



Jacobs

Challenging today.
Reinventing tomorrow.

Rancheria Spring UV

From Spring Development to UV Treatment in 9-Months

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Andy Huffman
Medford Water Commission
Capital and Special Projects Coordinator

Pat Van Duser, PE
Jacobs
Project Manager

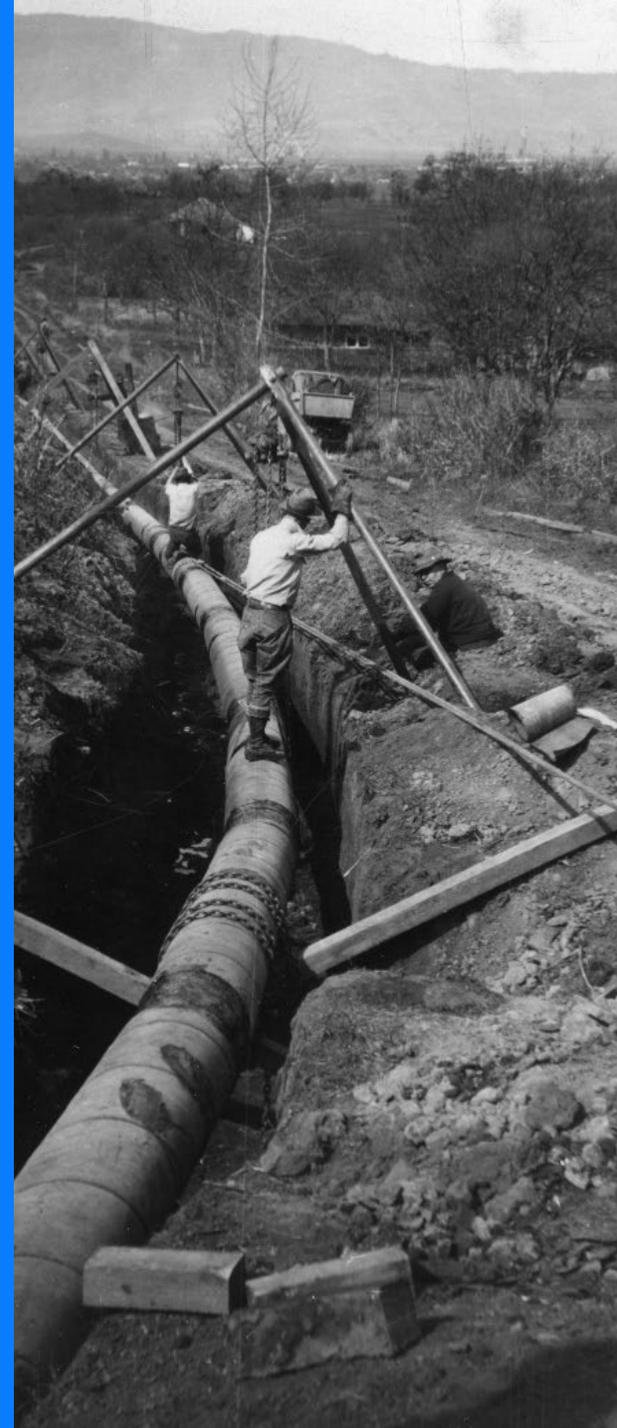
Overview

Rancheria Springs UV Disinfection Project

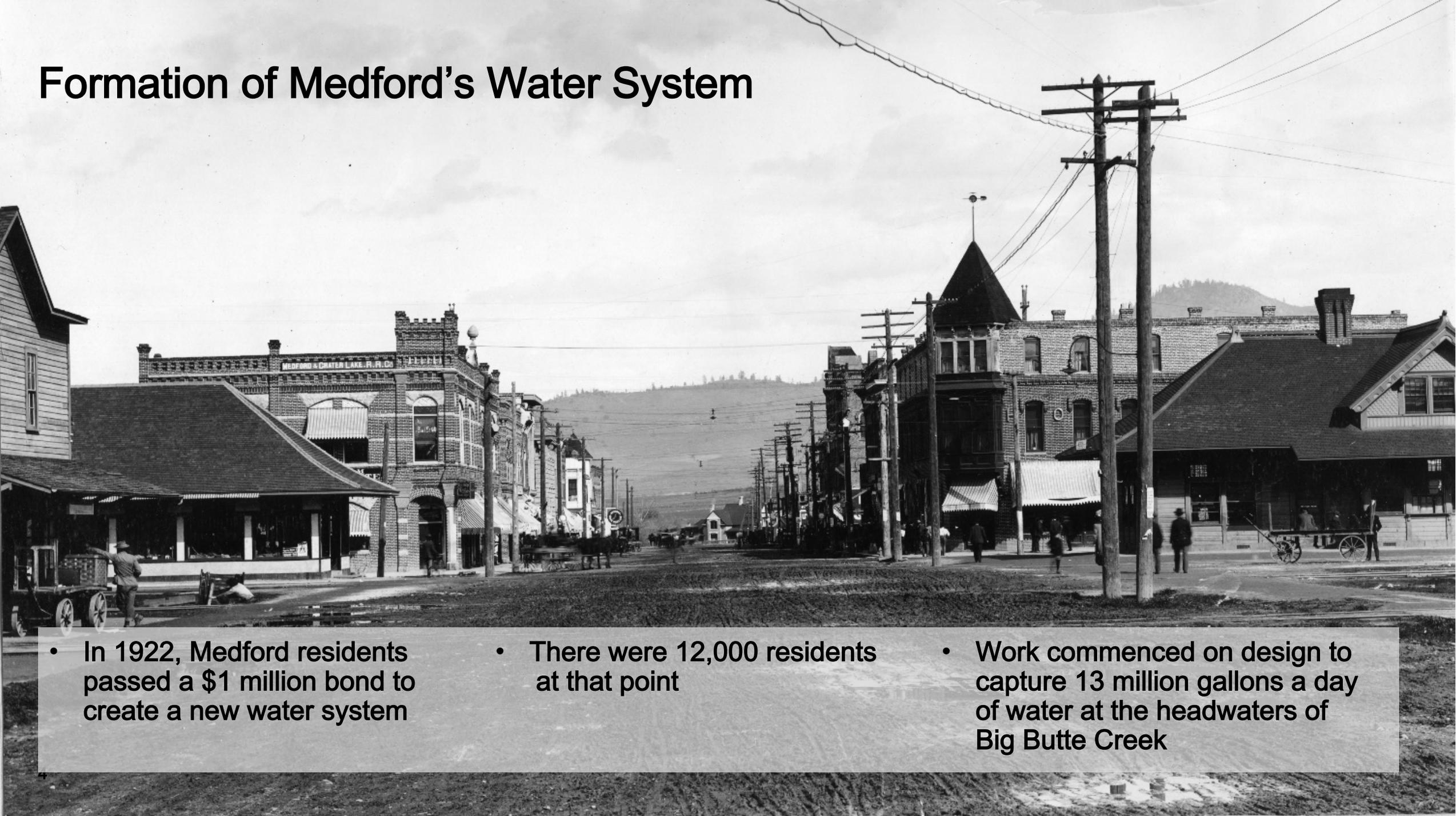
In December 2019, the Medford Water Commission and Jacobs determined that upgrading the collection system at Rancheria Springs to reduce the risk of E. coli in the water was not prudent. By early September 2020, a new UV Disinfection System was in place and commissioned.

- **Spring/System** – History, Background, and Significance
- **UV Treatment** – Innovation and Description
- **Implementation** – Design, Permitting, and Construction

Spring/System – History, Background, and Significance



Formation of Medford's Water System



- In 1922, Medford residents passed a \$1 million bond to create a new water system
- There were 12,000 residents at that point
- Work commenced on design to capture 13 million gallons a day of water at the headwaters of Big Butte Creek

Pipeline Creation

- Work began to install a 30-mile-long, 24-inch diameter welded steel pipeline
- A pipe fabrication plant was built locally to deliver pipeline materials
- Hydraulic analysis to get the water to town had to be right



“A Mountain Spring in Every Home”

- By 1927 the pipeline and infiltration gallery were complete
- The Medford Water Commission opened the valves to bring 13.2 million gallons a day to Medford



Continued Growth in the West

- By the early 1950s population growth triggered the need for more water
- BBS #2 Pipeline was completed in 1955
- This connected the newly developed East Intake bringing another 13.2 MGD to town
- By this point the trajectory of growth in Medford was clear



Tapping of Rancheria Spring

- By 1967, with demand still on the rise, plans to develop a second source from the Rogue commenced
- The Robert A. Duff Water Treatment Plant construction was in process when drought struck
- Adequate supply from the existing intakes was in question
- There was still water right capacity available when Rancheria Spring was identified as a possible third spring source
- Rancheria Spring and pump station was built in 1967 in about 60 days

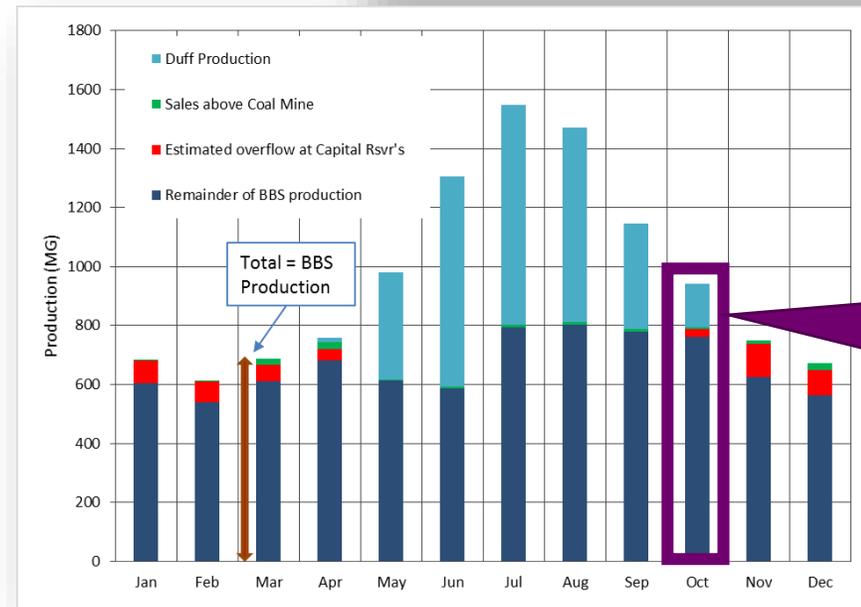
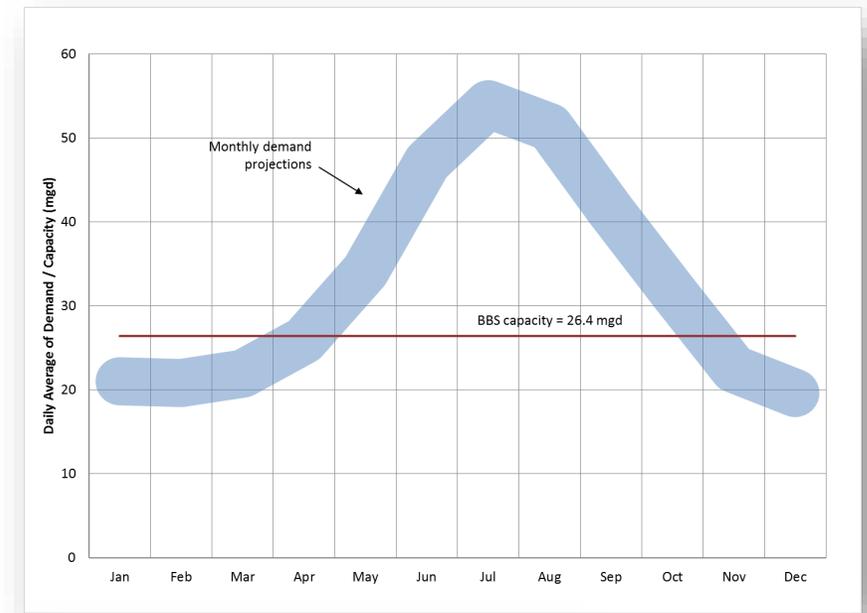
Modern Day Rancheria

Need for Cleaner Water



Value of Rancheria Springs to MWC

- The Big Butte Springs (BBS) provide reliable, high-quality, gravity fed supply year round
- BBS provides 26.4 MGD at max flow
- 2 MGD from Rancheria Springs is primarily used in the spring and fall to minimize Duff WTP operation
- The unit cost for this water is 10 times less than the Duff WTP
- Operating Rancheria Springs for a few weeks saves MWC up to \$260,000 in operating costs per year
- Rancheria is becoming more important to MWC as the frequency and severity of droughts increases



Shoulder Season Operation allows Duff to be winterized earlier

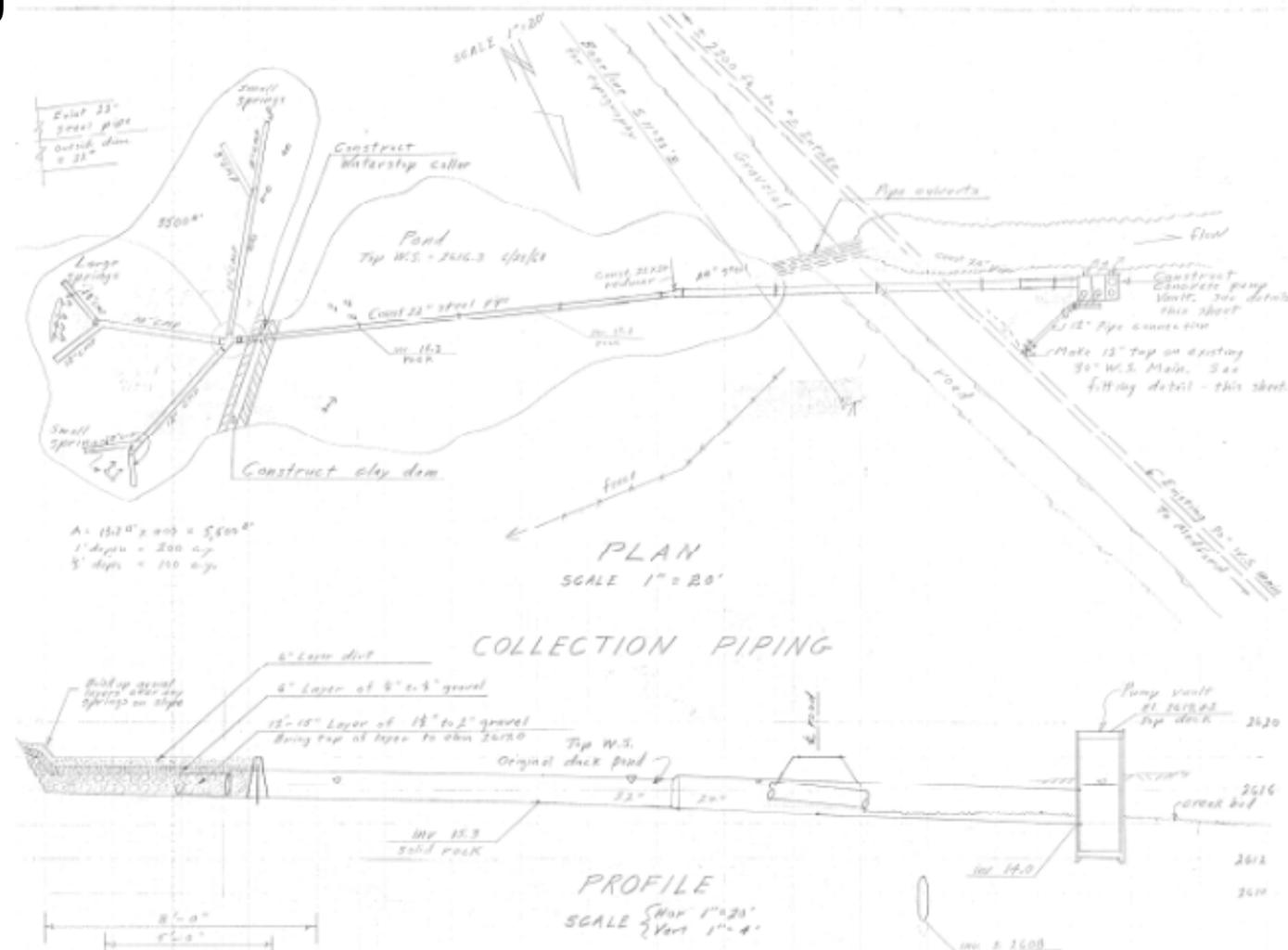
Rancheria Water Quality

- Rancheria Springs is different than the other infiltration galleries
- A small impoundment pond captures Rancheria Springs Water
- Water is conveyed to a small pump station clearwell and then pumped into Big Butte Springs (BBS) #2 line
- The infiltration system consists of three 6" perforated pipes
- The only protection provided for the infiltration gallery is the round drain rock over the pipes



Shutting Down Rancheria Spring

- In 2016 MWC experienced a positive E.coli sample
- MPAs were collected from Sept. 2016 through Sept. 2017
- Results showed Rancheria is not groundwater under the direct influence of surface water (GWUDI)
- OHA noted that the spring collection system did not meet OHA construction standards
- MWC ceased using the water after the 2016 positive E. coli sample



Rancheria Springs Facilities



A = 150' x 40' = 5000'
1' depth = 200 cu ft
3' depth = 150 cu ft

Typical Big Butte Springs Collection Systems



Rebuild Rancheria Springs Collection System?

- MWC went out to RFP in December of 2018
- Jacobs was selected for evaluation and design
- Initial plan was to build a collection system similar to other springs
- Infiltration gallery construction would significantly disrupt adjacent wetland
- Drilling wells was among the options explored for water collection
- Potential disruption of groundwater HGL quickly became a concern...



The UV Solution



Where Does UV Disinfection Make Sense?

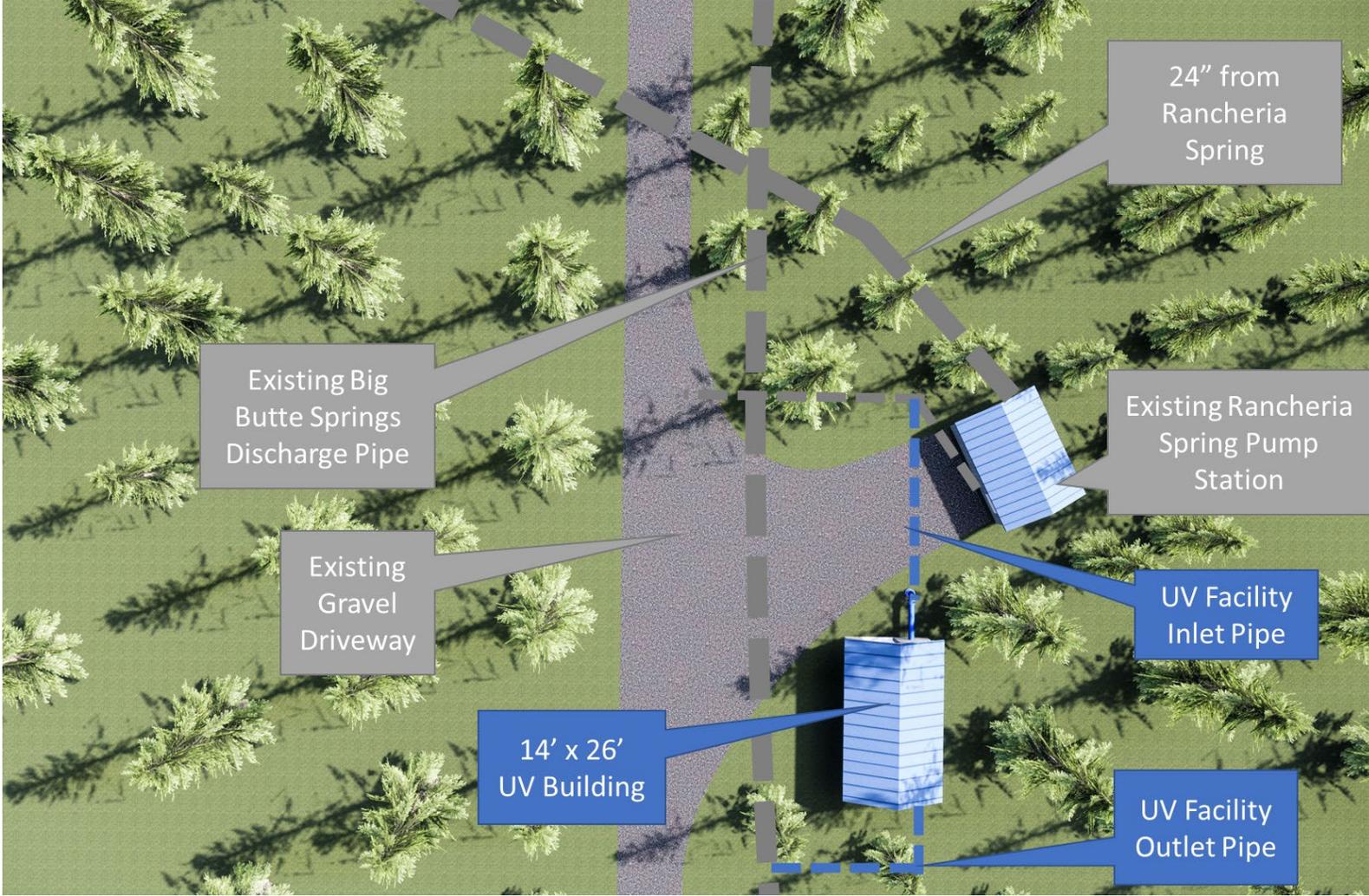
- Unfiltered surface water or GWUD systems
- Groundwater systems with elevated pathogen levels
- Utilities looking to improve public health protection with multiple disinfection barriers
- Filtered systems with high pathogen risk in source water
- Systems with high treatment risk (e.g., highly variable water quality)
- Utilities looking to reduce DBPs (e.g., replace *Giardia* CT)
- Waters with high bromide concentrations
- Systems with other barriers for taste and odor, or no taste and odor

UV Treatment - Approval

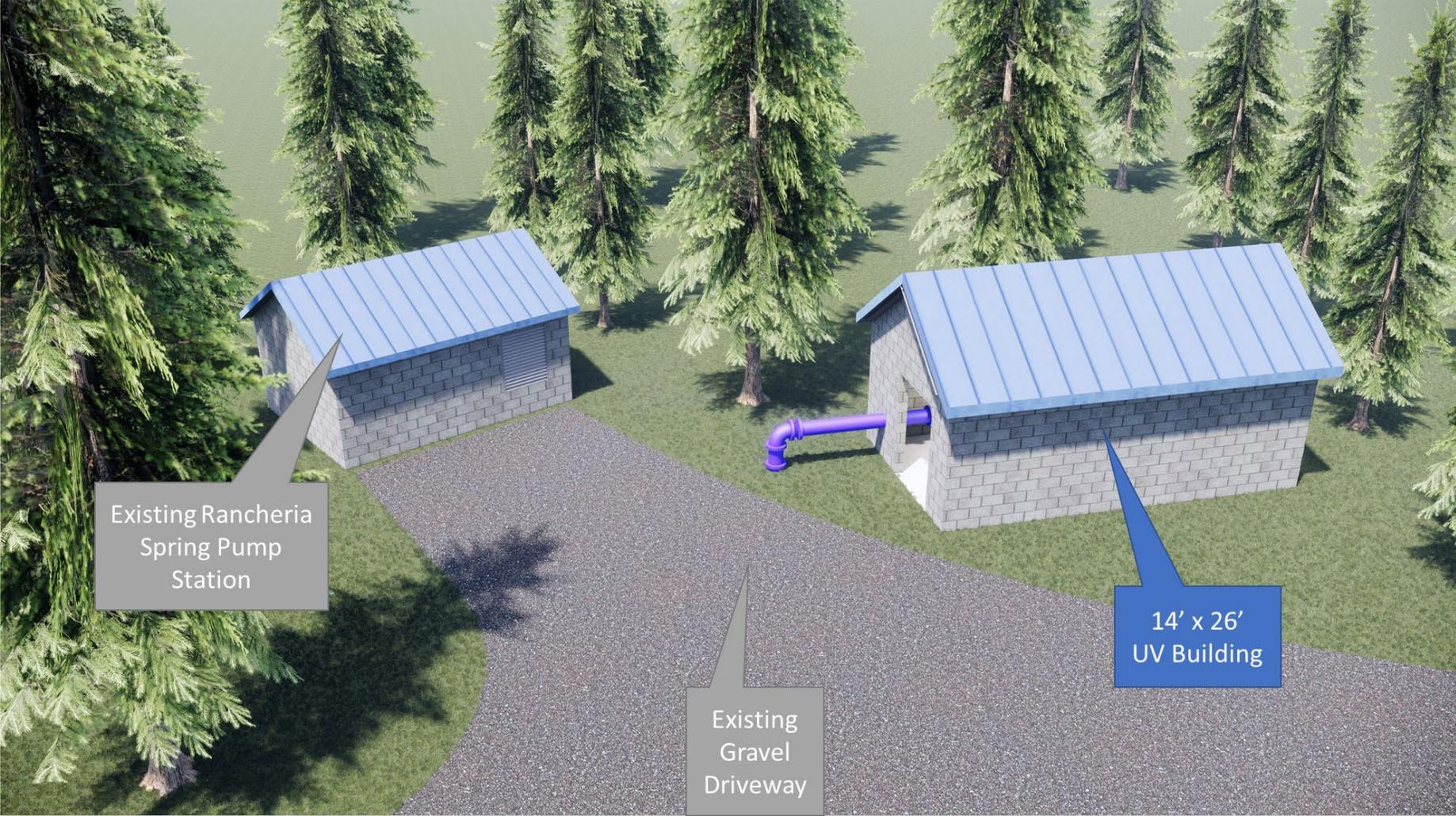
- Given the risk of adverse impact to the spring during collection system reconstruction, MWC evaluated the potential to add UV disinfection for pathogen inactivation at Rancheria Springs
- Initially, it was assumed the well would be reclassified as unfiltered GWUDI
- In coordination with OHA it was decided the best approach would be to classify the source as groundwater
- UV disinfection is considered to be a “corrective action” response to E. coli detection

Pathogen	Minimum Groundwater Treatment	Minimum Unfiltered Surface Water Treatment	Rancheria UV + Chlorine Treatment
Cryptosporidium	0-log	2-log	3-log
Giardia	0-log	3-log	3-log+
Viruses	4-log	4-log	4-log+

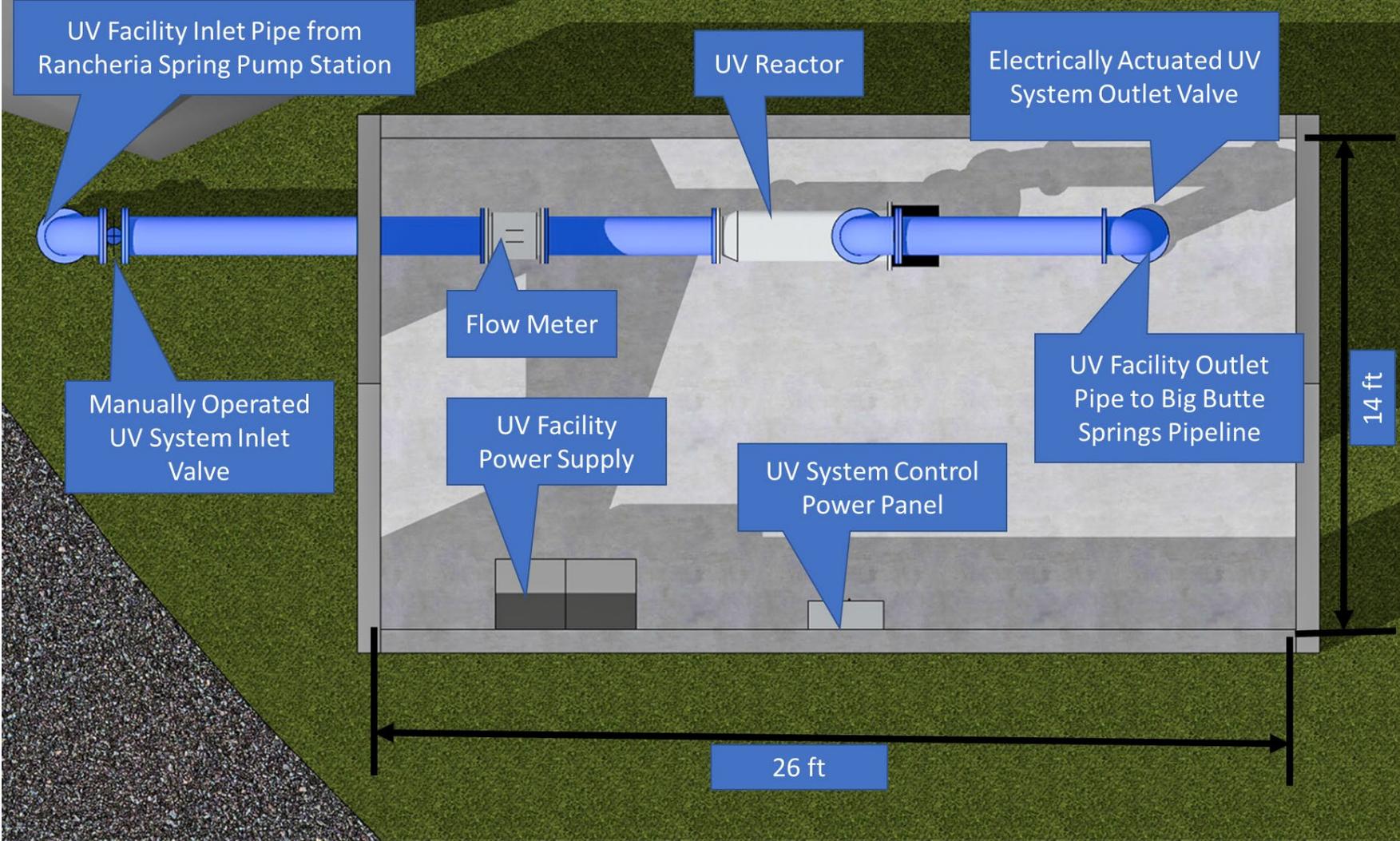
UV Concept for Rancheria Spring



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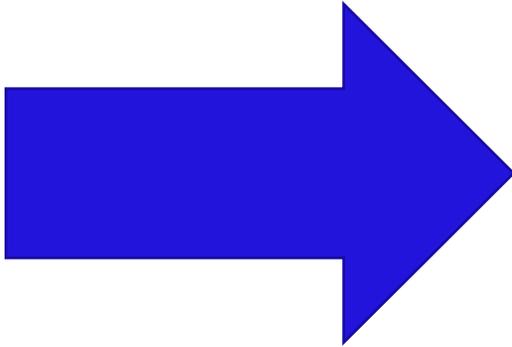
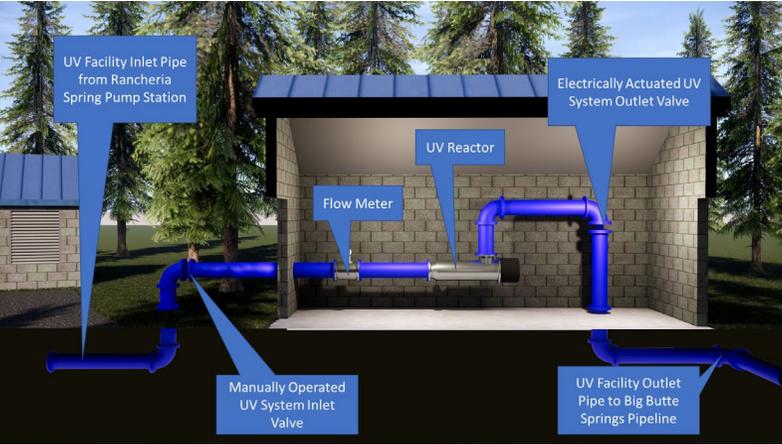
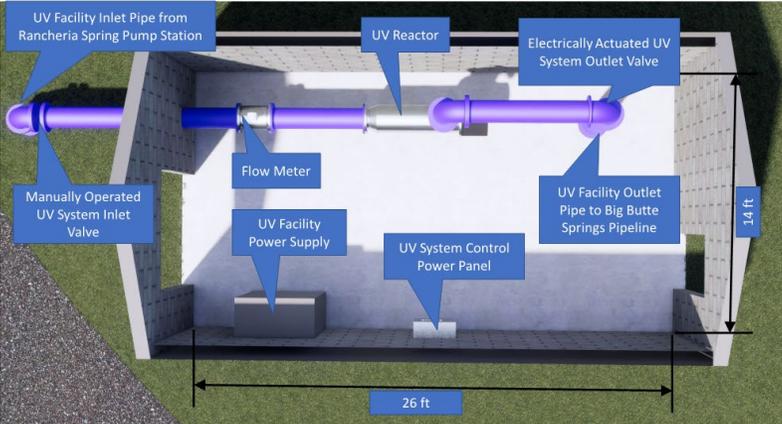
Project Highlights

Design to Completion –
Clean(er) water in 9-months



Concept to Tap

December 2019



September 2, 2020



Project Schedule – Design

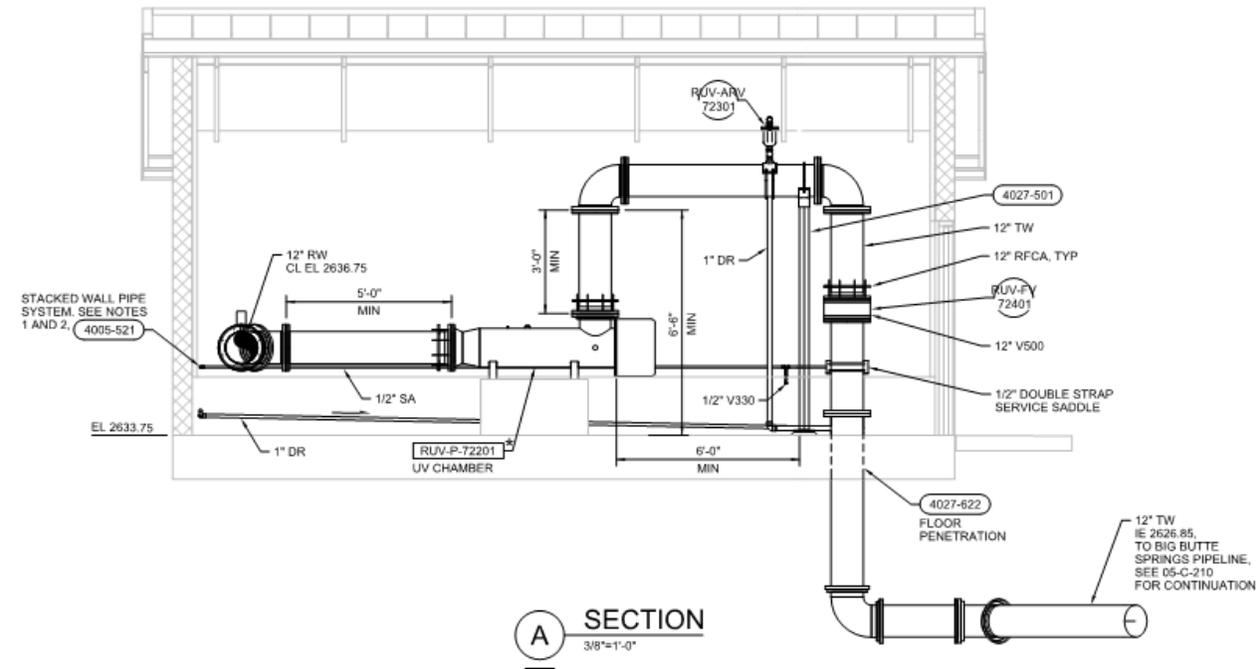
- **Fall 2018** – MWC contracted Jacobs to develop Rancheria Springs
 - Original focus to replace the existing collection system and adding shallow wells
- **October 2019** – Jacobs introduces UV Treatment as an alternative
 - Reuse existing collection system, no wells, and most importantly, no E. coli
- **November 2019** – Jacobs begins to develop UV Treatment design
- **January 2020** – Final Design activities begin
 - 2/21 - 50% Design delivered
 - 3/15 - CMGC Contractor brought on board
 - 3/16 - 95% Design delivered (Permit Set)
 - Plans submitted to the building department
 - 4/6 - 100% Design delivered

Project Schedule - Construction

- **May 6, 2020 – Board Approval**
- May 18 – McClure & Sons mobilizes
- May 19 – UV Equipment ships
- August 31 to September 1 – System Test

Measures for Success— Procurement, Permitting and Construction

- Engage Early with Local Building Officials
- Build Connections with Permitting Officials – Invite to See Their Role
- Early Procurement of Major Equipment
 - Purchase Order issued before 50% design
 - Equipment was onsite within 2-months of release, 3-months ahead of installation
- Reduce Risk and Uncertainty with Delivery, Fit, and Coordination



Construction



Construction



Start-up

- **September 2 – System is Operational**
 - Moving so fast we started treating water without a door on the building!
- **September 8 - Labor Day Fires** impact the region
 - Obenchain fire burned through the powerlines up to the Springs
 - Access was cutoff, but operators were onsite to work with firefighting crews

Conclusions and Lessons Learned

- Success doesn't start with "*I can't*"
- Push, push, and push – on parallel paths instead of sequential
- We had a feasible and plausible approach; however, challenging. By systematically stepping through it one task at a time, we got through it
- Highly motivated owner
- Close partnering and active work sessions. Did not wait for responses but pursued them
- Good to have partners that can tell you no, and also work to find alternatives
- 9-months from concept to flowing water
- All this happened during COVID

Acknowledgments

- **MWC Staff**

- Benjamin Klayman
- Dennis Berg
- Dashton Peccia

- **Jacobs Design Team**

- Enoch Nicholson/ Process Lead
- Matt Smith/ Design Manager
- Dozens of others who went from concept to 100% design in 3-months

- **McClure and Sons, MSI**

- Kyle Hansen
- Scott Crawford

- **Oregon Health Authority**

- Russ Kazmierczak
- Zach Golik
- Peter Farrelly

- **Trojan**

- Armino Pontes
- Bill Reilly (Wm. H. Reilly & Co.)

Special Thanks to our Retirees

- **Eric Johnson**/Medford Water Commission
 - Principal Project Engineer

- **Paul Berg**
 - Senior Project Manager

*Thank you for all the support!
Have a Happy Retirement!*

Quiz Questions

1. What is the minimum unfiltered surface water treatment requirement count for Cryptosporidium?
2. What alternate delivery method was used for construction of Rancheria Springs UV?

Bonus Round

3. What is the method of water collection at Big Butte Springs?
4. What year was Medford Water Commission Chartered?

Quiz Questions – Answer Key

1. 2-log
2. CM/GC
3. Infiltration Gallery
4. 1922

Thank You!

Andy.Huffman@medfordwater.org

Pat.VanDuser@jacobs.com



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