MUNICIPALITY OF BROCKTON

ROAD MANAGEMENT STUDY FOR RURAL ROADS

PRESENTATION TO
STAFF ON :
SEPTEMBER 10, 2019

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Presentation Agenda

- Scope of the Study
- Data collection and assessment method
- Scoring System
- Road Inventory and general observations
- Cost comparison, Gravel, LCB and HCB
- Road Maintenance Needs
- Road Capital Needs
- Concluding comments
- Questions

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Scope of Assessment for roads

1. Prepared the maps and an inventory of the assets in database and mapping software (ArcGIS, Access)
2. Reviewed each road section
   - Assign ID number, condition ratings, note deficiencies identified and improvements or preventative maintenance ideas.
3. Assembled and analysed the data
   - Develop list of general observations, lists of needs with suggested timelines and probable costs.
4. Prioritized the capital improvement needs
5. Incorporated information into a report

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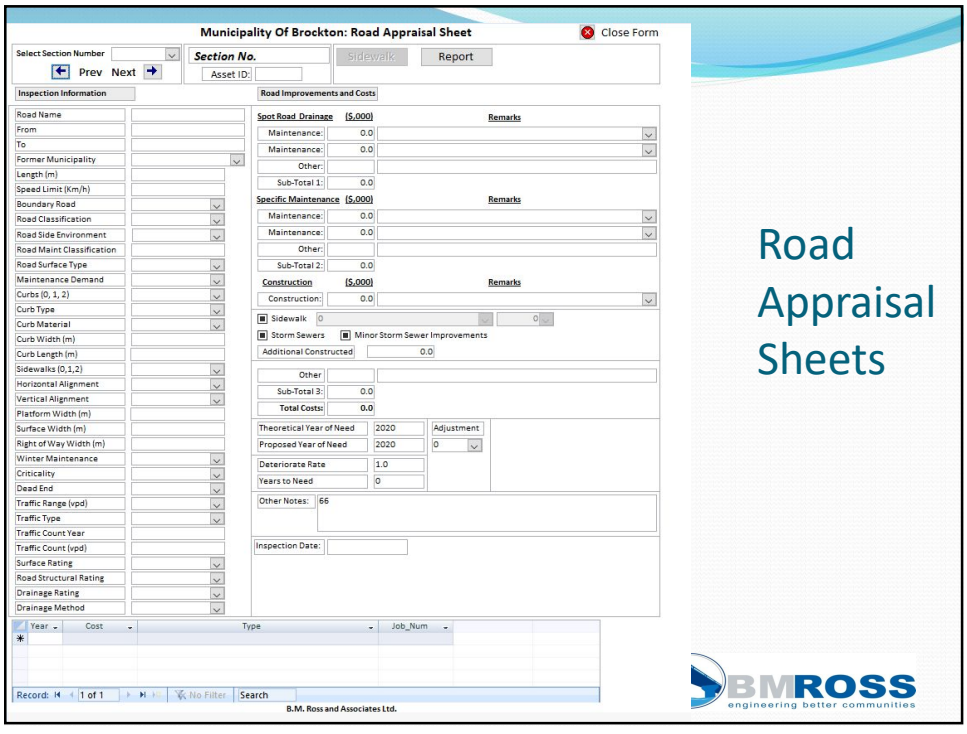

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Road Assessment Method

- MTO Methods and Inventory Manual used as a guide to assess the roads
- Surface and Structure condition ratings, drainage ratings, general observations and construction history data was recorded with assistance from Town staff
- Deterioration rates used to predict the theoretical year of need, different for different road types and traffic ranges
- Assemble scores of the different road parameters to further prioritize the needs

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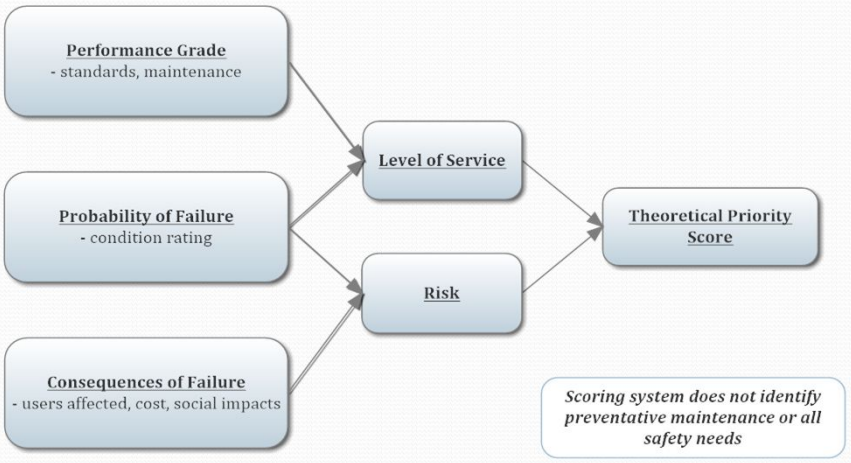
Scoring System



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Scoring System Ranking

Priority Score Calculation Factors for Roads

Consequence of Failure:

Traffic Volume

Traffic Volume	Value
0-49	1
50-199	2
200-499	3
500-999	4
>1000	5

Performance Grade:

Maintenance Demand

Rating	Value
Low	1
Average	2
High	4
Excessive	5

Alignment

Rating	Value
Both vertical and horizontal acceptable	1
Horizontal or vertical not acceptable	3
Horizontal and vertical not acceptable	5

Width Value based on Traffic Volume

Traffic Volume and Platform Width Criteria	Value
0-49 and Platform Width >= 6 m	1
0-49 and Platform Width 5 - 5.9 m	3
0-49 and Platform Width < 5 m	5
50-199 and Platform Width >= 7 m	1
50-199 and Platform Width 6 - 6.9 m	3
50-199 and Platform Width < 6 m	5
200-499 and Platform Width >= 8 m	1
200-499 and Platform Width 7 - 7.9 m	3
200-499 and Platform Width < 7 m	5
500-999 and Platform Width >= 9 m	1
500-999 and Platform Width 8 - 8.9 m	3
500-999 and Platform Width < 8 m	5
>1000 and Platform Width >= 9 m	1
>1000 and Platform Width 8 - 8.9 m	3
>1000 and Platform Width < 8 m	5

Probability of Failure:

Road Surface Rating Value

Rating	Value
>=9	1
8	2
7	3
6	4
<6	5

Drainage

Drainage Rating	Value
Good	1
Fair	3
Poor	5

Road Structure Rating Value

Rating	Value
>=8.5	1
7.5 - 8	2
6.5 - 7	3
5.5 - 6	4
< 5.5	5

Consequence of Failure: Traffic Value

Probability of Failure: (Surface Condition Value + Drainage Value + (Structure Value * 2) / 4

Performance Grade: (Maintenance Demand + Platform Width Value + Alignment Value) / 3

Risk = Consequence of Failure + Probability of Failure

Priority Score = Risk + Level of Service

Level of Service = Performance Grade + Probability of Failure

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Scoring System Issues

- This method helps to:
  - Develop a Risk Score and a Level of Service score that could be used for Asset Management
  - Performance Grade allows the ability to identify other deficiencies and put emphasis on addressing safety concerns, substandard assets, etc.
  - Provides a theoretical priority score for improvements
  - Simple scoring method that can be used with other assets types
- It should only be used as a guide when prioritizing the list of needs

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Scoring System Issues

- This method does <u>not</u> identify
  - Preventative maintenance needs
  - Overwhelming safety needs unless PG adjusted
  - Cost saving strategies such as economies of scale
  - Needs of other infrastructure in the same area
  - Financial obligations or funding availability
  - Other activities, development or preferences within the Town
- It should only be used as a guide to when sorting through the list of needs

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Rural Road Inventory

Road Surface	
Road Surface Type	**Length (km)**
Gravel	182.56
LCB – 2 lifts	82.76
HCB – 1 lift	116.00
HCB – 2 lifts	2.07
Total	383.39

Road Cross Section	
Roadside Environment	**Length (km)**
Urban	1.9
Semi-Urban	11.4
Rural	370.0
Total	383.4

Theoretical Kilometres of Improvements Per Year Required to Maintain Road System		
Surface	Assumed Life *	Recommended (km/year)
Gravel	100	1.82
LCB – 2 lifts	6	13.79
HCB – 1 lift	20	5.8
HCB – 2 lifts	30	0.07

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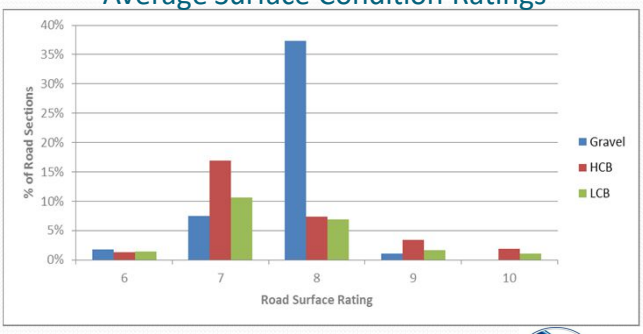
Condition Ratings of Road Sections

Average Condition Ratings		
	Surface Rating	Structural Rating
Gravel	7.8	7.4
LCB	7.5	7.6
HCB	7.6	7.9

Average Surface Condition Ratings



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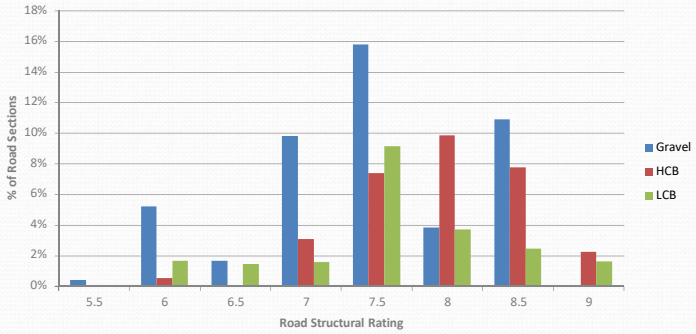
Average Structural Condition Rating



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General Observations

- Condition ratings for the road types suggest rural roads are in good condition.
- Suspect the sub-soil conditions allow sub-structure drainage in most locations but there are some swamping areas and some corduroy supported road sections
- LCB road surfaces are currently present within some rural villages, Elmwood, Riverside, Lake Rosalind.
- Traditionally procedure for HCB road is to pulverize and repave HCB roads to reconstruct them.
- Some LCB roads are experience relatively high traffic volumes for the road type

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Probable Cost to Maintain Gravel, LCB and HCB roads

Component	Gravel	LCB	HCB
Annual Maintenance	$3,448	$548	$921
Annualized Capital Cost	$0	$4,421	$6,713
Total $ /km /year	$3,448	$4,969	$7,635

Assumptions used:

1. Gravel road costs includes resurfacing, calcium chloride and grading 3 times per year. Incl. material, equipment and labour.
2. LCB includes emulsion application every 6 years, shoulder maintenance and sand / salt purchase costs.
3. HCB includes reconstruction every 25 years, crack sealing, shouldering, patching and sand / salt purchase costs. Also, assumes a suitable road base.

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Gravel Road Maintenance

- Maintain suitable drainage for road base, as required.
- Gravel resurfacing every second year and placing calcium chlorides annually
- Grading roads about 3 times a year to minimize pot holes and direct surface water to the ditches
- Budgeting $280,000 per year, excluding equipment, labour and fuel costs to perform this work.

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LCB and HCB Road Maintenance

- Maintain suitable drainage for road base, especially on paved roads, when required.
- Cracking sealing and patching on the HCB roads at appropriate times
- Shoulder grading on LCB and HCB roads to support the edge of hardtop surface
- Included application of emulsion and stone chips on LCB roads about once every 6 years
- Included new concept, to patch and apply a slurry seal on HCB roads to re-seal the surface and extend the lift of the HCB roads from 4 to 8 years. Apply before HCB surface is deteriorated.
- Averages $668,000 per year.

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Capital Improvement Costs per year

Year	Capital Improvements by Current Surface			Total Cost ($,000)
	Gravel (km)	LCB (km)	HCB (km)	
2020	0.0	2.7	0.2	$ 2,446
2021	0.0	8.5	0.0	$ 1,818
2022	0.0	3.2	3.3	$ 2,204
2023	0.0	0.4	1.4	$ 556
2024	0.0	0.0	9.2	$ 2,101
2025	0.0	3.0	3.1	$ 816
2026	0.0	0.0	7.2	$ 1,506
2027	0.0	0.0	0.0	$ 000
2028	0.0	0.0	0.0	$ 000
2029	0.0	0.0	0.6	$ 284
Total	0 km	17.8 km	25.0 km	$ 11,734
Average	0 km/yr	1.78 km/yr	2.50 km/yr	$1,173/yr

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Capital Improvements

- Generally only includes capital costs to reconstruct roads
- Included allowance to convert LCB road surfaces to HCB within some rural villages, Elmwood, Riverside and one section at Lake Rosalind. Includes curbs some sidewalks and storm sewers in Elmwood.
- Includes allowance to upgrade some of the LCB rural roads to HCB. Concern that LCB on the busiest of roads will not perform well as traffic loads increase.
- Some improvement work normally included here has been listed with the maintenance tasks because administrated by Municipal staff.
- In lieu of pulverizing and repaving all the HCB roads, propose applying a slurry surface. These costs are included in the maintenance budget.

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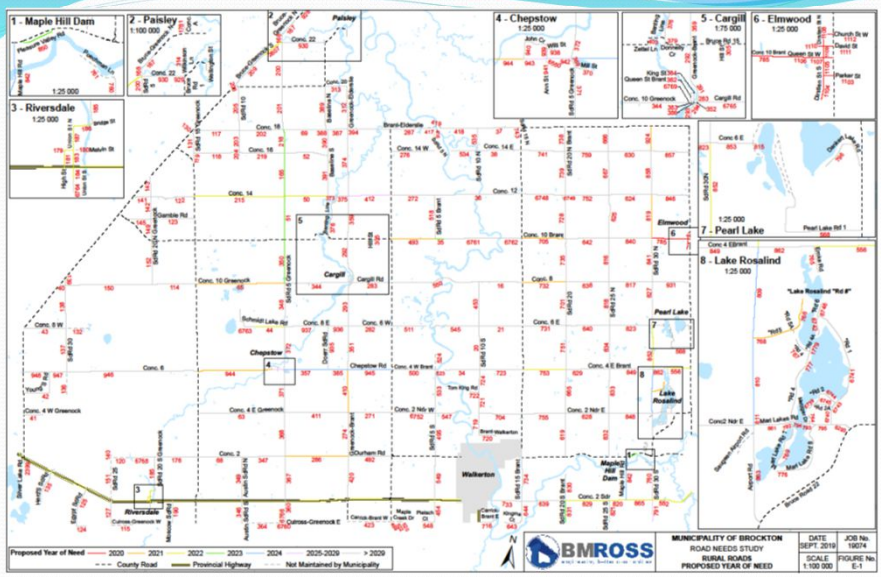

Proposed Year of Improvement

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Summary of Recommended Improvements

Category	2020	2021	2022	2023	2024
Specific Maintenance Needs – Gravel Roads	$280,000	$280,000	$280,000	$280,000	$280,000
Specific Maintenance Needs – Paved Roads	$668,000	$668,000	$668,000	$668,000	$668,000
Road Improvements	$2,446,900	$1,818,200	$2,204,400	$556,000	$2,101,500
Suggested Annual Budget	$3,394,900	$2,766,200	$3,152,400	$1,504,000	$3,049,500
Category	**2025**	**2026**	**2027**	**2028**	**2029**
Specific Maintenance Needs – Gravel Roads	$280,000	$280,000	$280,000	$280,000	$280,000
Specific Maintenance Needs – Paved Roads	$668,000	$668,000	$668,000	$668,000	$668,000
Road Improvements	$816,500	$1,506,900	$0	$0	$284,500
Suggested Annual Budget	$1,764,500	$2,454,900	$948,000	$948,000	$1,232,500

Notes: - The costs for equipment expenses, fuel, labour, etc. or improvements to other components along the road sections such as bridges, large culverts, etc. are not included above.
- Unit costs based on relatively small or individual contracts for each road section. Economies of scale or administration of work by Municipal staff may help to reduce the total costs.
- Costs have not been inflated and are HST exclusive.

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Concluding Comments

- Suggested total budget for rural road is about $948,000 per year for maintenance and an average of $1.17 million per year for improvements
- If adequate funds are not available may have to delay some of the upgrades of the LCB to HCB road surface types
- Alternative method to extend the life of the HCB road surfaces has been proposed, slurry seal
- The suggested budget numbers do not take into account savings that may be possible with economies of scale.
- Needs to be monitored and adjusted, as required.

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Questions

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