

Northeast & Mid-Atlantic States In-Place Recycling Conference

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



Field Investigation– Dauphin – SR 1017



Field Investigation– Dauphin – SR 1017



Field Investigation– Dauphin – SR 1017



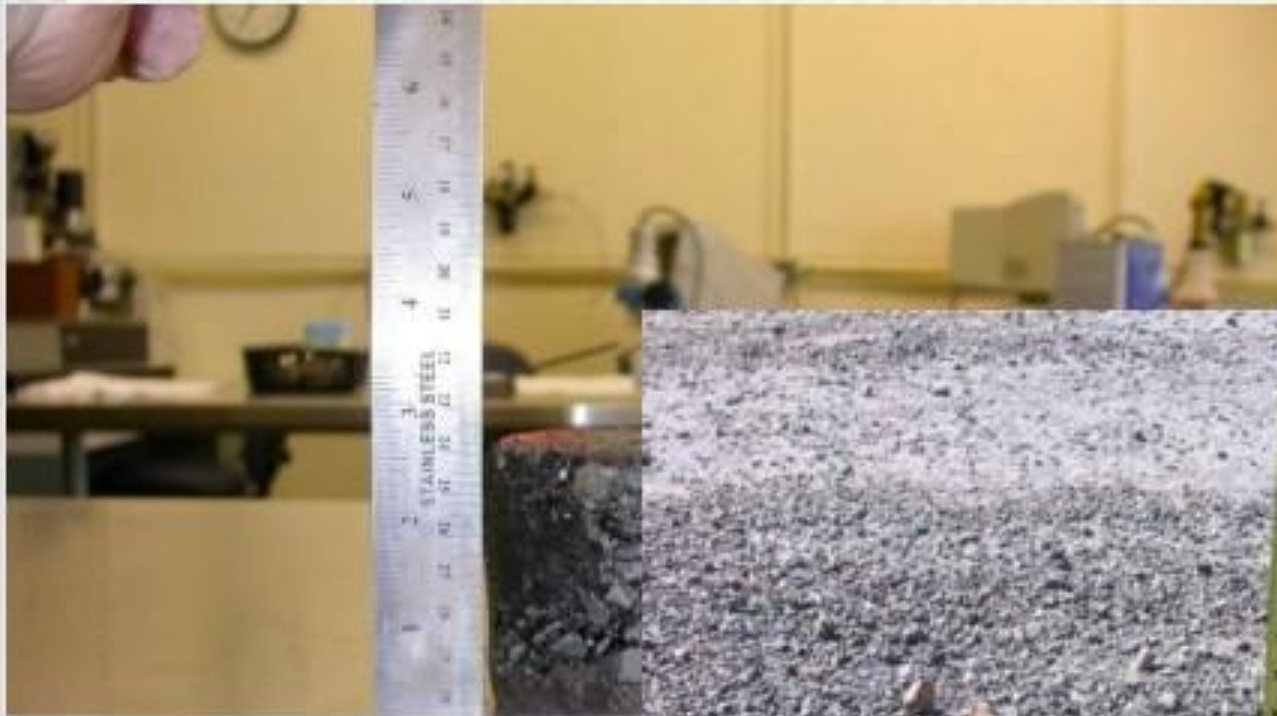
Dauphin – SR 1017 – Truck Traffic



Dauphin – SR 1017 – Truck Traffic



Field Investigation– Dauphin – SR 1017



FDR Project – Dauphin
Honeymoon



Field Investigation– Dauphin – SR 1017



Field Investigation– Butler Co. – SR 3016



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 Gyration?**
- Density & Indirect Tensile Strength
- Optimum Water Content?
- Optimum Emulsion
- Check Moisture Damage Resistance



Mix Design – Dauphin – SR 1017

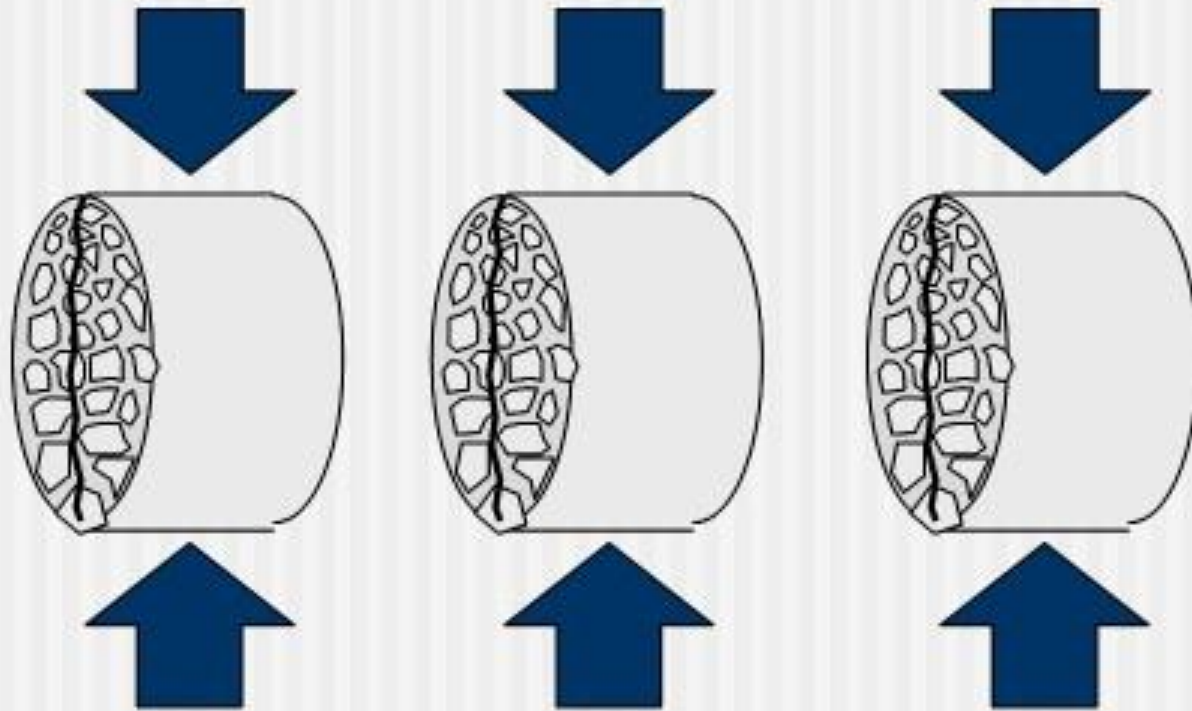


Mix Design– Dauphin Co. – SR 1017



Mix Design– Dauphin Co. – SR 1017

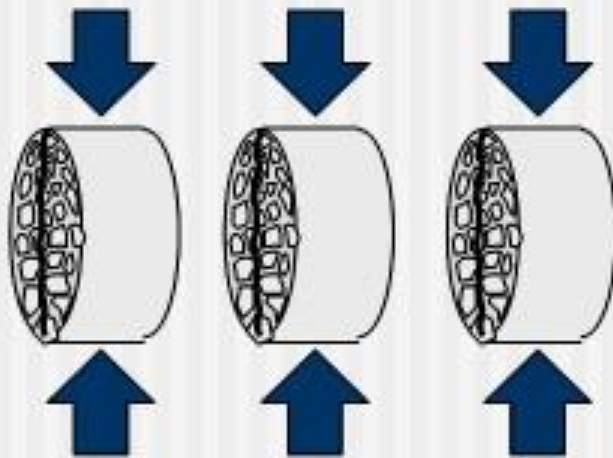
Indirect Tensile Strength



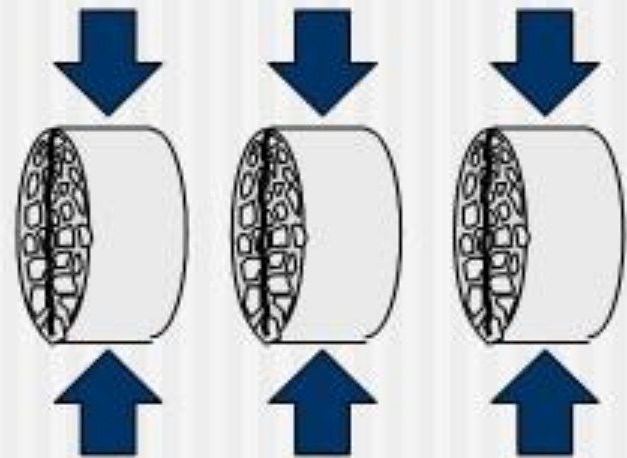
Mix Design– Dauphin Co. – SR 1017

Moisture Damage Resistance

51 mm / min @ 25 °C



Avg Dry Tensile Strength



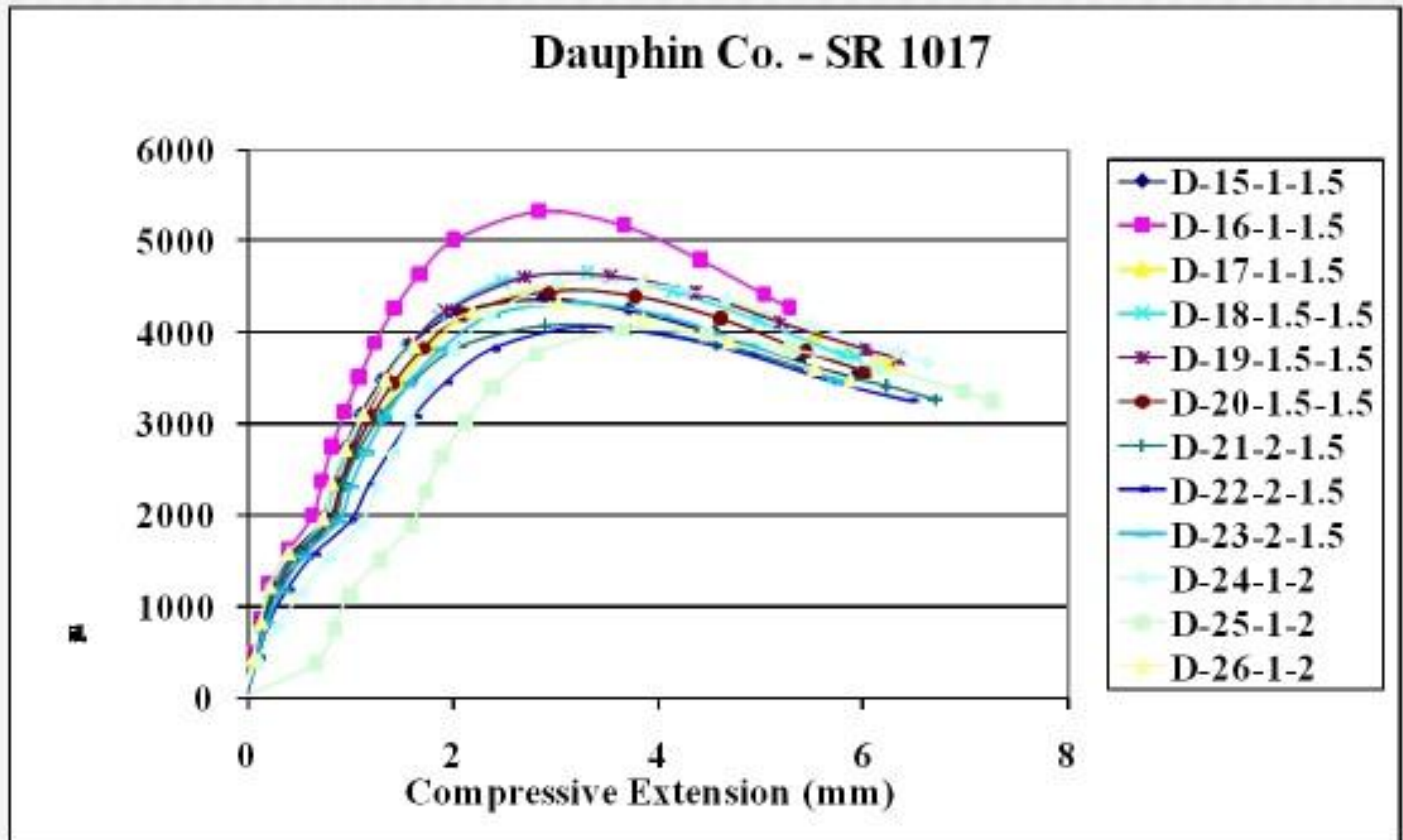
Avg Wet Tensile Strength

$$\text{TSR} = \frac{\text{Avg. Wet Strength}}{\text{Avg. Dry Strength}} \geq 80 \%$$



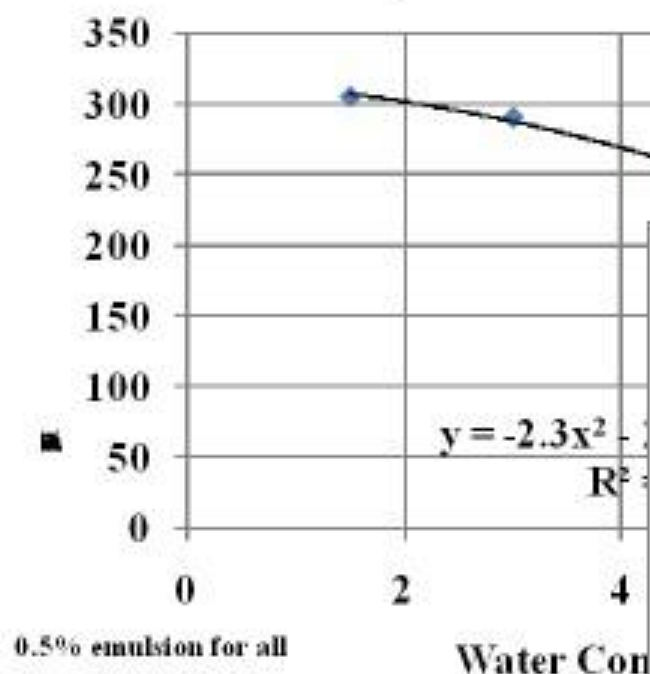
Mix Design– Dauphin Co. – SR 1017

Testing for Indirect Tensile Strength

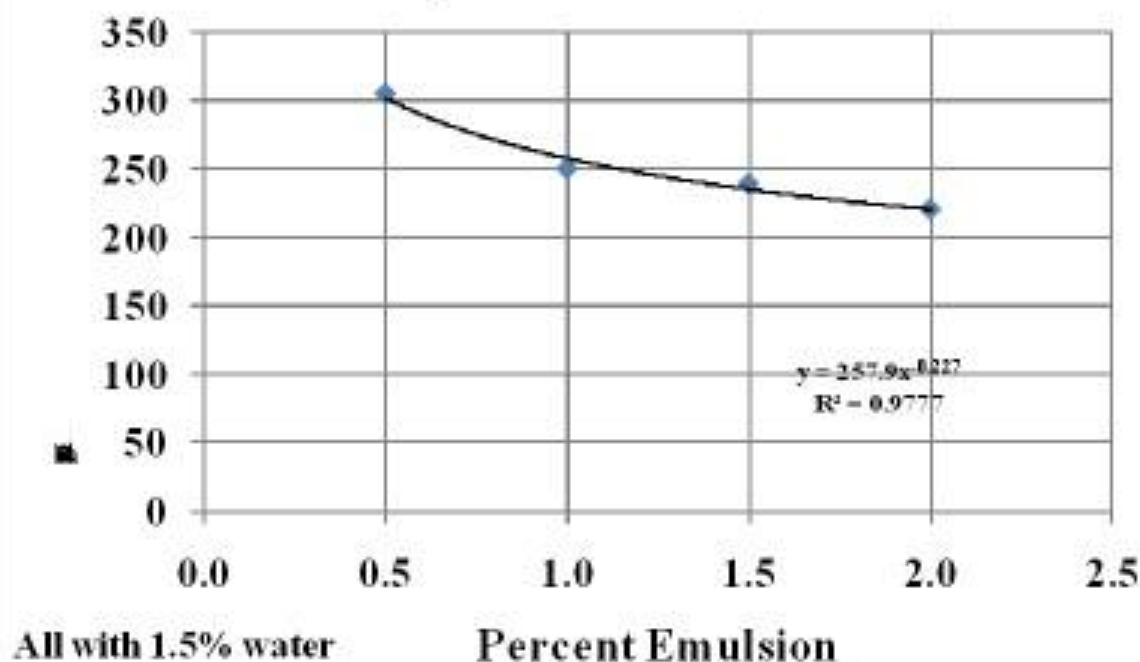


Mix Design– Dauphin Co. – SR 1017

Dauphin Co. - SR 1017



Dauphin Co. - SR 1017



Mix Design– Dauphin Co. – SR 1017



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

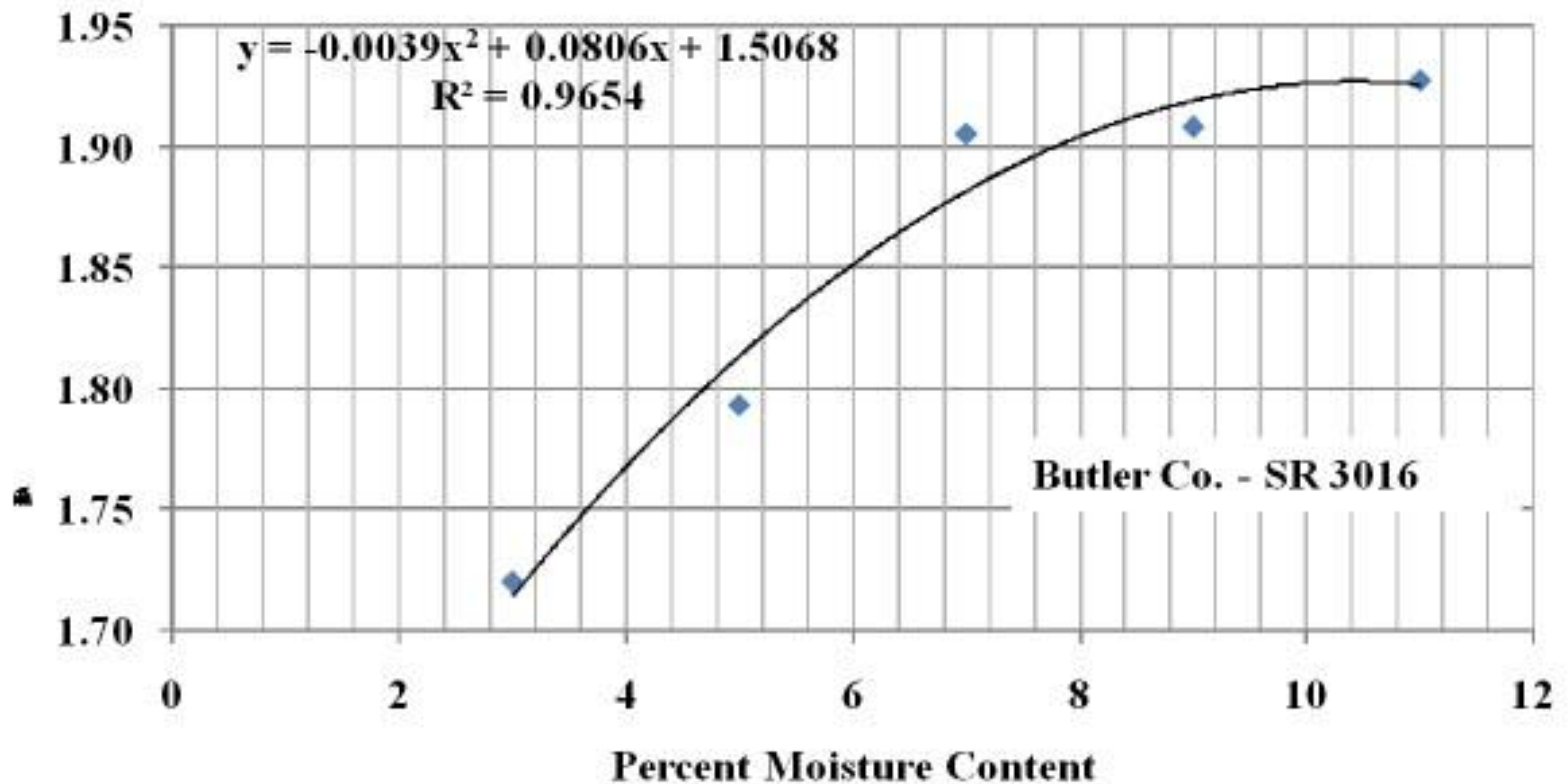


Butler Co. SR 3016
Proctor
11 % Water
From AUGUST



Mix Design – Butler Co. – SR 3016

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





Thank You!

