INDUSTRIAL TRAINING REPORT I

TRAINING ORGANIZATION	**:**	**NATIONAL WATER SUPPLY & DRAINAGE BOARD**
PERIOD OF TRAINING	**:**	**FROM 30.10.2017 TO 05.01.2018**
FIELD OF SPECIALIZATION	**:**	**ELECTRICAL & ELECTRONIC ENGINEERING**

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E/14/313

ACKNOWLEDGEMENTS

I would like to thank the supervisor and all the staff members of the National Water Supply and Drainage Board for supporting me throughout the ten weeks of my training period. It was such a meaningful and a productive experience. The industrial experience, knowledge and the experience gained on electric machines were really valuable. At the same time, I must appreciate the support and guidance given by Industrial Training and Carrier Guidance Unit of the Faculty of Engineering in leading me to a meaningful training experience.

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LIST OF ABBREVIATIONS

BS	Back Sight
DOL	Direct On Line
FS	Fore Sight
GKWTP	Greater Kandy Water Treatment Plant
KSWTP	Kandy South Water Treatment Plant
LS	Longitudinal Section
NWS&DB	National Water Supply & Drainage Board
RSC	Regional Support Centre
RWSK	Regional Workshop & Stores Kundalgama, Kundasale
SCADA	Supervisory Controls and Data Acquisition
VFD	Variable Frequency Drive

Chapter 1

INTRODUCTION

1.1 TRAINING SESSION

First session of the industrial training - TR400 was carried out at Regional Support Centre (Central) of the National Water Supply & Drainage Board located at Gatambe, Peradeniya for period of 10 weeks starting from 30.10.2017 to 05.01.2018.

The training session was carried out in several locations as per table 1.1 under Regional Support Centre (Central).

Table 1.1 Training Schedule

Worksite	Location	Duration (weeks)
Greater Kandy Water Treatment Plant	Katugasthota	2
Kandy South Water Treatment Plant	Meewathura	3
Regional Support Centre (Central)	Gatambe	3
Regional Workshop & Stores Kundalagama	Kundasale	2

1.2 INTRODUCTION TO TRAINING ORGANIZATION

1.2.1 Organization

The supply of portable water was originally the responsibility of Public Works Department (PWD) which was subsequently transformed to the Department of Water Supply in 1965. The Board was a sub- division under the Department of Water Supply. In 1970, it became a division under the Ministry of Irrigation, Power and Highways. The present Board was established in 1975 by an Act of Parliament which functions under the Ministry of Urban Development.

"Water Supply and Drainage" is the key responsibility of the NWS&DB. It aims at supplying safe drinking water and providing sanitary facilities for the well- being of people. The organization has extended its coverage and service by annexing several Urban Water Supply Schemes which were under the operation of Local Authorities. In 1982, consumer metering and billing commenced. The Board has initiated several water schemes and sanitary programmes in rural areas of Sri Lanka in order to ensure the sustenance and development. Presently, 324 Water Supply Schemes are operated under NWS&DB. It covers a population of about 34% with pipe borne water supply. The sewerage system in Colombo and suburbs is also managed by the NWS&DB.

1.2.2 Management Structure

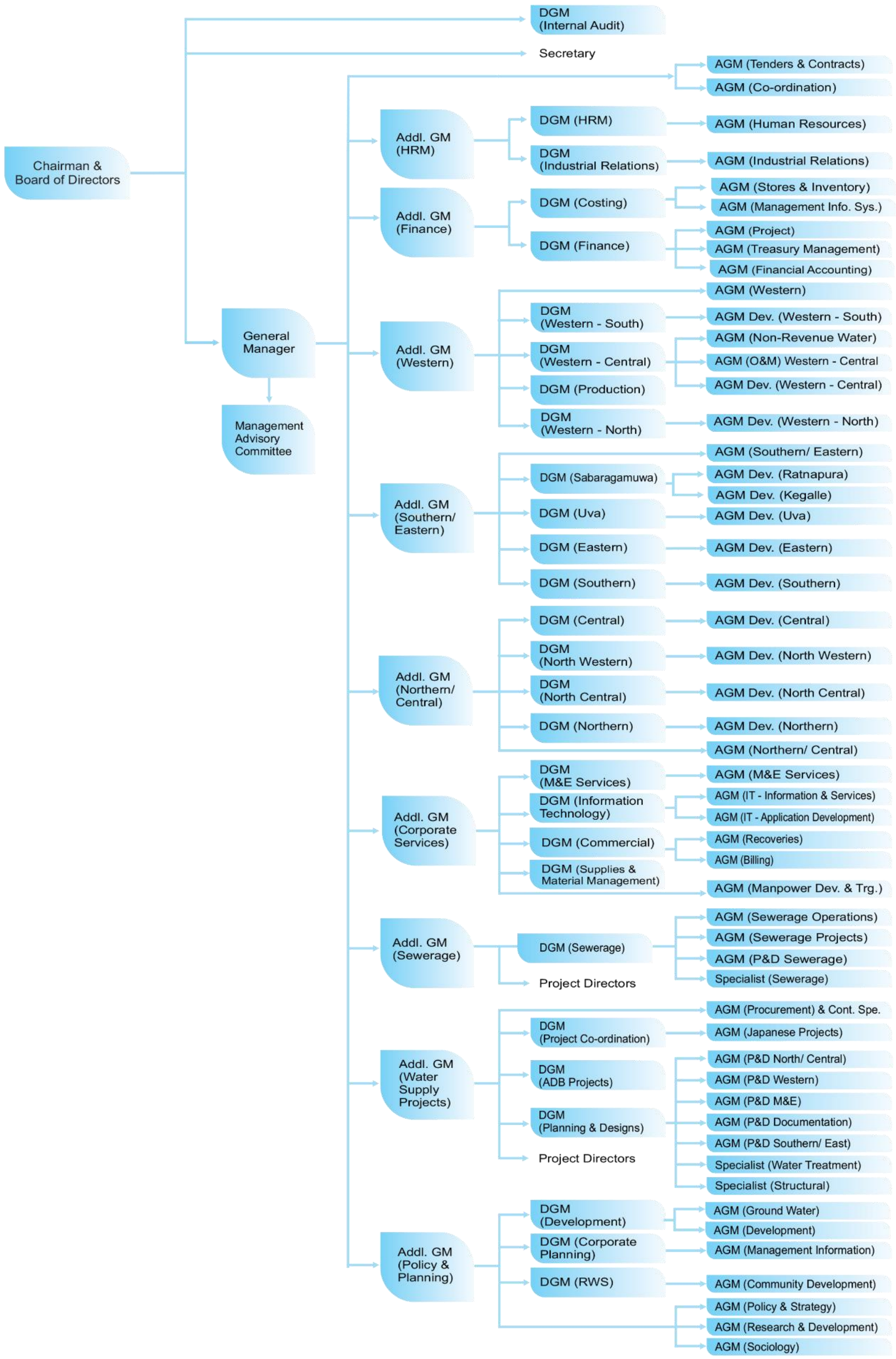

Figure 1.1 Management Structure of NWSD&B

1.2.3 Vision

"To be the most prestigious utility organization in Sri Lanka through technological and service excellence"

1.2.4 Mission

"Serve the nation by providing sustainable water and sanitation solutions, ensuring total user satisfaction"

1.2.5 Goals

- Increase water supply & sustain coverage.
- Improve business efficiency.
- Improve service to customers & promptly attend to public complaints.
- Promote information & communication technology solutions as a catalyst for business growth.
- Ensure greater accountability & transparency.
- Promote Human Resource Development.
- Facilitate safe drinking water supply & sustain to rural & undeserved communities.

1.3 SUMMARY OF THE WORK ENGAGED IN TRAINING

The whole process of the organization from the input of raw water to the distribution of pure water was studied during the training period. The flow rates of the transmission lines were measured to analyze the mismatches between rates of water flow. In order to increase the flow rate, analyzed the system for a new pump. For that a system curve of the pipeline was needed. Since the transmission system is outmoded finding LS drawing was difficult. Therefore, a survey was conducted in order to design a new system curve for the whole pipeline system. At the same time, the impeller diameter of the new pump was calculated to get the desired flow rate. In addition to these, I could get a comprehensive knowledge on SCADA systems and could examine the function of motor starters and motors as well.

Chapter 2

WATER TREATMENT PLANTS & WORKSHOPS

2.1 INTRODUCTION

This chapter gives a brief explanation about the training locations that I attended during my training period at NWS&DB. These locations include the Greater Kandy Water Treatment Plant, Kandy South Water Treatment Plant, Regional Support Centre (Central) and the Regional Workshop & Stores Kundalagama.

2.2 GREATER KANDY WATER TREATMENT PLANT

GKWTP is located at Pahalakondadeniya, Katugastota in Kandy - North region of the Central province. The catchment area of this water supply system includes the highly urbanized area in Kandy city. The raw water intake of GKWTP is near the solid waste dumping site of the Kandy city at Thekkawatta, which is downstream of the intake of GKWTP. A photo which is taken from front entrance of the GKWTP is shown in Figure 2.1.

Figure 2.1 Greater Kandy Water Treatment Plant

Greater Kandy Water Supply Project was proposed as a measure to solve the acute drinking water shortage in Pathadumbara, Kandy Four Gravets, Akurana, Pujapitiya and Harispattuwa Pradeshiya Saba areas.

The GKWTP operation was started on 8 January 2007. Earlier to this, water need for these areas was fulfilled by 21 small water supply schemes that were operating with minimum facilities and shallow tube wells with unsatisfactory water quality. The current GKWTP project was designed to produce 115,000 m^3/d at completion in phase 3. At present, it can produce 72,000 m3/d (Phase 1-Stage II). Generator of the GKWTP is shown in Figure 2.2.

Figure 2.2 Generator

Raw water is extracted from Mahaweli River at an intake structure constructed in the Kahawatta, with a maximum capacity of 110,000 m3/d. The Mahawali river catchment is not protected and flows through highly populated areas, hence affecting the quality of raw water. Raw water pumping is done in accordance with an agreement made with Mahaweli authority, Sri Lanka. This raw water is screened and grit removed at the intake and conveyed to the treatment plant at Pahala Kondadeniya via 1000 mm diameter pipeline. At the treatment plant, water is treated to meet SLS 614 standard and then distributed.

On an average 15,000 m^3/d is issued to Kandy Municipal Council and the rest is continuously pumped to Harispattuwa, Akurana, Pathadumbara and Pujapitiya areas. Population served under this water supply system is approximately 400,000. Water demand varies with the District Secretariat Division. Pump house of the plant is shown in Figure 2.3.

Figure 2.3 Pump House of GKWTP

2.3 KANDY SOUTH WATER TREATMENT PLANT

The Kandy South water treatment plant (see Figure 2.4) was commissioned on 29th January 2010 at a cost of 72.34 million US$. The main responsibility of this plant is to treat raw water extracted from the Mahaweli Ganga River and supply the treated water to 15 reservoirs located in South Kandy Metropolitan area. This plant is designed to produce 35,000 m3/d of drinking water complying with the SLS standards (Ordinance of SLS standard 614: Part 1 & 2 - Sri Lanka Standards Institute, 1985). It will serve 250,000 consumers before the design horizon of year 2030. Intake of the KSWTP and a submersible pump at the KSWTP are shown in Figure 2.5 and Figure 2.6 respectively.

Figure 2.4 Kandy South Water Treatment Plant

Figure 2.5 Intake of KSWTP

Figure 2.6 Submersible Pump at KSWTP

2.4 UNIVERSITY WATER SUPPLY SCHEME

University water supply scheme is the one which supplies purified drinking water to University of Peradeniya and to General Hospital Peradeniya (Teaching). The plant is located at university premises itself. This plant is established in 1963 & it has very old meters as shown in Figure 2.7.

Figure 2.7 University Water Treatment Plant Meter Panel

The intake pump house of the university water supply scheme is designed like a barrel- shaped shallow well (see Figure 2.8). This barrel-shaped pump house is separated into two halves in which water fills into one side while the two pumps are installed in the other side. The motors of the pumps are installed in the upper house (see Figure 2.9). We cannot find such a marvelous creation in any other part of Sri Lanka because no matter how much water fills the river and into the water filling side of the house, it does not make any impact to the side with pumps, thus making it really convenient for maintenance and repairing purposes (see Figure 2.10).

Figure 2.8 Intake Pump House

Figure 2.9 Inside the Pump House

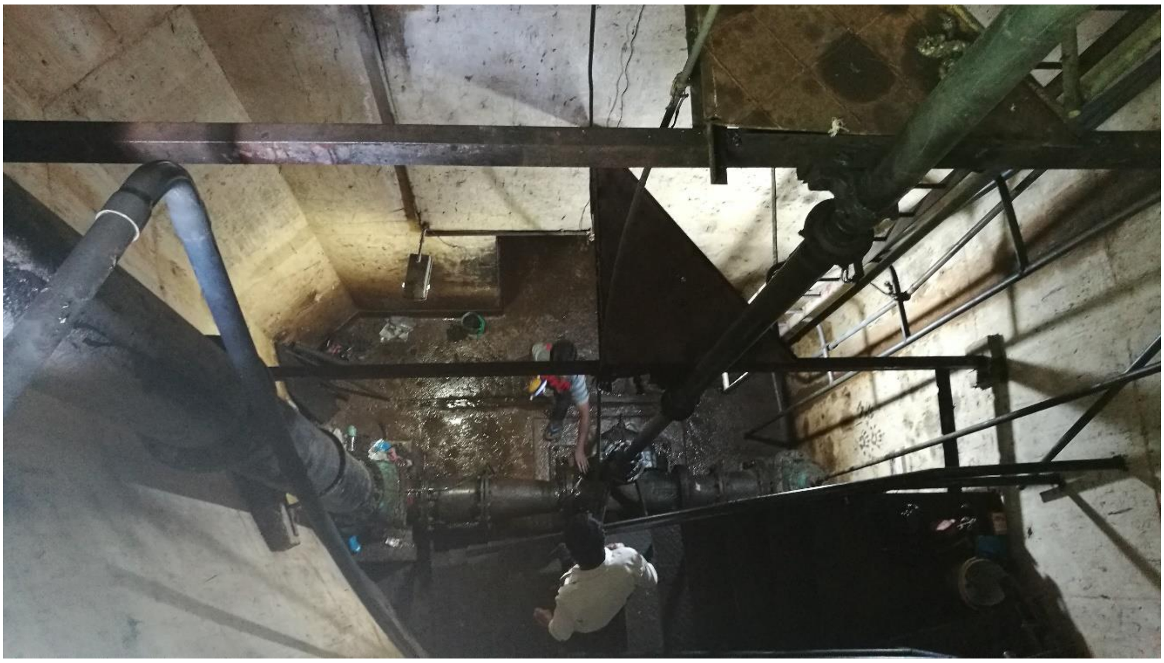

Figure 2.10 Inside the Barrel-Shaped Shallow Well

2.5 REGIONAL WORK-SHOP & STORES KUNDALAGAMA

This is the regional work-shop of the RSC (Central) which is located at Kundalagama, Kundasale. Repairing the vehicles (see Figure 2.11), water pumps and bulk meters which belong to RSC(Central) of the NWS&DB and testing of water pumps and water meters (see Figure 2.12) are the main functions here. It is also a store house for pipelines and various other components.

Figure 2.11 Vehicle Repair Section

Figure 2.12 Bulk Meter Test Bench

Chapter 3

FLOW RATE MEASUREMENTS

3.1 INTRODUCTION

This chapter is an analysis of the flow rate measurements of the GKWTP. A flow rate mismatch could be detected between the input raw water volume and the total output water volume including both purified & discharge water volume of the plant. It was discovered that the error was with inaccurate flow rate readings of the flow rate meters of the pipe lines. Hence, in order to do the required corrections to the flow rate meters, accurate flow rates were taken using a portable type Ultrasonic Flow Meter.

3.2 TEST METER

Test Meter	: Portable Type Ultrasonic Flowmeter
Manufacturer	: Fuji Electric Co. Ltd.
Product Nationality	: Japan
Model	: Portaflow C
Type	: FSCS1

Portaflow C portable type ultrasonic flowmeter is shown in Figure 3.1.

Figure 3.1 Portable Type Ultrasonic Flowmeter

3.3 OBTAINING READINGS USING TEST METER

The test meter was mounted on the intake pipeline of the GKWTP and flow rate readings were taken for few days using the logger function available in the test meter as showing in Figure 3.2.

Figure 3.2 Taking the Flow Rate Measurements of Raw Water Intake Pipe

Next the test meter was mounted on all output pipe lines of the GKWTP one by one and their flow rate measurements were taken as shown in Figure 3.3.

Figure 3.3 Taking the Flow Rate Measurements of the Output Pipes

Then all the readings were taken into a excel sheet for further analysis. The average flow rates of the pipelines obtained from main meters and test meter are shown in table 3.1 and table 3.2 respectively where main meter readings directly taken from the SCADA system available in the plant.

Table 3.1 Average Flow Rates Taken from Main Meters

Name of the Pipeline	**Average flow rate (m^3/h)**
Raw water intake	2136.46
Asgiriya	850.50
Gohagoda	187.67
Kahawatta	945.50
Yatiwawela	643.75

Table 3.2 Average Flow Rates Taken Using Test Meter

Name of the Pipeline	**Average flow rate (m^3/h)**
Raw water intake	2119.37
Asgiriya	842.85
Gohagoda	174.35
Kahawatta	862.29
Yatiwawela	679.14

3.4 FLOW RATE MEASUREMENT ANALYSIS

The error percentage and correction factors of the respective pipe lines are shown in table 3.3 which were calculated according to following equations.

$$\text{Error Percentage} = \frac{\text{Average Flowrate of Main Meter} - \text{Average Flowrate of Test Meter}}{\text{Average Flowrate of Test Meter}} \text{ x } 100\%$$

$$\text{Correction Factor} = \frac{100}{100 + \text{Error Percentage}}$$

Table 3.3 Error Percentages & Correction Factors

Name of the Pipeline	Error Percentage	Correction Factor
Raw Water Intake	0.81	0.992
Asgiriya	0.91	0.991
Gohagoda	7.64	0.929
Kahawatta	9.65	0.912
Yatiwawela	-5.21	1.055

Then test calculations were done for the flow rate readings of September 2017. The total water volume readings taken from the SCADA system of the plant and the readings after doing corrections these readings are shown in table 3.4 and table 3.5 respectively.

Table 3.4 Total Water Volumes of September 2017

	Total Water Volume (m^3)
Raw Water Intake	1 631 639
Asgiriya	577 874
Gohagoda	110 505
Kahawatta	569 524
Yatiwawela	388 926
Backwash	13 037
Service Water	450

Total Intake Raw Water Volume = 1 631 639 m^3

Total Discharge Water Volume = 1 660 316 m^3

Difference = -28 677 m^3

Table 3.5 Corrected Total Water Volumes of September 2017

	Total Water Volume (m^3)
Raw Water Intake	1 618 586
Asgiriya	572 673
Gohagoda	102 659
Kahawatta	519 406
Yatiwawela	410 317
Backwash	13 037
Service Water	450

Total Intake Raw Water Volume = 1 618 586 m^3

Total Discharge Water Volume = 1 618 542 m^3

Difference = 44 m^3

Chapter 4

LONGITUDINAL SECTION DRAWING

4.1 INTRODUCTION

A system curve of the pipe line system is required to analyze the performance of a pump in a system. In order to obtain the system curve LS drawing of the pipe line system is required. However, it was difficult to find a LS drawing as the pipe line system is outmoded. Hence a survey was conducted in order to draw the system curve of the existing pipe line system.

4.2 SURVEY

A survey was conducted from the raw water intake pump house to the treatment plant of the university water supply scheme at Meewathura in order to obtain the LS drawing of the existing pipeline. A picture taken near to the treatment plant during the survey is shown in Figure 4.1.

Figure 4.1 Survey at University Water Treatment Plant

Data obtained from survey using rise and fall method is shown in table 4.1.

Table 4.1 Level Line from University Pump House to The Treatment Plant

BS	IS	FS	Rise	Fall	Rise Level	Distance	Remarks
1.440					481.930	0.00	Floor level of the pump house
	1.395		0.045		481.975	25.20	End of the bridge
3.925		0.720	0.675		482.650	28.80	
2.950		0.450	3.475		486.125	50.80	
4.330		0.705	2.245		488.370	64.80	
4.960		0.225	4.105		492.475	97.80	
1.680		0.940	4.020		496.495	174.50	Prof. E.O.E. Pereira road
1.380		0.900	0.780		497.275	354.50	
0.935		1.765		-0.385	496.890	386.50	
0.615		4.190		-3.255	493.635		
0.305		4.660		-4.045	489.590		
		1.215		-0.910	488.680	396.00	Top of the Aerator Wall
22.520		15.770	15.345	-8.595			

BS – FS
= 6.750

Diff. between Rise & Fall
= 6.750

Diff. between Last & First RL
= 6.750

*All dimensions are in meters

4.3 LS DRAWING

Using the data which is shown in table 4.1 the LS drawing was obtained which is a plot of the pipeline height from sea level vs. distance from its origin. It is shown in Figure 4.2.

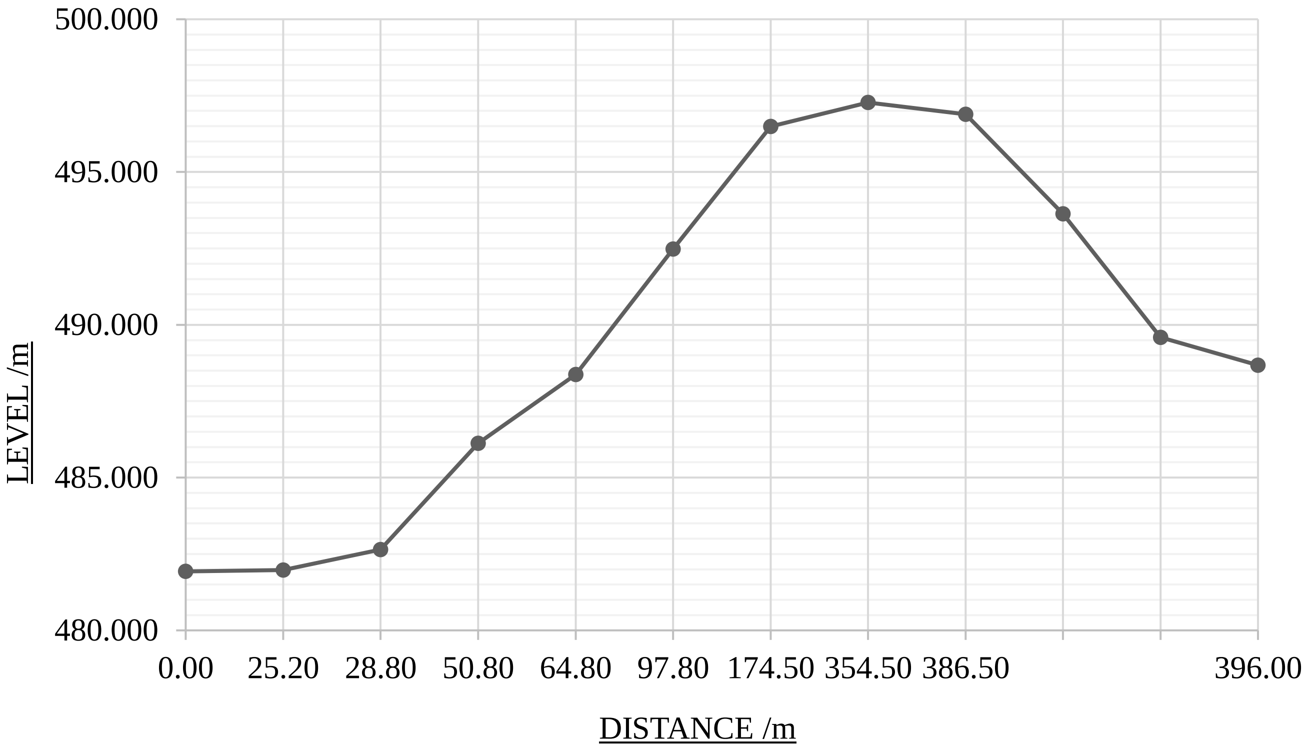

Figure 4.2 LS Drawing between University Pump House to The Treatment Plant

Chapter 5

IMPELLER DIAMETER SELECTION

5.1 INTRODUCTION

This chapter analyses raw water intake pumping system of the university water treatment plant for a new pump. The available capacity is not enough to meet the water requirements. If to aggravate the capacity, replacing the current pump would be a strategic solution. Nevertheless, installing a new pump is not enough. Hence the impeller diameter of the pump which is going to replace should be reduced to desired value which will ensure the duty point of the pump will be the same as the required. Analysis was done using the system curve and pump performance curves for respective diameters.

5.2 PUMP PERFORMANCE CURVE

The pump performance curve shows the correlation between flow rate (Q) and the pressure differential or head (H) that the pump creates. In order to obtain the performance curve of a specific pump, the pump is mounted on a test bench and required tests are done. Table 5.1 shows the pump performance table which is obtained from the test report of the pump which is going to replace the existing one. The pump performance curve was obtained using the table and it is shown in figure 5.3.

Table 5.1 Pump Performance Table

Symbol	Description	Unit				
D_1	Impeller diameter	mm	311.2			
Q_1	Capacity	m^3/h	0.00	318.00	400.00	500.00
H_1	Head	m H_2O	34.30	32.18	30.93	29.10
n_1	Efficiency	%	0.00	60.63	66.50	71.96

5.3 SYSTEM CURVE

A system curve is a graphical representation of the head and flow characteristics of a hydraulic system. In order to obtain the system curve, theoretical system table was obtained using Hazen William's equation and LS drawing of the system. The theoretical system table is shown in table 5.2 & the system curve is shown in figure 5.3.

Head losses were calculated using Hazen William's equation.

$$H_f = \frac{10.666 \cdot \left(\frac{Q}{3600}\right)^{1.85}}{C^{1.85} \cdot \left(\frac{D}{1000}\right)^{4.87}} \cdot L \cdot 1000$$

Table 5.2 Theoretical System Table

Symbol	Description	Unit							
L	length of the pipe line	m	423.580						
D	Inside diameter of the pipe	mm	400						
C	Hazen-Williams' coefficient	-	55.12						
H_s	Static head	m H_2O	32.580						
Q	Volume flow rate	m^3/h	0	100	200	300	400	500	600
h_f	Friction head loss mm H_2O per 100m of pipe length	mm H_2O per 100m of pipe length	0.00	73.35	264.44	559.89	953.32	1440.53	2018.40
H_f	Head loss	mm H_2O	0.00	310.72	1120.13	2371.58	4038.08	6101.81	8549.56
H_f	Head loss with added 10% percentage	mm H_2O	0.00	341.79	1232.15	2608.74	4441.89	6711.99	9404.52
H	Total head	m H_2O	32.58	32.92	33.81	35.19	37.02	39.29	41.98

5.4 IMPELLER DIAMETER SELECTION

Impeller diameter should be adjusted such that required the duty point will be meet when the pump is installed in to the system. A pump will be operated at the intersection point of the system curve and the pump performance curve. Therefore, if the intersection point is not matched with our requirements the pump performance curve can be shifted to meet the requirements by changing its impeller diameter. The impeller diameter of the pump should be chosen in order to shift the pump performance curve, such that the operating point will have the required flow rate. The impeller of the new pump and the the old pump are shown in the Figure 5.1 and Figure 5.2 respectively.

Figure 5.1 Impeller of the New Pump

Figure 5.2 Old Pump

Points of the pump performance curve will be shift according to the affinity law when the diameter is changed. Hence, to find the accurate diameter at once without any iterative method another curve was obtained using affinity law as per the Figure 5.3.

Affinity law states that,

$$\frac{q}{Q_2} = \frac{D_1}{D_2} \quad , \quad \frac{h}{H_2} = \frac{D_1^2}{D_2^2}$$

Where (q, h) is the shifted point of the (Q_1, H_1) when the impeller diameter changed from D_1 to D_2.

Using these relationships following equation was obtained,

$$h = \frac{H_2}{Q_2^2} \times q^2$$

Where Q_2 is the required flow rate and H_2 is the total head at Q_2 flow rate obtained from the system curve.

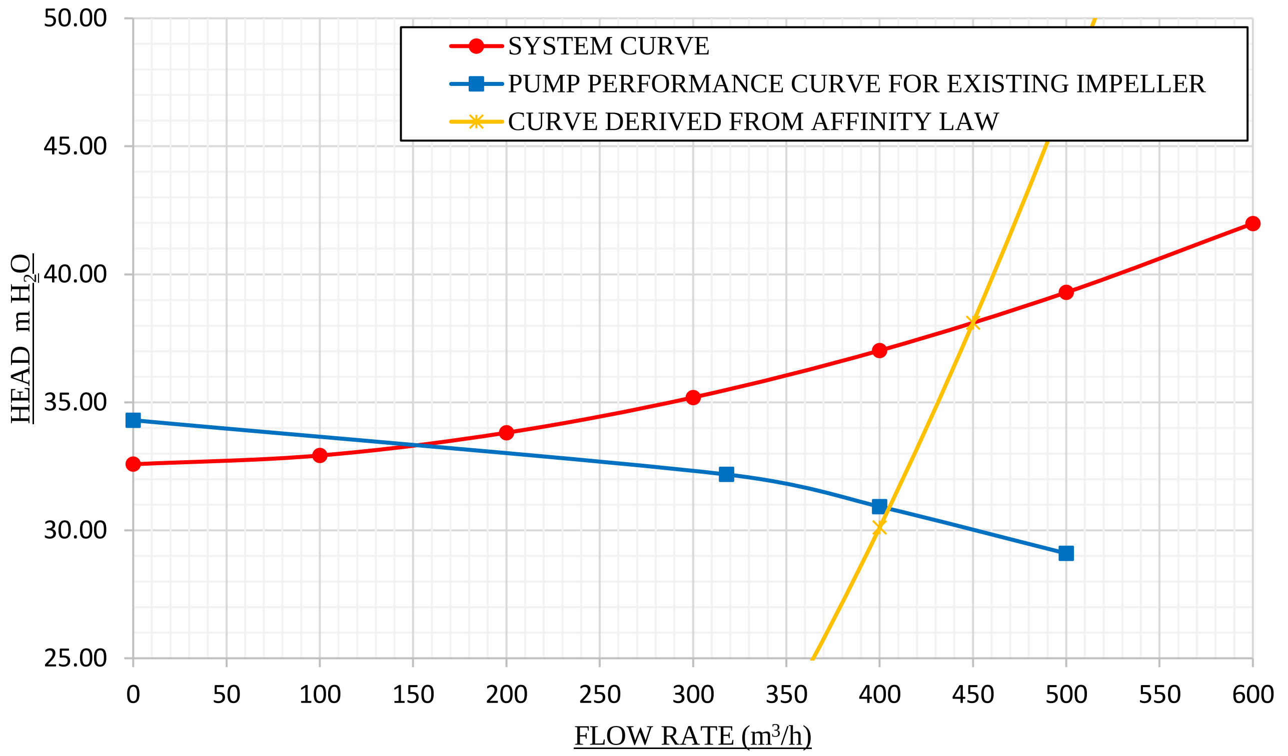

Figure 5.3 System Curve & Pump Performance Curve with Curve Derived from Affinity Law

Then the flow rate (Q_x) at the intersection point of that curve derived affinity law and pump performance curve was found using the Figure 5.3. Then the required impeller diameter was calculated using the following equation in order to have the required duty point (Q2, H2).

$$D_2 = \frac{Q_2}{Q_x} \times D_1$$

Then the pump performance table for new impeller diameter was calculated using following equations as per the table 5.3.

$$\frac{Q_1}{Q_2} = \frac{D_1}{D_2} \qquad , \qquad \frac{H_1}{H_2} = \frac{D_1^2}{D_2^2}$$

Table 5.3 Pump Performance Curve for New Impeller Diameter

Symbol	Description	Unit				
D_2	Impeller diameter	mm	345.8			
Q_2	Capacity	m^3/h	0.00	353.36	444.47	555.59
H_2	Head	$m\ H_2O$	42.35	39.73	38.19	35.93

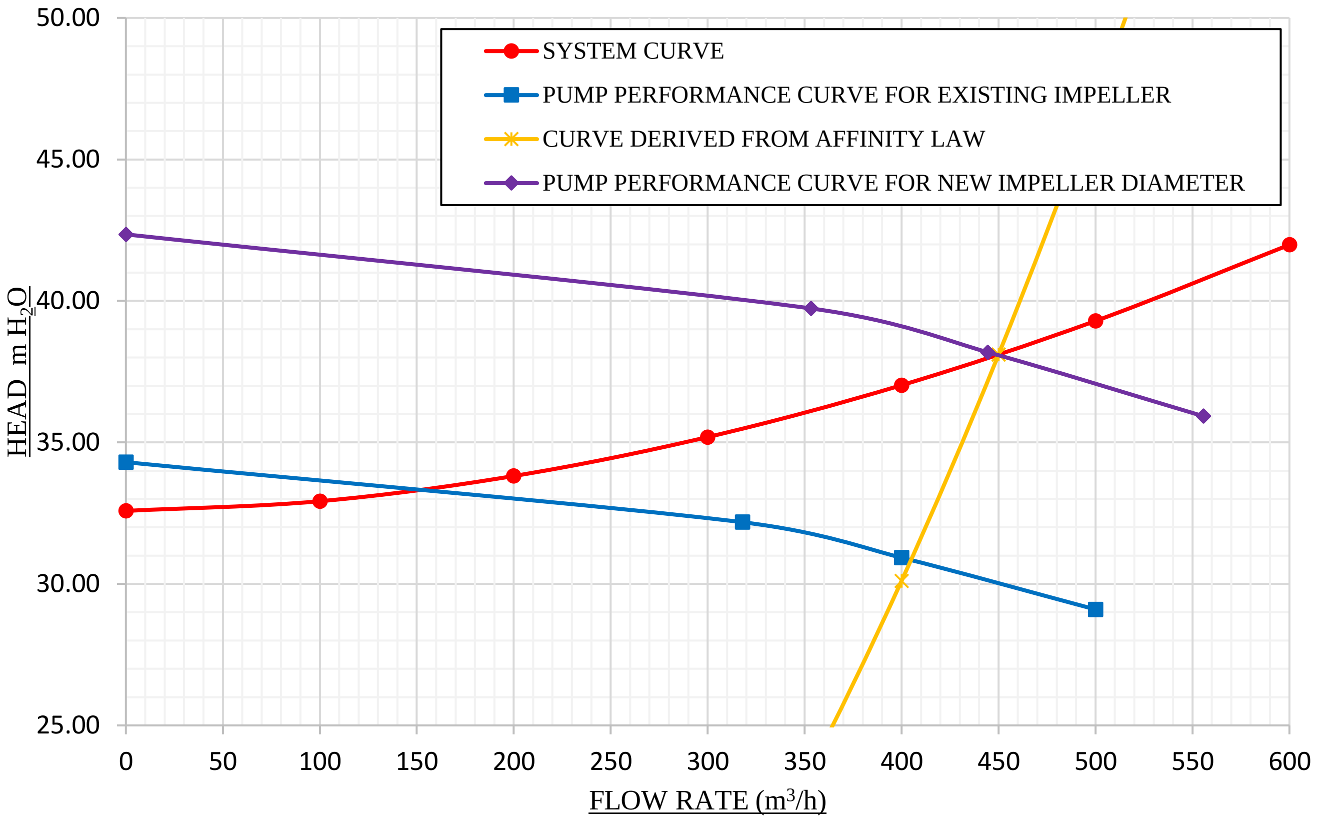

Figure 5.4 System Curve, Pump Performance Curve & Pump Performance Curve for New Impeller Diameter

System curve & pump performance curve for new impeller diameter is intersecting at the duty point which will fulfill the requirements according to the Figure 5.4.

Chapter 6

MOTOR STARTING METHODS

6.1 INTRODUCTION

Different starting methods are employed for starting induction motors because Induction Motor draws more starting current during starting. To prevent damage to the windings due to the high starting current flow, Different types of starters are employed.

6.2 DIRECT ON LINE

The simplest form of the induction motor starting methods is Direct On Line. The DOL starter consist a MCCB or Circuit Breaker, Contactor and an overload relay for protection. Electromagnetic contactor which can be opened by the thermal overload relay under fault conditions. This method is suitable for small three phase induction motors. A wiring diagram of a DOL starter is shown in Figure 6.1.

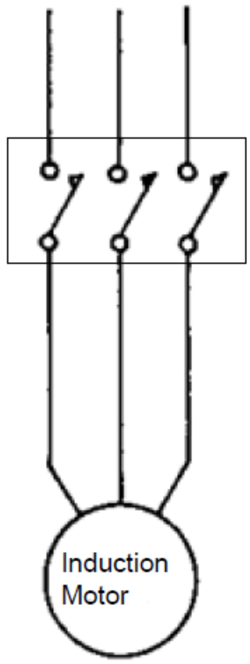

Figure 6.1 Wiring Diagram of a DOL Starter

To start, the contactor is closed, applying full line voltage to the motor windings. The motor will draw a very high inrush current for a very short time, the magnetic field in the iron, and then the current will be limited to the Locked Rotor Current of the motor. The motor will develop Locked Rotor Torque and begin to accelerate towards full speed.

6.3 REACTOR STARTING

In this method, a reactor is added in each phase as shown in the Figure 6.2 (between the motor terminal and the supply mains). Thus, supply voltage can be controlled by adding reactor. Only a fraction of the supply voltage is applied at the time of starting of the induction motor. Due to the drop in the voltage, the starting torque also decreases and draw less amount of current. As the motor speeds-up the reactor is cut out from the circuit and finally the reactors are short circuited when the motor reaches to its operating speed.

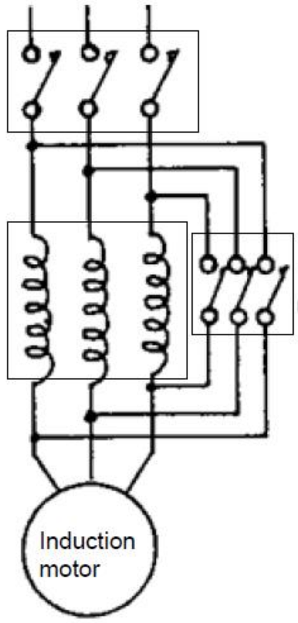

Figure 6.2 Wiring Diagram of a Reactor Starter

6.3 STAR-DELTA STARTING

The Star-Delta Starter is a very common type of starter and is used extensively as compared to the other type of starting methods of the induction motor. A star delta is used for a cage motor designed to run normally on the delta connected stator winding. The connection of a three-phase induction motor with a star delta starter is shown in the Figure 6.3.

Firstly, the stator winding is connected in Star and then in Delta so that the starting line current of the motor is reduced to one-third as compared to the starting current with the windings connected in delta. At the starting of an induction motor when the windings of the stator are star connected, each stator phase gets a voltage $V_L/\sqrt{3}$ where V_L is the line voltage. Hence, the motor draws less amount of inrush current during the start. Since the developed torque is proportional to the square of the voltage applied to an induction motor. Star delta starter reduces the starting torque to one-third that is obtained by direct delta starting.

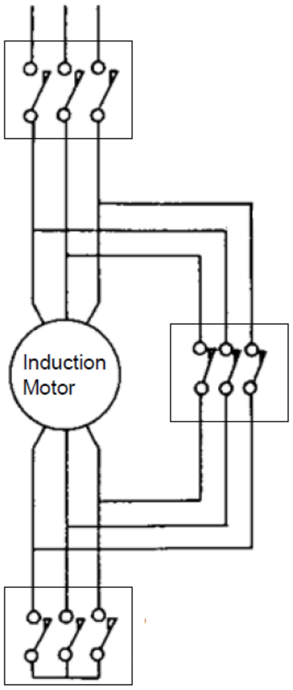

Figure 6.3 Wiring Diagram of a Star-Delta Starter

6.4 AUTO TRANSFORMER STARTING

In the auto transformer starting, an auto transformer is used to start the motor. During start-up, the motor is connected to the auto transformer's tapping. This means that the motor starts up with a reduced voltage and a correspondingly low current. When motor accelerate to full speed, the tap of contactor was open and disconnecting motor from transformer and other contactor close to connecting the motor to the supply. When the motor has almost reached its rated torque, the star connection on the transformer is opened.

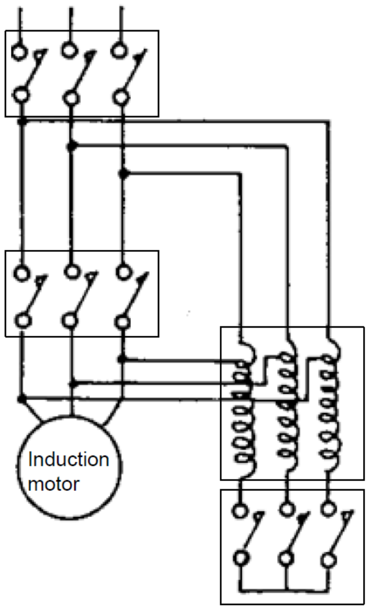

Figure 6.4 Wiring Diagram of an Auto Transformer Starter

The transformer's partial windings act as chokes in series to the motor windings, and therefore, like the uninterrupted star delta connection, the motor speed does not drop during switch over. Wiring diagram of an auto transformer starter is shown in Figure 6.4

6.5 SOFT-STARTER

Soft-starters are based on semiconductors, which has a power circuitry & a control unit that initially reduces the supply voltage of the motor. During the starting process, the soft-starter progressively increases the motor voltage so that the motor becomes strong enough to accelerate the load to rated speed without causing torque or current peaks. Soft-starters can also be used to control the stopping of the process. A diagram of a soft-starter is shown in the Figure 6.5.

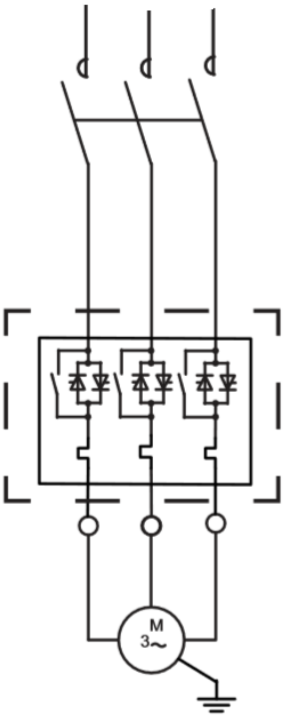

Figure 6.5 Diagram of a Soft-Starter

6.6 VARIABLE FREQUENCY DRIVE

Essentially, a VFD takes AC line voltage, converts it to a DC voltage, filters the DC voltage, and then inverts the signal back. That RMS value of this inversion simulates an AC voltage. The output frequency of the drive is usually from 0 to AC input line frequency. Higher frequencies than the nominal AC are also possible when required for certain applications. Therefore, the speed of the motor can be controlled by controlling the frequency of the output waveform since rotational speed of an AC motor is proportional to the frequency of that AC source. Hence, VFDs can be used to start, stop and also control the speed of a motor. Simple diagram of a VFD is shown in Figure 6.6.

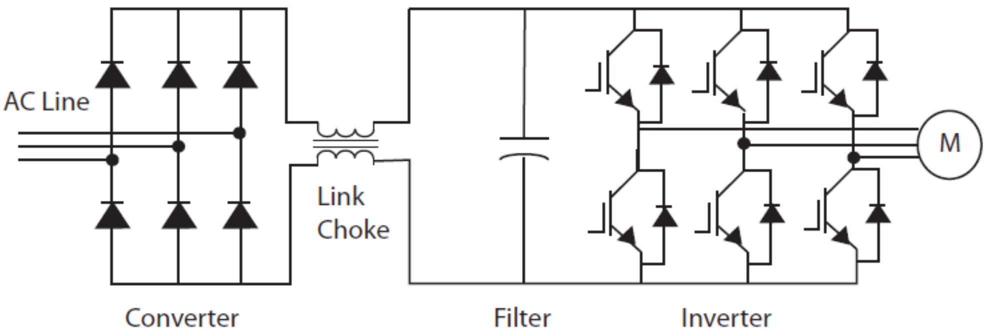

Figure 6.6 Diagram of a VFD

CONCLUSION

Ten weeks of training experience outside the traditional lecture rooms was extremely fruitful. It is the best opportunity one gets to apply the learnt theories in an actual work setting. Through the training I could get a thorough knowledge of the nature of the organization and its functioning. Several issues could identify in each training location such as meter reading errors, flow rate errors as described in each chapter. Surveys were conducted in order to provide solutions for the problems encountered. I hope my service was supportive for the organization for its efficient functioning and also in reaching the organizational goals as well.