

Solving a “Hard” Problem For The NYC DOT With a High Performance Thin Overlay

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1st Avenue in NYC



- 1st Avenue in Manhattan is 30 year old 18” thick PCC pavement
- Pavement was built with huge fanfare in 1983 projecting 40 year life
- Utilities beneath the pavement
 - Gas lines
 - Water lines
 - Sewer lines
 - Steam line

1st Avenue in NYC



- **Removing the PCC would most likely damage the utilities**
 - NYC DOT tries not to use compaction with vibration when paving streets
 - After paving projects are completed NYC DOT tests utilities for leaks
- **Funding not available to replace PCC pavement and the utilities**

1st Avenue in NYC



- PCC pavement is in very poor condition
- Curb clearances prevent use of a thick overlay

1st Avenue in NYC

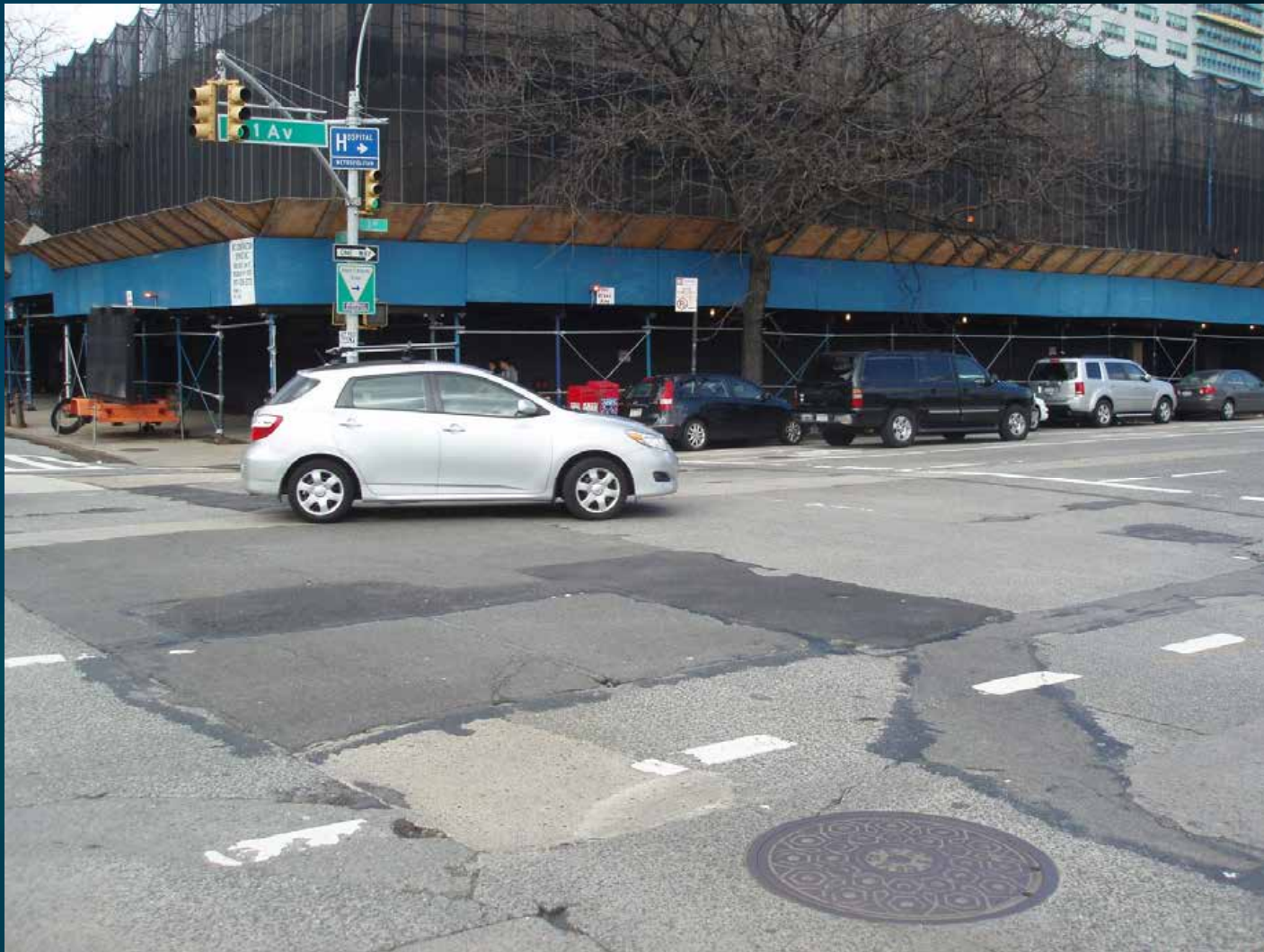


- NYC is planning to improve bus service with a new bus lane on 1st Avenue
- Question – How to Rehabilitate 1st Avenue?
- To come up with an answer you certainly must “Think Harder”

1st Avenue in NYC



1st Avenue in NYC



1st Avenue in NYC



1st Avenue in NYC



1st Avenue in NYC



- NYC DOT contacted NuStar Asphalt and asked for suggestions
- Research at Rutgers University had developed a High Performance Thin Overlay (HPTO) Mix

Paulsboro HPTO – 5 years old

Original



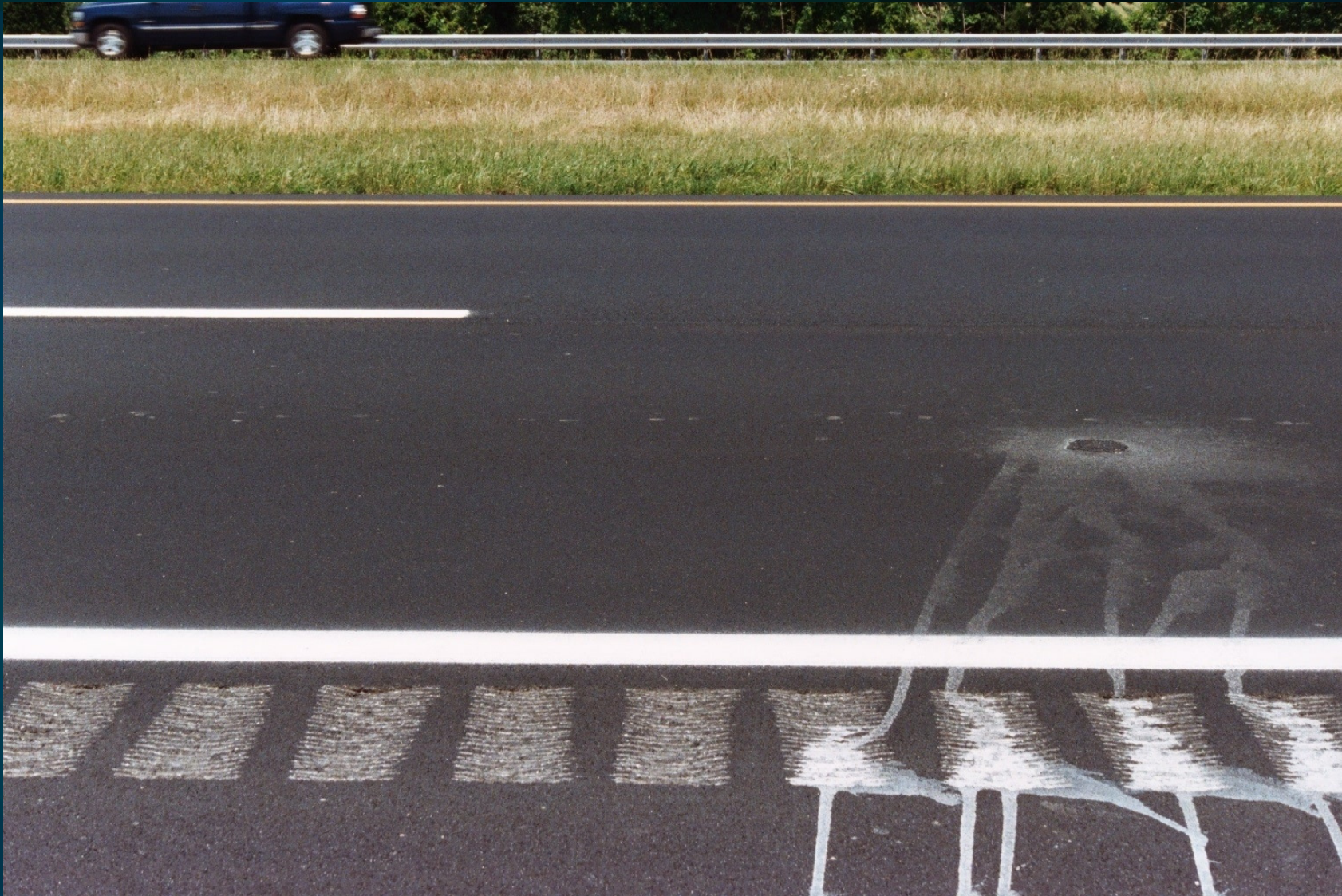
After 5 years



NJ I-295 HPTO Project



NJ I-295 HPTO Project



NJ I-295 HPTO Project



1st Avenue in NYC



- Search to improve HPTO performance under severe conditions by beefing up the asphalt binder
- Highly Modified Asphalt (HiMA) developed by Kraton Polymers
 - Specialty SBS material with lower viscosity increase
 - Allows up to 7.5% polymer loading with workability

1st Avenue in NYC

- Research at Rutgers University comparing HPTO mix with conventional PMA binder and Highly Modified Asphalt (HiMA)

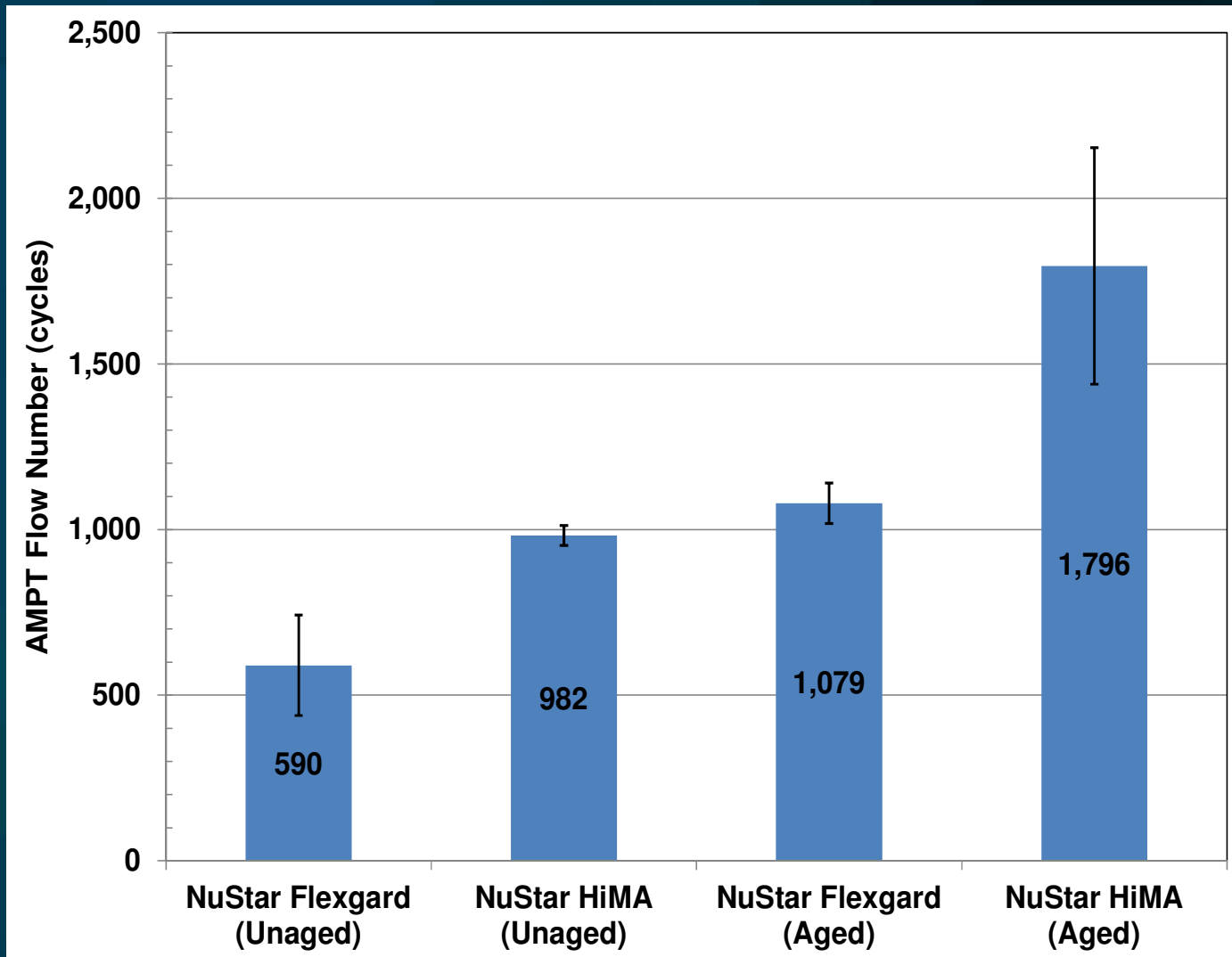


1st Avenue in NYC

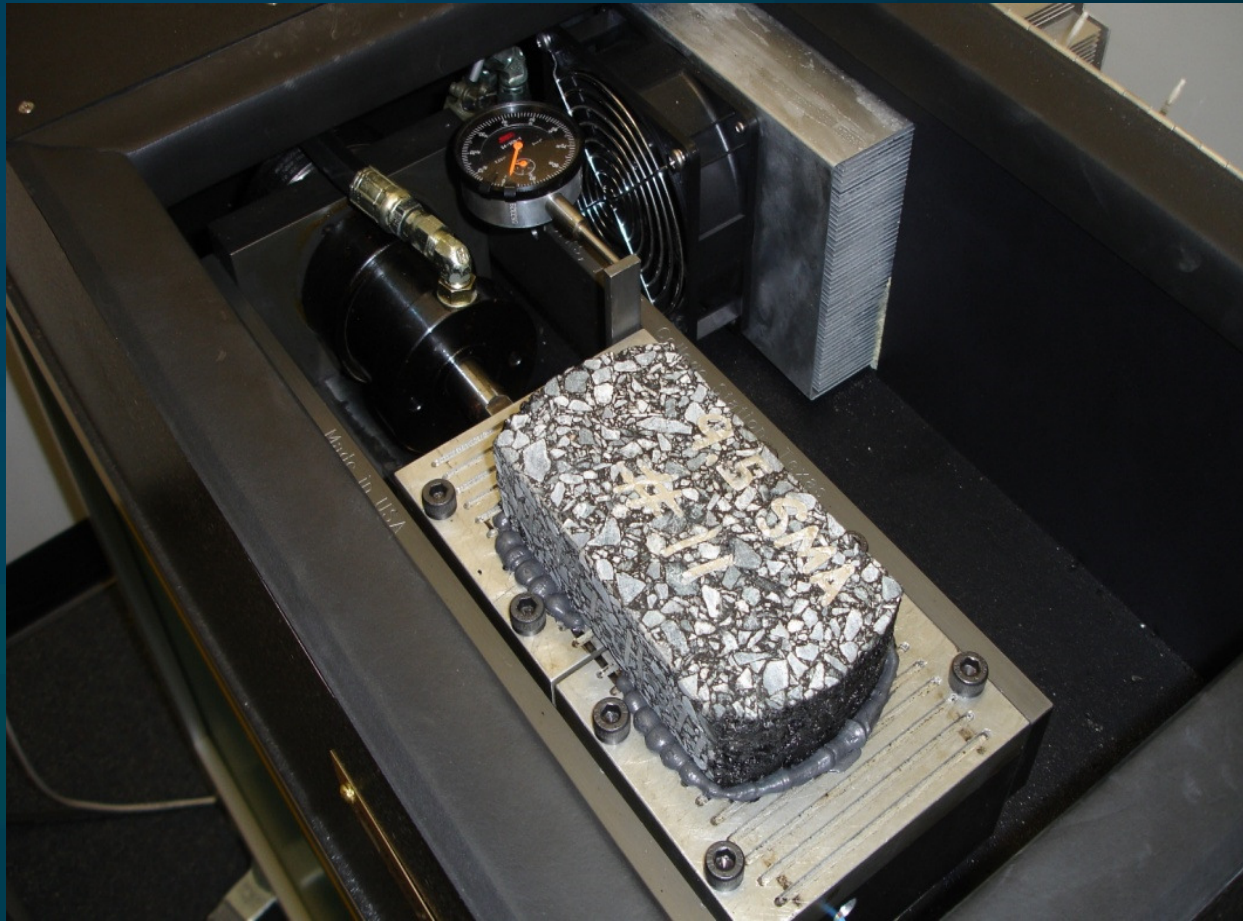


- Conventional PMA binder had continuous grade of PG 80.4-27.3
- HiMA binder had a continuous grade of PG 95.4-31.03

Flow Number

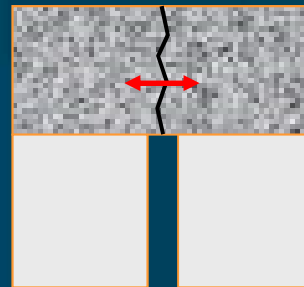
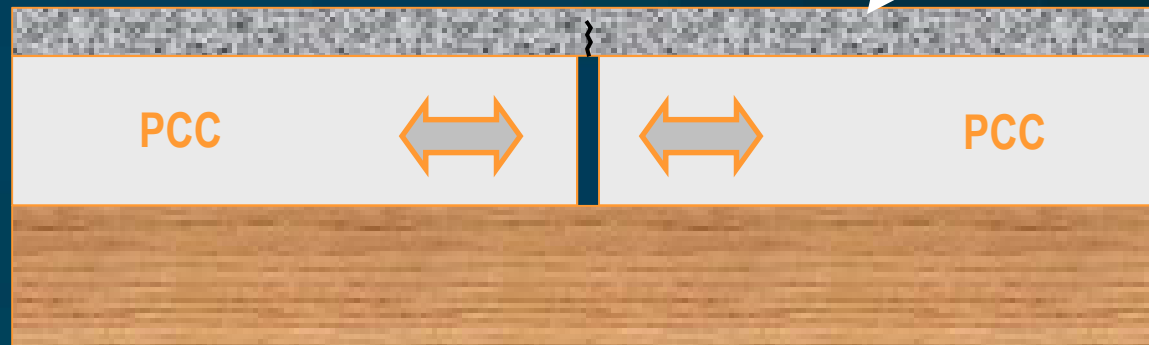


Texas Overlay Tester



Texas Overlay Tester

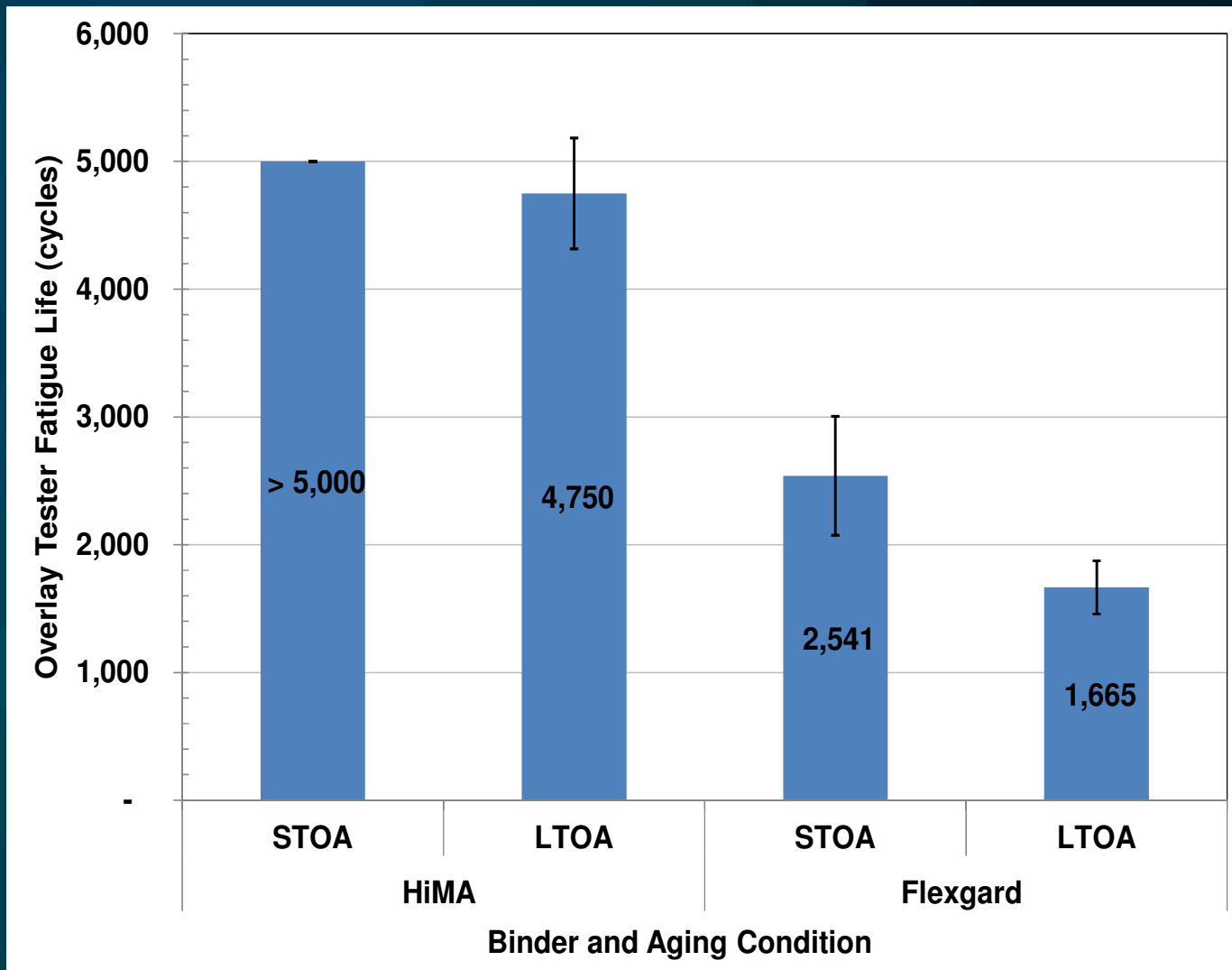
Hot Mix Asphalt Overlaid on PCC



Horizontal Tensile Stress due to Expansion/Contraction of PCC from Temperature

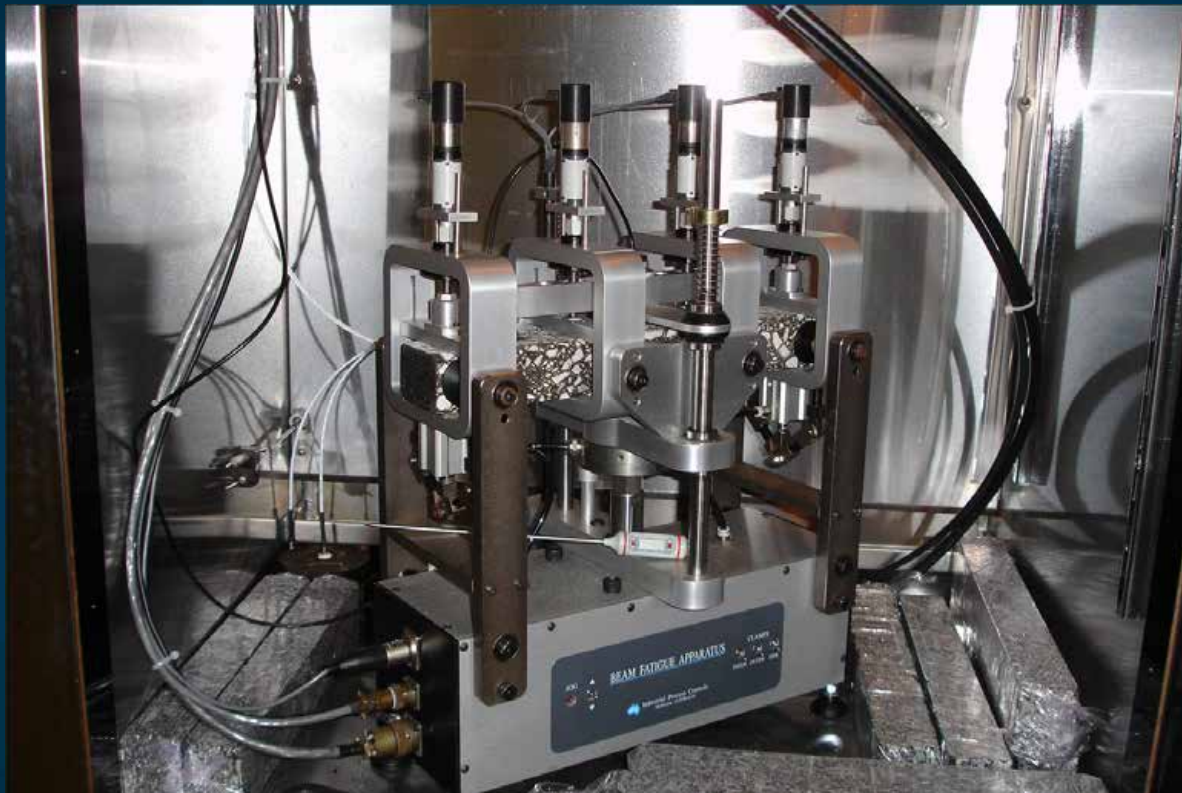
Horizontal Stress/Strain is modeled using
Overlay Tester

Texas Overlay Tester

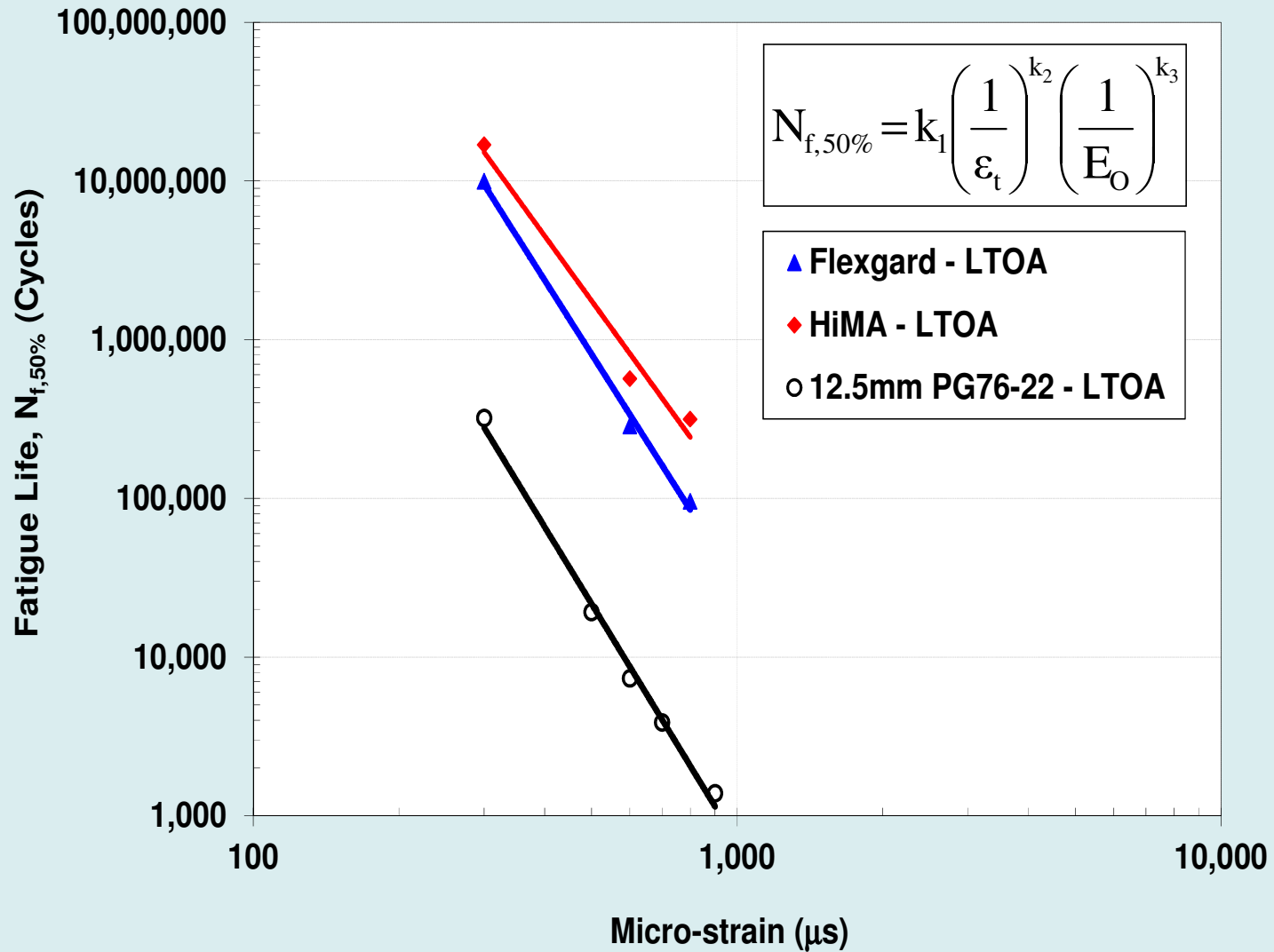


Flexural Beam Fatigue

- Flexural Beam Fatigue Testing
 - Measure number of cycles to failure



Flexural Beam Fatigue

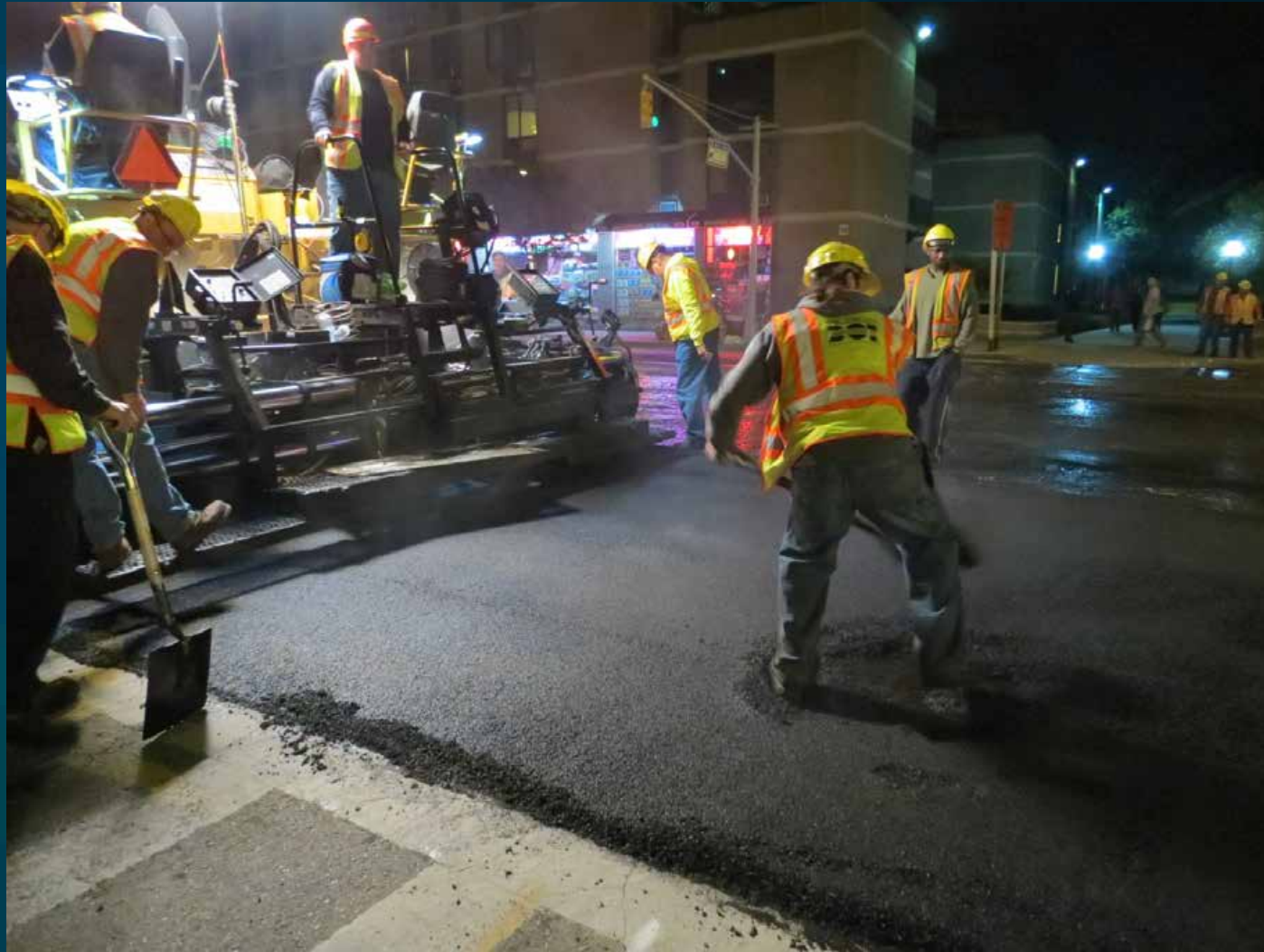


1st Avenue in NYC



- HPTO mix containing each binder was placed on 1st Avenue on September 25, 2012
 - HiMA placed between 100th and 101st Street
 - Conventional PMA placed between 101st and 102nd Street
- 1 1/2” thick overlay

1st Avenue in NYC



1st Avenue in NYC



1st Avenue in NYC



- Both sections performed well through August 2013
- NYC DOT selected HiMA based on laboratory testing and field performance

1st Avenue in NYC



- **Rehabilitation Design**
 - Micro-mill existing PCC pavement
 - Patch areas as required
 - Crack seal as required
 - Place PG 76-22 tack coat and Mirafi PGMG4 fabric
 - Overlay with 1 1/2" HPTO mix with HiMA asphalt binder
 - Added Evothem warm mix additive to lower mix temperatures and improve workability
 - Produced mix at 300 °F

1st Avenue Micro-Milling



1st Avenue Micro-Milling



1st Avenue Micro-Milling



1st Avenue Crack Sealing and Patching



1st Avenue Crack Sealing and Patching



1st Avenue Tack Coat and Fabric



1st Avenue Tack Coat and Fabric



1st Avenue Paving



1st Avenue Paving



1st Avenue Paving



1st Avenue Paving



1st Avenue Finished Pavement



1st Avenue Finished Pavement



1st Avenue Finished Pavement



1st Avenue Finished Pavement



Summary



- **Combination of HPTO mix and HiMA gives a thin overlay solution for “hard” pavement rehabilitations**
- **NYC DOT and NuStar Asphalt will monitor pavement performance**

Questions?

