Improving System Resiliency One Critical Valve at a Time

Portland Water Bureau
PNWS AWWA 2024
Section Conference

PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

CITY OF PORTLAND, OREGON 1851

Presenters

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Critical Valve Replacements

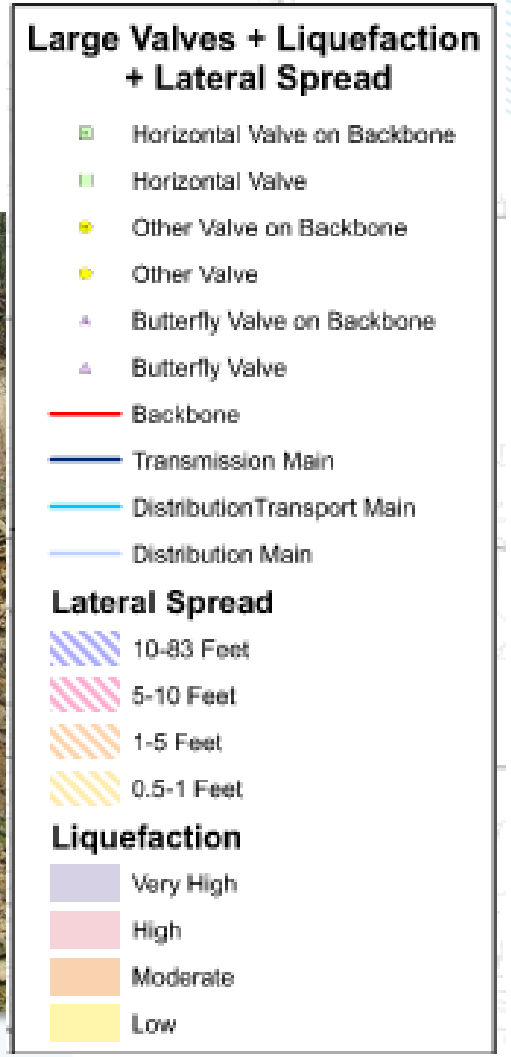
1. **Developing the Program – *How did we get here?***

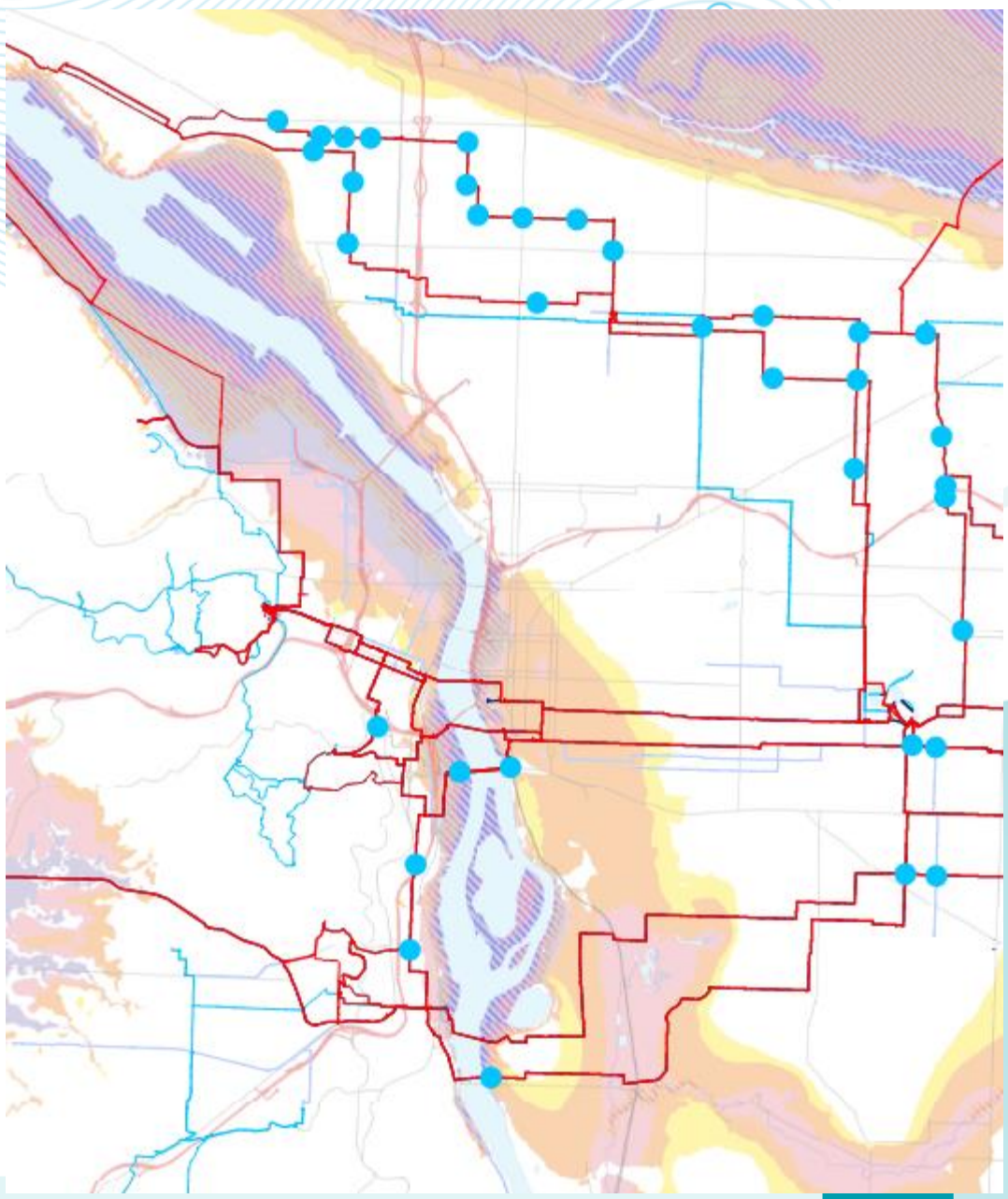
2. **Making Progress – *What does it look like?***

3. **Complexities & Challenges – *How are we moving forward?***

What is a critical valve?

Source: Portland Water Bureau





How many valves are critical?

Table 6-3. Asset-level BRE by Count of Distribution Line Valves

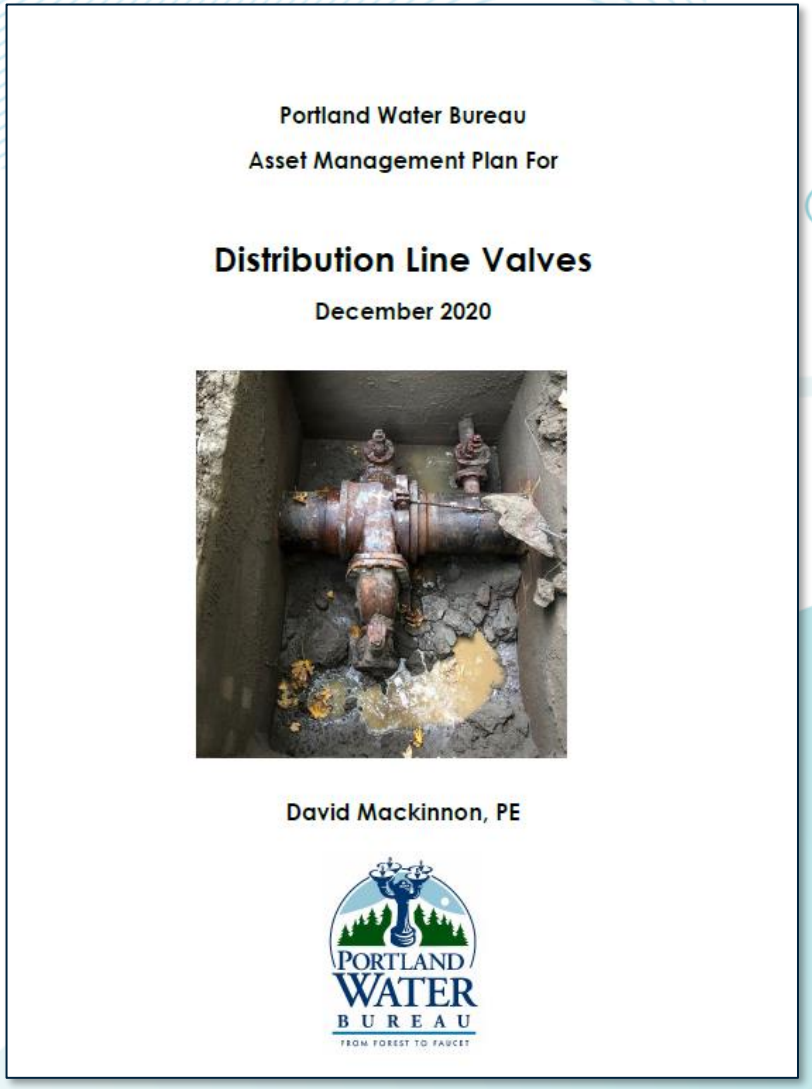
LOF*	COF				
	1	2	3	4	5
1	4,892	1,924	469	913	301
2	3,560	1,613	611	690	136
3	2,067	963	268	448	64
4	2,154	848	163	221	18
5	5,446	2,532	277	329	21

	Count	% of Total
Very Low	11,989	38.8%
Low	11,099	35.9%
Medium	5,895	19.1%
High	1,292	4.2%
Extreme	653	2.1%
Total	30,928	100.0%

*For the 2020 Distribution Line Valves AMP, LOF = RUL.

Asset Management Plan for Critical Valves

- ✓ **Every 2 years: Exercise and assess the condition of <u>all</u> critical valves**
- ✓ **Every 7 years: Assess the condition and pressure test critical <u>crossing</u> valves**
- ✓ **Over the next 6 years: Annually replace critical <u>large</u> valves (≥ 24-inches)**
- ✓ **Develop equitable planning and maintenance practices**



Portland Water Bureau

Asset Management Plan For

Distribution Line Valves

December 2020

David Mackinnon, PE

PORTLAND WATER BUREAU

FROM FOREST TO FAUCET

Critical Valve Replacements

2. Making Progress – *What does it look like?*

The Big Break

Water main break floods several blocks in Northeast Portland, police evacuate residents

by KATU News | Sat, March 16th 2019 at 11:47 AM
Updated Sat, March 16th 2019 at 7:01 PM

Source: kgw.com

LOCAL

'A very rare event': Flooding, power outages in NE Portland neighborhood after water main break

Fire officials estimated water was coming out at 1 million gallons per minute. The Portland Water Bureau reported Sunday morning that the pipe could take several days to repair.

Source: katu.com

Source: Portland Water Bureau

PHOTO GALLERIES

Photos: Water main break in Northeast Portland

by: KOIN 6 News Staff
Posted: Mar 16, 2019 / 03:43 PM PDT
Updated: Mar 16, 2019 / 03:43 PM PDT

Source: koin.com

SHARE

PORTLAND, Ore. (KOIN) — A water main break caused major flooding in a Northeast Portland neighborhood.

The break happened on Saturday, March 16 at Northeast 23rd Avenue and Northeast Skidmore Stre

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Multnomah County › Communications

Responding safely to Portland's water main break

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This page was updated at 7:00 p.m. Saturday, March 16, 2019.

Source: multco.us

The Portland Water Bureau on March 16, 2019 reported the break of a 30-inch water main at 23rd and Skidmore in Northeast Portland. The break of the cast-iron pipe sent a million of gallons of water onto nearby streets, prompting the closure of an area from NE 21rd Avenue to NE 30th Avenue, and from NE Alameda to Rosa Parks Way. The break occurred about 11:30 a.m. The Bureau's press release is here. Portland Water Bureau Press Release on Water Main Break (282.97 KB)

Although the Water Bureau reports about 200 breaks a year in pipes ranging from 2-inches to 24 inches, this incident was more significant because of the size of the pipe and volume of water it unleashed.

Portland Fire Bureau and Multnomah County Emergency Management are responding along with the Portland Bureau of Transportation and Neighborhood Emergency teams. Officials urge the following:

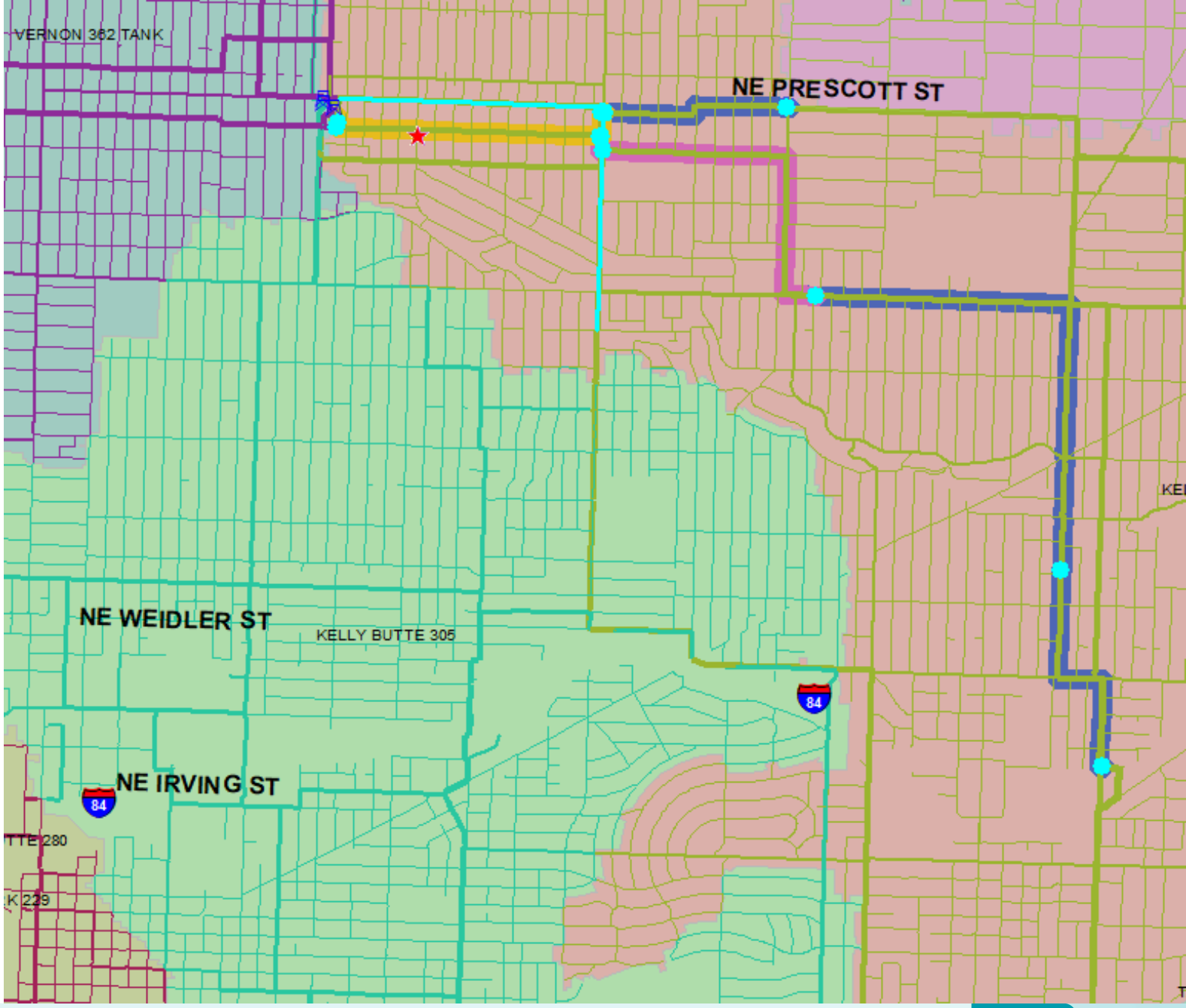
- **Stay out of the water.** Underwater hazards can include open manholes and breaks in the pavement.
- **Plan for power outages.** Power for the affected area was turned off to protect people from electrical hazards.
- **Travel with great care.** As a result of the power being turned off, traffic signals in that area, street lights and residential lights are out and will remain so until electricity can safely be restored. Please take extra care with pedestrians, bicyclists and other drivers.
- **Know that tap water in the area is safe to drink, but people should wait until the discolored water runs clear.** The Water Bureau reports that a break that size will stir up sediment that is always in the water pipes.
- **Call 503-823-1700** to report any signs of sewers backing up or plugged storm drains.

30-inch Broken CI Pipe

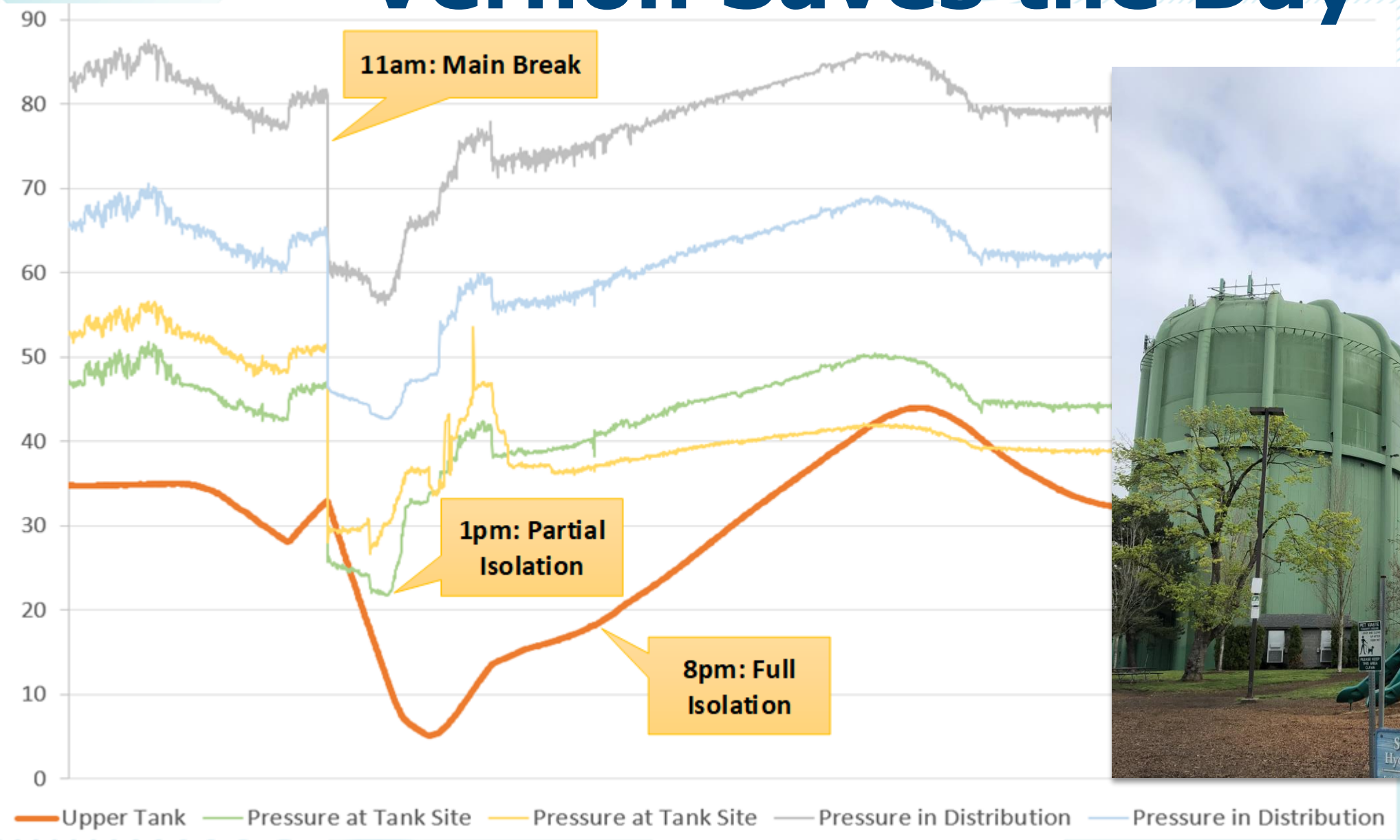
Source: Portland Water Bureau

- **Installed in 1915**
- **Supplies Vernon Tank Site**
- **Carries up to 9500 gpm**
- **Contributes to the supply of 100,000+ customers**

Chasing the Shutdown

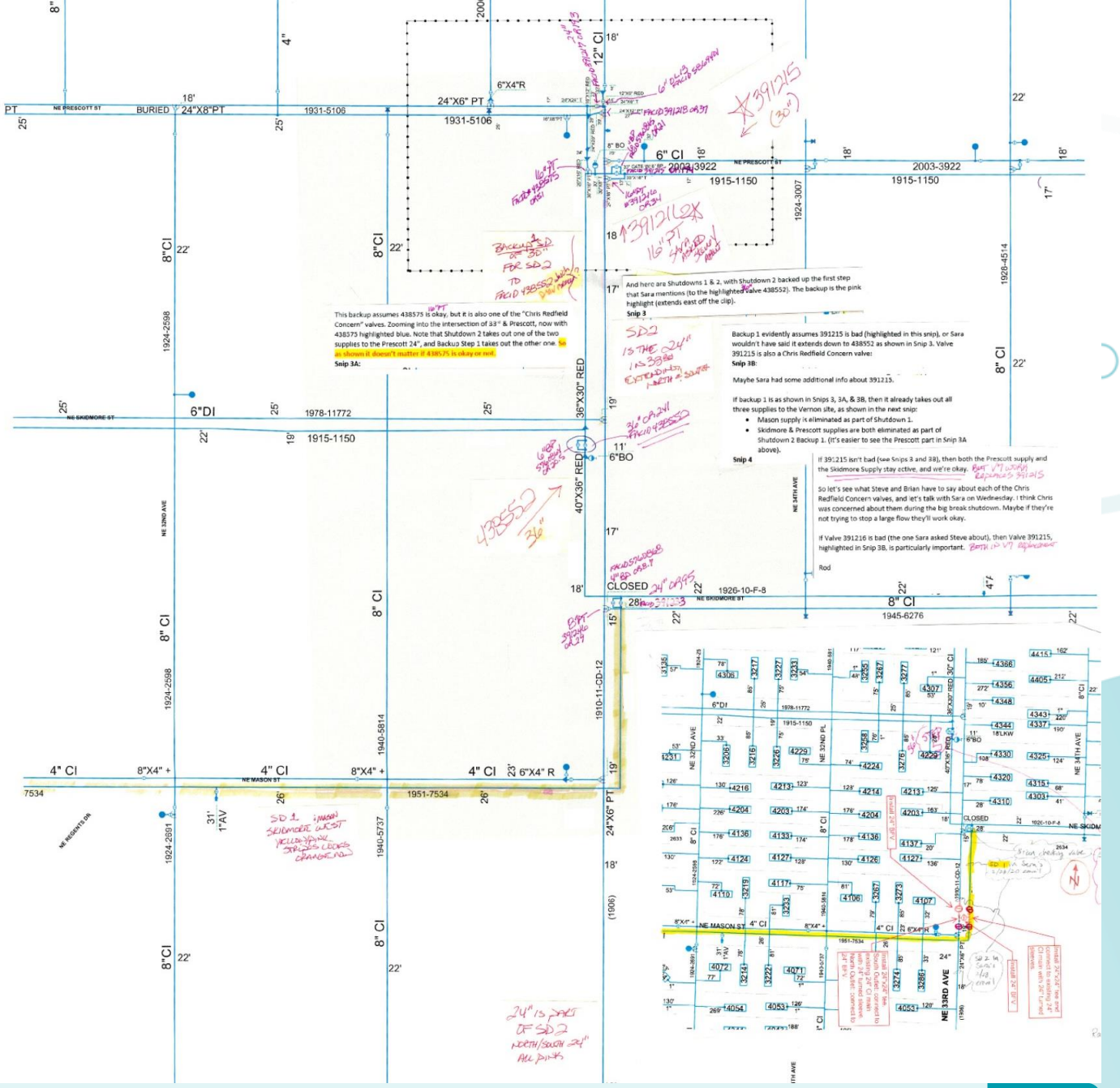


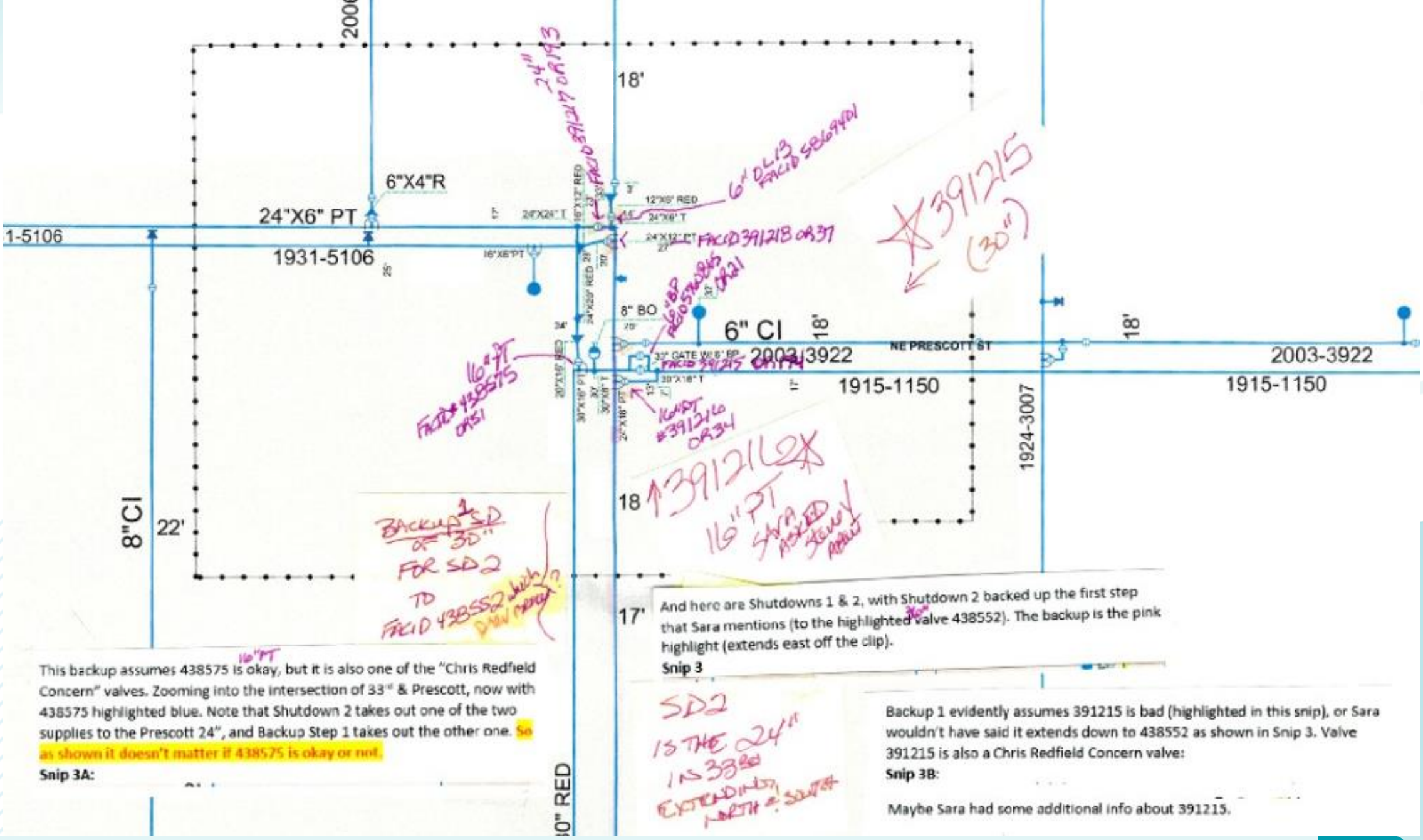
Vernon Saves the Day



Source: Portland Water Bureau

Collecting Years of History





And here are Shutdowns 1 & 2, with Shutdown 2 backed up the first step that Sara mentions (to the highlighted valve 438552). The backup is the pink highlight (extends east off the clip).

Snip 3

This backup assumes 438575 is okay, but it is also one of the "Chris Redfield Concern" valves. Zooming into the intersection of 33rd & Prescott, now with 438575 highlighted blue. Note that Shutdown 2 takes out one of the two supplies to the Prescott 24", and Backup Step 1 takes out the other one. So as shown it doesn't matter if 438575 is okay or not.

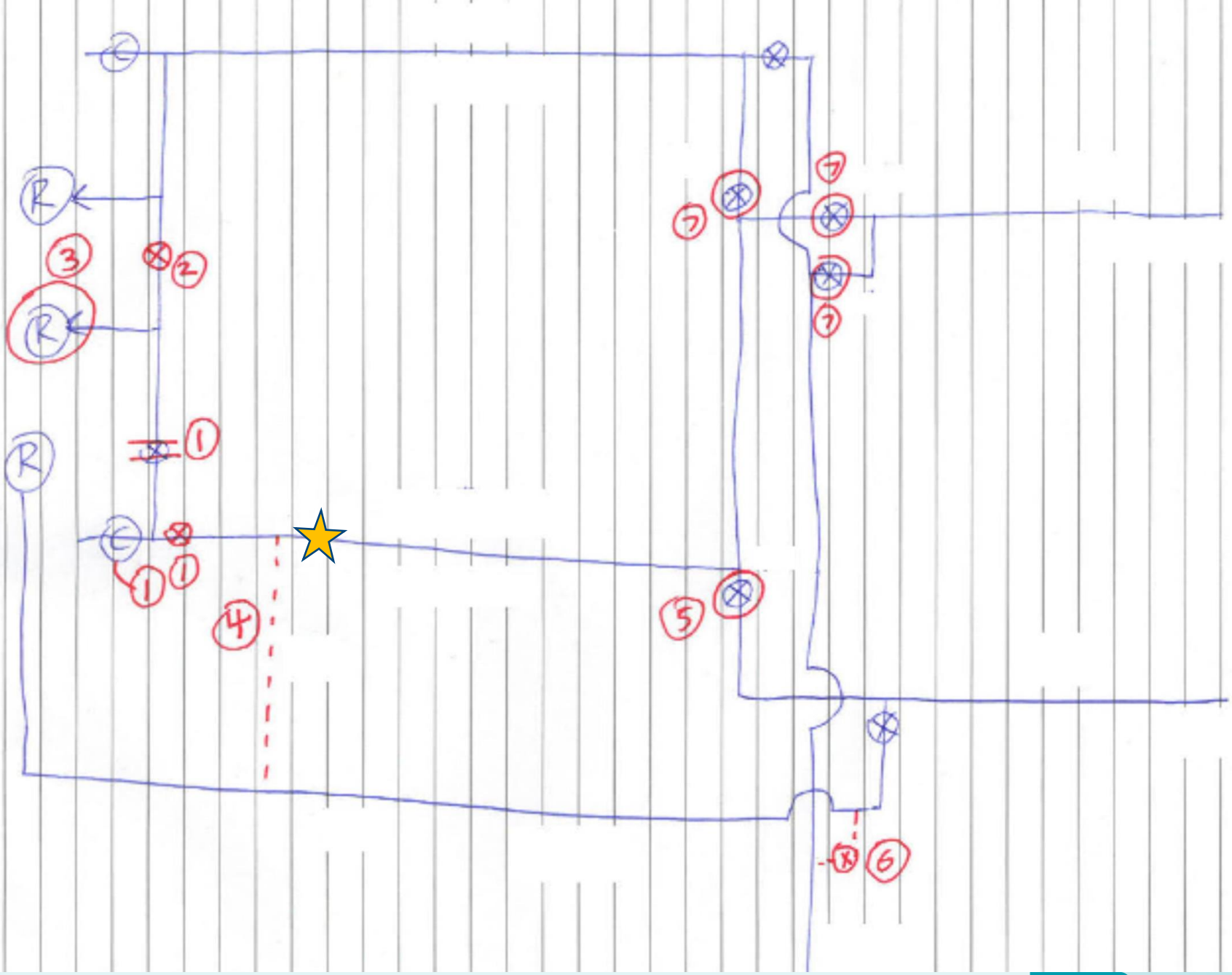
Snip 3A:

Backup 1 evidently assumes 391215 is bad (highlighted in this snip), or Sara wouldn't have said it extends down to 438552 as shown in Snip 3. Valve 391215 is also a Chris Redfield Concern valve:

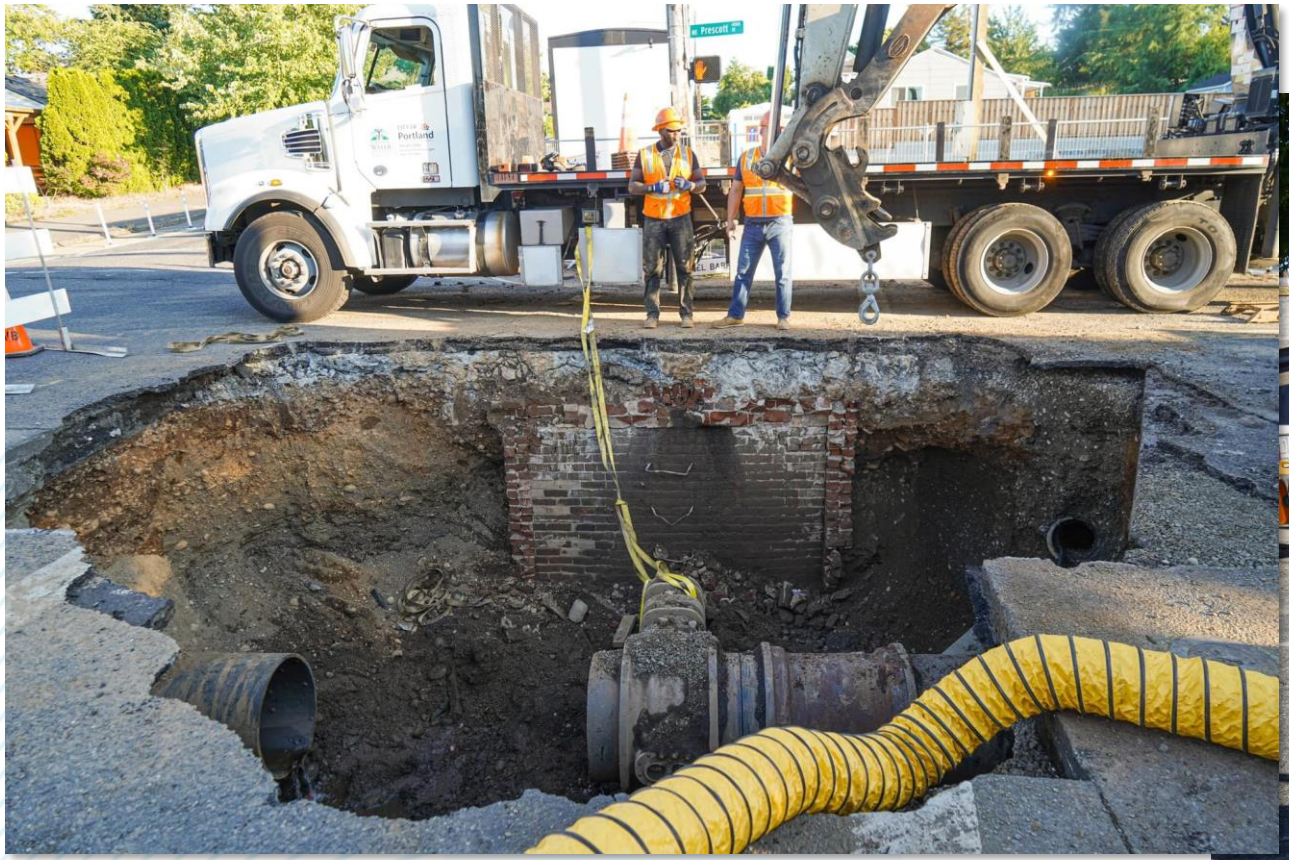
Snip 3B:

Maybe Sara had some additional info about 391215.

Making a Plan



Vernon Valve Replacements



Source: Portland Water Bureau

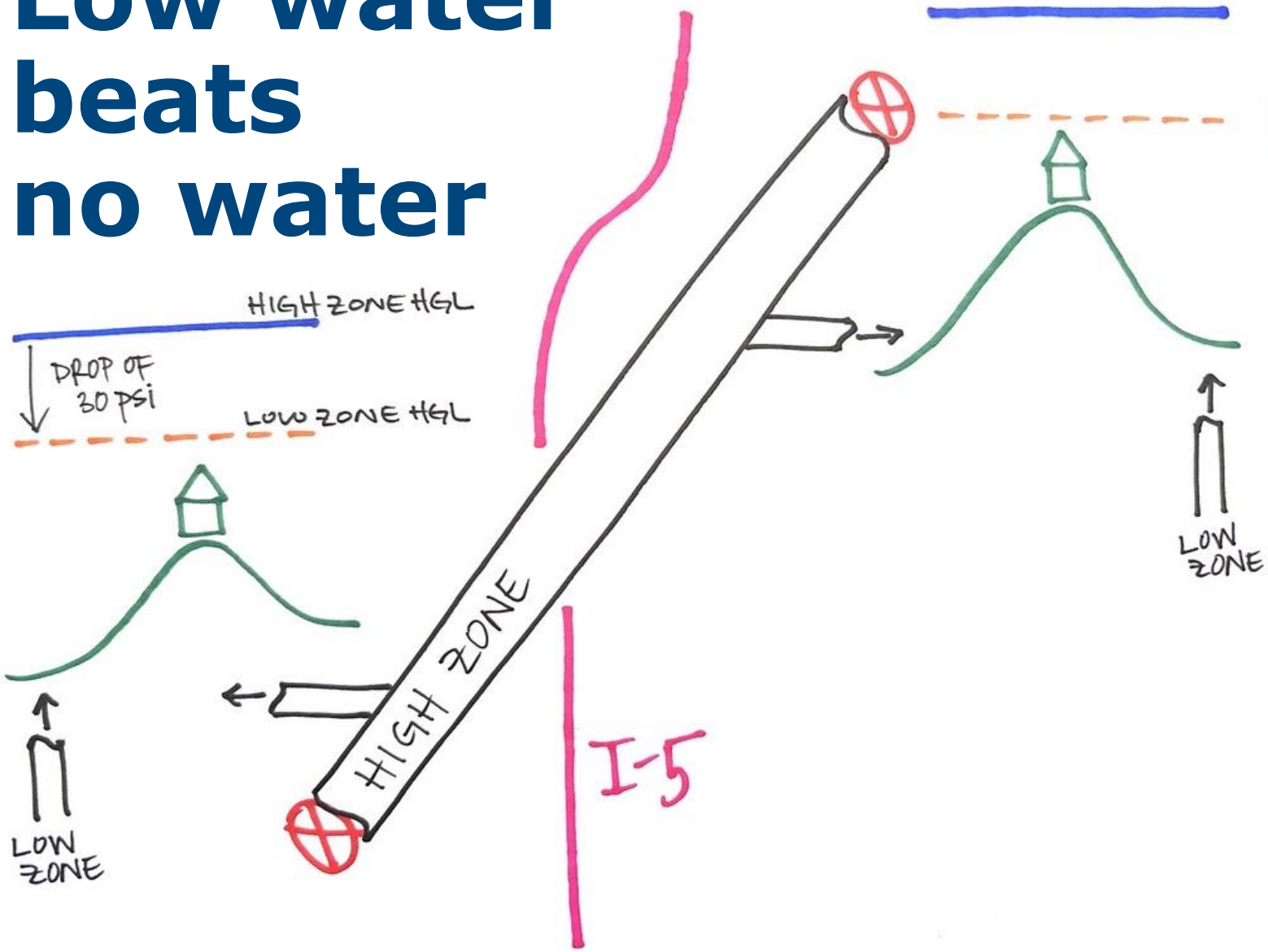
Vernon Valve Replacements

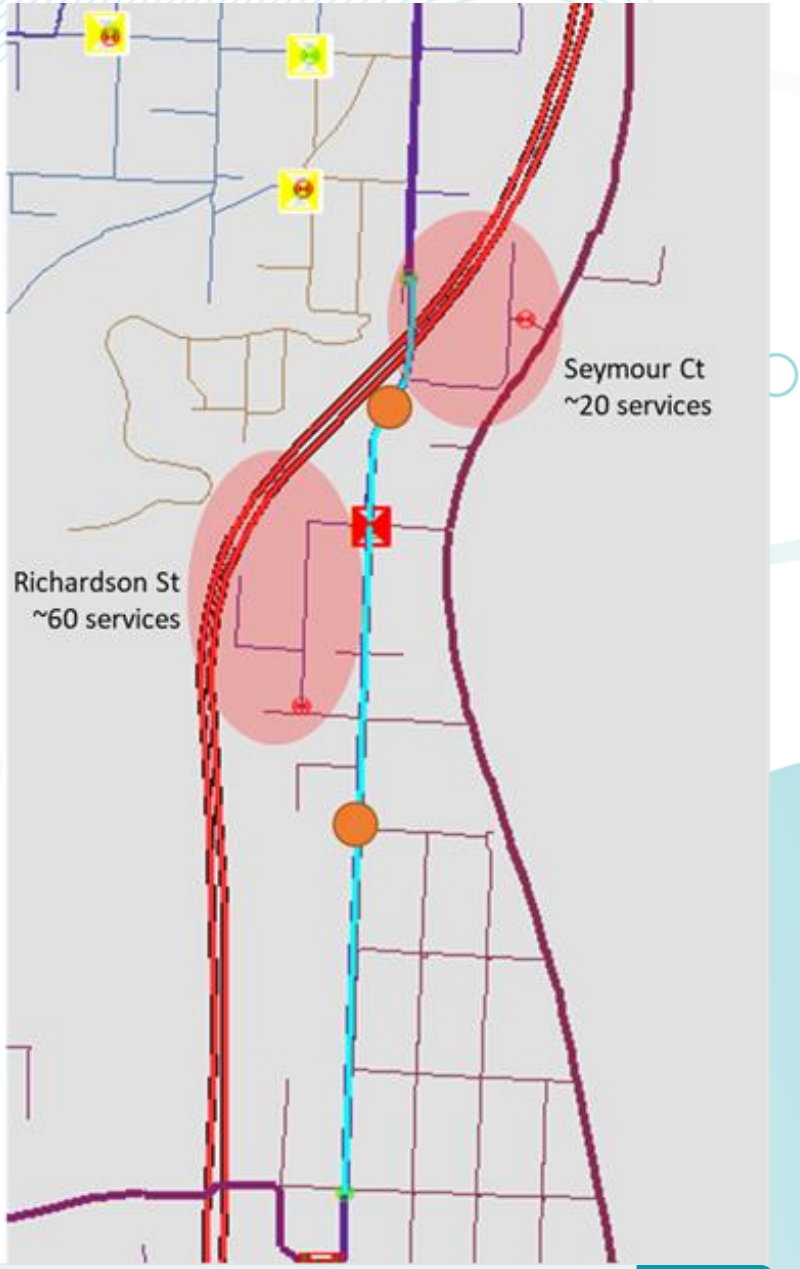
Source: Portland Water Bureau

I-5 Crossing Valve Replacements

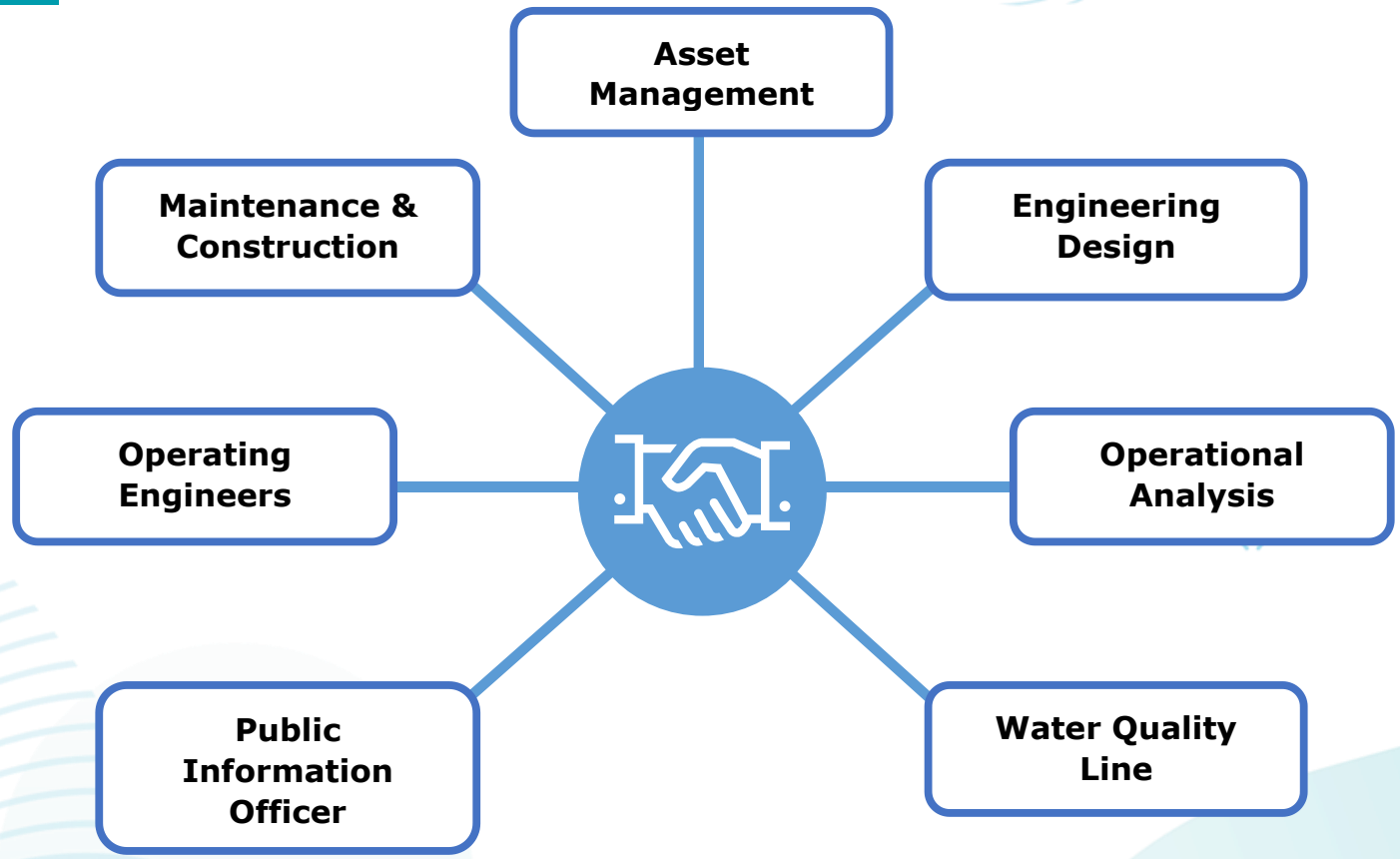
Source: Portland Water Bureau

Low water beats no water





Collaboration & Coordination

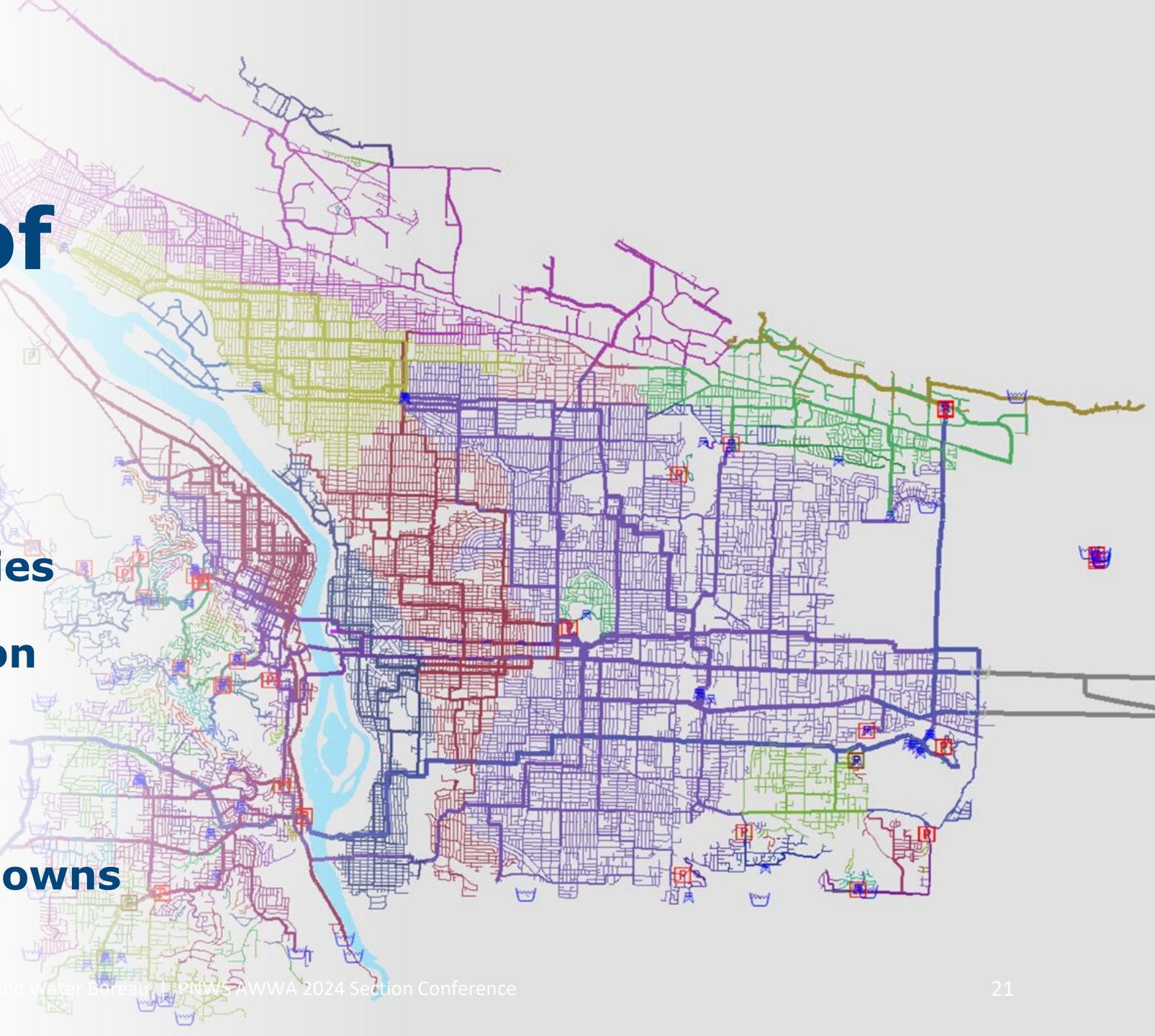


Critical Valve Replacements

3. Complexities & Challenges – *How are we moving forward?*

Analyzing shutdowns of operational significance

- ✓ **Evaluate remaining supplies**
- ✓ **Extended period simulation modeling**
- ✓ **Perform shutdown tests**
- ✓ **Avoid simultaneous shutdowns**



Navigating Operational Impacts

Source: Portland Water Bureau

Installation Complexities & Challenges

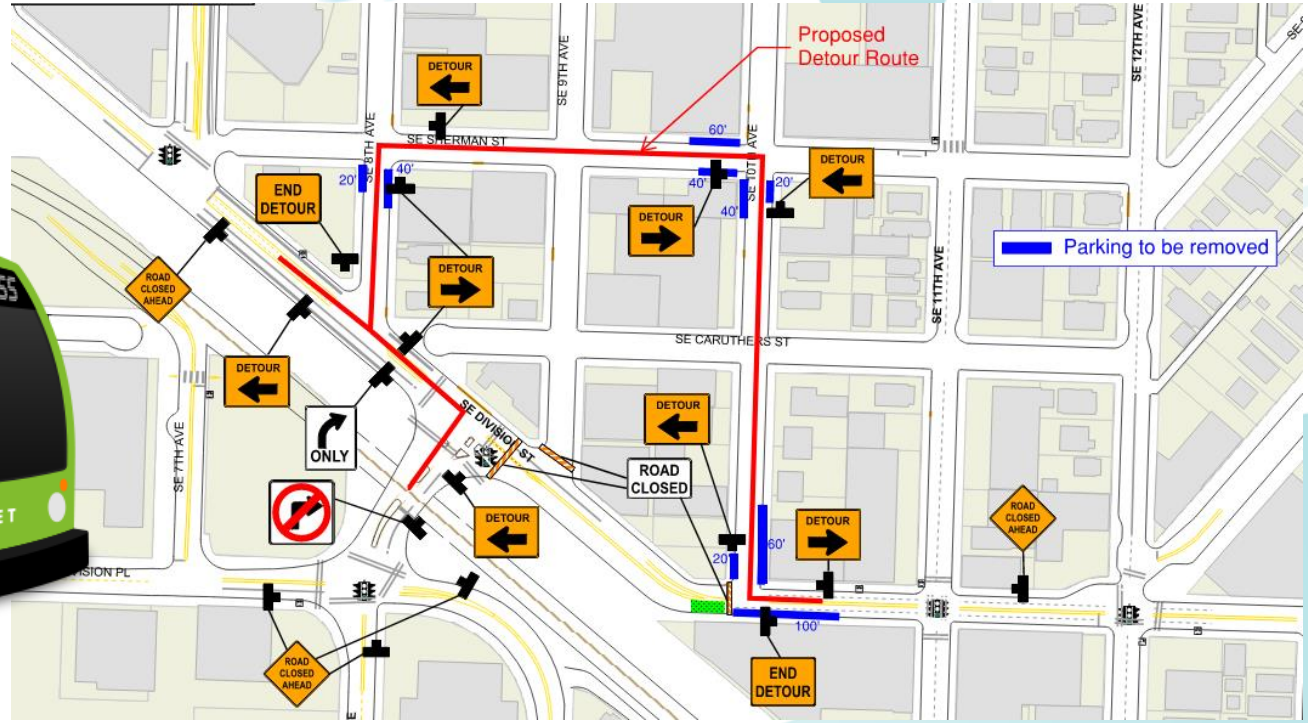
Time

- Traffic impacts
- Coordination with other Agencies
- Weather
- Water Disposal

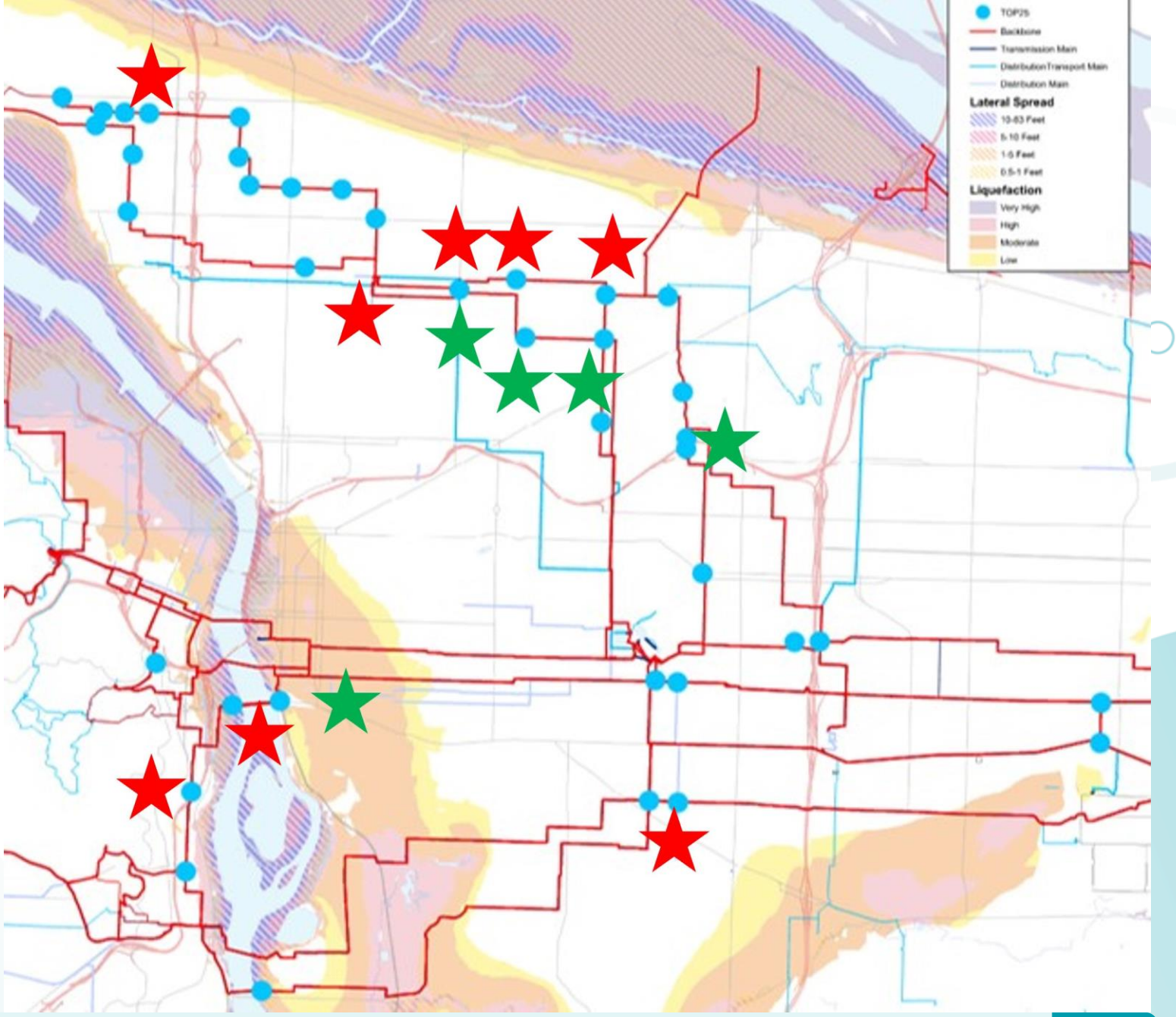
Money

- Work off peak or 24x7
- Installation of additional infrastructure
- Customer impacts
- Water Disposal

Traffic & Equity Considerations



Next Steps


TOP25
Backbone
Transmission Main
Distribution Transport Main
Distribution Main
Lateral Spread
10-63 Feet
5-10 Feet
1-5 Feet
0.5-1 Feet
Liquefaction
Very High
High
Moderate
Low

Lessons Learned

- ✓ **Every 2 years: Exercise and assess the condition of all critical valves**
  - **Not currently being completed**
- ✓ **Every 7 years: Assess the condition and pressure test critical crossing valves**
  - **Will be complete before next version of AMP 2027 less than 10% complete**
- ✓ **Over the next 6 years: Annually replace critical large valves (≥ 24-inches)**
  - **Currently have installed 8 new large Valves with 5 in Design**
- ✓ **Develop equitable planning and maintenance practices**
  - **Design evaluates projects and works to ensure construction is equitable for customers**

Questions?

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अनुवादन तथा व्याख्या | Устный и письменный перевод
Turjumaad iyo Fasiraad | Письмовий і усний переклад
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