Puget Sound Energy
Pipeline Replacement Program Plan
June 2017

Docket No. UG-120715

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1. Introduction

On December 31, 2012, the Washington Utilities and Transportation Commission (UTC) issued a policy statement for the accelerated replacement of natural gas pipeline facilities with elevated risk. This policy statement requires each gas company, whether requesting a special pipe replacement cost recovery mechanism (CRM) or not, to file with the Commission a pipe replacement program plan containing the following elements:

1. A "master" plan for replacing all pipes with an elevated risk of failure
2. A two-year plan that specifically identifies the pipe replacement goals for the upcoming two year period
3. A plan for identifying the location of pipe that presents elevated risk of failure

In accordance with this policy statement, Puget Sound Energy (PSE) had previously prepared pipeline replacement program (PRP) plans beginning 2013 for pipe that poses an elevated risk of failure. Through PSE's Distribution Integrity Management Program (DIMP), PSE continually analyzes the performance of its distribution system and detailed analysis indicates the same subsets of materials continue to present an elevated risk of failure. These subsets include larger diameter (1-1/4" and larger) DuPont Aldyl "HD" plastic pipe, older vintage wrapped steel mains, and older vintage wrapped steel services. Sewer cross bores was also identified as pipe with an elevated risk of failure through DIMP and was included in the PRP plan in 2015.

2. PSE's Distribution Integrity Management Program (DIMP)

As required by the DIMP regulations, PSE analyzes many aspects of system performance including trends on identified system threats. The threats that are identified and evaluated in DIMP include:

- Corrosion failure
- Natural force damage
- Excavation damage
- Other outside force damage
- Pipe, weld or joint failure
- Equipment failure
- Incorrect operations
- Other cause

The analysis includes reviewing leak, failure analysis, and system condition data to identify trends, and the results are reported in the Continuing Surveillance Annual Report. A copy of the report is provided to the UTC after each annual update. The analysis provides insight into the risks associated with pipe identified as having an elevated risk of failure that are included in the PRP plan.

PSE continues to increase pipeline safety and system reliability through the continuous improvement of its DIMP. The assessment, prioritization, and mitigation of system risks continue to be refined as new and additional risk knowledge is incorporated into DIMP through normal O&M and DIMP activities. Activities related to DIMP could include gathering data, conducting targeted inspections, and completing remediation and replacement work associated with integrity management driven programs. Based on additional risk knowledge and the results of the system trends analysis, the Master Plan may be modified appropriately to further accelerate or decelerate the pipe replacement schedule. Additionally, PSE is actively monitoring system threats and performance and may identify additional materials that have an elevated risk of failure. If any material changes are made to the PRP plan, PSE will submit the changes to the Commission as required by the Commission's Policy Statement.

Currently, PSE has identified corrosion due to unintentionally buried pipe to be a system risk and may consider requesting the material to be included in the PRP plan at a later date. Meters and associated fittings that are inadvertently buried have resulted in hazardous corrosion leaks up against structures. As part of DIMP, the strategy is being re-evaluated for preventing burial and accelerating risk mitigation to reduce the growing backlog. Previously, Celcon service tee caps and bolt-on service tees were being considered for inclusion in the PRP plan. It was determined that the risks are being adequately addressed under DIMP therefore accelerated pipe replacement programs for these materials are not needed.

3. PSE's PRP Plan Progress

The following table summarizes the miles of pipe and the number of services replaced under the replacement programs according to the Master Plan since 2013.

Table 1. Summary of Replacement Programs from 2013-2016[1]

	DuPont Aldyl "HD" Plastic Pipe		Older Vintage Wrapped Steel Mains		Older Vintage Wrapped Steel Services	
Program Year	**Miles of Pipe**	**Expenditures[2]**	**Miles of Pipe**	**Expenditures**	**Services**	**Expenditures**
2013	6.5	$6.9 million	3.2	$3.7 million	163	$1.6 million
2014	10.5	$13.5 million	4.5	$7.1 million	187	$2.1 million
2015	28.6	$41.4 million	4.0	$6.5 million	208	$2.7 million
2016	27.4	$32.7 million	5.0	$7.9 million	215	$2.8 million
Total	**73.0**	**$94.6 million**	**16.7**	**$25.3 million**	**773**	**$9.3 million**

1 Expenditures are as of April 2017; 2 Additional expenditures for DuPont Aldyl "HD" Plastic Pipe are expected to incur after April 2017

PSE also originally identified bare steel pipe as a material having an elevated risk of failure. As of December 31, 2014, PSE has completed the replacement of all known bare steel pipe in accordance with the negotiated Settlement to Dockets PG-030080 & PG-030128 between PSE and the UTC.

4. DuPont Aldyl "HD" Plastic Pipe

Master Plan

Risk Assessment

PSE identified an increased risk of premature, brittle-like cracking of the larger diameter (1-1/4" and larger) Aldyl "HD" plastic pipe manufactured by DuPont. PSE installed this pipe in the 1970s and early 1980s and originally estimated there be approximately 400 miles left in service in 2013. After further review, PSE estimates there to be nearly 435 miles that was in service at the beginning of 2013 prior to any pipe replacement completed under PRP.

The brittle-like cracking is due to slow crack growth (SCG) at locations where there is a stress concentration. Based on PSE's experience, the brittle-like cracking is primarily due to rock impingement but also occurs where the pipe has been squeezed or where other stress concentrations have been introduced due to inconsistent joining practices. The failure is referred to as brittle-like cracking because it occurs without any localized plastic deformation. While the failure occurs without plastic deformation, the pipe is not brittle. Even when a failure occurs due to SCG, the PE pipe is still resistant to crack propagation preventing it from becoming a larger crack. A

study by GTI (Gas Technology Institute) performed at PSE's request provides additional insight into how installation and operating practices, environmental conditions, and operating pressures impact the life expectancy of the pipe.

PSE developed and implemented a program in 2010 to prioritize larger diameter DuPont Aldyl "HD" plastic pipe for replacement based on the likelihood and consequence of failure. The program was incorporated into DIMP and evaluates the risk of brittle-like cracking based on installation and operating practices and environmental conditions. These segments of larger diameter DuPont Aldyl "HD" plastic pipe have an elevated risk of failure as validated by DIMP system performance data.

Industry Experience

PSE's experience with the larger diameter DuPont Aldyl "HD" material is similar to industry experience with many of the older PE materials. This is highlighted by many of the Safety Recommendations issued by the National Transportation Safety Board (NTSB) on April 30, 1998. These recommendations were based on findings from NTSB's investigation of PE pipe following several natural gas distribution accidents that involved plastic piping that cracked in a "brittle-like" manner. The following summarizes many of the issues identified in the NTSB's investigation that correlate to PSE's experience with the DuPont Aldyl "HD" material:

- Nationally, brittle-like failures represent a frequent failure mode for older plastic piping.
- The procedure used to rate PE materials from the 1960s through the early 1980s may have overrated the materials long term strength and resistance to brittle-like cracking.
- The test methods used at the time did not reveal the susceptibility of many early PE materials to brittle-like cracking.
- Plastic pipe was assumed to perform in a ductile manner; therefore, plastic pipe design focused primarily on stress due to operating pressure. As a result, little consideration was given to stress due to external loading as it was assumed that these stresses would be reduced by localized yielding.
- Experts in gas distribution plastic piping indicate that some of the PE pipe manufactured from the 1960s through the early 1980s has demonstrated poor resistance to brittle-like cracking. There is evidence that some early vintage PE materials have a lower SCG resistance than other PE materials. Newer test methods more accurately predict the pipe's resistance to SCG.

Aldyl "HD" vs Aldyl "A"

In addition to the Aldyl "HD", DuPont also manufactured a medium density PE pipe marketed under the name Aldyl "A". While PSE only purchased and installed the Aldyl "HD" pipe, information on both Aldyl "A" and Aldyl "HD" pipe is included to highlight the similarities and differences in the risks of these two materials. Similar to PSE's experience with Aldyl "HD", the Aldyl "A" pipe has been found to be susceptible to brittle-like cracking.

The Aldyl "A" pipe manufactured from 1970 through early 1972 had a manufacturing issue that resulted in a brittle inside surface also referred to as low ductile inner wall (LDIW). This characteristic resulted in premature failures. In early 1972, DuPont changed the manufacturing process to address the LDIW phenomena. While only early 1970s vintage Aldyl "A" pipe had the LDIW inner surface, both Aldyl "HD" and later vintage Aldyl "A" have exhibited brittle-like cracking failure characteristics in pipes 1 ¼" and larger in diameter. The smaller diameter piping is more flexible and not as susceptible to the brittle-like cracking experienced in larger diameters.

Both Aldyl "HD" and Aldyl "A" were made with state-of-the-art PE resins at the time of manufacture and met applicable industry standards and complied with federal regulations. However, by today's standards they both

have low resistance to SCG and are susceptible to SCG field failures. This is particularly true when these pipes are subjected to secondary loads, such as rock impingement and squeeze-off.

Predictions on the Remaining Useful Life Expectancy

PSE consulted with Gas Technology Institute (GTI) to develop data, information, and predictions on the remaining useful life expectancy based on samples of DuPont Aldyl "HD" plastic pipe extracted from PSE's distribution system. The purpose for the evaluation performed by GTI is to provide additional risk knowledge into the failure mode of DuPont Aldyl "HD" plastic pipe and information on the pipe characteristics, operating conditions, and environmental factors that may impact the material's performance. This study also provides a means to predict the remaining useful life expectancy of the pipe to validate the current remediation schedule or determine the appropriate remediation timeframe. Based on the testing and analysis performed, the study concludes that the expected useful life is impacted by temperature, operating pressure, and the severity of stress risers.

Based on the evaluation, there may be specific pipelines operating at relatively low pressures that even under extreme stress risers pose minimal risk. These facilities may be deemed to be low risk and not replaced as part of the Master Plan. The overall pipe replacement strategy will continue to prioritize based on the highest risk pipe from historical performance, however may be adjusted considering the new risk knowledge.

DuPont Aldyl "HD" Plastic Pipe Replacement Program Plan

PSE is actively replacing the larger diameter DuPont Aldyl "HD" plastic pipe that poses an elevated risk of failure. The current plan is to replace this pipe within 20 years beginning in 2013. PSE will continue monitoring the performance of larger diameter DuPont Aldyl "HD" pipe. By acquiring new risk knowledge through DIMP, PSE will update the replacement schedule and timeframe as necessary.

Based on current risk knowledge and historical performance, PSE currently plans to replace approximately 245 miles of larger diameter DuPont Aldyl "HD" plastic pipe within the first 10 years of the 20-year plan beginning in 2013. The pipe replacement in the first 10 years targets the population with a history of brittle-like cracking and fusion failures. The miles of pipe planned for replacement and the replacement schedule were updated from 190 miles and 8 years, respectively, based on new risk knowledge acquired since 2015. By 2022, the Master Plan will be reviewed to determine the appropriate replacement schedule for the remaining pipe in service. The current replacement schedule is provided in the Table 2 and Figure 1.

Table 2. DuPont Aldyl "HD" Plastic Pipe Replacement Schedule, Miles, and Estimated Expenditures

Program Years	Total Planned Replacement Miles	Estimated Expenditures[1]
1 – 10	245 Miles	$321.2 million
11 – 20	190 Miles	$249.1 million
Total	**435 Miles**	**$570.3 million**

1 Estimated expenditures are in 2017 dollars and do not include AFUDC

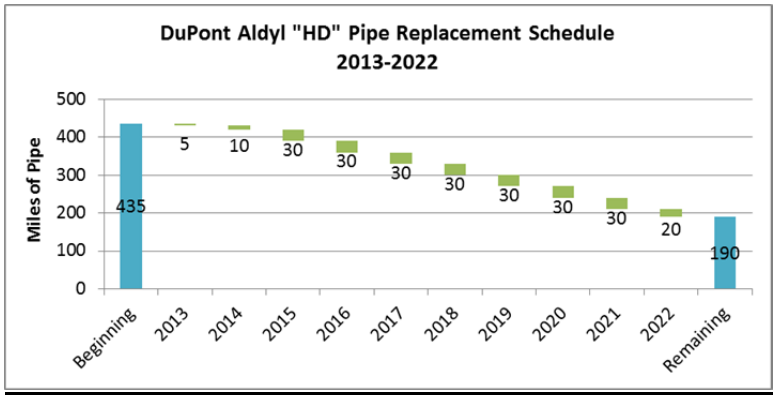

Figure 1. DuPont Aldyl "HD" Plastic Pipe Replacement Schedule for Years 1 - 10

Two-Year Plan

The two-year plan is to continue replacing DuPont Aldyl "HD" plastic pipe according to the Master Plan. The following table shows the planned replacement miles and expenditures of DuPont Aldyl "HD" plastic pipe for the current year and in calendar years 2018 and 2019.

Table 3. Planned Replacement Miles and Expenditures

Year	Planned Replacement Miles	Planned Expenditures[1]
2017	30 Miles	$39.3 million
2018	30 Miles	$39.3 million
2019	30 Miles	$39.3 million
Total	**90 Miles**	**$118.0 million**

1 Estimated expenditures are in 2017 dollars and do not include AFUDC

Appendix A provides a list of the DuPont Aldyl "HD" plastic pipe projects that are planned for replacement in the calendar years 2018 and 2019. Adjustments to projects will be made as required while managing to the Master Plan and overall system risk.

Identification Plan

PSE purchased and installed DuPont Aldyl "HD" plastic pipe in the 1970s and early 1980s. During this timeframe, PSE also purchased and installed Phillips Driscopipe M8000 and Plexco pipe. PSE's historical construction records did not capture the pipe manufacturer and only indicated the location of the pipe, material type, pipe size, and date the pipe was installed. As a result, PSE developed and implemented a plan in 2013 to identify the manufacturer of larger diameter HDPE pipe installed in the 1970s and early 1980s. The plan focused only on identifying candidate pipe installations that may pose an elevated risk of failure.

Completion of Targeted Excavations

By the end of 2016, PSE completed the targeted excavations to identify locations of DuPont Aldyl "HD" plastic pipe in the system. Locations of the targeted excavations were strategically selected to identify all original installation jobs that potentially contain DuPont Aldyl "HD" plastic pipe. The identification effort confirmed that approximately 2,700 original installation jobs contain some amount of DuPont Aldyl "HD" plastic pipe.

Ongoing Verification through Routine Operations and Planned Projects

PSE currently captures information on the pipe manufacturer through the Exposed PE Pipe Report whenever plastic pipe is exposed during routine operations and maintenance activities. Additional information is also gathered from confirmation excavations when refining the scope of DuPont Aldyl "HD" pipe replacement projects and opportunities through other planned pipe replacement projects. The information is used to further refine and verify the amount and location of DuPont Aldyl "HD" pipe remaining in service.

5. Older Vintage Wrapped Steel Mains

Master Plan

Risk Assessment

PSE identified an increased risk of failure on a subset of older vintage wrapped steel mains. The primary risks on older vintage wrapped steel mains include external corrosion, weld failures, and equipment failures. External corrosion on older vintage wrapped steel mains is attributed to disbonded, damaged or poorly performing pipe coatings, poor soil conditions, ineffective cathodic protection, and other factors. Majority of weld failures are on older vintage wrapped steel mains and also at the service to main connections. The primary contributor to equipment failure is aging valves.

PSE developed and implemented a program in 2010 to prioritize sections of wrapped steel mains installed prior to 1972 for replacement based on the likelihood and consequence of failure. Ongoing analysis of the older vintage wrapped steel system continues to identify areas that have leaked and have reports of corrosion and/or substandard pipe conditions. These segments of main and their associated service piping have an elevated risk of failure as validated by DIMP system performance data. The program has also been incorporated into DIMP and there is approximately 3,100 miles of older vintage wrapped steel main that remain in service.

Older Vintage Wrapped Steel Main Replacement Program Plan

PSE is actively replacing older vintage wrapped steel main and associated service pipe that poses an elevated risk of failure. PSE will continue monitoring the performance of older vintage wrapped steel mains through DIMP and appropriately update the replacement schedule and timeframe as necessary. For pipe currently not identified as having an elevated risk of failure, PSE will continue to incorporate new risk knowledge and evaluate whether this population warrants replacement under PRP in the future.

Based on current risk knowledge and historical performance, PSE will continue replacing approximately 20 miles of older vintage wrapped steel mains within 5 years beginning in 2013. The current replacement schedule is provided in Table 4.

Table 4. Older Vintage Wrapped Steel Main Replacement Schedule, Miles, and Estimated Expenditures

Program Years	Total Planned Replacement Miles	Estimated Expenditures[1]
1 – 5	20 Miles	$32.1 million

1 Estimated expenditures are in 2017 dollars and do not include AFUDC

At the end of 2017, the Master Plan for replacing older vintage wrapped steel mains with an elevated risk of failure will be complete. The remaining older vintage wrapped steel mains currently do not pose an elevated risk of failure based on recent trends and performance. Older vintage wrapped steel mains will no longer be included in the PRP after 2017 and will continue to be monitored and mitigated through DIMP.

Two-Year Plan

The two-year plan is to continue replacing older vintage wrapped steel mains according to the Master Plan. The following table shows the planned replacement miles and expenditures of older vintage wrapped steel main for the current year. No additional pipe replacement projects are planned beyond 2017 according to the Master Plan.

Table 5. Planned Replacement Miles and Expenditures

Year	Planned Replacement Miles	Planned Expenditures[1]
2017	4 Miles	$6.4 million

1 Estimated expenditures are in 2017 dollars and do not include AFUDC

Identification Plan

The location of older vintage wrapped steel pipe that presents an elevated risk of failure is continually monitored by reviewing system information that includes leak repairs, active leaks, and exposed pipe condition reports. In conjunction with reviewing system performance data, the geographic information system (GIS) is being utilized to proactively identify any new areas that may present an elevated risk of failure.

6. Older Vintage Wrapped Steel Services

Master Plan

Risk Assessment

PSE identified an increased risk of failure on a subset of the older vintage wrapped steel services. The primary risk on older vintage wrapped steel services is external corrosion, which is attributed to disbonded, damaged or poorly performing pipe coatings, poor soil conditions, ineffective cathodic protection, and other factors.

PSE developed and implemented a program in 2006 to assess the risks on wrapped steel services installed prior to 1972 based on the likelihood and consequence of failure. The older vintage wrapped steel services that pose an elevated risk of failure are determined based on current risk knowledge and the results from the risk model. The risk model, which was previously approved by the UTC, is updated annually with new risk knowledge as well as additional risk knowledge that is gained from on-going review of installation records. Since this program began, more than 10,000 of the original population of approximately 100,000 services have been mitigated. The program has also been incorporated into DIMP and there is approximately 85,000 older vintage wrapped steel services remaining in the system.

Older Vintage Wrapped Steel Service Replacement Program Plan

PSE is actively replacing older vintage wrapped steel services that pose an elevated risk of failure. PSE will continue monitoring the performance of older vintage wrapped steel services through DIMP and appropriately update the replacement schedule and timeframe as necessary. For pipe currently not identified as having an elevated risk of failure, PSE will continue to incorporate new risk knowledge and evaluate whether this population warrants replacement under PRP in the future.

Based on current risk knowledge, historical performance, and risk model results, PSE will continue replacing approximately 200 older vintage wrapped steel services each year over 5 years beginning in 2013. The current replacement schedule is provided in Table 6.

Table 6. Older Vintage Wrapped Steel Service Replacement Schedule, Units, and Estimated Expenditures

Program Years	Approximate Annual Replacement	Estimated Expenditures[1]
1 – 5	200 Services	$12.7 million

1 Estimated expenditures are in 2017 dollars and do not include AFUDC

At the end of 2017, the Master Plan for replacing older vintage wrapped steel services with an elevated risk of failure will be complete. The remaining older vintage wrapped steel services currently do not pose an elevated risk of failure based on recent trends and performance. Older vintage wrapped steel services will no longer be included in the PRP after 2017 and will continue to be monitored and mitigated through DIMP.

Two-Year Plan

The two-year plan is to continue replacing older vintage wrapped steel services according to the Master Plan. The following table shows the planned replacement and expenditures of older vintage wrapped steel services for the current year. No additional pipe replacement projects are planned beyond 2017 according to the Master Plan.

Table 7. Planned Replacement Miles and Expenditures

Year	Planned Replacement	Planned Expenditures[1]
2017	200 Services	$2.5 million

1 Estimated expenditures are in 2017 dollars and do not include AFUDC

Identification Plan

PSE identified the location of older vintage wrapped steel services based on an extensive map review when the program first began and recorded this information in a database. While this database is a useful tool for managing these services, PSE is working towards utilizing GIS as the data source for the ongoing identification and tracking of these services. Beginning in 2015, the services in the existing database are being migrated into GIS with the plan to complete the migration by 2018. Once the GIS is configured, there will be improved data integration, risk knowledge, and tracking of older vintage wrapped steel services and risks.

7. Sewer Cross Bores

Master Plan

Risk Assessment

Through DIMP in 2011, sewer cross bores was identified as having an elevated risk of failure. A sewer cross bore is a gas pipeline that was inadvertently installed through an unmarked sewer pipe. Sewer cross bores occur from the use of trenchless construction which creates inherent risk because sewers are not always located. If there is a sewer cross bore and it causes a blocked sewer, using a machine to clear the blocked sewer could damage the gas line endangering people and property. Sewer cross bores pose an elevated risk of failure due to the high consequence that would result if damage occurs. Based on PSE's experience, it is more likely for plastic service lines in residential urban areas to be cross bored through sewers. Since 2001, more than 890 cross bores have been discovered in PSE's system.

Sewer Cross Bore Replacement Plan

PSE is actively replacing all sewer cross bores as they are discovered. Any sewer cross bore is considered an elevated risk of failure and is immediately scheduled for replacement. PSE will continue to incorporate new risk knowledge to enhance the identification of potential locations of sewer cross bores to further proactively correct such installations. Currently, PSE plans to continue replacing sewer cross bores as they are discovered.

Two-Year Plan

The two-year plan is to continue replacing locations where sewer cross bores are discovered according to the Master Plan.

Identification Plan

PSE is continually improving the identification of sewer cross bores to proactively identify and replace cross bores while not creating new ones. Camera inspections are necessary to identify if there are potential sewer cross bores and also to physically locate sewer main and laterals because municipalities and property owners have poor records or lack records. Beginning in 2013, PSE has increased the public awareness of sewer cross bore safety, started conducting post-construction sewer inspections near new gas trenchless installations, and started inspecting sewers near legacy gas trenchless installations.

PSE has launched a public awareness initiative to publicize PSE's cross bore safety program. The awareness targets plumbers, other utility contractors, municipalities, and customers to call PSE before clearing a blocked sewer. PSE's Gas First Response responds within an hour of the call to determine if there is a potential sewer cross bore. PSE plans to continue improving sewer cross bore public awareness by messaging the intended audience through a variety of mediums.

PSE has contracted with Hydromax USA to be PSE's service provider to conduct sewer inspections near new and legacy gas trenchless installation sites. The sewer inspections include:

- Sewers in proximity to new gas trenchless installations to confirm that new cross bores are not created and also as a cost-effective opportunity to conduct legacy inspections
- At-risk sewers in proximity to legacy trenchless gas installations identified through a historical cross bore study of PSE's installation records between 2001 and 2013

A risk model was developed and implemented in 2016 to prioritize legacy inspections to better target at-risk sewers. The risk model is based on the results from the historical cross bore study, risk knowledge gained through new and legacy inspections conducted to date, and other risk factors.

8. Public Interest

The pipe replacement plans for the materials that pose an elevated risk of failure included in this PRP plan have been developed considering many factors. These factors include:

- Improving the safety of the distribution system by replacing pipe based on the relative level of risk presented for each material and location
- Minimizing the replacement costs by maximizing efficiencies and productivity
- Minimizing the impacts to municipalities and the general public

9. Rates Impact

The replacement programs that are included the CRM include DuPont Aldyl "HD" plastic pipe, older vintage wrapped steel mains, and older vintage wrapped steel services. Sewer cross bores is currently not included in the CRM. PSE proposes to recover the total capital investments for these replacement programs. The first CRM filing submitted by PSE was in June 2014, with rates effective November 1, 2014.

The impact of that rate filing represented an increase in overall customer rates of 0.5%. Consistent with the requested potential rate impact analysis discussed in paragraph 55 of the policy statement, PSE's best estimate at this time is that the current impact on the overall customer rates is 0.56%, while the long-term impact is expected to be less than 0.5% for the 2018 through 2034 period.

Appendix A

Two-Year Replacement Plan for DuPont Aldyl "HD" Plastic Pipe

Table A-1. 2018 Planned Replacement Projects

Project Location	Planned Retirement Footage
ALGONA	43
AUBURN	3,013
BELLEVUE	9,659
BOTHELL	17,586
BURIEN	219
DES MOINES	2,492
EVERETT	300
FEDERAL WAY	7,143
FETERAL WAY	367
GIG HARBOR	5,617
HUNTS POINT	465
KENT	22,151
KIRKLAND	5,002
LAKEWOOD	9,164
LYNNWOOD	224
MAPLE VALLEY	123
MERCER ISLAND	293
MILL CREEK	4,200
OLYMPIA	466
PUYALLUP	2,305
RENTON	16,795
SAMMAMISH	3,906
SEATTLE	44,720
STEILACOOM	2,808
TACOMA	3,272
TUKWILA	3,049
WOODINVILLE	5,157

Table A-2. 2019 Planned Replacement Projects

Project Location	Planned Retirement Footage
AUBURN	8,685
BELLEVUE	6,585
EDGEWOOD	185
EVERETT	5,758
FEDERAL WAY	6,126
JBLM	433
KENT	9,645
LACEY	720
LAKEWOOD	3,111
OLYMPIA	10,471
PUYALLUP	6,286
REDMOND	8,272
RENTON	6,064
SAMMAMISH	5,992
SEATTLE	55,062
TACOMA	14,666
TUKWILA	1,118
TUMWATER	5
WOODINVILLE	9,218