

Getting Creative in Bellevue

A Unique Approach to Evaluating and Improving a Critical Storage Tank and Pump Station within a Residential Neighborhood



Presented by Doug Lane, PE | City of Bellevue
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April 30, 2015

Existing Horizon View #1 Reservoir & Pump Station



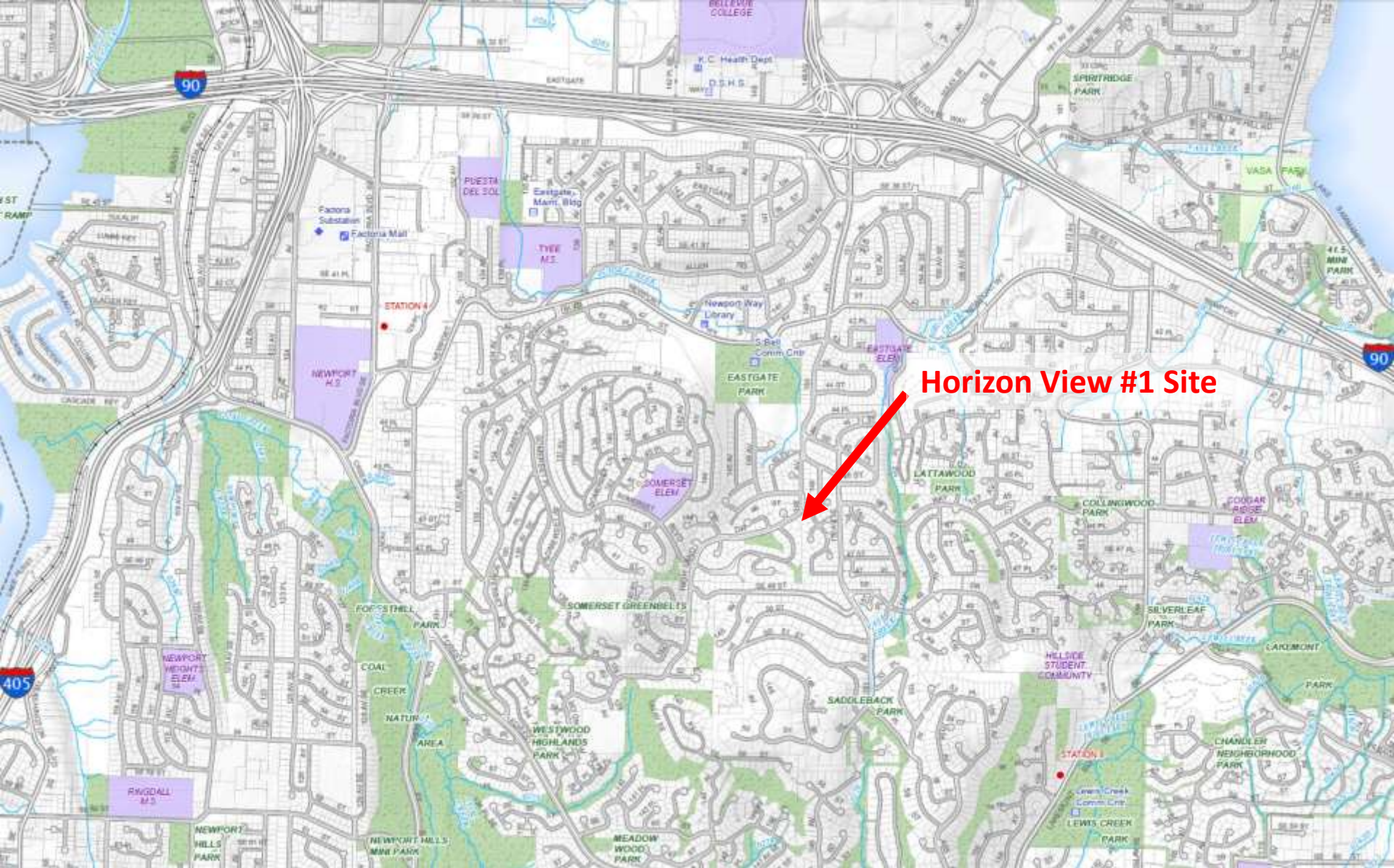
850 Zone Pump Station

- Built in 1964
- Two 1250 gpm centrifugal pumps
- Non-reinforced CMU building

700 Zone Welded Steel Reservoir

- Built in 1958 on another site
- Moved to current site in 1963
- 0.2 MG nominal capacity

Horizon View #1 Vicinity Map



Horizon View #1 Site

Why is the City Doing the Project?

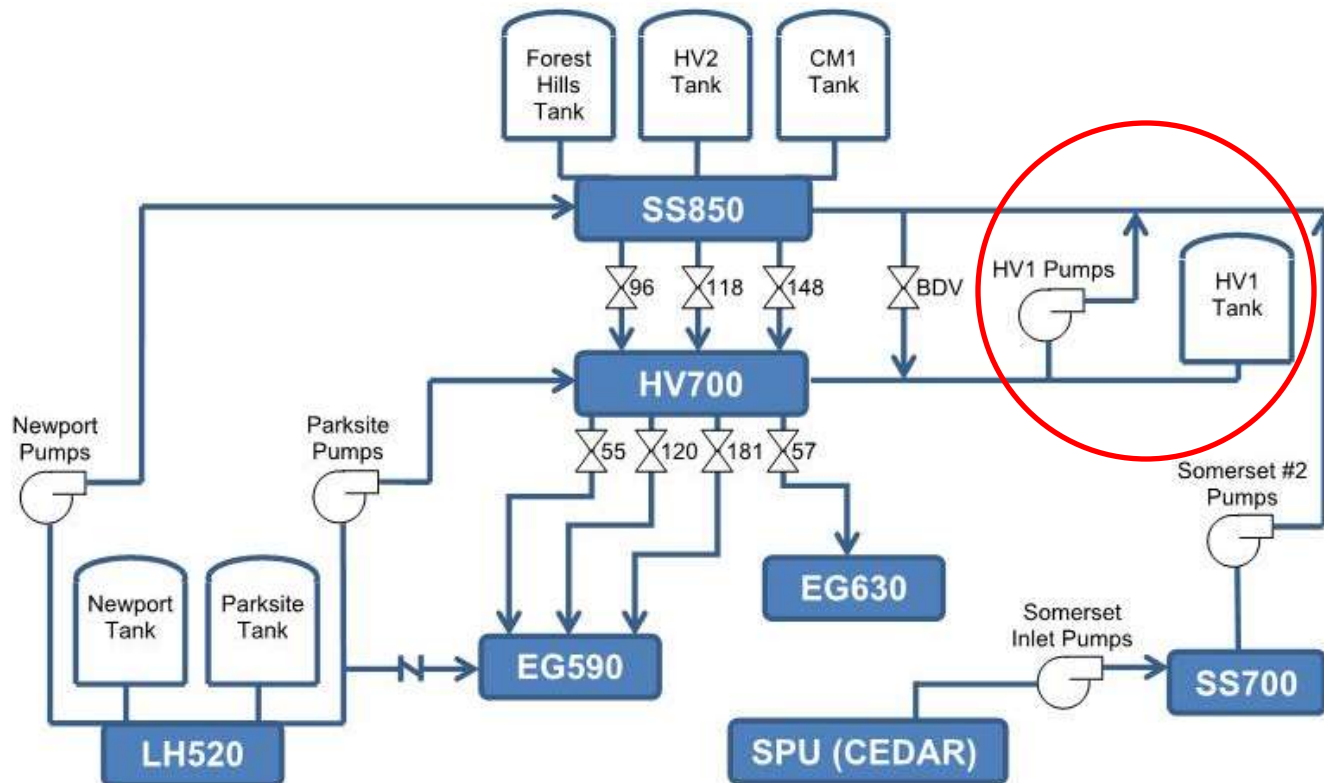


- Critical facilities that supply many upper zones
- Increase reliability during seismic events
- Replace aging structures and equipment

Unique Approach to Sizing Storage

Unique functionality of reservoir

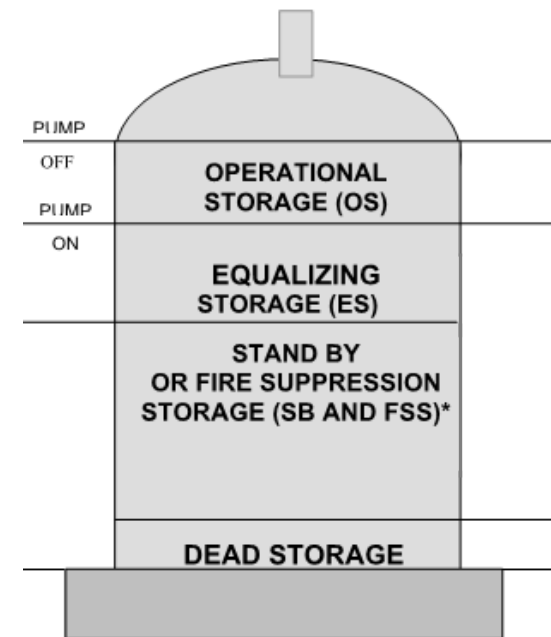
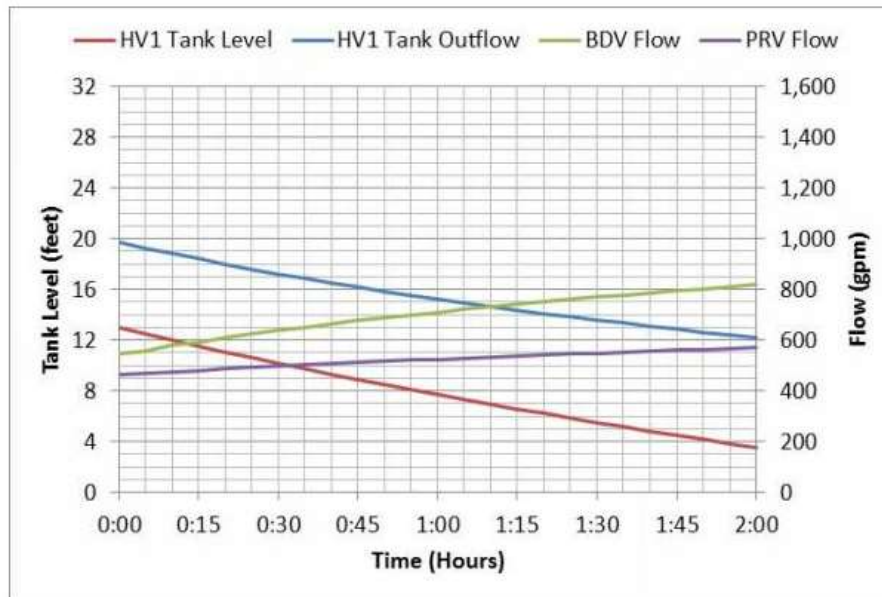
Partial HV700 Service Area System Schematic
(Numerous Connections Not Shown)



Unique Approach to Sizing Storage

Conventional and system-specific approaches

- DOH Design Manual criteria
- EPS hydraulic modeling
- Power outage impacts



Unique Approach to Sizing Storage

Conclusion – 300,000 gal tank required

Table 1: Horizon View #1 Reservoir Minimum Size Recommendations

Storage Component	Criteria	Required	Met by PRVs (SS850)	Minimum HV1 Tank
Operational	2-feet Buffer*	19,000 gal	0 gal	19,000 gal
	Parksite Pumps	40,000 gal	0 gal	40,000 gal
Equalization	25% of MDD	183,000 gal	67,000 gal	116,000 gal
Fire	1,500 gpm, 2 hours	180,000 gal	88,000 gal	92,000 gal
Standby	200 gal/ERU	287,000 gal	287,000 gal	0 gal
Dead Storage [†]	N/A	15,000 gal	0 gal	15,000 gal
Total Minimum		724,000 gal	442,000 gal	+282,000 gal

City's Updated Public Information Program

- City staff training on consent-building
- Bleiker “Informed Consent” Analysis
- Post Cards notification of project initiation
- Annual Status updates
- Community meeting at 30% design

PROJECT NOTICE
Reservoir & Water Pump Station Rehabilitation / Replacement



Dear Bellevue Utilities Customer and Neighbors:

Dear Bellevue Utilities Customer:


In September of 2013 the City sent out a postcard introducing the Horizon View No. 1 Pump Station and Reservoir Rehabilitation/Replacement project in your neighborhood. This letter is intended to inform you of the progress to date.

The purpose of this project is to replace the aging 200,000 gal reservoir and pump station. This is part of an ongoing program to increase the reliability of the water system.

The next phase of the design will be validated by the performance of a geologic investigation of the site. In early October a geotechnical engineer will be on site with a drilling rig to sample the subsurface soil. In the following months a topographic survey will be performed to locate existing surface features, utilities, easements and the roadway right-of-way.

Construction is not anticipated until late next year. Our objective is to inform you early on in our design process so that any concerns can be addressed.

For More Information or to Provide Comments:
Contact: James B. Novak, Senior Engineer - (425) 452-2669
Bellevue Utilities
P.O. Box 90012, Bellevue, WA 98009-9012
www.bellevue.gov/utilities.htm



City of Bellevue
Utilities Department
450 110th Ave. NE
Bellevue, WA 98009

PROJECT NOTICE!
Reservoir & Water Pump Station Rehabilitation / Replacement

Condition Assessment of Existing Pump Station



- Non-reinforced CMU walls
- Aging equipment
- Best option is replacement

Condition Assessment of 0.2 MG Reservoir



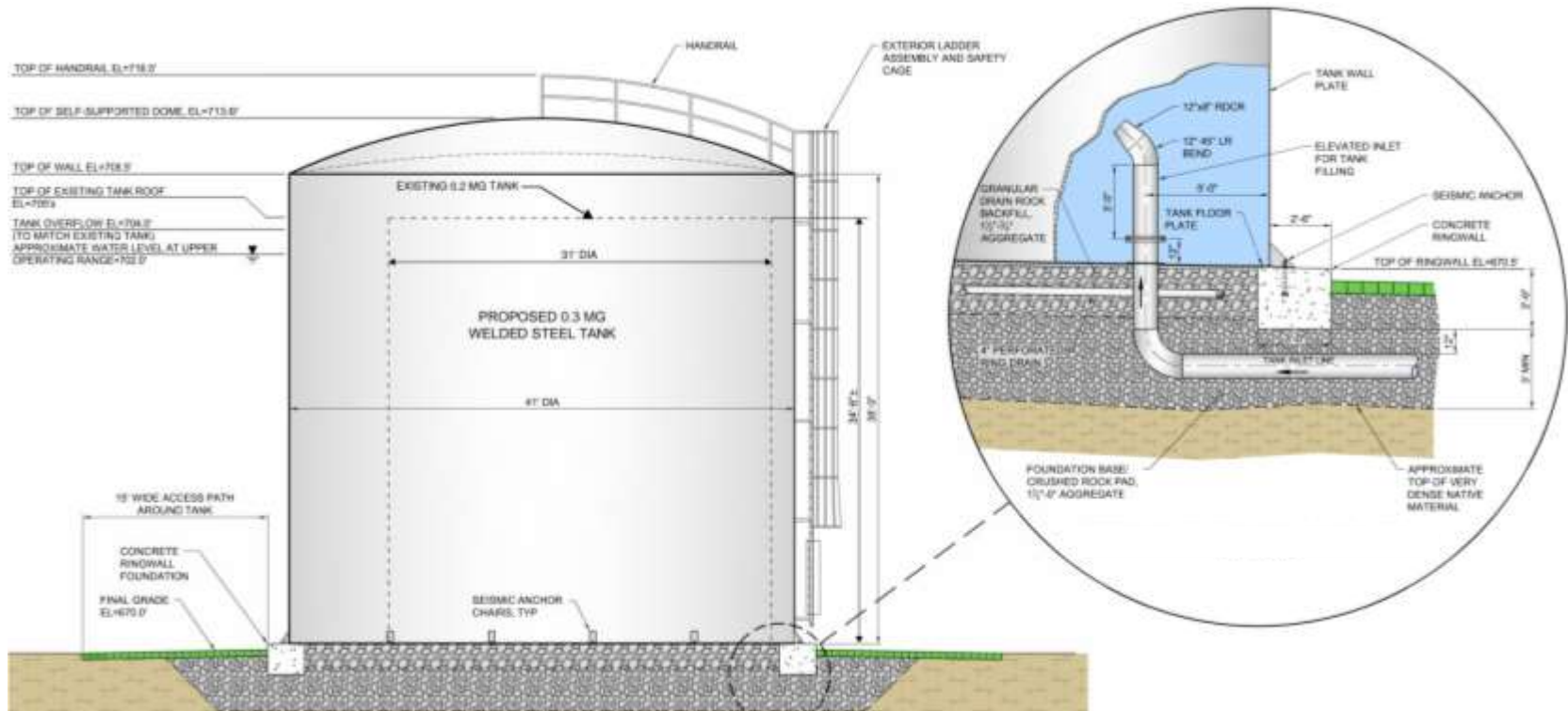
- 1958 original construction; 31' D x 34' H
- Inadequate freeboard, anchorage and foundation
- Rehabilitation or replacement options available

Reservoir Rehabilitation vs. Replacement Evaluation

- Triple Bottom Line decision model approach
- Workshop with City staff
- Best option is replacement

Triple Bottom Line Evaluation		Reservoir Rehabilitation		Reservoir Replacement		
		(A) Criteria Weight (1 - 3)	Alternative 1		Alternative 2	
			(B) Score (1 - 3)	Weighted Score (1 - 9)	(B) Score (1 - 3)	Weighted Score (1 - 9)
Financial						
F1	Minimize Life Cycle Costs	3	1	3	9	
Social						
S1	Reliable Operation	3	3	9	3	
S2	Long Service Life	3	2	6	3	
S3	Minimize O&M Requirements	2	2	4	3	
S4	Capacity to Meet Future Needs	2	1	2	3	
S5	Safety for Employees	3	2	6	3	
S6	Minimize Traffic Impacts	1	2	2	1	
S7	Minimize Noise Impacts	1	1	1	2	
S8	Minimize Odor Impacts	1	2	2	2	
S9	Minimize Visual Impacts	2	2	4	3	
S10	Minimize Construction Duration	1	3	3	2	
S11	Minimize Water Service Impacts During Construction	2	1	2	3	
S12	Create Jobs/Boost Local Economy	1	2	2	1	
Environmental						
E1	Minimize Area of Land Disturbed	1	2	2	1	
E2	Minimize Amount of New Materials Required	1	2	2	1	
E3	Minimize Construction Equipment Impacts	1	2	2	2	
E4	Minimize Drinking Water Quality Impacts	3	2	6	3	
E5	Minimize Surface Water Quality Impacts	2	2	4	1	
E6	Meets Existing & Potential Future Regulations	2	2	4	2	
(C) Total Weighted Score				Alt 1 = 66	Alt 2 = 89	
(A) Criteria Weight Factors: 1 = Least important 2 = Average importance 3 = Most important						
(B) Criteria Scoring Approach: Financial: 1 = highest cost, 2 = similar cost, 3 = lowest cost Social: 1 = least satisfies criteria, 2 = somewhat satisfies criteria, 3 = mostly satisfies criteria Environmental: 1 = least satisfies criteria, 2 = somewhat satisfies criteria, 3 = mostly satisfies criteria						
(C) Evaluation Results: Highest Total Weighted Score is associated with the alternative that best meets the criteria						

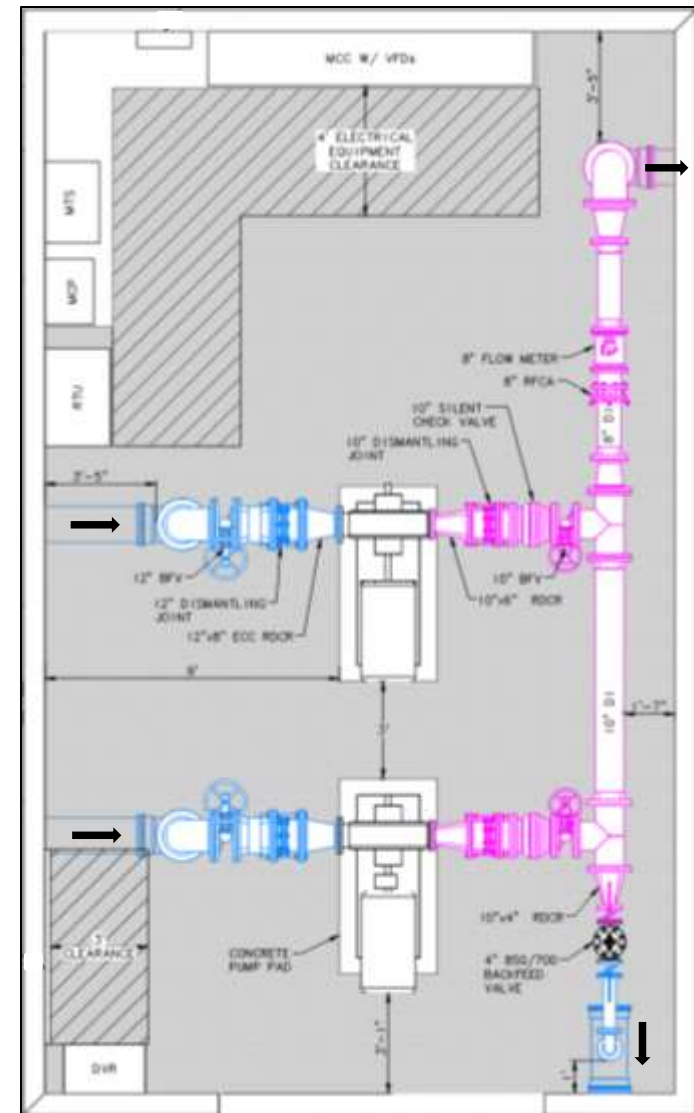
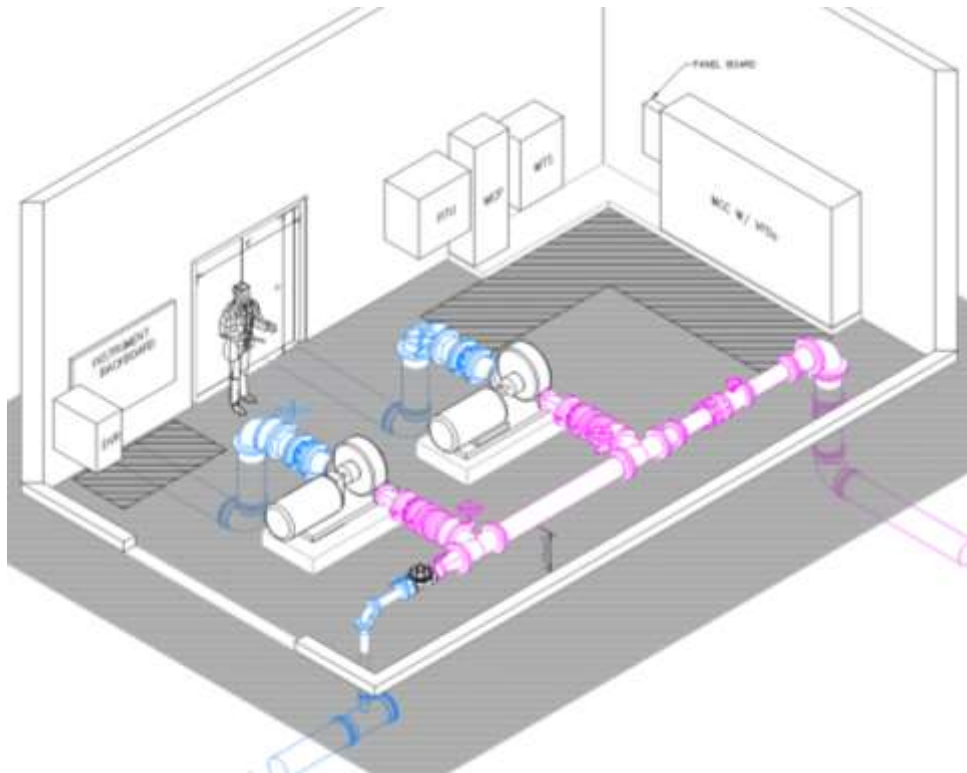
Proposed 0.3 MG Reservoir



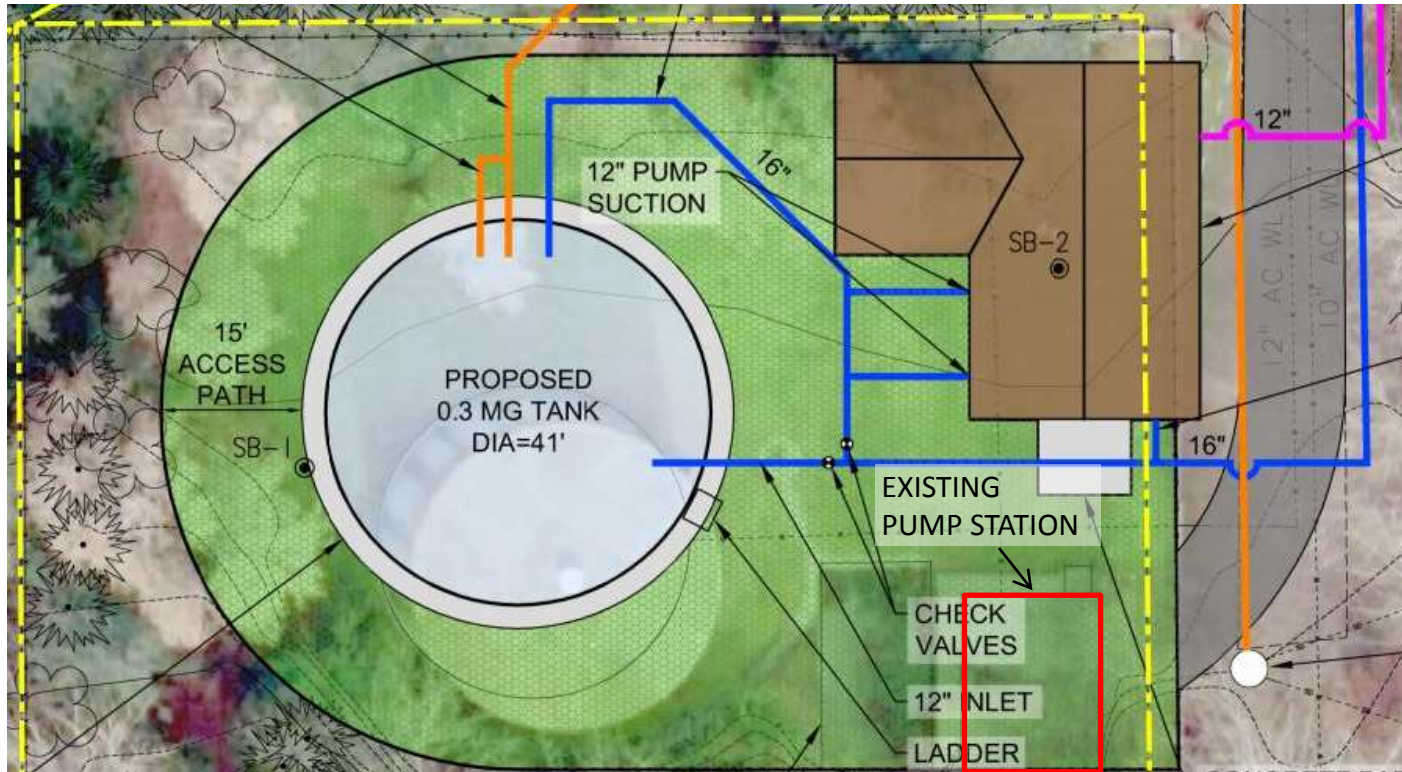
- Welded steel tank; 41' D x 43' H
- Self-supporting dome roof
- Elevated inlet, separate outlet

Proposed 1800 gpm Pump Station

- Horizontal centrifugal pumps with VFDs
- 850 Zone/700 Zone back-feed
- Generator for backup power

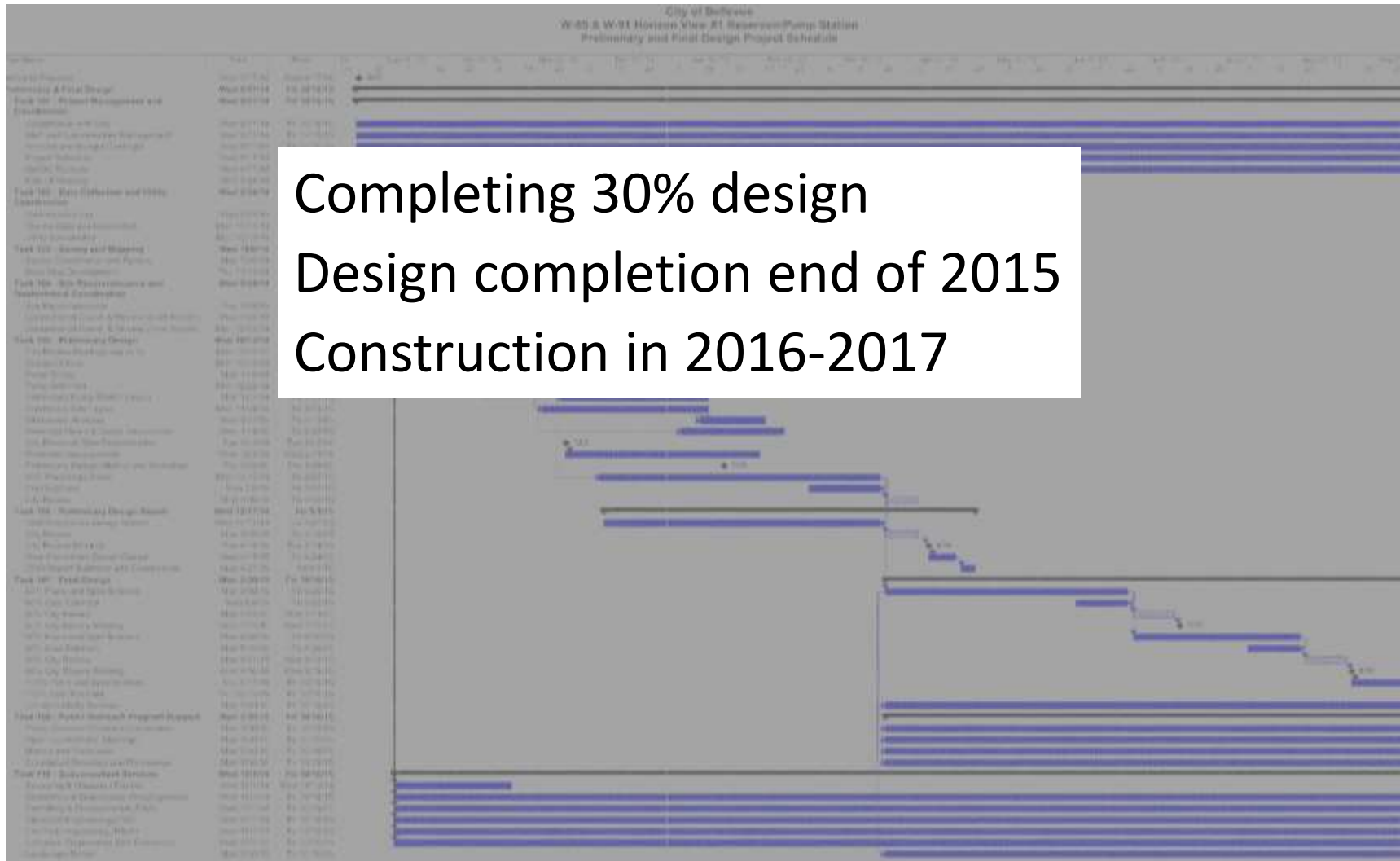


Maintaining Service During Construction



- 1) Build new pump station
- 2) Remove existing pump station and reservoir
- 3) Build new reservoir

Project Schedule



Questions

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