



## **Tale of 3 Reservoirs**

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**05/08/2014 AWWA PNW Conference**



# Program Components



**Powell Butte Reservoir 2**

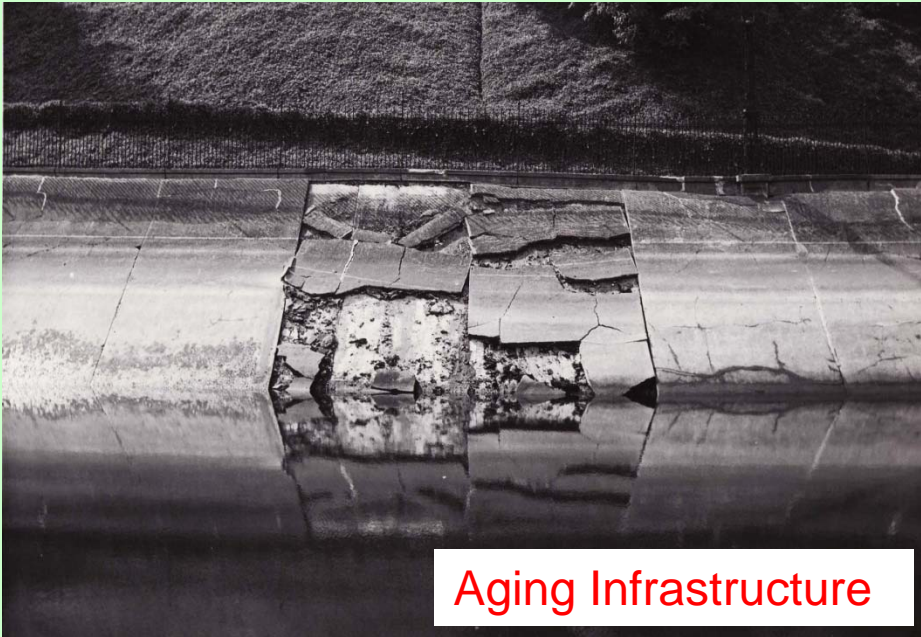


**Kelly Butte Reservoir**



**Washington Park  
Reservoir  
Improvements**

# Drivers

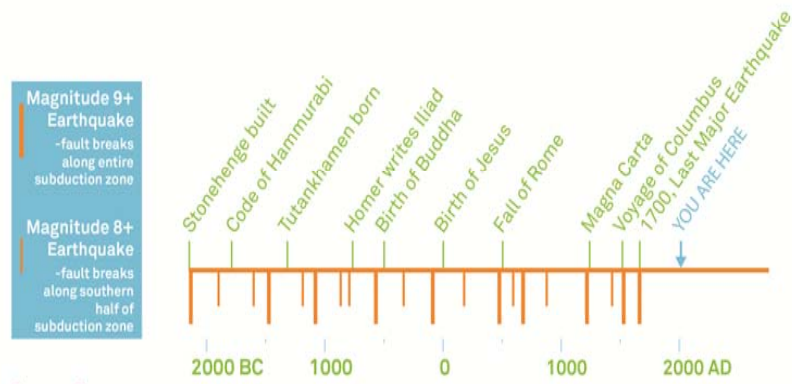


Aging Infrastructure



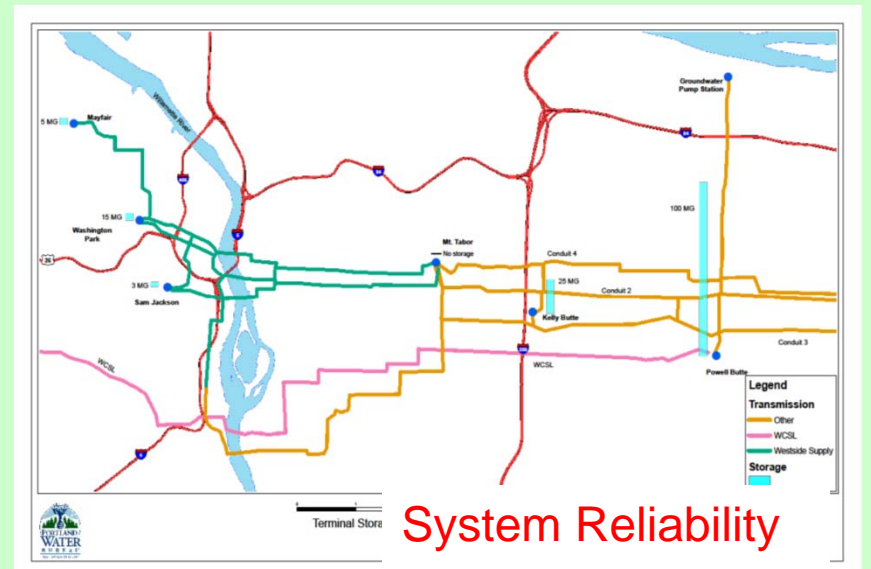
Regulatory Requirements

## Earthquake Recurrence Rates for Cascadia Subduction Zone



Source: Oregon.gov

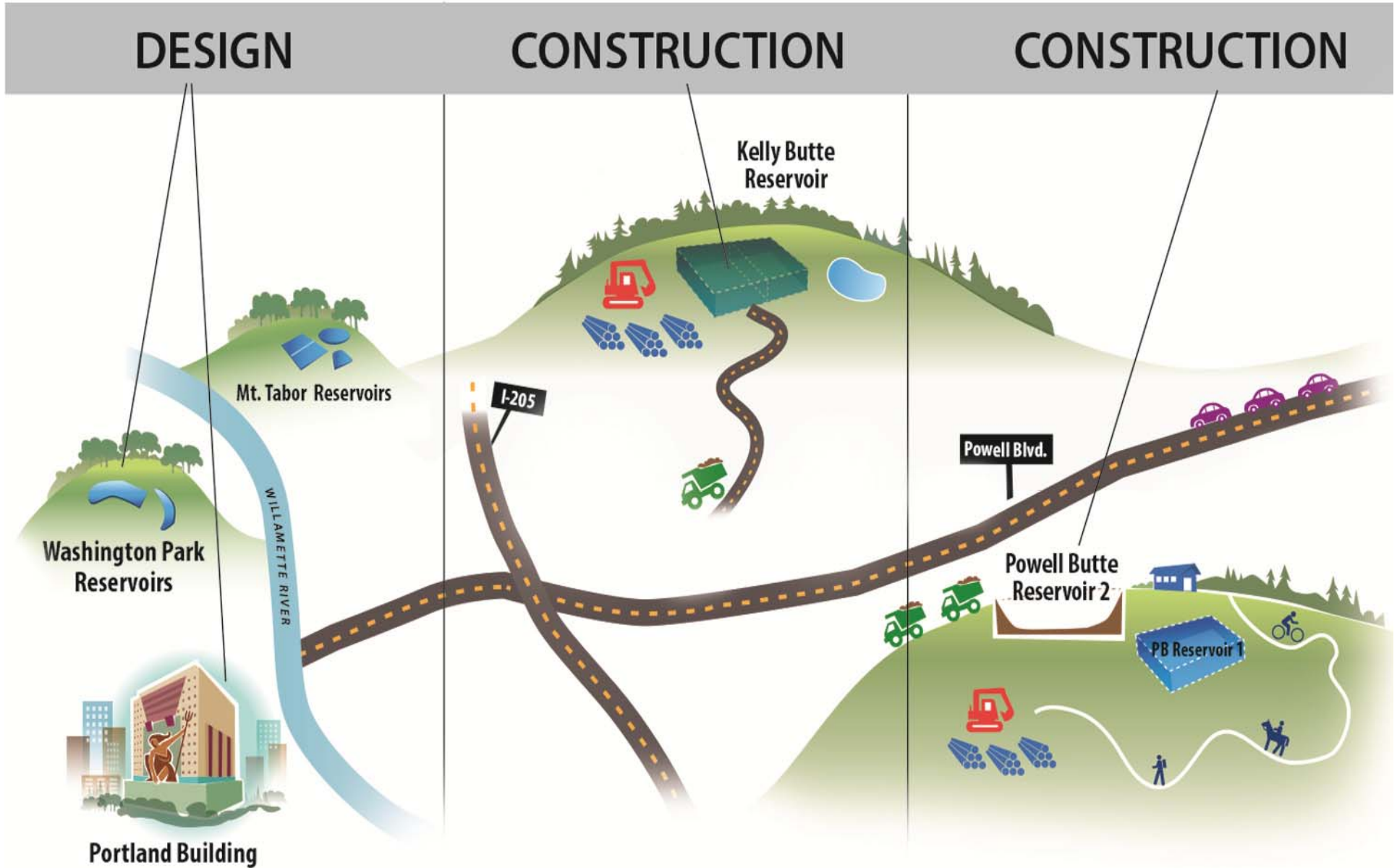
Seismic Vulnerability



System Reliability

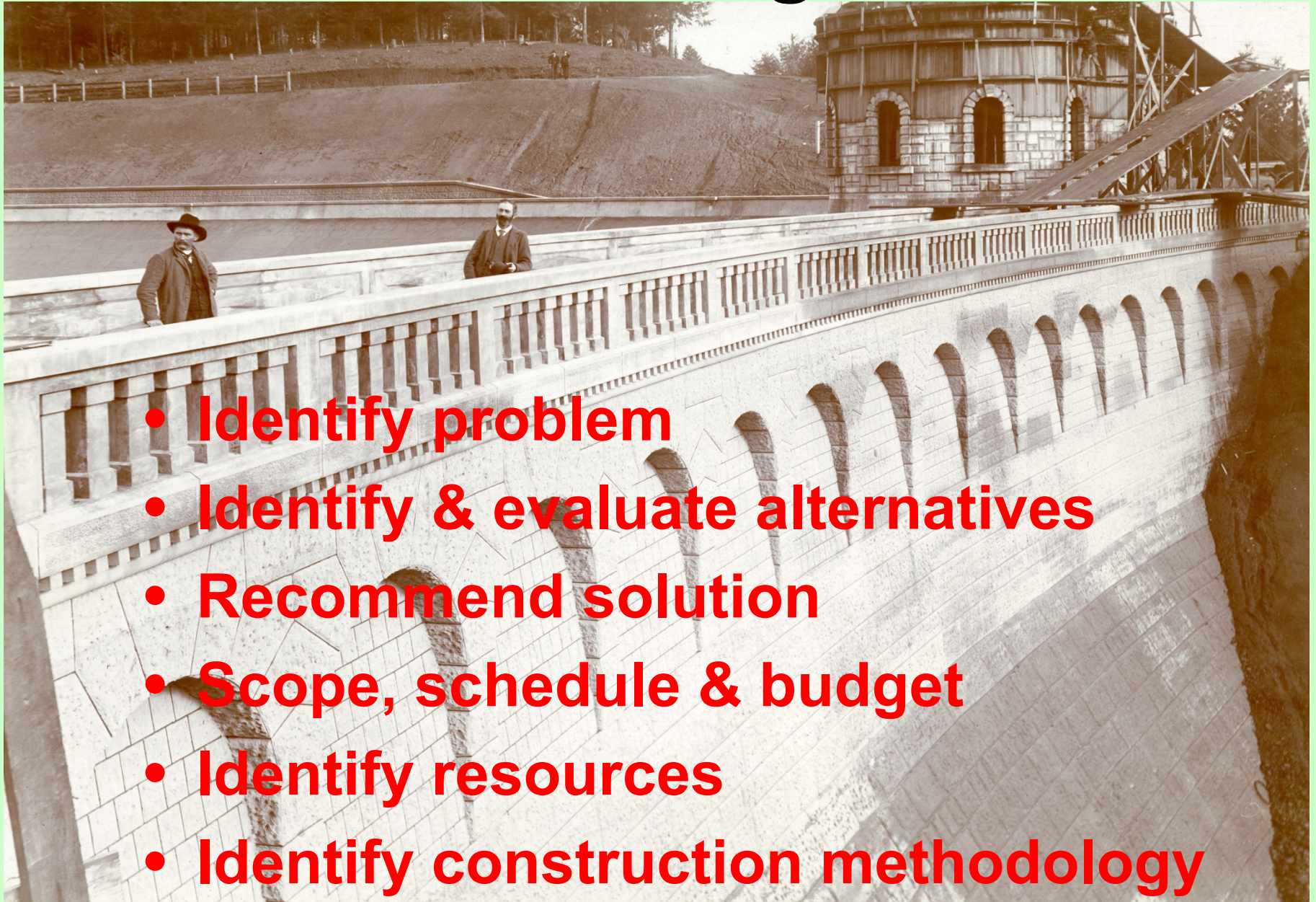


# Current Status 2014





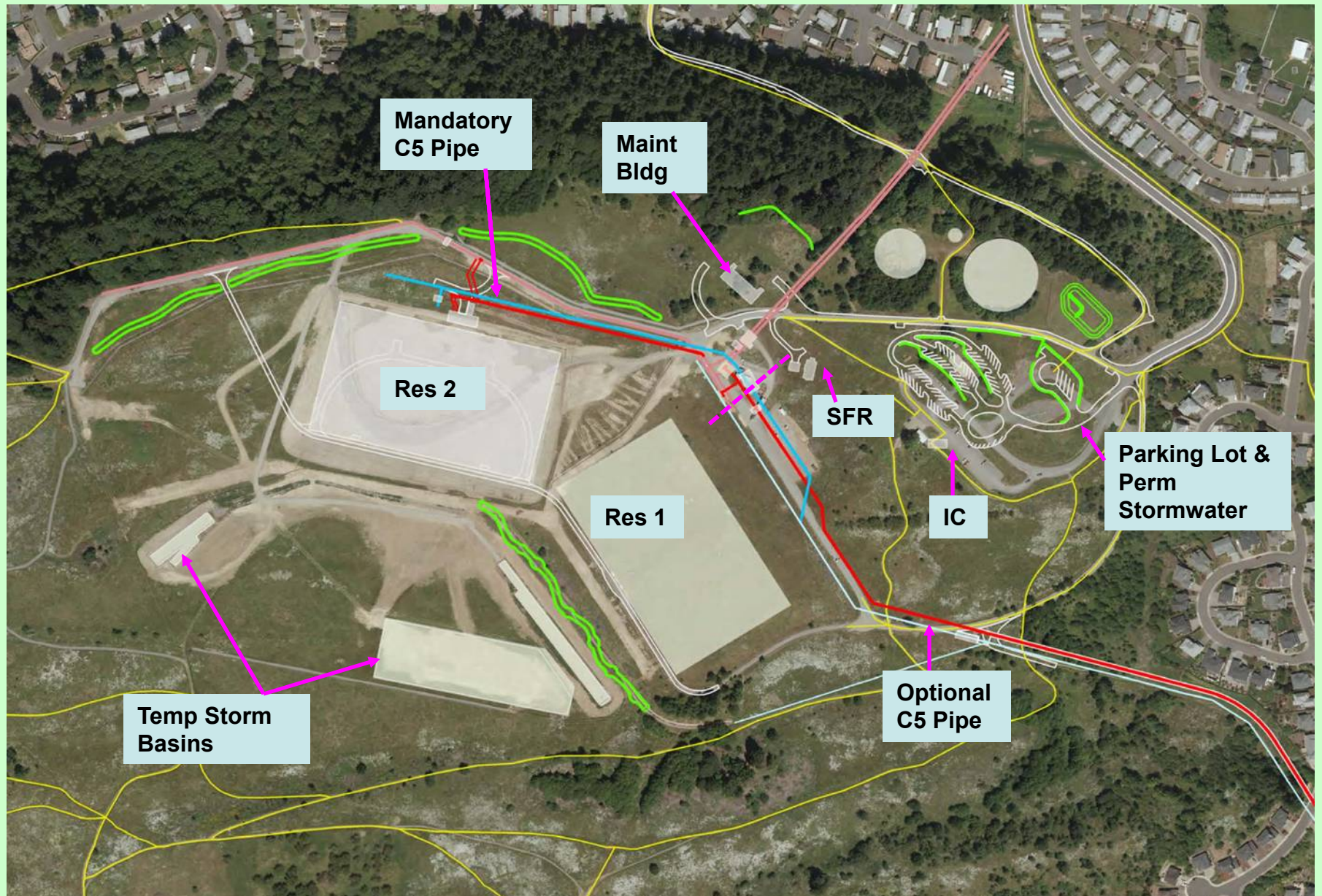
# Planning



- **Identify problem**
- **Identify & evaluate alternatives**
- **Recommend solution**
- **Scope, schedule & budget**
- **Identify resources**
- **Identify construction methodology**



# Powell Butte Scope





# Kelly Butte Scope

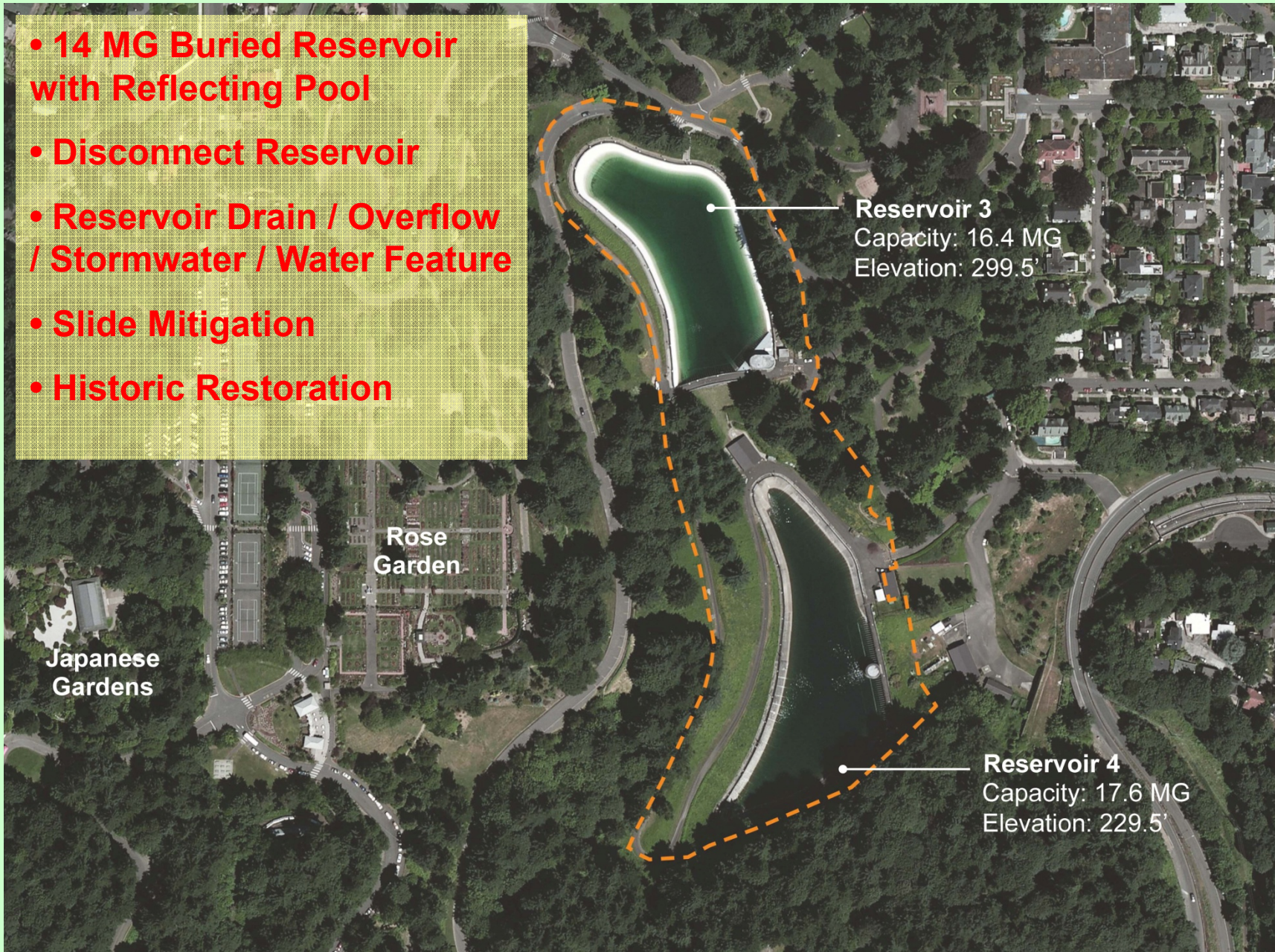
- 25 MG Res & Mech Rms
- Road
- Piping
- Landscaping





# Washington Park Scope

- 14 MG Buried Reservoir with Reflecting Pool
- Disconnect Reservoir
- Reservoir Drain / Overflow / Stormwater / Water Feature
- Slide Mitigation
- Historic Restoration





# Budget

- **Develop project budget**
- **Identify funding source**
- **Annual budgets**
- **Cash flow projections**

<b>PB</b>	<b>\$138 M → \$ 122 M</b>
<b>KB</b>	<b>\$ 90 M → \$ 75 M</b>
<b>WP</b>	<b>\$ 74 M → ?</b>



# Schedule Comparison

- **Powel Butte**

- ❖ 1995 to 2015
- ❖ Over 10 yrs public involvement
- ❖ Construction started 2011, 960 + days

- **Kelly Butte**

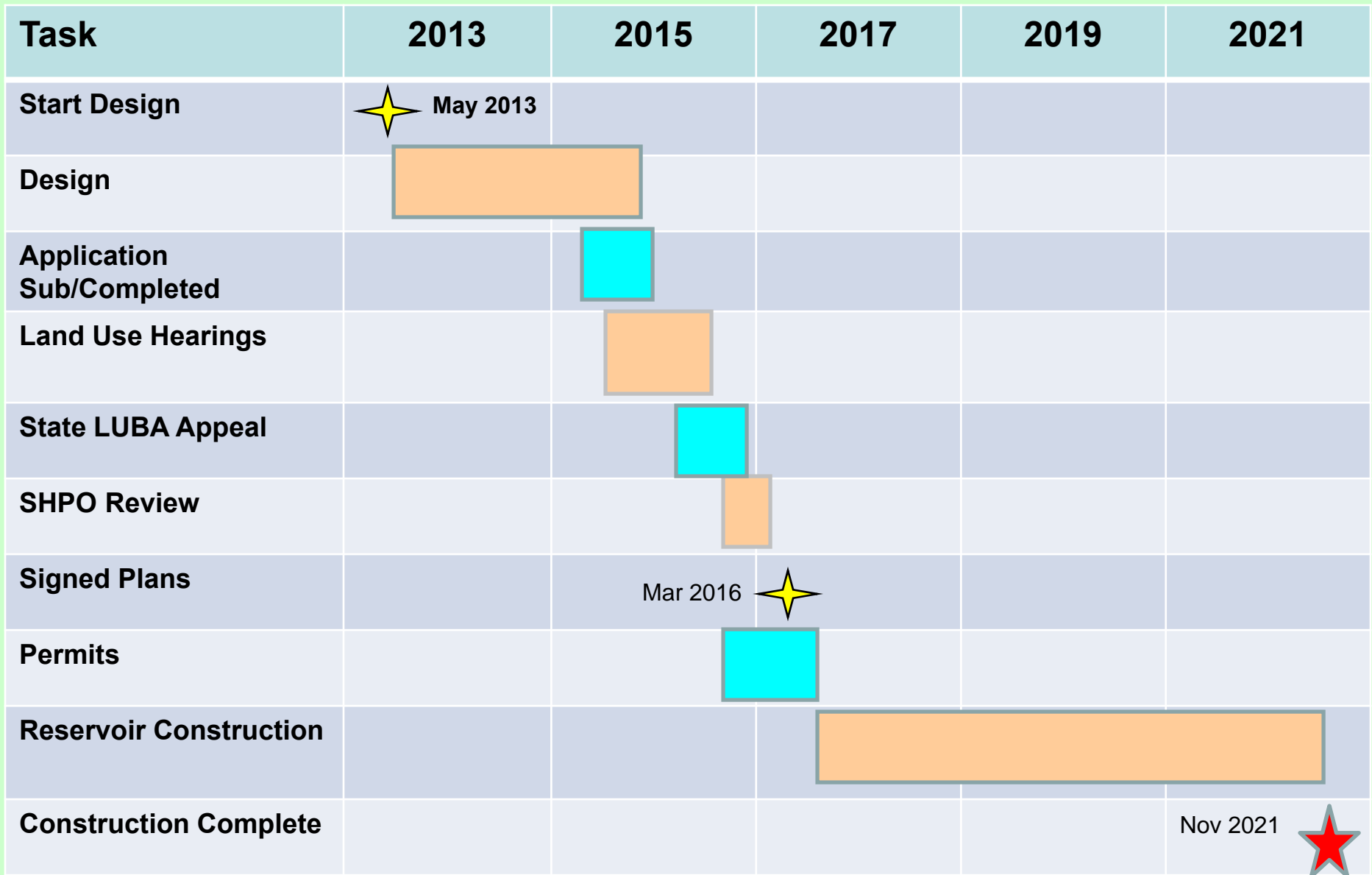
- ❖ 2010 to 2015
- ❖ Construction delayed 1 year
- ❖ Compressed construction, 2.5 yrs

- **Washington Park**

- ❖ 2013 to 2021
- ❖ Compressed design
- ❖ 12 to 18 month LUR process
- ❖ 4.5 yrs construction



# Washington Park Schedule



# Alternatives



Water Over the Divide



In the Ravine



Landscape Terraces (A)



Landscape Terraces (B) ● ● ● ● ●



Landscape Terraces (C) ● ● ● ● ●



Cascade ● ● ● ● ●



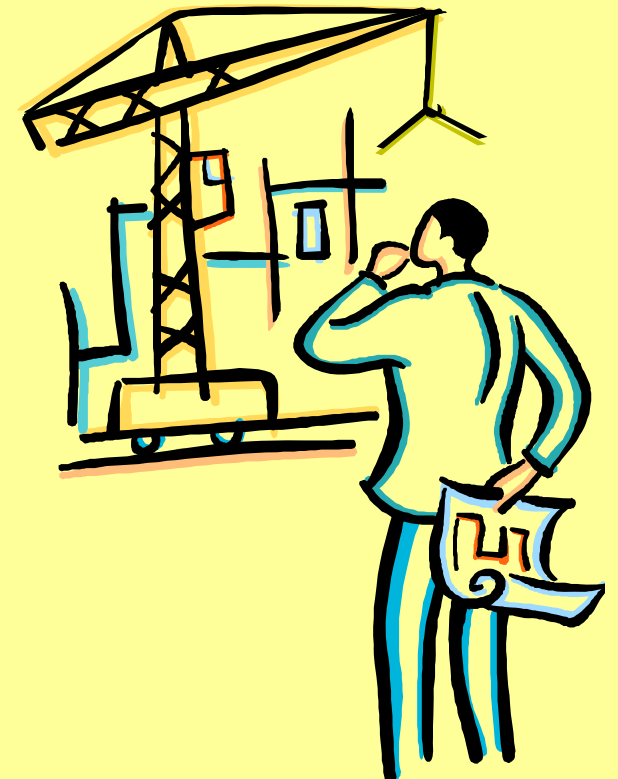
# Contracting Methods

- **Powell Butte – Design Bid Build**
- **Kelly Butte – Construction Manager / General Contractor (CM/GC)**
- **Washington Park - CM/GC**



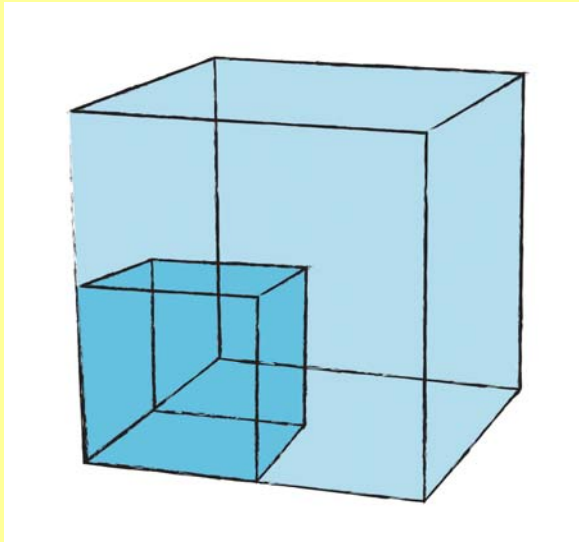
# Design

- **Plans, specs, and costs**
- **Survey**
- **Impacts**
- **Mitigations**
- **Permits, land use**
- **Legal**
- **Procurement**
- **Public Involvement**

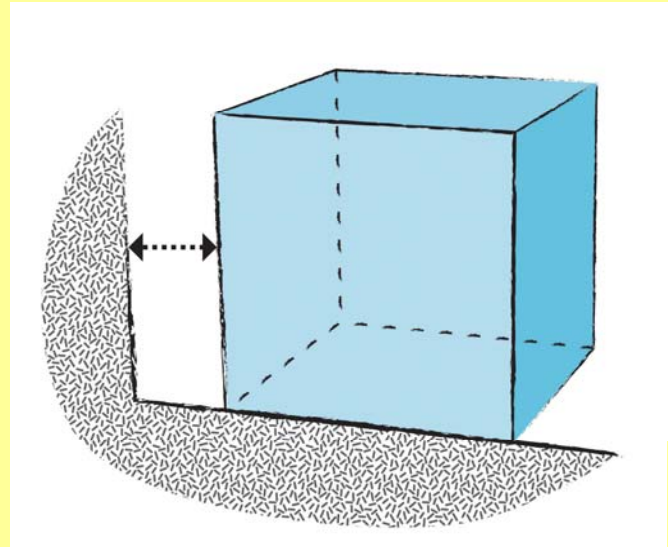




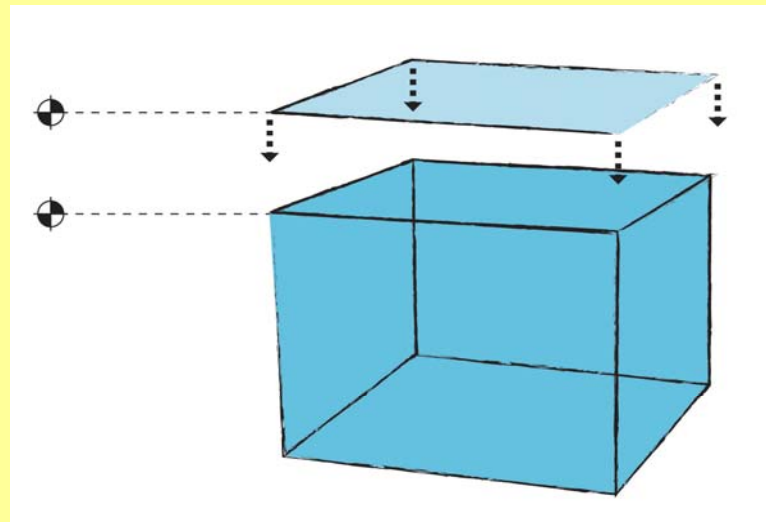
# Design Constraints



Future  
Storage



Geotechnical  
Considerations



Surface  
Elevation

# Site Constraints

Powel Butte	Kelly Butte	Washington Park
Open Space	Top of the Hill	Landslide
Nature Park	Limited Space	Ravine
95 Acres	13 Acres	17 Acres
Wetlands	Forested	Historical
Environmental	Environmental	Environmental



# Sequencing Constraints

- **Inter-project Coordination**
- **Conduit shutdowns**
- **Reservoir impacts – concurrent work limits**



# Construction

- **Construction impacts**
- **Sequencing of work**
- **Public access**
- **Wildlife access**
- **Migratory birds**
- **Erosion control**
- **Permit compliance**
- **Contract compliance**
- **Historic Preservation**





# Powel Butte Reservoir 2 Construction

- Matt foundation
- Hopper bottom
- 2 phases
- 3' to 8' cover
- Box











2012.09.20



2012.11.09



2012.10.24

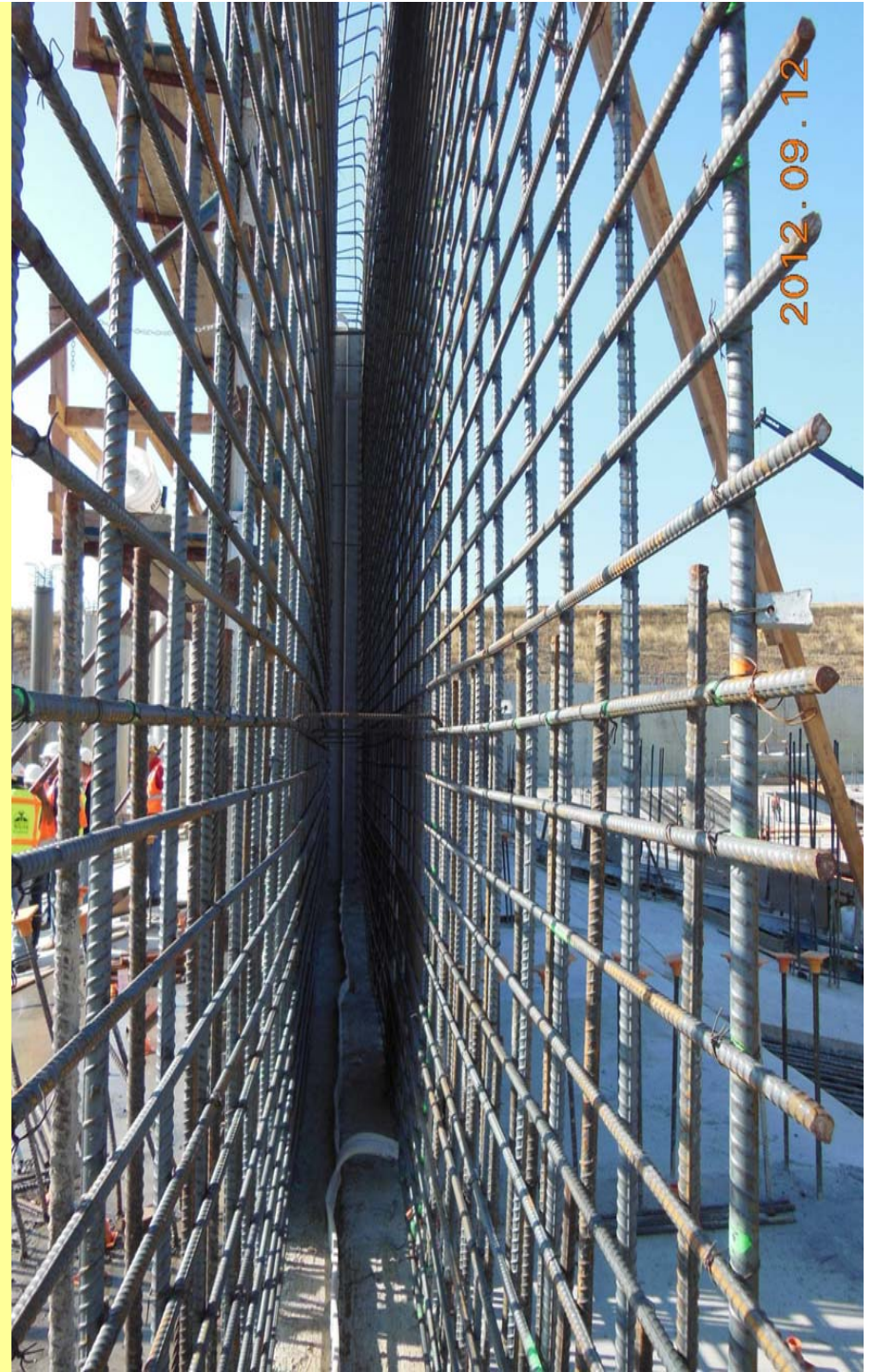






















# Kelly Butte Construction

- Half the size of Powel Butte
- Embankment sides
- Membrane floor
- Hopper bottom
- 2' cover















2014.01.08



2014.03.05



2014.03.05



# KB Aerial April 2014





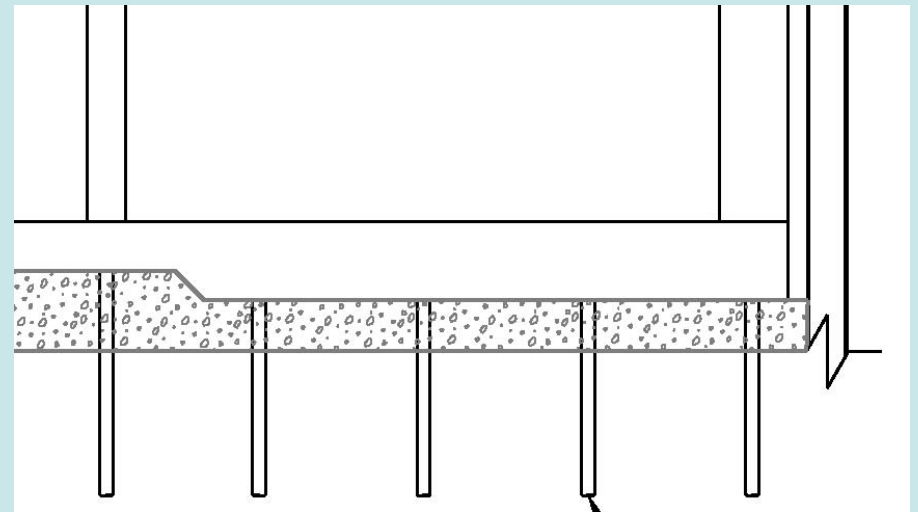
# Kelly Butte Final View





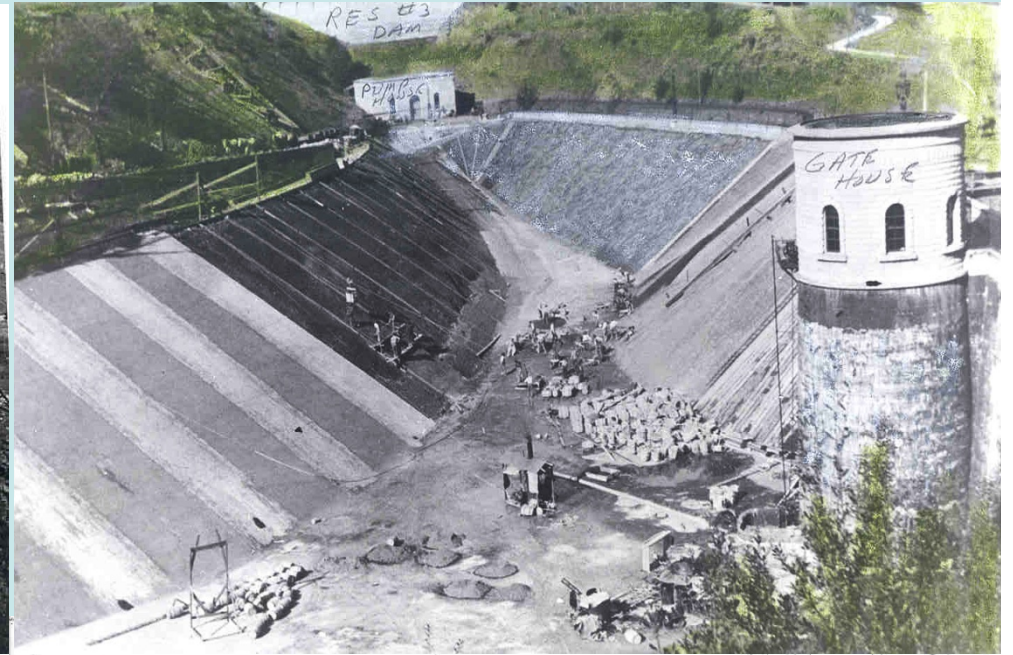
# Washington Park Construction

- Quarter the size of Powel Butte
- Deep foundation on piles
- Shoring walls, temp and perm
- Floor sloped with terrain
- Reflecting pool cover
- Tall, thick walls

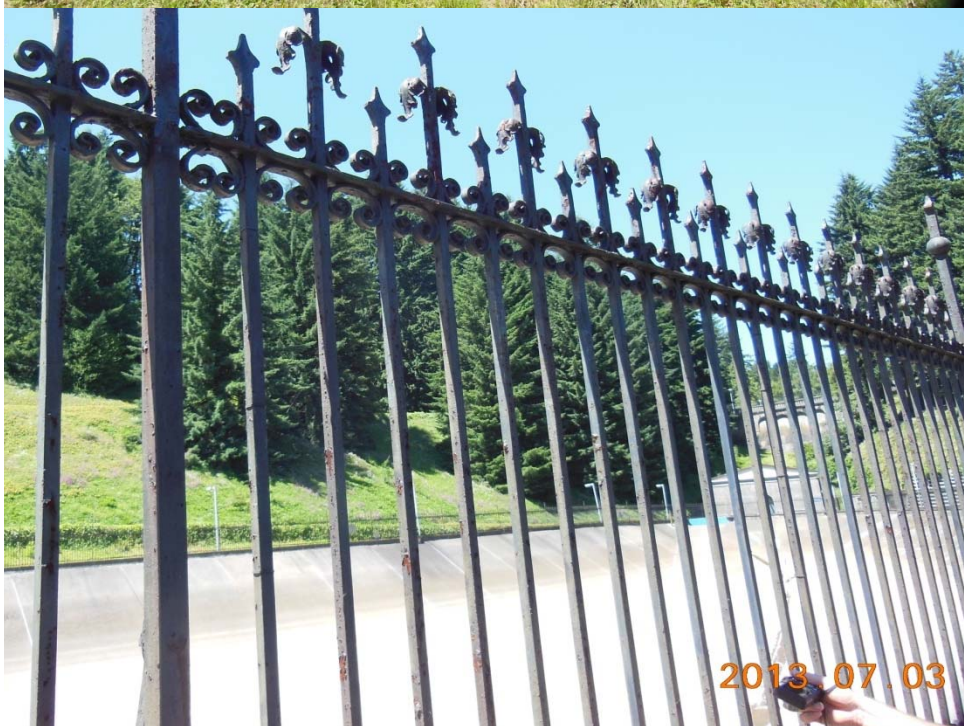




# Historical Site





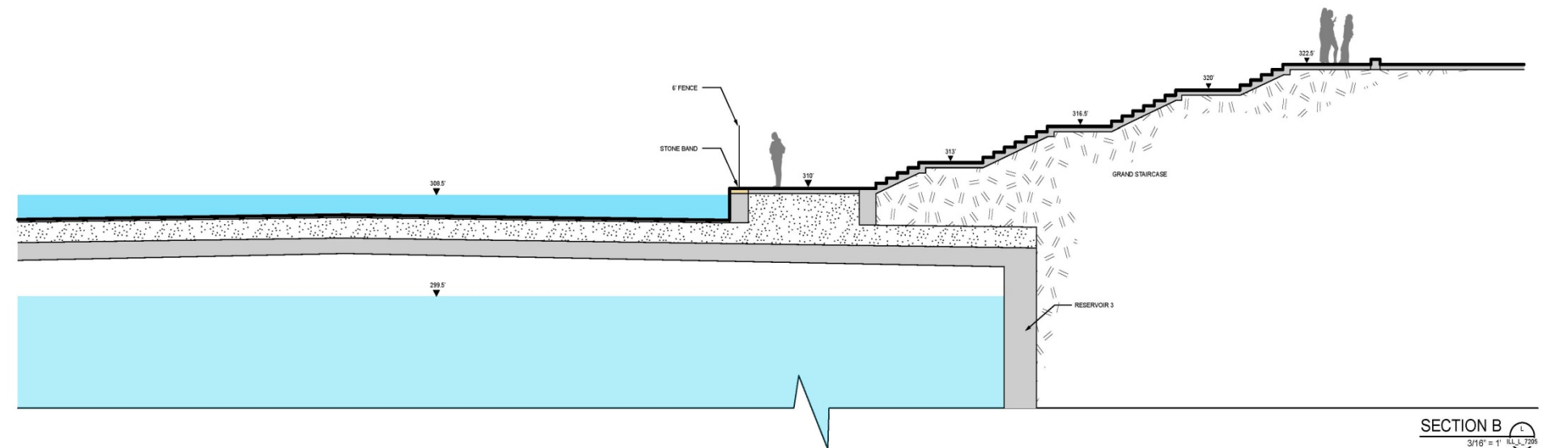
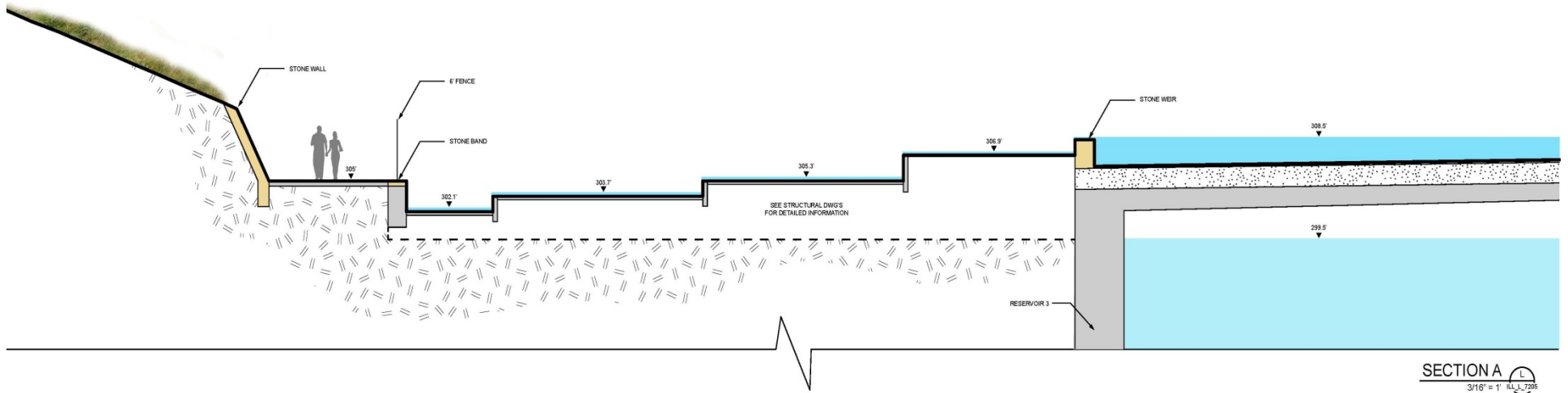






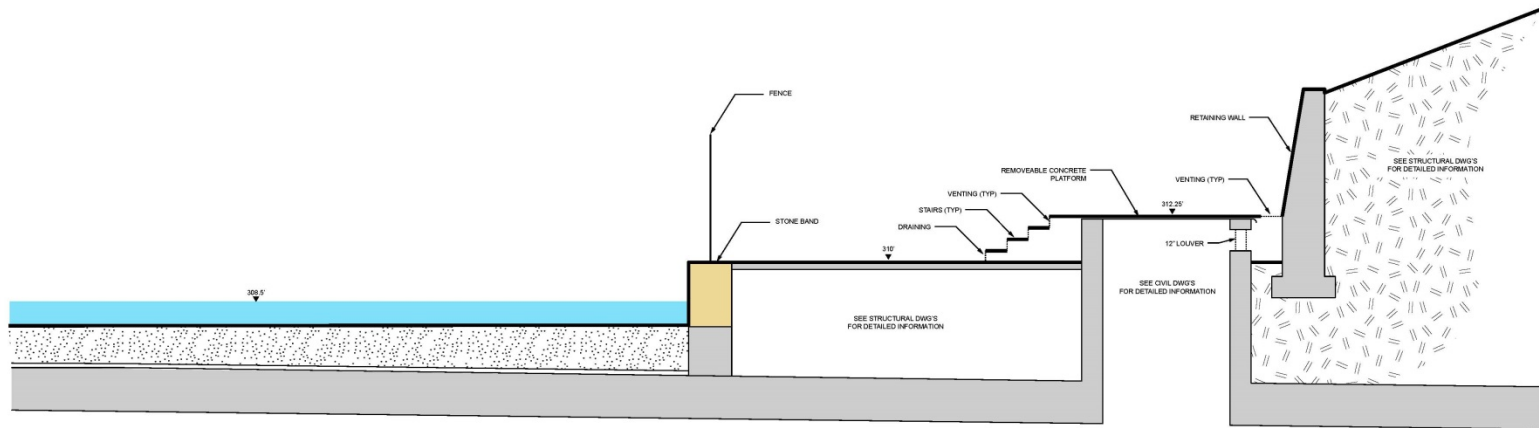


# WP3 typical cut section

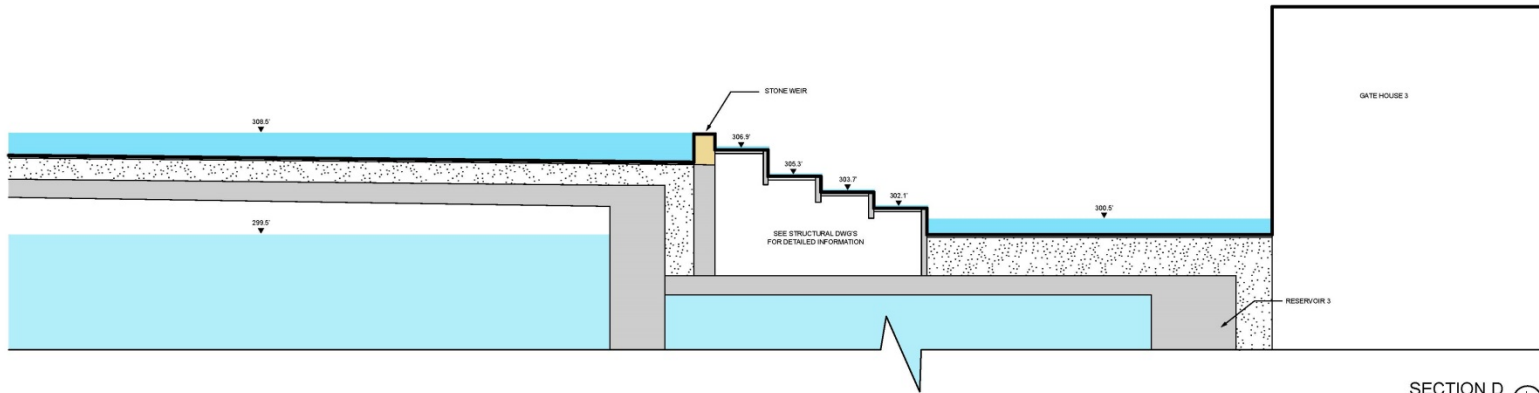




# WP3 typical cut section



SECTION C  
3/8" = 1' (LL 719)



SECTION D  
3/16" = 1' (LL 720)

Proposal and design as approved in case file No. LU 11-XXXXX. No field changes allowed. **Confidential** Verify Scale: 0 1' Bar measures one inch at full size. If not one inch then adjust scales accordingly.

No.	Date	Description	Appd.

Survey: \_\_\_\_\_ Book: \_\_\_\_\_ Page: \_\_\_\_\_  
Plot Driver = PWB\_half\_SW.pdf.plt; Pentable = PWB\_half\_SW.pdf.tbl



Designed By	Program Mgr
Drawn By	Const Mgr
Checked By	Design Super
Project Mgr	Date
CDD-DATE	30% SUBMITTAL

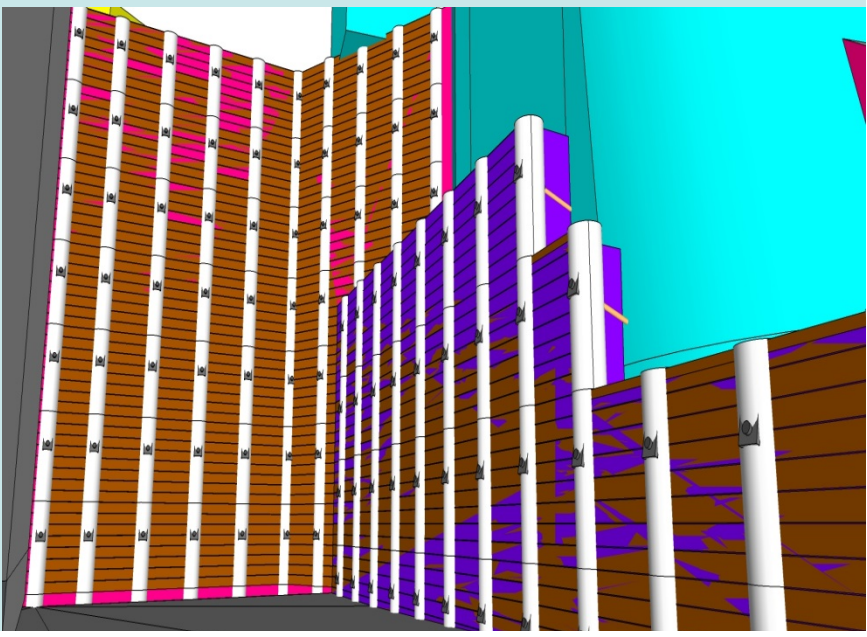
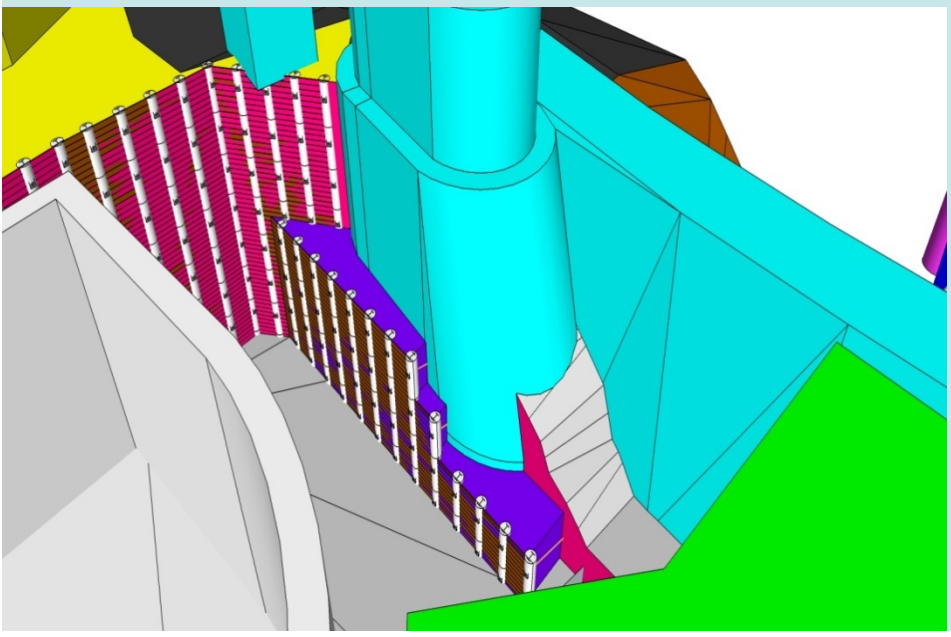
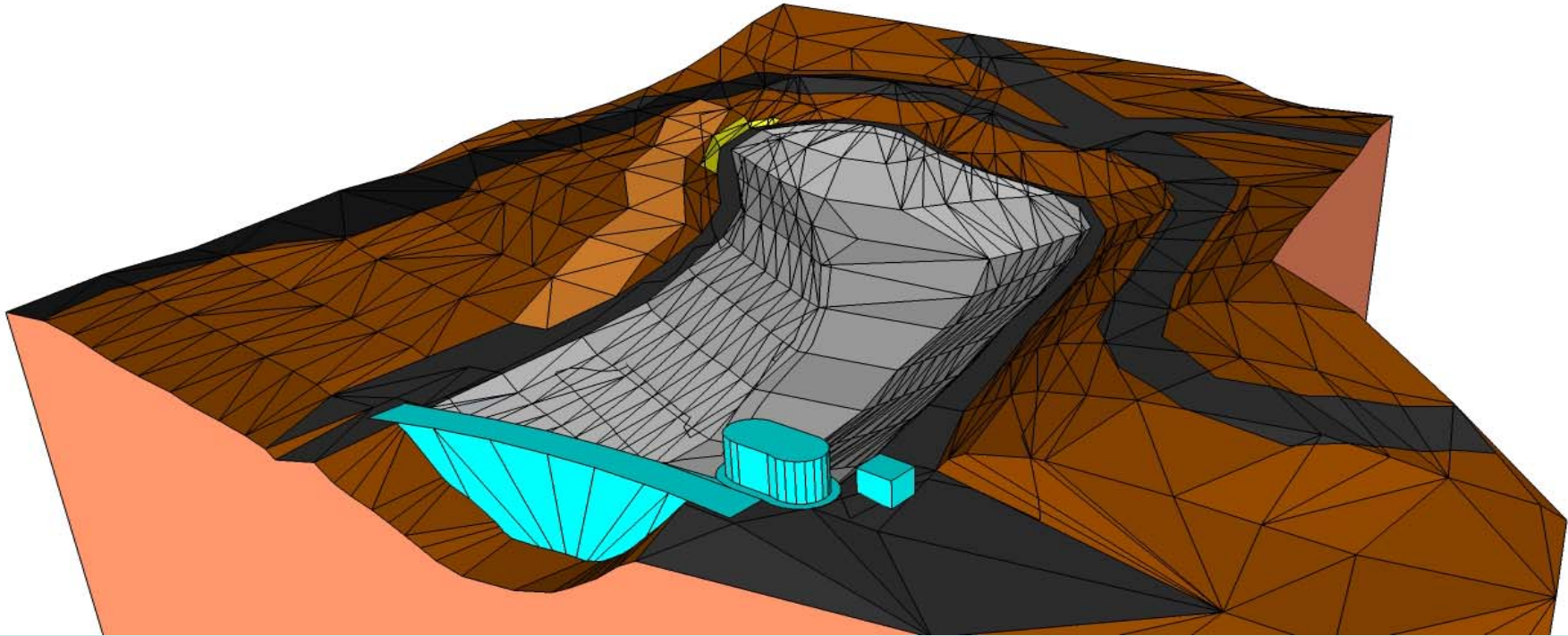


**PRELIMINARY**  
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Washington Park Reservoir Improvements	SDP Project No: <b>W01402</b>
ILLUSTRATIVE	UT Station: 308, 307, 306, 312
RESERVOIR 3 SECTIONS	Drawing No: ILL_L_7210
	Sheet No of













GATE HOUSE 3

GRAND  
STAIRCASE

RESERVOIR 3  
CASCADES  
REFLECTING POOL

PUMP STATION 1

DAM 3

RESERVOIR 4  
LOWLAND HABITAT AREA

PUMP STATION 2  
CHLORINATION  
BUILDING  
DAM 4  
GATE HOUSE 4  
REFLECTING  
POOL

# SITE PLAN

washington park reservoir improvements project



# Questions?

