Strathcona County

ISSUED FOR USE

SUSTAINABLE RURAL ROADS MASTER PLAN 2010

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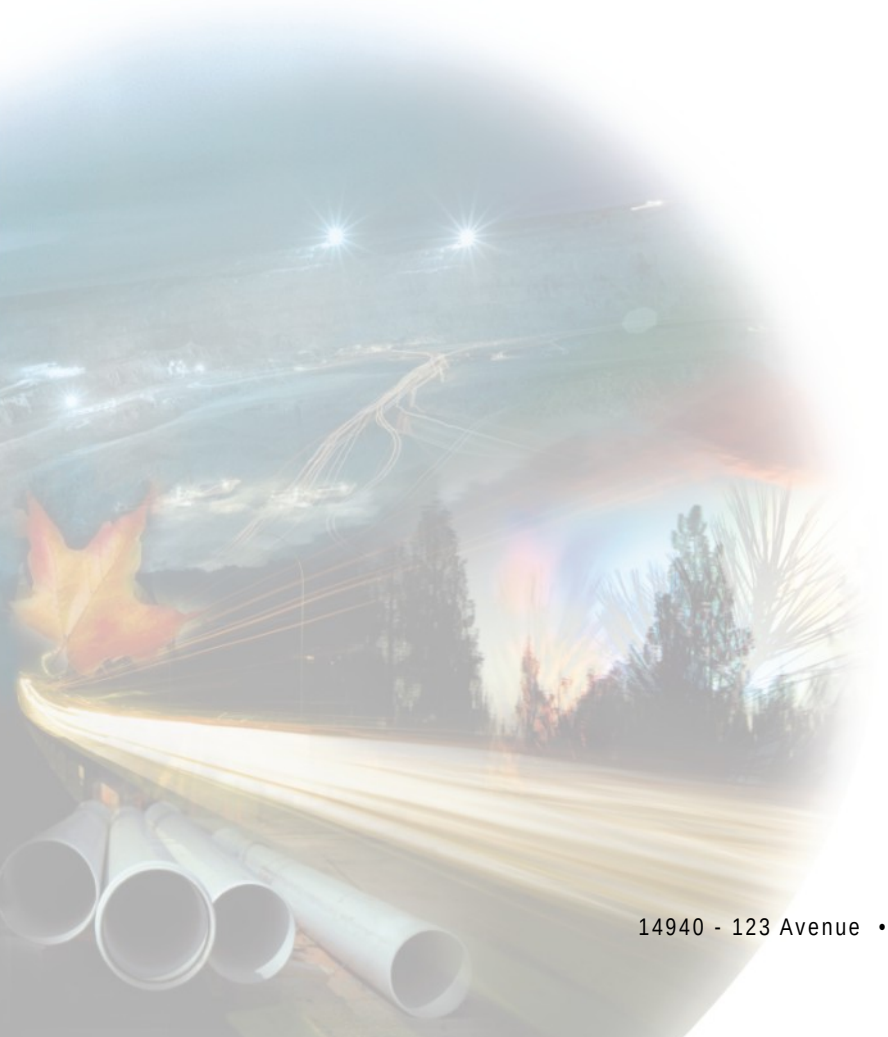

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EXECUTIVE SUMMARY

1.0 PURPOSE OF STUDY

The maintenance, rehabilitation, and improvement of the County's 1,302 kilometre rural road network have been guided by the County's Rural Roads Master Plan (RRMP) 1995 (Strathcona County, 1995), as updated by the various administrative reviews prepared by County staff, the latest of which was the Rural Roads Master Plan Extension Report, June 2003 (Strathcona County, 2003).

In June 2009, the County retained the services of EBA Engineering Consultants Ltd. (EBA) to update the 1995 and 2003 RRMPs, and to develop the Sustainable Rural Roads Master Plan 2010 (SRRMP 2010).

The rural road network of Strathcona County totals 1,302 km; consisting of 938 km of range and township (grid) roads, categorized as:

- Class I (79 km)
- Class II (491 km)
- Class III (135 km)
- Class IV (233 km)
- Country Residential Subdivision (CRS) Roads (333 km)
- Rural Hamlet Roads (31 km)

Rural roads have one of the following four surface types:

- Paved (hotmix asphalt)
- Paved (coldmix asphalt)
- Gravel
- Dust-suppressed Gravel

Under the study's Terms of Reference (TOR) for the SRRMP 2010, EBA's main tasks were to conduct consultation with rural residents, carry out the required technical analyses, and make recommendations to update the current Rural Roads Master Plan with respect to, among other items, the following major elements:

- Classification criteria and road standards for the range and township (grid) roads;
- Rehabilitation practices and frequencies for grid roads, country residential subdivision roads and rural hamlet roads;
- Funding allocations for various program elements: maintenance, overlays, upgrading and reconstruction;
- Funding allocations for various road classes;

- Priorities for upgrades to Class I (paved hotmix) roads which carry high traffic volumes;
- Progression of Class IV (dust-suppressed) to a Class II (paved coldmix) standard;
- Review of the road safety program, including recommendations for line marking on narrow roads; and
- An overarching imperative and governing concept for EBA's work was the "sustainability" of the County's road network from environmental and budget viewpoints.

2.0 ENVIRONMENTAL AND ECONOMIC / FISCAL SUSTAINABILITY FRAMEWORK

Strathcona County's Strategic Plan commits the County to consciously move toward creating a sustainable community. The Strategic Plan emphasizes a balanced, triple-bottom-line approach to encourage a balance of social, environmental and economic elements to sustain a healthy and vibrant community.

To realize the goals of the Strategic Plan, the County has developed three frameworks:

- The Social Sustainability Framework was approved by Council in March 2007 as the first step in endorsing a sustainable community that balances social, economic and environmental components.
- The Environmental Sustainability Framework, a guide to assess environmental factors and impacts in the County's planning and decision making, was approved in June, 2009.
- The Economic Sustainability Framework, a guide to decision making toward fostering a healthy economy that benefits residents, business and industry, is currently being developed.

Good rural roads improve community interconnectivity and social interaction; and they provide the necessary access to recreational, medical, educational, shopping, employment and other services and activities for the County's rural residents.

An overarching imperative and governing concept for EBA's work for the SRRMP 2010 was the "sustainability" of the County's road network from environmental and budget viewpoints. The following are some of the considerations and guidelines that were employed in EBA's analyses of the various elements of this study with a view to achieving the twin goals of environmental and fiscal sustainability of the County's rural road network:

1. Base spending decisions on objective criteria, such as surface condition, rather than on a fixed annual number of kilometres of overlays.
2. Utilize design standards that will satisfy the level of service and safety requirements while minimizing the environmental footprint of the transportation infrastructure.
3. Where appropriate, recycle existing hotmix and coldmix pavement surfaces; this may help postpone the need for widening.

4. Utilize maintenance techniques that use less material (e.g. crack filling, seal coats and other maintenance measures rather than overlays).
5. If cost is not significantly different, use pavement types with a longer life (e.g. hotmix instead of coldmix).
6. Find efficiencies in the existing rural road budget levels to fund un-met high priority needs.

3.0 OVERVIEW OF THE COUNTY'S RURAL ROAD NETWORK

3.1 Traffic Volumes Status

Traffic volume in terms of vehicles per day (vpd) is the most important determinant of the functional classification, design and surfacing standards, and related elements of a road. Table 2 (in the report) shows the overall averages and ranges of traffic volumes for each of the six road classifications. Class I roads carry five times the average traffic volumes of Class II roads: 2,180 vpd compared to 440 vpd.

3.2 Surface Type Status

The surface type on the County's rural roads mostly conforms to the current surface type standard. The main surface type improvement needs are:

1. 46 % of Class I roads (36 of 79 km) need improvement in surface type; they have coldmix pavement rather than hotmix called for in the current design standard.
2. 56 % of country residential roads (186 of 334 km) need improvement in surface type; they have coldmix pavement rather than hotmix called for in the current design standard.

3.3 Width Status

Many rural roads were originally constructed to a previous narrower road width standard. In addition, a main reason for narrow road widths, particularly for Class II coldmix roads, is that repeated overlays have narrowed the road width. The result is that currently large proportions of the County's rural roads in the various functional road classes are narrower than the current design road-top width for their design class. The overall narrow width statistics, as shown for each functional road class below, may sound alarming; but when we look at how many kilometres are narrower by how much when compared to the current width standards, the conclusion is that the picture is not as bad as it looks at first glance.

When discussing the narrow road widths, it should be kept in mind that an analysis conducted by EBA of a sample of Strathcona County rural road crashes found no evidence that narrow width is directly correlated with higher crash frequencies. A reason for this may be that narrow roads generally carry low traffic volumes. Generally speaking, narrow road width is a risk factor when combined with other factors such as high traffic volumes and poor road alignment and driver behaviour. Section 5.2 below recommends various methods

to deal with road width loss, and Section 5.3 provides general guidelines for prioritizing budget expenditures with a view to reconstructing/widening narrow roads which carry high traffic volumes.

1. Of the 79 km in the Class I network, 65% are narrower than the current width standard of 9.0 m, but only 47% are narrower by more than 1.0 m than the current width standard, and only 12% are narrower by more than 2.0 m than the current width standard. Since these roads by definition carry relatively high volumes, widening to current standards should be the highest priority for the County.

2. Of the 491 km in the Class II network, 91% are narrower than the current width standard of 7.5 m, but only 31% are narrower by more than 1.0 m than the current width standard, and only 0.3% are narrower by more than 2.0 m than the current width standard. Some roads within the Class II network carry relatively high volumes for the Class and widening to current standards should be a higher priority. Other roads within the Class II network carry moderate to low volumes of traffic. If no significant safety or operational issues exist then widening of these low to moderate volume roads should be a lower priority.

3. Of the 135 km in the Class III network, 84% are narrower than the current width standard of 7.5 m, but only 48% are narrower by more than 1.0 m than the current width standard, and only 13% are narrower by more than 2.0 m than the current width standard. The Class III roads which are narrower than the current standard were most likely built to the "standard of the day". Widening of these roads should only be necessary if safety or functional issues are identified on a specific section of roadway.

4. Of the 233 km in the Class IV network, 91% are narrower than the current width standard of 7.5 m, but only 29% are narrower by more than 1.0 m than the current width standard, and only 0.5% are narrower by more than 2.0 m than the current width standard. The Class IV roads which are narrower than the current standard were most likely built to the "standard of the day". Widening of these roads should only be necessary if safety or functional issues are identified on a specific section of roadway.

5. Of the 334 km of Country Residential roads, 91% are narrower than the current width standard of 8.5 m, and 85% are narrower by more than 1.0 m than the current width standard, and only 7% are narrower by more than 2.0 m than the current width standard. The Country Residential roads which are narrower than the current standard were most likely built to the "standard of the day". Widening of these roads should only be necessary if safety or functional issues are identified on a specific section of roadway.

6. Of the 31 km of Hamlet roads, 94% are narrower than the current width standard of 9.0 m, and 93% are narrower by more than 1.0 m than the current width standard, and 62% are narrower by more than 2.0 m than the current width standard. The Hamlet roads which are narrower than the current standard were most likely built to the "standard of the day". Widening of these roads should only be necessary if safety or functional issues are identified on a specific section of roadway.

3.4 Surface Condition Status

The main points to note are:

1. The surface condition of the improved, hotmix Class I roads is very good, but the surface condition of the un-improved, coldmix Class I roads is very poor.
2. The surface condition of the Class II coldmix network has steadily improved over the years, and is now excellent.
3. The surface condition of the CRS hotmix network is excellent.
4. The surface condition of the CRS coldmix network has steadily improved over the years and is now very good.
5. The surface condition of hamlet roads has steadily improved over the years and is now excellent.

4.0 PUBLIC CONSULTATION WITH RURAL RESIDENTS

Public consultation for the SRRMP 2010 study consisted of three phases:

1. A mail out questionnaire survey (included in Appendix B) of all rural residents in the County in September 2009.
2. Three open houses (October 13, 14 and 15, 2009) to present the results of the questionnaire survey and obtain additional feedback.
3. A workshop with the County Council (on November 12, 2009) to present and discuss the preliminary findings and recommendations of the study.

From the public consultation process, the following four issues stand out as the top priorities for the rural residents who use the County's rural roads:

1. Widen narrow roads.
2. Complete improvements to the Class I network.
3. Make roads with high traffic volumes and/or safety issues a priority.
4. Keep maintenance levels high.

5.0 RECOMMENDATIONS

The following is a summary of the budget re-allocation scenario, the recommended prioritization guidelines, and recommendations regarding the various items in the study's Terms of Reference. These recommendations were based on the technical analyses, while keeping in mind the feedback from the public consultation process and the sustainability framework.

5.1 The Scenario for Estimated Internal Budget Savings and their Re-Allocation

A main recommendation of this report is that the fixed cycles for overlaying coldmix Class II roads and CRS roads, which result in overlaying of a fixed number of kilometres per year, be discontinued. This recommendation is based on an analysis of historical and current budget allocation, overlay practices, and condition of the concerned roads. EBA estimates that discontinuing the fixed overlay cycles for coldmix Class II roads and CRS roads, and instead determining the number of kilometres requiring overlay in a given year based on annual road condition assessment, can produce *net savings*. EBA is recommending that these savings be redirected into improving the un-improved Class I network.

It should be noted, however, that the actual savings achievable in a given future year could vary up or down from the savings estimated in this report, depending upon factors such as future traffic volumes and types, unforeseen climatic conditions, unexpected road failures, development of heavy traffic generators, annual road conditions, and public expectations. The "current scenario" savings should therefore be considered as a plausible but only one among several possible scenarios.

EBA recommends that, over the next few years, the County should track the condition-based overlay needs, and refine the magnitude of potential net savings.

5.2 How to Preserve Road Width or Delay Width Loss

Table 9 of the main report (reproduced at the end of this Executive Summary) lists various strategies that can help preserve or delay pavement width loss, or at least slow down the rate of width reduction. Suggestions regarding preservation of road width in various road operations are provided below:

Reconstruction

As a matter of course, any new construction or reconstruction of an existing road should be to the current road width standards. It should be noted that the County's design standards for new road construction/reconstruction provide road-top width sufficient for two overlays. For example, the road-top width standard for Class I hotmix roads is 9.0 m; and therefore a new or reconstructed Class I hotmix road is built with a 10 m road-top width so that the top width would be greater than 9.0 m even after two overlays.

Overlays

Preservation of road width should be a prime objective during pavement overlays. Several strategies for width preservation when designing and placing overlays are included in Table 9.

Safety Improvement Projects

Implementation of spot safety improvement projects offers a good opportunity to address the width issue, at least within the limits of the safety improvement project. Widening the road to current standards as part of safety improvements should normally be a cost-effective proposition.

Routine Maintenance

All attempts should be made to retain the existing road width when carrying out routine maintenance operations.

5.3 Framework for Prioritization of Needs

Roads and other transportation infrastructure are built to serve the needs of the road users. Those needs must be met at acceptable levels of service and safety, which must be incorporated into prescribed "engineering" standards and requirements. It should be noted that public acceptance/satisfaction should be considered an important factor in road planning and engineering decisions. Thus, Strathcona County's experience shows that the level of public complaints about rural roads tend to increase when the road surface failure rating reaches about 7%, which, upon further analysis and confirmation, could be used as a possible factor in determining overlay needs.

Since budgets are normally limited and are not sufficient to meet all needs in a given year, prioritization of needs is necessary. EBA recommends that the following scheme be used to prioritize the needs and expenditures for Strathcona County rural roads. It should be noted that this prioritization scheme is a logical general guideline. The Council and County staff will of course consider and respond to other factors, such as public complaints, unexpected urgent or important non-urgent events, industry's emerging requirements, in determining priorities in a given year. Indeed, a side benefit of doing away with fixed overlay cycles (which result in a fixed number of kilometres of overlays each year) is to give the Council and County staff the flexibility to respond to emerging needs**.**

1. Preservation of Investment

This is done in two ways:

i) Maintenance according to the County's maintenance standards and practices for the various functional classes. It should be noted that regular maintenance can help delay the more expensive overlays or reconstruction, and therefore are the backbone of an environmentally and fiscally sustainable road management system. It is recommended that adequate maintenance should be kept up even on the road sections that may appear to be candidates for overlays.

ii) Overlays as needed on the basis of condition ratings help to preserve the road surface, and thus delay more costly reconstruction.

2. Safety Improvements

Road safety improvements in conjunction with rehabilitation, reconstruction and widening projects are an obvious and effective means of implementing the needed safety improvements. In addition, the County should give a high priority to redressing localized safety problems as discrete projects.

3. Re-allocation of Budget Savings to Address the Narrow Width Problem

EBA recommends that the net budget savings discussed above should be utilized in the following rough priority order. The recommendations assign the highest priority to Class I roads that are narrow and/or need surface improvement, followed by Class II roads that need width improvement. It is understood that the County already has programs for dealing with the Country Residential Roads and Hamlet roads.

This study is at the overall strategic Master Plan level and therefore cannot produce a prioritized list of specific road projects. Provided below are general guidelines that the County can apply to determine project priorities for the annual capital programs. In general, to determine priorities of individual projects within each category, consideration should be given to the road width, volume and type of traffic, safety issues (collision history), and other emerging needs as discussed above.

Priority 1: Reconstruct un-improved Class I roads requiring improvement in both width and surface type

It is recommended that, other things being equal, first priority in this category should be given to Class I road sections that do not have a hotmix surface, which are:

- Narrower than 7.0 m (that is, more than 2 m narrower than the current design standard of 9.0 m).
- Carry relatively high traffic volumes among un-improved Class I roads.
- With due consideration given to crash history.

Second priority in this category should be given to, other things being equal, Class I road sections that do not have a hotmix surface, which are:

- Between 7.0 and 8.0 m in width (that is, more than 1 m narrower than the current design standard of 9.0 m).
- Carry relatively high traffic volumes among un-improved Class I roads.
- With due consideration given to crash history.

Third priority in this category should be given to, other things being equal, Class I road sections that do not have a hotmix surface, which are:

- Between 8.0 m and 9.0 m in width (that is, narrower than the current design standard of 9.0 m).
- Carry relatively high traffic volumes among un-improved Class I roads.
- With due consideration given to crash history.

Priority 2: Reconstruct Class I roads requiring improvement in width

It is recommended that, other things being equal, priority in this category should be given to narrow Class I road sections requiring width improvement, which are:

- Narrower than 7.0 m (that is, more than 2 m narrower than the current design standard of 9.0 m).
- Carry relatively high traffic volumes among un-improved Class I roads.
- With due consideration given to crash history.

Second priority in this category should be given to, other things being equal, Class I road sections requiring width improvement, which are:

- Narrower than 8.0 m (that is, more than 1 m narrower than the current design standard of 9.0 m).
- Carry relatively high traffic volumes among un-improved Class I roads.
- With due consideration given to crash history.

Third priority in this category should be given, other things being equal, to Class I road sections requiring width improvement, which are:

- Between 8.0 m and 9.0 m in width (that is, narrower than the current design standard of 9.0 m).
- Carry relatively high traffic volumes among un-improved Class I roads.
- With due consideration given to crash history.

Priority 3: Reconstruct Class II roads requiring improvement in width

It is recommended that, other things being equal, first priority in this category should be given to narrow Class II road sections requiring width improvement, which are:

- Narrower than 5.5 m (that is, more than 2 m narrower than the current design standard of 7.5 m).
- Carry relatively high traffic volumes among narrow Class II roads.
- With due consideration given to crash history.

Second priority in this category should be given to, other things being equal, Class II road sections requiring width improvement, which are:

- Narrower than 6.5 m (that is, more than 1 m narrower than the current design standard of 7.5 m).
- Carry relatively high traffic volumes among narrow Class II roads.
- With due consideration given to crash history.

Third priority in this category should be given to, other things being equal, Class II road sections requiring width improvement, which are:

- Between 6.5 m and 7.5 m in width (that is, narrower than the current design standard of 7.5 m).

- Carry relatively high traffic volumes among narrow Class II roads.
- With due consideration given to crash history.

It is anticipated that the County will have the flexibility to decide, for example, whether the highest rated Class II road under Priority 3 above has for other reasons a better case than the lowest rated Class I road under Priority 2 above. EBA believes that a prioritization scheme should not be so rigid as to restrict the discretion and flexibility of the County Staff or Council to decide on the basis of emerging factors that cannot be captured in a rigid prioritization scheme.

5.4 Road Safety

County's Road Safety Program

1. Intersection improvements ranging from intersection upgrades to improvements in sight lines are recommended.
2. Many roads are currently narrower than the classification's design width. Priorities for widening should be based on safety performance and traffic volumes.
3. The County has an existing Traffic Safety Improvement reserve program for Urban and Rural roads; under this program the County plans to undertake rural safety project(s) in 2010. It is recommended that priorities, particularly for intersections, should be based on collision numbers and severity, and traffic volumes. The nature of improvements (e.g. enhancements to STOP control, improvements to sight lines, road widening, or even rural roundabouts) should be based on the types of collisions at the selected location.
4. Good data collection and analysis is of crucial importance in the design and implementation of effective road safety programs. It is recommended that the County should ensure it has the latest safety data collection and analysis systems, including appropriate software tools.

Line Markings on Narrow Roads

EBA recommends that the County's current policy, which does not mark lines on narrow roads, regarding line marking as contained in the Municipal Policy SER-009-017, "Traffic Control Devices" should be retained, with minor amendments.

5.5 Overlay Cycles

1. The practice of overlaying a fixed number of kilometres (based on a fixed cycle) each year (of Class II coldmix pavements and of CRS coldmix road improvement to hotmix) should be discontinued. Instead, overlay priorities should be based on annual condition ratings. In other words, pavements should be overlaid only when required; this revised strategy is expected to save on budgets, in addition to being more environmentally friendly.

2. To obtain the optimum balance between deferred overlays and increased maintenance costs, it is recommended that the County should undertake a Life Cycle Cost Analysis of the paved rural road network, and apply pavement management principles to identify the most cost-effective treatments and the schedule of their application.

Extending the overlay cycle by overlaying based on need, or implementing in-place recycling technologies contributes to sustainability and provides other benefits and indirect cost savings due to (1) maintaining the width, or reducing width loss, and delaying future widening, (2) reducing quantities of non renewable aggregate and asphalt materials incorporated into County roads, and (3) reducing damage to other grid roads used to haul materials.

5.6 Recommended Regime for Coldmix Class II Roads

- Discontinue the fixed 12 year overlay cycle and determine annual needs based on condition assessment. This strategy will produce net savings that can be redirected into improving the Class I network.
- Evaluate graded aggregate seal coat as a preservation treatment to extend the life of coldmix surfaces.
- Implement the width preservation strategies discussed in the report.

5.7 Recommended Regime for CRS Roads

- Discontinue the fixed 15 year practice and determine annual needs based on condition assessment, as recommended for Class II roads. This strategy will produce net savings that can be redirected into improving the Class I network.

5.8 Recommended Regime for Coldmix (un-improved) Class I Roads

- Improve/reconstruct the 35.7 km of coldmix Class I roads to meet the width and hotmix standards, utilizing the re-allocated from the net savings in overlays on Class II and CRS overlays.

5.9 Recommended Regime for Hotmix (improved) Class I Roads

- Develop a program to widen 15.3 km of roads with substandard widths to meet Class I standards.
- Prioritize roads for hotmix rehabilitation overlays based on pavement condition.

It is worth repeating that when determining project priorities, in addition to considering quantifiable factors discussed in this report, the Council and County staff should have the flexibility to consider and respond to other factors, such as public complaints, unexpected urgent or important non-urgent events, and industry's emerging requirements.

5.10 Recommended Re-gravelling Regime for Class III and Class IV Roads

The current County policy for re-gravelling of Class III and Class IV gravel roads stipulates a 7 year re-gravelling cycle.

Based on a survey of re-gravelling practices of selected Alberta rural municipalities, EBA recommends that the County assess a 5 year average re-gravel cycle based on needs determined on the basis of annual condition surveys and recommendations by maintenance staff. The cycle length of 5 years would apply to the gravel road networks as a whole, with an allowance for re-gravelling higher volume roads more frequently and lower volume roads less frequently.

5.11 Recommended Regime for Hamlet Roads

The current County practice is to surface rehabilitate Hamlet roads with a hotmix overlay based on a fixed budget partially funded by the Province. No change to the current overlay practice is recommended.

5.12 Recommendations Regarding Budget Allocations

The spending decisions based on fixed overlay cycles for Class II and CRS roads are resulting in sub-optimal expenditures; and at the cost of neglecting more urgent priorities such as improving the narrow coldmix Class I roads.

Therefore, it is recommended that, within existing budget levels, the savings accruing from overlays based on annual need and condition assessment should be re-allocated to the improvement of Class I roads.

These re-allocations will bring the rural roads budget distribution back in line with current and future needs.

Timing of Implementing the Recommended Budget Re-distribution

If it is too late to formally incorporate the recommended changes in the County's practices and budgets in the official 2010 budget documents, then EBA recommends that:

1. The recommended changes in the Class II and CRS road overlay practices (from a "fixed overlay cycle/fixed no. of kilometres overlaid " to "condition-based, as-needed overlays" be formally implemented in the 2010 construction season, and the net savings be placed in a reserve fund for investment in improvement of un-improved Class I roads; and
2. The recommended changes should be formally incorporated into the official 2011 budget.

6.0 REVIEW OF RURAL ROAD FUNCTIONAL CLASSIFICATION & DESIGN STANDARDS

6.1 Proposed Revisions to the County's Functional Road Classification Criteria

EBA's recommendations regarding future functional classification of the County's rural roads are summarized below:

1. Adopt the proposed functional road classification system, which includes additional factors listed below (in addition to traffic volume) to determine the functional classification of County's rural roads in the future.

   a. Traffic volume and type

   b. Function of the road

   c. Connection to the Provincial Highway Network

   d. Spatial hierarchical system

   e. Continuity

At the present time, EBA does not propose reclassification of any specific roads.

In the future, as and when substantial changes in one or more of the five classification factors a to e in the above list indicate that the functional classification of specific rural roads needs reviewing, the County can apply the proposed classification system/criteria to determine whether functional classification of the affected roads warrants a change. For example, the traffic volume on a road may increase because of industrial, residential or other developments. Another example is a "subdivision application" that may trigger a quick functional classification check for the affected road(s). It is recommended that traffic volumes on the affected roads be double checked by special counts to ensure accuracy and to avoid misclassification. It is understood that any future functional classification revisions will be brought before Council for review and approval.

2. Keep the current six classifications (Class I, II, III, and IV roads; CRS roads; and Hamlet roads).

3. Create a new Industrial Roads classification to deal with special heavy industrial (truck) traffic in the Heartland area, and elsewhere as applicable. Table 13 suggests classification criteria for Industrial Roads. It should be noted that any proposed changes in the functional classification and/or design standards of the roads in the Industrial Heartland area should be considered in light of other relevant studies such as the "Strathcona Area Industrial Heartland Transportation Study Update, November 2007 (Stantec 2007), and the current Heartland Transportation Study by ISL Engineering and Land Services Ltd.

4. Consider reversing Class III and Class IV names to de-confuse the current situation in which the surface standard of "gravel" is numbered Class III and the surface standard of "dust-suppressed" is numbered Class IV.

5. For classification of roads in Special Areas, apply the proposed classification criteria.

6.2 Review of the Rural Road Design Standards

EBA's evaluation shows that, for most functional road classifications, the County's geometric and surfacing design standards (road-top width and other geometric and structural features) are expected to well serve the County's needs for the foreseeable future, and therefore EBA recommends that no changes are required.

For industrial roads and very high traffic volume Class I roads, it is recommended that individual engineering analyses be conducted to determine appropriate geometric and structural dimensions in accordance with the Transportation Association of Canada guidelines.

TABLE 9: ALTERNATIVE STRATEGIES FOR PRESERVING OR DELAYING PAVEMENT WIDTH LOSS

Strategy	Effect on Width Loss	Technical Aspects	Cost Implications
1. Use maintenance to delay overlay	Existing width is maintained for a longer period of time; this can lead to longer overlay cycles.	Increased maintenance required for the delay period.	Modest increase in ongoing maintenance costs; high cost for overlay is deferred.
2. Reduce coldmix overlay thickness from 50mm to 40mm	Very slight reduction in width loss of less than 0.04m (2:1 sideslope assumed).	May be more difficult to restore crown and may result in inadequate overlay thicknesses in some locations.	20% reduction in coldmix material cost.
3. In-place Recycling - Full Depth Reclamation (FDR)	Reuses existing granular and asphalt bound material. Can only maintain/reduce width loss if the subgrade is reshaped during subgrade preparation or if the overlay thickness can be reduced significantly. Removes existing crack history and mitigates reflection cracking.	Requires a granular layer for recycling. Fine grained subgrade soils can not be incorporated into the FDR. Requires an asphalt bound wearing surface. FDR material needs to be engineered.	Potential cost savings only if the overlay thickness can be reduced due to the increased load carrying capacity of the stabilized FDR.
4. In-place Recycling - Cold In-Place Recycling (CIR)	Can only reduce width loss if the overlay thickness can be reduced significantly. Reuses a portion of the existing asphalt bound layer. Removes existing crack history and mitigates reflection cracking.	Requires an asphalt bound wearing surface. CIR material needs to be engineered.	Potential cost savings only if the overlay thickness can be significantly reduced.

5. Cold Mill 40mm and overlay 40mm	Existing width is not changed.	Does not add strength to the pavement structure. Opportunity to recycle cold millings.	Increased cost due to cold milling. Recycling of cold millings may reduce costs.
6. Base stabilization and overlay	Can only maintain/reduce width loss if the subgrade is reshaped during subgrade preparation or if the overlay thickness can be reduced significantly. Reuses existing granular and asphalt bound material. Removes existing crack history and mitigates reflection cracking.	Experience and judgment required to determine locations for stabilization and to determine moisture conditioning requirements. Reshaping of the subgrade results in a lower road profile and potential for weaker subgrade support conditions.	Modest additional cost to double handle the scarified material and reshape the subgrade during subgrade preparation.
7. Longer overlay cycles	Existing width is maintained for a longer period of time. Comparing a 10 year to a 14 year coldmix cycle over a 40 year period, a 10 year cycle (50mm and 2:1 sideslopes) would result in a total width loss of 1.0m vs. 0.6m for a 14 year cycle.	Increased maintenance required for the delay period.	Modest increase in ongoing maintenance costs; can result in the reduction of 1 or 2 overlays; high cost for overlay is deferred.
8. Grade widening	Pavement width is reconstructed to meet present standards with an allowance for future overlays.	May require purchase of Right-of-Way.	Very high capital cost. Lowest maintenance cost of all strategies.
9. Overlay with subgrade sideslope improvement	Maintains existing pavement width.	Sidesloping may reduce ditch bottom width.	Additional cost.
10. Surface treatment (graded aggregate or double seal) to replace asphalt bound surface course following Base Stabilization	Maintains existing width.	Would require improved workmanship of stabilized layer to provide a smooth and proper cross-section; cycle to next overlay would be reduced to 6 to 8 years.	Graded aggregate seal coat is less expensive than coldmix.