

NCAT Pavement Test Track

An aerial photograph of the NCAT Pavement Test Track. The track is a long, winding road that curves through a dense forest of trees with varying shades of green and brown. On the right side of the track, there is a building with a green roof and a parking lot. The track itself is a multi-lane road with a smooth surface, and it appears to be a closed course used for testing pavement technology.

Development of a Ride Quality
Smoothness Specification and
Technology Evaluation Program

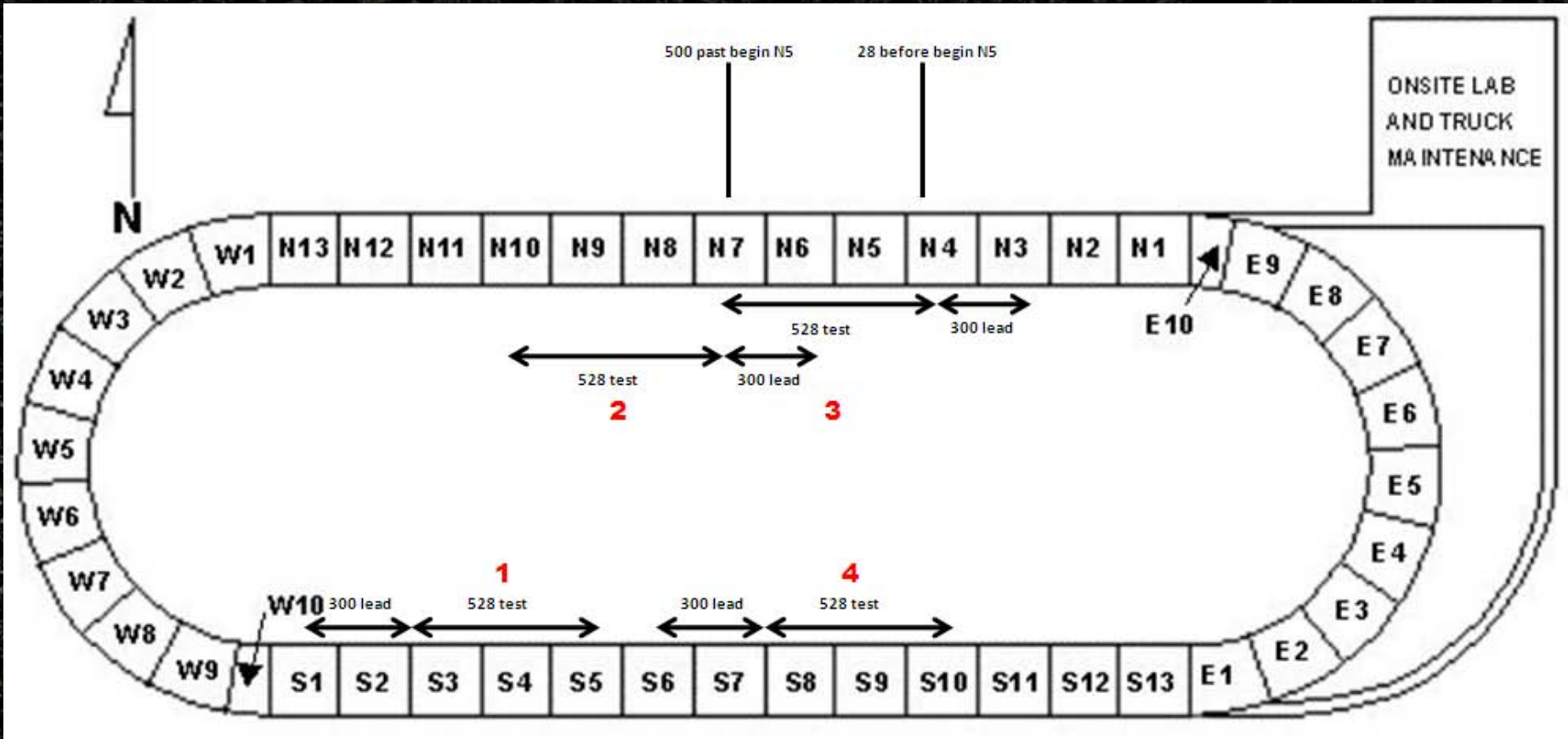
Contract Documents

- ALDOT Procedure for Quality Assurance
- Revision of smoothness specification

Technology Evaluation Program (QA)

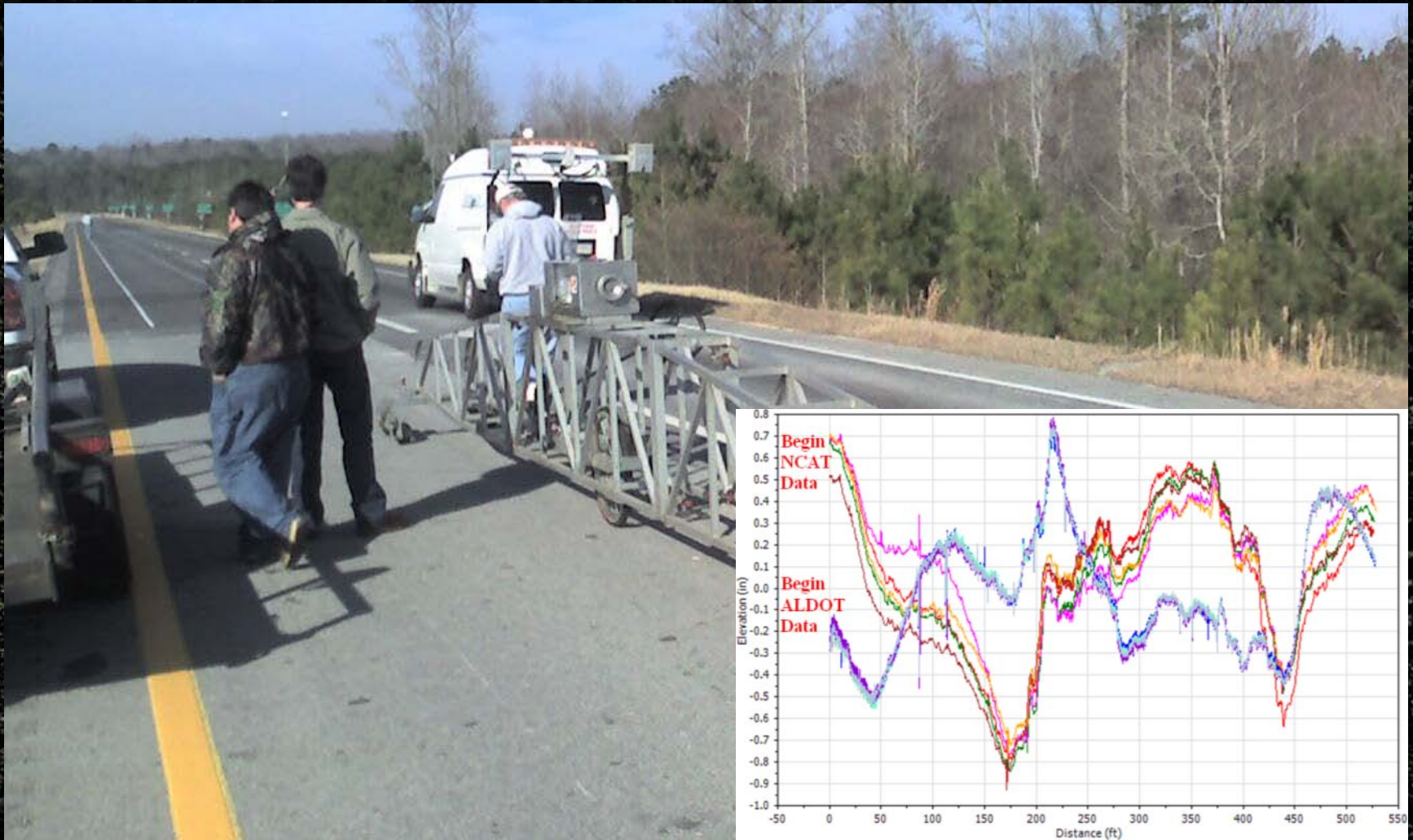
- Certification for reliable profile measurements
 - Model numbers (hardware and software)
 - Serial numbers (actual delivered units)
 - Operators (technicians who run delivered units)

Technology Evaluation Program



<u>Section Number</u>	<u>Surface Type</u>	<u>Desired Avg IRI Range</u>	<u>Proposed Location on NCAT Track</u>
1	Dense	30 to 75	Begin S3
2	Dense	95 to 135	500 ft past begin N5
3	Dense	Approaching 200	28 ft before Begin N5
4	PFC	30 to 75	Begin S8

Technology Evaluation Program



Technology Evaluation Program

- Completed NCAT/ALDOT comparisons to SurPRO
- Several pending profilograph assessments
- Completed ALDOT test procedure for certification
- Specification currently under development

ALDOT Test Procedure

- Referenced AASHTO Standards
 - M 328, Inertial Profiler
 - R 54, Pavement Ride Quality via Inertial Profiler
 - R 56, Certification of Inertial Profiling Systems
 - R 57, Operating Inertial Profiling Systems
 - R 43M/R 43, Quantifying Roughness of Pavements
- Referenced ASTM Standards
 - E 867, Terminology for Vehicle Pavement Systems
 - E 950, Inertial Profiling Test Method

ALDOT Test Procedure

- Inertial Profiler
 - Must produce and store inertial profiles (ProVAL)
 - 65 to 71 inch spacing on dual wheelpath units
 - Output IRI summarized for 0.1 mile section lengths
 - Field calibration/verification for distance and height
 - **Model and unit of test system must be certified**
 - Maintained in good repair and within specifications

ALDOT Test Procedure

- Equipment
 - Vehicle capable of traveling at constant speed (25/45)
 - Distance measuring device accurate to within 0.15%
 - Inertial profiler meeting specific requirements

ALDOT Test Procedure

- Major adjustments requiring recertification
 - Repair or replacement of accelerometer(s)
 - Repair or replacement of height sensor(s)
 - Repair or replacement of printed circuit boards
 - “Foundational” software parameters and scale factors

ALDOT Test Procedure

- Minor adjustments not requiring recertification
 - Inspecting, resoldering or replacing connectors
 - Cleaning components or making voltage adjustments
 - “Non-foundational” parameters and scale factors

ALDOT Test Procedure

- Verification procedure before 1st project use
 - Longitudinal check to within 1 foot in 528 feet
 - Vertical check to within 0.01 inches over 1 inch
 - IRI within 5% on 1 of 2 control sections in each Division
- Daily consistency check throughout project
 - IRI within 5% of measurement on previous day's run
 - No 2 profilers can differ by more than 10 percent

ALDOT Test Procedure

- Measurement of IRI on newly placed pavement
 - Allow for pre-section lead in for measurement
 - Target test wheelpaths 3 feet from EL and CL
 - Measure roughness in direction of traffic
 - Include event markers for discounted sections
 - Data submitted to ALDOT in ProVAL format
 - ALDOT computes IRI for each 0.1 mile segment

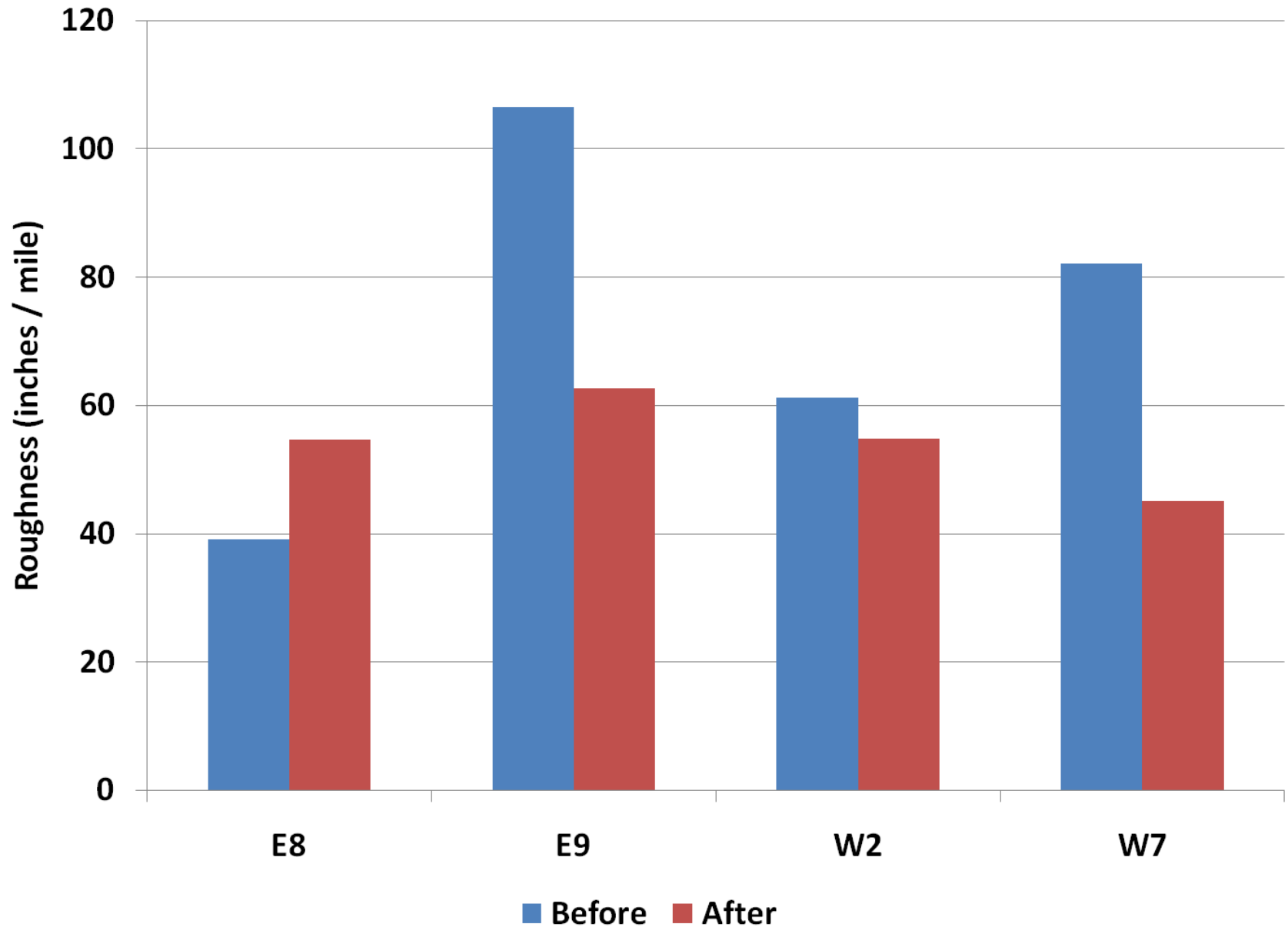
Specification Considerations

- Measure profile before and after paving ?
- Dual mechanism for pay adjustment ?
 - Absolute smoothness of new paving
 - Relative improvement as result of paving
- Must consider experience of other agencies
- Test drive and improve prior to implementation

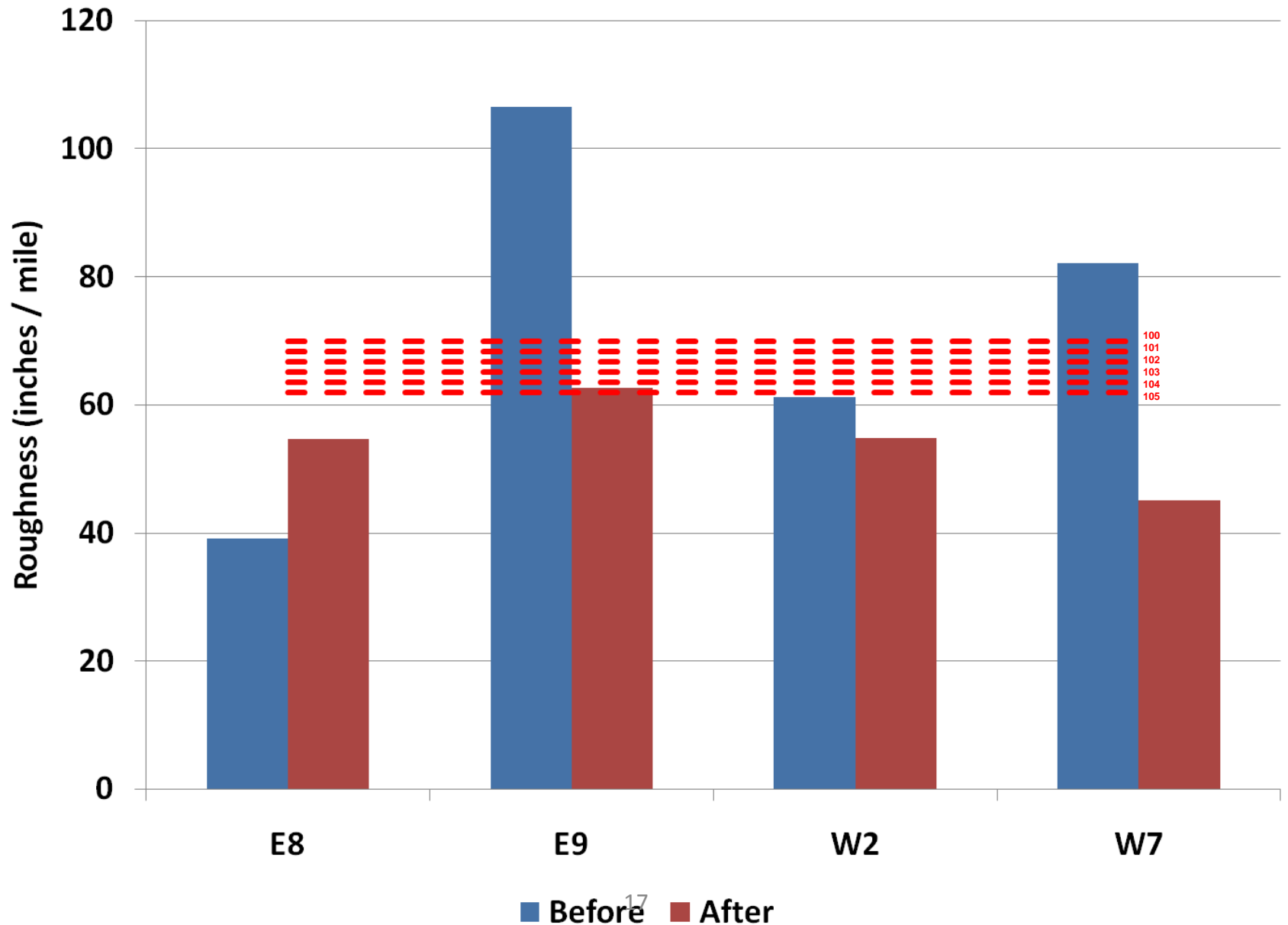
Federal Smoothness Specification

- Pay adjustment for overlays/inlays/recycling
 - Measure original surface within 30 days of work
 - Measure new surface after paving is complete
 - $PF = -0.00625 \times IRI + 1.43750$ (but not > 1.05)
 - $\% \text{ Improvement} = (IRI_{\text{original}} - IRI_{\text{final}}) / IRI_{\text{original}} \times 100$
 - $PF_{\text{max}} = 1$ for $\% \text{ Improvement} < 0$
 - $PF_{\text{min}} = 1$ for $\% \text{ Improvement} > 25$ (single lifts)
 - $PF_{\text{min}} = 1$ for $\% \text{ Improvement} > 35$ (multiple lifts)

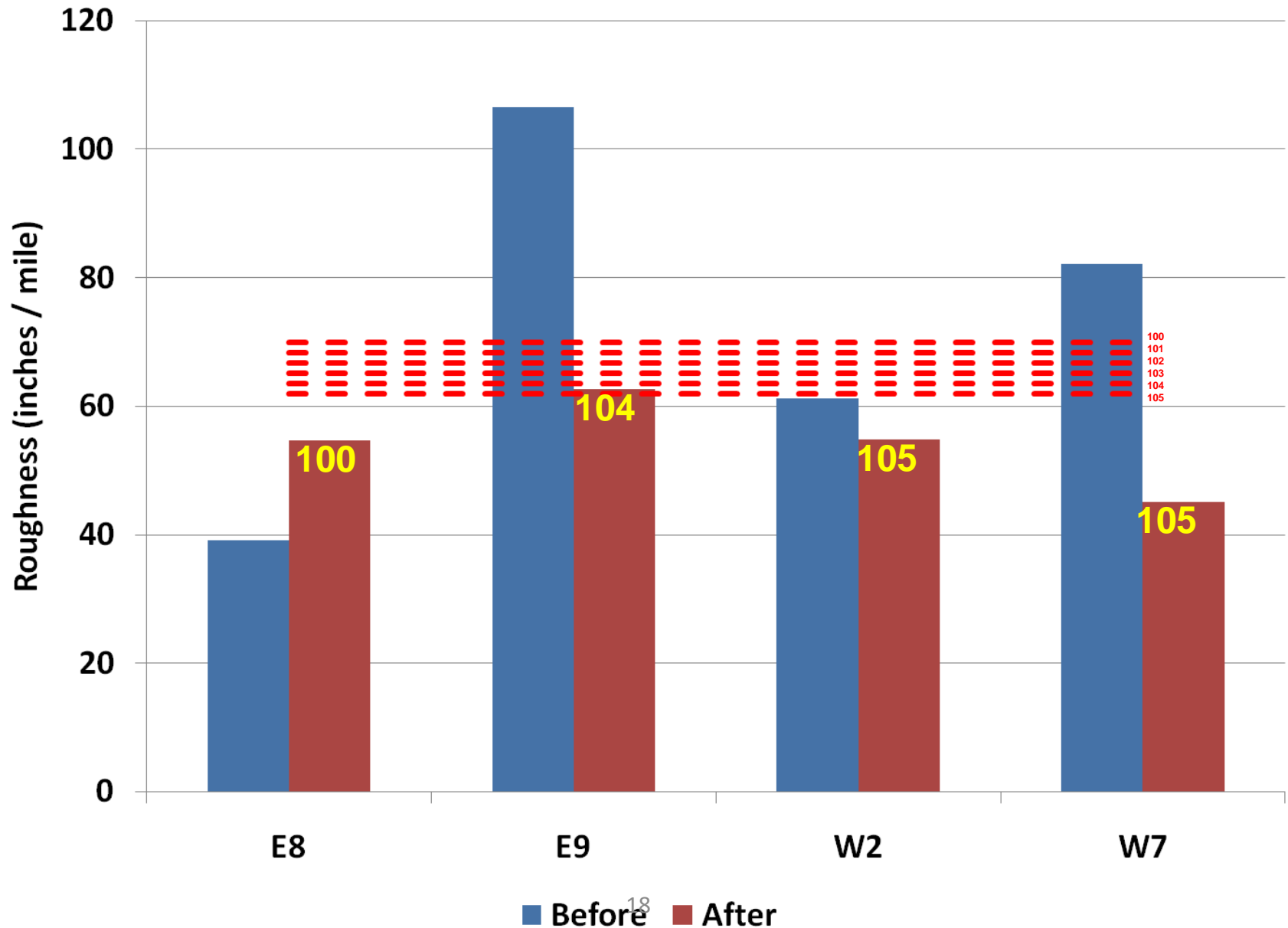
WMA Certification Sections



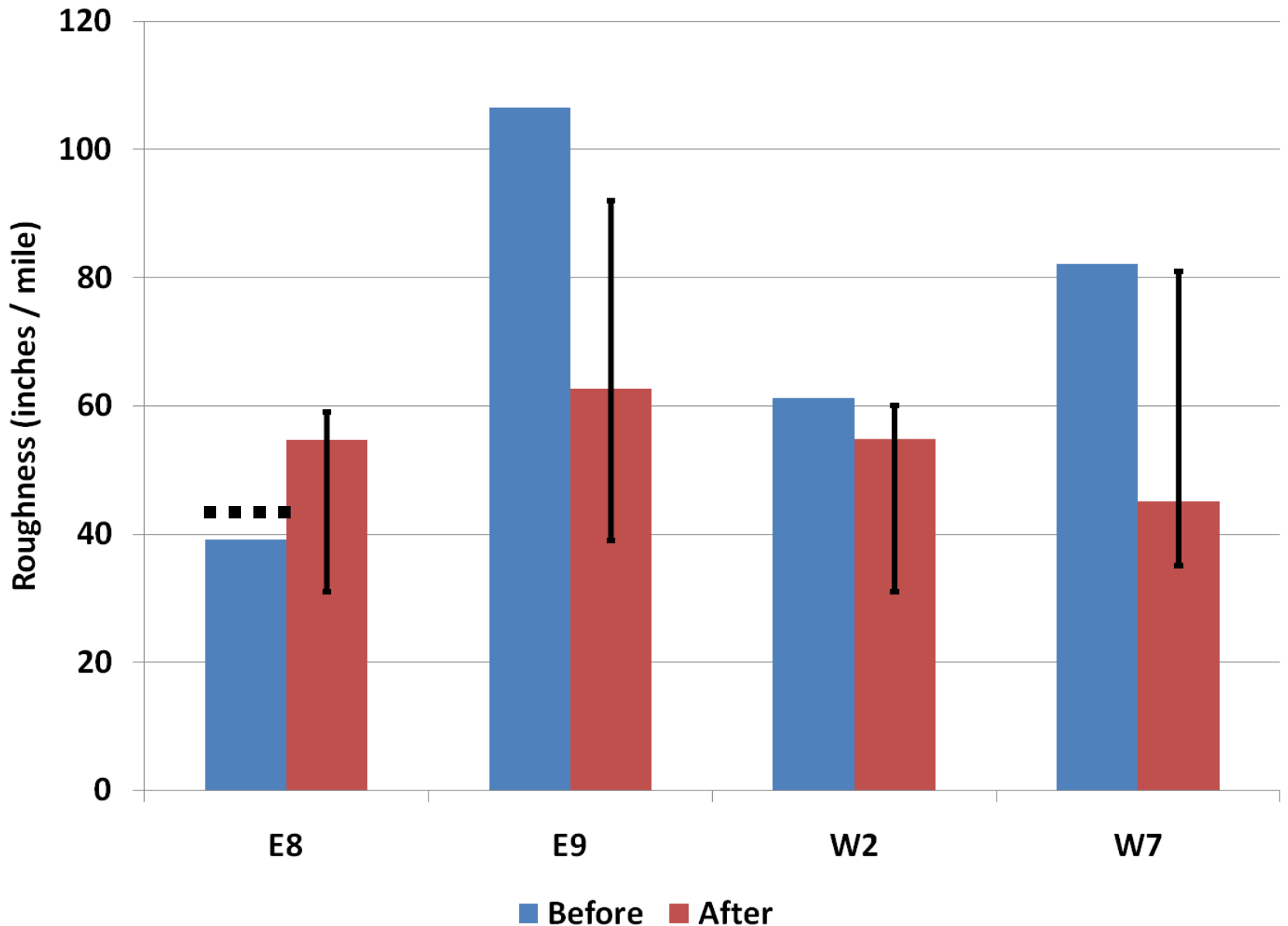
Federal Smoothness Specification



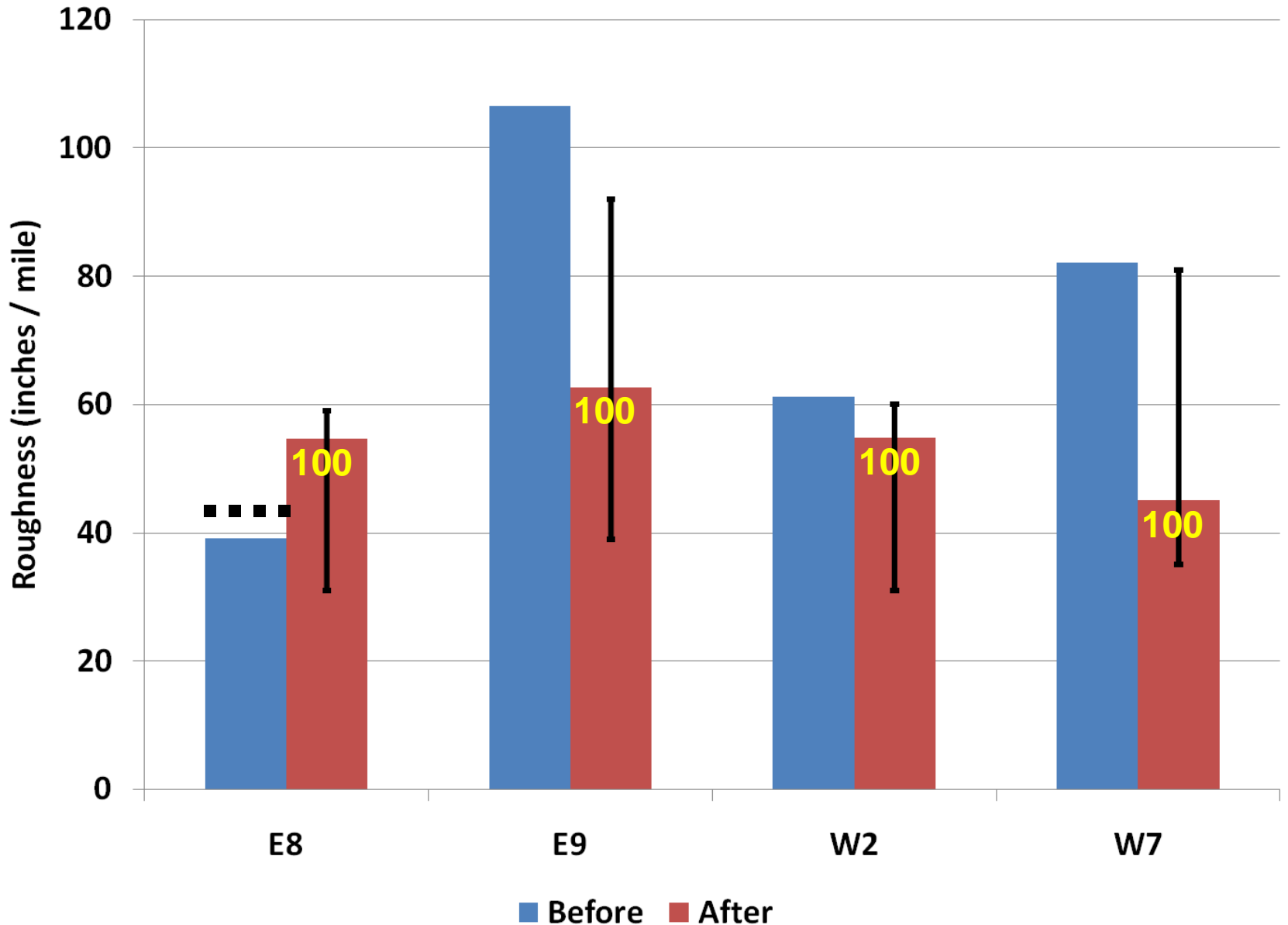
Federal Smoothness Specification



Proposed South Carolina Specification



Proposed South Carolina Specification

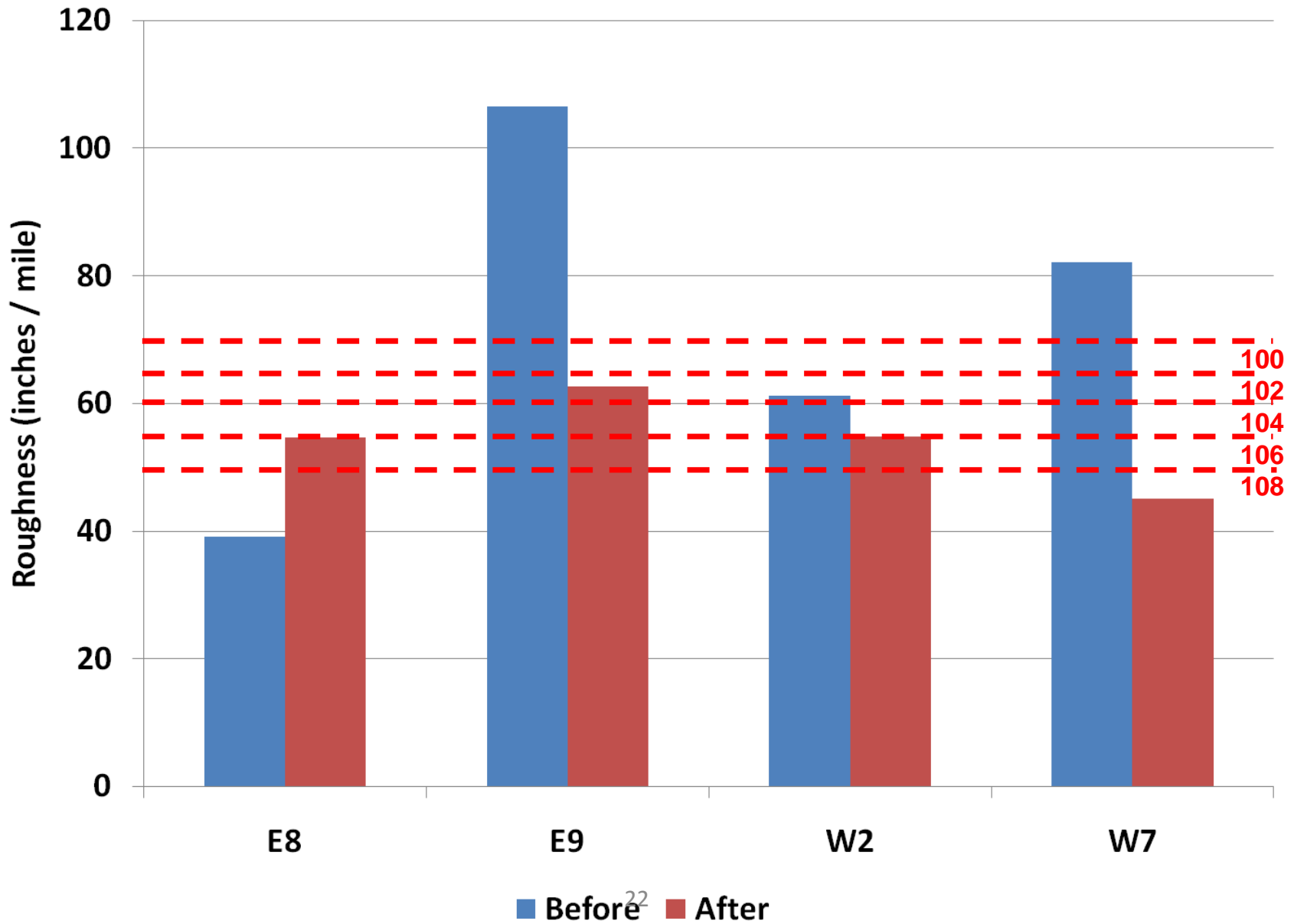


Proposed Mississippi Specification

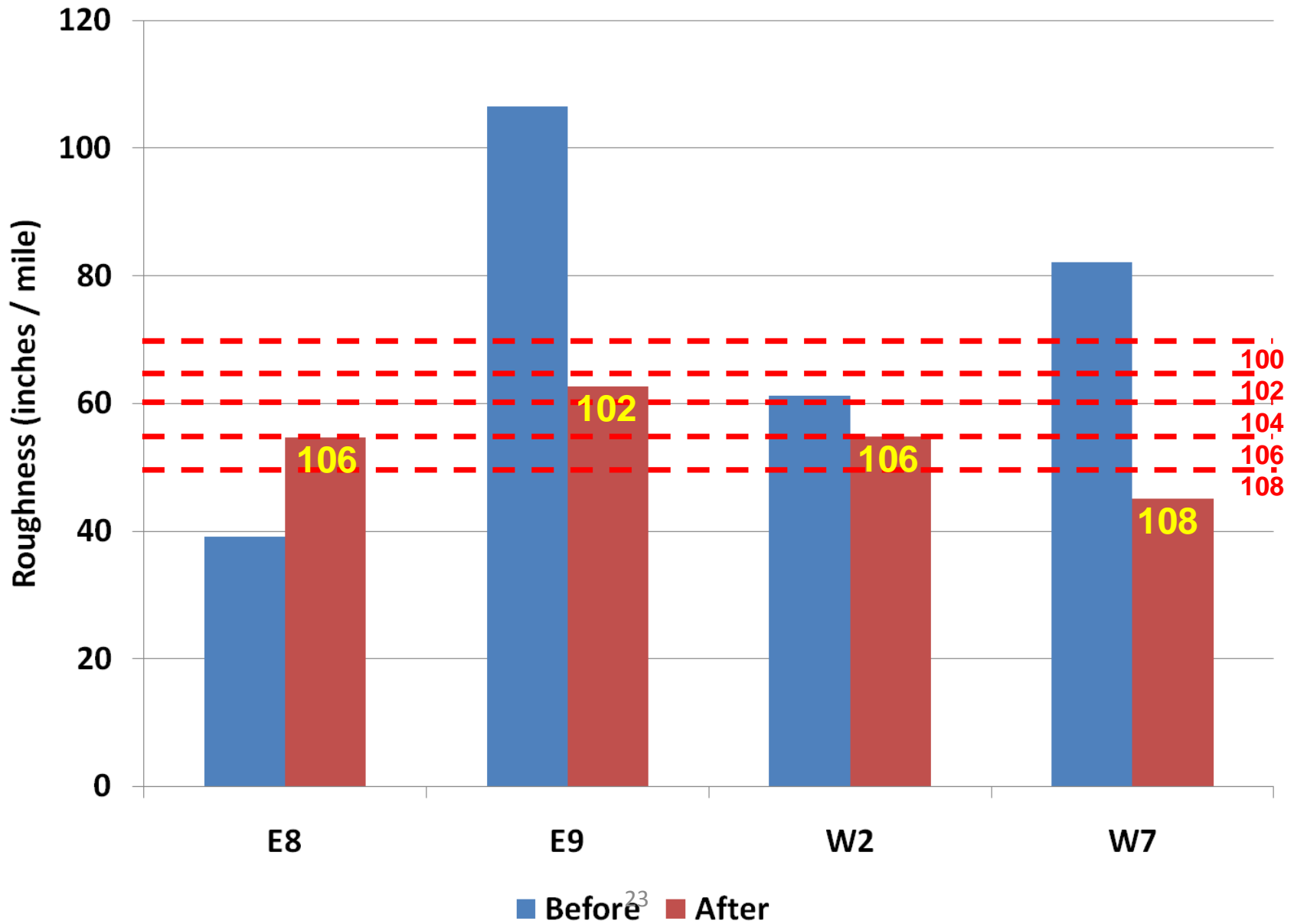
- A = Reconstruction, 3 or more lifts, mill + 2 lifts
- B = 2 lifts, mill + single lift
- C = Single lift overlay with no mill

Price Adjust. %	A	B	C
108	< 40.0 "/mile	< 50.0 "/mile	< 60.0 "/mile
106	40.0 to 45.0	50.1 to 55.0	60.1 to 65.0
104	45.1 to 50.0	55.1 to 60.0	65.1 to 70.0
102	50.1 to 55.0	60.1 to 65.0	70.1 to 75.0
100	55.1 to 60.0	65.1 to 70.0	75.1 to 80.0
must correct	> 60.0	> 70.0	> 80.0

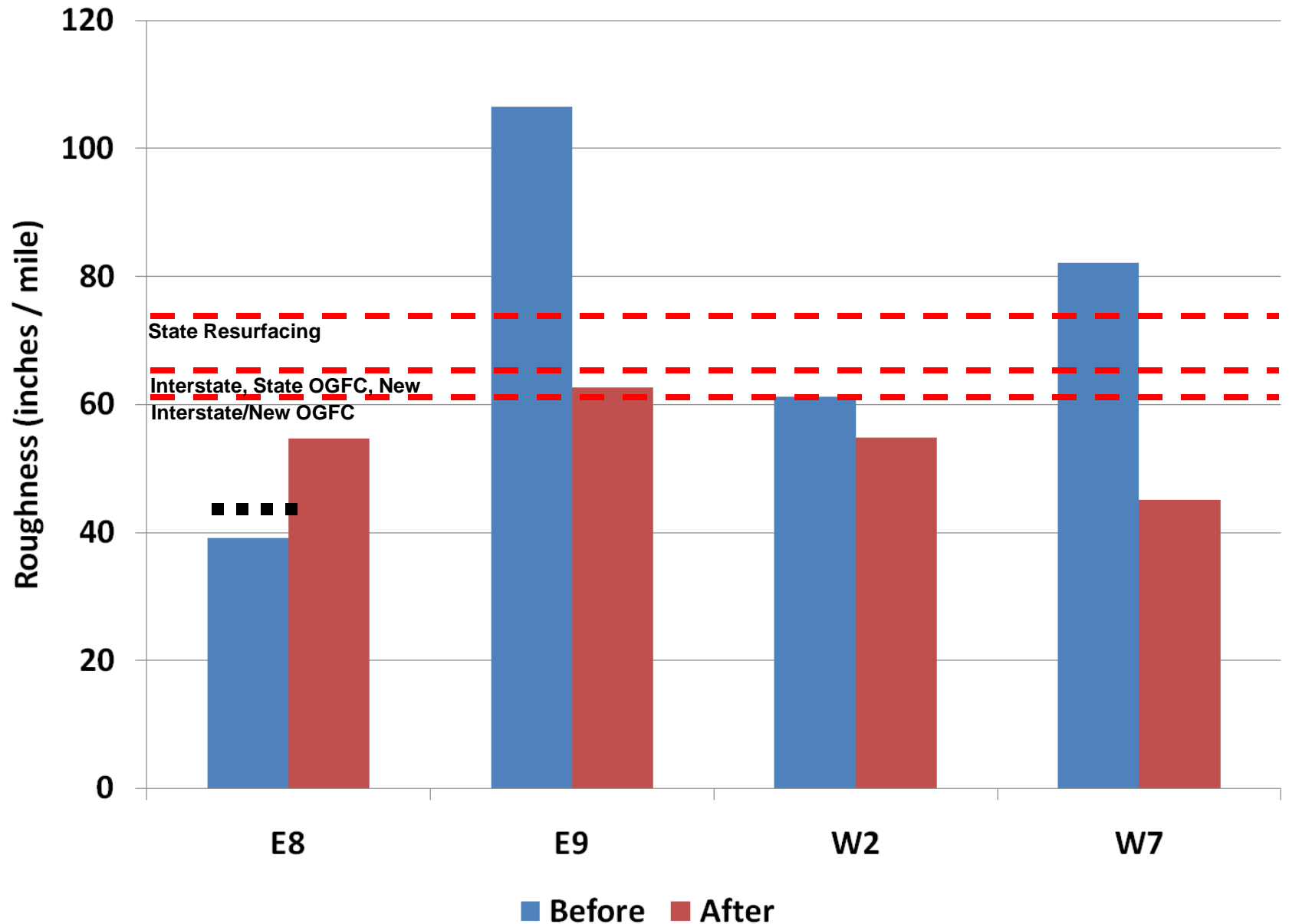
Proposed Mississippi Specification



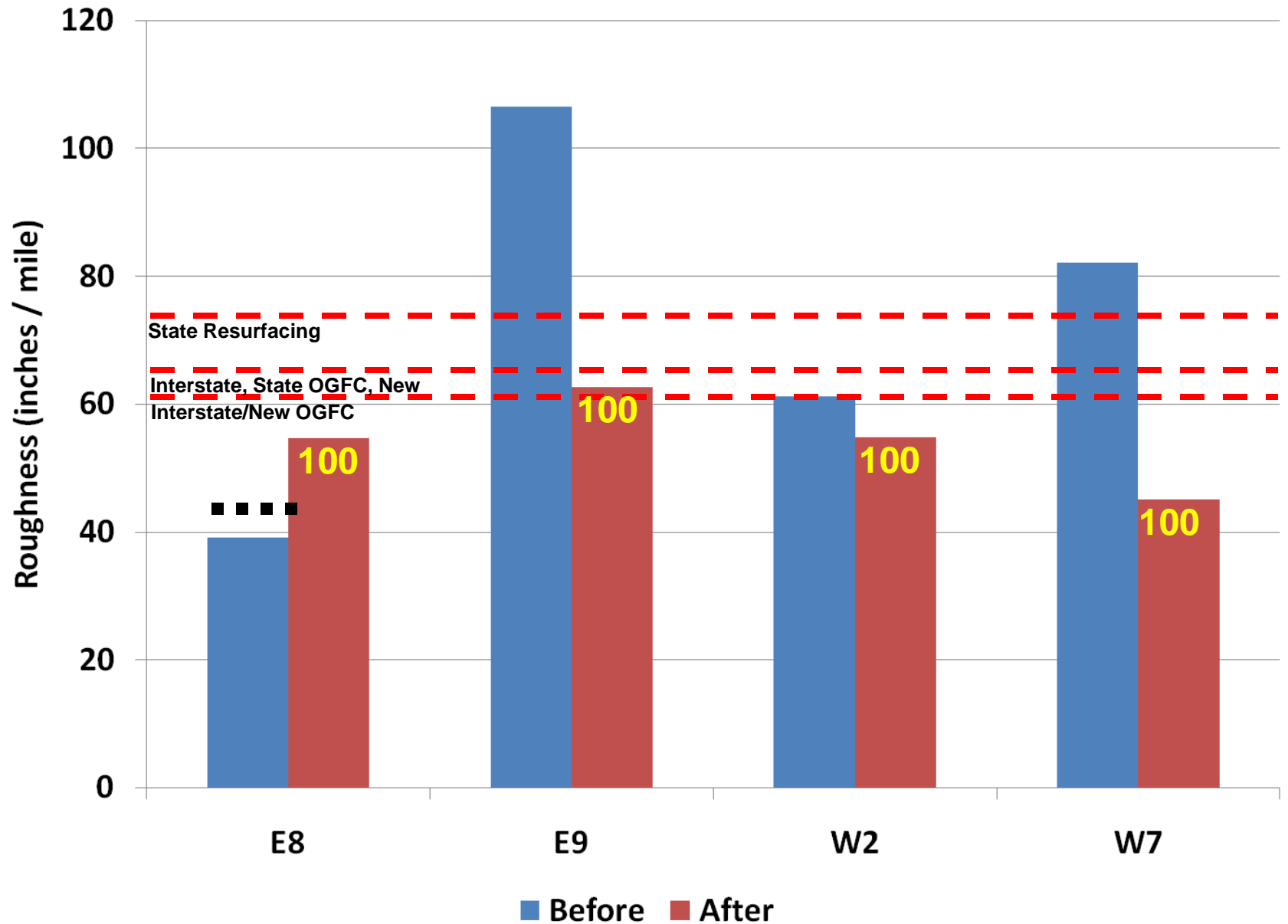
Proposed Mississippi Specification



Active Georgia Specification



Active Georgia Specification



Smoothness Specification Comparison

- Federal
 - 75-105% pay with very narrow bonus bands
 - % improvement generally buffers big pay deductions
- South Carolina
 - 95-105% (100% relatively easy, bonus very difficult)
 - No pay adjustment for paving less than 150 psy
- Mississippi
 - 100-108% (replace < 100%, bonus bands are reasonable)
 - No direct consideration for percent improvement
- Georgia
 - Pass or fail specification requirement

Likely Alabama Recommendation

- Banding via profilograph comparisons (AL)
- Percent improvement (+/-) buffers pay adjustment (Fed)
- Something less than 100% before replacement (SC)
- Scales progress as function of opportunity (MS)
- Possibility for pass/fail for thin overlays/inlays (GA)

Questions ?

