NJ 2020 SHSP

Lane Departure Emphasis Area

Completed Priority Action 1.B.1.a

Mapping of high-risk county and municipal lane departure crashes

Driving Toward ZERO Deaths

August 9, 2022

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Section 1: Mapping Tool

During the development of the NJ 2020 Strategic Highway Safety Plan (SHSP), the need to map crashes, with other data points to evaluate high crash locations was identified under multiple action items. The methods used to identify high crash locations and evaluate crash data on county and municipal roadways requires acquiring data from multiple sources in varying formats. High crash network screening lists produced by NJDOT must be supplemented with crash data from Safety Voyager by Subregions and MPO staff to identify potential locations for Road Safety Audits and for the Local Safety and High Risk Rural Roads Program (LSP/HRRRP) solicitation. Applicants for LSP/HRRRP funding are required to gather additional information using ArcGIS and EPA's EJ screening tools.

The SHSP Data Viewer is a new mapping tool which includes all of the data mentioned in separate layers that can be turned on and off, allowing the user to identify high risk locations or trends along certain roadways/within certain areas. At the start of work on this action item, MPOs representatives met to discuss mapping format and layers for consistency between the three MPOs. Subsequently, NJTPA has agreed to host DVRPC and SJTPOs data layers in one mapping tool.

Presently, the data viewer includes 52 layers of the following data:

- Fatal and Suspected Serious Injury Crashes
- Network Screening List locations
- HSIP funded projects
- Road Safety Audits
- Vulnerable Communities data from the EPA EJ Screening Tool

Attachment A is the SHSP Data Viewer User Guide which provides more details regarding the data layers.

Crash Data is derived from Safety Voyager and includes fatal and serious injury crashes during years 2015-2020 on County and Municipal roadways for the following crash types:

- Fixed Object
- Opposite Direction Head On
- Opposite Direction Sideswipe
- Overturned
- Other

There are a total of 1,351 fatal crashes and 3,382 suspected serious injury crashes on county and municipal roadways included in the crash data.

Network Screening Data is derived from set of lists produced by NJDOT using crash data from 2012-2016 and includes:

- Corridors
- Intersections
- Pedestrian and Bicycle Corridors
- Pedestrian and Bicycle Intersections
- High Risk Rural Road Segments

HSIP funded projects include all projects (completed, under construction and in design) funded through the Local Safety and High Risk Rural Roads Programs of the three MPOs.

Road Safety Audit include all FHWA-funded - NJDOT led audits completed to date. TMA-led RSAs will be added (a comprehensive list is currently being compiled).

Vulnerable Communities data is derived from EPA's EJ screening tool utilizing the Demographic Index (which considers two factors: low-income residents and people of color above 50% of population).

There are additional layers that will be added in the future including:

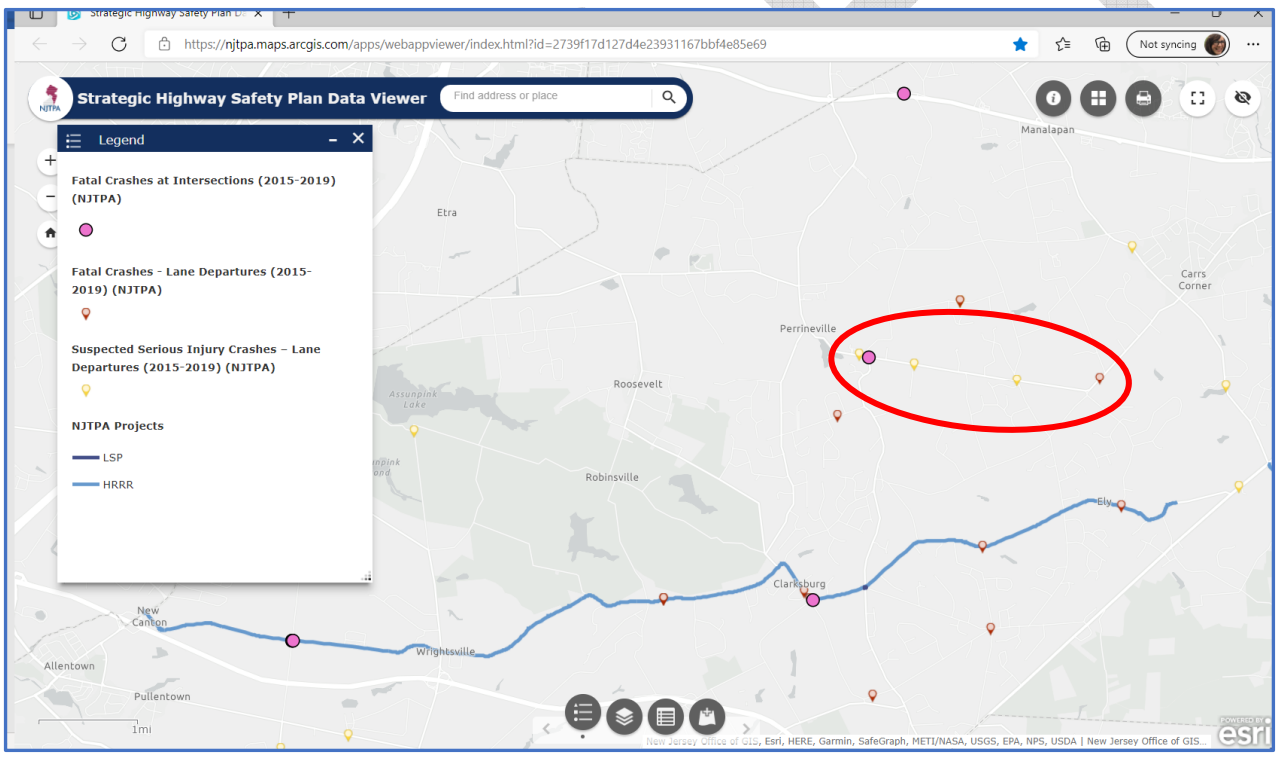
- Bicycle and Pedestrian from NJTPA's Pedestrian Count Program
- Trail crossings
- Curves from the Regional Curve Inventory effort led by NJDOT.

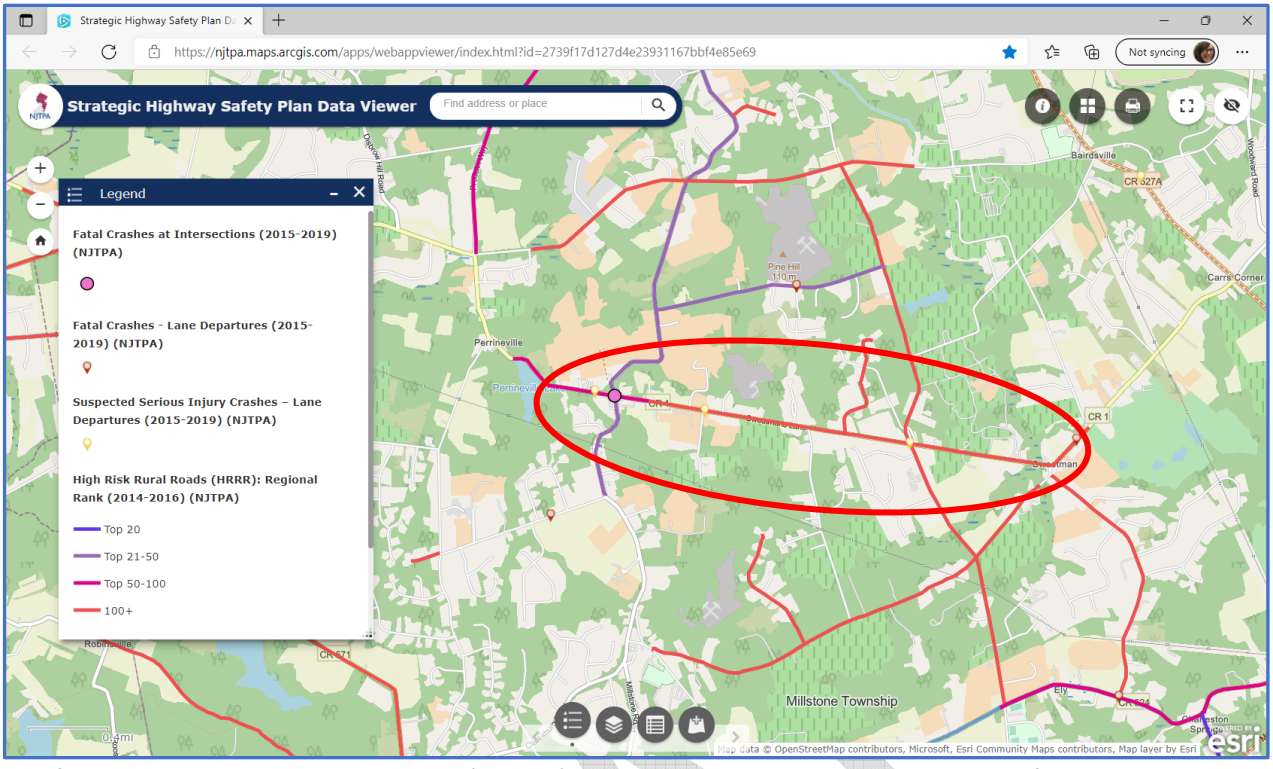
Users have the ability to add additional GIS layers to aid in:

- Reviewing potential locations for the Road Safety Audit program
- Funding applications (ex. Complete Street Technical Assistance Program, TAP, SRTS, and others)
- Environmental impacts assessments conducted as part of the LSP/HRRRP application process

Please note that the SHSP Data Viewer will be continuously updated on a regular basis, but not in real-time, with revisions to the data elements listed above.

Example 1:

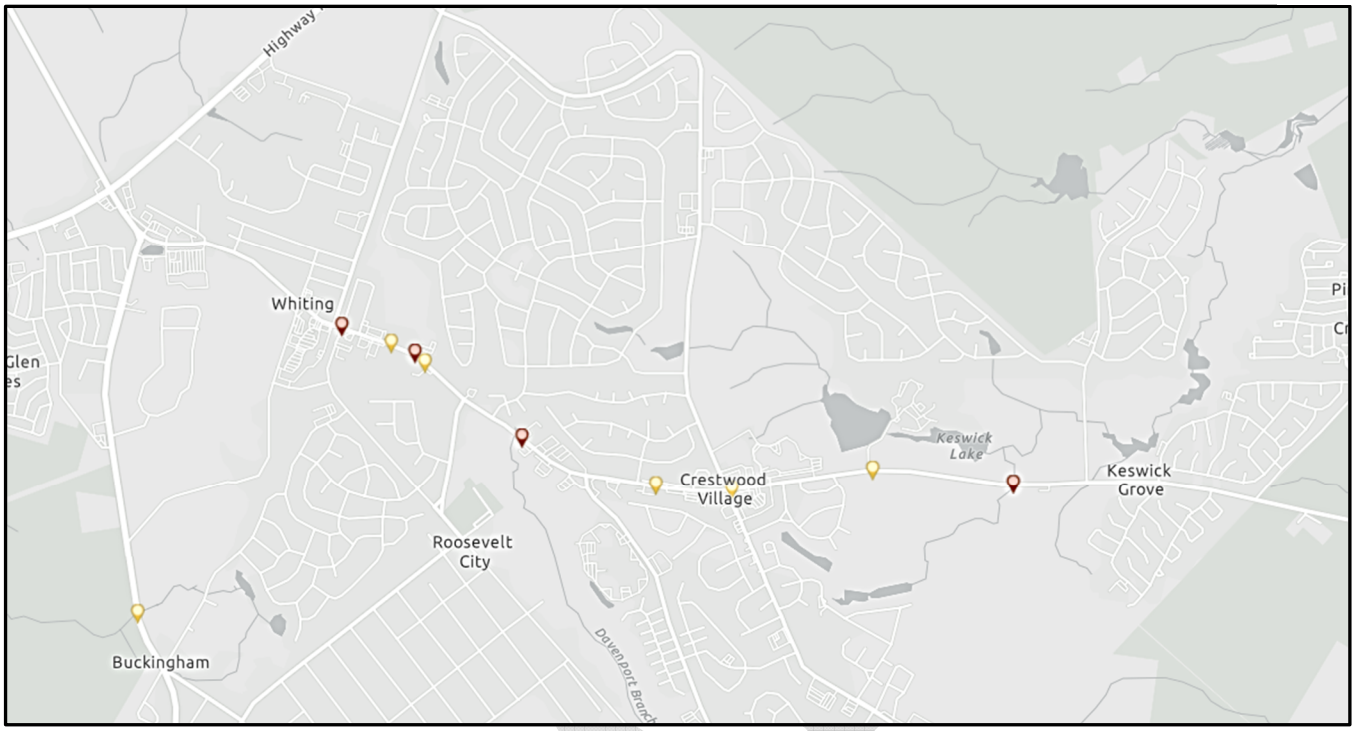




The first map shows Stage Coach Road (CR 524) Phases II, III and IV HRRR projects and fatal and serious injury lane departure crashes. It shows a cluster of lane departure crashes along another road to the north. The second map zooms into that area with a basemap that displays the routes and the HRRR network screening layers displayed. This is Sweetmans Lane (CR 1) and it is eligible for HSIP funding.

Example 2:

Below is an image from the SHSP data viewer displaying nine fatal and suspected serious injury crashes between 2015 and 2020 along Pinewald Kenswick Road, (CR 530) in Manchester Township, Ocean County. This is an example of how the crash data can be utilized by counties and municipalities to identify potential locations for safety improvements.



The SHSP data viewer has basemap layers options that can be selected by the user.

A link to the mapping tool will be provided on NJTPA's website in the near future. In the interim, a link to the data viewer can be found here:

https://njtpa.maps.arcgis.com/apps/webappviewer/index.html?id=2739f17d127d4e23931167bbf4e85e69

Section 2: Data Analysis - Lane Departure Crashes

The analysis of lane departure crashes includes fatal and suspected serious injury crashes (2015-2020) of the following crash types:

Fixed Object	**3132**	**66%**
Opposite Direction - Head On	**869**	**18%**
Opposite Direction - Sideswipe	**104**	**2%**
Other	**159**	**3%**
Overturned	**1464**	**10%**

In 2019, the definition of suspected serious injuries was modified on the New Jersey Crash Record form (NJTR-1) to align with the definition in the Model Minimum Uniform Crash Criteria's 4th Edition definition per 23 CFR 490.207. This change has resulted in a substantial increase in the number of suspected serious injury crashes in the years 2019 and 2020 which impacts the ability to analyze trends using the 5-year rolling averages for this crash severity category. Therefore, only fatal crashes were analyzed using 5 year rolling averages (2015-2019 compared to 2016-2020). A combination of fatal and suspected serious injury crashes were analyzed using 3-year averages (2015-2017 to 2016-2018) and a year-over-year comparison (2019 and 2020).

Lane departure crashes were analyzed in a number of different ways beginning first with an analysis of all fatal crashes Statewide compared to the subset of fatal lane departure crashes. This was followed by an analysis of fatal and SSI lane departure crashes by:

- MPO region
- Roadway jurisdiction
- County
- Posted speed limit
- Alcohol involved crashes
- Hit and run crashes
- Fixed object types

An analysis of Statewide fatal and suspected serious injury crash data (2015-2020) was performed first in order to compare the trends to intersection-related crashes. Five-year rolling averages were calculated only for fatal crashes due to change in severity rating beginning in 2019. For suspected serious injury crashes 3 year averages were calculated for 2015-2017 and 2016-2018 and year to year % change was calculated for 2019 and 2020.

Fatal Crashes - All Crash Types	2015	2016	2017	2018	2019	2020	Total
	546	596	653	582	547	576	3500

1. There was a 1% increase in the Statewide rolling average for fatal crashes (all types):

Fatal Crashes - All Crash Types 5 Year Rolling Average	2015-2019	2016-2020	1.0%
	584.8	590.8	

2. The following five crash types comprise 79% of all fatal crashes (all types) with pedestrian crashes highest among the types over the 6-year period.

Fatal Crashes - All Crash Types (2015-2020)				
Pedestrian	1032	29%	79%	Top 5 Crash Types
Fixed Object	960	27%		
Right Angle	320	9%		
Opposite Direction - Head On	247	7%		
Same Direction - Rear End	218	6%		
Other	153	4%		
Overturned	112	3%		
Struck Parked Vehicle	107	3%		
Same Direction - Sideswipe	106	3%		
Left Turn/U Turn	92	3%		
Pedalcyclist	80	2%		
Opposite Direction - Sideswipe	19	1%		
Non-fixed Object	19	1%		
Animal	13	0.4%		
Backing	9	0.3%		
Railcar	8	0.2%		
Blank	3	0.1%		
Encroachment	2	0.1%		
Total	3500			

3. The 5-year rolling average of fatal crashes by crash type shows disparate changes.

4. The 5-year rolling average for pedestrian fatal crashes remained flat when comparing 2015-2019 to 2016-2020.

Fatal Crashes 5 Year Rolling Averages	2015-2019	2016-2020	
Pedestrian	174.0	173.8	0%
Fixed Object	158.8	163.0	3%
Right Angle	54.8	56.0	2%
Opposite Direction - Head On	40.8	43.2	6%
Same Direction - Rear End	33.8	38.2	13%
Other	27.8	20.8	-25%
Overturned	18.6	18.4	-1%
Struck Parked Vehicle	17.6	17.6	0%
Same Direction - Sideswipe	16.8	17.8	6%
Left Turn/U Turn	16.4	15.8	-4%
Pedalcyclist	12.6	13.2	5%

Fatal Crashes – Lane Departures (All Facilities)

Combined Fatal and Suspected serious injury Lane Departure Crashes	2015	2016	2017	2018	2019	2020	Total
	619	612	696	657	1068	1081	4733

5. The 5-year rolling average for Statewide fatal lane departure crashes increased 4% which is higher than the 5-year rolling average for fatalities Statewide – all types.

Fatal Lane Departure Crashes	2015	2016	2017	2018	2019	2020	Total
	197	210	267	230	209	238	1351

Fatal Lane Departure crashes 5 Year Rolling Average	2015-2019	2016-2020	
	223	231	4%

6. Fatal and suspected serious injury lane departure crashes combined increased 2% when comparing 3-year averages (2015-2017 to 2016-2018) and increased 1% from 2019 to 2020.

Combined fatal and suspected serious injury lane departure crashes 3 Year Averages	2015-2017	2016-2018	
	642	655	2%

Combined fatal and suspected serious injury lane departure crashes Year to Year % Change	2019	2020	
	1068	1081	1%

7. Five year rolling averages, combined fatal and suspected serious injury crashes 3 year averages (2015-2017 to 2016-2018) and annual total crashes (2019 to 2020) by **MPO region**:

Fatal Crashes
5 Year Rolling Average

MPO Region	2015-2019	2016-2020	
DVRPC	55	56	2%
NJTPA	129	133	3%
SJTPO	39	42	7%

Combined Fatal and SSI Lane Departure Crashes
3 Year Average

MPO Region	2015-2017	2016-2018	
DVRPC	155	161	3%
NJTPA	399	399	0%
SJTPO	88	95	8%

Combined Fatal and SSI Lane Departure Crashes
Total Crashes Year to Year comparison

Year to Year % Change	2019	2020	
DVRPC	212	240	13%
NJTPA	696	674	-3%
SJTPO	160	167	4%

8. Five year rolling average for fatal lane departure crashes by **roadway jurisdiction** increased for county and state facilities and decreased for roadways under municipal jurisdiction. Notable is a 10% increase on State Highways and an 8% increase on all State facilities.

5 Year Rolling Averages – Fatal Lane Departure crashes	2015-2019	2016-2020	
County	72	73	2%
Municipal	39	37	-5%
All State Facilities (Combined)	104	113	8%
Interstate	21	23	7%
State Highway	55	61	10%
State/Interstate Authority	28	29	4%

9. Three-year average comparisons for fatal and suspected serious injury lane departure crashes by roadway jurisdiction shows increases on municipal and state roadways and a decrease on roadways under county jurisdiction. The percent change from 2019 to 2020 follows the same pattern among jurisdictions. Notable is the 12% increase on interstate roadways for the 3-year average comparison followed by 46% increase on from 2019 to 2020.

Suspected Serious Injury Lane Departure Crashes

3 Year Averages	2015-2017	2016-2018	
County	156	147	-6%
Municipal	81	87	7%
Interstate	35	39	12%
State Highway	110	113	3%
State/Interstate Authority	28	28	1%
All State Facilities (Combined)	172	180	5%

% Change from 2019 to 2020	2019	2020	
County	327	276	-16%
Municipal	195	199	2%
Interstate	50	73	46%
State Highway	227	231	2%
State/Interstate Authority	54	56	4%
All State Facilities (Combined)	331	360	9%

10. The top 10 counties accounted for 65% of all fatal and suspected serious injury lane departure crashes.

County	Fatal crashes over 6 years	Suspected Serious Injuries over 6 years	Combined F + SSI over 6 years		
BERGEN	69	293	362		
OCEAN	100	255	355		
MIDDLESEX	105	239	344		
CAMDEN	90	226	316		
BURLINGTON	111	197	308		
MONMOUTH	107	198	305		
ESSEX	61	237	298		
GLOUCESTER	91	200	291		
ATLANTIC	92	181	273		
PASSAIC	52	179	231	65%	Top 10
UNION	61	148	209		
MORRIS	55	143	198		
CUMBERLAND	65	117	182		
MERCER	44	122	166		
SOMERSET	38	128	166		
SUSSEX	40	110	150		
WARREN	35	93	128		
SALEM	41	80	121		
HUDSON	32	84	116		
HUNTERDON	24	84	108		
CAPE MAY	38	68	106		
TOTAL	1351	3382	4733		

11. 19% of fatal and suspected serious injury lane departure crashes over the 6-year period occurred on roadways with posted speeds of 25 mph or less.

Posted Speed Limit	Fatal crashes	Suspected serious injury crashes	Combined fatal and suspected serious injury crashes	% of total crashes
25 or less	175	723	898	19%
30	15	84	99	2%
35	157	452	609	13%
40	129	361	490	10%
45	159	411	570	12%
50	256	571	827	17%
55	152	320	472	10%
65	234	336	570	12%
Not identified	74	124	198	4%
Total	1351	3382	4733	100%

12. Unmapped crashes

Unmapped fatal crashes	57	
Unmapped suspected serious injury crashes	217	
Unmapped fatal and suspected serious injury crashes	274	6%
Unmapped fatal and suspected serious injury crashes on county and municipal roadways	179	7%

13. Alcohol-involved crashes

Alcohol involved fatal crashes	285	
Alcohol involved suspected serious injury crashes	788	
Alcohol involved fatal and suspected serious injury crashes combined	1073	23%
Alcohol involved fatal and suspected serious injury crashes combined on county and municipal roadways	565	22%

14. Hit and run involved crashes

Hit and Run Fatal & SSI crashes combined	73	2%

Recommendations for Further Evaluation/Next Steps:

1. Unmapped fatal and suspected serious injury crashes on county and municipal roadways need to be reviewed and mapped if feasible.

2. Alcohol-related crashes account for 22% of all fatal lane departure crashes over this 6-year period on county and municipal roadways. These locations should be isolated on the map and overlayed with network screening and curve inventory data to look for any clusters or locations of concern that could be shared with counties and/or municipalities. There may be an opportunity to increase enforcement in specific areas or along certain roadways.

3. Fatal lane departure crashes were grouped by the following fixed object categories utilizing descriptions under Fixed Object, First Harmful Event or Property Damage attributes. Out of these 468 fixed object-lane departure crashes, 21% involved a culvert/curb/ditch and 16% involved utility poles or trees, while 49% were labeled as unknown or blank. It could be beneficial to review a small sampling of the crashes marked as unknown fixed object (229 crash records) to better ascertain what is being hit and to see if the percentages remain relatively consistent. It can also determine if this missing information can be pulled from crash records in the future during the data review and uploaded into Safety Voyager at NJDOT. Also, these fixed object crashes should be isolated as a layer in the SHSP data viewer with horizontal curve data overlayed to identify locations where curves may be a contributing factor. This information could be shared with county and municipalities regarding their respective roadways.

Category	Fatal Crashes (2015-2020)	Percent of Subtotal Categorized
Bridge Support/Embankment	4	**1%**
Building/Structure	6	**1%**
Culvert/Curb/Ditch	98	**21%**
Fence/Wall/Gate/Railing	9	**2%**
Guard Rail	9	**2%**
Hydrant	1	**0%**
Lawns/Shrubs	10	**2%**
Light Standard	4	**1%**
Mailbox	4	**1%**
Sign	10	**2%**
Traffic Barrier	4	**1%**
Traffic Sign/Signal Support	3	**1%**
Tree	28	**6%**
Utility Pole/Light Post	45	**10%**
Vehicle	2	**0%**
Other	2	**0%**
Unknown	229	**49%**
Total Crash Type: Fixed Object	468	**100%**

4. The analysis indicates 19% of all fatal and serious lane departure crashes occur on roadways with speeds of 25 mph or less. Is speed the main factor in these crashes and is there a way to include this information in the data downloaded from Safety Voyager?

5. Ten counties accounted for 65% of all fatal and suspected serious injury lane departure crashes on county and municipal roadways. Should additional funding be allocated these counties for intersection related systemic improvements?

ATTACHMENT A

Strategic Highway Safety Plan Data Viewer (SHSP) Tool

Welcome to the Strategic Highway Safety Plan Data Viewer (SHSP) Tool

This tool combines data from other sources in a map format that aids in crash analysis and project development on County and municipal roadways for the three Metropolitan Planning Organizations (MPOs) in New Jersey . Data includes fatal and serious injury crashes, high-crash locations and corridors, Federal Highway Administration - Highway Safety Improvement Program (HSIP) funded projects, Road Safety Audits, and Environmental Justice communities.

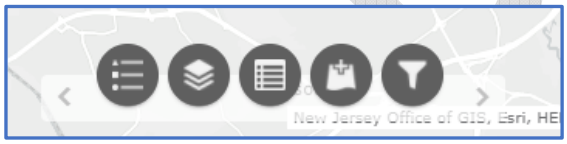
How to navigate the site?

There are four buttons on the top left of the screen. The top two allow you to zoom in and out. The 3rd button resets to a New Jersey-wide view. The 4th button zooms into your current location (if you allow it when prompted)

The bar at the top of the screen includes a box that allows you to enter a county, municipality, street name, street address, intersecting streets and the map will zoom to that location.

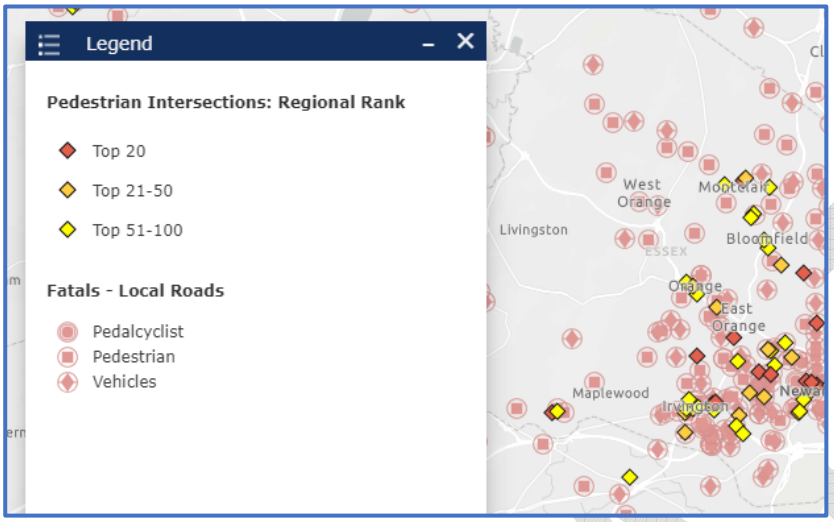
Diplaying information

There are five buttons located at the bottom center of the page.



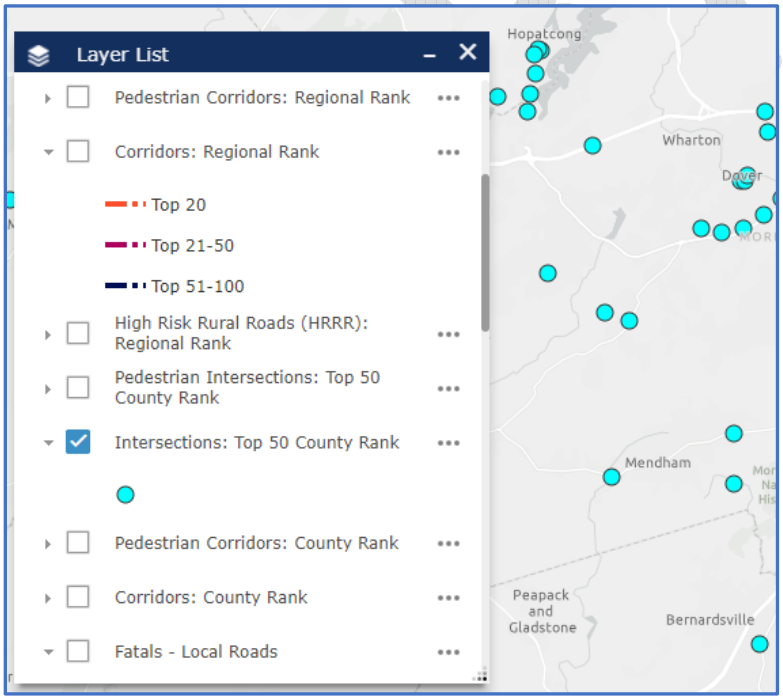
Legend

Displays a legend for each layer



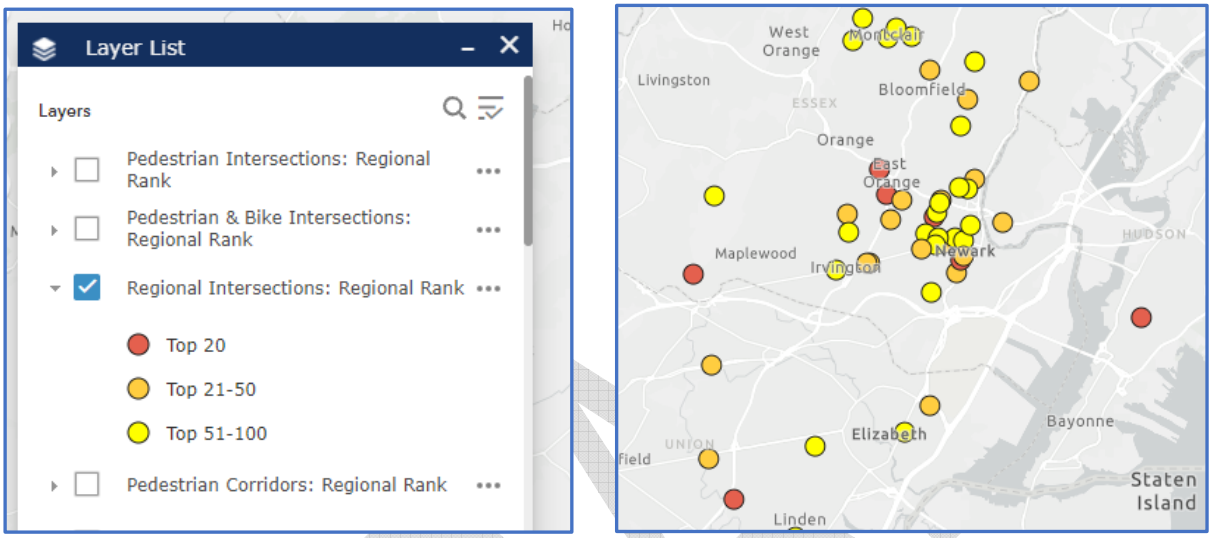
Layer List

To display a layer (or multiple layers) click on a box (or multiple boxes). Some of the layers have subcategories which have been color-coded. Click on the triangle to the left of each box to display the breakdown.



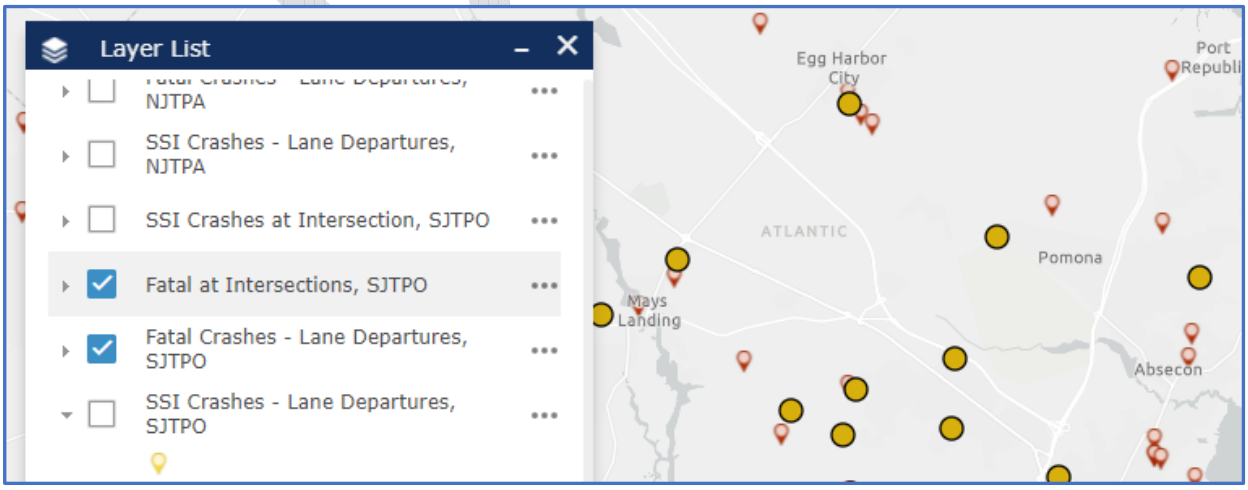
NJDOT High Crash Network Screening Lists

The NJDOT currently provides high crash network screening lists to the three Metropolitan Planning Organizations which includes county and local roadways that are eligible for Highway Safety Improvement Program Funds (HSIP). These screening lists are included in the tool.

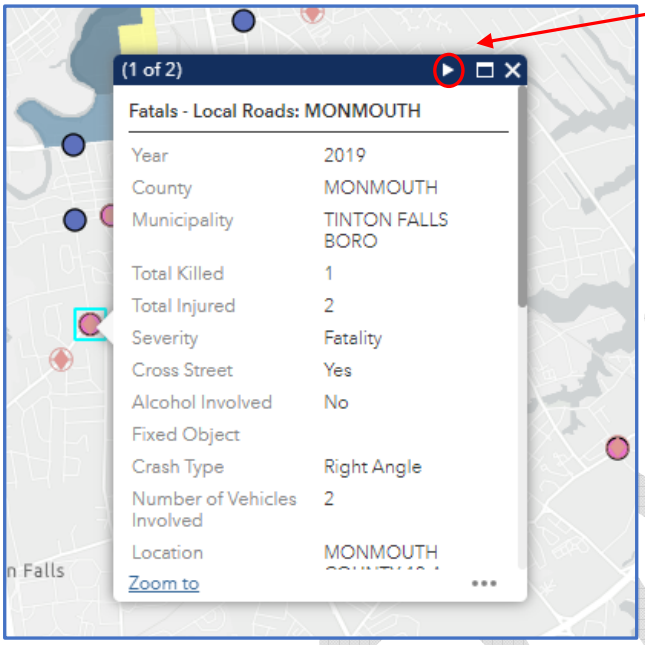


NJDOT Safety Voyager Crash Data

The crash data is taken from New Jersey Department of Transportation's Safety Voyager database of Statewide crashes. Fatal and suspected serious injury crashes on county and municipal roadways have been included in the tool



Click on a crash point and a pop-up box will display crash details. You can use the grey bar on the right side of the box to scroll down and see all of the details or click on this box here and a larger box will appear with all the details displayed.



HSIP funded Projects

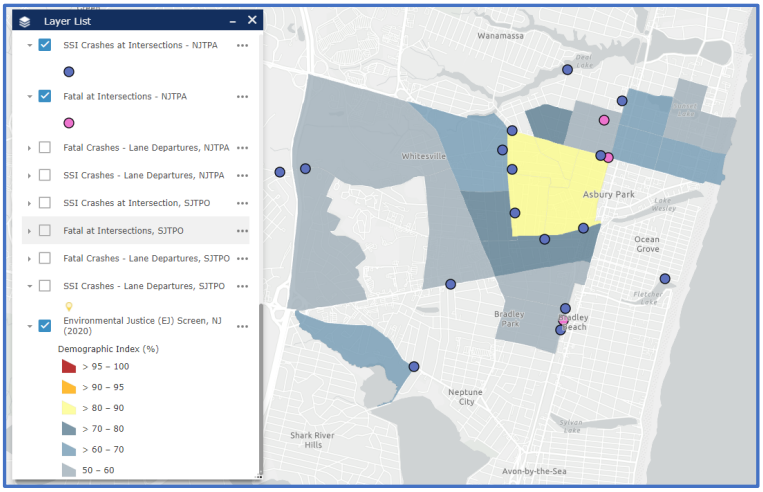
All HSIP funded Local Safety and High Risk Rural Roads projects have been included in the tool.

Road Safety Audits

All Road Safety Audits funded by FHWA through the MPOs have been included in the tool.

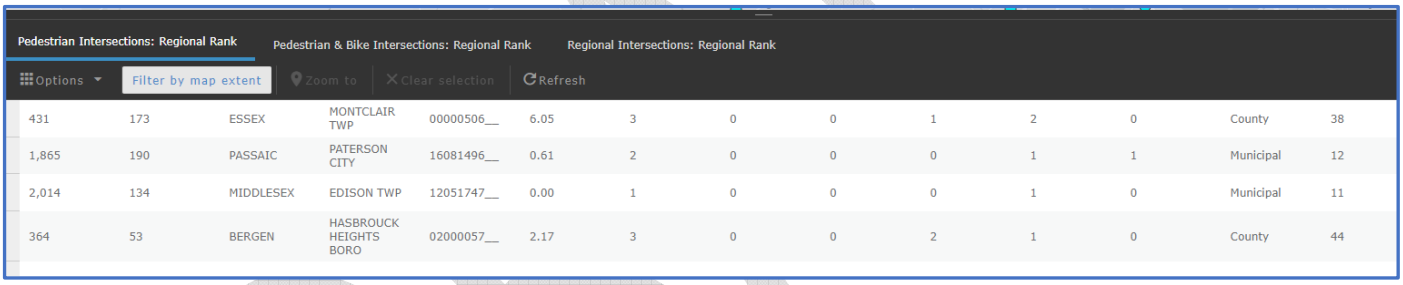
Vulnerable communities

The EPA Environmental Justice (EJ) Screen, NJ (2020) has been included in the tool



Attribute Table

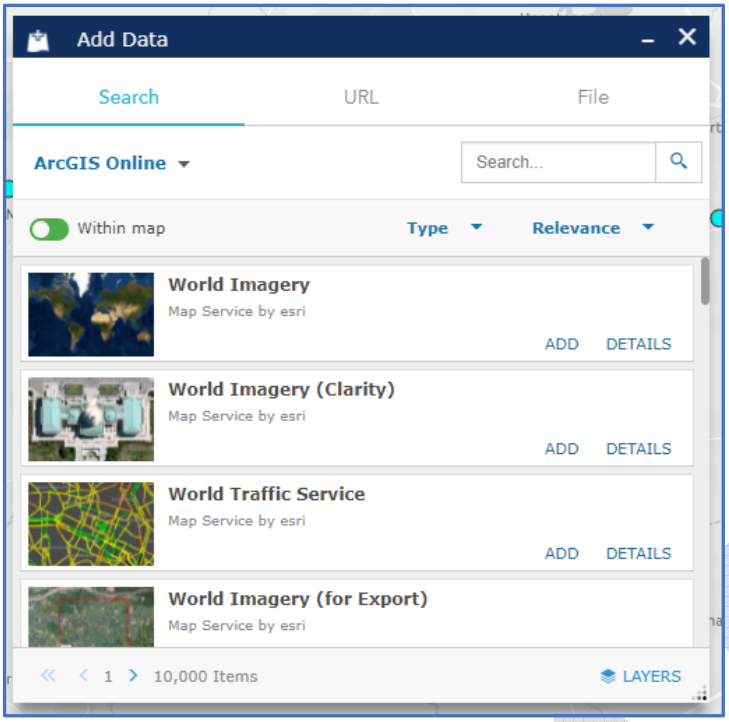
Allows the user to view the location details of layers by map extent



431	173	ESSEX	MONTCLAIR TWP	00000506__	6.05	3	0	0	1	2	0	County	38
1,865	190	PASSAIC	PATERSON CITY	16081496__	0.61	2	0	0	0	1	1	Municipal	12
2,014	134	MIDDLESEX	EDISON TWP	12051747__	0.00	1	0	0	0	1	0	Municipal	11
364	53	BERGEN	HASBROUCK HEIGHTS BORO	02000057__	2.17	3	0	0	2	1	0	County	44

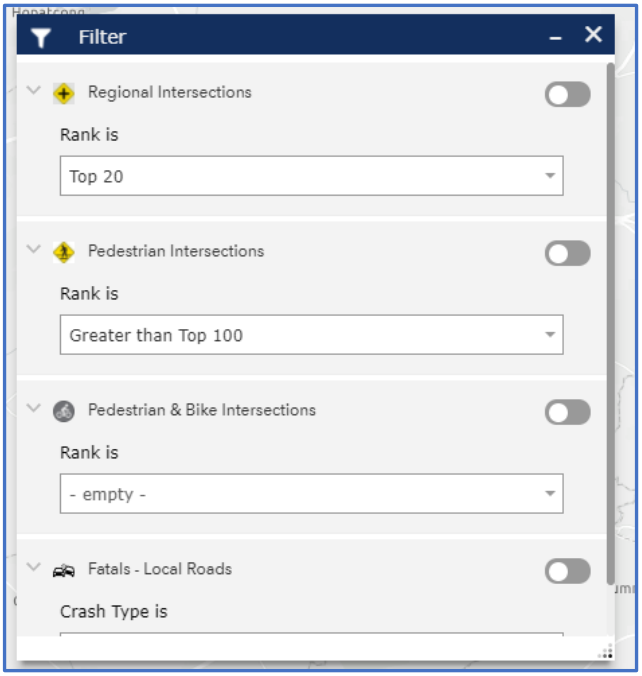
Add Data

Allows the user to add data layers from ArcGIS Online



Filter

Future functionality/under development Will allow the user to filter locations by layers



About, Basemaps and Print

About

Includes information about the mapping application.

Basemaps

Allows the user to select various basemaps.

Print

Allows the user to print the map to a .pdf file.