treated water pump	The existing equipment will be used.
	Floor drainage pump	To be installed for improving the maintenance and control.
	Electric equipment	Electric equipment accompanying mechanical equipment will be rehabilitated.
	Pre-chlorination	Substitution due to deterioration and for increasing the chlorination volume
	Post-chlorination	Substitution due to deterioration and for increasing the chlorination volume
	Water treatment plant central monitoring board	Renewal due to paralyzation of functions caused by deterioration
	DC switchboard and Low-voltage switchboard	To be installed anew for supplying power to the electric equipment mentioned above.
	Raw water flow meter	Renewal of transmitter unit due to increase of measurement range resulting from increased flow rate and additional installation of receiver unit to strengthen monitoring functions.
	Treated water flow meter	Renewal of transmitter unit and additional installation of receiver unit due to deterioration and the causes mentioned above.
	Clear water reservoir water level meter	Renewal of transmitter unit due to deterioration and additional installation to strengthen monitoring functions.
	Water quality meter	To be installed anew for strengthening the water quality monitoring functions.
	Instrumentation panel	To be installed anew for housing the various meters mentioned above.
	Exterior rehabilitation	Rehabilitation of the Plant site taking into consideration the aesthetic factors.
	Indoor area of filter basin	Rehabilitation of the Plant site taking into consideration the aesthetic factors.

3 - 4 - 3 Construction and Supervisory Plan

(1) Consultant

An agreement about the design and the supervision of the works shall be signed between a Japanese consultant and the organization in charge of the Project. The said consultant shall prepare the documents and the drawings for the tender, and shall carry out the tender for execution of the Project. Moreover, the consultant must be selected by taking into consideration the peculiar fact that, unlike the ordinary construction works, this rehabilitation project should be carried out without interrupting the operation of the existing water treatment plant. Such being the case, the consultant team must be composed of the consulting engineers of the water supply field.

(2) Contractor

A Japanese contractor, selected through open tender in conformity with the grant-aid system of the Government of Japan, shall take charge of the construction of the facilities, the procurement for the required materials and equipment, as well as the execution of the rehabilitation work. The contractor should be sufficiently familiarized with the market, the labor conditions, the labor legislation and other relevant aspects related to the Arab Republic of Egypt so as to use as much local contents as possible in the works to be carried out within the context of the Project.

(3) Necessity of dispatching technical personnel from Japan

Skilled technical personnel will be required in connection with the water treatment facilities, pumping facilities, chemical dosing facilities, etc., involved in the construction and rehabilitation works to be carried out within the context of the Project. Since it will be difficult to secure the said personnel with the required technical skill in the Egyptian labor market, it will be necessary to avail the required personnel from Japan so as to make it possible to complete the works in conformity with the schedule.

(4) Supervision plan

The input estimation for the supervision work will be obtained from the work schedule. The duties to be taken charge by the consultant during the construction stage are listed in the followings.

- Review of the detailed drawings and manufacturing drawings.
- Inspection of the manufacturer of the materials, equipment and machinery.
- Confirmation of the shipment of the materials, equipment and machinery.
- Control of the progress of the works, quality control and inspection after the completion of the works.
- Orientation related to the operation and control of the facilities
- Test operation of the rehabilitated facilities
- Final inspection of the works

Unlike the ordinary projects, in which the facilities are built anew, in this rehabilitation project, the existing facilities have no stand-by units, and the work must be executed with the existing facilities in operation, and as a consequence the works will be quite complicated. Thus, the work execution supervision personnel shall be allocated as follows.

- (1) Since the operation of the existing water treatment plant and the execution of the rehabilitation work will be carried out concurrently, consulting engineers registered in the field of water supply or having knowledge of and experience in the water works will be appointed to take charge of the coordination.
- (2) Coordination adviser (water quality and operation control) who have many experience in the execution, operation and maintenance of the water treatment plant will assist the coordination in the execution of the rehabilitation work, depending on the state of operation of the water treatment plant.
- (3) The resident supervisor and the spot work engineers must be selected consulting engineers having experience in the construction of water treatment plant.

By taking into consideration the said facts, the consultant shall dispatch to Egypt the personnel as listed below. The work supervision includes the review of the detailed drawings and manufacturing drawings, as well as the orientation and supervision of the operation, and the orientation of the water quality inspection.

TABLE 3 - 7 PLAN OF THE WORK SUPERVISION PERSONNEL

Designation	Duty
Coordination	Assigned to periodic spot duties, because this engineer will take charge of the coordination of the normal operation of the rehabilitated facilities and the coordination with the execution of the work.
Coordination adviser (Water quality & operation supervision)	Since this engineer will advise and coordinate the operation and supervision work, he will be allotted for spot duties at opportune occasions (witnessing of the start of the works, intermediate inspection, completion inspection)
Resident supervisor	Supervision of the progress of the work orientation of the contractor, consultations with and advising to Egyptian counterparts, approval of field modifications in the design.
Civil engineering design (spot)	Inspection of civil engineering structures. Advising and recommendation about the execution of the work.
Mechanical engineering design (spot)	Allocation to spot duties (intermediate inspection, test operation, adjustment inspection, witnessing of handing over procedure) at important work execution phases, advising and orientation to the contractor.
Electrical engineering design (spot)	Allocation to spot duties (test operation, adjustment inspection, witnessing of handing over procedure) at important work execution phases, advising and orientation to the contractor.

The following local staff should be recruited in Egypt when opening the local office.

- Secretary & technical worker: 1 person
- Typist: 1 person
- Draftsman: 1 person
- Driver: 1 person

3 - 4 - 4 Procurement Plan

(1) Procurement of materials and equipment.

The contents and quantities of procurement of materials and equipment are detailed as tabulated in Table 3-4 on the Section 3-3-2.

(2) Transportation means

The transportation from Japan harbor to Alexandria will be by sea using regular services, with 50 days period taken into consideration for the trip. The transportation over a distance of approximately 250 km from Alexandria to the Project site will be done by trucks, with 10 days taken into consideration for the trip. Altogether, 60 days will be required for transportation from Japan to the Project site.

3 - 4 - 5 Implementation Schedule

(1) Outline

In the case of the Project carried out with grant-aid provided by the Government of Japan, the E/N is signed by the Government of Japan and the Government of the Arab Republic of Egypt, the design for rehabilitation of the facilities is formulated in conformity with the steps of procedure as shown below, and then the required materials and equipment are procured.

Field survey

The field survey has the purpose of supplementing the basic design study, and consists of investigating and confirming the various conditions required for the sake of the execution design at the Project site.

Detailed design

The detailed design should be carried out by analyzing the results of the field survey. These results should be reflected in the tender documents.

Tender procedures

The consultant should prepare the tender documents, carry out the prequalification exam as representative of the Egyptian counterparts, and carry out the tender procedures.

The results of the tender should be evaluated, and the documents for signing the agreement for execution of the work should be prepared.

Supervision duties

The consultant should approve the design and manufacturing drawings submitted by the contractor, and should carry out the inspection of the equipment before their shipment.

At the Project site, the consultant should take charge of the supervision of the execution of the works, the preparation of the consultancy duty report to be submitted during the period of execution of the works, the certificates of partial completion of each stage of the works, the certificates of payment, and the certificate of approval when the whole project is completed.

Duties when the work is completed

The consultant should issue the certificate of completion of the works, should hand over the work executed by the Japanese contractor to the Egyptian owner, should prepare the duty completion report, and should carry out the duty completion procedures.

Operation, maintenance and control

The consultant should prepare the operation, maintenance and control manual which will be required for proper operation of the Amyria Plant after its rehabilitation.

3 - 4 - 6 Scope of Work

The scopes listed in the followings should be taken charge either by the Government of Japan or the Government of the Arab Republic of Egypt so as to complete the Project.

Scopes to be covered by the Government of Japan

The scopes to be taken charge by the Japanese counterparts in the form of Grant Aid within the context of the Project consist of the 2 items listed in the followings.

- (1) Detailed design and supervision of the work to be carried out by the Japanese consultant.
- (2) Execution of the rehabilitation work of the facilities by the Japanese contractor

Scopes to be covered by the Government of the Arab Republic of Egypt

- (1) To bear all the duties and taxes imposed in the Arab Republic of Egypt throughout the execution of the Project.
- (2) To carry out all the works assigned to the Arab Republic of Egypt.
- (3) To secure water right on taking increased amount of water from Ismailia Canal with the authority concerned.

TABLE 3 - 8 IMPLEMENTATION SCHEDULE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Phase - I	Detailed Design	Site Survey																				1
		Preparation of Tender Documents																				4
		Approval of Tender Documents																				1
		Tendering and Evaluation																				1
	Construction	Design																				3
		Manufacturing and Inspection																				4
		Transportation																				4
		Temporary Works																				2
		Construction Works																				5
		Test Run																				1
Phase - II	Detailed Design	Site Survey																				1
		Preparation of Tender Document																				5
		Approval of Tender Document																				1
		Tendering and Evaluation																				2
	Construction	Design																				3
		Manufacturing and Inspection																				4
		Transportation																				4
		Temporary Works																				2
		Construction Works																				13
		Test Run																				1

CHAPTER 4. PROJECT EVALUATION AND CONCLUSION

CHAPTER 4 PROJECT EVALUATION AND CONCLUSION

4 - 1 Evaluation of the Project

(1) Prevailing problems

The Amyria Plant, which was built approximately 30 years ago, is located in the Amyria district, at the right bank of the Ismailia Canal, in the north-eastern part of Cairo. The Amyria water supply area, which is being supplied with potable water by the Amyria Plant, is an area whose population has increased rapidly in the last 30 years, and is a neighborhood with a high demographic density, consisting of residents of the low and middle-class income levels, and considerable demographic growth is expected to occur also in the future.

According to the Master Plan, the service area being covered by the Amyria Plant had a population of 1.51 million in 1990, and it is expected to increase to 1.63 and 1.81 million in 2000 and 2010, respectively. The water demand of Amyria supply area is expected to be increased to 447,000 m³/d and 497,000 m³/d in 2000 and 2010.

On the other hand, the Amyria Plant has a nominal capacity of only 300,000 m³/d of surface water and 120,000 m³/d of ground water, totaling 420,000 m³/d. It must be remembered that the facilities of the Amyria Plant are in much deteriorated condition in view of the shortage of the materials, equipment and machinery for maintenance, which is being caused by financial and technical difficulties, and it would be no surprise even if the operation of the Plant were stopped at any moment. Moreover, a recommendation was issued by the Ministry of Health of Egypt to stop the use of the wells, that are located within the site of the Plant and are part of the water source of the Amyria Plant, in view of the poor quality of the groundwater and in view of the declining water supply capacity.

Therefore, the actual treatment capacity is evaluated at 330,000 m³/d at present due mainly to worsening groundwater quality. Under the circumstances, the use of wells are being suspended one after another, and there are plans for scrapping all of the existing wells in the near future.

(2) Countermeasures of the Project

The use of 120,000 m³/d of ground water will be abandoned. While, the water treatment capacity will be increased from the current 330,000 m³/d to 430,000 m³/d. As a result, the nominal capacity of the Amyria Plant will be increased from the current 420,000 m³/d to 430,000 m³/d. Such being the case, the implementation of the Project, which has the objects of avoiding absolute shortage of water, maintaining the obsolete water treatment plant from stopping and preventing the water treatment capacity from declining, thereby coping with the increasing demand of water occurring within the Amyria water supply area, is expected to make positive contributions to solve the sanitary and social problems for the more than 1.51 million residents of the Amyria water supply area and to improve their living standards by increasing the supply of potable water. Thus, it is presumed that the Project will exert strong impact from the social and sanitary standpoints, and will be able to secure supplying potable water with the required quality level.

(3) Effects of the Project

The implementation and its effects in each phase are indicated as follows:

1) Phase I

The Phase I of the Project consists as follows:

- Renewal of two (2) units of connection pipe between distribution shaft and clari-flocculator facility (out of 8 pipes in total)
- Renewal of two (2) units of connection pipe between clari-flocculator facility and filter basin (out of 8 pipes in total)
- Renewal of filter media of eight (8) units for filter basin (out of 36 basins in total)
- Renewal of pre-chlorination facility of four (4) units
- Renewal of pre-chlorination facility of four (4) units
- Rehabilitation of electric equipment related with filter basin

Part of the obsolete facilities of the Amyria Plant will be rehabilitated as a result of the implementation of this Project. The water treatment capacity of the facilities using surface water as raw water source will be increased by 30,000m³/d, totaling 330,000m³/d.

As a consequence, the 1.51 million water consumers of the Amyria water supply area will be supplied with 20 more liters/person-day of potable water of superior sanitary standard as compared with the current condition.

2) Phase II

The Phase II of the Project consists as follows:

- Installation of one (1) set of screen fence
- Substitution of two (2) sets of raw water screen
- Change of two (2) units of irrigation pump to the raw water pump
- Renewal of six (6) units of connection pipe between distribution shaft and clari-flocculator facility (out of 8 pipes in total)
- Renewal of six (6) units of connection pipe between clari-flocculator facility and filter basin (out of 8 pipes in total)
- Renewal of filter media of twenty-eight (28) units for filter basin (out of 36 basins in total)
- Renewal of two (2) sets of backwashing water main pipe
- Rehabilitation of electric equipment accompanying mechanical facilities to be rehabilitated
- Renewal of one (1) set of raw water flow meter
- Renewal of one (1) set of treated water flow meter
- Rehabilitation of one (1) set of indoor area of filter basin and exterior of water treatment plant site
- Setting of one (1) set of water analysis equipment

The water treatment capacity of the facilities using surface water as raw water source will be increased by 100,000m³/d, totaling 430,000m³/d. As a result of the Phase II Project, the obsolete facilities will be rehabilitated, and the treatment capacity will be increased to 430,000m³/d.

As a consequence, the 1.51 million water consumers of the Amyria water supply area will be supplied with 66 more liters/person-day of potable water of superior sanitary standard as compared with the current condition.

4 - 2 Conclusion

Most of the Amyria water supply area consists of neighborhoods occupied by residents belonging to the low and middle-class income levels, with a total population of more than 1.51 million that compose a high demographic density. The population is expected to continue increasing also in the future, and according to the forecasts it will reach to 1.81 million in 2010. Residents with relatively low income level will suffer a strong impact from the sanitary and social standpoints in the case of any reduction or stoppage in the supply of potable water.

With the object of improving the unstable water supply prevailing at present in Cairo, which is characterized by a large demand for potable water and small capacity of the water treatment facilities, GOGCWS has formulated the Master Plan in 1990, and is carrying out programs for developing water treatment facilities through studies referring to the areas for construction of the facilities, location of the water treatment plants and other related aspects, with the object to cope with the demand of potable water mounting to $9,000,000\text{m}^3/\text{s}$ which is expected to occur in 2010. Within the context of the Master Plan, the Amyria Plant is assumed to have an actual treatment capacity of $330,000\text{m}^3/\text{d}$. There are plans to expand the capacity of the Amyria Plant by $100,000\text{m}^3/\text{d}$ through the rehabilitation of the existing facilities, and by $200,000\text{m}^3/\text{d}$ more through the expansion of its facilities.

More than 30 years have passed since the construction of the existing facilities of the Amyria Plant, and as a matter of fact one must admit that they are quite obsolete. Moreover, it must be noted that the purification mechanism of the plant is not sufficient to cope with the stabilization of the quality of the raw water at low turbidity levels, which resulting from the operation of the Aswan High Dam, and with the increase of the concentration of vegetable plankton contained in the raw water.

Besides the problems mentioned above, it shall be noted that the quality of the groundwater is deteriorating rapidly in recent years. The problem is to be solved by gradually reducing the intake of water from the wells, but as the degree of deterioration of the quality of groundwater is evolving, in the near future it will be unavoidable to stop the use of the wells located at the site of the Amyria Plant as sources.

The facilities of the Amyria Plant have a nominal capacity of 420,000m³/d , but it is possible to expand the capacity of the surface water treatment facilities to 430,000m³/d through rehabilitation and upgrading of the existing equipment and installations. In order to realize the expansion of the existing facilities to create anew an additional surface water treatment capacity of 130,000 m³/d, as well as rehabilitation and upgrading of the existing facilities for securing their practical operation at the nominal capacity of 300,000m³/d are initiatives that require the investment of huge financial resources, and the current financial situation prevailing at GOGCWS makes it quite difficult to cope with the required investment.

Since the operation, maintenance and control of the facilities of the Amyria Plant, with increased capacity resulting from this rehabilitation and upgrading process does not involve radical changes in the water treatment process itself, the existing human resources and technical skill will be sufficient to cope with the plant operation after the rehabilitation. Moreover, it is presumed that the additional water charge income that will be resulted from the increased volume of potable water to be supplied to the service area is expected to be sufficient to cover the operation and maintenance expenditures of the Amyria Plant.

The Amyria Plant is serving more than 1.51 million consumers of potable water in the Amyria water service area, but it is becoming increasingly difficult to secure a stable supply of the required volume of potable water due to such problems as the obsolescence of the facilities of the Amyria Plant, as well as the gradual reduction in securing of groundwater due to the deterioration of its quality. If the volume of potable water being supplied by the Amyria Plant should become insufficient to cope with the demand, it is all but sure that more than 1.51 million residents living in the Amyria water supply area would suffer serious effects from the sanitary and social standpoints.

Under the circumstances, it is urgently necessary to take the steps to secure the stable supply of potable water in the Amyria water supply area. The Project is aimed at securing the stable supply of the required quantity of potable water with the investment of the minimum amount of financial resources, and implementation of the Project in the form of Grant Aid by the Government of Japan is deemed as an initiative of particular significance.

4 - 3 Important Issues

1) The new intake

The new intake of 136,500m³/d (130,000m³/d×1.05) of surface water from the Ismailia Canal is one of the fundamental premises taken into consideration for the sake of carrying out the basic design, and such being the case the operation of the intake must be carried out for sure after the completion of the works.

2) The existing wells

Water being pumped from the wells existing within the site of the Plant contains high concentration of Fe (iron), Mn (manganese), Cl (chlorine) and other impurities, and the intake is being stopped when their level surpass the water quality standard values. It must be remembered, however, that groundwater is an important water resource, and appropriate measures, for purifying groundwater must be studied in order to make it possible to realize its effective use.

3) The execution of rehabilitation and upgrading works

Since the object of the Project is a water treatment plant serving a densely populated area of Cairo, the execution of the work must be controlled with utmost care, and in such a way to prevent the occurrence of a large-scale stoppage in the supply of potable water during the execution of rehabilitation and upgrading works.

4) The maintenance and control

Since the raw water has low turbidity and contains large quantities of vegetable plankton, the treatment must be carried out through an appropriate control of the quantity of flocculent to be injected. In order to carry out a continuous treatment of water by filtration, an appropriate control must be carried out in the backwashing of the sand layer with air and water, which has the function of eliminating the contaminated substances accumulated in the sand layer after finishing the filtration process.

4 - 4 Recommendations

1) Conserving the environment of the Ismailia Canal

The backwashing waste water drained out by the filter basin and the sludge resulting from the clari-flocculator are being discharged by natural flow into the Ismailia Canal. This is a convenient and economical method. When the environment of the Ismailia Canal is taken into consideration, however, it is recommendable that the Egyptian authorities build a new settling basin, introduce the filter basin backwashing waste water and the sedimented sludge waste water in the new settling basin, discharge the resulting clear water in the Ismailia Canal, carry out the natural dewatering the sedimented sludge by exposing it to the sun, and then use the dewatered sludge in reclamation sites. As a result, the contamination of the Ismailia Canal by the waste water being produced by the Amyria Plant could be substantially reduced.

2) Improving the mechanism for cleaning the filter basin

The raw water of the Amyria Plant has low degree of turbidity and contains large quantities of vegetable plankton. As a general rule, in the treatment of this kind of raw water an appropriate quantity of chlorine is injected in the pre-chlorination process to kill the vegetable plankton, followed by injection of flocculent, and then water is purified by high-speed filtration.

The high speed filter basin operates through a batch process system that consists of a repetition of the filtration process and washing process, and appropriate water treatment capacity can not be attained when the two

processes do not operate correctly. In view of the occurrence of such problems that in the first place, the water collecting plate provided with strainer, which is located at the lower part of the filter basin is deteriorated, in the second place, the molding and the installation are inadequate, in the third place, there is no sand layer working effectively to realize even washing, in the fourth place, there is no washing waster water trough to realize prompt drainage of the washing waster water, etc., it is all but sure that the washing process is not working normally, and as a consequence the treatment of water by filtration, which is being carried out at the Amyria Plant, can not be necessarily regarded as satisfactory.

As a result of the analytical work done in Japan, it was decided to carry out the Project by attributing higher priority in securing the supply of the planned volume of potable water. In the case of potable water, however, securing superior water quality is an aspect of vital importance, and we propose to the Government of Egypt to execute required research and studies related to the means for improving the water quality and to execute an appropriate rehabilitation and upgrading work for this sake.

APPENDIX

APPENDIX - 1

Member List of Survey Team

1 - 1 Basic Design Study

Team leader:

Mitsuru Suemori
Director
Basic Design Study Division I
Grant Aid Study & Design Department
Japan International Cooperation Agency (JICA)

Water supply planner:

Takashi Minato
Assistant Manager
Planning Division
Engineering Department
Kobe City Waterworks Bureau

Project coordinator:

Junko Fujiwara
Basic Design Study Division I
Grant Aid Study & Design Department
Japan International Cooperation Agency (JICA)

Project manager:

Takumi Matsuo
Consulting Engineer
Sanyu Consultants Inc.

Water treatment plant planner:

Takeshi Matsunami
Consulting Engineer
Sanyu Consultants Inc. (Mechanical facilities)

Water treatment plant planner:

Noboru Kioka
Consulting Engineer
Sanyu Consultants Inc. (Electrical facilities)

Water intake planning:

Kaoru Suzuki
Consulting Engineer
Tokyo Engineering Consultants Co., Ltd.

1 - 2 Draft Final Report Explanation

Team leader:

Masahiro Tawa
Basic Design Study Division I
Grant Aid Study & Design Department
Japan International Cooperation Agency (JICA)

Water supply planner:

Takashi Minato
Assistant Manager
Planning Division
Engineering Department
Kobe City Waterworks Bureau

Project manager:

Takumi Matsuo
Consulting Engineer
Sanyu Consultants Inc.

Water treatment plant planner:

Takeshi Matsunami
Consulting Engineer
Sanyu Consultants Inc. (Mechanical facilities)

APPENDIX - 2

Study Schedule

2 - 1 Basic Design Study

No.	Date	Day	Itinerary	Study contents
1 } 2	Jan.13 } /14	Thu. } Fri.	Tokyo (JL 405) Paris (AF 8090) Cairo	Excl. leader & project coordinator
3	/15	Sat.	Cairo	JICA, Min. Housing, Util. New. com., GOGCWS
4	/16	Sun.	Cairo	Embassy of Japan, JICA Meeting, site survey
5 } 7	/17 } /19	Mon. } Wed.	Cairo	Site survey Leader & manager Jan. 17th Tokyo (BA 008) London, 18th London (BA 115) Jan. 19th leader & manager: Courtesy visits, site survey
8	/20	Thu.	Cairo	Discussion of minutes
9	/21	Fri.	Cairo	Data filing
10	/22	Sat.	Cairo	Discussion of minutes
11	/23	Sun.	Cairo	Signature of minutes, reporting to Japan Embassy & JICA
12	/24	Mon.	Cairo	Leader & manager: Luxor Hospital DF survey (Return Feb. 1) Water supply plan & consultant Further studies
13 } 14	/25 } /26	Tue. } Wed.	(Water supply plan & leader) Cairo (AZ 988) Rome (JL 410) Tokyo	Water supply plan & leader: Return Consultant: Further studies
15 } 33	Jan. 27 } Feb. 14	Thu. } Sun.	Cairo	Consultant: Further studies
34 } 35	/15 } /16	Mon. } Tue.	(Consultant) Cairo (AZ 899) Rome (JL 10) Tokyo	Return to Japan

2 - 2 Draft Final Report Explanation

No.	Date	Day	Itinerary	Study contents
1 } 2	4/7 } /8	Thu. } Fri.	Tokyo (JL 407) (LH 594) Cairo	Excl. leader
3	/9	Sat.	Cairo	Ministry of Housing, Utilities and New Communities
4	/10	Sun.	Cairo	Embassy of Japan, JICA meeting Meeting (explaining the Draft Final Report) Leader: Kathmandu (MS 865) Cairo
5	/11	Mon.	Cairo	Discussion of Minutes
6	/12	Tue.	Cairo	Discussion of Minutes, Signature of Minutes
7	/13	Wed.	Cairo	Site Survey
8	/14	Thu.	Cairo	Embassy of Japan, JICA meeting, Courtesy Call
9 } 11	/15 } /17	Fri. } Sun.	Cairo (MS 779) (JL 402) Tokyo	Return to Japan

APPENDIX - 3

Member list in Egypt

Government office	Name	Post
Ministry of International Cooperation	Mr. Moshin M. Sadek	Chief of division in charge of Japan
	Mr. Ashraf Atia Nafal	Economic researcher in charge of Japan
	Ms. Saiha Barakat	Economic researcher in charge of Japan
Ministry of Housing, Utilities and New Communities	Mr. Abdel Salam S. Awad	Vice minister
GOGCWS	Mr. Saad El Din El Deed	Chairman
	Mr. Adel El Toweiry	Vice Chairman, technical affairs
	Mr. Mahmoud Abo Khalef	Technical advisor for the chairman
	Mr. Farah Kamel	Manager, project department
	Mr. Abdel Aziz A. Mahmoud	Assistant manager, project department
	Mr. Mohamed Abd Elzaher Ahmed	Engineer, project department
	Mr. Mohamed Ali Soliman	Administrative manager
Amyria WTP	Mr. Ali Ibrahim Abdel Keriem	Superintendent
	Mr. Mahrous El Kholy	Chief mechanical engineer
	Mr. Alias Anwar	Mechanical engineer
	Mr. Wahid Amin Ahmid	Electric engineer
Rod El Farag WTP	Mr. Mahmod Ahmed Abo El Naga	Superintendent
	Mr. Nashot Abdel Aziz	Water laboratory manager
	Mr. Anwer Motwadi Sedrah	Mechanical engineer
Mostrod WTP	Mr. Galai Heshmat	Superintendent
	Mr. Ibrahim Badawy	Engineer
Fostad WTP	Mr. Atef El Ghanman	Superintendent
	Mr. Gehad Ahmed Hassan	Central Laboratory Manager

Government office	Name	Post
Ensira Water Office	Mr. Hanai S. Shenouda	Superintendent
Zeitun Water Office	Mr. Mansour Yakob	Superintendent
Cairo Public Health Organization	Mr. Ebid Faheim	Assistant Planning Manager
Ministry of Irrigaiton (South Karibia Office)	Mr. Mohamed Elwy	Documentation Assistant Manager
	Mr. Larry D. Annis	Engineer
	Mr. Sher G. Singh	Maintenance & control engineer
Japanese Embassy	Naoaki Kurumada	First secretary
JICA Cairo Office	Tadashi Shinoura	Head
	Kazuhide Nagasawa	

APPENDIX - 4

Minutes of Discussion

4-1. Basic Design Study - Basic work study

MINUTES OF DISCUSSIONS

ON
BASIC DESIGN STUDY ON THE PROJECT FOR
REHABILITATION AND UPGRADING OF
AMIRYA WATER TREATMENT PLANT
IN
THE ARAB REPUBLIC OF EGYPT

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a Basic Design Study on the Project for Rehabilitation and Upgrading of Amirya Water Treatment Plant (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Arab Republic of Egypt a study team, which is headed by Mr. Mitsuru SUEMORI, Director, First Basic Design and Study Division, Grant Aid Study and Design Department, JICA, and is scheduled to stay in the country from January 14 to February 15, 1994.

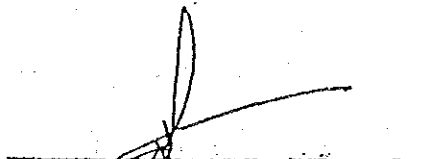
The team held discussions with the officials concerned of the Government of the Arab Republic of Egypt and conducted a field survey at the study area.

In the course of the discussions and field survey, both parties have confirmed the main items. The team will proceed further work and prepare a Basic Design Study Report.

Cairo, January 23, 1994

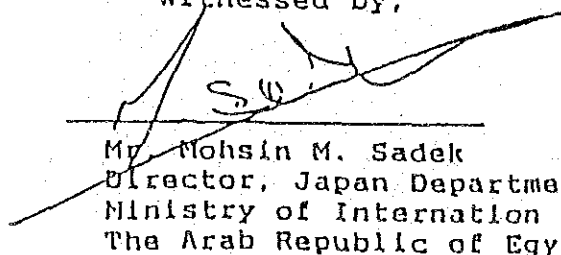


Mr. Mitsuru SUEMORI
Leader,
Basic Design Study Team,
Japan International
Cooperation Agency



Eng. Saad El Din El Deeb
The Chairman,
General Organization for
Greater Cairo Water Supply,
The Arab Republic of Egypt

Witnessed by:



Mr. Mohsin M. Sadek
Director, Japan Department
Ministry of International Cooperation,
The Arab Republic of Egypt

ATTACHMENT

1. Objective

The objective of the Project is to make water supply stable, improving the life-level of the people living in the area by rehabilitating and upgrading of Amirya Water Treatment Plant.

2. Project Area

Amirya Water Treatment Plant, Cairo which is shown in ANNEX-I.

3. Responsible and Executing Agency

(1) Responsible and coordinating organization for the Project is Ministry of Housing and Public Utilities.

(2) Executing organization of the Project is the General Organization for Greater Cairo Water Supply (GOGCWS).

4. Items Requested by GOGCWS

After discussions with the Basic Design Study Team, as described in ANNEX-II, the Project was confirmed by GOGCWS, which details will be clarified in the further work.

5. Japan's Grant Aid System

(1) GOGCWS has understood the system of Japan's Grant Aid explained by the Team. The Grant Aid will be extended by the Government of Japan based on the Basic Design Study.

(2) The Government of the Arab Republic of Egypt will take necessary measures described in item-7 and ANNEX-III for the smooth implementation of the Project, provided that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Schedule of the Study

(1) The Consultants will proceed further work in Egypt until February 15, 1994, for which the Government of the Arab Republic of Egypt shall provide all necessary information and data related to the Project.

(2) Based on the Minutes of Discussions and the technical examination of the further work, JICA will prepare a draft final Report in English and dispatch a mission in order to explain its contents in April, 1994.

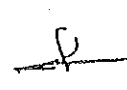

(3) In case that the contents of a draft final Report are acceptable in principal by the responsible and executing agency of the Arab Republic of Egypt, JICA will complete a final Report and send it to the Government of the Arab Republic of Egypt by the end of June, 1994.

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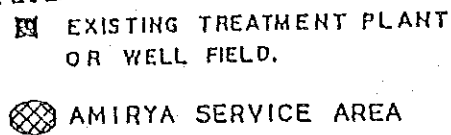
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7. Required Assistance from GOGCWS in case that Japan's Grant is extended to the Project

- (1) To secure land necessary for the implementation of the Project.
- (2) To provide temporary land for liaison office, warehouse, stockyard, etc.
- (3) To provide information and data enough for detailed design.
- (4) To take necessary actions to expedite approval and permission to be made by the organizations necessary for the execution of the Project.
- (5) To take necessary measures for inhabitants' cooperation on traffic control and other items related to the Project.
- (6) To maintain the existing facilities and equipment for the implementation of the Project in proper conditions prior to the commencement of the implementation of the Project.

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APPROXIMATE
SERVICE AREA BOUNDARIES

ANNEX-II

ITEMS REQUESTED BY GOGCWS

The Project is to rehabilitate and upgrade the Amirya Water Treatment Plant, increasing its design capacity (300,000m³/d) to the maximum possible level, at least to the 125% (375,000m³/d).

All the items requested by GOGCWS to satisfy above objective of the Project will be clarified and listed in the further work.

The confirmation duly made by both parties on the items requested during discussions are as follows.

(1) There is a difficulty in maintaining stable supply of quality water with its design capacity in the Plant through deterioration of the existing facilities, including the problems of groundwater.

(2) Securing a stable supply of quality water is an urgent and important theme for GOGCWS to maintain the living level in the Amirya water supply area. It is a traditional, middle and lower class residential area and its population has been increasing rapidly.

(3) It was explained by GOGCWS that the latest GOGCWS' plan for the target year 2010 was made in Dec. 1993, based on the East Bank Water System Master Plan Update 1990. As regards the Amirya Water Treatment Plant, an actual average capacity is estimated 330,000m³/d and a capacity of 100,000m³/d is needed urgently for the increasing water demand in the area by the rehabilitation and upgrading of the Plant. In addition, a future expansion of the Plant, the capacity of 200,000m³/d, is planned in order to be close to the water demand of the target year 2010.

(4) The water treatment plant site and buildings is not in good condition from environmental aspects. Cleaning up the buildings and their surroundings, including foundations within the site, shall be discussed as the items requested.

(5) Together with working with the existing monitoring system in Rod El Farag Water Treatment Plant, GOGCWS strongly requested to be provided with a monitoring equipment of water quality analysis in the site, under the Project.

ANNEX-III

RECOMMENDATIONS FOR UNDERTAKINGS BY THE GOVERNMENT OF THE ARAB REPUBLIC OF EGYPT IN CASE THAT JAPAN'S GRANT AID IS EXTENDED TO THE PROJECT

1. To execute and/or improve incidental outdoor work such as gardening, gates and exterior lighting in and around the site.
2. To construct the access to the site in better condition prior to the commencement of the implementation of the Project.
3. To provide facilities for distribution of electricity, water supply, telephone, drainage and other incidental facilities necessary for the Project.
4. To ensure prompt unloading and customs clearance at ports of disembarkation in the Arab Republic of Egypt and internal transportation therein of the products purchased under the Grant.
5. To secure, with respect to the supply of the products and services under the verified contracts, that Japanese nationals shall not be subject to any customs duties, internal taxes and other fiscal levies which may be imposed in the Arab Republic of Egypt.
6. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into Egypt and stay therein for the performance of their work in accordance with the relevant laws and regulations of the Arab Republic of Egypt.
7. To maintain and use properly and effectively the facilities implemented and equipment supplied under the Grant.
8. To bear all the expenses, other than those to be borne by the Grant, necessary for the execution of the Project.

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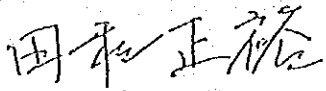
MINUTES OF DISCUSSIONS
ON
BASIC DESIGN STUDY ON THE PROJECT FOR
REHABILITATION AND UPGRADING OF
AMIRYA WATER TREATMENT PLANT
IN
THE ARAB REPUBLIC OF EGYPT
(CONSULTATION ON DRAFT FINAL REPORT)

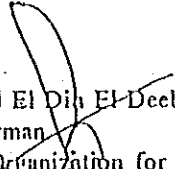
In January 1994, the Japan International Cooperation Agency (JICA) dispatched a study team for the Basic Design Study on the Project for Rehabilitation and Upgrading of Amirya Water Treatment Plant (hereinafter referred to as "the Project" and through the discussion, field survey in the country, and technical examination of the results in Japan, the Study team has prepared the Draft Final Report of the Project.

In order to explain and consult with the official concerned of the government of the Arab Republic of Egypt on the components of the Draft Final Report of the Project. JICA sent to Egypt a study team, headed by Mr. TAWA, 1st. Basic Design and Study Division, Grant Aid Study and Design Department. JICA and is scheduled to stay in the country from April 8 to April 15, 1994.

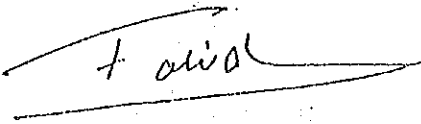
As a result of discussions and constructions, both parties confirmed the main items described on the attached sheets.

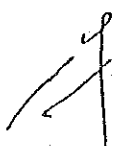
Cairo, April 12, 1994


Mr. Masahiro TAWA
Leader
Basic Design Study
Draft Final Report Explanation Team
JICA


Eng. Saad El Din El-Deeb
The Chairman
General Organization for
Greater Cairo Water Supply
The Arab Republic of Egypt

Witnessed by :


Mr. Faried M. Ali
Director General
Ministry of International Cooperation
The Arab Republic of Egypt



ATTACHMENT

1. Component of Draft Final Report

The government of the Arab Republic of Egypt has agreed and accepted in principle of the components of the Draft Final Report of the Project proposed by the Team and GOGCWS comments as shown in ANNEX I.

2. Japan's Grant Aid System

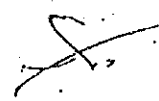
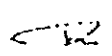
- (1) GOGCWS has understood the system of Japan's Grant Aid explained by the team.
- (2) The government of Egypt will take the necessary measures described in ANNEX II for the smooth implementation of the Project, on condition that the Grant Aid by the Japanese Government is extended to the Project.

3. Required Assistance for GOGCWS in case that Japan's Grant is extended

- (1) To secure land necessary for the construction of the building and facilities.
- (2) To provide temporary land for the construction of liaison office, warehouse, stockyard, etc.
- (3) To provide necessary data and information for detailed design.
- (4) To take necessary actions to acquire the approved for execution of the Project by GOGCWS.
- (5) To give permission for all the works related to the Project.
- (6) To take necessary measures for inhabitants cooperation on traffic control.
- (7) To secure necessary approval of the intake water which amount of the 130,000 m³/d from Ismailia Canal before the implementations of the Project.
- (8) To move the workshop in the project site until the end of the construction work, or separate from the site by the fencing and/or independent gate way.

4. Further Schedule

The team will make the Final Report of the Project, in accordance with the confirmed items, and send it to the government of the Arab Republic of Egypt by the middle of June 1994.

ANNEX 1

GOGCWS requested and commented the following items to the JICA Team and the following items are mutually agreed between the parties.

1. Keeping the flocculators in the clarifier without removal.
2. The replacement of two (2) small size raw water pumps to bigger size or change the two (2) irrigation water units to the raw water units. And relevant suction and delivery pumping system to be modified.
3. The back wash pumps will be replaced by GOGCWS.

The following items will be studied and considered by the JICA Team while preparing Final Report.

1. The hydraulic calculation of water flow between the clarifiers and filters shall be studied by the JICA team.
2. Keeping the operation panel of the sand filter as it is, and install new flow meter for each panel according to new flow rate.
3. Adding flow meters between the clarifiers and the filters and for the back washing pipes.
4. Adding kW/H meter for each incoming feeders in the each switchboards.



ANNEX II

RECOMMENDATION FOR UNDERTAKING BY THE GOVERNMENT OF ARAB REPUBLIC OF EGYPT IN CASE THAT JAPAN'S GRANT AID IS EXTENDED TO THE PROJECT

1. To execute and/or improve incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.
2. To construct the access road to the site in better condition prior to the commencement of the implementation of the project.
3. To provide facilities for distribution of electricity, water supply, telephone circuit, drainage and other incidental facilities necessary for the Project.
4. To ensure prompt unloading and customs clearance at ports of disembarkation in the Arab Republic of Egypt and internal transportation therein the products purchased under the Grant.
5. To secure with respect to the supply of the products and services under the verified contracts, that Japanese nationals shall not be subject to any customs duties, internal taxes and other fiscal levies which may be imposed in the Arab Republic of Egypt.
6. To Accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into Egypt and stay therein for the performance of their work in accordance with the relevant laws and regulations of the Arab Republic of Egypt.
7. To maintain and use properly and effectively the facilities implemented and equipment supplied under the Grant.
8. To bear all the expense other than those to be borne by the Grant, necessary for the execution of the Project.



JICA