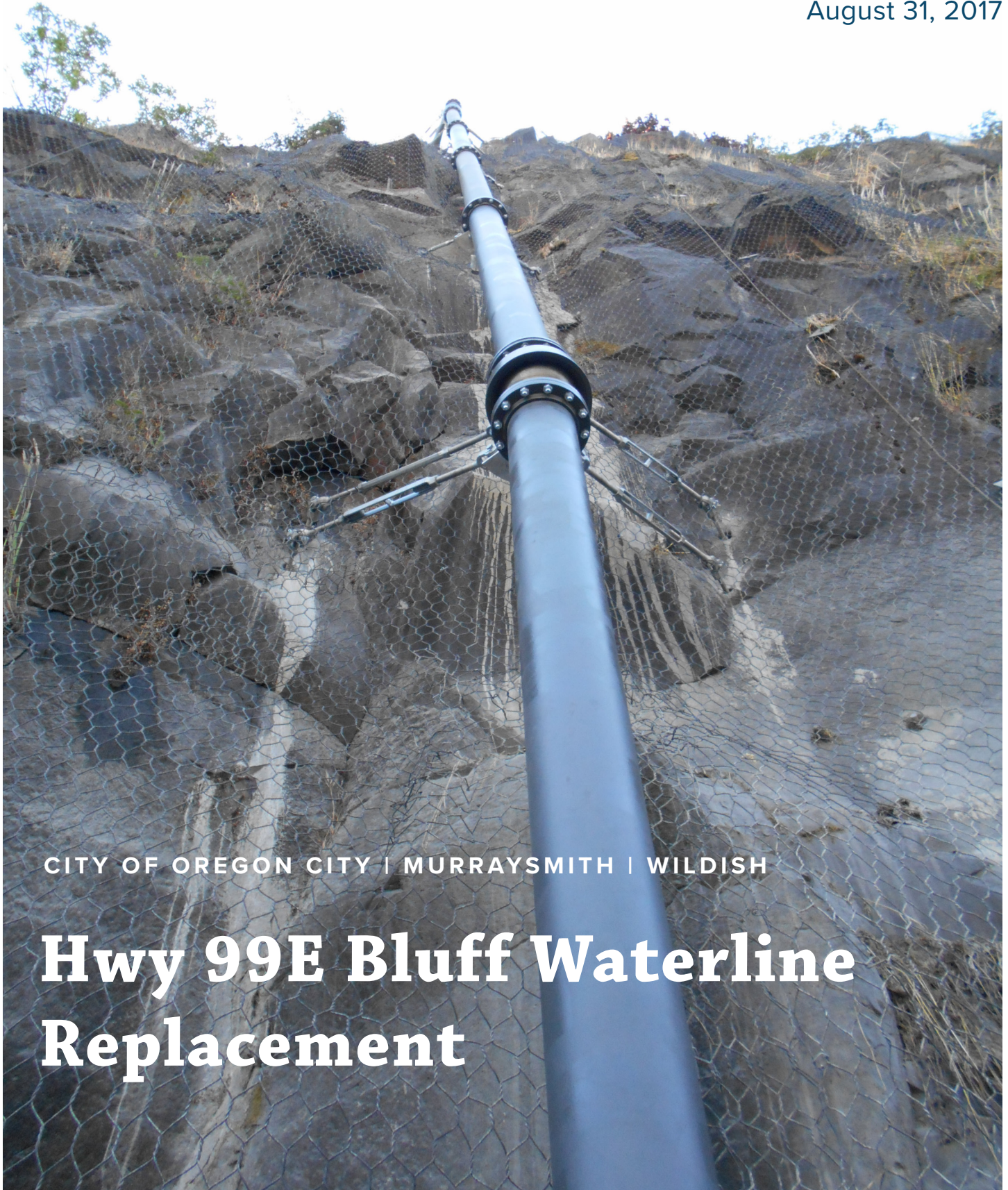


**APWA - OREGON**  
**Public Works Project of the Year**

August 31, 2017



CITY OF OREGON CITY | MURRAYSMITH | WILDISH

**Hwy 99E Bluff Waterline  
Replacement**

# PUBLIC WORKS PROJECT OF THE YEAR NOMINATION FORM



**SUBMITTAL DEADLINE:** August 31 each year

## PROJECT INFORMATION

Hwy 99E Bluff Waterline Replacement

*Project Name*

June 2017

*Project Completion Date\**

2017

*Application Submittal Year*

City of Oregon City

*Public Agency*

### PROJECT CATEGORY (select one):

- ☐ Structures
- ☐ Transportation
- ☒ Environmental (Water, Wastewater, Stormwater)
- ☐ Historical Restoration/Preservation
- ☐ Disaster or Emergency Construction/Repair

### PROJECT DIVISION (select one):

- ☒ Less than \$5 million
- ☐ \$5 million to less than \$25 million
- ☐ \$25 million to \$75 million
- ☐ More than \$75 million

\*Must be substantially complete and available for public use within two calendar years prior to nomination.

## MANAGING AGENCY

Dayna Webb

*Name*

Project Engineer

*Title*

City of Oregon City

*Agency/Organization*

625 Center Street

*Address (if post office box, include street address)*

Oregon City

*City*

OR

*State*

97045

*Zip*

dwebb@orcify.org

*Email*

503-974-5508

*Phone*

503-657-7892

*Fax*

## PRIMARY CONTRACTOR

Scott Hovgaard

*Name*

Project Engineer

*Title*

Wildish

*Agency/Organization*

3600 Wildish Lane

*Address (if post office box, include street address)*

Eugene

*City*

OR

*State*

97408

*Zip*

scotth@wildish.com

*Email*

503-806-9926

*Phone*

*Fax*



## PRIMARY CONSULTANT

Jeff Jones

Project Manager

*Name*

*Title*

Murraysmith

*Agency/Organization*

888 SW 5th Avenue, Suite 1170

*Address (if post office box, include street address)*

Portland

OR

97204

*City*

*State*

*Zip*

jeff.jones@murraysmith.us

503-225-9010

866.274.9807

*Email*

*Phone*

*Fax*

## NOMINATED BY *(only managing public agency or APWA Chapters eligible to nominate)*

John Lewis

Public Works Director

*Name*

*Title*

City of Oregon City

*Agency/Organization*

625 Center Street

*Address (if post office box, include street address)*

Oregon City

OR

97045

*City*

*State*

*Zip*

jmlewis@orc.org

503-496-1545

503-657-7892

*Email*

*Phone*

*Fax*

### SUBMIT APPLICATION PACKET TO:

#### Public Works Project of the Year • Awards Program

Krey Younger

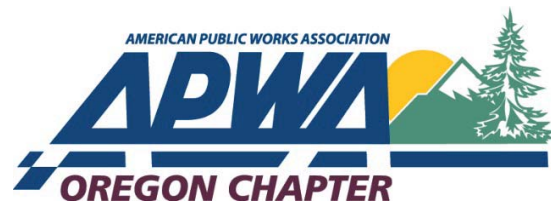
GeoDesign Inc.

15575 SW Sequoia Parkway, Suite 100

Portland, OR 97224

[kyounger@geodesigninc.com](mailto:kyounger@geodesigninc.com)

503.726.3104



**NOTE:** Supporting documentation is **limited to twenty (20) pages**, exclusive of photographs (10 to 20 photos of the project including a few "before" photos if possible) and the nomination form. **This submittal will not be returned.** Please submit your application by the deadline identified at the top of this application by both of the following methods:

- **Email** – Send by email a digital copy of the nomination form and supporting documentation. If possible, include 10 to 20 photographs of the project which can be sent, if necessary, by more than one email.
- **Hard Copy** – Hand deliver or send by US mail (postmarked by due date) or delivery service one "hard" copy of the nomination form and supporting documentation. Include a USB flash drive (or CD) with 10 to 20 photographs of the project along with a digital copy of the nomination form and supporting documentation.



**Title of Entry:** Hwy 99E Bluff Waterline Replacement

**Project Category:**  
Environmental Water

**Project Location:**  
Oregon City, Oregon

**Project Purpose:**  
Maintain domestic & fire service

**Completion Date:**  
Substantial - June 22nd, 2017  
Final - July 14th, 2017

**Engineering Design:**  
\$75K (25% of construction)

**Construction Cost:**  
\$296K

**Managing Agency:**  
City of Oregon City, Oregon

**Primary Consultant:**  
Murraysmith

**Primary Contractor:**  
Wildish

10-inch diameter high pressure water main extends 100 feet above Highway 99E. Leaking pipe rains down on passing vehicles.



## PROJECT BACKGROUND

### Exposed Water Main is a Major Liability

Murraysmith completed preliminary design, final design, and construction phase support for the replacement of a failing 10-inch diameter steel water transmission main. Originally constructed in the early 1900's, this main originates at the Mountain View Reservoirs and provides a critical feed to the former Blue Heron mill site and provides fire suppression supply during peak seasons to the downtown business district.

The main extends through the historic McLoughlin Promenade park, crossing under the WPA built stone wall and handrail, before emerging 100 feet above Highway 99E and the Union Pacific Railroad lines. The main was anchored to the rock face as it dropped vertically toward the highway and railroad lines.

The exposed water main began leaking as a result of corrosion in its pipe wall in December 2013. The leak sprayed water down onto Highway 99E and



The historic Mcloughlin Promenade wall was originally constructed in 1935 and sits over the water main.



the rail lines below, forcing a closure of the Highway and shutdown of the main. This hole in the pipe was repaired by City operations staff, but further inspection of the remaining pipe discovered significant corrosion in many other locations. The line clearly needed to be replaced before more breaks occur. A complete break in the main would create a significant risk as it would release water at a rate over 15,000 gpm and pressure of 110 psi. This would likely flood the 99E tunnel that is just north of the pipeline.

In early 2016, the Oregon Department of Transportation (ODOT) notified the City of upcoming projects to scale loose rocks from the cliff face and replace the rockfall protection screening behind the water main. It was agreed the City would replace the water main in advance of ODOT's project. In addition, the City agreed to remove and replace the rock fall screen and scale the bluff face behind the water main during this project.

Traffic impacts during construction was a significant challenge for this project. OR99E carries over 23,000 vehicles a day in and out of Oregon City. Lane closures during construction would cause significant travel delays, impacts to commercial mobility, and increased traffic on detour routes that are not built to accommodate the type and volume of traffic that travels on 99E. In addition, the close proximity of the railroad tunnel and curves on 99E to the project area required a very long traffic control area that impacted downtown traffic movements. Detailed traffic control planning and public outreach were critical elements of the project development.

### Contract Completion

The contract required the work be completed within 10 consecutive working days between June 2nd and June 29th, 2017. This was intended to allow the contractor flexibility of its start date, limit time for lane closures on 99E, and avoid holiday travel for Memorial Day and the Fourth of July. The work began on June 12th and was completed on June 22nd. No time extensions were necessary.



The proximity between the project area and the tunnel limited the allowable work zone.

The City of Oregon City and Murraysmith began design of the new water main in June 2016 and completed construction in June 2017. Design development required coordination with and approval from ODOT Region 1 geo-environmental, traffic control, and mobility services group and a right of way permit from the ODOT District 2B Maintenance office.

## Construction schedule, management, and control techniques used

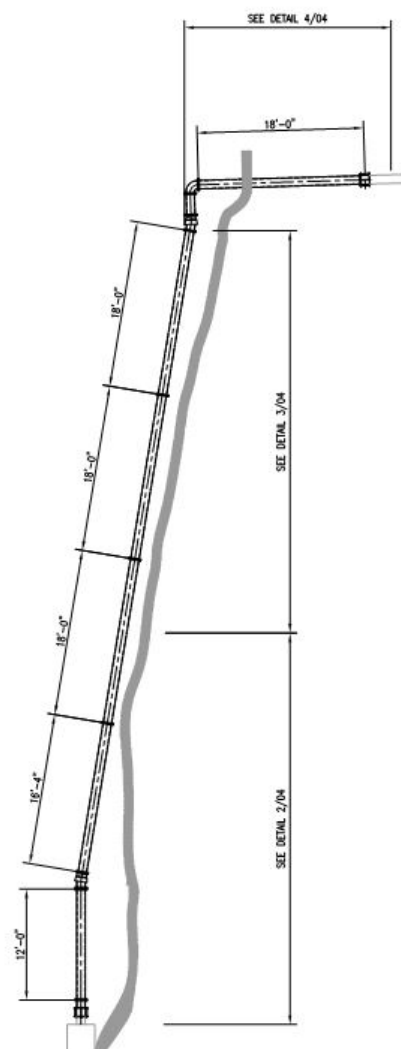
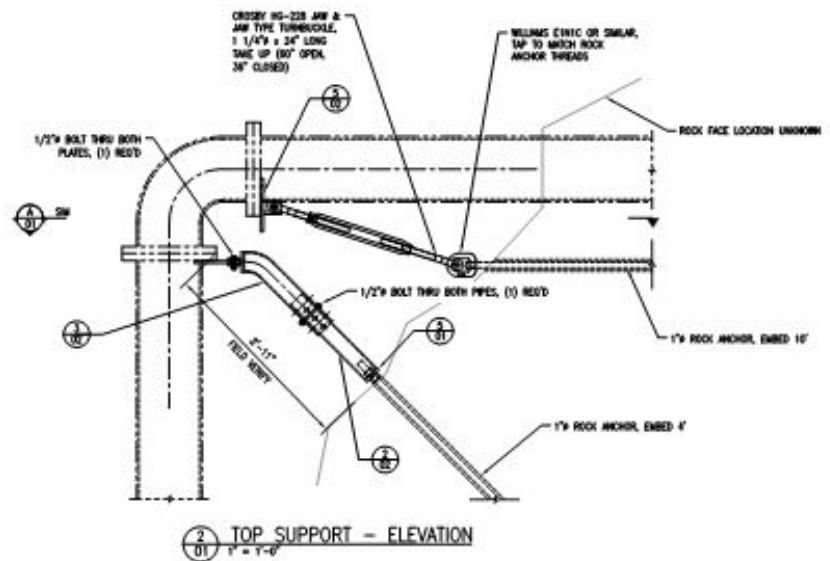
Several methods to manage the schedule and overall success of the project were used during design development. These included bidder qualifications for both scaling the cliff and installing the exposed pipe. Additionally, a design-build approach was used to allow the contractor final design of the pipe support systems to align with installation and phasing needs. This made the project more constructible and saved time during the lane closures.

### Design/Build Hybrid Approach Proves Valuable

Initial planning for the project evaluated alternative contracting methods to complete this project. The City was most comfortable with the traditional design/bid/build method for projects of this size, but wanted to allow experienced contractors flexibility to influence design and installation of the pipe support system. This led to developing a traditional contract that required quantifiable bidder qualifications, presented a pipe support design system that was sufficiently developed for competitive bidding, but allowed the contractor to have the final design and control over the installation.

Wildish Standard Paving was awarded the contract in March 2017 and subcontracted with Smith, Monroe, and Gray Engineers (SMG) to develop the final design of the pipe support system. SMG is a structural and mechanical engineering firm specializing in design of industrial and mining conveyor and structural support systems for various industrial and mining businesses. Wildish and SMG were able to further develop the pipe support connections design to provide flexibility for the variable distance and angles of the rock face. This allowed them to drive the installation and share in the responsibility for a successful installation.

### Design Details of pipe support and alignment





**Partnering Approach is a Key Ingredient for Success** - Once Wildish was under contract in late March, several coordination meetings were held to finalize design details, traffic control planning, step-by-step sequencing of work, and public notice schedules. These meetings identified the critical path for both pre-construction planning and on-site work, allowing the project team to mitigate potential schedule delays. This collaborative effort formed a unified team with a shared objective: to complete the project on-time while minimizing impacts to the public.

Once construction began, Wildish prepared daily reports outlining the work completed each day and work planned for the following day. Project managers from the City, Wildish, and Murraysmith spoke every evening to clarify any issues and make sure they were resolved in a timely matter. On-site construction meetings were held each morning to review the plan of the day, ensure that issues were resolved, and testing and inspections were scheduled to keep the work progressing smoothly while avoiding impacts to the public. The project team grew to be very cohesive, which fostered a partnering approach that kept the contractor moving rapidly without compromise to quality of work.

## Safety Performance

The project presents many hazards, including significant traffic control, fall protection, rockfall protection of workers and motorists, and heavy materials being lifted 100 feet into the air. The work zone at the base of the cliff was in the two north bound lanes of 99E and was only 100 feet long and 20 feet wide. It couldn't be any longer because of its proximity to the tunnel, or wider to maintain one travel lane in each direction which were being constrained by the sidewalk & railroad tracks to the west. The workers navigated the slopes with ropes, lifts, and cranes, even in adverse weather conditions. Falling rocks, tools, or debris was a serious concern within the work zone. Meanwhile constant traffic navigates the lane closures and shifts.

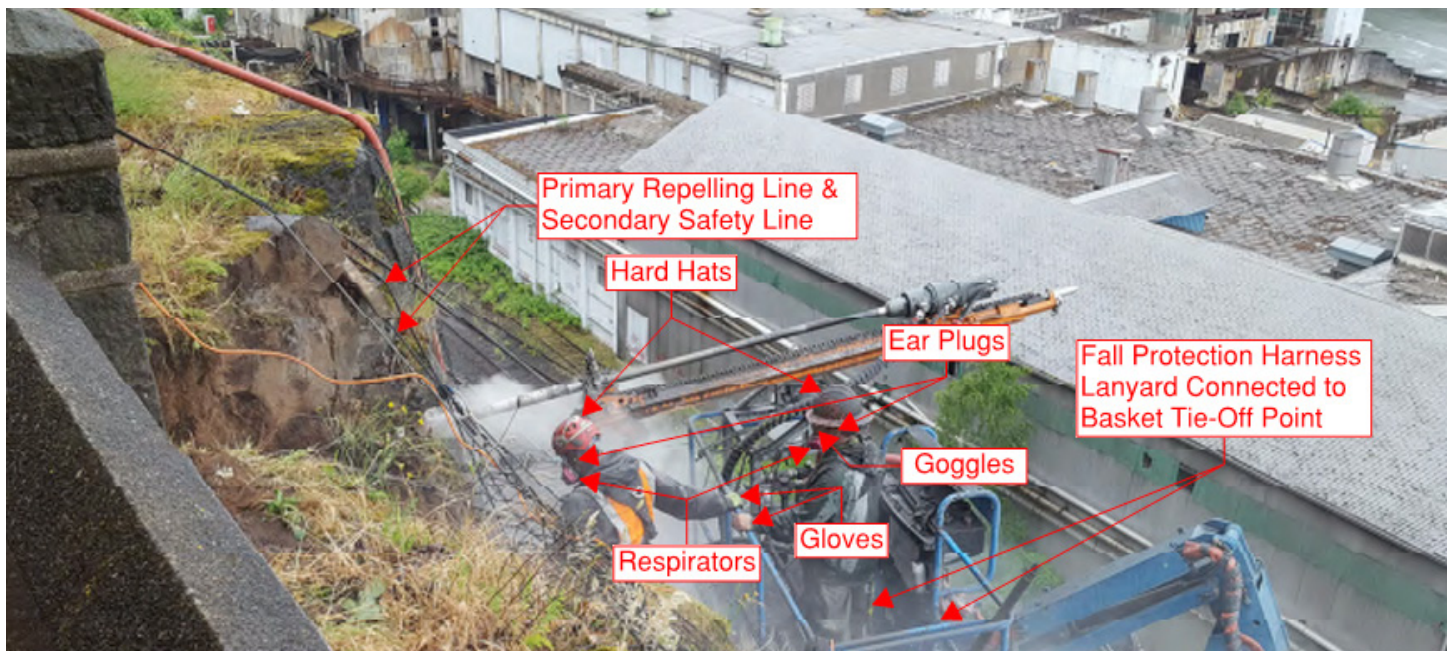
**Thorough Safety Planning Results In No Incidents** - Wildish has successfully completed challenging projects for over 30 years. As such, it understands that practicing safety is not just lip service; it's a mindset. A safety plan was prepared to outline the risks, procedures, personal protection gear, and contacts that all employees knew and followed. Wildish provided quality equipment and gear for its crews, maintained daily safety meetings and gear checks every morning before beginning work. Wildish reported 2,243 labor hours worked with no time lost from injury. In fact, there was no need to even open a first-aid kit on this project.

Work on the project continued through adverse weather





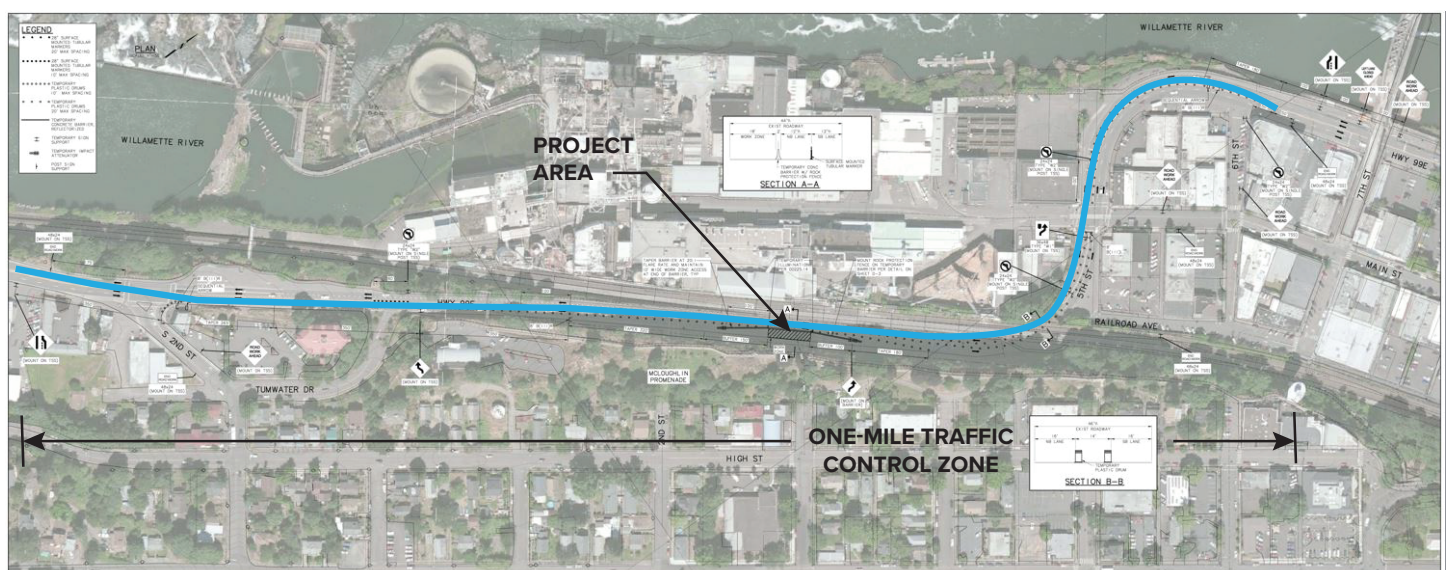
Wildish performed safety inspection on its own staff and sub-contractors



**Traffic Control Planning Success** - An estimated 23,000 vehicles drove past the project site every day. 99E is a major arterial between Oregon City and the south-east Clackamas County region. It has two 11-foot lanes in each direction at the project site. The two northbound lanes were closed for the project, requiring lane closures and lane shifts across the centerline. The highway crosses under the Union Pacific tracks and through an S curve before it emerges into downtown Oregon City.

Careful planning and coordination with ODOT Region 1 Traffic and Mobility Groups, Canby area commercial transportation businesses, and residents along potential detour routes allowed the project team to fully understand implications for the lane closures and uphold access needs from key stakeholders. Over 200,000 cars and semi-trucks passed through the work zone without a single accident.

During construction, a traffic control supervisor was on-site 24/7 to inspect and maintain the work zone. This ensured that cones or traffic control devices did not become traffic obstructions and allowed rapid changes to the plan to optimize its effectiveness.



The overall traffic control extended a half mile in each direction of the project site



## Community Need

**Economic Benefit to Community** - This water main provides a critical feed that ensures fire flows can be maintained at the former Blue Heron mill site and downtown area during peak season demands. Planned redevelopment of the former Blue Heron mill site represents the largest commercial and residential project in the region. This development is estimated to create 1,200 permanent jobs and 1,100 construction jobs, which is more than 20 times more jobs than when the mill was operating. The replacement of this water main was one more step towards removing and reducing barriers to the redevelopment of the former mill site.

In addition to the economic benefits of revitalizing the former mill site, the project will restore long lost public access to the Willamette falls, through the Willamette Falls Legacy project.

**Mitigating Economic Risks** - Highway 99E is a vital commerce route for both the City and its neighbors to the south. A 2007 report of the Oregon Business Council estimates twenty percent of jobs in Oregon is either directly transportation-related or else strongly transportation-reliant (as traded industries). With the potential for a major water main failure that would close Highway 99E, the aging high-pressure water main represented a major liability to the economic balance of the region. A water main break in this area could harm drivers and cause significant damage to 99E, rendering it impassible. In addition to replacing the water main, several large and loose rocks were bolted into the solid cliff face to prevent them from falling in the future and causing damage.



Public space along the River will be restored with the Willamette Falls Legacy Project

**Value Engineering** - The project was planned to allow the contractor to complete the final design and value engineering for the pipes support systems. This allowed the installers to design the system so it aligns with their installation plans, equipment, and experience, saving time and reducing the project costs.

**Creative Use of Resources** - To take advantage of the traffic control measures and the rock fall protection measures. City operations staff excavated and replaced the section of water main that extended under the historic stone wall in conjunction with Wildish's work. This work was coordinated closely with Wildish to make sure both projects could be completed on time. This coordinated effort saved the City \$15K in traffic control costs by combining the projects. It also resulted in new pipe installed 18 feet back from the cliff face, improving seismic performance.



City crew removing pipe under historic wall



## Sustainable Practices

### Use of Recycled and Reused Materials

The pipeline and fittings are manufactured from ductile iron, which is made from 100 percent recycled scrap iron and steel. In addition, the final product is recyclable after its long, useful life.

The project reused the existing wire mesh rockfall protection fabric as it was found to be in good condition. This prevented the material from being placed in a landfill and new resources devoted to the project.

**Use of Low VOC Paint** - Pipe coatings are critical to provide long-term corrosion protection. The pipe specification carefully selected a three-coat system using low VOC paint to provide long-term protection and minimize the release of harmful or toxic chemicals.

**On-site Disposal of Materials** - Rocks from the scaling process were disposed onsite in a rocky area that blended the material into the natural setting. This prevented the need to haul and dispose of the material offsite, saving fuel and carbon emissions. The city also salvaged the existing pipe for use in an upcoming public art project that highlights the importance of public infrastructure.

Existing pipe was salvaged for future public art project



## Environmental Considerations

This project is located within the historic McLoughlin Promenade park at the top of the cliff that is heavily used by visitors viewing the falls, walking or jogging, and bird watching. A metric of success for the project includes protecting this asset and all that it offers to the citizens. Several considerations were included during design and construction to minimize impacts to the park and surrounding environment.

**Erosion and Pollution Control** - The project's proximity to the Willamette River was a concern for the risk that silt laden water, fuel, or hydraulic fluid spills enter the storm system along 99E and be released into the water shed. Wildish followed best management practices for erosion control with daily inspection and maintenance. In addition, it prepared a Pollution Control Plan to address spill prevention and clean up procedures. This included supervision and documentation of all materials brought into the work zone, clearly marking storage areas, and removing all materials after use for storage in a containment area.

**Endangered Species** - A visual inspection for any nesting or migratory birds along the bluff near the project area was completed by a licensed engineer to ensure this project would not have an adverse impact on endangered or threatened species.

**Maintaining Trail Access** - Access along the popular McLoughlin Promenade path was maintained for user's safe use and enjoyment of the park. A signed detour route around the immediate work zone was maintained.



## Community relations

The City of Oregon City strives for open communication with its residents on all projects and have many tools to do so. This project required a higher than normal level of communications due to its regional impacts.

**Public Involvement Plan** - City staff developed a detailed public involvement plan to outline the message, timing, and method of communications throughout the entire project period. The plan outlined target groups, methods of communication, schedule, description of tasks, responsibility for completion. This plan outlined all communications in detail beginning one month before the lane closures and that ramped up to the day of the closure.

|   |   |                       |  |                          |
|---|---|-----------------------|--|--------------------------|
| LUL   |   |                       |  | Monday, April 13, 2017   |
| TAC   |   |                       |  | Tuesday, May 16, 2017    |
| Downtown Oregon City                            |   |                       |  | Thursday, April 27, 2017 |
| <b>1 Month Prior to Closure</b>                 |   |                       |  |                          |
| ODOT Freight Mobility & VMS Signage             | Submit ODOT Freight Mobility Notice & Notify VMS Signage Staff of closure dates | Webb                  | Minimum 28 days prior to lane closures | Monday, May 08, 2017     |
| Project Post Card                               | Mail Project Post Card & Post of Webpage  | Oreskovich            | *15 weeks prior to lane closures       | Thursday, June 01, 2017  |
| <b>1 Week Prior to Closure</b>                  |   |                       |  |                          |
| ODOT Freight Mobility & VMS Signage             | Confirm with ODOT Freight Mobility & VMS Signage that closure is still set      | Webb                  | 1 week prior to lane closures          | Monday, June 05, 2017    |
| Stakeholder Update                              | Send Update to Stakeholder List   | Webb                  | 1 week prior to lane closures          | Monday, June 05, 2017    |
| Social Media                                    | Social Media (1 week notice)  | Webb                  | 1 week prior to lane closures          | Monday, June 05, 2017    |
| <b>3 Days Prior to Closure</b>                  |   |                       |  |                          |
| Press Release                                   | Issue Press Release, post on Social Media & Update Project Webpage              | Webb / Lewis / Harris | 3 days prior to lane closures          | Friday, June 09, 2017    |
| Social Media                                    | Press Release on Social Media   | Webb / Harris         | 3 days prior to lane closures          | Friday, June 09, 2017    |
| ODOT VMS Signage                                | Confirm ODOT Signs on I-205 SB & 99E SB are displaying Advance Language         | Webb                  | 3 days prior to lane closures          | Friday, June 09, 2017    |
| Stakeholder Update                              | Send Update to Stakeholder List - only if we have more information for them     | Webb                  | 3 days prior to lane closures          | Friday, June 09, 2017    |
| <b>Day of Closure &amp; During Construction</b> |   |                       |  |                          |
| ODOT VMS Signage                                | Confirm ODOT Signs on I-205 SB & 99E SB are switched to Construction Language   | Webb                  | Day of Closure                         | Monday, June 12, 2017    |
| Social Media                                    | Closure Notice  | Webb / Harris         | Day of Closure                         | Monday, June 12, 2017    |
| Stakeholder Update                              | Send Update to Stakeholder List at end of 1st day (if needed)                   | Webb                  | Day of Closure                         | Monday, June 12, 2017    |
| Social Media & Project Webpage Updates          | Periodic updates on social media & project webpage during lane closures         | Webb / Harris         | During lane closures                   | During Closure           |

### City's Public Involvement Plan

### Freight Mobility and Highway Restriction Notices

- To minimize disruption to commercial traffic, ODOT Mobility coordination began several months before the lane closures to provide notices to freight interests using Highway 99E. Highway restriction notices were provided through ODOT to warn oversized hauling operations of the upcoming lane restrictions.

City staff also directly contacted Canby area transportation companies, known to use Highway 99E daily several months in advance, to understand their access needs and potential for detouring to Interstate 5 during the project. This allowed these businesses to anticipate the lane closures and adjust their operations accordingly.

**Public Information** - Public notice and communications began a year in advance of the actual construction through the City's website and social media. Public information efforts became increasingly more intensive a few months before the closure as well. Public information included:

- A website dedicated to the project was created and maintained by City staff that provided project details, contact information, and updates as they became available.
- Neighboring cities and counties were notified in late March.
- Post cards were sent to all residents in proximity to the project and along possible detour in April.
- City published news article, Trail News, and provided information about the project and lane closures in May.
- City staff also presented the project to key stake holders, including the City Commission, Citizen Involvement Committee, Transportation Advisory Committee, and Downtown Oregon City Business Association throughout April and May.
- ODOT mobility notices and VMS signs provided advanced notice three days before the closure.
- Social media and Oregon Live press releases were issued the day before the closure.



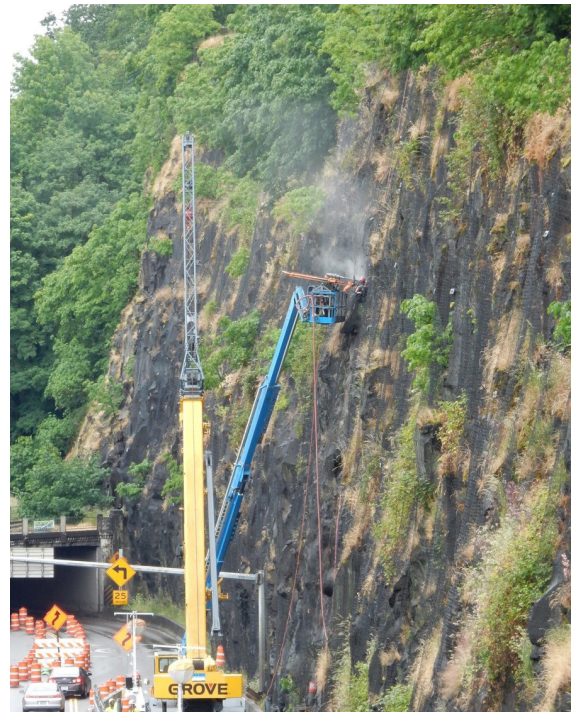
City staff presented project information to many stakeholder groups



## Unusual accomplishments

This project includes several unique accomplishments that contributed to the success of the project. These include the extended closure of Highway 99E, flexible design of pipe support system to fit with uneven rock face, and coordination between the City's water main replacement work in concert with the pipe upgrades on the bluff.

**Extended Lane Closures on Highway 99E** - Convincing ODOT that an extended closure of Highway 99E was the safest and most feasible way to construct the project was the first challenge. The City has several coordination meetings with ODOT staff to discuss construction staging, schedule, and traffic control. ODOT was adverse to the closure based on mobility disruption and asked the City for a feasibility review for limiting lane closures to non-peak traffic periods, essentially at night or between 9AM and 3PM. The project team demonstrated that night work along the rock was not safe due to difficulty of lighting the entire cliff face. In addition, residents living at the top of the bluff and would be significantly impacted by the noise. Also, it was demonstrated that the traffic control set up or removal takes the majority of a day and is the most dangerous time for both drivers and contractor crews. ODOT eventually agreed to a 10-day closure, which it ended up being able to use as test run for the traffic control planned for the upcoming scaling projects in 2018.



Proximity to the tunnel limited the work zone



Fabricated parts had to work

**Pipe Profile Survey and Pipe System Flexibility** - It was critical the pipe support connections between the pipe and rock wall had the ability to adjust to the rock face, which is inconsistent relative to the distance from the water main. The distances varied between several inches to several feet. As all the parts were fabricated in advance of the lane closures and could not be changed within the 10-day period, there was no room for error.





Installing upper pipe section and ball joint



Pre-fabrication survey of existing pipe and rock face profiles

To address these challenges, Wildish surveyed the existing pipe using a hanging basket to mark and measure the support anchor locations and the distance to the rock face from the pipe at each location. Each support bracket was designed to fit, but also included the ability to telescope up to one-foot of extension. In addition, multiple bolt holes were drilled into the fabricated connection brackets to provide even more flexibility. This proved to be an invaluable feature during installation.

In addition to the flexibility of the support system, the use of flexible ball joints in a vertical orientation provided up to 25 degrees of bending in any direction. This allowed the new pipe to maintain a similar profile as the existing pipe, which had two non-standard angle bends that followed changes in bluff profile. This simplified the installation, saved time during construction, and improved seismic performance.



Upper elbow and ball joint

### Coordination of Projects

As mentioned, City staff decided to replace the buried portion of the water main at the top of the bluff while Wildish replaced the exposed portion. The City excavated the existing main, tunneled under the historic wall without damaging it, and worked with Wildish to thread a new pipe into its place. This work didn't delay the project and provided the City with additional length of new hardened pipe along a critical part of the alignment.



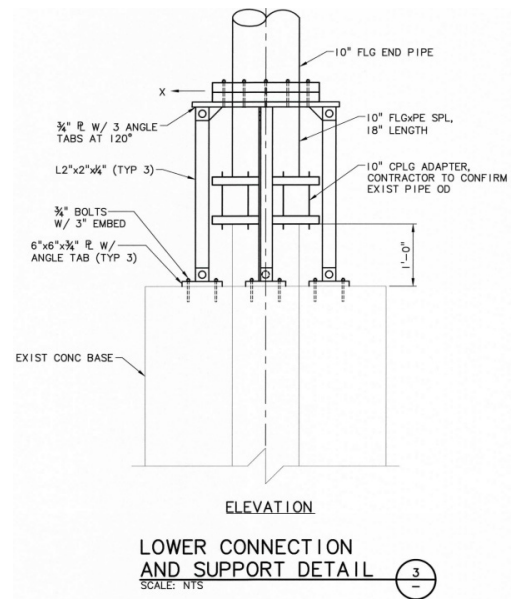
## Additional considerations

This project had significant geotechnical, structural, traffic, and schedule related challenges that the design and the City had successfully addressed.

**Geohazards** - Geohazards along the bluff were identified during construction and either removed or secured with rock bolts that were anchored 10-feet into solid rock.

**Protection of Existing Pipe** - The structural support system was designed to transfer the load from the new pipe to the rock face or concrete support system, thus isolating the new pipe from the existing pipe at the end connections. This will relieve any stresses on the more fragile existing steel pipe.

## Detail for base support system



Before and after of the upper connection illustrates increased pipe support over the original installation





**Traffic** - The mile-long traffic control plan safely directed over 200,000 cars and trucks through the work zone. Careful planning, active communication, and responsive traffic control management paid off as the project was completed without a single incident. This the longest and most complicated traffic control plan the City has completed since its closure of Highway 213 for the Washington Street Bridge installation in 2012.



Timeline photos of project site

**CCTV of Buried Water Main** - The team video inspected the existing pipe section that extends under Highway 99E to access its condition while the pipe was cut open. The intent of this work was to identify any underground sources of leaks or failure points. The City intends to replace the buried portion of the water main in conjunction with the mill site redevelopment, but this may not occur for several years.

Inspection results found the pipe extends approximately 40 feet below the grade of 99E before it turns and runs under the road and railroad tracks. The camera was not able to go through the bend, therefore the City was not able to inspect the entire section under the road. However, the pipe condition that was inspected did appear to have enough remaining useful life until it can be replaced.

CCTV shows  
modest  
tuberculation,  
but no excessive  
corrosion













Water main leak in December 2013



Site visit during design



Excavation of existing main at top of Bluff



Work zone in 99E



Existing water main



Drilling pipe support anchors



Installing new water main



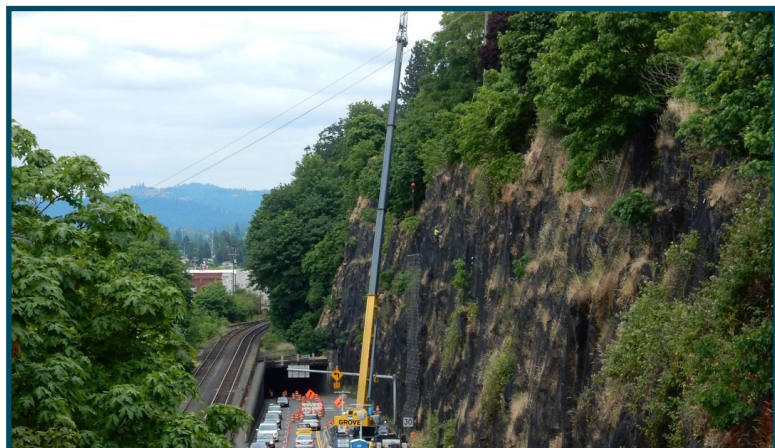
Base support for new water main





# City of Oregon City Hwy 99E Bluff Waterline Replacement

Construction Sequence



Lane closures and equipment mobilization



Preparing to remove existing water main



Removal of existing water main



Drilling pipe anchors



Installing new water main



Upper bend and ball joint



Touch up painting



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City of Oregon City

**Murraysmith**  
888 SW 5th Avenue, Suite 1170  
Portland, OR 97204  
503.225.9010

