



9th International Conference on MANAGING PAVEMENT ASSETS (ICMPA9)

LTTP InfoPave™

Extracting Information out of LTTP Data

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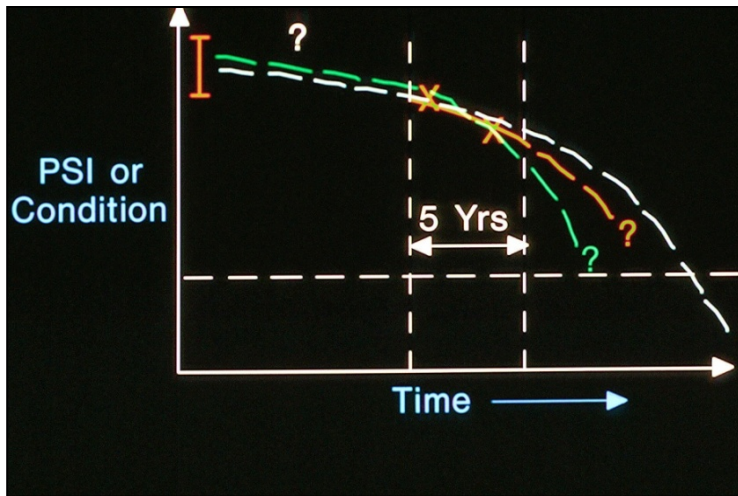
U.S. Department
of Transportation
**Federal Highway
Administration**



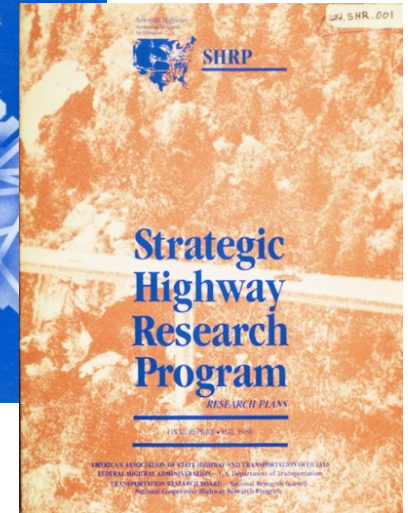
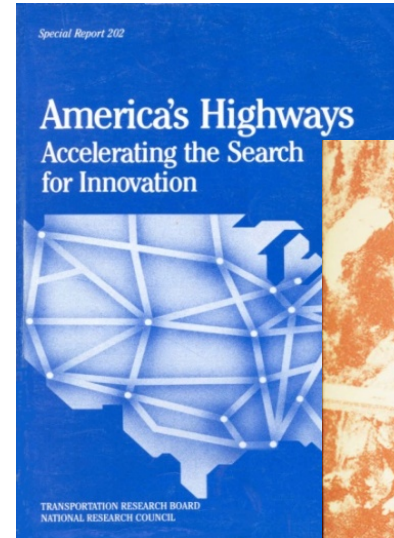
Overview

- 1) Introduction to LTPP
- 2) Data visualization in LTPP InfoPave
- 3) Extracting information out of the data
- 4) Discussion

LTPP'S GOAL IS...

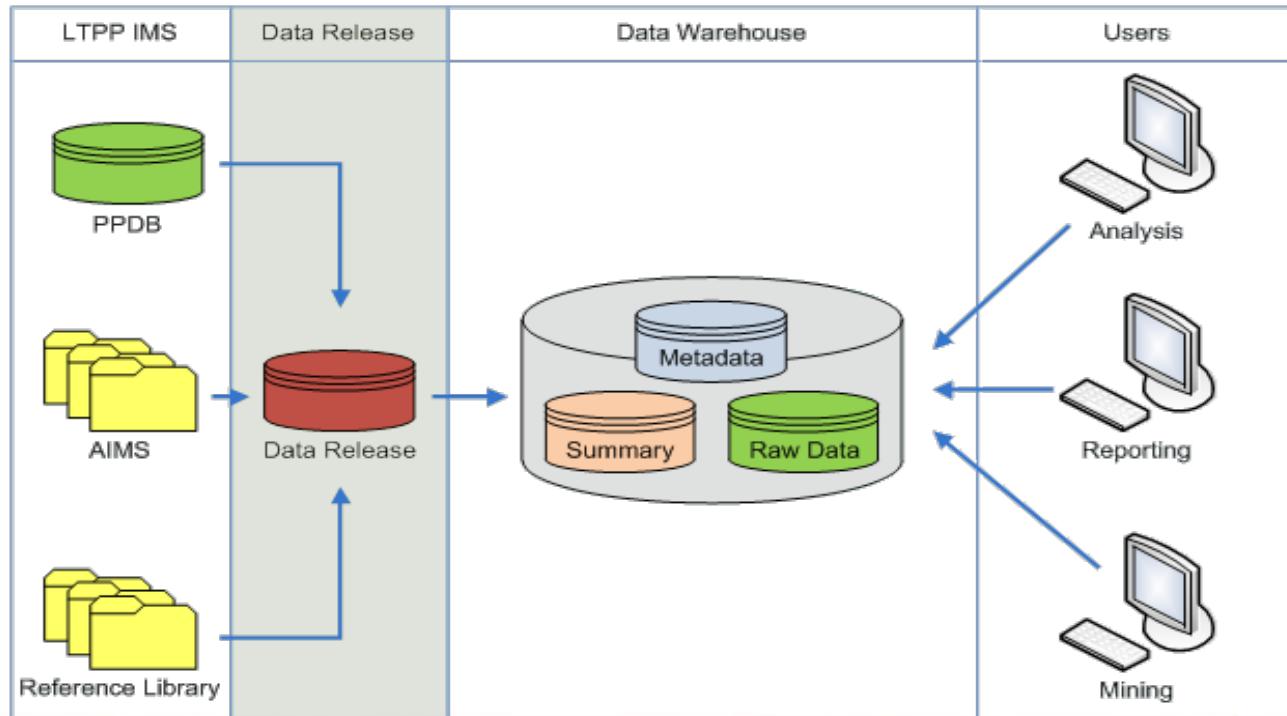


to provide answers to
HOW and **WHY**
pavements perform as they do!

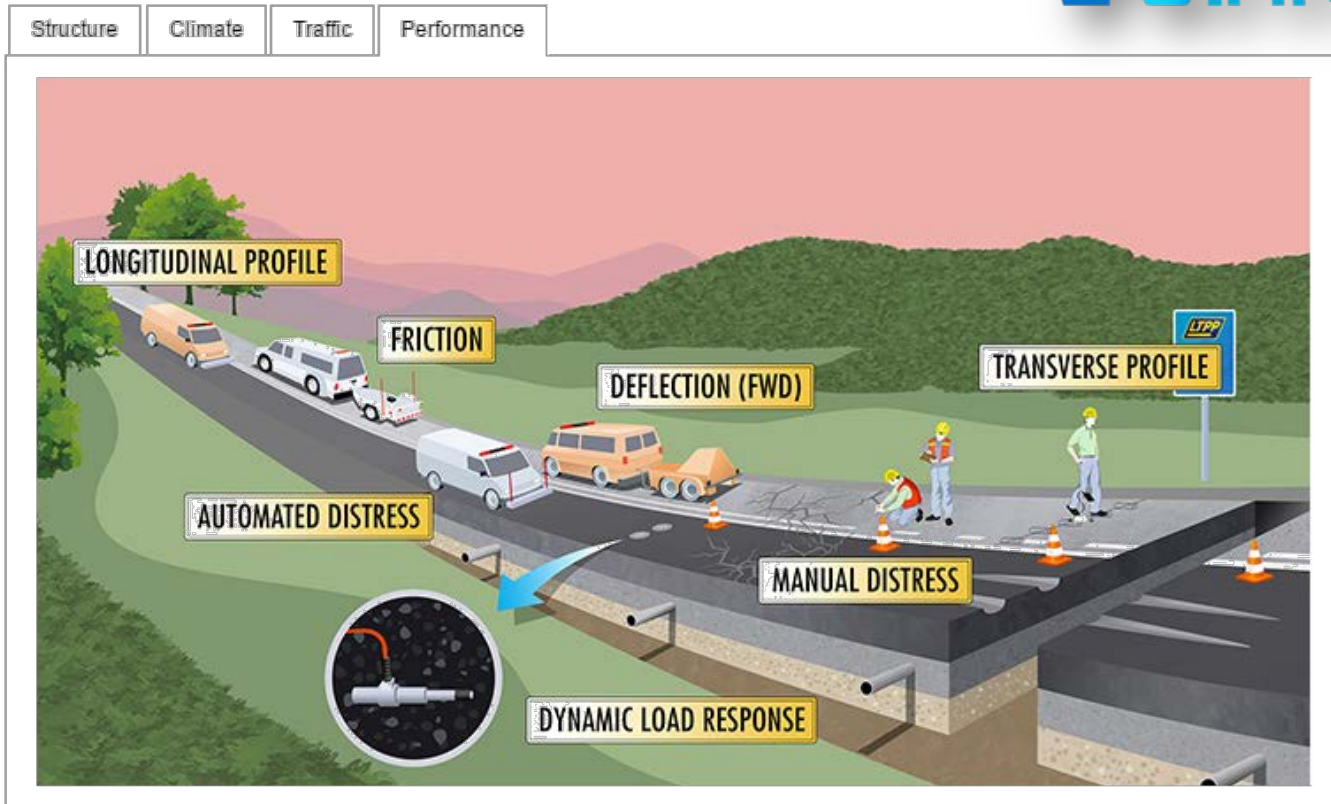


LTPP InfoPave

- Enhance Access and Understanding
- Improve Utilization
- Disseminate Information



LTPP DATA VISUALIZATION



Home: Getting Started

[HOME](#) [SEARCH](#) [MAP](#) [DATA](#) [ANALYSIS](#) [VISUALIZATION](#) [TOOLS](#) [LIBRARY](#) [HELP](#) [MY LTPP](#) [NON-LTPP](#)

Announcements

- SPS-10 Presentations on Pavements/Materials
- Interactive LTPP Data
- LTPP InfoPave Showcased at the Transportation Data Palooza
- EDC News Gives Publicity to Recruitment of LTPP SPS-10 Project
- Delaware Hosts SPS-2 Concrete Tech Day on April 9, 2014

[View LTPP Sections by Location](#)

[View LTPP Data by Location](#)

[How to Locate Sections?](#)

[Geospatial Analysis](#)

Search



Map



Data



Analysis



New

Visualization



Tools



Introduction to LTPP InfoPave



Find Sections: Advanced Filters

Find Sections ?

General

- Age
- Experiment Type
- Study
- Section
- Monitoring Status
- Location
- Maintenance and Rehabilitation
- Roadway Functional Class

Structure

- Surface Type
- Base Type
- Subgrade Type

Climate

- Climatic Region
- Freezing Index (Annual)
- Precipitation (Annual)
- Temperature (Annual)

Traffic

- Avg. Annual Daily Traffic (AADT)
- Avg. Annual Daily Truck Traffic (AADTT)

Performance

- Deflection (9-kip, wheel path)
- Fatigue Cracking
- Faulting
- Longitudinal Cracking
- Longitudinal Profile (IRI)
- Transverse Cracking
- Transverse Profile

Experiment Type

Selects sections by LTPP defined Experiment Type (at any time during section monitoring period)

Selects sections by latest corresponding LTPP defined Experiment Type

Basic Advanced

Please select options from the

- GPS-1 - Asphalt Concrete
- GPS-2 - Asphalt Concrete
- GPS-3 - Jointed Plain Conc
- GPS-4 - Jointed Reinforced
- GPS-5 - Continuously Rein

Experiment Type

Selects sections by LTPP defined Experiment Type (at any time during section monitoring period)

Basic **Advanced**

Please drag filter options from the list below:

- GPS-1 - Asphalt Concrete on Un-bound Granular Base
- GPS-3 - Jointed Plain Concrete Pavement (JPCP)
- GPS-4 - Jointed Reinforced Concrete Pavement (JRCP)
- GPS-5 - Continuously Reinforced Concrete Pavement (CRCP)
- GPS-6A - Existing AC Overlay on AC Pavement
- GPS-6C - AC Overlay with Modified Asphalt Cement on AC Pavement, No Milling
- GPS-6D - Multiple AC Overlays with Conventional Asphalt Cement on AC Pavement, No Milling
- GPS-6S - AC Overlay on AC Pavement with Milling and/or Fabric

OR: Include any of the selected filter options

- GPS-2 - Asphalt Concrete on Bound Base
- GPS-6B - AC Overlay with Conventional Asphalt Cement on AC Pavement, No Milling

AND: Include all of the selected filter options

GPS-2 - Asphalt Concrete on Bound Base

GPS-6B - AC Overlay with Conventional Asphalt Cement on AC Pavement, No Milling

Apply **Cancel**

Map: Locate Sections

Find Sections ?

General

- Age
- Experiment Type
- Study
- Section
- Monitoring Status
- Location
- Maintenance and Rehabilitation
- Roadway Functional Class

Structure

- Surface Type
- Base Type
- Subgrade Type

Climate

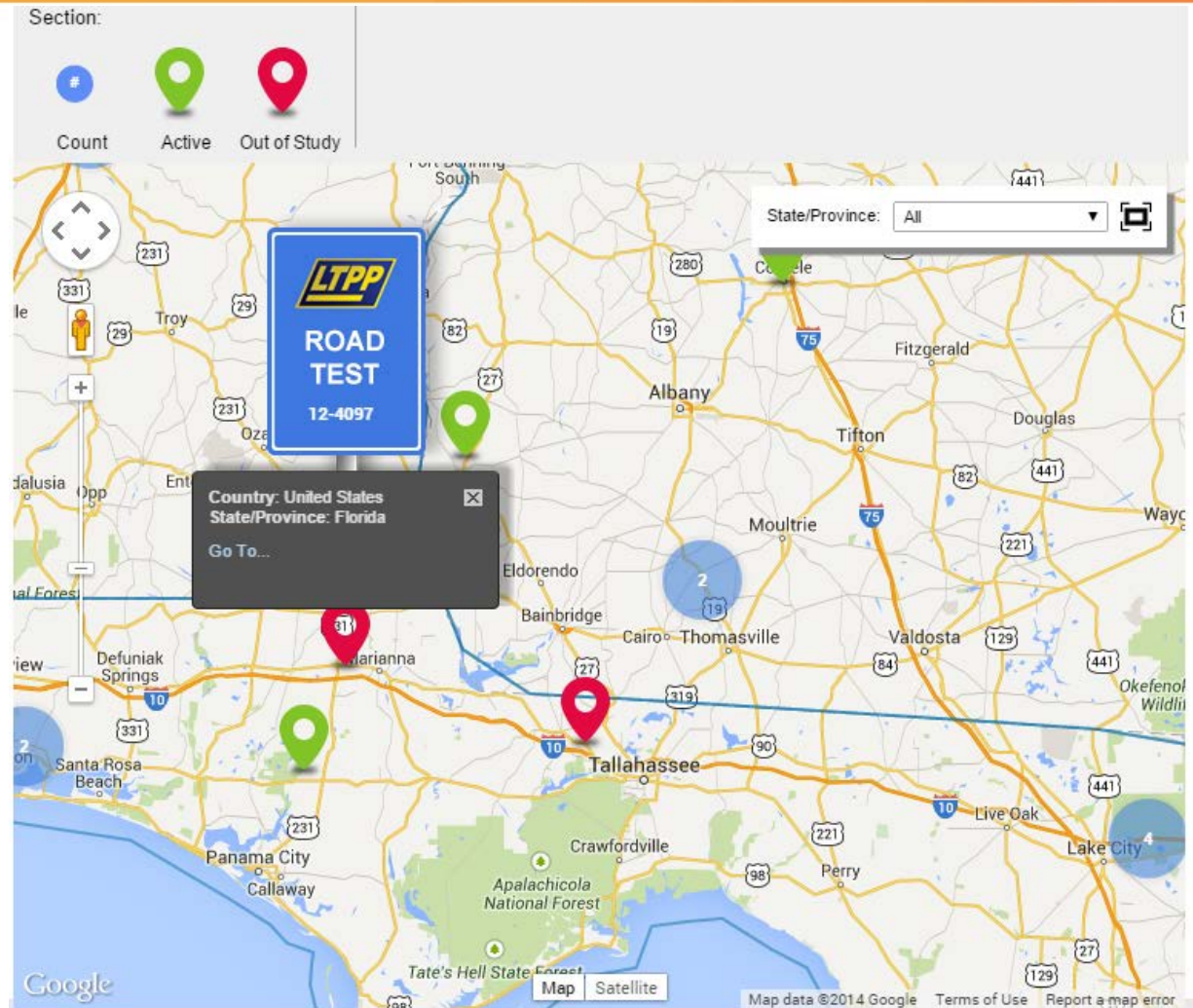
- Climatic Region
- Freezing Index (Annual)
- Precipitation (Annual)
- Temperature (Annual)

Traffic

- Avg. Annual Daily Traffic (AADT)
- Avg. Annual Daily Truck Traffic (AADTT)

Performance

- Deflection (9-kip, wheel path)
- Fatigue Cracking
- Faulting
- Longitudinal Cracking
- Longitudinal Profile (IRI)
- Transverse Cracking
- Transverse Profile



Toggle (Go To...)

Find Sections ? View LTPP Sections by Location Help?

General There are 2509 of 2509 sections currently selected. Show Sections Go To...

Age
 Experiment
 Study
 Section
 Monitoring
 Location
 Maintenance
 Roadway

Structure
 Surface Type
 Base Type
 Subgrade

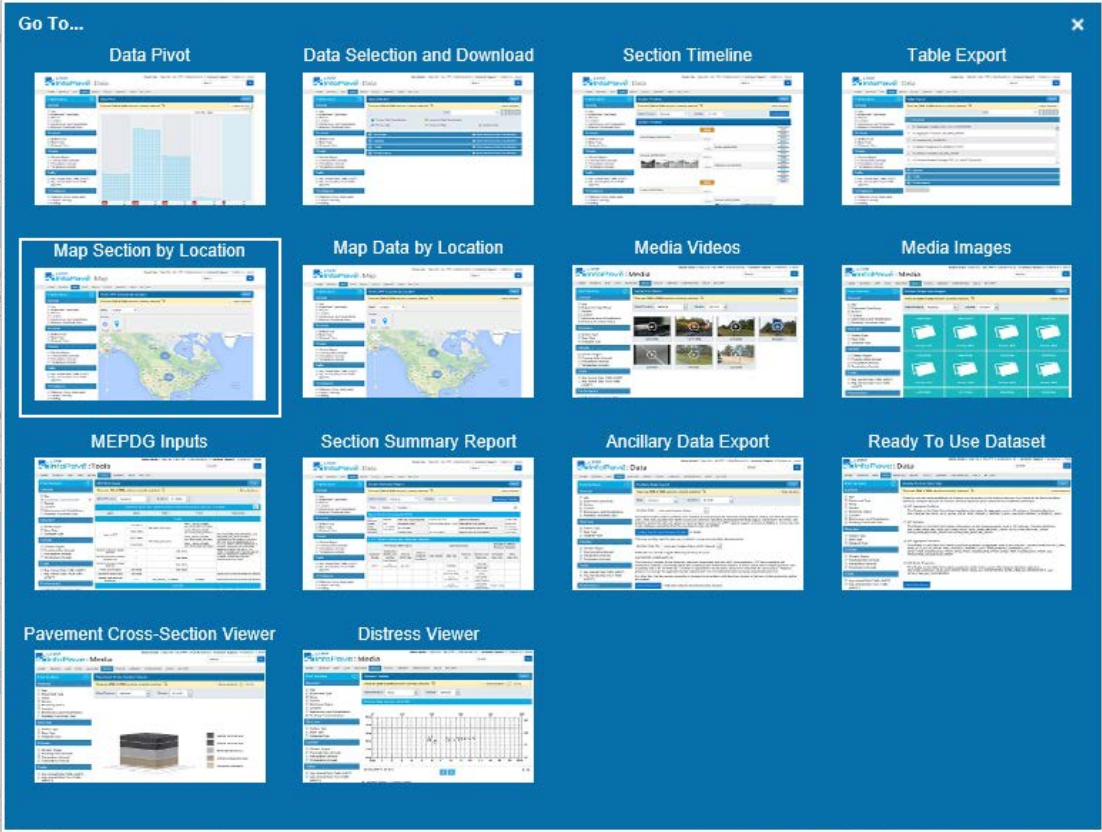
Climate
 Climatic Region
 Freezing Index
 Precipitation
 Temperature

Traffic
 Avg. Annual Daily Traffic
 Avg. Annual Daily Traffic (AADTT)

Performance
 Deflection
 Fatigue Cracking
 Faulting
 Longitudinal Cracking
 Longitudinal Cracking
 Transverse Cracking
 Transverse Profile

Go To...

- Data Pivot
- Data Selection and Download
- Section Timeline
- Table Export
- Map Section by Location
- Map Data by Location
- Media Videos
- Media Images
- MEPDG Inputs
- Section Summary Report
- Ancillary Data Export
- Ready To Use Dataset
- Pavement Cross-Section Viewer
- Distress Viewer



Venezuela
Guyana
Suriname
Colombia

LTPP Data Visualization

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View Inspection Videos

Watch the videos of the LTPP pavement sections collected during the manual distress surveys.

Manual Distress Survey Viewer

New

Pavement Cross-Section Viewer

New

What is LTPP Media?



Access Distress Maps and Images

Want to get a basic section information?

Access Single- and Multi-Section Summary Reports on the selected section(s) with tabulated data and graphs.

Section Timeline

Updated

Data Pivot

Pavement Cross-Section Viewer

Find Sections ?

General

- Age
- Experiment Type
- Study
- Section
- Monitoring Status
- Location
- Maintenance and Rehabilitation
- Roadway Functional Class

Structure

- Surface Type
- Base Type
- Subgrade Type

Climate

- Climatic Region
- Freezing Index (Annual)
- Precipitation (Annual)
- Temperature (Annual)

Traffic

- Avg. Annual Daily Traffic (AADT)
- Avg. Annual Daily Truck Traffic (AADTT)

Performance

- Deflection (9-kip, wheel path)
- Fatigue Cracking
- Faulting
- Longitudinal Cracking
- Longitudinal Profile (IRI)
- Transverse Cracking
- Transverse Profile

Pavement Cross-Section Viewer Help?

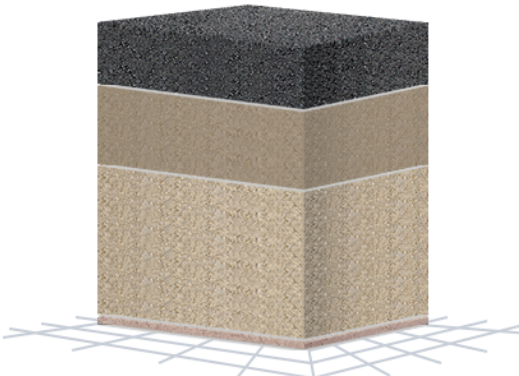
There are 2509 of 2509 sections currently selected. + Show Sections Go To...

State/Province: Florida Section: 12-0901

Monitoring Status: Out of Study

Construction No: 1 📅 06/01/1963

Construction Description: ▪ Date Constructed




Click layer type below for more information.

- Asphalt concrete layer (7.1")
- Unbound (granular) base (10.8")
- Unbound (granular) subbase (24")
- Subgrade (untreated)

Age (Years)

0 11 22 33 44



Construction Number (CN)

Age: 33.17 Year(s)

Construction No: 2

Description: ▪ Mill Off AC and Overlay with AC (sq. yards)

Section Timeline

Find Sections ?

General

- Age
- Experiment Type
- Study
- Section
- Monitoring Status
- Location
- Maintenance and Rehabilitation
- Roadway Functional Class

Structure

- Surface Type
- Base Type
- Subgrade Type

Climate

- Climatic Region
- Freezing Index (Annual)
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Traffic

- Avg. Annual Daily Traffic (AADT)
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Performance

- Deflection (9-kip, wheel path)
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- Longitudinal Profile (IRI)
- Transverse Cracking
- Transverse Profile

Section Timeline Help?

There are 2509 of 2509 sections currently selected. Show Sections Go To...

State/Province: Section:

Traffic: Average Daily Volume Days of Data Average Daily Percent Truck
Climate: Precipitation Temperature Humidity Wind
Construction: Construction No

Section Timeline View by: All

The visualization shows a vertical timeline with years from 1991 to 2012. Data points are clustered around 2011 and 2012. In 2012, there are two main data points: 'Profile' on Feb 25 and 'Distress' on Mar 31. In 2011, there is a 'Climate' data point on Jan 01. In 2012, there is another 'Climate' data point on Jan 01. Each data point has a pop-up window with details and a 'View Data' link. The 'Profile' window shows 'Profile data collected.' The 'Distress' window shows four images of road distress. The 'Climate' windows show 'Climate data captured.'

6/4/2015

9th International Conference on Managing
Pavement Assets | May 18-21, 2015

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Access LTPP Data

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Section Summary Reports

Want to get a basic section information?

Access Single- and Multi-Section Summary Reports on the selected section(s) with tabulated data and graphs.

Updated

Data Selection and Download

Updated

How to View LTPP Data?



Standard Data Release

Updated

Ancillary Data Selection and Download

New

Visual Data Selection and Download

New

Table Export

Updated

SQL Export

Updated

Ready to Use Data Sets

Data Analysis/ Operations Feedback

New

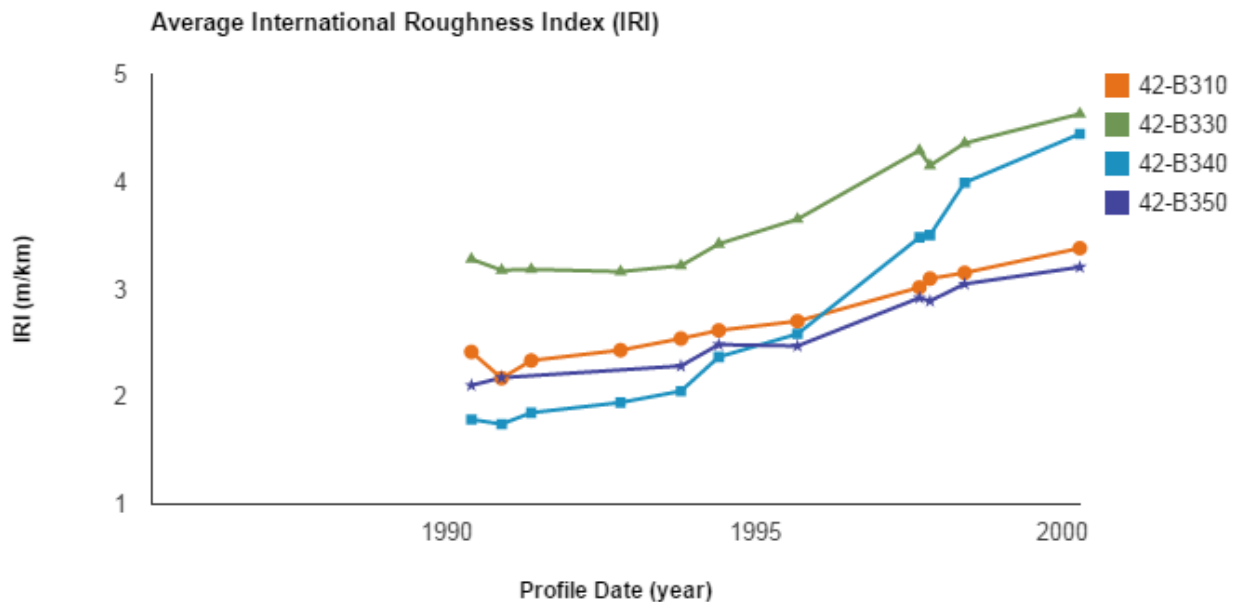
Section Summary Report

Data

Graphs

+ Average Annual Freezing Index

- Average International Roughness Index (IRI)



+ Total Area of AC Fatigue Cracking

Data Selection and Download

Find Sections ?

General

Age
30 - 55 (years)

Experiment Type
 Study
 Section
 Monitoring Status
 Location
 Maintenance and Rehabilitation
 Roadway Functional Class

Structure

Surface Type (1)
 Base Type
 Subgrade Type

Climate

Climatic Region
 Freezing Index (Annual)
 Precipitation (Annual)
 Temperature (Annual)

Traffic

Avg. Annual Daily Traffic (AADT)
 Avg. Annual Daily Truck Traffic (AADTT)

Performance

Deflection (9-kip, wheel path)
 Fatigue Cracking
 Faulting
 Longitudinal Cracking
 Longitudinal Profile (IRI)

Data Selection and Download Help? Help Tour

There are 730 of 2509 sections currently selected. Total 2 filters are selected. + Show Sections Go To...

Find:

Primary Data Classification
 Primary Data

Advanced Data Classification
 Advanced Data

+ Structure Show Data Sources Show Advanced Data Classification

+ Climate Show Data Sources Show Advanced Data Classification

+ Traffic Show Data Sources Show Advanced Data Classification

- Performance Show Data Sources Show Advanced Data Classification

Collapse All

- Automated Distress
 - AC
 - JF Automated Distress
 - CRCP
 - Deflection
 - Deflection Data
 - Temperature Data
 - Equipment Data
 - Surface Characteristics
 - Longitudinal Profile (IRI)
 - Transverse Profile
 - Friction
- Manual Distress
 - AC
 - JPCP
 - CRCP
- Dynamic Load Response (DLR)
 - North Carolina
 - Ohio

Data Attributes Basic Additional All

AC PADIAS Distress Survey Ratings (72 Sections)

- High Severity Transverse Crack Length (m)
- Water Bleeding And Pumping Number
- Water Bleeding And Pumping Length (m)
- High Severity Patches Area (sq m)
- Low Severity Transverse Cracks Number
- Medium Severity Patches Area (sq m)
- Record Status
- High Severity Wheel Path Longitudinal Crack Length (m)
- Medium Severity Wheel Path Longitudinal Crack Length (m)
- Medium Severity Transverse Crack Length (m)
- Low Severity Wheel Path Longitudinal Crack Length (m)

Interactive Help (Guided Tour)

Data Classification

After finding your desired sections, you can select your required data nodes under Structure, Climate, Traffic, and Performance categories. This data classification is organized according to primary and advanced data. The legend key on top, describes the type of data classification.

Previous

Next

End Tour

Avg. Annual Daily Truck Traffic (AADTT)

Performance

- Deflection (9-kip, wheel path)
- Fatigue Cracking
- Faulting
- Longitudinal Cracking
- Longitudinal Profile (IRI)
- Transverse Cracking
- Transverse Profile

Structure

Show Advanced Data Classification

Collapse All

- General Section Information
 - Section Experiment Type and Improvement (M&R) History
 - Compiled Section Data (Layout and Structure History)
 - GPS Coordinates
 - Age (Inventory)
- Pavement Structure (Representative Structure and Related Data Sources)
 - Representative Pavement Structure (Section Level)
- Material - Layer Properties and Field Sampling (Test, M&R, Inventory)
 - AC
 - PCC
 - Bound Base/Subbase
 - Unbound Base/Subbase
 - Unbound Base/Subbase and Subgrade (Applied To Both)
 - Subgrade
 - Surface Treatments
- Feature - Drainage, Joints, Shoulder, Reinforcement (Monitored, M&R, Experiment Specific, Inventory)
 - Joints
- Maintenance and Rehabilitation (M&R)
 - Improvement (M&R) Details
 - AC Treatments
 - PCC Treatments
 - Joint Seal
 - Patching
 - Grinding, Milling, Grooving

Add to Selection

Climate

Show Advanced Data Classification

APPLICATION SAMPLES

- *Sample Application 1:* IRI trends following various rehabilitation treatments on AC
- *Sample Application 2:* Cracking trends on JPCP pavements with various structural properties
- *Sample Application 3:* Comparison of AC pavement profiles following various maintenance treatments
- *Sample Application 4:* Evaluation of pavement structural condition using available FWD deflection data

www.InfoPave.com: Help → Application Samples

Problem Statement #1

Objective: Investigate effects of rehabilitation treatments on flexible pavement performance using International Roughness Index (IRI) data

Approach: compare IRI trends on various sections of one SPS-5 site

Selection Criteria:

- SPS-5 experiment
- AADTT < 1000 trucks/day
- Wet-no freeze climatic zone

Downloaded Data

| | A | B | C | D | E | F | J | K | L |
|----|------------|---------|-----------------|--------------|--------------|------------|---------------------|----------------------|-------------|
| 1 | STATE_CODE | SHRP_ID | CONSTRUCTION_NO | PROFILE_DATE | PROFILE_TIME | RUN_NUMBER | IRI_LEFT_WHEEL_PATH | IRI_RIGHT_WHEEL_PATH | IRI_AVERAGE |
| 2 | 40 | 0509 | 2 | Jan/14/1998 | 16:46:05 | 3 | 1.073 | 0.745 | 0.909 |
| 3 | 40 | 0509 | 2 | Jan/14/1998 | 17:10:55 | 6 | 1.075 | 0.762 | 0.918 |
| 4 | 40 | 0509 | 2 | Jan/14/1998 | 18:55:00 | 5 | 1.073 | 0.745 | 0.909 |
| 39 | 40 | 0503 | 3 | Jan/04/2001 | 12:32:2 | 16 | 1.098 | 0.887 | 0.992 |
| 41 | 40 | 0509 | 3 | Jan/04/2001 | 12:56:2 | 16 | 1.025 | 0.842 | 0.933 |

EXPERIMENT_SECTION: TST_L05B TRF_MON_EST_ESAL: MON_PROFILE_MASTER Table Reference Field Reference Codes Reference

Ready

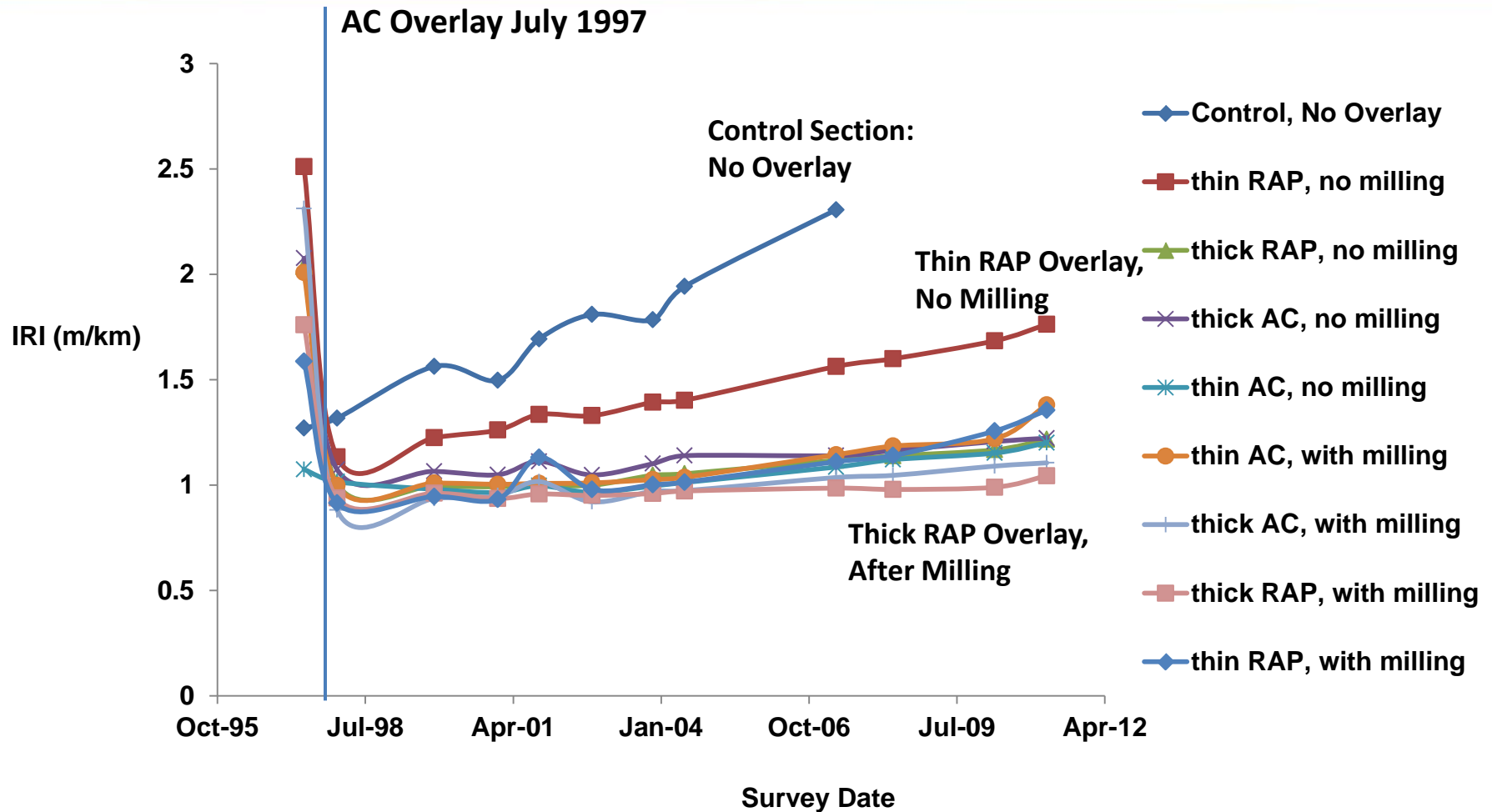
| G | H | I | J | M |
|-----------|---------|------------------------------------|---------|--|
| POINT_LOC | LANE_NO | LANE_NO_EXP | DROP_NO | DROP_HEIGHT_EXP |
| 0 | F1 | Flexible pavement mid lane | 1 | Drop height position 1, target load 27KN (6kips) - 380kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 2 | Drop height position 1, target load 27KN (6kips) - 380kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 3 | Drop height position 1, target load 27KN (6kips) - 380kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 4 | Drop height position 1, target load 27KN (6kips) - 380kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 13 | Drop height position 4, target load 71KN (16kips) - 1000kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 14 | Drop height position 4, target load 71KN (16kips) - 1000kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 15 | Drop height position 4, target load 71KN (16kips) - 1000kpa for standard |
| 0 | F1 | Flexible pavement mid lane | 16 | Drop height position 4, target load 71KN (16kips) - 1000kpa for standard |
| 0 | F3 | Flexible pavement outer wheel path | 1 | Drop height position 1, target load 27KN (6kips) - 380kpa for standard |
| 0 | F3 | Flexible pavement outer wheel path | 2 | Drop height position 1, target load 27KN (6kips) - 380kpa for standard |

Rehabilitation Treatments Data

the SPS-5 site in Oklahoma

| Section | Surface Preparation | Overlay Materials | Overlay Thickness |
|---------|---------------------|-------------------|-------------------|
| 0501 | Control Section | No Overlay | No Overlay |
| 0502 | None | Recycled | 1.7" |
| 0503 | None | Recycled | 4.5" |
| 0504 | None | Virgin | 4.4" |
| 0505 | None | Virgin | 1.8" |
| 0506 | Milling | Virgin | 3.8" |
| 0507 | Milling | Virgin | 6.3" |
| 0508 | Milling | Recycled | 6.3" |
| 0509 | Milling | Recycled | 3" |

IRI Trends on SPS-5 in Oklahoma



Sample Application Findings

On Oklahoma SPS-5 site:

- Milling existing pavement surface resulted in more effective treatments in reducing the IRI
- Thicker overlays resulted in lower IRI increase rates
- Thin overlay with recycled asphalt pavement and without milling had the highest rate of increase in IRI
- There is no difference between the performance of overlays with recycled and virgin asphalt materials

Problem Statement #2

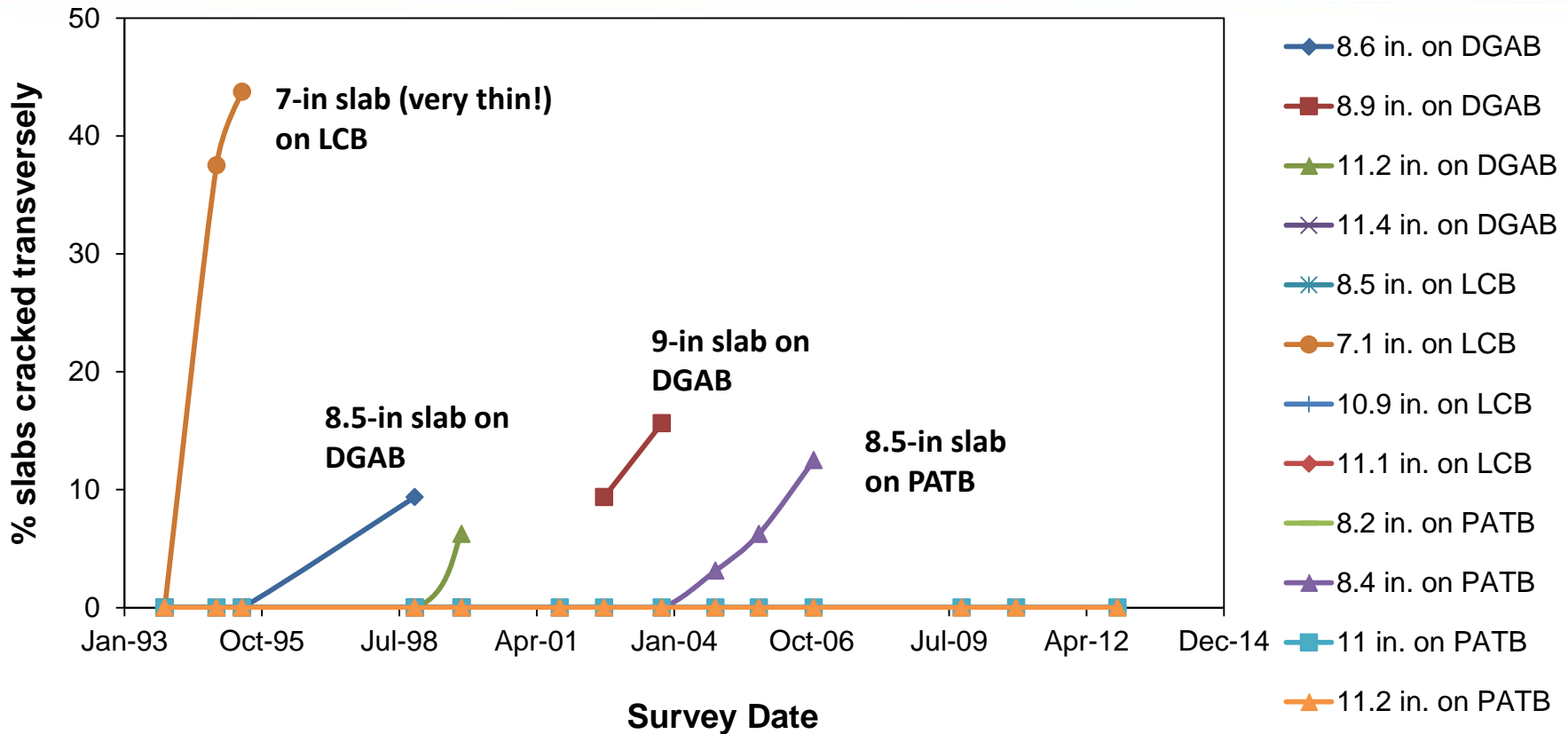
Objective: Investigate effects of structural factors on performance of jointed concrete pavements

Approach: compare cracking, faulting and IRI trends on various sections of one SPS-2 site

Selection Criteria:

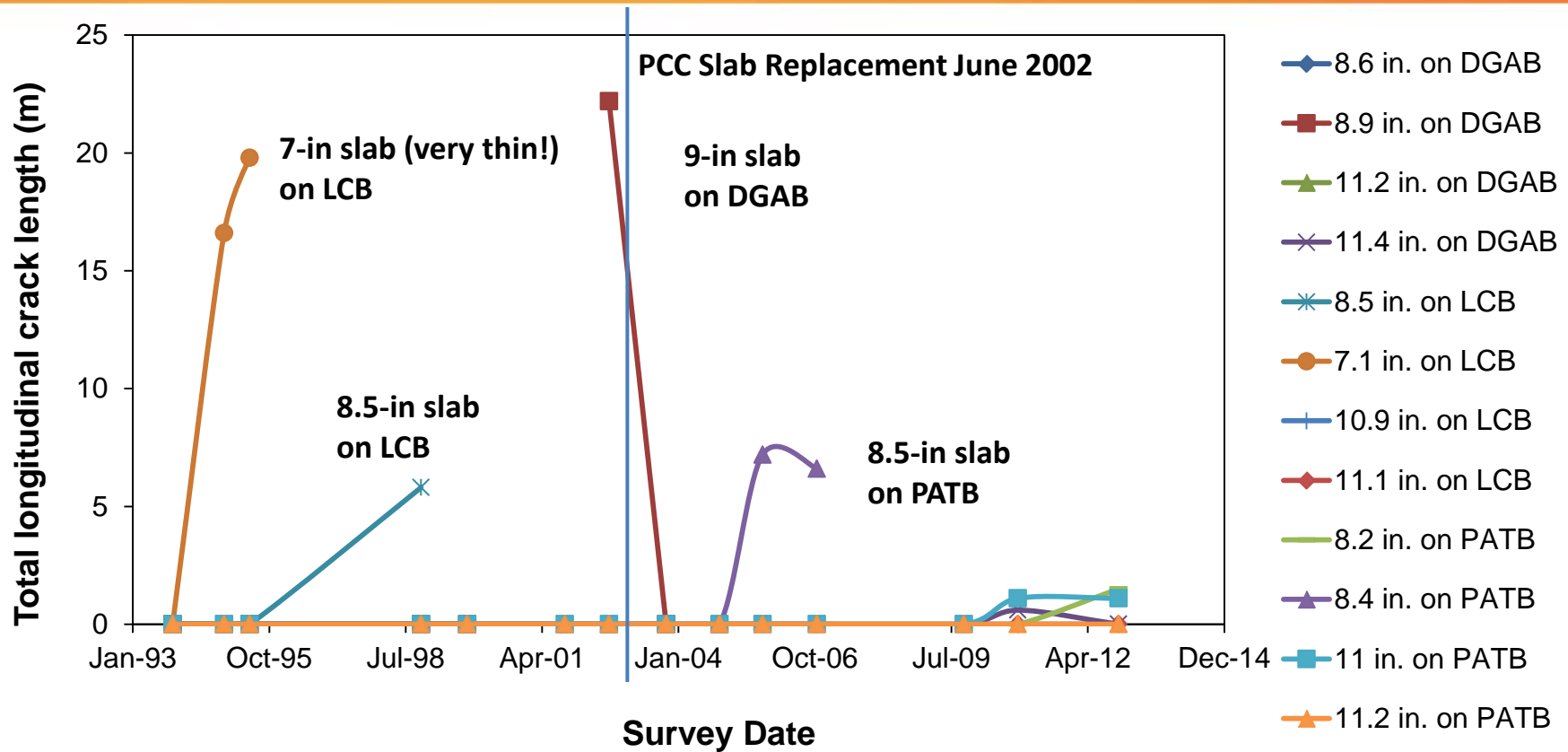
- SPS-2 experiment
- AADTT > 2000 trucks/day
- Wet-freeze climatic zone

% Slabs Cracked Transversely (SPS-2 Michigan)



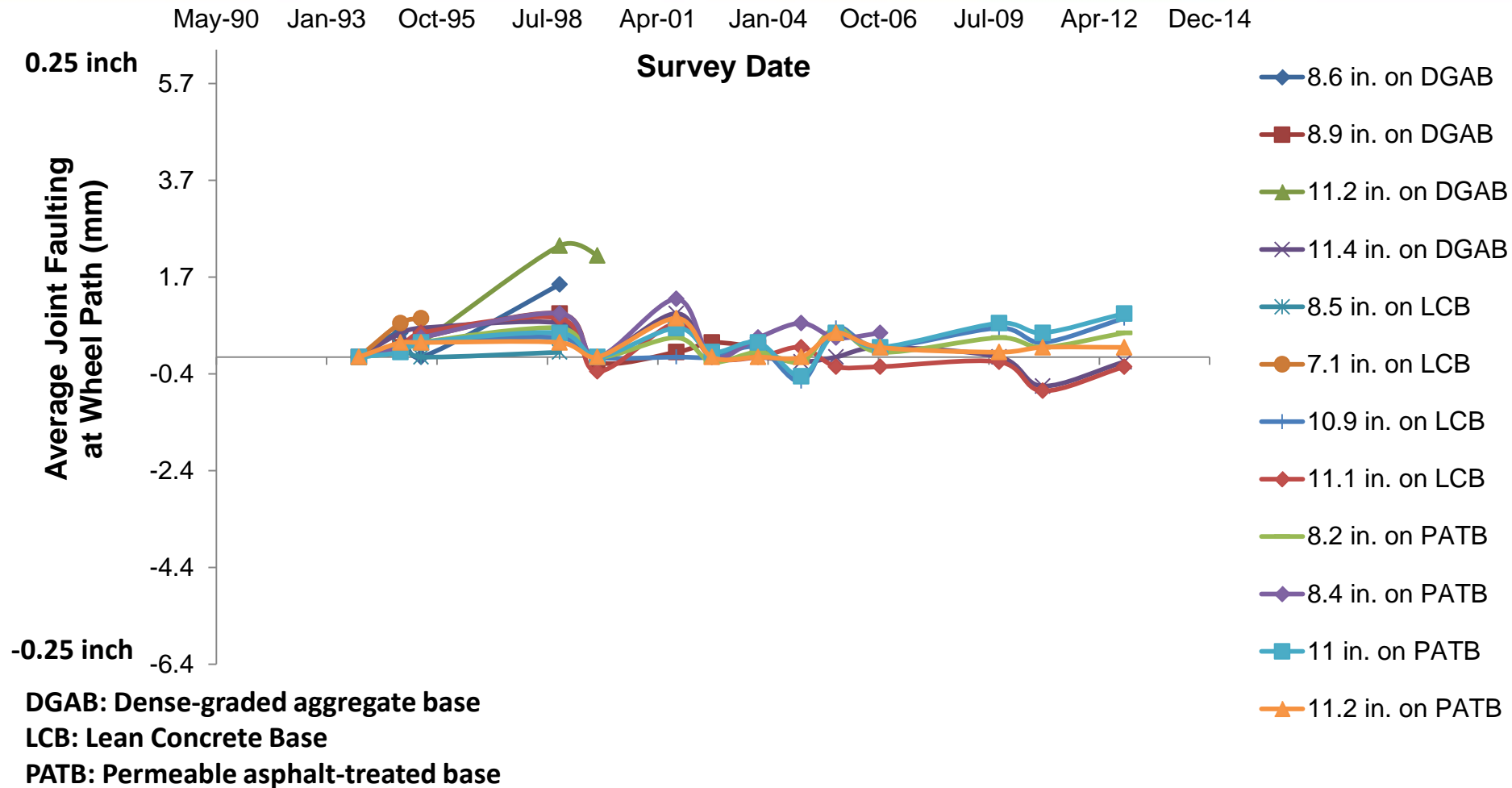
DGAB: Dense-graded aggregate base
 LCB: Lean Concrete Base
 PATB: Permeable asphalt-treated base

Longitudinal Crack Length (SPS-2 Michigan)

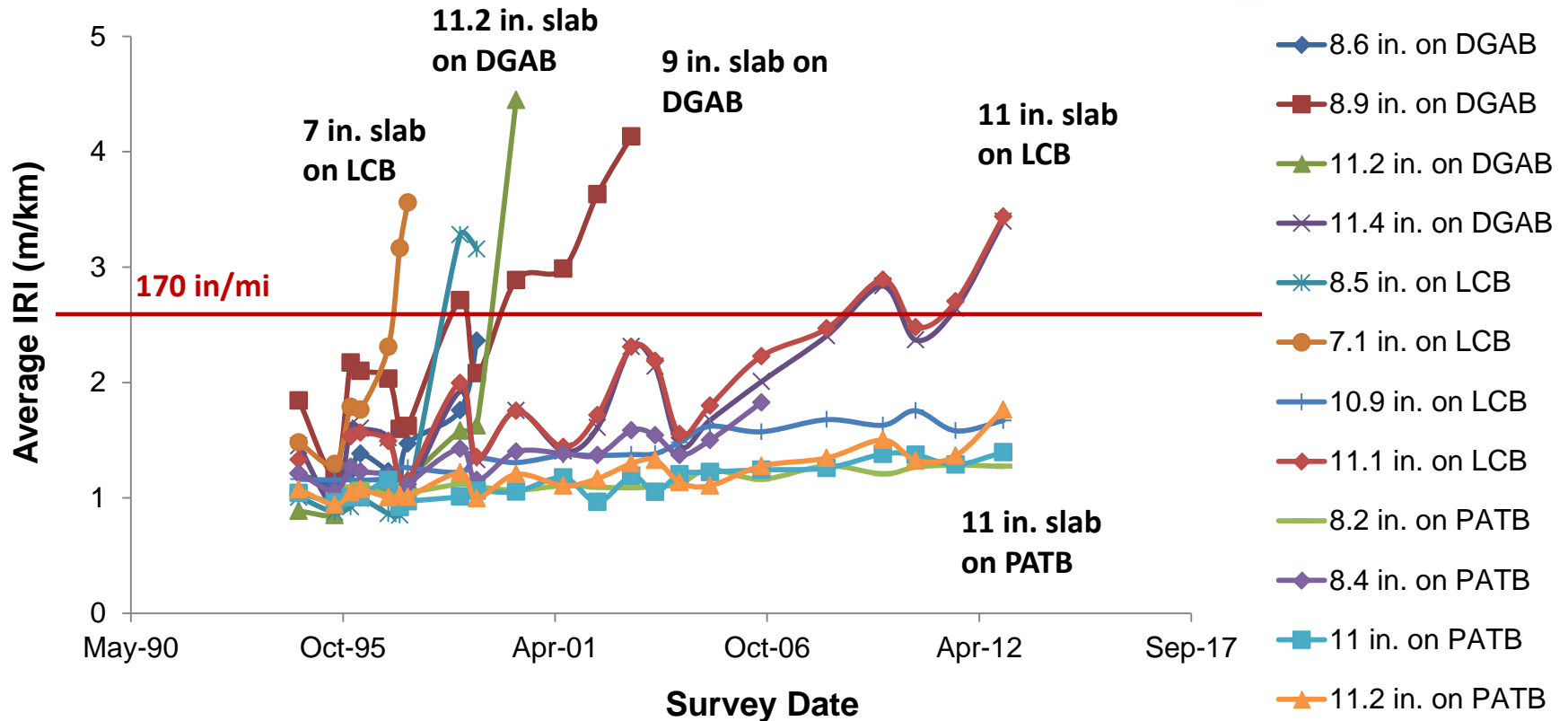


DGAB: Dense-graded aggregate base
 LCB: Lean Concrete Base
 PATB: Permeable asphalt-treated base

Faulting (SPS-2 Michigan)



IRI (SPS-2 Michigan)



DGAB: Dense-graded aggregate base
 LCB: Lean Concrete Base
 PATB: Permeable asphalt-treated base

Sample Application Findings

On Michigan SPS-2 site:

- The very thin slab (7") has exhibited higher amount of transverse and longitudinal cracking
- Base type does not seem to have affected amount of cracking
- The amount of faulting is negligible (less than 1/8") on all sections
- Drainage in asphalt treated bases has reduced the amount of roughness compared to other types of base layers

EXTRACTING INFORMATION OUT OF LTPP DATA

- Proposed MAP-21 requirements
 - Establish performance targets
 - Develop a data quality management program
- Develop pavement performance models
- Set performance-based pay adjustment factors
- Evaluate effectiveness of maintenance and rehabilitation
- Generate the inputs for AASHTOWare Pavement ME Design Software

DISCUSSION

1. Any other suggestions to facilitate data visualization?
2. How to help new users get familiar with the website?
 - [www.InfoPave.com](http://www.infopave.com): Help → How To Videos
 - [www.InfoPave.com](http://www.infopave.com): Help → Application Samples
3. Other problems that could be solved using LTPP data?
4. How to provide preliminary evaluations to identify availability of data for specific research topics?

Please submit your feedback at
<http://www.infopave.com/Help/CustomerSupport>
or email to ltppinfo@dot.gov.



InfoPave Help

HOME SEARCH MAP DATA ANALYSIS VISUALIZATION TOOLS LIBRARY **HELP** MY LTPP NON-LTPP

Announcements

- LTPP Program Soliciting WMA Sites in Wet-Freeze Region
- TRB Webinar: LTPP InfoPave™ - Visualization to Facilitate Extraction of Information out of Data
- 2015 T&DI/ASCE-LTPP International Data Analysis Contest
- SPS-10 Presentation at Arizona Pavements/Materials Conference
- Interactive LTPP Data Analysis Strategic Plan

How To...

Presentations

Application Samples

Explore how our users are utilizing LTPP InfoPave to solve pavement engineering problems.

New

Release Notes

Frequently Asked Questions

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Updated

New

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New

New