What’s new at MTO –
GreenPave, ARAN, iCorridor

Becca Lane  P.Eng.
Manager, Materials Engineering and Research Office
Highway Standards Branch
Provincial Highways Management
Ministry of Transportation Ontario
GreenPave
Rating System for Sustainable Pavements

BRONZE
SILVER
GOLD

For information, contact:
Pavements and Foundations Section
Ministry of Transportation Ontario
How to address Sustainability in Road Construction?

- Use fewer natural resources: *reuse, reduce, recycle*
  - Consume less energy
  - Reduce greenhouse gas emissions
  - Overall costs savings through conservation of resources, elimination of disposal costs, and reduction in energy requirements.
Aggregates in Road Construction

- MTO is the largest single consumer of aggregates in the province, approximately 10-12 Mt per year.
  - Increasing population
  - Economic growth
  - New infrastructure requirements
  - Aging roads and bridges
  - Environmental protection
  - Social impacts
  - Decreasing access to close to market sources
  - Increasing costs of aggregate supply

- How can we promote aggregate recycling?
Recycling Conserves Aggregate Resources

- MTO specifications permit recycled/reclaimed materials to be used in lieu of natural aggregates:
  - Reclaimed asphalt pavement (RAP)
  - Reclaimed concrete material (RCM)
  - Air-cooled blast furnace slag
  - Granulated blast furnace slag
  - Crushed glass and ceramics
  - Rubber tires (tire-derived aggregate)
  - Roof shingle tabs
- MTO has been a leader in recycling since the 1970’s.
OPS Specifications Allow Recycling

- Aggregates for **road base** and **subbase** may include:
  - up to 100% reclaimed concrete material (RCM)
  - up to 100% air-cooled blast furnace slag (BFS)
  - up to 40% reclaimed asphalt pavement (RAP)
  - up to 15% crushed glass and/or ceramics

- In place recycling of existing **pavements**:
  - Full depth reclamation (FDR)
  - Stabilized base with expanded asphalt (EAS)
  - Cold In-place recycling (CIR)
  - CIR with expanded asphalt (CIREAM)
  - Hot in-place recycling (HIR)

- **RAP use in asphalt mixes**:
  - MTO has increased the amount of RAP allowed in hot mix binder courses up to 40%, and introduced RAP into premium surface courses.
Promoting Sustainable Choices

- MTO has developed a “green points rating system” to promote sustainable road building:

  Why a rating system?

  To create an **understandable and quantifiable system** to promote sustainable pavement technologies for the design and construction of new pavements, rehabilitation, reconstruction and preservation management of pavements.
## GreenPave Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pavement Design Technologies</strong></td>
<td>To optimize sustainable designs. These include long life pavements, permeable pavements, noise mitigating pavements, etc.</td>
</tr>
<tr>
<td><strong>Materials &amp; Resources</strong></td>
<td>To optimize the use/reuse of recycled materials and to minimize material transportation distances</td>
</tr>
<tr>
<td><strong>Energy &amp; Atmosphere</strong></td>
<td>To minimize energy consumption and GHG emissions</td>
</tr>
<tr>
<td><strong>Innovation &amp; Design Process</strong></td>
<td>To recognize innovation and exemplary efforts made to foster sustainable pavement designs</td>
</tr>
</tbody>
</table>
# GreenPave Resources

## Reference Guide

![GreenPave Design Rating System](image)

## Computer Spreadsheet

### GreenPave Rating Summary

<table>
<thead>
<tr>
<th>Maximum Point</th>
<th>GreenPave Category</th>
<th>Option 1</th>
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<tbody>
<tr>
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<td>Credit PT - 2 Permeable Pavements</td>
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<tr>
<td>2</td>
<td>Credit PT - 3 Noise Mitigation</td>
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<tr>
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<td>Credit PT - 4 Cool Pavements</td>
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<td>Credit MR - 1 Recycled Content</td>
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<tr>
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<td>Credit MR - 2 Undisturbed Pavement Structure</td>
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<tr>
<td>2</td>
<td>Credit MR - 3 Local Materials</td>
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<td>Credit MR - 4 Construction Quality</td>
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<td>Credit I - 1 Innovation in Design</td>
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<tr>
<td>2</td>
<td>Credit I - 2 Exemplary Process</td>
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</tr>
</tbody>
</table>

32 Total GreenPave Points:  

Bronze 7-10 points  Silver 11-14 points  Gold 15-18 points  Trillium 20-36 points
GreenPave Summary

• Over 90 design projects have been assessed using MTO’s simple points-based rating system for sustainability of pavement design and construction alternatives

• Point awarding system in relation to construction methods and activities is being finalized for “construction stage”:
  • Actual mass of recycled materials
  • Pollution reduction due to retrofitted equipment / alternative fuels
  • Sustainable practices / innovations beyond design requirements
  • Improvements to conventional processes

• Anticipating a future launch of GreenPave to include on-line availability of promotional materials - Overview Presentation, GreenPave Reference Guide and GreenPave Worksheet

• External training strategy being developed considering webinar format and joint workshop with OGRA
MTO’s ARAN
Automated Road Analyser

For information, contact:
Pavements and Foundations Section
Ministry of Transportation Ontario
The ARAN (Automated Road Analyser)

• High-speed vehicle capable of testing multiple pavement indices
• Current ARAN is the fourth generation for MTO.
MTO’s new ARAN Vehicle

- Accurate positioning and distance measure
- Roughness (IRI), rutting, cracking, texture
- iVision software
**ARAN Subsystems**

- Laser Roughness Sub-System
- Inertialy-aided GPS using POS LV
- Distance Measurement Instrument (DMI)
- Dual HD Overhead Video Cameras
- LCMS – Cracking, Rutting and Macro-texture
Right Of Way Images:

- Approx. 230 degree field of view between two cameras
- High definition
- Calibrated for feature extraction using software tools
Roughness (IRI)

- RoLine Laser
- 100mm footprint
- Samples longitudinally every 25mm continuously
Laser Crack Measurement System (LCMS)

- Determines crack width, depth and extent
- Calculates rutting in both wheel paths
- Calculates macrotexture
iVision

- iVision is a web-based application for deployment of synchronized map, video and pavement condition data
- Video and pavement condition data are captured using the ARAN
- Pavement performance metrics can be presented as charts, tables or numerical indices to determine performance trends
- Allows for open collaboration/use by offices across MTO
iVision – IRI Pavement Performance Chart
iCorridor

Transportation Analysis and Information Sharing Tool

http://www.mto.gov.on.ca/iCorridor/

For information, contact:
Systems Analysis and Forecasting Office
Transportation Planning Branch
Policy and Planning Division
Ministry of Transportation Ontario
iCorridor

- an MTO initiative to modernize transportation data collection, analysis and access.
Background

- MTO carries out evidence-based analysis of the provincial transportation system in support of policy and program development / delivery.
- Evidence-based analysis requires collection and analysis of large amounts of system-wide data, which is then shared with colleagues and clients in other ministries, Metrolinx, municipalities, Transport Canada, etc.
- Data sources are evolving. New approaches exist to collect large volumes of continuous data from GPS and mobile device travel applications (i.e., travel speeds, routes, origins-destinations).
- To unlock the potential of valuable data held within MTO’s various databases, a modernized approach was needed for storage, processing and sharing of data and analysis products.
iCorridor

**GOAL** – To develop a web-based information sharing tool to allow automated access to multiple users, allowing them to acquire the most up-to-date information, for their specific needs, on their own time, at their own location.

**What is iCorridor?**
- A multi-user data visualization platform, allowing multiple users to access data at the same time
- A central database for transportation data storage and analysis
- An innovative, web-based, user friendly, data-sharing tool

**Why iCorridor?**
- Improve communication and information exchange
- Optimize use of existing foundation data and modern GPS data
- Revolutionize support for transportation policy, planning and decision making
# iCorridor Layers

<table>
<thead>
<tr>
<th>Category</th>
<th>Publicly Available</th>
</tr>
</thead>
</table>
| **Transport’n Infras and Performance** | • Provincial Highways/municipal roads historical travel speeds and performance indices  
• Regional summaries of road congestion/performance  
• High definition congestion pattern analysis (speed contour)  
• Transportation Forecasts (passenger and commercial)  
• Highway traffic volumes – (annual average car and truck volumes) and estimated hourly volumes  
• The Ontario-Québec Continental Gateway  
• Real-time traffic information from MTO COMPASS & TRIP  
• Existing GGH Transit lines/stations |
| **Boundaries and Land Use** | • Greater Toronto Area (GTA), Greater Toronto-Hamilton Area (GTHA), and Greater Golden Horseshoe (GGH) boundaries  
• Traffic Analysis Zone (TAZ) Boundaries |
| **Transit Project Evaluation** | • Transit modal share  
• Transit accessibility to employment  
• Within 500m catchment areas around the existing and proposed transit stations: Number of people and seniors; Number of households and low-income households; Number of jobs |
| **Demographic** | • Ontario population change (2006 – 2011)  
• 2011 Number of private dwellings occupied by usual residents  
• GGH population and employment density at TAZ level (2006 & 2031)  
• GGH 2006 population at Dissemination Block (DB) level:  
  o Population; Senior population  
• GGH 2006 at Dissemination Area (DA) level:  
  o Number of households; Number of low-income households |
| **Other** | • AASHTOWare Pavement ME design (Provincial highways) |
Next Steps

• We continue to explore partnerships and opportunities for data sharing
• iCorridor could ultimately include continuous system-wide travel information, including local roads, transit, cycling and other modes, and area-based information such as population, employment, transit usage, densities, land use, etc.
• iCorridor can be used to overlay layers of data for decision making on infrastructure projects.
• Next step is to determine what data is needed to link land use, land value and transportation planning across all modes.
Thank you!

Becca Lane, P. Eng.
Manager, Materials Engineering and Research Office
Ministry of Transportation Ontario
Tel: 416-235-3512
Fax. 416-235-3919
email: Becca.Lane@ontario.ca