

Project Screening

Using Data-Based Analysis



Vincent Cardone
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Monmouth County

High Risk Rural Roads Program

- ▶ Competitive program administered by MPO
- ▶ Uses funds from the Federal Highway Administration's Highway Safety Improvements Program (HSIP).
- ▶ 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



High Risk Rural Roads Program

- ▶ For projects to be advanced in FY 2018 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 | 15.58 |
| 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 | 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 |

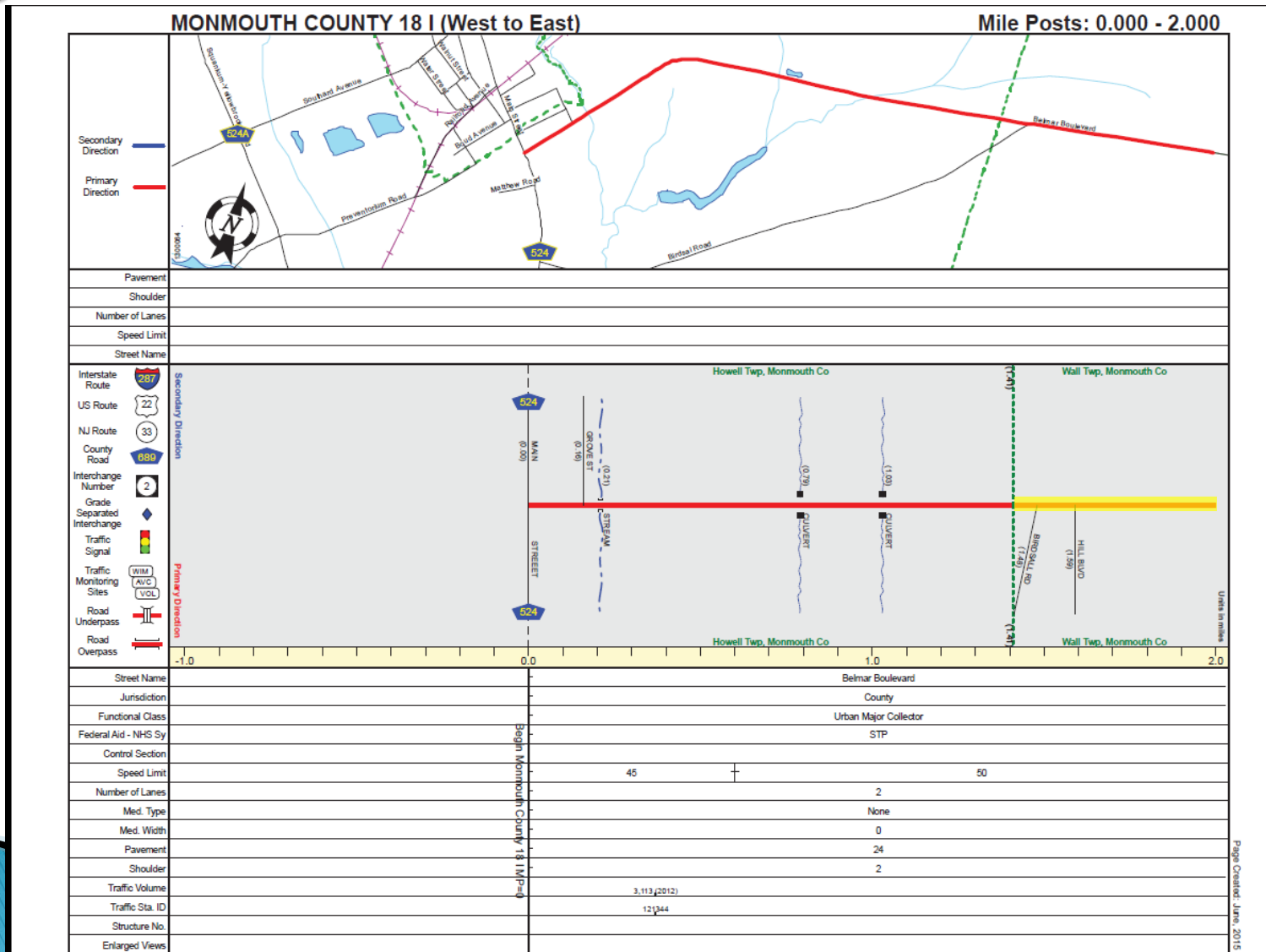
Monmouth County List

| 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 |



Identify location on straight line diagram

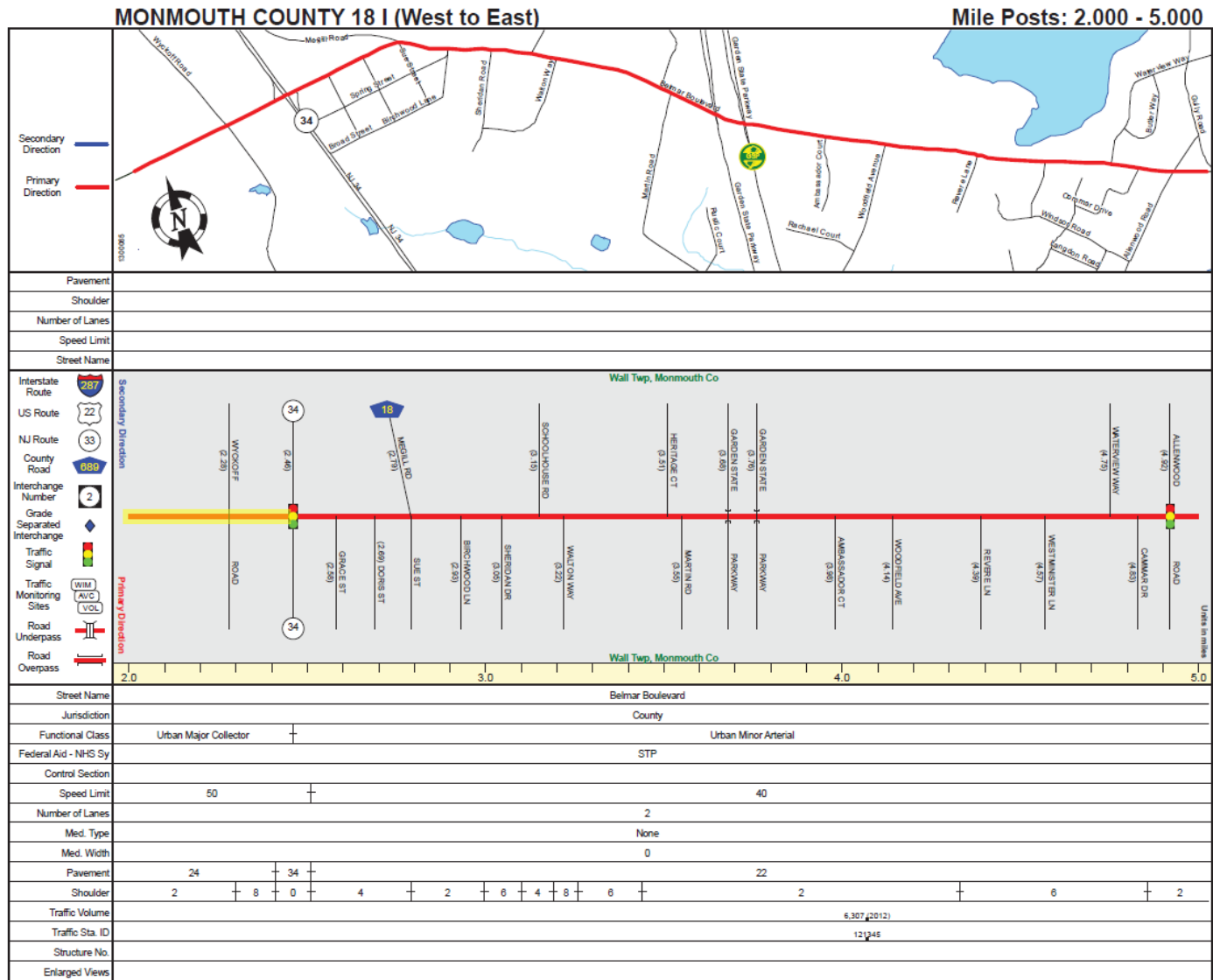


SRI = 130000181_

Date last inventoried: July 2011



Identify location on straight line diagram



SRI = 130000181_

Date last inventoried: July 2011



Plan4Safety Filter

Filter Builder - You're editing filter: CR18HRRR2017 -

Preview Your Filter

The filter you're building will find crash records where...

```
[  
  CRASH.COUNTY = MONMOUTH  
  and  
  CRASH.CRASH_YEAR in [2011,2012,2013,2014,2015]  
  and  
  [  
    CRASH.MILEPOST <= 2.46  
    and  
    CRASH.MILEPOST >= 1.41  
  ]  
  and  
  CRASH.SRI = 130000181  
]
```

[Select All](#) [Unselect All](#) [Alt. Shading On](#) [Preview Off](#) [Refresh](#)

| | | | | |
|--------------------------|--------------|--------------------|--------------|-------------------------------------|
| <input type="checkbox"/> | Table: CRASH | Column: COUNTY | Operator: = | Value: MONMOUTH |
| AND | | | | |
| <input type="checkbox"/> | Table: CRASH | Column: CRASH_YEAR | Operator: IN | Value: 2013 2014 2015 2016 |
| AND | | | | |
| <input type="checkbox"/> | Table: CRASH | Column: MILEPOST | Operator: <= | Value: 2.46 |
| AND | | | | |
| <input type="checkbox"/> | Table: CRASH | Column: MILEPOST | Operator: >= | Value: 1.41 |
| AND | | | | |
| <input type="checkbox"/> | Table: CRASH | Column: SRI | Operator: = | Value: 130000181 |

Network screening
List covered 2011 –
2013
Query expanded to
capture the most
recent data



New Criteria

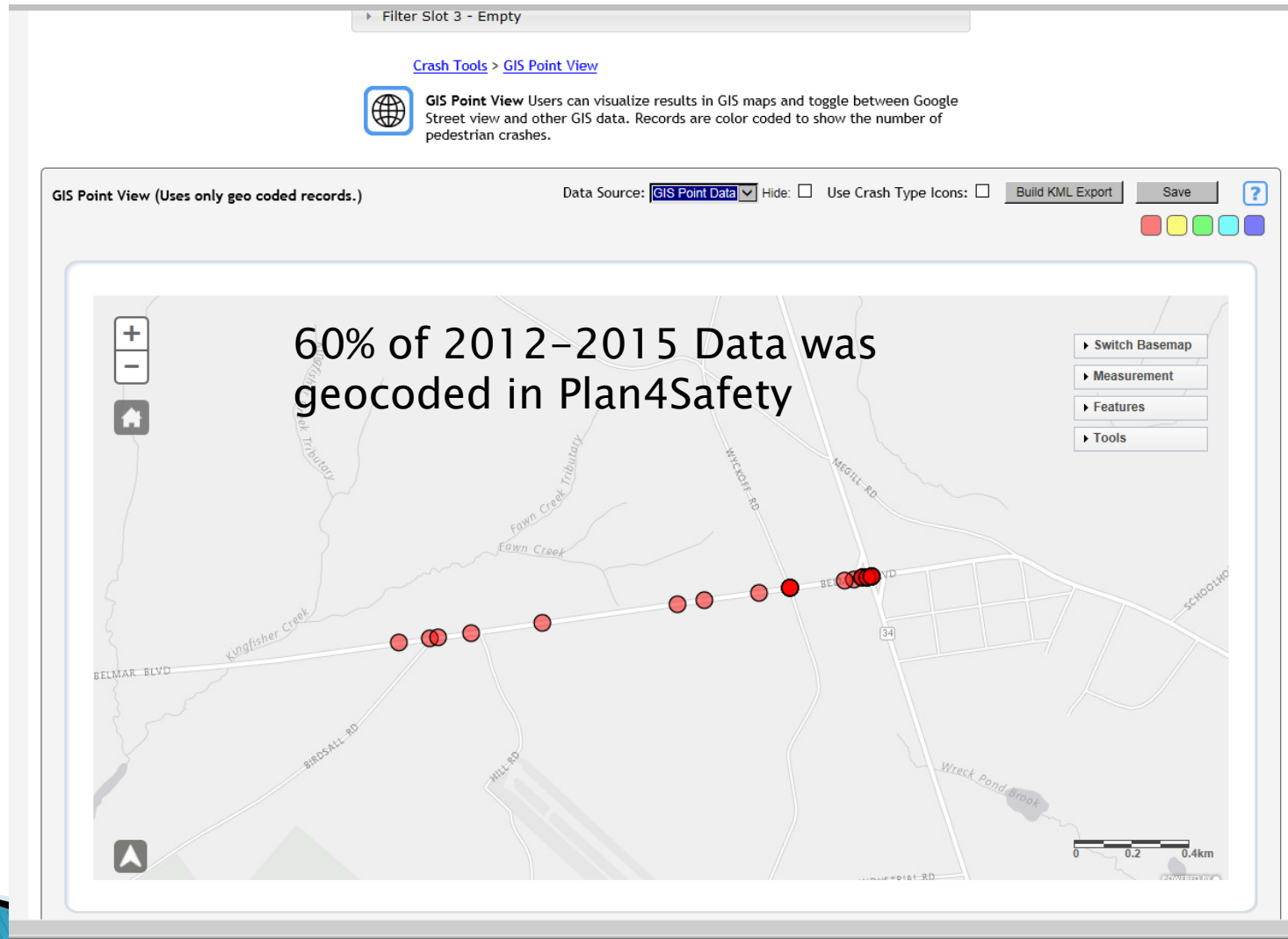
Insert Criteria

Delete Checked

Group Checked

Ungroup Checked

Plan4Safety GIS Point View



Use crash tools to create a road histogram (P4S)

Comprehensive Crash Analysis Program


Home Filter Tools Filtered Data **Crash Tools** Fix It Settings Logout

CR18HRRR2017 - Active Filter (100.00 % Geo Coded)

Filter Slot 2 - Empty

Filter Slot 3 - Empty


[Crash Tools](#) > [Roadway Histogram Tool](#)

 The **Roadway Histogram Tool** allows you to view the a roadway histogram based on an SRI road segment with crashes defined by your filter.

Roadway Histogram Tool (Uses only geo coded records.)

**** No data found for this filter!! ****

No Data Found
Could not find data for the given active filter and form criteria.

SQL XLS CSV TAB PNG DOC PDF  Rows Per Page: 25 [Filters On](#)

SRI: 00000030 From: 2011 To: 2012 Segment Length: 0.1 Start Milepost: 2 End Milepost: 20 Crash Count >: 0 **Save**

Result Set: 0 Rows

Empty Grid Drag columns here

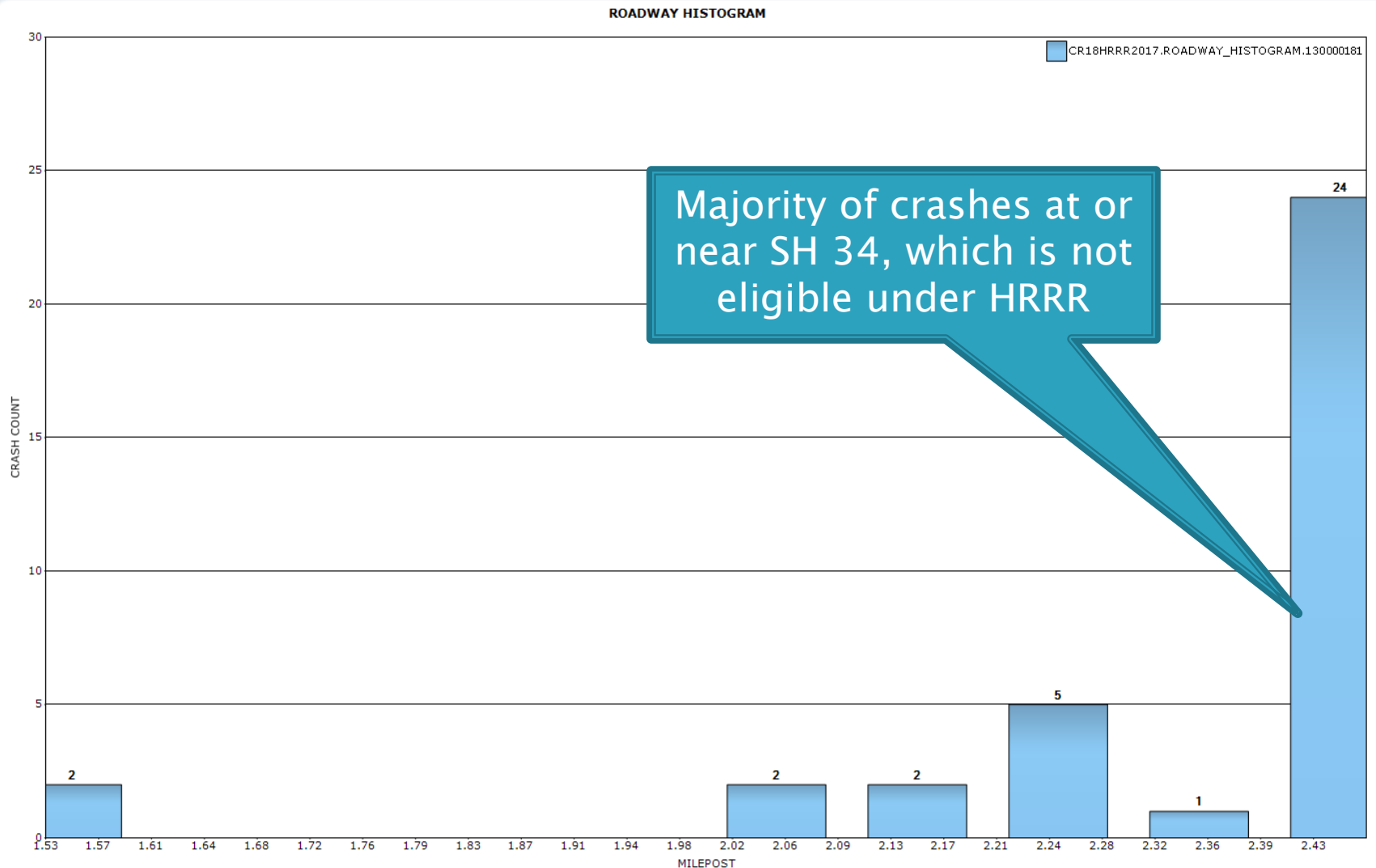
Empty Grid: 1 Items (Showing 1 to 1) **Search**

Empty :-

Total: 0 Mean: 0 Median: 0



Road Histogram reveals crash locations (P4S)

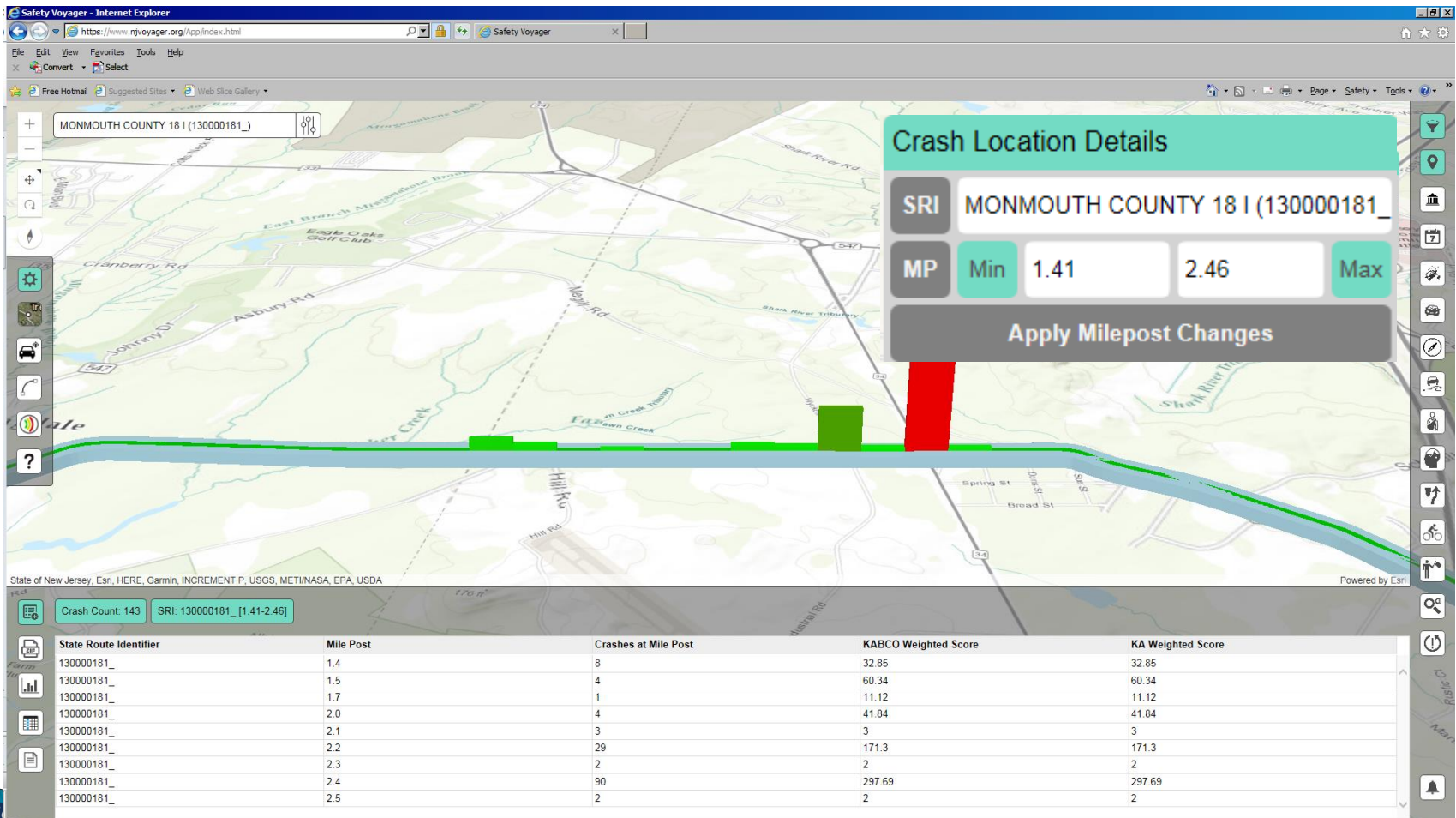


Safety Voyager

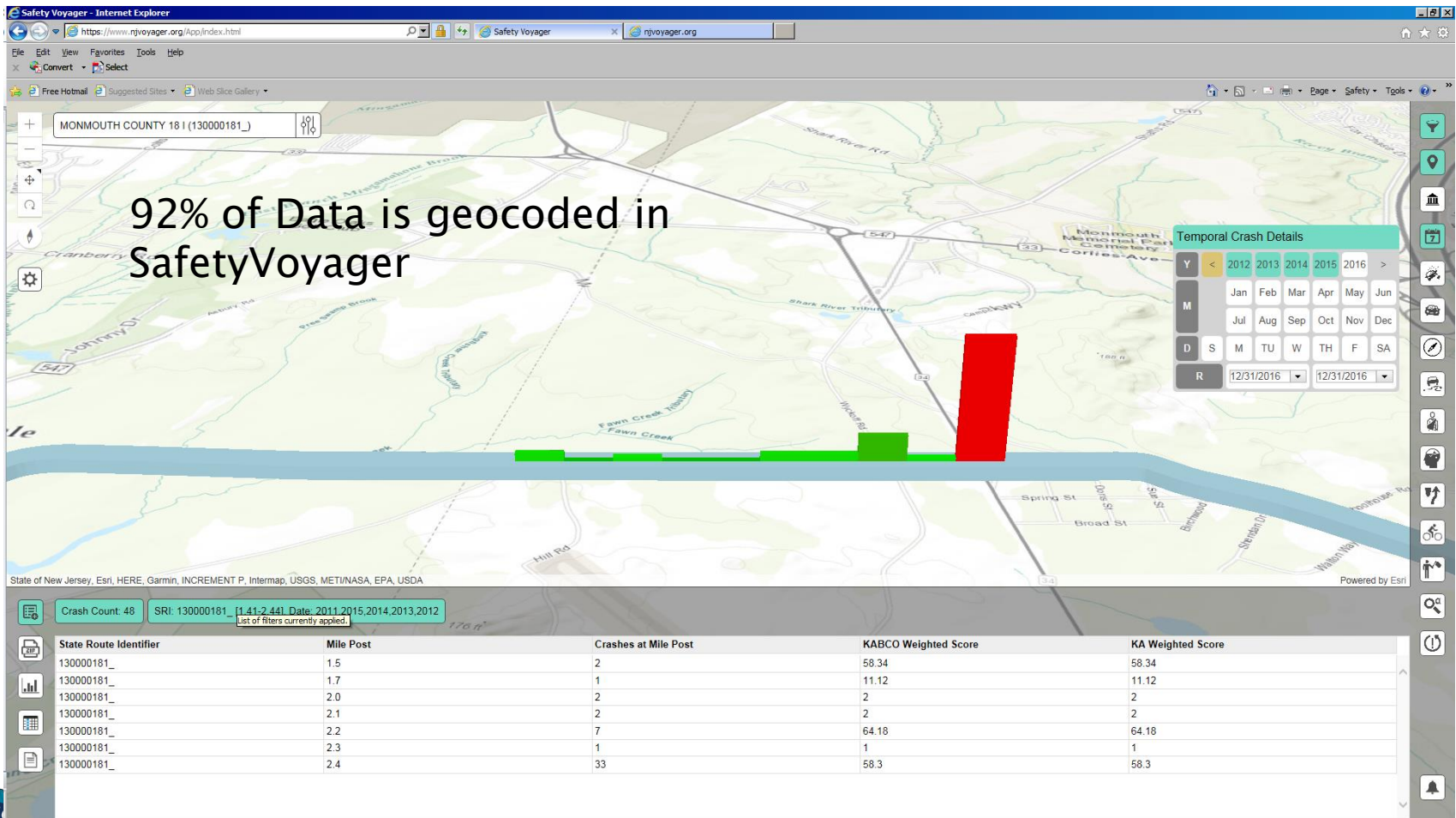
- ▶ Process using Safety Voyager is similar, but results are obtained faster



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



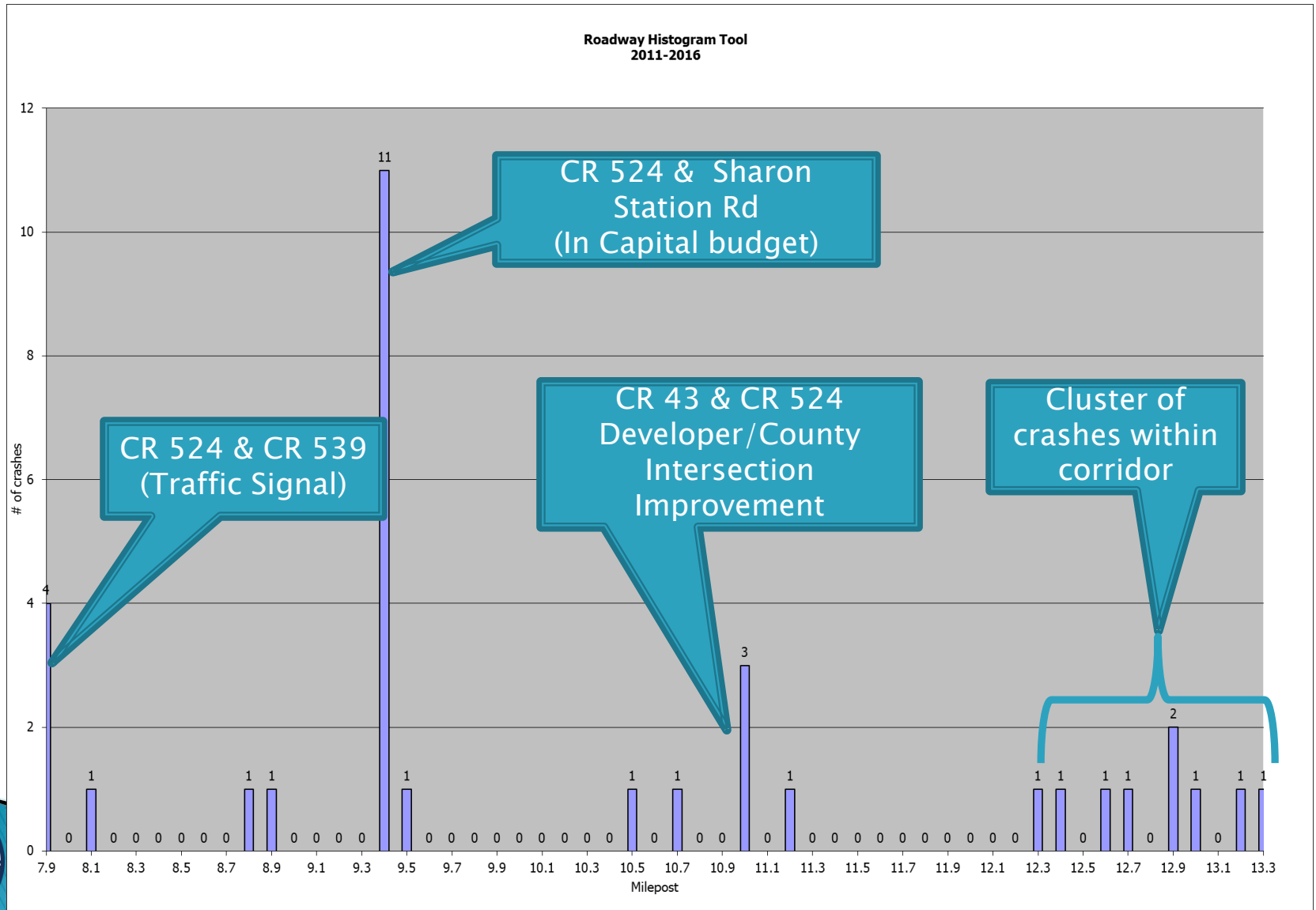
Review remainder of screening list

| | | | | | | | | |
|----|----|----------|-------------------------|-----------------------|------------|-------|-------|------|
| 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 |

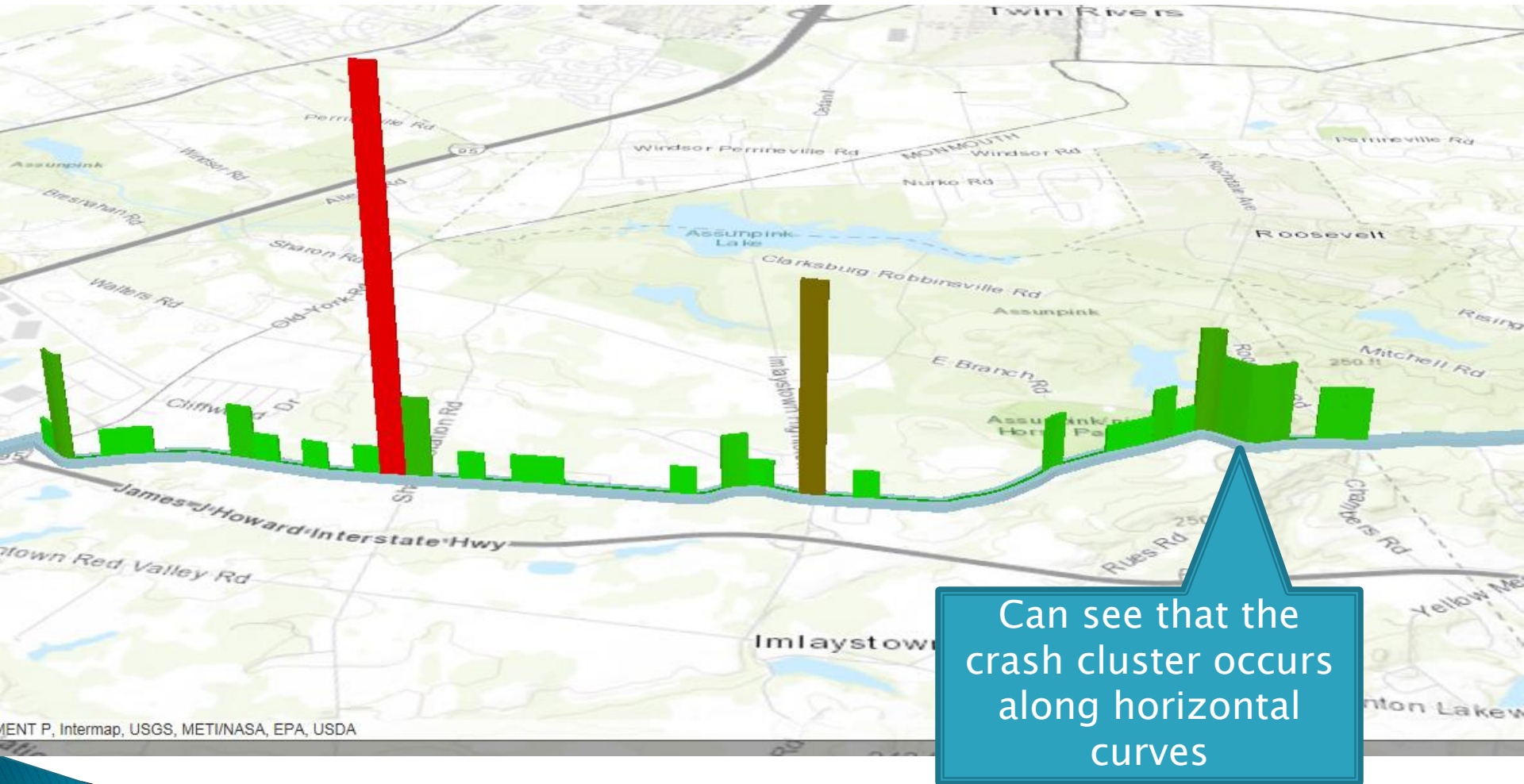
- ▶ Jackson Mills Rd corridor included several Developer–lead projects that were yet to be constructed
- ▶ Perrineville Rd–reviewed intersection of CR 1 & Millstone Rd for possible roundabout–Green Acres implications and ROW impacts would not qualify under HRRR
- ▶ Casino Rd, South Rochdale Ave, & Arnold 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)



CR 524 Histogram (P4S)



CR 524 Histogram-SafetyVoyager



Detailed Crash Data



The image shows the Plan4Safety web application interface. At the top is a banner with the text "Plan4Safety" and "Comprehensive Crash Analysis Program" over a background of police lights. Below the banner is a navigation bar with buttons: Home, Filter Tools, Filtered Data, Crash Tools, Fix It, Settings, and Logout. The "Crash Tools" button is highlighted, and a dropdown menu is open showing options: Filter Statistics (Filter Statistic Required), Crash Tables (Active Filter Required), and Single Crash Report (Active Filter Required). To the left of the dropdown, there are filter slots: "Temp 17102411", "CR18HRRR2017", and "Filter Slot 3 - Empty". Below the navigation bar, there are links for "Crash Tools" and "P4S Dashbaord". At the bottom, there is an information icon and a text box describing the Plan4Safety System (P4S) as a crash and analysis database system.

Plan4Safety
Comprehensive Crash Analysis Program

Home Filter Tools Filtered Data Crash Tools Fix It Settings Logout

Temp 17102411 Viewing Tools > Filter Statistics (Filter Statistic Required)
CR18HRRR2017 Comparison Tools > **Crash Tables (Active Filter Required)**
Filter Slot 3 - Empty Single Crash Report (Active Filter Required)

[Crash Tools](#) > [P4S Dashbaord](#)

 The Plan4Safety System (P4S) is a crash and analysis database system capable of providing users with a quick way to rank, analyze, and visualize crashes.

Detailed Crash Data

► Plan4Safety

[Filtered Data](#) > [Basic Table Summary](#)



The **Basic Table Summary** page allows you to view data in the main crash tables defined by your filter.

Basic Table Summary

**** Notice, you have a maximum row return of 50,000 rows for viewing data. Use the Bulk Export Tool to download larger data sets. ****

[Small On](#) [Medium On](#) [Large](#) [Extra Large On](#) [Filters On](#) Rows Per Page: [Single Crash Report](#) [Bulk Export Filter](#)

Filter: Table:

Table Dr: [Click here to download an Excel version \(XLS\) of this report.](#)

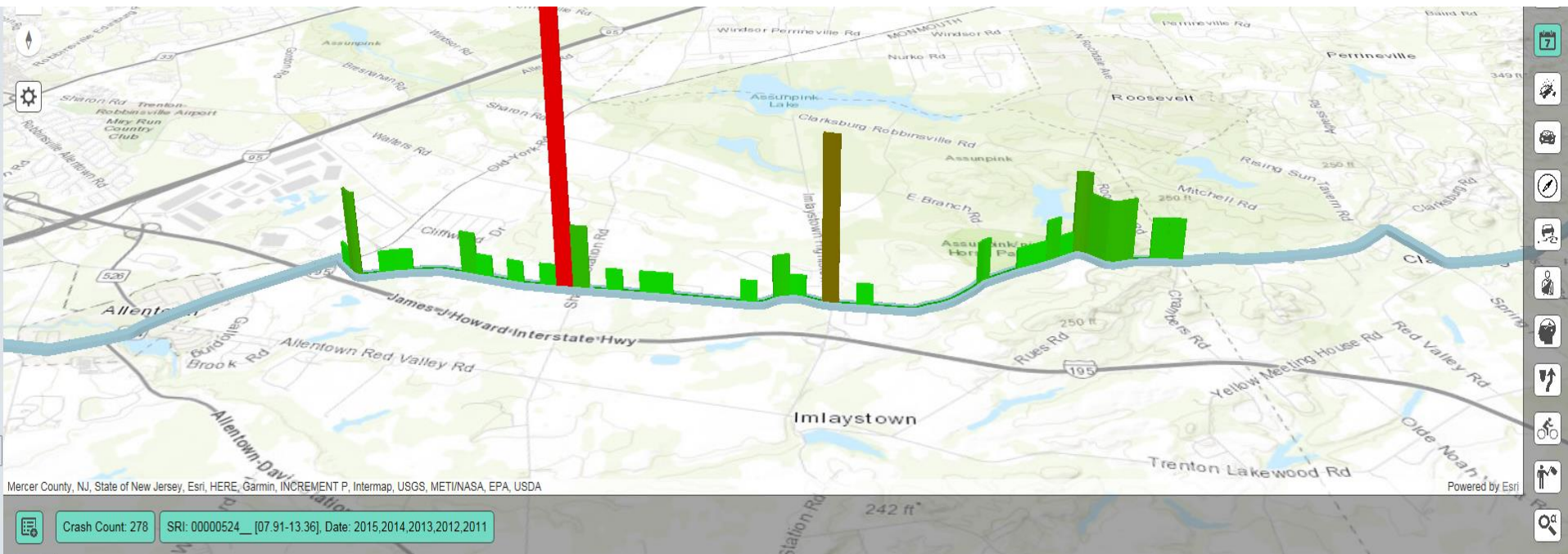
Table: 84 Items (Showing 1 to 25)

| | ID | DOT_WEB_ID | CASE_NUMBER | CRASH_YEAR | COUNTY | MUNICIPALITY | CRASH_DATE | CRASH_DAY_OF_WEEK | CRASH_MONTH | CRASH_TIME |
|---|---------|--------------------------|------------------|------------|----------|----------------------------|------------|-------------------|-------------|------------|
| ► | 3747837 | 20111112I-2011-007864 | I-2011-007864 | 2011 | MERCER | Washington Twp (Mercer Co) | 2011-05-04 | Wednesday | May | 16:27:00 |
| | 4037262 | 20121112I-2012-019209 | I-2012-019209 | 2012 | MERCER | Washington Twp (Mercer Co) | 2012-10-26 | Friday | October | 13:45:00 |
| | 4320565 | 20131112I-2013-023242 | I-2013-023242 | 2013 | MERCER | Washington Twp (Mercer Co) | 2013-11-05 | Tuesday | November | 14:43:00 |
| | 4369597 | 20131351C060-2013-00129A | C060-2013-00129A | 2013 | MONMOUTH | Upper Freehold township | 2013-01-31 | Thursday | January | 07:21:00 |
| | 8489422 | 20141351C060-2014-00129A | C060-2014-01628A | 2014 | MONMOUTH | Upper Freehold township | 2014-11-01 | Saturday | November | 09:47:00 |



Detailed Crash Data

► Safety Voyager



Mercer County, NJ, State of New Jersey, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA

Powered by Esri

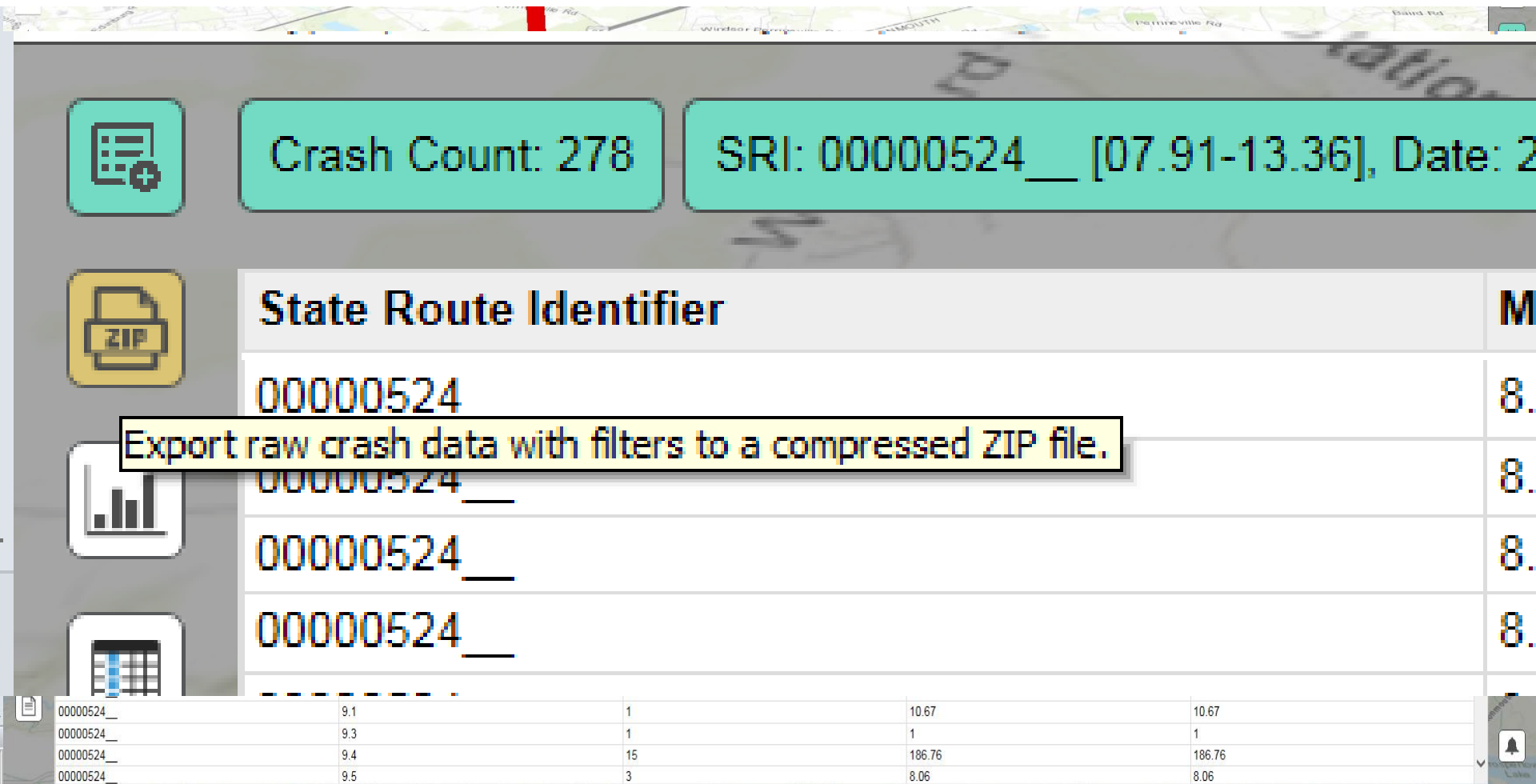
Crash Count: 278 SRI: 00000524__ [07.91-13.36], Date: 2015,2014,2013,2012,2011

| 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

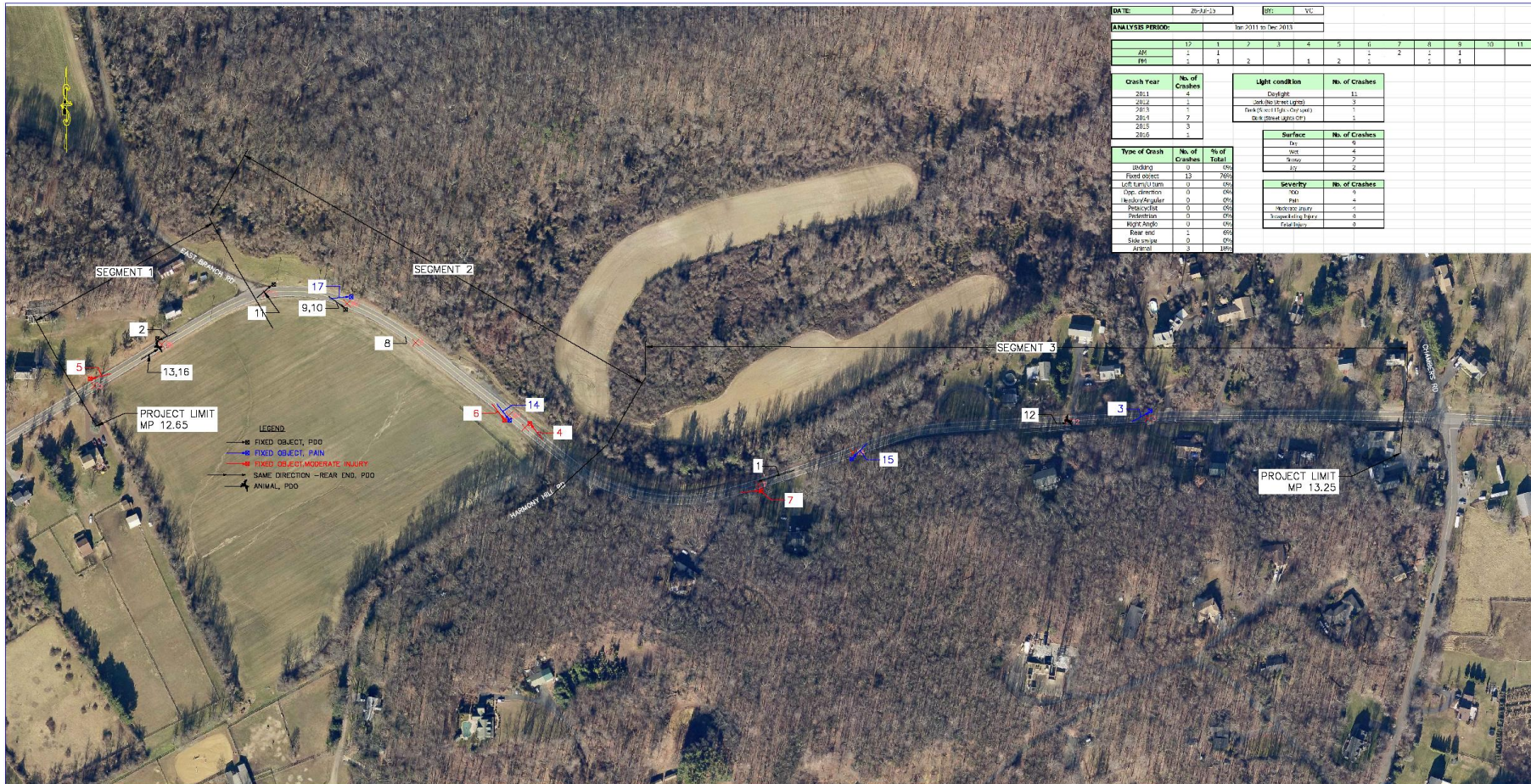


Detailed Crash Data

► Safety Voyager

| Crash Identifier | | | | | | | | | | | | |
|---------------------------|----------|----------------|------|----------------|------------------|--------------------------------|--------------|---------------------|-------------------|----------------|-------------------------|-------------|
| 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 | MV04-13 | Apr-48 Tuesday | Struck Parked Vehicle | NOT RECORDED | Straight and Level | Blacktop | Dry | Daylight | Clear |
| 13-02-2004-MV04-13 | MONMOUTH | ALLENTOWN BORO | 2004 | | 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 | MV09-16 | 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 | MV03-07 | 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 | MV03-07 | Mar-54 Wednesday | Same Direction - Sideswipe | NOT RECORDED | Straight and Level | Blacktop | Wet | Daylight | Rain |
| 13-02-2003-MV03-07 | MONMOUTH | ALLENTOWN BORO | 2003 | | 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 | MV04-23 | 28-Apr Saturday | Struck Parked Vehicle | NOT RECORDED | Straight and Level | Blacktop | Dry | Daylight | Clear |
| 13-02-2004-MV04-23 | MONMOUTH | ALLENTOWN BORO | 2004 | | Saturday | Same Direction - Sideswipe | NOT RECORDED | Straight and Level | Blacktop | Dry | Daylight | Clear |
| 13-02-2005-05-64 | MONMOUTH | ALLENTOWN BORO | 2005 | MV05-21 | May-64 Tuesday | Backing | NOT RECORDED | Straight and Level | Blacktop | Dry | Daylight | Clear |
| 13-02-2005-MV05-21 | MONMOUTH | ALLENTOWN BORO | 2005 | | 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

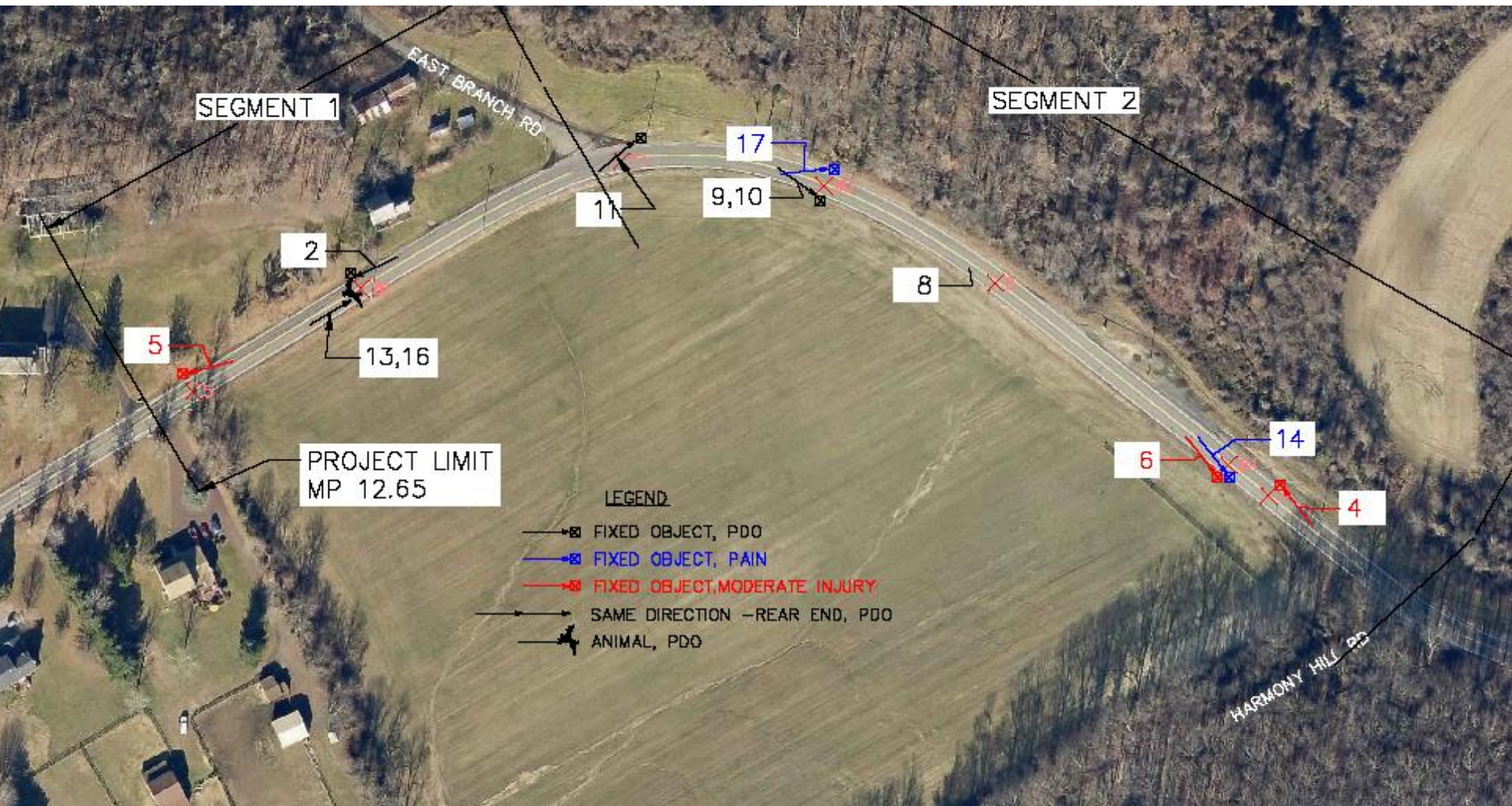


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| DATE: | 28-Mar-23 | BY: | VAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| # | CRASH DATE | CRASH TIME | ROUTE | MILEPOST INTERSECTION | CRASH TYPE | SURFACE CONDITION | LIGHT CONDITION | ENVIRONMENTAL CONDITION | CRASH LOCATION | CRASH DESCRIPTION |
|----|------------|------------|-------|-----------------------|--------------------------------|-------------------|-----------------|-------------------------|----------------|--------------------------------|
| 1 | 1/16/2011 | 17:30 | 524 | 13.01 | W. 524, intersection, rear end | Asp. | Dark | Clear | 13.01 | W. 524, intersection, rear end |
| 2 | 2/27/2011 | 20:30 | 524 | 12.7 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.7 | W. 524, intersection, rear end |
| 3 | 4/26/2011 | 12:15 | 524 | 12.34 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.34 | W. 524, intersection, rear end |
| 4 | 6/7/2011 | 18:41 | 524 | 12.01 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.01 | W. 524, intersection, rear end |
| 5 | 8/3/2011 | 8:36 | 524 | 12.06 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.06 | W. 524, intersection, rear end |
| 6 | 10/2/2011 | 12:05 | 524 | 11.8 | W. 524, intersection, rear end | Asp. | Dark | Clear | 11.8 | W. 524, intersection, rear end |
| 7 | 10/2/2011 | 7:41 | 524 | 13.01 | W. 524, intersection, rear end | Asp. | Dark | Clear | 13.01 | W. 524, intersection, rear end |
| 8 | 7/8/2014 | 11:38 | 524 | 12.84 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.84 | W. 524, intersection, rear end |
| 9 | 10/2/2014 | 8:49 | 524 | 12.8 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.8 | W. 524, intersection, rear end |
| 10 | 10/1/2014 | 17:13 | 524 | 12.8 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.8 | W. 524, intersection, rear end |
| 11 | 10/1/2014 | 8:18 | 524 | 12.78 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.78 | W. 524, intersection, rear end |
| 12 | 10/2/2014 | 7:18 | 524 | 12.7 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.7 | W. 524, intersection, rear end |
| 13 | 11/1/2014 | 14:15 | 524 | 12.7 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.7 | W. 524, intersection, rear end |
| 14 | 11/1/2014 | 14:15 | 524 | 12.7 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.7 | W. 524, intersection, rear end |
| 15 | 11/1/2014 | 13:34 | 524 | 12.09 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.09 | W. 524, intersection, rear end |
| 16 | 11/2/2015 | 0:10 | 524 | 12.7 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.7 | W. 524, intersection, rear end |
| 17 | 11/2/2015 | 0:10 | 524 | 12.7 | W. 524, intersection, rear end | Asp. | Dark | Clear | 12.7 | W. 524, intersection, rear end |

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| no. | revisions | date |
| <p align="center">COUNTY OF MONMOUTH DEPARTMENT OF PUBLIC WORKS AND ENGINEERING DIVISION OF ENGINEERING & TRAFFIC SAFETY JOSEPH M. ETTORE, COUNTY ENGINEER</p> <p align="center">CORRIDOR IMPROVEMENTS ON CR 524 (NEW CANTON-STONE TAVERN RD) MP 12.65 TO 13.25 UPPER FREEHOLD TOWNSHIP</p> | | |
| <p align="center">MONMOUTH COUNTY NEW JERSEY</p> <p align="center">CRASH DIAGRAM</p> | | |
| <p>NOT TO SCALE drawn by: VAC checked by: DAJ date: 07-27-2018</p> | | |
| <p align="right">date: 07-27-2018</p> | | |
| <p>JOSEPH M. ETTORE, P.E. N.J. LIC. NO. 240E032384</p> <p>PROFESSIONAL ENGINEER</p> | | |

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 M | DIRECTION | CROSS STREET NAME | X | Y | EPDO | Direction of travel | Crash description |
|----|------------|------------|-------|----------|------------------|---------------------------|-------------------|--------------------------|--------------------------|----------|-----------|-----------|----------------------------|-----------|-----------|-----------------|---------------------|--|
| 1 | 1/26/2011 | 17:19 | 524 | 13.04 | Not At Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 Intersect | 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 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 Intersect | Fixed Object | Wet | Daylight | Rain | | NULL | NULL | | 497080.2 | 493999.32 | Pain | 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 |
|------------|----------------|
| 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 |

| 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



Crash Modification Factors



<http://www.cmfclearinghouse.org/>

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)



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)



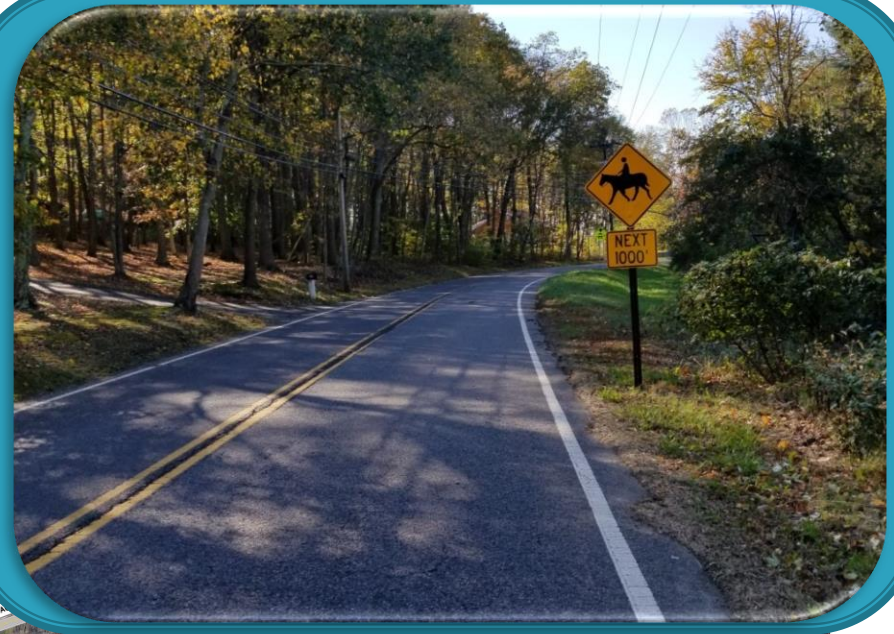
KABCO Costs

| | | | 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



Concept Plan



st
ing the project limits

| | | |
|--|-------------|---------------------------------|
| | | |
| 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 (STAGE COACH ROAD) MP 12.65 TO 13.25 UPPER FREEHOLD TOWNSHIP | | |
| MONMOUTH COUNTY | NEW JERSEY | |
| CONCEPTUAL IMPROVEMENT PLAN | | |
| NOT TO SCALE | drawn by SK | checked by J.M. date 08-31-2016 |
| date | | 1 |
| JOSEPH M. ETTORE, P.E. | | of |
| PROFESSIONAL ENGINEER | | 1 |
| N.J. LIC. NO. 24GE032394 | | |



Summary

- ▶ Follow the guidelines for the funding solicitations
- ▶ 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)
- ▶ Effective understanding and presentation of data will help the people that make the decisions.



Thank You

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Vincent Cardone
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Monmouth County