IN-PLACE COLD RECYCLING 30 + YEARS PENNDOT DISTRICT 1-0



Jeff Oswalt, P.E., PennDot District 1-0 Pavement Mgt Engineer

DISTRICT 1-0 COLD RECYLING

445 Miles In-Place Cold Recycling



SECTION 341 – COLD RECYCLED BITUMINOUS BASE COURSE, COLD-IN-PLACE, 3" DEPTH

- Utilizes On-Grade Processing of Material.
 Structural Strength increases as mix cures.
 Application of Traffic provides additional compaction to CRBC.
- High Void Content
 - CRBC must be Seal Coated or Overlayed.

BENEFITS

- In-Place Cold Recycling Very Effective in Reducing/Eliminating Reflective Cracking.
- High Production (Approximately 2 lane miles per day).
- Economical. (Eliminates Hauling of RAP Material).
- Reduced Emissions (Environmentally Friendly).

Reflective Cracking In-Place Cold Recycling vs. Control Section

COUNTY	PROJECT	Control/CIR #Cracks/Mile Ratio	Control/CIR Linear Ft/Mile Ratio
CRAWFORD	SR 77-07M	1.8	1.9
ERIE	SR 20-04M	1.6	1.1
ERIE	SR 3006-02M	2.7	3.1
MERCER	SR 62-05M	3.7	5.8
MERCER	SR 18-04M	1.3	2.5
	AVERAGE	2.2	2.9

Dennis A. Morian, P.E. Quality Engineering Solutions, Inc.

DISTRICT 1 PRACTICES

- 3" vs. 4" depth
 - Compaction and Curing issues experienced with 4" depth.
- Virgin Aggregate Not Utilized
 - Raveling Issues/Increased Project Cost
 - No. 57s Increase Final Grade of Pavement
 - Increased Emulsion Quantities
 - Additional Scratch/Leveling Quantities on Shoulders
 - Drive Adjustments Require More Material

BEST PRACTICES

- District 1 Seasonal Restrictions September 1 through May 15. Warmer Temperatures Aid in Compaction and Curing.
- "Boxing In" Cold Recycled Mat with Existing/New Shoulders.
- Polymer Modified Emulsion
 Use Polymer Modification High Truck Traffic.

PROJECT SELECTION

- Project selection is an important factor in assuring the success of cold recycling.
 - Requires evaluation of existing pavement conditions.
 - Candidate projects should be structurally sound with good drainage.
 - Pavement Coring and Analysis
 - Existing pavement should have adequate depth for cold recycling.

PROJECT SELECTION CONT.

Traffic Analysis

Truck Percentage and ADT

Utilities

Manholes, valves, drainage inlets

 Good candidates include Composite Pavement and Full-Depth Bituminous Pavements exhibiting Thermal Cracking, Reflective Cracking, Block Cracking and Miscellaneous Cracking.

Full-Depth Bituminous Pavements







Composite Pavement Sections







Traffic – Pub 242 ADT Criteria

- 1,000 and less. Provide a surface treatment (double application) as a minimum for wearing surface.
- 1,001 to 3,000. Provide a hot mix or cold mix wearing course.
- 3,001 to 10,000. Provide a hot mix wearing course.
- More than 15,000. Do not Recycle.
- Projects carrying significant heavy truck traffic (i.e. 200 or more daily ESALs) should not be selected for cold recycling.

SR 62-05M CONTROL SECTION (9 YR OLD at Time of Photo)



SR 62-05M RECYCLED PAVEMENT (9 YR OLD at Time of Photo)



Recycled Roadway (Uncompacted Mat)



Recycled Roadway (Compacted Mat)



FINSHED PRODUCT



Summary

- Study of Control Sections (Conventional Mill and Overlay or Level and Overlay) vs. Cold Recycling.
 - Cold Recycled Sections exhibited almost 3 times less Reflective Cracking (LF) than adjacent control sections.
 - Increase in roughness higher in Control Sections than Cold Recycled Section.
- Backcalculated Cold Recycled Pavement Modulus comparable to Typical Plant Mixed HMA (250,000 – 450,000 psi.)
- On average, Cold Recycling extends Project Service Life an approximately 4 years compared to Conventional Overlay Treatments.

QUESTIONS?

