



Rowan CREATES Research Update

69th Annual NJ Asphalt Paving Conference

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Presented by: Yusuf Mehta, Ph.D., P.E. & Ayman Ali, Ph.D.

Center for Research and Education in Advanced Transportation Engineering Systems (CREATES) at Rowan University (RU)

mehta@rowan.edu & alia@rowan.edu





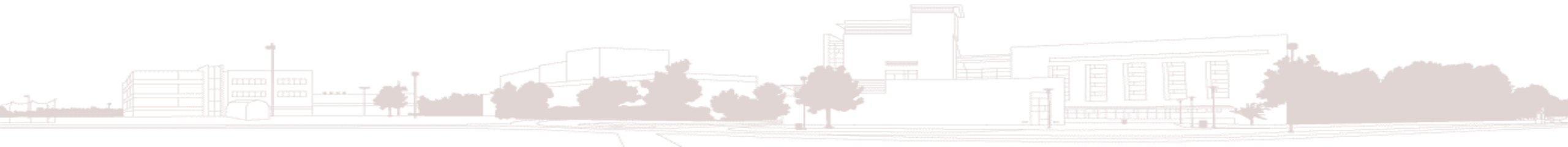
Outline

- **CREATES Overview**
- **Porous Pavement Structures**
- **Electrically Heated Pavement Structures**
- **Highly Elastic Asphalt Binders**
- **Plastic Modified Asphalt Mixtures**





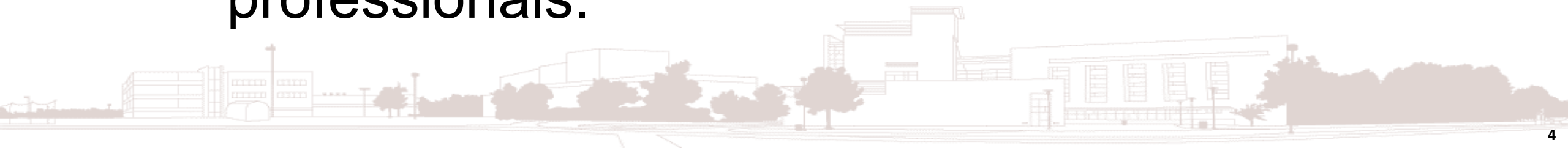
CREATES Overview





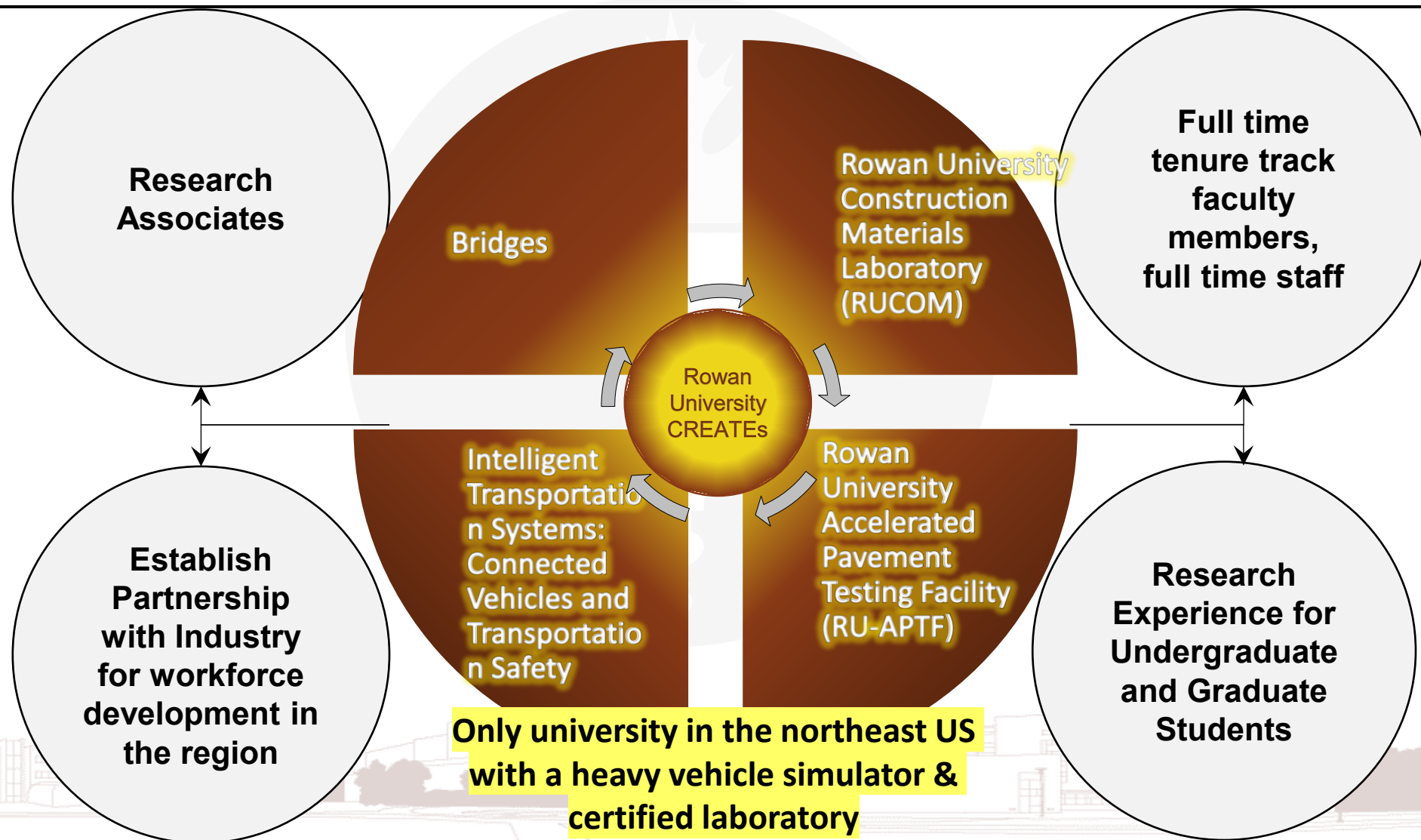
CREATES Mission

- ❑ To conduct cutting edge, applied, and readily implementable research in transportation engineering.
- ❑ Create a diverse work environment that educates and trains the next generation of professionals.





Rowan CREATES





POWER OF CREATES

- **P** : Professional Development
- **O** : Outreach
- **W** : Workforce Development
- **E** : Education, and
- **R** : Research





CREATES Research Update



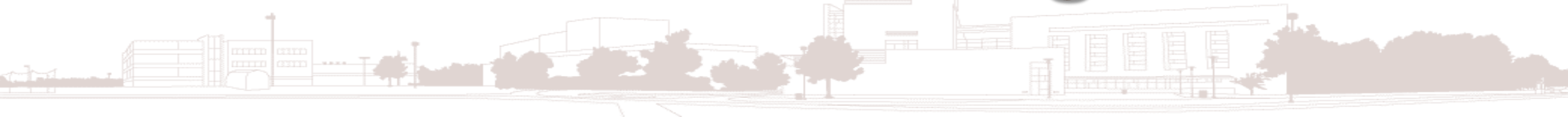


CREATES Staff & Undergraduate Students

- CREATES Staff: **7**
- Post-doctoral fellows: **10**
- UG students (funded and unfunded): **Approx. 60** across all subject areas
- (25% -30% URM)



Evaluation of Permeable Porous Pavement for Heavy Traffic Loading and Validation of Design Framework Using Full- Scale Testing





Acknowledgement

- **New Jersey Department of Transportation**
- **Thomas Baird**
- **Jem Paving**
- **Entire CREATES team**





Background and Motivation

- Porous pavements improve stormwater management and reduce flooding risk
- Widely used for low-volume roads but limited heavy-traffic validation
- Need for structural design framework integrating hydrology and traffic



Porous asphalt mixture



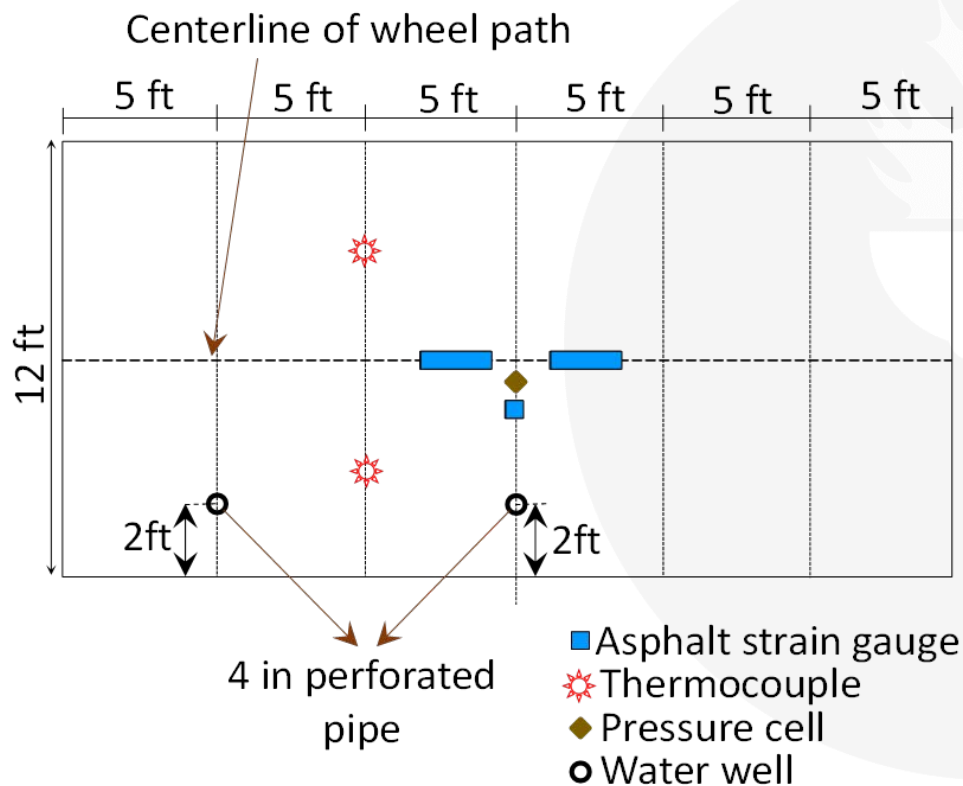


Research Objectives

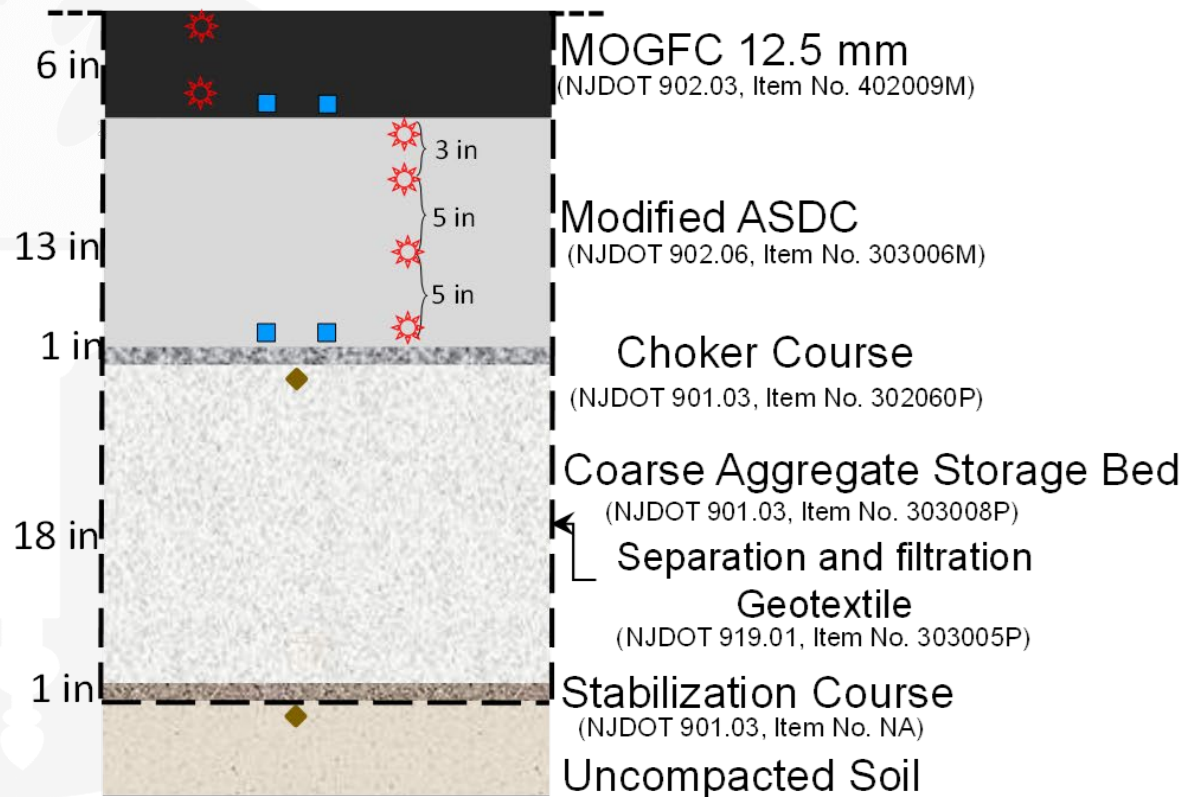
- Develop design framework for full-depth porous asphalt pavements for high-traffic volume roadways
- Validate porous pavement design using Accelerated Pavement Testing
- Develop rutting prediction model and calibration coefficients for porous pavements specific to NJ conditions
- Establish design and construction specifications for high-traffic porous pavements



Test Strip II Construction Details



Plan

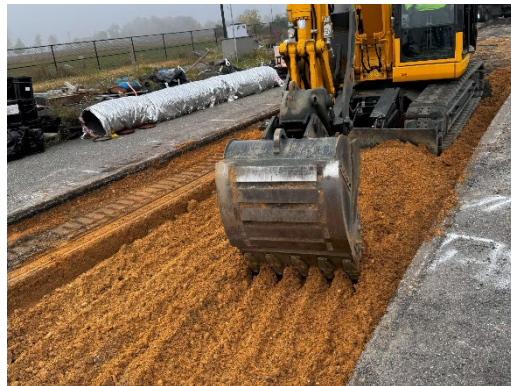


Cross Section





Porous Pavement Layers and Instrumentation



Uncompacted
Subgrade



Non-woven
Geotextile



1-inch-thick
Stabilization Course



Coarse aggregate
Storage Bed



Choker course



ASDC



MOGFC



Sensors

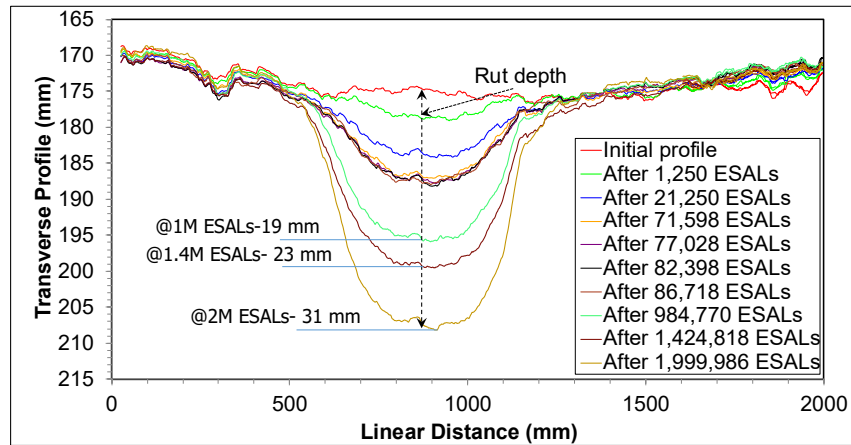


Accelerated Pavement Testing

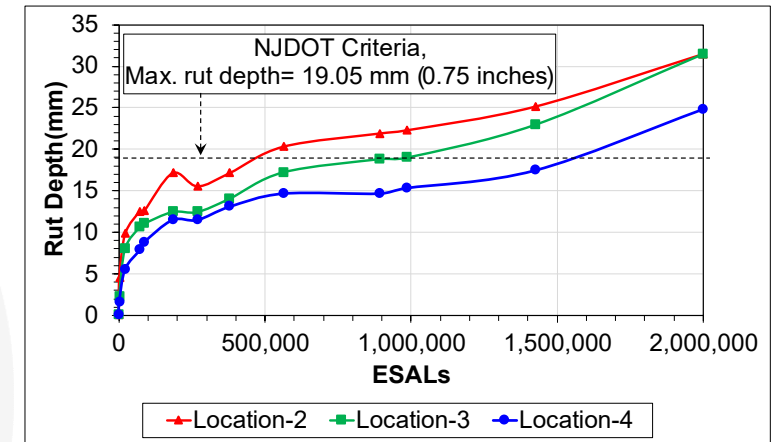
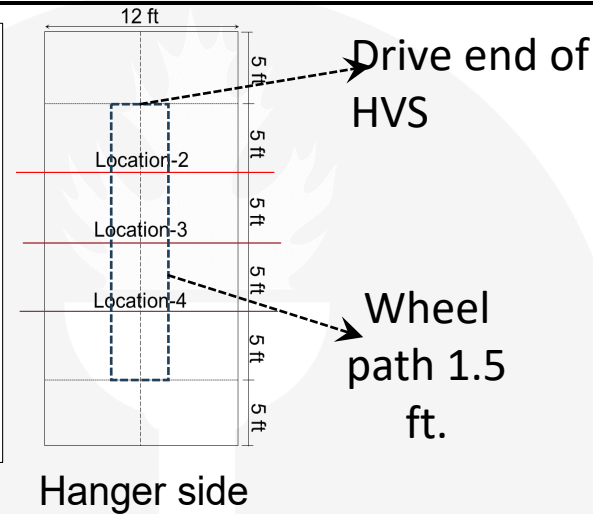




Rutting at Location-3 (Test strip I)



Transverse profile



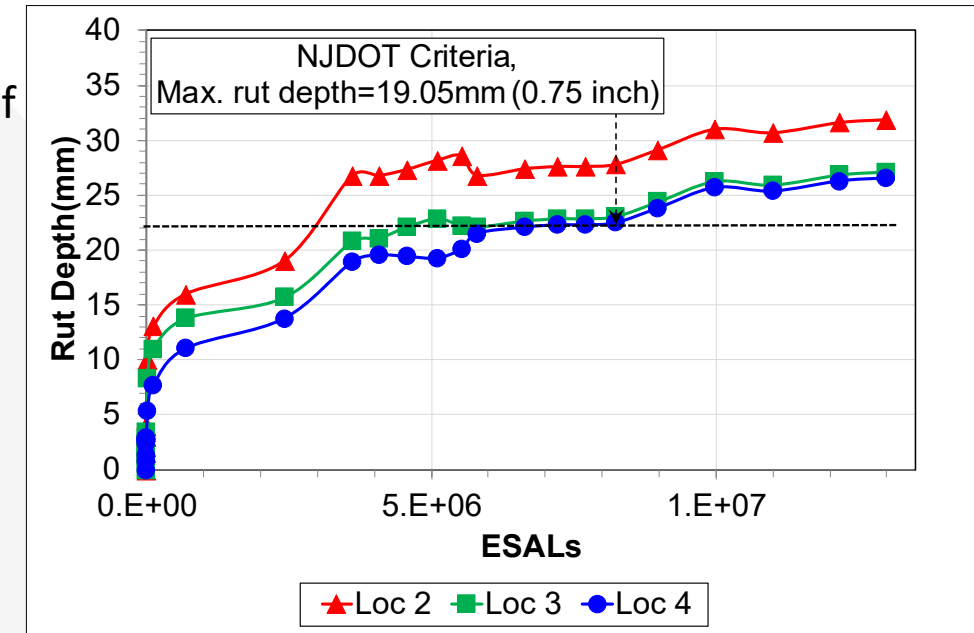
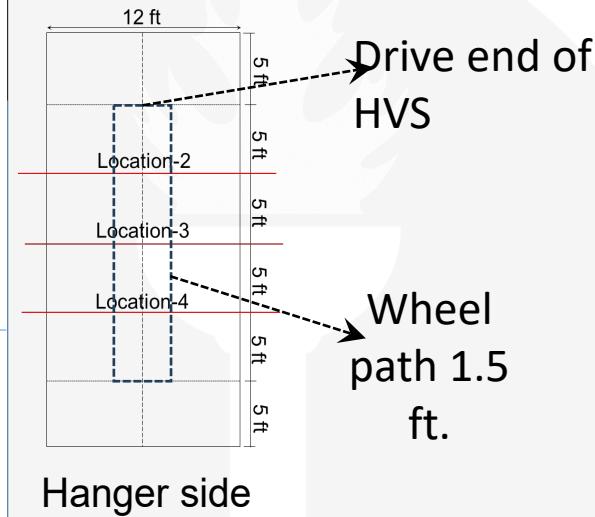
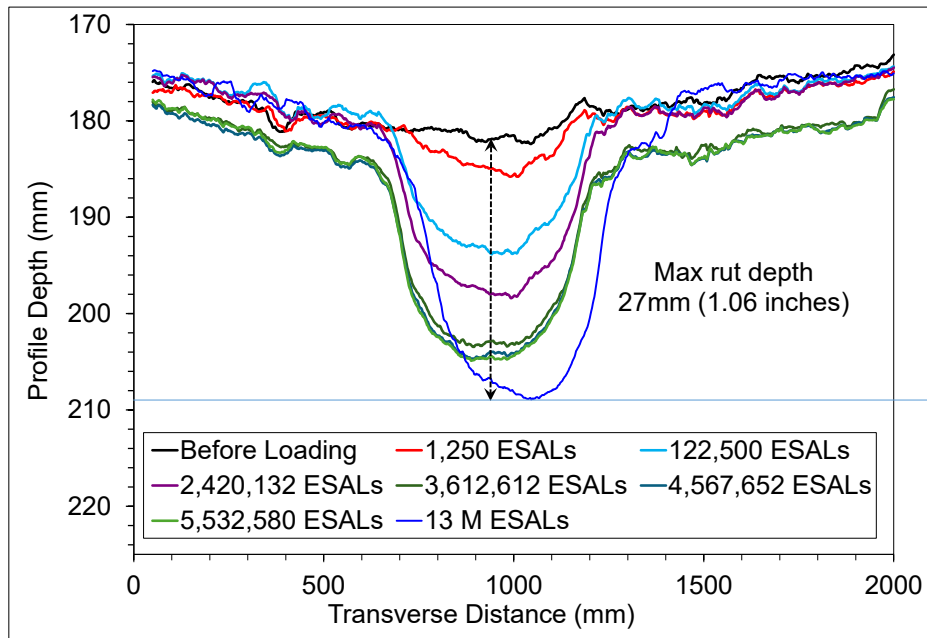
Rut progression curve

➤ Rutting after 1 Million ESALs- 19.05 mm or 0.75 inches
(Designed to carry 1 Million ESALs with max rut depth 1 inch)

➤ The section showed initial compaction and then stabilization



Rutting at Location-3 (Test strip II)



Transverse profile

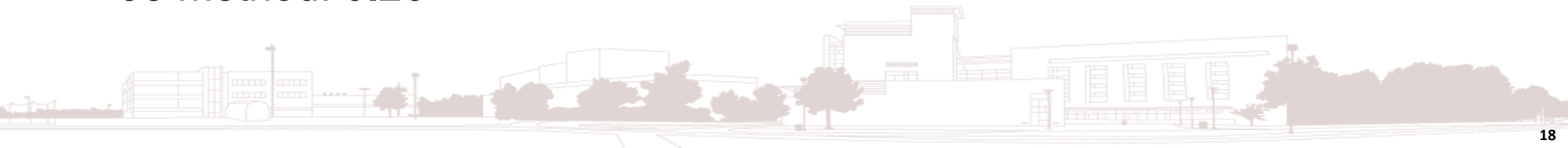
Rut progression curve

- 8.5M ESALS - 0.75 in
- 10M ESALS - 1 in
- 13 M ESALS - 1.06 in



Key Outcomes

- Validated design and construction specifications for porous asphalt pavements, informed by construction lessons learned and confirmed through APT-based performance evaluation.
- Pavement ME coefficients for the rutting prediction model for NJ conditions:
 - Recommended baseline coefficients ($k_{1r} = -2.42$, $k_{3r} = 0.255$)
- Layer coefficient for the porous asphalt pavement to use in AASHTO 93 method: **0.26**





Publications

- Eleyedath, Abhary, El Gabriel Becerril Jr, Ayman Ali, and Yusuf Mehta. "Development of a framework for the structural design of long-lasting porous asphalt pavement for high-traffic volume roadways." *Construction and Building Materials* 470 (2025): 140638.
- Carroll, Jessica, Scott Simonsen, Ty Rosas, Abu Bakar Md Siddique, Abhary Eleyedath, Ayman Ali, and Yusuf Mehta. "Laboratory Study on the Effect of Confinement on the Dynamic Complex Modulus of Porous Asphalt Mixtures." In *Airfield and Highway Pavements 2025*, pp. 206-214. 2025.
- Eleyedath, Abhary, Ali Raza Khan, Abu Bakar Md Siddique, Ayman Ali, and Yusuf Mehta. "Laboratory Evaluation of Porous Asphalt Mixtures for Use in High-Traffic-Volume Roads." In *International Symposium on Asphalt Pavement & Environment*, pp. 645-651. Cham: Springer Nature Switzerland, 2024.

Thank You!

Yusuf Mehta & Ayman Ali

Center for Research and Education in Advanced Transportation Engineering
Systems (CREATEs)

Department of Civil and Environmental Engineering
Rowan University

Email: creates@rowan.edu

Web.: www.rowan.edu/creates

