

SAFER STREETS FOR ALEXANDRIA

# Vision Zero in Alexandria, VA





### **Executive Summary**

- On January 24, 2016, the City of Alexandria adopted a Vision Zero resolution, which set a goal of eliminating traffic deaths and serious injuries by 2028. In an on-going effort to support this resolution, the Office of Performance Analytics (OPA) and Information Technology Services (ITS) has performed an updated citywide crash analysis for CY2016 CY2020 in partnership with the Department of Transportation and Environmental Services (TES) and the Alexandria Police Department (APD)
- This analysis is organized into the following sections:
  - Analysis Notes highlights important analysis terms, methodology notes, and general information
  - Key Findings highlights the key findings from the crash analysis
- The traffic crash data was extracted by APD from their Record Management System (RMS). RMS crash data was compared with data captured in the State's Traffic Records Electronic Data System (TREDS). Data discrepancies were evaluated and resolved by the analysis team as needed.
- Findings from this analysis can inform future transportation planning decisions regarding policy, infrastructure or public outreach.
- This reporting period includes the first year of the COVID-19 pandemic. No formal study has been conducted regarding the Alexandria-specific travel impacts of COVID-19. However, regional studies have shown that travel patterns changed drastically due to public health lockdown measures in 2020 which resulted in lower overall traffic volumes and public transit ridership, and higher rates of walking and biking [Study references in memo]. The impacts of the COVID-19 pandemic (lockdowns, work from home mandates etc.) should be considered when evaluating crash trends and insights associated with 2020.



#### <u>Analysis Notes</u>

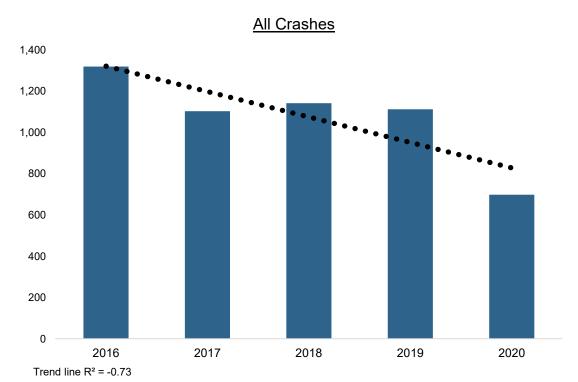
- For this analysis, crash data is evaluated by two major classifications: Severity and Mode:
  - Crash severity is classified as either a crash that results in someone being killed or severely injured (KSI) or it does not (non-KSI). All or total
    crashes refer to KSI and non-KSI crashes
  - Crash mode is classified into three groups: vehicle-only crashes, crashes that involve pedestrians, and those that involve bicyclists
- The crash data used in this analysis consists of three tables (1) crash data (2) crash names and (3) crash vehicles.
  - Crash data is the primary data table which contains general information of the crash such as location, weather, time, day, type of crash, intersection type, road condition, who was involved (vehicles only, pedestrian, or bicyclists) and severity (killed, seriously injured or other injuries)
  - Crash names Contains information about all individuals involved in a crash including age, primary action at the time of the crash, whether they were drinking and wearing their safety restraint
  - Crash vehicles Contains information about all the vehicles involved in a crash including vehicle type, speed they were traveling, and vehicle maneuver performed at the time of the accident
- For the graphs that display crash trends over time, the strength of the trend is expressed through the r<sup>2</sup> value. The closer the r<sup>2</sup> value is to 1 or -1 the stronger the trend. Positive r<sup>2</sup> values indicate an upward trend, negative r<sup>2</sup> values indicate a downward trend, and zero indicates a flat trend.
- Within the crash data the incident address, or latitude and longitude coordinates, were used to map crash locations. Due to data inaccuracies or lack of location information, 25 crash records (<1%) were unable to be mapped. However, they were included in the non-spatial parts of the analysis.
- Maps showing concentration of crashes were used to show general concentration of crashes for planning purposes. Crash concentrations can vary based on parameters used. Parameters used for this analysis were derived from Alexandria specific data characteristics and industry guidance.
- The High Injury Network was created to highlight corridors with high concentrations of KSI crashes. If two street segments had a KSI crash (killed or seriously injury crash), and the distance between them was less than 2,500 feet; both those segments and any segments lying between them are combined to define a single corridor. Only those segments that have KSI crashes on them or on segments around them, are selected. Two more steps were taken to refine the final outcome. First, we dropped corridors that were less than 2,500 feet. Then, we removed any corridor with only one KSI from the tally. If needed, other adjustments were made based on subject matter expertise.



**Key Finding 1:** Crashes are trending downward



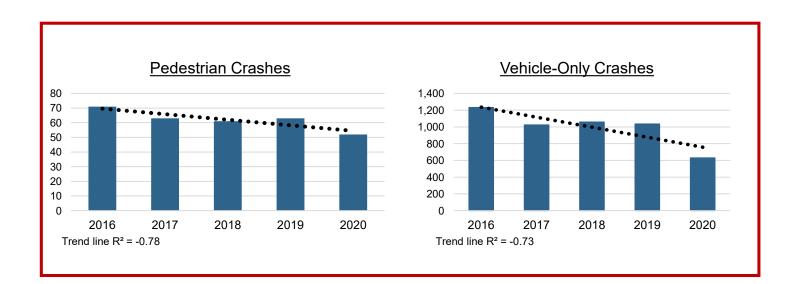
Total crashes for this reporting period are trending downwards.

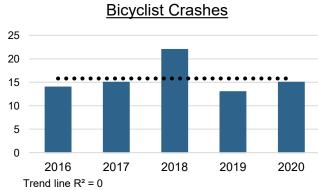


| Year  | Total<br>Crashes | Previous<br>Year<br>Difference |
|-------|------------------|--------------------------------|
| 2016  | 1,318            |                                |
| 2017  | 1,102            | -16%                           |
| 2018  | 1,141            | 4%                             |
| 2019  | 1,111            | -3%                            |
| 2020  | 697              | -37%                           |
| Total | 5,369            |                                |



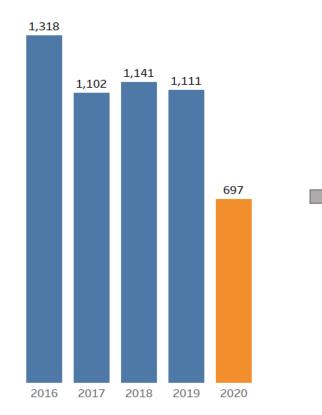
The downward crash trend is driven primarily by pedestrian and vehicle-only crashes.







In 2020, there was a noticeable decline in crash totals. From 2019 to 2020, there was a 37% decline in crashes – the largest in this reporting period. Vehicle-only crashes accounted for the largest drop by mode from 2019 to 2020. The impacts of the COVID-19 pandemic should be considered when evaluating crash trends and insights associated with 2020. Regional studies have shown that people's travel patterns changed drastically due to public health lockdown measures in 2020 (see memo for study references).



| Yea  | r  | Total<br>Crashes | Previous<br>Year<br>Difference |
|------|----|------------------|--------------------------------|
| 201  | 6  | 1,318            |                                |
| 201  | 7  | 1,102            | -16%                           |
| 201  | 8  | 1,141            | 4%                             |
| 201  | 9  | 1,111            | -3%                            |
| 202  | 0  | 697              | -37%                           |
| Tota | al | 5,369            |                                |

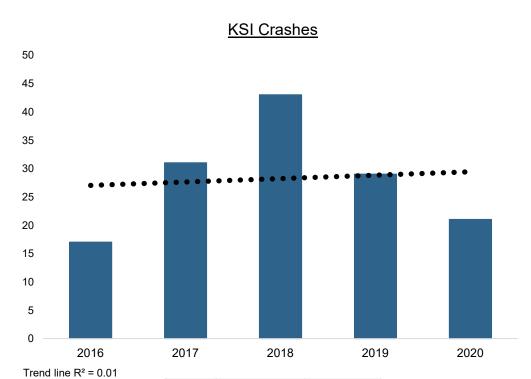
| Crash Mode   | 2019 Total | 2020 Total | Previous Year<br>Difference |
|--------------|------------|------------|-----------------------------|
| Bicyclist    | 13         | 15         | 15%                         |
| Pedestrian   | 63         | 52         | -18%                        |
| Vehicle-Only | 1,035      | 630        | -39%                        |



Key Finding 2: KSI crashes are trending slightly upwards, while KSI risk varies by mode



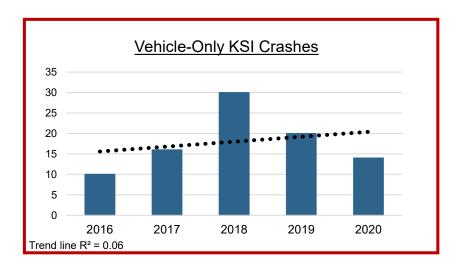
KSI crashes for this reporting period are trending slightly upwards.

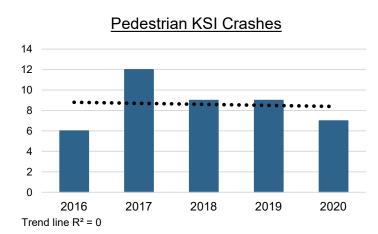


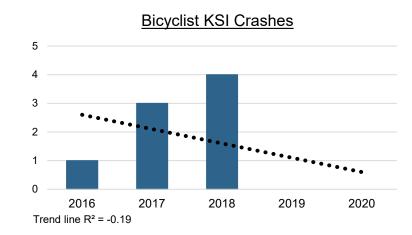
| Year  | KSI<br>Crashes | Previous<br>Year<br>Difference |
|-------|----------------|--------------------------------|
| 2016  | 17             |                                |
| 2017  | 31             | 82%                            |
| 2018  | 43             | 39%                            |
| 2019  | 29             | -33%                           |
| 2020  | 21             | -28%                           |
| Total | 141            |                                |



The slightly upward KSI trend is driven primarily by vehicle-only KSI crashes.

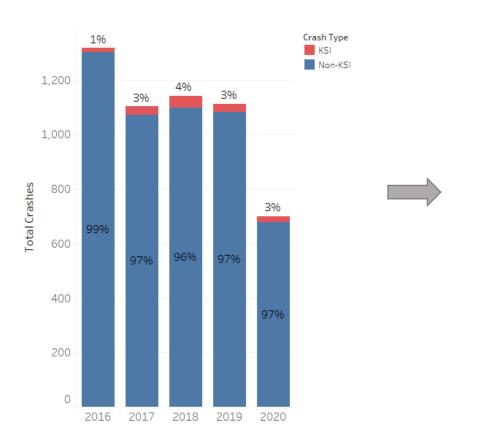


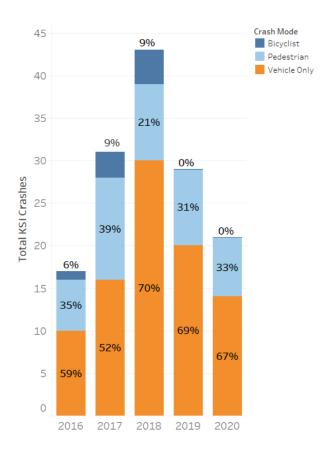




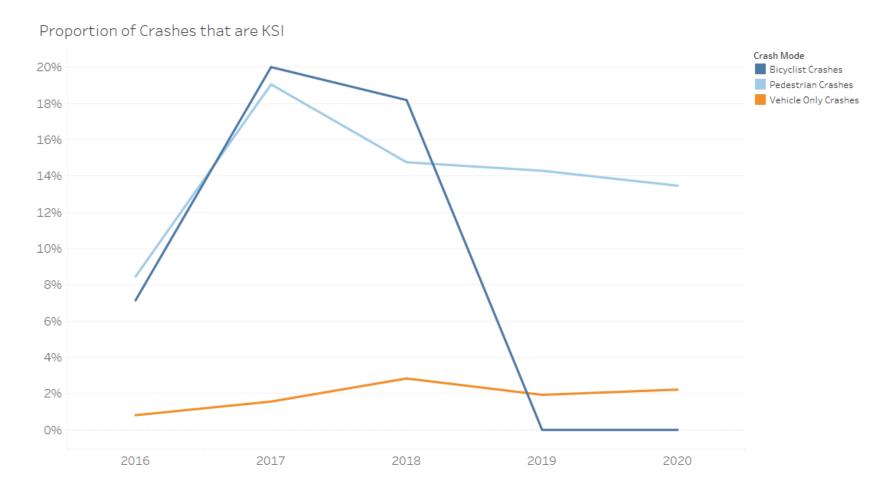


The proportion of crashes that were fatal or severe remained somewhat consistent throughout the reporting period, hovering around 3%. Vehicle-only crashes had the highest number of KSI crashes every year, followed by pedestrian crashes, then bicyclist crashes.





The proportion of vehicle-only crashes that were fatal or severe were overall much lower than pedestrian and bicyclist crashes. The proportion of pedestrian and bicyclist crashes that were fatal or severe followed a similar trajectory from 2016-2018, then the bicyclist KSI proportion dropped significantly while the pedestrian KSI proportion hovered around 14%.

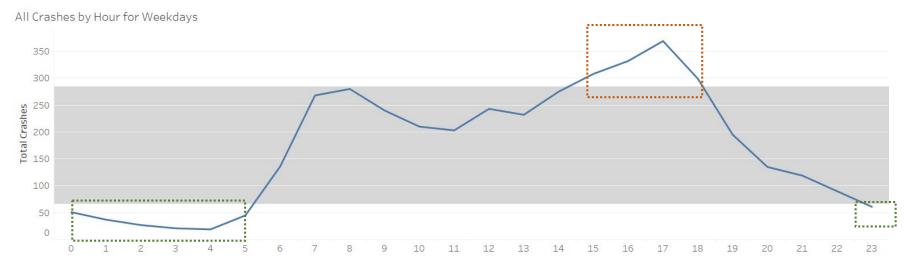




Key Finding 3: Crash volume and KSI risk varies by hour, day, and month



During the weekday, the highest crash frequencies are seen during the evening commute (3:00pm – 6:00pm/15:00-18:00). The lowest weekday crash frequencies are seen during the late night, early morning hours (11:00pm - 5:00am/23:00-5:00). On the weekend, the highest crash frequencies are seen during mid-day (12:00pm – 2:00pm/12:00-14:00), while the lowest are seen during the early morning hours (3:00am to 7:00am/3:00-7:00).



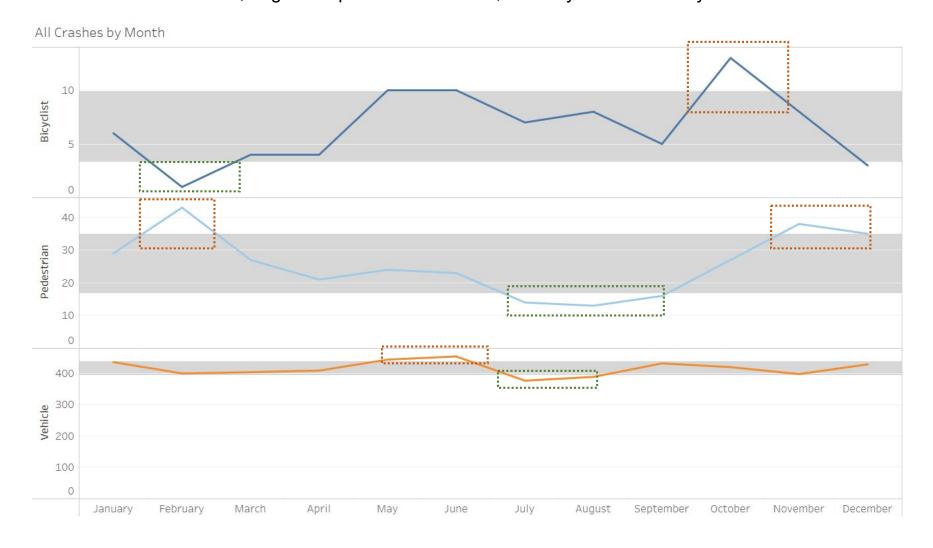
Gray bands show -1/+1 standard deviation. High crash volume is defined as above one standard deviation (above gray bar); low crash volume is below one standard deviation (below gray bar)







Examining crashes by month identifies any seasonal trends. The highest monthly crash totals by mode were October for bicycle crashes, February for pedestrian crashes, and June for vehicle-only crashes. The lowest monthly crash totals were February for bicycle crashes, August for pedestrian crashes, and July for vehicle-only crashes.

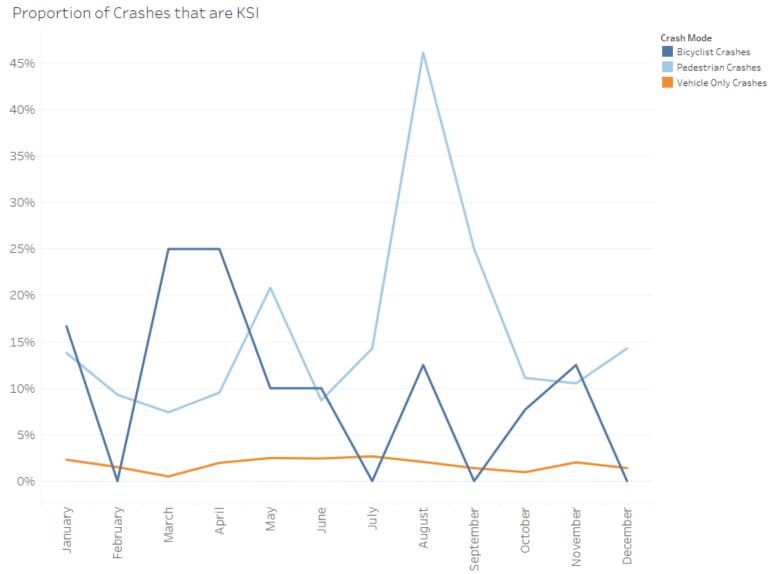


\*\*\*Gray bands show 1/+1 standard deviation.
High crash volume is
defined above one
standard deviation
(above gray bar); low
crash volume is below
one standard deviation
(below gray bar)

Low Crash Volume High Crash Volume



March and April had the highest proportion of fatal or severe crashes for bicyclists. August and September were high months for fatal or severe pedestrian crashes. Vehicle-only crashes remained constant through out the year with only minor fluctuations in KSI proportion.

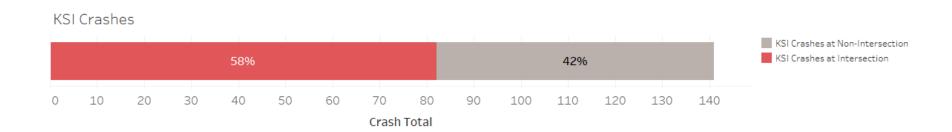




**Key Finding 4:** Most KSI crashes occur at intersections



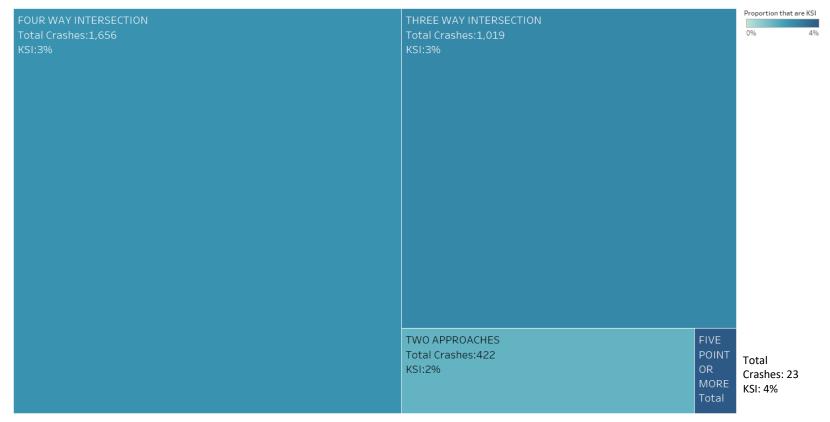
#### The majority of KSI crashes occur at intersections.





Five point or more intersections had the highest proportion of KSI crashes, but the number of crashes are low. Four-way and three-way intersections had the next highest KSI proportion at 3%.

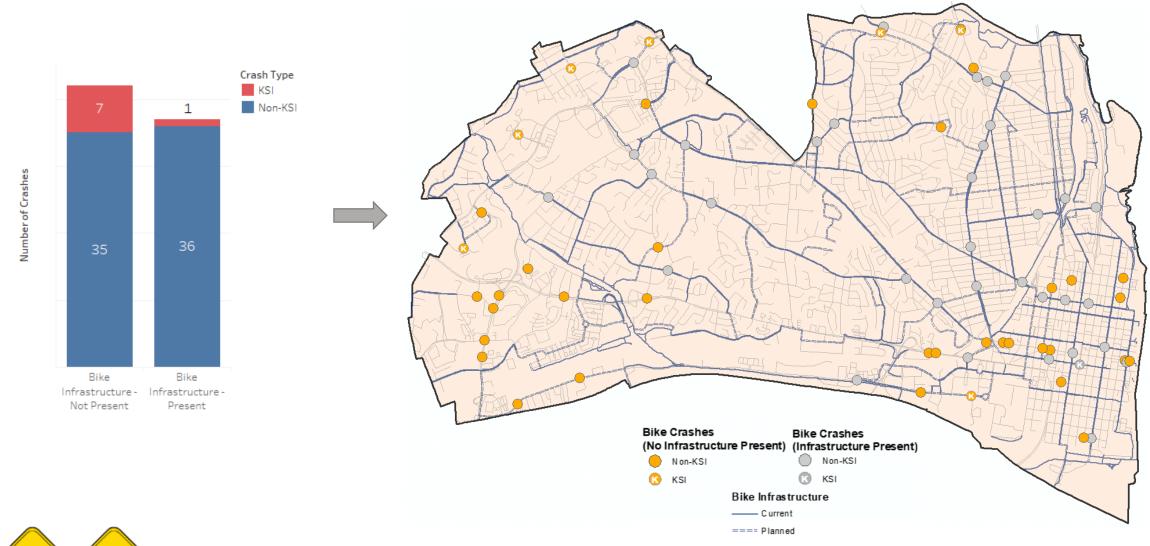
Crashes by Intersection Type (Size indicates number of KSI crashes; color shows KSI proportion)



**Key Finding 5:** Most KSI bicyclist crashes occur where there is no bike infrastructure



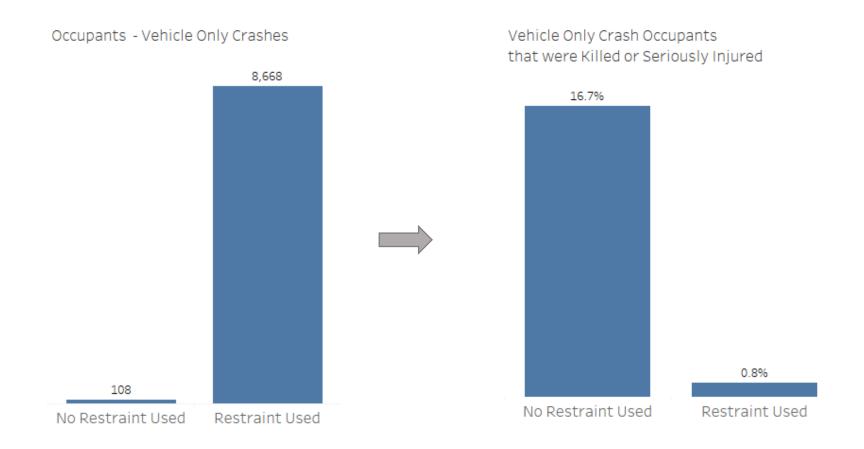
The majority of bicyclist KSI crashes occurred where no bike infrastructure was present.



**Key Finding 6:** Not using a safety restraint while in a vehicle increases KSI risk



In vehicle-only crashes, the majority of occupants used their safety restraint (e.g., seat belt). Vehicle occupants who didn't wear their safety restraints were approximately 20 times more likely to be killed or seriously injured than those who did wear them.

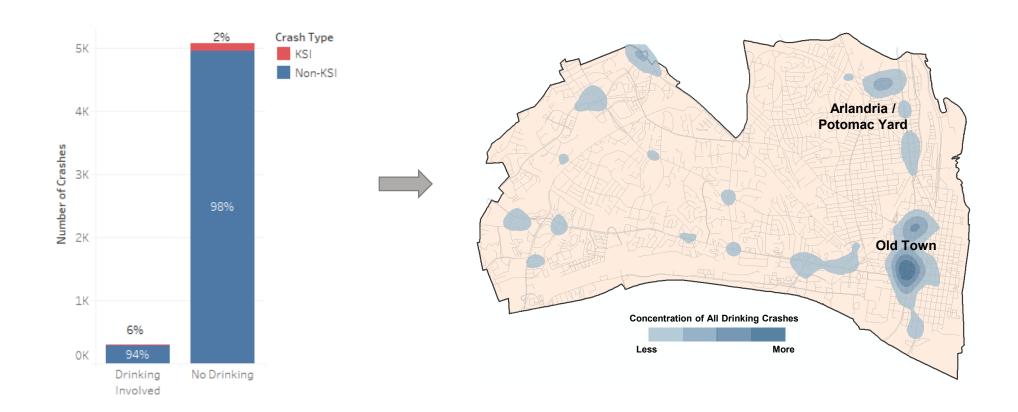




**Key Finding 7:** Drinking while driving increases the risk of KSI crashes

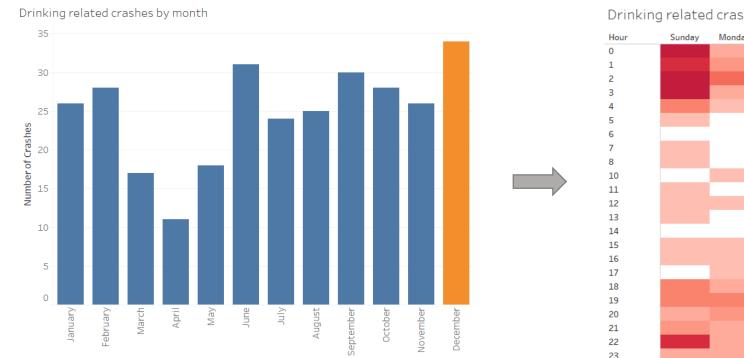


Crashes when drinking was involved had a higher proportion of KSI crashes (6%) compared to crashes that didn't (2%). Certain locations within the City have higher concentrations of drinking related crashes than others.

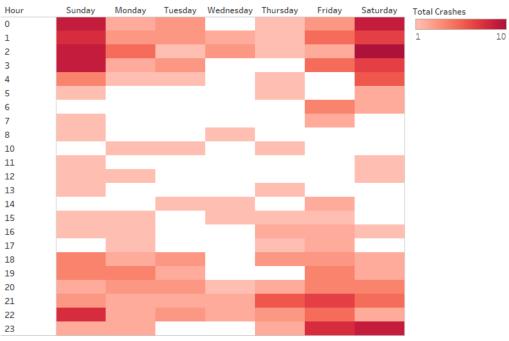




December had the highest number of drinking-related crashes. Most drinking-related crashes occurred on the weekend during the evening or early morning hours.







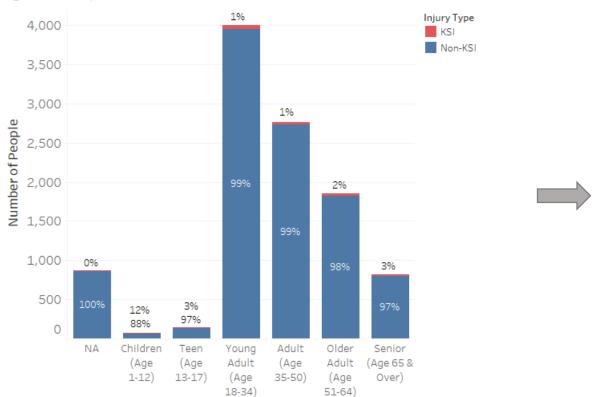


**Key Finding 8:** Children, teens, and seniors are at higher risk of fatal or serious injury



Children, teens and seniors had the highest proportion of fatalities or serious injuries compared to other age groups. Young adults had the highest total number of fatalities or serious injuries compared to other age groups.





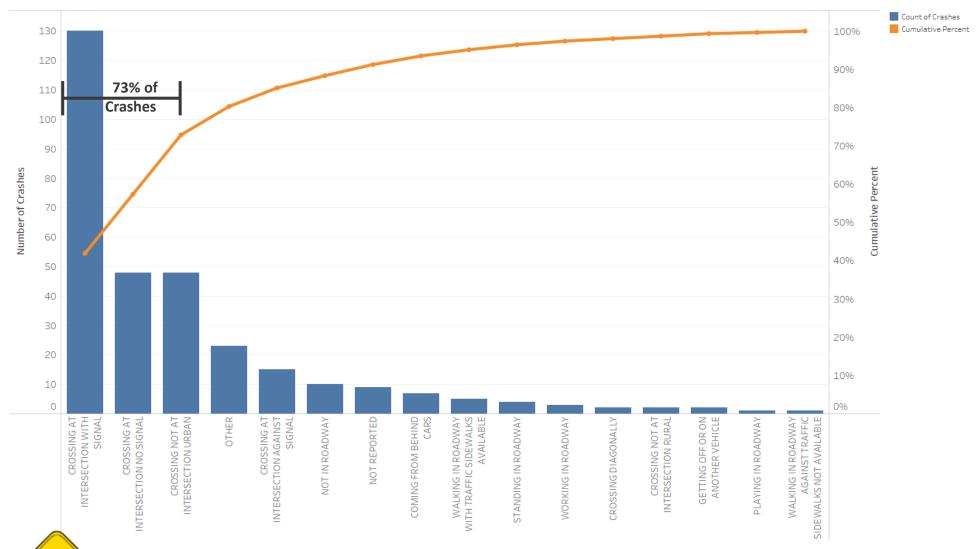
| Age Group    | Total Number of KSI Injuries | Proportion of all<br>KSI Injuries |
|--------------|------------------------------|-----------------------------------|
| Children     | 8                            | 5%                                |
| Teen         | 5                            | 3%                                |
| Young Adult  | 56                           | 36%                               |
| Adult        | 34                           | 22%                               |
| Older Adult  | 32                           | 20%                               |
| Senior       | 21                           | 13%                               |
| NA (Unknown) | 1                            | 1%                                |



**Key Finding 9:** Certain actions or maneuvers carry higher risk of fatal or severe injury for pedestrians



During pedestrian crashes, certain pedestrian crossing types occur more frequently than others. Crossing at an intersection with a signal, Crossing at an intersection without a signal, and Crossing not at an intersection (urban) account for 73% of actions taken by pedestrians.



Certain pedestrian crossing types have higher KSI risk than others. Walking in road against traffic (where sidewalks were not available) had the highest KSI proportion, but low crash numbers. Crossing at intersection with a signal and crossing not at an intersection (urban) had high numbers of KSI crashes.

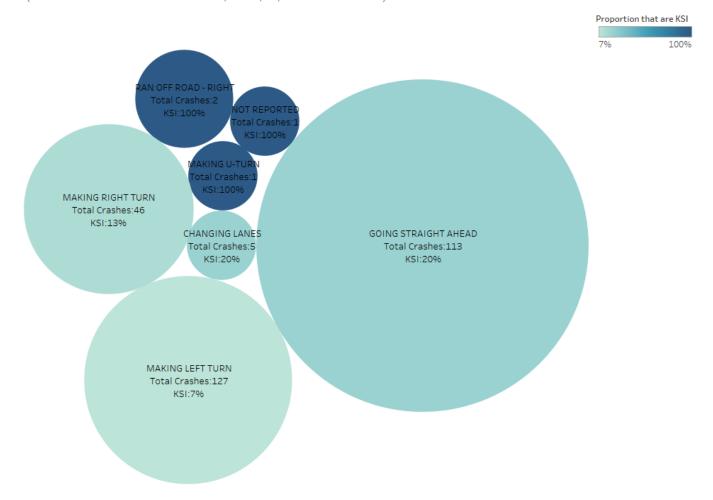
Pedestrian Crossing Types & KSI Proportion (Size indicates number of KSI crashes; color shows KSI proportion)

| CROSSING AT INTERSECTION WITH SIGNAL Total Crashes: 130 KSI:996 | CROSSING AT INTERSECTION NO SIGNAL Total Crashes:48 KSI:10%            | OTHER Total Crashes:23 KSI:21%  | Proportion that are KSI 9% 100% |
|---|--|---|---------------------------------|
| CROSSING NOT AT INTERSECTION URBAN Total Crashes:48 KSI:2396    | CROSSING AT INTERSECTION AGAINST SIGNAL<br>Total Crashes:15<br>KSI:20% | COMING FROM BEHIND CARS Total Crashes:7 KSI:1496  CROSS DIAGONALLY Total Crashes:2 KSI:5096 |                                 |
|   | NOT IN ROADWAY<br>Total Crashes:10<br>KSI:30%                          | GETTING OFF/ON ANOTHER VEHICLE<br>Total Crashes:2<br>KSI:50%                                |                                 |
|   |  | WALKING IN ROAD AGAINST TRAFFIC<br>SIDEWALKS NA<br>Total Crashes:1<br>KSI:100%              |                                 |



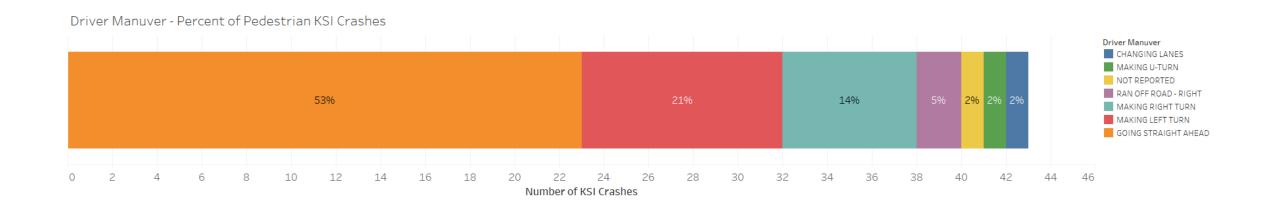
During pedestrian KSI crashes, certain driver maneuvers result in a higher proportion of KSI crashes. Ran off road (right) and Making a U-Turn had the highest proportion of KSI crashes, but low crash numbers.

Driver maneuver during Pedestrian KSI crashes (Size indicates number of KSI crashes; color proportion that are KSI)





Crashes where the driver was going straight ahead account for over half of fatal or severe pedestrian crashes.

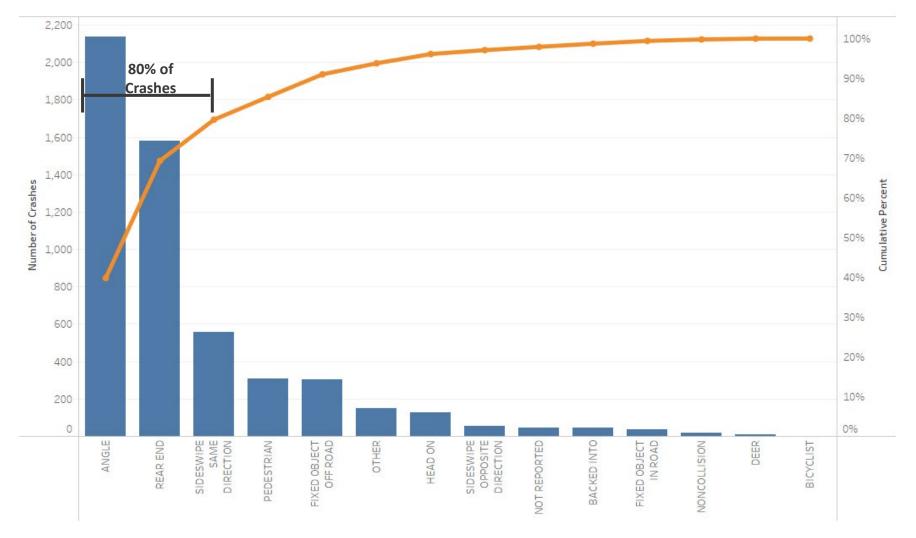




Key Finding 10: Certain crash types have higher crash frequencies and KSI risk



Certain crash types occur more frequently than others. Angle, Rear end, or Sideswipe (same direction) account for 80% of all crashes.





Certain crash types have higher KSI risk than others. Pedestrian and Non-collision crashes have the highest proportion of KSI crashes.

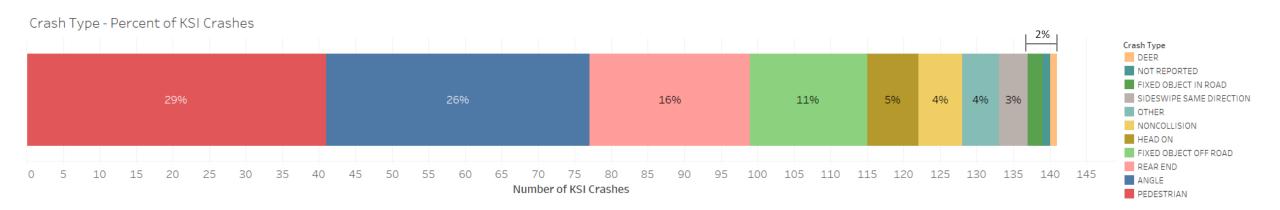
(Size indicates number of KSI crashes; color indicates KSI proportion) Proportion that are KSI PEDESTRIAN REAR END FIXED OBJECT OFF ROAD Total Crashes:307 Total Crashes:1,581 Total Crashes:304 KSI:1396 KSI:196 KSI:596 ANGLE Total Crashes: 2.138 KSI:296 HEAD ON OTHER SIDESWIPE SAME Total Crashes:125 Total Crashes:149 DIRECTION KSI:6% KSI:396 Total Crashes:556 KSI:196 KSI: 9% FIXED OBJECT IN DEER ROAD Total Crashes:11 Total Crashes:37 NOT REPORTED KSI:596 Total Crashes:44 2%



Crash Type and KSI Proportion

<sup>\*</sup>Non-Collision - Includes crashes such as runoff road, crossing median and vehicle rollovers

Pedestrian crashes and angle crashes account for over half of all fatal and severe crashes.

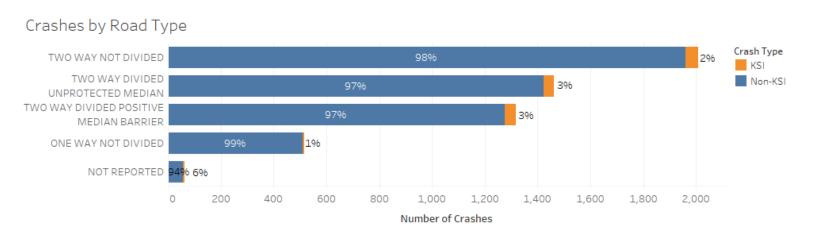




**Key Finding 11:** Certain street characteristics and environmental conditions have higher KSI risk



Examining crashes by various road types shows that Two-way (not divided) roads had the most KSI and non-KSI crashes. While Two-way (divided – Unprotected Median) and Two-way (divided – Positive Median Barrier) roads had the highest proportion of KSI crashes.







Two-Way Divided Positive Median Barrier



Two Way Not Divided

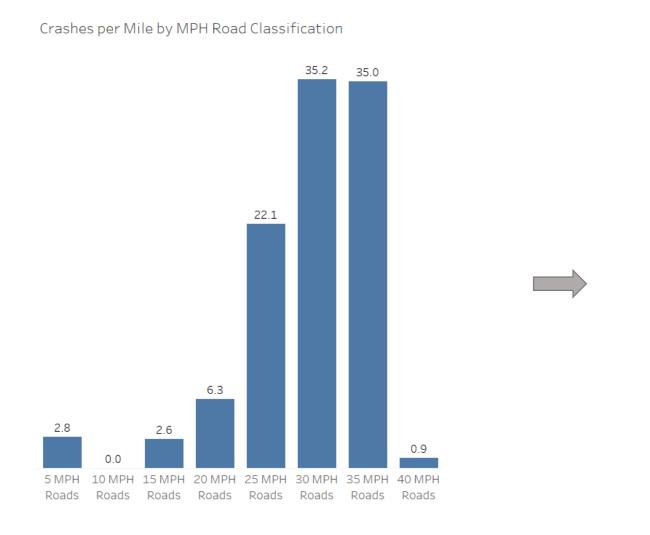


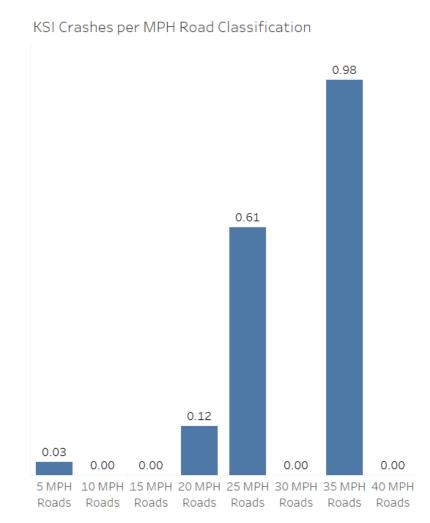
Two-Way Divided Unprotected Median





## 30 MPH roads have the highest crash rate per mile at 35.2, while 35 MPH roads have the highest KSI crash rate per mile at 0.98.

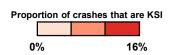




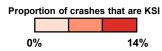


Certain environmental conditions have higher proportions of KSI crashes. The majority of crashes occurred during clear conditions; however, KSI crashes did occur during wet weather (rain or mist) for pedestrian and vehicle-only crashes. When roads had holes, ruts or bumps the proportion of KSI crashes increased for vehicle-only crashes. The proportion of crashes that were fatal or severe were higher at dark (road lighted) for pedestrians and at dawn for bicyclists.

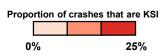
| Weather Condition | Total Crashes |           |            |
|-------------------|---------------|-----------|------------|
| Weather Condition | Vehicle Only  | Bicyclist | Pedestrian |
| Blowing Debris    | 0             | 0         | 1          |
| Fog               | 16            | 0         | 0          |
| Mist              | 211           | 0         | 13         |
| Clear             | 4,176         | 77        | 253        |
| Other             | 10            | 0         | 0          |
| Rain              | 524           | 2         | 39         |
| Severe Crosswinds | 3             | 0         | 0          |
| Sleet or Hail     | 3             | 0         | 0          |
| Smoke or Dust     | 4             | 0         | 0          |
| Snow              | 23            | 0         | 1          |
| Not Reported      | 10            | 0         | 3          |



| Road Condition         | Total Crashes |           |            |
|------------------------|---------------|-----------|------------|
| Road Condition         | Vehicle Only  | Bicyclist | Pedestrian |
| Edge Pavement Drop Off | 1             | 0         | 0          |
| Holes, Ruts, or Bumps  | 17            | 0         | 0          |
| Loose Material         | 4             | 0         | 0          |
| No Defects             | 4,843         | 79        | 303        |
| Other                  | 9             | 0         | 1          |
| Restricted Width       | 5             | 0         | 0          |
| Roadway Obstruction    | 2             | 0         | 0          |
| Slick Pavement         | 82            | 0         | 3          |
| Under Repair           | 5             | 0         | 0          |
| Not Reported           | 12            | 0         | 3          |



| Light Condition            | Total Crashes |           |            |
|----------------------------|---------------|-----------|------------|
| Light Condition            | Vehicle Only  | Bicyclist | Pedestrian |
| Darkness, Road Lighted     | 1,067         | 12        | 94         |
| Darkness, Road Not Lighted | 50            | 1         | 12         |
| Darkness, Unknown Lighting | 14            | 0         | 1          |
| Dawn                       | 161           | 4         | 8          |
| Daylight                   | 3,459         | 58        | 169        |
| Dusk                       | 219           | 4         | 20         |
| Unknown                    | 7             | 0         | 3          |
| Not Reported               | 13            | 0         | 3          |

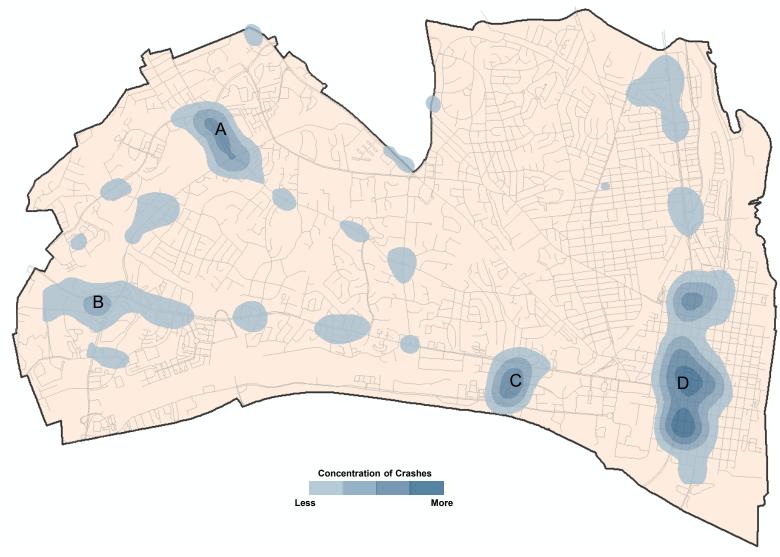




**Key Finding 12:** Crashes involving speeding vehicles are concentrated in certain areas



Crashes involving speeding vehicles are concentrated in these major areas: Seminary Road near I-395 interchange (A), Landmark Area (B), Telegraph Road (C), and Old Town (D). Note: It's expected that number of speeding related crashes are under-reported to the inaccuracies of recording speed at the time of the crash





**Key Finding 13:** Certain road segments have a higher concentration KSI risk



The High Injury Network (HIN) is a collection of corridors that have a high concentration of KSI crashes. 70% of all fatal or severe crashes occurred on these corridors.

