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INFORMATION UPDATE PAVEMENT MANAGEMENT STRATEGY FOR REGIONAL ROADS

The Transportation Services Committee recommends the adoption of the recommendation contained in the following report dated June 2, 2011, from the Commissioner of Transportation Services.

1. RECOMMENDATION

It is recommended that:

1. The Regional Clerk forward this report and attached presentation to the Clerks of all local municipalities for their information and that the Regional Clerk advise the local municipalities that staff are available to make a presentation to local municipal councils, if requested.

2. PURPOSE

To provide information on the Region's pavement management strategy for Regional roads.

3. BACKGROUND

The Region is responsible for 3,472 lane kilometres of arterial roads in the Region of which 4% are surface treated and 96% are asphalt roads

The Region has jurisdiction over a large network of arterial roads spanning over all of its nine local municipalities. Of the 3,472 lane kilometres of road, 139 lanes kilometres or 4% of the overall road network are surface treated roads and 3,333 lane kilometres or 96% are roads with at least one layer of asphalt pavement.

The Region's road network is valued at \$2.2 Billion excluding the cost of land, bridges and culverts

The physical assets of the Regional road system include pavements, bridges, culverts, storm sewers, curb-gutter, boulevards, signs, etc. The Regional road system, based on replacement value, is worth about \$2.2 billion, not including the cost of land, bridges and culverts.

In 2004, Council committed to fund an annual program to maintain an acceptable standard of roads in the Region

The Region is responsible for the moving people and goods over the arterial road network. With the rise in employment and population, the demands on our arterial network are continuing to grow. With the increasing demand comes the expectation of a higher standard of roadway performance.

Recognizing the need to maintain a satisfactory level of service to the driving public, in 2004, Council committed to increase funding for pavement management projects for 2004 and beyond. *Figure 1* shows the level of funding committed to pavement management from 2003 onwards:

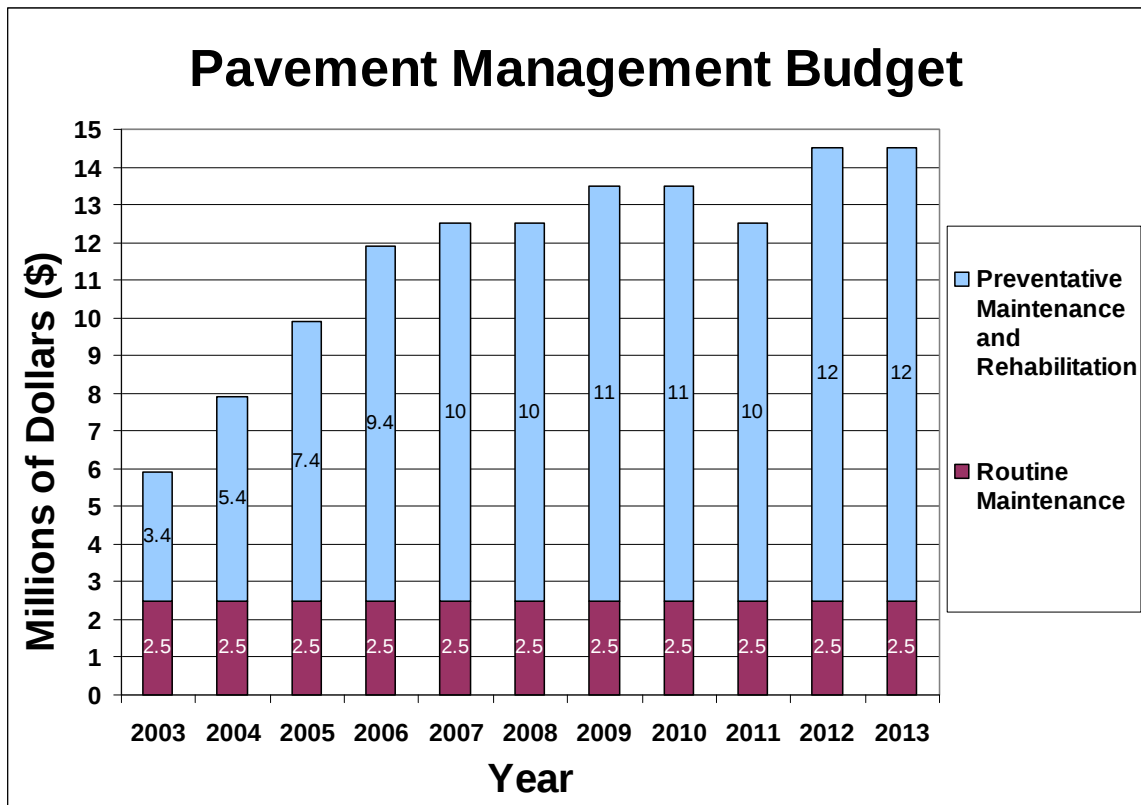


Figure 1: Funding Commitment for Pavement Management Projects

In addition to the above funding, the Region continues to invest \$2.5 Million annually in routine maintenance activities which include crack sealing and grind and pave projects.

In 2007, in addition to the regular funding commitment of \$10 Million for 2008, Council directed additional monies to the pavement management program to a total amount of \$15.4 Million. These additional monies were available as a result of surplus Regional funds and funding provided by the Province.

During the 2009 to 2010 period, the pavement management program benefitted from monies available through the Federal Infrastructure Stimulus Fund in the amount of \$22.8 Million.

Over the last five years, 870 lane kilometres of roads have been resurfaced /rehabilitated as part of the program

As a result of this significant funding commitment, the Region has accomplished the following:

- Cracksealing - 1,550 kilometres of cracks sealed
- Grinding and paving of patches - 100 lane kilometres of roads patched
- Minor Rehabilitation - 160 lane kilometres of roads resurfaced
- Major Rehabilitation - 300 lane kilometres of roads rehabilitated
- Preventive maintenance - 310 lane kilometres of roads surfaced

Pavement Condition Rating or Pavement Condition Index (PCI) is a way of evaluating the overall acceptance of the road surface to the user. A condition rating of 100 is the best possible rating, typical of a newly paved road. The average condition rating for the Regional road system in 2009 was approximately 83.

The following *Figure 2* illustrates the overall condition of the Regional road network in 2009:

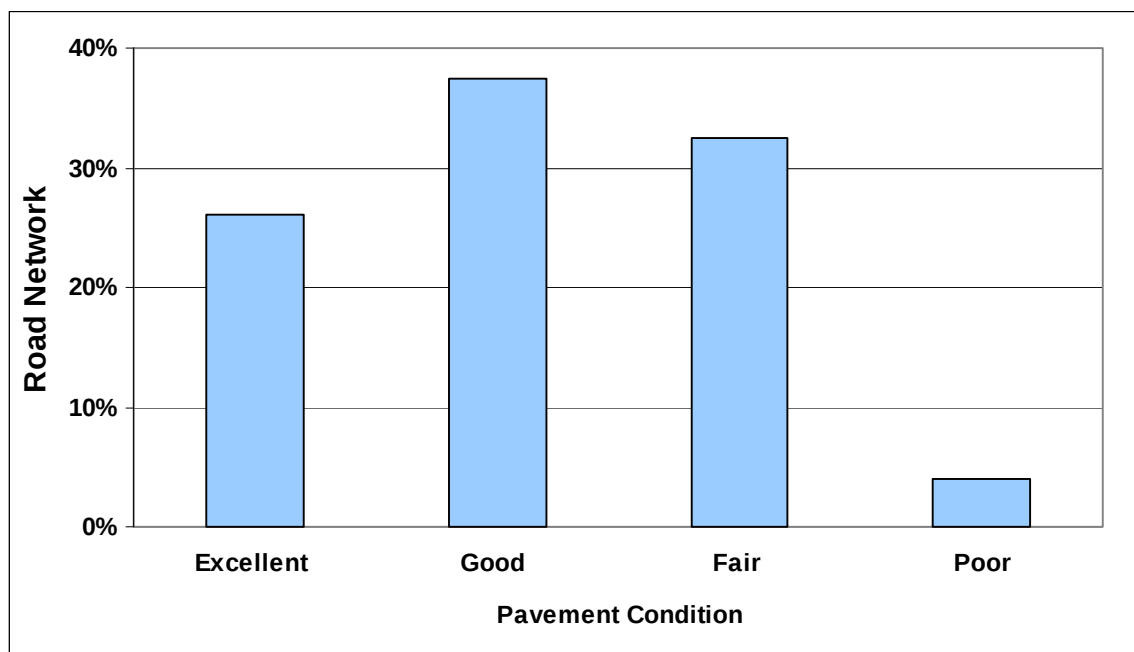


Figure 2: Overall Condition of Regional Road Network in 2009

4. ANALYSIS AND OPTIONS

A. NEW PAVEMENTS

Asphalt pavements constructed for medium to high volume roads consist of a pavement structure made up of a granular sub-base at the bottom, followed by granular base, binder course asphalt and top course asphalt

Roads that carry medium to high traffic volumes are typically surfaced with asphalt pavements. A typical asphalt pavement structure consists of granular sub-base at the bottom, followed by granular base, binder course asphalt and top course asphalt. The proportion of each of the layers is dependent on existing ground conditions and the traffic volumes the roadway is anticipated to carry over its service life.

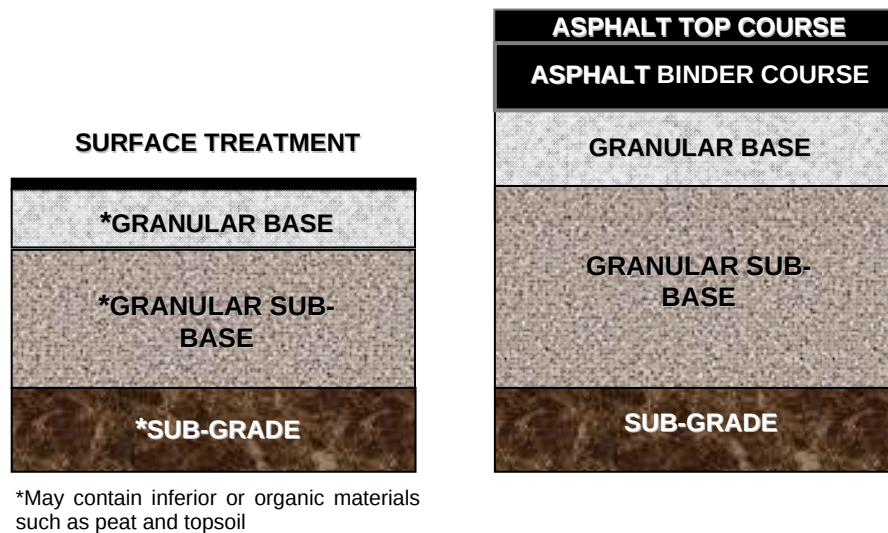


Figure 3: Typical Composition of Surface Treated and Asphalt Pavements

A surface treated pavement is constructed for low volume roads and consists of a granular sub-base, granular base and is topped by a thin coat of surface treatment to seal the pavement structure

For low volume roads, it is cost beneficial to construct surface treated roads. A surface treated road has a service life of 4 to 6 years.

A surface treated pavement consists of a granular sub-base, granular base and is topped by a thin coat of surface treatment to seal the pavement structure. At less than 15mm or half of an inch, a surface treatment is thin and therefore a fraction of the cost of an asphalt pavement. However, because it is thin, a surface treated pavement is more prone to damage and once damaged, it tends to deteriorate rapidly.

Some of the rural roads in the Regional road network were built decades ago. The pavement structures on these typically low volume roads may be built over poor subgrade or have pavement layers that contain organic materials (for example peat or topsoil) that are weak for pavement strength and frost susceptible. Constructing an asphalt pavement over weak or frost susceptible materials will result in the asphalt pavement cracking, rutting or breaking up within the early years of its service life. In order to address the poor soil and pavement structure conditions, a road would have to be entirely reconstructed including the removal of poor subgrade material. Surface treatments are a useful and cheap tool to surface such road sections. Surface treatments over such pavements also deteriorate over time but cheaper successive treatments will serve the purpose.

For example, during the reconstruction of Ravenshoe Road in 2008, the existing roadway and subgrade material were removed to depths of 1.2 to 1.8m to remove all existing material and replaced with competent granular material and paved with an asphalt pavement. The cost of the reconstruction work on Ravenshoe Road was about \$2,000,000 per kilometre of roadway. While Kennedy Road from Mt. Albert Road to Pollock Road (14.4 km) and Old Homestead Road from Warden Avenue to Station Road (19 km) were surface treated with a double chip seal coat at a cost of about \$100,000 per kilometre.

A road pavement has a service life of 15-20 years

A road pavement structure is designed to provide a service life of 15 to 20 years. With periodic intervention with maintenance techniques, the life of the pavement can be extended.

The condition of a pavement is influenced by water, traffic loading, sub-grade quality, age, periodic maintenance and quality of construction

The materials that make up asphalt pavement begin to break down and become affected by elements such as rain, snow, sunlight and chemicals that come into contact with the pavement surface. Exposure to the atmospheric elements makes the asphalt brittle and susceptible to cracking which in turn allows moisture to penetrate in to the pavement structure. Prolonged exposure to water will seriously harm the pavement structure.

The volume of traffic and especially heavy commercial vehicles has a strong influence on the condition of roads. The road is designed proportionately to the traffic volume it is projected to carry and the composition of light to heavy vehicles. The heavier the traffic, the thicker the pavement needs to be.

The condition of ground upon which the pavement is built on will also influence the pavement structure. A road which is built on poor ground, such as peat material through a wetland will not perform as well as road built on well firm and well draining material.

While a pavement is designed to provide a service life of 15 to 20 years, it needs to be constructed properly in order to achieve the desired performance. Poor quality construction will result in a reduced life.

Asphalt pavements will slowly deteriorate over time

An asphalt pavement will deteriorate as it ages as shown in *Figure 4*. The rate of deterioration is slower in the initial years and increases rapidly towards the end of its service life. In order to address the deterioration corresponding repair treatments are required.

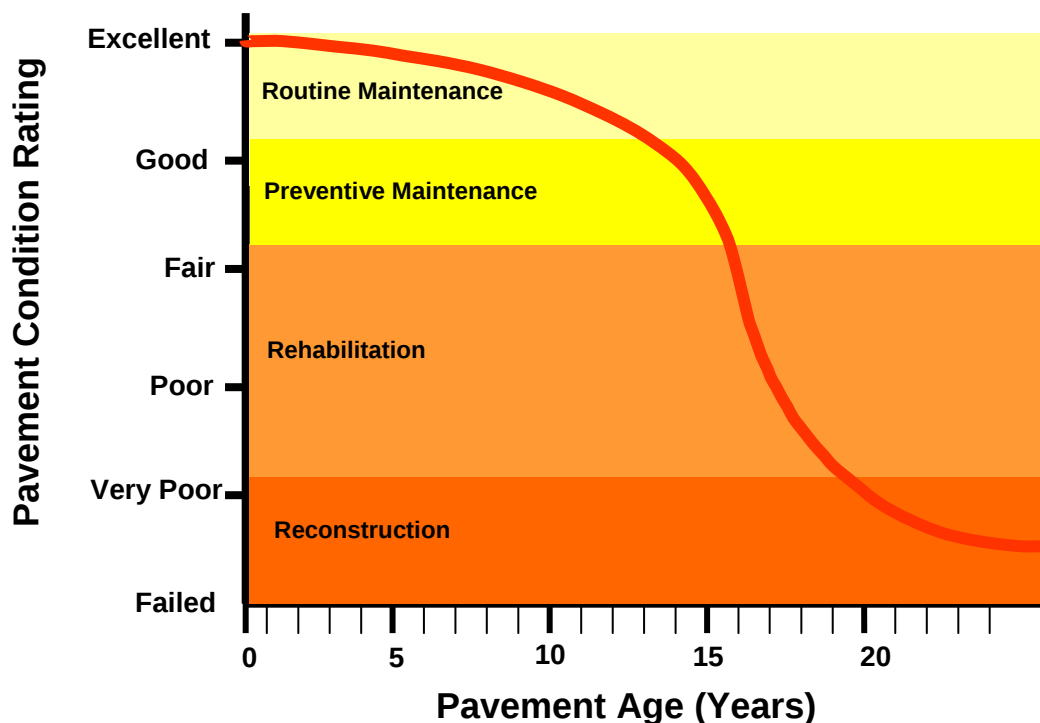


Figure 4: Pavement Deterioration Curve and Treatment Options

When the pavement is newly constructed, the pavement is in excellent condition. As the pavement deteriorates, the condition rating of the pavement begins to fall resulting in performance and ride quality issues. Regular intervention is required before the condition of the pavement falls below an acceptable level. The appropriate repair strategy depends on the condition of the pavement when it is applied. If the intervention is undertaken when the pavement condition is good, routine and preventive maintenance will suffice to extend the service life. When the condition of the pavement rating is fair to poor, minor to major rehabilitation will be required, respectively. Finally if the condition of the pavement is very poor, the pavement loses its structural strength and is beyond repair. Major reconstruction will typically be required to restore the pavement to good condition.

A. ROUTINE MAINTENANCE

As the name suggests, under routine maintenance the Region undertakes routine activities to maintain the condition of the pavement and stall the onset of deterioration. Routine maintenance activities include:

- Crack sealing various cracks that tend to form as the pavement ages
- Grinding and patching isolated roadway sections where for some reason the pavement has deteriorated significantly relative to the overall roadway
- Cleaning ditches, storm outlets and catchbasins to facilitate drainage
- Grading roadway shoulders
- Pavement marking

While this form of maintenance is important for a road network, it does not improve the overall condition of a road network. Routine maintenance is a holding strategy to maintain the pavement condition without extending the pavement life.

B. PREVENTIVE MAINTENANCE

Preventive Maintenance techniques are relatively quick and low cost but do not add structural strength to the pavement

Preventive maintenance is typically undertaken when a road pavement is still in good condition with a significant portion of its service life remaining. Preventive maintenance is a strategy of extending the service life of structurally sound pavements by applying cost-effective treatments to seal or rejuvenate the surface. It is the same concept that one undertakes in painting windows for a house; regular maintenance that extends the service life. Preventive maintenance treatments include:

- Chip seal coats applied as single or double chip seal coats to cover the surface of a low volume asphalt road.
- Slurry seal applied to cover an asphalt surface while correcting underlying distresses in pavements.
- Micro-surfacing applied to cover an asphalt surface on high volume roads.
- Thin asphalt overlays applied over an asphalt surface.

While the treatments will not improve structural capacity, each applied treatment will restore the condition of the road and prevent or delay future deterioration.

Typically, investing one dollar (\$1) in proactive, preventive maintenance treatments when the pavements are in good condition will eliminate or delay spending four to five dollars (\$4 to \$5) in reactive and disruptive rehabilitation or reconstruction repair treatments.

Preventive maintenance consists of undertaking periodic treatments to extend the service life of the pavement, deferring costly rehabilitation

Undertaking treatments on a regular basis through a preventive maintenance program can extend the pavement life an average of 5 to 7 years. The cumulative effect of systematic, successive preservation treatments is to postpone costly rehabilitation and reconstruction. During the life of a pavement, the cumulative cost of the series of treatments is substantially less than the cost of the more extensive rehabilitation or reconstruction.

In addition, the preventive maintenance treatment methods are less disruptive to road users than those associated with rehabilitation and reconstruction projects.

The benefits of preventive maintenance are not widely understood and public perception of the concept is poor

While this concept has been adopted by many jurisdictions, it has not been fully embraced by many communities. The traditional method of pavement management has been to “fix the worst first”; be reactive and address problems when they occur rather than being proactive and prevent them from occurring in the first place. For example, when undertaking a chip seal treatment on Park Road in Georgina or microsurfacing on Mulock Drive in Newmarket, staff dealt with queries from the public who complained about the Region wasting resources on fixing a road that appears to be fine while ignoring other road sections that clearly show signs of distress and could be improved.

Immediately following the application of a chip seal or micro surfacing treatment, it is common to have some excess loose chips that did not bind together. While these chips are swept up during the first few days following installation of the treatment, motorists who are used to driving on smoother asphalt pavements tend to get aggravated because the chips tend to get picked up by vehicle tyres.

Preventive maintenance treatments such as chip seal treatments when installed, initially feel coarse and noisy due to the thinness of the layer. Over the first couple of years, the action of traffic on the thin layer usually kneads that aggregate into place and the pavement becomes relatively smoother. The change in macrotexture of the chip seal surface has been documented in studies to decrease from 3 to 2 mm over a period of two years. Irrespective of the study result, it should be noted that the macrotexture depth of a chip sealed surface even after two years will not be as smooth as that of a new asphalt pavement.

This initial characteristic of a surface treatment typically generates public concerns during the first year after application. Sometimes these concerns manifest themselves in the following:

- Perception of getting the second grade treatment where it appears that the Region provided a cheaper, thin and rough treatment instead of a thicker and smooth asphalt pavement.

- Degrading the standard of the roadway from a smoother urban asphalt pavement to a rural chip-sealed surface.

Regional staff continue to recommend the use of these preventive maintenance applications at the right time in order to optimize the overall return on investments in the road pavements. For example, Mulock Drive from Bathurst Street to Yonge Street was microsurfaced in 2008 and a double chip-seal coat treatment was placed on Weston Road from Highway 9 to Lloydtown-Aurora Road and both roads are performing well.

C. PAVEMENT REHABILITATION

Pavement rehabilitation is a reactive treatment undertaken to address age-related pavement problems or increased traffic

Pavement rehabilitation extends the service life of a pavement and its load carrying capacity by enhancing its pavement structure. This is achieved by eliminating the age-related deterioration of the pavement or increasing the thickness of pavement layers to address projected increase in traffic volumes.

The rehabilitation treatments are designed to provide a service life of 7 to 15 years. Rehabilitation treatments are more costly than preventive maintenance techniques but less costly than reconstruction.

Minor rehabilitation consists of a treatment to address the pavement deterioration due to the exposure to the elements. Typically the treatment includes grinding to remove a layer of asphalt and replacing it with a similar layer of asphalt. The grinding and paving process is commonly known as 'shave and pave'.

Major rehabilitation consists of treatments that are undertaken to restore or enhance the structural capacity of a pavement, with both extending the service life of the restored roadway.

The Region uses several types of rehabilitation techniques

Over the last few years, the Region has used several different types of major rehabilitation techniques:

- Full depth reclamation.
- Full depth reclamation with expanded asphalt material.
- Cold in Place Recycling.
- Cold in Place Recycling with expanded asphalt material.

D. PAVEMENT RECONSTRUCTION

During reconstruction a substantial portion of the pavement structure is removed and replaced with new material.

If pavements are left to deteriorate, they become weak and lose their structural integrity. As its structural capacity is weakened, a pavement will begin to disintegrate, extensive cracking, rutting and potholes will develop. At this point, when the pavement is beyond repair, preventive maintenance, minor or major rehabilitation treatments will not be able to restore its structural capacity. Reconstruction will be required to restore the surface condition and structural integrity of the pavement.

Reconstruction is also required when the pavement needs to be improved to cater for a significant increase in projected traffic volumes or to accommodate road widening. Reconstruction involves the complete replacement of the pavement structure. The new pavement structure is typically designed to last at least 20 years.

Major Rehabilitation and reconstruction are expensive and time consuming but perceived to provide good value

Through rehabilitation and reconstruction the pavement is restored to new condition and therefore the condition rating of the pavement is restored.

Replacing the entire pavement structure and restoring new layers, is a disruptive process and it is time consuming. However, as this process restores a distressed and failed pavement to new condition, it is perceived to provide good value in the eyes of the public.

Reconstruction is the most costly of all the repair strategies available. If pavements were allowed to slip to a stage where they are beyond repair, an enormous amount of funds would have to be committed to maintain a steady level of investment to maintain an acceptable condition of the road network.

E. PAVEMENT MANAGEMENT STRATEGY

The Region employs a multi-tier annual program comprising of new construction, reconstruction, rehabilitation, preventive maintenance and routine maintenance to manage the performance of the Regional Road network. The worst roads are repaired through reconstruction, poor roads are improved by rehabilitation, and good roads are preserved with preventive and routine maintenance.

However, due to the existing condition of the overall Regional road network, the Region relies heavily on rehabilitation treatments to improve the overall condition of the road network. Continuing with this approach to maintain the condition of the road network will not be sustainable as it would require a prohibitive level of funding.

Deciding on what treatment to apply when and where is undertaken through a traceable process

Determining the right road, the right treatment, and the right timing for maintenance activities, requires that we have the right information to make informed decisions. The Region has a comprehensive Pavement Management System (PMS) to collect existing pavement data, evaluate the data and use it to determine what treatments will be appropriate and timely for each section of road within the Region.

Road condition data on each road section in the Region is collected once every two years

Data collection is the first step in the PMS. It is the evaluation of the condition of all paved Regional road sections. Every year pavement condition data is collected for half of the Regional road network, so that data is collected for the entire network every two years. The data collection consists of a survey to record the extent and severity of pavement distresses (such as rutting, roughness, longitudinal cracking, alligator cracking, patching, and block cracking) in numerical terms.

A pavement management system software is used to analyse the data and prepare a list of potential improvements

The data that is collected is input in to a pavement management system software. In addition, staff add a variety of road system data for each section of Regional road (such as traffic volumes, and structural and drainage characteristics), as well as a list of optional treatments to improve the pavement, the average life span of each treatment and its cost. The final step in the process is for staff to input the anticipated funding levels over a 10-year horizon for road resurfacing and minor road maintenance activities (such as patching and crack-sealing, for example) and the road sections identified for widening and reconstruction through the roads capital program. The software then carries out a network-wide optimization routine, to maximize the effectiveness of committed funding allocated to the pavement management program, and determines road sections that would benefit from some treatment over a 10-year timeframe.

The list is screened through an on-site review by staff

Staff then reviews this information and makes adjustments based on specific field conditions. Projects may be advanced or deferred to avoid conflict with other Regional or local municipality projects.

Projects are selected for further geotechnical investigation and analysis by professional geotechnical firms

Once a list of road sections is determined, detailed geotechnical investigation is undertaken to review the condition of the existing road. The characteristics of the road,

existing and projected traffic volumes and composition of truck traffic are used in concert with the field information to determine the appropriate treatment for the roadway. The right treatment, for the right road at the right time is determined.

The recommended improvements are considered during the preparation of annual business plans through the budget process

The recommended improvements include a combination of preventive maintenance and rehabilitation techniques. Cost estimates are prepared for the proposed prioritized treatments and are considered in the preparation of business plans for the upcoming year. In addition to undertaking routine maintenance on various road sections, the Region plans to resurface several road sections in 2011:

Table 1
Pavement Management Projects

Treatment	Location
Routine Maintenance	• Crack sealing and grind and pave work on various roads in the Region
Preventive Maintenance -	• Microsurfacing on Highway 9 from Highway 400 to Bathurst Street
Minor Rehabilitation	• Woodbine Avenue from Steeles Avenue to Highway 7 • Markham Road from Steeles Avenue to Highway 407
Major Rehabilitation	• Kennedy Road from Bloomington Road to Mount Albert Road • Wellington Street from Bathurst Street to Yonge Street
Reconstruction	• Bowes Road from Keele Street to 250m Westerly

In pursuit of continuous improvements, the Region has engaged a consulting engineering firm to review the Region's current pavement management system, strategy and practices, and recommend improvements

While the Region has a comprehensive pavement management system and robust pavement management program, the Region is pursuing continuous improvements towards its goal of enhancing the condition rating of the overall road network.

Towards this end, the Region has retained the services of a consulting engineering firm to review the Region's current pavement management system, strategy, practices and recommend improvements that will enhance the overall process.

The Region continues to develop education material to provide information on the Region's pavement management strategy

The Region has developed a presentation (*See Attachment 1*) that provides information on the Region's road network, the types of pavements on our roads, pavement deterioration and available treatments options and the Region's pavement management system.

Staff are available to make a presentation or provide information to local municipalities, stakeholders and other groups who are interested in learning about the Region's pavement management strategy.

Staff continue to send out customary construction notices for all Region construction projects. As preventive maintenance treatments tend to generate the most concerns, staff will send out flyers to residents explaining the benefits of preventive maintenance and information about the particular treatment that is being applied.

5. FINANCIAL IMPLICATIONS

There are no financial implications related to this report.

6. LOCAL MUNICIPAL IMPACT

The Region continues to coordinate its pavement management program with local municipalities to integrate any local municipality infrastructure improvements.

7. CONCLUSION

The Region's Pavement Management System and program represents a proactive approach in maintaining the Region's road network. The Region employs a multi-tier annual program comprising of new construction, reconstruction, rehabilitation, preventive maintenance and routine maintenance to manage the performance of the Regional Road network. The worst roads are repaired through reconstruction, poor roads are improved by rehabilitation, and good roads are preserved with preventive and routine maintenance.

Determining the right road, the right treatment, and the right timing for maintenance activities requires that we have the right information to make informed decisions. The Region's has a comprehensive Pavement Management System (PMS) to collect existing

pavement data, evaluate the data and use it to determine what treatments will be appropriate and timely for each section of road within the Region.

For more information on this report, please contact Paul Jankowski, General Manager of Roads at extension 5901.

The Senior Management Group has reviewed this report.

(The attachment referred to in this clause is attached to this report.)



Pavement Management Strategy for Regional Roads

Summary of Presentation

- Introduction
- Pavements and why they deteriorate
- Treatment Options
- Why preventive maintenance is better
- The Region's Pavement Management System
- Current State of the Regional road network
- 2011 Pavement Preservation Projects



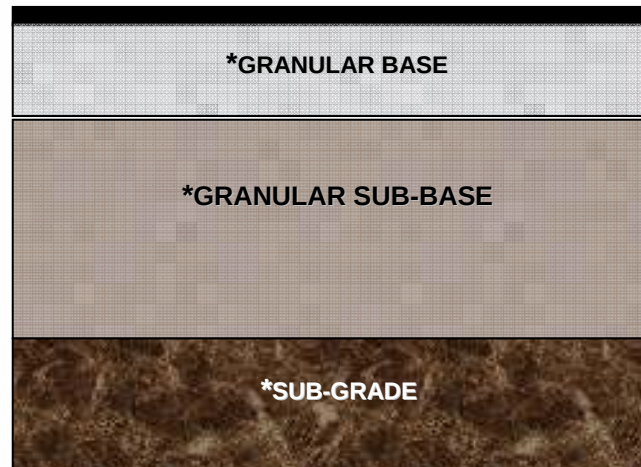
Introduction



- 3,472 lane-km's of roads under the Region's jurisdiction
- Urban and rural roads - 46% with curbs, 54% with shoulders
- 2 to 7-lane roads
- 96% paved, 4% surface treated
- Some roads were built decades ago
- Various stages of distress
- The Regional road network's replacement value is \$2.2 billion, excluding the cost of land, bridges and culverts

Pavement Types

SURFACE TREATMENT



*May contain inferior or organic materials such as peat and topsoil

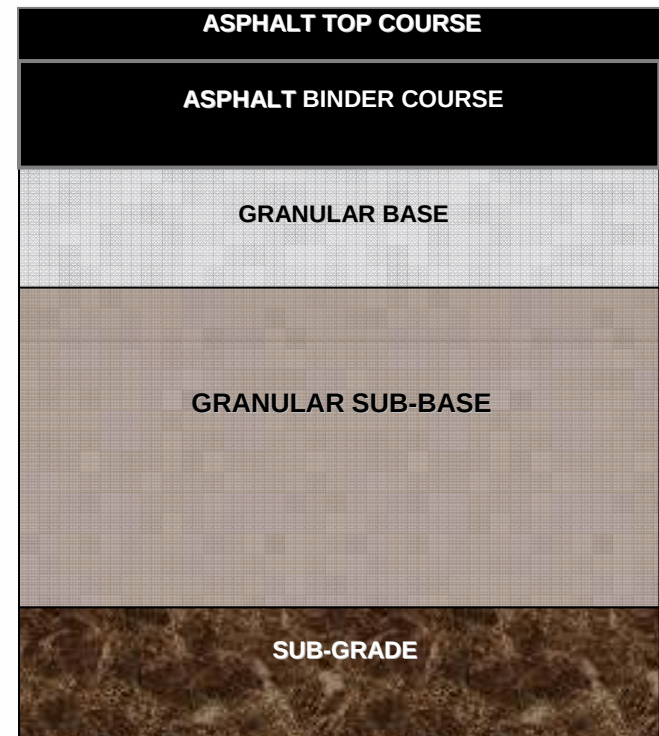
ASPHALT TOP COURSE

ASPHALT BINDER COURSE

GRANULAR BASE

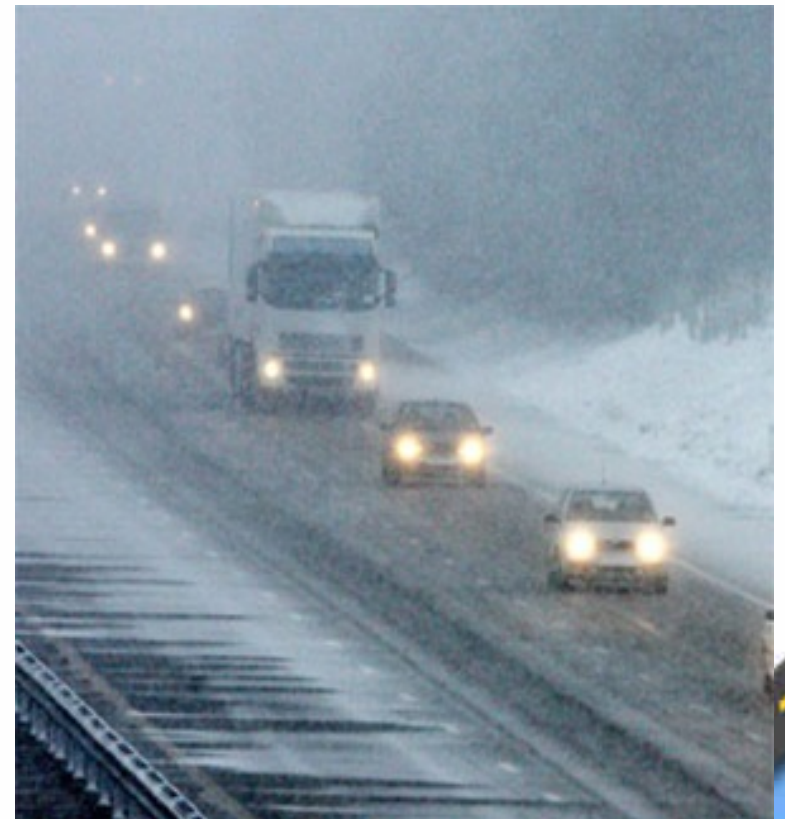
GRANULAR SUB-BASE

SUB-GRADE

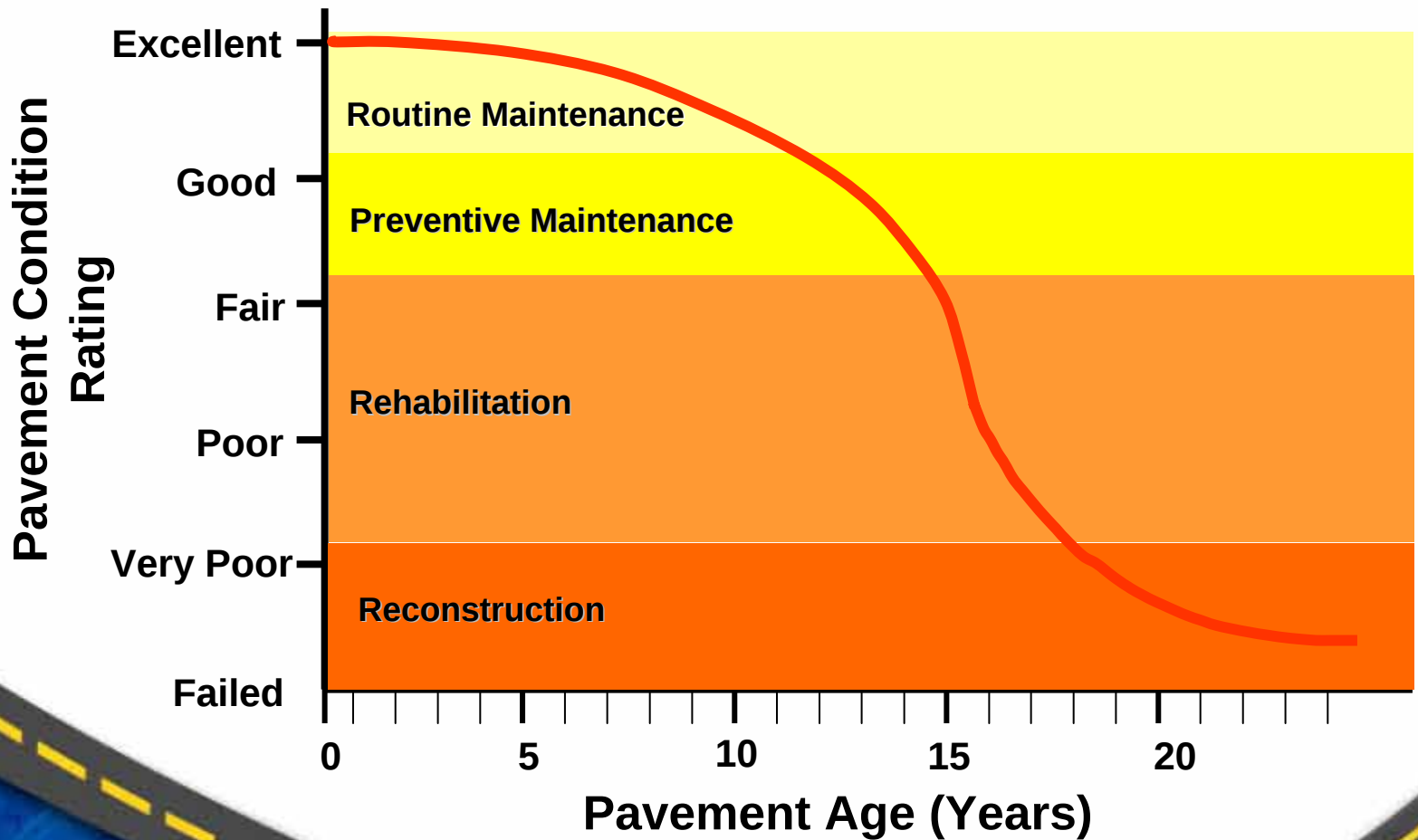


Pavements deteriorate over time

- Exposure to the elements (e.g. water, snow, ice, sun, air & chemicals)
- Traffic volumes especially trucks & buses
- Existing ground conditions
- Age of pavement
- Lack of maintenance
- Initial quality of construction



Pavement Deterioration and Treatment Options





Routine Maintenance

- Routine / regular activities
- Pavement is in very good to fair condition
- Activities include:
 - Crack sealing
 - Grinding & pavement patching
 - Cleaning ditches, culverts, sewer outlets
 - Grading roadway shoulders
- Maintains the condition of the road and delays deterioration

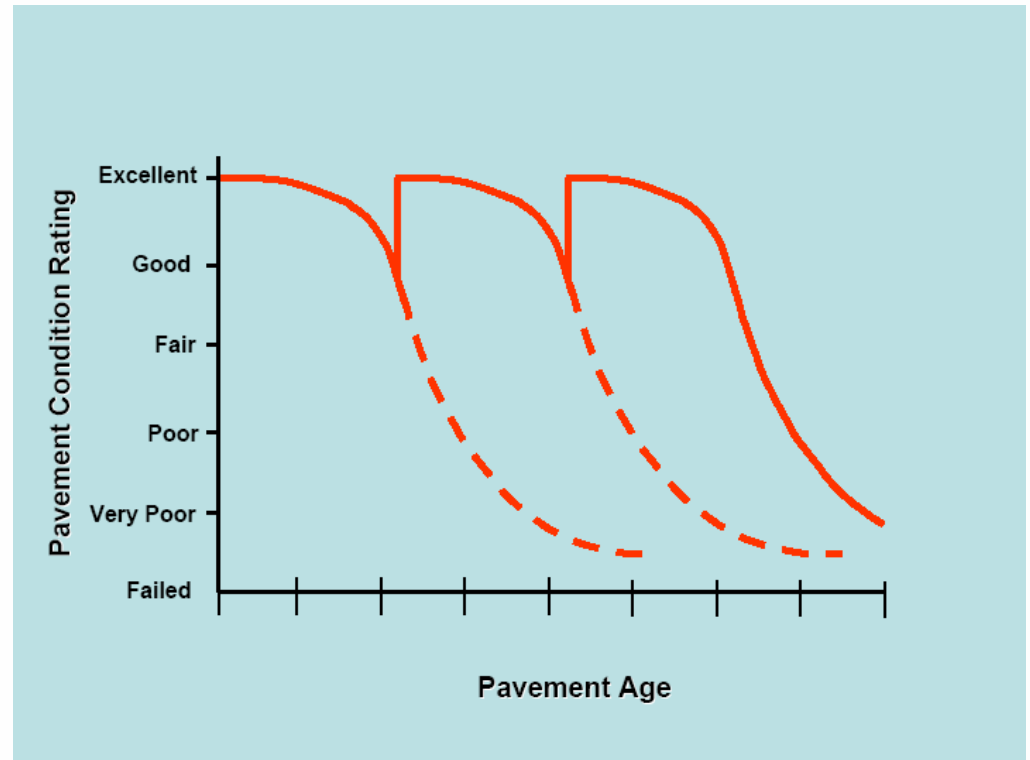
Preventive Maintenance



- Undertaken when pavement is in very good to fair condition
- Consists of applying a thin layer of coating to seal the surface
- Restores the condition of the road and extends the pavement life

Preventive Maintenance (Continued ...)

- Treatments include:
 - Chip sealing
 - Microsurfacing
 - Slurry Seals
- Quick to install
- Low cost
- Cumulative treatment costs in series is less than the cost of rehabilitation

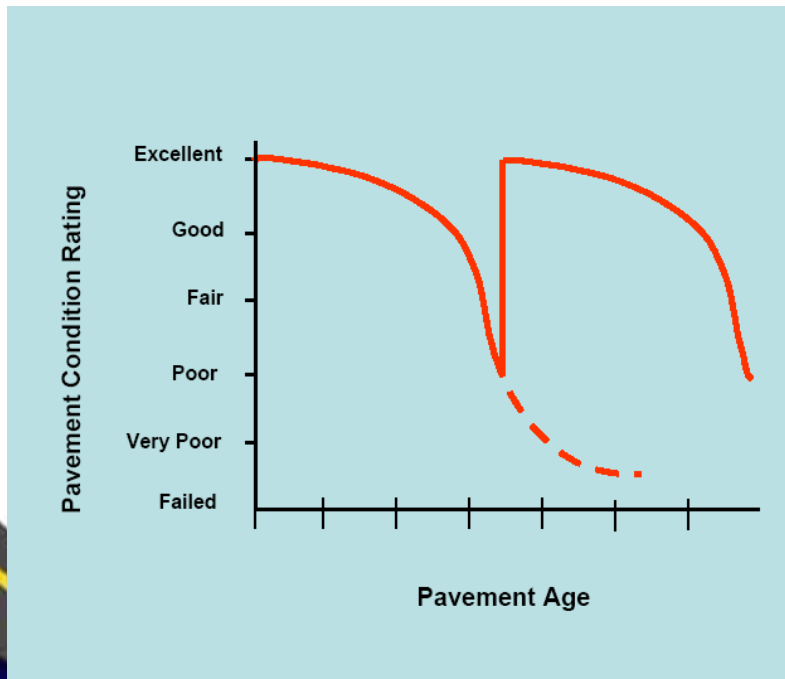


Preventive Maintenance (Continued ...)



- Not fully embraced by many communities
- Traditionally 'Fix the Worst First' approach
- New approach is to be proactive
- Treatment characteristics generate public concerns:
 - Funds being directed to a good road
 - Second grade treatment
 - Degrading the standard of the pavement

Pavement Rehabilitation



- Reactive treatment
- Undertaken when pavement is in fair to very poor condition
- Consists of pulverizing a part or entire layer of asphalt, applying a form of liquid asphalt and repaved
- Restores the condition of the road, enhances the pavement strength and extends the pavement life
- Extends the pavement life by 7 to 15 years

Pavement Rehabilitation (Continued ...)



- Minor and major rehabilitation treatments
- 'Grind and pave' is minor rehabilitation treatment
- Major rehabilitation Treatments include:
 - Full depth reclamation
 - Full depth reclamation with expanded asphalt material
 - Cold in Place Recycling
 - Cold in Place Recycling with expanded asphalt material

Pavement Rehabilitation (Continued ...)

- Time consuming and sequential process
- Cost is higher than preventive maintenance, but lower than reconstruction
- Perceived to provide 'good value'



Reconstruction



- Reactive treatment
- Undertaken when pavement has failed
- Consists of replacing all layers
- Disruptive and very time consuming
- Costs as much as new road
- Perceived to provide 'good value'

Preventive Maintenance

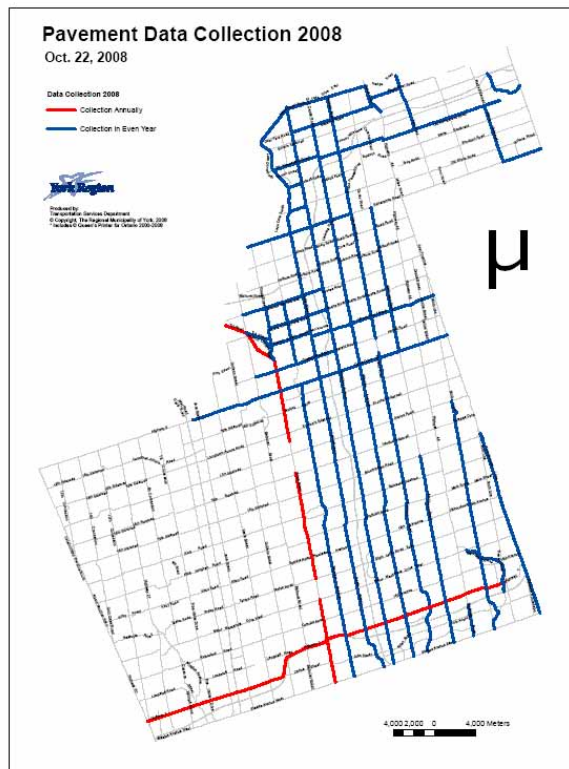
- Proactive
- Less expensive
- Faster to implement
- Seals the surface
- Initial rough texture

VS.

Rehabilitation/ Reconstruction

- Reactive
- Expensive
- Disruptive
- Restores structural integrity
- Restored to new condition



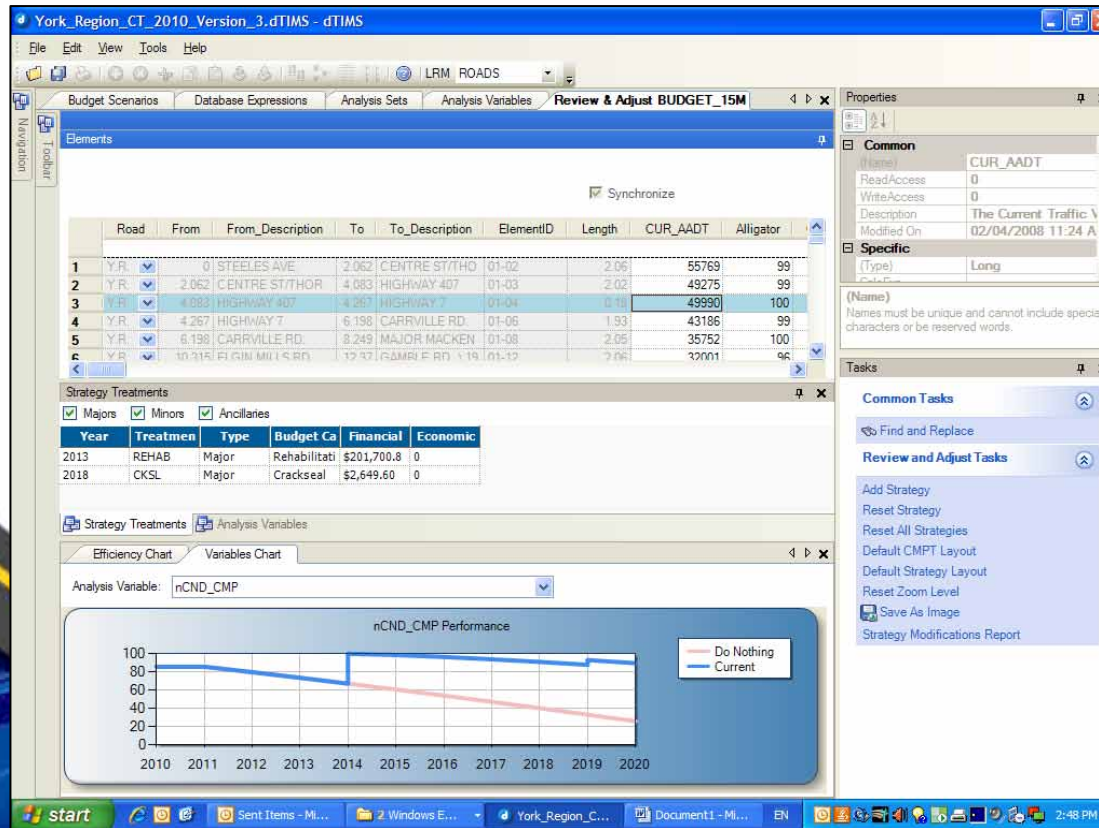


Pavement Data Collection

- Half of the Region's roads are surveyed every year!



Pavement Management System



- Assess the condition of existing pavement
- Evaluate roughness, rutting and cracking
- Determine most cost effective treatment option

Pavement Management System (Continued ...)



Falling Weight Deflectometer
Testing

- Undertake geotechnical investigation
- Recommend the appropriate treatment
- Prepare preliminary cost estimate for each identified road section
- Define list of projects as part of the annual budget process
- Present Business Plan to Council for approval
- Design, tender and construct the work

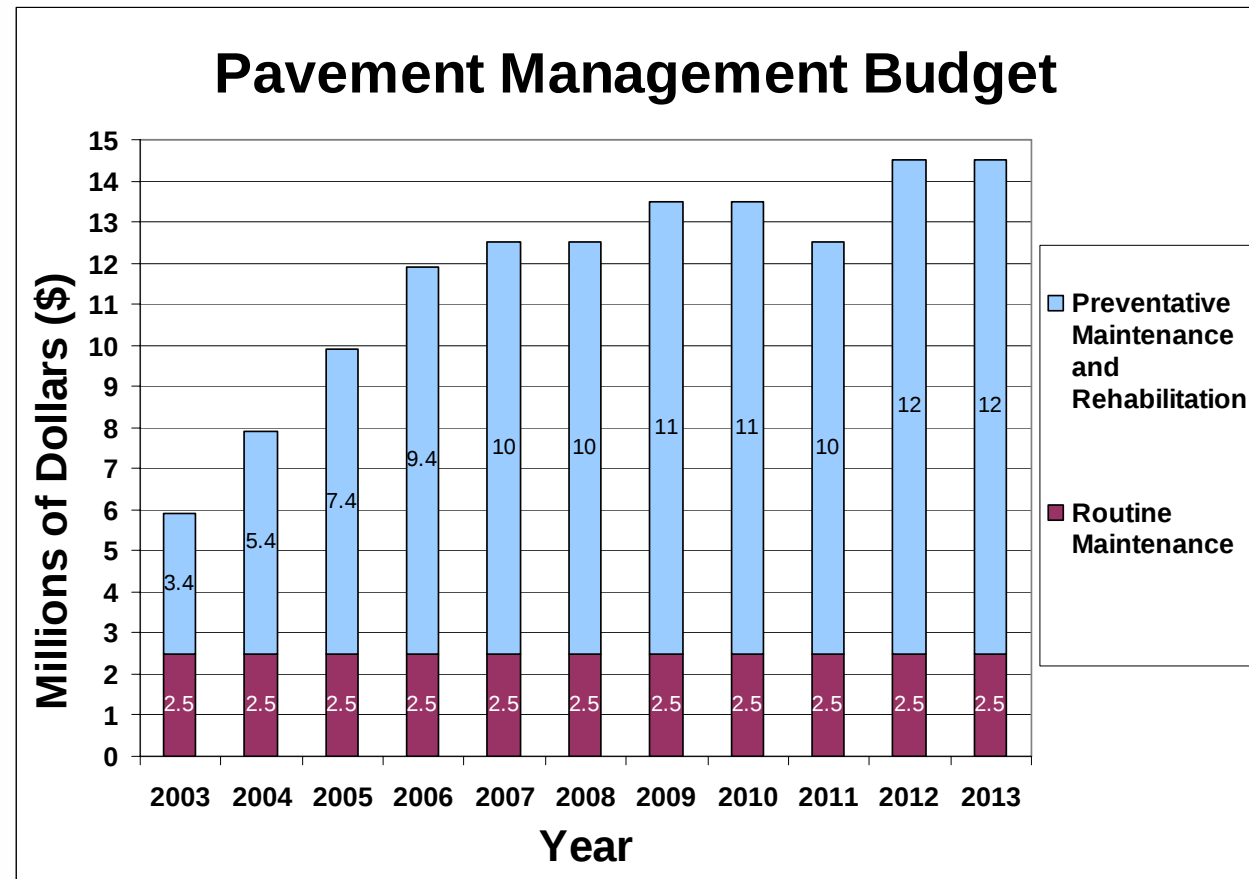
Pavement Condition 2009

York Region Road Network



Steady Program to Maintain an Acceptable Standard

- In 2003, Council committed to fund an annual program to maintain an acceptable standard of roads in the Region.



- As a result, 870 lane-km's of road, or 22% of the road network has been resurfaced or rehabilitated between 2006 and 2010.

2011 Pavement Maintenance Projects

Treatment	Location
Routine Maintenance-	•Crack sealing and grind and pave work on various roads in the Region
Preventive Maintenance -	•Microsurfacing on Highway 9 from Highway 400 to Bathurst Street
Minor Rehabilitation-	•Woodbine Avenue from Steeles Avenue to Highway 7 •Markham Road from Steeles Avenue to Highway 407
Major Rehabilitation-	•Kennedy Road from Bloomington Road to Mount Albert Road •Wellington Street from Bathurst Street to Yonge Street •King Road from Keele Street to Warren Road
Reconstruction-	•Bowes Road from Keele Street to 250m Westerly

