Green Solutions

• Inherent environmental issues with traditional road rehabilitation methods:
  – High resource and energy consumption
  – Lengthy traffic interruptions
  – Disruption to local community

• Halton Region’s Green Procurement Policy
  – The objective of this policy is to purchase environmentally preferred goods and services in which reasonable cost and lowering the impact on the environment and human health are key considerations
Green Solutions

• Three road re-surfacing projects
  – Steeles Avenue/Martin Street (18 lane kms), Trafalgar Road (9.2 lane kms), and Campbellville Road (8.6 lane kms)
  – Forward thinking allowed the Region of Halton to realize improved environmental net benefits as well as cost savings
Green Solutions: Technologies

Green Technologies Implemented

• Detailed pavement condition assessments undertaken at the planning stage found that innovative, “green” solutions could be used:
  • Cold-in-place recycling with expanded asphalt mix (CIREAM)
  • Stress-absorbing membrane interlayer (SAMI)
  • Pulverized asphalt
  • Warm-mix asphalt
Green Solutions

• Although these technologies are not new, the Ontario engineering and construction industry has been relatively slow to adopt their regular use, mostly due to general unfamiliarity and uncertainty about their historical track record.
Green Solutions: Technologies

Green Technologies Implemented

• Cold-in-place recycling with expanded asphalt mix (CIREAM)
  – Utilized on Trafalgar Road
  – Repairs aged pavements (thermal fatigued, or reflective cracking) and previously recycled pavements
  – Mitigates reflective cracking
  – Not suitable for pavements with extensive base or sub-base problems, pavements containing steel slag, or pavements of insufficient strengths
  – Ravelling can be an issue in high traffic areas until CIREAM is covered by a surface lift of asphalt
Green Solutions: Technologies

Green Technologies Implemented

- Stress-absorbing membrane interlayer (SAMI)
  - Utilized on Steeles Avenue & Campbellville Road (15,000 m² placed)
  - A combination of special polymer modified asphalt emulsion, chopped fibreglass strands, and aggregate (10 mm thickness)
  - Highly resilient waterproof membrane that bridges alligator distressed pavements and delays reflective cracking
Green Solutions: Technologies

Green Technologies Implemented

• Stress-absorbing membrane interlayer (SAMI)
  – Eliminates need for full-depth pavement removal and replacement and only requires milling and replacement of top asphalt
Green Solutions: Technologies

Green Technologies Implemented

• Pulverized asphalt
  – Utilized on Campbellville Road
  – Eliminates the need to haul a majority of material off-site
  – Increases road base thickness
Green Solutions: Technologies

Green Technologies Implemented

• Warm-mix asphalt
  – 4000 tonnes placed on Trafalgar Road
  – The technology allows asphalt pavement to be mixed and placed at lower temperatures
Green Solutions: Key Benefits

Key benefits of green technologies:

1. Material re-use and reduced resource consumption
2. Reduced energy consumption and carbon footprint
3. Minimizes social disruption
4. Increases worker safety during construction
5. Economical
Green Solutions: Sustainable Benefits

1. Material Re-use and Reduced Resource Consumption
   • CIREAM technology vs. full depth removal and replacement
     – Eliminated the need to dispose of existing milled asphalt off site
Green Solutions: Sustainable Benefits

1. Material Re-use and Reduced Resource Consumption
   • SAMI technology vs. full depth removal and replacement
     – Reduced asphalt removal and replacement by roughly 60 – 75%
     – Eliminated need for 2,700 additional tonnes of asphalt replacement
Green Solutions: Sustainable Benefits

1. Material Re-use and Reduced Resource Consumption
   - Pulverized asphalt
     - 6,300 tonnes of existing asphalt was pulverized and re-used on Campbellville Road as granular base
Green Solutions: Sustainable Benefits

2. Reduced Carbon Footprint & Energy Consumption
   • CIREAM technology vs. full depth asphalt removal and replacement
     – Eliminated need to haul/dispose of milled asphalt off-site
     – Eliminated need for production, transport & placement of base asphalt
Green Solutions: Sustainable Benefits

2. Reduced Energy Consumption & Carbon Footprint
   • SAMI technology vs. full depth asphalt removal and replacement
     – Significant reduction in energy to remove additional existing asphalt
     – Significant reduction in energy to produce, transport & place additional asphalt
Green Solutions: Sustainable Benefits

2. Reduced Energy Consumption & Carbon Footprint

- Pulverized asphalt vs. full depth asphalt removal and replacement
  - Significant reduction in energy to transport milled asphalt off-site
  - Reduced energy consumption and emissions due to reduction of new material to be produced and transported
Green Solutions: Sustainable Benefits

2. Reduced Energy Consumption & Carbon Footprint

• Warm-mix asphalt vs. hot mix asphalt
  – Lower mix temperature, which cuts fuel consumption and decreases emissions
Green Solutions: Sustainable Benefits

3. Minimized Social Disruption
   - CIREAM vs. full depth asphalt removal & replacement
     - Reduced construction duration
     - Reduced truck traffic
     - Road opened to traffic shortly after placement of CIREAM
Green Solutions: Sustainable Benefits

3. Minimized Social Disruption

• SAMI & pulverized asphalt technology vs. full depth asphalt removal and replacement
  – Reduced construction duration
  – Reduced truck traffic
  – Less traffic disruption

• Warm mix asphalt vs. hot mix asphalt
  – Reduced emissions
Green Solutions: Sustainable Benefits

4. Increased Worker Safety during Construction

- CIREAM, SAMI, pulverized asphalt
  - Reduced construction duration
  - Pilot vehicle specified to control traffic speeds through construction area
- Warm-mix asphalt
  - Lower emissions and mix temperature creates a safer environment for workers
Green Solutions: Sustainable Benefits

5. Economical

- CIREAM (cold-in-place recycling with expanded asphalt mix)
  - CIREAM on Trafalgar Road resulted in 40% lower construction costs than conventional re-construction approach
  - Estimated 30 year lifecycle cost, 30% lower than conventional re-construction methods
- SAMI – Cost is comparable to the removal & replacement of a 25 mm thickness of asphalt
- Pulverized asphalt
  - ± 70% less expensive than full depth removal & replacement and offered the lowest lifecycle costs
- Warm mix
  - Prices are marginally higher than hot mix asphalt
Green Solutions: Summary

- Select sustainable pavement designs that:
  - Reduces resource consumption
  - Reduces energy consumption and carbon footprint
  - Minimizes social disruption
  - Increases worker safety
  - More economical than conventional methods
Green Solutions: Summary

• Let current road conditions and future road requirements dictate the technology selected.
• Try new technologies;
  – See what works
  – Don’t be afraid
• Green technologies may be more economical than conventional methods for your projects