

NEW JERSEY STATE TRANSPORTATION INNOVATION COUNCIL www.NJDOTtechtransfer.net/NJ-STIC

4TH Quarterly Meeting December 15th, 2021



WELCOME

Mike Russo Assistant Commissioner NJDOT Planning, Multimodal & Grant Administration







FHWA UPDATES



Helene Roberts, P.E. Innovation Coordinator & Performance Manager FHWA, NJ Division Office



- TOPS Session at County Engineers' Fall Forum
- TOPS Working Group meetings
- Let's Go! Workshop highlights
- Next national STIC meeting





REMINDER: EDC-6 PROGRESS REPORT #2 AND STIC INCENTIVE FUNDING UPDATE DUE: January 28, 2022

CIA TEAM SAFETY

NJDOT – Dan LiSanti FHWA – Keith Skilton CORE INNOVATION AREA REPORTS

CIA TEAM INFRASTRUCTURE PRESERVATION

NJDOT – Bob Signora FHWA – Nunzio Merla

CIA TEAM MOBILITY & OPERATIONS

NJDOT – Sue Catlett FHWA – Ek Phomsavath CIA TEAM ORGANIZATIONAL IMPROVEMENT & SUPPORT

> NJDOT – Zenobia Fields FHWA – Brian Goodson

CIA TEAM SAFETY

NJDOT – Dan LiSanti FHWA – Keith Skilton

Proven Safety Countermeasures

FHWA's Proven Safety Countermeasures initiative (PSCi) is a collection of countermeasures and strategies effective in reducing roadway fatalities and serious injuries on our Nation's highways. Transportation agencies are strongly encouraged to consider widespread implementation of PSCs to accelerate the achievement of local, State, and National safety goals.



SPEED MANAGEMENT







Variable Speed Limits



ROADWAY DEPARTURE



Wider Edge Lines

<u>SafetyEdgeSM</u>



Enhanced Delineation for Horizontal Curves



Longitudinal Rumble Strips and Stripes



Roadside Design Improvements at Curves



INTERSECTIONS



Backplates with Reflective Borders



Reduced Left-Turn Conflict Intersections



<u>Yellow Change</u> Intervals



<u>Corridor Access</u> <u>Management</u>



Roundabouts



Left- and Right-Turn Lanes at Two-Way Stop-Controlled Intersections



Systemic Application of Multiple Low Cost Countermeasures at Stop-Controlled Intersections

PEDESTRIAN/BICYCLIST



Crosswalk Visibility Enhancements



Leading Pedestrian Interval

Road Diets (Roadway



Bicycle Lanes



Medians and Pedestrian Refuge Islands in Urban and Suburban Areas



<u>Walkways</u>



Rectangular Rapid Flashing Beacons



Pedestrian Hybrid Beacons



Reconfiguration)

CROSSCUTTING



Pavement Friction Management



<u>Lighting</u>





Road Safety Audits



FHWA PSCi Lighting

The number of fatal crashes occurring in daylight is about the same as those that occur in darkness. However, the nighttime fatality rate is three times the daytime rate because only 25 percent of vehicle miles traveled (VMT) occur at night. At nighttime, vehicles traveling at higher speeds may not have the ability to stop once a hazard or change in the road ahead becomes visible by the headlights. Therefore, lighting can be applied continuously along segments and at spot locations such as intersections and pedestrian crossings in order to reduce the chances of a crash.

Adequate lighting (i.e., at or above minimum acceptable standards) is based on research recommending horizontal and vertical illuminance levels to provide safety benefits to all users of the roadway environment. Adequate lighting can also provide benefits in terms of personal security for pedestrians, wheelchair and other mobility device users, bicyclists, and transit users as they travel along and across roadways.





Safety Benefits:

Lighting can reduce crashes up to:



for nighttime injury pedestrian crashes at intersections.¹

33-38%

for nighttime crashes at rural and urban intersections.¹

28% for nighttime injury crashes on

rural and urban highways.¹

Proven Safety Countermeasures

« Proven Safety Countermeasures Home

Proven Safety Countermeasures Filter Tool

All 28 PSCs are listed at the bottom of the page in alphabetical order. Answer one or more of the following questions to obtain a tailored listing of potential PSCs for the location of interest. Users may select multiple answers for each question. After checking the desired box(es), click "Apply Filters," then the list of PSCs will update at the bottom of the page to match the query. Click "Clear Form" to remove all filters and return to the default display of all 28 PSCs. Select a countermeasure name to learn more including a description, safety effectiveness, context, application, cost, and considerations for implementation.

What type of area is the roadway located? Urban Suburban Rural	What is the functional classification of the roadway? Freeway Highway Arterial Collector Local
Which focus area is being addressed? Roadway Departure Intersection Pedestrian Bicyclist Speed Management	What is vehicular volume in Average Annual Daily Traffic (AADT) along the major roadway? Low (<2,000) Medium (2,000-15,000) High (>15,000)
 What problem is being addressed? Inadequate Visibility, Conspicuity, or Sight Distance Excessive Vehicular Conflicts Congestion Excessive Speeds Non-Compliance (yielding right-of-way) No Separation of Users Vulnerable Users not Considered Driver Inattention (distracted/drowsy) Driver Impairment (alcohol/drugs) 	What specific crash types are being targeted at the location? Angle Left-Turn Rear End Pedestrian/Bicyclist Head On Run-Off-Road/Single Vehicle Sideswipe, same direction Sideswipe, opposite direction Wet Nighttime Speed-related Rollover Fixed-Object
Apply Filters	Clear Form

4	results:	
	Ppropriate Speed Limits for All Road Users	
	Pavement Friction Management	
	Road Safety Audit	
	Speed Safety Cameras	
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QUESTIONS?

CIA TEAM INFRASTRUCTURE PRESERVATION

> NJDOT – Bob Signora FHWA – Nunzio Merla

EDC - 6

Digital As-Builts



Purpose: To explore the use of 3D models to build projects and update that digital information to reflect the project's as-built condition

- Team members attended the Let's Go! Innovation Workshop on September 21st. and 28^{th.}
- Team is in process of scheduling a meeting with upper management to present the current progress and potential pilot projects for their buy in
- A designated team member is coordinating with a company to present their innovative technique in construction inspection.

EDC - 6 e-Ticketing



Purpose: Provide stakeholders with an electronic means to produce, transmit, and track and verify materials deliveries

- Two Vendors have given presentations to date and a third Vendor has been contacted .
- In the next quarter, the team plans on selecting the e-ticketing Vendor.
- The team will begin implementing e-ticketing with the existing software (SiteManager Construction)



Targeted Overlay Pavement Solutions (TOPS)



Purpose: To develop and install overlays that provide long-life performance under a wide range of traffic, environmental, & existing pavement conditions

- Ultra High Performance Thin Overlay is included in Route 42 project (UPC 213090). Item number was created for this product.
- Team is continuing to develop SFY2023/2024 preservation projects which will include additional TOPS treatments.
- In the next months, the team will evaluate any potential projects for the application Enhance Friction Overlay (EFO) treatment.



UHPC for Bridge Preservation and Repair



Purpose: To explore the use of UHPC for Bridge Preservation and Repair.

- NJDOT hosted the FHWA EDC-6 UHPC workshop on October 20th & 21st, 2021. (191 attendees, NJ contractors, designers, suppliers, State & County Engineers).
- NJDOT also provided support to researchers at Rutgers for UHPC testing in the BEAST Lab.
- Team is currently identifying performance testing locations for UHPC overlay pilot projects. The highway occupancy permits were submitted last week in hopes of initiating the testing by the middle of December.
- Testing occurrences per bridge for the long-term testing program will be from 2022 through 2026 (pending funding).



QUESTIONS?

CIA TEAM MOBILITY & OPS

NJDOT – Sue Catlett FHWA – Ek Phomsavath

EDC-6: Next-Generation TIM: Integrating Technology, Data, and Training

NJDOT collaborating with NJSP

- Computer-Aided Dispatch (CAD) integration project
- CAD integration into traffic operation centers to improve incident response and quicker clearance.
- NJ State Police has installed new CAD system.

"Development" Stage

- Assembled a team
- NJ State Police have deployed a new CAD system
- Need to determine the data types/interface format of the new CAD system



EDC-6: Crowdsourcing for Advancing Operations

NJDOT partnering with Waycare

- Pilot project
- Support/improve operations of traffic incident management (TIM) and traffic operations centers (TOCs)

"Development" Stage

- Awarded the STIC Incentive funding (\$55,000)
- Federal authorization of funds
- Status of procurement





QUESTIONS?

CIA TEAM Organizational Improvement & Support

NJDOT – Zenobia Fields FHWA – Brian Goodson

Strategic Workforce Development



Let's Go! Pilot Workshop – Succession Planning Efforts

Mission Statement – "To create career opportunities for a diverse workforce in terms of disciplines, demographics, and career levels in order to meet the demands of the transportation skills of tomorrow."

Priority Actions

- i. Industry Association Outreach
- ii. Goal, Measures, Timeline, Buy-In
- iii. Regular Meetings and Follow-up Actions
- iv. College/UniversityOutreach



Virtual Public Involvement

National Virtual Public Involvement (VPI) Peer Exchange

- Early Development Conversations
- ✤ 3 to 5 Potential Peers
- Engaging Underserved Populations think outside the box!
- Information Sharing & Feedback projects, programs, long range planning efforts, and ongoing initiatives.
- ✤ Kick-off meeting in February.



QUESTIONS?

Feature Presentation Use of BRIC by **Camden County** Kevin Becica, PE, PP, CME County Engineer



Making It Better, Together.

New Jersey State Innovation Council December 15, 2021 Targeted Overlay Pavement Solutions (TOPS) Projects Using BRIC & SMA

> Kevin Becica, PE, PP, CME Camden County Engineer

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Making It Better, Together.



CAMDEN COUNTY

POPULATION 523,485

227 SQUARE MILES

2,365 PERSONS/SQ. MILE



Making It Better, Together.



CAMDEN COUNTY

411 CENTERLINE MILES OF ROAD

2,500 LANE MILES OF ROADWAY

- CONCRETE ROADWAYS
- COMPOSITE ROADWAYS
- ASPHALT ROADWAYS



Making It Better, Together.


HISTORY

GROWTH OUT FROM CAMDEN CITY

- PRE-1950 ROADS CONCRETE 20' TOTAL WIDTH
- MAIN N-S & E-W ARTERIALS CONCRETE
- CONCRETE ROADS WIDENED AFTER 1950
 - WIDENED WITH CONCRETE CURB AND GUTTER
 - WIDENED WITH ASPHALT
- FABC OVERLAY ON CONCRETE POST 1954
- ASPHALT ROADS MOST SOUTH OF MID-COUNTY

CONCRETE ROADWAY



CR 561 HADDONFIELD

- 10' WIDE
- 20' 30' LONG
- CONCRETE SLAB
 SHOULDERS
- UTILITY OPENINGS



CONCRETE ROADWAY

CR 561 CHERRY HILL Rt 295 Exit

- FULL CONCRETE SLAB REPLACEMENT
- 4.5' WIDE JOINT REPAIRS
- NO DIAMOND GRINDING



COMPOSITE ROADWAY

CR 627 COOPER LANDING ROAD CHERRY HILL

- TRANSVERSE JOINT FAILURE
- ASPHALT SUB-BASE SHOULDERS

<u>REPAIR</u>

- TRANSVERSE JOINT REPAIRS 4.5' WIDE
- SAW AND SEALED JOINTS
- FAILURE ADJACENT TO SAW AND SEAL IN 2 YEARS



WESTFIELD AVE - PH 1

BID B7-17 PENNSAUKEN, 46TH TO BROWNING RD 0.47 MILES, \$1,130,400

- 13,000 SY MILLING
- 525 SY CONCRETE REPAIRS W/DOWELS
- 625 SY CONCRETE
- 11,840 LF SAW & SEAL
- 2,030 TONS 9.5M64



JUNE 6, 2018

MILLING

- RAILROAD BALLAST
- UTILITY OPENINGS

* NOTE – CURB CONDITION



JUNE 6, 2018

MILLING

- TROLLEY TRACKS
- UTILITY OPENINGS

FIELD MODIFICATION – JUNE 7, 2018

- Item #S2 Binder Rich Intermediate Course: 1,000 tons at \$120/ton = \$120,000.00
- Item #19 Concrete Base Course, 9" Thick: -517.3 SY at \$150/SY = -\$77,595.00
- Item #20 Concrete Surface Course, 9" Thick: -625 SY at \$6/SY = -\$3,750.00
- Item #21 Partial Depth Cncrete Repair: -1,240 SY at \$6/SY = -\$7,440.00
- Item #23 Sawing and Sealing of Joints in HMA Overlay: -11,840 LF at \$2.50/LF = -\$29,600.00

Total Change Order = \$1,615.00 Previously Adjusted Contract Price = \$1,130,800.00 Newly Adjusted Contract Price = \$1,132,415.00 0.14% increase in the contract amount.





6/18/18 Binder Rich Intermediate Course between Browning Road and Tinsman Avenue Installation of HMA 9.5M64 surface course

WESTFIELD AVE - PH 2



BID B1-19 PENNSAUKEN, BROWNING RD TO 130 1.4 MILES, \$2,031,211

COMMERCIAL AREA

1,840 BRIC 4.5MM
 @ \$150/TON

\$276,000.00

INDUSTRIAL AREA

- 3,920 SMA
 - @ \$125/TON,
 - \$490,000.00



/ESTFIELD CR 610 - PHASE 2

WESTFIELD PH 2 - BRIC



6/12/2020 & 6/15/2020



WESTFIELD PH 2 - SMA



NIGHT WORK

LEVELING COURSE

GOOD PLANS



BID ITEM 34- 9.5M64 2" MIN & VARIES BID ITEM 36 – BRIC 4.5MM, 1" MIN camdencounty

BRIC & SMA SPEC

- NJDOT STANDARD SPEC
- SUBMITTALS FOR BRIC & SMA REVIEWED BY DESIGNER
- INSPECTOR AT THE PLANT
- INSPECTOR IN THE FIELD
- PREP CONDITIONS AND TACK COAT



BRIC & SMA COSTS

- COST COMPARISON
 - 9.5 M 64 2019 \$80.00 \$90.00/ TON
 - BRIC 2019 \$150.00 / TON
 - SMA 2019 \$125.00/ TON



Making It Better, Together.

COST CONSIDERED A DETRIMENT



RE ROAD OPENINGS

FUTURE OPENINGS NOT IN BRIC OR SMA - CONSIDERED A DETRIMENT

BRIC & SMA BENEFITS

<u>SERVICE LIFE – COMPOSITE ROADWAY</u>

- BRIC DURABILITY 15+ YEARS
- STANDARD OVERLAY 10 YEARS

IRI- COMPOSITE ROADWAY

- BRIC-SMA- NO SAW AND SEAL, SMOOTH
- STANDARD OVERLAY TRANSVERSE CRACKING, THUMP, THUMP, THUMP COM



SERVICE LIFE IN BRIC OR SMA - CONSIDERED A BENEFIT

BRIC & SMA BENEFITS COMPOSITE VS EXPOSED CONCRETE

PAVEMENT MARKINGS

- COMPOSITE MORE DURABLE, MORE VISIBLE
- CONCRETE ROAD LESS VISIBLE REQ. PROPER PREP

AESTHETICS

- BRIC-SMA COMPOSITE- NO SAW AND SEAL, SMOOTH
- CONCRETE W/ REPAIRS NOT APPRECIATED



VISUAL SURFACE W/BRIC OR SMA – CONSIDERED A BENEFIT

BRIC & SMA BENEFITS COMPOSITE VS FULL ASPHALT

CONCRETE REMOVAL

- 9" THICK CONCRETE VS 14" THICK ASPHALT
- MATERIAL HANDLING LSRP CONSIDERATIONS
- SOIL CONDITIONS, HIGH WATER TABLE
- SOIL CONDITIONS, POOR SOILS REQUIRE 12"-18" DGA
- TRANSITION BETWEEN CONCRETE & ASPHALT, HEAVING



COMARISON BRIC & SMA TO FULL SUBBASE REMOVAL – CONSIDER A BENEFIT



SUMMARY

NEED CURB REVEAL FOR 3" COMPOSITE ROADWAY

BENEFITS OUTWEIGH DETRIMENTS

NEED POLITICAL UNDERSTANDING OF BENEFIT / DETRIMENT RATIO

NEXT – KINGS HIGHWAY





Any Questions?

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Weather Savvy Roads

UPDATE

NJDOT Weather Savvy Pilot

Updates and Lesson Learned Summary

NJ STIC 4th Quarterly Meeting December 15, 2021



Agenda

- 1. Weather Savvy Roads Pilot Project
- 2. Vehicle Instrumentation Status
- 3. Instrumentation Process
- 4. Web Portal Status
- 5. FirstNet Communication Coverage and Quality Experience
- 6. Initial Takeaways
- 7. Lesson Learned
- 8. Next Steps



What is the pilot?

An FHWA pilot program, valued at \$322,462, under the "Weather Savvy Roads Integrating Mobile Observations (IMO)" innovation.



Road Weather Management - Weather-Savvy Roads



Why is NJDOT Doing This?

To do our own research ...

...to compare the value of mobile RWIS vs fixed RWIS



...to test FirstNet signal strength vs commercial cellular strength on NJDOT's road network







Vehicle Instrumentation Status

• Operational: 24 vehicles

Operations Region \rightarrow	North	Central	South
Plow trucks	3	2	2
Supervisor pickup	4	3*	2
IMRT vehicle	1	-	1
SSP trucks	3	-	3

* Includes one SUV assigned to a Manager

Strategic instrumentation of vehicles:

- Cover the yards assigned to "incline packages"
- Cover the North/Central/South regions
- Cover SSP North/South routes





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Instrumentation Process



Weather Savvy Roads – Pilot Project Instrumentation Process



- Video Camera Transcoder and Power Unit
- Power distribution unit



Instrumentation Process



New Jersey Institute Intelligent Transportation Sy of Technology Resource Cente

Instrumentation Process



Instrumentation Process



MRWIS Installed

Ambient Weather Sensor Installed

Weather Savvy Roads – Pilot Project Web Interface (GUI)

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of Technology

Intelligent Transportation System

Resource Center





- More Secure website with user authentication
- Real-time data feed from deployed vehicles
- Map interface, virtual video wall
- External map data layers (e.g., RWIS stations, snow subregions, CCTV)
- Additional data analytics and visualizations being developed




Weather Savvy Roads – Pilot Project Web Interface (GUI)



Weather Savvy Roads – Pilot Project GUI: December 16-17, 2020, Winter Storm

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Intelligent Transportation Systems

Resource Center





First Net Signal Quality



Data: December 2020 – February 2021

Over 98% Excellent or Good Signal Quality.





First Net Signal Quality



- Total records: 41,047
- POOR signal percentage: 0.4%
- FAIR signal percentage: 0.13%
- Slightly improved signal quality as compared to the previous analysis (53,771 records from 2020-11 to 2021-06)

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Percentages of RSSI signal quality for grids that have POOR or FAIR signals

First Net Signal Quality

60.00

- Averaged RSSI per 5000ft-by-5000ft grid
- Problematic area along NJ-29 (with much fewer poor signal records in the most recent record set)
- On average, no poor signal quality per grid over the last three months

lew lersey Instit

Averaged RSSI per grid

Weather Savvy Roads – Pilot Project Initial Takeaways

- Very useful tool for Maintenance and Mobility Operations Management.
- Improved situational awareness, served as a decision support tool.
- "Wish I had this on every DOT vehicle out there!"
- Consider expansion of the program and additional decision support and automation features to improve efficiency and effectiveness of road weather management and operations.





- 1. Weather Sensors
 - Discovered a manufacturing issue in the sensor all sensors will be replaced under warranty
 - This finding helped vendor to fix the flaw.
 - Some states and countries who use this sensor also benefited from design fix
- 2. Tablet PC Security
 - One incident of theft tablet retrieved (was exposed to dirt and elements, but fully functional due to rugged design).
 - Solution: Purchased Absolute software for PC tracking and data security to be installed on all tablet PC units.



Weather Savvy Roads – Pilot Project

Lessons Learned



Weather Savvy Roads – Pilot Project

Lessons Learned

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3. Dashboard Camera (continued) – dome camera solution for future instrumentations.



Weather Savvy Roads – Pilot Project Next Steps

1. Additional vehicle instrumentations

- a) Cost per vehicle ~\$15,000 /vehicle (including 1-yr FirstNet service).
- b) Work with the vendor EAI to prevent installation scheduling delays.
- c) Will require additional funding

- 2. Improve System's Capability
 - a) Allocate deliciated Server to handle additional vehicles and user.
 - b) Video Management System: Example Genetec.
 - c) Maintain the servers and databases



3. Hardware Maintenance

- a) Document protocols, especially for MRWIS sensor
- b) Camera maintenance pertains mainly to proper positioning of bullet-cameras
- c) Cellular router/communication monitoring and maintenance NJIT

4. Driver Awareness

- a) Educate driver about Weather Savvy Roads.
- b) Train how to troubleshoot if needed.



GPS ADVANCED **ENTERPRISE** SATELLITE NETWORK MANAGEMENT PUBLIC FIRSTNET. PRIVATE CELLULAR CELLULAR BAND 14 MOBILE MULTI-NETWORK SECURITY **GNSS** Data Wi-Fi Camera RIERRO (Ethernet) Cellular Router/ **GPS Module** Laptop (Ethernet) Vehicle Diagnostics (AirLink Vehicle Telemetry) **Road Weather** Spreader Controller (Bluetooth, I/O Data) LATER NEXT 84

Weather Savvy Roads – Pilot Project Next Steps (cont.)

- 6. New (Advanced) Technologies
 - a) Integration with the spreader controller pilot demonstration
 - b) CV/CV2X Road Weather Information Pilot Demonstrations
 - c) Weather Responsive Variable Advisory Speed
 - d) Weather-Responsive Signalized Intersection

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cv2x

Intelligent Transportation















https://youtu.be/B0va3P5CTg0



REMINDERS & ANNOUNCEMENTS

NJDOT Tech Transfer Website <u>www.njdottechtransfer.net</u>

NJ STIC Website <u>www.njdottechtransfer.net/nj-stic/</u>

All meeting recordings, presentations, and summary are posted https://www.njdottechtransfer.net/nj-stic-meetings/



THANK YOU!

www.NJDOTtechtransfer.net/NJ-STIC (609)963-2242 – Bureau of Research