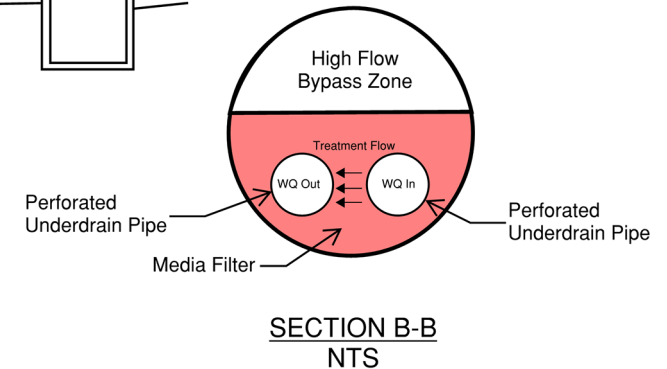
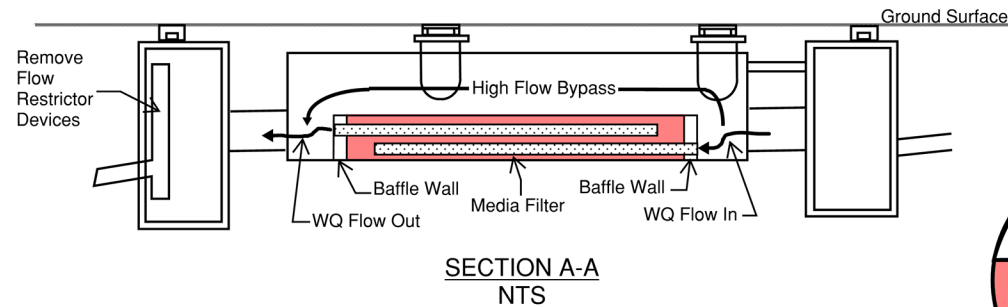
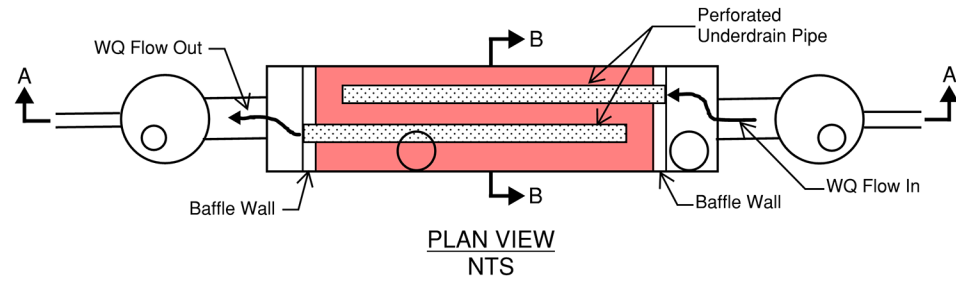




Detention Pipe Retrofit Study and Pilot Project



Problem Statement

The City owns numerous underground stormwater detention pipes, which hold runoff and release it slowly after storms.

Underground detention pipes require regular inspection and maintenance. Tigard is responsible under its agreement with Clean Water Services (CWS) for inspecting and maintaining its detention pipes. This maintenance also meets requirements of the National Pollutant Discharge Elimination System municipal stormwater permit that Tigard co-implements with CWS.

The City's assessment from 2012 shows that maintenance crews have difficulty accessing 67 of the pipes. These take more time to inspect and clean compared to other types of storm sewer infrastructure.

The assessment also shows that eight pipes cannot be maintained by the City without a structural change. The performance status and condition of these is unknown.

The City lacks the resources to analyze the eight unmaintainable pipes and requires professional services to assess them and develop solutions.

In addition, many of Tigard's stormwater detention pipes have no pollutant removal capability. Adding a water quality treatment function to these existing detention systems could be a cost-effective way to improve water quality in creeks where the pipes discharge. Further study is needed to evaluate options.

Recommendation

The recommendation is to develop an initial three-year retrofit project to address the most urgent needs followed by a second study and pilot project.

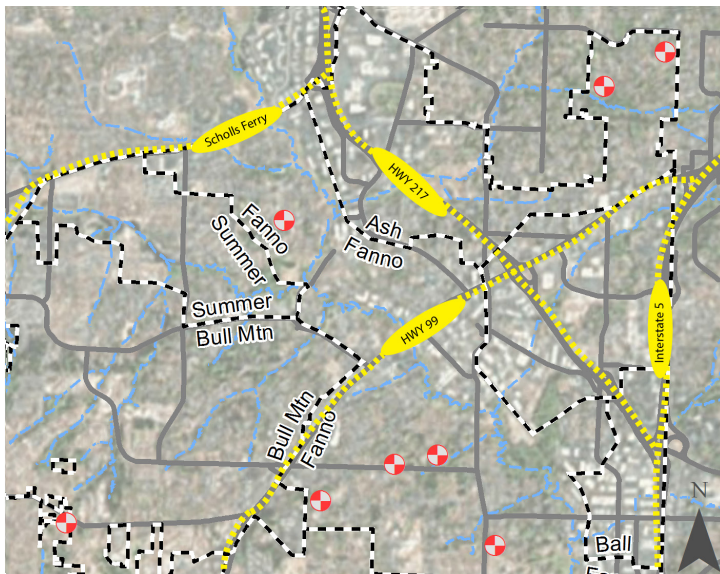
In the first year of the program, assess the conditions of the eight pipes that cannot be maintained, diagnose access issues, and design solutions.

In the second and third years, construct improvements for as many of the eight critical pipes as possible within the program budget.

- If access can easily be improved by adding one or more manholes into the pipe, then design and construct these improvements.
- If access cannot be improved, but space is available upstream for a pre-settling basin or hydrodynamic separator, evaluate whether this option could reduce the need for maintenance by reducing how much trash and sediment enter the pipe.
- If neither option is feasible, then remove the pipe from the system by eliminating the flow control structure or installing a slip line. Conduct a downstream analysis to ensure sufficient capacity in the system.

In subsequent years, study the remaining 67 detention pipes to identify opportunities to add water quality treatment. For example, burying a perforated pipe in a filtration media such as sand, while allowing a portion of the pipe to remain open to pass high flows, would add pollutant removal capability while maintaining detention function. See illustration on the front page. Consider other innovative retrofit designs.

Conduct a pilot project to retrofit two pipes and evaluate the results.



Locations of detention pipes that cannot be maintained

Cost Estimate

The cost estimate assumes a consultant is hired in year one for the initial study and design and that construction takes place during years two and three. Extent of needed repairs are roughly anticipated based on the City's 2012 internal assessment of detention pipes. Costs are estimated using the cost estimates prepared for the capital improvement projects of this master plan. Costs below assume construction is bid as a group of projects rather than as individual projects.

A subsequent study and retrofit pilot project is recommended for a period of three years. This follow-up study will begin in year four of the program.

Year One - Initial Study and Design

Items	Qty	Unit	Unit Price	Total
Professional Services Contract	1	EA	\$100,000	\$100,000
Project Administration, 15% of Services				\$15,000
Total				\$115,000

Years Two and Three - Construction

Manhole	6	EA	\$8,000	\$48,000
Pre-Settling Basin (5-15 ac upstream basin)	2	EA	\$32,000	\$64,000
Other Structures Construction				\$15,000
Annual Permitting	2	EA	\$5,000	\$10,000
Annual Mobilization	2	EA	\$6,350	\$12,700
Annual Erosion & Sediment Control	2	EA	\$1,270	\$2,540
Construction Contingency, 40%	1	EA	\$50,800	\$50,800
Project Administration, 15% of Services				\$31,000
Total (Rounded)				\$240,000

Years Four through Six - Water Quality Retrofit Study and Pilot Project

Study	1	EA	\$50,000	\$50,000
Design	2	EA	\$50,000	\$100,000
Construction, Mobilization, Permitting	2	EA	\$130,000	\$260,000
Project Administration, 15% of Services				\$65,000
Total				\$475,000

