Comparing Subjective Pavement Marking Assessments with Measured Retroreflectivity Values

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TxDOT Project 0-5656

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Objectives

- Compare subjective pavement marking assessment with measured retroreflectivity values
- Compare rank order assessment of adjacent pavement markings of varying retroreflectivity levels

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Purpose

- Improve inspection process
- How accurate can visual observations be
- Not everyone has a retroreflectometer
- Cost/Time savings of subjective vs. quantitative measurement

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Methodology

- Conduct 2 night studies
  - One open road study
  - One closed course study
- Use DOT participants
- 1-5 Subjective rating scale
  - (1) Very poor – (5) New
- Mobile and handheld retroreflectivity data collection

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Methodology

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Methodology

- Pavement Markings Evaluated

- Road Surfaces

Hot Mix Asphalt

Concrete

Seal Coat

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Open Road Methodology

- Open Road Study
  - 8 participants
  - 16 sections
  - Retroreflectivity range (88-419 mcd/m^2/lux)
  - Segment length of 0.1-0.5 miles
  - All participants were passengers
  - All vehicles were Ford Taurus sedans with halogen headlamps
  - Vehicles traveled at posted speeds (30-65mph)

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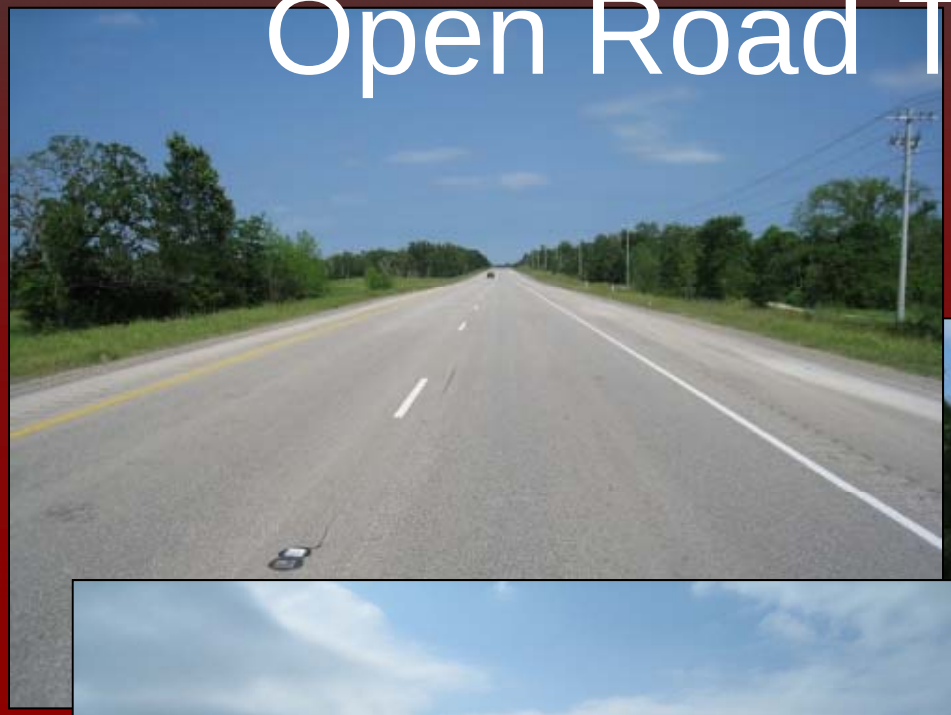
Open Road Test Sections



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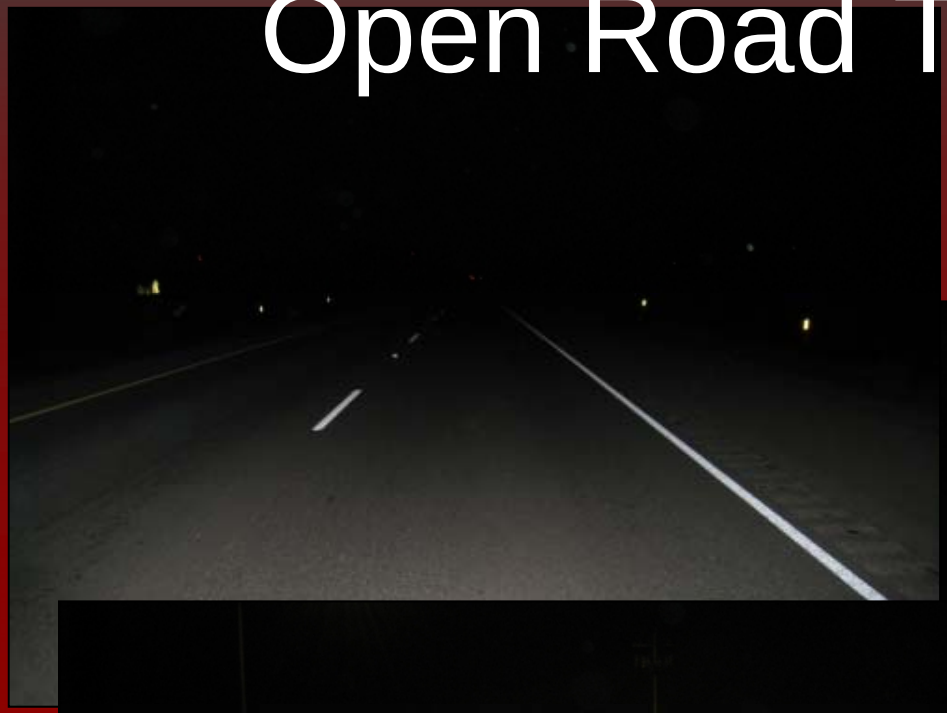
Open Road Test Sections



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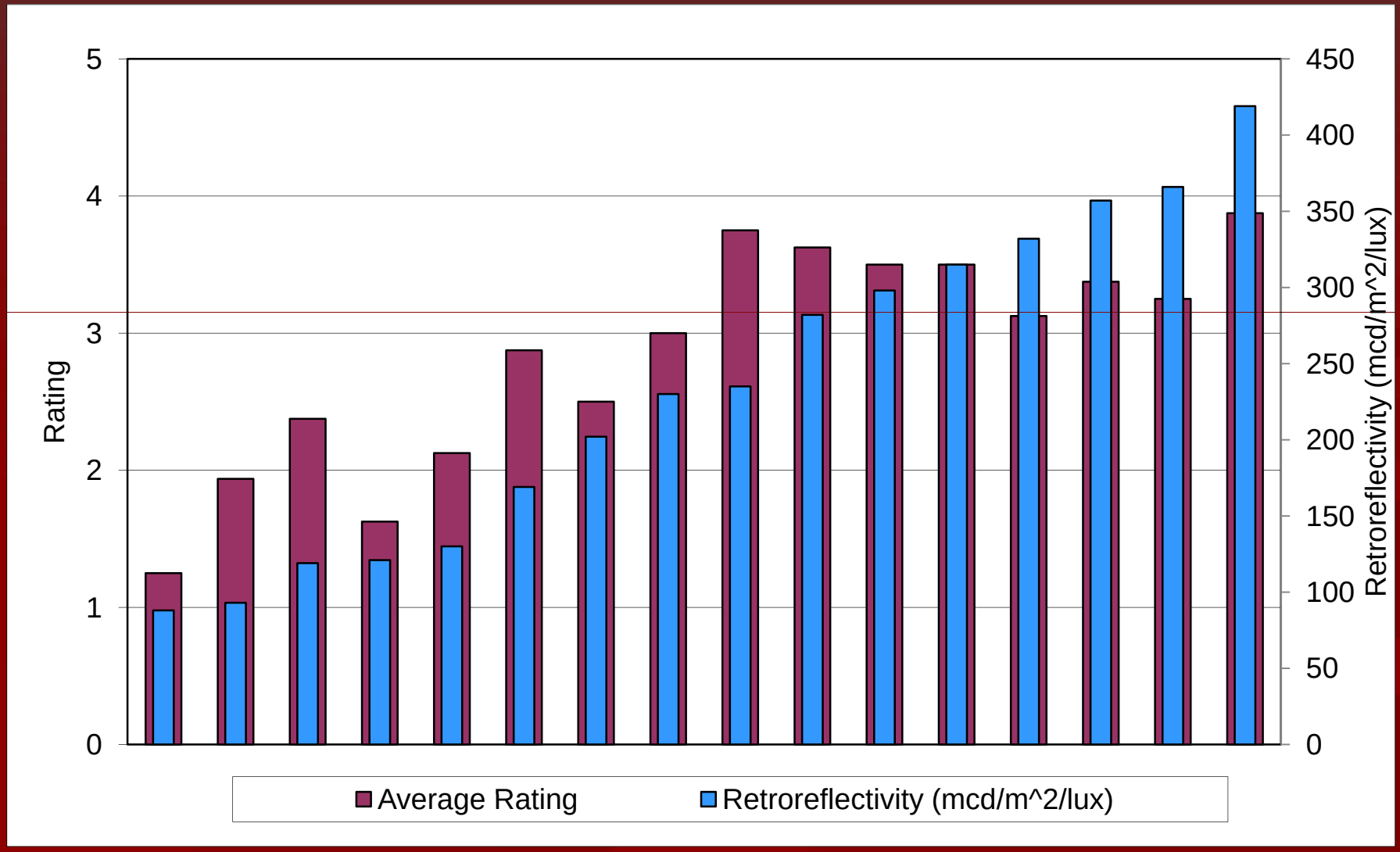
Open Road Ratings



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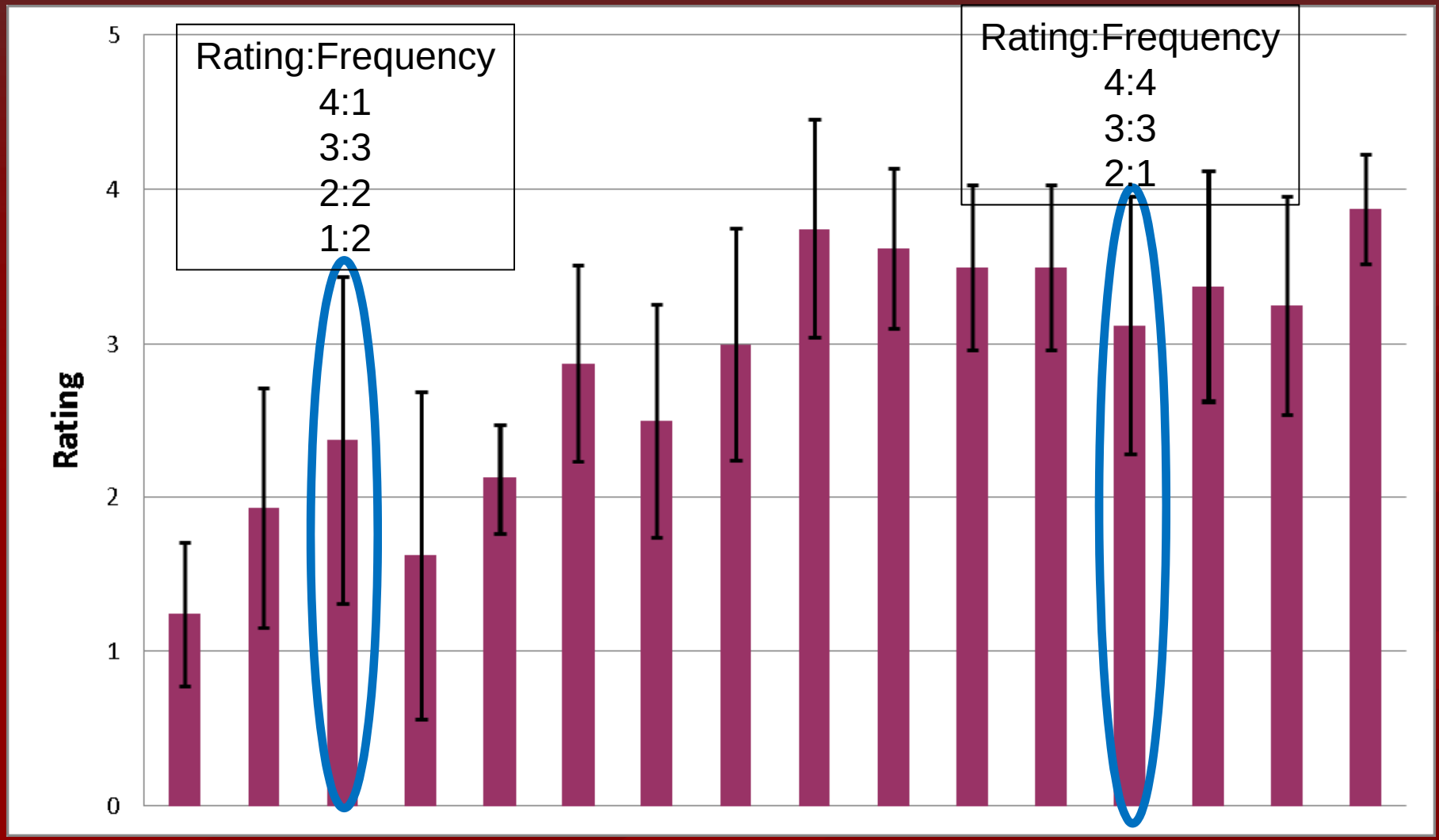
Open Road Rating Error



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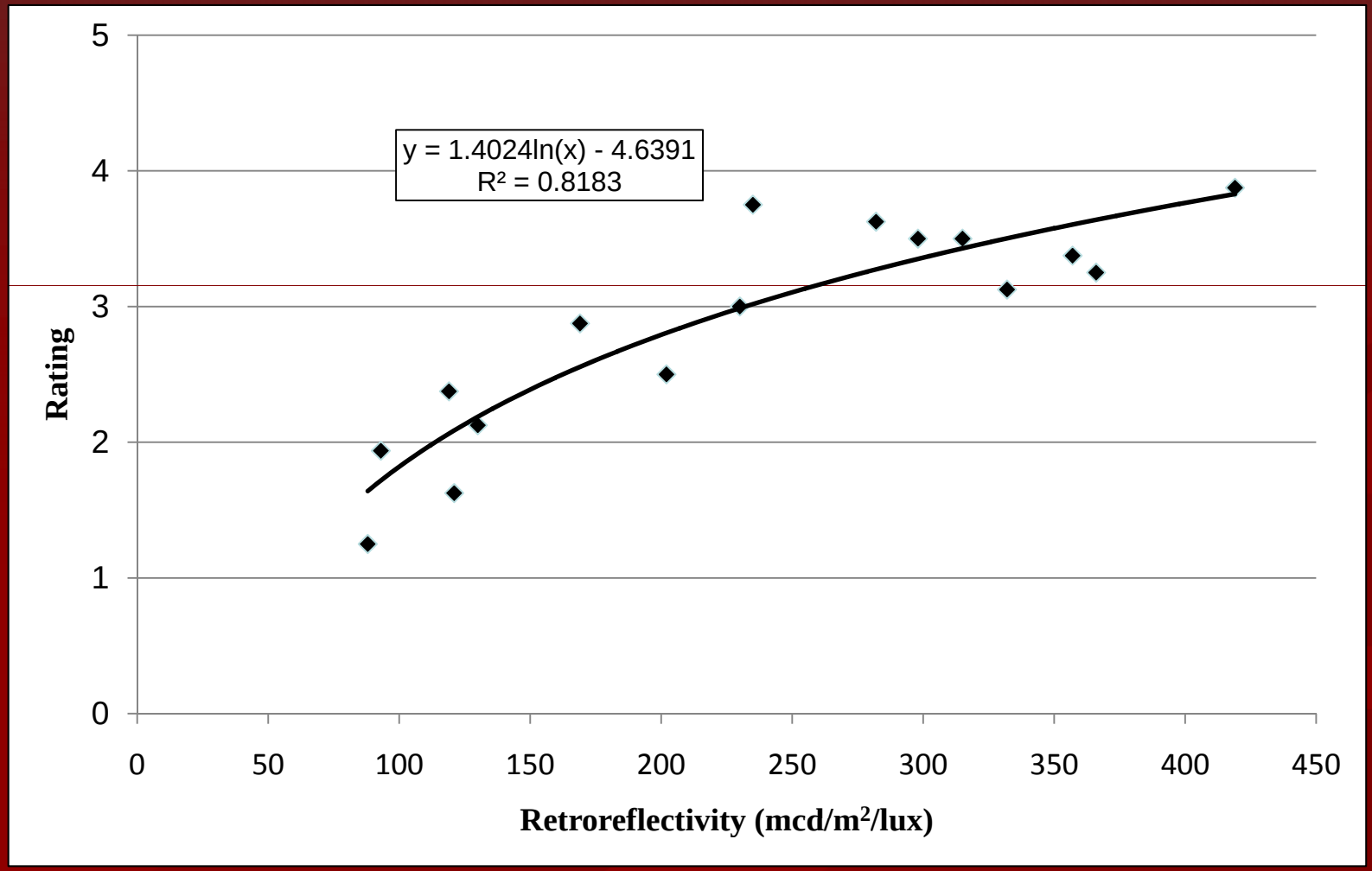
Open Road Rating vs. Retroreflectivity



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Closed Course Methodology

- Closed Course Study
  - 11 participants (all passengers)
  - 12 sections
  - Retroreflectivity range (88-684 mcd/m^2/lux)
  - Marking length of 120 continuous feet
  - Markings viewed stationary at 210 feet and 30 meters
  - All vehicles were Ford Taurus sedans with halogen headlamps
  - Markings evaluated before and after training

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Closed Course Test Site

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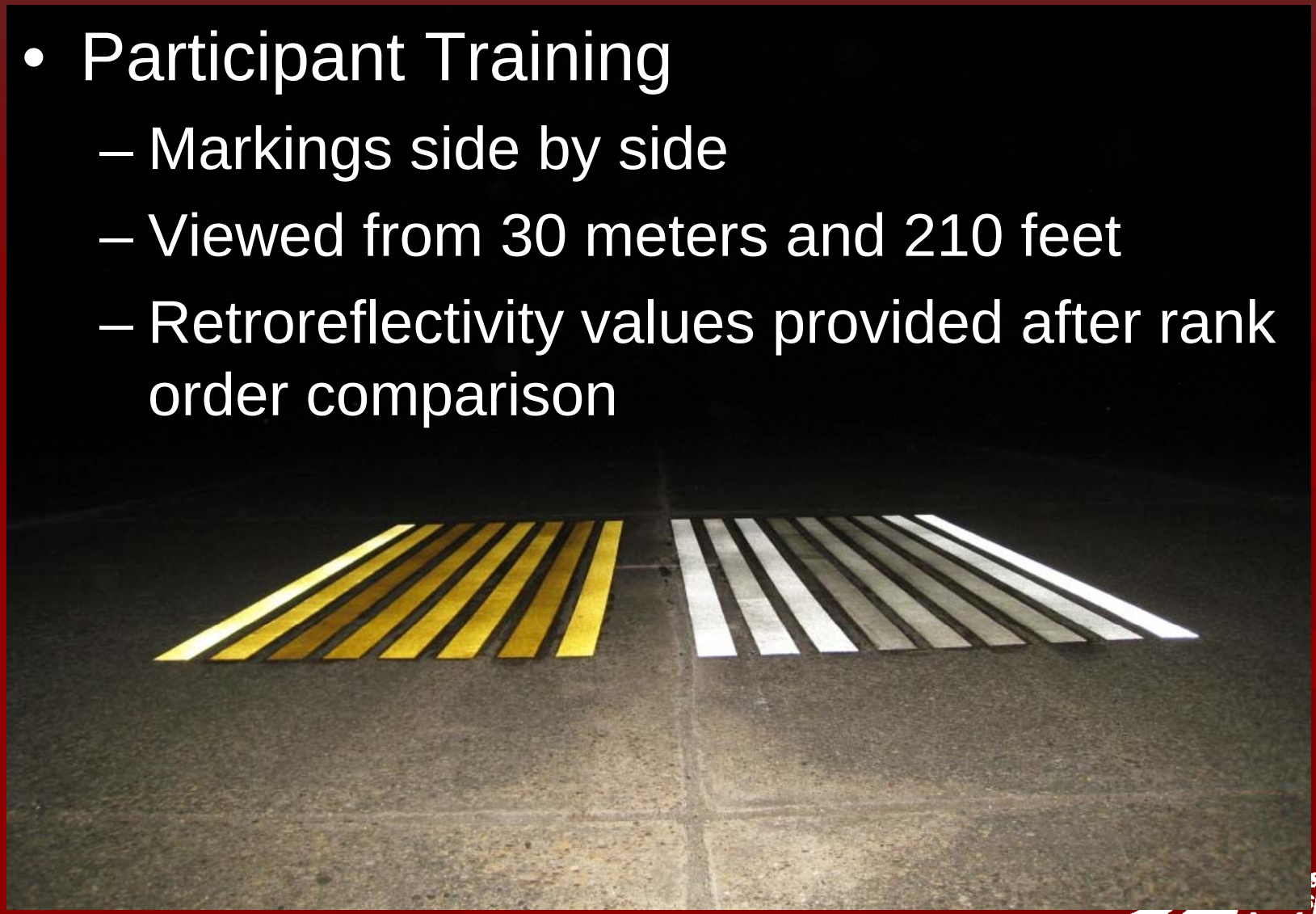
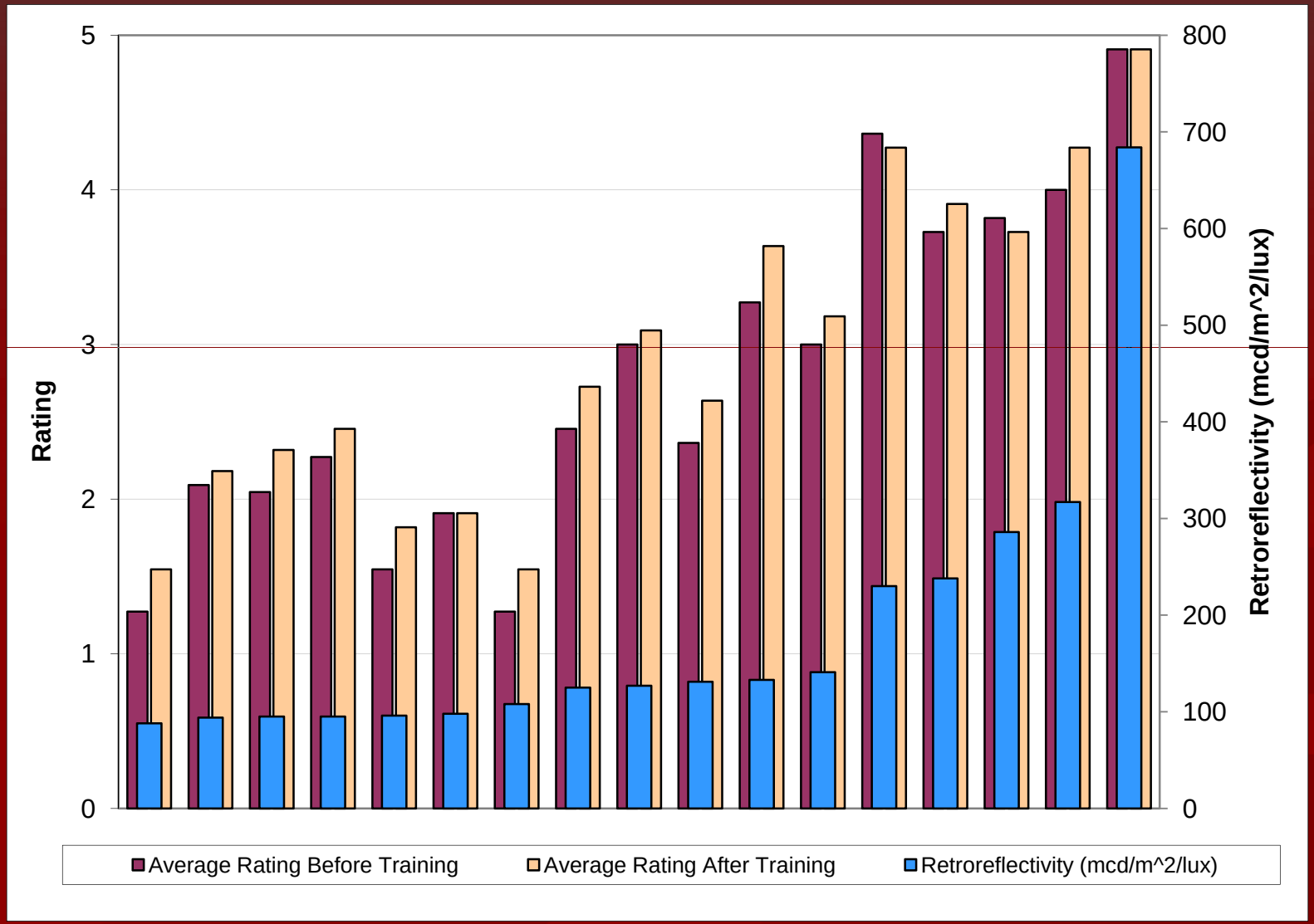
Closed Course Test Sections

Closed Course Methodology

- Participant Training
  - Markings side by side
  - Viewed from 30 meters and 210 feet
  - Retroreflectivity values provided after rank order comparison



Closed Course Ratings



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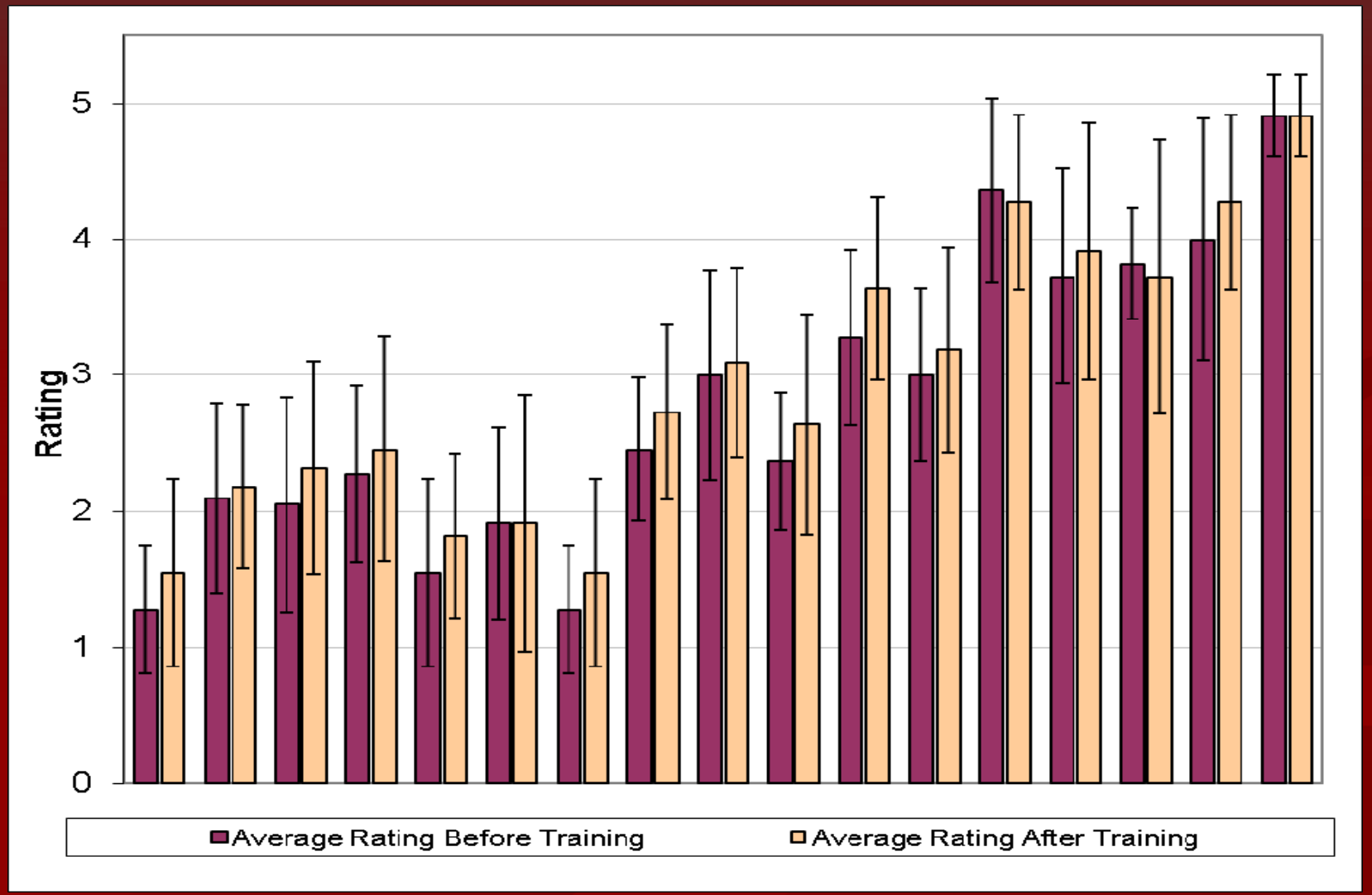
Closed Course Rating Error



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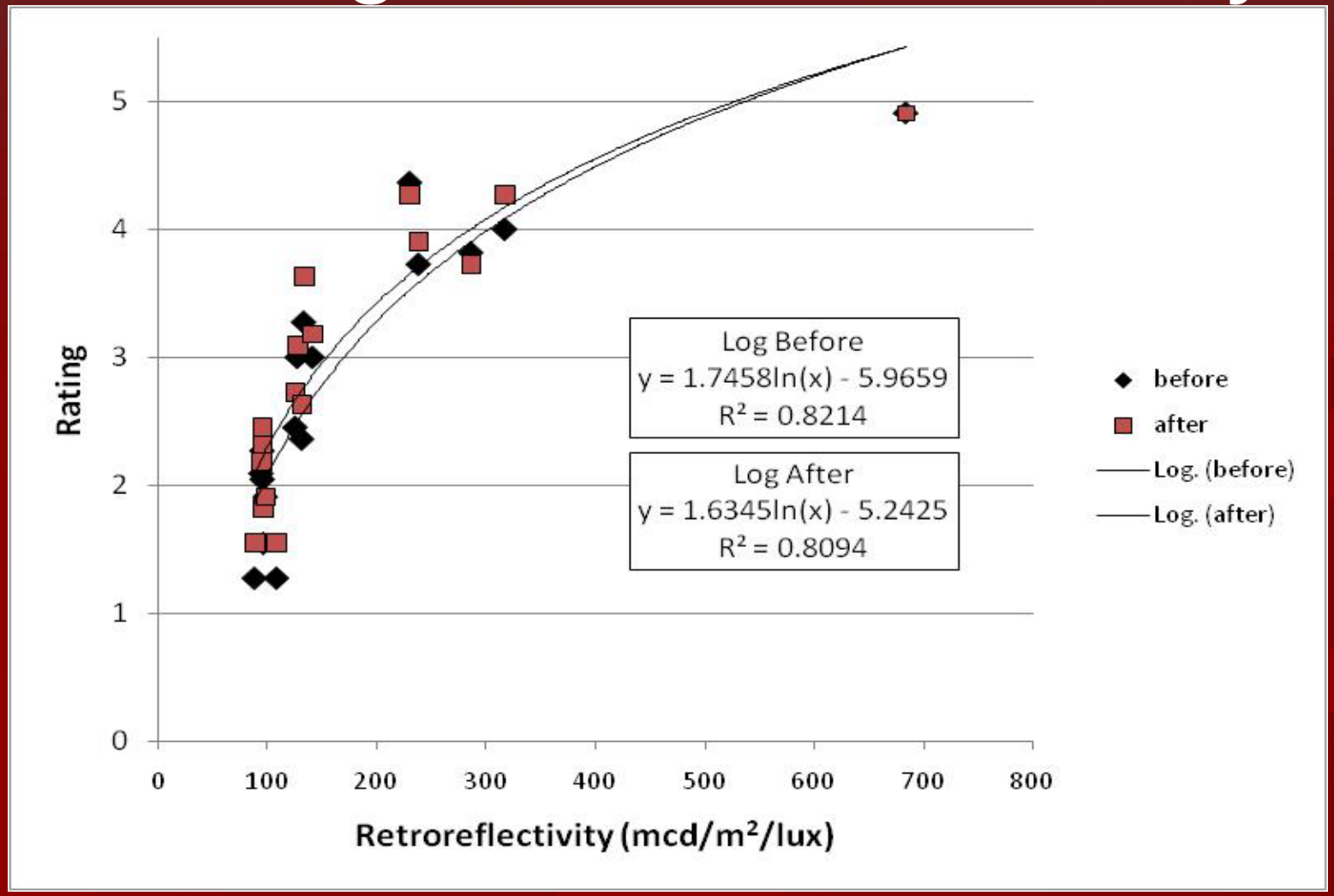
Closed Course Rating vs. Retroreflectivity



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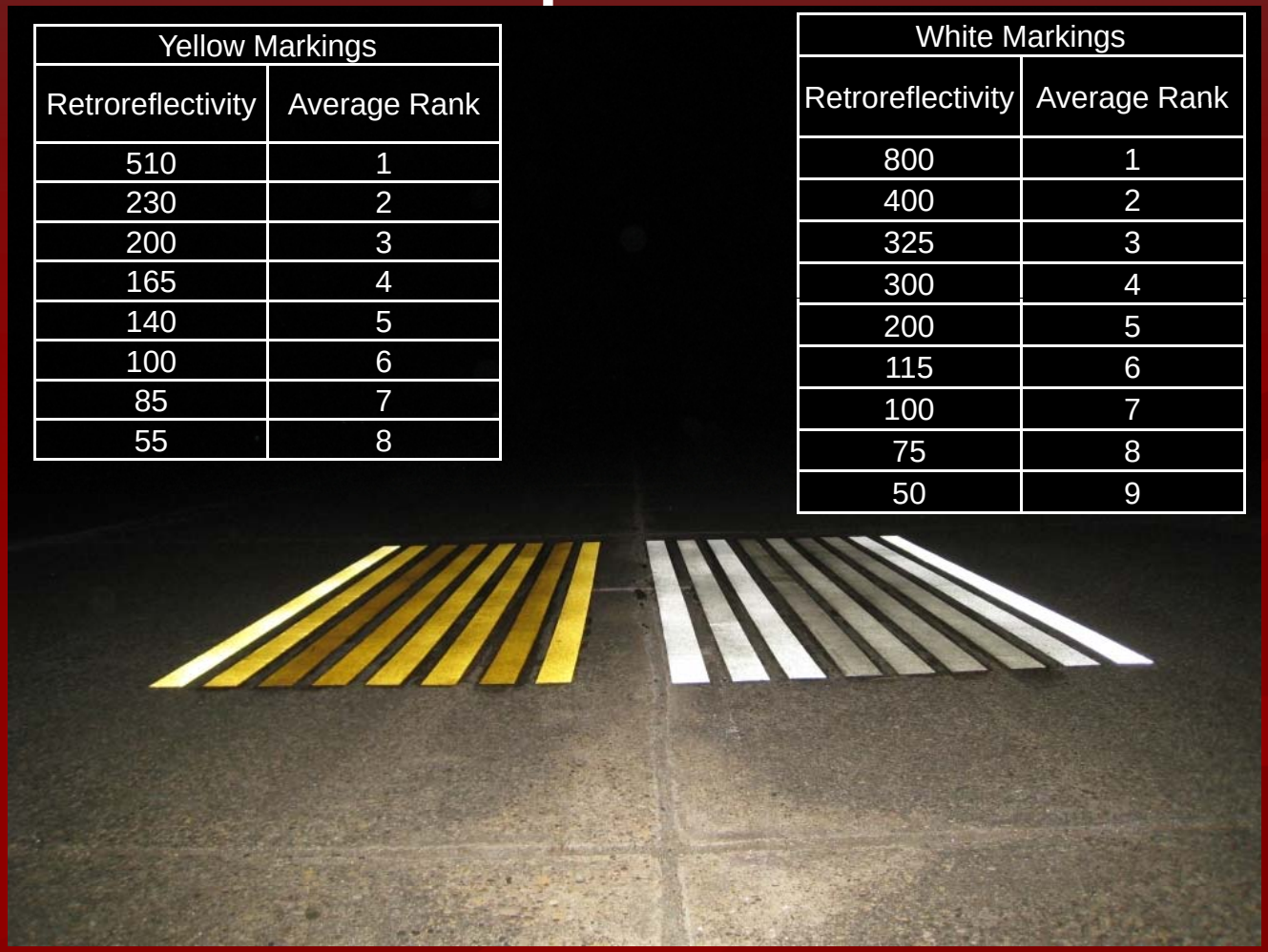
Side by Side Rank Order Comparison

Yellow Markings	
Retroreflectivity	Average Rank
510	1
230	2
200	3
165	4
140	5
100	6
85	7
55	8

White Markings	
Retroreflectivity	Average Rank
800	1
400	2
325	3
300	4
200	5
115	6
100	7
75	8
50	9



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Findings

- Average subjective ratings do show acceptable correlation with retroreflectivity measurements
  - Open road course $R^2 = 0.82$
  - Closed course $R^2 = 0.82$ before training
    $R^2 = 0.81$ after training
- Ratings can show large variations between individuals
- Minimal training did not improve our results

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Recommendations

- Subjective nighttime rating methods can be considered a viable option for evaluating pavement markings
- Quantitative measurements should supplement ratings for restriping prioritization or end of life evaluations, may not be necessary for QC
- Adequate training or multiple evaluators should be utilized, averaging the reported ratings

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Questions?

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