SUSTAINABLE PAVEMENT DESIGN: DOING MORE WITH LESS


The Regional Municipality of Halton recognizes the inherent environmental issues associated with construction projects, such as pollution, disruption to the local community, traffic interruptions, and high resource consumption.

To help address these concerns, the Region adopted a Green Procurement Policy that integrates sustainability considerations into the decision process at all phases of a project’s (and product’s) lifecycle.

For three recent road resurfacing projects, this forward-thinking approach allowed the Region to realize improved environmental net benefits, as well as cost-savings, through implementing more sustainable technologies, and getting them to work in the “real world.”

Traditional road resurfacing projects involve pavement removal and disposal, production, transportation, and placement of asphalt. These activities consume considerable energy and resources, as well as disrupt the local community. Recognizing this, efforts were made during the planning stage to find “greener” methods.

Detailed pavement condition assessments undertaken at the planning stage found that three innovative, “green” solutions could be used: CIREAM (cold-in-place recycling with expanded asphalt mix), SAMI (stress absorbing membrane interlayer), and pulverized asphalt.

Although these technologies are not new, the Ontario engineering and construction industry has been relatively slow to adopt this method.

The combined technologies used on these projects resulted in reducing the amount of milled asphalt hauled off-site at Trafalgar Road, Steeles Avenue, and Campbellville Road—approximately 15,000, 2,700, and 6,300 tonnes respectively.

The three technologies also assisted in minimizing the construction duration, which reduced hydrocarbon emissions and resulted in lower construction costs when compared to conventional full depth removal and replacement.

Reduced carbon footprint

The project approach resulted in a significantly reduced carbon footprint in comparison to traditional removal and replacement techniques.

The estimated cost was 30% lower as a result of CIREAM technology.

Approximately 0,000 tonnes of warm mix asphalt was placed on Trafalgar Road. Warm mix asphalt requires a lower mix temperature than the standard hot mix asphalt, reducing the average production energy consumption by 20 to 30 percent.

Using SAMI technology along Steeles Avenue resulted in less energy consumption for removal of the existing pavement, as well as less energy consumption in the production, transportation, and placement of additional asphalt.

The three technologies utilised significantly reduced the hauling of materials off-site, as well as the production, transportation, and placement of additional asphalt.

Minimized social disruption

The use of the SAMI technology at Steeles Avenue reduced overall noise and pollution—a general inconveniences to the public was significantly reduced the construction duration when compared with conventional methods of pavement structure removal and replacement.

SAMI allows traffic to drive on the new surface almost immediately after it is placed. Four metre sections can be placed well as the need for new material to be brought onto the site.

THE TOP 5 SIGNIFICANT BENEFITS

1. Material re-used and reduced resource consumption

The use of CIREAM technology eliminated the need to haul and dispose of 4,600 tonnes existing asphalt off-site at Trafalgar Road (totaling 9.2 lane km), as well as the need for new material to be hauled into the site.

For Steeles Avenue (totaling 18 lane km), SAMI technology was used in a trial section to significantly reduce the disposal of materials off-site.

SAMI technology, a product called Flaminex, which comprises fibreglass strands sandwiched between two layers of asphalt emulsion, coved in a thin layer of stone, for a thickness of 10 mm. The SAMI layer provides tensile strength and inhibits cracks from reflecting through to the surface.

In total, 15,000 m² of SAMI was used in lieu of additional asphalt removal, which would have required an additional 2,700 tonnes of asphalt removal and replacement. On this section of the project, 60 mm of the 240 mm of existing asphalt was removed. Followed by the placement of the SAMI layer and then the top asphalt.

Preservation of the existing pavement or st the majority of the existing asphalt on site by pulverizing and in situ using SAMI as a granular base. Approximately 9,300 tonnes of existing asphalt was reused.

2. Reduced carbon footprint

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5. Increased worker safety during construction

The technologies reduced the overall construction duration, which allowed the road conditions to return to normal more quickly. This improves general safety for the public and workers.

Warm mix asphalt placed on Trafalgar Road produced lower emissions, which provided a safer environment for workers.


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