Overview

- Sponsor: U.S. DOE
- Research Team: Bloom Consultants, LLC (prime) and University of Wisconsin at Madison
- Partner: Minnesota DOT
Organization

- DOE Project Manager: Mr. Bob Patton
- PI: Dr. Haifang Wen (UW)
- Team: Dr. Tuncer Edil (UW), Mathew Tharaniyil (Bloom), and Swapna Danda (Bloom)
- MnDOT: Maureen Jensen, Ben Worel, Tim Cylne, Roger Olson, Ed Johnson, Bob Edstrom
Phases of Study

- Phase 1: Aug. 2005 – Mar. 2006 (Over!!)
Phase I Study

- Proved the feasibility of using high carbon high calcium fly ash to stabilize the recycled asphalt pavement materials as base course.
- The recycled pavement materials (RPM) consisted of recycled asphalt and existing gravel.
Phase I Study

- Used two high carbon fly ashes
  - King fly ash from Xcel Energy (Minnesota), 25.8% CaO and 14.3% carbon
  - Dewey fly ash from Nelson Dewey Power Plant (Wisconsin), 9.2% CaO and 49.3% carbon
Phase I Study

- Untreated RPM: very weak
- RPM – Dewey fly ash: weak
- Crushed aggregate: reference
- RPM – King fly ash: strong
Phase II Study

- Full-scale Test Road: MnROAD
- Well-controlled
- Well-instrumented
- Real life application
- Live truck
Phase II Study
Phase II Study
Phase II Study

- King Power Plant Under Reconstruction
- Will Use Riverside 8 Fly Ash from Xcel Energy
- 14.6% LOI (Carbon)
- 22% CaO
- 14% Application Rate
Phase II Study

- MPCA considers Riverside 8 Fly Ash a non-compliant materials
- An agreement was made on June 20, 2007 in which MPCA permitted the use of Riverside 8
- MPCA requested continuous monitoring of leachate till 2017.
Phase II Construction

- MnDOT let the project on June 8, 2007
- Midwest Asphalt won the bid.
Recycle Asphalt
Mix with Gravel
Reclaiming
Reclaimed Materials
Stockpiled Materials
Instrumentation

- Pressure Cell, Strain Gauges, Temperature, Moisture
- Lysimeters for leaching
Trenching
Lysimeter

- 100mm HMA
- 203mm RPM with Fly Ash, RPM without Fly Ash, or Crushed Aggregate
- Subgrade Soil
- Lysimeter
Plan View of Lysimeter
Installation of Lysimeter
Pipe to Tank
Collecting Tank
Field Tests

- Bloom: Moisture and Density
- UW: Soil Stiffness Gauge
- MnDOT: Falling Weight Deflectometer (FWD) and Dynamic Cone Penetrometer (DCP)
Lab Tests

- Sampling Soil, Base Materials, and Asphalt
- Mechanical Tests and Environmental Tests