Management of The City of Calgary’s Local Roads

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What is Management?

Management is like investment: its goal is to get the most out of resources, add the most value or get the best return.

Management can be defined as: achieving goals in a way that makes the best use of all resources.

http://www.leadersdirect.com/what-is-management
Agenda

- Overview
- Pavement Management
- Challenges
- Opportunities for Innovation
- Conclusions
Calgary’s Road Network

- Total Network ~ 15,000 lane kms
- Arterials are ~ 3800 lane kms
- Collectors & Industrial are ~ 3600 lane kms
- Locals are ~ 7200 lane kms

2016 Network Distribution

- Arterial: 26.0%
- Collector: 21.3%
- Industrial: 3.2%
- Locals: 49.5%
How long is Canada Coast to Coast?

Cape Spear NFL to Yukon and Alaska Border – 5514 km (Stats Canada)
Network Performance

% of Roads in Need of Rehabilitation

- 2013: 39.4% Arterials, 28.8% Collector/Ind, 1.2% Local
- 2014: 41.0% Arterials, 27.5% Collector/Ind, 1.9% Local
- 2015: 43.0% Arterials, 27.2% Collector/Ind, 2.0% Local
- 2016: 41.0% Arterials, 37.0% Collector/Ind, 5.0% Local

Management of The city of Calgary's Local Roads
Local Roads: Performance (Historical Data 2014 - 2016)

Pavement Quality Index (PQI) is a measure of **road condition** and is a combination of visual distresses (VCI), roughness (RCI) and structural strength (SAI).
We are Expanding!!

Adding almost 85 lane kms every year
Pavement Management Process

Data Collection

Data Analysis (PMS)

Plan Rehab Program

Design & Coordination

Implement (Rehab & preservation tools)
Data Collection

- Manual sampling method for local roads – 6 years cycle, City Staff
- Collecting 6 distresses (Fatigue Cracking, Longitudinal Cracking, Transverse Cracking, Edge Cracking, Block Cracking, Rutting)
Pavement Management

Fatigue Cracking

NCHRP

Block Cracking

Edge Cracking

Fatigue Cracking
Data Analysis

- Pavement Management System – HPMA
- PQI is calculated based on deterioration models
- Run analysis towards the end of the year
- Dynamic segmentation
Rehabilitation Program

Initial program
- Program based on PMS report
- Typically 3 times of the budget

Design & Coordination
- Windshield & Walking Survey
  - Design & Prioritize roads based on actual ground condition
- Circulate to internal and external stakeholders – manage conflicts
- Finalize
  - Short list the projects – based on Priority, clear of conflicts, available budget etc.
Initial Pavement Rehab Program
Final Pavement Rehab Program
Pavement Rehabilitation & Preservation Treatments

Thin Mill & Inlay

Crack sealing

Micro Surfacing

Spray Patching
Local Road network has grown by 8% since 2011
Operational funding has decreased, but compensated by Capital funding
More investment into major roads
Data Collection - Gaps

• Until 2015, Six distresses were collected and used for PQI calculations
• Gap in the data i.e. Raveling and Distortion
• Some local roads rehabbed due to:
  • Extreme, Extensive Raveling
  • Distortion - Utility cuts
Data Collection - Gaps

Raveling

- Paved the road because of raveling/stripping
- No other major distresses
Utility Cuts

- Paved roads in this community because of utility cuts
- No other major distresses
Utility Cuts

- Study findings - Almost **22% reduction** in pavement life
- Proposed fees meant to recover the cost of long term damage to the pavement

### Top 15 Communities with excavation Permits

<table>
<thead>
<tr>
<th>Community</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Sum:</th>
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<tbody>
<tr>
<td>ALTADORE</td>
<td>346</td>
<td>314</td>
<td>311</td>
<td>194</td>
<td>120</td>
<td>1285</td>
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<tr>
<td>BELTLINE</td>
<td>102</td>
<td>115</td>
<td>149</td>
<td>121</td>
<td>137</td>
<td>624</td>
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<td>BOWNESS</td>
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<td>144</td>
<td>148</td>
<td>161</td>
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<td>686</td>
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<td>BRIDGELAND/RIVERSIDE</td>
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<td>111</td>
<td>108</td>
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<td>526</td>
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<td>146</td>
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<td>CRESCENT HEIGHTS</td>
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<td>162</td>
<td>128</td>
<td>86</td>
<td>69</td>
<td>558</td>
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<tr>
<td>KILLARNEY/GLENGARRY</td>
<td>229</td>
<td>246</td>
<td>227</td>
<td>161</td>
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<td>948</td>
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<td>144</td>
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<td>RICHMONDE</td>
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<td>WEST HILLHURST</td>
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<td>196</td>
<td>199</td>
<td>137</td>
<td>103</td>
<td>923</td>
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</tbody>
</table>
Data Collection

- Using GIS & iPad for live data collection
- Semi-Automated method (Pilot 2016)
Improved Data Collection

- Included Distortion and Raveling in 2016
- Better reflects the condition of local roads
- Following is the effect on the Average PQI for local roads

Only for the roads surveyed in 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Avg. PQI</th>
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<tbody>
<tr>
<td>2014 (6 distresses)</td>
<td>7.51</td>
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<tr>
<td>2015 (6 distresses)</td>
<td>7.45</td>
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<tr>
<td>2016 (8 distresses incl. Raveling &amp; Distortion)</td>
<td>6.75</td>
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10% drop in the PQI
Improved Coordination

- Better coordination
- Data updating frequency - high
- Citizens have access to updated information
- Live update from the field using iPad

Use of eMaps
Result of Improved Coordination

- Reduced excavation after paving
- Win-Win situation for all parties
Conclusions

• Reduced budget – explore more preservation tools
• Use web applications for walking survey
• Continue managing utility cuts
• High frequency of distress data collection – rezoned communities
• IRI for local roads
• Refined QC/QA
Thank You!