September 2022

Revised & Updated August 2023

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Executive Summary

The Troy *Multimodal Safety Action Plan* (MSAP) has been developed through the joint effort of the City of Troy, the Alabama Transportation Assistance Program at Auburn University, and The Fifty Fund. The Alabama Department of Transportation and the Federal Highway Administration provided support for plan development. The MSAP embodies a commitment by the City to reduce fatalities and serious crashes on its road network. The expected outcome for the City of Troy is improved roadway safety in the community, improved knowledge of roadway safety among community members, and improved ability within the community regarding how to advocate for roadway safety improvements.

The project objectives included leading elected officials, municipal leaders, and other community influencers toward a vision of a safer Troy (a "Vision Zero" approach) and a citywide culture of transportation safety. Development of a process for managing the implementation and continuous feedback for the MSAP includes critical representation across many layers of stakeholder groups in Troy. This process is also intended to serve as a model for other municipalities, especially those outside of metropolitan areas or otherwise with relatively limited resources.

The community engagement plan for the Troy MSAP was built upon the work begun with the Safe Transportation for Every Pedestrian for Underserved Communities (STEP-UC) initiative, intended to develop and demonstrate a model that engages underserved communities and empowers them to advocate for their pedestrian facility needs, resulting in improved infrastructure, and ultimately reduced pedestrian risk. Key engagement activities in development of the MSAP included a focus group with exceptional knowledge of the Troy transportation system and subsequent creation of a smaller working group to shape the plan. In addition to eliciting concerns about transportation safety by mode (walking, cycling, passenger vehicles, freight vehicles, and public transit), the focus group participants identified a common theme around the fact that Troy has no bus transportation for its school system.

Analysis of data obtained from crash reports is also an important input in the development of any safety-related transportation plan. Among the 3416 crashes reported in Troy during the five-year study period (2016-2020), six fatalities occurred (4 in 2019 and 2 in 2020). It was also found that the crash rate (per extent of system usage or travel) in Troy was 23.4% higher than the Alabama statewide rate. 39.0% of crashes in Troy occurred on US 231, which experienced a crash rate 13.4% higher than the citywide average across all streets.

One of the most important items on the crash report involves the attending officer's opinion as to the *primary contributing circumstance (PCC)* that led to the crash. Crashes involving following too closely and misjudging stopping distance comprised the most prevalent family of these factors. The second most common was various forms of failure to yield the right-of-way. Intersections are of particular concern; about 58% occurred at intersections (on average nationally, about 40-50% of crashes occur at intersections). Crashes at intersections, those involving turning movements, and failure-to-yield errors are key focus areas of the MSAP.

Crash trends across time-related factors, such as time of day, day of the week, and month were also examined. These seasonal patterns are of particular interest in Troy because of the impact of Troy University and because US 231 is a primary route from points north to reach the beaches along the Gulf of Mexico in the panhandle of Florida. August, September, and October experienced the largest number of crashes. Possible causal factors include the fact that the university attracts an overrepresentation of

young drivers unfamiliar with the area, specifically at the beginning of school year in August, and that football games in the fall also generate substantial increases in traffic from outside the area.

Safety for human-powered modes of transportation (walking and cycling) was identified early in the community engagement effort in development of the MSAP as areas of concern. Among the 3416 crashes in Troy, 15 (0.45%) involved pedestrians, and 5 (0.15%) involved cyclists. While fortunately these numbers are too small for trend analysis, the importance of safety for these modes as identified in the community engagement activities leads this to be a key focus of the MSAP.

Infrastructure strategies can be informed by trends in the crash data and identification of improvements, or countermeasures, intended to reduce risk of certain types of crashes targeted in the crash analysis. Several low-cost countermeasures exist that can potentially reduce the incidence of crashes associated with speed-related issues, such as following too close and misjudging stopping distances. Effective use of traffic control devices, such as optimal signal timing and phasing, and strategic use of signage and pavement markings in advance of signalized intersections are relevant countermeasures. In addition to relatively low-cost traffic engineering countermeasures, design treatments associated with roadway geometrics may also be effective in reducing crashes associated with intersections and entrances. Finally, consideration of access management strategies on US 231 also merits further study.

A key focus of the community engagement effort was on bicycle and pedestrian facilities. Given the lack of school bus transportation for students in Troy City Schools, a well-developed network of these facilities along routes to school is of major importance, as is improving connectivity to parks and recreational sites. Bringing existing pedestrian infrastructure into ADA accessibility compliance, as well as providing facilities in lower-income neighborhoods or otherwise underserved communities can strengthen the equity of the transportation system. Adding pedestrian signal heads at signalized intersections, particularly those with substantial pedestrian traffic, as well as installation of rectangular rapid flashing beacons at crosswalks away from signalized intersections, can improve safety and comfort for pedestrians. These strategies then lead to a list of projects that are intended to improve safety for all road users. Some of these projects are specific infrastructure improvements, while some others require further study to develop recommendations and a project scope.

In addition to infrastructure improvements, outreach or education approaches intended to modify road user behavior are another important aspect of a safe system approach to improving safety. These strategies include efforts to reach various sectors of the population, such as young drivers as well as older drivers. Many forms of media will be employed in this family of approaches to address decisions made by road users.

A review of city policies and practices will be undertaken to identify opportunities to improve transportation safety and implement associated changes. Initial reviews will focus on developing a more comprehensive understanding of the Troy crash database, determining crash rates for city-owned vehicles, and examining infrastructure management practices. Finally, the development, monitoring, and updating of the Troy MSAP will be the responsibility of the Troy Transportation Safety team.

Background Information

The Troy *Multimodal Safety Action Plan* (MSAP) was partially funded by the Federal Highway Administration (FHWA) through its Technology and Innovation Deployment Program (TIDP). Additional support was provided by the Alabama Department of Transportation (ALDOT), and in-kind services of The Fifty Fund (TFF). The development of the Troy MSAP was led by the Alabama Transportation Assistance Program (ATAP) at Auburn University. ATAP manages Alabama's LTAP (Local Technical Assistance Program). Another partner in this effort is The Fifty Fund, a 501(c)3 non-profit organization whose mission includes making communities safer. The organization has been engaged in a variety of projects across Alabama that address community wellness. The Fifty Fund's grassroots, street-level approach to community engagement has yielded active participation of citizens, community leaders, and local elected officials.

The development process for the Troy MSAP is intended to serve as a model for other municipalities, especially those with limited resources. Within metropolitan areas, federal funds are available to metropolitan planning organizations for multimodal transportation planning. Limited resources are available for these activities outside of metropolitan areas; for the typical small town, no federal or state support stream exists for transportation planning. Therefore, low-cost alternatives are necessary. The project is intended to develop a model for other similar communities (localities outside metropolitan areas).

The Safe Systems Approach to improving multimodal transportation safety was employed in the plan development process. Use of this comprehensive perspective to reducing crash frequency and severity is encouraged by the Federal Highway Administration of the United States Department of Transportation. By viewing crashes as preventable events and travelers as vulnerable, this paradigm addresses contributing factors associated with road user behavior, infrastructure design and maintenance, vehicles, speed, and post-crash care in a holistic manner. This approach to safety action planning also supports communities interested in moving toward zero deaths on our roadways – a *Vision Zero* paradigm – in making substantial reductions in fatalities and serious injuries.

Improving the safety of Troy's transportation network and creating a culture of safety will require a commitment of the key stakeholders and endorsement of the city leadership with a common understanding of the goals. To achieve this, Troy city leadership (City Council) will adopt a *Vision Zero* (VZ) statement. In addition to key stakeholder meetings and targeted community engagement, Troy City Council was briefed on the key concepts of VZ, Troy crash data trends, and transportation countermeasures.

Additionally, a transportation safety group (VZ team) has been established to not only continue the development, monitoring, and updating of the Troy MSAP but continue community engagement and communication efforts throughout the city. The VZ team will facilitate the dialogue citywide. Some initial goals for this team include:

- Ensure city leadership and elected officials are provided continuous information about VZ and progress the MSAP goals
- Communicate with local road users about VZ

- Inform citizens about general crash trends in Troy
- Develop targeted communication with citizens with educational messaging aimed toward following too closely, failure to yield at intersections, and yielding behavior at driveways (over 50% of Troy's crashes)

The transportation safety group has a goal of creating multiple avenues for road users to access information about VZ, the MSAP, ongoing activities related to transportation safety, and progress toward the citywide goals.

Goals and Objectives

The expected outcome for the City of Troy is improved roadway safety in the community, improved knowledge of roadway safety among community members, and improved ability within the community regarding how to advocate for roadway safety improvements.

The project objectives include:

- Leadership from elected officials, community influencers, and municipal leaders toward a vision of a moving Troy safer (Vision Zero, or "VZ") and a citywide culture of transportation safety.
- A process for managing the implementation and continuous feedback for the MSAP that includes critical representation such as: representative of the city to include all possible voices, technical knowledge to review progress and make recommendations, and a direct connection to city leadership to provide oversight and accountability.

Community Engagement

The community engagement plan for the Troy MSAP was built upon the work begun with the Safe Transportation for Every Pedestrian for Underserved Communities (STEP-UC) initiative, also an FHWA TIDP project. The purpose of STEP-UC was to develop and demonstrate a model that engages underserved communities and empowers them to advocate for their pedestrian facility needs, resulting in improved infrastructure, and ultimately reduced pedestrian risk. The STEP-UC project not only established a statewide model for progressive community engagement but created the foundation for a United States Department of Transportation (USDOT) discretionary grant through its RAISE (Rebuilding America's Infrastructure with Sustainability and Equity) program. Continuing to build from the community level up, this project further integrated the municipal leaders with underserved communities in the planning process. This planning group included community leaders, transportation professionals, and local officials.

The engagement plan included identifying a focus group with exceptional knowledge of the Troy transportation system. Sixteen representatives were selected. They represented Troy University, the Troy city school system, major freight movers, economic development, emergency management, the Housing Authority, and elected officials. The composition of the focus group mirrored the community of Troy demographically, to ensure a broad perspective regarding transportation safety was heard.

To collect the focus group data, each participant used a tablet and interfaced with a mapping software. Results were available in real time and for the discussion to follow. The meeting was facilitated by TFF

and ATAP. Each participant pinpointed their top three safety improvement locations by mode (bicycle, pedestrian, public transit, freight, and passenger vehicles). Priorities were shown in real time and choices narrowed. Staff from ALDOT, FHWA, and ATAP served as experts to answer funding questions or engineering dilemmas.

Some advantages to this approach included:

- Groupthink is eliminated. Participants cannot see others' responses when votes are placed or pins dropped.
- Each “pin” drop can be a dot, a polygon, or linear. The data is usable with GPS coordinates associated with each idea.
- Conversation can occur among citizens in real time.
- Inherent bias is rooted out by giving each participant similar tools; it is often a complaint that advocates get a much greater voice in some planning processes.
- Nothing is predetermined; no recommendations were developed before the focus group.
- A comment box is associated with each map object; that provides additional information that is provided digitally by the participant.
- The advantage of the digital tools was a game changer for fielding input. People seemed to enjoy having the technology and helped each other with inputting information.

Prior to parsing out the perceived safety issues by mode, an overall transportation safety issue that pervades all modes was discussed. Troy has no bus transportation for its school system. Before desegregation, schools were largely located in neighborhoods, and walking was the prevalent mode choice for a safe route to school. Once desegregation was enforced, children no longer attended schools near their homes. The Troy public school system did not provide transportation at the time and still does not in 2022. Some of the hardships caused by lack of public-school transportation are: school drop-off and pick-up lines that cause waits exceeding 90 minutes, traffic issues associated with long queues approaching Troy’s three public schools, high absenteeism during inclement weather, and most importantly no complete pedestrian facilities to provide safe routes to their public schools.
As a first priority, Troy would like to leverage all possible avenues to create safer and move complete transportation to its city schools.

The following is the compilation of data by mode collected with the Troy MSAP focus group:

Mode: Cycling

Systematic Improvements

- Connectivity to Troy's public school system
- Troy University connectivity to the downtown area

Areas for Additional Exploration for Safety Improvements based on Geographic Cluster Data

- In the vicinity of Three Notch Street, Fairview Avenue, and Knox Street
- Downtown Area
- Troy University interface (especially around the perimeter)

Other Transportation-related Improvement Discussions

- Multi-use paths that would provide facilities connected to Troy Sportsplex or to Pike County Lake

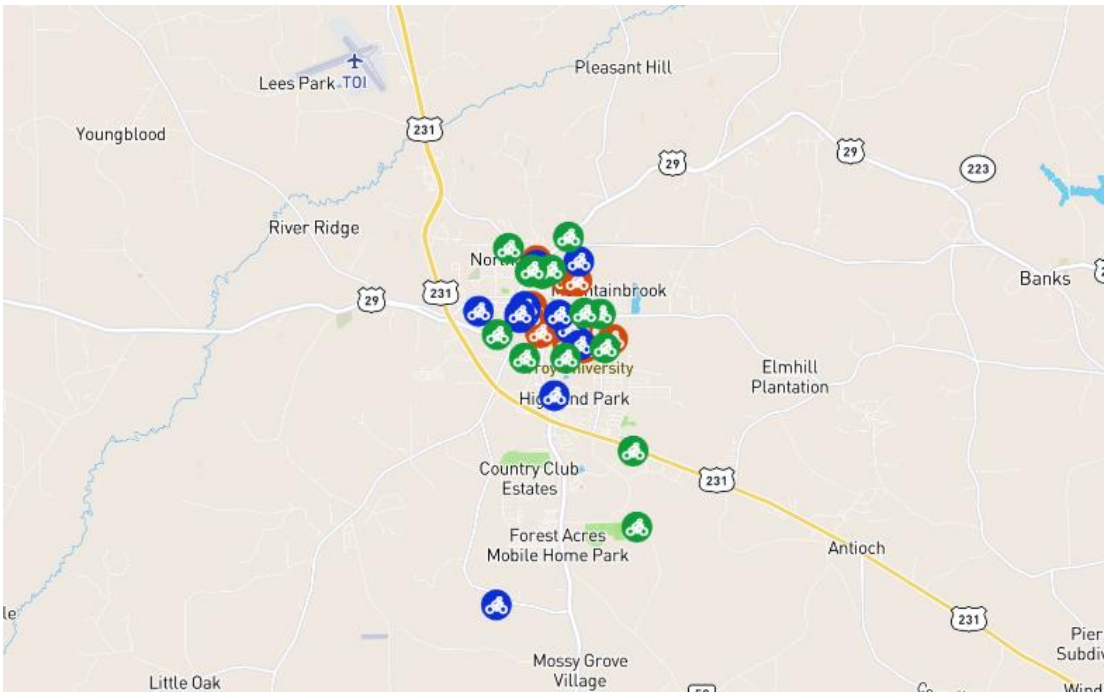

Figure 1. Focus Group Priorities for Bicycle Facility Safety Improvements

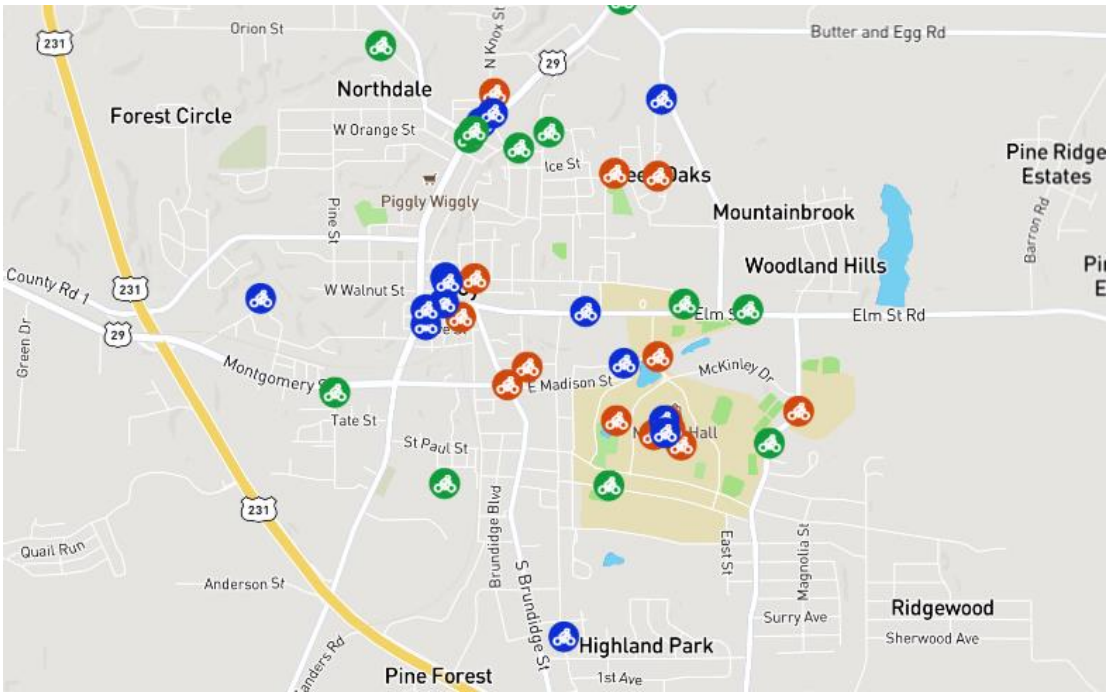

Figure 2. Focus Group Priorities for Bicycle Facility Safety Improvements Close-Up

Mode: Walking

Systematic Improvements

- Connectivity to Troy's public school system
- Troy University connectivity to the downtown area
- Connectivity in neighborhoods anchored by housing authority properties

Areas for Additional Exploration for Safety Improvements based on Geographic Cluster Data

- In the vicinity of Three Notch Street, Fairview Avenue, and Knox Street
- Downtown Area
- Troy University interface (especially around the perimeter)
- In vicinity of the middle and elementary schools on Gibbs Street
- US 231 between Three Notch Street and the Troy Regional Medical Center
- Elba Highway between US 231 and Forest Acres Drive

Other Transportation-related Improvement Discussions

- Multi-use paths that would provide facilities connected to Troy Sportsplex

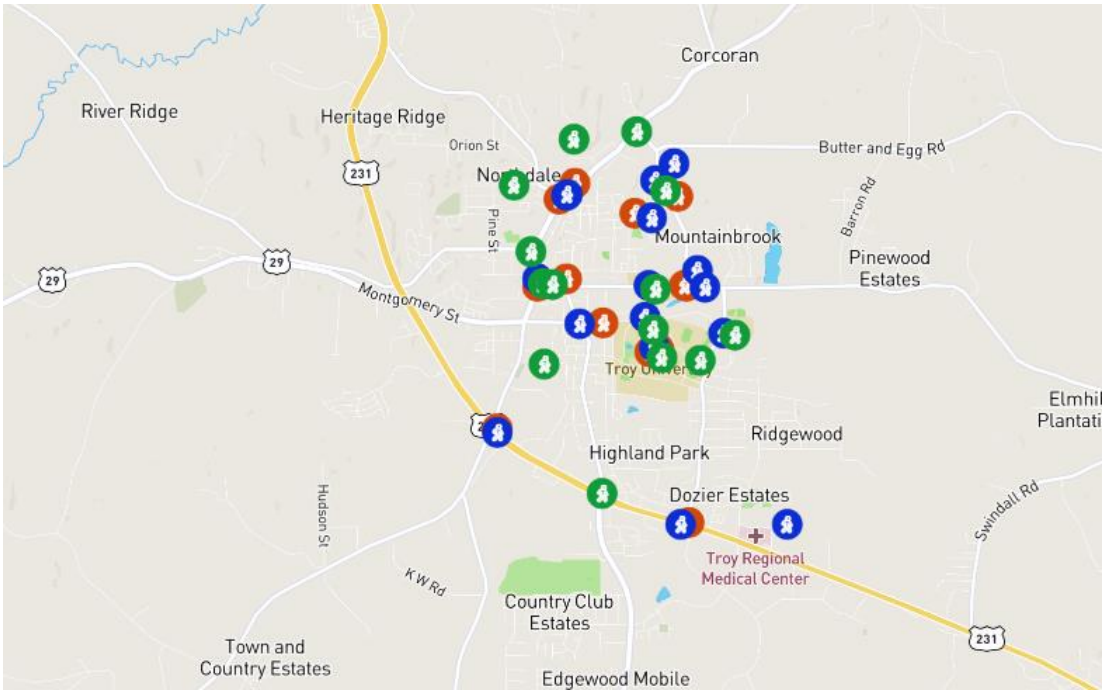

Figure 3. Focus Group Priorities for Pedestrian Facility Safety Improvements

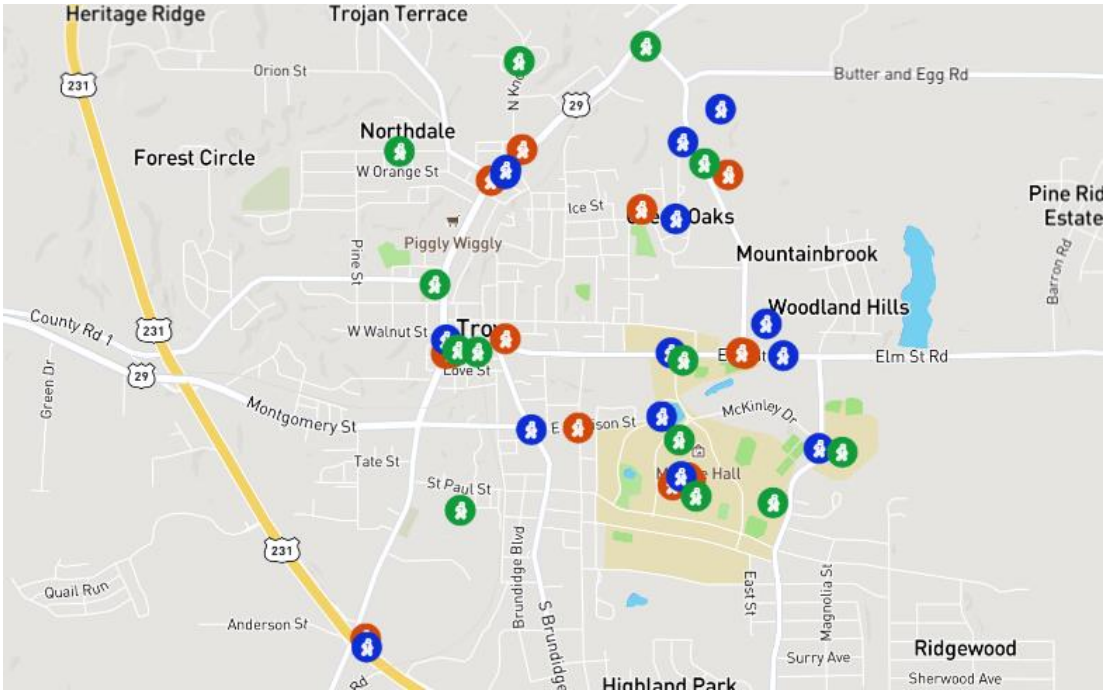

Figure 4. Focus Group Priorities for Pedestrian Facility Safety Improvements Close-Up

Mode: Public Transit

Systematic Improvements

- Connectivity to Troy's public school system through a deviated fixed route
- Connectivity in neighborhoods anchored by housing authority properties

Areas for Additional Exploration for Safety Improvements based on Geographic Cluster Data

- In the vicinity of Three Notch Street, Fairview Avenue, and Knox Street
- Downtown Area
- In vicinity of the middle and elementary schools on Gibbs Street
- US 231 between Elba Highway and the Troy Regional Medical Center
- Elba Highway at Forest Acres Drive

Other Transportation-related Improvement Discussions

- Transit service to other areas (e.g., Montgomery and Dothan)

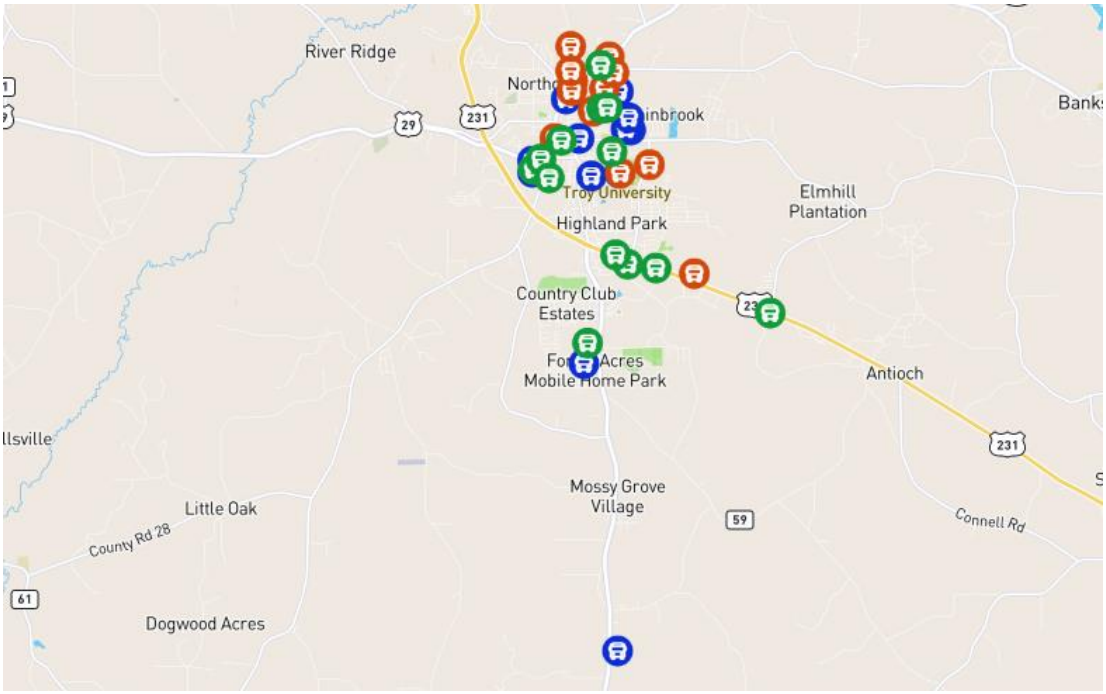

Figure 5. Focus Group Priorities for Public Transit Safety Improvements

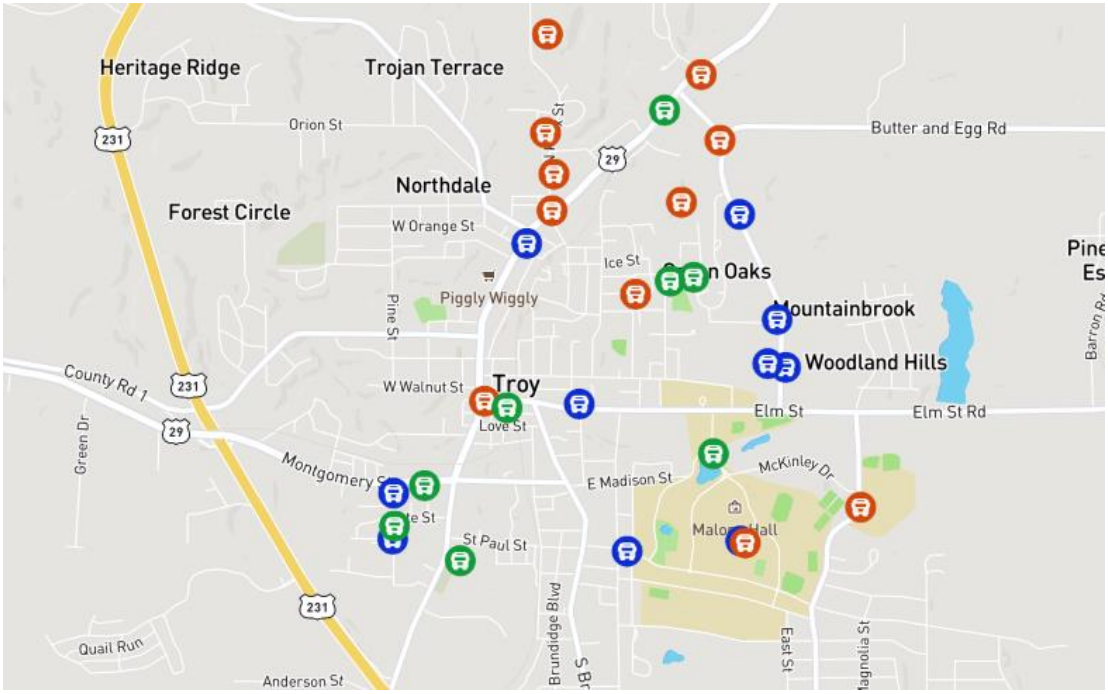

Figure 6. Focus Group Priorities for Public Transit Safety Improvements Close-Up

Mode: Freight Vehicles (Commercial Vehicles)

Systematic Improvements

- None were identified

Areas for Additional Exploration for Safety Improvements based on Geographic Cluster Data

- Intersection safety in downtown area
- Intersection safety on US 231 from Three Notch Street to the Troy Regional Medical Center

Other Transportation-related Improvement Discussions

- Moving US 29 designation out of downtown

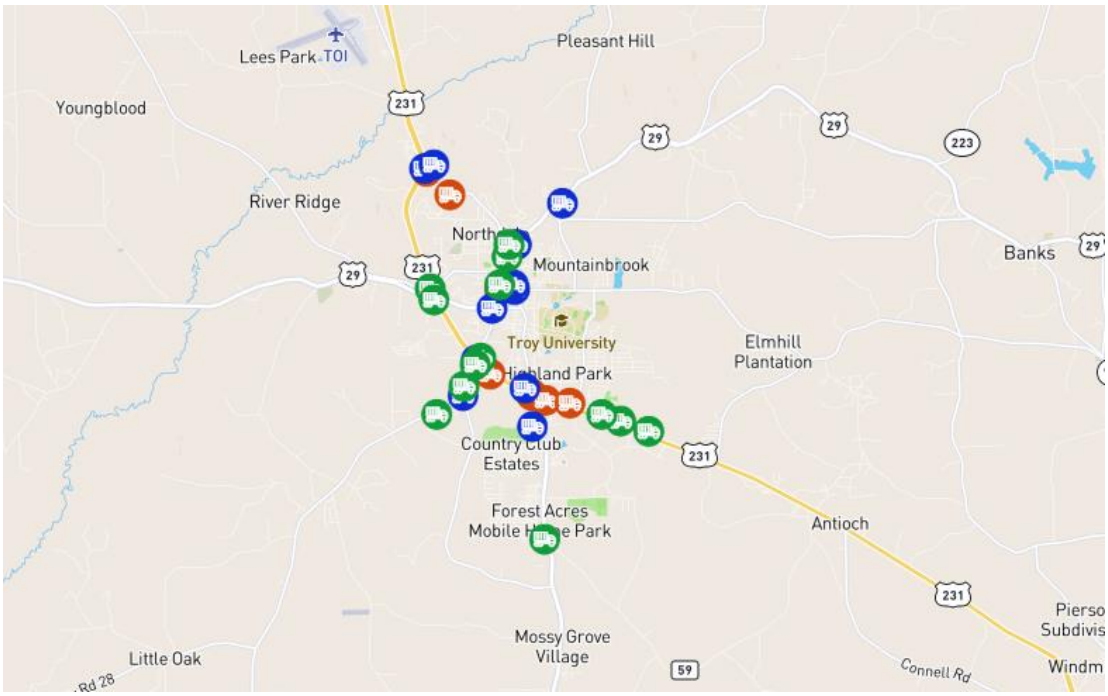

Figure 7. Focus Group Priorities for Commercial Vehicle Safety Improvements

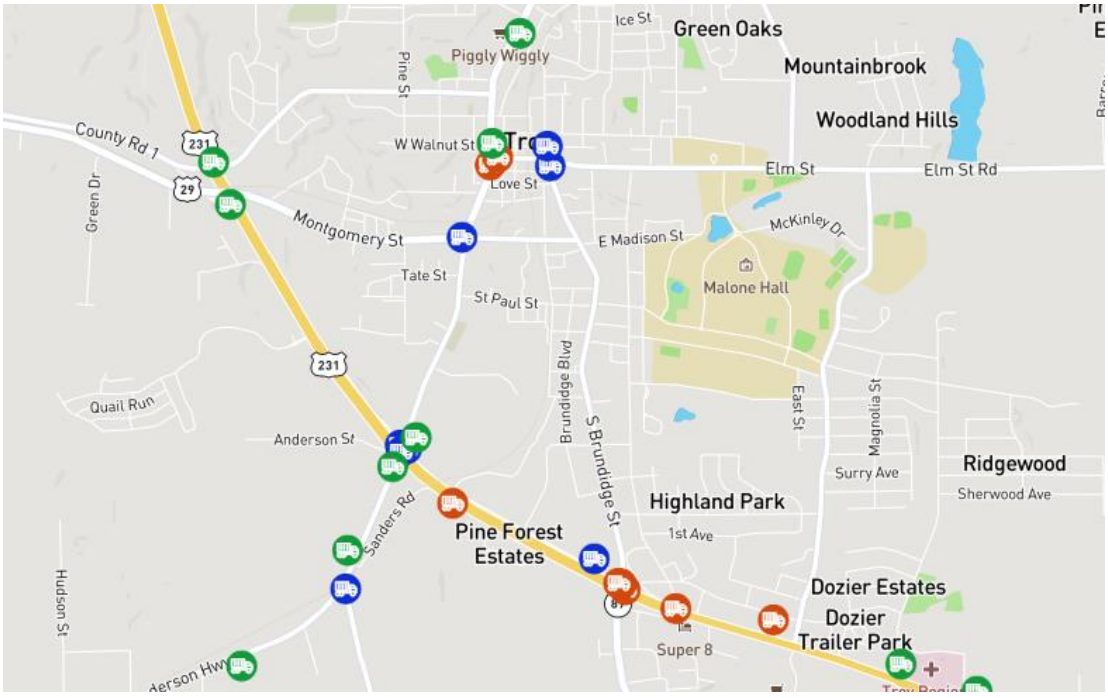

Figure 8. Focus Group Priorities for Commercial Vehicle Safety Improvements Close-Up

Mode: Passenger Vehicles

Systematic Improvements

- Intersection improvements downtown
- US 231 Corridor

Areas for Additional Exploration for Safety Improvements based on Geographic Cluster Data

- Downtown Area
- US 231 from Three Notch Street to the Troy Regional Medical Center

Other Transportation-related Improvement Discussions

- Moving US 29 designation out of downtown
- Pedestrian bridge on US 231 near Trojan Parkway

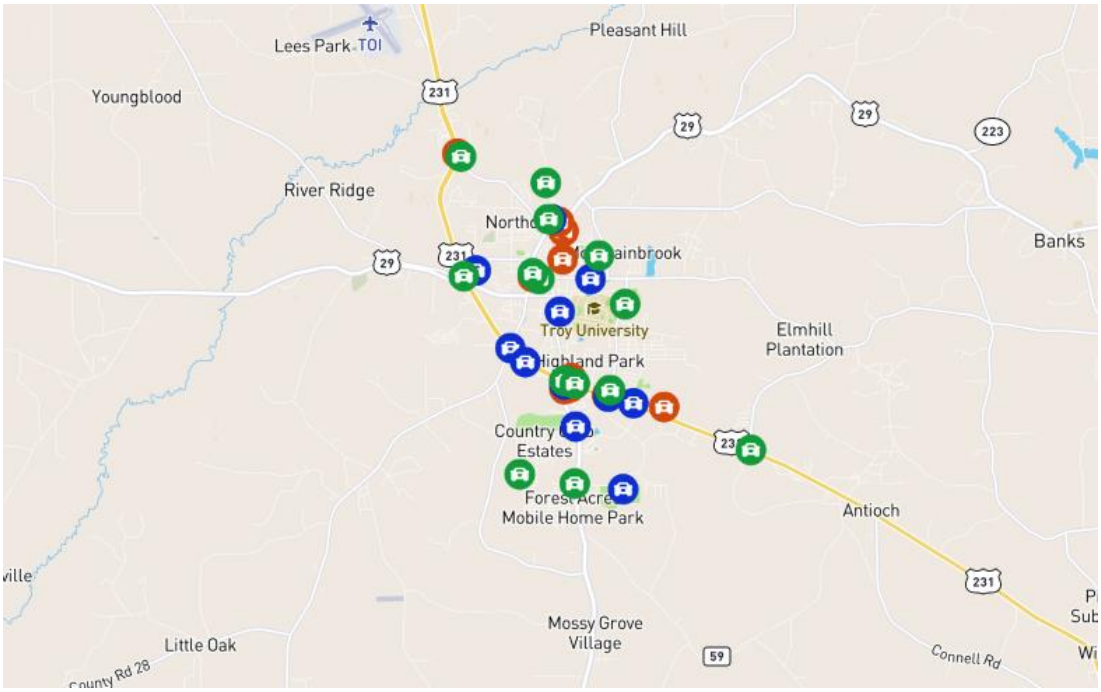

Figure 9. Focus Group Priorities for Passenger Vehicle Safety Improvements

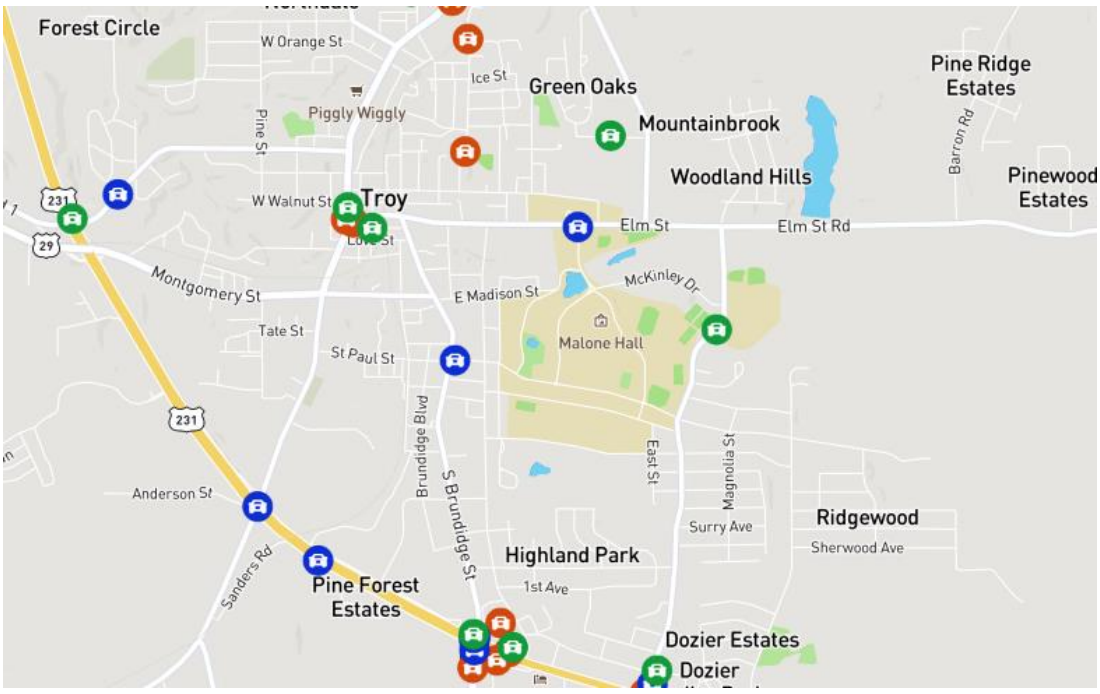

Figure 10. Focus Group Priorities for Passenger Vehicle Safety Improvements Close-Up

Safety Data Analysis

An important tool in development of any safety-related plan is the use of crash data. Crash data contain all of the information captured through crash reports completed by law enforcement officers on the scene. Analysis of these data can illuminate patterns associated with driver behavior and decision-making. This information can assist in the selection of countermeasures that can be applied to the road network to reduce the risk of similar crashes occurring in the future. In addition to infrastructure-based treatments, other approaches intended to impact driver actions can also improve the safety performance of the system. The quality of crash data may be limited by the capabilities of law enforcement officers completing crash reports. Crash data do not provide a complete picture of high-risk situations as near-crash events averted in the last moments before a crash might have occurred are not captured, and many property-damage-only crashes do not get reported.

Crash data were obtained from CARE (Critical Analysis Reporting Environment), which is the database for Alabama crash data. Records of crashes that occurred in the City of Troy during the 5-year period of 2016 through 2020 were extracted for analysis. 3416 crashes were reported in Troy during this period. These data were then used to compare safety performance within Troy to statewide trends and also to analyze US 231 within Troy, since this facility was identified through the community engagement process as needing attention. Common factors related to crashes were also analyzed.

For a high-level examination of safety performance, crash rates were developed using the data obtained through CARE and data on system usage (vehicle-miles of travel), obtained from ALDOT. Crash rates are determined by identifying the number of crashes and extent of vehicle-miles of travel (VMT) that occurred during the time period of interest and then expressing the rate as number of crashes per 100 million VMT, which provides a consistent basis for comparison of rates between areas, across time, or among different highways. During 2016-2020, 3416 crashes were reported in Troy, and the estimated VMT during this period is about 1.265 million. This translates to a crash rate of 270 crashes per 100 million VMT. Across Alabama, during the same period, there were 765,966 reported crashes that occurred over 350.017 million VMT, which corresponds to a statewide crash rate of 219 crashes/100 MVMT. Therefore, the crash rate in Troy is 23.4% higher than the statewide average.

Due to the common concerns about safety on US 231 found through the community engagement effort, and the route's importance locally (as the highest traffic volume facility) and regionally, additional analysis was performed specifically for US 231. Traffic volume data from ALDOT indicate that, in 2020, traffic volumes ranged between 19,000 and 32,000 vehicles per day among several traffic count locations in Troy. During the study period, 1333 crashes occurred on US 231, comprising 39.0% of all crashes in Troy. Regarding crash rate, with a VMT of 438.1 million during the five-year study period, US 231 experienced a crash rate of 304 crashes/100 MVMT, which is 13.0% higher than the city as a whole. This difference may be attributable to a combination of many factors, ranging from US 231 being a relatively high-speed facility, to the mix of local and through traffic that it serves. Because of these factors, further study of this corridor, from crash contributing factors to countermeasure selection, is

warranted. The comparison among crash rates (per 100 million VMT) statewide, citywide, and specifically US 231 within Troy for the entire study period are shown in Figure 11.

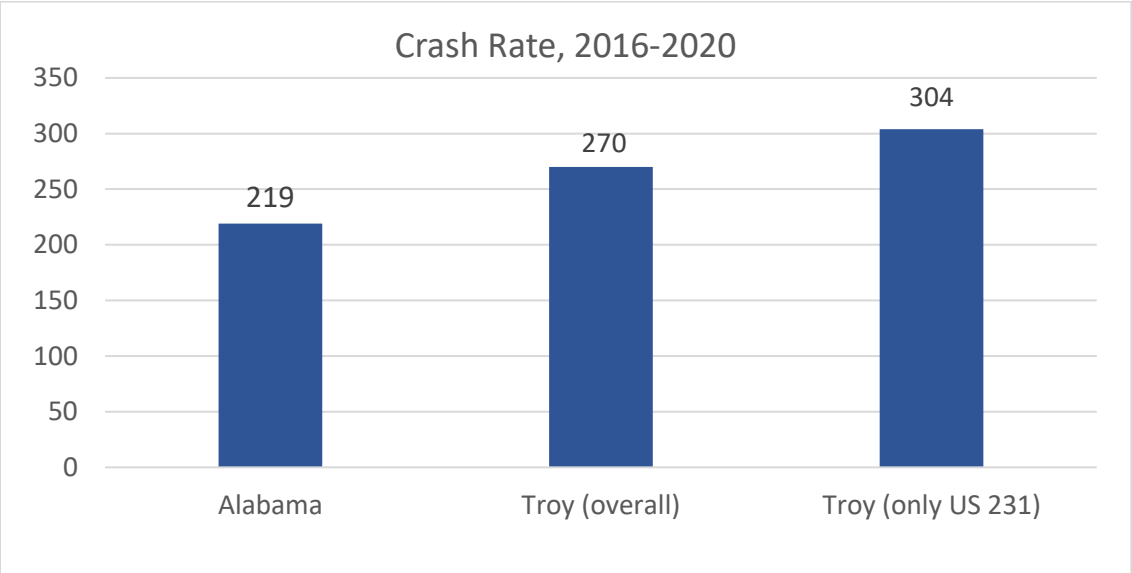

Figure 11. Crash Rates Comparison

Trends Across Time

Analysis of key measures by year during the 2016-2020 period can provide a large-scale overview of safety trends. Among the 3416 crashes reported in Troy during the five-year study period, six fatalities occurred (4 in 2019 and 2 in 2020). This corresponds to a fatality rate (per capita) of 6.3 fatalities per 100,000 people (a standardized approach to quantifying fatality rates). While it is concerning that six fatalities occurred in just the last two years of the study period, the sample size is too small to allow for trend analysis. However, when examining total crashes per year, and total crashes resulting in fatalities or injuries per year, the volume of crashes is sufficiently large for comparisons across time. It can be seen in Figure 12 that the crash rate exhibits a slightly downward trend across time both at the statewide level as well as specifically in Troy. This is a favorable trend that should support future goals to further reduce crash rates. Crash rates, instead of the number of crashes, is used to normalize for variations in traffic volumes across time. This approach is particularly important since traffic volumes (measured in VMT) in 2020 in Troy were about 13% below the 2016-2019 period, reflective of the impact of the COVID-19 pandemic on travel. However, when the share of crashes that results in a fatality, serious injury, or minor injury is isolated, it can be seen in Figure 13 that a trend of crashes in Troy becoming increasingly severe may be emerging.

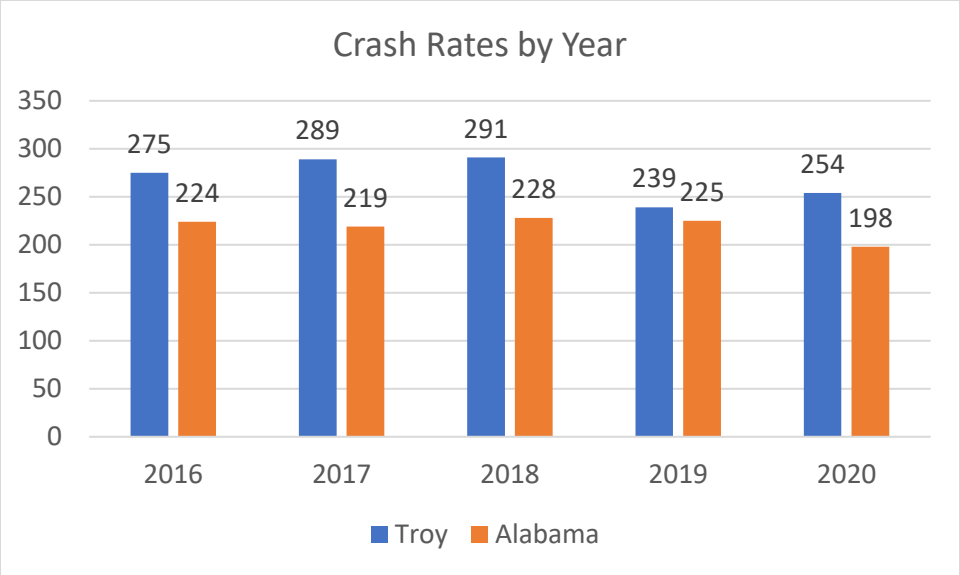

Figure 12. Crash Rates by Year

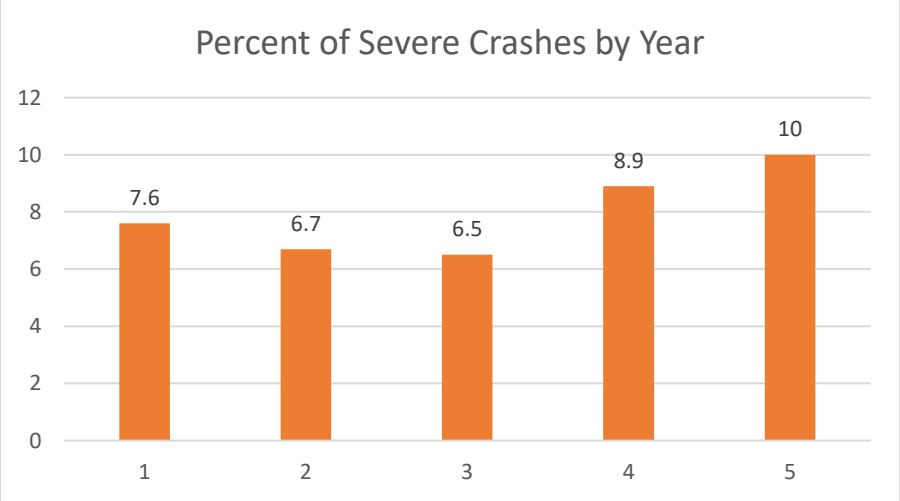

Figure 13. Percent Severe Crashes by Year

Crash Causing Factors

One of the approaches used to further understand crash trends and their causes is to examine specific variables in the crash data. One of the items on the crash report involves the attending officer's opinion as to the *primary contributing circumstance (PCC)* that led to the crash. Analysis of the Troy data shows that most common PCC is "Followed too close", cited in 17.1% of the crashes. Among all crashes, over 50 different categories were selected for this important factor, so combining similar items and examination of the top group of categories reveals a small group behaviors to be responsible for most crashes (as assessed by the attending law enforcement officer). For example, *Following too close and Misjudged Stopping Distance*, which are similar circumstances, account for the PCC in 22.5% of crashes. Several related PCCs associated with failure to yield the right-of-way and running stop signs and traffic signals comprise 19.0% of crashes. More details of the top groups of factors (comprising 3% or more of crashes) are shown in Figure 14.

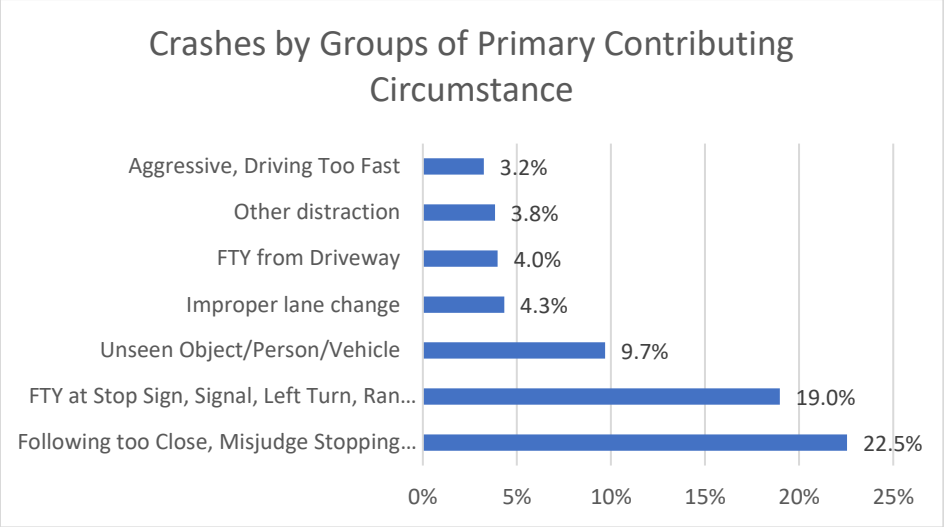

Figure 14. Distribution of Crashes by Primary Contributing Circumstance

Examination of crashes occurring at intersections is another potential focus area. Among the 3416 crashes in the data set, 1962, or about 58% occurred at intersections. On average nationally, about 40-50% of crashes occur at intersections. Ensuring that road users recognize the presence of an intersection ahead and the potential for stopped traffic is important in reducing intersection crashes. When at the intersection, clarity for road users on assignment of right-of-way priority, traffic control, and appropriate paths of movement can also help reduce conflicts. Among primary contributing circumstances a family of related scenarios that include failure to yield right-of-way, ran stop sign, and ran traffic signal combined for 31% of crashes at intersections, while following too close and misjudged stopping distance together represent 22%. Figure 15 illustrates these groups of PCC (comprising more than 4%) among all intersection crashes citywide.

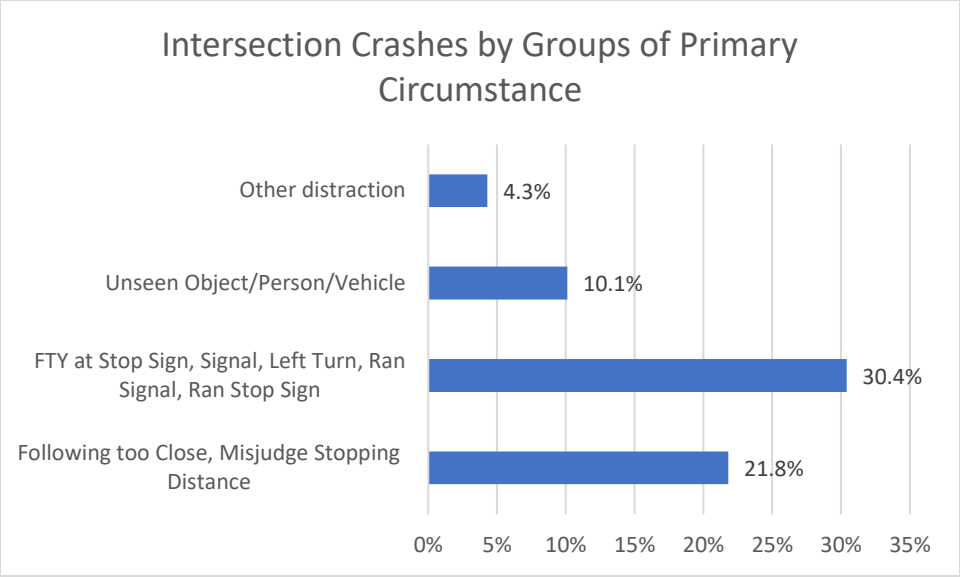

Figure 15. Distribution of Intersection Crashes by Primary Contributing Circumstance

Another useful approach is to examine the distribution of crash trends across time-related factors, such as time of day, day of the week, and month. These seasonal patterns are of particular interest in Troy because of the presence of Troy University and because US 231 is a primary route from points north to reach the beaches along the Gulf of Mexico in the panhandle of Florida. Troy University attracts an overrepresentation of young drivers unfamiliar with the area, specifically at the beginning of school year in August. Football games in the fall also generate substantial traffic from outside the area. Finally, the role of US 231 as an important access route for beach traffic generates a substantial amount of pass-through traffic unfamiliar with the area. Figure 16 displays the distribution of crashes by month. It is noteworthy that the three highest months are August, September, and October. This is not a typical trend nationally; however, in Troy, the influx of young drivers in August who remain in the area (when the academic year begins for Troy University) and the influx of weekend visitors for football games in the fall are likely key factors in shaping the trend that results in the fall months experiencing the largest share of crashes.

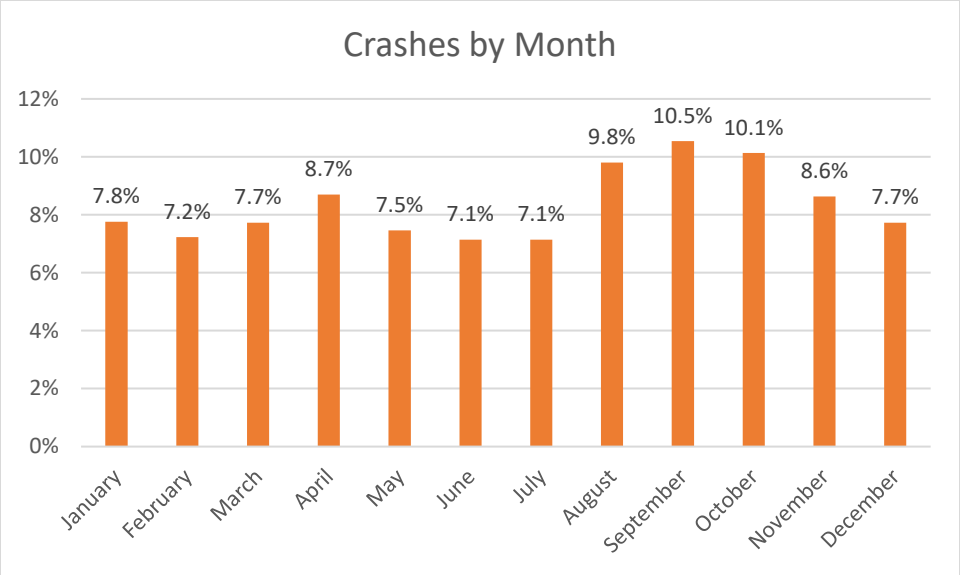

Figure 16. Distribution of Crashes by Month

The trend in crash distribution by day of the week is shown in Figure 17. Friday experiences a substantially higher proportion of crashes than do any other days of the week. Specifically, the number of crashes on Fridays is 28.2% higher than the next highest day (Monday and Tuesday) Conversely, Sunday is by far the most underrepresented in crashes. These trends generally mirror trends in traffic volume (representing exposure, or the opportunity for crashes to occur).

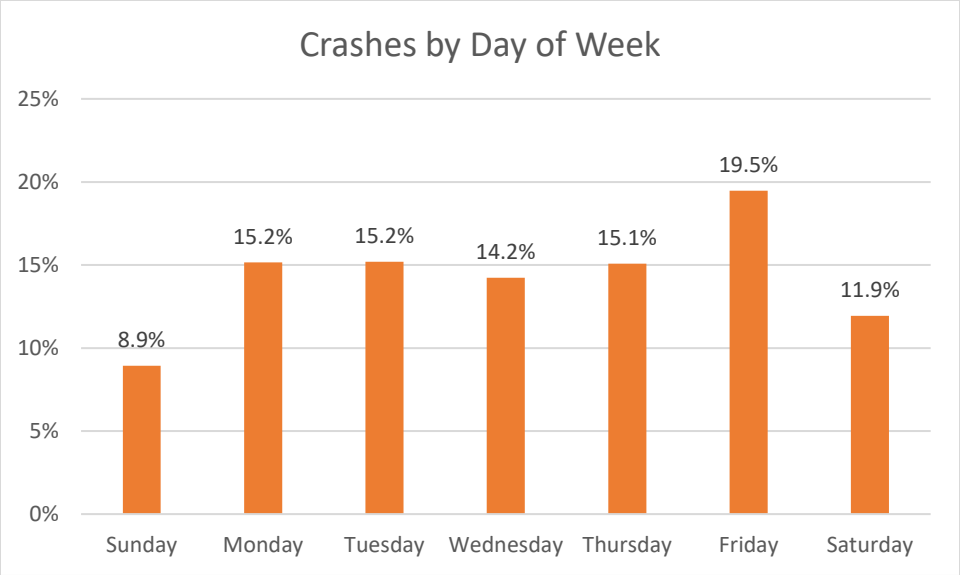

Figure 17. Distribution of Crashes by Day of Week

The trend in crash distribution by time of day is shown in Figure 18. The general trend mirrors typical travel patterns by time of day, in which morning and evening peak periods experience the highest volumes and therefore opportunity for crashes to occur. The period from mid-afternoon to early evening may carry a greater share of crashes than expected based on typical traffic volume patterns.

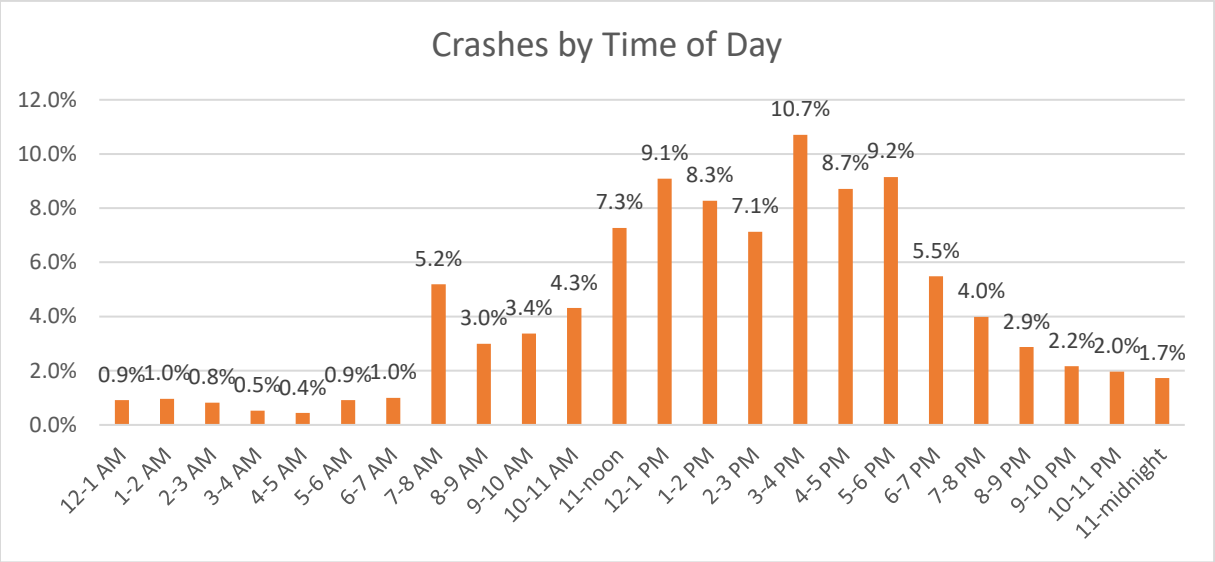

Figure 18. Distribution of Crashes by Time of Day

Crashes Involving Vulnerable Road Users

Safety for human-powered modes of transportation (walking and cycling) was identified early in the community engagement effort in development of this plan as an area of concern. Two key themes included provision of facilities, particularly in historically underserved communities where reliance on walking as the primary mode of transportation is relatively high, and ensuring that schoolchildren are well-provided for in the multimodal transportation network, as school bus transportation for K-12 students is not provided in Troy.

Among the 3416 crashes in Troy, 15 (0.45%) involved pedestrians, and 5 (0.15%) involved cyclists. The locations of these crashes are shown in Figure 19. These numbers are fairly small and therefore not adequate for making generalizations or addressing site-specific concerns due to the small sample size. However, according to statewide statistics, cyclists are injured or killed in 76% of such crashes; for pedestrians, this figure is about 92%. Given the high likelihood that a pedestrian or cyclist struck will be injured or killed, identifying opportunities for improvements in corridors of interest (such as approaches to schools or where existing facilities are incomplete) is still necessary. As identified earlier in this plan, there is strong community interest in improving pedestrian and bicycle facilities along corridors leading to Troy City Schools. Concerns for pedestrians have also been raised in the downtown area and along US 231.

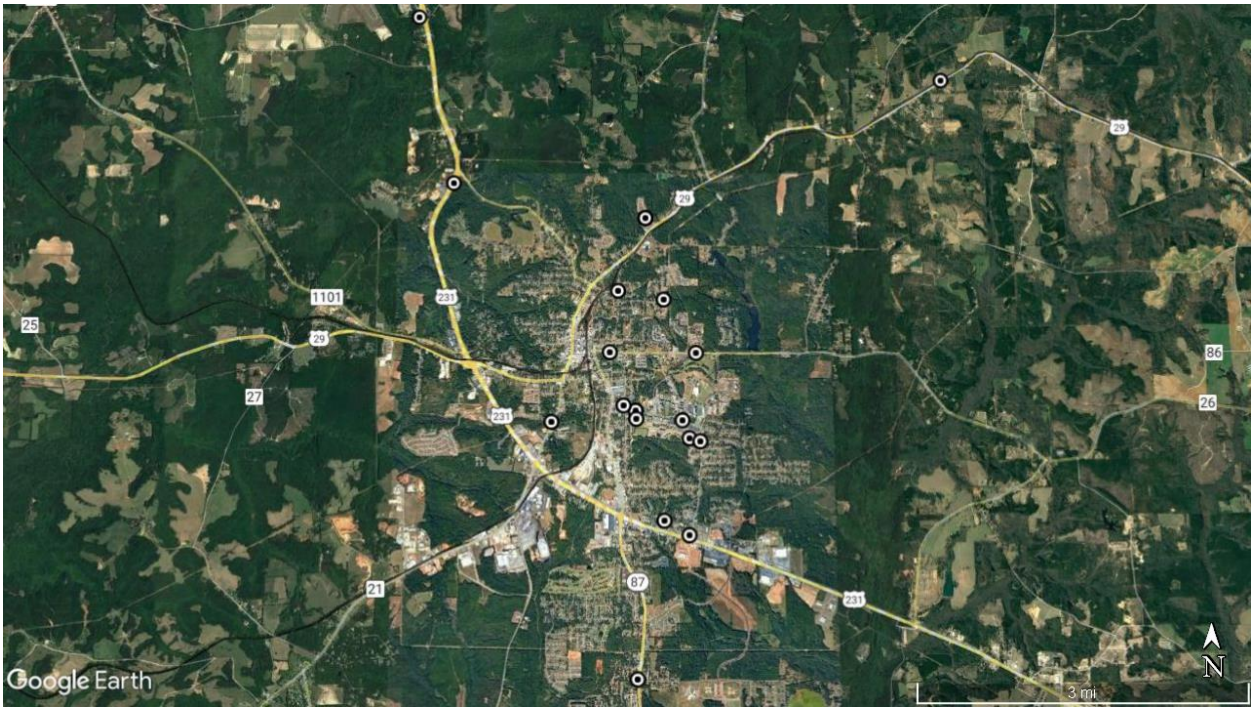

Figure 19. Location of Pedestrian and Bicycle Crashes

Safety Improvement Strategies

Selection of approaches to improve transportation safety within Troy can be informed through many sources. Community engagement to gather road safety concerns and their priorities for improvement ensures that the residents and community leaders in Troy have provided input to the safety action plan. Assessment of the safety performance of the road network in Troy through crash data analysis provides another key source of information in identifying strategies to reduce crashes and fatalities on Troy's roads. Support of the City government, including department leaders, City Council, and the Mayor in plan development and a vision to move Troy toward substantial a reduction in fatalities and serious injuries also informs safety strategies. These strategies can be grouped into two broad categories: improvements to the transportation infrastructure, and approaches to influence the behavior, or decision-making, of road users.

Infrastructure Improvements

Selection of infrastructure strategies can be informed by trends in the crash data and identification of improvements, or countermeasures, intended to reduce risk of certain types of crashes targeted in the crash analysis. A systematic approach to addressing issues raised in the community engagement activities as well as the broader pattern of crashes and locations where crashes are likely to occur can guide both the selection of countermeasures as well as specific projects or locations. The focus areas identified previously include intersection-related crashes, crashes in which issues such as following too close and misjudging stopping distance are prevalent, and systematic improvements to streets that may carry substantial amounts of cyclists and pedestrians, particularly along routes to school and in historically underserved communities.

Countermeasures for Intersections and Entrance Related Crashes

Several low-cost countermeasures exist that can potentially reduce the incidence of crashes associated with speed-related issues, such as following too close and misjudging stopping distances. Ensuring that speed limits are set appropriately, considering traffic characteristics, roadway geometric features, and context or setting of targeted facilities, particularly those with relatively high volumes and speeds. Candidate locations include the entirety of US 231 through Troy and other major routes approaching the city, including Three Notch St from Gibbs St north, AL 87 (Elba Hwy), and Henderson Hwy.

Ensuring that signal timings are optimized and yellow clearance intervals set according to current recommended practice has the potential to reduce crashes at intersections, such as those involving running red intervals at traffic signals, as well as crashes associated with close following and stopping distance in queues that form upstream of signalized intersections. Candidate locations include all signalized intersections along US 231. From south to north, these six intersections are Limestone Spring Rd, John H Witherington Dr / Franklin Dr, Trojan Pkwy / George Wallace Dr, Elba Hwy / Brundidge St, Henderson Hwy / 3 Notch St, and Murphree St.

Certain signage and pavement markings can also be employed to reduce crashes at signalized intersections. Some of these already exist on US 231 but are in need of maintenance. For example, traffic entering Troy from the south on US 231 traverses a series of transverse rumble strips (intended to supplement signage warning drivers of a signalized intersection ahead); these rumble strips are in need of maintenance. This treatment could be used for traffic entering Troy from the north as well. Near the

location of the rumble strips on the south end of the corridor, overhead signage ("signal ahead") already exists. Evaluation of the condition of these signs as well as the optimal signage for this purpose should be considered. For example, "congested area ahead" signage at the beginning of a corridor of signalized intersections, or "be prepared to stop" signs used in conjunction with flashing beacons that are activated when the downstream signal turns yellow, are countermeasures worthy of consideration.

In addition to the relatively low-cost traffic engineering countermeasures discussed above, several design treatments associated with roadway geometrics may also be effective in reducing crashes associated with intersections and entrances. For example, a thorough consideration of access management treatments, such as right-in/right-out entrance design, consolidation of entrances, and the use of raised medians to control left turn movements, can all help reduce certain types of intersection crashes as well as those associated with the PCC of "improper left turn / U-turn". A systematic approach to deploying these and other access management treatments should be considered after a thorough traffic engineering study of the US 231 corridor.

Countermeasures for Pedestrian and Bicyclist Safety

A key focus of the community engagement effort was on bicycle and pedestrian facilities. Given the lack of school bus transportation for students in Troy City Schools, a well-developed network of these facilities along routes to school is of major importance. Improving connectivity to parks and recreational sites was also identified in the engagement process. Addressing pedestrian infrastructure that is not ADA accessibility compliant, as well as providing facilities in lower-income neighborhoods in which automobile ownership is low and reliance walking is high relative to other parts of the city, can strengthen the equity of the transportation system. Examining signalized intersections, particularly those with substantial pedestrian traffic, for accommodations such as pedestrian signal heads and rectangular rapid flashing beacons, can improve safety and comfort for pedestrians.

The focus on improving safety for pedestrians and cyclists is to add facilities along corridors of importance (key routes to schools, historically underserved communities, and other locations identified in the focus group) and improve pedestrian facilities at signalized intersections with substantial pedestrian traffic. These activities include adding facilities where none exist, bringing existing sidewalks into ADA accessibility compliance, and addressing gaps in existing facilities. For example, simply adding sidewalks is expected to reduce the risk of vehicle-pedestrian collisions by 65-89%, according to the Federal Highway Administration. Additionally, many sidewalks constructed prior to passage of the ADA contain obstacles for rolling pedestrians, such as adverse cross-slopes and utility poles in the middle of the sidewalk.

Reliance on walking and cycling as the primary means of transportation is relatively high in lower-income and otherwise historically underserved communities. Therefore, improving facilities for vulnerable road users in these areas is important from both a safety and an equity perspective. This issue was also identified in stakeholder focus group. Neighborhoods of concern include those centered on public housing authority properties and other neighborhoods where automobile ownership is relatively low and trip attractors such as stores and schools are nearby. Specific neighborhoods and corridors identified include the public housing along Knox Street, Hubbard Street/Aster Avenue, and Segars Street. The neighborhood along Elba Hwy (SR 87) including Forest Acres Mobile Home Park and resulting pedestrian traffic along and crossing Elba Hwy is also of concern.

There are many destinations such as shops, churches, and government buildings that generate substantial pedestrian traffic along Three Notch Street in and near downtown Troy. There are several signalized intersections – many with marked crosswalks – that do not include pedestrian signal heads. Addition of pedestrian signal heads can give clear direction to pedestrians regarding when to enter, and cross, the intersection. Away from intersections, safety at marked crosswalks can be improved through the use of rectangular rapid flashing beacons (RRFBs). Installation of RRFBs can reduce pedestrian-involved crashes by an average of 47%. At these locations, particularly those along key school access routes, are candidates for RRFB installation.

Recommended Infrastructure Improvement Projects

From the findings of the community engagement activities and the crash data analysis, safety improvement strategies were presented in groupings by types of countermeasures. These strategies then lead to a list of projects that are intended to improve safety for all road users. Some of these projects are specific infrastructure improvements while some others require further study to develop recommendations and a project scope. The following list presents estimated time ranges for implementing these projects. The findings of the crash data analysis and the community engagement suggest prioritizing improvements to US 231 and to pedestrian facilities in historically underserved neighborhoods as short-term (0-5 years), improved pedestrian facilities on key routes to schools and adding pedestrian signal heads in high-pedestrian-volume locations in the medium term (5-10 years), and strengthening accommodations for cyclists in the long-term (10-20 years).

- Short-term (0-5 years): A traffic engineering study of US 231 through Troy. This project falls under the purview of the Alabama Department of Transportation. Given the overrepresentation of US 231 in the story of crashes in Troy, an examination of various traffic control devices to warn drivers of the change in character and presence of signalized intersections is appropriate. This may include, but is not limited to, advance warning signage for traffic signals and the congested corridor as a whole as well as supplemental pavement markings such as transverse rumble strips. Examination of traffic signal timings and phasing plans at the six signalized intersections along US 231, as well as addition of backplates, to ensure optimal safety and flow should also be included in such a study.

- Short term (0-5 years): An access management study of US 231 through Troy. This project falls under the purview of the Alabama Department of Transportation. Given the extent of crashes associated with turning movements and failure to yield at intersections and driveways, an examination of opportunities to reduce conflict points, restrict turning movements, consolidate entrances, and consider other access management strategies is appropriate. The Alabama Department of Transportation is currently designing a project to implement access management techniques to improve traffic flow and address safety concerns by modifying access and reducing conflict points along US-231 from the intersection of Hwy 87/167 to southeast to approximately Industrial Blvd. The proposed project will add concrete islands in the median to restrict unsafe turning movements and add U-turn lanes to provide access to the opposite side of the roadway. Construction on the project is expected to begin in 2024. This project should address the crashes related to causes associated with following too closely and failure-to-yield actions along this section of this corridor.

- Medium-term (5-10 years): Pedestrian facilities along major routes to school and recreation facilities, including sidewalks and RRFBs at key crosswalks can improve safety and address equity. Specific project ideas include:
  - Creating a continuous sidewalk corridor across the north side of Troy, from Three Notch Street to Gibbs Street. A possible route would include relevant portions of South Knox St, Walters St, L.C. Millian Ave, Carver St, Hubbard St, Aster Ave, and Henderson Ave.
  - Adding RRFBs at key street crossings near Troy City Schools, specifically on Gibbs St at Aster Ave (near Troy Elementary School), on Gibbs St near Charles Henderson Middle School, and on Wallace Dr near Charles Henderson High School, and at the intersection of Elm St at Gibbs St.

- Short-term (0-5 years): Pedestrian facilities in underserved communities can improve safety and address equity in neighborhoods in which reliance on walking as the primary mode of transportation is relatively high.
  - Improve pedestrian facilities along the North Knox St corridor as identified in the Recommendations Report from the STEP for Underserved Communities effort. This generally includes sidewalk along North Knox St from Three Notch St to Autumn Ridge Apartments, along with other supporting infrastructure and traffic control devices.
  - Improve pedestrian facilities along the Hubbard St and Aster Ave corridor as identified in the Recommendations Report from the STEP-UC effort. This generally includes sidewalk along Hubbard St from Washington Park to Aster Ave and along Aster Ave from Hubbard St to Gibbs St, along with other supporting infrastructure and traffic control devices.
  - Improve pedestrian facilities in the Segars St community. This neighborhood was not included in the STEP-UC effort, but recommended improvements should be similar to those in the Knox and Hubbard communities.
  - Improve pedestrian facilities along the Elba Hwy (SR 87) corridor south of US 231. This neighborhood was not included in the STEP-UC effort, but with the traffic speeds and volumes along the SR 87 corridor, sidewalks and crossing treatments are recommended.

- Medium-term (5-10 years): Addition of pedestrian signal heads in the downtown area and at other signalized intersections along corridors connecting downtown to Troy University and along routes to schools.
  - Given the substantial pedestrian volume and presence of trip generators along Three Notch St through the downtown area, the addition of pedestrian signal heads is recommended along this corridor at intersections with Montgomery St, Love St, Church St, Elm St, Walnut St, Academy St, College St, and Fairview St. Other signalized intersections along routes to schools in need of this treatment include Elm St at Veterans Memorial Dr, Elm St at Wallace Dr, Brundidge St at Madison St, Brundidge St at University Park, and Brundidge St at University Ave.

- Long-term (10-20 years): Bicycle facilities along routes to school and recreation facilities can improve safety and address equity. Further study is needed to identify high priority corridors. Among areas of interest expressed in the focus group are key routes to city schools, Three Notch Street, and routes to the Troy Sportsplex and Pike County Lake.

Behavioral Approaches

A key aspect of a holistic approach toward reducing fatalities and serious injuries in Troy is to facilitate behavioral changes in road users that will yield reductions in Troy's crash rates. Communicating about VZ and the current conditions on Troy's roadways is the first step. In addition, the city will develop initiatives that aim toward influencing driver behaviors such as reducing following too closely, failure to yield at intersections, and yielding behavior at driveways. Examples of options for influencing driver behavior that are being considered are traditional approaches such as public service announcements and roadway advertising (billboards) as well as more creative approaches such as working with Troy's high school students to design messaging to use in driver education classes and social media. Additionally, in areas that been identified in under-engaged in previous safety efforts (for example, those included in the STEP-UC initiative and the RAISE grant), streetbeating will continue as that engagement continues. To influence driver behavior, many different tools will be utilized as Troy citizens receive news and information in many ways. The transportation safety group (VZ group) will coordinate the behavioral strategies, monitor changes to crash data, and communicate progress.

Policy and Process Changes

Troy will begin a review of city policies and practices to identify opportunities to improve transportation safety and implement changes that prioritize safety transportation as a city-wide effort. The initial reviews focus on developing a more comprehensive understanding of the Troy crash database. Since data input is a law enforcement responsibility, Troy leadership (Chief of Police) will begin a review of the common errors and field entry mistakes that lead to unusable data. The result of the review will be to determine if training needs exist, if procedural changes are needed, and suggestions for improvement to the Alabama Uniform Traffic Crash Report. (This form is state-wide and standardized. Local feedback should be useful.)

Note: Troy's data entry error rate and unusable data was very low. Overall, officers are doing a very good job with the reports, entering over 200 fields for each crash.

The second review will determine crash rates for city-owned vehicles by use and examine crashes involving city-owned vehicles. The result of the review will be to determine if any commonality exists among crashes, compare and contrast the practices of city departmental units that have the highest crash rates and lowest to look for improvement areas, determine if training needs exist.

A third review will compare city policy and practices in general around transportation safety. The result of the review will be to determine if improvements in transportation safety could be made through policy change. For example, a city might have a practice that crosswalks could be placed where a ramp is not provided, in the interest of pedestrian safety. However, this creates a compliance issue with ADA accessibility guidelines (by creating a vertical barrier) and could jeopardize the safety of someone traversing the intersection in a wheelchair.

A fourth review will examine City policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize safety and requirements for infrastructure provisions for vulnerable road users. Opportunities identified for improving such facilities will be recommended for adoption and/or implementation.

Troy leadership (defined in the Progress and Transparency section) will document the adoption of revised or new policies, guidelines, and/or standards, as appropriate and update the plan.

Progress and Transparency

The development, monitoring, and updating of the Troy MSAP will be the responsibility of the Troy Transportation Safety team. This team will measure progress, update the plan as needed, ensure ongoing transparency with residents and other relevant stakeholders, continue to collect data by the ongoing community engagement and examining crash data, and creating an accessible interface for the public to see the publishing the plan and updates including accomplishments. Currently, the team is comprised of Donta Frazier and Sharon McSwain-Holland (both original members of the transportation safety team that began this effort in 2020), Melissa Sanders, and Michael Stephens.

In summary, the Troy MSAP aims to improve transportation safety throughout the city through the multiple families of strategies, using the Safe Systems Approach. Through the engagement, analyses, and strategies identified in this plan, the plan has the following key objectives of:

1) communicate the current safety conditions on Troy's roadways with all citizens
2) engage all modes of road users in the VZ discussion
3) reduce by 2% each year over the next 10 years (a 20% reduction in total) the incidents of fatal and severe crashes with the following primary contributing circumstances:
    - following too closely
    - failure to yield at intersections
    - yielding errors at driveways
4) support the safety efforts of other community organizations and agencies

To monitor progress toward these outcomes, the City's Transportation Safety team will annually obtain, review, and analyze crash records for the City. Key performance measures that will be reviewed and progress tracked over the next 10 years include:

- the number of crashes
- the number of severe crashes (severity levels of K, A, and B)
- the number of fatalities
- the number of pedestrian-involved crashes
- the number of bicycle-involved crashes

City leadership is committed to the Vision Zero concept, with an eventual goal of elimination of crashes resulting in fatalities and serious injuries, with a 20% reduction in the next 10 years, as noted above.