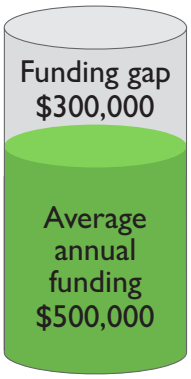
Bridges and culverts

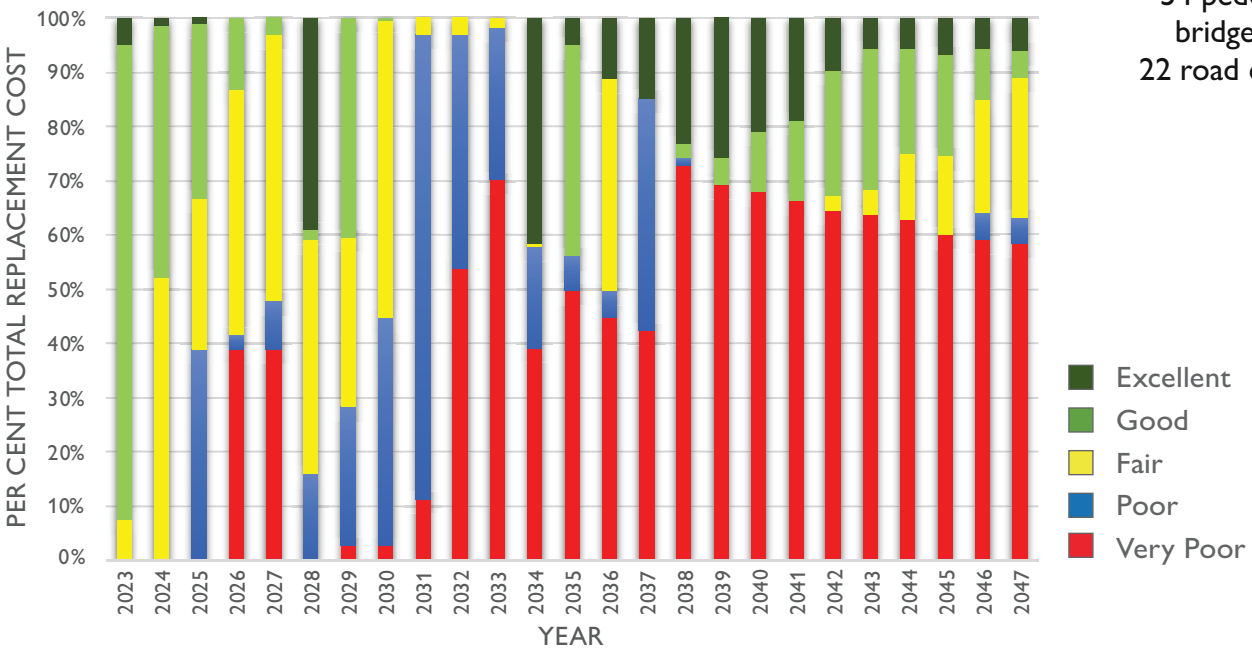
Total asset replacement value	**$57 million**
Current condition	**GOOD**
Projected condition in 25 years	**VERY POOR**
Annual funding needed to meet target performance	**$800,000**
Annual average funding	**$500,000**
Annual funding gap	**$300,000**
Funding source	**Tax base and stormwater user fees**
Data maturity level	**Medium**



Annual funding needed: $800,000

Assets include 54 pedestrian bridges and 22 road culverts.

Annual performance of bridges assets



CURRENT STRATEGY

Within the city, bridges fall into two categories: pedestrian bridges and road structures. Pedestrian bridges are meant to support pedestrians, cyclists and maintenance vehicles such as those used for snow clearing. All road structure bridges in the city are storm culverts with a span of three metres or greater, and may support heavy transport, motor vehicles, emergency vehicles, pedestrians and cyclists. Bridges are funded by both the tax base and through stormwater users fees.

Both types of bridge structures are replaced when they reach the end of their useful life. Inspections done every two years determine if there is a need for work to be done, ranging from replacement of railings to asphalt and concrete repairs, right up to full bridge replacement.

ASSET PERFORMANCE

Bridge asset performance is evaluated using historical knowledge, age, and observed conditions. The quality and availability of our asset data (data maturity) are continuously evolving. The current data maturity level for bridge assets is assessed to be medium. The city is continuously working to improve asset data quality.

All bridge assets are currently considered in good or better condition. Over the 25 year timeline, with the current level of funding, we expect this to change, with the percentage of our bridge assets with a poor or very poor profile increasing from zero in 2023 to approximately 63% by 2047. Based on the best available bridge asset data, deterioration rates and 2020-2029 capital funding, we estimate that bridge assets have an annual infrastructure funding gap of $300,000.

0%

Bridge and culvert assets with a poor or very poor performance

LEVELS OF SERVICE

The following tables show the levels of service established by the City for bridge assets. These metrics include the technical and community level of service required as part of the Ontario Regulation 588/17. Service metrics are reported for the prior year ending on December 31.

COMMUNITY LEVELS OF SERVICE

The following table outlines the qualitative descriptions that determine the community levels of service for bridge assets.

SERVICE ATTRIBUTE	QUALITATIVE DESCRIPTION	2022
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	In the City of Waterloo bridges fall into two categories, pedestrian bridges and road structures. Pedestrian bridges are meant to support pedestrians, cyclists and maintenance vehicles such as those used for snow clearing. All road structures in the city are storm culverts with a span of three metres or greater. These structures may support heavy transport, motor vehicles, emergency vehicles, pedestrians and cyclists.
Quality	Description or images of the condition of **bridges** and how this would affect their use.	A number of factors related to the various elements that comprise a bridge structure can affect the condition and use of a bridge. Elements of a bridge include substructures such as foundations and abutments, primary components and secondary components. The elements may be composed of the varying materials which may display ranging levels of defect. Bridges where the severity and extent of any one defect is high, or bridges with a high proportion of elements in a poor condition state and structures with load limits all effect the use of a bridge structure from a public safety, comfort and convenience perspective.
Quality	Description or image of the condition of **culverts** and how this would affect their use.	A number of factors related to the various elements that comprise a culvert can affect the condition and use of a bridge. Elements of a culvert include barrels, barriers, headwalls, foundations, embankments and streams, etc. The culvert barrels themselves may made of concrete, or corrugated steel pipe and may be constructed in several shapes; namely, round, ellipses, pipe arches or rectangular. The other elements that make of the bridge structure may be composed of the varying materials which may display ranging levels of defect. Bridges where the severity and extend of any one defect is high, or bridges with a high proportion of elements in a poor condition state and structures with load limits all effect the use of a bridge structure from a public safety, comfort and convenience perspective.

TECHNICAL LEVELS OF SERVICE

The following table outlines the quantitative metrics that determine the technical level of service for bridges and culverts.

SERVICE ATTRIBUTE	QUANTITATIVE METRICS	2020	2021	2022
Scope	Bridges in the city with loading or dimensional restrictions (per cent).	27.5%	20.4%	15.8%
Quality	Average bridge condition index value (per cent) for bridges.	74%	74%	74%
Quality	Average bridge condition index value (per cent) for structural culverts	67%	67%	69%

The information presented here is based on the best currently available data regarding asset inventory, performance, and degradation curves, along with funding included in 2023 approved capital budget and 2024-2032 capital forecast.