Sustainability Specifications and Implementation

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Sustainability

• Oxford dictionary definition
  • *Able to be maintained at a certain rate or level*

• *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.* (World Commission on Environment and Development (WCED))

• *As state transportation professionals, we need to model the way toward achieving a sustainable future…Sustainable transportation requires innovative approaches and partnerships like never before.* (AASHTO 2009)
What is sustainability when it comes to maintaining roadway asset?

- Maintain roads through
  - Preservation
  - Rehabilitation
    - Recycling is another cost effective tool in the tool box

- In fact, the pavement engineering community has adopted a number of technologies as a way of improving sustainability, such as the increased use of recycled materials in pavement structures, the incorporation of modified binders to increase pavement performance, and the development of rating systems to measure sustainability. (FHWA 2015)

- Sustainability has many features: Recycling is the focus
Presentation Outline

• What it is
• Types
• When to use it
• Benefit
• Elements of the specifications
• Implementation
• VDOT’s history of recycling
• Way forward
Pavement Recycling: What is it

Simple – Taking existing materials and using them….again.

But not all recycling is equal…..
Types

- RAP (Reclaimed Asphalt Pavement)
  - Using RAP in Hot Mix Asphalt
  - RAP in unbound aggregate base layer

Focusing on these types:

- CCPR – Cold Central Plant Recycling
  - Typically 100% RAP processed off site and stabilized (3” to 6” layers)
- CIR – Cold In-Place Recycling
  - Bound asphalt layers mixed in-place and stabilized (3” to 6”)
- FDR – Full Depth Recycling
  - Deep mixing-includes bound and unbound (aggregate/soil) material (6” to 12”)

6
When to use it

• Not every project is a good candidate for recycling
• Reconstruction (RC) or Restorative Maintenance (RM) sites are potential candidates
• Recycling is good alternative where deep manipulation is warranted
• Recycling viable where > 15% patches are needed for conventional rehab method
• VDOT’s ‘Project Selection Guideline for Cold Pavement Recycling’ outlines typical applicability
  (http://www.virginiadot.org/business/materials-download-docs.asp)
When to use it, contd.

• CIR
  • Major rehab (RM/RC site)
  • Problem within the AC layers only
  • Excessive distresses within the AC layer
  • Transverse reflective crack situation
When to use it, contd.

- **FDR**
  - Deeper structural problem (can stabilize part of subgrade as well)
  - Can work as a stable platform for the upper AC layers (as in I81 project)
  - Low volume/sub division streets
    - Excessive distress, repair cost prohibitive, reconstruction may be needed
  - More up front cost
    - More service life – cost effective
    - May be cheaper if the road warrants reconstruction or excessive repair

- **CCPR**
  - Can be used new construction or rehab projects
  - As a replacement of BM-25.0
    - Not identical as BM-25.0
When to use it, contd.
Benefits

- Preservation of natural resources
  - Recycling aggregates/binder
  - Sustainable
- Significant cost savings
  - Lot of times, conventional rehab option is cost prohibitive reconstruction
  - Does not require hauling materials from site and hauling new materials back to site (in place recycling)
- Less greenhouse gases emitted
  - Fewer trips for in place recycling
- Fix deterioration *causes* rather than *symptoms*
  - Greatly improves life cycle cost
Millings being plant processed
CCPR – Cold Central Plant Recycling

Looks Like HMA…..Placed like HMA…. Compacted Like CMA
CIR – Cold In-Place Recycling

Cement placed ahead, mixing with foamed emulsion
FDR – Full Depth Recycling

Cement placed ahead, mixing with water
Elements of the Specifications

• Specifications developed in November 2012 on FDR, CIR, CCPR
  • A joint effort between industry and VDOT
  • Objective was to have one statewide specifications minimizing the need to project level adjustment
• A project selection guideline was developed
  • To help district pavement staff to identify potential projects and apply the best course of action
• Applied the specifications on a few projects
• Continued assessing feedback/lessons learned from the projects
• Continued assessing comments/suggestions from external stakeholders
Elements of the Specifications, contd.

- Last year, effort undertaken to revisit the specifications and revise, if needed
- Comments on the existing specifications were solicited from both internal and industry
- FDR and CIR spec to remain as Special Provision (SP)
- CCPR spec is to be broken into general use (Materials & Placement) SP
- CIR specification revised in late 2014
- Had series of meetings with industry on CCPR, FDR and project selection guidelines
- Internally reviewing all comments prior to finalizing the above documents
- Expecting to finalize specifications soon
Elements of the Specifications, contd.

- Test Strip Prior to full production
- Technical Representative
- Quality Control Plan
- Acceptance requirements
  - Field density
  - Stability / indirect tensile / compressive strength
  - Gradation
  - Depth
  - Stabilizing agent dosage
- The plan is to mimic the HMA spec as much as possible for CCPR spec
Implementation – Specifications, Training

- **Specifications**
- **Training/awareness**
  - Meetings
  - VCTIR staff
  - Recycling task force
    - Looking for greater opportunities to promote recycling
    - Providing Just in Time training and any needed assistance/guidance
  - NHI/FHWA class
    - Available online
    - Trying to arrange NHI class on recycling in Virginia
Implementation – Project Selection Criteria

• **Guidelines for selecting projects**
  • Currently a stand alone document
  • Length of project
    • For better pricing
  • **Distress rating**
    • RM/RC sites possible candidates
  • **Maintenance history**
    • Too frequent maintenance

• **Overlay thickness requirements**
  • Generally meet SN calculations
  • 2-course overlay on interstate and high volume roads
  • Provide guidance on CCPR substitution
Implementation – Project Selection Criteria, contd.

• Guideline document to be incorporated in MOI (chapter VI)
• Directives
  • Mulling over some options
  • Will provide specifics on how CCPR can be used in lieu of BM25 (and some aggregate base)
    • CCPR not identical as BM 25
    • Not a 1:1 replacement on mainline
    • May be used on 1:1 replacement (low risk)
    • VDOT can design the project with CCPR
    • Dual bid with both conventional and CCPR materials
    • Contractor can submit VE following guidelines
• Expecting to finalize the document soon
VDOT Pavement Recycling History

• Pre-2008
  • Regional focus, no monitoring

• 2008-To-date
  • 15 projects
    • CIR: 3
    • FDR: 12
    • CCPR: 2
  • Few are in the pipeline

• VDOT seems to apply FDR on more high volume roads than other southern states
Way Forward

• Publish all the revised specs soon
• Incorporate Project selection criteria as part of MOI
• We are still in the learning curve
• Continue learning from previous and future project
• Adjust documents as needed
• Continue promote recycling
  • Help achieve sustainable way of maintaining our road network
Thank You!

Questions?

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