OPERATION & MAINTENANCE MANUAL

Water Treatment Plant, Cambridge Bay, NU

PREPARED FOR THE GOVERNMENT OF NUNAVUT
DEPARTMENT OF COMMUNITY AND GOVERNMENT SERVICES

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CHAPTER 1

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CHAPTER 1

1. INTRODUCTION

1.1 USE OF THE MANUAL

This manual has been prepared to provide operation and maintenance personnel with a clear and concise understanding of how the Water Treatment Facility operates and the steps which must be followed to keep the facility running safely and efficiently.

The primary goal of this manual and of all personnel operating in and around the water Treatment Facility is the prevention of personnel injury, fire losses and property damage. To meet this goal, the operation and maintenance program includes:

- Emergency procedures to be followed in the event of spills or accidents.
- Specific operating instructions to be learned and followed at all times to promote safe and efficient operation.
- Routine maintenance of all the facility's systems and structures.
- Detailed inspections of all equipment, facilities, system and structures as well as reporting and correcting any deficiencies.
- Proper record keeping.
- Maintaining a supply of parts, material and equipment necessary to keep the facility running safely and efficiently.

This manual has been divided into 9 chapters.

CHAPTER 1 includes a brief description of the contents of the manual, and a discussion of its proper use.

CHAPTER 2 is an index of the complete contents of the manual.

CHAPTER 3 provide the background and design data of the facility.

CHAPTER 4 provides functional data and schematic information on the systems for the Facility and Treatment System.

CHAPTER 5 compiles component details

CHAPTER 6 describes procedures to be completed during the operation of the facility.

CHAPTER 7 contains a detailed maintenance manual for the products supplied and installed at the facility.

CHAPTER 8 contains a compilation of all inspection and testing certificates for all products supplied and installed at the facility.

CHAPTER 9 contains manufacture data and service information.

APPENDICES contain construction documents (record drawings, specifications, shop drawings.

Personnel must review and be familiar with all chapters of the manual to ensure that they have a thorough working knowledge of the Water Treatment Facility. This will enable them to turn directly to the correct chapter should a reference be required.

1.2 PROJECT TEAM

Project Owner:	**Government of Nunavut** Department of Community Government Services PO Bay 200, Helen Maksagak Centre Cambridge Bay, NU X0B 0C0 Shane Slifka Regional Projects Manager Kitikmeot
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CHAPTER 3

3. BACKGROUND AND DESIGN DATA

3.1 BACKGROUND

3.1.1 Prior Facilities

Cambridge Bay's water system has been upgraded several times since the construction of its first intake pumphouse in 1970. In 1980, a new insulated water line, central distribution pumphouse, water storage tanks and upgrades to the existing intake pumphouse were completed. In 2002, further significant upgrades and modifications were completed at that time consisting of a new insulated water line, access vaults, and refurbished boiler stations. The water treatment process only included chlorination.

The water delivery system consisted of three 12,500L water trucks with a fourth truck for emergency use. These trucks typically operate on a 7-day delivery schedule with an 8-hour delivery day. Also, a piping system supplied water to core services in the community.

The scope of the project is to provide a new water treatment plant capable of treating water to meet the Drinking Water Regulations under the Public Health Act. The facility must operate in a very harsh environment with a minimum of maintenance. Ease, simplicity, and economy of operation over the design life and in all conditions, must be inherent in the facilities.

3.1.2 Design Criteria

- Prefabricated insulated building to house equipment
- Prefabricated (package) treatment plant to reduce capital cost
- Daily production rate should be in the range of 750 to 2400 L/min
- Local and remote alarms to indicate system malfunctions
- Reduce or eliminate the need for chemicals
- Capable of rapidly responding to fluctuations in turbidity
- Taste and odour control to be considered
- Capable of remote process control monitoring
- Equipment and piping must be self-draining, freeze protected or recoverable if frozen
- Disposal of treatment wastes in an environmentally acceptable manner
- Twenty years design horizon
- Vehicular access for service trucks and tank trucks

3.1.3 New Process Description

The new water treatment plant has incorporated the following process components:

- Filter feed Pumps
- Raw water circulation pump
- Coagulant dosing system
- Filtration System (three filters) and backwash holding tank
- Two UV reactors
- Chlorine dosing system
- Treated water tank
- Truck fill pumps
- Core Servicing pumps

- Fire pump

3.2 DESIGN DATA

3.2.1 Design Capacity

It is estimated that the Community's population is projected to grow from the estimated 1,613 in 2010 to approximately 2,820 residents by 2032 including provision for future Canada High Arctic Research Station (CHARS).

The design life of the new WTP is 20 years to 2032 to provide a total capacity of 20 L/s. This design capacity was estimated based on the storage requirements as described in the Preliminary Design report.

3.2.2 Raw Water Supply

Raw water enters the plant through an existing 150 mm main to common header where the filter feeding pumps supply water to the filtration system and the raw water recirculation pump. Raw water is heated and recirculated back to the Lake pumphouse through a 100 mm line, where it ties-in the raw water pipeline.

3.2.3 Chemical Feed System

Coagulant and chlorine are applied in several stages of the treatment process as follows

- Upstream Filtration system: Coagulant (CP-01) and chlorine injection (CP-02) modules are placed at the 100-mm line to the filters. Ferric Chloride and Liquid sodium hypochlorite (12.5%) is injected upstream the filters as an aid to oxidation for augmenting the coagulant. An inline mixer is installed after the injection point to provide homogeneous mixing prior to entering the filtration vessels. Coagulant bind particles to assist in turbidity removal prior to contact with the media whereas, sodium hypochlorite oxidized to allow for optimum precipitation of minerals.

- Downstream UV system: Liquid sodium hypochlorite (12.5%) is injected (CP-03) downstream UV system to provide inactivation of bacteria and Virus. The contact time required is achieved in the treated water tank.

- Post chlorination in treated water distribution: Liquid sodium hypochlorite (12.5%) is also injected through CP 04/05/06/07 devices downstream truckfill, core servicing, and fire pumps to provide additional chlorine residual to the final users.

The characteristics of the chemical feed system are as follows;

Parameter	Feed Pump Tag Number		
	CP-01	CP-02/03/04/05	CP-06/07
Liquid	40% Ferric Chloride Solution (FeCl3)	12% NaOCl solution	12% NaOCl solution
Temperature (deg C)	20	20	20
Specific Gravity	1.42	1.16	1.16
Chemical concentration (%)	40	12	12
Capacity (L/hr)	0 - 0.1	0 – 1.4	0 – 3.6
Maximum pressure (kPa)	870	1,700	1,000
Pump Drive Type	Solenoid	Solenoid	Solenoid

3.2.4 Filtration

The filtration process consists of (3) pressure filters designed to provide filtration and removal of turbidity. The treatment approach selected for Turbidity removal is AD140Z oxidation / filtration media, which is a Zeolite mineral that acts in the oxidation of contaminants and filtration of Turbidity. The media is subsequently used to filter the particles generated during oxidation. At the end of its useful life, it can be discarded as a non-hazardous waste at a solid waste municipal landfill.

The pressure filter design parameters are as follows;

Parameter	Value
Total Design flow rate	72 m3/hr
Number of filters	3 (two duty and one standby)
Design flow per filter	36 m3/hr
Filter loading rate at design flow rate	24.5 m/hr
Normal maximum operating pressure	690 kPa (100 psi)
Total Filter Area	4.41 m^2
Individual filter area	1.47 m^2
Media Type	AD140Z Zeolite Filtration
Air Scour Rate	Not required
Backwash Rate	58 m^3/hr
Backwash Duration	10 minutes per vessel
Required time between backwash	Every 2 days
Expected wash volume	9.6 m^3 per vessel
Filter Rinse Flow	58 m^3/hr
Rinse time	1 to 2 min
Expected filter to waste volume	1.9 m^3 per vessel

3.2.5 Backwash and Filter to Waste Storage

Backwashing produces large amounts of waste water for a relatively short time, and because the capacity of the sanitary sewage system is limited, a Backwash Waste Holding Tank of 60 m^3 is provided. This tank will only be sufficient for the volume of five filter washes and rinses. Therefore, need to be drained by sewage trucks, as required.

3.2.6 UV Disinfection

As the raw water enters the WTP it is disinfected with UV light to inactivate pathogens. UV light is the primary disinfectant with chlorination as a secondary disinfectant to provide a residual through the distribution system. The design parameters of the UV system are as follows;

Parameter	Value
Number of UV Reactors	1 duty + 1 standby
Peak flow per reactor	20 L/s
UV Transmittance	85% @254 nm
Target Organism	2-log Cryptosporidium and 1-log Giardia
Required Reduction Equivalent dose	21.3 mJ/cm^2 based on MS2

3.2.7 Plant Capacity and Storage

The treated water tank is sized to allow the necessary truck fill rate, in the design year, for an 8-hour day, 5 days a week. Thus, in the design year, with the water supply into the tank flowing at the design rate, water would be withdrawn from the tank at a rate such that at the end of the 8 hour day, the tank would be at or above the fire water storage level

Treated water storage is important for providing sufficient disinfection and to balance the needs of the community with respect to fire storage, equalization storage and emergency storage. The capacity of the treated water tank is 570,000 L (570 m^3) which are allocated as follows;

Storage Requirements	Capacity (L)
A – Fire	60,000
B – Daily Demand	418,370
C – Emergency 20% of Average day demand	83,674
In-Plant Needs	105
Total Storage Required	562,149

3.2.8 Tempered Water System

Tempering of treated water and backwash water is required during the winter to prevent water from freezing during storage, distribution or discharge. Water is tempered via heat exchangers by the hydronic heating system to maintain the raw water temperature above 5°C.

END OF CHAPTER 3

CHAPTER 4

4. SCHEMATICS AND FUNCTIONAL DATA

4.1 GENERAL

The following tables describe where the components to the various systems are located and the function that each performs. For each table, there are drawings that can be referenced, to better understand the flow of that part of the Water Treatment Plant.

4.2 RAW WATER FLOW

(Refer to Drawing P-101 in Appendix A)

The following table identifies the components related to the flow of water from the plant intake to the filters.

No.	Component	Location	Function Performed	Remarks
1	Butterfly Valve (FFBUV-01)	On 100 mm RW Intake line	Shuts off Raw Water Intake, and induces pressure drop	Normally Open
2	Filtered Feed Pump (FFP-01)	On 100 mm RW Intake line	Pumps RW to Filtration System	PLC Controlled
3	Pressure Indicator (PI-xx)	On 100 mm RW Intake line	Indicates discharge pressure of FFP-01	
4	Check Valve (CHV-01)	On 100 mm RW Intake line	Prevents Backflow	
5	Butterfly Valve (FFBUV-03)	On 100 mm RW Intake line	Shuts off Raw Water Intake, and induces pressure drop	Normally Open
6	Butterfly Valve (FFBUV-02)	On 100 mm RW Intake line	Shuts off Raw Water Intake, and induces pressure drop	Normally Open
7	Filtered Feed Pump (FFP-02)	On 100 mm RW Intake line	Pumps RW to Filtration System	PLC Controlled
8	Pressure Indicator (PI-xx)	On 100 mm RW Intake line	Indicates discharge pressure of FFP-02	
9	Check Valve (CHV-02)	On 100 mm RW Intake line	Prevents Backflow	
10	Butterfly Valve (FFBUV-04)	On 100 mm RW Intake line	Shuts off Raw Water Intake, and induces pressure drop	Normally Open

No.	Component	Location	Function Performed	Remarks
11	Butterfly Valve (FFBUV-xx)	On 50 mm RW line upstream recirculation line	Shuts off raw water intake, and induces pressure drop	Normally Open
12	Raw Water Circulation Pump (RCP-01)	On 50 mm RW intake line to Recirculation System	Pumps water to recirculation system	PLC Controlled
13	Pressure Indicator (PI-xx)	On 50 mm RW line downstream RCP-01	Indicates discharge pressure of RCP-01	
14	Check Valve (CHV-xx)	On 50 mm RW line downstream RCP-01	Prevents backflow	
15	Butterfly Valve (FFBUV-xx)	On 50 mm RW line downstream RCP-01	Shuts off raw water intake, and induces pressure drop	Normally Open
16	Flow Limiting Orifice (xx)	On 50 mm RW line from FFP to HEX-1.2	Limits the flow to 3.8 L/s when filtered feed pumps are running	
17	Globe Valve (xx)	On 50 mm RW line from FFP to HEX-1.2	Regulates flow	
18	Check Valve (CHV-xx)	On 50 mm RW line from FFP to HEX-1.2	Prevents backflow of raw water intake	
19	Butterfly Valve (BUV-xx)	On 50 mm line from RCP-01 to HEX-1.2	Controls water flow and induces pressure drop	Normally Open
20	Temperature Control Valve (TCV-xx)	Glycol Supply Line	Regulates temperature of glycol supply	
21	Heat Exchanger (HEX-1.2)	Between raw water supply and recirculation	Maintains raw water temperature before recirculation	
22	Butterfly Valve (BUV-xx)	On 50 mm line from HEX-1.2 to Raw Water Recirculation	Controls water flow and induces pressure drop	Normally Open
23	Temperature Indicating Transmitter (TIT-105)	On 50 mm line from Heat Exchange (HEX-1.2) to Raw Water Recirculation	Provides a reading of Temperature to PLC after maintaining temperature from heat exchanger	

4.3 CHEMICAL FEED SYSTEM

(Refer to Drawing P-101 in Appendix A)

The following table identifies the components related to the flow of coagulant and chlorine from the corresponding tanks to the plant filters.

No.	Component	Location	Function Performed	Remarks
1	Coagulant Tank (TK-101)	Main Floor	Contains coagulant (ferric chloride)	
2	Coagulant Pump (CP-01)	Main Floor	Pumps coagulant to the filtration system	
3	Ball Valve (xx)	Downstream CP-01	Isolates coagulant application system	Normally Open
4	Chlorination Tank (TK-102)	Main Floor	Contains chlorine (NaOCl)	
5	Chlorination Tank (TK-103)	Main Floor	Contains chlorine (NaOCl)	
6	Ball Valve (xx)	Downstream CP-02	Isolates CP-02	Normally Open
7	Chlorine Pump (CP-02)	Upstream Filtration System	Pumps chlorine from chlorine tanks to upstream filtration system	PLC Controlled
8	Chlorine Pump (CP-03)	Downstream UV system	Pumps chlorine from chlorine tanks to treated water tank	PLC Controlled
9	Chlorine Pump (CP-04)	Truck Fill #1 discharge line	Pumps chlorine from chlorine tanks to truck fill #1	PLC Controlled
10	Chlorine Pump (CP-05)	Truck Fill #2 discharge line	Pumps chlorine from chlorine tanks to truck fill #2	PLC Controlled
11	Chlorine Pump (CP-06)	Core Servicing Feed Line	Pumps chlorine from chlorine tanks to core servicing feed line	PLC Controlled
12	Chlorine Pump (CP-07)	Main Floor	Spare	PLC Controlled
13	Inline Mixer (xx)	On 150 mm RW line upstream filtration system	Provides mixing of coagulant and chlorine in raw water	
14	Butterfly Valve (FFBUV-xx)	On 150 mm RW filter by-pass line to UV	Isolates filter by-pass line	Normally Closed
15	Chlorine Sensor (AE-107)	On 150 mm RW line upstream filtration system	Analyze chlorine concentration	

No.	Component	Location	Function Performed	Remarks
16	Air Release Valve (xx)	On 150 mm RW line upstream filtration system	Allows air release from piping upstream filtration system	

4.4 FILTRATION

(Refer to Drawing P-101 and P-101A in Appendix A)

The following table identifies the components related to the flow of coagulant and chlorine from the corresponding tanks to the plant filters.

No.	Component	Location	Function Performed	Remarks
1	Turbidity Sensor (AE-101 and AT-101)	On 150 mm line from RW supply upstream Filtration System	Provides reading on the clarity of the water and transmits to PLC	Sends info to PLC
2	Pressure Indicator (PI/PT-101)	On 150 mm line from RW supply upstream Filtration System	Provides reading for pressure of Flow	Sends info to PLC
3	Ball Valve (BLV-108)	On 150 mm line from RW supply upstream Filtration System	Isolates PIT-101	Normally open
4	Inlet Sample Valve (SV-101)	On 150 mm line from RW supply to Filtration System	Provides sample of the inflow	Normally closed
		Vessel A		
5	Media Filter Vessel (MF-101A)	Main Floor	Contains media filter	
6	Butterfly Valve (BFV-101A)	On 100 mm line upstream MF-101A	Isolates vessel MF-101A	Normally Open
7	Flow Sensor (FE-101A)	On 100 mm line upstream MF-101A	Indicates flow to MF-101A	Sends info to PLC
8	Ball Valve (BLV-103A)	On 100 mm line upstream MF-101A	Drain valve	Normally closed
9	Ball Valve (BLV-105A)	On 100 mm line upstream MF-101A	Isolates pressure indicating gauge (PI-103A)	Normally Open
10	Pressure Indicating Gauge (PI-103A)	On 100 mm line upstream MF-101A	Indicates pressure (0-100 psi)	
11	Actuated Butterfly Valve (BFV-011A)	Within MF-101A	Controls flow from RW intake to media filter (MF) - 101A	PLC controlled

No.	Component	Location	Function Performed	Remarks
12	Actuated Butterfly Valve (BFV-013A)	Within MF-101A	Controls flow sequence in MF-101A	PLC controlled
13	Actuated Butterfly Valve (BFV-014A)	Within MF-101A	Controls flow sequence in MF-101A	PLC controlled
14	Actuated Butterfly Valve (BFV-015A)	Within MF-101A	Controls flow sequence in MF-101A	PLC controlled
15	Air Release Valve (ARV-xx)	Top of filtration vessel MF-101A	Allows air release from filtration system	
16	Ball Valve (BLV-101A)	Top of filtration vessel MF-101A	Drain Valve	Normally closed
17	Ball Valve (BLV-102A)	Bottom of filtration vessel MF-101A	Drain Valve	Normally closed
18	Ball Valve (BLV-104A)	On 100 mm line downstream of MF-101A	Drain valve	Normally closed
19	Ball Valve (BLV-106A)	On 100 mm line downstream of MF-101A	Isolates pressure gauge PI-104A	Normally open
20	Pressure Indicator (PI-104A)	On 100 mm line downstream of MF-101A	Indicates pressure (0-100 psi)	
21	Actuated Butterfly Valve (BFV-012A)	Within MF-101A	Controls flow sequence of MF-101A	PLC controlled
22	Turbidity Sensor (AE-102 and AT-102)	On 100 mm line from MF-101A to UV System	Provides reading of water turbidity	Sends info to PLC
23	Clear PVC (SG-102A)	On 100 mm line from MF-101A to Backwash Tank	Allows visual inspection of backwash flow	
Vessel B				
24	Media Filter Vessel (MF-101B)	Main Floor	Contains Media Filter	
25	Butterfly Valve (BFV-101B)	On 100 mm line upstream Media Filter MF-101B	Isolates vessel MF-101B	Normally Open
26	Flow Sensor (FE-101B)	On 100 mm line upstream Media Filter MF-101B	Indicates flow to MF-101B	Sends info to PLC
27	Ball Valve (BLV-103B)	On 100 mm line upstream Media Filter MF-101B	Drain valve	Normally closed
28	Ball Valve (BLV-105B)	On 100 mm line upstream Media Filter MF-101B	Isolates Pressure Indicating Gauge (PI-103B)	Normally Open

No.	Component	Location	Function Performed	Remarks
29	Pressure Indicating Gauge (PI-103B)	On 100 mm line upstream Media Filter MF-101B	Provides reading of pressure (0-100 psi)	
30	Actuated Butterfly Valve (BFV-011B)	Within MF-101B	Controls flow from RW Intake to media filter (MF) - 101B	PLC controlled
31	Actuated Butterfly Valve (BFV-013B)	Within MF-101B	Controls flow sequence in MF-101B	PLC controlled
32	Actuated Butterfly Valve (BFV-014B)	Within MF-101B	Controls flow sequence in MF-101B	PLC controlled
33	Actuated Butterfly Valve (BFV-015B)	Within MF-101B	Controls flow sequence in MF-101B	PLC controlled
34	Air Release Valve (ARV-xx)	Top of filtration vessel MF-101B	Allows air release from filtration system	
35	Ball Valve (BLV-101B)	Top of filtration vessel MF-101B	Drain Valve	Normally closed
36	Ball Valve (BLV-102B)	Bottom of filtration vessel MF-101B	Drain Valve	Normally closed
37	Ball Valve (BLV-104B)	Downstream MF-101B	Drain valve	Normally closed
	Ball Valve (BLV-106B)	Downstream MF-101B	Isolates PI-012B	Normally open
38	Pressure Indicator (PI-104B)	Downstream MF-101B	Provides pressure reading	
39	Butterfly Valve (BFV-012B)	Downstream MF-101B	Controls flow sequence in MF-101B	PLC controlled
40	Turbidity Sensor (AE-103 and AT-103)	On 100 mm line from MF-101B to UV System	Provides reading on the clarity of the water and transmits to PLC	Sends info to PLC
41	Clear PVC (SG-102B)	On 100 mm line from MF-101B to Backwash Tank	Allows visual inspection of backwash flow	
Vessel C				
42	Media Filter Vessel (MF-101C)	Main Floor	Contains media filter	
43	Butterfly Valve (BFV-101C)	On 100 mm line upstream MF-101C	Manually isolate each vessel's inlet	Normally Open
44	Flow Sensor (FE-101C)	On 100 mm line upstream MF-101C	Inline flow meter, provides analysis to PLC	Sends info to PLC
45	Ball Valve (BLV-103C)	On 100 mm line upstream MF-101C	Drain valve	Normally closed
46	Ball Valve (BLV-105C)	On 100 mm line upstream MF-101C	Isolates pressure indicating gauge (PI-103C)	Normally Open

No.	Component	Location	Function Performed	Remarks
47	Pressure Indicating Gauge (PI-103C)	On 100 mm line from RW supply to Media Filter (MF) - 101C	Provides reading of pressure (0-100 psi)	
48	Actuated Butterfly Valve (BFV-011C)	Within MF-101C	Controls flow from RW Intake to media filter (MF) - 101C	PLC controlled
49	Actuated Butterfly Valve (BFV-013C)	Within MF-101C	Controls flow sequence MF-101C	PLC controlled
50	Actuated Butterfly Valve (BFV-014C)	Within MF-101C	Controls flow sequence MF-101C	PLC controlled
51	Actuated Butterfly Valve (BFV-015C)	Within MF-101C	Controls flow sequence MF-101C	PLC controlled
52	Air Release Valve (ARV-xx)	Top of filtration vessel MF-101C	Allows air release from filtration system	
53	Ball Valve (BLV-101C)	Top of filtration vessel MF-101C	Drain Valve	Normally closed
54	Ball Valve (BLV-102C)	Bottom of filtration vessel MF-101B	Drain Valve	Normally closed
55	Ball Valve (BLV-104C)	On 100 mm line downstream of MF-101C	Drain valve	Normally closed
56	Ball Valve (BLV-106C)	On 100 mm line downstream of MF-101C	Drain valve	Normally open
57	Pressure Indicator (PI-104C)	On 100 mm line downstream of MF-101C	Provides pressure reading	
58	Actuated Butterfly Valve (BFV-012C)	On 100 mm line downstream of MF-101C	Controls flow within MF-101C	PLC controlled
59	Turbidity Sensor (AE-104 and AT-104)	On 100 mm line downstream of MF-101C	Provides reading on the clarity of the water and transmits to PLC	Sends info to PLC
60	Clear PVC (SG-102C)	On 100 mm line from MF-101C to Backwash Tank	Allows visual inspection of backwash flow	
Backwash Discharge				
61	Manual Diaphragm Valve (DV-102)	On 150 mm line from filtration vessels to Backwash Tank	Manually throttle the backwash water outlet	Normally Open
62	Ball Valve (BLV-107)	On 150 mm line from filtration vessels to Backwash Tank	Drain valve	Normally Closed

No.	Component	Location	Function Performed	Remarks
63	Backwash Tank (TK-504)	Outside WTP	Collects backwash waste and rinse	
64	Level Indicating Transmitter (LIT-302)	On Backwash Tank	Provides reading on water levels	Sends info to PLC
64	Temperature Indicator/ Transmitter (TIT-302)	Backwash Tank	Indicates and transmits Backwash Temperature to PLC	
Filtered Water Common Discharge				
66	Turbidity Sensor (AE-105 and AT-105)	On 150 mm line downstream filtration vessels to UV System	Provides reading on the Turbidity of the water	Sends info to PLC
67	Clear PVC (SG-101)	On 150 mm line downstream filtration vessels to UV System	Allows visual inspection of filtered water	
68	Manual Diaphragm Valve (DV-101)	On 150 mm line downstream filtration vessels to UV System	Manually throttle the backwash water outlet	Normally Open
69	Pressure Gauge (PI/PT-102)	On 150 mm line downstream filtration vessels to UV System	Provides pressure reading	
70	Outlet Sample Valve (SV-102)	On 150 mm line downstream filtration vessels to UV System	Provides sample of the filtered water	Normally closed
71	Ball Valve (BLV-109)	On 150 mm line from filtration vessels to Backwash Tank	Isolates PI/PT-102	Normally Open
72	Butterfly Valve (BFV-117)	On 150 mm line downstream filtration vessels to UV System	Automatically open or close the system effluent header	PLC Controlled
73	Butterfly Valve (BFV-xx)	On 150 mm line downstream filtration vessels to UV System	Manually open or close the system effluent header	Normally Open

4.5 UV DISINFECTION

(Refer to Drawing P-101 in Appendix A)

The following table identifies the components related to the Filtration System

No.	Component	Location	Function Performed	Remarks
1	Ball Valve (xx)	Upstream UV reactors	Sample port	
2	Flow Indicating Transmitter (FIT-300)	150 mm line upstream UV reactors	Indicates and transmits flow to PLC	
3	Air Release Valve (ARV-xx)	150 mm line upstream UV reactors	Allows air release from piping upstream UV system	
4	Butterfly Valve (UVBUV-xx)	150 mm line upstream UV reactors	Isolates UV-01	
5	Butterfly Valve (UVBUV-01)	150 mm line upstream UV-01	Isolates UV-01	Normally Open
6	UV-01	Main Floor	UV disinfection	
7	Butterfly Valve (UVBUV-02)	150 mm line upstream UV-02	Isolates UV-02	Normally Open
8	UV-02	Main Floor	UV disinfection	
9	Butterfly Valve (UVBUV-04)	On 150 mm line downstream UV-01 to Treated Water Tank	Isolates UV-01	Normally Open
10	Butterfly Valve (UVBUV-05)	On 150 mm line downstream UV-02 to Treated Water Tank	Isolates UV-02	Normally Open
11	Butterfly Valve (xx)	Downstream UV-01 to drain	Drain valve	Normally closed
12	Butterfly Valve (xx)	Downstream UV-02 to drain	Drain valve	Normally closed
13	Butterfly Valve (xx)	150 line downstream UV reactors to Treated Water Tank	Isolates UV System	Normally Open

4.6 DISTRIBUTION

(Refer to Drawing P-102 at the end of this section)

The following table identifies the components related to the flow of Treated Water to truck fill and core servicing.

No.	Component	Location	Function Performed	Remarks
1	Treated Water Tank (TK-XXX)	Outside WTP	Provide treated water storage and contact time	
2	Duckbill Check valve (CHK-XX)	Treated water tank	Prevents backflow	
3	Level Indicating Transmitter (LIT-401)	On Treated Water Tank	Provides reading on water levels	Sends info to PLC
4	Butterfly valve (xx)	On 200 mm line downstream Treated Water Tank	Manual isolation valve	Normally Open
5	Butterfly valve (xx)	On 200 mm line downstream Treated Water Tank	Manual isolation valve	Normally Open
6	Butterfly valve (xx)	On 150 mm line connecting discharge and recirculation Treated Water Tank	Manual isolation valve	Normally open
7	Temperature Indicating Transmitter (TIT-403)	On 200 mm line downstream Treated Water Tank to Distribution System	Provides temperature reading of treated water	Sends info to PLC
8	Butterfly Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Manual isolation valve	Normally Open
9	Pump (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Pumps treated water to Heat Exchanger (HEX-1.1)	
10	Check Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Prevents backflow of raw water intake	Normally Open
11	Butterfly Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Manual isolation valve	Normally Open
12	Butterfly Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Manual isolation valve	Normally Open
13	Pump (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Pumps treated water to Heat Exchanger (HEX-1.1)	
14	Check Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Prevents backflow of raw water intake	Normally Open

No.	Component	Location	Function Performed	Remarks
15	Butterfly Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Manual isolation valve	Normally Open
16	Butterfly Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Manual isolation valve	Normally Open
17	Heat Exchanger (HEX-1.1)	Main Floor	Maintains treated water temperature	
18	Butterfly Valve (xx)	On 50 mm line from Treated Water Tank to Heat Exchanger (HEX-1.1)	Manual isolation valve	Normally Open
19	Temperature Control Valve (xx)	Glycol supply line to Heat Exchanger (HEX-1.1)	Temperature adjustment valve	
20	Butterfly Valve (xx)	On 50 mm line from HEX-1.1 to Treated Water Tank	Manual isolation valve	Normally Open
21	Butterfly Valve (xx)	On 50 mm line from HEX-1.1 to Treated Water Tank	Manual isolation valve	Normally Open
22	Chlorine Sensor and Transmitter (AE-404 and AIT-404)	On 200 mm line downstream Treated Water Tank to Distribution System	Provides flow analysis to PLC	Sends info to PLC
		TRUCKFILL #1		
23	Butterfly Valve (xx)	On 100 mm line from Treated Water Tank to TFP-01	Manual isolation valve	Normally open
24	Truck Fill Pump (TFP-01)	On 100 mm line from Treated Water Tank to Truck Fill #1	Pumps treated Water to Truck	PLC Controlled
24	Pressure Gauge (PI-xx)	On 100 mm line from TFP-01 to Truck Fill #1	Provides pressure reading	
25	Check Valve (xx)	On 100 mm line from TFP-01 to Truck Fill #1	Prevents backflow of raw water intake	Normally open
25	Butterfly Valve (xx)	On 100 mm line from TFP-01 to Truck Fill #1	Manual isolation valve	Normally open
26	Actuated Butterfly Valve (xx)	On 100 mm line to Truck Fill #1	Controls flow	PLc Controlled
27	Flow Indicating Transmitter (FIT-601)	On 100 mm line from TFP-01 to Truck Fill #1	Indicates flow reading on PLC	Sends info to PLC
28	Ball Valve (xx)	On 100 mm drain line Truck fill #1	Manual isolation valve	Normally open
29	Solenoid Valve (xx)	On 100 mm drain line Truck fill #1	Drains line of truckfill#1	Normally open

No.	Component	Location	Function Performed	Remarks
		TRUCKFILL #2		
30	Buttefly Valve (xx)	On 100 mm line from Treated Water Tank to TFP-02	Manual isolation valve	Normally open
31	Truck Fill Pump (TFP-02)	On 100 mm line from Treated Water Tank to Truck Fill#2	Pumps treated water to Truck	PLC Controlled
31	Pressure Gauge (PI-xx)	On 100 mm line downstream TFP-02	Provides pressure reading	
32	Check Valve (xx)	On 100 mm line downstream TFP-02 to Truck Fill#2	Prevents backflow of raw water intake	Normally open
33	Butterfly Valve (xx)	On 100 mm line from TFP-02 to Truck Fill	Manual isolation valve	Normally open
34	Actuated Butterfly Valve (xx)	On 100 mm line from TFP-02 to Truck Fill	Controls flow	PLC Controlled
35	Flow Indicating Transmitter (FIT-604)	On 100 mm line from TFP-02 to Truck Fill	Indicates flow reading on PLC	Sends info to PLC
36	Ball Valve (xx)	On 100 mm line from TFP-02 to Drian Pump (DP-01)	Controls flow	Normally open
37	Solenoid Valve (xx)	On 100 mm Drain line Truck fill #2	Drains line of truckfill#2	Normally open
38	Drain Pump (DP-01)	On 25 mm Drain line of Truck fill	Drains treated water going to truck fill towards Treated Water Tank	PLC Controlled
39	Check Valve (xx)	On 25 mm Drain line of Truck fill	Prevents backflow of raw water intake	
40	Ball Valve (xx)	On 25 mm Drain line of Truck fill	Manual isolation valve	Normally Open
41	Ball Valve (xx)	On 25 mm Drain line of Truck fill	Manual isolation valve	Normally Open
		CORE SERVICING SUPPLY LINE		
42	Butterfly Valve (xx)	On 75 mm line downstream treated water tank	Manually isolate flow	Normally Open
43	Core Servicing Pump (CSP-01)	On 75 mm line from Treated Water tank to Core Servicing	Pumps treated water to core servicing	PLC Controlled
44	Pressure Gauge (PG-xx)	75 mm line downstream CSP-01	Provides pressure reading	
45	Check Valve (xx)	75 mm line downstream CSP-01	Prevents backflow of raw water intake	Normally Open

No.	Component	Location	Function Performed	Remarks
46	Butterfly Valve (xx)	75 mm line downstream CSP-01	Manually isolate flow	Normally Open
47	Butterfly Valve (xx)	On 75 mm line upstream Core Servicing Pump (CSP) -02	Manually isolate flow	Normally Open
48	Core Servicing Pump (CSP-02)	On 75 mm line from Treated Water tank to Core Servicing	Pumps treated water to core servicing	PLC Controlled
49	Pressure Gauge (PG-xx)	75 mm line downstream CSP-02	Provides pressure reading	
50	Check Valve (xx)	75 mm line downstream CSP-02	Prevents backflow of raw water intake	Normally Open
51	Butterfly Valve (xx)	75 mm line downstream CSP-02	Manually isolate flow	Normally Open
52	Butterfly Valve (xx)	On 100 mm line upstream Core Servicing Pump CSP-03	Manually isolate flow	Normally Open
53	Core Servicing Pump (CSP-03)	On 100 mm line from Treated Water tank to Core Servicing	Pumps treated water to core servicing	PLC Controlled
54	Pressure Gauge (PG-xx)	100 mm line downstream of CSP-03	Provides pressure reading	
55	Check Valve (xx)	100 mm line downstream of CSP-03	Prevents backflow of raw water intake	Normally Open
56	Butterfly Valve (xx)	100 mm line downstream of CSP-03	Manually isolate flow	Normally Open
57	Butterfly Valve (xx)	On 100 mm line upstream Core Servicing Pump CSP-04	Manually isolate flow	Normally Open
58	Core Servicing Pump (CSP-04)	On 100 mm line from Treated Water tank to Core Servicing	Pumps treated water to core servicing	PLC Controlled
59	Pressure Gauge (PG-xx)	100 mm line downstream of CSP-04	Provides pressure reading	
60	Check Valve (xx)	100 mm line downstream of CSP-04	Prevents backflow of raw water intake	Normally Open
61	Butterfly Valve (xx)	100 mm line downstream of CSP-04	Manually isolate flow	Normally Open
62	Butterfly Valve (xx)	On 150 mm line upstream Fire Pump FP-01	Manually isolate flow	Normally Open
63	Fire Pump (FP-01)	On 150 mm line from Treated Water tank to Core Servicing	Pumps water in the event of fire	PLC Controlled

No.	Component	Location	Function Performed	Remarks
64	Pressure Gauge (PG-xx)	150 mm line downstream of FP-01	Provides pressure reading	
65	Check Valve (xx)	150 mm line downstream of FP-01	Prevents backflow of raw water intake	Normally Open
66	Butterfly Valve (xx)	150 mm line downstream of FP-01	Manually isolate flow	Normally Open
67	Flow Indicating Transmitter (FIT-505)	On 150 mm line to Core Servicing	Provides flow reading to PLC	Sends Info to PLC
68	Air Release Valve (ARV-xx)	On 150 mm line to Core Servicing	Allows air release from piping upstream core servicing	
69	Pressure Indicating Transmitter (PIT-506)	On 150 mm line to Core Servicing	Provides pressure reading to PLC	Sends Info to PLC
70	Butterfly Valve (xx)	200 mm line downstream PIT-506	Manual isolation valve	Normally Open
71	Butterfly Valve (xx)	150 mm line Cross-connection Supply and recirculation lines core servicing	Manual isolation valve	Normally Closed
72	Butterfly Valve (xx)	200 mm line downstream PIT-506	Manual isolation valve	Normally Open
CORE SERVICING RECIRCULATION LINE				
72	Butterfly Valve (xx)	On 150 mm recirculation line from core servicing to Treated Water Tank	Manual isolation valve	Normally Open
73	Butterfly Valve (xx)	On 150 mm recirculation line from core servicing to Treated Water Tank	Manual isolation valve	Normally Open
74	Pressure Indicating Transmitter (PIT-700)	On 150 mm recirculation line from core servicing to Treated Water Tank	Provides Pressure Reading to PLC	Sends info to PLC
75	Temperature Indicating Transmitter (TIT-701)	On 150 mm recirculation line from core servicing to Treated Water Tank	Provides Temperature Reading to PLC	Sends info to PLC
76	Flow Indicating Transmitter (FIT-703)	On 150 mm line from core servicing to Treated Water Tank	Provides Flow Reading to PLC	Sends info to PLC
77	Flow Control Valve (FCV-704)	On 150 mm recirculation line from core servicing to Treated Water Tank	Controls the flow from Servicing core to Treated Water Tank	PLC Controlled

No.	Component	Location	Function Performed	Remarks
78	Check Valve (xx)	On 150 mm recirculation line from core servicing to Treated Water Tank	Prevents Backflow	
79	Air Release Valve (ARV-xx)	On 150 mm recirculation line from core servicing to Treated Water Tank	Allows air release from piping upstream recirculation line	
80	Butterfly valve (xx)	On 150 mm recirculation line from core servicing to Treated Water Tank	Manual Flow Control	Normally Open
81	Butterfly valve (xx)	On 150 mm recirculation line from core servicing to Treated Water Tank	Manual Flow Control	Normally Open

4.7 FUEL OIL AND PLUMBING

(Refer to Drawing M-601 at the end of this section)

The following table identifies the components related to the flow of Treated Water to truck fill and core servicing.

No.	Component	Location	Function Performed	Remarks
		BOILER 1		
1	Boiler (B-3.1)	Mechanical room	Heats heating fluid	
2	Burner	Adjacent to boiler	Supplies the boiler with the required amount of fuel and air	
3	Primary Hot Water Pump (P-3.1)	On 75 mm line downstream of boiler	Moves heating water from the boiler downstream	
4	Shut off valve	On 75 mm line upstream of P-3.1	Isolates P-3.1	Normally Open
5	Check valve	On 75 mm line downstream of P-3.1	Prevent Backflow to Boiler	
6	Shut off valve	On 75 mm line downstream of check valve	Isolates P-3.1	Normally Open
7	Balancing valve	On 75 mm line downstream of shut off valve	Creates desired flow rate	

No.	Component	Location	Function Performed	Remarks
8	Pressure indicator	Boiler (B-3.1)	Shows boiler pressure	
9	Temperature Indicator	Boiler (B-3.1)	Shows boiler temperature	
10	Pressure Indicator	Pump (P-3.1)	Shows pressure difference across pump	
11	Temperature Indicator	On 75 mm line downstream of balancing valve	Shows GWS temperature coming out of boiler	
BOILER 2				
1	Boiler (B-3.2)	Mechanical room	Used to heat water	
2	Burner	Adjacent to boiler	Supplies the boiler with the required amount of fuel and air	
3	Primary Hot Water Pump (P-3.2)	On 75 mm line downstream of boiler	Moves heating water from the boiler downstream	
4	Shut off valve	On 75 mm line upstream of P-3.2	Isolates P-3.2	Normally Open
5	Check valve	On 75 mm line downstream of P-3.2	Prevent Backflow to Boiler	
6	Shut off valve	On 75 mm line downstream of check valve	Isolates P-3.2	Normally Open
7	Balancing valve	On 75 mm line downstream of shut off valve	Creates desired flow rate	
8	Pressure indicator	Boiler (B-3.2)	Shows boiler pressure	
9	Temperature Indicator	Boiler (B-3.2)	Shows boiler temperature	
10	Pressure Indicator	Pump (P-3.2)	Shows pressure difference across pump	
11	Temperature Indicator	On 75 mm line downstream of balancing valve	Shows GWS temperature coming out of boiler	
BOILER 3				
1	Boiler (B-3.3)	Mechanical room	Used to heat water	

No.	Component	Location	Function Performed	Remarks
2	Burner	Adjacent to boiler	Supplies the boiler with the required amount of fuel and air	
3	Primary Hot Water Pump (P-3.3)	On 75 mm line downstream of boiler	Moves heating water from the boiler downstream	
4	Shut off valve	On 75 mm line upstream of P-3.3	Isolates P-3.3	Normally Open
5	Check valve	On 75 mm line downstream of P-3.3	Prevent Backflow to Boiler	
6	Shut off valve	On 75 mm line downstream of check valve	Isolates P-3.3	Normally Open
7	Balancing valve	On 75 mm line downstream of shut off valve	Creates desired flow rate	
8	Pressure indicator	Boiler (B-3.3)	Shows boiler pressure	
9	Temperature Indicator	Boiler (B-3.3)	Shows boiler temperature	
10	Pressure Indicator	Pump (P-3.3)	Shows pressure difference across pump	
11	Temperature Indicator	On 75 mm line downstream of balancing valve	Shows GWS temperature coming out of boiler	
Glycol Fill				
1	Hydronic System Feeder (Pump P-3.6 and Tank TK-1.6)	Mechanical room	Stores glycol mixture and feeds it to the system when required. In case of glycol overpressure in boilers, glycol surplus is transferred to tank TK-1.6.	
2	Ball Valve	On 13 mm line downstream of hydronic system feeder	Isolates upstream check valve	Normally open
3	Check Valve	On 13 mm line downstream of hydronic system feeder	Prevents backflow to hydronic system feeder	
4	Ball Valve	On 13 mm line downstream of hydronic system feeder	Isolates upstream hydronic system feeder and check valve	Normally open

No.	Component	Location	Function Performed	Remarks
5	Pressure Safety Valve	On 13 mm line upstream of hydronic system feeder	Releases excess pressure in hydronic system towards the hydronic system feeder tank	
		Expansion tank		
1	Expansion Tank TK-1.5	Mechanical Room	Expands and contracts to compensate for thermal expansion of heating fluid.	
2	Drain valve	On 25 mm line downstream of expansion tank	Permits draining of expansion tank	
3	Ball Valve	On 25 mm line downstream of expansion tank	Isolates the drain valve	Normally open
		Air Separator		
1	Dust/Air Separator	Mechanical Room	Removes dust and air from the heating fluid	
2	Butterfly valve	On 100 mm line upstream of dust/air separator	Isolates dust/air separator	Normally open
3	Butterfly valve	On 100 mm line downstream of dust/air separator	Isolates dust/air separator	Normally open
		Primary Heating Fluid Pumps		
1	Butterfly Valve	On 100 mm line upstream of pump P-3.4	Isolates the primary heating pump system	Normally open
2	Pressure indicator	Upstream of pump P-3.4	Indicates the pressure of the fluid entering the primary heating system	
3	Suction Guide with Strainer	Upstream of pump P-3.4	Guides and roughly filters the fluid towards pump P-3.4	
4	Pressure Indicator	Pump P-3.4	Shows pressure difference across pump	
5	Pump P-3.4	Mechanical Room	Pumps the hot water fluid through the heating system	

No.	Component	Location	Function Performed	Remarks
6	Balancing valve	On 100 mm line downstream of pump P-3.4	Maintains desired flow rate	
7	Check Valve	On 100 mm line downstream of pump P-3.4	Prevents backflow to hydronic system feeder	
8	Butterfly Valve	On 100 mm line upstream of pump P-3.5	Isolates the primary heating pump system	Normally open
9	Pressure indicator	Upstream of pump P-3.5	Indicates the pressure of the fluid entering the primary heating system	
10	Suction Guide with Strainer	Upstream of pump P-3.5	Guides and roughly filters the fluid towards pump P-3.5	
11	Pressure Indicator	Pump P-3.5	Shows pressure difference across pump	
12	Pump P-3.5	Mechanical Room	Pumps the hot water fluid through the heating system	
13	Balancing valve	On 100 mm line downstream of pump P-3.5	Maintains desired flow rate	
14	Check Valve	On 100 mm line downstream of pump P-3.5	Prevents backflow to hydronic system feeder	
15	Butterfly valve	On 100 mm line downstream of pump P-3.5	Isolates pump 3.5 system	Normally open
16	Ball Valve	On 19 mm line upstream of side stream filter	Isolates the side stream filter	Normally open
17	Sight glass	On 19 mm line upstream of side stream filter	Permits to physically observe the flow in the side stream filter	
18	Side Stream Filter	Mechanical Room	Filters the heating system's fluid.	
19	Globe valve	On 19 mm line downstream of side stream filter	Isolates the side stream filter	Normally open
Chemical Pot Feeder				
1	Ball Valve	On 100 mm line upstream of chemical pot feeder	Isolates the chemical pot feeder	Normally closed

No.	Component	Location	Function Performed	Remarks
2	Chemical Pot Feeder	Mechanical Room	Permits the addition of chemicals to heating fluid	
3	Ball Valve	On 100 mm line upstream of chemical pot feeder	Isolates the chemical pot feeder	Normally closed
4	Ball valve	On 100 mm bypassing chemical pot feeder	Diverts flow towards chemical feeder when closed	Normally open
5	Butterfly valve	On 100 mm line downstream of chemical pot feeder	Isolates hot fluid distribution system.	Normally open
6	Temperature indicator	On 100 mm line downstream of chemical pot feeder	Indicates the temperature of the hot fluid before its distribution	
		Raw Water Heating		
1	Butterfly valve	On 50 mm line upstream of double-walled heat exchanger HEX-1.2	Isolates double-walled heat exchanger HEX-1.2	Normally open
2	Pressure indicator	Upstream of double-walled heat exchanger HEX-1.2	Indicates pressure of the heating fluid upstream of double-walled heat exchanger HEX-1.2	
3	Temperature Indicator	Upstream of double-walled heat exchanger HEX-1.2	Indicates the temperature of the heating fluid upstream of double-walled heat exchanger HEX-1.2	
4	Double-Walled Heat Exchanger HEX-1.2	Process Room	Warms up raw water from the lake	
5	Ball Valve	Downstream of double-walled heat exchanger HEX-1.2	Drain valve	Normally closed
6	Temperature Indicator	Downstream of double-walled heat exchanger HEX-1.2	Indicates the temperature of the heating fluid downstream of double-walled heat exchanger HEX-1.2	

No.	Component	Location	Function Performed	Remarks
7	Butterfly Valve	On 50 mm line downstream of double-walled heat exchanger HEX-1.2	Isolates double-walled heat exchanger HEX-1.2 or control valve and balancing valve	Normally open
8	Control Valve	On 50 mm line downstream of double-walled heat exchanger HEX-1.2	Controls the flow of heating fluid through the double-walled heat exchanger HEX-1.2	Normally open
9	Balancing Valve	On 25 mm line downstream of double-walled heat exchanger HEX-1.2	Maintains flow rate through double-walled heat exchanger HEX-1.2 when the control valve is opened	
10	Butterfly Valve	On 50 mm line downstream of double-walled heat exchanger HEX-1.2	Isolates double-walled heat exchanger HEX-1.2 or control valve and balancing valve	Normally open
Potable Water Reheating				
1	Temperature Indicator	Upstream of heat exchanger HEX-1.1	Indicates the temperature of the heating fluid upstream of heat exchanger HEX-1.1	
2	Butterfly Valve	On 100 mm line upstream of heat exchanger HEX-1.1	Isolates heat exchanger HEX-1.1	Normally open
3	Pressure indicator	Upstream of heat exchanger HEX-1.1	Indicates pressure of the heating fluid upstream of heat exchanger HEX-1.1	
4	Heat Exchanger HX-1.1	Mechanical Room	Warms up potable water from treated water tank	
5	Ball Valve	Downstream of heat exchanger HEX-1.1	Drain valve	Normally closed
6	Butterfly Valve	On 100 mm line downstream of heat exchanger HEX-1.1	Isolates double-walled heat exchanger HEX-1.2 or control valve and balancing valve	Normally open

No.	Component	Location	Function Performed	Remarks
7	Control Valve	On 100 mm line downstream of double-walled heat exchanger HEX-1.1	Controls the flow of heating fluid through the double-walled heat exchanger HEX-1.1	
8	Temperature Indicator	Downstream of heat exchanger HEX-1.1	Indicates the temperature of the heating fluid downstream of heat exchanger HEX-1.1	
9	Balancing Valve	On 75 mm line downstream of double-walled heat exchanger HEX-1.1	Maintains flow rate through double-walled heat exchanger HEX-1.1 when the control valve is opened	
Main Hot Fluid Supply Header				
1	Ball Valve	On 63 mm line downstream of reducer	Isolates the building heating distribution piping	Normally open
Main Hot Fluid Return Header				
1	Ball Valve	On 63 mm line upstream of reducer	Isolates the building heating distribution piping	Normally open
2	Temperature Indicator	Downstream of HEX-1.1 return branch-in	Indicates the temperature of the hot fluid return	
Genset Heating				
1	Ball Valve	On 19 mm line upstream of UH-3.1	Isolates UH-3.1 control valve	Normally open
2	Control Valve	On 19 mm line upstream of UH-3.1	Controls the heating fluid flow through UH-3.1	
3	Ball Valve	On 19 mm line upstream of UH-3.1	Isolates UH-3.1 control valve	Normally open
4	Ball Valve	On 19 mm line upstream of UH-3.1	Isolates UH-3.1	Normally open
5	Manual Air Vent	Upstream of UH-3.1	Used to purge the air in the genset heating fluid system	
6	Unit Heater UH-3.1	New Generator (emergency) room	Heats its room	

No.	Component	Location	Function Performed	Remarks
7	Ball Valve	Downstream of UH-3.1	Drain valve	Normally closed
8	Globe Valve	On 19 mm line downstream of UH-3.1	Isolates UH-3.1	Normally open
9	Balancing Valve	On 13 mm line downstream of UH-3.1	Maintains ideal flow through UH-3.1	
Electrical Room Heating				
1	Ball Valve	On 19 mm line upstream of UH-3.2	Isolates UH-3.2 control valve	Normally open
2	Control Valve	On 19 mm line upstream of UH-3.2	Controls the heating fluid flow through UH-3.2	
3	Ball Valve	On 19 mm line upstream of UH-3.2	Isolates UH-3.2 control valve	Normally open
4	Ball Valve	On 19 mm line upstream of UH-3.2	Isolates UH-3.2	Normally open
5	Manual Air Vent	Upstream of UH-3.2	Used to purge the air in the electrical room heating fluid system	
6	Unit Heater UH-3.2	Electrical room	Heats its room	
7	Ball Valve	Downstream of UH-3.2	Drain valve	Normally closed
8	Globe Valve	On 19 mm line downstream of UH-3.2	Isolates UH-3.2	Normally open
9	Balancing Valve	On 13 mm line downstream of UH-3.2	Maintains ideal flow through UH-3.2	
Backwash Tank Heating				
1	Temperature Indicator	Upstream of heat exchangers HEX-2.1 and HEX-2.2	Indicates temperature of supply heating fluid	
2	Manual Air Vent	Upstream of heat exchangers HEX-2.1 and HEX-2.2	Used to purge the air in the backwash tank heating fluid system	
3	Ball valve	On 50 mm line upstream of heat exchangers HEX-2.1 and HEX-2.2	Isolates HEX-2.1 and HEX-2.2 control valve	Normally Open
4	Control Valve	On 50 mm line upstream of heat exchangers HEX-2.1 and HEX-2.2	Controls the heating fluid flow through HEX-2.1 and HEX-2.2	

No.	Component	Location	Function Performed	Remarks
5	Ball Valve	On 50 mm line upstream of heat exchangers HEX-2.1 and HEX-2.2	Isolates HEX-2.1 and HEX-2.2 control valve or HEX-2.1 and HEX-2.2	Normally open
6	Globe Valve	On 50 mm line control valve 4 and isolation valves 3 and 5 bypass	Bypasses control valve 4 and isolation valves 3 and 5	Normally closed
8	Heat Exchanger HEX-2.1	In backwash tank	Heats the water in the backwash tank	
9	Heat Exchanger HEX-2.2	In backwash tank	Heats the water in the backwash tank	
11	Ball Valve	On 50 mm line downstream of heat exchangers	Isolates HEX-2.1 and HEX-2.2	Normally open
12	Temperature Indicator	Downstream of heat exchangers HEX-2.1 and HEX-2.2	Indicates temperature of return heating fluid	
13	Balancing Valve	On 25 mm downstream of heat exchangers HEX-2.1 and HEX-2.2	Maintains ideal flow through heat exchangers HEX-2.1 and HEX-2.2	
Mechanical Room Heating				
1	Ball Valve	On 19 mm line upstream of UH-3.3	Isolates UH-3.3 control valve	Normally open
2	Control Valve	On 19 mm line upstream of UH-3.3	Controls the heating fluid flow through UH-3.3	
3	Ball Valve	On 19 mm line upstream of UH-3.3	Isolates UH-3.3 control valve	Normally open
4	Ball Valve	On 19 mm line upstream of UH-3.3	Isolates UH-3.3	Normally open
5	Manual Air Vent	Upstream of UH-3.3	Used to purge the air in the mechanical room heating fluid system	
6	Unit Heater UH-3.3	Mechanical room	Heats its room	
7	Ball Valve	Downstream of UH-3.3	Drain valve	Normally closed
8	Globe Valve	On 19 mm line downstream of UH-3.3	Isolates UH-3.3	Normally open
9	Balancing Valve	On 13 mm line downstream of UH-3.3	Maintains ideal flow through UH-3.3	

No.	Component	Location	Function Performed	Remarks
		Chlorine Room Heating		
1	Ball Valve	On 19 mm line upstream of UH-3.4	Isolates UH-3.4 control valve	Normally open
2	Control Valve	On 19 mm line upstream of UH-3.4	Controls the heating fluid flow through UH-3.4	
3	Ball Valve	On 19 mm line upstream of UH-3.4	Isolates UH-3.4 control valve	Normally open
4	Ball Valve	On 19 mm line upstream of UH-3.4	Isolates UH-3.4	Normally open
5	Manual Air Vent	Upstream of UH-3.4	Used to purge the air in the chlorine room heating fluid system	
6	Unit Heater UH-3.4	Chlorine room	Heats its room	
7	Ball Valve	Downstream of UH-3.4	Drain valve	Normally closed
8	Globe Valve	On 19 mm line downstream of UH-3.4	Isolates UH-3.4	Normally open
9	Balancing Valve	On 13 mm line downstream of UH-3.4	Maintains ideal flow through UH-3.4	
		Process Room Heating		
1	Ball Valve	On 19 mm line upstream of UH-3.5	Isolates UH-3.5 control valve	Normally open
2	Control Valve	On 19 mm line upstream of UH-3.5	Controls the heating fluid flow through UH-3.5	
3	Ball Valve	On 19 mm line upstream of UH-3.5	Isolates UH-3.5 control valve	Normally open
4	Ball Valve	On 19 mm line upstream of UH-3.5	Isolates UH-3.5	Normally open
5	Manual Air Vent	Upstream of UH-3.5	Used to purge the air in the process room UH-3.5 heating fluid system	
6	Unit Heater UH-3.5	Process room	Heats its room	
7	Ball Valve	Downstream of UH-3.5	Drain valve	Normally closed
8	Globe Valve	On 19 mm line downstream of UH-3.5	Isolates UH-3.5	Normally open

No.	Component	Location	Function Performed	Remarks
9	Balancing Valve	On 13 mm line downstream of UH-3.5	Maintains ideal flow through UH-3.5	
10	Ball Valve	On 19 mm line upstream of UH-3.6	Isolates UH-3.6 control valve	Normally open
11	Control Valve	On 19 mm line upstream of UH-3.6	Controls the heating fluid flow through UH-3.6	
12	Ball Valve	On 19 mm line upstream of UH-3.6	Isolates UH-3.6 control valve	Normally open
13	Ball Valve	On 19 mm line upstream of UH-3.6	Isolates UH-3.6	Normally open
14	Manual Air Vent	Upstream of UH-3.6	Used to purge the air in the process room UH-3.6 heating fluid system	
15	Unit Heater UH-3.6	Process room	Heats its room	
16	Ball Valve	Downstream of UH-3.6	Drain valve	Normally closed
17	Globe Valve	On 19 mm line downstream of UH-3.6	Isolates UH-3.6	Normally open
18	Balancing Valve	On 13 mm line downstream of UH-3.6	Maintains ideal flow through UH-3.6	
HRV RHC-1				
1	Ball Valve	On 19 mm line upstream of RHC-1	Isolates RHC-1 control valve	Normally open
2	Control Valve	On 13 mm line upstream of RHC-1	Controls the heating fluid flow through RHC-1	Normally open
3	Ball Valve	On 19 mm line upstream of RHC-1	Isolates RHC-1 control valve	Normally open
4	Ball Valve	On 19 mm line downstream of RHC-1	Drain valve	Normally closed
5	Re-Heat Coil RHC-1	Office	Re-heats supply air up to set temperature	
6	Manual Air Vent	Upstream of RHC-1	Used to purge the air in the chlorine room heating fluid system	
9	Balancing Valve	On 13 mm line downstream of RHC-1	Maintains ideal flow through RHC-1	
Office Heating				

No.	Component	Location	Function Performed	Remarks
1	Ball Valve	On 19 mm line upstream of office radiation fin	Isolates office radiation fin control valve	Normally open
2	Control Valve	On 19 mm line upstream of office radiation fin	Controls the heating fluid flow through office radiation fin	
3	Ball Valve	On 19 mm line upstream of office radiation fin	Isolates office radiation fin control valve	Normally open
4	Manual Air Vent	Upstream of office radiation fin	Used to purge the air in the chlorine room heating fluid system	
5	Ball Valve	On 19 mm line upstream of office radiation fin	Isolates office radiation fin	Normally open
6	Radiation Fin	Office	Heats its room	
7	Ball Valve	Downstream of office radiation fin	Drain valve	Normally closed
8	Globe Valve	On 19 mm line downstream of office radiation fin	Maintains ideal flow through office radiation fin	Normally open
Hydronic Packaged Heat Trace Unit (HTIP-1.1)				
1	Ball Valve	On 32 mm line upstream of HTIP-1.1	Isolates HTIP-1.1	Normally open
2	Temperature Indicator	Upstream of HTIP-1.1	Indicates temperature of supply heating fluid	
3	Manual Air Vent	Upstream of HTIP-1.1	Used to purge the air in the chlorine room heating fluid system	
4	Hydronic Packaged Heat Trace Unit HTIP-1.1	Process Room	Distributes heating fluid through	
Exterior Main Fuel Oil Storage Tank				
1	Exterior Main Fuel Oil Storage Tank (TK-1.1)	Exterior	Stores Fuel Oil	
2	Levelometer	Levelometer air chamber inside fuel oil tank TK-1.1 and wall monted levelometer in mechanical room	Indicates when fuel level is below setpoint	

No.	Component	Location	Function Performed	Remarks
3	Anti-Syphon Valve	Exterior on 50mm FOS line downstream of fuel oil tank TK-1.1	Prohibits fuel oil from flowing through when pumps are not activated	Normally closed
4	Ball Valve	In generator room on 50mm FOS line downstream of fuel oil tank TK-1.1	Isolates fuel oil tank TK-1.1	Normally open
Fuel Oil Pumps				
1	Ball Valve	On 19mm line upstream of pump P-2.1	Isotates pump P-2.1	Normally open
2	Vacuum Indicator	On 19mm line upstream of pump P-2.1	Indicates a leak.	
3	Pump P-2.1	Mechanical Room	Pumps fuel oil from the main fuel oil tank to the fuel oi day tank	
4	Pressure indicator	On 19mm line downstream of pump P-2.1	Indicates the pressure in the fuel line	
5	Check Valve	On 19mm line downstream of pump P-2.1	Prevents backflow to pump P-2.1	
6	Ball Valve	On 19mm line downstream of pump P-2.1	Isolates pump P-2.1	Normally open
7	Ball Valve	On 19mm line upstream of pump P-2.2	Isotates pump P-2.2	Normally open
8	Vacuum Indicator	On 19mm line upstream of pump P-2.2	Indicates a leak.	
9	Pump P-2.2	Mechanical Room	Pumps fuel oil from the main fuel oil tank to the fuel oi day tank	
10	Pressure indicator	On 19mm line downstream of pump P-2.2	Indicates the pressure in the fuel line	
11	Check Valve	On 19mm line downstream of pump P-2.2	Prevents backflow to pump P-2.2	
12	Ball Valve	On 19mm line downstream of pump P-2.2	Isolates pump P-2.2	Normally open
Fuel Oi Day Tank				

No.	Component	Location	Function Performed	Remarks
1	Fuel Oil Day Tank TK-1.4	Mechanical Room	Stores fuel oil in smaller quantity than the main fuel oil tank and reheats it before use.	
		Generator		
1	Oil Safety Valve	On 13mm FOS line upstream of generator	Prohibits fuel oil from flowing through the line when the generator is not in function	Normally closed
2	Ball Valve	On 13mm FOS line upstream of generator	Isolates the fusible link valve	Normally open
3	Fusible Link Valve	On 13mm FOS line upstream of generator	Closes in case of fire	Normally open
4	Fuel Oil Filter	On 13mm FOS line upstream of generator	Filters the fuel oil before use in generator	
5	Ball Valve	On 13mm FOS line upstream of generator	Isolates the generator	Normally open
6	Generator	Generator Room	Produces electricity	
7	Ball Valve	On 13mm FOR line downstream of generator	Isolates the generator	Normally open
		Boilers Fuel Distribution		
1	Oil Safety Valve	On 13mm FOS line upstream of boiler B-3.1	Prohibits fuel oil from flowing through the line when boiler B-3.1 is not in function	Normally closed
2	Ball Valve	On 13mm FOS line upstream of boiler B-3.1	Isolates the fusible link valve	Normally open
3	Fusible Link Valve	On 13mm FOS line upstream of boiler B-3.1	Closes in case of fire	Normally open
4	Fuel Oil Filter	On 13mm FOS line upstream of boiler B-3.1	Filters the fuel oil before use in boiler B-3.1	
5	Ball Valve	On 13mm FOS line upstream of boiler B-3.1	Isolates the boiler B-3.1	Normally open
6	Fuel Oil De-Aerator	On 13mm FOS line upstream of boiler B-3.1	Removes air bubbles from the fuel oil	

No.	Component	Location	Function Performed	Remarks
7	Oil Safety Valve	On 13mm FOS line upstream of boiler B-3.1	Prohibits fuel oil from flowing through the line when boiler B-3.1 is not in function	Normally closed
8	Ball Valve	On 13mm FOS line upstream of boiler B-3.1	Isolates the fusible link valve	Normally open
9	Fusible Link Valve	On 13mm FOS line upstream of boiler B-3.1	Closes in case of fire	Normally open
10	Fuel Oil Filter	On 13mm FOS line upstream of boiler B-3.1	Filters the fuel oil before use in boiler B-3.1	
11	Ball Valve	On 13mm FOS line upstream of boiler B-3.1	Isolates the boiler B-3.1	Normally open
12	Fuel Oil De-Aerator	On 13mm FOS line upstream of boiler B-3.1	Removes air bubbles from the fuel oil	
13	Oil Safety Valve	On 13mm FOS line upstream of boiler B-3.1	Prohibits fuel oil from flowing through the line when boiler B-3.1 is not in function	Normally closed
14	Ball Valve	On 13mm FOS line upstream of boiler B-3.1	Isolates the fusible link valve	Normally open
15	Fusible Link Valve	On 13mm FOS line upstream of boiler B-3.1	Closes in case of fire	Normally open
16	Fuel Oil Filter	On 13mm FOS line upstream of boiler B-3.1	Filters the fuel oil before use in boiler B-3.1	
17	Ball Valve	On 13mm FOS line upstream of boiler B-3.1	Isolates the boiler B-3.1	Normally open
18	Fuel Oil De-Aerator	On 13mm FOS line upstream of boiler B-3.1	Removes air bubbles from the fuel oil	
Domestic Water System				
1	Ball Valve	On 25mm line upstream of DW pressure pump P-1.4	Isolates the domestic water system	Normally open
2	Reduced Pressure Backflow Preventer	On 25mm line upstream of DW pressure pump P-1.4	Prevents domestic water from flowing to upstream process system	
3	Ball valve	On 25mm line upstream of DW pressure pump P-1.4	Isolates the reduced pressure backflow preventer	Normally open
4	Control Valve	On 25mm line upstream of DW pressure pump P-1.4	Controls the domestic water flow through the system	Normally open

No.	Component	Location	Function Performed	Remarks
5	Domestic Water Pump and Pressure Tank (P-1.4 and TK-1.2)	Process room	Ensures water pressure through the domestic water system	
6	Pressure Indicator	On 25mm line downstream of DW pressure pump P-1.4	Indicates the pressure in the domestic water system	
7	Ball Valve	On 25mm line downstream of DW pressure pump P-1.4	Isolates pump P-1.4	
8	Hose Bibb HB-1	Process room	Provides connection to water system	
9	Hose Bibb HB-2	Aqueous chlorine room	Provides connection to water system	
10	Ball Valve	On 19mm line upstream of DHWH-1	Isolates the domestic hot water heater	Normally open
11	Check Valve	On 19mm line upstream of DHWH-1	Prevents backflow from domestic hot water heater	
12	Domestic Hot Water Heater (DHWH-1)	Mechanical room	Heats and stores domestic water	
14	Ball Valve	On 19mm line downstream of DHWH-1	Isolates the domestic hot water heater	Normally open
15	Ball Valve	On 13mm domestic hot water line upstream of eye wash station	Isolates the eye wash station	Normally open
16	Ball Valve	On 13mm domestic cold water line upstream of eye wash station	Isolates the eye wash station	Normally open
17	Thermostatic Mixing Valve	On 13mm domestic water line upstream of eye wash station and downstream of the eye wash station's isolation valves	Mixes the cold and hot water to 29°C	
18	Eye Wash Station (EW-1)	Process room	Used to wash eyes in case of emergency	
19	Lavatory LAV-1	Unisex washroom	Lavatory	
20	Water Closet WC-1	Unisex washroom	Water closet	
21	Sink (SK-1)	Office	Sink	

No.	Component	Location	Function Performed	Remarks
22	Drain Valve	On 19mm line downstream of domestic water heater drain pan	Permits draining the drain pan	
		Sanitary		
1	Sanitary Storage Tank TK-1.3	Mechanical room	Stores sewage	
2	Anti-vacuum valve	On 75mm vent from TK-1.3	Prevents vacuum in sewage tank vent.	
3	Arctic vent	On 75mm vent from TK-1.3	Electrically heated to avoid frost on the roof sanitary vent	

END OF CHAPTER

CHAPTER 5

5. COMPONENT DETAILS

5.1 GENERAL OVERVIEW

The following tables describe the components of the various systems and provide some basic details and settings. For each table, there are drawings that can be referenced to better understand in what part of the Water Treatment Plant the components are located.

5.2 RAW WATER FLOW

(Refer to Drawing P-101 in Appendix A)

The following table identifies the components related to the flow of water from the plant intake to the filters.

No.	Component	Details	Setting	Remarks
1	Butterfly Valve (FFBUV-01)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
2	Filtered Feed Pump (FFP-01)	Grundfos Model Paco 16N6-25709-13010X		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
3	Pressure Indicator (PI-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
4	Check Valve (CHV-01)	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
5	Butterfly Valve (FFBUV-03)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
6	Butterfly Valve (FFBUV-02)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

No.	Component	Details	Setting	Remarks
7	Filtered Feed Pump (FFP-02)	Grundfos Model Paco 16N6-25709-13010X		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
8	Pressure Indicator (PI-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
9	Check Valve (CHV-02)	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
10	Butterfly Valve (FFBUV-04)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
11	Butterfly Valve (FFBUV-xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
12	Raw Water Circulation Pump (RCP-01)	Grunfos TP 32-160/2		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
13	Pressure Indicator (PI-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
14	Check Valve (CHV-xx)	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
15	Butterfly Valve (FFBUV-xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
16	Flow Limiting Orifice (xx)	Sized to allow maximum flow of 3.8 L/s		
17	Globe Valve (xx)	Flanged End Globe Valve 2053		Supplier: Haitima Corp. Armor Alloys, BC Ltd Unit 110, 9 burbidge St, Coquitlam, BC 604-942-2424

No.	Component	Details	Setting	Remarks
15	Air Release Valve (ARV-xx)	A.R.I. D-040C		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0061
16	Ball Valve (BLV-101A)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0062
17	Ball Valve (BLV-102A)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0063
18	Ball Valve (BLV-104A)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0064
19	Ball Valve (BLV-106A)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0065
20	Pressure Indicator (PI-104A)	EWP PG-100-S/P Pressure Gauge		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0066
21	Actuated Butterfly Valve (BFV-012A)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0067
22	Turbidity Sensor (AE-102 and AT-102)	HACH 1720E W/ SC200		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0068
23	Clear PVC (SG-102A)	Archon model AKG-F Sight Flow Indicator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0069

No.	Component	Details	Setting	Remarks
		Vessel B		
24	Media Filter Vessel (MF-101B)	ADE-5460-LV100 SA516Gr70 Carbon Steel / A140Z Turbidex Media		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0071
25	Butterfly Valve (BFV-101B)	Bray 31H Resilient seated valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0072
26	Flow Sensor (FE-101B)	ABB FEW315 Flanged electromagnetic flowmeter		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0073
27	Ball Valve (BLV-103B)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0074
28	Ball Valve (BLV-105B)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0075
29	Pressure Indicating Gauge (PI-103B)	EWP PG-100-S/P Pressure Gauge		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0076
30	Actuated Butterfly Valve (BFV-011B)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0077
31	Actuated Butterfly Valve (BFV-013B)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0078
32	Actuated Butterfly Valve (BFV-014B)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0079

No.	Component	Details	Setting	Remarks
18	Check Valve (CHV-xx)	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
19	Butterfly Valve (BUV-xx)	Keystone Butterfly Valve - 221 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
20	Temperature Control Valve (TCV-xx)	Belimo ball valve with actuator HEX 1.2		Supplier: Sinclair Supply Sinclair Supply Ltd. (Surrey) 13155-82A Ave. Surrey BC V3W 9Y6 Canada Phone: 604-543-6310
21	Heat Exchanger (HEX-1.2)	PS and PW Type Heat Exchanger		Supplier: Advanced Industrial Components, ON
22	Butterfly Valve (BUV-xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
23	Temperature Indicating Transmitter (TIT-105)	Weksler 3A04-44-DLX, 3A02-44-DLX, Efector 600 TA2613		Supplier: IFM Efector Inc. 782 Springdale Dr. Exton, PA 19341 USA Jag Kainth Phone: (800) 441-8246

5.3 CHEMICAL FEED SYSTEM

(Refer to Drawing P-101 in Appendix A)

The following table identifies the components related to the flow of coagulant and chlorine from the corresponding tanks to the plant filters.

No.	Component	Details	Setting	Remarks
1	Coagulant Tank (TK-101)	80 L tank, Norwesco Inc		Supplier: Norwesco Twin Maple Industrial Tanks 21351 Huntingdon Rd, Abbotsford, Gary Dyck, 604-854-6776
2	Coagulant Pump (CP-01)	Blue White Flex Pro M-324-MND		Supplier: Capital H2O Systems Inc. 12315-17 St. SW Calgary, AB, 403.251.0428

No.	Component	Details	Setting	Remarks
3	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier:
4	Chlorination Tank (TK-102)	190 L tannk, Norwesco Inc		Supplier: Norwesco Twin Maple Industrial Tanks 21351 Huntingdon Rd, Abbotsford, Gary Dyck, 604-854-6776
5	Chlorination Tank (TK-103)	190 L tannk, Norwesco Inc		Supplier: Norwesco Twin Maple Industrial Tanks 21351 Huntingdon Rd, Abbotsford, Gary Dyck, 604-854-6776
6	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier:
7	Chlorine Pump (CP-02)	Prominent Pro-SIP-S, GALA 1602NPB900UD113000		Supplier: Prominent, Canada
8	Chlorine Pump (CP-03)	Prominent Pro-SIP-S, GALA 1602NPB900UD113000		Supplier: Prominent, Canada
9	Chlorine Pump (CP-04)	Prominent Pro-SIP-S, GALA 1602NPB900UD113001 / Skid serial no. 2014348988		Supplier: Prominent, Canada
10	Chlorine Pump (CP-05)	Prominent Pro-SIP-S, GALA 1602NPB900UD113002 / Skid serial no. 2014348988		Supplier: Prominent, Canada
11	Chlorine Pump (CP-06)	Prominent Pro-SIP-S, GALA 1602NPB900UD113002 / Skid serial no. 2014348983		Supplier: Prominent, Canada
12	Chlorine Pump (CP-07)	Prominent Pro-SIP-S, GALA 1602NPB900UD113002 / Skid serial no. 2014348983		Supplier: Prominent, Canada
13	Inline Mixer (xx)	MMX 2102D Serial 5529		Supplier: Dynamix Agitators / Koflo
14	Butterfly Valve (FFBUV-xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
15	Chlorine Sensor (AE-107)	HAC CL17 C/W SC200		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0046

No.	Component	Details	Setting	Remarks
16	Air Release Valve (xx)	A.R.I.		Southern Drip 44160 Yale Rd W Chilliwack BC V2R 3Z9 Canada, Mitch/Alfred Oostenbrink Phone: (800) 663-2615

5.4 FILTRATION

(Refer to Drawing P-101 at the end of this section)

The following table identifies the components related to the flow of coagulant and chlorine from the corresponding tanks to the plant filters.

No.	Component	Details	Setting	Remarks
1	Turbidity Sensor (AE-101 and AT-101)	HACH 1720E W/ SC200		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0046
2	Pressure Indicator (PI/PT-101)	EWP PG-100-S/P Pressure Gauge- IFM PX3244 Pressure Trasmitter		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0047
3	Ball Valve (BLV-108)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0048
4	Inlet Sample Valve (SV-101)	Toogle Valve DK LOK V103		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0049
		Vessel A		
5	Media Filter Vessel (MF-101A)	ADE-5460-LV100 SA516Gr70 Carbon Steel / A140Z Turbidex Media		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0051

No.	Component	Details	Setting	Remarks
6	Butterfly Valve (BFV-101A)	Bray 31H Resilient seated valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0052
7	Flow Sensor (FE-101A)	ABB FEW315 Flanged electromagnetic flowmeter		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0053
8	Ball Valve (BLV-103A)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0054
9	Ball Valve (BLV-105A)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0055
10	Pressure Indicating Gauge (PI-103A)	EWP PG-100-S/P Pressure Gauge		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0056
11	Actuated Butterfly Valve (BFV-011A)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0057
12	Actuated Butterfly Valve (BFV-013A)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0058
13	Actuated Butterfly Valve (BFV-014A)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0059
14	Actuated Butterfly Valve (BFV-015A)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0060

No.	Component	Details	Setting	Remarks
33	Actuated Butterfly Valve (BFV-015B)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0080
34	Air Release Valve (ARV-xx)	A.R.I. D-040C		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0081
35	Ball Valve (BLV-101B)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0082
36	Ball Valve (BLV-102B)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0083
37	Ball Valve (BLV-104B)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0084
	Ball Valve (BLV-106B)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0085
38	Pressure Indicator (PI-104B)	EWP PG-100-S/P Pressure Gauge		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0086
39	Butterfly Valve (BFV-012B)	Bray 31H Resilient seated valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0087
40	Turbidity Sensor (AE-103 and AT-103)	HACH 1720E W/ SC200		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0088

No.	Component	Details	Setting	Remarks
41	Clear PVC (SG-102B)	Archon model AKG-F Sight Flow Indicator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0089
		Vessel C		
42	Media Filter Vessel (MF-101C)	ADE-5460-LV100 SA516Gr70 Carbon Steel / A140Z Turbidex Media		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0091
43	Butterfly Valve (BFV-101C)	Bray 31H Resilient seated valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0092
44	Flow Sensor (FE-101C)	ABB FEW315 Flanged electromagnetic flowmeter		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0093
45	Ball Valve (BLV-103C)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0094
46	Ball Valve (BLV-105C)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0095
47	Pressure Indicating Gauge (PI-103C)	EWP PG-100-S/P Pressure Gauge		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0096
48	Actuated Butterfly Valve (BFV-011C)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0097
49	Actuated Butterfly Valve (BFV-013C)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0098

No.	Component	Details	Setting	Remarks
50	Actuated Butterfly Valve (BFV-014C)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0099
51	Actuated Butterfly Valve (BFV-015C)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0100
52	Air Release Valve (ARV-xx)	A.R.I. D-040C		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0101
53	Ball Valve (BLV-101C)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0102
54	Ball Valve (BLV-102C)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0103
55	Ball Valve (BLV-104C)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0104
56	Ball Valve (BLV-106C)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0105
57	Pressure Indicator (PI-104C)	EWP PG-100-S/P Pressure Gauge		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0106
58	Actuated Butterfly Valve (BFV-012C)	Bray 31H Resilient seated valve / RCEL 009L Electric actuator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0107

No.	Component	Details	Setting	Remarks
59	Turbidity Sensor (AE-104 and AT-104)	HACH 1720E W/ SC200		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0108
60	Clear PVC (SG-102C)	Archon model AKG-F Sight Flow Indicator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0109
		Backwash Discharge		
61	Manual Diaphragm Valve (DV-102)	Sharp 45114 Series Globe Valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0111
62	Ball Valve (BLV-107)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0112
63	Backwash Tank (XXX)	2500-GA-201		Supplier: PK Metal Works 19469 - 92 Ave. Surrey, BC V4N 4G6, Tel: 604-882-8699
64	Level Indicating Transmitter (LIT-302)	IMSTL-G0700-5A2-AAV-010-5-D-000		Supplier: MCT/RAM 2 W. Main Street Suite 300 Victor NY 14564 USA, Kendra Haney Phone: 585-461-2110
64	Temperature Indicator/ Transmitter (TIT-302)	Weksler 3A04-44-DLX, 3A02-44-DLX, Efector 600 TA2613		Supplier: IFM Efector Inc. 782 Springdale Dr. Exton, PA 19341 USA Jag Kainth Phone: (800) 441-8246
		Filtered Water Common Discharge		
66	Turbidity Sensor (AE-105 and AT-105)	HACH 1720E W/ SC200		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0112
67	Clear PVC (SG-101)	Archon model AKG-F Sight Flow Indicator		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0113

No.	Component	Details	Setting	Remarks
68	Manual Diaphragm Valve (DV-101)	Sharp 45114 Series Globe Valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0114
69	Pressure Gauge (PI/PT-102)	EWP PG-100-S/P Pressure Gauge- IFM PX3244 Pressure Transmitter		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0115
70	Outlet Sample Valve (SV-102)	Toggle Valve DK LOK V103		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0116
71	Ball Valve (BLV-109)	Sharp 50B7 Series / Flow-Tek Series 80		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0117
72	Butterfly Valve (BFV-117)	Bray 31H Resilient seated valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0118
73	Butterfly Valve (BFV-xx)	Bray 31H Resilient seated valve		Supplier: AdEdge Water Technologies, 5152 Belle Wood Ct, Suite A, Buford, GA, 30518 US, (678)835-0119

5.5 UV SYSTEM

(Refer to Drawing P-101A in Appendix A)

The following table identifies the components related to the Filtration System

No.	Component	Details	Setting	Remarks
1	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier:
2	Flow Indicating Transmitter (FIT-300)	WaterMaster FEW315		Supplier: ABB Inc. Delpro Automation Inc. 213-669 Ridley Pl Delta, BC V3M 6Y9 Ali Hendi alih@delpro.net 604-517-5599
3	Air Release Valve (ARV-xx)	A.R.I.		Southern Drip 44160 Yale Rd W Chilliwack BC V2R 3Z9 Canada, Mitch/Alfred Oostenbrink Phone: (800) 663-2615
4	Butterfly Valve (UVBUV-xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
5	Butterfly Valve (UVBUV-01)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
6	UV-01	Trojan UVSwift SC model D-03 / SS316L Chamber		Supplier: Ramtech Environmental Products, Unit B, 2130-33 Ave SW Calgary, AB T2T 1Z6 Jeff Kundert, (403) 221-8585 EDA Environmental Ltd. 180 wyatt Rd, Winnipeg, MB Mike Cassie, (204) 632-9154
7	Butterfly Valve (UVBUV-02)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
8	UV-02	Trojan UVSwift SC model D-03 / SS316L Chamber		Supplier: Ramtech Environmental Products, Unit B, 2130-33 Ave SW Calgary, AB T2T 1Z6 Jeff Kundert, (403) 221-8585 EDA Environmental Ltd. 180 wyatt Rd, Winnipeg, MB Mike Cassie, (204) 632-9154
9	Butterfly Valve (UVBUV-04)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

No.	Component	Details	Setting	Remarks
10	Butterfly Valve (UVBUV-05)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
11	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
12	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
13	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

5.6 DISTRIBUTION

(Refer to Drawing P-102 in Appendix A)

The following table identifies the components related to the flow of Treated Water to truck fill and core servicing.

No.	Component	Details	Setting	Remarks
1	Treated Water Tank (TK-XXX)	572,000 Liter tank Serial T1/J0140-01		Supplier: Parr Metal Fabricators 717 Jarvis Ave. Winnipeg, MB
2	Duckbill Check valve (CHK-XX)	Red-White Valve Corp, Tideflex TF-2		Supplier: Tideflex 20600 Regency Lane Lake Forest, CA 92630 Tel: 949.859.1010 www.redwhitevalvecorp.com
3	Level Indicating Transmitter (LIT-401)	IMSTL-G0700-5A2-AAV-010-5-D-000		Supplier: MCT/RAM 2 W. Main Street Suite 300 Victor NY 14564 USA, Kendra Haney Phone: 585-461-2110
4	Butterfly valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

No.	Component	Details	Setting	Remarks
5	Butterfly valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
6	Butterfly valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
7	Temperature Indicating Transmitter (TIT-403)	Weksler 3A04-44-DLX, 3A02-44-DLX, Efector 600 TA2613		Supplier: IFM Efector Inc. 782 Springdale Dr. Exton, PA 19341 USA Jag Kainth Phone: (800) 441-8246
8	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
9	Pump 4.1 (xx)	Grundfos TPE 100-160/2 On 50 mm treated water line upstream HEX-1.1		Grundfos (all Grundfos Pumps) Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
10	Check Valve (xx)	Crane/Moygro On 50 mm treated water line upstream HEX-1.1		MA Stewart & Sons 12900-87th Avenue Surrey BC V3W 3H9 Canada Phone: 604-594-8431
11	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
12	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
13	Pump 4.2 (xx)	Grundfos TPE 100-160/2 On 50 mm treated water line upstream HEX-1.1		Grundfos (all Grundfos Pumps) Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
14	Check Valve (xx)	Crane/Moygro On 50 mm treated water line upstream HEX-1.1		MA Stewart & Sons 12900-87th Avenue Surrey BC V3W 3H9 Canada Phone: 604-594-8431

No.	Component	Details	Setting	Remarks
15	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
16	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
17	Heat Exhanger (HEX-1.1)	PS and PW Type Heat Exchanger		Supplier: Advanced Industrial Components, ON
18	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
19	Temperature Control Valve (xx)	Belimo 2-way control valve on HEX 1.1, raw water heat exchange valve		Supplier: Sinclair Supply Sinclair Supply Ltd. (Surrey) 13155-82A Ave. Surrey BC V3W 9Y6 Canada Phone: 604-543-6310
20	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
21	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
22	Chlorine Sensor and Transmitter (AE-404 and AIT-404)	Electromagnetic Flowmeter Full-bore flow sensors		Supplier: ABB Warminster PA 18974
		TRUCKFILL #1		
23	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
24	Truck Fill Pump (TFP-01)	Grunfos Paco 40707 VL		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
24	Pressure Gauge (PI-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
25	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730

No.	Component	Details	Setting	Remarks
25	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
26	Actuated Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer C/W EPI2 Modulating Actuator		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
27	Flow Indicating Transmitter (FIT-601)	WaterMaster FEW315		Supplier: ABB Inc. Delpro Automation Inc. 213-669 Ridley Pl Delta, BC V3M 6Y9 Ali Hendi alih@delpro.net 604-517-5599
28	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier: MA Stewart & Sons 12900-87th Avenue Surrey BC V3W 3H9 Canada Phone: 604-594-8431
29	Solenoid Valve (xx)	Burkert 0290 / 5282		Supplier: Burkert Controlmatic Inc. 5002 South Service Rd Burlingon ON 1.877.507.7719 Cathy Duncan
		TRUCKFILL #2		
30	Buttefly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
31	Truck Fill Pump (TFP-02)	Grunfos Paco 40707 VL		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
31	Pressure Gauge (PI-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
32	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730

No.	Component	Details	Setting	Remarks
33	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
34	Actuated Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
35	Flow Indicating Transmitter (FIT-604)	WaterMaster FEW315		Supplier: ABB Inc. Delpro Automation Inc. 213-669 Ridley Pl Delta, BC V3M 6Y9 Ali Hendi alih@delpro.net 604-517-5599
36	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier: MA Stewart & Sons 12900-87th Avenue Surrey BC V3W 3H9 Canada Phone: 604-594-8431
37	Solenoid Valve (xx)	Burkert 0290 / 5282		Supplier: Burkert Controlmatic Inc. 5002 South Service Rd Burlingon ON 1.877.507.7719 Cathy Duncan
38	Drain Pump (DP-01)	Series X Magnetic coupled Pumps		Suuplier: Vissers Sales Corp. 102-1628 Fosters Way Delta, BC V3M 6S6 Larry smith 604.523-1798
39	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
40	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier: MA Stewart & Sons 12900-87th Avenue Surrey BC V3W 3H9 Canada Phone: 604-594-8431
41	Ball Valve (xx)	M. A. Stewart & Sons/Kitz B3		Supplier: MA Stewart & Sons 12900-87th Avenue Surrey BC V3W 3H9 Canada

No.	Component	Details	Setting	Remarks
				Phone: 604-594-8431
CORE SERVICING SUPPLY LINE				
42	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
43	Core Servicing Pump (CSP-01)	Grunfos Paco Model 20959 VL		Supplier: Grundfos BC Canada
44	Pressure Gauge (PG-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
45	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
46	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
47	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
48	Core Servicing Pump (CSP-02)	Grunfos Paco Model 20959 VL		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
49	Pressure Gauge (PG-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
50	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
51	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
52	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

No.	Component	Details	Setting	Remarks
53	Core Servicing Pump (CSP-03)	Grunfos Paco 16N6-25709-13010X		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
54	Pressure Gauge (PG-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
55	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
56	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
57	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
58	Core Servicing Pump (CSP-04)	Grunfos Paco 16N6-25709-13010X		Supplier: Corix Water Products 19900 84 Ave Langley, BC V2Y 3C2 Fred Partridge Fred.Partridge@corix.com 604-455-3577
59	Pressure Gauge (PG-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
60	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
61	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
62	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
63	Fire Pump (FP-01)	Model: 23SH2S52F0		Suuplier: Goulds Water Technology, Edmonton AB
64	Pressure Gauge (PG-xx)	Winters PFQ120SF / PFQ106		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

No.	Component	Details	Setting	Remarks
65	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
66	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
67	Flow Indicating Transmitter (FIT-505)	WaterMaster FEW315		Supplier: ABB Inc. Delpro Automation Inc. 213-669 Ridley Pl Delta, BC V3M 6Y9 Ali Hendi alih@delpro.net 604-517-5599
68	Analysis Releaae valve (ARV-xx)	A.R.I.		Southern Drip 44160 Yale Rd W Chilliwack BC V2R 3Z9 Canada, Mitch/Alfred Oostenbrink Phone: (800) 663-2615
69	Pressure Indicating Transmitter (PIT-506)	Winters PFQ120SF, PFQ106 / IFM Efector 500 PX3244		Supplier: IFM Efector Inc. 782 Springdale Dr. Exton, PA 19341 800-441-8246
70	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
71	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
72	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
CORE SERVICING RECIRCULATION LINE				
72	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
73	Butterfly Valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
74	Pressure Indicating Transmitter (PIT-700)	Winters PFQ120SF, PFQ106 / IFM Efector 500 PX3244		Supplier: IFM Efector Inc. 782 Springdale Dr. Exton, PA 19341 800-441-8246

No.	Component	Details	Setting	Remarks
75	Temperature Indicating Transmitter (TIT-701)	Weksler 3A04-44-DLX, 3A02-44-DLX, Efector 600 TA2613		Supplier: IFM Efector Inc. 782 Springdale Dr. Exton, PA 19341 USA Jag Kainth Phone: (800) 441-8246
76	Flow Indicating Transmitter (FIT-703)	WaterMaster FEW315		Supplier: ABB Inc. Delpro Automation Inc. 213-669 Ridley Pl Delta, BC V3M 6Y9 Ali Hendi alih@delpro.net 604-517-5599
77	Flow Control Valve (FCV-704)	6" Stainless steel, Keystone butterfly valve		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
78	Check Valve (xx)	Pratt RD-Series		Supplier: Spartan Controls 7500 Winston St Burnaby, BC 604.422.3730
79	Air Release Valve (ARV-xx)	A.R.I.		Southern Drip 44160 Yale Rd W Chilliwack BC V2R 3Z9 Canada, Mitch/Alfred Oostenbrink Phone: (800) 663-2615
80	Butterfly valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700
81	Butterfly valve (xx)	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Ashley Kay, (604) 422-3700

5.7 MECHANICAL SYSTEM

The following table identifies the components related to the Mechanical System.

No.	Component	Details	Setting	Remarks
		BOILER 1		
1	Boiler (B-3.1)	Weil McLean model 780		Supplier: Weil McLain, 4390 Paletta Court, Burlington, Ontario, L7L 5R2, (905)456-8300
2	Burner	Riello RS 28-50		Supplier: Weil McLain, 4390 Paletta Court, Burlington, Ontario, L7L 5R2, (905) 456-8300
3	Primary Hot Water Pump (P-3.1)	Grundfos UPS 80-80/4		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
4	Shut off valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
5	Check valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
6	Shut off valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
7	Balancing valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand

No.	Component	Details	Setting	Remarks
				Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
9	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
10	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
11	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
12	Temperature indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
BOILER 2				
1	Boiler (B-3.2)	Weil McLean model 780		Supplier: Weil McLain, 4390 Paletta Court, Burlington, Ontario, L7L 5R2, (905)456-8300
2	Burner	Riello RS 28-50		Supplier: Weil McLain, 4390 Paletta Court, Burlington, Ontario, L7L 5R2, (905) 456-8300
3	Primary Hot Water Pump (P-3.2)	Grundfos UPS 80-80/4		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
4	Shut off valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500

No.	Component	Details	Setting	Remarks
				Winston St, Burnaby, BC Edward Chu, (604) 422-3700
5	Check valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
6	Shut off valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
7	Balancing valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
9	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
10	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
11	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
12	Temperature indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
BOILER 3				

No.	Component	Details	Setting	Remarks
1	Boiler (B-3.3)	Weil McLean model 780		Supplier: Weil McLain, 4390 Paletta Court, Burlington, Ontario, L7L 5R2, (905)456-8300
2	Burner	Riello RS 28-50		Supplier: Weil McLain, 4390 Paletta Court, Burlington, Ontario, L7L 5R2, (905) 456-8300
3	Primary Hot Water Pump (P-3.3)	Grundfos UPS 80-80/4		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
4	Shut off valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
5	Check valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
6	Shut off valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
7	Balancing valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291

No.	Component	Details	Setting	Remarks
9	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
10	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
11	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
12	Temperature indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
		Glycol Fill		
1	Hydronic System Feeder (Pump P-3.6 and Tank TK-1.6)	*Acceptable Material: Axiom MF200		Mechanical systems 2000 Bay 52 2333 18th Avenue NE Calgary, AB T2E 8T6 PHONE: (403) 291-1244
2	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
3	Check Valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion

No.	Component	Details	Setting	Remarks
				Burnaby, BC Bill Lee (604) 713-2206
4	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		MA Stewart & Sons Ltd.
5	Pressure Safety Valve			
		Expansion tank		
1	Expansion Tank TK-1.5	Amtrol Extrol SX-60V		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
2	Drain valve	*Acceptable Material: Ktiz 58 c/w cap and chain, Toyo		MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
3	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
		Air Separator		
1	Dust/Air Separator	Spirotherm Spirovent Dirt Air Eliminator and Dirt Separator		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650

No.	Component	Details	Setting	Remarks
2	Butterfly valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
3	Butterfly valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
Primary Heating Fluid Pumps				
1	Butterfly Valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
2	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
3	Suction Guide with Strainer			
4	Pressure Indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
5	Pump P-3.4	Grundfos TPE 80-240/2		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
6	Balancing valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue

No.	Component	Details	Setting	Remarks
				Toronto, Ontario, M1L2P3, (416)-755-2291
7	Check Valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
8	Butterfly Valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
9	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
10	Suction Guide with Strainer			
11	Pressure Indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
12	Pump P-3.5	Grundfos TPE 80-240/2		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
13	Balancing valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291

No.	Component	Details	Setting	Remarks
14	Check Valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
15	Butterfly valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
16	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
17	Sight glass	*Acceptable Material: SAI Model 200		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
18	Side Stream Filter	*Acceptable Material: Armteck Model #10 Hot c/w sight flow glass		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
19	Globe valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
Chemical Pot Feeder				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8

No.	Component	Details	Setting	Remarks
				Phone: 905-683-7303
2	Chemical Pot Feeder	J.L.Wingert DB-HD		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
3	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Ball valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Butterfly valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
6	Temperature indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
Raw Water Heating				
1	Butterfly valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700

No.	Component	Details	Setting	Remarks
2	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
3	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
4	Double-Walled Heat Exchanger HEX-1.2	AICOO K140917-15-02		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
5	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
6	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
7	Butterfly Valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
8	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand

No.	Component	Details	Setting	Remarks
				Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
10	Butterfly Valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
		Potable Water Reheating		
1	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
2	Butterfly Valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
3	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
4	Heat Exchanger HX-1.1	AICOO AT210X-IS1-67/32-DW		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
5	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303

No.	Component	Details	Setting	Remarks
6	Butterfly Valve	Keystone Butterfly Valve - 221/222 Wafer		Supplier: Spartan Controls, 7500 Winston St, Burnaby, BC Edward Chu, (604) 422-3700
7	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
8	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
Main Hot Fluid Supply Header				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
Main Hot Fluid Return Header				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/59/ Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8

No.	Component	Details	Setting	Remarks
				Phone: 905-683-7303
2	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
		Genset Heating		
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Manual Air Vent			

No.	Component	Details	Setting	Remarks
6	Unit Heater UH-3.1	Sterling HS-60		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
		Electrical Room Heating		
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8

No.	Component	Details	Setting	Remarks
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Manual Air Vent			
6	Unit Heater UH-3.2	Sterling HS-60		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291

No.	Component	Details	Setting	Remarks
		Backwash Tank Heating		
1	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
2	Manual Air Vent			
3	Ball valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
5	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
6	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
7	Heat Exchanger HEX-2.1	Tranter Coil Style 40D 16 ga 304L SS 26 in x 47 in - 3		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650

No.	Component	Details	Setting	Remarks
8	Heat Exchanger HEX-2.2	Tranter Coil Style 40D 16 ga 304L SS 26 in x 47 in - 3		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
9	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
10	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
11	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
Mechanical Room Heating				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8

No.	Component	Details	Setting	Remarks
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Manual Air Vent			
6	Unit Heater UH-3.3	Sterling HS-60		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291

No.	Component	Details	Setting	Remarks
		Chlorine Room Heating		
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Manual Air Vent			
6	Unit Heater UH-3.4	Sterling HS-60		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8

No.	Component	Details	Setting	Remarks
				Phone: 905-683-7303
8	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
Process Room Heating				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303

No.	Component	Details	Setting	Remarks
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Manual Air Vent			
6	Unit Heater UH-3.5	Sterling HS-60		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
10	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303

No.	Component	Details	Setting	Remarks
11	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
12	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
13	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
14	Manual Air Vent			
15	Unit Heater UH-3.6	Sterling HS-60		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
16	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
17	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303

No.	Component	Details	Setting	Remarks
18	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
		HRV RHC-1		
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
5	Re-Heat Coil RHC-1	*Acceptable Material: Trane, Heat Craft		Supplier: Trane, 1024 Morrison Drive Ottawa, Ontario K2H8K7

No.	Component	Details	Setting	Remarks
6	Manual Air Vent			
9	Balancing Valve	Armstrong CBV-S circuit balancing valve		Supplier: Armstong*, 23 Bertrand Avenue Toronto, Ontario, M1L2P3, (416)-755-2291
Office Heating				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W Downsview, ON, M3J 2Z8
3	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Manual Air Vent			
5	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8

No.	Component	Details	Setting	Remarks
				Phone: 905-683-7303
6	Radiation Fin			
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Globe Valve	*Acceptable Material: Ktiz Fig 11/12/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
Hydronic Packaged Heat Trace Unit (HTIP-1.1)				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Temperature Indicator	*Acceptable Material: Treric/Wika/Marsh called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
3	Manual Air Vent			
4	Hydronic Packaged Heat Trace Unit HTIP-1.1	Heat Link SSP106SL		Supplier: Calgary Warehouse: Bays C & D #36, 10221 15 Street NE, Calgary, AB,

No.	Component	Details	Setting	Remarks
				Canada, T3J 0T1
Exterior Main Fuel Oil Storage Tank				
1	Exterior Main Fuel Oil Storage Tank (TK-1.1)	Regal Tanks 1000G Gallon Vertical contained tank (ULC S601)		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
2	Levelometer	*Acceptable Material: Levelometer #277		Supplier: Ktech, 11-20 Regan Road, Brampton, ON, L7A 1C3, Canada
3	Anti-Syphon Valve			
4	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
Fuel Oil Pumps				
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Vacuum Indicator	*Acceptable Material: Marsh Standard Gauges/Winters		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200

No.	Component	Details	Setting	Remarks
3	Pump P-2.1	Viking Pump Model GG190 Arrangement #13		Supplier: Kemtag Enterprises Ltd, 99 Millennium Blvd., Moncton, NB E1E 2G7
4	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
5	Check Valve	*Acceptable Material: Kitz Fig 22/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
6	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Vacuum Indicator	*Acceptable Material: Marsh Standard Gauges/Winters		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
9	Pump P-2.2	Viking Pump Model GG190 Arrangement #13		Supplier: Kemtag Enterprises Ltd, 99 Millennium Blvd., Moncton, NB E1E 2G7
10	Pressure indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200

No.	Component	Details	Setting	Remarks
11	Check Valve	*Acceptable Material: Kitz Fig 22/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
12	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
		Fuel Oi Day Tank		
1	Fuel Oil Day Tank TK-1.4	Westeel 264014-SC		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
		Generator		
1	Oil Safety Valve	Webster OSVA 38		Supplier: E.S. Gallagher Sales Ltd. 920 Caledonia Road, Unit 3B Toronto, Ontario M6B 3Y1
2	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
3	Fusible Link Valve	*Acceptable Material: Firomatic		Supplier: Ward Heating Products, 1-800-265-4484

No.	Component	Details	Setting	Remarks
4	Fuel Oil Filter	*Acceptable Material: General Filters 2A-700A		Supplier: General Filters, 400 Midwest Road, Toronto, ON, M1P 3A9
5	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
6	Generator	Kohler 150REOZJF		Supplier: Frontier Power Products Ltd. 7983 Progress Way Delta, BC Canada V4G 1A3
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
Boilers Fuel Distribution				
1	Oil Safety Valve	Webster OSVA 38		Supplier: E.S. Gallagher Sales Ltd. 920 Caledonia Road, Unit 3B Toronto, Ontario M6B 3Y1
2	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8

No.	Component	Details	Setting	Remarks
				Phone: 905-683-7303
3	Fusible Link Valve	*Acceptable Material: Firomatic		Supplier: Ward Heating Products, 1-800-265-4484
4	Fuel Oil Filter	*Acceptable Material: General Filters 2A-700A		Supplier: General Filters, 400 Midwest Road, Toronto, ON, M1P 3A9
5	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
6	Fuel Oil De-Aerator	*Acceptable Material: Tigerholm Type S		Supplier: Ontor Ltd. 12 Leswyn Road Toronto, Ontario M6AIk3 Phone: +1 416 781 5286
7	Oil Safety Valve	Webster OSVA 38		Supplier: E.S. Gallagher Sales Ltd. 920 Caledonia Road, Unit 3B Toronto, Ontario M6B 3Y1
8	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
9	Fusible Link Valve	*Acceptable Material: Firomatic		Supplier: Ward Heating

No.	Component	Details	Setting	Remarks
				Products, 1-800-265-4484
10	Fuel Oil Filter	*Acceptable Material: General Filters 2A-700A		Supplier: General Filters, 400 Midwest Road, Toronto, ON, M1P 3A9
11	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
12	Fuel Oil De-Aerator	*Acceptable Material: Tigerholm Type S		Supplier: Ontor Ltd. 12 Leswyn Road Toronto, Ontario M6Alk3 Phone: +1 416 781 5286
13	Oil Safety Valve	Webster OSVA 38		Supplier: E.S. Gallagher Sales Ltd. 920 Caledonia Road, Unit 3B Toronto, Ontario M6B 3Y1
14	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
15	Fusible Link Valve	*Acceptable Material: Firomatic		Supplier: Ward Heating Products, 1-800-265-4484
16	Fuel Oil Filter	*Acceptable Material: General Filters 2A-700A		Supplier: General Filters, 400 Midwest

No.	Component	Details	Setting	Remarks
				Road, Toronto, ON, M1P 3A9
17	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
18	Fuel Oil De-Aerator	*Acceptable Material: Tigerholm Type S		Supplier: Ontor Ltd. 12 Leswyn Road Toronto, Ontario M6Alk3 Phone: +1 416 781 5286
		Domestic Water System		
1	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
2	Reduced Pressure Backflow Preventer			
3	Ball valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
4	Control Valve	*Acceptable Material: Honeywell D146M1032		Supplier: Supplier: Yorkland Controls Ltd. 2693 Steeles Avenue W

No.	Component	Details	Setting	Remarks
				Downsview, ON, M3J 2Z8
5	Domestic Water Pump and Pressure Tank (P-1.4 and TK-1.2)	Grundfos JP05S-SS		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
6	Pressure Indicator	*Acceptable Material: Marsh Standard Gauges/ Winters called for in spec		Supplier: Marsh, 8019 Ohio River Blvd., Newel, WV, 26050 USA, (304)-387-1200
7	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
8	Hose Bibb HB-1	*Acceptable Material: Acorn #8136		Supplier: Acorn Engineering Company® 15125 Proctor Avenue, City of Industry, CA 91746 USA
9	Hose Bibb HB-2	*Acceptable Material: Acorn #8136		Supplier: Acorn Engineering Company® 15125 Proctor Avenue, City of Industry, CA 91746 USA
10	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303

No.	Component	Details	Setting	Remarks
11	Check Valve	Moygro - M. A. Stewart & Sons Ltd		Supplier: Emco Corp-Burnaby 3140 Filmore Diversion Burnaby, BC Bill Lee (604) 713-2206
12	Domestic Hot Water Heater (DHWH-1)	Rheem 40 Gallon 630007		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
14	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
15	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
16	Ball Valve	*Acceptable Material: Kitz Fig 58/Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
17	Thermostatic Mixing Valve	*Acceptable Material: Bradley S19-2000SS		Supplier: Bradley, P.O. Box 309, Menomonee Falls, WI 53052-0309, 800 BRADLEY (800 272 3539)
18	Eye Wash Station (EW-1)	Bradley S19214Y		Supplier: BI Pure Water, #2, 9790-190th St., Surrey,

No.	Component	Details	Setting	Remarks
				BC, Canada, V4N3M9 (604) 882-6650
19	Lavatory LAV-1	Franke OV1619/6/3		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
20	Water Closet WC-1	*Acceptable Material: Moldex, Olsonite, Centoco, Bemis		Supplier: Orillia, 85 Commerce Road, Orillia, ON L3V 0Z2, 705.325.7225
21	Sink (SK-1)	Acri-Tec 240241		Supplier: BI Pure Water, #2, 9790-190th St., Surrey, BC, Canada, V4N3M9 (604) 882-6650
22	Drain Valve	*Acceptable Material: Ktiz 58 c/w cap and chain, Toyo		Supplier: MA Stewart & Sons Ltd. 40 Pugsley Court, Ajax, Ontario L1Z 0L8 Phone: 905-683-7303
Sanitary				
1	Sanitary Storage Tank TK-1.3			Manufacturer: Progressive Yard Works Ltd 3423 Millar Ave, Saskatoon. Saskatchewan S7K 6J4

No.	Component	Details	Setting	Remarks
2	Anti-vacuum valve			
3	Arctic vent	Arctic Vent GFC		Supplier: Heat-Line, 1095 Green Lake Road, Algonquin Highlands, ON, Canada

5.8 ELECTRICAL SYSTEM

The following table identifies the components related to the Electrical System.

No.	Component	Details	Setting	Remarks
1	Electrical service mast and meter	None		Utility company owned
3	Panel A 60 circuit 120/208 volts	Generator Room		
4	Standby diesel generator	Kohler Power Systems Model 150REOZJF		Supplier Frontier Power Products LTD 7983 Progress Way Delta, BC Canada, V4G 1A3 Phone 604-946-5531
5	600 amp ATS (Automatic Transfer Switch)	Thompson Technology TS 873A0600A1CE3G		Supplier ThompsonTechnology 9087A-198th Street Langley, BC Canada V1M 3B1 Phone 604-888-0110
7	Autdialler	Electrical Room Room		
8	Battery Charger	Kholer GM78298-Ka1		Supplier Frontier Power Products LTD 7983 Progress Way Delta, BC Canada, V4G 1A3 Phone 604-946-5531
9	Load Bank	Avtron LSH-150 UL/ULc		Supplier" Ascon Power Technologies

No.	Component	Details	Setting	Remarks
				6255 Halle Drive, Cleveland, OH, 44125 Phone 216-573-7600
10	Load Bank Controller	Avtron		Supplier" Ascon Power Technologies 6255 Halle Drive, Cleveland, OH, 44125 Phone 216-573-7600
11	Motor Control Center (MCC)	Siemens Model 8PX3		
12	Generator Remote Annunciator	Kholer		Supplier Frontier Power Products LTD 7983 Progress Way Delta, BC Canada, V4G 1A3 Phone 604-946-5531
13	Receptacles	Various throughout project		
14	Light Fixtures Type 200	RAB FW4-2T8		Supplier: RAB Design Lighting 222 Islingtom AVE Toronto, ON,M8V 3W7 Phone 800-268-0381
15	Light Fixture Type 201	RAB FW4-2T8		Supplier: RAB Design Lighting 222 Islingtom AVE Toronto, ON,M8V 3W7 Phone 800-268-0381
16	Light Fixture Type 300	Cooper HPWM70P		Supplier Cooper Lighting 1121 High 74 South, Peachtree City, GA. Phone 770-486-4800
17	Light Fixture Type 301	RAB FFLED18		Supplier: RAB Design Lighting 222 Islingtom AVE Toronto, ON,M8V 3W7 Phone 800-268-0381
18	Exterior lighting controller	Electrical Room		Built by Contractor
19	Photocell	Exterior of the building		

No.	Component	Details	Setting	Remarks
20	Emergency Lighting Battery Packs	Ultima L502M6ULT13W		Thomas and Betts, Emergi Light
21	Exit Lights	JMLC06JMLC442M		Thomas and Betts, Redy-lite

END OF CHAPTER 5

CHAPTER 6

6. OPERATING PROCEDURES

6.1 GENERAL

Raw water enters the Water Treatment Plant through a 150 mm from raw intake at Water Lake. Upon entering the Plant the raw water flows to a common header where the filter feeding pumps supply water to the filters and to the heaters and raw water recirculation pump. Raw water is heated and recirculated back to the Lake pumphouse through a 100 mm, where it ties-in the raw water pipeline.

Ferric Chloride and Liquid sodium hypochlorite (12.5%) is injected upstream the filters as an aid to oxidation for augmenting the coagulant. An inline mixer is installed after the injection point to provide homogeneous mixing prior to entering the filtration vessels. Turbidity removal is achieved by AD140Z oxidation / filtration media, which is a Zeolite mineral that acts as a superior filter in the coagulation and filtration of Turbidity. The media is subsequently used to filter the particles generated during oxidation. From the filters the now filtered water flows through UV reactors where target microorganism is inactivated. Downstream UV system, chlorine is injected into the water previous to be stored in the treated storage tank (Reservoir) where contact time is provided.

Water is distributed to the Hamlet through two truckfill stations, and piping system that provides fire flows and supply to core servicing buildings in the community.

The process is automatically controlled using a Plant Control System (PCS) and will require minimal intervention unless there is an alarm indicated. Monitoring, fine-tuning and scheduled maintenance of the Plant operating systems will ensure reliability and dependability with reduced system malfunctions and breakdowns.

A Video Operations Manual was provided by contractor to plant operators with the following content and a copy is enclosed with this document in **Appendix B**.

1. WTP Control System

    a. Introduction: How to access and control various aspects of the plant from the HMI
    b. The main HMI
    c. The filtration system HMI

2. Filtration System

    a. Introduction
    b. View the turbidity on the HMI
    c. View the chlorine dosage
    d. Valve control

e. How to do a manual backwash
f. Backwash flow monitoring
g. Alarms

3. UV System

a. Introduction
b. Using the UV unit controller
c. Monitoring the UV from the main HMI

4. Chemical Feed Systems

a. Chemical Room
b. Monitor the chlorine use on the HMI
c. Manually check the chlorine use
d. The Ferric Chloride system
e. Changing the chlorine dose
f. Alarms & Troubleshooting

5. Main Plant control

a. Truckfill and outside control
b. Pump that drains truckfill to prevent freezing
c. HMI showing flow rates
d. Pump controls

6. Tanks

a. Tank troubleshooting
b. Emergency operations

6.2 OPERATION DESCRIPTION

6.2.1 Chemical Feed System

All of the chemicals are supplied from pumping skid consisting of one or two injection pumps with associated equipment and appurtenances. The chlorine system uses liquid sodium hypochlorite and the coagulant is ferric chloride.

6.2.2 Filtration System

The filtration system has three operational modes (flow sequences) for effective removal of contaminants and cleanup of the media; these are service, backwash and fast-rinse. Each process vessel is equipped with a four-valve harness which effectively routes the flow to the desired outlet based on the flow sequence. The valves on the harness are all electrically-

actuated, and each sequence is controlled via the PLC which will automatically position the valves (see Table). During stand-by (shutdown), all valves are closed.

Table 6-1 Control Valve Positions

Sequence	Valve Position					
	BFV-011 (A-C)	BFV-012 (A-C)	BFV-013 (A-C)	BFV-014 (A-C)	BFV-015 (A-C)	BFV-117 (A-C)
Service	Open	Open	Closed	Closed	Closed	Open
Backwash	Closed	Open	Closed	Open	Closed	Closed
Fast Rinse	Open	Closed	Closed	Closed	Open	Closed

The filtration system uses a four-valve harness of electrically-actuated butterfly valves for process control (BFV-011 to BFV-015 A-F) to automatically re-route the flow of water during backwash and rinse operations. The position of the valves (whether they are open or closed) is automatically controlled by the PLC, removing the need for an operator during a backwash event.

In addition, the systems are equipped with isolation valves (BFV-101 A-C) on each vessel's inlet, and manual throttling valves on the system's treated outlet (DV-101) and on the system's backwash outlet (DV-102) to provide flow control. Flow control of the backwash outlet is required to ensure the media is backwashed at the required flowrate to expand the media bed 30-40%, while preventing loss of media from the vessels with excessively high flows; flow control is achieved on site at the time of start-up. Finally, the system is equipped with an automated effluent isolation valve (BFV-117) which is opened during service but closed during backwash to allow the treated backwash supply water from the vessels in service to enter the vessel in backwash. Table 1 summarizes the major valves used on the system.

6.2.2.1 Service Flow Description

Service flow is the contaminant-removal operation of the vessels, during which raw water enters the vessels through the top inlet distributor; it is then forced down and filtered through the media, after which time it exits through the collection laterals; this is the normal operation mode.

Each vessel is equipped with dedicated magnetic flow sensors. The flow sensors, which are located on each vessel's inlet, measure instantaneous flow and transmit the information to the PLC, which is located on the control panel. Local pressure gauges are located on the valve harness for each vessel. The system is also equipped with a hydraulic panel to serve as a common location for the reading of system inlet and outlet pressure. Pressure sensors are placed on the system inlet and outlet and their reading is transmitted to the PLC to indicate if a high differential pressure is encountered.

6.2.2.2 Backwash Flow Description

Backwash is the media-cleaning operation of the vessels, during which water is forced up through the media at a high rate to allow the media to be fluffed and the solids to escape to the backwash outlet. Each of the vessels will be backwashed independently (only one vessel is backwashed at a time), and each will have its own backwash initiation controls. Each backwash trigger can be set to initiate immediately or can be delayed to a low use period of the day. Backwash typically runs for 10 minutes; once complete, the unit enters the rinse cycle for one to two minutes before completing the backwash cycle and returning to service.

The Reverse Backwash Option will be the primary method of operation. The backwash water will originate from the treated water header will reverse flow through the treated outlet header through the bottom of the tank, up through the media and flow through the backwash outlet header. This operation is possible only when the well pump is running such that treated water from the two vessels in service will supply the needed water for backwashing for the vessel in backwash. Only one vessel shall be backwashed at a time. Backwash management is automatically-controlled by the PLC and can be initiated by one of four ways: elapsed time, flow throughput, differential pressure, or manual. The optimal backwash procedure shall be determined by the operator as water demand changes

6.2.2.3 Rinse Flow Description

During the rinse cycle, water is directed down through the media bed at the same flow rate as during backwash. Rinse water exits through the collector laterals and it is routed towards the backwash outlet. This step removes the last traces of foreign matter and packs the media in preparation for service. This cycle typically runs 2 minutes; after which the vessel will be placed back into service.

6.2.2.4 System Monitoring

The main parameters to be considered by the operator for monitoring include total and individual vessel flow, free chlorine residual, differential pressure across each train, and effluent Turbidity levels. Backwashing setpoints and intervals can be optimized during the first few weeks of operation by monitoring pressure, flow, and turbidity in and out of the filters as a function of time. Backwashing should occur prior to breakthrough being observed in the effluent above required levels or reaching a terminal head loss of 10-12 psi across the system, whichever occurs first. It is recommended that the operator have field test kits or instrumentation available onsite to obtain real-time free chlorine. These parameters will be the subject of operator training during system commissioning at the time of startup.

6.2.2.5 Sample Ports

The treatment system is equipped with two 1/4-inch toggle valves mounted on the hydraulic panel for sampling the incoming raw water and the treated water. In addition, local sampling valves are located on the valve harness for each vessel and a single sample valve is present on the combined backwash drain line. As the name suggests, sample ports allow the operator to

routinely take samples of the raw, treated and backwash water to perform quality tests and assess the effectiveness of the treatment system in removing the desired contaminants.

6.2.2.6 Process Control

The filtration systems will utilize a programmable logic controller (PLC) to perform the automated functions needed for proper operation of the control valves and monitoring. The operator will interface with the PLC through an Automation Direct C-More 10" color touch screen HMI. The PLC and HMI will be located in a skid-mounted NEMA 4X enclosure. All programming will be performed on the unit prior to being delivered to the site. Automated functions controlled by the PLC shall include:

- Initiating backwash based on time, flow throughput or differential pressure
- Control of process control valves (on valve harness)
- Record and display total gallons processed through each vessel
- Display of flow rate through each vessel
- Display flow sequence status (service, backwash or rinse mode)
- Display alarm conditions on the HMI
- Control Feed Water Pumps
- Monitor and Alarm Conditions for the Treated Water Storage Tank
- Additional I/O's for site monitoring and operation as required

6.2.3 UV Disinfection

To provide an additional means of treatment the effluent of the filtration system will feed a single Ultra Violet unit for further purification of the water. The effluent of the treatment system will feed a Trojan UVSwift SC D-03 system equipped with low pressure high output amalgam lamps which utilizes a 185 & 254nm Lamp with a capacity of 20 L/s at 30mJ/cm^2. Two UV reactors comprised the system to be operated as duty and standby. Each UV reactor is equipped automatic wiping system, automatically initiated by the control panel. The UV system is monitored using by the control panel which will provide feedback to the system PLC to capture information including, Digital Run Time, Alarm Conditions and UV Dosage.

6.2.4 Truckfill and Core Servicing

Truckfill was designed with the following parameters:

- A minimum of 1,000 L/min flow rate for filling water delivery trucks. This will provide 13 minute fill time for the 12,500L (2,750 gal.) trucks in service; which includes hook-up and disconnect.
- Provide two (2) truck fill arms and a facility large enough to provide filling services to two vehicles simultaneously.

From the raw water storage tank, redundant pumps pump to the new water treatment train. The water treatment train then sends water to an insulated exterior treated water storage tank.

The treated water tank is sized to allow the necessary truck fill rate, in the design year, for an 8-hour day, 5 days a week. Thus, in the design year, with the water supply into the tank flowing at the design rate, water can be withdrawn from the tank at a rate such that at the end of the 8 hour day, the tank would be at or above the fire water storage level.

Downstream of the treatment plant, the existing pipelines serve the requirements of the four off take buildings, the Enokhok Building, the Arc (servicing both the high school and the elementary school), the Group Home/Solar Apartments, and the Health Centre.

The previous water treatment building and treated water storage tank have been decommissioned, demolished and removed.

6.2.5 Mechanical System

6.2.5.1 Heating Plant

Unit Number(s): B-3.1, B-3.2, B-3.3, P-3.1, P-3.2, P-3.3, P-3.4, P-3.5, P-3.6, TK-1.5
Location: Boiler Room
Service: Hydronic heating of building
Components: Typical:

- System of supply and return piping
- Fuel oil fired boilers
- Primary recirculation pumps
- Secondary recirculation pumps
- Expansion tank
- Glycol fill system
- Air separator
- Chemical pot feeder
- Heat exchangers
- System of automatic control

System Description:

.1 Boilers:

.1 Boilers operate using packaged boiler operating controller. Controls cycle burner to satisfy setpoint.

.2 Tekmar model 268 multi stage boiler controller cycles lead boiler based on 7 day runtime and provides outdoor reset HWS temperature reset based on the following schedule:

OAT (°C)	HWST(°C)
>18	Boiler off. Warm Weather Shut Down (WWSD) Minimum Deadband = 3°C.

>13	60
1	60
-20	82
<-20	82

.3 When the lead boiler energizes, the associated boiler circulation pump energizes (B3.1/P-3.1, B3.2/P-3.2, B3.3/P-3.3). Current sensors are used to prove boiler circulation pump operation. The burner will not operate until pump flow is proven.

.4 A low water cutoff (LWCO) is provided to disable boiler in the event of low heating water level.

.5 A high limit controller is provided with manual reset to disable boiler in event of high heating water temperature. Setpoint = 93°C.

.6 If the heating water supply (HWS) temperature does not rise to target HWS temperature overtime period (initial set at 5 min), the boiler controller will alarm to the alarm panel, the building alarm strobe and the autodialer.

.2 Primary Recirculation Pumps P-3.4 and P-3.5

.1 The primary HW circulation pumps are to be controlled by the boiler controller, and to operate in unison with boilers on boiler controller demand signal.

.2 In the event of pump failure as sensed by current sensor, the failure will be alarmed to the pump sequencer, the building alarm panel and the lag boiler and pump will be activated.

6.2.5.2 Treated water tank tempering

Unit Number(s): P-4.1, P-4.2, HEX-1.1
Location: Process room
Service: Provides heating to the treated water tank
Components: Typical:

- System of supply and return piping
- Lead/lag injection pumps
- Heat Exchanger
- System of automatic control

System Description:

.1 Injection pumps P4.1 and P4.1 operate as lead/lag autochanger pumps. Pump sequencer alternates lead pump every 7 days of operation.

.2 In event of a lead pump failure as sensed by current sensor, the lead pump failure is alarmed to the pump sequencer, at the building alarm panel and the lag pump is activated.

.3 Lead pump is activated by treated water tank inflow or outflow temperature. In the event that the inflow temperature (TWE-TMP) or the outflow temperature (TWL-TMP) is less than 5°C, the lead treated water heat injection pump P-4.1 or P-4.2 is activated.

.4 Lead pump continues to run until TWL-TMP greater than 5.5°C.

.5 In event of TWL-TMP temperature less than 1°C, low treated water tank temperature will alarm to the building alarm panel, alarm strobe and autodialler.

6.2.5.3 Backwash tank tempering

Unit Number(s): N/A
Location: Backwash Tank
Service: Cleans out filters by backwashing residue into backwash tanks
Components: Typical:

- System of supply and return piping
- Lead/lag injection pumps
- Heat Exchanger
- System of automatic control

System Description:

.1 Temperature sensor in backwash tank senses the tank water temperature.

.2 In event that water temperature less than 5°C, heating control valve is to open.

.3 In event that backwash water temperature less than 1°C, the low backwash tank water temperature will alarm to the building alarm panel and energize the autodialer.

6.2.5.4 Terminal heat

Unit Number(s): UH-3.1, UH-3.2, UH-3.3, UH-3.4, UH-3.5, UH-3.6
Location: Throughout building

Service: Provide building space heating
Components: Typical:

- System of supply and return piping
- Unit heaters
- Baseboard fin-tube convector
- System of automatic control

System Description:

.1 Fin-Tube Convector:

.1 The low voltage thermostat monitors the office temperature. The convector control valve cycles to satisfy the thermostat setpoint.

.2 Unit Heaters:

.1 The line voltage thermostats monitor the space temperatures. The unit heater blower motor and hydronic control valve cycles to satisfy the thermometer setpoint.

.2 Initial setpoint = 20°C.

6.2.5.5 Hydronic heat trace

Unit Number(s): HTIP-1.1
Location: Throughout building
Service: Provide heat to components which are exposed to outdoor temperatures
Components: Typical:

- System of supply and return piping
- Primary recirculation pumps
- Hydronic packaged heat trace unit
- System of automatic control

System Description:

.1 The outdoor air temperature sensor activates the hydronic heat trace control panel recirculation pump. The pump activates when the outdoor air less than 2°C. The pump will run for a minimum of 20 minutes to prevent short cycling.

.2 In the event of no pump flow as sensed by a pump current sensor, the heat trace pump failure will be alarmed at the building alarm panel.

6.2.5.6 Fuel oil system

Unit Number(s): P-2.1, P-2.2, TK-1.1, TK-1.4
Location: Northwest corner of boiler room
Service: Provide fuel oil to the generator and boilers
Components: Typical:

- System of supply and return piping
- Fuel oil transfer pumps
- Outdoor & indoor tanks
- System of automatic control

System Description:

.1 A four-point level float switch in the day tank will cycle the lead fuel oil transfer pump P2.1 and P2.2 to satisfy the day tank fuel level.

.2 Day tank controls operate as follows.

.1 Low Level Alarm (Setpoint: 10%): Lag fuel pump is activated and Alarm "Lead Fuel Pump Failure" at the building alarm panel.

.2 Low Level Pump On (Setpoint: 30%): Lead fuel oil pump is Activated

.3 High Level Pump Off (Setpoint: 85%): Lead fuel oil pump is disabled

.4 High Level Alarm (Setpoint: 95%): Lock out fuel pumps and pump failure is alarmed to the building alarm panel.

.5 Lead pump alternates after each duty run.

.3 A single point level float switch in main exterior tank alarms low fuel level to the building alarm panel.

6.2.5.7 Low building temperature alarm

Unit Number(s): N/A
Location: Outside front of building
Service: Provide an alarm warning if building temperatures drop below setpoint
Components: Typical:

- System of automatic control

System Description:

.1 In the event that a low building temperature as sensed by temperature sensors, after a 15 minute delay an alarm is sent to the building alarm to panel, the alarm strobe and the autodialer. Initial setpoint = 10°C

.2 Low temperature sensors are located in process room, mechanical room and generator room.3 A single point level float switch in main exterior tank alarms low fuel level to the building alarm panel.

6.2.5.8 Domestic water

Unit Number(s): P-1.4, TK-1.2, DHWH-1
Location: Throughout building
Service: Provides domestic/potable water to various fixtures in the building
Components: Typical:

- System of supply and return piping
- Domestic water tank and associated pump
- Domestic hot water heater
- Drain pan
- Water hammer arrestors
- System of automatic control

System Description:

.1 Potable Water:

.1 The domestic water pump package will cycle the domestic cold water pump based on the domestic water system pressure P-1.4 as follows:

.1 Pump on: 275 kPa

.2 Pump off: 415 kPa

.2 The domestic water pressure pump is provided to absorb and damper fluctuations in system pressure and prevent short cycling of the pressure pump.

.2 Domestic Hot water

.1 Domestic hot water heater will operate on the packaged aquastat controller to cycle the electric heating elements to satisfy the domestic hot water temperature setpoint. Initial setpoint = 60°C.

6.2.5.9 Sewage System

Unit Number(s): P-1.4, TK-1.3
Location: Interior tank space
Service: Controls the level of sanitation stored in the tank at a given time
Components: Typical:

- System of sanitary piping
- Domestic water pump
- Saniplus pump
- Alarm panel
- System of automatic control

System Description:

.1 In event of high sewage as sensed by the sewage tank level float switch, the domestic water pressure pump is disabled and high sewage alarm is sent to the building alarm panel. The alarm and pump must be manually reset.

.2 Packaged saniplus lift pump assembly cycles automatically on the packaged level float switch.

6.2.5.10 HRV-1

Unit Number(s): P-1.4, TK-1.3
Location: Process Room
Service: Provides warm fresh air to the office within the building
Components: Typical:

- System of supply, return, exhaust and outdoor ventilation
- Control dampers
- Grilles
- Access hatches
- Flexible connections
- Filters
- System of automatic control

System Description:

.1 HRV-1 provides fresh air to the building. HRV-1 is activated on a manual 0-2hr spring return timer switch located in office, and is also interlocked with the light switch in washroom.

.2 In event that HRV-1 is energized by light switch, HRV-1 will remain energized for 30 minutes.

6.2.5.11 RHC-1

Unit Number(s): P-1.4, TK-1.3
Location: Office
Service: Increases temperature of supply air to satisfy setpoint temperature

Components: Typical:

- Reheat Coil
- System of automatic control

System Description:

.1 A duct mounted temperature sensor modulates the hydronic control valve to satisfy the supply air temperature setpoint. Initial setpoint = 18°C

.2 In the event of a failure, the control valves will fail to the fully open position (full heating position).

6.2.5.12 Chlorine RM exhaust EF-1

Unit Number(s): EF-1
Location: Aqueous Chlorine Room
Service: Expels air to the outdoors to ensure levels of chlorine do not exceed setpoint
Components: Typical:

- Exhaust fan
- O/A damper
- System of automatic control

System Description:

.1 Indoor air continually sensed by gas detector.

.2 In the event of high Chlorine level, an audible alarm on the detector is activated, and exhaust fan EF-1 is activated.

.3 Exhaust fan EF-1 also activated by 0-30 minutes spring return timer light switch.

.4 When exhaust fan EF-1 is activated, the normally closed outdoor air damper is to open fully.

6.2.5.13 Generator Cooling

Unit Number(s): CD-01, CD-02, CD-03, CD-04
Location: Generator room
Service: Provides cooling to emergency generator as required
Components: Typical:

- Emergency generator
- Control dampers
- System of automatic control

System Description:

.1 On a RUN status from the generator, CD-01 (combustion air damper) opens and activates the free cooling dampers.

.2 The free cooling dampers (CD-02, 03, and 04) modulate maintain room thermostat setpoint. Initial setpoint = 20°C.

6.2.5.14 Alarms

Unit Number(s): N/A
Location: Office room
Service: Provides a warning when a particular system is not functioning properly or deviates significantly from the setpoint.
Components: Typical:

- Alarm panel
- Strobe light
- System of automatic control

System Description:

.1 Alarm panel located in office to include following alarm points

.1 Lead Boiler fail

.2 HW pump fail

.3 Treated Water Tank Heating Pump Failure

.4 Treated Water Tank - Low Temperature

.5 Back wash tank - Low Temperature - by process instrumentation

.6 Hydronic heat trace recirc pump failure

.7 Lead fuel oil pump failure

.8 Low Building Temperature

.9 High Sewage

END OF CHAPER 6

CHAPTER 7

7. MAINTENANCE PROCEDURES AND SERVICE INFORMATION

7.1 GENERAL

To ensure uninterrupted use, equipment should be regularly inspected, tested, and proper repairs made and recorded. The objective is to minimize equipment operating problems and prevent failures by making minor or necessary repairs before major difficulties occur. The importance of record keeping cannot be over-emphasized. Good maintenance protects the owner's interest with manufacturer warranties, continuity, or maintenance despite staff turnovers and equipment reliability track record.

Environmental and operating conditions are key elements affecting proper and reliable operation of equipment. Costly repairs can be minimized if the following items are attended to:

KEEP IT CLEAN

KEEP IT TIGHT

7.1.1 Keep It Clean

Day-to day accumulation of normal atmospheric particles, lint, metallic particles form mechanical equipment cause problems with equipment over a long period of time. An accumulation affects equipment reliability and operating life. ALL equipment should be regularly cleaned.

7.1.2 Keep It Tight

All contactors and control devices operate with high speed movement. This motion creates vibration that can loosen hardware and other parts. External vibration from equipment may cause the loosening of hardware and connections in any equipment. All hardware and connections should be tightened regularly. This simple procedure takes only a small amount of time and can save hours of searching for intermittent problems. All rotating equipment such as motors are affected by vibrations. This can cause alignment problems, which can result in bearing failures.

7.1.3 Renewal Parts

Availability of parts can be a major problem these days as distributors are keeping very low inventories in a move to economize. This may make any part a long delivery item. For this reason local distributors should be contacted and parts availability assessed.

Any critical part affecting the reliability of the system should be ordered, recorded and stored by the maintenance department.

7.1.4 Parts and Equipment Ordering Procedure

During the first year of operation, the Contractor should be contacted for any replacement parts required. This will ensure that parts covered by warranty will be replaced under warranty. Failure to contact the Contractor may result in difficulties in obtaining warranty replacement.

Following the first year of operation, it is recommended that the Contractor also be contacted as many of the suppliers have a wholesale only policy. If it is necessary to purchase parts directly from the original supplier, the following information is required.

Make

Model No.

Year of Installation

Installing Contractor

Description of Part Required (i.e. Fan Bearing)

Part No. if Available

When quoting a part number contained in manufacturer's catalogue, always provide the date of the catalogue you are referring to, as these numbers are often subject to change. The equipment supplier will have the latest edition of the manufacturer's catalogue.

If the original supplier is no longer in business, contact the contractor who will be able to suggest an alternate source of supply.

7.1.5 Scheduled Preventive Maintenance Program

Scheduled preventive maintenance is an effective means to improve services from systems and equipment. Where failure of equipment can result in shutdown, scheduled preventive maintenance is an economical alternative.

Causes of Equipment Failure

An effective maintenance program will attempt to remove or reduce causes of equipment failure. Common failure initiating causes are:

- Loose and broken belts
- Misaligned pulleys
- Dirty or plugged filters
- Dirty or plugged coils

- Worn bearings
- Improper lubrication and oiling or lack of
- Persistent overloading
- Above normal temperatures
- Below normal temperatures
- Obstruction of ventilation by foreign objects or material (blockage of air, dirt on components etc.)
- Normal deterioration from age
- Severe weather conditions

The scheduled preventive maintenance suggestions presented will be applicable to most equipment, but all of the suggestions given in any one section may not be applicable to the particular mechanical component being maintained. Most of the work may be done by the building operator but some may have to be left to the discretion of the building operator.

When equipment repair is necessary, please refer to the Manufacturer Data section provided in this manual. The frequency, which the tasks should be done as indicated.

Most maintenance can be done by average personnel, with a minimum need for specialized service.

7.1.6 Maintenance Legend

D		Daily
W		Weekly
M		Monthly
SA		Semi-Annually
A		Annually
PMI		Per Manufacturer's Instructions
AN		As Necessary

7.2 GENERAL MAINTENANCE

Maintenance to be conducted as per recommendations of components suppliers.

Item	Maintenance Operations	Inspection Frequency	Remarks
Valves	Check for proper operation	A	
Actuated Valves	Follow maintenance schedule in the manufacturers manual	PMI	
Filters	Maintenance as required by the list in the manufacturers manual	PMI	
UV Reactors	Maintenance as required by the list in the manufacturers manual	PMI	
Pumps	Follow maintenance schedule in the manufacturers manual	PMI	
Chemical Feed Pumps	Follow maintenance schedule in the manufacturers manual	PMI	
Tanks	Follow maintenance schedule in the manufacturers manual	PMI	

7.3 MAINTENANCE SCHEDULE

Maintenance to be conducted as per recommendations of components suppliers. **Appendix C** provide a suggested maintenance schedule.

7.4 MAINTENANCE MANUALS

For all maintenance and inspection schedules, please refer to the manuals provided by component suppliers (**Appendix D**) and manufacturers and as shown in maintenance schedule (**Appendix C**), shop drawings (**Appendix E**) and manufacturer data and service information (**Appendix F**). Maintenance manuals of the following major process components are provided in **Appendix D**.

- AdEdge Pressure Filter
- UV System
- Chemical Feed Pumps

7.5 SPARE PARTS LIST

Description	QTY	UoM
1/4 turn actuator configured for throttling control	1	EA
1/4 turn actuator configured for on/off control	1	EA
AdEdge spare filter media skids	10	SKIDS
UV lamps	2	EA
Quartz sleeves	2	EA
4-pack of sleeve sealing O-rings, UV	1	EA
Prominent Dosing pump/kit	1	EA
25 gallons of 100% propylene glycol (1/2 drum)	1	EA
Desiccant pouch for turbidity analyzer		
Side stream filter cartridge	2	EA
Side stream filter tool	1	EA
Spare flange gasket for each size of hydronic pump		
Boiler Burner	1	EA
Spare control relays, electrical	2	EA
Fuses, electrical	2	EA
Lamps, electrical	2	EA
Spare filter set, HRV	1	EA
Oil filters, Genset	6	EA
Filter; Fuel Primary, Genset	6	EA
Filter Fuel Secondary, Genset	6	EA
Filter, Air, Genset	6	EA
Belt, fan (B) , Genset	2	EA

Fuse, 1.5 A, 250 V, Genset	6	EA
Spare lenses for fluorescent lamps	2	EA
Spare fluorescent lamps	6	EA
Spare ballasts	2	EA
Spare fuses of each type used	20	EA
1 spare overload coil	1	EA
TD relay of each type	5	EA
HYDRANT HOUSING STEM O-RING	5	EA
HYDRANT HOUSING JOINT GASKET	5	EA
HYDRANT OPERATING NUT O-RING	5	EA
HYDRANT INTER SECTION GASKET	5	EA
HYDRANT SEAT O-RING (LOWER)	5	EA
HYDRANT SEAT O-RING (UPPER)	5	EA
HYDRANT MAIN VALVE DISC. (RUBBER)	5	EA
HYDRANT MAIN VALVE O-RING	5	EA
HYDRANT DRIP VALVE FACING	5	EA
HYDRANT PUMPER CAP GASKET SMALL FOR "EF"	5	EA
HYDRANT OPERATING NUT O-RING	5	EA
HYDRANT BODY CAP GASKET	5	EA
HYDRANT SEAT REMOVAL TOOL + GUIDE	1	EA
HYDRANT SEAT REMOVAL HOLDING NUT	1	EA

END OF CHAPTER 7

CHAPTER 8

8. TESTING AND CERTIFICATION

Testing records, certificates and warranties are provided in **Appendix G**. The following documents are provided in the appendix

1. AdEdge Filtration System
2. Trojan UV System
3. Arctic Vent
4. Boiler
5. Load Bank
6. Load Bank Hoods
7. Indoor Fuel Tank

CHAPTER 9

9. MANUFACTURER DATA AND SERVICE INFORMATION

Manufacturer data and service information is grouped in 9 categories and attached in **Appendix F.**

1. Pumps
2. Filtration System
3. UV System
4. Chemical Feed System
5. Instrumentation
6. Valves
7. Heating and Power
8. Tanks
9. Controls

Appendix A RECORD DRAWINGS