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HISTORICAL RIDE QUALITY OUTCOMES UNDER SCDOT'S RIDEABILITY SPECIFICATION

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PAVEMENT ENGINEER

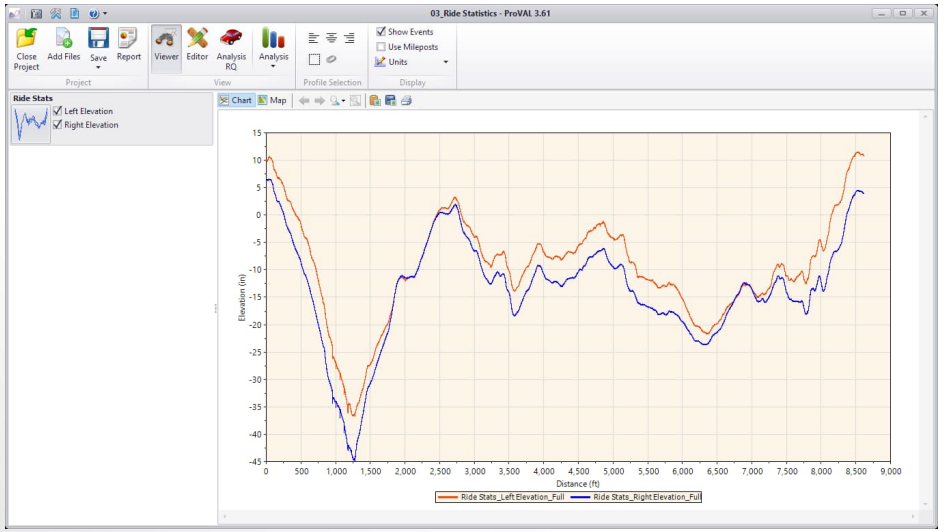
OUTLINE

- Background
- Study Objectives
- State of Practice
- Analysis of Historical Rideability Data
- Conclusions

BACKGROUND

Pavement Roughness

- A key functional performance indicator affecting comfort, fuel efficiency, safety, and maintenance costs.
- Lower initial IRI (post-construction) is generally associated with improved long-term pavement performance and reduced maintenance needs.
- Many transportation agencies have adopted rideability specifications for new pavement construction.



BACKGROUND

SC Rideability Specification

- SCDOT implemented a rideability specification based on the International Roughness Index (IRI).
- The specification establishes incentive and disincentives to improve ride quality, tailored to different project types.

History

- September 2008 : Applied to new construction and resurfacing projects
- September 2011: New Tables introduced following rideability research
- April 2016: Transition from point laser to line laser technology
- July 2021: Addition of CMRB single lift provision

Supplemental Technical Specification for

Rideability for Asphalt Mixtures

SCDOT Designation: SC-M-403 (4/16)

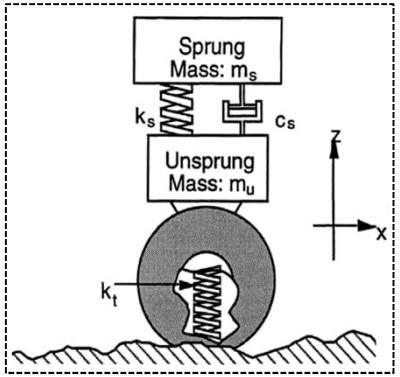
1. SCOPE

1.1. The Resident Construction Engineer (**RCE**) will evaluate asphalt surfaces for a satisfactory ride. If conditions permit and unless otherwise specified in the special provisions, the Materials and Research Engineer will test the asphalt surface in accordance with **SC-T-125** when requested by the **RCE**. General guidelines for the application of this specification are shown in Figure 1.

2. REFERENCED DOCUMENTS

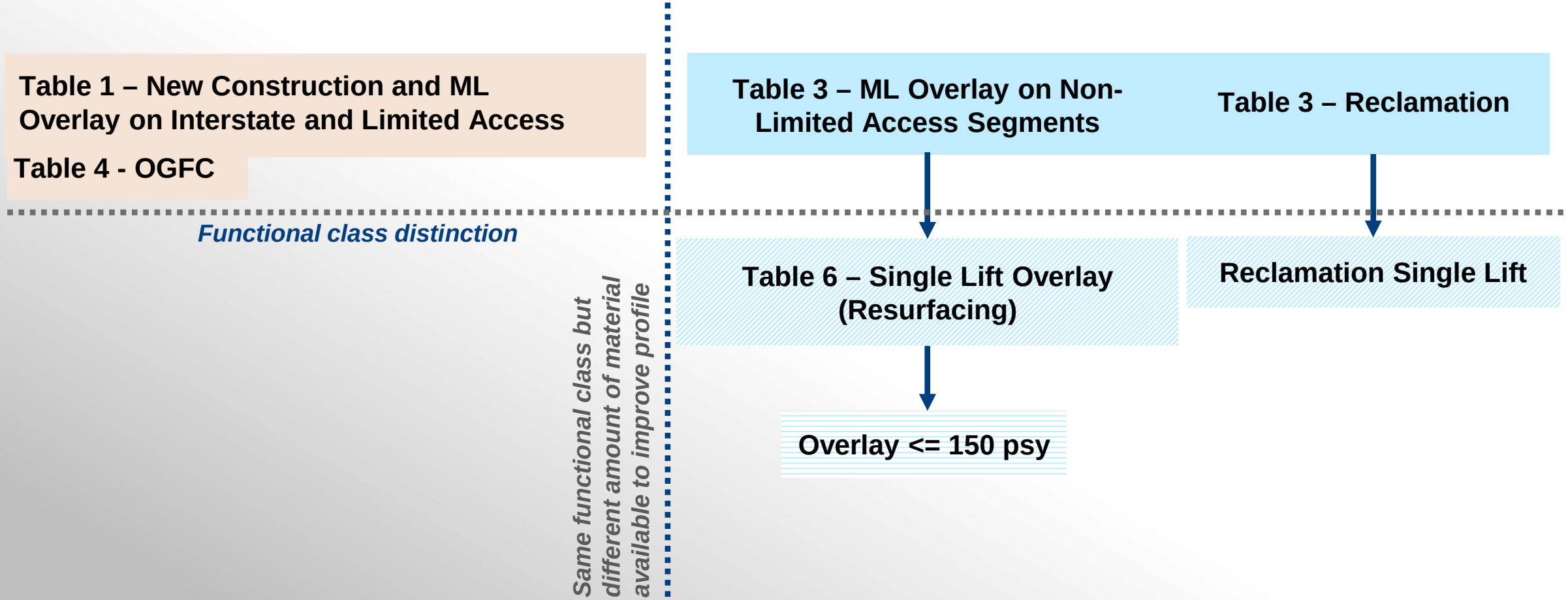
2.1. **SC-T-125**, *Measurement of Pavement Rideability using the Dynatest 5051 Mark III Road Surface Profiler with LMI 3D Gocator series wheel path lasers.*

2.2. **SC-M-502**



BACKGROUND

South Carolina's Rideability Specification SC-M-403



BACKGROUND

Motivation for Revising SC-M-403

- A comprehensive statewide analysis of historical project-level rideability performance has not been recently conducted, limiting data-driven updates to the specification.
- Current framework may not optimize cost–benefit or long-term pavement performance incentives.
- Field experience shows recurring CMRB chatter issues, potential gaps in smoothness/ride quality evaluation.
- Current ride specification does not capture localized roughness; a localized roughness-based spec could better address this gap.
- Specification complexity leads to interpretation and implementation challenges.

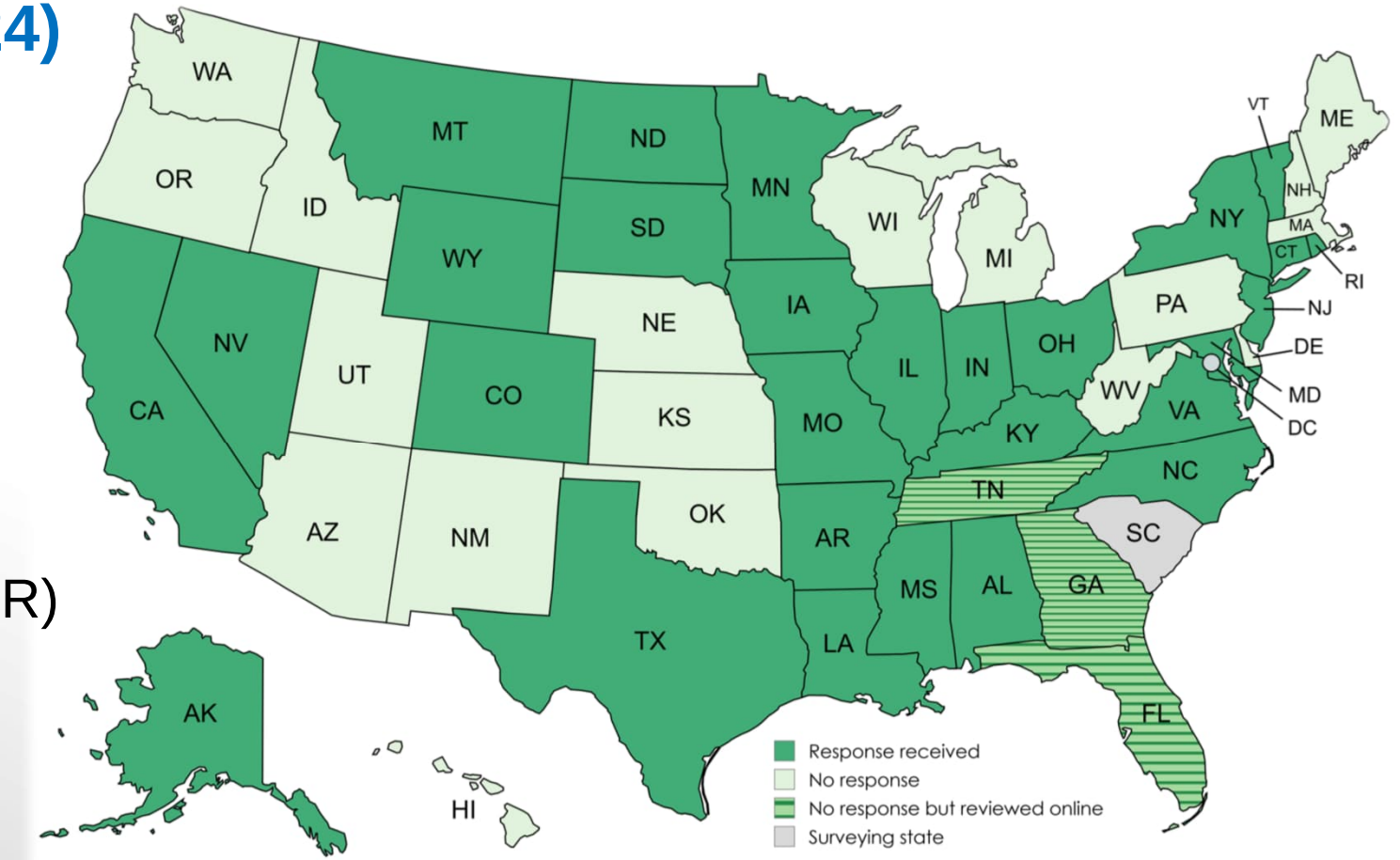
STUDY OBJECTIVES

- Literature Review - Rideability specifications, methodologies, and practices from other states.
- Historical Rideability Data Analysis - SCDOT's historical rideability data to assess the effectiveness of the current incentive and disincentive framework.
- Performance Based Ride Specification - Conduct performance-based assessment of rideability provisions by linking initial pavement smoothness to long-term performance and economic outcomes.
- Localized Roughness Specification Analysis
- Proposal of New Thresholds - Develop recommendations for refinement to SCDOT's existing rideability specification.

STATE OF PRACTICE

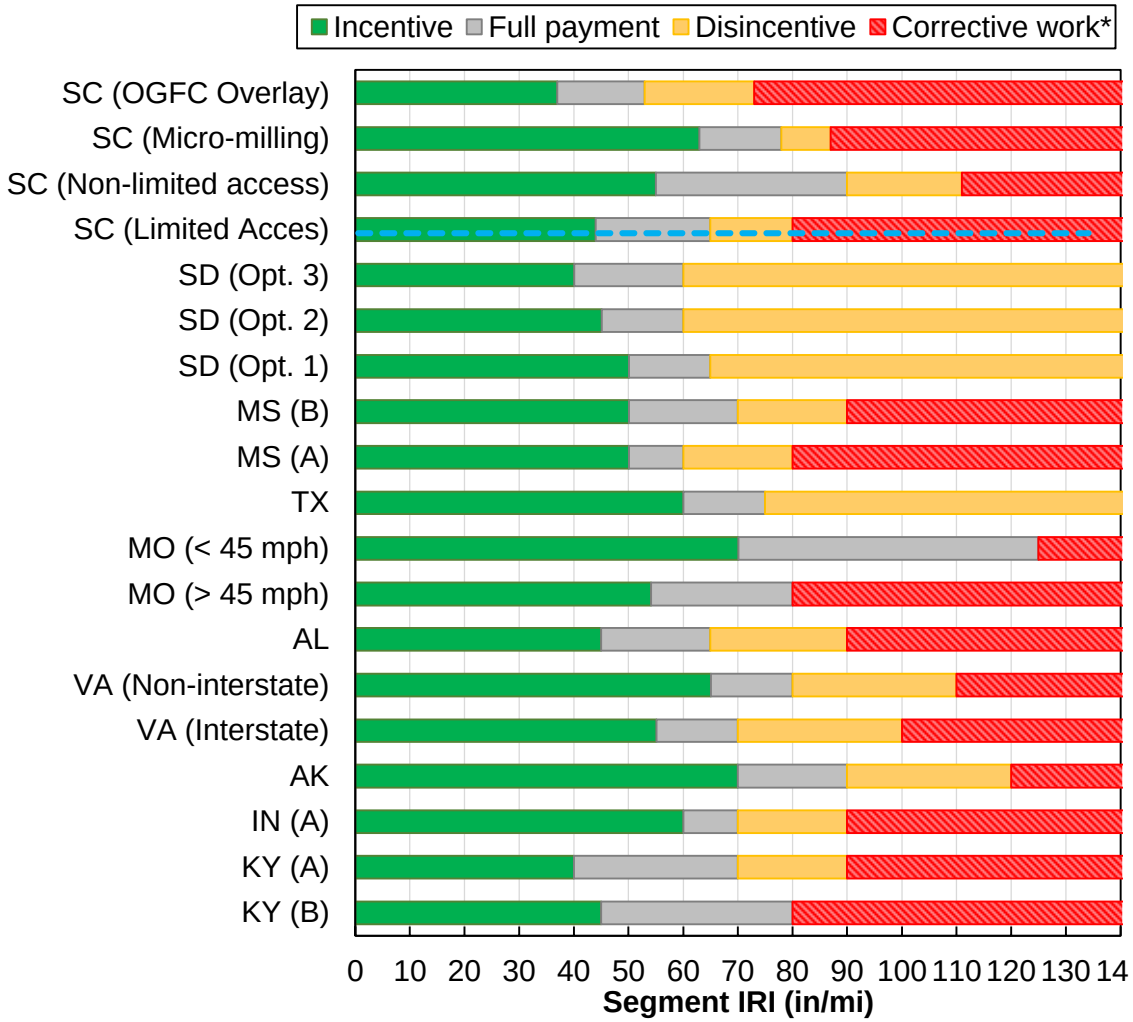
Survey Questions (July 2024)

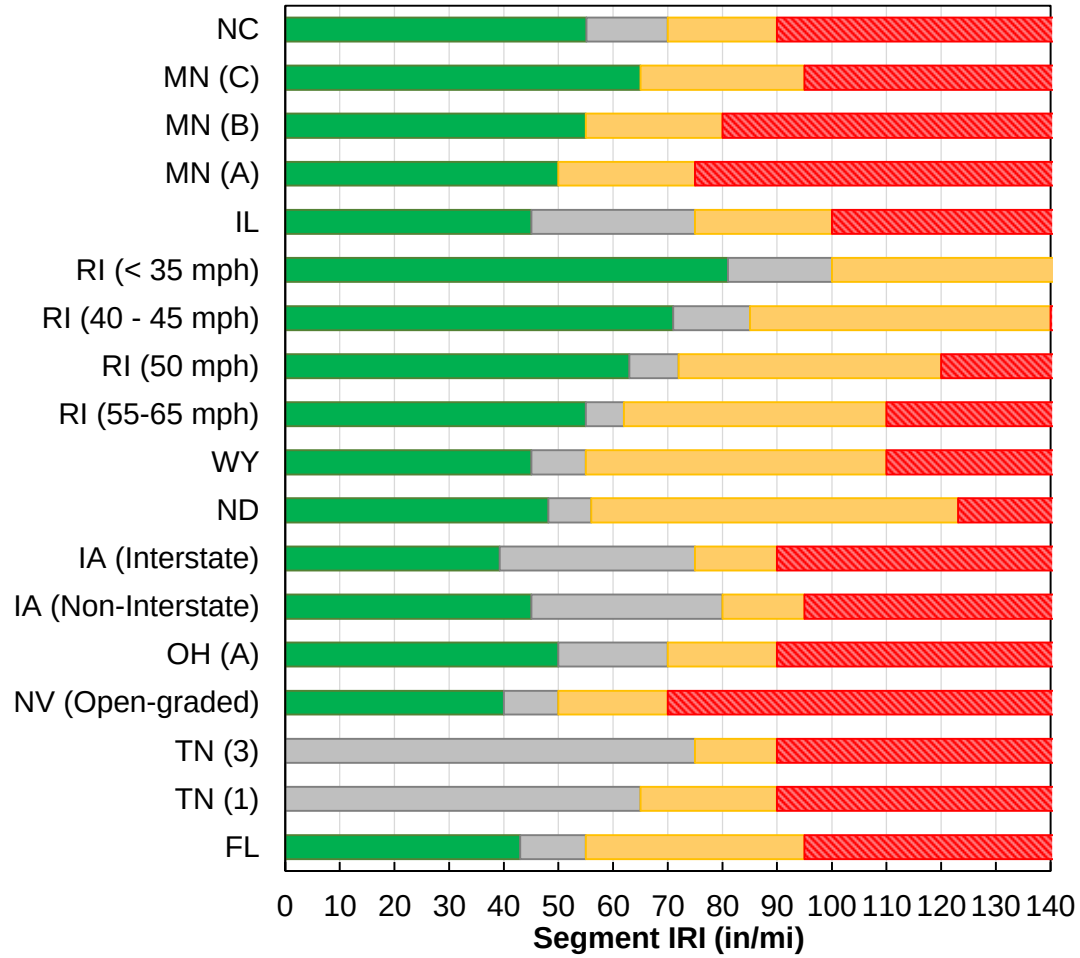
- Structure of ride quality specifications
- Performance requirements and acceptance criteria
- Incentive and disincentive provisions
- Area of localized roughness (ALR) requirements
- Measurement technologies
- Operational and implementation procedures



STATE OF PRACTICE

IRI Requirements

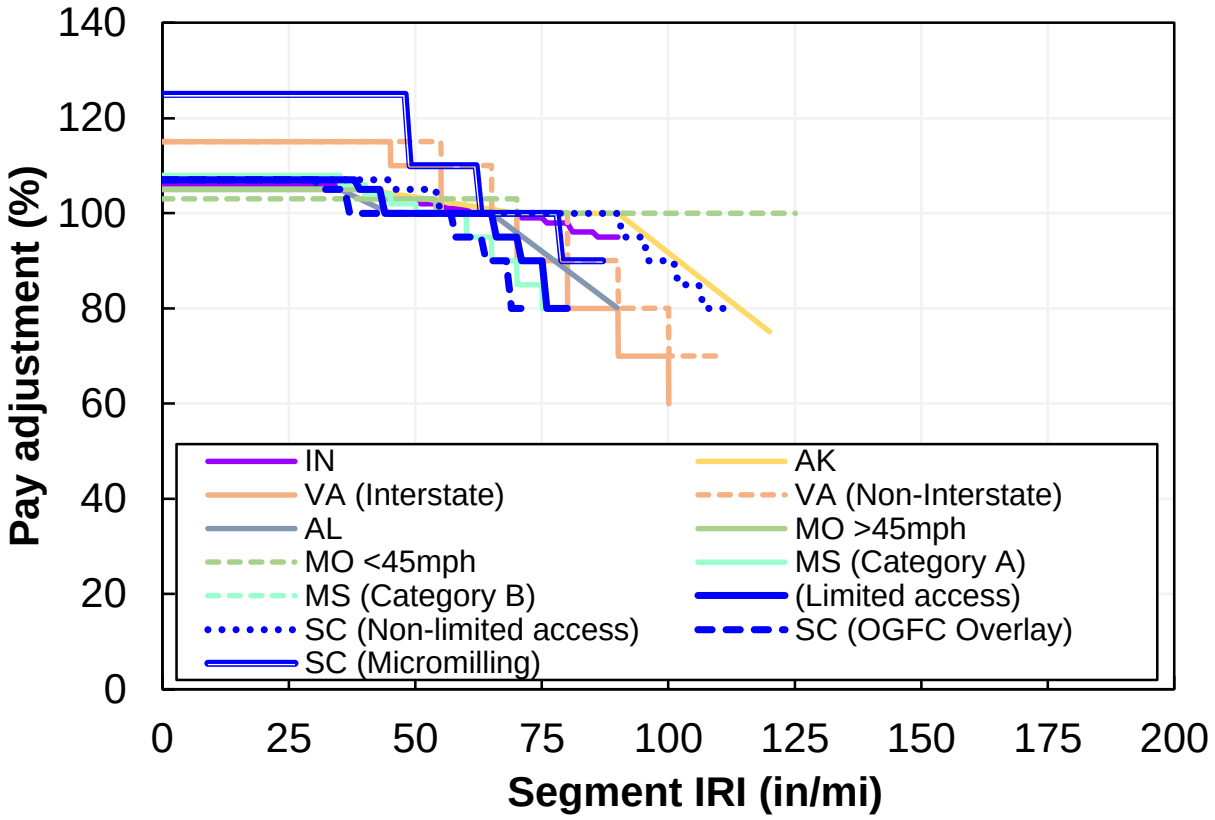




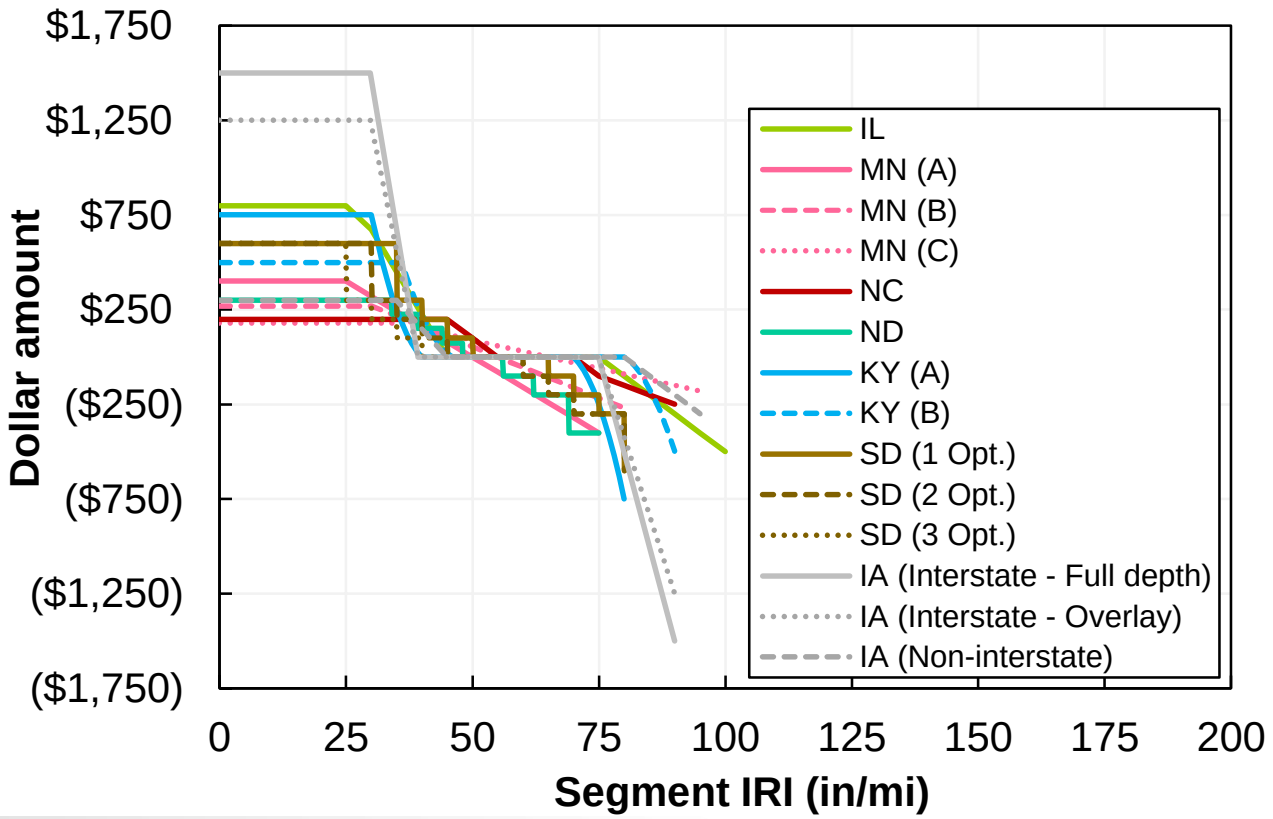
STATE OF PRACTICE

Pay Incentive and Disincentives

Portion of Unit Bid Value

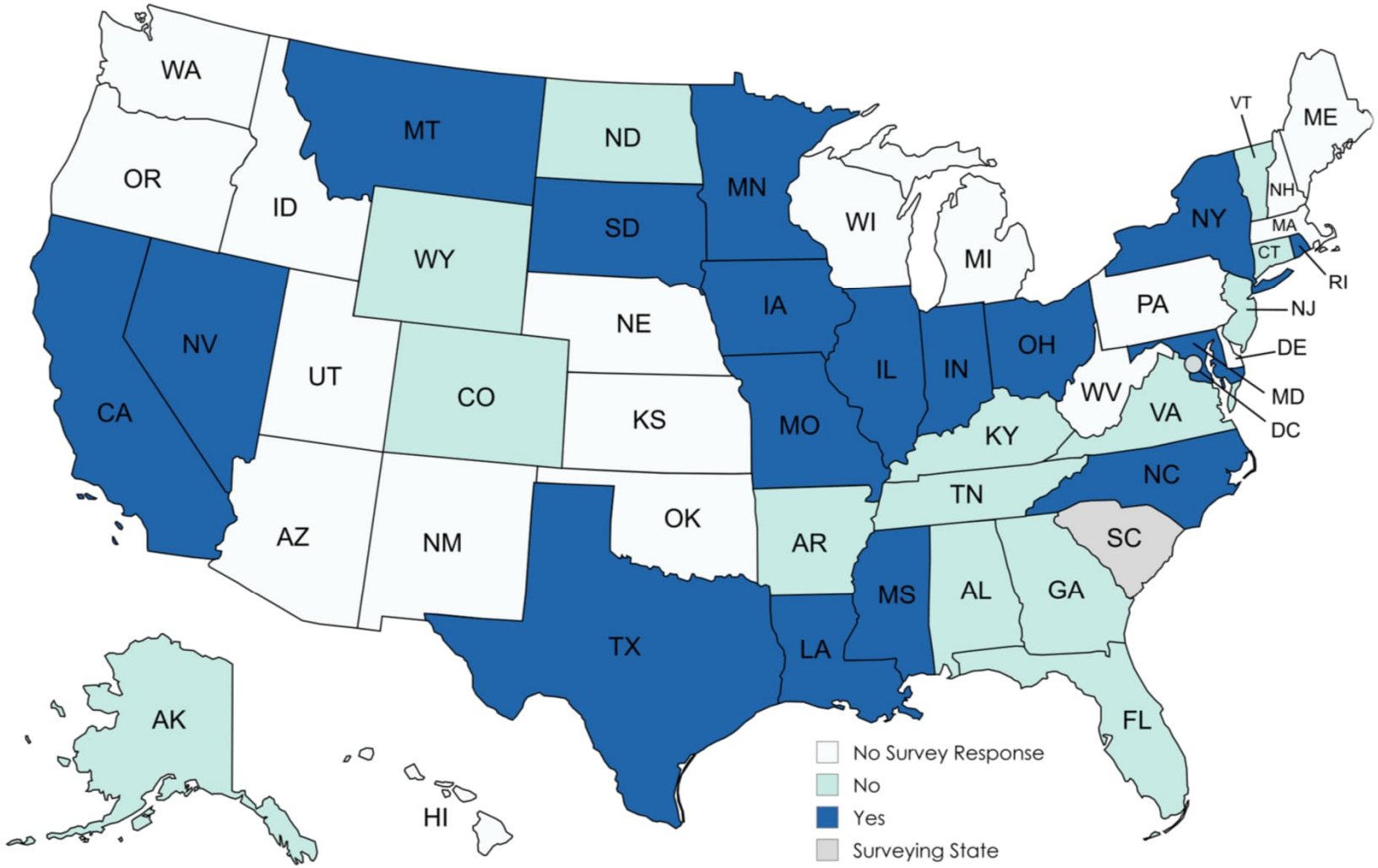


Fixed Dollar Amount



STATE OF PRACTICE

Implementation of Area of Localized Roughness (ALR) Provisions

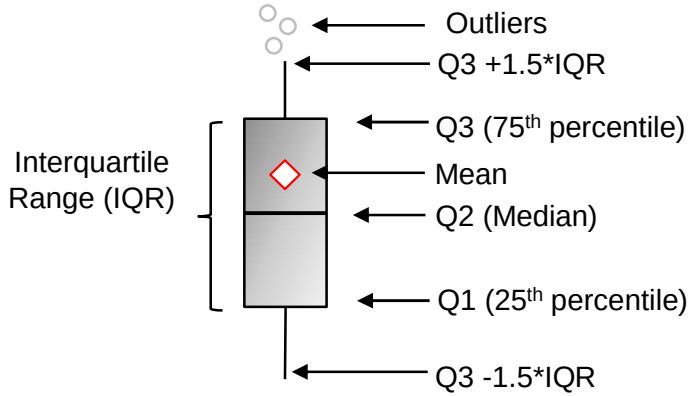


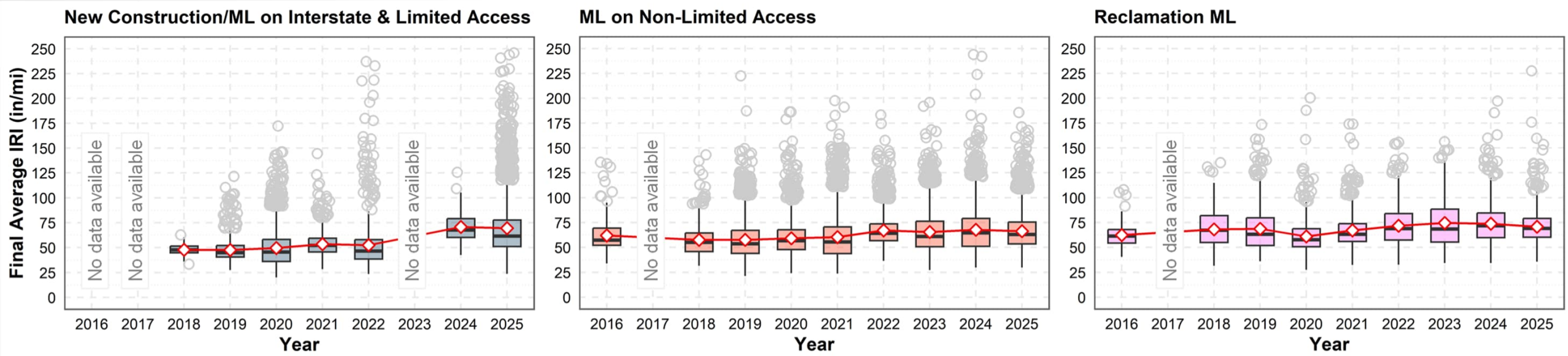
HISTORICAL RIDEABILITY DATA

HISTORICAL RIDEABILITY DATA

Temporal IRI Analysis

- Analysis of IRI trends over the past 10 years





*ML = Multiple lifts

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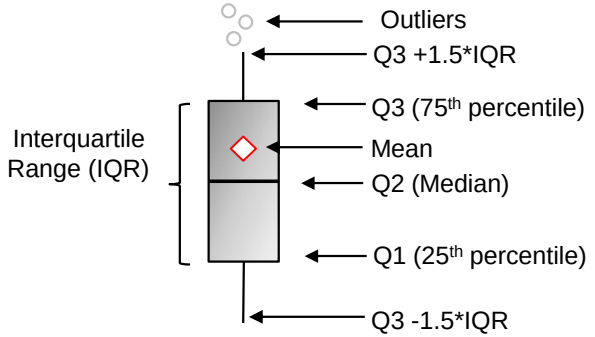

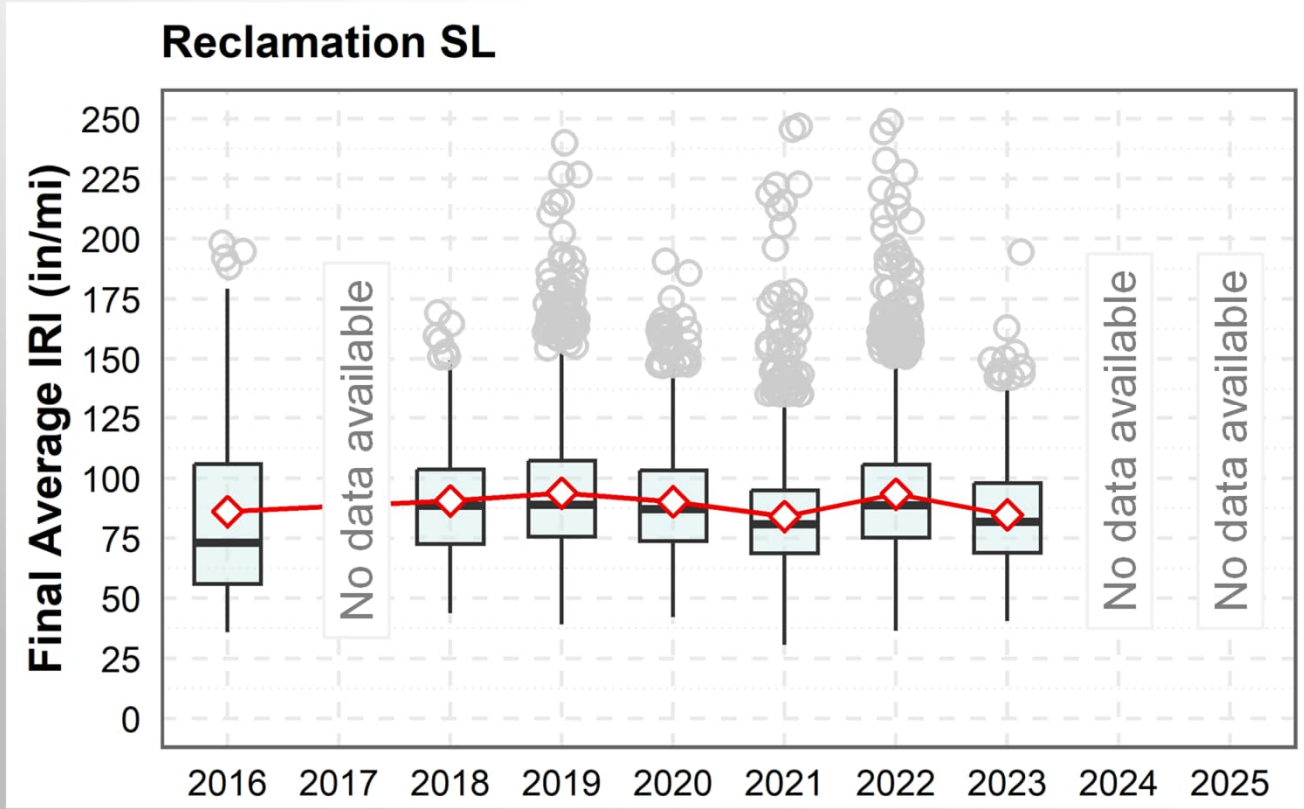

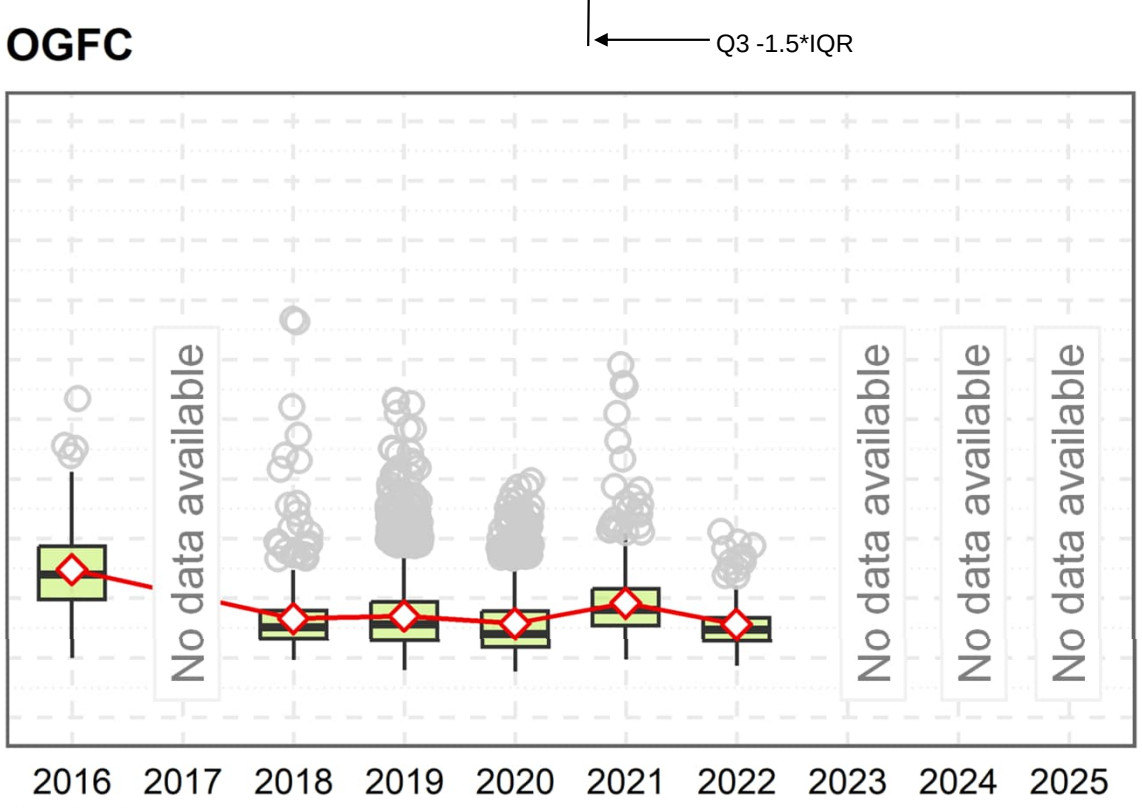

*SL = Single lift

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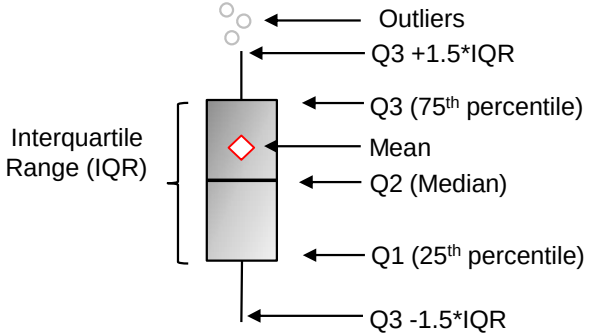
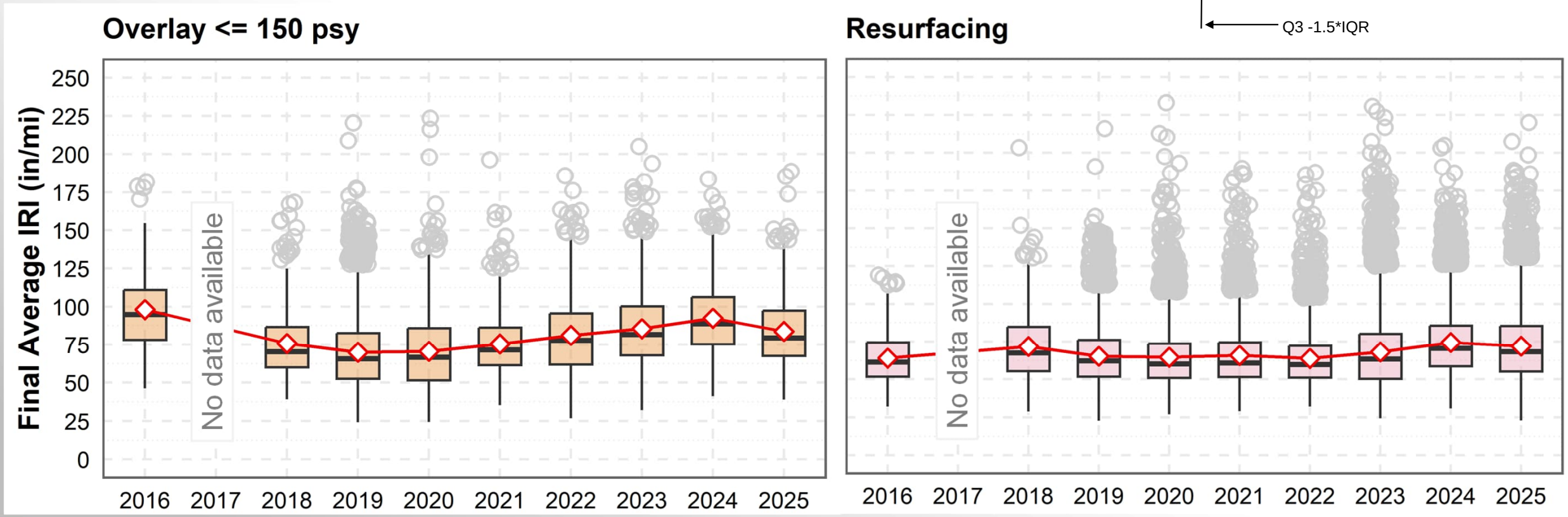




HISTORICAL RIDEABILITY DATA

Temporal IRI Analysis

- Analysis of IRI trends over the past 10 years

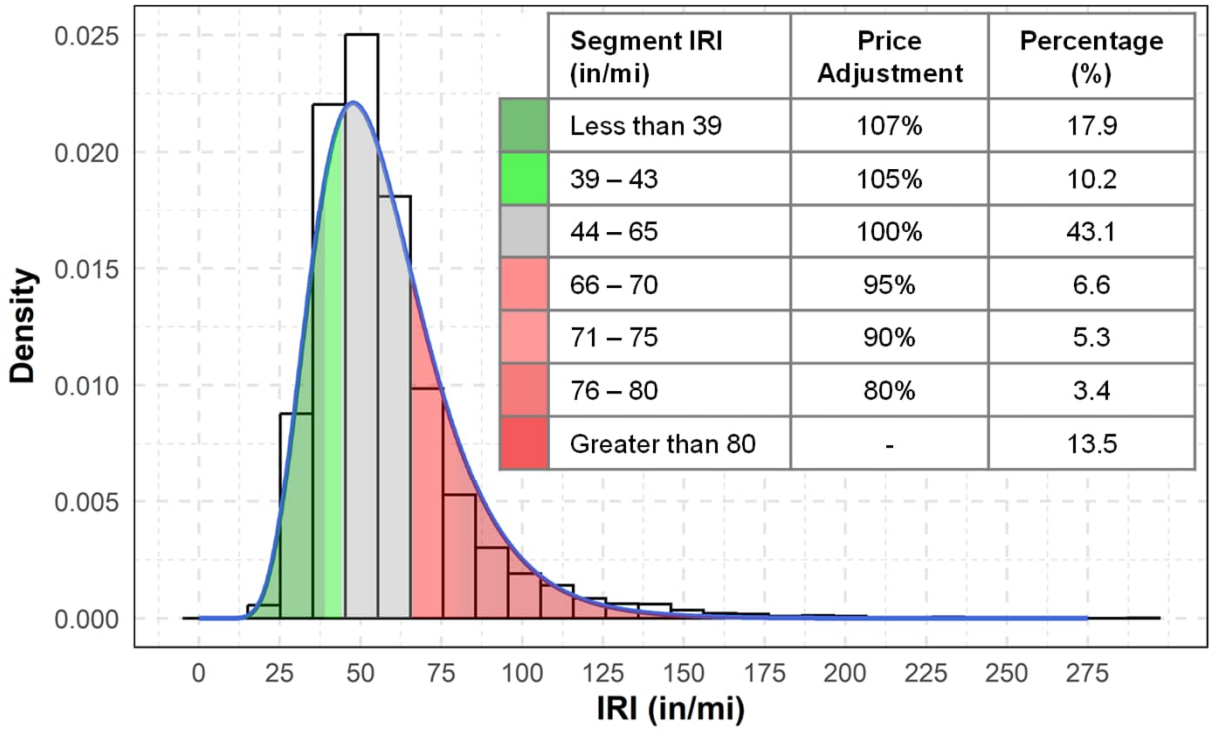
Project/Specification	Average Final IRI (in/mi)										
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Avg.
New construction/ML	NA	NA	47.9	47.8	49.6	53.6	52.5	NA	70.8	69.6	56.0
ML non-limited access	61.9	NA	57.7	57.6	59.2	60.3	67.08	65.5	67.8	66.4	62.6
Reclamation ML	62.4	NA	68.1	68.6	61.1	67.1	71.9	74.5	73.8	70.8	68.7
Reclamation SL	86.1	NA	90.6	93.8	90.3	84.1	93.4	84.8	NA	NA	89.0
OGFC Overlays	62.1	NA	41.5	42.6	39.4	48	39	NA	NA	NA	45.4
Overlay <= 150 psy	98.1	NA	75.8	69.9	70.6	75.5	81.2	85.5	92.4	83.8	81.4
Resurfacing	64.1	NA	71.8	65.3	64.6	65.9	63.8	68.2	74.4	72	67.8

HISTORICAL RIDEABILITY DATA

Statistical Distributions

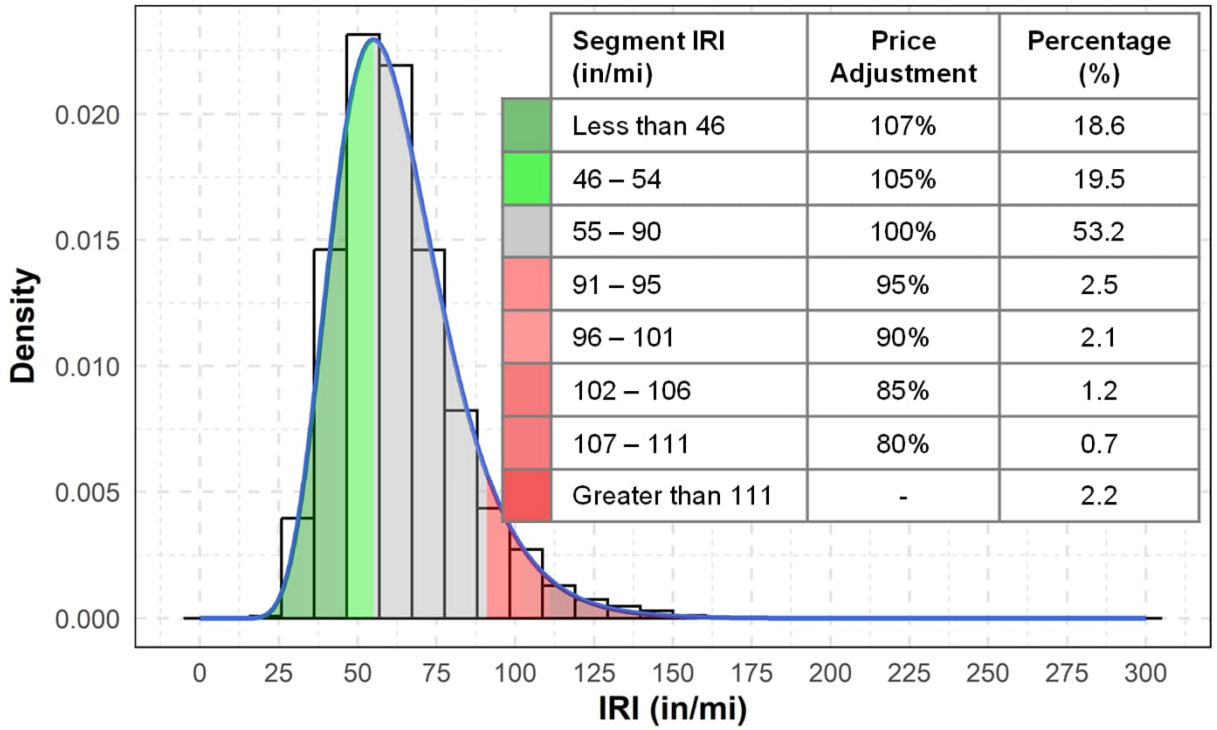
- Distributions of IRI values for each project type and assessment of current thresholds

Specification: Table 1



Segment IRI (in/mi)	Price Adjustment	Percentage (%)
Less than 39	107%	17.9
39 – 43	105%	10.2
44 – 65	100%	43.1
66 – 70	95%	6.6
71 – 75	90%	5.3
76 – 80	80%	3.4
Greater than 80	-	13.5

Specification: Table 3



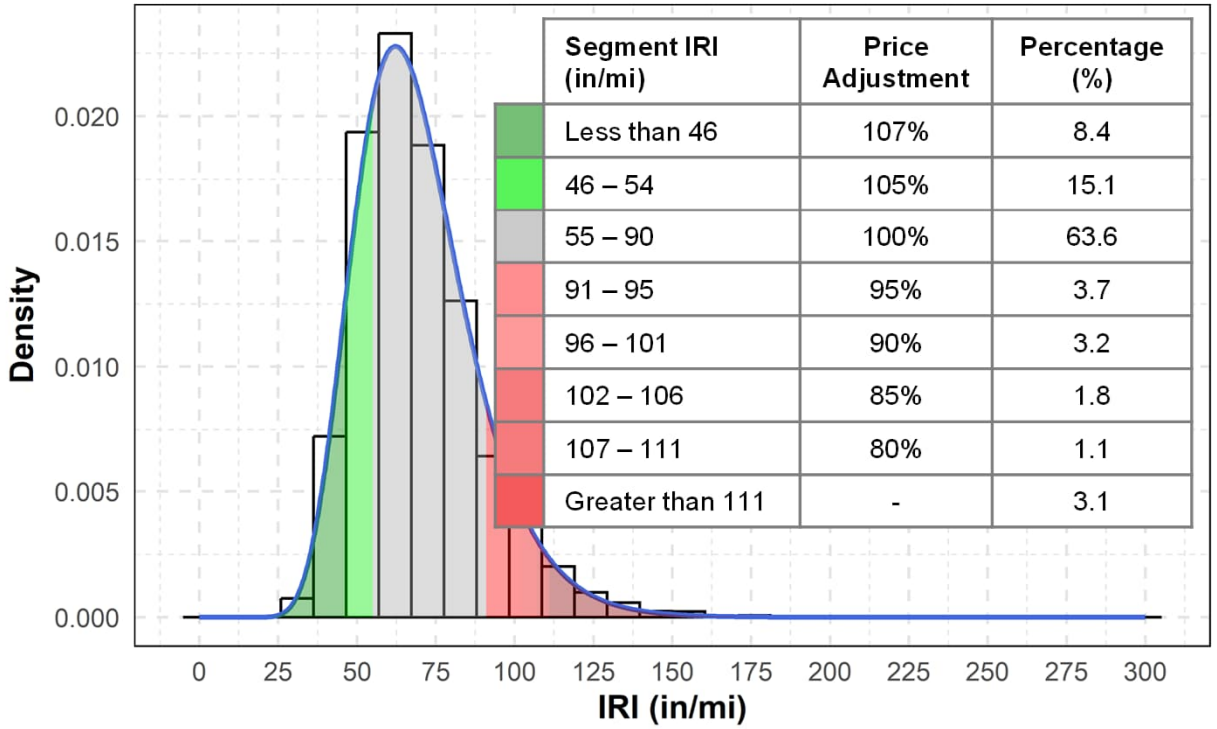
Segment IRI (in/mi)	Price Adjustment	Percentage (%)
Less than 46	107%	18.6
46 – 54	105%	19.5
55 – 90	100%	53.2
91 – 95	95%	2.5
96 – 101	90%	2.1
102 – 106	85%	1.2
107 – 111	80%	0.7
Greater than 111	-	2.2

HISTORICAL RIDEABILITY DATA

Statistical Distributions

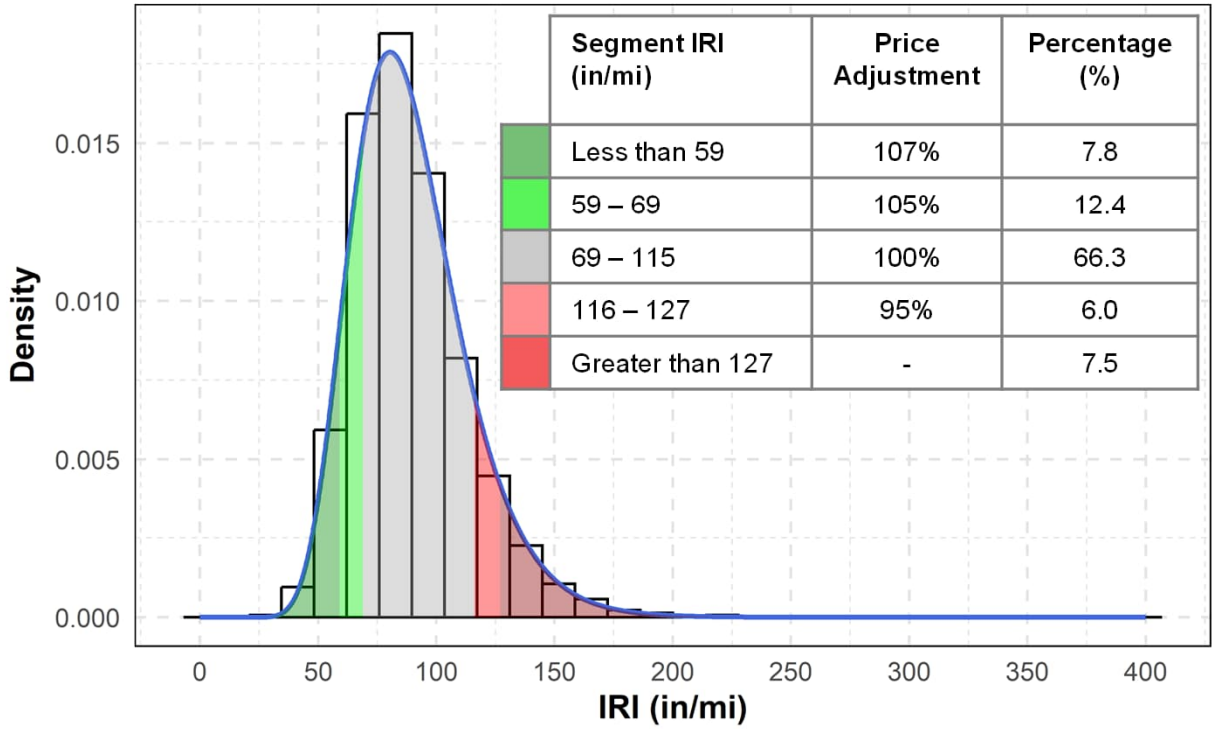
- Distributions of IRI values for each project type and assessment of current thresholds

Specification: Reclamation ML (Table 3)



Segment IRI (in/mi)	Price Adjustment	Percentage (%)
Less than 46	107%	8.4
46 – 54	105%	15.1
55 – 90	100%	63.6
91 – 95	95%	3.7
96 – 101	90%	3.2
102 – 106	85%	1.8
107 – 111	80%	1.1
Greater than 111	-	3.1

Specification: Reclamation SL



Segment IRI (in/mi)	Price Adjustment	Percentage (%)
Less than 59	107%	7.8
59 – 69	105%	12.4
69 – 115	100%	66.3
116 – 127	95%	6.0
Greater than 127	-	7.5

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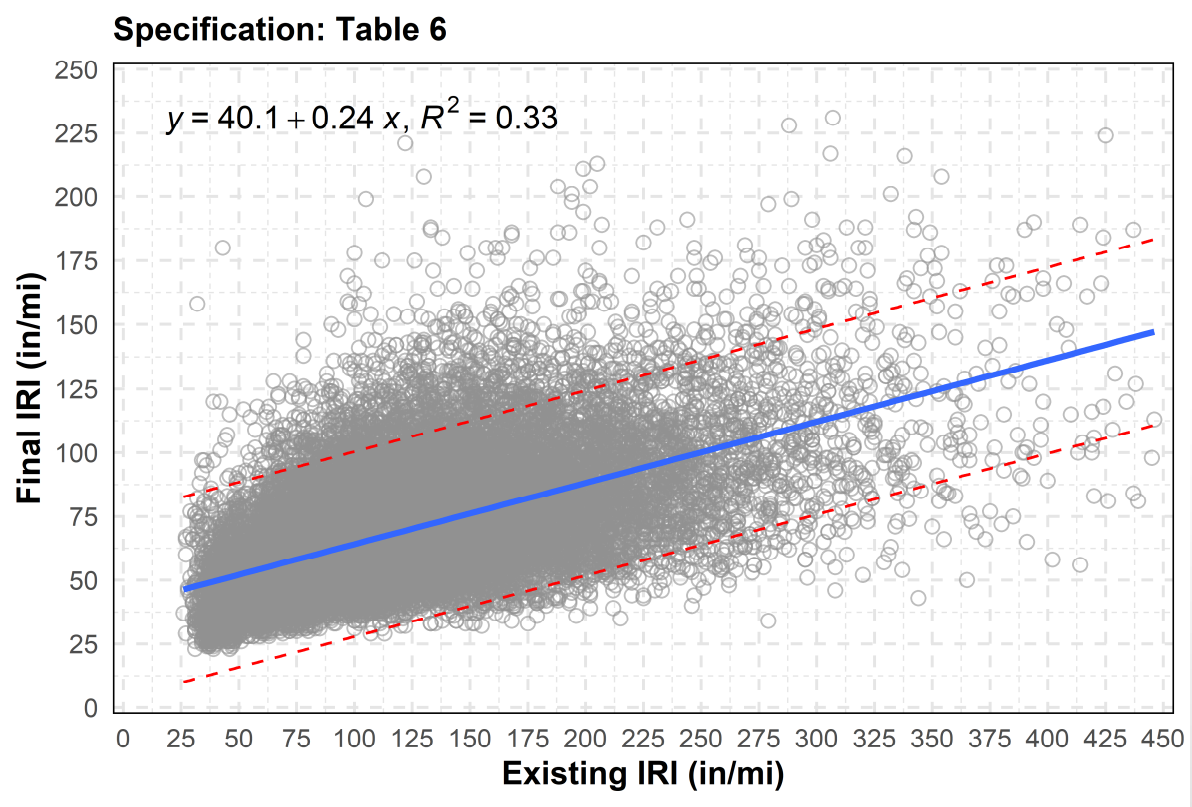

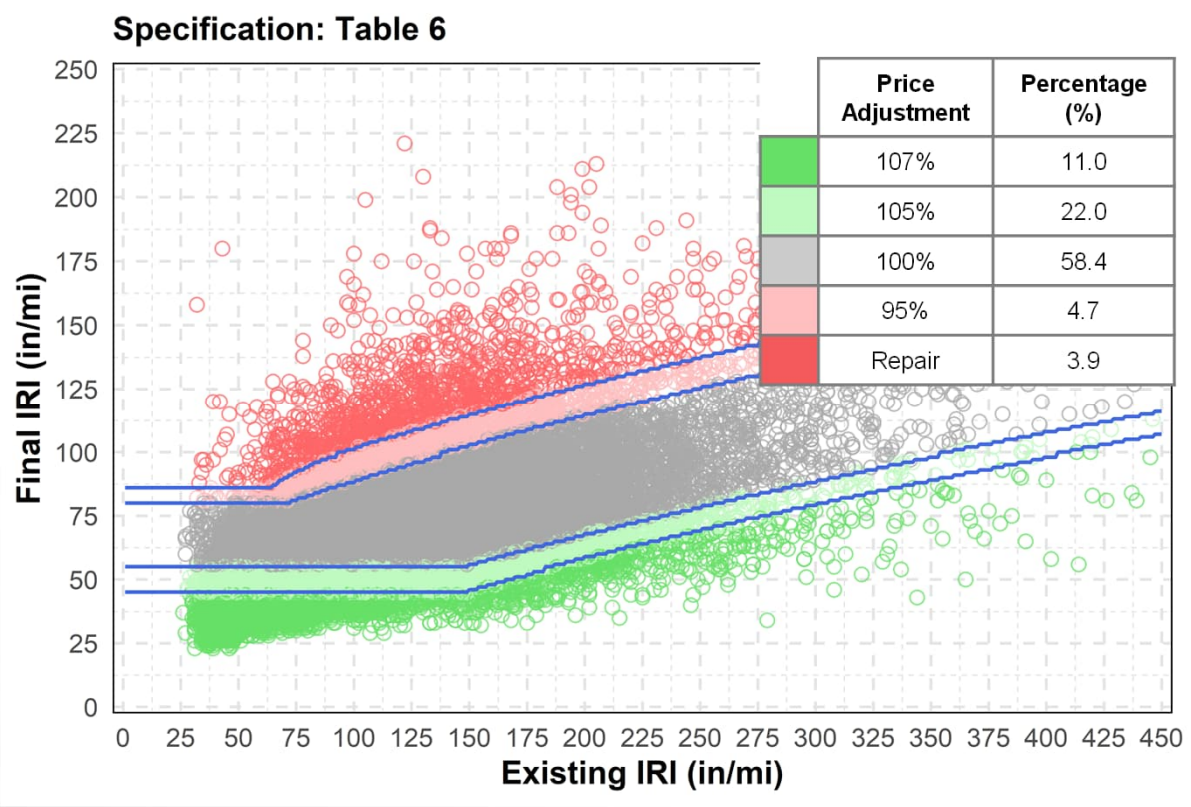

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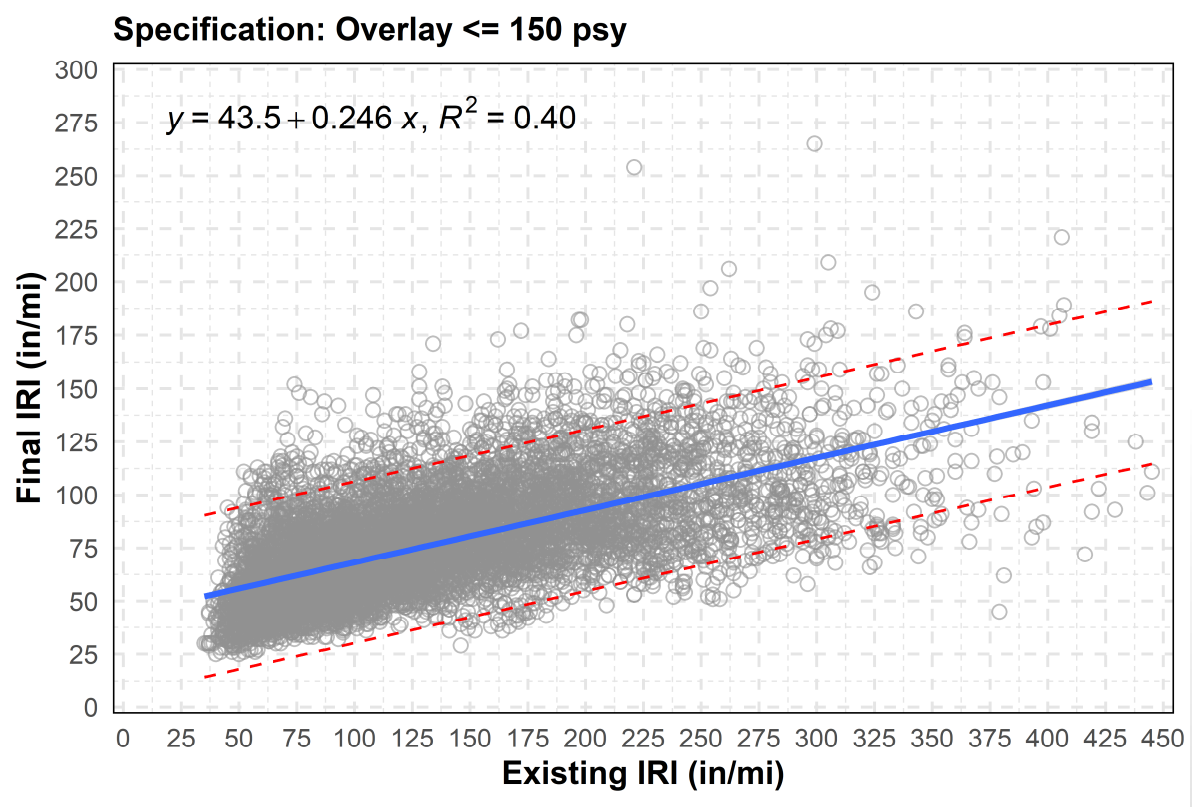
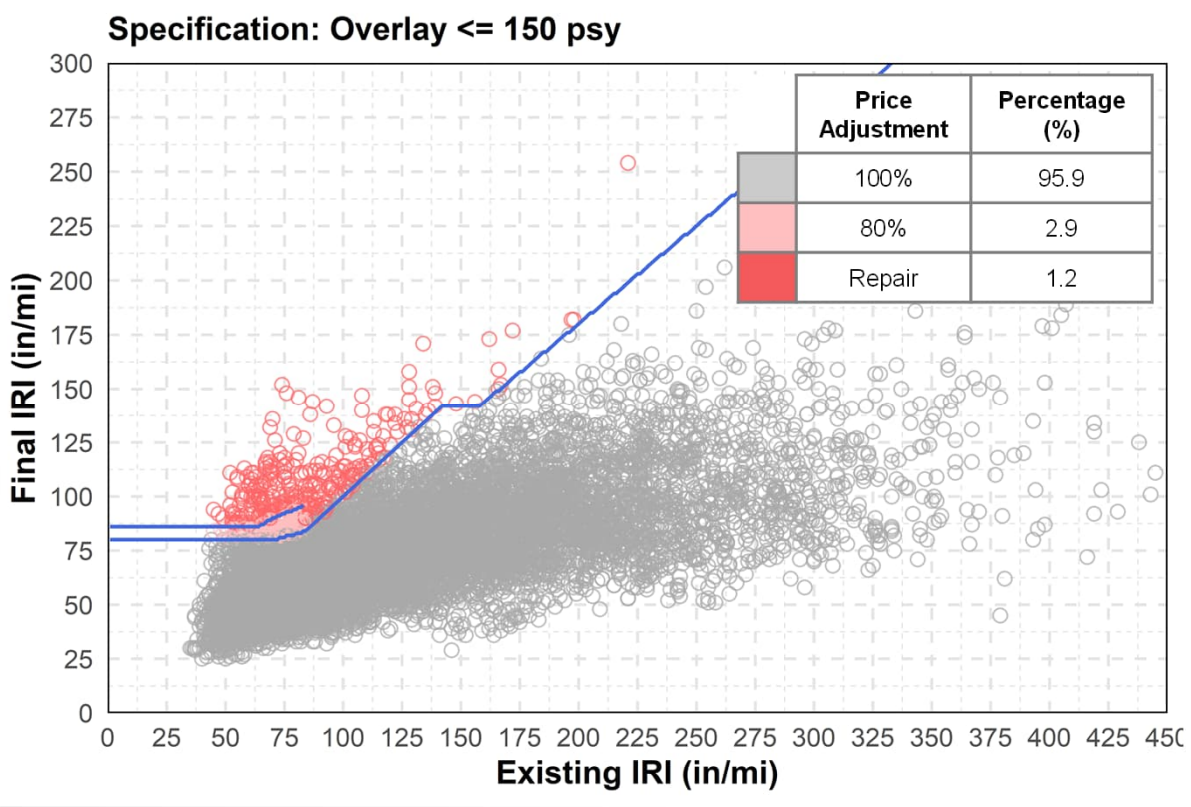




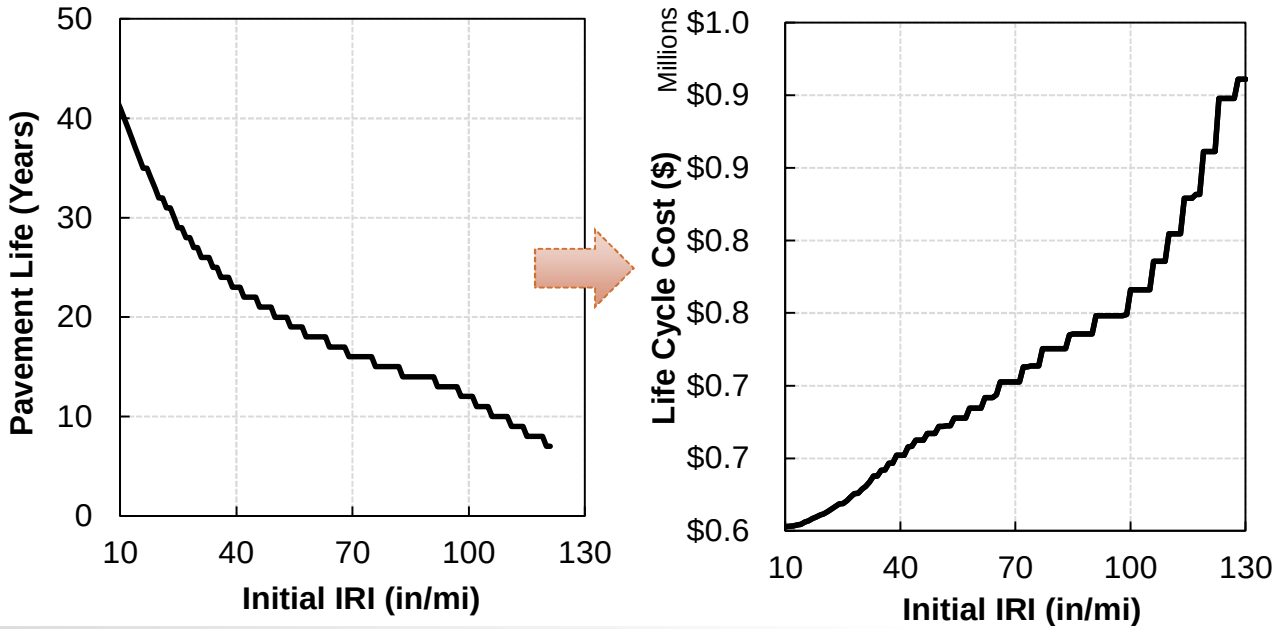
CONCLUSIONS

Conclusions

- Slight increase in IRI for some project types, while no consistent trend was observed for others
- Major segments achieve full pay or qualify incentives
- Small percentage of segments fall into disincentive or corrective-action categories

Beyond Today's Presentation

- Performance-based assessment linking initial smoothness to long-term pavement performance and economic outcomes through roughness deterioration modeling.
- Propose updated rideability specification with new thresholds for each table.



THANK YOU

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