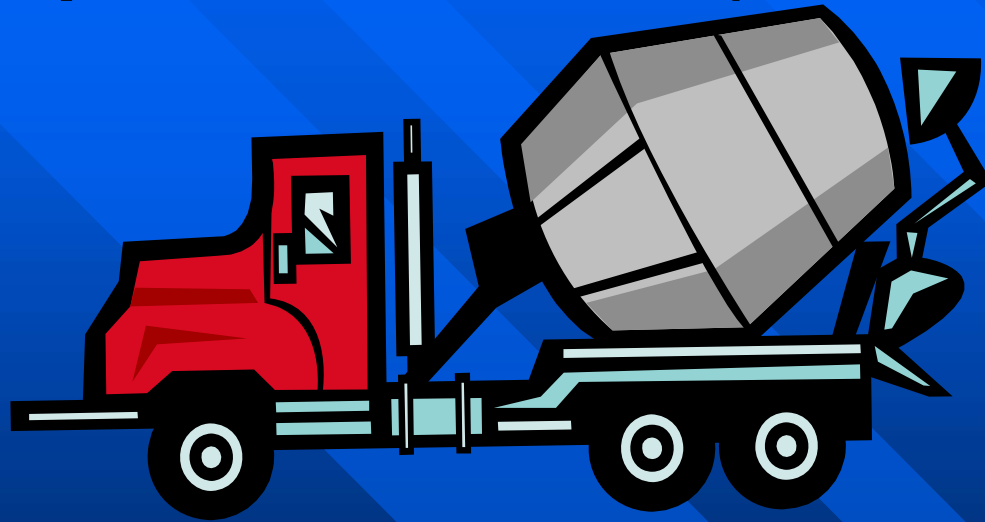


# Material and Construction Optimization (MCO)



MoDOT  
Perspective

# Changes Impacting MCO Implementation

- MoDOT Reorganization
  - Research Division eliminated
- Alternate Bidding Process
  - Changes in PCCP specification that impacts risks, costs or production; impacts competitiveness.
- Short Term Rehabilitation Focus
  - “Taking Care of What We Have” Short Term Mode
  - Limited system expansion makes new pavement issues less of a priority
- QC/QA and Industry Involvement
  - Performance Related Specifications
  - Pay for performance measures w/ incentives
  - New Testing must be: Timely, Cost Effective, Easy to Interpret

# Current Material Acceptance

- Compressive Strength
- Thickness
- Air Content
  - 5% Minimum Behind Paver
- Gradation
  - Meets Criteria in QC/QA Plan
- Deleterious Content
  - Control on Substandard Material



# MCO's Impacts on Future Specifications Changes



Concrete Paving

# MIX DESIGN CHANGES

- Contractor Submits Mix Design
  - Optimized Mix Designs
  - Ternary Cementitious Materials Allowed
- MoDOT Standard Mixes Allowed
  - Material Availability
  - Contractor Capabilities

# PCCP Placement Changes



- Discharge Time – No Time Limit
  - “All handling and discharge shall occur prior to the initial set of concrete.”
- Push to reduce the mix time to increase production.
  - MoDOT retained the 60 second minimum mix time at a central batch plant.
  - Retained minimum and maximum revolutions in truck mixers.

# MoDOT Looks for Guidance from the MCO Study

- Optimized Gradation Requirements
  - Shilstone Methods
- Initial Set of Concrete
  - Need Performance Related Specification
  - Implementation in QC/QA for PCCP
- Mixing Time
  - Performance Specs on determining appropriate mix time for different mixes.

# Anticipated MCO Test Development

- Recommended Shilstone Gradation Requirements
- Initial Set of Concrete
  - Modified ASTM 359
  - Coffee Cup Test
  - Other Test
- Mixing Time Adjustments
  - Air Void Analysis by AVA
  - Uniformity Test
- Other Performance Related Specifications
  - Easy to Conduct and Interpret
  - Performed reasonably in time, training, and cost.

# Biggest Challenge - Technology Transfer and Implementation

- Specification changes must not increase costs or slow production.
- Industry Support and Involvement
- Use of the Best Practice Manual

# UPDATE ON IMAGE ANALYSIS

- Project Completed – Final Report will be Published in November on MoDOT Website

[www.modot.mo.gov/services/rdt/index.htm](http://www.modot.mo.gov/services/rdt/index.htm)

- Picking up equipment in December
- Equipment – Total Cost About \$75,000
  - Hardware – Off the shelf
  - Software – Patent
- High Quality Results
- Participating in 2 Round Robin Studies
  - FHWA
  - Dr. Jana – CMC Testing Lab in Pennsylvania

# Thank You

