November 12, 2021

MEMO

City of Iqaluit
P.O. Box 460
Iqaluit, NU X0A 0H0

WSP Project No. 201-09487-00

Attention: **Amy Elgersma**

Subject: **City of Iqaluit Water Treatment Plant - Bypass Option**

Dear Ms. Amy Elgersma,

See below the description of the proposed bypass option for the Iqaluit Water Treatment Plant (WTP). In response to the request of the Government of Nunavut Department of Health (GNDOH), the proposed bypass option bypasses below-ground water tanks.

OVERVIEW

The proposed bypass option utilizes much of the existing WTP infrastructure, including:

- Raw water intake piping
- UV disinfection (primary disinfection)
- Chlorine and hydrofluorosilic acid injection
- Water treatment plant outlet piping (ie. to the reservoir)

Other than additional piping and appurtenances, the proposed bypass option operates exclusively by gravity and does not require any additional pumps. Similarly, this option does not leave the extents of the WTP and therefor would not require:

- SCADA integration
- Additional electrical or mechanical servicing
- Insulation or heat tracing

OPERATION OF THE BYPASS LINE

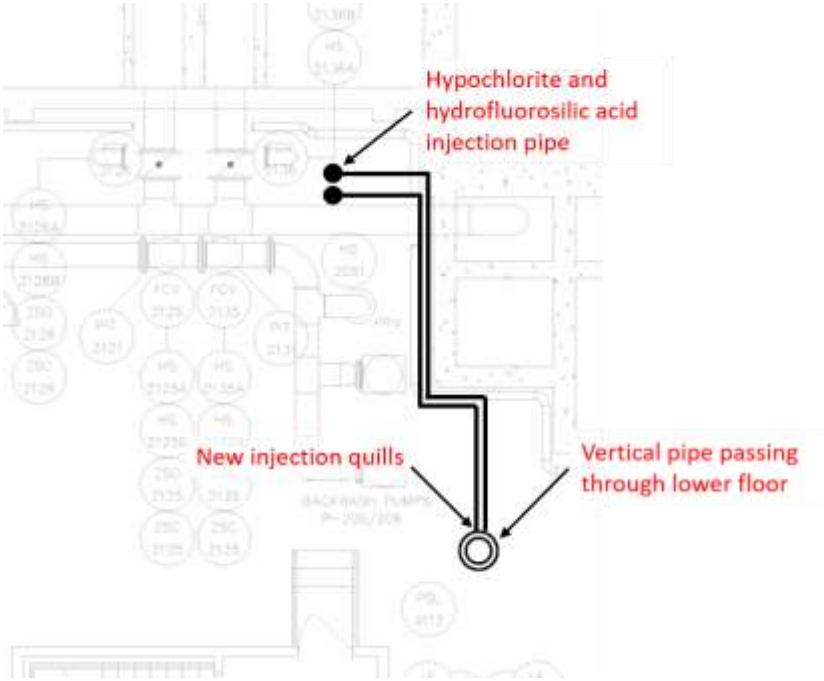
The bypass line will use the existing actuated valve at the raw water intake (FCV1001) and the actuated valve at the WTP outlet (FCV2501). In normal operation, these two valves operate in tandem – as water is permitted to enter the WTP, water is permitted to flow out of the WTP downhill to the reservoir. Other valves that will be utilized in the bypass are manual isolation valves.

The production of water at the WTP is controlled by a level sensor. When the level in the reservoir drops below the low setpoint, water is produced. Conversely, when the water level in the reservoir exceeds the high setpoint, water production is stopped.

In a typical water production run, other valves such as those that permit water through the filter media may be opened. However, as these components will be effectively isolated from the system, there will be no water passing through and the opening and closing of such valves will have no impact on the system. As such, this option requires no integration into the SCADA system, and operators can permit water in an out of the WTP “as usual”.

DISINFECTION AND CHEMICAL DOSING

The proposed bypass connection occurs *after* the UV disinfection system; this means that water will receive primary disinfection prior to any new piping and appurtenances. Furthermore, the existing chlorine and hydrofluorisilic acid dosing pipes can be easily tapped into and isolated via manual ball valves. The location of the chemical dosing piping is approximately 15 ft away from the proposed 350 mm bypass pipe on the lower floor of the WTP, thus adding simplicity to the retrofit installation.



The use of the existing chemicals, and in particular the chlorine gas injection system, eliminates the need for any additional chemical administration systems to be installed or chemicals to be shipped to the WTP and stored on site. This also permits there to be minimal change to the existing chemical storage and handling procedures.

VISUAL PRESENTATION OF HOW IT WILL BE CONNECTED

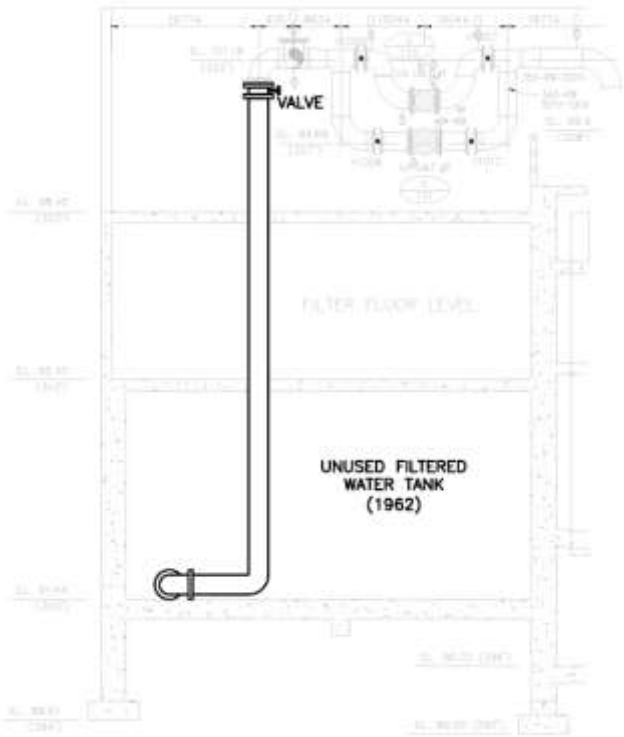
The bypass line will be installed immediately following the UV disinfection system and break off from the treatment line on a blind flanged connection near the office, shown in the image below.

WTP operations personnel indicated that this connection was used during the upgrades of the WTP in 2004 to bypass a portion of the process during commissioning. Directly below the blind flange is a pre-existing floor penetration that leads to the lower floor, as shown in the image below. The floor penetration was filled after its use during the 2004 upgrades.

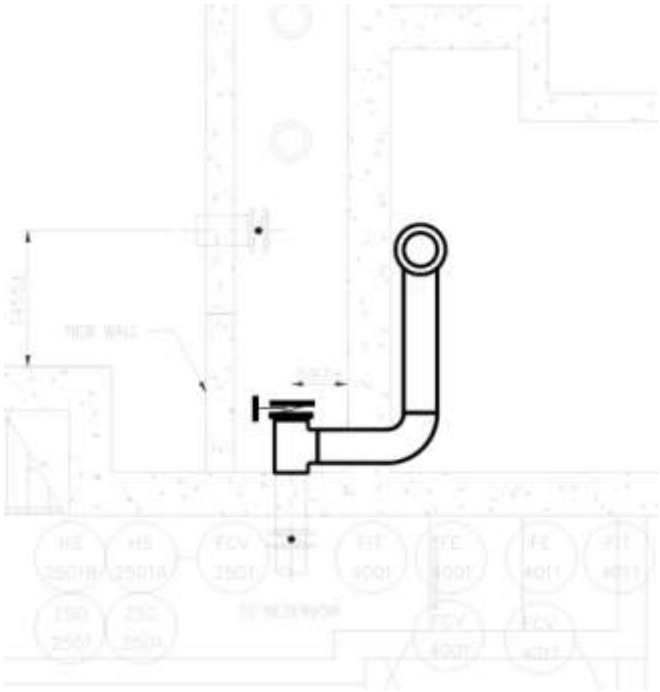
From the lower floor, this penetration can be seen on the ceiling.

Directly below this ceiling penetration is the proposed floor location where the pipe will enter a currently unused tank. The below ground tank that will be penetrated was operated as a *Treated Water* tank as part of the original 1962 construction. The tank has since been taken out of commission. The access hatch for the treated water tank is in the east corner of the lower floor (figure below).

The vertical pipe segment, as shown in the appended drawings, is shown in the image below.



A wall penetration will be made through the southeast side of the treated water tank into the backwash tank. The backwash tank will have to be isolated and drained prior to coring and servicing. On the backwash side of the wall, a tee will be installed on the WTP outlet line that goes to the reservoir. An isolation valve will be installed on the northwest side of the tee to effectively isolate the WTP.

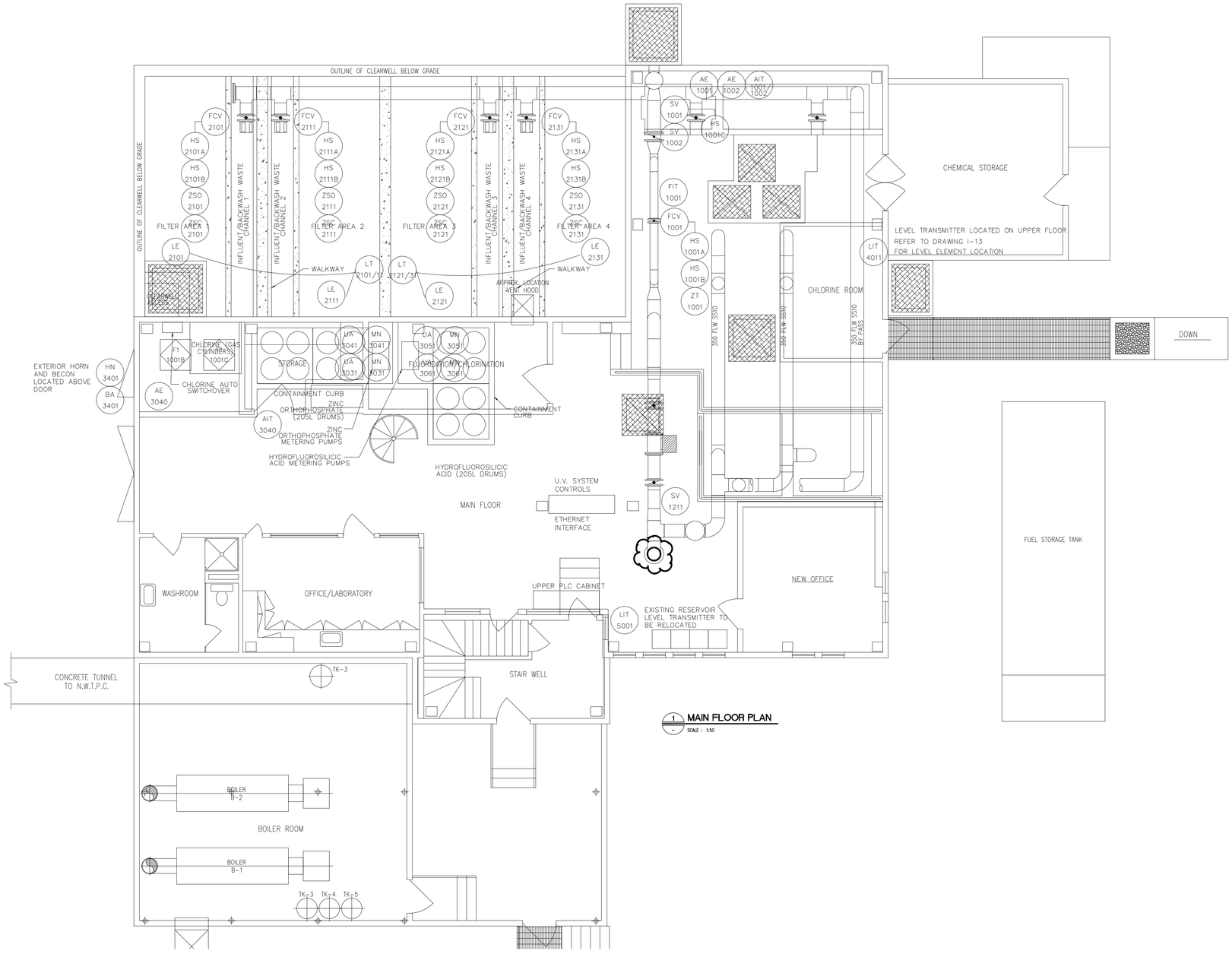


INSTALLATION CONSIDERATIONS

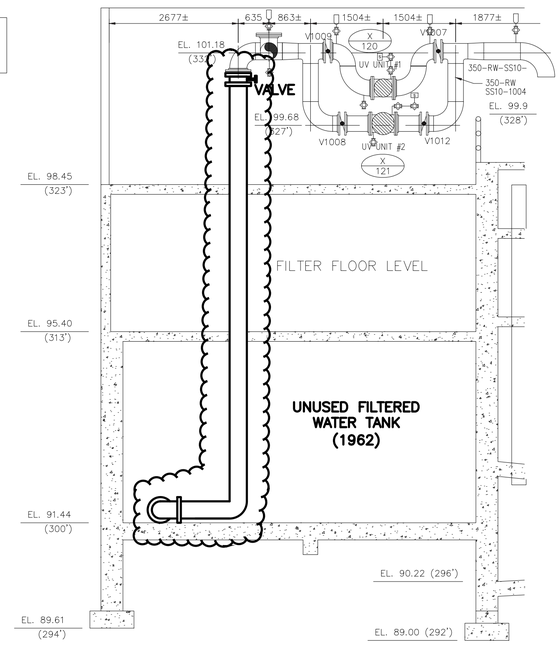
In order to install the proposed bypass line, the following preliminary steps will need to be taken:

1. Isolate the backwash pumping chamber.
2. Drain the backwash pumping chamber.
3. Core and install the pipes and valves, maintaining proper safety measures at all times.

Further sketches have been appended to this memo.



1 MAIN FLOOR PLAN
SCALE : 1:50



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MODIFIED BY: V.A.A.
APPROVED BY: C.G.
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PROJECT NUMBER: 201-09487-00

CLIENT: CITY OF IQALUIT

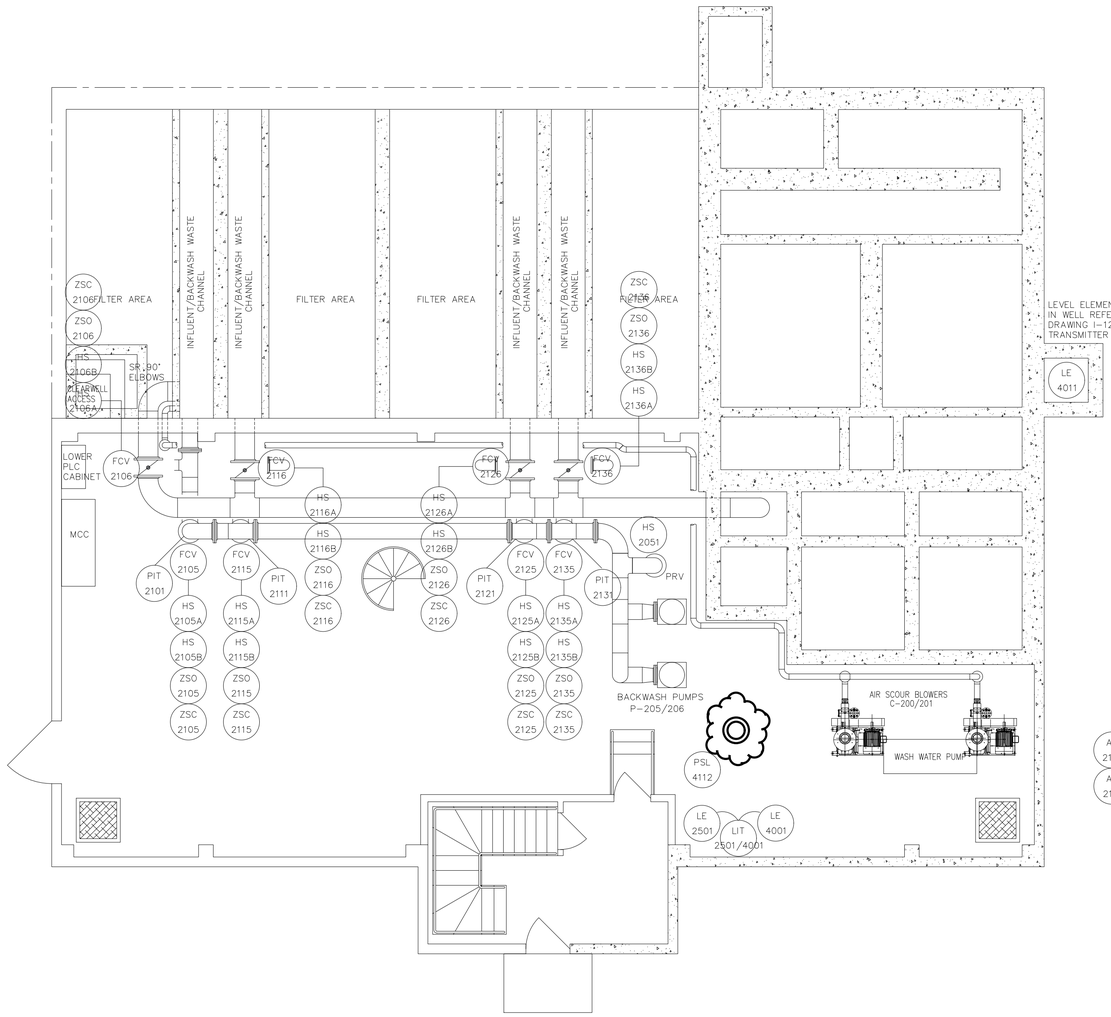
CLIENT REF. #: -

TITLE: MAIN FLOOR PLAN

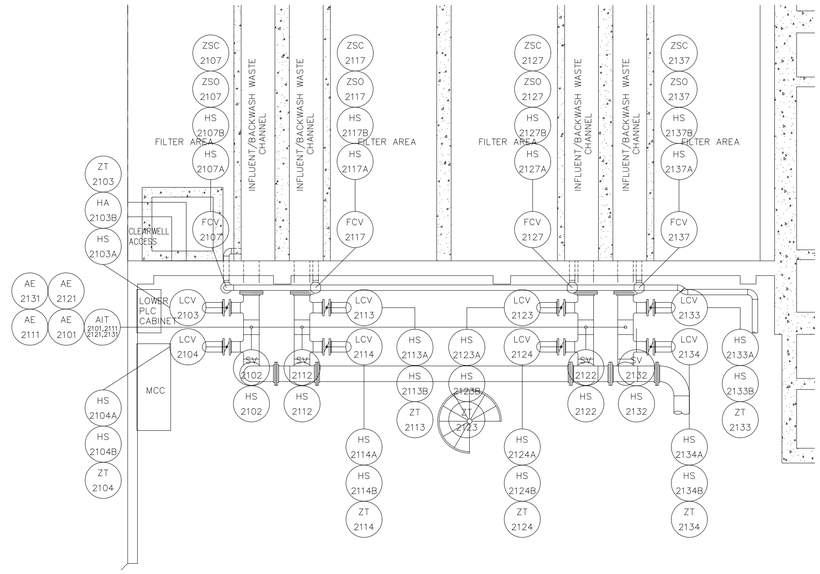
PROJECT: IQALUIT WATER EMERGENCY

DRAWING NUMBER: P-101

REV. A



1 PUMPS FLOOR PLAN
SCALE : 1:50



2 PARTIAL PUMPS FLOOR PLAN
SCALE : 1:50

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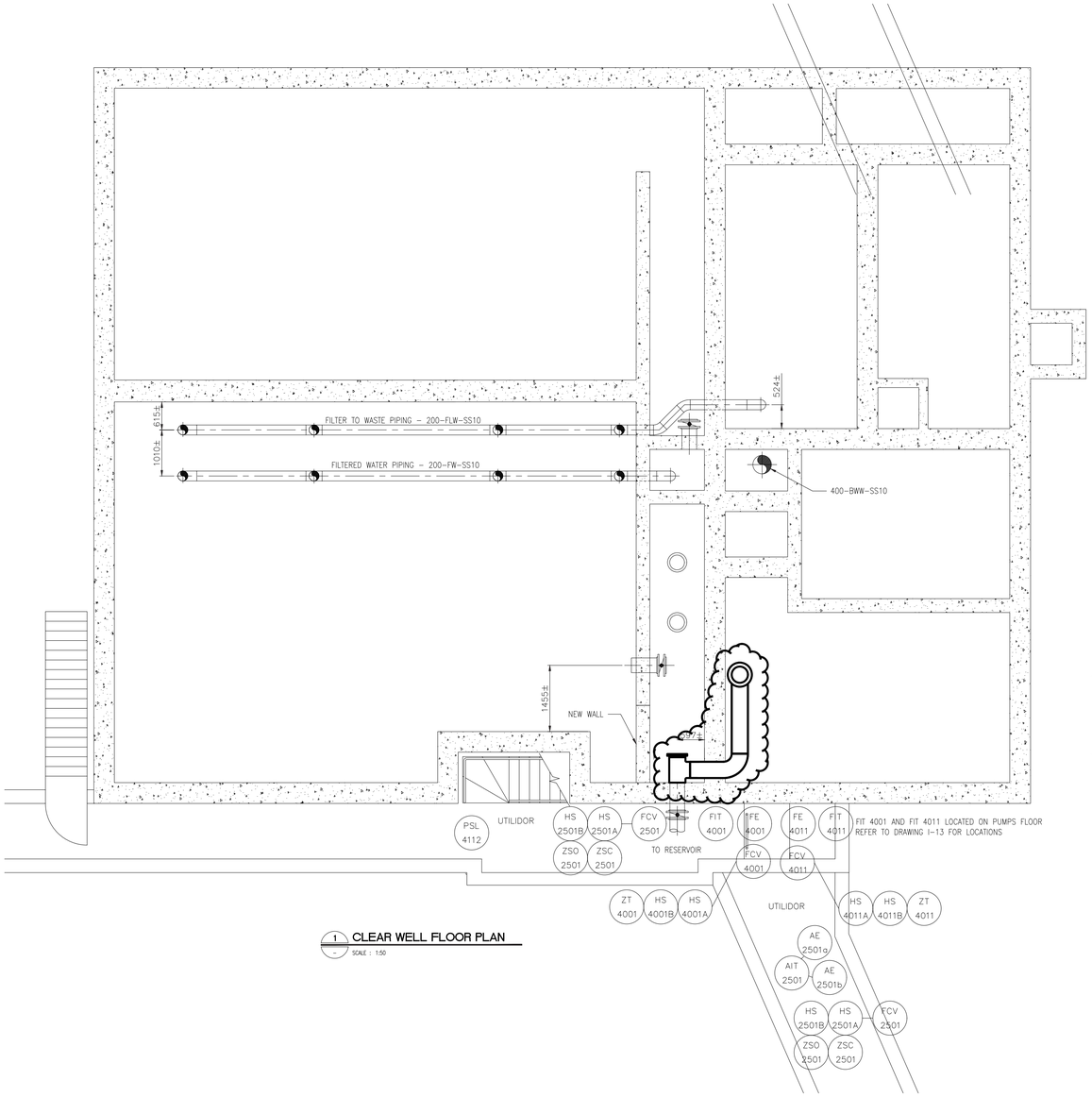
CLIENT: CITY OF IQALUIT
CLIENT REF. #: -

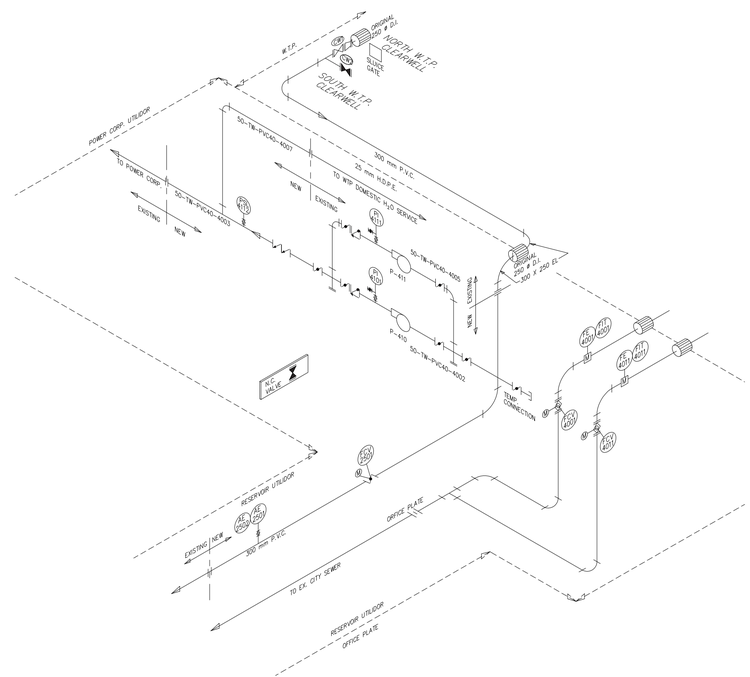
TITLE: FILTER FLOOR LEVEL

PROJECT: IQALUIT WATER EMERGENCY

DRAWING NUMBER: P-102
REV. A



1 CLEAR WELL FLOOR PLAN
SCALE : 1:50



2 SCHEM. SHOWING SERVICE WATER
SCALE : N.T.S.

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PROJECT NUMBER: 201-09487-00

CLIENT:
CITY OF IQALUIT

CLIENT REF. #: -

TITLE:
UNUSED FILTERED WATER TANK (1962)

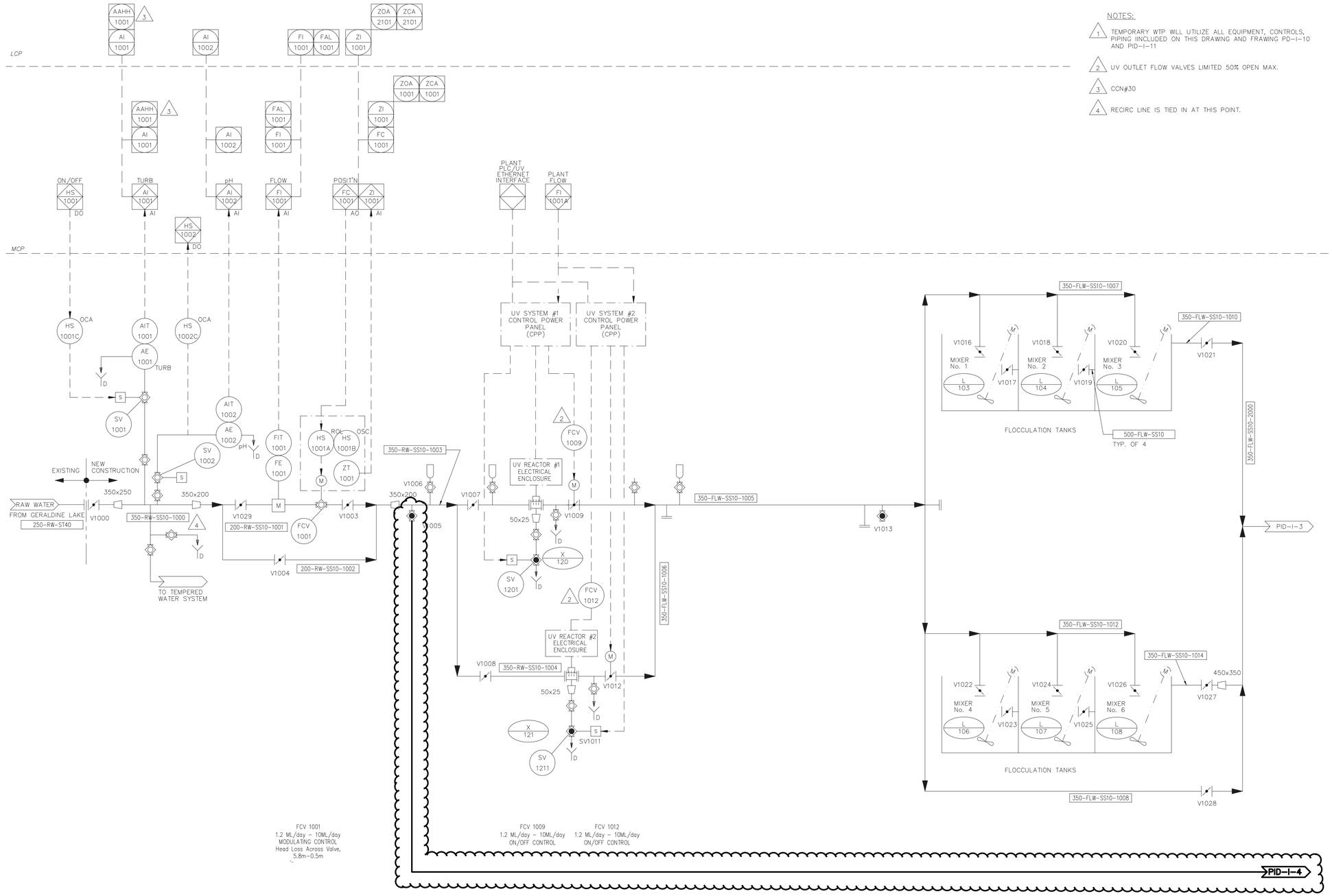
PROJECT:
IQALUIT WATER EMERGENCY

DRAWING NUMBER: P-103

REV. A

NOTES:

1. TEMPORARY WTP WILL UTILIZE ALL EQUIPMENT, CONTROLS, PIPING IINCLUDED ON THIS DRAWING AND FRAWING PD-I-10 AND PID-I-11
2. UV OUTLET FLOW VALVES LIMITED 50% OPEN MAX.
3. CCN#30
4. RECIRC LINE IS TIED IN AT THIS POINT.



FCV 1001
1.2 ML/day – 10ML/day
MODULATING CONTROL
Head Loss Across Valve,
5.8m–0.5m

FCV 1009
1.2 ML/day – 10ML/day
ON/OFF CONTROL

FCV 1012
1.2 ML/day – 10ML/day
ON/OFF CONTROL

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PROJECT NUMBER: 201-09487-00

CLIENT: CITY OF IQALUIT

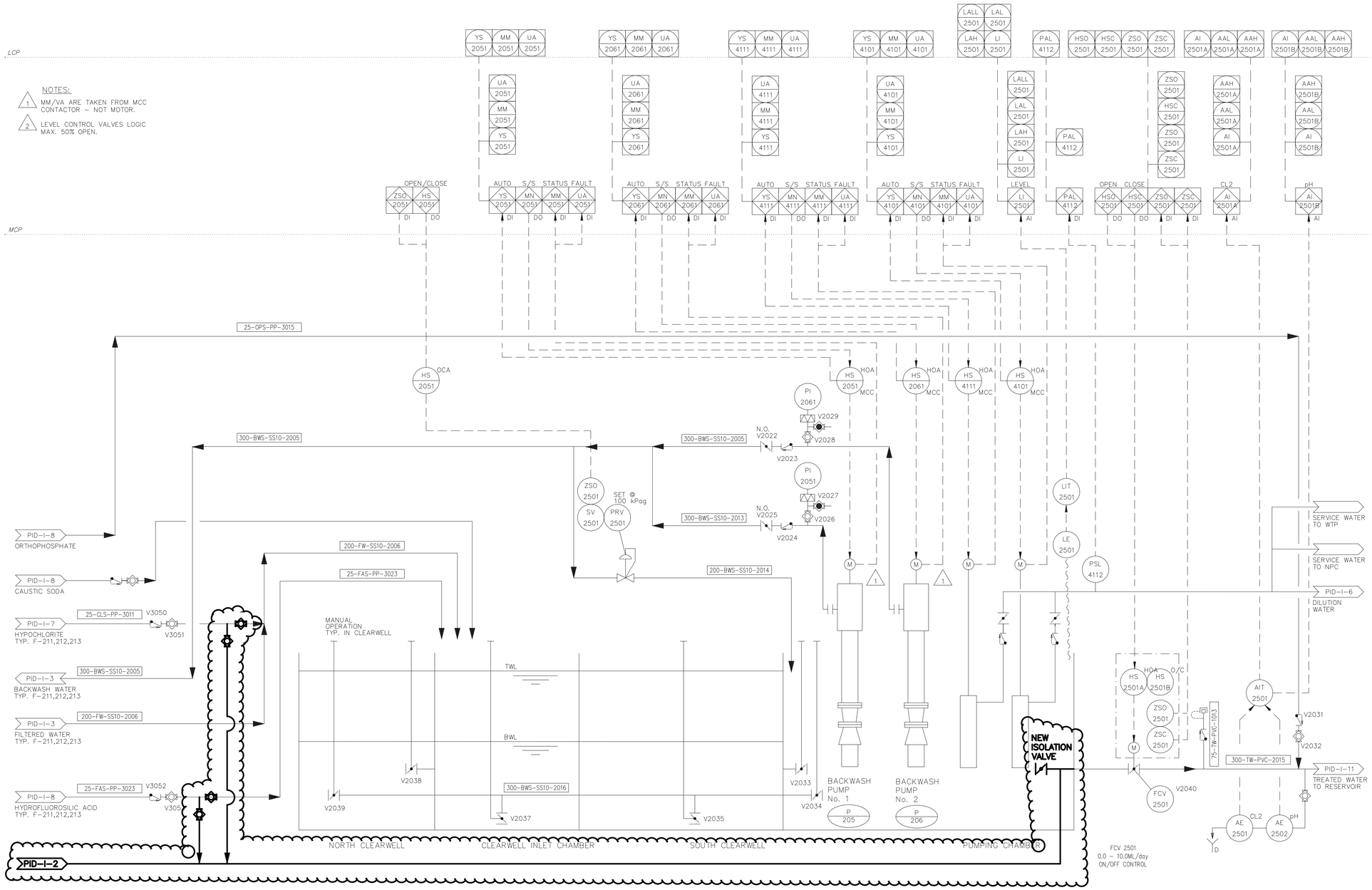
CLIENT REF. #: -

TITLE: PID 1

PROJECT: IQALUIT WATER EMERGENCY

DRAWING NUMBER: P-104

REV.: A



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CLIENT: CITY OF IQALUIT

CLIENT REF. #: -

TITLE: PID 2

PROJECT: IQALUIT WATER EMERGENCY

DRAWING NUMBER: P-105

REV. A