



# Lessons Learned: VDOT Perspective

Virginia Pavement Recycling Workshop

November 27, 2012

**Michael E. Wells, P.E.**


VDOT Materials Division

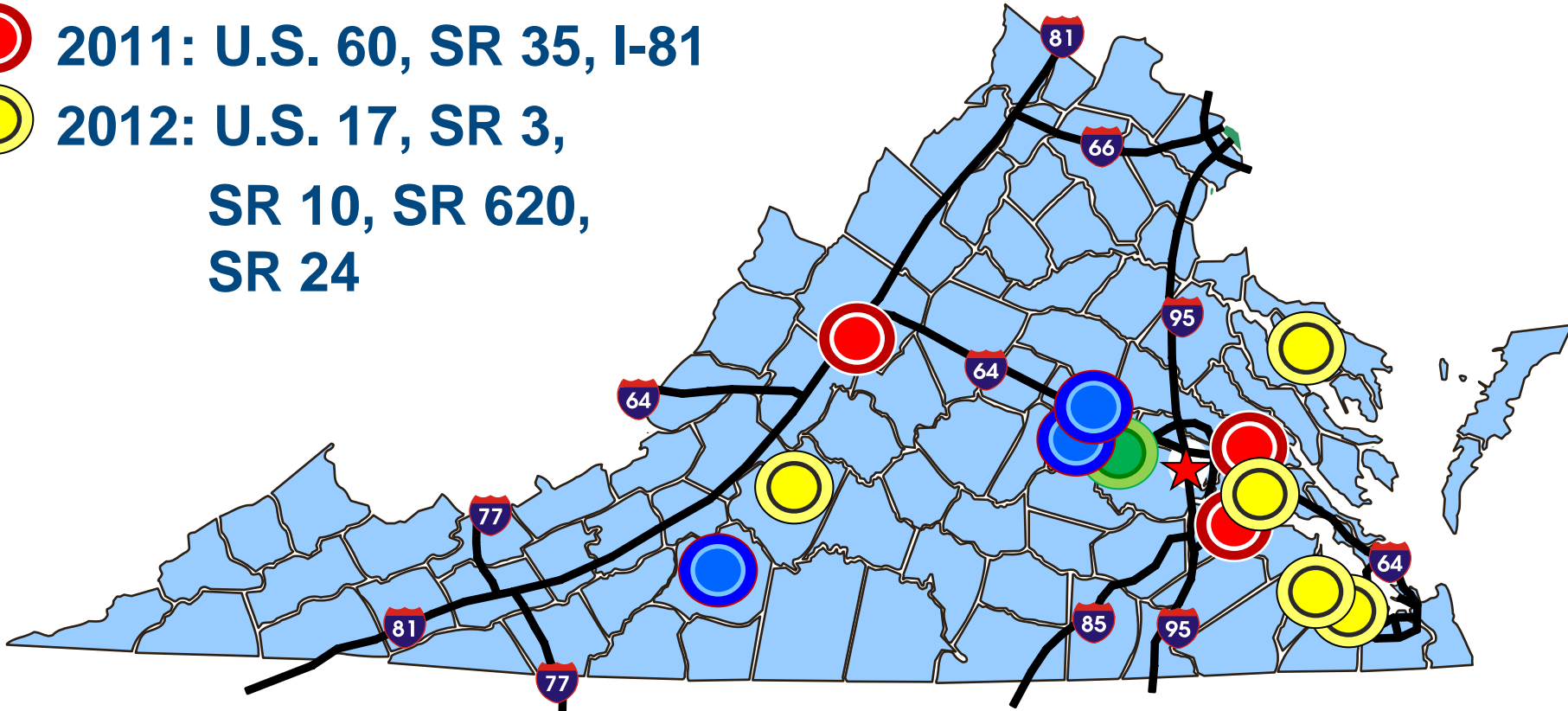
Senior Pavement Engineer

# Discussion

- What have we learned from our projects?
  - Project Development
    - Project Selection
    - Specifications
  - Project Delivery
    - Construction
  - Acceptance of Process

# VDOT Recycling Projects

-  2008: SR 6, 13, 40
-  2010: U.S. 60
-  2011: U.S. 60, SR 35, I-81
-  2012: U.S. 17, SR 3,  
SR 10, SR 620,  
SR 24



# Additional Project Information

Year	District	County	Route	Treatment and Agent
2008	Richmond	Powhatan	SR 13	FDR w/cement
	Richmond	Powhatan	SR 6	FDR w/cement
	Salem	Franklin	SR 40	FDR w/Foam,Emulsion
2010	Richmond	Powhatan	US 60	FDR w/cement
2011	Richmond	Henrico	US 60	CIR w/emulsion
	Richmond	Prince George	SR 35	CIR w/emulsion
	Staunton	Augusta	IS 81	FDR, CIR, CCPR
2012	Hampton Roads	Isle of Wight	US 17	CIR w/Foam,emulsion
	Hampton Roads	Isle of Wight	Rte 620	FDR w/cement
	Fredericksburg	Richmond	SR 3	FDR w/cement
	Salem	Bedford	SR 24	FDR w/cement
	Richmond	Chesterfield	US 10	FDR w/cement

**Project Selection**



# Goal of Project Selection

- **Provide right fix**
  - Identify
    - What projects are candidates
      - Rating Data
  - Verify
    - Pavement Investigation
      - Non-Destructive
      - Destructive
  - Certify

# Early Project Selection

- **2008 and 2010 – Some Project Review**
  - FDR Projects
    - Pavement History and Rating Data
    - Geometric Review
    - Some coring
    - Some subgrade



# Early Project Selection cont'd

- **2011 – More Detailed Review**
  - CIR (composite pavement SR 35 and US 60)
  - CIR, FDR, CCPR (IS 81)
    - Pavement History and Rating Data
    - Geometric Review
    - Higher Frequency of Coring
    - Subgrade
    - FWD
    - GPR (IS 81)



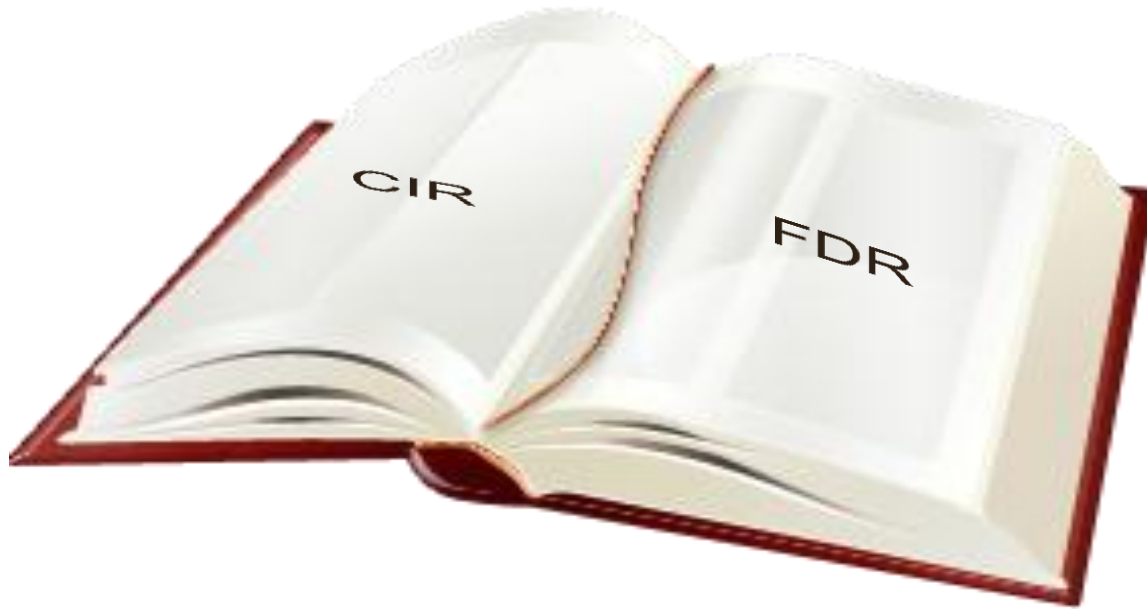
# Current Project Selection

- **2012 – Industry/VDOT initiative**
  - Will be covered by Andy Babish, State Materials Engineer

# Lessons Learned Project Selection

- **Factors to consider when reviewing a project for recycling**
  - **Pavement History**
  - **Type of pavement failure**
  - **In-place material**
    - Structural Condition
    - Material types (SM, IM, BM, other)
    - Thickness (uniform or variable)
  - **Geometrics**
  - **Maintenance of Traffic**

# Specifications



# Specification Development

- **2008**
  - No Official VDOT Specification for FDR
  - Project specific “General Notes”
    - Process
    - Additive Type and Percentage
    - Testing Requirements (Field)
      - Depth
      - Gradation
      - Proof Roll
    - “General” equipment criteria

# Specification Development cont'd

- **2010**

- After 2008 Projects, VDOT Provision developed for FDR
  - Contractor must have
    - Experience performing this work (within 3 years and 50,000 sy)
    - Project reference list
    - QC Plan
    - Reviewed VDOT data and/or project site
  - Preconstruction Meeting prior to beginning
  - Mix Design Required (Cement Percentage)
  - Testing Requirements (Design and Field)
- Also developed provision for CIR and CCPR

# Specification Development cont'd

- **2011**
  - District modified CIR spec for SR 35 and US 60 based on composite pavement
    - Required engineered emulsion
  - Contractor must have
    - Technical rep on site at all times (2 years and 5 projects)
    - Qualified to do design, perform and oversee
    - QC Plan
  - Preconstruction Meeting prior to beginning
  - Mix Design Required
  - Testing Requirements (Design and Field)
  - Equipment Requirements
  - Weather Requirements

# Current Specifications

- **2012 – Industry/VDOT initiative**
  - Will be covered by Andy Babish, State Materials Engineer

# Lessons Learned Specifications

- **Need to clearly identify expectations**
  - Contractors role and responsibilities
  - Departments role and responsibilities
- **How specific do you want to be?**
  - Flexible versus Absolute requirement
    - Equipment requirements
    - Cement versus lime versus emulsion versus foamed
- **Testing protocol**
  - Which properties to measure (i.e. density, strength, additive content, depth)
- **Seek Input from Resources (local, other states, ARRA, etc.)**



# Construction

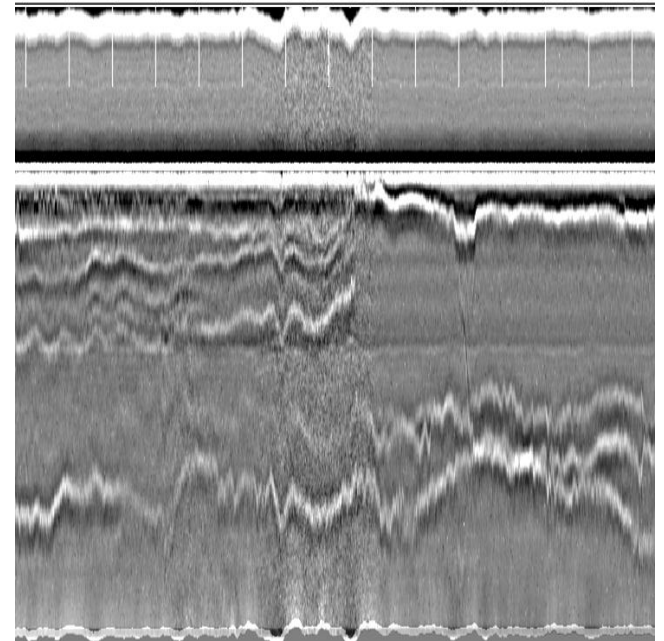


# Highlights

- **Depth of In-Place Material**
- **Mix Design**
- **Additive Content**
- **Compaction Equipment**
- **Density**
- **Strength Testing**
- **Dust (FDR)**
- **Returning to Traffic**
- **Material Protection (CIR)**
- **Trench Widening**

# Depth of In-Place Material

- **Uniformity of depth**
  - Begin to end points of project
  - Across Lane
- **Recommend**
  - Coring locations across lane width
  - GPR
    - Education on how to interpret data



# Mix Design

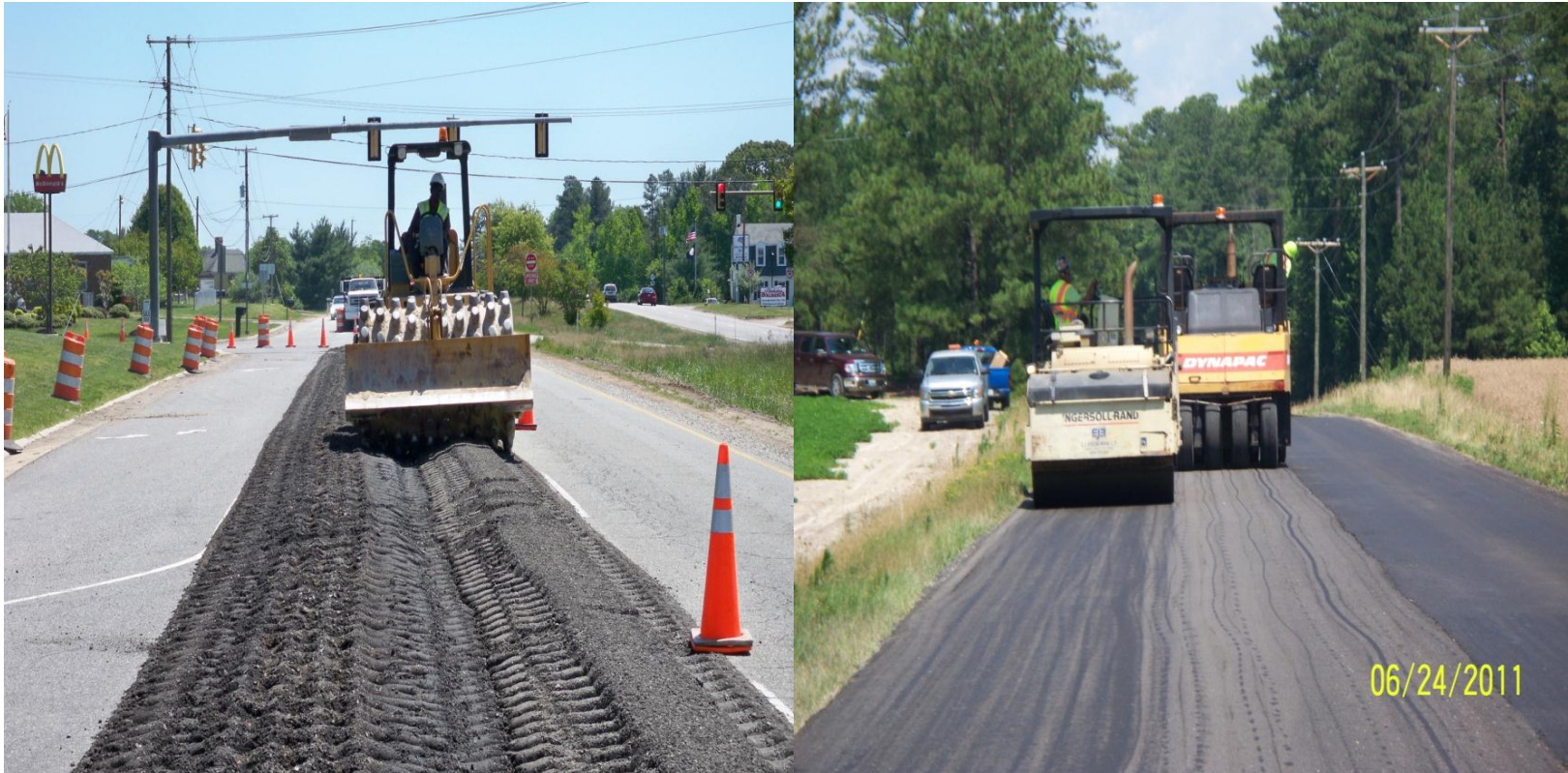
- **Contractor must take sufficient material to develop**
  - Establishes optimum additive content
  - Establishes density target
    - Make sure enough material is gathered throughout project to establish representative target(s)
- **Labs capable of performing tests required?**
  - Training

# Additive Content

- **How to measure/ensure consistent feed**
  - Required automatic displays
  - Have used “tarp method” for FDR
  - Calculate daily yield
  - Uniform depth across pavement width (FDR)
- **Frequent monitoring**

# Compaction Equipment

- Equipment requirements different than conventional HMA placement



# Density

- **Overall, has not been an issue**
  - Some issues on previous project
    - Cause not 100% defined
      - Speed of recycling?
      - Materials change?
      - Process change?
  - Aggressively pursue possible cause(s)

# Strength Testing

- **Sampling**
  - Cores
  - “Box” Samples
    - Molded in lab and tested
      - Does this correlate to field cores?



# Dust (FDR)

- Public Concern/Complaints
- Safety?



# Returning to Traffic

- **Same “day” or extended lane closure**
  - Quality Impact?
    - Overall, no but...
      - Some deformation under heavy vehicles turning on CIR
      - Isolated raveling of FDR
  - Perform proof roll (FDR)



Courtesy Slurry Pavers



Courtesy Slurry Pavers



06/24/2011

# Material Protection (CIR)

- **Protection Plan if exposed to excess moisture (i.e. heavy rain)**
  - Required as part of QC Plan
- **Did have a couple of potholes due to heavy rain storms prior to overlay**

# Trench Widening

- **Investigate if existing material is suitable for incorporation into process**
  - Must be accounted for as part of design
    - If not, add additional material or trench prior to recycling/reclaiming
- **Remove existing vegetation**

# Acceptance of Process

- **Communication**
  - Technology being implemented on roads not previously considered
  - Public Acceptance
  - Stakeholder Acceptance (Dept and Industry)
- **Training**
- **Performance Monitoring**

# Summary

- **Do your homework**
- **Clearly define Specifications**
- **Train workforce**
- **Communicate with Construction Family**
- **Project Follow-up**

# MONARCH FOOTBALL

# WE'RE #1!



**10-1 MONARCHS FINISH FIRST IN THE CAA**

**EARN NO. 4 SEED IN FCS PLAYOFFS**

**Dec. 1, 2012 • Foreman Field at SB Ballard Stadium**





Questions?





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