NEW JERSEY STATE TRANSPORTATION INNOVATION COUNCIL

www.NJDOTtechtransfer.net/NJ-STIC

SUMMER Meeting
August 8, 2019

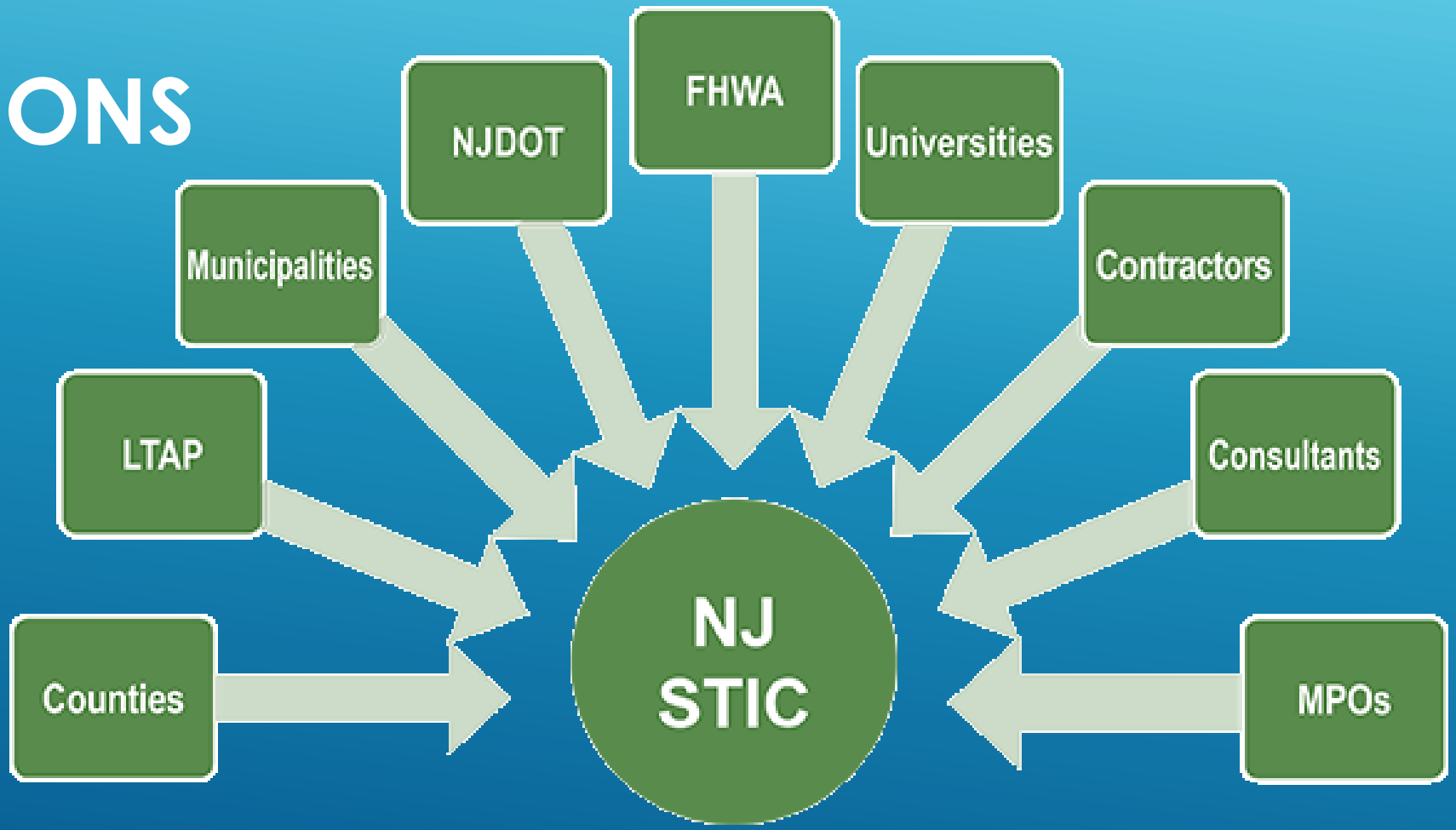
WELCOME & OPENING REMARKS

Mike Russo

Assistant Commissioner

NJDOT Planning, Multimodal & Grant Administration

INTRODUCTIONS



ROUNDTABLE RECAP

Amanda Gendek
Manager
NJDOT Bureau of Research

ROUNDTABLE RECAP

EXPANDING STIC MEMBER LIST TO:

Port Authority

Transcom

Motor Vehicle Commission

NJ Turnpike

I-95 Corridor Coalition

NJ Asphalt Pavement Association

Regional NJDOT reps from NJDOT Cherry Hill & Mt. Arlington

STIC SURVEY RESULTS: Distributed via email on 4/17/2019

- Identified EDC-5 initiatives & high priority topics for LPAs, lessons learned
  - Share through future STIC-related presentations, articles, workshops, or peer exchange type events.
- Examples of implemented innovations will be posted on the "New and Noteworthy" and "Innovative Initiatives" pages of the NJDOT Technology Transfer website
  - Assist communities in adopting innovation.
- Identified lock of available funding
  - Use existing survey mailing list to notify LPAs of upcoming rounds of STIC Incentive Funding to foster non-NJDOT applicants for participation

New Jersey Local Technical Assistance Program

NJ LTAP offers workshops to Local Public Agencies on EDC initiatives.

COMING SOON:

Focused EDC curriculum, starting with EDC Round 6

- Master EDC class - overview of the next round of innovations.
- Survey will be performed early during each EDC rollout to assess what is feasible at the local level and identify constraints to implementation. Then several additional innovation-specific workshops can then be tailored to the LPAs needs.

NJLTAP EDC Supporting Activities 2016-2019

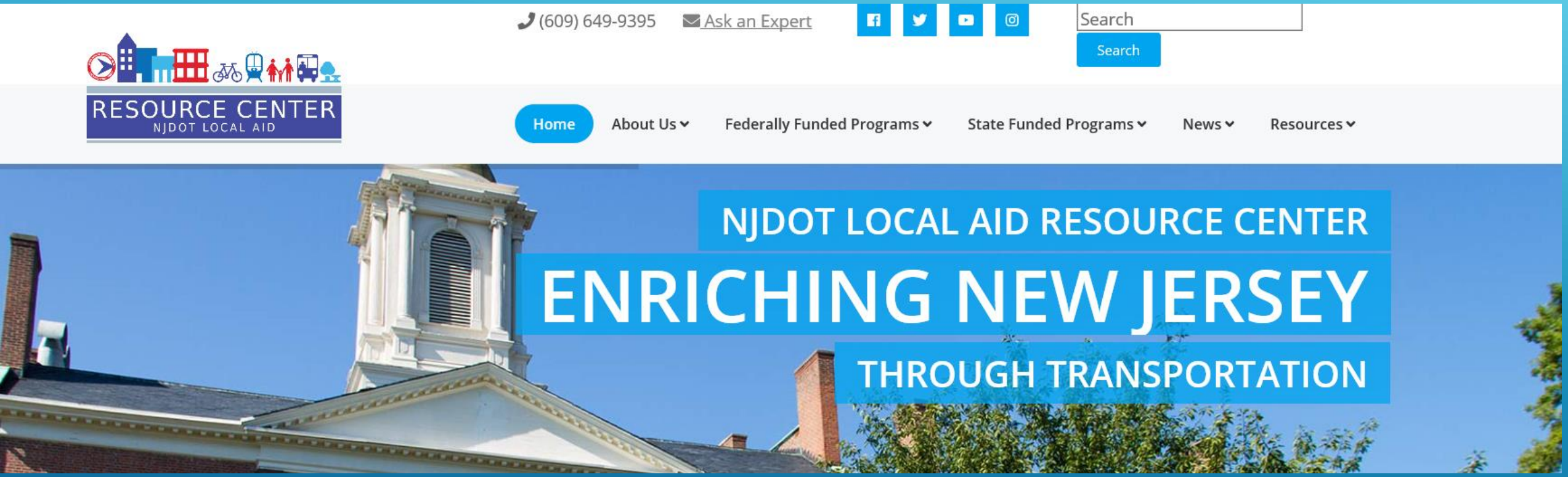
Newslette	Article title	EDC Innovation
February 201	EDC Innovation of the Month: Smarter Work Zones	EDC-3 Smarter Work Zones
February 201	Smarter Work Zone Webinar Series Features Project Coo	EDC-3 Smarter Work Zones
February 201	Alternative Uses of Highway Right of Way: 3 Renewable	EDC-1 Flexibilities in Right-of-Way
April 2016	New Jersey Makes Progress in Implementing EDC-3 Initi	EDC-3
April 2016	First Responder Facts	EDC-2 National Traffic Incident Management Responder Training
June 2016	State DOTs Using Drones to Improve Safety, Collect Dat	EDC-5 Unmanned Aerial Systems (UAS)
August 2016	Using Portable Traffic Monitoring Devices (PTMDs) in V	EDC-3 Smarter Work Zones
October 201	Paving the Way with High Friction Surface Treatment	EDC-2 High Friction Surface Treatments (HFST)
October 201	Every Day Counts Traffic Incident Management Deployed	EDC-2 National Traffic Incident Management Responder Training
October 201	EDC-2 National Traffic Incident Management Responder	EDC-3 Road Diets (Roadway Reconfiguration)
October 201	Find Out More: EDC-4	EDC-4
October 201	Ultra-High Performance Concrete Connections for PBES	EDC-3 Ultra-High Performance Concrete Connections for Prefabricated Bridge Elements
December 2(	Road Diets: Safer Roads, Safer Communities	EDC-3 Road Diets (Roadway Reconfiguration)
February 201	Championing Safety on Local Roads	EDC-3 Locally Administered Federal-Aid Projects: Stakeholder Partnering
February 201	Winter Weather: Plan, Equip, Train	EDC-5 Weather-Responsive Management Strategies
April 2017	Working Smarter, Together	EDC-3 Locally Administered Federal-Aid Projects: Stakeholder Partnering
April 2017	Stakeholder Partnering Supported by Every Day Counts	EDC-3 Locally Administered Federal-Aid Projects: Stakeholder Partnering
April 2017	Pavement Preservation Decision Making	EDC-4: Pavement Preservation
April 2017	Data-Driven Safety Analysis: A Health Check Up on Your	EDC-3 Data-Driven Safety Analysis
June 2017	Traffic Incident Management Course Available Online	EDC-2 National Traffic Incident Management Responder Training
August 2017	Data Driven Safety Analysis: Adding a Local Focus in ED	EDC-4 Data-Driven Safety Analysis
August 2017	e-Construction Speeding up Projects for State DOTs	EDC-3 e-Construction
August 2017	Safe Transportation for Every Pedestrian (STEP) Webins	EDC-5 Safe Transportation for Every Pedestrian (STEP)
October 201	ITS is Changing the World	EDC-4 Automated Traffic Signal Performance Measures (ATSPMs)
October 201	Safe Transportation for Every Pedestrian (STEP) highlig	EDC-5 Safe Transportation for Every Pedestrian (STEP)
October 201	FHWA Launches the Strategic Highway Safety Plan Datab	EDC-3 Data-Driven Safety Analysis
December 2(	Call for EDC-5 Innovations Open	EDC-5
December 2(	Roundabouts Coming Full Circle	EDC-2 Intersection and Interchange Geometrics
December 2(	Can Self-Driving Equipment Make a Work Zone Safer?	EDC-3 Smarter Work Zones
December 2(	TIM Program Reaches New Milestone	EDC-2 National Traffic Incident Management Responder Training
February 201	Building Connections that Last	EDC-3 Ultra-High Performance Concrete Connections for Prefabricated Bridge Elements
February 201	Watch EDC Innovations On-Demand Webinars	EDC
February 201	Local Safety Data Peer Exchange Recap	EDC-2 Locally Administered Federal-Aid Projects
February 201	Getting through the Green: Smarter Traffic Management	EDC-1 Adaptive Signal Control Technology
February 201	Ultra-laser imaging for pavement surface analysis	EDC-2 HFST, EDC-4 Pavement Preservation
April 2018	Reducing Rural Roadway Departures	EDC-5 Reducing Rural Roadway Departures
April 2018	New Work Zone ITS Implementation Tool Available	EDC-3 Smarter Work Zones
April 2018	New FHWA Pedestrian Countermeasure Tech Sheets Nov	EDC-5 Safe Transportation for Every Pedestrian (STEP)
April 2018	NJDOT Launches Facebook Page to Share Innovative Pro	EDC-5 Virtual Public Involvement
April 2018	On-Demand EDC Webinars from CAI	EDC
June 2018	Rolling Out Pavement Technologies	EDC-3 Ultra-High Performance Concrete Connections
June 2018	Every Day Counts round five initiatives announced	EDC-5
June 2018	USDOT Announces Competition Advancing Innovative W	EDC-3 Data-Driven Safety Analysis
August 2018	Pavement Preservation: When, Where, and How?	EDC-4: Pavement Preservation
August 2018	Can a Sleeve and a Gateway Improve Pedestrian Safety?	EDC-5 Safe Transportation for Every Pedestrian (STEP)
October 201	Two safety innovations take the stage in EDC-5	EDC-5
October 201	A New View for Bridge Inspectors	EDC-5 Unmanned Aerial Systems (UAS)
October 201	New Guide Helps Local and Regional Practitioners Achie	EDC-3 Locally Administered Federal-Aid Projects: Stakeholder Partnering
October 201	NJDOT Receives Grant for Pilot Road Weather Manager	EDC-5 Weather-Responsive Management Strategies
February 201	Reducing Rural Roadway Departures Primer	EDC-5 Reducing Rural Roadway Departures
February 201	Roundabouts: An Informational Guide	EDC-2 Intersection and Interchange Geometrics
April 2013	Renewable Roadsides	EDC-1 Flexibilities in Right-of-Way
June 2013	NJLTAP to Work with Stakeholders on Developing Inter	EDC-2 Intersection and Interchange Geometrics
June 2013	Are Your Roads Weather Savvy?	EDC-4 Road Weather Management - Weather-Savvy Roads

Technical Briefs	EDC Innovation
Asphalt Maintenance Factsheet	EDC-1 Warm Mix Asphalt, EDC-4 Pavement Preservation

EDC-1
EDC-2
EDC-3
EDC-4
EDC-5

http://cait.Rutgers.edu/cait/training

ROUNDTABLE RECAP



NJDOTlocalaidRC.com

FHWA UPDATES

Helene Roberts, P.E.

Innovation Coordinator & Performance Manager

FHWA, NJ Division Office

Not Implementing	not currently using the innovation anywhere in the State and is not interested in pursuing the innovation
Development	collecting guidance and best practices, building support with partners and stakeholders, and developing an implementation process
Demonstration	testing and piloting the innovation
Assessment	assessing the performance of and process for carrying out the innovation and making adjustments to prepare for full deployment
Institutionalized	adopted the innovation as a standard process or practice and uses it regularly on projects

STAGES OF INNOVATION

- **Advanced Geotechnical Exploration Methods (A-GaME) – Demonstration**
- **Collaborative Hydraulics (CHANGE) – Demonstration**
- **Project Bundling - Institutionalized**

PROGRESS REPORT #1
INFRASTRUCTURE CIA

- **Reducing Rural Roadway Departures (RwD) - Development**
- **Safe Transportation for Every Pedestrian (STEP) - Assessment**

PROGRESS REPORT #1
SAFETY CIA

- **Unmanned Aerial Systems (UAS) - Institutionalized**
- **Use of Crowdsourcing to Advance Operations - Institutionalized**
- **Weather-Responsive Management Strategies (WRMS)- Development**

PROGRESS REPORT #1
MOBILITY CIA

STIC INCENTIVE FUNDING PROGRAM

- **Four completed projects:**
  - **Local Safety Peer Exchanges**
  - **Construction Devices – pilot program**
  - **Safety Analyst**
  - **Local Aid Mobile Devices – pilot program**
- **Two ongoing projects:**
  - **iCone ITS Beacon**
  - **UAS – Phase 1**

CORE INNOVATION AREA REPORTS

CIA TEAM
SAFETY

NJDOT – Dan LiSanti
FHWA – Keith Skilton

CIA TEAM
MOBILITY & OPS

NJDOT – Wayne Patterson
FHWA – Ek Phomsavath

CIA TEAM
INFRASTRUCTURE PRESERVATION

NJDOT – Bob Signora
FHWA – John Miller

CIA TEAM

SAFETY

NJDOT – Dan LiSanti

FHWA – Keith Skilton

EDC – 5

Reducing Rural Roadway Departures

A Roadway Departure (RwD) is a crash in which a vehicle crosses an edge line, a center line, or otherwise leaves the traveled way.

Per FARS data, from 2014 to 2016 New Jersey had 10% of fatality crashes being Rural RwD, about 55-60 a year.

EDC – 5

Safe Transportation for Every Pedestrian (STEP)

Under EDC4, an action plan was completed for NJDOT which targeted specific countermeasures for improving pedestrian safety at uncontrolled intersections.

The EDC4 initiative is now considered Institutionalized.

The action plan recommends measures that when implemented may help reduce the number and rate of pedestrian crashes, fatalities, and injuries on New Jersey highways.

CIA TEAM

INFRASTRUCTURE PRESERVATION

NJDOT – Bob Signora

FHWA – John Miller

EDC – 5

Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)

Purpose: **Improve the understanding of complex interactions between river or coastal environments and transportation assets**

Benefits:

- *enabling better design*
- *enhanced communication*
- *more efficient project delivery*

Status: *Assessing product, will make recommendation to FHWA*

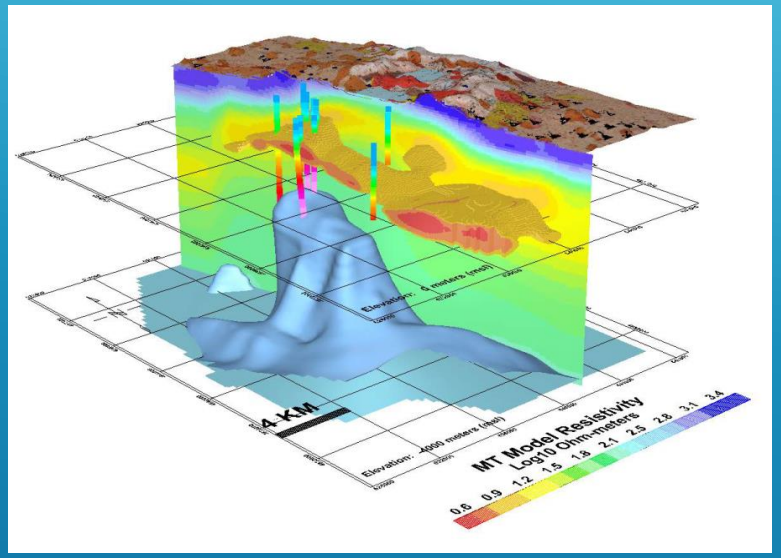
EDC – 5

Advanced Geotechnical Exploration Methods (The A-Game)

Purpose: ***To explore new innovative technologies for enhancing the subsurface exploration program.***

Benefits:

- **Reduce uncertainties in subsurface conditions**
- **Mitigates design and construction risks**
- **Improved Quality**
- **Accelerate Project Delivery**



Status: Continuing to evaluate, on a project by project basis, the feasibility of implementing the new technologies

EDC – 5

Project Bundling

Purpose: **To continue to explore new methods of project bundling**

Benefits:

- *Streamlines design, contracting, and construction*
- *Capitalize on economies of scale to increase efficiency*
- *Greater collaboration during project delivery and construction*

Status: *NJDOT is exploring the use of project bundling solicitations for Intersection Improvement projects and Delaware & Raritan Canal bridge replacement projects.*

CIA TEAM

MOBILITY & OPS

NJDOT – Sal Cowan & Wayne Patterson

FHWA – Ek Phomsavath

EDC5 Initiatives Assigned:

Weather-Responsive Management Strategies

Goals:

- Maximize the use of mobile road weather data to support NJDOT in implementing traffic and maintenance operations strategies during inclement weather.
- Improve safety, mobility, and minimize environmental impacts of weather on the transportation system.

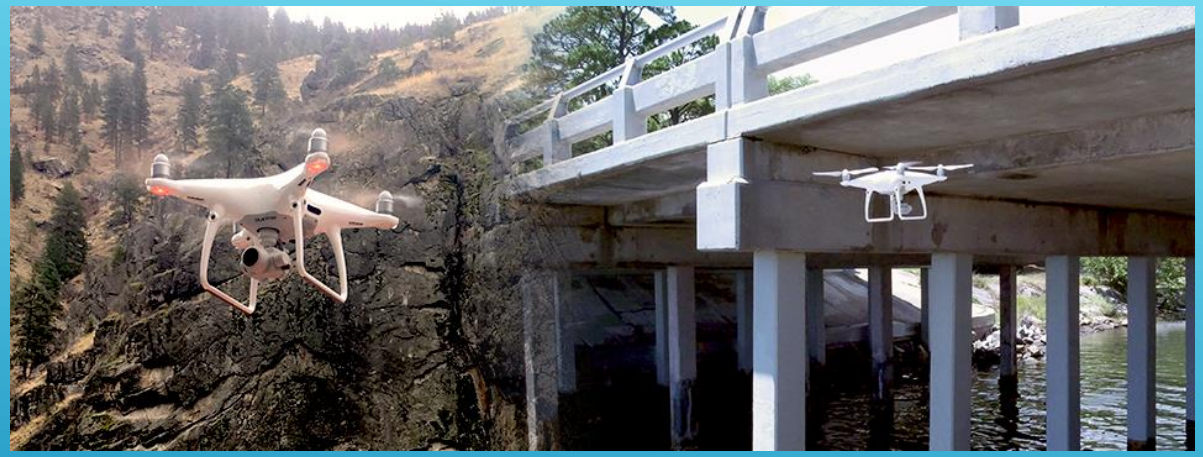
Initiatives:

- FHWA Accelerated Innovation Deployment (AID) grant ($322,462): NJDOT was awarded the AID grant ($322,462) to install video camera dashboards and sensors onto NJDOT maintenance trucks and safety service patrol vehicles to collect streaming video and weather / pavement information to support road weather management throughout the state. We (Sue Catlett) are currently in the process of putting together the federal authorization package (i.e. project implementation schedule with cost breakdown) for submission to FHWA for funding.

- On Wednesday, April 24th, NJDOT participated in FHWA's Road Weather Management Capability Maturity Framework program. With help from the NJ Division Office and FHWA DC Headquarters Roemer Alfelor (Transportation Specialist for Road Weather Management), nearly 40 DOT employees and our weather vendor DTN discussed our current weather management strategies.

EDC5 Initiatives Assigned:

Unmanned Aerial Systems (UAS)



Goals:

- Utilize UAS to enhance data collection for structural/ construction inspections and emergency response while saving time and money for taxpayers.

Initiatives:

NJDOT State Transportation Innovation Council (STIC) Incentive Funding Grant Application:

The Multi-Modal Bureau of Aeronautics have put together a proposal for STIC Incentive Funding ($43,104; note: total cost will change to increase the scope of the activity).

- Funding to procure thermal equipment for bridge deck inspections and counting bats under the bridge to comply with NJDEP regulations regarding potential wildlife under bridges.

- Funding is also provided for training courses related to Infrared Thermography, 3D Modeling, Drone Photography, and drone videography to help provide extended knowledge and experience for specialized situations to support other NJDOT divisions.

EDC5 Initiatives Assigned:

Use of Crowdsourcing to Advance Operations

Goals:

- Expands and improves real-time monitoring
- Enables more targeted and timely response
- Enables strategic / programmatic operational improvements

Initiatives:

Status of using crowdsource operations data in New Jersey:

- NJDOT is not participating in the use of crowdsourcing to advance traffic operations. We're institutionalized.
- Waze has been sharing traffic and incident report data with NJDOT by way of TRANSCOM. NJDOT TOC operators are using it for their incident detection and situational awareness when monitoring and verifying traffic conditions.
- On Tuesday, April 30th, Leadership from NJDOT met with the NJ Partnership Coordinators from Waze to discuss their "Waze Beacon" product (a GPS product that improves GPS accuracy within tunnels). This could possibly be a STIC incentive funding initiative for 2019. We are also exploring the option of having NJDOT sign up as a Connected Citizens Program, independent of our existing arrangement with Transcom.

FEATURE
CORE INNOVATION AREA
PRESENTATION:

HIGH FRICTION SURFACE TREATMENT - LESSONS LEARNED

CIA TEAM

INFRASTRUCTURE PRESERVATION

NJDOT – Bob Signora

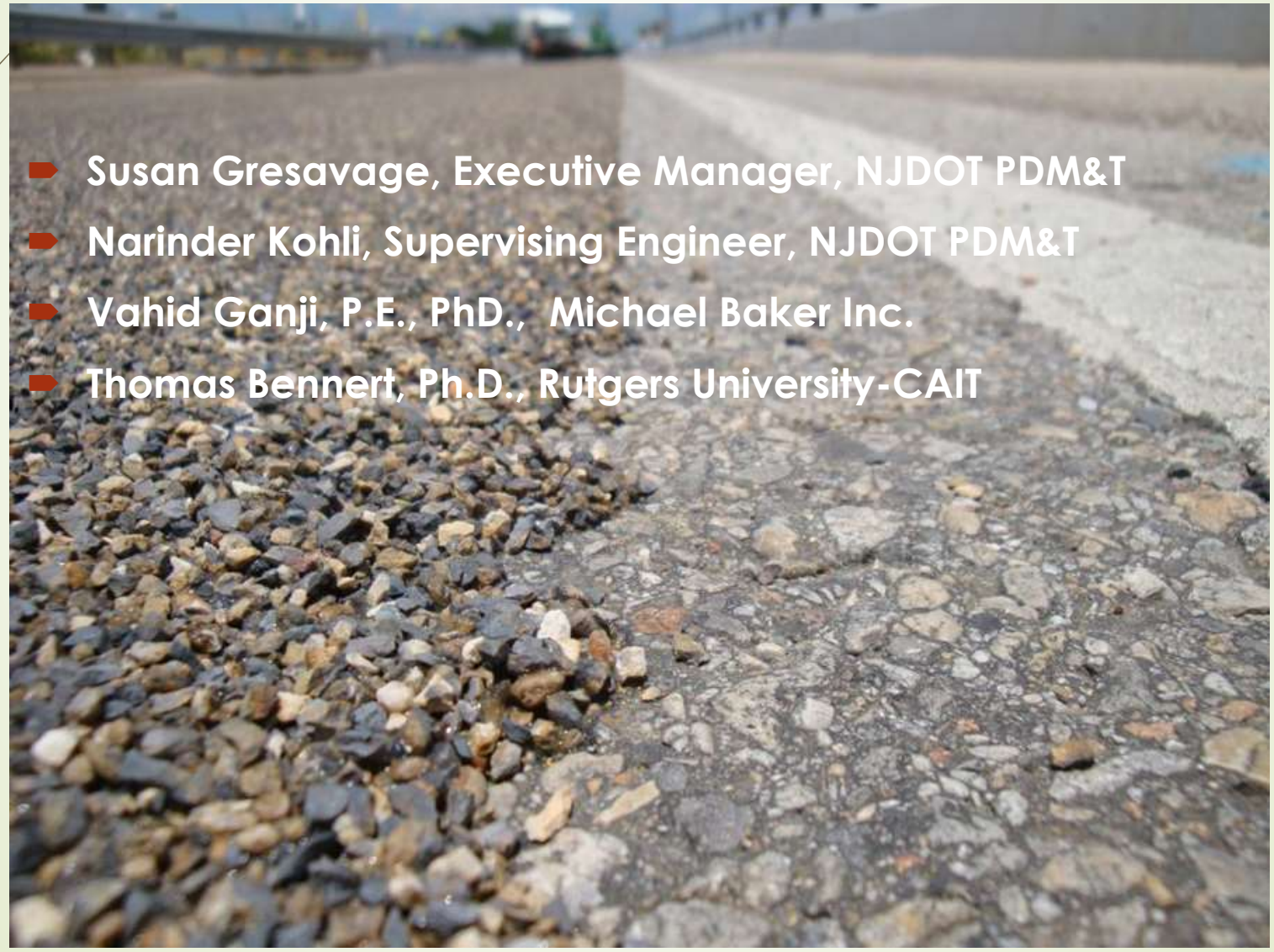
FHWA – John Miller

Robert Blight, Supervising Engineer
NJDOT Pavement Design and Technology Section

NJDOT High Friction Surface Treatment Update

ROBERT BLIGHT
SUPERVISING ENGINEER
NJDOT PAVEMENT DESIGN & TECHNOLOGY SECTION

Acknowledgements



- Susan Gresavage, Executive Manager, NJDOT PDM&T
- Narinder Kohli, Supervising Engineer, NJDOT PDM&T
- Vahid Ganji, P.E., PhD., Michael Baker Inc.
- Thomas Bennert, Ph.D., Rutgers University-CAIT

NJDOT HIGH FRICTION SURFACE TREATMENT (HFST)

- WHAT IS HFST?
- LESSON LEARNED & CHALLENGES

What is High Friction Surface Treatment (HFST)?

- HFST is a safety countermeasure
  - polish-resistant calcined bauxite aggregate (**grit**)
  - bonded to the pavement surface using a polymer resin binder (**glue**)

Why do we need HFST?

- Targeted Solution to Roadway Departure Crash Reduction– curve location only
- Friction ↑ Crashes ↓
- Distracted Driving?- HFST does not need to communicate with the driver to work
- Speeding?- HFST does not enhance driver comfort or promote higher speeds
- It's a Proven, Effective Solution.

Center for Sustainable Transportation Infrastructure

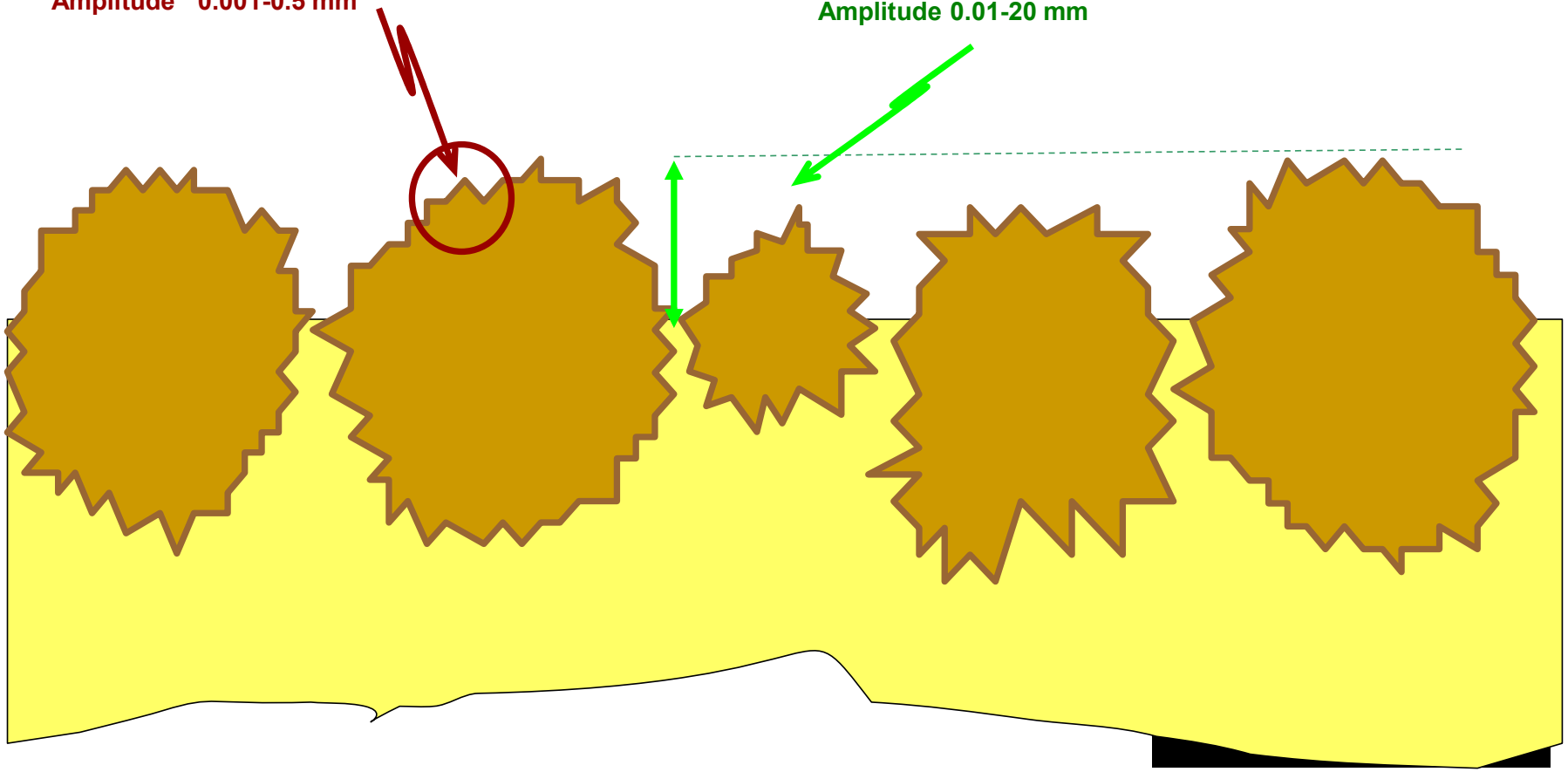
Textures that affects friction

Microtexture

Amplitude 0.001-0.5 mm

Macrotexture

Wavelength 0.5-50 mm
Amplitude 0.01-20 mm



NJDOT SPEC. Surface Quality Skid Resistance Acceptance

- RE performs visual inspection of HFST
- RE can reject HFST based on visual assessment and require corrective action
- If RE visually approves HFST, then NJDOT Pavement Management performs Skid Resistance Testing using ASTM Test Method E 274 for Initial Acceptance
  - **Average Minimum SN ≥ 65**

HFST Quality Acceptance Skid Test Video

HFST Limitations

- Are NOT designed as:
  - **Pavement preservation methods**
  - Pavement repair methods
  - Bridge deck overlays
  - Educational or driver alert systems (not rumble strips)
  - Only wet weather systems
- HFSTs ARE: Designed to act mostly invisibly, under all times of the day or night, in all weather conditions to dramatically enhance the friction and reduce or eliminate roadway departure crashes.

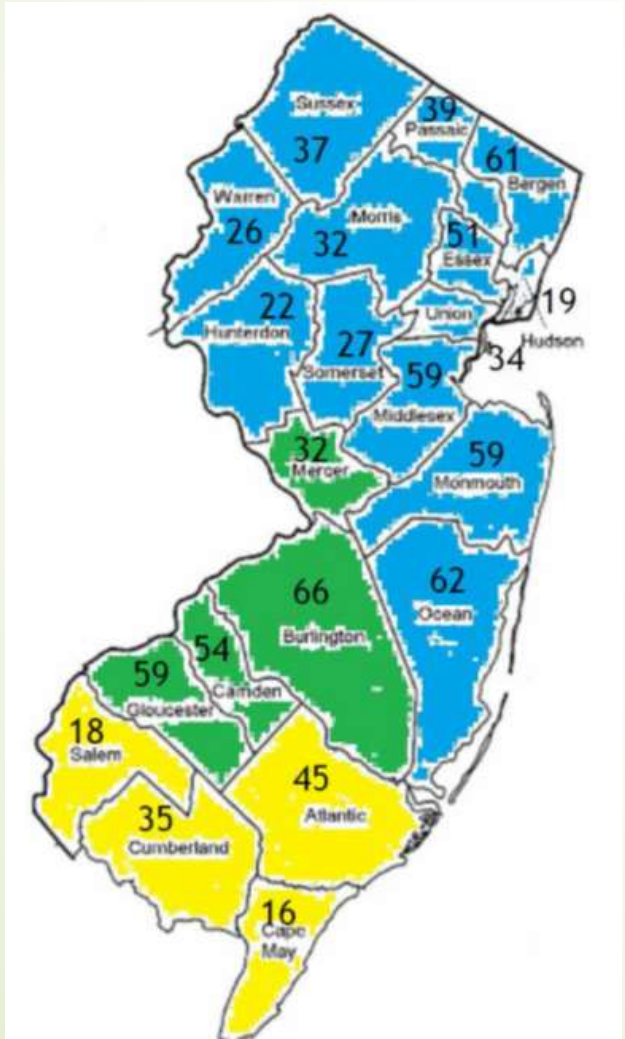
Where to Install HFST?

- Horizontal Curves
- Intersections
- On and Off Ramps– especially with elevation change (loop ramps)
- Steep Grades
- Line of Sight problem locations
- High Speed connectors/Merge locations
- **Where there are high crash clusters, roadway departures or poor roadway friction conditions**

Lessons Learned & Challenges

HFST Pilot Program Start

2016 Lane Departure Serious Injuries and Fatalities in New Jersey



- Safety Programs and NJ FHWA requested Pavement Design assistance for HFST Specification
- Goal: Reduce Roadway Departures on Horizontal Curves
  - 336 Fatalities
  - 517 Serious Injuries
- Need NJDOT Spec. for HFST
- Other products being used as HFST by Locals
- Pavement Design provided Safety Programs HFST Specification in March 2016

FOLLOW NJDOT HFST GUIDELINES

- Good Pavement
  - Newer pavement with adequate Remaining Service Life
  - Distress free or repair/resurface
  - Smooth
  - Structurally adequate
  - Quality material

Apply HFST ONLY on GOOD Pavement

FOLLOW NJDOT SPECIFICATION

- MATERIALS
- **EQUIPMENT**
- EXPERIENCE
- WEATHER LIMITATIONS
- CONSTRUCTION REQUIREMENTS
- QUALITY ASSURANCE
- MAINTENANCE BOND (3 YEARS)

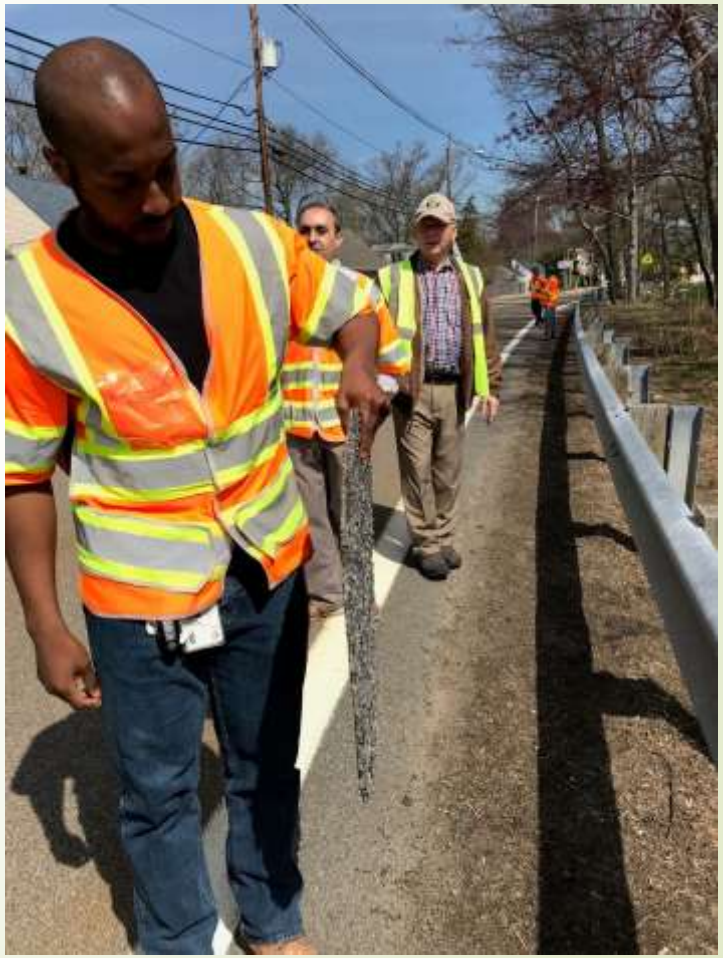
TRUCK MOUNTED HFST APPLICATION EQUIPMENT VS. MANUAL APPLICATION

Manual HFST Placement or Mechanically Assisted Installation = Premature Failure

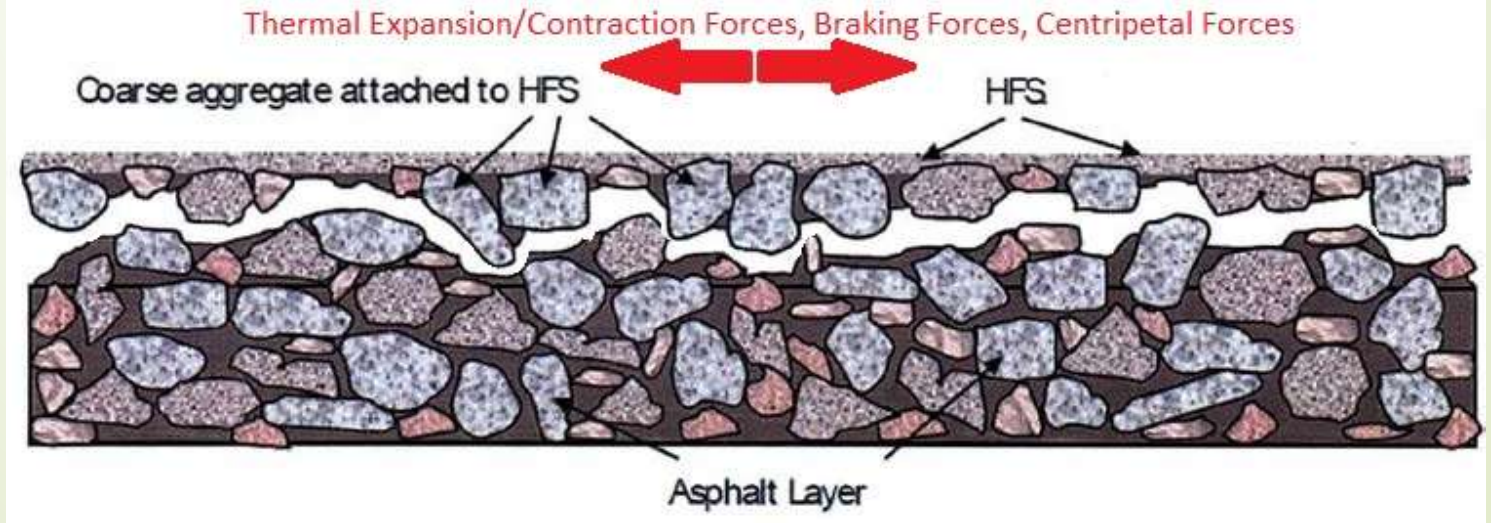
Automated Equipment Installation = Best Opportunity for Success

Automated Equipment = Binder + Aggregate placed by machine without manual spreading or leveling

Pavement Condition Matters



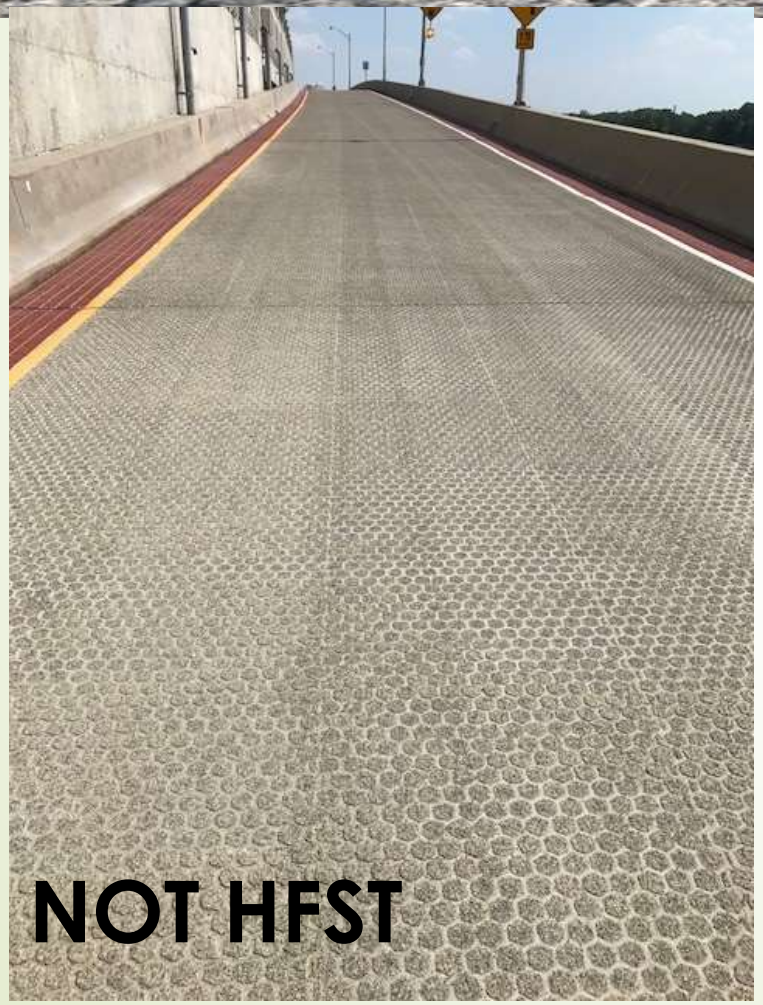
Pavement Condition Matters



HFST Failure Forensic Investigation - Conclusions

- Asphalt pavement was significantly aged or contained high amounts of RAP when placed in 2014
- Areas within the project showed excessive amounts of epoxy binder thickness and high variability of thickness
- Combination of poor asphalt and excessive epoxy binder caused accelerated delamination failures in the asphalt substrate

Products Advertised as HFST, but Not HFST = Inadequate Skid Resistance



Route 29 Southbound to Lalor St. Ramp						
Pass 1		Pass 2		Pass 3		Average
MP	SN40	MP	SN40	MP	SN40	SN40
0.000	40.5	0.000	37.4	0.000	36.7	**38.2**
0.036	37.2	0.024	32.9	0.035	36.4	**35.5**
0.071	34.1	0.054	31.4	0.073	32.7	**32.7**
0.109	52.2	0.085	50.0	0.111	46.5	**49.6**
0.144	51.4	0.119	50.1	0.141	50.4	**50.6**
0.174	48.2	0.142	49.7	0.163	48.4	**48.8**
0.203	49.5	0.168	45.4	0.186	51.8	**48.9**
0.229	54.4	0.200	54.2	0.206	50.7	**53.1**

Route 29 Southbound to Lalor St. Ramp						
Pass 1		Pass 2		Pass 3		Average
MP	SN40	MP	SN40	MP	SN40	SN40
0.000	66.4	0.000	66.3	0.000	66.7	**66.5**
0.013	64.2	0.011	56.5	0.011	61.5	**60.7**
0.026	63.0	0.022	56.8	0.022	55.9	**58.6**
0.039	52.2	0.034	63.1	0.036	49.9	**55.1**
0.053	58.8	0.048	65.9	0.058	59.9	**61.5**
0.067	64.0	0.064	59.9	0.086	55.9	**59.9**
0.082	55.6	0.081	55.8	0.100	60.0	**57.1**
0.099	58.3	0.098	56.1	0.113	61.5	**58.6**
0.115	60.8	0.115	57.5	0.125	59.4	**59.2**
0.13	52.7	0.131	52.9	0.138	65.1	**56.9**

Products Advertised as HFST

NOT HFST (as per NJDOT specification)

Route 68 High Friction Chip Seal (HFCS) Case Study

Route 68 High Friction Chip Seal (HFCS) Case Study

- What if we tried high friction aggregate with a highly modified asphalt binder?
  - Stellarflex PG82-22 FR
    - True Grade PG88-22
    - 7.5% Polymer
- Try some other aggregates? Locally sourced
  - TRI Diabase (NJ)
  - Calcined Bauxite (Great Lakes Minerals)
  - Flint Rock (Oklahoma)

Route 68 High Friction Chip Seal (HFCS) Case Study

PG82-22 FR Binder Appl.

Aggregate Spreading

High Friction Chip Seal Installation Video

LESSONS LEARNED

- **Automated equipment matters -** properly functioning and calibrated
  - Consistent binder thickness
- Make sure **pavement condition is GOOD**!
  - Visual condition assessment NOT ADEQUATE!
- Not all products advertised as HFST meet NJDOT specification or FHWA/AASHTO requirements
- Experience and workmanship matters
- NJDOT still in the pilot phase with HFST
- Researching HFCS. Stay Tuned!

Challenges – Aggressive Snow Operations

Challenges – Aggressive Snow Operations + Improper HFST Equipment

Challenges – Maintenance Bond Enforcement

Stay Tuned!

Questions?

High Friction Surface Treatment Can Save Lives!

- When done properly
- In appropriate locations

Thank you!
Robert.blight@dot.nj.gov

FEATURE LOCAL PRESENTATION:

EDC INNOVATIONS - THE LOCAL PERSPECTIVE

Princeton

Deanna Stockton

Municipal Engineer

Deanna is joined by:

Joe Ettore, Monmouth Co.
Vince Cardone, Monmouth Co.
Dan Burke, Jackson Township
Clint Dicksen, Fanwood/Garwood
Heather Vitz-Del Rio, Wayne Township

EDC Innovations – The Local Perspective

August 7, 2019

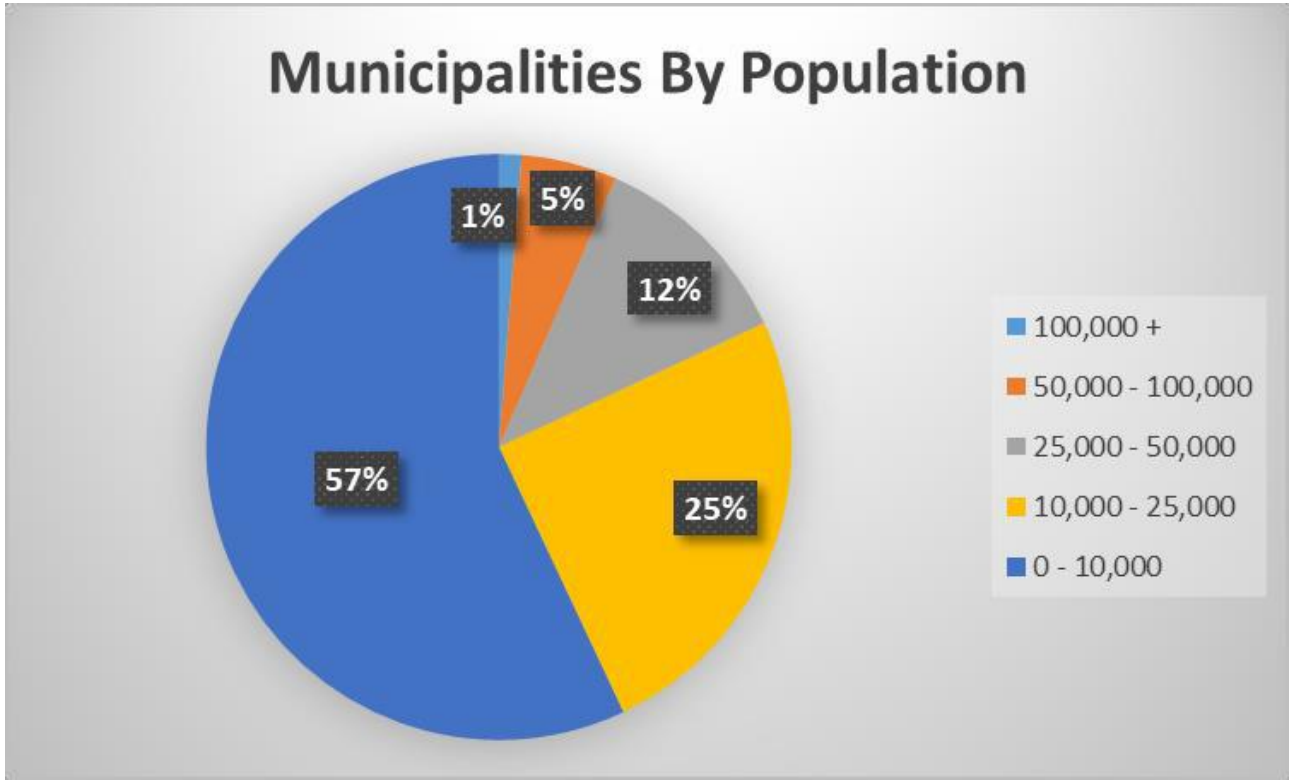
Local STIC Representatives

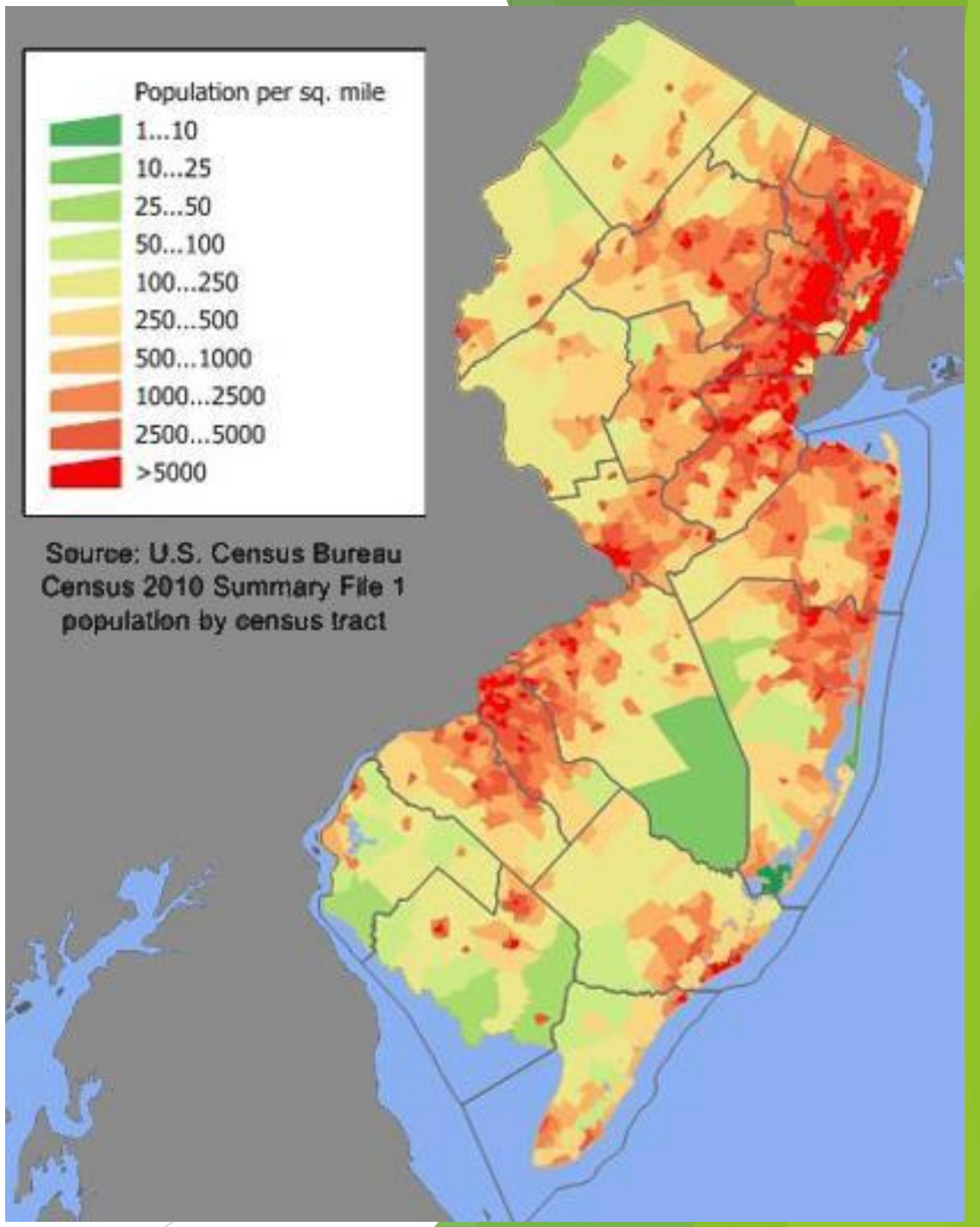
- Joseph Ettore, P.E. – Monmouth County Engineer
- Vince Cardone, P.E. – Monmouth County Principal Traffic Engineer
- Deanna Stockton, P.E. – Princeton Municipal Engineer
- Heather Vitz-Del Rio, P.E. – Wayne Township Director of Public Works
- Daniel Burke, P.E. – Jackson Township Engineer (NJSME Representative)
- Clint Dicksen, C.P.W.M. – Fanwood Director of Public Works (APWA Representative)

New Jersey Statistics

- NJDOT has jurisdiction on just 7% of roads in New Jersey / 66% volume
- In Mercer: 11% County, 80% Municipal, 8% NJDOT
- In Monmouth: 11% County, 82% Municipal, 7% NJDOT
- In Ocean: 21% County, 73% Municipal, 6% NJDOT

Municipal Statistics





SOURCES: U.S. Census Bureau (Dept. of Commerce), N.J. *Star-Ledger*, https://www.quora.com/What-US-state-has-the-highest-population-density

EDC Innovations – INSTITUTIONALIZED

- Construction Manager/General Contractor (CM/GC)
- Prefabricated Bridge Elements and Systems; ABC; UHPC; Ultra-High Performance Concrete Connections for PBES
- Use of In-Lieu Fee and Mitigation Banking
- Alternative Technical Concepts (ATC) – Value Engineering in LPCL
- Intersection and Interchange Geometrics - roundabouts
- Road Diets (Roadway Reconfiguration)
- Data-Driven Safety Analysis
- Project Bundling
- Reducing Rural Roadway Departures / High Friction Surface Treatments (HFST)
- Safe Transportation for Every Pedestrian (STEP)
- e-Construction

Project Screening

Using Data-Driven Safety Analysis

Vincent Cardone
Principal Engineer II, Traffic
Monmouth County

Data Driven Safety Analysis

- An EDC-3 and EDC-4 Innovation
- Using tools to analyze crash and roadway data to predict the safety impacts of highway projects
- Target investments with more confidence and reduce severe crashes on the roadways.

High Risk Rural Roads Program

- Data Driven Safety Analysis is required
- Competitive program administered by MPO
- Uses funds from the Federal Highway Administration's Highway Safety Improvements Program (HSIP).

High Risk Rural Roads Program

- Only NJTPA member subregions are eligible to submit applications to the NJTPA for these programs. Municipalities located within the subregions may recommend a project to their respective county
- For projects to be advanced, all environmental approvals, local approval, and right-of-way acquisition must be completed and a full set of PS&E documents submitted to the Local Aid office by a set deadline.

High Risk Rural Roads Program

- Project sponsors must give consideration to modern roundabouts for all new intersection and intersection upgrade projects.
- The National Environmental Policy Act (NEPA) regulations must be followed. As such, projects must have minimal or no environmental and cultural resource impacts.
- Projects must be completed within 24 months of receiving federal authorization.

High Risk Rural Roads Program

- The following types of projects are NOT eligible:
  - Improvements involving State, U.S. and Interstate highways including any improvements at intersections with such facilities;
  - Routine maintenance/ replacement projects (including general resurfacing projects)
  - Congestion management/ roadway capacity enhancements (road widening)
  - Aesthetic improvements along the rights-of-way.

NJTPA High Risk Rural Roads Network Screening List

FY 2017-2018 HIGH RISK RURAL ROADS PROGRAM
NETWORK SCREENING (USING CRASH DATA FROM 2011-2013)
ALL COUNTIES

NJTPA RANK	COUNTY RANK	COUNTY	MUNICIPALITY	ROAD NAME	SRI	MILEPOST START	MILEPOST END	LENGTH	TOTAL CRASHES	FATAL INJURY	INCAPACITATING INJURY	MODERATE INJURY	PAIN	PDO	WEIGHTED SCORE/MILE
9	2	Hunterdon	Clinton town	West Main Street	00000173Z_	0.00	0.45	0.45	2	1	0	0	0	1	10.69
11	3	Hunterdon	Tewksbury township	Fairmount Road West	00000512__	3.73	4.93	1.20	14	0	2	1	1	10	10.24
13	3	Hunterdon	Delaware township	Stockton-Flemington Road	00000523__	3.03	3.95	0.92	10	0	1	1	2	6	9.22
14	3	Hunterdon	Lebanon township	Fairview Avenue	00000513__	15.97	20.05	4.08	73	1	3	3	12	54	8.88
19	4	Hunterdon	Tewksbury township	Old Turnpike Road	00000517__	1.39	3.29	1.90	36	1	0	3	4	28	7.27
21	4	Hunterdon	Clinton township	PAYNE RD	10061007__	0.60	1.33	0.73	2	1	0	0	0	1	6.59
23	5	Hunterdon	Holland township	Milford-Warren Glen Road	00000519__	19.46	22.56	3.10	49	0	2	5	2	40	6.44
27	5	Hunterdon	Kingwood township	Kingwood Road	00000519__	9.19	10.36	1.17	6	0	1	0	2	3	5.82
41	7	Hunterdon	Union Twp (Hunterdon Co)	Little York Road	10000614__	5.11	6.37	1.26	8	1	0	0	1	6	4.61
64	11	Hunterdon	East Amwell township	Rileyville Road	10000607__	0.00	2.08	2.08	5	0	1	0	0	4	2.31
3	2	Middlesex	Old Bridge township	Texas Road	00000520__	0.00	2.06	2.06	107	0	1	2	26	78	16.58
4	1	Monmouth	Wall township	Belmar Boulevard	130000181__	1.41	2.46	1.05	28	0	2	1	3	22	13.61
6	1	Monmouth	Freehold township	Jackson Mill Road	13000023__	0.00	1.45	1.45	35	1	0	3	9	22	12.98
15	4	Monmouth	Millstone township	Perrineville Road	13000001__	1.57	3.23	1.66	40	0	1	1	8	30	8.72
26	8	Monmouth	Howell township	CASINO RD	13191012__	2.62	3.60	0.98	6	0	1	0	1	4	5.93
31	8	Monmouth	Roosevelt borough	South Rochdale Avenue	00000571__	29.68	30.57	0.89	4	1	0	0	0	3	5.40
31	8	Monmouth	Howell township	ARNOLD BLVD	13191101__	0.00	0.89	0.89	4	0	1	0	0	3	5.40
42	9	Monmouth	Upper Freehold township	Stage Coach Road	00000524__	7.91	13.36	5.45	29	1	1	5	7	15	4.58
43	9	Monmouth	Freehold township	Ely Harmony Road	13321049__	0.00	4.46	4.46	37	0	1	5	7	24	4.52
51	12	Monmouth	Upper Freehold township	Holmes Mill Road	13000027__	1.37	4.67	3.30	13	1	0	3	1	8	3.28
56	12	Monmouth	Upper Freehold township	MEIRS RD	13511013__	1.79	3.97	2.18	4	1	0	1	0	2	2.97
60	12	Monmouth	Millstone township	Millstone Road	13321017__	0.00	5.57	5.57	39	1	0	4	3	31	2.60
1	1	Morris	Washington Twp (Morris Co)	West Mill Road	00000513__	25.67	25.85	0.18	11	0	1	0	0	10	26.72
30	2	Morris	Washington Twp (Morris Co)	Fairmont Road	00000517__	7.31	9.30	1.99	22	0	1	3	1	17	5.44
36	2	Morris	Washington Twp (Morris Co)	East Mill Road	00000513__	26.87	28.39	1.52	31	0	1	0	3	27	5.14
38	3	Morris	Jefferson township	Ridge Road	14141233__	1.51	2.49	0.98	2	0	1	0	0	1	4.91
40	3	Morris	Mendham township	Roxciticus Road	14191045__	2.18	3.52	1.34	4	1	0	1	0	2	4.84
18	1	Ocean	Ocean Twp (Ocean Co)	Warren Grove-Waretown Road	00000532__	32.21	33.04	0.83	5	0	1	1	0	3	7.81
20	1	Ocean	Manchester township	Whiting-New Egypt Road	00000539__	25.36	28.38	3.02	43	0	1	3	11	28	6.89
24	2	Ocean	Stafford township	North Green Street	00000539__	10.58	11.68	1.10	6	0	1	0	2	3	6.19
25	2	Ocean	Plumsted township	Pinehurst Road	00000539__	32.23	33.71	1.48	5	1	0	2	1	1	6.18
29	4	Ocean	Little Egg Harbor township	Thomas Avenue	15000602__	0.00	1.75	1.75	4	1	1	0	0	2	5.50
33	5	Ocean	Jackson township	West Veterans Highway	00000528__	16.41	18.18	1.77	13	0	1	1	3	8	5.36
39	6	Ocean	Little Egg Harbor township	STAGE RD	15161159__	0.00	0.99	0.99	3	0	1	0	0	2	4.86
44	7	Ocean	Little Egg Harbor township	North Green Street	00000539__	0.73	3.69	2.96	53	1	0	2	5	45	4.44
46	7	Ocean	Lacey township	Lacey Road	15000614__	2.71	10.04	7.33	46	0	1	8	8	29	3.57
47	8	Ocean	Lacey township	Cedar Bridge-Whiting Road	00000539__	15.91	20.85	4.94	33	1	0	4	6	22	3.54
55	9	Ocean	Berkeley township	Dover Road	15000618__	1.90	3.80	1.90	9	0	1	0	1	7	3.06
61	9	Ocean	Lacey township	Dover Road	15000618__	0.00	1.90	1.90	1	0	1	0	0	0	2.53
68	9	Ocean	Plumsted township	Long Swamp Road	15230004__	0.00	3.85	3.85	2	1	0	0	0	1	1.25
16	1	Somerset	Tewksbury township	Lamington Road	00000523__	24.36	24.94	0.58	6	1	0	0	0	5	8.25
58	4	Somerset	Hillsborough township	BEEKMAN LN	18101024__	1.22	3.24	2.02	5	0	1	0	1	3	2.88
59	4	Somerset	Bedminster township	Burnt Mills Road	18000620__	0.00	3.01	3.01	23	0	1	1	2	19	2.82

Monmouth County List

NJTPA RANK	COUNTY RANK	COUNTY	MUNICIPALITY	ROAD NAME	SRI	MILEPOST START	MILEPOST END	LENGTH
4	1	Monmouth	Wall township	Belmar Boulevard	130000181_	1.41	2.46	1.05
6	1	Monmouth	Freehold township	Jackson Mill Road	13000023__	0.00	1.45	1.45
15	4	Monmouth	Millstone township	Perrineville Road	13000001__	1.57	3.23	1.66
26	8	Monmouth	Howell township	CASINO RD	13191012__	2.62	3.60	0.98
31	8	Monmouth	Roosevelt borough	South Rochdale Avenue	00000571__	29.68	30.57	0.89
31	8	Monmouth	Howell township	ARNOLD BLVD	13191101__	0.00	0.89	0.89
42	9	Monmouth	Upper Freehold township	Stage Coach Road	00000524__	7.91	13.36	5.45
43	9	Monmouth	Freehold township	Ely Harmony Road	13321049__	0.00	4.46	4.46
51	12	Monmouth	Upper Freehold township	Holmes Mill Road	13000027__	1.37	4.67	3.30
56	12	Monmouth	Upper Freehold township	MEIRS RD	13511013__	1.79	3.97	2.18
60	12	Monmouth	Millstone township	Millstone Road	13321017__	0.00	5.57	5.57

ROAD NAME	SRI	TOTAL CRASHES	FATAL INJURY	INCAPACITATING INJURY	MODERATE INJURY	PAIN	PDO	Weighted Score/mile
Belmar Boulevard	130000181_	28	0	2	1	3	22	13.61
Jackson Mill Road	13000023__	35	1	0	3	9	22	12.98
Perrineville Road	13000001__	40	0	1	1	8	30	8.72
CASINO RD	13191012__	6	0	1	0	1	4	5.93
South Rochdale Avenue	00000571__	4	1	0	0	0	3	5.40
ARNOLD BLVD	13191101__	4	0	1	0	0	3	5.40
Stage Coach Road	00000524__	29	1	1	5	7	15	4.58
Ely Harmony Road	13321049__	37	0	1	5	7	24	4.52
Holmes Mill Road	13000027__	13	1	0	3	1	8	3.28
MEIRS RD	13511013__	4	1	0	1	0	2	2.97
Millstone Road	13321017__	39	1	0	4	3	31	2.60

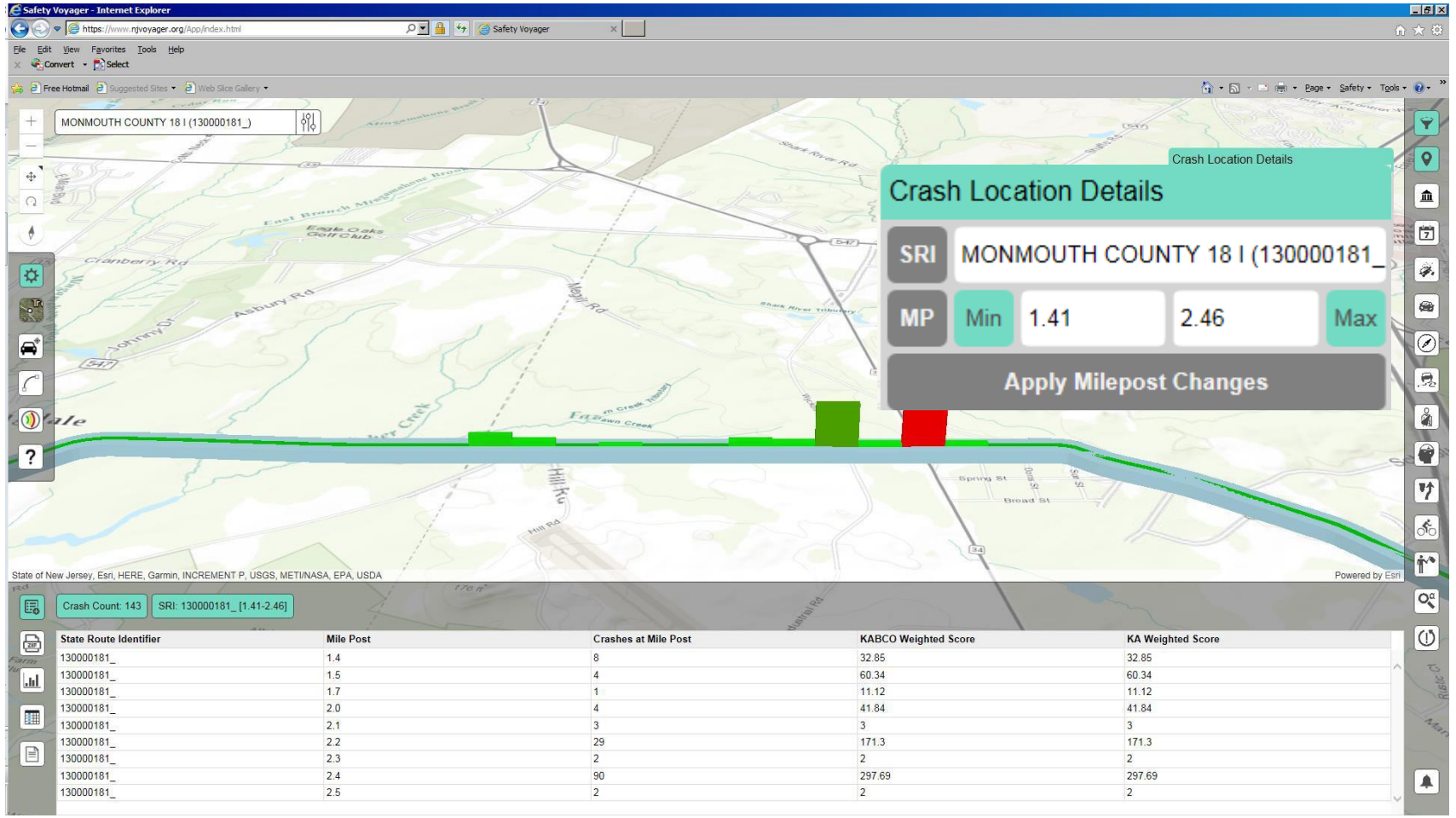
Monmouth County List

Lists are ranked assuming the weight of a fatal crash is the same as an incapacitating injury crash and using the value of a Complaint of Pain injury as the base value (K=A, no Property Damage only (PDO)).

NJTPA / RUTGERS Center for Advanced Infrastructure and Transportation		HSM (FHWA-HRT-05-051) Link Published 2005		Weighting Factors		
		2001 dollars	2012 dollars (KABCO)	KABCO Weight	K=A Weight	K=A No PDO Weight
K	Fatal	$ 4,008,900	$ 5,197,200	89.30	4.81	2.73
ABC	ALL INJURY	$ 82,600	$ 107,100			
A	Incapacitating	$ 216,000	$ 280,000	4.81	4.81	2.73
B	Moderate	$ 79,000	$ 102,400	1.76	1.76	1.00
C	Complaint of Pain	$ 44,900	$ 58,200	1.00	1.00	0.57
O	PDO	$ 7,400	$ 9,600	0.16	0.16	0.00

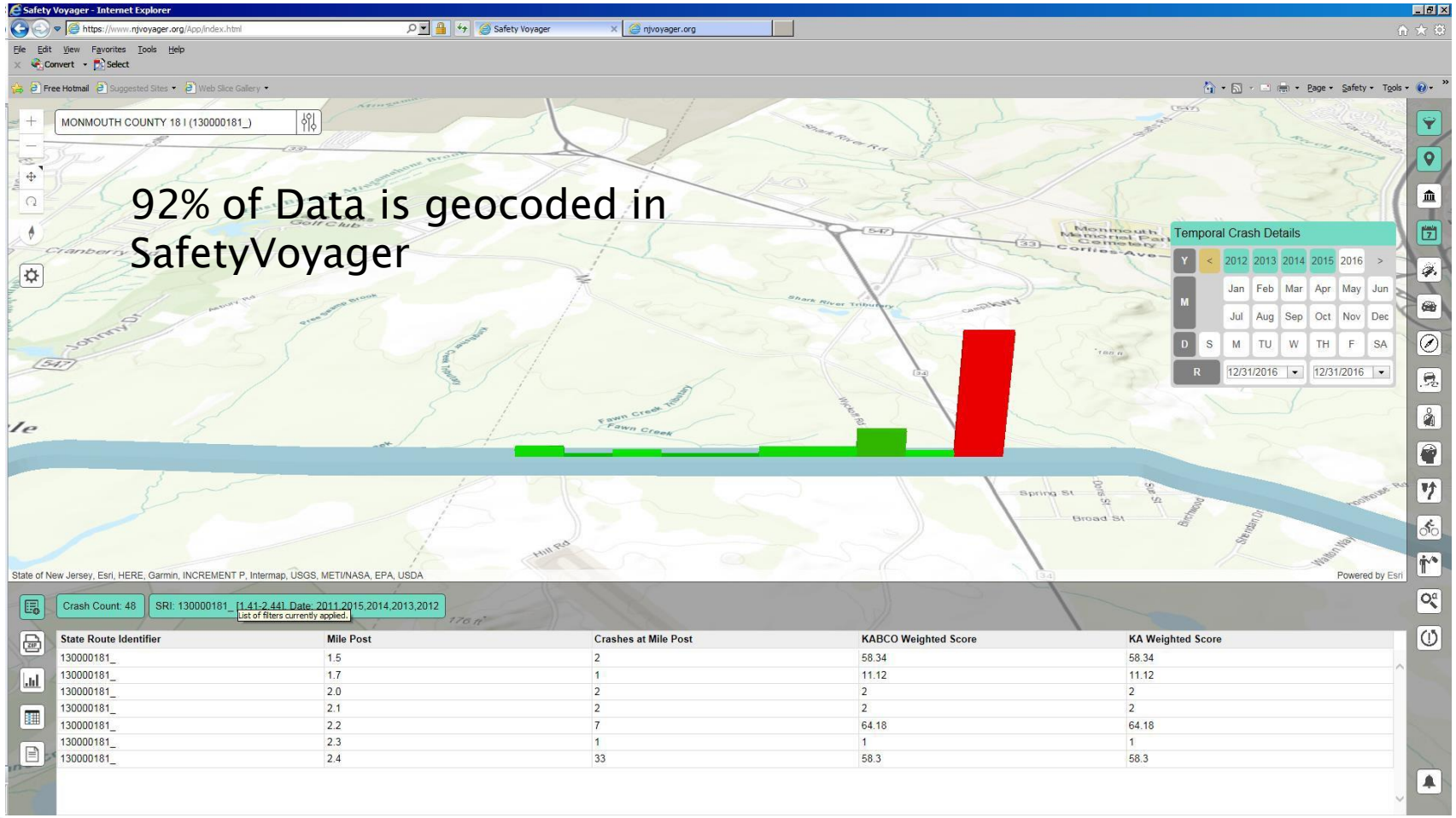
ROAD NAME	SRI	TOTAL CRASHES	FATAL INJURY	INCAPACITATING INJURY	MODERATE INJURY	PAIN	PDO	Weighted Score/mile
Belmar Boulevard	130000181_	28	0	2	1	3	22	13.61
Jackson Mill Road	13000023__	35	1	0	3	9	22	12.98
Perrineville Road	13000001__	40	0	1	1	8	30	8.72
CASINO RD	13191012__	6	0	1	0	1	4	5.93
South Rochdale Avenue	00000571__	4	1	0	0	0	3	5.40
ARNOLD BLVD	13191101__	4	0	1	0	0	3	5.40
Stage Coach Road	00000524__	29	1	1	5	7	15	4.58
Ely Harmony Road	13321049__	37	0	1	5	7	24	4.52
Holmes Mill Road	13000027__	13	1	0	3	1	8	3.28
MEIRS RD	13511013__	4	1	0	1	0	2	2.97
Millstone Road	13321017__	39	1	0	4	3	31	2.60

Crash SRI and Milepost



State Route Identifier	Mile Post	Crashes at Mile Post	KABCO Weighted Score	KA Weighted Score
130000181_	1.4	8	32.85	32.85
130000181_	1.5	4	60.34	60.34
130000181_	1.7	1	11.12	11.12
130000181_	2.0	4	41.84	41.84
130000181_	2.1	3	3	3
130000181_	2.2	29	171.3	171.3
130000181_	2.3	2	2	2
130000181_	2.4	90	297.69	297.69
130000181_	2.5	2	2	2

Filters are easy to find



State Route Identifier	Mile Post	Crashes at Mile Post	KABCO Weighted Score	KA Weighted Score
130000181_	1.5	2	58.34	58.34
130000181_	1.7	1	11.12	11.12
130000181_	2.0	2	2	2
130000181_	2.1	2	2	2
130000181_	2.2	7	64.18	64.18
130000181_	2.3	1	1	1
130000181_	2.4	33	58.3	58.3

Review remainder of screening list

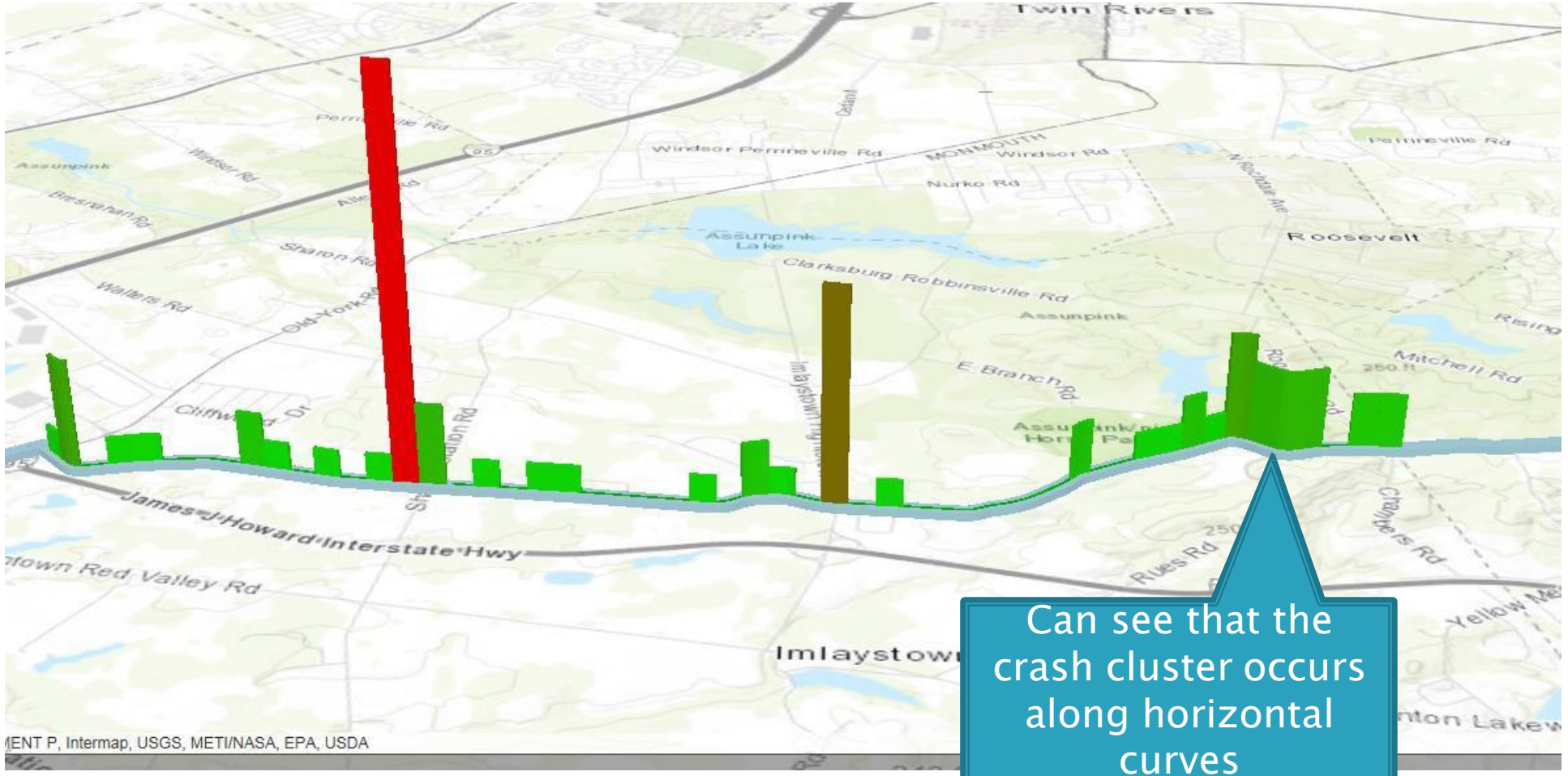
- Iterative process
- Need to diagnose the problem before coming up with a solution

Review remainder of screening list

- Jackson Mills Rd corridor included several Developer-lead projects that were yet to be constructed
- Perrineville Rd-reviewed intersection of CR 1 & Millstone Rd for possible roundabout-Green Acres implications and ROW impacts would not qualify under HRRR
- Casino Rd, South Rochdale Ave, & Arnold Blvd had 3 to 4 crashes per corridor-Cost/Benefit would be low
- CR 524 (Stage Coach Rd)-Several "hot spots"
  - CR 524 & CR 539-Traffic Signal installed by Developer
  - CR 524 & Sharon Station Rd-Discussions with Upper Freehold for large-scale project outside funding limits of HRRR
  - Several fixed object crashes in the corridor, especially along easterly portion (connects to segment previously approved by HRRR)

4	1	Monmouth	Wall township	Belmar Boulevard	130000181_	1.41	2.46	1.05
6	1	Monmouth	Freehold township	Jackson Mill Road	13000023__	0.00	1.45	1.45
15	4	Monmouth	Millstone township	Perrineville Road	13000001__	1.57	3.23	1.66
26	8	Monmouth	Howell township	CASINO RD	13191012__	2.62	3.60	0.98
31	8	Monmouth	Roosevelt borough	South Rochdale Avenue	00000571__	29.68	30.57	0.89
31	8	Monmouth	Howell township	ARNOLD BLVD	13191101__	0.00	0.89	0.89
42	9	Monmouth	Upper Freehold township	Stage Coach Road	00000524__	7.91	13.36	5.45
43	9	Monmouth	Freehold township	Ely Harmony Road	13321049__	0.00	4.46	4.46
51	12	Monmouth	Upper Freehold township	Holmes Mill Road	13000027__	1.37	4.67	3.30
56	12	Monmouth	Upper Freehold township	MEIRS RD	13511013__	1.79	3.97	2.18
60	12	Monmouth	Millstone township	Millstone Road	13321017__	0.00	5.57	5.57

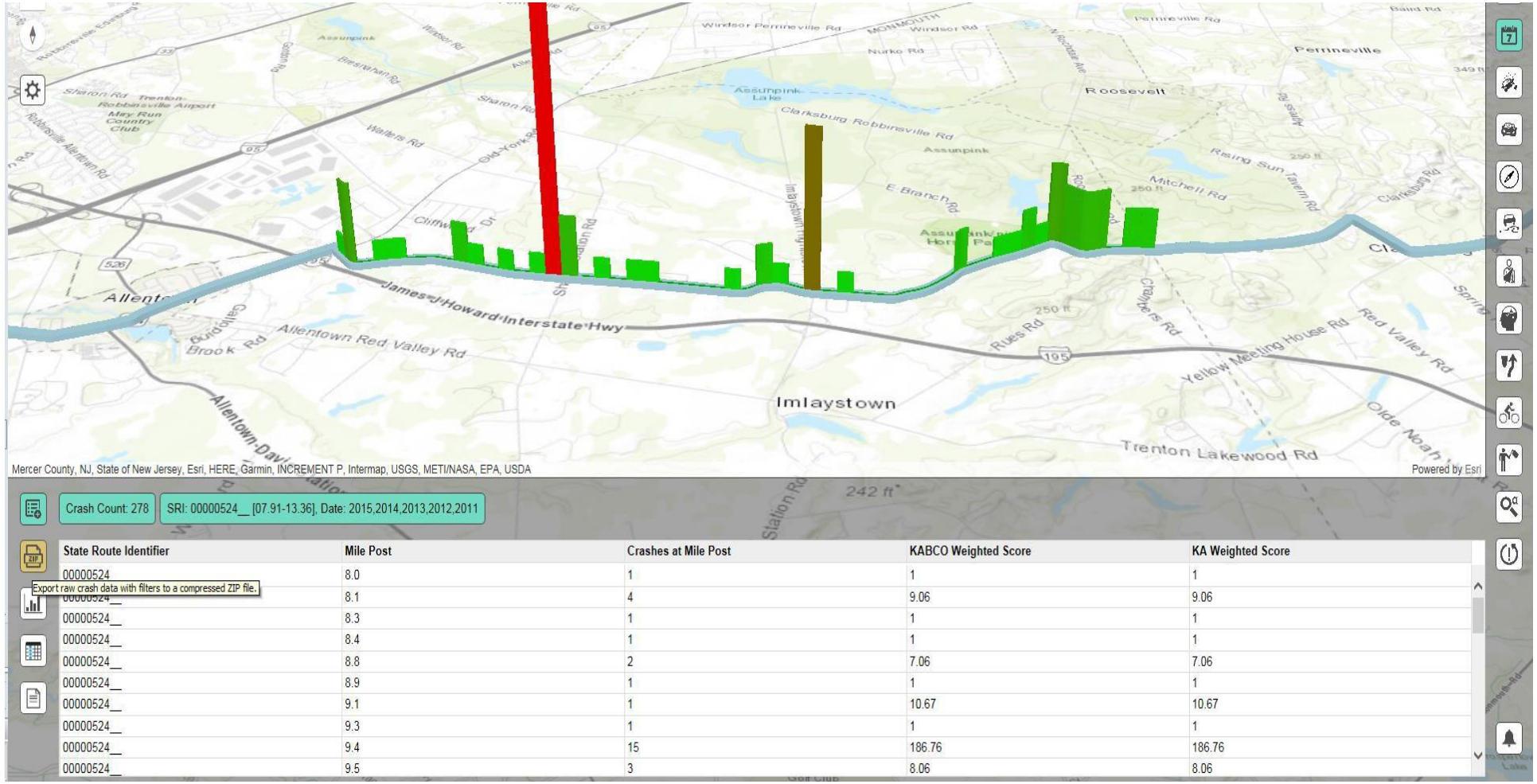
CR 524 Histogram-SafetyVoyager



Can see that the crash cluster occurs along horizontal curves

Detailed Crash Data

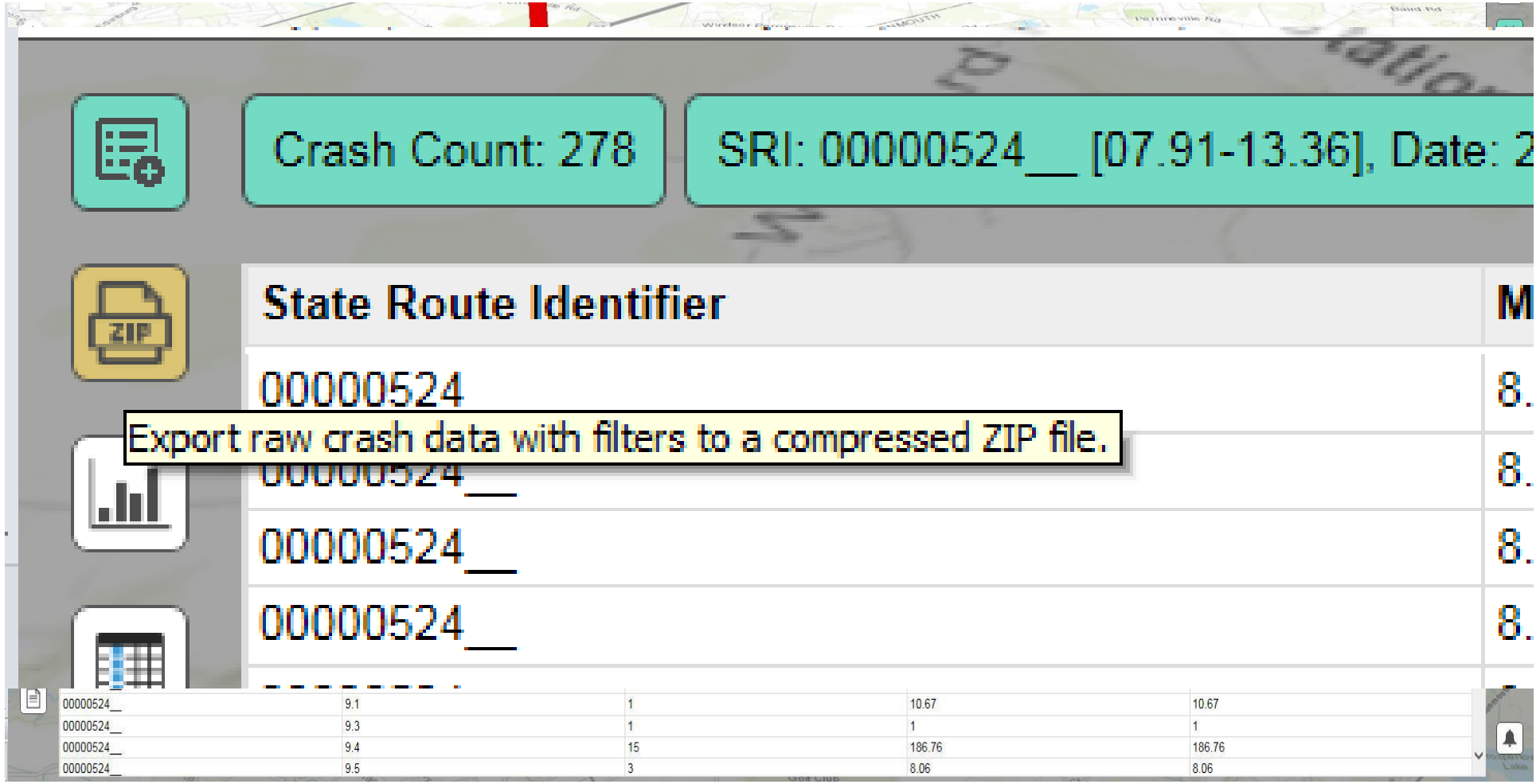
- Safety Voyager



State Route Identifier	Mile Post	Crashes at Mile Post	KABCO Weighted Score	KA Weighted Score
00000524	8.0	1	1	1
00000524__	8.1	4	9.06	9.06
00000524__	8.3	1	1	1
00000524__	8.4	1	1	1
00000524__	8.8	2	7.06	7.06
00000524__	8.9	1	1	1
00000524__	9.1	1	10.67	10.67
00000524__	9.3	1	1	1
00000524__	9.4	15	186.76	186.76
00000524__	9.5	3	8.06	8.06

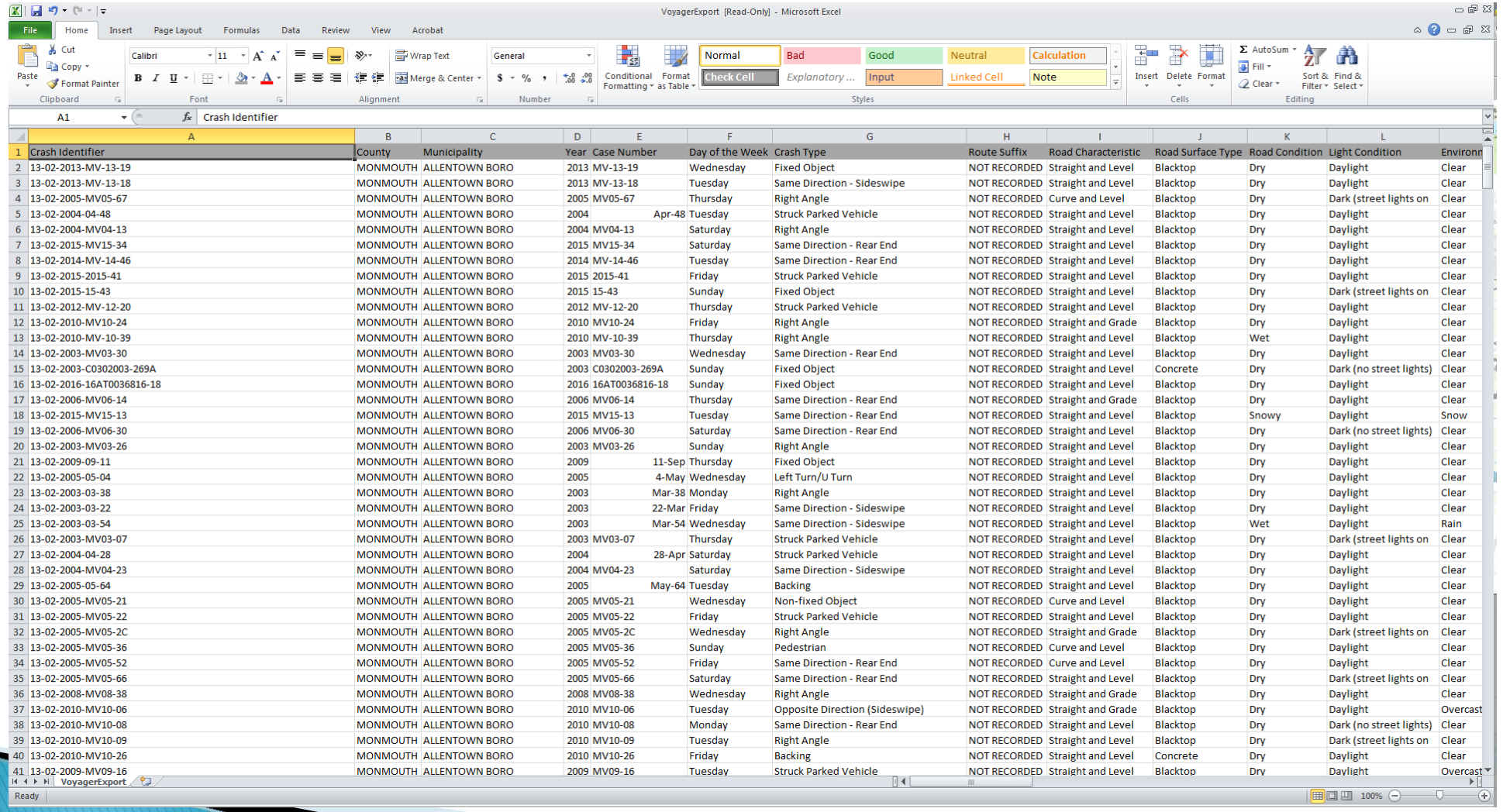
Detailed Crash Data

- Safety Voyager



Detailed Crash Data

- Safety Voyager



VoyagerExport [Read-Only] - Microsoft Excel

Crash Identifier	County	Municipality	Year	Case Number	Day of the Week	Crash Type	Route Suffix	Road Characteristic	Road Surface Type	Road Condition	Light Condition	Environ
13-02-2013-MV-13-19	MONMOUTH	ALLENTOWN BORO	2013	MV-13-19	Wednesday	Fixed Object	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2013-MV-13-18	MONMOUTH	ALLENTOWN BORO	2013	MV-13-18	Tuesday	Same Direction - Sideswipe	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-MV05-67	MONMOUTH	ALLENTOWN BORO	2005	MV05-67	Thursday	Right Angle	NOT RECORDED	Curve and Level	Blacktop	Dry	Dark (street lights on	Clear
13-02-2004-04-48	MONMOUTH	ALLENTOWN BORO	2004	Apr-48	Tuesday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2004-MV04-13	MONMOUTH	ALLENTOWN BORO	2004	MV04-13	Saturday	Right Angle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2015-MV15-34	MONMOUTH	ALLENTOWN BORO	2015	MV15-34	Saturday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2014-MV-14-46	MONMOUTH	ALLENTOWN BORO	2014	MV-14-46	Tuesday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2015-2015-41	MONMOUTH	ALLENTOWN BORO	2015	2015-41	Friday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2015-15-43	MONMOUTH	ALLENTOWN BORO	2015	15-43	Sunday	Fixed Object	NOT RECORDED	Straight and Level	Blacktop	Dry	Dark (street lights on	Clear
13-02-2012-MV-12-20	MONMOUTH	ALLENTOWN BORO	2012	MV-12-20	Thursday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2010-MV10-24	MONMOUTH	ALLENTOWN BORO	2010	MV10-24	Friday	Right Angle	NOT RECORDED	Straight and Grade	Blacktop	Dry	Daylight	Clear
13-02-2010-MV-10-39	MONMOUTH	ALLENTOWN BORO	2010	MV-10-39	Thursday	Right Angle	NOT RECORDED	Straight and Level	Blacktop	Wet	Daylight	Clear
13-02-2003-MV03-30	MONMOUTH	ALLENTOWN BORO	2003	MV03-30	Wednesday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2003-C0302003-269A	MONMOUTH	ALLENTOWN BORO	2003	C0302003-269A	Sunday	Fixed Object	NOT RECORDED	Straight and Level	Concrete	Dry	Dark (no street lights)	Clear
13-02-2016-16AT0036816-18	MONMOUTH	ALLENTOWN BORO	2016	16AT0036816-18	Sunday	Fixed Object	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2006-MV06-14	MONMOUTH	ALLENTOWN BORO	2006	MV06-14	Thursday	Same Direction - Rear End	NOT RECORDED	Straight and Grade	Blacktop	Dry	Daylight	Clear
13-02-2015-MV15-13	MONMOUTH	ALLENTOWN BORO	2015	MV15-13	Tuesday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Snowy	Daylight	Snow
13-02-2006-MV06-30	MONMOUTH	ALLENTOWN BORO	2006	MV06-30	Saturday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Dry	Dark (no street lights)	Clear
13-02-2003-MV03-26	MONMOUTH	ALLENTOWN BORO	2003	MV03-26	Sunday	Right Angle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2009-09-11	MONMOUTH	ALLENTOWN BORO	2009	11-Sep	Thursday	Fixed Object	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-05-04	MONMOUTH	ALLENTOWN BORO	2005	4-May	Wednesday	Left Turn/U Turn	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2003-03-38	MONMOUTH	ALLENTOWN BORO	2003	Mar-38	Monday	Right Angle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2003-03-22	MONMOUTH	ALLENTOWN BORO	2003	22-Mar	Friday	Same Direction - Sideswipe	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2003-03-54	MONMOUTH	ALLENTOWN BORO	2003	Mar-54	Wednesday	Same Direction - Sideswipe	NOT RECORDED	Straight and Level	Blacktop	Wet	Daylight	Rain
13-02-2003-MV03-07	MONMOUTH	ALLENTOWN BORO	2003	MV03-07	Thursday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Dark (street lights on	Clear
13-02-2004-04-28	MONMOUTH	ALLENTOWN BORO	2004	28-Apr	Saturday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2004-MV04-23	MONMOUTH	ALLENTOWN BORO	2004	MV04-23	Saturday	Same Direction - Sideswipe	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-05-64	MONMOUTH	ALLENTOWN BORO	2005	May-64	Tuesday	Backing	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-MV05-21	MONMOUTH	ALLENTOWN BORO	2005	MV05-21	Wednesday	Non-fixed Object	NOT RECORDED	Curve and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-MV05-22	MONMOUTH	ALLENTOWN BORO	2005	MV05-22	Friday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-MV05-2C	MONMOUTH	ALLENTOWN BORO	2005	MV05-2C	Wednesday	Right Angle	NOT RECORDED	Straight and Grade	Blacktop	Dry	Dark (street lights on	Clear
13-02-2005-MV05-36	MONMOUTH	ALLENTOWN BORO	2005	MV05-36	Sunday	Pedestrian	NOT RECORDED	Curve and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-MV05-52	MONMOUTH	ALLENTOWN BORO	2005	MV05-52	Friday	Same Direction - Rear End	NOT RECORDED	Curve and Level	Blacktop	Dry	Daylight	Clear
13-02-2005-MV05-66	MONMOUTH	ALLENTOWN BORO	2005	MV05-66	Saturday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Dry	Dark (street lights on	Clear
13-02-2008-MV08-38	MONMOUTH	ALLENTOWN BORO	2008	MV08-38	Wednesday	Right Angle	NOT RECORDED	Straight and Grade	Blacktop	Dry	Daylight	Clear
13-02-2010-MV10-06	MONMOUTH	ALLENTOWN BORO	2010	MV10-06	Tuesday	Opposite Direction (Sideswipe)	NOT RECORDED	Straight and Grade	Blacktop	Dry	Daylight	Overcast
13-02-2010-MV10-08	MONMOUTH	ALLENTOWN BORO	2010	MV10-08	Monday	Same Direction - Rear End	NOT RECORDED	Straight and Level	Blacktop	Dry	Dark (no street lights)	Clear
13-02-2010-MV10-09	MONMOUTH	ALLENTOWN BORO	2010	MV10-09	Tuesday	Right Angle	NOT RECORDED	Straight and Level	Blacktop	Dry	Dark (street lights on	Clear
13-02-2010-MV10-26	MONMOUTH	ALLENTOWN BORO	2010	MV10-26	Friday	Backing	NOT RECORDED	Straight and Level	Concrete	Dry	Daylight	Clear
13-02-2009-MV09-16	MONMOUTH	ALLENTOWN BORO	2009	MV09-16	Tuesday	Struck Parked Vehicle	NOT RECORDED	Straight and Level	Blacktop	Dry	Daylight	Overcast

Crash Diagram/Crash Table

DATE:	26-Jul-15	BY:	VC
ANALYSIS PERIOD:	Jan 2011 to Dec 2013		

	12	1	2	3	4	5	6	7	8	9	10	11
AM	1	1					1	2	1	1		
PM	1	1	2		1	2	1		1	1		

Crash Year	No. of Crashes
2011	4
2012	1
2013	1
2014	7
2015	3
2016	1

Light condition	No. of Crashes
Daylight	11
Dark (No Street Lights)	3
Dark (Street Lights On/ spot)	1
Dark (Street Lights Off)	1

Type of Crash	No. of Crashes	% of Total
Backing	0	0%
Fixed object	13	76%
Left turn/U turn	0	0%
Opp. direction	0	0%
Headon/Angular	0	0%
Petalcyclist	0	0%
Pedestrian	0	0%
Right Angle	0	0%
Rear end	1	6%
Side swipe	0	0%
Animal	3	18%

Surface	No. of Crashes
Dry	9
Wet	4
Snowy	2
Icy	2

Severity	No. of Crashes
PDO	9
Pain	4
Moderate Injury	4
Incapacitating Injury	0
Fatal Injury	0

#	CRASH DATE	CRASH TIME	ROUTE	MILEPOST	INTERSECT.	CRASH TYPE	SURFACE CONDITION	LIGHT CONDITION	ENVIRONMENTAL CONDITION	DISTANCE	UNIT OF M	DIRECTION	CROSS STREET NAME	X	Y	EPDO	Direction of travel	Crash description
1	1/26/2011	17:19	524	13.04	Not At Inters	Same Direction Rear End	Icy	Dark (No Street Lights)	Sleet/Hail/Freezing Rain	1581	Foot	West	CHAMBERS RD / ROOSEVELT RD	498181.17	493515.81	PDO	Westbound	Same Direction - Rear End
2	2/27/2011	20:30	524	12.7	At Intersecti	Fixed Object	Dry	Dark (No Street Lights)	Clear		At	South	EAST BRANCH RD	496584.63	493889.55	PDO	Westbound	ran off road right, struck utility pole
3	4/26/2011	12:51	524	13.24	Not At Inters	Fixed Object	Dry	Daylight	Clear	528	Foot	West	CHAMBERS RD / ROOSEVELT RD	499221.59	493693.02	Pain	Eastbound	ran off road left, struck utility pole & mailbox
4	8/7/2011	18:44	524	12.91	Not At Inters	Fixed Object	Wet	Daylight	Rain	2640	Foot	East	ROUTE 539	497556.03	493668.03	Moderate Injury	Westbound	ran off road right, struck embankment
5	9/23/2012	0:36	524	12.66	Not At Inters	Fixed Object	Dry	Dark (Street Lights On/	Clear	200	Foot	West	EAST BRANCH RD	496405.07	493779.66	Moderate Injury	Westbound	ran off road right, struck tree
6	12/24/2013	1:28	524	12.9	Not At Inters	Fixed Object	Dry	Dark (No Street Lights)	Clear		NULL	NULL		497514.24	493701	Moderate Injury	Westbound	ran off road left, struck tree
7	2/22/2014	7:41	524	13.04	Not At Inters	Fixed Object	Icy	Daylight	Clear	1581	Foot	East	CHAMBERS RD / ROOSEVELT RD	498181.17	493515.81	Moderate Injury	Eastbound	ran off road right, struck utility pole
8	7/8/2014	21:28	524	12.84	Not At Inters	Other	Wet	Dark (No Street Lights)	Rain	2640	Foot	West	CHAMBERS RD / ROOSEVELT RD	497264.01	493895.48	PDO	Eastbound	"thrown/falling object"
9	9/27/2014	8:48	524	12.8	Not At Inters	Fixed Object	Dry	Daylight	Clear		NULL	NULL		497080.2	493999.32	PDO	Eastbound	ran off road right, struck traffic sign
10	10/11/2014	17:03	524	12.8	Not At Inters	Fixed Object	Wet	Daylight	Clear		NULL	NULL		497080.2	493999.32	PDO	Eastbound	ran off road right, struck tree
11	10/13/2014	9:05	524	12.76	Not At Inters	Other	Dry	Daylight	Overcast	300	Foot	East	EAST BRANCH RD	496864.46	494025.66	PDO	Westbound	ran off road right, crossed centerline, ran off road left, struck post
12	10/24/2014	7:33	524	13.2	Not At Inters	Animal	Dry	Daylight	Clear		NULL	NULL		499008.49	493683.44	PDO	Eastbound	deer strike
13	11/12/2014	14:11	524	12.7	Not At Inters	Animal	Dry	Daylight	Clear		NULL	NULL		496584.63	493889.55	PDO	Westbound	deer strike
14	3/1/2015	14:11	524	12.9	Not At Inters	Fixed Object	Snowy	Daylight	Snow		NULL	NULL		497514.24	493701	Pain	Eastbound	ran off road right, struck tree
15	3/1/2015	13:34	524	13.09	Not At Inters	Fixed Object	Snowy	Daylight	Snow	1056	Foot	East	HARMONY HILL RD	498433.68	493600.71	Pain	Westbound	ran off road left, struck mailbox
16	12/16/2015	6:10	524	12.7	At Intersecti	Animal	Dry	Dark (Street Lights Off)	Clear		At	NULL	EAST BRANCH RD	496584.63	493889.55	PDO	Westbound	deer strike
17	3/14/2016	16:06	524	12.8	Not At Inters	Fixed Object	Wet	Daylight	Rain		NULL	NULL		497080.2	493999.32	Pain	Eastbound	ran off road left, struck post

no.	revisions	date

COUNTY OF MONMOUTH
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
DIVISION OF ENGINEERING & TRAFFIC SAFETY
JOSEPH M. ETTORE, COUNTY ENGINEER

CORRIDOR IMPROVEMENTS ON
CR 524 (NEW CANTON–STONE TAVERN RD)
MP 12.65 TO 13.25
UPPER FREEHOLD TOWNSHIP
MONMOUTH COUNTY NEW JERSEY

CRASH DIAGRAM

NOT TO SCALE drawn by VJC checked by DAJ date 07-27-2016

date

JOSEPH M. ETTORE, P.E.
PROFESSIONAL ENGINEER N.J. LIC. NO. 24GE032394

1 of 1

Crash Diagram/Crash Table

Crash Diagram/Crash Table

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Surface	No. of Crashes
Dry	9
Wet	4
Snowy	2
Icy	2

Type of Crash	No. of Crashes	% of Total
Backing	0	0%
Fixed object	13	76%
Left turn/U turn	0	0%
Opp. direction	0	0%
Headon/Angular	0	0%
Petalcyclist	0	0%
Pedestrian	0	0%
Right Angle	0	0%
Rear end	1	6%
Side swipe	0	0%
Animal	3	18%

Severity	No. of Crashes
PDO	9
Pain	4
Moderate Injury	4
Incapacitating Injury	0
Fatal Injury	0

Countermeasures selected based on crash type

- High friction surface treatment (FHWA proven Safety Countermeasure)
- Centerline rumble strips (FHWA proven Safety Countermeasure)
- Safety Edge pavement edge treatment (FHWA proven Safety Countermeasure)
- 8” edge line marking
- Raised pavement markers on center line
- Additional signage for advanced guidance on roadway
- Sign upgrades based on advisory speed limits determined by ball banking
- Improve sign visibility by installation of retroreflective post covers
- Chevrons and/or other traffic control devices to provide further guidance through curves
- Brush clearing to improve line of sight
- Installation of breakaway roadside fixtures within clear zone

What benefit can be expected?

Highway Safety Manual

- Provides a predictive method for estimating expected average crash frequency at an individual site.
- Relies on safety performance functions (SPF). –equations that estimate predicted average crash frequency as a function of traffic volume and roadway characteristics (e.g., number of lanes, median type, intersection control, number of approach legs).
- This case: Chapter 10 – Rural Two-Lane, Two-Way Roads

Crash Modification Factors

CRASH MODIFICATION FACTORS CLEARINGHOUSE

CMF / CRF Details

CMF ID: 7900

Improve pavement friction (HFS-High Friction Surfacing)

Description: The safety benefit of High Friction Surfacing Treatment (HFS)

Prior Condition: Individual curve with perceived friction-related crash problem

Category: Roadway

Study: *Evaluation of Pavement Safety Performance*, Merritt et al., 2015

Star Quality Rating:	★★★★☆ [View score details]

Crash Modification Factor (CMF)	
Value:	0.759
Adjusted Standard Error:	
Unadjusted Standard Error:	0.067

Crash Reduction Factor (CRF)	
Value:	24.1 *(This value indicates a **decrease** in crashes)*

http://www.cmfclearinghouse.org/

Crash Modification Factors

Treatment	Crash modifcation factor			
	Total		Fatal/Injury	
	CMF #	CMF	CMF #	CMF
High Friction Surface Treatment	7900	0.759	N/A	1
Safety Edge	4303	0.923	4323	0.835
Centerline Rumble Strip	3364	0.83	3368	0.63
Combined CMF		0.581		0.526
Predicted Crash Rate-Existing Conditions		2.343		0.846
Predicted Crash Rate-Post-construction		**1.362**		**0.445**

Cost/Benefit Analysis can be performed by comparing KABCO costs with and without modification factors vs estimated project cost (over the service life of the improvement)

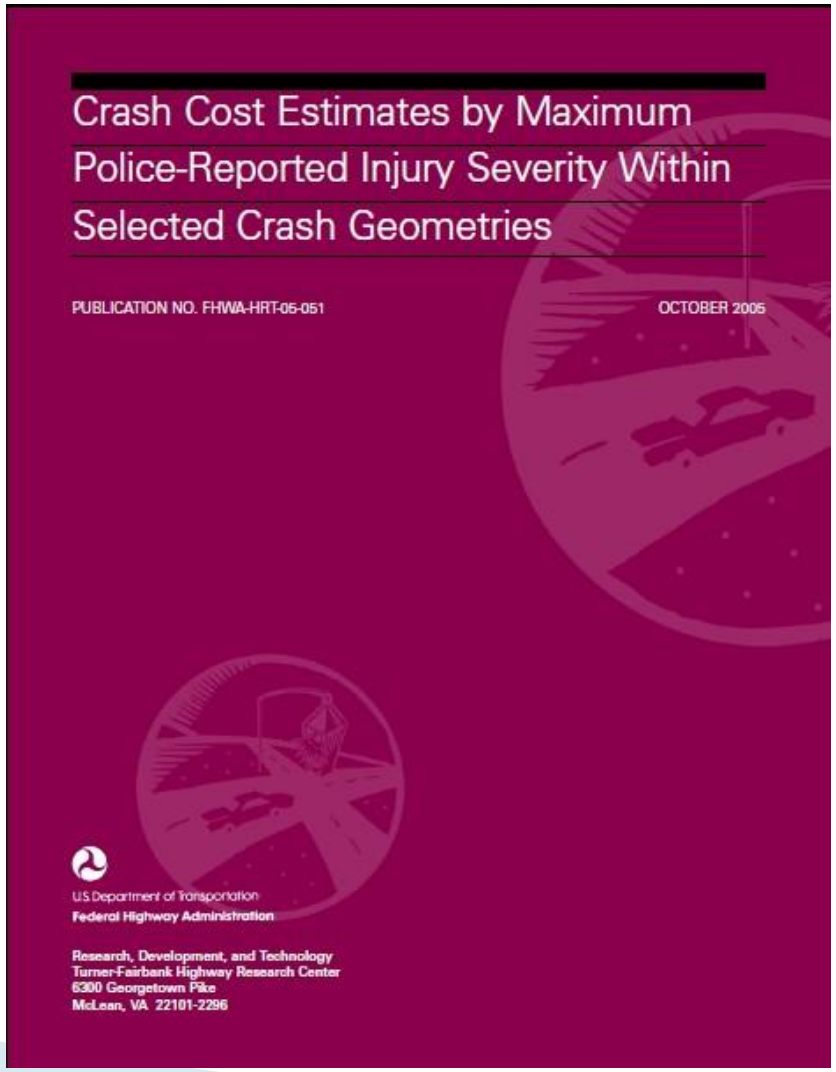
KABCO Costs

	Injury Severity		Estimated Cost	
			2001*	2016/17
	Fatal	(K)	$4,008,900	$5,447,373.00
	Fatal and/or Injury	(K/A/B/C)	$158,200	$214,965.30
	Injury	(A/B/C)	$82,600	$112,238.52
"Incapacitating"------ >	Disability Injury	(A)	$216,000	$293,505.09
"Moderate"-- -------- >	Evident Injury	(B)	$79,000	$107,346.77
"Complaint of Pain"--- >	Possible Injury	(C)	$44,900	$61,011.01
	Property Damage Only	(O)	$7,400	$10,055.27

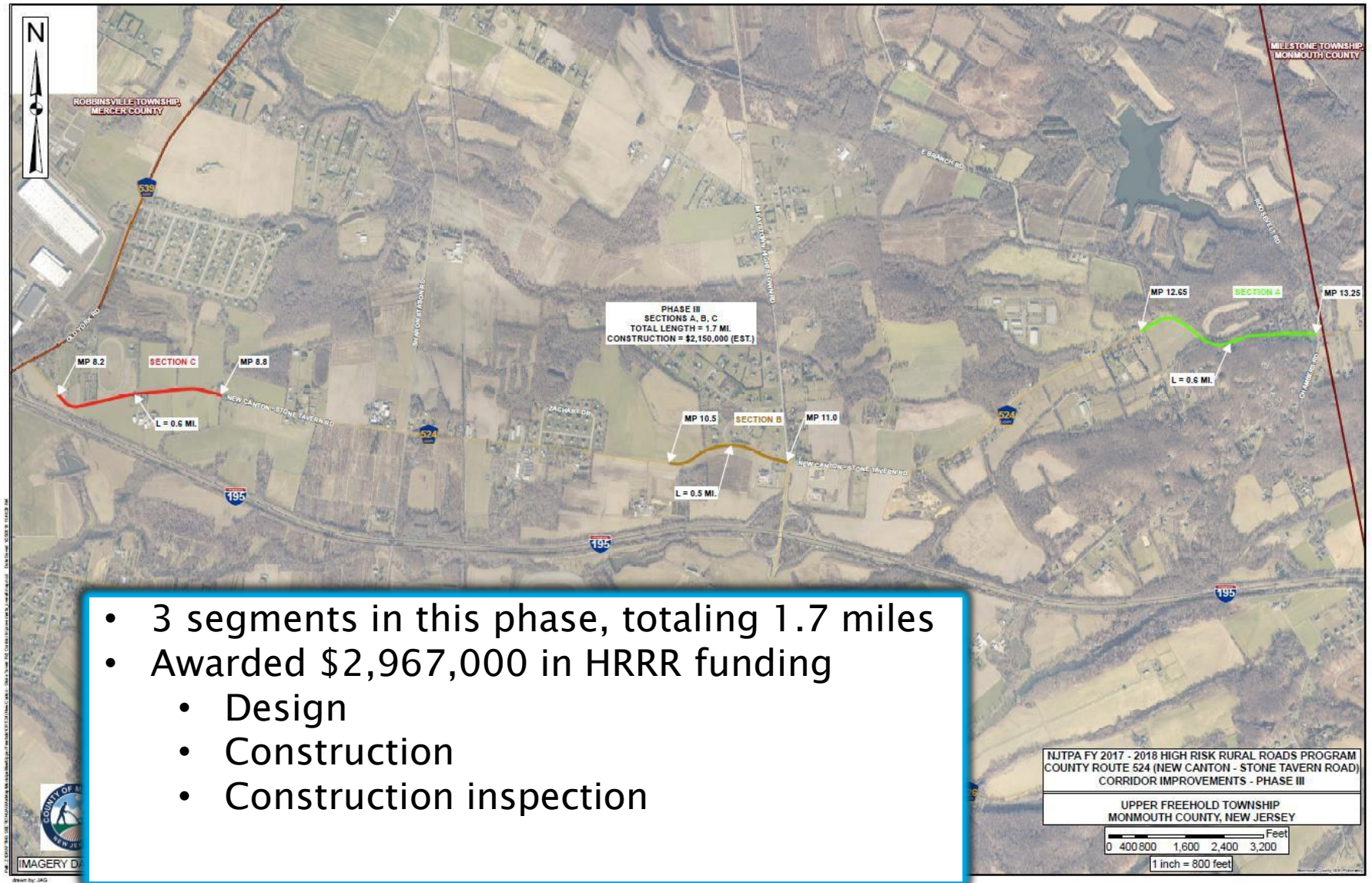
* *Societal Crash Costs by Severity, FHWA-HRT-05-051, October 2005*

KABCO Costs

https://www.fhwa.dot.gov/publications/research/safety/05051/05051.pdf



Concept Plan



- 3 segments in this phase, totaling 1.7 miles
- Awarded $2,967,000 in HRRR funding
  - Design
  - Construction
  - Construction inspection

Summary

- Follow the guidelines for the funding solicitations
- Data-Driven Safety Analysis is institutionalized and is a requirement of the HRRR/LSP application process (Spreadsheets and other tools available)
- Develop a process for selecting potential projects
  - Start with “high level” data (i.e. network screening lists)
  - Narrow down to a specific corridor or location
  - Identify crash patterns & develop a problem statement
  - Identify potential countermeasures
  - Evaluate the potential effect of countermeasures (i.e. use CMF, HSM analysis)
- Benefits
  - Informed Decision-Making
  - Targeted Investment
  - Improved Safety

EDC Innovations - INTERESTED

- Adaptive Signal Control Technology and Automated Traffic Signal Performance Measures (ATSPMs)
- 3D Engineered Models for Construction
- Geospatial Data Collaboration
- Regional Models of Cooperation
- Crowdsourcing for Operations
- Virtual Public Involvement
- Pavement Preservation (When, Where, and How)
- Advanced Geotechnical Methods in Exploration (A-GaME)
- Unmanned Aerial Systems (UAS)
- Safety Edge^{SM}

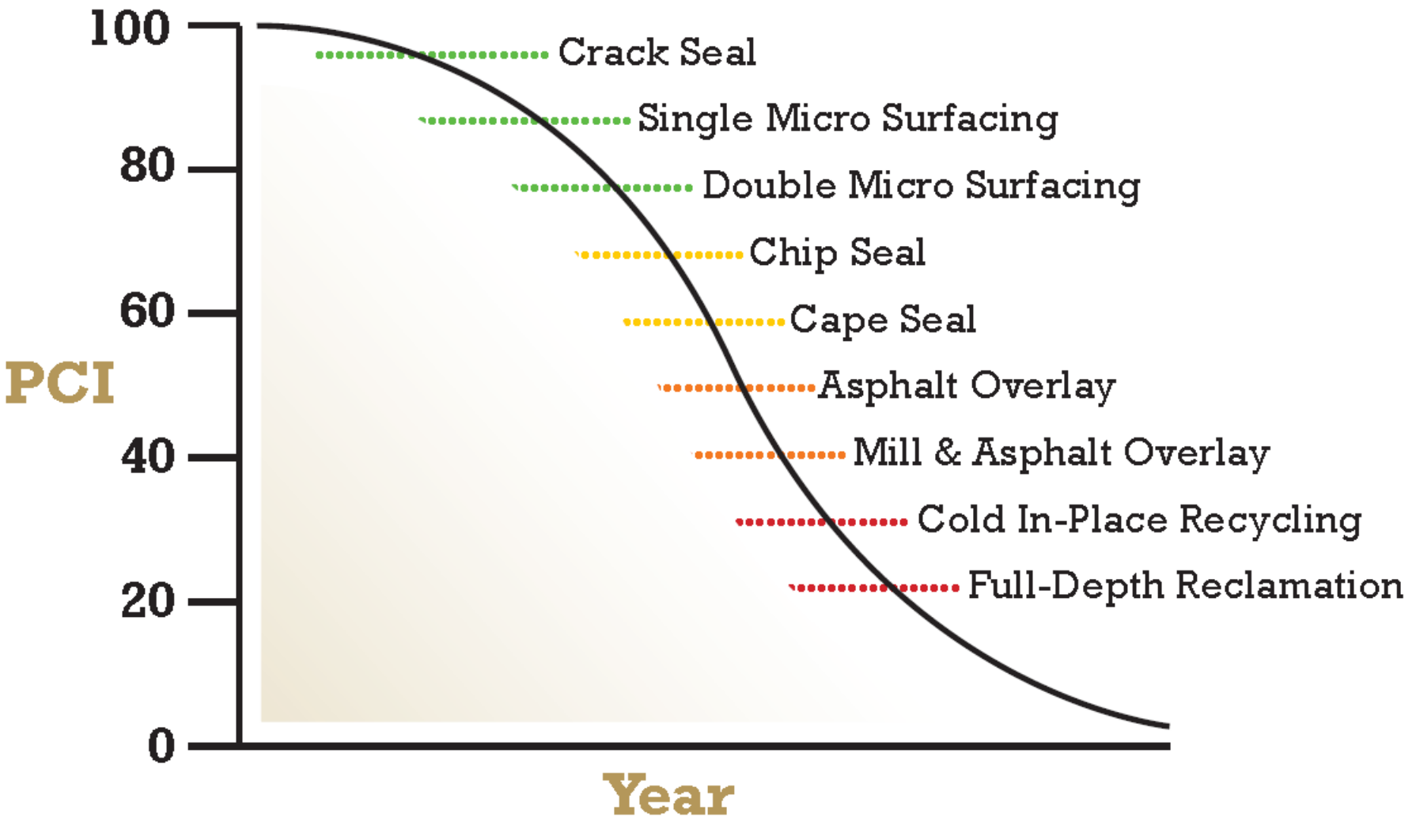
NJ STIC August 2019 Meeting
Pavement Preservation

Where to start

The objective is to maintain pavement condition such that corrective rehabilitation isn't needed

- **Evaluate your overall road network and condition of the individual roads**
- **Determine which treatment would be correct for the road condition**

Effective Pavement Management:
"Right Road, Right Treatment, Right Time"



Life cycle extension based on preservation techniques

Treatment	Life extension
Routine	
Crack Sealing Micropave Joints	1 – 3 years 5 – 8 years
Preventative	
Slurry Seal	3 - 5 years
Chip Seal High Performance Chip Seal	3 - 6 years 5 - 8 years
Micro Surfacing – Single Application Double Application	5 – 8 years 6 - 10 years
Cape Seal	6 – 10 years
Ultra Thin Overlays	8 – 10 years
Major Rehabilitation	
Cold In-Place Recycling	10 – 15 years
Full Depth Reclamation	10 – 15 years

Jackson Township

Jackson Township, Ocean County As of the 2010 United States Census, the township population was 54,856.
Area 100.6 mi²
Jackson Township is the third-largest township in New Jersey by area with approximately 10 miles of State Highway, 101 miles of County and 232 miles of Municipal roads.

Winterberry Project Plan

STREET NAME	EST. SQ. YD OF TREATMENT SURF
WINTERBERRY BLVD	30506 SQ YD
SANDCASTLE CT	3058 SQ YD
TWIN OAKS CT	5632 SQ YD
BUTTONWOOD DR	7509 SQ YD
BEECH CT	1476 SQ YD
BANYAN CT	1877 SQ YD
IRONWOOD CT	1208 SQ YD
ASPEN CT	3754 SQ YD

JACKSON TOWNSHIP

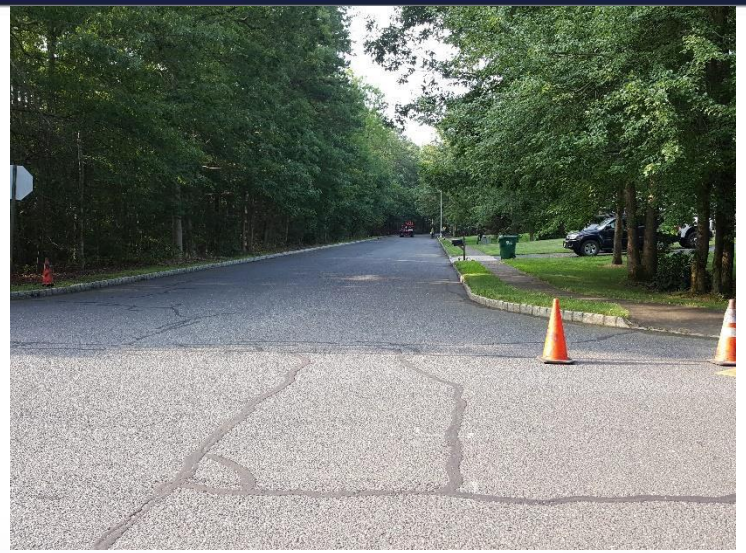
Daniel J. Burke, P.E.

REPAIR PLAN

DATE: 04/1/18

SCALE: N.T.S.

Winterberry Project – Prep Pictures



Winterberry Project - Pictures

Winterberry Project - Pictures

Winterberry Project - Videos

Micro-Surfacing vs. Mill / Pave

Winterberry Mill / Pave Project Cost

Total Centerline Miles = 2.55
Total Road Surface Sq Yards = 55,020
Total Asphalt Tonnage = 6,878 = $78 per Ton = $536,520
Total Milling Sq Yards = 24,082 @ $2.70 = $65,020

Total Cost for Mill / Pave = $601,520

Winterberry Micro-Surfacing Project Cost

Micro-Surfacing Aggregate = $41,919
Micro-Surfacing Emulsion = $105,011.12
Crack Sealing and Joints = $45,842.45

Total Cost for Micro-Surfacing = $192,772.57

QUESTIONS?

Deanna Stockton, P.E., Princeton, dstockton@princetonnj.gov

Vince Cardone, P.E., Monmouth County, vince.cardone@co.monmouth.nj.us

Daniel Burke, P.E., Jackson Township, dburke@jacksontwpnj.net

CALL FOR FUTURE PRESENTERS

WHO?

- Any member of the STIC Council or a designated representative

WHAT?

- Depending on the topic, 15-30 minutes
- Any of the EDC initiatives

When?

- Quarterly, at each STIC Meeting

WHY?

- NJ STIC is not solely a NJDOT initiative.

OUTREACH & COORDINATION EFFORTS

RECENT:

- PA STIC Meeting (July 17)
- Tech Talk! – EDC5 Collaborative Hydraulics (2.0) Advancing to the Next Generation of Engineering (CHANGE) (August 6)

FUTURE:

- Director's Meeting
- Article being prepared for the League of Municipalities magazine
- State Innovation Forum for innovation officers/engineers (Sept 16-19)
- ACEC Fall Conference (Sept 22-24)
- Annual NJDOT Research Showcase (October 23)
- Tech Talk! -- Safe Transportation for Every Pedestrian (STEP) (Oct 30)
- League of Municipalities (November 19-21)

NOVEMBER 19, 2019
NJ STIC FALL MEETING:

CONFIRMED: TOM HARMAN, DIRECTOR –
FHWA CENTER FOR ACCELERATING INNOVATION

POTENTIAL:

DVRPC – CRASHES AND COMMUNITIES OF CONCERN
SJTPO - CROWD SOURCING
NJTPA – SOCIAL MEDIA, OUTREACH BEST PRACTICES, TRAINING ON PUBLIC OUTREACH
WAYNE TWP. - SMART SIGNALS, UAS FOR SEWER AQUEDUCT INSPECTIONS

State Transportation Innovation Council
Business Meeting Agenda
July 17, 2019

8 a.m. – Hot Pour Mastics Demonstration

(Parking Lot, Corner of Sycamore Drive and Lab Lane, State Hospital Grounds, Harrisburg)

Note: Demonstration is weather permitting, and attendance is optional.

10 a.m. – STIC Business Meeting

(PEMA Building, 1310 Elmerton Ave., Harrisburg, PA 17110)

- **Call to Order –**
  - *PennDOT Secretary Leslie S. Richards*
  - *FHWA Pennsylvania Assistant Division Administrator Keith Lynch*
- **Welcome and Introductory Remarks**
- **2019 STIC Incentive Funding Update**
  - *Karyn Vandervoort, FHWA Pennsylvania Division Office*
- **Future Highways –**
  - *Tom Harman, FHWA Center for Accelerating Innovation*
- **Every Day Counts Innovation Highlight: Advancing e-Construction and Partnering Beyond EDC-4**
  - *John Myler, PennDOT District 11*
  - *Phil Petrina, PennDOT Office of Information Services*
  - *Bob Latham, Associated Pennsylvania Constructors*
- **Innovation Submission Presentation: Link Slabs**
  - *Rachel Duda, Design TAG Assistant Leader*
- **Panel Discussion: Municipal Separate Storm Sewer System (MS4) Partnerships**
  - *Daryl St. Clair, PennDOT Highway Administration Deputate*
  - *Jon Fleming, PennDOT Bureau of Maintenance and Operations*
  - *Graham Boardman, Stantec*
  - *Jeff MacKay, NTM Engineering*
  - *George Wolfe, Manager (Retired), Lower Paxton Township, Dauphin County*
  - *Lee Murphy, Pennsylvania Department of Environmental Protection*
  - *Steven Taglang, Pennsylvania Department of Environmental Protection*
  - *Roger Adams, Pennsylvania Department of Environmental Protection*
  - *Brad Heigel, Pennsylvania Turnpike Commission*
  - *Question-and-Answer Session*
- **Innovative Approaches to Geotechnical Slides**
  - *Jonathan Moses, PennDOT District 11*
- **Feedback from the Floor**

PA STIC Business Meeting
July 17, 2019

Pennsylvania Department of Transportation (PennDOT)
Federal Highway Administration (FHWA)
Pennsylvania Association of Environmental Professionals (PAEP)
American Council of Engineering Companies (ACEC/PA)
Southern Alleghenies Planning & Development Commission (SAPDC)
Lehigh University
Women in Transportation Seminar
Lehigh Valley Planning Commission
Pennsylvania State Association of Township Supervisors (PSATS)
Pennsylvania Asphalt Pavement Association (PAPA)
American Society of Highway Engineers (ASHE)
American Public Works Association (APWA)
Pennsylvania State Association of Boroughs (PSAB)
Associated PA Constructors (APC)
Traffic 21 Institute (Carnegie Mellon University)
American Concrete Pavement Association (ACPA)
Larson Transportation Institute (Pennsylvania State University)
County Commissioners Association of Pennsylvania (CCAP)
U.S. Army Corps of Engineers, Baltimore District
Pennsylvania Municipal League
Pennsylvania Aggregates and Concrete Association (PACA)
Pennsylvania Department of Community and Economic Development (DCED) - Governor's Center for Local Government Services
Pennsylvania Public Utility Commission
Pennsylvania Turnpike Commission
Pennsylvania Historical Museum Commission (PHMC) - Bureau for Historic Preservation
Pennsylvania Department of Conservation and Natural Resources (DCNR)
Pennsylvania Department of Environmental Protection (DEP)

	What is the SAME?	What is *slightly* DIFFERENT?
Format & Duration	2-3 hours	• Duration was a little longer, but not by much. Start/end times not listed on the agenda. • Meet 3X/yr
Leadership Level		PennDOT Secretary, Leslie S. Richards (unable to attend) FHWA PA Asst. Division Administrator, Keith Lynch
Attendees	Mostly similar to our attendance list, except…	More representatives from academia, industry/consultants
Agenda Items	• STIC Incentive Funding reminders/updates • featured innovation presentation	Hot Pour Mastics Demonstration prior to business meeting was well received (several vendors present)
		PA STIC Council presented with innovation submission, gave feedback then and there
Other		Interactive live polling via menti.com
STIC Structure	HOME: Bureau of Research • $200K (includes STIC grant $) • 4 employees (part time working on STIC) 3 CIA Teams Website, articles	HOME: Bureau of Innovations • $1.9M/fiscal year (includes STIC grant $ and $500K in SPR funding) • 13 employees 4 TAGs Strategic Plan, Annual Reports, detailed meeting minutes, Newsletters

REMINDERS!

Build A Better Mousetrap Competition
- Entries due August 15th (state agency)
- **https://cait.rutgers.edu/mousetrap/**

National STIC Meeting
- October ?? at NJDOT/FHWA or can participate remotely

NJ STIC Quarterly Meeting
- Fall – November 19th, 2019

ROUNDTABLE DISCUSSION

1 TO 2 MINUTES EACH

STIC
State Transportation Innovation Councils

EDC

THANK YOU!

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