

# Planned Improvements

*The City must continually invest in our water and sewer systems to maintain safe reliable services. City Utilities has identified the following major projects:*

## WATER

- Replacement Wells
  - Phase II Complete
  - Phase III
- Airport Plant Filter Upgrades
- SCADA Control Upgrades

## SEWER

- Filter Replacement
- Aeration System Upgrades
- WAS Thickening
- Digester Rehab
- Pipe Gallery Roof Repair
- MCC and Switchgear Replacement
- New SCADA System
- Sturdy Road Pump Station



March 1<sup>st</sup>, 2024

# UPGRADE SUMMARY



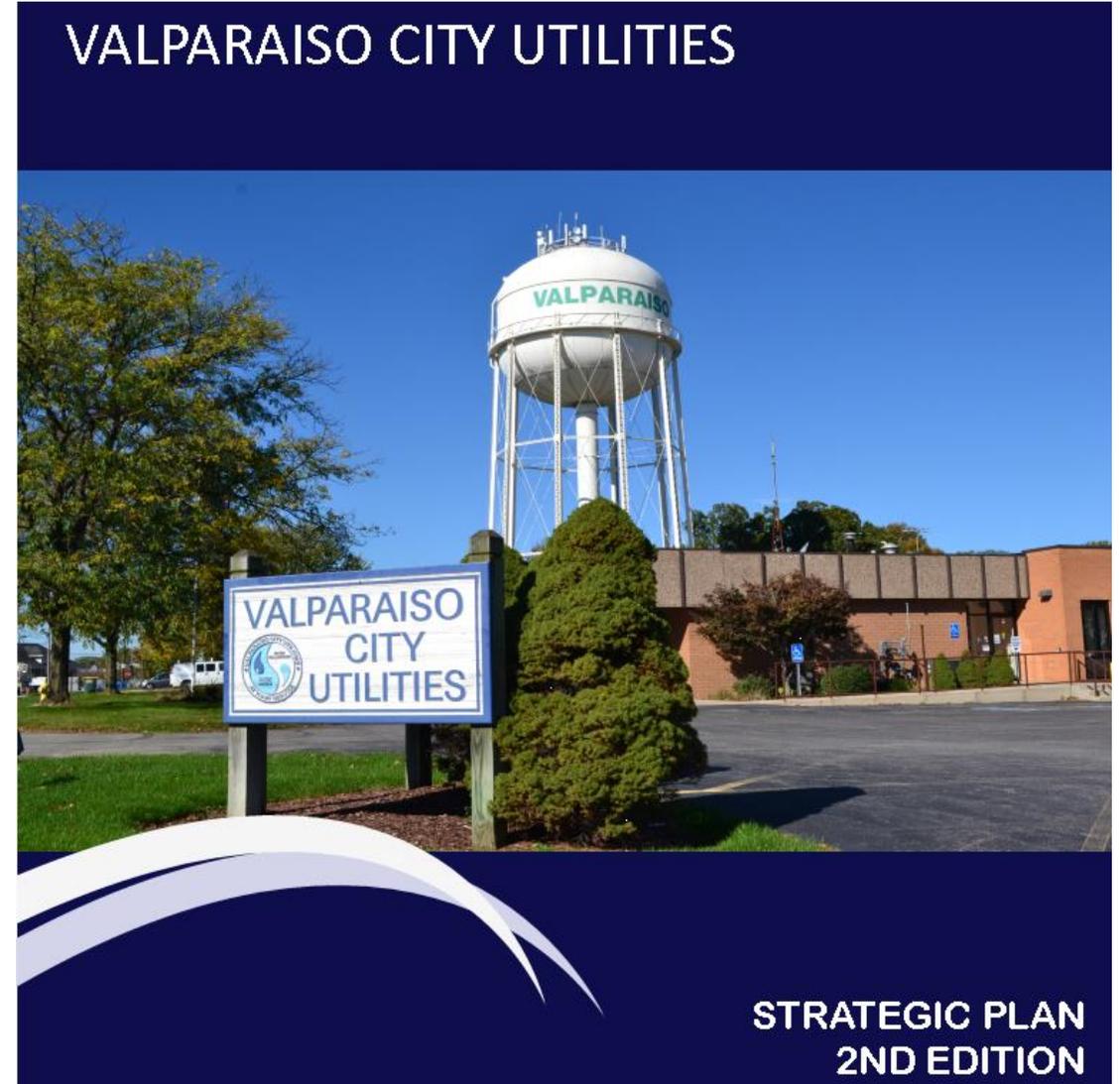
## Water Projects

*Replace Aging Systems  
(Aging Wells/Filters/Controls)*

# PURPOSE OF ORDINANCE No. 29, 2022

- Engineering and construction of additions and improvements to the City's Waterworks.
- **\$23 Million financed through Bonds:**
  - Construction of up to 8 New Wells & Transmission Lines
    - ✓ Phase II – 4 Wells by 2023
    - ✓ Phase III
      - ✓ *Additional Wells*
      - ✓ Backwash Recycling System Flint Lake
      - ✓ 4 New Filters (Airport Plant)
      - ✓ Structural & Electrical Modification
- The ability to issues Bond Anticipation Notes (BANs) of not to exceed **\$6 Million**
  - Interim Financing for:
    - Engineering Phase II & III **\$2.3 Million**
    - Phase II Construction 4 Wells **\$5 Million**

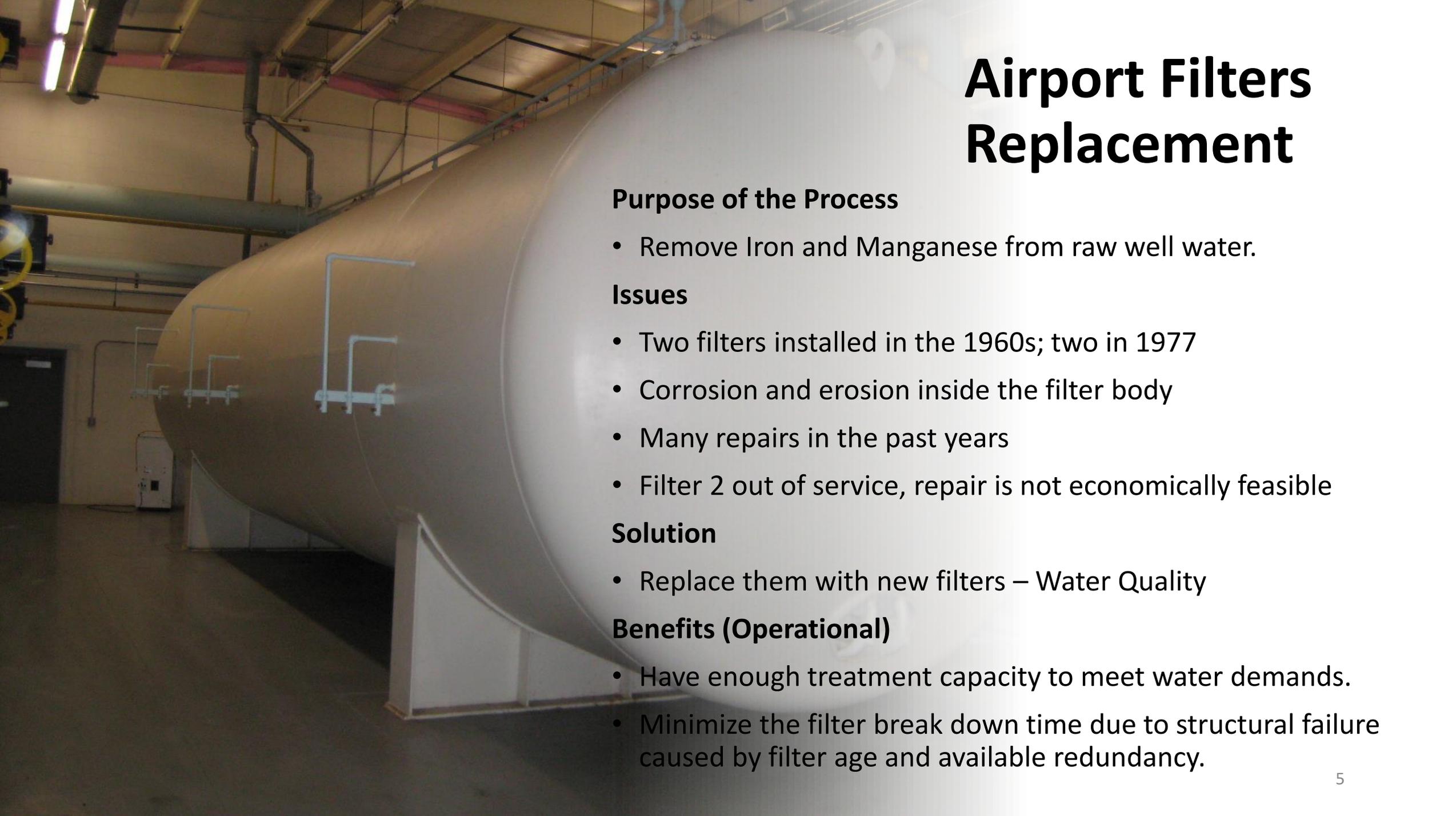
## VALPARAISO CITY UTILITIES



STRATEGIC PLAN  
2ND EDITION

# Phase III Country Club Wells Replacement



A large, cylindrical, light-colored industrial water filter tank is the central focus of the image. It is situated in a well-lit industrial facility with visible pipes, conduits, and structural elements on the ceiling and walls. The tank has several access points and valves on its side. The background shows a clean, organized industrial environment.

# Airport Filters Replacement

## **Purpose of the Process**

- Remove Iron and Manganese from raw well water.

## **Issues**

- Two filters installed in the 1960s; two in 1977
- Corrosion and erosion inside the filter body
- Many repairs in the past years
- Filter 2 out of service, repair is not economically feasible

## **Solution**

- Replace them with new filters – Water Quality

## **Benefits (Operational)**

- Have enough treatment capacity to meet water demands.
- Minimize the filter break down time due to structural failure caused by filter age and available redundancy.

March 1<sup>st</sup>, 2024



## UPGRADE SUMMARY

# Wastewater Projects

*Replace Aging Systems*  
*Maintain Compliance & Environmental Stewardship*  
*Improve Efficiency*  
*Increase Capacity (Same Footprint)*

# Blower Replacement and Mechanical Mixing Addition

## Purpose of the Process

- Blowers provide air to tanks for mixing and the “bugs” can breathe so they may:
  - Promote microbial growth to treat and stabilize wastewater

## Issue

- Excessive power costs from oversized motors
- Current Piping & Mixing System Disks are failing due to age

## Solution

- New system to include blowers, headers, sub-headers, diffusers, and controls.

## Benefits (Environmental, Financial)

- Replaces a system in operation for 36 years
- Eliminates Hard-to-get replacement parts for existing VFDs
- Reduces electricity energy costs of blowers.
- Continues to meet environmental regulations.



# Biological Aeration Tank Operations (Removal of Biochemical Oxygen Demand & Ammonia Nitrogen)

Existing

Modification

**Risk: Compliance with Biochemical Oxygen Demand & Ammonia Nitrogen Requirements**

## Aeration Tanks

- 6 North ATs, 8 South ATs
- 2.74 MG Total Volume
- 5340 Total ceramic diffusers

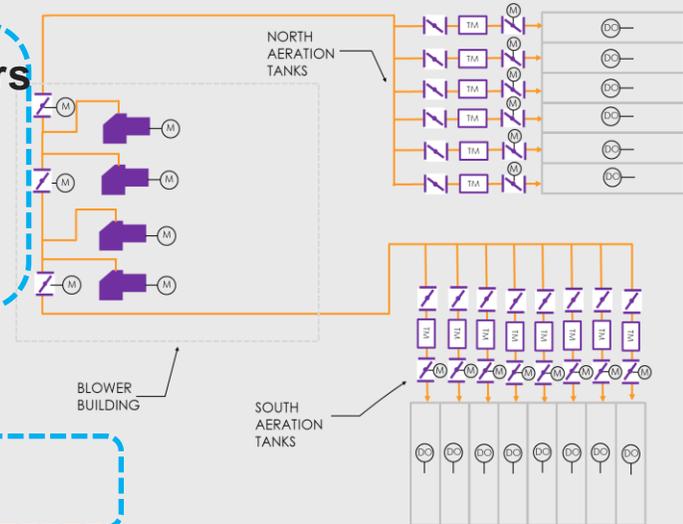


## Blower Building

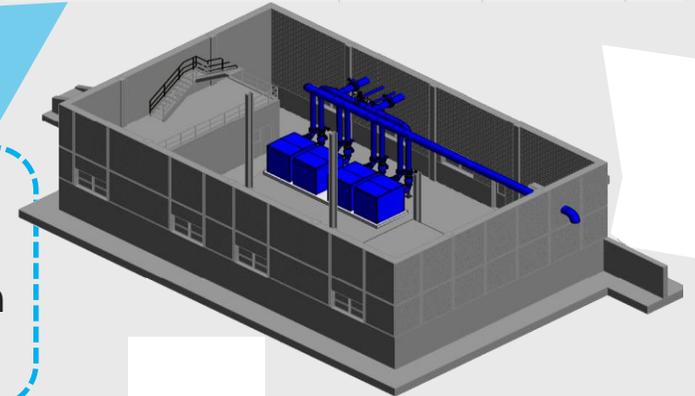
- 4 Multi-Stage Centrifugal Blowers
- Two @ 8,000 SCFM (400 HP)
- Two @ 4,000 SCFM (200 HP)



- **Membrane Diffusers**
- **2560 total**
- **New air piping**
- **Automated DO Control**



- **Hybrid Screw Blower**
- **768 SCFM Each**
- **125 HP**



# Anerobic Digester Covers and Piping Rehab (1950s and 1970s)



## Purpose of the Process

- Microorganisms break down organic matter in the absence of air “anaerobic”
- Biogas (methane) produced in digester, used to generate energy.

## Issue

- Structural covers and coatings deteriorating (1950s & 1970s).
- Gas piping and parts deteriorated, not all replacement parts available.

## Solution

- Replace covers, mixing units and repair coating.
- Replace and update gas piping and associated items.

## Benefits (Operational, Structural, Safety)

- Avoid potential safety issues in working with methane gas from leaks or explosion hazards
- Alleviate potential of covers tipping, operational loss, NPDES permit violation as well as expense of resetting covers.
- Continue to meet environmental requirements.

# Digester/Biogas Existing Assessment & Design Modifications

Equipment	Description - Existing	Notes
West Digester, Cover	- Primary digester - Floating, radial beam cover	- Installation: 1970s - Considerations: Minimal gas capture, can be unstable - Condition: Poor, requires replacement
East Digester, Cover	- Secondary digester - Floating, truss-style cover	- Installation: 1950s - Considerations: Minimal gas capture; stable, reliable - Condition: Poor, requires replacement
Digesters, Mixing	- Pumped mixing	- Installation: 1987 - Considerations: Effective mixing technology - Condition: Poor, requires replacement
Biogas, Pipe	SS, 3-in and 4-in diameter	- Installation: 3-in diameter does not meet code
Biogas, Flare	Single, open flare	- Installation: Does not meet code - Condition: Poor, not reliable

Equipment	Description - Proposed	Notes
West Digester, Cover	- Primary digester - Membrane cover	- Considerations: Gas capture to supplement gas for dual fuel boiler; reliable
East Digester, Cover	- Secondary digester - Floating, truss-style cover	- Considerations: Replace with functional/reliable cover
Digesters, Mixing	- Pumped mixing	- Installation: Replace in kind - Considerations: Known/reliable mixing system
Biogas, Pipe	SS, 3-in and 4-in diameter	- Installation: Replace with 6-in diameter pipe to match existing 6-in pipe in Gallery, Boiler Room - Considerations: Additional gas collection from membrane cover for dual fuel boilers
Biogas, Flare	Dual, open flare	- Installation: Dual flares, south of Boiler Building to meet code requirements - Condition: Added redundancy/reliability

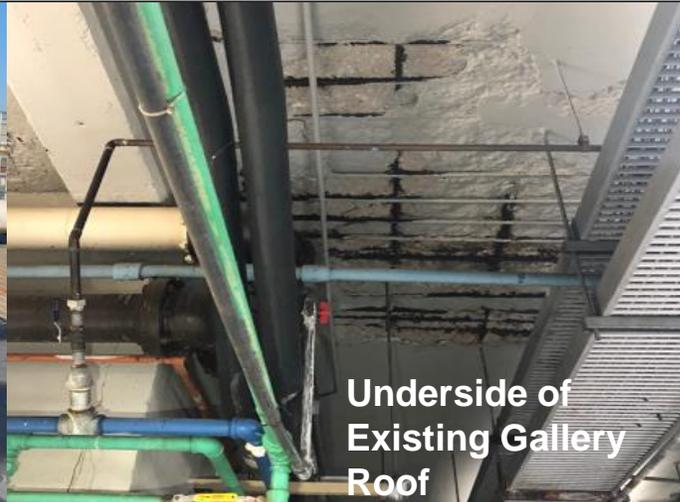
# Structural Modifications/Upgrades

## East-West Pipe Gallery

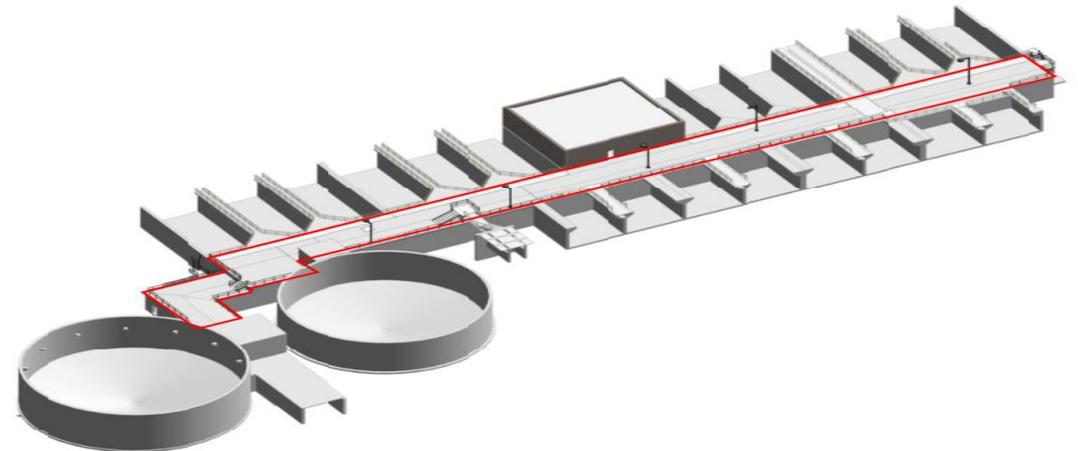
- Removal and replacement of existing East-West Pipe Gallery roof due to deterioration of existing concrete
- New concrete roof will be sloped adequately to improve drainage and increase durability
- New concrete roof will be coated with a pedestrian traffic rated waterproofing coating to prolong lifespan of roof
- Removal and replacement of existing stairs at east end due to deterioration



Top of Existing  
Gallery Roof



Extents of Pipe Gallery  
Roof Replacement



# Waste Activated Sludge Thickening

## Purpose of the Process

- Use air to remove solids.
- Thicken activated sludge before it moves to next process of anaerobic digestion.

## Issue

- DAF system occupies a large footprint.
- DAF system is at the end of its useful life (36 years in service).
- Unit is corroding; Sandblasting and Coating are no longer effective

## Solution

- Replace the existing DAF system with a new WAS thickening system

## Benefits

- Existing building can be used for other functions (if a system with a smaller footprint is chosen)



# WAS Thickening – Existing & Modifications

## Existing

- Equipment installed 40+ years ago
- System lacks automation requiring frequent operator intervention
- Existing tanks are corroded



## Modification

- **Centrifuge thickening** is the recommended technology
- Design Condition
- 2 units (1 Average; 2 Max Day)
- Expected run times:
  - 4.75 hrs (Average)
  - 6.73 hrs (Max Day)
- Produce 4-6% TS solids to digestion



### New Equipment

- **Two (2) WAS feed pumps**
- **Centrifuge package**
- **Two (2) centrifuges**
- **Two (2) thickened sludge pumps**
- **Two (2) sludge hoppers gates**
- **Associated controls and monitoring equipment**
- **Polymer delivery system**

## Improvements

- ✓ **Smaller Footprint**
- ✓ **Automation & Control**
- ✓ **Less Recycle Water**
- ✓ **Less Run Times**
- ✓ **Energy Savings**

# Existing Filter Operations 1985

- Ten filter cells (operated in pairs)
- Sand and anthracite media with 5'-7' bed depth
- 240 SF each
- Two 125 HP vertical turbine backwash pumps
- Firm capacity of 13.5 MGD at 5 gpm/SF



## Current Challenges:

- ✓ Underdrain System is Clogged
- ✓ No replacement parts for controls
- ✓ Limitations of flow during Rain Events
- ✓ Heavy Power User during Cell Cleaning Events

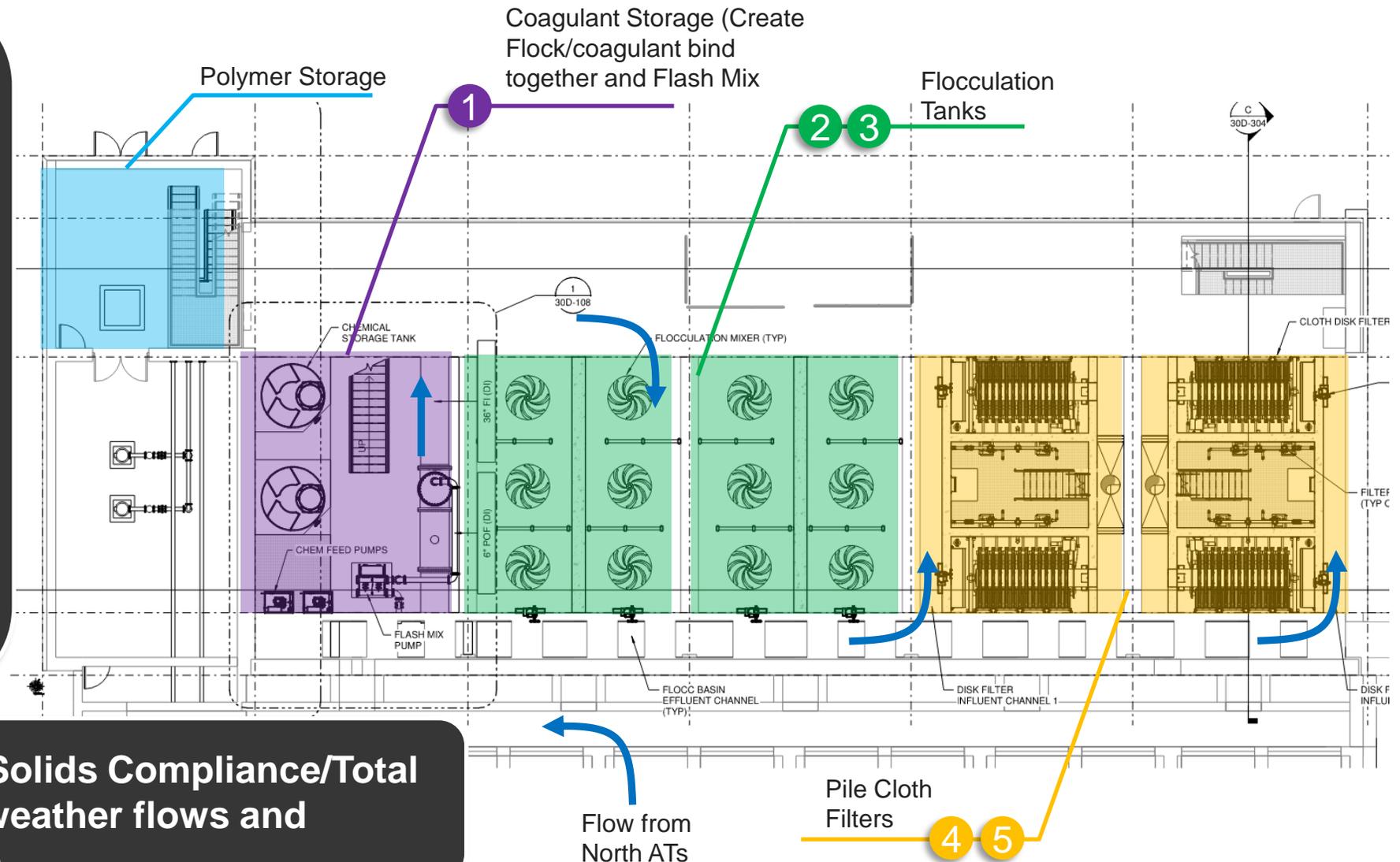
# Filter Rehabilitation Design

**Objective:** Improve filter performance with respect to Total Suspended Solids and Total Phosphorus removal and increase component capacity.

## Improvements

- ✓ Higher Solids & Phosphorus Removal
- ✓ Peak flow increased to 22.5 MGD from 13.5 MGD
- ✓ Less Power Used for Cleaning Cloth Filters
- ✓ Higher Treatment Capacity in Smaller Footprint
- ✓ Can expand to Future Cells within same footprint.

**Risk:** Totals Suspended Solids Compliance/Total Phosphorus during wet weather flows and further underdrain failure.



# Instrumentation & Control Existing Utilities and Modifications

## Remove in its entirety and Replaced/Relocated

CSO Storage PLC- Rack 1&2

Pipe Gallery (RAS) PLC

Effluent PLC

Boiler PLC

Filter Main Control Panel

Filter Consoles

## Modified and Replaced within Panels

CSO Disinfection PLC

Screen and Press PLC

Clarifier PLC

Lift Station PLC

Blower Building PLC

UV main Control Panel

UV Building PLC

Control Building PLC



## Overall Modifications

- New Process Control System redundant servers, network switches, and fiber optic loop
- New Operator computer workstations
- New Plant-wide PLC programming and software
- Upgraded iFix software (building on existing licensing) and programming
- Other new instruments and equipment; valving, flowmeters, gas detection

# Sturdy Road Regional Lift Station Project Constructed in the 1980s (Tin Can Design)

Strategic Regional Pump Station

Useful Life Reached – 40 + Years

Force Main Failures – Piping

Limited Capacity

Confined Space Entry

Pumps Plug Often

Continual Maintenance



# Sturdy Road Regional Lift Station Project Upgrades

## Include:

- 4 Plex Pump Station w/Redundancy Increase – Capacity to 8.2 MGD
- 13,000 Feet of C900 Plastic (Thicker diameter)
- Provide Capacity to Horseprarie Pump Station
- Employee Safety (Confined Space)

