TPF-5(463): MANAGING THE PAVEMENT PROPERTIES FOR IMPROVED SAFETY

2023 SURFACE PROPERTIES RODEO

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RPUG
Road Profile Users' Group

23 USC § 407

Information in the slide set is associated and considered part of the pooled fund member states' Highway Safety Improvement Program (HSIP) site listing and identification processes. The Attorney General's office for these states have advised that neither the HSIP information or the HSIP reports are discoverable or admissible at trial pursuant to 23 USC § 407.

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Outline

1) Introduction
2) Surfaces tested at ICART
3) Testing Equipment (Friction)
4) Testing Equipment (Texture)
5) Texture Results
6) Friction Results
7) Conclusions and Recommendations

Introduction

Objective:

Evaluate relationships between different testing systems that are used in the field that are reported to assess similar friction characteristics (for example, more sensitive to macrotexture or more sensitive to microtexture).

Testing:

- ✓ **Friction (Microtexture)**
- ✓ **Macrotexture**

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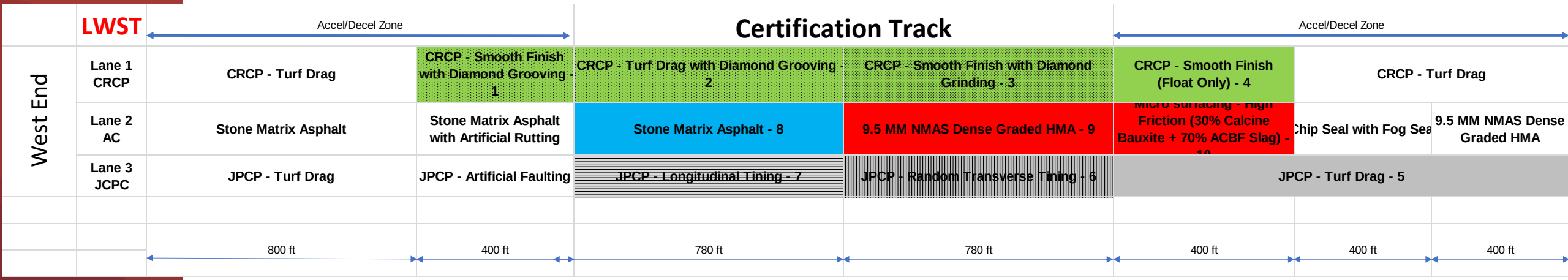
Surfaces Tested at ICART



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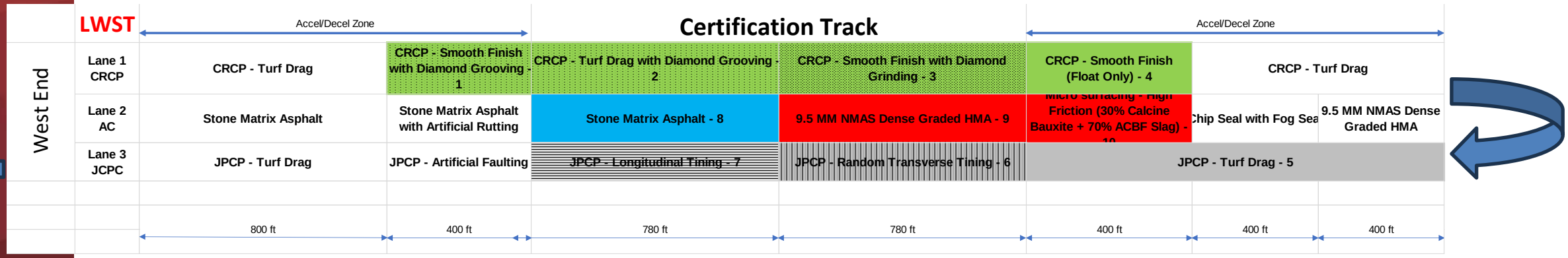
Surfaces Tested at ICART



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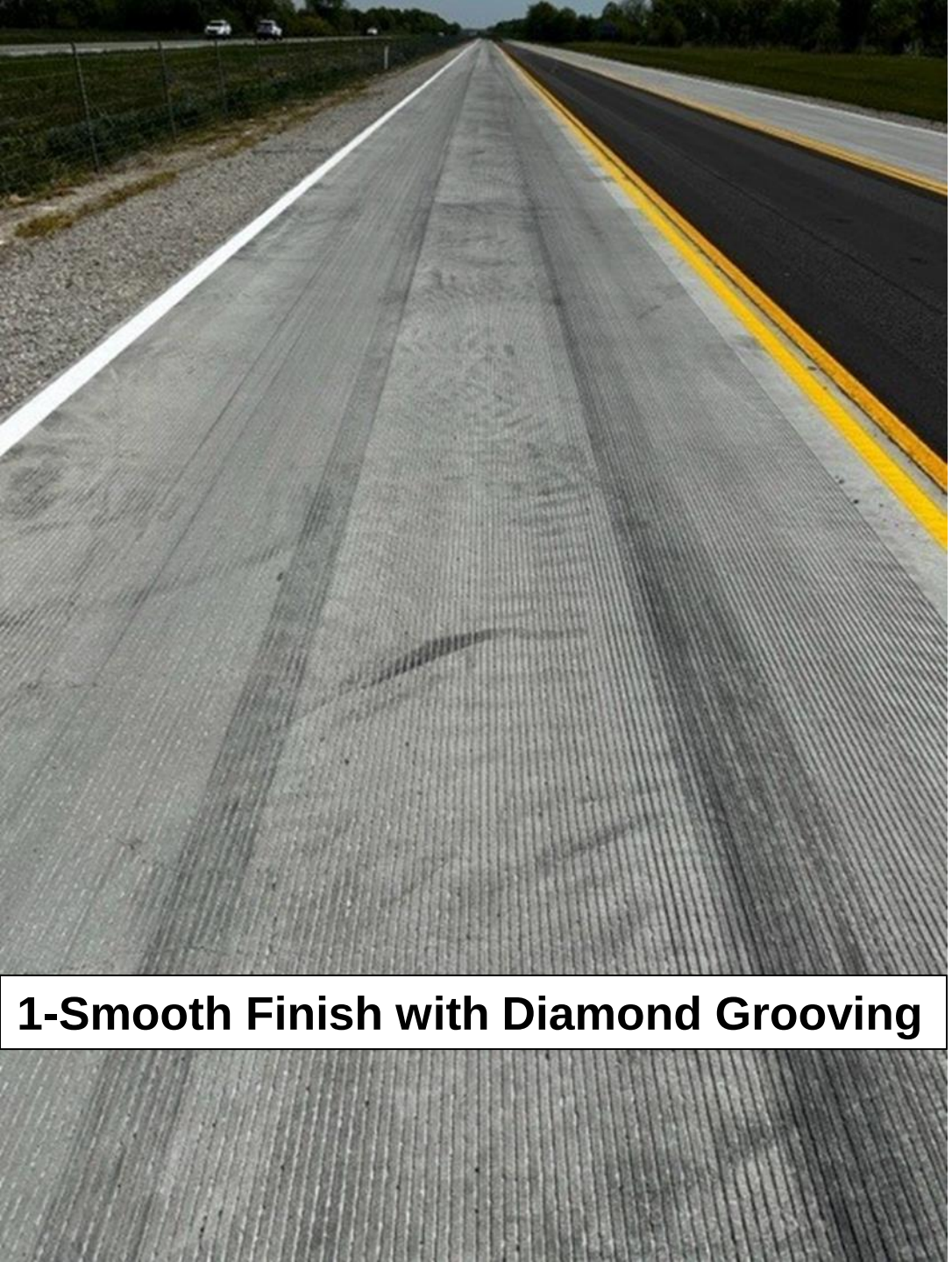
Surfaces Tested at ICART

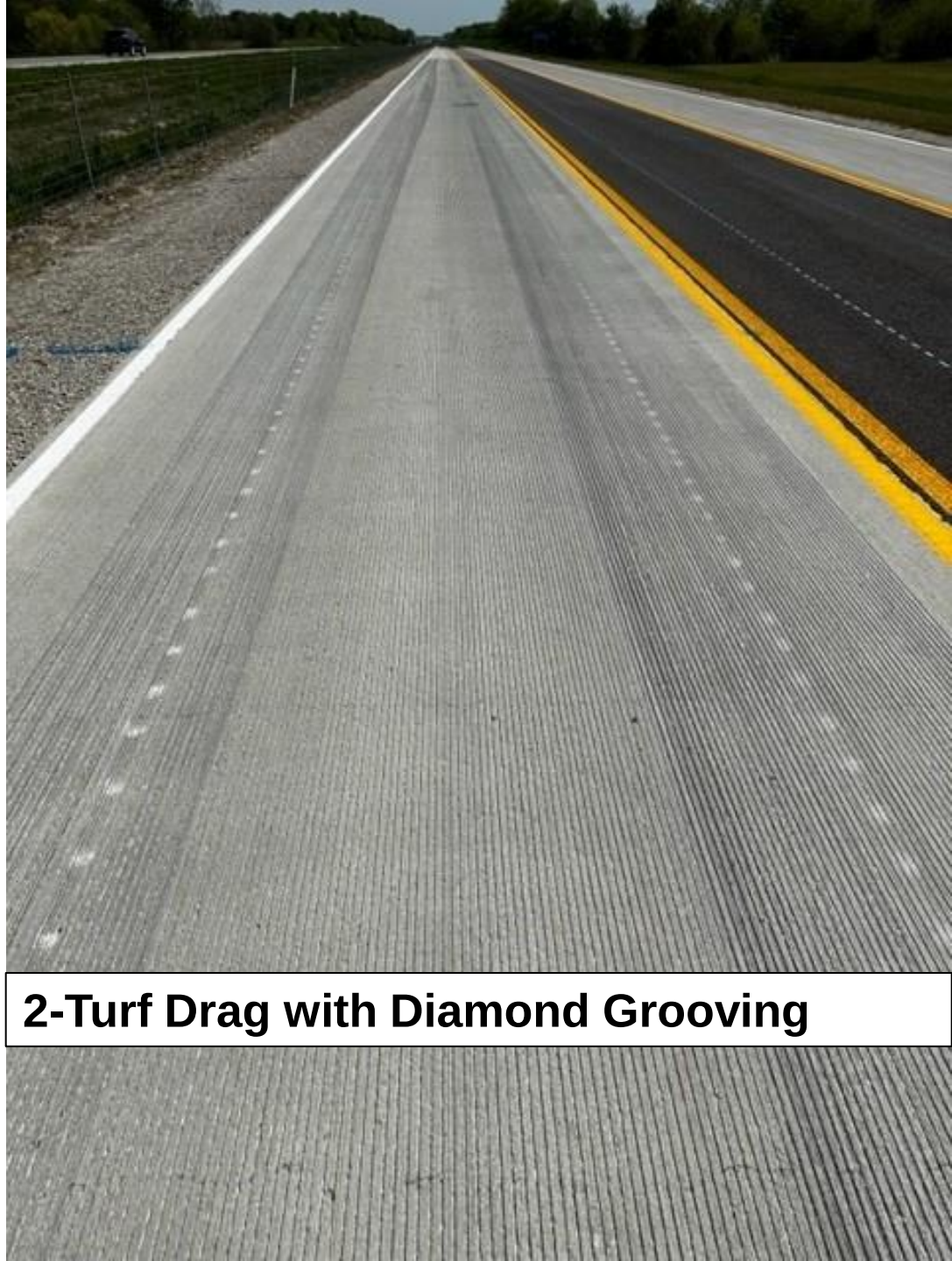
A. Lane 1 CRCP –

1) Smooth Finish with Diamond Grooving
2) Turf Drag with Diamond Grooving
3) Smooth Finish with Diamond Grinding
4) Smooth Finish (Float Only)

Lane 1
CRCP



1-Smooth Finish with Diamond Grooving



2-Turf Drag with Diamond Grooving

Lane 1
CRCP

3-Smooth Finish with Diamond Grinding

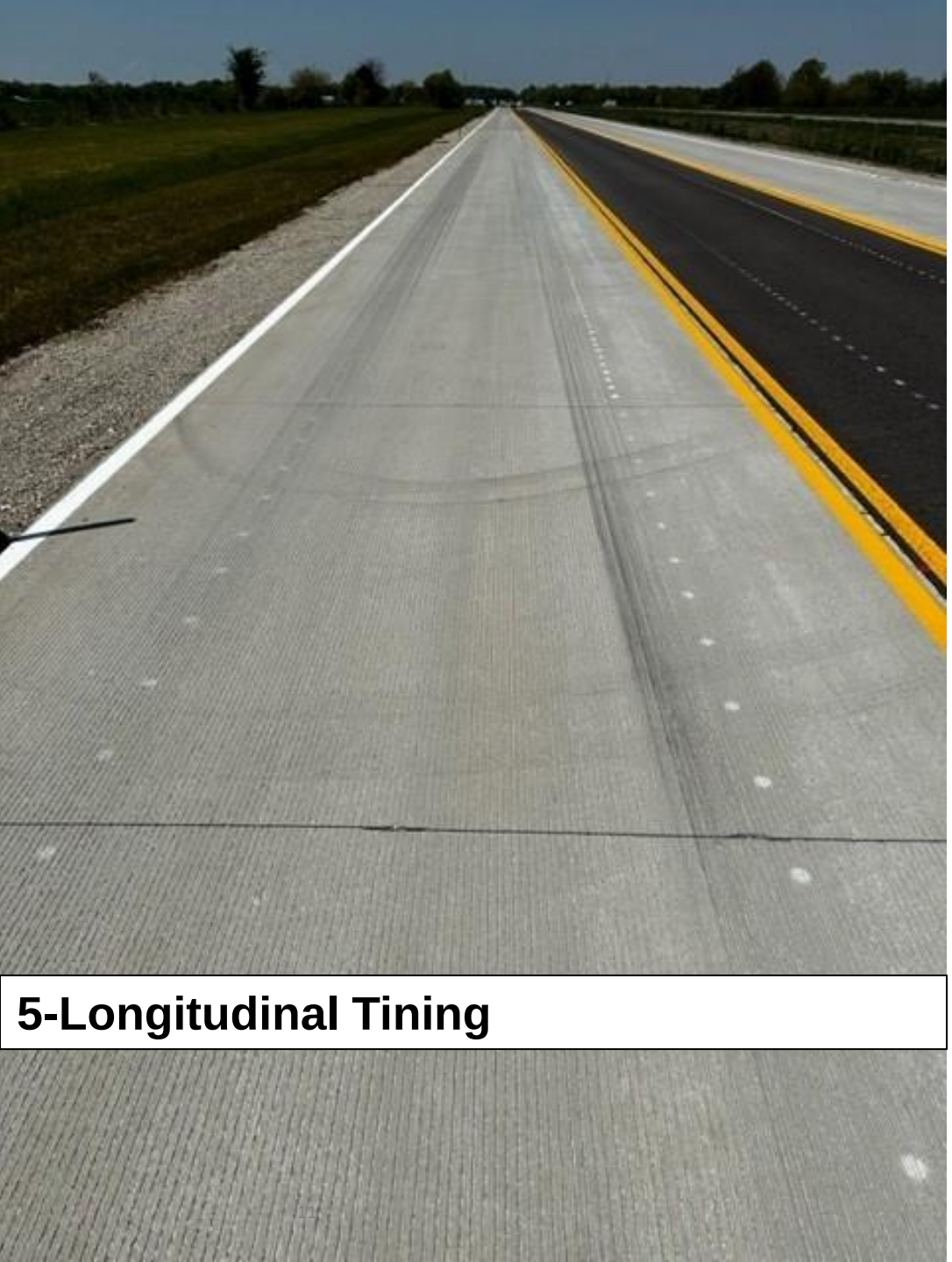
4-Smooth Finish (Float Only)

Surfaces Tested at ICART

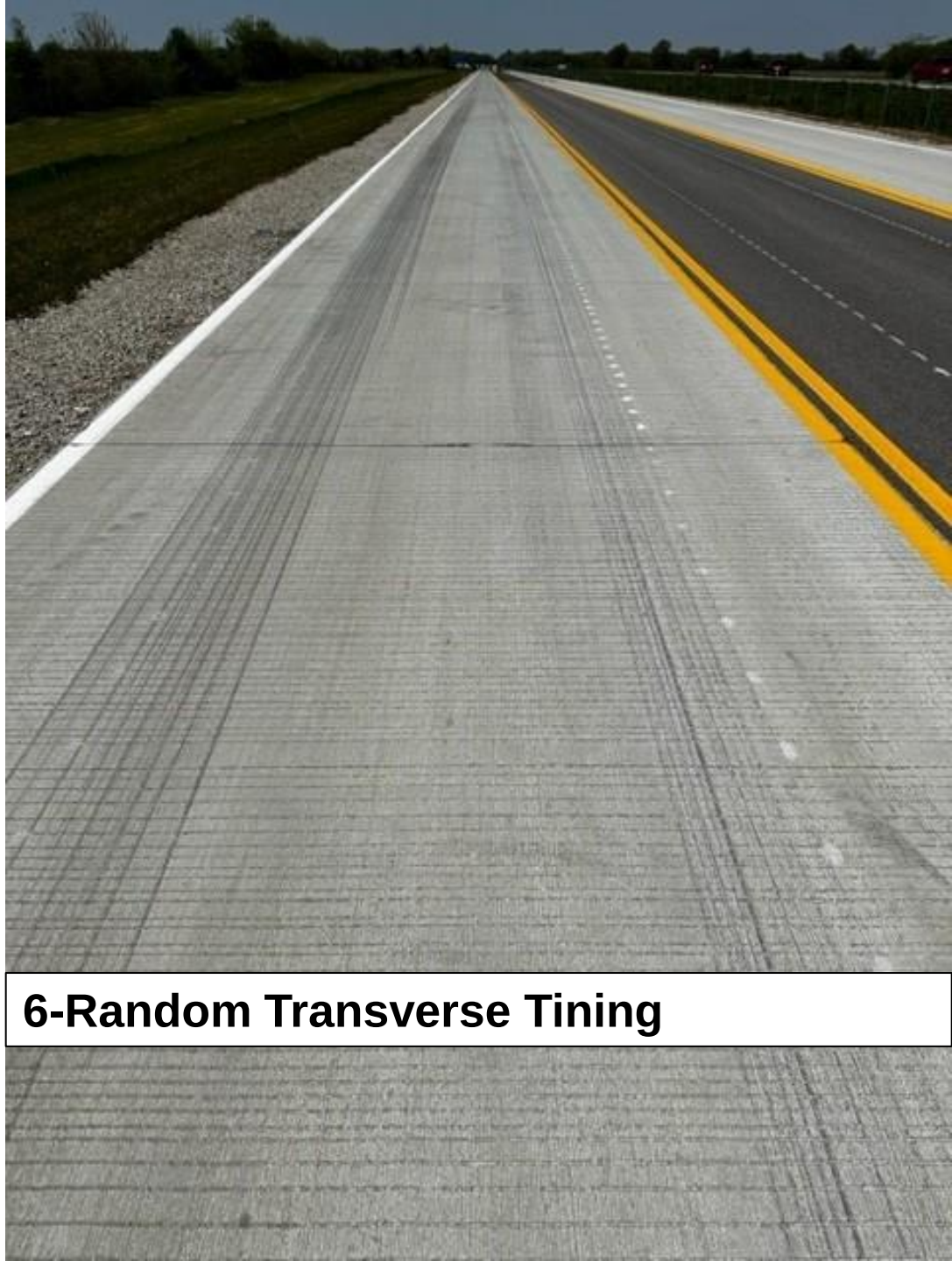
B. Lane 3 JPCP –

1) **Longitudinal Tining**
2) **Random Transverse Tining**
3) **Turf Drag**

Lane 3 JPCP



5-Longitudinal Tining



6-Random Transverse Tining

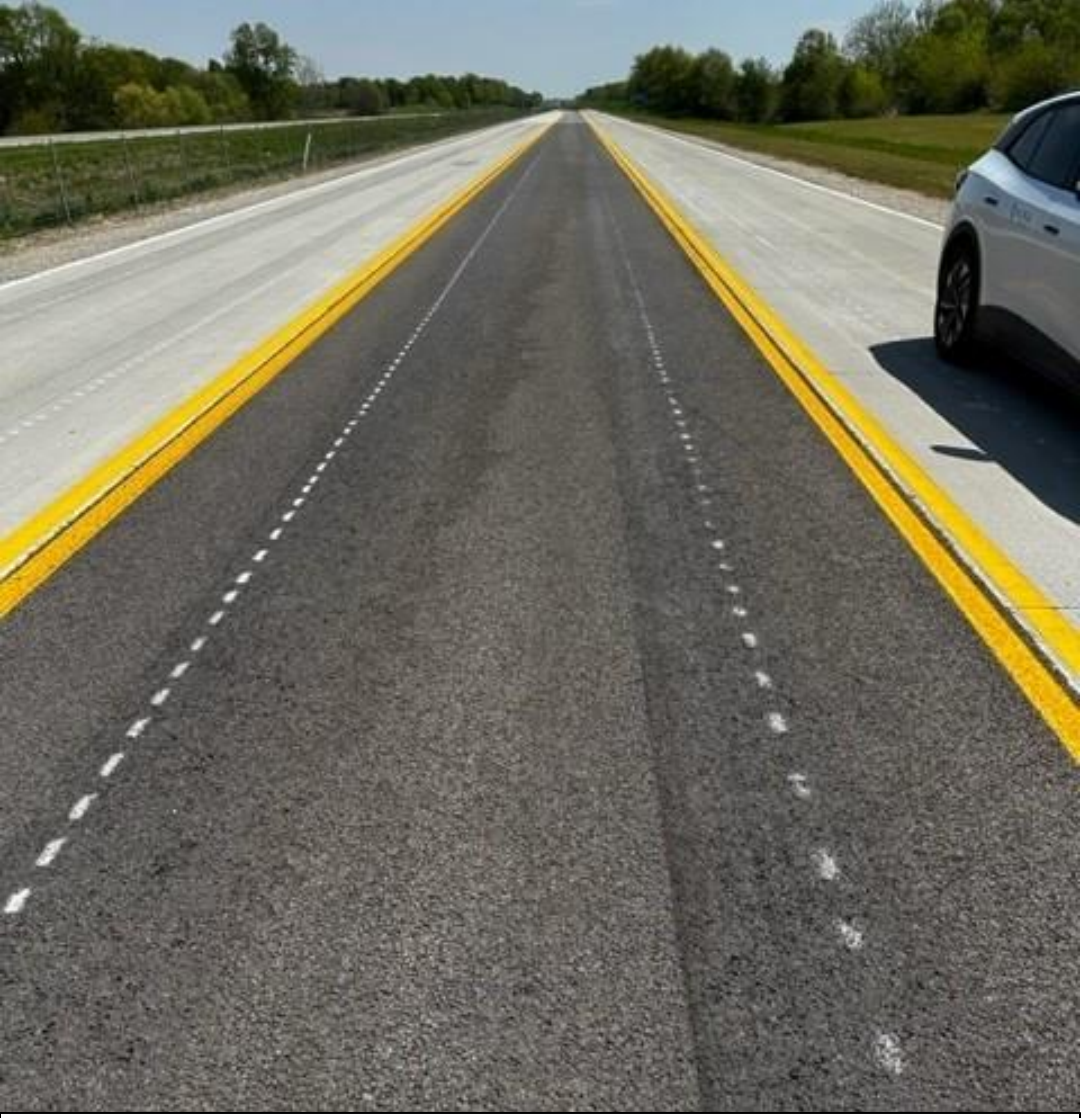
7-Turf Drag

Lane 3
JPCP

Surfaces Tested at ICART

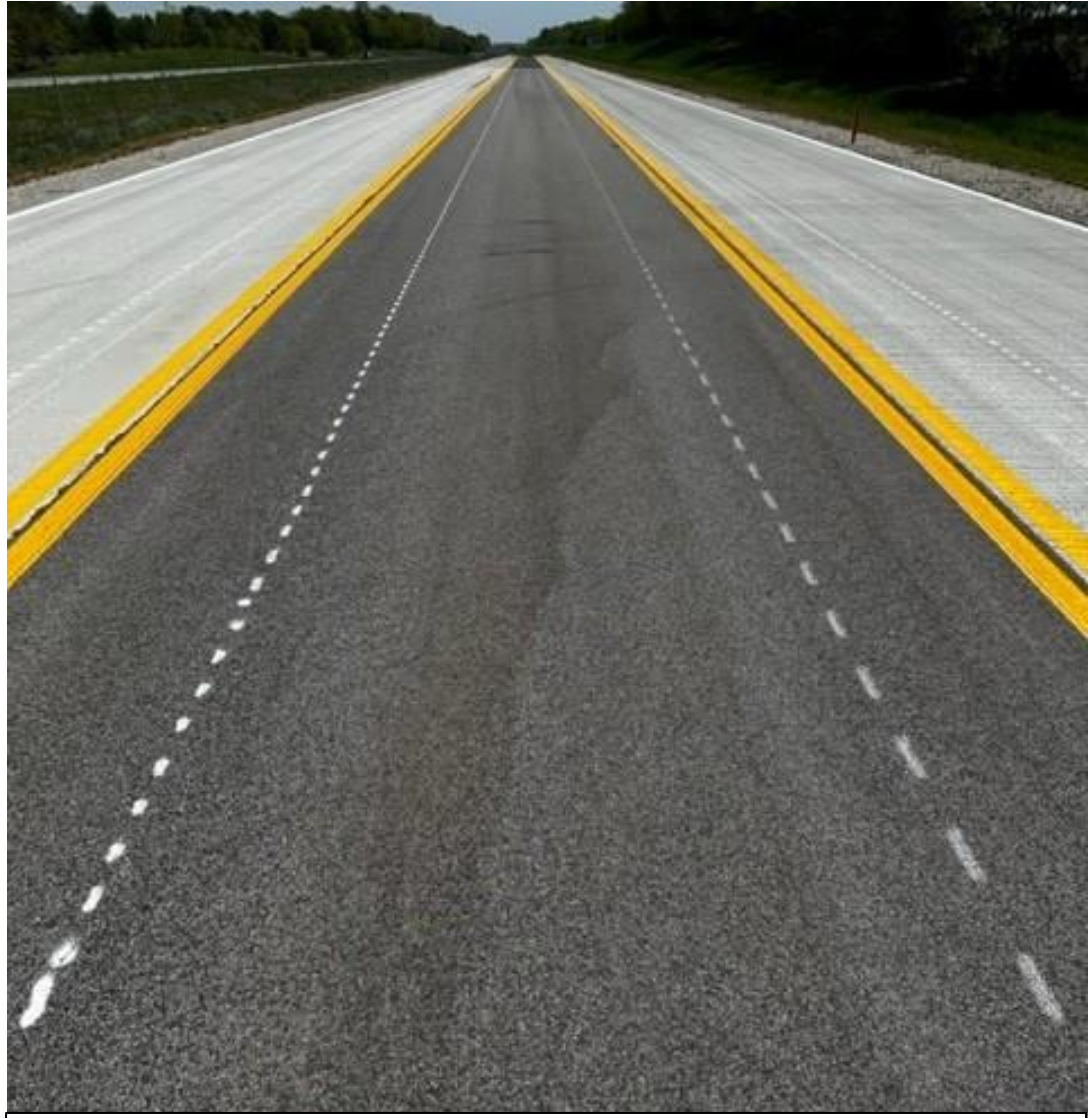
C. Asphalt Pavements

1) SMA
2) 9.5 mm DGAC
3) Micro surfacing - High Friction (30% Calcine Bauxite + 70% ACBF Slag)



8-Stone Matrix Asphalt (SMA)

Lane 2



8-Stone Matrix Asphalt (SMA) with artificial rutting

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Lane 2

10-Micro surfacing - High Friction (30% Calcine Bauxite + 70% ACBF Slag)

9-9.5 MM NMAS Dense Graded HMA

Testing Equipment (Background)

Equipment showed up “as is”. Did not verify:

- Calibration
- Certification

Considerations for variability:

- ✓ Operator experience
- ✓ Lack of markings
- ✓ Temperature differences
- ✓ Tire and equipment characteristics

Testing Equipment (Friction)

1) Locked Wheel Skid Tester (6 Ribbed/1 Smooth)
2) Continuous Friction Measuring Equipment (CFME)
   a) SFC – Sideways-force Friction (3)
   b) Other: Halliday RT-3, ICC DFT
   c) NIRA friction (Volkswagen)
3) Macrotexture
   a) Mandli (LCMS)
   b) Pathways – line laser
   c) SSI – line laser
   d) SFC (FHWA) – line laser
   e) Static and walk behind

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LWST

Testing Equipment (Friction)

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LWST

Infrastructure

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LWST

Infrastructure

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Infrastructure

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ARRB iSAVe

SCRIM (large)

SCRIM (large)

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- **ICC DFT**

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Halliday RT-3

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Testing Equipment (Friction)

NIRA

Volkswagen

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Mandli LCMS

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Pathways

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SSI CS9500

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Testing Equipment (Texture)

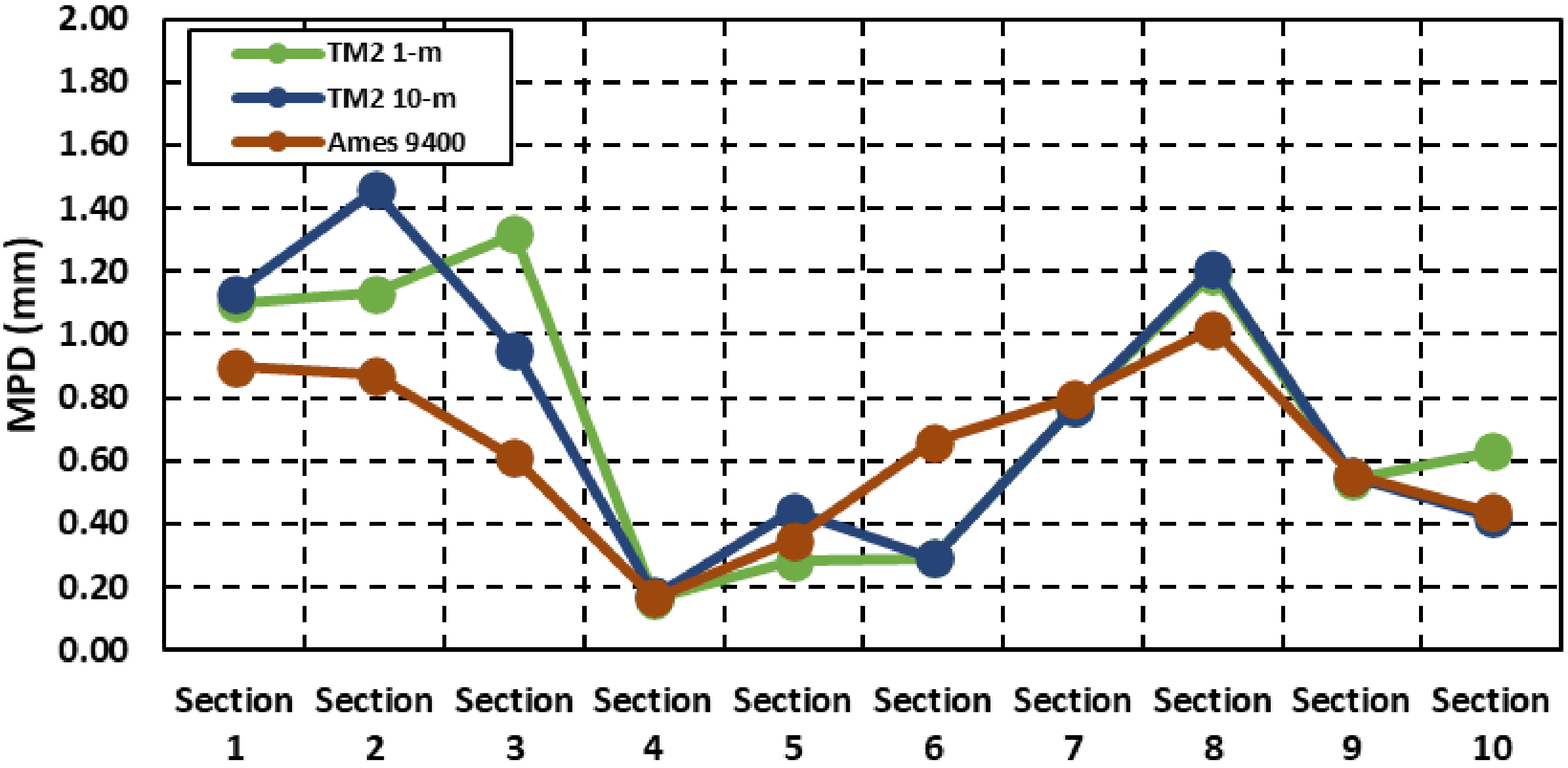
Above:
AMES 9400 Laser Texture Analyzer

Right:
WDM TM2 Surface Texture Meter

Testing Equipment (Texture)

1) Static or walk behind (4” line laser)
   a) AMES 9400 Rapid Laser Texture Analyzer
   b) TM2 – Surface Texture Meter (ILL – transverse)
2) Highway speed
   a) LCMS (Mandli – MTD “sandpatch” to MPD)
   b) SCRIM Single Spot
   c) SCRIM Line Laser
   d) Pathways Line Laser
   e) SSI Line Laser

Static or walk behind



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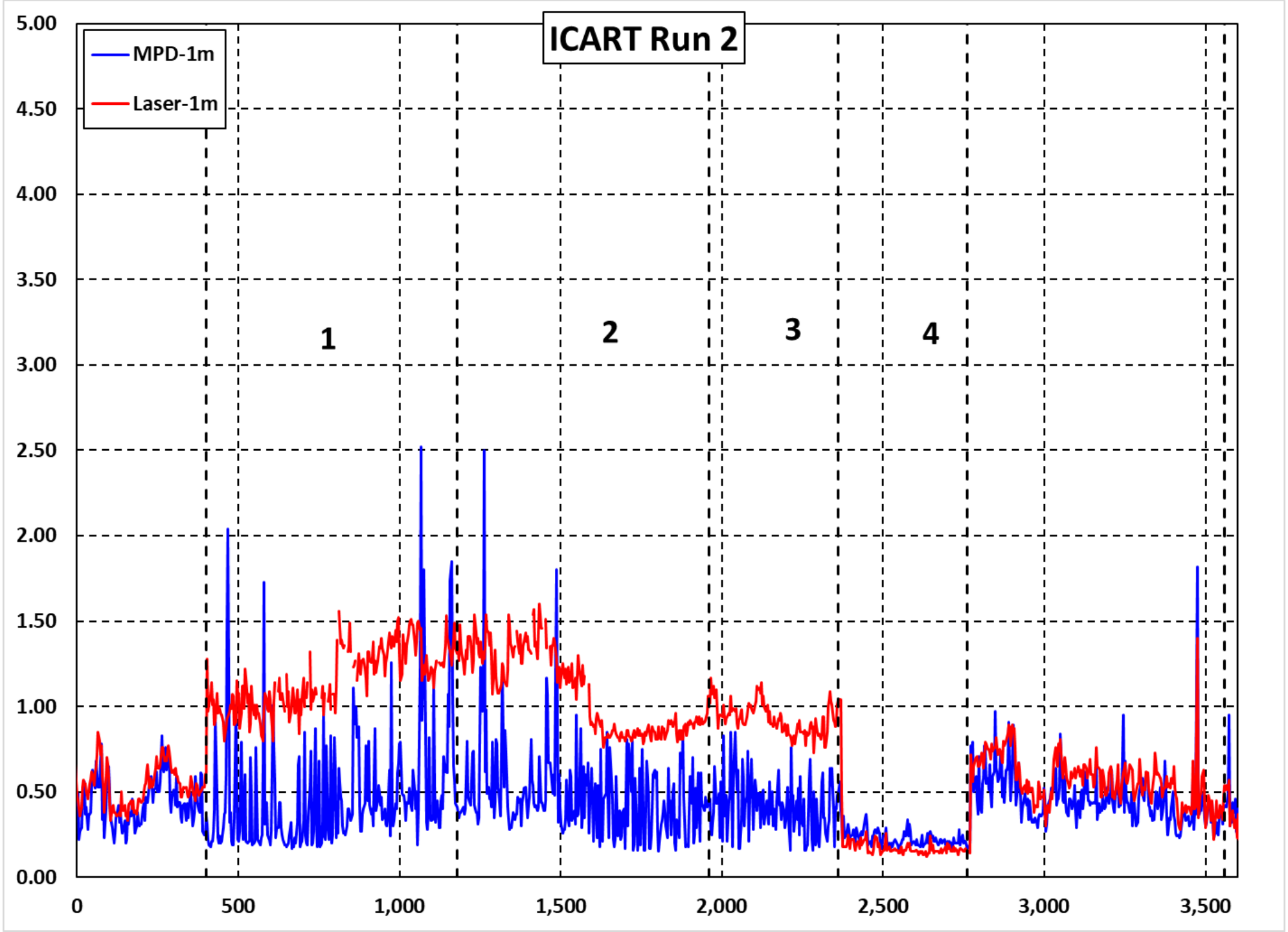

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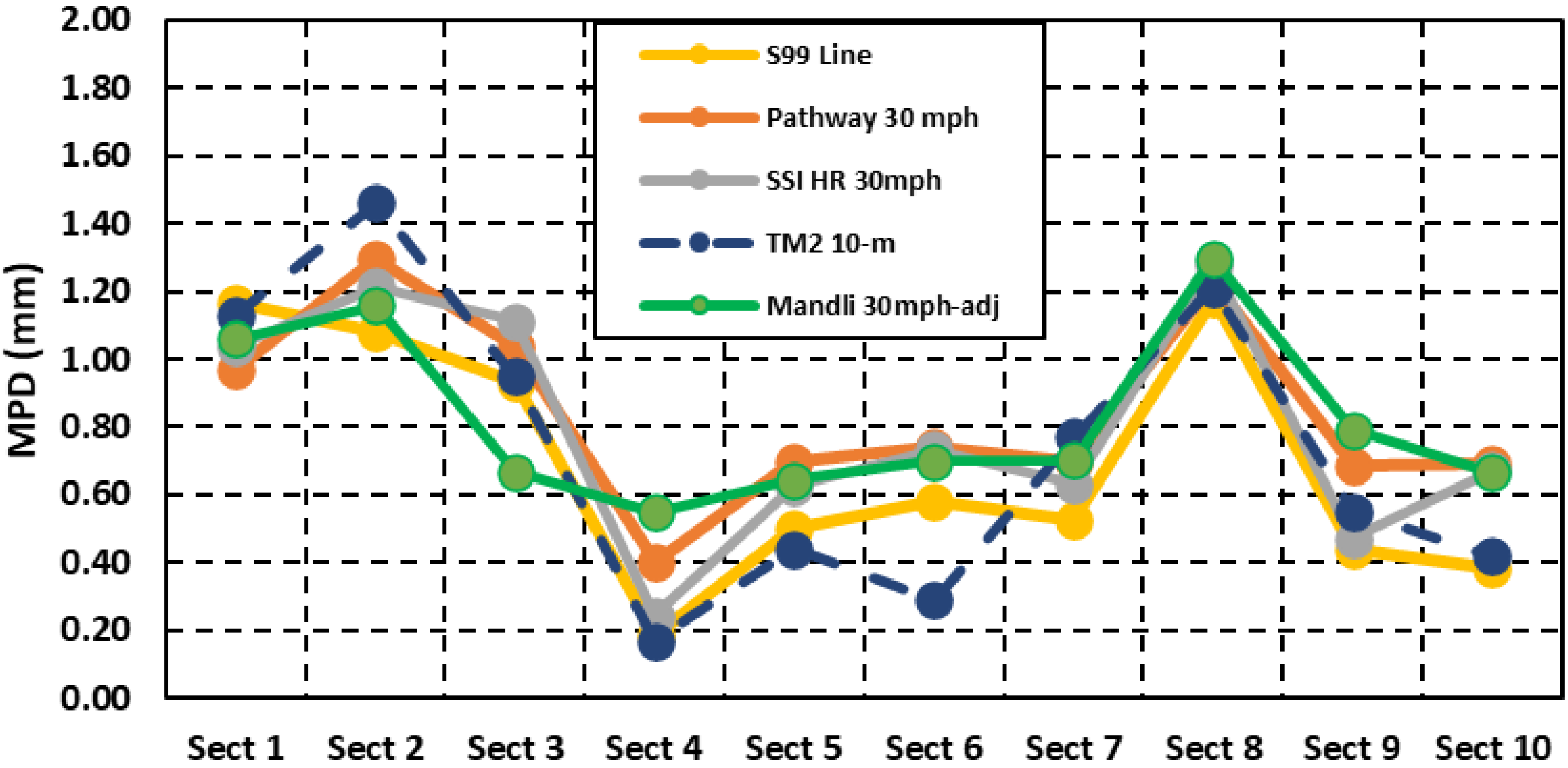
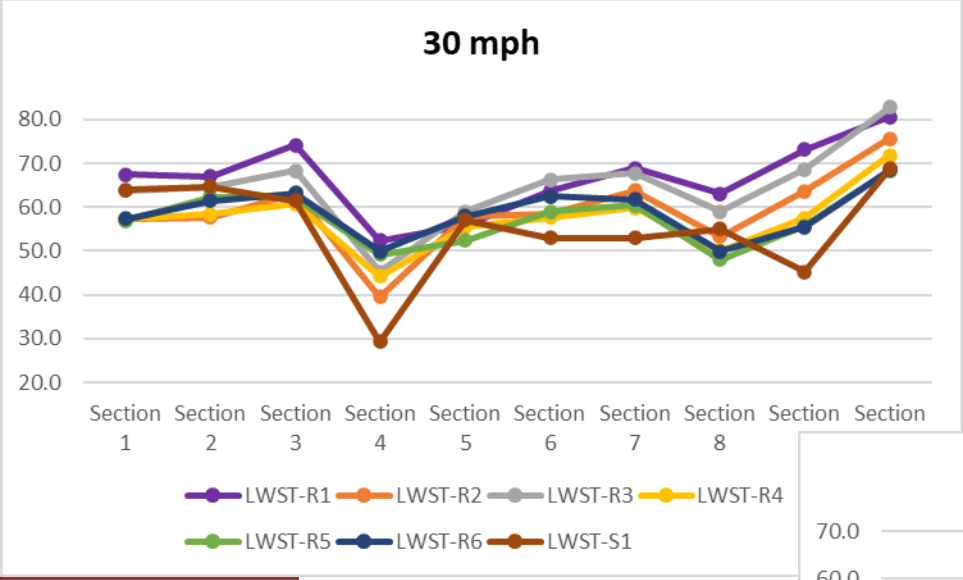
Macrotexture - Line lasers and TM2

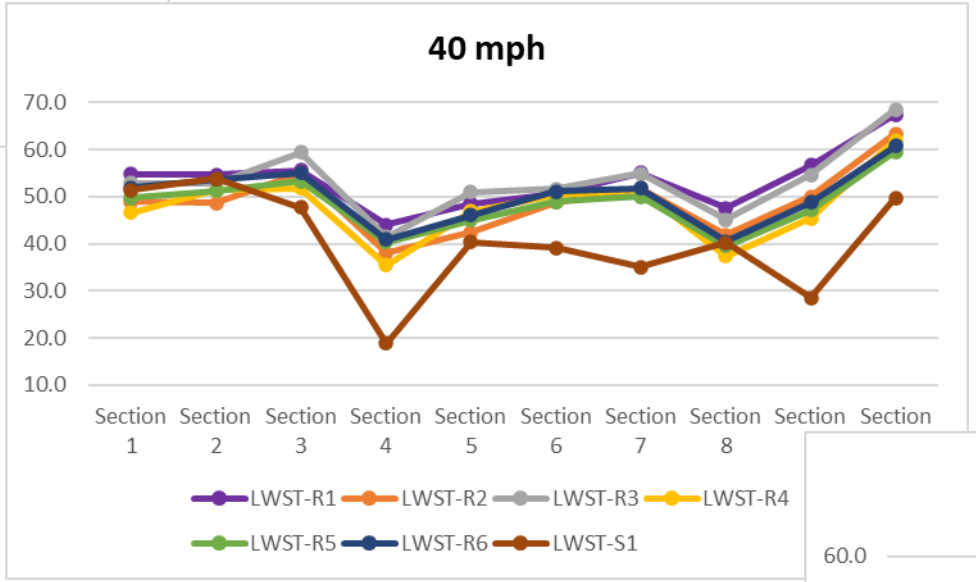


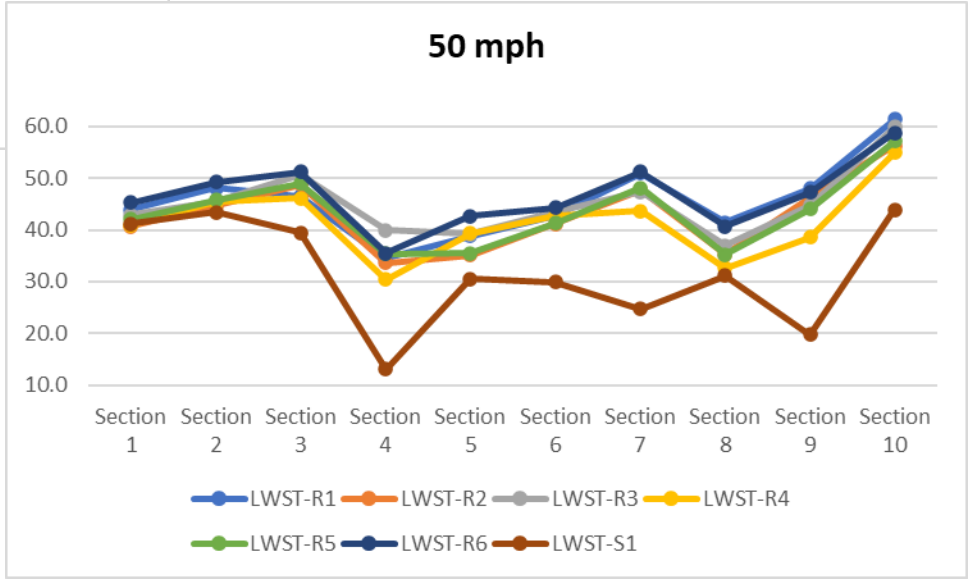
Testing Equipment (Friction)

1) Locked Wheel Skid Tester (6 Ribbed/1 Smooth)
2) Continuous Friction Measuring Equipment (CFME)
   a) SFC – Sideways-force Friction (3)
   b) Other: Halliday RT-3, ICC DFT
   c) NIRA friction (Volkswagen)
3) Macrotexture
   a) Mandli (LCMS)
   b) Pathways – line laser
   c) ISS – line laser
   d) SFC (FHWA) – line laser
   e) Static and walk behind

LWST 6-Ribbed 1-Smooth







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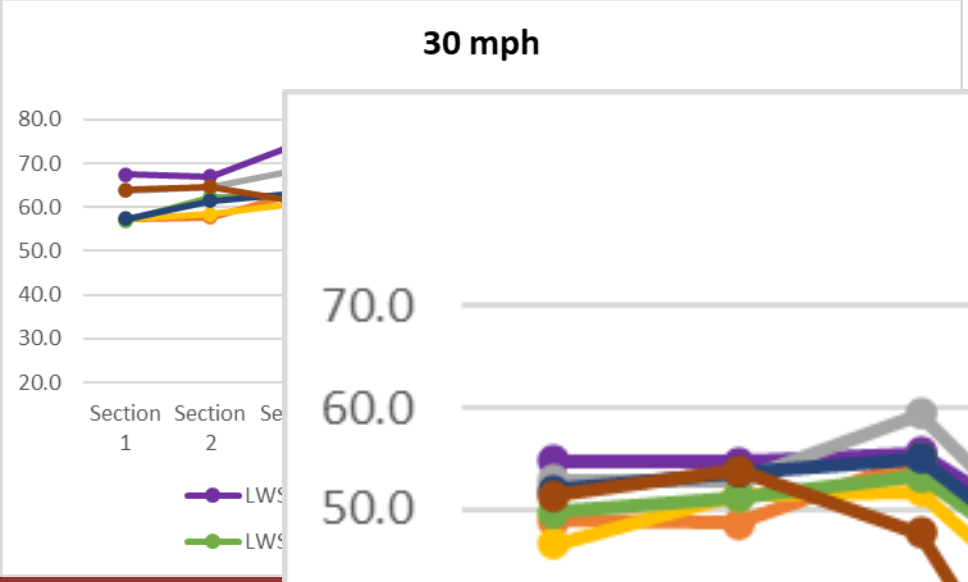

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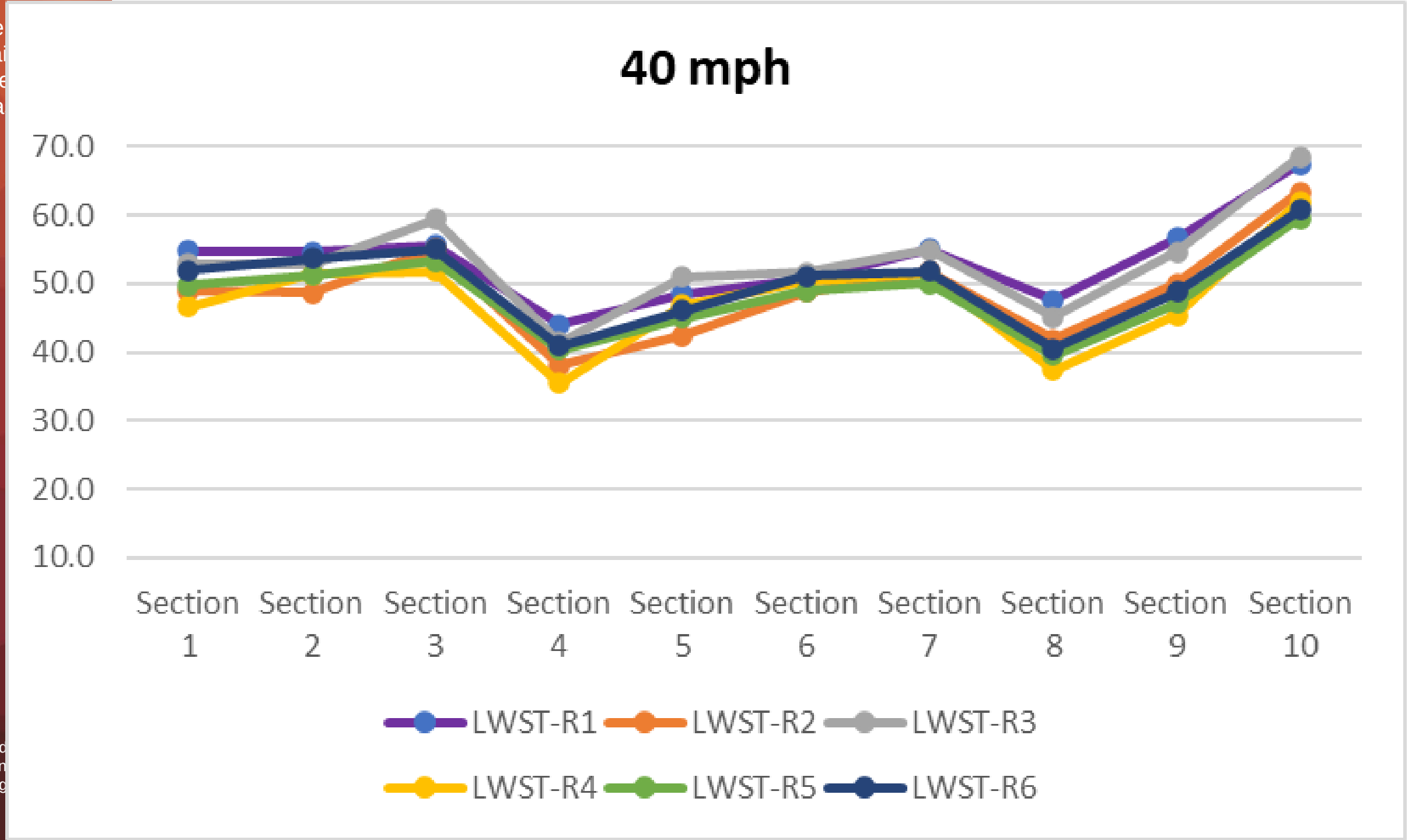
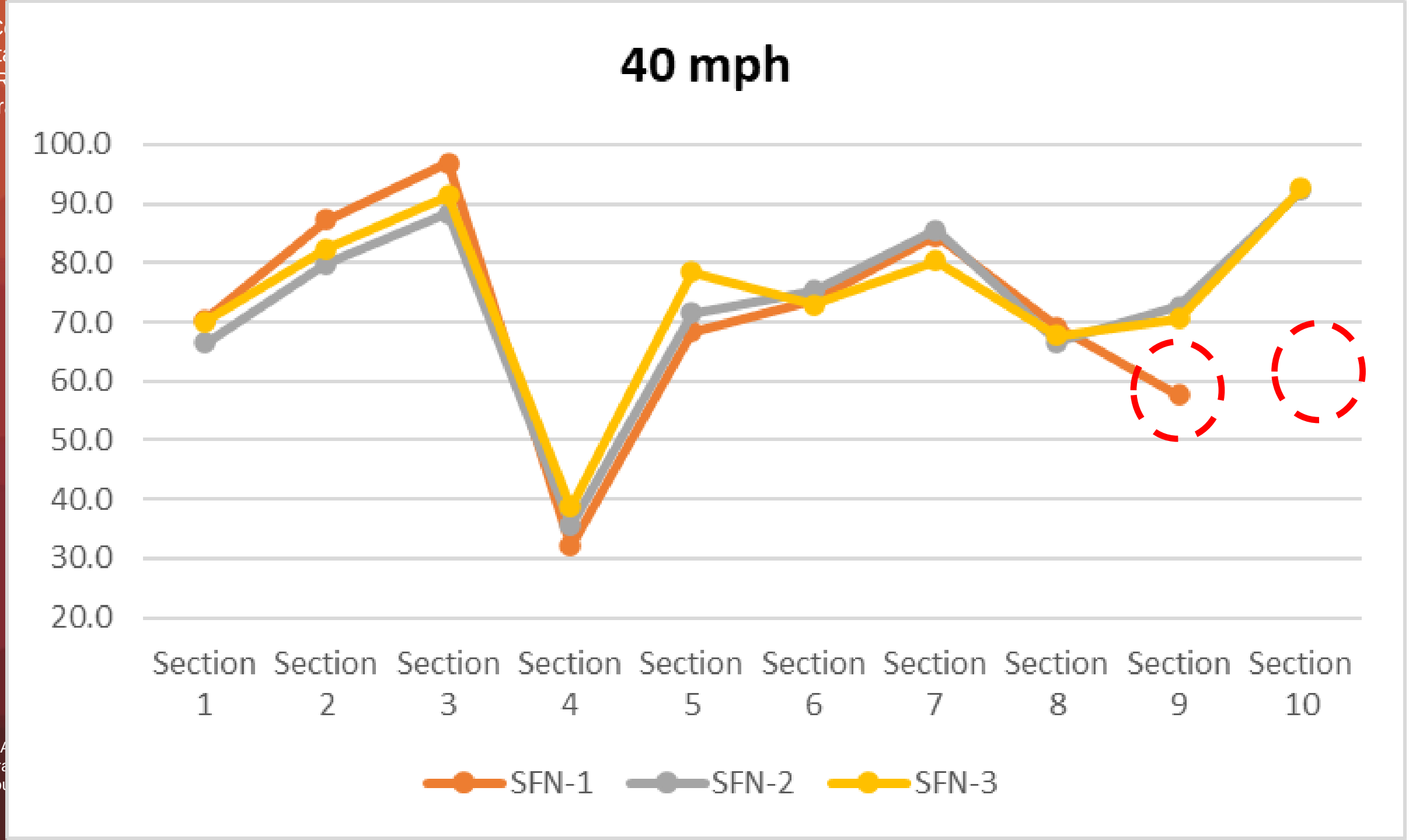

40 mph
70.0
60.0
50.0
40.0
30.0
20.0
10.0
Section 1
Section 2
Section 3
Section 4
Section 5
Section 6
Section 7
Section 8
Section 9
Section 10
LWST-R1
LWST-R2
LWST-R3
LWST-R4
LWST-R5
LWST-R6

Testing Equipment (Friction)

1) **Continuous Friction Measuring Equipment (CFME)**
   a) **SFC – Sideways-force Friction (3)**
   b) **Other: Halliday RT-3, ICC DFT**
   c) **NIRA friction (Volkswagen)**


40 mph
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Section 1
Section 2
Section 3
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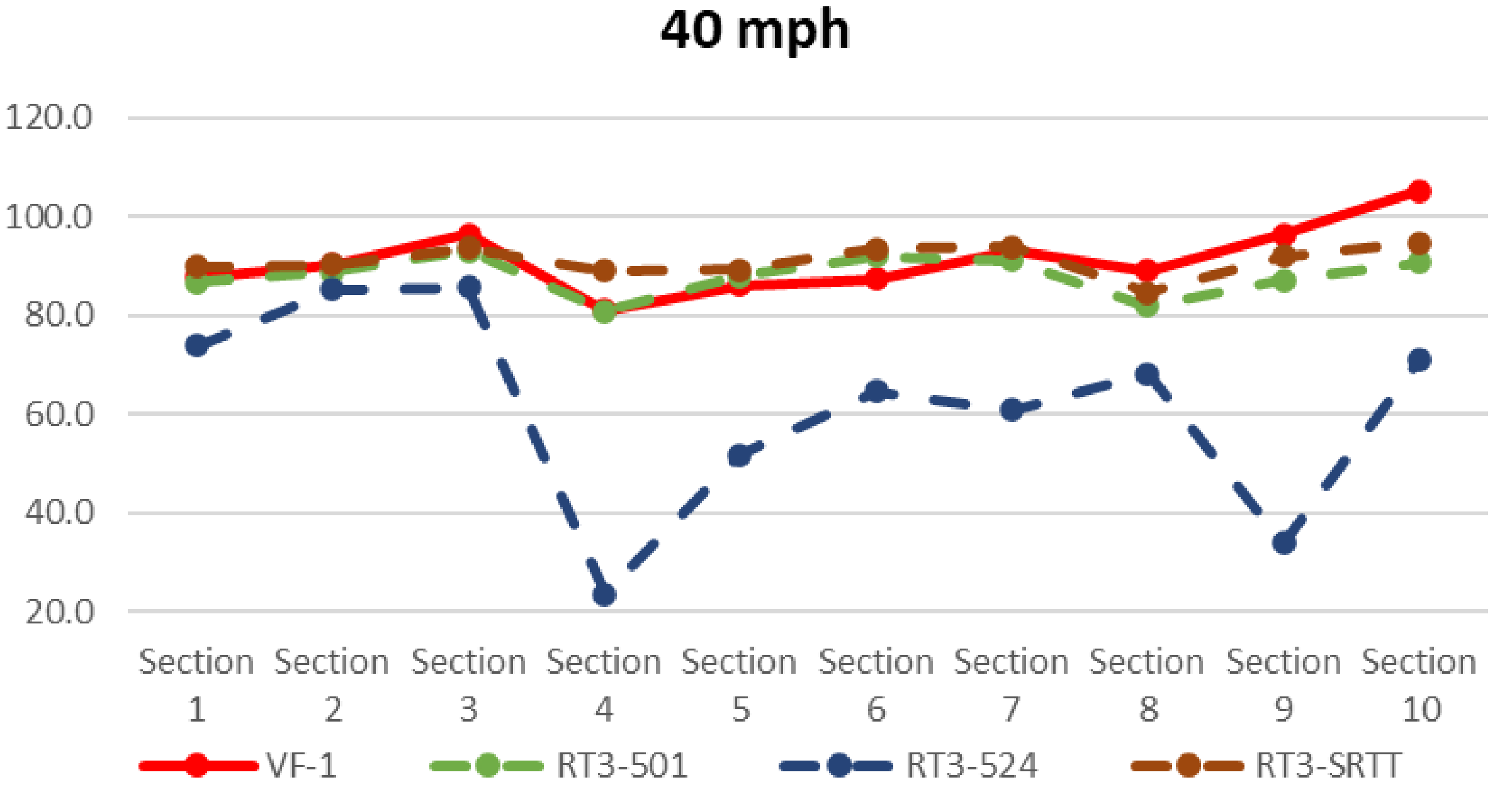
Section 10
SFN-1
SFN-2
SFN-3


40 mph
120.0
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60.0
40.0
20.0
Section 1
Section 2
Section 3
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Section 5
Section 6
Section 7
Section 8
Section 9
Section 10
VF-1
RT3-501
RT3-524
RT3-SRTT

CONCLUSIONS+RECOMMENDATIONS

1. **Proposal #1: make an NCHRP 10-98 Macrotexture Implementation Project to review, test, and validate the standards made in the project. Testing will require valid reference measurements and will test only line lasers.**
2. **Proposal #2: make a friction verification center(s) to evaluate and accredit SFN equipment. There are two possible centers that will develop these concepts together based on UK procedures.**
3. **Proposal #3: LWST verification – independent evaluation *after* calibration is done. Possible implementation will require Pooled Fund involvement.**