

How Clear Can We Make the Crystal Ball? Addressing Risks During Design and Construction –

West Slope Water District Reservoir No. 3

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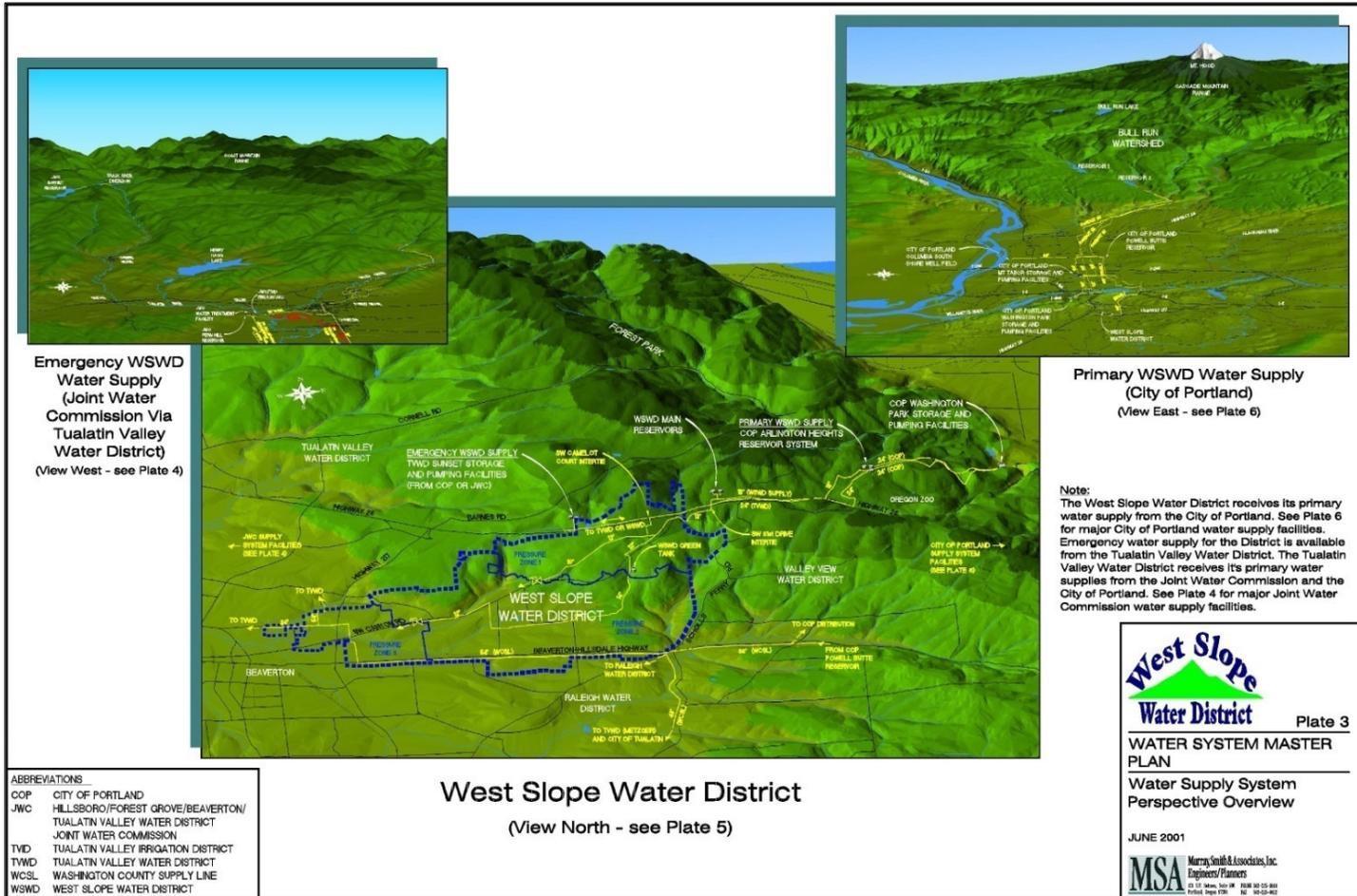
Overview

- ❑ West Slope Water District background
- ❑ Risk considerations during design
- ❑ Construction activities
- ❑ Question and answer



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West Slope Water District Supply



District Statistics

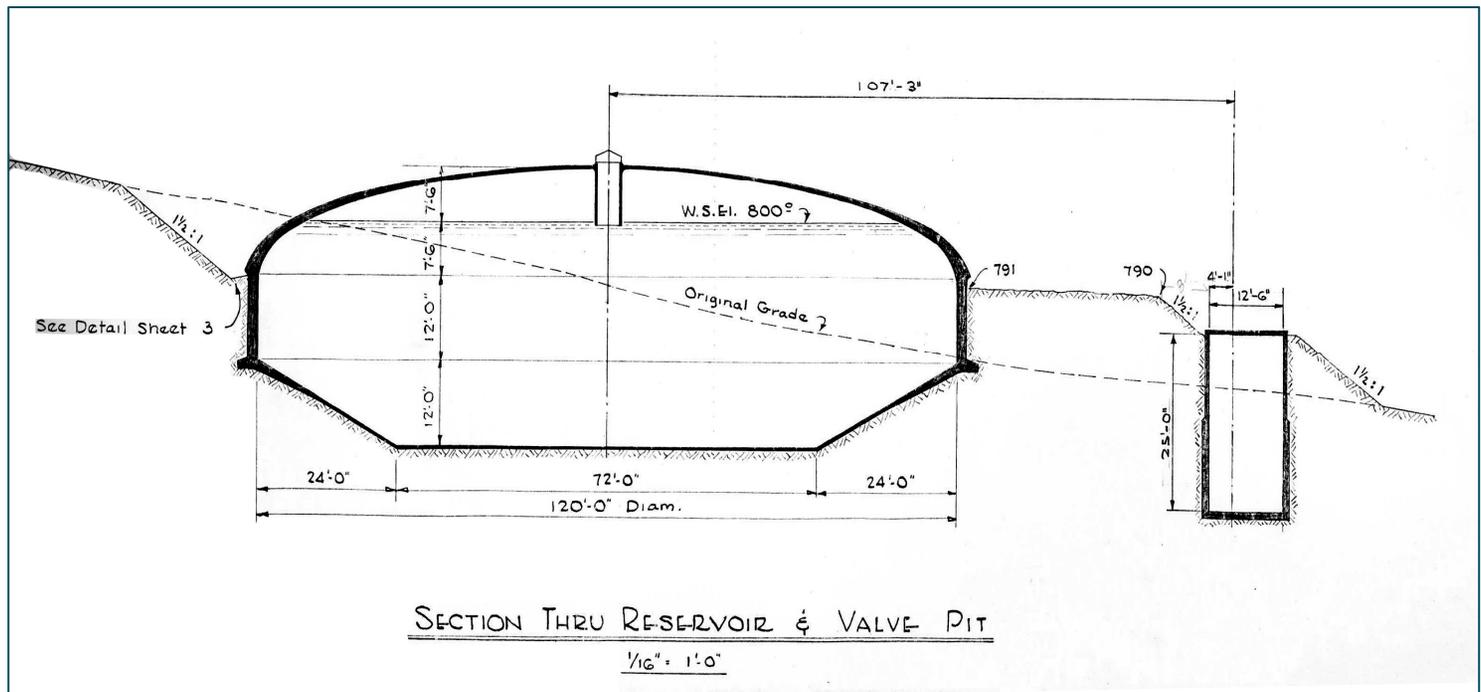
- ❑ Wholesale purchaser of water from the City of Portland
- ❑ ~11,000 Residents
- ❑ ~3,350 connections
- ❑ Average daily demand at ~1.4 mgd
- ❑ Peak daily demand at ~3.8 mgd
- ❑ Interties with Tualatin Valley Water District for redundant and emergency supply capability
- ❑ 48 miles of transmission and distribution piping



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Existing Reservoir

- Existing reservoir in slow ductile failure mode

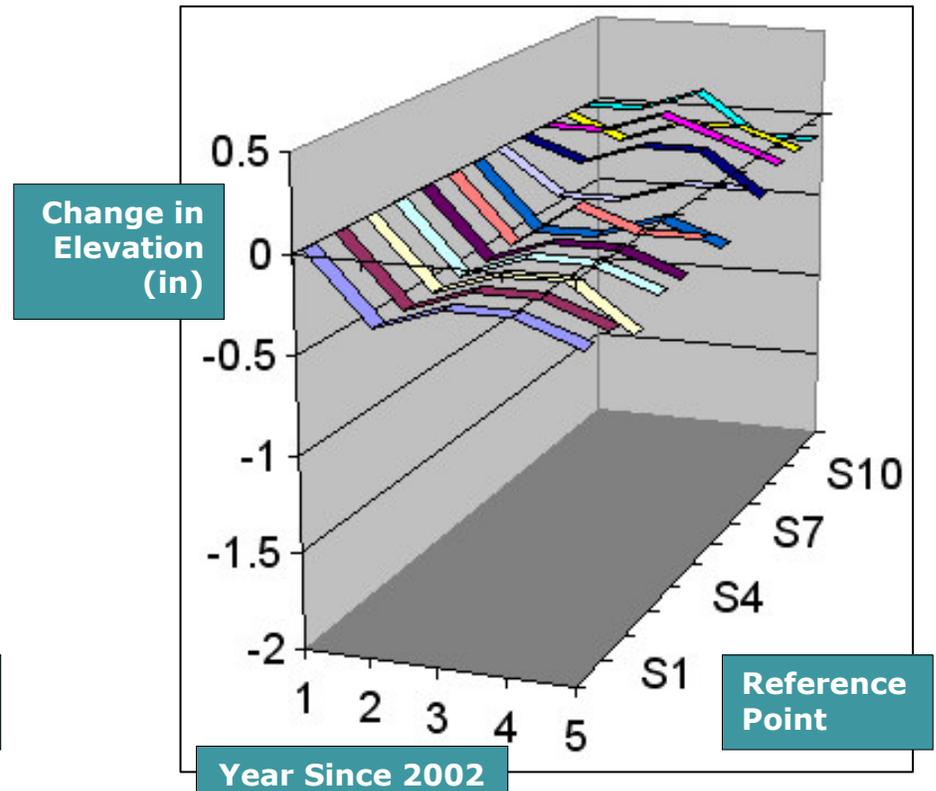
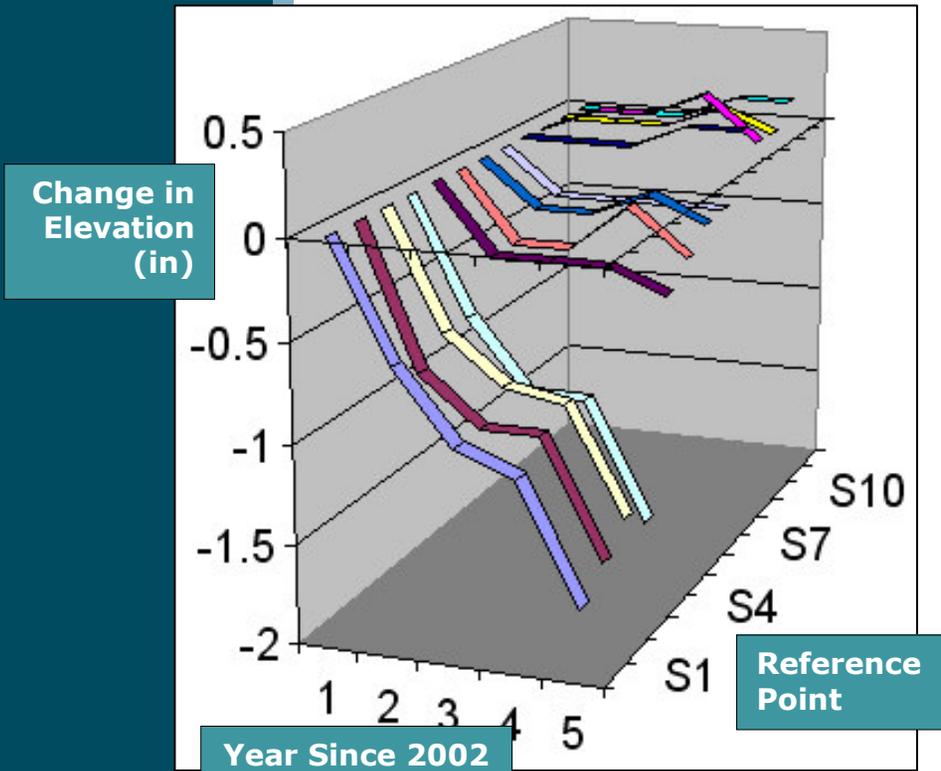


Existing Reservoir Dome Settlement

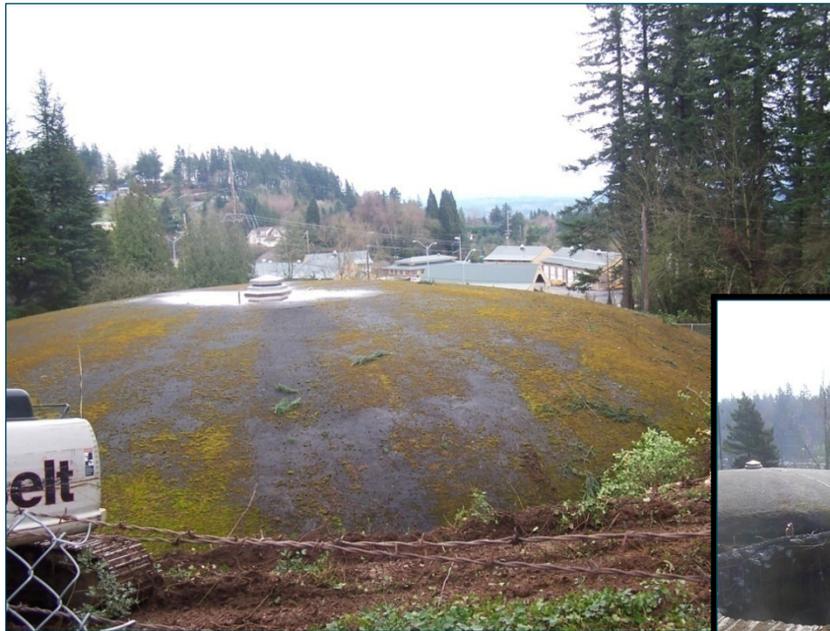
Change in Dome Elevations Since 2002

Reservoir No. 1

Reservoir No. 2



Existing Reservoir No. 1



Design Considerations – Risks

- ❑ Construction Contractor
- ❑ Site Location
- ❑ Rock Profile and Excavation Quantity
- ❑ Seismic Upgrades
- ❑ Schedule
 - Shutdown period of existing storage capacity
 - Permitting
 - Easements



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Contractor Selection

- ❑ MSA Approaches
 - Design/RFP/Build
 - Design/Bid/Build
- ❑ Contractor Prequalifications
 - Tank Contractor
 - Tank Prestressor

Site Considerations

❑ Location

- Early planning (1950's): adjacent SW 60th Ave
- Access challenges – proximity of existing reservoirs, PGE substation, overhead electric lines, PWB waterline, undeveloped nature of SW 60th Ave



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Aerial Plan View – Reservoir Site



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Site Considerations

- ❑ Demolish existing Reservoir No. 1 and build new reservoir in its place
 - Allowed for better access
 - Allowed spoils to be stored on-site instead of hauled away
 - Avoided construction immediately adjacent substation



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Constrained Site Conditions



Spoils Stockpiling – Constrained Access



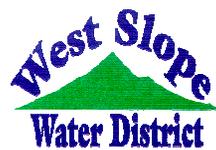
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Constrained Site Conditions



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Limited Access

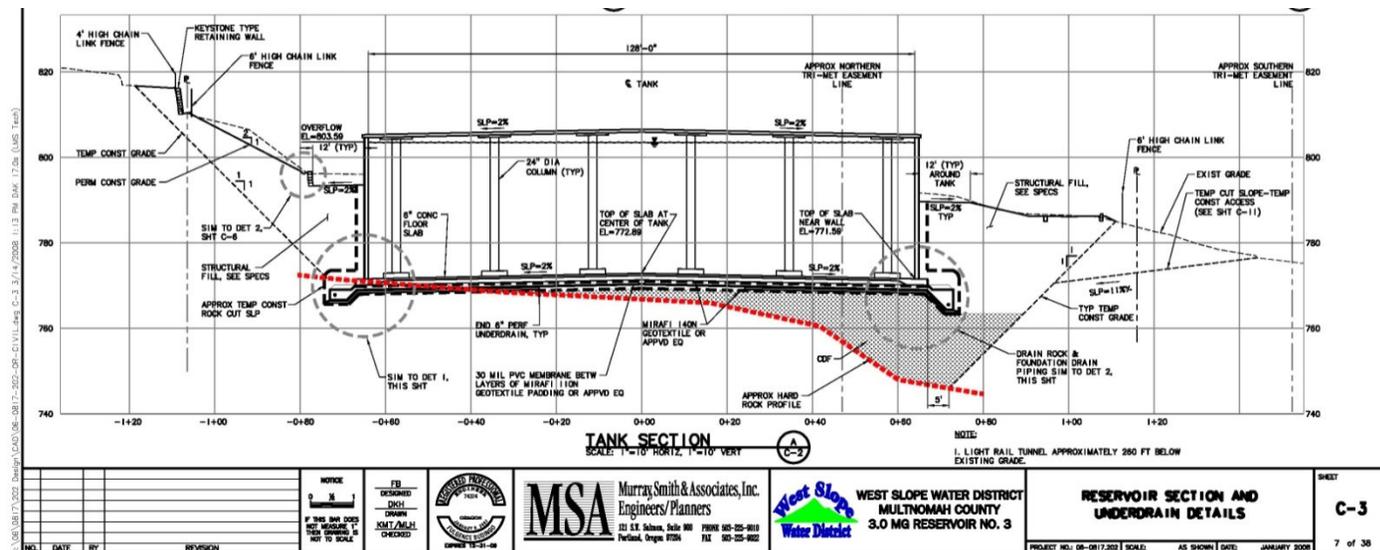


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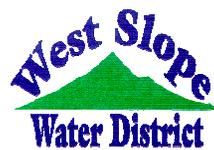
Geotechnical Considerations

Highly Variable Rock Profile

Additional borings helped determine type of floor (mat slab vs membrane slab)

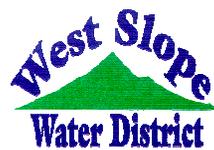


General Contract Lump Sum; Rock Excavation and Controlled Low Strength Materials (CLSM) Backfill by the Cubic



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Variable Rock Surface



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Seismic Considerations

- ❑ Seismic upgrades
 - Tank designed to meet latest seismic and building code requirements – wall to roof and floor flexibility
 - Seismic valves to be added to both reservoirs' outlet piping
 - Flex-tend couplings to be added to inlet, outlet, overflow and drain piping for both reservoirs



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Wall Rebar, Seismic Cables & Tendons



Seismic Shut-off Valve



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Flex-tend Couplings

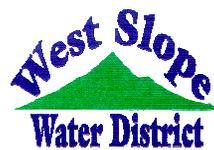


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Flexibility with Retaining Wall

- ❑ Contractor to Complete Design of Retaining Walls per Contract Documents

Spiral-Nail Wall Construction – Spiral Nails



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Spiral-Nail Wall Construction – Spiral-Nail Installation



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Spiral-Nail Wall Construction – Minimal Materials, Fast Installation



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Schedule Considerations

- ❑ Shutdown Window
- ❑ Permitting
 - Conditional Use Permit
 - Building Permits (Tank, Retaining Walls)
 - Demolition Permit
 - TriMet
- ❑ Temporary Easements
 - Two Adjacent Private Residences
 - PGE



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Tank Nearing Completion



MSA

❑ Questions?