

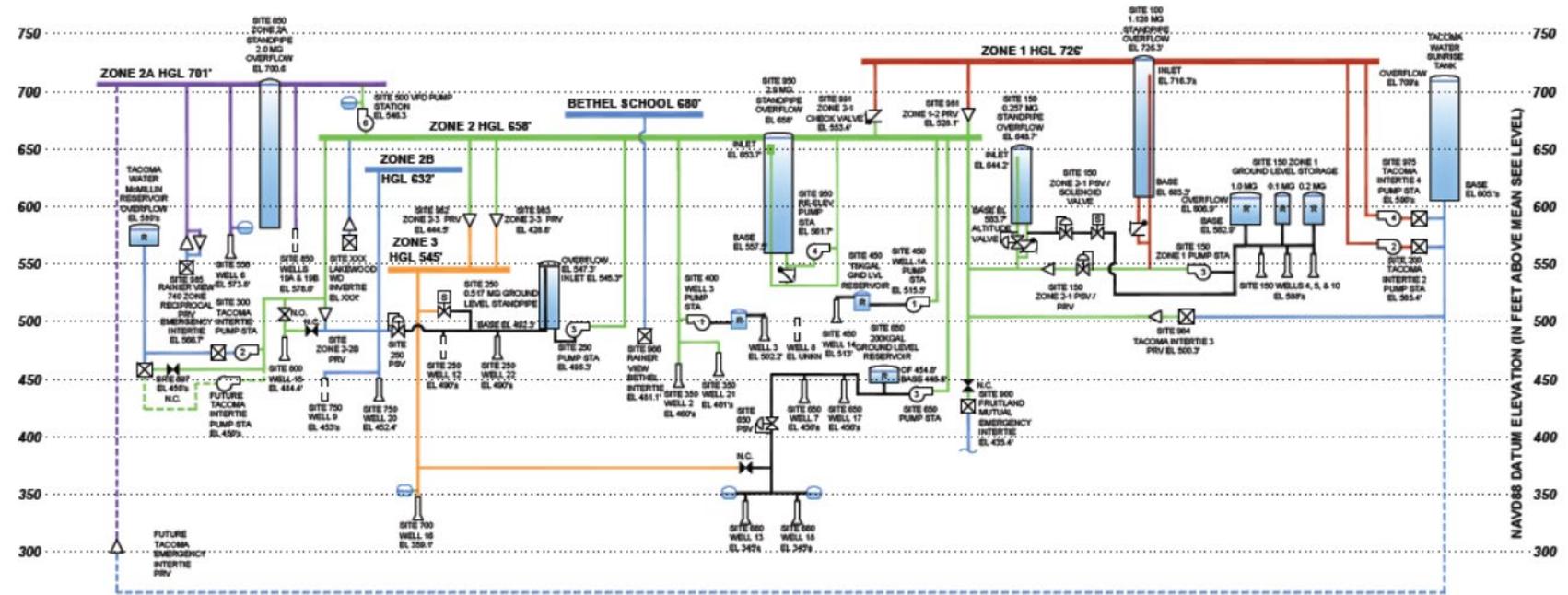
ENHANCING SUPPLY FLEXIBILITY AND ACCOMMODATING STORAGE FACILITY MAINTENANCE THROUGH THE CONSTRUCTION OF A REGIONAL SUPPLY SOURCE

Chris Kelsey, BHC Consultants

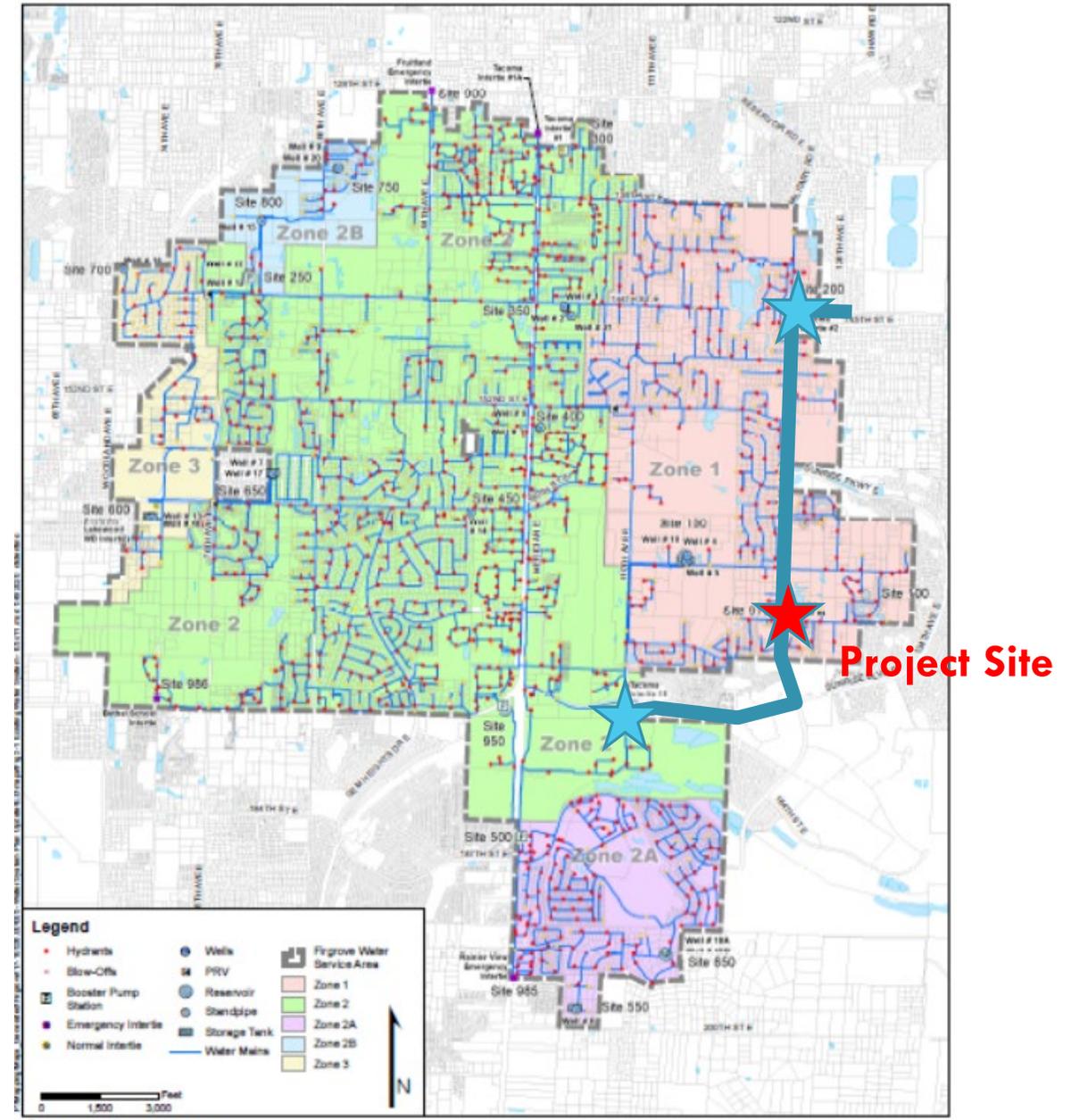
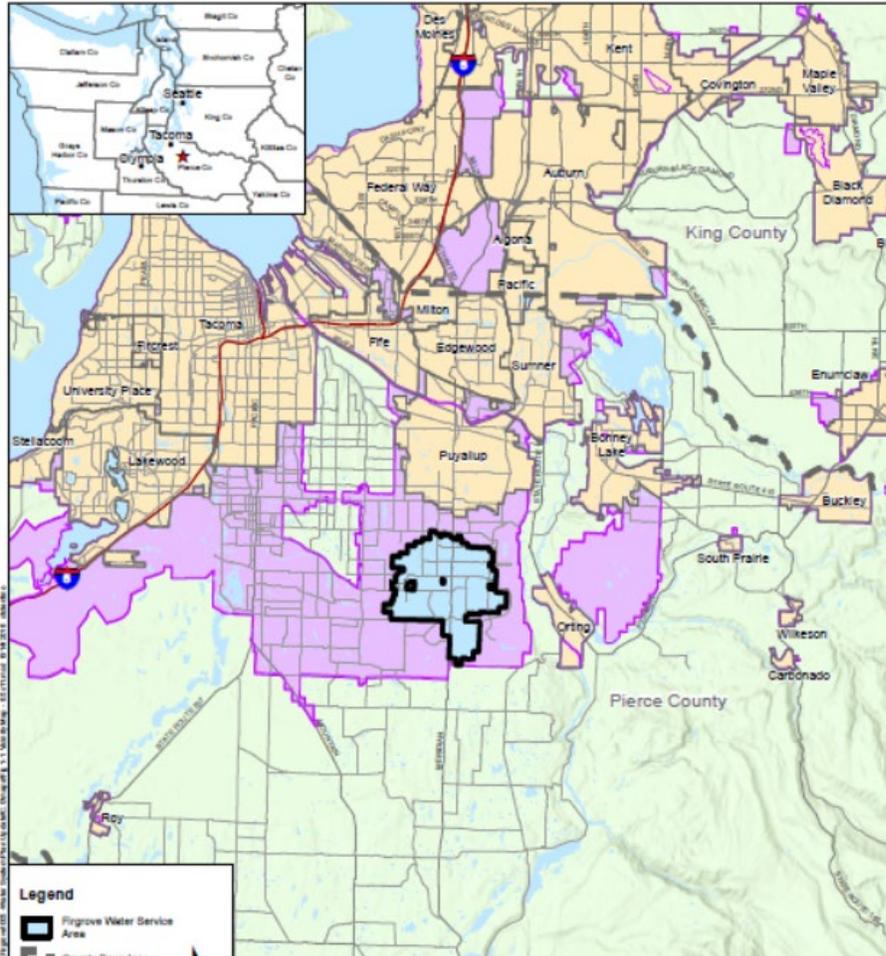
Jordan Zier, BHC Consultants

FIRGROVE SYSTEM BACKGROUND

- Population ~ 30,000
- > 10,000 Connections
- 16 Wells
- Interties
 - Tacoma Water (4)
 - Lakewood Water District (1)
 - Other Neighboring Systems (Emergency Basis)
- Major Storage Facilities include Re-Elevation Pumping

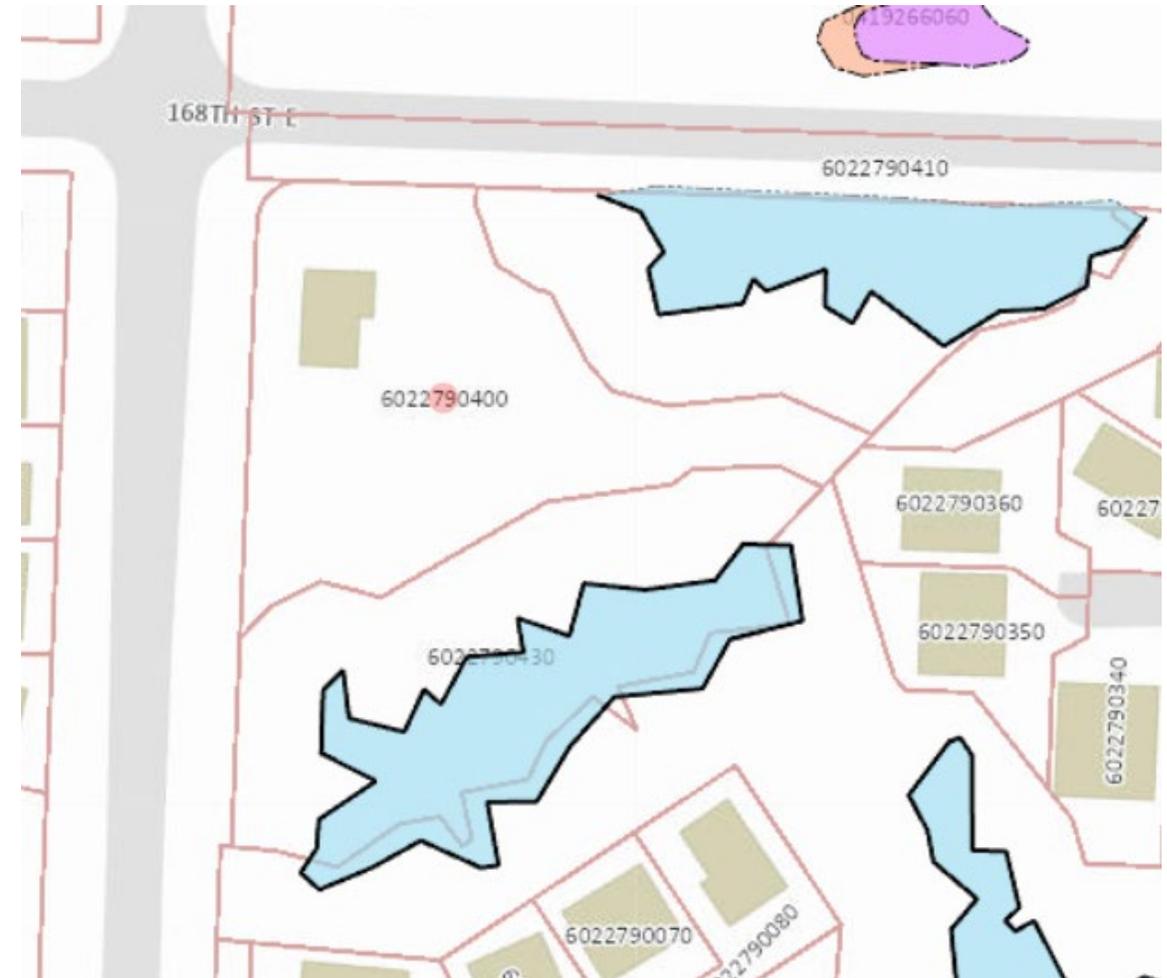


SYSTEM MAPS



PROJECT OBJECTIVES

- Firgrove Mutual Water Company (Owner) desired a new primary supply source to its highest pressure zone to:
 - Meet increasing demands
 - Create more robust supply alternatives to zone and overall system
 - Allow periodic maintenance and coating of Site 100 standpipe
 - Allow eventual decommissioning of Intertie No. 2
- Firgrove acquired a property at intersection of 122nd Ave E and 168th St E in South Puyallup for development of the new “Intertie No. 4”



STAKEHOLDERS

- Firgrove Mutual Water Company (Owner) and customers/members
- Tacoma Water (Wholesale water provider)
- Pierce County (Permitting authority)
- BHC Consultants (Design Engineer and Services During Construction Lead)
 - KPG-Psomas (Survey)
 - Landau, Inc. (Geotechnical)
 - Fsi Engineers (HVAC/Plumbing)
 - Greenbusch Acoustics (Acoustical)
 - Quality Controls Corporation (Controls)
- Pacific Civil and Infrastructure (General Contractor)

DESIGN CHALLENGES

- **1) Pump/motor selection to meet two distinct operational objectives of the PS**
- 2) Value Engineering
- 3) Permitting

1) FUNCTIONAL OBJECTIVES

	Description	Purpose	Design Conditions
Objective #1	Operation based on Site 100 tank levels. Pumps turn on and off to fill the tank.	Normal operation, “open zone” configuration	2500 gpm at 65 ft Total Dynamic Head (TDH)
Objective #2	Operation based on matching system demand. Motor speed adjusted to match system demand within an acceptable pressure range.	Allows Site 100 tank to be taken offline for recoating, cleaning, inspection, etc. “Closed zone” configuration.	150 to 300 gpm minimum demand. TDH could be as low as a few psi pressure difference between Tacoma Supply and Zone 1 desired pressure.

1) PUMP-SYSTEM CURVES

- Preferred four-pump configuration (2 larger and 2 smaller pumps)

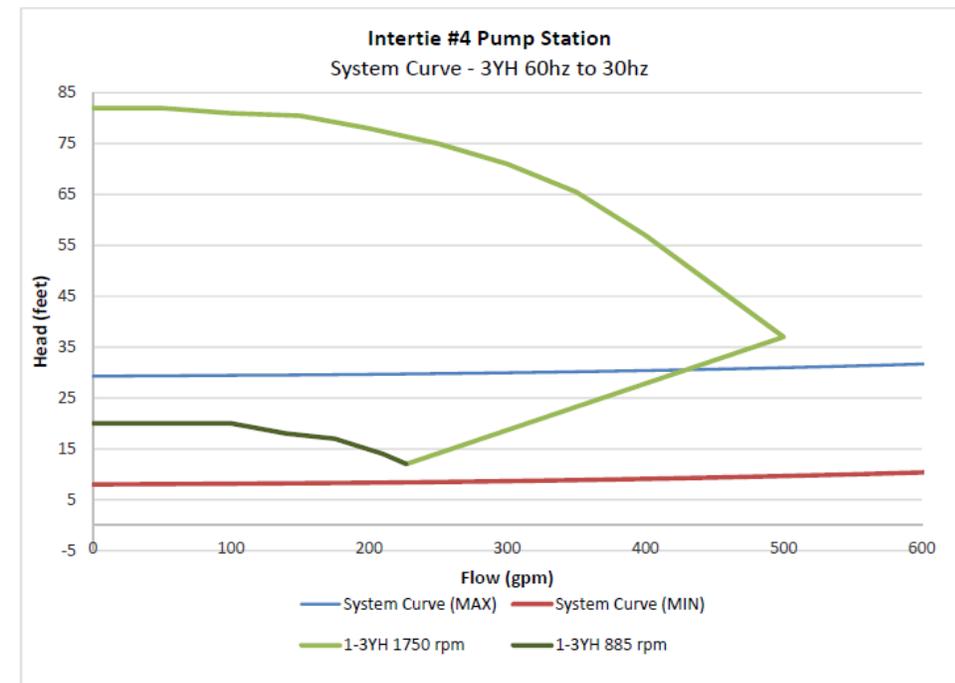
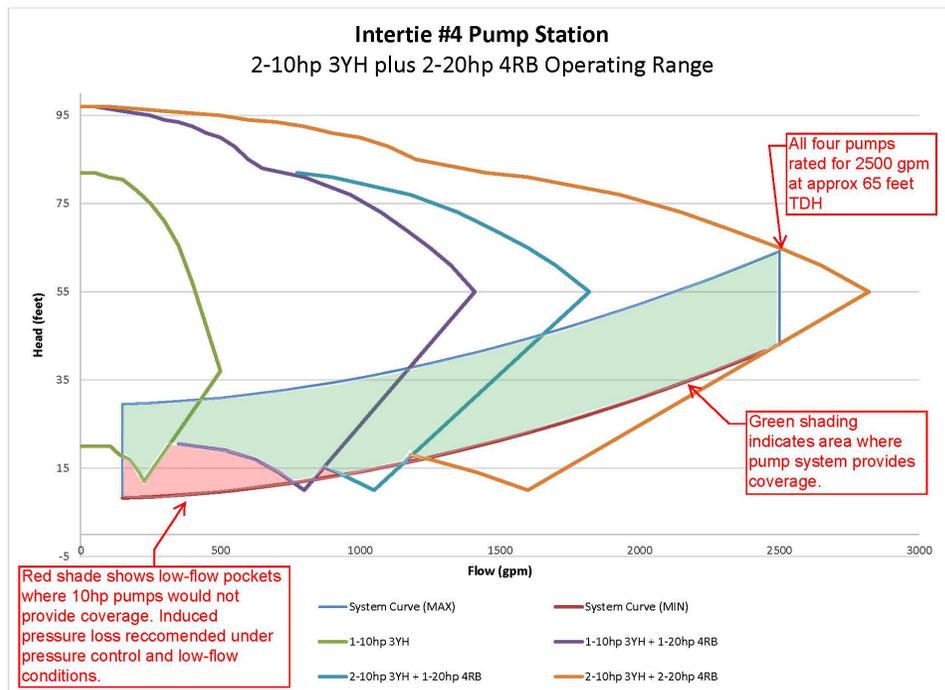
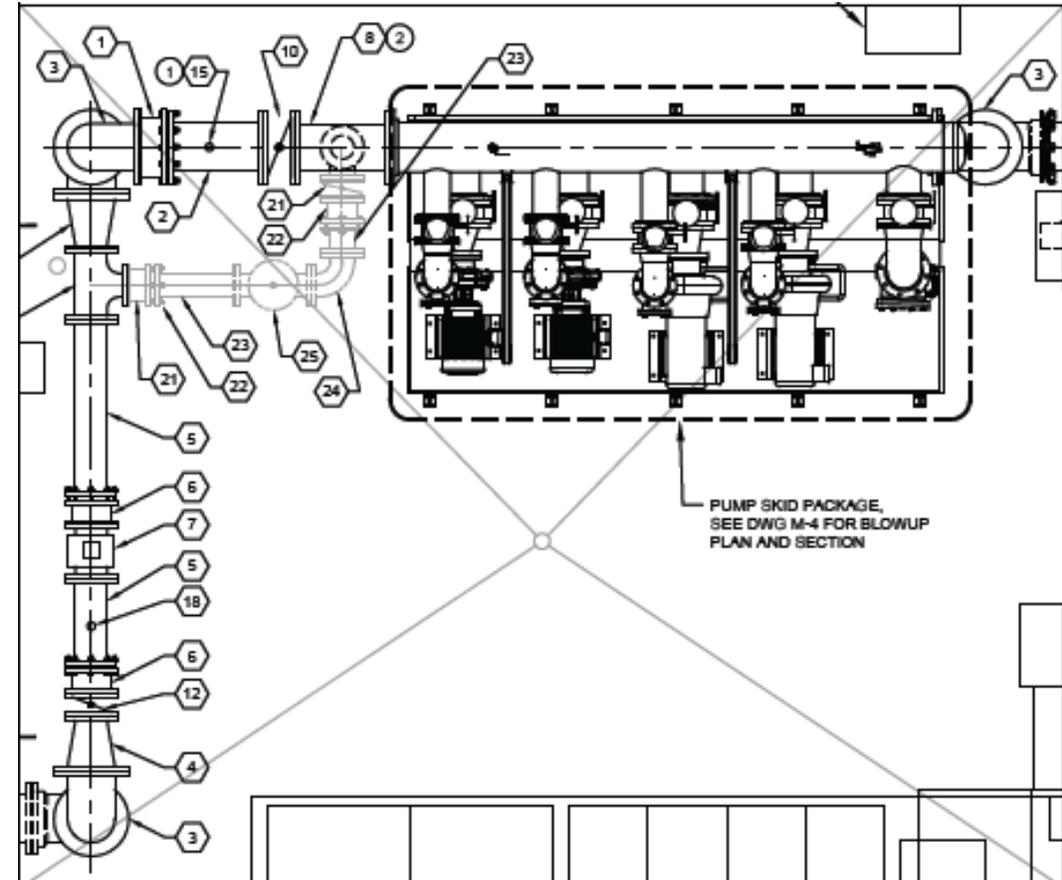


Figure 2-5 – Alternative 2 Operating Range of Smaller 10 hp 3YH Pump

1) SOLUTIONS

- Hydraulically or electrically controlled regulating valve for full condition coverage
 - Necessity dependent on closed zone configuration operation and actual zone demands
 - Design included a configuration for a potential future configuration to include a pressure sustaining valve
 - Notched actuator specified for potential manual throttling
 - During construction, a butterfly valve was added with actuated operator to automatically “throttle” valve so pumps can operate within allowable range



DESIGN CHALLENGES

- 1) Pump/motor selection to meet two distinct operational objectives of the PS
- **2) Value Engineering**
- 3) Permitting

DESIGN CHALLENGES

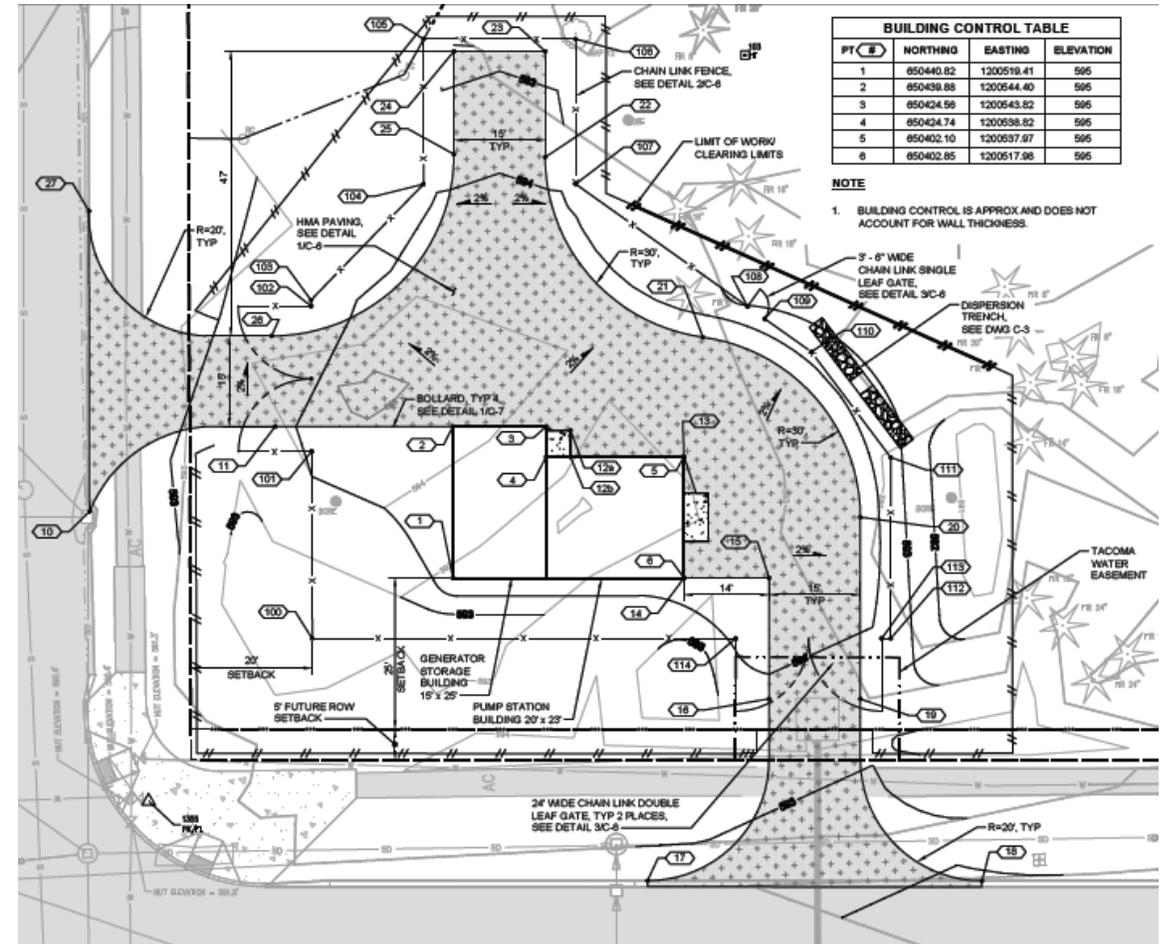
- 1) Pump/motor selection to meet two distinct operational objectives of the PS
- 2) Value Engineering - budget versus expectations
- **3) Permitting**

3) PERMITTING

- Site includes 3 legal parcels, facilities constructed on one of the 3. Acreage of all 3 needed to permit added impervious surfaces of construction.
- Solution
 - Firgrove provided certified letter that no further development would occur on the other 2 parcels (restricted due to wetlands anyway).

3) PERMITTING

- County code required vehicle access to site from 168th. Wetland buffers and impervious surface constraints would be impeded by the design of paved areas with adequate turning radiuses for some trucks planned for infrequent access needs.
- Solution
 - Exemption granted by County to allow second driveway access along 122nd for infrequent needs of maintenance, delivery and emergency vehicles to this essential facility.
 - Firgrove moved building location further from 122nd for setback requirements that included granting the County additional right-of-way width along 122nd for future road widening.



PROJECT COSTS

Project Element	Cost	Change Order %
Engineering Design and Permitting	\$324,000	0%
Engineers Estimate for Construction	\$1,370,000	N/A
General Contractor Bid	\$1,310,000	1%

SITE PLAN



PUMPING/ELECTRICAL ROOM



ADDITIONAL FEATURES — LIGHTING, SECURITY CAMERAS AND STORMWATER DISPERSION TRENCH



EXTERIOR VIEWS



QUESTIONS?

