New Tools that Support Use of Pavement Management Data in Engineering Applications

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Pavement Management Systems are Maturing

- Historical pavement performance data is now available covering multiple pavement rehab cycles
- New Information Technology developments provide enhanced and integrated data analysis capabilities
- Relational databases, network level pavement structural data, and powerful software such as SAS now allow large scale analysis of performance

Historical Performance Data

- Pavement Condition Survey data is available in Florida back to 1976
- This allows pavement rehab cycles to be determined even when not all project data is available
- Changes in Rating Technologies and Policies create challenges in analysis
  - New rating equipment such as lasers replacing ultrasonics
  - Rating scale changes
  - Missing years

New Information Technologies

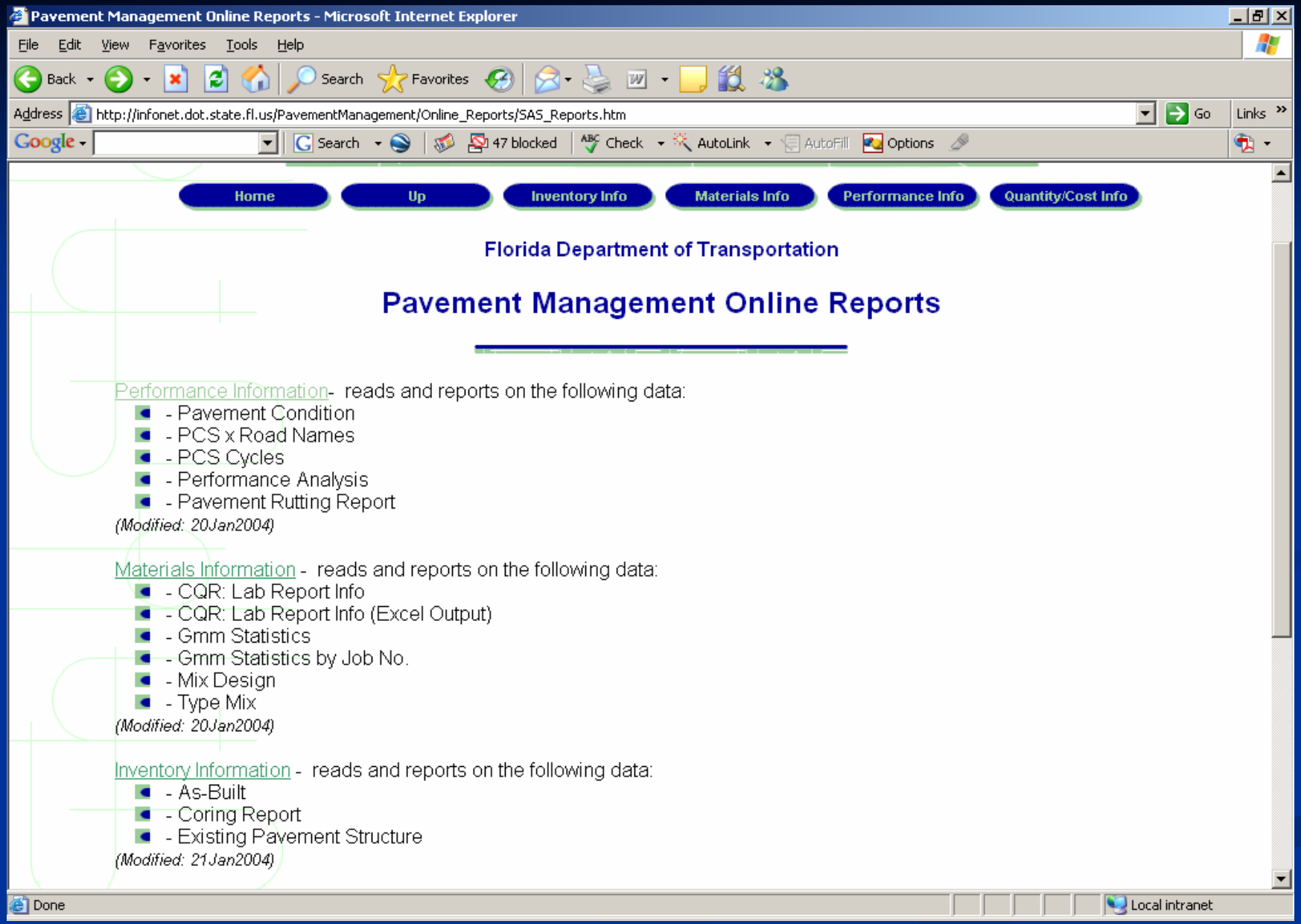
- **Internet and Intranet**
  - Thin client web browsers allow graphical user interfaces with minimal development time and maintenance
  - Internet protocols and tools allow seamless integration of multiple applications
  - Desktop color laser printers provide enhanced reporting capabilities

Relational Databases and Networks make Access to Data faster

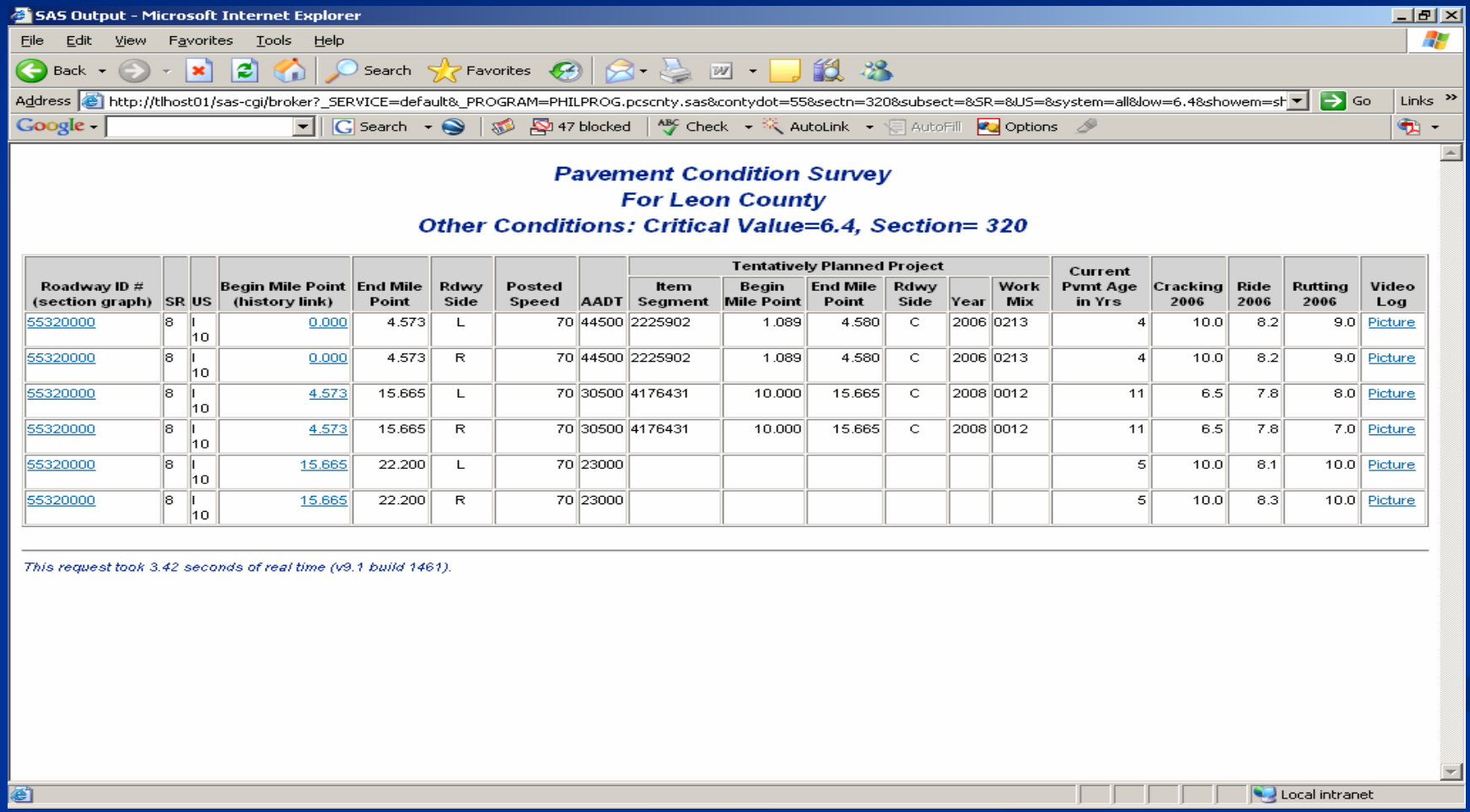
- Intuitive data tables, Structured Query Language (SQL), and SAS software for data manipulation and analysis make development of analysis programs easier
- Additional data now available as more systems are automated and historical data is kept in databases
- High speed networks and integration of mainframe and server applications allow quick analysis of huge volumes on data

Integrated Applications Examples

- Rated Pavement Sections linked to video logs
- Video logs linked to web based GIS maps
- Statewide pavement coring and as-built data linked from Turnpike Enterprise Asset Management System (TEAMS)
- Hidden form elements and XML used to pass parameters between applications


Pavement Management Online Reports - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://infonet.dot.state.fl.us/PavementManagement/Online_Reports/SAS_Reports.htm
Go Links
Google Search 47 blocked Check AutoLink AutoFill Options
Home
Up
Inventory Info
Materials Info
Performance Info
Quantity/Cost Info
Florida Department of Transportation
Pavement Management Online Reports
Performance Information- reads and reports on the following data:
- Pavement Condition
- PCS x Road Names
- PCS Cycles
- Performance Analysis
- Pavement Rutting Report
(Modified: 20Jan2004)
Materials Information - reads and reports on the following data:
- CQR: Lab Report Info
- CQR: Lab Report Info (Excel Output)
- Gmm Statistics
- Gmm Statistics by Job No.
- Mix Design
- Type Mix
(Modified: 20Jan2004)
Inventory Information - reads and reports on the following data:
- As-Built
- Coring Report
- Existing Pavement Structure
(Modified: 21Jan2004)
Done
Local intranet

Rated Pavement Sections performance charts and links to video log



Pavement Condition Survey
For Leon County
Other Conditions: Critical Value=6.4, Section= 320

Roadway ID # (section graph)	SR	US	Begin Mile Point (history link)	End Mile Point	Rdwy Side	Posted Speed	AADT	Tentatively Planned Project						Current Pvmt Age in Yrs	Cracking 2006	Ride 2006	Rutting 2006	Video Log
								Item Segment	Begin Mile Point	End Mile Point	Rdwy Side	Year	Work Mix					
55320000	8	I 10	0.000	4.573	L	70	44500	2225902	1.089	4.580	C	2006	0213	4	10.0	8.2	9.0	Picture
55320000	8	I 10	0.000	4.573	R	70	44500	2225902	1.089	4.580	C	2006	0213	4	10.0	8.2	9.0	Picture
55320000	8	I 10	4.573	15.665	L	70	30500	4176431	10.000	15.665	C	2008	0012	11	6.5	7.8	8.0	Picture
55320000	8	I 10	4.573	15.665	R	70	30500	4176431	10.000	15.665	C	2008	0012	11	6.5	7.8	7.0	Picture
55320000	8	I 10	15.665	22.200	L	70	23000							5	10.0	8.1	10.0	Picture
55320000	8	I 10	15.665	22.200	R	70	23000							5	10.0	8.3	10.0	Picture

This request took 3.42 seconds of real time (v9.1 build 1461).

"Pavement Condition" - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

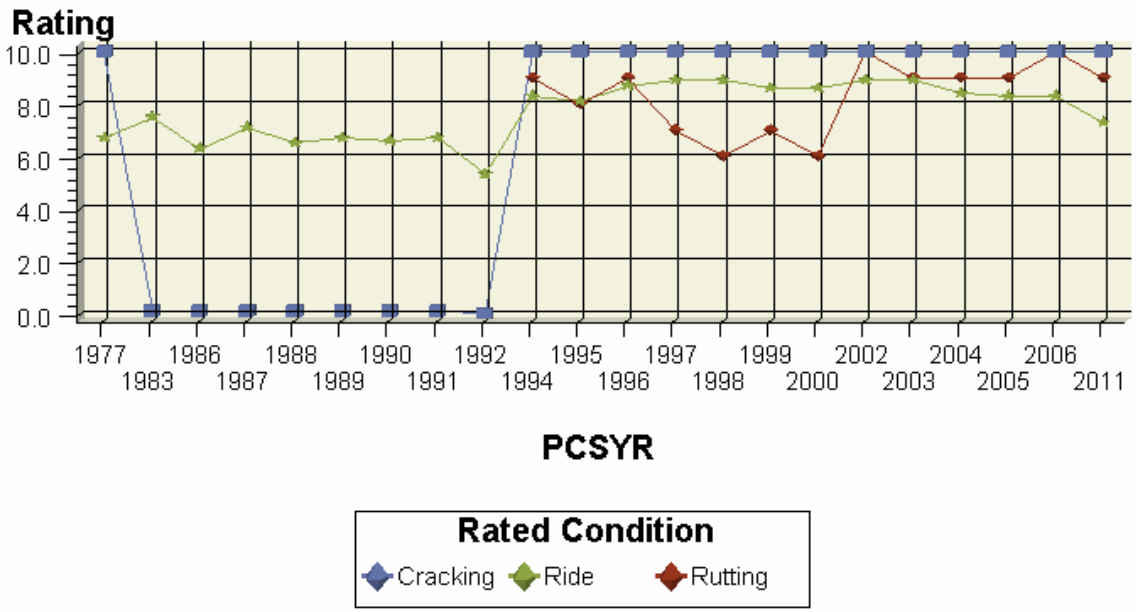
Address http://tlhost01/sas-cgi/broker?_service=default&_program=PHILPROG.pcsdetl.sas&Rdwyid=55320000&bmp=15.665&emp=22.2&rdwy=R&low=6.4&thisyr=2006 Go Links

Google Search 47 blocked Check AutoLink AutoFill Options

Pavement Condition Survey

History for Roadway ID 55320000

Milepoints 15.665 to 22.2, Roadwayside = R



2011 forecast created using simple linear regression.

Right click to access popup menu

Local intranet

Video Log Viewer - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address http://webapp01.dot.state.fl.us/videolog/default.asp Go Links

Google Search Popups okay Check AutoLink AutoFill Options

Video Log Viewer Application

Help

Roadway ID: 55320000 **Dir:** East **Mile Pt:** 16.410 **View:** Front **CD Drive:** No

Search | Map | Click this button to find Video Log for info above

Roadway Name: INTERSTATE 10

Frame Date: 03/28/2005

Frame: 1684

Front Full-sized Frame

Right Full-sized Frame

Frame Backward | Play Backward | Stop | Play Forward | Frame Forward

Play Speed: 1 fps 2 fps 3 fps 4 fps

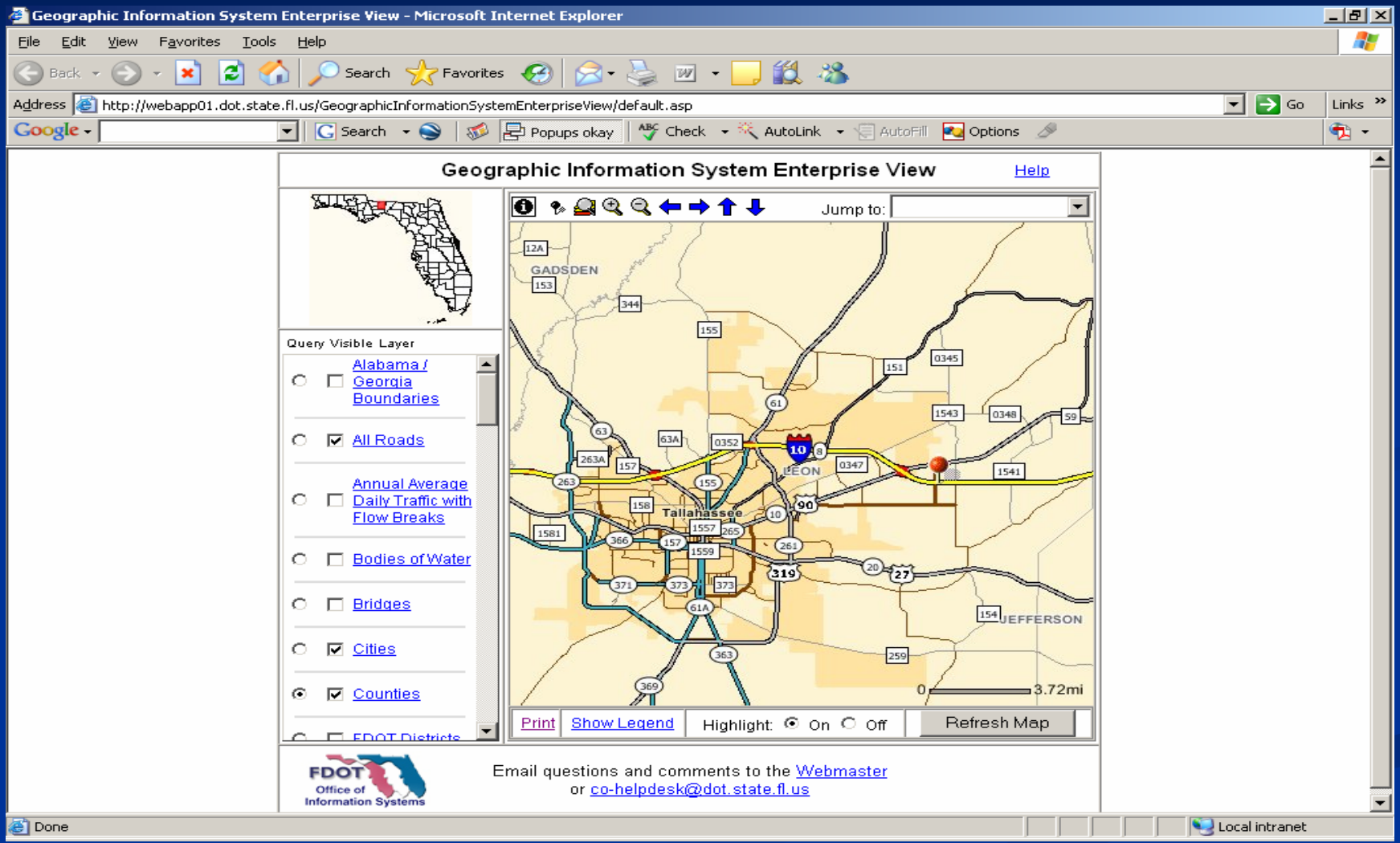
Message: Roadway Segment

FDOT Office of Information Systems

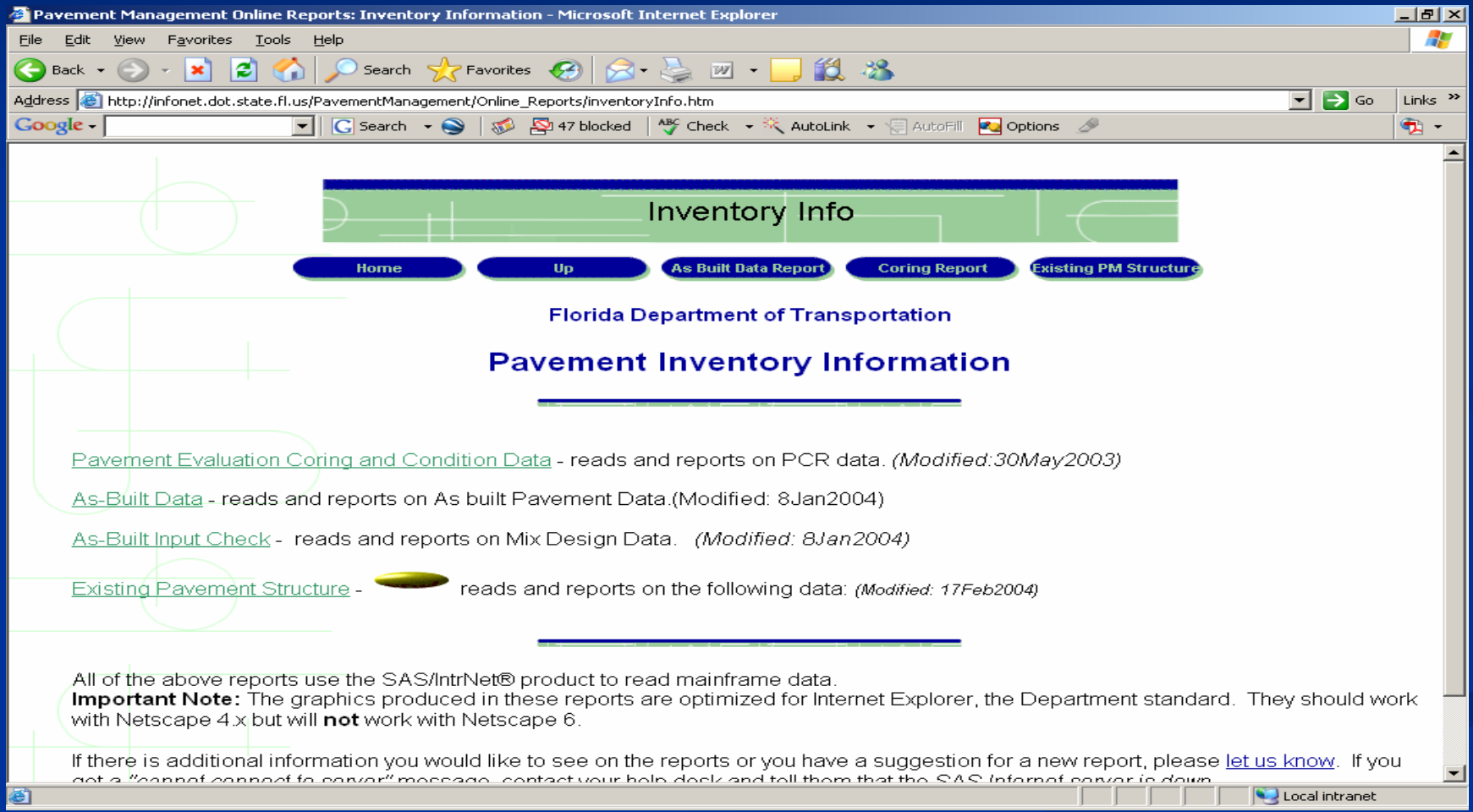
Email questions and comments to the Webmaster
or co-helpdesk@dot.state.fl.us

Local intranet

Video log linked to web based GIS



Pavement Coring and As-built Data

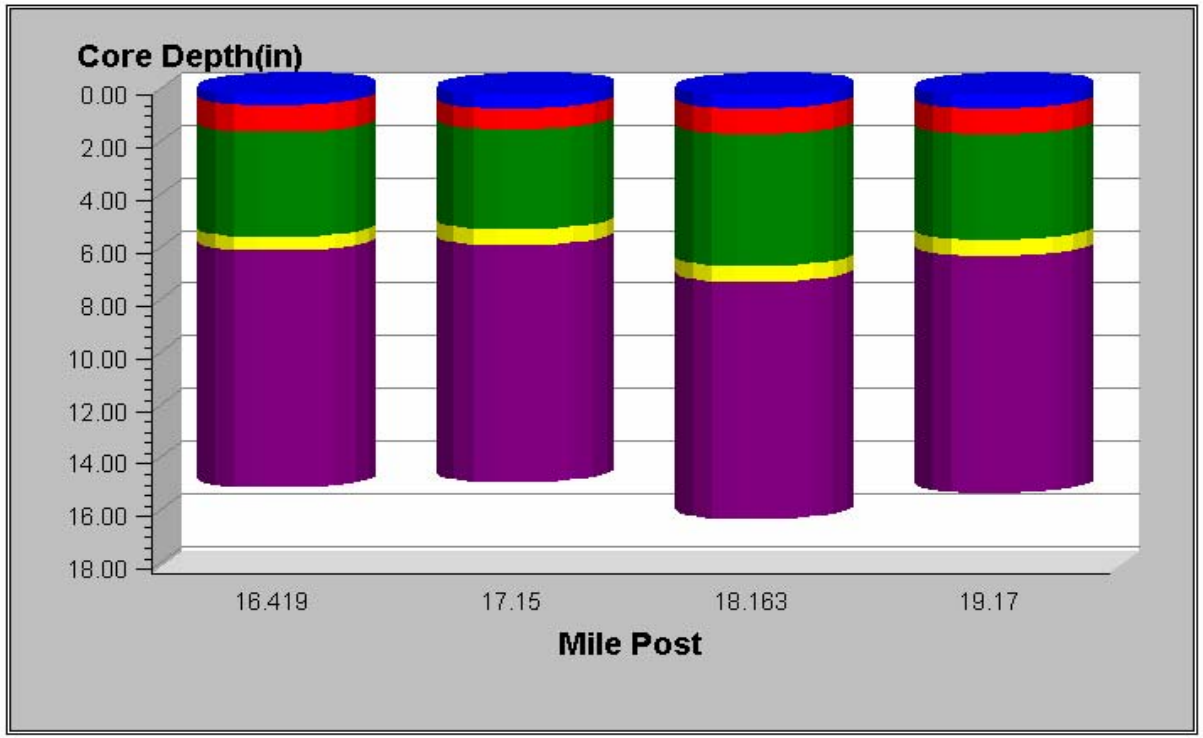


Core Makeup

Project # 222596 -1 -31 -01 / Roadway ID # 55320000

Local Name: "

Lane R2

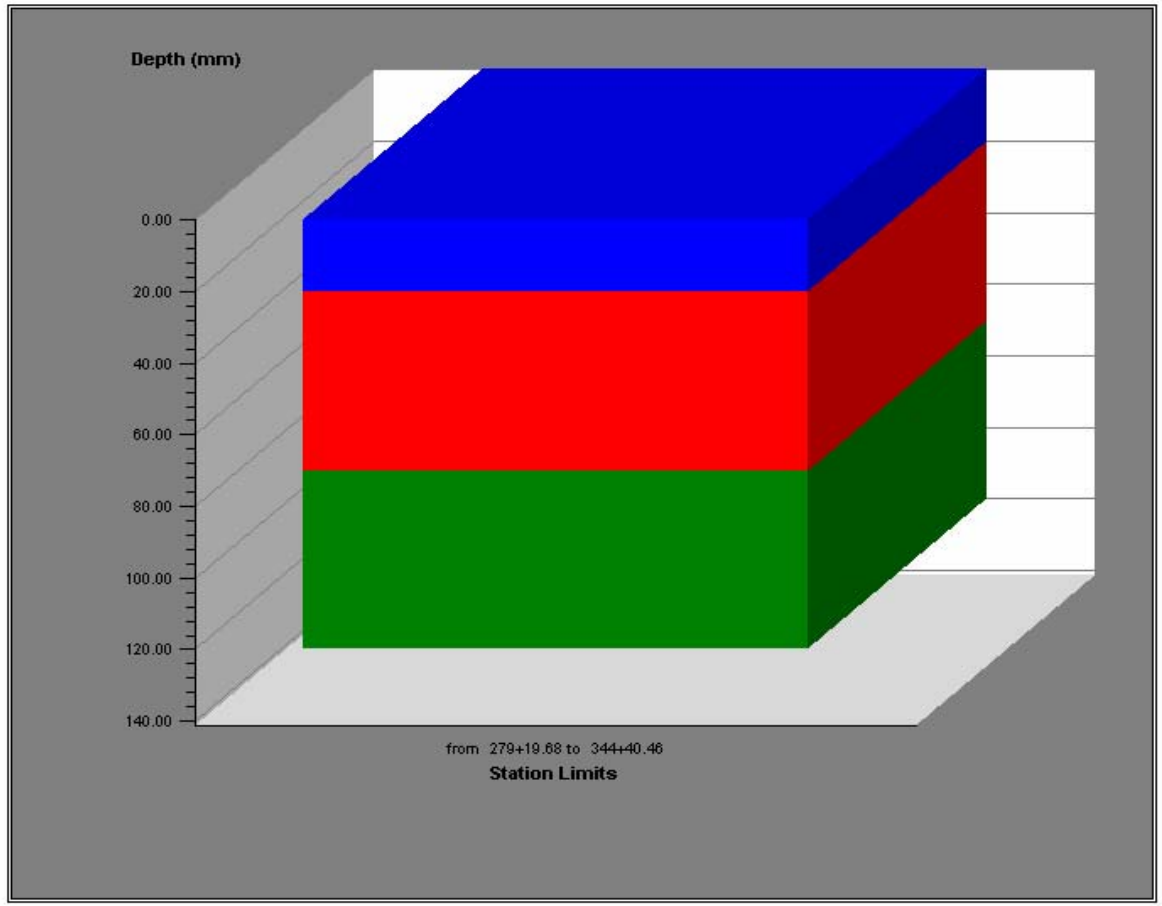


Layer Types

FC2 S3 T2 CRL CONC

Download Graph Data to Excel

As-Built Pavement Structure
Project # 222596-1-52-01 / Roadway ID # ''
Lane R2



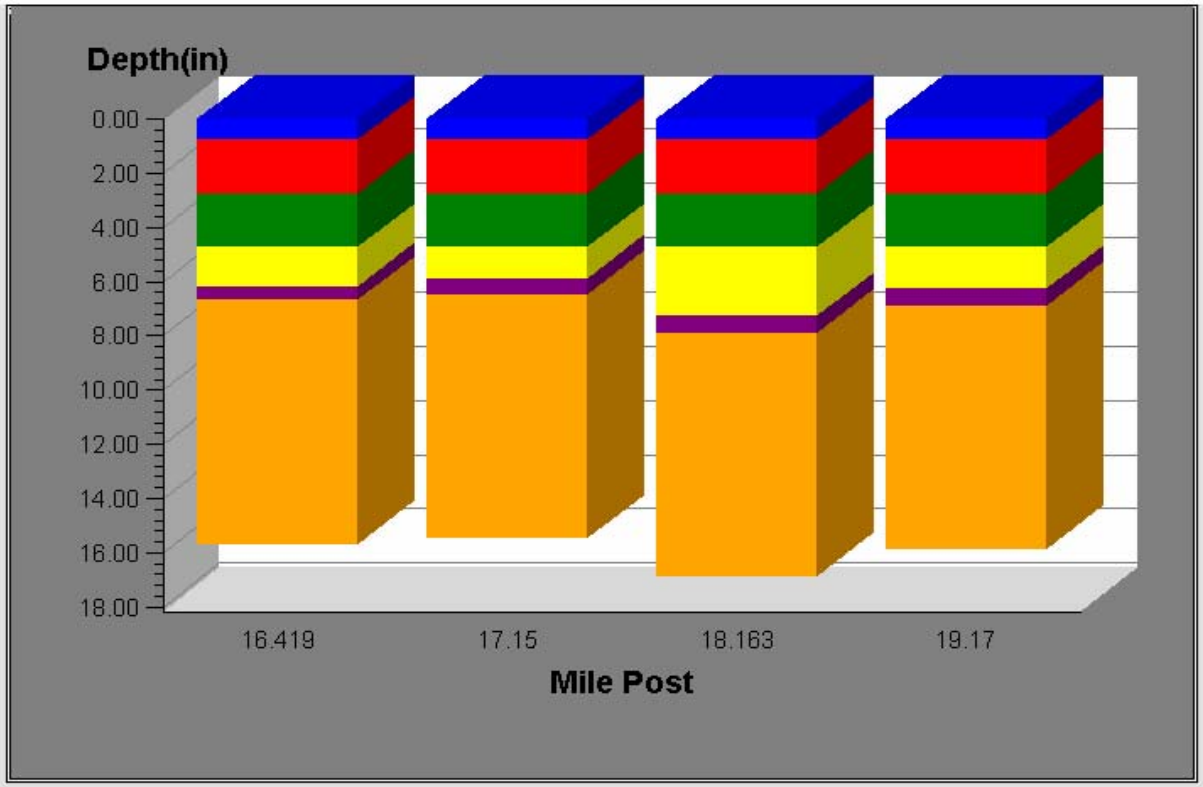
Layer Types

FC5 SP125DM SP125DM

Existing Pavement Structure

Project # 222596 -1 -31 -01 / Roadway ID # 55320000

Lane: R2



Layer Types

FC5 SP125DM SP125DM. T2 CRL CONC

View this projects As-Built report View this projects core report

Download Graph Data to Excel

Statewide pavement inventory reporting also linked from TEAMS system

- Turnpike Enterprise Asset Management System (TEAMS) crosses district geographical boundaries and has unique features
- It is a Web based system based on Turnpike Regions for data selection
- Linking with the statewide pavement inventory application was possible with minor modifications
- Data parameters are passed by defining the data through XML

TEAMS - Turnpike Enterprise Asset Management System - Microsoft Internet Explorer

Home | Facilities | Pavement | Roadway | Structures | Utilities | NPDES | Finance | Plans Log | Safety | Video

Select Report

Report

Map

Both

Click on an Item link to view the Pavement Evaluation Coring and Condition Data Report

Item - Seg	Roadway ID	Typical Section #	Lane	Beg MP	End MP	Local Name	Limits From	Limits To
232739 -1	94470000	01	L1	31.074	34.968	RESURFACE ST. LUCIE	CO. M.P. 168.8	M.P.173.2
232739 -1	94470000	01	L2	31.074	34.968	RESURFACE ST. LUCIE	CO. M.P. 168.8	M.P.173.2
232739 -1	94470000	01	R1	31.074	34.968	RESURFACE ST. LUCIE	CO. M.P. 168.8	M.P.173.2
232739 -1	94470000	01	R2	31.074	34.968	RESURFACE ST. LUCIE	CO. M.P. 168.8	M.P.173.2

powered by sas

Output produced by "pccd2.sas" program.

This request took 0.89 seconds of real time (v9.1 build 1461).

Pavement Standard > Report

Local intranet

TEAMS - Turnpike Enterprise Asset Management System - Microsoft Internet Explorer

Home | Facilities | Pavement | Roadway | Structures | Utilities | NPDES | Finance | Plans Log | Safety | Video

Select Report

Report

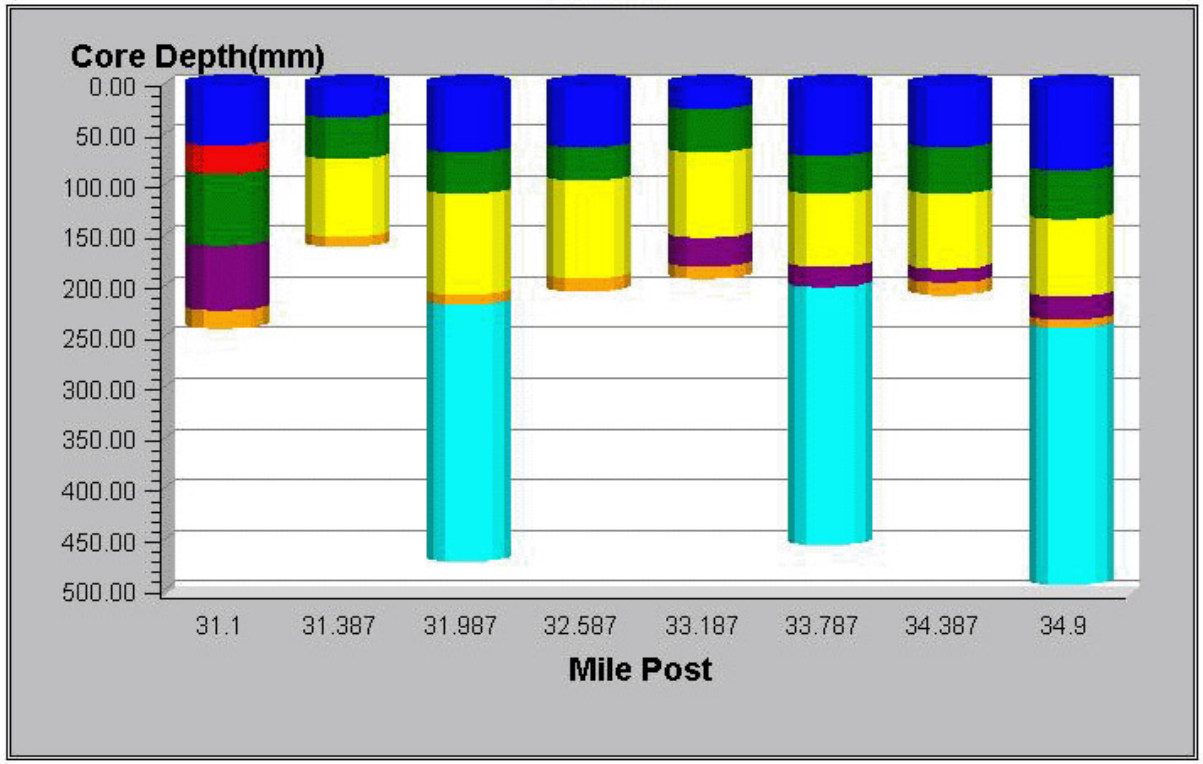
Map

Both

Project # 232739 -1 -52 -01 / Roadway ID # 94470000

Local Name: RESURFACE ST. LUCIE

Lane L1



Layer Types

FC2 | S3 | S1 | S2 | T1 | T2 | LR

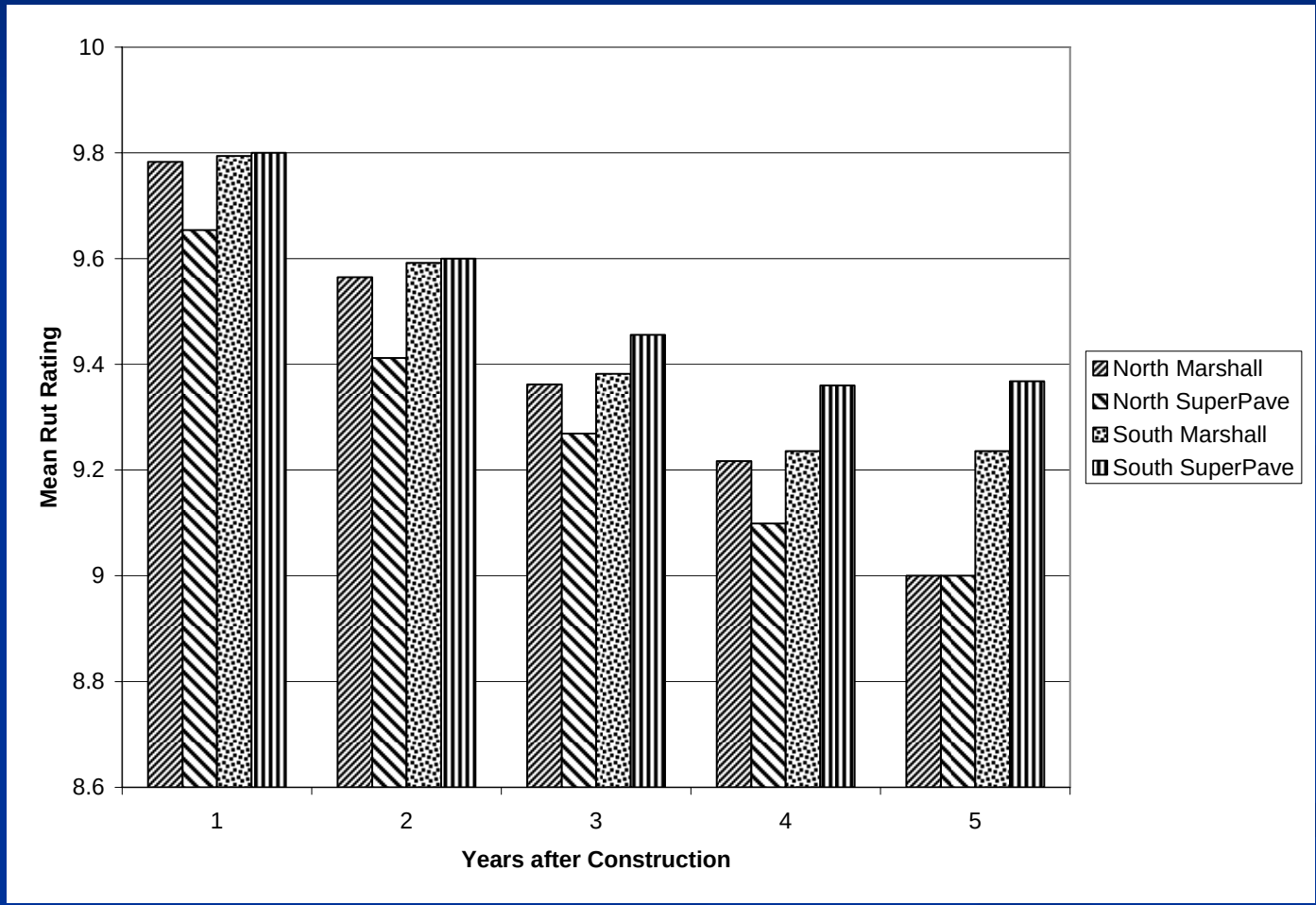
Pavement Standard > Report

Local intranet

Statistical Analysis of structural performance

- Network Level Structural information in databases can be combined with performance history database
- Average performance comparisons in near term
- Survival analysis for longer term
- Example: 5 year performance comparison of Superpave and Marshall mix design performance

Superpave and Marshall Mix Design Performance Comparison by Region



Performance Analysis Challenges

- Quality and completeness of data
- Minor rated section limit changes from year to year complicate combining data
- Project limits different from rated section limits
- How to account for sections overlaid for capacity purposes rather than condition
- Engineering judgement still needed and data must pass the test of common sense