SCDOT Experience with Maintenance Overlays

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SCDOT Background

- SCDOT maintains 41,475 lane miles of roads
- 4\textsuperscript{th} largest ** or 5\textsuperscript{th} largest state-owned system in the US*
- SCDOT Ranked 2\textsuperscript{nd} in overall performance and 1\textsuperscript{st} in total state source disbursements($14,580) per mile of responsibility*

*(FHWA)*  
**(Reason Foundation Report)**
SCDOT System Facts

- Interstate 843 miles
- Primary 9,483 miles
- Secondary 31,150 miles
- Total System 41,475 miles
- Non-Federal Aid 20,877 miles
- Percent NonFA Eligible Roads 50.34%
Funding Issues

- SCDOT has the 4th lowest Motor Fuel User Fee at 16.75 cents per gallon
- Last increase to user fee was in 1987
Funding Issues

- State Source funding in 2008 is approximately $435 million but $106 million is needed for Federal Match Funds
- As Federal Funding has increased, so has dollars needed for FA Match
- Maintenance Funds have been depleted by this need
Weather Issues

- Southeast USA in a drought over the last decade
- Officially still in a drought
- Rainfall has increased in last several years
Traffic Issues

- USA more and more a trucking economy
- SC and Georgia ports
  - Overweight trucks
- Limited state funds for load limit enforcement
Where we are now

• Our system has deteriorated

• Recent news release estimated $22 billion shortfall in highway funding

• Agency was restructured by a 2007 state law
Where we are now

• New state law requires selecting all projects using certain criteria at a minimum:
  – ADT
  – Truck numbers
  – Maintenance Costs
  – Pavement Condition
  – Local Significance

• Management decision to perform designs on all overlays, even maintenance overlays
Typical Distress
Curb & Gutter Section With Distressed Widening
Age and Load Related Distresses
SCDOT Pavement Design Section

- Contained in The Office of Materials & Research
- State Pavement Design Engineer
  - Also supervises Pavement Evaluation, Soils Testing & Subsurface Investigation
  - Pavement Design Engineer
    - Supervises Cement Lab, Chemistry Lab, & Traffic Markings Coordinator
    - Pavement Design Coordinator
- Typically design 40-60 projects per year
Existing Maintenance Overlay Process Prior to 2007

- Money allocated to each county
  - 46 counties
  - 7 districts
- Resident Maintenance Engineer chose resurfacing candidates and assigned an overlay thickness based on their own criteria
- This created multiple approaches to resurfacing selections
  - Not all bad
  - Some choices influenced by non-engineering factors
- Tendency to spread money as thin as possible
- Some roads failed within 3 years of overlay
New Process

• Rank all FA roads using formula based on criteria from the new law
  – PQI
  – IRI
  – ADT
  – Truck percentage
  – Maintenance $
  – Local Significance

• Divide list into three categories:
  – Preservation
  – Rehabilitation
  – Reconstruction
Criteria Used

- From Pavement Management System:
  - PQI
  - IRI
  - ADT
- From Traffic Data Services:
  - Functional Class
    - Used to estimate truck %
- From HMMS:
  - Maintenance Costs
- From Resident Maintenance Engineer
  - Local Significance
Maintenance Candidate Selection

- List was broken into three categories:
  - Reconstruction
    - Lowest scoring sections
  - Rehabilitation
    - Middle scoring range
  - Preservation
    - Highest scoring sections
- Funds were allocated for each category
- Roads were selected until funds depleted
  - Based on rough cost estimates
- Ranked on a statewide basis
Provided to Pavement Design Section

- Listing of 296 sections for pavement design
  - Vast majority Primary routes
  - A few FA secondary routes
  - Shortest section was 0.06 miles
- List had the following information:
  - County
  - Road Number
  - Beginning and Ending Milepoints
  - ADT
  - Functional Class
  - Treatment Type (Preservation, Rehabilitation, or Reconstruction)
Requested by Maintenance

- Full pavement design
  - FWD and coring
  - Site Visit
  - Design
- Data provided early October
- Designs needed in three stages:
  - December, January, February
Work Plan

• Negotiate contract modifications for 4 on-call consulting firms with pavement design experience
• Negotiate contract modifications for on-call firms to perform coring
• Train consultants to use our process
  – Easier to review designs
• Distribute work
• Perform FWD and some coring in-house
• Review designs
• Submit to districts
Challenges to Process

- Low staffing level
  - Pavement Design Coordinator position was vacant
- No maps provided
- Short sections needed to be combined
- Other work
Challenges to process

• Sorting out road sections
  – Many contiguous sections were not combined
  – Some roads had two or more treatments proposed
  – Producing maps

• Dividing work into logical groups
  – Tried to eliminate duplication of travel

• Time, time, and time
Design Issues

• Assumed values used for some data
  – SSV by county (some counties split)
  – Truck % by functional class
• Thick overlays
• Resistance to change
  – Funding still an issue
• Curb and gutter sections
  – Mill and fill not enough
Solutions to Challenges

• Training course for consultants
  – Computer training
  – Field training
  – Phone contact and visits for follow up
• Lots of hours
• Drafted help from other sections
• Unfortunately, neglected other work
• Learned new techniques
  – ITMS
Solutions to Design Challenges

• Curb and gutter sections
  – Let two test sections using roller compacted concrete
  – Both will have 10 inches RCC and 2 inches of HMA

• Thick overlays
  – Encouraged using full depth reclamation
    • FDR with Portland Cement
    • One test section of FDR using asphalt emulsion
Results of Program

• 63 roads designed by consultant
  – Reviewed, condensed and edited by SCDOT staff
• 21 designed by in house staff
• Designs delivered by March 15
Secondary Resurfacing

• Developed computer application using MS Access
• Used same soils data as for FA Roads
• User Inputs:
  – ADT & growth rate
  – truck percentage & functional class
  – pavement type
  – pavement thickness, age and condition
  – percent full depth patching required
• Returns recommendation for overlay and/or FDR
Lessons Learned

• Allow more time
• Start with good information
• Educate your customers
• Assumptions increase pavement thickness
Questions?