TUALATIN VALLEY
WATER DISTRICT

WHERE'S THE BACKBONE?

Andrew Barrett

April 2022

ABOUT TUALATIN VALLEY WATER DISTRICT

Lots happening at TVWD…

TVWD

Estimated Population: 218,400

Service area: 41 square miles

Total water provided:

8.25 Billion Gallons (FY 2021)

WWSS

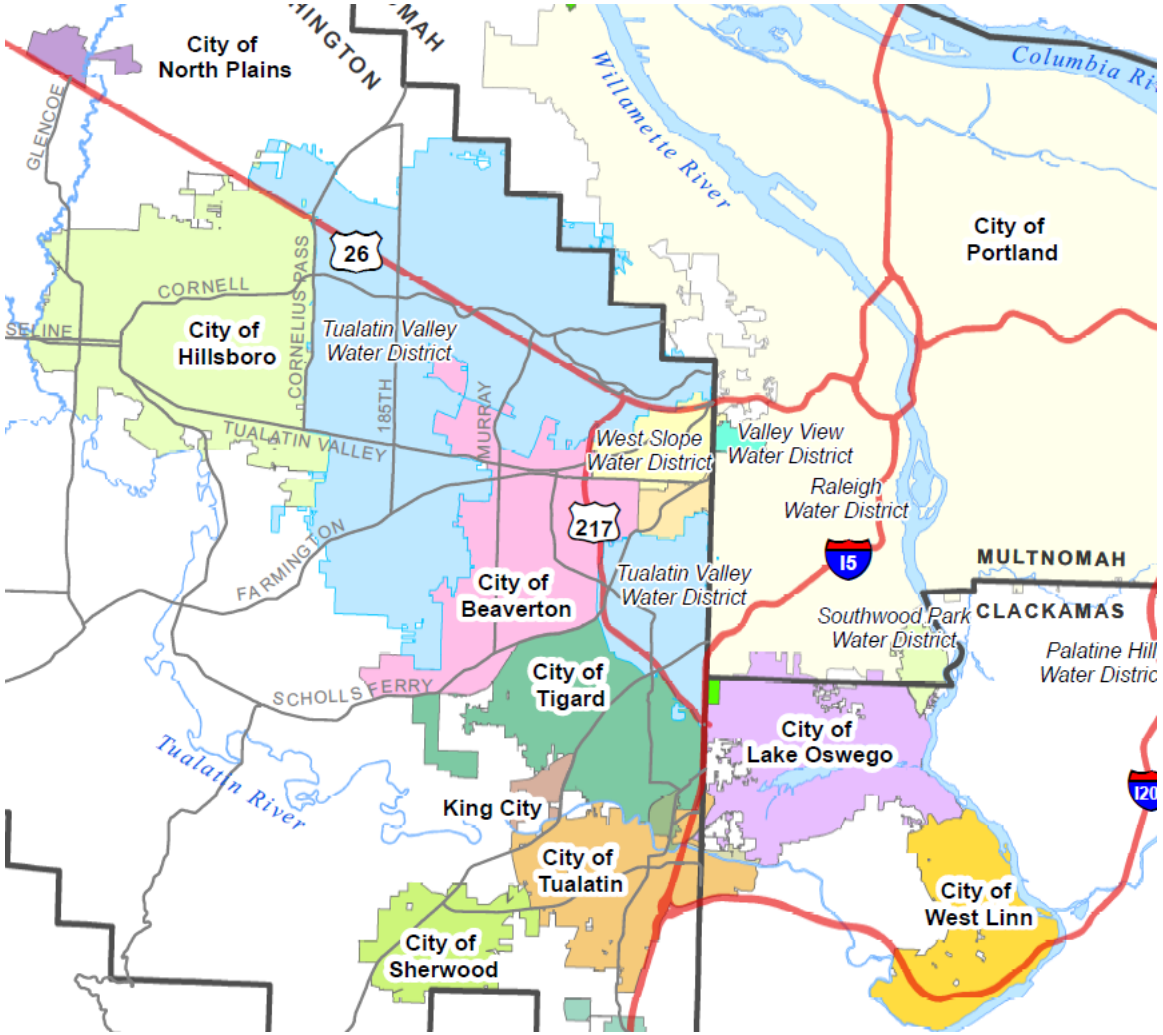
The Willamette Water Supply System Commission (WWSS Commission) is an Oregon intergovernmental entity formed by TVWD, the City of Hillsboro, and the City of Beaverton.

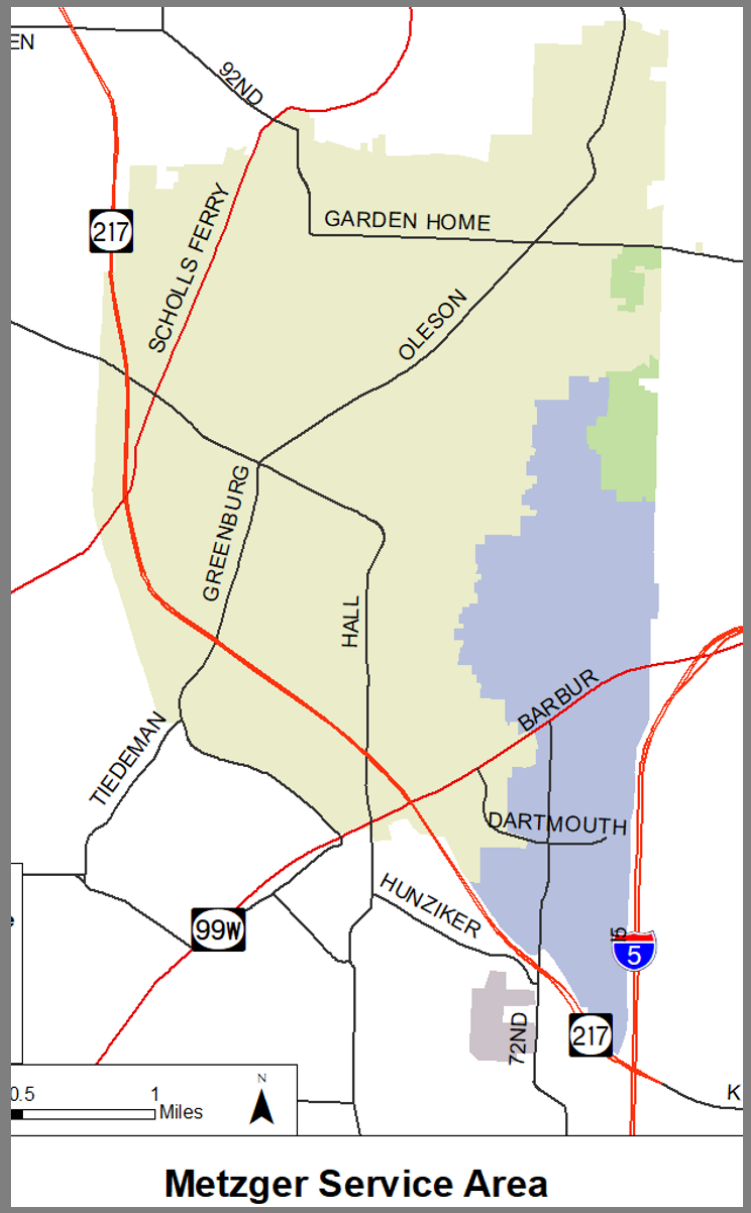
TVWD Organization

127 full time staff

WHAT DOES THAT LOOK LIKE?

A picture is worth a thousand words…





Metzger Service Area

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The Matter at Hand

New development, limited fire flow capacity, lack of transmission capacity in this area.

Where and how do we install a new transmission main?

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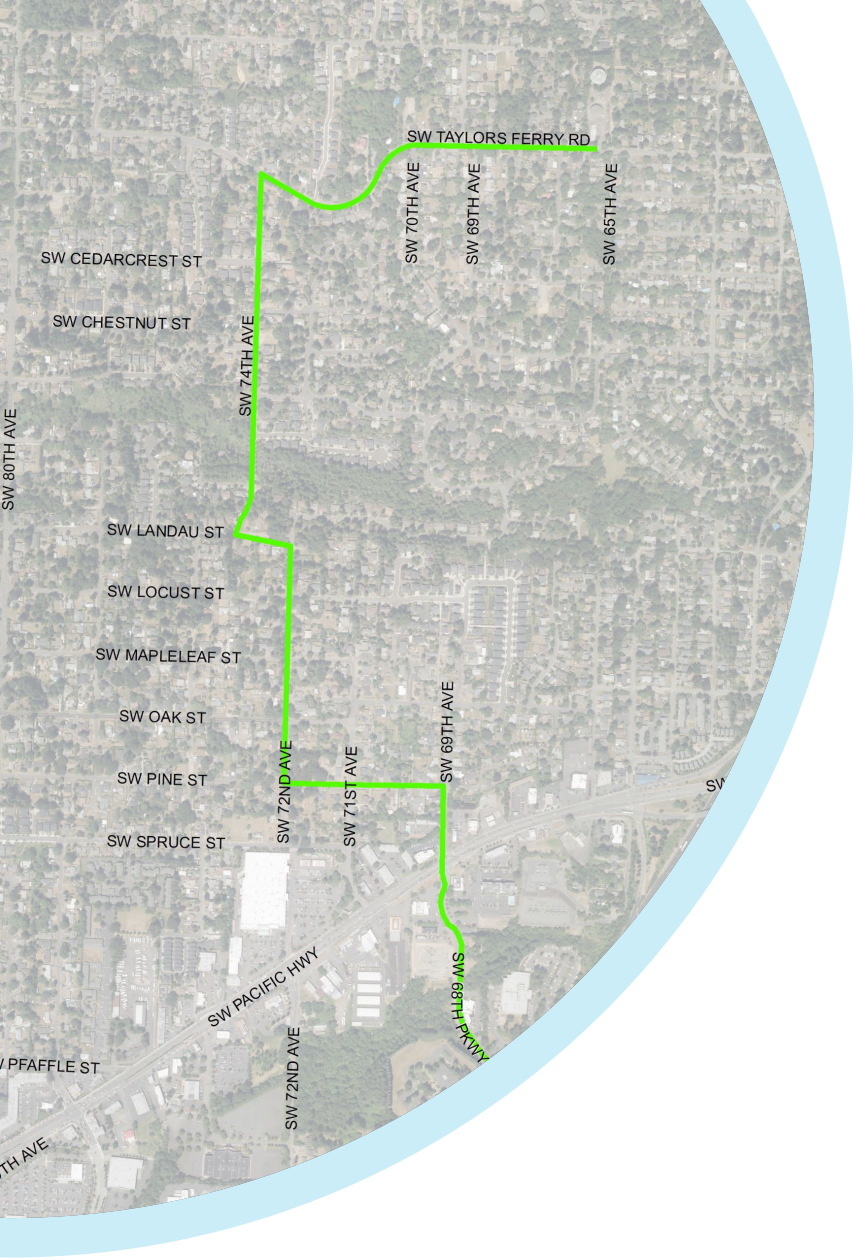

METZGER NORTH-SOUTH

A Transmission Main Story

Provide new capacity via a transmission main from existing reservoirs to key connection points in the water system.

Project goals – Looking to improve:

- Increased Fire flows to this part of our district
- Highest ranking fire flow project in our Master Plan
- Seismic resilience
- Replace aging and difficult to maintain infrastructure
- Direct water transportation from storage a to targeted area

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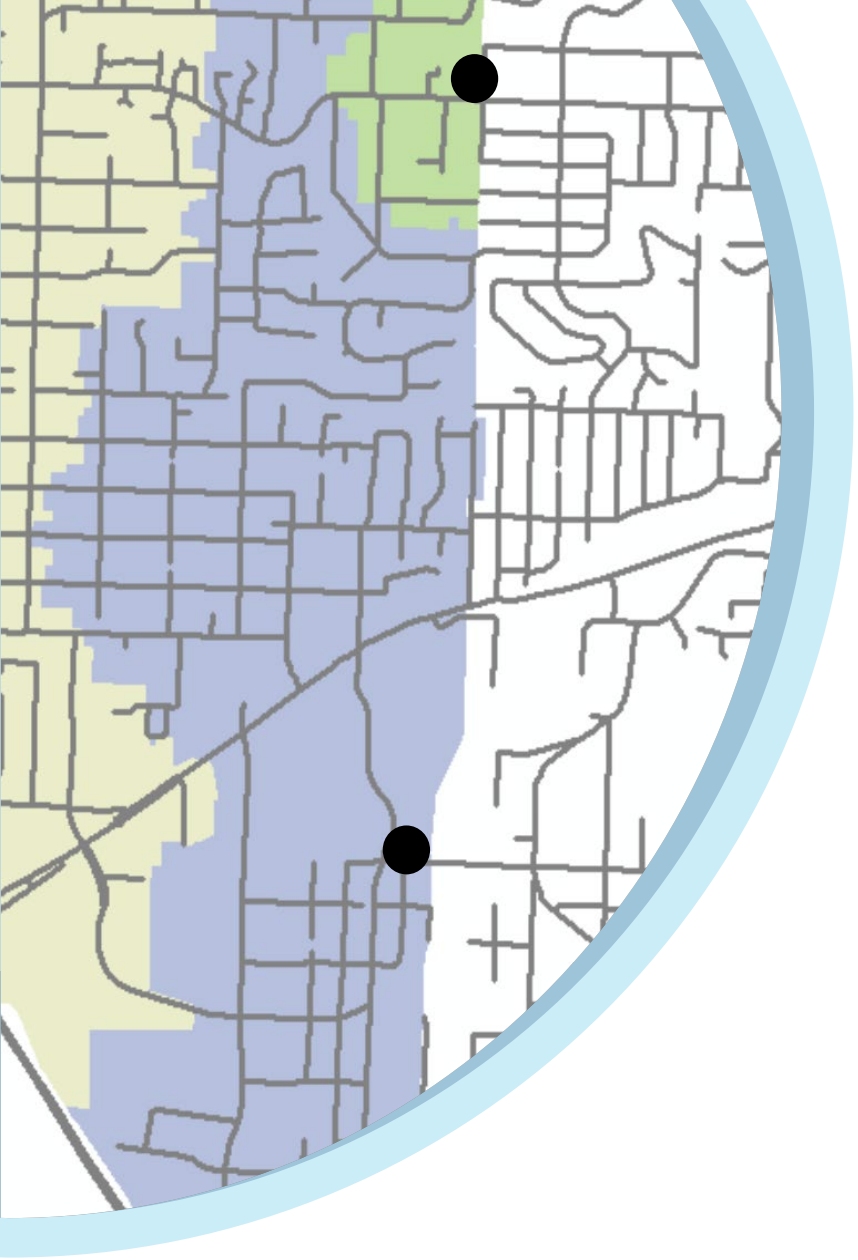

FROM WHERE TO WHERE?

Connect the Dots

Our Master Plan:

It's a high-level document without specific routing. For example, it has this pipe upsizing shown on existing pipes.

Clearly, we can't do this.

A few constraints:

Street work not exactly a grid

White area is the City of Portland:

Existing pipes along City of Portland boundary

- No easement

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WEIGHING OUR OPTIONS

Apples to Oranges??

Criteria Weighting	Pass/Fail
Ability to Meet Hydraulic Needs	15%
Construction Costs	10%
Number of Easements Requires	10%
Public/Traffic Impacts	10%
Business Impacts	10%
Impacts to/from Existing Utilities	10%
Permitting Complexity	10%
Constructability	10%
Maintenance – Long-Term Access	10%
Schedule	15%

Take away: Each project like this will need to create a list similar to this for weighing the different options for each potential alignments.

WEIGHING OUR OPTIONS

Apples to Apples!!

Criteria	Alt 1	Alt 2	Alt 3
OPCC	$ 8,376,000	$ 8,164,000	$ 6,881,000
Criteria 1 – Ability to Meet Hydraulic Needs & Other Project Goals	P	P	P
Criteria 2 – Constructability	3	4	3
Criteria 3 – Construction Cost	1	1	1.6
Criteria 4 – Number of Permanent Easements Required	1	1	5
Criteria 5 – Public / Traffic Impacts	3	3	2
Criteria 6 – Business Impacts	2	3	3
Criteria 7 – Impacts to/from Existing Utilities	2	3	3
Criteria 8 – Permitting Complexity	1	1	4
Criteria 9 – Maintenance / Long-Term Access	2	3	4
Criteria 10 – Project Schedule	1	1	5
Total	**16.00**	**20.00**	**30.56**

Criteria	Weighting	Alt 1	Alt 2	Alt 3
Criteria 1 – Ability to Meet Hydraulic Needs & Other Project Goa	(P/F)	P	p	P
Criteria 2 – Constructability	10%	0.30	0.40	0.30
Criteria 3 – Construction Cost	15%	0.15	0.15	0.23
Criteria 4 – Number of Permanent Easements Required	10%	0.10	0.10	0.50
Criteria 5 – Public / Traffic Impacts	10%	0.30	0.30	0.20
Criteria 6 – Business Impacts	10%	0.20	0.30	0.30
Criteria 7 – Impacts to/from Existing Utilities	10%	0.20	0.30	0.30
Criteria 8 – Permitting Complexity	10%	0.10	0.10	0.40
Criteria 9 – Maintenance / Long-Term Access	10%	0.20	0.30	0.40
Criteria 10 – Project Schedule	15%	0.15	0.15	0.75
Total	**100%**	**1.70**	**2.10**	**3.38**

WEIGHING OUR OPTIONS

Findings:

Blue ~7,400’ total (4,900’ trench, 2,300’ trenchless, 200’ bore)

Significant wetland challenges

Parallel TVWD Transmission main along trenchless

Red ~7,700’ total (5,200’ trench, 2,300’ trenchless, 200’ bore)

Significant wetland challenges

Parallel TVWD Transmission main along trenchless

Green ~10,200’ total (10,000’ trench, 200’ bore)

Longer alignment, no wetlands
Utilities City of Tualatin Transmission Feed (very deep)
Future Maintenace – Easy

Design Challenges

Boring is never boring.

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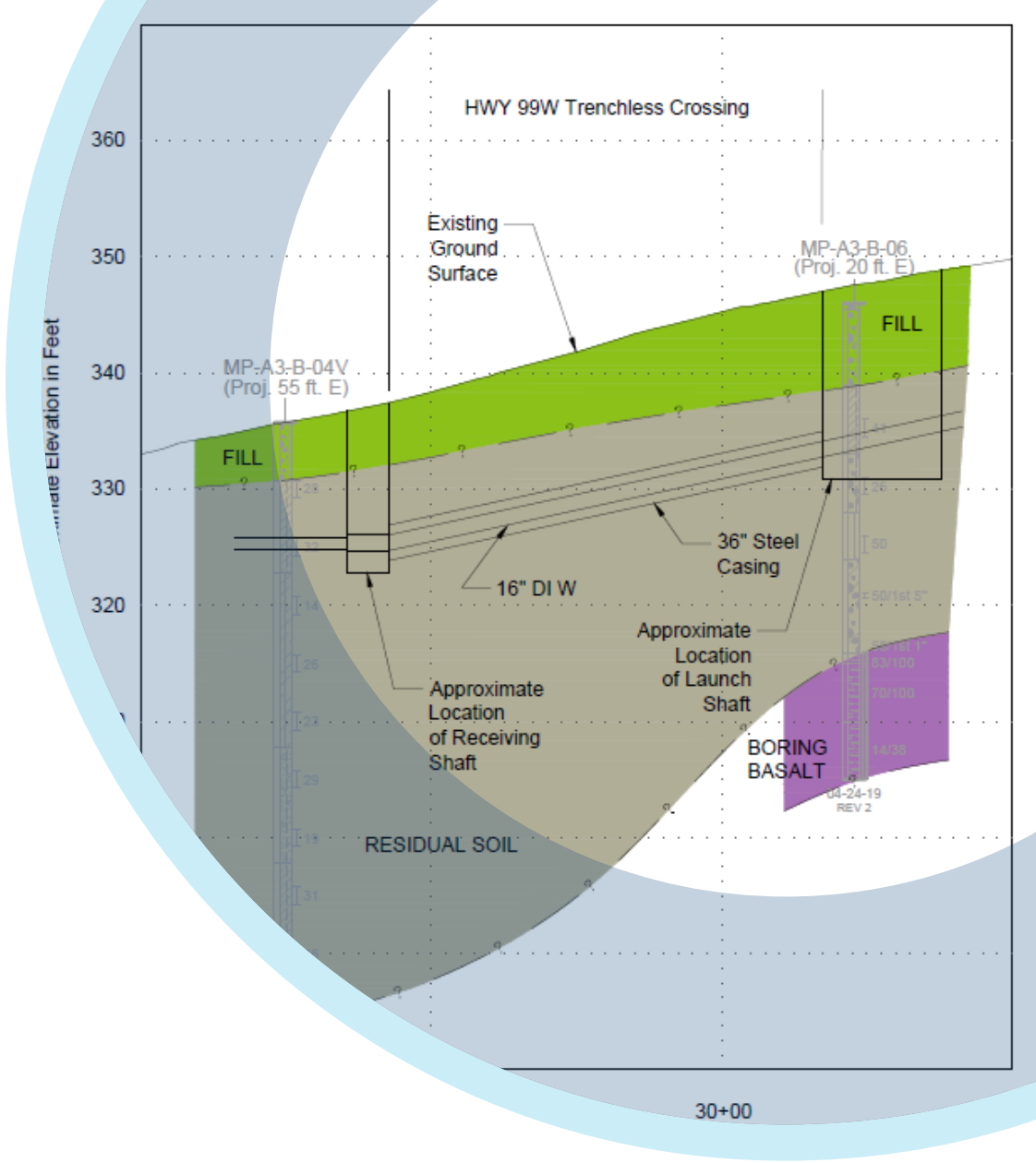
HIGHWAY 99 CROSSING

Bearing the Boring

State highway three blocks from I-5 forbidding open-trench construction

Boring under the road was the only solution

- Evaluated several options for trenchless
- Traditional jack and bore was selected due to alignment, length, cost, constructability



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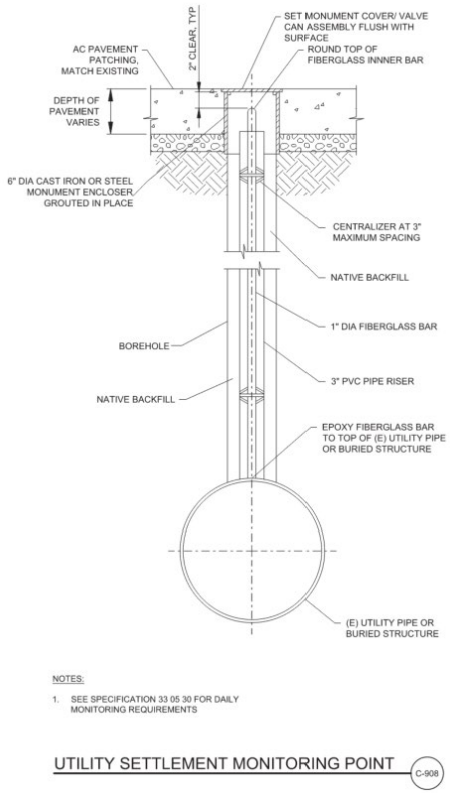
UTILITY MONITORS

No, not screentime...

For the boring, utilities we crossed needed to have a way to determine if settlement occurred.



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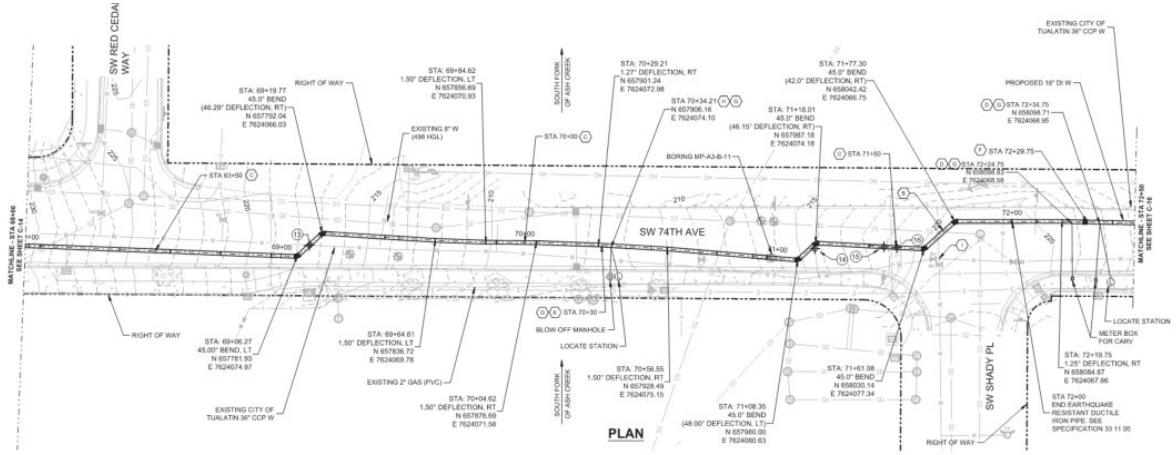
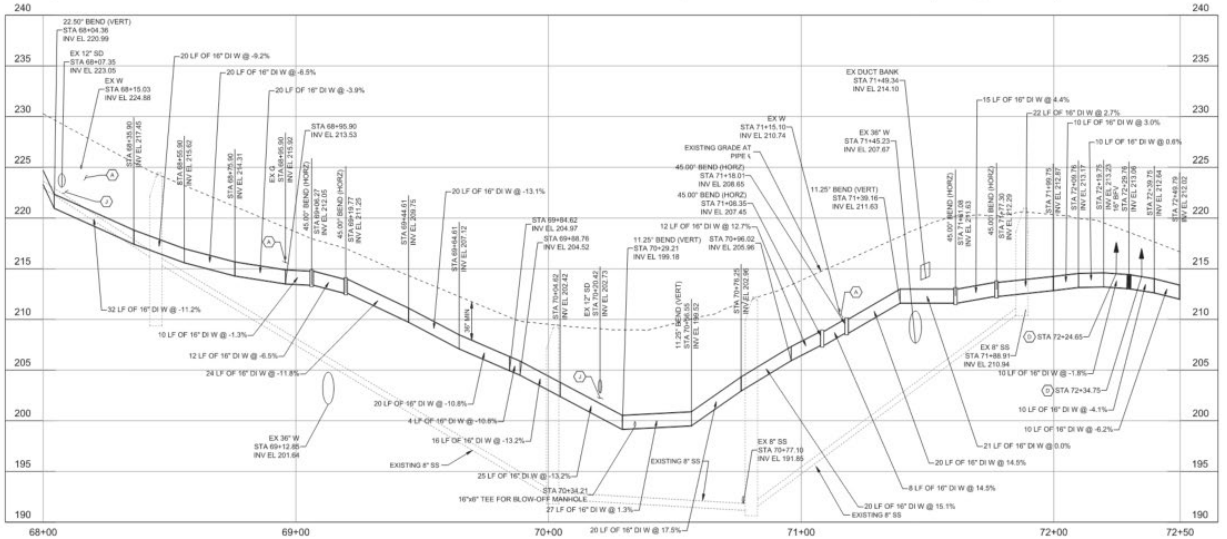
ASH CREEK – EQ THREAT

Wetlands and water pipes





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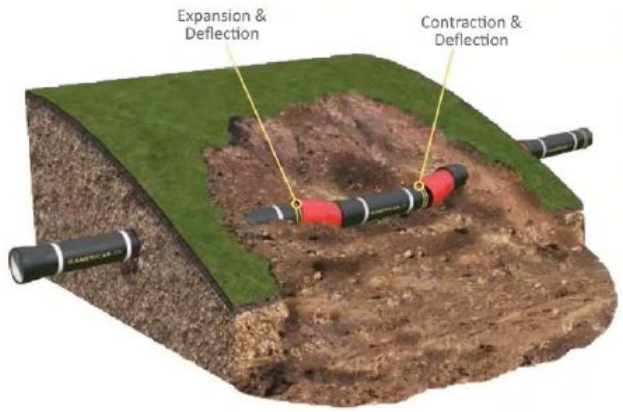

Creating a Seismically Resilient Community

Post Earthquake fires are the largest seconadry cause of structure damage. Dislodged gas and electric lines spark and neighborhoods are burned.

1ST Large use of telescoping seismic joints in the district

4.8” of differential movement and 7° of rotation per joint

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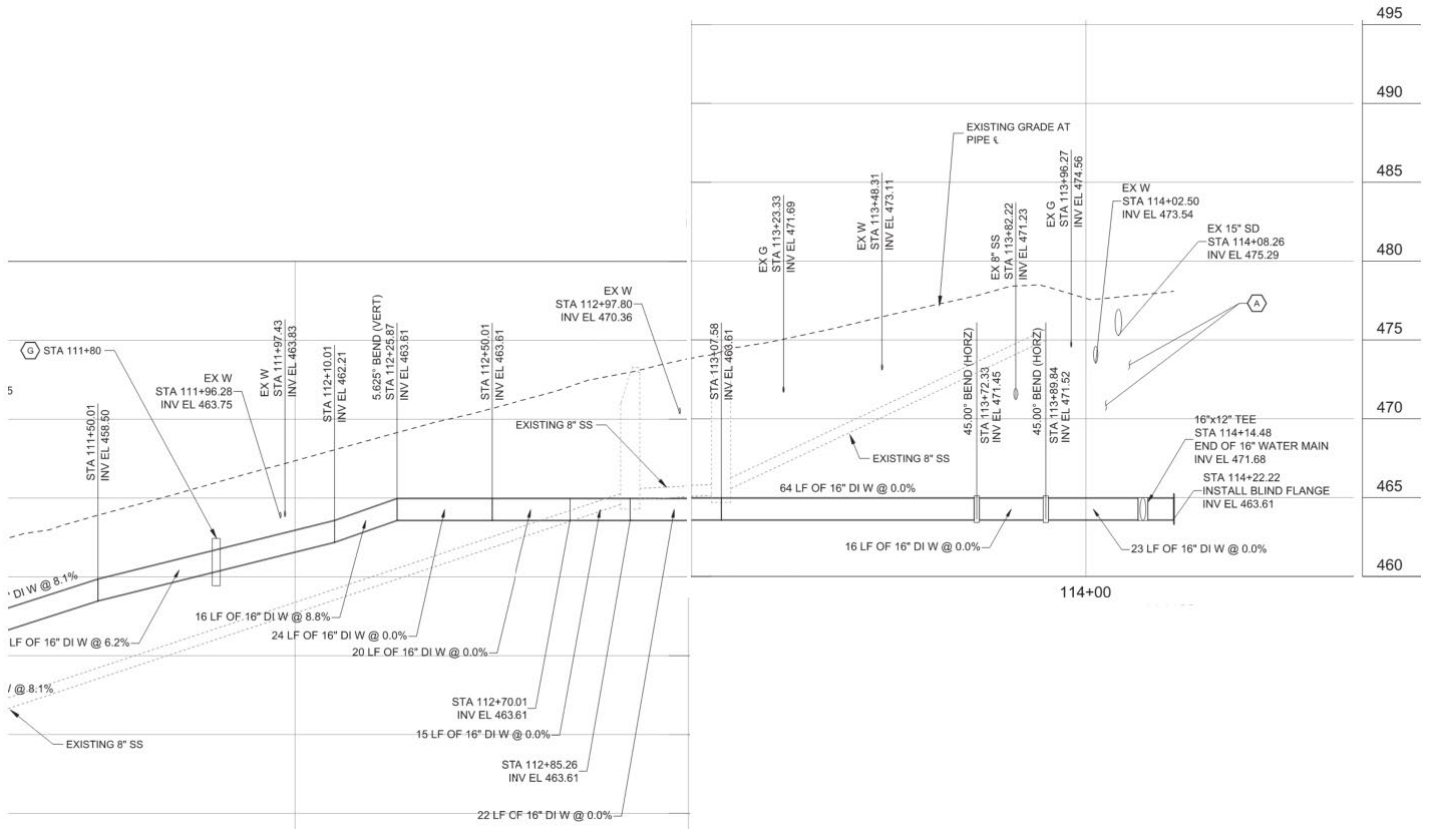
RESERVOIR CONNECTION

Proper depth for initial connection point



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MULTIPLE JURISDICTIONS

All the cooks, just one kitchen

Permits and Inspection from:

- Washington County
- Clean Water Services (stormwater & sanitary)
- City of Tigard
- ODOT

Different permit requirements, specifications, inspection staff for each jurisdiction.

A cost to the alignment that was chosen.

Many of the permits would be required for all alignments

Completely avoided Oregon DSL and Army Corp in water work permits – which had excessive schedule delays and schedule permit constraints

CATHODIC PROTECTION

Jumpers and Anodes

Critical main, aiming to maximize the life of the pipe.

Soil analysis and criticality of main helped us determine CP was worth it for initial upfront costs.

Costs more, extends the life of the system.

- Zinc Coated
- Poly wrapped
- Anodes
- Test stations at isolation points

SHOW ME THE MONEY

The Bid

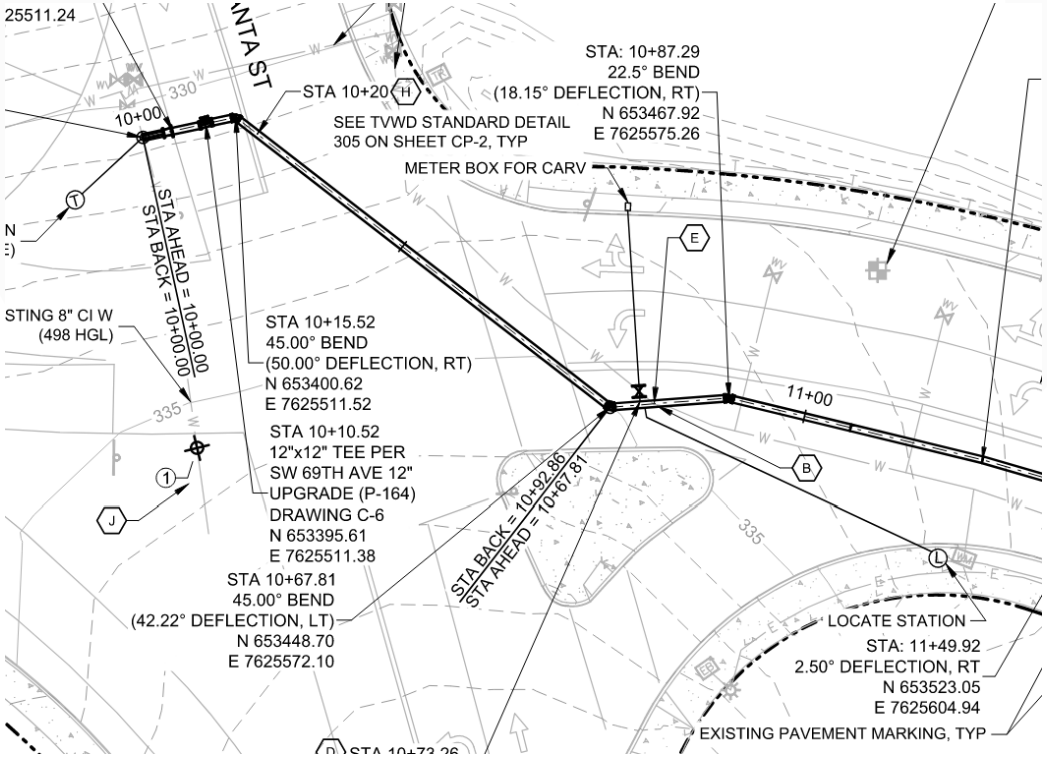
Company Name	Bid Amount	
K&E Excavating	$ 3,917,005.00	100%
Tapani Inc	$ 4,302,225.00	110%
Emery and Sons	$ 4,472,665.00	114%
Trenchline Excavation	$ 4,498,500.00	115%
Moore Excavating	$ 4,651,725.00	119%
Saunders Company	$ 4,888,100.00	125%

CHALLENGES: BORING ROCKS

Literally, boring through rocks – and fires!

Every project has some risk exposure, we found it here despite boring mere feet away looking for these types of conditions.

UNKNOWN UTILITY DEPTH



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FINAL BUDGET

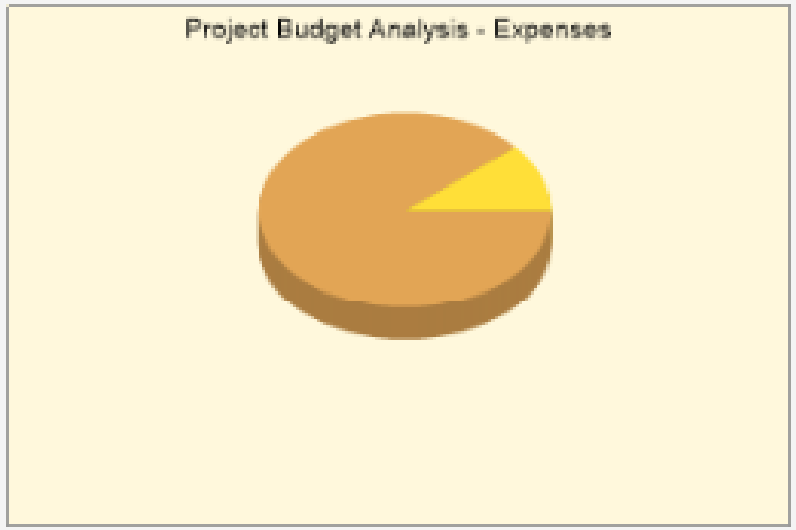
In case you wondered

Budget Method **Project Life Basis** Status **Active**

Expenses

Original Budget	$0.00	
Budget Amendments - Posted	$5,776,100.00	
Budget Amendments - Unposted	$0.00	
Total Budget	$5,776,100.00	
Actual	$5,119,917.90	88.64%
Encumbrances	$0.00	0.00%
Unposted Transactions	$0.00	0.00%
Available Budget	$656,182.10	11.36%

Expenses Graph Show/Hide



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QUESTIONS?

Is it time to go?