Use of Warm Mix Asphalt at NYSDOT

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New York State Dept. of Transportation Materials Bureau
Overview

- Past Use of WMA at NYSDOT.
- What did we learn?
- Experimental Work Plan
- Current and Future Use of WMA at NYSDOT
Past Efforts

- Tracking national efforts since 2004.
- Trial sections being placed on NYSDOT roads since 2006
Past Efforts

- Prior to 2010, over 50,000 tons of WMA has been placed on NYSDOT projects.

- Several 400+ ton trial sections.
  - Placed in 5 different Regions.
    - Majority of this work has been done in Region 3.
  - 5 Different Technologies were used
Past Efforts

- **Region 1 (Albany)**

  - September 2008 – WMA using the Low Emission Asphalt (LEA) technology was placed on State Route 43 in the town of Stephentown.

  - December 2009 – Evotherm technology was used as a compaction aid on the approach ramp for the Crown Point Bridge ferry service.
Lake Champlain Bridge
Crown Point, NY
12/15/2009
Lake Champlain Bridge
Crown Point, NY
Lake Champlain Bridge
Crown Point, NY
Past Efforts

- **Region 3 (Syracuse)**
  - September 2006
    - WMA using the Low Emission Asphalt (LEA) technology was placed on State Route 11 just south of Cortland.
    - WMA using Sasobit technology was placed on State Route 80 in the town Tully.
  - 2007 – Almost 35,000 tons of WMA using the LEA technology was placed on various State roads in Cortland County.
  - October 2009 – WMA using the Terex technology was placed on State Route 104B near the city of Mexico.
State Route 104B
Mexico, NY
State Route 104B
Mexico, NY
State Route 104B
Mexico, NY
Past Efforts

- **Region 5 (Buffalo)** - July 2009 – WMA using Hypertherm technology was placed on State Route 93 in Lockport.
Past Efforts

- **Region 7 (Watertown)** - June 2008 – WMA using Sasobit technology was placed on State Route 12 in the town of Clayton.

- **Region 9 (Binghamton)** – July/August 2009 – WMA using the LEA technology was placed on State Route 23 in the town of Pitcher.
Past Efforts at other agencies within New York

- **NYCDOT** – September 2008 – WMA using the Evotherm technology was placed on 168th street in Queens.
- **NYSTA** – July 2006 – WMA using the Sasobit technology was used to perform full depth repairs (18” deep) west of Syracuse.
- Various Counties have placed WMA trial sections, including Albany, Washington, Jefferson, Erie, Westchester, Cortland, and others.
What did we learn?

- Early age rutting has not been an issue.
  - NYSDOT WMA trials have not rutted.
  - We have not heard of rutting issues in other places.
  - We need more trials in varying traffic and climatic conditions to ensure there is not a problem.
- Moisture susceptibility has not been an issue.
  - WMA mixtures meet existing specification requirements.
What did we learn?

- Construction practices similar to conventional mixtures.
  - Handwork has not been a big issue.
  - Good pavement densities have been achieved using the same or less effort.
What did we learn?

- Construction practices similar to conventional mixtures (continued).
  - Mixtures still have to be handled and placed properly.
    - Appropriate temperatures must be maintained for the WMA technology.
    - Follow the usual practices to prevent segregation.
    - Proper paving practices need to be followed.
What did we learn?

The WMA got too cold before placement.
What did we learn?

• Definite potential to open roadways to traffic sooner.
  • **NYSTA – 18” full depth repairs.**
    • Repair work was performed overnight and the roadway had to be fully opened to traffic by 6 am.
    • Conventional HMA repairs showed signs of rutting immediately.
    • WMA repairs did not rut.
What did we learn?

- Every technology is different – one size does not fit all.
  - Laboratory testing modification differ with technology.
    - Test sample conditioning varies.
    - Sample compaction temperature varies.
  - Some technologies require plant modification.
Experimental Work Plan

- Established a WMA Technical Workgroup
  - NYSDOT
  - NYSTA
  - FHWA – New York Division
  - AGC – New York State Chapter
  - New York Construction Materials Association
    - Asphalt Mixture Producers
    - PG Binder Suppliers
    - WMA Technology Providers
Experimental Work Plan

- Developed a programmatic experimental features plan.

Objectives.

- Expand experience and knowledge.
  - Various Agencies (NYSDOT, NYSTA, FHWA)
  - HMA Producers
  - Contractors

- Evaluate more WMA mixtures
  - Varying aggregates and PG Binder sources.
  - Varying traffic and climatic conditions.
  - Cost

- Validate the experimental WMA specification and procedures.
Experimental Work Plan

- Plan approach
  - Develop a WMA Approval Process
  - Develop a WMA Specification
  - Getting asphalt paving projects through out the state using this WMA specification out for bid.
  - Allow further substitution of WMA on existing asphalt paving projects.
Experimental Work Plan

- Developed an Approval Process for the WMA Technologies
  - Initial Meeting with NYSDOT
  - Resume of projects with Agency Contacts
  - Required Rut Performance Testing on NYSDOT Mix Design
  - Top Course 75 Gyration Mix Design
  - Non-RAP Mix
  - WMA Technology added at a typical rate
- PG Binder and Additive Sample Submission
- Development of “Production, Testing, and Compaction Details”
Experimental Work Plan

- Production, Testing and Compaction Details
  - Developed by the Technology
  - Procedures for the proper use of a given Technology
    - Directions for the PG Binder Supplier (if applicable)
    - Directions for the Mixture Producer
    - Directions for the QC and QA Technicians
    - Directions for the Contractor
Experimental Work Plan

- Production, Testing and Compaction Details (con’t)
  - Example - Chemical and Organic Additives at the PG Binder Primary Source
    - What equipment is needed to properly mix the additive?
    - What are the proper dosage rates?
    - Storage/Handling requirements?
      - Storage of the additive?
      - Storage of PG Binder mixed with the additive?
    - Shipping requirements?
Experimental Work Plan

- Production, Testing and Compaction Details (con’t)
  - Example – Foaming Processes At the Mixture Production Facility
    - Is the system compatible with drum plants? batch plants? both? various manufacturers?
    - What equipment does the Production Facility need? electrical requirements? water feed requirements?
    - How does this equipment fit into the automation and recordation systems? how is it calibrated?
    - What water dosage rates are recommended? what mixing temperature is recommended?
    - What equipment maintenance is required? daily? weekly? etc.
Experimental Work Plan

- Once a Technology is Approved
  - Added to NYSDOT’s List of Approved Materials and Equipment
  - Contact person for the Technology Supplier
  - Link to the “Production, Testing and Compaction Details”
# Technical Services - Materials - Approved List

## Bituminous Materials

### WARM MIX ASPHALT (WMA) TECHNOLOGIES

**A. ORGANIC (WAXES) ADDITIVES (712-1010)**

**B. CHEMICAL ADDITIVES (712-1020)**

**C. FOAMING PROCESSES (712-1030)**

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
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</tr>
</thead>
<tbody>
<tr>
<td>SONNEWARMix™</td>
<td>Sonneborn, Inc. 575 Corporate Drive, Suite 415 Mahwah, NJ 07430</td>
<td>Chris Strack 203-261-8582 <a href="mailto:chris.strack@sonneborn.com">chris.strack@sonneborn.com</a></td>
<td>SONNEWARMix (06/08/2010)</td>
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<tr>
<td>Evotherm WMA</td>
<td>MWV Asphalt Innovations 5255 Virginia Avenue North Charleston, NC 29406</td>
<td>Everett Crews 843-697-5509 <a href="mailto:everett.crews@mwv.com">everett.crews@mwv.com</a></td>
<td>Evotherm (09/10/2010)</td>
</tr>
<tr>
<td>Low Emission Asphalt-Lite (LEA-Lite)</td>
<td>McConnaughay Technologies 1911 Lorings Crossing Cortland, NY 13045</td>
<td>Gregory Harder 866-622-8324 <a href="mailto:gharder@mcconnaughay.com">gharder@mcconnaughay.com</a></td>
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<td>LEA (06/08/2010)</td>
</tr>
<tr>
<td>Terex® foamed warm mix asphalt system</td>
<td>Terex Roadbuilding 9528 W. I-40 Service Road Oklahoma City, OK 73128</td>
<td>Scott McMaster 405-208-3982 <a href="mailto:scott.mcmaster@terex.com">scott.mcmaster@terex.com</a></td>
<td>Terex (07/27/2010)</td>
</tr>
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*Revised on: September 10, 2010*
Experimental Work Plan

- Specifications
  - Required the use of an Approved Technology
  - Require the “Production, Testing, and Compaction Details” be followed
  - Required the Producer use an existing NYSDOT HMA Mix Design
  - Required some additional testing
    - Tensile Strength Ratio
    - Performance test for rutting
      - APA
      - Hamburg
      - AMPT Flow Number
Experimental Work Plan

- Solicit projects from our Regional Offices
  - Location
  - Traffic Volumes
  - Risk
  - Require at least a small HMA control section on each project
Current and Future Use of WMA at NYSDOT

- **2010**
  - 9 Projects went out for bid
    - >30 million ESAL level
  - 3 Courses of WMA over Rubbilized PCC
  - 2 Projects with WMA Substitution
Current and Future Use of WMA at NYSDOT

- 2011
  - Continue with Projects from 2010
  - Put out more projects for bid
  - WMA substitutions on selected projects

- Future
  - Long term implementation looks very promising
  - Contractor/Mix Producer choice
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