Engineering for people

Union Water Flow Meter Chambers Renewal Pilot

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Presentation Agenda

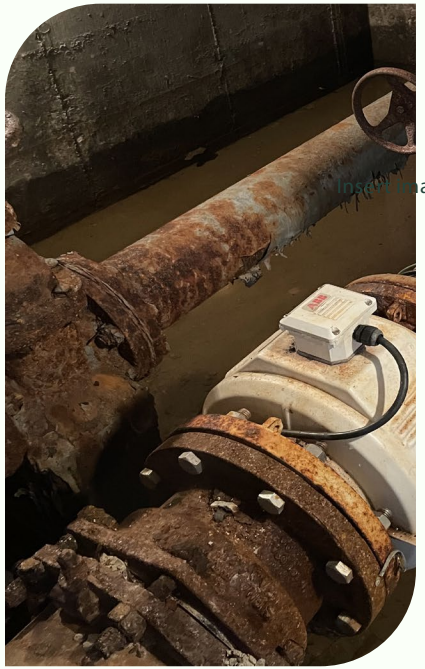
01 Union Water Supply System & Background

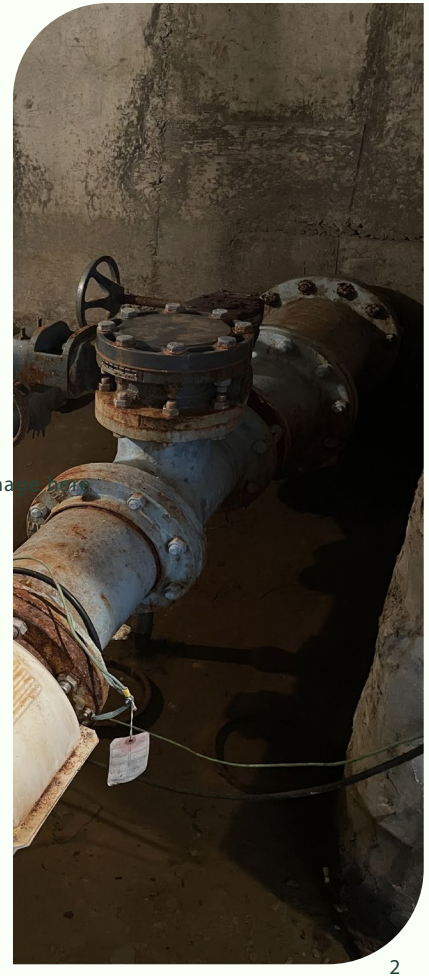
02 Project Overview

03 Site Investigations & Assessments

04 Refining the “Ideal” Flow Meter Chamber

05 Next Steps & Conclusions





01

UNION WATER SUPPLY SYSTEM

Background

BACKGROUND

History

The Union Water Supply System (UWSS) is unique in Ontario and Canada

- It services four municipalities in Southern Ontario, including Point Pelee, the most southern tip of Canada
- Largest concentrated area of greenhouses in North America with over 2,500 acres of covered land and growing
- Famous for ketchup factory, and now growing cannabis industry

BACKGROUND

1960, Original Union Water System (UWS) was commissioned by the Ontario Water Resources Commission (OWRC)

1972, OWRC operations, including the UWS were absorbed into the newly created Ministry of Environment

1993, ownership and operation of the UWS was transferred to the newly created Ontario Clean Water Agency (OCWA)

2001, UWSS established and the four Municipalities became the owners of the system

BACKGROUND

History & Structure

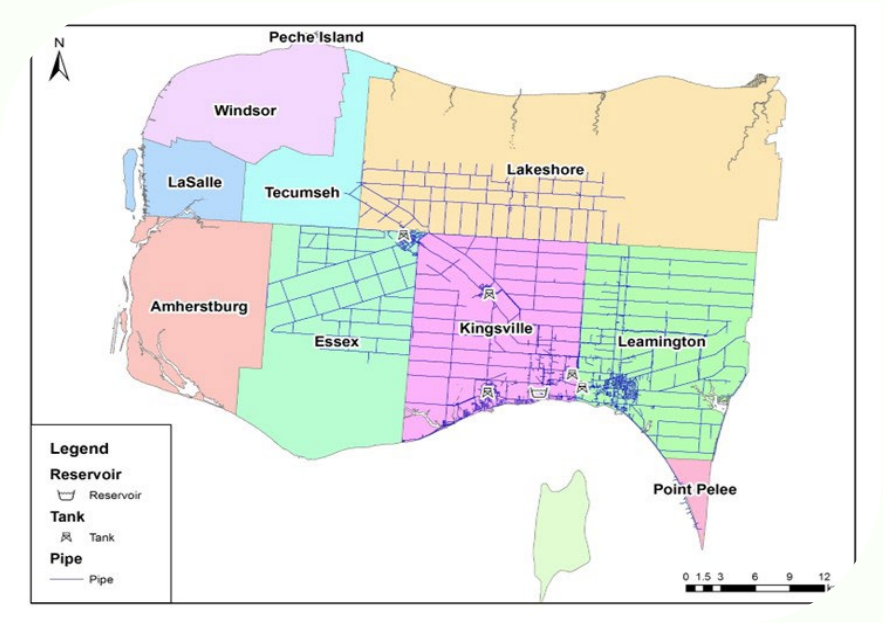
The UWSS is owned in partnership by:

- Municipality of Leamington
- Town of Kingsville
- Municipality of Lakeshore
- Town of Essex

Municipalities are billed by individual usage based on flow meters

Ontario Clean Water Agency (OCWA) operates and maintains the supply system and flow metering chambers

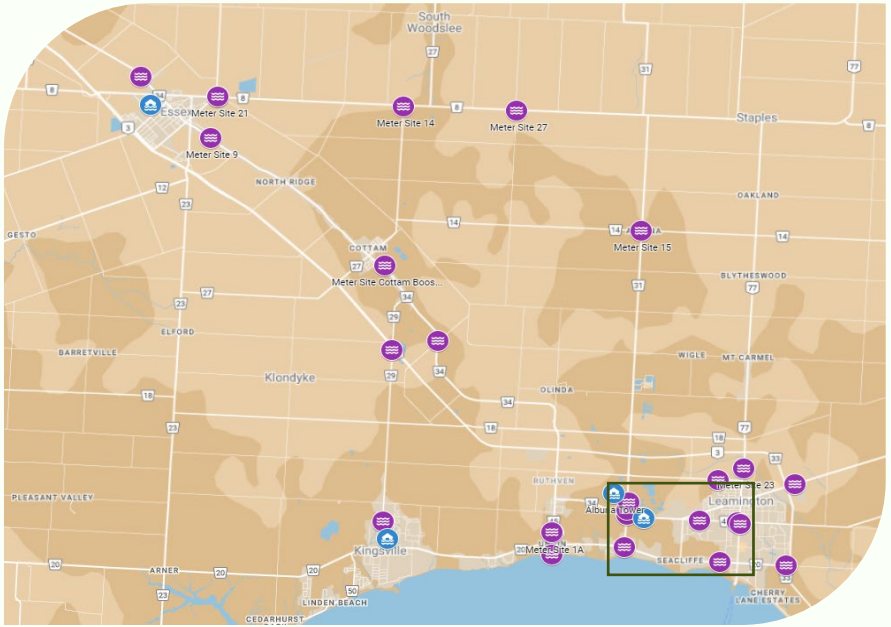
Local municipalities operate and maintain their distribution systems



BACKGROUND

Flow Metering Chambers

- Twenty-six (26) flow metering chambers installed throughout the UWSS service area
- Various chamber designs, assets, asset ages and physical conditions
- Previous condition assessment project findings generated a list of needs to both renew and move towards chamber standardization



BACKGROUND – CONDITION ASSESSMENT FINDINGS

DATA COLLECTION & TRANSMISSION

Condition Assessment

- Only 2 chambers with PLC units installed
- Data currently collected locally through data loggers or flow meter totalizers not integrated into the SCADA system

PANEL & POWER

Condition Assessment

- All panels were slightly different in size and layout
- Asssumed that all existing panels will be replaced with a new standardized panel that will house PLC and communications to integrate into SCADA
- 2 chambers do not have power supply sources available

STRUCTURAL

Condition Assessment

- Concrete deterioration noted at most of the chambers; i.e., concrete cracking, spalling, staining
- In most cases concrete cleaning and restoration will prolong useful life
- Under some circumstances, full chamber replacements are recommended due to poor physical condition or space limitations preventing ease of O&M

BACKGROUND – CONDITION ASSESSMENT FINDINGS

BUILDING MECHANICAL

Condition Assessment

- Chamber inconsistencies; the following recommended per chamber:
  - Wall mounted unit heater
  - Portable dehumidification system
  - Sump pit, pump, and level switch/alarm

PROCESS PIPING & EQUIPMENT

Condition Assessment

- Various asset conditions
- Full or partial replacement recommended at some locations due to poor physical condition

INSTRUMENTATION

Condition Assessment

- Flow meter replacements are being recommended at all chamber locations where the UWSS preferred make/model are not currently installed
- In most cases concrete cleaning and restoration will prolong useful life

02

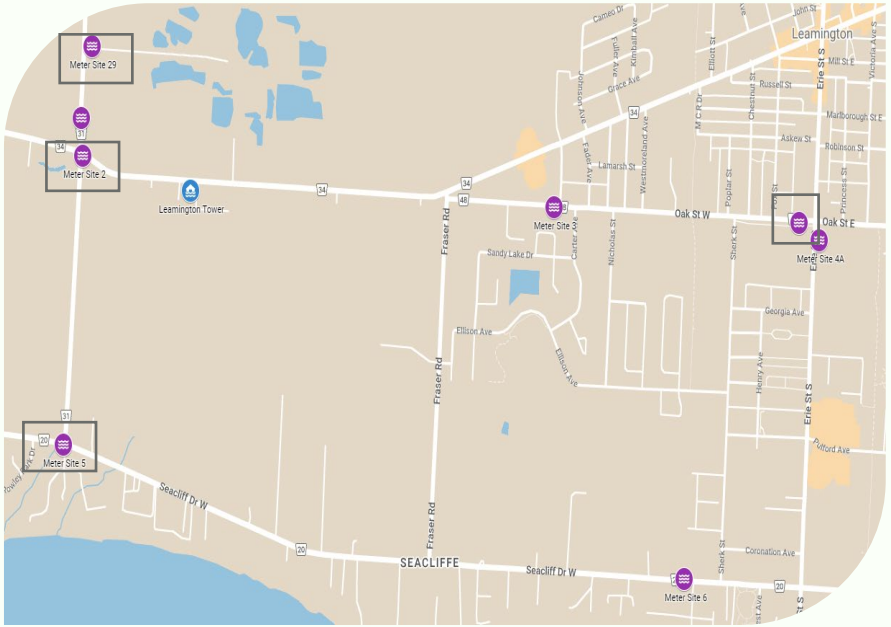
PROJECT OVERVIEW

Pilot Chamber Renewal Project

PROJECT OVERVIEW

Pilot Flow Meter Chamber Renewal Project

- Four (4) flow metering chambers selected as pilot sites for renewal & upgrades to new standards
- Three (3) along the Kingsville & Leamington boundary (Albuna Townline Road)
    - Chamber 29
    - Chamber 2
    - Chamber 5
- One (1) monitoring flows into Highbury Canco:
    - Chamber 4

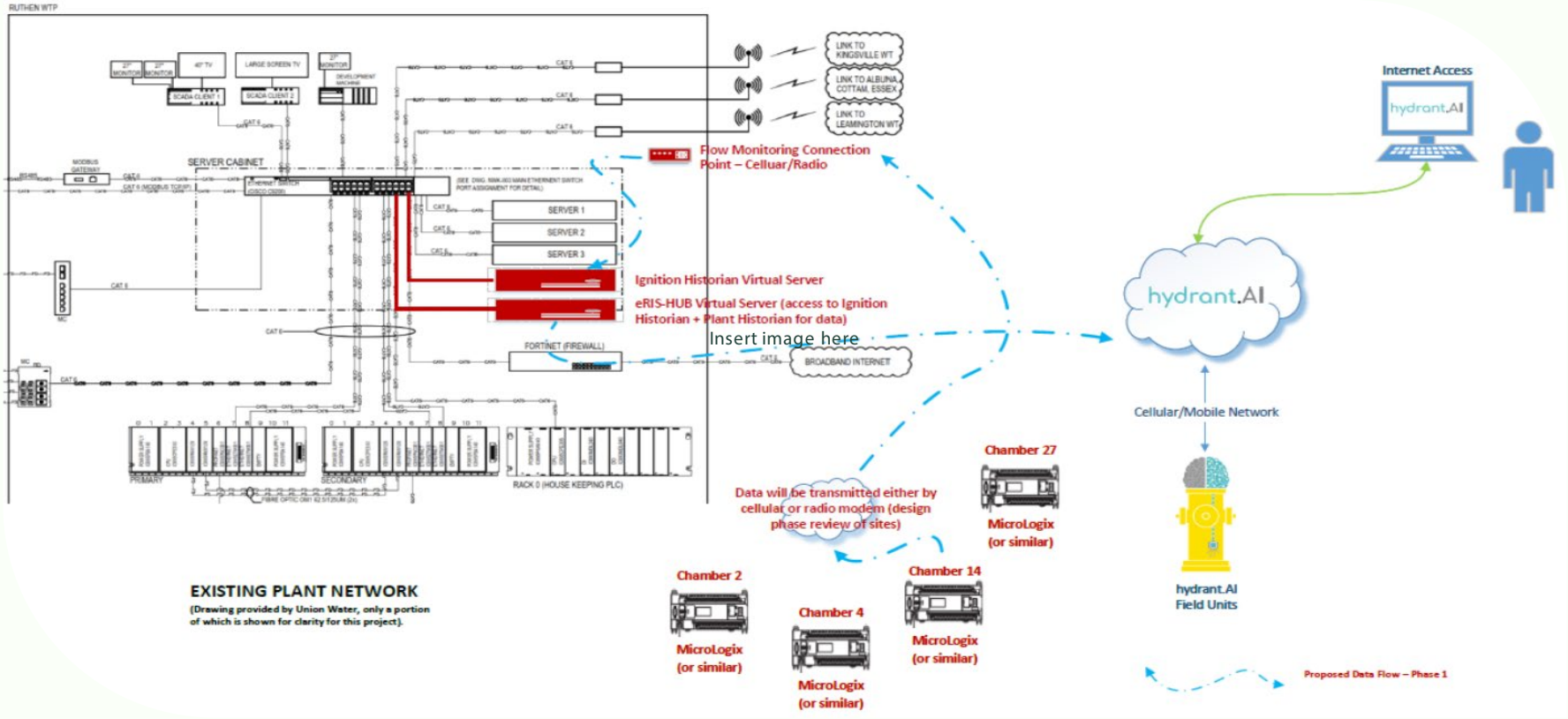


PILOT PROJECT OVERVIEW

Characteristics of Ideal Chamber – Establish New Standard

- Standard panel design: outdoor, above grade
- PLC with cellular modem, or radio
- Typical instruments and I/O points:
  - Flow (bi-directional)
  - Pressure
  - Water temperature
  - Chamber temperature
  - Flood switch
  - Chamber hatch open
  - PLC panel open
  - Power failure
- Chamber lighting
- Sump pump with float switch
- Spare electrical outlets
- Unit heater, dehumidifier
- Water quality sampling station*
- Sufficient working space for O&M access
- Replace valves, piping as needed
- Refurbish and seal concrete roof and floor surfaces

DATA FLOW DIAGRAM

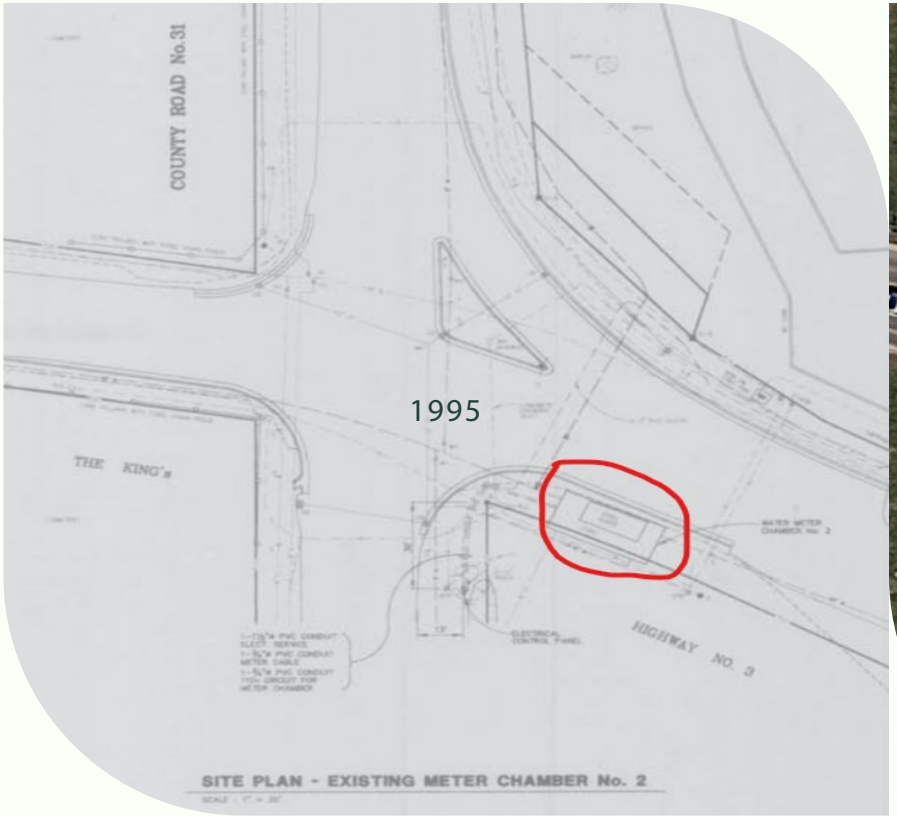


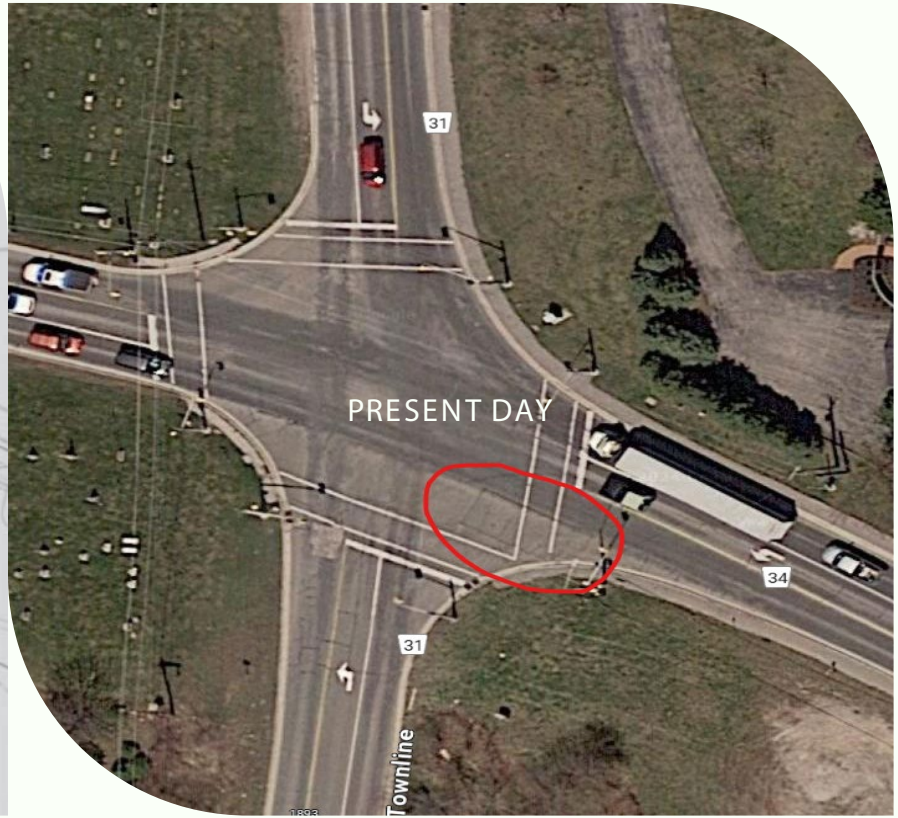
03

SITE ASSESSMENTS & CONSTRUCTABILITY PLANNING

Pilot Chamber Renewal Project

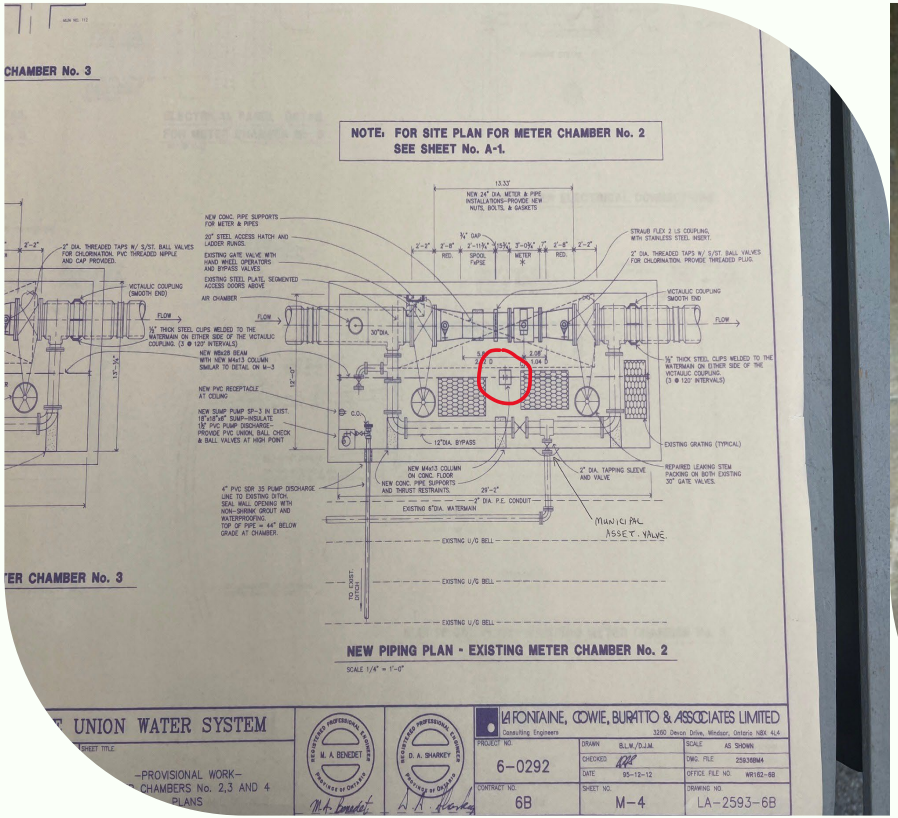
STRUCTURAL ASSESSMENT





Source: Google Maps

STRUCTURAL ASSESSMENT



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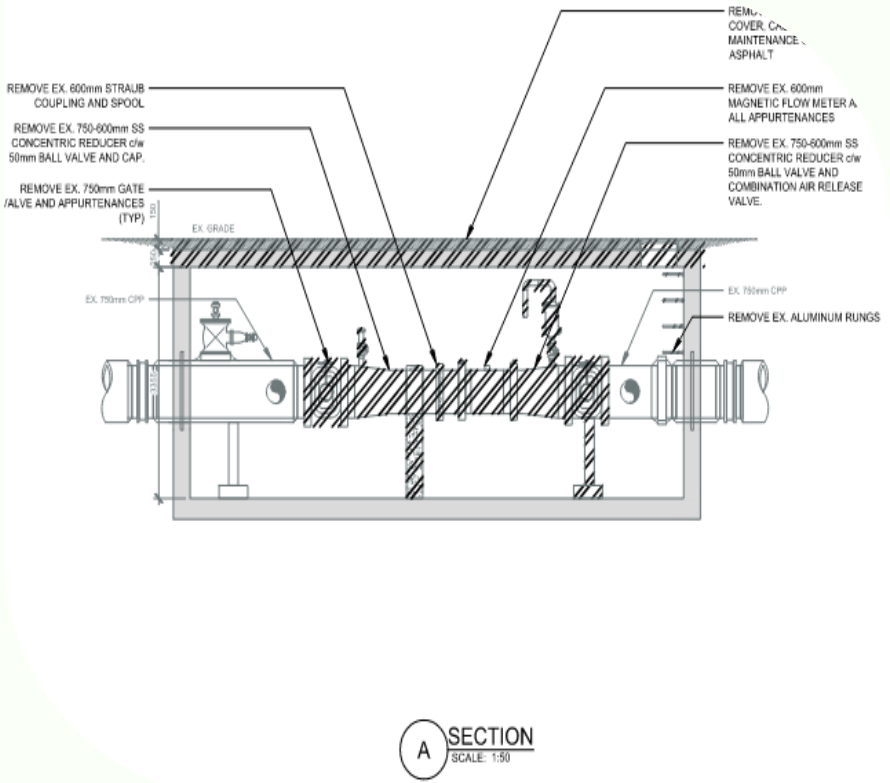

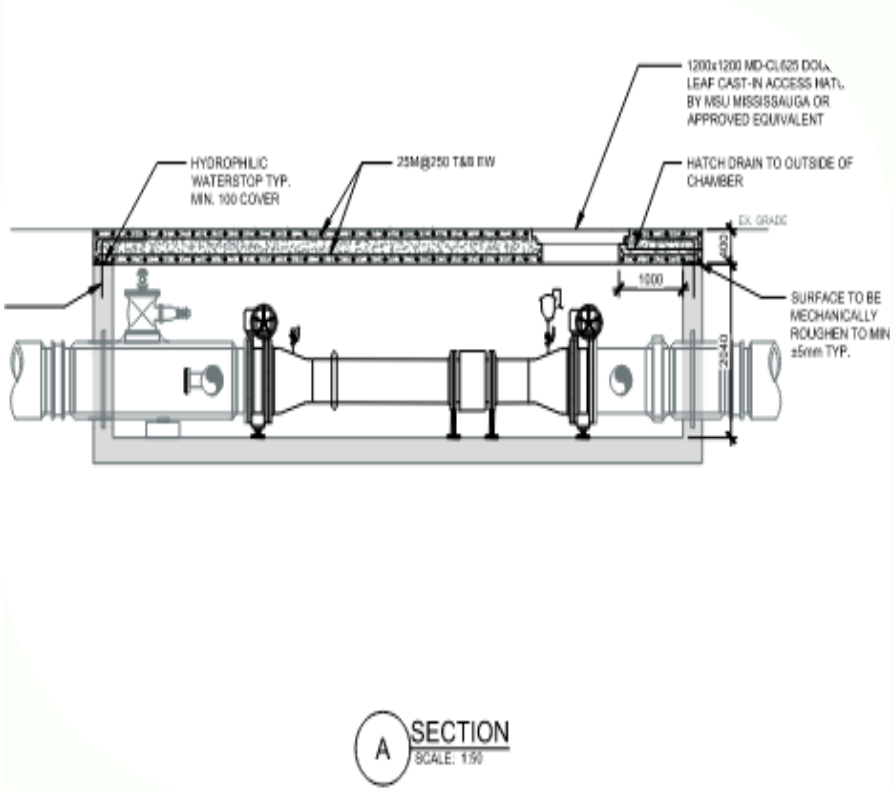

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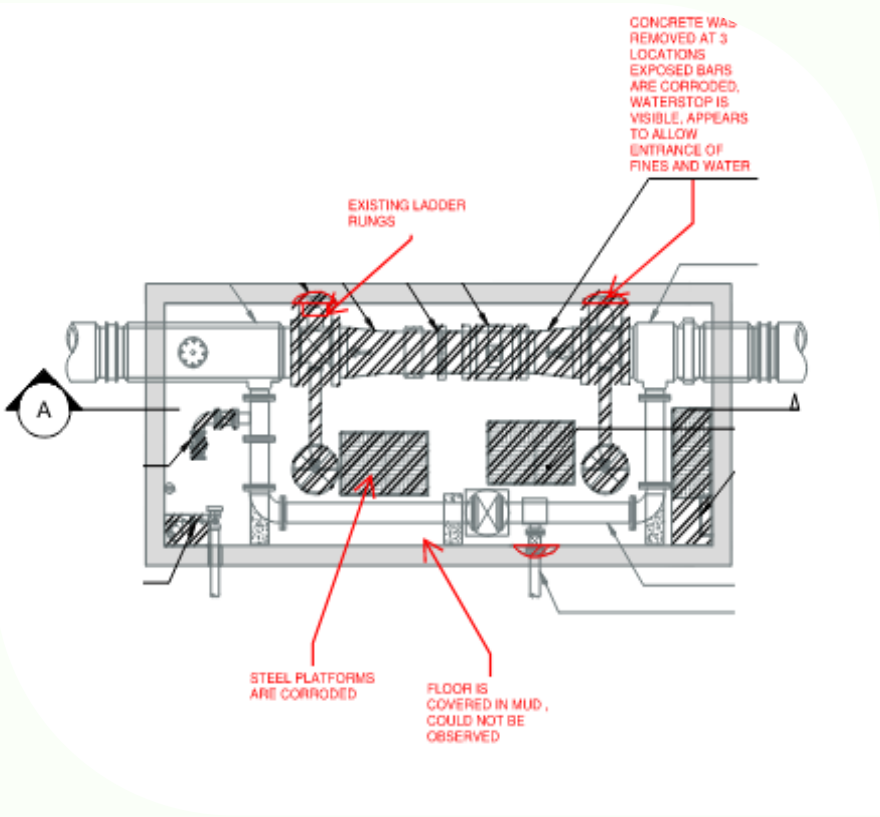
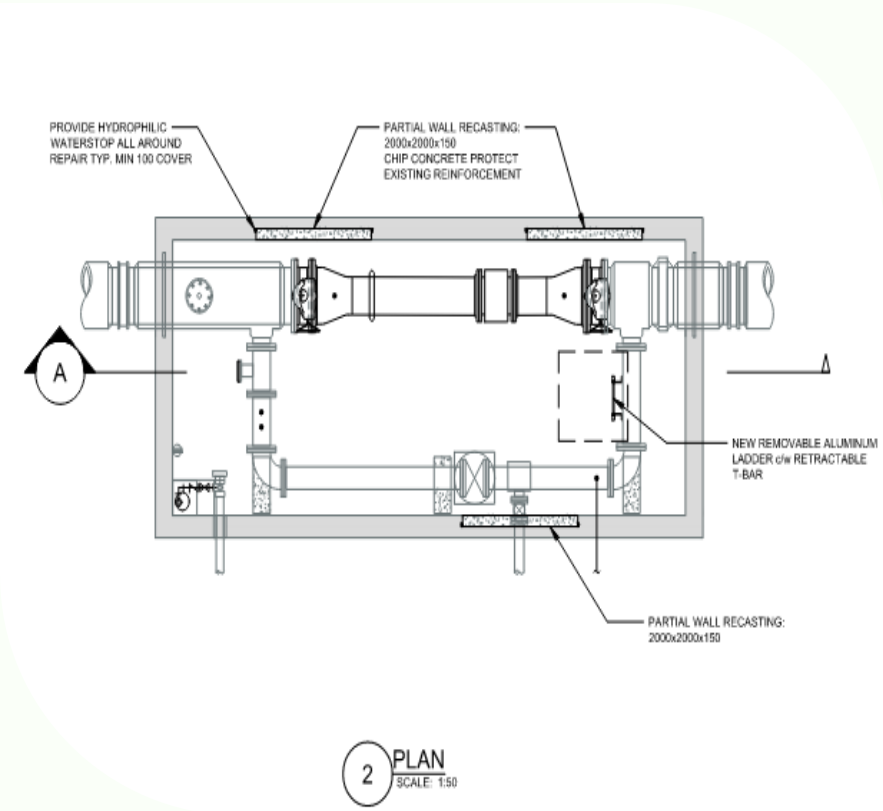
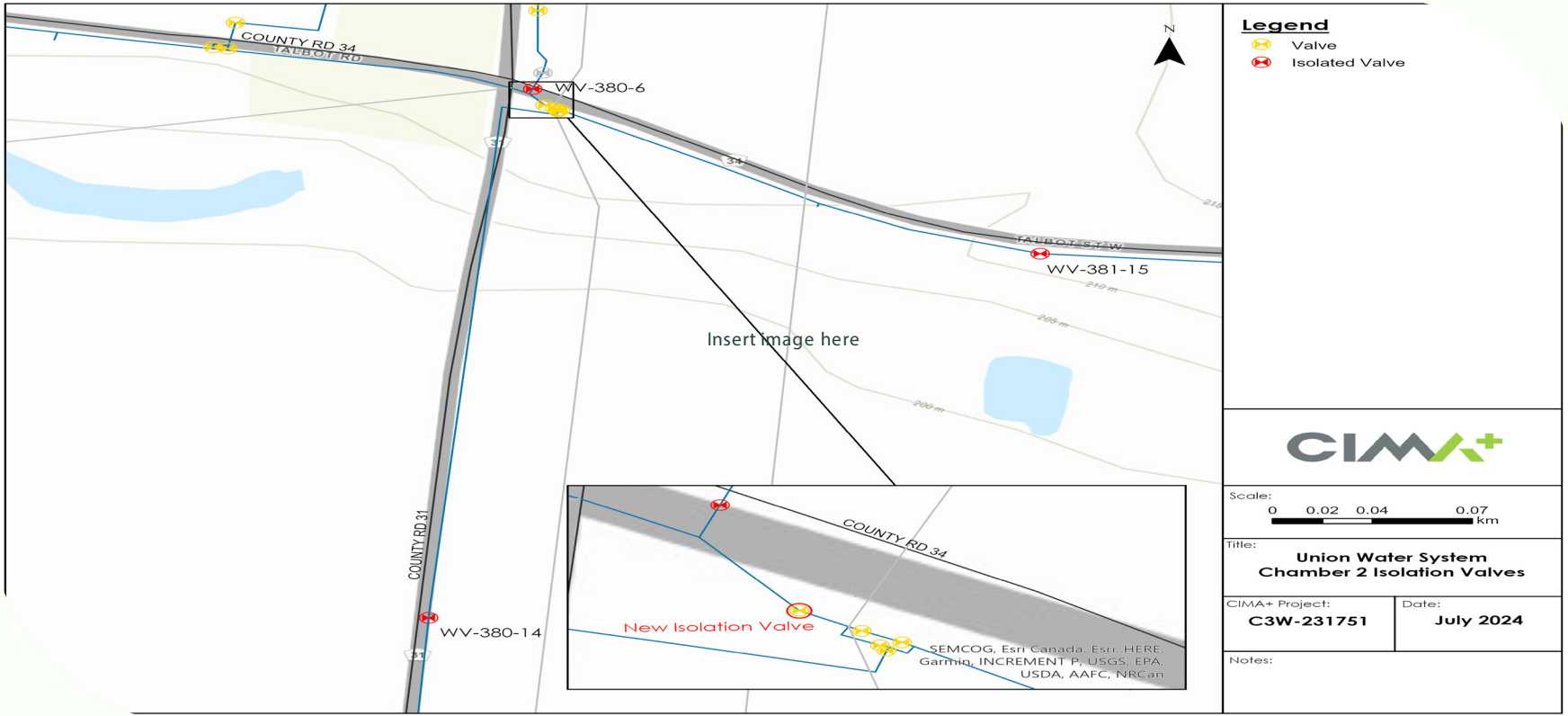




ISOLATION VALVING CONSIDERATIONS



04

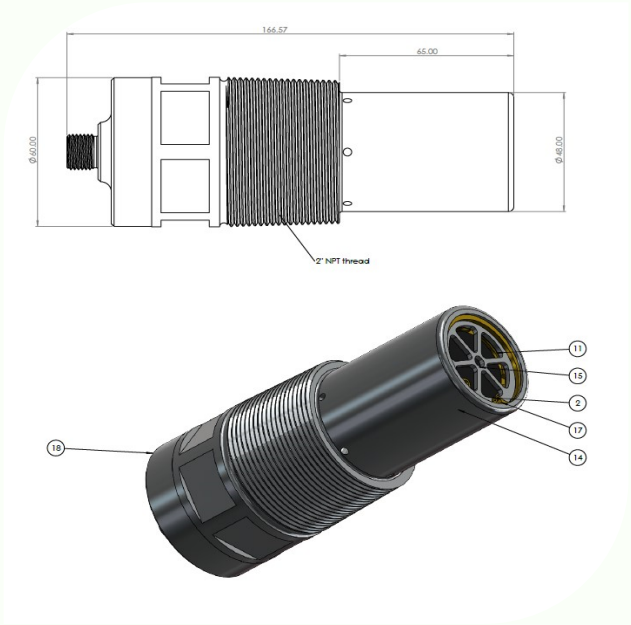
REFINING THE “IDEAL” FLOW METER CHAMBER

Pilot Chamber Renewal Project

DIGITAL WATER SYSTEMS

hydrant.AI Device Within Flow Meter Chambers

- New application of hydrant.AI sensor within a chamber, inserted into 2” port.
- Measures pressure, acoustics and water temperature from directly inside the water column
- Monitors for transient pressure events and leaks in distribution system
- Enhances UWSS’ existing DWS hydrant network, improving system monitoring & leak detection.
- See https://digitalwater.solutions/device-and-platform/



PILOT PROJECT DESIGN UPDATES

Refining the "Ideal Chamber" – New Standard Updates

- Standard panel design: outdoor, above grade
- PLC with cellular modem, or radio
- Typical instruments and I/O points:
  - Flow (bi-directional)
  - Pressure
  - Water temperature
  - ~~Chamber temperature~~
  - Flood switch
  - ~~Chamber hatch open~~
  - PLC panel open
  - Power failure
  - **New DWS monitor on 2" port.**

- Chamber lighting
- Sump pump with float switch
- Spare electrical outlets
- Unit **radiant** heater**(s)**, dehumidifier
- Water quality sampling station*** (where none nearby)**
- Sufficient working space for O&M access
- Replace valves, piping as needed
- Refurbish and seal concrete roof and floor surfaces
- **Resolve structural concerns where applicable**
- **Add isolation valves - minimize service disruptions**

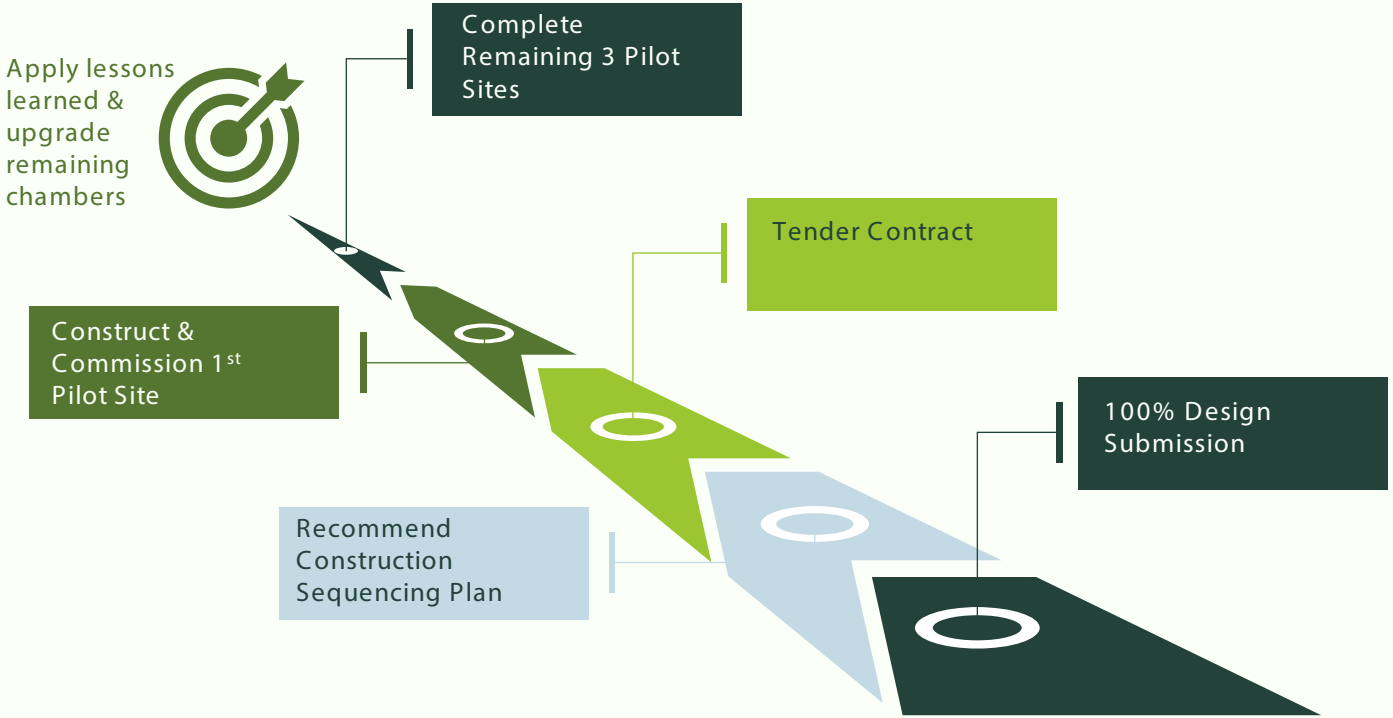
05

NEXT STEPS & CONCLUSIONS

Pilot Chamber Renewal Project

NEXT STEPS

Flow Chamber Renewal Pilot



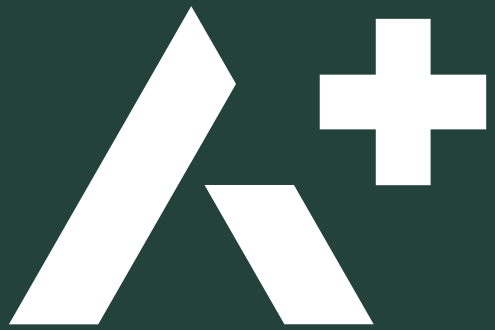
CONCLUSIONS

Lessons Learned

- Consider historical design, prior modifications, and availability of records
  - A deeper analysis of structural conditions could be necessary
- Take the opportunity to apply new technology & update preferred instruments and equipment standards
- Include exceptions and variations where necessary in updated standards
- Consider additional isolation valves to minimize service disruptions from future chamber valve replacements
- Apply continuous improvement throughout the chamber upgrade process







Thank you