Chapter 2 INTRODUCTION

2.1 GENERAL INFORMATION

This project consists of the construction of a new Truck Fill Station, and chlorination system. The new filtration building includes two strainers (one for each pump), three new "Harmsco" filters and a 15,000-liter contact tank

Water is pumped from a storage reservoir that was built adjacent to the Truck Fill Station. Two intakes were installed. The pumps in the intakes are fed by a 120/208V, 3Ø line connected to the Qulliq Energy Corporation. There is an 80kWe back-up generator located in the building providing power to the existing truck fill station in case of a power failure.

2.2 PROCESS INFORMATION

The design of this water Truck Fill Station consists of the following features:

- Two skids mounted with 25 HP submersible pumps located inside a 12'' insulated casing, feeding a 3'' HDPE line up to the plant and placed at a low level in the water storage lake.
- Two 12-inch pipe casings with six heat traces each, three per pipe in service, are pump housing with a screen at intake and three spare heat trace cables per casing.
- One electronic heat trace controller per casing connected to 3 heat traces in parallel with an alarm in case of fault.
- At the highest point of the building entrance there is a 2" return insertion point on casing #2 for return water that is used for water sampling. Instrumentation is in the chlorination room. A sump pump ensures level compatibility.
- Similarly, at building casing inlet #1 we find a 2" return line from the truck fill arm, this water return point is used to empty the filling line at each truck fill.
- There is one VFD starter for each submersible pump.

- In the building at each pump outlet pipe, you will find a flow switch used for the pump sequencer control panel.
- Pump sequencer panel ensures pump alternation and flow supervision.
- One 200 MESH strainer with a 75 mircon insert per pump to capture debris and one differential pressure indicator for indication of a restricted strainer.
- One header for water capture and a flow meter feeder.
- At header output before the first metering there is a chlorine injector that receives a chlorine mixture from the injection pumps.
- One flow meter indicating the water speed in conduit, flow of water in liters per hour, and a cubic meter cumulative data, 4-20 ma programmable output proportional to flow. (flowmeter is programmable to suit your preference for example (gal/HR or liter /HR)
- At flow meter output there is a water sampling point feeding a sample of treated water to a chlorine analyzer probe and controller.
- Past the water sampling point there are two motorized valves connected in standard "C" arrangement. (One flow direction is possible at a time).
- In normal operation water passes through the filter and the 15,000-liter contact tank.
- In fire mode as initiated by truck operator at loading arm loaded water bypasses filtration and contact tank.
- In normal operation this filtration loop also includes 3 new in line filters with the following order of filtration 20 microns, 5 microns and LT2 followed by a 15,000-liter contact tank at filter output.
- The #2 chlorine injection point followed by a second flowmeter is found at the last filter outlet.

- Past the #2 flowmeter there is a second water sampling point feeding a second chlorine content measurement probe supplying information to chlorine analyzer #2.

- A 15,000-liter contact tank is located under the floor grating followed by 6'' rising piping to truck fill arm.

- Two truck fill arms and truck positions are available, each fill line position includes a motorized valve activated by a start and stop station located at eye level once on truck top.

- On each 4'' water supply line there is a 2'' motorized valve opening to return after truck filling the excess water to be returned to pump intake casing.

2.3 ELECTRICAL & CONTROL INFORMATION

- On the electrical side there is a 250-amp 3 phase 120/208-volt underground feeder connected to "QEC" - the electrical supplier.

- At the main breaker outlet there is a metering box with an outside cabinet for the meters.

- At the metering box outlet, there is a 400-amp 120/208-volt 3 phase automatic transfer switch that starts the generator upon power failure and transfers power from the building to the generator.

- At the transfer switch outlet, you will find the main power panel that feeds itself three Secondary panels, one for pump house distribution, one for the generator room and one for the old decommission pump house.

- At control and supervision level there are two panels

    - the main control panel which is capable of supervising multiple points, includes an auto dialer that informs by recorded telephone message the nature of the alarm and has the capacity to acknowledge at a distance a malfunction at the plant caused by faulty operation. It has the capacity to latch a transient alarm and run an amber strobe

on rooftop under alarm conditions. On the panel face there is an acknowledge push button to stop the telephone alarm emission, and strobe on the rooftop. The panel fault indication light remains on until fault is corrected.

- The pump sequencer panel, as its name implies changes the pump in usage at each truck fill.

2.4 PLAN OVERVIEW

2.4.1 Mechanical plans

Plan M1

Plan M2

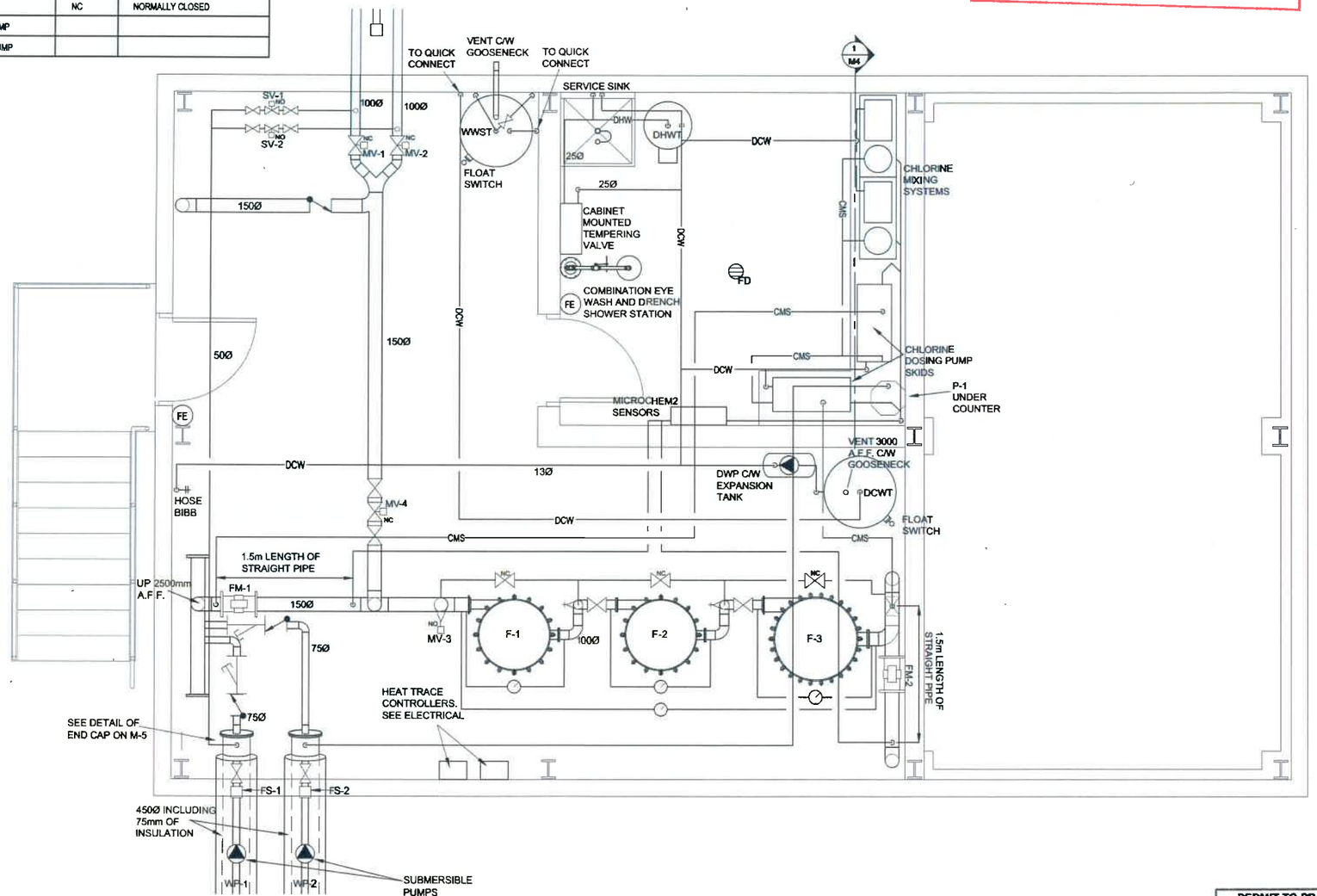
Plan M3

Plan M4

Plan M5

LEGEND			
CMS	CHEMICAL SUPPLY	DWP	DOMESTIC WATER PUMP
DHW	DOMESTIC HOT WATER	FS	FLOW SWITCH
DCW	DOMESTIC COLD WATER	F	FILTER TANK
SAN	SANITARY	MV	MOTORIZED VALVE
	BALL VALVE	SV	SOLENOID VALVE
	CHECK VALVE	DCWT	DOMESTIC COLD WATER TANK
	PUMP	WWST	WASTE WATER STORAGE TANK
	PRESSURE GAUGE	CS	CHLORINE SENSOR
FE	FIRE EXTINGUISHER	DHWT	DOMESTIC HOT WATER TANK
FM	FLOW METER	DP	DIFFERENTIAL PRESSURE GAUGE
CFM	CHEMICAL FLOW METER	NO	NORMALLY OPEN
SP	SUMP PUMP	NC	NORMALLY CLOSED
WP	SUBMERSIBLE PUMP		
CP	CHLORINATION PUMP		

AS-BUILT
DATE: November 5, 2018
DIC NORTH



1 / M1 PLUMBING PLAN - HIGH ELEVATION
1:25

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CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature
Date 30 March 2016
PERMIT NUMBER: P 732
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Arktis piusitippaa

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MECH. PROJECT No: 13–072

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4	14/04/14	RS	REISSUED FOR TENDER
3	13/02/14	RS	ISSUED FOR TENDER
2	15/01/14	RS	ISSUED FOR 99% REVIEW
1	25/11/13	RS	ISSUED FOR 50% REVIEW
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DESIGNED BY: M.M.
APPROVED BY: M.M.
DATE: MARCH 2016

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CONSULTANT:
DRAWN BY:
DESIGNED BY:
APPROVED BY:
DATE:

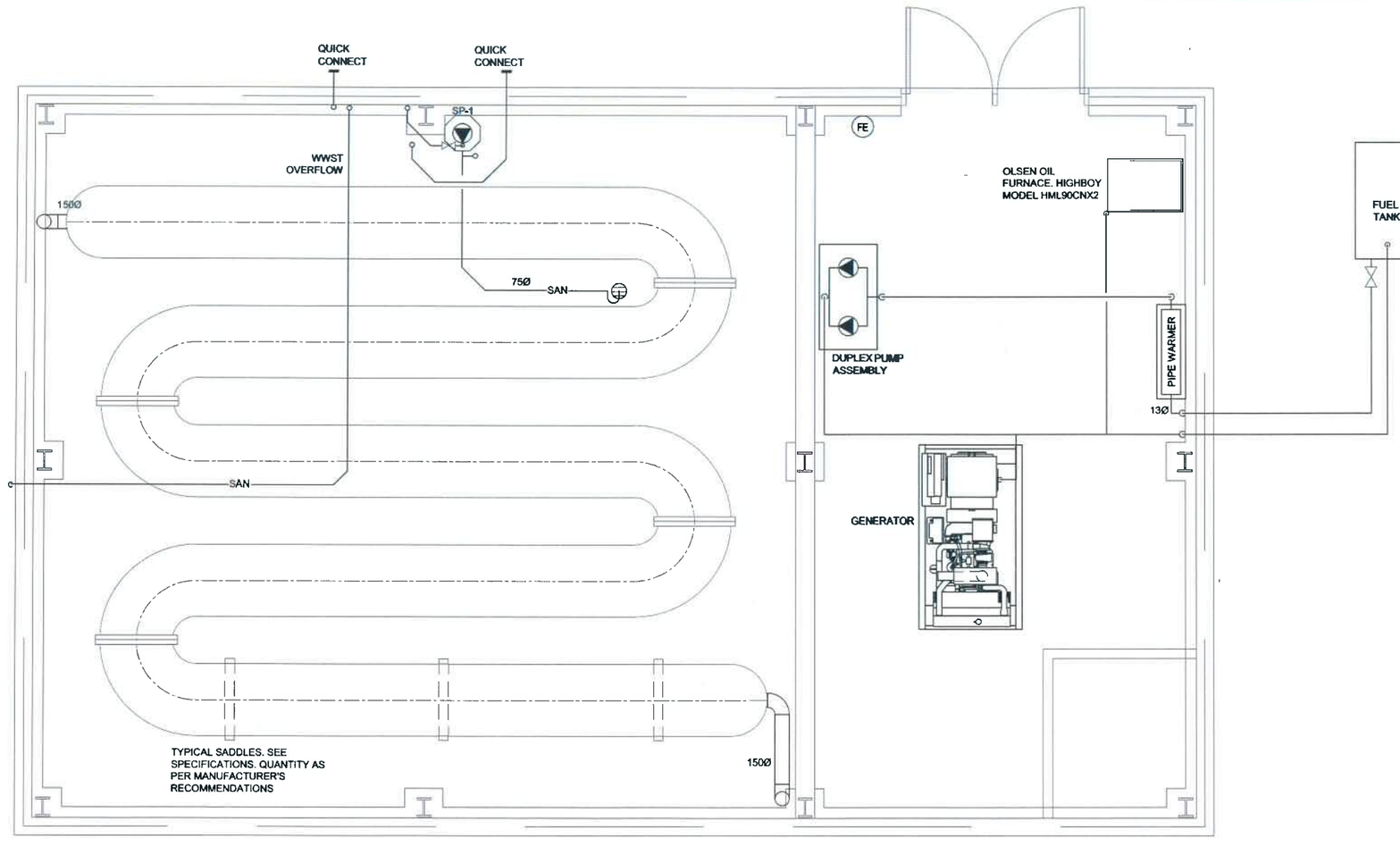
LOCATION:
IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

PROJECT:
IMPROVEMENT OF WATER SUPPLY SYSTEM

DRAWING TITLE:
PLUMBING LAYOUT - HIGH ELEVATION

MECH FILE NAME	DWG NO	BY:	SCALE
13–072	M1	5	AS NOTED

AS-BUILT
DATE: November 5, 2018
DIC NORTH



1/M2 PLUMBING PLAN - LOW ELEVATION
1:25

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1	25/11/13	RS.	ISSUED FOR 50% REVIEW
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DESIGNED BY: M.M.
APPROVED BY: M.M.
DATE: MARCH 2016
CONSULTANT:
DRAWN BY:
DESIGNED BY:
APPROVED BY:
DATE

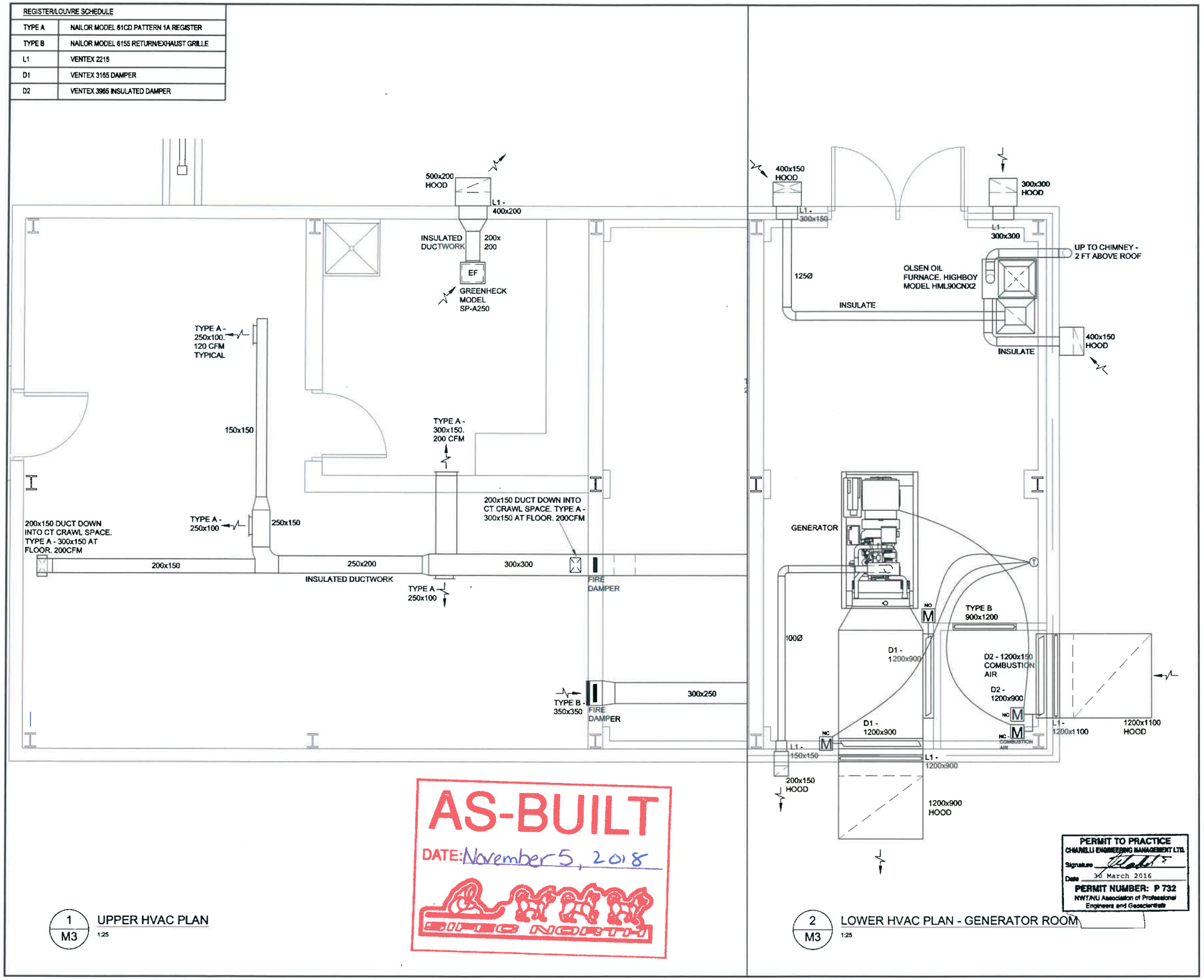
LOCATION:
IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

PROJECT:
IMPROVEMENT OF WATER SUPPLY SYSTEM

DRAWING TITLE:
PLUMBING LAYOUT - LOW ELEVATION

MECH FILE NAME:	DWG NO	OF:	SCALE:
13–072	M2	5	AS NOTED

REGISTER/LOUVRE SCHEDULE	
TYPE A	NAILOR MODEL 61CD PATTERN 1A REGISTER
TYPE B	NAILOR MODEL 6155 RETURN/EXHAUST GRILLE
L1	VENTEX 2215
D1	VENTEX 3165 DAMPER
D2	VENTEX 3985 INSULATED DAMPER



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DATE: November 5, 2018
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1/M3 UPPER HVAC PLAN
1:25

2/M3 LOWER HVAC PLAN - GENERATOR ROOM
1:25

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5	28/03/16	M.S.	REISSUED FOR TENDER
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2	25/06/14	M.S.	ISSUED FOR 99% REVIEW
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IMPROVEMENT OF WATER SUPPLY SYSTEM

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HVAC LAYOUTS

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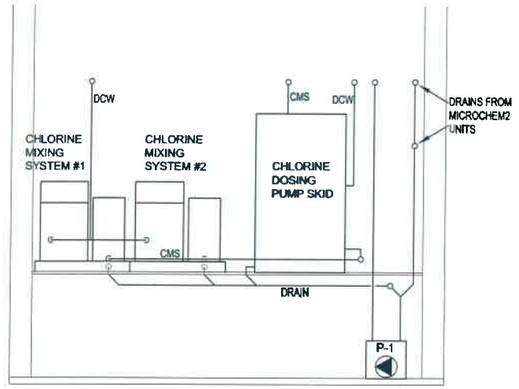
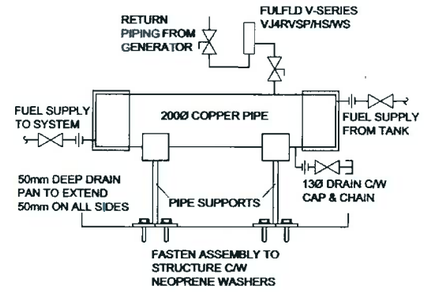
13–072	M3	5	AS NOTED



1 / M4 CHEMICAL TANK DETAIL
1:25



2 / M4 FUEL PIPE WARMER DETAIL
1:10

1. SEQUENCE OF OPERATION DOMESTIC WATER PUMP (DWP):

a. THE DOMESTIC STORAGE TANK WILL BE FILLED BY ONE OF THE WATER TRUCKS VIA AN OUTSIDE INLET THAT WILL PERMIT THE FILLING OF THE TANK. THERE WILL BE A LOW WATER ALARM TO ADVISE THE OPERATOR THAT THE TANK IS LOW.
b. UPON A DROP IN PRESSURE, THE PUMP WILL START AND PROVIDE WATER TO BOTH THE SINK AND THE TO THE DOMESTIC HOT WATER TANK.
c. ONCE THE SUPPLY FIXTURES ARE CLOSED, THE PRESSURE IN THE SYSTEM WILL INCREASE AND SHUT OFF AT 40 PSIG AND SHUT OFF.

2. SEQUENCE OF OPERATION SUMP PUMP (SP-1):

a. THE DRAIN FROM THE SERVICE SINK AND THE FLOOR DRAINS WILL DRAIN INTO A SUMP PUMP PACKAGE THAT WILL DISCHARGE INTO A WASTEWATER STORAGE TANK. THERE WILL BE A HIGH WATER ALARM TO ADVISE THE OPERATOR OF WHEN THE TANK IS TO BE DRAINED OR IF THE PUMP FAILED TO START.

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DATE: November 5, 2018
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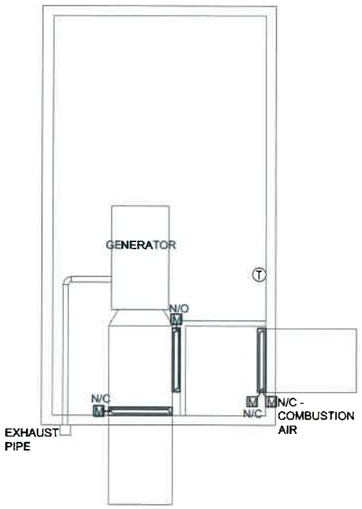
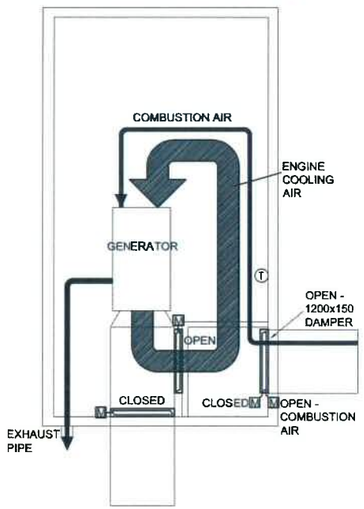
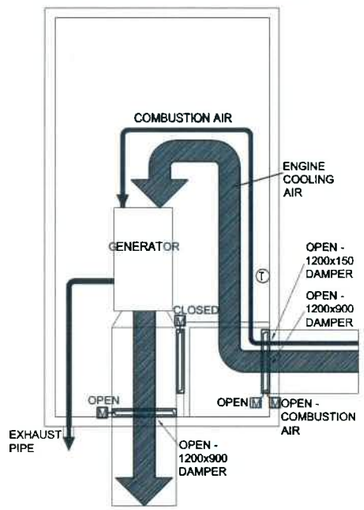
GENERATOR NOT RUNNING



GENERATOR RUNNING. ROOM IS COLDER THAN THERMOSTAT SET POINT



GENERATOR IS RUNNING. ROOM IS WARMER THAN THERMOSTAT SET POINT



3 / M4 GENERATOR SEQUENCE
NTS

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2	15/01/14	R.S.	ISSUED FOR 99% REVIEW
1	25/11/13	R.S.	ISSUED FOR 50% REVIEW
No.	DATE: dd/mm/yyyy	BY:	DESCRIPTION

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DRAWN BY: R.S.
DESIGNED BY: M.M.
APPROVED BY: M.M.
DATE: MARCH 2016

STAMP CONSULTANT:
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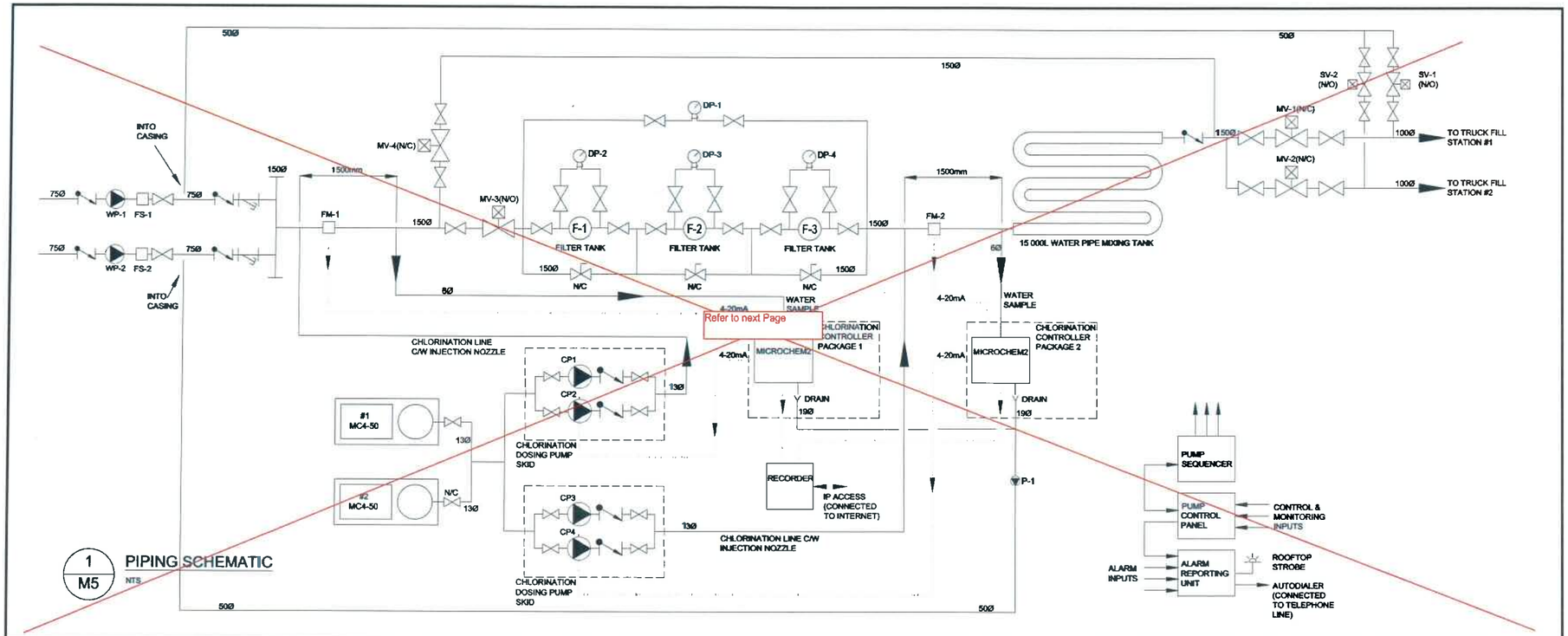
APPROVED BY:
DATE:

LOCATION:
IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

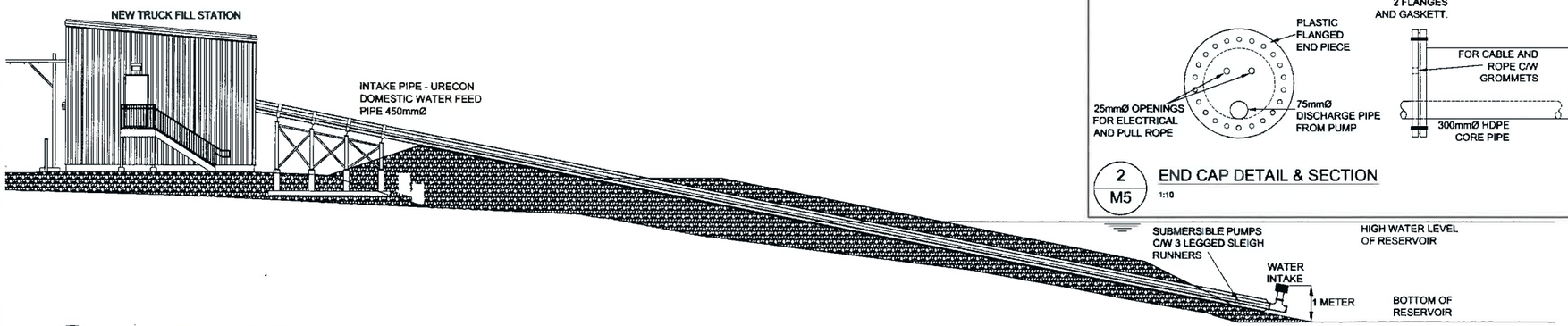
PROJECT:
IMPROVEMENT OF WATER SUPPLY SYSTEM

DRAWING TITLE:
MECHANICAL SECTIONS AND SCHEMATICS

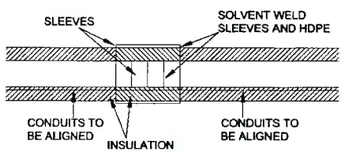
MECH FILE NAME	DWG NO	SHT	SCALE
13-072	M4	5	AS NOTED



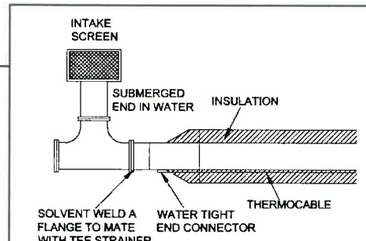
1/M5 PIPING SCHEMATIC
NTS



3/M5 INTAKE PIPE SECTION
1:100



4/M5 INTAKE PIPE JOINT - TYPICAL
1:25



5/M5 SUBMERGED END CAP DETAIL
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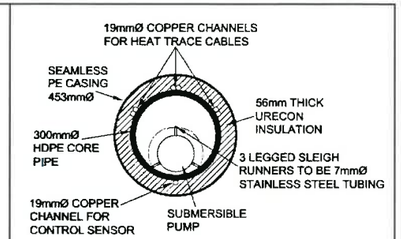

6/M5 INTAKE CROSS SECTION
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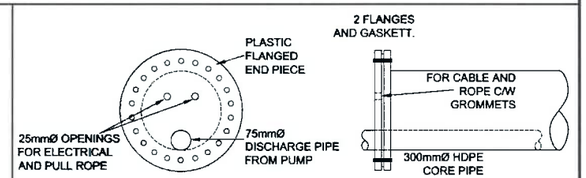

2/M5 END CAP DETAIL & SECTION
1:10

AS-BUILT
DATE: November 5, 2018
SITE NORTH

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CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature
Date 30 March 2016
PERMIT NUMBER: P 732
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1	13/02/14	M.S.	ISSUED FOR TENDER

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APPROVED BY: M.M.
DATE: MARCH 2016

REGISTERED PROFESSIONAL ENGINEER NWT/NU M.M. CHIARELLI MAR 2016

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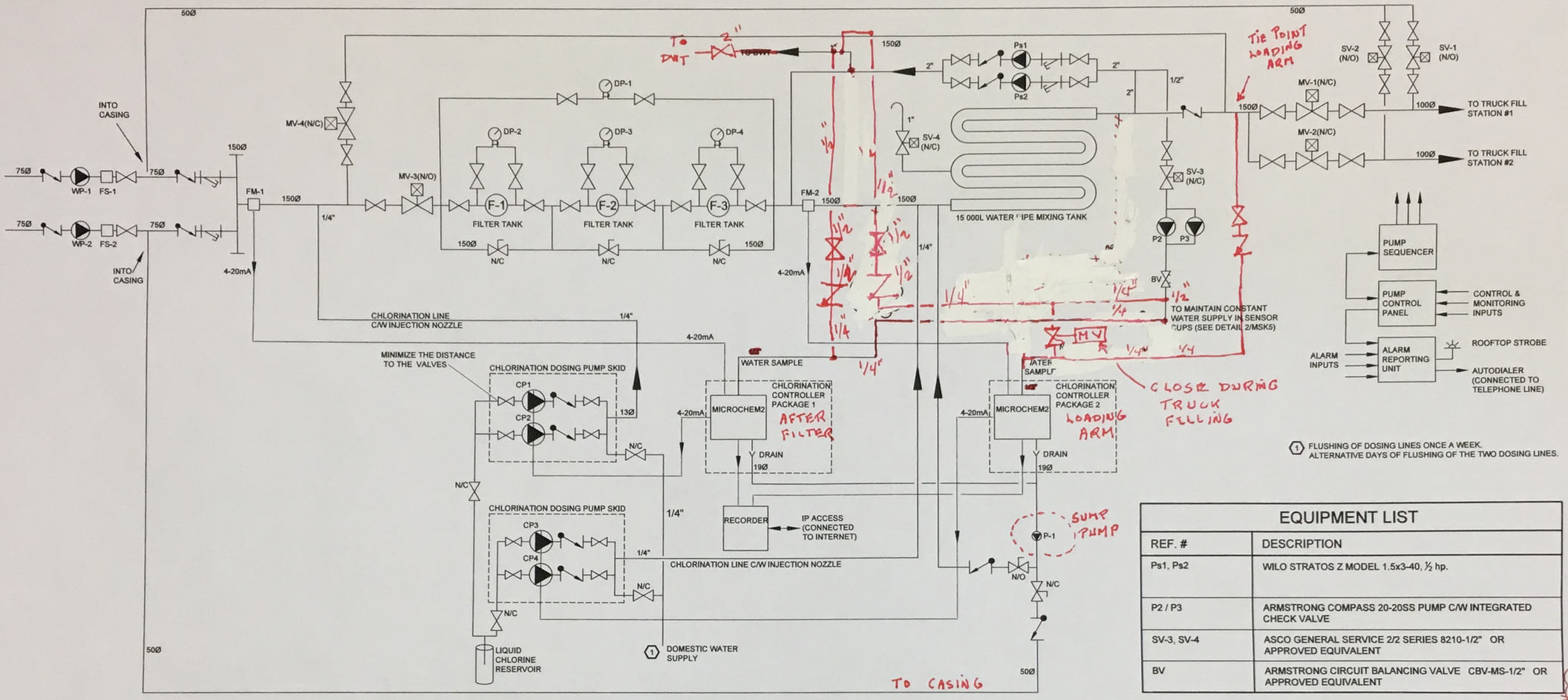
PROJECT
IMPROVEMENT OF WATER SUPPLY SYSTEM

DRAWING TITLE
MECHANICAL SECTIONS AND SCHEMATICS

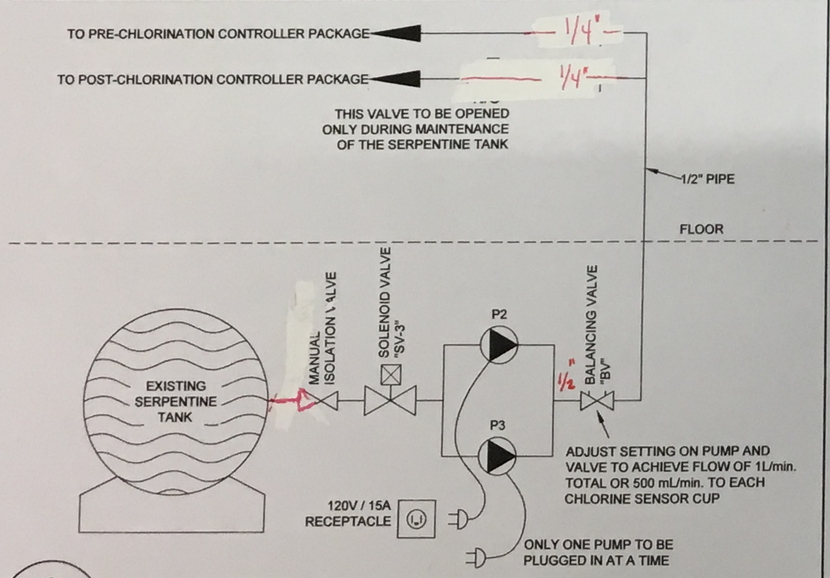
MECH FILE NAME	DWG NO	SH.	SCALE
13–072	M5	5	AS NOTED



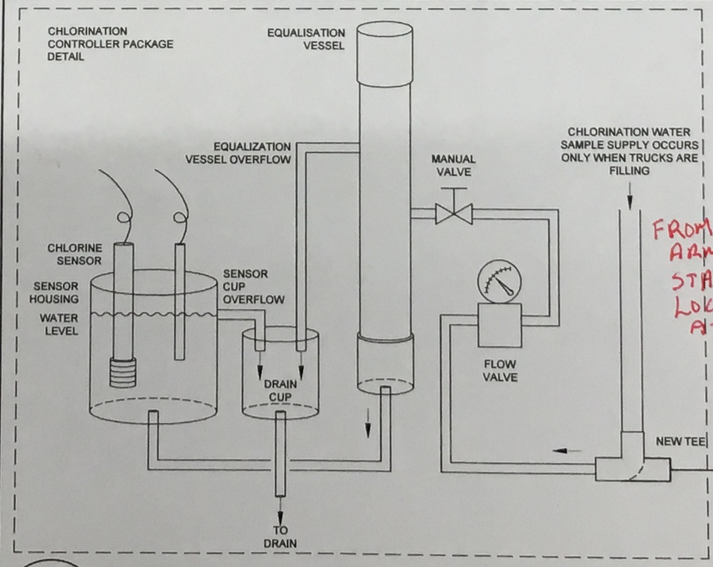
EQUIPMENT LIST

REF. #	DESCRIPTION
Ps1, Ps2	WILO STRATOS Z MODEL 1.5x3-40, ½ hp.
P2 / P3	ARMSTRONG COMPASS 20-20SS PUMP C/W INTEGRATED CHECK VALVE
SV-3, SV-4	ASCO GENERAL SERVICE 2/2 SERIES 8210-1/2" OR APPROVED EQUIVALENT
BV	ARMSTRONG CIRCUIT BALANCING VALVE CBV-MS-1/2" OR APPROVED EQUIVALENT

1 / MSK5 — CHLORINATION MODIFICATIONS SCHEMATIC
N. T. S.



2 / MSK5 — CHLORINATION MODIFICATIONS RISER DIAGRAM
N. T. S.



3 / MSK5 — CHLORINATION CONTROLLER PACKAGE DETAIL - MODIFICATIONS
N. T. S.

SEQUENCE OF OPERATIONS:

- WHEN WP1 AND/OR WP2 STOPS RUNNING AND AFTER TIME DELAY OF 1 MIN, OPEN "SV-3" AND "SV-4" AND TURN ON P2 OR P3 (ONLY ONE ACTIVE).
- WHEN DELIVERY OF WATER IS REQUESTED (WP-1 AND/OR WP-2 IS ON), TURN OFF "SV-3" AND "SV-4"AND P2/P3.
- NOTE: VENT TO BE AT HIGHEST POINT ON OUTLET PIPING TO TRUCK DELIVERY ARMS.

AS-BUILT
DATE: 01-11-2018

PWGSC A2 (594x420)

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REGISTERED PROFESSIONAL ENGINEER
M.M. MATTLET
LICENSEE
NWT/NU

CEML
Chiarelli Engineering Management Ltd
210–2120 ROBERTSON RD.
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TEL. (613) 225–1123
EMAIL: info@cemlottawa.com

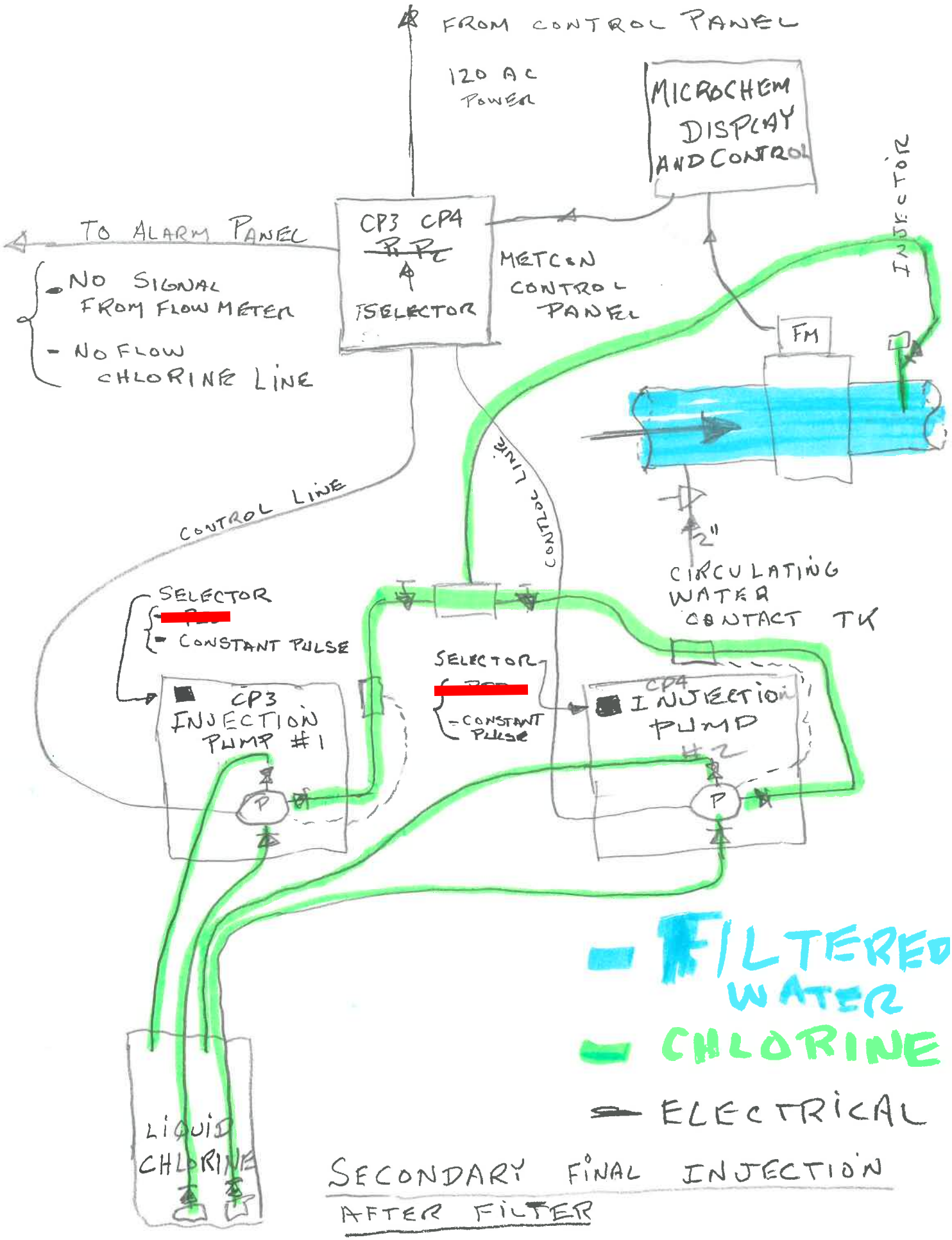
Contractor to verify all dimensions & conditions on site and immediately notify the engineer of all discrepancies.

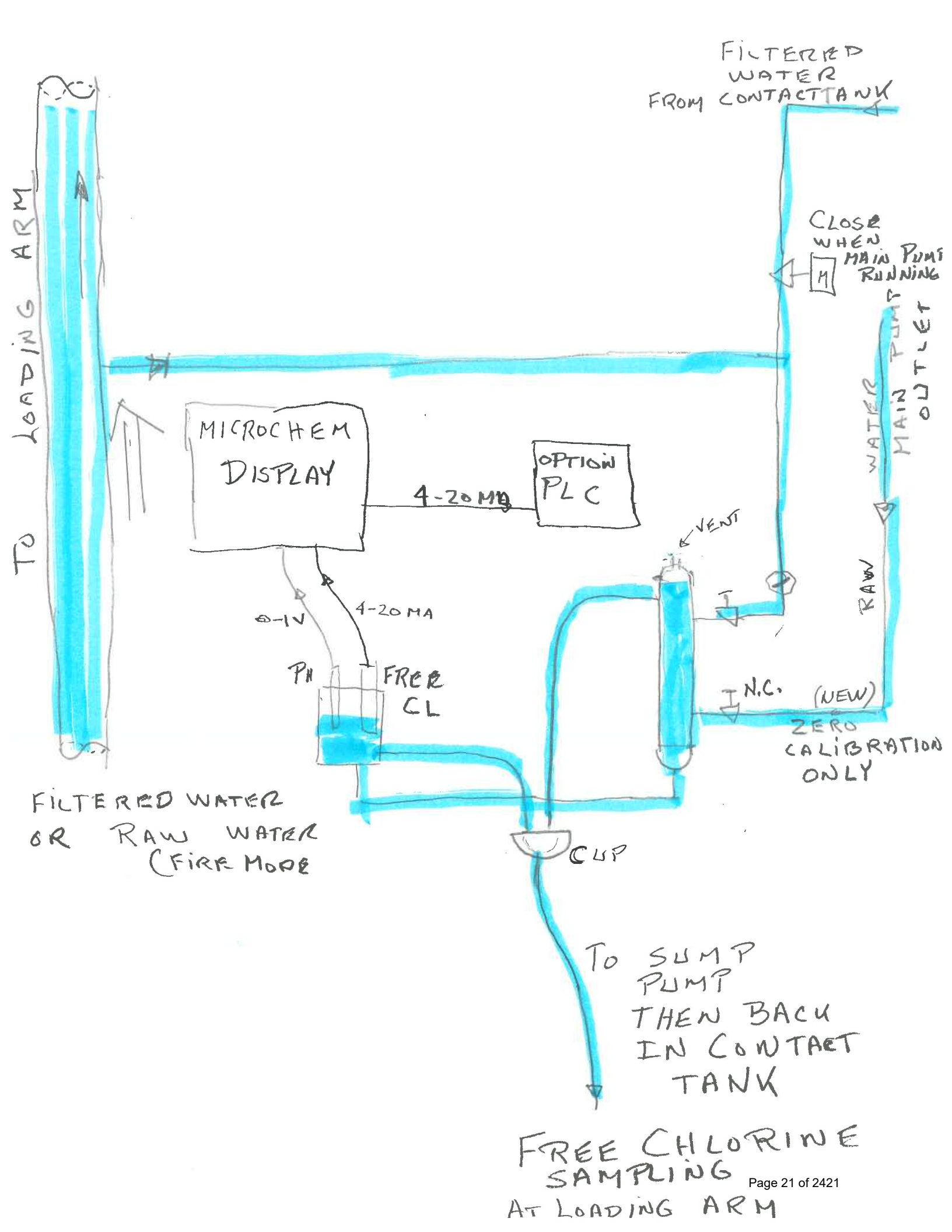
revisions	description	
2	Reissued for CCN# M&E 4	2018/08/14
1	Issued for CCN# M&E 4	2018/08/08

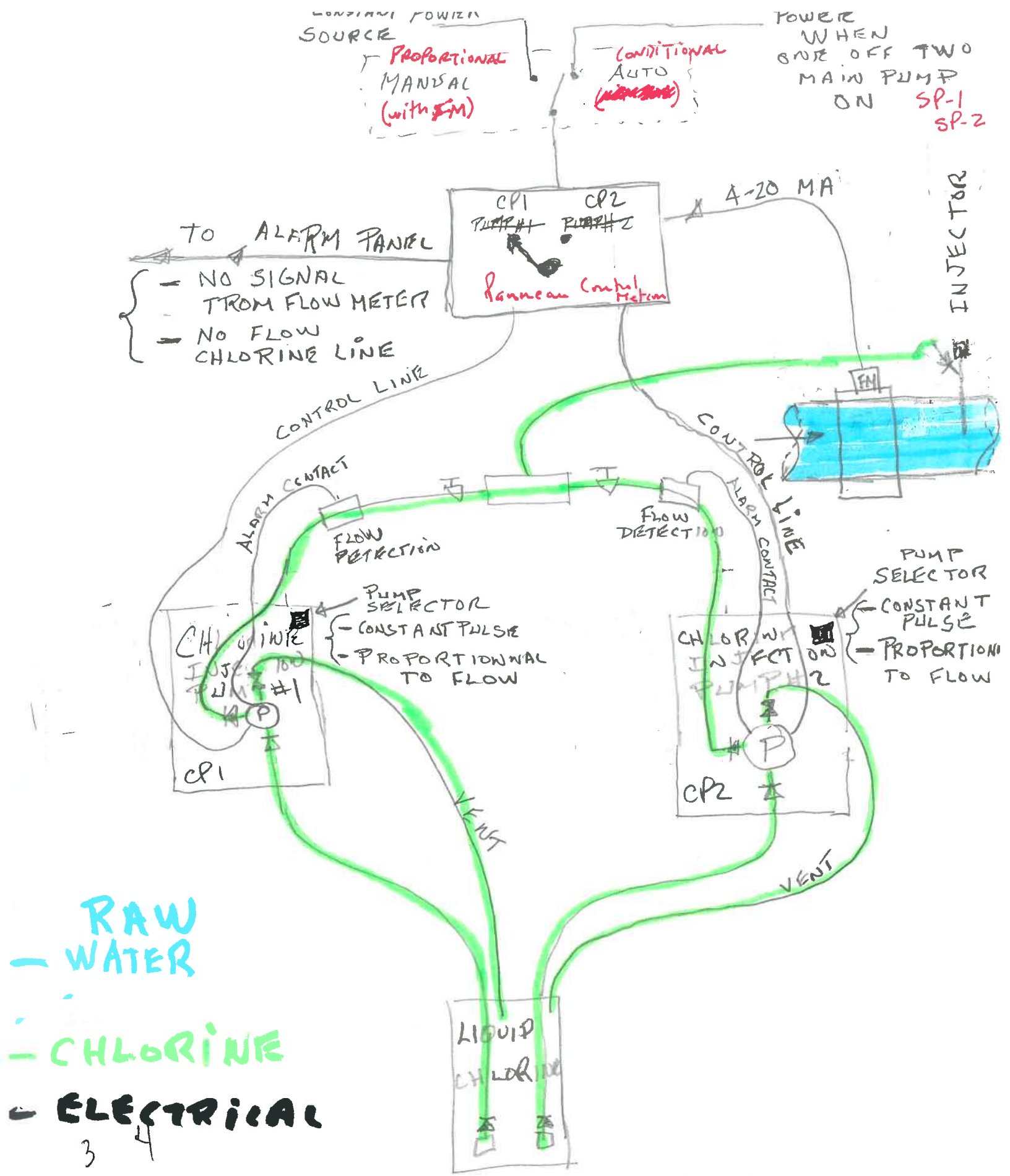
project / projet
IMPROVEMENT OF DRINKING WATER SUPPLY
IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0R0

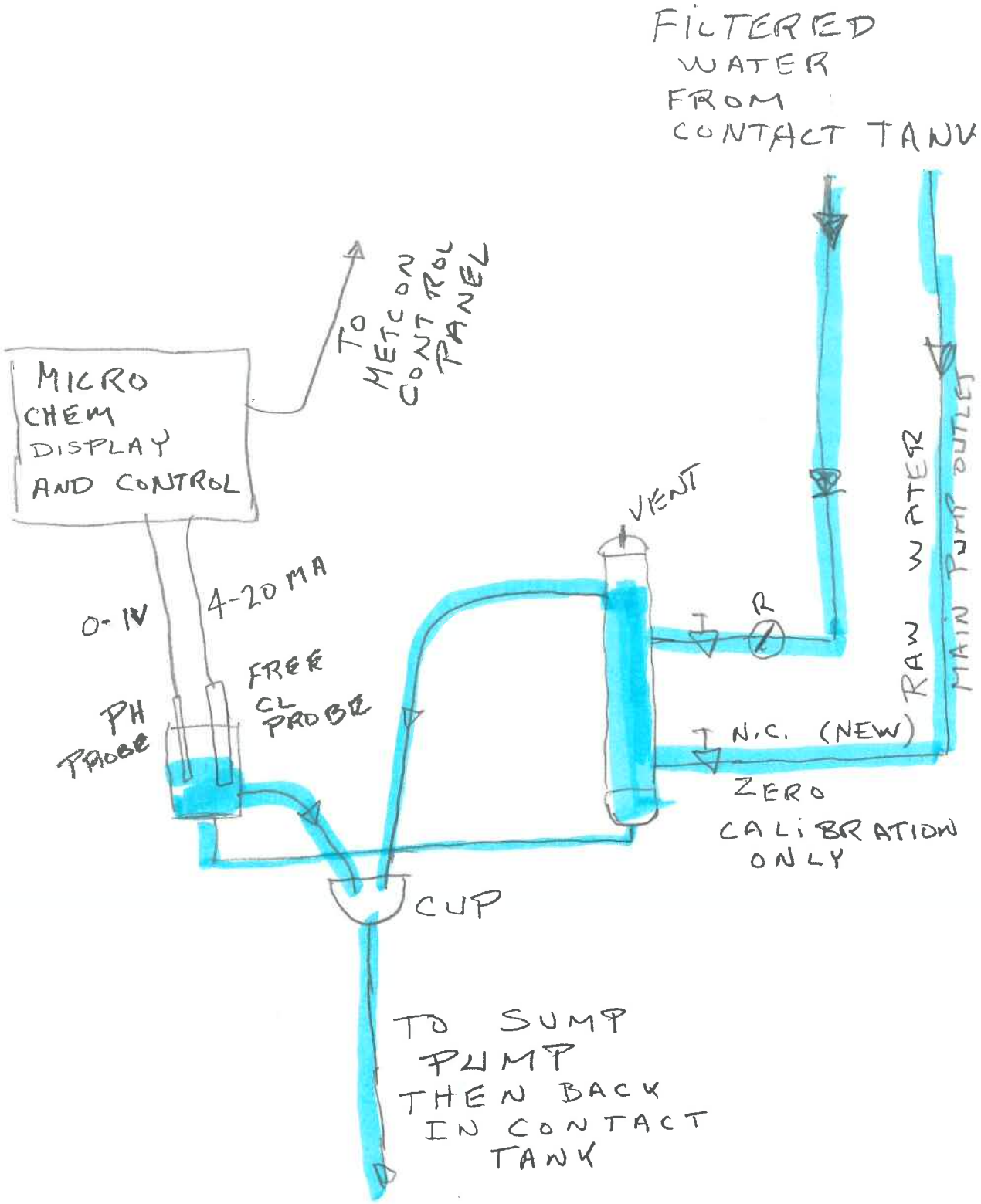
drawing / dessin
CHLORINATION SYSTEM MODIFICATIONS

Designed By	M.M.	Conçu par
Date	2018/08/14	(yyyy/mm/dd)
Drawn By	B.P.	Dessiné par
Date	2018/08/14	(yyyy/mm/dd)
Reviewed By	N.K.	Examiné par
Date	2018/08/14	(yyyy/mm/dd)
Approved By	M.M.	Approuvé par
Date	2018/08/14	(yyyy/mm/dd)
Tender		Soumission
Project Manager		Administrateur de projets
Project no.	13-072	No. du projet
Drawing no.	MSK5	No. du dessin

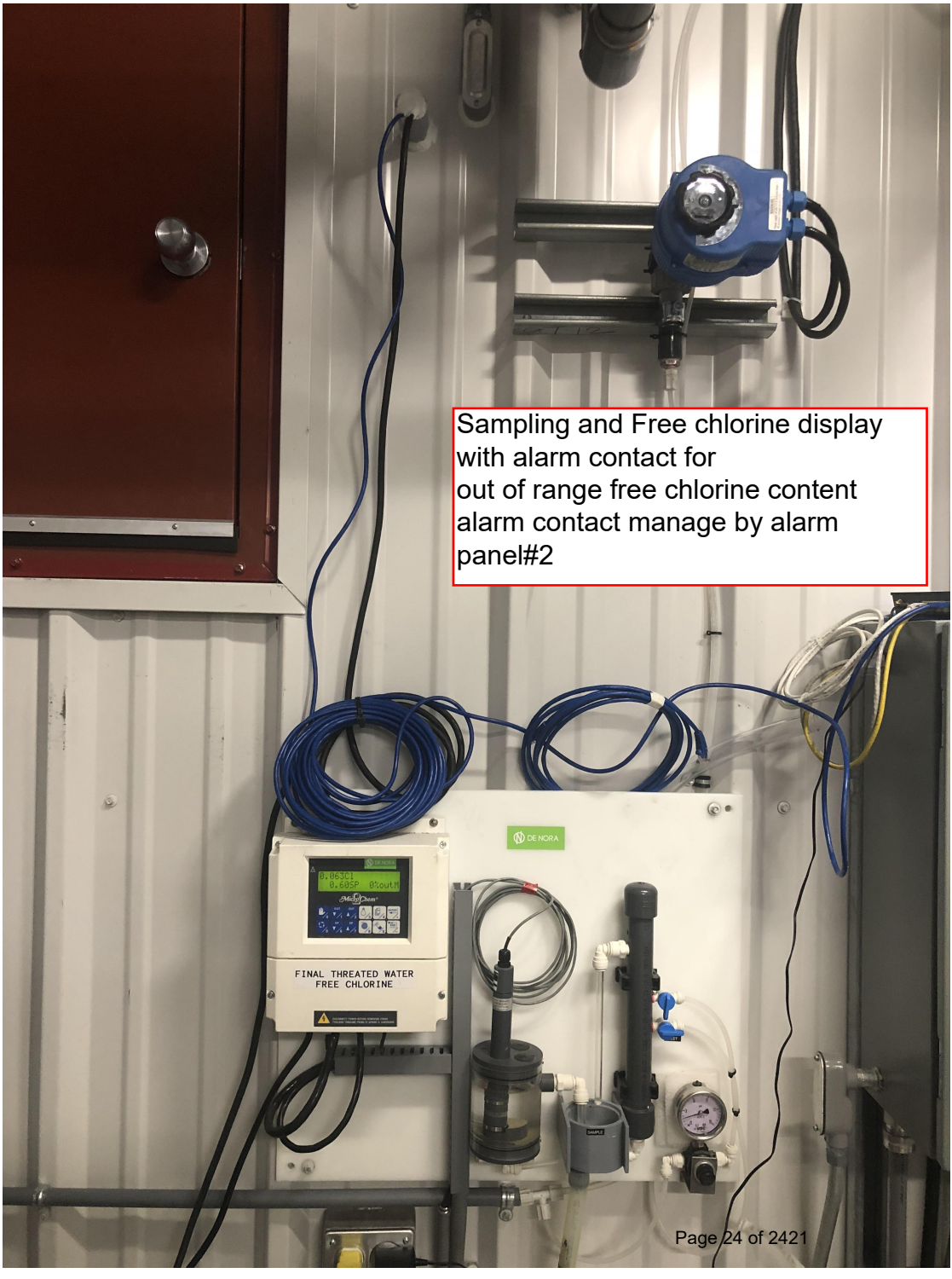

FROM CONTROL PANEL
120 AC POWER
MICROCHEM DISPLAY AND CONTROL
TO ALARM PANEL
CP3 CP4
SELECTOR
METCON CONTROL PANEL
- NO SIGNAL FROM FLOW METER
- NO FLOW CHLORINE LINE
INJECTION
FM
CONTROL LINE
CONTROL LINE
2"
CIRCULATING WATER CONTACT TK
SELECTOR
- CONSTANT PULSE
SELECTOR
- CONSTANT PULSE
CP3 INJECTION PUMP #1
CP4 INJECTION PUMP #2
P
P
FILTERED WATER
CHLORINE
ELECTRICAL
LIQUID CHLORINE
SECONDARY FINAL INJECTION
AFTER FILTER


FILTERED WATER FROM CONTACT TANK
TO LOADING ARM
CLOSE WHEN MAIN PUMP RUNNING
M
WATER MAIN PUMP OUTLET
MICROCHEM DISPLAY
4-20 MA
OPTION PLC
VENT
0-1V
4-20 MA
PH
FREE CL
RAW
N.C.
(NEW) ZERO CALIBRATION ONLY
FILTERED WATER OR RAW WATER (FIRE MODE
CUP
TO SUMP PUMP THEN BACK IN CONTACT TANK
FREE CHLORINE SAMPLING AT LOADING ARM


CONSTANT POWER SOURCE
PROPORTIONAL
MANUAL
(with FM)
CONDITIONAL
AUTO
POWER WHEN ONE OFF TWO MAIN PUMP ON
SP-1
SP-2
CP1
CP2
4-20 MA
INJECTOR
TO ALARM PANEL
- NO SIGNAL FROM FLOW METER
- NO FLOW CHLORINE LINE
Programmable Control Meter
CONTROL LINE
FM
ALARM CONTACT
FLOW DETECTION
PUMP SELECTOR
- CONSTANT PULSE
- PROPORTIONAL TO FLOW
CHLORINE INJECTION PUMP #1
CP1
CHLORINE INJECTION PUMP #2
CP2
VENT
LIQUID CHLORINE
RAW WATER
CHLORINE
ELECTRICAL
- BEFORE FILTER
- MAIN INJECTION PUMP
- IGLOOLIK / PANG



FREE CHLORINE SAMPLING FROM CONTACT TANK OUTLET



Sampling and Free chlorine display with alarm contact for
out of range free chlorine content alarm contact manage by alarm panel#2


CONTACT FOR SERVICE, PARTS, AND REPAIRS:
metcon
SALES & ENGINEERING LTD.
CCP-2
FILTRED WATER
PUMP 1 -0- PUMP 2
Constant chlorine injection rate
at Contact tank inlet 15,000 litres
1) ajustable rate on pump
2) ajustable stroke lenth on pump
ProMinent
gamma/ X
STOP


CONTACT FOR SERVICE, PARTS, AND REPAIRS:
metcon
SALES & ENGINEERING LTD
CCP-1
RAW WATER
PUMP 1 -0- PUMP 2
Normal Operation with flow meter available
1) chlorine injection rate proportionnal to main pump flow
2) stroke lenth ajustable with knob

Back Pressure/ Relief Valves

CRN REGISTERED

1/2" to 2"

2-1/2" to 4"

SB12 Series – 1/2" to 4"

- SB12 Series Back Pressure/Relief valves feature a **built-in check valve function, desirable in dosing applications.** Inlet pressure acts upward against the disc allowing excess pressure flow upwards through the orifice.
- These valves are **recommended for dirty fluids.**
- Relief pressure settings are 5–150 psi for 1/2" to 3" and 5–90 psi for 4" sizes.
- FPM (Viton•) seat and seals are supplied as standard. EPDM is available special order.

True Union

Size	Item No.	PVC x=A Socket y=U	PVC x=A Threaded y=UT	PP x=B Socket y=U	PP x=B Threaded y=UT	PVDF x=K Socket y=UT	PVDF x=K Threaded y=UT	
1/2"	SB12x005Vy	*SB12A005VU* 278.00	*SB12A005VUT* 292.00	*SB12B005VU* 364.00	*SB12B005VUT* 398.00	*SB12K005VU* 930.00	*SB12K005VUT* 969.00	G
3/4"	SB12x007Vy	389.00	404.00	505.00	544.00	1,420.00	1,466.00	G
1"	SB12x010Vy	405.00	523.00	513.00	556.00	1,462.00	1,532.00	G
1-1/4"	SB12x012Vy	512.00	640.00	664.00	709.00	2,213.00	2,342.00	G
1-1/2"	SB12x015Vy	533.00	690.00	690.00	746.00	2,264.00	2,370.00	G
2"	SB12x020Vy	554.00	583.00	736.00	804.00	2,348.00	2,482.00	G

Spigot and ANSI 150 Flanged•

Size	Item No.	PVC x=A Flanged† y=F	PP x=B Metric Spigot (Blank)[1]	PP x=B Flanged† y=F	PVDF x=K Metric Spigot (Blank)[1]	PVDF x=K Flanged† y=F	
1/2"	SB12x005Vy	*SB12A005VF* 308.00	*SB12B005V* 319.00	*SB12B005VF* 436.00	*SB12K005V* 875.00	*SB12K005VF* 999.00	G
3/4"	SB12x007Vy	416.00	456.00	584.00	1,355.00	1,494.00	G
1"	SB12x010Vy	419.00	456.00	597.00	1,355.00	1,506.00	G
1-1/4"	SB12x012Vy	521.00	588.00	743.00	2,097.00	2,276.00	G
1-1/2"	SB12x015Vy	521.00	588.00	767.00	2,097.00	2,304.00	G
2"	SB12x020Vy	531.00	588.00	797.00	2,097.00	2,353.00	G
2-1/2"	SB12x025Vy	1,612.00	1,982.00	2,299.00	6,751.00	7,275.00	G
3"	SB12x030Vy	2,494.00	3,136.00	3,510.00	8,872.00	9,528.00	G
4"	SB12x040Vy	3,771.00	4,753.00	5,196.00	13,448.00	14,182.00	G

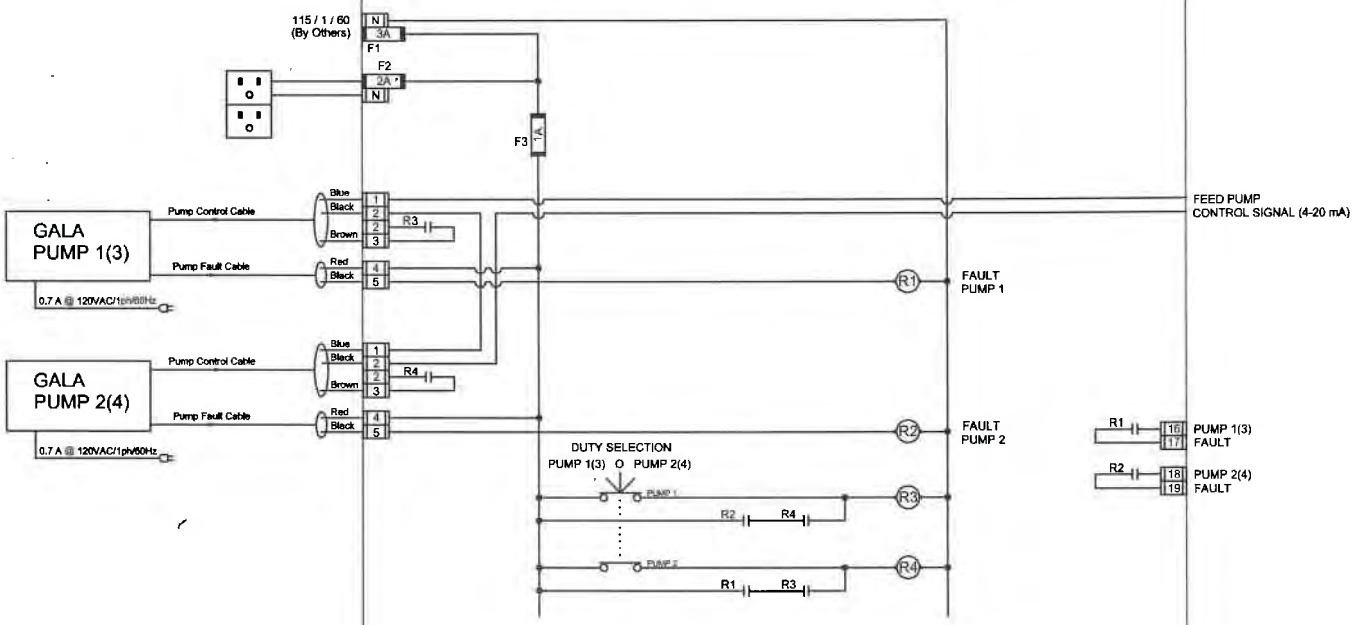
[1]Metric Spigot ends may be butt fused directly to metric pipe.

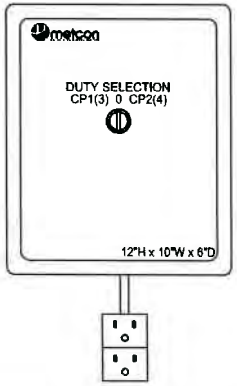
Socket and Threaded[2]•†

Size	Item No.	PVC x=A Socket y=S	PVC x=A Threaded y=T	PP x=B Threaded y=T	PVDF x=K Threaded y=T	
1/2"	SB12x005Vy	*SB12A005VS* 293.00	*SB12A005VT* 293.00	*SB12B005VT* 403.00	*SB12K005VT* 970.00	G
3/4"	SB12x007Vy	402.00	402.00	544.00	1,457.00	G
1"	SB12x010Vy	402.00	407.00	554.00	1,479.00	G
1-1/4"	SB12x012Vy	509.00	518.00	693.00	2,233.00	G
1-1/2"	SB12x015Vy	510.00	523.00	721.00	2,279.00	G
2"	SB12x020Vy	511.00	547.00	741.00	2,308.00	G

[2]Solid (no unions) socket and threaded ends are socket welded to spigot valves. Solid socket ends are available up to 4". P.O.A.

CHEMICAL PUMPS CONTRL PANEL





NOTES:

1. Two identical control panels, one for each chemical system
2. Selected duty pump will automatically start after selection from selector switch. Second pump will be the stand-by one.
3. If selected duty pump fails, the stand-by pump will automatically start. Please advise if this feature is not required.
4. If manual control is required, disconnect control cable from pump. On manual control, start/stop and speed adjustment from pump key pad.
5. Control panels will have CSA approval (general inspection).

REVISIONS:

No	Date	By	Description
1.			
2.			

BILL OF MATERIALS

#	Part #	Make	Description	Pcs
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

☐ PROPOSAL ONLY
☒ FOR APPROVAL
☐ FOR CONSTRUCTION
☐ AS BUILT

metcon SALES & ENGINEERING LTD.

Control Panel

Wiring and Layout

Date:	Mar 05, 2015
Job Number:	15-S010792
Job Name:	Pangnirtung
Dwg. #:	2
Approved by:	GM
Drawn by:	GT

Notes:
1. [#] Indicates supplied by others.
2. Unit: Inches (mm). Do not scale this drawing. All dimensions, sizing, orientation of piping, wiring and equipment, are estimations and approximations and are not to be used in other related design.
3. The information contained on this drawing is of confidential nature and shall not be used or reproduced without written consent from Metcon Sales and Engineering Limited.

K14
120VAC

K15
120VAC

LOW OR HI CHLORINE 3Hr STUP PUMP

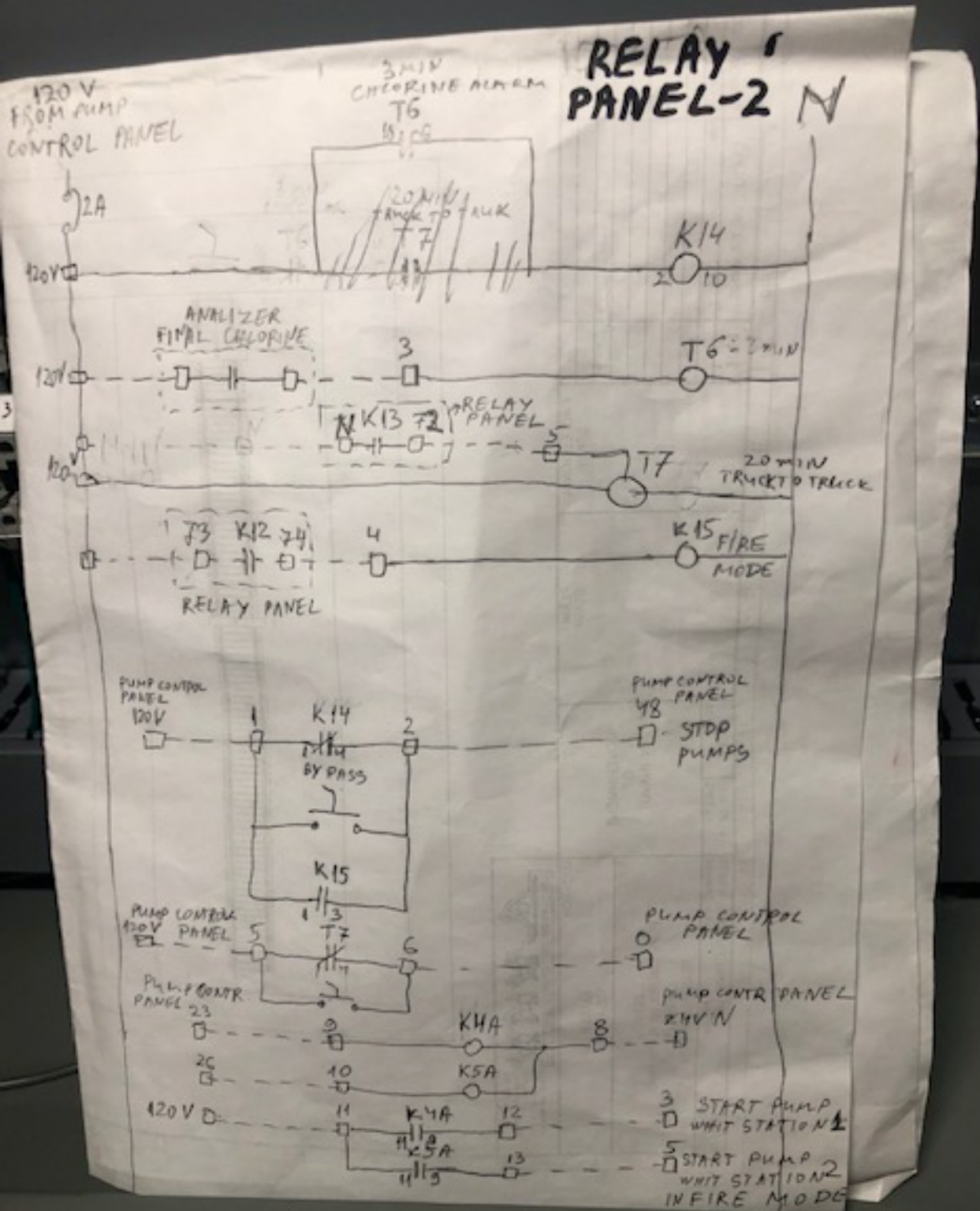
T6
120VAC

START-TO-START PUMPS 24hr

T7
120VAC

K4A
24VAC

STOP PUMPS
ALARM
AUTO BY-PASS


RELAY PANEL-2
120 V FROM PUMP CONTROL PANEL
2A
3 MIN CHLORINE ALARM T6
20 MIN TRUCK TO TRUCK T7
K14
ANALIZER FINAL CHLORINE
3
T6 - 3 MIN
K13 T2 RELAY PANEL
5
T7
20 MIN TRUCK TO TRUCK
T3 K12 T4
4
K15 FIRE MODE
RELAY PANEL
PUMP CONTROL PANEL 120V
1
K14
2
PUMP CONTROL PANEL
48
STOP PUMPS
BY PASS
K15
3
PUMP CONTROL PANEL
5
T7
6
PUMP CONTROL PANEL
PUMP CONTR PANEL
23
9
KHA
8
PUMP CONTR PANEL
KHV'N
26
10
K5A
120 V
11
K4A
12
3 START PUMP WHIT STATION 1
K5A
13
5 START PUMP WHIT STATION 2
IN FIRE MODE

2.4.2 Electrical plans

Plan E1

Plan E2

Plan E3

Plan E4

Plan E5

Plan E6

ELECTRICAL SCOPE OF WORK

ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH:

A) ELECTRICAL DRAWINGS 13-072 E1 THROUGH E6, NOTES AND SPECIFICATIONS
B) ALL APPLICABLE CODES, BYLAWS AND BEST-RECOMMENDED PRACTICES

FOR THE PURPOSES OF THIS PROJECT, 'PROVIDE' SHALL MEAN TO SUPPLY AND INSTALL.

FOR THE PURPOSES OF THIS PROJECT, 'DEMOLISH' SHALL MEAN MATERIALS AND EQUIPMENT ARE TO BE REMOVE THEIR INSTALLED LOCATION AND DISPOSED OF, UNLESS MATERIAL IS RECYCLABLE, IN WHICH CASE IT SHALL BE IN FERROUS AND NON-FERROUS CONTAINERS SUPPLIED BY CONTRACTOR. THE REMAINDER SHALL BE CONS GARBAGE. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF GARBAGE IN ACCORDANCE WITH STANDARDS AND REGULATIONS, AND PROVIDE HIS OWN WASTE REMOVAL SERVICES

WHERE MATERIALS AND EQUIPMENT ARE IDENTIFIED AS 'SALVAGE', THEY SHALL BE REMOVED FROM THEIR INS LOCATION WITHOUT DAMAGE AND HANDED TO THE OWNER AT THE DESIGNATED DROP LOCATION WITHIN THE FACIL

MAKE PRIOR ARRANGEMENTS AND CAREFULLY PLAN THE DISCONNECTING AND SHUT-DOWN OF ANY EQUIPMEI OWNERS FACILITIES DEPARTMENT. GIVE MINIMUM 48 HOURS NOTICE OF ANY SHUT-DOWN.

IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO CAREFULLY COORDINATE HIS WORK WITH THAT OF OWNER'S FOR THE BEST SUCCESS OF THIS PROJECT.

CONTRACTOR TO:

A. VERIFY EQUIPMENT ROUTING.
B. VERIFY ALL DIMENSIONS PRIOR TO EQUIPMENT PURCHASE.
C. VERIFY ALL LIGHTING VOLTAGE PRIOR TO EQUIPMENT PURCHASE.
D. PROTECT BUILDING STRUCTURE FROM DAMAGE.
E. ENSURE ADJACENT AREAS ARE NOT AFFECTED BY ANY WORK ON THIS PROJECT.
F. RETURN ALL RECYCLABLE MATERIALS (COPPER, METAL, BUILDING WIRE, ETC) TO OWNER.
G. PROVIDE SEISMIC RESTRAINTS PER SPECIFICATION. PROVIDE STRUCTURAL DESIGN AND SHOP DR/ STAMPED BY STRUCTURAL ENGINEER.
H. SUBMIT FOUR (4) HARD COPIES OF EQUIPMENT SHOP DRAWINGS OR ELECTRONIC COPIES OF SHOP DR FOR APPROVAL BY THE ENGINEER PRIOR TO COMMENCING ANY WORK OR ORDERING OF ANY EQUIPMENT.
I. OBTAIN RELATED PERMITS TO CARRY OUT THE WORK OF THIS PROJECT.

THE NUMBERS INSIDE HEXAGONS SHOWN ON THE PLANS REFER TO THE NUMBERED POINTS BELOW. NOT ALL ARE SHOWN ON THE PLANS.

1. CONTRACTOR TO COORDINATE UPGRADE OF THE HIGH VOLTAGE LINE TO THE PUMPING STATION WITH ENERGY CORPORATION (LOCAL POWER UTILITY), INCLUDING:
   A. UPGRADING THE FEEDER TO 3 PHASE,
   B. RELOCATION OR MODIFICATION OF THE END OF THE LINE DUE TO CONSTRUCTION OF THE NEW PUMPING S AND/OR ACCESS ROAD,
   C. ENSURING TEMPORARY POWER TO THE EXISTING PUMPING STATION DURING THE CONSTRUCTION OF TI PUMPING STATION, AND
   D. REPLACEMENT OF THE SINGLE PHASE 25 KVA TRANSFORMER WITH 3x 25 KVA TRANSFORMERS.
2. PROVIDE BURIED CABLE AND CONDUIT BETWEEN EXISTING POWER POLE AND NEW TRUCK FILL STATIC BETWEEN NEW TRUCK FILL STATION AND OLD TRUCK FILL STATION; SIZED ACCORDING TO SINGLE LINE DIAGRA
3. PROVIDE MAIN 250A CIRCUIT BREAKER, CURRENT TRANSFORMER CABINET AND 13JAW REVENUE METER BASE.
4. PROVIDE MAIN PANELBOARD P-1 TO BE 120/208V/3PH/60CCT/400AF SURFACE MOUNT WITH 250A MAIN BREAKER. PROVIDE SUBPANEL P-2 TO BE 120/208V/3PH/30CCT/100AF SURFACE MOUNT TO BE PROTECTED BY 100A/3PH BREAKER IN PANEL P-1. PROVIDE TWO 120V/15A CIRCUIT BREAKERS IN PANEL P-2 AS SPARES.
5. PROVIDE GENSET FOR BACKUP EMERGENCY POWER. INCLUDED ARE GENSET CONTROLLER AND GENSET LOAD CENTRE. PROVIDE 260A-RATED AUTOMATIC TRANSFER SWITCH (ATS) TO SWITCH BETWEEN NORMAL GRID AND EMERGENCY BACKUP POWER. PROVIDE 208V/3P/30A CIRCUIT BREAKER IN PANEL P-2 FOR GENSET LOAD CENTRE.
6. PROVIDE WALL-MOUNTED THERMOSTAT (TS-1) TO CONTROL GENERATOR VENTILATION DAMPERS. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL P-2 AND PROVIDE WIRING TO DAMPER MOTORS.
7. PROVIDE COMBINATION BATTERY PACK/ PICTOGRAM EXIT SIGN/ DUAL-HEAD EMERGENCY LIGHT PACKS TO BE MOUNTED ABOVE DOORWAYS WHERE INDICATED. EMERGENCY LIGHTING CIRCUIT TO BE ON SAME CIRCUIT AS INTERIOR LIGHTING CIRCUIT ON PANEL P-2. PROVIDE 120V/15A DUPLEX RECEPTACLE ABOVE DOORWAY NEXT TO EACH COMBO PACK.
8. PROVIDE INTERIOR LIGHTING WHERE INDICATED. 'A' LUMINAIRES ARE TO BE SUSPENDED BY CHAINS AT 3m AFF. PROVIDE WALL-MOUNTED SWITCHES WHERE INDICATED. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL P-2 FOR INTERIOR LIGHTING.
9. PROVIDE EXTERIOR LIGHTING WHERE INDICATED. DESIGNATED 'B' LUMINAIRE ARE TO BE MOUNTED ADJACENT TO DOORWAY ENTRY AT TOP OF STAIRS. DESIGNATED 'C' LUMINAIRES ARE TO BE MOUNTED AT 4m AGL. OUTDOOR LIGHTS TO BE CONTROLLED BY COMBINATION OF PHOTOCELL AND TIMER. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL P-2 FOR EXTERIOR LIGHTING.
10. PROVIDE CONVENIENCE RECEPTACLES WHERE INDICATED, TO BE WALL-MOUNTED STANDARD 300mm AFF. PROVIDE TWO 120V/15A CIRCUIT BREAKERS IN PANEL P-2 FOR THE RECEPTACLE CIRCUITS. RECEPTACLES WITHIN 1.5m OF WATER ZONES TO BE GFCI PROTECTED.
11. PROVIDE DIRECT ELECTRICAL CONNECTION TO CEILING EXHAUST FAN (EF). EF TO BE CONNECTED TO SAME CIRCUIT AS INTERNAL LIGHTING AND ALWAYS POWERED 'ON'.
12. PROVIDE DIRECT ELECTRICAL CONNECTION TO BACKUP UNIT HEATERS UH-1 – 5; EACH UNIT TO BE PROTECTED BY ITS OWN 208V/3P/15A CIRCUIT BREAKER IN PANEL P-1. UNITS TO BE INDIVIDUALLY CONTROLLED BY INTERNAL THERMOSTATS, SET TO 5°C LOWER THAN FURNACE THERMOSTAT. EACH UNIT SPECIFIED TO HAVE INTEGRAL DISCONNECT SWITCHES. PROVIDE WALL-MOUNT BRACKETS AND MOUNT UNIT'S BELOW MAXIMUM HEIGHT OF 8'.
13. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL P-2 FOR OIL-FIRED FURNACE. PROVIDE WALL SWITCH IN GENERATOR ROOM BETWEEN EXIT DOORWAY AND FURNACE UNIT, SEPARATE FROM ANY OTHER CONTROLS, AND LABELED AS "FURNACE SHUTOFF".
14. PROVIDE 120V/1P/15A CIRCUIT BREAKER IN PANEL P-2 FOR DUPLEX OIL PUMP CONTROLLER (DPC) IN GENERATOR ROOM. PROVIDE DIRECT ELECTRICAL CONNECTION TO DPC, TO BE SPECIFIED AS HAVING INCLUDED DISCONNECT SWITCH.
15. PROVIDE 120V/25A CIRCUIT BREAKER IN PANEL P-2 FOR DOMESTIC WATER PUMP (DWP). PROVIDE DIRECT ELECTRICAL CONNECTION TO DWP.
16. PROVIDE 208V/3P/15A CIRCUIT BREAKER IN PANEL P-1 FOR DOMESTIC HOT WATER TANK (DHWT). PROVIDE DIRECT ELECTRICAL CONNECTION TO DHWT WHERE INDICATED.
17. PROVIDE TWO 120V/15A CIRCUIT BREAKERS IN PANEL P-2 FOR TWO PUMPS (SP-1, & P-1). PROVIDE DEDICATED WALL-MOUNTED 120V GFCI-PROTECTED DUPLEX OUTLETS AT EACH PUMP LOCATION.
18. PROVIDE 120V/20A CIRCUIT BREAKER IN PANEL P-2 AND DEDICATED CSA CONFIGURATION 5-20R RECEPTACLE FOR CHLORINE MIXING SYSTEM (CMS) SKID. A BACKUP UNIT IS TO BE PROVIDED BUT ONLY ONE POWERED AT A TIME.
19. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL P-2 FOR DIRECT ELECTRICAL CONNECTION TO CHLORINE DOSING PUMP (CDP) SKIDS. SKID INCLUDES QUAD RECEPTACLE FOR CONNECTION TO DOSING PUMPS AND CHLORINATION CONTROLLER PANELS (CCP).
20. PROVIDE TWO 208V/2P/30A CIRCUIT BREAKERS IN PANEL P-1 FOR HEAT TRACE CONTROLLERS (HTC-1 - 2). PROVIDE DEDICATED ELECTRICAL CONNECTION TO EACH HTC. EACH WATER INTAKE PIPE TO ALSO INCLUDE A THERMAL SENSOR KIT C/W 3 TEMPERATURE PROBES FOR CONTROL AND PROTECTION.
21. PROVIDE TWO 208V/3/80A TIME DELAY CIRCUIT BREAKERS IN PANEL P-1 FOR SUBMERSIBLE WATER PUMPS (WP-1 AND WP-2). PROVIDE DIRECT ELECTRICAL CONNECTION TO EACH PUMP. PUMPS ARE TO BE CONTROLLED BY PUMP SEQUENCER UNIT, LOCATED AS SHOWN.
22. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL P-2 FOR ALARM CONTROL PANEL. PROVIDE 120V/15A DUPLEX RECEPTACLE FOR CONNECTION TO INCLUDED AC ADAPTER.
23. PROVIDE WALL-MOUNTED TELEPHONE JACK FOR CONNECTION TO AUTODIALER OF ALARM REPORTING UNIT. WIRE PHONE JACK BACK TO TELEPHONE DEMARCATION POINT OF BUILDING.
24. PROVIDE AMBER STROBE WARNING LIGHT TO BE MOUNTED EXTERIOR ABOVE LEVEL OF OUTDOOR LUMINAIRE 'B' AT FRONT CORNER OF BUILDING AS SHOWN. UNIT WILL FLASH IF ALARM CONTROLLER DETECTS ANY ALARM CONDITION.
25. PROVIDE EXTERIOR RATED WARNING LIGHT TO INDICATE WASTE WATER STORAGE TANK IS FULL.
26. PROVIDE CEILING-MOUNTED HEAT-DETECTORS IN EACH ROOM AS SHOWN. PUMP ROOM AND CHEMICAL MIXING ROOM ARE TO HAVE FIXED TEMPERATURE 135F UNITS AND GENERATOR ROOM IS TO HAVE FIXED TEMPERATURE 200F UNIT. PROVIDE LOW-VOLTAGE CABLES FOR CONNECTION BACK TO ALARM PANELBOARD.
27. PROVIDE WALL-MOUNTED THERMOSTAT TS-2 FOR LOW-TEMPERATURE ALARM AT LOCATION SHOWN. PROVIDE LOW-VOLTAGE WIRING TO ALARM PANELBOARD.
28. PROVIDE WEATHERPROOF CONTROL BOXES TO BE MOUNTED AT TRUCK TOP HEIGHT. PROVIDE STOP AND START PUSHBUTTONS, IN-USE INDICATOR LIGHTS, FIRE PUSHBUTTON AND FIRE STROBE LIGHT AND LINE-VOLTAGE CONNECTIONS BACK TO PUMP CONTROL PANELBOARD.
29. PROVIDE ALL NECESSARY CONTROL DEVICES AS DESCRIBED IN E5-1 SCHEMATIC (LOW-VOLTAGE TRANSFORMER, RELAYS, PUSHBUTTONS, SWITCHES, MOTORIZED VALVES, INDICATOR LIGHTS) AND CONNECTIONS BETWEEN DEVICES, ALARM REPORTING UNIT, EXPANDER & POWER SUPPLY AND PUMP CONTROL PANEL.
30. ONCE NEW TRUCK FILL STATION HAS BEEN COMMISSIONED, DEMOLISH ALL ELECTRICAL EQUIPMENT, WIRING AND CONDUIT IN OLD FILL STATION BUILDING.
31. PROVIDE NEW PANELBOARD PA-1 IN OLD PUMP STATION TO BE 120/208V/3PH/24CCT/60AF SURFACE-MOUNT. PROVIDE BURIED CONNECTION BACK TO PANEL P-1 AND PROVIDE 208V/3P/60A BREAKER IN PANEL P-1. PROVIDE TWO 120V/15A CIRCUIT BREAKERS IN PANEL PA-1 AS SPARES.
32. PROVIDE INTERIOR LIGHTING OF LUMINAIRE TYPE 'A', TO BE CHAIN-SUSPENDED FROM CEILING AT 3m AFF. PROVIDE WALL-MOUNTED LIGHT SWITCHES WHERE INDICATED. PROVIDE 120V/15A CIRCUIT BREAKER IN PANEL PA-1 FOR INTERIOR LIGHTING.
33. PROVIDE COMBINATION BATTERY PACK/ PICTOGRAM EXIT SIGN, DUAL-HEAD EMERGENCY LIGHTS TO BE MOUNTED DIRECTLY ABOVE DOORWAYS. POWER TO BE ON SAME CIRCUIT AS INTERIOR LIGHTING. PROVIDE DUPLEX 120V RECEPTACLES TO BE WALL-MOUNTED NEXT TO EACH COMBO UNIT.
34. PROVIDE WALL-MOUNTED CONVENIENCE RECEPTACLES WHERE INDICATED, TO BE WALL-MOUNTED AT 300mm AFF. PROVIDE TWO 120V/15A CIRCUIT BREAKERS IN PANEL P-2 TO POWER RECEPTACLES IN EACH ROOM.
35. PROVIDE INTERNET CONNECTION, WALL JACK AND REQUIRED ETHERNET CABLING FOR DATA RECORDER.
36. TRACE ALL CIRCUITS OF PANELBOARDS RELATED TO THIS PROJECT AND PROVIDE NEATLY TYPED, UPDATED CIRCUIT DIRECTORIES IN A PLASTIC HOLDER ON THE INSIDE DOORS OF ALL PANELBOARDS, WITH COPY IN MANUAL.
37. IDENTIFY AND LABEL EACH DEDICATED RECEPTACLE FOR ITS INTENDED USE ONLY.
38. IDENTIFY ALL PULL BOXES, JUNCTION BOXES, FIXTURES, CONTROL PANELS, MOTOR STARTERS, AND DISCONNECT SWITCHES WITH PERMANENT MARKER IDENTIFICATION INDICATING PANEL AND CIRCUIT NUMBERS.
39. CLEAN AREA OF ANY DEBRIS CREATED DURING DEMOLITION WORK.
40. AFTER CONSTRUCTION COMPLETION, MARK UP DRAWINGS INDICATING ANY AND ALL DEVIATIONS FROM THE DRAWINGS AND PROVIDE TWO COPIES TO OWNER.

ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
A	TYPE 'A' LIGHT FIXTURE ROUGH SERVICE CEILING/SUSPEND MOUNT 79W, 5725lm, 4100K, CRI65, ASYMMETRIC BEAM, MVOLT DRIVER
B	TYPE 'B' LIGHT FIXTURE EXTERIOR WALL-PACK 19W, 1017lm, 5000K, 120V, PHOTOELECTRIC CELL, DARK BRONZE FINISH
C	TYPE 'C' LIGHT FIXTURE EXTERIOR WALL-PACK 45W, 3149lm, 5000K, 120V, PHOTOELECTRIC CELL, DARK BRONZE FINISH
STROBE	PENDANT-MOUNT STROBE WARNING LIGHT, WEATHERPROOF 12W, 2Mcp, 60fl/min, 90-130VAC, 3/4" CONDUIT ENTRY, AMBER LENS
	COMBO ALUMINUM 6V 36W CAPACITY BATTERY UNIT W/ 2x PAR18 4W LED HEADS, LED BACKLIT PICTOGRAM SIGN, 120/347VAC INPUT
$	SINGLE POLE WALL-MOUNT SWITCH
	WALL-MOUNT DUPLEX RECEPTACLE CSA CONFIGURATION 5-15R
	WALL-MOUNT DUPLEX RECEPTACLE CSA CONFIGURATION 5-15R ON DEDICATED CIRCUIT
	WALL-MOUNT DUPLEX RECEPTACLE WITH INTEGRAL GFCI PROTECTION
	WALL-MOUNT DUPLEX RECEPTACLE WITH INTEGRAL GFCI ON DEDICATED CIRCUIT
	WALL-MOUNT QUAD RECEPTACLE CSA CONFIGURATION 5-15R
	WALL-MOUNT SPECIAL PURPOSE DIRECT CONNECTION TO EQUIPMENT VOLTAGE, NUMBER OF PHASES AND CIRCUIT BREAKER AMPERAGE AS STATED
	TELEPHONE JACK WALL-MOUNT
	DATA JACK WALL-MOUNT
	ELECTRICAL DISTRIBUTION PANEL
	ELECTRICAL POWER PANEL
	ELECTRICAL PANEL, LOW-VOLTAGE OR SPECIAL-PURPOSE
WHM	WATT-HOUR REVENUE METER
G	EMERGENCY DIESEL ENGINE-GENERATOR SET 208V 3ϕ 60Hz 80kW 100kVA 278A
	AUTOMATIC TRANSFER SWITCH SOLID NEUTRAL, 3-POLE, 3ϕ, 260A, 208V, C/W WINDOW KIT
UF	UNFUSED DISCONNECT SWITCH
	MOTOR, SINGLE-PHASE
	MOTOR, THREE-PHASE
EF	EXHAUST FAN CEILING-MOUNTED
	HEAT DETECTOR CEILING-MOUNTED
T	THERMOSTAT, WALL-MOUNT
FS	FLOW SWITCH
	LEVEL SWITCH
	MOTORIZED VALVE
DP	DIFFERENTIAL PRESSURE METER
	FLOW METER
M	MOTORIZED DAMPER
M	MOTORIZED DAMPER PARALLEL BLADE
	HEAT TRACE CABLE
HTC	HEAT TRACE CONTROLLER
	UNIT HEATERS UH-1–5

EQUIPMENT LIST: IGLOOLIK

1. MB, MAIN BREAKER, 250 AMPS, 250V, 3 POLE BREAKER IN A NEMA 4 ENCLOSURE, IR PER SPEC
2. G, EMERGENCY GENERATOR, DIESEL ENGINE-GENERATOR, STANDBY, AIR CHARGED-AIR COOLED, 3 PHASE, 120/208 V, 80KW, 100 KVA, C/W MAIN BREAKER, LOAD CENTRE AND GFI RECEPTACLE, COMPLETE WITH AN INTEGRATED CONTROLLER, BATTERY CHARGER AND STARTING BATTERIES, BLOCK HEATER AND FIRE ALARM CAPABLE CONTROL PANEL WITH TROUBLESHOOTING AND MAINTENANCE ASSISTANCE CAPABILITIES. MONITORING THE FOLLOWING: VOLTAGES, FREQUENCY, CURRENTS, KILOWATTS AND THE FOLLOWING ALARMS AND FAULTS: LOW OIL PRESSURE, LOW OIL LEVEL, LOW COOLANT LEVEL, HIGH ENGINE TEMPERATURE, NO START UP, ENGINE OVER-SPEED, MIN./MAX. ALTERNATOR VOLTAGE, MIN./MAX. BATTERY VOLTAGE AND EMERGENCY STOP AND THE FOLLOWING ENGINE PARAMETERS: HOURS COUNTER, OIL PRESSURE, COOLANT TEMPERATURE, ENGINE SPEED, BATTERY VOLTAGE, BATTERY CHARGING AMPS, ROOM TEMPERATURE AND STATUS OF COOLANT HEATER (CURRENT)..
3. ATS, AUTOMATIC TRANSFER SWITCH, SOLID NEUTRAL, 3 POLE, 3 PHASE, 120/208 V, 260 AMPS, C/W WINDOW KIT, ASCO CAT. NUMBER: 300 3 260 C 1 C 123 120/208V, 60 HZ, OR EQUIVALENT, IR PER SPEC, MONITORING THE FOLLOWING: A.T.S. POSITION, VOLTAGES, FREQUENCY AND CURRENTS, KILOWATTS, ATS TROUBLE.
4. P1, PANEL BOARD, 120/208V, 3 PHASE, 4 WIRE, 400 AMP FRAME, SURFACE MOUNT, 60 CIRCUITS, NEMA 4 ENCLOSURE. C/W 250A/3P MAIN BREAKER AND THE FOLLOWING LOAD BREAKERS: 100A/3P, 2X 100A/3P TIME DELAY, 60A/3P, 2X 30A/2P, 7X 15A/3P. IRS PER SPEC.
5. P2, PANEL BOARD, 120/208V, 3 PHASE, 4 WIRE, 100 AMP FRAME, 30 CIRCUITS, SURFACE MOUNT, NEMA 4 ENCLOSURE. C/W THE FOLLOWING LOAD BREAKERS: 30A/2P, 25A/1P, 20A/1P AND 13X 15A/1P. IRS PER SPEC
6. PA-1, PANEL BOARD, 120/208V, 3 PHASE, 4 WIRE, 60 AMP FRAME, 24 CIRCUITS, SURFACE MOUNT, NEMA 4 ENCLOSURE. C/W THE FOLLOWING LOAD BREAKERS: 4X 15A/1P. IRS PER SPEC
7. UH-1 TO 5, 4kW 208V 3PHASE UNIT HEATER, C/W INTERNAL THERMOSTAT AND 40A DISCONNECT SWITCH. CHROMOLOX MODEL NUMBER: LUH-04-83-34-40-1. C/W WALL-MOUNT BRACKET MODEL NUMBER: WUH-01A
8. LIGHT 'A': SUSPEND MOUNT LED ROUGH SERVICE FIXTURE, LITHONIA LIGHTING MODEL NUMBER: VAP 79LED ASY, C/W 8' CHAIN MOUNT BRACKET MODEL: VAPCMB MSI8
9. LIGHT 'B': 19W 1017LM LED WALL LUMINAIRE C/W PHOTOCELL, LITHONIA LIGHTING MODEL NUMBER: TWS LED 1 50K 120 PE
10. LIGHT 'C': 45W 3149LM LED WALL LUMINAIRE C/W PHOTOCELL, LITHONIA LIGHTING MODEL NUMBER: TWP LED 20C 700 50K T3M 120 PE DDBXD
11. EXIT SIGNS: COMBO ALUMINUM LED PICTOGRAM EXIT SIGN, DUAL HEAD 4W PAR18 LED LIGHTS AND 36W BATTERY PACK, AIMLITE MODEL: CARPW0636 U M-2SM4LJ WHT/ATD
12. ALARM REPORTING UNIT: BARNETT ENGINEERING MODEL: B1290 PROTALK PLUS, C/W ONE EXPANDER UNIT MODEL: B1292 AND ONE BATTERY BACKUP POWER SUPPLY MODEL: OPTION 004
13. STROBE: PENDANT-MOUNT STROBE WARNING LIGHT, WEATHERPROOF, ¾" CONDUIT ENTRY, AMBER LENS. APPLIED STROBE TECHNOLOGY MODEL: AST-2-90-130-AC-AM
14. FIRE BEACON: RED, FLASHING LED, 24V AC/DC, WERMA SIGNALTECHNIK PART NUMBER: 22410075
15. HD-1 TO 2, FIXED TEMPERATURE 135F MOISTURE-PROOF HEAT DETECTOR, MIRCOM MODEL: CF-135MP
16. HD-3: FIXED TEMPERATURE 200F MOISTURE-PROOF HEAT DETECTOR, MIRCOM MODEL: CF-200MP
17. K0 TO 3: 4PDT, 120VAC COIL RELAY
18. K4 TO 5: 4PDT, 24VAC COIL RELAY
19. HTC-1 TO 2: HEAT TRACE CONTROLLER, URECON MODEL NUMBER: UTC-2030-11, WITH GROUND FAULT DETECTION CIRCUITRY, 120-240VAC, 30A, 2 POLES IN A NEMA 4 PAINTED STEEL ENCLOSURE. CONTROLS FACTORY SET @ 3°C AND HIGH LIMIT: 65°C FOR PROTECTION OF PLASTIC PIPING. EACH HTC TO CONTROL: 2 HEAT TRACE CABLES, AND 3 RTD TEMPERATURE SENSORS, PER INTAKE PIPE. FOR INSTALLATION DETAILS OF HEAT TRACE COMPONENTS SEE: SPEC 224201_13-072 REV PLUMBING SPECIALTIES AND ACCESSORIES, SECTION 2.8: INTAKE PIPES.
20. HEAT TRACE CABLES: THERMOCABLE MODEL# C13-240-COJ, 12AWG BUS WIRES WITH OUTPUT OF 9.75 W/m @ 208VAC AND MAXIMUM CIRCUIT LENGTH OF 220m. EACH INTAKE PIPE TO HAVE A REDUNDANT SET OF THREE SPARE HEAT TRACE CABLES PULLED UPON INSTALLATION.
21. 100 Ω RTD TEMPERATURE SENSOR URECON MODEL: ERTD-15-G WITH 15 m OF GREY PVC LEAD WIRE.
22. 100 Ω RTD TEMPERATURE SENSOR URECON MODEL: ERTD-15-R WITH 15 m OF RED PVC LEAD WIRE.
23. 100 Ω RTD TEMPERATURE SENSOR URECON MODEL: ERTD-30-G WITH 30 m OF GREY PVC LEAD WIRE.

PUMP STATION OVERVIEW:

MAJOR COMPONENTS:

1. PUMP SEQUENCER: ITS FUNCTION IS TO SEQUENCE THE 2 SUBMERSIBLE PUMPS (WP-1 AND WP-2), SO THAT EACH PUMP IS EXERCISED EQUALLY OVER TIME.
   IN CASE OF A PUMP FAILURE (DETERMINED BY THE RELEVANT FLOW SWITCH FS-1 OR FS-2), THE SEQUENCE SWITCHES TO THE NEXT AVAILABLE PUMP AND INITIATES AN ALARM CONDITION.
2. PUMP CONTROLLER: IT TIES ALL CONTROL DEVICES AND SENSORS TOGETHER. THE CONTROL LIGHTS INDICATE WHICH FILLING STATION IS IN USE AND WHICH PUMP IS RUNNING. IT ALSO INDICATES SOME OF THE ALARM CONDITIONS AND PROVIDES AN EMERGENCY POWER OFF AND RESET PUSHBUTTONS.
3. ALARM REPORTING UNIT: ITS FUNCTION IS TO TURN ON THE ROOFTOP STROBE AT ANY OF THE 10 ALARM CONDITIONS AND TO DIAL PRE-PROGRAMMED PHONE NUMBERS WITH A RECORDED MESSAGE WARNING OF THE ALARM CONDITION.

OPERATION:

4. DEPRESSING THE "ON" PUSHBUTTON OF FILLING STATION #1 LOCATED ON THE FILLING ARM WILL START THE CHLORINATION LOOP, CLOSE VALVE SV-1 AND OPEN MV-1. THIS OPERATION TAKES APPROX. 3 SECONDS. AFTER A 3 SECOND DELAY, THE PUMP SEQUENCER STARTS THE "NEXT" AVAILABLE PUMP. DEPRESSING THE SAME "ON" PUSHBUTTON AGAIN WILL HAVE NO IMPACT.
5. PUMPING MUST BE STOPPED BY DEPRESSING THE "OFF" PUSHBUTTON OF FILLING STATION #1. DEPRESSING THE "OFF" PUSHBUTTON WILL STOP THE CHLORINATION AND THE PUMP IT STARTED. IT ALSO CLOSES VALVE MV-1 AND OPENS VALVE SV-1 WHICH DRAINS THE OUTSIDE PORTION OF THE FILL ARM.
6. THE PROCESS IS IDENTICAL FOR FILL STATION #2 (EXCEPT IT WORKS WITH VALVES MV-2 AND SV-2).

THE CHLORINATION LOOP:

7. THE MICROCHEM2 CHLORINE CONTROLLER PACKAGE (CCP-1) IS THE CONTROLLING UNIT FOR THE PRIMARY CHLORINATION PROCESS. SINCE THE WATER FLOW IN THE MAIN 100mm WATER PIPE CAN VARY DEPENDING ON WHETHER 1 OR 2 WATER PUMPS ARE RUNNING, THE CONDITION OF THE FILTERS AND WATER LEVEL IN THE LAGOON, THE FLOW IS PRECISELY MEASURED BY THE FLOW METER (FM-1). THE CCP-1 SENDS A 4-20mA SIGNAL TO ITS CHLORINE DOSING PUMP (CDP-1) THAT IS PROPORTIONAL TO THE WATER FLOW MEASURED BY FM-1. A WATER SAMPLE IS TESTED CONTINUALLY BY CHLORINATION AND pH/TEMPERATURE PROBES CONNECTED TO CCP-1 AND CCP-1 WILL ADJUST THE AMOUNT OF CHLORINE PUMPED BY CDP-1 TO ENSURE THE REQUIRED LEVEL OF PRIMARY CHLORINATION.
8. CCP-2 IS A POST-CHLORINATION LOOP IDENTICAL TO CCP-1. ITS FUNCTION IS TO CHECK CHLORINATION LEVEL OF WATER DELIVERED TO TRUCKS AND ADD CHLORINE IF REQUIRED. THE FLOW IS PRECISELY MEASURED BY THE FLOW METER (FM-2). THE CCP-2 SENDS A 4-20mA SIGNAL TO ITS CHLORINE DOSING PUMP (CDP-2) THAT IS PROPORTIONAL TO THE WATER FLOW MEASURED BY FM-2. A WATER SAMPLE IS TESTED CONTINUALLY BY CHLORINATION AND pH/TEMPERATURE PROBES CONNECTED TO CCP-2 AND CCP-2 WILL ADJUST THE AMOUNT OF CHLORINE PUMPED BY CDP-2 TO ENSURE THE REQUIRED LEVEL OF POST-CHLORINATION.
9. THE INFORMATION GATHERED BY CCP-1 AND CCP-2 (WATER DELIVERY, CHLORINATION AND pH LEVELS, TEMPERATURE) CAN BE STORED IN THE DATA RECORDER AND ACCESSED THROUGH A USB PORT OR REMOTELY THROUGH AN IP ADDRESS.
10. ONLY ONE OF THE CDP SUBCOMPONENT DOSING PUMPS (CP-1 OR CP-2) IS "ON". THE SECOND PUMP IS A BACKUP IN CASE THAT THE ACTIVE PUMP HAS FAILED. THIS MUST BE SWITCHED MANUALLY. THE CDP DOSING PUMP SKID ALSO CONTAINS CALIBRATION AND CLEANING ACCESSORIES.
11. THE CHLORINE SOLUTION FOR THE DOSING PUMPS IS PREPARED BY AN "MC4-50" CHLORINE MIXING SYSTEM (CMS). HERE AGAIN THE SECOND SYSTEM IS A BACKUP IF THE ACTIVE ONE FAILS. IT IS RECOMMENDED TO KEEP THE BACKUP SYSTEM DRY & CLEAN AND ONLY ACTIVATE IT UNTIL IT IS REQUIRED.

SYSTEM FAILURES AND ALARMS:

12. THE ALARMS ARE LISTED IN THE ALARM REPORTING TABLE. THERE ARE 10 ALARMS CONNECTED TO THE ALARM REPORTING UNIT. IT ALSO CAN ACCOMMODATE ANOTHER 6 ALARM INPUTS IN THE FUTURE IF REQUIRED.
13. SOME OF THE ALARM LEVELS ARE SETTABLE: A). - THE LOW TEMPERATURE ALARM ON THERMOSTAT TS-1 LOCATED IN THE MAIN PUMPING ROOM, AND B).- PRESSURE DROPS ACROSS THE WATER FILTERS MEASURED BY DP-1. DP-1 HAS TWO ADJUSTABLE ALARM SETTINGS: HIGH (H) - WHEN ONE TRUCK IS BEING FILLED (ONE WATER PUMP IS RUNNING), AND HIGH/HIGH (H/H) WHEN TWO TRUCKS ARE BEING FILLED (TWO WATER PUMPS ARE RUNNING). THE SETTINGS OF DP-1 WILL NEED TO BE ESTABLISHED BY EXPERIENCE. HOWEVER, THE PRESSURE SHOULD NOT EXCEED 15LB ACROSS THE FILTER BANK WHEN TWO PUMPS ARE RUNNING (H/H). THE HIGHER THE ALLOWED PRESSURE DROP ACROSS THE FILTERS, OVER TIME IT WILL TAKE LONGER TO FILL THE TRUCKS AS THE FILTERS CATCH MORE SEDIMENT, BUT THE FILTERS WILL NEED TO BE CLEANED LESS FREQUENTLY.

Arktis piusitippaa

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MECH. PROJECT No: 13–072

NO.	DATE: (dd/mm/yy)	BY:	DESCRIPTION:
10			
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8			
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5	28/03/16	B.P.	REISSUED FOR TENDER
4	14/04/14	B.P.	REISSUED FOR TENDER
3	13/02/14	B.P.	ISSUED FOR TENDER
2	15/01/14	B.P.	ISSUED FOR 99% REVIEW
1	25/11/13	B.P.	ISSUED FOR 50% REVIEW

STAMP

REGISTERED PROFESSIONAL ENGINEER — M.M. MILLET — MAR 2016 — NWT/NU

CONSULTANT: CEML
DRAWN BY: B.P.
DESIGNED BY: N.K.
APPROVED BY: M.M.
DATE: MARCH 2016

STAMP

PERMIT TO PRACTICE
CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature _____
Date 30 March 2016
PERMIT NUMBER: P 732
NWT/NU Association of Professional Engineers and Geoscientists

LOCATION:

IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

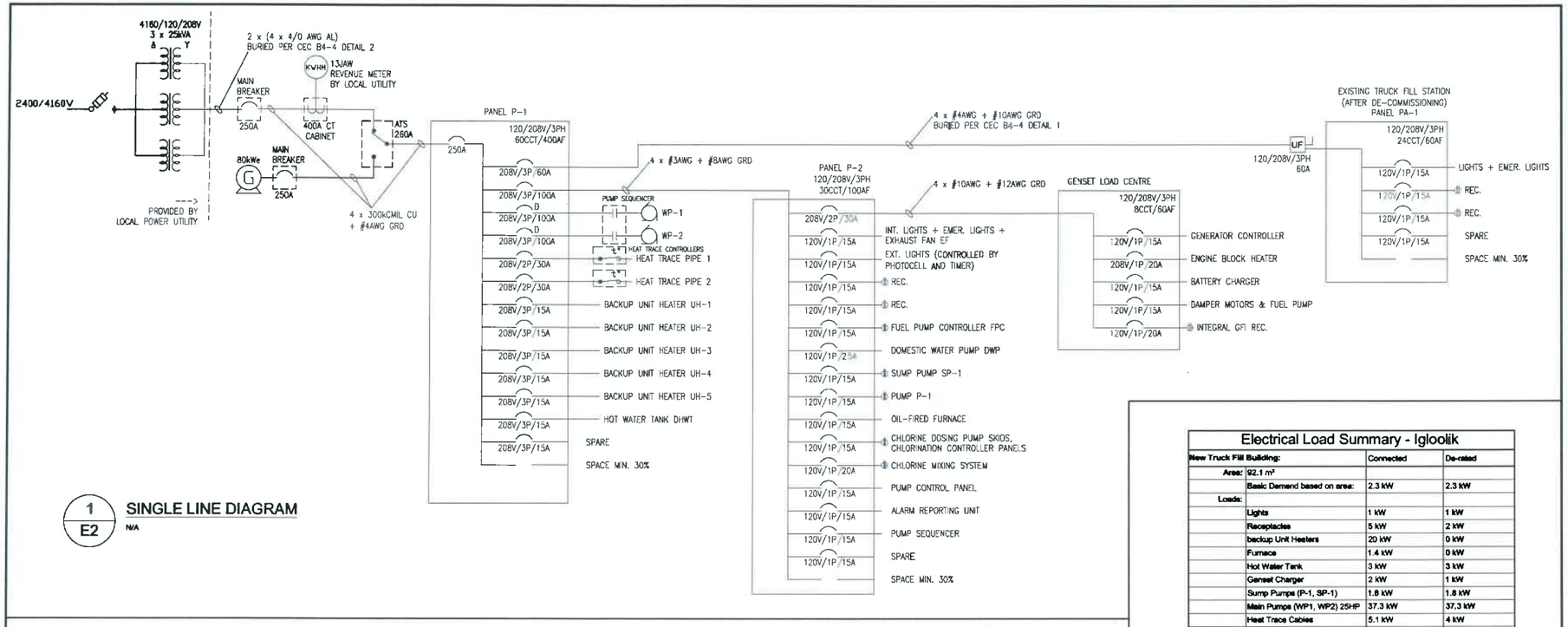
PROJECT:

IMPROVEMENT OF
WATER SUPPLY SYSTEM

DRAWING TITLE:

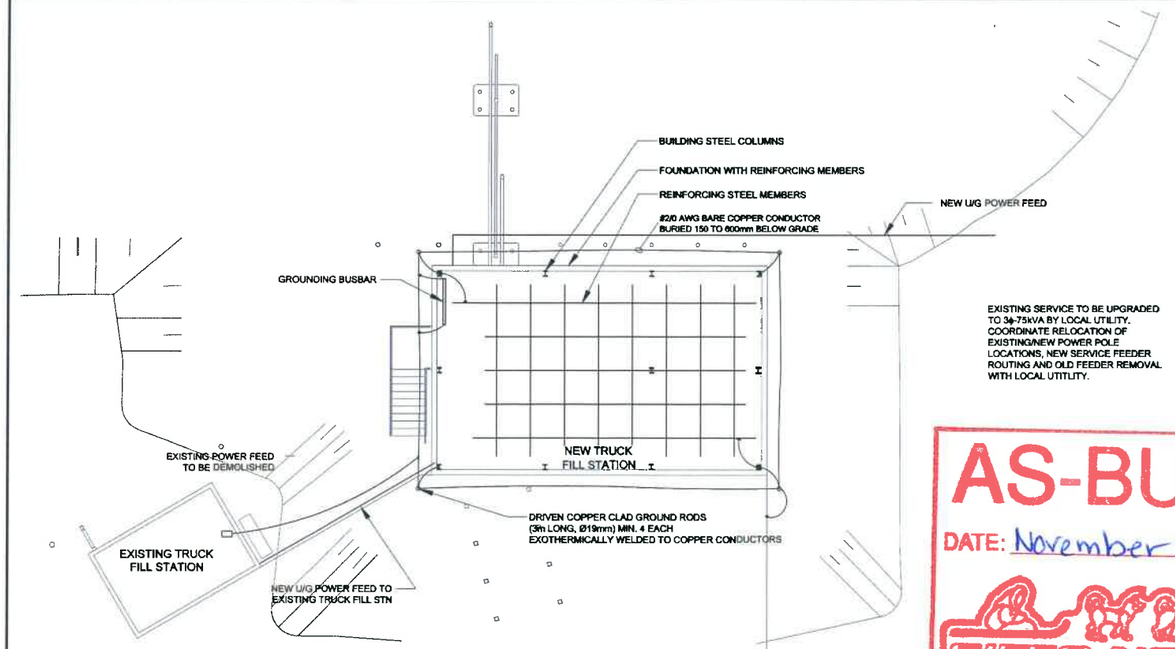
ELECTRICAL
SCOPE OF WORK, LEGEND AND
MAJOR EQUIPMENT SCHEDULE

MECH. FILE NAME:	DWG. NO:	OF:	SCALE:
13-072 E	E1	6	AS NOTED



1 / E2 **SINGLE LINE DIAGRAM**

N/A



2 / E2 **SITE PLAN - POWER DISTRIBUTION & GROUNDING SCHEME**

N/A

AS-BUILT
DATE: November 5, 2018
CIMC NORTH

Electrical Load Summary - Igloolik

New Truck Fill Building:		**Connected**	**De-rated**
Area:	**92.1 m²**		
	Basic Demand based on area:	**2.3 kW**	**2.3 kW**
Loads:			
	Lights	**1 kW**	**1 kW**
	Receptacles	**5 kW**	**2 kW**
	backup Unit Heaters	**20 kW**	**0 kW**
	Furnace	**1.4 kW**	**0 kW**
	Hot Water Tank	**3 kW**	**3 kW**
	Genset Charger	**2 kW**	**1 kW**
	Sump Pumps (P-1, SP-1)	**1.8 kW**	**1.8 kW**
	Main Pumps (WP1, WP2) 25HP	**37.3 kW**	**37.3 kW**
	Heat Trace Cables	**5.1 kW**	**4 kW**
	Domestic Water Pump (DWP)	**0.9 kW**	**0.9 kW**
Existing Truck Fill Building:			
Area:	**26.7 m²**		
	Basic Demand based on area:	**0.7 kW**	**0.7 kW**
Loads:	**Lights**	**0.3 kW**	**0.3 kW**
	Receptacles	**0 kW**	**0 kW**
	TOTAL Connected Load:	**80.8 kW**	
	TOTAL De-rated Load:		**54.4 kW**
	Minimum Service (at 125%)	**68 kVA**	**189 A**
	Required Service	**75 kVA fused at**	**250 A**

GROUNDING NOTES:

1. PERFORM COMPLETE INSTALLATION AND EQUIPMENT IN STRICT ACCORDANCE TO THE STRINGENT MOST REQUIREMENTS OF A) CSA C22.1-12 - 22ND EDITION OF THE CANADIAN ELECTRICAL CODE 2012 B) GN/CGS- PROTECTION SERVICES DIVISION-ELECTRICAL / MECHANICAL SAFETY SECTION -ELECTRICAL BULLETINS.
2. ALL GROUNDING EQUIPMENT SHALL BE CSA APPROVED. GROUNDING SHALL BE DONE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE 2012 AND INSPECTED BY ESA PRIOR TO BACKFILLING. EXCAVATION TO BE BACKFILLED AND COMPACTED TO 600 mm WITH THE BALANCE OF THE EXCAVATION TO REMAIN OPEN FOR GROUNDING INSTALLATION BY CONTRACTOR UNTIL INSPECTION IS COMPLETED.
3. PROVIDE MINIMUM FOUR DRIVEN COPPER CLAD GROUND RODS NOT LESS THAN 3 m LONG AND 19 mm IN DIAMETER, SPACED AT LEAST THE ROD LENGTH APART, LOCATED AROUND THE PERIMETER WALL OF THE BUILDING. INTERCONNECT THE GROUNDING RODS WITH NO. 2/0 AWG BARE COPPER CONDUCTOR AT A MINIMUM DEPTH OF 150 mm BELOW THE FINISHED GRADE OF THE BUILDING.
4. BOND THE REINFORCING STEEL OF THE FOUNDATION AND SLAB TO THE BURIED GROUNDING WIRES WITH AT LEAST IN 2 PLACES USING 2/0 AWG BARE COPPER CONDUCTORS.
5. BOND THE STEEL COLUMNS OF THE BUILDING TO THE BURIED GROUNDING SYSTEM AS SHOWN.
6. BOND THE EXISTING TRUCK FILL STATION AND THE CHAIN LINK FENCE TO THE NEW BURIED GROUNDING SYSTEM AS SHOWN.
7. CHECK RESISTANCE TO GROUND BEFORE ENERGIZING. TEST GROUND RESISTANCE FOR THE PROSPECTIVE FAULT CURRENT UNDER BOTH SHORT CIRCUITS AND EARTH FAULT CONDITIONS AND AT EVERY RELEVANT POINT OF THE COMPLETE INSTALLATION. PERFORM CONTINUITY TEST, INSULATION RESISTANCE TESTS AND POLARITY TEST FOR EARTH FAULT LOOP IMPEDANCE.
8. PROVIDE ADDITIONAL GROUNDING RODS IF THE MEASURED GROUNDING RESISTANCE IS HIGHER THAN 15 OHMS.
9. PROVIDE COPPER GROUND BUSBAR AT THE INCOMING ELECTRICAL SERVICE. CONNECT THE BUSBAR TO THE BURIED GROUNDING CONDUCTOR IN AT LEAST 2 PLACES AND GROUND ALL NON-CURRENT CARRYING METAL PARTS OF THE EQUIPMENT AND STRUCTURES IN THE BUILDING TO IT.

Arktis piusitippaa

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STAMP

REGISTERED PROFESSIONAL ENGINEER
M.M. MARLET
MAR 12 2016
NWT/NU

CONSULTANT: CEML
DRAWN BY: B.P.
DESIGNED BY: N.K.
APPROVED BY: M.M.
DATE: MARCH 2016

STAMP

PERMIT TO PRACTICE
CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature
Date 30 March 2016
PERMIT NUMBER: P 732
NWT/NU Association of Professional Engineers and Geoscientists

LOCATION:

IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

PROJECT:

IMPROVEMENT OF
WATER SUPPLY SYSTEM

DRAWING TITLE:

SINGLE LINE DIAGRAM AND
SITE POWER DISTRIBUTION &
GROUNDING SCHEME

MECH FILE NAME	DWG NO.	OF:	SCALE
13-072 E	E2	6	AS NOTED

Truck Fill Station

Igloolik, NUNAVUT

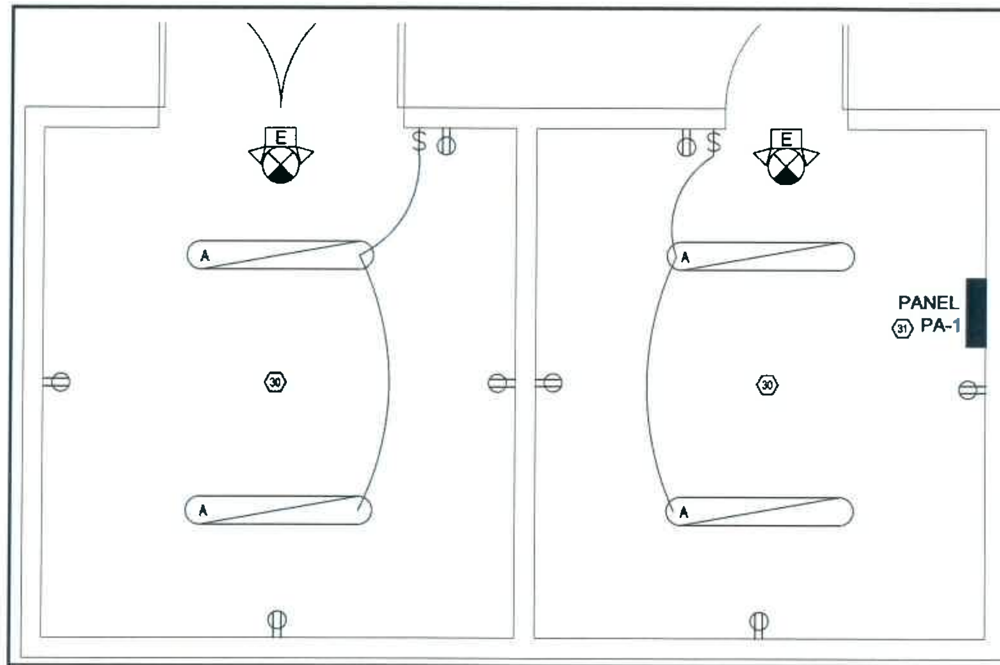
PANEL P-1

120/208 VOLT, 3 PHASE, 4 WIRES

CKT. TRIP	DESCRIPTION	No BRKR.	PH	No BRKR.	DESCRIPTION	CKT. TRIP
3P-100	Water Pump - 1	1	A	2	Panel P2	3P-100
		3	B	4		
		5	C	6		
3P-100	Water Pump - 2	7	A	8	Old Station	3P-60
		9	B	10		
		11	C	12		
2P-30	Heat Trace - 1	13	A	14	Heat Trace - 2	2P-30
		15	B	16		
1P-15	Spare	17	C	18	Spare	1P-15
3P-15	Heater UH - 1	19	A	20	Heater UH - 2	3P-15
		21	B	22		
		23	C	24		
3P-15	Heater UH - 3	25	A	26	Heater UH - 4	3P-15
		27	B	28		
		29	C	30		
3P-15	Heater UH - 5	31	A	32	Hot Water	3p-15
		33	B	34		
		35	C	36		
1P-15	Spare	37	A	38	Spare	1P-15
1P-15	Spare	39	B	40	Spare	1P-15
		41	C	42		
		43	A	44		
		45	B	46		
		47	C	48		
		49	A	50		
		51	B	52		
		53	C	54		
		55	A	56		
		57	B	58		
		59	C	60		
		61	A	62		
2P-30	Spare	63	B	64		
		65	C	66		
2P-30	Spare	67	A	68		
		69	B	70		
		71	C	72		

Truck Fill Station						
Igloolik, NUNAVUT						
PANEL P-2						
120/208 VOLT, 3 PHASE, 4 WIRES						
CKT. TRIP	**DESCRIPTION**	**No BRKR.**	**PH**	**No BRKR.**	**DESCRIPTION**	**CKT. TRIP**
3P-30	Genset Panel	1	**A**	2	Light & Exit - Light & Fan	1P-15
		3	**B**	4	Exterior Light	1P-15
		5	**C**	6	Receptacle	1P-15
1P-15	Fuel Pump 1	7	**A**	8	Fuel Controller	1P-15
1P-15	Fuel Pump 2	9	**B**	10	Furnace	1P-15
1P-15	P-1	11	**C**	12	Receptacle (Gen Room)	1P-15
1P-15	SP-1	13	**A**	14	Receptacle (Chlorine Room)	1P-15
1P-15	Domestic Water Pump	15	**B**	16	Chlorine Dosing	1P-15
1P-15	Pump Control & Alarm Panel	17	**C**	18	Chlorine Mixing	1P-20
1P-15	Circulation Pump P2	19	**A**	20	Receptacle (Control Panel)	1P-20
1P-15	Circulation Pump P3	21	**B**	22	Analyzer Final	1P-15
1P-15	Sequencer	23	**C**	24	PLC	1P-15
1P-15	Receptacle Under Window	25	**A**	26	Water Pumps PS1 & PS2	2P-15
		27	**B**	28		
		29	**C**	30		
		31	**A**	32		
		33	**B**	34		
		35	**C**	36		
		37	**A**	38		
		39	**B**	40		
		41	**C**	42		

Truck Fill Station						
Igloolik, NUNAVUT						
Genset Load Panel						
240/48 VOLT, 3 PHASE, 4 WIRES						
CKT. TRIP	**DESCRIPTION**	**No BRKR.**	**PH**	**No BRKR.**	**DESCRIPTION**	**CKT. TRIP**
1P-15	Generator Dampers	1	**A**	2	Gen Run Damper	1P-15
1P-15	Receptacle Gen Panel	3	**B**	4	Battery Charger	1P-15
		5	**C**	6	Block Heater	1P-20
		7	**A**	8		
		9	**B**	10		
		11	**C**	12		
		13	**A**	14		
		15	**B**	16		
		17	**C**	18		

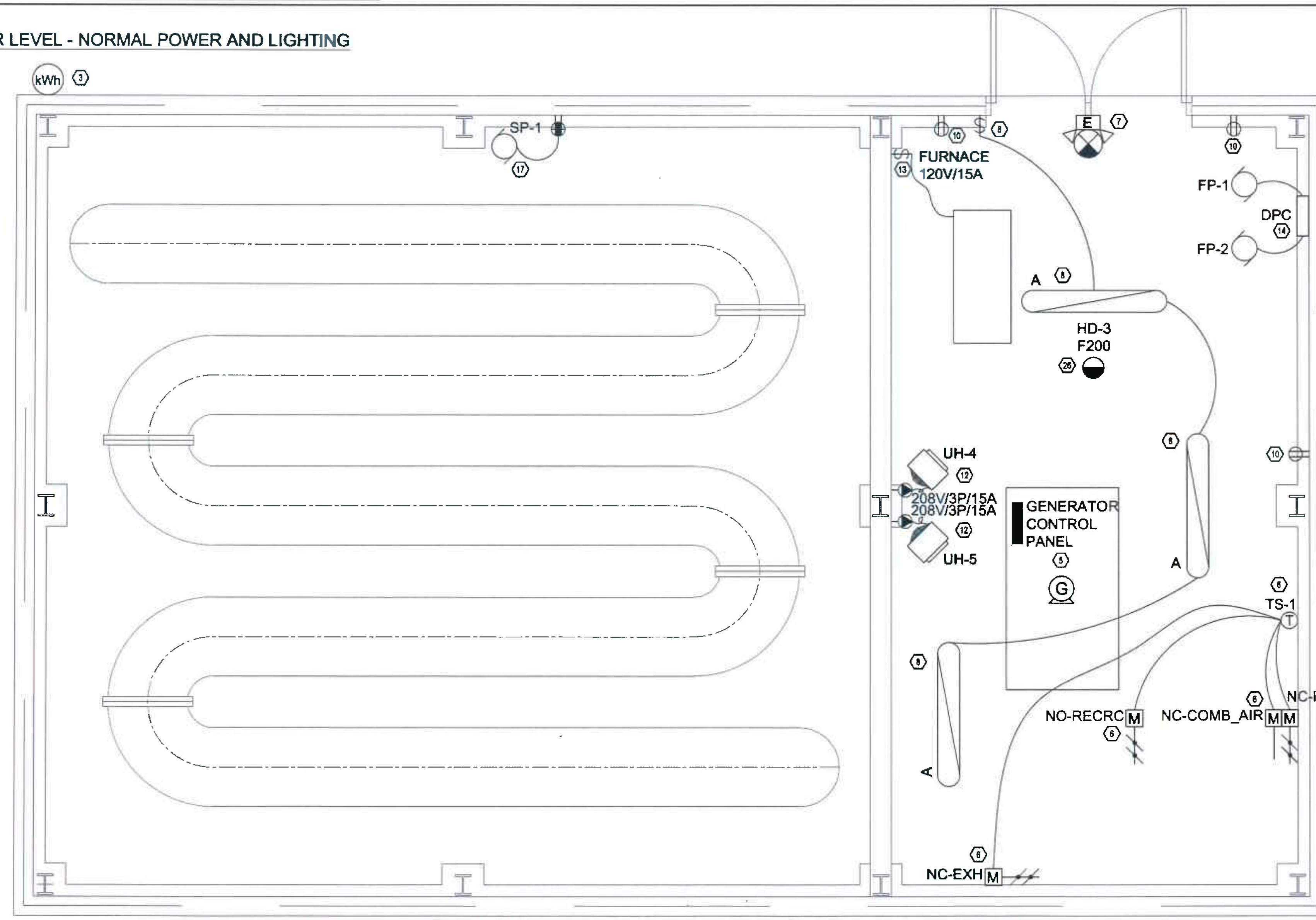


- DEMOLISH ALL EXISTING ELECTRICAL EQUIPMENT IN DECOMMISSIONED PUMP STATION.
- PROVIDE NEW PANEL PA-1 TO REPLACE OLD PANEL, AND PROVIDE NEW U/G FEED FROM NEW PUMP STATION.
- PROVIDE ONE DUPLEX CONVENIENCE RECEPTACLE AT EACH ENTRANCE AND ON EACH WALL.
- PROVIDE WALL-MOUNTED LIGHT SWITCHES AT EACH ENTRANCE AND SUFFICIENT LIGHTING FIXTURES 'A' TO PROVIDE 50LX ILLUMINATION FOR EACH ROOM.
- PROVIDE COMBINATION BATTERY PACK/ PICTOGRAM EXIT SIGN AND DUAL 4W LED EMERGENCY LIGHTS ABOVE DOORWAY TO EACH EXTERNAL DOOR.

PERMIT TO PRACTICE
CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature [signature]
Date 30 march 2016
PERMIT NUMBER: P 732
NWT/NU Association of Professional Engineers and Geoscientists

2 / E3 ELECTRICAL LAYOUT - EXAMPLE DECOMMISSIONED PUMP STATION
N/A

1 / E3 ELECTRICAL LAYOUT - LOWER LEVEL - NORMAL POWER AND LIGHTING
1:25



AS-BUILT
DATE: November 5, 2018
SIFEC NORTH

Arktis piusitippaa

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CHIARELLI ENGINEERING MANAGEMENT LTD.
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MECH. PROJECT No: 13-072

NO	DATE: (dd/mm/yy)	BY:	DESCRIPTION:
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5	28/03/16	B.P.	REISSUED FOR TENDER
4	14/04/14	B.P.	REISSUED FOR TENDER
3	13/02/14	B.P.	ISSUED FOR TENDER
2	15/01/14	B.P.	ISSUED FOR 99% REVIEW
1	25/11/13	B.P.	ISSUED FOR 90% REVIEW

STAMP: REGISTERED PROFESSIONAL ENGINEER M.M. MALLET MAR. 2016 NWT/NU

CONSULTANT: CEML
DRAWN BY: B.P.
DESIGNED BY: N.K.
APPROVED BY: M.M.
DATE: MARCH 2016

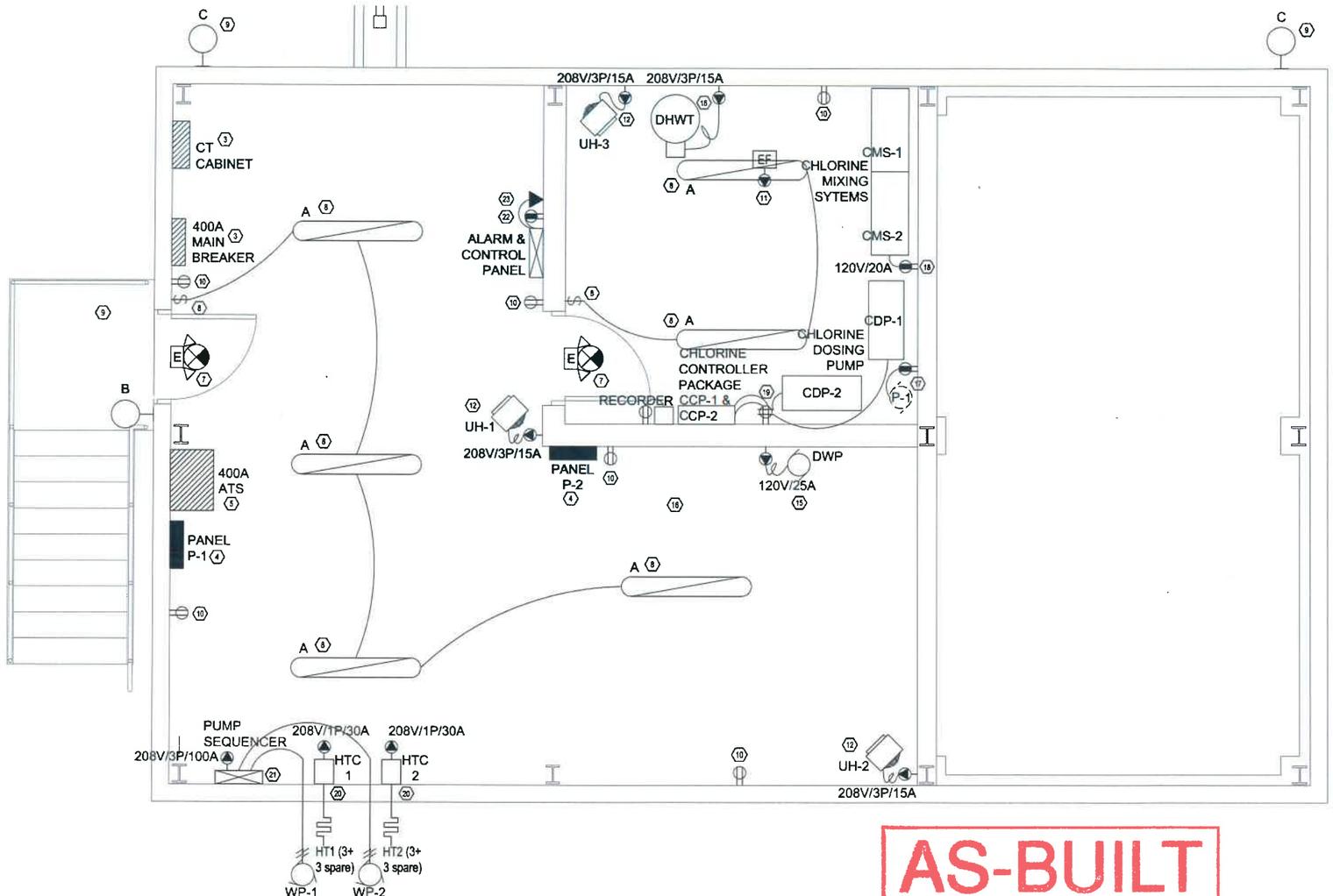
STAMP
CONSULTANT:
DRAWN BY:
DESIGNED BY:
APPROVED BY:
DATE:

LOCATION:
IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

PROJECT:
IMPROVEMENT OF WATER SUPPLY SYSTEM

DRAWING TITLE:
ELECTRICAL POWER & LIGHTING LAYOUT LOWER LEVEL

MECH FILE NAME:	DWG NO:	OF:	SCALE:
13-072 E	E3	6	AS NOTED



1/E4 ELECTRICAL LAYOUT - UPPER LEVEL - NORMAL POWER AND LIGHTING

1:25

AS-BUILT

DATE: November 5, 2018

DIEC NORTH

PERMIT TO PRACTICE
CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature
Date 30 March 2016
PERMIT NUMBER: P 732
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3	13/08/14	B.P.	ISSUED FOR TENDER
2	15/01/14	B.P.	ISSUED FOR 99% REVIEW
1	25/11/13	B.P.	ISSUED FOR 50% REVIEW
No.	DATE: (dd/mm/yy)	BY:	DESCRIPTION

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REGISTERED PROFESSIONAL ENGINEER M.M. CHIARELLI M.APR. 2016 NWT/NU

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CONSULTANT: CEML
DRAWN BY: B.P.
DESIGNED BY: N.K.
APPROVED BY: M.M.
DATE: MARCH 2016

CONSULTANT:
DRAWN BY:
DESIGNED BY:
APPROVED BY:
DATE:

LOCATION:

IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

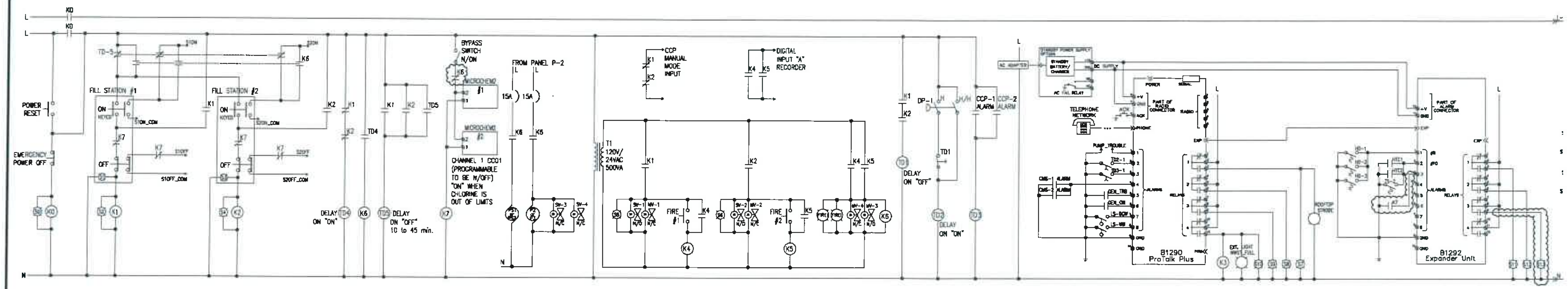
PROJECT:

IMPROVEMENT OF WATER SUPPLY SYSTEM

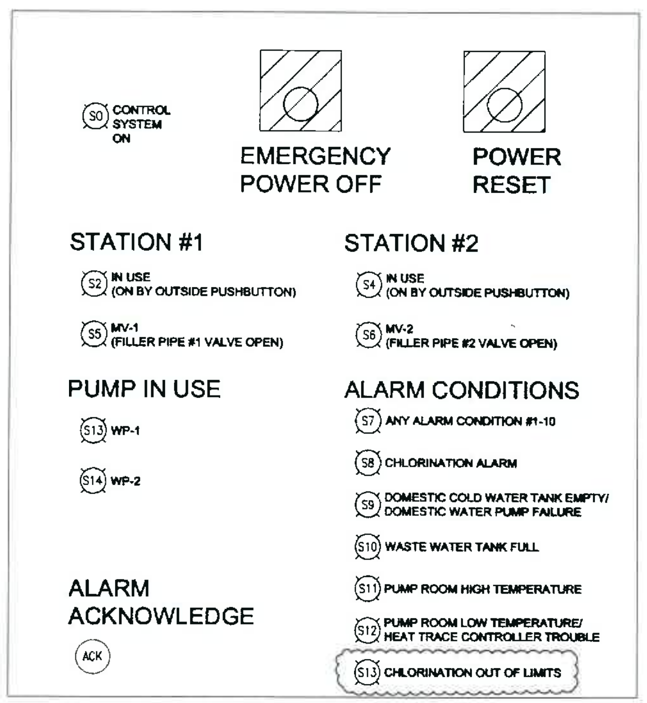
DRAWING TITLE:

ELECTRICAL POWER & LIGHTING LAYOUT UPPER LEVEL

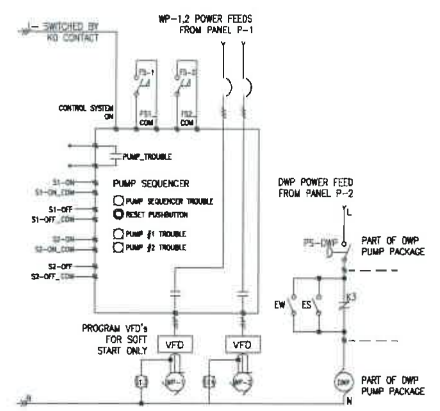
MECH FILE NAME	DWG NO	REV	SCALE
13-072 E	E4	6	AS NOTED



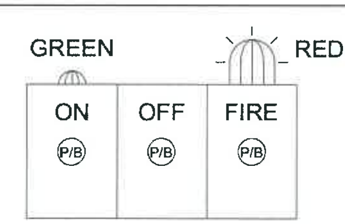
1 / E5 PUMP CONTROL SYSTEM & ALARM SYSTEM LADDER LOGIC DIAGRAM
N/A



3 / E5 PUMP CONTROL SYSTEM PANELBOARD LAYOUT
N/A



2 / E5 PUMP C.S. LOGIC DIAGRAM CONT'D
N/A



4 / E5 FILL ARM CONTROL BOX LAYOUT
N/A

ALARM REPORTING UNIT			
ALARM #	**ALARM DESCRIPTION**	**ALARM CONDITION**	**ALARM GENERATED BY**
1	PUMP TROUBLE	NO FLOW OF WATER WHEN PUMP TURNED ON	PUMP SEQUENCER & WATER PUMP FLOW SWITCHES FS-1 – 2
2	FILTER BLOCKED	INSUFFICIENT FLOW OF WATER WHEN PUMP IS RUNNING	DIFFERENTIAL PRESSURE SWITCH DP-1
3	CHLORINATION STOPPED	INSUFFICIENT FLOW OF CHLORINE WHEN CCP-1 OR CCP-2 IS RUNNING	CHLORINATION CONTROLLER PANEL CCP-1 OR CCP-2
4	CHLORINE FEED TROUBLE	CHLORINE MIXING SYSTEM TROUBLE	CHLORINE MIXING SYSTEM CMS-1 OR CMS-2
5	EMERGENCY GENERATOR TROUBLE	ANY OUT-OF-SPEC CONDITION	GENERATOR CONTROLLER
6	EMERGENCY GENERATOR RUNNING	NORMAL GRID POWER LOST	AUTOMATIC TRANSFER SWITCH ATS
7	WATER STORAGE TANK EMPTY	LOW LEVEL IN DOMESTIC COLD WATER STORAGE TANK	FRESH WATER STORAGE TANK LOW LEVEL FLOAT SWITCH LS-DCW
8	WASTE WATER TANK FULL	HIGH LEVEL IN WASTE WATER STORAGE TANK	WASTE WATER STORAGE TANK HIGH LEVEL FLOAT SWITCH LS-WW
9	PUMP STATION HIGH TEMPERATURE	HIGH PUMP STATION ROOM TEMPERATURE	3 ROOM HEAT DETECTORS HD-1 – 3
~~10~~	~~PUMP STATION LOW TEMPERATURE~~	~~LOW PUMP STATION ROOM TEMPERATURE / HEAT TRACE TROUBLE~~	~~ROOM THERMOSTAT & 2 HEAT TRACE CONTROLLERS~~
11	CHLORINATION OUT OF LIMITS	CHLORINE IS LOWER THAN MIN. OR HIGHER THAN MAX. SETTINGS	MICROCHEM #1 OR MICROCHEM #2

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DATE: November 5, 2018
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ALARMS:

1. ALARM ACTIVATES IF A FLOW SWITCH (FS-1 OR FS-2) SENSES NO FLOW IN 15 (ADJUSTABLE) SECONDS AFTER ITS RELEVANT PUMP (WP-1 OR WP-2) IS TURNED ON.
   ACTION: CHECK THE PUMP CONTROLLER, DETERMINE WHICH PUMP FAILED AND WHY.
   REPAIR THE PROBLEM, RESET THE PUMP SEQUENCER AND ACKNOWLEDGE THE ALARM CONTROLLER.
2. ALARM ACTIVATES IF A DIFFERENTIAL PRESSURE SWITCH (DP-1) SENSES HIGHER THAN SET (H) (ADJUSTABLE) PRESSURE ACROSS FILTERS IN 15 SECONDS (ADJUSTABLE) AFTER ONE PUMP IS TURNED ON. ALARM ACTIVATES IF A DIFFERENTIAL PRESSURE METER (DP-1) SENSES HIGHER THAN SET H/H (ADJUSTABLE) PRESSURE ACROSS FILTERS IN 15 SECONDS (ADJUSTABLE) AFTER TWO PUMPS ARE TURNED ON.
   ACTION: CLEAN ALL 3 WATER FILTERS, ONE AT A TIME. ACKNOWLEDGE ALARM CONTROLLER.
3. ALARM ACTIVATES IF EITHER CHLORINATION CONTROLLER PANELS CCP1 OR CCP2 SENSES OUT-OF-SPEC CONDITIONS FOR 15 SECONDS (ADJUSTABLE).
   ACTION: DETERMINE THE REASON FOR THE CHLORINATION CONTROLLER ALARM.
   FIX THE PROBLEM AND RESET THE CHLORINATION CONTROLLERS AND ACKNOWLEDGE THE ALARM CONTROLLER.
4. ALARM ACTIVATES IF CHLORINE MIXING SYSTEM SENSES TROUBLE.
   ACTION: CHECK THE CHLORINE MIXING SYSTEM AND FIX THE PROBLEM.
   RESET THE CHLORINE MIXING SYSTEM AND ACKNOWLEDGE ALARM CONTROLLER.
5. ALARM ACTIVATES IF GENERATOR CONTROLLER SENSES OUT-OF-SPEC CONDITION WITH GENERATOR.
   ACTION: CHECK THE GENERATOR CONTROLLER AND DETERMINE THE CAUSE FOR THE ALARM.
   FIX THE PROBLEM AND RESET THE GENERATOR CONTROLLER AND ACKNOWLEDGE ALARM CONTROLLER.
6. ALARM ACTIVATES IF NORMAL GRID POWER IS LOST AND AUTOMATIC TRANSFER SWITCH ENGAGES EMERGENCY GENERATOR.
   ACTION: DETERMINE THE REASON WHY THE GENERATOR IS RUNNING.
   ENSURE THE GENERATOR HAS ENOUGH FUEL IF THE POWER OUTAGE IS PROLONGED. ACKNOWLEDGE ALARM CONTROLLER.
7. ALARM ACTIVATES IF DOMESTIC COLD WATER STORAGE TANK (DCWST) LOW LEVEL FLOAT SWITCH (LS-DCW) DETECTS LOW WATER LEVEL.
   ACTION: ARRANGE TO RE-FILL THE DCWST AND ACKNOWLEDGE THE ALARM.
8. ALARM ACTIVATES IF WASTE WATER STORAGE TANK (WWST) HIGH LEVEL FLOAT SWITCH (LS-WW) DETECTS HIGH WATER LEVEL.
   ACTION: ARRANGE TO PUMP OUT THE WWST AND ACKNOWLEDGE THE ALARM.
9. ALARM ACTIVATES IF ANY OF THE ROOM FIRE ALARM HEAT DETECTORS (HD-1, -2 OR -3) SENSES HIGH ROOM TEMPERATURE.
   ACTION: DETERMINE THE REASON FOR THE HIGH TEMPERATURE. FIX THE PROBLEM. ACKNOWLEDGE THE ALARM.
10. ALARM ACTIVATES IF THE ROOM THERMOSTAT (TS-2) SENSES LOW ADJUSTABLE ROOM TEMPERATURE OR IF ANY OF THE 2 HEAT TRACE CONTROLLERS SENSES TROUBLE WITH THE HEAT TRACE CABLES.
    ACTION: DETERMINE WHAT IS CAUSING THE ALARM. TAKE APPROPRIATE ACTION: (A) PROVIDE TEMPORARY HEAT SOURCE FOR THE PUMP ROOM IF THE ROOM TEMPERATURE FALLS BELOW SET POINT (10°C ADJUSTABLE), OR (B) DETERMINE WHICH HEAT TRACE CONTROLLER ALARMED AND TAKE ACTION TO FIX THE PROBLEM. ACKNOWLEDGE THE ALARM.
11. ALARM ACTIVATES WHEN CHLORINATION IS LOWER THAN MIN. OR HIGHER THAN MAX. SET TOLERANCES.

ALARM REPORTING UNIT RELAYS:

1. PROGRAMMED TO TURN "ON" WITH ANY OF THE 1-10 ALARM INPUTS. TURNS "ON" AN OUTDOOR STROBE BEACON LOCATED OUTSIDE THE PUMP STATION TO DISPLAY THAT THE PUMP STATION REQUIRES ATTENTION. TURNS "ON" AN INDICATOR LIGHT ON THE MAIN PANEL LABELED "ANY ALARM CONDITION #1-10"
2. PROGRAMMED TO TURN "ON" WITH EITHER ALARM INPUT #3 OR #4. TURNS "ON" AN INDICATOR LIGHT ON THE MAIN PANEL LABELED "CHLORINATION ALARM"
3. PROGRAMMED TO TURN "ON" WITH ALARM INPUT #7. TURNS "ON" AN INDICATOR LIGHT ON THE MAIN PANEL LABELED "FRESH WATER TANK EMPTY OR DWP PUMP FAILURE"
4. PROGRAMMED TO TURN "ON" WITH ALARM INPUT #8. TURNS "ON" AN INDICATOR LIGHT ON THE MAIN PANEL LABELED "WASTE WATER TANK FULL". TURNS "ON" AN OUTDOOR WARNING LAMP TO INDICATE FULL TANK REQUIRING SERVICE. FULL WWST WILL DISABLE (K3) DOMESTIC WATER PUMP TO PREVENT OVERFILL, UNLESS EMERGENCY EYEWASH (EW) OR EMERGENCY SHOWER (ES) IS USED.

ALARM EXPANDER UNIT RELAYS:

1. PROGRAMMED TO TURN "ON" WITH ALARM INPUT #9. TURNS "ON" AN INDICATOR LIGHT ON THE MAIN PANEL LABELED "PUMP ROOM HIGH TEMPERATURE"
2. PROGRAMMED TO TURN "ON" WITH ALARM INPUT #10. TURNS "ON" AN INDICATOR LIGHT ON THE MAIN PANEL LABELED "PUMP ROOM LOW TEMPERATURE / HEAT TRACE CONTROLLER TROUBLE"

PUMP SEQUENCER OPERATION:

BY DEPRESSING THE "ON" PUSHBUTTON AT FILL STATION #1 OR #2 (SEQUENCER INPUT CONTACTS S1-ON OR S2-ON) THE SEQUENCER STARTS THE "NEXT" PUMP WITH A DELAY OF 3 SECONDS.
DEPRESSING THE SAME "ON" PUSHBUTTON AGAIN WILL DO NOTHING UNTIL THE RELEVANT "OFF" BUTTON IS PRESSED.
ONCE THE PUMP IS RUNNING, IT CAN BE TURNED "OFF" BY DEPRESSING THE "OFF" PUSHBUTTON (SEQUENCER INPUT CONTACTS S1-OFF OR S2-OFF) AT THE INITIATING FILL STATION.
DEPRESSING THE SAME "OFF" PUSHBUTTON AGAIN WILL DO NOTHING.
BASED ON THE ABOVE, 1 OR 2 PUMPS CAN RUN SIMULTANEOUSLY.

THE SEQUENCE OF THE "NEXT PUMP" IS WP-1 -> WP-2 -> WP-1 -> WP-2 -> ETC...

FLOW SWITCHES WILL PROVIDE FEEDBACK SO THAT WHEN A PUMP IS TURNED "ON" IT ACTUALLY DELIVERS WATER.
IF THE FLOW SWITCH OF ITS RELEVANT PUMP IS NOT "ON" WITHIN 15 SECONDS, THE PUMP SEQUENCER WILL TURN THAT PUMP "OFF" AND TURN THE "NEXT" PUMP "ON".
THIS WILL CAUSE THE AFFECTED PUMP TO BE TAKEN OUT FROM THE SEQUENCE OF THE "NEXT PUMP". IT WILL ALSO TURN "ON" A "PUMP # TROUBLE" ALARM LIGHT AND TURN "ON" A SET OF DRY OUTPUT ALARM CONTACTS "PUMP TROUBLE".
LATCHING OF A FAILED PUMP "OFF" CAN BE RESET BY DEPRESSING A "RESET" BUTTON ON THE PUMP SEQUENCER.

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NO.	DATE: (dd/mm/yy)	BY:	DESCRIPTION
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7	08/08/18	B.P.	ISSUED FOR CONN M&E 4
6	[illegible]	B.P.	ISSUED FOR CONSTRUCTION
5	20/03/16	B.P.	REISSUED FOR TENDER
4	14/04/14	B.P.	REISSUED FOR TENDER
3	13/02/14	B.P.	ISSUED FOR TENDER
2	15/01/14	B.P.	ISSUED FOR 99% REVIEW
1	25/11/13	B.P.	ISSUED FOR 50% REVIEW

STAMP
REGISTERED PROFESSIONAL ENGINEER
M.M. MALLET
AUG. 2018
NWT/NU

CONSULTANT: CEML
DRAWN BY: B.P.
DESIGNED BY: N.K.
APPROVED BY: M.M.
DATE: AUGUST 08 2018

STAMP
PERMIT TO PRACTICE
Signature
Date 2018-08-08
PERMIT NUMBER: P 7[illegible]
NWT/NU Association of Professional Engineers and Geoscientists

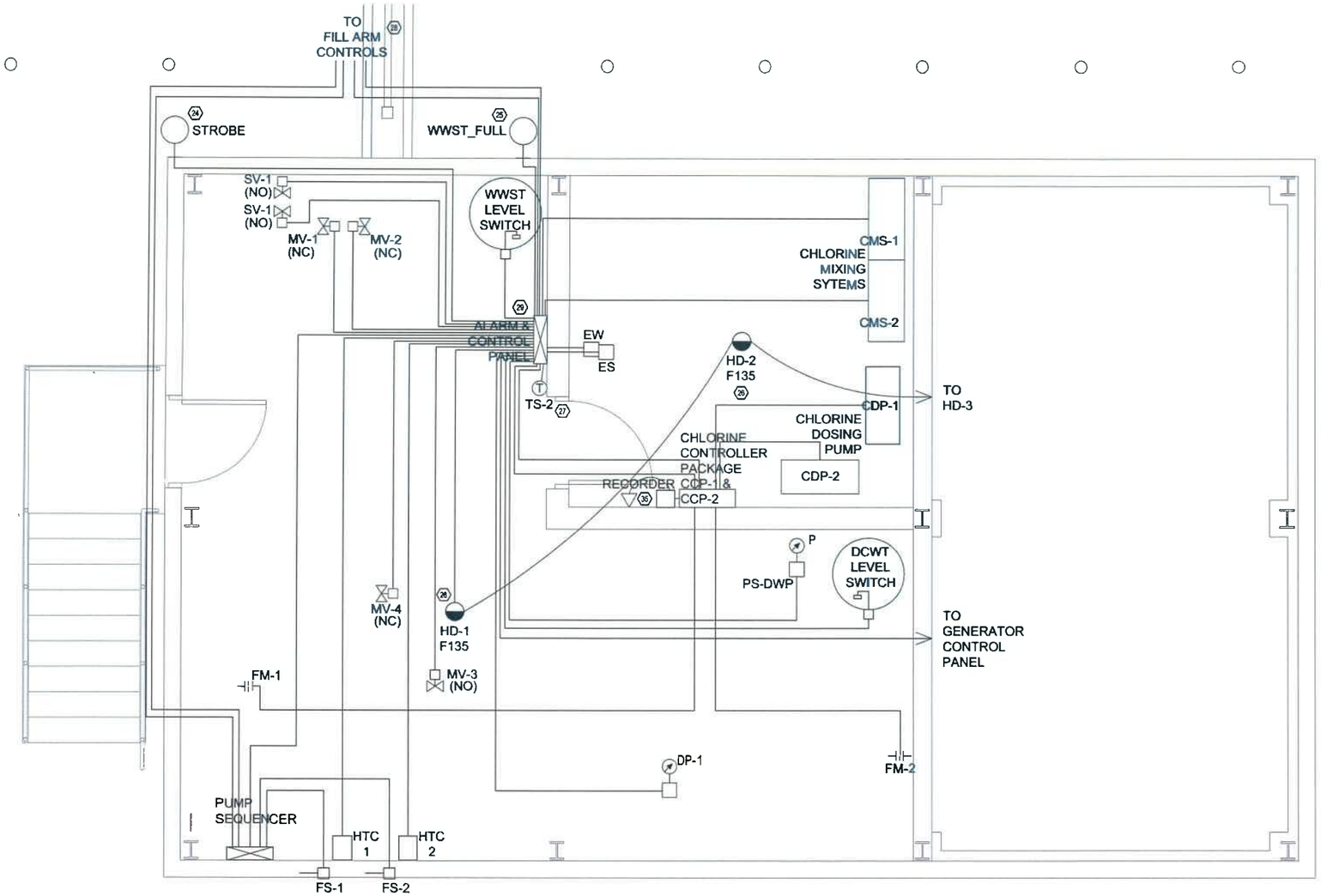
CONSULTANT:
DRAWN BY:
DESIGNED BY:
APPROVED BY:
DATE:

LOCATION:
IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

PROJECT:
IMPROVEMENT OF WATER SUPPLY SYSTEM

DRAWING TITLE:
PUMP CONTROL & ALARM SYSTEM SCHEMATIC AND SEQUENCE OF OPERATIONS

MECH FILE NAME:	DWG NO:		SCALE:
13-072 E	E5	6	AS NOTED



1/E6 LOW-VOLTAGE ELECTRICAL LAYOUT - UPPER LEVEL - CONTROL AND MONITORING SYSTEM

1:25

AS-BUILT

DATE: November 5, 2018

DIEC NORTH

PERMIT TO PRACTICE
CHIARELLI ENGINEERING MANAGEMENT LTD.
Signature
Date 30 March 2016
PERMIT NUMBER: P 732
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MAR. 2016
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DRAWN BY:
DESIGNED BY:
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LOCATION:

IGLOOLIK
QIKIQTAALUK REGION OF NUNAVUT
X0A 0L0

PROJECT:

IMPROVEMENT OF
WATER SUPPLY SYSTEM

DRAWING TITLE:

LOW-VOLTAGE
ELECTRICAL LAYOUT
UPPER LEVEL

REDW FILE NAME:	DWG. NO	BY:	SCALE:
13-072 E	E6	6	AS NOTED