Report:

Federal Fiscal Year 2024

Vulnerable Roadway User Safety Assessment

Office of Traffic Operations Safety Engineering Program

PROGRAM CONTACTS

Kelli Roberts, P.E.
State Safety Engineering Program Manager

keroberts@dot.ga.gov
Georgia Department of Transportation
Office of Traffic Operations
935 United Avenue SE
Bldg. 24 Wayne Shackelford Building
Atlanta, GA 30316
404.635.2908 office
404.807.3827 cell

Ronald Knezevich, E.I.T.
State Safety Engineering Supervisor

rknezevich@dot.ga.gov
Georgia Department of Transportation
Office of Traffic Operations
935 United Avenue SE
Bldg. 24 Wayne Shackelford Building
Atlanta, GA 30316
470.487.4380 office

Connor Booth, E.I.T.
State Pedestrian and Bicycle Engineer

cbooth@dot.ga.gov
Georgia Department of Transportation
Office of Traffic Operations
935 United Avenue SE
Bldg. 24 Wayne Shackelford Building
Atlanta, GA 30316
404.635.2824 office

Dave Adams
State Safety Data Manager

eadams@dot.ga.gov
Georgia Department of Transportation
Office of Traffic Operations
935 United Avenue SE
Bldg. 24 Wayne Shackelford Building
Atlanta, GA 30316
404.635.2850 office
404.430.3354 cell

Samuel Harris, P.E.
Assistant State Traffic Engineer

sharris@dot.ga.gov
Georgia Department of Transportation
Office of Traffic Operations
935 United Avenue SE
Bldg. 24 Wayne Shackelford Building
Atlanta, GA, 30316
404.635.2881 office
404.858.1933 cell

Georgia Department of Transportation

Russell R. McMurry, P.E.,
Commissioner
One Georgia Center
600 West Peachtree Street, NW
Atlanta, GA 30308
(404) 631-1000 Main Office

November 15, 2023

Mrs. Sabrina David
Georgia Division Administrator
Federal Highway Administration
75 Ted Turner Drive, Suite 1000
Atlanta, GA, 30303

Re: Vulnerable Roadway User Safety Assessment

Dear Ms. David:

The Georgia Department of Transportation (GDOT) has developed a Vulnerable Road User (VRU) Safety Assessment as described in 23 U.S.C. 148(l), as amended by the Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, also known as the "Bipartisan Infrastructure Law" (BIL)). This Vulnerable Road User Safety Assessment has been developed as part of the Highway Safety Improvement Program and is submitted as an addendum to the already published 2022-2024 Georgia Strategic Highway Safety Plan. This safety assessment adheres to the requirements of 23 U.S.C. 148(l).

Please find the Federal Fiscal Year 24 GDOT Vulnerable Roadway User Safety Assessment attached to this letter. Upon approval, the VRU assessment will be published alongside the Strategic Highway Safety Plan.

We appreciate the continued partnership in managing the safety program. If you have any questions, please feel free to contact Kelli Roberts, State Safety Engineering Manager, at keroberts@dot.ga.gov.

Sincerely,

Russell R. McMurry, P.E.
Commissioner

cc: The Honorable Governor Brian P. Kemp
Robert L. Brown, Jr., Chairman, State Transportation Board
Allen Poole, Director, Governor's Office of Highway Safety

SUMMARY

In Georgia, over the past 15 years, the proportion of total fatal roadway crashes that involved a pedestrian or cyclist, also called Vulnerable Roadway Users (VRU), increased from 11% (2007) to 19% (2021). This percentage increase is due to the fatal VRU crashes increased from 170 to 315. The Georgia Department of Transportation's (GDOT) VRU Safety Assessment intends to combat these trends and support the U.S. DOT's Safe System Approach, aiming for zero fatalities while promoting emissions reductions, public health, and equity.

A data-driven approach is necessary to systemically and equitably address VRU safety. However, given that VRU crashes comprise only 1% of all crash data, it is necessary to consider other data sources, such as near-miss analyses, to make effective data-driven decisions.

Statistical analysis revealed six vital high-risk areas for VRUs. The high-risk areas are 1) locations with high social vulnerability (age, disability, income, minority status, and transportation access), 2) transit stop presence, 3) locations in proximity to schools, 4) undivided (i.e., no median) and high lane number roadways, 5) principal and minor arterials, and 6) locations with higher speeds. Additionally, analysis shows that 77% of VRU fatalities occur in non-daylight conditions. These findings contribute to the ongoing development of a user-friendly tool by the Georgia Department of Transportation (GDOT) known as AASHTOWare Numetric Safety. GDOT uses AASHTOWare Numetric Safety to Identify and rank high-risk sites.

To combat these VRU crash trends, GDOT increased VRU safety funding, focusing on infrastructure and education. Collaborating with diverse organizations, including engineers, advocates, public health departments, local governments, law enforcement, transit agencies, and more, ensures a comprehensive approach to VRU safety.

To enhance VRU safety, GDOT employs educational initiatives, including classroom sessions, walk-and-roll events, and school Safe Driving Summits. Engineering approaches encompass systemic transit stop and trail crossing assessments, Complete Streets initiatives, lighting enhancements, video analytics, and a rural active transportation plan. Using these strategies, GDOT is proactively and systemically attempting to eliminate roadway fatalities.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF EQUATIONS

GLOSSARY

AADT: Annual Average Daily Traffic – Average number of vehicles per day on a given roadway.

B/C: Benefit Cost Ratio – Equivalent dollar value of predicted crashes prevented by a safety project vs the cost of the safety project.

CODES: Crash Outcome Data Evaluation Survey – linked electronic data to track persons involved in motor vehicle crashes from the scene through the health care system to determine crash outcome.

DPH: Department of Public Health – Georgia state government department tasked with preventing disease and injury, promoting health and well-being, and preparing for and responding to disasters.

ePDO: Equivalent Property Damage Only – All crashes at a given location (fatalities, injuries, and PDO) converted to the equivalent number of PDO crashes based on equivalent dollar cost for each crash type.

FARS: Fatality Analysis Reporting System – Data on fatal traffic crashes across states, involving motor vehicles on public roads, gathered from various state documents, and managed through cooperative agreements with state agencies.

FIRST: Fatality and Injury Reporting System Tool --Allows a user to construct customized queries from the FARS.

HSIP: Highway Safety Improvement Program – Federal program that provides funding for transportation safety projects.

ICE: Intersection Control Evaluation – GDOT tool used to determine the appropriate traffic control type at an intersection.

IDIQ: Indefinite Delivery Indefinite Quantities – On-call maintenance contract that allows the GDOT Safety Program to quickly install maintenance level improvements.

MARTA: Metropolitan Atlanta Rapid Transit Authority – Transit agency serving Atlanta and some of the Atlanta metro area.

MOSD: Menu of Service Design – An expedited PDP with pre-negotiated design rates for projects with no right of way requirements and limited environmental impacts.

MUTCD: Manual on Uniform Traffic Control Devices – Manual developed by the FHWA that sets national standards for traffic control devices (signs, roadway striping, signals, etc.)

OASIS: Online Analytical Statistical Information System: The tool suite accesses Georgia Department of Public Health data from the U.S. Census Bureau, enabling users to create detailed population tables by various demographics

PDP: Plan Development Process – GDOT's traditional process for developing engineering plans from concept to final design.

PHB: Pedestrian Hybrid Beacon (Also known as High-Intensity Activated Crosswalk) – Traffic control device activated by pedestrians to stop vehicles at mid-block pedestrian crossing locations.

RRFB: Rectangular Rapid Flashing Beacon – Flashing yellow lights installed at crosswalks that are activated by pedestrians to draw driver's attention to the crossing.

RSA: Road Safety Audit – A transportation safety study that analyzes crash patterns on a corridor and recommends solutions to reduce crashes.

SHSP: Strategic Highway Safety Plan – A comprehensive roadmap developed by state authorities, outlining data-driven strategies and actions to reduce traffic-related fatalities and injuries on highways.

SPF: Safety Performance Function – Variable used to calculate predicted crash reductions for various safety project types based on observed crash reductions for similar projects.

SRTS: Safe Routes to School – GDOT program that provides education and engineering services to encourage children to safely walk, bike and roll to school.

SVI: Social Vulnerability Index – Social vulnerability refers to potential negative effects on communities caused by external stresses on human health. SVI was developed by the Centers for Disease Control and uses census data to identify vulnerable communities that may need additional assistance after a disaster based on economic, demographic, household, and transportation factors.

VRU: Vulnerable Roadway User – Pedestrian, bicyclist, rider using a personal conveyance device (scooter, skateboard, etc.), or worker in a work zone.

INTRODUCTION

In the last 15 years, the proportion of roadway fatalities in Georgia that contain a pedestrian, cyclist, or other Vulnerable Roadway User (VRU) has increased disproportionally compared to vehicular crashes. In 2007, VRU fatalities represented approximately 11% of total roadway fatalities; in 2021, this number passed 19% [1]. Additionally, the total number of fatal pedestrian crashes has nearly doubled in this time frame, increasing from 170 to 315[1]. Georgia has developed the Vulnerable Roadway User Safety Assessment to address these trends. As the State of Georgia has adopted a Safe System Approach in Georgia's Strategic Highway Safety Plan, prioritizing vulnerable roadway user safety is crucial.

A VRU is defined in this assessment as a non-motorist with a Fatality Analysis Reporting System (FARS) person attribute code for pedestrian, bicyclist, another cyclist, and person on personal conveyance or an injured person that is or is equivalent to a pedestrian or pedal cyclist. Additionally, highway workers in work zones, wheelchair users, skateboarders, electric-assisted bicyclists, and scooters are included in this definition of a VRU. Motorcyclists and other motorized modes of transportation are not.

Figure 1: Roadway Users Included as a VRU

In an effort to eliminate VRU fatalities, the four objectives of this assessment are as follows:

1) Summarize historical trends related to VRU safety
2) Develop data-driven analysis techniques to assess VRU safety
3) Establish a list of partner organizations to aid in the reduction of VRU fatalities
4) Outline a series of projects to reduce VRU fatalities.

Achieving these four objectives hinges on using a data-driven and Safe System approach. In efforts to utilize a Safe System approach, this assessment is created in collaboration with the Georgia Governor's Office of Highway Safety (GOHS) Bicycle and Pedestrian Task Teams, which

[1] FIRST Crash Query: https://cdan.dot.gov/query

comprise an interdisciplinary group of local governments, non-profits, transit authorities, and various state entities. The collaboration between these entities allows for a series of strategies to evaluate VRU safety and reduce VRU fatalities through engineering, enforcement, education, and emergency medical service initiatives. Many of these initiatives aim to reduce vehicular speeds to mitigate the kinetic energy of potential collisions. Additionally, these initiatives include efforts to educate the public on safer pedestrian, cyclist, and driver behavior. All these principles are critical elements of the Safe System Approach.

Figure 2: A Safe System Approach

Image Source: U.S. DOT, What is a Safe System Approach?

Though the primary purpose of this effort is to eliminate VRU fatalities, many of the strategies developed benefit safety to all roadway users. This assessment also supports other federal and state objectives, such as reducing emissions, enhancing public health, and advancing equity by providing accessible transportation options for roadway users of all income levels and abilities. In some instances, encouraging safe modes of active transportation can lead to reductions in congestion by shifting trips to more space efficient modes.

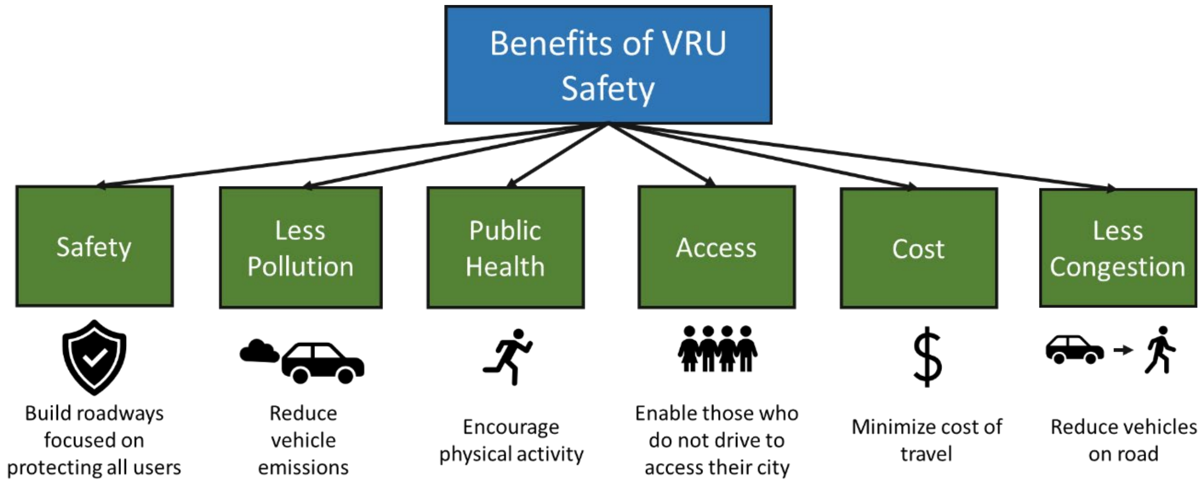


Figure 3: Additional Benefits to a Focus on VRU Safety

VRU SAFETY PERFORMANCE

The purpose of this section is to review the historical trends for VRU safety. This section outlines our performance targets, crash trends, distributions of crash data, and GDOT's progress towards improving VRU safety. The performance targets section reviews GDOT's ability to meet the goals set toward VRU safety in our Strategic Highway Safety Plan (SHSP).

Performance Targets

As part of the Strategic Highway Safety Plan, GDOT is responsible for setting performance targets based on a five-year average of crash data. These targets are set with the aim of ultimately achieving zero roadway fatalities. **Table 1** below shows GDOT's history of meeting these performance targets.

Table 1: GDOT's Safety Performance Target Determination

Calendar Year	2018	2019	2020	2021
Analysis Years	2014 - 2018	2015 - 2019	2016 - 2020	2017 - 2021
Safety Performance Targets Met	✗	✓	✓	✗

Table 2 displays the percentage difference between the actual non-motorized fatalities and serious injuries for the calendar year 2021 and the target values.

Table 2: GDOT's Calendar Year 2021 Safety Performance Targets

	2017 - 2021 Year Average	2021 Calendar Year Targets	Percent Difference	Met or Made Significant Progress
Number of Non-motorized Fatalities and Serious Injuries	720	686.5	-5%	No

GDOT, like many other state DOTs, faced challenges in achieving its safety performance goals due to the widespread impact of the COVID-19 pandemic on increasing fatal and serious injury crashes. In 2020, the pandemic disrupted daily routines, travel patterns, driving behavior, and overall road usage. Despite an initial decrease in traffic volume during the early stages of the pandemic, unforeseen consequences emerged. To evaluate these precarious driving patterns, GDOT collaborated with the Governor's Office of Highway Safety (GOHS) to assess trends between 2019 and 2020 regarding fatalities associated with speeding, alcohol impairment, drug use, distracted driving, drowsy driving, and failure to use proper safety measures such as seatbelts or motorcycle helmets. Speeding-related fatalities experienced a 46% increase from 2019 to 2020, while all these risky fatal crash behaviors collectively rose by 37% during the same period. These increases in risky behaviors are likely because the confluence of reduced vehicle presence on the roads, changes in driver conduct. This pattern was observed nationwide. Nevertheless, GDOT remains unwavering in its commitment to surpassing federal requirements to eliminate traffic-related deaths. The key to achieving this objective lies in maintaining a data-driven approach.

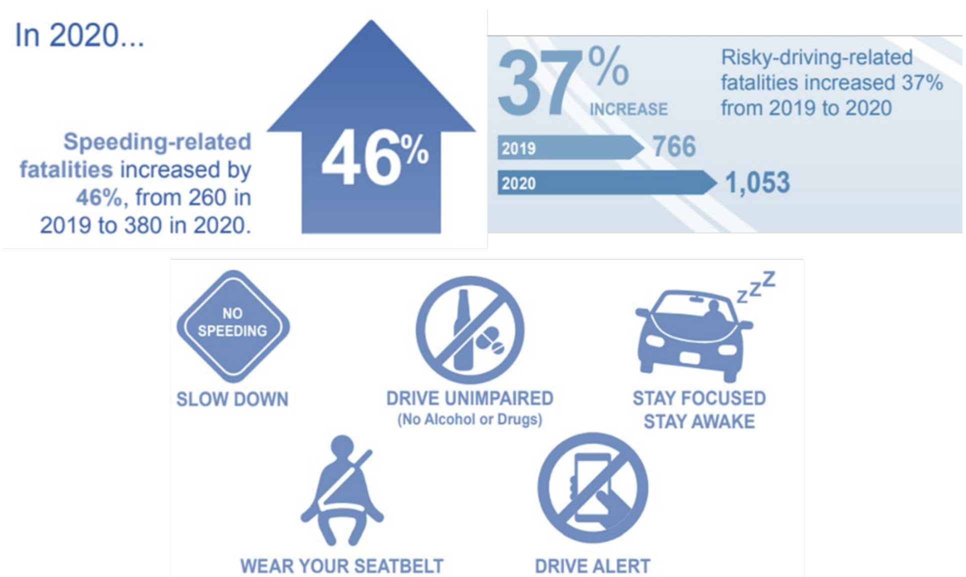


Figure 4: Risky Driver Trends Due to COVID
(Source: GOHS, *Georgia Traffic Safety Quick Facts: Risky Driving*[2])

[2] *GOHS, Georgia Traffic Safety Quick Facts: Risky Driving:* http://www.gahighwaysafety.org/wp-content/uploads/2023/03/2020_RiskyDriving_GTSFQuick.pdf

Historical Crash Trends

This section assesses crash data for both fatality and injury crashes. The following crash data has been obtained from multiple sources to assess VRU safety adequately. Fatal crash data is obtained from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) Fatality and Injury Reporting System Tool (FIRST)[3]. This data is available from 2007 to 2021. Other crash data related to injuries or data with a spatial connection to the roadway is obtained from GDOT's crash data analysis tool, AASHTOWare Numetric Safety[4]. Additionally, the Georgia Department of Public Health (DPH) is referenced for injury and crash data in specific scenarios. This dataset brings a broader perspective rather than just crash reports. This dataset is from the Crash Outcome Data Evaluation System (CODES)[5].

Key findings of this assessment indicate the proportion of fatal crashes involving VRUs rose from less than 12% in 2007 to over 20% in 2018 and 2020. VRU fatalities show peak times during evenings and nights. Additionally, urban areas experienced more VRU collisions, but rural areas had a higher fatality rate per collision. Furthermore, the likelihood of a crash becoming a fatality increased with higher speed limits. The study emphasizes the importance of a holistic approach beyond crash reports to enhance VRU safety measures due to the limited amount of total crash data, but a high proportion of fatalities.

This section uses the following color scheme to represent different data types.

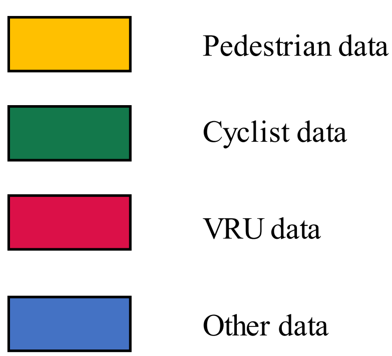


Figure 5: Color Scheme for Historical Crash Trends Section

---

[3] FIRST Crash Query: https://cdan.dot.gov/query
[4] AASHTOWare Numetric Safetyhttps://www.numetric.com/aashtowaresafety/
[5] Crash Outcome Data Evaluation Survey (CODES): https://dph.georgia.gov/injury-epidemiology/crash-outcome-data-evaluation-survey-codes

Fatality Trends

This section reviews and compares fatality trends for both VRU crashes and all crash types. Georgia has experienced an upward trend in total crash fatalities from 2014 to 2017 and 2019 to 2021 during the COVID-19 pandemic. From 2020 to 2021, fatalities increased by 10%.

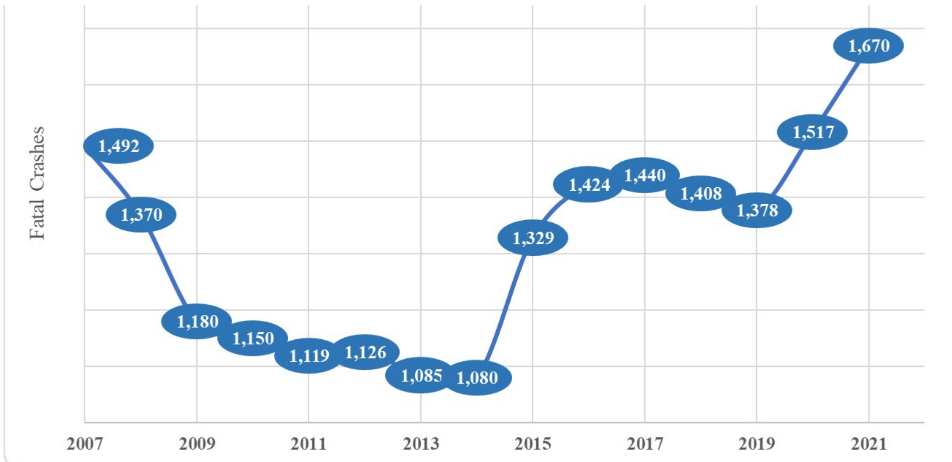
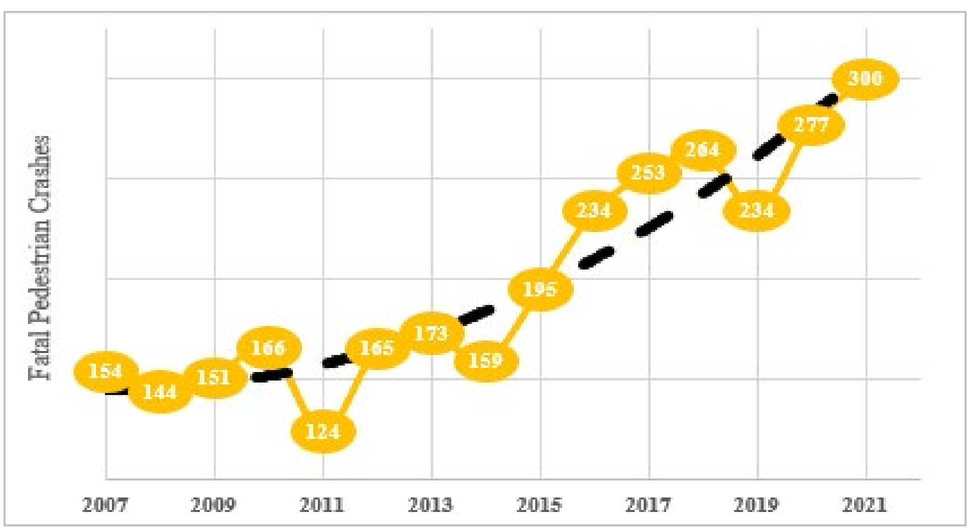
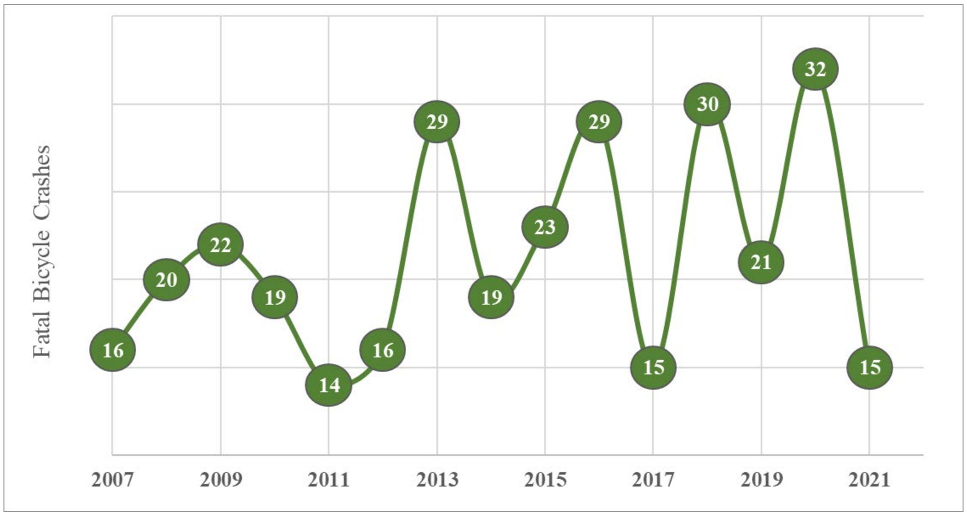


Figure 6: Fatal Crash Trends in Georgia (VRU and non-VRU)
(Source: FARS)

Despite total fatalities having a trend that fluctuates, pedestrian fatalities have been on an increasing trend since 2007. From 2020 to 2021, there was an 8% increase in pedestrian fatalities. Due to the relatively lower number of bicycle fatalities, the data has no clear trend.



a: Pedestrian Fatality Trends



b: Bicycle Fatality Trends

Figure 7: Fatal VRU Crash Trends
(Source: FARS)

Analyzing pedestrian fatality trends reveals that pedestrian crash rates are increasing exponentially rather than linearly. When assessing this data in terms of population growth, trends remain similar. In 2007, there were 1.65 fatal pedestrian crashes per 100,000 population, but in 2021 there were 2.78 crashes per 100,000 population. Population data is collected from the Georgia DPH Online Analytical Statistical Information System (OASIS)[6].

While the figure does not include data for 2022 since NHTSA has not yet verified it, GDOT's internal dataset has indicated a minor reduction in total roadway fatalities in that year.

Table 3: Georgia Traffic Deaths 2021 to 2022
(Source: GDOT Office of Traffic Operations)

	2021	2022	Percent Change
Total Fatalities	1828	1821	-0.4%
Pedestrian Fatalities	319	343	7.5%
Bicyclist Fatalities	14	33	135.7%

[6] Online Analytical Statistical Information System OASIS: https://oasis.state.ga.us/oasis/webquery/qryPopulation.aspx

Based on GDOT data on total traffic fatalities (not fatal collisions; one crash can have more than one fatality) as of 10/1/2023, pedestrian fatalities have continued to increase, with a 7.5% increase observed from 2021 to 2022. Bicyclist fatalities also increased by 135.7% from 2021 to 2022, although bicyclist fatality data is sporadic due to the relatively low number of collisions.

From assessing the pedestrian and bicycle fatality trends compared to overall fatal crashes, it is clear from **Figure 8** that the proportion of fatal crashes that involve a VRU is increasing. In 2007, fewer than 12 percent of fatal crashes involved a pedestrian or bicyclist, however these surpassed 20 percent in 2018 and 2020.

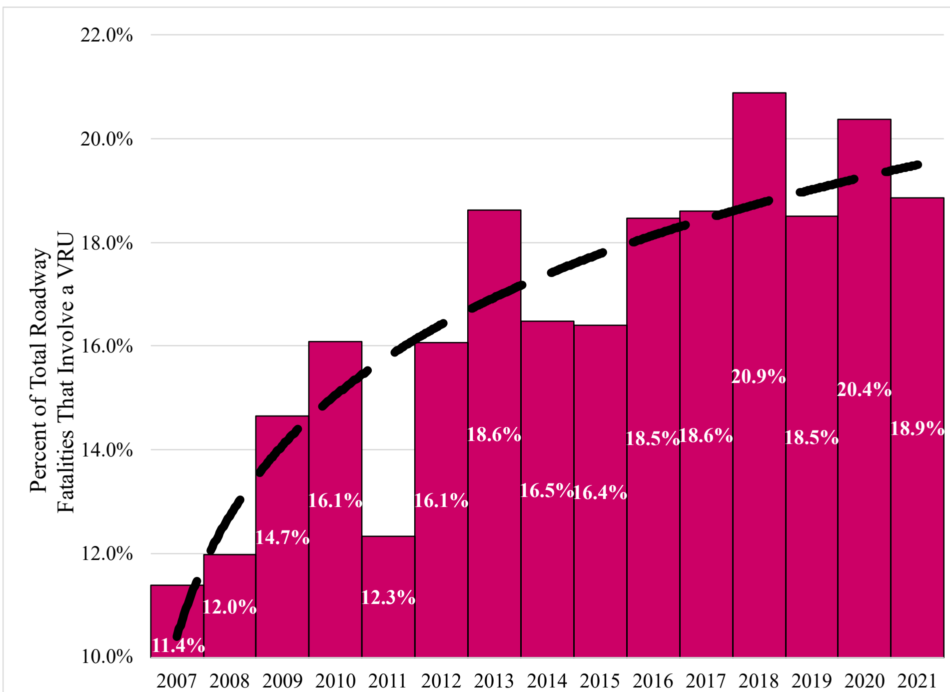
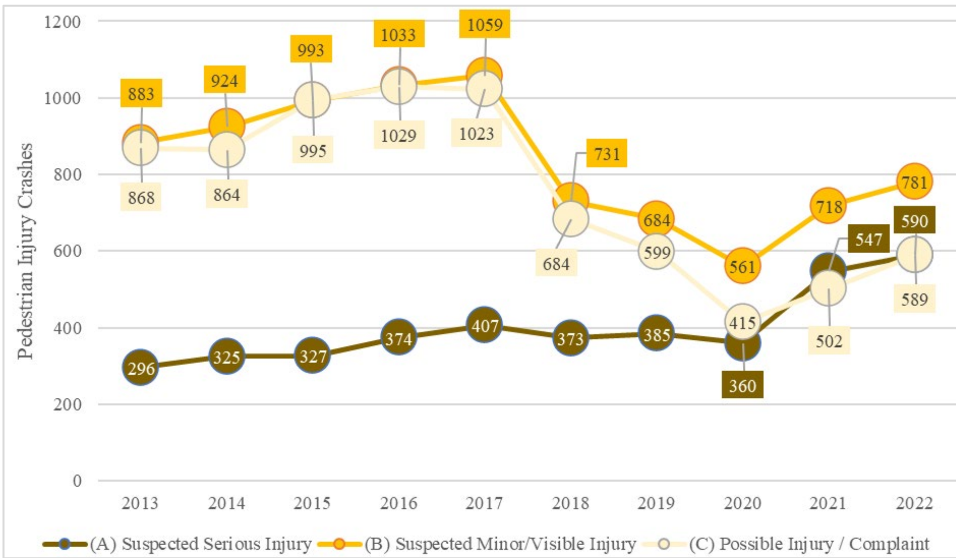


Figure 8: Proportion of Total Roadway Fatalities that Involve a VRU
(Source FARS)

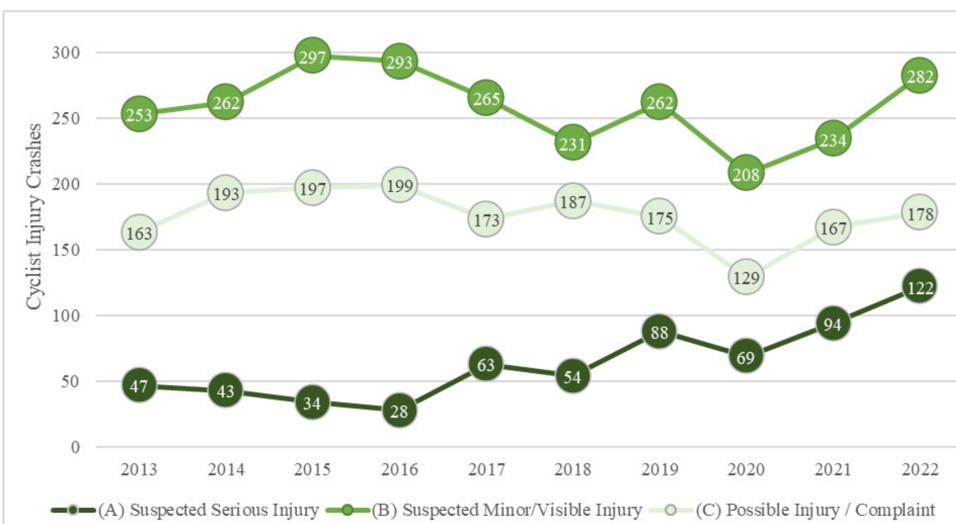
According to AASHTOWare Numetric Safety, VRU crashes from 2013 to 2022 represent 18% of all roadway fatalities but only approximately 1% of all crash data. This limited amount of crash data means that practitioners deal with a limited crash dataset compared to vehicular crashes. Therefore, to reduce pedestrian and bicyclist fatalities, it is essential to assess additional data besides crashes when conducting VRU safety assessments.

Injury Trends

In this section, injury trends are examined. Injury data is obtained using GDOT's crash query tool, AASHTOWare Numetric Safety. It is important to note that serious injury data is less reliable than fatality data because the processes to manually review these crash types is less intensive. When writing the crash reports, the officer's perception of the injury severity may not accurately reflect the victim's condition, introducing bias into the data.



a: Pedestrian Injury Trends



b: Bicycle Injury Trends

Figure 9: Injury VRU Crash Trends
(Source: AASHTOWare Numetric Safety)

Pedestrian injuries were decreasing from 2017 to 2020 but began increasing after 2020. Pedestrian serious injury collisions increased by 8% from 2021 to 2022, with minor injury and complaint injury crashes growing by 9% and 17%, respectively. Bicycle serious injury collisions began increasing in 2016, whereas bicycle minor injury and complaint injury collisions trended downward from 2016 to 2020 but began growing from 2020. Bicycle serious injury collisions increased by 30% from 2021 to 2022, with minor injury and complaint injury crashes rising by 21% and 7%, respectively.

Although police crash data is conventionally used for traffic safety analyses, the DPH also gathers data on pedestrians and bicyclists who require medical services following a collision. Any collision requiring EMS, emergency room, hospital, or trauma care services would usually qualify as a serious injury collision. The DPH data shows that the police crash data used for traffic safety analyses may be underreporting pedestrian and bicyclist serious injury collisions. This analysis is backed up by national level research as well[7]. In 2021, there were 572 police crash reports for serious injury pedestrian collisions, but according to DPH data, 2,579 pedestrians required EMS after a crash, and 2,356 were taken to an emergency room. Similarly, in 2020, there were 71 crash reports for cyclist serious injury collisions, but 716 bicyclists required EMS, and 349 were taken to an emergency room. Note that in 2020 there were fewer officers available to report less serious crashes due to COVID, with more officers becoming available in 2021 and 2022. Also, data from EMS, trauma, emergency department,

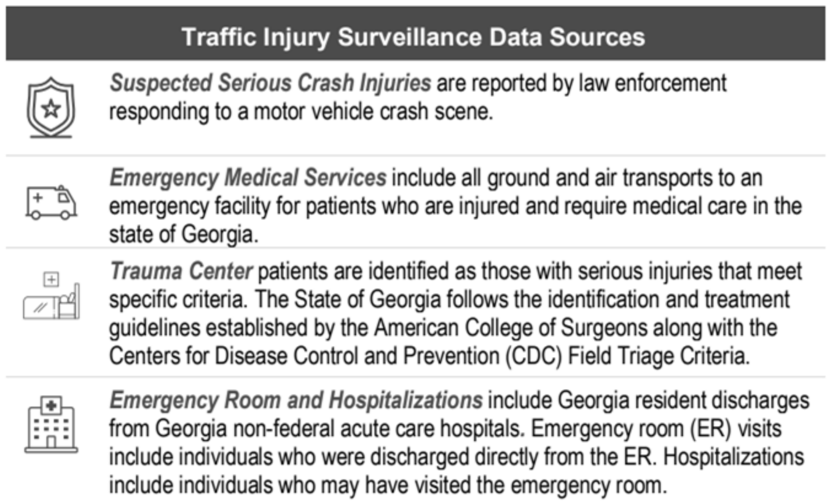


Figure 10: Sources for Traffic Injury Reporting
(Image Source: Georgia Traffic safety Facts, Non- Motorist Traffic Safety Facts, 2021

[7] Evaluating Research on Data Linkage to Assess Underreporting of Pedestrian and Bicyclist Injury in Police Crash Data https://escholarship.org/uc/item/0jq5h6f5 .

and hospital visits are not necessarily related to a collision with a motor vehicle, as pedestrians and cyclists can be injured on their own. **Table 4** shows the injury trends.

Table 4: Traffic Injuries from Various Sources[8]

Source: CODES, DPH Hospital Impatient and Emergency Room Visit Data, Georgia Emergency Medical Services Information System, Georgia Trauma Registry

	2019		2020		2021	
Injury Surveillance Source	**Pedestrian**	**Cyclist**	**Pedestrian**	**Cyclist**	**Pedestrian**	**Cyclist**
Crash Reports *(Serious Injury)* *Source: CODES*	395	88	358	71	572	95
Emergency Medical Services *(Injury severity not classified in the report)*	2102	510	1877	716	2579	*
Trauma *(Serious Injury)* *Source: Georgia Emergency Medical Services Information System*	1141	519	826	148	1079	192
Emergency Department *(Injury Severity not classified in the report)* Source: *DPH Hospital Impatient and Emergency Room Visit Data*	2682	543	1529	349	2356	413
Hospital *(Serious Injury)* Source: *DPH Hospital Impatient and Emergency Room Visit Data*	758	92	654	68	701	63

* Data was not available at the time of reporting

Note:

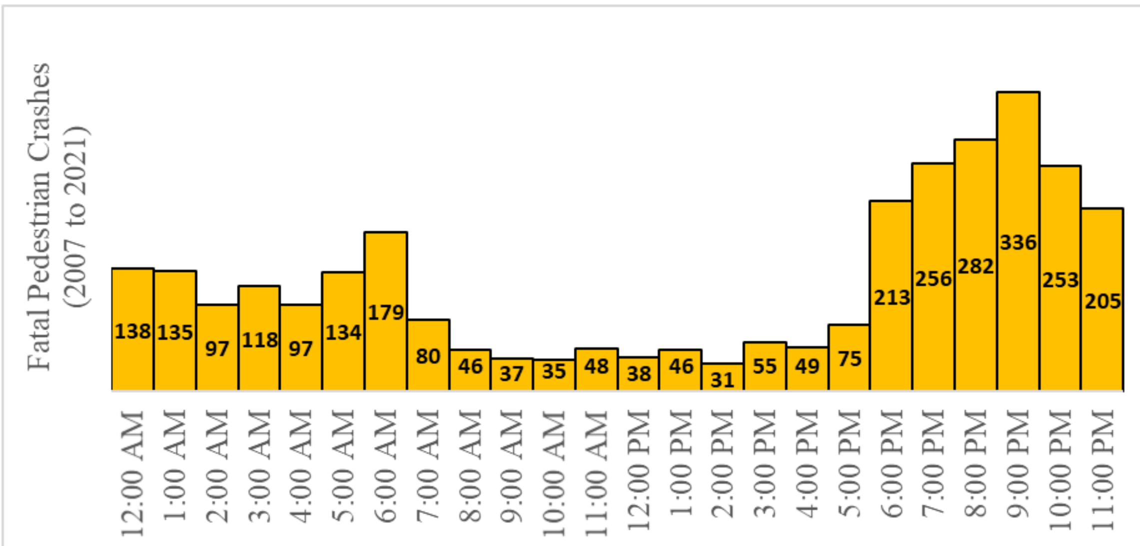
1. These values represent injuries that occurred, not crash numbers.
2. Data from EMS, trauma, emergency department, and hospital is not necessarily related to a collision with a motor vehicle. Other elements of the roadway may cause these injuries.

[8]GOHS Non-Motorist Traffic Safety Facts: http://www.gahighwaysafety.org/wp-content/uploads/2023/08/2021-Non-Motorist-Pedestrian-and-Bicyclist-Georgia-Traffic-Safety-Facts-updated.pdf

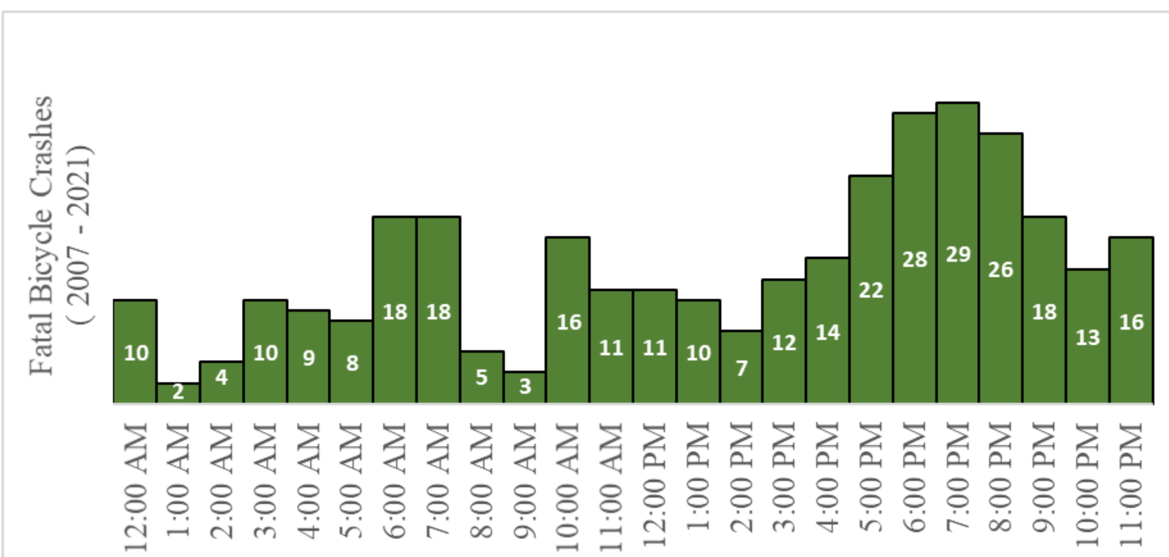
Fatality And Serious Injury Distributions

In this section, VRU fatalities are spatially and temporally distributed to better understand when and where VRU fatalities are more probable.

From **Figure 11**, it is shown that fatal pedestrian crashes are at their lowest between 7 AM and 6 PM and experience a significant increase between 6 PM and 11 PM. Bicycle fatality trends have a daytime peak between 6 AM -8 AM and a night-time peak between 6 PM – 9 PM.



a: Pedestrian Fatality Trends by Time of Day



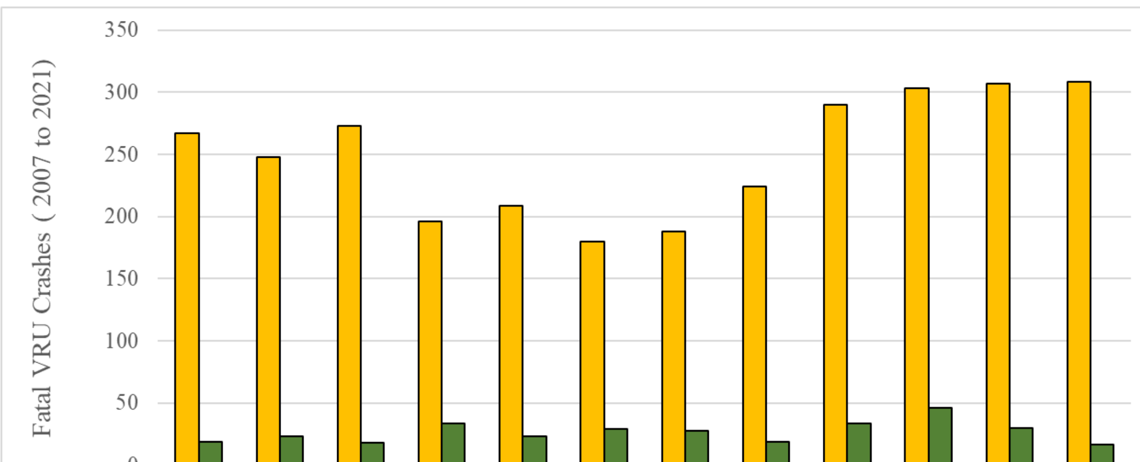
b: Bicycle Fatality Trends by Time of Day

Figure 11: VRU Fatalities Distributed by Time of Day

(Source: FARS – 2007-2021)

The peak hours for pedestrian and bicycle fatality crashes occur during evening and nighttime hours. FARS reports that 77% of pedestrian fatalities occur during non-daylight hours.

Figure 12 shows distributions of pedestrian and bicyclist fatalities by month. Fatal pedestrian crashes are highest during the fall and winter months and lowest during the summer months of June and July. This trend is likely due to the fall and winter months having more hours of darkness when pedestrians are more difficult for drivers to see. Cyclist fatalities are higher in the fall months from September to November.

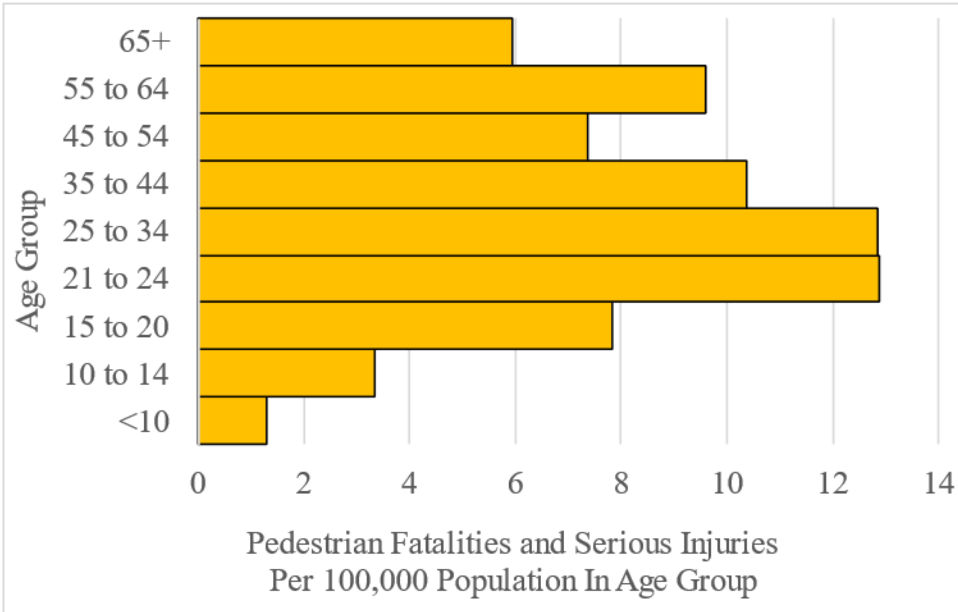


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pedestrian	267	248	273	196	209	180	188	224	290	303	307	308
Cyclist	19	23	18	34	23	29	28	19	34	46	30	17

Figure 12: VRU Fatalities Distributed by Month
(Source: FARS – 2007-2021)

October has the highest number of cyclist fatal crashes and a relatively high number of pedestrian fatal crashes. Halloween in October has the highest number of VRU fatalities of any day, probably due to the presence of trick-or-treaters, the consumption of alcoholic beverages, and dark lighting conditions. The data shows that the warmer months have a lower number of pedestrian fatalities.

Figure 13 shows the distribution of pedestrian and cyclist fatalities by age group normalized by population.



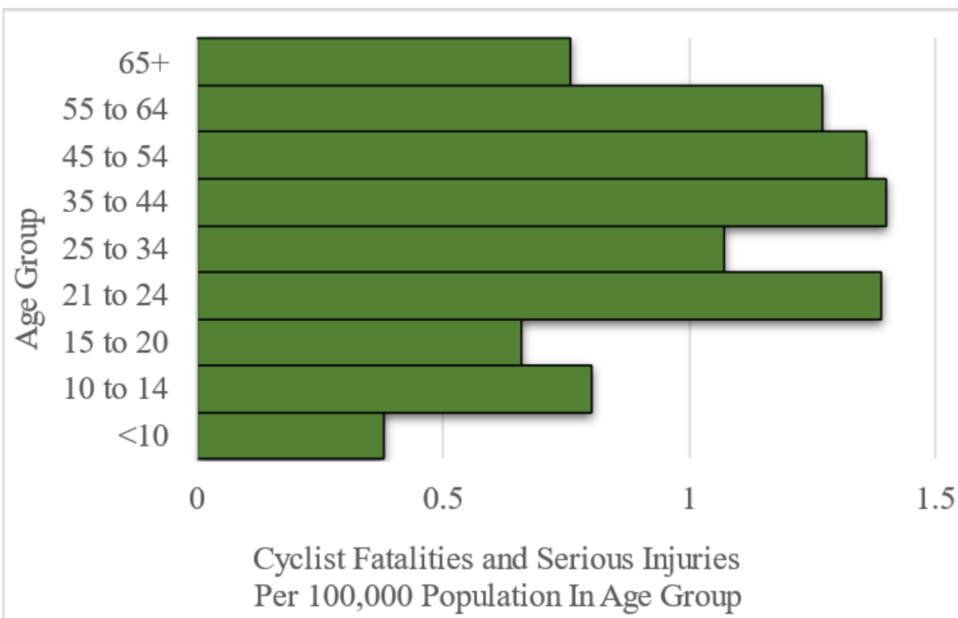


Figure 13: VRU Fatalities and Serious Injuries by Age Group (2021)
(Source: CODES – 2021)

Pedestrian fatalities are most common in younger adults (ages 21-34), while cyclist fatalities are higher in young and middle-aged adults (ages 21-24 and 35-64).

Figure 14 shows VRU fatalities distributed across different roadway functional classifications.

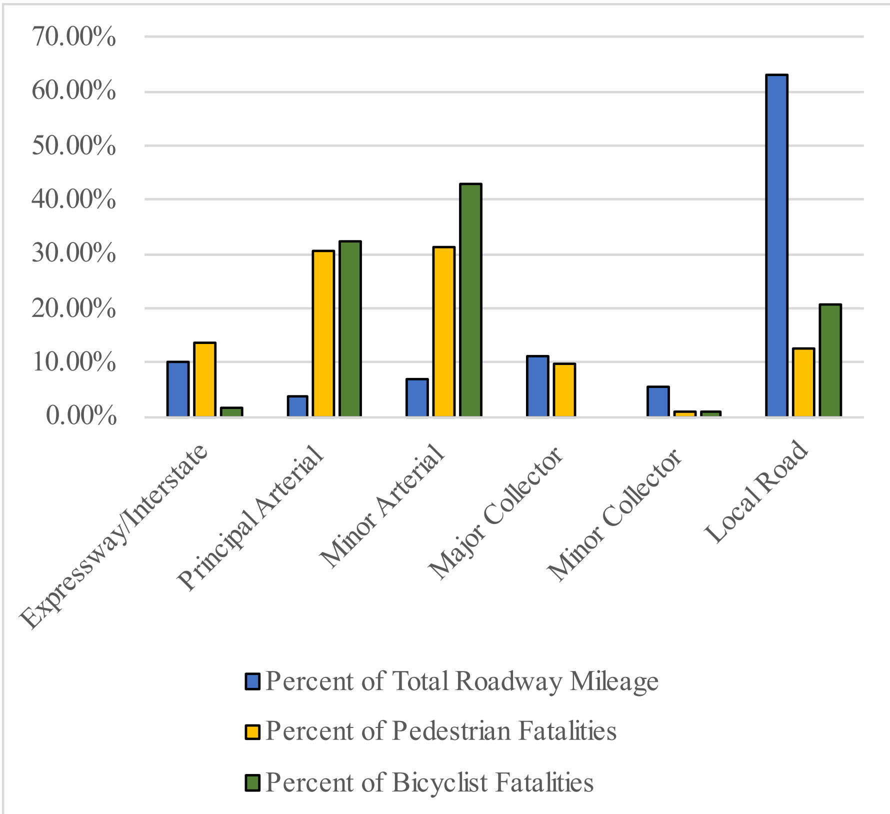
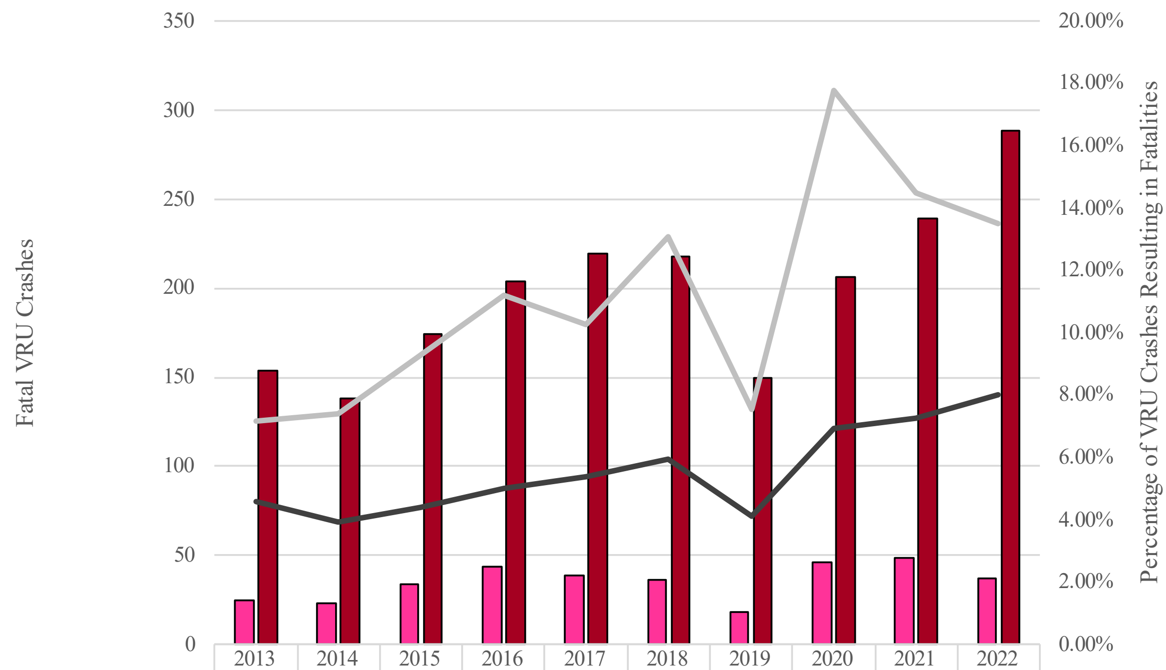


Figure 14: VRU Fatalities by Roadway Classification
(Source: AASHTOWare Numetric Safety – 2013-2022)

Compared to total roadway mileage, the percentage of VRU fatalities is highest on minor and principal arterial roads. Though local roads make up at least 60% of total roadway mileage, less than 20%of bicycle and pedestrian fatalities occur on these roads. Furthermore, roughly 10% of VRU crashes occur on interstates. These are often related to people pulled over on the side of the roadway. GDOT's Traffic Incident Management Enhancement (TIME) Task Force[9] works with the Highway Emergency Response Operator (HERO), Coordinated Highway Assistance and Maintenance Program (CHAMP), and towing companies to reduce these crash types.

[9] TIME Task Force: https://timetaskforce.com/

To assess VRU safety in relationship to urban/rural context, **Figure 15** shows the number of fatal VRU crashes as well as the percentage of all VRU collisions that resulted in fatalities in each context.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Rural Fatal	25	23	34	44	39	36	18	46	49	37
Urban Fatal	154	138	174	204	219	218	150	206	239	288
Rural % Fatal	7.18%	7.40%	9.26%	11.20%	10.26%	13.09%	7.56%	17.76%	14.50%	13.50%
Urban % Fatal	4.58%	3.91%	4.41%	4.99%	5.39%	5.93%	4.12%	6.95%	7.26%	8.00%

Figure 15: VRU Fatal Collisions by Urban/Rural Context
(Source: AASHTOWare Numetric Safety)

Most VRU fatal collisions occur in urban areas; however, a VRU collision is more likely to be fatal in rural areas than urban ones. Urban fatalities are likely much higher due to higher amounts of exposure, but rural crashes are presumably more likely to be severe due to speeds and proximity to medical care. In 2022, 89% of fatal VRU collisions occurred in urban areas, and 8% of those collisions were fatal. Whereas in rural areas, 13.5% of VRU collisions were fatal. The percentage of VRU collisions resulting in fatalities has been trending upward since 2013 in both contexts. Additionally, when these values are adjusted for population, there were approximately 1.63 VRU fatalities per 100,000 rural county population and 3.33 VRU fatalities per urban county population in 2022. Note that the trend is reversed when considering all crash types: there were approximately 27.79 total fatalities per 100,000 rural county population but 13.97 total fatalities per urban county population[10].

Figure 16 shows that as the speed limit increases, the proportion of VRU crashes that result in a serious injury or fatality increases exponentially.

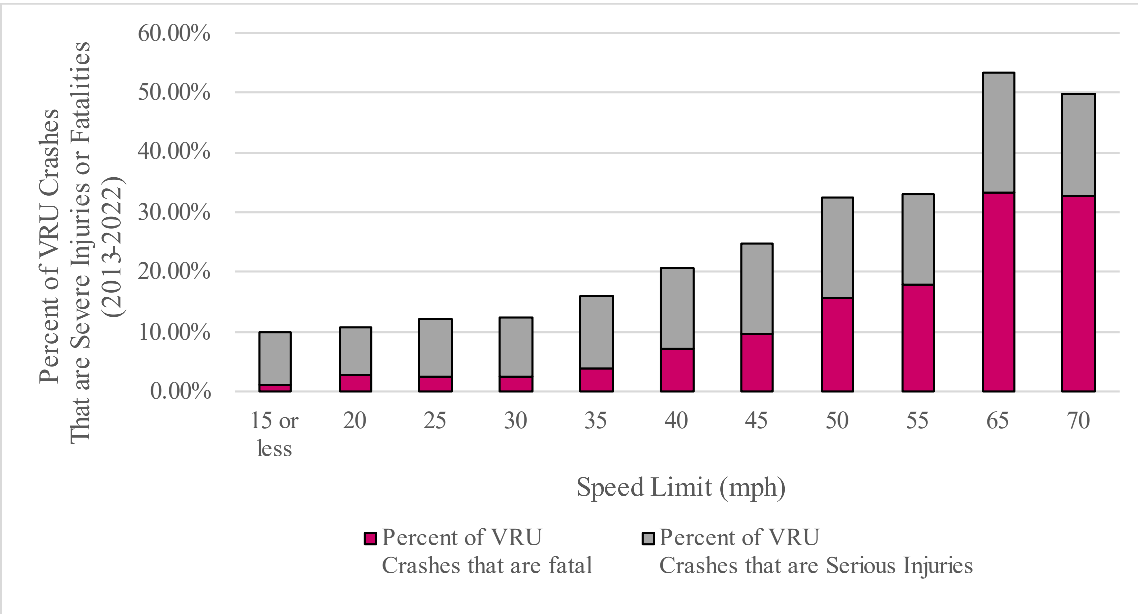


Figure 16: Percent of VRU Crashes Resulting in a Serious Injury/Fatality by Speed Limit
(Source: AASHTOWare Numetric Safety – 2013-2022)

Progress Towards Improving VRU Safety

In an effort to increase VRU spending, GDOT has prioritized increasing the percentage of apportionment of Highway Safety Improvement Program (HSIP) funding spent on VRU safety. These projects are those whose primary purpose or one of the primary purposes is VRU safety. These projects include pedestrian crossing installations or upgrades, pedestrian refuge islands, bike lanes, roadway reconfigurations to accommodate multimodal transportation and slow vehicular speeds, and roundabouts near pedestrian facilities. **Figure 17** shows the amount of funding from HSIP spent toward VRU safety per fiscal year.

[10] Online Analytical Statistical Information System (OASIS) https://oasis.state.ga.us/oasis/webquery/qryPopulation.aspx

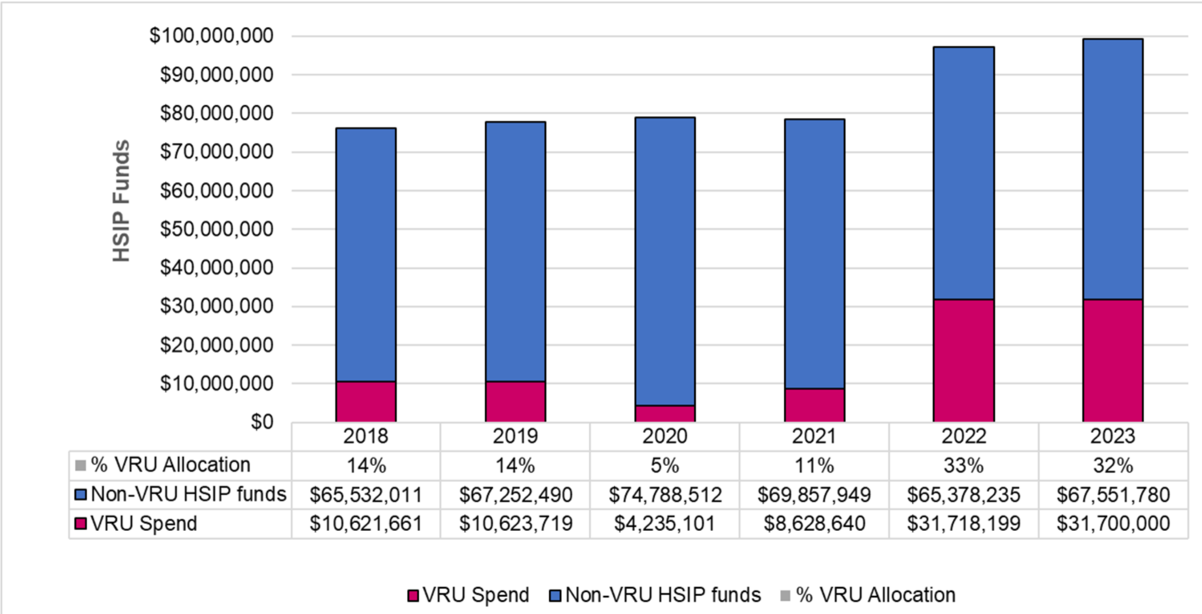


Figure 17: Spending in VRU Safety

Figure 17 shows that starting in 2022 the apportionment of funding dedicated towards VRU safety has purposely and noticeably increased. The list of projects for fiscal year 2023 and 2024 that are HSIP funds can be found in the **APPENDIX: PROJECT LIST**.

To encourage states to invest in VRU safety improvements, the Bipartisan Infrastructure Law (BIL) established a new Special Rule under 23 U.S.C. 148(g)(3) which states, “If the total annual fatalities of vulnerable road users in a State represents not less than 15 percent of the total annual crash fatalities in the State, that State shall be required to obligate not less than 15 percent of the amounts apportioned to the State under section 104(b)(3) for the following fiscal year for highway safety improvement projects to address the safety of vulnerable road users.” This rule took effect October 2023.

Table 5: Georgia Apportionment and Vulnerable Road User (VRU) Obligation

2024 Federal HSIP Apportionment	Funds required to be obligated in the fiscal year if the HSIP VRU Special Rule applies
$101,415,513	$15,212,327

Given this new rule, **Figure 17** shows that since fiscal year 2022, Georgia has exceeded the required obligation. Additionally, these projects have a high return on investment. **Table 6** shows the benefit-cost ratio (B/C) (i.e., the annualized expected safety benefit over the annualized project cost) for the most common projects let for construction since 2021.

Table 6: Benefit Cost Ratio for Common Let Projects to VRU Safety Since 2021

Project Type	Average B/C
Roadway Reconfiguration	32
Pedestrian and Bicycle Crossing Treatments	13
Roundabouts	9
Pedestrian Refuge Islands	6

Table 6 shows that the B/C for the most common project types applied to VRU safety have high B/C ratios. A B/C value of greater than one is considered HSIP eligible.

Because the B/C ratio relies on an anticipated reduction in crashes, evaluating the real safety impact of constructed projects is crucial. Hence, a study has examined crash reductions for both Pedestrian Hybrid Beacons (PHB) and roadway reconfigurations. Although a study for roundabouts has been conducted, the present study primarily concentrates on vehicular safety.

GDOT has installed PHBs on various roadways, especially in densely populated areas, to decrease pedestrian crashes at midblock crossings. A PHB is only activated when pedestrians push the pedestrian button to cross the roadway. The impacts before and after installation for a 2,000 foot section around each PHB is analyzed. Five PHBs were analyzed to determine the effectiveness of this safety countermeasure. The locations were in GDOT's District 7. The Naïve Method analysis identified an average of 89% decrease in pedestrian crashes at midblock crossings. A before-and-after crash analysis was also conducted for the pedestrian improvement project of just over a mile long segment along State Route (SR) 8/Ponce de Leon Avenue, covering the stretch from Piedmont Avenue to SR 42 in. The project primarily installed three PHBs in addition to upgrading the pedestrian signal heads, installing, and repairing sidewalk, constructing intermittent traffic islands, and improving lighting along the corridor. **The analysis showed an 86% decrease in injury/fatal mid-block pedestrian crashes. Additionally, a 46% decrease in all injury/fatal pedestrian crashes (at mid-block and intersections) was observed. Other smaller before-after studies have shown similar**

results. GDOT also installed over 10 PHBs throughout the SR 13/Buford Highway Corridor, where the majority of the population's first language is not English. To better serve this minority population, GDOT coordinated with local law enforcement to help provide bilingual brochures that cover pedestrian safety. Since the implementation of safety improvements, there has been a decrease in the average number of pedestrian crashes along the corridor. However, a formal crash reduction factor has not been defined for this corridor. PHBs will play a significant role as one of GDOT's key countermeasures in addressing VRU safety concerns.

Roadway Reconfiguration- An assessment was conducted of a roadway reconfiguration of four through lanes (two in each direction) to two through lanes (one in each direction) and a center left turn lane on the SR 154/Memorial Drive corridor from Pearl Street to SR 155/Candler Road. After the project was completed, it was observed that crashes had decreased, with vehicle volumes and delays remaining consistent before and after. This assessment was done with before data from quarter 3 of 2016 to 2017 and the after data was from 2019 to 2020. The following results are documented:

- Statistically significant reductions in quarterly crash totals and rates (crashes/AADT)
- Total crashes were reduced by 29% (27% for injury crashes)
- Crash rates (crashes/AADT) were reduced by 33% (30% for injury crash rates)
- Crash rates along the east section (Maynard Terrace to SR 155/Candler Road) were reduced by 40% (38% for injury crash rates) from mid-2020 through the end of 2022
- Traffic volume trends indicate similar conditions before and after the project
- Average delays in the corridor were similar before and after the project

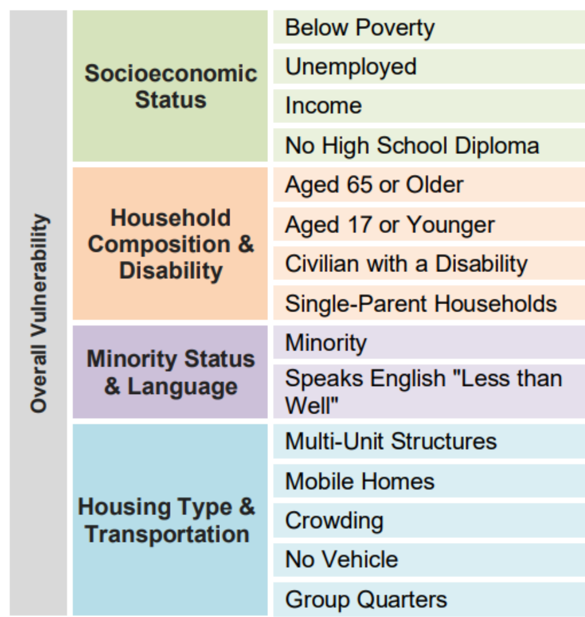
Another project on Moreland Avenue NE from DeKalb Avenue to Euclid Avenue converted a six-lane roadway (three through lanes in each direction) into a five lane roadway with two through lanes in each direction, a center left turn lane, and bike lanes. Subsequently protection to the bike lanes was added and raised center medians were installed. A preliminary before and after analysis was conducted with before crash data from 2013 to 2017 and after data from 2018 to 2022. This analysis showed that the roadway reconfiguration resulted in an approximately 39% reduction in all crash types and a 33% reduction in pedestrian crashes.

QUANTITATIVE ANALYSIS

This section describes the quantitative analysis used to identify optimal safety improvement locations. First, the section demonstrates how GDOT utilizes demographic data in VRU safety analyses. Next, the section presents a risk factor analysis identifying site characteristics associated with VRU crashes. Furthermore, the section illustrates the efforts to integrate demographic data and risk factors into a crash analysis tool. Finally, the section describes the process of ranking high-risk sites using GDOT's interactive map on the crash analysis platform.

Social Vulnerability and Pedestrian Crashes

The Social Vulnerability Index (SVI) developed by the CDC is a valuable instrument for gauging and mapping communities' susceptibility in emergencies. It evaluates variables such as economic status, household composition, minority representation, and housing characteristics to pinpoint regions that might require extra assistance and resources during crises. Each census tract has a rating assigned on a scale of 0 to 1, with 1 indicating the highest vulnerability among communities. In collaboration with GOHS and Georgia DPH, GDOT conducted a study revealing a positive correlation between the SVI and serious pedestrian injuries and fatalities [11].



Adopted from the 2018 CDC SVI Documentation

Figure 18: SVI Categories
Image Source: GOHS, Examining Social Vulnerability and the Association with Pedestrian Crashes

Figure 19 displays the distribution of pedestrian serious and fatal injury collision rates within the SVI quintiles for various regions in Georgia (Atlanta metropolitan area, other urban counties, and rural counties). In every region,

[11] *GOHS, Examining Social Vulnerability, and the Association with Pedestrian Crashes* http://www.gahighwaysafety.org/wp-content/uploads/2022/08/2020-GTSF-Issue-Brief-Examining-SVI-and-Pedestrian-Crashes.pdf

there are significant variations in the rates of pedestrian serious and fatal injury crashes across the SVI quintiles.

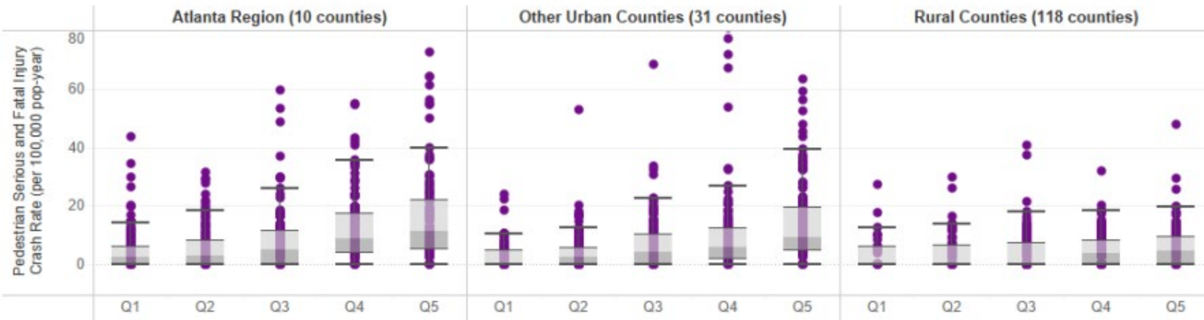


Figure 19: Pedestrian Serious and Fatal Injury Crash Rate (per 100,000 population-year) by Overall SVI Quintile and Georgia Region
Image Source: GOHS, Examining Social Vulnerability, and the Association with Pedestrian Crashes

To assess all SVI themes, a negative binomial regression model was developed. **Figure 20** shows the correlation between the SVI scores (overall and theme) and the rates of pedestrian serious and fatal injury crashes. All SVI themes have a positive and significant relationship between SVI and the pedestrian crash rate in Atlanta metropolitan regions, other urban counties, and rural counties.

Social Vulnerability Index Theme	Atlanta Region (10 counties)			Other Urban Counties (31 counties)			Rural Counties (118 counties)		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Social Vulnerability Index	1.94	(1.51, 2.37)	<0.001	2.03	(1.56, 2.49)	<0.001	0.82	(0.74, 0.90)	<0.001
Socioeconomic Status	1.85	(1.42, 2.28)	<0.001	2.10	(1.63, 2.57)	<0.001	0.40	(0.31, 0.48)	<0.001
Household Composition & Disability	0.88	(0.38, 1.38)	<0.001	0.86	(0.37, 1.36)	<0.001	0.75	(0.67, 0.83)	<0.001
Minority Status & Language	1.42	(0.94, 1.91)	<0.001	0.90	(0.36, 1.43)	<.01	0.62	(0.55, 0.69)	<0.001
Housing Type & Transportation	2.06	(1.61, 2.50)	<0.001	1.93	(1.46, 2.40)	<0.001	0.61	(0.54, 0.68)	<0.001

Figure 20: Correlation Between SVI Themes and Pedestrian Serious and Fatal Crashes
Image Source: GOHS, Examining Social Vulnerability, and the Association with Pedestrian Crashes

Bivariate maps are generated to illustrate locations with both high social vulnerability and high pedestrian severe injury crash rates. A bivariate map displays two or more variables on a single map by combining different symbols. **Figure 21** shows the bivariate map for the overall

SVI index and pedestrian serious and fatal crashes per 100,000 population. The GOHS website[12] provides additional bivariate maps for each SVI theme.

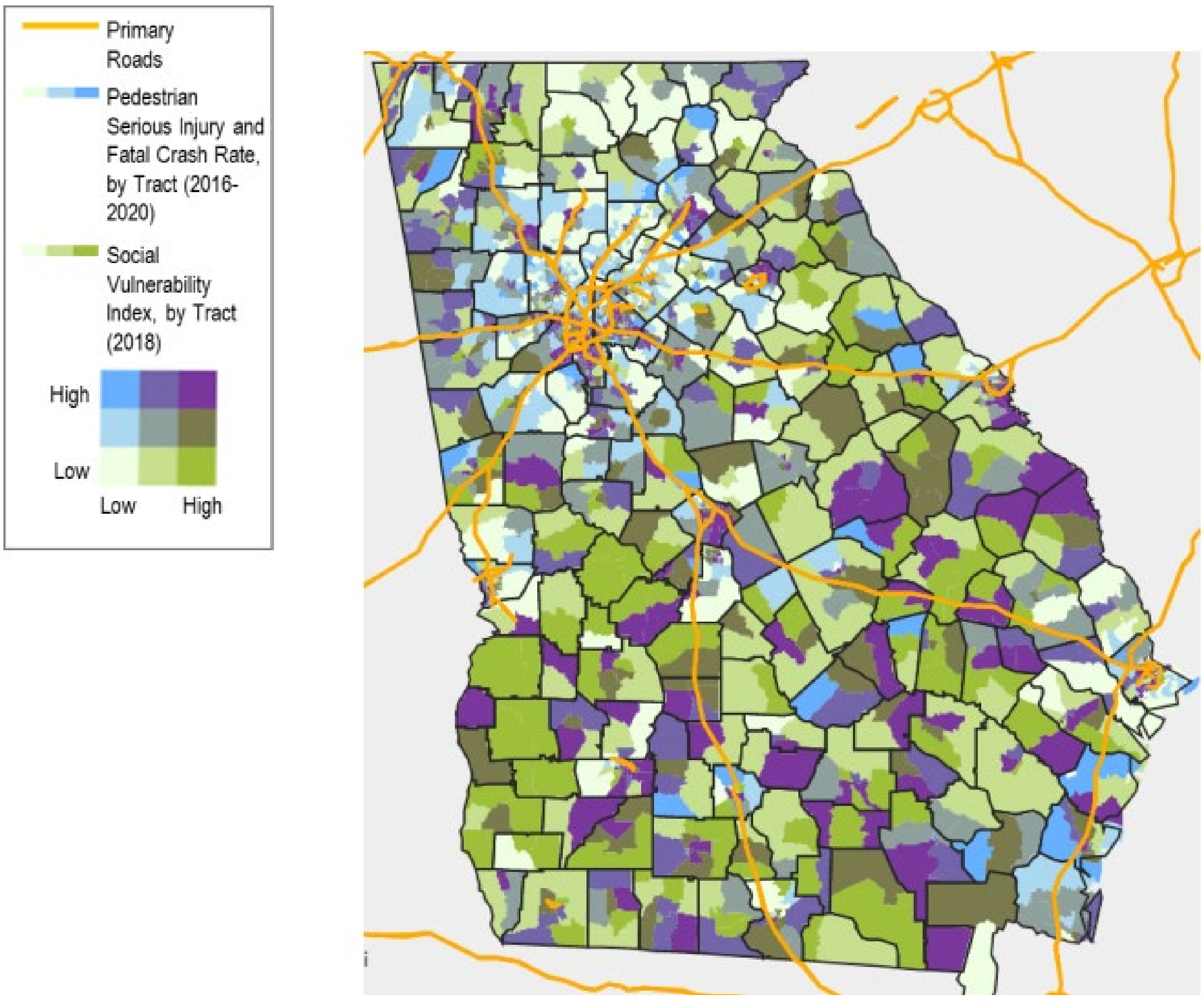


Figure 21: Bivariate Map of Serious and Fatal Pedestrian Crash Rates and SVI
Image Source: GOHS, Examining Social Vulnerability, and the Association with Pedestrian Crashes

The result of this SVI analysis has led to the incorporation of SVI into GDOTs project prioritization tool, AASHTO Numetric Safety, and inclusion in GDOT strategies referenced in the Systemic Transit Stop Assessment section.

---

[12] *GOHS, Examining Social Vulnerability, and the Association with Pedestrian Crashes*
http://www.gahighwaysafety.org/wp-content/uploads/2022/08/2020-GTSF-Issue-Brief-Examining-SVI-and-Pedestrian-Crashes.pdf

Risk Factor Analysis

(Note: This analysis is conducted to identify risk factors for pedestrian crashes. It's important to note that this analysis is not intended for accurately predicting crash frequencies at specific sites.)

To identify additional risk factors associated with higher pedestrian crash frequencies in addition to social vulnerability, a pedestrian safety performance function (SPF) utilizing city boundaries of Atlanta state routes with AADT less than 50,000 vehicles/day was developed using negative binomial regression. Atlanta was utilized instead of statewide information due to the data availability in this region. Although Atlanta was used for the analysis, it is assumed the identified risk factors apply statewide. The assessment is limited to roadways with an AADT of less than 50,000 because there is minimal pedestrian traffic when AADT is higher.

Table 7: Risk Factors Associated with Pedestrian Crashes

Atlanta State Routes w/ AADT <50,000 veh/day			
Risk Factor or Trip Generator	Relationship to Pedestrian Crashes	Scaled Coefficient	Significance
# of Transit Stops (log transformed # of transit stops on segment)	+	.56	***
# Dark Not lighted Crashes (log transformed # of total crashes in not lighted conditions)	+	.56	***
Roadway Division (1 = divided, 0 = undivided)	-	.54	***
Distance to School (ft)	-	.28	***
Distance to Location with Alcohol License (ft)	-	.23	***
Distance to Grocery Store (ft)	-	.23	***
Lane # (# lanes for roadway)	+	.22	***
Traffic Volume (Vehicles/day)	+	.16	***
Speed Limit 35 or 40 (1 = speed limit of the segment is 35 or 40 mph, 0 = other speed limits)	+	.13	***
*** p-value is <.001			

Risk factors that were identified (i.e., the significant variables in the SPF) are displayed in **Table 7**. All p-values indicated a statistically significant correlation between variables and pedestrian crashes. The scaled coefficient measures the variable's influence on the model regardless of unit; therefore, the higher the scaled weight, the more influential the variable. The number of transit stops and the number of dark, not lighted crashes were most effective in predicting the pedestrian crash frequency. Below, the following data is described:

- Logically, transit stops were identified as a risk factor since these are pedestrian trip generators and riders usually cross the street once to get to or from their destination. Transit stop data are compiled directly by the transit operator or created in partnership with the Atlanta Regional Commission [13].
- The quantity of non-lighted crashes is linked to the lighting condition of the roadway. Data is obtained from GDOT's AASHTOWare Numetric Safety Tool.
- The rationale for undivided roadways (i.e., those without a median) having more pedestrian crashes is that medians can act as traffic calming devices and pedestrian refuges. Data related to roadway division was identified through GDOT's road inventory data [14].
- Proximity to schools, grocery stores, and stores with alcohol licenses indicates locations where there may be more pedestrian traffic. Additionally, proximity to locations with alcohol licenses increases the potential for pedestrians and drivers under the influence. School data was developed by the Research & Analytics Group of the Atlanta Regional Commission using data from the Georgia Department of Education [15]. Alcohol license data was obtained per the Audit Department for Alcohol License Audits [16]. Data obtained for grocery stores is publicly crowdsourced and credited to Daniel Fenton [17].
- Roadways with more lanes are expected to have more pedestrian crashes because travel speeds are expected to be higher and crossing distances are longer. Lane number data is obtained from GDOT's Road Inventory Data [18]
- Roadways with more vehicles per day typically indicate larger arterials, which have higher speeds and more potential for collisions. Traffic volume data is obtained from GDOT's Traffic Data Analysis Platform. [18]
- Speed limits of 35 and 45 were identified as the locations with higher pedestrian crash frequencies. This information was insightful as vehicular speeds may not always denote more pedestrian crashes. However, the data described in **Figure 16** indicates higher speed limits are where pedestrian crashes are more likely to be serious. Speed limit data is obtained from GDOT's Road Inventory Data [19].

---

[13] ARC Transit Stop: https://atltransit.ga.gov/system-maps/
[14] GDOT Road and Traffic Data: https://www.dot.ga.gov/GDOT/Pages/RoadTrafficData.aspx
[15] Georgia Department of Education
[16] Audit Department, City of Atlanta
[17] Fresh Food Access Atlanta: https://www.arcgis.com/apps/dashboards/70578caff04247c595509fe3022211e0
[18] GDOT TADA: https://gdottrafficdata.drakewell.com/publicmultinodemap.asp
[19] GDOT Road and Traffic Data https://www.dot.ga.gov/GDOT/Pages/RoadTrafficData.aspx

AASHTOWare Numetric Safety Platform

GDOT has continually worked with the AASHTOWare Numetric Safety team to continually develop and enhance the platform. Utilizing this platform has led to approximately a 60% reduction in time needed to conduct safety analyses. This platform allows for a streamlined way to identify data-driven projects. Users can quickly identify statistics pertaining to VRU safety near schools, segments, intersections, and other locations. Both segments and the nodes between two segments (i.e., intersections) can be ranked.

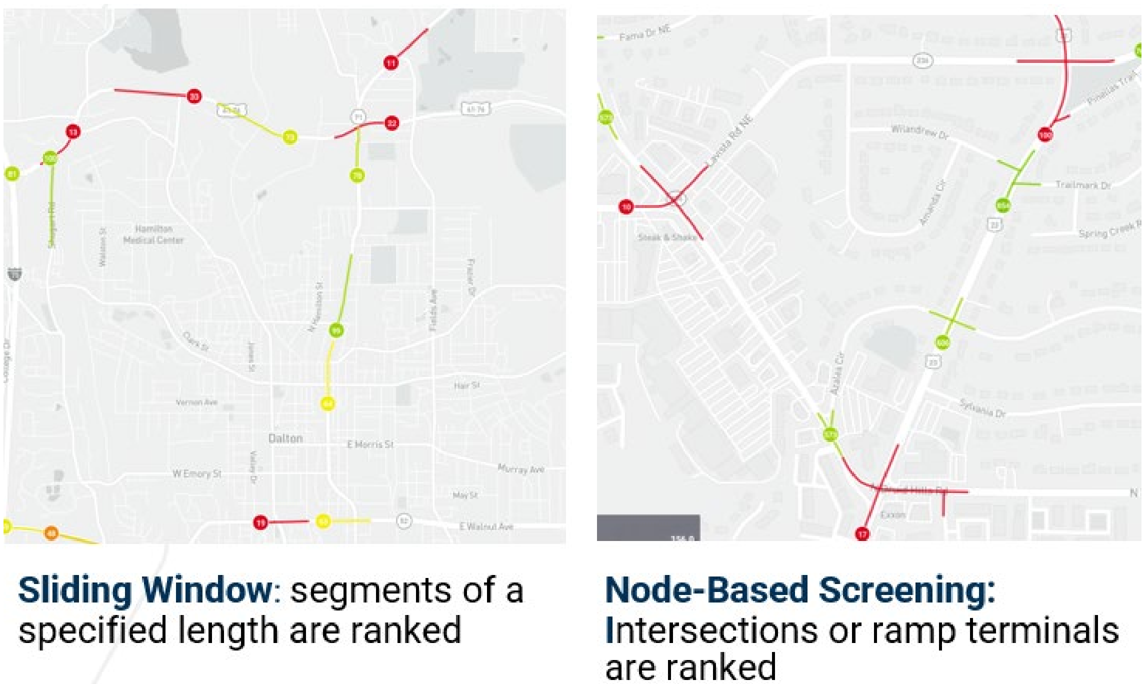


Figure 22: Network Screening Methods on AASHTOWare Numetric Safety

Both the sliding window and intersection rankings can be sorted by 1) crash frequency, 2) fatal crashes, 3) crash rate (i.e., crashes per vehicle), and 4) a severity rating defined as equivalent Property Damage Only (ePDO). These rankings of segments and intersections can be conducted while a variety of crash, roadway, and special filters can be applied to these segment and intersection rankings. The data can be filtered by crash type; therefore, pedestrian or bicyclist crashes can be queried independently. Additionally, different age groups for VRUs can be queried to target treatments for older or younger VRUs. The particular vehicle data can also be filtered by vehicle and VRU maneuvers as well as by lighting conditions. Furthermore, various other roadway filters, such as the presence of a median, lane number, functional class, traffic volume, and more can be identified. Spatial filters on Numetric include demographic data such as the Centers for Disease Control's (CDC) Social Vulnerability Index (SVI), transit route presence, schools, and state bike routes. Using these filters allows for proactive safety analysis to be conducted in a data-driven manner. One way to target a specific improvement is through a roadway reconfiguration screening. In this type of screening, specific roadway environments with excess lanes compared to the traffic volume can be screened to identify if there is potential to remove lanes and accommodate other modes of transportation. These filters can be applied to screen for locations to implement specific safety countermeasures. For instance, a screening for potential roadway reconfiguration locations could filter for roadways with excess lanes to accommodate their traffic volume, offering the potential to reduce the number of lanes and provide accommodation for other modes of transportation as shown in **Figure 23**.

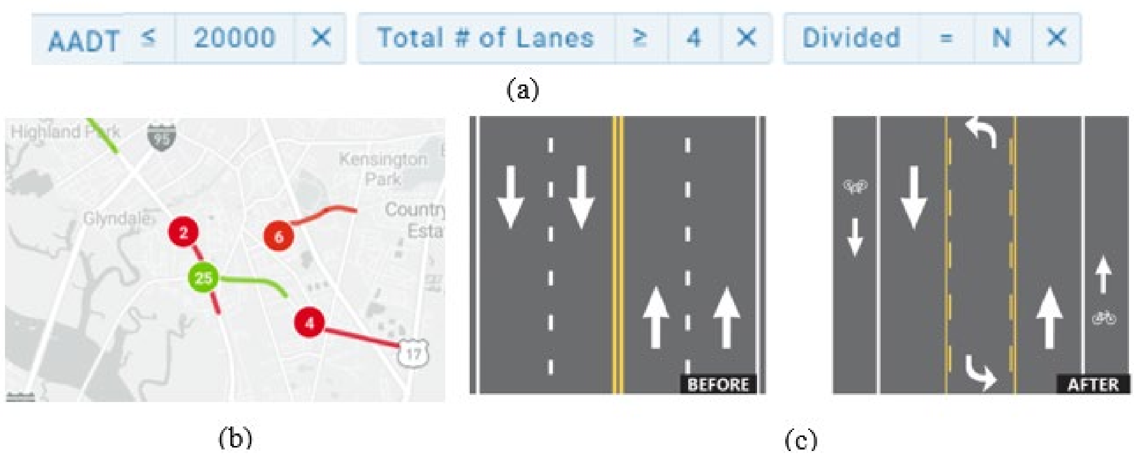


Figure 23: Roadway Reconfiguration Network Screening
Image Source: (a) and (b): AASHTOWare Safety, (c) FHWA Road Diet Informational Guide

For this roadway reconfiguration network screening, the roadway environment is filtered to undivided roadways (i.e., those without a median) with greater than or equal to four lanes and an AADT of less than 20,000 vehicles per day. These filters were selected because, according to FHWA's Road Diet Informational Guide[20], "Average Daily Traffic (ADT) for treatment sites in these studies ranged from 2,000 to 26,000, with most sites having an ADT below 20,000." By applying these filters, you can sort eligible roadways for roadway reconfiguration based on all

[20] FHWA Road Diet Informational Guide: https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/rdig.pdf

crashes, fatal crashes, crash rate, or ePDO. Furthermore, you can introduce additional filters to refine the ranking process. Commonly used filters include the pedestrian and bicycle crash filters, which enable rankings based on the frequency or severity of bike/ped crashes; the state bike route spatial filter to prioritize bike route connectivity across the state; or high values of the CDC's SVI to prioritize locations where alternative modes of transportation are needed most.

High-Risk Areas

Following the safety performance review and quantitative analysis, GDOT has identified the high-risk areas listed below. Cross-references are provided to the figure or table in the **Quantitative Analysis** or **Historical Crash Trends** sections where the analyses were conducted to determine these high-risk areas.

1. Locations with high social vulnerability according to the CDC's SVI - **Figure 20**
2. Transit stops - **Table 7**
3. Locations in proximity to schools - **Table 7**
4. Undivided (no median) and high lane number roadways - **Table 7**
5. Principal and minor arterials - **Figure 14**
6. Locations with higher speeds **- Figure 16**

These areas are all highlighted as risk factors within the quantitative analysis or in the **Historical Crash Trends** section as roadways with higher VRU crash frequencies and severities. These risk factors are the focal points for VRU Safety Assessment because they exhibit potential for serious and fatal VRU crashes and have data availability across the entire state.

Because Georgia is comprised of seven GDOT Districts, 12 Regional Commissions, 159 counties, and numerous local governments, a single list of roadways for the entire state is not generated. An interactive dashboard within GDOT's AASHTOWare Numetric Safety platform can be used to compile a roster of high-risk roadways for pedestrians and cyclists in a specific region. Individuals affiliated with a government agency can request access to this dashboard by contacting one of the program contacts. Additionally, a publicly accessible platform is available on GDOT's Crash Reporting site[21].

[21] GDOT Crash Data: https://www.dot.ga.gov/GDOT/Pages/CrashReporting.aspx

To prioritize sites on the dashboard, you can utilize a 5-step process adapted from the Highway Safety Manual's Network Screening Procedure. This process includes:

1) **Establish Focus**: Crashes can be filtered to pedestrians or cyclists. Additionally, crashes can be filtered to locations with higher social vulnerability, transit stops, and other filters discussed in the **AASHTOWare Numetric Safety Platform** section.
2) **Identify Network**: The roadway data can be filtered by geographic boundary. The platform is configured to allow all government agencies to screen their roadway system efficiently.
3) **Select Performance Measure**: Sites can be ranked by crash frequency, fatal crash frequency, or ePDO (a severity crash ranking).
4) **Select Screening Method**: Either intersections or segments can be assessed. Additionally, segments by node based or sliding window analyses respectively. For sliding window analyses, segment lengths of 0.1 miles to 10 miles can be ranked.
5) **Screen and Evaluate**: Sites can be sorted by the desired performance measure, and each site can be inspected to see if it is a worthy candidate for safety improvement.

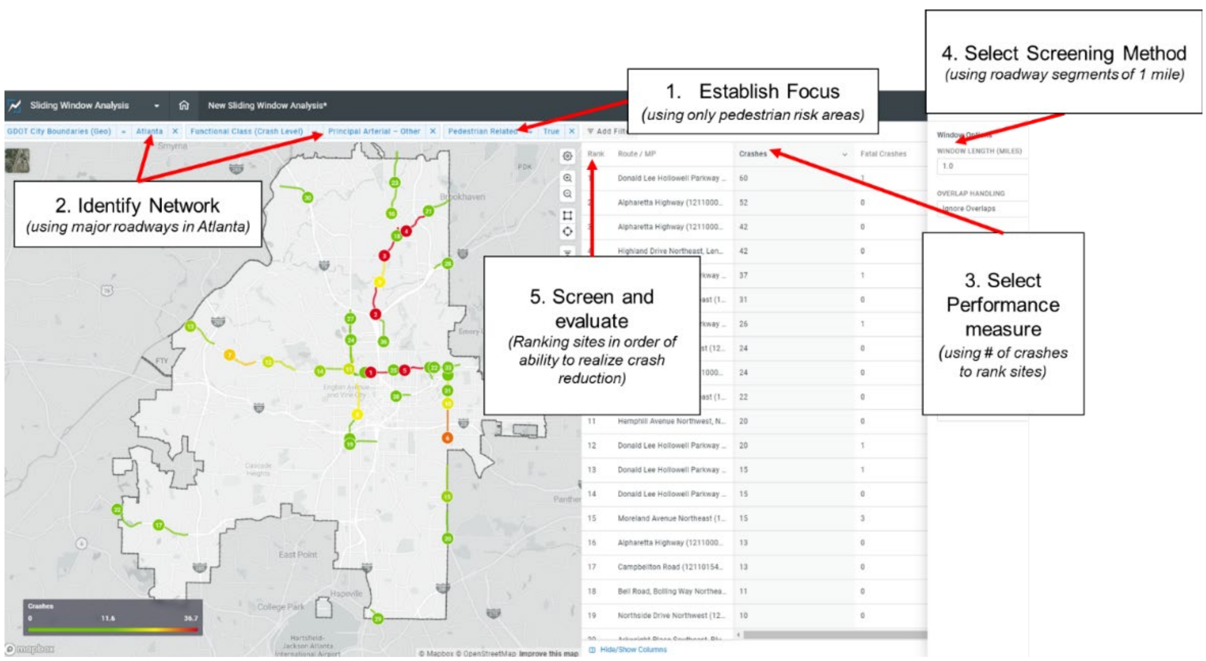


Figure 24: Network Screening Process Using AASHTOWare Numetric Safety

CONSULTATION

To achieve a Safe System approach and address safety holistically, consulting with other stakeholders on safety strategies is necessary. Therefore, GDOT partners with various organizations to address safety concerns via enforcement, education, EMS, and more. This section of the VRU assessment provides descriptions of the pedestrian and bicycle task teams, which consist of diverse stakeholders from across the state. It also covers the initiatives and accomplishments of the Safe Routes to School Program, and presents GDOT's partnerships with advocacy organizations, Regional Commissions, transit agencies, and even LEGO®. Finally, it illustrates the processes used to involve community stakeholders during Road Safety Audits.

Pedestrian and Bicycle Task Teams

GDOT's State Pedestrian and Bicycle Engineer and the State Safety Engineering Supervisor serve as the task team leaders for the Governor's Office of Highway Safety (GOHS) Pedestrian and Bicycle Task Teams. The task teams leverage the Safe System Approach and allow for collaboration among various stakeholders, including engineers, advocacy groups, trail organizations, public health departments, Regional Commissions, city and county governments, federal government organizations, law enforcement, research institutions, and transit agencies. **Figure 25** shows a visualization of all organizations that are a part of these task teams.

Figure 25: Partners of the Georgia Pedestrian and Bicycle Task Teams

With the use of these task teams, GDOT can holistically develop strategies that are equitable across the state and accommodate the needs of a variety of stakeholders, as well as to educate organizations about best practices for implementing safety projects.

Georgia Bikes Partnership

GDOT partners with the non-profit organization Georgia Bikes, which advocates for pedestrian and bicycle safety statewide. This group supports GDOT in a variety of initiatives that include:

- Educational outreach across the state
- Law enforcement training
- Pedestrian and bicycle planning at the state, regional, and local level
- Providing connections with local bicycle organizations that are stakeholders in GDOT projects
- Assisting local governments and tribal communities in developing VRU plans and implementing safety initiatives
- Participating in Road Safety Audits
- Providing recommendations for public encouragement, policy, planning and implementation, and infrastructure management and maintenance
- Providing high-level safety screenings that serve as recommendations to GDOT for future safety projects.

One of the most significant Georgia Bikes initiatives is the Annual Bike-Walk-Live Summit. This year, Athens, Georgia, will host the summit from November 16th-18th. This summit will have a variety of meetings to educate engineers, planners, advocates, and the general public on pedestrian and bicycle safety. The summit will include a Pedestrian and Bicycle Task Teams meeting; a meeting between the Regional Commissions, Georgia Bikes, and the Safe Routes to School Program; and a dedicated program on trails development. Content includes traditional classroom education and on-site mobile workshops designed to highlight successes and areas for improvement in and around Athens. Bike-Walk-Live Summits have been conducted every year since 2010.

Figure 26: Georgia Bike Walk Live Summit

Table 8: Bike Walk Live Summit History

Year	Location
2010	Savannah
2011	Athens
2012	Augusta
2013	Roswell
2014	Columbus
2015	Milledgeville
2016	Jekyll Island
2017	Macon
2018	Athens
2019	Atlanta
2020	Virtual
2021	Virtual
2022	Virtual and trails across GA
2023	Athens

Regional Commission Contracts

GDOT works closely with each Regional Commission on pedestrian and bicycle planning safety initiatives across the state. These initiatives range from developing coursework at schools to recommending engineering projects. GDOT maintains contracts with the Regional Commissions to conduct these planning activities. As part of each contract, Regional Commissions will conduct high-level VRU-focused safety screenings to determine if projects are feasible for GDOT to pursue. Furthermore, invitations are extended to all Regional Commissions to participate in the Pedestrian and Bicycle Task Teams and Road Safety Audits. The Regional Commissions also routinely meet with GDOT's Safe Routes to School program and Georgia Bikes to understand state practices and encourage them to apply for various funding opportunities.

Figure 27: Regional Commissions in Georgia

Transit Agencies

To conduct systemic screenings at bus stops, GDOT has partnered with transit agencies. Bus stop locations and ridership from each transit agency is requested. All transit routes are incorporated into the AASHTOWare Numeric Safety Platform to systematically prioritize bus stop locations for safety improvements. Using AASHTOWare Numetric Safety, transit routes are ranked based on the pedestrian crashes that occur along the route. Rankings are sorted by the pedestrian crash's societal and economic impact costs. The costs for each crash are based on the severity of the crashes. The crash severity is discussed in the Strategic Highway Safety Plan (SHSP). **Table 9** shows pedestrian crash costs that are along the transit routes per transit agency.

Table 9: Pedestrian Societal and Economic Crash Costs Per Transit System

Transit Systems	Pedestrian Crash Cost (2013-2022)
MARTA	$8,039,618,000
Chatham Area Transit	$966,553,000
Gwinnett County Transit	$656,735,000
Macon-Bibb County Transit Authority	$559,164,000
Athens-Clarke County Transit	$318,149,000
METRA Transit System	$312,841,000
Albany Transit System	$275,379,000
Augusta Transit	$272,611,000
Overlap between MARTA & Emory University	$198,966,000
Rome Transit Department	$125,999,000
Liberty Transit	$82,079,000
Overlap between Athens-Clarke CT & UGA	$69,347,000
CobbLinc	$25,184,000
Overlap between MARTA & Georgia Tech	$24,726,000
Kennesaw State University	$22,695,000
Statesboro Area Transit & GSU	$22,287,000
University of Georgia	$20,134,000
Emory University	$17,192,000
Georgia Tech	$10,012,000
Statesboro Area Transit	$6,867,000

The crash cost ranking reveals that MARTA's transit system bears the highest pedestrian crash costs. Consequently, this has initiated a partnership and shared funding for enhancing safety at bus stops. Alongside MARTA's collaboration, many other transportation agencies have already begun sharing data with GDOT.

LEGO® Discovery Center Atlanta

Figure 28: GDOT & LEGO® Ribbon Cutting

GDOT has partnered with LEGO® Discovery Center Atlanta to blend creativity and education by using play to introduce young minds to engineering and STEM and to encourage them to consider careers in civil engineering. As part of the partnership, LEGO® Discovery Center Atlanta built a scaled model of the Sidney Lanier Bridge and displayed it in the center for two months. GDOT facilitated an internal competition among employees to create original LEGO® designs that featured common components of transportation infrastructure. Two VRU-focused videos included talks on safe crossings, helmet safety, and protected bicycle intersections[22]. This partnership represents a joint investment by GDOT and the community in children's education and future of children.

Schools

GDOT has partnered with various schools and universities to provide education outreach as part of curriculum and assemblies. GDOT's Safe Routes to School Resource Center partners with public, private, and charter schools and has a network of 523 elementary, middle, and high schools. Additionally, GDOT has partnered with the Lutzie43 Foundation to old 11 Safety Summits hosted in Carrolton, Statesboro, Gainesville, Georgia Tech's campus (twice), Cherokee County, Flowery Branch, Macon, Jefferson County, Sandersville, and Wilkerson County. Read more about the school partnerships in the **Safe Routes to School** section and the **Safe Driving Summits** section.

Road Safety Audit Stakeholder Engagement

As part of every Road Safety Audit (RSA) GDOT conducts, GDOT partners with local governments and advocacy groups. RSAs are identified through the data-driven screening process discussed in **AASHTOWare Numetric Safety Platform** section. Two RSAs are performed in each District annually. When selecting a location, various stakeholders are invited,

[22] GDOT LEGO® YouTube: https://www.youtube.com/playlist?list=PLOmONQQOLK5DJi34sXrQc5E4OhG5CkNGW

including city public works or DOTs, county public works or DOTs, local law enforcement, Regional Commissions, fire departments, transit agencies, local advocacy groups, state advocacy groups, and others, to participate in field visits and virtual pre- and post-meetings. These local entities are requested to contribute to developing countermeasures to ensure local support before the projects are scheduled.

PROJECTS AND STRATEGIES

In addition to the educational outreach strategies GDOT has implemented in cooperation with various partnerships, various infrastructure and educational strategies have been implemented, programmed, or planned to improve VRU safety. This section outlines multiple engineering, outreach, research, and planning initiatives.

Infrastructure Projects

GDOT has implemented or is developing the following infrastructure projects to improve VRU safety.

Systemic Transit Stop Assessment

GDOT has developed a systemic and proactive approach to evaluate midblock transit stop locations in Georgia. The analysis has been nearly completed on the MARTA system and this data is currently being processed or gathered in the majority of bus or rail transit systems in the state. To allow riders to cross the road safely, all stops located at midblock locations (i.e., at least 300 ft away from a traffic signal) are assessed for the installation of a midblock crossing. Transit stops were chosen for systemic analysis because a Crash Modification Factor (CMF) in the Highway Safety Manual (HSM) identifies that a higher number of pedestrian crashes occur at locations where bus stops are present. Additionally, GDOT's analysis determined that bus stops are significantly correlated to pedestrian crashes, as discussed in the **QUANTITATIVE ANALYSIS** section. Transit stops are inherently a risk factor because riders commonly cross the roadway regardless of existing traffic control.

A Safety Performance Function (SPF) was developed to determine the predicted pedestrian crash frequency at each bus stop. This model incorporated stop ridership (in units of passengers per day), intersection presence, lane number, annual average daily traffic, social vulnerability, and roadway division (i.e., presence of a median). This model is developed using negative binomial regression. This SPF is shown in **Equation 1**. Additionally, **Figure 29** shows the standardized coefficients[23] (i.e., the relative influence of each variable in the SPF).

[23] Standardized Coefficients: https://www.sciencedirect.com/topics/mathematics/standardized-regression-coefficient#:~:text=Standardized%20coefficients%20allow%20researchers%20to,measurement%2C%20have%20equal%20standard%20deviations.

Equation 1: Safety Performance Function for Pedestrian Crashes at Transit Stops

$$P = e^{-4.38 \; + \; (1.3E-10)\times AADT \; + \; .26\times Lane \; - .438\times Div \; + \; .47\times LN(Rider+1) \; + .85\times LN(SVI+1) + 1.23\times Int}$$

Where: P= Predicted Pedestrian Crashes per year, AADT = Annual average daily traffic (veh/day), Lane = lane number in both directions (#), Div = roadway division (1=divided with raised or unraised median, 0=undivided), Rider = Ridership (passengers per day), SVI = CDC's Social Vulnerability Index Housing Type and Transportation theme, Int = Intersection Presence (1= signalized or unsignalized intersection, 0 = midblock

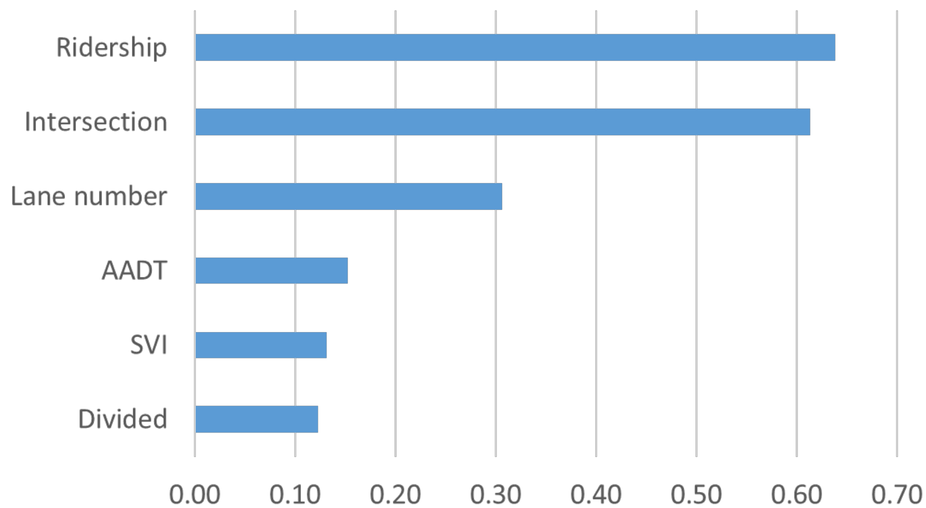


Figure 29 Weight of Risk Factors Based on Standardized Coefficients[23]

Using this SPF, pedestrian crash frequency is predicted. Additionally, the crash severity was predicted by assessing roadway speed. As discussed in the **VRU SAFETY PERFORMANCE** section, VRU crashes are more likely to be serious at higher speed limits. The dollar value for each pedestrian crash is determined by considering the crash severities at each speed limit. An expected crash frequency and crash severity is calculated by giving equal weight to both the observed (i.e., historical) and predicted frequency.

Table 10: Dollar Value of Pedestrian Crashes at Each Speed Limit

Speed Limit	<25	25-30	35	40	45	>45
Dollar Value Per Predicted Crash	$628,853	$742,719	$970,672	$1,559,792	$2,010,057	$3,304,778

Three types of crossing treatments are considered for improving crossing safety at these midblock crossing locations: Pedestrian Hybrid Beacons (PHB), Rectangular Rapid Flashing

Beacons (RRFB), and raised crosswalks. Additionally, medians and curb extensions are installed where feasible.

a: Raised Crosswalk

b: Rectangular Rapid Flashing Beacon (RRFB)

c: Pedestrian Hybrid Beacon (PHB)

Image Source a: PEDSAFE, b: FHWA Interim Approval 21,

Figure 30: Pedestrian Midblock Crossing Treatments

Guidance from the GDOT Pedestrian Streetscape Guide, FHWA, and the Manual on Uniform Traffic Control Devices (MUTCD) is used to determine the appropriate roadway environments for the placement of each of these countermeasures. These directives are used to select a countermeasure that would appropriately assess the roadway environment for the use of each countermeasure. These roadway environments for each countermeasure are shown in **Figure 31.**

<table>
<tr><th rowspan="3">Roadway Configuration</th><th colspan="9">Posted Speed Limit and AADT</th></tr>
<tr><th colspan="3">Vehicle AADT <9,000</th><th colspan="3">Vehicle AADT 9,000–15,000</th><th colspan="3">Vehicle AADT >15,000</th></tr>
<tr><th>≤30 mph</th><th>35 mph</th><th>≥40 mph</th><th>≤30 mph</th><th>35 mph</th><th>≥40 mph</th><th>≤30 mph</th><th>35 mph</th><th>≥40 mph</th></tr>
<tr><td>2 or 3 total lanes No Median</td><td rowspan="2">Raised X-walk</td><td rowspan="3">RRFB</td><td rowspan="4">PHB</td><td colspan="2" rowspan="3">RRFB</td><td rowspan="4">PHB</td><td colspan="2" rowspan="2">RRFB</td><td rowspan="4">PHB</td></tr>
<tr><td>2 or 3 total lanes median</td></tr>
<tr><td>4 total lanes median</td><td rowspan="2">RRFB</td><td colspan="2" rowspan="2">PHB</td></tr>
<tr><td>4 total Lanes no median</td><td>PHB</td><td colspan="2">PHB</td></tr>
<tr><td>> 4 Lanes</td><td colspan="9">PHB</td></tr>
</table>

Figure 31: Recommended Crossing Type at Different Roadway Environments

Note: The image from Figure 31 *comes from FHWA's STEP Guide for Improving Ped Safety at Uncontrolled Crossings. This image does not reflect official GDOT guidance but represents a conservative method of appropriate crossings on different roadway environments.*

To prioritize projects, the benefit-cost (B/C) ratio was calculated for each transit stop using the expected crashes for all of these bus stops. Other factors were considered when selecting midblock crossing locations, including horizontal curvature, grade, sight distance concerns, other pedestrian trip generators besides the bus stop, and proximity to traffic signals. As a result, a series of high B/C ratio projects are recommended.

More about this systemic bus stop analysis can be found on GDOT's Extra Mile Blog.[24]

Pedestrian Crossing Packages

In addition to the transit stop project, GDOT continually screens for and receives requests for pedestrian hybrid beacons and rectangular rapid flashing beacons across the State. Requests may come from District offices, local governments, schools, concerned citizens, etc. Crossing improvements are considered based on crash history, pedestrian origins and destinations, and projected pedestrian volumes. Pedestrian crossing projects are often packaged together to be let as more extensive, cost-efficient projects.

Systemic Trail Crossing Analysis

TrailLink
by Rails-to-Trails Conservancy

Figure 32: Trail Link Source to Download Existing Trails in Georgia.

Since trails naturally generate pedestrians and cyclists, GDOT has taken the initiative to improve safety where trails cross the roadway. Various countermeasures are recommended, ranging from striping and signage improvements to constructing additional trail segments and protected bicycle intersections. The existing trails are currently identified using TrailLink, AllTrails, and Strava.

[24] GDOT Extra Mile Blog: https://www.dot.ga.gov/GDOT/Pages/ExtraMileBlogDetails.aspx?postID=1254

For example, GDOT has performed a bicycle safety analysis and site visit for the Stone Mountain Trail. **Figure 33** shows GDOT staff on the site visit to Stone Mountain Trail. The scope of this project will include low-cost countermeasures for signing and marking for VRUs and improving trail crossing controls for all road users. Once the Stone Mountain Trail Study is finished, this analysis will be replicated with other trails throughout the state.

Figure 33: GDOT Staff on Google Maps Imagery While Assessing the Stone Mountain Trail
Source: Google Maps

Another notable trail project GDOT is working on is the connection of two major trails, the Atlanta BeltLine and the Proctor Creek Greenway. In this project, SR 8 lies between a portion of the Proctor Creek Greenway and a planned portion of the Atlanta BeltLine shown in **Figure 34.** To proactively prevent crashes from occurring along this route, GDOT is partnering with the Atlanta BeltLine to provide a trail connection with highly visible bicycle pavement markings and concrete buffers to separate it from the travel lane.

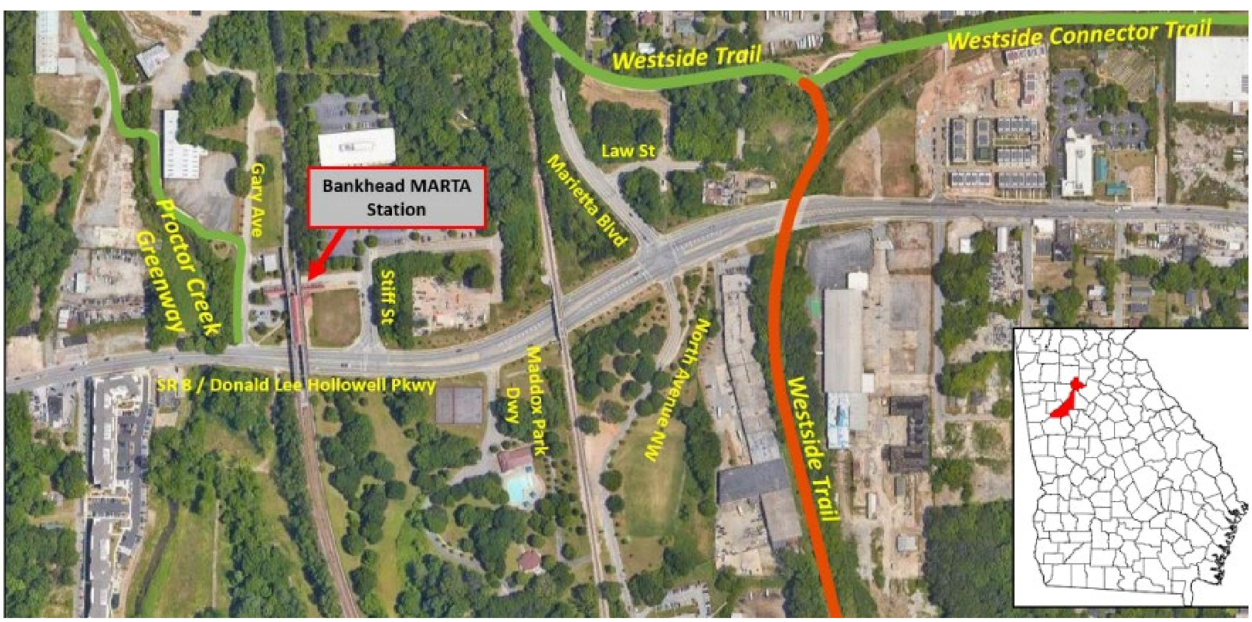


Figure 34: Trail Connection Between Atlanta BeltLine and the Proctor Creek Greenway
Image Source: Shaun Green, Principal Engineer Atlanta BeltLine

The Safety Program is currently in the process of identifying trail systems across the state and prioritizing routes based on exposure (number of crossings and trail users) and crash history. Once prioritized, corridor screenings will be conducted to evaluate systemic low-cost countermeasures where applicable. This will be an important project to proactively install VRU infrastructure.

Complete Streets Initiatives

In 2020, GDOT completed a proactive safety mobility analysis within state routes that lie within the Atlanta BeltLine perimeter. Roadways were assessed through a congestion scan to identify sites that have the potential to reduce vehicular capacity for VRU infrastructure. One of the main goals was to create a connected network for VRUs. Seventeen corridors were identified and 9 have been addressed or are currently in progress. Roadway reconfiguration projects have been completed on three corridors: SR 9/Peachtree Road, SR 8/Ponce de Leon Avenue, and SR 154/Trinity Avenue. For other corridors, counts are currently being recollected to confirm capacity after the impacts of the COVID-19 pandemic.

Corridor	Cycle Track	Side Path	Bike Lane + Buffer	Bike Lane	Marked Shared Lane	Median / Ped Refuge	Road Diet	Transit / HOV Lane
SR 9 / 14th St (SR 3 to Techwood Dr)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Continue Study	Could be Considered
SR 154 / Memorial Dr (Grant St to Pearl St)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Continue Study	Could be Considered
SR 8 / North Ave (SR 3 to Tech Pkwy)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered
SR 14 / SR 154 / Peters St (SR 3 to Walker St)	Could be Considered	Could be Considered	Continue Study	Could be Considered	Could be Considered	Could be Considered	Continue Study	Could be Considered
SR 14 / SR 154 / W. Whitehall St (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Continue Study	Could be Considered
SR 139 / R. D. Abernathy Blvd (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Not Recommended	Could be Considered	Continue Study	Not Recommended
SR 9 / Spring St (Entire Study Limits)	Could be Considered	Could be Considered	Continue Study	Could be Considered	Not Recommended	Not Recommended	Continue Study	Could be Considered
SR 10 / Freedom Pkwy (Entire Study Limits)	Not Recommended	Already Existing	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended
SR 3 / Metropolitan Pkwy (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Not Recommended	Could be Considered	Could be Considered	Could be Considered
SR 42 / University Ave (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Not Recommended	Could be Considered	Continue Study	Not Recommended
SR 3 / Northside Dr (Chapel St to Wells St)	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Could be Considered	Could be Considered	Could be Considered
SR 8 / D. L. Hollowell Pkwy (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Continue Study	Continue Study	Could be Considered
SR 9 / W. Peachtree St (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Not Recommended	Not Recommended	Could be Considered	Could be Considered
SR 9 / Peachtree Rd (Entire Study Limits)	Not Recommended	Not Recommended	Could be Considered	Could be Considered	Not Recommended	Could be Considered	Partially Existing	Could be Considered
SR 154 / Trinity Ave (Entire Study Limits)	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Could be Considered	Not Recommended
SR 8 / Ponce de Leon Ave (Entire Study Limits)	Not Recommended	Not Recommended	Already Existing	Not Recommended	Not Recommended	Could be Considered	Already Existing	Not Recommended
SR 154 / Bill Kennedy Way (Entire Study Limits)	Not Recommended	Could be Considered	Could be Considered	Could be Considered	Already Existing	Not Recommended	Not Recommended	Not Recommended

Continue Study | Could be Considered | Not Recommended | Already Existing | Partially Existing

Figure 35: Intown Multi-Modal Projects

Following the success of programming projects from the Intown Multi-Modal study, a variety of roadway reconfigurations are in the early stages of evaluations. Locations are identified using the methodology demonstrated in the **QUANTITATIVE ANALYSIS** section. A variety of corridors in all Districts have been identified and corridors are prioritized using the CDC's SVI index.

Lighting Initiatives

GDOT's Safety Program has implemented its first lighting-only project that focused on VRU safety on SR 3/Tara Boulevard. This location was ranked second in the state for pedestrian night-time crashes. This project had a partnership with the local government to maintain the lighting, while GDOT implemented it.

Due to the success of the SR 3/Tara Boulevard project, GDOT has decided to participate in EDC-7 Innovations: Night-time Visibility for Safety in partnership with Georgia Power. The goal of participating in EDC-7 is to use a data-driven approach to address dark or low-light condition crashes. An emphasis will be placed on addressing VRU crashes. The program is expected to improve lighting at over 100 segments and intersections across the state and will install pedestrian-level lighting and street lighting. This initiative will primarily take advantage of low-cost lighting installations on existing poles.

Additionally, GDOT is working to upgrade existing crosswalks by adding lighting. GDOT is updating its typicals for crosswalks to include lighting as a component.

Road Safety Audits

The State Safety Program performs 14 RSAs, two per District, per year. RSAs typically have a VRU focus and engage the local communities in the initial stages. The city public works or DOT, county public works or DOT, local law enforcement, Regional Commissions, fire department, transit agencies, local advocacy groups, state advocacy groups, and more are invited to attend the field visits and virtual pre and post-meetings. RSA locations are determined using a safety data-driven and collaborative process. These locations are selected based on a wide range of filters which may include the number of lanes and AADT.

A top ten list of potential RSA locations for the upcoming fiscal year is developed for each District in the final quarter of a fiscal year. These locations are determined by ranking corridors by their pedestrian and bicycle severity rankings as well as their total crash severity ranking. This list is shared with the corresponding District and other essential stakeholders. The Safety Program's RSA team then collects data and performs preliminary analysis. At a minimum, the information includes 3 to 5 years of historical crash data, previous Traffic Engineering (TE) studies and/or existing traffic warrant analyses, traffic signal permits, future resurfacing projects, crash diagrams with vehicle movements at intersections, aerial photos of the location, traffic volume data, and schematics for any existing improvement designs or proposed projects. This information is provided to the assessment team to evaluate the history of the site, crash patterns, and general layout before the field assessment. Pre-work is presented in a balanced fashion as to not give the impression that all solutions are predetermined. Next, the RSA team and local stakeholders perform a field assessment to observe safety concerns. The RSA team then develops the full RSA report and determines the appropriate countermeasures to address the safety concerns. All RSAs are performed in the first two quarters of a fiscal year to ensure there is enough time to develop recommendations and deliver a final report within one year. **Figure 36** below shows the typical process of an RSA.

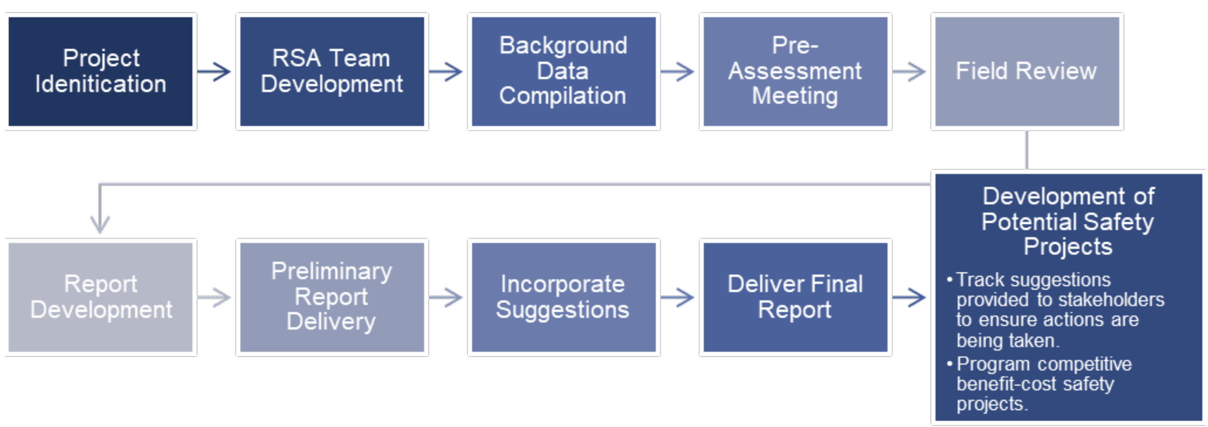


Figure 36: RSA Process

In addition to the RSAs, any significant corridors that were not selected for an RSA will also have a corridor screening conducted to determine countermeasures and improvements. GDOT developed detailed RSA guidelines that can be shared when requested. This document outlines the required steps and data analysis while providing expected timelines and milestone submittal examples. The COVID-19 pandemic had direct impacts on the RSA process due to the limitations of meeting in person. Since stakeholder engagement is essential to the RSA process, fully virtual and hybrid environments were explored. These options are currently being added to the guidelines. One adaptation was the incorporation of an app to collect data from stakeholders. This allowed users to evaluate the corridor outside of the formal site visit due to scheduling conflicts or walk the corridor virtually and still input comments. Images of the app and its functionality can be seen in **Figure 37** below. Recommendations in the app include geolocation tags and supporting images which allow the RSA team to easily verify them.

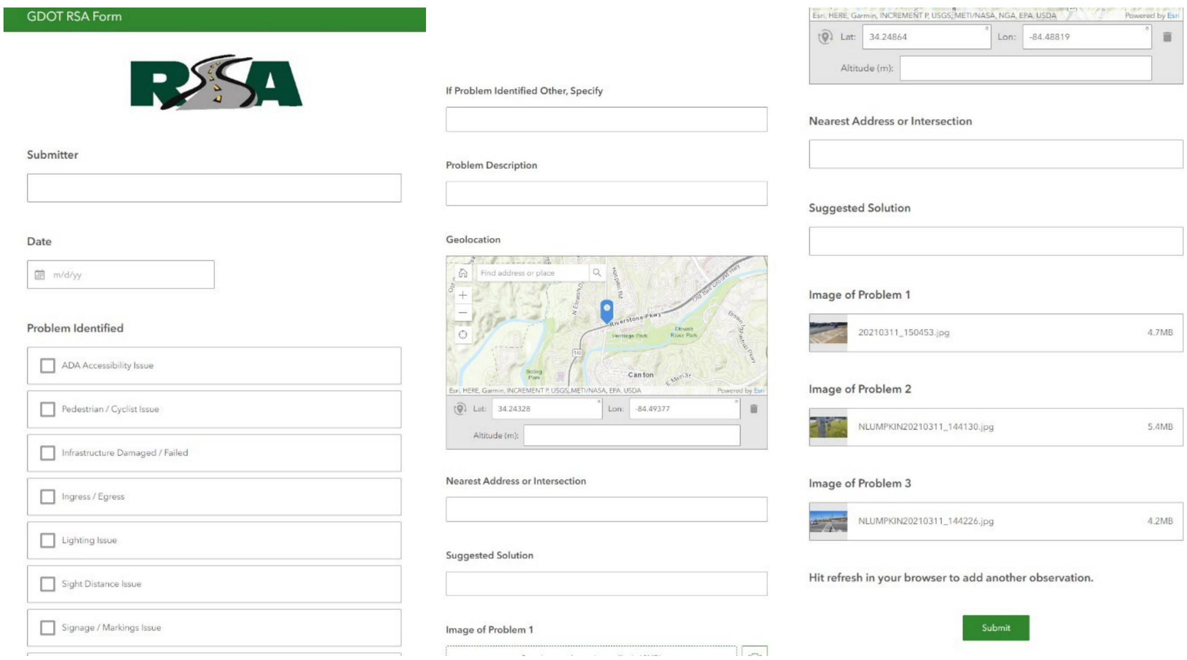


Figure 37: RSA Mobile Application (Survey 123)

Accelerated Delivery Implementation

GDOT has developed four new delivery mechanisms to accelerate safety project implementation: Menu of Service Design (MOSD), Indefinite Delivery Indefinite Quantities (IDIQ), Resurfacing Project Analysis, and the Safety Equipment Purchase Program. These delivery mechanisms are applicable when right of way is not needed and environmental impact is limited.

Menu of Service Design (MOSD)

Menu of Service Design (MOSD) is an expedited plan development process (PDP) with pre-negotiated design rates and pre-defined scope which allows for an abbreviated schedule. This menu of services was developed in collaboration with the Office of Program Delivery for projects with limited environmental impacts and no right of way. In comparison to the structured PDP, the MOSD allows for faster delivery of infrastructure since there is typically no concept report phase, a shortened environmental phase, and no right of way phase. This has allowed for the quick delivery of VRU projects such as pedestrian crossings. By leveraging the MOSD, GDOT has enhanced delivery speed, ultimately getting infrastructure installed and saving lives.

Indefinite Delivery Indefinite Quantities (IDIQ)

For the first time, the GDOT Safety Program will have an on-call maintenance contract to install maintenance level improvements without having to rely on District forces. The initial focus of this delivery mechanism will be outstanding RSA recommendations and upgrading VRU infrastructure. Improvements include bringing pedestrian signals to ADA compliance, restriping crosswalks or bicycle crossings, striping curb extensions, and other improvements that upgrade signals to current GDOT standards.

Resurfacing Project Analysis

The GDOT Safety Program has begun an evaluation of new resurfacing projects to include striping improvements, such as improving right turn viewing angles, and improving bicycle and pedestrian crossings. Additionally, this partnership with our maintenance program allows for upcoming roadway reconfiguration projects to be prepared and installed simultaneously with the resurfacing.

Safety Equipment Purchase Program

With this program, local entities can request safety equipment from GDOT by filling out a form that outlines the safety justification and potential safety benefits of installing the equipment. This program began in fiscal year 2020. The local entity can then use its resources to install the equipment while GDOT pays for the hardware itself. This program has been a successful partnership with local agencies to more rapidly deploy VRU safety countermeasures. Over $1 million of equipment has been provided to

Figure 38: Equipment Purchase Program Items

local agencies. Over $865,000 in additional enhancements have been identified or are being procured. GDOT intends to continue to provide $1 million dollars per fiscal year to this program. The application has been updated based on program requirements and needs. Examples of safety equipment that can be purchased are the following:

- Backplate with retroreflective borders
- Signal/pedestrian heads
- Audible Pedestrian Systems (APS)
- Rectangular Rapid Flashing Beacons (RRFBs)
- Pedestrian Hybrid Beacons (PHBs)
- Blank-out signs
- Flashing Yellow Arrow signal heads

Emerging Data Used for Proactive VRU Assessments

Since VRU crashes only make up 1% of crash data but 18% of roadway fatalities as discussed in the **HISTORICAL CRASH TRENDS** section, additional data is needed to proactively address VRU safety. Therefore, GDOT is exploring a variety of data sources as surrogates for VRU crashes. These surrogate data include near misses and compliance analysis from video analytics, vehicle probe data to detect speed in pedestrian-trafficked areas, vehicle event data, and pedestrian count estimation from existing GDOT data sources.

Using Video Analytics to Evaluate VRU Safety

GDOT uses conflict detection or “near miss” analysis to proactively assess safety for all types of roadway users, but this technology is particularly useful for supplementing VRU crash data. Near miss data allow engineers to have a clearer picture of VRU patterns and make more informed decisions. A near miss can be detected through computer vision where roadway users are detected and the post encroachment time (PET) or time to collision (TTC) is calculated. When PET and TTC are less than 3 seconds, a near miss is identified. As the PET and TTC get smaller and the conflict speed increases, the near miss becomes more serious. GDOT is currently developing a formula to predict both crash frequency and severity based on this information and other roadway characteristics. GDOT is also exploring using probe data to detect near misses by detecting hard braking, but this data has not yet been implemented for VRU safety.

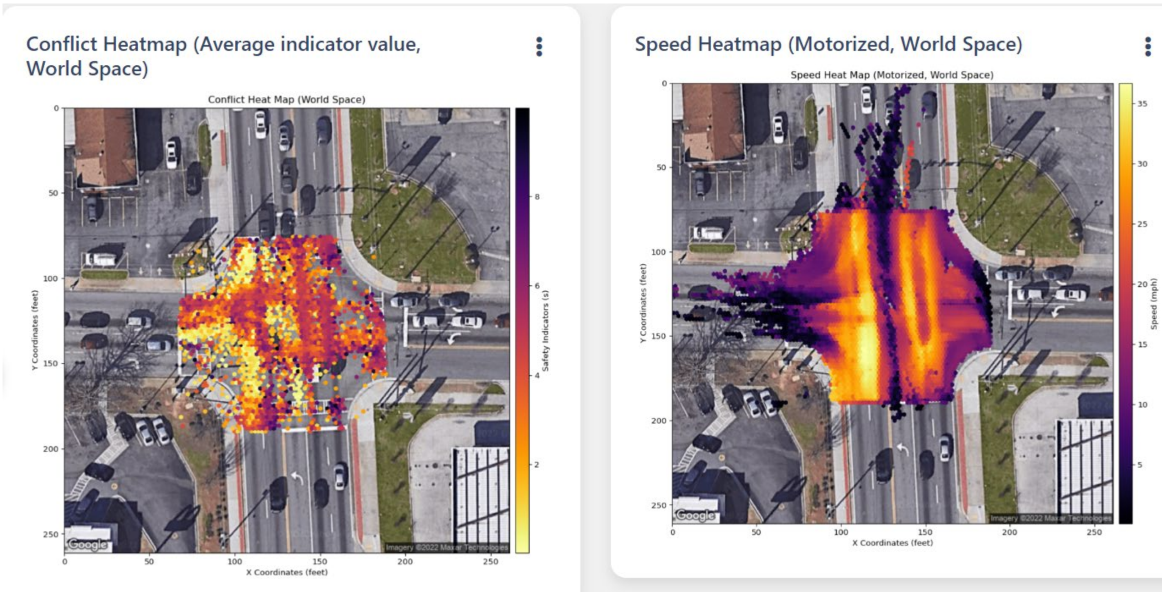


Figure 39: Conflict and Speed Heat Maps (Source: Transafe)

Near-miss analysis is particularly useful when conducting before and after studies. Studies to assess the effectiveness of countermeasures used to take years to wait for sufficient crash data, but with near miss analysis data can be collected in a couple of days.

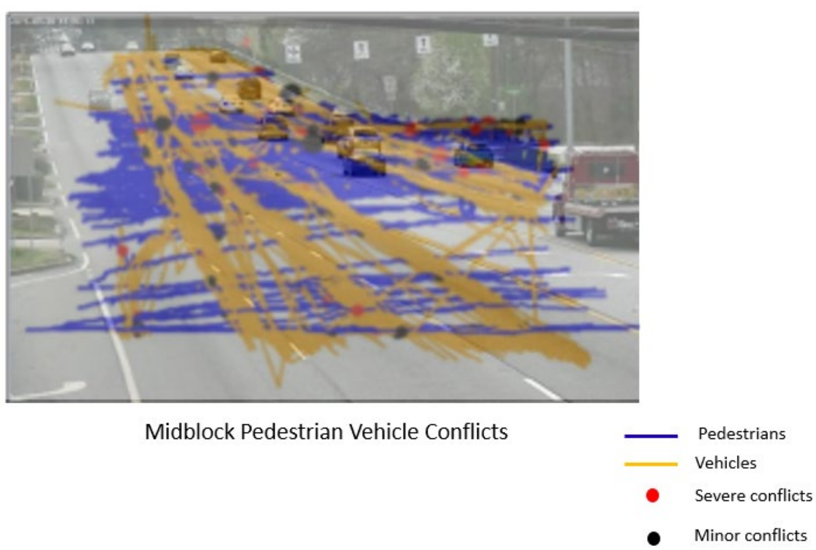


Figure 40: GDOT Inhouse Conflict Detection Solution (*Usher, et. al)*

GDOT uses both vendors and an in-house system to detect near misses. Vendors are used when a large amount of data needs to be collected at scale. The in-house solution allows GDOT staff to cost-efficiently collect and process data. This system was developed in a research project with Georgia Tech titled “Portable Pedestrian and Cyclist Detection System” which recently won the AASHTO High-Value Research Award for Region 2. An example project where these systems are being utilized is an evaluation of compliance, safety, and operations of signal timing techniques for Pedestrian Hybrid Beacons (PHBs). In collaboration with our Signal Operations group, the Safety program is conducting before and after near miss analysis to evaluate the following characteristics of PHBs:

- Georgia-specific 1 vs. 2 stage crossing benefits and disadvantages
- Optimal offset for 2-stage crossing
- Impacts of PHB timing on pedestrian and vehicular compliance

Vehicle Probe Speed Data

Iteris Clearguide and Regional Integrated Transportation Information System (RITIS) are two probe data tools GDOT uses for safety analysis. This data gives GDOT the ability to rank corridors by a variety of different speed-related metrics. These metrics include the percent or total number of vehicles speeding over the speed limit, percentile speeds (i.e., 85%, 90%, 95% speed), speed differentials, and average speeds. This data can be assessed at different times of day, days of week, times of year, etc.

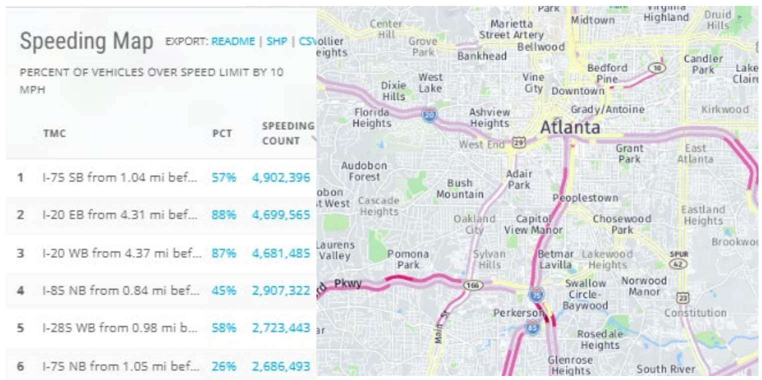


Figure 41: GDOT Iteris Speeding Map

Platforms such as Iteris Clearguide and RITIS can generate visualizations that can be easily included in safety reports. This platform is also useful for before and after studies. These tools were also used to confirm the trend in increased speeding seen during the COVID-19 Pandemic. GDOT started partnerships with local law enforcement to target sites where people are most likely to speed in VRU-trafficked areas.

Vehicle Event Data

GDOT is currently exploring a variety of vendors to collect waypoint information. Information that is expected to be utilized for proactive VRU safety assessments includes:

- Harsh braking and acceleration movements
- VRU travel locations
- Emergency braking indications (which can detect if VRUs were involved)

Pedestrian Count Estimation

Due to the limited availability of pedestrian and bicyclist counts, GDOT is partnering with Georgia Tech in a research project to leverage push button activation data and Strava Metro data (running and cycling tracking app) to develop prediction models that estimate counts for pedestrians and cyclists. This GDOT-funded research harnesses data sources already frequently used by transportation agencies and a Bayesian framework to estimate biking and walking volumes in the Georgia context. The proposed framework uses a combination of efficient sampling of non-motorized counts and multiple proxies, including crowdsourced and passively collected biking and walking data, to estimate walking and biking volumes. This sampling is directed through the development of roadway typologies via unsupervised machine learning methods, and then counts are collected within each typology. Those observations are used as the regressor to update prior assumptions in Bayesian count models for biking and walking. The estimates predicted by these models will be used to quantify crashes as rates.

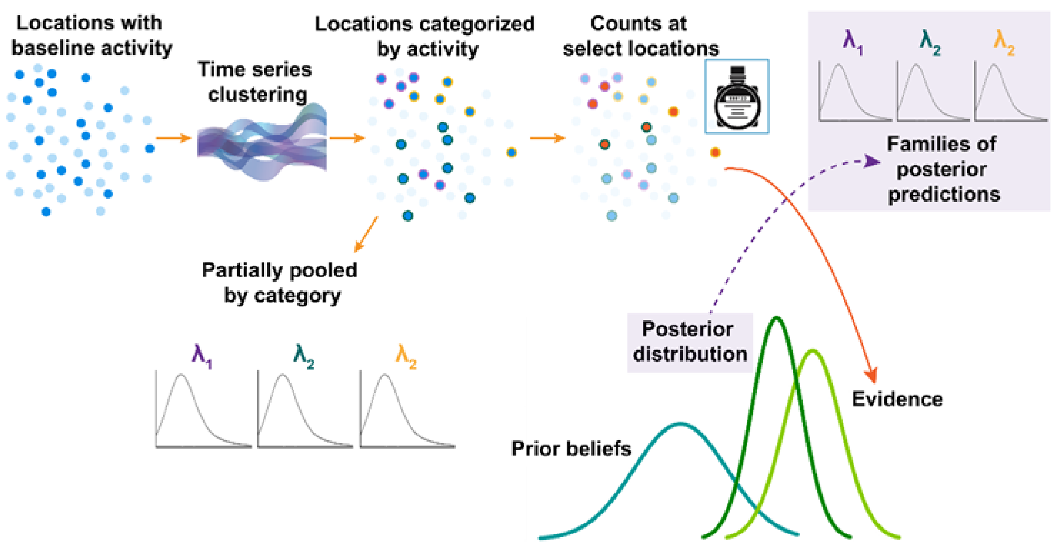


Figure 42: Count Estimation Process Developed by Georgia Tech

Statewide Active Transportation Plan

GDOT's Safety Program and Office of Planning in partnership with Georgia Bikes are developing and implementing a Rural Statewide Active Transportation Plan. The first phase of this robust statewide plan for bicycle and pedestrian transportation will include the following activities:

- Public engagement process with stakeholder input
- Safety data analysis
- Identify needs and opportunities unique to rural areas
- Catalog gaps in funding sources and availability
- Provide a review of other states' best practices for design and funding

While this plan addresses rural travel, the project will also define a broader planning framework that GDOT will be able to extend to the rest of the state in future phases. This effort will identify gaps and needs for VRU mobility infrastructure outside of metropolitan planning organizations (MPOs), ensuring equitable transportation for both urban and rural areas for pedestrians and cyclists. In this plan, an evaluation of our State Bicycle Routes will occur with a Level of Traffic Stress (LTS) ranking methodology. Additionally, GDOT's Pedestrian and Streetscape Guide and Complete Streets Design Policy will be reevaluated. The Rural Statewide Active Transportation Plan is currently in the initial stages, and when it's complete, the process will be repeated to develop an Urban Active Transportation Plan.

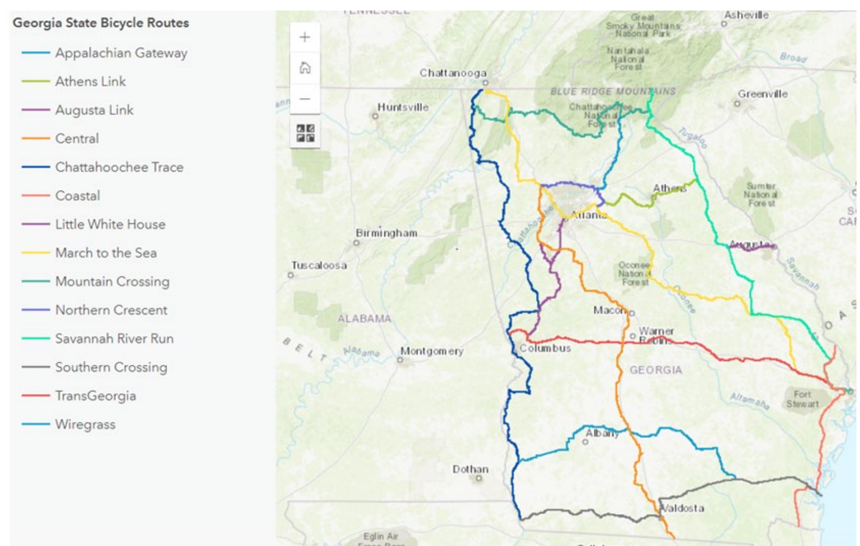


Figure 43: State Bicycle Routes Under Evaluation in Rural Active Transportation Plan

Resources

Within this section, a list of helpful resources in Georgia related to VRU safety have been summarized.

Complete Streets Policy

Chapter 9 of the GDOT Design Policy Manual (DPM) contains design policy for Complete Streets, including pedestrian, bicyclist, and transit warrants for when Complete Streets principles must be considered. The pedestrian warrants include warrants based on the presence of pedestrian trip generators and land use context, evidence of pedestrian activity, pedestrian crashes, and local planning studies. Similarly, the bicycle warrants include warrants for existing bicycle infrastructure or designated bicycle route, bicycle trip generators and land use context, and bicycle crashes. The transit warrants are based on the presence of transit routes on or near the project corridor.

GDOT Bicycle and Pedestrian Webpage

The Bicycle and Pedestrian Page from the GDOT website contains a map of Georgia's Bicycle Route system as shown in **Figure 43**. It also contains GDOT's pedestrian and bicycle policies and manuals, Pedestrian and Bicycle Safety Action Plans, as well as resources on safe walking and biking practices and laws. The website can be found here: https://www.dot.ga.gov/GDOT/Pages/BikePed.aspx.

Georgia Bikes Web Page

Georgia Bikes provides a variety of resources to bicycle and pedestrian safety. The resources include tools for bicycle/pedestrian advocacy organizations, a summary of Georgia bicycle and pedestrian laws, best practices for bicycling in Georgia, and upcoming bicycle events. The Georgia Bikes Web page can be found here: https://georgiabikes.org/.

Pedestrian and Streetscape Guide

GDOT maintains and continually updates the Pedestrian and Streetscape Guide which contains design guidance for pedestrian infrastructure, including midblock crossings. The guide can be found here: https://www.dot.ga.gov/GDOT/pages/DesignManualsGuides.aspx.

Pedestrian and Bicycle Typicals

GDOT provides typical plans for the construction of pedestrian and bicycle infrastructure and is currently updating its typicals for RRFBs and bicycle designs at intersections.

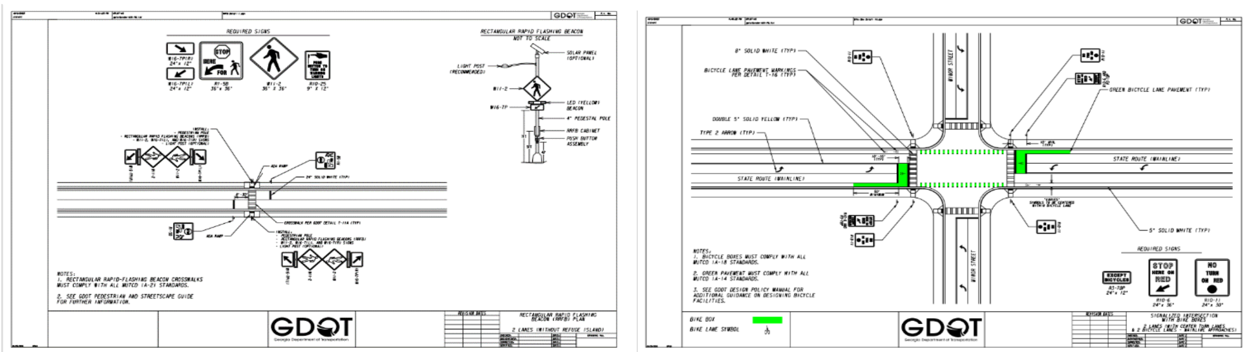


Figure 44 Example Pedestrian/Bicycle Typicals

Quick Fact Sheets

The Georgia Traffic Safety Facts webpage on the Georgia Governor's Office of Highway Safety website contains yearly safety facts sheets for several demographic groups of concern, including pedestrians and bicyclists, older drivers, younger drivers, motorcyclists, etc. The webpage can be found here: https://www.gahighwaysafety.org/georgia-traffic-safety-facts/

Figure 45: Pedestrian and Bicycle Quick Facts 2020

Educational Initiatives

Drive Alert Arrive Alive (DAAA) is GDOT's statewide safety campaign comprised of a variety of educational initiatives to improve safety for roadway users. The following initiatives are components of this campaign that focus on VRU safety.

Figure 46: GDOT's Safety Campaign

See and Be Seen

GDOT's See & Be Seen campaign aims to make it safer to walk in Georgia. See & Be Seen is the pedestrian component of GDOT's Drive Alert Arrive Alive campaign to reduce crashes and fatalities on Georgia's roadways. Collaboration between the GDOT Safety and Intelligent Transportation Systems (ITS) Offices has resulted in the development of impactful public service announcements (PSAs). GDOT has also distributed thousands of reflective armbands to local governments and schools to make VRUs more visible while walking, biking, or running at night.

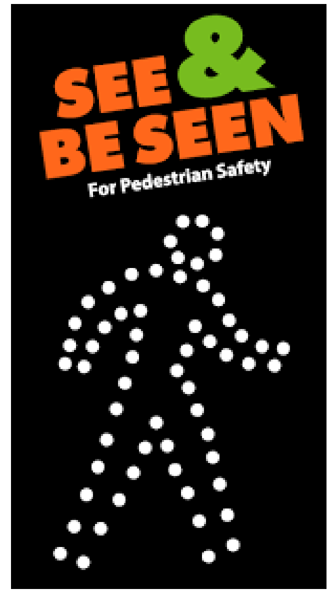


Figure 47: GDOT's Safety Campaign Focusing on VRU Safety at Night

Figure 48: GDOT See and Be Seen Reflective/Light up Arm Bands

Education Curriculum

Through a partnership with We Are Teachers, GDOT is developing digital and physical materials on transportation safety for teachers to use in classrooms across Georgia. The program originated as a partnership with Scholastic reaching students in 3rd through 5th grades. Now, with the new We Are Teachers partnership, educational materials including custom digital and print materials including in classroom posters and lesson concepts, microsite design and development, videos, virtual field trips, interactive experiences, classroom kits, and comic books, among others are being developed for k-12 students across the state. Lessons and materials are developed based on current Georgia Education Standards for each grade level. Though this program teaches traffic safety for all modes, it has an emphasis on VRU safety.

GDOT Social Media

GDOT uses social media to educate the public about new projects and how to use the roadway infrastructure. GDOT's Instagram page typically features road updates, safety tips, infrastructure projects, public outreach, event promotions, environmental initiatives, and occasional employee spotlights. Various posts have been made related to VRU safety, including a tutorial on using a Pedestrian Hybrid Beacon. This Instagram reel was created because it was found that many did not understand PHB signal activation, and it received over 2,000 views.

Figure 49: GDOT Instagram Reel on How to Use a Pedestrian Hybrid Beacon

GDOT Ahead of the Curve Podcast

GDOT's *Ahead of the Curve* Podcast provides insight into GDOT employees, programs, projects, and activities. This podcast helps educate engineers and the general public on various topics and GDOT initiatives. Both episode 6 (GDOT's Safety Program) and 10 (SRTS – Bicycle and Pedestrian Safety) of the podcast are VRU related and discuss GDOT's Safety Program and the department's Pedestrian and Bicycle Safety Initiatives.

Figure 50: GDOT Podcasts Related to VRU Safety

Safe Driving Summits

GDOT's partnership with the Lutzie 43 Foundation is also part of GDOT's Drive Alert Arrive Alive Campaign (DAAA) campaign. The safe driving initiative 43 Key Seconds promotes everyday driver responsibility. GDOT advocates for using a lanyard and key card, seen in **Figure 51,** as a visual reminder to encourage individuals to make safe and responsible choices while driving. The Safe Driving Summits aim to educate Georgia's youngest drivers about the dangers of distracted, impaired, and unsafe driving and equips them with valuable tools to make better decisions behind the wheel. These events are typically held at a local college in the area, and 200-300 students from surrounding high schools are bussed in to attend. The first VRU-focused summit was held at Georgia Tech on April 13th. These school day-long events include powerful keynote speakers, including the founder and director of the Lutzie 43 Foundation, Mike Lutzenkirchen, GDOT representatives, members of local and state law enforcement, healthcare providers that treat patients following crashes, post-crash care specialists, as well as truck drivers. From there, students participate in four breakout sessions led by various leaders from law enforcement agencies, healthcare companies, and more. These Safe Driving Summits provide young adult drivers with valuable tips and tools to prioritize safety on the road and enable them to gather real-life examples and stories they can share within their social circles, families, and communities. More information on these summits can be found: **Figure 52** shows examples of the breakouts at the Safe Driving Summit. More information on these summits can be found: https://youtu.be/PpvTWPmGAjc.

Figure 51: Lutzie 43 Lanyard and Key

Figure 52: GDOT & Lutzie 43 Safe Driving Summit

From left to right: Keynote Presentation, A Glimpse into the Trauma Bay

Safe Routes to School

The Georgia Safe Routes for School (SRTS) program joins an international initiative to improve the health and well-being of children in grades K-12, including those with disabilities, by making it safer, more convenient, and fun to walk, bike, and roll to school. This program provides educational resources and services through the SRTS Resource Center and support team, such as bike and pedestrian safety education materials and classes, encouragement activities and events, community engagement, and awareness strategies. It also provides engineering support for evaluating school walking and biking routes and infrastructure as well as school-focused Road Safety Audits (RSAs).

Figure 53: GDOT SRTS Logo

Figure 54: GDOT SRTS Program
Image Source: GDOT SRTS Website

Figure 56: Handing out Light up Arm Bands at a SRTS Event

Figure 55: Walk and Roll to School Day

The SRTS program works statewide, partnering with 523 schools in 94 school districts and collaborating with Regional Commissions and GDOT Districts. A network of support comprises over 400 stakeholder organizations, including local governments, advocacy groups, health professionals, law enforcement agencies, businesses, and community leaders. In FY 22, the Safe Routes to School Resource Center team delivered 210 educational sessions. In addition to 13 school focused RSAs, the staff also conducted safety walks and school transportation observations to assist local agencies and schools with identifying barriers to safe routes and developing solutions, including identifying funding sources for improvements. These safety walks engage community partners and empower locals to act. Schools and local entities can request support, register for events, and inquire about a safety walk on GDOT's Safe Routes to School Website found at https://saferoutesga.org/.

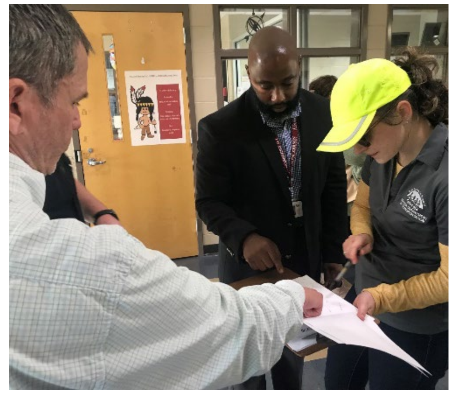


Figure 57: Working With School Champion and Principal on a Safety Walk Around Campus

Figure 58: Bicycle Educational Session

CONCLUSION

Over the past 15 years, the proportion of fatal crashes involving Vulnerable Roadway Users (VRUs) has increased significantly. Despite VRU crashes comprising less than 1% of all crash data, their severity and fatality rates are disproportionately high, especially in low-light conditions and on high-speed arterial roads. Therefore, the U.S. DOT's Safe System approach to road safety has been utilized to combat these trends. Six high-risk areas have been identified, including locations with high social vulnerability, presence of transit stops, proximity to schools, undivided (i.e., no median) and high lane number roadways, principal and minor arterials, and locations with higher speeds. The integration of these risk factors into the AASHTOWare Numetric Safety tool and the implementation of engineering strategies demonstrate a commitment to systematically working toward the goal of eliminating roadway fatalities. Georgia's data-driven and proactive approach to combat these trends is evident in its increased funding for VRU safety, educational initiatives, and collaboration with various organizations. The practices established are replicable for future years. By addressing these challenges comprehensively and holistically within the framework of the Safe Systems approach, the Georgia Department of Transportation (GDOT) is dedicated to making roads safer for all road users and ultimately achieving zero fatalities on its roadways.

ACKNOWLEDGMENTS

GDOT Safety Program has written this Vulnerable Roadway User Safety Assessment in cooperation with the Georgia Pedestrian and Bicycle Task Teams. The task teams are managed by the Governor's Office of Highways Safety in cooperation with GDOT. These task teams combine advocacy groups, trail organizations, public health departments, Regional Commissions, city and county governments, federal government organizations, law enforcement, research institutions, and transit agencies. Notable groups that participated in developing this assessment include the Safe Routes to School Program, Georgia Bikes, the Department of Public Health, and Georgia Tech. The authors of this assessment are:

- Ron Knezevich, EIT: GDOT Safety Engineering Supervisor
- Connor Booth, EIT: GDOT State Pedestrian and Bicycle Engineer
- Kelli Roberts, PE: GDOT Safety Program Manager
- Sam Harris, PE: GDOT Assistant State Traffic Engineer

APPENDIX: PROJECT LIST

Fiscal Year 2023 Projects with Dedicated Funding to Reduce VRU Fatalities

PI#	County	Description	Phase	VRU Spend ($)
0006935	Rockdale	SR 20 @ CR 98/WEST HIGHTOWER TRAIL & CHANDLER RD	Right of Way	$30,000.00
0006935	Rockdale	SR 20 @ CR 98/WEST HIGHTOWER TRAIL & CHANDLER RD	Construction	$466,288.31
0006935	Rockdale	SR 20 @ CR 98/WEST HIGHTOWER TRAIL & CHANDLER RD	Right of Way	$65,500.00
0006935	Rockdale	SR 20 @ CR 98/WEST HIGHTOWER TRAIL & CHANDLER RD	Construction	$6,209.56
0008314	Pickens	SR 136 FROM SR 136 CONN TO SR 515	Construction	$5,838.09
0008314	Pickens	SR 136 FROM SR 136 CONN TO SR 515	Construction	$4,528.62
0008314	Pickens	SR 136 FROM SR 136 CONN TO SR 515	Construction	$4,794.50
0008314	Pickens	SR 136 FROM SR 136 CONN TO SR 515	Construction	$124,049.56
0008314	Pickens	SR 136 FROM SR 136 CONN TO SR 515	Construction	$1,750.00
0009400	DeKalb	SR 13 FM CS 8/AFTON LANE TO CS 750/SHALLOWFORD TERRACE-PH II	Right of Way	$590,000.00
0009874	Glynn	SR 25/US 17 @ SR 99	Construction	$324,059.03
0009874	Glynn	SR 25/US 17 @ SR 99	Construction	$284,598.27
0009901	Haralson	I-20 @ CR 826/WACO ROAD - EB & WB RAMPS	Construction	$7,251.32
0009901	Haralson	I-20 @ CR 826/WACO ROAD - EB & WB RAMPS	Construction	$81,619.08
0009916	Richmond	SR 88 @ CR 58/BATH EDIE ROAD	Construction	$96.25
0009928	Newton	SR 11 @ SR 142	Preliminary Engineering	$10,000.00
0009931	Barrow	SR 11 @ SR 211	Construction	$118,577.53
0009966	Butts	SR 42 @ SR 87	Construction	$277,272.37

0009967	Coweta	SR 14 @ SR 41	Construction	$16,257.73
0009967	Coweta	SR 14 @ SR 41	Construction	$940.13
0009975	Troup	I-85 @ SR 18 & SR 18 @ SR 103	Construction	$111,503.17
0009989	Rockdale	SR 138 @ CR 6/CR 443/UNION CHURCH ROAD	Construction	$347,467.56
0009989	Rockdale	SR 138 @ CR 6/CR 443/UNION CHURCH ROAD	Construction	$34,705.74
0009990	Rockdale	SR 138 @ CR 8/CR 15/EAST FAIRVIEW ROAD	Right of Way	$59,500.00
0009990	Rockdale	SR 138 @ CR 8/CR 15/EAST FAIRVIEW ROAD	Construction	$312,107.07
0009990	Rockdale	SR 138 @ CR 8/CR 15/EAST FAIRVIEW ROAD	Construction	$72,573.92
0010428	Bulloch	CR 248/LANGSTON CHAPEL ROAD @ CR 585/HARVILLE ROAD	Construction	$319,981.92
0010428	Bulloch	CR 248/LANGSTON CHAPEL ROAD @ CR 585/HARVILLE ROAD	Construction	$59,344.38
0013172	Appling	PEDESTRIAN UPGRADES @ 17 LOCS IN DISTRICT 4 - VRU	Preliminary Engineering	$300,000.00
0013194	Fulton	SR 9/US 19 @ CS 351/GLENRIDGE DRIVE	Construction	$15,633.46
0013194	Fulton	SR 9/US 19 @ CS 351/GLENRIDGE DRIVE	Construction	$8,498.75
0013194	Fulton	SR 9/US 19 @ CS 351/GLENRIDGE DRIVE	Construction	$6,188.22
0013257	Emanuel	PEDESTRIAN UPGRADES@16 SR LOC IN BURKE;EMANUEL&JEFFERSON-VRU	Preliminary Engineering	$628,000.00
0013259	Putnam	PEDESTRIAN UPGRADES @ 13 LOC IN NEWTON & PUTNAM COUNTY - VRU	Construction	$1,370,881.13
0013259	Putnam	PEDESTRIAN UPGRADES @ 13 LOC IN NEWTON & PUTNAM COUNTY - VRU	Construction	$28,670.78
0013260	Baldwin	SR 24 @ 10 LOCS & SR 29 @ 2 LOCS - PED UPGRADES - VRU	Preliminary Engineering	$690,000.00
0013333	DeKalb	I-20 EB @ CS 2776/MAYNARD TERRACE	Construction	$238,084.46
0013375	Gwinnett	WEST PIKE STREET FROM SR 316 TO HURRICANE SHOALS ROAD - VRU	Construction	$3,100,000.00

0013685	Ben Hill	SR 90 @ CR 250/LOWER REBECCA ROAD	Construction	$128,580.44
0013686	Henry	SR 155 @ CR 672/PANOLA ROAD	Construction	$994.95
0013686	Henry	SR 155 @ CR 672/PANOLA ROAD	Construction	$21,387.33
0013690	Floyd	PEDESTRIAN UPGRADES @ 19 LOCS IN FLOYD COUNTY - VRU	Preliminary Engineering	$370,000.00
0013691	Gordon	PEDESTRIAN UPGRADES @ 27 LOCS IN BARTOW & GORDON COUNTY-VRU	Preliminary Engineering	$320,000.00
0013692	Cherokee	PEDESTRIAN UPGRADES @ 23 LOCS IN DISTRICT 6 - VRU	Preliminary Engineering	$270,000.00
0013693	Whitfield	PEDESTRIAN UPGRADES @17 LOC IN CATOOSA;MURRAY &WHITFIELD-VRU	Preliminary Engineering	$415,000.00
0013694	Walker	PEDESTRIAN UPGRADES @ 10 LOCS IN DADE & WALKER COUNTY - VRU	Preliminary Engineering	$300,000.00
0013697	Henry	SR 81 @ CR 434/JACKSON LAKE ROAD/CR 656/SNAPPING SHOALS ROAD	Construction	$68,248.44
0013859	Newton	SR 11 @ SR 12	Construction	$98,901.87
0013861	Habersham	SR 105 @ SR 115	Preliminary Engineering	$3,000.00
0013861	Habersham	SR 105 @ SR 115	Preliminary Engineering	$1,000.00
0013861	Habersham	SR 105 @ SR 115	Construction	$492,214.26
0013861	Habersham	SR 105 @ SR 115	Construction	$30,836.33
0015151	Chatham	SR 204 FROM SR 21 TO CS 1201/RIO ROAD @ 23 LOCS - VRU	Preliminary Engineering	$375,000.00
0015151	Chatham	SR 204 FROM SR 21 TO CS 1201/RIO ROAD @ 23 LOCS - VRU	Preliminary Engineering	$740,000.00
0015591	Forsyth	SR 9 @ CR 741/BANNISTER ROAD	Right of Way	$102,000.00
0015592	Jackson	SR 11 @ SR 124	Preliminary Engineering	$1,400.00
0015667	Baldwin	SR 22 @ SR 24	Preliminary Engineering	$53,000.00
0015672	Newton	CR 1840/BROWN BRIDGE ROAD @ CR 13/MAGNET ROAD	Preliminary Engineering	$7,500.00
0015672	Newton	CR 1840/BROWN BRIDGE ROAD @ CR 13/MAGNET ROAD	Preliminary Engineering	$3,000.00
0015672	Newton	CR 1840/BROWN BRIDGE ROAD @ CR 13/MAGNET ROAD	Preliminary Engineering	$2,000.00

0015672	Newton	CR 1840/BROWN BRIDGE ROAD @ CR 13/MAGNET ROAD	Construction	$212,036.17
0015672	Newton	CR 1840/BROWN BRIDGE ROAD @ CR 13/MAGNET ROAD	Construction	$54,446.59
0015679	Douglas	SR 8 @ CS 352/CS 968/CONNERS ROAD	Construction	$483,568.84
0015686	Bibb	SR 11/SR 49 @ SR 247	Preliminary Engineering	$4,000.00
0015686	Bibb	SR 11/SR 49 @ SR 247	Construction	$317,421.59
0015687	Chattahoochee	SR 1 @ SR 520 & CR 109/WELLS STREET	Preliminary Engineering	$55,000.00
0015688	Butts	SR 16 @ ENGLAND CHAPEL ROAD/HIGH FALLS ROAD	Preliminary Engineering	$38,000.00
0015689	Henry	SR 81 @ CR 204/NEW MORN DRIVE	Preliminary Engineering	$45,000.00
0015689	Henry	SR 81 @ CR 204/NEW MORN DRIVE	Right of Way	$47,000.00
0015692	Bibb	SR 87 @ CR 742/BASS ROAD/CR 85/ARKWRIGHT ROAD	Construction	$373,107.33
0015692	Bibb	SR 87 @ CR 742/BASS ROAD/CR 85/ARKWRIGHT ROAD	Construction	$153,548.60
0015694	Carroll	SR 16 @ CR 212/CR 833/BEULAH CHURCH ROAD	Preliminary Engineering	$8,000.00
0015694	Carroll	SR 16 @ CR 212/CR 833/BEULAH CHURCH ROAD	Right of Way	$23,800.00
0015844	Coweta	SR 14/US 29 @ CS 2334/CORINTH ROAD IN NEWNAN	Preliminary Engineering	$2,500.00
0015918	Hall	SR 60 @ CS 898/ACADEMY STREET	Preliminary Engineering	$40,000.00
0015918	Hall	SR 60 @ CS 898/ACADEMY STREET	Preliminary Engineering	$11,100.00
0015918	Hall	SR 60 @ CS 898/ACADEMY STREET	Preliminary Engineering	$2,500.00
0016106	Polk	SR 6 @ SR 100	Right of Way	$22,799.07
0016106	Polk	SR 6 @ SR 100	Preliminary Engineering	$1,500.00
0016106	Polk	SR 6 @ SR 100	Right of Way	$7,500.00
0016106	Polk	SR 6 @ SR 100	Construction	$234,823.50

0016106	Polk	SR 6 @ SR 100	Construction	$74,958.37
0016107	Gwinnett	SR 378 FROM CR 823/LIGHT CIRCLE TO SR 13 - VRU	Construction	$938,937.08
0016107	Gwinnett	SR 378 FROM CR 823/LIGHT CIRCLE TO SR 13 - VRU	Construction	$76,932.48
0016108	Carroll	SR 16 @ CS 1110/COLUMBIA DR/CS 1120/BRUMBELOW RD	Preliminary Engineering	$3,300.00
0016108	Carroll	SR 16 @ CS 1110/COLUMBIA DR/CS 1120/BRUMBELOW RD	Construction	$250,157.02
0016108	Carroll	SR 16 @ CS 1110/COLUMBIA DR/CS 1120/BRUMBELOW RD	Preliminary Engineering	$2,500.00
0016108	Carroll	SR 16 @ CS 1110/COLUMBIA DR/CS 1120/BRUMBELOW RD	Construction	$57,857.54
0016109	Lowndes	SR 122 @ SR 125	Right of Way	$138,000.00
0016111	Houston	SR 247 @ SR 247 SPUR	Construction	$2,500.00
0016111	Houston	SR 247 @ SR 247 SPUR	Construction	$1,800.00
0016111	Houston	SR 247 @ SR 247 SPUR	Construction	$14,265.20
0016113	Meriwether	SR 41 @ CR 174/JUDSON BULLOCH ROAD	Preliminary Engineering	$1,600.00
0016113	Meriwether	SR 41 @ CR 174/JUDSON BULLOCH ROAD	Construction	$282,010.63
0016113	Meriwether	SR 41 @ CR 174/JUDSON BULLOCH ROAD	Construction	$34,490.16
0016116	Pickens	SR 53BU @ DRAGON DRIVE	Right of Way	$24,000.00
0016117	Peach	SR 247 CONN @ CR 83/CS 668/HOUSERS MILL ROAD	Construction	$306,603.01
0016117	Peach	SR 247 CONN @ CR 83/CS 668/HOUSERS MILL ROAD	Construction	$306,603.01
0016117	Peach	SR 247 CONN @ CR 83/CS 668/HOUSERS MILL ROAD	Construction	$306,392.69
0016117	Peach	SR 247 CONN @ CR 83/CS 668/HOUSERS MILL ROAD	Construction	$27,656.27
0016319	McDuffie	SR 17 @ CR 159/WIRE ROAD	Preliminary Engineering	$33,000.00
0016319	McDuffie	SR 17 @ CR 159/WIRE ROAD	Right of Way	$8,000.00
0016319	McDuffie	SR 17 @ CR 159/WIRE ROAD	Preliminary Engineering	$8,800.00
0016356	Newton	SR 162 @ CR 228/ROCKY PLAINS ROAD	Preliminary Engineering	$5,000.00

0016356	Newton	SR 162 @ CR 228/ROCKY PLAINS ROAD	Preliminary Engineering	$1,000.00
0016357	Laurens	SR 26 @ CR 68/BETHLEHEM CHURCH ROAD - HRRR	Construction	$370,474.93
0016357	Laurens	SR 26 @ CR 68/BETHLEHEM CHURCH ROAD - HRRR	Construction	$109,561.04
0016357	Laurens	SR 26 @ CR 68/BETHLEHEM CHURCH ROAD - HRRR	Construction	$144,255.36
0016359	Troup	SR 219 @ CR 407/BARTLEY ROAD	Preliminary Engineering	$42,000.00
0016363	Walton	SR 81 @ CR 29/OZORA CHURCH ROAD	Preliminary Engineering	$20,000.00
0016363	Walton	SR 81 @ CR 29/OZORA CHURCH ROAD	Right of Way	$151,000.00
0016464	Bulloch	SR 73/US 25 @ SR 67	Preliminary Engineering	$5,000.00
0016466	Carroll	SR 8 FROM CS 919/ROCKY BRANCH ROAD TO SR 61	Preliminary Engineering	$110,000.00
0016469	Polk	SR 6/SR 101 @ COOTS LAKE - VRU	Preliminary Engineering	$230,000.00
0017371	Appling	STATEWIDE IDIQ SIGNAL INSTALLATION - FY 2023 - VRU	Construction	$2,000,000.00
0017372	Appling	STATEWIDE SAFETY EQUIPMENT PURCHASE - FY 2023 - VRU	Construction	$1,000,000.00
0017394	Bibb	SR 74 FROM CR 5462/OGLESBY PLACE TO CR 741/COLUMBUS RD - VRU	Preliminary Engineering	$100,000.00
0017394	Bibb	SR 74 FROM CR 5462/OGLESBY PLACE TO CR 741/COLUMBUS RD - VRU	Preliminary Engineering	$170,000.00
0017395	Bibb	SR 247/US 41 @ CR 5104/CR 5481/ANTHONY ROAD	Preliminary Engineering	$45,000.00
0017401	Fulton	SR 42 @ CS 2199/UNITED AVE & CS 2935/SKYHAVEN ROAD - VRU	Preliminary Engineering	$10,000.00
0017517	Baldwin	SR 24 & SR 29 FROM HOLLY DRIVE TO MELODY WAY - VRU	Preliminary Engineering	$985,000.00
0017697	Liberty	SR 38/US 84 FROM FLOWERS DRIVE TO PATRIOTS TRAIL - VRU	Preliminary Engineering	$968,000.00
0017926	Fulton	SR 8/US 278 FROM SR 280 TO CS 6701/STIFF STREET	Construction	$2,589,529.11
0017926	Fulton	SR 8/US 278 FROM SR 280 TO CS 6701/STIFF STREET	Construction	$584,681.95
0017960	Colquitt	SR 37 @ CR 483/THIGPEN TRAIL	Preliminary Engineering	$71,800.00

0017961	Clay	SR 1/US 27 @ SR 37	Preliminary Engineering	$66,000.00
0017962	Lee	SR 3/US 19 @ CS 507/CHURCH STREET - VRU	Preliminary Engineering	$465,000.00
0017964	Whitfield	SR 286 @ CR 670/DAWNVILLE ROAD	Preliminary Engineering	$87,000.00
0017966	Carroll	SR 61 @ COMMERCE DRIVE & @ MEADOWLARK DRIVE - VRU	Construction	$1,010,287.48
0017966	Carroll	SR 61 @ COMMERCE DRIVE & @ MEADOWLARK DRIVE - VRU	Construction	$160,075.80
0017968	Peach	SR 96 @ CS 767/HOUSERS MILL ROAD	Preliminary Engineering	$65,200.00
0017968	Peach	SR 96 @ CS 767/HOUSERS MILL ROAD	Preliminary Engineering	$9,200.00
0018175	Hart	SR 172 @ CR 510/BIO CHURCH ROAD	Preliminary Engineering	$13,600.00
0018330	Coweta	SR 54 @ CR 547/GORDON ROAD	Preliminary Engineering	$30,000.00
0018332	Columbia	SR 232 @ CR 576/LOUISVILLE ROAD	Preliminary Engineering	$19,600.00
0018335	DeKalb	SR 10 FROM SR 155 TO SR 10	Preliminary Engineering	$474,000.00
0019032	Thomas	SR 1; SR 3; SR 38 & SR 520 @ 5 LOCS IN DISTRICT 4 - VRU	Preliminary Engineering	$30,000.00
0019198	Monroe	HIGH FALLS ROAD - OFF-SYSTEM SAFETY IMPROVEMENTS - VRU	Preliminary Engineering	$8,000.00
0019251	All Counties	TEENS IN THE DRIVERS SEAT - FY 2023-2025	Preliminary Engineering	$927,800.00
0019348	Fulton	SR 3; SR 42 & SR 70 @ 7 LOCS IN CLAYTON; DEKALB & FULTON-VRU	Preliminary Engineering	$50,000.00
0019558	DeKalb	SR 154 @ 7 LOCS IN DEKALB & 1 LOC IN FULTON - VRU	Preliminary Engineering	$15,000.00
0019601	Coffee	SR 206 @ SR 268	Preliminary Engineering	$2,500.00
0019602	Decatur	SR 309 @ CS 402/FACEVILLE ATTAPULGUS ROAD	Preliminary Engineering	$2,500.00
0019612	Effingham	SR 17 @ MARLOW ROAD/WESLEY DRIVE	Preliminary Engineering	$70,000.00
0019613	Jeff Davis	SR 19 FROM CS 541/L STREET TO CS 654/N WILLIAMS STREET - VRU	Preliminary Engineering	$10,000.00
0019691	Clayton	SR 3 @ 4 LOCS & SR 3 CONN @ 1 LOC	Preliminary Engineering	$15,000.00
0019699	Chatham	SR 26 FROM LAZARETTO CREEK TO TYBRISA STREET - SCOPING ONLY	Scoping	$200,000.00

0019707	Lee	SR 133 @ CR 109/CEDRIC STREET	Preliminary Engineering	$3,000.00
0019834	Fulton	SR 280 @ CS 2645/NORTHWEST DRIVE	Preliminary Engineering	$60,000.00
0019835	Carroll	SR 113 FROM CENTER POINT ROAD TO MEADOWCLIFF CIRCLE	Preliminary Engineering	$12,000.00
0019836	Whitfield	SR 3/US 41 @ CR 666/FIVE SPRINGS ROAD	Preliminary Engineering	$8,000.00
0019838	Houston	SR 11/SR 49 @ CR 1717/N HOUSTON LAKE BLVD	Preliminary Engineering	$9,000.00
0019839	Ware	SR 4BU/US 1 @ CR 465/JAMESTOWN ROAD	Preliminary Engineering	$30,000.00
0019840	Houston	SR 11/SR 49 @ SR 11 & @ PR 4/HOUSTON ROAD	Preliminary Engineering	$20,000.00
0019841	Fulton	SR 138 @ CR 581/BETHSAIDA ROAD	Preliminary Engineering	$70,000.00

Fiscal Year 2024 Projects with Dedicated Funding to Reduce VRU Fatalities

Note, total spend is subject to change.

PI#	County(s)	Description	Primary Work Type	Phase	VRU Spend ($)
0008288	DeKalb	SR 12/US 278 FM DEKALB MEDICAL PKWY TO CRAGSTONE COURT - VRU	Pedestrian Facilities	Construction	$ 1,133,218.91
0013197	Wayne	CR 396/RAYONIER ROAD @ CR 392/SPRING GROVE ROAD - HRRR	Roundabout	Construction	$ 208,280.75
0013258	Greene, McDuffie, Taliaferro	SR 12; SR 17 & SR 44 @ 9 LOCS - PEDESTRIAN UPGRADES - VRU	Pedestrian Crossings	Construction	$ 1,725,687.44
0013693	Catoosa, Murray, Whitfield	PEDESTRIAN UPGRADES @17 LOC IN CATOOSA;MURRAY &WHITFIELD-VRU	Pedestrian Crossings	Right of way	$ 140,000.00
0013694	Dade, Walker	PEDESTRIAN UPGRADES @ 10 LOCS IN DADE & WALKER COUNTY - VRU	Pedestrian Crossings	Right of way	$ 220,000.00
0015592	Jackson	SR 11 @ SR 124	Roundabout	Construction	$ 386,920.87
0015687	Chattahoochee	SR 1 @ SR 520 & CR 109/WELLS STREET	Roundabout	Right of way	$ 35,000.00
0015688	Butts	SR 16 @ ENGLAND CHAPEL ROAD/HIGH FALLS ROAD	Roundabout	Right of way	$ 33,000.00
0015918	Hall	SR 60 @ CS 898/ACADEMY STREET	Roundabout	Right of way	$ 117,000.00
0016112	Sumter	SR 30 @ LAMAR ROAD/PECAN ROAD	Roundabout	Right of way	$ 74,000.00

0016122	Cobb, Paulding	BURNT HICKORY ROAD @ 1 LOC - OFF-SYSTEM SAFETY IMPROVEMENTS	Roundabout	Construction	$ 146,501.75
0016166	Jackson	SR 124 @ SR 60 & CR 17/SAM FREEMAN ROAD	Roundabout	Right of way	$ 79,000.00
0016347	Banks	SR 98 @ SR 164 - VRU	Intersection Improvement	Right of way	$ 1,400,000.00
0019238	Paulding	OFF-SYSTEM SAFETY IMPROVEMENTS @ 14 LOCS IN PAULDING CO-VRU	Pavement Markings	Construction	$ 357,161.86
0019470	DeKalb	SR 10 FROM CR 5148/ROCKBRIDGE ROAD TO CR 814/RAYS ROAD - VRU	Intersection Improvement	Preliminary Engineering	$ 1,550,000.00
0019472	Thomas	SR 3/SR 300 @ 4 LOCS IN THOMAS COUNTY - VRU	Intersection Improvement	Preliminary Engineering	$ 1,550,000.00
0020042	DeKalb	SR 12 @ HILLVALE ROAD - VRU	Sidewalks	Preliminary Engineering	$ 150,000.00
0020043	DeKalb	LAREDO DRIVE @ 1 LOC & N CLARENDON AVE @ 1 LOC - VRU	Sidewalks	Preliminary Engineering	$ 20,000.00
				Total to date	$ 9,325,771.58