

Ontario's Experience with Medium Term Warranties

Chris Raymond, PhD, P.Eng.
Head, Bituminous Section
Ministry of Transportation of Ontario

Trevor Moore, P.Eng., GSC
Corporate Technical Director
The Miller Group

Canadian User Producer Group for Asphalt
November 18, 2012

Presentation Overview

- What is a Performance Specification
- Why Performance Specifications/Warranties
- Performance Based Initiatives
- Pavement with Warranty Specification
- Development of Performance Curves
- Going Forward
- Industry experience with pertinent warranty contracts

What is a Performance Specification?

- Move away from looking at a contract in the short term – ie acceptance during or at the end of a contract on an item by item basis
- Measure performance of a deliverable at the end of a warranty period to ensure its condition gives assurance of its future performance
- Warranty period up to 10 years
- Contractor responsible for determining materials, workmanship and controlling methods

Why Performance Specifications/Warranties?

- Next phase in specification evolution
- Allocate appropriate risk/responsibilities to the party best able to manage it
- Increase flexibility for contractor innovation
- Next step for a mature industry with well developed quality control programs
- Potential to reduce contract oversight

“Freedom to innovate with accountability to deliver”

Performance Specifications – Strategic Road Map Spring 2004 (FHWA)

Performance/Warranty Initiatives

Several Initiatives

- Area Maintenance Contracts
- Pavement with Warranty Specification
- Minimum Oversight Specifications (i.e. Short Term Warranties)
- Design Build Projects
- Performance Specification Initiatives – Strategic Direction (2010-2015) to ... In collaboration with industry, develop performance specifications for all contracts

Pavement with Warranty Initiative

- Unique Partial “Design/Build/Warranty”
- Design, materials and construction based warranty
- Minimal material & construction requirements
- Fixed 7-year unconditional warranty on pavement performance
- Performance requirements for each year
- Bidders are permitted to take pavement samples and field measurements
- Normal pre-qualification of bidders
- Low bid award

Pavement with Warranty vs MinOs

- Pavement with Warranty contracts are not MinOs
- Minimum Oversight (MinO) contracts are short term warranty contracts with minimal or no contractor design (ie material and workmanship warranties)
- MinO contracts include warranties up to 3 years depending on the nature of the product
- MinO projects include
 - HMA Resurfacing
 - Double Seal Coats
 - Shouldering
 - Surface Treatment
 - Micro-surfacing
 - Slurry Seals

Pavement Design

- Contractor designs:
 - the pavement: subbase, base, hot mix, including recycling
 - earth/rock, cut/fill transition & culvert treatments
 - pavement drainage (noting constraints below)
- MTO designs:
 - the alignment and final cross-section of the highway
 - special treatments to widen the roadway subgrade or stabilise shoulders and embankments
 - ditches, culverts, sewers, frost heave treatments, special treatments (Due to impact on utilities, environment, property, 3rd party approvals)

Materials

- The contractor is given flexibility to select materials in the pavement structure
- Use of certain materials are restricted or prohibited
- With specific exceptions, Ontario Provincial Standard Specifications and Material requirements are not mandatory

Examples of exceptions:

- Surface course mix type must meet the requirements of MTO's surface course directive including the requirement for hot mix aggregates for premium surface course mixes to come from an MTO listed designated source

Pavement Warranty

- 500 m lane segments of the highway must meet the performance requirements during the 7 year warranty period
- MTO is responsible for normal maintenance activities except for repairing pavement distresses and roughness
- MTO is responsible for repairing damage caused by floods, wash outs, spills, fires and accidents
- Warranty void if 20-year ESAL's exceeded during the 7 year period
- Warranty Security:
 - no bond required
 - no holdback during warranty period

Payment

- One Lump Sum tender item “Pavement with Warranty”
 - No Quantities in the Tender,
 - No weighed items for pavement materials
- Lump Sum divided between each material

Example:	Subbase	15%
	Base	20%
	Hot mix	60%
	Shouldering	5%
- Progress payment is based on the area of the completed proportion of each material

Main Performance Measures

- Ride Quality (Roughness)
 - mechanical (objective) measurements
 - International Roughness Index (IRI)
- Pavement Distresses
 - based on field manuals
- Pavement Friction (ASTM skid trailer)



Pavement with Warranty

- 10 Tendered
- 1 Non-award
- 8 Constructed, now in warranty period
- 1 Still in construction
- Used on Design Build Minor Projects

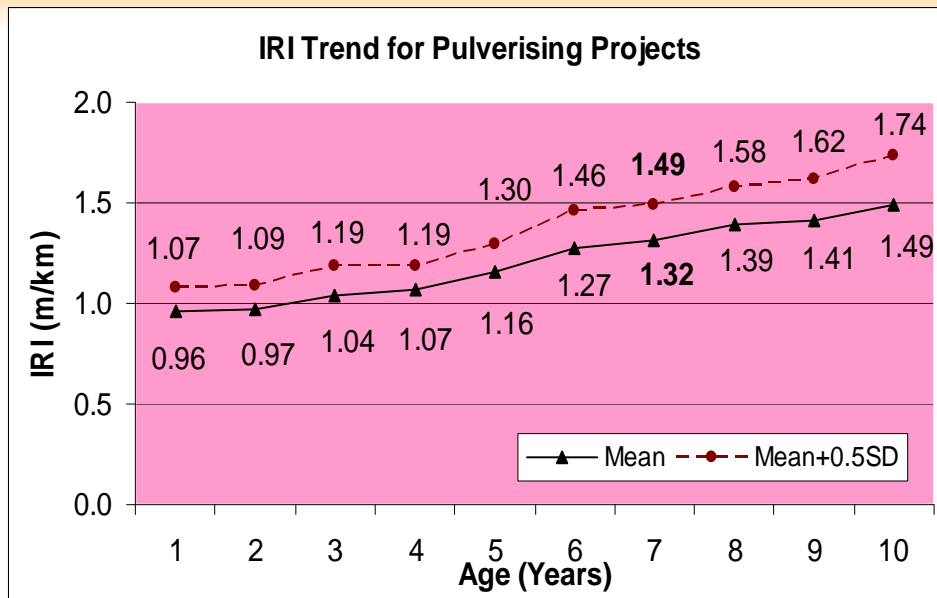
Development of Pavement Performance Curves

- Reviewing performance requirements based on historical performance for all provincial highways
- Pavement management system (PMS2) contains performance data on all provincial highways
- Within the data set of existing pavement sections, it is possible to select sections based on treatment type, to generate performance curves

Performance Curves - Reconstruction

Data Preparation for the Analysis:

- There are 700 pavement sections on 2-lane Kings Highways with a total length of 9112 km
- Within the 700 sections, 100 sections were identified as reconstruction contracts (FDR with HMA overlay) with 10 years of performance data



Performance

- Similar pavement designs from PWW in comparison to what would have been tendered through conventional DBB projects
- Similar pavement performance to conventional design, bid, build projects. Most are performing well with the exception of one project
- Only short term performance information to date

Costs

- Average bid prices can be more than estimated conventional prices - noting:
 - Difficult to provide an apples to apples comparison
 - This is a relatively new initiative
- Other considerations:
 - CA costs estimated to be 10-20% less
 - Pavement evaluation costs
 - Warranty enforcement costs
 - Performance is “warrantied” so Contractor is responsible for poor pavement performance
 - Currents costs include two pavement designs (MTO and Contractor)

Going Forward

- Continued use of Area Maintenance Contracts and Min O specifications
- In collaboration with industry, develop performance specifications for all contracts
- MTO has established Performance Specification Task Groups to refine existing specifications and develop new specifications
- Continued use of Design Build contracts that incorporate medium term pavement requirements into an overall warranty contract (13 DB projects have been awarded since 2010)
- Refinement and development of specifications in consultation with industry

Minimum Oversight

- ◆ **Generally well accepted amongst industry**
- ◆ **Candidate selection is critical to success**
 - Consider localized repairs including HMA patching and premilling
 - Consider per tonne payment when variable pavement conditions exist
- ◆ **Tender closing season imperative for success**

Minimum Oversight

- ◆ Pavement information provided relative to pavement condition
 - Depends on payment type (m2 vs. tonne)
 - Allows contractor to price contract with controlled risk
 - Rutting
 - Distortion
- ◆ Contractors recognize importance of roadway investigation prior to construction

Contractors' Perspective on Minimum Oversight

- ◆ Contractors assume MTO accepts responsibility of reflective distresses due to the limitations of each process/treatment
- ◆ Snow plow damage on cold process surfacing needs to be recognized/standardized

Contractors' Perspective on Minimum Oversight

- ◆ Minimum oversight ideal for AMC's
 - All 3rd generation AMC's certified by ISO 9001 for quality and 14001 for environmental
 - Mandates ISO manual, standard operating procedures, work practices, and audits
- ◆ Consider standardizing end of warranty notification with other contract delivery models

Pavement with Warranty

- ◆ 7 year warranty contracts
- ◆ Rehabilitation or reconstruction selected by owner
- ◆ General acceptance among industry
- ◆ Field construction has proceeded without issues
- ◆ First contract in 2007

Pavement with Warranty – Bidding

- ◆ High contractor pedigree
 - Strong technical expertise/support
 - Understanding of performance criteria and repair protocols
 - Appetite for risk
- ◆ Very important that clear delineation of responsibility exists for limits of pavement with warranty vs. additional items
- ◆ Fuel price adjustment and AC index should be included on all contracts

Pavement with Warranty – Bidding

- ◆ Contract closing dates should be chosen to provide contractors ample time to investigate the work in the appropriate season
 - Structural analysis
- ◆ Material exceptions
 - Rubber
 - Recycled Asphalt Shingles (RAS)
- ◆ Consider including construction history of roadway as standard

Pavement with Warranty – Bidding

- ◆ Geotechnical information provided
 - Risk evaluated based on extent and type of information provided
 - Option 1: More information from MTO up front
 - Option 2: Honorarium
 - Option 3: Combination of Options 1 & 2
- ◆ Pre bid testing and investigation
 - Extent depends on individual contractor and knowledge of pertinent pavement

Pavement with Warranty – Design

- ◆ Strong consulting support critical
- ◆ Some contractors perform their own design
- ◆ Balance value of investigation vs. value of risk
- ◆ Contractor innovation has been limited to date but an increase is expected over time with more experience

Pavement with Warranty – Contract Execution

- ◆ Contract administration presence
 - Less than normal as expected
 - Allows contractors to make field decisions to improve/expedite constructability
- ◆ Lack of QA testing has impacted the QC programs of contractors
- ◆ Protocols required if additional frost treatments/poor performing areas found by contractor

Pavement with Warranty – Warranty Period

- ◆ Manage the pavement as an asset
 - Utilize crack sealant as necessary
 - Opportunity to include other preservation strategies in the future?
- ◆ Contractors still learning about performance parameters
 - Pavement evaluation
 - Geographic dependence
- ◆ Objective performance criteria a necessity to ensure warranty provisions can be fairly enforced
 - Coarse aggregate loss
 - Cracking
 - Flushing
 - Distortion

Pavement with Warranty – Warranty Period

- ◆ Specifications for repair need to be according to those current at time of tender closing
- ◆ Improve transparency of performance monitoring
 - Promote collaboration of evaluations
 - Institute deadlines for information exchange and resultant repair
 - o Distresses jeopardizing safety are repaired immediately
 - Evaluate how warranty construction impacts long-term quality

Design Build

- ◆ Mixed feelings amongst industry on Design Build Contracts
- ◆ Type of job needs to be conducive to design build model
 - Bridge rehabilitation – qualified bids throughout
 - Overhead sign jobs have worked well
 - Pavement rehab/reconstruction have worked well
- ◆ Use of RAS and rubber restricted for hot mix asphalt
- ◆ Improvements seen in design build performance specifications compared to 7 year warranty contracts as natural progression

Performance

- ◆ Generally received and operating well
- ◆ “Unconditional” warranty may be an unfair share of risk
- ◆ Distresses out of contractor’s control should be removed from the warranty
 - Snow plow damage on cold process seals needs to be recognized/standardized
 - Oil spills on cold process seals needs to be omitted from warranty
- ◆ Clarity in extent of rutting required for all treatments

Concluding Remarks

- ◆ Clear definition of responsibilities required
- ◆ Contractor input/insight after their evaluation important
- ◆ Fair allocation of risk critical
- ◆ Consistency/clarity for all models
- ◆ Innovation restrictions
 - Rubber, RAS, and new innovations
- ◆ Models are evolving with a bright future

Thank you

Chris Raymond, PhD, P. Eng.

Head, Bituminous Section
Materials of Transportation Ontario
Tel: 416-235-3725

Email: Chris.Raymond@ontario.ca

Trevor Moore, P. Eng., GSC

Corporate Technical Director
The Miller Group
Tel: 905-726-9518

Email: trevor.moore@millergroup.ca