Panel Discussion

How is New Jersey Department of Transportation Creating Pathways to Sustainability?

Today's Panelists

Alex Borovskis
Director
NJDOT – Construction & Materials

Robert Blight
Executive Manager
NJDOT – Pavement & Drainage Management and Technology Bureau

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Project Management Specialist 3
NJDOT – Project Management

Mohab Hussein
Supervising Engineer
NJDOT – Bureau of Structural Design & Geotechnical Engineering

Sushant Darji
Principal Engineer Planning
NJDOT - Bureau of Statewide Strategies

Giri Venkiteela
Innovation Officer
NJDOT - Bureau of Research, Innovation & Information Transfer

Alex Borovskis

Director

NJDOT – Construction and Materials

Pathways to Sustainability in Transportation

- **Carbon reduction**
- **Climate resilience**

Carbon Reduction

- **The National Electric Vehicle Infrastructure (NEVI) Program**
- **Other New Jersey Programs:**
  - **It Pay$ to Plug In**
  - **Complete Streets Initiative**

Climate Resilience

- **Asphalt**
- **Concrete**

Integrated Long-Term Planning

- **Adaptative Traffic Signal Program:**
  - **Projects Completed – 5**
  - **In Design and Construction – 10**

Thank You

Alex Borovskis

Director

NJDOT – Construction and Materials

Robert Blight

Executive Manager

NJDOT – Pavement & Drainage Management and Technology Bureau

Paving Pathways to Sustainability

Sustainable Pavements

- Achieve the engineering goals.
- Preserve and (ideally) restore surrounding ecosystems.
- Use financial, human, and environmental resources wisely.
- Meet basic human needs such as health, safety, equity, employment, comfort, and happiness.
- Balance: economic, environmental, and social impacts.

Benefits of Striving for Sustainability

- Reduced pavement life-cycle costs

- Reduction in greenhouse gas emissions
- Reduced energy
- Reduced noise
- Improved air quality

- Improved safety
- Improved ride quality
- Conservation of resources

Pavement Life Cycle Stages

- Materials
- Design
- Construction
- Use
- Maintenance/Preservation
- End of Life

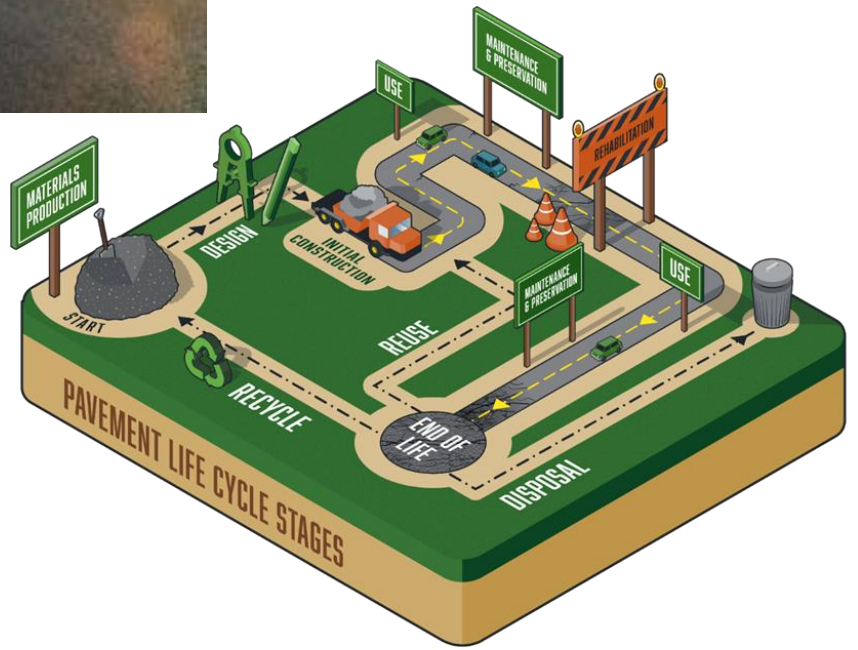
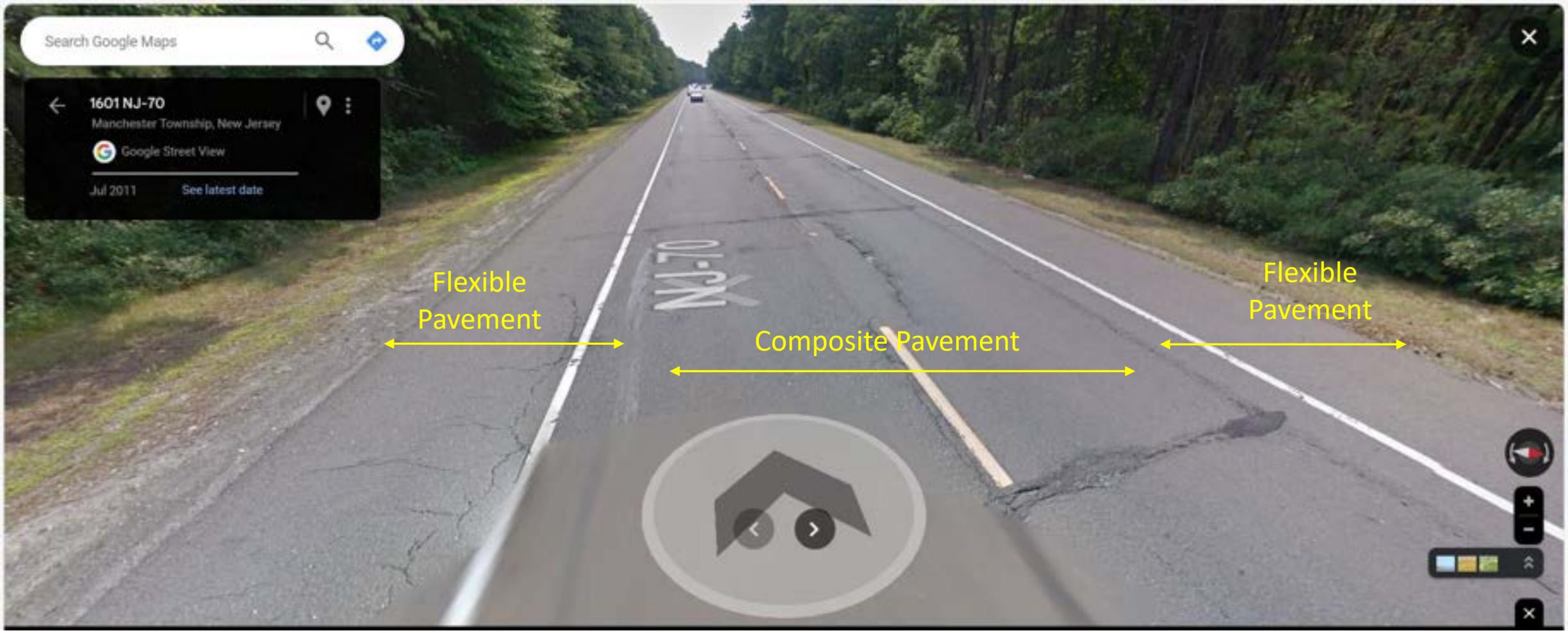


Image Source: FHWA/APTech

Sustainable Pavement Example



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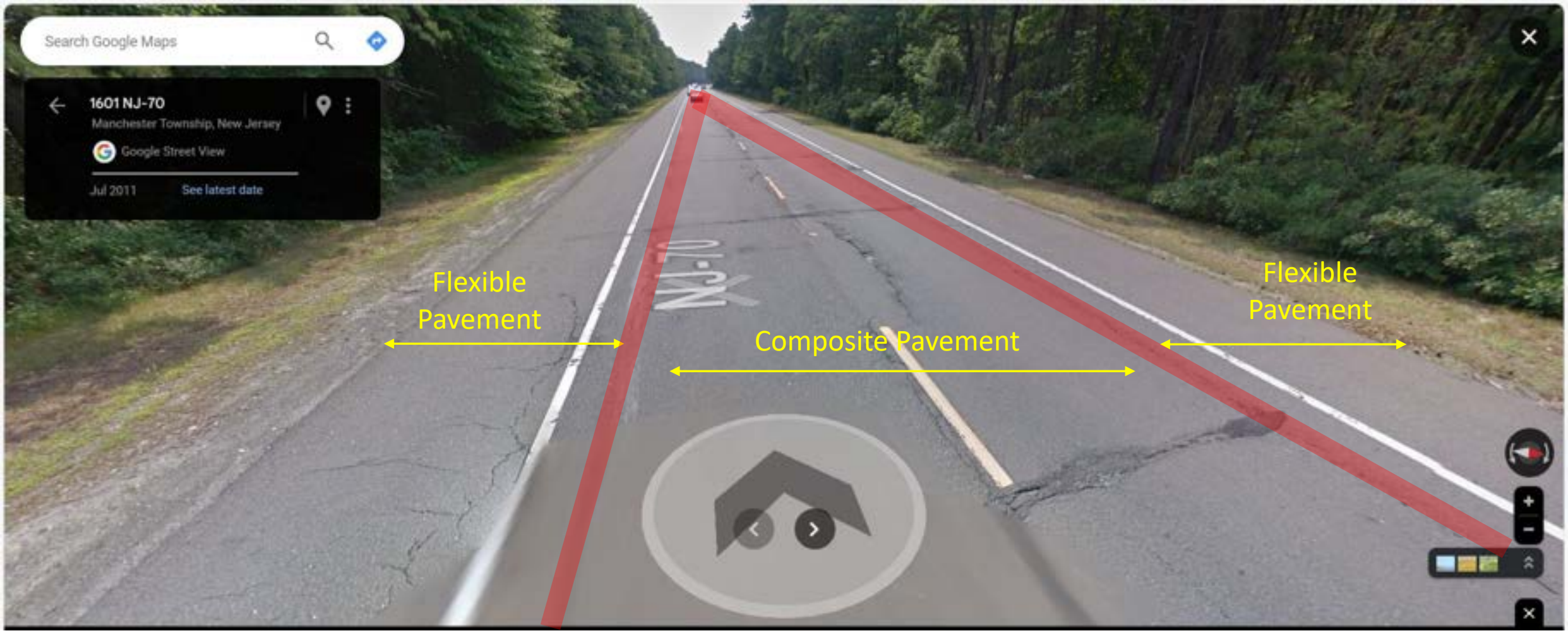

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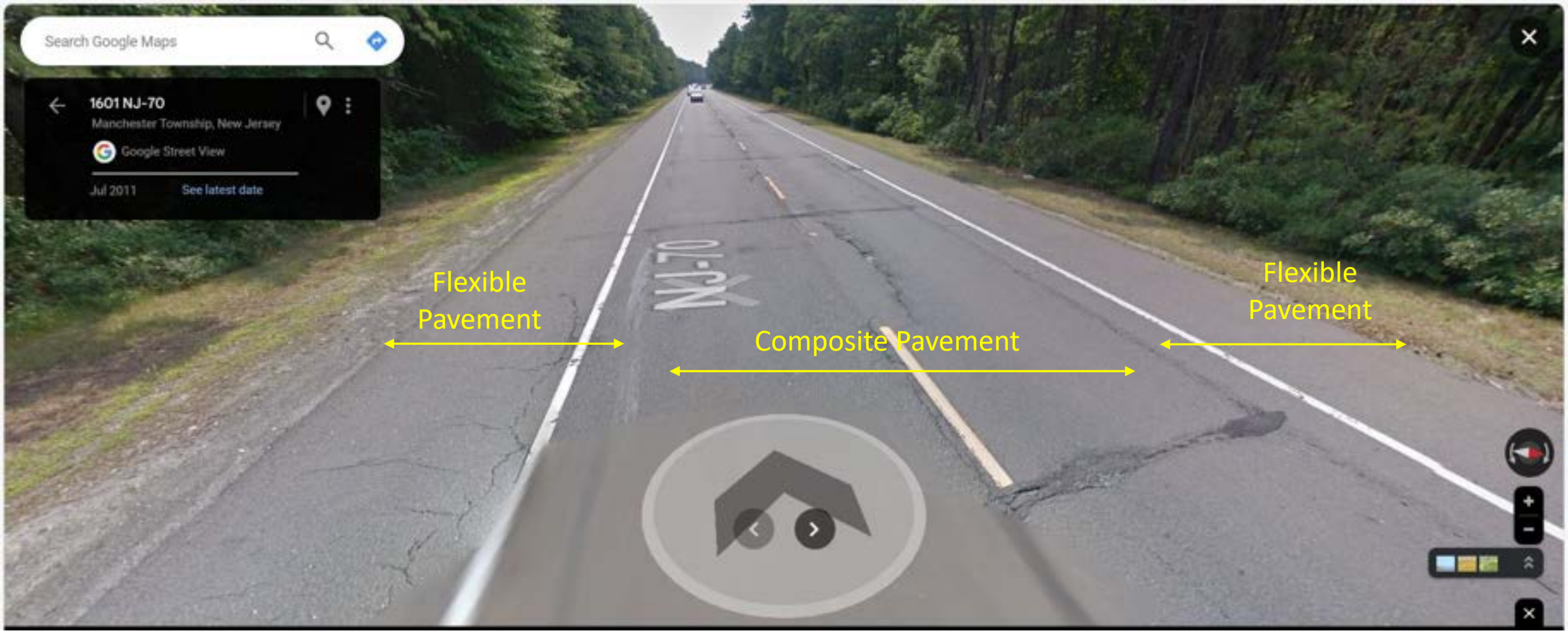
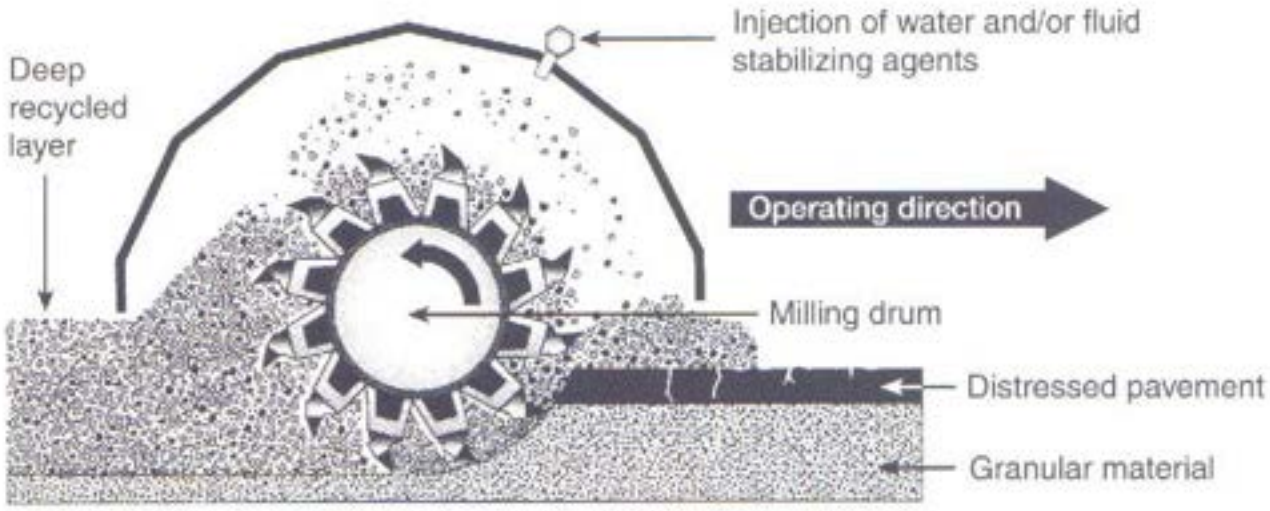


Rubblization

Rubblization

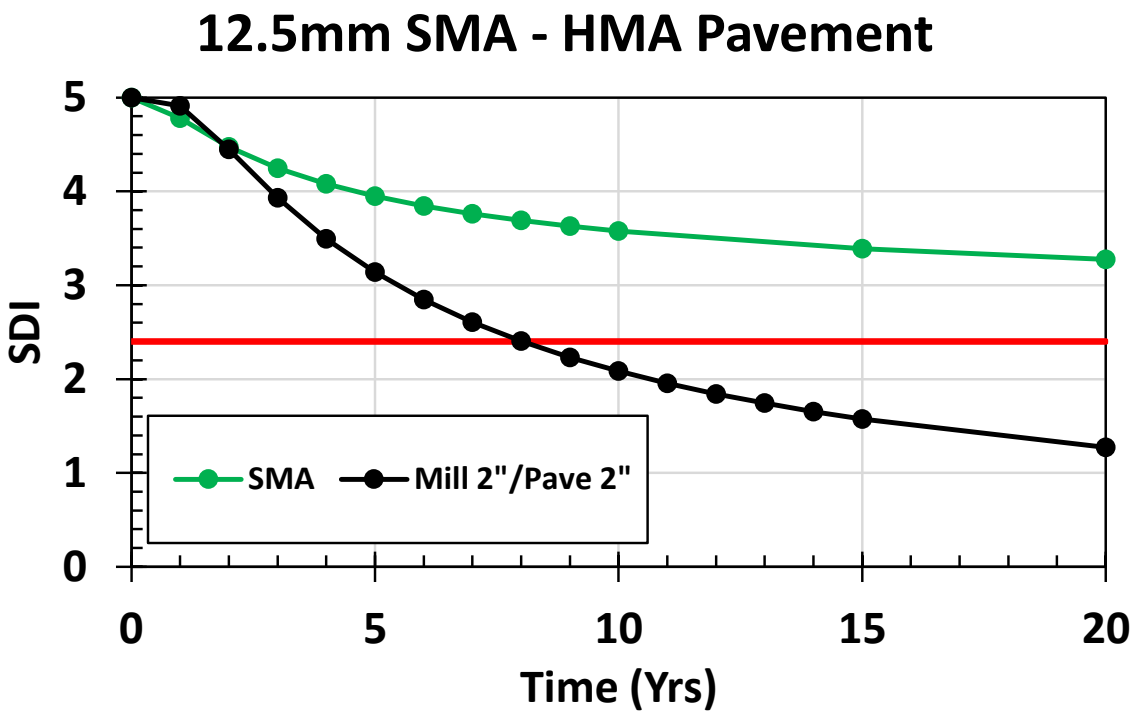
Rubblized Concrete Pavement

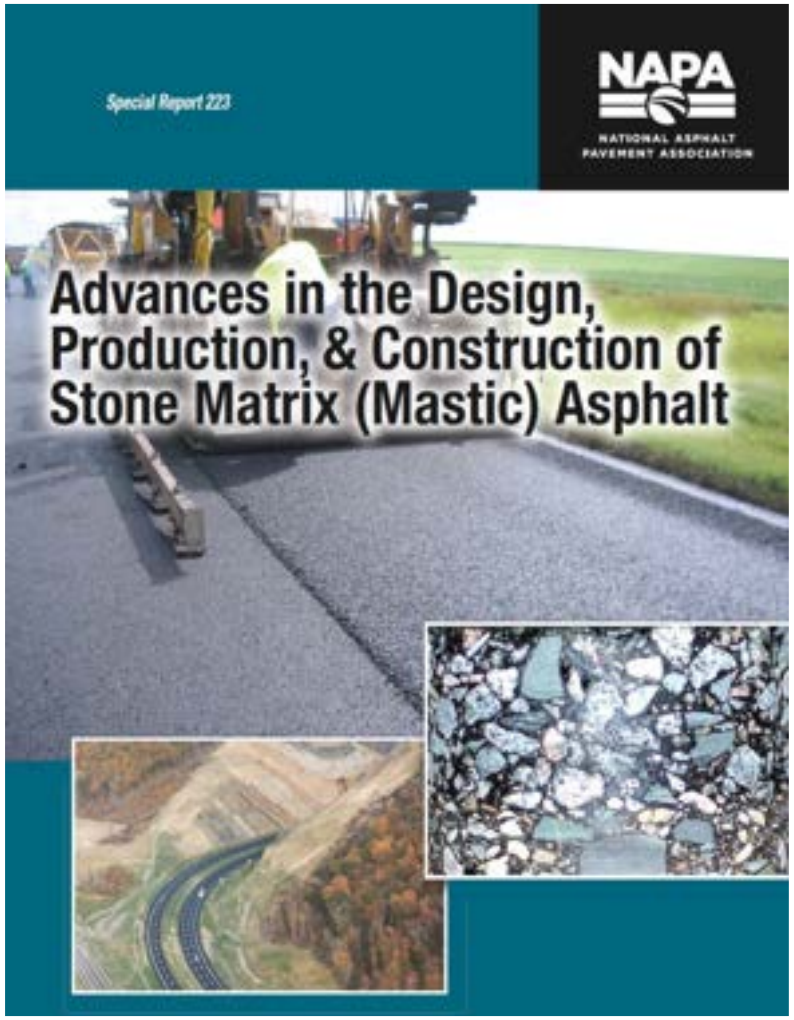
Full Depth Reclamation



Bottom Rich Base Course (BRBC)

Stone Matrix Asphalt (SMA)





Pavement Life Cycle Opportunities

- Materials – Reduced by >60%
- Design – Long life pavement
- Construction – Reduced construction processes by >60%
- Use – Smoother longer
- Maintenance/Preservation – Reduced # of resurfacing cycles
- End of Life – Reused existing pavement

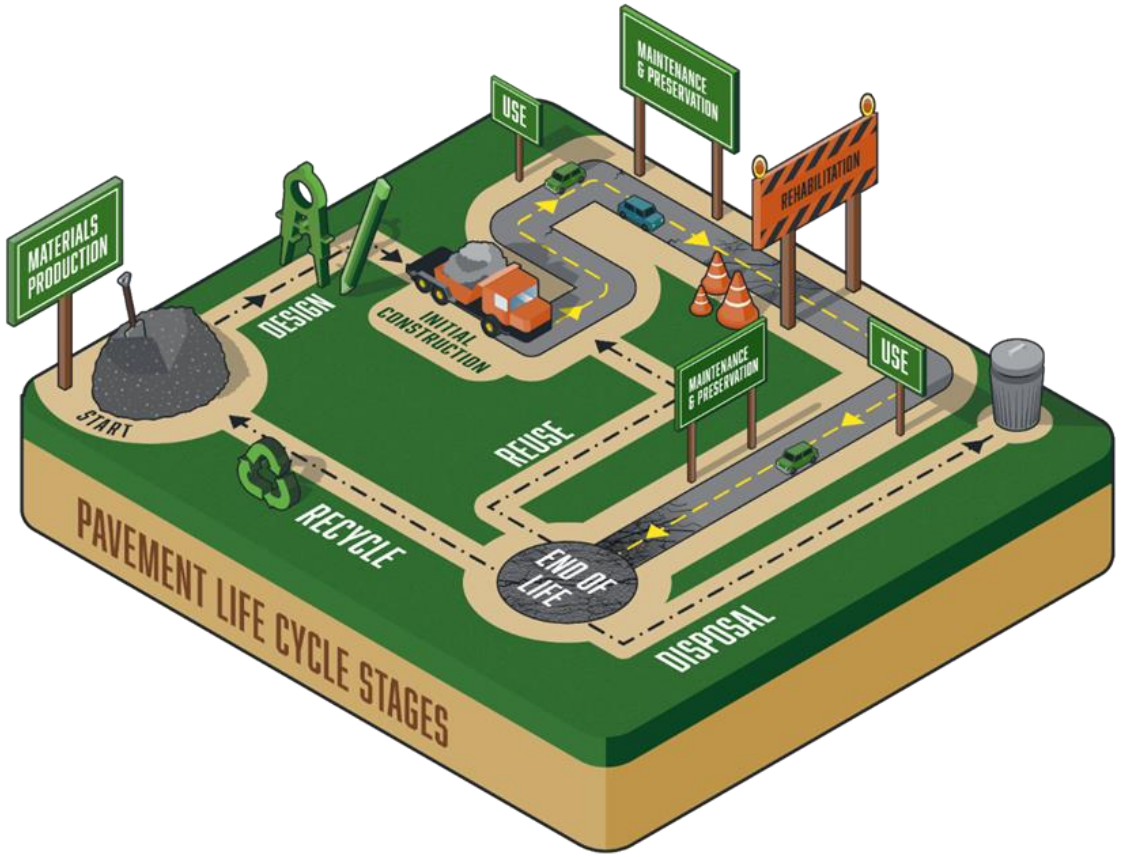


Image Source: FHWA/APTech

Thank You

Robert Blight

Executive Manager

NJDOT – Pavement & Drainage Management and Technology Bureau

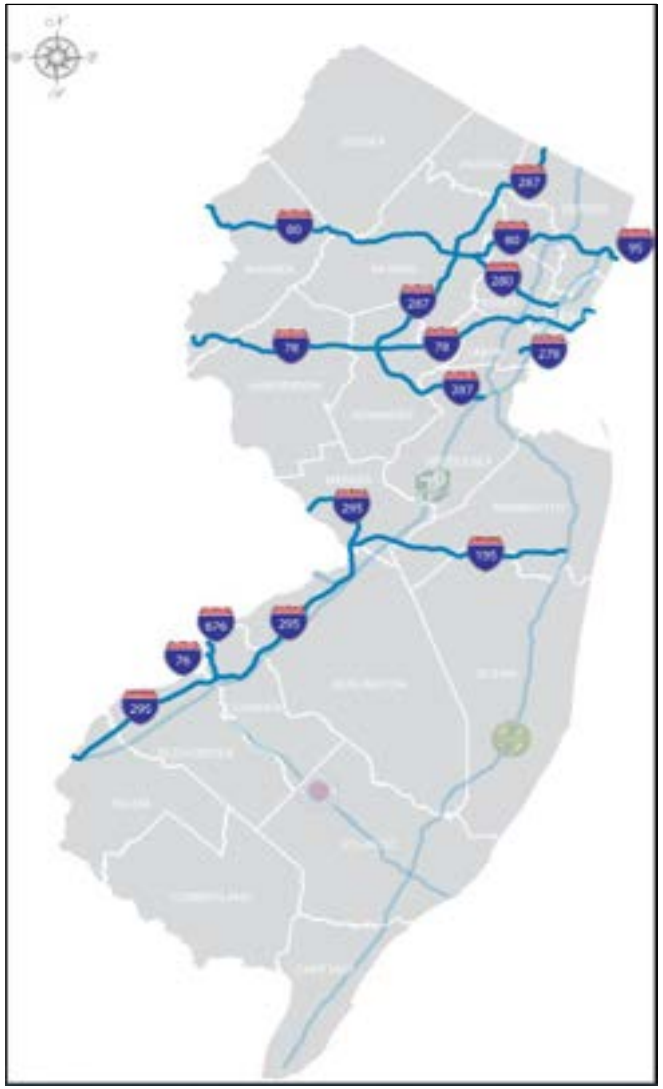
Krishna Tripathi

Project Management Specialist 3

NJDOT – Project Management

National Electric Vehicle Infrastructure (NEVI)

- Joint Office of Energy and Transportation (JOET) Program
  - Administered by the FHWA
  - Funds Designated to Each State
  - Implemented by NJDOT
- Sustainability by Promoting Electric Vehicle (EV) Adoption
  - Eliminate Range Anxiety along the Nation's Highways
  - Provide Direct Current Fast Chargers (DCFCs) at least every 50 Miles
  - Reliable, Accessible, Equitable, Convenient EV Chargers

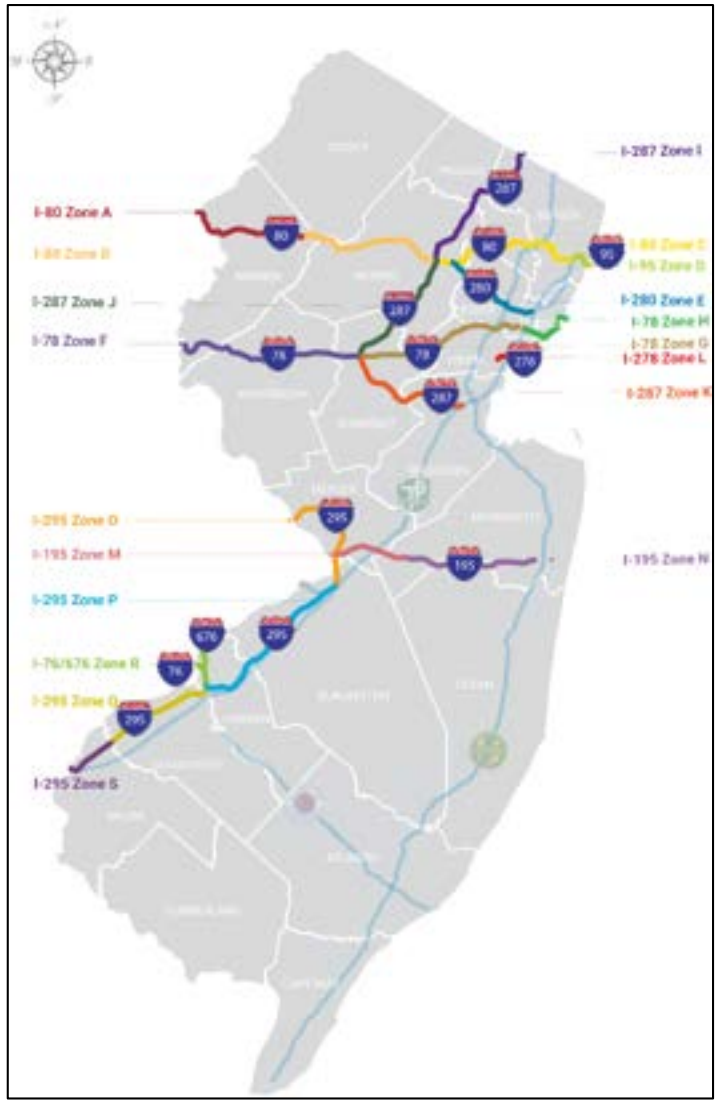


NEVI in New Jersey

- Provide DCFCs** on All Interstates
  - NJ's 10 Interstates → 19 DCFC Development Zones
  - Accommodates Roadway Users in Every Direction of Travel

- Equity
  - 8 of 19 Locations in Disadvantaged / Overburdened Communities
  - DCFCs Along All NJDOT Interstates
  - Developer Outreach with Local Communities

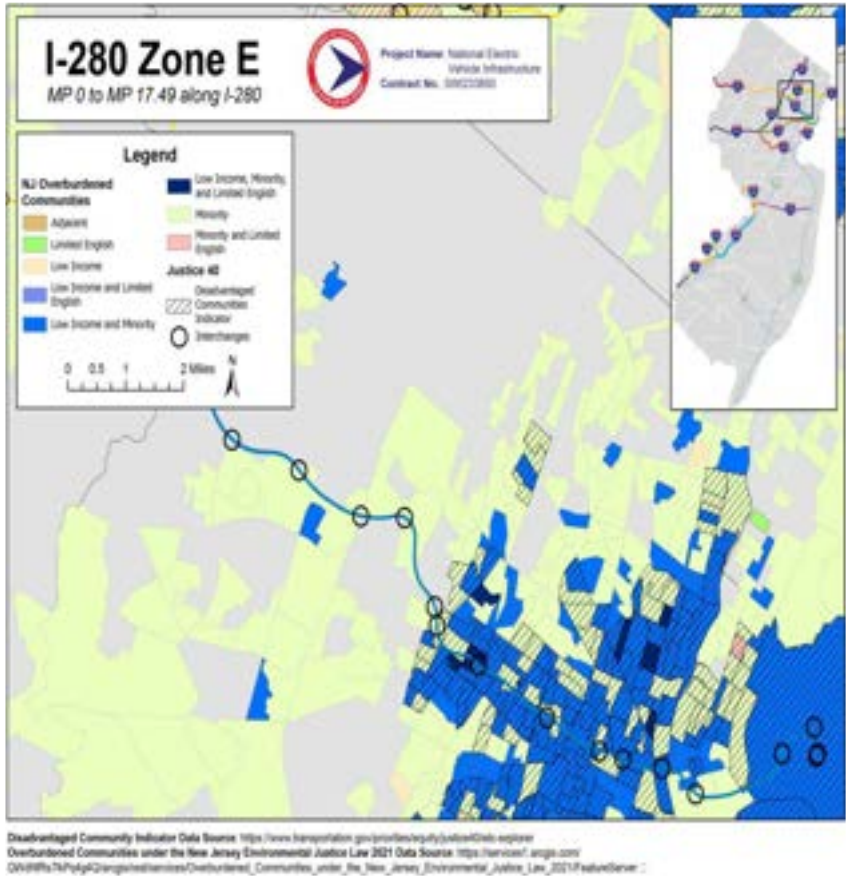
*** DCFCs Can Charge an EV up to 80% in Approximately 20 Minutes*



Next Steps

- NEVI Contract
  - Award in Fall 2024
  - Design & Construct by Fall 2026
  - Operate 19 Charger Stations for 5 years

- Gather Data to Inform Future Decisions
  - Uptime Performance Reported Quarterly
  - Report to FHWA on Innovative Contracting Approach
  - Outreach & Workforce Development Plans



- Support Other EV Adoption Efforts
  - EV Charger Reliability and Accessibility Accelerator (EVC RAA) Program
  - Continue Coordination with Stakeholders: Team NJ, FHWA, etc.

Thank You

Krishna Tripathi

Project Management Specialist 3

NJDOT – Project Management

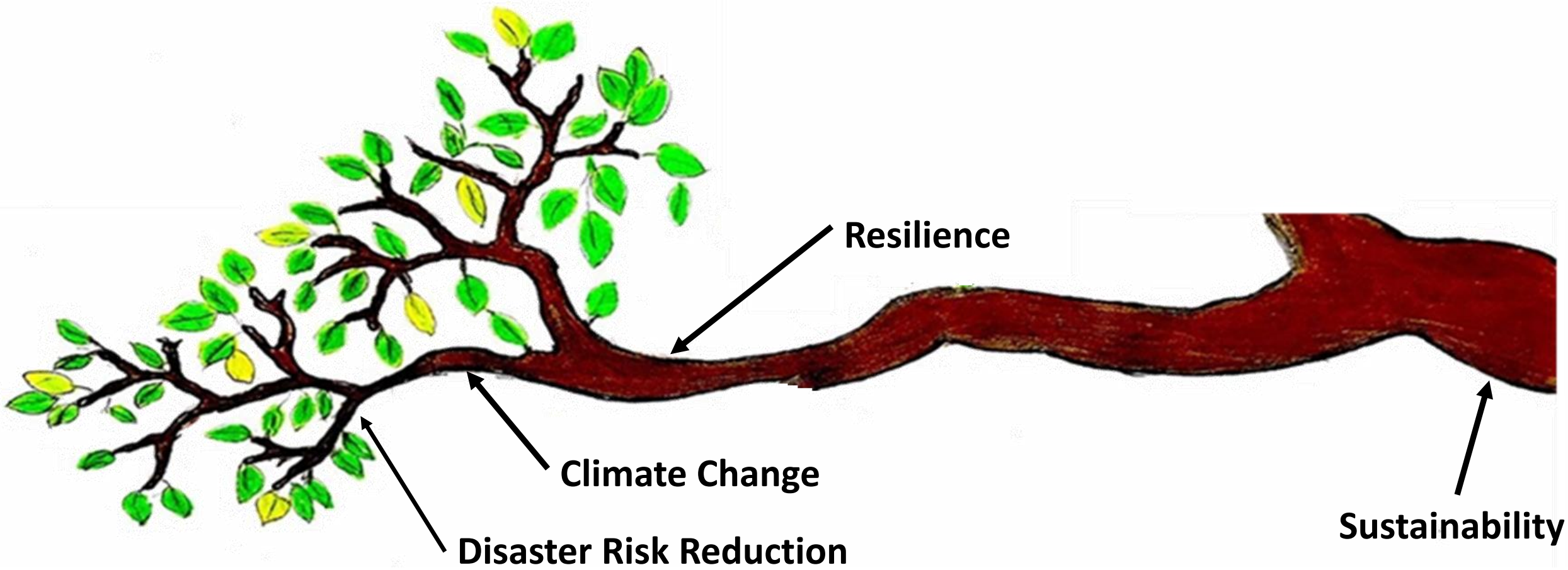
Mohab Hussein

Supervising Engineer

NJDOT – Bureau of Structural Design & Geotechnical Engineering

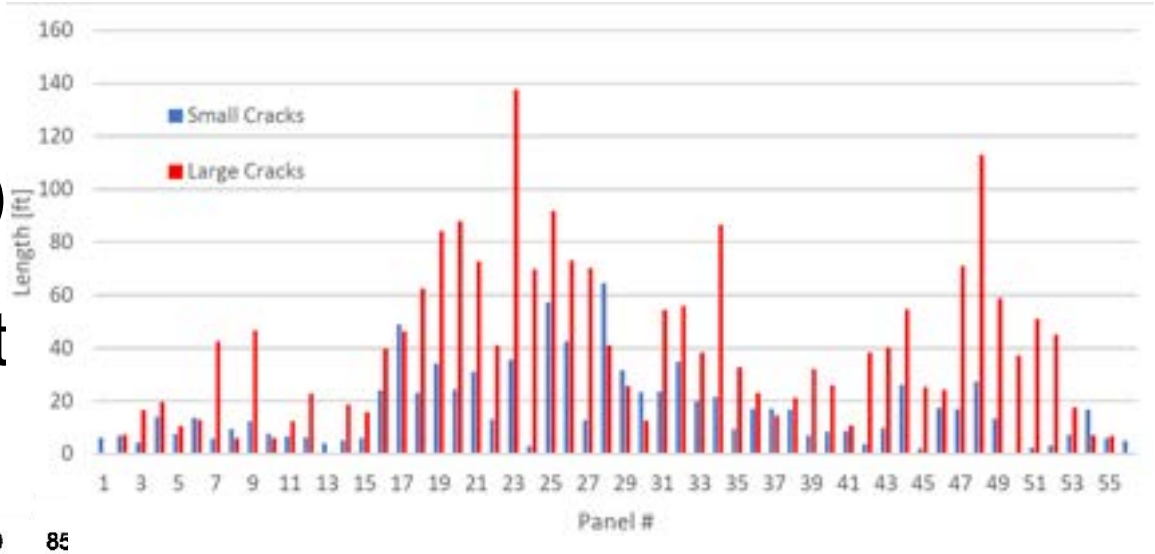
Sustainability

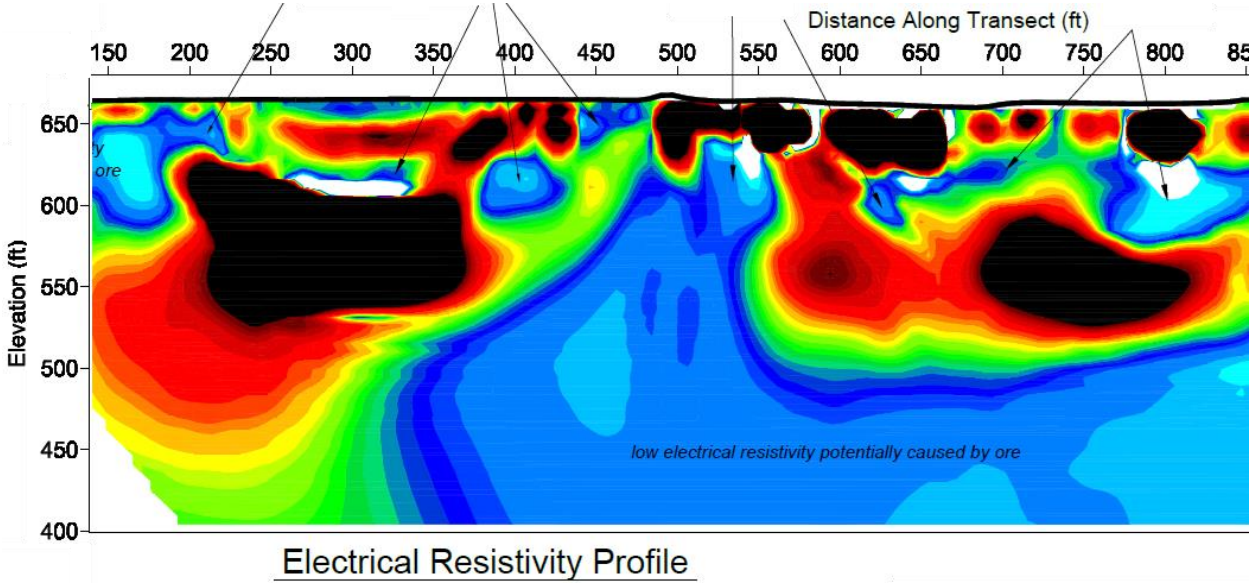
Sustainability



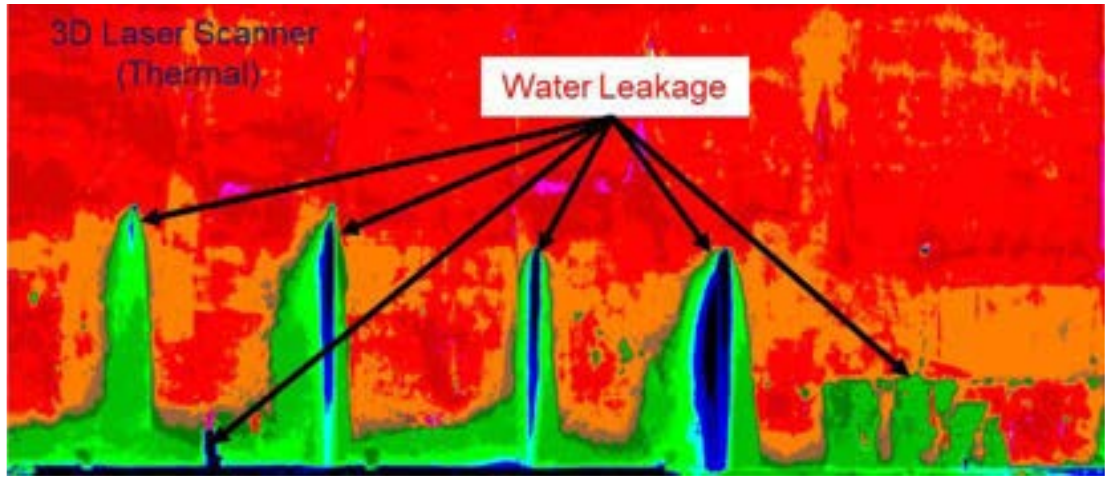
Geotechnical Asset Management

- ❑Risk-based Asset Management
- ❑Physical and Non-Physical (Data)
- ❑Guide the State's investment decisions





Electrical Resistivity Profile



Environmental Product Declaration

- ❑FHWA Every Day Counts / EDC-7
- ❑Clear benchmark
- ❑Reliable data on material or product impacts using LCA.
- ❑Promote environmental improvements.
- ❑Support decision-making with environmental data.
- ❑Identify key areas to improve environmental performance.

ENVIRONMENTAL IMPACTS
Declared Products:
Description:Exterior 4000 PSI
Compressive strength: 4000 PSI at 28 days

Declared Unit: 1 m^3 of concrete

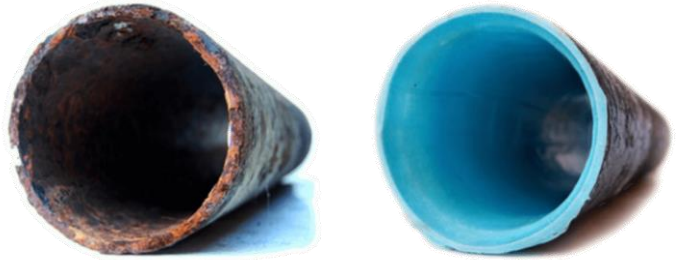
Global Warming Potential (kg CO -eq)	318
Ozone Depletion Potential (kg CFC-11-eq)	7.15E-6
Acidification Potential (kg SO -eq)	0.95
Eutrophication Potential (kg N-eq)	0.24
Photochemical Ozone Creation Potential (kg O -eq)	20.7
Abiotic Depletion, non-fossil (kg Sb-eq)	5.82E-5
Abiotic Depletion, fossil (MJ)	658
Total Waste Disposed (kg)	94.2
Consumption of Freshwater (m^3)	2.40

Product Components: natural aggregate (ASTM C33), Portland cement (ASTM C150), fly ash (ASTM C618), batch water (ASTM C1602), admixture (ASTM C494), admixture (ASTM C260)

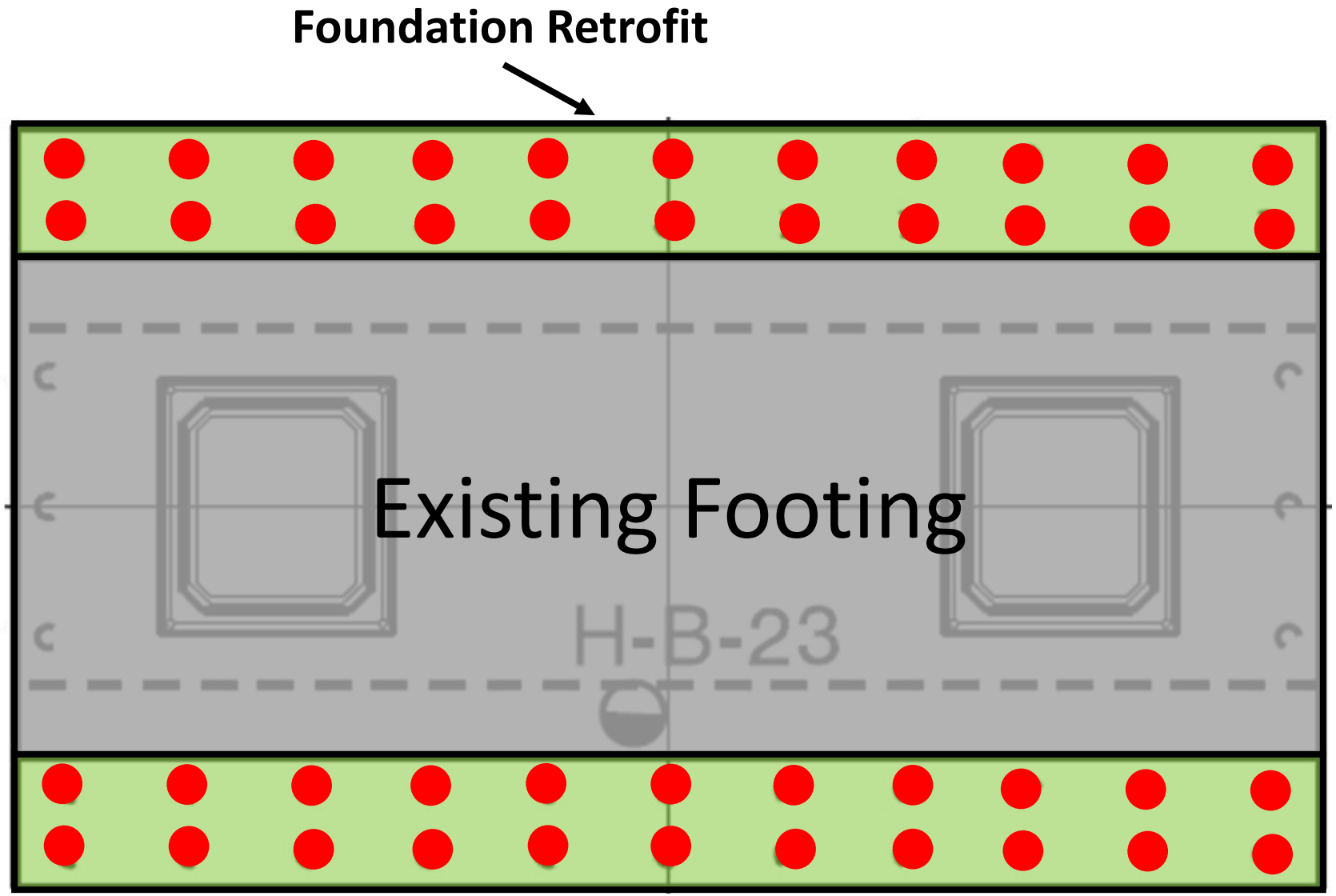
Bridge Rehabilitation

Preservation

- Service life can increase to 120 to 150 years with the suggested routine and periodical maintenance.
- Pipelining
- UHPC Overlays
- Scour Countermeasures



Foundation Reuse

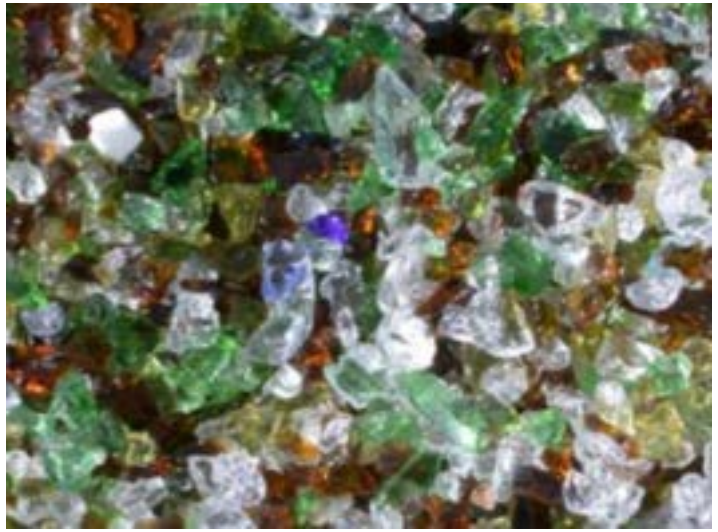


Corrosion-Resistant

- ❑Stainless Steel
- ❑Fiberglass
- ❑Epoxy
- ❑Galvanized

Lightweight Aggregate

- Less production and energy emission
- Transportation emission and congestion
  - 1 Truck of Lightweight Aggregate ≈ 3-7 Trucks Of Regular Backfill Trucks Off the Road
- Locally Recycled and Manufactured Material
  - 150 million glass bottles will be kept out of landfills
- Material Reduction
  - Less Weight → Smaller Walls → Less Materials (i.e. Concrete, Steel) → Less Emissions



Lightweight Concrete

- Lightweight Concrete can save materials, energy, and emission compared normal weight concrete
- Example analysis for a 3,340-ft bridge in North NJ.

X Saves of 497 Concrete Truck

X Saves emissions ≅ driving 235 million times around the earth

X Saves ≅ 1.1 times the amount of steel in the Eiffel Tower

X Saves energy ≅ 113 thousands houses for a whole year.

Mousa, Ahmad, Mohab Hussein, and Mohamed Mahgoub. "Merits and Future of Lightweight Concrete: Insights from USA Construction Market." Unpublished manuscript

Lightweight Concrete

Some of the Benefits of using more sustainable materials:

- ❑Beam length
- ❑Reduce the load
- ❑Increase the load radius and/or decrease crane capacity.
- ❑Reduce the number of splices and/or temporary support.
- ❑Accelerated Bridge Construction (ABC)

Thank You

Mohab Hussein

Supervising Engineer

NJDOT – Bureau of Structural Design & Geotechnical Engineering

Sushant Darji

Principal Engineer Planning

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NJDOT's Commitment to Decarbonization

Join us on a journey towards cleaner air and greener transportation!

- **Content:**
  - **Carbon Reduction Program :** Overview of strategies to decrease carbon emissions in transportation.
  - **Congestion Mitigation and Air Quality (CMAQ) Program:** Focused on improving air quality and reducing congestion through various transportation initiatives.
  - **Goals:** Emphasizing NJDOT’s commitment to sustainable practices and innovation in achieving decarbonization.

Carbon Reduction Program: Five Strategies to Breathe Easy!

❑ NJDOT Develops Carbon Reduction Strategies: A Step Towards Decarbonization with Five Key Categories

I. **Promote Electric and Zero-Emission Vehicles -** Encouraging a shift to cleaner fuels.
II. **Use of Mass Transit and Active Modes -** Reducing reliance on single occupancy vehicles (SOVs).
III. **Support Efficient Roadway Operations -** Enhancing traffic flow and minimizing delays.
IV. **Incorporate Efficient Construction and Maintenance -** Utilizing recycled materials and best practices.
V. **Enable Innovative Solutions -** Exploring new technologies and sustainable materials.

➢ **Implementation:** We are actively working towards establishing a plan to effectively implement these strategies through internal collaboration and engagement with other agencies.

CMAQ Program: Clearing the Air!

- **The CMAQ program provides flexible funding for transportation projects that improve air quality and reduce congestion in nonattainment areas.**

- **Project Categories:**
  - **I. Active Transportation:** Bike/pedestrian infrastructure and shared mobility.
  - **II. Traffic Management:** Intelligent Transportation Systems (ITS) and congestion relief.
  - **III. Infrastructure Modernization:** Retrofit projects and rail car replacements.
  - **IV. Port Electrification:** Initiatives to reduce emissions at ports.

- **Emission Goals:** Establishing 2-year and 4-year targets for the CMAQ program involves setting goals for reducing CO, NOx, VOC (Volatile Organic Compounds), and PM2.5 emissions, along with improving traffic metrics assessed through measures like Annual Hours of Peak Hour Excessive Delay (PHED), Percent of Non-Single Occupancy Vehicle travel (Non-SOV), and Total Emissions Reduction, to ensure accountability in funding air quality projects.

Together Towards a Sustainable Tomorrow

❑ Driving Sustainable Change for Tomorrow

- **Implementation:** NJDOT is dedicated to crafting a comprehensive plan for effectively implementing our decarbonization strategies.
- **Active Engagement:** We're building strong collaborations internally and with external agencies to ensure smooth execution of our goals.
- **Strategic Partnerships:** Collaborating with local governments, transportation authorities, and community organizations to amplify our efforts in reducing emissions.

"Join us in shifting gears toward sustainability
after all, every mile saved is a smile earned!"

Thank You

Sushant Darji

Principal Engineer Planning

NJDOT – Bureau of Statewide Strategies

Giri Venkiteela

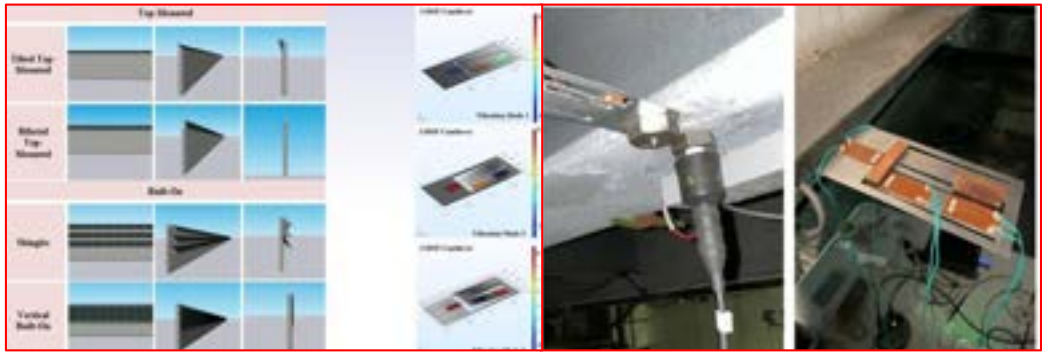
Innovation Officer

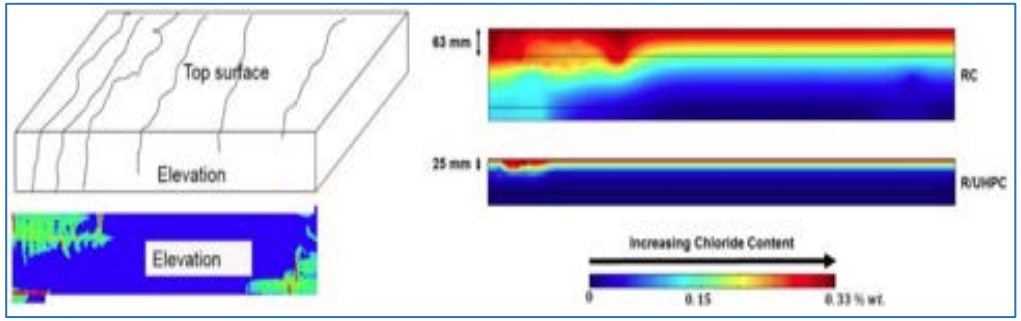
NJDOT – Bureau of Research,
Innovation & Information Transfer

BRIIT's role in Sustainability – R&I Projects

- BRIIT recent research and innovative projects to address sustainability

  - **Energy Harvesting**
  - **Porous Concrete Pavements**
  - **Advanced Materials**
  - **Steel Corrosion**

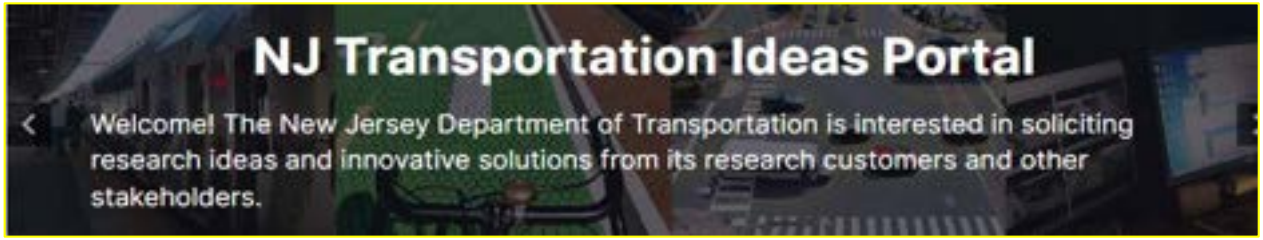




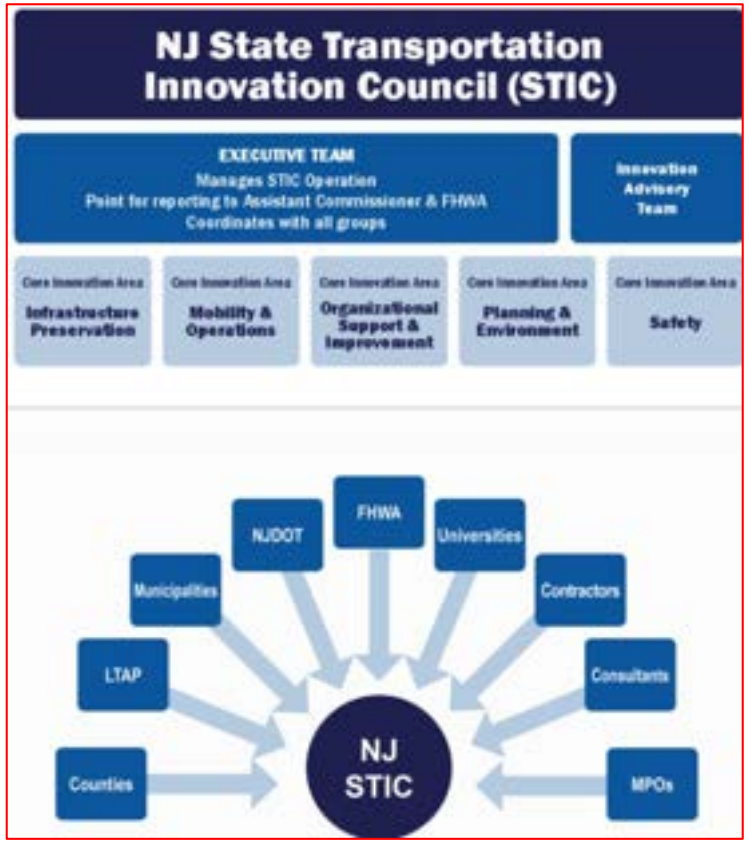
Final Reports - NJDOT Technology Transfer (njdottechtransfer.net)

BRIIT's role in Sustainability – R&I Programs

- **NJDOT R&I Program**
- **NJDOT STIC -EDC Initiatives**
- **NJDOT LCTM Grant Program**
- **NJDOT Tech Transfer Program**



NJDOT Low-Carbon Transportation Materials (LCTM) Program



BRIIT's role in Sustainability – Funding

- **State and Federal Funding**
- **Federal Grants**
- **Transportation Pooledfund Program**
- **TRB/NCHRP Implementation Support**

TPF TRANSPORTATION POOLED FUND

TRB TRANSPORTATION RESEARCH BOARD

U.S. Department of Transportation

Thank You

Giri Venkiteela

Innovation Officer

NJDOT – Bureau of Research, Innovation & Information Transfer

Question & Answer Session

Question #1

What do you see as sustainability and/or resilience priorities or advancements in the next 25-years of NJDOT activities?

Question #2

How can emerging technologies transform and enhance sustainable practices within the transportation industry?

Specifically, what innovations hold the most promise for driving significant environmental and economic benefits in this sector?

Question #3

How can NJDOT enhance collaboration with local, state, and federal agencies to integrate sustainable practices into transportation planning and infrastructure development, and what specific frameworks or partnerships do you envision to facilitate this integration?

Question #4

Given the significant costs associated with incorporating resiliency and sustainable practices into infrastructure projects, what strategies can agencies like NJDOT employ to balance immediate costs with long-term economic and environmental benefits?

Audience Questions

Thank You

Further Questions?

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