MUNICIPALITY OF BROCKTON

ROAD MANAGEMENT STUDY FOR RURAL ROADS

PRESENTATION TO
STAFF ON :
SEPTEMBER 10, 2019

BMROSS
engineering better communities

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

BMROSS
engineering better communities

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

BMROSS
engineering better communities

Road Appraisal Sheets

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

Scoring System

Performance Grade
- standards, maintenance

Probability of Failure
- condition rating

Consequences of Failure
- users affected, cost, social impacts

Level of Service

Risk

Theoretical Priority Score

Scoring system does not identify preventative maintenance or all safety needs

BMROSS
engineering better communities
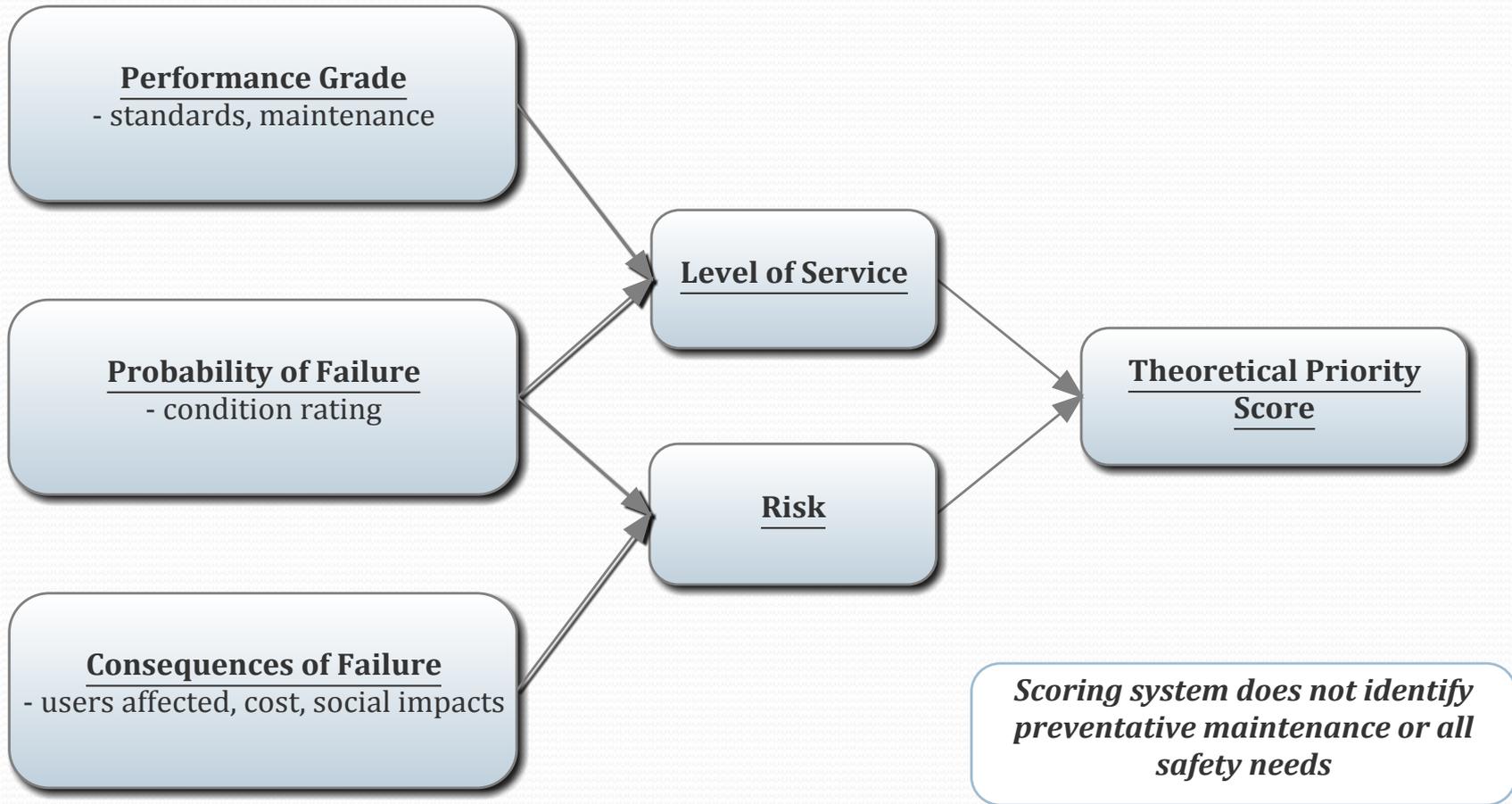
Scoring System Ranking

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

Level of Service = Performance Grade + Probability of Failure

Priority Score = Risk + Level of Service

BMROSS
engineering better communities

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

BMROSS
engineering better communities

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

BMROSS
engineering better communities

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

BMROSS
engineering better communities

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
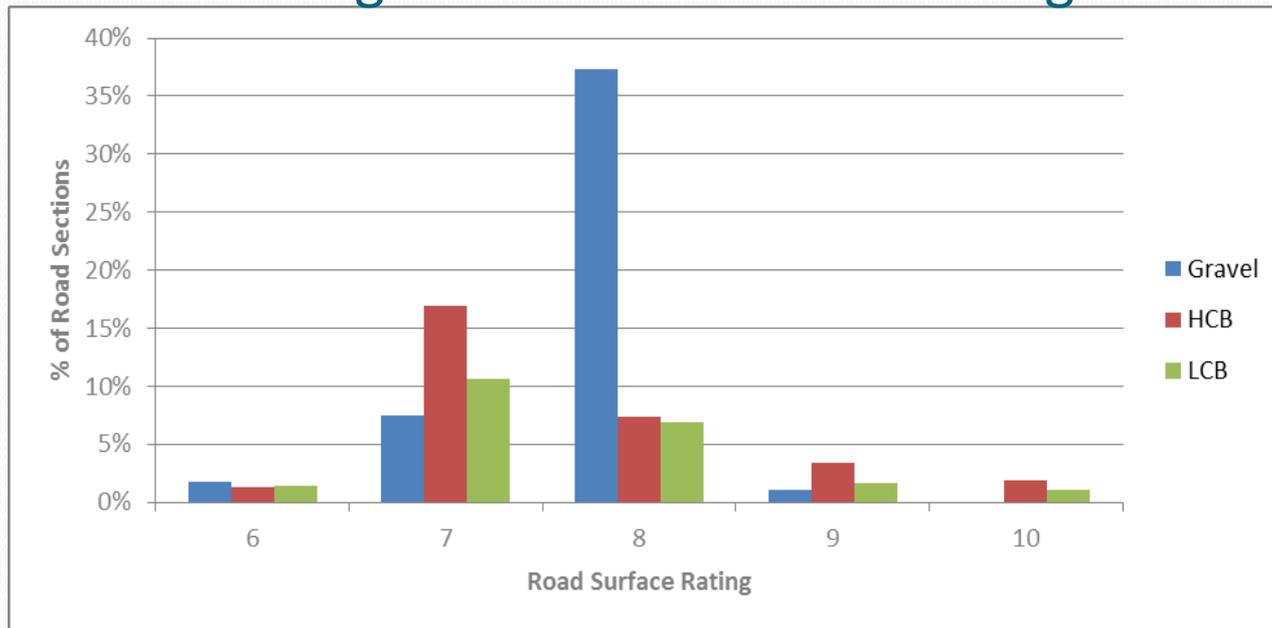
Average Structural Condition Rating
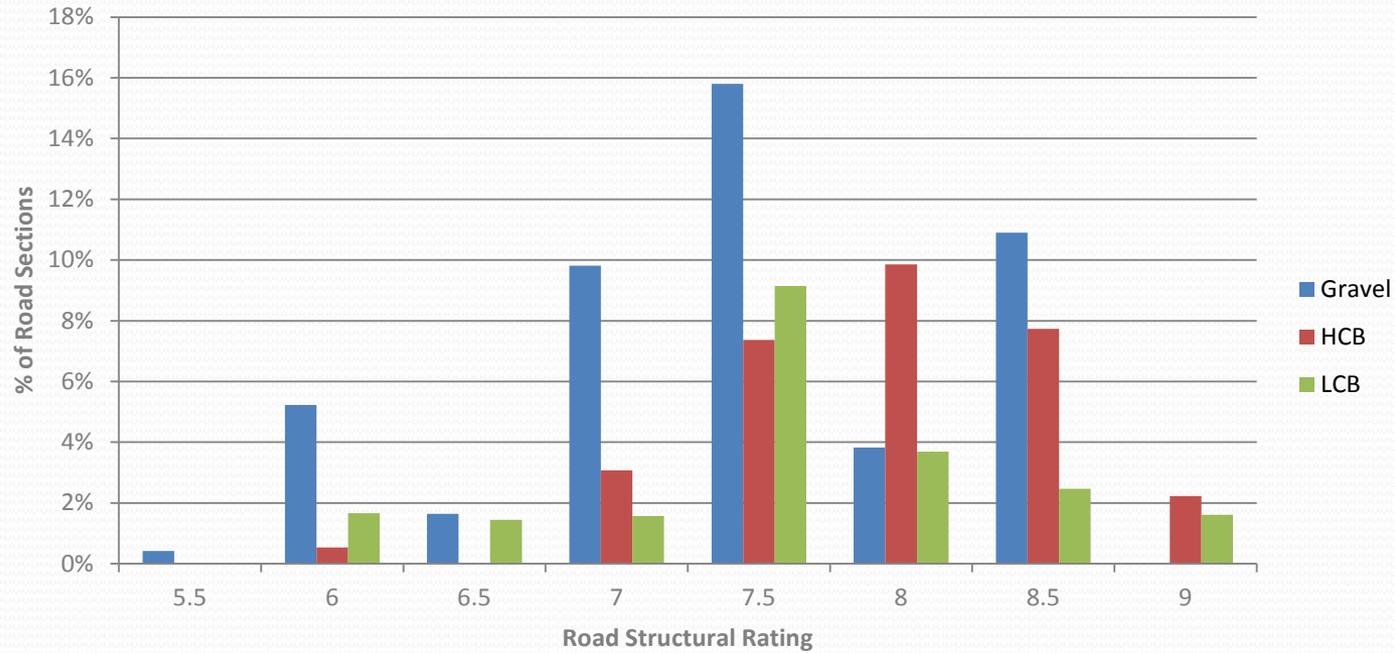
General Observations

- 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

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.

BMROSS
engineering better communities

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.

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.

BM**ROSS**
engineering better communities

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

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.

BMROSS
engineering better communities
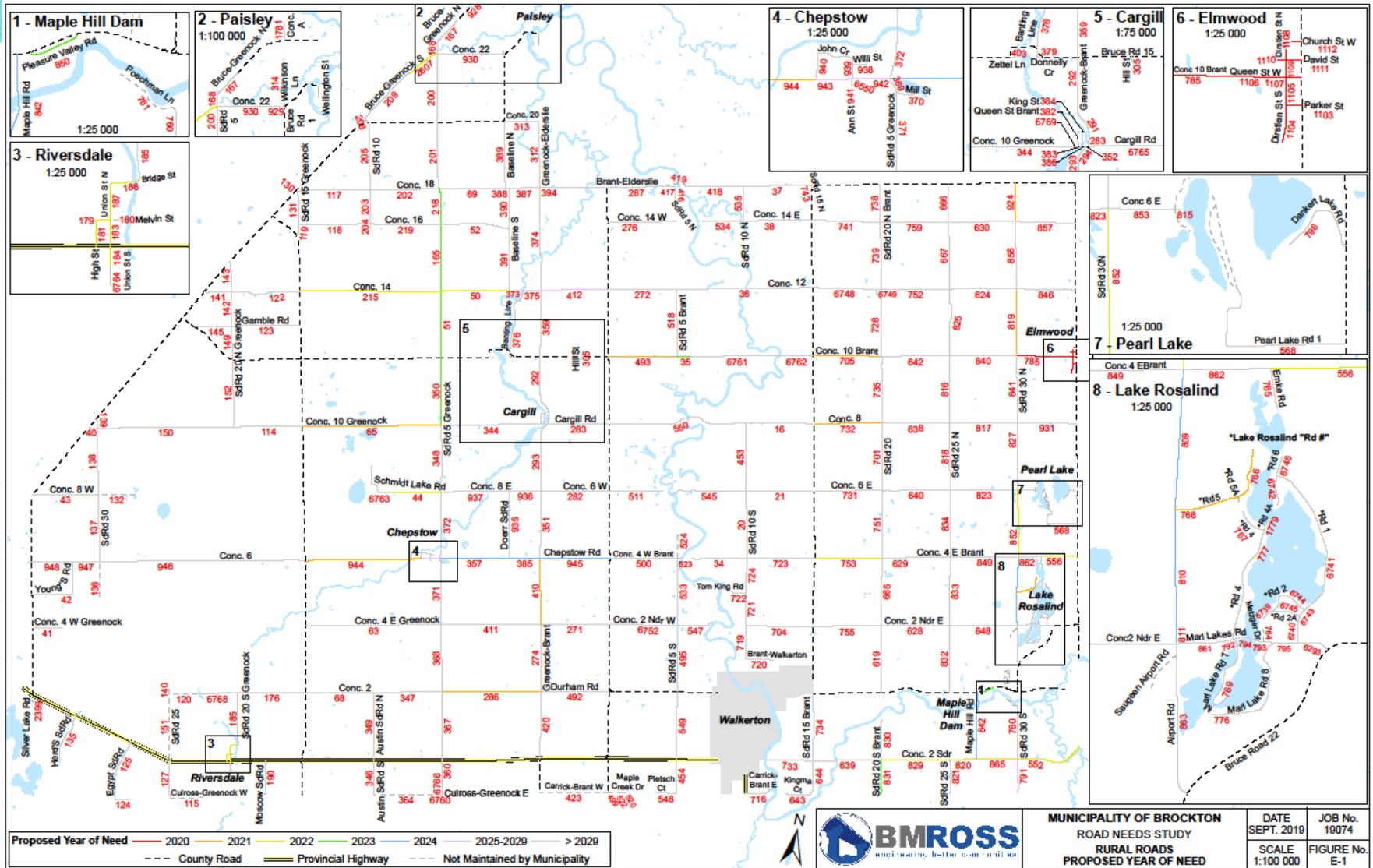
Proposed Year of Improvement

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.

BMROSS
engineering better communities

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.

Questions