Automated Data Collection and Rating of Pavements Using AI Cameras
- Alice Lam has extensive experience in engineering, operation and maintenance of road transportation systems in highway and urban settings.

- Alice has been with the City of Markham since 2014, first as the Manager of Capital and Infrastructure and currently as the Director of Operations.
Markham Operations Department

Deliveries

555 Miller Avenue
Minimum Maintenance Standard O.Reg 239/02

“paved surface” means a surface with a wearing layer or layers of asphalt, concrete or asphalt emulsion

“pothole” means a hole in the surface of a roadway caused by any means, including wear or subsidence of the road surface or subsurface

Maintenance Standards

Patrolling: 3. (1) The standard for the frequency of patrolling of highways to check for conditions described in this Regulation is set out in the Table to this section. O. Reg. 23/10, s. 3 (1); O. Reg. 366/18, s. 3 (2).

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<tr>
<th>Class of Highway</th>
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<tr>
<td>2</td>
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<td>once every 7 days</td>
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<td>once every 14 days</td>
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Pavement Management – Asset Management
O. Reg. 588/17

• Right technique, at the right time, on the right road to extend the life of the roads and reduce the overall annual cost of ownership
• 2,200+ lane km paved road
• Annual road preservation
• Annual road rehabilitation
Collaboration Experience

• Collaboration – win win for Municipal Roads Operations and AI Industry
• Software Improvement through interactive response
• Record with photo and GPS location
• Staff/work scheduling
• Proactive repair -> long term saving
Innovative maintenance practices awards

- Technical Innovation of the Year
- Engineering Project of the Year
- IDC North America Smart Cities
- OGRA John Niedra Better Practices Award
ROVER EXPANSION – BEYOND POTHOLES

PATROLLER

MANHOLE

SIGNAGE

POTHOLES

BY LAWS

WASTE MANAGEMENT
CITYROVER
Artificial Intelligence Camera & Cloud Service
- Roy Tal has actively worked in the technology industry for the past 17 years, serving in various technical roles.

- For the last 10 years, Roy has been the Chief Technology Officer of Visual Defence / CITYROVER.

- Roy is absolutely delighted with his role today using artificial intelligence to solve real world problems in the public works space.
Imagine a world where citizens would not report any issues because they would be already fixed.
Road Maintenance

and the road to a good state of repair
To Repair Issues
Cities Need to Find Them

Survey

Inspection / Patrol

Reactive (Complaint Driven)

Proactive
Slowest & Most Expensive
Most Detailed
Infrequent (every 2-8 years)

Proactive
Slow & Expensive
Some Details are Missed
Frequent (daily – quarterly)

Reactive
Cheapest but Riskiest
Few Details
Public Dissatisfaction
The road to a good state of repair

1. Staff Reporting (Proactive)
2. Service request opened
3. Work request opened
4. Staff show up with the right tools at the right place at the right time.
5. Deficiency is fixed
6. Good state of repair
A brief overview of how CITYROVER AI works
Easy to use by design

All inclusive kit shipped  Installed by city staff  Then start driving
Simple access

Once the vehicle is on the road, it starts to collect data and sends it to the cloud where you can view it.
Your data includes:

- High resolution image
- GPS coordinates
- Nearest address
- Direction of travel
- Size and depth estimates
- Date and time
Actionable data

Service requests can be resolved within cloud system or through API integration to third party systems.
The optimized road to a good state of repair

Data is collected while city vehicles drive their day to day routes.

Work orders assigned in system or third party system in seconds.

Service levels are tracked and measured.

Service requests are generated automatically.

Staff can access high resolution images and point-by-point navigation.

Decisions based on objective data measured through system.
More deficiencies identified by CityROVER

Deficiencies captured before reported by public

Repair crew productivity boost

300+ Municipalities

COMMUNITY
Next Generation Technology

What is next with CITYROVER AI
CITYROVER FOR INCIDENTS
PULSE FOR ASSETS
CITYROVER FOR TRANSIT
COMPANION FOR WORK MGMT
INCIDENTS

DATA COLLECTION

Respond | Prioritize

Cloud

REQUESTS

WORK ORDERS

Companion

Reports

API

Integrations
AI Pavement Quality Rating

1. Based on ASTM 6433 Standard

2. Assessment of roads condition through visual surveys using the Pavement Condition Index (PCI) method of quantifying pavement condition

3. Pavement condition index (PCI) is a numerical rating of the pavement condition that ranges from 0 to 100 with 0 being the worst possible condition (Failed) and 100 being the best possible condition (Excellent \ Good).
Deficiencies:
1. Pothole
2. Alligator Cracking
3. Block Cracking
4. Edge Cracking
5. Patching and Utility Cut
6. Raveling
7. Longitudinal Cracking
8. Transverse Cracking
9. Seal
AI Pavement Quality Rating

- Collect Data
- Process Samples
- Aggregate Sub Segments
- Aggregate Segments
- Produce Reports
AI Pavement Quality Rating

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### AI Pavement Quality Rating

- Collect Data
- Process Samples
- Aggregate Sub Segments
- Aggregate Segments
- Produce Reports

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<th>Segment ID</th>
<th>Rating</th>
<th>Length</th>
<th>Street</th>
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Questions?