NJ 2020 SHSP

Intersections Emphasis Area

Completed Priority Action 1.A.1.b

Mapping of high-risk county and municipal intersections crashes

November 9, 2021

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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 (RSAs) 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.

At the present time, the 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 obtained from Safety Voyager includes fatal and suspected serious injury crashes at or within 50' of an intersection during years 2015-2020 on county and municipal roadways for the following crash types:

- Pedestrian
- Right Angle
- Left Turn
- Fixed Object
- Opposite Direction – Head On
- Opposite Direction – Side Swipe
- Pedalcyclist
- Same Direction – Rear End
- Same Direction – Side Swipe
- Overturn
- Struck Parked Vehicle

There were a total of 1,018 fatal crashes and 4,316 suspected serious injury crashes on county and municipal roadways during this time period.

Network Screening Data is derived from a 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 Audits 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).

Additional layers 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 RSA 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.
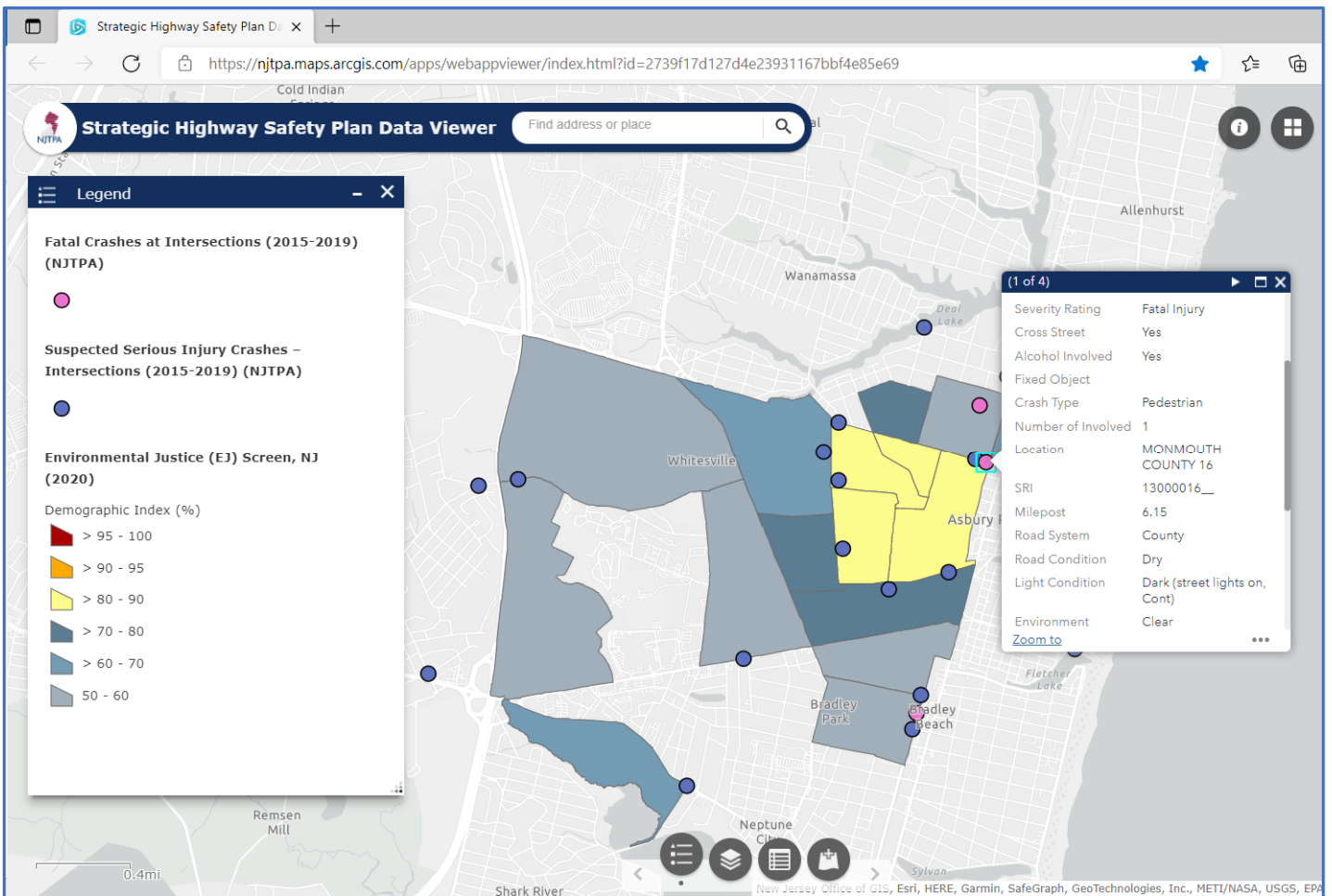

Strategic Highway Safety Plan Data Viewer
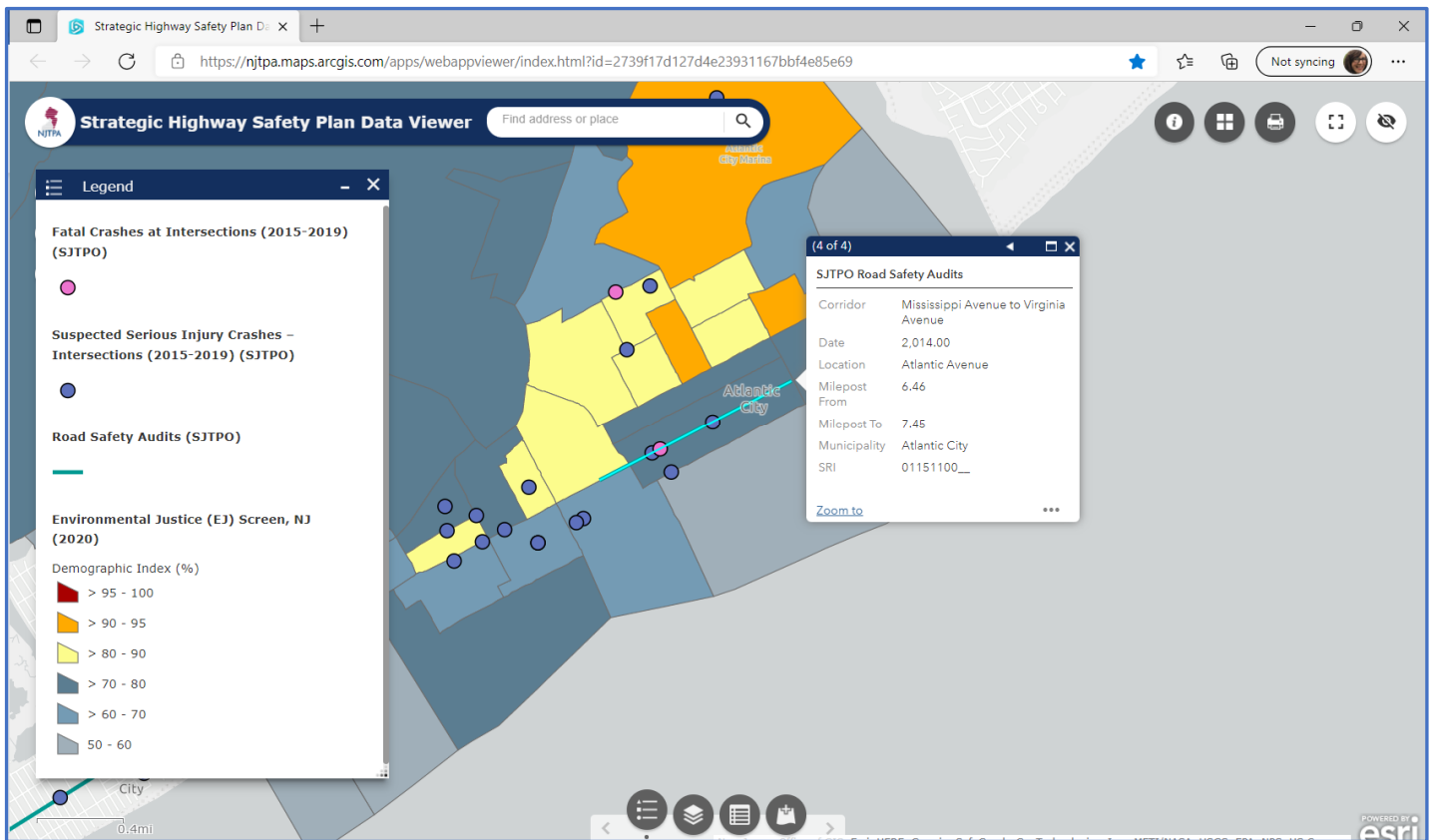
Example 1:
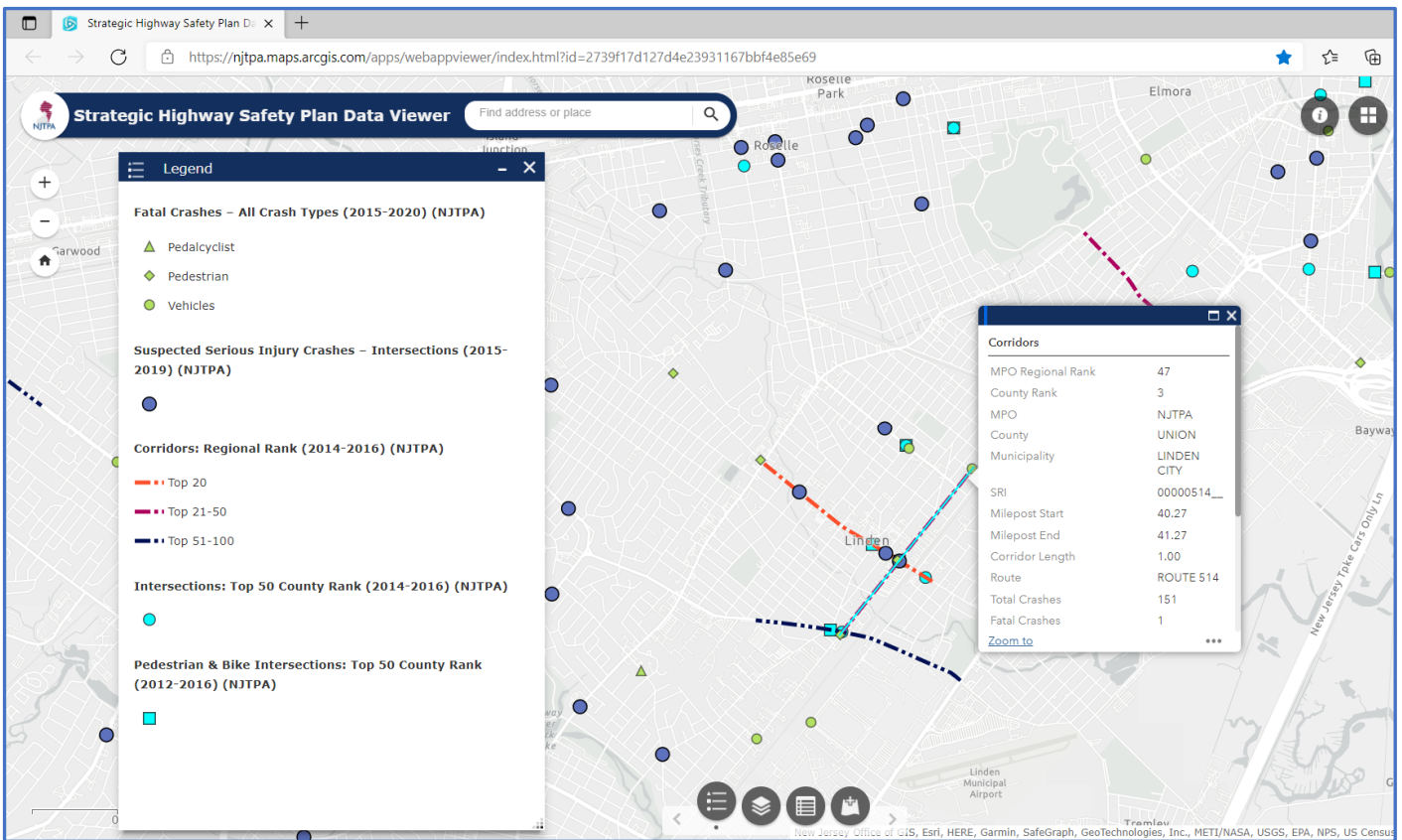
This screenshot shows several layers turned on, including crashes and network screening data. Locations on the map (points, lines) can be clicked on to view the data details. In this example, a network screening corridor is selected to display details.

Example 2:

In this example, fatal and suspected injury crashes as intersections and the EPA EJ Screen layers have been selected with the details of a specific crash displayed.

Example 3:

In this example, fatal and suspected injury crashes at intersections, Road Safety Audits and the EPA EJ Screen layers have been selected with the details of a specific Road Safety Audit displayed.

Example 4:
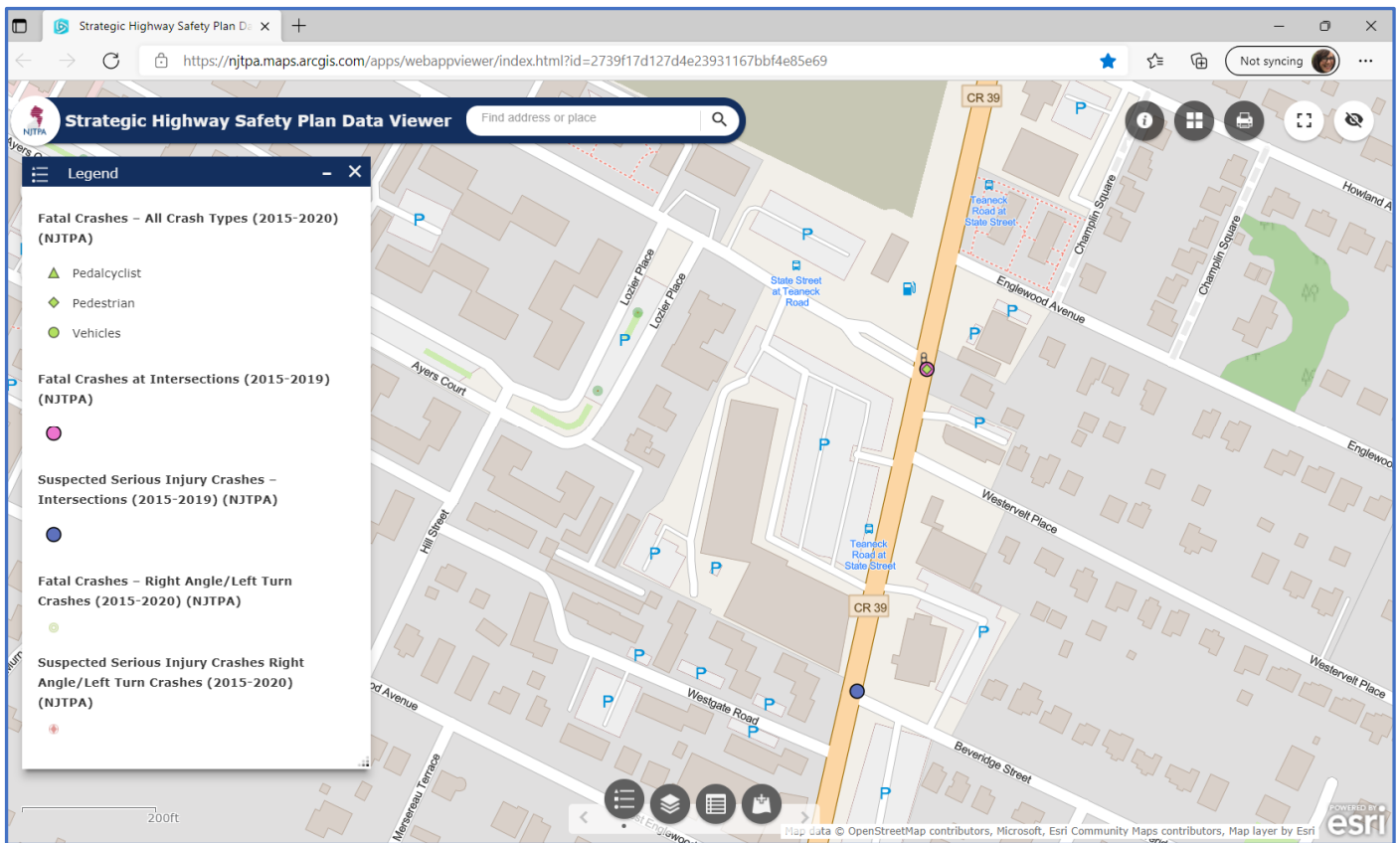
In this example, crash layers have been selected and displayed over the OpenStreetMap base map which identifies transit locations, parking, schools, parks and other community features.

The SHSP data viewer has base map 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 - Intersection Crashes

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

Combined fatal and suspected serious injury crashes at or near intersections by Crash Type		
Pedestrian	1311	25%
Right Angle	1446	27%
Fixed Object	658	12%
Same Direction -Rear End	469	9%
Left Turn	329	6%
Pedalcyclist	295	6%
Opposite Direction - Head On	288	5%
Same Direction -Side Swipe	151	3%
Struck Parked Vehicle	136	3%
Other/Encroachment/Railcar	104	2%
Overturn	98	2%
Opposite Direction -Side Swipe	33	1%
Backing	12	0%
Unknown	4	0%
	5334	

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 MMUCC 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).

Intersection 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 intersection crashes. This was followed by an analysis of fatal and SSI lane intersection crashes by:

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

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 percent change was calculated for 2019 and 2020

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

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

Fatal Crashes - All Crash Types, 2015-2020		
Pedestrian	1032	29%
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	

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 - At or Near Intersections

Fatal crashes at or near Intersections	2015 156	2016 174	2017 193	2018 173	2019 166	2020 156	Total 1018

1. Fatal crashes at or near intersections accounted for 29% of all fatal crashes over a 6-year period.

Fatal crashes at or near intersections, 2015-2020	**1018**	**29%**
All fatal crashes, 2015-2020	**3500**	

2. The 5 year rolling average was flat for fatal crashes at or near intersections.

Fatal crashes at or near Intersections - 5 Year Rolling Average	**2015-2019**	**2016-2020**	**0%**
	172.4	**172.4**	

3. The following top 6 crash types comprised 85% of all fatal and suspected injury crashes at or near intersections over the 6-year (2015-2020) period:

Combined fatal and suspected injury crashes At or Near Intersections by Crash Type	**Fatal**	**Suspected Serious Injury**	**Combined**	**% of Total**
Right Angle	**257**	**1189**	**1446**	**27%**
Pedestrian	**397**	**914**	**1311**	**25%**
Fixed Object	**112**	**546**	**658**	**12%**
Same Direction -Rear End	**27**	**442**	**469**	**9%**
Left Turn	**92**	**237**	**329**	**6%**
Pedalcyclist	**33**	**262**	**295**	**6%**
Opposite Direction - Head On	**35**	**253**	**288**	**5%**
Same Direction -Side Swipe	**16**	**135**	**151**	**3%**
Struck Parked Vehicle	**11**	**125**	**136**	**3%**
Other/Encroachment/Railcar	**22**	**82**	**104**	**2%**
Overturn	**12**	**86**	**98**	**2%**
Opposite Direction -Side Swipe	**2**	**31**	**33**	**1%**
Backing	**2**	**10**	**12**	**0%**
Unknown	**0**	**4**	**4**	**0%**
	1018	**4316**	**5334**	

4. Five-year rolling average for fatal crashes at or near intersections **by crash type**:

Fatal crashes 5 Year Rolling Averages	**2015-2019**	**2016-2020**	
Pedestrian	**67.8**	**66.4**	**-2%**
Right Angle	**43.8**	**44.6**	**2%**

Fixed Object	19.2	18.4	-4%
Left Turn	16.4	15.8	-4%

5. Fatal and suspected injury crashes at or near intersections combined comparing 3-year averages (2015-2017 to 2016-2018) and year-over-year (2019 to 2020).

Combined fatal and suspected serious injury crashes at or near intersections 3 Year Averages	2015-2017	2016-2018	
	595.0	625.0	5%

Combined fatal and suspected serious injury crashes at or near intersections Year to Year % Change	2019	2020	
	1463	1424	-3%

6. Five-year rolling averages for fatal crashes at or near intersections by **MPO region**:

Fatal crashes 5 Year Rolling Averages	2015-2019	2016-2020	
DVRPC	45.2	43.2	-4%
NJTPA	107.4	107.8	0%
SJTPO	19.8	21.4	8%

7. Five-year rolling average for fatal crashes at or near intersections by **roadway jurisdiction**:

Fatal crashes 5 Year Rolling Averages	2015-2019	2016-2020	
County	62.6	60.0	-4%
Municipal	39.0	38.8	-0.5%
State Highway	68.4	71.2	4%
Interstate	0.4	0.4	0%
State/Interstate Authority	0.8	0.8	0%

8. Fatal and suspected injury crashes combined at or near intersections **by roadway jurisdiction** comparing 3-year averages (2015-2017 to 2016-2018) and the percent change from 2019 to 2020.

Combined fatal and suspected serious injury crashes 3 Year Averages	2015-2017	2016-2018	
County	244	257	5%

Municipal	155	169	9%
State Highway	191	193	1%

Combined fatal and suspected serious injury crashes % Change from 2019 to 2020	2019	2020	
County	596	546	-8%
Municipal	470	467	-1%
State Highway	377	390	3%

9. The top 10 Counties accounted for 74% of all fatal and suspected serious injury crashes at or near intersections over the 6-year (2015-2020) period:

County	Fatal	Suspected Serious Injury			
ESSEX	109	583			
CAMDEN	80	479			
MIDDLESEX	78	340			
MONMOUTH	76	328			
BURLINGTON	70	320			
BERGEN	65	281			
HUDSON	63	257			
UNION	59	245			
OCEAN	58	220			
ATLANTIC	54	194	3959	74%	Top 10
GLOUCESTER	54	190			
MERCER	46	157			
PASSAIC	44	141			
CUMBERLAND	36	130			
MORRIS	34	121			
SOMERSET	30	77			
SALEM	17	71			
CAPE MAY	14	61			
SUSSEX	11	53			
WARREN	10	43			
HUNTERDON	10	25			
	1018	4316	5334		

10. 38% of fatal and suspected serious injury (SSI) crashes at or near intersections occurred on roadways with posted speed limits of 25 mph or less.

Posted Speed Limit	Fatalities 2015-2020	SSI 2015-2020	Total	% of Total
25 or less	280	1765	2045	38%
30	31	150	181	3%
35	142	696	838	16%

40	143	524	667	13%
45	137	423	560	10%
50	194	472	666	12%
55	55	119	174	3%
60 or more	3	12	15	0%
Not identified	33	155	188	4%
	1018	4316	5334	100%

11. Unmapped Crashes (2015-2020)

Unmapped fatal crashes	9	
Unmapped suspected serious injury crashes	80	
Unmapped fatal & suspected serious injury crashes	89	2%
Unmapped fatal & suspected serious injury crashes on county and municipal roadways	72	2%

12. Alcohol involved crashes (2015-2020)

Alcohol involved fatal crashes	111	
Alcohol involved suspected serious injury crashes	470	
Alcohol involved fatal and suspected serious injury crashes	581	11%
Alcohol involved fatal and suspected serious injury crashes on county and municipal roadways	389	10%

13. Hit and Run involved crashes (2015-2020)

Hit and run fatal and suspected serious injury crashes	389	7%

Recommendations for Further Evaluation/Next Steps:

1. Unmapped fatal and suspected serious injury intersection related crashes on county and municipal roadways (72 records in total) need to be reviewed to see if they can be mapped.

2. The analysis indicates 38% of all fatal and suspected serious injury intersection related crashes on county and municipal roadways were on roadways with a posted speed limit of 25 mph or less. Is speed the main contributing factor in these fatal crashes and how can this be verified through available data?

3. Ten counties accounted for 75% of all fatal and suspected serious injury intersection related crashes on county and municipal roadways. The trends need to be assessed further, including the means available to mitigate the assessed concerns.

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

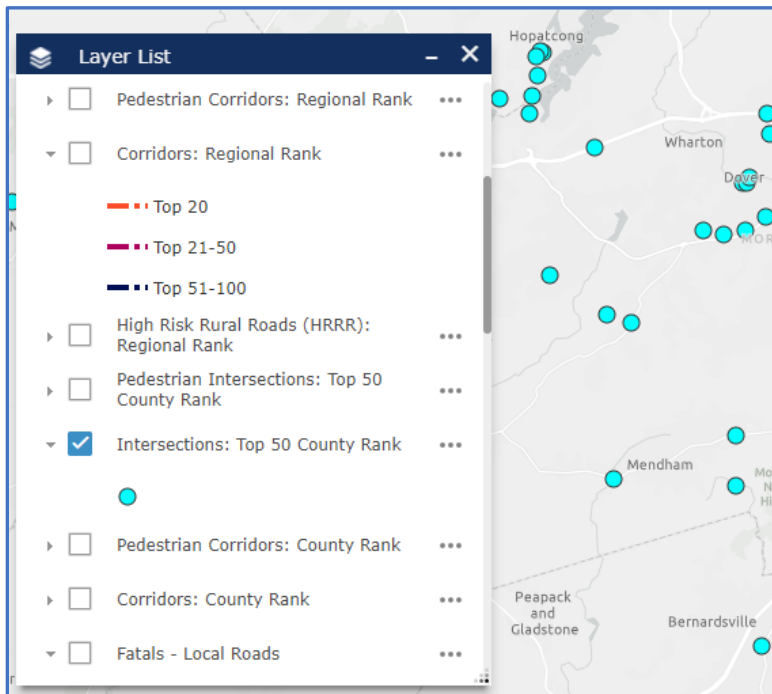There are five buttons located at the bottom center of the page.
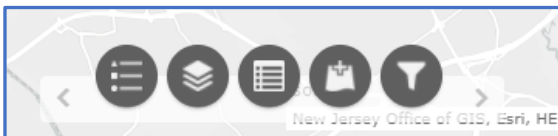
          Legend

Displays a legend for each layer
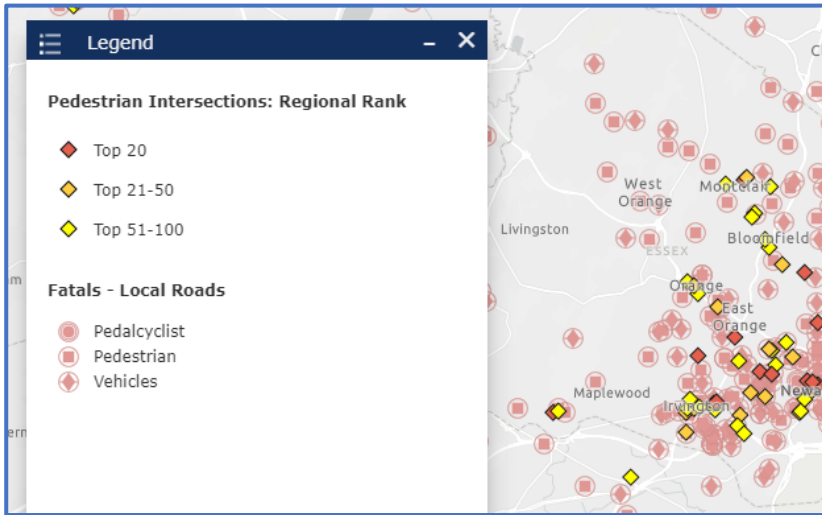
 Layer List

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.
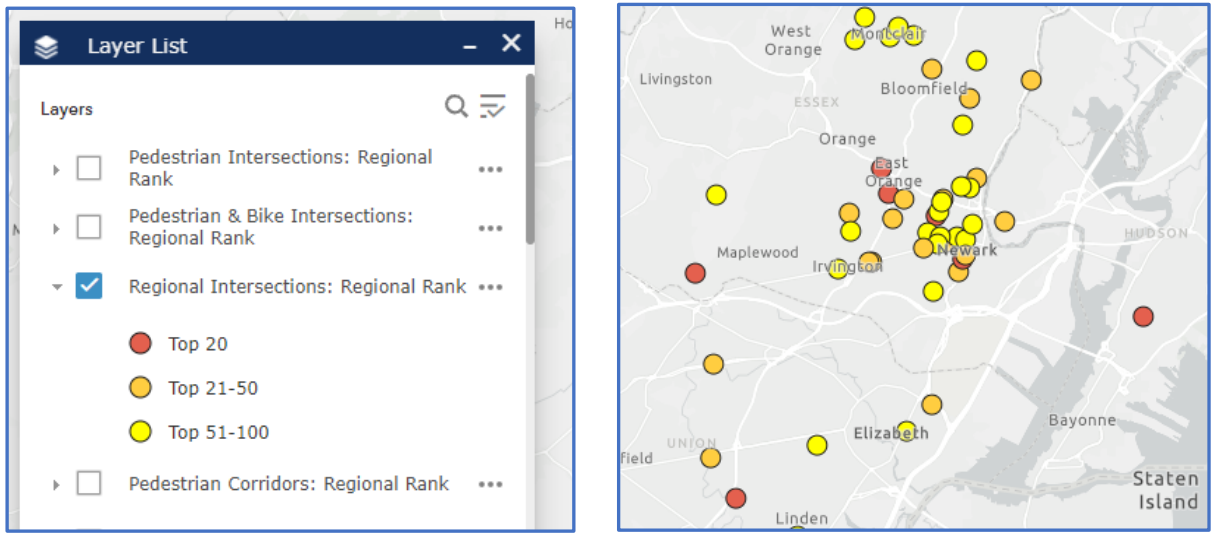

NJDOT Safety Voyager Crash Data

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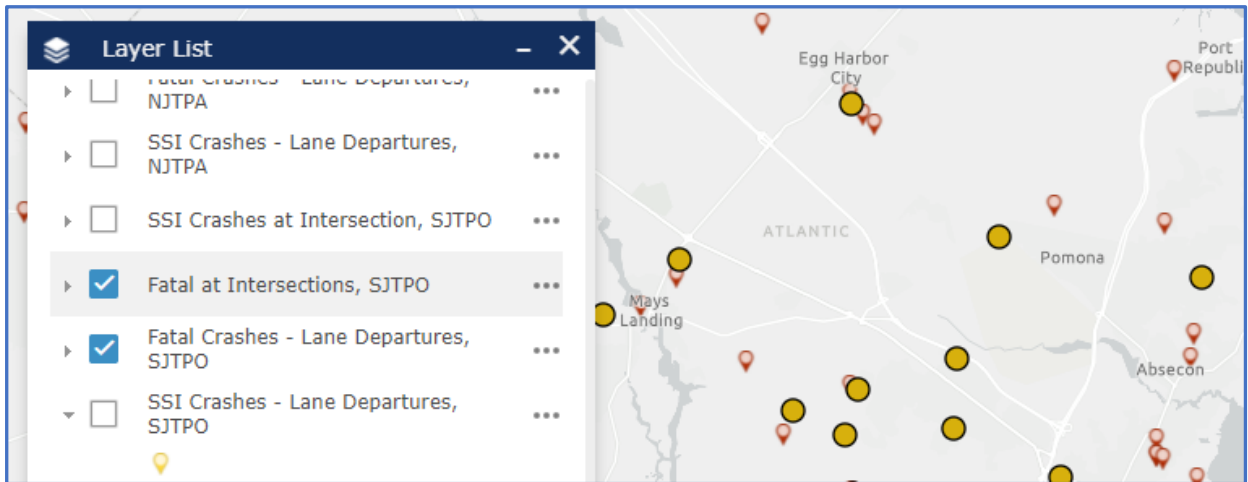
Click on a crash point and a pop-up box will display crash details. You can use the grey bar on the right side of the box to scroll down and see all of the details or click on this box here and a larger box will appear with all the details displayed.
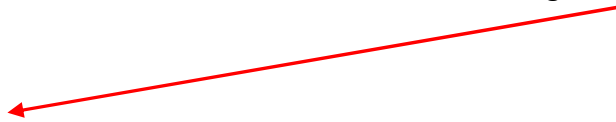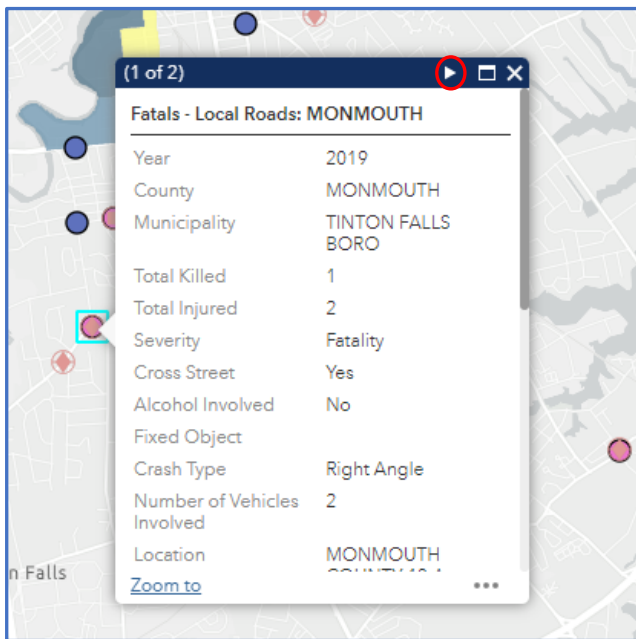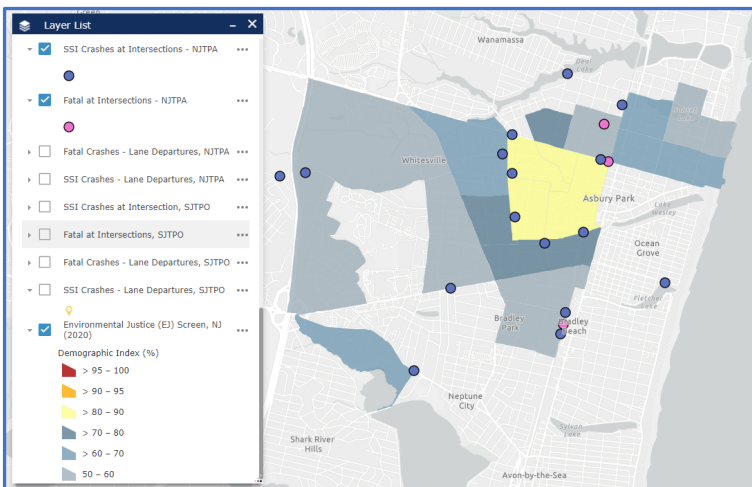
HSIP funded Projects

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

|													
⊞ Options ▾	Filter by map extent		📍 Zoom to	✕ Clear selection		↻ Refresh							
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
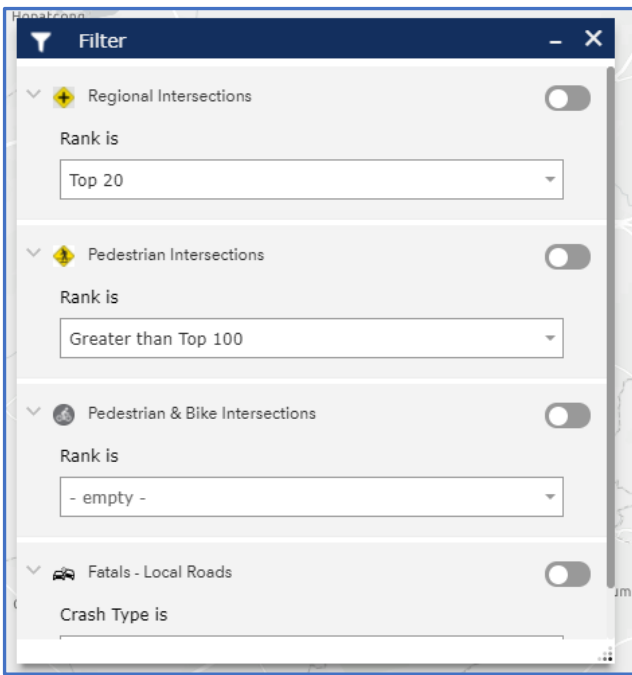
About, Basemaps and Print

   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.