

SCDOT FDR Program

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Overview

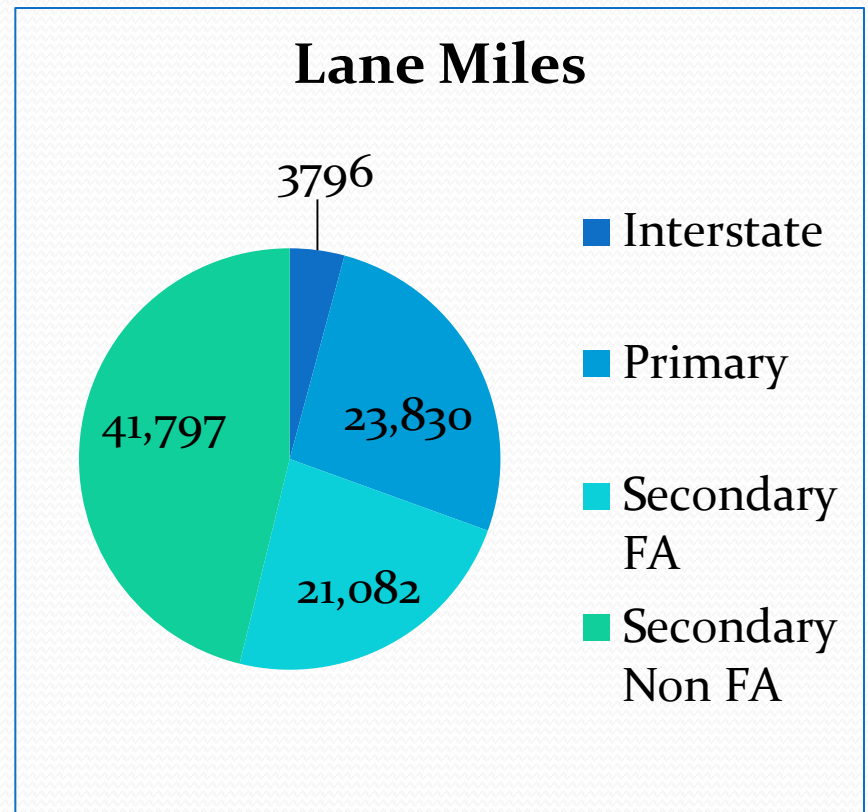
- Driving Factors of FDR Increase in South Carolina
 - SCDOT State of the Pavement
 - Long History with Cement Treated Bases
 - First FDR Project Successful
- Current FDR Program
 - FDR Candidate Selection Process
 - Average Weighted Cost
 - Lane Miles Reclaimed
- Improving the Program
 - Identifying Problems
 - Improving The Product
 - Additional Training

South Carolina System

2013 State of the Pavement

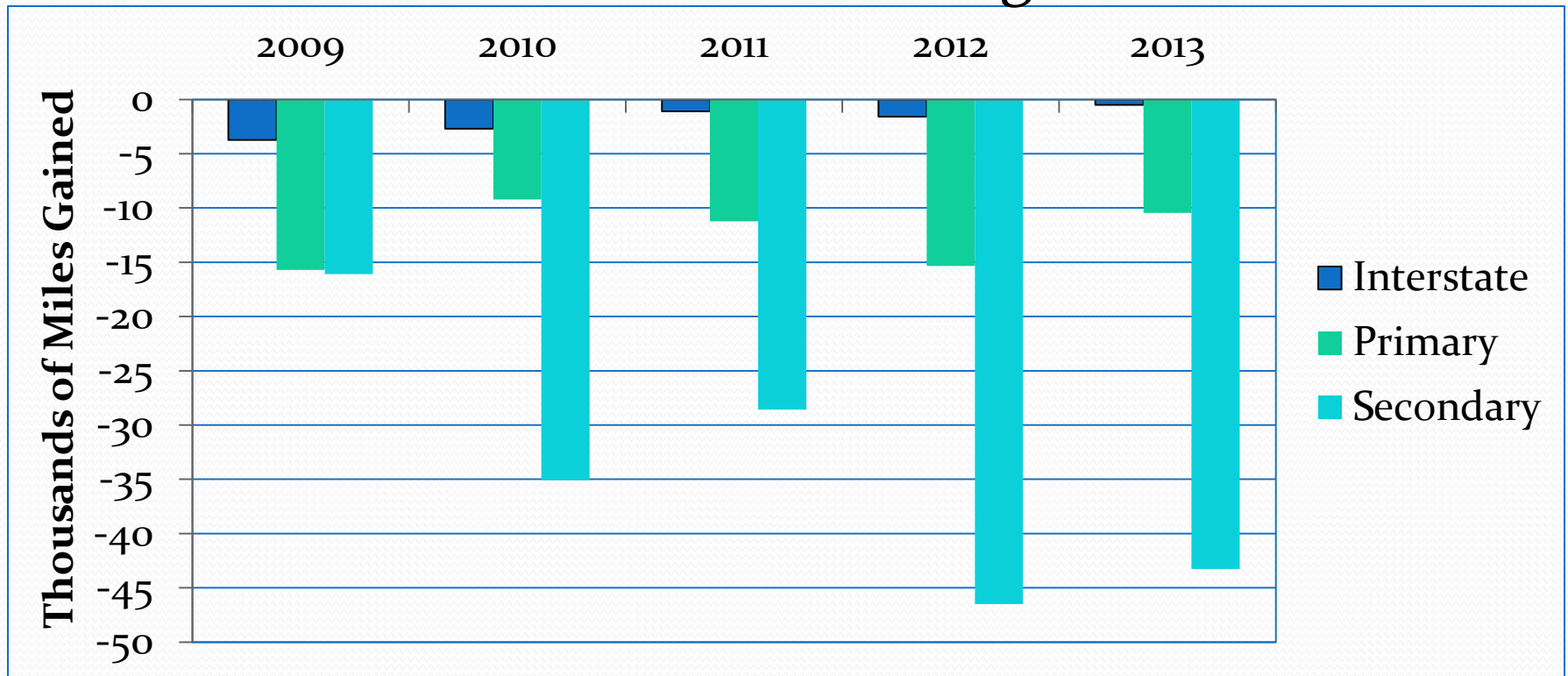
- Pavement System
 - 5th Largest in Country
 - 41,460 Centerline Miles
 - 90,384 lane miles
- Accelerated Deterioration
 - 10th Fastest Population Growth
 - Increased Truck Traffic
- Funding
 - Declining Level of Service
 - Net Loss of 71,656 lane mile years of service in 2013

Lane Mile Breakdown



South Carolina System

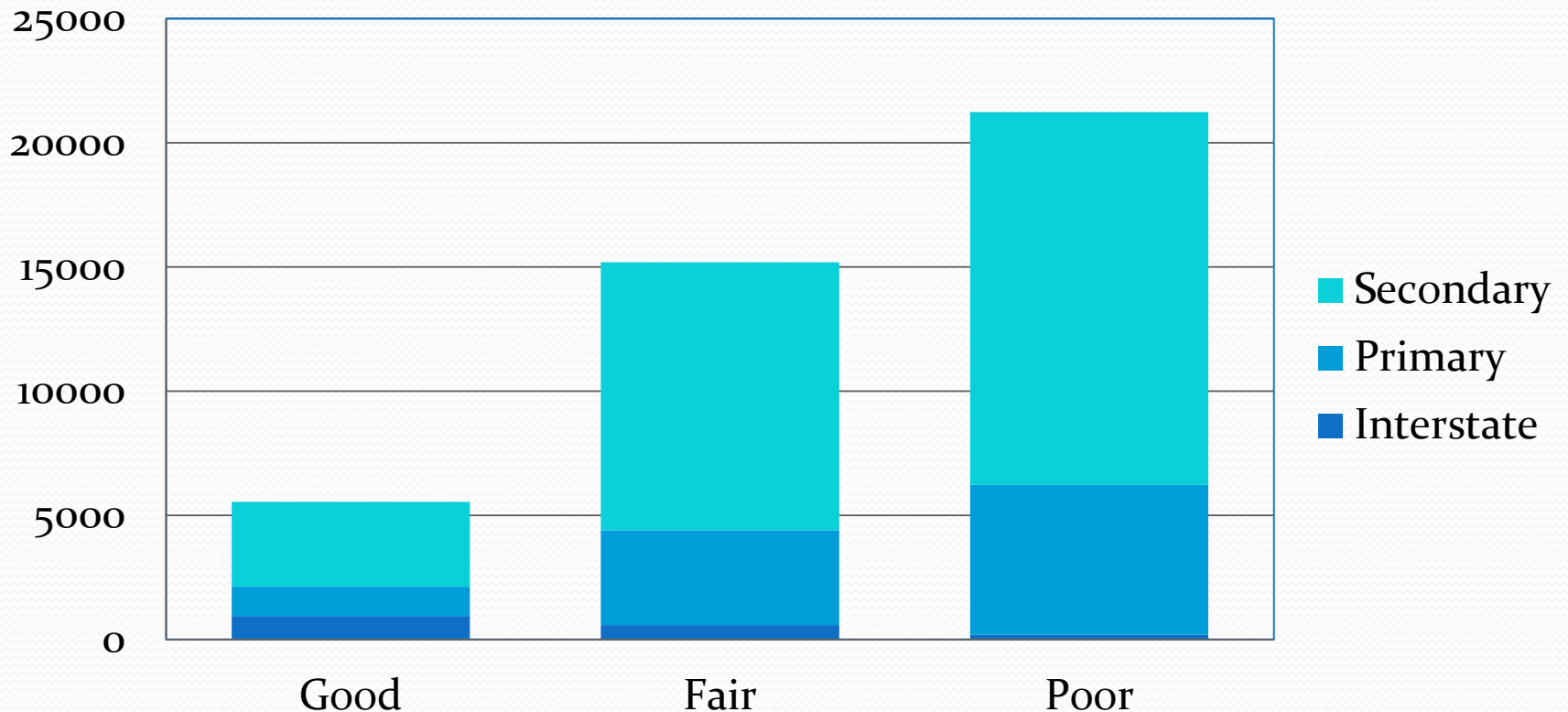
Service Life Net Change



Source: 2013 State of the Pavement Report

South Carolina System

Pavement Condition by Route Type



Source: 2013 State of the Pavement Report

Background - History

- SCDOT's Long History with Cement Treated Bases
 - 1930s - First Engineered Soil Cement Base Material
 - 1969 - Stabilizing Soils for Use as Base Material on Secondary Road Projects- Dr. Chu - USC / SCDOT
 - 1971 - An Evaluation of the Relative Strength of Flexible Pavement Components - Dr. Busching -Clemson/SCDOT
- Rehab Program
 - Pre 1995 - FDP / Overlay or Chip Seal
 - 1995 - SC Route 97

SC Route 97 (1994)



Current FDR Program

Current Program

- Districts Assess Current Pavement Condition
 - Pavement Structure Type
 - Surface Material and Depth
 - Base Material and Depth
 - Surface Condition
 - Determine the Percentage of FDP Required
- Collect Traffic Data
 - Functional Class
 - ADT
 - Growth Rate

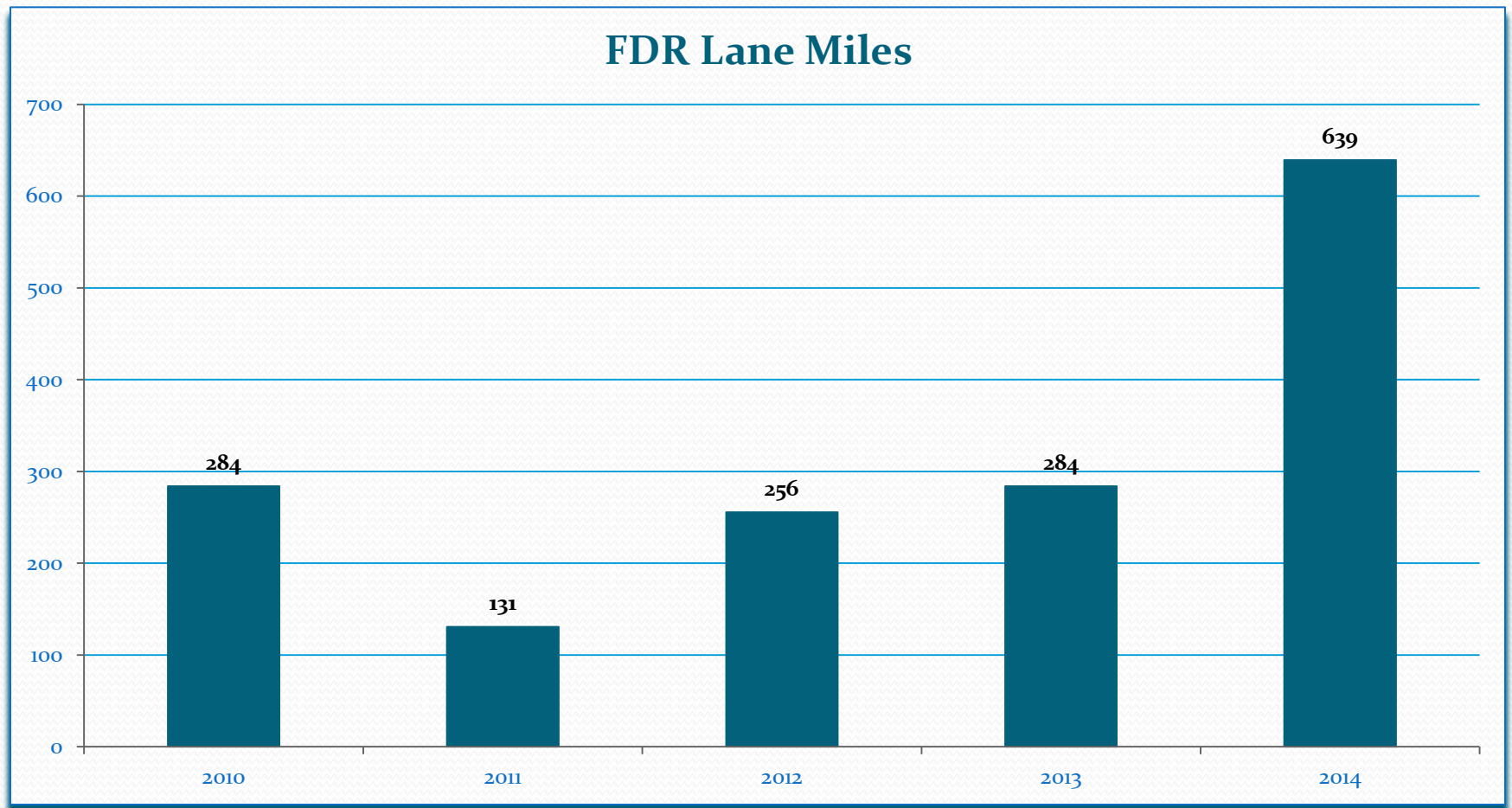
Current Program

- Pavement Design Estimator Inputs
 - Pavement Information
 - Traffic Data
 - General Information
 - Project Location
 - Project Dimensions
- Pavement Design Estimator Outputs
 - Structural Number Estimations
 - 2 design Alternatives
 - Overlay
 - FDR

Current Program

- Weighted Average Program Costs (11/2013 – 11/2014)
 - Cement – \$115.88 per ton (\$3.47 psy)
 - FDR 8" – \$ 5.00 +/- \$0.87 per square yard
 - FDR 10" – \$ 4.98 +/- \$0.54 per square yard
 - FDP 8" – \$42.99 +/- \$25.23 per square yard
 - FDP 10" – \$47.56 +/- \$15.80 per square yard

Current Program



Moving Forward- Improving the Program

Moving Forward – Identify Improvement Areas

- Quality Improvement Committee for CTB Bases
 - Industry
 - Contractors
 - Field Personnel
 - Materials Personnel
- In-House Research Study – “An Examination of Current Cement Treated Base Practices”
 - Includes FDR
 - Expected Deliverable – Best Practices Guide
 - Literature Review
 - Survey of State DOTs

Moving Forward - Mixes

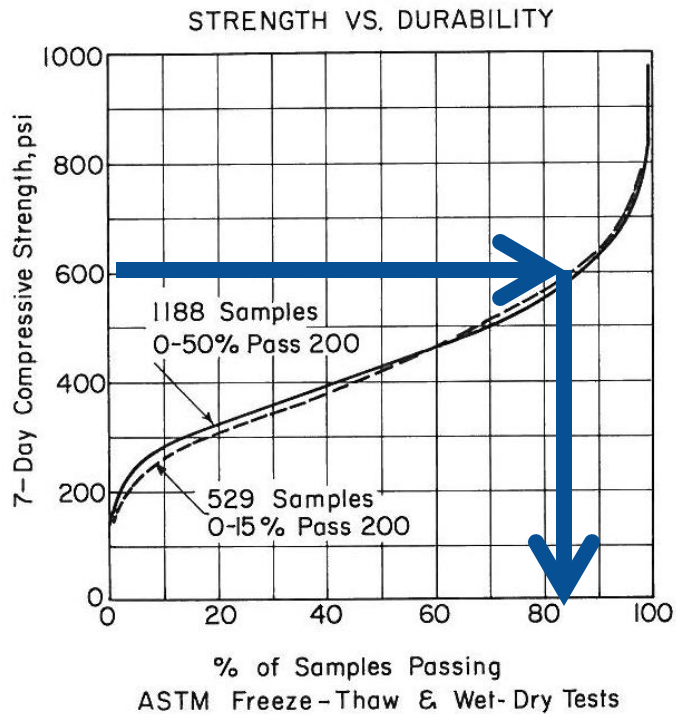
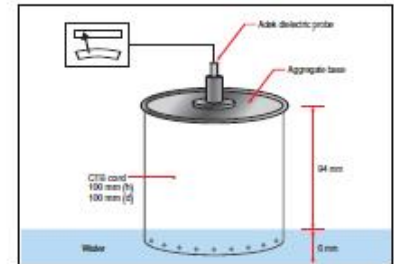


Fig. 31. Relationship between strength and durability.

PCA S-C Lab Handbook



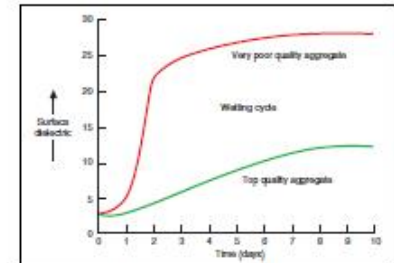
a. Dielectric Measuring Equipment



b. Test Setup



c. Surface Measurement



d. Typical Results

Tube Suction Testing

Moving Forward - Mixes

Depth (in)	300 psi (3.7% - Cement)	400 psi (5.0% - Cement)	500 psi (6.6% - Cement)	600 psi (8.0% - Cement)
8	26	35	46	56
10	32	43	57	69
12	39	52	69	83
13	42	56	74	90
14	45	61	80	97
16	51	69	92	111
17	55	74	97	118

Moving Forward - Design

UCS	Mres	Mrup	Tensile Stress	Ratio	Depth	Rate (psy)	tons /mile	Cement Cost Per Mile
600	774	155	74.37	0.480	8	56	197.12	\$ 22,792
500	707	141	54.72	0.387	10	57	200.64	\$ 23,200
400	632	126	36.92	0.292	13	56	197.12	\$ 22,792
300	547	109	23.71	0.217	17	55	193.6	\$ 22,385
300	547	109	49.67	0.454	10	32	112.64	\$13, 024

Moving Forward – Field Control

- Development of a Technician Training Course
 - Earthworks
 - Expand CTB Discussion
 - Material Components
 - Best Practices
 - Inspection
 - Control
 - New Testing Procedures

Recap

- Driving Factors
- Current Program
 - Significant Increase in use of FDR Alternative
- Moving Forward
 - Identify Further Cost Savings
 - Evaluate Their Potential

Questions

