Transformation from Lime Softening to Ultrafiltration and Reverse Osmosis Treatment

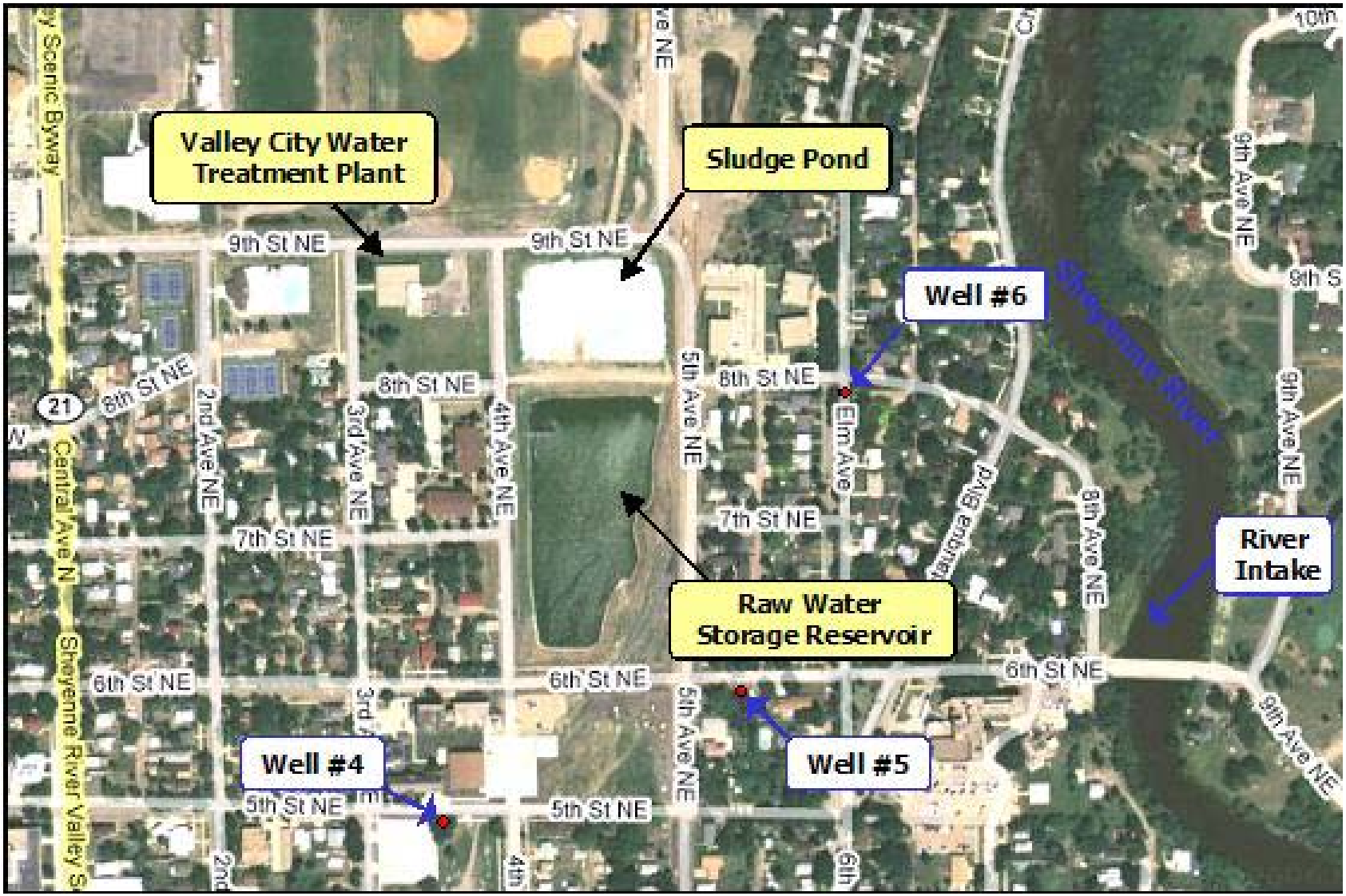
Wade Hesch

October 13, 2011

Valley City Water Treatment Plant

- ✓Constructed in 1974
- ✓4 Million Gallons Per Day (mgd)

Raw Water


Valley City Water Treatment Plant
Sludge Pond
Well #6
River Intake
Raw Water Storage Reservoir
Well #4
Well #5
9th St NE
8th St NE
7th St NE
6th St NE
5th St NE
2nd Ave NE
3rd Ave NE
4th Ave NE
5th Ave NE
Elm Ave
8th Ave NE
9th Ave NE
Central Ave N
Shoyenne River Valley S
Shoyenne River
21

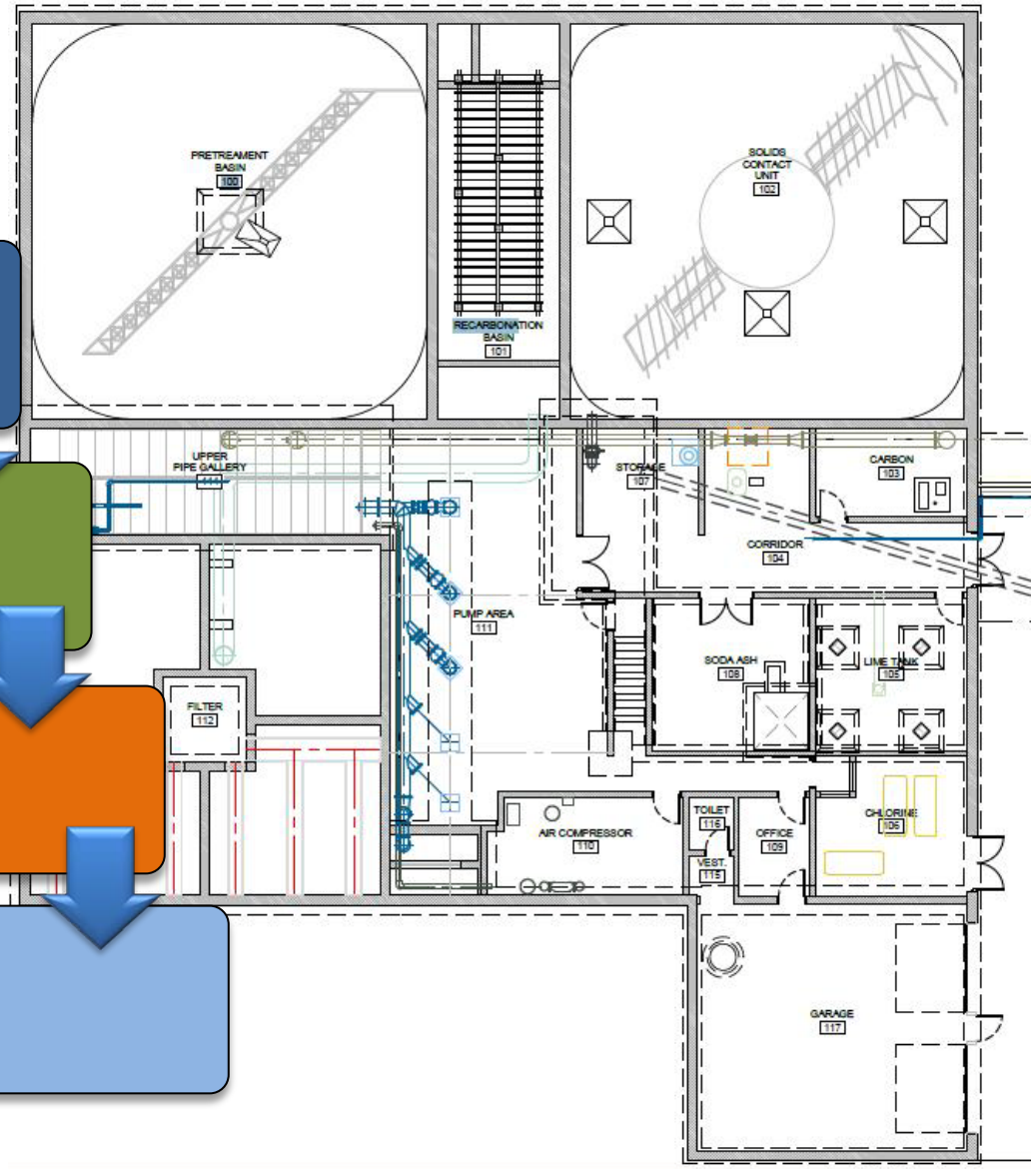
Existing Treatment Processes

Pretreatment (Settling)

Lime Softening

Re-Carbonation

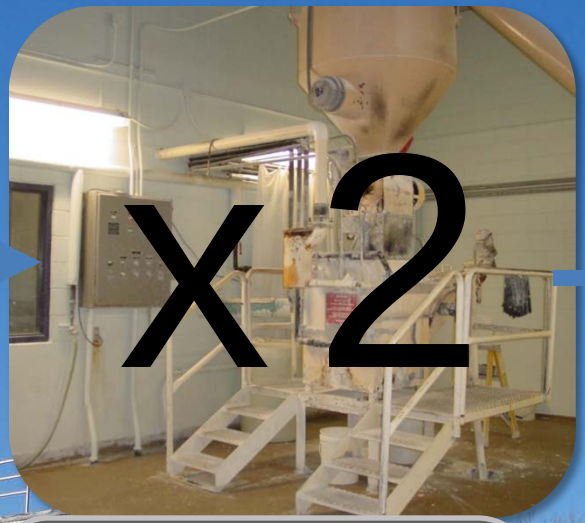
Gravity Rapid Sand Filtration



Existing Process

- ✓ Removes Particulate Contaminants
- ✓ Reduces Hardness
- ✓ Produces Good Potable Water for the Community

Valley City Projects



Refurbish Existing Lime Slaker and Softening Contractor

Install Second Slaker and Contractor

Estimated Cost $2.8 Million

August 2009

Increased pumping into Sheyenne from Devils Lake

New Rule...

Sulfate levels allowed to increase to 750 mg/L at point one tenth of a mile downstream of Baldhill Dam and 450 mg/L at Valley City

High Sulfate Levels

Existing system not capable of treating water for sulfates

Temporary health concerns for citizens

Agreements…

- ✓ NDDH recognized that elevated sulfate levels pose concerns
- ✓ NDSWC to help with funding

Selected Alternative

Ultrafiltration (UF) membrane system selected for its ability to remove particulates and pathogens. Also provides pretreatment for RO.

Reverse osmosis (RO) selected for ability to remove sulfates as well as soften water.

UF Pilot Study

[redacted]

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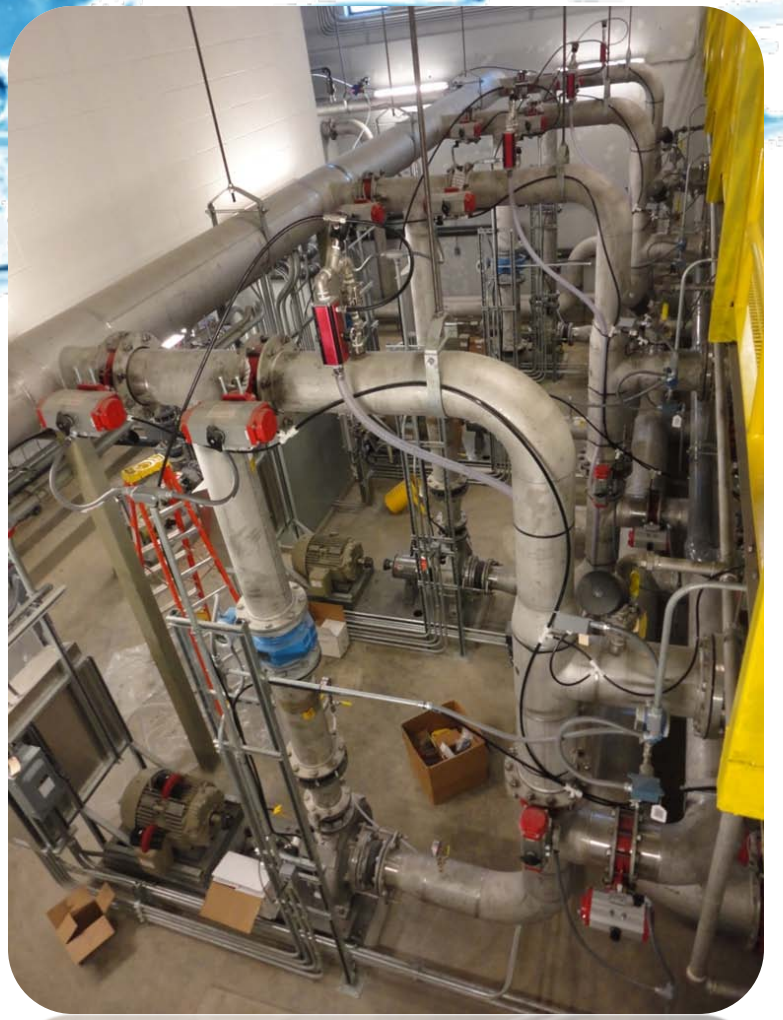

RO Pilot Study

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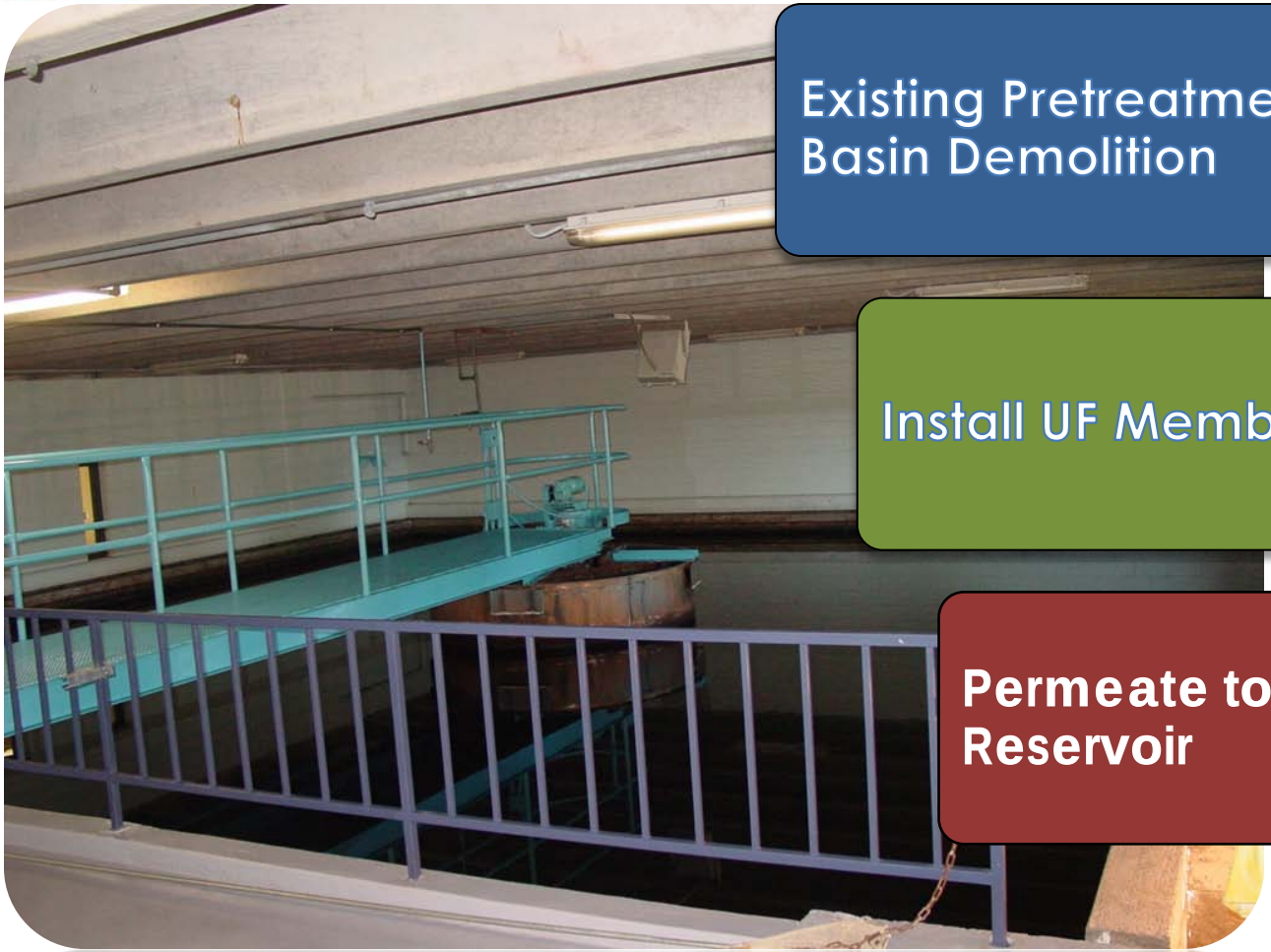
Pilot Study

- ✓5 months
- ✓No CIP performed

Construction Phase 1



Existing Pretreatment Basin Demolition

Install UF Membranes

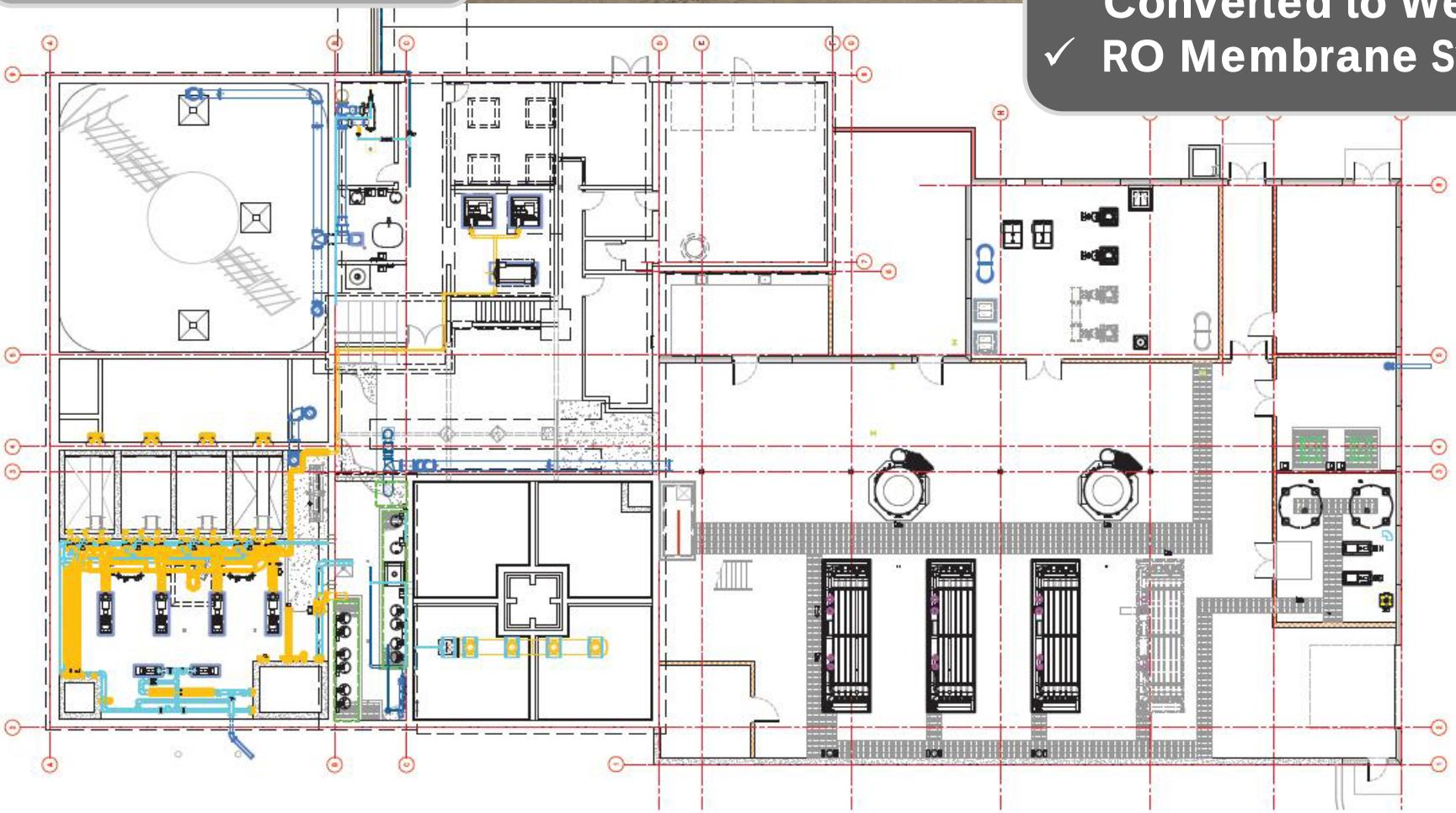
Permeate to Clearwell Reservoir

Construction Phase 1

Construction Phase 1

Phase 2

- ✓ Gravity Media Filters Converted to Wetwell
- ✓ RO Membrane System



Construction Phase 2

Construction Phase 2

Phase 3

- ✓Modify Lime Softening Contactor
- ✓Remove Lime Slaker and Handling System
- ✓Remove CO2 Feed System
- ✓Architectural Modifications to Office Area

Concentrate Disposal

Ability to discharge directly to the Sheyenne River or store in 180 day holding pond depending of river water quality and flow

Total Project Costs

Phases 1-3: $15.27 Million

Concentrate Disposal: $5.93 Million

Total: $21.20 Million

$$$$ Funding

NDSWC	$15.39 Million
NDDH	$2.6 Million SRF Forgiven Loan (ARRA)
City	$2.8 Million ($800,000 State & Tribal Assistance & $2.0 DWSRF)
TOTAL	$20.81 Million

Thank You

Any Questions?