Rubblization / Reconstruction I-39
Steve Robinson
D-5 Acting Materials Engineer
Mixtures Control Engineer

I-39 N.W. of Bloomington-Normal in McLean County
Built in 1989
15 ft Hinge Jtd.
10 ¾” PCC
Tied PCC Shldr.
4” CAM II
16” Lime Mod.Soil
19,000 ADT, 28 % Trks
33 Mill. ESAL
Existing Conditions

I-39 Condition Rating Survey
2012 CRS
- NB 3.8 / SB 3.0
- Poor Condition

Pavement Distress
Durability Cracking
- High Level Infrequent
Transverse Cracking
- Medium to High level

Existing Conditions

I-39 Condition Rating Survey

Joint Deterioration
- Frequent / Spalling
- > 6 inches

Centerline Deterioration
- High Level / Spalling
- > 6 inches
Project Scope

I-39 Pavement Issues

- Extensive patching in both NB & SB
- Patch survey identified 12% patching required
- IRI
  - NBL 127
  - SBL 193

I-39 Patching

Class B Patching
Six Patching Contracts
since 2009 totaling
$2,090,000

Operations and Day Labor
Patching also
Structure and Field Testing Investigation

Pavement & Subgrade investigation Nov. 2011

Pavement cores: 13 ¼” max (plan 10 3/4”)

CAM II cores: 6” max (plan 4”)
  - No thin sections

Core Analysis

Alkali Silica Reactivity (ASR) possible culprit
  - Reaction of Alkali in cement with reactive silicas in Fine Agg.
  - Reaction forms a hygroscopic gel
  - Gel absorbs water, expands into void structure and cracks paste/aggregates
  - Process continues until one of the three elements is used up or eliminated
Core Analysis

- BMPR assistance
  - Cores submitted to consultant lab for petrographic analysis
- Analysis determined “distress is primarily, if not wholly due to the effects of expansion associated with ASR”

Existing Materials

- High Alkali cement, no fly ash
- Expansive sand source
- Freeze/Thaw durable coarse aggregate

Samples of Alternatives Analyzed

- Patch and Policy O/L
- Patch and Structural O/L
- Rubblization and 11 ¼” HMA
- Rubblization and 8” HMA
Case Study - SHRP Section

I-57 north of Pesotum in Champaign Co.
- 6 and 8 inch HMA on rubblized PCC
- Constructed in 1990
- Resurfaced in 2010
- 20 year service life

Rehab Strategy – Experimental Work Plan

Rubblize PCC and Experimental Thin Overlay
- 8” HMA in lieu of 11 ¼”

Objectives of the experiment
- Evaluate performance of a thin O/L on a low-volume interstate
- Establish recommendations for the rehab of ASR-distressed, hinge jointed pavements
Experimental Work Plan

- Evaluations – 5 Years
  - Annual visual distress surveys
  - Rutting measurements
  - Falling Weight Deflectometer testing

Control Section

- I-57 SB North of Champaign (~5 mi. long)
  - Similar Average Daily Traffic and Truck Volumes
  - HMA Overlay on Rubblized PCC Pavement, 11 ¼”
  - Pipe Underdrain Removal and Replacement
    - Completed Fall 2012
2013 Construction

- June 2013 Letting
- 2.8 Mi. S.B. direction only due to funding
- ~2.4 Mi. HMA, (PFP on 3 separate mixtures)
- ~0.4 Mi. PCC Removal & Replacement
Lightweight MTD

Fine Graded IL 19.0, N90
F.G. IL 19.0 Texture

PFP Sampling Plates
PFP Results

- 3 ¾” Neat 19.0 FG, N90 Final Pay = 103.0%
- 2 ¼” Polymer 19.0 FG, N90 Final Pay = 101.9%
- 2” Polymer Surface Mix D, N90 Final Pay = 103.0%

Fine Graded IL 19.0 Benefits

- Reduced Segregation
- Consistent Mat Texture
- Improved Density
- Reduced Permeability
- Stable - Excellent Hamburg Wheel Performance
- Durable - Long Term Performing Mixture
Questions?