National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

MDOT SCDOT

Stabilized Foundation (S2) & Thick Lift Paving (S9)

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SEVENTH RESEARCH CYCLE

NCAT TEST TRACK CONFERENCE

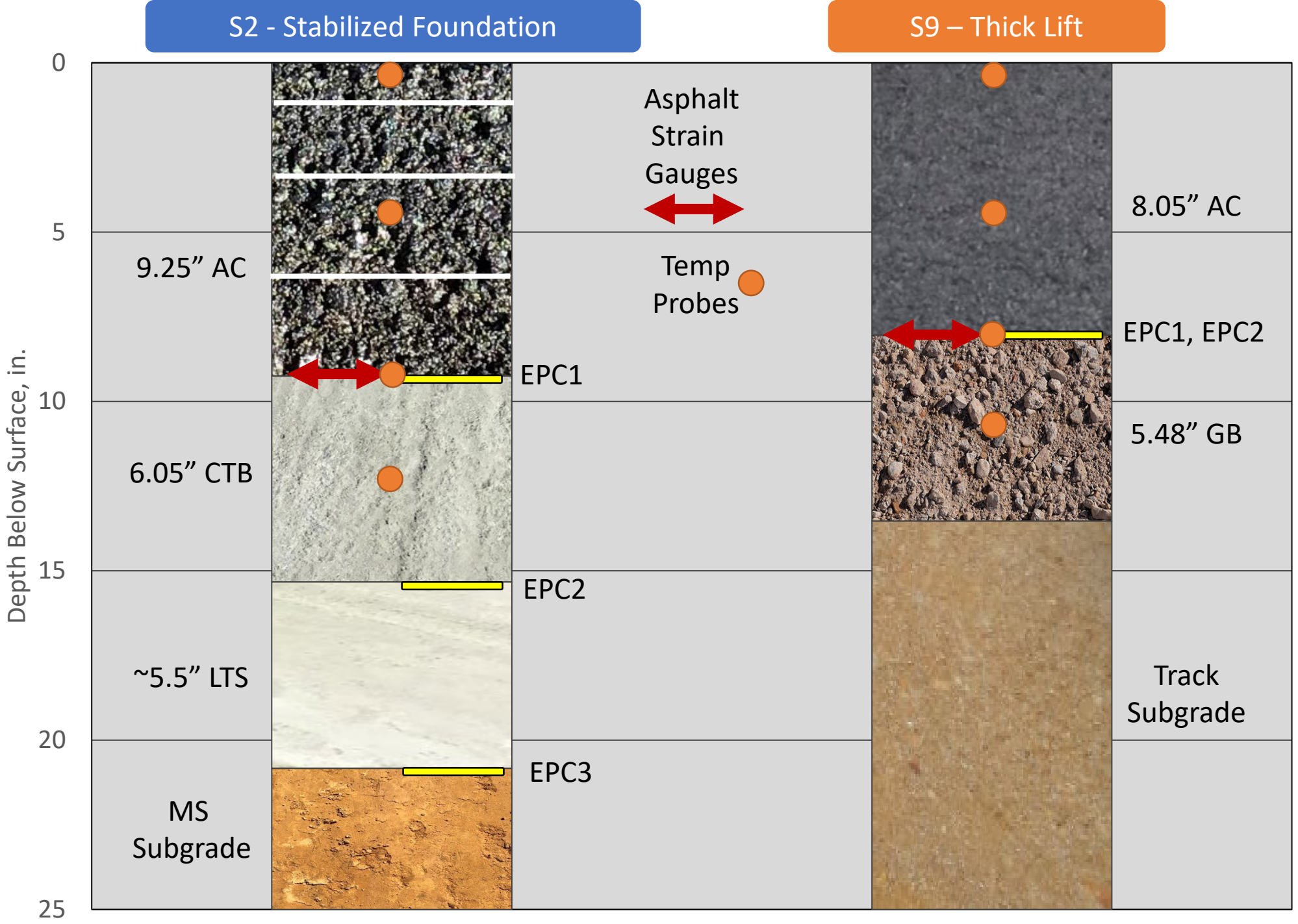
Background – Stabilized Foundation

- Weak bases/soils often stabilized
  - Improved construction platform
  - Improved rutting performance
- Risk of reflection cracking
- Very little data for M-E modeling and calibration

Background – Thick Lift Paving

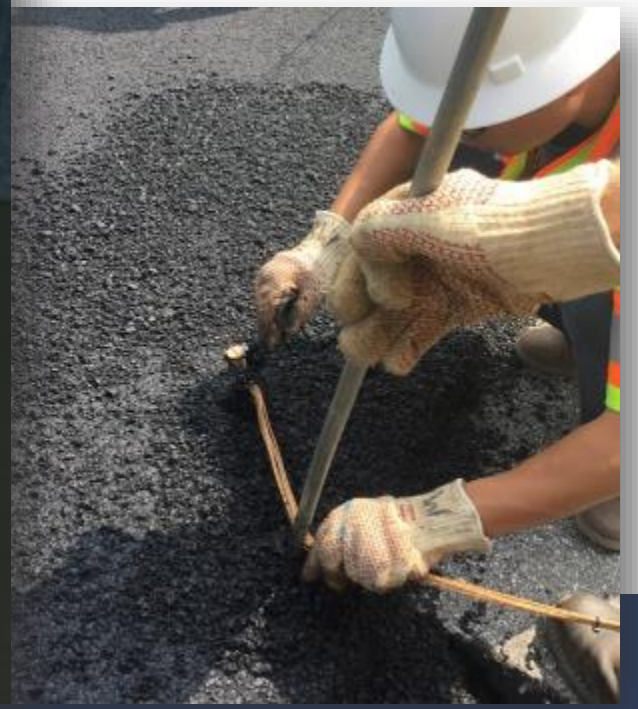
- Flexible pavements usually built in series of lifts
  - Tack between layers
  - Different materials
  - Long and time-consuming work zones
- Due to traffic demands, SCDOT working on rapid deep rehabilitations in single lifts (4 to 5”)
  - Desire to pave even thicker in single lift
- Key concerns
  - Time to Cool & Compaction
  - Rutting susceptibility
  - Mechanistic Characterization

Test Sections

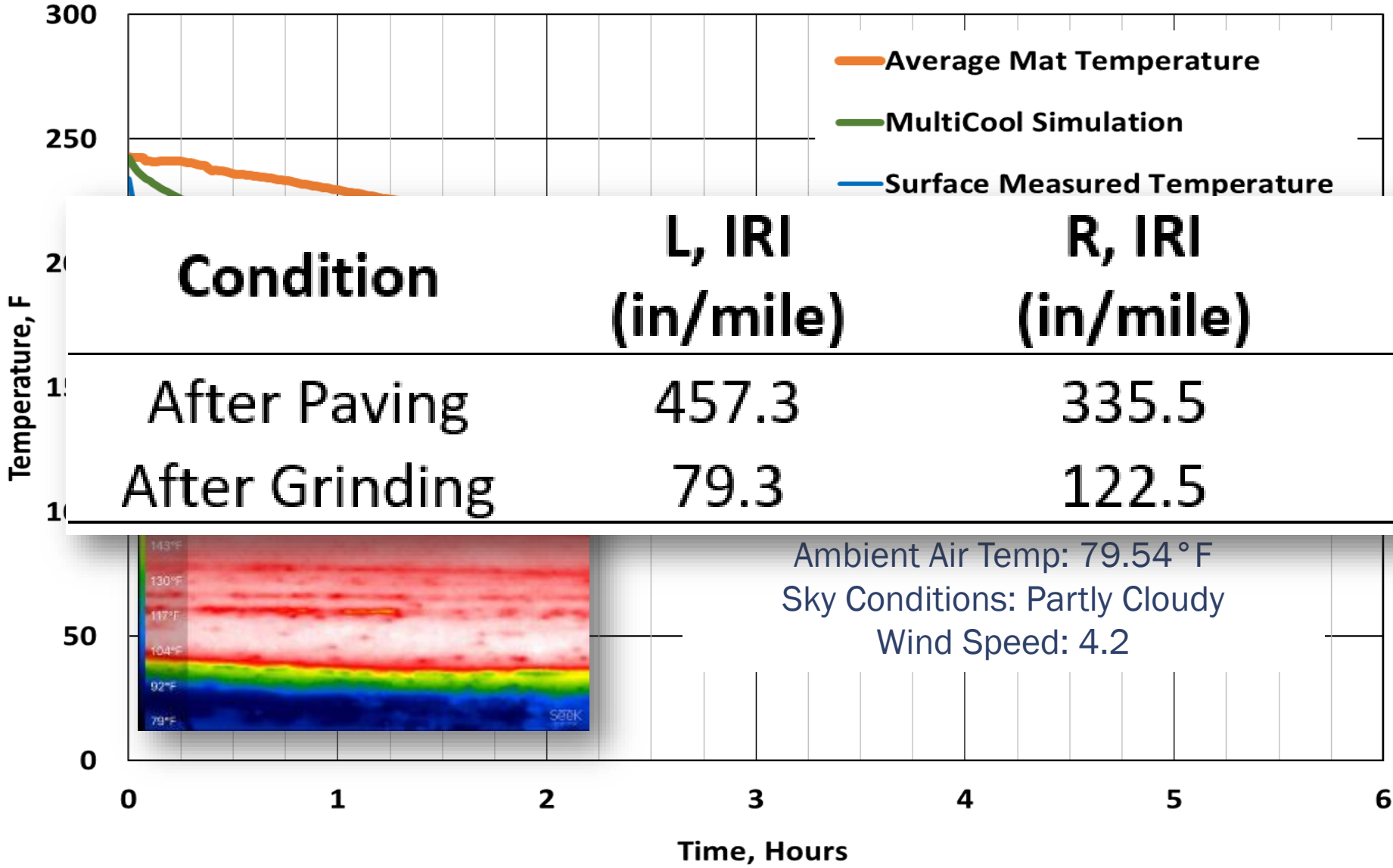


S2 – Stabilized Foundation Construction

S9 – Thick Lift Construction



Thick Lift (S9) Pavement Cooling & Initial Roughness

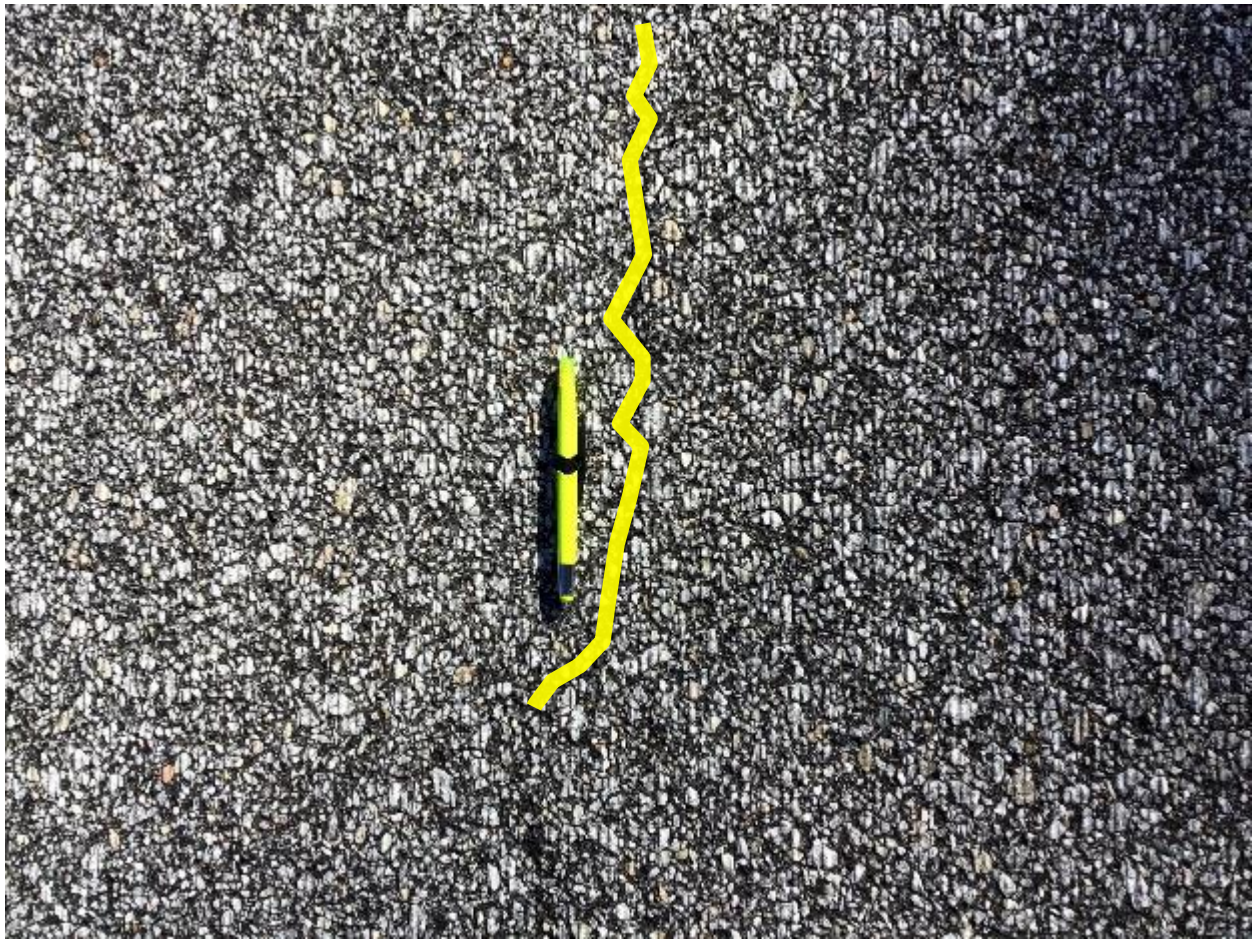


Condition	L, IRI (in/mile)	R, IRI (in/mile)	Mean, IRI (in/mile)
After Paving	457.3	335.5	396.4
After Grinding	79.3	122.5	100.9

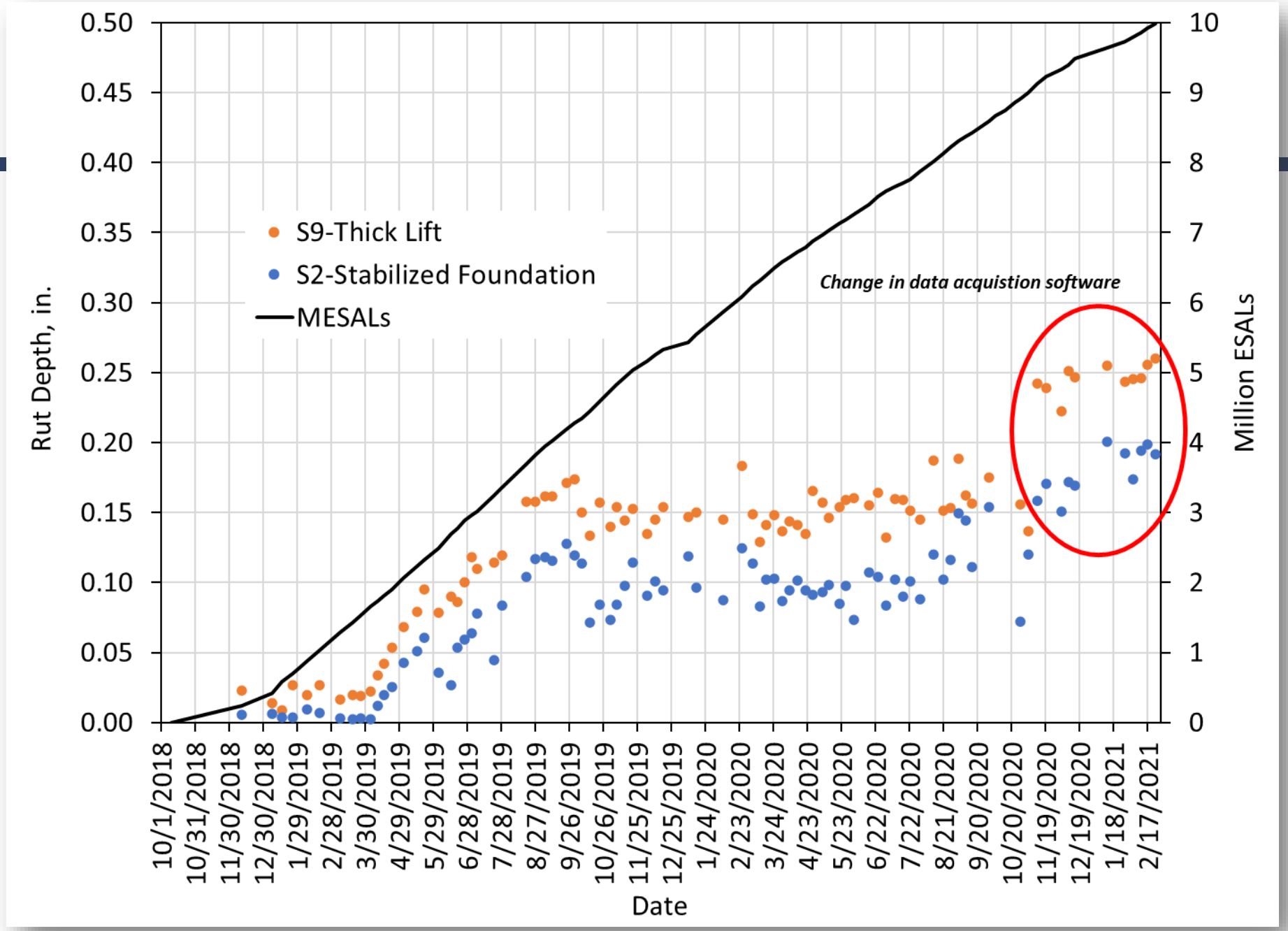
Finished Surfaces

Cracking Performance

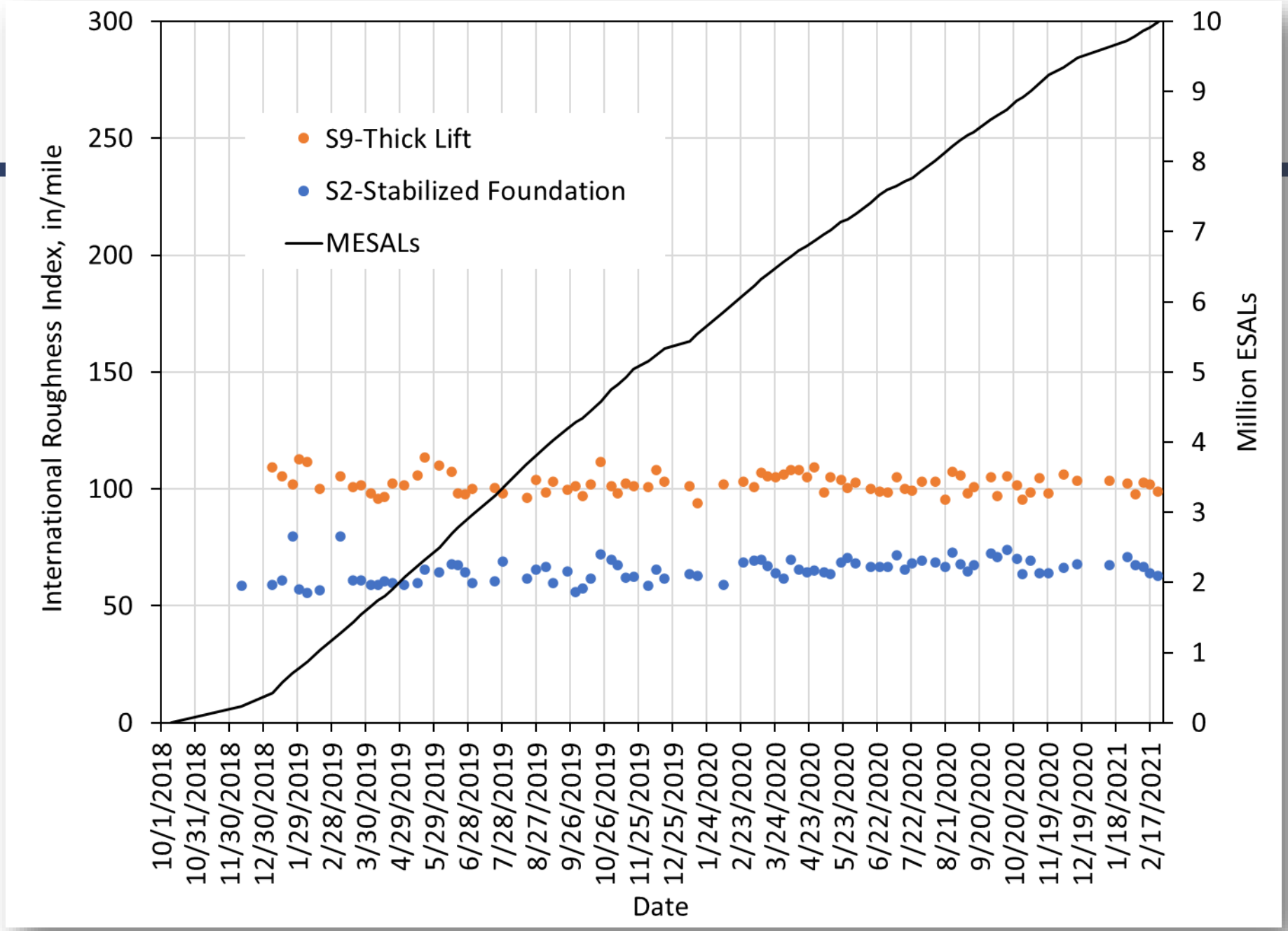
- No cracking in Stabilized Foundation Section (S2)
- Very minor cracking observed in Thick Lift Section (S9)
  - 0.7% of Lane / 1.1% of Wheelpath



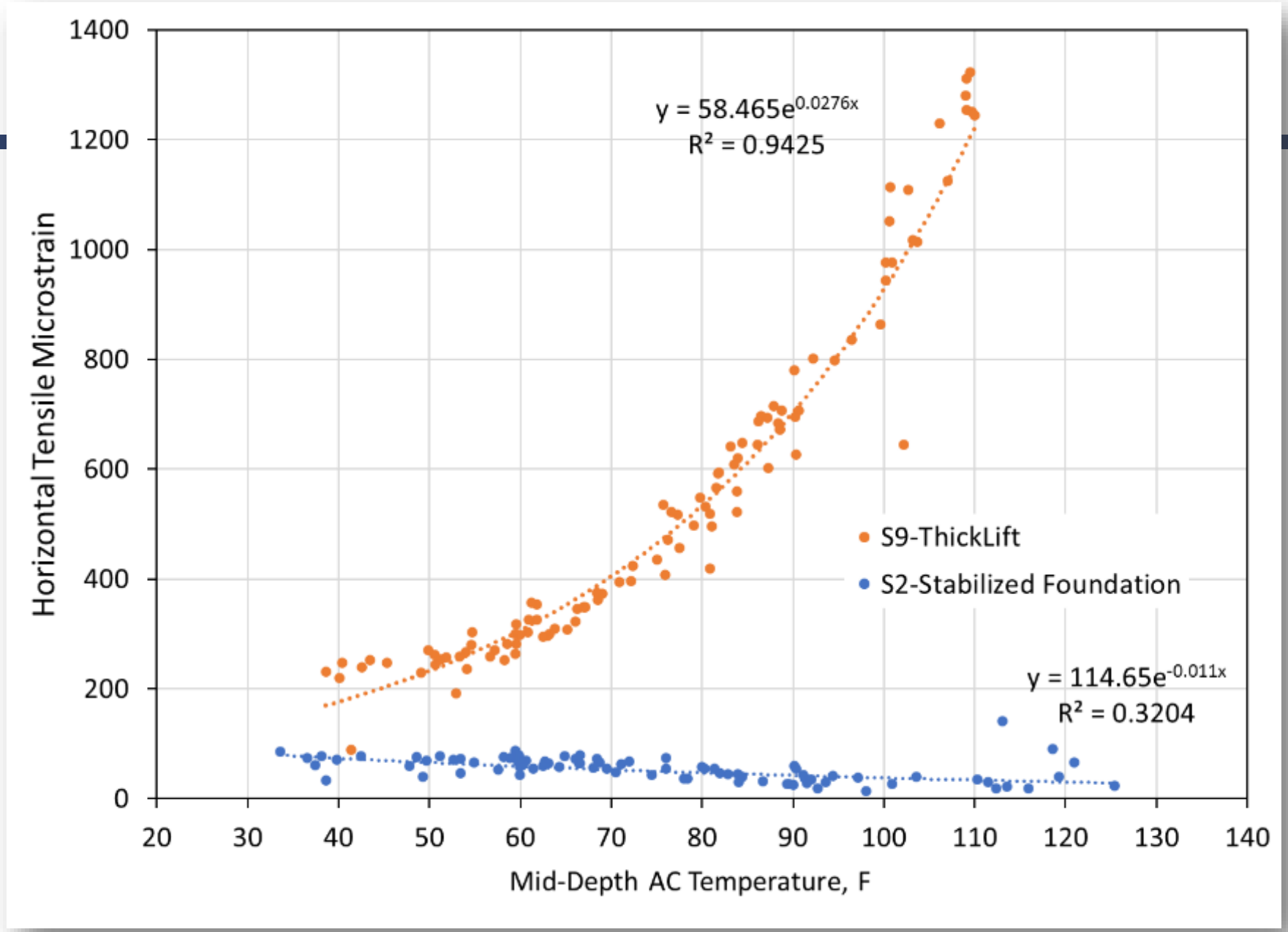
Rutting Performance



Ride Quality (IRI)



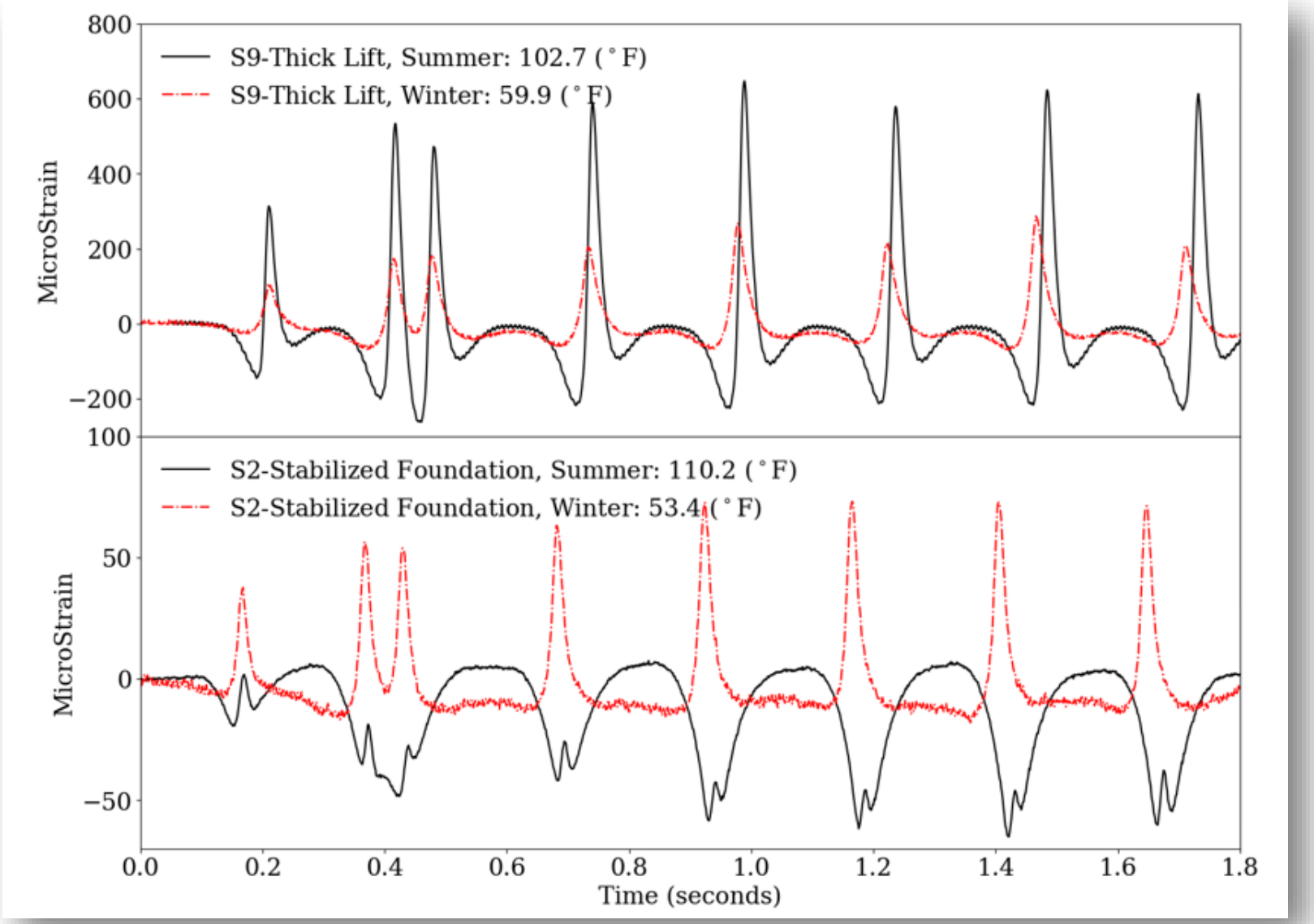
Measured Strain Responses



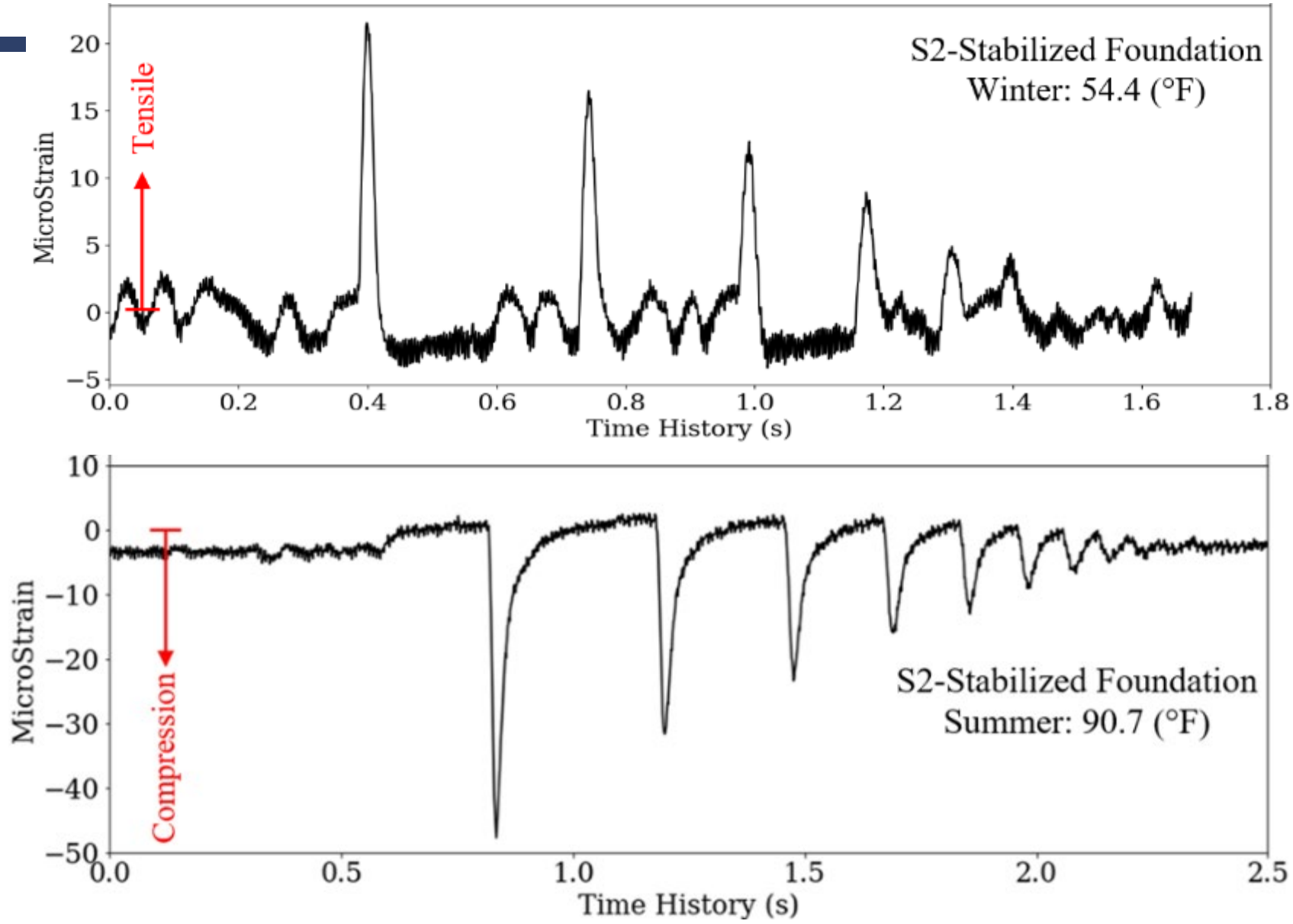
Measured Strain Responses – Single Truck Passes

S9 – Thick Lift

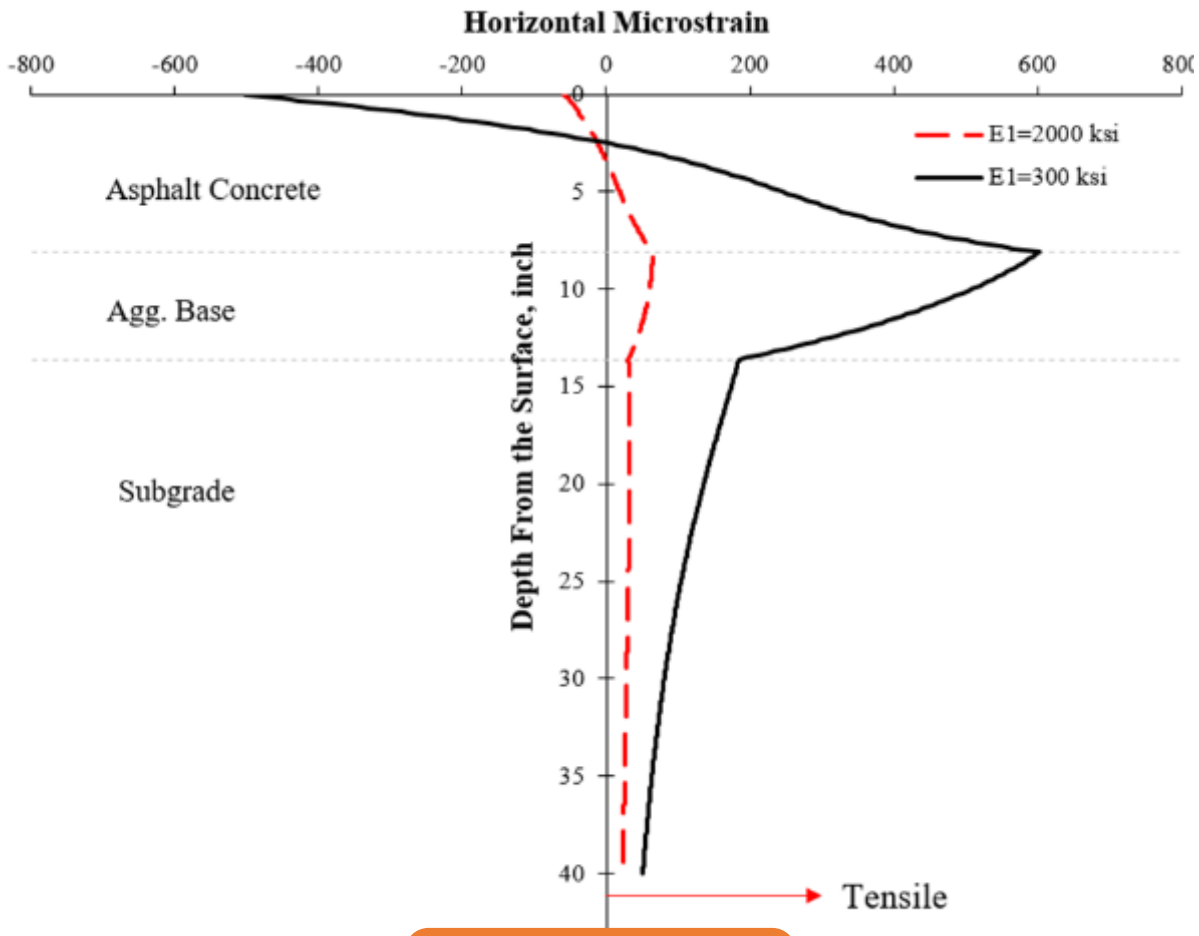
S2 - Stabilized Foundation



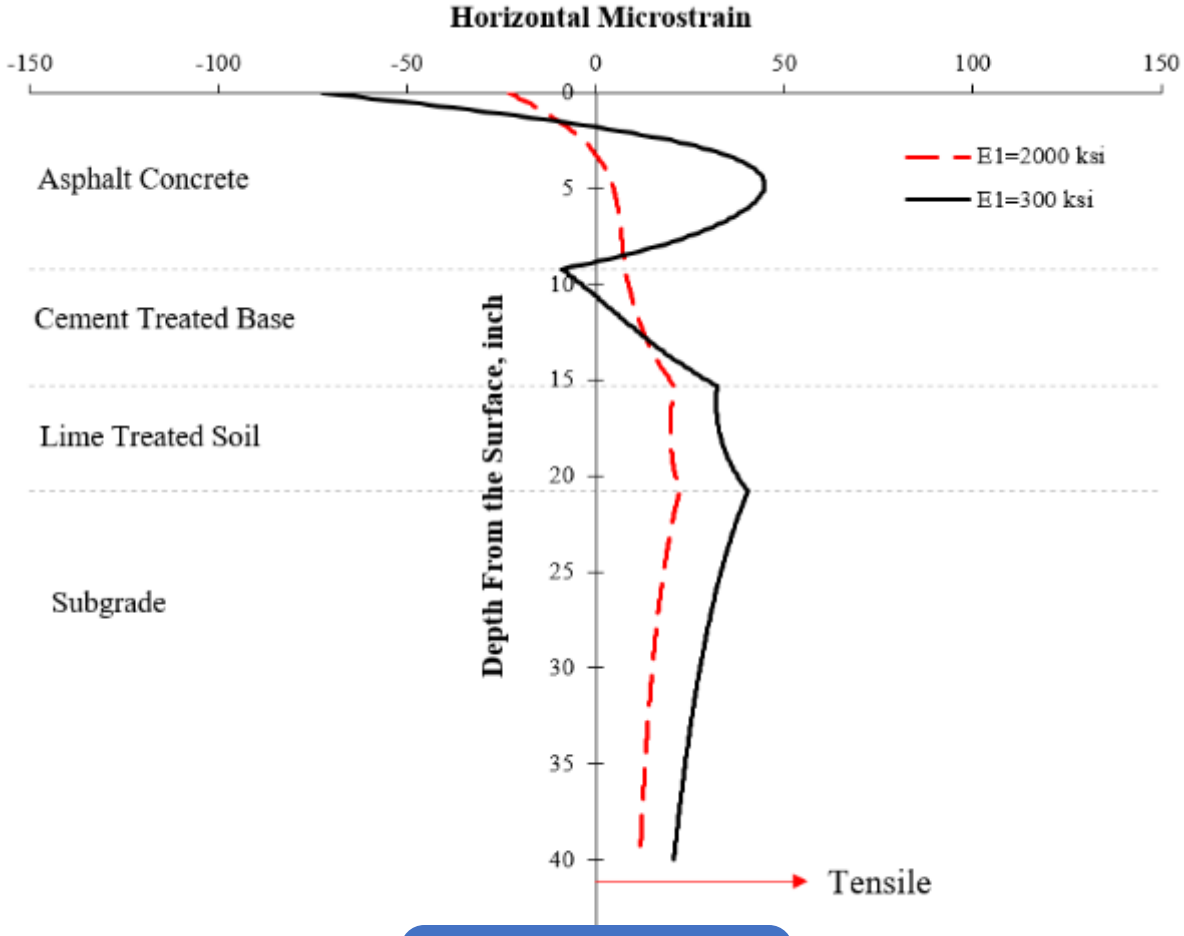
Measured Strain Responses – FWD Testing in S2



Simulated Pavement Responses

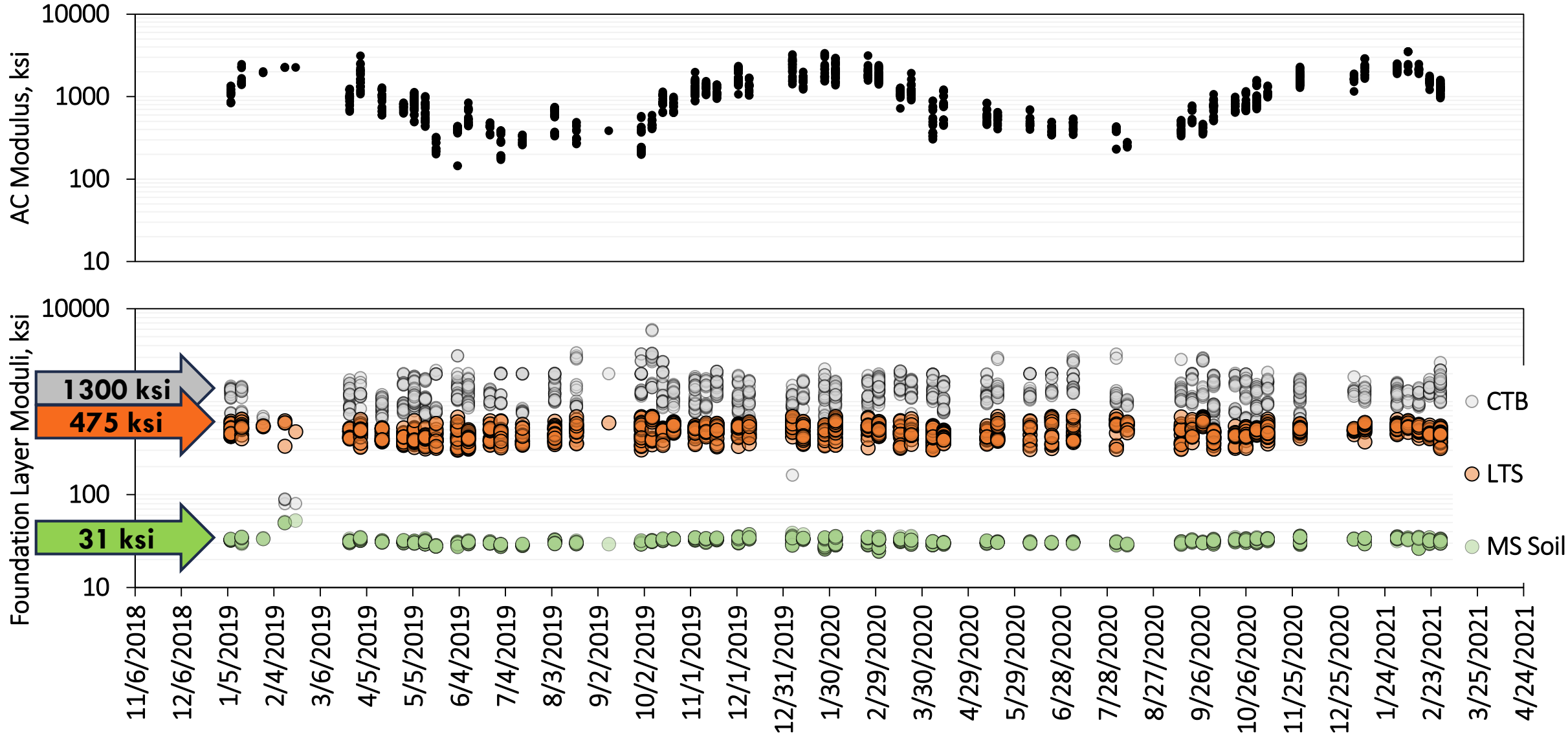


S9 – Thick Lift

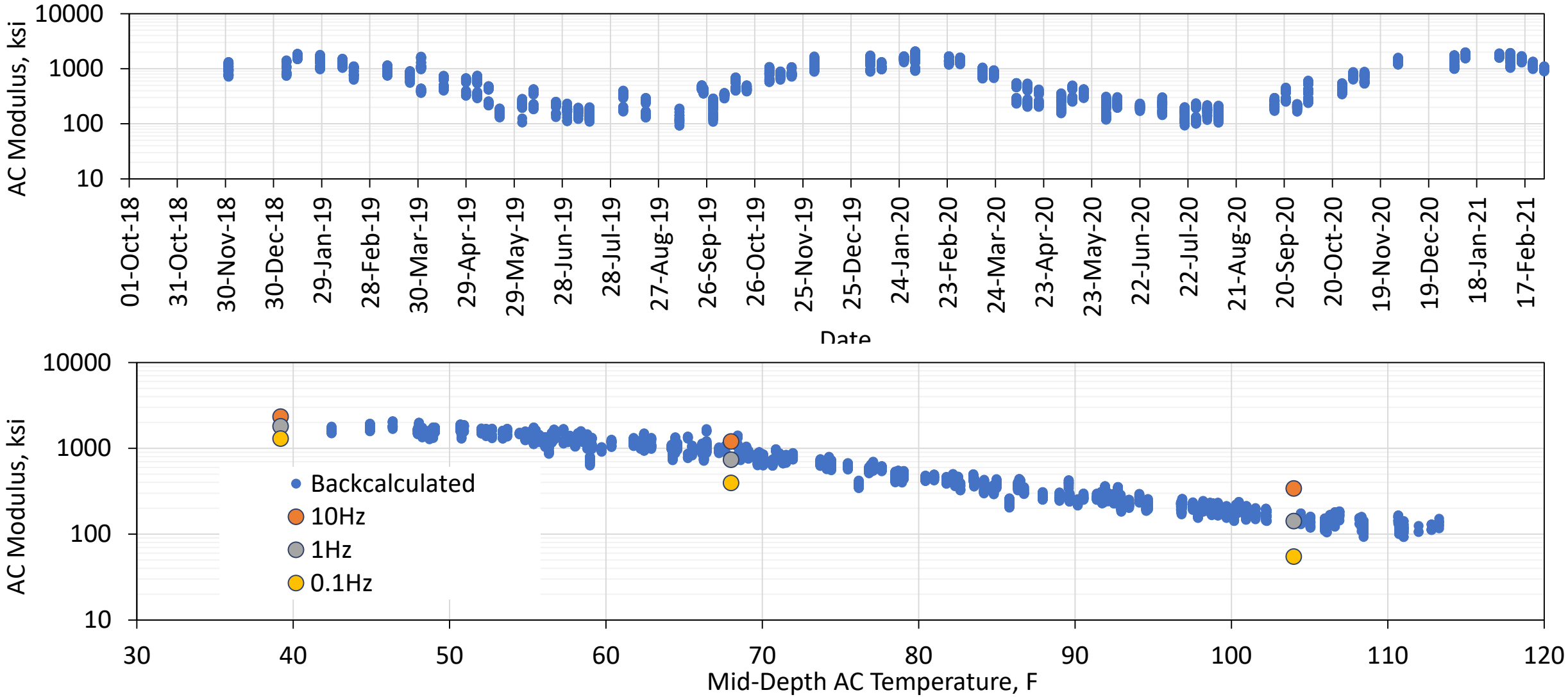


S2 - Stabilized Foundation

Backcalculated Moduli – Stabilized Foundation (S2)



Thick Lift (S9) Backcalculated AC Modulus & |E*|



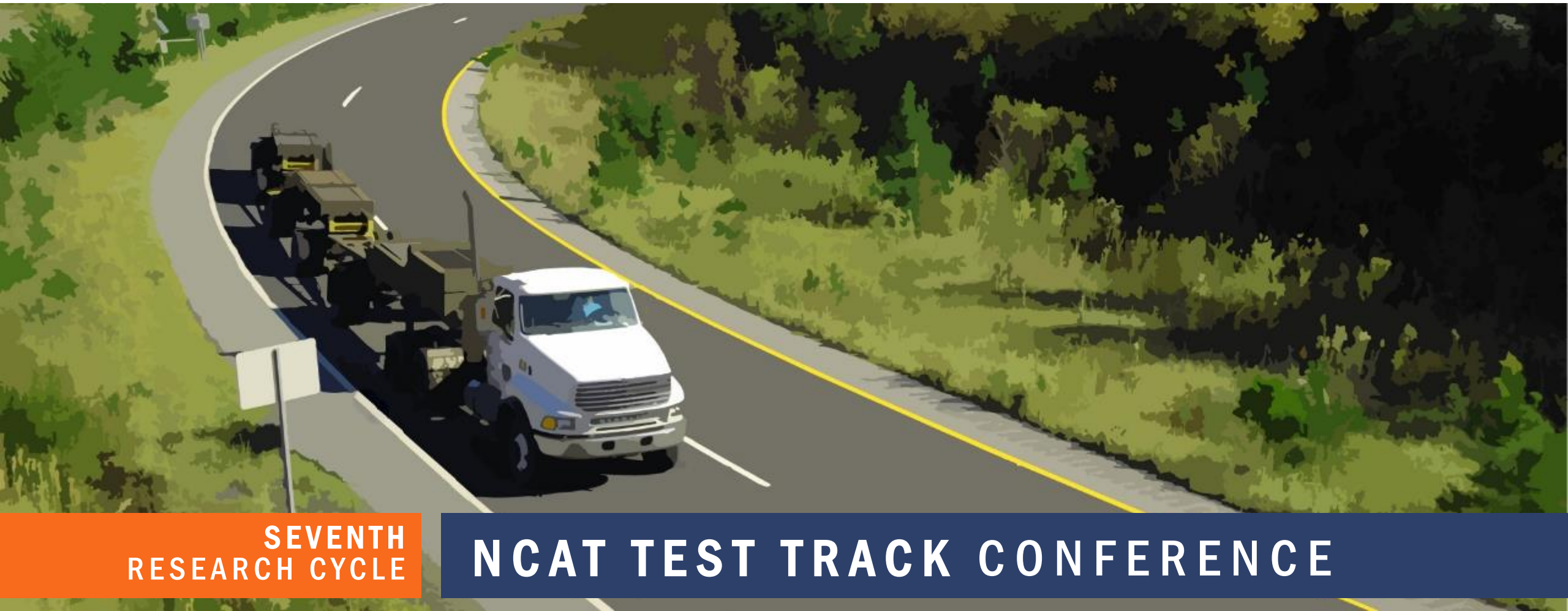
Conclusions & Recommendations – Stabilized Foundation (S2)

- Excellent performance
  - Rutting < 0.15” | No cracking | Steady IRI
- Very low tensile strain at bottom of AC
  - Bottom-up cracking not-expected
- Tensile strain decrease with increase temperature **NOT** expected
  - Occurs due to restraint provided by stiff foundation layer when AC is softer than CTB
  - Mechanistic modeling predicts mid-depth peak tensile strain
    - Middle up cracking?
- Best backcalculation cross section was AC / CTB / LTS / Soil
  - Reasonable results that also predict unexpected observed behavior
- Continue monitoring into next test cycle

Conclusions & Recommendations – Thick Lift (S9)

- Construction of single 8” lift is viable
  - Be prepared for extended cooling time
    - Monitor temperature with embedded probe
  - Density with conventional rollers and patterns achieved 95% of maximum density
  - Initial smoothness may be a problem
    - Rectify with diamond grinding
    - May improve with more experience
- Excellent performance through 10 MESALs
  - Rutting < 0.20” | Minimal Cracking (top down?) | Steady IRI
- Structural behavior similar to conventional multi-lift sections
  - Advantage of no lift interfaces to slip?
- Continue monitoring into next test cycle

Discussion



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