Willamette Water Supply
Our Reliable Water

Just Add Water
2018 TACOMA PNWS-AWWA

Long-Term Storage and Maintenance of Out-of-Service Pipelines

April 27, 2018

Agenda

- WWSP Background
- Development of Interim Operations Plans
- PLW_1.1 Example
- Water Quality Data Collection

Water Supply Program

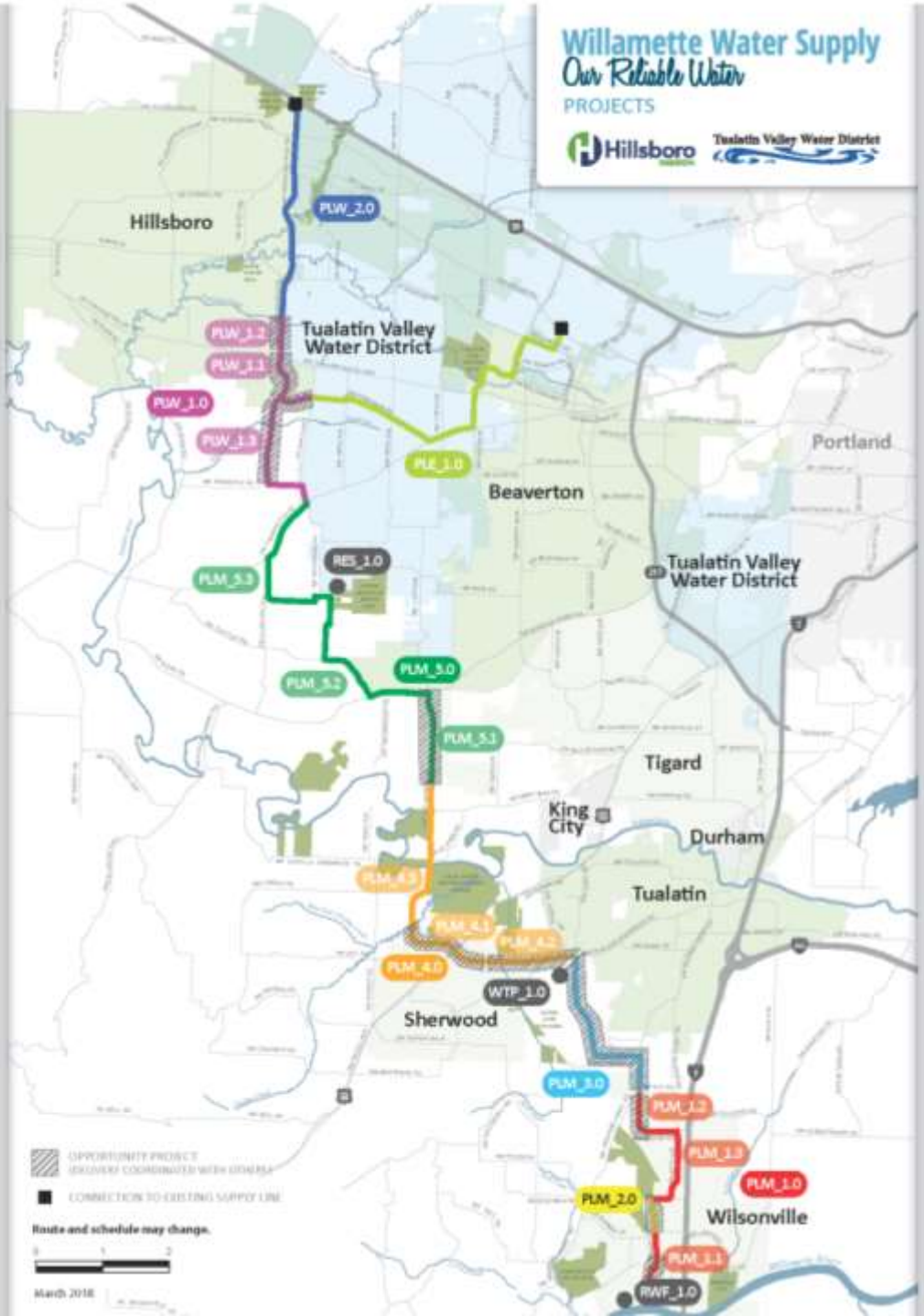
- Modified water intake
- New water filtration plant
- Water reservoirs
- 30+ miles of large diameter pipeline
- Tualatin Valley Water District: 60% City of Hillsboro: 40%
- Scheduled completion: 2026

Tualatin Valley Water District

Hillsboro OREGON

Willamette Water Supply
Our Reliable Water
PROJECTS

Hillsboro | Tualatin Valley Water District



CORNELIUS PASS PIPELINE PROJECT — PLW_2.0 (PIPELINE WEST)
FRANCES RD TO HIGHWAY 26
3.4 MILES
CONSTRUCTION: 2021 - 2023

SOUTH BEAVERTON AREA WATER STORAGE TANKS — RES_1.0
STORAGE TANKS
CONSTRUCTION: 2022 - 2024

TUALATIN-SHERWOOD AREA PIPELINE PROJECT — PLM_4.0 (PIPELINE MAIN)
SW 124TH AVE TO NORTH OF BEEF BEND RD
5.3 MILES
- PLM_4.3 HIGHWAY 99 CROSSING (WASHINGTON COUNTY) CONSTRUCTION: 2020 - 2021
- PLM_4.2 TUALATIN-SHERWOOD ROAD (WASHINGTON COUNTY) CONSTRUCTION: 2020 - 2022
- PLM_4.1 ROY ROGERS ROAD CONSTRUCTION: 2022 - 2023

124TH AVENUE PARTNERSHIP PROJECT — PLM_3.0 (PIPELINE MAIN)
SW 124TH AVE EXTENSION
2.7 MILES
CONSTRUCTION: 2016 - 2018 (WASHINGTON COUNTY)

WATER TREATMENT PLANT — WTP_1.0
WATER TREATMENT PLANT (WTP)
CONSTRUCTION: 2022 - 2025
INCLUDES FINISHED WATER PUMP STATION PROJECT (EPS_1.0)
INCLUDES DISTRIBUTED CONTROL SYSTEM PROJECT (DCS_1.0)

RAW WATER FACILITIES — RWF_1.0
RAW WATER FACILITIES (RWF)
CONSTRUCTION: 2020 - 2024

SOUTH HILLSBORO AREA PIPELINE PROJECT — PLW_1.0 (PIPELINE WEST)
FARMINGTON RD TO FRANCES RD
3.9 MILES
- PLW_1.3 BLANTON TO TV HWY (SOUTH HILLSBORO DEVELOPMENT) CONSTRUCTION: 2017
- PLW_1.2 TV HWY TO FRANCES (CITY OF HILLSBORO) CONSTRUCTION: 2019 - 2020
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BEAVERTON AREA PIPELINE PROJECT — PLE_1.0 (PIPELINE EAST)
SW 209TH AVE TO WALKER RD
5.5 MILES
CONSTRUCTION: 2021 - 2023

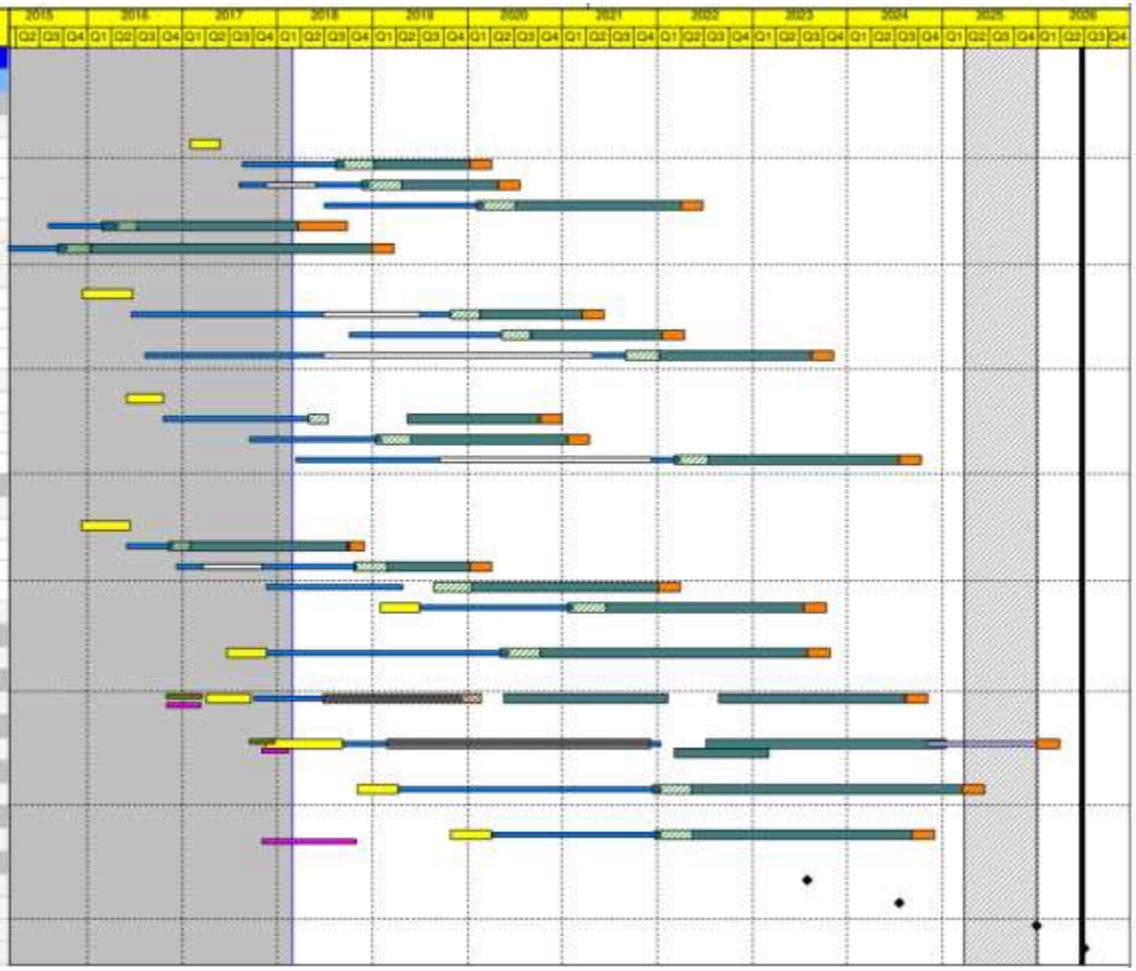
SCHOLLS AREA PIPELINE PROJECT — PLM_5.0 (PIPELINE MAIN)
NORTH OF BEEF BEND RD TO FARMINGTON
7.2 MILES
- PLM_5.3 NORTH OF BEEF BEND TO SCHOLLS (WASHINGTON COUNTY) CONSTRUCTION: 2018 - 2020
- PLM_5.2 SCHOLLS TO GRABHORN RD CONSTRUCTION: 2019 - 2020
- PLM_5.1 GRABHORN RD AT TILE FLAT TO FARMINGTON CONSTRUCTION: 2022 - 2024

WILSONVILLE AREA PIPELINE PROJECT — PLM_1.0 (PIPELINE MAIN)
WTP TO DAY RD
3.0 MILES
- PLM_1.3 WILSONVILLE RD (CITY OF WILSONVILLE) CONSTRUCTION: 2018 - 2019
- PLM_1.2 GARDEN ACRES TO 124TH (GARDEN ACRES DEVELOPMENT) CONSTRUCTION: 2018 - 2019
- PLM_1.1 WILSONVILLE RD TO GARDEN ACRES CONSTRUCTION: 2020 - 2022

KINSMAN ROAD PARTNERSHIP PROJECT — PLM_2.0 (PIPELINE MAIN)
KINSMAN RD EXTENSION
0.5 MILES
CONSTRUCTION: 2016 - 2018
(CITY OF WILSONVILLE / ODOT)

Program Schedule

Activity Name	Start	Finish
WWSP Program Master Schedule 3.2.2	1-Jan-14 A	30-Jun-26
Project Specific	1-Jan-14 A	30-Jun-26
Main Stem Extension Pipelines	1-Jan-14 A	10-Oct-24
Pipeline PLM_1.0: WTP to Day Road	31-Jan-17 A	24-Jun-22
Pipeline PLM_1.0: WTP to Day Road	31-Jan-17 A	26-May-17 A
Pipeline PLM_1.1: South of Wilsonville Road (Opportunity Project)	22-Aug-17 A	3-Apr-20
Pipeline PLM_1.2: Garden Acres to 124th Project (Opportunity Project)	8-Aug-17 A	22-Jul-20
Pipeline PLM_1.3: Wilsonville Rd to Garden Acres	3-Jul-18	24-Jun-22
Pipeline PLM_2.0: Kinsman Road (Opportunity Project)	3-Aug-15 A	25-Sep-18
Pipeline PLM_3.0: SW 124th Avenue Extension (Opportunity Project)	1-Jan-14 A	26-Mar-19
Pipeline PLM_4.0: 124th to Beef Bend Road	16-Dec-15 A	10-Nov-23
Pipeline PLM_4.0: 124th to Beef Bend Road	16-Dec-15 A	22-Jun-16 A
Pipeline PLM_4.1: Highway 99 Crossing (Opportunity Project)	20-Jun-16 A	9-Jun-21
Pipeline PLM_4.2: Tualatin-Sherwood Road (Opportunity Project)	5-Oct-18	13-Apr-22
Pipeline PLM_4.3: Roy Rogers Road (Opportunity Project)	12-Aug-16 A	10-Nov-23
Pipeline PLM_5.0: Beef Bend to Farmington	31-May-16 A	10-Oct-24
Pipeline PLM_5.0: Beef Bend to Farmington	31-May-16 A	19-Oct-16 A
Pipeline PLM_5.1: Beef Bend to Scholls (Opportunity Project)	19-Oct-16 A	31-Dec-20
Pipeline PLM_5.2: Scholls to Grabhorn	18-Sep-17 A	14-Apr-21
Pipeline PLM_5.3: Grabhorn to Farmington	15-Mar-18 A	10-Oct-24
Western Extension Pipelines	10-Dec-15 A	12-Oct-23
Pipeline PLW_1.0: Farmington to Frances	10-Dec-15 A	29-Mar-22
Pipeline PLW_1.0: Farmington to Frances	10-Dec-15 A	16-Jun-16 A
Pipeline PLW_1.1: Blanton to TV Hwy (Opportunity Project)	31-May-16 A	30-Nov-18
Pipeline PLW_1.2: TV Hwy to Frances (Opportunity Project)	12-Dec-16 A	3-Apr-20
Pipeline PLW_1.3: Farmington to Blanton	20-Nov-17 A	29-Mar-22
Pipeline PLW_2.0: Frances to Highway 26	29-Jan-19	12-Oct-23
Eastern Extension Pipelines	20-Jun-17 A	24-Oct-23
Pipeline PLE_1.0: 209th to Walker	20-Jun-17 A	24-Oct-23
Raw Water Facilities	1-Nov-16 A	4-Nov-24
RWF_1.0: Raw Water Facilities	1-Nov-16 A	4-Nov-24
WWSS Water Treatment Plant/Finished Water Pump Station	15-Sep-17 A	25-Mar-26
WTP_1.0: Willamette WTP/FWPS	15-Sep-17 A	25-Mar-26
Distributed Controls System	5-Nov-18	13-Jun-25
DCS_1.0: SCADA System	5-Nov-18	13-Jun-25
Storage Reservoirs	1-Nov-17 A	2-Dec-24
RES_1.0: Ground Storage Reservoirs	1-Nov-17 A	2-Dec-24
Program Milestones	31-Jul-23	30-Jun-26
Gravity Pipeline Completion	31-Jul-23	31-Jul-23
Pressure Pipeline Completion	17-Jul-24	17-Jul-24
Program Substantial Completion	30-Dec-25	30-Dec-25
Program In-Service Date	30-Jun-26	30-Jun-26



Willamette Water Supply
Our Reliable Water

Interim Operations

- Needed during the “waiting period” between completion of package construction and 2026 startup
- Objective is to protect the pipe and lining
- Water in pipe will increase in pH
- Due to the time period, need means to document the plan and data collected

Components of the Interim Operations Plan

- Interim Operations Plan is comprised of three main components:
  - Preparation of pipe for long-term storage
  - Periodic inspection of the pipe
  - Placing of the pipe into service

Preparation of Pipe for Long-Term Storage

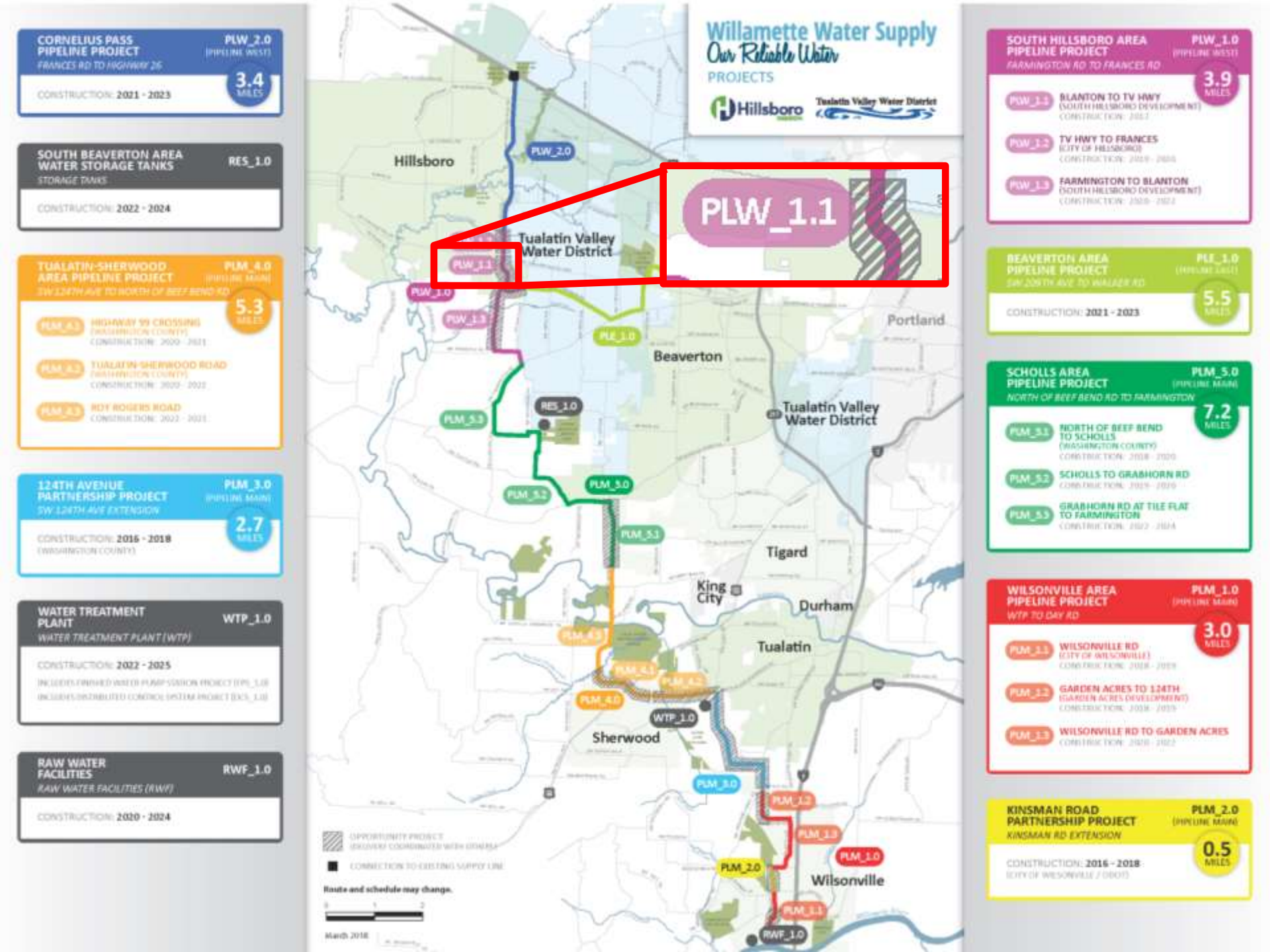
- Typically led by the construction contractor as required by the project specifications and consists of some or all of the following:
  - Visual inspection of the pipeline and removal of construction debris
  - Mortar coating repairs
  - Filling with water (allowing mortar to absorb)
  - Pressuring testing and disinfection per the project requirements
  - Protection/lubrication of valve seats
  - Seal pipe to keep moisture in the pipe and to keep pests/animals from entering
  - Placing into long-term storage
    - Option 1 – leave pipeline full
    - Option 2- drain most of the water

Periodic Inspection of the Pipe

- Monitoring
  - Water level/humidity
  - Water quality (e.g., pH, chlorine residual)
- Inspect valve seats and apply/reapply lubricant, where needed
- Inspect mortar lining integrity (typically at high points)
- Add water, as necessary
- Manufacturer-recommended equipment maintenance
- Re-seal pipeline
- Need to create a record of data and actions taken

Staffing Responsibilities

- Locating the pipe (requests from Oregon Utility Notification Center)
- Pipe inspections
- Sampling and water quality testing
- Equipment exercise/maintenance
- Data collection/recording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PLM_4.2
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PLW_1.1
Hillsboro
PLW_2.0
Tualatin Valley Water District
PLW_1.1
PLW_1.0
PLW_1.3
PLE_1.0
Portland
Beaverton
RES_1.0
PLM_5.3
Tualatin Valley Water District
PLM_5.2
PLM_5.0
PLM_5.1
Tigard
King City
Durham
PLM_4.3
PLM_4.1
PLM_4.2
Tualatin
PLM_4.0
WTP_1.0
Sherwood
PLM_3.0
PLM_1.2
PLM_1.3
PLM_1.0
PLM_2.0
Wilsonville
PLM_1.1
RWF_1.0
OPPORTUNITY PROJECT
(DELIVERY COORDINATED WITH CITY OF WILSONVILLE)
CONNECTION TO EXISTING SUPPLY LINE
Route and schedule may change.
0
1
2
March 2018
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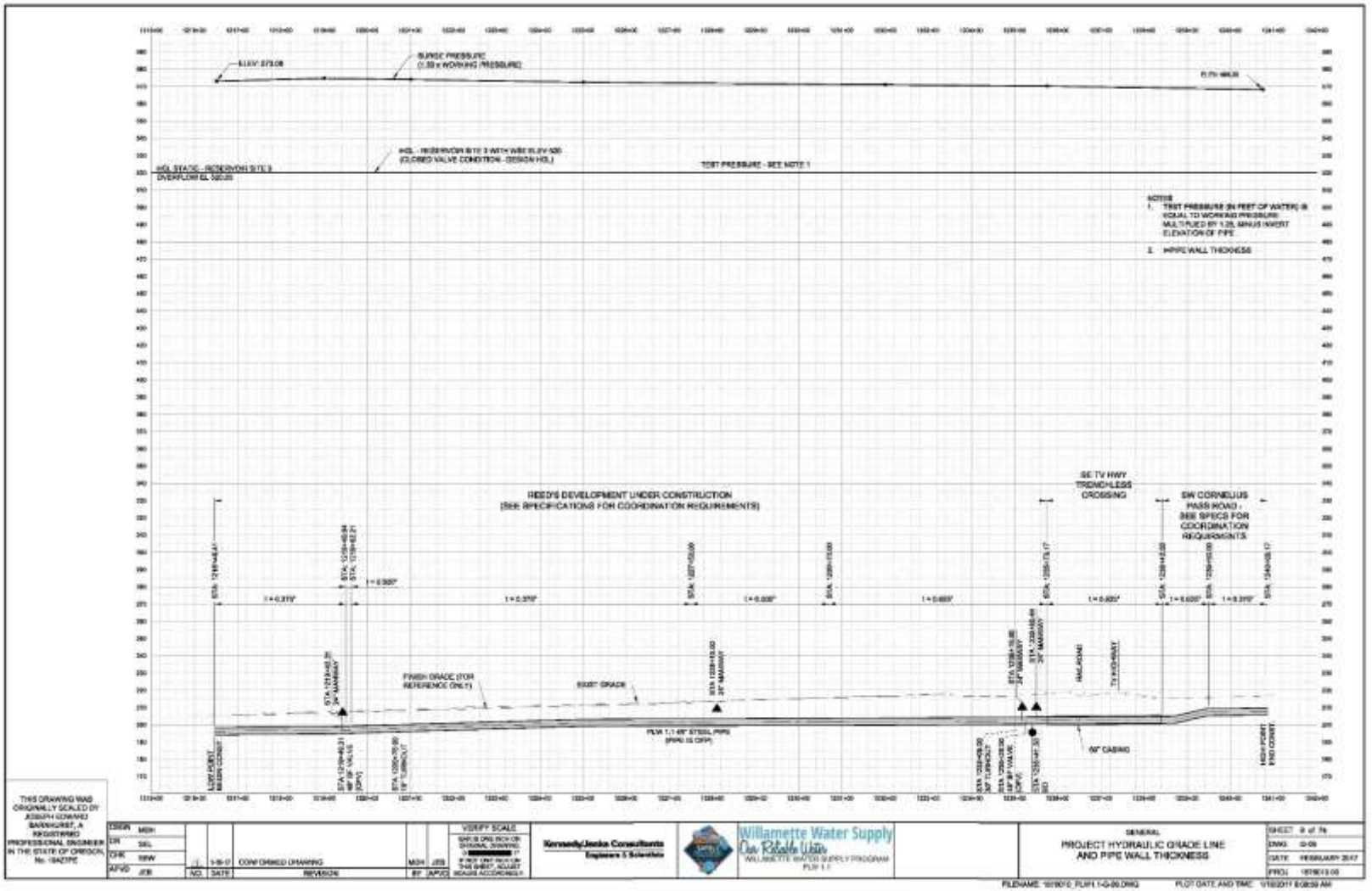
PLW_1.1 Profile



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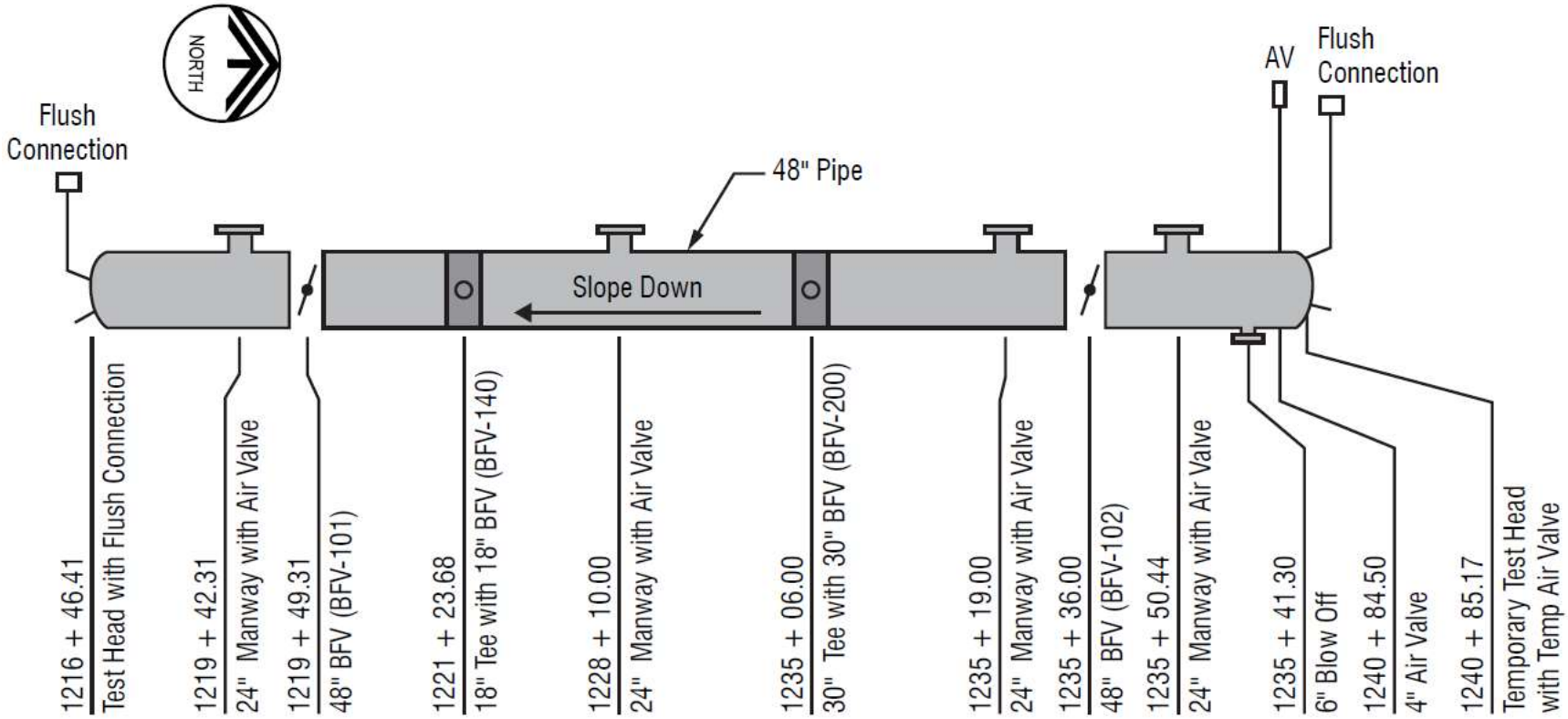


Interim Operations Plan Development for PLW_1.1

July 2017

- Advance Interim Plan Development
- Identify Issues to Resolve

August 2017

- Review Draft Interim Operations Plan for PLW_1.1 and SOPs
- Define Responsibilities and Ongoing Coordination Approach
- Site Visit to Review Installation

September 2017

- Finalize Interim Operations Plan
- Finalize Responsibilities and Ongoing Coordination Approach

October 2017

- Confirm Readiness to Implement Plans

PLW_1.1 Interim Storage and Operations Specifics

- PLW_1.1 to be placed in storage for approximately one year (with pipe left full of water)
- Monitoring and maintenance required for the year
- After one year, City of Hillsboro to place PLW_1.1 pipe into service

Organizational Responsibilities

WWSP

- Startup Coordination and Management
- Training of interested parties
- Prepare and Update Interim Plan
- Manage Data Storage and Analysis
- Lead Facilitation and Coordination
- Prepare Overall Operations Plan

Hillsboro

- Operate PLW_1.1 (between main line valves), operate and maintain STL valve, operate TV Hwy vaults, operate and maintain Blanton vault (share meter data with WWSP/TVWD)
- Provide Data and Feedback to WWSP
- Participate in Ongoing Coordination/Communication
- Participate in Overall Operations Plan Development

Definitions:

Operate

- Water quality sampling and testing
- Flow and pressure management

Maintain

- Preventative maintenance
- Repairs
- Collecting asset performance data
- Turning valves
- Warranty management and inspection
- Spare parts storage/inventory

TVWD

- Complete all locates
- Operate and Maintain PLW_1.1 (dead ends), Maintain PLW_1.1 (line valves and air valves between main line valves with direction from COH), maintain TV Hwy vaults (with direction from COH)
- Provide Data and Feedback to WWSP
- Participate in Ongoing Coordination/Communication
- Participate in Overall Operations Plan Development

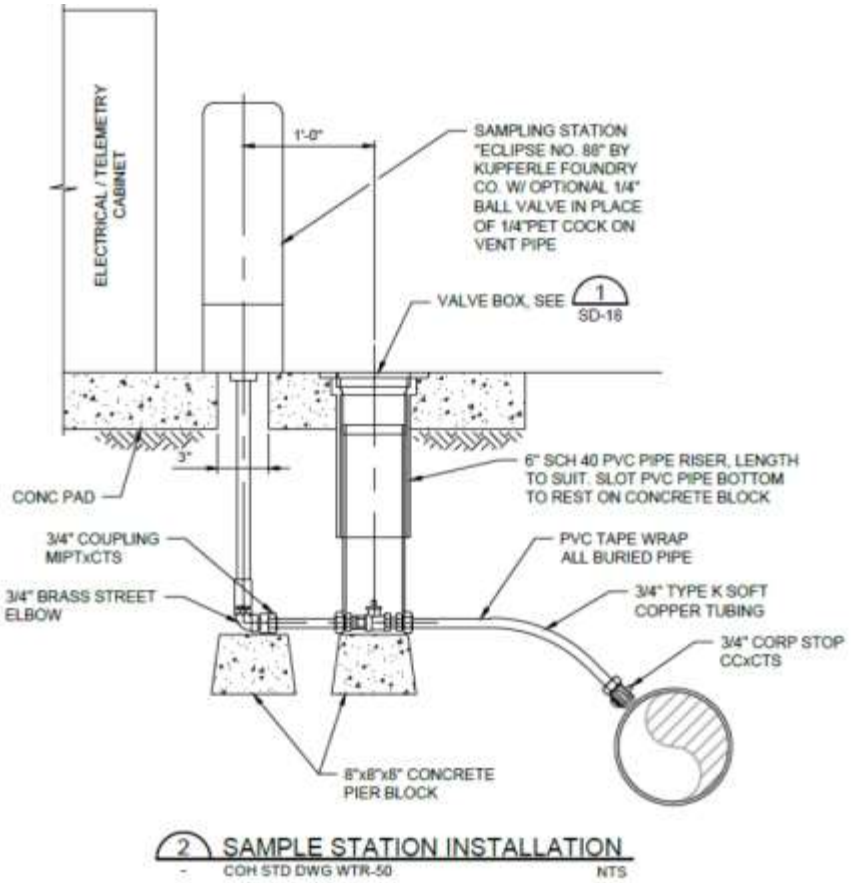
PLW_1.1 Preliminary Operations Plan

Action	Frequency	Date	Responsibility	Status/Notes
Prior to Final Completion				
Establish schedule	N/A	N/A	N/A	Pipe testing Third week of August, 2017 Substantial completion October 20, 2017 Final completion November 20, 2017
Design sample stations	N/A	7/24/17	Corianne H/KJ	COMPLETE
Design "jumper" to keep pipe pressurized for sampling	N/A	8/15/17	Corianne H/KJ	Need to consider how jumper will be removed at a later date. Leave jumper open or provided above-ground access to the valve to ensure WQ staff does not need to enter a confined space. Consider meter to measure flow into the pipe as an indication of leakage.
Install "jumper"	N/A	9/15/17	Kerr	
Determine regular maintenance to be completed and maintenance intervals	N/A	9/15/17	Corianne H	Look at OM for exercising valves, inspections, battery life, manufacturer's recommendations, etc.
Install sample stations	N/A	10/1/17	Kerr	Piping has been installed, still need to install sample boxes
Submit polygons of final as-builts to One Call at substantial completion	N/A	10/20/17	Scott F	
Fill pipe with water	N/A	10/20/17	Kerr	Contractor will pressure test, drain, and then refill prior to substantial completion
Start collecting WQ samples	Weekly initially, less as readings stabilize	10/20/17	Jessica D	WQ testing includes pH, chlorine residual, heterotrophic plate counts, conductivity, alkalinity, and oxygen reduction potential
After Final Completion				
Locating of pipe	N/A	10/20/17	TVWD	Through One Call system
Monitor water level in pipe	N/A	N/A	City of Hillsboro	Use meter on jumper to monitor drops in pressure as an indication of water being added to the pipe

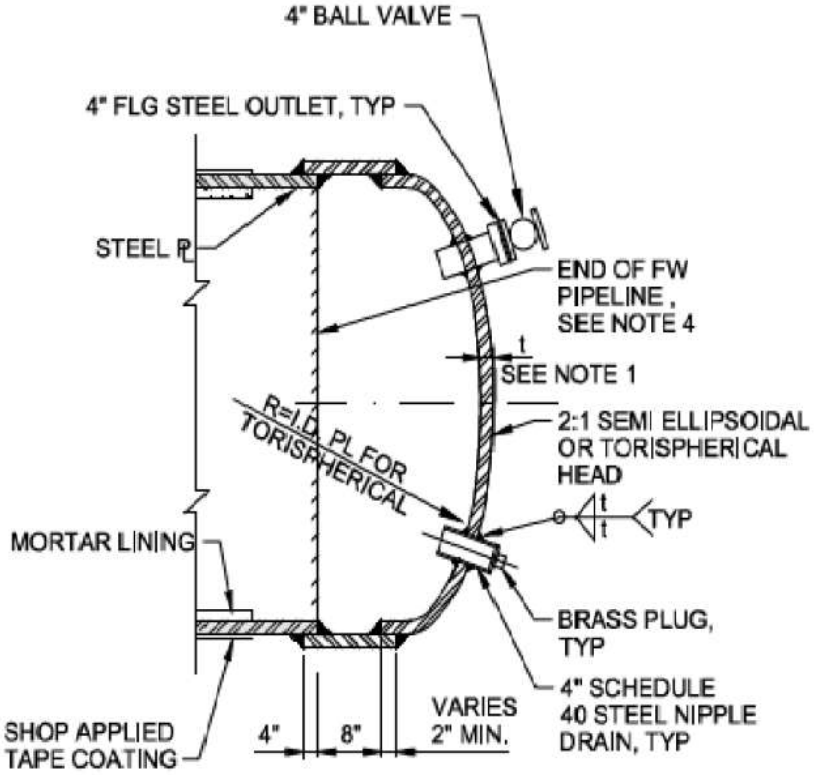
Issues Identified During Planning

- Sampling stations required for safety of water quality staff (high pH water, limit confined space entries)
- Lubrication of valve seats not required due to water in the pipe
- Inspection/sampling frequency developed
- Need source to add water (approximately 50,000 gallons)
- Data to record (water quality parameters, actions, date, responsibility, status)
- Identified potential for dead zones in pipe during City of Hillsboro operations

Sample Station



2 SAMPLE STATION INSTALLATION
COH STD DWG WTR-50 NTS



Standard Operating Procedures Developed

- Confined space entry
- Pipe locating
- Water quality sampling
- Water quality data collection
- Water level verification
- Maintenance of equipment

Water Quality

What do we know?

- Limited literature available
- pH responds rapidly
- High pH is a natural disinfectant
- DIP kinetics understood

Began Monitoring Plan Design

- Capacity
- Access
- Safety
- Equipment
- Data collection
- Parameters
  - pH, DO, ORP, Cl_2, etc.

Field Trail & Final Design

- Refine approach
- Value of data
- Validate field methods
- Ready, set, go!

Water Quality

- Where did we end up?

Parameter	Q1							Q2[2]	Q3[2]	Q4[2]
	Week 1[1]		Week 2	Week 3	Week 4	Month 2	Month 3			
pH	x	x	x	x	x	x	x	x	x	x
Conductivity	x	x	x	x	x	x	x	x	x	x
Coliform/*E. coli*	x			x		x	x	x		x
Total, free chlorine[3]	x	x	x	x	x					
HPC	x			x		x	x	x		x
Alkalinity	x			x		x	x	x		x
ORP	x	x	x	x	x	x	x	x	x	x
Temperature	x	x	x	x	x	x	x	x	x	x

What's Next?


Interim Operations Plan has been prepared
Gain experience and data
Prepare Overall Operations Plan

Thank you!

Matthew Gribbins
matt.gribbins@tvwd.org

Joel Cary
joel.cary@tvwd.org

Marlys Mock

Media & Community Relations Coordinator

Willamette Water Supply Program

503-941-4570

info@ourreliablewater.org

www.ourreliablewater.org

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