WMA at MnROAD

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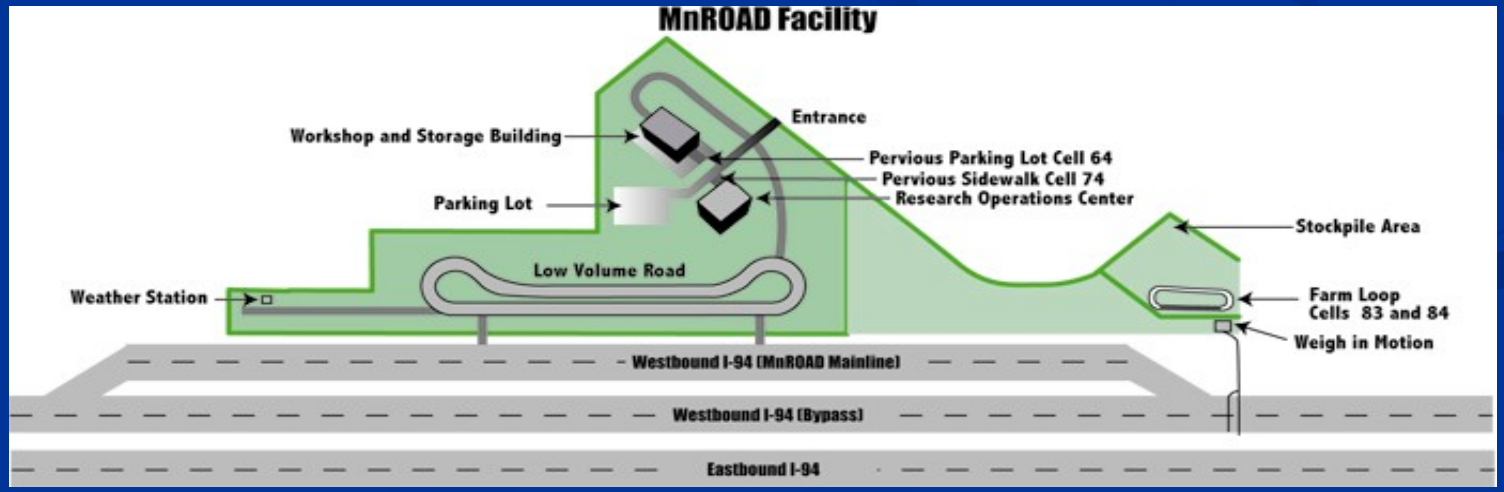
Hardrives, Inc.

2008 MnROAD Project Overview

- Hardrives, Inc. - Bituminous Subcontractor
- Approximately 10,500 tons of Bituminous Mix
- 6 Asphalt Binders
- 17 Bituminous Mixes

Warm Mix Asphalt

- Cells 16, 17, 18 19,20, 23
  - 3 lifts of WMA over different aggregate bases
  - 2” SPNWB430, 3” SPWEB440
- Cell 15
  - 3” SPWEB440 overlay on existing HMA (paved in 1993)
- Cell 24
  - 3” SPWEB440 HMA – Control Cell



What is Warm Mix Asphalt?

- WMA is basically HMA at lower temperatures
  - Possible reduction of 35° F to 100° F
- Variety of available technologies
  - Chemical Additives
  - Organic Additives
  - Foaming

Why Warm Mix Asphalt?

- Potential Benefits
  - Reduced Fuel Consumption
  - Reduced Emissions
  - Less aging of asphalt binder
  - Greater Recycle percentages
  - Greater haul time
  - Greater Density with equal effort

Mix Design Requirements

- SPNWB430 and SPWEB440
- PG 58-34
- 20% RAP from MnROAD
- No requirements for WMA technology

REVIX™ Technology

- Developed by Mathy Technology and Engineering and Paragon Technical Services, Inc.
  - Chemical additive added at terminal or HMA plant
  - Requires no plant modification
- This technology is now marketed as Evotherm 3G

Mix Design

- Existing SPWEB440 Mix Design
  - ¾” 100% Crushed Stone
  - ½” Granite Chips
  - Washed Granite Sand
  - Crushed Millings from MnROAD
- Replaced Standard Binder with WMA Binder
  - Lab compaction temperature 235° - 245° F
- Ran points to find optimum AC content for SPWEB440
- Non-Wear MDR written from trial point data

WMA Production

- Day 1 – 990 tons of SPNWB430C
  - No change in GMM from design
  - Drastic increase in GMB (about 0.040)
  - Lower than expected Air Voids and VMA
  - Lower gyrating temperature gave equal results

WMA Production

- Day 2 – 1996 tons of SPWEB440C
  - Aggregate proportion change as well as add AC% reduction
  - Air Voids on target
  - VMA drop of about 1.0

WMA Laydown

- Business as usual – only cooler
- Positive comments from the crew
- Rolling Pattern Challenges

Laydown Temp

Density Results

- Non-Wear
  - All cores >93.0%
  - Low air voids
- Wear
  - Cores averaged 92%

WMA vs HMA

WMA vs. HMA

WMA vs. HMA

Conclusions

- More Lab work needed at mix design to determine compaction temperature range
- Definite energy savings
- Appears as though fumes/emissions were less
- Equal density appears to be achievable with equal or less effort

Questions?

Thank You

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