State Construction Update

2021 ACAF Expo

Richard Hewitt, PE

State Construction Pavement Engineer

FDOT State Construction Office

Overview

- Pavement Smoothness
- Construction-Related Specification Changes
- Tack Rate Simplification
- Construction Issues
- Constructability, Accomplishments & Look Forward

Smoothness

- One Pavement Quality All Road Users Have an Opinion About
- It's How Most Road User's Rate a Road's Quality
- So, How Are We Doing?

FHWA
Nationwide Pavement Condition Survey (PCS) Data

FHWA Data - Rural Roads IRI < 95

Rural								
Interstate			Other Roads			Total Roads		
STATE	% Miles < 95	Total Miles Reported (All IRI's)	STATE	% Miles < 95	Total Miles Reported (All IRI's)	STATE	% Miles < 95	Total Miles Reported (All IRI's)
Florida	97%	717	Nevada	90%	1,544	Nevada	92%	2,001
Nevada	96%	457	Kansas	88%	3,030	Alabama	89%	2,551
New Hampshire	95%	142	Alabama	88%	1,981	Florida	88%	3,479
Rhode Island	94%	18	Maryland	87%	377	Kansas	88%	3,670
North Dakota	94%	510	Florida	86%	2,762	Maryland	87%	519
Tennessee	93%	645	North Dakota	83%	2,945	Missouri	85%	3,831
Missouri	93%	842	Missouri	83%	2,989	North Dakota	85%	3,455
Vermont	93%	255	Tennessee	81%	1,746	Vermont	84%	561
North Carolina	91%	559	Georgia	80%	3,187	Tennessee	84%	2,391
Alabama	91%	571	Michigan	78%	2,483	Kentucky	82%	2,354

Rural Interstate
% Miles < 95 IRI

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Florida	97%	717
Nevada	96%	457
New Hampshire	95%	142
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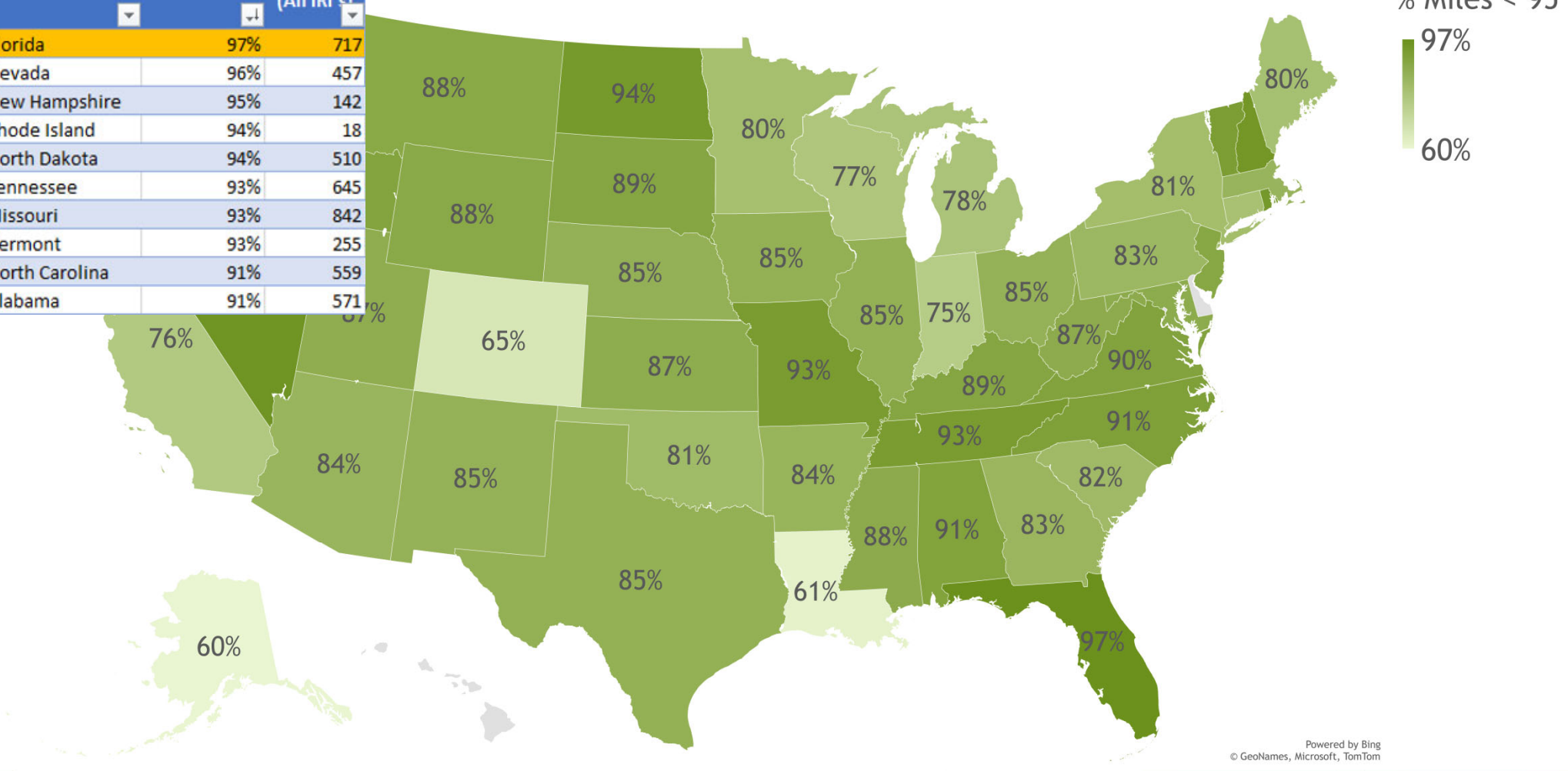

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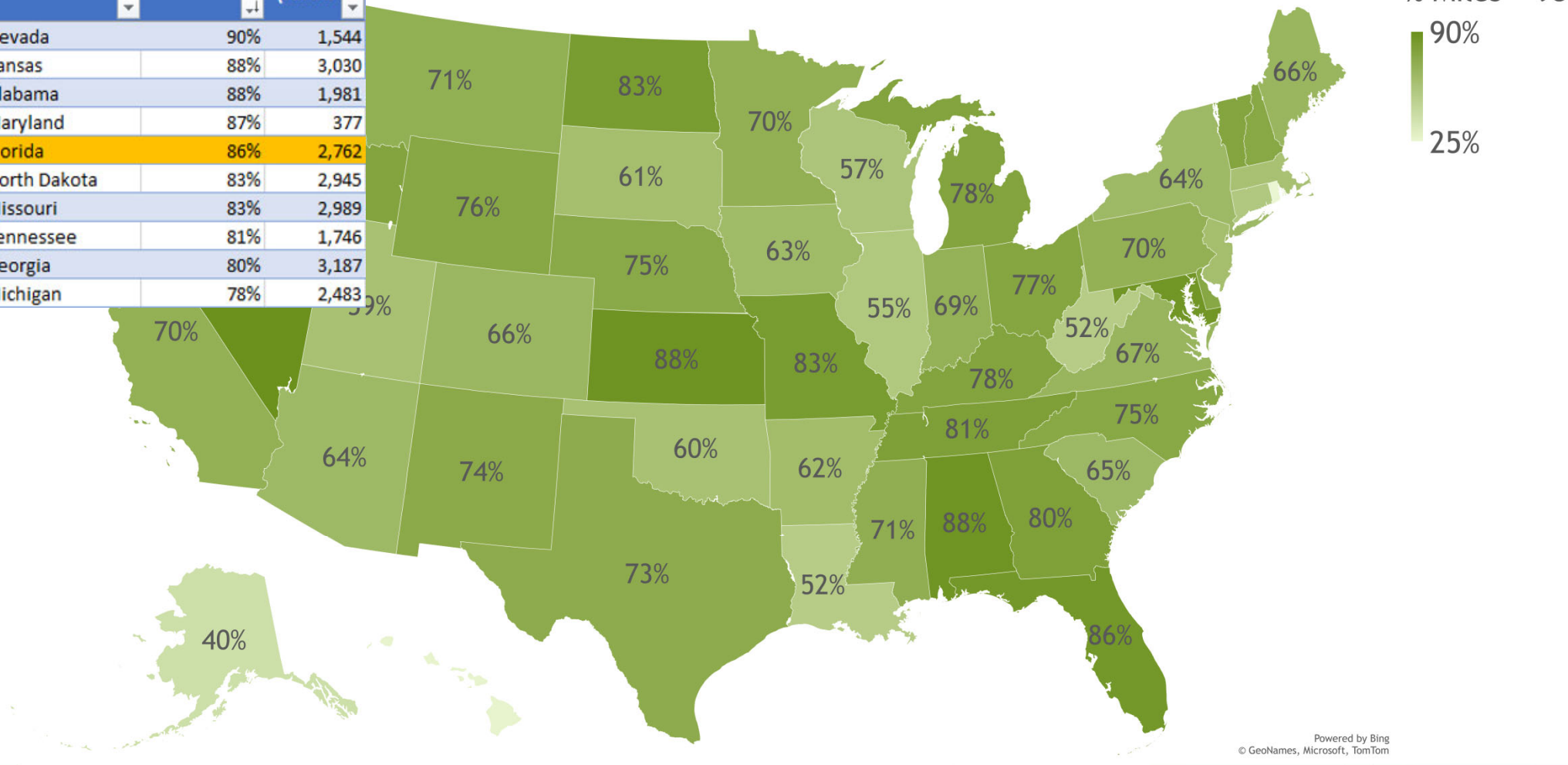

Rural All Roads
% Miles < 95 IRI

STATE	% Miles < 95	Total Miles Reported (All IRI's)
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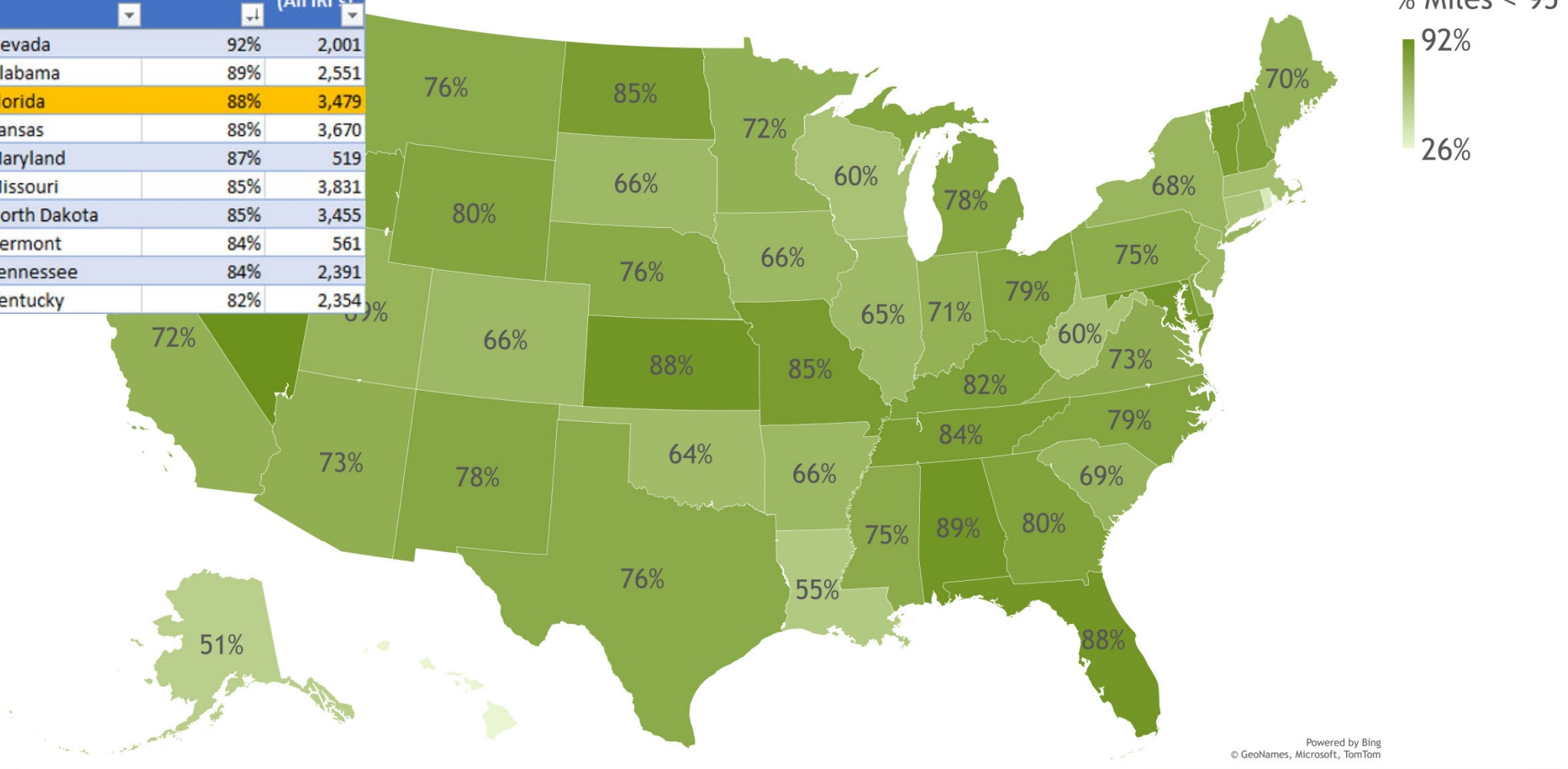

FHWA Data - Urban Roads IRI < 95

Urban								
INTERSTATE			OTHER			TOTAL		
STATE	% Miles < 95	Total Miles Reported (All IRI's)	STATE	% Miles < 95	Total Miles Reported (All IRI's)	STATE	% Miles < 95	Total Miles Reported (All IRI's)
New Hampshire	96%	83	Alabama	74%	1,284	Alabama	75%	1,717
Vermont	92%	64	Florida	68%	4,531	Vermont	72%	149
Maine	89%	87	Georgia	67%	2,806	New Hampshire	72%	403
Idaho	88%	92	New Hampshire	65%	320	Florida	71%	5,309
North Dakota	87%	61	Tennessee	63%	2,066	Georgia	70%	3,516
Montana	87%	98	Minnesota	62%	841	Tennessee	68%	2,622
Florida	86%	778	Kansas	59%	502	Kansas	64%	735
Tennessee	86%	557	Utah	58%	695	Missouri	64%	1,882
Massachusetts	86%	502	Vermont	56%	85	Minnesota	64%	1,167
New Mexico	85%	156	Missouri	56%	1,344	Utah	63%	948

STATE	% Miles < 95	Total Miles Reported (All IRI's)
New Hampshire	96%	83
Vermont	92%	64
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Idaho	88%	92
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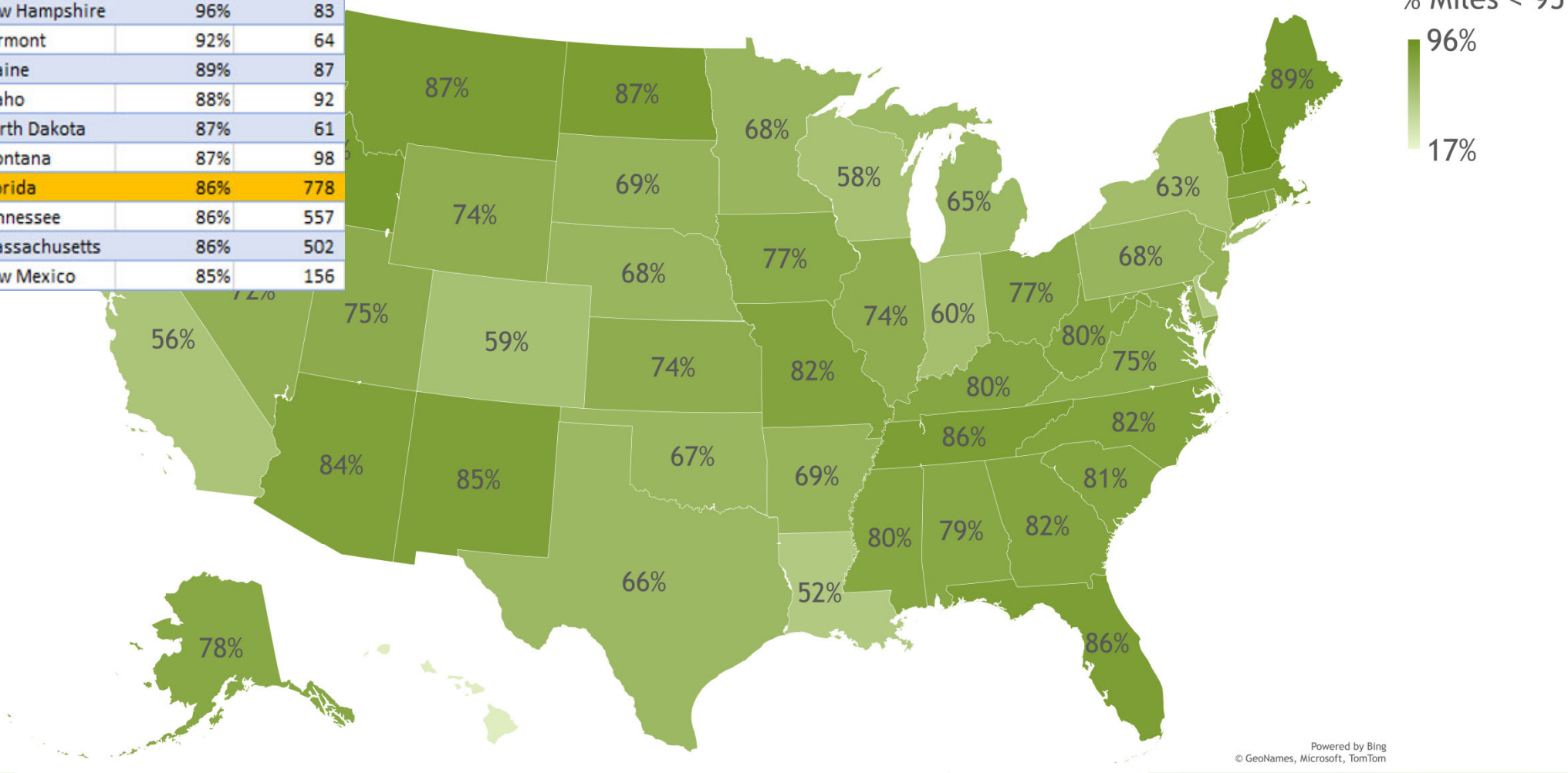
Massachusetts	86%	502
New Mexico	85%	156

Urban Interstate
% Miles < 95 IRI



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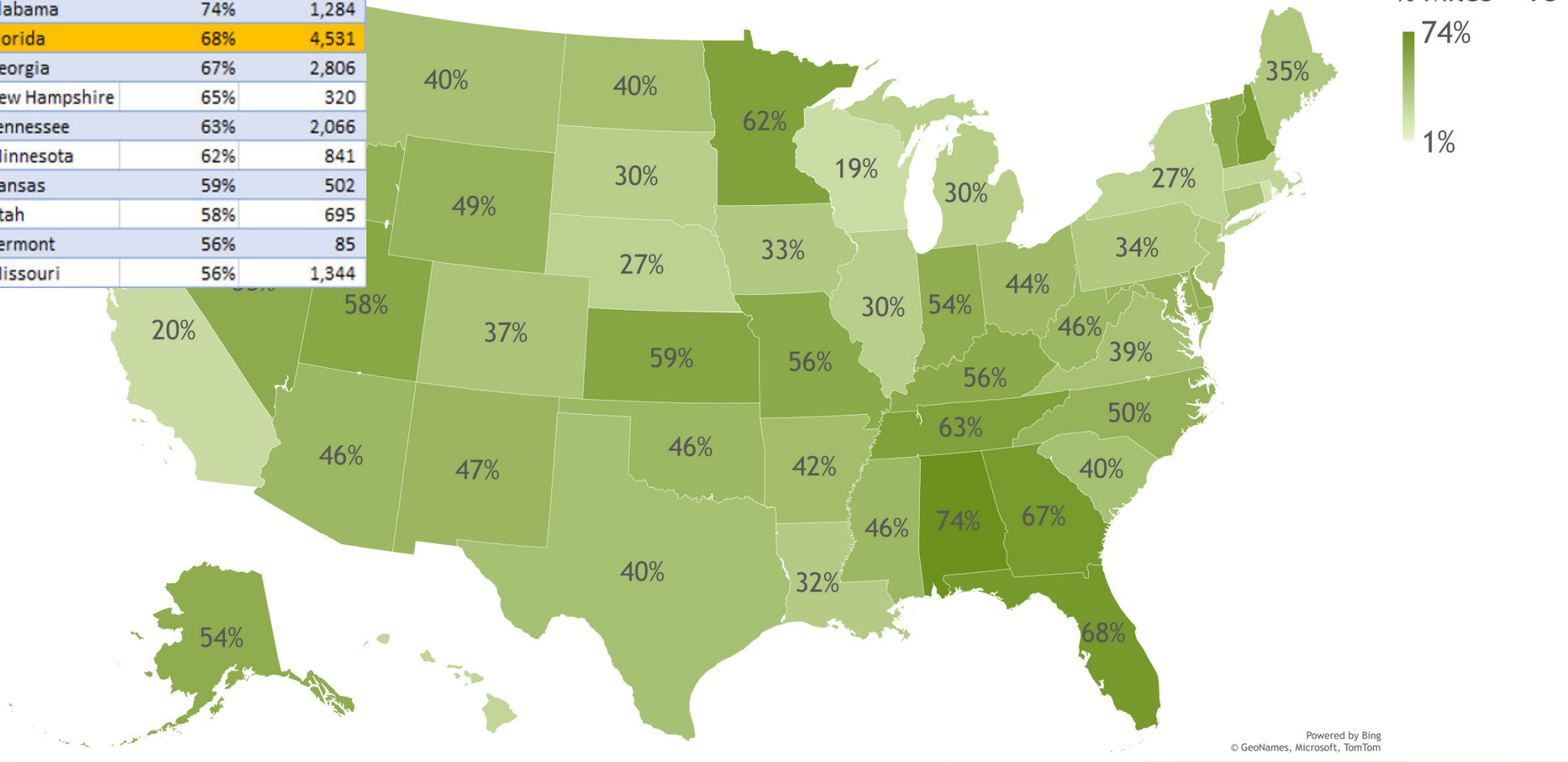
Missouri	56%	1,344



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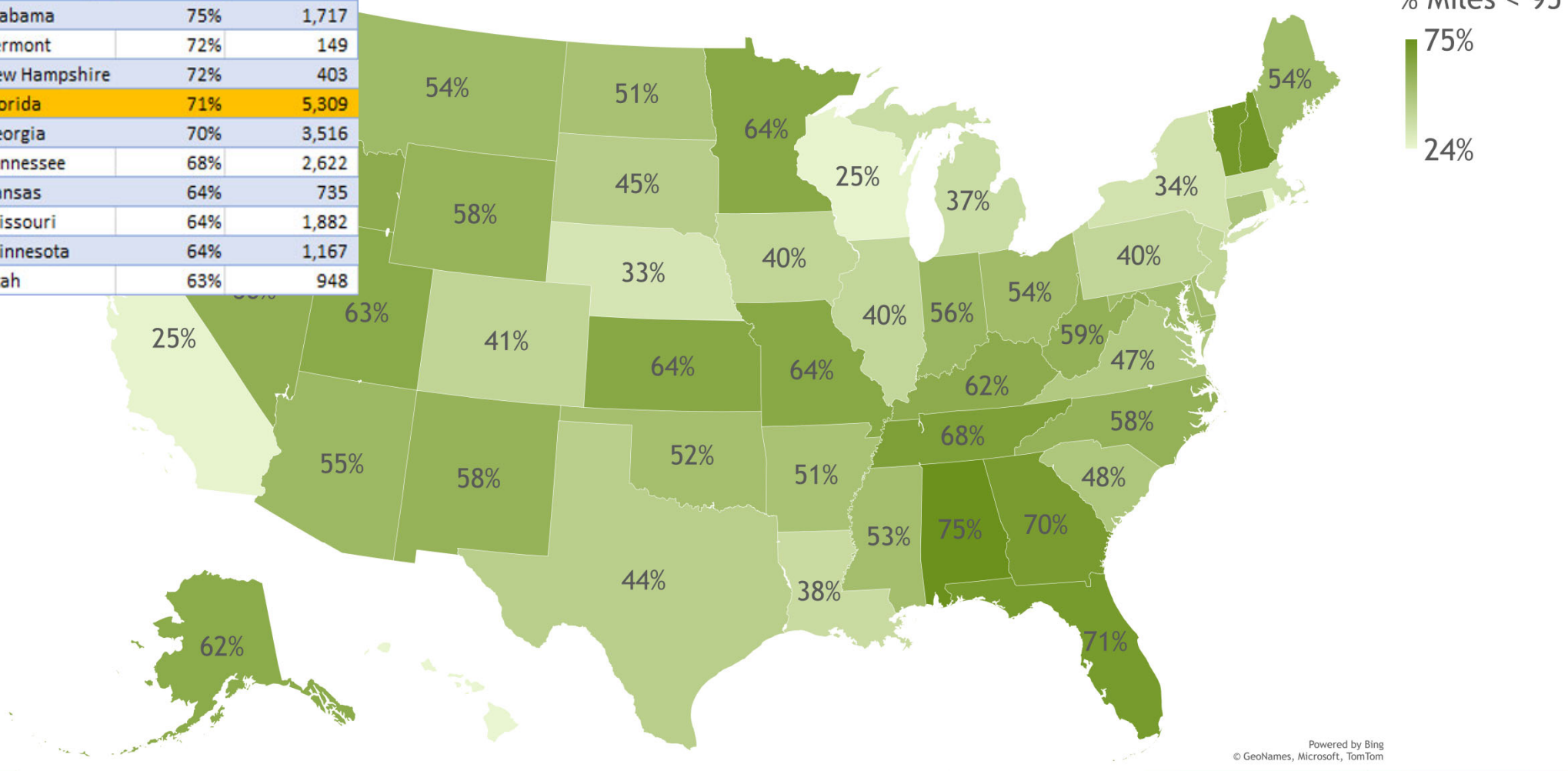
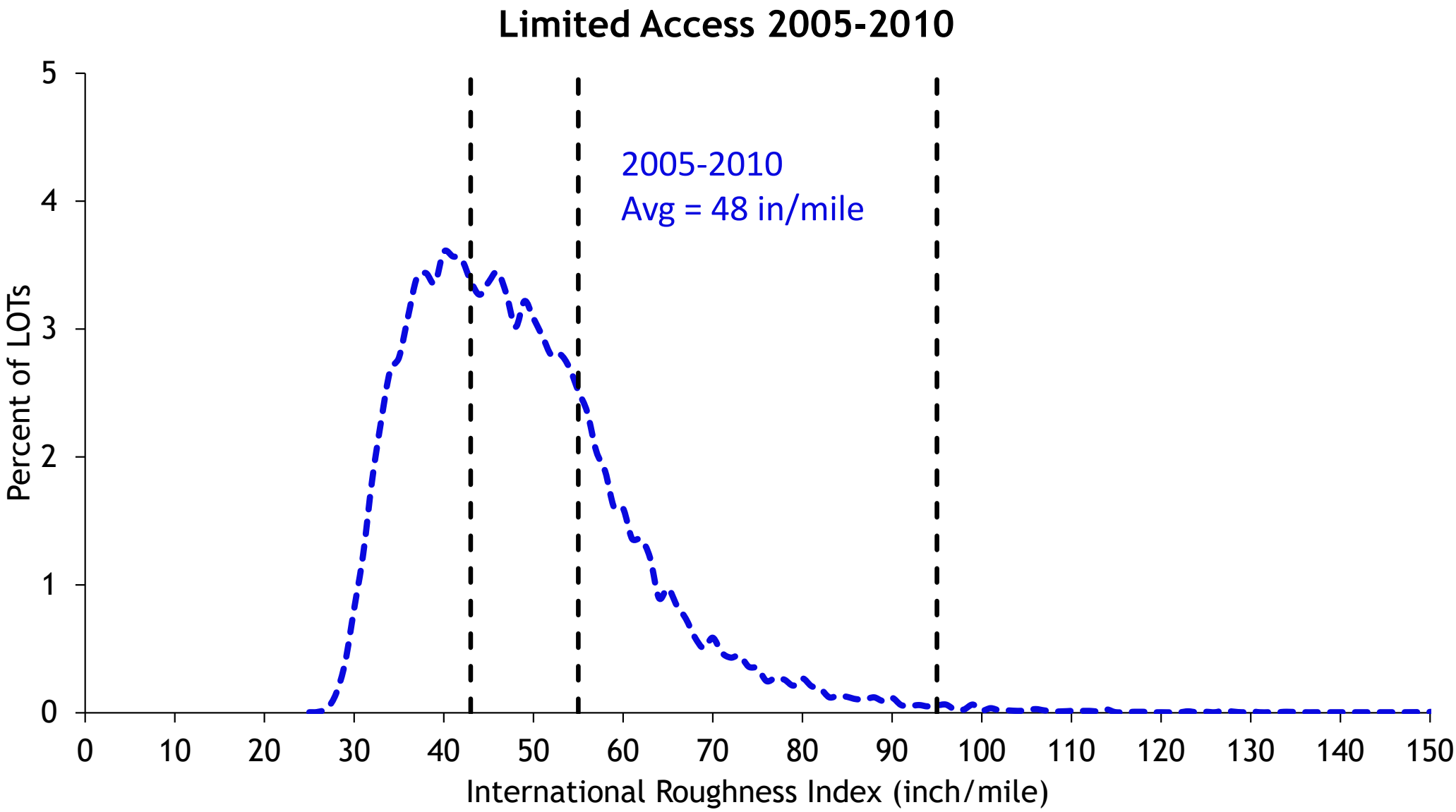
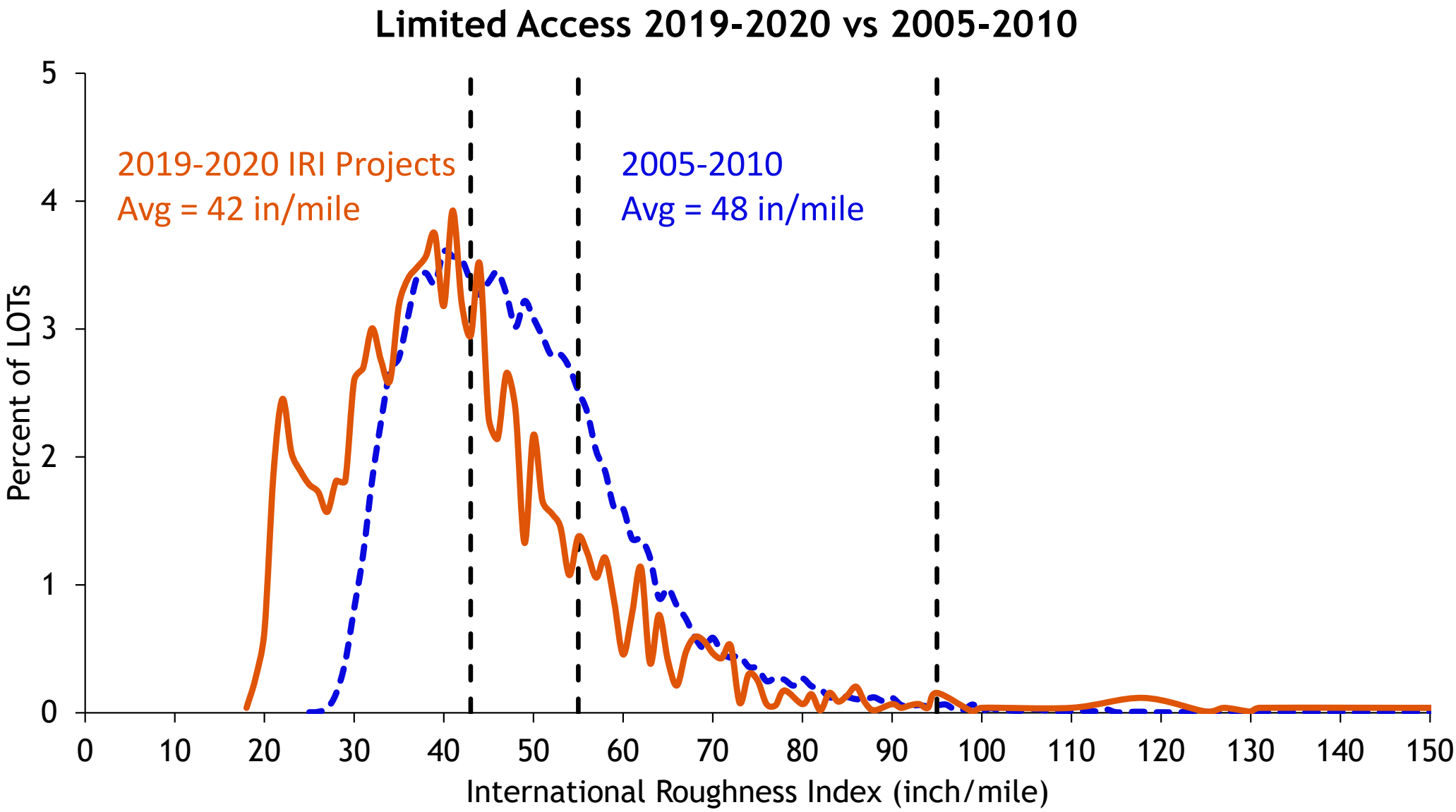


Florida: A Top State for Smoothness

- Team Effort
  - High-Quality Paving by Contractors to Put Us at Top
  - Timely Resurfacing Program Keeps Us at Top
  - Requires Challenging, but Reasonable Specifications & Inspection

Limited Access IRI Projects


Limited Access 2005-2010
2005-2010
Avg = 48 in/mile
Percent of LOTs
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
International Roughness Index (inch/mile)


Limited Access 2019-2020 vs 2005-2010
2019-2020 IRI Projects
Avg = 42 in/mile
2005-2010
Avg = 48 in/mile
Percent of LOTs
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
International Roughness Index (inch/mile)

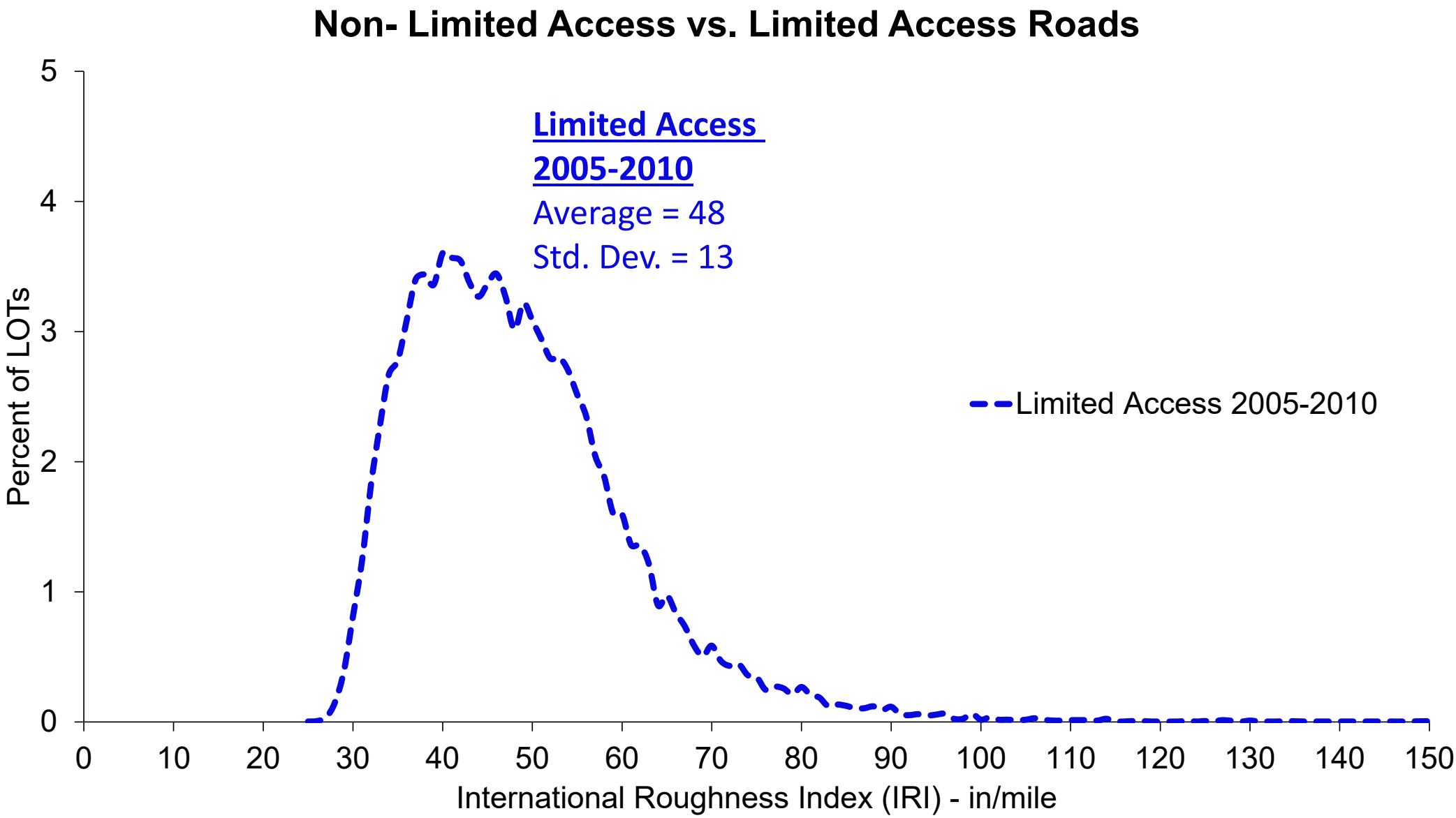
2019 - IRI Project Overview

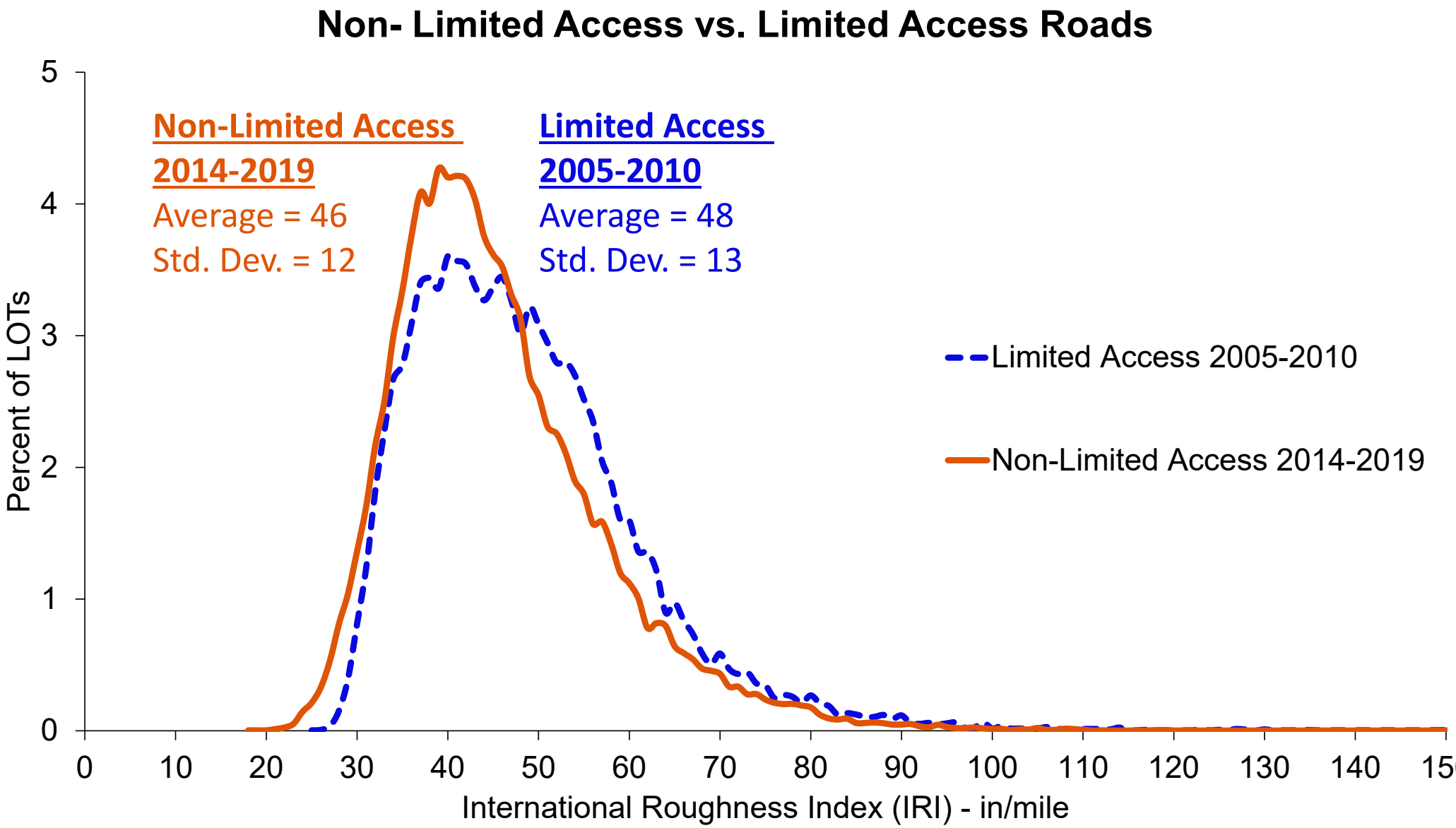
- 5 Projects
  - Lowest Average Project IRI = 38
  - Highest Average Project IRI = 59
  - (Average) Average Project IRI = 45
  - Average Incentive/Disincentive = $333 per lane mile
- 4 Projects Received Incentive
- No Projects Received 3% Consistency Bonus
  - All LOTs ≤ 55

2020 - IRI Project Overview

- 12 Projects
  - Lowest Average Project IRI = 24
  - Highest Average Project IRI = 71
  - (Average) Average Project IRI = 41
  - Average Incentive/Disincentive = $800 per lane mile
- 10 Projects Received Incentive
- 2 Project Received 3% Consistency Bonus
  - All LOTs ≤ 55

Non-Limited Access Roads


Non- Limited Access vs. Limited Access Roads
Limited Access
2005-2010
Average = 48
Std. Dev. = 13
Limited Access 2005-2010
Percent of LOTs
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
International Roughness Index (IRI) - in/mile


Non- Limited Access vs. Limited Access Roads
Non-Limited Access
2014-2019
Average = 46
Std. Dev. = 12
Limited Access
2005-2010
Average = 48
Std. Dev. = 13
Limited Access 2005-2010
Non-Limited Access 2014-2019
Percent of LOTs
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
International Roughness Index (IRI) - in/mile

Multi-Class, IRI-based Incentive/Disincentive Smoothness Specification for Non-Limited Access Roads

- Created a Multi-Class, IRI-based Smoothness System
  - Address Variation in Project Ease/Difficulty to Meet One Set of IRI Limits
- Based on Construction Acceptance Data – (2014-2019)
- Five Smoothness Classes
  - Most Lane Miles are in Class 1, 2, & 3
  - Some in Class 4, Very Few in Class 5
- Developmental Specs Written
- Working with Design on Project Selection
- Pilot Soon in the Districts

Non-Limited Access – IRI Pay Limits by Class

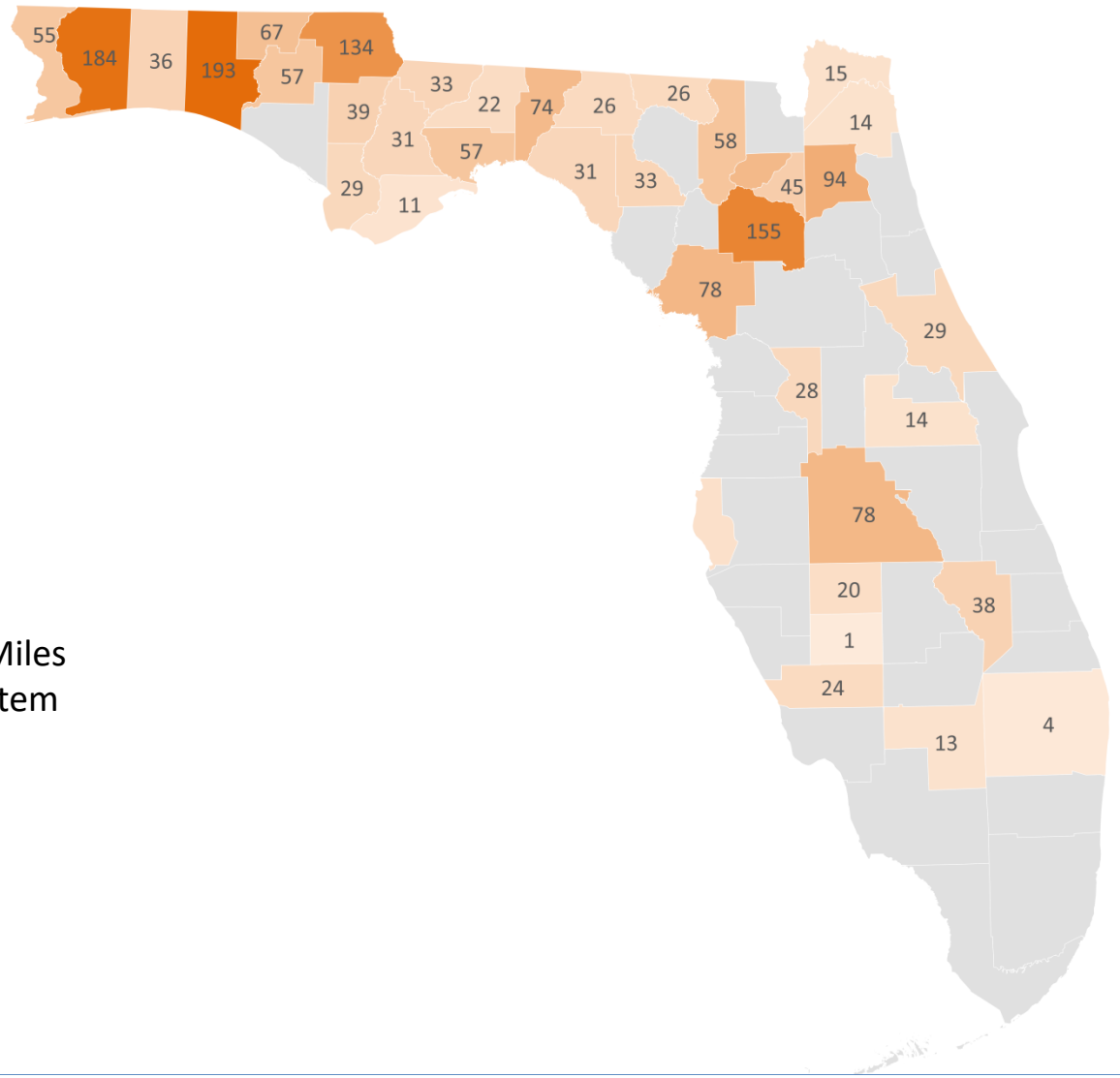
Class	IRI Pay Limits			
	Incentive	Full Pay	Disincentive	Corrective Action
1	≤ 36	37 - 42	43 - 95	>95
2	**≤ 42**	**43 - 55**	**56 - 95**	**>95**
3	≤ 52	53 - 62	63 - 110	>110
4	≤ 62	63 - 85	86 - 125	>125
5	≤ 85	86 - 105	106 - 125	>125

- Class 2 IRI Limits Same as Limited Access IRI Limits
- Corrective Action Limit was not Lowered for Class 1

Non-Limited Access (2014-2019)
Lane Miles per Class & District

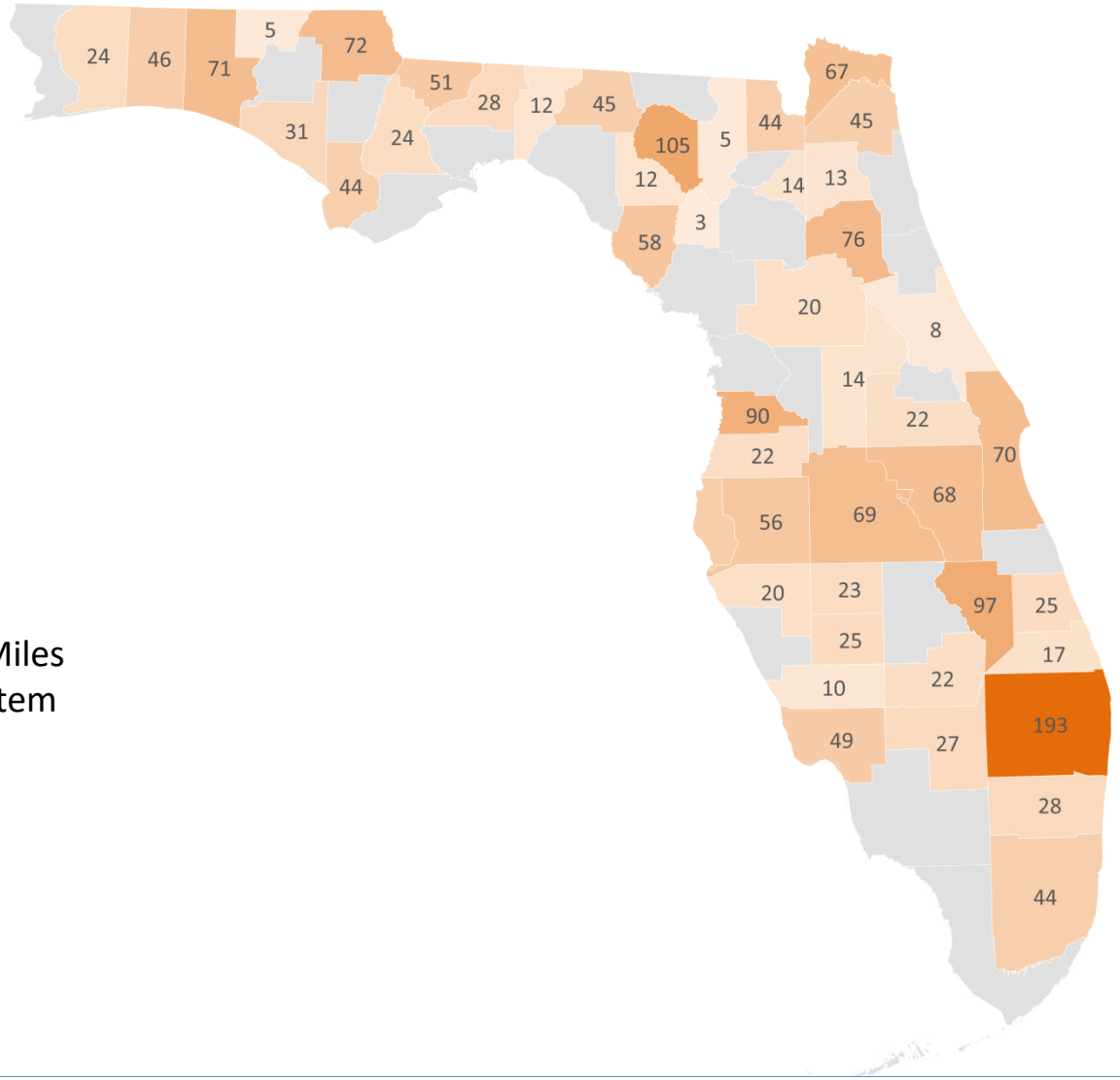
	Lane-Miles					
District	Class 1	Class 2	Class 3	Class 4	Class 5	Total
1	207	343	212	74	1	838
2	626	487	158	41	0	1,313
3	1,014	408	24	1	0	1,447
4	4	263	70	72	0	409
5	71	202	264	19	1	558
6	0	44	100	58	1	203
7	16	214	379	45	0	655
Total	1,939	1,961	1,208	310	3	5,421

Class 1 Lane Miles by County



Class 1
1,939 Lane Miles
35.8% of System

Class 2 Lane Miles by County

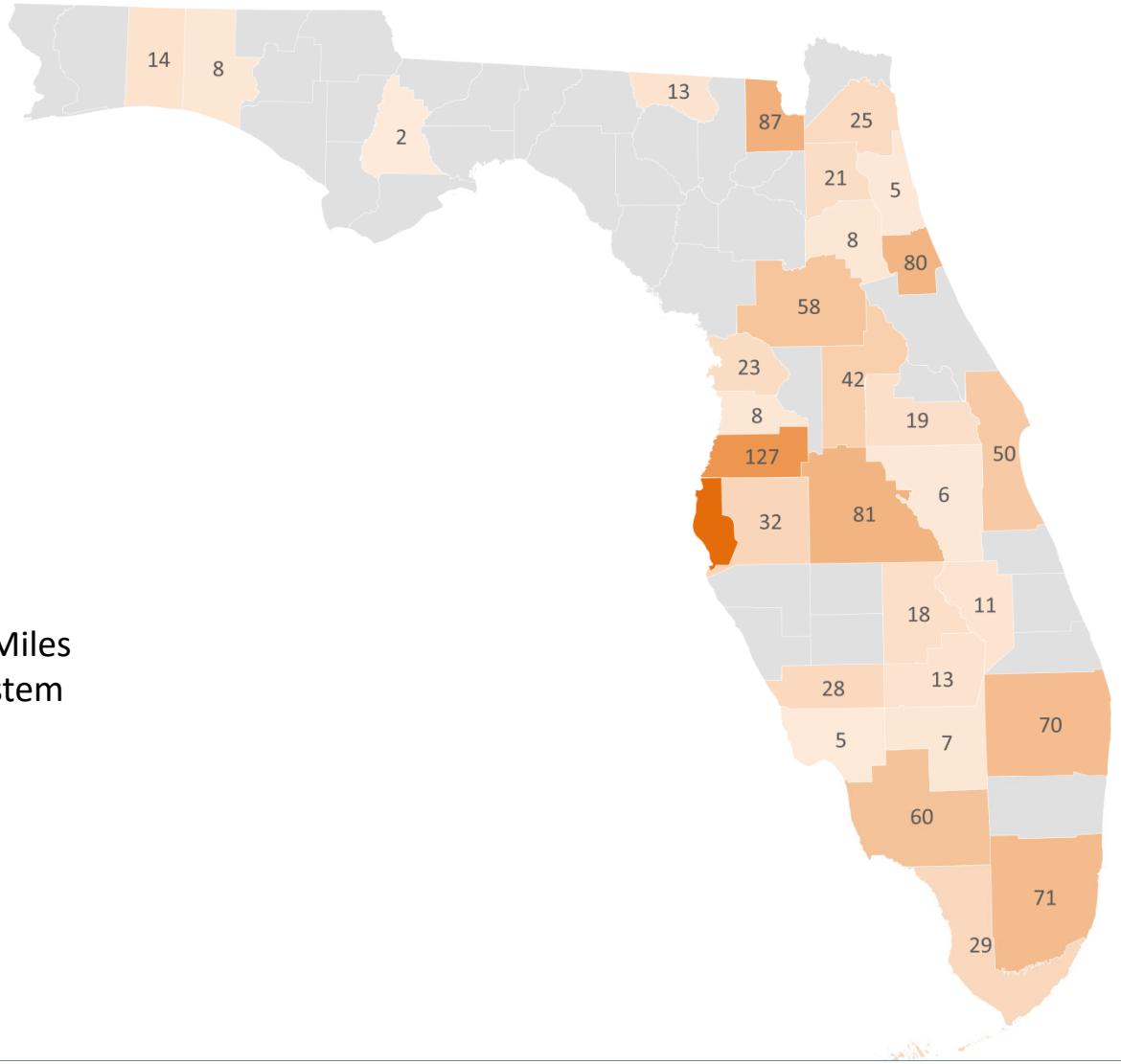


Class 2
193
3

Powered by Bing
© GeoNames, Microsoft, TomTom

Class 2
1,961 Lane Miles
36.2% of System

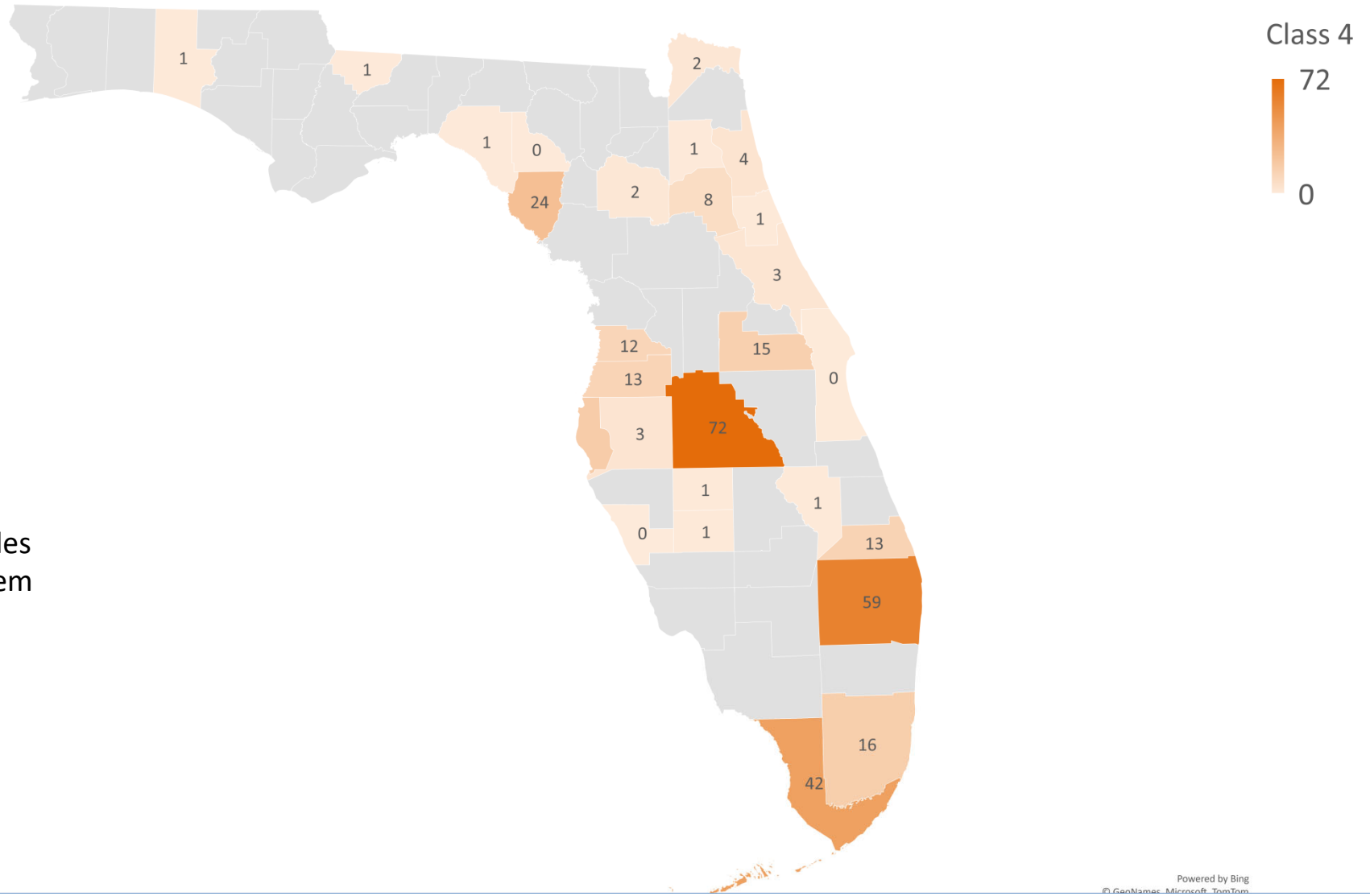
Class 3 Lane Miles by County



Class 3
189
2

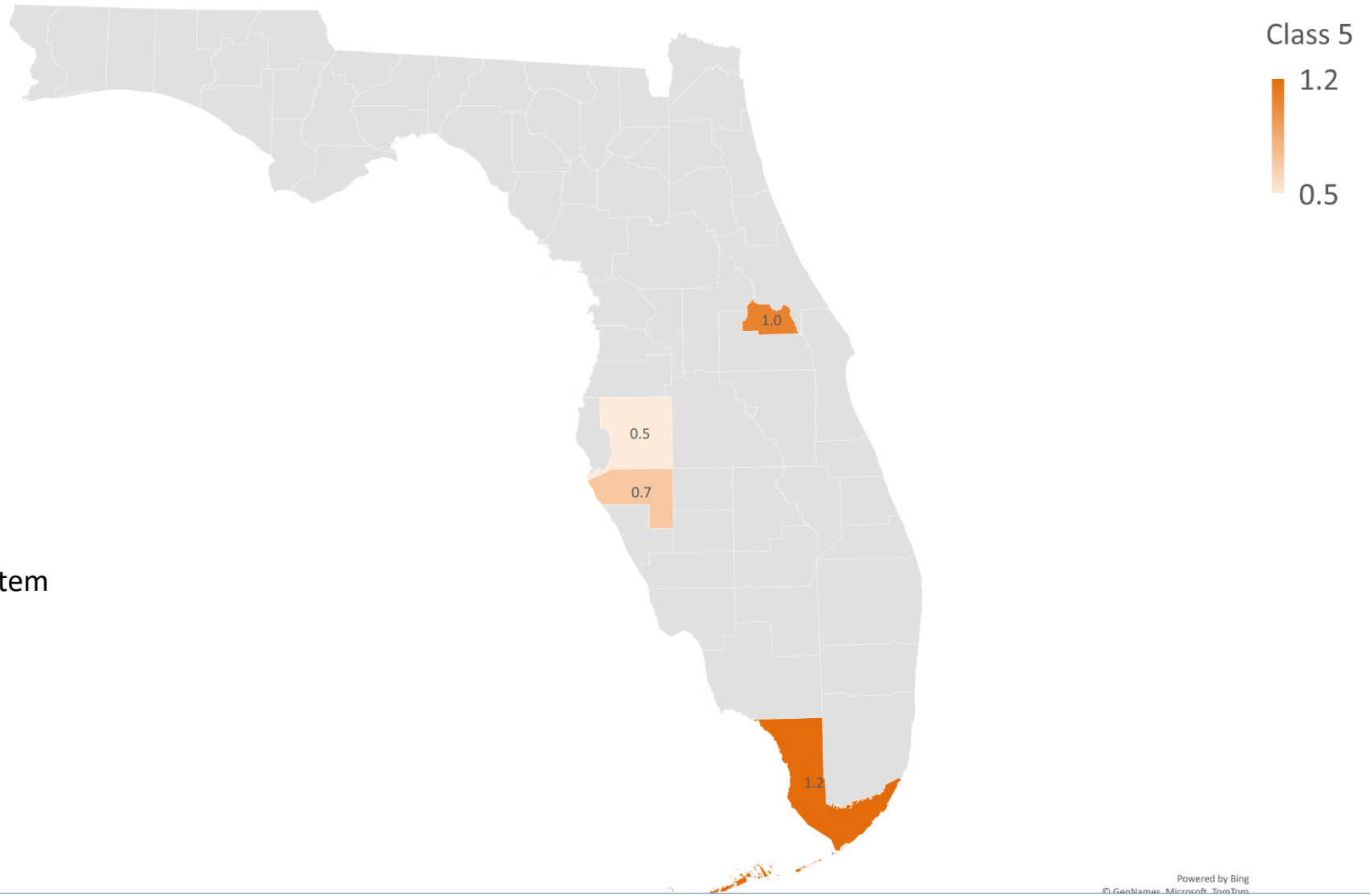
Class 3
1,208 Lane Miles
22.3% of System

Class 4 Lane Miles by County



Class 4
310 Lane Miles
5.7% of System

Class 5 Lane Miles by County



Class 5
3 Lane Miles
0.06% of System

Non-Limited Access (2014-2019)
Incentive/Disincentive by District & Class

Incentive/Disincentive						
District	Class 1	Class 2	Class 3	Class 4	Class 5	Total
1	$5,233	$75,431	$5,199	$47,879	($200)	$133,543
2	$12,356	$70,427	$30,536	$22,051	$0	$135,370
3	$44,565	$49,666	$14,398	($835)	$0	$107,793
4	$2,588	$56,930	$14,073	$2,619	$0	$76,210
5	($1,777)	$52,973	$52,649	$8,637	($142)	$112,340
6	$0	$1,981	$7,630	$24,835	$1,028	$35,475
7	($1,819)	$43,682	$133,343	$16,385	$312	$191,903
Total	$61,146	$351,090	$257,828	$121,571	$998	$792,633

Non-Limited Access (2014-2019)
Incentive/Lane Mile per Class & District

Incentive/Lane Mile						
District	Class 1	Class 2	Class 3	Class 4	Class 5	Total
1	$25	$220	$25	$647	($305)	$159
2	$20	$145	$193	$535	$0	$103
3	$44	$122	$602	($663)	$0	$75
4	$690	$216	$202	$36	$0	$186
5	($25)	$262	$199	$450	($136)	$201
6	$0	$45	$76	$432	$874	$175
7	($114)	$204	$352	$367	$683	$293
All	$32	$179	$214	$392	$299	$146

Thanks to

- Hank Lambert
- Mateo Carvajal
- Poura Arabali

- Smoothness Data Analysis Work
- Creation of Florida Method
- Work on Developmental Specification

Construction Specification Changes

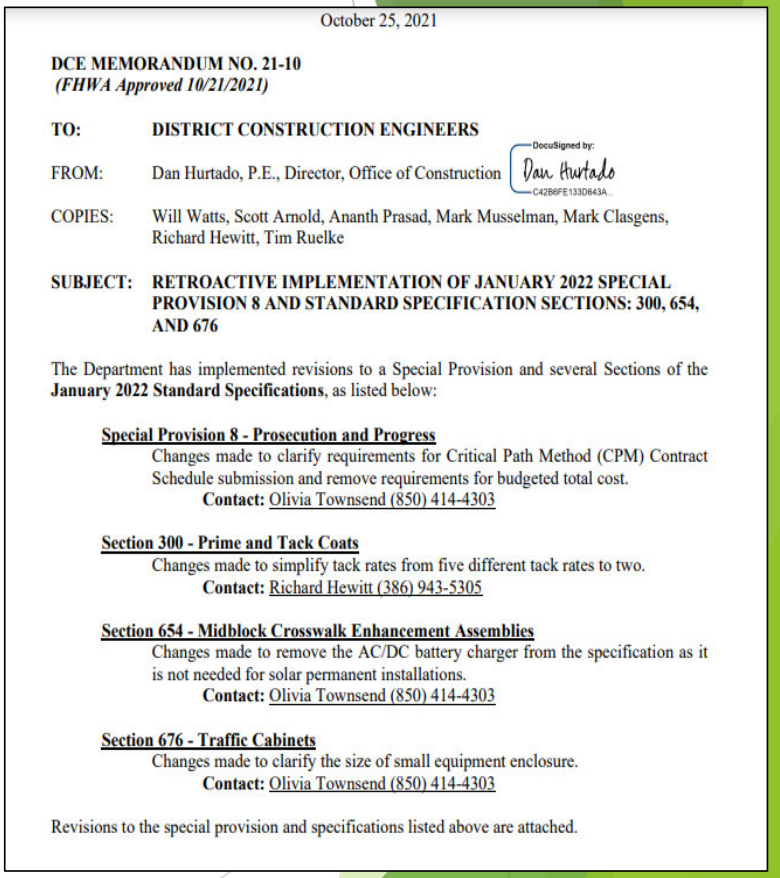
- Implemented July 2021
  - Milled Surface Open 3 Days
- Implemented Jan 2022
  - Tack Rate Simplification

Construction Specification Changes

- Proposed July 2022
  - Milling Low's in Structural Asphalt
    - Likely Need to Add Deficiency Limit
  - ½" Elevation Tolerance on Curb & Gutter
- Being Discussed
  - Paving Friction Course to Correct Lows in Structural Asphalt
    - Likely Need to Add Deficiency Limit
    - Intend to Add to July 2022

DCE Memo - Retroactive Implementation

- New DCE Memo Format for Retroactive Specs
  - One Memo for All Specs Within a Spec Workbook
    - Four Jan 2022 Specs in DCE Memo 21-10
    - Rather Than Four Memos
- As Spec Changes Occur, Let Us Know Specs Likely Want to Add to Existing Projects



October 25, 2021

DCE MEMORANDUM NO. 21-10
(FHWA Approved 10/21/2021)

TO: **DISTRICT CONSTRUCTION ENGINEERS**

FROM: Dan Hurtado, P.E., Director, Office of Construction

DocuSigned by: Dan Hurtado C42B6FE133D643A...

COPIES: Will Watts, Scott Arnold, Ananth Prasad, Mark Musselman, Mark Clasgens, Richard Hewitt, Tim Ruelke

SUBJECT: **RETROACTIVE IMPLEMENTATION OF JANUARY 2022 SPECIAL PROVISION 8 AND STANDARD SPECIFICATION SECTIONS: 300, 654, AND 676**

The Department has implemented revisions to a Special Provision and several Sections of the **January 2022 Standard Specifications**, as listed below:

Special Provision 8 - Prosecution and Progress
Changes made to clarify requirements for Critical Path Method (CPM) Contract Schedule submission and remove requirements for budgeted total cost.
Contact: Olivia Townsend (850) 414-4303

Section 300 - Prime and Tack Coats
Changes made to simplify tack rates from five different tack rates to two.
Contact: Richard Hewitt (386) 943-5305

Section 654 - Midblock Crosswalk Enhancement Assemblies
Changes made to remove the AC/DC battery charger from the specification as it is not needed for solar permanent installations.
Contact: Olivia Townsend (850) 414-4303

Section 676 - Traffic Cabinets
Changes made to clarify the size of small equipment enclosure.
Contact: Olivia Townsend (850) 414-4303

Revisions to the special provision and specifications listed above are attached.

Tack Rate Simplification Jan 2022

- Past: 5 Tack Rates, Based On
  - Surface to be Paved On
  - & Mix Type to be Paved
- Now: Simplified to 2 Tack Rates, Based On
  - Surface to be Paved On

Tack Rate Simplification

- 2 Tack Rates
  - 0.06 gal/SY
  - 0.09 gal/SY
- Tolerances
  - +0.02 gal/SY
  - -0.01 gal/SY
- **Actually, Can Use One Tack Rate**
  - **0.08 gal/SY ---> Always Meets Specs**

Tack Rate Simplification

- How Much Is a 0.01 gal/SY Increase?
- 0.01 gal = 1.28 oz
  - About a Shot Glass of Additional Tack per Square Yard
  - Residual is Half As Much

How Much More Tack, Thickness-wise?

- 0.01 gal/sy
- 0.01 gal/sy * (1 cf/7.48 gallons) = 0.00134 cf/sy
- 0.00134 cf/sy * (1 sy/9 sf) = 0.000149 cf/sf = 0.000149 ft
- 0.000149 ft * (12 in/1 ft) = 0.00178 inches
- 0.00178 inches

Tack Thickness

- Copy Paper is About 0.004” Thick = 0.022 gal/sy
- Folded Once = 2 Sheets = 0.008” = 0.044 gal/sy
- Folded Twice = 4 Sheets = 0.016” = 0.088 gal/sy
  - Residual is Half = 2 Sheets Thick

Tack Thickness

- Fold 26 times
  - At 22,000 ft
  - Commercial Jet Traffic

Tack Thickness

- Fold 30 times
- Covered the Moon (at 238,900 miles) by 119,000 miles

Tack Thickness

- Fold 103 times
  - Reach End of Universe
  - 93 Billion Light Years

Simplification

- Streamline Operations – More Efficient
- Fewer Mistakes, Work Stoppages, & Arguments
  - Lower Stress / Higher Quality Projects
- Simpler Specs & Processes Can Guarantee Success
  - Make it Difficult to Fail
  - Ex. 0.08 gal/SY Tack Rate

Construction Issues

- FC-5 Overlap
  - Couple Projects Where 8” Overlap Not Achieved
- Cross Slope
  - Can Be Safety & Drainage Concern
  - Occurred on New Construction
    - Asphalt Contractor was Prime Contractor
    - Not Just Resurfacing Issue or “Prime’s Fault”

Construction Issues

- Best to Resolve & Avoid Creation of More Restrictive Specs
- Smooth, High-Quality, Long-Lasting Pavements Make Case for Asphalt Pavement
- Problem Pavements Make Case for Another Pavement Type

Constructability

- Spoke at Several Design Expos & Symposiums
  - Thanks to ACAF Contractors & Equipment Suppliers Made Presentations & Brought Milling & Paving Equipment
- Thank Contractors Participated in Recent Discussions
  - Raised Crosswalks
  - Reduced # of Traffic Levels
  - Shoulder Widths
  - Too Many Milling Depths & Milling Depth Changes
  - & Other Design Constructability Topics

Thanks for Everyone's Work On Recent Asphalt Accomplishments

- Statewide Asphalt e-Ticketing Implementation
- Piloting AMG Milling & Paving Projects
- Previously Mentioned Spec Changes
- Smooth Pavements
  - Some of the Smoothest Ever!
- Creating Non-Limited Access IRI Incentive/Disincentive Smoothness Specs
  - Coming Soon to a Project Near You

Looking Forward

- Continue Constructability Discussions & Improvements
- Simplify, Streamline, & Automate Processes & Specs
- Use Technology to Improve Safety, Quality & Efficiency
- More e-Ticketing Use
- More AMG Milling & Paving Pilot Projects
- Non-Limited Access IRI Smoothness Pilot Projects

Contact

- Richard Hewitt, PE
  - State Construction Pavement Engineer
  - State Construction Office
  - (386) 943-5305
  - richard.hewitt@dot.state.fl.us

2021 - IRI Project Overview

- 8 Projects (Jan-Oct 2021)
  - Lowest Average Project IRI = 25
  - Highest Average Project IRI = 55
  - (Average) Average Project IRI = 42
  - Average Incentive/Disincentive = $707 per lane mile
- 5 Projects Received Incentive
- 1 Project Received 3% Consistency Bonus
  - All LOTs ≤ 55

2013-2021 - IRI Project Overview

- 58 Projects (Jan 2013 through Oct 31, 2021)
  - Lowest Average Project IRI = 24
  - Highest Average Project IRI = 71
  - (Average) Average Project IRI = 42
  - Average Incentive/Disincentive = $715 per lane mile
- 45 Projects Received Incentive
- 6 Projects Received 3% Consistency Bonus
  - All LOTs ≤ 55