

ATTACHMENT C

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Life Cycle of a Road

Assuming that the road base is constructed according to specifications, an asphalt road has a predictable maintenance cycle and useful life. The useful life varies from 25 to 40 years depending on roadway use and standards of construction at the time. Once constructed, the surface will start to weather as it is exposed to precipitation and ultraviolet light; it will go through freeze-thaw cycles and heat up during the summer; and it will be exposed to loading and unloading as traffic passes over it. This expansion, contraction and flexing results in cracks starting to develop, leading to the first maintenance activity, usually occurring between years 5 and 10: Crack Sealing. Using a polymeric rubber compound, the cracks are cleaned, filled and sealed. The cracks are usually limited to the top surface, but can project entirely through the thickness of the asphalt road. Sealing these cracks prevents water from intruding into the road base, preventing acceleration of failures.

Over time, the network of cracks within a given area of asphalt exceeds the ability for additional crack sealing to be effective. At this point, localized sections of the road are removed and replaced (called patching). If water has made it through to the road base, the base will be replaced at this time as well. However, it is more typical for the top 50mm of asphalt to be milled off and replaced. This work happens as required throughout the life of the roadway and addresses issues with Surface Distress (SDI), primarily.

For Arterial and Collector roads, the performance of the roadway is driven by Ride Comfort (RCI). As this metric decreases, more significant patching is planned and undertaken. This can be larger scale patching (covered under Operating budgets) or road rehabilitation (covered under Capital budgets). Whenever possible and reasonable, this work is coordinated with other utility work that will require surface restoration work.

The life of a road can be negatively impacted by other utility works requiring removal and replacement of sections of roadway. This work introduces joints in an otherwise sealed roadway, creating a potential point of failure to be monitored. This type of work is generally unavoidable, being required for repairs, extension and installation of new underground services. Staff work with developers and engineers to minimize the long term impact on the roadway performance.

The useful life of any given roadway is highly dependent on the quality of initial construction, the loads that it experiences in that lifetime and any ingress of water to the road base. Based on City experience, that life can vary from 25 years to 40 years. At end of life, either the entire road structure is removed and replaced (if road base failure has occurred) or the top 50mm is milled off and replaced.

Each of these maintenance and renewal techniques are included in the Pavement Management System (AMS) used to record and forecast road conditions.

