Developing Standards and Specifications for Full Depth Pavement Reclamation

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Outline

1. About This Research Project
2. Field Projects (Pilot Projects)
3. Mix Design Considerations
4. Summary
About The Research Project

- **Goal:** Developing Standards and Specifications for Full Depth Pavement Reclamation

- **Sponsor:** Pennsylvania Department of Transportation

- **Duration:** January 2010-May 2011

- **Budget:** $150,000
About The Research Project

- Technical Advisor: C. Goodhart
- Contract Manager: B. Fields
- Project Manager: K. Ferroni
- Technical Panel: A. Azab, B. Harter, S. Dietz

- Research Team (QES/PSU):
  - D. Morian (PI),
  - M. Solaimanian (Co-PI),
  - Barry Scheetz (Research)
About The Research Project

- Project Tasks
  - Survey of FDR Practices in Various States
  - Update PennDOT Pubs, Manuals, Bulletins
    - Bulletin 27 – Design & Specs for Bituminous Mixtures
    - Pub 242 – Pavement Policy Manual
    - Pub 408 – Highway Construction Specifications
    - Pub 447 – Approved Products for Low Volume Roads
  - Construct Pilot Projects
  - Develop Standards/Specification
  - Conduct Train-the-Trainer Courses
Important Sources

- State Highway Agencies
- ARRA
- PAMAA (PA Asphalt Mat’l Appl. Association)
- PennDOT BOMO & Municipal Services
- PennDOT Pub. 447
- FHWA Publication No. FHWA-SA-98-042 (Pavement Recycling Guidelines for State and Local Governments, Participant’s Reference)
Best Practice/Spec Development

- Address Four Major Sections:
  - Pavement Evaluation & Assessment
  - Mix Design
  - Construction
  - Quality Assurance/Performance Measurement
Best Practice/Spec Development

- Pavement Evaluation & Assessment
  - Traffic (ADT)
  - Pavement Condition/Distress Survey
  - FWD
  - CPT or DCP
  - Sampling
Best Practice/Spec Development

- Mix Design
  - Materials Selection
  - Specimen Preparation Techniques/Curing
  - Tests to Evaluate Properties
Best Practice/Spec Development

- **Construction**
  - Equipment
  - Process

- **Quality Assurance**
  - QC/QA Tests to run?
  - Criteria to use?
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Pilot Projects

- SR 1017 (Honey Moon Trail)
  - Dauphin County - Lykens Township
  - Length: 8,156 feet – 1.544 miles
  - Pavement Width: 14-18 Feet

- SR 3016 (Plains Church Road)
  - Butler County – Cranberry/Adams Township
  - Length: Approximately 2 miles
  - Pavement Width: 15-18 Feet
Pavement Structure - Dauphin-SR 1017

- HMA & Multiple Chip Seal Layers
- Large Size Aggregate Base
- Subgrade

- A CIR Project rather than FDR
Field Investigation– Dauphin – SR 1017
Dauphin – SR 1017 – Truck Traffic
Field Investigation– Dauphin – SR 1017
Field Investigation– Butler Co. – SR 3016
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Mix Design – Dauphin – SR 1017

- **Materials**
  - Reclaimed Pavement
  - Hauled-In RAP
  - Emulsion *(Evaluate Aggregate Coating - ASTM 6998)*
  - Coarse Aggregate *(AASHTO # 67)*
  - Cement

- **Design**
  - SGC : 6-in diameter specimens, No. of Gyrations?
  - Density & Indirect Tensile Strength
  - Optimum Water Content?
  - Optimum Emulsion
  - Check Moisture Damage Resistance
Mix Design – Dauphin – SR 1017

Dauphin Pit 1

Dauphin Pit 2

Dauphin Pit 3
Mix Design – Dauphin Co. – SR 1017
Indirect Tensile Strength
Mix Design – Dauphin Co. – SR 1017

Moisture Damage Resistance

51 mm/min @ 25 °C

Avg Dry Tensile Strength

Avg Wet Tensile Strength

TSR = \frac{\text{Avg. Wet Strength}}{\text{Avg. Dry Strength}} \geq 80\%
Mix Design– Dauphin Co. – SR 1017

Testing for Indirect Tensile Strength

![Graph showing indirect tensile strength data for Dauphin Co. - SR 1017 with different labels for each curve.](image)
Mix Design – Dauphin Co. – SR 1017

![Graphs showing data for Dauphin Co. SR 1017 with equations and R² values.](image-url)
Mix Design– Dauphin Co. – SR 1017

#67 Aggregate
Mix Design – Butler Co. – SR 3016

- **Materials**
  - Existing Pavement- HMA and Seal Coat
  - Existing Pavement – Stabilized Earth
  - Cement
  - Fly Ash?
  - Coarse Aggregate?

- **Design**
  - Standard Proctor : 4-in diameter specimens
  - Maximum Dry Density & Optimum Water Content
  - Unconfined Compressive Strength
  - Optimum Cement (Fly ash) Content
Mix Design – Butler Co. – SR 3016

Compact Specimens Using Standard Proctor Procedure
Mix Design – Butler Co. – SR 3016

Water Content-Dry Density Relationship
(Volumes from Corelok Device)

\[ y = -0.0039x^2 + 0.0806x + 1.5068 \]

\[ R^2 = 0.9654 \]
Thank You!