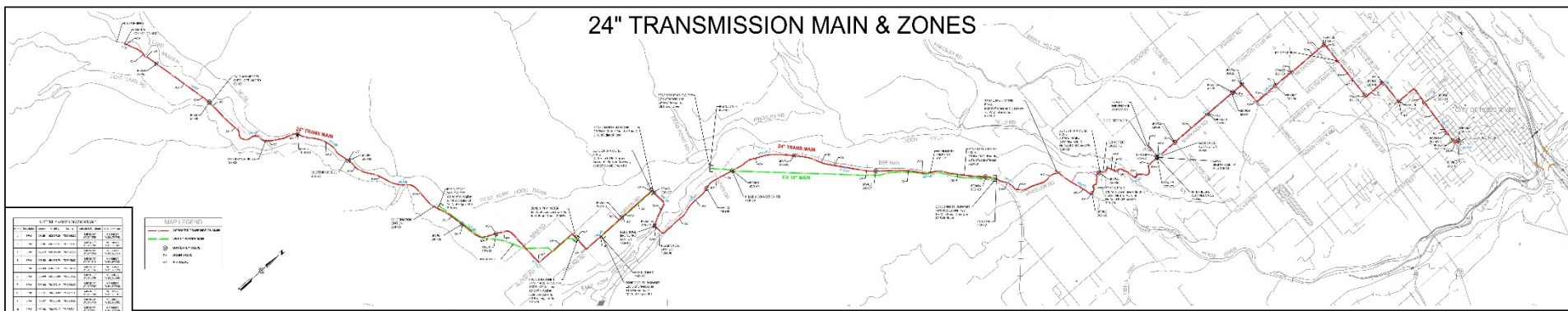


Using Line-stops to Repurpose the Old 14" Transmission Main



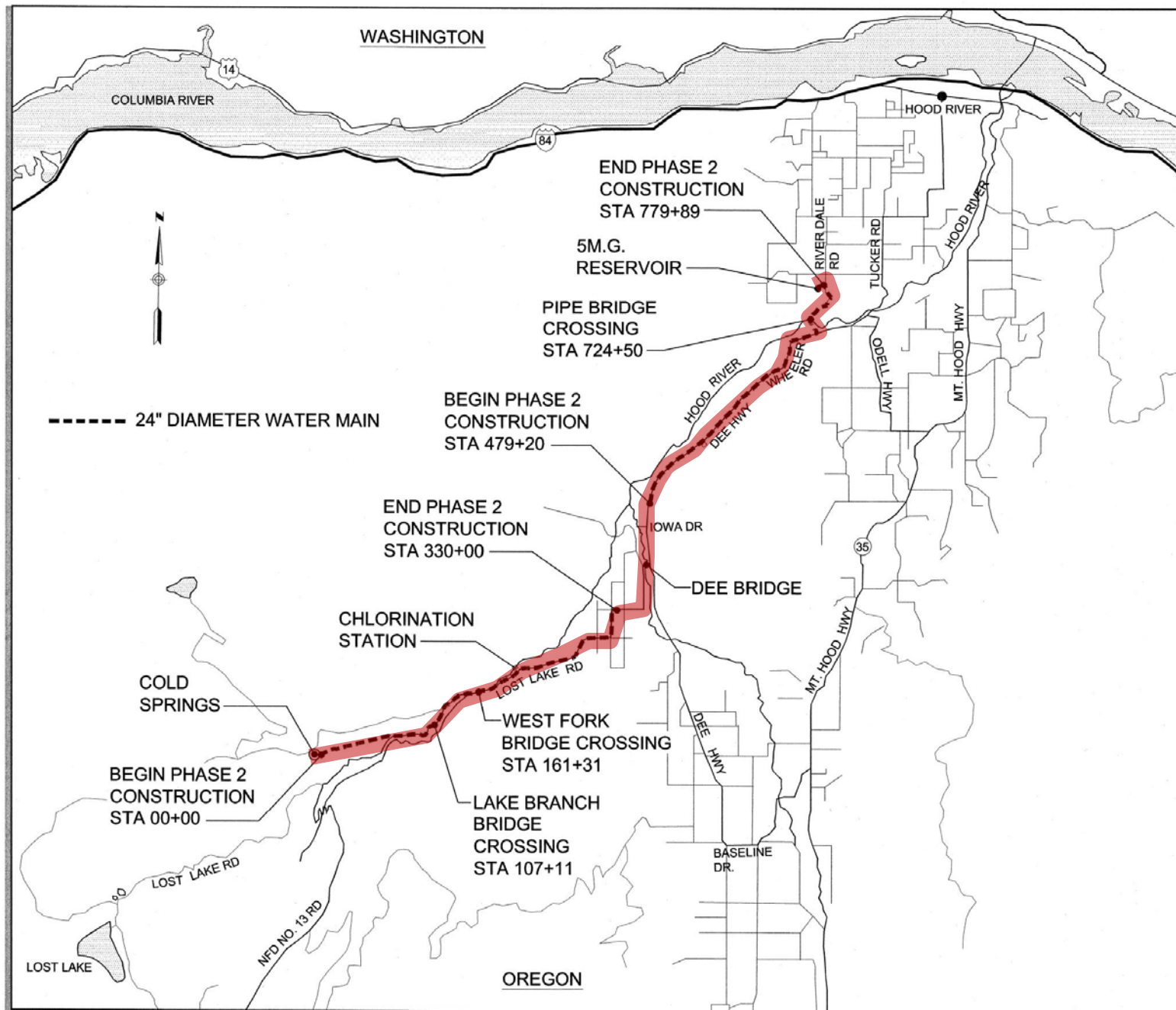
Dan Johnston, PE, Civil Engineer



The Project

- Replace the 14-mile, 100-year old 14" Steel Transmission Main
- New 16-mile 24" DIP in Public ROW
- Every type of terrain and crossing
- High system pressures





The Goals

- Build a New 24-Inch Line in Public ROW
- Create Service Zones (separate districts)
- Avoid Direct Tap Services
- Minimize Downtime to 4 Hours or Less



The Challenges

- Sparsely located residents
- Too costly to provide new submains and service connections to all
- Not enough funding
- How to switchover service from old to new



The Solutions

- First Priority Build the 24" Transmission Main
- Repurpose Old 14" Line as a Submain
 - Eliminate as much of old line as possible
 - Create separate service zones with PRV's and master meters
 - Keep existing meters and service lines
- Use Line-Stops for the Switchover to Minimize Downtime

Why This Works

- 14" Pipe was failing because of surge pressures, exposed sections, and isolated corrosion
 - Dropped pressures
 - Eliminated problem segments
 - Remaining segments maintainable
- Residents keep meters and services
- Not ideal for circulation but manageable
- Future consideration to sleeve with HDPE

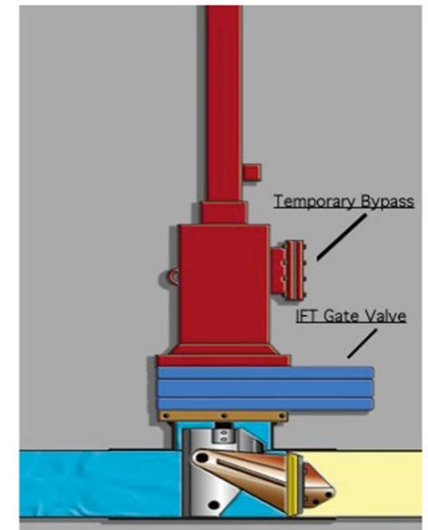
How We Did It

- First built the new 24" line
- Activate both lines
- Interim settings for Zone PRV's
- Strategically used line-stops for switchover



What are Line-stops?

- Temporarily stops flow
- Isolates pipe segments
- Abandon pipe segments
- Flow must be near zero
- Thrust blocking in place
- Not always successful



Why Linestops

- 14" Line only had 2 isolation valves in 14 miles
- Forced to drain entire line
 - Static pressures spike
 - Draining takes 24 hours
- Too much time to recharge
- Sequential switchover
- Minimized outages





Detailed Switchover Plan

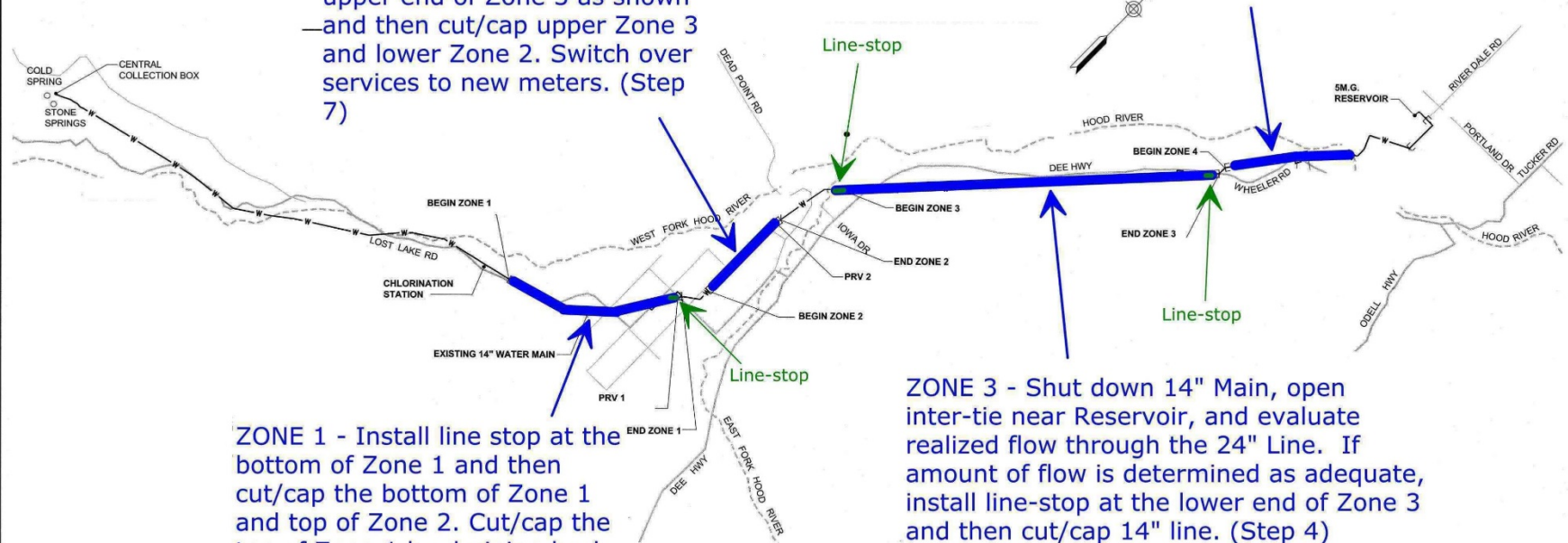
STEP	ACTION				
#1 Complete 24" Main	Construct, test, disinfect and flush new 24" main to Wilderness boundary. Terminate upper end with 24" BFV at Wilderness boundary and LL Road. COMPLETED	#6 Cutover and Sleeve for Zone 4	As soon as the decision is made to begin the line-stops in Step #4, switch Zone 4 to the 24" Main. Switch all existing service lines/meters to the new services. As soon as line-stop is complete at the north end of Zone 3, begin sleeving service lines through the 14" main to connect to the 3 meters, and then continue sleeving of one service across the highway.	#12 Complete 24" Main	Remove 12" bypass system and activate the 24" main through the Wilderness area by opening the valve at the headworks and the valve at the edge of the Wilderness area. ▪ All – Determine plan for value recovery of HDPE pipeline.
		#7 Upper Zone 3, Lower Zone 2	To establish the south end of Zone 3 and north end of Zone 2, complete the following : a) Shut off Zone 3 PRV. b) Install a line-stop just downstream of the cut/cap for the south end of Zone 3 and drain only the section between the Green Road PRV and the line-stop location. c) Cut/cap the 14" at the south end of Zone 3. d) Reactivate Zone 3 PRV and meter and make any necessary pressure adjustments. e) Cut and cap the bottom of Zone 2 since this section of pipe is already drained. f) Open Green Road PRV valve (on existing 14" line) and reactivate Zone 2 PRV. g) Fully open Glacier PRV valve. Make any necessary PRV adjustments.		
#2 Connect 12" Bypass	Complete and connect 12" Wilderness bypass to new 24" main via 24"x12" tapping saddle (see detail). Fill 24" main and flush/chlorinate as necessary. Complete final charge of 24" main for potable water service. Maintain normal 14" main operation during this process by making any necessary filling adjustments. COMPLETED	#8 Wilderness Line-stop	Install the line-stop at the designated location in the Wilderness section. Cut and cap the existing main.	#13 Project Completion	Complete remaining project requirements. When approved, take the reservoir offline for rehabilitation. The final 24" connection to the reservoir can be completed at that time. Provide line-stop and cut and cap existing 14" main as shown in the detail. This will require manual adjustment of the altitude valve per GC Systems. Complete 24" connection to the reservoir. Reactivate reservoir when improvements are complete. ▪ City - Verify operability of existing gate valve at the reservoir.
#3 Adjust PRVs	Adjust all new PRVs including the Phase I PRVs for interim cutover settings, and final settings. This includes the 24" mainline PRV, the Zone PRVs and the altitude valve. For the interim cutover settings, 50 psi should be the highest pressure in the Zone.	#9 Wilderness Line-stop, Upper Zone 2, Lower Zone 1	To establish the north end of Zone 2 and south end of Zone 1, complete the following : a) Shut off Zone 1 and 2 PRVs. b) Install line-stop and cut/cap at the north end of Zone 1. c) Drain the line downstream and cut and cap the 14" main at the top of Zone 2. d) Re-activate Zone 1 and 2 PRVs and make any necessary pressure adjustments.		
#4 Shut-down 14" Main, Evaluate Flow	For Cutover Day, complete the following with approval : a) Flow the two hydrants near Iowa Drive as was done for the 8" bypass connections. The Hydrant on Hwy 281 can be hard-piped under the highway through a nearby culvert. While flowing the hydrants, and when the flow downstream of the hydrants has virtually stopped, simultaneously close the existing altitude valve, and Glacier valve. Continue to flow hydrants while subsequently closing the Chlorination and Green Road valves. Turn off hydrants in sync with the closing of the Chlorination and Green Road valves. b) **** CRITICAL **** After 14" is shut down, but before it is cut and capped, open the 14" intertie near the altitude vault so that the 24" line is now flowing to the reservoir. Open it until 40psi is reached. Check flows and pressures at PRVs, services, and altitude valve, and make necessary adjustments.	#10			

CUTOVER EXHIBIT A Primary Steps

ZONE 2 - Provide linestop at the upper end of Zone 3 as shown —and then cut/cap upper Zone 3 and lower Zone 2. Switch over services to new meters. (Step 7)

ZONE 1 - Install line stop at the bottom of Zone 1 and then cut/cap the bottom of Zone 1 and top of Zone 2. Cut/cap the top of Zone 1 by draining back from Chlorination Station. (Step 8-9)

ZONE 4,5,6 - Switch to new submains and switch existing meters to new services. Sleeve to services at the upper end of Zone 4. (Steps 5-6)

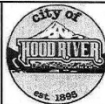


ZONE 3 - Shut down 14" Main, open inter-tie near Reservoir, and evaluate realized flow through the 24" Line. If amount of flow is determined as adequate, install line-stop at the lower end of Zone 3 and then cut/cap 14" line. (Step 4)

dvj
7/27/12

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DRAWN BY
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PROJ MGR

CITY OF HOOD RIVER
WATER TRANSMISSION MAIN IMPROVEMENTS
PHASE II
SERVICE ZONES, EXISTING 14" MAIN

DRAWING NO. **C46**
PROJECT NO. PAPOR-11-010
DATE:

Take Away

- Switchover was a SUCCESS
- Linestops essential to meeting goals
- City saved thousands by repurposing the old transmission main
- Have had few problems since

