Smoothness Specifications

Overview of the multiclass system & its development

Nick Zakoske

Overview

- History of Florida Smoothness Specifications
- Multi Class Non-Limited Access Specification & Development
- Future Implementations

Historical Smoothness Specifications

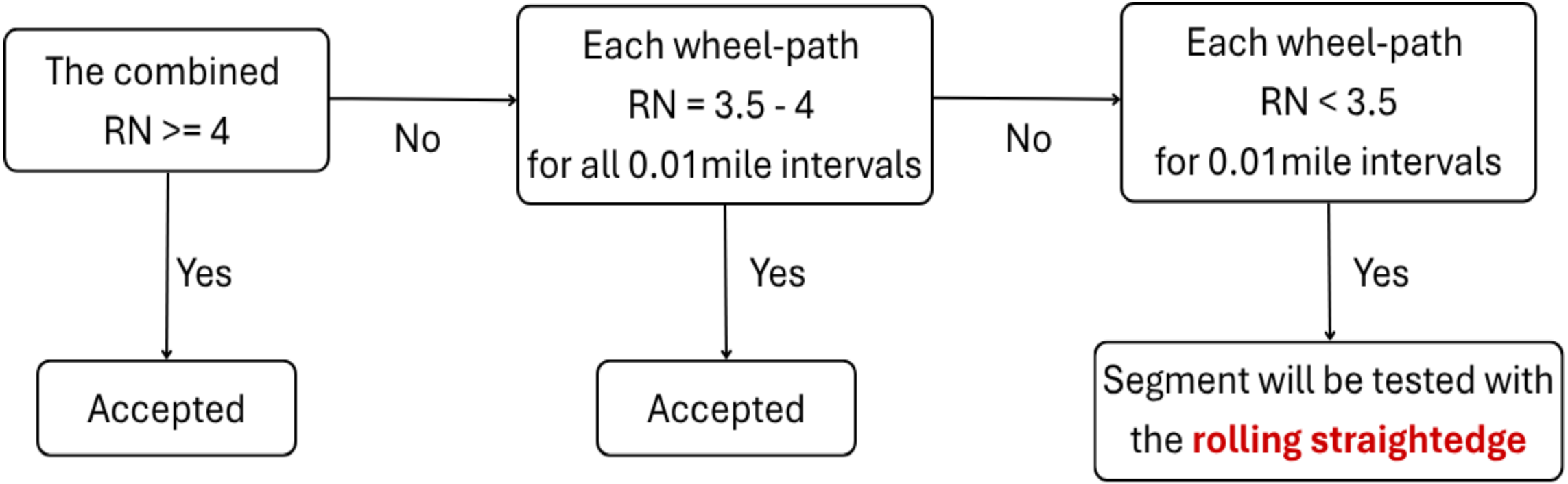
- Originally all smoothness was determined by a rolling straightedge for maximum deviation
- Technological improvements allowed use of laser profiler to get continuous, safer smoothness measurement
- Starting in 2013, Florida moved to laser profiler Acceptance criteria for smoothness
- Other states have also moved to laser profiler acceptance



Historical Ride Number (RN) – Specification

How does the RN Specification work?

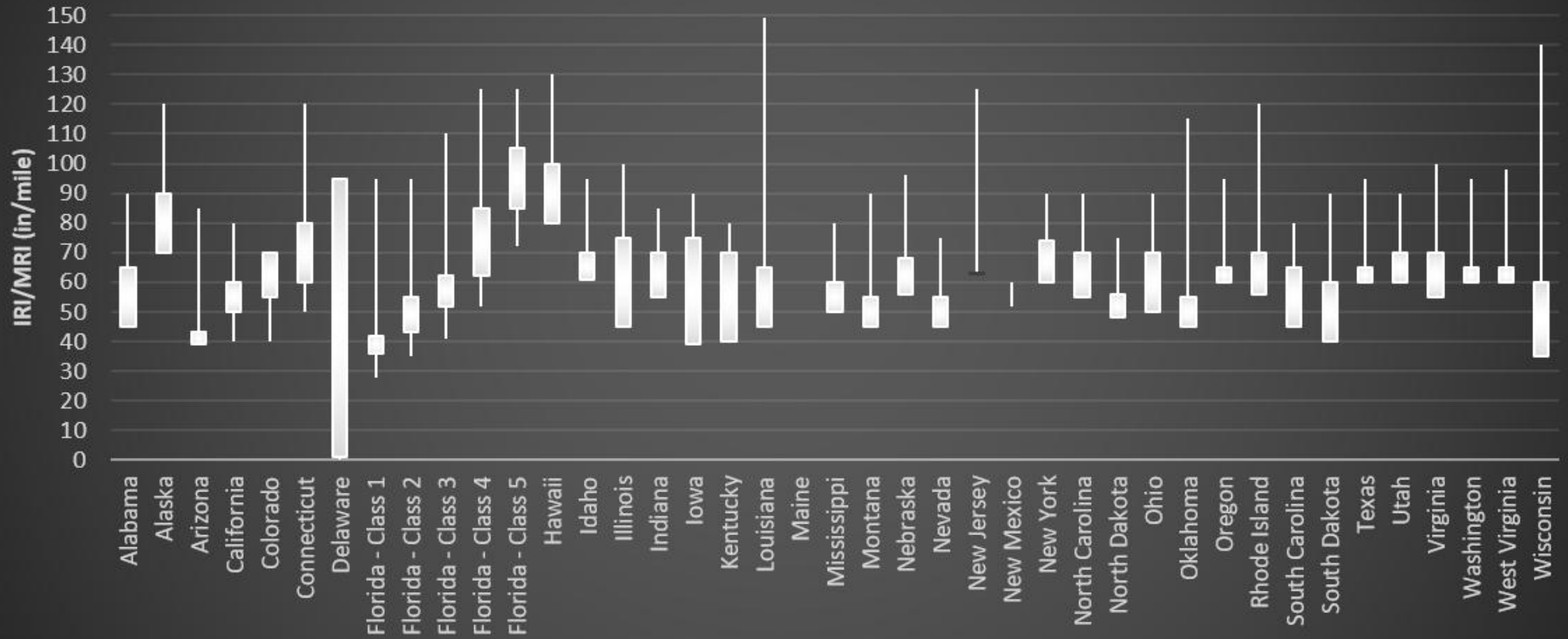
- LOTs are typically 0.1-mile/0.01-mile segments



Specification Changes

- Other states began using incentive/disincentive based smoothness specifications for final acceptance
- There were a wide variety of differences in pay ranges, amounts, areas for correction, & localized roughness, among others
- Florida reviewed these specifications & our historical data to implement an IRI incentive specification

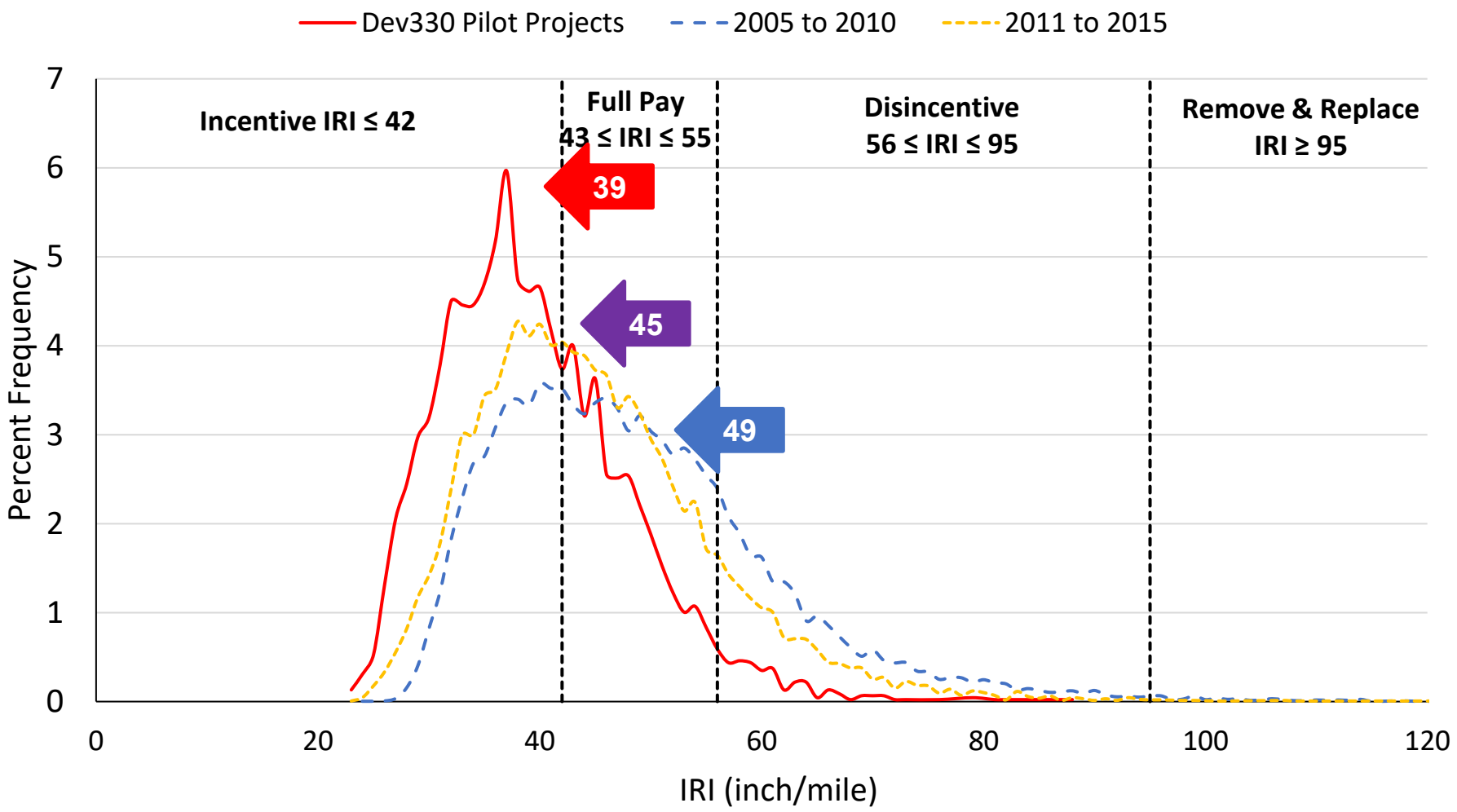
Example Incentive Ranges



Incentive Specification Development

- Looking at historical Florida data from 2005-2010 for limited access facilities, a developmental specification was developed
- Intent was to be revenue neutral & create smoother pavements across the state
- Another goal was to reduce or eliminate rolling straight edge testing and replace with laser profiling
- Pilot projects were identified for testing in 2013
- These projects would be tested preconstruction, after structural course placement, and after friction course placement

Pilot Project Comparison



Limited Access IRI Specification 330-9

LOT IRI	LOT Pay Adjustment	LOT IRI	LOT Adjustment Pay	LOT IRI	LOT Pay Adjustment
≤ 30	$260	56	-$20	76	-$420
31	$240	57	-$40	77	-$440
32	$220	58	-$60	78	-$460
33	$200	59	-$80	79	-$480
34	$180	60	-$100	80	-$500
35	$160	61	-$120	81	-$520
36	$140	62	-$140	82	-$540
37	$120	63	-$160	83	-$560
38	$100	64	-$180	84	-$580
39	$80	65	-$200	85	-$600
40	$60	66	-$220	86	-$620
41	$40	67	-$240	87	-$640
42	$20	68	-$260	88	-$660
		69	-$280	89	-$680
43 – 55	Full Pay	70	-$300	90	-$700
		71	-$320	91	-$720
		72	-$340	92	-$740
		73	-$360	93	-$760
		74	-$380	94	-$780
		75	-$400	95*	-$800

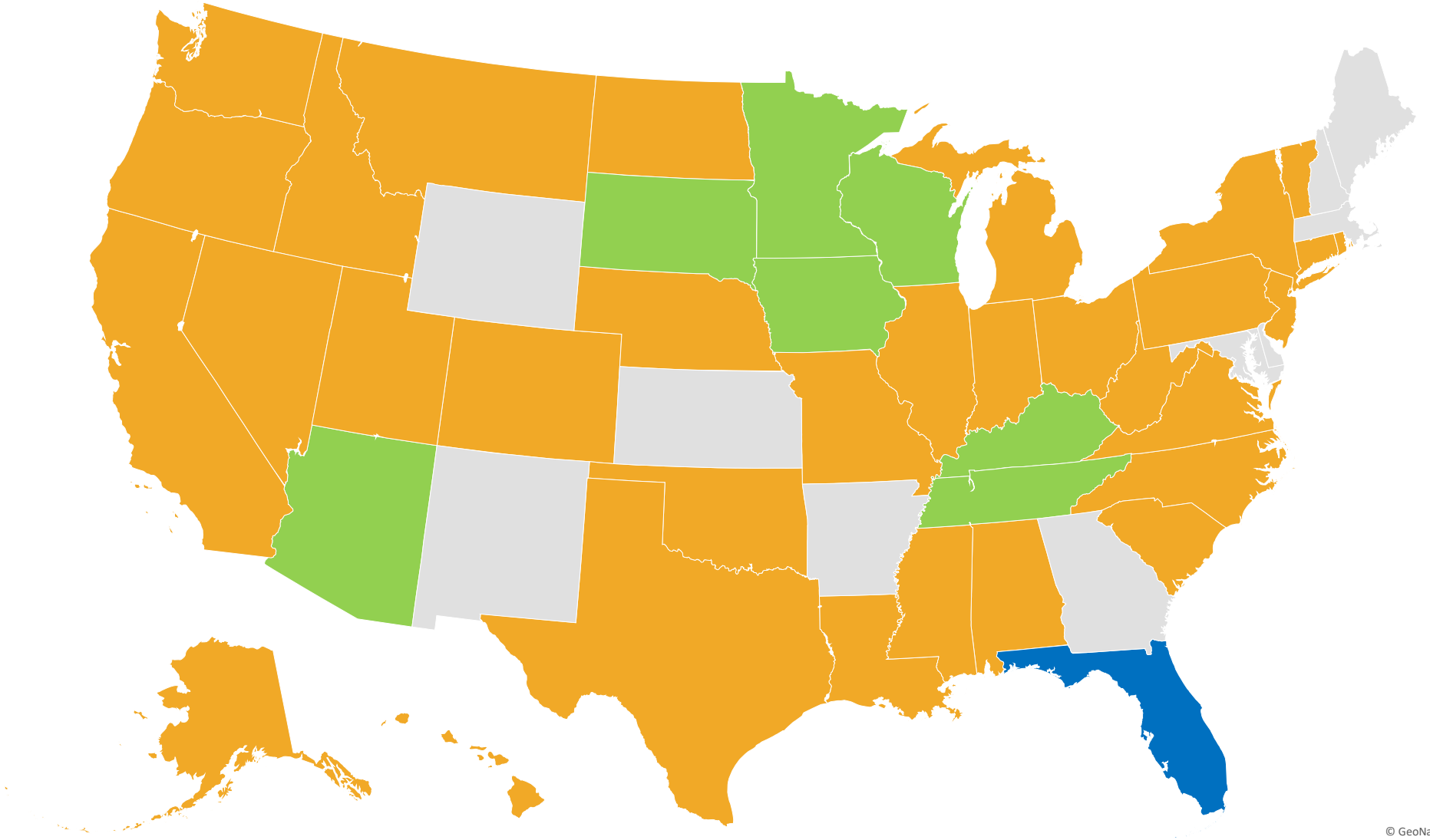
*LOTs > 95 IRI left in place receive -$800 LOT pay adjustment.

- Full pay is IRI 43-55
  - Incentive/disincentive pay per 0.1-mile lot is ±$20/IRI above or below full pay range
- Remove & replace requirements begin at 95, but can be left in place with engineers' discretion, with a maximum penalty
- There is no localized roughness requirement
- Adopted into standard specifications in 2025

Nationwide Incentive Ranges

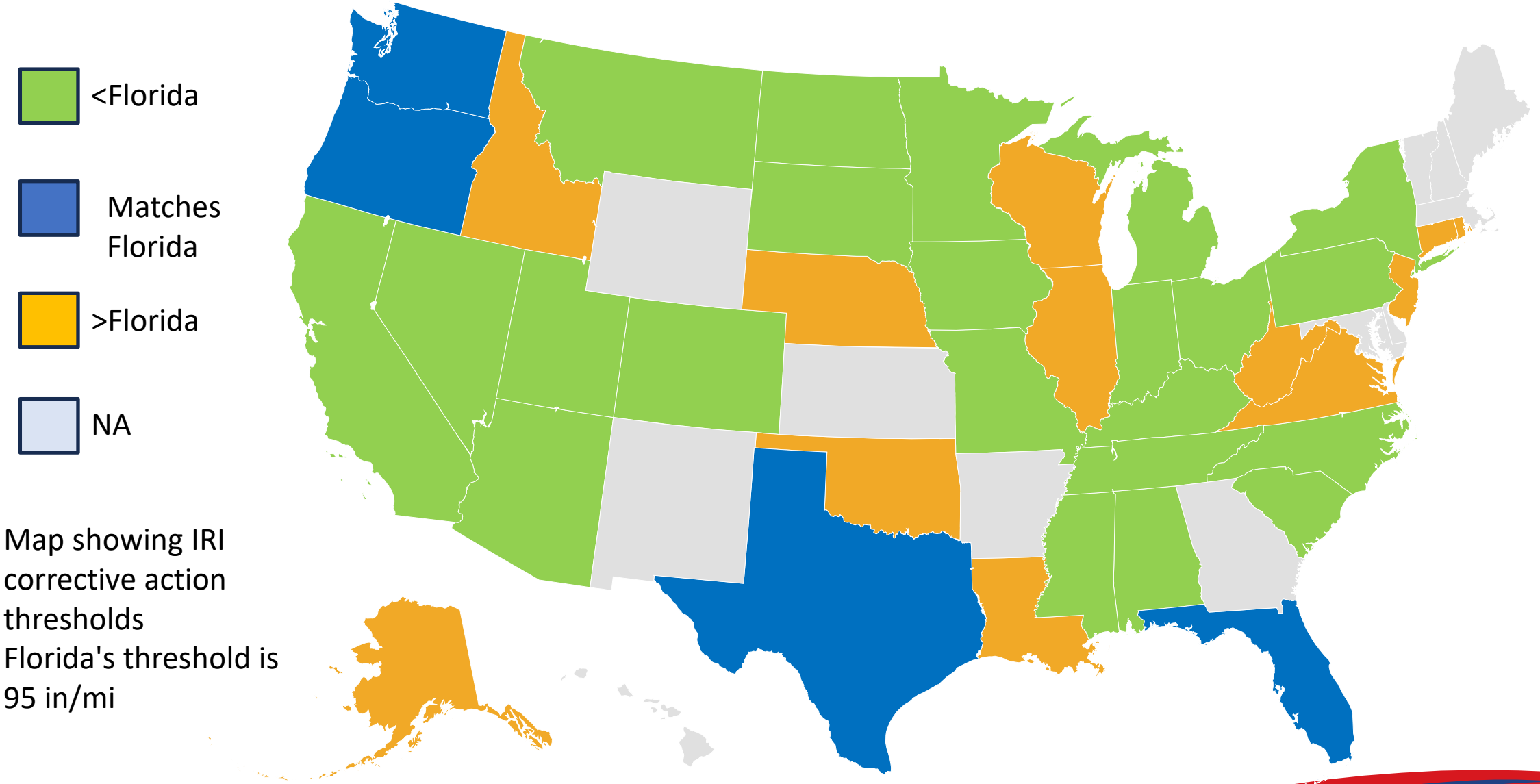
Florida's incentive range is below 43 IRI points for Limited Access

- <Florida
- Matches Florida
- >Florida
- NA



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Corrective Action Thresholds



Map showing IRI corrective action thresholds
Florida's threshold is 95 in/mi

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Effects of Specification

- Since implementation*, a net $2 million in incentives has been paid, an overall average of $249 per lane mile
  - 183 projects received incentive
  - 118 received disincentive
- Project level average incentive has been ~$6K
- Removed majority of rolling straight edge on the interstate, decreasing costs & increasing safety
- Driven average IRI down 5 points

*Data as of 10/1/2026

Non-Limited Access Specification 330

- Given success of limited access IRI incentive program & its full adoption into specs, a similar specification for non-limited was desired
- There are more differences in pavements & paving situations on non-limited roadways so a single incentive range could be harsh to difficult paving situations
- Research into other states procedures did not yield an acceptable specification, so further research into our historic data was needed

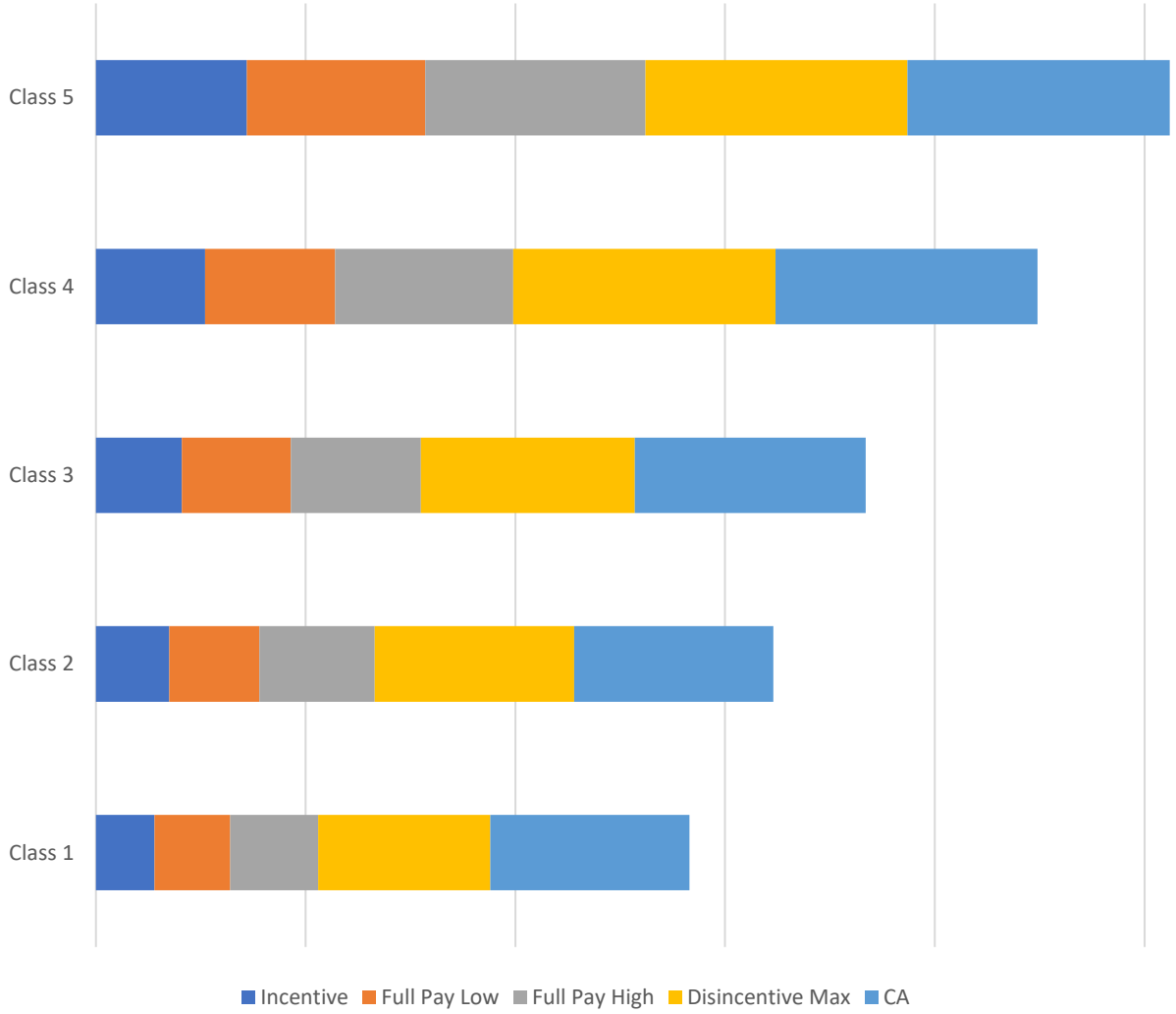
Multi-Class Development

- Incentive/disincentive ranges & system had been very successful, so goal was to develop a straight-forward way to implement a similar system
- A multi-class system which was based on projects historic smoothness was proposed
- The range determination was done so that no district or class was net negative over analysis period
- Generally, if project IRI improved from last paving, incentive would be paid on project

The 5-Class System

- 5 smoothness classes developed
  - Class 1 is smoothest
- Smoothness class was determined by most recent smooth measurements of new pavement within the project limits
  - If no data was available, default class of 2 was assigned
- Ranges exist to reflect project paving challenges
  - Specifics are outlined in FM5-623
- Implemented in Dev Spec 330, in 2022
- Became Standard Spec 330 for Fiscal Year 2025-2026

Class Visualization



Smoothness Class	IRI Classification Limits	IRI Pay Limits			
		Incentive	Full Pay	Disincentive	R&R
1	≤ 41	≤ 35	36 - 42	43 - 95	>95
2	42 - 49	≤ 42	43 - 55	56 - 95	>95
3	50 - 60	≤ 51	52 - 62	63 - 110	>110
4	61 - 84	≤ 61	62 - 85	86 - 125	>125
5	≥ 85 -	≤ 84	85 - 105	106 - 125	>125

Pilot Project Overview

Smoothness Class	FIN	District	Project IRI	Incentive	LM	Incentive/LM	Fiscal Year
4	44804015201	7	54	$ 19,595	15.32	$ 1,279	2026
4	44547315201	1	51	$ 30,776	22.043	$ 1,396	2025
3	44794815201	7	55	$ 1,082	14.376	$ 75	2026
3	44620815201	1	55	$ 542	19.456	$ 28	2025
3	44514415201	1	40	$ 42,631	27.645	$ 1,542	2026
3	44155015201	1	59	$ (2,102)	7.721	$ (272)	2025
4	44521715201	5	62	$ 11,642	16.703	$ 697	2025
1	44563115201	3	35	$ 9,512	23.336	$ 408	2026
3	44575915201	3	41	$ 34,135	20.456	$ 1,669	2025
2	42293855201	2	72	$ (7,830)	2.182	$ (3,589)	2025
2	44520815201	5	45	$ 876	4.325	$ 203	2025
3	44617115201	4	62	$ (15,208)	23.242	$ (654)	2025
5	44780615201	6	92	$ 691	3.689	$ 187	2025
2	44965615201	1	61	$ (5,355)	3.173	$ (1,688)	2026
3	44897415201	1	51	$ 5,012	8.84	$ 567	2026
Overall			55	**$126,000**	213	**$ 123**	

Statewide Class Summary

Percent of district in each smoothness class

District	Class 1	Class 2	Class 3	Class 4	Class 5
D1	17%	30%	**35%**	16%	2%
D2	**33%**	32%	20%	14%	2%
D3	**47%**	36%	10%	6%	1%
D4	2%	18%	19%	**35%**	26%
D5	11%	**37%**	34%	15%	3%
D6	0%	4%	19%	32%	**46%**
D7	7%	31%	**35%**	25%	2%
Statewide	**20%**	**26%**	**23%**	**19%**	**12%**

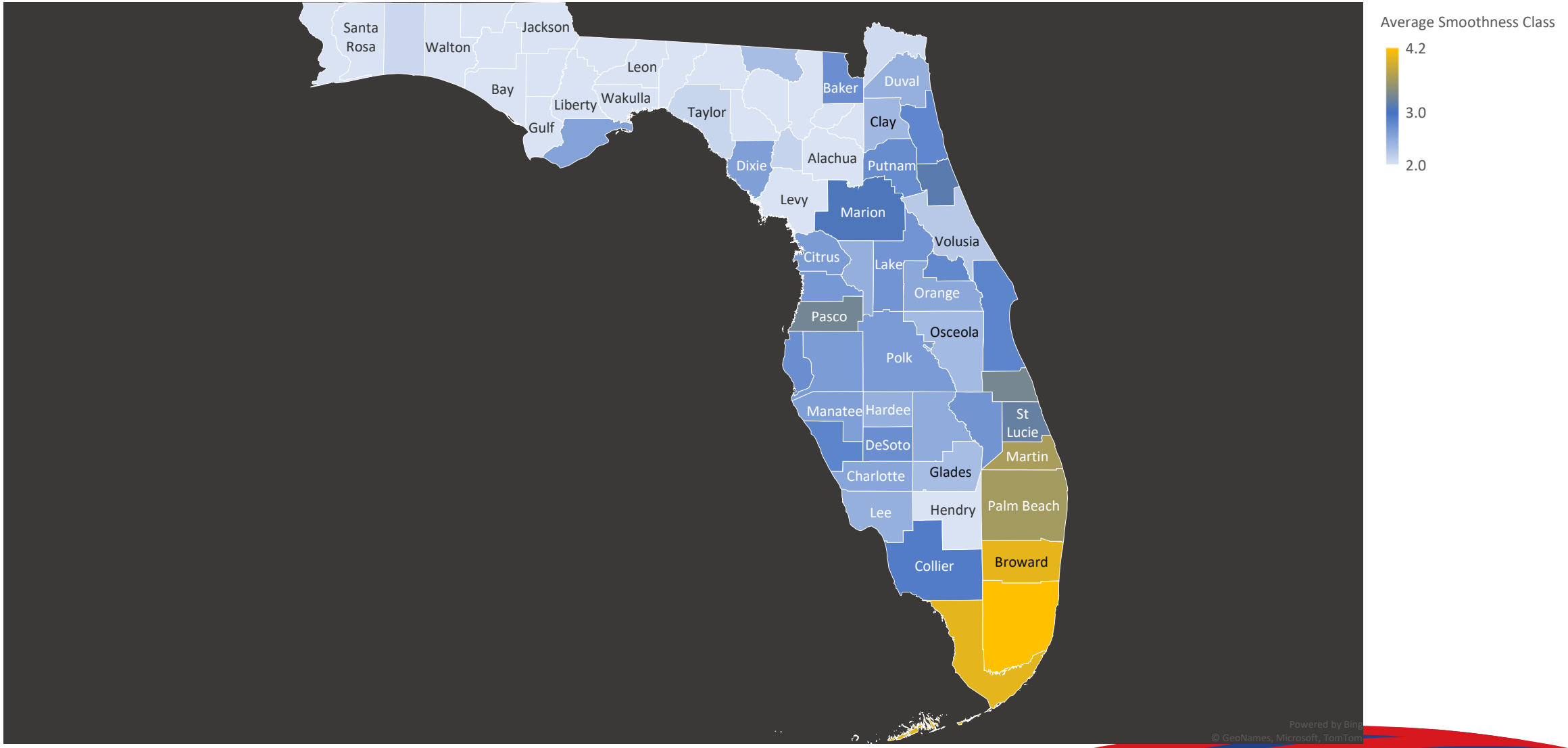
Percent of Smoothness Class in each District

Smoothness Class	D1	D2	D3	D4	D5	D6	D7
Class 1	13%	32%	**44%**	1%	7%	0%	3%
Class 2	16%	23%	**25%**	5%	18%	3%	10%
Class 3	**22%**	17%	8%	6%	18%	15%	13%
Class 4	12%	14%	5%	14%	10%	**32%**	11%
Class 5	2%	3%	1%	17%	3%	**72%**	1%

Non-Limited Access Roadways since 2010
Expressed as percent of projects that would fall in that class

Statewide Class Summary

County Average Smoothness Class



Application

- The new specification can be added to existing projects if requested
- All new high speed (design speed ≥ 55mph) projects will have a smoothness class assigned during design so that information is readily available & will be tested with laser profiler
- Completed projects can request to see what project IRI would be & how it would have performed under this specification
- Projects can request to change to multi-class system after getting ride number results, follow up with local construction & materials office, but this change must benefit state

Example Case

Ride Number

Lane	Total Lots	Deficient	Status
R1	74	10	Fail
R2	74	12	Fail
L1	74	2	Fail
L2	74	18	Fail
Total	**296**	**42**	**Fail**

14% of lots, **4.2 additional lane miles** would have required straight edge

IRI Class 2

Lane	Total Lots	Incentive	Full Pay	Disincentive	Corrective Actions
R1	74	46	27	1	0
R2	74	42	29	3	0
L1	74	57	17	0	0
L2	74	44	25	5	0
All	**296**	**189**	**98**	**9**	**0**

Project is complete for smoothness, no additional testing required
There would be a total **incentive of $20K** on this project

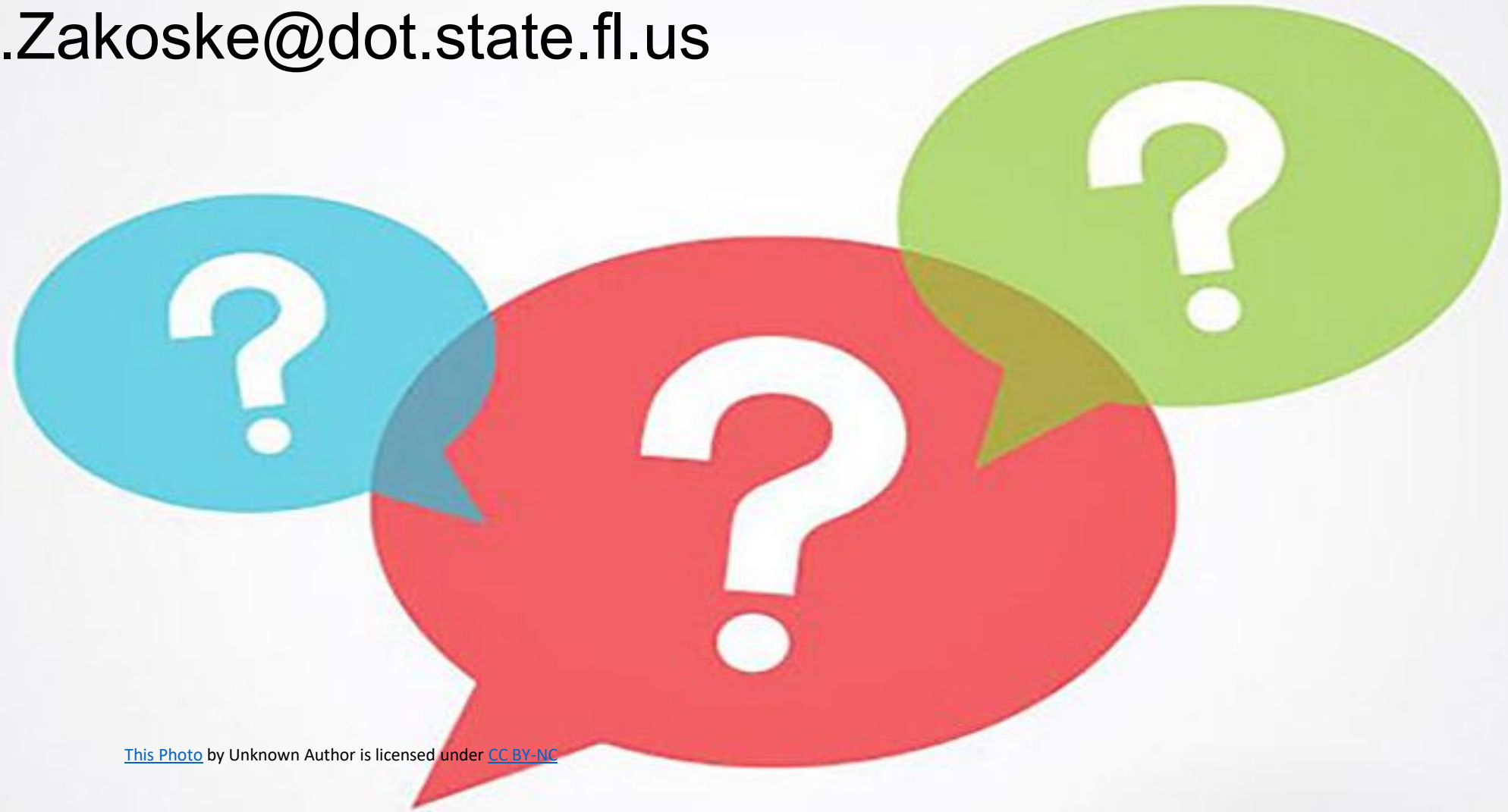
No additional testing is required to change from ride number to IRI

Summary

- Pavement smoothness is moving towards laser profiling, IRI, & incentive/disincentive specifications
- Multi-class system for non-limited access was developed to account for challenging projects and to ensure pay factors were fair
- Laser profiling is faster, safer, and provides better overall data
- Incentive specifications lead to smoother pavement, which is better pavement

Questions

- Nick.Zakoske@dot.state.fl.us



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