

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)

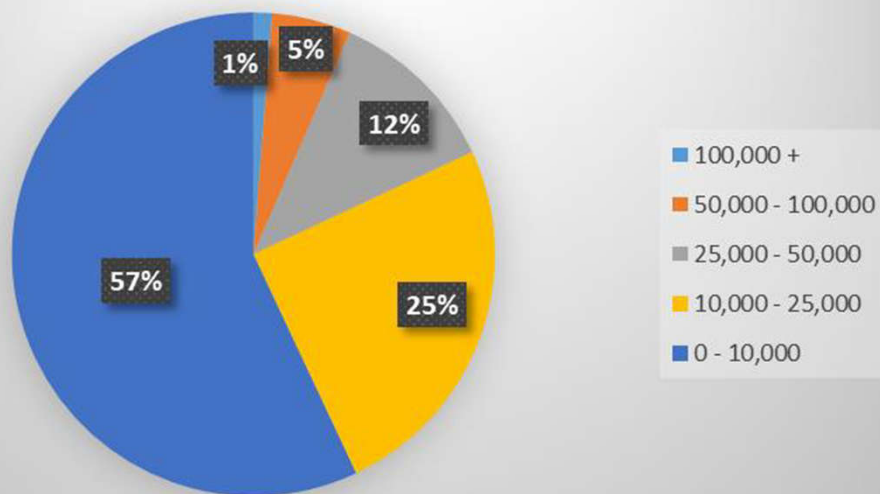


New Jersey Statistics

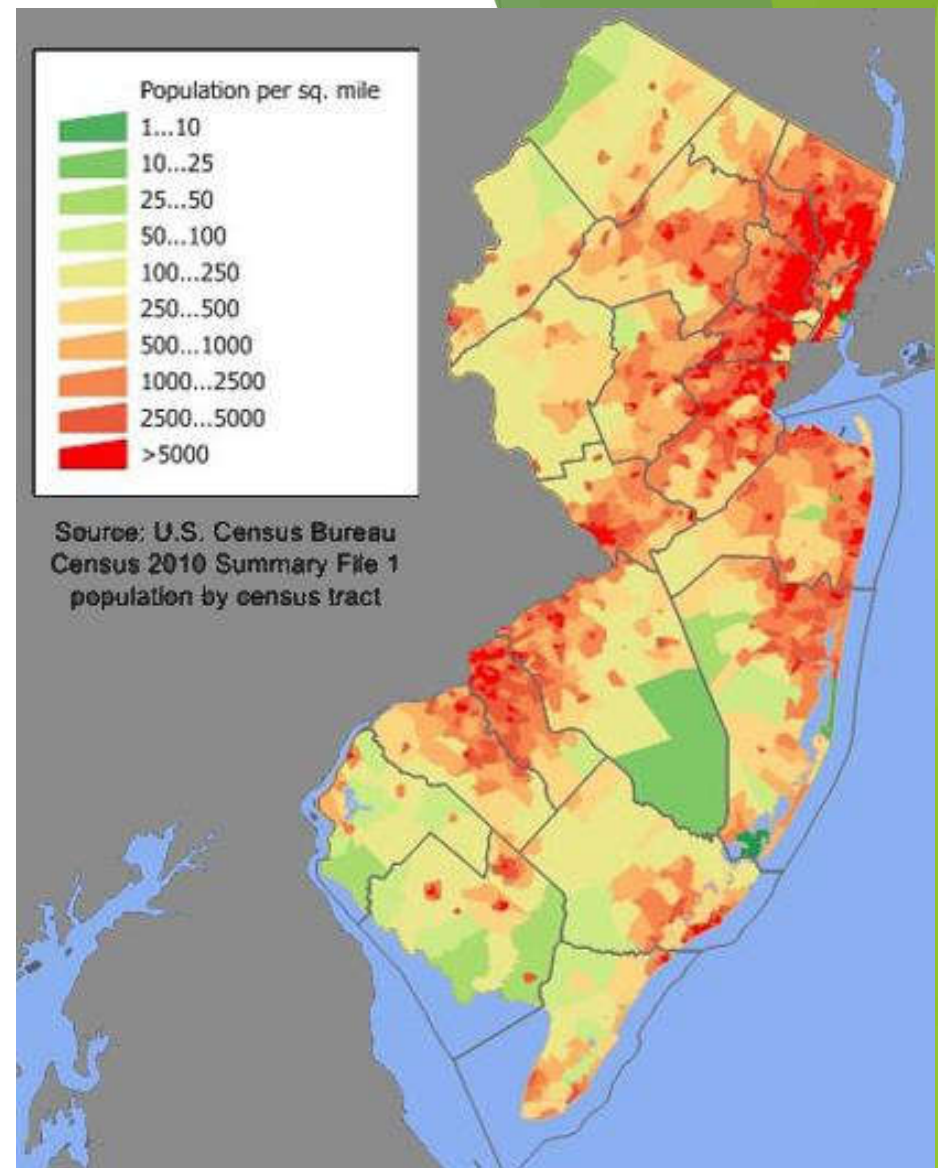
- ▶ NJDOT has jurisdiction on just 7% of roads in New Jersey / 66% volume
- ▶ In Mercer: 11% County, 80% Municipal, 8% NJDOT
- ▶ In Monmouth: 11% County, 82% Municipal, 7% NJDOT
- ▶ In Ocean: 21% County, 73% Municipal, 6% NJDOT

Municipal Statistics

Municipalities By Population



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	000001732	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	Roxcticus 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	1	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	BECKMAN 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	CASINORD	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
CASINORD	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

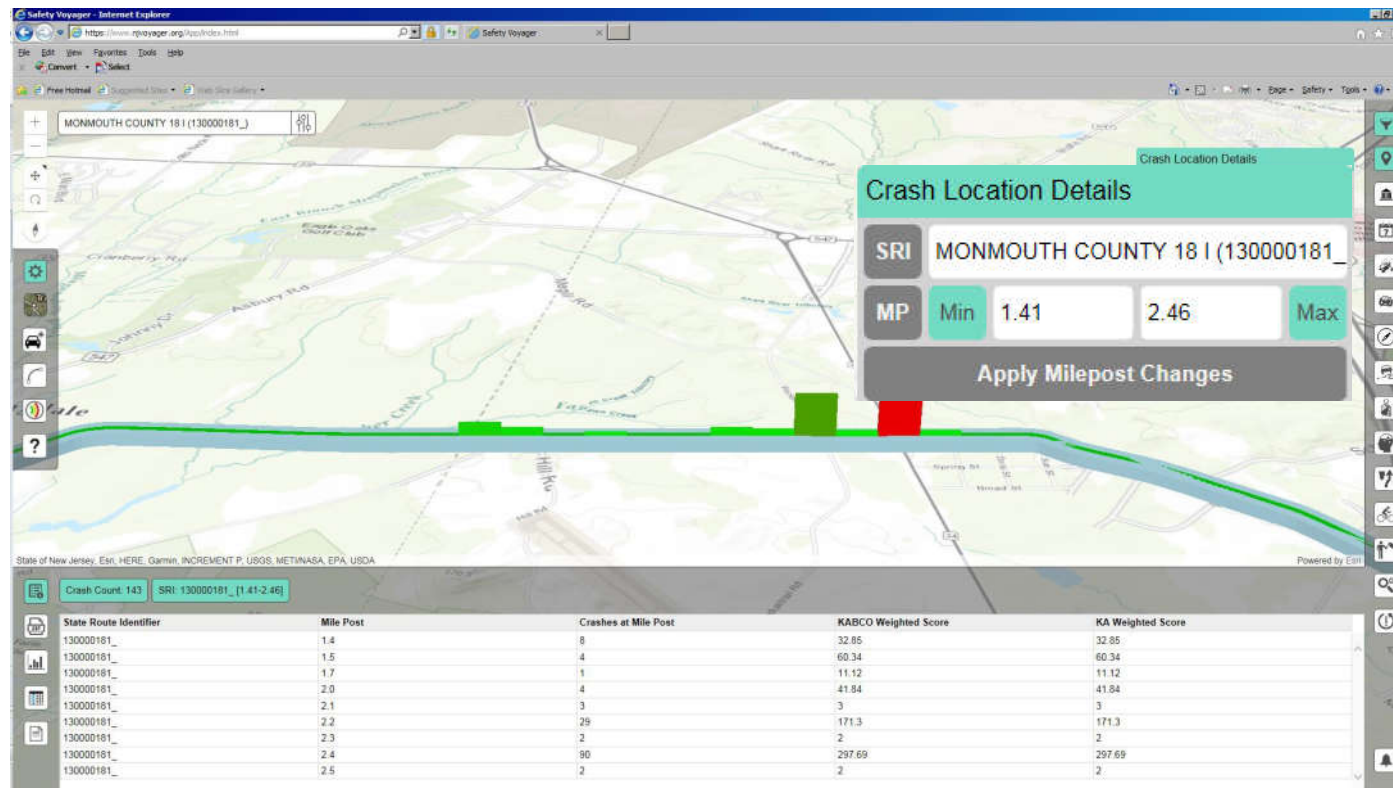
Lists are ranked assuming the weight of a fatal crash is the same as an incapacitating injury crash and using the value of a Complaint of Pain injury as the base value (K=A, no Property Damage only (PDO)).

 		HSM (FHWA-HRT-05-051)		Weighting Factors		
		Published 2005				
		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

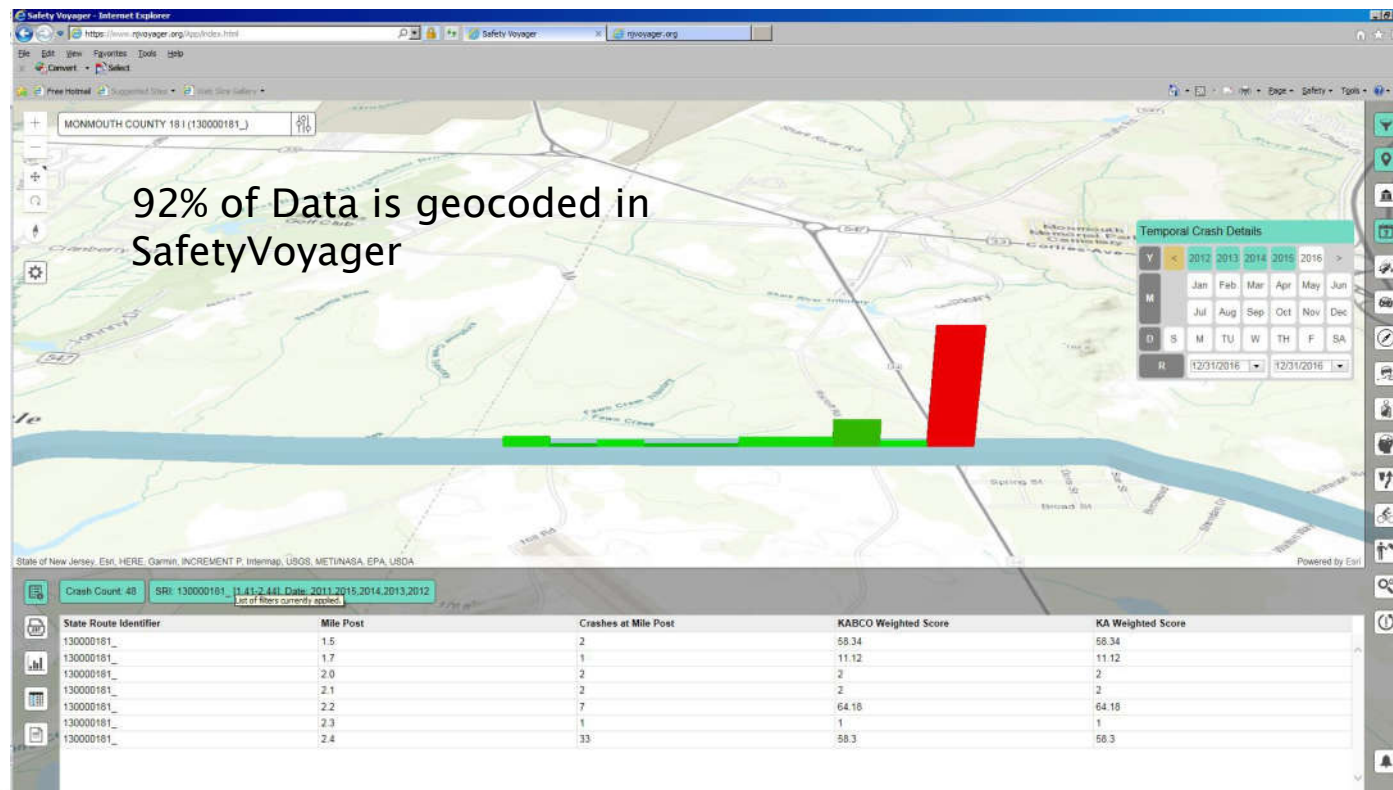
ROAD NAME	SRI	TOTAL CRASHES	FATAL INJURY	INCAPACITATING INJURY	MODERATE INJURY	PAIN	PDO	Weighted Score/mile
Belmar Boulevard	130000181_	28	0	2	1	3	22	13.61
Jackson Mill Road	13000023_	35	1	0	3	9	22	12.98
Perrineville Road	13000001_	40	0	1	1	8	30	8.72
CASINORD	13191012_	6	0	1	0	1	4	5.93
South Rochdale 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
MEIRSRD	13511013_	4	1	0	1	0	2	2.97
Millstone Road	13321017_	39	1	0	4	3	31	2.60



Crash SRI and Milepost



Filters are easy to find



Review remainder of screening list

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



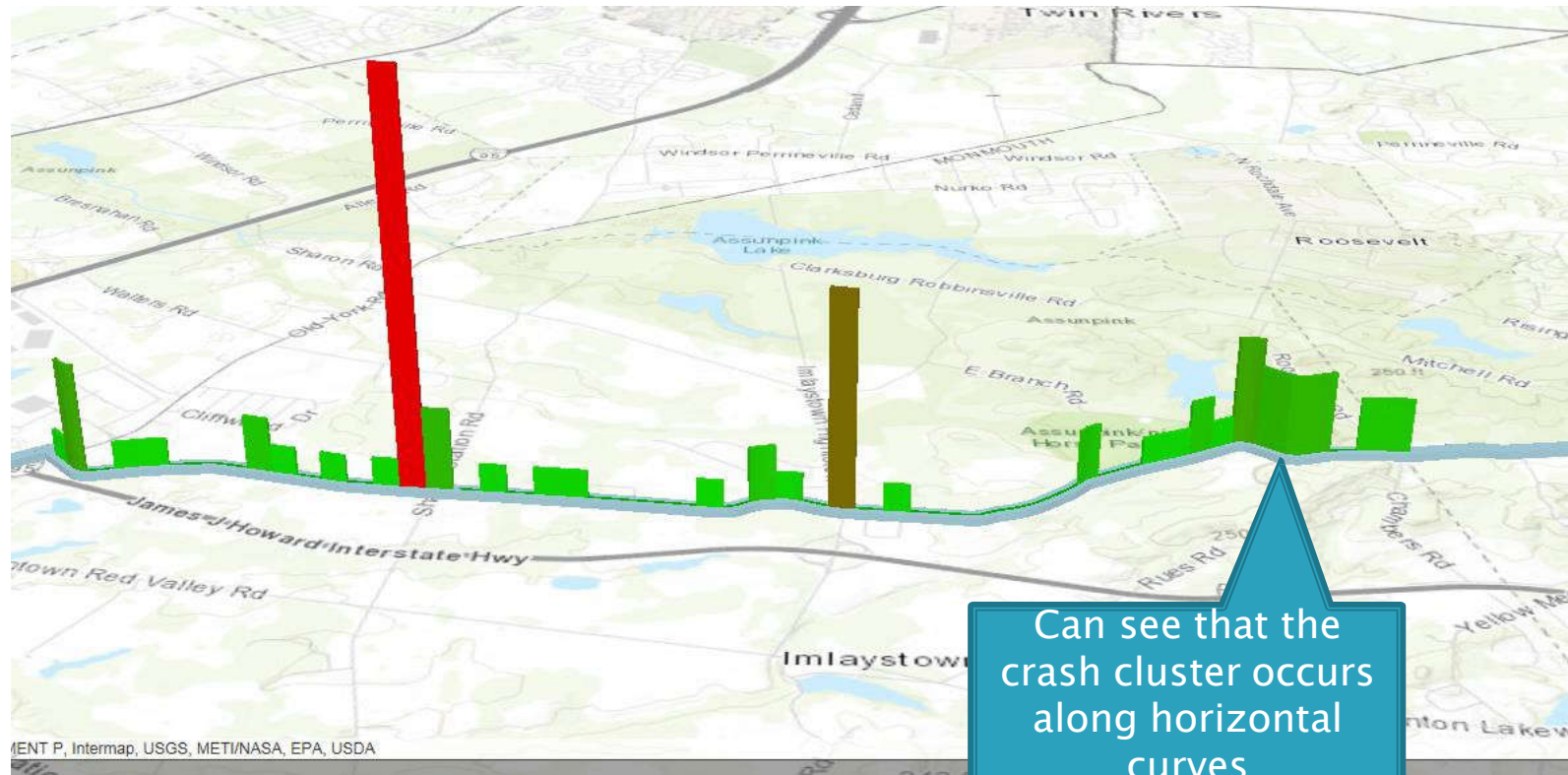
Review remainder of screening list

- ▶ 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	130000023_	0.00	1.45	1.45
15	4	Monmouth	Millstone township	Perrineville Road	130000001_	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	130000027_	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

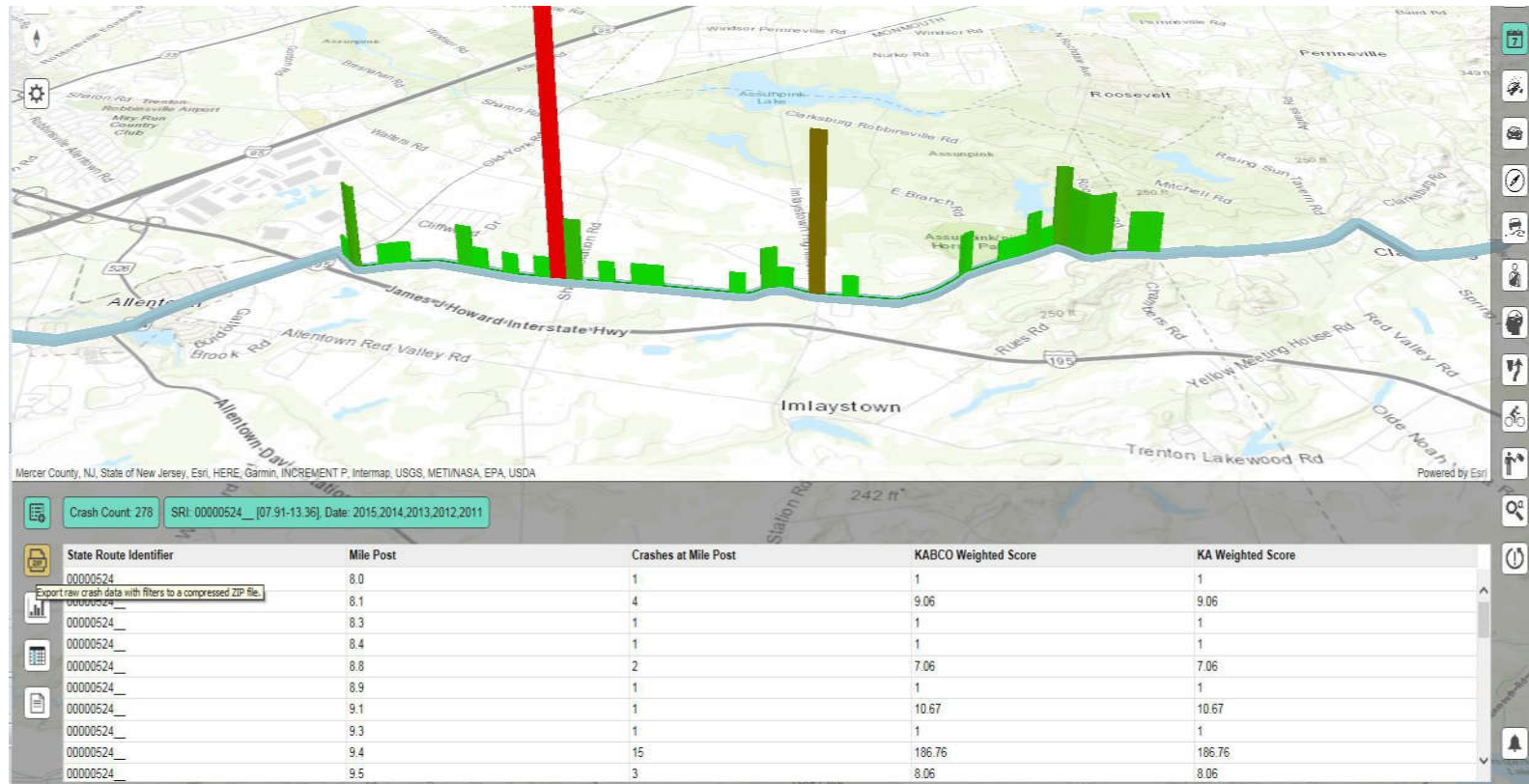


CR 524 Histogram-SafetyVoyager



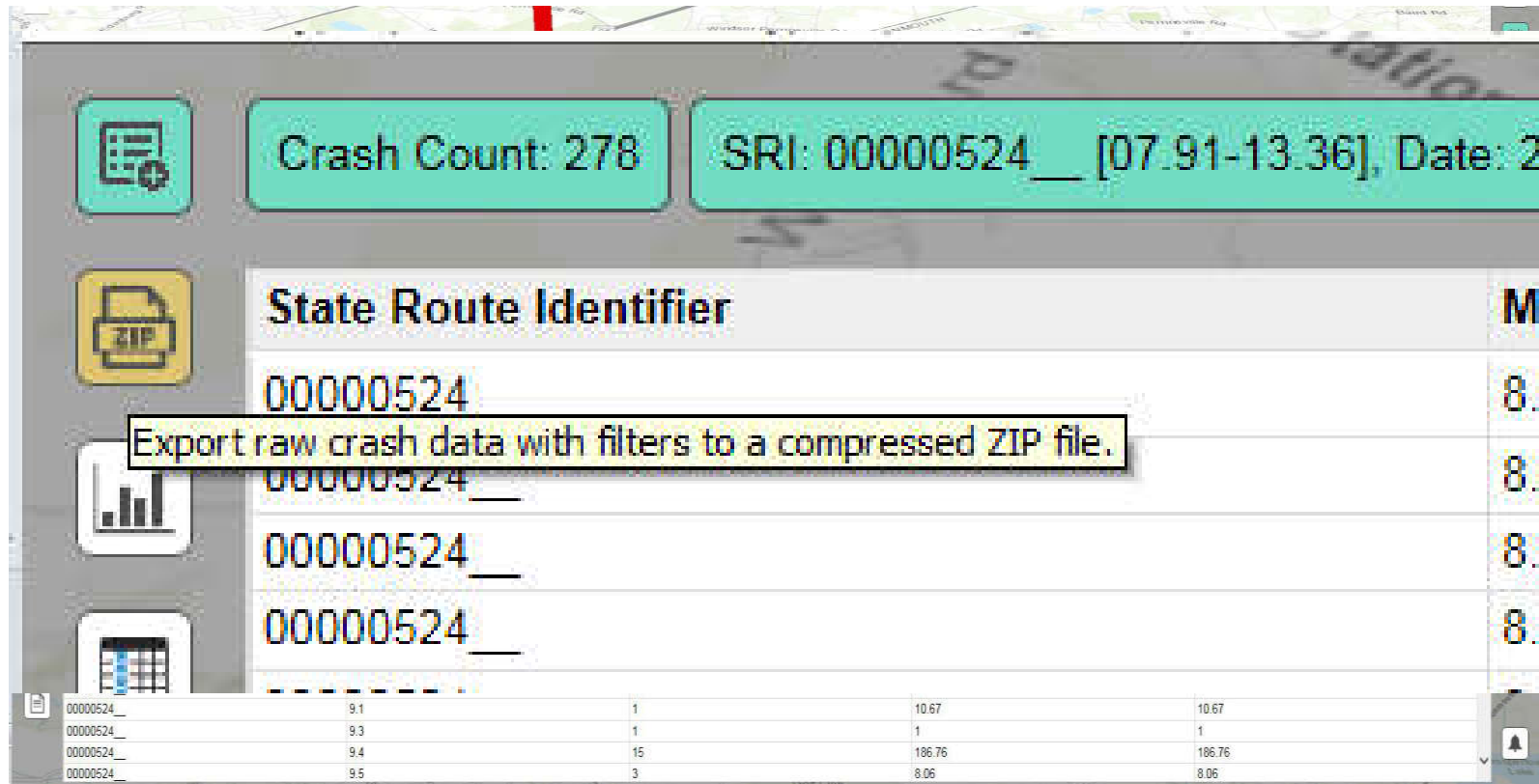
Detailed Crash Data

► Safety Voyager



Detailed Crash Data

- ▶ Safety Voyager



Detailed Crash Data

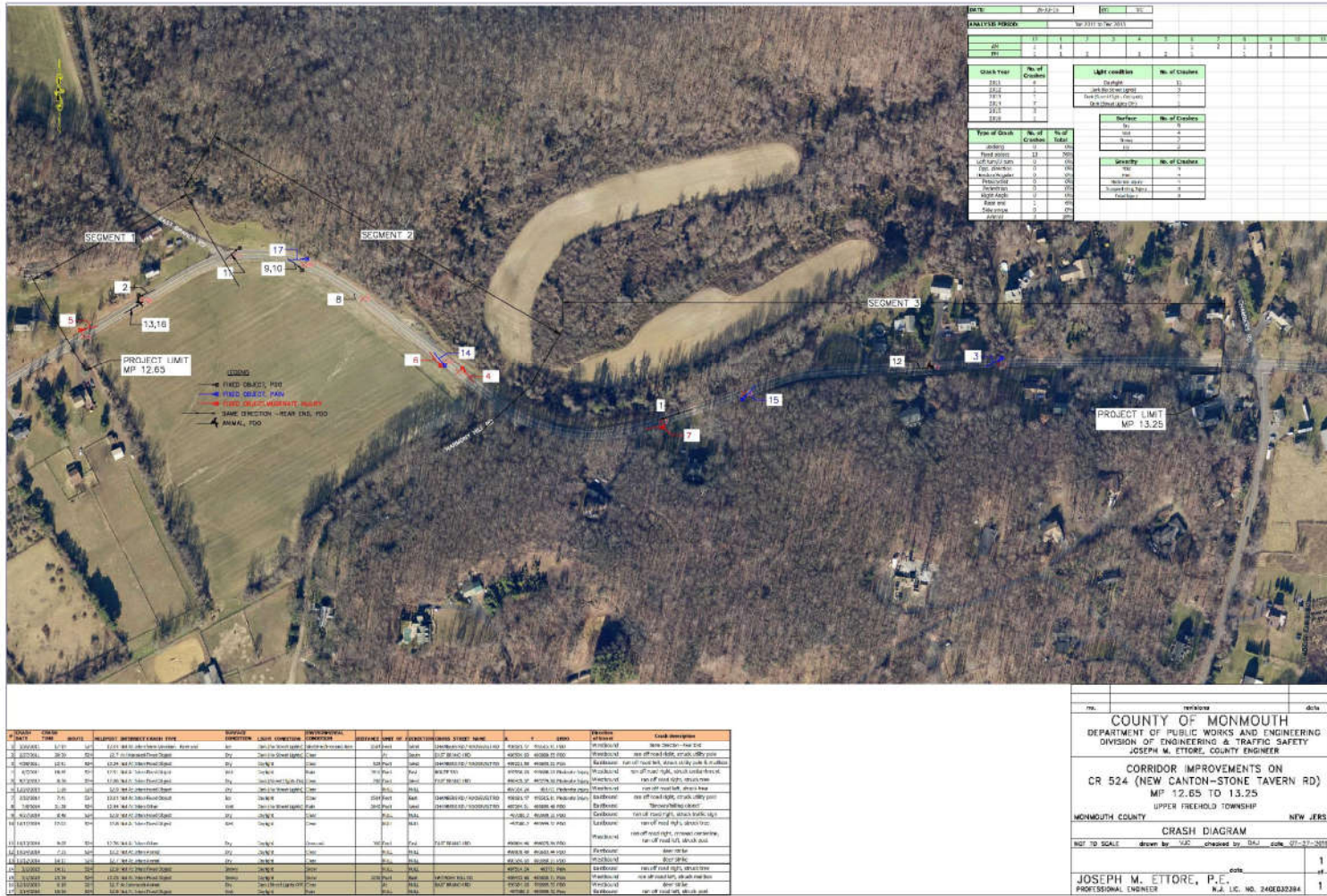
► Safety Voyager

VoyagerExport (Read-Only) - Microsoft Excel

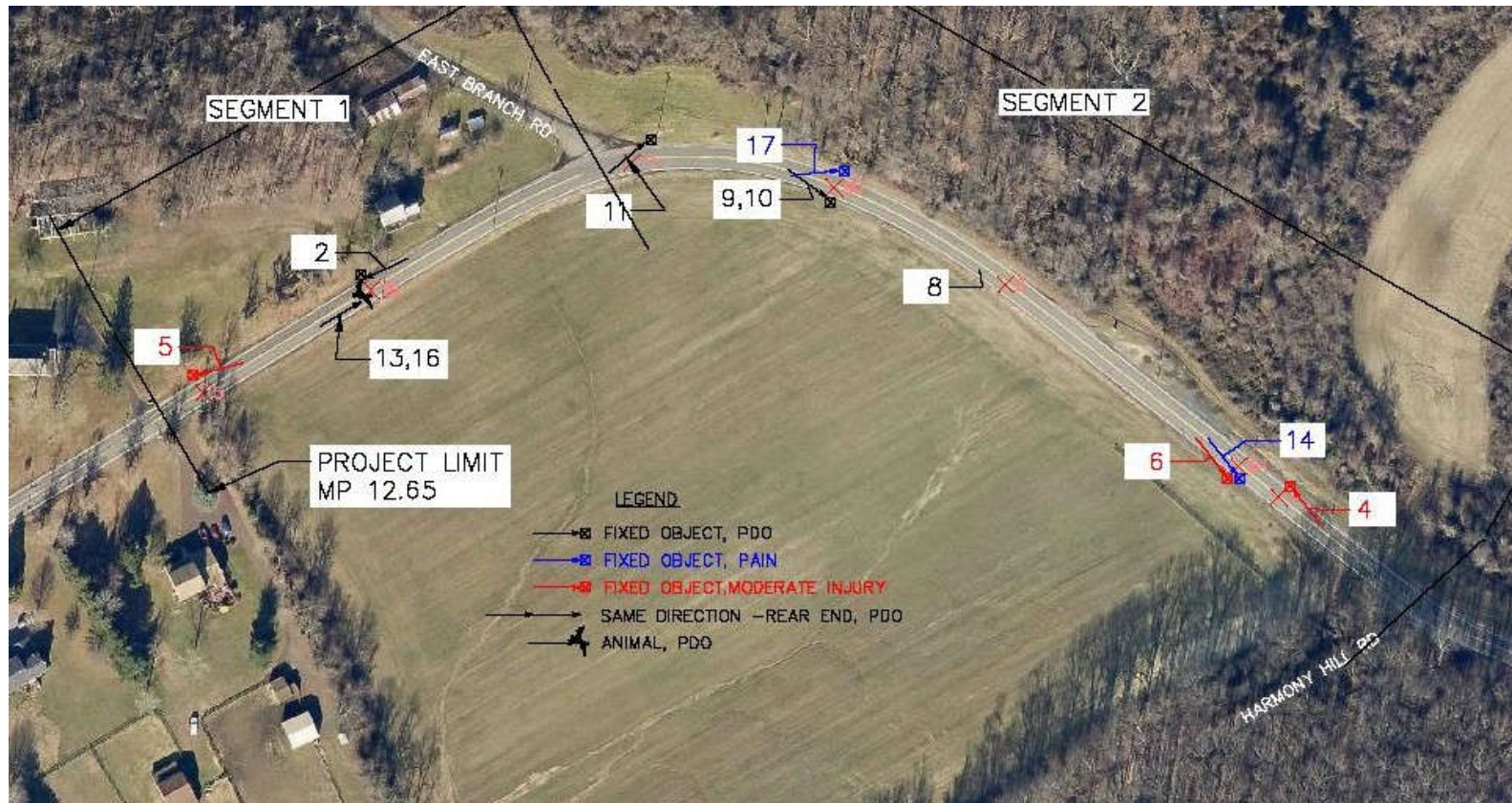
Crash Identifier												
A	B	C	D	E	F	G	H	I	J	K	L	M
Crash Identifier	County	Municipality	Year	Case Number	Day of the Week	Crash Type	Route Suffix	Road Characteristic	Road Surface Type	Road Condition	Light Condition	Environment
13-02-2013-MV-13-19	MONMOUTH	ALLENTOWN BORO	2013	MV-13-19	Wednesday	Fixed 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



Crash Diagram/Crash Table



Crash Diagram/Crash Table

#	CRASH DATE	CRASH TIME	ROUTE	MILEPOST	INTERSECT	CRASH TYPE	SURFACE CONDITION	LIGHT CONDITION	ENVIRONMENTAL CONDITION	DISTANCE	UNIT OF MEASURE	DIRECTION	CROSS STREET NAME	X	Y	EPOD	Direction of travel	Crash description
1	1/26/2011	17:15	524	13.04	Not At Inter	Same Direction - Rear End	Icy	Dark (No Street Lights)	Sleet/Hail/Freezing Rain	1584	Foot	West	CHAMBERS RD / ROOSEVELT RD	498181.47	493515.81	PDO	Westbound	Same Direction - Rear End
2	2/27/2011	20:30	524	12.7	At Intersect	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 Inter	Fixed Object	Dry	Daylight	Clear	528	Foot	West	CHAMBERS RD / ROOSEVELT RD	499221.39	493693.02	Pan	Eastbound	ran off road left, struck utility pole & mailbox
4	8/7/2011	18:44	524	12.91	Not At Inter	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 Inter	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 Inter	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 Inter	Fixed Object	Icy	Daylight	Clear	1584	Foot	East	CHAMBERS RD / ROOSEVELT RD	498181.47	493515.81	Moderate Injury	Eastbound	ran off road right, struck utility pole
8	7/8/2014	21:28	524	12.84	Not At Inter	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 Inter	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 Inter	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 Inter	Other	Dry	Daylight	Overcast	300	Foot	East	EAST BRANCH RD	496864.48	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 Inter	Animal	Dry	Daylight	Clear		NULL	NULL		499008.49	493663.44	PDO	Eastbound	deer strike
13	11/12/2014	14:11	524	12.7	Not At Inter	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 Inter	Fixed Object	Snowy	Daylight	Snow		NULL	NULL		497514.24	493701	Pan	Eastbound	ran off road right, struck tree
15	3/1/2015	12:24	524	13.09	Not At Inter	Fixed Object	Snowy	Daylight	Snow	1056	Foot	East	HARPOY HILL RD	498433.88	493600.71	Pan	Westbound	ran off road left, struck mailbox
16	12/16/2015	6:10	524	12.7	At Intersect	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 Inter	Fixed Object	Wet	Daylight	Rain		NULL	NULL		497080.2	493999.32	Pan	Eastbound	ran off road left, struck post



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

20114

20121

20131

20147

20153

20161

Light condition

No. of Crashes

Daylight11

Dark (No Street Lights)3

Dark (Street Lights On/ spot)1

Dark (Street Lights Off)1

Surface

No. of Crashes

Dry9

Wet4

Snowy2

Icy2

Severity

No. of Crashes

PDO9

Pain4

Moderate Injury4

Incapacitating Injury0

Fatal Injury0

Type of Crash

No. of Crashes

% of Total

Backing00%

Fixed object1376%

Left turn/U turn00%

Opp. direction00%

Headon/Angular00%

Petalcyclist00%

Pedestrian00%

Right Angle00%

Rear end16%

Side swipe00%

Animal318%



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



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 modification 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)



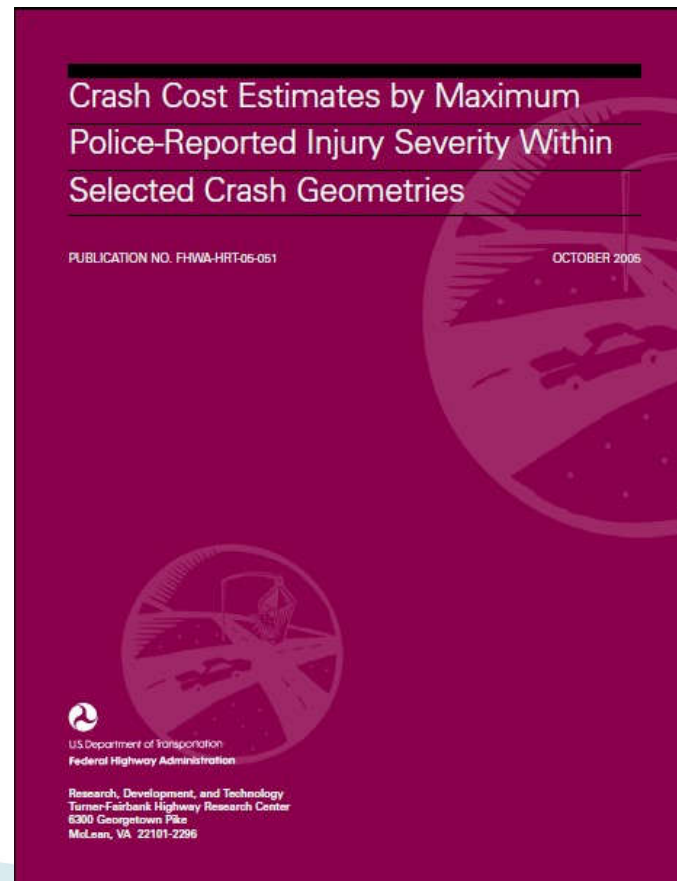
KABCO Costs

	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					

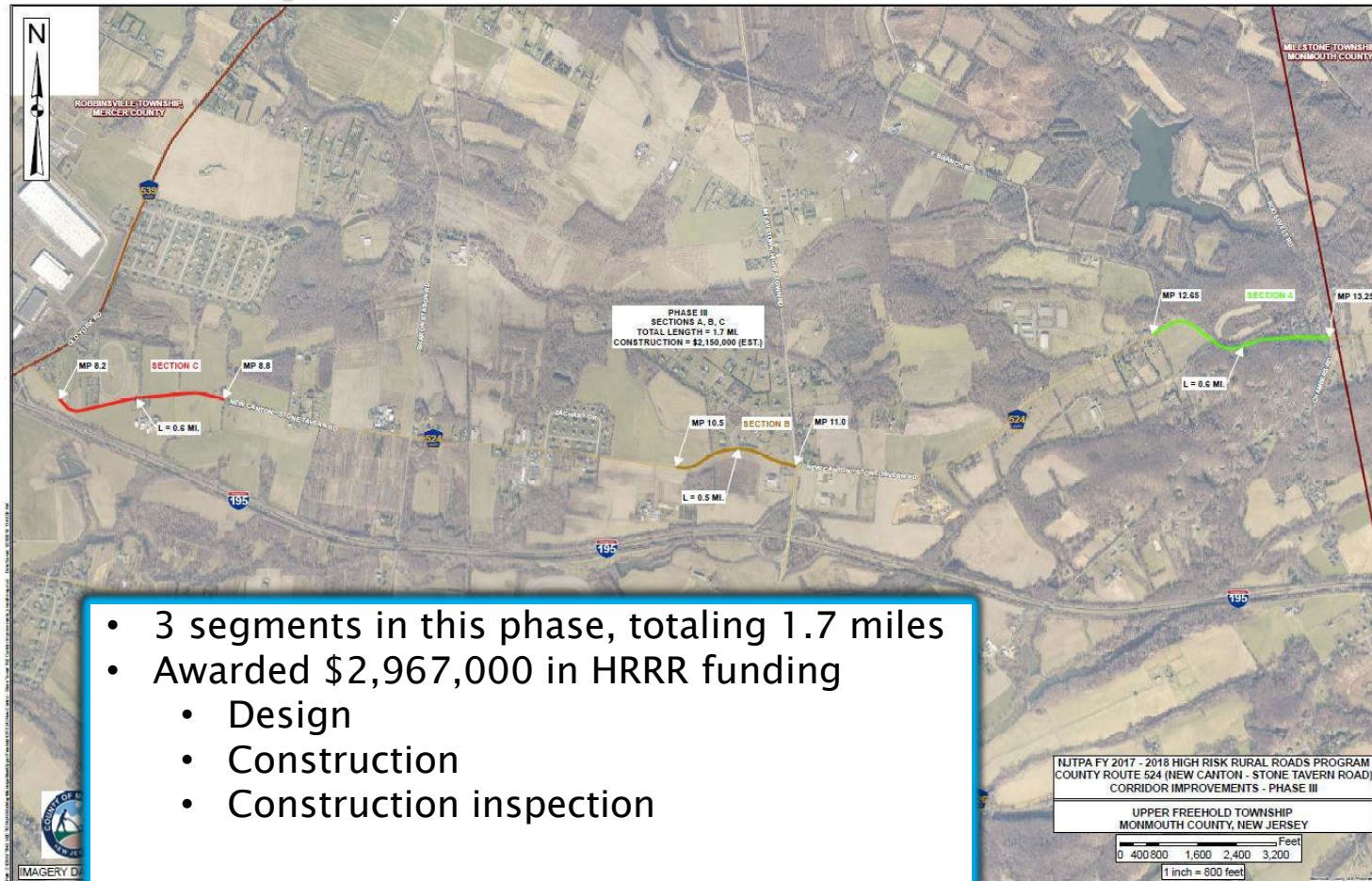


KABCO Costs

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



Concept Plan



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 EdgeSM

NJ STIC August 2019 Meeting Pavement Preservation



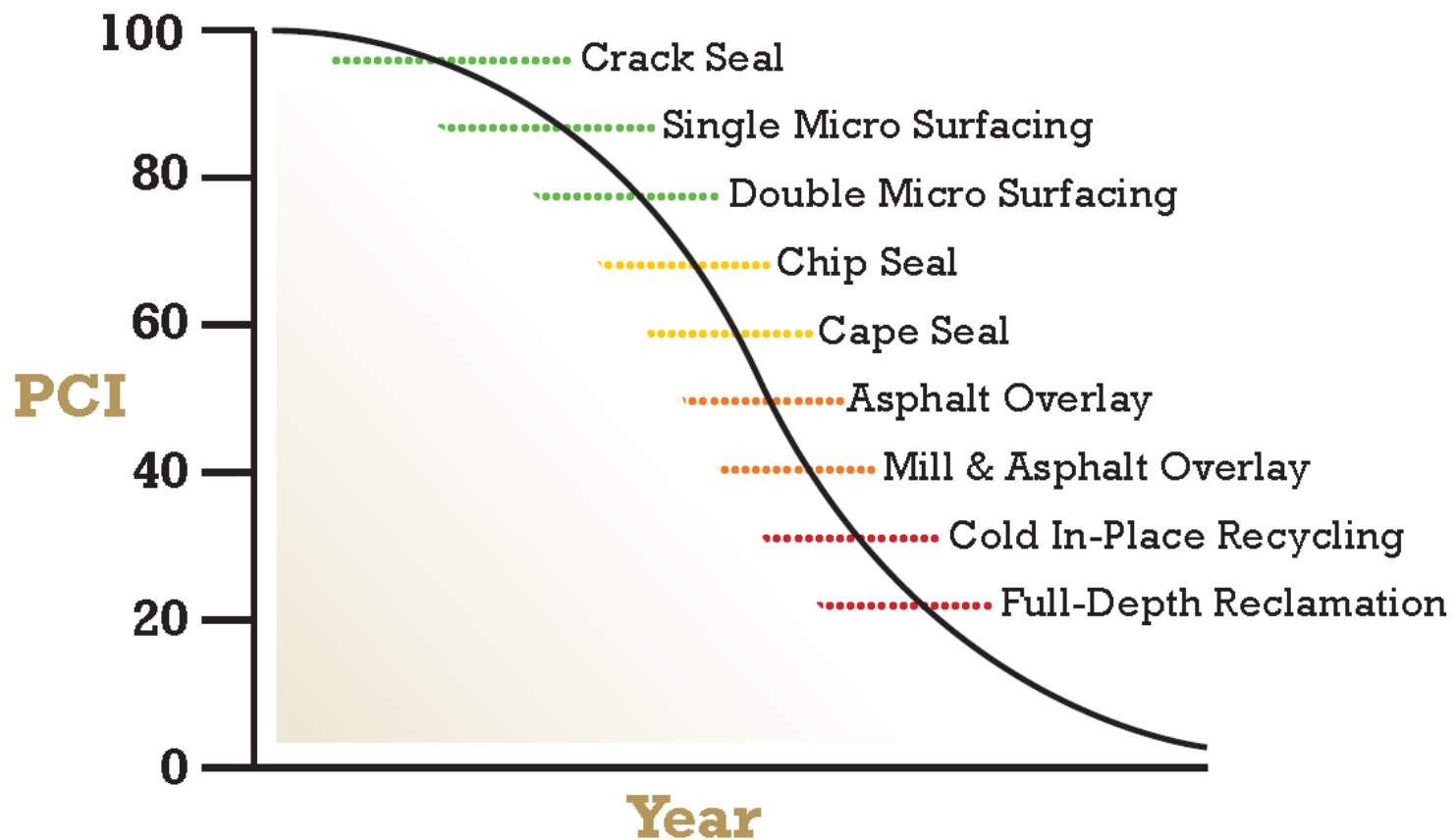
Where to start

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**



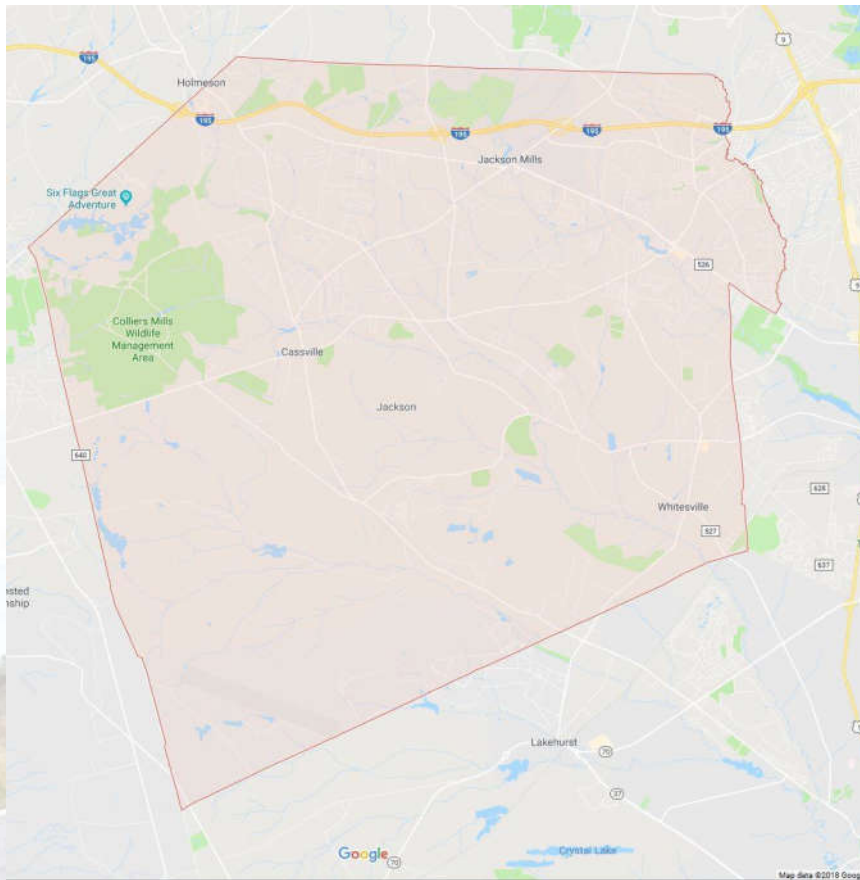
Effective Pavement Management: “Right Road, Right Treatment, Right Time”



Life cycle extension based on preservation techniques

Treatment	Life extension
<u>Routine</u>	
Crack Sealing	1 – 3 years
Micropave Joints	5 – 8 years
<u>Preventative</u>	
Slurry Seal	3 - 5 years
Chip Seal	3 - 6 years
High Performance Chip Seal	5 - 8 years
Micro Surfacing – Single Application	5 – 8 years
Double Application	6 - 10 years
Cape Seal	6 – 10 years
Ultra Thin Overlays	8 – 10 years
<u>Major Rehabilitation</u>	
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	3056 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	1205 SQ YD
ASPEN CT	3754 SQ YD

DATE: 10/20/2016	BY: [Signature]	FOR: [Signature]	JACKSON TOWNSHIP 81 West Veterans Highway, Jackson, NJ 07033 Tel: 908.755.0400, Fax: 908.755.0400			APPROVED BY: [Signature] DATE: 05/11/18 FOR: [Signature]
Daniel J. Burke, P.E. Municipal Engineer, 1st of 2016				REPAIR PLAN SHEET: 1 OF 1 SCALE: 1" = 400' DATE: 10/20/16		

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?

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