

# Vision Zero

## ACTION PLAN



**APEX**  
NORTH CAROLINA



*ADOPTED*

August 9, 2022



# Message from the Mayor

Dear Apex Community,

I am pleased to support the Town of Apex Vision Zero Action Plan, an initiative to eliminate all transportation-related fatalities and severe injuries in Apex by 2035.

As the town works towards our goal of maintaining safe spaces and places, we acknowledge that it is unacceptable for a life to be lost on Apex roadways. We are all responsible for doing our part to cultivate a safe and accessible community. This plan identifies actionable strategies to prevent roadway fatalities and serious injuries, and to provide a safe, multi-modal transportation network.

Input from you and your neighbors guided the development of this action plan. We ask that you continue to be engaged throughout the plan implementation process. Thank you for your participation in moving our community forward, as we work to achieve the goal of zero fatalities on Apex roadways.

Sincerely,

Jacques K. Gilbert  
Town of Apex Mayor





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*For additional information online, go to [www.ApexNC.org](http://www.ApexNC.org) and search for Vision Zero.*

# Acknowledgments

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Downtown Apex

## Executive Summary

Vision Zero is a transportation safety philosophy to eliminate deaths and severe injuries in the transportation system. The Town of Apex has experienced significant population growth, adding close to 20,000 additional drivers, pedestrians, and cyclists to its transportation network between fiscal year (FY) 2015-16 and FY 2019-20 (July 2016 - June 2020). During this timeframe, more than 6,700 traffic collisions resulting in four fatalities and 237 severe injuries occurred in Town.

The Town wanted to build on its existing programs, initiatives, plans, and policies designed to make its streets safer by adopting Vision Zero. Vision Zero was adopted as Town policy by the Apex Town Council in July of 2020. The **Resolution to Support** Vision Zero directed the Town Manager to initiate formation of a Vision Zero Task Force to develop an Action Plan. This Apex Vision Zero Action Plan is the result of that direction.

This Action Plan lays out immediate (0-2), short-term (2-5), mid-term (5-7), and long-term (7-10) actions to eliminate traffic-related fatalities and severe injuries in the Town by 2035. These actions will be undertaken by numerous Town departments (Planning and Community Development; Police; Public Works and Transportation; Fire; Communications; Parks, Recreation, and Cultural Resources; Community and Neighborhood Connections; Diversity, Equity, and Inclusion; and Human Resources/Risk Management), in cooperation with other agency and community partners.

Vision Zero will also need the ongoing support and commitment of all Town residents who use the transportation system as Vision Zero is a shared responsibility between decision-makers, designers, and users.

This Action Plan is a living document and should be evaluated and refined on an on-going basis (at least every five years).



Crosswalk in Downtown Apex

## Chapter 1: Introduction

### What is Vision Zero?

Vision Zero is a transportation safety philosophy to eliminate deaths and severe injuries in the transportation system. It challenges communities to think differently: Instead of believing traffic deaths are inevitable and relying on perfect human behavior, Vision Zero is centered on the belief that everyone has a right to move about safely. Vision Zero recognizes that people make mistakes and suggests that system designers and policy makers share the responsibility to ensure

**Vision Zero** began as a national policy in Sweden in 1997. Since the policy was introduced, **traffic deaths have dropped 30%**.

safe systems for travel. The focus is not on eliminating collisions, but rather on lowering the likelihood of collisions resulting in fatalities or severe injuries.

### TRADITIONAL APPROACH

Traffic deaths are **INEVITABLE**

**PERFECT** human behavior

Prevent **COLLISIONS**

**INDIVIDUAL** responsibility

Saving lives is **EXPENSIVE**

VS

### VISION ZERO

Traffic deaths are **PREVENTABLE**

Integrate **HUMAN FAILING** in approach

Prevent **FATAL AND SEVERE CRASHES**

**SYSTEMS** approach

Saving lives is **NOT EXPENSIVE**

Source: Vision Zero Network

## Five "E" Approach

The Town has centered its Vision Zero framework around a "Five E Approach" to traffic safety.



### Engineering

Design (redesign) and construct improvements to the built environment to make it safer for all users.



### Education

Raise public awareness of traffic safety problems and solutions and integrate Vision Zero guiding principles into existing educational initiatives.



### Encouragement

Support safe travel and the development of safe travel habits.



### Enforcement

Deter unsafe travel behaviors through the enforcement of traffic laws.



### Evaluation

Collect, analyze, track, and share data about fatal and severe injuries, their causes, and countermeasures put in place to prevent these types of collisions going forward.

## Why Apex Needs Vision Zero

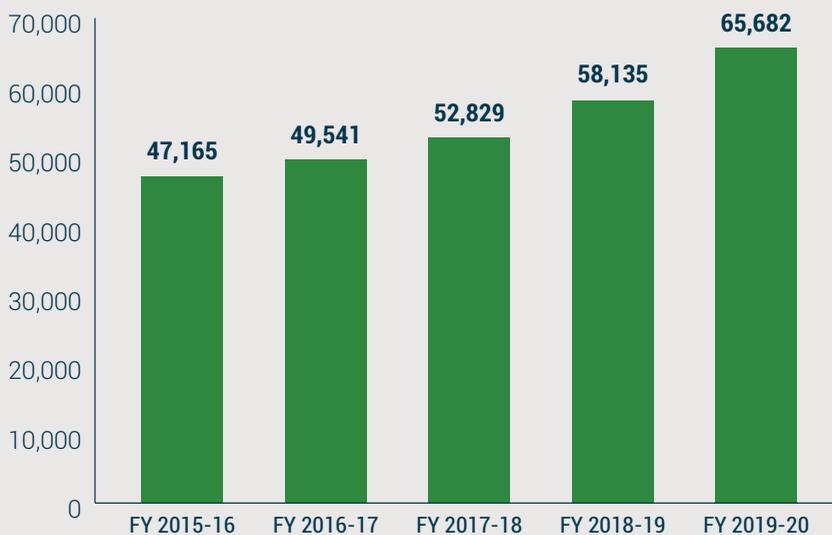
### Population and Traffic Growth

The Town of Apex is one of the fastest-growing cities in North Carolina. The population grew by almost 40% to over 65,000 people from 2015 to 2019. The population is also becoming more diverse, with minority groups comprising about 22% of the Town's 2019 population. The increase in population has resulted in more cars on Town roads. Traffic data collected by NCDOT showed traffic volumes increased 55% from 2015 to 2019, an annual growth rate of 12%.

Over a five-year period from FY 2015-16 to FY 2019-20, more than 6,700 traffic collisions occurred in Apex. These collisions resulted in four fatalities and 237 severe injuries. These numbers do not reflect the full toll on the community as each victim's family, friends, coworkers and acquaintances were also impacted.



APEX POPULATION GROWTH (FY 2015-16 to FY 2019-20)

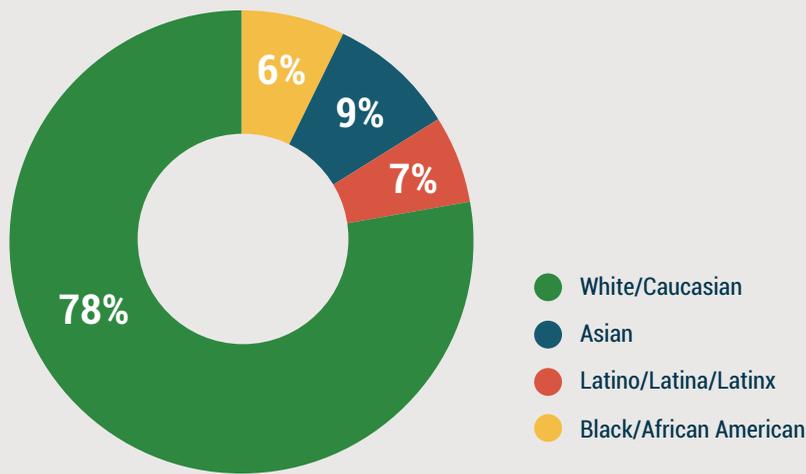


Apex Population  
**HAS GROWN**  
BY ALMOST  
**40%** ↑  
SINCE 2015

■ POPULATION

Source: Town of Apex Planning Department

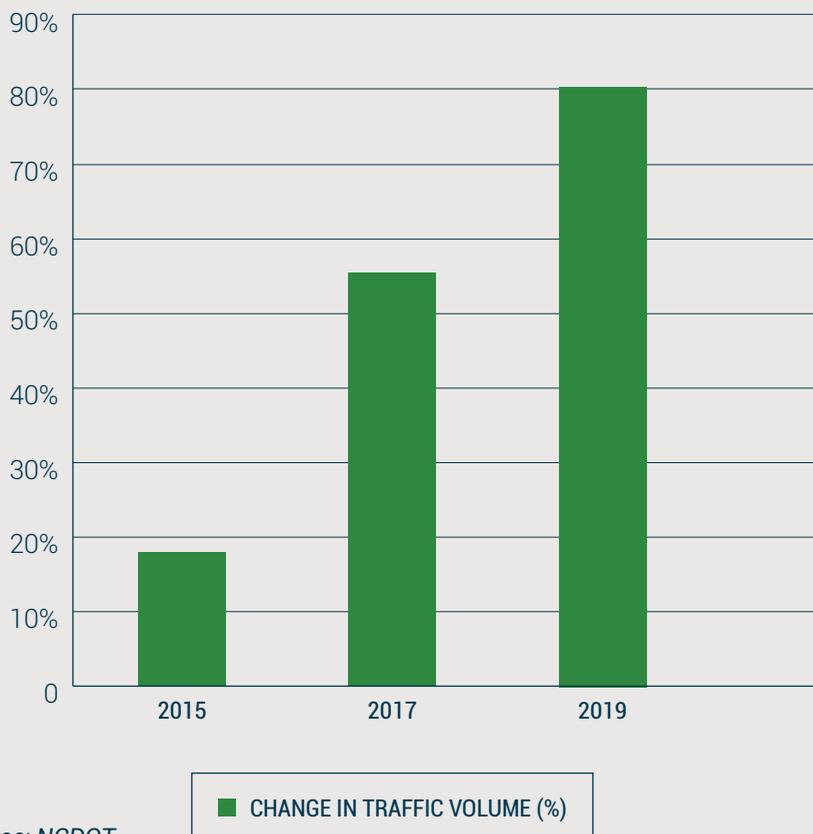
APEX 2019 POPULATION DEMOGRAPHICS



Source: Town of Apex Planning Department

ABOUT **22%**  
of the Town's  
Population is  
made up of  
**MINORITY  
GROUPS**

TRAFFIC GROWTH



Source: NCDOT

**12%**   
ANNUAL GROWTH RATE

TRAFFIC VOLUMES  
**INCREASED**  
**55%**   
FROM 2015 TO 2019



Apex Barbecue Road

## Resolution of Support

In July 2020, the Apex Town Council adopted a [Resolution to Support](#) for Vision Zero affirming the Town's commitment to eliminating traffic deaths and severe injuries.

## Purpose of the Action Plan

The Vision Zero Action Plan is the Town's roadmap to reaching zero traffic-related fatalities and severe injuries by 2035. The process of developing the plan brought the community together to create a commitment statement, guiding principles, goals, and actionable strategies to achieve Vision Zero. This collaboration promotes better coordination

across departments, organizations, and stakeholders. Additionally, the plan includes measures of progress and methods for evaluation that move the plan from vision to action. These measures and methods promote transparency and accountability by outlining who is responsible for carrying out each actionable strategy and by when.

## Organization of the Action Plan

The Vision Zero Action Plan is organized into 6 chapters:

### **Chapter 1: Introduction**

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This chapter explains what Vision Zero is and why it was adopted in the Town of Apex. It describes the purpose of the Vision Zero Action Plan and lists the foundational elements of the plan.

### **Chapter 2: Plan Development**

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This chapter outlines the process and timeline for development of the Vision Zero Action Plan.

### **Chapter 3: Data Analysis**

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This chapter compiles and summarizes the traffic, safety, and public input data analyzed as a part of Vision Zero. It provides the foundation of shared knowledge that informed the Town's guiding principles, goals, and actionable strategies.

### **Chapter 4: Programs & Initiatives**

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This chapter describes current programs and initiatives managed by the Town or those in which Vision Task Force members are actively involved that contribute to the goals of Vision Zero Apex.

### **Chapter 5: Goals & Actionable Strategies**

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This chapter details the goals for the Town's transportation future and the activities and procedures the Town will undertake to achieve its goals.

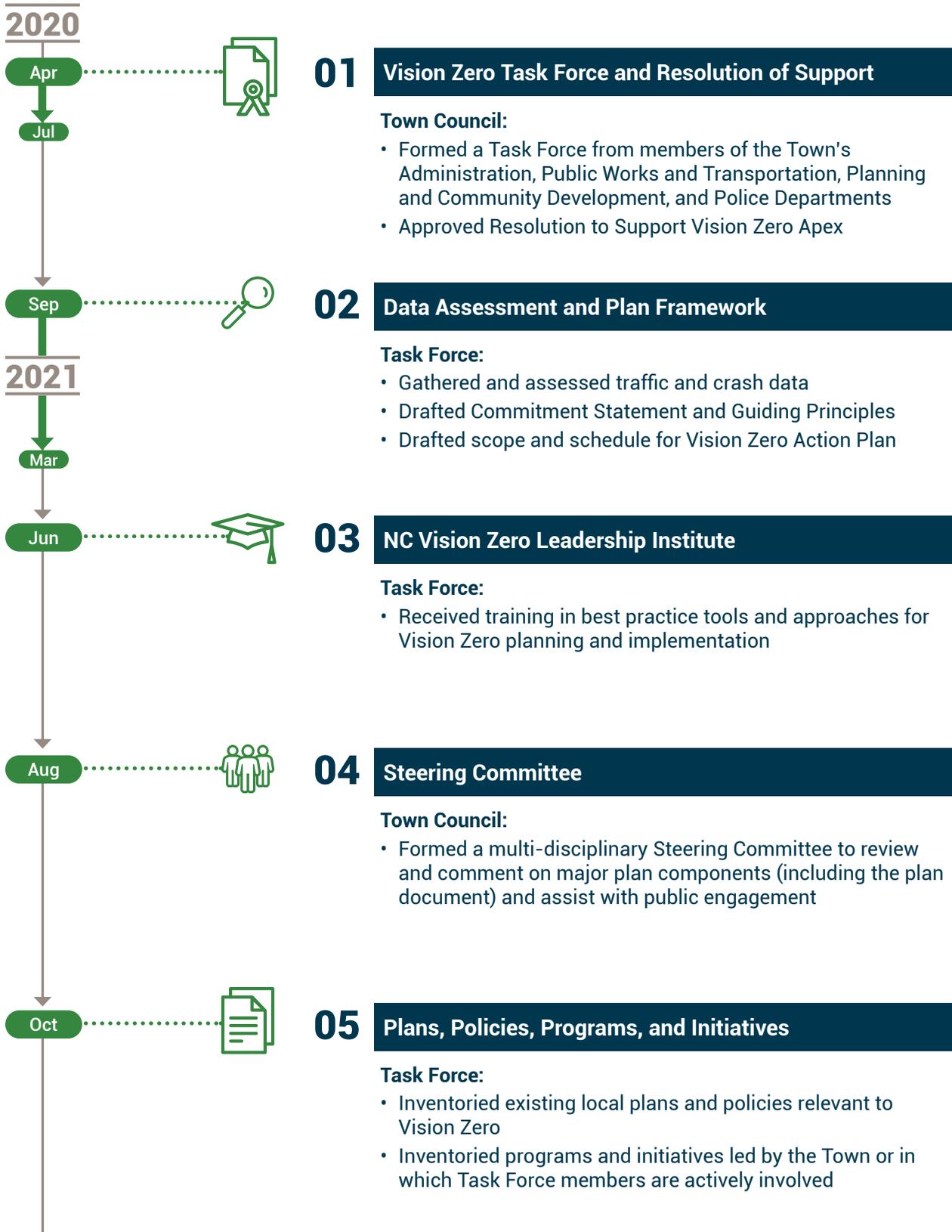
### **Chapter 6: Implementation & Evaluation**

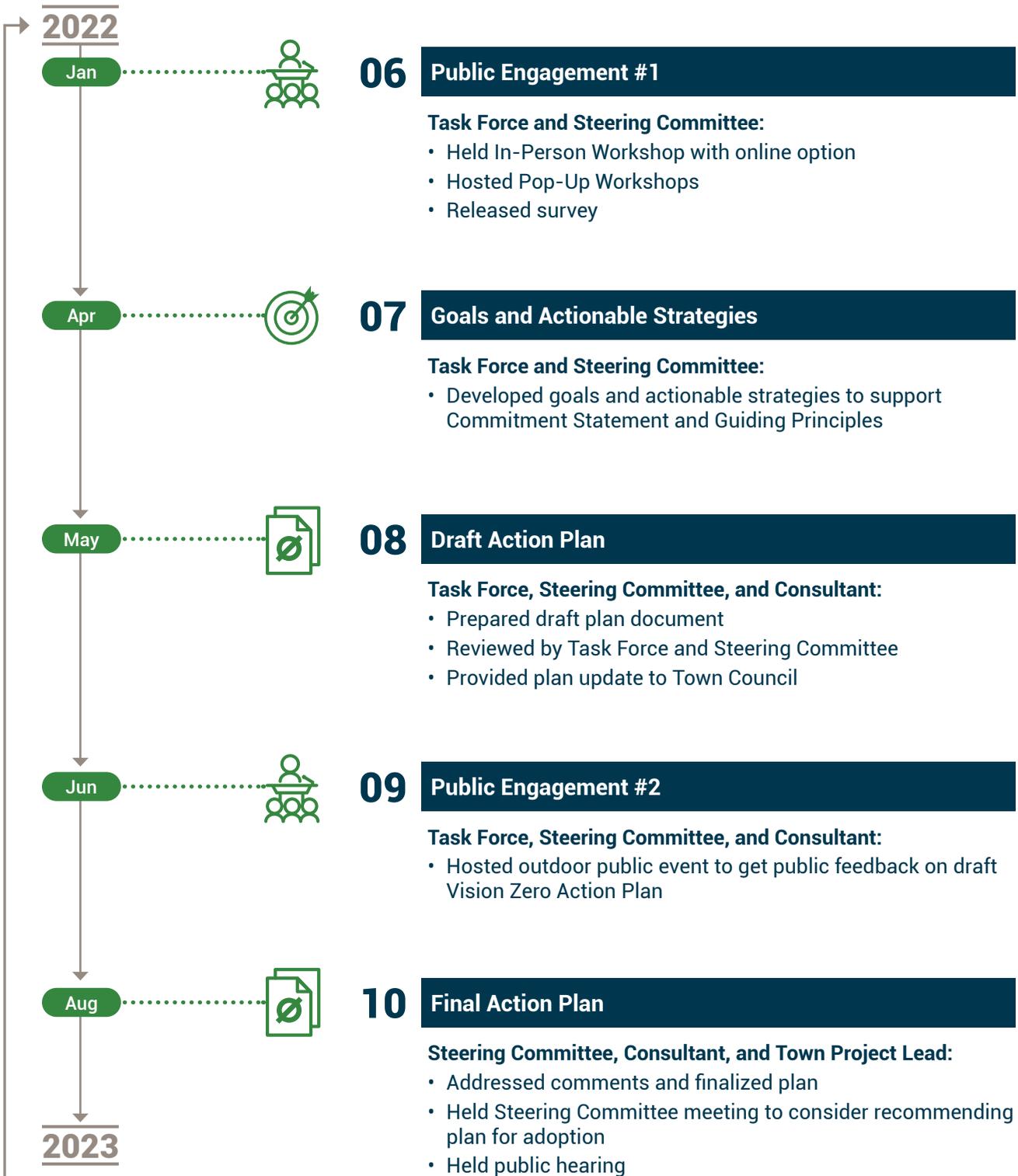
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This chapter discusses how the Town will implement its actionable strategies and measure progress towards eliminating traffic fatalities and severe injuries.

# Chapter 2: Plan Development

## Road to Vision Zero





*The Task Force met monthly and the Steering Committee met four times (Sept 2021, Dec 2021, April 2022, July 2022) during the development of the plan.*



Driving Impairment Simulator

## Chapter 3: Data Analysis

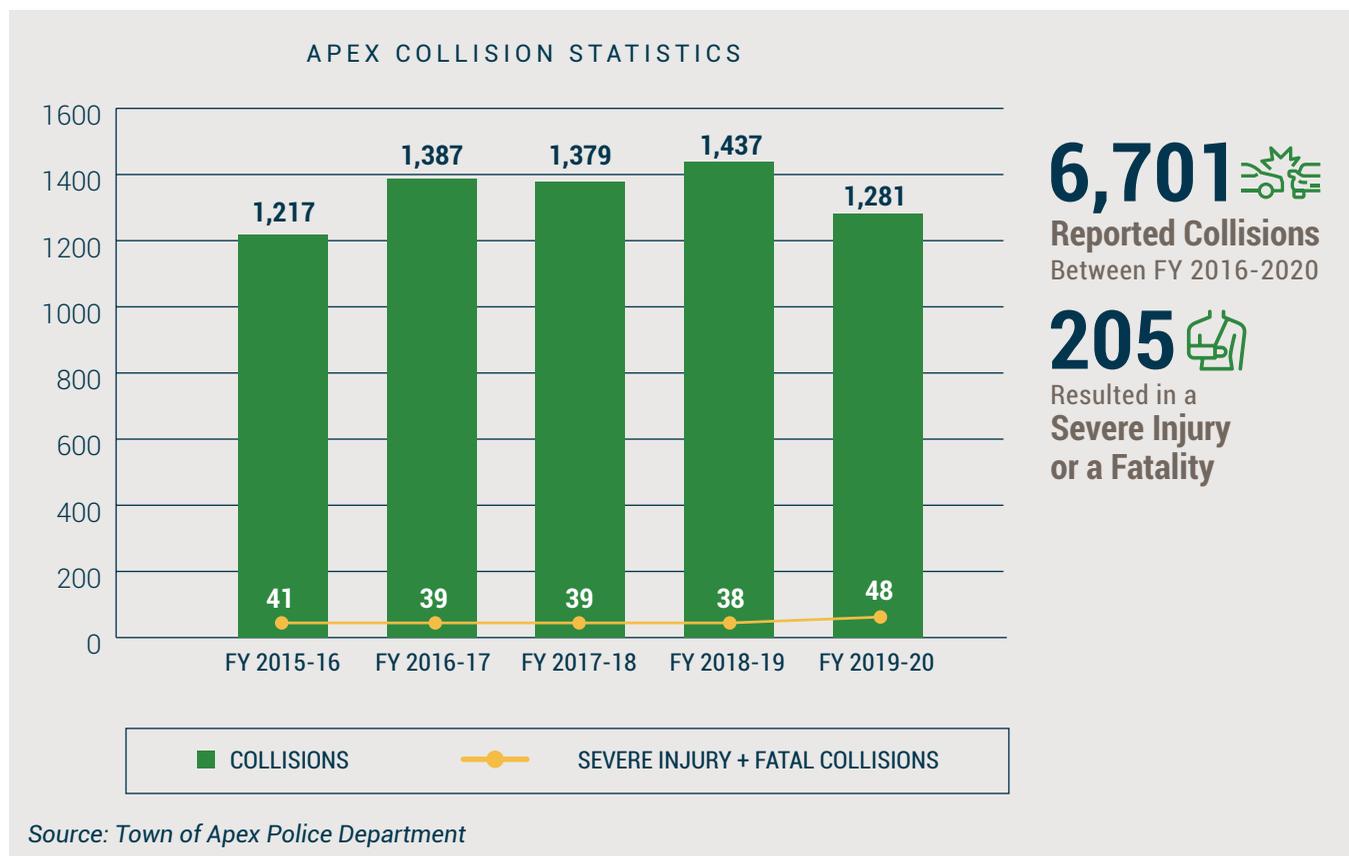
### Traffic and Safety Data

The Town analyzed traffic and safety data to understand trends and impacts on different populations.

Key highlights are provided in this chapter. More detailed collision data and maps are available in [Appendix C](#).

### Collision Statistics

Between FY 2015-16 and FY 2019-20, a total of 6,701 collisions were reported in Apex. Out of these collisions, 205 resulted in a severe injury or fatality. Some collisions had multiple severe injuries. In total, 237 severe injuries and four fatalities occurred in Town during the five-year time frame.



## Collision Severity

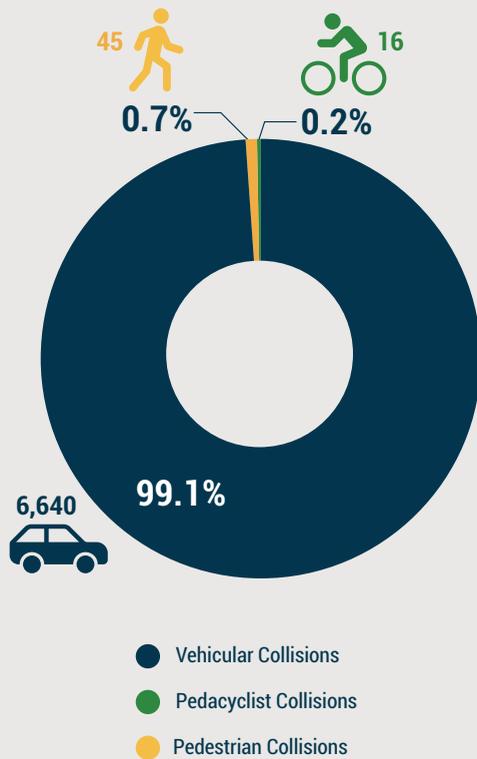
The North Carolina Department of Transportation (NCDOT) uses the KABCO scale to classify the severity of injuries from collisions. The scale ranges from Property Damage Only (O) to Fatal (K). Type A and Type B collisions are considered severe.

Since Vision Zero is focused on eliminating traffic-related fatalities and severe injuries, it is focused on eliminating Type A, Type B, and Type K collisions.

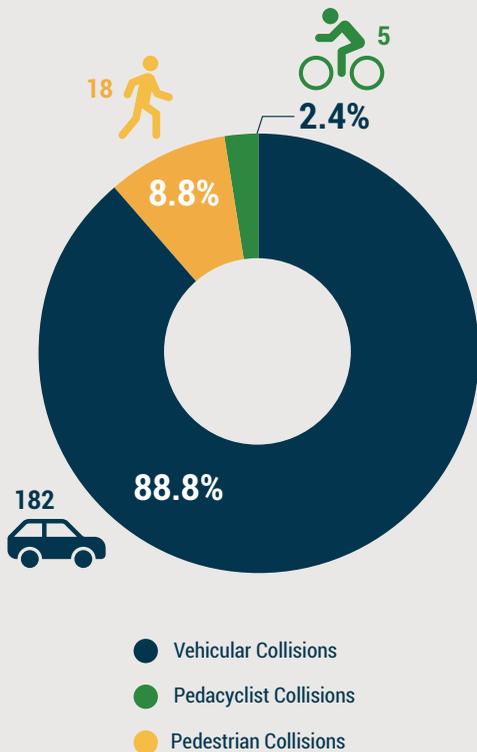
The table below shows the KABCO Scale.

Collision Severity	Description
K (Fatal)	One or more people are killed at the scene or die within 30 days of the crash due to injuries received from the crash.
A (Disabling)	One or more people receive incapacitating injuries that prevent the individuals from performing their normal activities for 24 hours or longer.
B (Evident Injury)	One or more people receive non-incapacitating injuries that are apparent at the scene and will not prevent the individual from performing their normal activities for more than 24 hours.
C (Possible Injury)	One or more people complain of pain or momentary unconsciousness; however, the injuries are not visible or obvious at the scene of the crash.
O (Property Damage Only)	No one is injured and only property is damaged.

TOTAL COLLISIONS BY MODE  
(FY 2015-16 to FY 2019-20)



TOTAL COLLISIONS WITH SEVERE INJURY AND FATALITY BY MODE



Source: Town of Apex Police Department

## Collision by Mode Type

Vehicle-to-vehicle collisions made up 99% of all traffic collisions and 89% of roadway fatalities and severe injuries in Town.

Between FY 2015-16 and FY 2019-20, there were 61 collisions that involved a pedestrian or bicyclist. These collisions resulted in one fatality (pedestrian) and 23 severe injuries.

While less than 1% of total collisions in the Town involved a pedestrian or bicyclist, 11.2% of fatal and severe injury collisions involved a pedestrian or bicyclist.

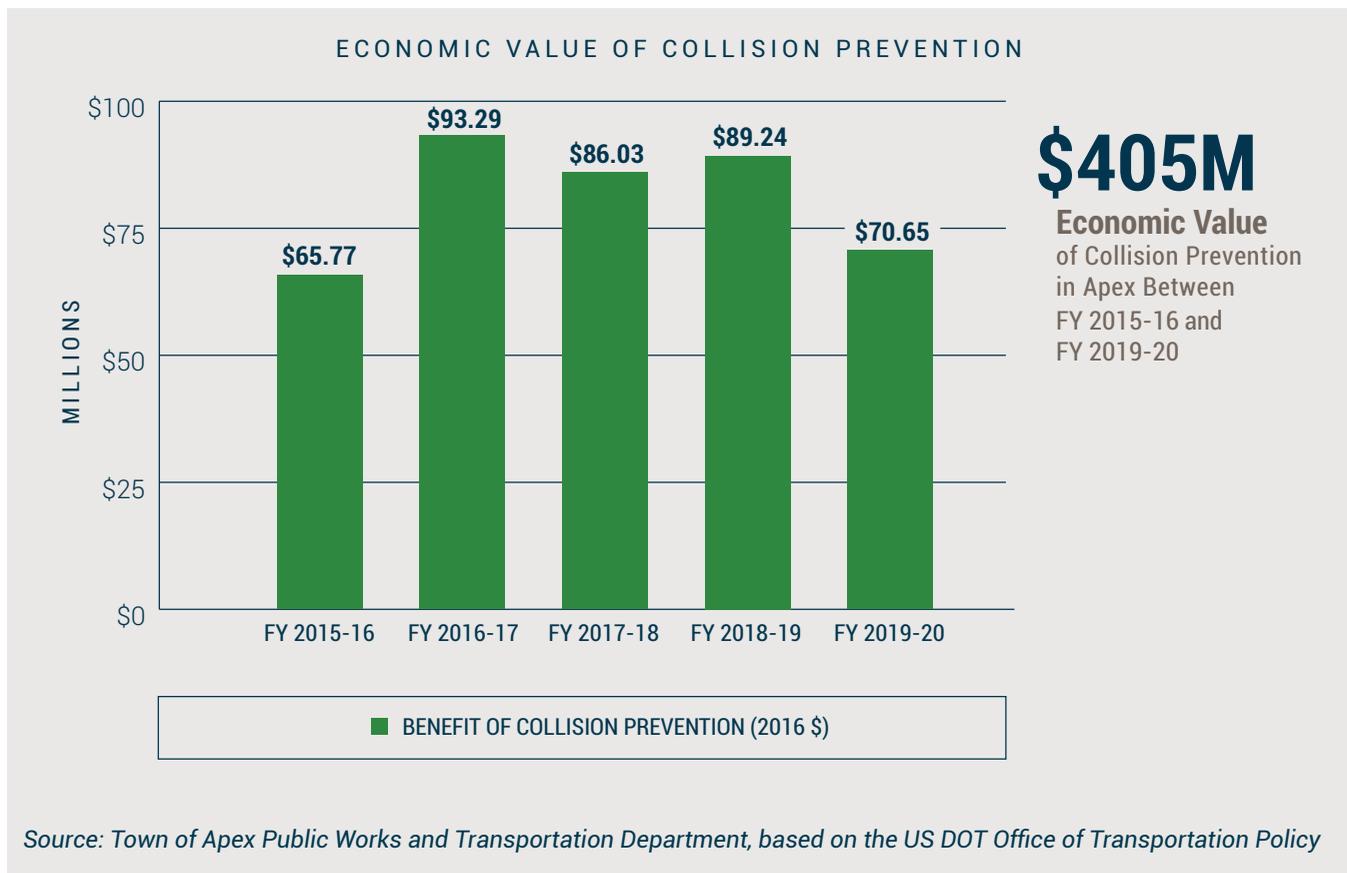
 **38%** OF COLLISIONS INVOLVING A **BICYCLIST OR PEDESTRIAN RESULTED IN A Severe Injury or Fatality** 

## Economic Value of Crash Prevention

The US Department of Transportation Office of Transportation Policy established a measure to evaluate the benefits of transportation infrastructure investments. The measure, the Value of Statistical Life (VSL), is the benefit or additional cost that society is willing to bear for traffic safety improvements to prevent an injury or fatality. The VSL puts a monetary value on loss of income, loss of productivity, medical expenses, and loss of value to friends, family, and society due to a traffic injury or death.

Collision Severity (KABCO Scale)	Cost Per Collision (2016, USDOT)
Fatal (K)	\$ 9,600,000
Disabling Injury (A)	\$ 517,249
Evident Injury (B)	\$ 189,179
Possible Injury (C)	\$ 107,521
Property Damage Only (O)	\$ 17,721

Based on the number of fatalities and severe injuries in Apex between FY 2015-16 and FY 2019-20, the economic value of collision prevention in Apex is valued at over \$400 million (2016 dollars).



## WHERE COLLISIONS OCCUR IN APEX



Within **250 feet** of a **Traffic Signal**



Along a **Roadway Segment** not associated with a **Traffic Signal**



In **Parking Lots** and along **Private Streets** (i.e. apartment complexes, office parks, and shopping centers)

*Source: Town of Apex Public Works and Transportation Department*

## Where Collisions Occur

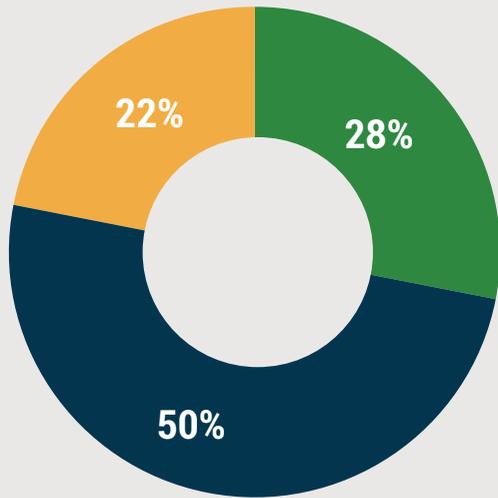
There are three locations where traffic collisions occurred in Town:

- Within 250 feet of a traffic signal
- Along a roadway segment not associated with a traffic signal, and
- In parking lots and along private streets (i.e. apartment complexes, office parks and shopping centers).

Between FY 2015-16 and FY 2019-20, over three-quarters (78%) of all collisions and 93% of all severe and fatal collisions in Town occurred within the public right-of-way, either on a local or NCDOT road or at a traffic signal.

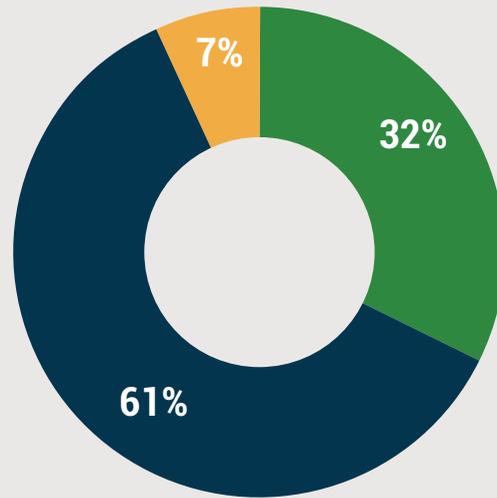
A severe or fatal collision occurred more than three times as often within the public right-of-way (at a traffic signal or along a roadway) than in a parking area or on a private road.

ALL COLLISIONS BY LOCATION  
(FY 2015-16 to FY 2019-20)



- Road Segments and Unsignalized Intersections
- Traffic Signal
- Parking Areas and Private Roads

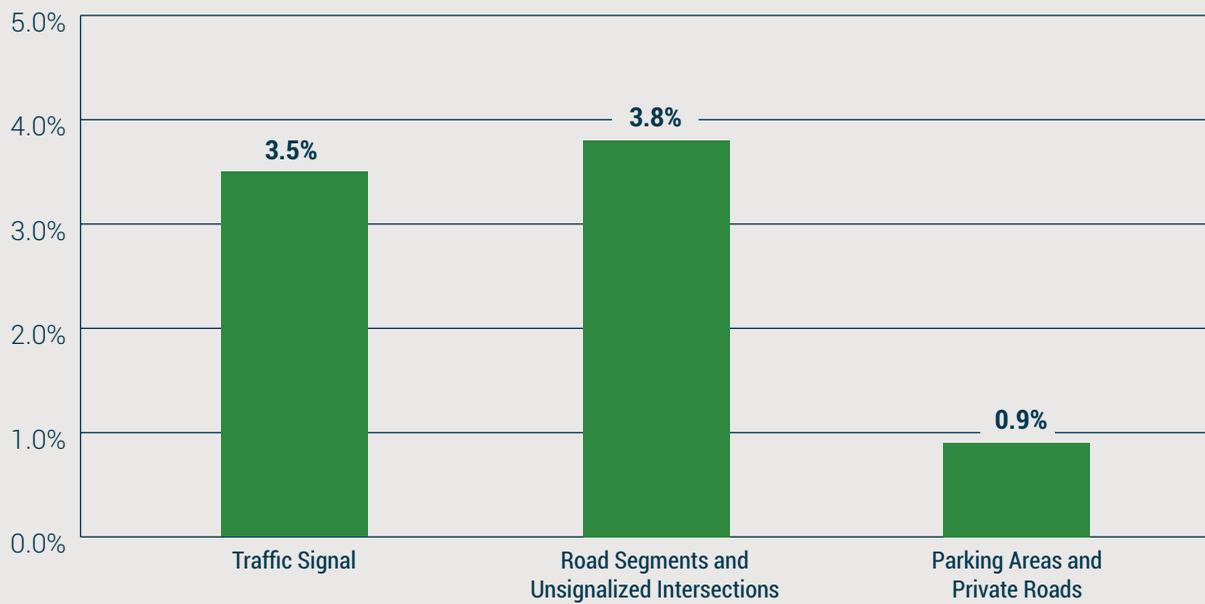
SEVERE + FATAL COLLISIONS BY LOCATION  
(FY 2015-16 to FY 2019-20)



- Road Segments and Unsignalized Intersections
- Traffic Signal
- Parking Areas and Private Roads

Source: Town of Apex Public Works and Transportation Department

LIKELIHOOD OF A SEVERE OR FATAL COLLISION



Source: Town of Apex Public Works and Transportation Department

## Types of Collisions

Certain types of collisions are more likely to result in a severe injury or fatality. The following collision types have a high likelihood (above 10% per collision event) of a severe injury or fatality (collision types are listed in order of likelihood):

- Collisions involving a pedestrian or bicyclist
- Overturn/rollover
- Head on
- Other non-collision (includes fire in or explosion of motor vehicle, injured in vehicle, fell or thrown from vehicle, gas inhalation, or thrown or falling object)
- Ran off road – straight
- Ran off road – right

Between FY 2015-16 and FY 2019-20, these types of collisions accounted for 6% of total collisions in Apex, but 34% of severe and fatal collisions.

The top three collision types in Apex were as follows:

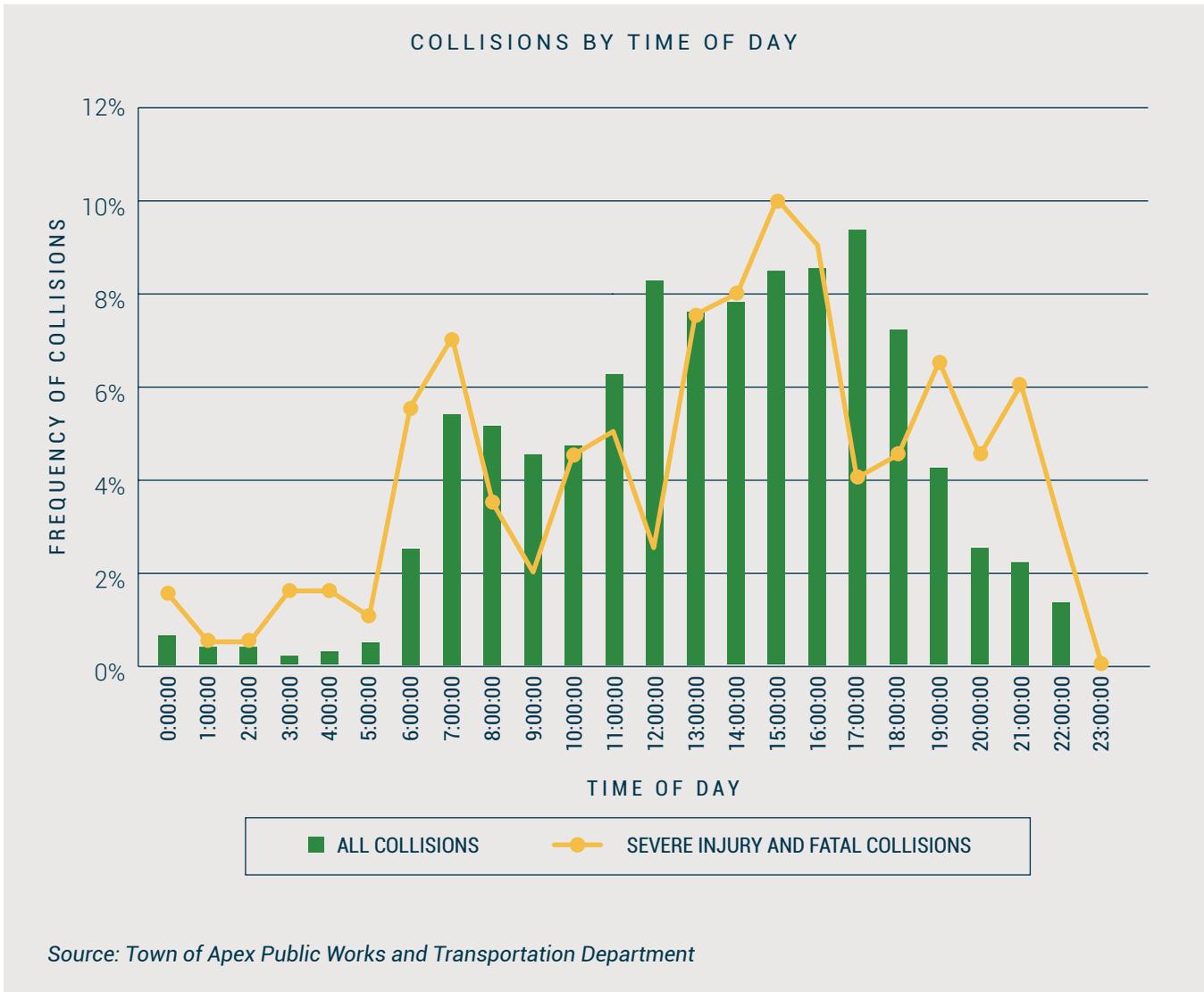
- Rear end
- Angle
- Left Turn

These types of collisions typically occur at intersections (particularly signalized intersections) and with stop and go traffic. They can be attributed to poor visibility, inadequate gaps, driver distraction or inattention, and signal timing issues, among others.

These three collision types comprise 50% of all collisions in Apex and 52% of severe and fatal collisions.



*Police Officer monitoring speed in downtown Apex*

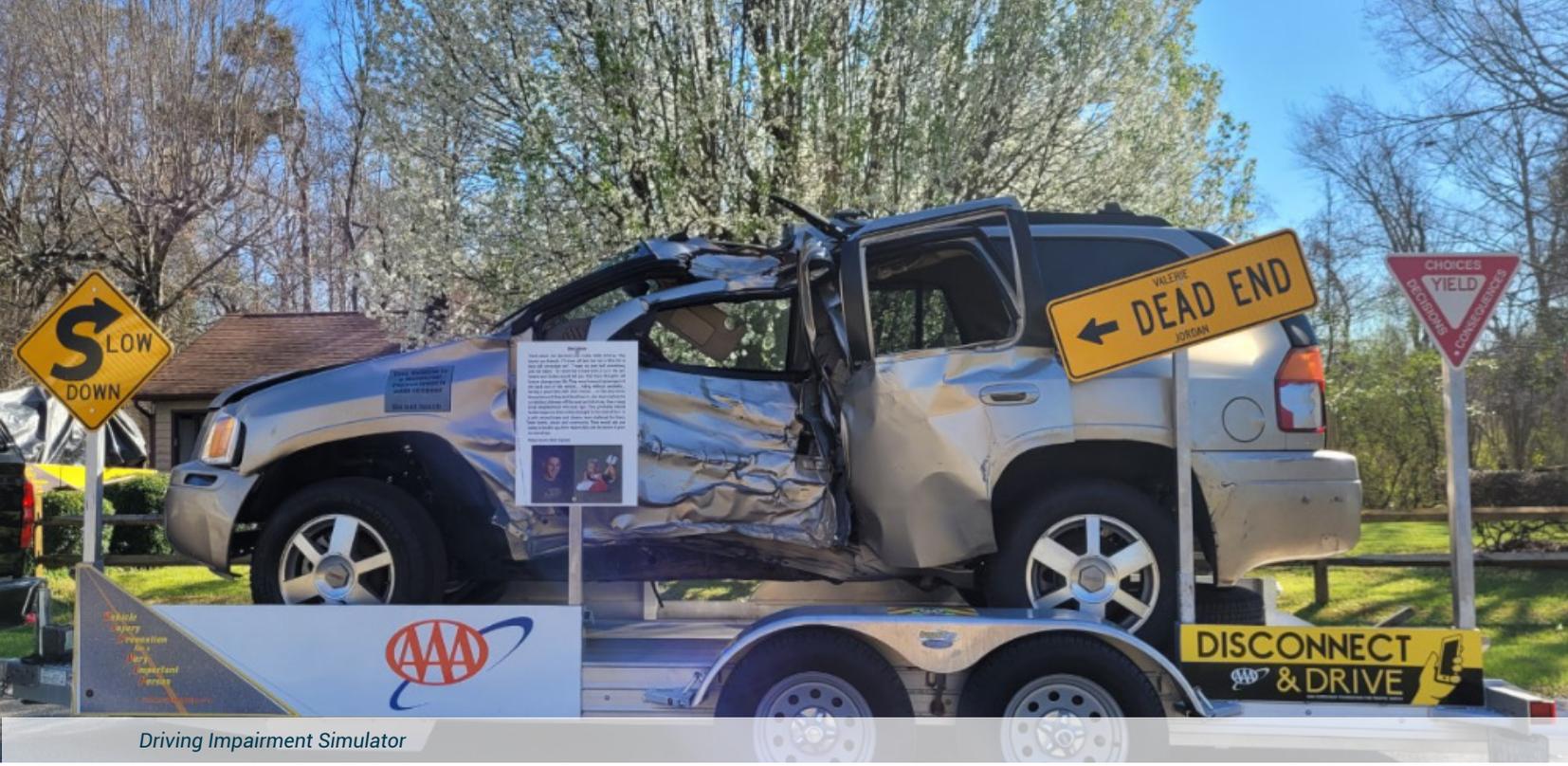


## What Time of Day Do Collisions Occur?

Between FY 2015-16 and FY 2019-20, half of all collisions in Town occurred between 12PM-6PM. The majority of severe and fatal collisions (63%) occurred during one of three distinct peaks:

- 6AM – 8AM
- 1PM – 5PM
- 7PM – 10PM

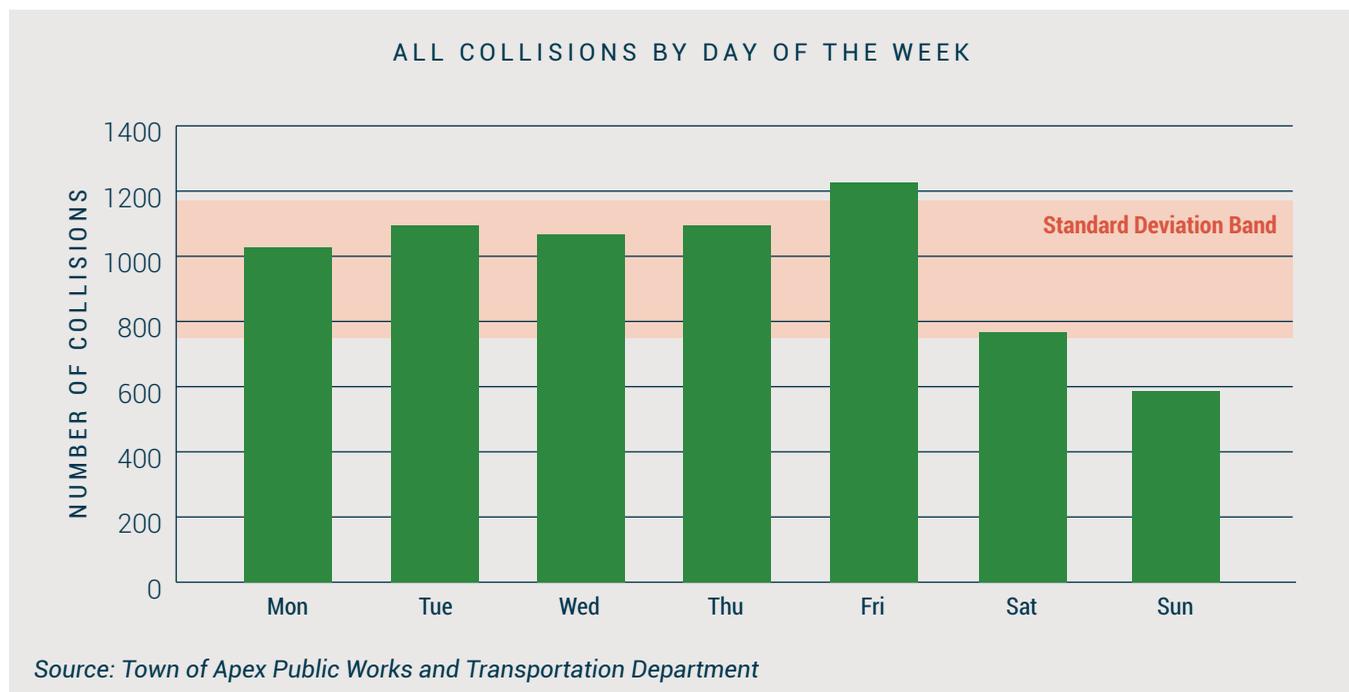
These peaks include morning and evening rush hours and school dismissal times.



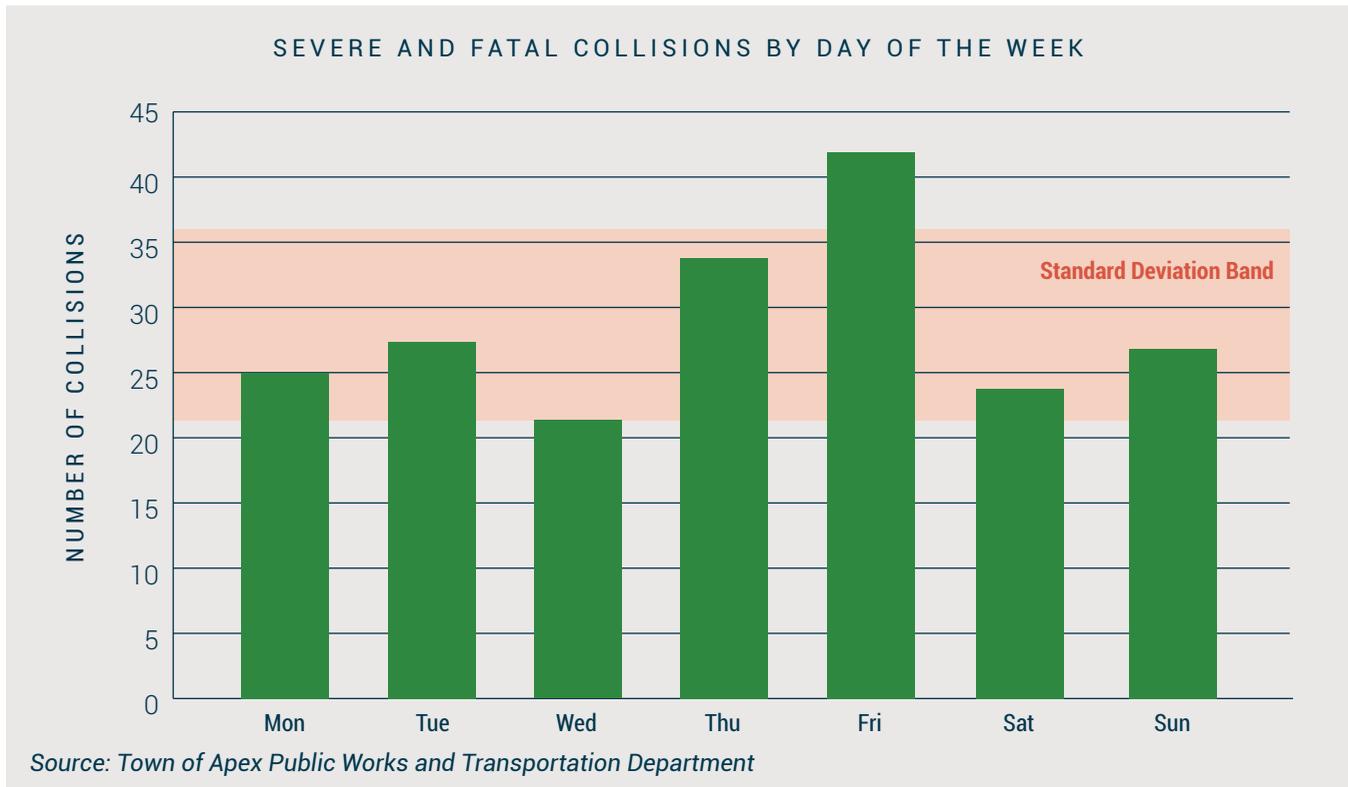
Driving Impairment Simulator

## What Days of the Week Do Collisions Occur?

Between FY 2015-16 and FY 2019-20, more collisions occurred during the weekdays (Monday-Friday) than over the weekend (Saturday and Sunday). A statistically significant difference is one that is not attributed to chance. Collision frequency is considered to be statistically significant if it is more than one standard deviation from the mean. Collision frequency was statistically higher on Fridays and statistically lower on Sundays than other days of the week.



Between FY 2015-16 and FY 2019-20, severe and fatal collisions were statistically higher on Fridays and statistically lower on Wednesdays than any other day.





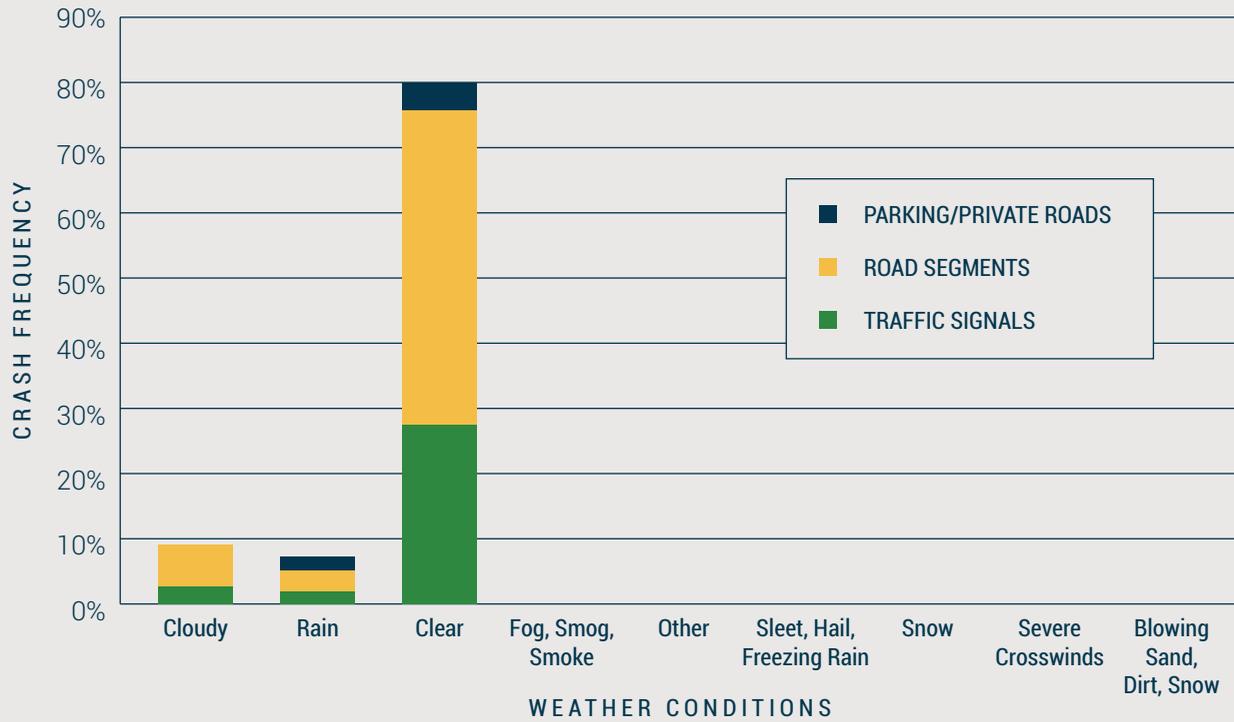
Booze It & Loose It Vehicle

## Do Roadway Conditions Have an Impact on Collisions?

Weather conditions and construction activity were not seen as contributing factors to collision frequency or severity in Town. Over three quarters (78%) of all collisions and 81% of all severe and fatal collisions between FY 2015-16 and FY 2019-20 occurred in clear, dry weather. Also, 99% of all collisions and 99% of severe and fatal collisions during the same time period occurred when there was no construction activity on the road.

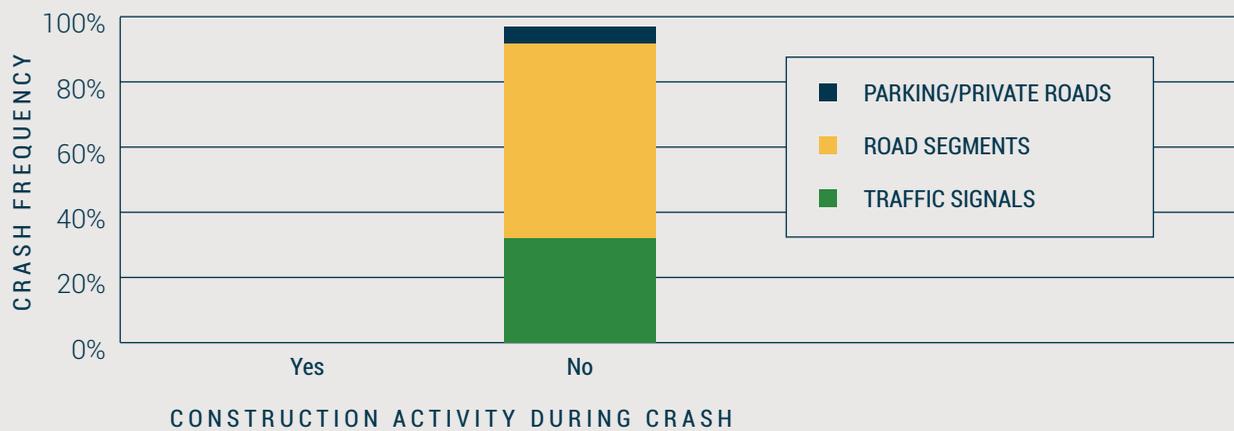
Additionally, 77% of all collisions and 78% of severe collisions involving a bicyclist or pedestrian occurred during clear weather conditions. Also 97% of collisions involving a bicyclist or pedestrian were non-work zone related.

### SEVERE AND FATAL COLLISIONS BY WEATHER CONDITIONS



Source: Town of Apex Public Works and Transportation Department

### SEVERE AND FATAL COLLISIONS IN CONSTRUCTION ZONES



Source: Town of Apex Public Works and Transportation Department

## Equity Considerations

### Low Income Areas

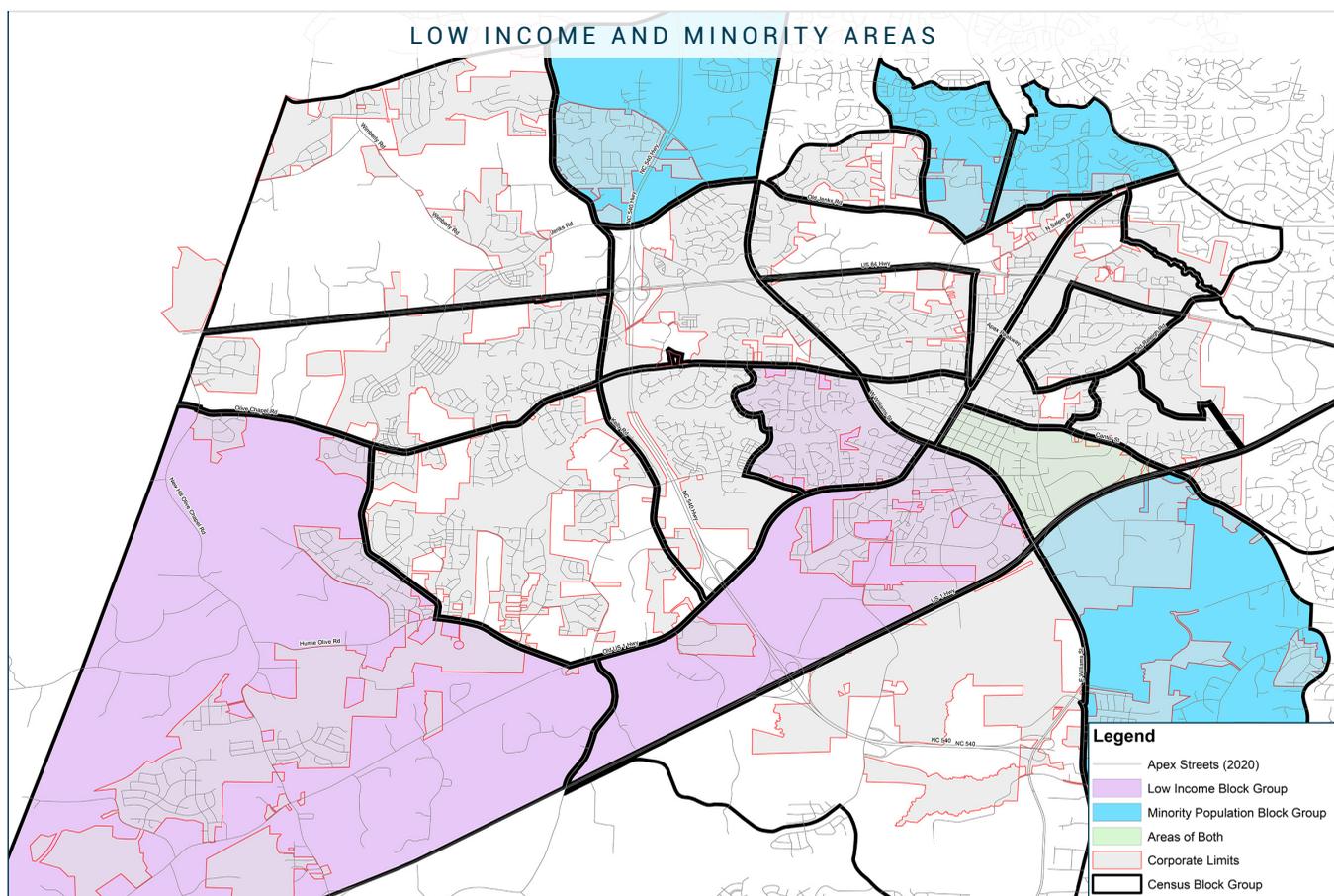
According to Wake County annual median income data, low-income households are generally defined as households with an annual household income of \$40,000 or less. The map below displays areas in Apex where at least 25% of residents have an estimated annual household income of less than \$40,000. In Apex, low-income areas are located in block groups south and west of Downtown and in rural areas outside of the Town limits but within the Apex Planning Area south of NC 540.

When analyzing collision data in low-income areas, it appears that low-income areas are not overrepresented in the number or severity of collisions based on land area. Low-income areas comprise about one quarter (24%) of the land area in the Apex Planning Area and about

22% of all collisions and 17% of severe and fatal collisions in Town occurred in low-income areas.

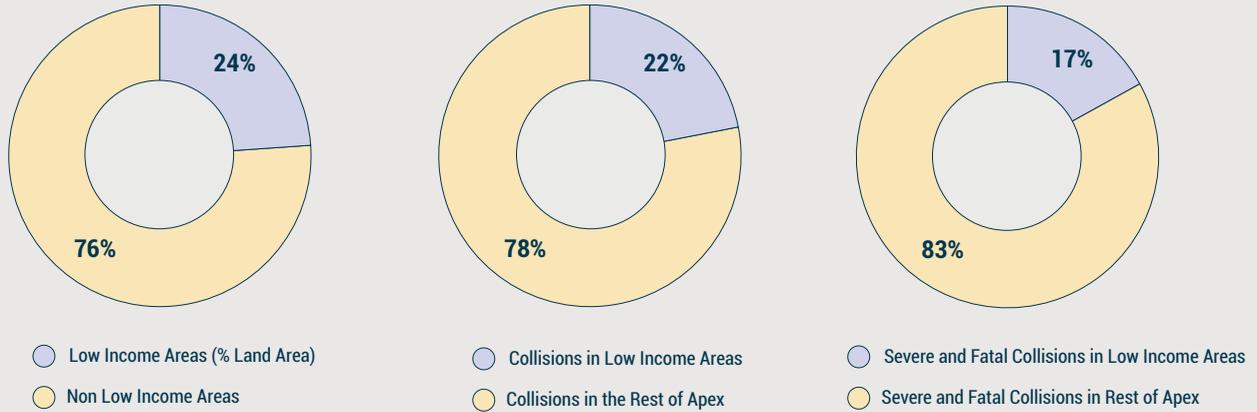
### Minority Areas

Minority areas are defined as block groups in Apex where more than 40% of the population is identified in the American Community Survey (2015-2019 estimates) as a race or ethnicity other than "White, alone, not Hispanic or Latino." In Apex, minority areas are located in block groups south and east of Downtown and in areas south of US Highway 1. Minority areas are also located in the northern part of Apex, in block groups that overlap with the Town of Cary. (see map below). When analyzing collision data in minority areas, it appears that minority areas are not overrepresented in the number or severity of collisions based on land area. Minority areas comprise about 14% of the land



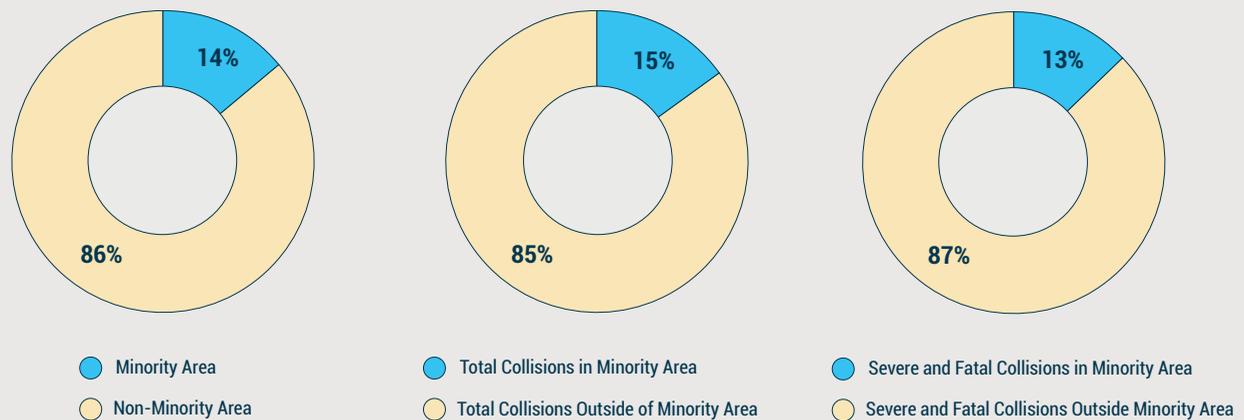
Source: 2015-2019 American Community Survey (ACS) Estimates

### COLLISIONS IN LOW INCOME AREAS



Source: 2015-2019 American Community Survey (ACS) Estimates (low income areas) and Town of Apex Public Works and Transportation Department (crash data)

### COLLISIONS IN MINORITY AREAS



Source: 2015-2019 American Community Survey (ACS) Estimates (minority areas) and Town of Apex Public Works and Transportation Department (crash data)

area in the Apex Planning Area and about 15% of all collisions and 13% of severe and fatal collisions in Town occurred in minority areas.

#### Zero Car Households

Due to its suburban nature, Apex has high car ownership. Census tracts with the highest percentage of zero car households (5%-6%) are located south of Salem Street/Old US Highway 1 (see map on page C-23). While fewer households in these census tracts have

vehicles, the number of pedestrian and bicycle crashes in these block groups is low. The majority of pedestrian and bicycle crashes occur around commercial and shopping areas in Town.

The Vision Zero Task Force plans to expand upon this initial equity analysis as part of the actionable strategy to develop a traffic safety report card and progress report (see Evaluation Actionable Strategy 3 on page 50).

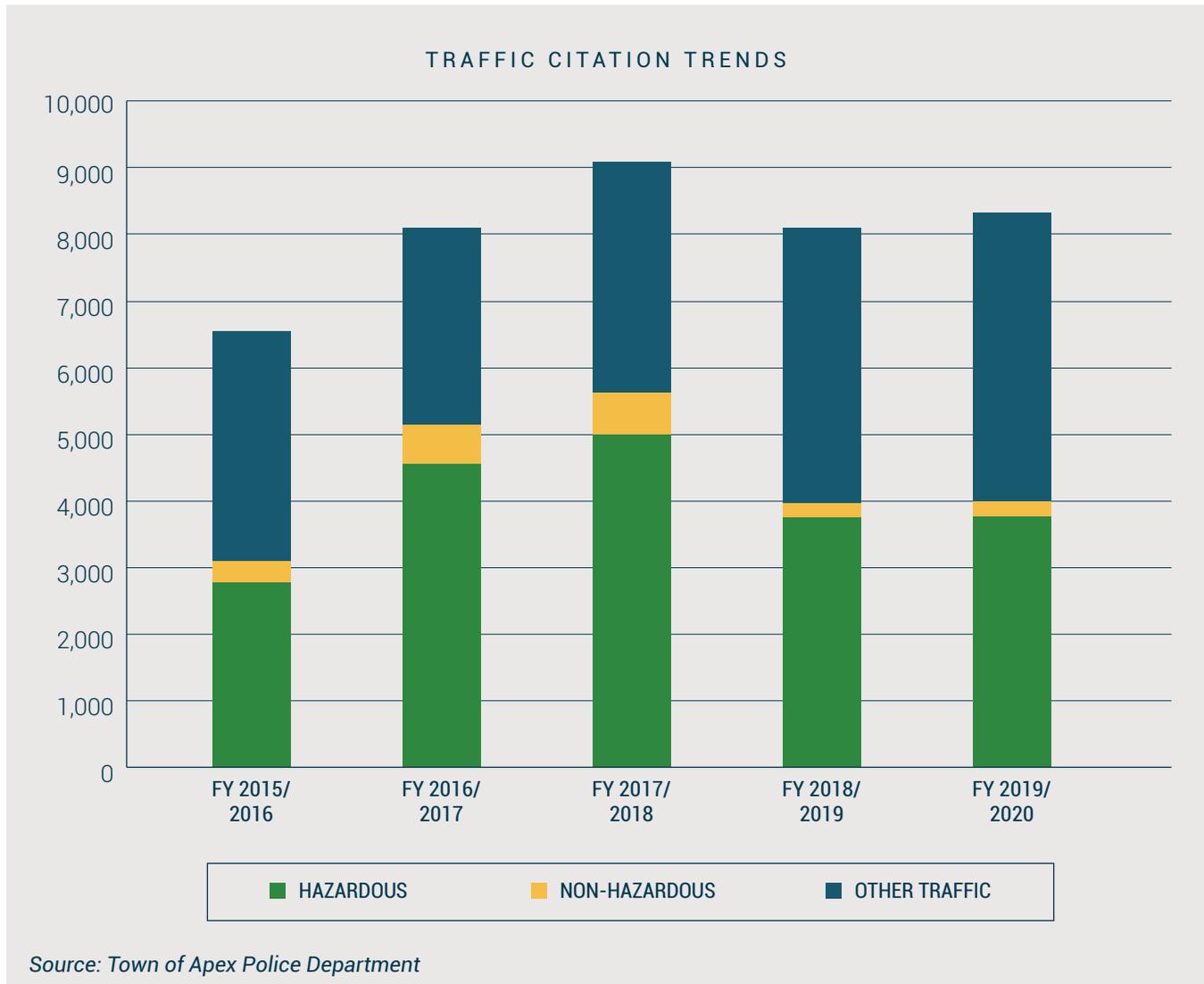
## Traffic Citation Trends

Traffic citations fall into three categories:

- **Hazardous** - Basic driver techniques and actions that are likely to endanger the driver as well as others on the road, including, but not limited to, speeding violations, driving under the influence, lane violations, and inattentive to driving violations
- **Non-hazardous** - Basic driver techniques and actions that can contribute to endangering the driver as well as others on the road or increase the risk of injury, including parking violations and vehicle equipment failures

- **Other Traffic** – Violations that fall outside the definition of hazardous and non-hazardous offenses, including, but not limited to, some improper/fault equipment and regulatory violations that do not necessarily contribute to a vehicle collision

Between FY 2015-16 and FY 2019-20, traffic citations ranged from 6,481 to 9,159 annually in Apex. Non-hazardous citations comprised the smallest number of citations. From FY 2015-16 to FY 2017-18, hazardous offenses made

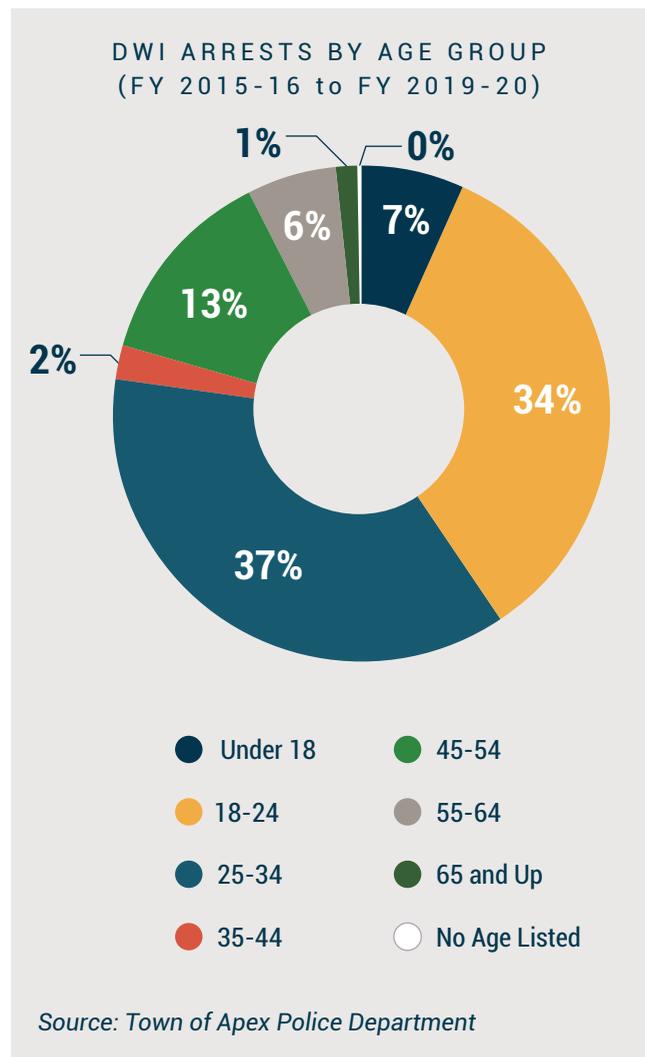




Downtown Apex accommodates vehicles, pedestrians, and cyclists.

up the largest category of traffic citations in Town and the number of hazardous offenses grew each year. While the Town saw a reduction in hazardous offenses in FY 2018-19 and FY 2019-20, the number of other traffic offenses in Town has grown each year since FY 2015-16.

Between FY 2015-16 and FY 2019-20, almost 600 people were arrested for driving while intoxicated (DWI) in Town. Over two-thirds of the arrests were people ages 18-34 (37% ages 25-34 and 34% ages 18-24). About 7% of people arrested for DWI were under 18.



## High Collision Network

The high collision network includes the signalized intersections and roadway segments in Town with the highest frequency of collisions. It includes 12 signals and 16 roadway segments. Almost one-quarter (24%) of collisions that occurred in Town between FY 2015-16 and FY 2019-20 happened on the high collision network.

High Collision Network - Signalized Intersections			
Ranking (Collision Frequency)	SIGNAL	Total Collisions (FY 2015-16 - FY 2019-20)	Intersection
1	05-0209	115	US 1 SB Off Ramp at NC 55
2	05-2332	93	SR 1444 (Lufkin Rd)/US 1 at SR 1010 (Ten Ten Rd)
3	05-0934	92	SR 1308 (Laura Duncan Rd) at US 64
4	05-2183	85	Beaver Ck Commons Dr/Pemberton Hill Rd at NC 55
5	05-1270	83	Lake Pine Dr at US 64
6	05-0900	80	US 1 NB Ramps at NC 55
7	05-0712	77	SR 1444 (Lufkin Rd) at NC 55
8	05-0932	74	SR 1158 (S Hughes St) at NC 55 (E Williams St)
9	05-1999	72	E Williams St/SR 1191 (Technology Dr) at NC 55
10	05-1770	70	US 64 EB Off Ramp/US 64 EB On Ramp at NC 55
11	05-2224	70	Apex Peakway at NC 55 (W Williams St)
12	05-0608	70	SR 1160 (Olive Chapel Rd)/Hunter St at NC 55

High Collision Network - Roadway Segments		
Ranking (Collision Frequency)	Total Collisions (FY 2015-16 - FY 2019-20)	Road Name
1	64	E Williams St/NC 55 (Public Power Dr to Pristine Water Dr)
2	56	Beaver Creek Commons Dr (Creekside Landing Dr to Zeno Rd)
3	55	E Williams St/NC 55 (Pristine Water Dr to 1521 E Williams St)
4	45	Lake Pine Dr (Pine Plaza Dr to US 64)
5	43	US 64 (Laura Duncan Rd to Knollwood Dr)
6	41	E Williams St/NC 55 (S Mason St to S Tunstall St)
7	38	E Williams St/NC 55 (1650 E Williams St to 1775 E Williams St)
8	37	W Williams St/NC 55 (Apex Peaway to Hunter St)
9	35	N Salem St (Saunders St to Chatham Street)
10	35	E Williams St/NC 55 (James St to Perry Rd)
11	33	W Williams St/NC 55 (Bryan Dr to Upchurch St)
12	32	E Williams St/NC 55 (Perry Rd to Apex Peakway)
13	31	E Williams St/NC 55 (1521 E Williams St to 1581 E Williams St)
14	30	Lake Pine Dr (Versailles Dr to Pine Plaza Dr)
15	29	E Williams St/NC 55 (Marco Dr to Mark Weaver Ln)
16	29	E Williams St/NC 55 (Mark Weaver Ln to US 1 SB Offramp)

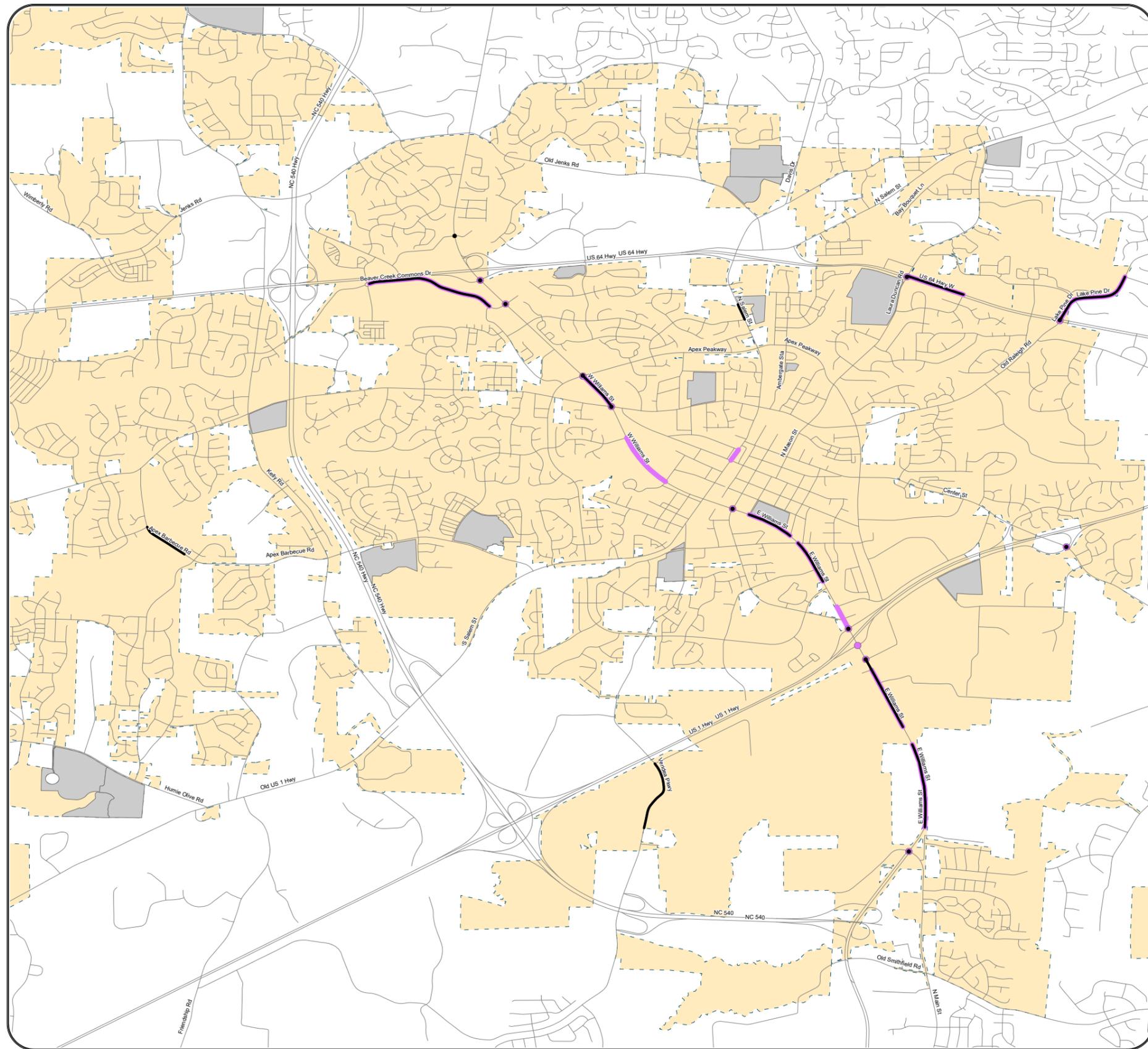
## High Injury Network

The high injury network includes the signalized intersections and roadway segments with the highest frequency of fatal and severe collisions. It includes 12 signals and 16 roadway segments. Over one-quarter (28%) of severe collisions and 75% of fatal collisions that occurred in Town between FY 2015-16 and FY 2019-20 happened on the high injury network.

High Injury Network - Signalized Intersections				
Ranking (Collision Severity)	SIGNAL	VSL Total (2016\$)	Total Collisions (FY 2015-16 - FY 2019-20)	Intersection
1	05-1270	\$ 6,679,697.68	83	Lake Pine Dr at US 64
2	05-0209	\$ 6,635,396.25	115	US 1 SB Off Ramp at NC 55
3	05-2332	\$ 6,199,565.97	93	SR 1444 (Lufkin Rd)/US 1 at SR 1010 (Ten Ten Rd)
4	05-1770	\$ 5,998,413.53	70	US 64 EB Off Ramp/US 64 EB On Ramp at NC 55
5	05-2224	\$ 5,301,803.49	70	Apex Peakway at NC 55 (W Williams St)
6	05-0934	\$ 4,964,394.23	92	SR 1308 (Laura Duncan Rd) at US Hwy 64
7	05-0932	\$ 4,883,214.85	74	SR 1158 (S Hughes St) at NC 55 (E Williams St)
8	05-0712	\$ 4,730,674.25	77	SR 1444 (Lufkin Rd) at NC 55
9	05-1999	\$ 4,654,044.75	72	E Williams St/SR 1191 (Technology Dr) at NC 55
10	05-2049	\$ 4,440,679.49	55	Vision Dr at NC 55
11	05-2183	\$ 4,143,261.25	85	Beaver Ck Commons Dr/Pemberton Hill Rd at NC 55
12	05-0608	\$ 3,848,237.67	70	SR 1160 (Olive Chapel Rd)/Hunter St at NC 55

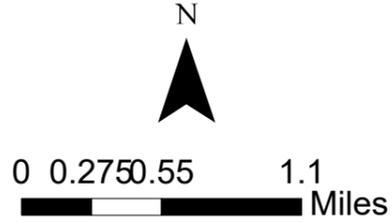
### High Injury Network - Roadway Segments

Ranking (Collision Severity)	VSL Total (2016\$)	Road Name	Total Collisions (FY 2015-16 - FY 2019-20)	Rank by Total Collisions
1	\$ 10,027,688.39	N Salem St (Thales Academy to Brittley Way)	6	116
2	\$ 9,842,340.79	Veridea Parkway (Prince Dead End Rd to King David Ct)	4	198
3	\$ 9,706,323.43	Apex Barbecue Rd (Kinship Ln to Evans Rd)	5	154
4	\$ 4,146,134.85	E Williams St/NC 55 (Public Power Dr to Pristine Water Dr)	64	1
5	\$ 3,563,750.66	Lake Pine Dr (Pine Plaza Dr to US Hwy 64)	45	4
6	\$ 3,335,777.90	Beaver Creek Commons Dr (Creekside Landing Dr to Zeno Rd)	56	2
7	\$ 3,312,789.05	E Williams St/NC 55 (Pristine Water Dr to 1521 E Williams St)	55	3
8	\$ 2,904,736.96	E Williams St/NC 55 (1650 E Williams St to 1775 E Williams St)	38	7
9	\$ 2,664,311.91	US Hwy 64 (Laura Duncan Rd to Knollwood Dr)	43	5
10	\$ 2,615,460.60	Lake Pine Dr (Versailles Dr to Pine Plaza Dr)	30	14
11	\$ 2,494,050.74	E Williams St/NC 55 (S Mason St to S Tunstall St)	41	6
12	\$ 2,370,006.74	W Williams St/NC 55 (Apex Peakway to Hunter St)	37	8
13	\$ 2,331,452.52	E Williams St/NC 55 (Perry Road to Apex Peakway)	32	12
14	\$ 2,214,353.07	E Williams St/NC 55 (Lufkin Rd to Public Power Dr)	26	18
15	\$ 2,075,941.03	E Williams St/NC 55 (James St to Perry Rd)	35	10
16	\$ 2,059,417.80	E Williams St/NC 55 (1521 E Williams St to 1581 E Williams St)	31	13



**DATA ANALYSIS RESULTS  
MAP OF HIGH COLLISION  
NETWORK AND HIGH INJURY  
NETWORK IN APEX**

- Legend**
- High Injury Network - Signals High
  - Injury Network - Segments High
  - Collision Network - Signals High
  - Collision Network - Segments
  - Apex Schools
  - Apex Streets 2020
  - Corp Limits



This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- There are **12** **signalized** intersections and **16** **roadway** segments on each of the **high collision and high injury** networks in Town.
- The **majority** of **signalized** intersections and **roadway** segments on the **high collision and high injury** networks are on **Williams St/NC 55**.

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## Public Input

Community engagement is a critical aspect of Vision Zero. The Town of Apex had several opportunities for community input throughout the development of the Vision Zero Action Plan. Town residents served on the Vision Zero Steering Committee. The Town also hosted a Vision Zero website where residents could watch a Vision Zero presentation, review digital maps, and take a survey. The survey was open from January 19-February 28, 2022. The Town received 275 survey responses. An in-person Public Workshop was held on January 26, 2022 at the Apex Senior Center and four Pop-Up Workshops were held during the month of February. Details on the Pop-Up Workshops are as follows:

- Eva Perry Library – February 9, 2022
- Hope Community Church – February 15, 2022
- Apex Senior Center – February 22, 2022
- Apex Community Center – February 25, 2022

The following tactics were used to advertise the survey and Pop-Up Workshops: website, social media (Facebook, Nextdoor, Twitter, Instagram), utility bill insert, eBill (about 11,000 email addresses), and ground signs placed throughout town. Another Pop-Up Workshop was held at The Hub gas station after the public input period closed at the request of the Steering Committee to gather input from residents south of U.S. 1.

A high-level summary of the public input is provided in this section and details are included in [Appendix B](#).

The Town also hosted a “Safety Town” event on June 25, 2022, to promote traffic safety in Apex and share the Draft Vision Zero Action Plan. The event included a traffic garden for children to practice roadway safety on bicycles, a Booze It or Lose It Trailer, a DWI simulator, a crash display, and demonstrations on how to load a bike on the GoApex bus.



*Eva Perry Library Pop-Up Workshop*



*Public Workshop #1*



*Public Workshop #1*



*Safety Town Event*

The information on the following pages is a summary of the public input received during the development of the plan.

## Priority Safety Issues

### High Priority

High priority safety issues are issues that at least 40% of survey respondents identified as 'Very Concerning.'

The top four high priority safety issues in Town include:

-  **Unsafe Driver Behavior**
-  **Lack of Sidewalk Connections**
-  **Speeding**
-  **Unsafe Intersections**

### Medium Priority

Medium priority safety issues are issues that at least 40% of survey respondents identified as 'Somewhat Concerning.'

The top four medium priority safety issues in Town include:

-  **Lighting/Nighttime Visibility**
-  **Crossing the Street as a Pedestrian**
-  **Lack of Crosswalks**
-  **Unsafe Cyclist Behavior**

#### ADDITIONAL TRANSPORTATION-RELATED SAFETY COMMENTS

Specific unsafe driver behaviors not listed in the question:

- Distracted Driving
- Aggressive Driving
- Tailgating
- Running Red Lights
- Lack of Indicator Usage

## OTHER SAFETY ISSUES

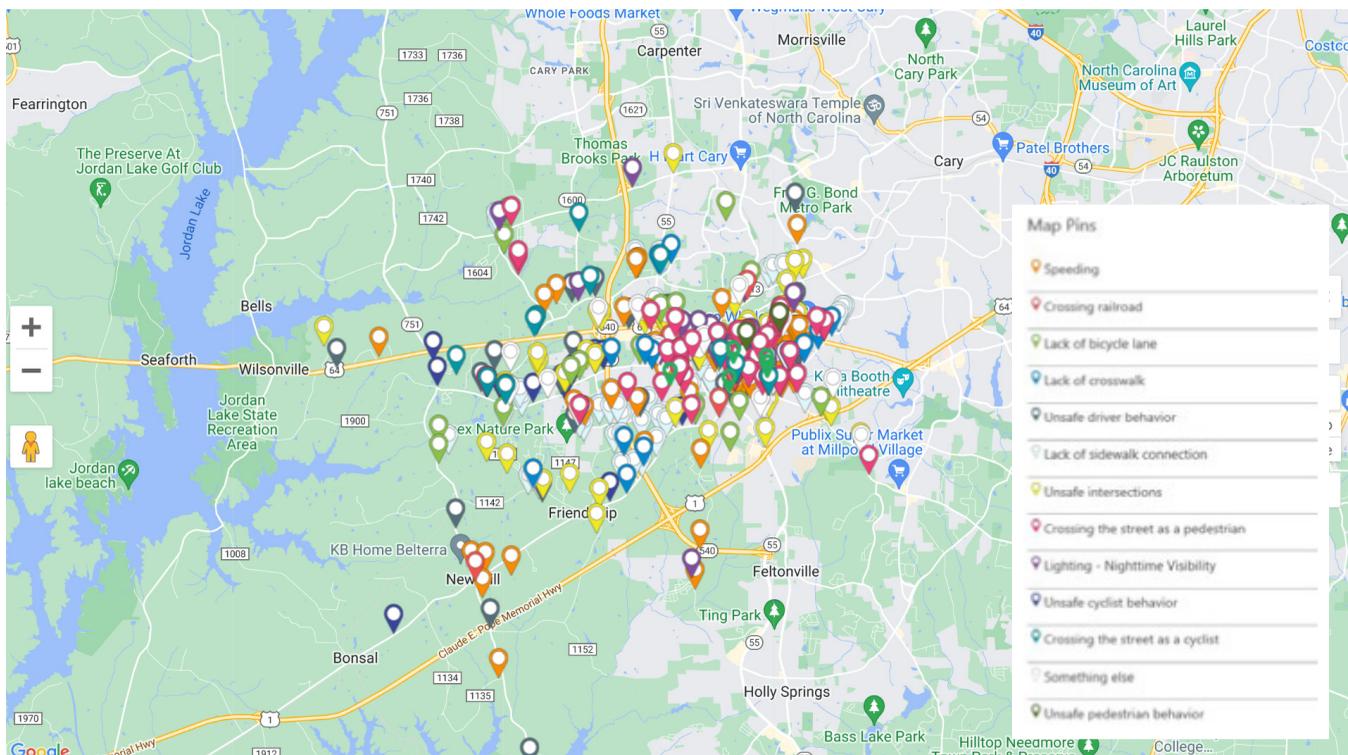
Other safety issues frequently noted by respondents included:

- Lack of Driver Education
- Lack of Traffic Signals
- Lack of Traffic Enforcement
- Posted Speed Limit in Neighborhoods is Too High
- Traffic Signal Timing
- Sidewalk Gaps to Schools
- Lack of Public Transit

### Safety Concerns

Interactive mapping was used to elicit input on locations where transportation safety concerns have been observed in Town and the type of safety concern.

The public identified over 500 locations (see map).

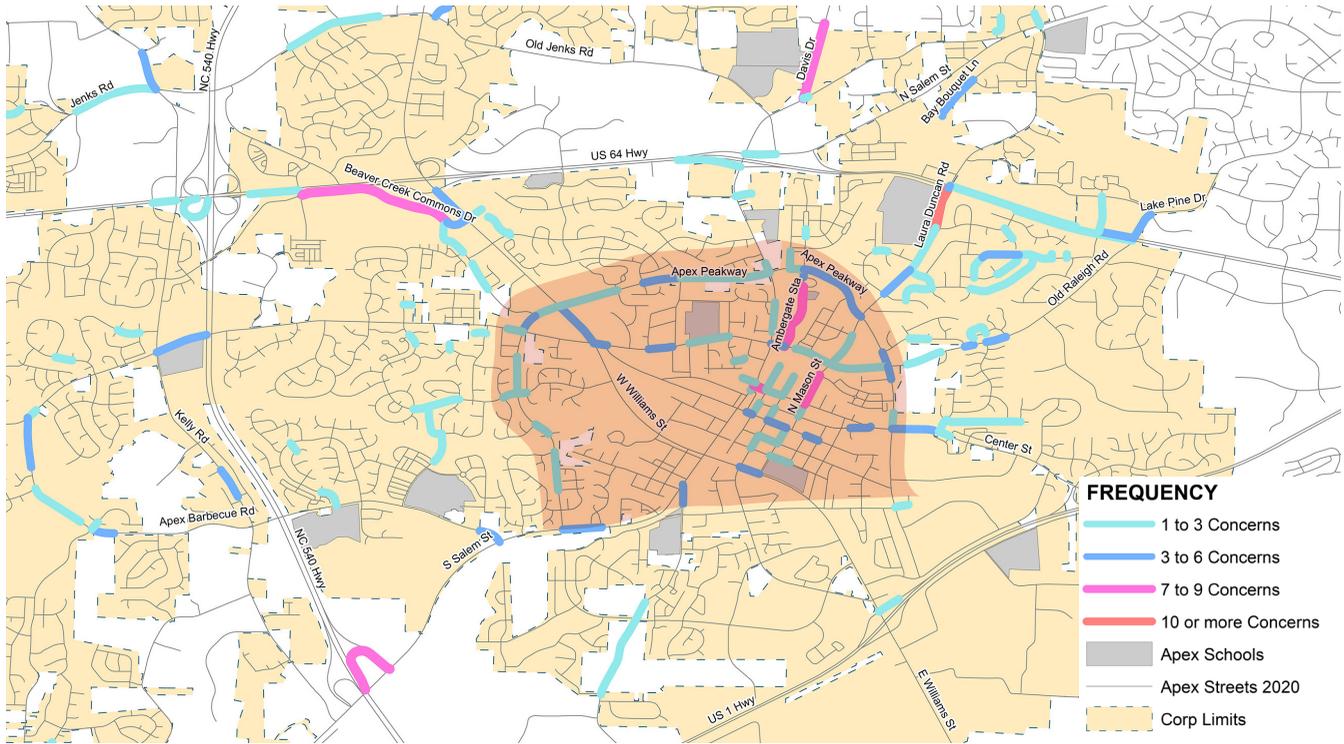


Almost three-quarters of the transportation safety concerns (69%) were one of the following five types:

- 1 Unsafe intersections
- 2 Lack of Sidewalk Connections
- 3 Speeding
- 4 Crossing the Street as a Pedestrian
- 5 Unsafe Driver Behavior



Thirty percent of all safety concerns were reported in the urban core of Apex, within the Apex Peakway. Fifteen percent of safety concerns were reported around schools.



Public input confirmed the need to address the Town's high injury networks. Nine of the top 12 high injury signal locations and seven of the top 16 high injury roadway segment locations were identified by the public as areas of concern.

### Priority Public Outreach and Education Programs

The top five public outreach and education programs the Town should place the most focus on according to survey respondents included:

- |   |  |
|---|--|
| <p>1</p>  <p><b>Speeding and Traffic Calming</b></p>         | <p>4</p>  <p><b>Safe Routes to School</b></p>          |
| <p>2</p>  <p><b>Pedestrian/ Bicycle Safety</b></p>           | <p>5</p>  <p><b>Young Driver/ Passenger Safety</b></p> |
| <p>3</p>  <p><b>Distracted Driver/ Behavior Programs</b></p> |  |



Laurel Park Elementary School Crosswalk

## Chapter 4: Programs and Initiatives

The Town of Apex has introduced several programs and initiatives to improve the safety of its transportation system. Details on these programs and initiatives are as follows:

### Planning and Engineering

#### Crosswalk Lighting Improvement Program

The Town initiated this program in 2020. Planning staff prioritize locations through use of GIS and take light-reading measurements on site. Public Works staff confirm recommendations for Electric staff to install/upgrade lighting.

#### Rectangular Rapid Flashing Beacons and High Visibility Crosswalks

The first Rectangular Rapid Flashing Beacon (RRFB) system in Apex was installed for the crosswalk across Apex Barbecue Road at Scotts Ridge Elementary School in 2016. Currently the Town maintains eight RRFBs, with plans to install two more in 2022. RRFBs allow

pedestrians to press a button that activates a flashing warning to alert oncoming motorists. This device provides enhanced visibility for crossings where warranted by higher pedestrian volumes and serves as a potential countermeasure where data has shown a crash history despite warning signs and markings.

#### Safe Routes to School Improvement Program

The Town initiated a Safe Routes to School (SRTS) improvement program in 2018. The initial analysis identified gaps in infrastructure for 17 schools and led to the development of a Pedestrian Needs Inventory. The analysis was updated in 2021 based on follow-up meetings with Apex Principals and site visits. Recommendations in the inventory along with ongoing evaluation are used to inform the Capital Improvement Plan (CIP) with an annual expenditure of approximately \$500,000 per year. The Town also pursues competitive grant funding to address SRTS needs. In

2021, a local Streets and Sidewalks bond was approved. Bond funding will be used to address SRTS needs. Improvements include new and enhanced facilities (crosswalks, sidewalks, and paths) to promote walking and biking to school.

### **School Zone Time of Day Flashing Beacon System**

Apex began operating a Town-wide school zone time of day flashing beacon system in 2016. Ten (10) schools are currently served by time of day flashing school speed reduction beacons. The beacons provide enhanced visibility and more accurate warnings based on actual varying school bell times compared to static signs. Access to the system via desktop computer and mobile app with real-time adjustments based on alerts from the school system makes the beacons both flexible and easy to monitor.

### **Traffic Calming Program**

The Apex Unified Development Ordinance provides for traffic calming requests to be studied and implemented when warranted on residential streets as well as evaluation for proposed residential streets in the plan review process. More information can be found on the [traffic calming webpage](#).

### **Traffic Safety Improvement Program**

This program began in 2012. Public Works staff summarize information from the annually published North Carolina Highway Safety Improvement Program lists below, tracking from year-to-year, and request Police input.

- Potentially Hazardous Intersection Locations
- Potentially Hazardous Section Locations
- Potentially Hazardous Bicycle and Pedestrian Intersection Locations

Locations identified are compared to planned local and state projects and considered



Apex Police Officer on bicycle at Peakfest

for possible countermeasures. Identified improvements are proposed for funding through the CIP.

## **Enforcement & Education**

### **BikeSafe NC**

The Apex Police Department supports and is an active in BikeSafe NC. This program invites motorcyclists to participate in rider skills sessions that offer rider assessments on driving skills and provides recommendations to help make rider safety a priority. Experienced motorcycle officers from local and state law enforcement agencies deliver this program. The unit conducts several BikeSafe courses within our community annually to enhance rider skills.

### **Data-Driven Approach to Crime and Traffic Safety Model**

Data-Driven Approach to Crime and Traffic Safety (DDACTS) is a law enforcement operational model supported by a partnership with the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) as well as two Department of Justice agencies, the Bureau of Justice Assistance

(BJA) and the National Institute of Justice (NIJ). The Apex Police Department has integrated this data-driven approach into its operations. DDACTS has allowed the Apex Police Department to incorporate location-based crime and traffic crash data to determine the most effective methods for deploying law enforcement and other resources. Drawing on the deterrent value of highly visible traffic enforcement and the knowledge that crimes often involve motor vehicles, the goal of DDACTS is to reduce crime, collisions, and traffic violations across the country.

### **Mothers Against Drunk Driving**

The Apex Police Department supports and has established a partnership with Mothers Against Drunk Driving (MADD). This organization and the Apex Police Department collectively seek to stop drunk driving, prevent underage drinking, and strive for stricter impaired driving laws, whether the cause of impairment is from alcohol or drugs. The Apex Police Department Traffic Safety Unit is actively involved in MADD's Power of Parents and Power of Youth Education Programs. The programs target middle and high school students and their parents and focus on the dangers and consequences of underage drinking. Power of Youth is taught at every driver's education class at both Apex high schools.

### **North Carolina Governor's Highway Safety Program**

The Apex Police Department supports and is an active partner with the Governor's Highway Safety Program (GHSP). The GHSP provides support and resources to law enforcement agencies to reduce traffic collisions and promote highway safety awareness through a variety of grants, traffic safety/awareness messages, and safe-driving initiatives. The program addresses such issues as impaired



*Apex supports programs that address distracted driving*

driving, seat belt use, speeding, distracted driving, motorcycle safety, bicycle safety, pedestrian safety and other aspects of highway safety. In addition to this partnership, the Patrol Captain represents law enforcement on the NC GHSP Traffic Safety Symposiums board. This board develops the biennial training symposium to keep law enforcement abreast of current traffic related trends and enhances their training on enforcement and crash reduction.

### **Traffic Incident Management Systems**

Traffic Incident Management Systems (TIMS) is a national program that uses a planned and coordinated process to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible. The program is designed through its implementation to prevent secondary collisions. The Apex Police Department, Apex Fire Department and other Town of Apex resources utilized this traffic management program to respond to and resolve traffic incidents within Apex. All sworn personnel and Fire personnel are trained in this national program.



*Pedestrians in Downtown Apex*

### **Vehicle Injury Prevention for a Very Important Person**

The Apex Police supports and participates in the VIP for a VIP Program (Vehicle Injury Prevention for a Very Important Person). This program educates teen drivers about the dangers of driving impaired and/or distracted driving. The program exposes high school students to a mock fatal vehicle crash embedding the consequences into the minds of teenage drivers. The vision is that, by the end of the day, students will have a realistic picture of what can happen due to a moment of inattention and/or impaired driving. Volunteers from local fire, EMS, Police as well as the North Carolina State Highway Patrol, deliver this program. This program is typically offered twice a year at both Apex high schools.

### **Watch for Me NC**

The Apex Police Department is committed to the safety of pedestrians and bicyclists within our community and has partnered with Watch For Me NC Program to help enhance pedestrian and bicycle safety. The program focuses on safety and educational messages directed towards drivers, pedestrians and bicyclists, and high visibility enforcement in an effort to reduce violations of traffic safety laws in Apex.

### **Plans and Policies**

The Town also has several plans and policies that informed the Vision Zero Action Plan. Additionally, the Town is considering instituting a number of other policies to improve the safety of its transportation system.

Details on the plans and policies are discussed in [Appendix A](#).



Vision Zero Steering Committee

## Chapter 5: Goals and Actionable Strategies

### Commitment Statement and Guiding Principles

As a community, it's our responsibility to promote solutions to eliminate transportation-related deaths and severe injuries in Apex by 2035.

– Vision Zero Commitment Statement

The following principles were developed by the Vision Zero Task Force with support from the Steering Committee and guide the development of Apex's Vision Zero Action Plan.

1. Traffic deaths and severe injuries are unacceptable and preventable.
2. Human life and health are prioritized within all aspects of the transportation system.
3. Human error is inevitable and transportation systems should be forgiving.
4. Systems-level changes should be prioritized above influencing individual behavior.
5. Transportation safety solutions must be collaborative, equitable, and data-driven.
6. Transportation initiatives should encourage alternative modes of transportation to single-occupancy vehicles.



The Town developed four goals to help achieve its desired transportation future.

Goal	Description
<b>1</b>	<b>Promote a culture of traffic safety that prioritizes equity and inclusion.</b> Include users of all ages and abilities in planning, designing, and operating Apex's transportation system to ensure that all residents can travel safely while increasing the use of multi-modal transportation.
<b>2</b>	<b>Address collisions through infrastructure investments.</b> Apply countermeasures to improve roadway safety broadly, and focus improvements at high collision frequency and severity "hotspot" locations.
<b>3</b>	<b>Enhance Town policies, processes, and evaluation to incorporate Vision Zero tenets.</b> Consider the effect of all Town decisions on walking and driving, fulfilling a vision that facilities are safely walkable whenever possible and drivable whenever necessary.
<b>4</b>	<b>Create and leverage partnerships to improve traffic safety and awareness.</b> Collaborate with universities, businesses, state entities, and local communities to improve traffic safety and promote, educate, and encourage safer practices among people driving, walking, riding transit, and bicycling.

## Actionable Strategies

Actionable strategies are specific activities the Town will undertake to achieve its goals. The actionable strategies are organized around a Five "E" Approach. The goals that align with each strategy, the departments responsible for implementation, and the time frame for implementation are included for each strategy. Many actions will be ongoing and need to happen consistently over time. Ongoing actions are indicated by a dashed line within each timeline.



### Engineering Actionable Strategies

1. Review and refine the method for prioritizing bicycle and pedestrian needs using crash data, information from the ADA Transition Plan, pedestrian facility gaps to bus stops, equity considerations, and community input gathered for the Vision Zero Action Plan.



- Develop and maintain a traffic safety performance management system to track traffic collision data and system performance metrics on an annual basis to inform safety improvement projects.



- Develop and maintain a traffic engineering toolbox of countermeasures to address traffic safety.



- Conduct engineering studies and identify countermeasures that will address traffic safety on the high injury network. Use this information to prioritize projects for the Capital Improvement Plan (CIP).



- Develop a performance evaluation process for ranking traffic safety projects based on a benefit or value to cost analysis.



- Prioritize the design and maintenance of pedestrian and bicycle facilities, to comply with the Americans with Disabilities Act, ensuring facilities are clear of poles, signs, trees, shrubbery, and other impediments.



- Coordinate with school officials and Wake County Public School System to evaluate pedestrian and bicycle needs, provide pedestrian and bicycle routes, and address school transportation safety concerns in order to promote walking and biking to school.



### Education Actionable Strategies

- Create a social media campaign with appropriate traffic messages that targets the following 5 most relevant concerns identified through public input: (1) Speeding and Traffic Calming, (2) Pedestrian and Bicycle Safety, (3) Distracted Driver / Behavior Programs, (4) Safe Routes to School, (5) Young Driver / Passenger Safety.



2. Create safe traffic messaging information on buses and at or around bus stops.



3. Create a safety education team that will engage in traffic safety outreach and education to community groups (schools, churches, HOAs, and Town staff), and will be supported by the social media campaign and safe traffic messaging.



4. Provide targeted outreach when adding new traffic signals, roundabouts, and pedestrian and bicycle facilities to the transportation network.



5. Provide Town employees with defensive driving classes and curriculum on an annual basis.





## Encouragement Actionable Strategies

1. Partner with schools for National Walk to School Day and other walking and biking events.



2. Make Vision Zero visible through Town-sponsored and co-sponsored events and festivals.



3. Develop Vision Zero marketing materials. Disseminate through various medium, including the Town's website and newsletter.



- 4. Keep Town Council members informed about the Vision Zero program, with updates on traffic safety projects, program performance metrics, and outreach and education initiatives.

**Goal:** 1

**Leading Department:** Transportation

**Supporting Department:** Administration, Police Department, Communications, Planning and Community Development

**Timeframe:**  0-2 2-5 5-7 7-10 YEARS

- 5. Continue participation in statewide Vision Zero programs through the North Carolina Governor's Highway Safety Program and the University of North Carolina at Chapel Hill Highway Safety Research Center.

**Goal:** 4

**Leading Department:** Transportation

**Supporting Department:** Planning and Community Development, Police Department

**Timeframe:**  0-2 2-5 5-7 7-10 YEARS

- 6. Participate in conferences that include traffic safety programs and look for opportunities to network with other organizations for knowledge sharing.

**Goal:** 4

**Leading Department:** Transportation

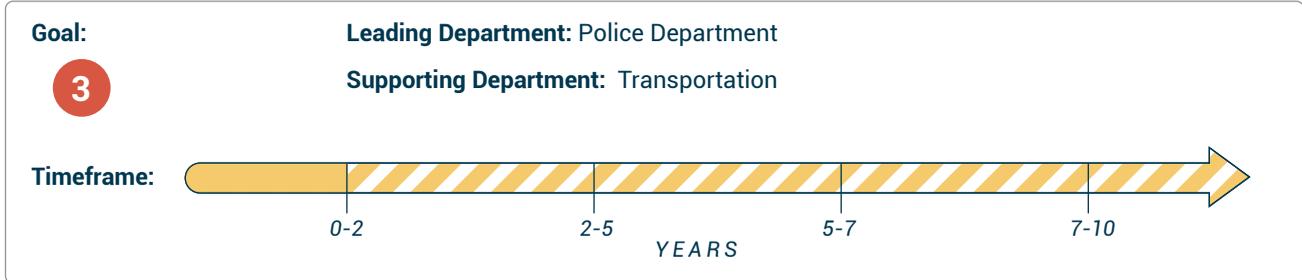
**Supporting Department:** Planning and Community Development, Police Department

**Timeframe:**  0-2 2-5 5-7 7-10 YEARS

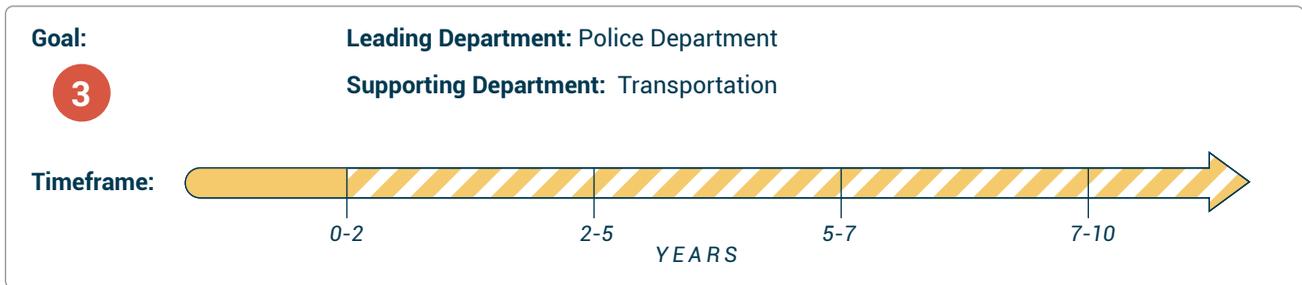


## Enforcement Actionable Strategies

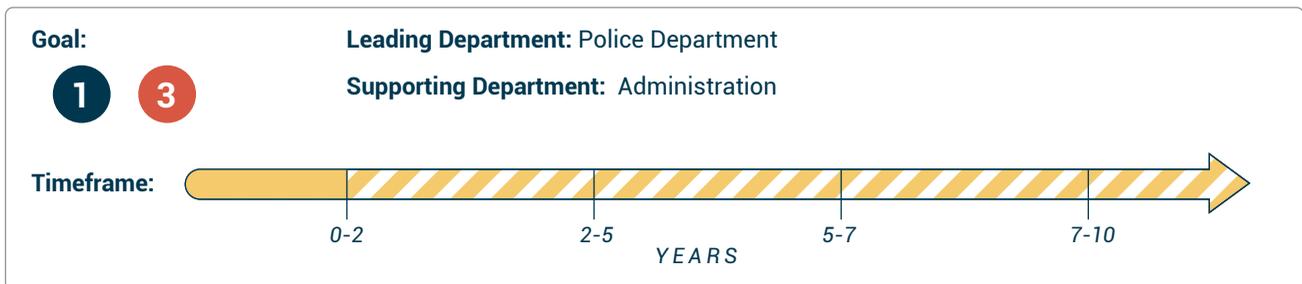
1. Develop a reporting system of performance metrics on an annual basis to inform police enforcement activity.



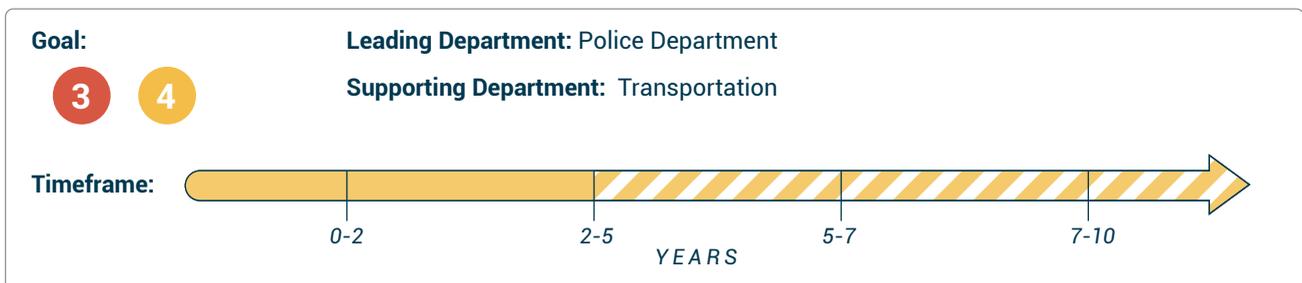
2. Target enforcement on the high injury network, and target the most dangerous driving behavior.



3. Continue to review and improve upon existing processes that protect against racial profiling.



4. Research enforcement techniques and partner with other municipalities in the region to reduce high-risk driving behavior.





## Evaluation Actionable Strategies

1. Evaluate and update the Town-wide policy, guidance and specifications with the goal of promoting alternative modes of transportation, including more walkable, transit-friendly, and bicycle-friendly streets.



2. Evaluate and update Town-wide policy, guidance and specifications with the goal of reducing crash severity within the public right-of-way and in public vehicular spaces.



3. Develop a traffic safety report card and progress report on the actionable strategies on an annual basis for public information and to inform policy decisions. Update crash statistics, the high injury network, and performance metrics as part of the annual reporting process.



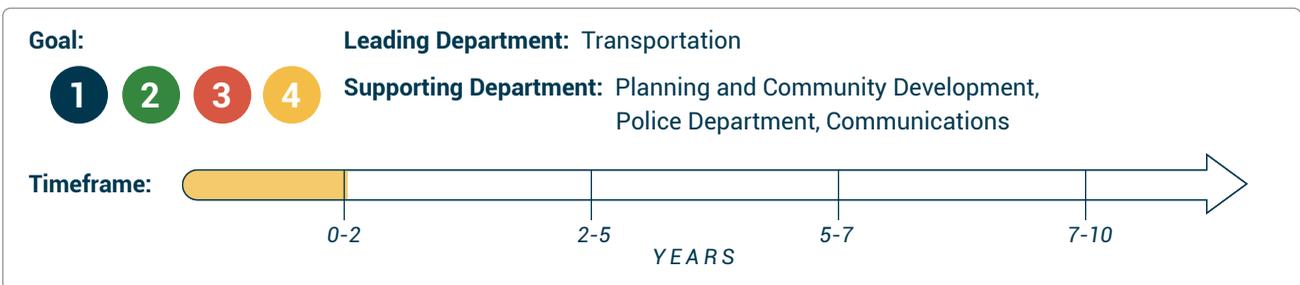
- Continue to evaluate traffic enforcement and education techniques to adapt to changes in technology and road user behavior.



- Continue regular collaboration of the Vision Zero Task Force to check in on progress, issues, and ideas.



- Hire a Traffic Safety Engineer to oversee implementation of the Vision Zero Action Plan, annual reporting, coordination of the Task Force, communication with the community, and to seek funding opportunities for infrastructure projects.





## Chapter 6: Implementation and Evaluation

Implementation and evaluation of actionable strategies will require a strong commitment from the Town as well as close collaboration across departments facilitated by the Task Force and continuous outreach to businesses, state entities, other Vision Zero communities, and Apex residents.

The evaluation process in this chapter will be used to track and measure progress across actionable goals and strategies. In addition, physical improvements to roadways, bicycle, pedestrian, and transit facilities based on the Vision Zero Action Plan will be prioritized as described in this section.

### Priority Infrastructure Improvement Projects

#### Apex Traffic Signal System

The Town should prioritize upgrading and connecting the traffic signal system by pursuing CIP and other funding and forming partnerships. Traffic signals within the Town of Apex are currently either part of the Town of Cary Signal System, controlled by NCDOT within one of the independent closed-loop systems, or isolated NCDOT signals. Apex has limited maintenance responsibilities with respect to a few locations. There is an increasing expectation for Apex to both maintain and control traffic signals throughout the community as traffic volumes increase, locally-maintained roadway mileage expands, and pedestrian facilities are expanded and connected to signalized intersections.

The Western Wake Traffic Signal System Integration (WWTSSI) Study was completed in July 2022 for adoption by the Executive Board of the Capital Area Metropolitan Planning Organization (MPO) in August. It evaluated technology and options for traffic signal system expansion, potential partnerships, benefits, and planning-level operating costs for western Wake County communities. This study effort included participation by NCDOT, Town of Cary, Town of Apex, Town of Holly Springs and Town of Fuquay-Varina.

Benefits to installation of town wide traffic signal communication fiber lines along with upgrading equipment and establishing a centralized traffic signal system include: automated data collection, improved traffic-responsive and coordinated signal timing, ability to monitor traffic flows and adjust signal timing in real-time, plus faster maintenance and emergency response times than what NCDOT might otherwise be able to provide. Additional safety benefits could also come from adding GPS or Cellular-based vehicle preemption for improving emergency response and transit priority along with other vehicle-to-infrastructure technology to enhance network safety and reliability. Emergency vehicle preemption is currently proposed within the Capital Improvement Program to install along high-priority corridors for fire department vehicles, but would be more cost-effective to implement as part of a larger signal system project.

### Low-Cost/High-Impact Countermeasure Toolbox

Part of Apex's actionable strategies is to develop a toolbox of proven, low-cost, high-impact countermeasures that can be applied systemically to the high injury network for measurable results. There are many low-cost, high-impact countermeasures that the Town can implement in the immediate and short-term (beginning in years 0-2) that are proven to reduce the percentage of fatal and severe injury collisions and address each mode of transportation. Apex has already developed a table of potential countermeasure strategies for various types of locations, targeting a specific mode of travel, with an anticipated

crash reduction benefit. The table below shows the percent reduction in fatal/severe injury collisions by travel mode expected after implementation of each treatment type or countermeasure at different treatment locations.

The countermeasures listed in this table are just a starting point for the Town. Apex will grow and expand this table into a comprehensive toolbox within two years of plan adoption. The ultimate product will follow AASHTO's Strategic Highway Plan guidance and provide supplemental information in relation to cost, effectiveness, challenges, and policy issues for each strategy.

Location of Treatment	Treatment Type/Countermeasure	% Reduction in Fatal/Severe Injury by Travel Mode
<b>Pedestrian, Cyclist and Transit Oriented Countermeasures</b>		
Midblock Crosswalk	Refuge Island with Marked Crosswalk	56% (Ped)
Signalized Intersections	Signalized crosswalks	20%-25% (Ped)
Signalized Intersections	Leading Pedestrian Interval	5% (Ped)
Near Schools and Commercial High Pedestrian Areas	Traffic Calming (Raised crosswalk, or Speed humps at crosswalk approaches)	30% (Ped)
Midblock Crosswalk	Install a Rectangular Rapid Flashing Beacon	25%-27% (All)
Bus Stops	Lighting	30% (Ped)
Bus Stops	Install sidewalk to avoid walking on roadway	65%-89% (Ped)
<b>Vehicle Oriented Countermeasures</b>		
Unsignalized Intersections	Convert Two-Way to All-Way Stop (warranted)	47% (All)
Unsignalized Intersections	Convert Two-Way Stop to mini-roundabout/traffic circle	44% (All)
Signalized Intersections	Provide protected left turns	30%-36% (All)
Signalized Intersections	Install Emergency Vehicle Preemption	70% (All)
Roadway Segments (Curves)	Install Edgeline Markings	15%-44% (All)
Roadway Segments (Curves)	Install curve advance warning signs	10%-30% (All)
Roadside	Remove or relocate fix objects outside the Clear Zone	38% (All)

Source: Desktop Reference for Crash Reduction Factors Report No. FHWA-SA-07-015, published by the U.S. Department of Transportation Federal Highway Administration. September 2007.

## Roadway Improvements

Engineering actionable strategies involving physical alterations to roadways can be costly and difficult to implement, oftentimes requiring years of work involving programming, study, design, property acquisition, and construction. In order to make progress toward Vision Zero, the Town intends to implement an incremental strategy where low-cost/high-impact roadway projects can be implemented systematically beginning in the 0-2 year timeframe and high-cost/high-impact projects can be further prioritized and implemented beginning in the 2-5 year timeframe. Implementation of both strategies will require ongoing work over time.

To determine where and what type of improvements are needed, Apex will build upon the existing high injury network (see pages 27-30) by performing detailed collision analyses and express design studies for each roadway segment and intersection. Analyses will begin with the highest-priority locations based on crash severity ranking, and continue through the intersections and segments along the High Injury Network.

The tables below break down the High Injury Network priorities for intersections and roadway segments into excluded from the State Transportation Improvement Program (STIP) and included in the STIP. Where there is overlap between the high-priority intersections and high-priority roadway sections, expanding an intersection project can be targeted to address both.

The STIP is a 10-year program, subject to reprioritization and the availability of funds to move projects forward. Apex has experienced significant delays in STIP projects over the last five years. For those locations that have a project already programmed in the STIP, the goal of the additional study will be to identify

whether there are low-cost countermeasures the Town could implement in the interim to help address safety in the short term before STIP projects move forward. The Town will also continue to monitor the programming of these STIP projects and advocate they move forward based on the completed analysis. The Town will share the results of the detailed collision analyses with NCDOT and the Capital Area Metropolitan Planning Organization (CAMPO) to inform the ultimate design of major improvements at these locations.

For those locations that do not have a project programmed in the STIP, the study will identify both countermeasure opportunities and more substantial roadway alterations that would need to be programmed and implemented over time. For these locations, the Town will need to submit major project recommendations for inclusion in the STIP, submit projects for local prioritization in the Town's Capital Improvement Program (CIP), or identify other funding sources.

For each location studied, a cost analysis will be performed, and projects will be ranked based on a benefit or value to cost analysis. Ultimate prioritization will also be based on the benefit of the project to multiple travel modes, input received from the public, and the eligibility of projects for other funding. This additional analysis and prioritization is anticipated to occur initially between years 0-2 of action plan implementation, with continuous evaluation over time.

### High Injury Network Intersection Priorities – Excluded from STIP

Ranking (Crash Severity)	Ranking (Total Crashes)	Intersection
2	1	US 1 SB Off Ramp at NC 55
4	9	US 64 EB Off Ramp/US 64 EB On Ramp at NC 55
8	6	SR 1444 (Lufkin Rd) at NC 55
10	10	Vision Dr at NC 55
11	4	Beaver Creek Commons Dr/Pemberton Hill Rd at NC 55
5	9	Apex Peakway at NC 55 (W Williams St)*

\*Geometric improvements at this intersection were completed in 2018

### High Injury Network Intersection Priorities – Included in STIP

Ranking (Crash Severity)	Ranking (Total Crashes)	Intersection
1	5	Lake Pine Dr at US 64
3	2	SR 1444 (Lufkin Rd)/US 1 at SR 1010 (Ten Ten Rd)
6	3	SR 1308 (Laura Duncan Rd) at US 64
7	7	SR 1158 (S Hughes St) at NC 55 (E Williams St)
9	8	E Williams St/SR 1191 (Technology Dr) at NC 55
12	9	SR 1160 (Olive Chapel Rd)/Hunter St at NC 55

### High Injury Network Roadway Segment Priorities – Excluded from STIP

Ranking (Crash Severity)	Ranking (Total Crashes)	Roadway Segment
1	116	N Salem St (Thales Academy to Brittley Way)
2	198	Veridea Parkway (Prince Dead End Rd to King David Ct)
3	154	Apex Barbecue Rd (Kinship Ln to Evans Rd)
4	1	E Williams St/NC 55 (Public Power Dr to Pristine Water Dr)
6	2	Beaver Creek Commons Dr (Creekside Landing Dr to Zeno Rd)
7	3	E Williams St/NC 55 (Pristine Water Dr to 1521 E Williams St)
8	7	E Williams St/NC 55 (1650 E Williams St to 1775 E Williams St)
12	8	W Williams St/NC 55 (Apex Peakway to Hunter St)
14	18	E Williams St/NC 55 (Lufkin Rd to Public Power Dr)
16	13	E Williams St/NC 55 (1521 E Williams St to 1581 E Williams St)
10	14	Lake Pine Dr (Versailles Dr to Pine Plaza Dr)*

\*Locally-managed improvement project with federal funds under construction in 2021-2022

## High Injury Network Roadway Segment Priorities – Included in STIP

Ranking (Crash Severity)	Ranking (Total Crashes)	Roadway Segment
5	4	Lake Pine Dr (Pine Plaza Dr to US Hwy 64)
9	5	US Hwy 64 (Laura Duncan Rd to Knollwood Dr)
11	6	E Williams St/NC 55 (S Mason St to S Tunstall St)
13	12	E Williams St/NC 55 (Perry Road to Apex Peakway)
15	10	E Williams St/NC 55 (James St to Perry Rd)

### Bicycle and Pedestrian Improvements

Based on the crash data presented in the map on page C-15, the roadway segments and intersections where severe or fatal bicycle or pedestrian crashes have occurred are:

- W. Williams Street from Hunter Street to Old Jenks Road
- Beaver Creek Commons Drive from W Williams Street to Creekside Landing Drive
- North Salem Street from Hunter Street to Brittley Way
- Apex Barbecue Road at Kinship Lane
- Humie Olive Road at Evans Road
- North Salem Street at Old Jenks Road
- North Salem Street at Salem Church Road
- Laura Duncan Road at Knollwood Drive
- Pine Plaza Drive in Nichols Plaza
- Parkfield Drive at Briarfield Drive
- Woodlands Creek Way
- Olive Chapel Road

If a severe or fatal bicycle or pedestrian crash occurs in Apex, there is an evaluation of whether infrastructure improvements are needed.

Many of the locations have been evaluated and addressed. The Town will revisit the crash data for each of these locations, determine if improvements have already been completed, evaluate whether additional improvements are needed, and prioritize these projects. In addition, the Town will complete the crosswalk lighting initiative and continue to proactively identify, prioritize, and construct Safe Routes to School projects.

### Transit Improvements

Transit use has been limited in Apex, but is anticipated to increase as a travel mode as the Town implements its first local bus route and regional providers increase the span and frequency of routes serving Apex. As ridership increases, the Town will begin to track crashes and safety concerns at bus stops. As needs are identified at transit stops, these projects will be prioritized in the CIP. Transit riders are often bicyclists or pedestrians before and after their bus trip. The Town will develop and carry out a method to identify, prioritize, and construct Safe Routes to Transit projects.

## Evaluation

The Town has established a foundation for a successful Vision Zero Action Plan. It formed a multi-stakeholder Task Force, conducted robust community engagement, built a data framework, and set measurable goals and actionable strategies with a clear timeline for implementation.

To ensure the Vision Zero Action Plan is a living document, there must be a transparent, regular, and performance-based evaluation process to track progress towards achieving and maintaining the goal of zero fatalities and severe injuries on Apex roads. The process involves annual data gathering, data processing to update crash maps and track changes to the high injury network over time, setting and monitoring performance metrics, reporting results, and changing approaches if needed. The evaluation process will answer fundamental questions such as:

- Have crashes involving fatalities and severe injuries decreased year-over-year trending toward zero?
- Have we continued our trend of expanding transit service and adding pedestrian and bicycle facilities, targeting areas with higher risk, and making equity a top priority?
- Have we increased the use of multiple modes of travel in Apex?
- Have we prioritized, funded, and implemented improvements on our high injury network?
- Is the Apex Community aware of the Town's Vision Zero initiative and can they easily find the results?

As a part of the evaluation process, the Town will provide status updates on the implementation of actionable strategies through development of an annual report. The annual report will be shared with Town Council and published on the Vision Zero website for access by the public. Relevant updates will be shared on the website and on social media platforms. The Town will track public outreach efforts associated with Vision Zero and provide the continued ability for citizens to provide comments and concerns through the Vision Zero website. The Town will also continue to provide information about Vision Zero at Town events and the Task Force will continue to meet monthly.



# Appendix

## Appendices

<b><u>Appendix A:</u></b> Plan and Policy Review .....	A-1
<b><u>Appendix B:</u></b> Public Input .....	B-1
<b><u>Appendix C:</u></b> Collision Maps and Data .....	C-1

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## **Plan and Policy Review**



# Plan & Policy Review

This is a summary of information from relevant Town plans and policies, intended to inform the Vision Zero Action Plan. This report includes key connections to the Vision Zero initiative from the following plans: Advance Apex; Bike Apex; and the Parks, Recreation, Greenways, and Open Space Master Plan. The report also includes summaries of existing traffic safety-related policies and potential policies to consider. These policies include the following: complete streets, off-street parking lot design, bicycle helmet wearing, biking on sidewalks, traffic calming, speed limits, roadway design standards, pedestrian crosswalk evaluation, transit stop design guidelines, school zone flashing beacons, red light cameras, and speed cameras.

## Americans with Disabilities Act (ADA) Transition Plan

The Town completed an [ADA Transition Plan](#) in 2022 and is actively working on implementation and recommendations.

- Lake Pine Drive at MacGregor Pines Drive/Pine Plaza Drive
- Tingen Road at James Street
- Laura Duncan Road at Laura Village Drive

## Advance Apex: The 2045 Comprehensive Transportation Plan

In February 2019, the Town Council adopted [Advance Apex: The 2045 Comprehensive Transportation Plan](#). This plan identifies transportation needs for all modes and establishes a vision for the transportation network. Key information related to Vision Zero is below.

- Apex should pay special attention to its walkability, bike facilities, and safety in neighborhoods surrounding schools, parks, and libraries.
- As of April 2021, North Carolina's Highway Safety Improvement Program had identified the following intersections as Potentially Hazardous Locations based on statewide crash history:
  - Ten Ten Road at Lufkin Road
  - US 64 WB at Kelly Road
  - NC 55 at Perry Road

- Spot recommendations on the Thoroughfare and Collector Street Plan Map are based on safety and congestion data, or recommendations for new intersections or interchanges based on future roadways.
- Intelligent Transportation Systems (ITS)
  - ITS solutions use communication and computer technology to manage traffic flow in an effort to reduce collisions, mitigate environmental impacts such as fuel consumption and emissions, and reduce congestion from normal and unexpected delays.
  - ITS includes the following:
    - Signalization
    - Progression-Controlled Signal System
    - Dynamic Message Signs (DMS)
    - Emergency Vehicle Preemption
    - Transit Vehicle Preemption

- Connected and Autonomous Vehicle (CAV) Planning Issues
  - Consider design requirements to enhance detection equipment and controller equipment to collect and broadcast speed and safety information.
  - Assess the safety and mobility impacts of providing two-way left turn lanes in a CAV setting.
- Prioritize sidewalks in the Transit-Oriented Development Context Area, the Town Center Context Area, and in School Priority Zones (1/2 mile buffer around schools).
- The Governor’s Highway Safety Program (GHSP) is an annual transportation funding source for safety initiatives.

- Separated Bikeways – Crash reductions observed up to 74%
- Shared-Use Paths – Crash reductions observed up to 60%
- When Apex residents don't ride a bike, the number one reason is because, "it doesn't feel safe" (according to the 2017 Advance Apex survey of 1,235 individuals).

## Bike Apex: The Comprehensive Bicycle Plan

In January 2019, the Town Council adopted [Bike Apex: The Comprehensive Bicycle Plan](#), a bicycle transportation plan that features policy, program, and infrastructure recommendations. Key information related to Vision Zero is below.

- A safety campaign should be launched to encourage motorists to slow down, yield when appropriate, and pass bicyclists safely.
- Bike Apex has a goal to Increase Safety
  - Address the safety and level of comfort of the transportation system for bicyclists.
  - Reduce the number of bicycle collisions, injuries, and fatalities over time.
- Bicycle facility safety benefits
  - Bike Lanes – Crash reductions observed up to 35%

### Bicycle Facilities with Pedestrian Crash Countermeasures

FACILITY TYPE	PEDESTRIAN CRASH REDUCTION FACTOR
Install bicycle & pedestrian overpass/underpass	90%
Install sidewalk or side path (to avoid walking along roadway)	88%
Provide paved shoulder (of at least 4 feet)	71%
Install raised median at unsignalized intersection	46%
Install crossing refuge island	36%
Install crossing countdown signal heads	25%

*Federal Highway Administration. (2008). Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes. [https://safety.fhwa.dot.gov/ped\\_bike/tools\\_solve/ped\\_tctpepc/](https://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/)*



Downtown Rail Crossing

- Between 2007 and 2015, a large majority of bicycle collisions occurred along arterial roadways, with the highest number occurring along NC 55 (13). The most severe collisions occurred along Old US 1 Hwy. This reflects a need for safety improvements along Apex's arterial roadways, and for alternative routing for bicyclists if possible.
- Public Input on Safety
  - Safety concerns were expressed at roadway crossings, such as NC 55 at Jaycee Park, Olive Chapel Road at Fairfax Woods Drive, and multiple locations along US 64 (Laura Duncan Road, Lake Pine Drive, N Salem Street, and Jenks Road).
  - The most noted safety concerns for entire corridors included Old US 1/Salem Street, NC 55, and Ten Ten Road.
- Consider implementing a rail safety program, such as NC's Be RailSafe, especially as proposed projects are constructed in close proximity to railroads.
- Recommendation to continue the Town of Apex Police Department's efforts with the Watch for Me NC Program.
  - Recommendation to publish a foldable paper map with the entire opposite side of the map dedicated to bicycle safety education.
- Recommendation to invest in staff training opportunities related to bicycle infrastructure such as those from the National Association of City Transportation Officials (NACTO) on the Urban Bikeway Design.
- Recommendation to distribute 'Ride Guide: North Carolina Bicycle Laws' - [https://www.bikelaw.com/wp-content/uploads/2014/11/BIKELAW\\_RG\\_NC\\_Web.pdf](https://www.bikelaw.com/wp-content/uploads/2014/11/BIKELAW_RG_NC_Web.pdf)
- State Funding Sources
  - SPOT Safety Program for low cost, high effective safety improvements for intersections (\$250,000 max per project).
  - Highway Hazard Elimination Program is used to develop larger improvement projects to address safety and potential safety issues.

Key Intersection Improvements

Intersection	Pedestrian Crossing Improvements Since Plan Adoption in 2013
Kelly Road and Olive Chapel Road	<ul style="list-style-type: none"> <li>• Crosswalks and pedestrian push-buttons at all four legs of the intersection.</li> <li>• Pedestrian refuge on the northeast corner of the intersection.</li> </ul>
Kelly Road and Beaver Creek Greenway	<ul style="list-style-type: none"> <li>• No at-grade changes</li> <li>• A greenway segment has been constructed under Kelly Road for the future Beaver Creek Greenway extension.</li> </ul>
Olive Chapel Road and Beaver Creek Greenway	<ul style="list-style-type: none"> <li>• No changes</li> </ul>
West Williams Street and Haddon Hall Drive	<ul style="list-style-type: none"> <li>• Crosswalks and pedestrian push-buttons at all four legs of the intersection.</li> </ul>
South Salem Street and Williams Street	<ul style="list-style-type: none"> <li>• Crosswalks and pedestrian push-buttons at all four legs of the intersection.</li> </ul>
North Salem Street and the Apex Peakway	<ul style="list-style-type: none"> <li>• No changes</li> <li>• There are existing crosswalks and push-buttons on the west and north legs of the intersection.</li> </ul>
Apex Peakway and Ambergate Station	<ul style="list-style-type: none"> <li>• Crosswalk across Apex Peakway on the west leg of the intersection with Rectangular Rapid Flashing Beacon and advanced yield pavement markings.</li> <li>• Advance warning signs and advance yield pavement markings on both Apex Peakway approaches.</li> </ul>
Laura Duncan Road and the Apex Peakway	<ul style="list-style-type: none"> <li>• No changes at the intersection.</li> <li>• Side path has been extended north along Laura Duncan Road.</li> <li>• There are existing crosswalks and push-buttons on all four legs of the intersection.</li> </ul>
Laura Duncan Road and Hunter Street	<ul style="list-style-type: none"> <li>• Crosswalks with pedestrian push-buttons on the north and west legs of the intersection.</li> <li>• Accessible curb ramps on the northwest corner.</li> <li>• Detectable surface on the southwest corner.</li> </ul>
Olive Chapel Road and the Apex Peakway	<ul style="list-style-type: none"> <li>• Pedestrian push-button pedestals.</li> <li>• Curb ramp replacements.</li> </ul>
Center Street and the Apex Peakway	<ul style="list-style-type: none"> <li>• Pedestrian push-buttons on the north leg of the intersection.</li> </ul>
US 64 and Laura Duncan Road	<ul style="list-style-type: none"> <li>• Crosswalk and pedestrian push-buttons on the north leg of the intersection.</li> </ul>
US 64 and Lake Pine Drive	<ul style="list-style-type: none"> <li>• No changes</li> </ul>



Apex Community Park

## Parks, Recreation, Greenways, and Open Space Master Plan

In June 2013, the Town Council adopted the [Apex Parks, Recreation, Greenways, and Open Space Master Plan](#). Key information related to Vision Zero is below. An update to this Master Plan is beginning in 2021. There may be an opportunity for the Vision Zero Action Plan to inform the Master Plan update.

- One benefit of side paths is the perceived safety for inexperienced cyclists and families – therefore supporting efforts to increase bicycling as a transportation mode.
- Safe mid-block crossing treatments or signage routing users to the nearest intersection are critical along greenways. Safety measures include pedestrian countdown signals, high visibility crosswalks, curb ramps, pedestrian refuge islands, and parallel connections. The intersections listed on page A-4 were identified by the community as in need of safety and analysis planning.

## [Complete Streets - Town of Apex Unified Development Ordinance](#)

- The street system shall conform to Advance Apex: The 2045 Transportation Plan, this includes the adopted Bicycle and Pedestrian System Plan map.
- Sidewalks must be provided on both sides of all streets for single-family detached homes in Planned Unit Development zoning districts.
- Sidewalks are required as part of all subdivisions along both sides of all thoroughfares and collectors and on one side of all other streets within and bordering the subdivision.
- Non-residential and Planned developments shall provide a continuous walkway from the perimeter public sidewalk or right-of-way to the principal customer entrance of all principal buildings on the site.
- Non-residential and Planned developments shall provide sidewalks along the street-facing side of any lot that abuts a public street, along the full length of the buildings, along any facades featuring a customer entrance, and along any facades abutting public parking areas.

### **Off-Street Parking Lot Design - Town of Apex Unified Development Ordinance**

- No more than 50% of all-street parking spaces shall be positioned between the building and the primary street.
- Parking lots shall be designed to allow pedestrians to safely move from their vehicles to the building.
- Minimum drive aisle widths were recently updated and are either 24 ft or 20 ft, depending on the parking lot layout.
- Each required off-street space shall be identified by surface markings and shall be maintained in a manner so as to be readily visible and accessible at all times.
- Each parking space adjoining a wall, column, or other obstruction higher than 0.5 feet shall be increased by two feet on the obstructed side.
- All off-street parking spaces shall be accessible without backing into or otherwise reentering a public right-of-way.
- All non-residential and/or multi-family sites proposed along a thoroughfare shall be required to dedicate vehicular cross-access to adjacent non-residential and/or multi-family sites.

### **Bicycle Helmet Wearing - Town of Apex Code of Ordinances**

- Every person less than 16 years shall wear a protective helmet while operating a bicycle on any right-of-way or any property owned or controlled by the Town.

### **Biking on Sidewalks - Town of Apex Code of Ordinances**

- Individuals are permitted to ride a bicycle on any public sidewalk as long as they are cautious and yield the right-of-way to all pedestrians and persons on other permitted devices using the sidewalks.
- Speed shall be limited to 10 mph on sidewalks and paths of five feet or less in width and when crossing the intersection of a public street or driveway along any sidewalk or path.
- No person shall ride a bicycle on the sidewalks along N Salem Street between Chatham Street and Templeton Street or along Chatham Street between Seaboard Street and Commerce Street.

### **Traffic Calming - Town of Apex Unified Development Ordinance**

- Traffic calming requirements are found in UDO Section 7.2.1.L.
- Proposed residential developments shall provide traffic calming measure(s) on each residential street where the length exceeds 1,000 ft. Traffic calming measure(s) include but are not limited to traffic circles, roundabouts, curb extensions, chicanes, splitter islands, and designated on-street parking.
- Existing public streets on which traffic calming devices are requested must meet certain criteria:
  - Posted speed of 25 mph;
  - Roadway is not a Collector Street or Thoroughfare;

- Average speed exceeds 30 mph during a study period; and
- The traffic calming device will not create unacceptable delays to emergency response times

- Traffic calming requests must be initiated, accepted, and supported by the residential property owners and will be reviewed by the Town's Traffic/Transportation Engineer, where a speed study conducted by the Public Works and Transportation Department is required to determine if traffic calming devices are warranted.

### Speed Limits - Town of Apex Code of Ordinances

- Speed limits are defined in Sec. 20-100 in the code of ordinances for the Town of Apex. For the purpose of this section, "street" means a street, road, or highway located within the corporate limits of the town that is not part of the state highway/road system.
- Pursuant to G.S. 20-141(e) all speed limits other than 35 miles per hour applicable to streets or sections thereof shall be posted

by signage erected upon the street or section thereof affected. All 35 mph speed limits may be posted, but are effective whether or not posted.

### Roadway Design Standards

- The Town of Apex Standard Specifications and Standard Details are to be utilized as minimum standards for all roadway construction:
  - In such situations where changes or modifications are proposed, the Town of Apex should be consulted prior to completion of final design and plan submittal. Such deviations from the minimum standards receiving such preliminary approval shall be clearly indicated at one location on the construction drawings, and labeled, "Exceptions to the Standard Specifications of the Town of Apex."
  - Section 300 of the Standard Specifications outlines specifications for general design, construction, inspection, and certification of streets including roadway pavement, curb and sidewalk.

*Town of Apex Street Geometric Standards Detail 300.14*

CLASSIFICATION	DESIGN SPEED (MPH)	MAX. GRADE (%)	HORIZONTAL CURVE CONTROLS		VERTICAL CURVE CONTROLS	
			MAX. SUPER ELEVATION (%)	MIN. CL RADIUS (FT)	MIN. LENGTH CREST (FT)	MIN. LENGTH SAG (FT)
THOROUGHFARE	50	7	4	926	84A	96A
MAJOR COLLECTOR	35	10	4	371	29A	49A
MINOR COLLECTOR RESIDENTIAL STREET	25	10	NC	198	12A	26A
ALLEY	--	10	RC	50	12A	26A



*Downtown Apex is a high pedestrian activity area*

- Section 300 of the Standard Details provides 40 detail sheets related to design of street typical sections, subdivision entrances, cul-de-sac and stub street turnarounds, curb and gutter, sidewalk and curb ramp, conduit crossing, trench and pavement repair, signage, traffic calming, bicycle parking, driveway grades and apron standards, single lane roundabout design, and design of channelized islands.
- Standard detail 300.14 (see page A-7) provides minimum geometric standards for streets based on roadway facility type.
- The Town of Apex also relies on AASHTO design guidelines (A Policy on Geometric Design of Highways and Streets and the Roadside Design Guide), NCDOT Design Manual, and the Manual on Uniform Traffic Control Devices.

## Pedestrian Crosswalk Evaluation

- Town staff evaluate locations for potential crosswalk installation and improvements by conducting pedestrian crossing studies.
  - Studies are conducted at specific locations using motion sensor trail cameras.
  - Studies are conducted for a duration of one week.
  - The following data is collected as part of the study:
    - Five-year crash history
    - Roadway traffic volume
    - Sight visibility and other geometric constraints at the crossing
    - Study weather conditions and observations
- Town staff use the following reference guides along with the collected data to

make informed decisions on warranting crosswalks:

- NCDOT Pedestrian Crossing Guidance
  - NCDOT Standard Practice for Crosswalks
  - Manual on Uniform Traffic Control Devices
- Potential measures include high-visibility markings and signs, advance warning signs, advance yield markings and signs, and push-button activated Rectangular Rapid Flashing Beacon (RRFB) systems.

## Transit Stop Design Guidelines

- In April 2022, Town Council adopted Bus Stop Design Standards. These standards are available in Section 300.32 of the Standard Specifications. The bus stop standards require all bus stops be designed to meet Americans with Disabilities Act (ADA) requirements and NCDOT clear zone requirements.
- All new bus stops are required to have accessible pedestrian facilities, an accessible landing pad, lighting, and a bus stop sign. Additional amenities such as a bench, shelter, trash receptacle, and bike parking may be provided per the standard specifications.
- The Town of Apex may consider establishing Transit Stop Design Guidelines to inform public and private development of bus stops. These guidelines may include sample bus stop amenity specifications as well as bus layover needs and specifications. The Transit Stop Design Guidelines would need to account for the variability in bus stop design based on engineering constraints and the surrounding land uses/context.

## School Zone Flashing Beacons

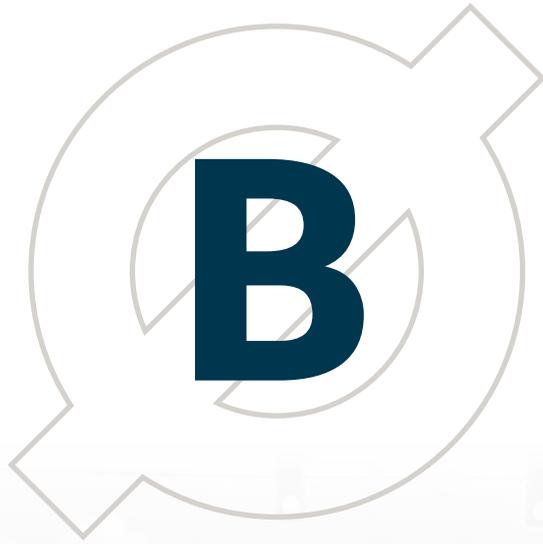
- The Town operates a school zone flashing beacon system for public school zones in Apex located on roads posted 35 mph or faster.
- Private schools may become part of the system through a funding agreement with Apex to install and maintain their beacons.
- The beacons indicate a school zone speed reduction of 10 mph.
- The beacons are operated and maintained by the Public Works & Transportation Department using a cloud-based cellular communication system with pre-programmed schedules and on-demand schedule changes using a web interface when notified by the school system.
- As new public schools are proposed, the system is expanded with new beacons to serve additional school zones.

## Red Light Cameras

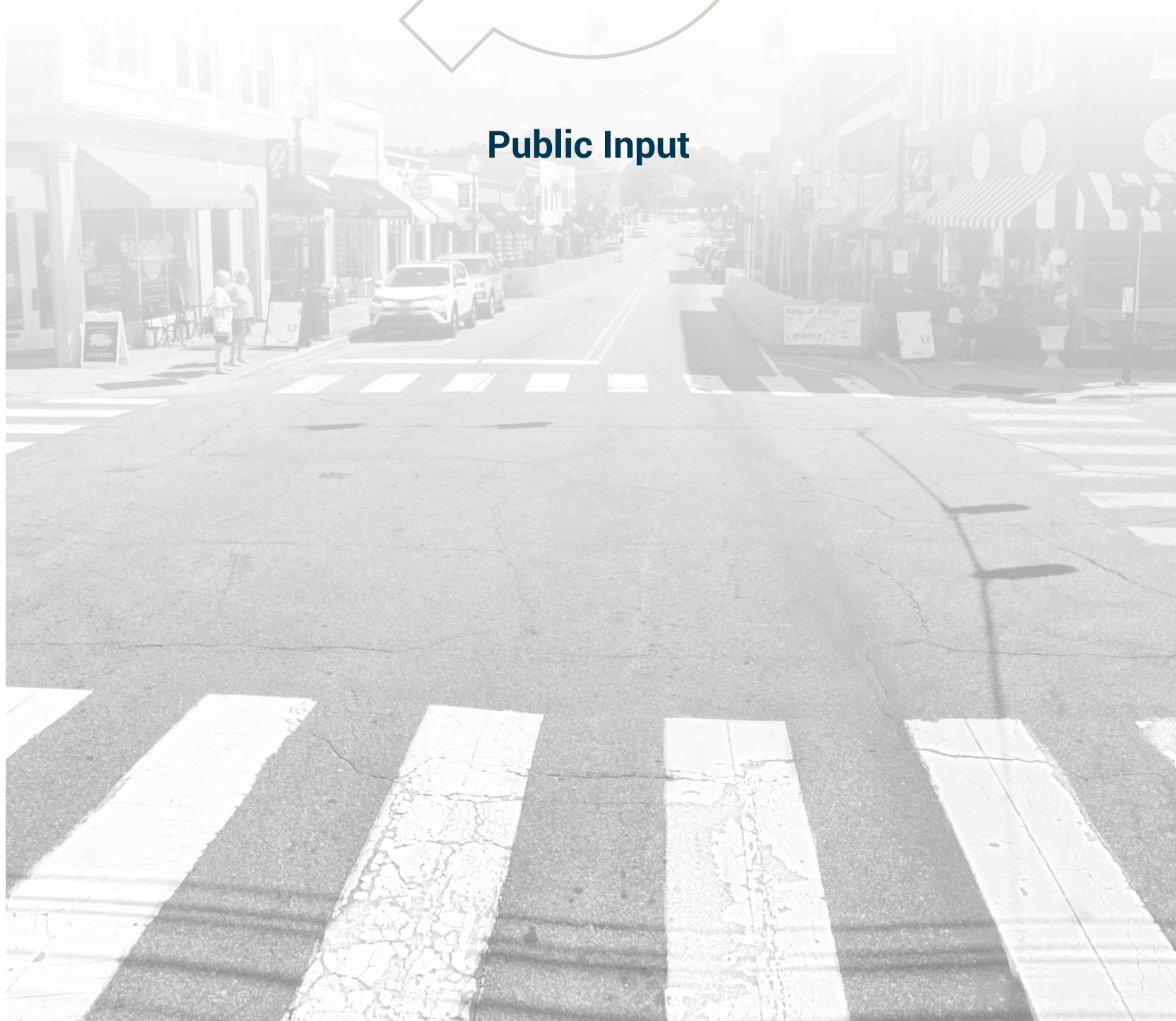
- The Town does not currently fund a red light camera program. If the community is interested in this type of program, staff would consider further investigation.

## Speed Cameras

- The Town does not currently fund a speed camera program. If the community is interested in this type of program, staff would consider further investigation.

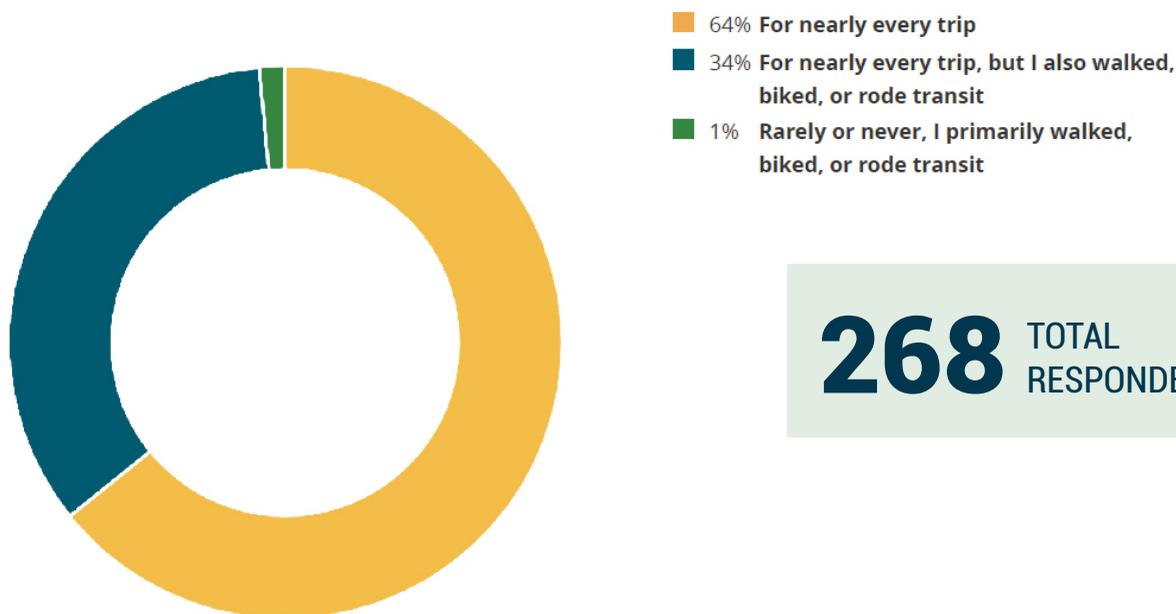


## Public Input



The information in this Appendix is a summary of the public comments received from the online survey available from January 19-February 28, 2022.

**Q1:** During this past month, how often did you use a car to get around Town?



**268** TOTAL RESPONDENTS

**Q2:** What transportation-related safety issues concern you in Apex? Rank each from "Very Concerning" to "Not Concerning". Provide any details in the comments section.

	Not Concerning	Somewhat Concerning	Very Concerning
Crossing the street as a pedestrian	20% Not Concerning	41% Somewhat Concerning	39% Very Concerning
Crossing the street as a cyclist	35% Not Concerning	38% Somewhat Concerning	28% Very Concerning
Lack of crosswalks	26% Not Concerning	40% Somewhat Concerning	34% Very Concerning
Lack of sidewalk connections	14% Not Concerning	31% Somewhat Concerning	54% Very Concerning
Lack of dedicated bicycle lanes	23% Not Concerning	38% Somewhat Concerning	38% Very Concerning
Crossing railroads	61% Not Concerning	30% Somewhat Concerning	9% Very Concerning
Speeding	14% Not Concerning	38% Somewhat Concerning	48% Very Concerning

	Not Concerning	Somewhat Concerning	Very Concerning
Speeding	14% Not Concerning	38% Somewhat Concerning	48% Very Concerning
Unsafe driver behavior	11% Not Concerning	28% Somewhat Concerning	60% Very Concerning
Unsafe pedestrian behavior	48% Not Concerning	38% Somewhat Concerning	14% Very Concerning
Unsafe cyclist behavior	33% Not Concerning	40% Somewhat Concerning	26% Very Concerning
Unsafe intersections	11% Not Concerning	41% Somewhat Concerning	48% Very Concerning
Lighting / Nighttime Visibility	27% Not Concerning	43% Somewhat Concerning	29% Very Concerning
Something else (explain in comments)	40% Not Concerning	6% Somewhat Concerning	54% Very Concerning

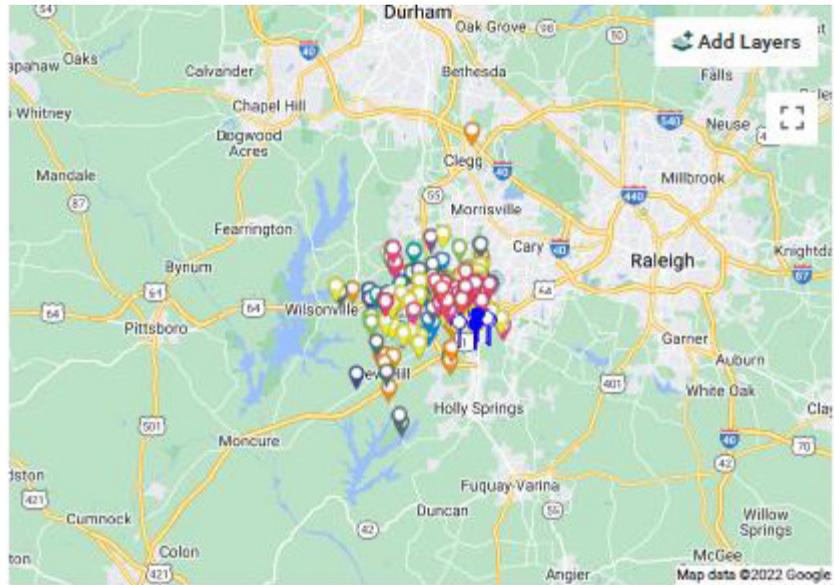
**261** TOTAL RESPONDENTS

The following table include key themes from the comments submitted in Question 2 on the Vision Zero Community Survey. The number of times each key theme appeared in a comment is listed in the frequency column.

Key Theme	Frequency
Lack of sidewalks	14
Crosswalk safety	13
Lack of bicycle facilities	10
Distracted drivers	8
Running red lights	8
Aggressive driving	7
Speeding	7
Lack of driver education	6
Lack of crosswalks	4
Lack of indicator usage	4
Lack of traffic law enforcement	4
Traffic signal timing	4
Driver behavior	3
Lack of public transit	3
Lack of traffic signals	3
Posted speed limit in neighborhoods is too high	3
Sidewalk gaps to school	3
Street lighting	3
Tailgating	3
Cyclist behavior	2
Lack of enforcement at crosswalks	2
Lack of traffic capacity	2
Pedestrian safety	2
Posted speed limits are too high	2
Remove flashing yellow signal	2
Roadway marking visibility	2
Sight distance obstructed by vegetation	2
Unsafe intersections	2
Crosswalk lighting	1
Crosswalks needed	1
Cyclist and motorist conflicts	1

Key Theme	Frequency
Driveways are too short	1
Driving below posted speed limit	1
Driving without headlights on	1
High posted speeds inside Apex Peakway	1
Improvements needed to police traffic direction	1
Lack of bicycle parking	1
Lack of commercial cross-access	1
Lack of cyclist education	1
Lack of cyclist law enforcement	1
Lack of greenway connectivity	1
Lack of pedestrian walkways during construction	1
Lack of reflectors on roads	1
Median visibility	1
Motor vehicle crashes	1
Need to separate pedestrian and cyclist crash data	1
Neighborhood cut-through traffic	1
Neighborhood traffic circles are ineffective	1
Pavement marking maintenance	1
Pedestrian behavior	1
Pedestrian-only downtown	1
Poor signage	1
Roads are too narrow	1
Roads changing	1
Roadway maintenance	1
Sidewalk gaps to downtown	1
Sign visibility obstructed by vegetation	1
Traffic conditions around schools	1
Traffic congestion	1
Updates needed to bicycle law signs	1

**Q3:** Where have you observed transportation safety concerns in Apex? You may identify multiple locations on this map. (Drag the correct pin to the map to identify a specific safety issue. Explain the issue using comments if desired.)



**522** LOCATIONS IDENTIFIED

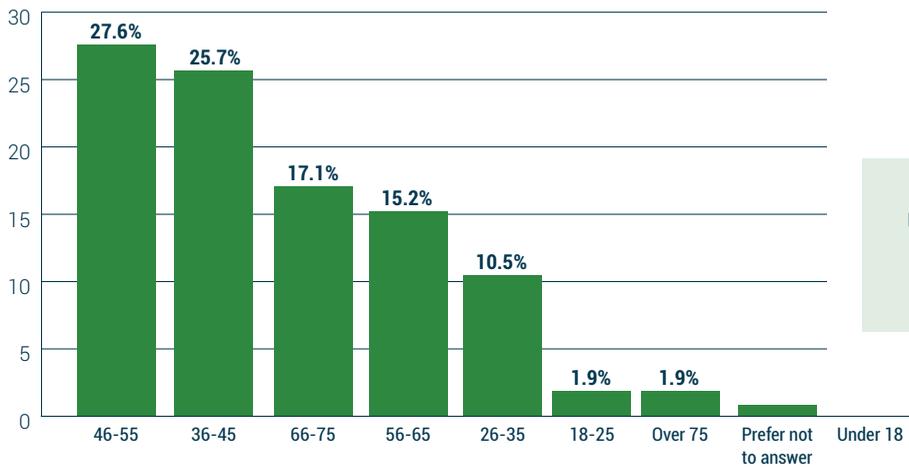
**Q4:** The Town of Apex is involved in a variety of public outreach and education programs to promote transportation safety. Please select the top three programs you believe the town should place the most focus on. If you have a recommendation for a new program, please describe that below. More information on existing programs is available at: <http://www.apexnc.org/VisionZero>.

The following table includes key themes from the comments submitted in Question 4 on the Vision Zero Community Survey. The number of times each key theme appeared in a comment is listed in the frequency column.

Key Theme	Frequency
Driver Education	5
Enforcement	5
Additional signage for transportation projects	1
Autonomous vehicle planning	1
Cyclist education	1

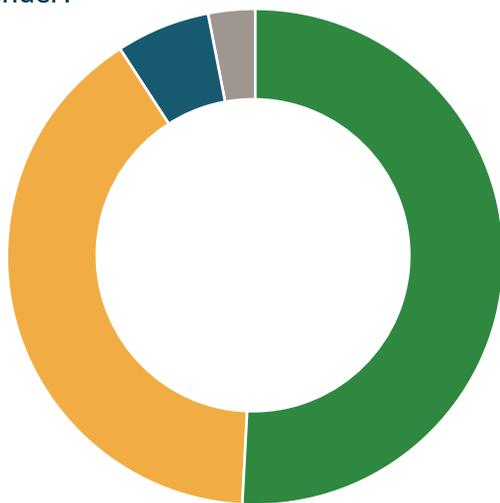
**112** TOTAL RESPONDENTS

**Q5: What is your age?**



**105** TOTAL RESPONDENTS

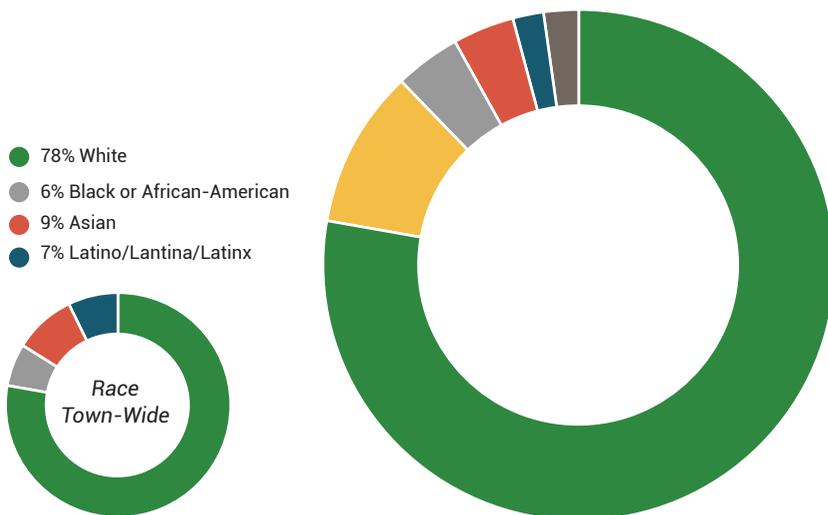
**Q6: What is your gender?**



- 51% Female
- 40% Male
- 5% Prefer not to answer
- 3% Others

**72** TOTAL RESPONDENTS

**Q7: What is your race/ethnicity?**

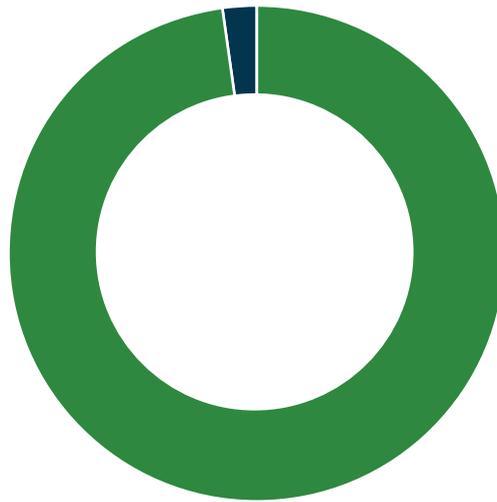


- 78% White
- 6% Black or African-American
- 9% Asian
- 7% Latino/Lantina/Latinx

- 78% White
- 10% Prefer not to answer
- 4% Black or African-American
- 4% Asian
- 2% Latino/Lantina/Latinx
- 2% Native Hawaiian or Other Pacific Islander

**90** TOTAL RESPONDENTS

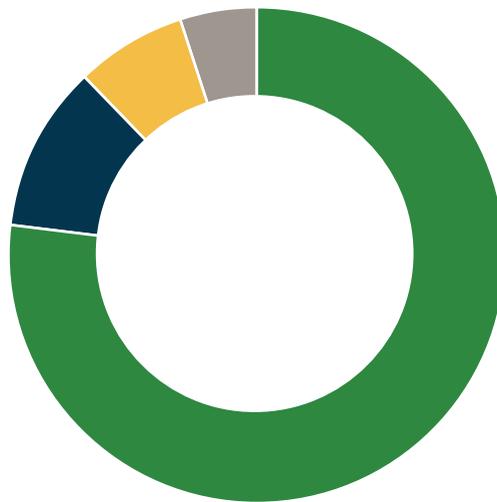
**Q8:** What is your primary mode of transportation?



- 98% Car
- 2% Others

**48** TOTAL  
RESPONDENTS

**Q9:** What is your secondary mode of transportation?



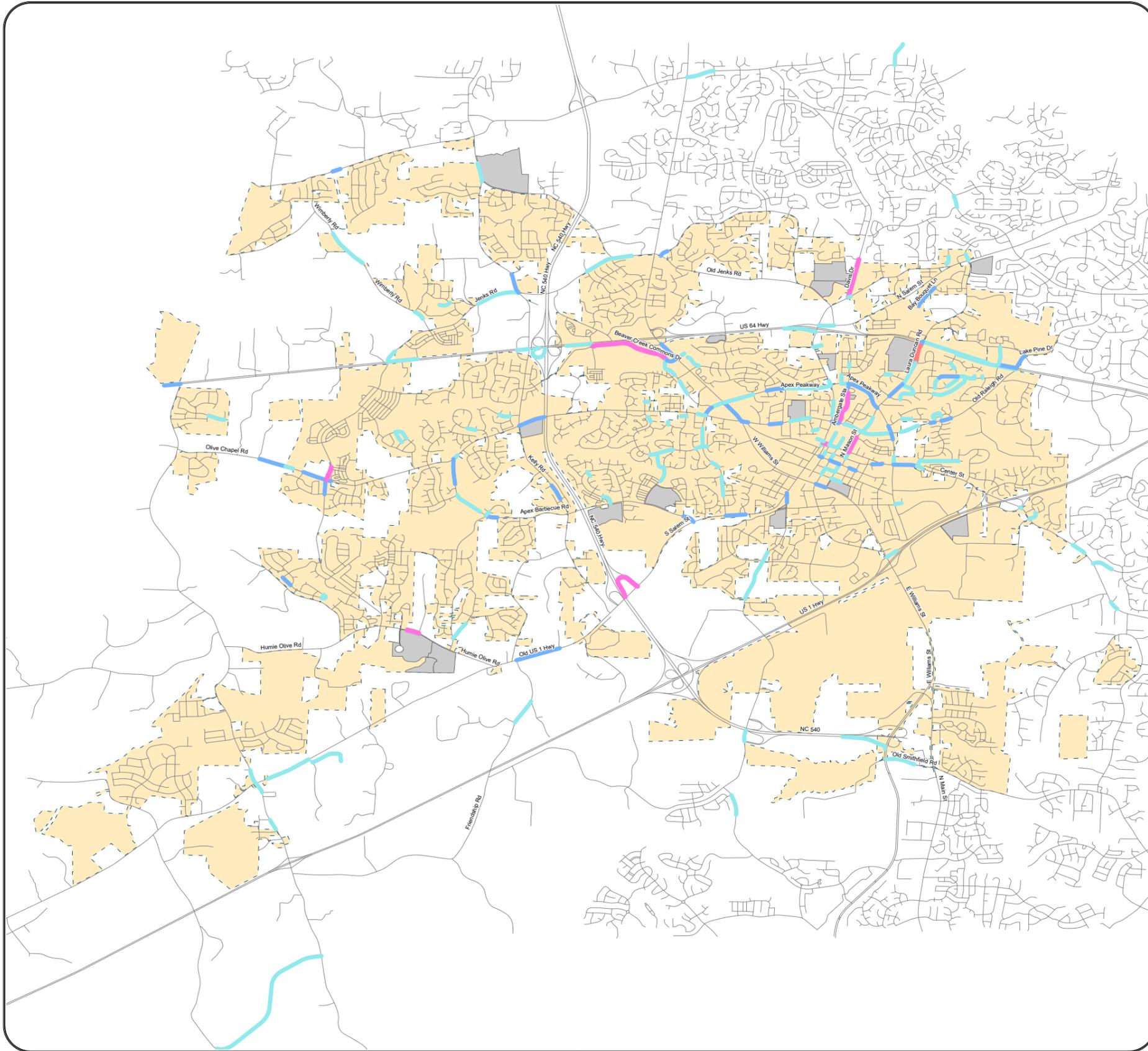
- 77% Walk
- 11% Bike
- 7% Car
- 5% Others

**44** TOTAL  
RESPONDENTS

The following comments were obtained at the Pop-Up Workshop at the Hub Convenience Store and Gas Station after the public input period closed:

Comment	South of US 1
Loops in the road are not recognizing motorcycles at the U-Turns on NC 55 in Holly Springs	
Debris on the road on NC 55 at the bypass	Yes
Traffic delays along E Williams St from The Hub gas station to Main St	Yes
Speeding issues on US 1 when cars exit onto NC 55 from the east	Yes
Traffic signal needed at Stephenson Road and Sunset Lake Road	Yes
Traffic delays at the intersection of NC 55 and S Salem St	
Flooding under the railroad bridge over NC 55	
Crashes on NC 55 at US 1	Yes
Difficult to access gas stations at the NC 55/US 1 interchange	Yes
Signs are obstructed by vegetation along highways in Apex	Yes
The curb on NC 55 at Marco Drive makes it difficult to make that right turn (too sharp)	
Traffic delays at Vision Drive and NC 55	
Exit ramp from US 64 onto NC 540 is under-engineered	
Crashes along NC 55 between NC 540 and Old Smithfield Road and at the interchanges	Yes

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**APEX**  
NORTH CAROLINA

**PUBLIC SURVEY RESULTS  
MAP OF PUBLIC SAFETY CONCERNS**

**Legend**

**FREQUENCY**

- 1 to 3 Concerns
- 3 to 6 Concerns
- 7 to 9 Concerns
- 10 or more Concerns
- Apex Schools
- Apex Streets 2020
- Corp Limits



N



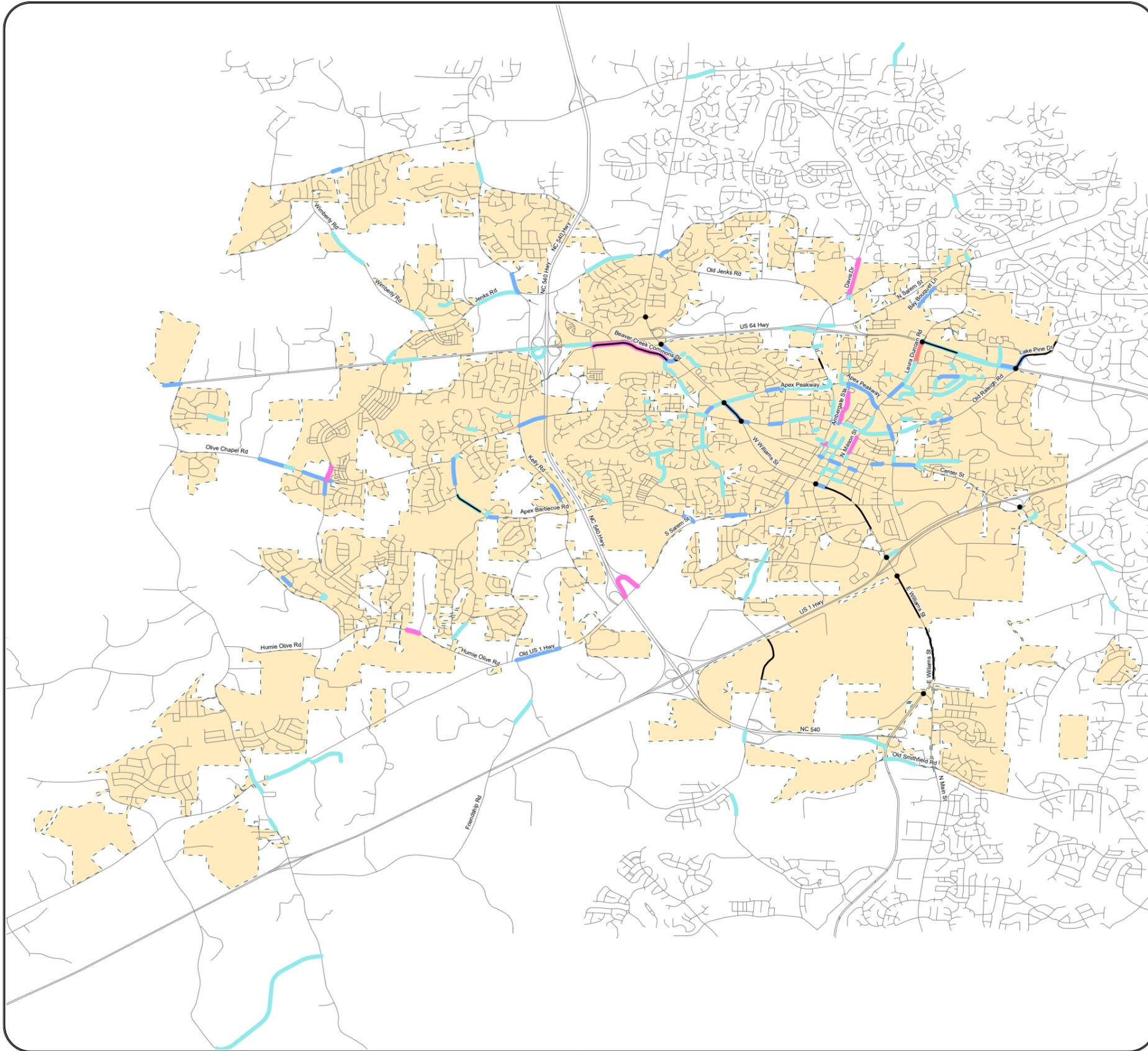
0 0.45 0.9 1.8 Miles

This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

High safety concern areas identified by the public include the "urban" core of Apex within the Apex Peakway and areas surrounding schools.

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**PUBLIC SURVEY RESULTS  
MAP OF PUBLIC SAFETY CONCERNS  
AND THE HIGH CRASH INJURY  
NETWORK IN APEX**

**Legend**

- Top 12 Crash Severity Signals
- Top 16 Crash Severity Segments

**FREQUENCY**

- Light Blue Line: 1 to 3 Concerns
- Medium Blue Line: 3 to 6 Concerns
- Pink Line: 7 to 9 Concerns
- Red Line: 10 or more Concerns
- Grey Line: Apex Streets 2020
- Orange Area: Corp Limits



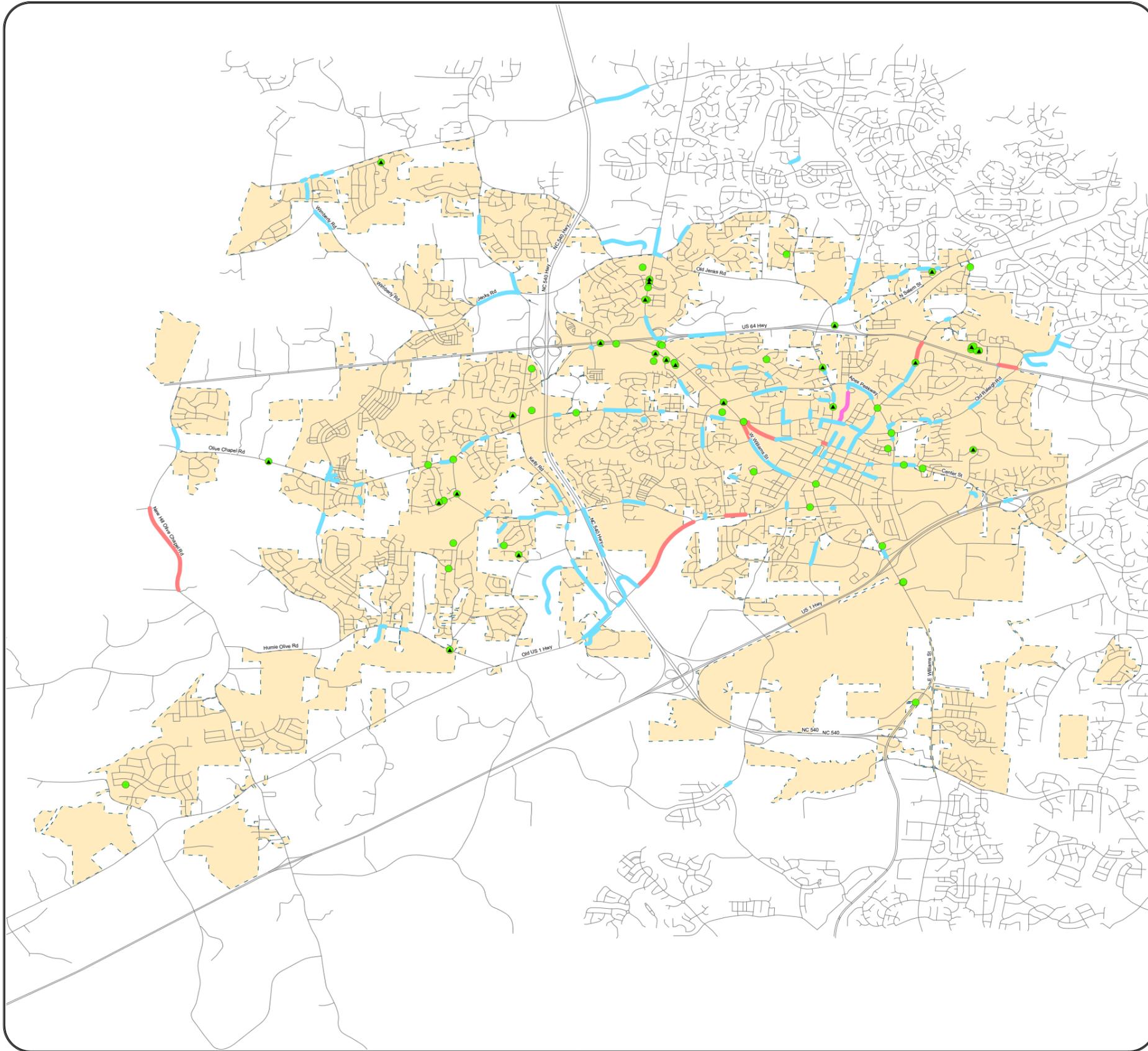
0 0.45 0.9 1.8 Miles

This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

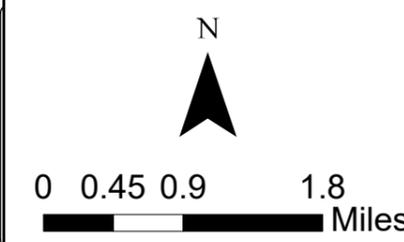
- Public survey results were overlaid with the Town's High Injury Signal Locations and High Injury Roadway Segments
- Public input confirmed the need to address Apex's High Injury Networks
  - 9 of the top 12 High Injury Signal Locations were identified by the public as areas of concern
  - 7 of the top 16 High Injury Roadway Segment locations were identified by the public as areas of concern
- Survey data did not capture many needs south of US Hwy 1

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**CRASHES 2015-2020  
PUBLIC SURVEY RESULTS  
PEDESTRIAN AND CYCLIST  
INFRASTRUCTURE NEEDS VERSUS  
CRASH DATA**

- Legend**
- ▲ Severe & Fatal Ped/Bike Crashes
  - Pedestrian and Cyclist Crashes
- FREQUENCY**
- Light Blue Line: 1-2 Concerns
  - Red Line: 3-4 Concerns
  - Pink Line: 5 Concerns
  - Thin Grey Line: Apex Streets 2020
  - Light Orange Shaded Area: Corp Limits



This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

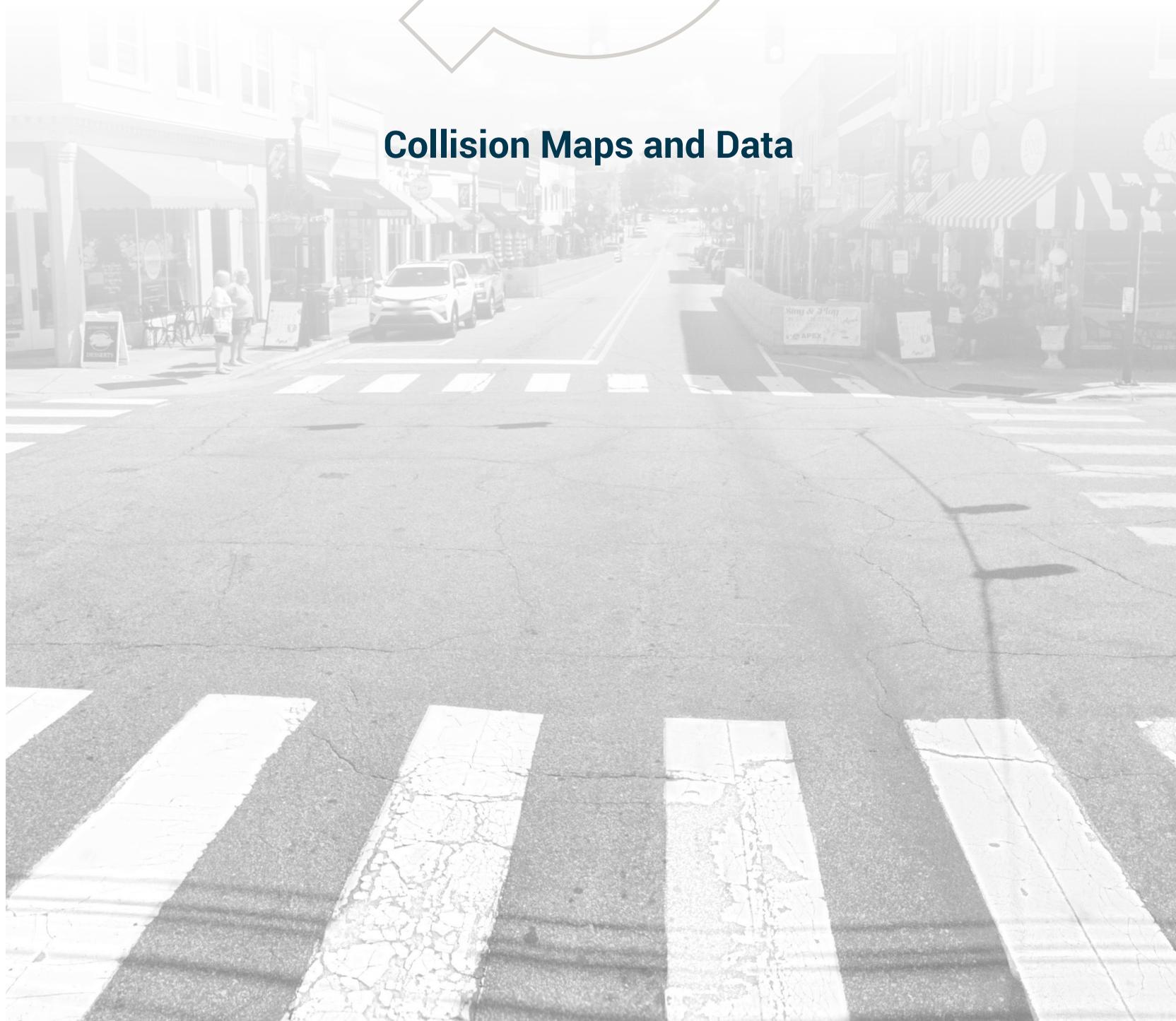
**KEY TAKEAWAYS**

- Locations where the public identified infrastructure needs to enhance walking or bicycling **did not appear to correlate** with locations where pedestrian and bicycle collisions have occurred.
- Indicates there are locations where people would like to walk or bike, but aren't because of the lack of safe facilities.

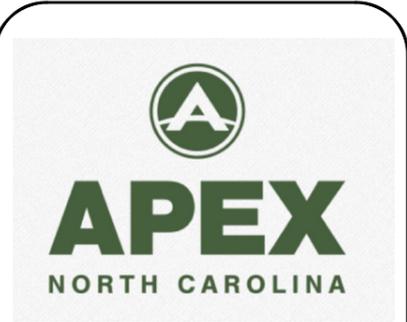
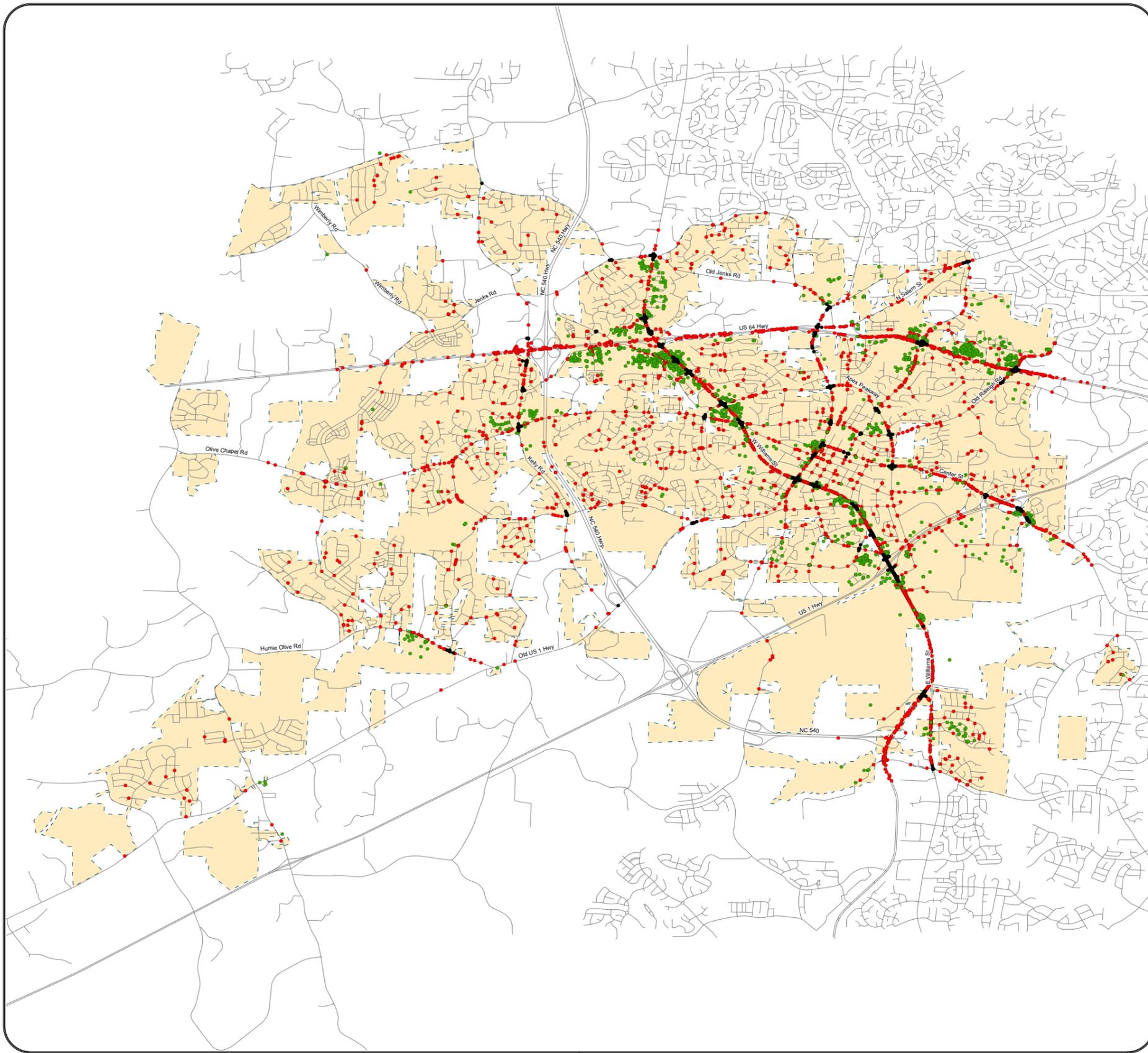
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## **Collision Maps and Data**

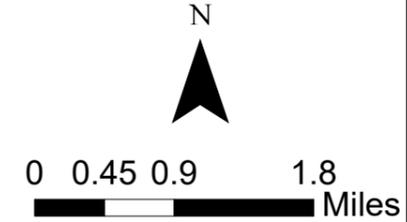


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**CRASHES 2015-2020  
ALL CRASHES BY LOCATION TYPE**

- Legend**
- Crashes at Traffic Signals
  - Crashes in Parking Areas/Private Streets
  - Crashes on Public Roadway Segments
  - Apex Streets 2020
  - Corp Limits

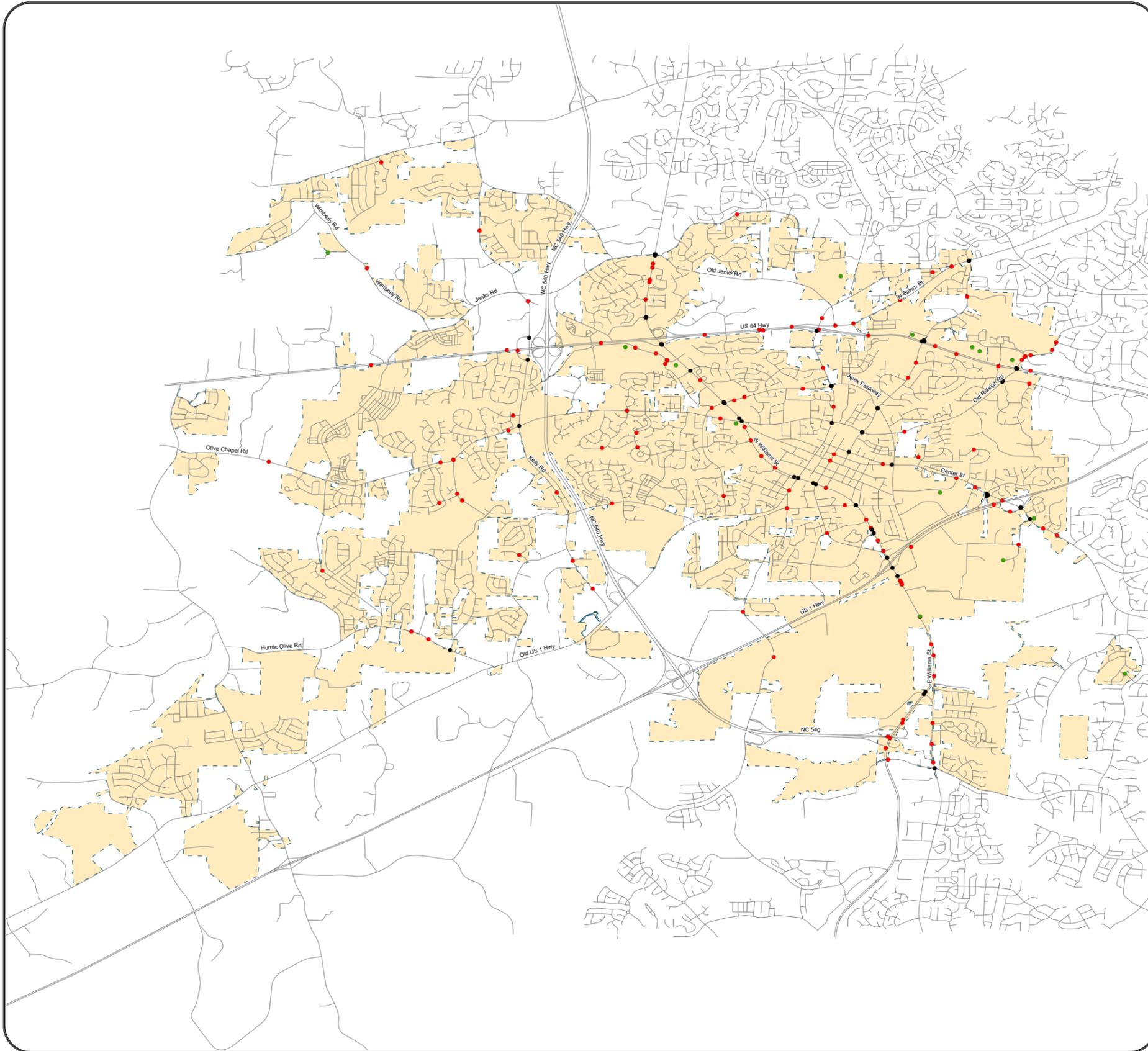


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

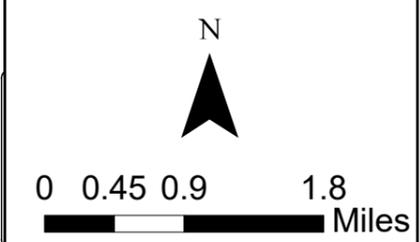
- **78%** of all collisions occurred **within the public right of way**
- Collisions were **concentrated along the thoroughfare networks** in Apex

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**CRASHES 2015-2020  
SEVERE INJURY AND FATAL  
CRASHES BY LOCATION TYPE**

- Legend**
- Crashes at Traffic Signals
  - Crashes in Parking Areas/Private Streets
  - Crashes on Public Roadway Segments
  - Apex Streets 2020
  - Corp Limits

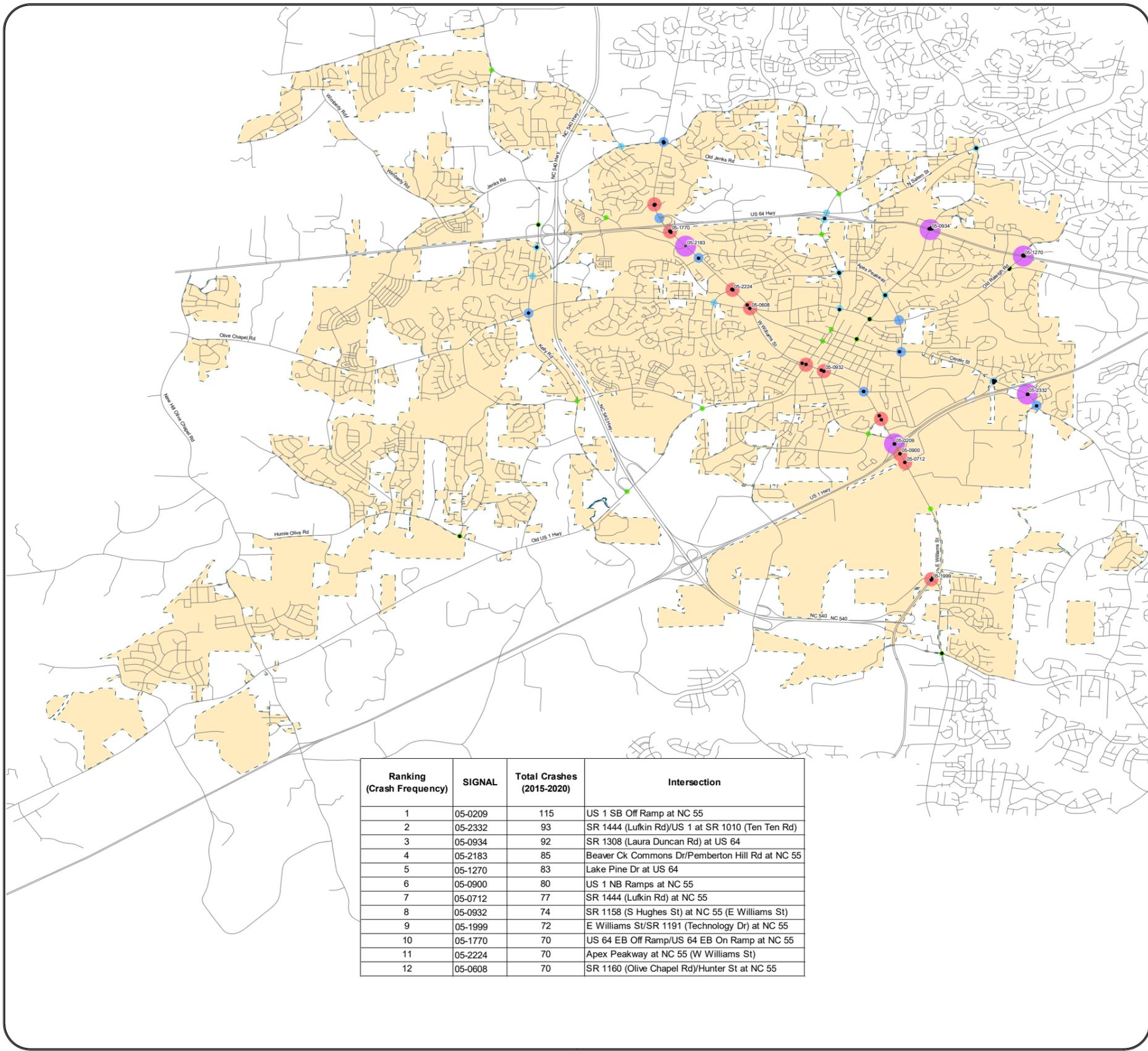


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- 93% of all severe and fatal collisions occurred **within the public right of way**
- Severe and fatal collisions were **concentrated around the thoroughfare networks** in Apex

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**CRASHES 2015-2020  
CRASH FREQUENCY AT  
TRAFFIC SIGNALS**

**Legend**

**Crashes at Traffic Signals**

- 1 - 14
- 15 - 29
- 30 - 44
- 45 - 80
- 81 - 115
- Severe and Fatal Crashes
- Apex Streets 2020
- Corp Limits

N



0 0.45 0.9 1.8 Miles

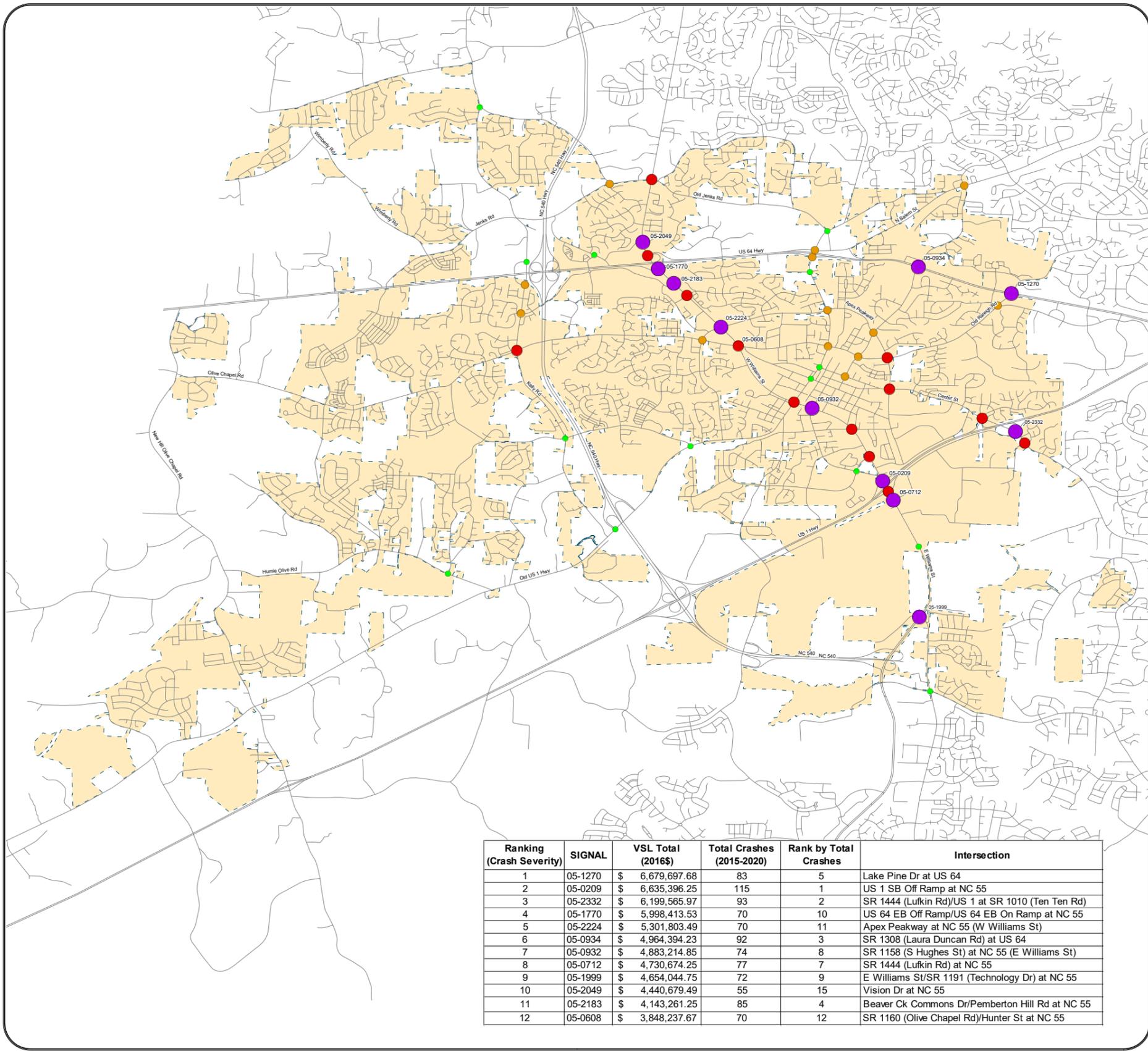


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

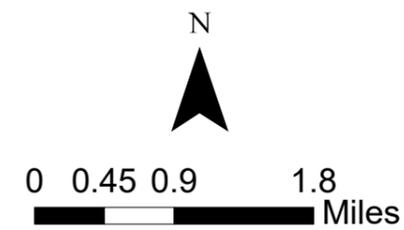
- The **NC 55** corridor between Old Jenks Road and NC 540 had the **highest concentration of collisions at traffic signals** in Apex

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**CRASHES 2015-2020  
CRASH SEVERITY AT  
TRAFFIC SIGNALS  
(BASED ON VALUE OF STATISTICAL  
LIFE- 2016 \$)**

- Legend**
- Crash Severity at Traffic Signals  
Benefit of Crash Reduction (VSL)**
- \$35k-\$900k
  - \$900k - \$2M
  - \$2M - \$4M
  - \$4M - \$7M
  - Apex Streets 2020
  - Corp Limits

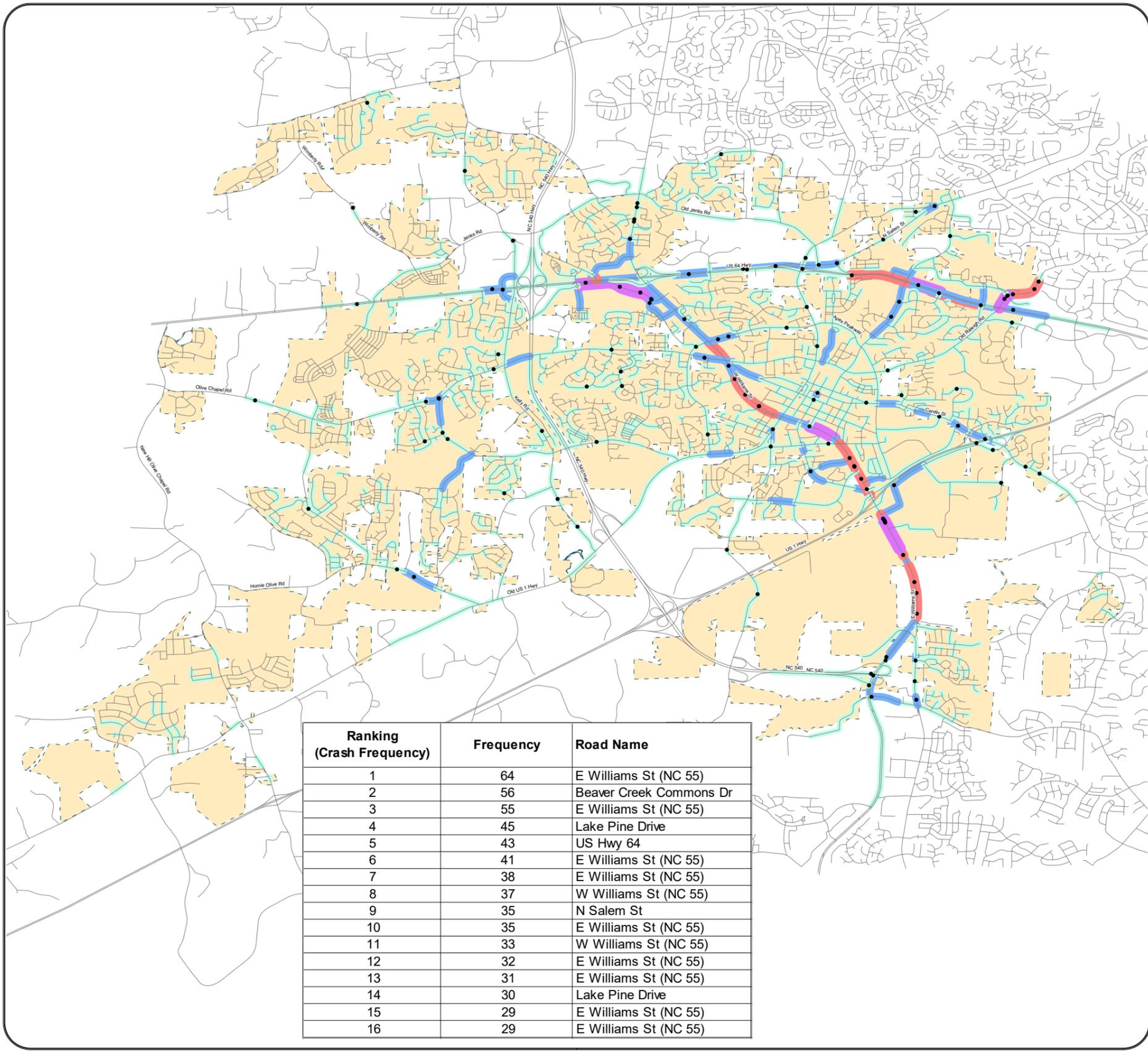


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- The **NC 55** corridor between Old Jenks Road and NC 540 had the **highest concentration of severe and fatal collisions** at traffic signals in Apex

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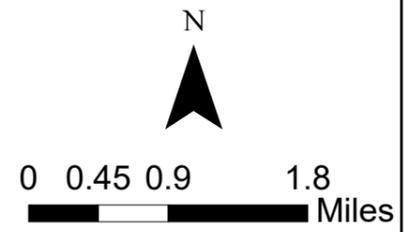
**CRASHES 2015-2020  
CRASH FREQUENCY ON  
ROAD SEGMENTS**

**Legend**

**Crash Frequency Road Segments**

- 1 - 6
- 7 - 20
- 21 - 38
- 39 - 64

- Severe and Fatal Crashes
- Apex Streets 2020
- Corp Limits

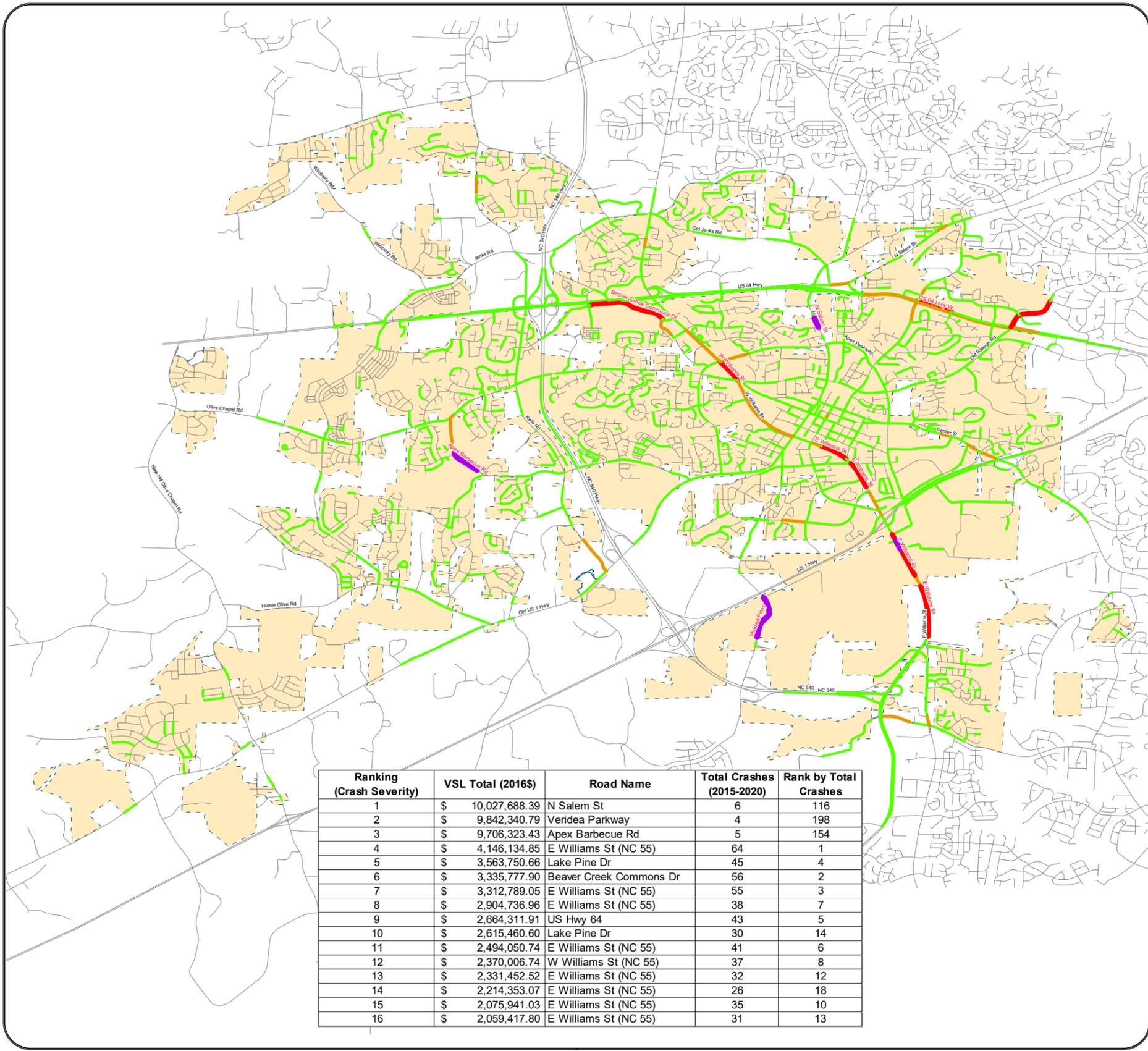


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- The **NC 55 corridor** between Apex Parkway and E. Williams Street had the **highest concentration of collisions on roadway segments** in Apex
- **Beaver Creek Commons Drive** through the Beaver Creek Commons and Beaver Creek Crossings shopping area also had a **high concentration of crashes**

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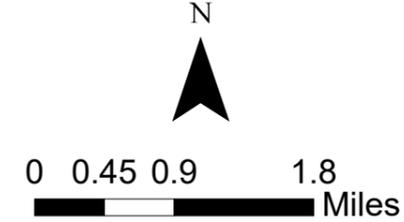


CRASHES 2015-2020  
 CRASH SEVERITY ON  
 ROAD SEGMENTS  
 (BASED ON VALUE OF STATISTICAL  
 LIFE- 2016 \$)

**Legend**

**Crash Severity on Road Segments  
 Benefit of Crash Reduction (VSL)**

- \$17k - \$900k
- \$900k - \$2M
- \$2M - \$4M
- \$4M - \$10M
- ApexStreets\_2020
- Corp Limits

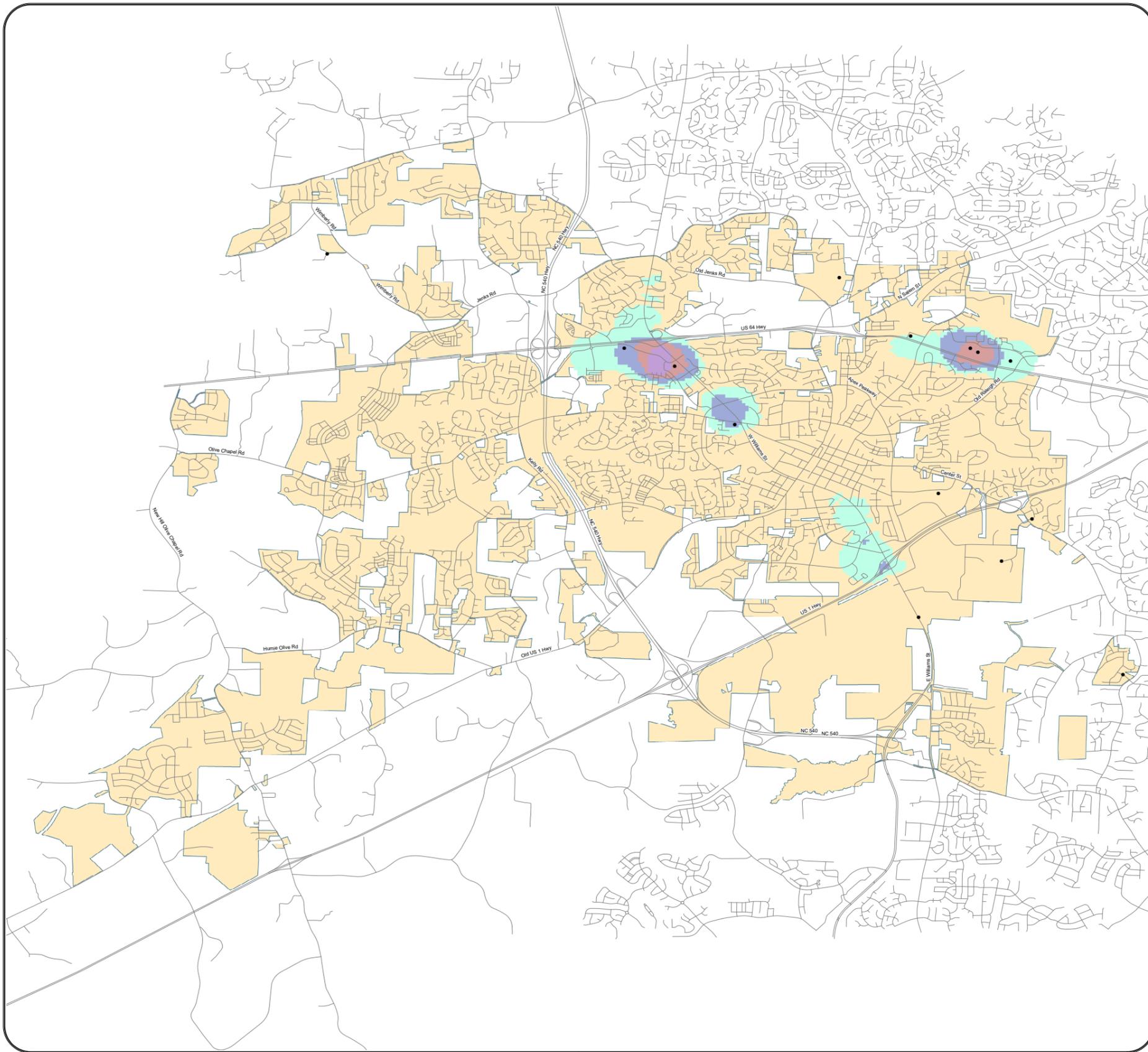


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- The **NC 55 corridor** between Apex Peakway and E. Williams Street had the **highest concentration of severe collisions** on roadway segments in Apex

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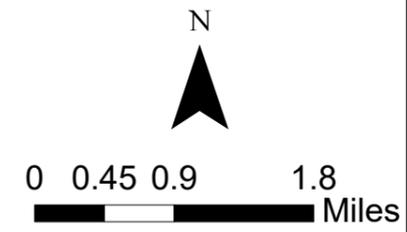


**CRASHES 2015-2020  
CRASH DENSITY IN  
PARKING AREAS AND  
PRIVATE ROADS  
(BASED ON TOTAL CRASHES PER  
SQUARE MILE)**

**Legend**

**Frequency of Crashes (per Sq. Mi)**

- 0 - 263
- 263 - 526
- 526 - 789
- 789 - 1,052
- 1,052 - 1,315
- Apex Streets 2020
- Corp Limits
- Severe and Fatal Crashes

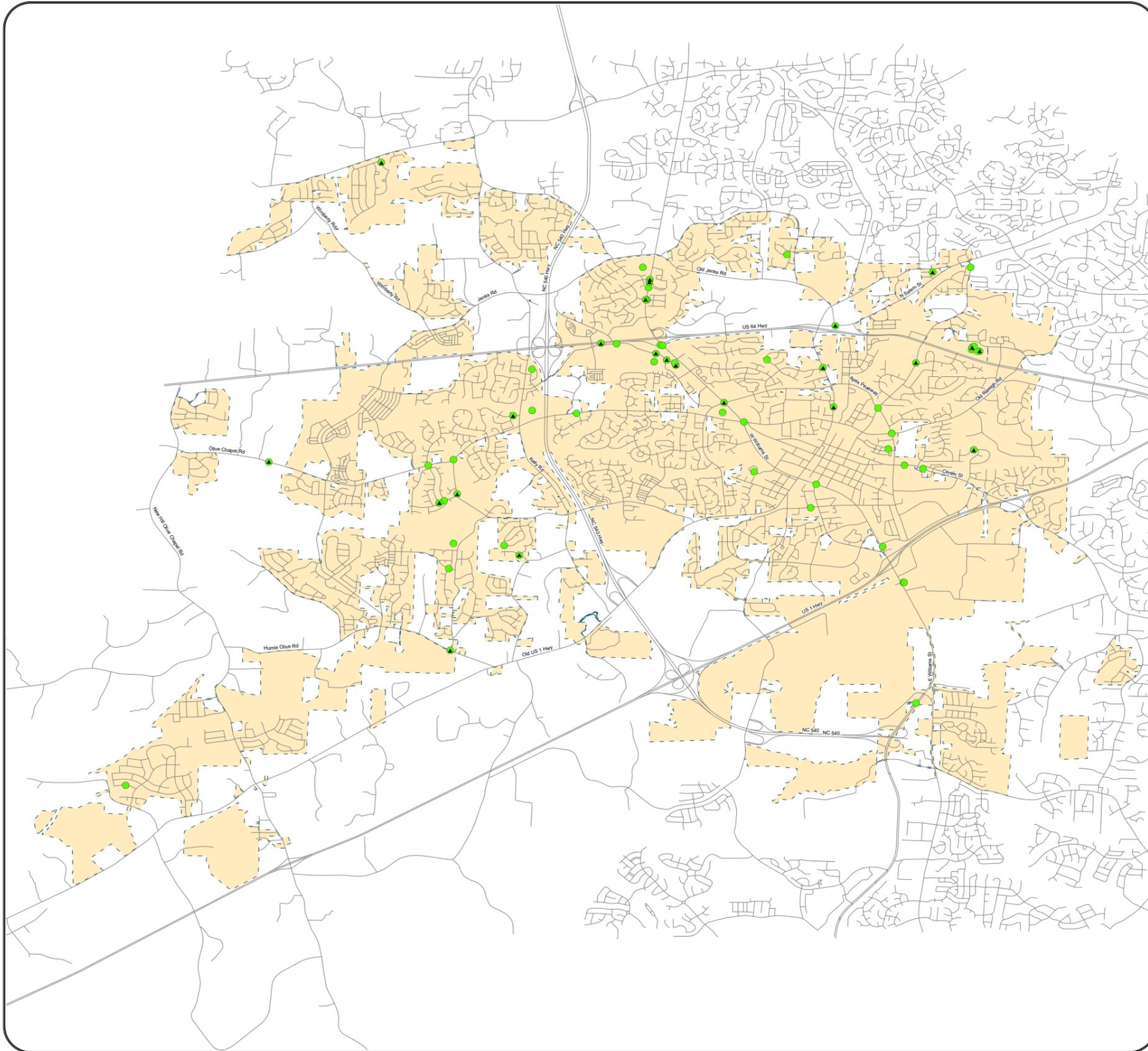


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

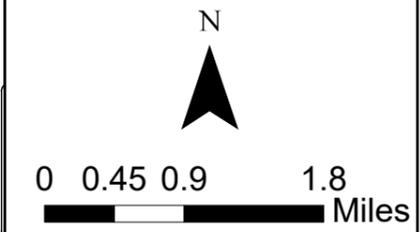
- Shopping centers along Beaver Creek Commons Drive and Pine Plaza Drive have the **highest concentration of collisions** as well as **severe and fatal collisions** in parking lots

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**CRASHES 2015-2020  
PEDESTRIAN AND  
CYCLIST CRASHES**

- Legend**
- ▲ Severe & Fatal Ped/Bike Crashes
  - Pedestrian and Cyclist Crashes
  - Apex Streets 2020
  - Corp Limits

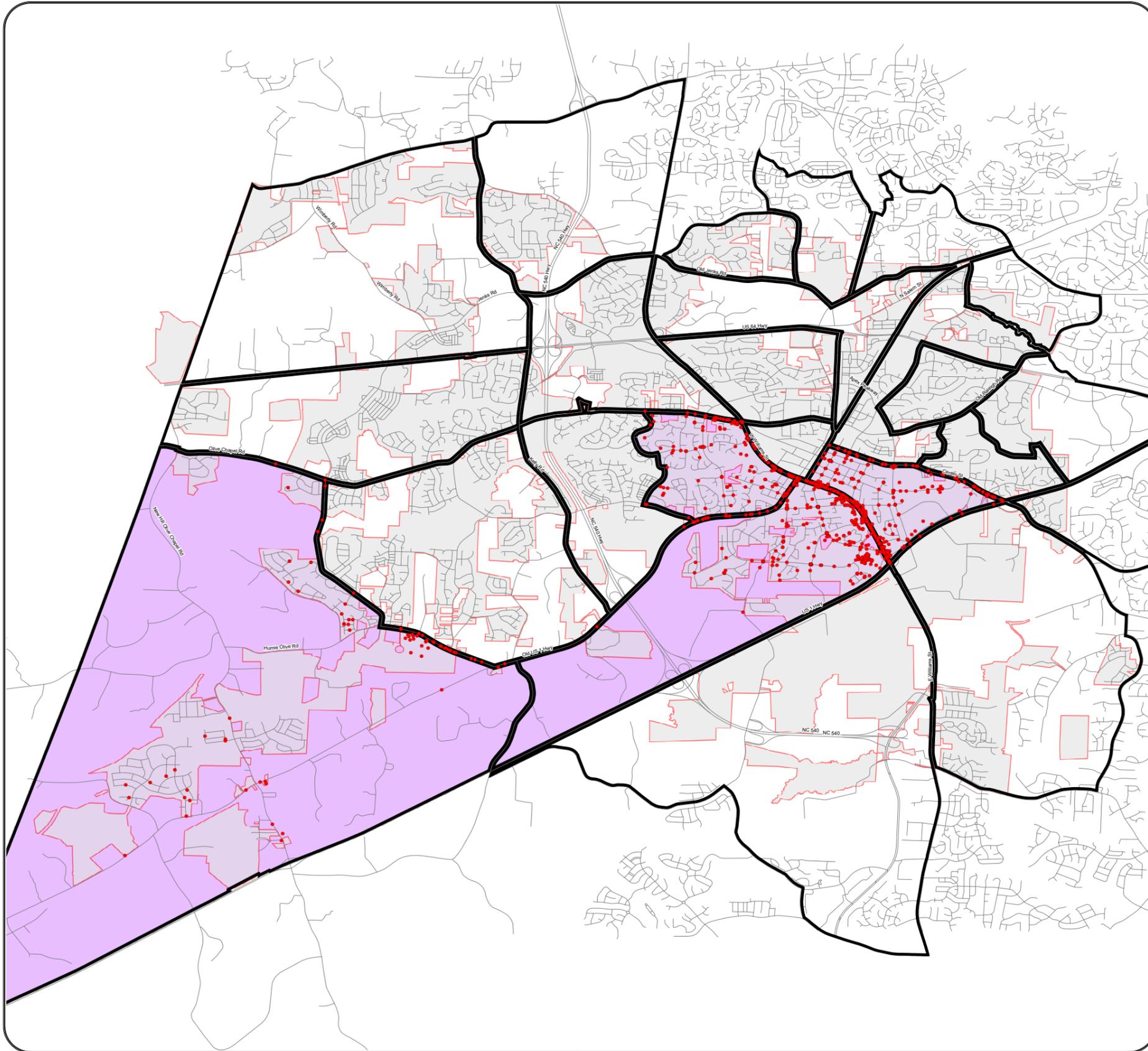


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

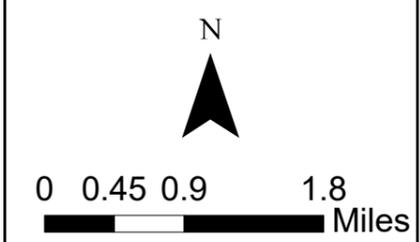
- Clusters of **severe and fatal pedestrian and bicycle collisions** were observed around the Pine Plaza Drive shopping area, Beaver Creek Commons Drive shopping area, and NC 55 between Vision Drive and Old Jenks Road

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**CRASHES 2015-2020  
CRASHES IN LOW INCOME AREAS  
(LOW INCOME AREAS ARE  
DEFINED AS BLOCK GROUPS WITH  
AT LEAST 25 PERCENT OF  
HOUSEHOLDS BELOW AN ANNUAL  
INCOME LEVEL OF \$40,000)**

- Legend**
- Apex Streets (2020)
  - Low Income Block Group
  - Corporate Limits
  - Census Block Group

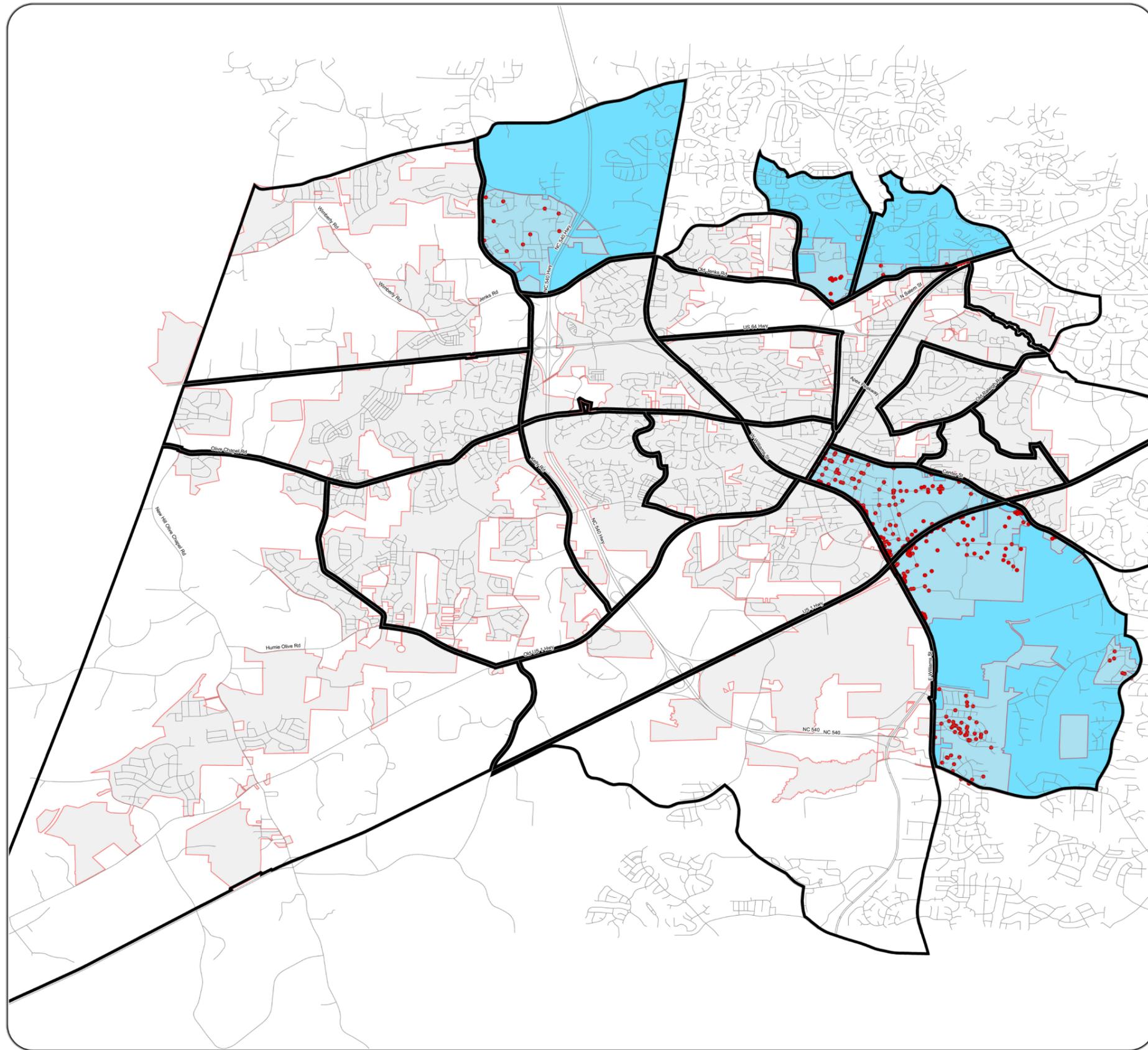


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- Low-income areas **do not appear overrepresented** in the number or severity of collisions based on land area.

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**APEX**  
NORTH CAROLINA

**CRASHES 2015-2020  
CRASHES IN MINORITY  
POPULATION AREAS  
(MINORITY AREAS ARE  
DEFINED AS BLOCK GROUPS  
WITH A POPULATION THAT  
CONSISTS OF AT LEAST 40 PERCENT  
MINORITY INDIVIDUALS)**

**Legend**

- Apex Streets (2020)
- Crashes in Minority Areas
- Minority Population Block Group
- ▭ Corporate Limits
- ▭ Census Block Group

N



0 0.45 0.9 1.8  
Miles

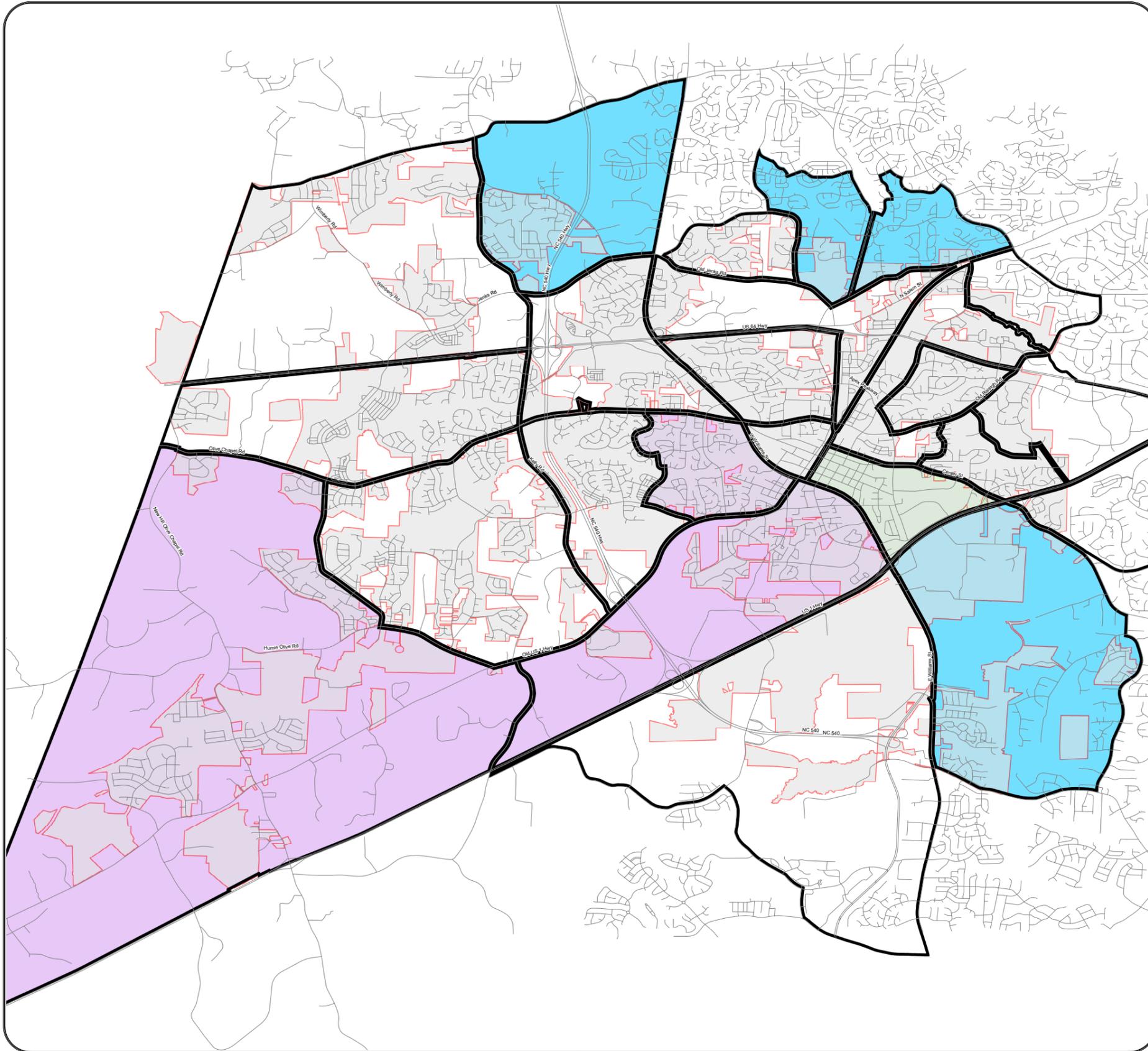
This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

Minority population areas are located:

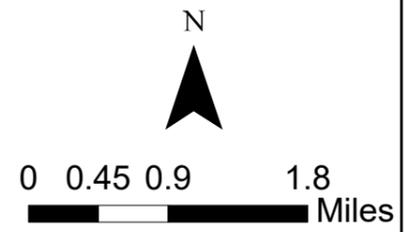
- South and west of Downtown
- South of US Hwy 1
- North of US Hwy 64

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**MAP OVERLAY  
AREAS OF LOW INCOME,  
MINORITIES, AND BOTH  
LOW INCOME AND MINORITIES**

- Legend**
- Apex Streets (2020)
  - Low Income Block Group
  - Minority Population Block Group
  - Areas of Both
  - Corporate Limits
  - Census Block Group

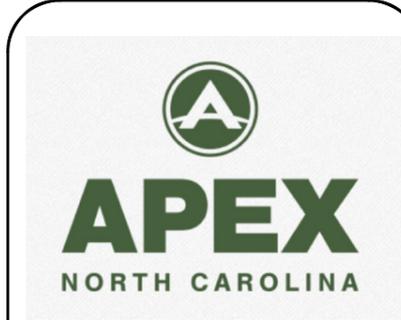
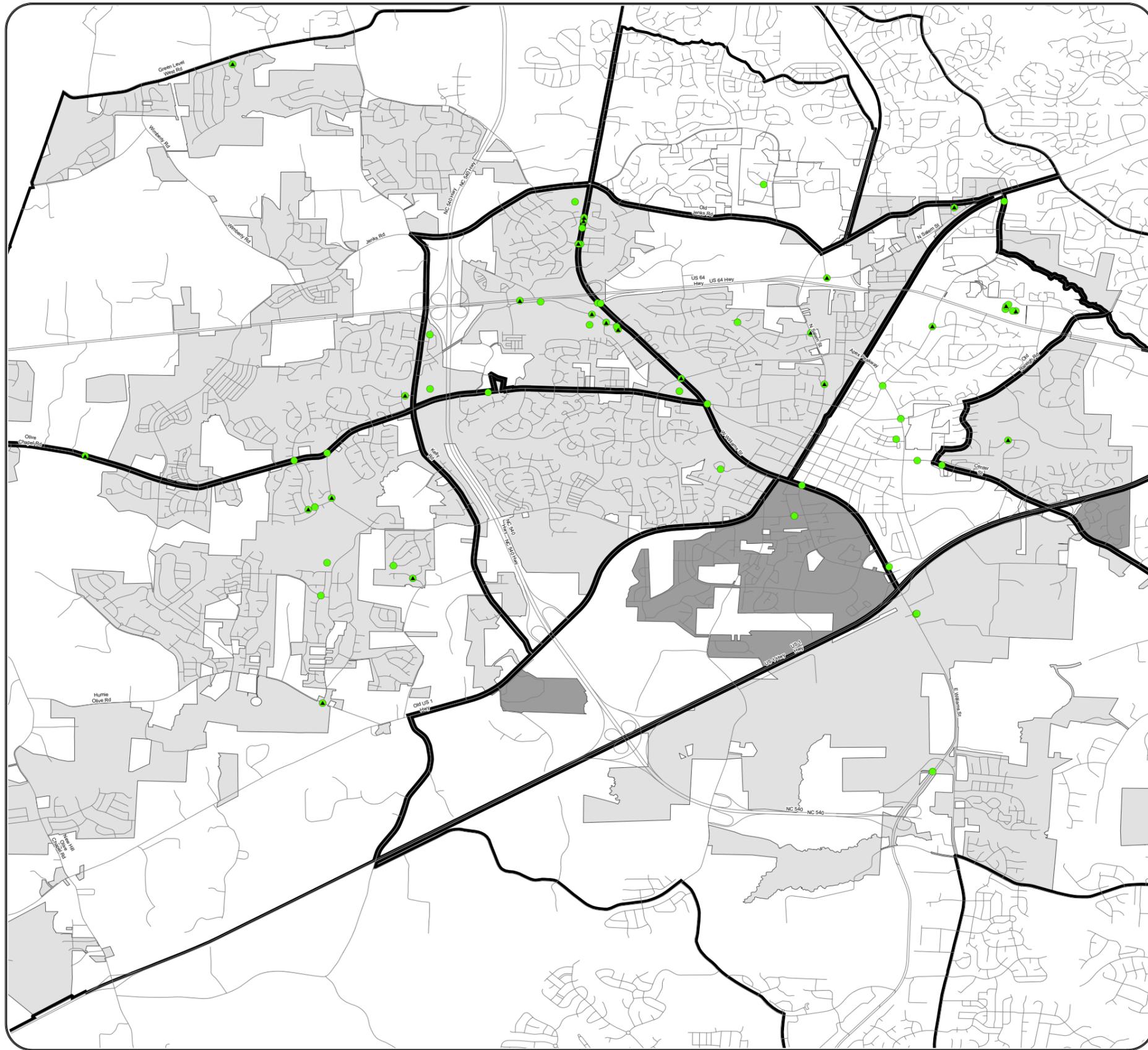


This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

- Approximately **3% of Apex's corporate limits** is located within **both** a **minority** population area and an area of **low income**.

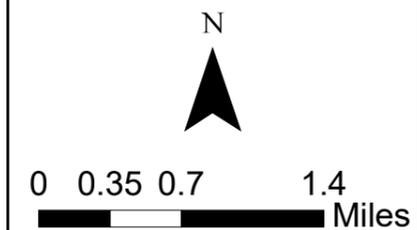
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**CRASHES 2015-2020  
PEDESTRIAN AND CYCLIST  
CRASHES AND ZERO VEHICLE  
HOUSEHOLDS**

**Legend**

- ▲ Severe & Fatal Ped/Bike Crashes
  - Pedestrian and Cyclist Crashes
  - Apex Streets 2020
  - ▭ Census Tract
- Percent Zero Car Households**
- 0% Zero Cars
  - 0% - 5% Zero Cars
  - 5% - 6% Zero Cars



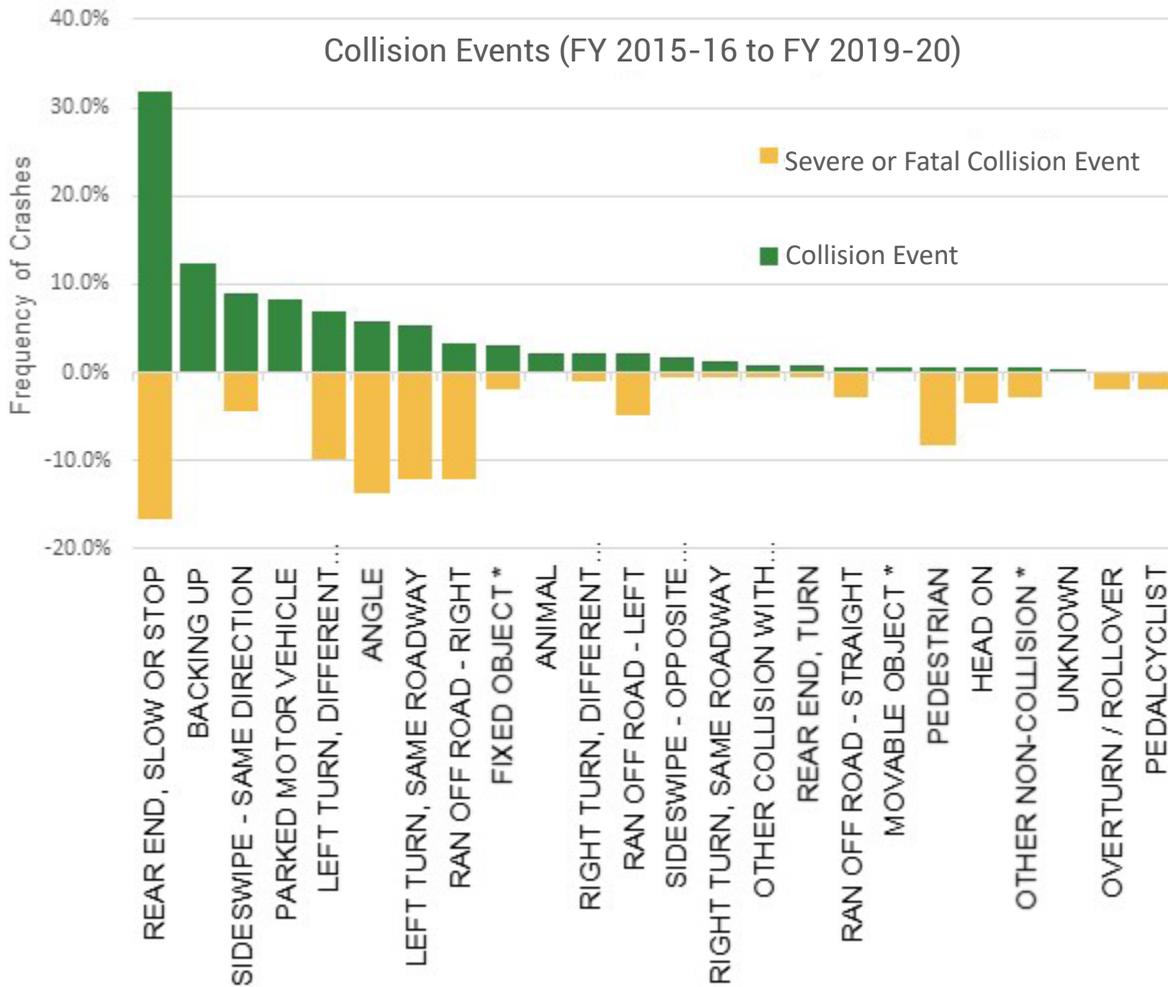
This map information was prepared by the Town of Apex Public Works and Transportation department with use of Geographic Information Services, and official Town documents.

**KEY TAKEAWAYS**

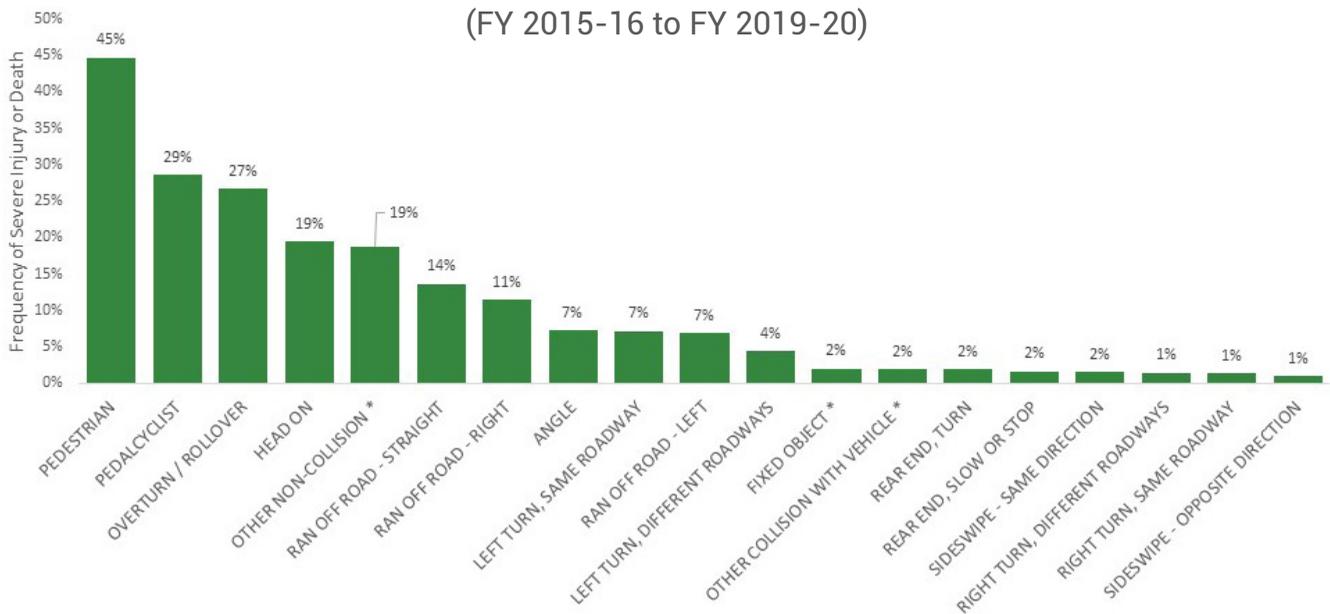
- Due to its suburban nature, Apex has **high car ownership**
- Block groups with **5%-6% of households with zero cars** are located **south of Salem Street/ Old US Hwy 1**
- **Car ownership and pedestrian and cyclist crashes do not correlate.** A large portion of pedestrian and cyclist crashes occur around commercial and shopping areas

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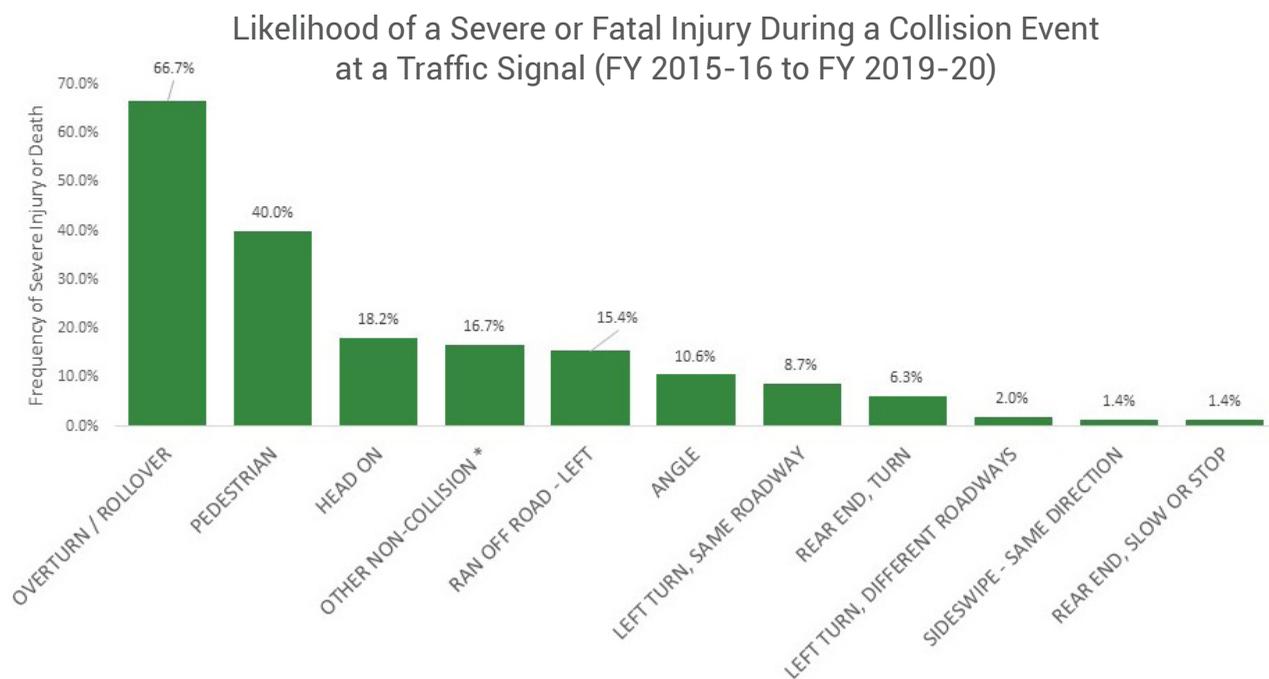
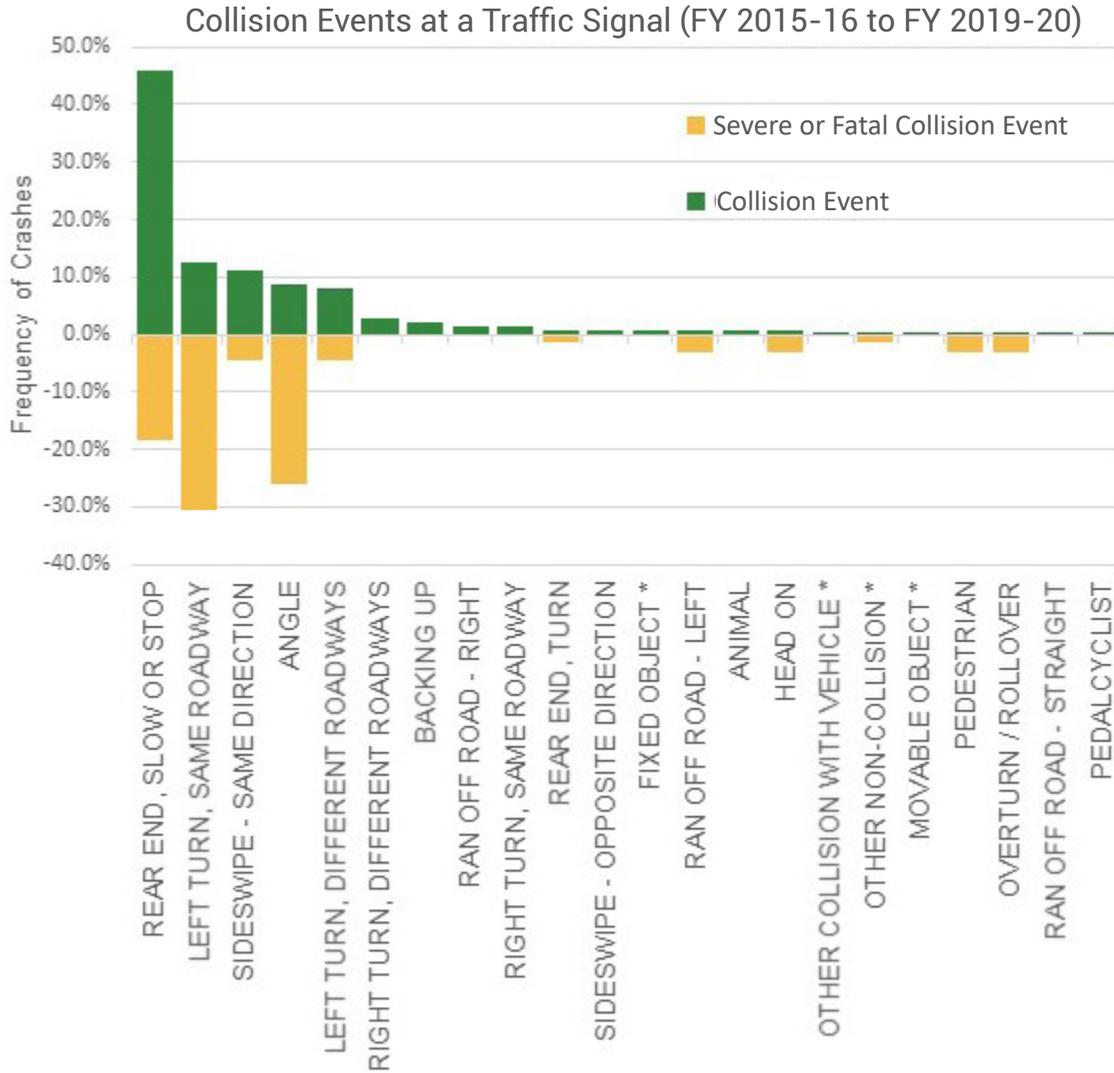
Collision Data Details



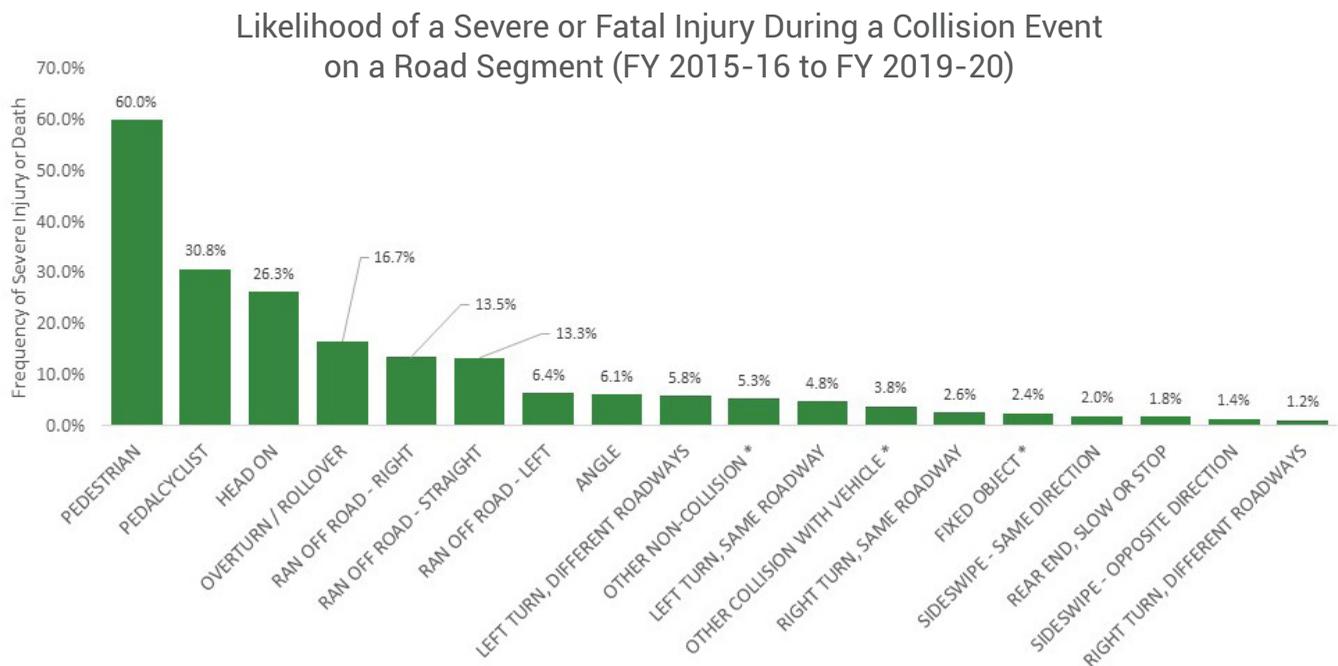
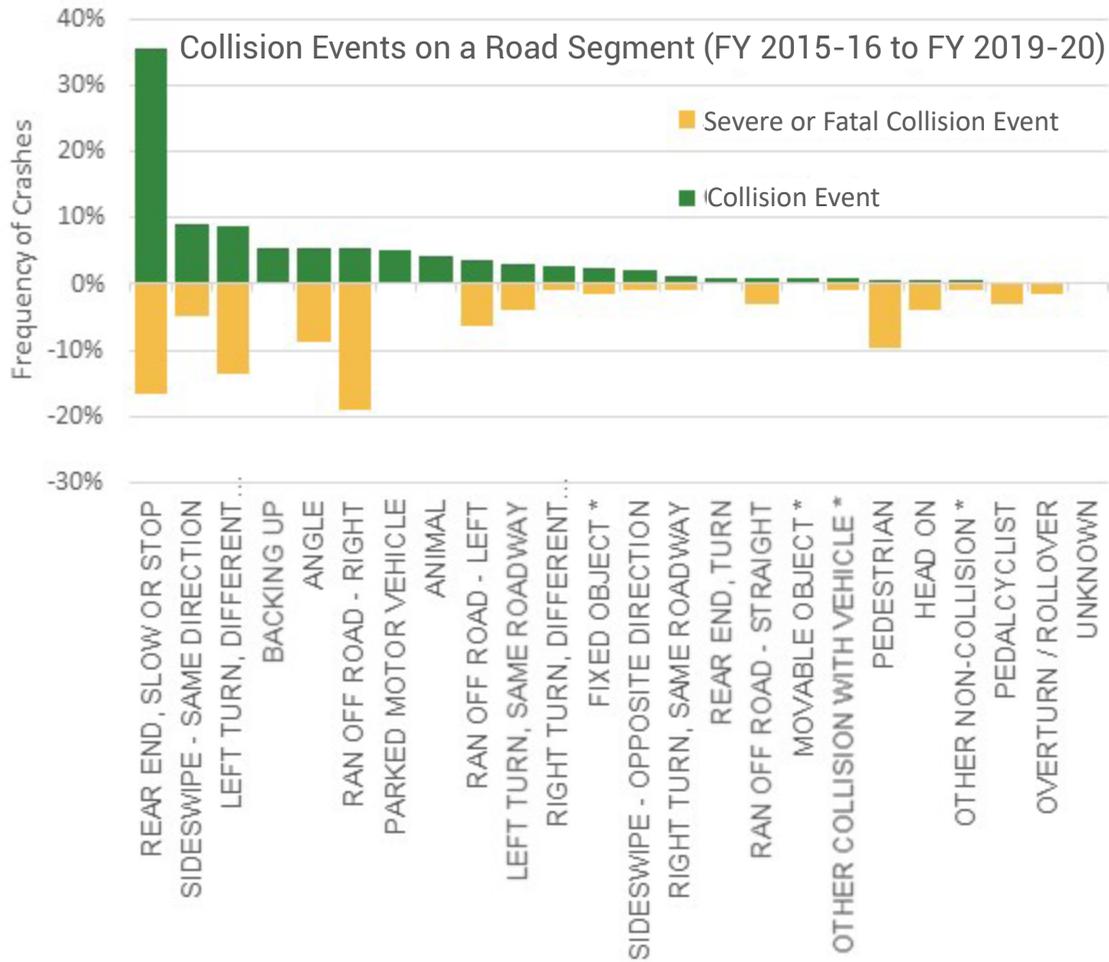
### Likelihood of a Severe or Fatal Injury During a Collision Event (FY 2015-16 to FY 2019-20)



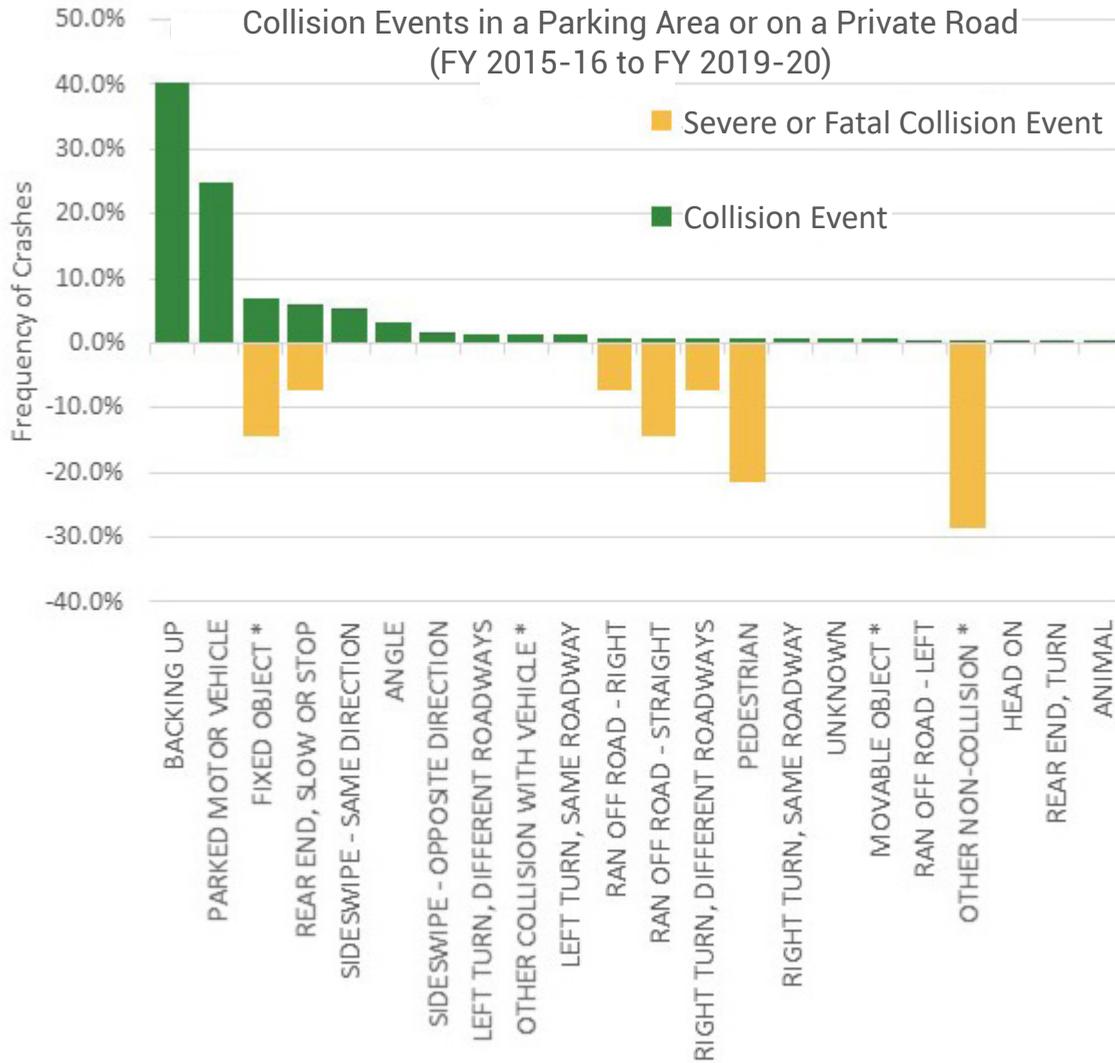
Collision Data Details (continued)



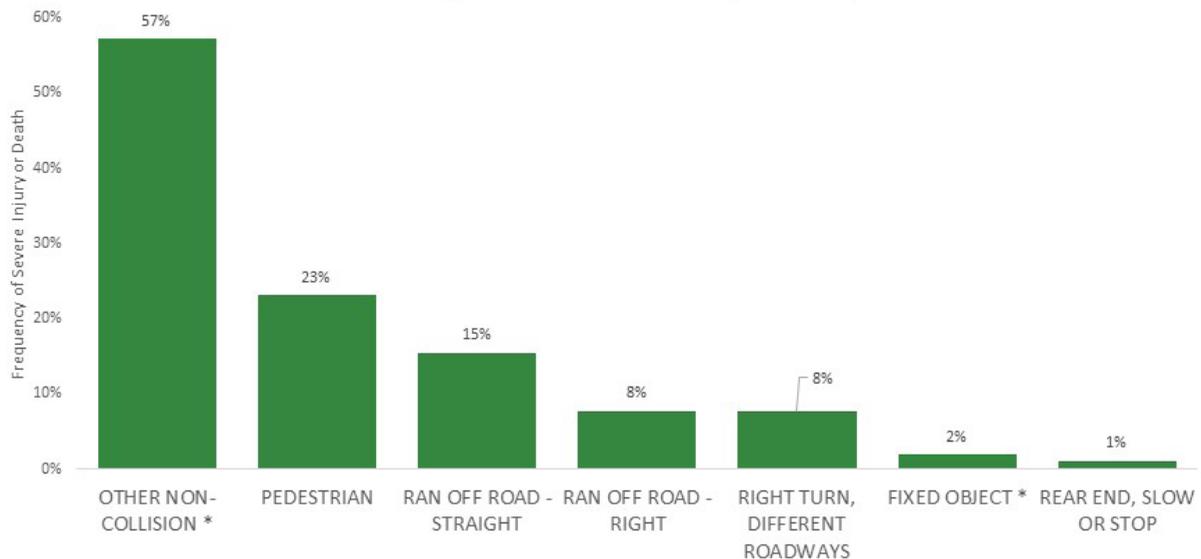
Collision Data Details (continued)



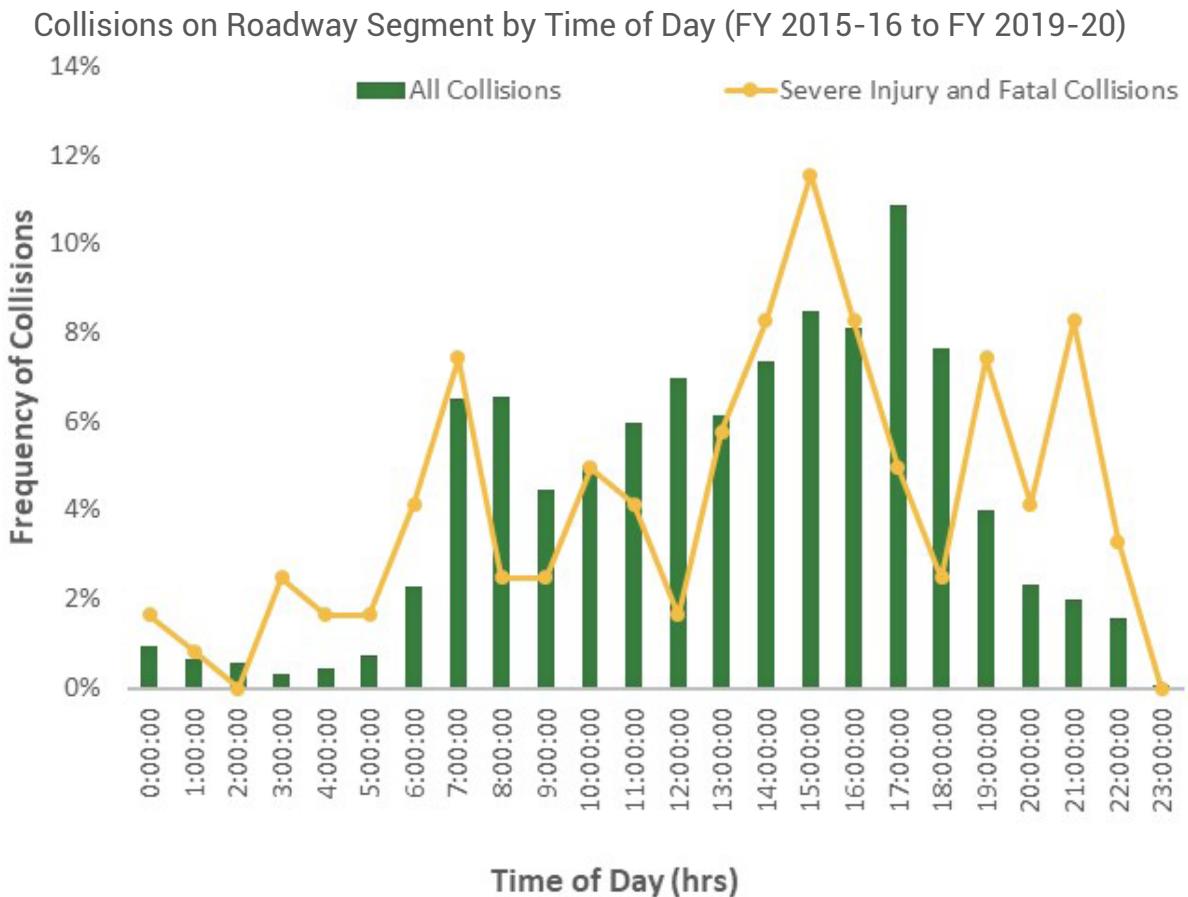
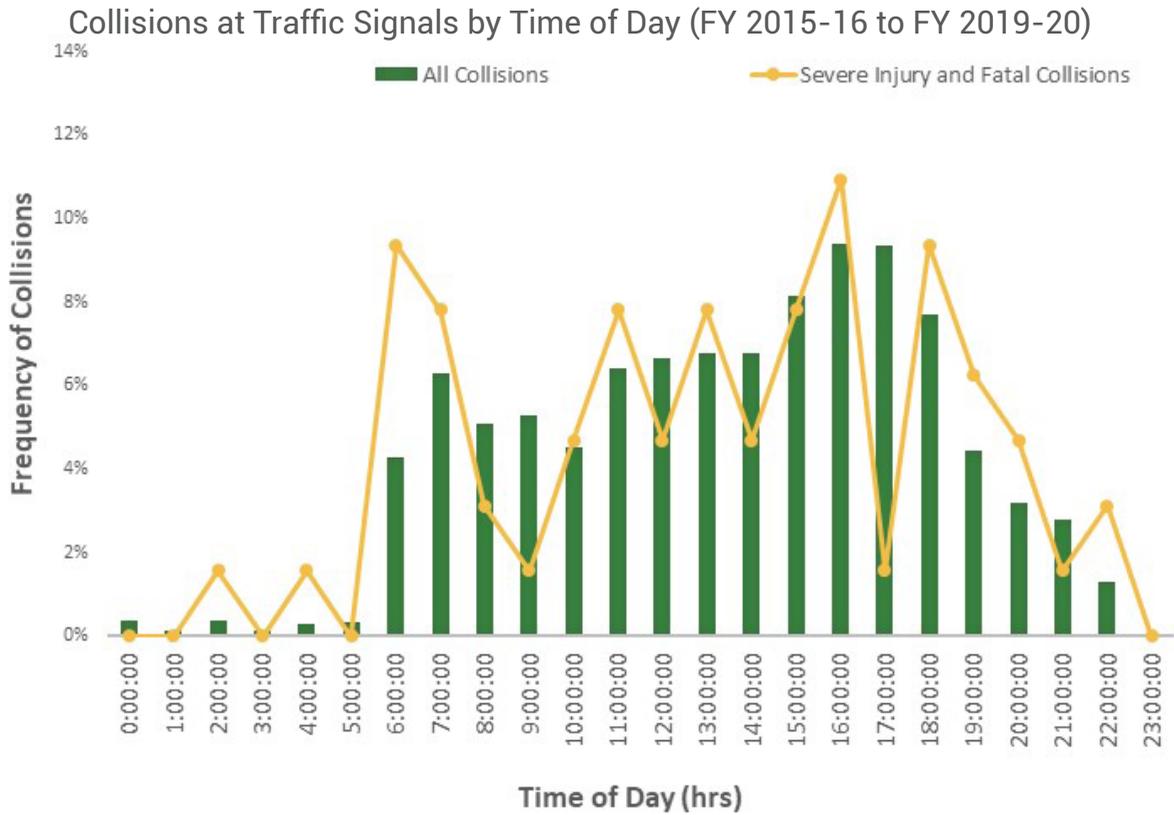
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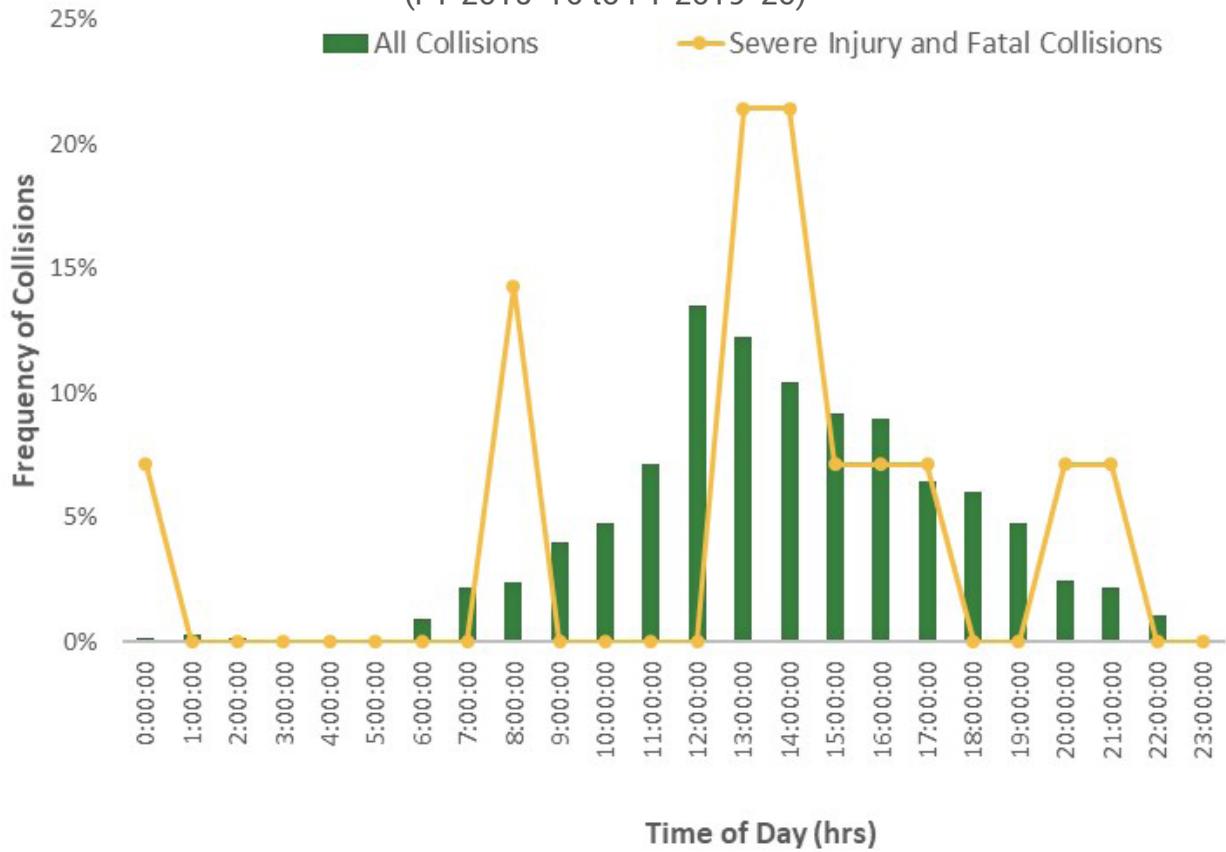
### Likelihood of a Severe or Fatal Injury During a Collision Event in a Parking Area or on a Private Road (FY 2015-16 to FY 2019-20)

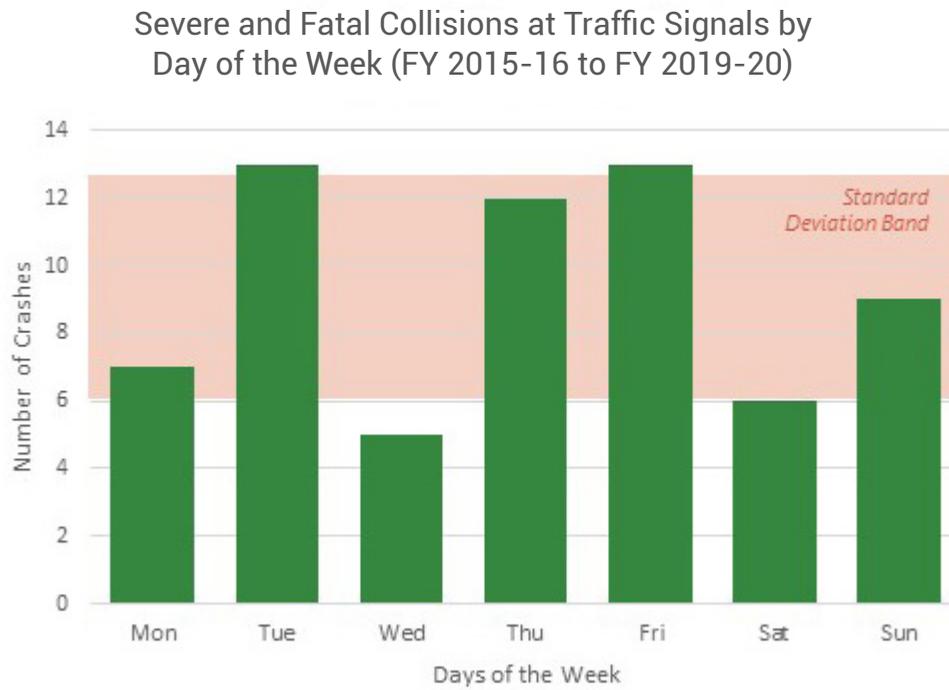
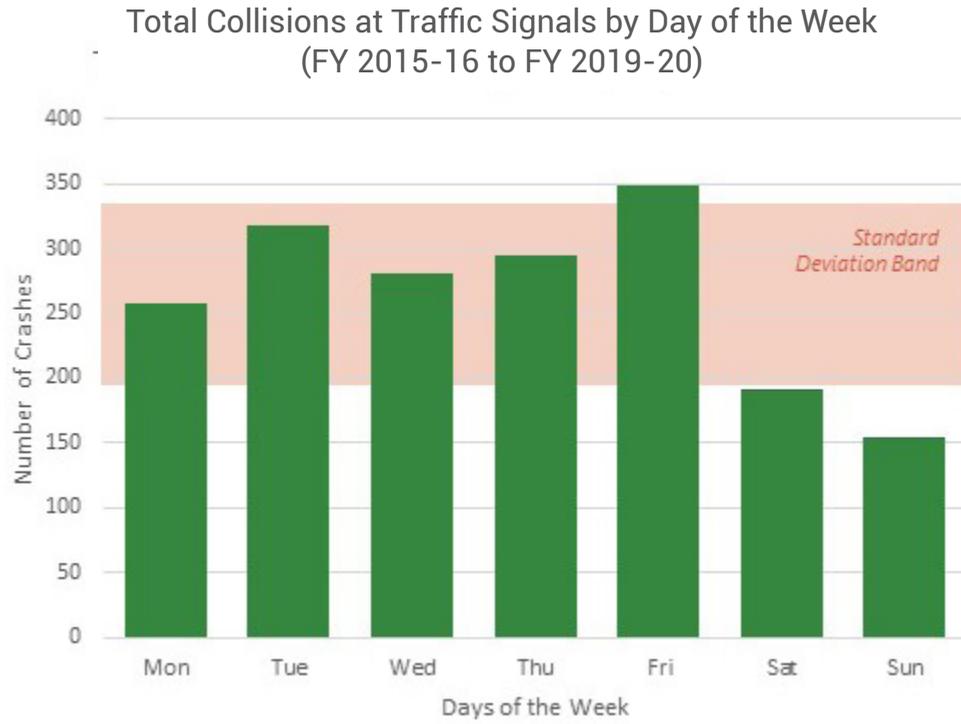


Collision Data Details (continued)

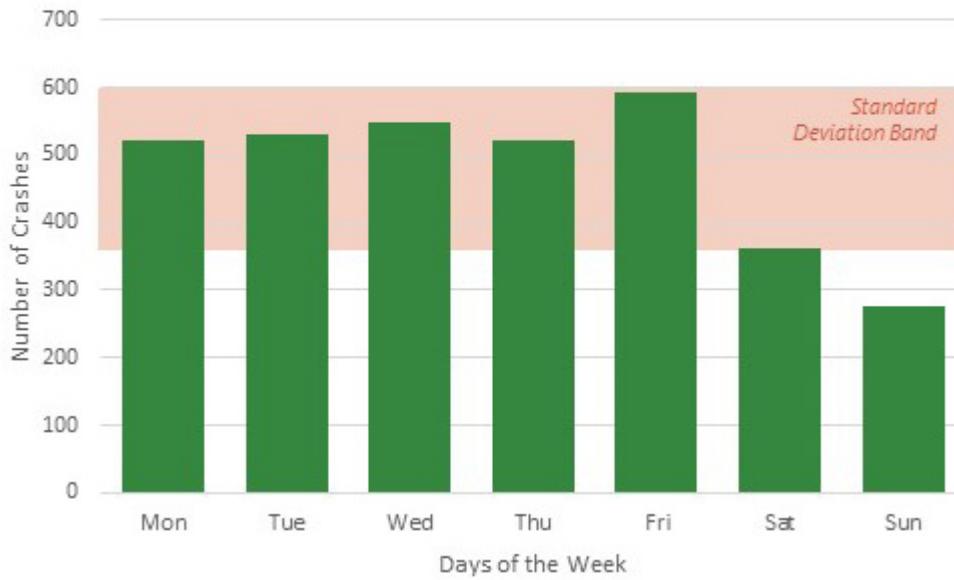


Collisions in Parking Areas and on Private Roads by Time of Day  
(FY 2015-16 to FY 2019-20)

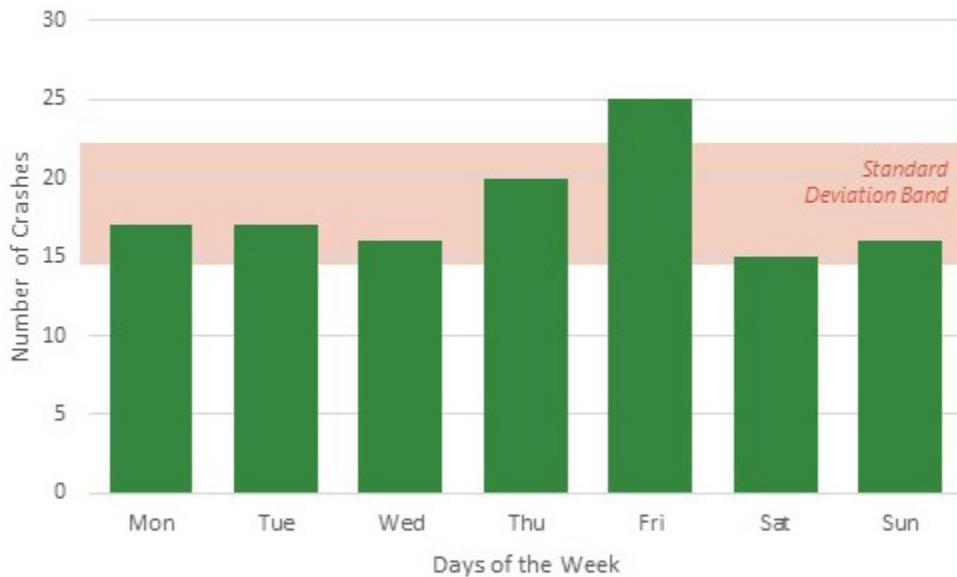




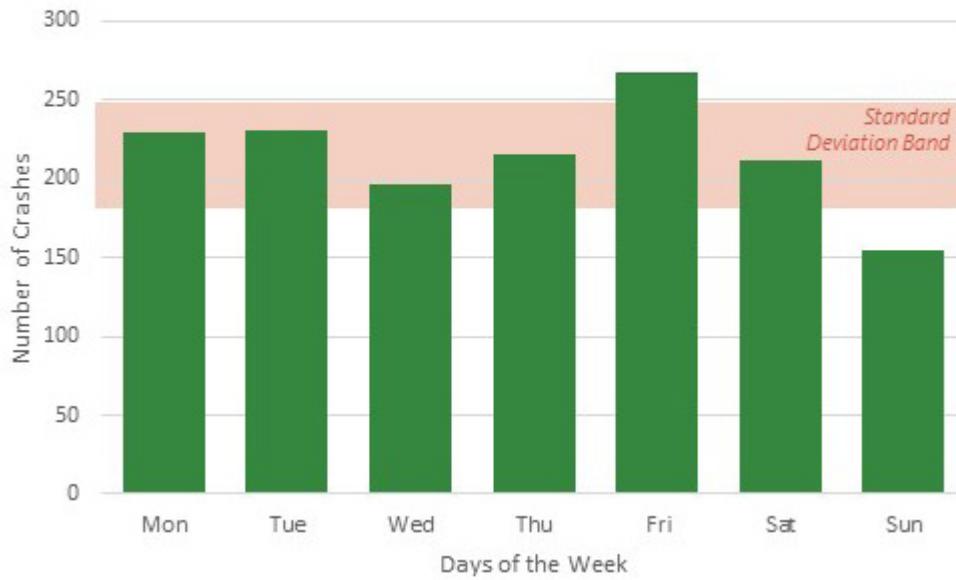
Total Collisions on Roadway Segments by Day of the Week (FY 2015-16 to FY 2019-20)



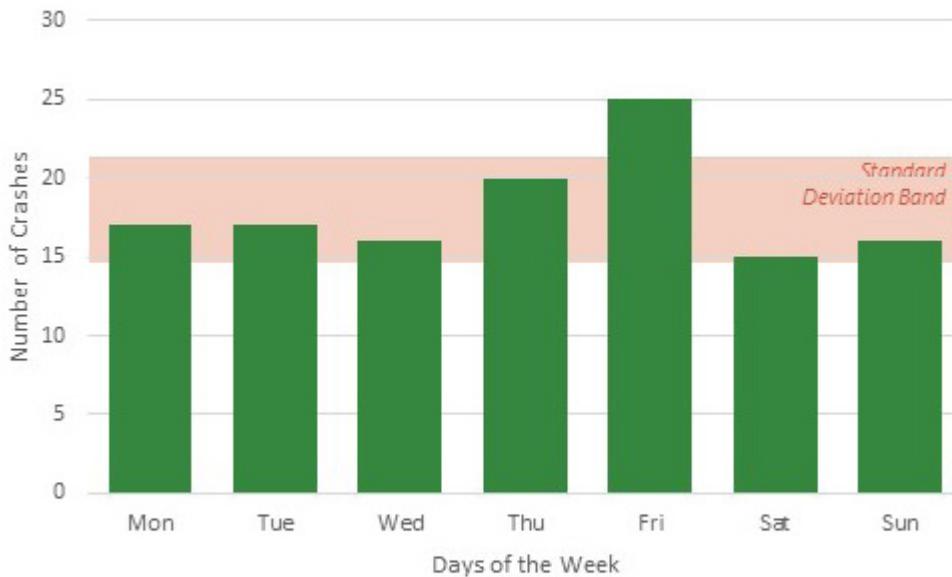
Severe and Fatal Collisions on Roadway Segments by Day of the Week (FY 2015-16 to FY 2019-20)



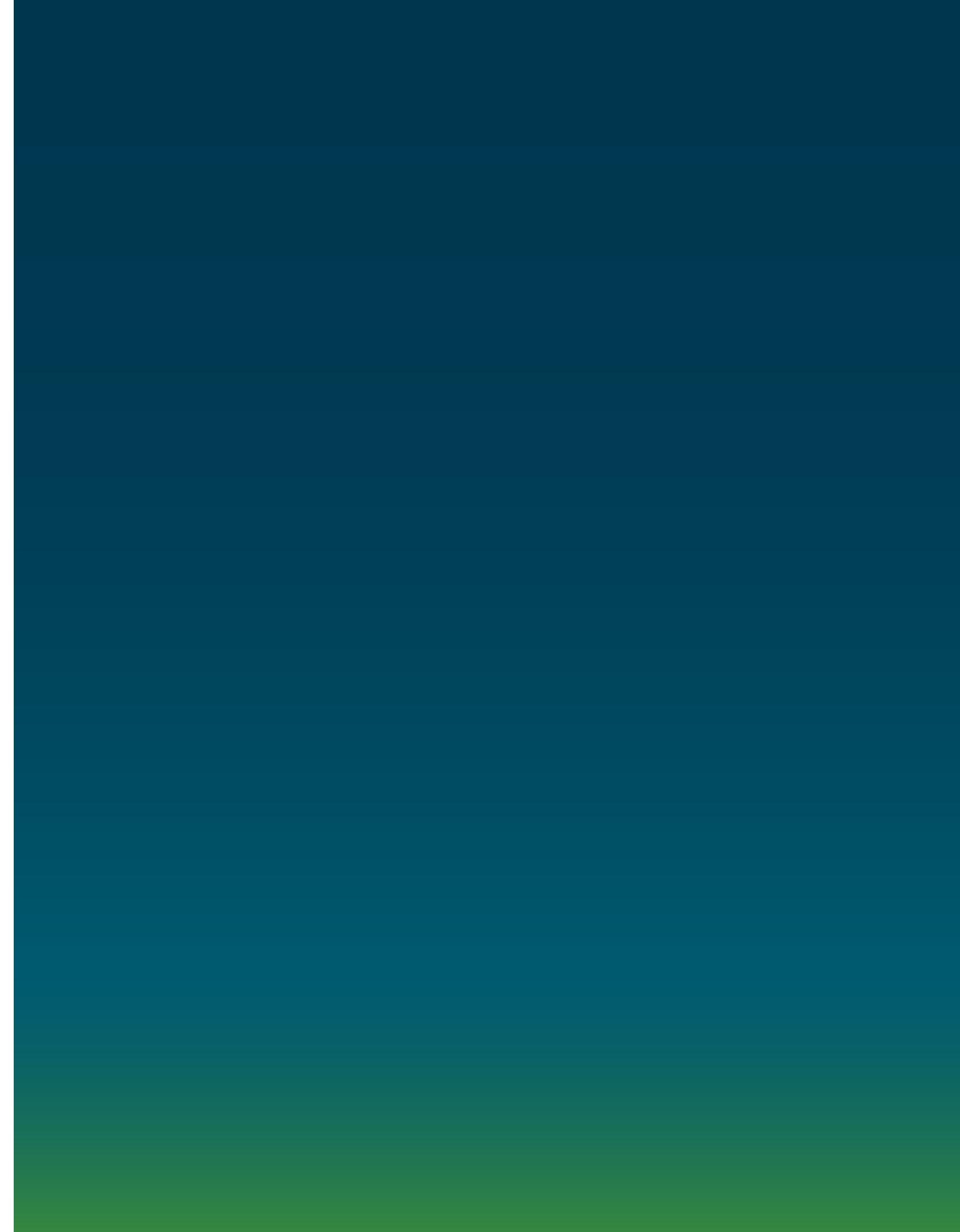
Total Collisions in Parking Areas and on Private Roads by Day of the Week (FY 2015-16 to FY 2019-20)



Severe and Fatal Collisions in Parking Areas and on Private Roads by Day of the Week (FY 2015-16 to FY 2019-20)



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