Asphalt Research Update

Construction Academy
October 1, 2025

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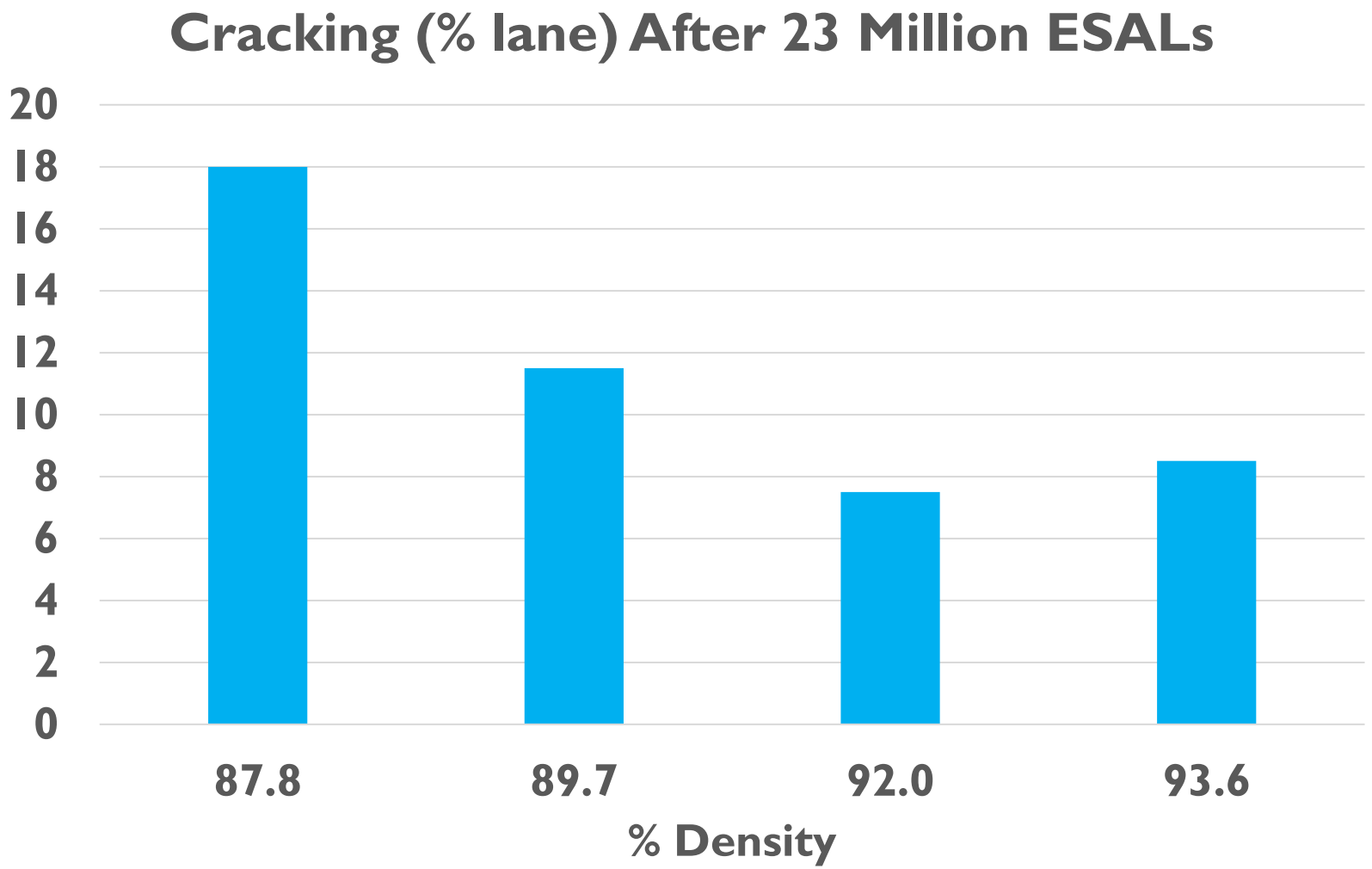
NCAT Test Track

- 5 trucks
- 46 test sections
- 5 million ESALs per year
- Traffic for 2 years
- Now on 3rd cycle

NCAT Test Track



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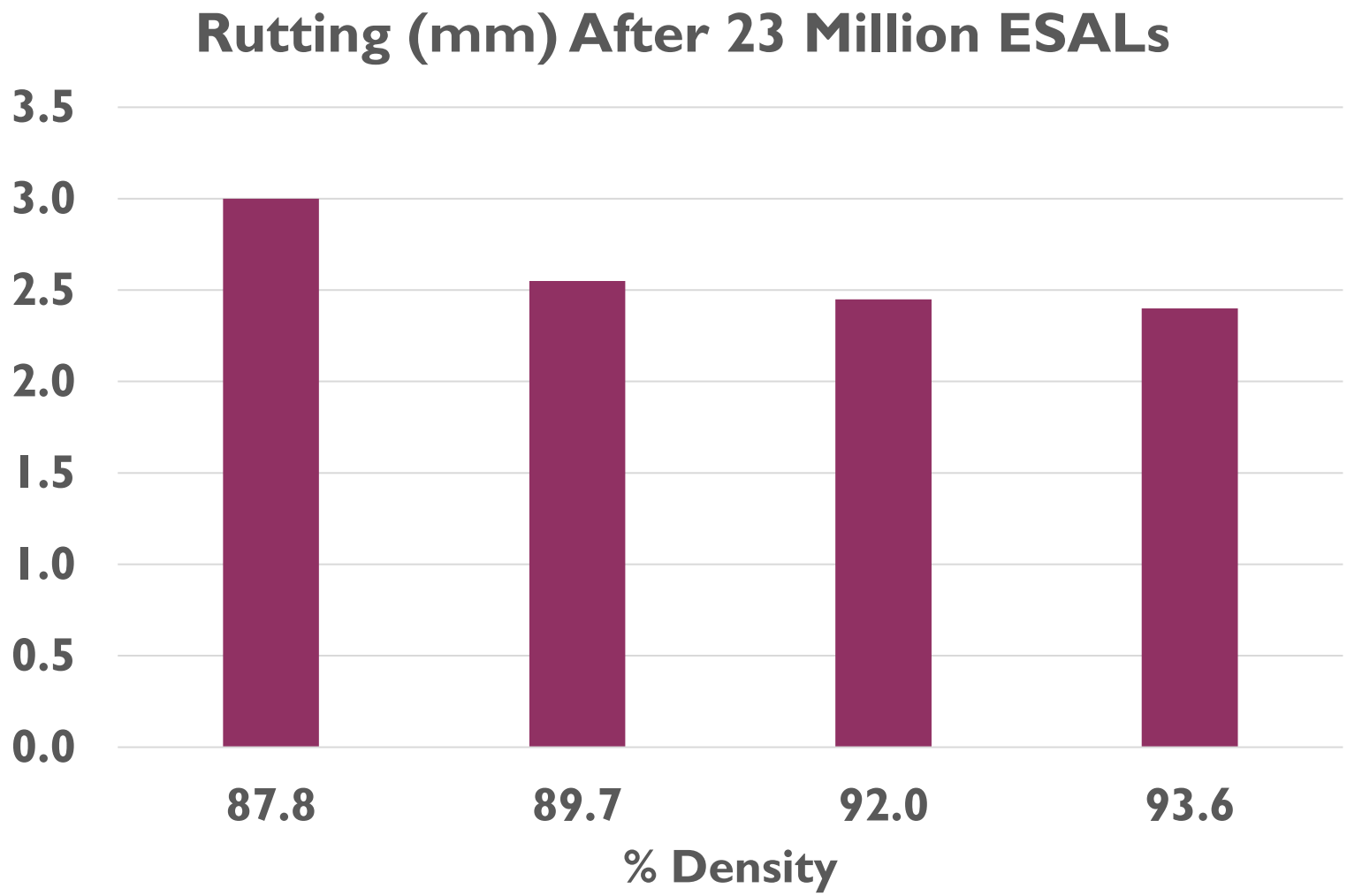
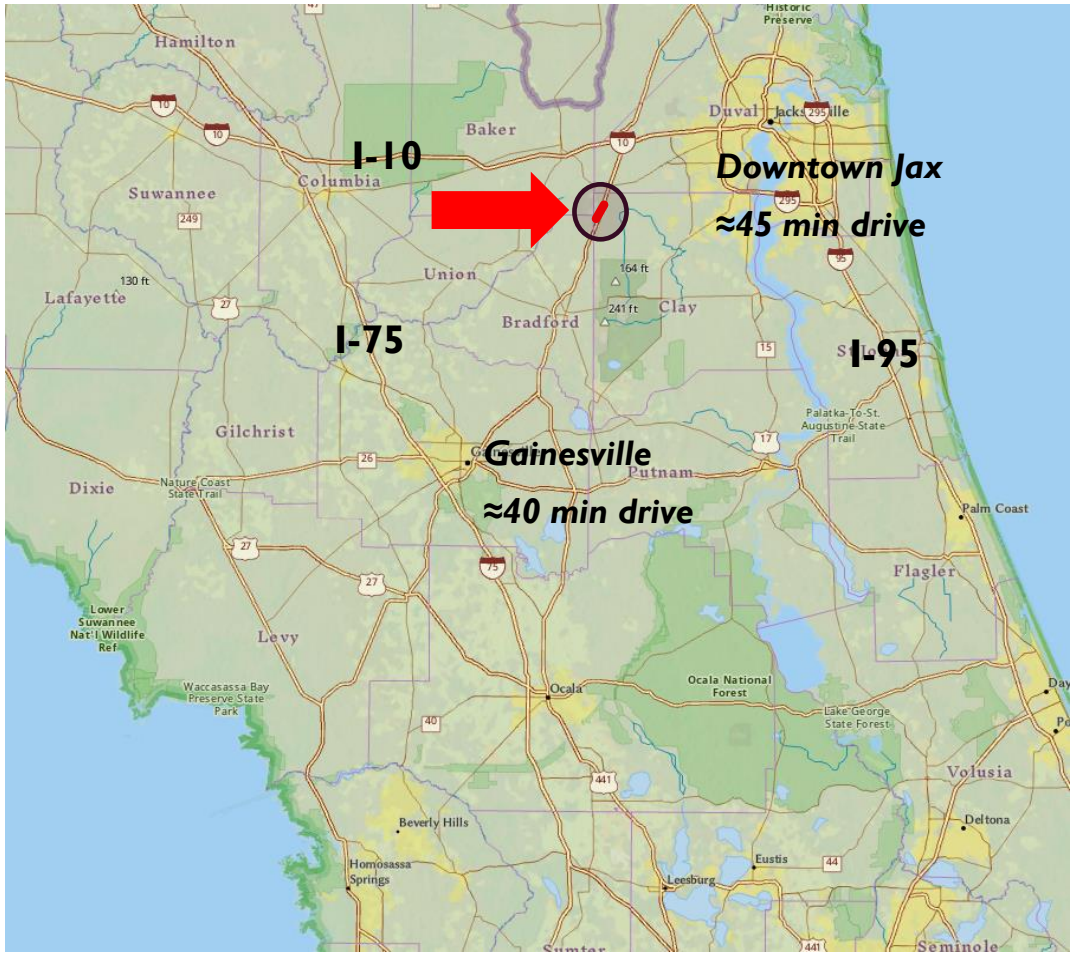
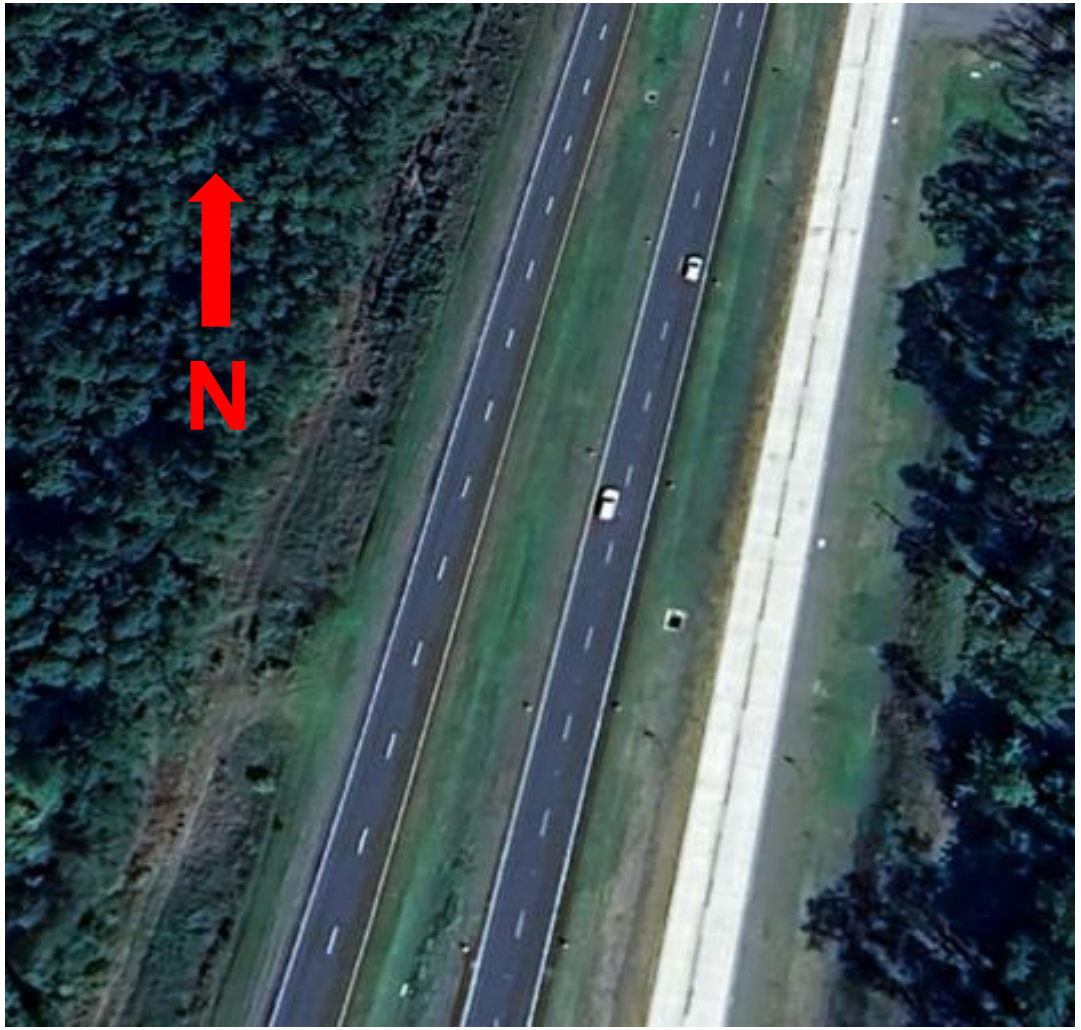


Asphalt Test Road



- US 301 (SR 200) in Clay County.
- Approximately 2.3 miles long.
- 12 test sections, 1000 ft. long.

Asphalt Test Road



- **Southbound travel lanes:**
  - Asphalt Test Road
- **Northbound travel lanes:**
  - Concrete Test Road
- **Middle lanes:**
  - Diversion Lanes
- **Traffic started Sept. 26, 2024.**

Asphalt Test Road – Base Sections

- Milled all existing asphalt pavement.
- Excavated the existing base down to the stabilized subgrade.
- Reconstructed the base sections with various materials.

Asphalt Test Road – Base Sections

1 Control	2 Unstabilized RAP Base	3 CCPR RAP Base	4 Emulsion Stabilized RAP Base Mixed in Place	5 Limerock/ RAP Base (50/50)	6 Limerock/ RAP Base (75/25)	7 Full-Depth Reclamation
0.75" FC-5	0.75" FC-5	0.75" FC-5	0.75" FC-5	0.75" FC-5	0.75" FC-5	0.75" FC-5
2" Type SPM	2" Type SPM	2” Type SPM	2" Type SPM	2" Type SPM	2" Type SPM	2" Type SPM
4" Type SP	4" Type SP	4" Type SP	4" Type SP	4" Type SP	4" Type SP	4" Type SP
12" Limerock	12" Unstabilized 100% RAP Base	12" CCPR RAP Base	12" Emulsion Stabilized RAP Base	12" Limerock/ RAP Base (50/50)	12" Limerock/ RAP Base (75/25)	12" FDR (Mill 6.75")

Asphalt Test Road – Asphalt Sections

8A Reflective Cracking	8B Reflective Cracking (Control)	9 Superpave 5	10A Deep Lift (HP)	10B Deep Lift (76-22)	11 FC-5 Only (Control)	12 FC-7 Only
0.75" FC-5	0.75" FC-5	0.75" FC-5	0.75" FC-5	0.75" FC-5	1.0" FC-5	1.0" FC-7
1.75" Type SPM	3.0" Type SPM	3.0" Type SP5	1.5" Type SPH, HP Binder	1.5" Type SPM	Existing Asphalt	Existing Asphalt
1.25" CRM	Saw cut cracks		6.0" Type SPH, HP Binder	6.0" Type SPM		
Existing Asphalt	Existing Asphalt	Existing Asphalt				
Existing Base	Existing Base	Existing Base	Existing Base	Existing Base	Existing Base	Existing Base

FDOT Heavy Vehicle Simulator

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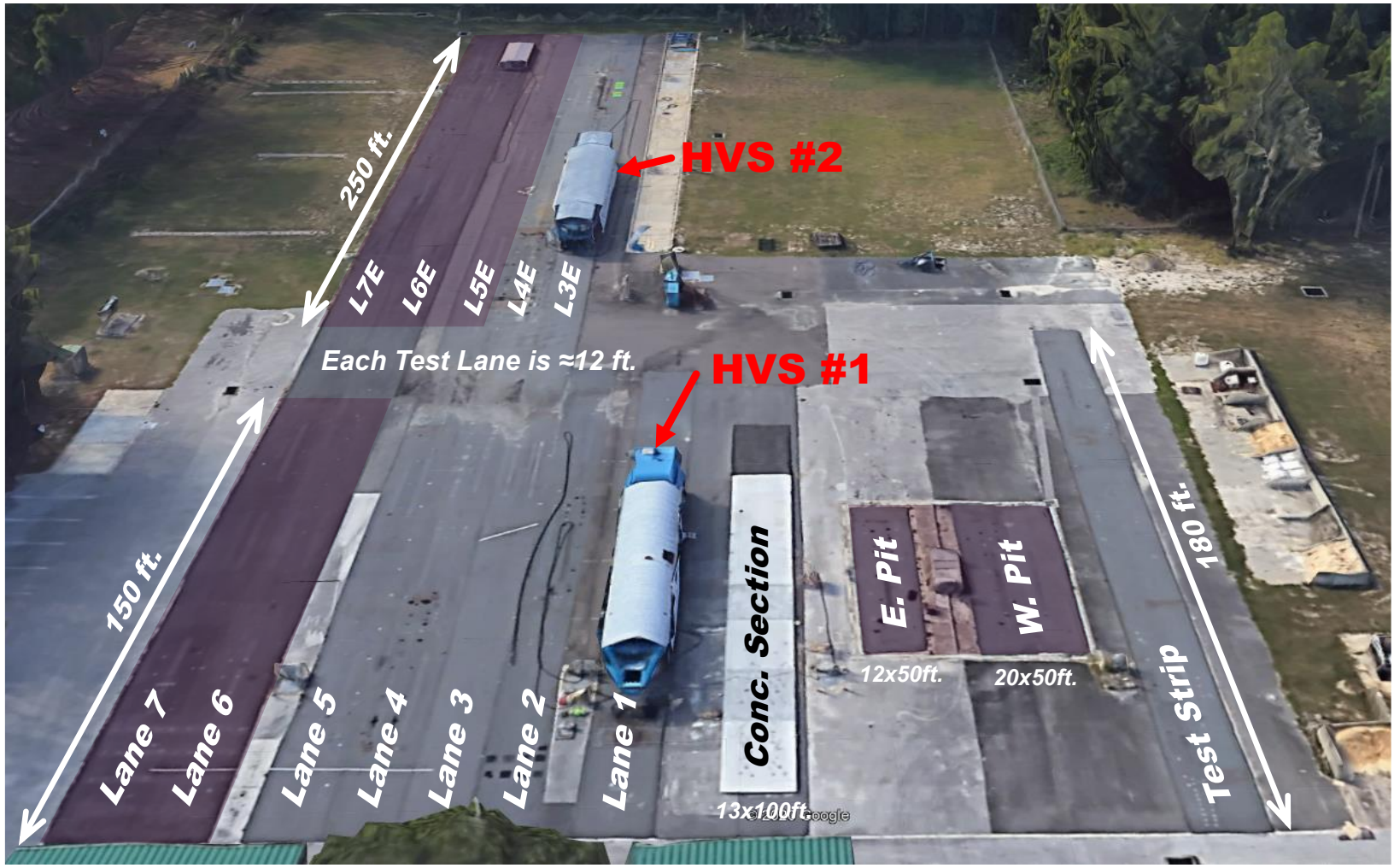

Pavement Wearing and Friction Determination

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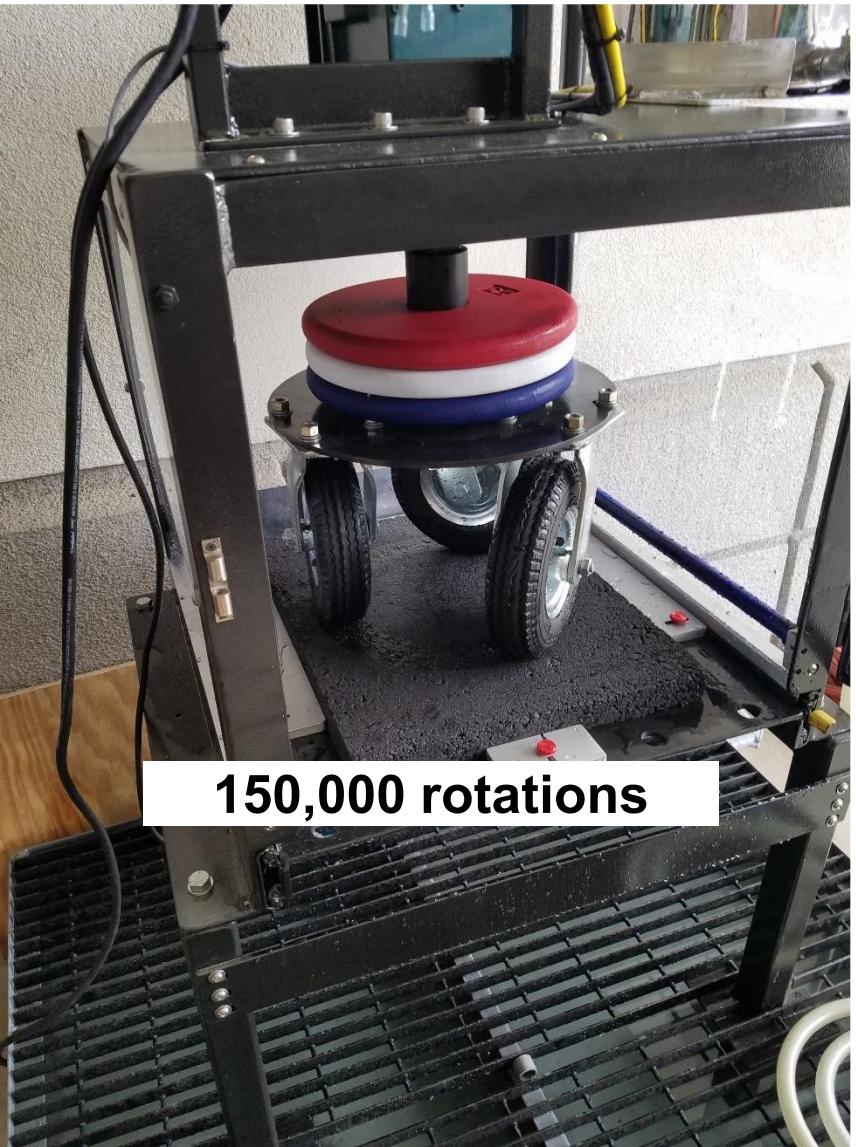

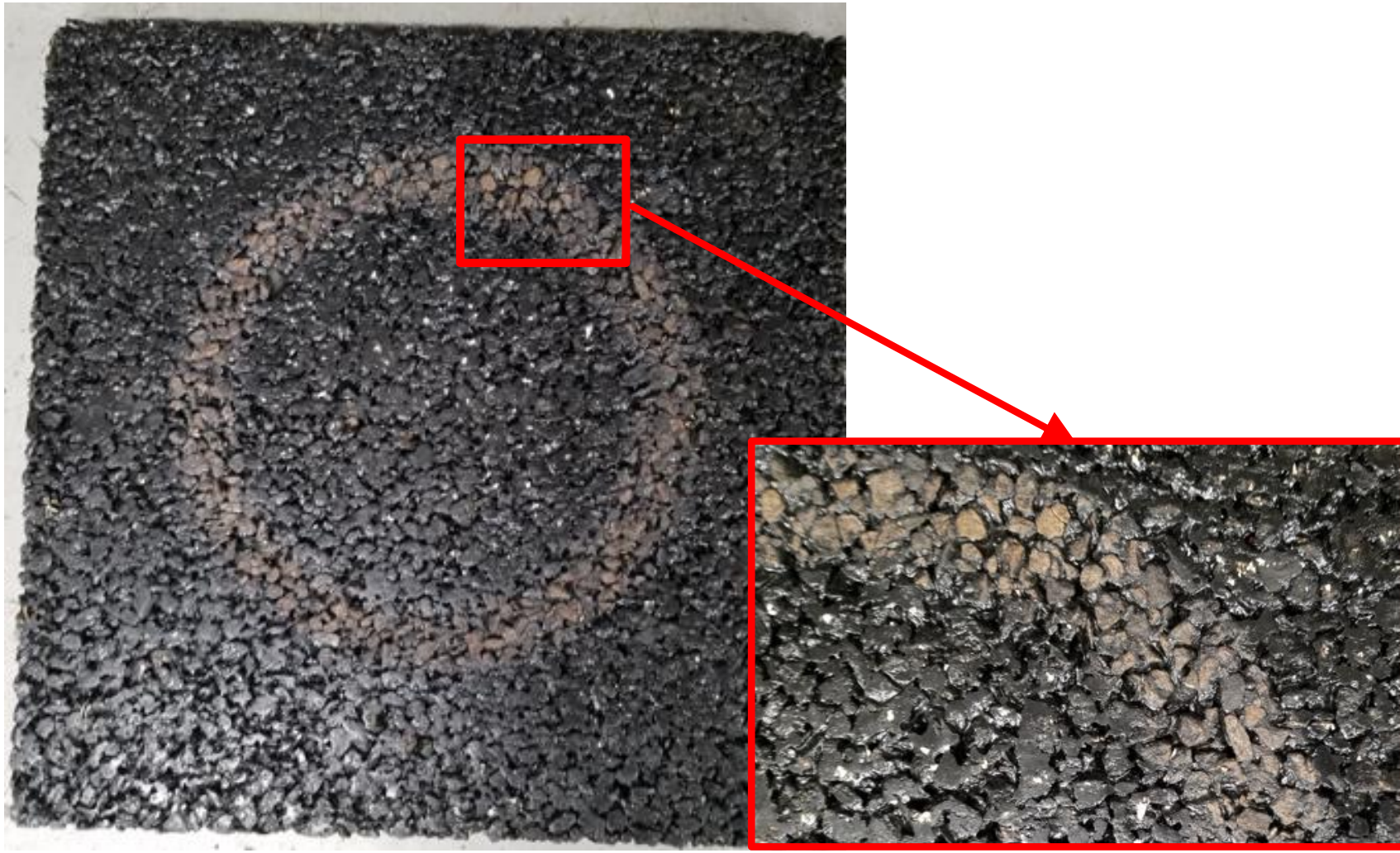

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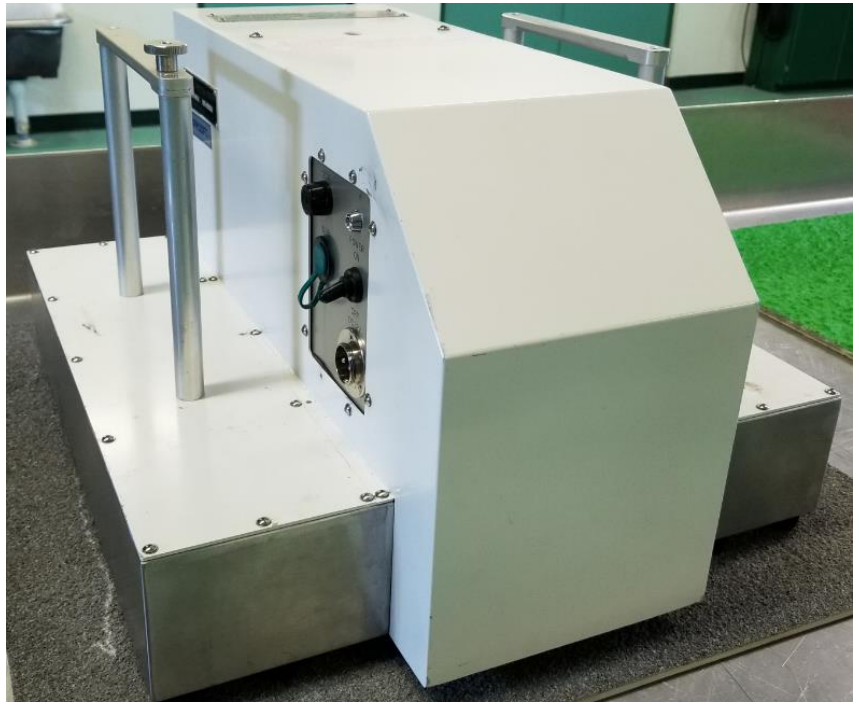

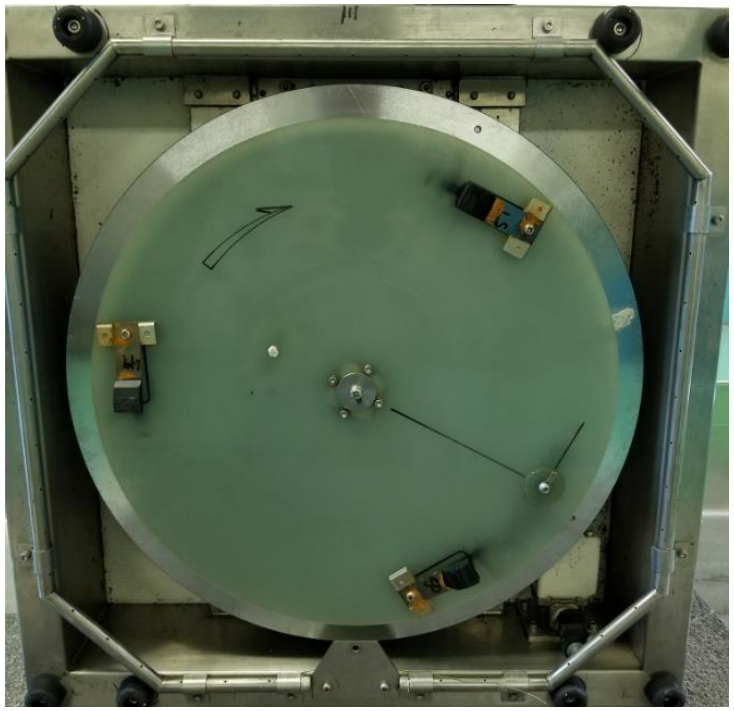

Pavement Wearing and Friction Determination

- **Allows expedited evaluation.**
- **Previous process required a roadway test section and the application of six million vehicle passes.**
- **Results so far:**
  - Approved 20% RAP in limestone dense graded friction course.
  - Approved Basalt, Gabbro, Quartzite, and Diorite as approved friction aggregates with up to 20% RAP.

OGFC for Suburban Environments (NCAT)

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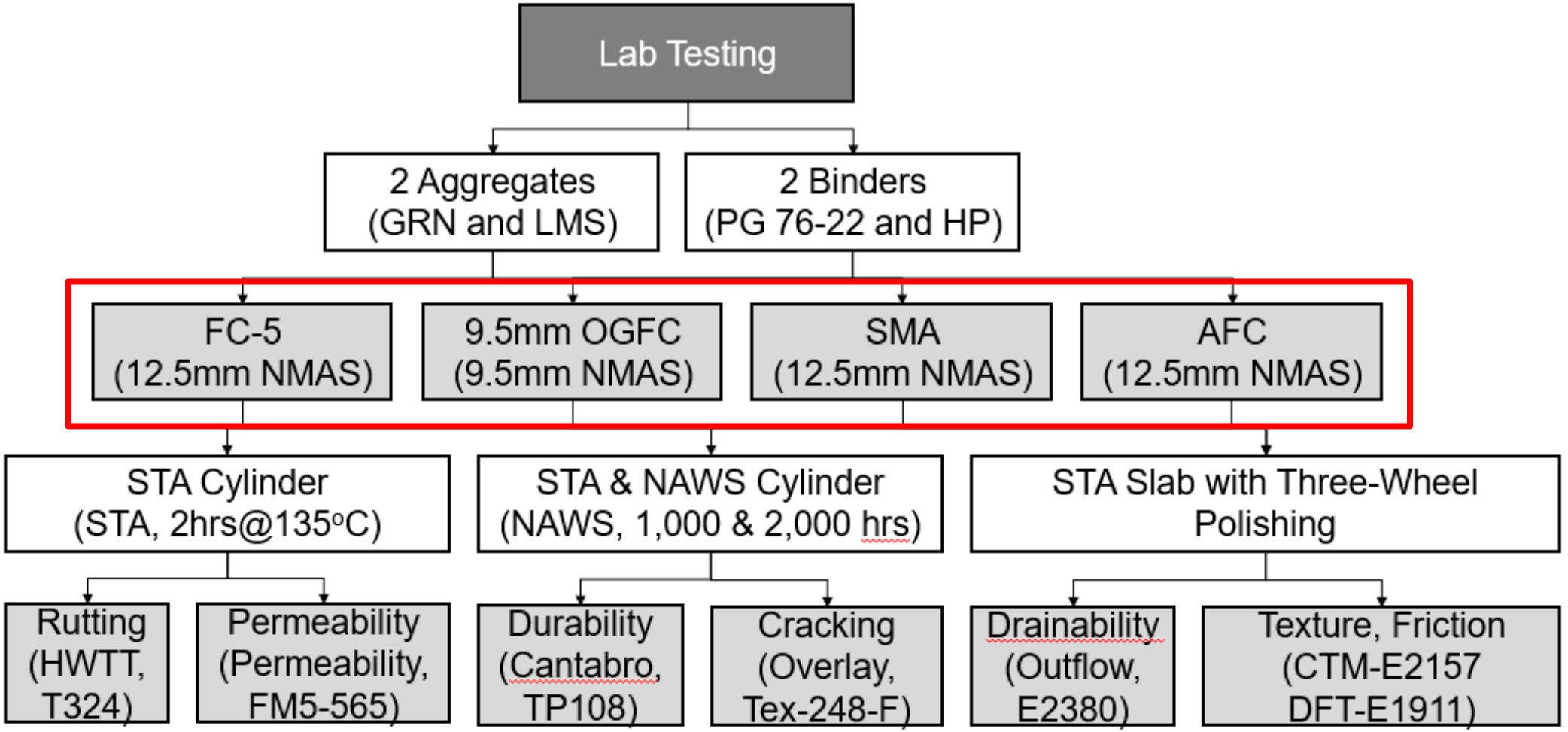

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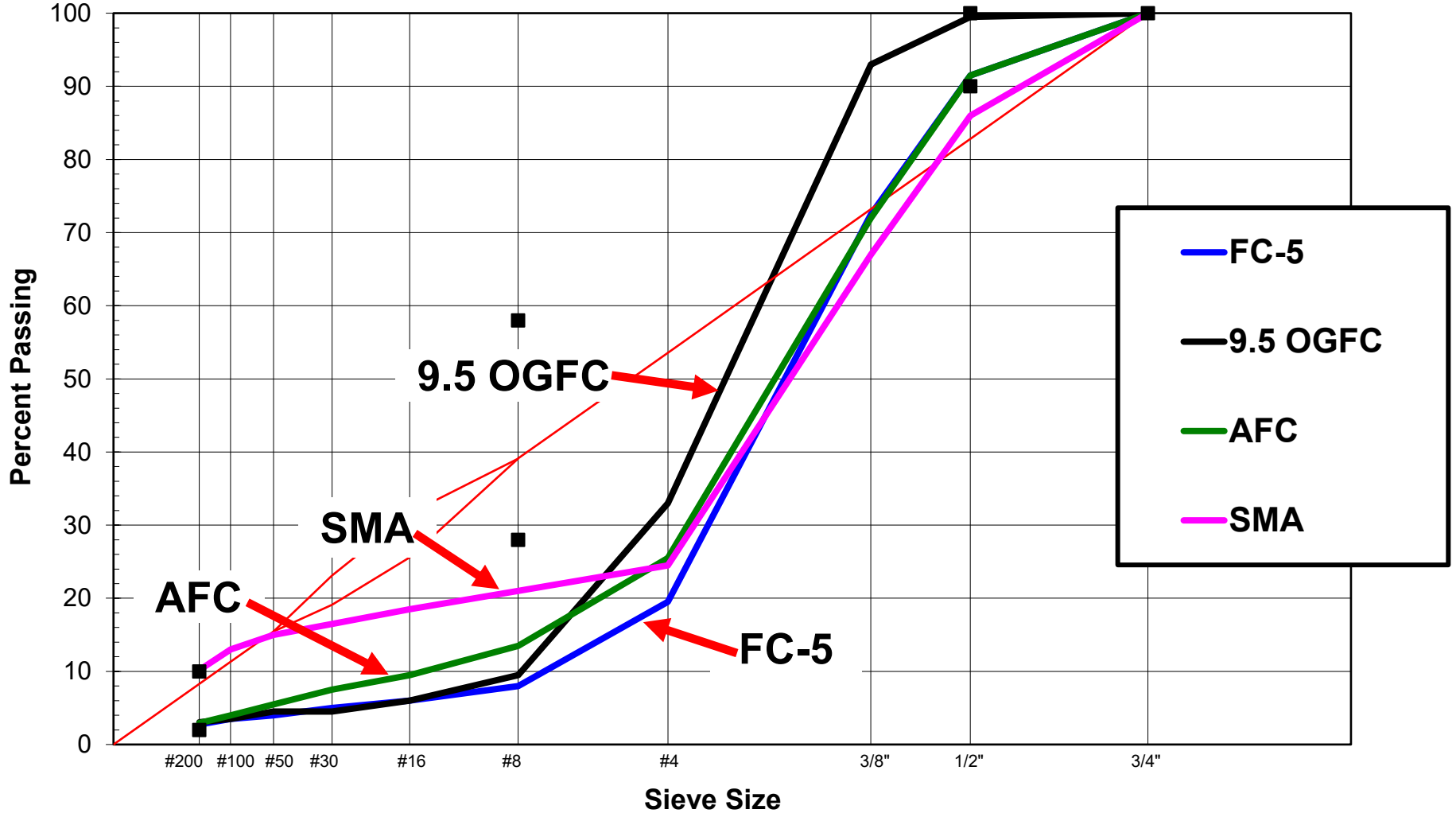


OGFC for Suburban Environments (NCAT)

Factor	Durability	Permeability	Drainability	Cracking Resistance	Rutting Resistance	Friction	Macrotexture
FC-5	O	O	O	O	O	O	O
HP	++	O	O	++	O	O	O
9.5 mm OGFC	+	O	O	O	O	O	O
Alternative FC	++	–	–	+	+	+	–
SMA	++	– –	– –	+	++	+	– –

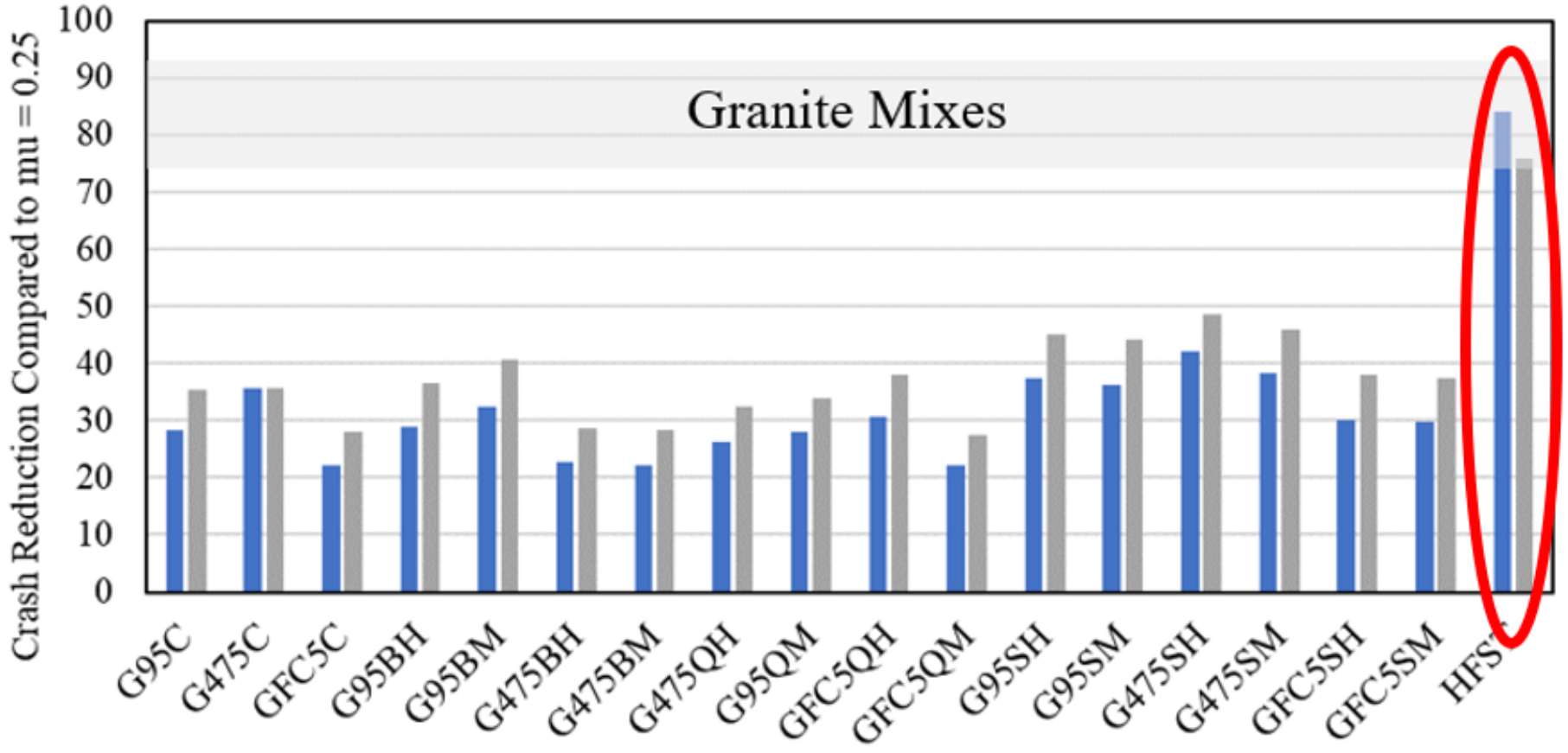
Alternative Friction Overlays (NCAT)

- Explored asphalt-based alternatives to standard High Friction Surface Treatment (epoxy with calcined bauxite aggregate).
  - **Currently $60/sy!!!**

Alternative Friction Overlays (NCAT)

- Studied the addition of quartzite, slag, and calcined bauxite vs. control.
- FC-4.75, FC-9.5, and FC-5.
- Used 3-wheel polisher and DFT.

Alternative Friction Overlays (NCAT)



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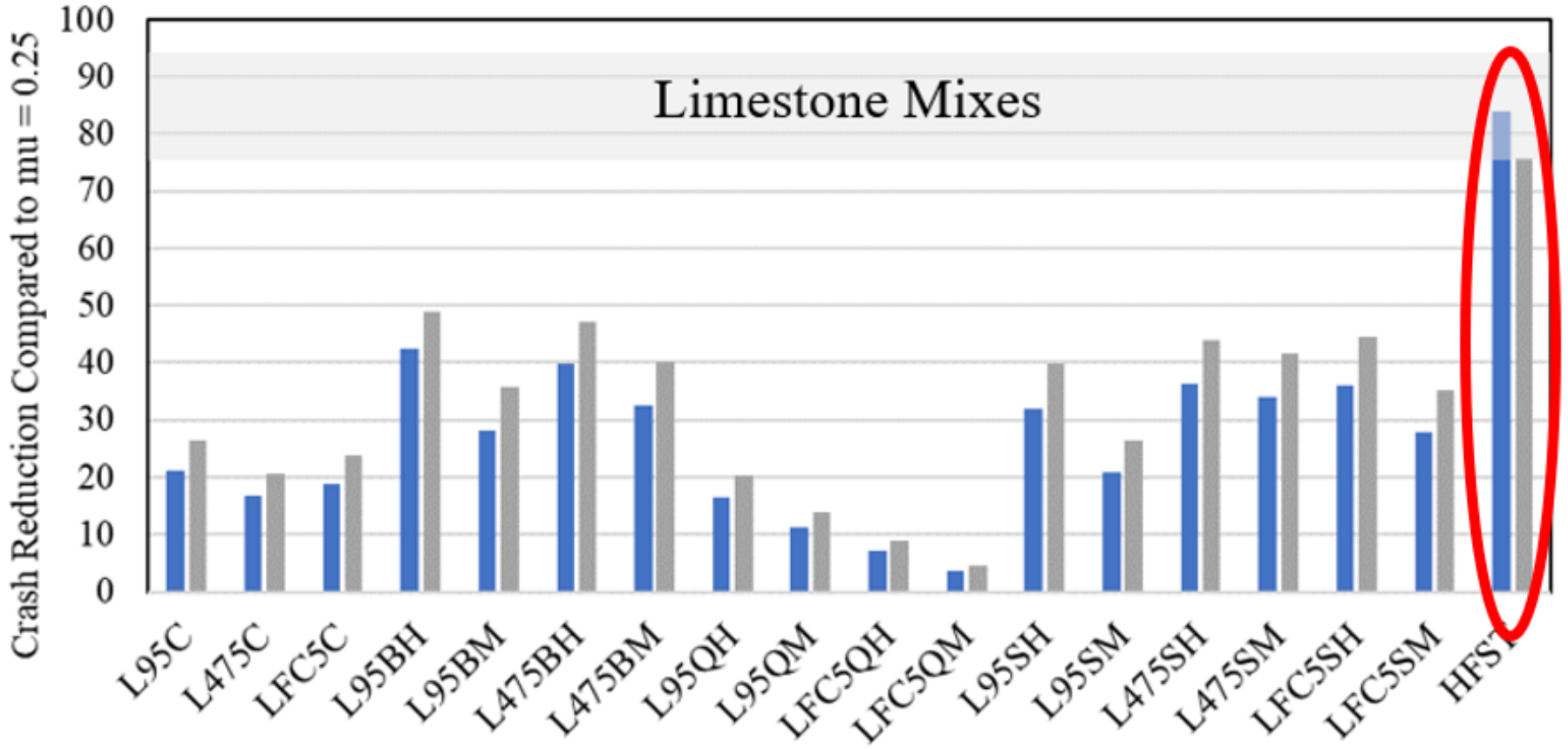
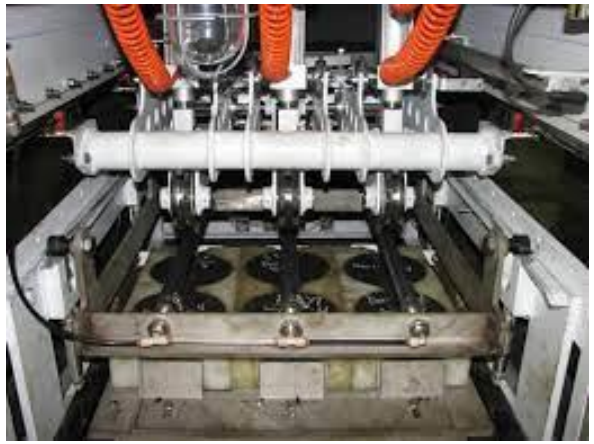


Alternative Friction Overlays (NCAT)

- **Conclusion:**
  - "None of the mixes in this study produced results comparable to HFST."

Balanced Mix Design Benchmarking of FL Mixtures

- Work performed by the University of Florida.
- Benchmarked 15 mixtures at mix design and 15 mixtures at production.



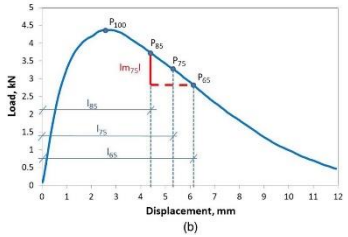
APA

Hot IDT

Ideal RT

Rutting

(a)



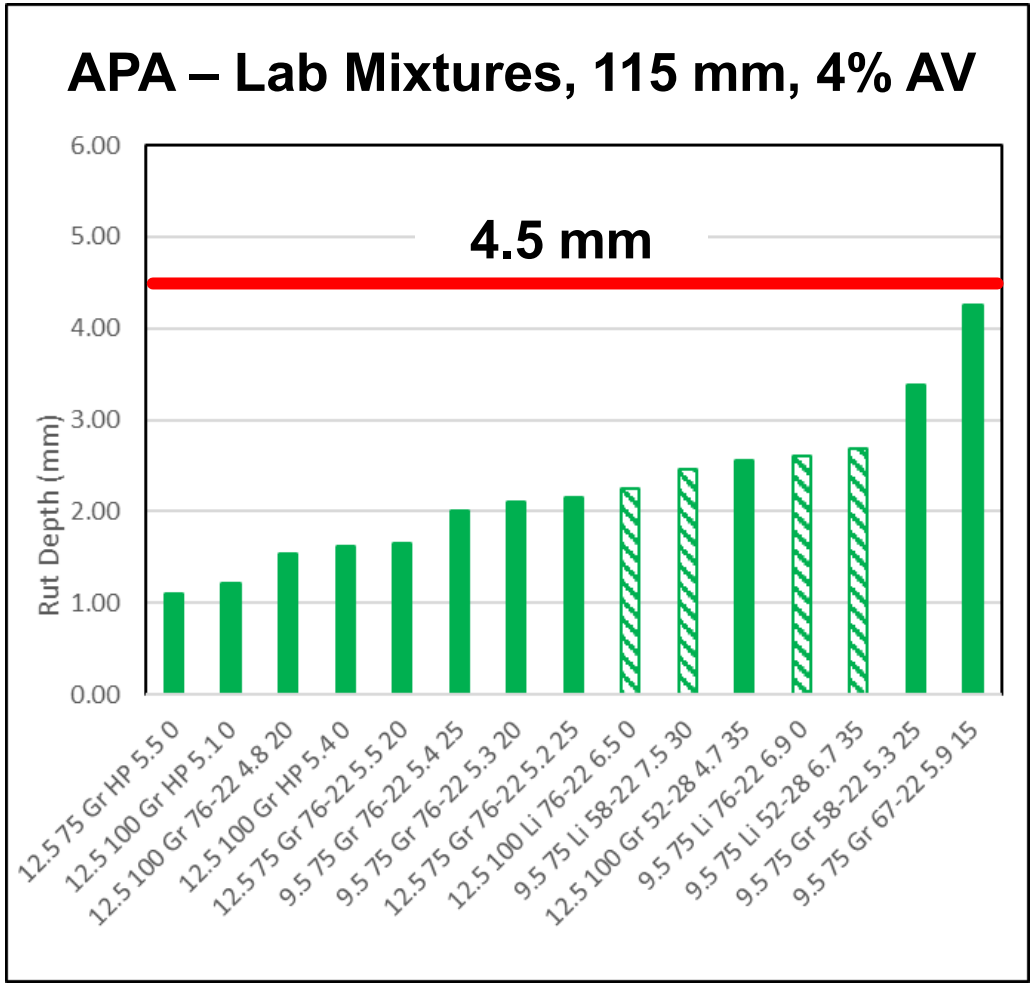
Ideal CT

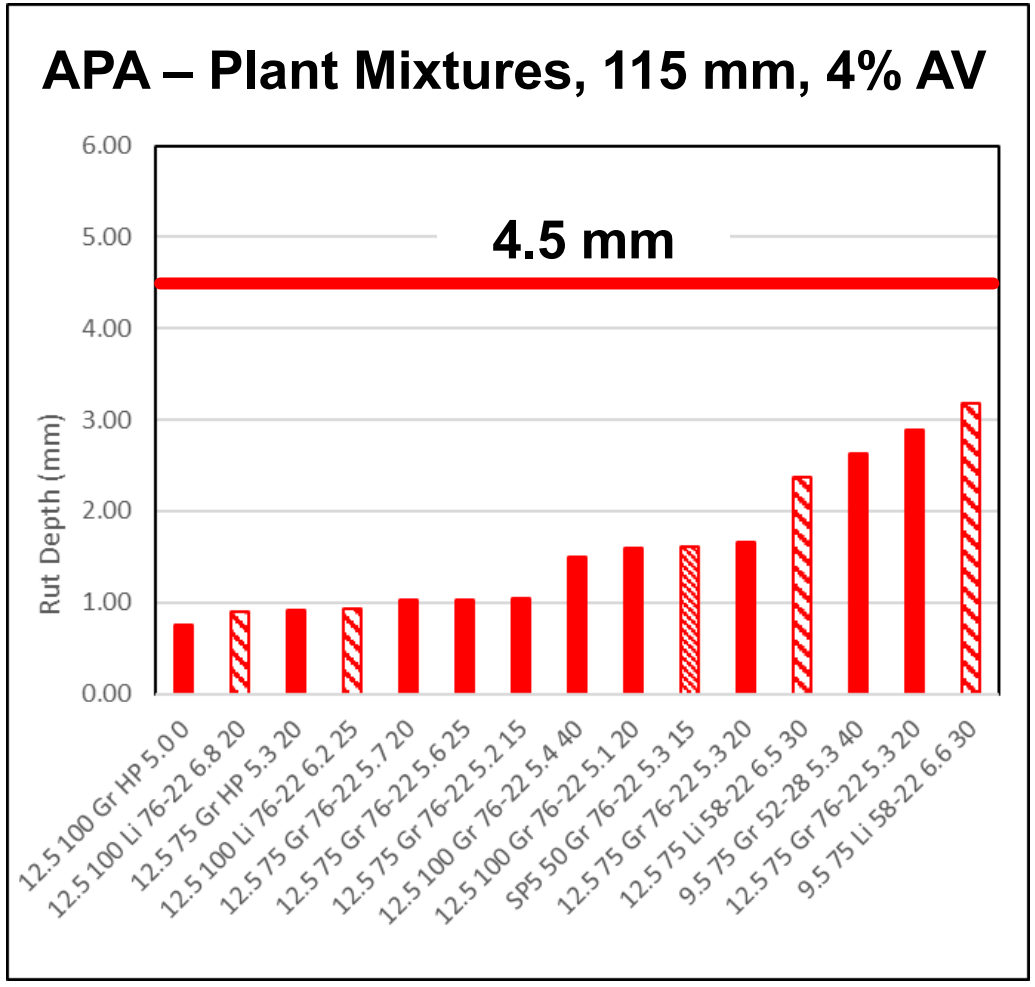
Cracking

Balanced Mix Design Benchmarking of FL Mixtures

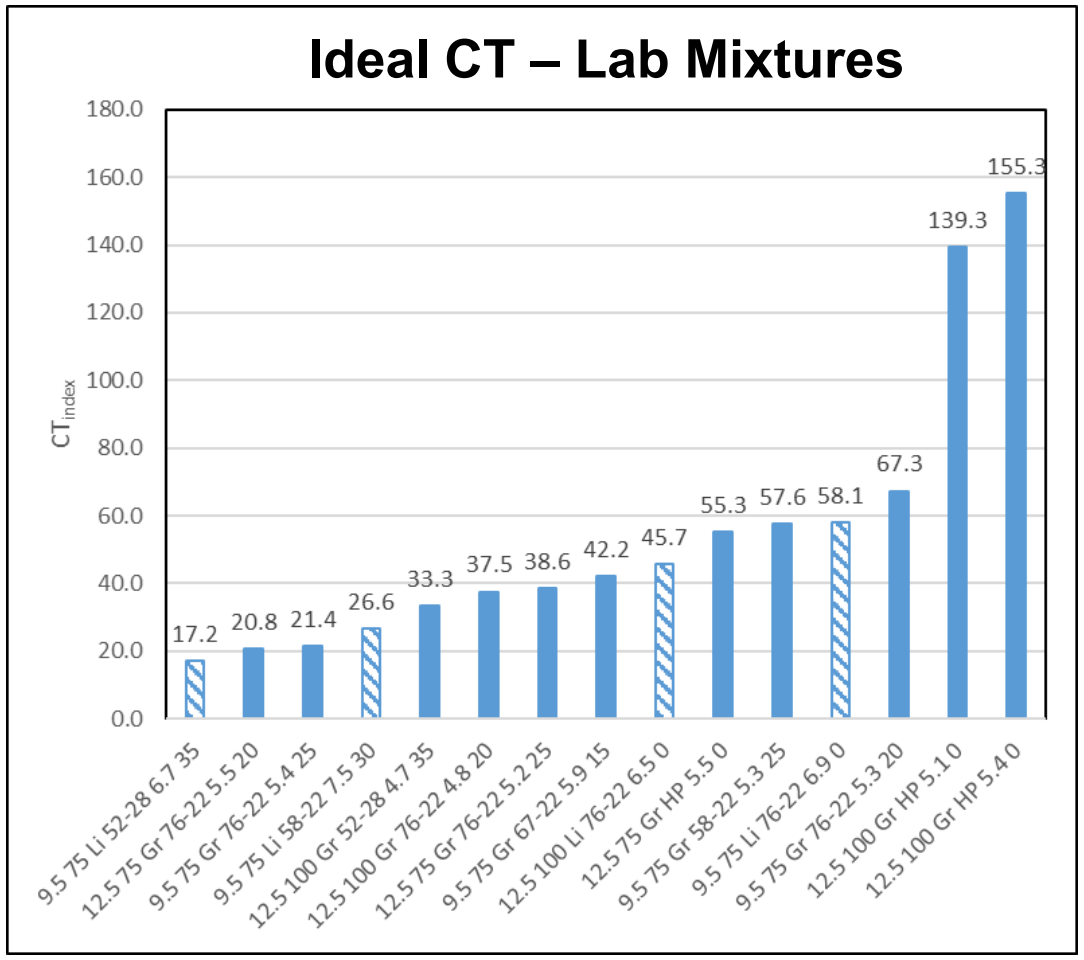
- Examined mixtures with different binder types, aggregate size, aggregate type, gyration level, and from eleven contractors.
- A large number of conclusions.

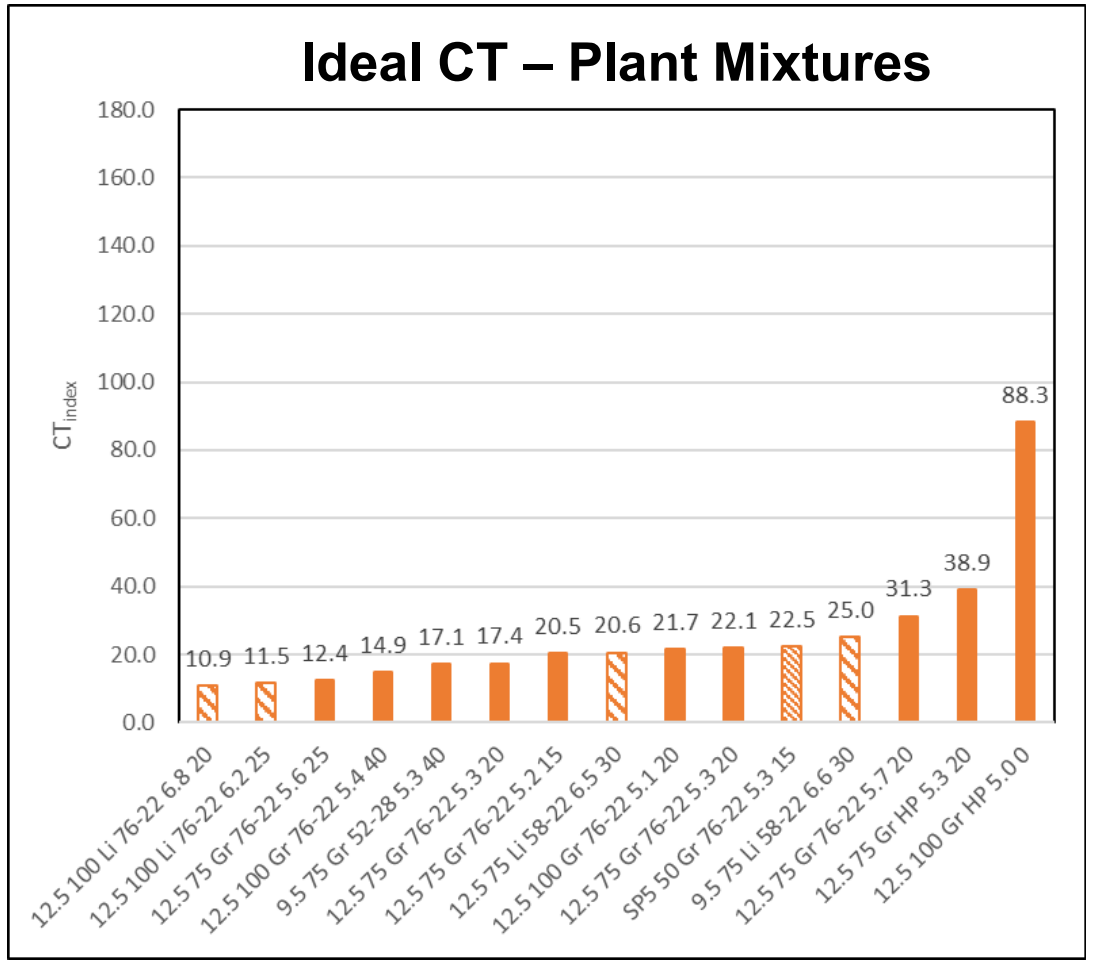
Balanced Mix Design Benchmarking of FL Mixtures





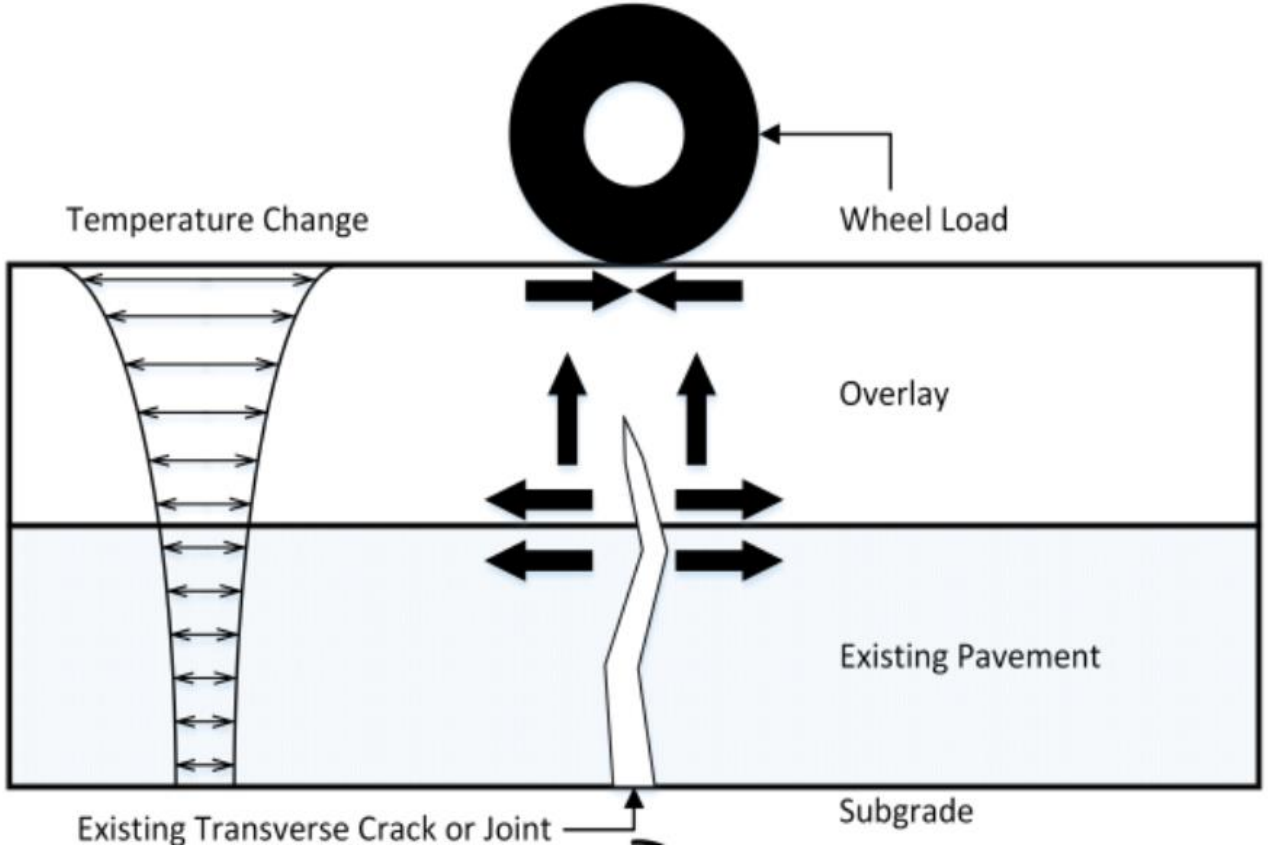
Balanced Mix Design Benchmarking of FL Mixtures





New Crack Relief Mixture (UF)

- Used for prevention of reflective cracking (bottom to top propagation). Not for top-down cracking.



New Crack Relief Mixture (UF)

- Placed on Asphalt Test Road (2024) and SMO track (2025).
- Layer thickness: 1.0 to 1.25” thick. (1.25” on Test Road).
- SP-9.5 coarse graded mix.
- PG 76-22 or HP binder. No RAP. (HP used on Test Road).
- Ndesign = 50.

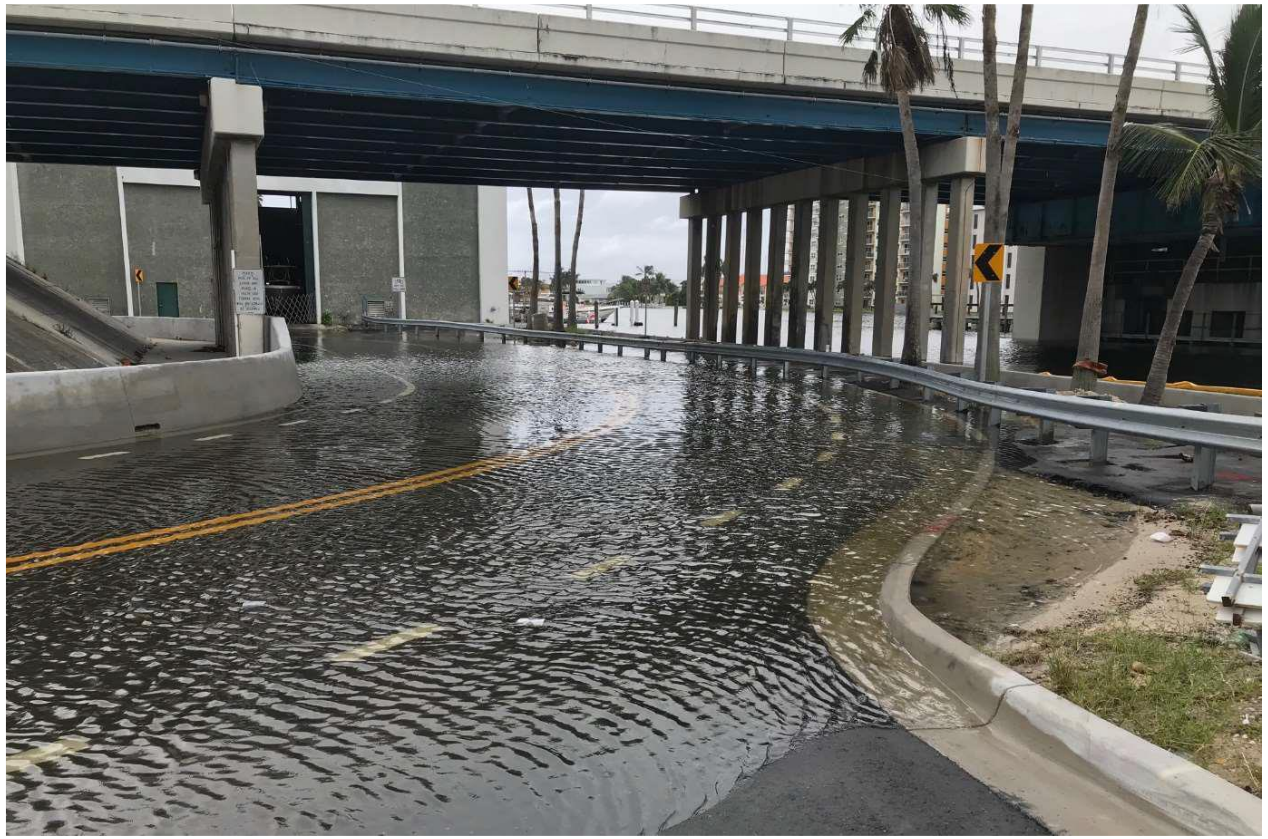
- Air voids = 2.0%
- VMA = 17% minimum. (VMA = volume of air + asphalt)
- Target density = 96.5 %Gmm.
- Minimum density = 93.0 %Gmm.

Evaluation of RAP in FC-5 and High Polymer Mixtures

- **Two separate projects to study the impact on mixture performance (especially cracking and raveling).**
- **15% RAP in FC-5 mixtures.**
  - Received final report last week.
  - Only detriment to adding RAP is reduced permeability due to RAP fineness.
  - -Implementation still to be discussed.
- **20% RAP in High Polymer mixtures (in progress).**

Evaluating Asphalt in Flooded Conditions (UF)

- Goal is to assure asphalt mix durability when submerged in water and at times trafficked.



Thank you.
Comments/Questions?

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