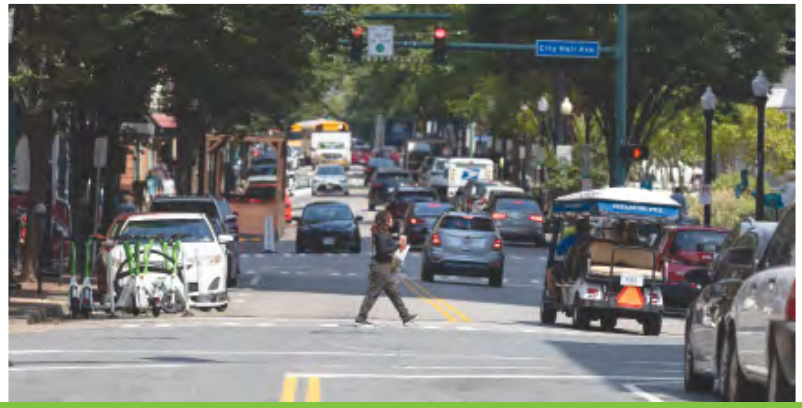
SAFETY ACTION PLAN

CITY OF NORFOLK



JANUARY 2025

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SAFETY ACTION PLAN

CITY OF NORFOLK

EXECUTIVE SUMMARY

The City of Norfolk is dedicated to ensuring safe and accessible roadways for all users, recognizing that reaching a destination safely is a fundamental right. To achieve this goal, the City has completed this comprehensive Safety Action Plan, funded by the United States Department of Transportation's (USDOT) Safe Streets and Roads for All (SS4A) program. The Plan is crafted to align with the City's existing Vision Zero goals, build upon the Multimodal Transportation Master Plan and other regional and federal planning efforts, and comply with the requirements of the SS4A program.

Supporting Vision Zero

The Norfolk City Council adopted a Vision Zero policy in November 2019. Vision Zero is a long-term strategy to eliminate all traffic, pedestrian, and bicycle fatalities and severe injuries, while increasing safety, mobility, and equity for all road users. The City of Norfolk joins more than 40 cities across the United States in adopting a Vision Zero policy.

Bicyclists and pedestrians are the most vulnerable users on the road, and transportation networks that prioritize vehicle speed and capacity over safe and convenient travel for users outside of cars can have dangerous and life-threatening consequences. By better balancing the needs of all road users, the City of Norfolk can advance the Vision Zero goal of reducing traffic fatalities and severe injuries to zero.

This Safety Action Plan takes the City's existing Vision Zero policy one step further by setting a target date for achieving zero traffic-related deaths and serious injuries on city streets.

Additional Planning Efforts

The City of Norfolk is using resources set forth at local, regional, and state levels to help develop and implement the comprehensive Safety Action Plan such as:

- Norfolk Multimodal Transportation Master Plan
- Norfolk 2050 Master Plan
- Hampton Roads Transportation Planning Organization (HRTPO) Regional Safety Study
- Virginia Department of Transportation (VDOT) Arrive Alive Strategic Highway Safety Plan (SHSP)

Safety Action Plan Overview

The Norfolk Safety Action Plan builds upon the City's Vision Zero policy and aims to reach a goal of zero traffic-related fatalities and serious injuries in Norfolk by 2050 by making city streets safer for all road users through engineering, enforcement, education, and policy.

It focuses on creating safe streets, improving the quality of life, and fostering a culture of safety that educates, enforces, and promotes safe roadway practices. The City will lead this effort with a data-driven, transparent, and equitable approach.

The study team, comprised of members from the City of Norfolk Department of Transportation and Kimley-Horn, developed the Plan with input from the community and a Stakeholder Committee and Advisory Committee formed as part of the plan. Community engagement and stakeholder involvement is summarized in Chapter 2.

Emphasis Area Approach

An extensive safety analysis, discussed in Chapter 3, was completed to examine crash trends and patterns over an eight-year period on streets and roadways maintained by the City of Norfolk. Using historical crash data from 2016 to 2023, the Plan identified critical areas for improvement. Emphasis areas were selected based on the safety analysis with input from the Advisory Committee, stakeholders, and the Norfolk community.

The following fifteen emphasis areas were the focus of the Plan's approach and additional analyses:

1. Signalized Intersections
2. Unsignalized Intersections
3. School Zones
4. Wet Roads
5. Pedestrians
6. Bicyclists
7. Motorcyclists
8. Heavy Vehicles
9. Speeding
10. Impaired Driving
11. Unprotected Occupants
12. Priority Intersection
13. Priority Corridor
14. Equity Focus Area: Low-income Population
15. Equity Focus Area: Minority Population

Equity Approach

A citywide equity assessment, described in Chapter 4, further analyzed safety within identified Areas of Persistent Poverty and Historically Disadvantaged Communities within Norfolk. It revealed that approximately 58% of the City's population resides in these areas, which account for a significant proportion of traffic crashes and related fatalities. The assessment uses an equity scoring approach to prioritize improvement needs based on mobility, connectivity, safety, and environmental considerations.

Countermeasure and Prioritization Approach

Specific countermeasures and an implementation strategy to enhance road safety across Norfolk are discussed in Chapters 5 and 6, respectively. The Plan recommends a range of engineering treatments, enforcement programs, policy initiatives, and educational campaigns to address identified safety concerns. A prioritization matrix guides the allocation of resources, emphasizing high-impact, cost-effective measures. Furthermore, the Plan includes a funding strategy and the development of a monitoring dashboard to track progress and maintain transparency, ensuring the continuous evolution and effectiveness of the Safety Action Plan.

SAFETY ACTION PLAN

CITY OF NORFOLK

CHAPTER 1: INTRODUCTION

Between 2016 and 2023, 137 people lost their lives in traffic crashes on City of Norfolk roadways, while an additional 965 individuals sustained serious injuries. This equates to an average of 18 deaths and 121 serious injuries per year, underscoring the significant toll that traffic incidents take on the City and its residents.

The City of Norfolk has developed this Safety Action Plan to align with the City's commitment to Vision Zero of reducing traffic fatalities and serious injuries to zero. The Plan aims to improve safety for all roadway users by pinpointing key issues, developing practical strategies, and providing effective solutions. The Plan was developed by examining historical crash data to identify trends and patterns that can be addressed through engineering measures or other targeted actions such as education, enforcement, and policy to establish a safer, more connected transportation network that benefits everyone.

Safe Streets and Roads for All (SS4A) Program

The SS4A discretionary program, established under the Bipartisan Infrastructure Law (BIL), allocates $5 billion in funding over five years (2022-2026) to support regional and local efforts in reducing roadway fatalities and serious injuries. In 2023, the City of Norfolk was awarded a planning grant from the first round (Fiscal Year 2022) of SS4A funding to conduct a citywide Safety Action Plan. The SS4A program offers two main types of grants:

Planning and Demonstration Grants	Implementation Grants
These grants support the creation of Comprehensive Safety Action Plans, including additional safety planning and demonstration projects to help inform an Action Plan.	These grants are intended to finance the execution of strategies or projects outlined in a previously established Action Plan.

SS4A Program Requirements

The SS4A program has general requirements and objectives which were used throughout the development of this Safety Action Plan for the City of Norfolk:

1. **Leadership Commitment and Goal Setting**—Establish clear goals for reducing roadway fatalities and serious injuries through leadership commitment and vision (i.e. Vision Zero)
2. **Planning Structure**—Develop a structured Safety Action Plan with actionable steps and measurable targets
3. **Engagement and Collaboration**—Formulate an Advisory Committee to foster engagement and collaboration with various stakeholders, including safety experts, law enforcement, and the public
4. **Safety**—Identify high-risk areas by analyzing crash data and other relevant information from the High Injury Network to focus on critical safety improvements
5. **Equity Considerations**—Ensure the Plan addresses equity, focusing on providing equitable benefits to underserved and vulnerable communities, and addressing disparities in safety outcomes
6. **Policy and Countermeasures**—Implement effective policies, enforcement strategies, and countermeasures designed to prevent roadway deaths and serious injuries
7. **Prioritization and Transparency**—Prioritize projects and actions based on data-driven analysis, focusing on areas and interventions that will have the greatest impact on improving safety with a clear, equitable approach

Safe System Approach

The SS4A grants are a crucial element of the United States Department of Transportation's (USDOT) National Roadway Safety Strategy (NRSS), which targets zero roadway deaths through a Safe System Approach, aimed at tackling the ongoing safety crisis on United States roadways. Currently, USDOT has set a target to reduce motor vehicle-related fatalities by 66% by 2040.

The Safe System Approach, widely recognized within the transportation community, effectively addresses and mitigates the inherent risks of our vast and complex transportation system. It operates by establishing multiple layers of protection designed to prevent crashes and reduce the severity of harm when they do occur.

Unlike traditional safety methods, the Safe System Approach shifts the focus to human error and vulnerability, creating a system with built-in redundancies that protect everyone. The USDOT's NRSS and its ongoing safety programs concentrate on key areas: infrastructure, human behavior, vehicle and transportation industry oversight, and emergency response.

Central to the Safe System Approach are several guiding principles:

1. The belief that death and serious injuries are unacceptable
2. Acknowledgment of human fallibility and vulnerability
3. A shared responsibility for safety
4. The proactive pursuit of safety measures
5. The importance of redundancy in the system

The NRSS will be implemented through five key objectives, shown in Figure 1, each aligned with elements of the Safe System Approach—ensuring safer people, creating safer roads, developing safer vehicles, promoting safer speeds, and improving post-crash care. These approach elements and principles were used to target emphasis area analyses within the City of Norfolk and identify countermeasures.

Figure 1: FHWA's Safe System Approach (Source: FHWA)

Plan Goal and Objectives

Based on input from the project team, Advisory Committee, and community stakeholders, the City of Norfolk has set the following goal for this Safety Action Plan:

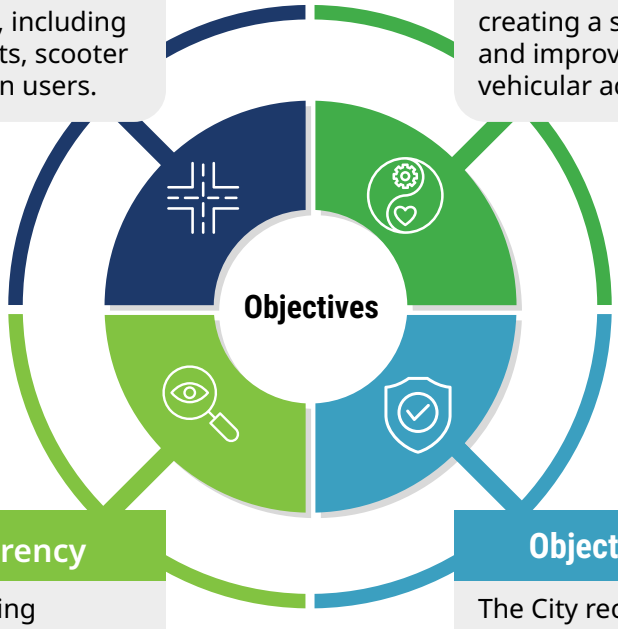
Building upon the Vision Zero policy adopted by Norfolk City Council in 2019, this Plan aims to reach a goal of zero traffic-related fatalities and serious injuries by 2050 by making city streets safer for all road users through engineering, enforcement, education, and policy.

Objective 1 – Safe Streets

To the extent possible, the Plan will allow for comprehensive safety measures that recognize human error cannot be eliminated but rather mitigated. It will build upon existing initiatives and plans developed by the City of Norfolk to improve roadway infrastructure and create safe streets for all users, including pedestrians, bicyclists, motorists, scooter users, and public transportation users.

Objective 2 – Quality of Life

The City recognizes that crashes may result in permanent impacts to human well-being that cannot be undone. The Plan will seek to improve the quality of life for residents and visitors of Norfolk by creating a safer transportation network and improving connections and non-vehicular access to daily destinations.



Objective 4 – Transparency

The City is responsible for leading the way to achieving Vision Zero. A comprehensive, data-driven Safety Action Plan establishes a clear and equitable approach for the prioritization and implementation of safety improvements across Norfolk.

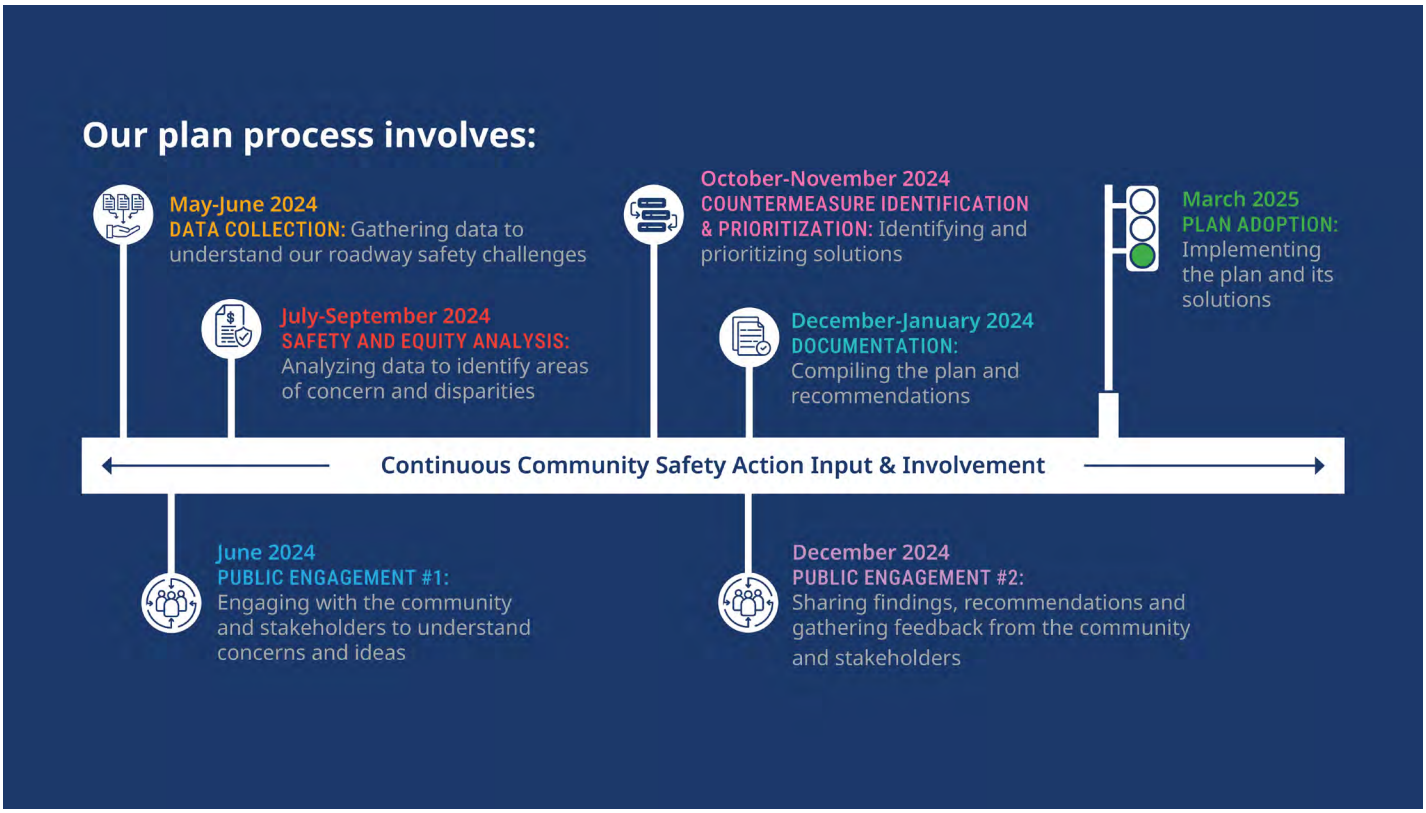
Objective 3 – Culture of Safety

The City recognizes that all transportation system users play a part in creating a safe transportation system. The Plan will foster a culture of safety that educates, enforces, and promotes safe roadway practices.

Plan Timeline

The success of the Safety Action Plan is reflective of Norfolk's community input and involvement. The Plan was developed over a nine-month period starting in May 2024 and included collaboration with various stakeholders, community members, and an Advisory Committee. This engagement provided context to the extensive safety and equity analysis and allowed for public recommendations before plan implementation and adoption in early 2025. Figure 2 illustrates the Plan's timeline.

Figure 2: Plan Timeline



Additional Planning Efforts

The City of Norfolk is using resources set forth at local, regional, and state levels to help develop and implement the comprehensive Safety Action Plan.

City of Norfolk, Multimodal Transportation Master Plan

The City of Norfolk's Multimodal Transportation Master Plan was completed in May 2022. The planning efforts focused primarily on pedestrians, bicyclists, scooter riders, and transit passengers with a vision of linking all travel modes to support the safety, connectivity, and prosperity of the people of Norfolk and the region. The Plan included a multimodal system plan which identified multimodal centers throughout the city and modal emphasis for each corridor. The Plan also provided a framework for designing and evaluating future multimodal projects.

City of Norfolk, NFK2050 Comprehensive Plan

NFK2050 is the City's Comprehensive Plan which is currently being developed and builds upon the Norfolk 2030 plan (adopted March 2013). The updated comprehensive plan, once adopted, will be used to guide the City's long-term planning involving:

- Economic Development
- Transportation, Mobility, and Infrastructure
- Land Use and Urban Development
- Public and Community Services
- Environment and Sustainability

The planning process has included extensive community engagement and an existing conditions assessment that includes the City's transportation infrastructure and barriers to mobility.

HRTPO, Hampton Roads Regional Safety Study

Hampton Roads Transportation Planning Organization (HRTPO) released a 2023 update to the Hampton Roads Regional Safety Study in May 2024 to meet eligibility requirements of the SS4A program. This update sets a goal to eliminate traffic fatalities and severe injuries by 2050, which is the horizon of the current HRTPO long-range transportation plan.

Within the Hampton Roads Regional Safety Study, HRTPO identifies Colley Avenue at 26th Street and 27th Street as high-crash intersections in the City of Norfolk's jurisdiction for further analysis. Potential countermeasures for these intersections were identified based on analyzed safety concerns. Additionally, the Regional Safety Study listed Chesapeake Boulevard at Little Creek Road and Chesapeake Boulevard at Norview Avenue as intersections with high numbers of fatal and serious injury crashes in Hampton Roads.

VDOT, Arrive Alive Strategic Highway Safety Plan

At the state level, the Virginia Department of Transportation (VDOT) has unveiled the 2022-2026 Arrive Alive Strategic Highway Safety Plan (SHSP). This plan aims to achieve an annual reduction of 2 to 4% in fatal and serious injury crashes. It reflects the state's dedication to ensuring the safety of all travelers on its roadways through the use of a Safe System Approach.

CHAPTER 2:

COMMUNITY ENGAGEMENT

CHAPTER 2: COMMUNITY ENGAGEMENT

The Safety Action Plan was shaped by a community and stakeholder engagement process that provided valuable insights into Norfolk's current safety conditions and challenges, adding depth and context to the data analysis. By fostering collaboration with both internal and external stakeholders, as well as the broader community, the study team was able to effectively incorporate key project improvements and address perceived safety concerns in the Plan. Detailed summaries of engagement efforts, community feedback, and stakeholder contributions are available in Appendix A.

Engagement Strategy

The Safety Action Plan's engagement strategy was designed to encourage broad participation and gather diverse perspectives from key stakeholders and the community. The community engagement process generally consisted of two phases and included the following:

- Advisory Committee Meetings
- Stakeholder Meetings
- Virtual Engagement
- Community Meetings

Advisory Committee Meetings

A central element of this strategy was the formation of a dedicated Advisory Committee, created specifically to guide the development of the Plan and oversee its implementation after adoption. This committee is comprised of representatives from various City departments:

- Transportation
- Planning
- Planning Commission
- Communications
- Diversity, Equity, and Inclusion
- Fire and Rescue
- Police
- Human Services
- Public Health
- Public Works
- Neighborhood Services
- Resilience
- Parks and Recreation

The group brought together a range of expertise, including engineers, planners, and other professionals, each offering insights based on their unique roles within the City. The Advisory Committee met a total of four times at critical points throughout the development of the Safety Action Plan. These meetings functioned as a guide to shape the Plan's recommendations by reviewing progress and analyzing findings.

Advisory Committee Meeting #1

The first Advisory Committee meeting was held on June 17, 2024, and introduced the Plan by outlining plan objectives. The study team presented historical citywide crash trends and preliminary crash trends for a number of potential emphasis areas. The Advisory Committee provided input on the selection of the emphasis areas for further safety analysis. Based on feedback from the Committee, it was determined that four of the emphasis areas should focus on specific geographic areas selected based either on crash history or equity considerations.

Advisory Committee Meeting #2

A second Advisory Committee meeting was held on September 20, 2024, to present and discuss preliminary takeaways from the first round of community engagement, results of the emphasis area analyses, and initial findings from the equity analysis. The Committee provided further insight on the results of the emphasis area analyses. During this meeting, the Committee confirmed methodologies to select locations for the remaining four emphasis areas for further analysis—a high-crash intersection, high-crash corridor, and two equity focus areas.

Advisory Committee Meeting #3

The third Advisory Committee meeting took place on December 2, 2024. The project team presented the refined goal and objectives of the Plan, the results of the four final emphasis area analyses, and the potential safety countermeasures and prioritization approach for review and discussion. Countermeasures included engineering treatments, policy changes, and strategic initiatives such as enforcement programs and educational campaigns to address safety improvements across all 15 emphasis areas. Countermeasures were presented to the Advisory Committee for input and refinement.

Advisory Committee Meeting #4

The fourth and final Advisory Committee meeting will be held in March 2025 to further discuss implementation strategy and monitoring following Plan adoption.

Stakeholder Meetings

In addition to the Advisory Committee, a Stakeholder Committee was formed to engage participants from local agencies, organizations, and businesses. Two stakeholder meetings were held in parallel with the first and second rounds of community meetings.

The first stakeholder meeting was held on July 18, 2024, to introduce the Safety Action Plan, present crash data and trends, and receive input on safety challenges and opportunities from the perspective of the attending organizations. Stakeholders in attendance included representatives from:

- Tidewater Community College
- Hampton Roads Transit (HRT)
- Bike Norfolk
- Lime
- Elizabeth River Trail (ERT)
- Downtown Norfolk Council
- Norfolk Bicycling, Pedestrian, and Active Transportation Commission
- Norfolk Commission for Persons with Disabilities (NCFPWD)

Stakeholders discussed potential approaches to emphasis areas and which areas across Norfolk may require a deeper analysis to unearth safety trends. Stakeholders stressed the need to observe trends with vulnerable road users—pedestrians, bicyclists, and transit users.

The final stakeholder meeting was held on December 5, 2024, to gather feedback on the proposed goals and objectives of the Safety Action Plan and refine a list of potential safety countermeasures, including infrastructure improvements, policy changes, and strategic initiatives such as enforcement programs and educational campaigns. Stakeholders also provided feedback on the prioritization of improvements and indicated that the greatest weight should be placed on the measurable safety benefit.

Virtual Engagement

To further facilitate community engagement, a project website was launched at the beginning of the Plan's development and maintained throughout the process. The website served as a hub for updates, project information, and interactive tools, such as maps and surveys. These online features were designed to be

accessible and user-friendly, enabling community members to easily express their concerns, review crash data and trends, and offer suggestions for improving roadway safety. As of December 2024, the website had received 1,414 visits from 981 visitors.

Community Meetings

Community meetings were another vital component of the engagement strategy, recognized early on as key opportunities to gather input directly from residents. Two (2) rounds of three (3) meetings were held. The first round of meetings was held in an open-house format at three (3) locations throughout the City while the second round of meetings was conducted as pop-up booths at three (3) different community events. These in-person meetings allowed for face-to-face interaction and discussion, while virtual tools supplemented these efforts, providing online documentation and engagement options to reach an even wider audience across the six (6) total meetings.

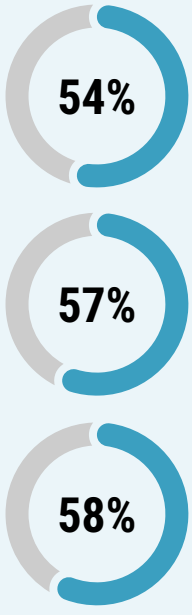
Round #1 Community Meetings

Three (3) initial community meetings were held consecutively from June 25, 2024 through June 27, 2024 at the Tabernacle Church of Norfolk, Jordan-Newby Anchor Branch Library, and Southside Boys and Girls Club. These meetings focused on introducing the Plan to the community and gathering initial input on safety needs from the perspectives of people who live, work, or visit the city.

The information presented at the meeting included a heat map of crashes occurring on city streets and a flow chart of the development process for the Plan. During the meeting, attendees had the opportunity to view information, complete comment cards, complete the State of Safety survey, identify areas of safety concern on an interactive map, and discuss concerns with members of the study team. All materials, including displays, surveys, and access to the interactive map were additionally available online and advertised by the City's communications team.

The State of Safety online survey was open from June 25 to July 28, 2024. There were 231 responses with 96% of respondents living in Norfolk. Figure 3 summarizes common themes from the survey results.The online interactive map also remained open following the initial round of community meetings until July 29, 2024 to allow for increased community input.

Figure 3: Online Survey Themes



The online interactive map also remained open following the intial round of community meetings until July 29, 2024 to allow for increased community input. The interactive map prompted community members to drag and drop pins to voice concerns in six (6) categories as shown in Figure 4:

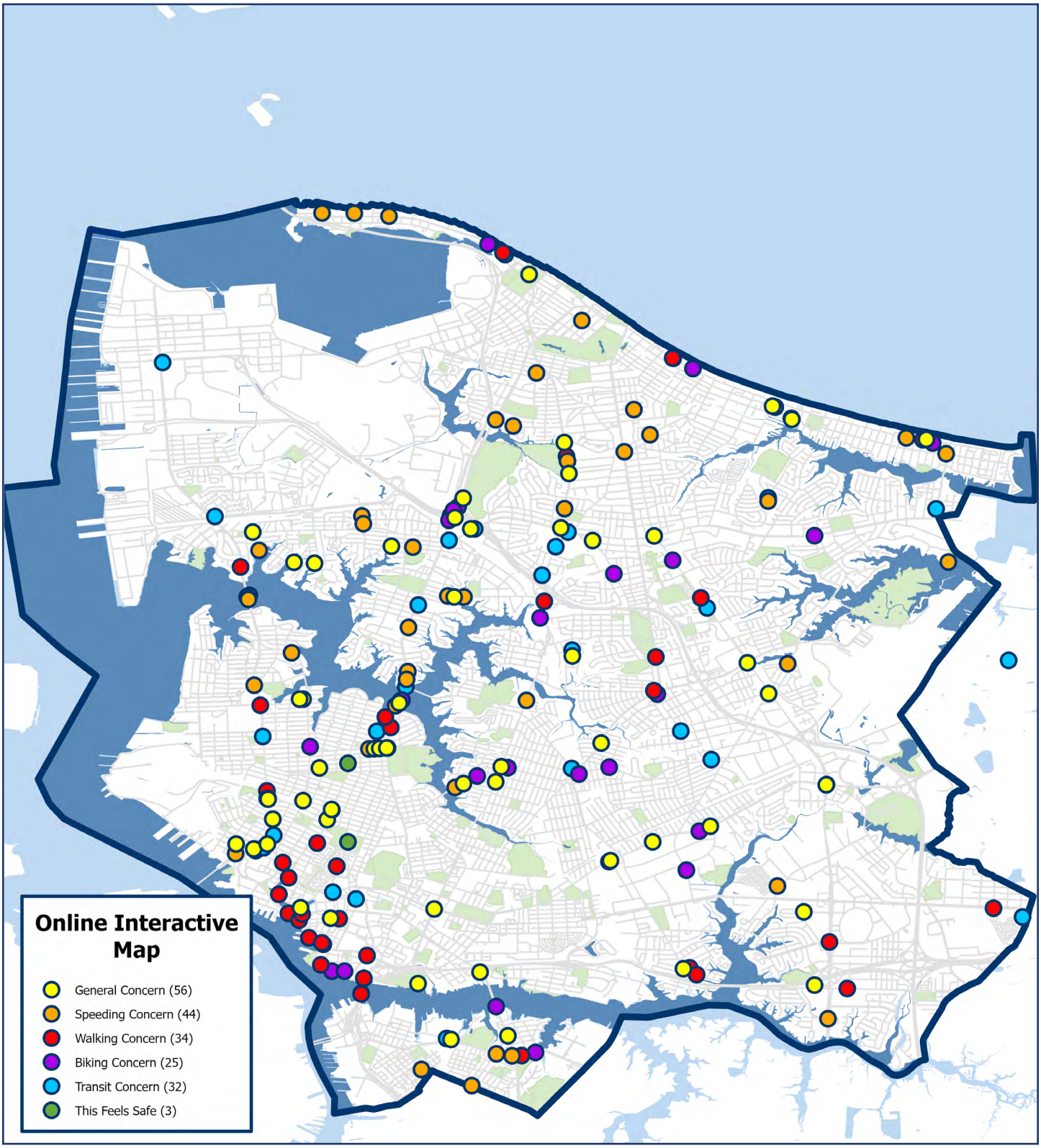
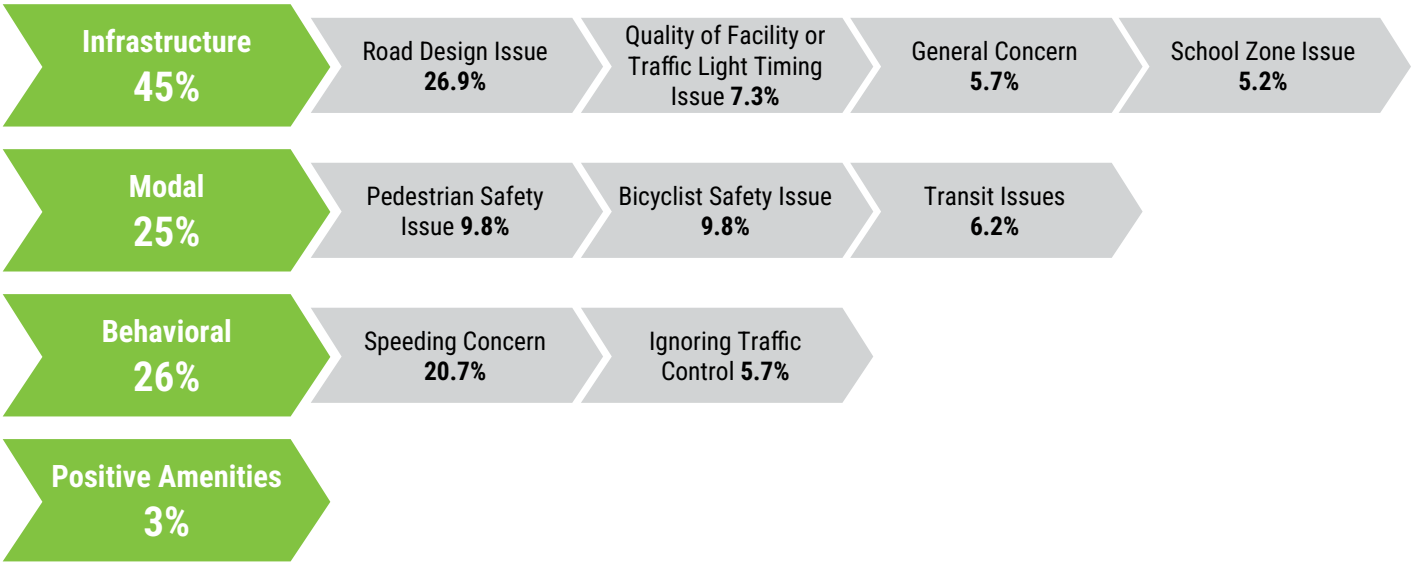


Figure 4: Community Engagement Round #1 Interactive Safety Map Comments

Responses were filtered into more specific concerns including infrastructure, modal, and behavioral concerns shown in Figure 5. Nearly 50% of the 194 comments indicated an issue with road design or speeding. Approximately 26% of comments involved modal concerns. Not only did the interactive map allow community members to voice their concerns, approximately 3% of respondents recorded positive amenities which highlighted areas to maintain throughout Norfolk.

Figure 5: Interactive Map Comment Responses



An in-person funding activity encouraged community members to use play money to categorize the best means of addressing roadway safety under four categories known as the 4E's of Safety:

1. **Engineering**—Use funds to improve roadway infrastructure
2. **Education**—Use funds to promote public awareness of road safety and hazards
3. **Enforcement**—Use funds to enhance policing along roadways or ensure compliance with safety regulations
4. **Enacting Policy**—Use funds to support policy changes

Figure 6: Funding Survey Responses

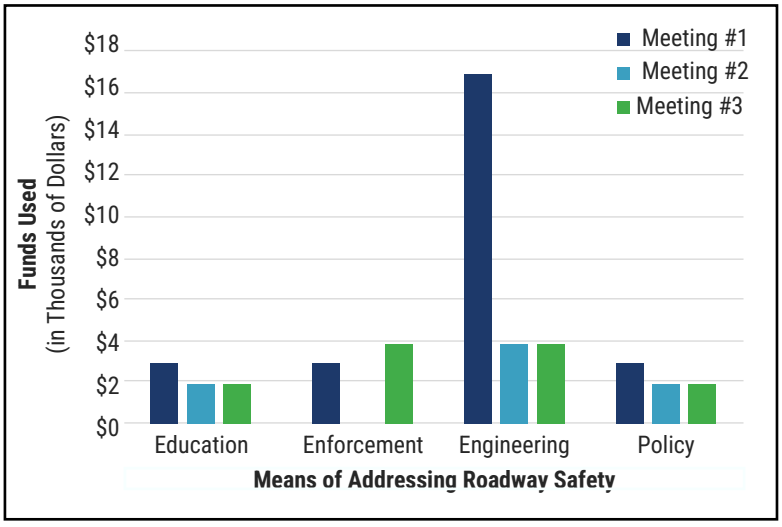
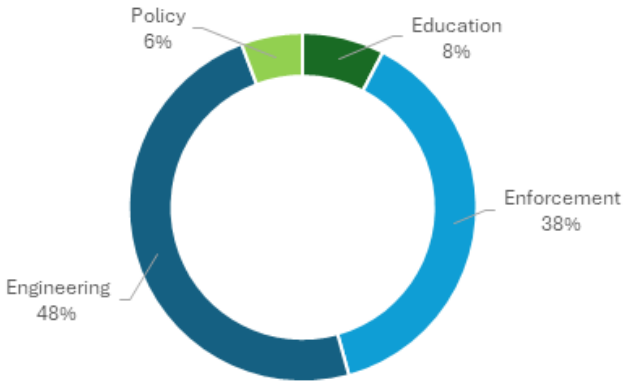


Figure 6 shows how funds were allocated by community members across the three nights of meetings. In-person respondents allocated nearly half of the $91,000 play funds to engineering related improvements.

Online survey respondents completed a similar ranking activity in which the 4E's of safety were prioritized. Likewise, online respondents desired safety efforts to be focused on infrastructure improvements with engineering ranked as first priority in 51% of responses. The percentage that ranked each category as top priority are shown in Figure 7.

Figure 7: 4E's Online Survey Responses



Respondents were also asked how safe City streets were to get around by various modes and indicated the following:

48%
Agree
by driving
a car

21%
Agree
by walking
or using a
wheelchair

12%
Agree
by riding
a bike
or e-Bike

Are City streets safe to get around?

Round #2 Pop-Up Booths

The final round of community meetings focused on sharing findings from the safety and equity analysis and proposed countermeasures. Three (3) pop-up booths were held in December of 2024 at the Jordan-Newby Anchor Library, Southside Boys and Girls Club, and the NEON District's Holiday Market to gather additional feedback from the community on potential countermeasures.

The study team interacted with 80 people across the three (3) pop-up booths. Community members provided input on potential countermeasures and prioritization by completing a paper or online survey and participating in a map activity to target areas where countermeasures could be implemented. All materials, including displays, surveys, and access to the interactive map were additionally available online and advertised by the City's communications team.

Highlights and themes of input received included:

Systemic Countermeasures

A total of 197 contributors provided 452 comments on the systemic countermeasures interactive map. The activity prompted community members to drag and drop different potential countermeasures. The most highly used were Traffic Calming (22%), Other (20%), and Enhanced Crosswalks (14%).

Policies and Initiatives

Community members completed a total of 17 surveys, with seven of these being conducted in person. This was built upon the 4Es of Safety activity from the first round of community engagement. While the systemic countermeasures represent the engineering efforts, this survey targeted potential policies and initiatives, or education, enforcement, and enacting policy, to be implemented across Norfolk.

Below are the highest-rated policies and initiatives for the remaining 4Es.

- **Education**
  Advocate for the Integration of Traffic Safety Education in Schools and Speed Kills Campaigns
- **Enforcement**
  High Visibility Saturation Patrols for Speeding and Traffic Enforcement
- **Design Policy (Enacting Policy)**
  Safe Routes to School Program (for Walking and Biking) and Appropriate Speed Limits for All Road Users

Locations

Most of the comments were left around Downtown and south of the Lafayette River, as well as near East Beach and East Little Creek.

Figure 8 shows a map indicating locations suggested by community members for the implementation of potential countermeasures.

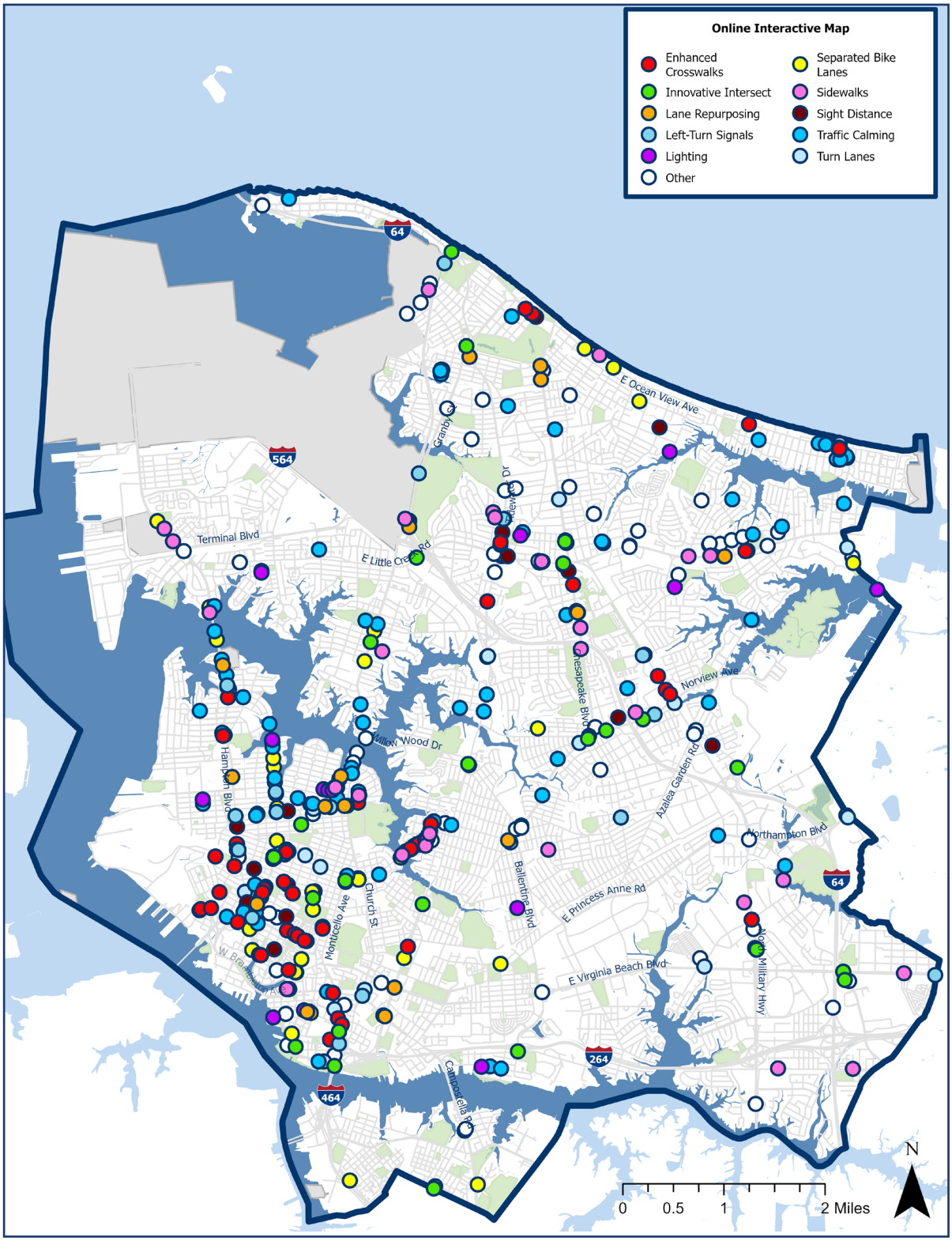


Figure 8: Community Engagement Round #2 Interactive Map Comments for Potential Countermeasure Locations

CHAPTER 3:
SAFETY ANALYSIS

VDOT's online crash database was used to obtain the most recent eight years (2016-2023) of historical crash data for all City-maintained roadways. The database includes detailed information for all crashes that have police reports associated with them. The crash data was analyzed for citywide trends and specific emphasis areas (as determined through the community engagement process) to provide a thorough assessment of crash types, ancillary causes, severity, crash locations, and more.

A common classification for crashes is by severity according to the Federal Highway Administration (FHWA) "KABCO" injury classification scale. The injury classification is defined by the most severe injury recorded in a crash report as described in Table 1 for Virginia roadways.

Table 1: "KABCO" Injury Classification Scale

Rank	Injury Type	Definition
K	**Fatal Injury**	A fatal injury is an injury that results in death within 30 days after the motor vehicle crash in which the injury occurred
A	**Serious Injury**	Suspected serious injury, which is any injury other than fatal, resulting in one or more of the following: • Severe laceration resulting in exposure of underlying tissues, muscle, organs, or resulting in significant loss of blood • Broken or distorted extremity (arm or leg) • Crush injuries • Suspected skull, chest, or abdominal injury other than bruises or minor lacerations • Significant burns (second- and third-degree burns over 10 percent or more of the body) • Unconsciousness when taken from the crash scene • Paralysis
B	**Minor/ Possible Injury**	Other visible injury, as bruises, abrasions, swelling, limping, etc.
C	**No Apparent Injury**	No visible injury, but complaint of pain, or momentary unconsciousness
O	**No Injury; Property Damage Only**	No injury; Property Damage Only

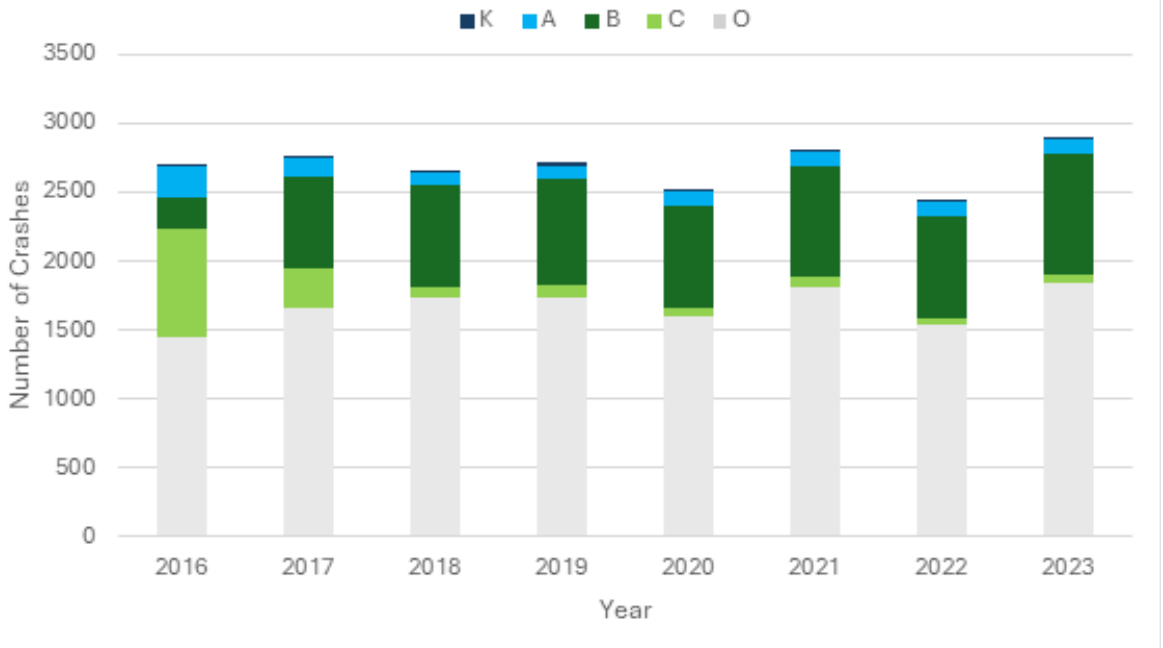
Citywide Crash Trends and Patterns

During the eight-year period from January 1, 2016 and December 31, 2023, a total of 21,521 crashes occurred on City of Norfolk roadways. This excludes crashes occurring on Interstates 64, 264, 464, and 564 as well as those occurring on private property and federal lands such as Naval Station Norfolk. With a population of 238,000 in the 2022 Census, this translates to an average annual fatality rate of 7 per 100,000 people and an average annual serious injury rate of 51 per 100,000 people. As illustrated in Figure 9, a total of 137 fatal crashes and 965 serious injury crashes occurred over the eight-year study period. The highest number of total crashes occurred in 2023. Serious injury crashes have also been increasing since the COVID-19 pandemic, a disturbing trend following several years of decline. Fatal crashes have been decreasing since peaking in 2021 following the COVID-19 pandemic. A citywide crash density map is shown in Figure 10.

To better understand why crashes are occurring in Norfolk, the study team analyzed additional elements such as the type of collision, contributing factors, and seasonal trends. The following sections summarize notable trends and patterns including the following:

- 45% of citywide crashes were angle collisions
- 43% of citywide crashes occurred on roadways classified as a principal arterial
- 32% of citywide crashes involved a young (18%) or senior (14%) driver
- 31% of citywide crashes occurred at dark, including all lighted conditions and dusk
- 23% of citywide crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol

Figure 9: Crash Severity by Year, 2016-2023



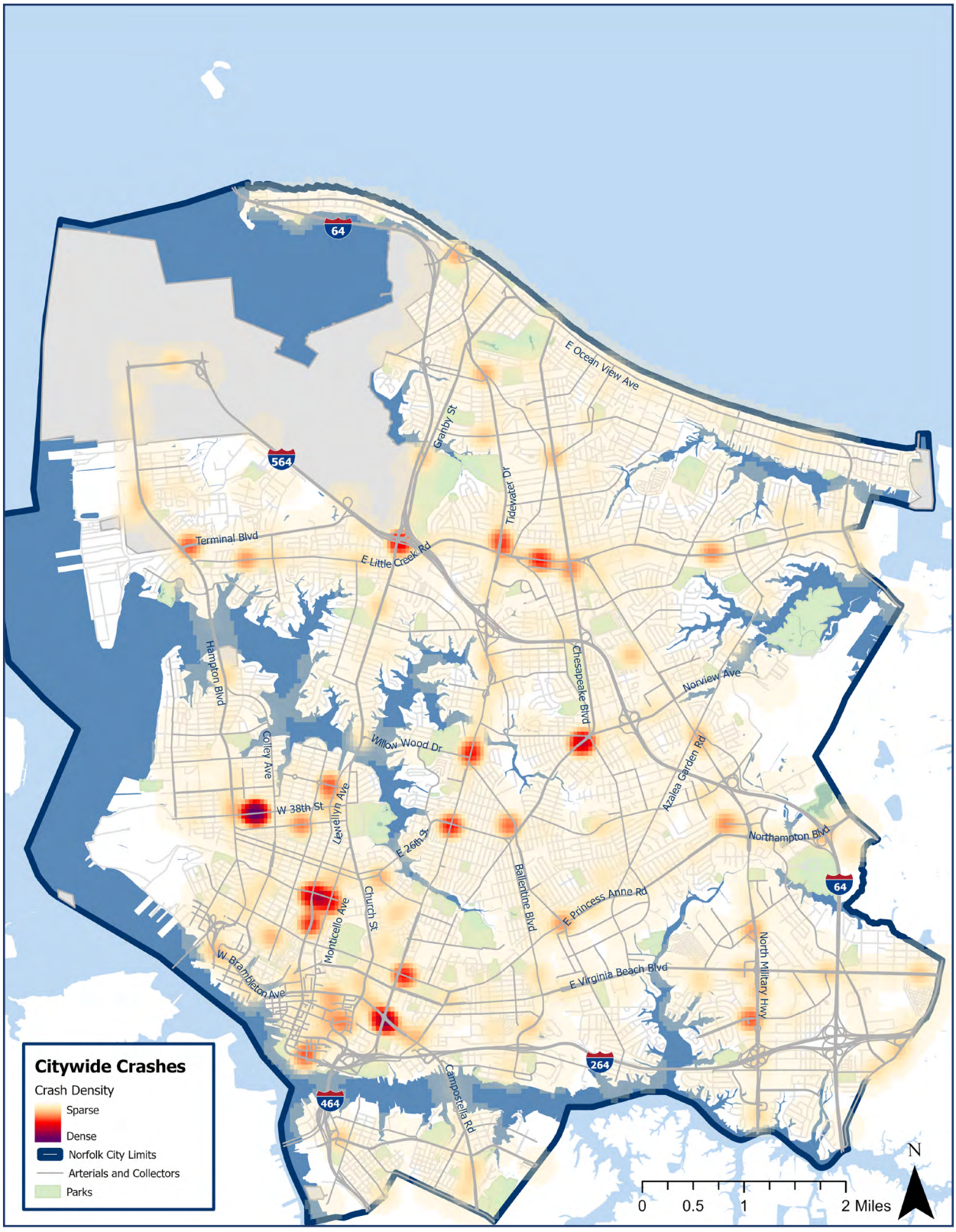
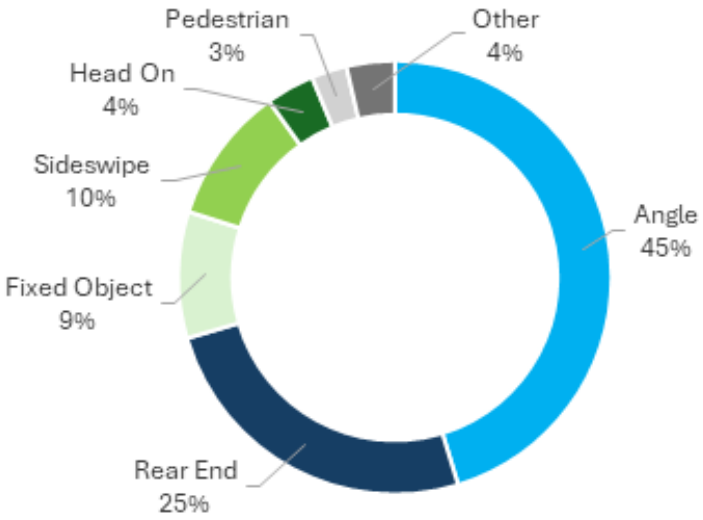


Figure 10: Citywide Crash Heat Map, 2016-2023

Crash Trends by Type

Of the 21,521 citywide crashes reported from 2016 to 2023, roughly 45% involved an angle-type collision, and the number of angle collisions increased by approximately 14% from 2016 to 2023. Other common crash types, summarized in Figure 11 and Table 2, included rear-end collisions (25%), off-road fixed object collisions (9%), and same-direction sideswipes (9%).



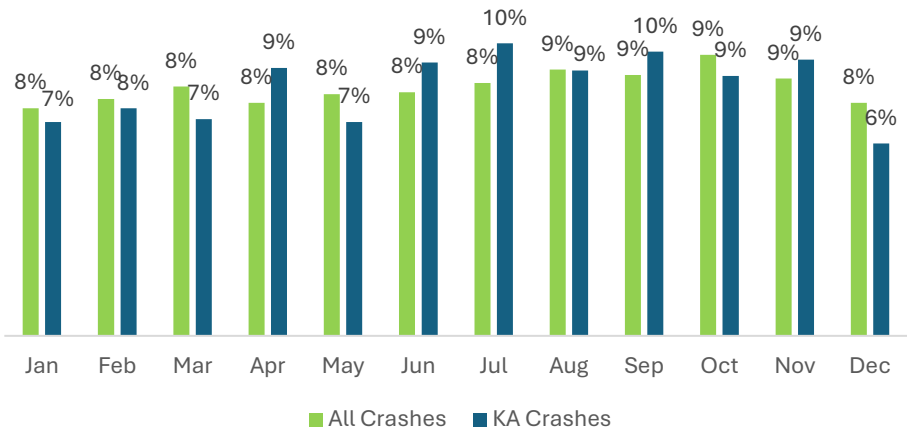
Additionally, same-direction sideswipes were noted to peak in 2023 (299 crashes) which is a 44% increase from the previous year in 2022 (207 crashes). Opposite-direction sideswipes, although not as common citywide, saw a similar trend with its peak also in 2023 (59 crashes) which is a 55% increase from 2022 (38 crashes). Head-on collisions peaked in 2023 (107 crashes) which is a 24% increase from 2022 (86 crashes). However, year-to-year trends of head on collisions varied and fatal and serious injury head-on collisions had an overall 75% decrease from 2016 to 2023.

Table 2: Citywide Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	1,177	1,171	1,185	1,217	1,139	1,314	1,201	1,343	9,747	45%
Rear End	769	760	686	691	615	672	540	690	5,423	25%
Fixed Object – Off Road	247	238	234	223	232	266	218	211	1,869	9%
Sideswipe – Same Direction	211	227	241	235	218	222	207	299	1,860	9%
Head On	93	105	84	101	107	96	86	107	779	4%
Pedestrian	63	91	79	77	45	76	68	72	571	3%
Other	40	67	78	67	72	75	55	81	535	2%
Sideswipe – Opposite Direction	44	41	26	40	52	37	38	59	337	2%
Fixed Object in Road	21	19	23	20	14	32	13	17	159	1%
Non-Collision	18	23	10	16	14	13	15	11	120	1%
Backed Into	16	16	16	22	14	6	7	10	107	<1%
Bicyclist	0	1	0	1	0	2	2	0	6	<1%
Train	1	1	0	0	1	1	1	0	5	<1%
Other Animal	1	0	0	0	0	1	0	0	2	<1%
Motorcyclist	1	0	0	0	0	0	0	0	1	<1%
Total	**2,702**	**2,760**	**2,662**	**2,710**	**2,523**	**2,813**	**2,451**	**2,900**	**21,521**	

Crash Trends by Time

Figure 12: Citywide Crashes by Month, 2016-2023

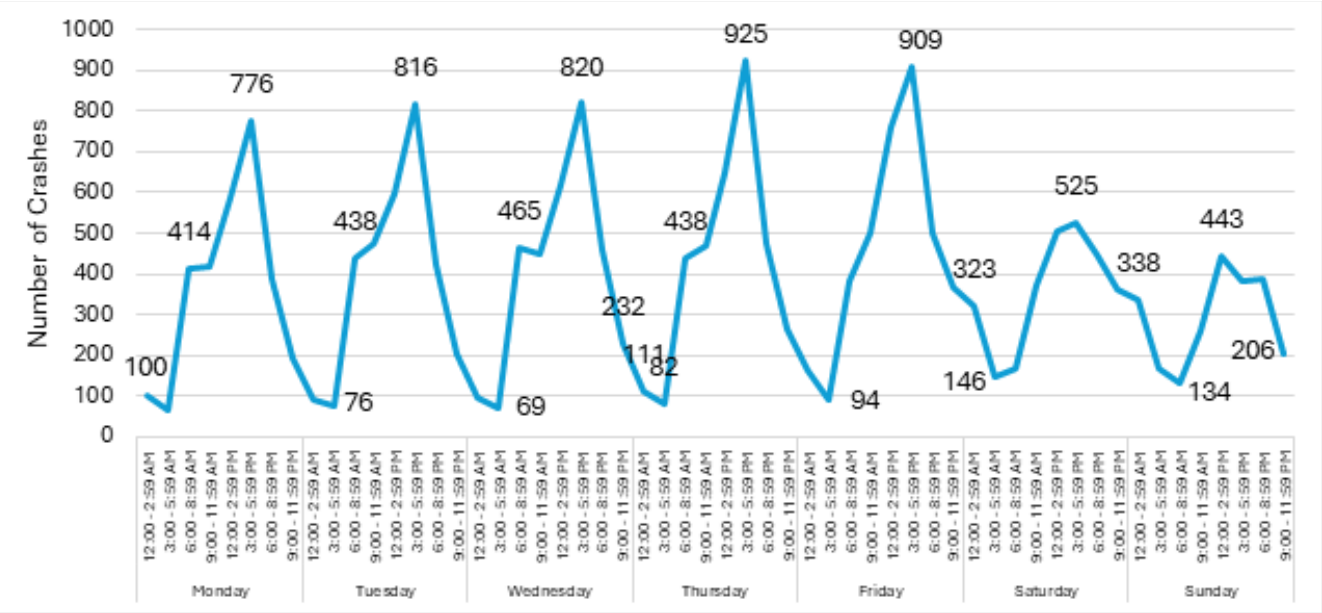


Citywide crashes were analyzed temporally by year, month, day of week, and time of day. As previously noted, citywide crashes peaked in 2023 after a sizable dip in 2020, with roughly a 7% increase over the total eight-year period.

Citywide crashes were relatively consistent across all months of the year, as illustrated in Figure 12, with the peak of all crashes seen in October (9.4%). More variance was seen with fatal and serious injury crashes, with peak fatal crashes occurring in September and serious injury crashes occurring in July. Temporal trends were also noted by day of week as shown in Figure 13. Nearly 17% of all crashes occurred on a Friday. The peak day for fatal crashes occurred on either Thursday or Friday, representing 35% of all fatal crashes.

Across the City, approximately 24% of all crashes occurred during the PM peak period from 3:00 PM to 6:00 PM over the eight-year study period. This time of day also sees many fatal and serious injury crashes (225); however, only 20% of all fatal and serious injury crashes occurred in the 3:00 PM to 6:00 PM period. The time of day with the highest number of fatal crashes occurred between 10:00 PM and 11:00 PM.

Figure 13: Citywide Crashes by Day of Week and Time, 2016-2023



Citywide Fatal and Serious Injury Crash Trends and Patterns

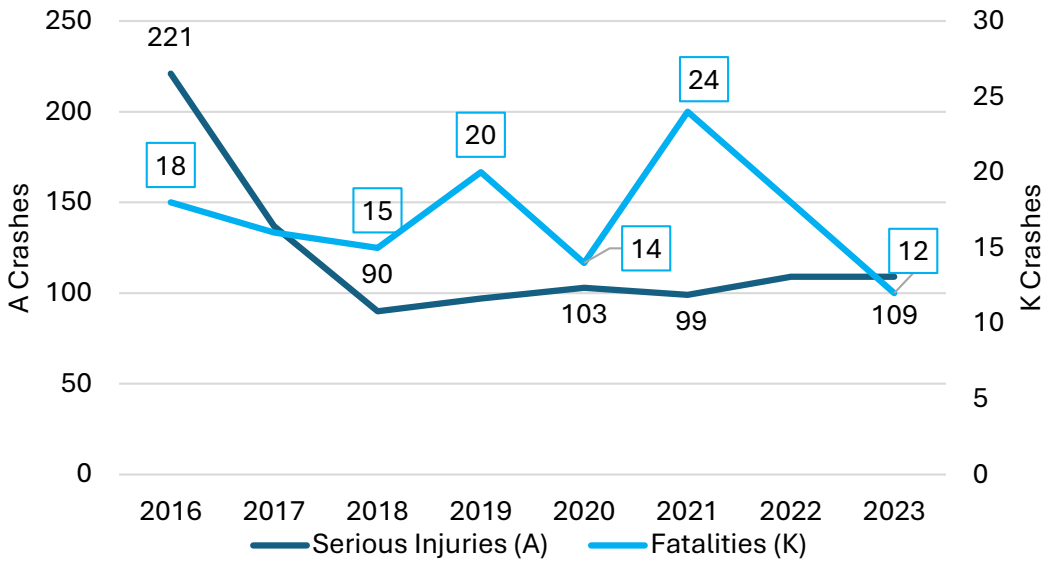
A total of 137 fatalities and 965 serious injuries occurred from 2016 to 2023—averaging 18 deaths and 121 serious injuries per year. This equates to 5% of all crashes on City-maintained roadways within the study period. Total fatal and serious injury crashes declined significantly (56%) from 2016 to 2018 and have been gradually increasing through 2023, as illustrated in Figure 14, representing a total increase of 15% since 2018. A map of citywide fatal and serious injury crashes is shown in Figure 15.

Table 3 summarizes the number of fatal and serious injury crashes by crash type during the study period with the two most common crash types as angle collisions (37%) or pedestrian collisions (17%).

Notable trends with fatal and serious injury crashes across the eight-year analysis period included:

- 45% of citywide fatal and serious injury crashes occurred at dark, including all lighted conditions and dusk
  - 63% of all fatal crashes occurred at dark
- 34% of all fatal crashes involved a pedestrian
- 34% of citywide fatal and serious injury crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol
  - 36% of all fatal crashes involved driving under the influence of alcohol
- 33% of citywide fatal and serious injury crashes occurred on a Friday or Saturday
- 31% of citywide fatal and serious injury crashes involved speeding
- 31% of citywide fatal and serious injury crashes involved unprotected occupants (i.e., not wearing a seatbelt or proper child restraint)

Figure 14: Citywide Fatal and Serious Injury Crashes by Year, 2016-2023



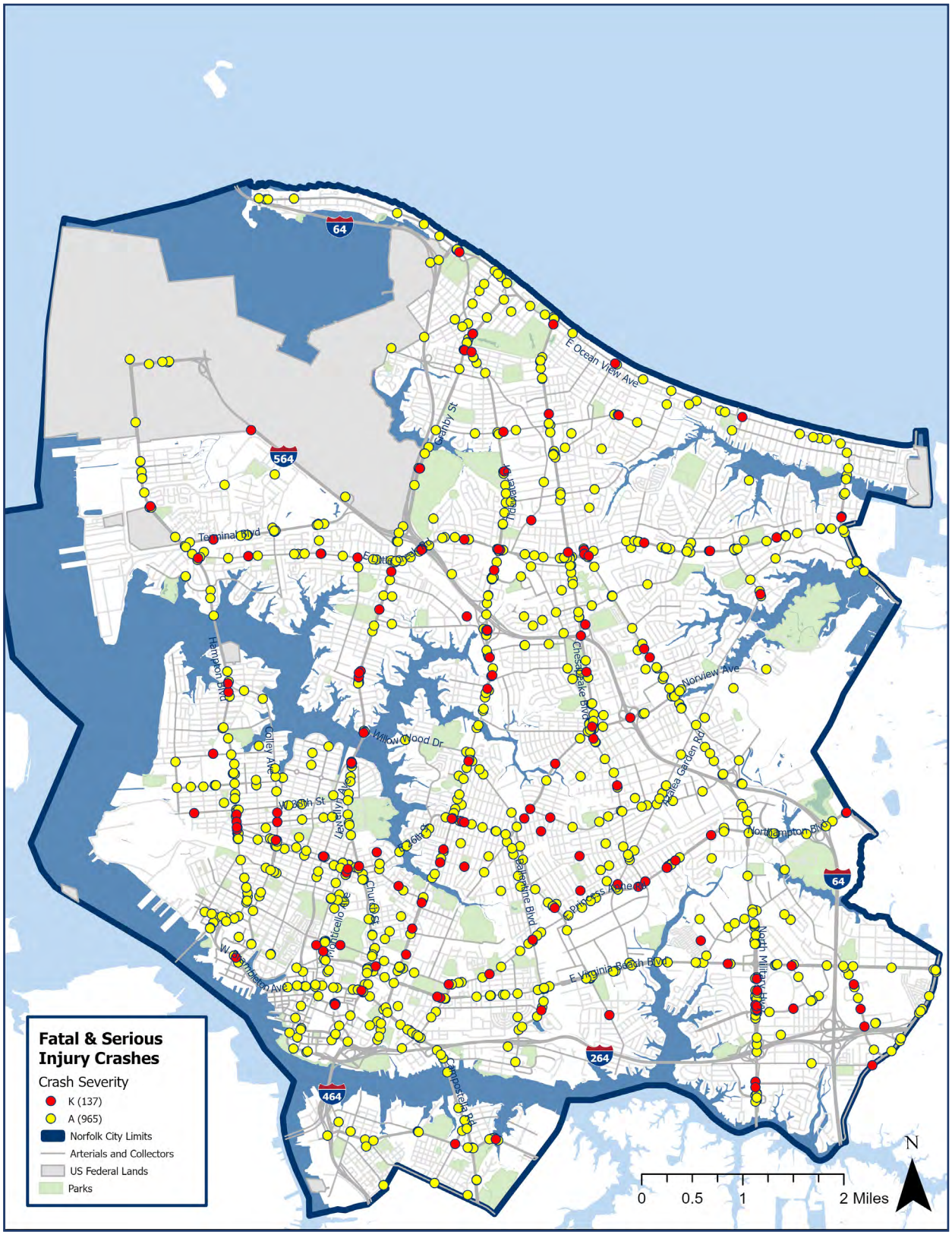


Figure 15: Citywide Fatal and Serious Injury Crashes by Severity, 2016-2023

Table 3: Citywide Fatal and Serious Injury Crashes by Type, 2016-2023

Crash Type 2016	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	94	49	30	46	50	48	45	41	403	37%
Pedestrian	30	32	22	18	14	22	28	18	184	17%
Fixed Object - Off Road	40	20	13	16	18	16	22	21	166	15%
Rear End	35	17	17	19	13	15	8	18	142	13%
Head On	20	15	7	8	10	6	7	5	78	7%
Other	5	2	4	4	6	6	5	10	42	4%
Sideswipe - Same Direction	4	5	3	1	2	1	6	5	27	2%
Non-Collision	5	4	2	2	2	3	2	0	20	2%
Fixed Object in Road	2	5	4	2	2	3	2	0	20	2%
Sideswipe - Opposite Direction	2	3	3	1	0	2	2	3	16	1%
Bicyclist	0	1	0	0	0	1	0	0	2	< 1%
Train	1	0	0	0	0	0	0	0	1	< 1%
Motorcyclist	1	0	0	0	0	0	0	0	1	< 1%
Total	**239**	**153**	**105**	**117**	**117**	**123**	**127**	**121**	**1,102**	

High Injury Network

The SS4A program emphasizes the importance of a data-driven approach to identifying and addressing safety issues. Aligned with this emphasis and Norfolk's road safety initiatives, such as Vision Zero, a High Injury Network (HIN) was developed to pinpoint roadways with high concentrations of fatal and serious injury crashes. This network highlights areas that may require additional safety analyses and helps prioritize targeted improvements to significantly reduce the number of fatal and serious injury crashes.

Norfolk's HIN was created by dividing city-maintained roadways into one-tenth-mile segments, using natural termini where routes begin and end or at milepost gaps. Only fatal and serious injury crashes were considered, with each crash geofenced to a specific one-tenth-mile segment. A segment was included in the HIN if it had at least two fatal or serious injury crashes in any combination.

The City of Norfolk maintains over 900 miles of roadways, with the resulting HIN encompassing 23 miles. As illustrated in Figure 16, the HIN captured 630 fatal and serious injury crashes from 2016 to 2023, accounting for 57% of all fatal and serious injury crashes during the study period. The HIN demonstrates the need for targeted safety countermeasures, since 57% of fatal and serious injury crashes occur on less than 3% of the City's roadway network.

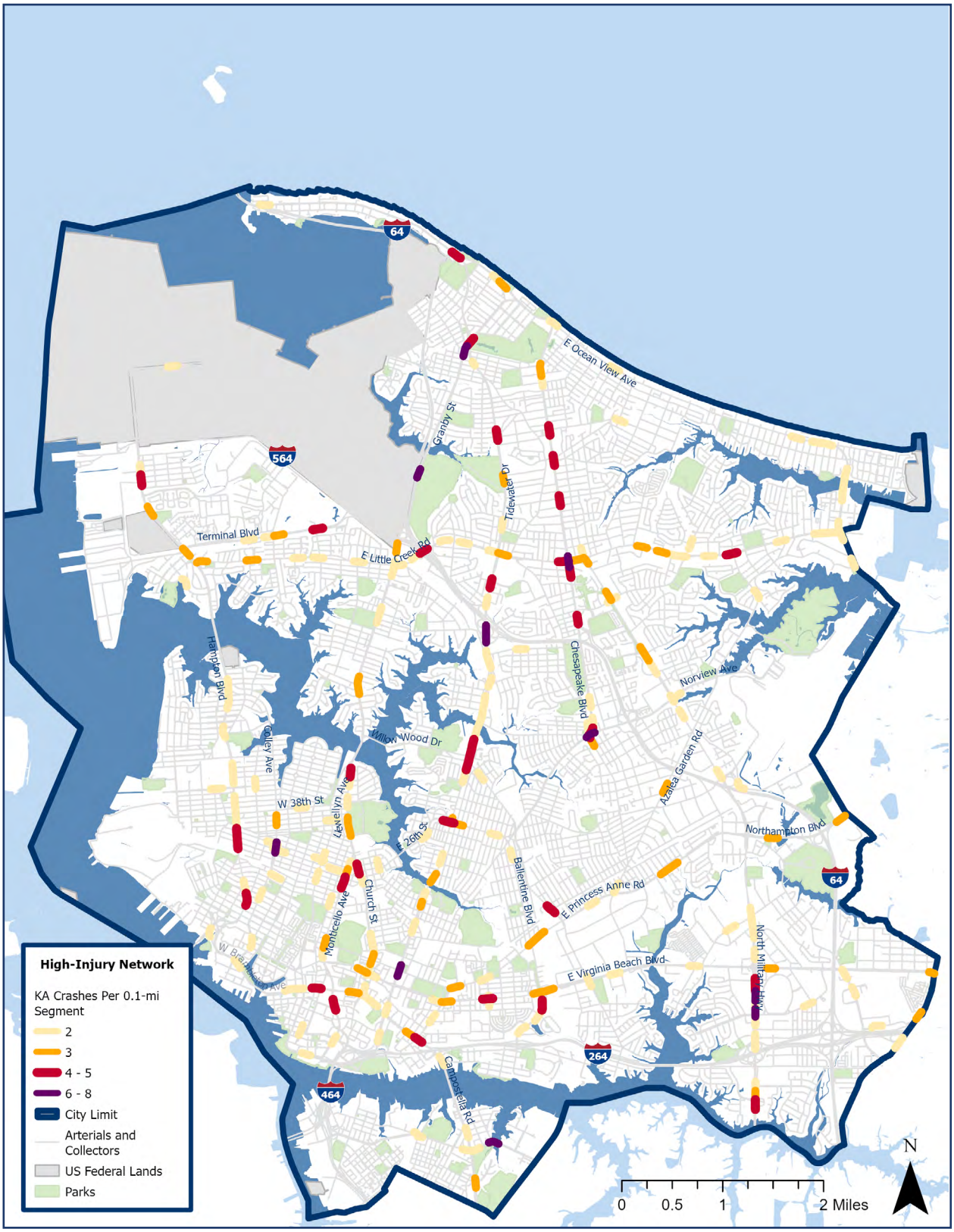


Figure 16: High Injury Network (HIN)

Emphasis Area Crash Trends and Patterns

With input from the Advisory and Stakeholder Committees, 15 emphasis areas were selected for further analysis. The selected emphasis areas offered a broad spectrum of analysis to include infrastructure and roadway conditions, road users and vehicle types, behavioral conditions, and geographic areas to provide a comprehensive approach to roadway safety in Norfolk.

Two of the emphasis areas were tied to specific geographic areas associated with one corridor and one intersection that experienced a high crash rate. With input from Norfolk's Chief Diversity, Equity and Inclusion Officer, two equity focus areas were identified for areas with lower income and higher percentages of minority populations at the census tract level.

- **Infrastructure & Road Conditions**
  - Signalized Intersections
  - Unsignalized Intersections
  - School Zones
  - Wet Roads
- **Road Users**
  - Pedestrians
  - Bicyclists
  - Motorcyclists
  - Heavy Vehicles
- **Behavioral Conditions**
  - Speeding
  - Impaired Driving
  - Unprotected Occupants
- **Geographic Areas**
  - Priority Corridor
  - Priority Intersection
  - Equity Focus Area: Low Income Population
  - Equity Focus Area: Minority Population

For perspective, Table 4 summarizes the total and fatal and serious injury crash percentages for each emphasis area compared to the citywide percentage. Although emphasis areas such as pedestrians, bicyclists, unprotected occupants, and motorcyclists account for low percentages of total citywide crashes, these emphasis areas have much higher rates of fatal and serious injury crashes given the additional exposure of these road users.

Table 4: Emphasis Area Crash Summary, 2016-2023

Emphasis Area	Total Crashes	Fatal & Serious Injury Crashes	% Fatal & Serious Injury Crashes	% of City-wide Total Crashes	% of Citywide Fatal & Serious Injury Crashes
Signalized Intersections	10,090	514	5%	47%	47%
Impaired Driving	4,855	373	8%	23%	34%
Speeding	2,529	229	9%	12%	21%
Pedestrians	625	198	32%	3%	18%
Unsignalized Intersections	4,675	198	4%	22%	18%
Unprotected Occupants	761	170	22%	4%	15%
Motorcyclists	452	140	31%	2%	13%
Wet Conditions	3,177	140	4%	15%	13%
Equity Focus Area: Low Income Population	1,897	102	5%	9%	9%
Equity Focus Area: Minority Population	2,051	90	4%	10%	8%
Heavy Vehicles	1,267	50	4%	6%	5%
Bicyclists	269	46	17%	1%	4%
Priority Corridor	723	41	6%	3%	4%
School Zones	511	33	6%	2%	3%
Priority Intersection	102	7	7%	0%	1%
Citywide Total Crashes*	**21,521**	**1102**	**5%**		

*A single crash can be considered part of multiple emphasis areas, so emphasis area crashes equal more than 100% of the total crashes in Norfolk.

Signalized Intersections

Crash data was analyzed for all roadway crashes occurring within 250 feet of a signalized intersection, which accounted for over 47% of all crashes in the City of Norfolk during the study period. From 2016 to 2023, there was an almost 11% increase in crashes that occurred at signalized intersections within Norfolk. Of the total crashes at signalized intersections (10,090 crashes), 514 resulted in fatalities or serious injuries—accounting for roughly 5% of all signalized intersection crashes. Following overall crash trends, the most common crash type at a signalized intersection was an angle collision (47%) or a rear end (29%) with additional crash types shown in Table 5.

Over the eight-year analysis period, fatal and serious injury crashes were reduced by nearly half despite the overall increase in signalized crashes. As illustrated in Figure 17, the largest reduction of fatal and serious injury crashes (61%) was seen from 2016 to 2018, with a 10% increase in crashes from 2019 to 2020, then leveling off from 2020 to 2023. This reduction of serious and fatal injuries could be a result of Norfolk's ongoing intersection improvements over the years, such as optimizing signal timings and updating yellow and red clearance intervals. However, total crashes at signalized intersections increased by 22% from 2022 to 2023. A map with crash density and fatal and serious injury crashes at signalized intersections is shown in Figure 18.

Notable crash trends at signalized intersections included:

- Signalized intersection crashes most frequently occurred on a weekday from 3:00 PM to 6:00 PM
- **36%** of fatal crashes at signalized intersections involved a pedestrian
- **34%** of signalized intersection crashes involved a young (18%) or senior (16%) driver
- **30%** of signalized intersection crashes occurred at dark, including all lighted conditions and dusk; 44% of fatal and serious injury crashes occurred at dark
- **22%** of signalized intersection crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol
- **15%** of signalized intersection crashes occurred in adverse weather conditions

Figure 17: Signalized Intersection Crashes by Year, 2016-2023

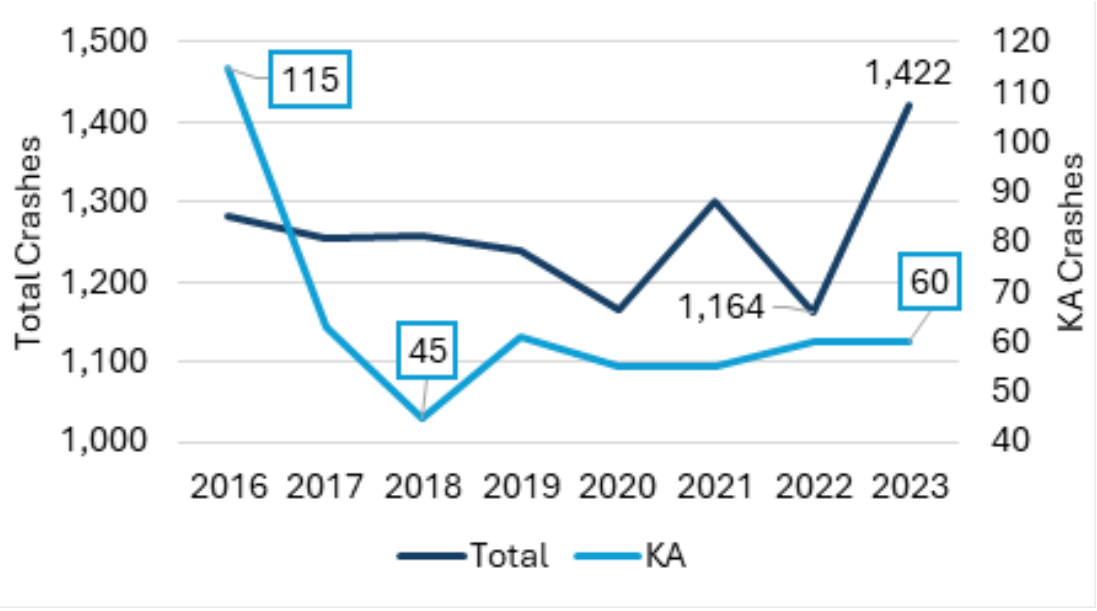


Table 5: Signalized Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	569	571	591	580	573	630	598	671	4,783	47%
Rear End	433	392	374	372	326	379	303	381	2,960	29%
Sideswipe - Same Direction	94	100	105	97	72	83	90	142	783	8%
Fixed Object - Off Road	79	56	64	58	66	77	65	69	534	5%
Head On	36	45	35	41	50	46	37	60	350	3%
Pedestrian	27	34	33	39	22	29	32	33	249	2%
Other	17	27	32	28	26	27	22	30	209	2%
Sideswipe - Opposite Direction	9	13	11	13	20	11	9	25	111	1%
Fixed Object in Road	8	1	8	7	5	10	2	6	47	<1%
Non-Collision	4	9	4	4	3	3	4	4	35	<1%
Backed Into	7	6	1	1	2	3	0	1	21	<1%
Bicyclist	0	1	0	0	0	1	2	0	4	<1%
Train	0	1	0	0	1	1	0	0	3	<1%
Motorcyclist	1	0	0	0	0	0	0	0	1	<1%
Total	**1,284**	**1,256**	**1,258**	**1,240**	**1,166**	**1,300**	**1,164**	**1,422**	**10,090**	

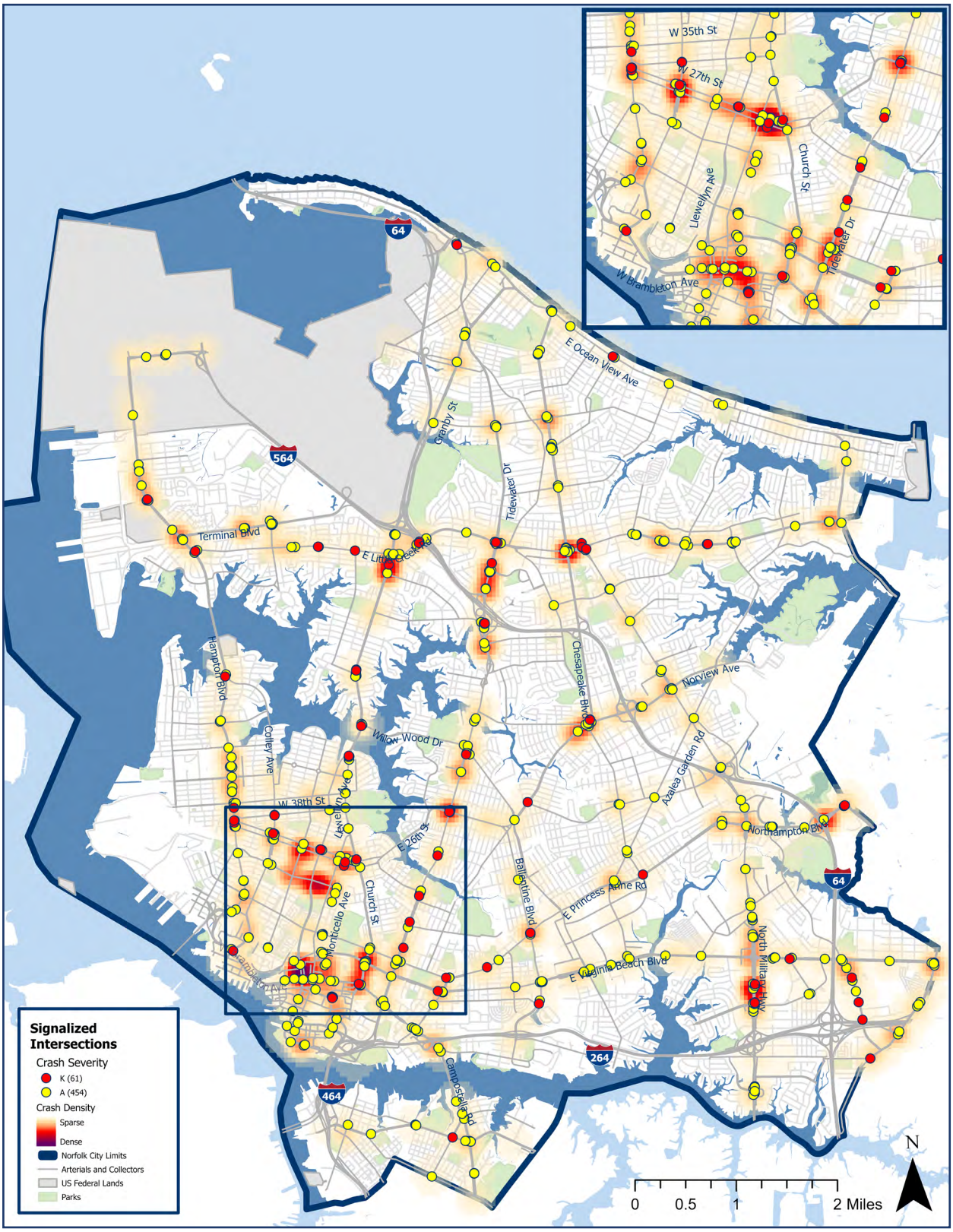


Figure 18: Signalized Intersections Crash Map, 2016-2023

Unsignalized Intersections

Unsignalized intersection crashes are those that occur within 250 feet of intersections with STOP signs, YIELD signs, or no right-of-way traffic control device. Over the eight-year analysis period, 4675 crashes occurred at unsignalized intersections with a peak of 681 crashes in 2016. A nearly 40% increase in unsignalized crashes occurred from 2022 to 2023 despite an overall reduction in unsignalized crashes from 2016 to 2023.

Fatal and serious injury crashes at unsignalized intersections had more variance across the study period, as shown in Figure 19, with a 77% reduction from their peak (57) in 2016 to 2018. Following this reduction, fatal and serious injury crashes increased by 123% from 2018 to 2020, and then decreased by 27% from 2020 to 2023.

The most common crash type at an unsignalized intersection was an angle crash (62%). Angle crashes also made up approximately 85% of fatal and serious injury crashes. Rear-end crashes (13%) were the next most common type of crash, similar to citywide crash trends by collision type. Additional crash types are shown in Table 6. A map with crash density and fatal and serious injury crashes at unsignalized intersections is shown in Figure 20.

Notable crash trends at unsignalized intersections included:

Unsignalized intersection crashes most frequently occurred on a weekday from 3:00 PM to 6:00 PM

33% of unsignalized intersection crashes involved a young (19%) or senior (14%) driver

18% of all unsignalized intersection crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol

- 27% of fatal and serious injury crashes involved impaired driving

Figure 19: Unsignalized Crashes by Year, 2016-2023

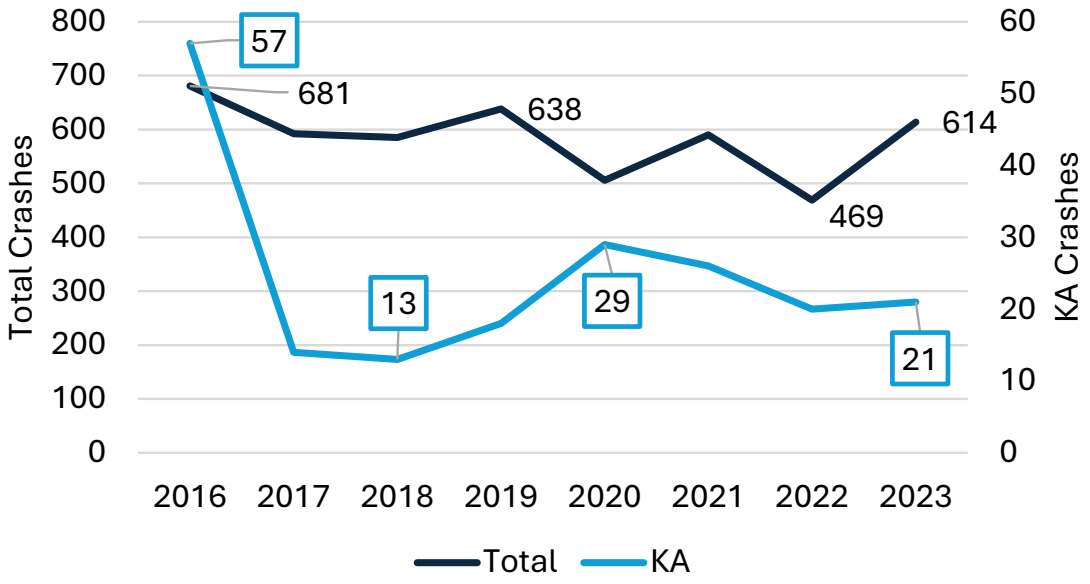


Table 6: Unsignalized Intersection Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	384	354	365	385	316	384	327	391	2,906	62%
Rear End	118	91	75	93	56	63	37	79	612	13%
Fixed Object - Off Road	54	45	41	41	38	41	29	38	327	7%
Sideswipe - Same Direction	47	29	35	36	30	35	27	39	278	6%
Head On	31	23	15	25	24	21	19	27	185	4%
Other	7	24	21	16	21	16	7	15	127	3%
Pedestrian	13	11	13	18	5	11	13	11	95	2%
Sideswipe - Opposite Direction	15	9	8	12	10	9	6	11	80	2%
Fixed Object in Road	3	2	7	4	0	6	2	2	26	1%
Backed Into	5	3	3	5	2	2	1	0	21	<1%
Non-Collision	4	1	2	2	4	1	1	1	16	<1%
Bicyclist	0	0	0	1	0	1	0	0	2	<1%
Total	**681**	**592**	**585**	**638**	**506**	**590**	**469**	**614**	**4,675**	

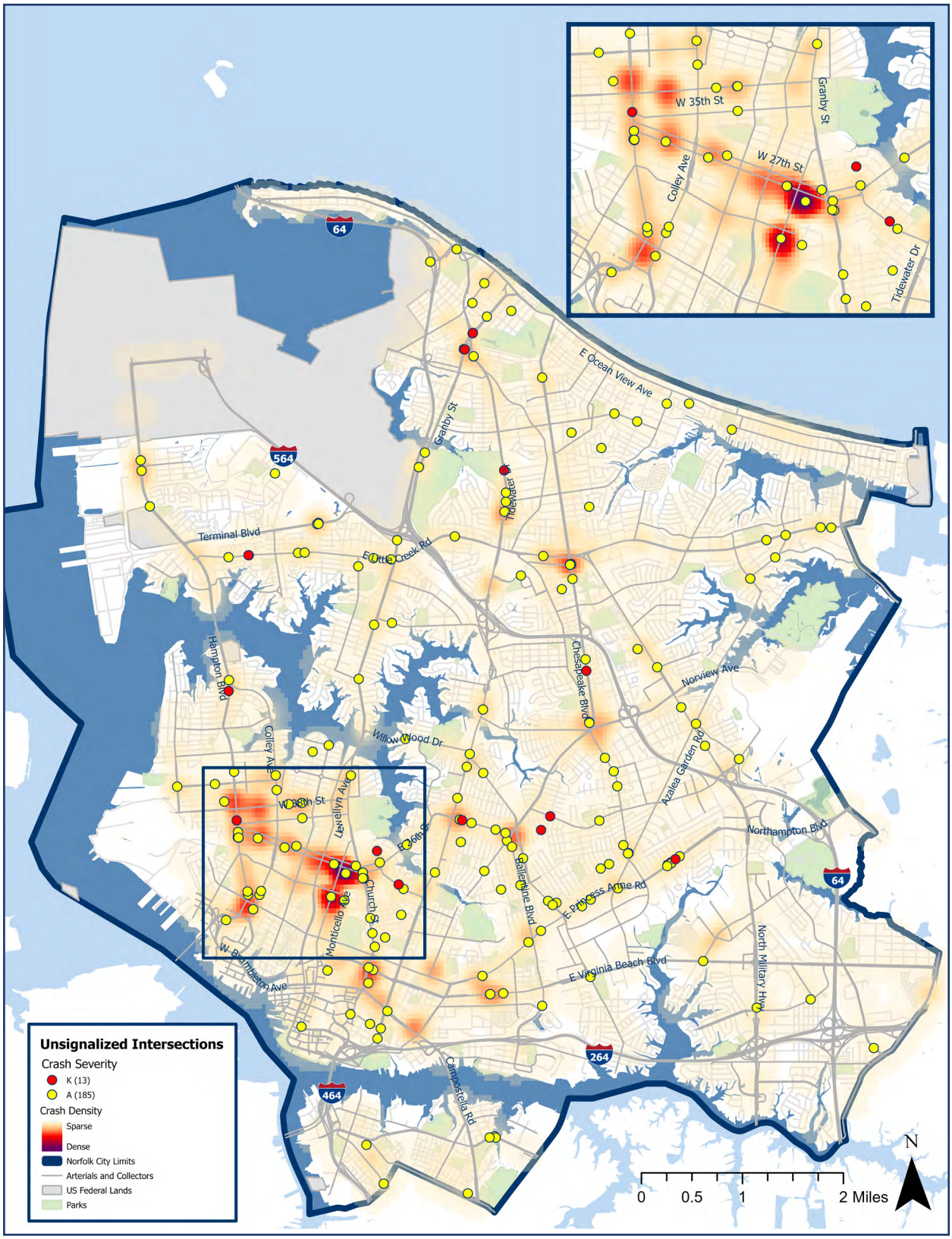


Figure 20: Unsignalized Intersections Crash Map, 2016-2023

School Zones

From 2016 to 2023, 511 crashes were reported as occurring within a school zone, with 95 (19%) of those occurring with school activity (i.e., school is in session or during student movement periods with active school zone flashing beacons or warning signs). There were 33 recorded fatal or serious injury crashes within school zones, and five (5) of these were reported as serious injuries with school activity. Despite an overall increase of crashes within school zones (17%) from 2016 to 2023, fatal and serious injury crashes in school zones steadily decreased from 2016 with none reported in 2023 as illustrated in Figure 21.

Following overall crash trends, the most common collision type within a school zone was an angle-crash (42%) followed by rear-end (22%) with additional crash types shown in Table 7. Of the crashes within school zones, 24% involved some type of impairment. The largest quantity of school zone crashes (11%) occurred during the month of October, similar to citywide trends. Figure 22 shows the hours of peak school zone crashes for each day of the week. Crashes in school zones most frequently occurred during the 3:00 PM to 6:00 PM peak period on Mondays and Fridays. A map showing all school zone crashes by severity is shown in Figure 23.

Figure 21: School Zone Crashes by Year, 2016-2023

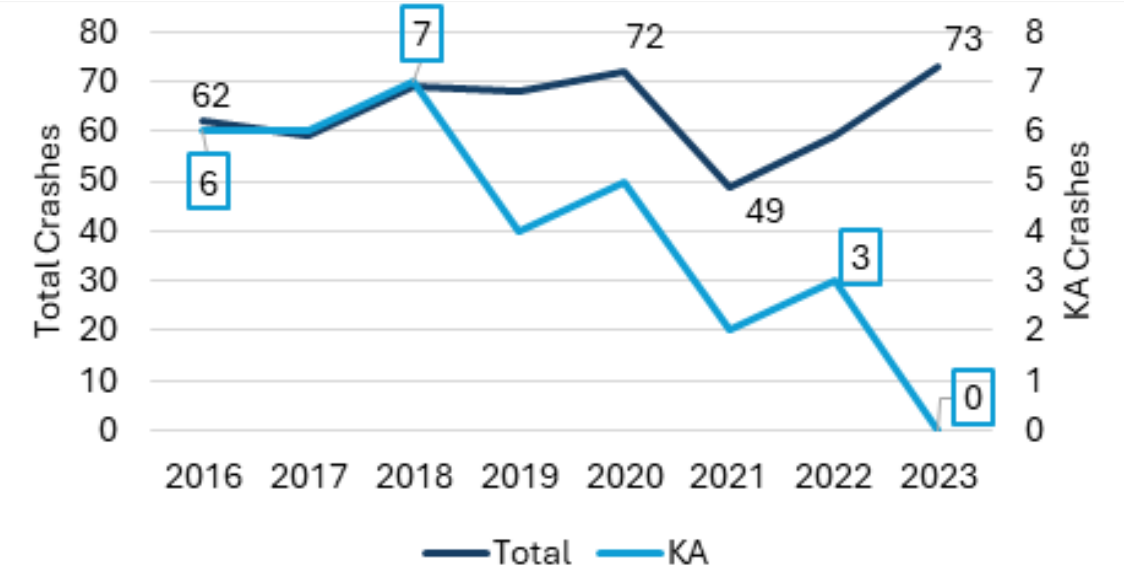


Figure 22: School Zone Crashes by Weekday and Time, 2016-2023

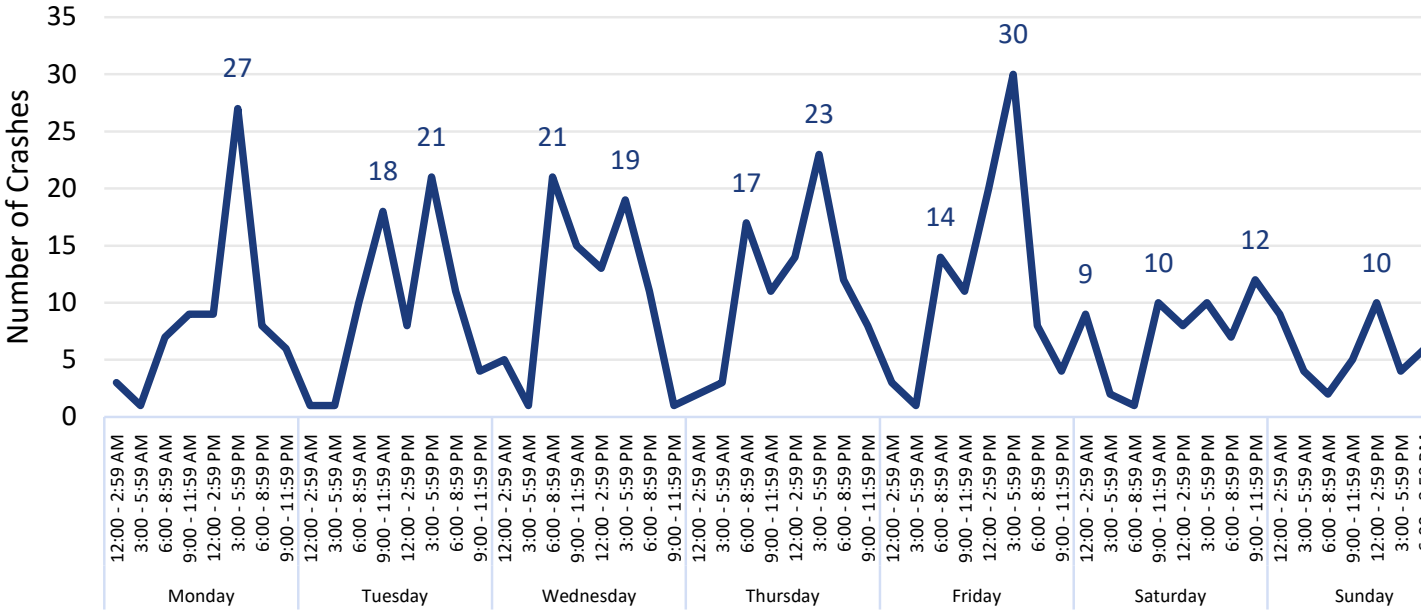


Table 7: School Zone Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	24	21	27	29	34	20	26	32	213	42%
Rear End	19	13	18	9	17	13	12	13	114	22%
Fixed Object - Off Road	8	6	7	9	9	5	7	7	58	11%
Sideswipe - Same Direction	4	3	7	12	5	3	6	8	48	9%
Pedestrian	5	8	6	1	2	4	4	3	33	6%
Head On	0	3	0	1	1	3	1	5	14	3%
Sideswipe - Opposite Direction	0	4	1	5	2	0	2	0	14	3%
Other	1	1	1	0	1	0	0	2	6	1%
Backed Into	1	0	0	1	1	0	1	1	5	<1%
Fixed Object in Road	0	0	2	0	0	1	0	1	4	<1%
Non-Collision	0	0	0	1	0	0	0	1	2	<1%
Total	**62**	**59**	**69**	**68**	**72**	**49**	**59**	**73**	**511**	

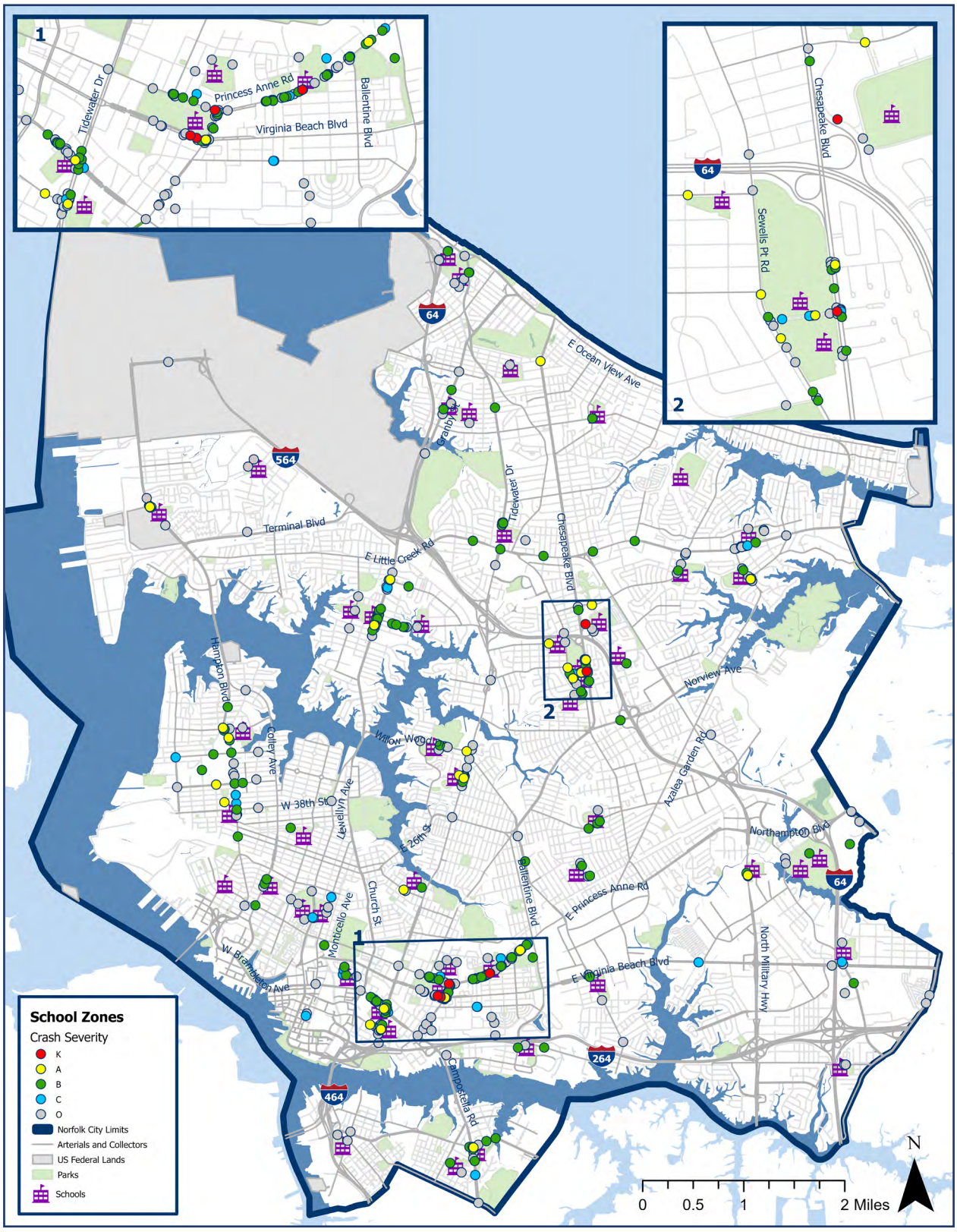


Figure 23: School Zone Crash Map, 2016-2023

Wet Roads

Crashes on wet roads were defined as crashes with roadway surface conditions classified as wet, standing water, or moving water. There were 3,177 total crashes on wet roads recorded from 2016 to 2023 with 140 (4%) of those recorded as fatal or serious injury crashes. Overall, crashes on wet roads decreased by 12% over the eight-year study period with a 40% reduction in fatal and serious injury crashes on wet roads as illustrated in Figure 24.

Following overall crash trends, the most common collision type on wet roads was an angle-crash (43%) followed by rear-end (27%) with additional crash types shown in Table 8. Fixed object off-road crashes occurred at a higher rate (12%) compared to citywide crashes. A map with crash density and fatal and serious injury crashes on wet roads is shown in Figure 25.

Notable trends for crashes on wet roads included:

- **76%** of crashes on wet roads occurred on roadways classified as a principal or minor arterial
- **55%** of crashes on roads with standing or moving water occurred during clear weather conditions
- **49%** of fatal or serious injury crashes on wet roads were rear-end collisions
- **19%** of crashes on wet roads occurred on Fridays
- Crashes on wet roads were higher across winter months with a monthly peak of 366 crashes (11%) in February
- **18%** of crashes on wet roads involved young drivers

Figure 24: Wet Road Crashes by Year, 2016-2023

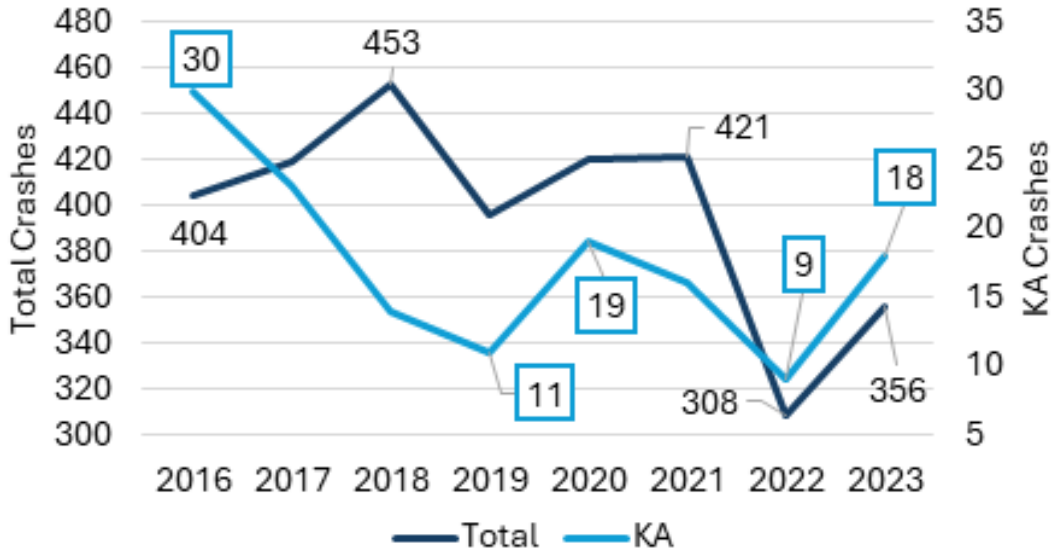


Table 8: Wet Road Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	155	171	205	175	181	179	155	159	1,380	43%
Rear End	136	123	117	100	114	101	69	85	845	27%
Fixed Object - Off Road	58	39	46	49	46	64	39	35	376	12%
Sideswipe - Same Direction	21	23	28	17	29	22	18	38	196	6%
Head On	8	26	14	18	19	20	6	12	123	4%
Other	2	15	16	13	11	11	7	11	86	3%
Pedestrian	11	12	12	10	6	12	6	6	75	2%
Sideswipe - Opposite Direction	4	4	4	4	7	5	2	7	37	1%
Fixed Object in Road	4	3	8	3	2	6	5	1	32	1%
Non-Collision	3	1	1	5	2	1	0	1	14	<1%
Backed Into	2	2	2	2	2	0	0	1	11	<1%
Train	0	0	0	0	1	0	0	0	1	<1%
Bicyclist	0	0	0	0	0	0	1	0	1	<1%
Total	**404**	**419**	**453**	**396**	**420**	**421**	**308**	**356**	**3,177**	

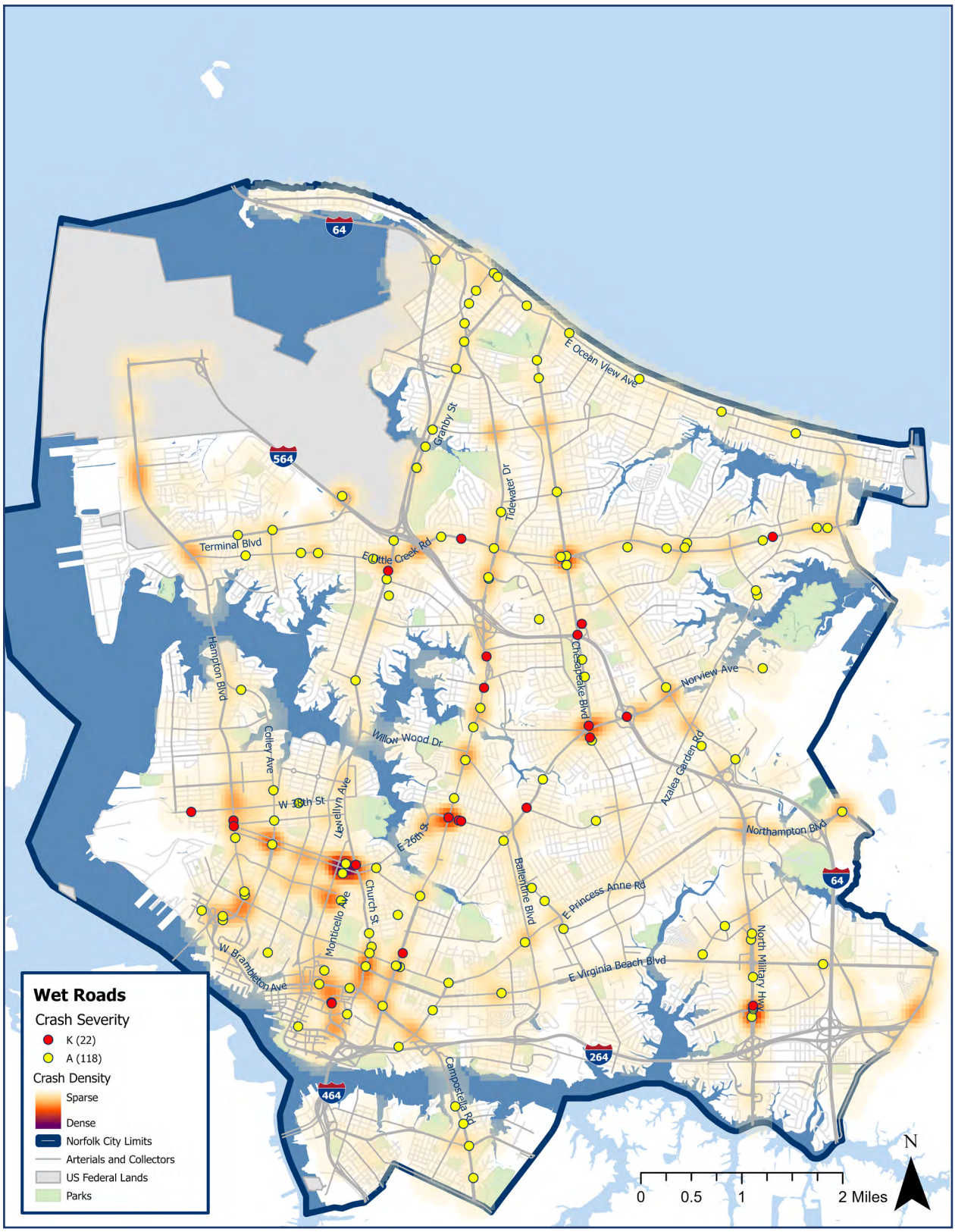


Figure 25: Wet Road Crash Map, 2016-2023

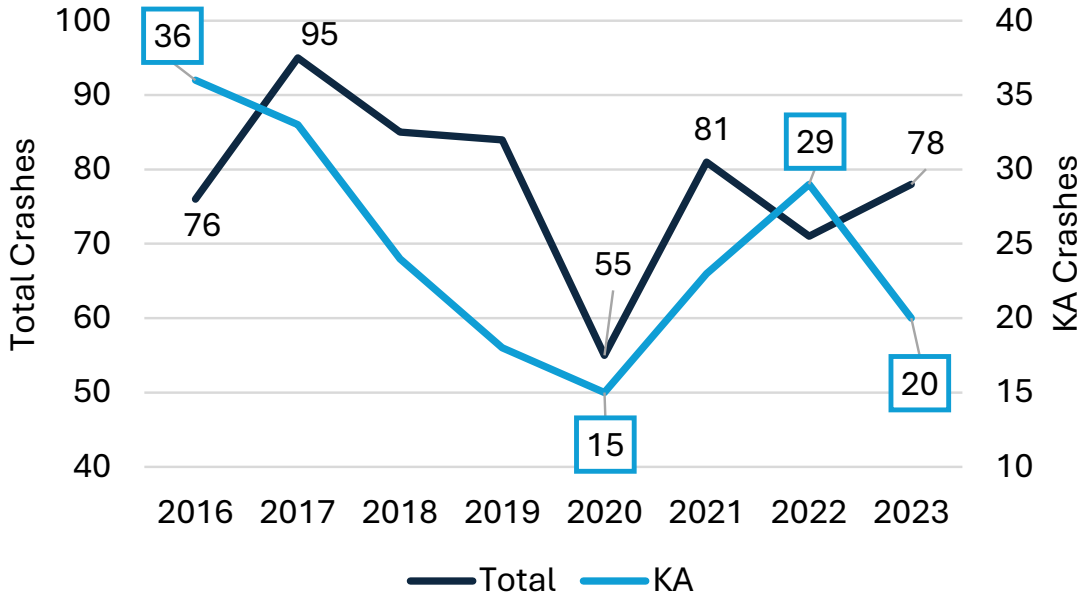
Pedestrians

Of the total 625 crashes involving pedestrians from 2016 to 2023, 32% involved fatal or serious injuries - accounting for roughly 18% of all fatal and serious injury crashes on Norfolk roadways. Furthermore, all pedestrian crashes resulted in some level of injury, visible or not, with no recorded property damage-only crashes. Year-to-year trends of pedestrian crashes are shown in Figure 26. A map showing all pedestrian crashes by severity is shown in Figure 27.

Notable trends for crashes involving pedestrians included:

- **50%** of pedestrian crashes occurred within an intersection or were coded as intersection related, indicating that approximately half of all pedestrian crashes occurred outside of intersections, where pedestrian crossings are typically marked
- **43%** of pedestrian crashes occurred at dark, including all lighted conditions and dusk
- **24%** of pedestrian crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol
- **8%** of pedestrian crashes resulted in fatal injuries
- Pedestrian crashes most frequently occurred on weekdays during the 3:00 PM to 6:00 PM peak period

Figure 26: Pedestrian Crashes by Year, 2016-2023



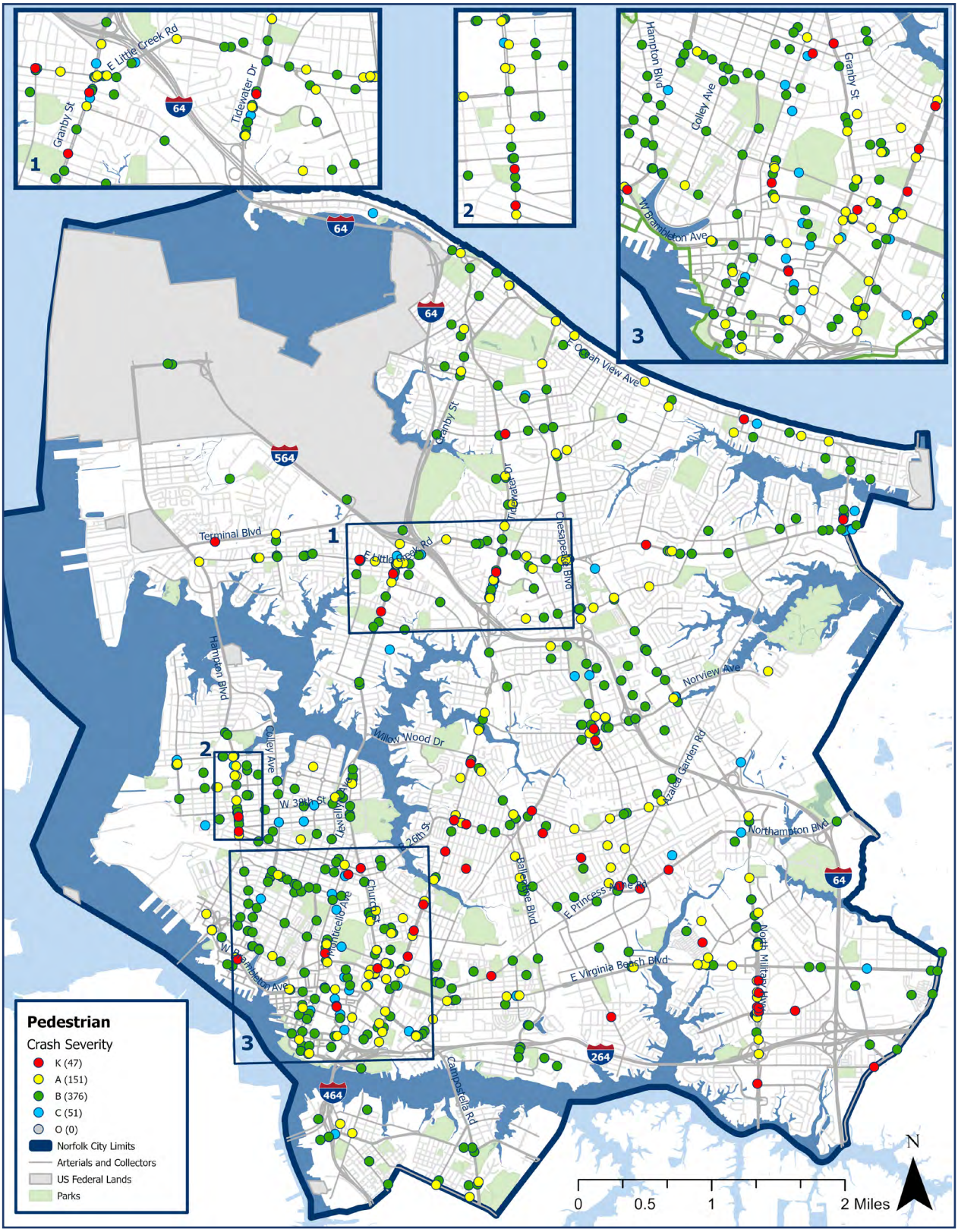


Figure 27: Pedestrian Crash Map, 2016-2023

Bicyclists

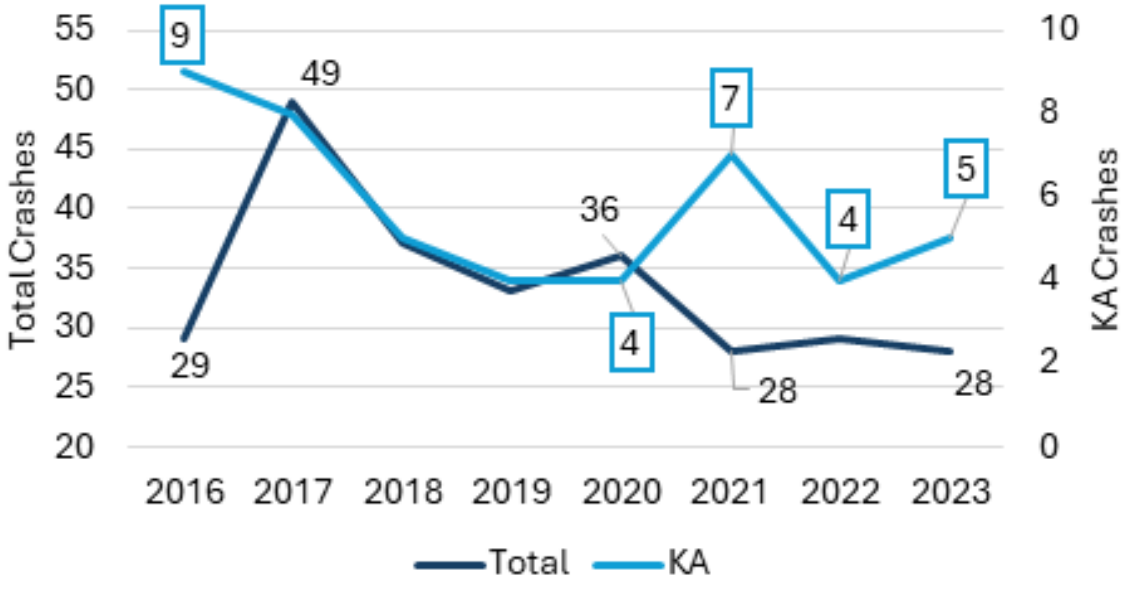
From 2016 to 2023, 269 crashes involving bicyclists were reported on City of Norfolk roadways, with 97% of bicyclist crashes resulting in some level of injury. Specifically, 17% were recorded as fatal and serious injury with four (4) fatalities over the eight-year study period. From 2016 to 2017, there was a 69% increase in bicyclist crashes. Since 2017, crashes involving bicyclists have trended downward, with the exception of a spike in 2020. Since 2021, annual bicyclist crashes have returned to 2016 levels, as depicted in Figure 28.

Nearly two-thirds (64%) of crashes involving bicyclists were angle crashes. Furthermore, three (3) out of the four (4) recorded fatalities were reported as angle crashes. Additional crash types are shown in Table 9.

Notable trends for crashes involving bicyclists included:

- **54%** of bicyclist crashes occurred within an intersection or were intersection related
- **50%** of fatal or serious injury bicyclist crashes occurred at dark, including all lighted conditions and dusk
- **19%** of bicyclist crashes involved senior drivers

Figure 28: Bicyclist Crashes by Year, 2016-2023

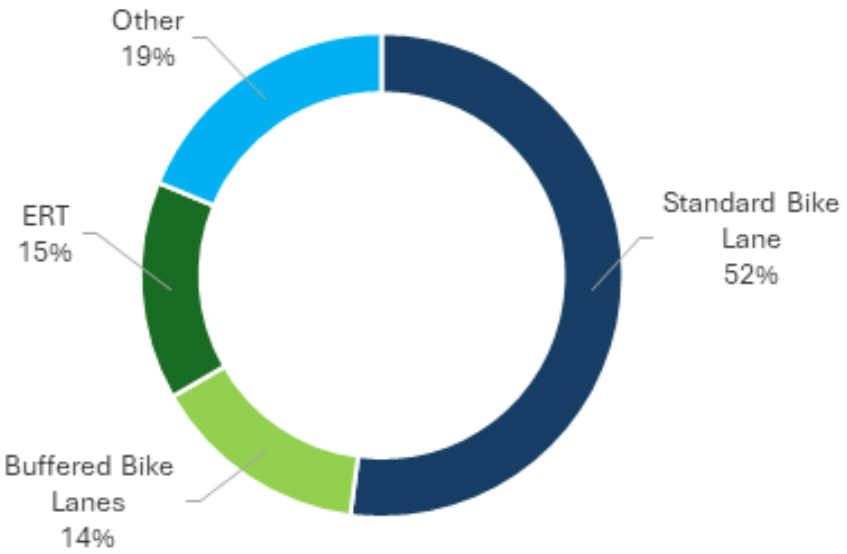


Approximately 18% of bicyclist crashes (48) occurred on existing bicycle infrastructure within the City. Notably, 33 (68%) of these 48 crashes resulted in a serious injury and 11 (23%) resulted in a minor injury. One (1) fatality was recorded at the intersection of Hampton Boulevard at 27th Street where a standard bike lane ended. Of the 48 crashes on existing bicycle infrastructure, 52% occurred on a standard bike lane, 14% on buffered bike lanes, 15% on the Elizabeth River Trail (ERT), and 19% were defined as "other" (i.e., occurring on signed bike routes with no markings or on shared lane markings), as shown in Figure 29. A map showing all bicyclist crashes by severity is shown in Figure 30.

Table 9: Bicyclist Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	17	30	28	23	20	16	20	21	175	65%
Other	2	7	4	2	5	5	4	2	31	12%
Head On	8	4	2	1	2	2	0	1	20	7%
Sideswipe - Same Direction	1	3	0	3	3	2	2	3	17	6%
Rear End	1	2	3	3	4	0	1	1	15	6%
Bicyclist	0	1	0	1	0	2	2	0	6	2%
Sideswipe - Opposite Direction	0	2	0	0	1	0	0	0	3	1%
Pedestrian	0	0	0	0	0	1	0	0	1	<1%
Backed Into	0	0	0	0	1	0	0	0	1	<1%
Total	**29**	**49**	**37**	**33**	**36**	**28**	**29**	**28**	**269**	**100%**

Figure 29: Bicyclist Crashes on Existing Bicycle Infrastructure, 2016-2023



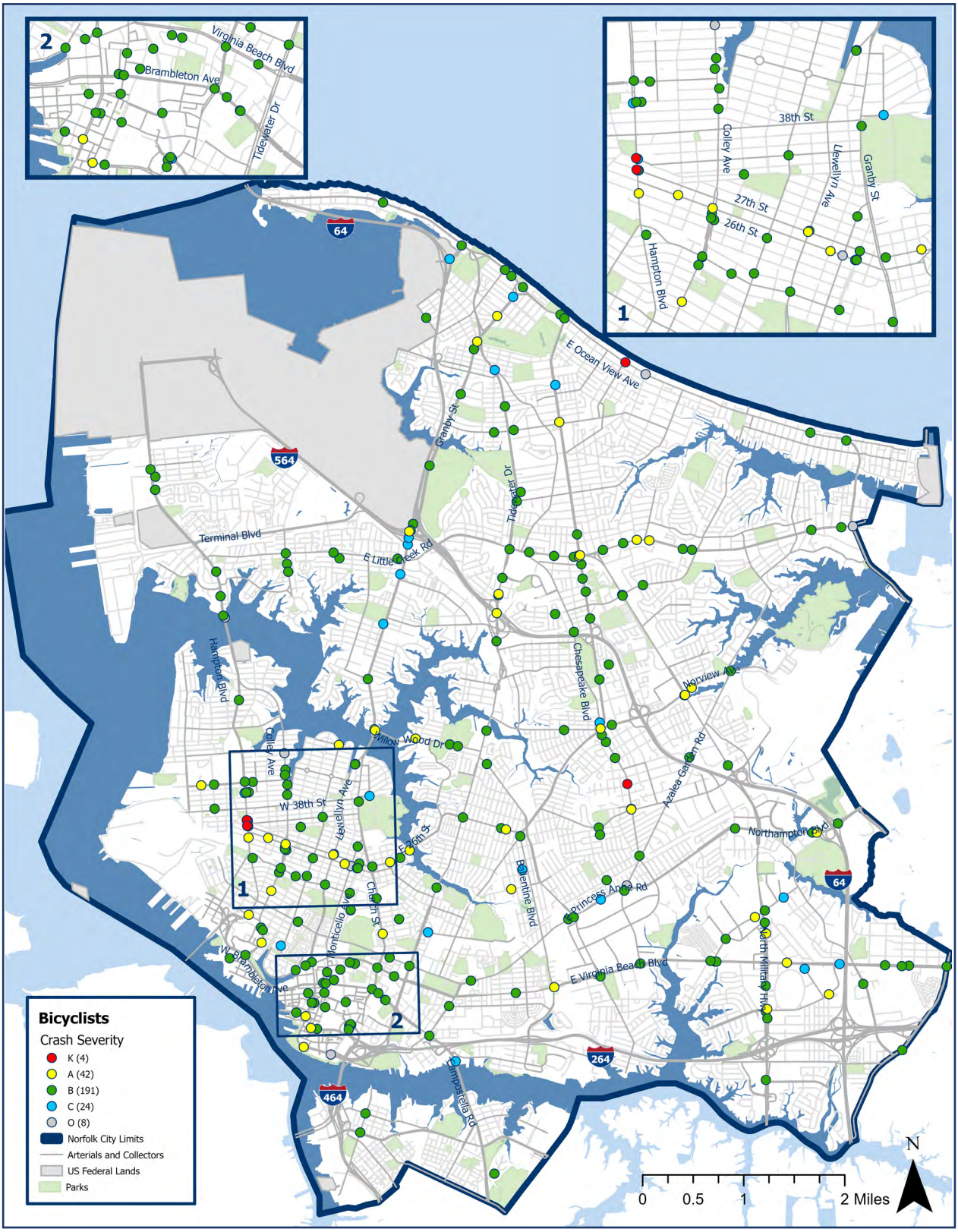


Figure 30: Bicyclist Crash Map, 2016-2023

Motorcyclists

There were 452 crashes involving motorcyclists on Norfolk's roadways between 2016 and 2023. Of these, 31% resulted in a fatality or serious injury, making up 13% of all fatal and serious injury crashes citywide. During this eight-year period, motorcycle crashes increased overall by 17%, with a peak in crashes in 2021 (70), as illustrated in Figure 31. During this same period, fatal and serious injury crashes decreased by 32%. Motorcyclist crashes were relatively consistent between April and September, with a peak in June (56), in line with warm weather patterns. Motorcycle crashes sorted by collision type are shown in Table 10. A map showing all motorcycle crashes by severity is shown in Figure 32.

Notable motorcyclist crash trends included:

55% of motorcyclist crashes occurred within an intersection or were coded as intersection related

31% of motorcyclist crashes occurred at dark, including all lighted conditions and dusk

- 38% of fatal and serious injury crashes occurred at dark

26% of fatal and serious injury motorcyclist crashes occurred on a Saturday

16% of motorcyclist crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol

- 26% of fatal and serious injury crashes involved impaired driving

Motorcyclist crashes most frequently occurred on Wednesdays and Fridays from 3:00 PM to 6:00 PM or on Saturdays from 12:00 PM to 3:00 PM

Figure 31: Motorcyclist Crashes by Year, 2016-2023

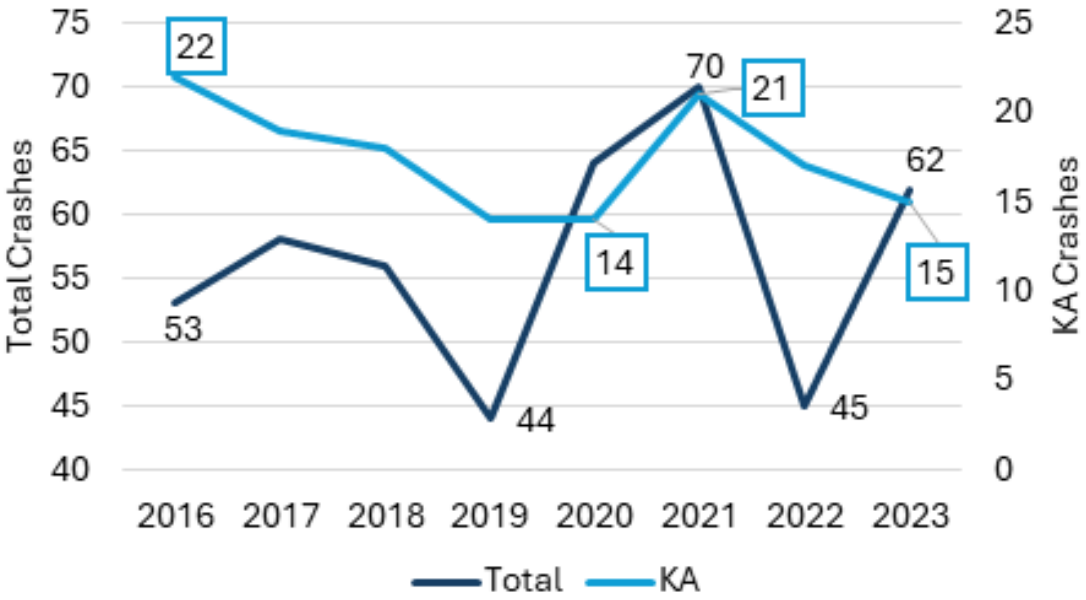


Table 10: Motorcyclist Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	16	20	26	22	22	30	16	31	183	40%
Rear End	10	9	8	8	11	12	4	10	72	16%
Non-Collision	9	11	5	2	8	7	5	8	55	12%
Other	5	8	1	3	5	8	7	6	43	10%
Sideswipe - Same Direction	3	2	6	4	8	2	6	2	33	7%
Fixed Object - Off Road	4	4	1	1	2	3	4	2	21	5%
Head On	3	1	2	3	6	4	1	0	20	4%
Fixed Object in Road	0	2	3	1	1	4	1	1	13	3%
Sideswipe - Opposite Direction	1	0	2	0	1	0	1	1	6	1%
Pedestrian	1	1	2	0	0	0	0	1	5	1%
Motorcyclist	1	0	0	0	0	0	0	0	1	<1%
Total	**53**	**58**	**56**	**44**	**64**	**70**	**45**	**62**	**452**	

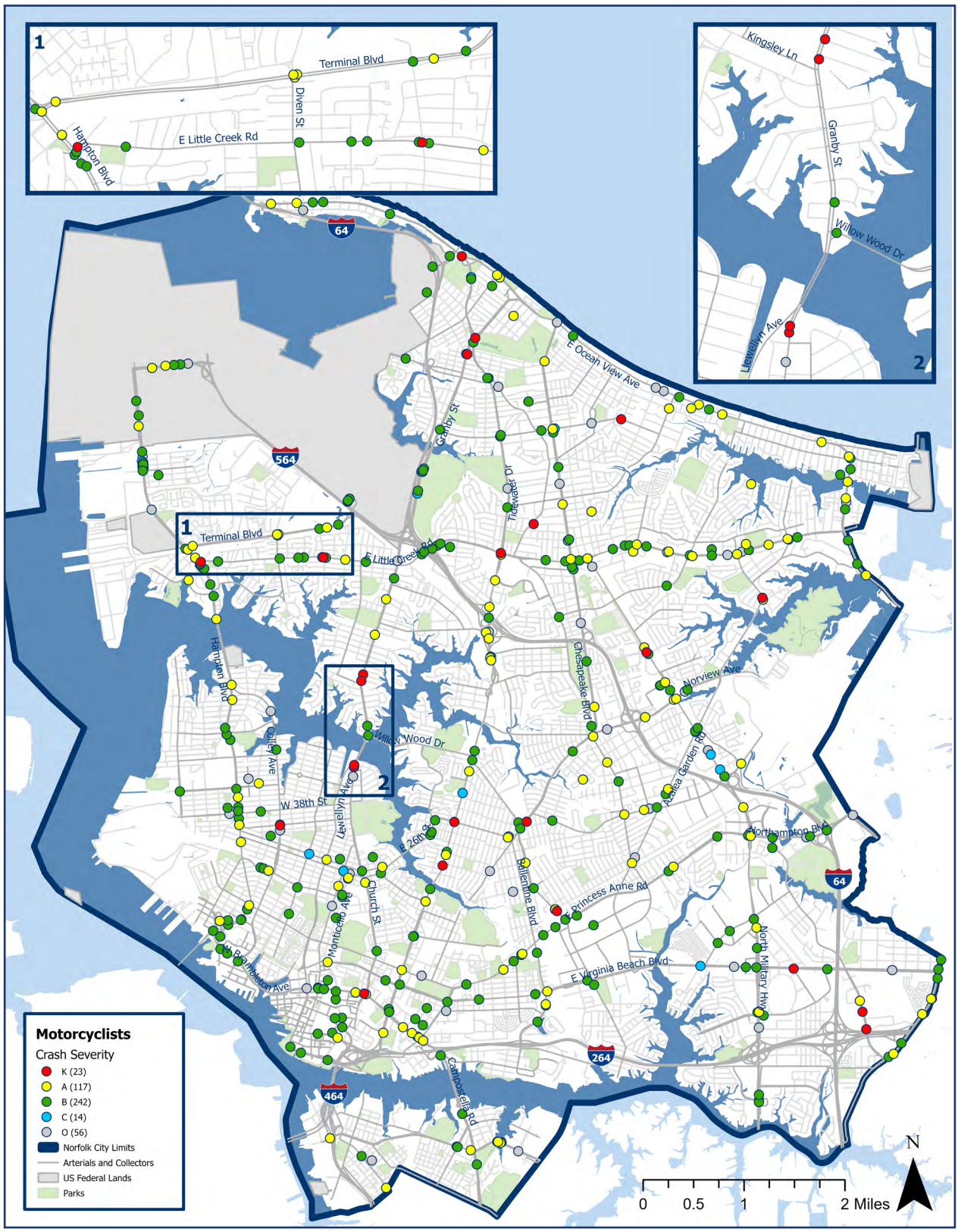


Figure 32: Motorcyclist Crash Map, 2016-2023

Heavy Vehicles

Crashes were recorded as a heavy vehicle crash if one or more vehicles involved in the crash had one of the following vehicle body types:

- Truck with 2 or more axles (with or without a trailer)
- School bus
- City transit bus
- Commercial or privately owned bus

Approximately 4% of the 1,267 heavy vehicle crashes occurring on City of Norfolk roads between 2016 and 2023 resulted in fatal or serious injuries. In this time, the annual number of heavy vehicle crashes increased by about 30%. Heavy vehicle crashes peaked in 2023 with a one-year increase of 33% after steadily decreasing from 2017 to 2022 as illustrated in Figure 33.

Compared to other emphasis areas, heavy vehicle crashes were less frequently influenced by conditions like darkness and adverse weather or contributing factors like speeding and impaired driving. While angle collisions (35%) and rear-end collisions (22%) were still prevalent, sideswipe same-direction crashes (26%) were much more common than in other crashes citywide. Additional crash types are shown in Table 11. A map with crash density and fatal and serious injury crashes involving heavy vehicles is shown in Figure 34.

Notable heavy vehicle crash trends included:

52%

of fatal and serious injury crashes involving a heavy vehicle were angle collisions

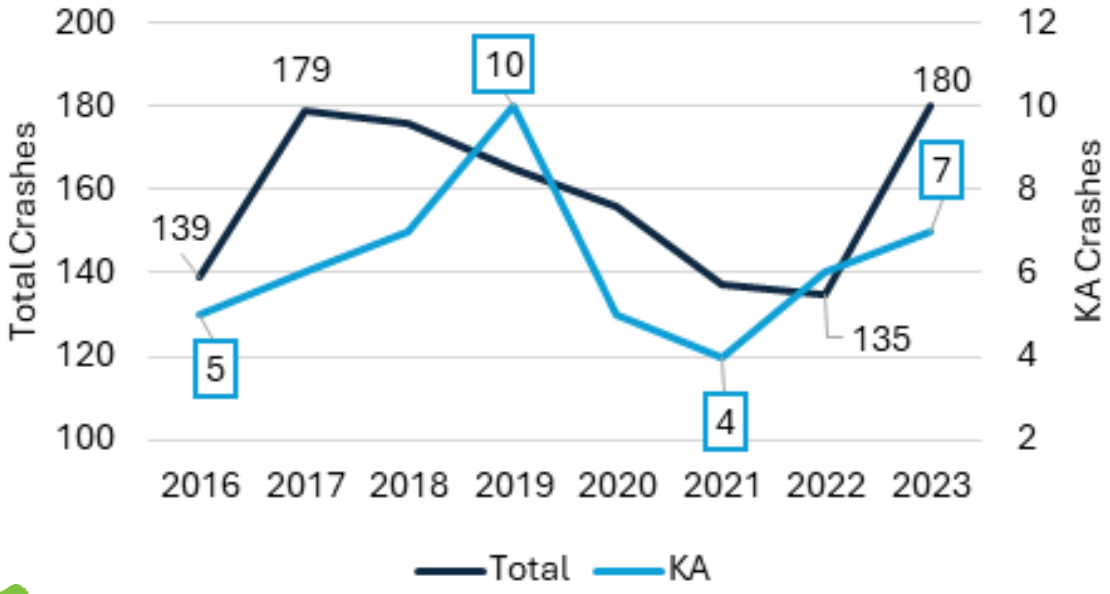
28%

of fatal and serious injury crashes involving a heavy vehicle occurred on a Friday

17%

of heavy vehicle crashes occurred on local roads

Figure 33: Heavy Vehicle Crashes by Year, 2016-2023



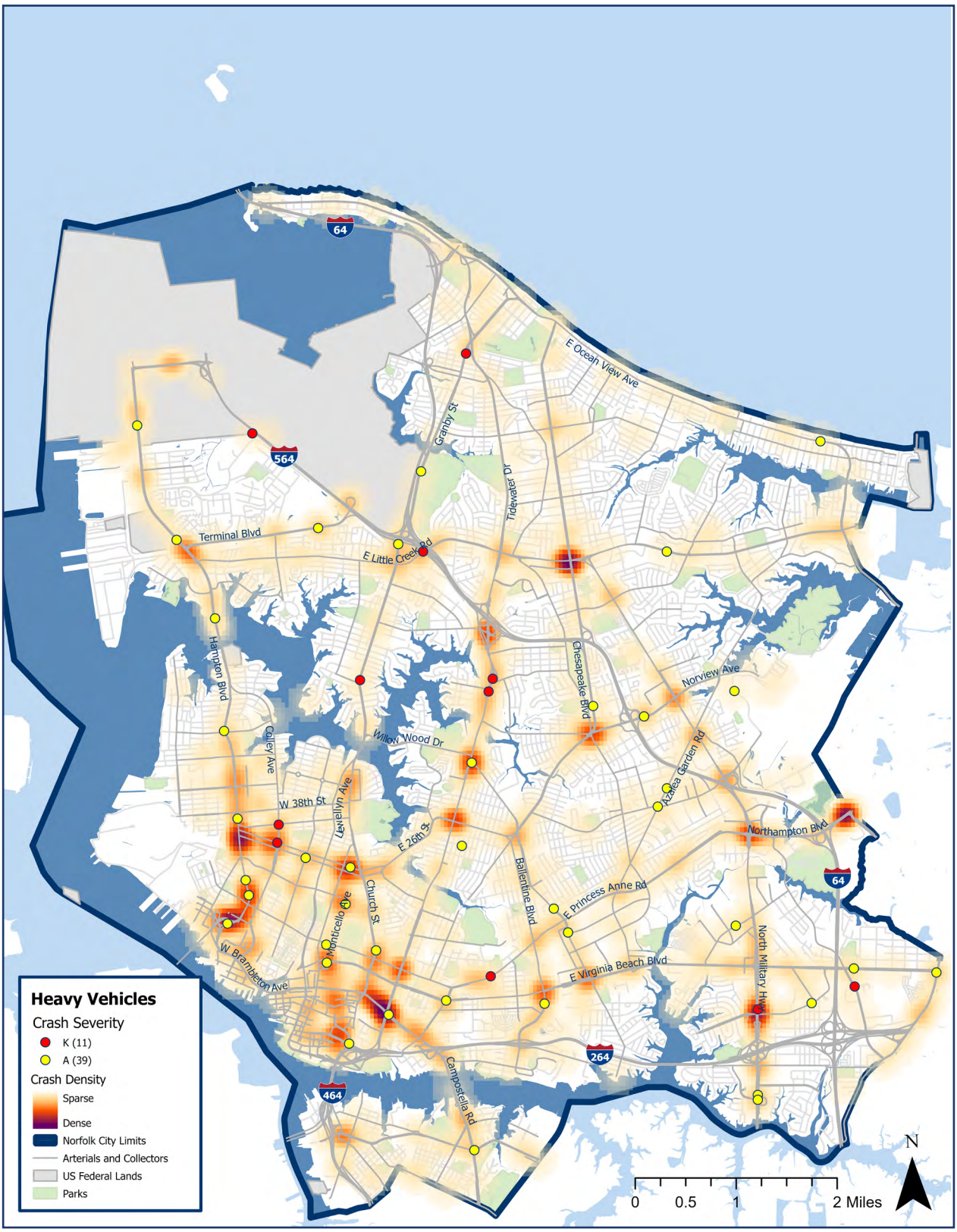


Figure 34: Heavy Vehicle Crash Map, 2016-2023

Table 11: Heavy Vehicle Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	47	62	65	61	52	47	48	65	447	35%
Sideswipe - Same Direction	29	40	50	49	43	32	42	44	329	26%
Rear End	34	47	36	26	38	33	29	42	285	22%
Fixed Object - Off Road	6	10	6	13	3	6	2	6	52	4%
Other	6	4	8	4	4	3	4	10	43	3%
Head On	5	1	3	3	5	5	4	4	30	2%
Sideswipe - Opposite Direction	5	5	0	3	6	4	3	4	30	2%
Backed Into	2	4	4	5	4	2	1	2	24	2%
Pedestrian	1	2	3	0	0	4	0	2	12	<1%
Non-Collision	1	3	0	1	1	1	1	0	8	<1%
Fixed Object in Road	3	1	1	0	0	0	1	1	7	<1%
Total	**139**	**179**	**176**	**165**	**156**	**137**	**135**	**180**	**1,267**	

Hampton Roads Transit (HRT) Crashes

The analysis of heavy vehicle crashes also included the focused examination of Hampton Roads Transit (HRT) crash data supplied by HRT from January 2020 to June 2024. During this 4.5-year period, there were 738 recorded crashes involving HRT vehicles in Norfolk—averaging 185 collisions per year. These transit collisions peaked in 2023 at 220 collisions. Of the 738 crashes, 44 were included in police reports and reflected in the above analyses for overall heavy vehicle crashes citywide.

From January 2020 to June 2024, the top collision types for HRT buses included being hit by other vehicles (47%), hitting fixed objects (28%), and hitting other vehicles (17%). The top type of HRT collision involving other vehicles were collision with the left mirror (39%). Crashes most frequently occurred on a Wednesday afternoon (12:00 PM to 4:00 PM). HRT data identified that Route 8 (primarily along Tidewater Drive) had the highest number of crashes per 100,000 vehicle revenue miles (VRM) since 2020 for any of the HRT bus routes across all six cities in the HRT regional service area.

Speeding

From 2016 to 2023, there were 2,529 crashes in which speed was reported as a contributing factor. It should be noted that the presence of speeding in crashes as a contributing factor is often self-reported, which means that the number of reported crashes in this section likely underrepresents the true number of crashes in which speed was a contributing factor. Approximately 9% of speeding crashes resulted in a fatal or serious injury, while 21% of citywide fatal or serious injury crashes involved speeding. Crashes involving speeding peaked in 2021 (370 crashes) following the COVID-19 pandemic and overall increased by 18% from 2016 to 2023 as illustrated in Figure 35. A map with crash density and fatal and serious injury crashes involving speeding is shown in Figure 36.

After angle crashes (42%), the most common crash type for crashes involving speeding were collisions with a fixed object off-road (20%), which is more than the double the citywide proportion of this type of collision. Additional crash types are summarized in Table 12.

Notable trends for crashes involving speeding included:

- **42%** of crashes involving speeding occurred at dark, including all lighted conditions and dusk
- **32%** of crashes involving speeding also involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol
- **22%** of crashes involving speeding involved distracted driving
- **14%** of crashes involving speeding involved driving under the influence of alcohol
- **32%** of crashes involving speeding occurred on a Friday or Saturday
- Crashes involving speeding most frequently occurred on a Saturday or Sunday from 12:00 AM to 3:00 AM or on a weekday from 3:00 PM to 6:00 PM

Figure 35: Speeding Crashes by Year, 2016-2023

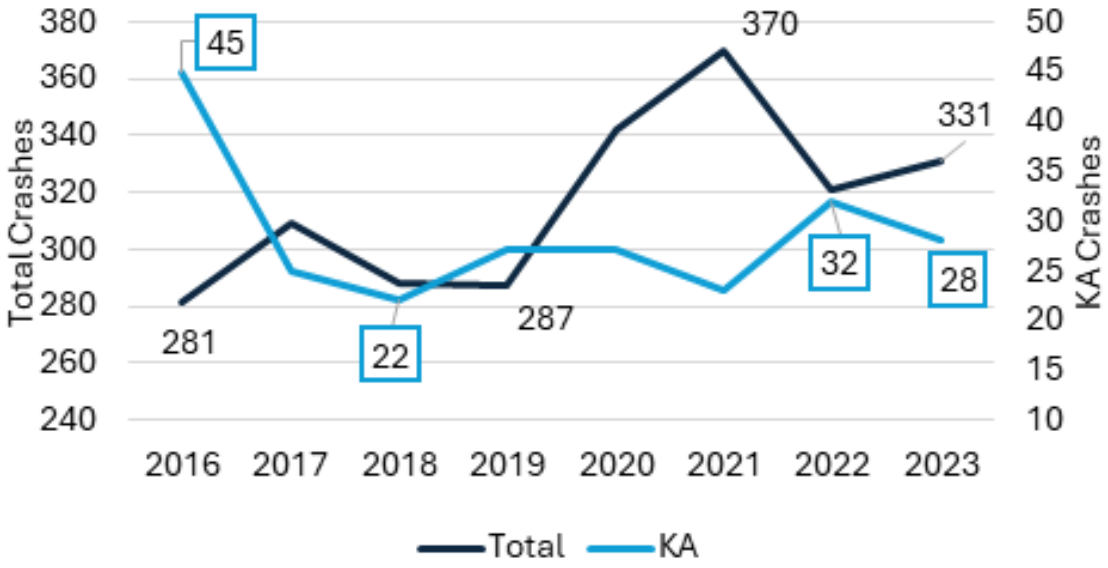


Table 12: Speeding Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	101	122	116	118	134	163	140	157	1,051	42%
Fixed Object - Off Road	69	71	51	62	64	73	55	50	495	20%
Rear End	61	57	49	55	66	56	59	54	457	18%
Sideswipe - Same Direction	19	19	24	19	31	23	29	26	190	8%
Head On	15	15	14	12	15	12	10	12	105	4%
Other	2	8	10	9	17	18	8	17	89	4%
Pedestrian	4	3	12	4	3	10	4	4	44	2%
Sideswipe - Opposite Direction	4	5	4	1	6	3	7	4	34	1%
Fixed Object in Road	2	3	4	3	4	8	5	4	33	1%
Non-Collision	2	4	4	3	2	3	3	3	24	<1%
Backed Into	1	2	0	1	0	0	1	0	5	<1%
Train	1	0	0	0	0	0	0	0	1	<1%
Other Animal	0	0	0	0	0	1	0	0	1	<1%
Total	**281**	**309**	**288**	**287**	**342**	**370**	**321**	**331**	**2,529**	

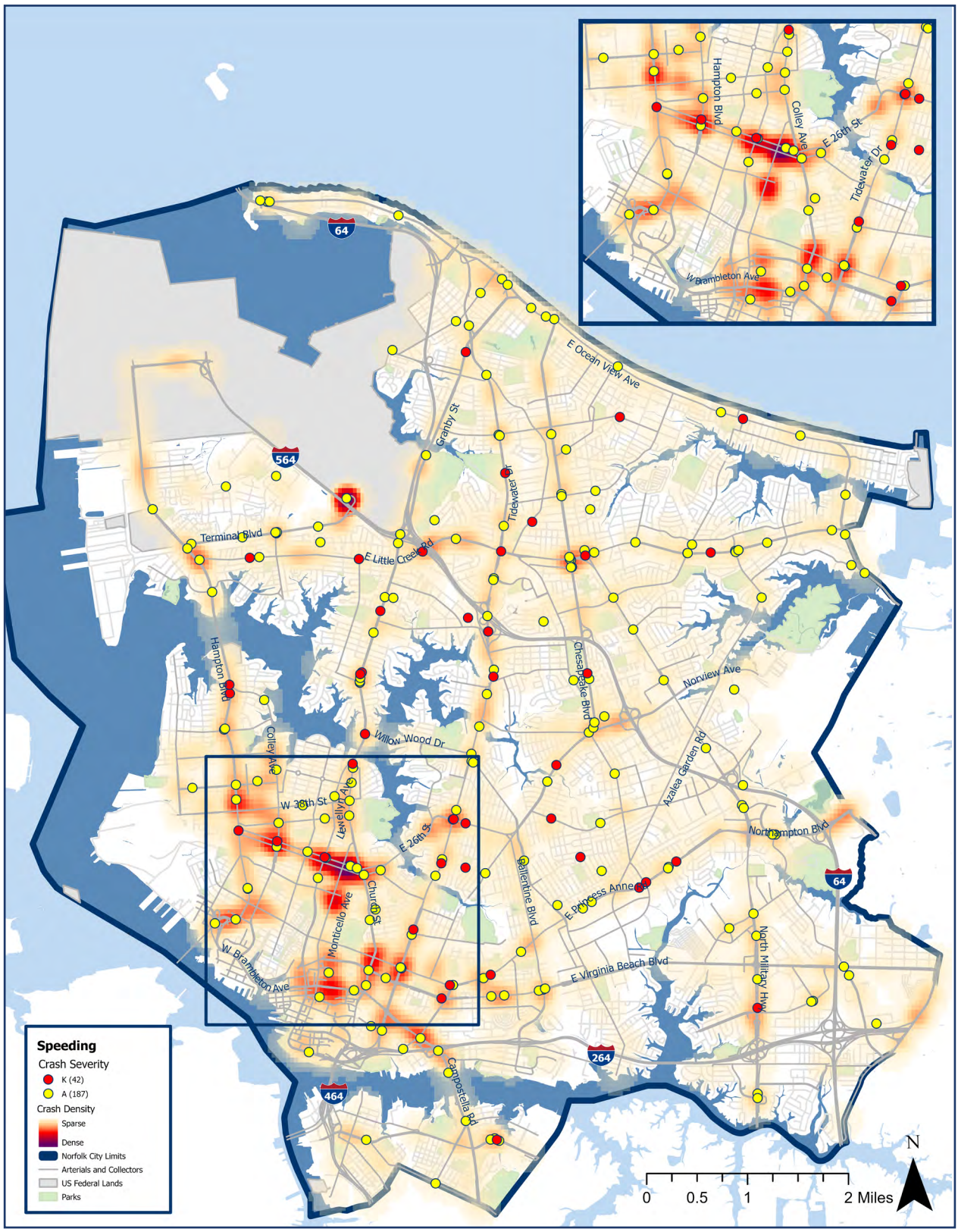


Figure 36: Speeding Crash Map, 2016-2023

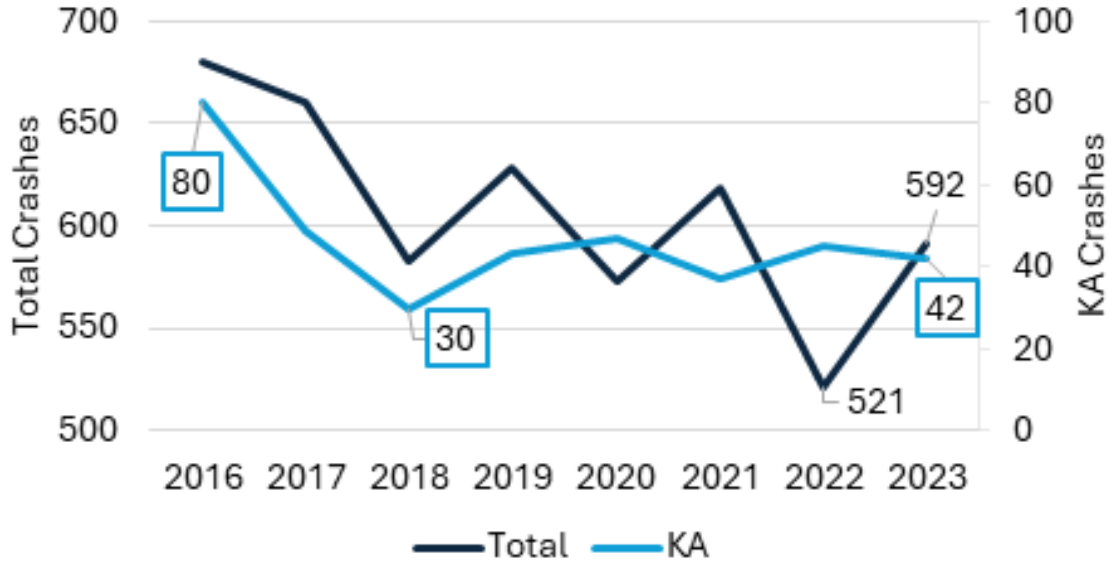
Impaired Driving

Impaired driving crashes are those recorded as involving distracted driving, driving under the influence of alcohol, driving under the influence of drugs, or drowsiness. Between 2016 and 2023, 4,855 crashes were reported as involving impaired driving, 373 of which resulted in fatal or serious injuries (8%). This represents approximately 23% of overall citywide crashes but 34% of all fatal and serious injury crashes. Crashes involving impaired driving generally decreased over the eight-year period as illustrated in Figure 37. Distracted driving was the most common impairment (79%), followed by alcohol influence (26%), drowsy driving (7%), and drug influence (2%).

More than 26% of all fatal crashes involving impaired driving occurred between 9:00 PM and 11:00 PM. During this time, drivers are more likely to be drowsy or under the influence of alcohol. Approximately 44% of impaired crashes occurred in dark conditions and approximately 47% occurred over the weekend (Friday to Sunday). This suggests a large percentage of impaired crashes are not associated with typical commuter traffic, shown by trends in Figure 38.

Crashes involving impaired driving had higher occurrences of rear ends (33%) and fixed object off-road collisions (17%) compared to all crashes citywide. Additional crash types are shown in Table 13. For only fatal and serious injury crashes, the most common collision types were collision with a fixed object off-road (23%), angle crashes (23%), and collision with a pedestrian (19%). Pedestrians are particularly vulnerable to impaired driving crashes, because they are harder to see. During the eight-year study period, 48% of impaired driving crashes involving a pedestrian resulted in a fatal or serious injury. A map with crash density and fatal and serious injury crashes involving impaired driving is shown in Figure 39.

Figure 37: Impaired Driving Crashes by Year, 2016-2023



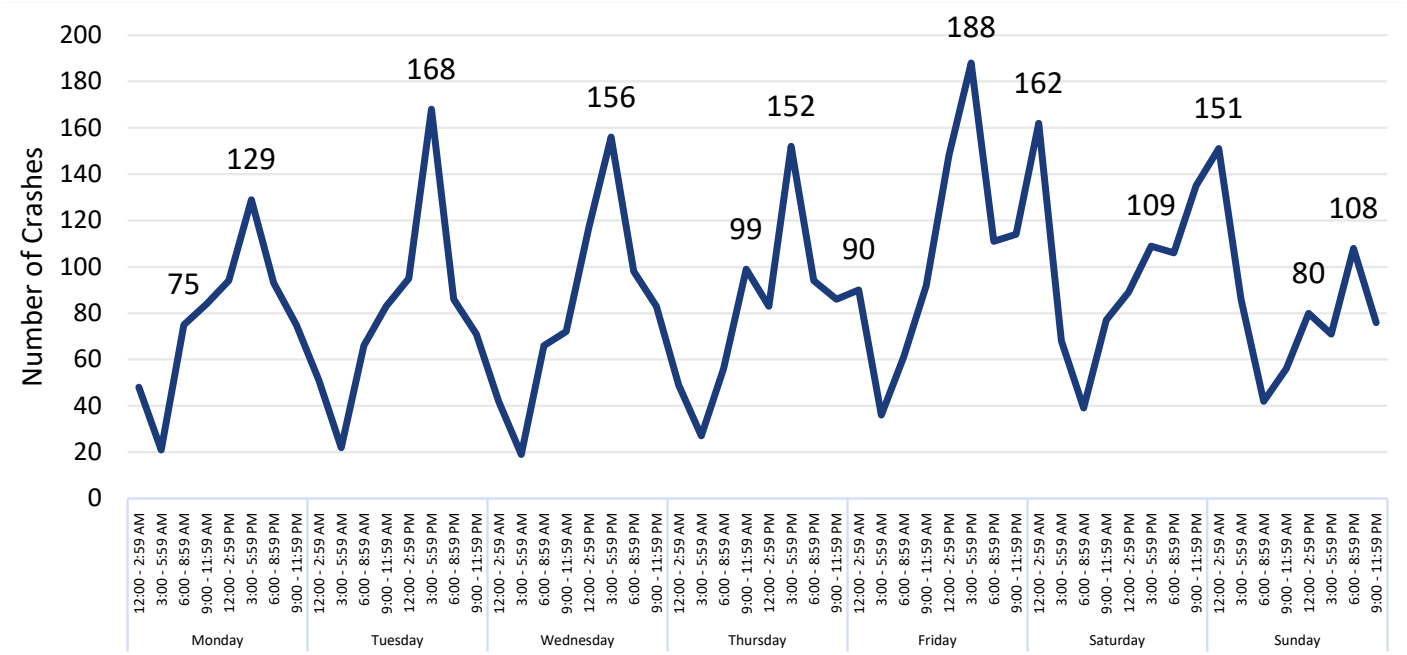


Figure 38: Impaired Driving Crashes by Day of Week and Time, 2016-2023

Table 13: Impaired Driving Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Rear End	251	225	197	222	183	185	136	185	1,584	33%
Angle	178	177	162	175	164	177	176	156	1,365	28%
Fixed Object - Off Road	119	100	94	103	92	111	92	97	808	17%
Sideswipe - Same Direction	47	50	43	41	36	50	31	57	355	7%
Head On	34	38	19	26	33	30	19	25	224	5%
Other	11	15	23	16	23	17	21	31	157	3%
Pedestrian	16	21	22	12	8	20	25	13	137	3%
Sideswipe - Opposite Direction	10	17	7	15	17	12	13	17	108	2%
Fixed Object in Road	7	9	8	9	9	12	3	7	64	1%
Backed Into	3	3	6	4	6	3	3	3	31	<1%
Non-Collision	3	4	2	4	2	1	1	1	18	<1%
Bicyclist	0	1	0	1	0	0	1	0	3	<1%
Train	1	0	0	0	0	0	0	0	1	<1%
Total	**680**	**660**	**583**	**628**	**573**	**618**	**521**	**592**	**4,855**	

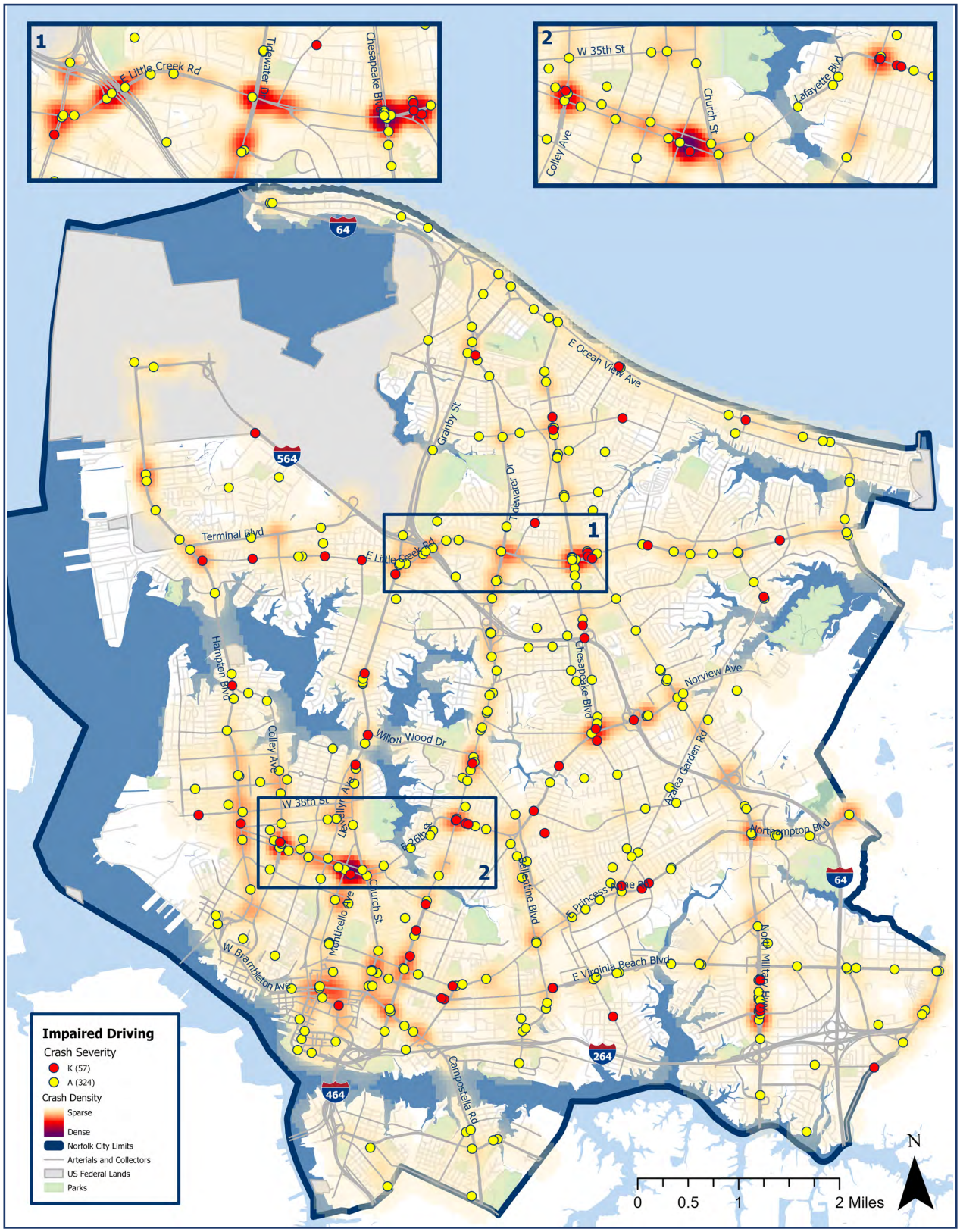


Figure 39: Impaired Driving Crash Map, 2016-2023

Unprotected Occupants

Unprotected occupant crashes are defined as those where any vehicle occupant was noted to be without a seatbelt or without a proper child restraint. There were 761 unprotected occupant crashes between 2016 and 2023. Unprotected occupant crashes peaked in 2021 (110 crashes) as illustrated in Figure 40. During the study period, the number of total unprotected occupant crashes increased by 22%, but the number of fatal and serious injury crashes decreased by more than half. Approximately 22% of the unprotected occupant crashes resulted in a fatal or serious injury, which accounted for 15% of citywide fatal and serious injury crashes. A map with crash density and fatal and serious injury crashes involving unprotected occupants is shown in Figure 41.

After angle crashes (38%), collision with a fixed object off-road was the most common collision type for unprotected occupant crashes, accounting for 22% of all unprotected occupant crashes and 33% of fatal crashes with unprotected occupants. Additional crash types are shown in Table 14.

Notable trends for unprotected occupant crashes included:

42% of unprotected occupant crashes occurred at dark, including all lighted conditions and dusk

38% of unprotected occupant crashes involved impaired driving, including driving while distracted, drowsy, or under the influence of drugs or alcohol

34% of unprotected occupant crashes occurred on a Saturday or Sunday with the most frequent occurrence on a Saturday from 9:00 PM to 12:00 AM

20% of unprotected occupant crashes involved young drivers, a number which has grown 44% from 2016 to 2023

Figure 40: Unprotected Occupant Crashes by Year, 2016-2023

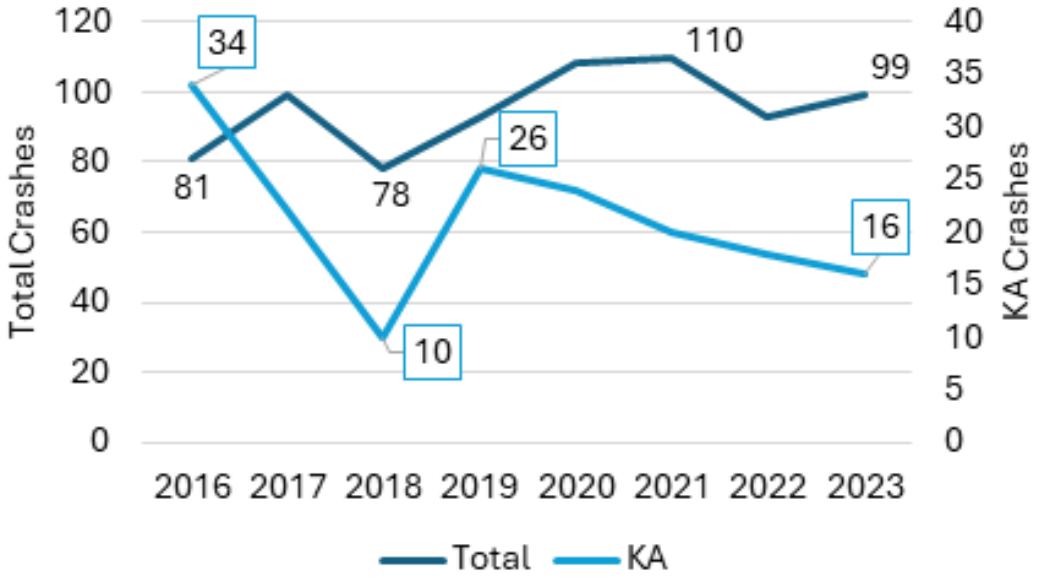


Table 14: Unprotected Occupant Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	32	36	25	37	52	37	32	35	286	38%
Fixed Object - Off Road	18	18	18	23	20	22	27	19	165	22%
Rear End	17	27	12	17	19	25	15	17	149	20%
Sideswipe - Same Direction	7	2	6	7	4	3	8	13	50	7%
Head On	3	6	5	2	5	5	5	8	39	5%
Other	0	3	6	3	1	4	0	0	17	2%
Sideswipe - Opposite Direction	2	1	1	1	3	2	2	4	16	2%
Fixed Object in Road	0	1	0	1	1	8	0	2	13	2%
Ped	0	3	3	1	0	0	2	0	9	1%
Backed Into	0	0	2	1	3	2	1	0	9	1%
Non-Collision	1	2	0	0	0	1	1	1	6	<1%
Train	1	0	0	0	0	0	0	0	1	<1%
Other Animal	0	0	0	0	0	1	0	0	1	<1%
Total	**81**	**99**	**78**	**93**	**108**	**110**	**93**	**99**	**761**	

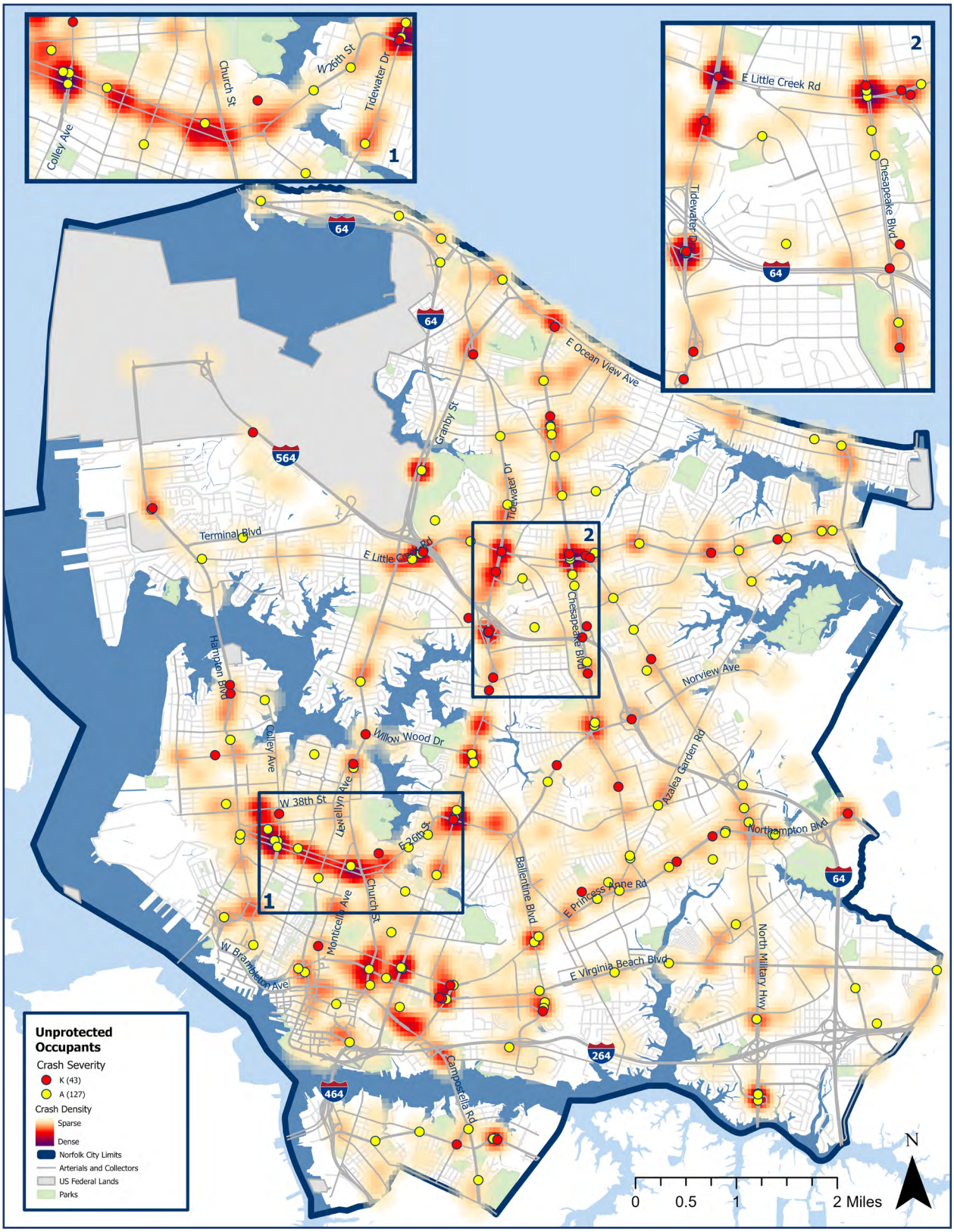


Figure 41: Unprotected Occupant Crash Map, 2016-2023

Priority Corridor

To identify targeted countermeasures, a priority corridor was selected for a more in-depth safety analysis. The High Injury Network (HIN) was used to identify potential priority corridors approximately one (1) to three (3) miles in length, which then were analyzed with additional metrics for final selection including:

- Fatal and Serious Injury Crashes
- Intersection-Related Crashes
- Crashes involving Vulnerable Road Users
- Percentage of Corridor included in the High Injury Network
- Crash Rates based on Estimated Average Daily Traffic (ADT)
- Approved Projects or Ongoing Improvements along Corridor

Based on a review of these metrics and input from City staff, **Tidewater Drive from the I-64 underpass to the intersection of Lafayette Boulevard was selected as the priority corridor for a targeted safety analysis.** Figure 42 illustrates the crash density and fatal and serious injury crashes along the corridor.

This 2-mile segment of Tidewater Drive is primarily a four-lane roadway with a speed limit of 35 miles per hour (mph). The corridor is primarily divided from its start at the I-64 underpass to its terminus at Lafayette Boulevard with either a median or two-way left turn lane (TWLTL) as separation. The corridor has an average daily traffic (ADT) volume of 38,000 as recorded by VDOT in 2022.

A total of 723 crashes occurred along this segment of Tidewater Drive from 2016 to 2023—a crash rate of 3.3 per million vehicle miles traveled (MVMT) based on its ADT volume. Of these crashes, 6% resulted in a fatality (9) or serious injury (32).

Along this segment of Tidewater Drive, 55% of the crashes involving pedestrians resulted in a fatality (2) or serious injury (4) during the eight-year study period. The data was similar for motorcyclists, with 55% of crashes involving a fatality (1) or serious injury (5). Consistent with evening peak hour traffic, crashes along this corridor most frequently occurred on weekdays from 3:00 PM to 6:00 PM. However, 20% of all crashes along the corridor occurred on a Friday.

As with citywide crash trends, the highest percentage of crashes by type were angle (40%, compared to the citywide 45%). The corridor saw a higher percentage of rear end collisions (33%) than the citywide crashes (25%). Additional crash types are shown in Table 15. Head-on collisions accounted for 15% of the fatal and serious injury crashes, which differs from the citywide by 7%.

Along the two-mile corridor, 21% of crashes involved impaired driving, including distracted, drowsy, alcohol, or drug-use. Looking at only fatal and serious injury crashes along the corridor, 46% involved impaired driving.

Based on field observations conducted in November 2024, the following existing conditions may contribute to crashes along the corridor:

- Several signalized intersections were missing backplates, which could reduce visibility and compliance
- Poor roadway surface conditions were present such as potholes, rutting, worn pavement markings, etc.
- Lane widths were narrow throughout most of the corridor, with utility poles located very close to the curb
- Pedestrians were observed crossing mid-block rather than in crosswalks or at signalized crossings
- Skid marks were present at multiple locations throughout the corridor, particularly southbound at Alsace Avenue and northbound at Norview Avenue, which could indicate near misses of rear-end collisions, as well as both northbound and southbound through the horizontal curves along the railroad overpass.

Table 15: Priority Corridor Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	37	36	34	38	39	37	38	33	292	40%
Rear End	29	25	26	46	24	28	28	33	239	33%
Sideswipe - Same Direction	8	8	11	4	9	6	12	11	69	10%
Fixed Object - Off Road	9	5	7	8	7	7	5	8	56	8%
Head On	4	2	6	2	3	4	1	6	28	4%
Pedestrian	2	1	0	2	1	1	2	2	11	2%
Other	1	0	4	0	1	1	2	2	11	2%
Sideswipe - Opposite Direction	2	0	0	1	1	0	2	3	9	1%
Total	**94**	**79**	**88**	**101**	**85**	**86**	**92**	**98**	**723**	

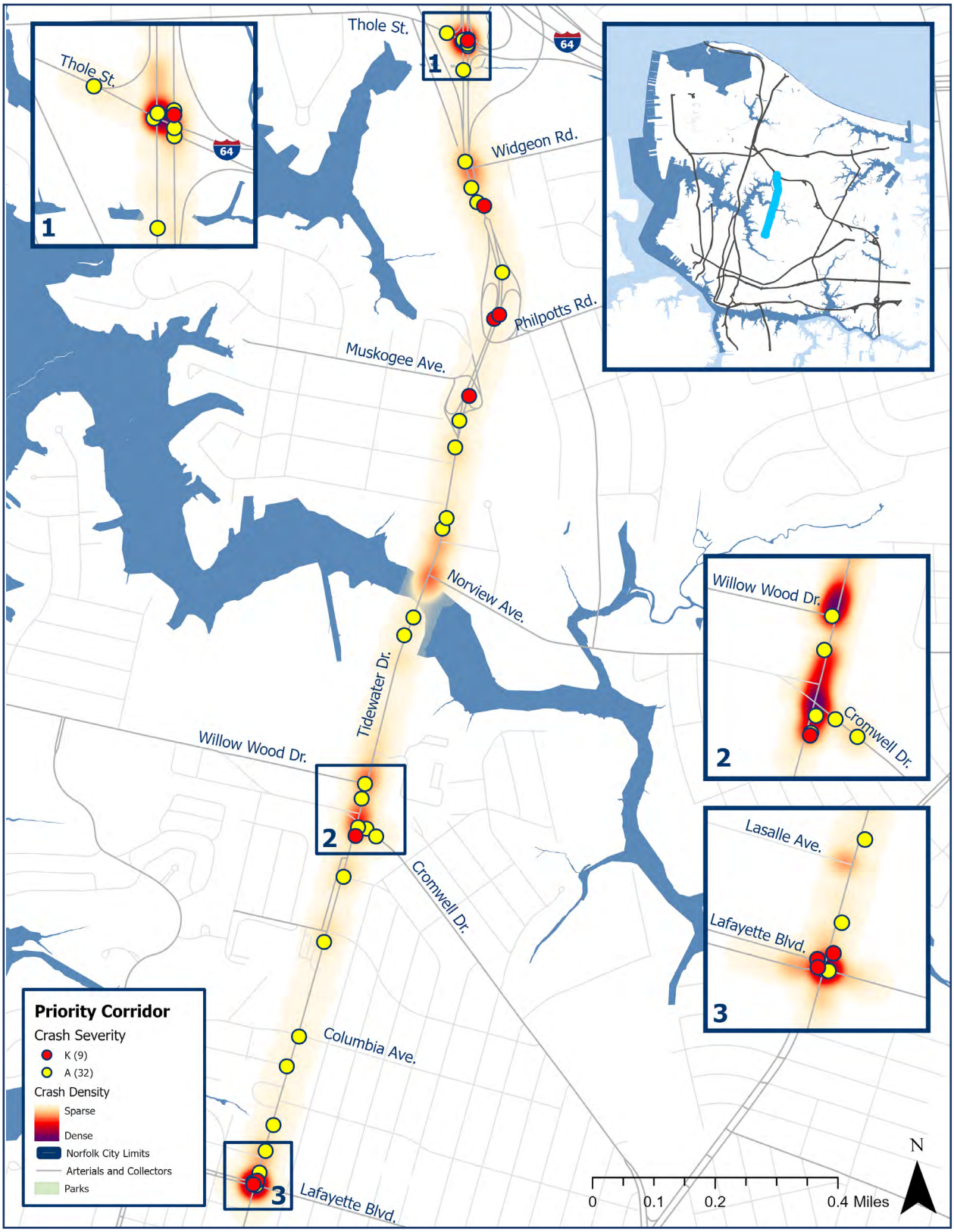


Figure 42: Priority Corridor Crash Map, 2016-2023

Priority Intersection

To identify targeted countermeasures, a priority intersection was selected for a more in-depth safety analysis. To select a priority intersection, citywide crashes were geofenced around all signalized and unsignalized intersections throughout Norfolk. The top 25 intersections were selected based on the number of crashes occurring geospatially within each intersection. Crashes at these intersections were normalized based on entering volumes to develop crash rates. Entering volumes were estimated by utilizing ADT volumes and K-factors (i.e., the design hour factor), then validated using available turning movement count (TMC) and Replica annual ADT data. Replica is a web-based platform available to public agencies and private agencies via paid subscriptions that collects a wide array of transportation metrics, including ADT. Replica's annual ADT dataset is developed using location-based data, traffic cameras, and government open data portals. Each crash rate was calculated as crashes per million entering vehicles such that

$$R = \frac{1{,}000{,}000 \cdot C}{365 \cdot N \cdot V}$$

R = Crash rate

C = Total number of intersection crashes

N = Number of years of data

V = Total daily entering traffic volume of the intersection

The following metrics were analyzed for final selection of the top intersection including:

- Fatal and Serious Injury Crashes and Crash Rates
- Crashes involving Vulnerable Road Users
- Total Crashes and Crash Rates
- Approved Projects or Ongoing Improvements at Intersections

Based on this analysis and input from City staff, **the intersections of Tidewater Drive at Stanley Street/ Central Business Park Drive and Southern Shopping Center were selected as the priority intersection for further analysis.** The intersection of Tidewater Drive at Stanley Street/ Central Business Park Drive is a four-legged, signalized intersection located approximately one-third of a mile north of I-64. The intersection also serves the adjacent Little Creek Marketplace shopping center; therefore, the nearby signalized entrance to the Little Creek Marketplace and Southern Shopping Center was also observed as a secondary intersection and included the analysis.

The two intersections experienced a total of 102 crashes from 2016 to 2023 with 7% of crashes resulting in a fatality (1) or serious injury (6). Of the five (5) pedestrian crashes at these intersections, 60% resulted in a fatality (1) or serious injury (2). A map showing all crashes by severity is shown in Figure 43.

Consistent with citywide crash trends, the highest percentage of crashes by type was angle (57%, compared to the citywide 45%) and rear ends (23% compared to the citywide 25%) with additional crash types shown in Table 16. At these intersections, 22% of crashes involved impaired driving (including distracted, drowsy, alcohol, or drug-use) and 37% involved a young (16%) or senior (21%) driver. Approximately 20% of crashes at the intersections occurred on a Friday, with the most frequent occurrence during the 3:00 PM-6:00 PM peak period. This rises to 43% for fatal and serious injury crashes.

Based on field observations conducted in November 2024, the following existing conditions may contribute to crashes at the intersections:

- Narrow lane widths, particularly the center turn lane
- Poor roadway surface conditions such as potholes, rutting, and concrete patches
- Worn and faded pavement markings, including nearly non-existent crosswalk markings on the west leg of the Stanley Street intersection
- Obstructed signal visibility due to low hanging utility lines
- Numerous closely spaced access points on the west side of Tidewater Drive which increase potential conflicts near the intersection
- Lack of continuous sidewalk along the eastbound and westbound approaches of both signalized intersections, and lack of buffer between curb and sidewalk along east side of Tidewater Drive

Table 16: Priority Intersection Crashes by Type, 2016-2023

Crash Type	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Angle	8	6	6	11	6	7	4	10	58	57%
Rear End	2	5	3	3	3	1	1	5	23	23%
Pedestrian	0	2	0	0	1	1	1	0	5	5%
Fixed Object - Off Road	1	0	0	0	2	0	2	0	5	5%
Head On	1	0	1	0	1	0	0	1	4	4%
Sideswipe - Same Direction	0	1	0	1	0	0	0	2	4	4%
Fixed Object in Road	0	0	0	0	0	2	0	0	2	2%
Other	0	0	0	1	0	0	0	0	1	1%
Total	**12**	**14**	**10**	**16**	**13**	**11**	**8**	**18**	**102**	

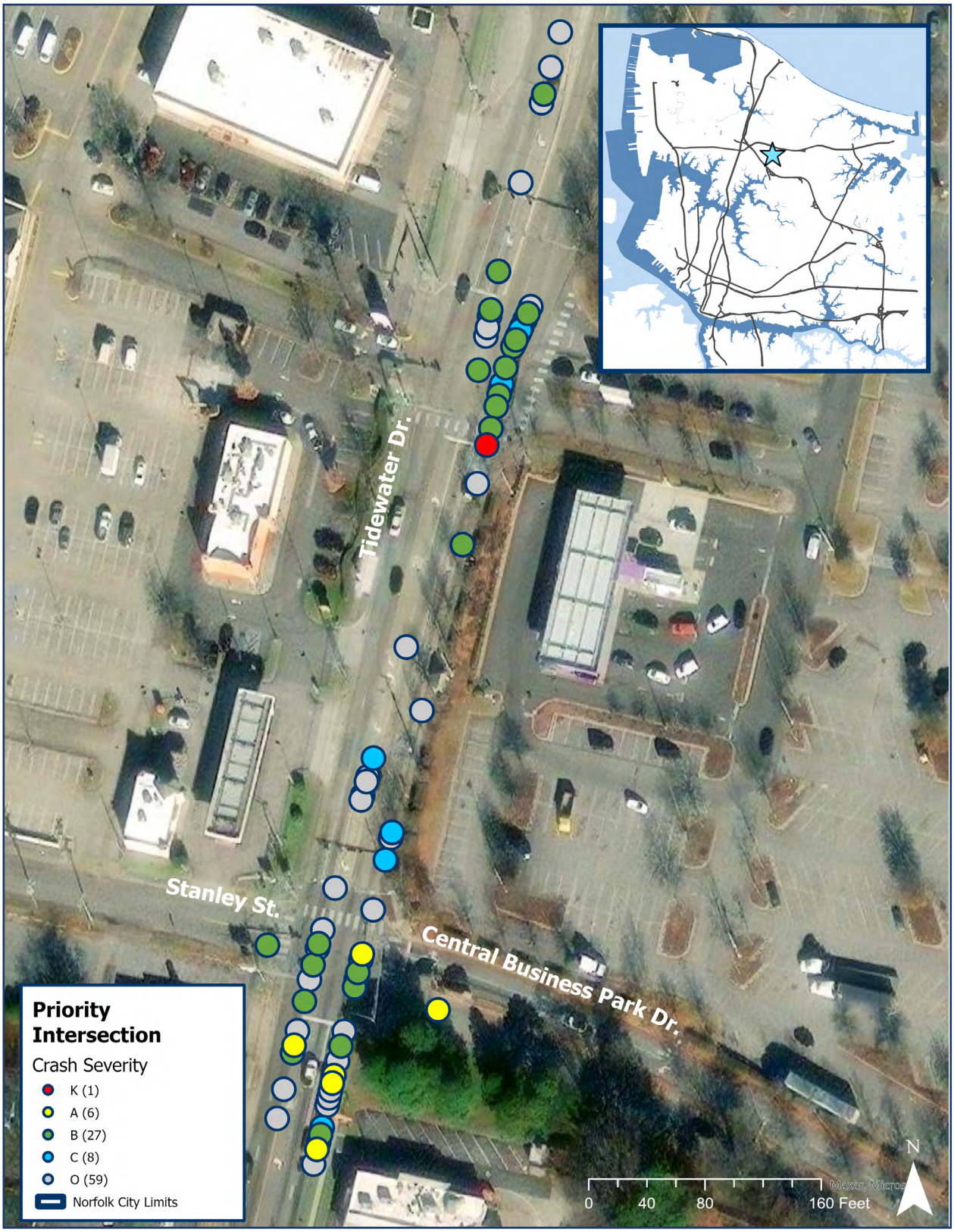


Figure 43: Priority Intersection Crash Map, 2016-2023

Equity Focus Areas

With input from Norfolk's Chief Diversity, Equity and Inclusion (DEI) Officer, two (2) equity focus areas were identified for areas with lower income and higher percentages of minority populations at the census tract level.

Low-income populations could experience the impact of fatalities and serious injury crashes at higher rates, not only emotionally or physically, but also financially. As such, low-income census tracts were initially defined as those whose median household income fell below the average (approximately $60,000 annually).

Similarly, minority populations could be underserved and have fewer resources or knowledge on how to advocate for safety and transportation needs. Minority population census tracts were initially defined as those with more than 50% minority population.

After an initial review of these census tracts, a significant portion of the City (53 out of 82 tracts) met the initial criteria, making it likelier that crash trends across all of these tracts would be very similar to citywide trends. The criteria were then narrowed to identify tracts with a median household income of less than $50,000 annually or a minority population greater than 80%. From these potential tracts, five (5) tracts were selected for each equity focus area using additional metrics including:

- Fatal and serious injuries per 100,000 people
- Number of pedestrian and bicyclist crashes over the 8-year study period
- Neighborhood of opportunity or Opportunity Zones (a federally designated geographical area, usually a low-income census tract, that is eligible for economic benefits)
- Approved projects or ongoing improvements

In coordination with City staff, the study team selected the following census tracts as equity-focus areas for further safety analysis:

- Low-Income Population—Census Tracts 27, 35.01, 42, 43, and 51
- Minority Population—Census Tracts 29, 34, 41, 50, and 70.01

Census tracts were also analyzed based on the presence of community amenities, schools, public housing, and different land uses (commercial, residential, industrial, etc.) in each census tract or census tract group (cluster of selected census tracts).

Low-Income Population

Census tracts 27, 35.01, 42, 43, and 51 were selected as the income-based equity-focus area for deeper analysis. Table 17 summarizes the data used for selection by tract. Tract 27 had the second-highest rate of fatal crashes and Tract 35.01 had the second-highest number of pedestrian crashes in the city.

Table 17: Low-Income Population Focus Area Crash Summary by Tract, 2016-2023

Census Tract	MHI	% Minority	Ped. Crashes	Bicyclist Crashe	Fatal (K) Crashes	K/ 100,000 Pop.	Serious Injury (A) Crashe	A/ 100,000 Pop.	Total Crashes
27	$ 40,481	79%	13	11	4	17	25	121	668
35.01	$ 41,250	89%	20	4	1	9	15	86	320
42	$ 12,245	86%	11	4	3	7	9	111	334
43	$ 26,386	98%	11	2	2	12	18	55	282
51	$ 33,311	94%	11	1	2	6	23	71	293
Total			**66**	**22**	**12**		**90**		**1,897**

The initial crash data analysis determined the overall number of crashes, crashes by severity, and crash rates for fatal and serious injury crashes. While fatal and serious injury crashes within the income-based focus area generally decreased, total crashes have increased from 2016 to 2023 as shown in Figure 44. Figure 45 shows a map of crash density and fatal and serious injury crashes for the five (5) income-based focus area tracts.

The collision types with the most crashes were angle (50%), rear end (21%), and same-direction sideswipes (10%).

Notable trends for crashes within the income-based equity focus area included:

33% of crashes involving pedestrians resulted in a fatal or serious injury

32% of unprotected occupant crashes resulted in a fatal or serious injury

18% of bicyclist crashes resulted in a serious injury

Angle and same-direction sideswipe percentages were slightly higher than the citywide average for those collision types which are 45% and 9%, respectively. Crashes within the income-based focus area tracts are summarized by collision type in Table 18.

Figure 44: Low-Income Population Focus Area Crashes by Year, 2016-2023

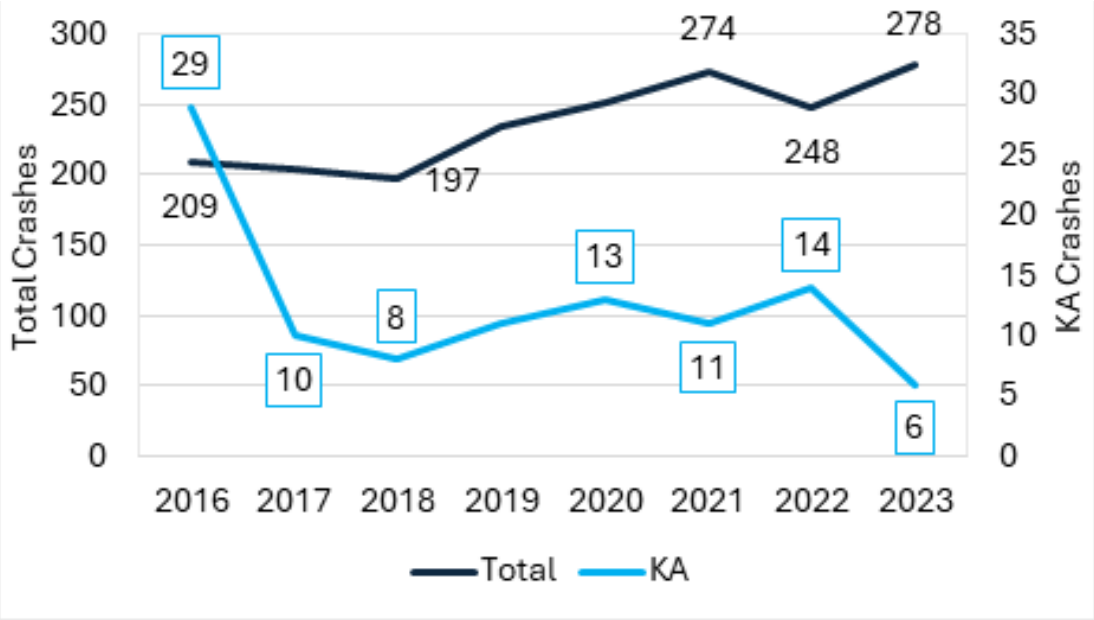


Table 18: Low-Income Population Focus Area Crashes by Type, 2016-2023

Crash Type	27	35.01	42	43	51	Total	%	Citywide
Angle	434	131	141	144	94	944	50%	45%
Rear End	84	68	103	46	92	393	21%	25%
Sideswipe - Same Direction	73	26	35	20	27	181	10%	9%
Fixed Object - Off Road	22	28	25	27	25	127	7%	9%
Head On	22	19	8	14	12	75	4%	4%
Pedestrian	11	18	9	9	10	57	3%	3%
Other	10	14	7	11	10	52	3%	2%
Sideswipe - Opposite Direction	10	3	2	8	6	29	2%	2%
Fixed Object in Road	1	8	2	1	6	18	<1%	1%
Non-Collision	1	4	1	1	7	14	<1%	1%
Backed Into	0	1	1	1	4	7	<1%	<1%
Total	**668**	**320**	**334**	**282**	**293**	**1,897**		
% of Focus Area Crashes Per Tract	**35%**	**17%**	**18%**	**15%**	**15%**			

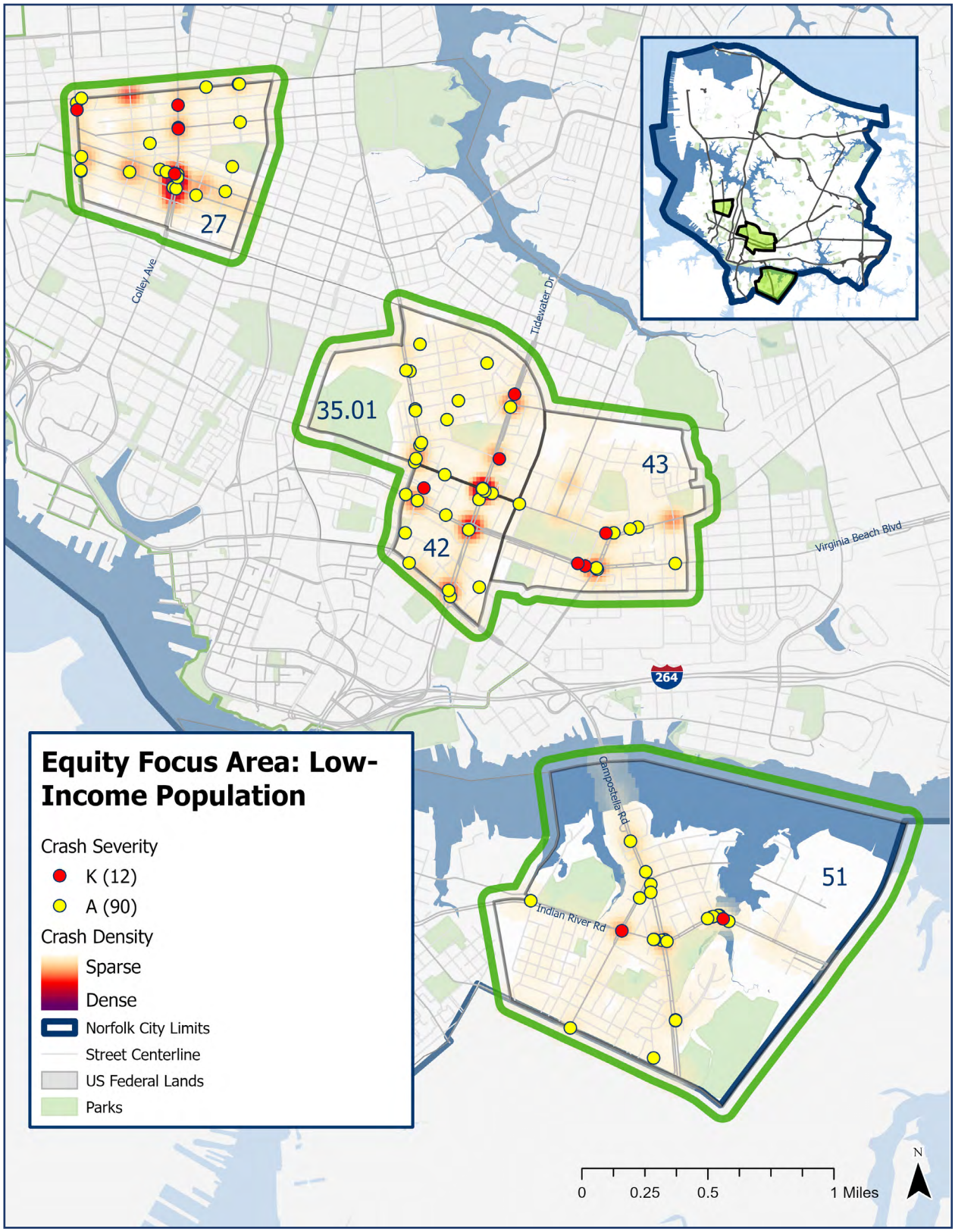


Figure 45: Low-Income Population Focus Area Crash Map, 2016-2023

All crashes from 2016 to 2023 in the income-based focus area census tracts were then analyzed against ten of the traditional emphasis areas as shown in Table 19. Crashes with contributing behavioral factors (such as impaired driving) were not analyzed under equity focus areas to not introduce bias or misrepresentation. Percentages of fatal and serious injury crashes associated with each emphasis area identified those areas with percentages higher than citywide averages such as crashes involving unprotected occupants (32%) or those occurring on wet roads (7%).

Table 19: Low-Income Population Focus Area Fatal and Serious Injury Crashes by Emphasis Area, 2016-2023

Emphasis Area	Low-Income Population KA%	Citywide KA%
Pedestrians	33%	32%
Unprotected Occupants	32%	22%
Bicyclists	18%	17%
Motorcyclists	17%	31%
Speeding	8%	9%
Wet Roads	7%	4%
Signalized Intersections	6%	5%
Heavy Vehicles	4%	5%
School Zones	6%	6%
Unsignalized Intersections	4%	4%
Overall	**5%**	**5%**

The census tracts within the income-based focus area feature a variety of community amenities including three (3) parks, three (3) libraries, one (1) grocery store, two (2) health and community services, and five (5) community and recreation centers, providing opportunities for community engagement and access to services. They are well-served by HRT's bus service, with 69 bus stops serving seven bus routes (4, 8, 11, 12, 13, 20, and 23), enhancing connectivity. Educational facilities are also part of the community, including one (1) high school, two (2) elementary schools, and two (2) auxiliary schools. Additionally, the area contains seven (7) Norfolk Redevelopment and Housing Authority (NRHA) housing communities, contributing to the support infrastructure for low-income residents.

Census Tract 27

Census Tract 27 encompasses 0.4 square miles, including the Kensington-Old Dominion and Park Place neighborhoods. Community amenities include the Park Place Public Library, Park Place Community Center, Munson Park, and the Food Lion grocery store on Colley Avenue. The area also includes James Monroe Elementary School collocated near the library and community center. It is primarily residential with mixed-use commercial and industrial uses. The Norfolk Southern rail line forms the southern boundary of this tract.

A total of 668 crashes occurred within Tract 27 during the study period, including four (4) fatalities and 25 serious injuries, as illustrated in Figure 46. A notable crash hotspot is Colley Avenue at the 26th Street and 27th Street intersections (approximately 132 crashes), which was also identified in the HRTPO Hampton Roads Regional Safety Study. In addition, 41 crashes occurred during the study period at the intersection of 38th Street at Killam Avenue; however, none resulted in fatal or serious injuries. Additional fatalities occurred at the signalized intersection of Colley Avenue at 35th Street and the unsignalized intersections of Colley Avenue at 37th Street and Hampton Boulevard at 37th Street.

Notable trends for crashes within Census Tract 27 included:

65% of crashes in Tract 27 were angle collisions (compared to 45% citywide)

33% of motorcyclist crashes in Tract 27 resulted in a fatal or serious injury

27% of bicyclist crashes in Tract 27 resulted in a serious injury

Census Tracts 35.01, 42, and 43

The clustered area of Census Tracts 35.01, 42, and 43 spans 1.1 square miles in total within neighborhoods such as Olde Huntersville, Hunters Square, Attucks-Barberton-Church, Calvert Square Bruce's Park, and Spartan Village. This area features both commercial and residential zones along with numerous community amenities including the Huntersville Neighborhood Services Community Center and Pool, Huntersville Park, multiple apartment complexes, the Norfolk Health & Rehab Center, Blyden Library, and the Broad Creek Community Center. Educational institutions in this area are Booker T. Washington High School and David Gilbert Jacox Elementary School. The Norfolk Southern rail line forms the northern boundary of Tracts 35.01 and 43 and spurs to the south, forming the western boundary of Tract 43.

A total of 936 crashes occurred within these tracts during the study period, including six (6) fatalities and 42 serious injuries, as illustrated in Figure 47. Crash hotspots include Tidewater Drive intersections at Princess Anne Road (102 crashes), Virginia Beach Boulevard (81 crashes), and Saint Julian Avenue (40 crashes), as well as Virginia Beach Boulevard at Park Avenue (45 crashes). Fatalities occurred at the signalized intersections of Tidewater Drive at Goff Street and Princess Anne Road at Park Avenue, at the unsignalized intersections of Tidewater Drive at Anderson Street and Princess Anne Road at Wide Street, and along Virginia Beach Boulevard in the vicinity of Booker T. Washington High School.

Notable trends for crashes within Census Tracts 35.01, 42, and 43 included:

- 100% of fatalities (3) in Tract 43 were fixed object off-road collisions
- 50% of crashes involving pedestrians in Tract 35.01 resulted in a fatal or serious injury
- 45% of crashes involving pedestrians in Tract 42 resulted in a fatal or serious injury
- 25% of bicyclist crashes in Tract 35.01 resulted in a serious injury

Census Tract 51

Census Tract 51 is located in the Southside area of Norfolk, covering 1.1 square miles, and includes the neighborhoods of Oak Leaf Forest, Diggs Town, and Campostella Heights. The area is mostly residential with Ford Park and various industrial and shipbuilding sites situated along the Elizabeth River. Key community amenities and services in this area consist of Oakleaf Forest Apartments, Diggs Town Apartments, the Richard A. Tucker Memorial Library, Southside Aquatic Center, Campostella Recreation Center, and Campostella Park. Students in the area are served by Berkley-Campostella Early Childhood Center and Southside STEM Academy. This census tract borders the City of Chesapeake to the south and east.

A total of 293 crashes occurred within Tract 51 during the study period, including two (2) fatalities and 23 serious injuries, as illustrated in Figure 48, Indian River Road, particularly from Wilson Road to the bridge just east of Waltham Street is identified as a significant crash hotspot located near an auxiliary school, accounting for approximately 94 crashes .

Notable trends for crashes within Census Tract 51 included:

- 100% of fatalities (5) in Tract 51 were fixed object off-road collisions
- 67% of unprotected occupant crashes in Tract 51 resulted in a fatal or serious injury
- 31% of crashes in Tract 51 were rear end collisions (compared to 25% citywide)
- 9% of all crashes in Tract 51 resulted in a fatal or serious injury (compared to 5% Citywide)

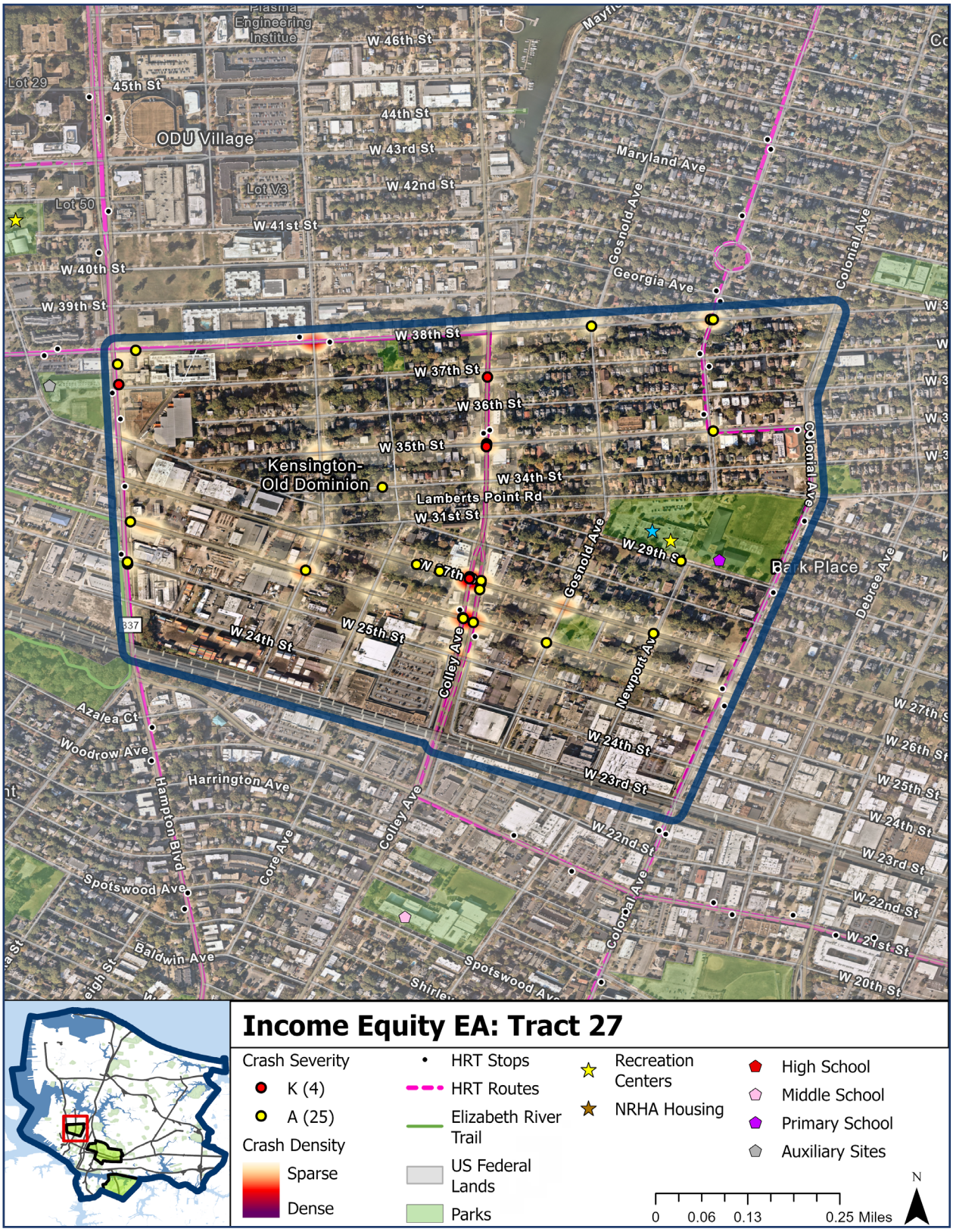


Figure 46: Census Tract 27 Crash Map, 2016-2023

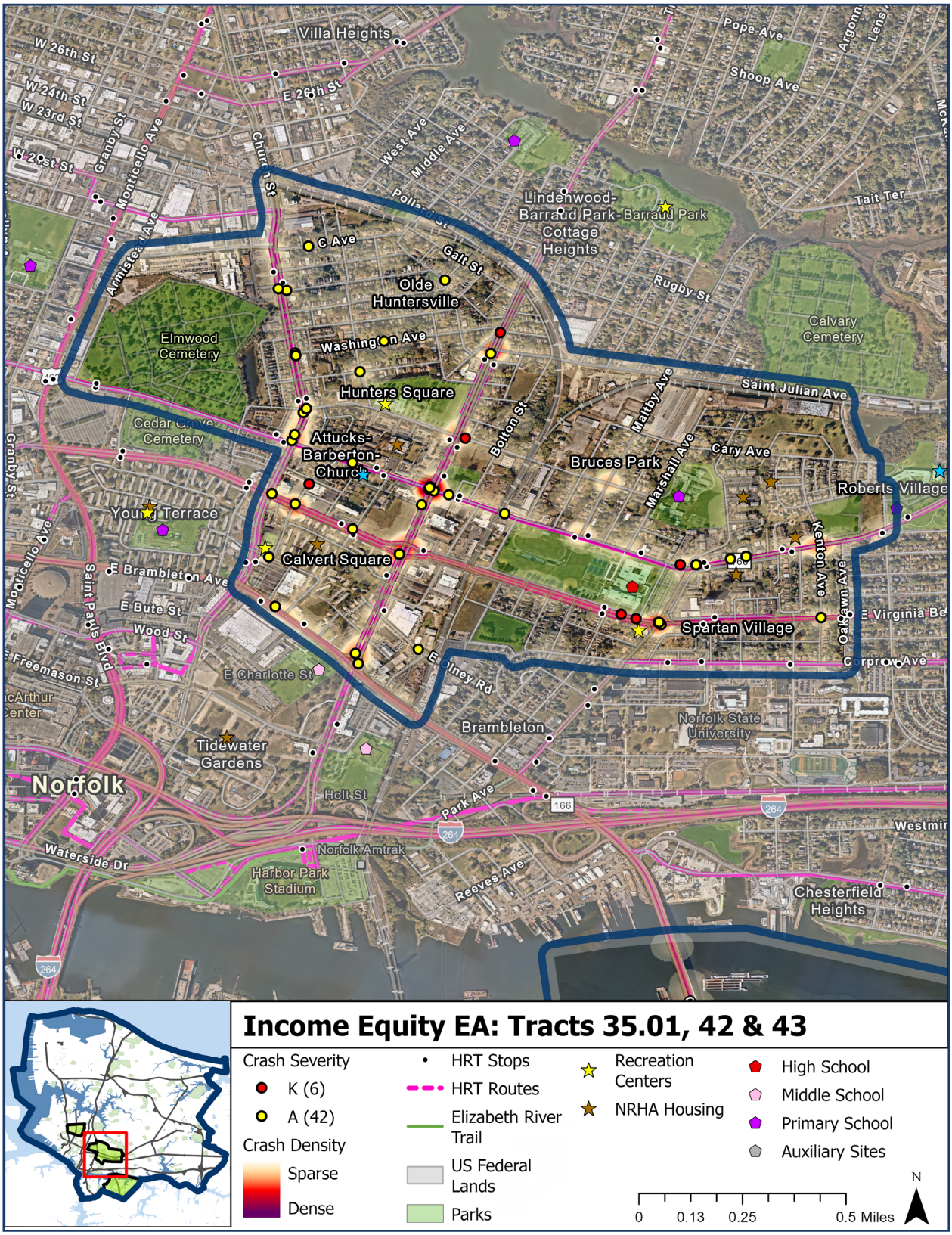


Figure 47: Census Tracts 35.01, 42, and 43 Crash Map, 2016-2023

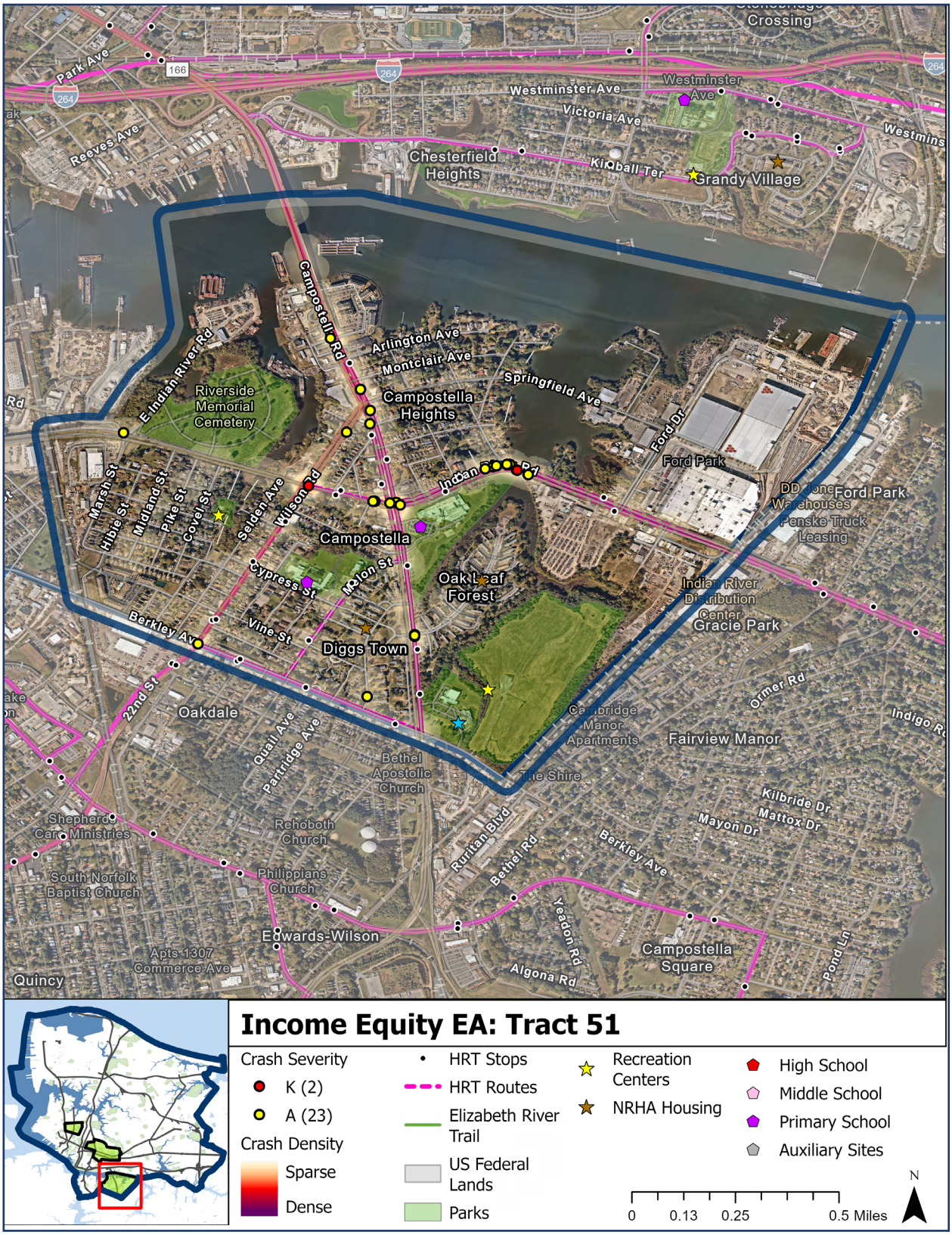


Figure 48: Census Tract 51 Crash Map, 2016-2023

Minority Population

Census tracts 29, 34, 41, 50, and 70.01 were selected as the minority-based equity focus area for deeper analysis. Table 20 summarizes the data for selection by tract. Tract 29 had the highest total number of crashes over the eight-year study period and the highest rates of fatal and serious injury. Tract 41 had the highest minority population percentage (99%) and the lowest median household income in the city. Tract 70.01 had the highest rate of pedestrian crashes and the second-highest fatality and serious injury rates.

Table 20: Minority Population Focus Area Crash Summary by Tract, 2016-2023

Census Tract	MHI	% Minority	Ped. Crashes	Bicyclist Crashes	Fatal (K) Crashes	/ 100,000 Pop.	Serious Injury (A) Crashe	A/ 100,000 Pop.	Total Crashes
29	$ 51,414	85%	16	15	5	16	42	158	1,103
34	$ 42,321	96%	2	1	2	11	5	45	144
41	$ 12,233	99%	8	3	1	6	9	51	237
50	$ 44,583	97%	10	2	0	0	8	36	206
70.01	$ 57,382	91%	16	6	2	13	16	106	361
Total			**52**	**27**	**10**		**80**		**2,051**

The initial crash data analysis determined the overall number of crashes, crashes by severity, and crash rates for fatal and serious injury crashes. While total crashes were generally steady from 2016 to 2023, fatal and serious injury crashes had more variance, as shown in Figure 49. Figure 50 shows a map of crash density and fatal and serious injury crashes for the five (5) minority-based focus area tracts.

Notable trends for crashes within the minority-based equity focus area included:

35% of crashes involving pedestrians resulted in a fatal or serious injury

32% of crashes involving motorcyclists resulted in a serious injury

19% of crashes involving a bicyclist resulted in a serious injury

The collision types with the most crashes were angle (57%), rear end (17%), and same-direction sideswipes (8%). The minority-based focus area experienced angle crashes at a higher rate than the citywide average of 45%. Crashes within the minority-based focus area are summarized by collision type in Table 21.

Figure 49: Minority Population Focus Area Crashes by Year, 2016-

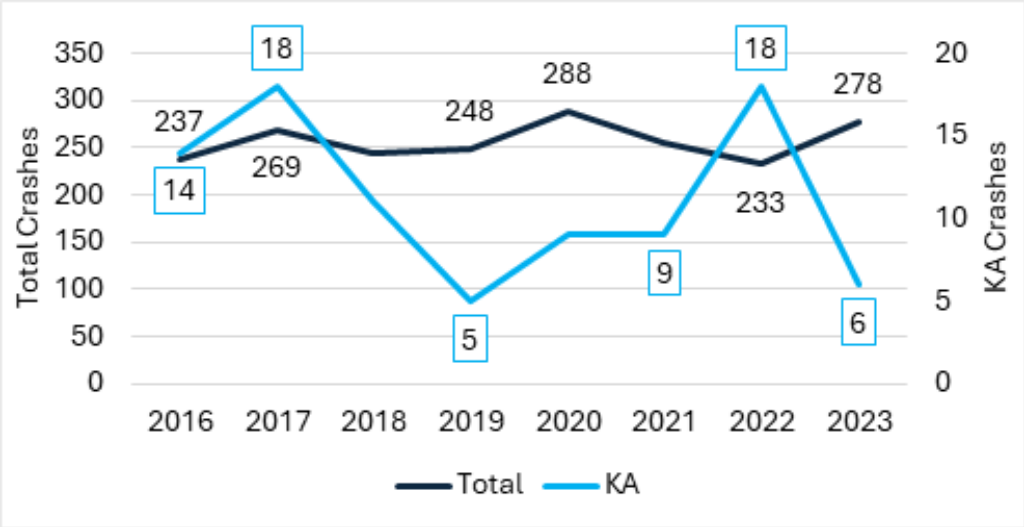


Table 21: Minority Population Focus Area Crash Summary by Tract, 2016-2023

Crash Type	29	34	41	50	70.01	Total	%	Citywide
Angle	769	64	118	84	135	1,170	57%	45%
Rear End	109	31	52	23	124	339	17%	25%
Sideswipe - Same Direction	77	13	17	28	38	173	8%	9%
Fixed Object - Off Road	63	16	16	31	17	143	7%	9%
Head On	31	8	10	11	14	74	4%	4%
Pedestrian	15	2	8	8	15	48	2%	3%
Other	16	3	9	9	7	44	2%	2%
Sideswipe - Opposite Direction	12	5	4	4	6	31	2%	2%
Fixed Object in Road	6	1	1	3	4	15	<1%	1%
Backed Into	0	1	2	4	0	7	<1%	0%
Non-Collision	3	0	0	1	1	5	<1%	1%
Train	1	0	0	0	0	1	<1%	0%
Bicyclist	1	0	0	0	0	1	<1%	0%
Total	**1,103**	**144**	**237**	**206**	**361**	**2,051**		
% of Focus Area Crashes Per Tract	**54%**	**7%**	**12%**	**10%**	**18%**			

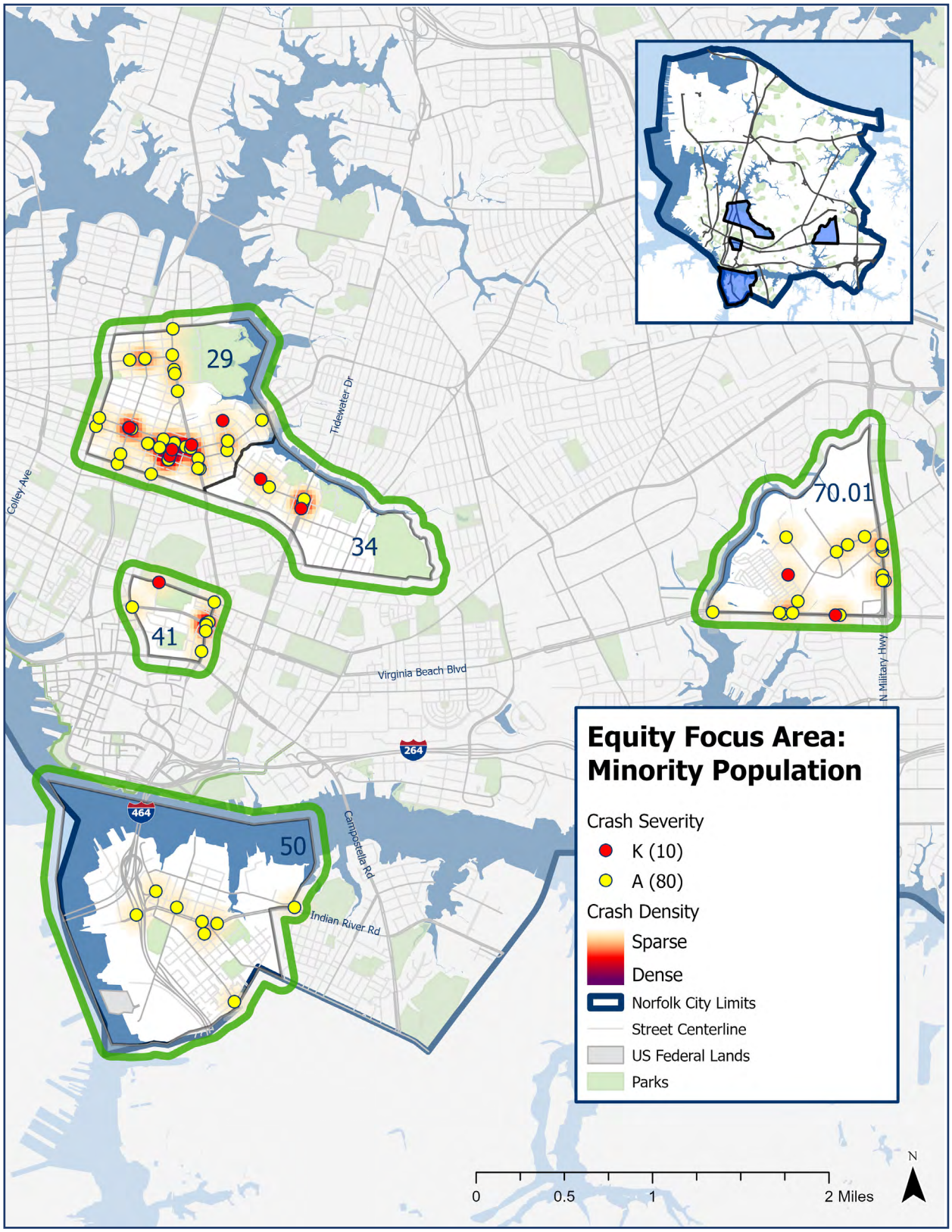


Figure 50: Minority Population Focus Area Crash Map, 2016-2023

All crashes from 2016 to 2023 in the minority-based focus area census tracts were then analyzed against ten of the traditional emphasis areas as shown in Table 22. Crashes with contributing behavioral factors (such as impaired driving) were not analyzed under equity focus areas to not introduce bias or misrepresentation. Percentages of fatal and serious injury crashes associated with each emphasis area identified those areas with percentages slightly higher than citywide averages such as crashes involving pedestrians (35%) and bicyclists (19%).

Table 22: Minority Population Focus Area Fatal and Serious Injury Crashes by Emphasis Area, 2016-2023

Emphasis Area	Minority Population KA%	Citywide KA%
Pedestrians	35%	32%
Motorcyclists	32%	31%
Bicyclists	19%	17%
Unprotected Occupants	13%	22%
Speeding	6%	9%
School Zones	6%	6%
Signalized Intersections	5%	5%
Heavy Vehicles	5%	5%
Wet Roads	3%	4%
Unsignalized Intersections	3%	4%
Overall	**4%**	**5%**

The census tracts within the minority-based focus area feature several community amenities, including six (6) parks, one (1) health and community services, and five (5) community and recreation centers. However, they lack libraries and grocery stores. The area is served by 40 bus stops and 12 bus routes. Educational facilities within the area include three (3) elementary schools. Additionally, there are two (2) NRHA housing communities.

Census Tracts 29 and 34

Located over 1.1 square miles, the clustered area of Census Tracts 29 and 34 is bordered to the west by the Lafayette River and includes segments of many major arterials in Norfolk such as Monticello Avenue, Granby Street, Church Street, 26th Street, 27th Street, and Tidewater Drive. This cluster includes the neighborhoods of Park Place, Hunters Square, Villa Heights, Lindenwood, Barraud Park, and Cottage Heights. This area consists of a blend of residential, commercial, and industrial properties. Community amenities include the Virginia Zoological Park, YMCA on Granby, Lafayette Park and Disc Golf Course, and Barraud Park. Lindenwood Elementary School serves the educational needs of the area. The Norfolk Southern rail line forms the southern boundary of both tracts.

A total of 1,247 crashes occurred within these tracts during the study period, including seven (7) fatalities and 47 serious injuries, as illustrated in Figure 51, Key crash hotspots include Monticello Avenue from 25th Street to 27th Street, Llewellyn Avenue from 25th Street to 27th Street, Church Street from 25th Street to 27th Street, and Tidewater Drive from Rugby Street to Vista Street. Additional fatalities occurred at the unsignalized intersections of Leo Street at 29th Street and Lindenwood Avenue at Middle Avenue.

Notable trends for crashes within Census Tracts 29 and 34 included:

100% of crashes involving pedestrians (2) in Tract 34 resulted in a fatal or serious injury

70% of crashes in Tract 29 were angle collisions (compared to 45% citywide)

27% of bicyclist crashes in Tract 29 resulted in a serious injury

Census Tract 41

Census Tract 41 covers approximately 0.2 square miles and is surrounded by Princess Anne Road to the north, Brambleton Avenue to the south, Church Street to the east, and St. Paul's Boulevard to the west. The tract consists primarily of the Young Terrace NRHA housing community which includes the Young Terrace Community Center and P. B. Young, Sr. Elementary School. The Cedar Grove Cemetery and City-owned Cedar Grove parking lot are located between Virginia Beach Boulevard and Princess Anne Road.

A total of 237 crashes occurred within Tract 41 during the study period, including one (1) fatality and nine (9) serious injuries, as illustrated in Figure 52. The most notable crash hotspot was the intersection of Church Street at Virginia Beach Boulevard. The single fatality within this census tract occurred at the unsignalized intersection of Princess Anne Road at Salter Street.

Notable trends for crashes within Census Tract 41 included:

50% of crashes in Tract 41 were angle collisions (compared to 45% citywide)

32% of all crashes in Tract 41 occurred at dark, including all lighted conditions and dusk

Census Tract 50

Census Tract 50 is a 1.0 square-mile area in the Southside of Norfolk which contains the Berkley Bridge and the Downtown Tunnel along I-264 and I-464. This tract includes the Hardy Field neighborhood (NSA 1) and contains community amenities and services such as the Southside Boys & Girls Club, Berkley Park, Craigh Street Playground, Berkley Community Center, Southside Senior Center, S. Main St. Pickle Ball Courts, and Skyes Apartments. The educational needs are served by St. Helena Elementary School. There are multiple shipyard facilities and industrial uses, including federal land, in this area along the Elizabeth River, and residential uses towards the center of the census tract. This census tract borders the City of Chesapeake to the south and the Elizabeth River to the north and west.

A total of 206 crashes occurred within Tract 50 during the study period, including eight (8) serious injuries, as illustrated in Figure 53. The primary crash hotspot is West Berkely Avenue at South Main Street.

Notable trends for crashes within Census Tract 50 included:

- 50% of motorcyclist crashes in Tract 50 resulted in a serious injury
- 23% of crashes in Tract 50 involved distracted driving
- 15% of crashes in Tract 50 were fixed object off-road collisions (compared to 9% citywide)
- 14% of crashes in Tract 50 were sideswipe same direction collisions (compared to 9% citywide)

Census Tract 70.01

Census Tract 70.01 spans 0.6 square miles and is bordered by the Elizabeth River to the north and west, Virginia Beach Boulevard to the south, and Military Highway to the east. The land uses in this tract consist of approximately half industrial or maintenance, including Norfolk Public Schools Transportation and Fleet Management facilities, one-quarter residential with the Crown Point neighborhood, and one-quarter commercial with big-box stores, fast food restaurants, gyms, and hotels.

A total of 361 crashes occurred within Tract 70.01 during the study period, including two (2) fatalities and 16 serious injuries, as illustrated in Figure 54. The primary crash hotspots were noted along Military Highway from Raby Road to the Janaf Shopping Center entrance and at the intersection of Virginia Beach Boulevard and Raby Road. Fatalities occurred at the unsignalized intersections of Virginia Beach Boulevard at Briar Hill Road and Pickett Road at Old Court Drive.

Notable trends for crashes within Census Tract 70.01 included:

- 75% of crashes in Tract 70.01 occurred at an intersection
- 50% of crashes involving pedestrians in Tract 70.01 resulted in a fatal or serious injury
- 34% of crashes in Tract 70.01 were rear end collisions (compared to 25% citywide)

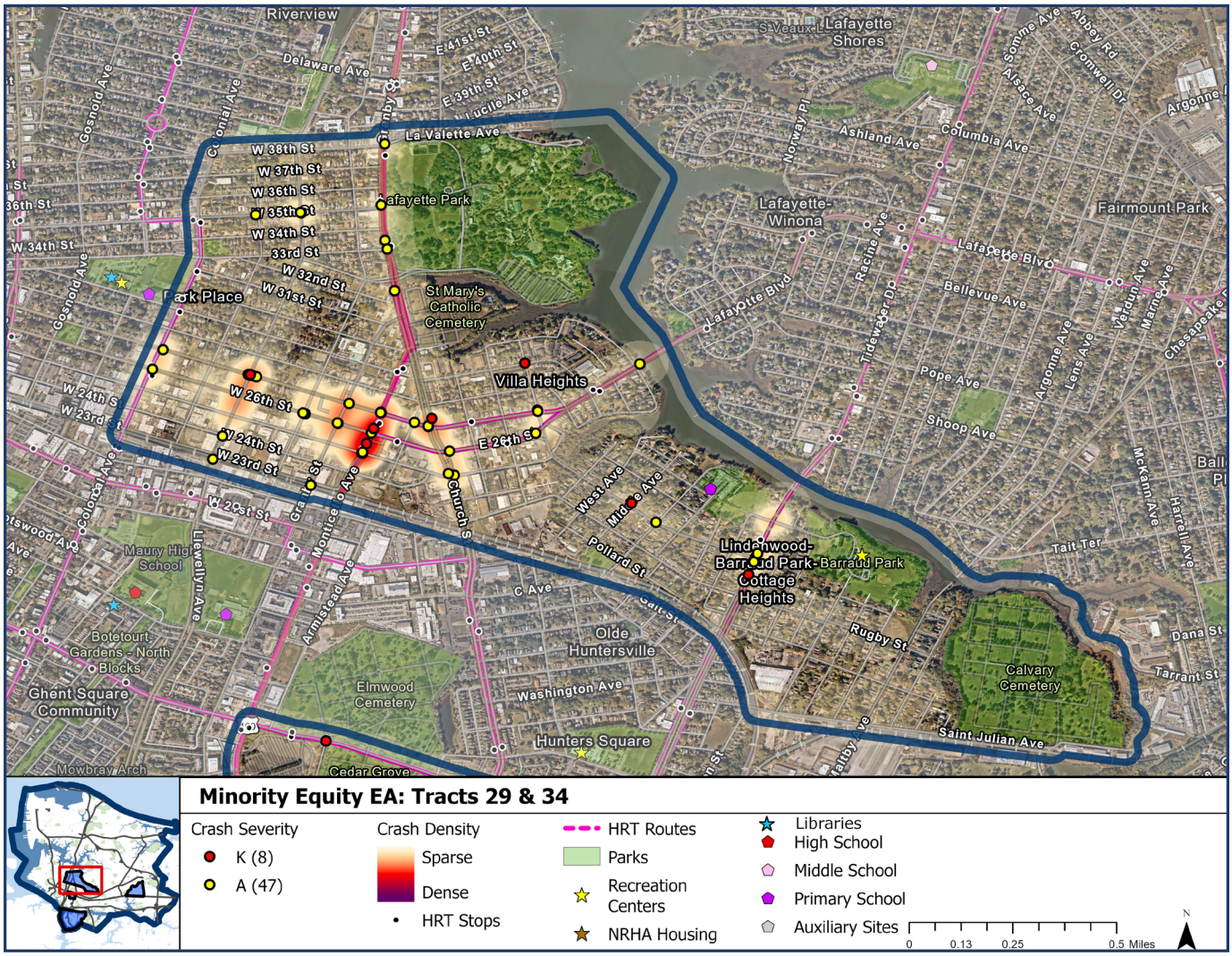


Figure 51: Census Tracts 29 and 34 Crash Map, 2016-2023

Figure 52: Census Tract 41 Crash Map, 2016-2023

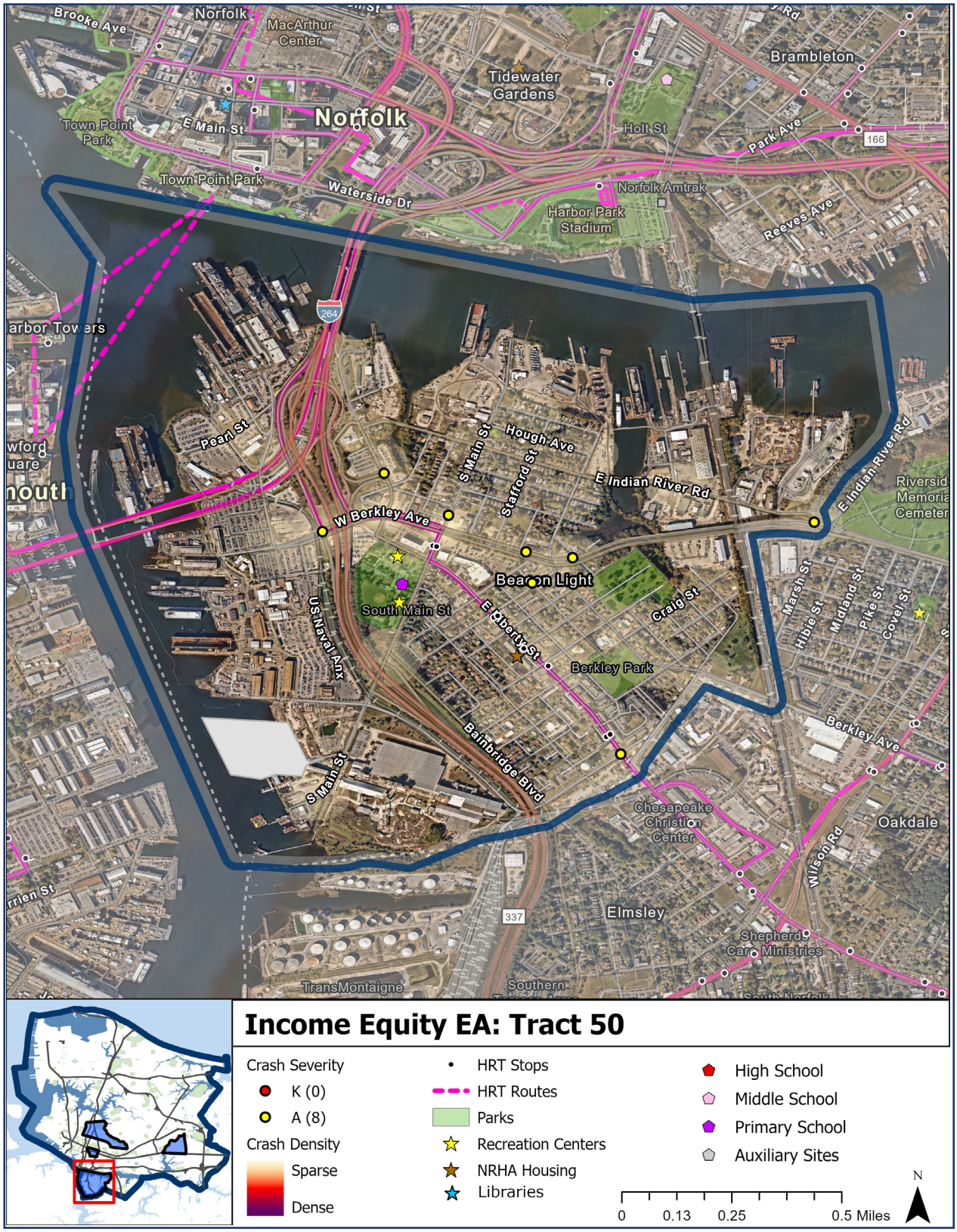


Figure 53: Census Tract 50 Crash Map, 2016-2023

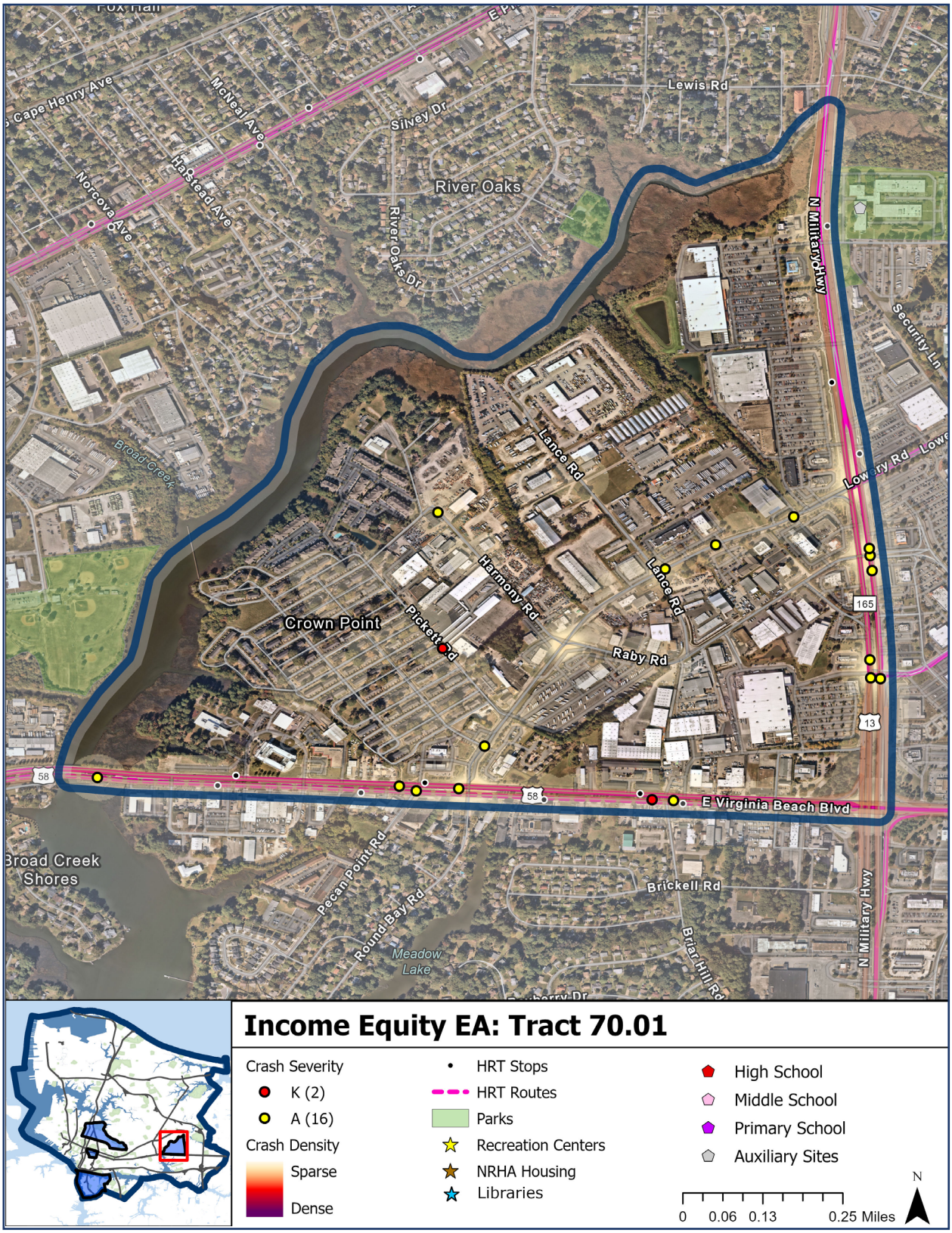


Figure 54: Census Tract 70.01 Crash Map, 2016-2023

CHAPTER 4:

CITYWIDE EQUITY ASSESSMENT

CHAPTER 4: CITYWIDE EQUITY ASSESSMENT

To best serve the community, roadway safety assessments and improvements must be considered in the context of equity. This Safety Action Plan recognizes that disparities in safety may exist across different geographic areas and socioeconomic groups. The Plan aims to identify areas of safety concern that may disproportionately affect disadvantaged communities by examining challenges related to transportation infrastructure and accessibility.

Approach to Equity

For an analysis of existing disparities in roadway safety, crash data was analyzed among census tracts that are identified as disadvantaged in some way. In this Plan, disadvantaged communities were defined as those federally designated as a Historically Disadvantaged Community (HDC) or Area of Persistent Poverty (APP), defined as part of the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Discretionary Grant program. An APP is a census tract where the poverty rate in the American Community Survey (ACS) 2014-2018 five-year data series was 20 percent or higher.

An HDC is a community identified by the Climate and Economic Justice Screening Tool (CEJST) as having been marginalized by underinvestment or high burden. There are eight categories for which a tract may be considered: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

An APP is a census tract where the poverty rate in the American Community Survey (ACS) 2014-2018 five-year data series was 20 percent or higher.

Areas of Persistent Poverty and Historically Disadvantaged Communities

In the City of Norfolk, 28 census tracts are designated as HDC while 32 are defined as APP. A total of 41 census tracts fell into one or both categories. This accounts for nearly 144,000 residents, over 58% of the City's population. Between 2016 and 2023, 11,520 crashes occurred in disadvantaged census tracts in the city, including 68 fatal crashes and 602 serious injury crashes. Per 100,000 residents, an average of six (6) people were killed and 52 were seriously injured in these tracts each year. This is in line with the citywide average given that these tracts represent such a large portion of the city. The fatal and serious injury crash rates for individual census tracts, however, reached as high as 23 fatalities and 159 serious injuries per 100,000 residents.

Across these tracts, crash data was also analyzed by emphasis area and compared to the citywide dataset, as summarized in Table 23. Rates of fatal and serious injury crashes are comparable.

Table 23: Disadvantaged Communities Crash Summary by Emphasis Area, 2016-2023

Emphasis Area	Percentage of Fatal and Serious Injury Crashes	
	Disadvantaged	Citywide
Motorcyclists	30%	31%
Pedestrians	30%	32%
Unprotected Occupants	22%	22%
Bicyclists	15%	17%
Speeding	9%	9%
Impaired Driving	7%	8%
School Zones	7%	6%
Signalized Intersections	5%	5%
Unsignalized Intersections	5%	4%
Wet Roads	5%	4%
Heavy Vehicles	4%	4%

Summary of Inequities

After the crash summaries were completed by tract and across the city, tracts were scored across four categories of possible inequity. An estimate of the relative inequity of the 41 disadvantaged tracts allows for prioritization of most affected areas.

Mobility
The ease with which a resident could travel by walking, biking, or using public transit in place of driving a personal vehicle

Connectivity
The connectivity index of the network assessed as the ratio of streets to intersections to indicate area accessibility

Safety
Considers the rates of fatal and serious injury crashes that were calculated in the initial crash summaries

Environment
Tabulated based on the number of CEJST categories by which the tract qualifies as a historically disadvantaged community

The scores were calculated such that a lower score correlates to greater inequity. Each category was weighted equally at 20 points each, for a maximum score of 80 points. Among the disadvantaged tracts in Norfolk, scores ranged from 30 to 69 points. The tracts with the lowest scores are shown in Table 24 below with a map of all tracts, grouped by score rank, shown in Figure 55. These census tracts with lower scores indicate which locations across the City would most benefit from improved transportation infrastructure and could assist in geographic-based prioritization of countermeasures that address safety concerns.

Table 24: Equity Score Summary by Census Tract

Census Tract	Mobility	Connectivity	Safety	Environment	Total	Rank
48	9	15	6	0	30	1
59.01	5	5	12	8	30	1
42	11	15	8	0	34	3
51	7	10	10	8	35	4
57.01	4	15	8	8	35	4
34	8	10	10	8	36	6
09.01	4	5	16	12	37	7
50	7	15	16	0	38	8
9.02	1	15	16	8	40	9
29	16	20	2	4	42	10
46	11	5	18	8	42	10
62	7	15	4	16	42	10

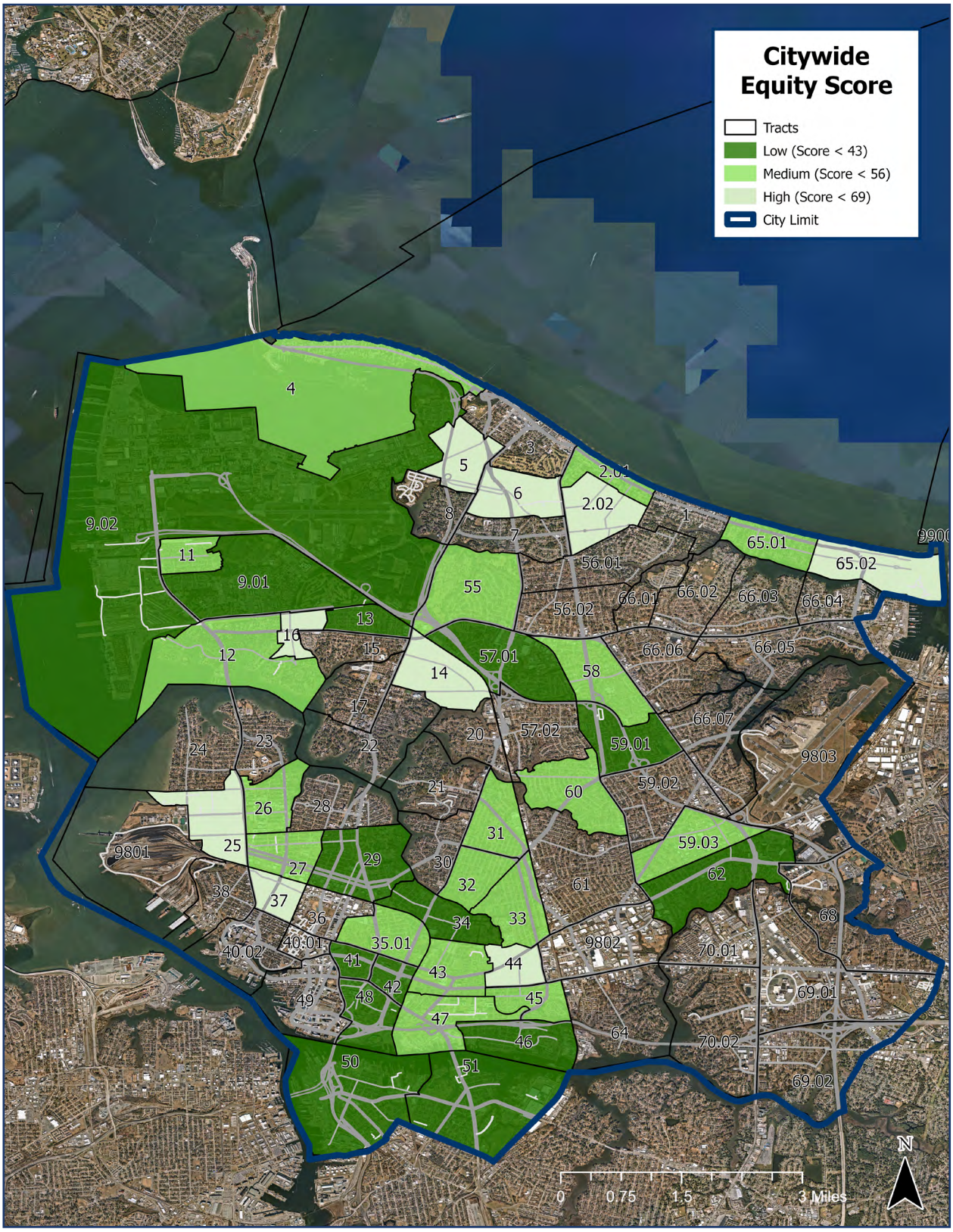


Figure 55: Equity Scores by Census Tract, 2016-2023

CHAPTER 5: COUNTERMEASURES

CHAPTER 5: COUNTERMEASURES

As identified throughout this Plan, the safety issues across the city involve a broad range of crash types, contributing factors, roadway types, and geographic locations. Based on data-driven analyses and collaboration with the Advisory Committee, stakeholders, and community during the Plan's development, a set of countermeasures was defined to mitigate the frequency and severity of crashes and enhance overall safety in the City of Norfolk. Selected countermeasures include a variety of engineering improvements, policy changes, enforcement measures, and educational campaigns aimed at addressing specific safety concerns targeted by emphasis area. The quantity of total countermeasures was selected as a result of each emphasis area's percentage of citywide fatal and serious injury crashes.

Systemic Countermeasures

Several systemic countermeasures were identified to be applied citywide as standalone engineering treatments or combined with larger, complex projects as desired. Engineering treatments were divided into subcategories of intersection treatments, road design, and improvements for vulnerable road users to support the plan's objective by targeting emphasis areas with higher rates of fatal and serious injuries.

Intersection-Related Countermeasures

Table 25 outlines the systemic intersection-related countermeasures by emphasis area. Within this table, intersection-related countermeasures are color-coded by category with blue representing general intersection improvements, purple representing signalized intersection improvements, and green representing unsignalized intersection improvements. Descriptions of the individual countermeasures for both signalized and unsignalized intersections and the corresponding safety impact are provided below the table.

Add Dedicated Turn Lane(s)

Turn lanes improve safety at intersections (particularly unsignalized intersections) by providing greater separation between turning vehicles and through vehicles. The percent reduction of crashes varies from less than 4% to 28% depending on the location's approach geometry and the addition of either a right or left turn lane.

Daylighting

Daylighting focuses on clearing obstructions near intersections, such as on-street parking or vegetation, to improve visibility for pedestrians and drivers, enhancing immediate sightlines at critical crossing points. Removing parking at intersections can reduce pedestrian crashes by 30%.

Increase Sight Distance

Sight distance improvements ensure drivers can see far enough ahead to react safely to oncoming vehicles, other road users such as pedestrians and bicyclists, or obstacles. Improvements can include removing on- or off-road fixed objects, improving curves, and trimming vegetation, and can reduce crashes by up to 47%.

Innovative Intersection

Innovative intersections reconfigure traditional intersection layouts to improve safety and efficiency for all road users. These intersections, such as Roundabouts, Restricted Crossing U-turns (RCUT), or Diverging Diamond Interchanges, reduce conflict points and enhance traffic flow, leading to fewer crashes and smoother travel. Depending on the type of innovative intersection, these treatments can reduce crashes from 20% to 44%.

Table 25: Intersection-Related Countermeasures

Intersection-Related Countermeasures	Pedestrians	Bicyclists	Motorcyclists	Vehicles	Intersections	Intersections	Wet Roads	School Zones	Speeding	Driving	Occupants
Add Dedicated Turn Lane(s)				●	●	●					
Daylighting	●	●			●	●					
Increase Sight Distance			●		●	●					
Innovative Intersection					●	●					
Install Intersection Lighting	●	●	●		●	●		●			
Relocate Bus Stops to Controlled Intersections				●	●	●					
Enhanced Traffic Signal Detection for Bicyclists and Motorcyclists		●	●		●						
Rest in Red Signal Operation	●	●			●				●		
Restrict Right Turn on Red (RTOR)	●	●			●						
Retroreflective Backplates					●						
Modify Left-Turn Phasing				●	●						
Enhanced Pavement Marking and Signing Improvements at Unsignalized Intersections						●					
Install Median Opening Treatments				●		●					

Install Intersection Lighting

Enhancing visibility at intersections during nighttime is crucial due to the convergence of various travel modes at these points, making them particularly prone to accidents. Therefore, installing intersection lighting or upgrading existing infrastructure to current industry illuminance standards should be considered at all intersections, especially those with a high incidence of nighttime crashes, significant traffic volumes, and substantial numbers of vulnerable road users. Installing intersection lighting has the potential to reduce crashes by up to 12%.

Relocate Bus Stops to Intersections

Relocating bus stops from mid-block to intersections improves safety by concentrating pedestrian activity at controlled crossing points. The presence of bus stops at intersections also minimizes conflict along roadway segments and reduces unexpected stopping and starting movements for bicyclists and drivers. Specifically, relocating bus stops to the far side of a signalized intersection has the potential to reduce transit-related crashes by up to 45%.

Enhanced Traffic Signal Detection for Bicyclists and Motorcyclists

Improving detection of bicyclists or motorcyclists at signalized intersections can improve safety by providing appropriate signal phases and increasing compliance with signal indications.

Rest in Red Signal Operation

During overnight signal operation, signals on the major street "rest in green" until a vehicle arrival on the minor street actuates the signal. Changing the signal operation to instead "rest in red" can decrease the number of speeding or impaired-related incidents by regulating drivers to stop on red and minimize unnecessary green phases when there is no traffic demand at the signal.

Restrict Right Turn on Red (RTOR)

Restricting right turns on red at signalized intersections allows pedestrians and bicyclists to enter the crosswalk before vehicles can turn, reducing crash risks and improving safety in areas with limited visibility. These RTOR restrictions, often paired with signal timing enhancements, can also lower overall intersection speeds by requiring vehicles to wait for a green signal. Restricting RTOR on all four approaches can reduce crashes by up to 8%.

Retroreflective Backplates

Adding 1- to 3-inch yellow retroreflective borders to traffic signal head backplates increases visibility in all conditions, reducing crashes by 15%.

Modify Left-Turn Phasing

Converting permissive/protected signals to protected only left turn phases simplifies driver decisions, enhances pedestrian safety, and can reduce angle crashes on the approach by 96%. Alternatively, implementing flashing yellow arrows for left turns clearly indicates drivers must yield to oncoming traffic, decreasing left turn crashes by 19%. Both changes aim to improve intersection safety and reduce confusion for drivers.

Enhanced Pavement Marking and Signing Improvements at Unsignalized Intersections

Enhancing pavement markings to improve reflectivity and visibility helps inform drivers of lane configurations and roadway geometry more effectively. Systemic signing improvements ensure signs are uniform, optimally placed, free of clutter, highly visible, and reflective, meeting or exceeding current standards. These systemic improvements at stop-controlled intersections can reduce overall crashes by 8% and potentially decrease angle and left turn crashes by 20%.

Install Median Opening Treatments

Median opening treatments are applied to gaps in medians on divided roads to control traffic movements and enhance safety. These treatments can include restrictions on turning movements, installation of physical barriers, or addition of traffic control devices, all aimed at reducing collision risks at median openings. Converting an open median to a directional median can reduce overall crashes by 7%.

Road Design Countermeasures

Table 26 outlines the systemic road design countermeasures by emphasis area, which include traffic calming measures and other roadway enhancements. Descriptions of the individual countermeasures and the corresponding safety impact is provided below.

Table 26: Road Design Countermeasures

Road Design Countermeasures	Pedestrians	Bicyclists	Motorcyclists	Vehicles	Intersections	Intersections	Wet Roads	School Zones	Speeding	Driving	Occupants
Curb Extensions (Bulb-Outs)	●	●				●			●		
Driver Feedback Speed Limit Signs									●		
Install Speed Humps, Tables, etc.									●		
Lane Repurposing (Road Diet)	●	●							●		
Install Segment Lighting							●			●	
Enhanced Curve Delineation			●	●					●		
High-friction Surface Treatment of Curves			●				●				
Wide Pavement Markings with Resurfacing									●	●	●
Retroreflective Raised Pavement Markers				●			●			●	

Curb Extensions (Bulb-Outs)

Curb extensions, also known as bulb-outs, extend the sidewalk into the parking lane, narrowing the street and improving pedestrian safety by shortening crossing distances and enhancing visibility. These extensions also prevent vehicles from parking at corners, thus increasing intersection visibility.

Driver Feedback Speed Limit Signs

Research shows interactive speed limit signs, which show a vehicle's current speed, have successfully reduced speeds by 5 miles per hour (mph) and can reduce crashes by 5%.

Install Speed Humps, Tables, or Other Traffic Calming Measures

Installing speed humps, tables, or other traffic calming measures on roadway segments can assist in speed management. Traffic calming can reduce crashes by up to 32%.

Lane Repurposing (Road Diet)

Lane repurposing involves reducing the existing number of travel lanes or narrowing lanes to accommodate other road users such as with bike lanes, sidewalks, parking, or transit stops. Lane repurposing reduces speeds, enhances accessibility for multiple types of road users, and can decrease crashes by 29% if applied to a four-lane undivided road conversion to two lanes with dedicated turns.

Install Segment Lighting

Adequate segment lighting significantly improves roadway visibility for drivers, reducing nighttime crash risks. Effective segment illumination can reduce nighttime crashes by up to 32%, underscoring its critical role in road safety.

Enhanced Curve Delineation

Improving markings and signage along curves, including chevrons, horizontal arrows, and advance warning signs can decrease injury crashes by 18%.

High-Friction Surface Treatment of Curves

Applying high-friction surface treatment along horizontal curves can decrease crashes on wet roads up to 74% by enhancing vehicle traction, especially in instances where speeding or wet surface conditions are apparent.

Wide Pavement Markings with Resurfacing

Increasing pavement markings from four-inch to six-inch markings can reduce crashes by 17%. These improvements can be implemented as part of regularly scheduled pavement resurfacing.

Retroreflective Raised Pavement Markers

Adding retroreflective raised pavement markers can improve lane delineation by increasing visibility in low light or heavy rainfall conditions and can decrease crashes by 19%.

Pedestrian and Bicyclist-Focused Countermeasures

Table 27 outlines the systemic countermeasures intended to benefit vulnerable road users by emphasis area. Descriptions of the individual countermeasures and the corresponding safety impacts is provided below the table.

Table 27: Pedestrian and Bicyclist-Focused Countermeasures

Pedestrian and Bicyclist-Focused Countermeasures	Pedestrians	Bicyclists	Motorcyclists	Vehicles	Intersections	Intersections	Wet Roads	School Zones	Speeding	Driving	Occupants
Install High Visibility Crosswalks	●	●			●	●	●	●			
Improve Crosswalk Lighting	●	●									
Install Midblock Crossings with Signing, RRFBs, or PHBs	●	●									
Install Pedestrian Countdown Timers	●				●						
Install ADA Compliant Sidewalks	●	●						●			
Add Leading Pedestrian Interval (LPI)	●	●			●						
Install Median Pedestrian Refuge Island	●	●			●	●					
Install Raised Pedestrian Crosswalks	●								●		
Install Bicycle Signals		●									
Improve Signing and Markings for Bicyclists		●									
Install Separated Bike Lanes		●							●		

High Visibility Crosswalks

Reflective crosswalks, using materials and patterns visible from greater distances, enhance pedestrian safety and reduce vehicle crashes, particularly at nighttime. High-visibility crosswalks can decrease pedestrian crashes by up to 40%.

Improve Crosswalk Lighting

Upgrading intersection lighting near crosswalks to industry illuminance standards can reduce pedestrian crashes by 59% and improve visibility and safety for all road users.

Install Midblock Crossings with Signage, RRFBs, or PHBs

Pedestrian-activated Rectangular Rapid Flashing Beacons (RRFBs) and Pedestrian Hybrid Beacons (PHBs) can be installed at uncontrolled, marked crosswalks with pedestrian warning signs, improving visibility and increasing driver yield rates up to 98%. These devices, ideal for midblock locations, can reduce pedestrian crashes by up to 54% depending on the type of treatment implemented.

Install Pedestrian Countdown Timers

Installing a pedestrian signal head that displays the remaining time in seconds for pedestrians to cross the street enhances safety by allowing pedestrians to make an informed decision regarding potential crossing times. Displaying pedestrian countdown times can decrease all crashes by almost 9%.

Install ADA Compliant Sidewalks

Installing ADA-compliant sidewalks decreases pedestrian-vehicle crashes by ensuring safe, accessible walking paths that keep pedestrians out of the roadway. These sidewalks effectively guide pedestrians, reducing the risk of collisions with vehicles. Installing sidewalks can reduce pedestrian- related crashes by up to 88%.

Leading Pedestrian Interval (LPI)

Leading pedestrian intervals (LPIs) at signalized intersections allow pedestrians to start crossing the road before vehicles receive a green light, reducing conflicts with turning vehicles and increasing driver yield rates. LPIs can decrease pedestrian-vehicle crashes at intersections by 59%.

Install Median Pedestrian Refuge Island

Median refuge islands provide pedestrians a safe spot to wait for a gap in traffic, allowing them to focus on one direction at a time. Highly recommended for midblock crossings, these islands can be paired with high-visibility crosswalks and curb extensions, reducing pedestrian crashes by 25%.

Raised Pedestrian Crosswalks

Raised pedestrian crosswalks are elevated sections of roadway with crosswalks, acting as a speed hump which reduces speeds and enhances visibility that decreases injury crashes by 30%.

Bicycle Signals

Installing bicycle signals, as specified in the Manual for Uniform Traffic Control Devices (MUTCD), reduces vehicle-bicycle crashes by providing distinct signal phases for bicyclists, thereby minimizing conflicts with vehicular traffic. These signals help manage traffic flow more safely, decreasing the likelihood of intersection collisions.

Improved Signing and Markings for Bicyclists

Enhanced signing and pavement markings for bicyclists reduce vehicle-bicycle crashes by clearly indicating bike lanes and cyclist positions, thereby increasing driver awareness of cyclists. These improvements contribute to a more organized traffic environment, significantly lowering the risk of collisions.

Install Separated Bike Lanes

Separated bike lanes, using bollards, curbs, or other vertical separation, provide cyclists with distinct space and protection from vehicle doors. Converting traditional or buffered bike lanes into fully separated lanes with flexible delineator posts can reduce bike crashes by 45% and overall improve safety on urban roads. Bike lane additions, where existing infrastructure does not exist, can reduce crashes by 49%.

Targeted Countermeasures

Tables 28 through 30 provides systemic countermeasures to target each of the geographical emphasis areas identified in this plan, which include theTidewater Drive at Stanley Street and Southern Shopping Center (priority intersection), Tidewater Drive from I-64 to Lafayette Boulevard (priority corridor), and the equity focus areas.

Table 28: Targeted Countermeasures - Tidewater Drive at Stanley Street & Southern Shopping Center

Countermeasure	Description
Intersection Visibility and Navigation	
Install Intersection Lighting	Signal poles at Tidewater Dr. at Stanley St. have luminaire mast arms, but no luminaires are present.
Modify Left-Turn Phasing	Evaluate left-turn phasing at both intersections and convert existing protected/permissive left-turn phases to either protected only or protected/permissive with flashing yellow arrow.
Restrict Right Turn on Red (RTOR)	The eastbound and westbound approaches at both the Stanley Street and Southern Shopping Center intersections could benefit from RTOR restriction due to the high number of angle crashes and potential sight distance concerns.
Install Retroreflective Backplates	Add retroreflective borders to backplates of all signal heads at both the Stanley Street and Southern Shopping Center intersections. Currently some signal heads have no backplates while others have only matte black backplates.
Resurface Pavement and Restripe with Wide Pavement Markings	Improve poor roadway surface conditions and replace worn and faded pavement markings at both intersections. Increase width of longitudinal pavement markings to improve driver perception of lane boundaries and reduce speeding.
Install Retroreflective Raised Pavement Markers	Retroreflective pavement markers are recommended along Tidewater Drive because lanes are narrow, and tactile feedback will help alert drivers.
Improvements for Vulnerable Road Users	
Relocate Bus Stops to Controlled Intersections	Relocate the east side (northbound) HRT bus stop to the northeast corner of the Stanley Street intersection. Relocate the west side (southbound) HRT bus stop to either the southwest corner of the Southern Shopping Center intersection or the northwest corner of the Stanley Street intersection.
Restripe High Visibility Crosswalks	Restripe worn or faded high visibility crosswalk markings, particularly on the west legs of both intersections.
Improve Crosswalk Lighting	Evaluate lighting levels for each crosswalk and improve / upgrade where needed.
Install ADA Compliant Sidewalks	Install new 5’ sidewalk along the south side of Stanley Street between Tidewater Drive and Wellington Road .
Install ADA-Compliant Curb Ramps	Upgrade curb ramps at all four corners of the Stanley Street intersection to be ADA compliant.
Add Leading Pedestrian Interval (LPI)	Implement LPIs for the pedestrian phases crossing Tidewater Drive at both intersections.

Table 28: Targeted Countermeasures - Tidewater Drive at Stanley Street & Southern Shopping Center (cont.)

Countermeasure	Description
Speeding and Driver Behavior	
Increase All-Red Clearance Intervals	Evaluate yellow and all-red clearance intervals at both intersections and consider increasing all-red clearance intervals to allow additional time for vehicles to clear the intersection before conflicting traffic enters.
Retime Existing Coordinated Traffic Signals	Retime traffic signals along Tidewater Drive to provide appropriate time for left-turn and minor street movements and to improve progression along Tidewater Drive with the intent of reducing the potential for rear-end collisions.

Table 29: Targeted Countermeasures - Tidewater Drive from I-64 to Lafayette Boulevard

Countermeasure	Description
Corridor Improvements	
Relocate Bus Stops to Controlled Intersections	Relocate HRT bus stops from midblock locations to intersections (preferably far side) to improve driver expectancy and limit rear-end crashes.
Install Driver Feedback Speed Limit Signs	Install driver feedback speed limit signs in both directions at the railroad overpass near Philpotts Road.
Install Segment Lighting	Evaluate existing lighting levels along the corridor, upgrade fixtures to LED, and install new fixtures where gaps are found to improve nighttime visibility.
Install Enhanced Curve Delineation	Install enhanced signage and pavement markings along the curves on either end of the railroad overpass near Philpotts Road to enhance visibility
Resurface Pavement and Restripe with Wide Pavement Markings	Improve poor roadway surface conditions and replace worn and faded pavement markings along the corridor. Increase width of longitudinal pavement markings to improve driver perception of lane boundaries and reduce speeding.
Install Retroreflective Raised Pavement Markers	Retroreflective pavement markers are recommended along Tidewater Drive because lanes are narrow, and tactile feedback will help alert drivers.
Install ADA Compliant Sidewalks	Install new 5’ sidewalk along both sides of Tidewater Drive to complete gaps in network, e.g., through the I-64 interchange. In addition, conduct comprehensive maintenance of existing sidewalks to clear overgrowth and debris and remove trip hazards.

Table 29: Targeted Countermeasures - Tidewater Drive from I-64 to Lafayette Boulevard (cont.)

Countermeasure	Description
Intersection Improvements	
Increase Sight Distance	Evaluate sight distance for each intersection and increase sight distance by trimming vegetation and relocating fixed objects.
Modify Intersection Phasing	Modify eastbound approach of Cromwell Drive to prohibit left-turn movements and remove signal phase to improve safety and operational efficiency. All eastbound left-turn movements should be directed to the Willow Wood Drive intersection. Evaluate for other innovative intersection treatments.
Install Retroreflective Backplates	Add retroreflective borders to backplates of all signal heads at all signalized intersections. Currently some signal heads have no backplates while others have only matte black backplates.
Install High Visibility Crosswalks	Install high visibility crosswalk markings to replace existing longitudinal crosswalk markings (such as at the Widgeon Road intersection), and restripe existing high visibility crosswalk markings that are worn or faded.
Install ADA-Compliant Curb Ramps	Upgrade all curb ramps to be ADA compliant.
Improve Crosswalk Lighting	Evaluate lighting levels for each crosswalk and improve / upgrade where needed
Modify Left-Turn Phasing	Evaluate left-turn phasing at signalized intersections and convert existing protected/permissive left-turn phases to either protected only or protected/permissive with flashing yellow arrow.
Increase All-Red Clearance Intervals	Evaluate yellow and all-red clearance intervals at all signalized intersections and consider increasing all-red clearance intervals to allow additional time for vehicles to clear the intersection before conflicting traffic enters.
Add Leading Pedestrian Interval (LPI)	LPIs are already in place at the Alsace Avenue and Lafayette Boulevard intersections; consider implementing at additional signalized intersections.
Install Advanced Yield Lines	Install advanced yield lines (shark teeth) at existing marked crosswalk across Tidewater Drive at Columbia Avenue

Table 30: Targeted Countermeasures - Equity Focus Areas

Countermeasue	Description
Corridor Improvements	
Relocate Bus Stops to Controlled Intersections	Relocate HRT bus stops from midblock locations to intersections (preferably far side) to improve driver expectancy and limit rear-end crashes.
Install Driver Feedback Speed Limit Signs	Install driver feedback speed limit signs at the following locations: • Indian River Road at Steamboat Creek Bridge (Tract 51) • 26th Street at Monticello Ave (Tract 29) • 27th Street at Monticello Ave. (Tract 29)
Install Speed Humps, Tables, or Other Traffic Calming Measures	Identify locations to provide traffic calming measures based on review of speed and crash data and coordination with civic leagues.
Install Enhanced Curve Delineation	Install enhanced signage and pavement markings along the curve on Indian River Road at Steamboat Creek Bridge to enhance visibility (Tract 51).
Install Midblock Pedestrian Crossings with Signage, RRFBs, or PHBs	Coordinate with civic leagues to identify locations to provide midblock pedestrian crossings with appropriate enhancements (e.g., signage, advanced yield lines, RRFBs, or PHBs).
Install ADA Compliant Sidewalks	Install new 5’ sidewalk to complete gaps in network. In addition, conduct comprehensive maintenance of existing sidewalks to clear overgrowth and debris and remove trip hazards.
Intersection Improvements	
Daylighting	Evaluate intersections adjacent to on-street parking and remove parking on-street parking spaces near intersections to improve visibility for pedestrians and drivers.
All-Way Stop Control	Evaluate warrants to provide all-way stop control at the intersection of 38th Street and Killam Avenue (Tract 27).
Provide Enhanced Traffic Signal Detection for Bicyclists and Motorcyclists	Provide enhanced detection at signalized intersections adjacent to existing bicycle lanes (such as along 26th Street and 27th Street) and at locations with patterns of motorcycle crashes, such as Tidewater Drive at Virginia Beach Boulevard (Tract 42).
Install Retroreflective Backplates	Add retroreflective borders to backplates of all signal heads at all signalized intersections. Currently some signal heads have no backplates while others have only matte black backplates.
Enhanced Pavement Marking and Signing Improvements at Unsignalized Intersections	Provide enhanced pavement marking and signing improvements at unsignalized intersections with significant crash patterns to improve visibility and compliance.
Install High Visibility Crosswalks	Install high visibility crosswalk markings to replace existing longitudinal crosswalk markings, and restripe existing high visibility crosswalk markings that are worn or faded.

Table 30: Targeted Countermeasures - Equity Focus Areas (cont.)

Countermeasue	Description
Intersection Improvements	
Install ADA-Compliant Curb Ramps	Upgrade all curb ramps to be ADA compliant.
Improve Crosswalk Lighting	Evaluate lighting levels for each crosswalk and improve / upgrade where needed
Modify Left-Turn Phasing	Evaluate left-turn phasing at signalized intersections and convert existing protected/permissive left-turn phases to either protected only or protected/permissive with flashing yellow arrow.
Install Pedestrian Signal Heads and Push Buttons	Install pedestrian signal heads and push buttons where they do not already exist at all marked crosswalks at signalized intersections.
Add Leading Pedestrian Interval (LPI)	LPIs are already in place at a number of signalized intersections; consider implementing at additional signalized intersections within these census tracts.
Install Median Pedestrian Refuge Islands	Install median pedestrian refuge islands at existing crosswalk locations where spacing allows to limit the crossing distance for pedestrians and bicyclists.
Install Bicycle Signals	Consider installing bicycle signal indications at signalized intersections where bike lanes are present (e.g., 26th Street and 27th Street).
Improved Signage and Markings for Bicyclists	Review signing and pavement markings for existing bike lanes and provide enhanced signing and pavement markings where needed. In particular, signing and markings could be improved along 26th Street at Monticello Avenue (Tract 29) to clarify positioning for right-turn vehicles.
Install Separated Bike Lanes	Install separated bike lanes along Indian River Road consistent with the City's Strategic Bike and Pedestrian Plan.

Policies and Initiatives

Several policies and initiatives were identified to work alongside the engineering treatments in alignment with the Safe System Approach which recognizes human behavior in the need to mitigate traffic safety concerns. Table 31 identifies the targeted countermeasures to promote safer behaviors with a combination of safety policies, enforcement initiatives, and educational campaigns. Descriptions of the individual policies and initiatives are provided below the table.

Table 31: Policies and Initiatives

Policies and Initiatives	Pedestrians	Bicyclists	Motorcyclists	Heavy Vehicles	Intersections	Intersections	Wet Roads	School Zones	Speeding	Impaired Driving	Occupants
High Visibility Cell Phone Enforcement										●	
High Visibility Saturation Patrols for Speeding									●		
Publicized Sobriety Checkpoints										●	
Click It or Ticket Checkpoints and Campaigns											●
Education Campaign for Car/Booster Seat Use											●
Bicycle Training/ Subsidized Helmets for Children		●									
Integration of Roadway Safety Education in Schools								●			
Pedestrian and Bicycle Safety Campaigns	●	●									
Impaired Driving Campaigns										●	
Appropriate Speed Limits for All Road Users									●		
Amended Bike Lane Design Guidelines		●									
Amended Curb Management Policy	●	●			●	●					
Updated Complete Streets Policy	●	●									
Access to Alternative Transportation	●	●			●	●					
Safe Routes to School Program								●			
Truck Restrictions				●							
Safety CIP Project List											
City Safety Audits	●	●	●	●	●	●	●				
EMS Planning					●						
Safety Officer	●	●	●	●	●	●	●	●	●	●	●

High Visibility Cell Phone Enforcement

This program would involve targeted enforcement campaigns where law enforcement officers actively monitor and penalize drivers for cell phone use while driving. These campaigns are highly visible to the public to deter distracted driving and promote safer road behaviors.

High Visibility Saturation Patrols for Speeding

These speeding patrols would deploy additional law enforcement officers to areas with high incidences of speeding. These intensified patrols aim to increase the perceived risk of enforcement, thereby reducing speeding and improving road safety.

Publicized Sobriety Checkpoints

The sobriety checkpoints would include advertised and strategically placed roadblocks where officers check drivers for signs of alcohol or drug impairment. These checkpoints serve as a deterrent and help remove impaired drivers from the road, enhancing overall traffic safety.

Click It or Ticket Checkpoints and Campaigns

These campaigns would involve highly publicized enforcement of seatbelt laws, with designated checkpoints where officers check for seatbelt compliance. This initiative aims to increase seatbelt usage through education and enforcement, thereby reducing fatalities and injuries in crashes.

Education Campaign for Car/Booster Seat Use

The educational campaign would focus on informing parents and caregivers about the proper installation and use of car seats and booster seats for children. These campaigns aim to improve child passenger safety and reduce injuries in the event of a crash by providing information and publicizing available resources such as free car seat checks at fire stations.

Bicycle Training and Subsidized Helmets for Children

This initiative would provide bicycle safety training and offer subsidized helmets to children to promote safe riding practices. The goal is to reduce head injuries and increase overall safety for young bicyclists.

Integration of Roadway Safety Education in Schools

The advocation of roadway safety would involve promoting the inclusion of traffic safety curricula in educational programs. This initiative aims to instill safe road behaviors in students from a young age, fostering a culture of safety that extends into adulthood.

Pedestrian and Bicycle Safety Campaigns

Pedestrian and Bicycle Safety Campaigns are public education efforts designed to raise awareness about safety practices for non-motorized road users. These campaigns aim to reduce crashes involving pedestrians and bicyclists through targeted messaging and community outreach.

Impaired Driving Campaigns

Impaired Driving Campaigns focus on raising awareness about the dangers of distracted and drowsy driving or driving under the influence of alcohol and drugs. These initiatives use a mix of media outreach, education, and enforcement to discourage impaired driving and improve road safety.

Appropriate Speed Limits for All Road Users

Setting Appropriate Speed Limits for All Road Users involves reviewing and adjusting speed limits to ensure they are suitable for the safety of drivers, pedestrians, and cyclists. This initiative aims to create a safer transportation environment by aligning speed limits with current roadway conditions and usage patterns.

Amended Bike Lane Design Guidelines

Amending Bike Lane Design Guidelines entails updating standards and practices for the design and implementation of bike lanes. The goal is to enhance the safety, functionality, and accessibility of bike lanes to better protect cyclists and encourage more bicycle use.

Amended Curb Management Policy

Amending Curb Management Policy involves revising regulations and guidelines governing the use of curbside space to balance the needs of various users, including parking, deliveries, and passenger loading zones. This initiative aims to optimize curbside operations and enhance safety and efficiency in urban areas.

Updated Complete Streets Policy

Updating the Complete Streets Policy involves revising guidelines to ensure streets are designed and operated to provide safe and accessible transportation for all users, including pedestrians, cyclists, motorists, and transit riders. This policy promotes a comprehensive approach to street design that enhances safety and mobility for everyone.

Access to Alternative Transportation

Providing Access to Alternative Transportation promotes the availability and accessibility of various transportation options, such as public transit, biking, and walking. This initiative aims to reduce reliance on personal vehicles, decrease congestion, and encourage more sustainable travel choices.

Safe Routes to School Program

The Safe Routes to School Program encourages the development and implementation of projects and activities that make it safer and easier for students to walk and bike to school. This initiative aims to improve student safety, reduce traffic congestion near schools, and promote healthy, active lifestyles.

Truck Restrictions

Implementing Truck Restrictions involves designating certain roads or areas off-limits to large trucks to reduce traffic congestion and enhance safety for other road users. This initiative aims to minimize the risks associated with heavy trucks in urban areas and improve overall traffic flow.

Safety CIP Project List

Developing a Safety Capital Improvement Program (CIP) Project List entails creating a prioritized list of infrastructure projects aimed at enhancing road safety. This initiative ensures that funding and efforts are strategically directed towards high-impact safety improvements.

City Safety Audits

City Safety Audits involve systematic evaluations of road conditions, traffic patterns, and safety measures within the City. These audits aim to identify potential hazards and recommend improvements to enhance overall traffic safety.

EMS Planning

EMS Planning focuses on enhancing the readiness and response capabilities of Emergency Medical Services in the event of traffic accidents such as with signal priority. This initiative aims to improve the efficiency and effectiveness of emergency response across multiple jurisdictions, thereby reducing the severity of injuries and saving lives.

Safety Officer

Create and staff a safety officer role within the City that is responsible for developing and overseeing safety projects for inclusion in the CIP, reviewing and analyzing fatal crashes as they occur, and guiding this Plan's implementation.

SAFETY ACTION PLAN

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CHAPTER 6:

IMPLEMENTATION STRATEGY

CHAPTER 6: IMPLEMENTATION STRATEGY

To provide a clear and equitable approach to the implementation of this Plan, a prioritization of systemic countermeasures was developed to act as a guide for project planning and potential funding allocation. It is important to note that while this Plan establishes a guide for implementation, all safety countermeasures, policies, and initiatives that support the goals and objectives of this Safety Action Plan are valuable. As previously mentioned, past and ongoing planning efforts including, but not limited to, the City of Norfolk Multimodal Transportation Master Plan and HRTPO's Hampton Roads Regional Safety Study include projects and recommendations that should be considered as additional opportunities for reaching the plan goal of reducing fatal and serious injuries.

Countermeasure Prioritization

Although each selected countermeasure, policy, or initiative contributes to reducing roadway fatalities and serious injuries, special emphasis was placed on engineering treatments to strategically identify potential funding allocations for safety enhancements. Countermeasure implementation should occur in a two-step process with step one identifying which countermeasures should be implemented in what order and step two determining the locations to implement the selected countermeasures.

Step One

Through a collaborative effort involving the Advisory Committee, stakeholders, and the City, a matrix was developed to prioritize projects across five (5) key categories:

- **Safety Benefit**— Assessing countermeasures based on their crash modification factor (CMF), which estimates the anticipated reduction in crashes post-implementation, thereby providing a quantifiable measure of safety improvement.
- **Cost Magnitude**— Evaluating the planning-level cost associated with the implementation of each individual countermeasure, ensuring financial considerations are integral to the prioritization process.
- **Funding Options**— Exploring the accessibility of various funding sources, including federal, state, and regional levels, to optimize the allocation of financial resources across numerous initiatives.
- **Implementation Complexity**— Considering factors such as project scope and scale, site conditions, and the availability of resources, thus addressing the logistical and practical aspects of project execution.
- **Vulnerable Road Users**— Ensuring that countermeasures specifically address the safety needs of pedestrians and bicyclists, thereby enhancing protection for the most at-risk groups on the roadways.

Results of the systemic prioritization are shown in Table 32. Systemic countermeasures with a higher ranking would be considered ideal candidates for federal or state grant funding, while those identified as low ranking should be considered for local funding or be paired with another countermeasure in a larger scale project.

Table 32: Systemic Countermeasure Prioritization

Systemic Countermeasure	Safety Benefit			Cost Magnitude			Implementation Complexity			Funding Options			Impact to Vulnerable Road Users			Score
Range	+++	++	+	$	$$	$$$	Low	Medium	High	High	Medium	Low	High	Medium	Low	
Weight	40	20	10	20	10	5	20	10	5	20	10	5	20	10	5	
High Visibility Crosswalks	✓			✓			✓					✓	✓			105
Leading Pedestrian Interval (LPI)	✓			✓			✓					✓	✓			105
High-Friction Surface Treatment of Curves	✓			✓			✓			✓					✓	105
Improve Crosswalk Lighting	✓			✓				✓				✓	✓			95
Install ADA Compliant Sidewalks	✓			✓				✓				✓	✓			95
Increase Triangle Sight Distance	✓			✓			✓				✓				✓	95
Install Speed Humps, Tables, etc.	✓			✓			✓				✓				✓	95
Prohibit Right Turn on Red (RTOR)		✓		✓			✓				✓		✓			90
Daylighting		✓		✓			✓					✓	✓			85
Add Segment Lighting	✓			✓				✓			✓				✓	85
Install Intersection Lighting		✓		✓				✓			✓		✓			80
Rest in Red Signal Operation			✓	✓			✓				✓		✓			80
Relocate Bus Stops to Controlled Intersections	✓				✓			✓			✓			✓		80
Install Median Pedestrian Refuge Islands		✓		✓				✓				✓	✓			75
Install Midblock Crossings with Signage, RRFBs, or PHBs		✓		✓				✓				✓	✓			75
Install Pedestrian Countdown Timers		✓		✓			✓					✓		✓		75
Install Separated Bicycle Lanes	✓				✓			✓				✓		✓		75

Table 32: Systemic Countermeasure Prioritization (cont.)

Systemic Countermeasure	Safety Benefit			Cost Magnitude			Implementation Complexity			Funding Options			Impact to Vulnerable Road Users			Score
Range	+++	++	+	$	$$	$$$	Low	Medium	High	High	Medium	Low	High	Medium	Low	
Weight	40	20	10	20	10	5	20	10	5	20	10	5	20	10	5	
Driver Feedback Speed Limit Signs		✓		✓			✓				✓				✓	75
Retroreflective Raised Pavement Markers		✓		✓			✓				✓				✓	75
Change Permissive Left-Turn Phasing to Protected Only		✓		✓				✓			✓			✓		70
Enhanced Signing and Marking Improvements at Unsignalized Intersections		✓		✓			✓					✓			✓	70
Lane Repurposing		✓			✓	✓			✓			✓	✓			65
Install Wider Markings with Resurfacing		✓		✓				✓			✓				✓	65
Raised Pedestrian Crosswalks		✓			✓			✓				✓	✓			65
Curb Extensions (Bulb Outs)			✓	✓				✓				✓	✓			65
Enhanced Curve Delineation		✓		✓				✓			✓				✓	65
Install Median Opening Treatments at Unsignalized Intersections		✓		✓				✓			✓				✓	65
Retroreflective Backplates		✓		✓				✓			✓				✓	65
Enhanced Traffic Signal Detection for Bicyclists & Motorcyclists			✓	✓			✓					✓		✓		65
Improved Signage and Markings for Bicyclists			✓	✓			✓					✓		✓		65
Bicycle Signals			✓	✓				✓				✓		✓		55
Innovative Intersection		✓			✓	✓			✓		✓				✓	55
Add Dedicated Turn Lanes to Intersections		✓			✓			✓				✓			✓	50

Step Two

As identified in the citywide safety and equity analyses, targeting areas with the highest fatal and serious injury rates should be considered a high priority for implementation of all countermeasures, including policies and initiatives.

Systemic countermeasures, policies, and initiatives which target the following emphasis areas should be prioritized:

Pedestrians (32% result in fatal and serious injuries)

Motorcyclists (31% result in fatal and serious injuries)

Unprotected Occupants (22% result in fatal and serious injuries)

Bicyclists (17% result in fatal and serious injuries)

Similarly, geographic areas which were identified as having an elevated risk of fatal or serious injury crashes should be prioritized. These targeted areas include:

- Priority Intersection (Tidewater Drive at Stanley Street and Southern Shopping Center)
- Priority Corridor (Tidewater Drive from I-64 to Lafayette Boulevard Intersection)
- Equity Focus Area (Low-Income Population)
- Equity Focus Area (Minority Population)

When possible, census tracts with the highest needs, as outlined in the equity analysis, should receive priority for implementation. However, all identified disadvantaged tracts could benefit from systemic countermeasures, policies, and initiatives outlined in the Safety Action Plan.

Implementation and Transparency

Aligned with the overarching objectives of the Plan, the City is committed to spearheading efforts to achieve Vision Zero by adopting and deploying a transparent and equitable framework for the prioritization and execution of safety enhancements as outlined in the Safety Action Plan.

This dedication includes the responsibility to periodically update the Safety Action Plan. These updates will document progress, reflect data trend changes, re-evaluate prioritization criteria, and incorporate emerging strategies. These regular reviews ensure that the Plan remains dynamic and responsive to evolving safety needs and technological advancements, thereby continuously fostering a safer and more resilient urban environment for all Norfolk residents.

Funding Plan

The prioritization matrix offers a strategic approach to efficiently allocate funding resources. It serves as a tool to discern which countermeasures are most suitable for seeking grant program applications and which should integrate into the Capital Improvement Plan (CIP).

In practice, this means smaller-scale projects could be more effectively managed if they are aligned with high-priority countermeasures or projects, thus increasing their chances of obtaining grant funding. Conversely, projects that rank lower in priority are better aligned with the budgetary constraints and planning processes of the CIP, ensuring they are still addressed but within a more manageable and appropriate financial framework. This methodical use of a prioritization matrix optimizes fund allocation, ensuring that resources are directed where they can have the most impact to the City of Norfolk.

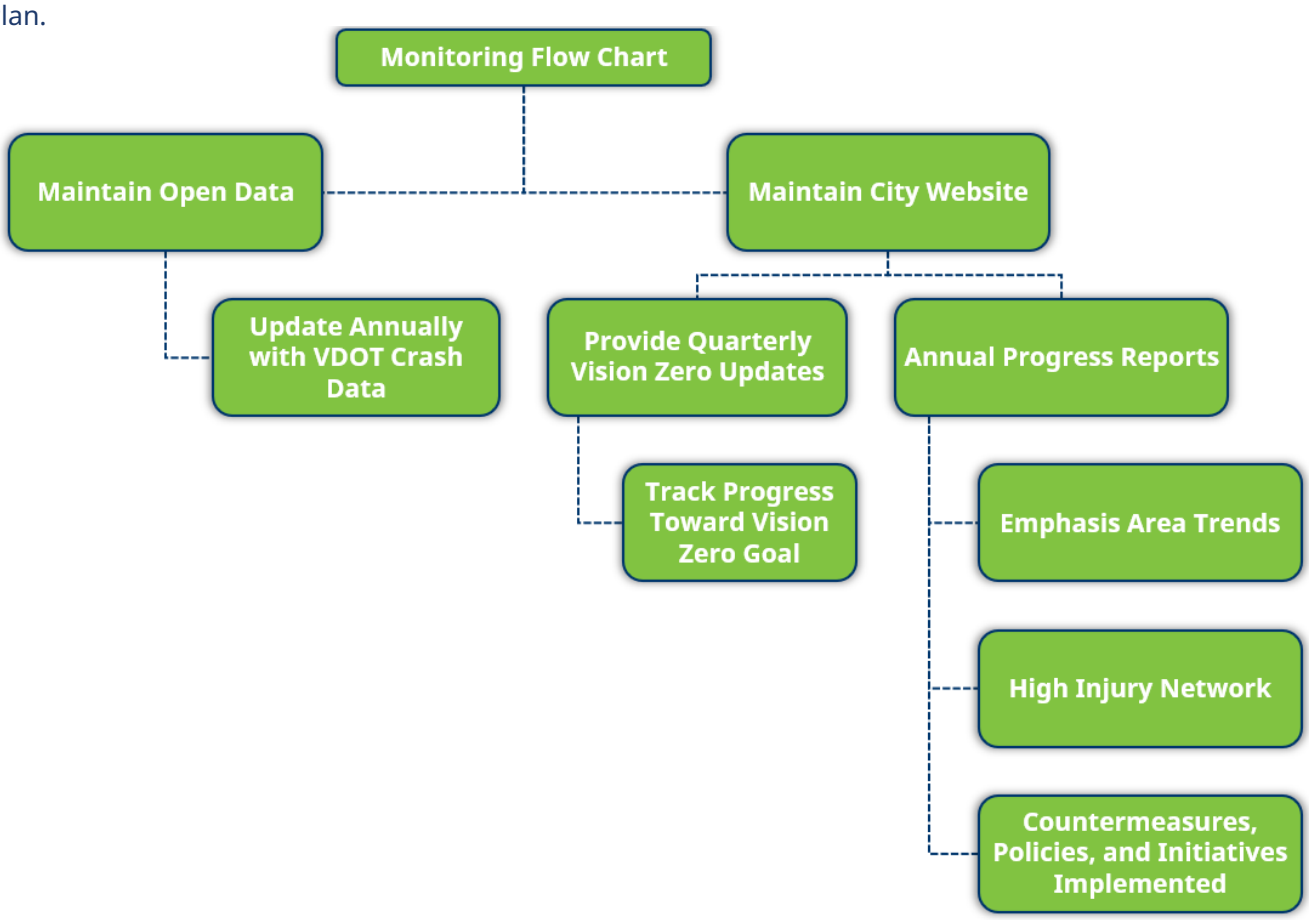
Monitoring

In alignment with the requirements of the SS4A program, the implementation of this Plan will be monitored on an annual basis at a minimum. To support that Plan monitoring, a dashboard will be developed to track fatal and serious injury crashes both before and after the implementation of countermeasures identified within the Plan. This includes tracking the Plan's vision to reach zero roadway fatalities. This dashboard is designed not only to monitor these critical safety metrics but also to assess the tangible impact of the projects outlined within the Safety Action Plan. Key elements to be monitored as part of this Plan should include:

- **Vision Zero Progress**
- **Crash Trends Citywide and by Emphasis Area**
- **Countermeasures Implemented**
- **Policies and Initiatives Implemented**

This monitoring will provide transparency and help to visualize progress towards safety goals, offering updates on the status of projects—whether ongoing or completed. Through this detailed tracking and reporting mechanism, stakeholders will gain insightful data to evaluate the effectiveness of safety interventions, ensuring that the initiatives are driving meaningful improvements in road safety.

Lastly, it is intended that the Advisory Committee will continue to support the Plan by guiding and championing implementation through ensuring the countermeasures, policies, and initiatives further the goals and objectives of this Plan.



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