Perpetual Pavements

Alexander W. (Sandy) Brown, P.Eng.
Ontario Hot Mix Producers Association - Technical Director
Asphalt Institute - Canadian Field Engineer

Perpetual Pavements

Why??
- Extend pavement service life
- Reduce delays to traveling public

Not a new concept for Ontario
- Don Valley Parkway in the City of Toronto was chosen by NCAT as one of the 8 inaugural winners of the APA Perpetual Pavement awards in 2003 and is one of the longest in service
- MTO and City of Hamilton have both constructed Perpetual Pavements
Definition

“A Perpetual Pavement is a hot mix asphalt pavement designed to last 50 years or more without major structural rehabilitation or reconstruction”

- Newcomb (NAPA)

Design Concept

- Thin asphalt pavements may crack and rut under repeated loading of heavy traffic.
- In thicker asphalt pavements, the potential for fatigue cracking is reduced and pavement distresses (cracking and rutting) occur only in the near surface layers.
- When surface distresses reach an unacceptable level, the surface course is removed and replaced.
- Periodically renewing the driving surface keeps the pavement serviceability high throughout the life of the pavement while reducing the inconvenience for the driving public.
Multi-Layer Design

The multi-layer design consists of:
- a renewable rut resistant surface layer
- a strong, rut-resistant intermediate layer
- a flexible, fatigue-resistant bottom layer

![Diagram of multi-layer design]

Design Methodology

- Pavements are designed for the traffic loading they will experience - typically in a 50 year lifetime
  - This is the lifetime without structural overlay not total lifetime
- **PerRoad** and **PerRoadXPress** were both developed by Dr. David Timm (NCAT, Auburn University)
  - **PerRoad** is a detailed tool for experienced pavement engineers and requires detailed input
  - **PerRoadXPress** is based on PerRoad but the inputs have been reduced and so has the calculation time
Instrumentation of Hwy 401 Perpetual Pavement Project

- Centre for Pavement and Transportation Technology (CPATT) at the University of Waterloo has been monitoring performance
- Industry funding provided by the Ontario Hot Mix Producers Association (OHMPA) and McAsphalt Industries
- All 3 sections Have been instrumented

Results of Monitoring

[Graph showing monthly and cumulative 90th percentile performance of conventional and perpetual pavements]
Where can it be used?

- Perpetual Pavements are not just for highway projects
- Many municipal pavements can also be designed as Perpetual Pavements
- Increasing the thickness of the hot mix layers by 25 to 35 percent will likely result in a perpetual pavement
- There are tools to allow municipalities to look at Perpetual Pavement options
- PerRoad v3.3 and PerRoadXPress v1.0 are both available free of charge from the National Asphalt Pavement Association
Advantages of Perpetual Pavement

- Durable, long lasting flexible pavement
- Less rutting
- Less fatigue cracking
- Smoother pavement
- No major reconstruction required
  - Work can be carried out at low traffic times
  - Minimize disruption to travelling public

Thank you