Systemic Analysis Data 2017-2019
Serious and Fatal Crashes – Critical Crashes

Table of Contents

Introduction 3

Methodology 3

Key Takeaways 4

Next Steps 8

Crash Severity Definitions 9

Introduction

Arlington County conducted this systemic analysis of serious and fatal crashes to evaluate common factors in serious and fatal crashes over a three-year period and identify high risk circumstances and roadway characteristics. This report documents the methodology employed for the systemic crash analysis, key findings, and detailed reports/charts of the various aspects analyzed in the crash data.

Methodology

Staff used data from the last available period of three calendar years from the Virginia Department of Transportation (VDOT) Full Crash Dataset for this systemic analysis. This spatial dataset was developed in-house by the VDOT Traffic Engineering Division Highway Safety section for crash analysis purpose based on Virginia's Traffic Records Electronic Data System (TREDS). TREDS reports crash data in Arlington from police reports (both local and state police) of crashes that result in injury or over $1,500 in property damage.

The analysis focuses on ***critical (serious or fatal) crashes*** as identified in the crash dataset. (See section on Crash Severity Definitions for more information on how crashes are classified based on injury.) Crashes resulting in minor/possible injury or property damage only were not considered in the systemic review as the intent of the analysis is to identify contributing factors in critical crashes.

The VDOT crash dataset included data fields with either ***categorized*** response fields (only one response was applicable to the crash) or ***binary*** response fields (yes/no responses—each crash could have many characteristics identified as factors in the crash).

- Categorized response fields include: crash type, month, day of week, time of day, weather conditions, light conditions, roadway surface conditions, intersection type, traffic control type, roadway description, age (per person involved), sex (per driver involved), vehicle type (per driver involved - e.g., car, bicycle, motorcycle, large truck, bus, or scooter), driver action during crash (per driver involved), driver safety equipment used (per person involved), and vehicle maneuver type (per driver involved).
- Binary response fields include identification of the following factors involved in each crash: alcohol-related, belted, distracted, drug-related, hit-and-run, large truck, pedestrian, bicycle, motorcycle, speed-related, school zone, night, senior driver, young driver, and work zone.

County staff also obtained detailed crash descriptions (reported by the responding police officer) of each crash from Arlington County Police Department and VDOT. Reviewing individual crash descriptions enabled staff to identify factors contributing to each crash that were not captured in either the categorized or binary response fields. Staff read and tagged each description based on commonly-cited characteristics or circumstances involved in the crash (e.g., failure to yield, driver did not see pedestrian, driver did not see bicyclist, driver did not see other vehicle, no crosswalk, bus, lost control, scooter, emergency maneuver, cell phone use, medical emergency, etc.). These tags were also used in the analysis.

Staff conducted the analysis by reviewing all critical crashes by to gather a baseline of common types of crashes, modes involved, and other key crash variables. Then, to identify the most common characteristics or circumstances in Arlington's serious and fatal crashes, staff isolated crashes by categorized response field variables, binary response field variables, and tags from the descriptions. Next, staff applied a cross-examination method to identify relationships between variables and understand which combinations of crash variables were most common. Last, the VDOT dataset

included latitude/longitude coordinates for each crash, which allowed staff to analyze the crashes spatially in ArcGIS for further commonalities based on where the crashes took place.

Key Takeaways

There was a total of 178 critical (serious or fatal) crashes in Arlington County involving 326 vehicles over the 2017-2019 three-year data period. The following summary identifies key commonalities across critical crash characteristics and circumstances:

Turn-related crashes comprised 29% of all critical crashes. Left turn crashes alone contributed to 20% of all critical crashes.

- Of turning-related critical crashes, about 30% involved a right turn and 70% involved a left turn.
- Common characteristics of turning-related critical crashes included:
    - Involved a pedestrian (35%) and
    - Involved a large truck (23%).
- Turning-related critical crashes were concentrated in the following locations:
    - Glebe Rd (between N Carlin Springs Rd and Columbia Pike) had six critical turn-related crashes, of which five were left-hand turns.
    - Columbia Pike (between the County Line and George Mason Dr) had five critical turn-related crashes, of which four were left hand turns.

Pedestrian crashes comprise nearly a quarter of total critical crashes at 23% (but only about 5% of overall reported crashes) and accounted for over half of fatal crashes at 54%.

- Common characteristics across critical pedestrian crashes included:
    - Occurred at an intersection (71%),
    - Occurred at a four-way approach (49%),
    - Occurred at night (39%),
    - The driver made a left turn (34%), and
    - Involved alcohol (22%).
- There were locations in Arlington with multiple critical pedestrian crashes rather than isolated incidents:
    - Ballston-Virginia Square had six critical pedestrian crashes, of which five took place at a four-way intersection, three were at night, and three involved a left turn.
    - Rosslyn had five critical pedestrian crashes, of which four involved a left turn.
    - Pentagon City had five critical pedestrian crashes.
    - Columbia Pike, between S Walter Reed Dr and Washington Boulevard, had four critical pedestrian crashes and, from S Four Mile Run Dr to S Frederick St, had three critical pedestrian crashes.
    - 10th St N had three critical pedestrian crashes.

Crashes occurring at night comprised over a third (39%) of critical crashes (compared to 29% of all reported crashes) and accounted for 54% of fatal crashes. Vehicle volumes are generally lower at night, so higher instances of crashes at night show a disproportionate of crashes occurring in dark conditions.

- Common characteristics across critical night crashes included:
    - Involved alcohol (41%),
    - Involved speed (36%),
    - Occurred on a highway (32%), and

    - Involved a pedestrian (23%).
- Night critical crash concentrations appeared on several corridors:
    - I-395 had 17 critical night crashes, of which 12 were speed-related and six were alcohol-related.
    - Arlington Boulevard had five critical night crashes, of which two were alcohol-related.
    - Columbia Pike (west of Four Mile Run) had four critical night crashes, of which two were alcohol-related and one was speed-related.
    - Ballston had four crashes occurred in the Ballston area, of which two were alcohol-related crashes and two were speed-related.

Speed-related crashes made up about a quarter (26%) of critical crashes (compared to 21% of overall reported crashes) and accounted for 23% of fatal crashes.

- Common characteristics across critical speed-related crashes included:
    - Occurred on a highway (53%),
    - Occurred at night (53%),
    - Occurred both at night and on a highway (28%),
    - Resulted in a rear-end crash (32%), and
    - Involved an unbelted driver and/or passenger (26%).
- Speed-related critical crashes occurred in the following locations:
    - I-395 had 15 critical speed-related crashes, of which 12 occurred at night, 8 of which resulted in a rear-end crash, and 7 were unbelted crashes.
    - I-66 (near East Falls Church) had five critical speed-related crashes, of which three were rear-end crashes.
    - Arlington Boulevard (west of S Edison St) had three critical speed-related crashes.

Alcohol-related crashes made up 19% of all critical crashes (but only 8% of overall reported crashes) and accounted for 46% of fatal crashes.

- Common characteristics of alcohol-related critical crashes included:
    - Occurred at night (82%),
    - Involved speed (32%),
    - Resulted in rear-end crash (24%), and
    - Occurred on a highway (24%).
- Alcohol-related critical crashes were concentrated in the following locations:
    - I-395 had six critical alcohol-related crashes—all of which occurred at night, four of which were speed-related, and four of which were rear-end crashes.
    - Northwest Arlington (Williamsburg, Yorktown, East Falls, Leeway) had five critical alcohol-related crashes, of which four occurred at night.

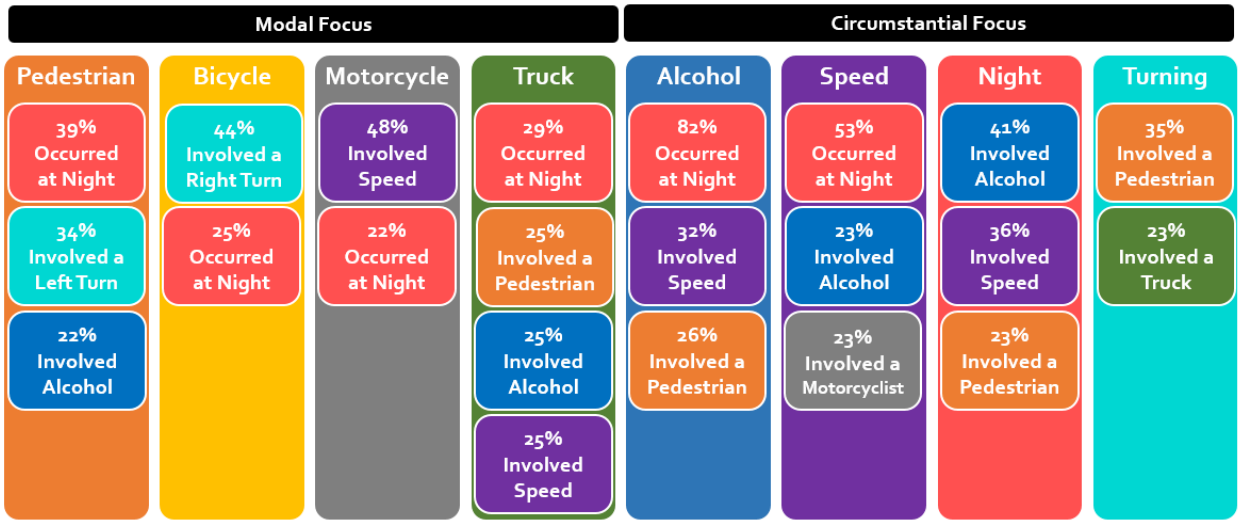
Bicycle crashes made up 9% of critical crashes (but only about 3% of overall reported crashes).

- Common characteristics across critical bicycle crashes included:
    - Occurred at a four-way approach (69%),
    - Involved a vehicle making a right turn (44%), and
    - Occurred at night (25%).
- The area between the Ballston and Clarendon metro stations had six bicycle crashes. Five crashes occurred at a four-way intersection, two crashes involved a vehicle making a right turn, and two crashes involved a vehicle making a left turn.

Other takeaways include:

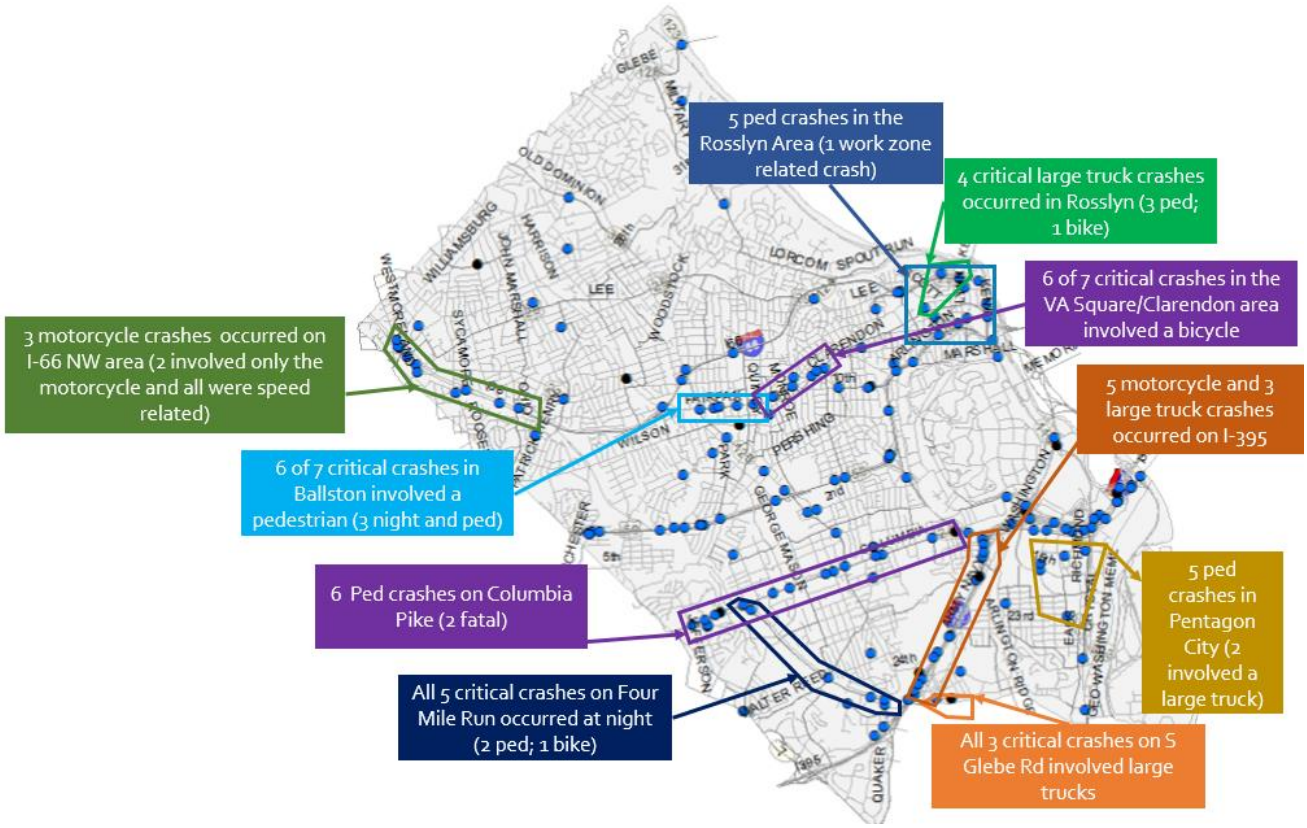
- Over 20% of all critical crashes involved ***distracted users***. It is important to note that not all distraction events are reported to the police completing the crash reports, so this statistic is likely underreported. (Distractions may include phone use, multitasking, or other interactions that may take the driver, pedestrian, or bicyclist's attention away from their trajectory.)
- ***Motorcycle crashes*** comprised 13% of all critical crashes, but only 1.5% of all crashes, affirming that motorcyclists are vulnerable users who tend to experience higher levels of severity when in a crash. Over half of critical motorcycle crashes occurred on a highway, and almost half of motorcycle crashes involved speed as a factor.
- ***Large truck crashes*** comprised 13% of all critical crashes and just 8% of all crashes, indicating that large trucks may cause slightly higher levels of severity when in a crash. A quarter of critical large truck crashes involved a pedestrian.
- Of 282 drivers involved in critical crashes for which sex identification was available, a majority of 73% ***identified as male***.
- Almost 20% of critical crashes ***involved a senior driver***, who comprise about 10% of the population.

The figure below provides an image showing how these various modes and circumstances interrelate to one another to show overlap between risk factors across critical crashes.

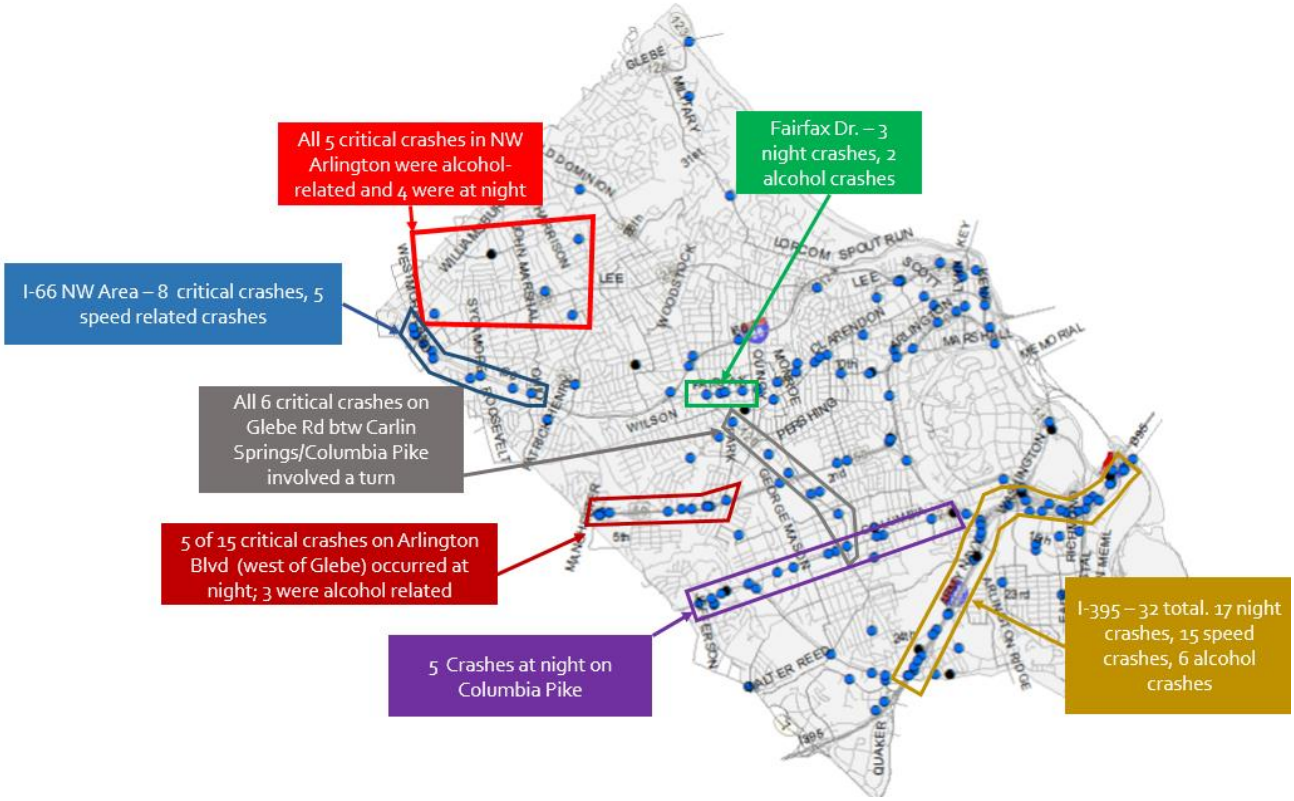


The annotated maps below depict the areas identified in the key takeaways by critical crash characteristics or circumstances.

Modal Focus



Circumstantial Focus



ARLINGTON VIRGINIA

Next Steps

The key takeaways listed above highlight characteristics, circumstances, and locations for further review and action. While some safety improvements may be apparent, other may require additional evaluation from an engineering and/or enforcement perspective. This section identifies these next steps for review and action.

Areas for ***further review and evaluation*** include:

- Review lighting in locations with critical night crash concentrations, including Arlington Boulevard, Columbia Pike, Four Mile Run, and Ballston-Virginia Square corridors.
- Review traffic control and intersection design along corridors with critical turning-related crashes, including Glebe Rd and Columbia Pike corridors.
- Review pedestrian infrastructure—particularly at intersections—in Rosslyn, Pentagon City, Columbia Pike, and Ballston-Virginia Square.
- Review bicycle infrastructure at intersections in the Clarendon area.
- Review locations include Rosslyn, Pentagon City, and S Glebe Rd for potential issues with large truck infrastructure and/or visibility.
- Discuss options for senior driver education or check-in programs given a disproportionate share of critical crashes involve a senior driver.

Areas for ***action*** include:

- Evaluate crash data for 2019/2020 versus previous years along the Ballston-Virginia Square/10th St N corridor to identify impacts of recent improvements installed once Arlington assumed ownership of this section of the VA-237 corridor. If crashes area still occurring on this section post-improvement implementation, the County will need to assess what additional engineering safety measures can be introduced on this corridor.
- Meet, evaluate, and collaborate with VDOT on the state-owned corridors identified through the systemic analysis (such as Arlington Boulevard, Glebe Rd, I-395, and I-66) to assess the potential for VDOT or the County to implement safety measures (either short-term, quick build improvements or long-term, larger-scale infrastructure changes).
- Meet with the Arlington County Police Department to identify potential measures (e.g., sobriety checkpoints, education efforts, etc.) in areas identified with high concentrations of alcohol-related crashes.
- Coordinate with Virginia State Police to identify potential measures (e.g., speed details, education efforts, etc.) in areas identified with high concentrations of speed-related crashes, which were all VDOT roadways.

Crash Severity Definitions

The following categories are using on the standard Virginia Police Crash Report (FR300P) to define the level of injury severity resulting from a crash. Each person involved in a crash receives an injury type rating. The highest level of severity is reported for the crash (example, if one person had "no apparent injury" but another person had a "serious injury," the crash would be categorized as a "serious injury" crash).

Definition of Injury Type with Detail (source)

1. Dead = Dead

2. Serious Injury = Suspected Serious Injury which is any injury other than fatal, resulting in one or more of the following:

> *a. Severe laceration resulting in exposure of underlying tissues, muscle, organs, or resulting in significant loss of blood*
>
> *b. Broken or distorted extremity (arm or leg)*
>
> *c. Crush injuries d. Suspected skull, chest, or abdominal injury other than bruises or minor lacerations*
>
> *e. Significant burns (second and third degree burns over 10 percent or more of the body)*
>
> *f. Unconsciousness when taken from the crash scene g. Paralysis*

3. Minor/Possible Injury = Other Visible Injury, as Bruises, Abrasions, Swelling, Limping, etc.

4. No Apparent Injury = No Visible Injury, But Complaint of Pain, or Momentary Unconsciousness

5. No Injury = No Injury (Driver Only)