PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

Bull Run Treatment Program

Filtration Facility 30% Design Update

August 12, 2021

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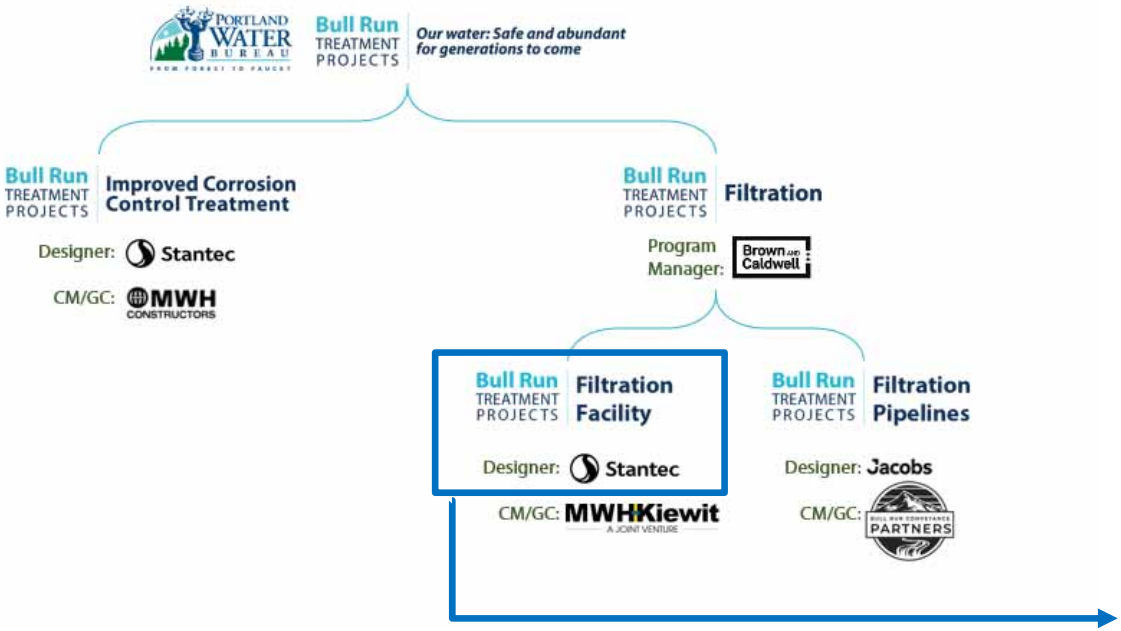
Mark Graham (Stantec)
Jude Grounds (Carollo)

Agenda

- Project Introduction
- Facility Preliminary Design
  - Level of Service Goals
  - Basis of Design Report
  - Value Engineering
- 30% Design
  - Stakeholder involvement
  - Discipline advancement
- Pipelines Preliminary Design
- Next Steps

Program Team and Project Team



Stantec

carollo

mwa architects

ABHT Structural Engineers

McMillen Jacobs Associates

Strongwork Architecture

HK Electrical Engineers

Leland Saylor Associates

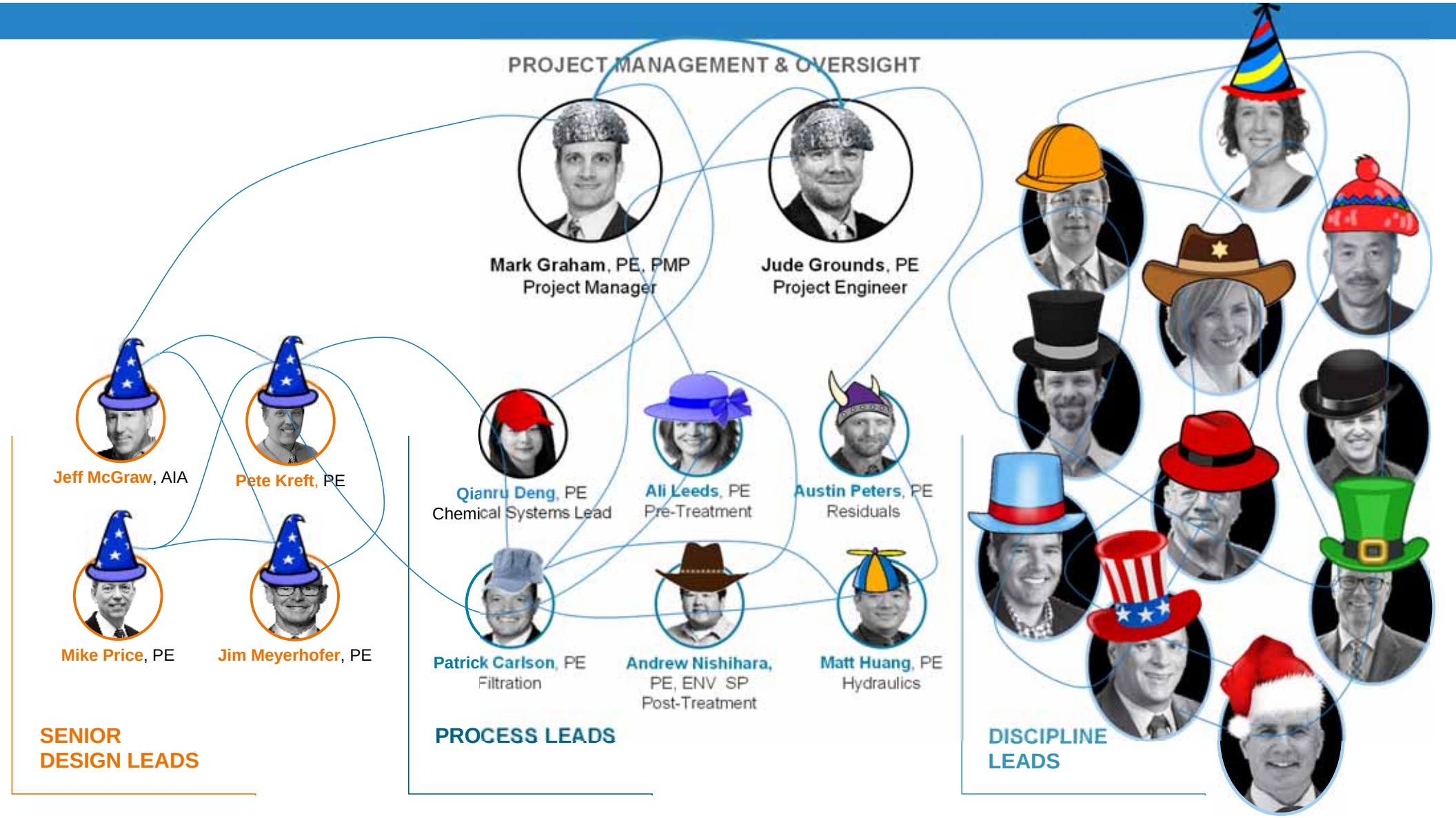
NNA Landscape Architecture

Emerio Design

Perimon CAD Group

Cathodic Protection Engineering, Inc.

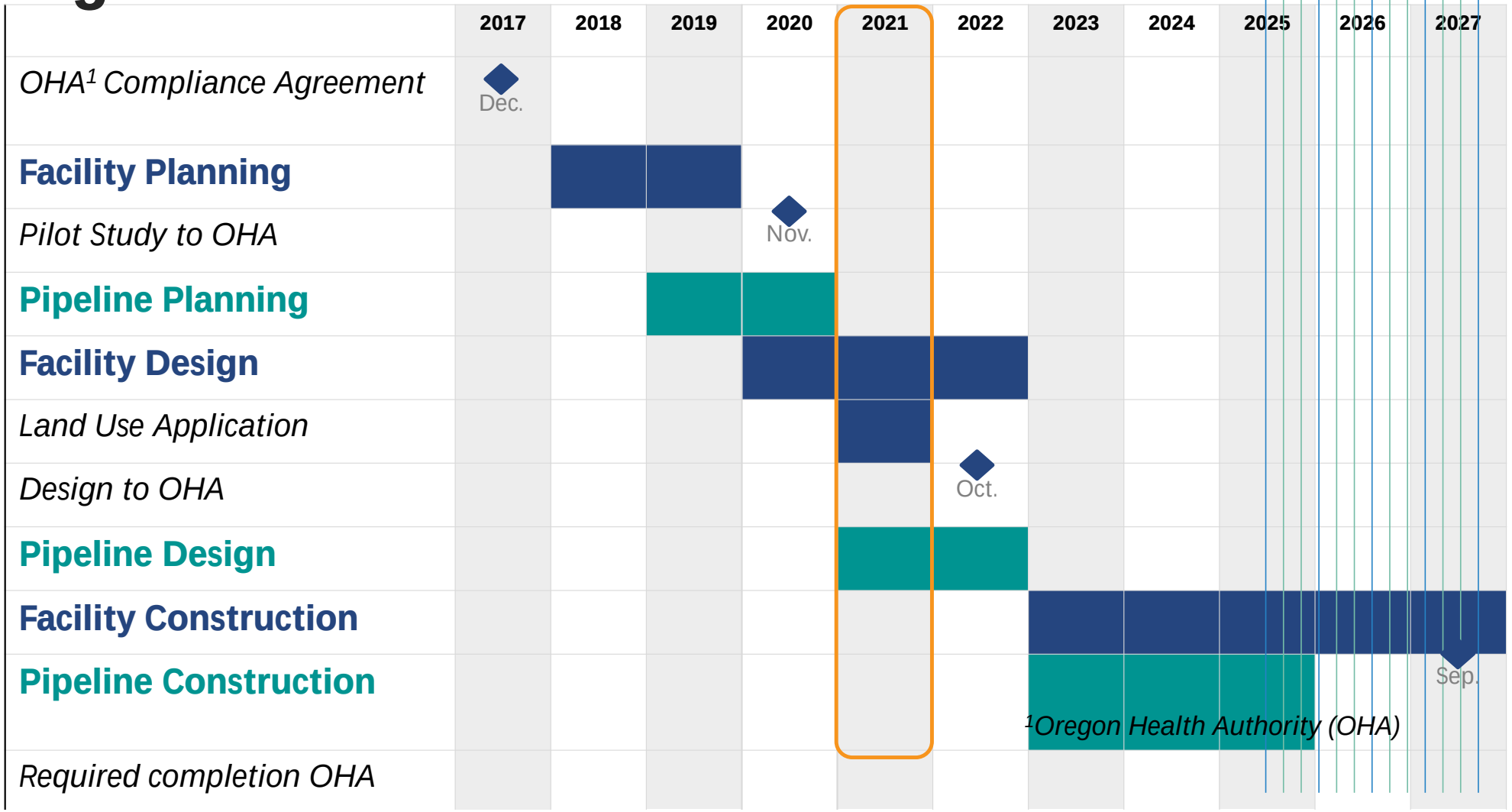
ELCON Associates, Inc.


PROJECT MANAGEMENT & OVERSIGHT
Mark Graham, PE, PMP
Project Manager
Jude Grounds, PE
Project Engineer
Jeff McGraw, AIA
Pete Kreft, PE
Mike Price, PE
Jim Meyerhofer, PE
SENIOR
DESIGN LEADS
Qianru Deng, PE
Chemical Systems Lead
Ali Leeds, PE
Pre-Treatment
Austin Peters, PE
Residuals
Patrick Carlson, PE
Filtration
Andrew Nishihara,
PE, ENV SP
Post-Treatment
Matt Huang, PE
Hydraulics
PROCESS LEADS
DISCIPLINE
LEADS

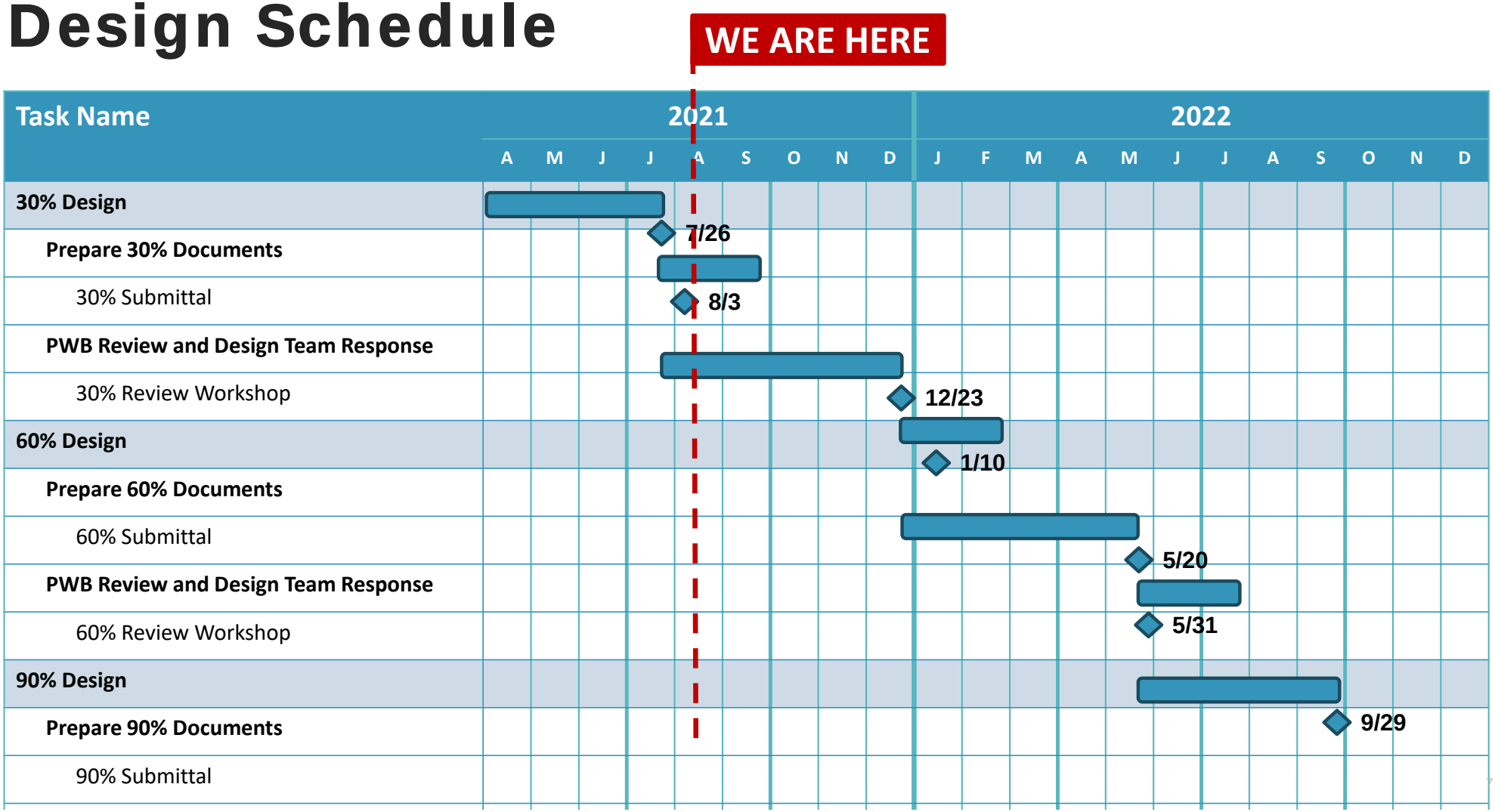
Project Driver

- PWB entered into a compliance agreement with OHA and must serve filtered water by September 2027

Program Schedule



Design Schedule



PORTLAND WATER BUREAU

FROM FOREST TO FAUCET

Level of Service Goals Drive the Design

- Level of Service goals define production capacity and finished water quality under:
  - Normally anticipated conditions
  - Potential local events (like earthquakes, supply chain interruptions, extreme weather events, etc.)
- How developed?
  - PWB staff collaboration
  - Reflection of community values
  - As guide for all other Facility design criteria

Level of Service Goals Identified

- Meet a peak day demand of 145 mgd
- Achieve Phase IV status in the AWWA's Partnership for Safe Water Program
- Meet return to service requirements outlined by Oregon Resilience Plan
  - 20 – 30 percent production within 0 to 24 hrs
  - 50 – 60 percent within 1 to 3 days
  - 80 – 90 percent within 1 to 2 weeks

Poll #1

- Do you know what the Level of Service Goals are for your facility?
  - A) Yes, I can name them right now.
  - B) No, but I know where to look it up.
  - C) No, I have no idea.
  - D) I don’t work for a public utility.
  - E) What’s a Level of Service Goal?

Filtration Facility Basis of Design (draft, Nov 2020)

Key Features	
Capacity	**145 mgd**
Sedimentation	Conventional
Main Process Turbidity Capability	500 NTU
Ozone	**2 Train**
Algal Toxin Destruction Capacity	85 mgd
Residuals Process Turbidity Capability	24 NTU
Opinion of Probable Construction Cost (Class 4)	$670M (-15% to +30%)

Value Engineering & Cost Management Measures

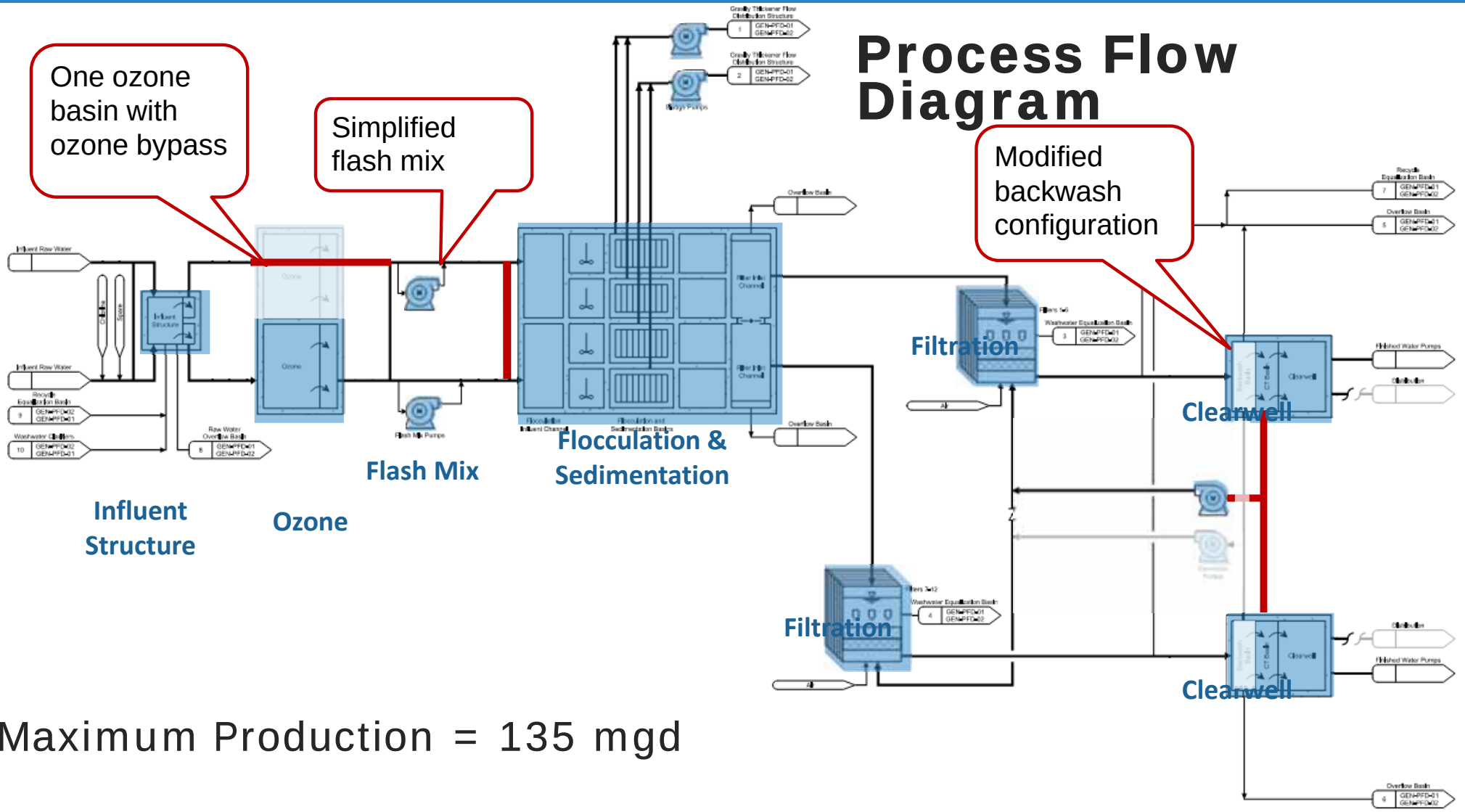
- Value Engineering exercise completed to reduce overall capital and operating costs while maintaining performance, safety, and schedule.
  - Phase 1: VE idea generation (third-party and project team)
  - Phase 2: Close scrutiny and vetting of concepts to prioritize significant cost savings with minimal impact on the Facility's Level of Service.

Process Flow Diagram

One ozone basin with ozone bypass

Simplified flash mix

Modified backwash configuration



Maximum Production = 135 mgd

Table 8-6: VE Recommendations Summary	
VE Recommendation	**Potential Cost Savings ($M)**
Optimize excavation and soil reuse	23.5
Reduce Facility production capacity to 135 mgd	18.5
Construct a single train of ozone sized for 0.75 mg/L ozone dose and 4 min HRT	16.5
Size treatment process for 5% recycle at peak day demand	9.0
Reduce I&C allocation in proportion to reductions in treatment process costs	9.0
Use less-expensive construction materials and methods in administration and maintenance buildings and in process buildings (chemical, mechanical dewatering, and ozone buildings)	6.4
Size residuals system to treat raw water turbidity of 1.5 NTU during peak day demand during normal operation and 24 NTU during peak winter demand with extended operation	6.0
Size treatment trains & connection piping for a maximum hydraulic capacity of 88 mgd	6.0
Eliminate structural enclosure over filters	4.0
Reduce area with formal landscaping and intensity of new landscape plantings	4.0
Construct two parallel CT basins, each capable of treating 88 mgd	3.5
Remove architectural features from process structures	2.6
Site transformers outside	2.2
Construct a single flash mix train	2.0
Reevaluation of ecoroof applicability	1.7
Size chemical storage building to accommodate only initial facility capacity	1.5
Reduce or eliminate air conditioning in process buildings	1.5
Size standby power generator capacity to treat facility capacity without using ozone	1.0
Size waste washwater equalization basins for two backwash cycles	0.7
Remove fleet fueling station and canopies over parking	0.7
Revise road construction strategy for proposed second site access way	0.6
Site soda ash silos outside of chemical building	0.6
Remove flow splitting weirs from inlet structure	0.5
Use chlorinated or chloraminated water for backwash supply	0.5
Minimize provisions for future expansion	0.3
Total Potential Cost Savings	**122.8**

Filtration Facility Basis of Design (final, July 2021)

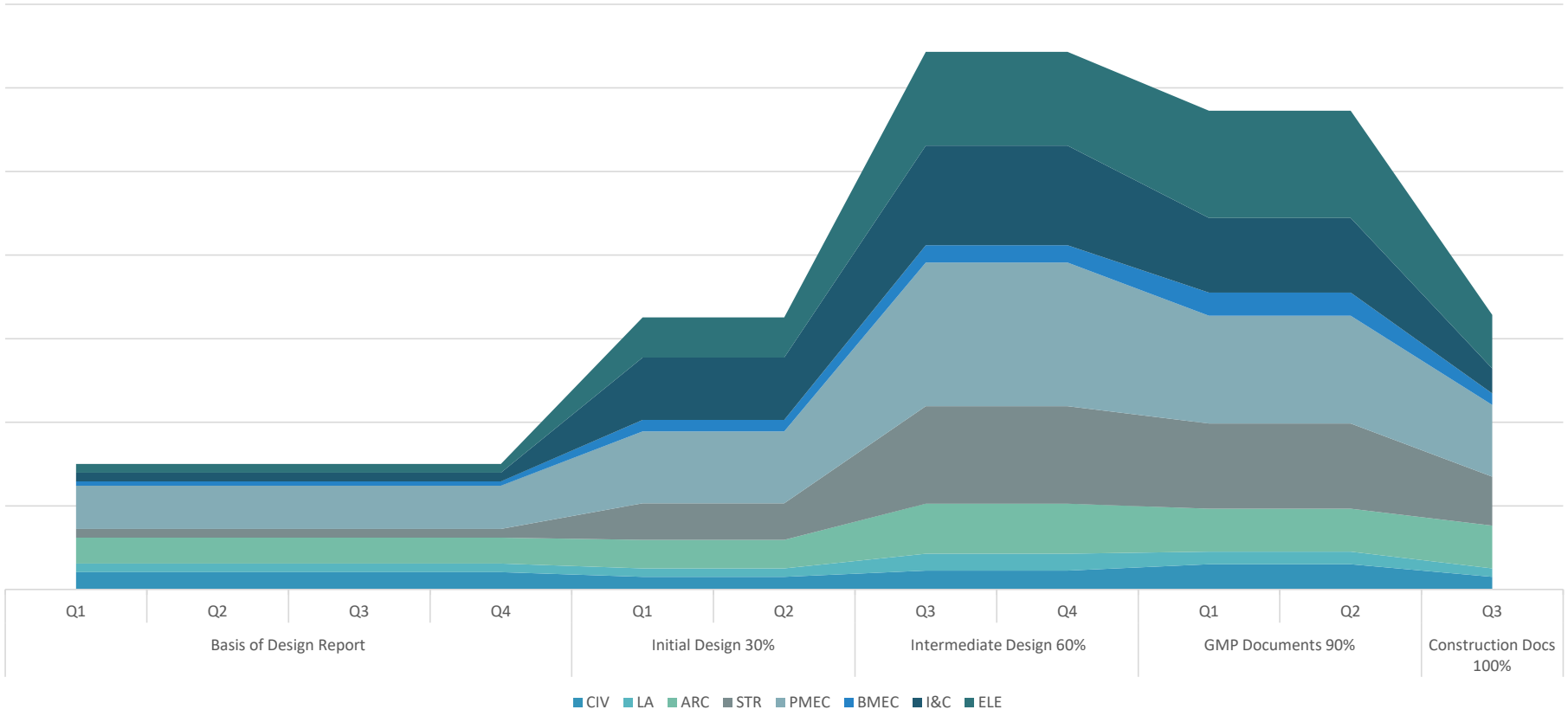
Key Features	
Capacity	**135 mgd**
Sedimentation	Conventional
Main Process Turbidity Capability	500 NTU
Ozone	**1 Train**
Algal Toxin Destruction Capacity	85 mgd
Residuals Process Turbidity Capability	24 NTU
Estimated Cost Savings	$122.8M

30% Design – Engaging Stakeholders…

- PWB's work groups and Leadership
- City Council
- Local agencies: Fire Department, Building Department, Multnomah County and Clackamas County
- State agencies: OHA, Oregon Dept Fish and Wildlife
- Federal agencies: EPA, USACE
- Tribal community
- Non-profit: Johnson Creek Watershed Council, East Multnomah Soil & Water Conservation District
- Neighbors and community businesses

… and making progress

Discipline Advancement, Level of Effort



Chemical Containment Philosophy

Chemical Delivery & Offloading (example)

GOOD NEIGHBOR COMMITMENTS:
Facility Architecture Design

Design facility structures to be as unobtrusive as possible to neighboring properties and to be in keeping with the agricultural and rural nature of the local surroundings.

Strategies will include:

- Designing structures with a **low profile** wherever operationally feasible.
- Using **natural-looking building materials** and finishes that have muted, earth tones to help integrate the facility with the surrounding landscape.
- Using design attributes of the **agrarian and Pacific Northwest architectural styles** to help the facility fit in with the surrounding community.
- **Screening the site** approach with landscaping and by setting the entry gate back from the perimeter.
- **Fencing only the area needed** and leveraging landforms and landscaping where possible to help screen security fencing for the facility.
- Placing the **communications tower in a location to help reduce visual impacts**.

Views Looking South from Carpenter Lane

Updated administration building concept

View from parking lot showing berm landscape area

Updated administration building concept

View from inside secure facility looking east

Updated process building concepts

Mechanical Dewatering Building

Chemicals Building

Landscape areas

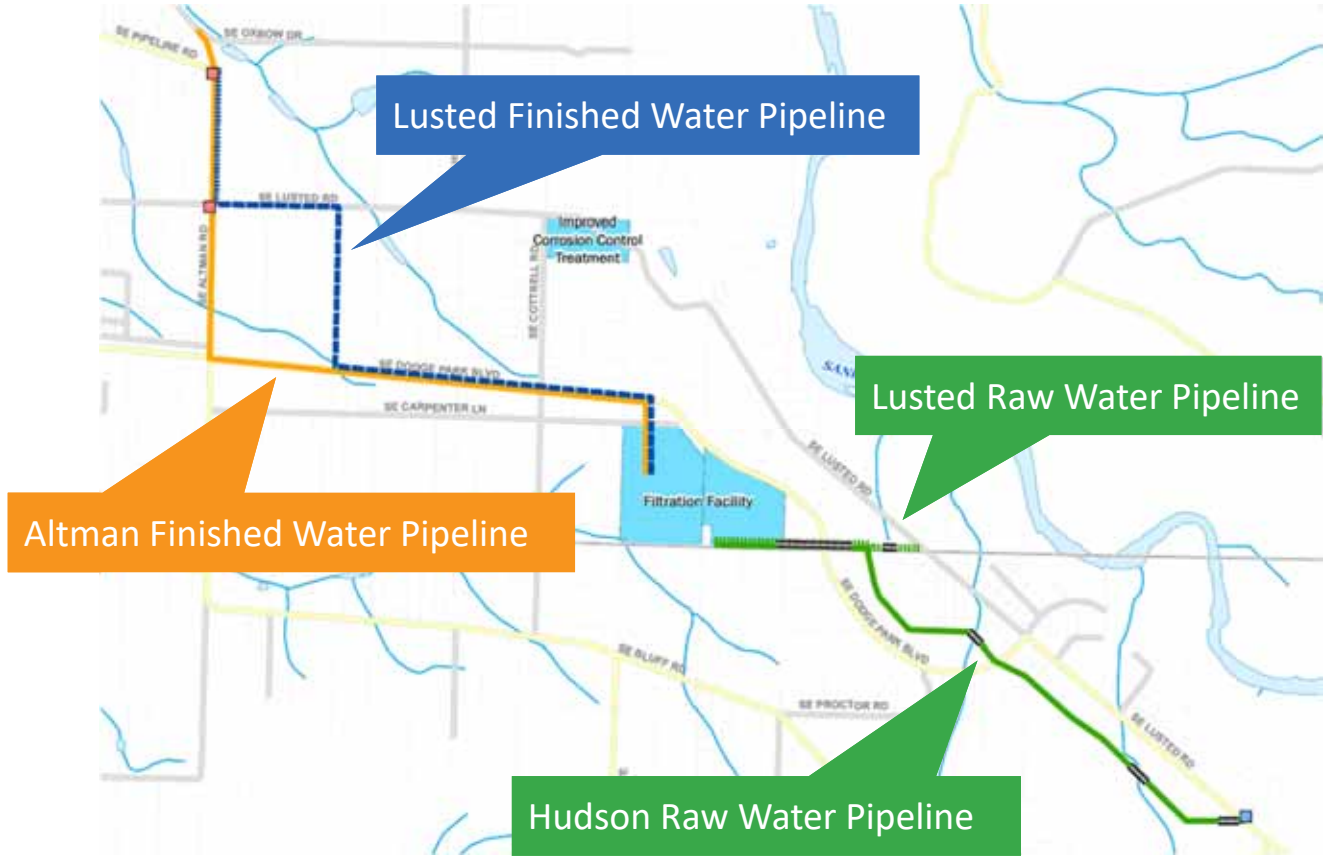
Outer Portion of the Facility

Intermediate Portion

Inner Portion of the Facility

Pipelines Preliminary Design

- Completed field investigations to inform design of new seismically-resilient pipelines
- Draft Basis of Design Report is in review



Next up: 60% Design

- Operations and Maintenance accessibility
  - Valve actuator orientation
  - Instrument locations and access
  - Hose bibb locations
- Safety/PPE strategy refinements
- Emergency eyewash/shower locations
- Smaller diameter pipe routing
- Chemical diffusers
- Specification development
- Constructability issues and opportunities (i.e., clean water testing)
- Hazards analysis (ice storm, chemical shortage, smoke, heat, etc.)
- Support Land Use Application

Poll #2

- What did you find most interesting to learn about?
  - A) VE and cost management measures
  - B) Process mechanical progress
  - C) Architectural progress
  - D) Landscape progress
  - E) all of the above

Thank you!

Questions?

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