

## Culvert Rehabilitation, Maintenance and Replacement Program



### Problem Statement

The City has an inventory of 37 culverts and six storm outfalls greater than or equal to 36 inches in diameter. A culvert is a pipe under a road used to convey a stream or open drainage channel. Driveway culverts are not included in this recommendation.

The City hired a consultant (OBEC, 2017) to inspect and make recommendations for maintenance and replacement. The majority of culverts inspected were found to be in either good or fair condition with only minor defects that do not affect the operation of the structure. The replacement value of these large culverts and outfalls was found to be approximately \$5 million.

Seven culverts remain unassessed because the structures were not accessible at the time of the study.

While most culverts were found to be in good condition, all are approximately the same age and condition. As a result, a large number of culverts will need to be

replaced at approximately the same time in 15 – 25 years.

The condition of the City's inventory of culverts less than 36 inches in diameter has not been assessed. Currently, the City maintains these as needed when a problem becomes apparent.

## Recommendation

One recommendation is to complete an assessment of culverts less than 36-in diameter (smaller culverts) and to establish a plan for maintenance and replacement.

Another recommendation is to conduct an hydraulic analysis on any culvert being assessed for replacement to determine needs for upsizing or fish passage.

Finally, a key recommendation is to maintain the inventory of large culverts as described by OBEC. Most culverts greater than 36-in diameter assessed as part of the Stormwater Master Plan process require only minor maintenance to function well.

Annual maintenance recommendations include:

- Maintaining hydraulic capacity.
- Keeping free of debris and vegetation.
- Inspecting culverts before and immediately following winter months.
- Additional inspections after storm events or if beaver activity is found.

Cyclic maintenance recommendations include:

- Cyclic coating program to address corrosion or issues with asphaltic coatings in corrugated metal pipe.
- Correct scouring, headcutting, or undermining at inlets and outlets.
- Repair or seal if cracking or settlement appears in pavement over culverts.

Some culverts may be too deteriorated to correct with cyclic maintenance and would require more in-depth rehabilitation. Rehabilitation work may include:

- Headwall repair or replacement.
- Void filling or seam/joint repairs.
- Lining, such as slip-lining with smaller diameter pipes or cured-in-place pipe liners.
- Pipe bursting.

The program should focus on culverts rated “fair” or better for lining. Liners can be a cost-effective rehabilitation option versus replacement; however, they can reduce the hydraulic capacity and may not be a good option when hydraulic capacity or fish passage is a consideration. With an average replacement value of \$25,000 for culverts, any lining costs below the average replacement value should be considered.

Three culverts in the inventory were rated in poor or critical condition and could be candidates for replacement. One (Durham Road at 113th Avenue) is already in the process of being repaired. The other two culverts in poor condition (SW Genesis Loop and 115th Avenue) had severe corrosion and poor alignment.

The current backlog of the culverts in poor to critical condition is approximately \$200,000. The study recommends an annual culvert replacement budget of \$40,000 based upon a median value of \$30,000 and a lifespan of 50 years.

## Cost Estimate

### One-Time Costs

Smaller Culvert Assessment Professional Services	\$50,000
Cyclic Maintenance Backlog	\$72,500
Rehabilitation Backlog	\$80,000
Replacement Backlog	\$200,000
Project Administration, 15% of Services	\$60,375
<b>One-Time Total (Rounded)</b>	<b>\$470,000</b>

### Annual Costs

Annual Maintenance	\$10,000
Cyclic Maintenance	\$20,000
Rehabilitation	\$26,500
Replacement	\$40,000
Project Administration, 15% of Services	\$14,500
<b>Annual Total</b>	<b>\$115,000</b>



References:

OBEC Consulting Engineers. February 2017. “City of Tigard Strategic Bridge & Culvert Plan.”

