SPS - 2
SHRP CONCRETE TEST SECTIONS
SPS – 2 Construction Overview

- Summer 1992
- Project 70-21 K-2609-01
- Hawkins Construction
  Omaha Nebraska
- Contract Administration-
  KDOT Salina KS Construction office

Project Approval/Sponsors:
KDOT Senior Management-FHWA-ACPA
Narrative Description

- SPS—2 1992
- The Long-Term Pavement Performance (LTPP) SPS-2 experiment was designed to study structural factors, such as drainage, base type, concrete strength and thickness, and lane width, of rigid pavements. The SPS-2 experiment section in Kansas, constructed in 1992, is a jointed dowelled plain concrete pavement. The experiment consisted of 12 standard SPS-2 sections and 1 Kansas DOT control section. These sections have been monitored by the LTPP program since construction. Performance monitoring included measurements for ride quality (International Roughness Index (IRI)), faulting, cracking, and surface deflections. Performance parameters analyzed in this study included IRI, faulting, cracking (combined longitudinal and transverse crack lengths), and joint load transfer efficiency. The results show that the project has performed very well to date. Most sections are smooth and crack-free, with negligible faulting. The load transfer efficiency of the sections has been good too. The drainable sections with a permeable asphalt-treated base have performed the best. The section with low PCC slab thickness (8 inches) and low concrete design strength (550 psi) on a dense graded aggregate base has performed the worst. The combination of high slab thickness and high concrete strength tends to mask the effect of the base on pavement performance. The Kansas DOT control section with a thick slab (12 inches) over a dense graded portland cement- treated base has also performed very well.
SPS – 2 Construction Overview

- **Background**
  - Long Term Pavement Performance (LTPP)
- **Preliminary Work**
  - Sampling and Testing
- **Actual Construction**
  - Subgrade
  - Base
  - Concrete Pavement
- **Reporting**
Project Location
Project Location

- Project 70-21 K-2609-01
- Westbound I-70
- Between Exits 286 and 290
Existing – Corroded Dowels
Existing Pavement

- Concrete Pavement
  - Built in 1959
  - 61’-6” Joints
  - Doweled with Mesh

- Aggregates
  - Walker Limestone
  - Smoky River Sand
SHRP SPS-2

- Long Term Pavement Performance
- Four Climatic Zones
- Constructed 1992 to 2000
- 14 Sets of Test Sections Constructed
  - Map Next Page
SPS-2 Locations
1992 Kansas Open House

KANSAS DEPARTMENT OF TRANSPORTATION

STRATEGIC HIGHWAY RESEARCH PROGRAM

SHRP

SPECIFIC PAVEMENT STUDIES

SPS-2

JUNE 2, 1992

6:00 AM Registration
Bill Legette, P.E., Moderator, District Engineer

9:00 AM Opening Remarks
Mike Johnston, Secretary of Transportation

9:30 AM SHRP Background on SPS-2 Test Sections
Herman Ingberg, P.E., Regional Engineer, SHRP

9:45 AM Design Preparation
Robert L. Hirt, P.E., Squad Leader, Reed Design

10:00 AM BREAK

10:20 AM Base and Pavement Design Sessions
Andrew J. Stol, P.E., Associate, Geotechnical Engineer

11:40 AM Construction of SHRP SPS-2 Test Sections
William Rinkhart, Hemmert Construction
Jim L. Kowalski, P.E., KDOT Area Concr. Engineer

11:10 AM Sampling and Testing of Test Section
Materials Charles W. Lieberman, P.E.,
KDOT Dist. Materials Engineer

11:30 AM Discussion of:
- Weigh-In-Motion
- Weather Station
- Concrete Carfield

NOON

1:00 PM Tours to Construction Sites on I-70
SPS-2 Sections

4:30 PM Return to Elbow Tunnel Center in Abilene

5:30 PM Reception

JUNE 4, 1992

8:30 AM Informal Workshop for the Design and Specifications on structural SHRP
SPS-2 Test Sections. This session is open
to SHRP Coordinators, Designers and others
who would be involved in preparation
for a SHRP SPS-2 Project.

11:30 AM Adjournment

STRATEGIC HIGHWAY

RESEARCH PROGRAM
1992 Open House
Base Types

- Dense Graded Aggregate Base
- Lean Concrete Base
- Permeable Asphalt Treated Base
- Cement Treated Base (KDOT Design)
6” Dense Graded Aggregate Base
Lean Concrete Base

- **Material**
  - Walker Limestone
  - Konza Sand
  - LaFarge Cement
  - Water
  - Air Entraining

- **Proportion**
  - 30% (953 lbs)
  - 70% (2222 lbs)
  - 282 lbs
  - 0.80 w/c (226 lbs)
  - 0.8 oz
6” Lean Concrete Base
Permeable Asphalt Treated Base

- **Material**
  - Walker Limestone
  - Konza Sand
  - Asphalt (AC-10)

- **Proportion**
  - 94% of Aggregate
  - 6% of Aggregate
  - 2.5% by Dry Weight
Permeable Asphalt Treated Base
550 PSI Mix

- **Materials**
  - Walker Limestone
  - Konza Sand
  - LaFarge Cement
  - Water
  - Air Entraining

- **Proportion**
  - 30% (2139 lbs)
  - 70% (860 lbs)
  - 554 lbs
  - 0.49 w/c (271 lbs)
  - 2.4 oz
KDOT Specified Mix

- **Materials**
  - Walker Limestone
  - Konza Sand
  - LaFarge Cement
  - Water
  - Air Entraining

- **Proportion**
  - 30% (2062 lbs)
  - 70% (884 lbs)
  - 620 lbs
  - 0.42 w/c (260 lbs)
  - 2.4 oz
900 PSI Mix

- **Materials**
  - Quartzite Sandstone
  - Konza Sand
  - LaFarge Cement
  - Water
  - Air Entraining
  - Water Reducer

- **Proportion**
  - 50% (1392 lbs)
  - 50% (1392 lbs)
  - 860 lbs
  - 0.33 w/c (286 lbs)
  - 5.7 oz
  - 42.9 oz
### Table 20 Summary of status of the design factors

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Construction – Haul Vehicles
Construction – Paving Train
Construction - Paver
Concrete Paving
Testing and Reporting
Flexural Beams
Weigh in Motion
Weather Station
Falling Weight Deflectometer
Failures

- Test Section 10
  - 8” 550 PSI Concrete on 6” DGAB
  - Panel Replacement in 3 Years
    - Basket Pulled by Paver
    - Diagonally within Panel
Conclusion

- LTPP is Being Used
- Technology Changes
- Collection of Data
- Kansas Typical Section has held up well