

Early Operator Input for Construction Sequencing and Maintaining Operations During Construction

April 26th, 2018

Michelle Henry, P.E. | City of Vancouver

Brittany Hughes, P.E. | JACOBS



American Water Works Association
Pacific Northwest Section

Vancouver USA's Water System

- 4th largest utility in Washington
- 72-square-mile service area
- 240,000 customers
- 1,000 miles of distribution pipe
- 40 wells at nine water stations
- 10 billion gallons pumped per year



History – Vancouver Water



Station No. 1, reservoirs and tank on hill; well and meter-tap on right.

THE WATER SUPPLY

LIFE BLOOD OF THE CITY

Without water there would be no city. Old timers still remember when the precious fluid was peddled through the rutted streets by wagon. But the horse-and-wagon days are gone forever. In the past three years the city has bought and built a \$2,000,000 water system, equal to any of like size, for an expenditure of about \$1,000,000. This feat of finance was accomplished by careful planning, skilled engineering and by the use of WPA labor.

The history of water in Vancouver has been a troubled one. The first system, privately owned, was organized in March 19, 1868 with a capital stock of \$50,000. Water was brought from the present springs to the city by means of a flume. During the next 60 years the system changed hands ten times, growing up like Topsy as it did so.

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Water service was never adequate. In the 20 years prior to 1933 ten complaints were lodged against the private owners and ten times the state department of public works investigated and ordered remedial action. Finally in 1933 the department itself initiated an action challenging the Oregon-Washington Water Service Company's rates, charges, rules and regulations and proceeded to launch an investigation into the company's rates and the adequacy of its service. Upon the findings of its engineers the department based an order placing the value of the company for rate-making purposes at \$350,000 and commanding the company to adopt new, reduced rate schedules effective June 1, 1934.

Water service continued to be inadequate and on September 1, 1936 the city council notified the People's Water and Gas Company (the then owners) of the city's intention to purchase the system under terms of an option embodied in the franchise. The franchise provided for a board of appraisers, including two engineers hired by the city, two by the company and a fifth agreeable to all.

After an independent appraisal this board agreed upon a price of \$610,000 for the system, which was accepted by the council. The city voted to issue \$610,000 in water revenue bonds for purchase of the system and an additional \$240,000 for improvements, replacements and extensions necessary to make the system usable.

On June 1, 1937 the purchase was consummated. Before the deal could be closed the roof on the old 1,000,000 gallon reservoir caved in. A couple of months later the old 100,000 gallon elevated wooden tank tower began to collapse.

Old wooden water tower collapses,
making way for new steel tank.

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Water Station 1

- 25 Acre Site
- (1) 4 MG Ground Level Reservoir
- (1) 1 MG Ground Level Reservoir
- (1) 250,000 Gallon Elevated Tower
- 4 Booster Pump Stations
- 5 Stripping Towers
- 12 Groundwater Wells (24,000 gpm)
- Chlorine Gas and Fluoride Treatment



Water Station 1 Project

Vancouver's 2016-2021 Strategic Plan

Objective to ensure our infrastructure, including building and utilities, is safe, environmentally responsible and well maintained.

“Build a new, state-of-the-art water facility at Water Station 1”



Water Station 1 Upgrades



The 3R's

- Resiliency
- Reliability
- Redundancy



Water Station 1 Project

Site Electrical Upgrades

- 2.5 MW Generator
- Low Voltage Distribution System (12.5KV)
- Two Separate Utility Feeds
- Parallel Switch Gear



Water Station 1 Project

SCADA UPGRADE NEEDED!



Water Station 1 Project

Tower Booster Pump Station

- Replacement BPS
- SCADA Control Room
- 12.5 KV Electrical Switchgear Room
- SCADA Technician's Shop
- Emergency Ops Support



Water Station 1 Project

Sodium Hypochlorite Building – Duplex Gen System



The Importance of Input from Operations Staff

Constructability and operational input early in the design is essential for projects at facilities where operations must be maintained throughout construction.



Input from Operations Staff

- Selection of equipment/materials
- Identification of additional project elements requiring maintenance
- Project operational constraints



Choosing the Right People

- Small Group of Decision Makers
 - Deep understanding of facility (and system) operations
 - Input must carry sufficient weight so that it is not dismissed due to lack of understanding of operational issues.



Choosing the Right People



Allen – Water
Production
Supervisor



Tim – Water
Operations
Superintendent



Russ – SCADA
and Electrical
Guru



The "Project"



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Setting a Baseline

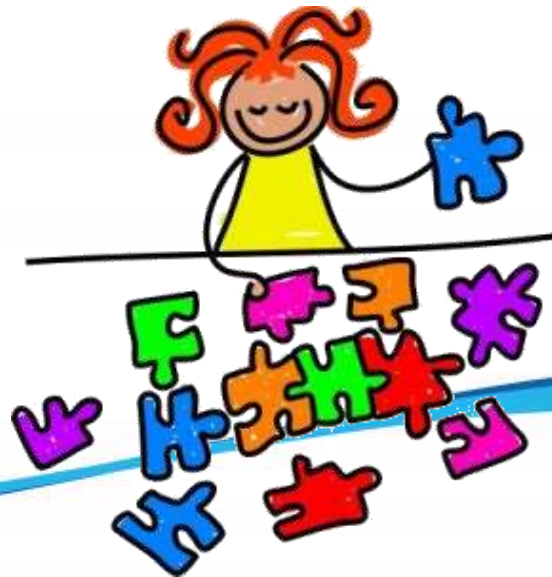
- What are your “deal-breakers”?
 - No more than 3 wells out of service at a time.
 - No wells taken down during the summer.
 - Buildings with treatment systems must have power at all times to provide treatment to raw water.
- Understanding Operational Flexibility
 - Site downtime may be allowed between Nov 1 and Feb 1, but must be coordinated with the City.



Creating a Road Map



- Prove its Possible
 - Developing a Construction Sequence
 - Determine whether additional design components are required to maintain facility/system functionality



Providing Flexibility

- Owner-Furnished Equipment
 - Sodium Hypochlorite System
 - Instrumentation and Control Panels
 - Outdoor Light Fixtures
- Early-out Packages
 - Package 1: Communications Duct bank
 - Package 2: Operations Center Upgrade



Checking-in Throughout Design

- Milestone Reviews
- Refinement of construction sequencing and constraints
 - Verifying the construction sequence is still viable



Implementation During Construction

- Construction sequencing and constraints specification
- Engagement of operations staff as a part of construction



Summary

- Operations input early in the design can be critical on a project.
- Get the right people involved in project reviews and work hard to get their buy-in.
- Explore ways to provide more flexibility to both the operations staff and the contractor during construction.



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