



Pavement AI Condition Assessment & Level of Service Development



Application of AI

Received provincial funding (GovLab) and collaborate with City IT and Mobility Operation Center on AI pavement condition assessment project

BUSINESS PROBLEM



Pavement condition assessments involve expensive data collection and labor costs for the City. The ability to use photo imagery from sources such as dashboard cameras, traffic cameras, and drone imagery would enable efficient and rapid screening.

BUSINESS VALUE



This solution will bring value to the City by reducing direct costs of pavement condition assessments. It will also lead to more consistent and repeatable comparison of road segments from year to year. In addition, there will be indirect benefits of collecting images of adjacent assets such as sidewalks and transit stops.

MACHINE LEARNING SOLUTION



Experimented with geolocated images from Google Street View to test the feasibility of detecting four categories of pavement distress: cracking, surface deformation, surface defects, and potholes. Proof of concept demonstrates the feasibility of the solution and points to higher resolution imagery for improving model results.

BUSINESS OUTCOMES

- The PoC builds the case for acquiring high resolution geo-located imagery through vehicle mounted cameras
- The solution can lead to more frequent, higher quality, and less expensive pavement condition assessments.
- Enables similar solutions for adjacent assets such as sidewalks and transit stops.



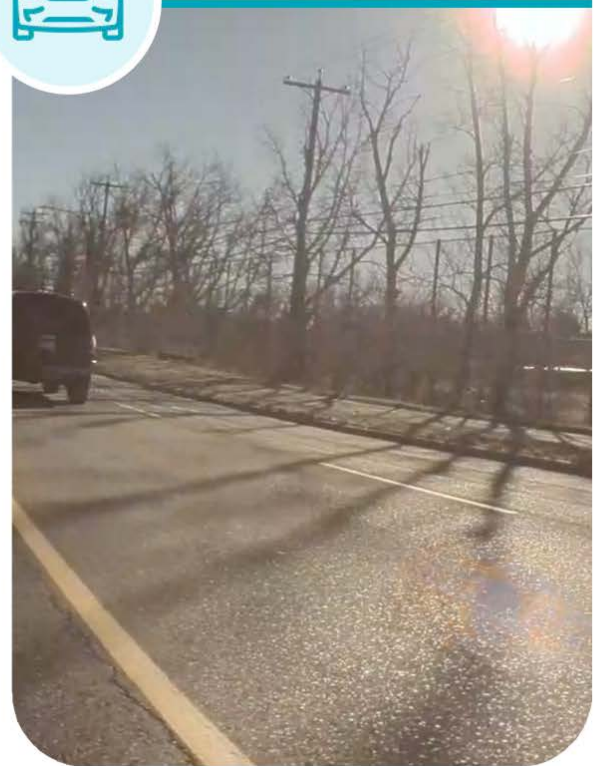
FIXED CAMERA

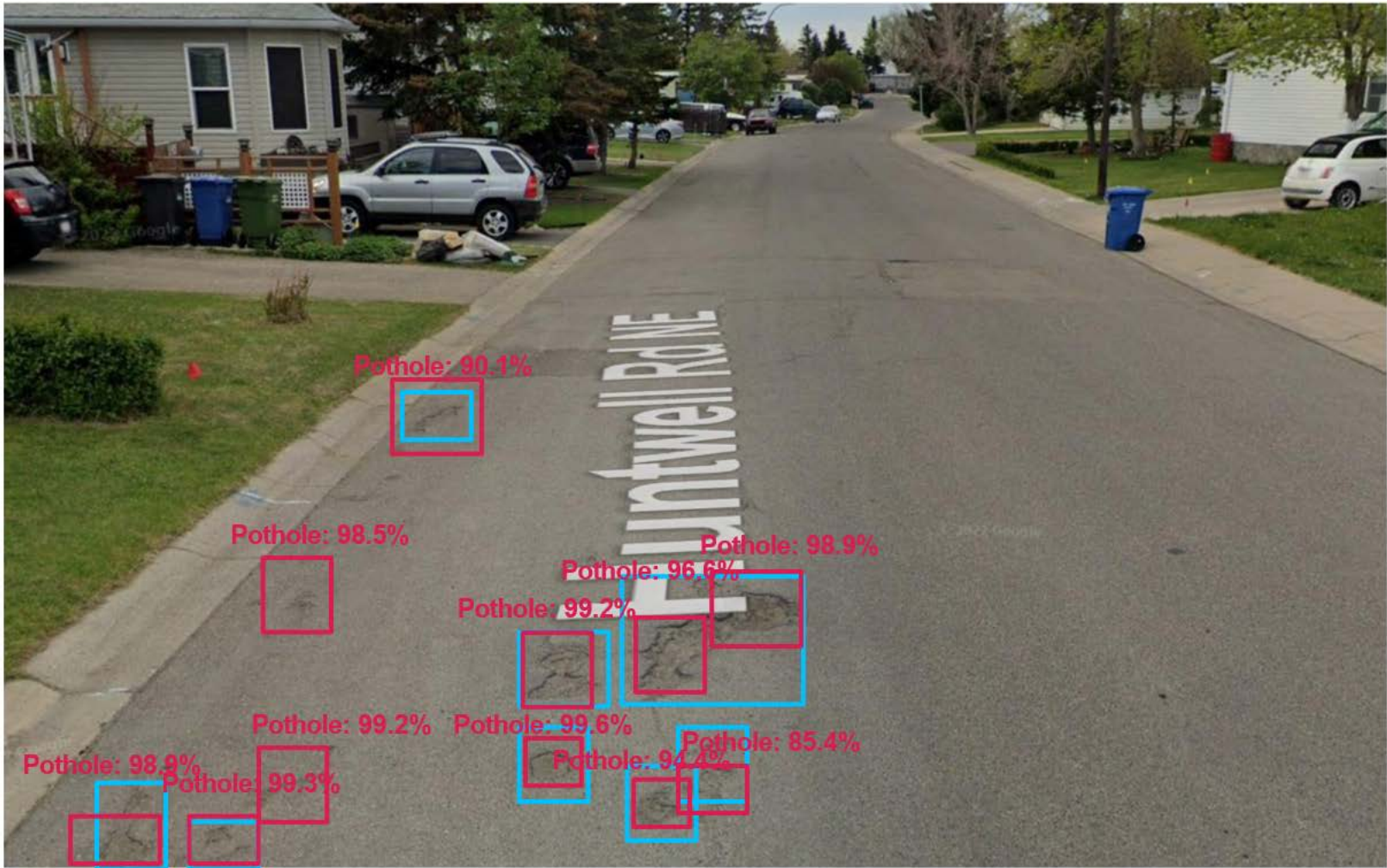


DRONE VIDEO



TESLA VIDEO





Ground truth labels  Pothole  Prediction



Future Plan

1. The procurement of visual data on adjacent infrastructure elements such as sidewalks, traffic signs, signals, trees, fire hydrants, street lights, and public transit amenities offers additional benefits. This initiative will support the creation of an extensive system that is favorable for assessing the condition of diverse assets.
2. Annual updates to the City's street view, synchronized with street cleaning operations, will reduce the need for physical site inspections, resulting in substantial cost savings.
3. Virtual Reality (VR) and Augmented Reality (AR) technologies hold potential for remote site evaluations in the future.
4. Integration with ground-penetrating technologies and Geographic Information Systems (GIS), along with the inclusion of subsurface utilities, will contribute to the development of a three-dimensional urban model.

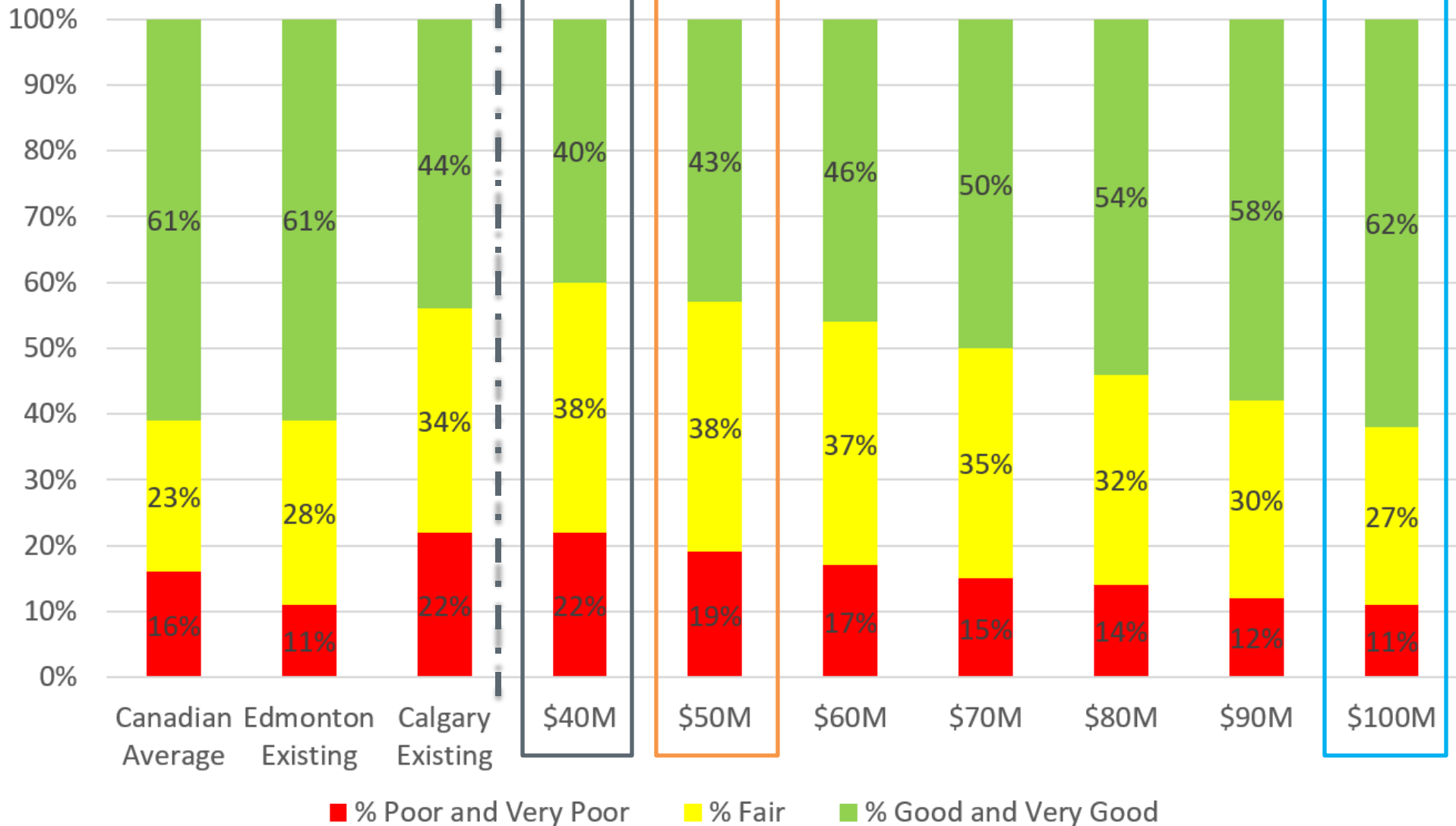


2023-2026 Investment Options (2026 Network Condition)

existing budget

Maintain existing condition

Clean backlog and catch up with peer agencies





Notice of Motion

Item # 8.2.1



Report Number: EC2023-0608

Meeting: Executive Committee

Meeting Date: 2023 May 23

NOTICE OF MOTION

RE: Setting a Standard for Pavement Quality in Calgary

Sponsoring Councillor(s): Councillor Demong, Councillor Penner, Councillor Chabot, Councillor Spencer, Mayor Gondek, Councillor Wyness, Councillor Dhaliwal, Councillor Wong, Councillor Pootmans

NOW THEREFORE BE IT RESOLVED that City Council directs City Administration to review opportunities to **allocate an appropriate funding increase for the surface overlay program** to help reduce seasonal street repairs and improve mobility for all modes such as vehicles, bicycles, and transit buses.

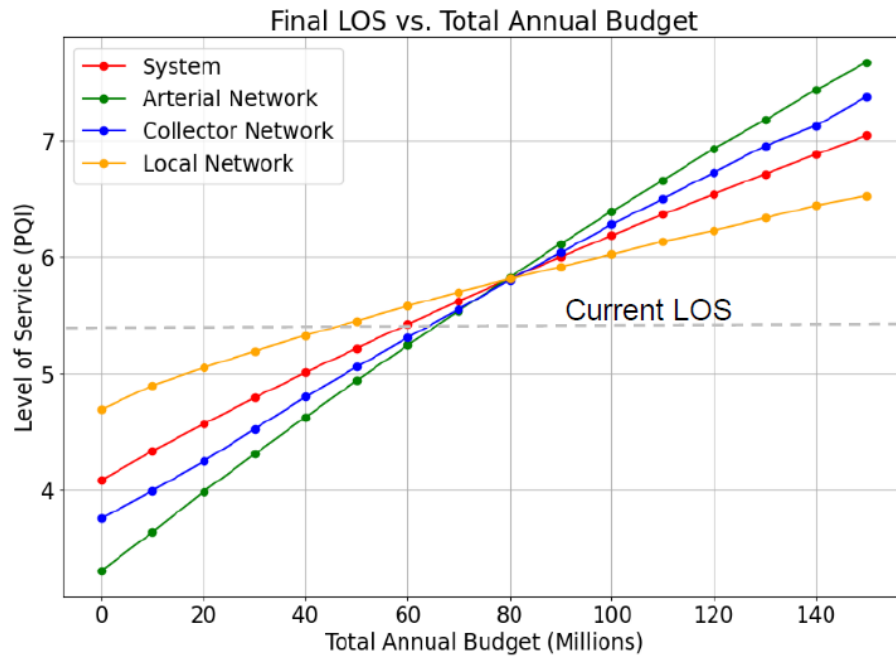
AND FURTHER BE IT RESOLVED that Council direct Administration to report back through budget deliberations with a **recommended Pavement Quality Index** and **minimum annual capital budget** to achieve an established Pavement Quality Index for the City of Calgary.



Table 1: Recommended minimum PQI thresholds

Design Speed (km/h)	80	70	60	50	40
PQI threshold	3.6	3.3	2.8	2.2	1.0
Limiting distress	Rutting	Rutting	Pothole	Pothole	Pothole

A harmonized optimization algorithm was developed to create an optimal investment and budget allocation plan for arterial, collector, and local roads simultaneously over five years from 2023 to 2028.





Thank you!

Questions?