EAST BAY MUNICIPAL UTILITY DISTRICT

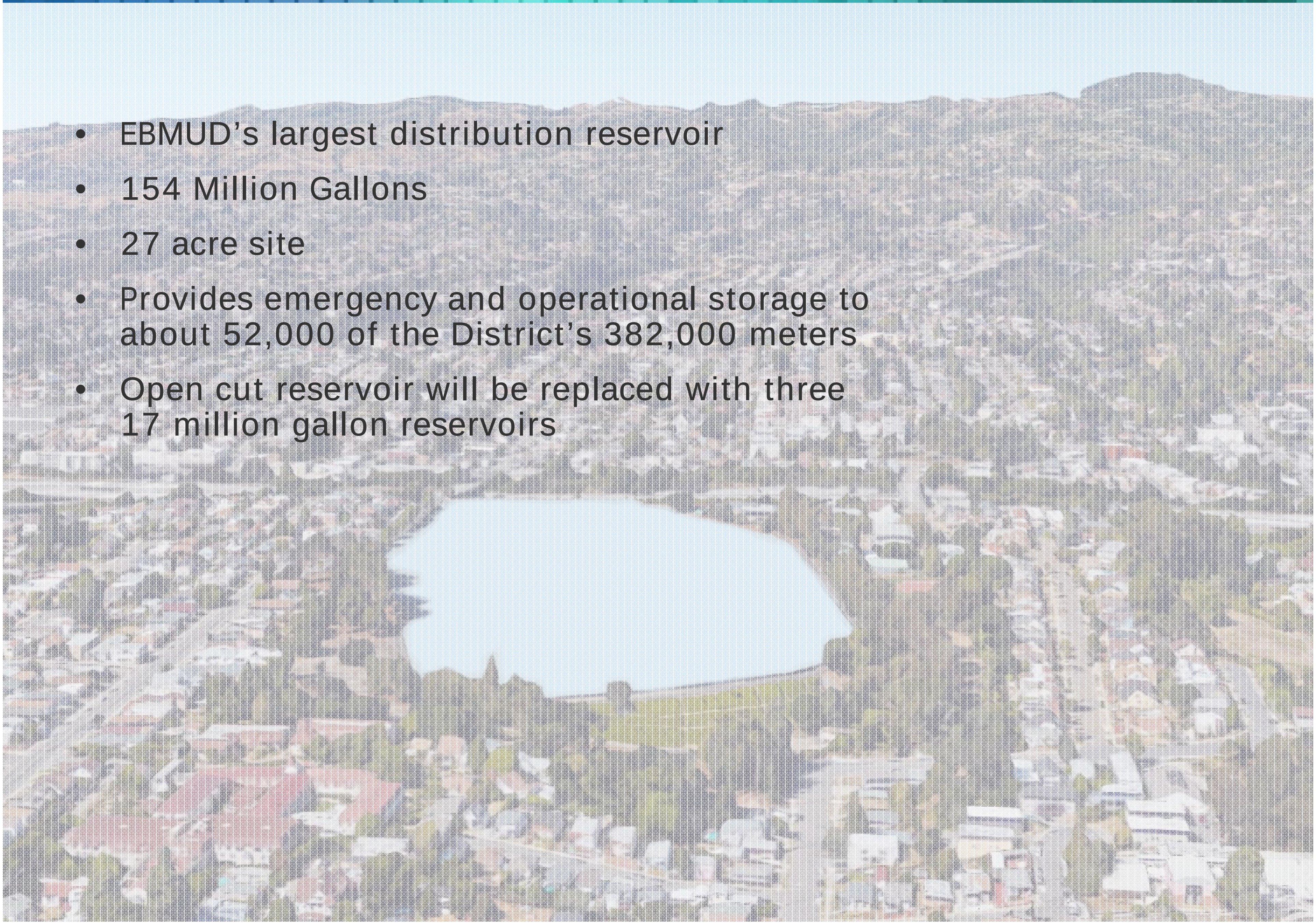
Central Reservoir Replacement Project

BAYWORK 2018

Agenda

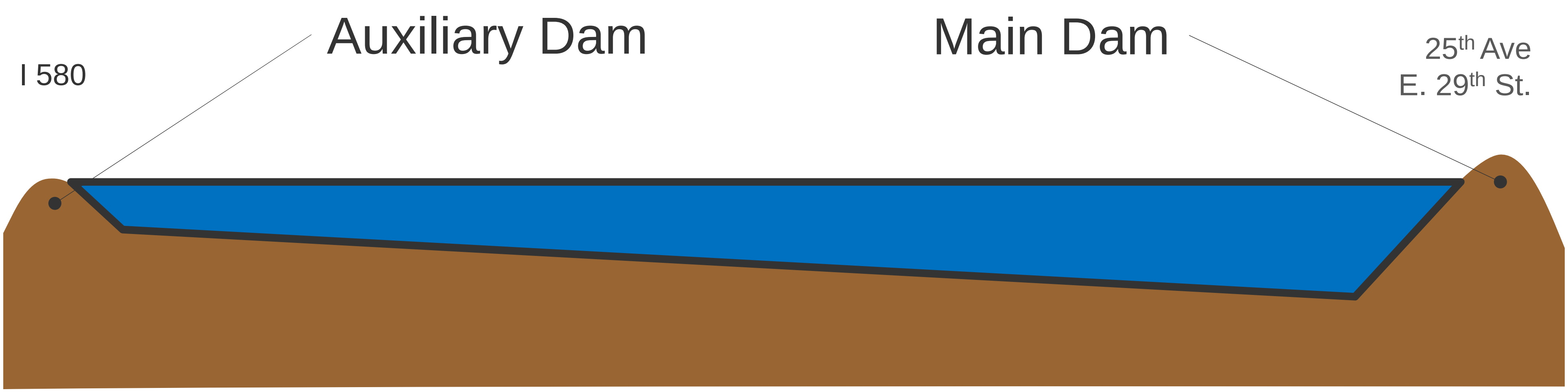
- Project Overview
- Background
- Why are we replacing Central reservoir?
- Why are we raising it?
- Alternatives
- Schedule & Construction Sequencing
- Site Plan

Project Overview



- EBMUD’s largest distribution reservoir
- 154 Million Gallons
- 27 acre site
- Provides emergency and operational storage to about 52,000 of the District’s 382,000 meters
- Open cut reservoir will be replaced with three 17 million gallon reservoirs

Existing Cross Section of Central Reservoir



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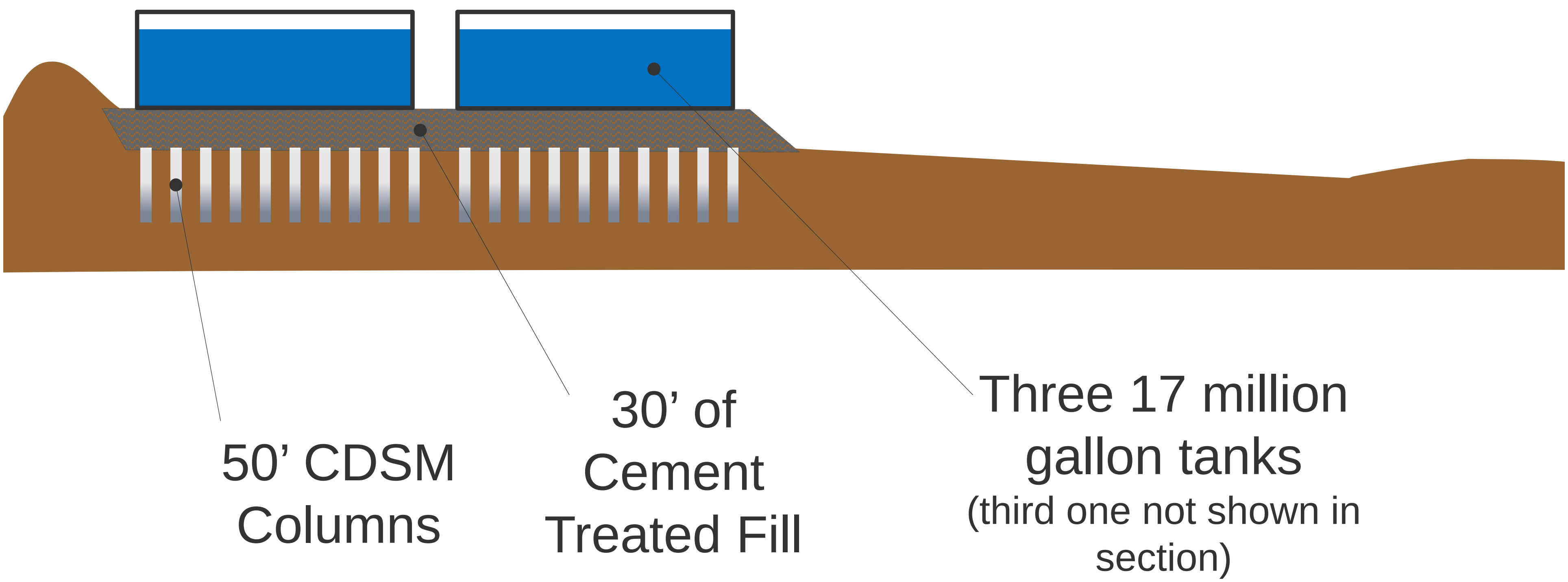
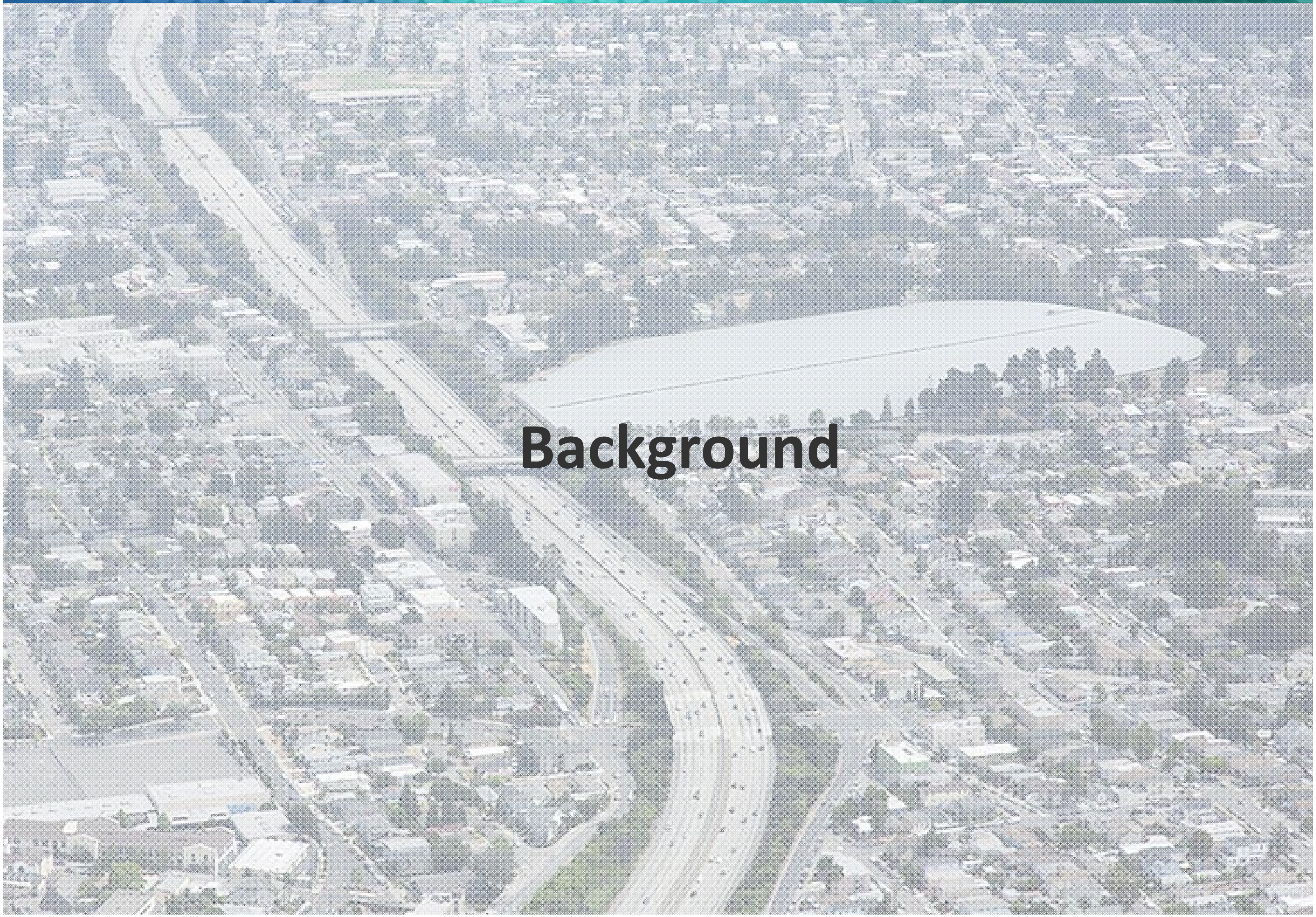


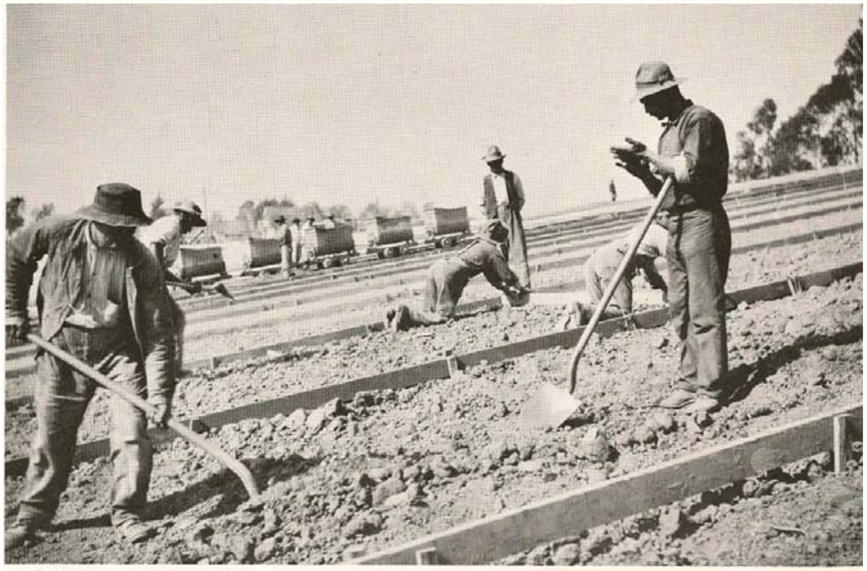
Project Scale

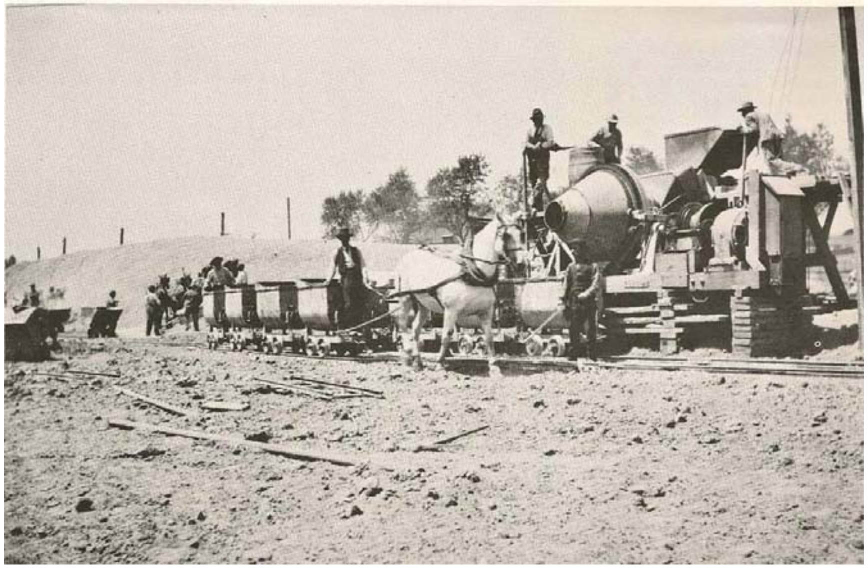
Background



Central Reservoir Construction

- Built in 1910 by the People's Water Company
- Originally constructed to distribute water from Lake Chabot





Central Reservoir Modifications

- Major modifications in the early 1960s
- North embankment (auxiliary dam) modified to make room for I580.
- Roof in 1961

Central Reservoir Modifications

- Liner in 1961
- Encapsulate Roof in 2004

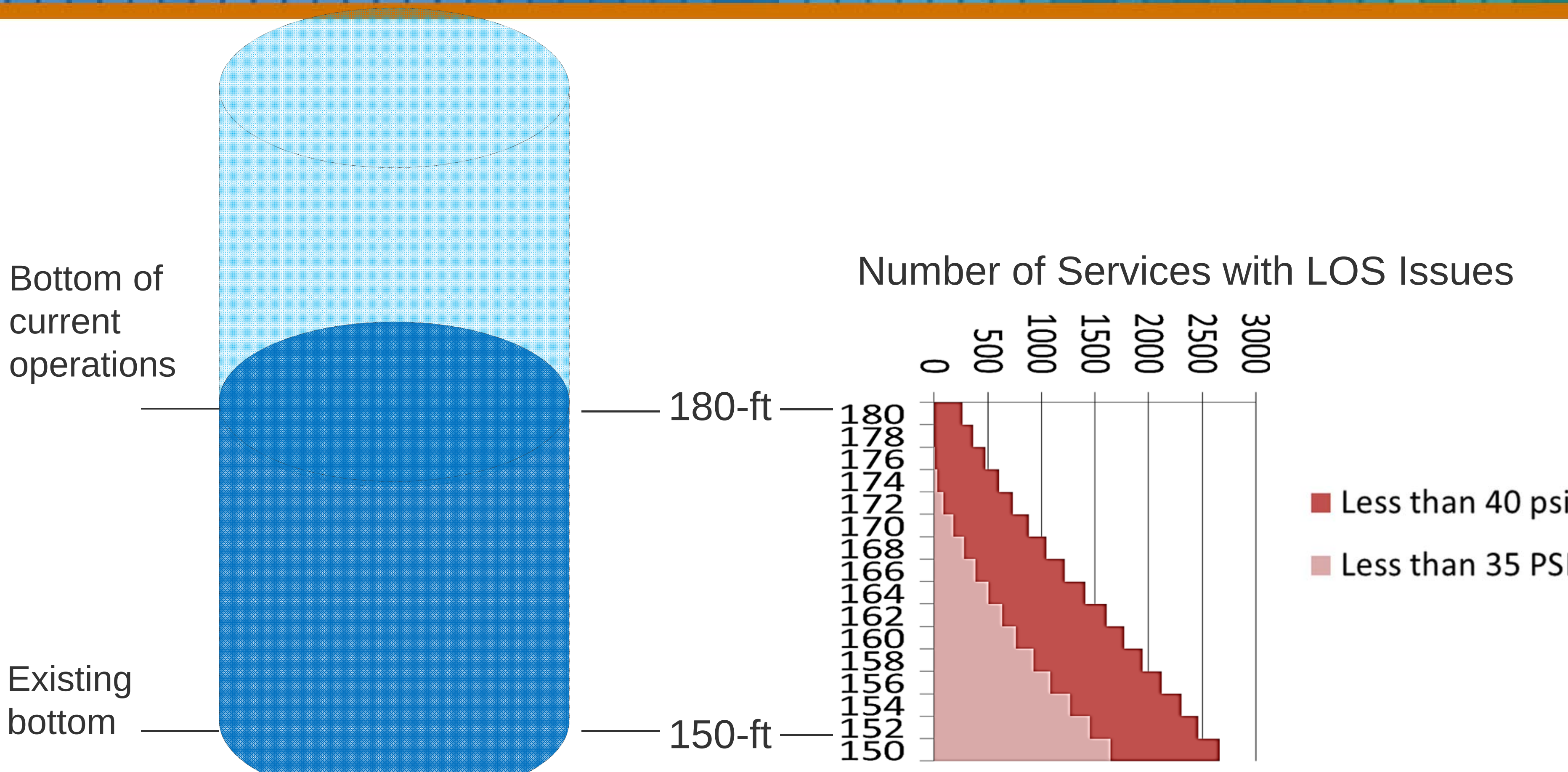
Why are we Replacing the Reservoir?

Why are we Replacing the Reservoir?

- The reservoir has reached the end of its useful life
- PCBs in the liner
- Reduce water loss through the liner
- Resize to meet existing & future demands
- Raise the reservoir to improve water distribution system

Why are we Raising Central?

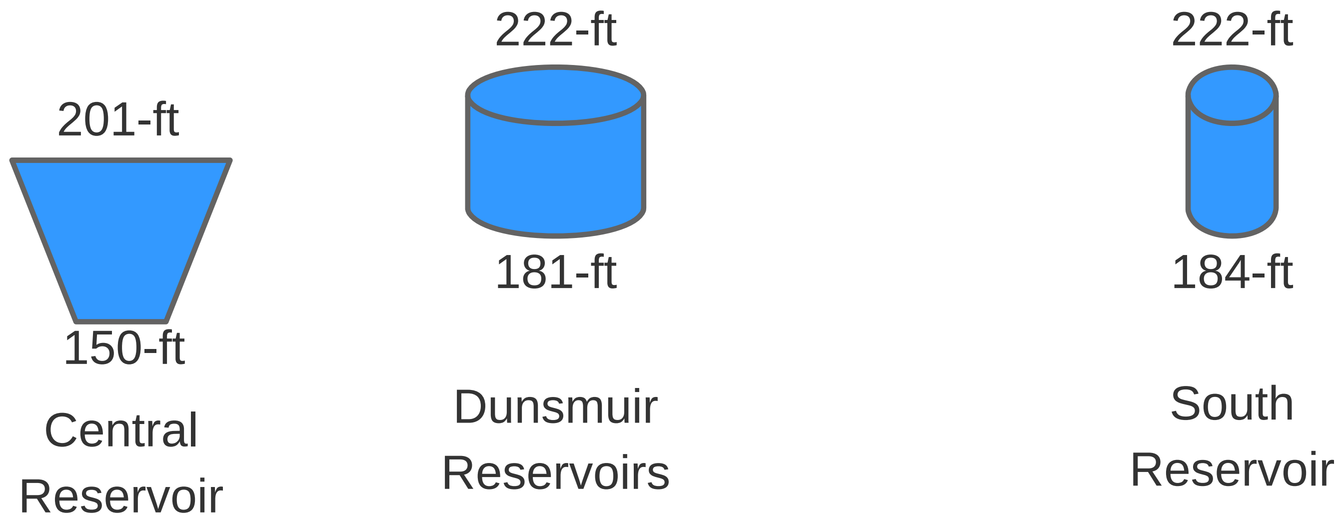
Raising Central Removes Dead Storage



Note: ~24,000 services in GOA3

<u>Dead Storage affects reliability and water quality</u>

Central Pressure Zone



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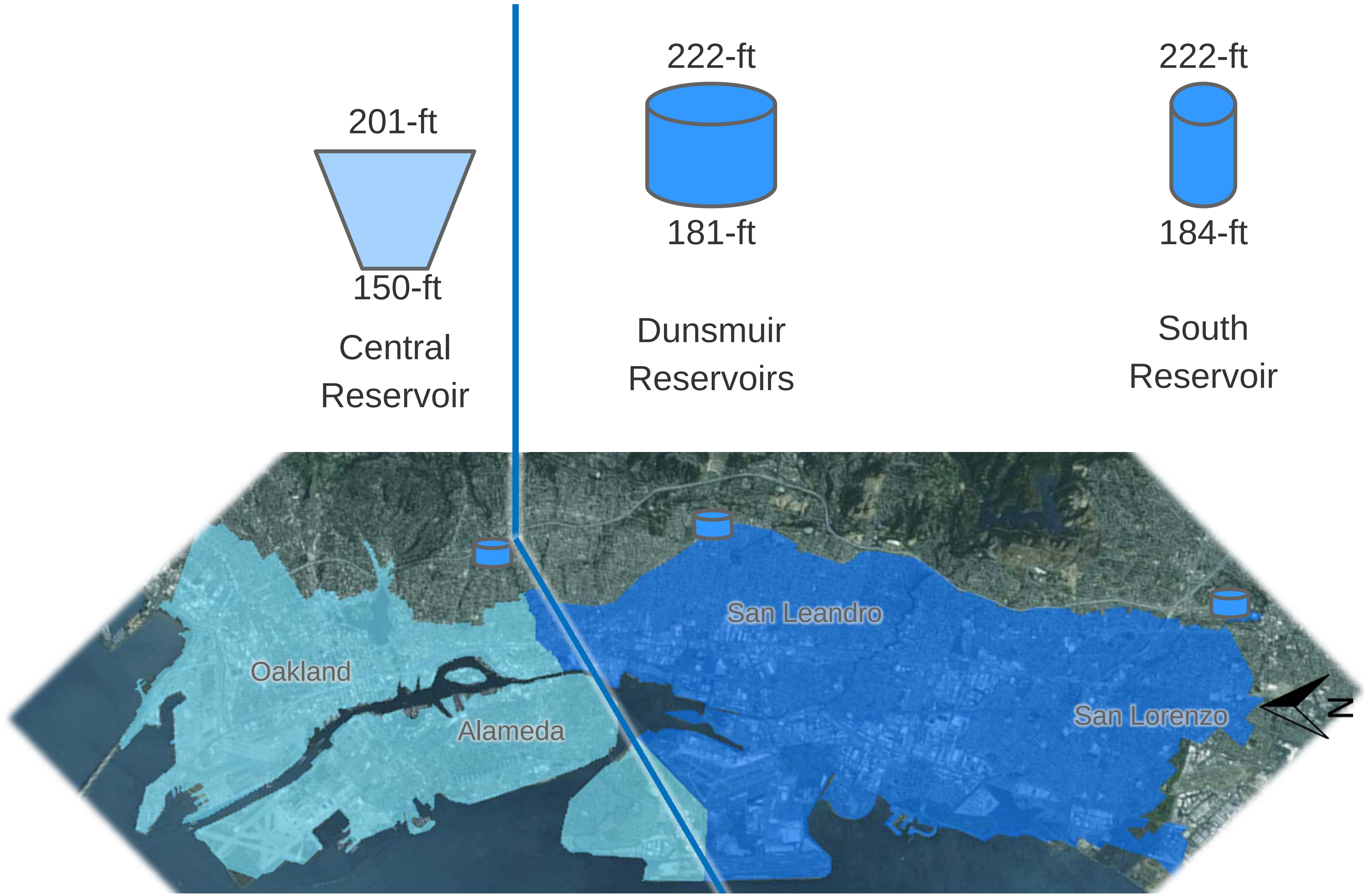

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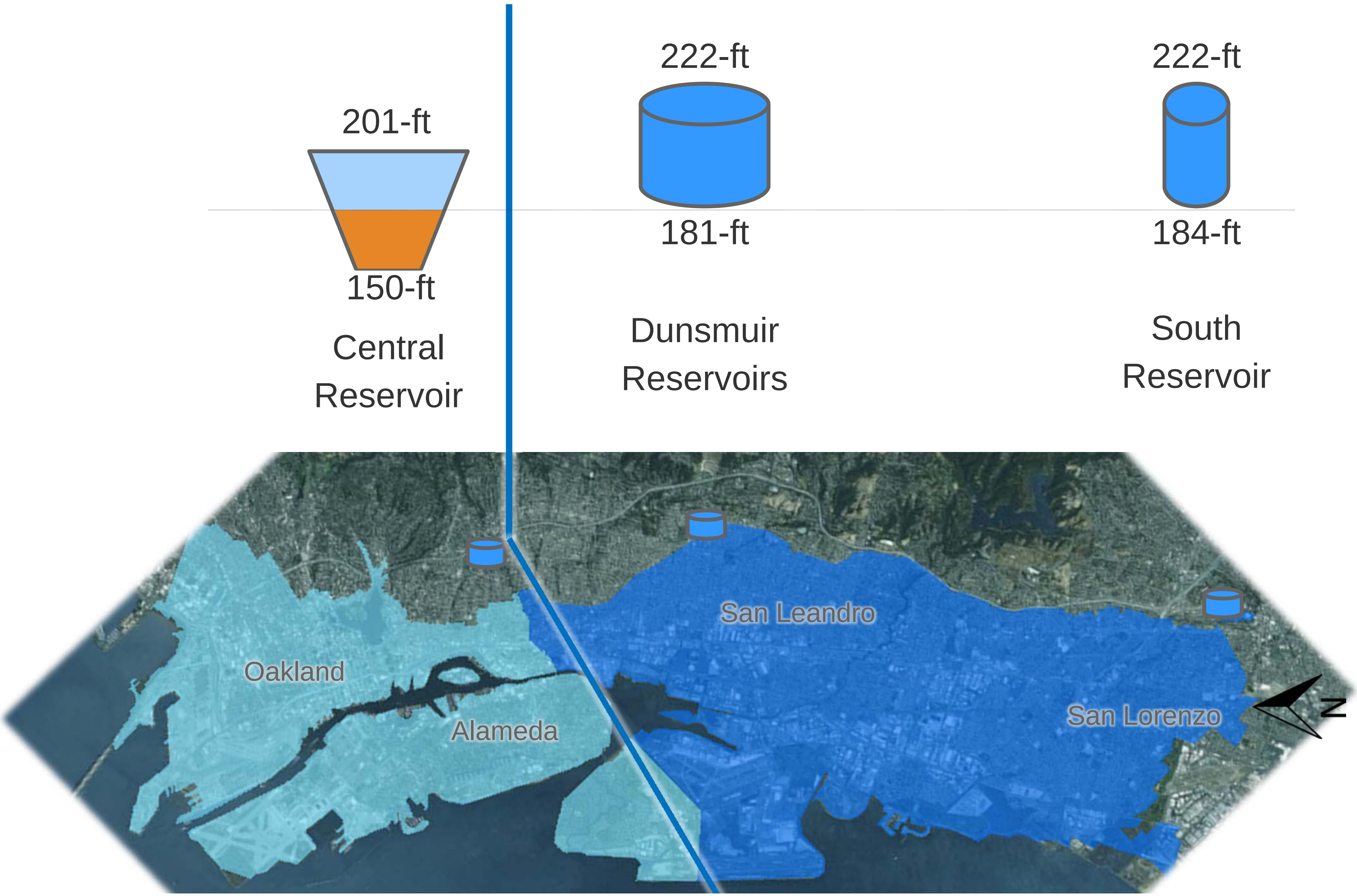

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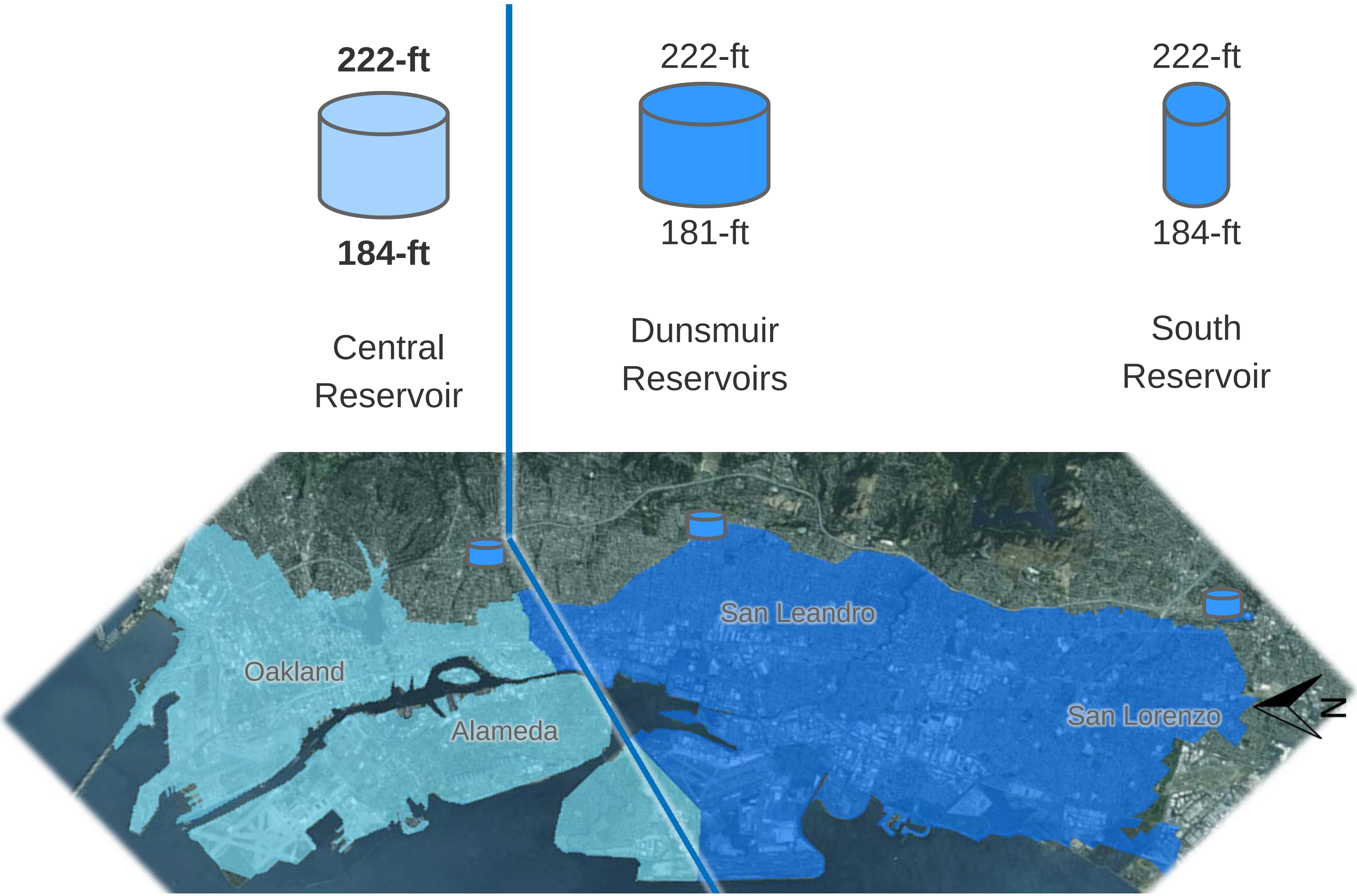

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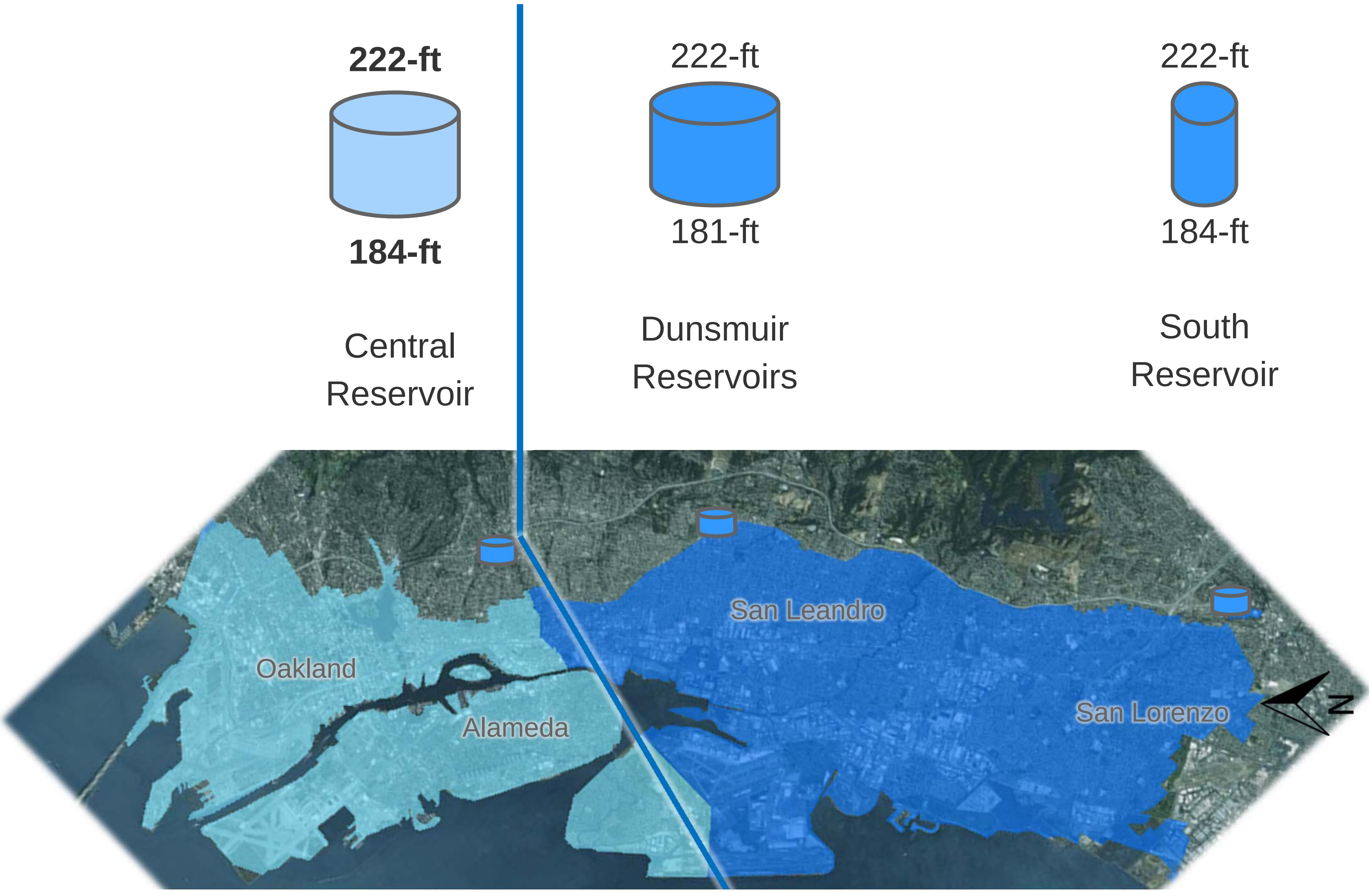
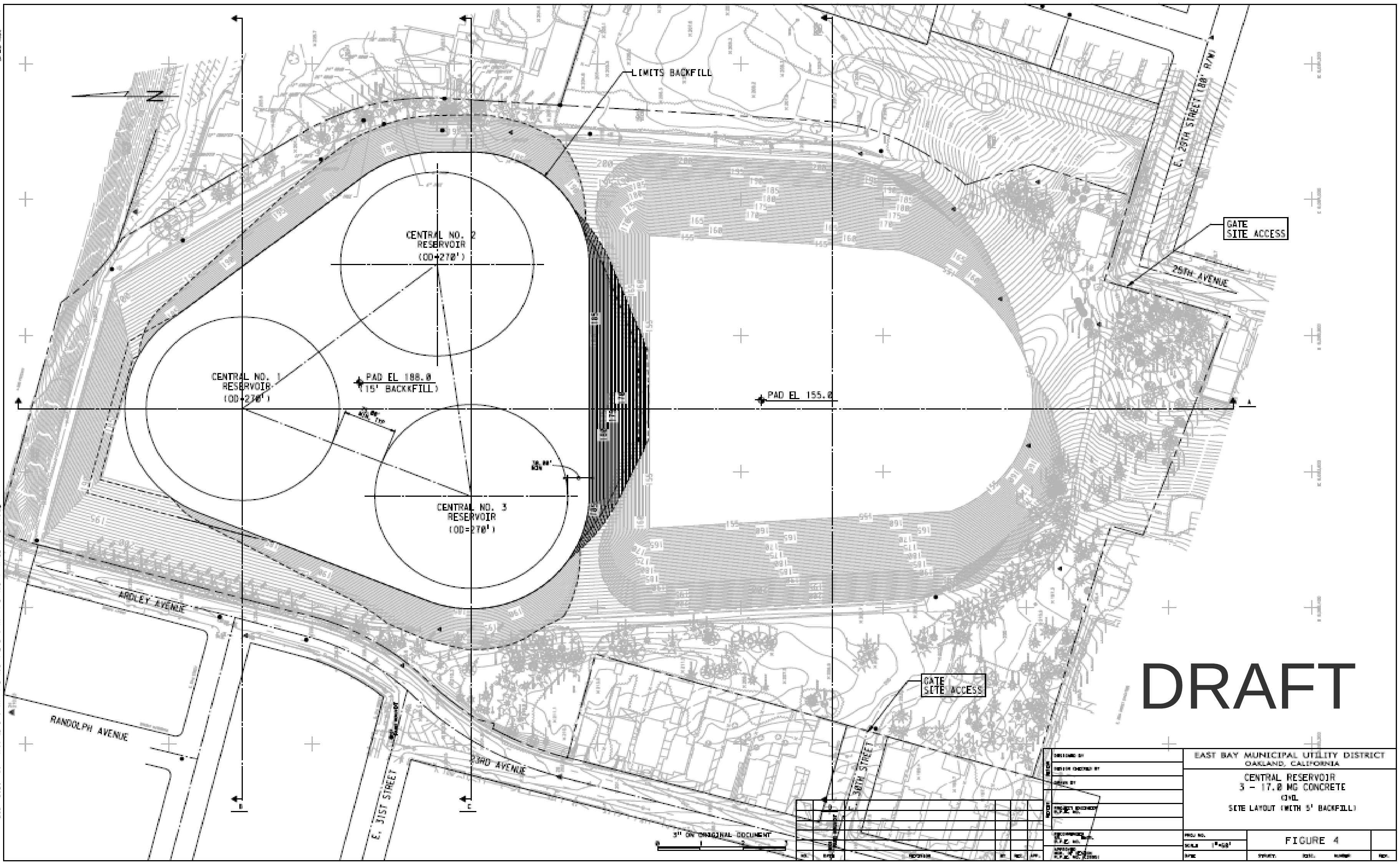


What Alternatives were Considered?

Superstructure Alternatives: Three Tanks – 17MG



Substructure Alternatives:

EBMUD

Alternative	Type	Description
1	**Excavation/Trench Spoil Fill**	Build pad using compacted embankment materials, and trench spoil as necessary.
2	**Cement/Lime Treated Fill**	Build pad using Cement/Lime Treated Fill (embankment materials, and trench spoil as necessary)
3	**Lightweight Cellular Concrete Fill**	Build pad using Lightweight Cellular Concrete
4	**Roller Compacted Concrete Fill**	Build pad using Roller Compacted Concrete
5	**Excavation Fill with 3-ft Spaced Geogrid**	Build pad using compacted embankment materials, and trench spoil as necessary, and reinforce with Geogrids at 3-ft vertical spacing.
6	**Aggregate Base (AB) Fill with 5-ft Spaced Geogrid**	Build pad using imported select non-expansive engineered fill and reinforce with Geogrids at 3-ft vertical spacing.
7	**Geopiers**	Build pad using compacted embankment materials, and trench spoil as necessary, and reinforce the pad with Geopiers.
8	**Cement Deep Soil Mixing (CDSM) Columns**	Build pad using compacted embankment materials, and trench spoil as necessary, and reinforce the pad with cement deep soil mixing columns.
9	**Stone Columns**	Build pad using compacted embankment materials, and trench spoil as necessary, and reinforce the pad with stone columns.
10	**Drilled Piers and Grade Beam Foundation**	Support tanks on grade beams and drilled piers embedded into Upper San Antonio Formation.
11	**Concrete Caisson**	Large caisson support for tank, without backfill.

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Does not meet consolidation settlement criteria

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Doesn't go deep enough

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Does not meet consolidation settlement criteria

Much too expensive

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Does not meet consolidation settlement criteria

Cheaper, less impacts

Much too expensive

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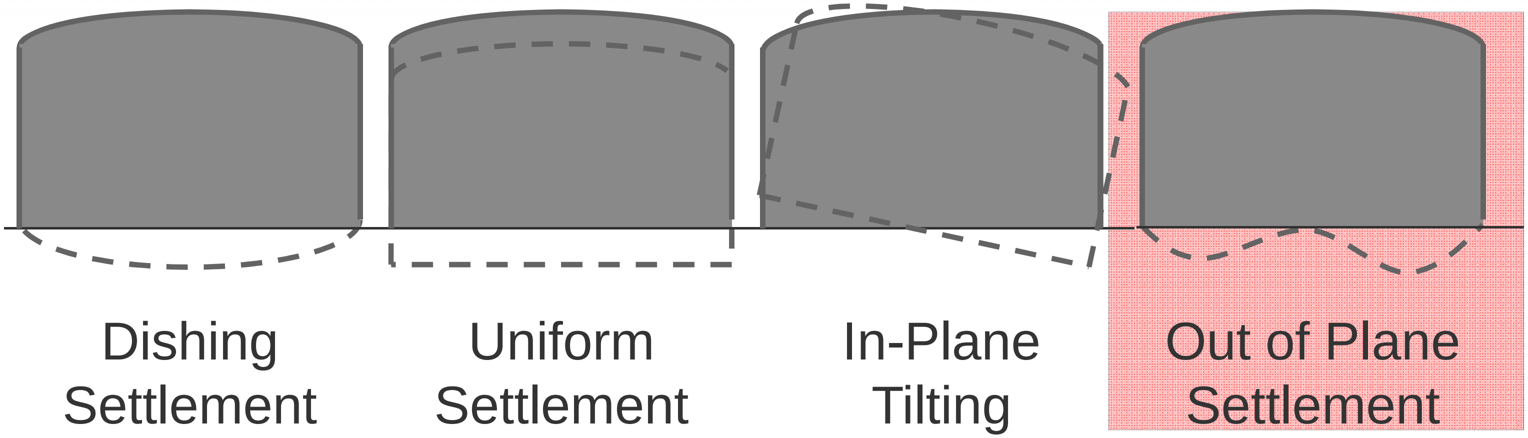
Combine to minimize costs and impacts

Concrete vs. Steel

- Concrete is less expensive (NPV)
  - $131 Million for steel vs. $121 Million for concrete
- Schedule is similar
  - 34 months for steel vs. 36 months for concrete
- Truck trips are similar
  - 7,771 trips for steel vs. 8,752 trips for concrete
- Concrete tanks are easier to maintain (no sandblasting for recoating)
- Concrete profile is 13 feet lower than steel

Concrete and Steel have Similar Settlement Criteria



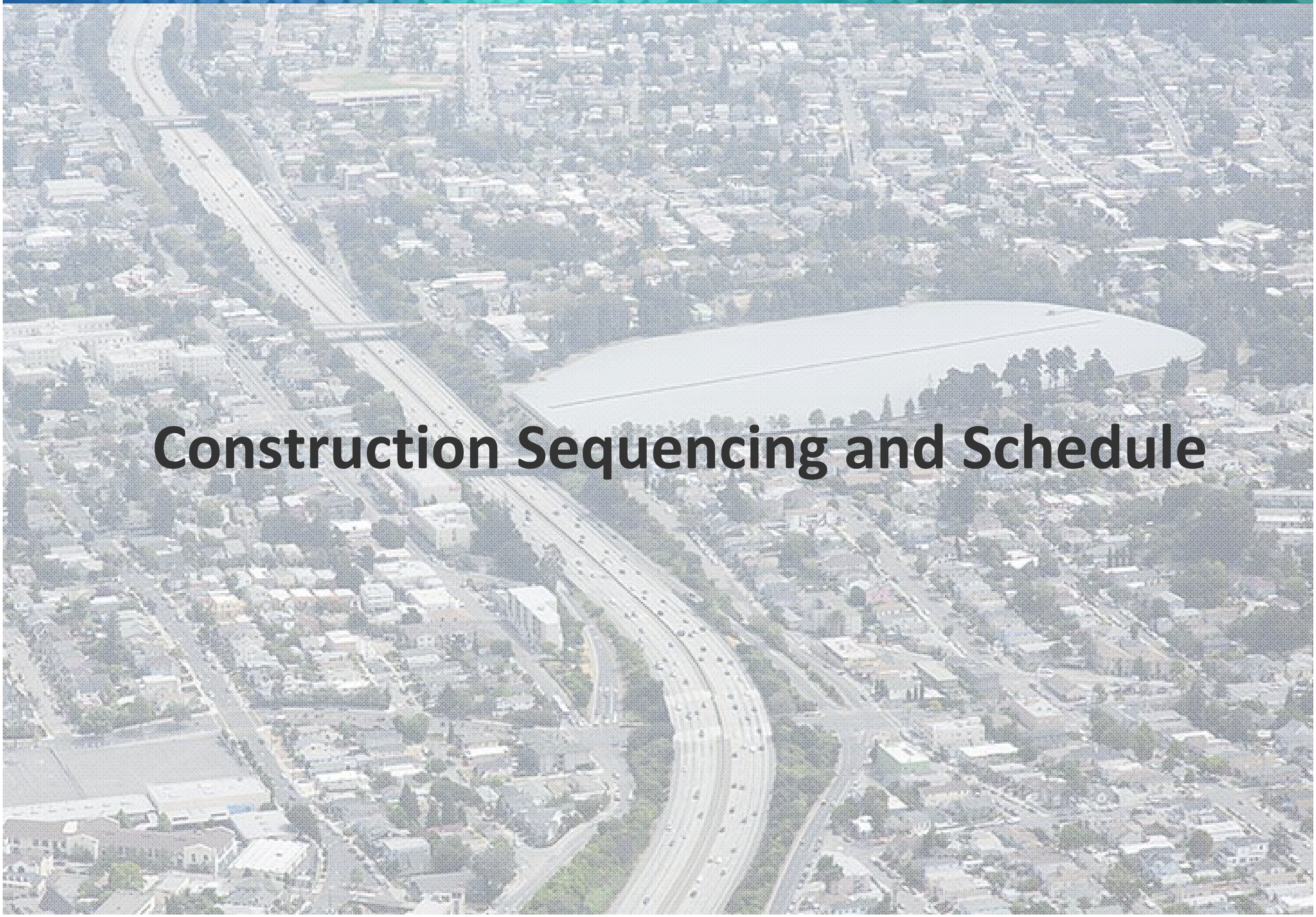
- Allowable differential settlement:
  - 0.1% for steel tanks (5/8" over 50-feet)
  - 0.04% for concrete tanks (1/4" over 50-feet)
  - (% = vertical settlement/distance over which the differential settlement is measured)
  - Based on most stringent settlement criteria from manufacturers
- Settlement predictions of 0.2% to 0.4% without any subgrade improvements
- Both steel and concrete tanks require subgrade improvements

No discernable advantage of one material over the other in terms of settlement

Subgrade Performance

- Subgrade improvements such as those proposed at Central are common.
- CDSM has been used on projects throughout the country for over 30 years
- CDSM was used most recently by EBMUD
  - Chabot Dam Seismic Improvements Project
  - San Pablo Dam Seismic Upgrade Project
- Concrete tanks larger than 10 MG have been successfully built in California on improved foundations:
  - City of San Bruno, Foster City (piers)
  - SFPUC at the Harry Tracy and Sunol water treatment plants (piers)
  - The Walnut Creek WTP Clearwell (30 feet of aggregate base fill) and no evidence of settlements or leaks)

CDSM at Chabot Dam

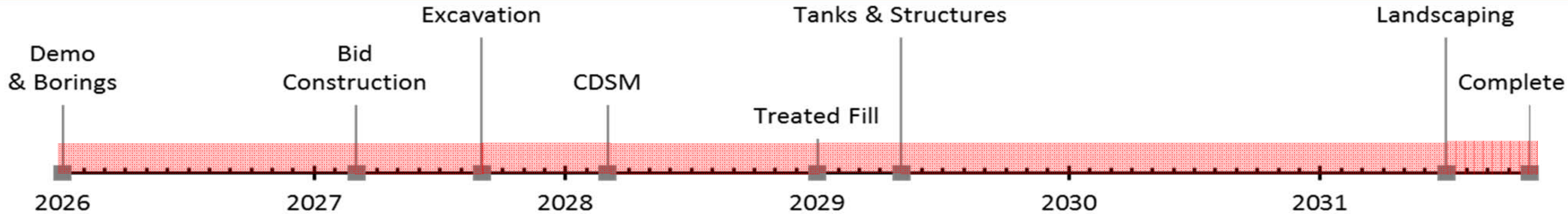


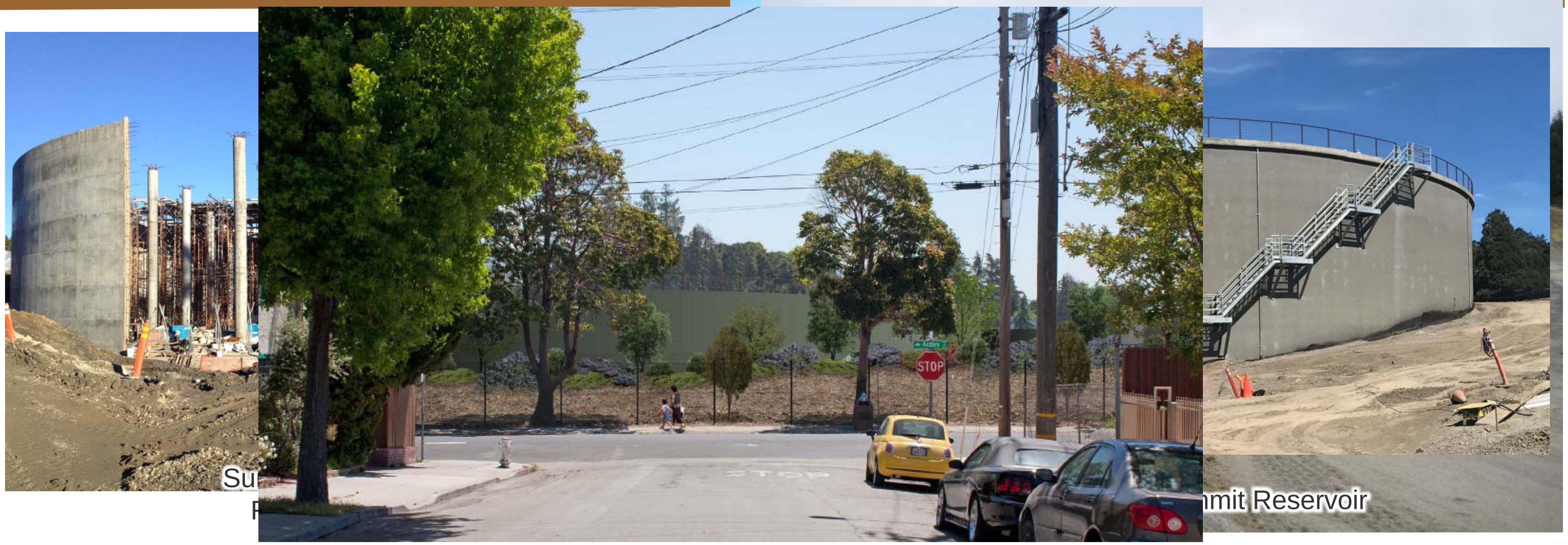
Construction Sequencing and Schedule

Central Reservoir Next Steps

- Planning
  - Planning work started circa 2014
  - EIR 2018-2020
- Design
  - 2022-2025
- Demolition
  - 2026-2027
- Construction
  - 2027-2031

Construction Sequence





THANK YOU