HVS Evaluation of Flexible Overlays of Composite Pavements
Background

- Approximately 50% of the pavements in New Jersey (NJ) are in “Poor” condition.
- Approximately 50% of those pavement are composite pavements (asphalt layer on top of a Portland Cement Concrete (PCC) layer).
Background

- To improve the conditions of NJ pavements, there is a need to investigate the potential for using thin asphalt overlays.
- Overlays are used for rehabilitating and preserving PCC pavements.
Study Objective

- Identify and predict the expected life of thin asphalt overlay treatments
Full Scale Pavement Sections

Plan View of the Full-Scale Pavement Sections Planned for this Project:

- 9.5 ME HMA (3 in.)
Full Scale Pavement Sections

Cross-Section View of the Full-Scale Pavement Sections Planned for this Project

- Thin Asphalt Overlay
- Portland Cement Concrete
- Comp. Unbound Base
- Compacted Subgrade
- Existing Soil

3 ft.

Thin asphalt layer ≈ 3 in.
PCC layer ≈ 8 in.
Portland Cement Concrete Layer

- Cylinders were prepared with the mix
- 7-day compressive strength test was conducted and passed
- 14-day and 28-day tests will be performed
Portland Cement Concrete Layer

- Poured on Oct 4$^{th}$, 5$^{th}$, and 7$^{th}$
Thin Asphalt Overlays

- Six full-scale pavement sections will be constructed in the RU-APTF
- Four thin asphalt overlay mixes:
  - Traditional Superpave Mix
  - Stone Matrix Asphalt (SMA) Mix
  - High Performance Thin Overlay
  - Binder Rich Intermediate Course (BRIC)
Testing Sections

12 ft.

12.5 mm. SMA Layer (3 Inch Thick)

Class B PCC Layer (8 Inch Thick)

Compacted Subbase (I-3 Agg., 6 Inch Thick)

Compacted Existing Soil (12 Inch Thick)

Existing Soil

12 ft.

12.5 mm. SMA Layer (2 Inch Thick)

BRIC Layer (1 Inch Thick)

Class B PCC Layer (8 Inch Thick)

Compacted Subbase (I-3 Agg., 6 Inch Thick)

Compacted Existing Soil (12 Inch Thick)

Existing Soil
Testing Sections

- HPTO Layer (2 Inch Thick)
- Class B PCC Layer (8 Inch Thick)
- Compacted Subbase (I-3 Agg., 6 Inch Thick)
- Compacted Existing Soil (12 Inch Thick)

- HPTO (1 Inch Thick)
- BRIC Layer (1 Inch Thick)
- Class B PCC Layer (8 Inch Thick)
- Compacted Subbase (I-3 Agg., 6 Inch Thick)
- Compacted Existing Soil (12 Inch Thick)

Existing Soil
Laboratory Experiments

- **Mixture Tests**
  - **Volumetrics**
    - Total Air Voids (VTM)
    - Aggregate Gradation
  - **Binder Content**
    - Binder Content (Extraction & Recovery of Binder)
- **Performance Tests**
  - Overlay Tester (OT)
  - Asphalt Pavement Analyzer (APA)
  - Tensile Strength Ratio (TSR)
## Instrumentation

### Procurement Status

<table>
<thead>
<tr>
<th>Sensor/DAQ</th>
<th>Status</th>
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<tbody>
<tr>
<td>NI cDAQ System</td>
<td>Delivered</td>
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<tr>
<td>Pressure Cells</td>
<td>Installed</td>
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<tr>
<td>Soil Compression Gauges</td>
<td>Installed</td>
</tr>
<tr>
<td>Thermocouple</td>
<td>Installed*</td>
</tr>
<tr>
<td>Asphalt Strain Gauges</td>
<td>Delivered</td>
</tr>
<tr>
<td>LVDTs</td>
<td>Installed</td>
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</tbody>
</table>

* Installed in I-3 Only
Instrumentation

Installation of Sensors

- Army Corps of Engineers (USACE) assisted Rowan team with the preparation and installation of the sensors
- Rowan team installed pressure cells and thermocouples with help of USACE in I-3 subbase layer
- Rowan team installed compression gauges with help of USACE in second layer of I-3
• **Instrumentation**

**Sensor Layout**

- Longitudinal Asphalt Strain Gauges (Total: 2)
- Pressure Cell (Total: 2, 2, 600KPa and 1 250KPa)
- Macrosensors LVDT (Total: 2)
- CTL Soil Compression Gauge (Total: 2)
- HMA Temperature Sensors (Total: 3 T-type Thermocouples)
- Type T thermocouples will be used for temperature measurements.
Pressure Sensor Installation
Thermocouple Installation
• Compression Gauge Installation
Questions?