
Kennesaw Mountain National Battlefield Park Traffic and Safety Assessment

Existing Conditions Summary

FINAL VERSION

September 2022



U.S. Department
of Transportation

**Federal Highway
Administration**





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1 GENERAL PROJECT INFORMATION

1.1 Project Overview

Kennesaw Mountain National Battlefield Park (KEMO), shown in **Figure 1**, is a 2,923-acre National Park Service (NPS) Battlefield Park that preserves the site of the American Civil War's Battle of Kennesaw Mountain, which took place on June 27, 1864. The Battlefield Park was initially established in 1917 under President Woodrow Wilson through the War Department and in 1935 transferred to NPS under President Franklin D. Roosevelt. KEMO also serves as a memorial with monuments placed for fallen soldiers of the battle.



Figure 1: Cannon Display at Kennesaw Mountain National Battlefield

KEMO is located in Cobb County, Georgia, within the Atlanta metropolitan area. As of 2021, the population of the county grew to 766,802, an increase of about 11% from the county population in 2010. Several major roads within Cobb County, including Old 41 Hwy and Dallas Hwy (also known as Georgia State Route 120), cross KEMO and serve a significant amount of local commuter traffic in addition to battlefield visitor traffic. Designs to improve Old 41 Hwy within KEMO are currently in place, which include realigning the road to the north of its existing alignment, widening the road from two to four lanes, and installing roundabouts at the intersections of Old 41 Hwy at Stilesboro Rd and Old 41 Hwy at Kennesaw Ave in place of the existing traffic signals at those two locations.

The NPS Southeast Region (SERO), KEMO, and Federal Highway Administration – Eastern Federal Lands Highway Division (EFLHD) are conducting a Traffic and Safety Assessment to analyze existing and future transportation conditions for roads along and within the KEMO boundary. The study began with a project kick-off meeting on June 22, 2022. The project team will conduct a public engagement meeting on September 21, 2022 and a partner stakeholder meeting on September 23, 2022 to review collected data from the project study area. The project team will also observe traffic conditions and conduct a field review of the project study area on September 22 and 24, 2022.

2 GENERAL STUDY AREA EXISTING CONDITIONS

2.1 Project Study Area

The KEMO Traffic and Safety Assessment analyzes existing and future transportation operations and transportation safety conditions at the following study trail crossing sites, listed below and shown in **Figure 2** and **Figure 3**.

1. Stilesboro Rd and Old Mountain Rd
2. Dallas Hwy trail crossing west of Kennesaw Memorial Park Cemetery
3. Burnt Hickory Rd near parking area
4. Burnt Hickory Rd near the 'S' Curve
5. Cheatham Hill Rd horse trailer parking area and equestrian crossing

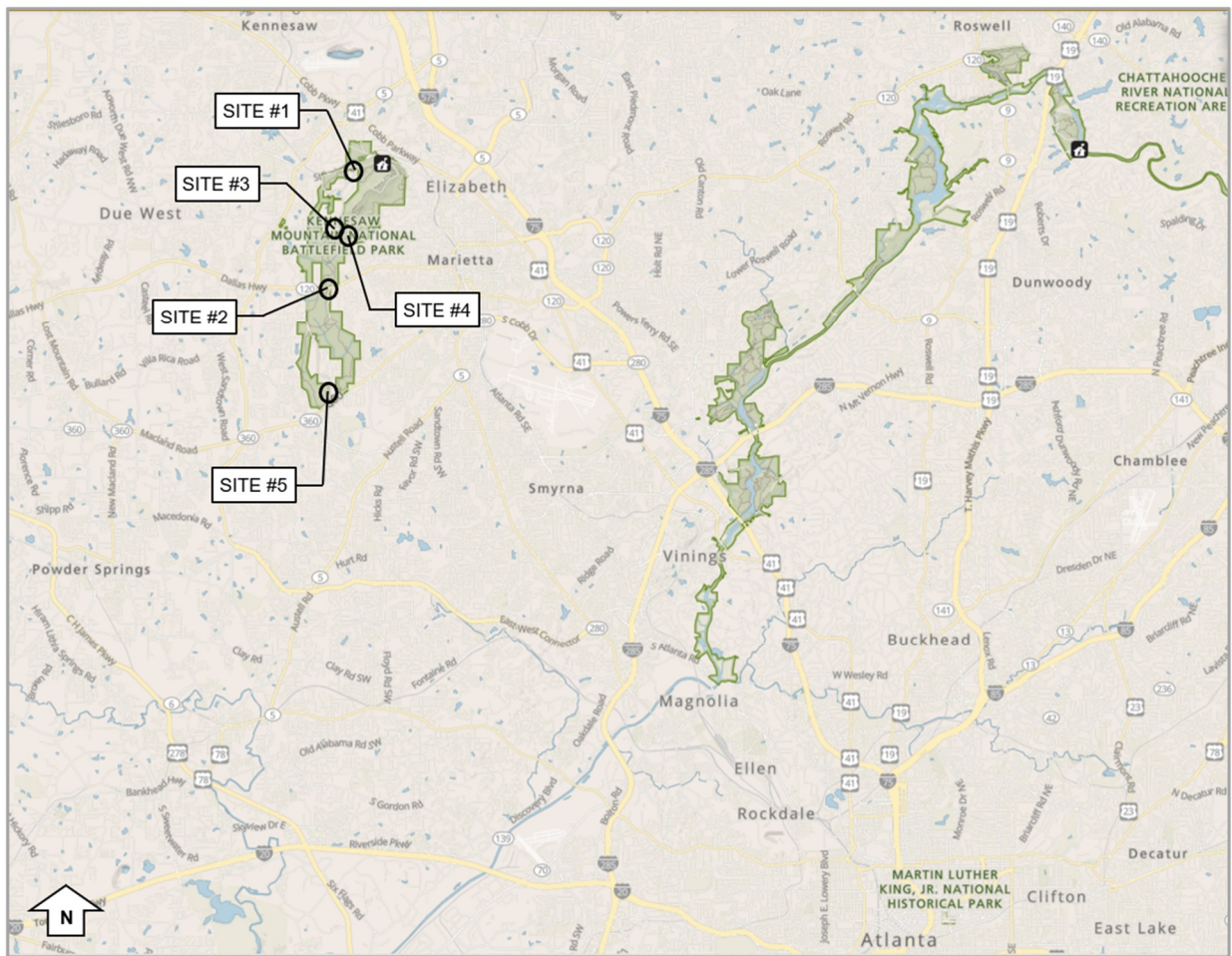


Figure 2: KEMO Traffic and Safety Assessment Project Location Map

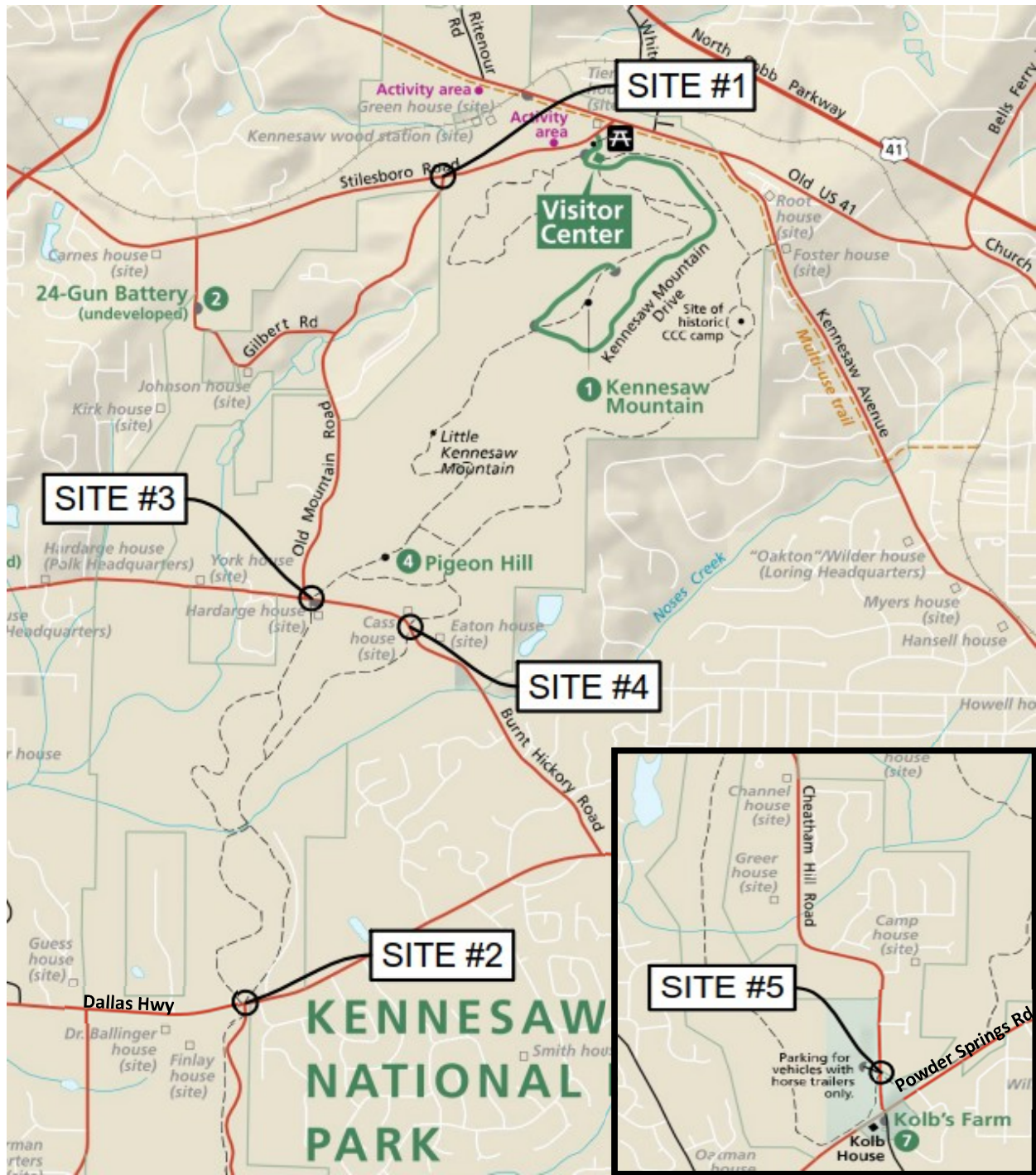


Figure 3: KEMO Traffic and Safety Assessment Study Sites



2.2 Local Land Use and Zoning

Segments of the key roadways through and around KEMO are within the City of Marietta's jurisdiction, while others are unincorporated and therefore under the jurisdiction of the Cobb County Community Development Agency's Zoning Division. The Cobb County Zoning Information Map shows KEMO and the surrounding area zoned as majority rural residential with some 20,000 square-foot lot size single-family residential (zoning codes RR and R-20 respectively). The RR zoning district is characterized as large open areas for limited residential, agricultural, and park needs until growth warrants urbanization. R-20 is zoning for single-family residential uses, as well as institutional and recreational uses compatible with residential areas.

The study multi-use trail crossing at the intersection of Old Mountain Rd and Stilesboro Rd is within the portion of KEMO that is zoned as RR. Just south of the crossing at Old Mountain Rd and Stilesboro Rd, the zoning along Old Mountain Rd alternates between R-20 and City of Marietta zoning. Old Mountain Rd is zoned under City of Marietta jurisdiction where it meets Burnt Hickory Rd, across from the KEMO parking lot along Burnt Hickory Rd. The parking lot is within a R-20 zoned area, while the area around the 'S' curve along Burnt Hickory Rd and the northeast corner of Old Mountain Rd and Burnt Hickory Rd is zoned RR.

The study multi-use trail crossings between the intersections of Dallas Hwy with Cheatham Hill Dr and Dallas Cir are at the boundary of RR and City of Marietta zones, with the RR zone including Cheatham Hill Dr and area to the west, and the City of Marietta jurisdiction including Dallas Cir and area to the east. The crossing along Cheatham Hill Rd, north of the intersection at Cheatham Hill Rd and Powder Springs Rd, is also located near a zoning boundary. The east edge of Cheatham Hill Rd and the area south of the horse trailer parking area and nearby trail crossing is zoned as RR. The west edge of Cheatham Hill Rd and the area north of the crossing is zoned as R-20.

KEMO's northern and eastern boundaries are mostly bordering the City of Marietta, with some smaller unincorporated areas zoned as R-20, residential multifamily (RM-8), light industrial (LI) and heavy industrial (HI), office/service (OS), community retail commercial (CRC), and tourist services (TS). The majority of the area adjacent to the southern and western boundaries of the park are zoned as R-20 and R-15 (single-family residential with 15,000 square-foot lot sizes), with small areas of single-family residential with 80,000 square-foot lot sizes (R-80), suburban condominium residential district (SC), low-rise office (LRO), single-family attached/detached residential (RA-5), planned residential development (PRD), and office and industrial (O&I).

2.3 Description of Area Roadways

The project study area includes six roadways: Stilesboro Rd, Old Mountain Rd, Burnt Hickory Rd, Dallas Hwy, Cheatham Hill Rd, and Powder Springs Rd. General characteristics of each roadway are described here, while more detailed conditions at each study trail crossing are described in Section 4.

Stilesboro Rd is a two-lane, undivided county road with one lane in each travel direction. The road generally runs east to west. The existing speed limit along Stilesboro Rd within the study area is 35 mph. The road has no bike lanes and no pedestrian facilities west of the KEMO Visitor Center.

Old Mountain Rd is a two-lane, undivided county road with one lane in each travel direction. The road runs north-south through the middle of KEMO and intersects with several minor residential roadways and private driveways. The existing speed limit along Old Mountain Rd is 30 mph. This road has no bicycle or pedestrian facilities.

Burnt Hickory Rd is a two-lane, undivided county road with one lane in each travel direction. The road generally runs east to west through KEMO. The existing speed limit along Burnt Hickory Rd is 35 mph in the project study area. This road has no bicycle facilities. Immediately east of the Pigeon Hill parking lot exit driveway and the Old Mountain Rd intersection, there is a crosswalk across Burnt Hickory Rd connecting the parking lot to trails east of Old Mountain Rd. Within the 'S' curve section of Burnt Hickory Rd, east of the parking lot, there is a signed and striped crosswalk at a second trail crossing. This crossing point is being relocated further west along Burnt Hickory Rd as part of the new trail proposed in the



Kennesaw Mountain Pedestrian Improvements Project. This project is described in greater detail in Section 3.6.

Dallas Hwy (also known as Georgia State Route 120) is a four-lane undivided Georgia Department of Transportation (GDOT) road outside of the KEMO boundary, but it narrows to two lanes (one in each direction) as the road passes through KEMO. Dallas Hwy runs east to west through KEMO. The existing speed limit along Dallas Hwy is 45 mph within KEMO. This road has no bicycle facilities. Along Dallas Hwy, between Cheatham Hill Dr and Dallas Cir, there is a crosswalk and pedestrian hybrid beacon (PHB) that stops traffic to let trail users cross. There is also a sidewalk along the south side of Dallas Hwy near the PHB crossing that extends along the road to the east from the crossing location.

Cheatham Hill Rd is a two-lane, undivided county road with one lane in each travel direction and a right turn lane just north of the horse trailer parking lot. The road generally runs north to south through KEMO and is different from Cheatham Hill Dr, another road further to the northeast. Just south of the horse trailer parking lot, the road picks up a southbound left turn lane and right turn lane as it approaches Powder Springs Rd. The existing speed limit along Cheatham Hill Rd is 45 mph. This road has no bicycle facilities or sidewalks. There is a signed and striped crosswalk at the trail crossing just north of the horse trailer parking entrance.

Powder Springs Rd (also known as Georgia State Route 360) is a four-lane GDOT road with two lanes in each direction and a center two-way left turn lane. The road generally runs northeast to southwest. The existing speed limit on Powder Springs Rd is 45 mph within KEMO. There are no existing bicycle facilities along the road, but there is a sidewalk along the south side of the road near the intersection of Cheatham Hill Rd.

2.4 Local Traffic Data

Two-way average annual daily traffic (AADT) volumes at points within KEMO are shown in **Figure 4**, along with the year in which those volumes were recorded. These volumes were obtained from the GDOT online AADT database found here: <https://gdottrafficdata.drakewell.com/publicmultinodemap.asp>. Typical weekday peak hours for these roads are between 6:00 AM – 9:00 AM and 3:30 PM – 6:00 PM. The weekend peak hours are more dispersed and occur between 7:00 AM – 11:30 AM and 4:00 PM – 6:00 PM. Highest traffic volumes through and around the park typically occur along Dallas Hwy and Powder Springs Rd, and along Old 41 Hwy to the east of Stilesboro Rd.

Additional traffic data including intersection turning movement counts (TMCs) including trail users, intersection queue lengths, vehicle gaps, and 24-hour volume, speed, and classification tube counts will be collected near each of the study sites as part of this project. All data will be collected for one weekday and one weekend day. Morning and evening peak hours for collecting queue lengths and peak 30-minute intervals for collecting vehicle gaps will be determined from the TMC peak hours.

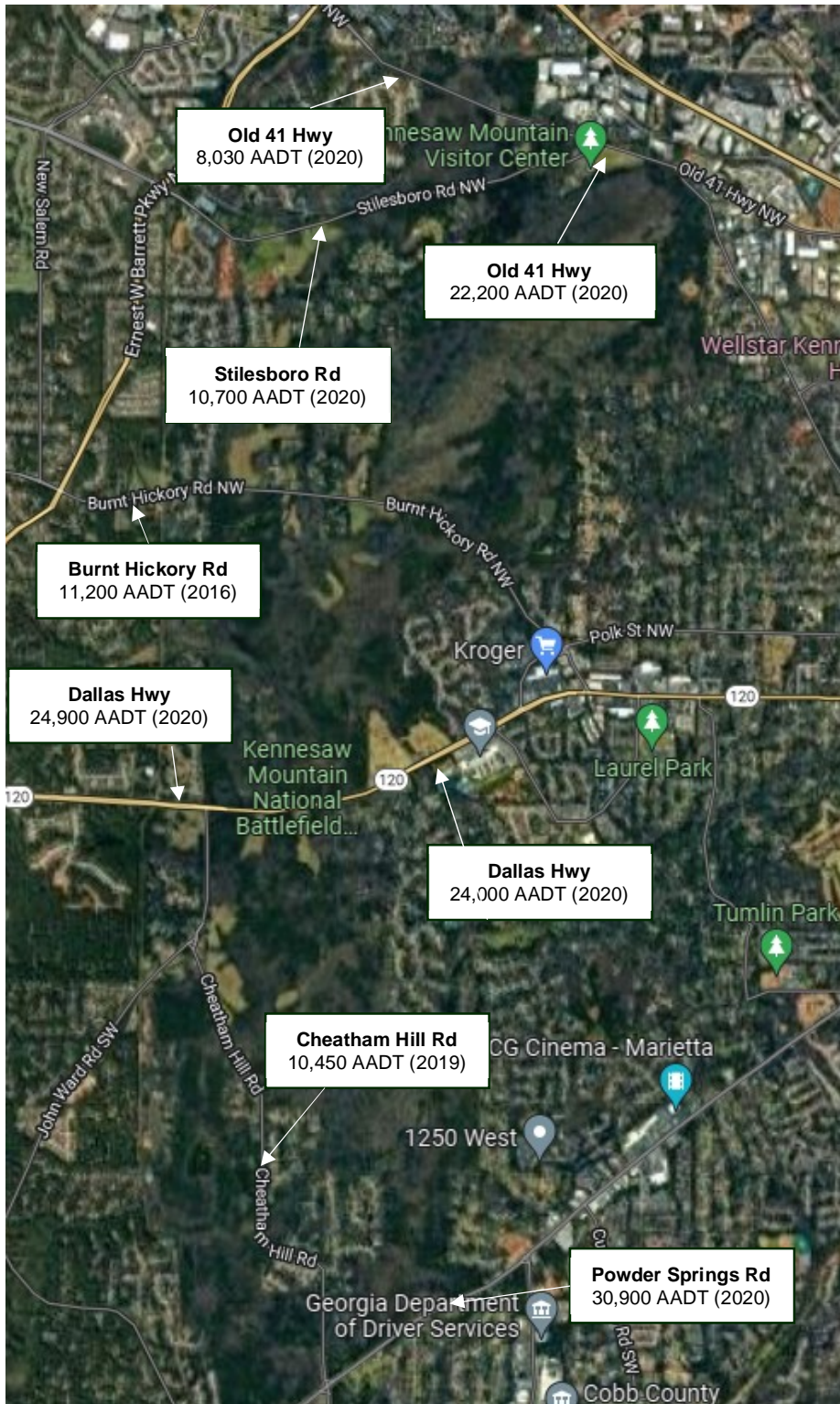


Figure 4: Two-Way Average AADT Volumes Near Kennesaw Mountain National Battlefield

2.5 Battlefield Park Visitation Data

Visitation to KEMO varies from month to month. The most popular times to visit are during the months on either side of summer, with recreational visitation peaking at about 190,000 visitors per month in June and again in September before markedly decreasing during the fall and winter months. Monthly visitation to KEMO in 2021 is shown in **Figure 5** for recreational visitors and **Figure 6** for non-recreational visitors.

More than 2 million non-recreational visitors pass through KEMO each month. Notably, more than 90 percent of vehicles passing through KEMO are defined as non-recreational visitors that do not stop at any NPS sites on their journey. Many of these non-recreational visitors are daily visitors due to their home-to-work commute that passes through the KEMO boundary.

Figure 7 shows annual vehicular traffic totals along four roads and parking areas with KEMO count stations from 2008 through 2021. The KEMO site with highest recreational visitation is the visitor center located along Stilesboro Rd and Kennesaw Mountain Dr, as shown in **Figure 7**. Traffic volumes along Cheatham Hill Rd peaked in 2020, and KEMO staff was unsure of the reason that traffic peaked along that road during that year.



Figure 5: Monthly Recreation Visitors to KEMO in 2021

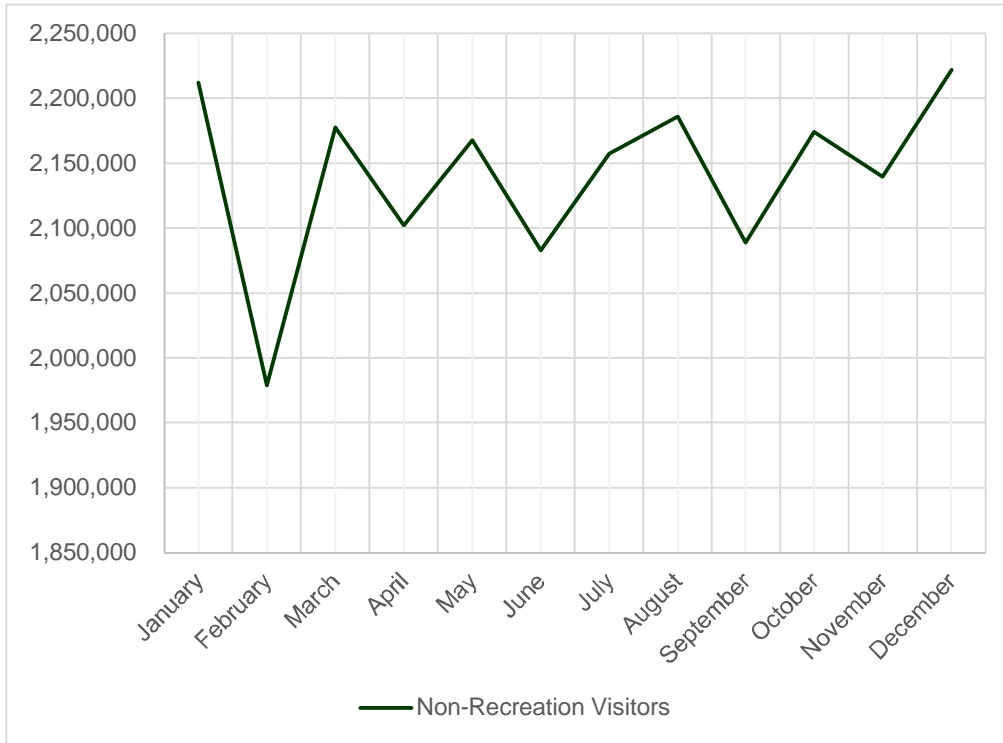


Figure 6: Monthly Non-Recreation Visitors to KEMO in 2021

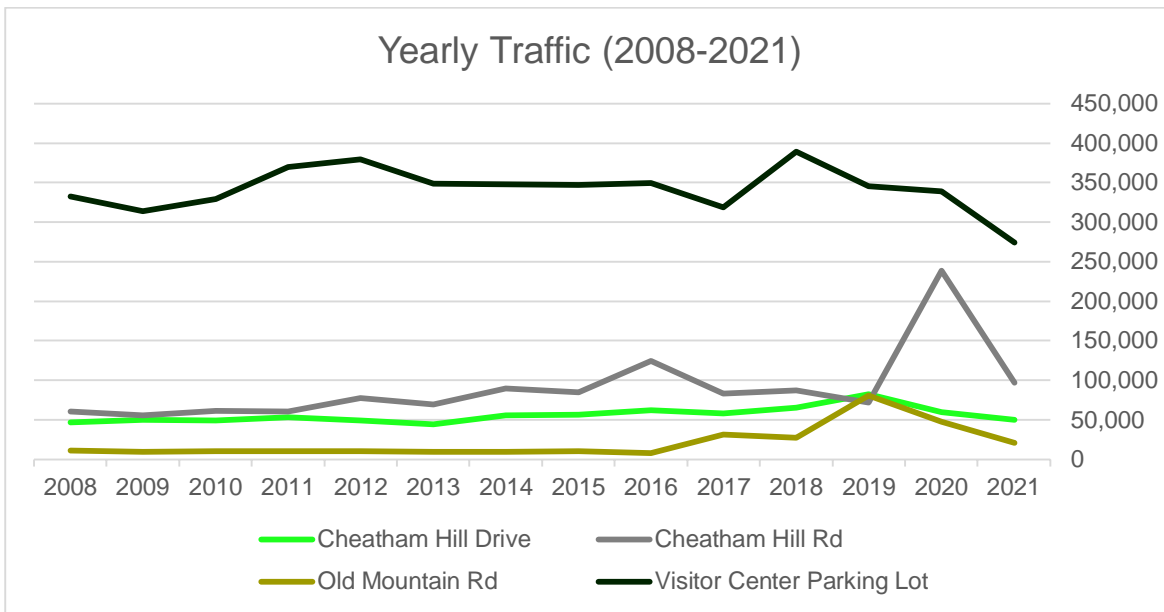


Figure 7: Annual Vehicular Traffic in Kennesaw Mountain National Battlefield from 2008 to 2021

2.6 Battlefield Park Crash Data

At the outset of this study, verified crash data was collected from the GDOT Numetrics database for the entire KEMO area for the five-year period from 2017 through 2021. Over that five year period, a total of 443 traffic crashes occurred along roads within the KEMO boundary. Over the five-year period from 2017 to 2021, the number of crashes peaked in 2019 and then decreased by more than 20 percent in 2020 and again slightly in 2021, as shown in **Figure 8**. A decrease in crashes during 2020 might have been a result from COVID-19 pandemic reducing the total amount of vehicle traffic travelling through KEMO.

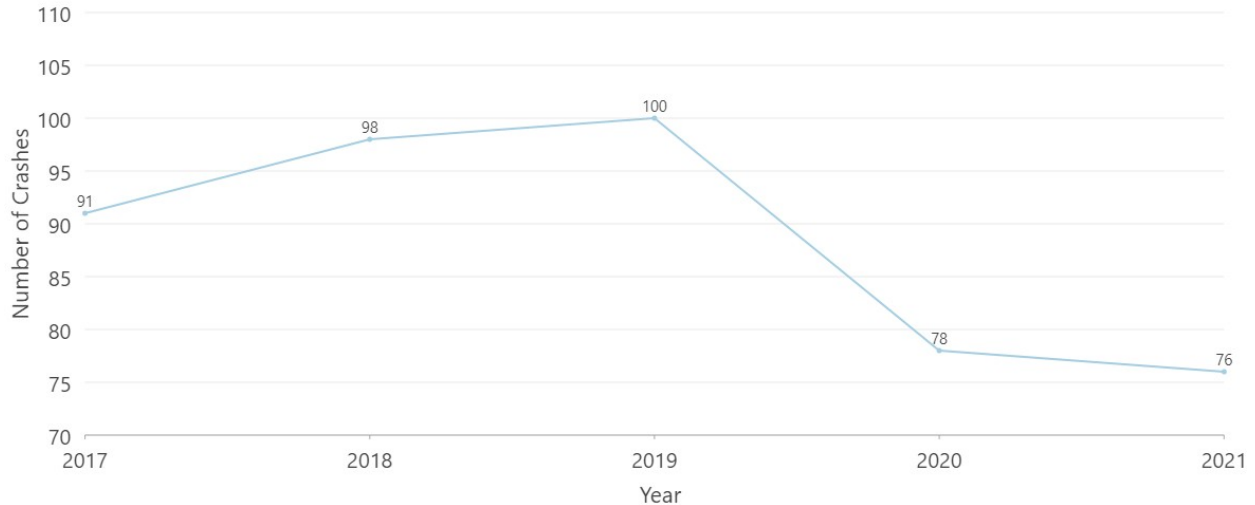


Figure 8: Number of Crashes per Year in KEMO

Figure 9 shows crashes that occurred within KEMO from 2017-2021, organized by month of year of crash. The highest numbers of crashes within KEMO occur in the late fall and winter months, including November (55), January (48), and December (45). These months tend to be some of the coldest and cloudiest of the year, and the daylight hours are also shortest in those months. Those weather-based factors may help explain the increase in crashes.

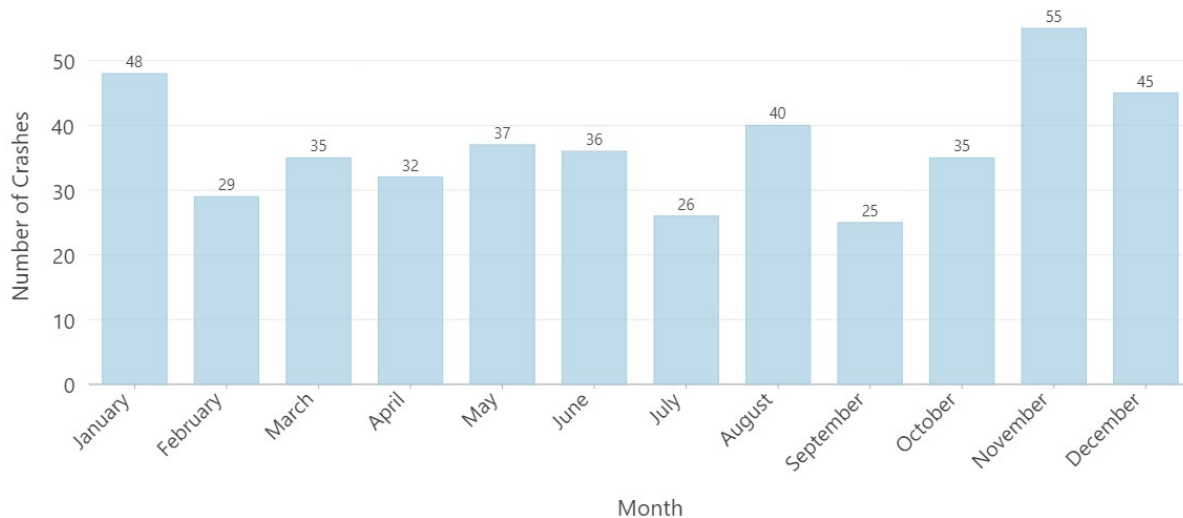


Figure 9: Number of Crashes per Month in KEMO

Figure 10 shows crashes that occurred within KEMO from 2017-2021, organized by day of week of crash. More crashes occur on weekdays than on weekends, with Thursday having the greatest number of crashes (84). This pattern suggests that a larger number of crashes are tied to weekday commuting patterns, as opposed to weekend travel patterns when KEMO recreational visitation tends to be higher. Sunday was the day that had by far the fewest crashes (36).

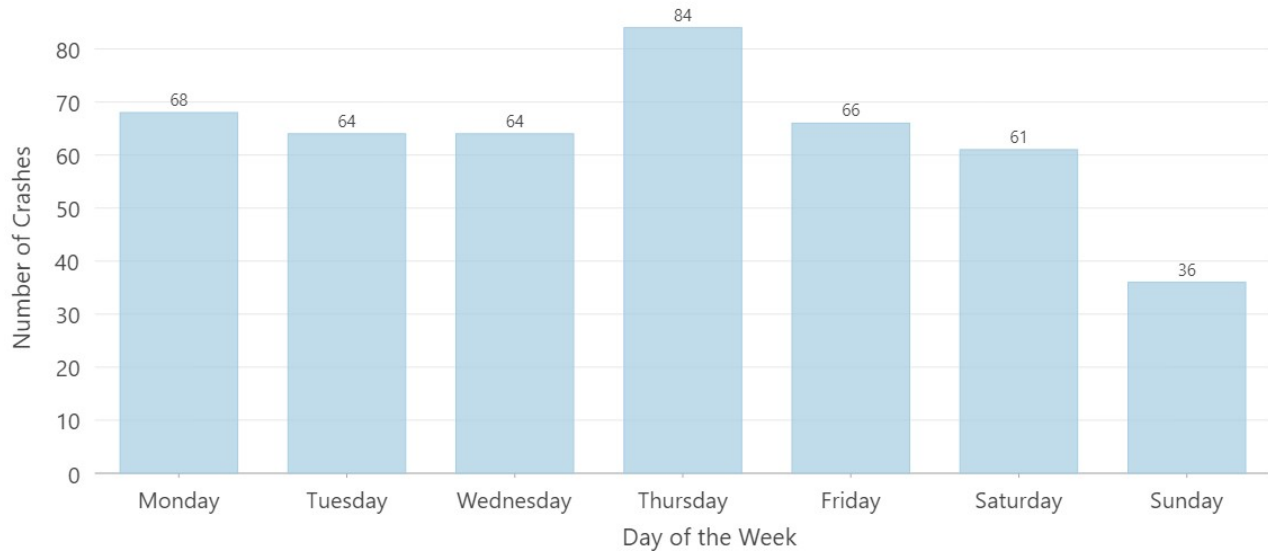


Figure 10: Number of Crashes per Day in KEMO

Figure 11 shows crashes within KEMO organized by manner of collision. More than half of all crashes were rear end crashes, and about 20 percent of crashes were single vehicle collisions that involved vehicles running off the road or colliding with an animal or a fixed object. Many of the most common attributed causes for these two types of crashes within KEMO were either vehicles following too closely (for rear end crashes) or distracted driving (for both rear end and single vehicle crashes)

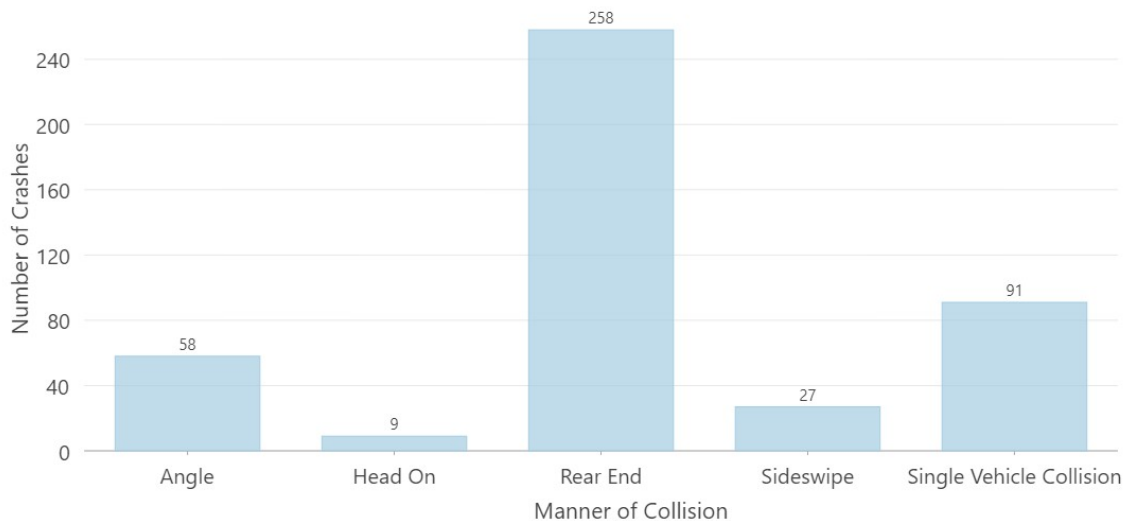


Figure 11: Manner of Collision Accidents in KEMO

Within KEMO, of the 443 reported incidents since 2017, 316 of the incidents resulted in no injury, as shown in **Figure 12**. Of those 316 no injury crashes, 60 percent were rear end crashes. Four of the crashes resulted in serious injury where one or more people involved in the crash were taken to a hospital. Of those four crashes, one was a rear end crash, and the rest were single vehicle collisions. One of the single vehicle collisions involved a struck pedestrian. There were no records of fatal crashes within the KEMO boundary between 2017 and 2021.

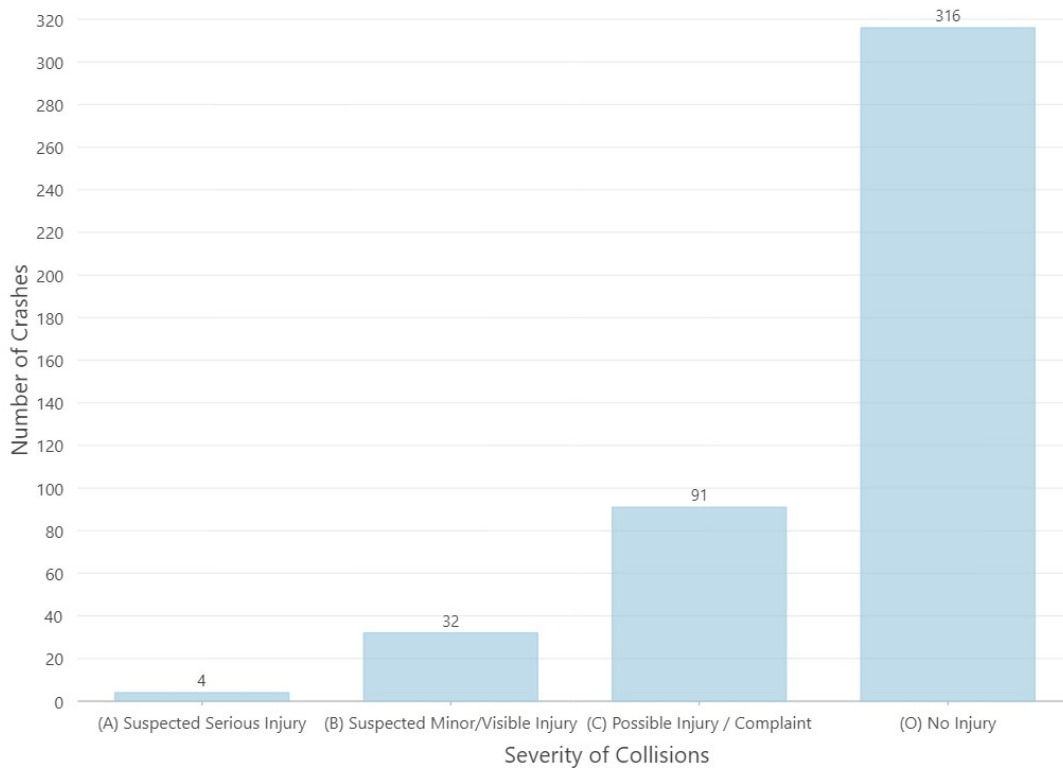


Figure 12: Severity of Collisions in KEMO

In KEMO from 2017-2021, more than 70 percent of crashes occurred in the daylight, as shown in **Figure 13**. Of the crashes that occurred at night more than two thirds of them happened in locations where roadway lighting was not present. Furthermore, more than 85 percent of crashes occurred in clear or cloudy weather, as shown in **Figure 14**. Rainy weather was the next most common weather conditions for crashes within the KEMO boundary. No crashes were reported in snowy or icy conditions.

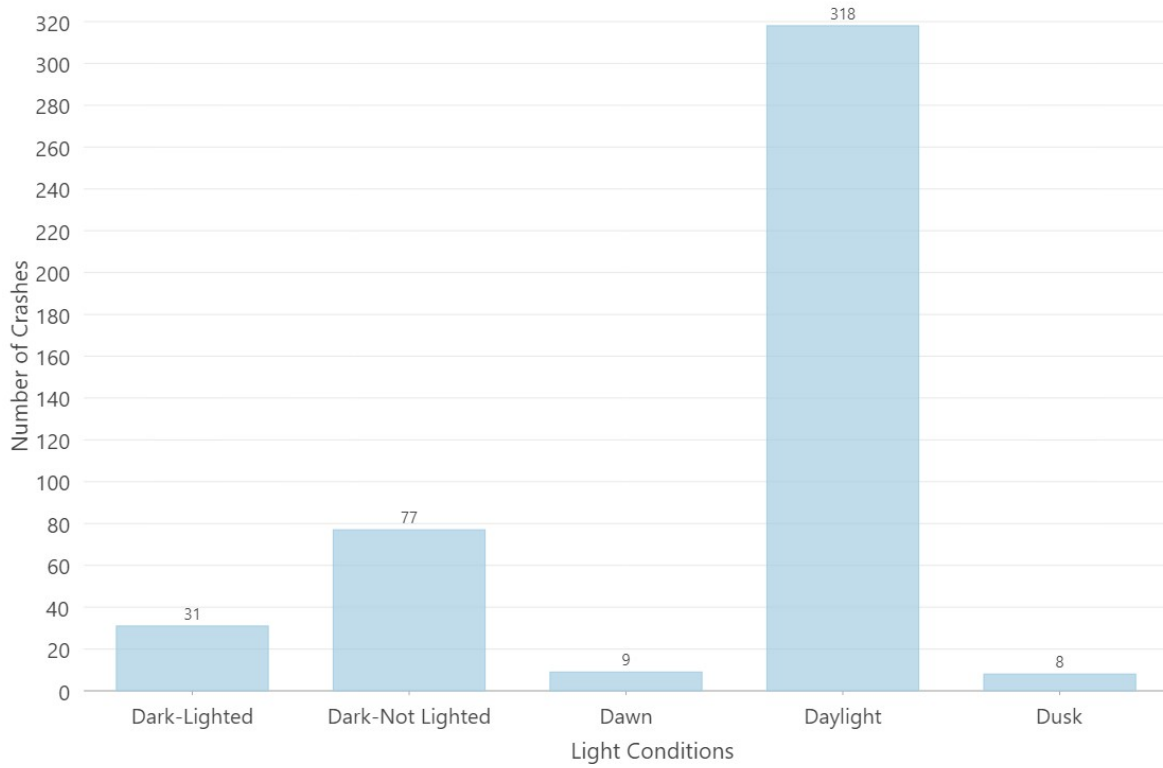


Figure 13: Lighting Conditions of Accidents in KEMO

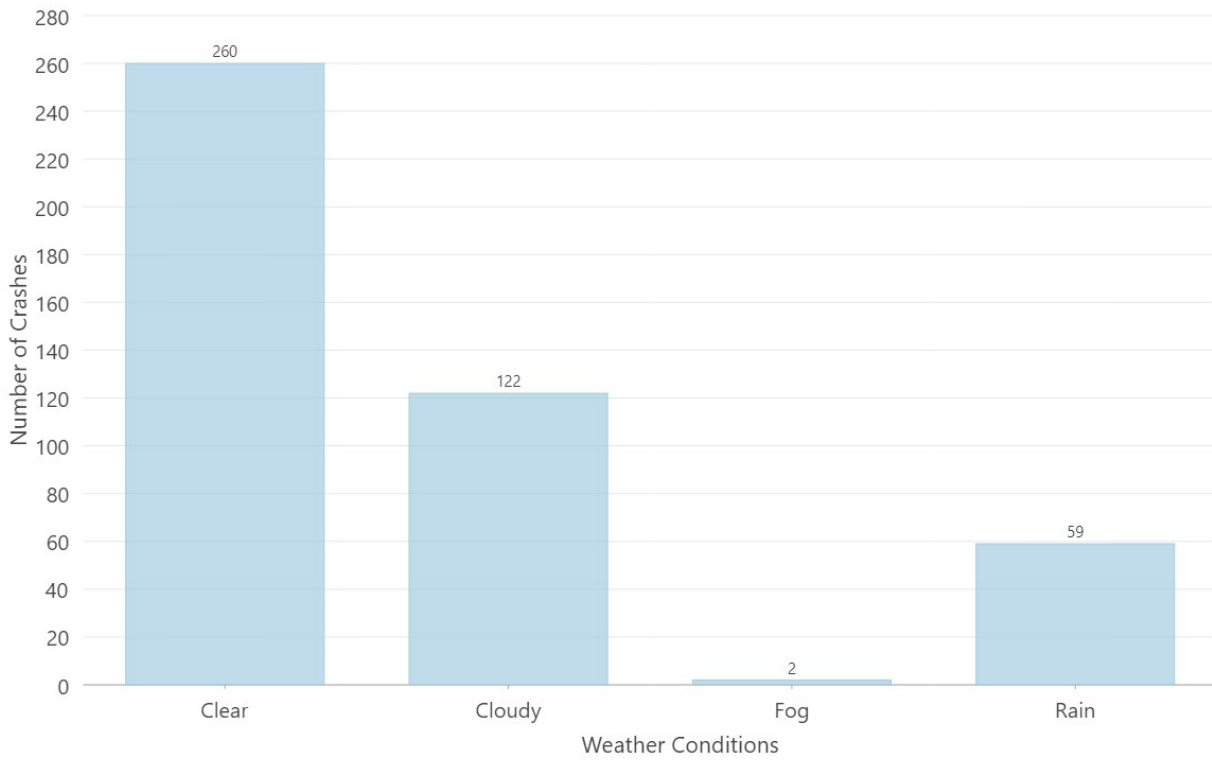


Figure 14: Weather Conditions of Accidents in KEMO

3 PAST AND CURRENT TRANSPORTATION-RELATED EFFORTS

3.1 2010 Bus Shuttle Service Assessment of Kennesaw Mountain Drive and Alternative Transportation Study

In 2010, the U.S. Department of Transportation (USDOT) conducted a study to assess the management of Kennesaw Mountain Drive, which runs from the Visitor Center to the summit of Kennesaw Mountain, and to assess the future of the shuttle service that had operated on the road during the weekends. The study included a vehicle technology assessment that compared the operations of an electric vehicle to a hybrid electric vehicle.

This study was conducted after KEMO submitted multiple proposals requesting funding to purchase an electric or hybrid electric bus for the shuttle service to reduce the cost of the shuttle contract, as well as reduce air and noise pollution levels. There were two uncertainties in the electric and hybrid electric vehicle technologies the study team was not able to resolve. This left the possibility of increased maintenance and operations costs and the need for specific staff and equipment as unknown variables. As a result, the purchase of a standard 30-foot transit bus that runs on clean diesel was recommended.

The weekend shuttle bus service is currently suspended due to COVID-19 precautions, but KEMO staff expect shuttle service to resume in Spring 2023. When the shuttle bus is running, it operates on weekends and holidays with 30-minute headways, beginning at 9:40 AM and ending with the last run up the mountain at 4:30 PM. While the shuttle bus is operating, Kennesaw Mountain Drive is closed to public traffic.

3.2 2018 Cobb County Greenways and Trails Master Plan

Cobb County developed its 2018 Greenways and Trails Master Plan to create additional opportunities for physical and social activity, expand travel options, and foster economic development. The Master Plan lays out an intentional and cohesive approach to prioritizing trail connections and establishes a framework for future investment in the countywide trail network. Proposed trails are identified in the Master Plan and prioritized based on various factors that fall within three categories: demand, connectivity, and project readiness.

As of 2018, Cobb County had over 84 miles of greenways and trails, including trails along Old 41 Hwy at the northern boundary of KEMO, along John Ward Rd at the eastern KEMO boundary, and along Dallas Hwy through the center of the park. Fifty miles of greenway and trails had been constructed throughout the county in the ten years leading up to 2018. In December 2017, two miles of trails were actively under construction and another 29 miles of trails were in the design and feasibility study stage.

Cobb County received \$4 million in Federal Land Access Program (FLAP) funds in 2017, along with \$1.6 million from NPS and \$1.2 million from GDOT, to design and construct trails from the Greenways and Trails Master Plan in and around KEMO. This funding went towards the design and construction of three segments of trail on Burnt Hickory Rd, Whitlock Ave, and Cheatham Hill Rd, for a total of 3.2 miles of new trail. The ongoing project to construct these trail improvements is described in Section 3.6.

The Burnt Hickory Rd trail was designed to connect Old Mountain Rd to Whitlock Ave, crossing through a central region of KEMO. The Cheatham Hill Rd trail was designed to connect the existing sidewalk along John Ward Rd at the center of the eastern KEMO boundary to Powder Springs Rd at the southern boundary. According to **Figure 15** from the 2018 Cobb County Greenways and Trails Master Plan, these trails were anticipated for completion in 2020, however construction is now expected to be complete in June 2023.

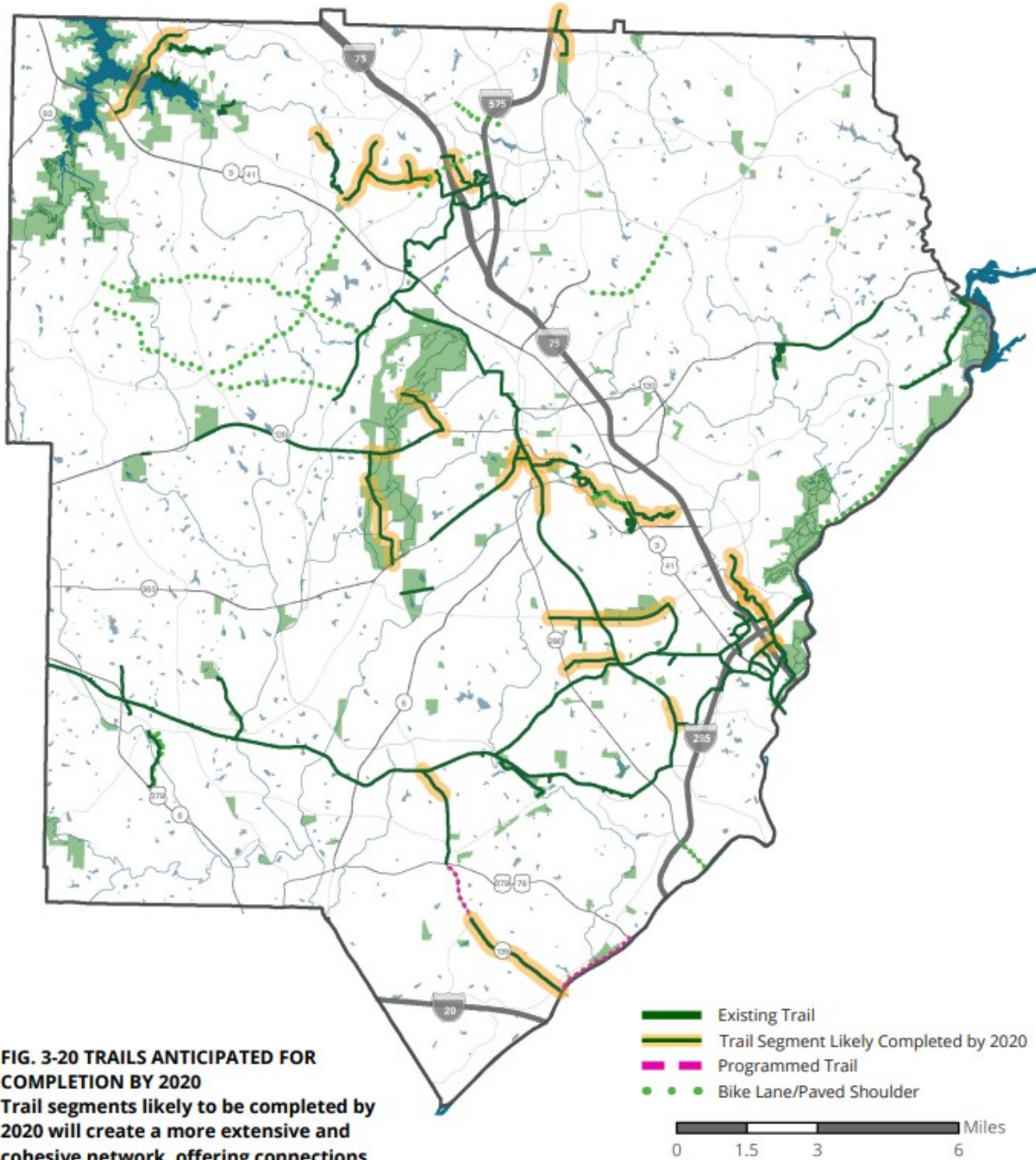


Figure 15: Cobb County Trails Map from the 2018 Greenways and Trails Master Plan

3.3 2020 City of Marietta ADA Transition Plan

The City of Marietta's Americans with Disabilities Act (ADA) Transition Plan, published in early 2020, serves as an overview of the compliance responsibilities the City of Marietta has under Title II of the ADA of 1990. This Plan ensures that the City of Marietta is providing full access to city programs, services, activities, and construction projects. The ADA Transition Plan provides a map identifying existing and proposed sidewalks and multi-use paths in the vicinity of KEMO as of 2019, such as proposed multi-use paths along Burnt Hickory Rd, Dallas Hwy, and Cheatham Hill Rd. The Plan also includes the results from the City of Marietta's Fall 2018 Sidewalk ADA Audit.

3.4 2022 Cobb Forward Comprehensive Transportation Plan

Cobb County adopted the updated Cobb Forward Comprehensive Transportation Plan (CTP) in February 2022. The CTP includes an analysis of the existing transportation infrastructure conditions, an assessment of needs regarding future transportation demand and mobility, and recommended projects and policies to address the identified needs.

The goals of the CTP are to improve health and safety, enhance mobility, utilize innovative technology, be cost effective, support equitable access, and integrate land use and design. Recommendations are broken out into a Long-Range Plan (30 years), Mid-Range Plan (10 years), and Short-Range Plan (5 years) to determine project priority and anticipated cost estimates to assist Cobb County with budget forecasting.

The Long-Range Plan includes four projects in the vicinity of KEMO, consisting of three intersection improvements at the intersections of Old 41 Hwy with Stilesboro Rd and Kennesaw Ave and the intersection of Dallas Hwy and John Ward Rd, and a capacity improvement project widening Dallas Hwy/Whitlock Ave. The Mid-Range Plan also identifies an intersection improvement project at the intersection of Dallas Hwy and John Ward Rd and a capacity improvement project along Dallas Hwy through KEMO. The Short-Range Plan identifies one intersection improvement project at the intersection of Dallas Hwy and John Ward Rd in the vicinity of KEMO.

3.5 2022 City of Kennesaw Comprehensive Plan

The City of Kennesaw adopted its 2022 Comprehensive Plan Update in June 2022. This document serves as a long-range plan, looking ahead five, ten, and twenty years to identify existing and anticipated needs, as well as to identify assets that provide opportunities for the community's continued success.

The City of Kennesaw 2022 Comprehensive Plan Update discusses transportation data, such as commuter and transportation mode statistics. Approximately 13,600 City of Kennesaw residents commute out of the city and approximately 13,300 people commute into the city, some of which travel through KEMO. This Comprehensive Plan also notes trail connectivity as a priority for the City of Kennesaw and identifies proposed trail connections, including filling in trail gaps within Cobb County. One of these Cobb County trail gaps is between Noonday Creek Trail and the Atlanta Belt Line Trail, which could connect through KEMO.

3.6 2022 City of Marietta Multi-Use Trail Map

The City of Marietta's 2022 Trail Map shows existing, programmed, and proposed multi-use trails as of August 2022. This map includes multi-use trails along Kennesaw Ave, Old 41 Hwy, Stilesboro Rd, Burnt Hickory Rd, Dallas Hwy, and Cheatham Hill Rd within the KEMO boundary. **Figure 16** shows a portion of the City of Marietta Trail Map that includes existing, programmed, and proposed multi-use trails in the vicinity of KEMO.

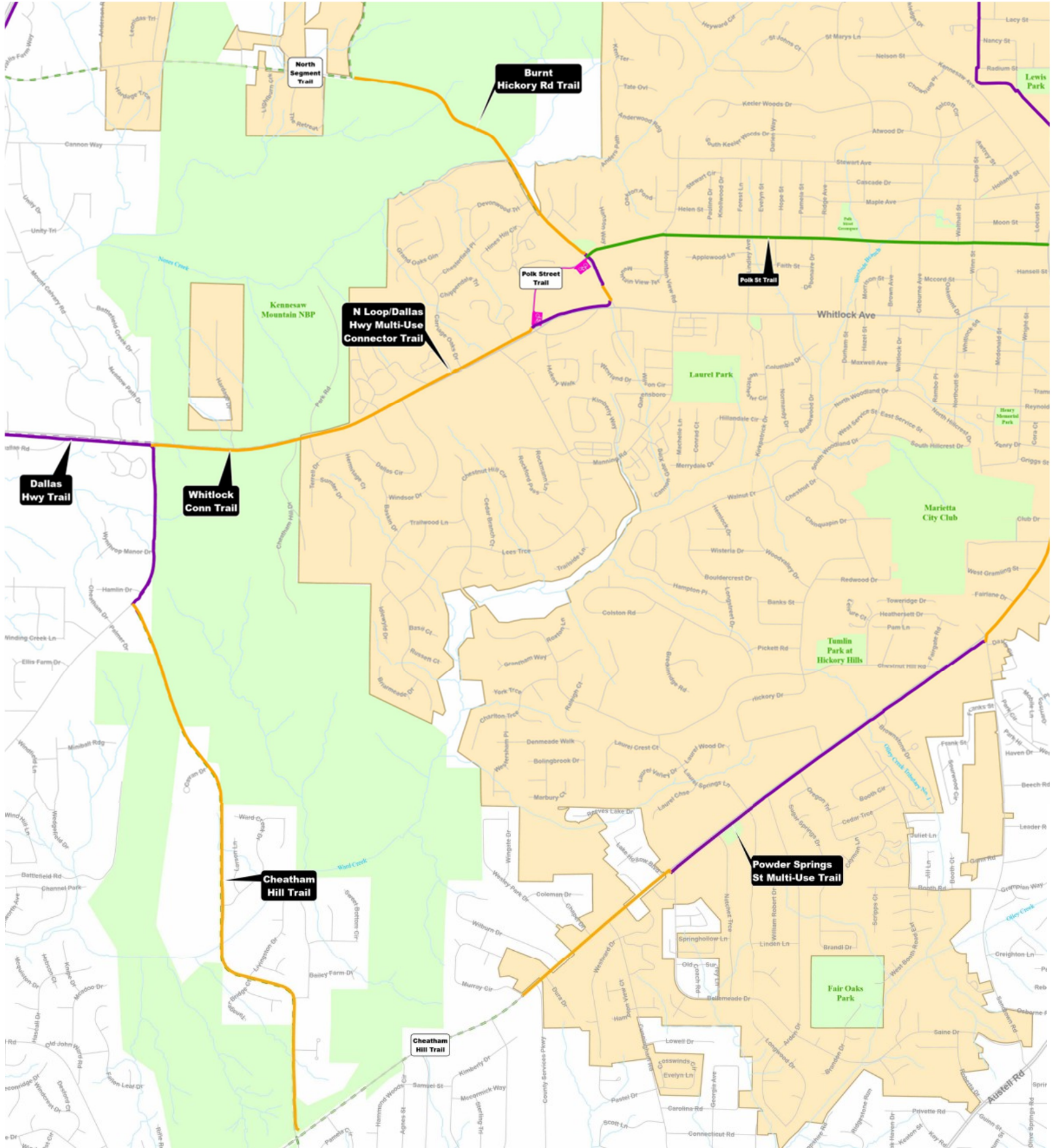


Figure 16: Portion of the City of Marietta 2022 Trail Map

3.7 Kennesaw Mountain Pedestrian Improvements Project

Cobb County Department of Transportation (CCDOT), in coordination with GDOT, FHWA, and NPS, is currently constructing pedestrian improvements within KEMO. These improvements consist of the construction of three multi-use trail segments along Burnt Hickory Rd, Dallas Hwy, and Cheatham Hill Rd approximately 1.0, 0.5, and 1.7 miles long respectively. After an initial planned construction schedule of 2020, all three segments are now expected to be complete in June 2023.

The purpose of this pedestrian improvement project is to provide an alternate mode of transportation in the vicinity of KEMO for residents and visitors, as well as provide connectivity to the existing Cobb County and City of Marietta multi-use trail network. The additional multi-use trail segments would also provide a safer route for pedestrians and cyclists, while increasing recreational opportunities to visitors of KEMO.

3.8 Town Center Bikeshare Program

The Town Center Bikeshare program currently provides access to 45 rental bikes at six stations, 24 hours a day, seven days a week. It became the first bikeshare service offered by a Georgia Community Improvement District (CID) in 2015. As connectivity improved, trail networks expanded, and ridership increased in Cobb County after various other bikeshare programs were established, the need to integrate bikeshare programs arose. Bikes from one program would be left at another program's station, with the users not being able to properly lock the bike.

Members of the established bikeshare programs, such as Kennesaw State University (KSU), Cumberland CID, and the City of Woodstock, began to discuss the concept and funding for a connected regional bikeshare system in 2019. However, due to the COVID pandemic, all bikeshare programs were closed in 2020 and the vendor used by all programs filed for bankruptcy. While Town Center CID and Cumberland CID were able to re-launch their programs with a new vendor by 2021, other partners faced 2021 budget constraints that inhibited their ability to re-launch their bikeshare programs.

The Town Center Alliance and its partners are currently working to develop a pilot regional bikeshare program that would address gaps in service, equity, and create a framework for funding a connected program. A county-wide bikeshare program that includes additional bike stations in the vicinity of KEMO could improve the park's accessibility via modes of transportation other than cars.

3.9 Old 41 Highway Improvements

In March 2021, a traffic impact study of Old 41 Hwy along the northern boundary of KEMO was completed for the segment between the intersection with Stilesboro Rd and intersection with Kennesaw Ave. The study assessed the safety and operations of a proposed conceptual layout of widening and realigning Old 41 Hwy. In this layout, Old 41 Hwy would be widened from two lanes to four lanes and the realignment would relocate this segment of Old 41 Hwy to its original alignment, north of where it currently lies. The layout also included a proposed replacement of the two existing traffic signals at the intersections of Old 41 Hwy at Stilesboro Rd and Old 41 Hwy at Kennesaw Ave with two roundabouts.

The results of the study concluded that the proposed improvements would increase the vehicular capacity of Old 41 Hwy, improve the safety of the corridor for all modes of transportation, and improve traffic operations of the intersections. Therefore, a Final Concept Report was submitted to GDOT and approved in May 2021. The approved concept layout shows a marked pedestrian crossing at the east and west legs of the intersection of Old 41 Hwy and Stilesboro Rd, as well as a tunnel for pedestrians to cross under the south leg of the intersection to eliminate the pedestrian-vehicle conflict point currently present there. There are also marked pedestrian crossings at the northeastern and southeastern legs of the intersection of Old 41 Hwy and Kennesaw Ave in the approved concept layout.



3.10 Future Widening of Dallas Highway

Dallas Hwy generally runs east-west through the center of KEMO, acting as a key corridor for commuters and visitors traveling to and from the City of Marietta. This road is currently a two-lane undivided roadway, with one lane in each direction within the KEMO boundary. On either side of the park, Dallas Hwy currently has two lanes in each direction, as well as various right-turn and left-turn bays and multiple types of medians. The 2022 Cobb County Forward Comprehensive Transportation Plan identifies the widening of Dallas Hwy, known as Whitlock Ave along the segment through KEMO into the City of Marietta, as a capacity improvement in the long-range plan.

4 SITE-SPECIFIC EXISTING CONDITIONS

The following discussions of the existing conditions at each study site summarize the crash data in the vicinity of the pedestrian and equestrian crossings. The KABCO Injury Classification Scale is a universal scale established by FHWA to evaluate the severity of auto collision injuries and estimate how they impact crash costs. The reporting code attributed to each injury severity are as follows:

- **K = Fatal Injury (Killed)** – A fatal injury includes any injury that results in death within 30 days after the crash in which the injury occurred.
- **A = Suspected Serious Injury** – A serious injury is an incapacitating injury, meaning the victim must be carried or helped from the scene, and does not result in death within 30 days.
- **B = Suspected Minor Injury** – Suspected minor injuries are visible, but the victim is capable of walking away from the scene without help.
- **C = Possible Injury** – A possible injury is any injury reported or claimed which is not fatal, suspected serious or suspected minor injury, such as limping or momentary loss of consciousness.
- **O = No Apparent Injury** – No apparent injury crashes are when there is no physical evidence of injury and the person does not report any change in functions, and therefore there is no reason to believe that the person was harmed in the crash.

4.1 Study Site 1 – Stilesboro Rd & Old Mountain Rd

Stilesboro Rd is a two lane road that runs through the northern area of KEMO and provides access to the KEMO Visitor Center just south of the intersection with Old Hwy 41. Further southwest, Old Mountain Rd ends at a T-intersection with Stilesboro Rd. The Old Mountain Rd approach is the only stop-controlled approach at the intersection, and there is a striped crosswalk at the trail crossing located immediately past the stop bar at the approach. There are no warning signs in advance of the trail crossing.

Figure 17 displays crashes that occurred from 2017-2021 within 250 feet of the crosswalk location. Of the 26 crashes that occurred at the intersection, 13 were rear end crashes, 6 were single vehicle crashes, 2 were sideswipes, and 5 were angled crashes. Nearly all crashes occurred along the Stilesboro Rd approaches, rather than the Old Mountain Rd approach. KEMO staff noted that a recent crash involving a pedestrian occurred at this location, but that crash is not reflected in the data obtained from GDOT. None of the crashes at this study site resulted in fatalities or serious injuries.

Figure 18 shows an aerial image of Study Site 1.

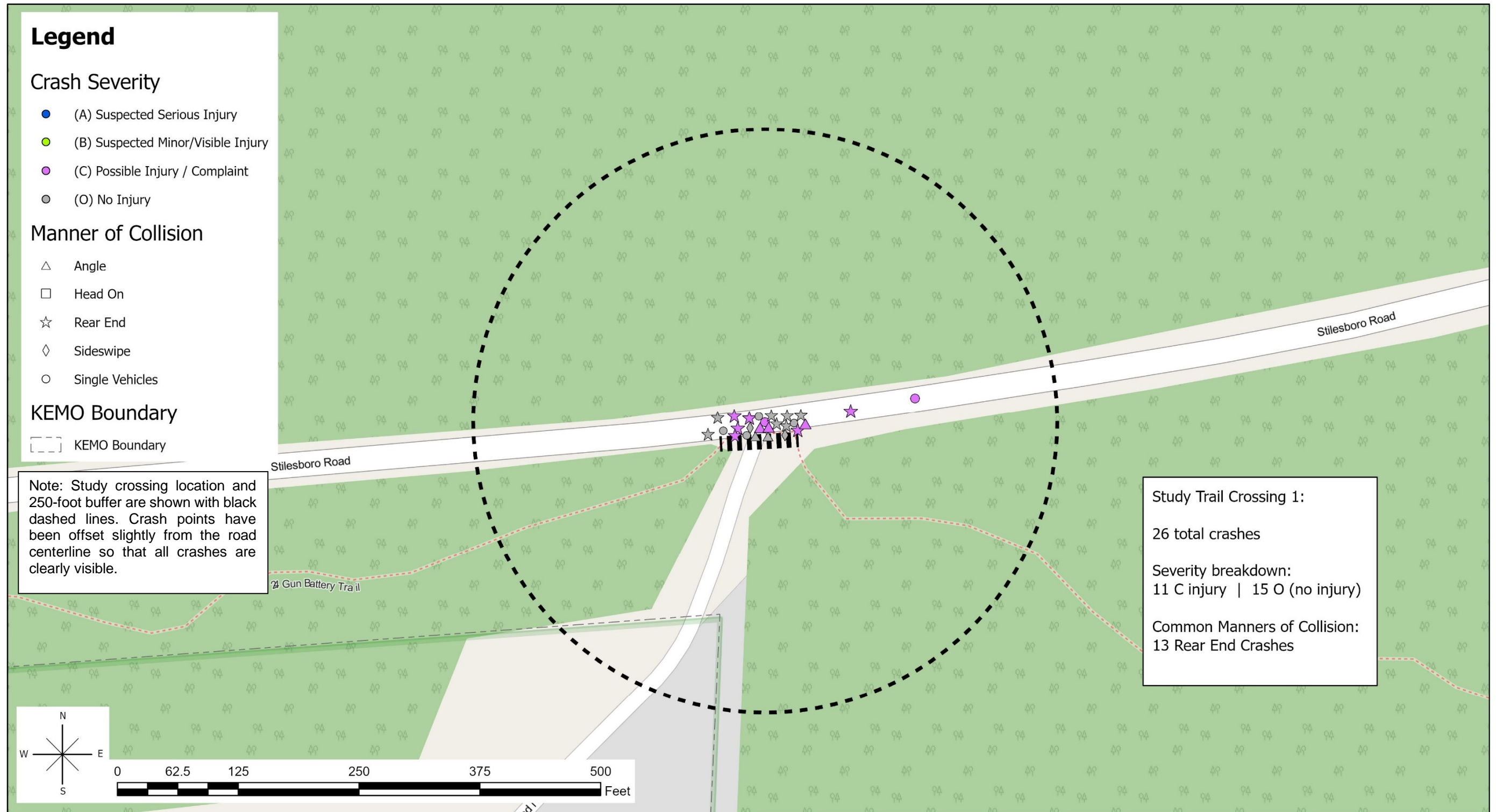


Figure 17: Crash Data at Study Site 1 – Stilesboro Rd & Old Mountain Rd



Figure 18: Aerial Imagery of Study Site 1 – Stilesboro Rd & Old Mountain Rd



4.2 Study Site 2 – Dallas Hwy Trail Crossing

Dallas Hwy runs east to west through KEMO, and both Dallas Cir and Cheatham Hill Dr end in T-intersections with stop control at Dallas Hwy. There are no stop control devices on Dallas Hwy at those intersections. In between those two intersections, however, there is a Pedestrian Hybrid Beacon (PHB) that stops traffic to allow pedestrians to cross Dallas Hwy to the Noses Creek Trail on the north side of the road.

Figure 19 displays crashes that occurred from 2017-2021 within 250 feet of the PHB location. Of the 33 crashes shown, 14 occurred nearest the Cheatham Hill Dr intersection, 14 occurred nearest the Dallas Cir intersection, and 5 occurred nearest the PHB location. 27 of the crashes at the study site were rear end crashes, but there was also a sideswipe crash at the PHB location and a single vehicle crash east of Dallas Cir that resulted in a serious injury. With Dallas Hwy narrowing to two lanes as it passes through KEMO, the likelihood of rear end crashes most likely increases due to reductions in available gaps in vehicular traffic for passing and turning maneuvers onto minor streets.

Figure 20 shows an aerial image of Study Site 2.

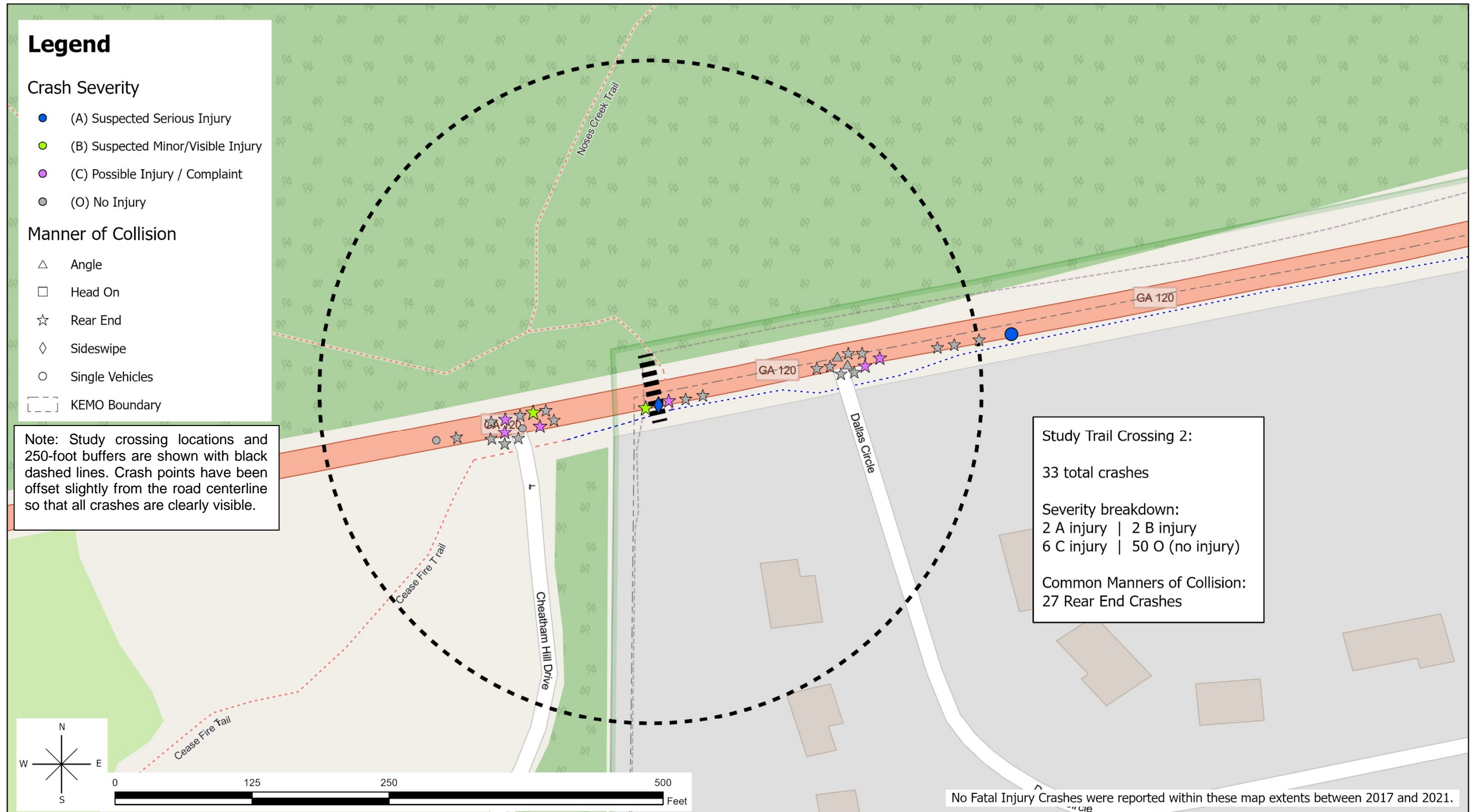


Figure 19: Crash Data at Study Site 2 – Dallas Hwy Trail Crossing



Figure 20: Aerial Imagery of Study Site 2 – Dallas Hwy Trail Crossing

4.3 Study Site 3 – Burnt Hickory Rd at Parking Lot

Burnt Hickory Rd is a two lane road that runs through the middle of the park and provides access to several KEMO recreational points of interest. The parking lot for the Pigeon Hill area of KEMO includes an exit lane that forms the south leg of the intersection of Burnt Hickory Rd and Old Mountain Rd. At this intersection, the only stop control devices present are stop signs along the north and south approaches. Additionally, there is a striped crosswalk with pedestrian crossing warning sign and user-activated rectangular rapid flashing beacons (RRFBs) along Burnt Hickory Rd at a trail crossing just east of the intersection.

Figure 21 displays crashes that occurred from 2017-2021 within 250 feet of the trail crossing. There are 15 rear end crashes that occurred along Burnt Hickory Rd within this area. There was also one serious injury crash involving a struck pedestrian at this location. According to the police report, one of the car passengers stated that the crash occurred due to the vehicle's brakes failing as it was traveling along Burnt Hickory Rd, causing the vehicle to swerve into oncoming traffic to avoid colliding with cars ahead. The car hit a pedestrian crossing at the crosswalk after swerving. This crash occurred during rain while the pavement was wet.

Figure 22 shows an aerial image of Study Site 3.

4.4 Study Site 4 – Burnt Hickory Road at 'S' Curve

Further east along the S-curve portion of Burnt Hickory there is also a striped crosswalk and pedestrian crossing warning signs at a trail crossing. **Figure 21** displays crashes that occurred from 2017-2021 within 250 feet of the trail crossing.

In the S-curve portion of Burnt Hickory, there are fewer total crashes, but half of the crashes that occurred within 250 feet of the trail crossing resulted in moderate or serious injuries. Many of the crashes reported were single vehicle collisions attributed to distracted or impaired driving, with some drivers losing control of the vehicles and running off the road. The one serious injury crash at this location was a single vehicle crash where the driver was an impaired teenager.

Figure 23 shows an aerial image of Study Site 4.

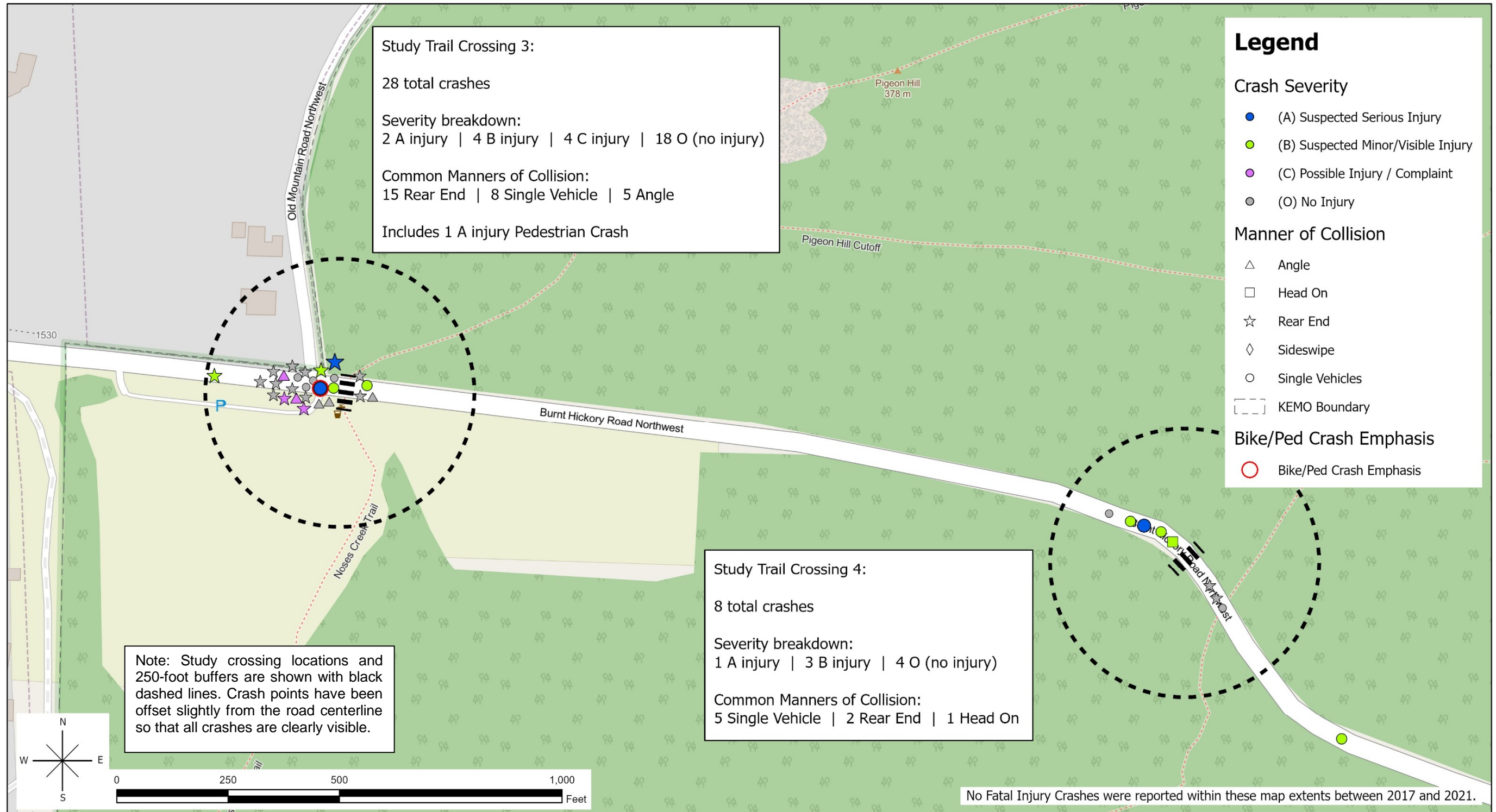


Figure 21: Crash Data at Study Site 3 – Burnt Hickory Rd at Parking Lot and Study Site 4 – Burnt Hickory Rd at ‘S’ Curve

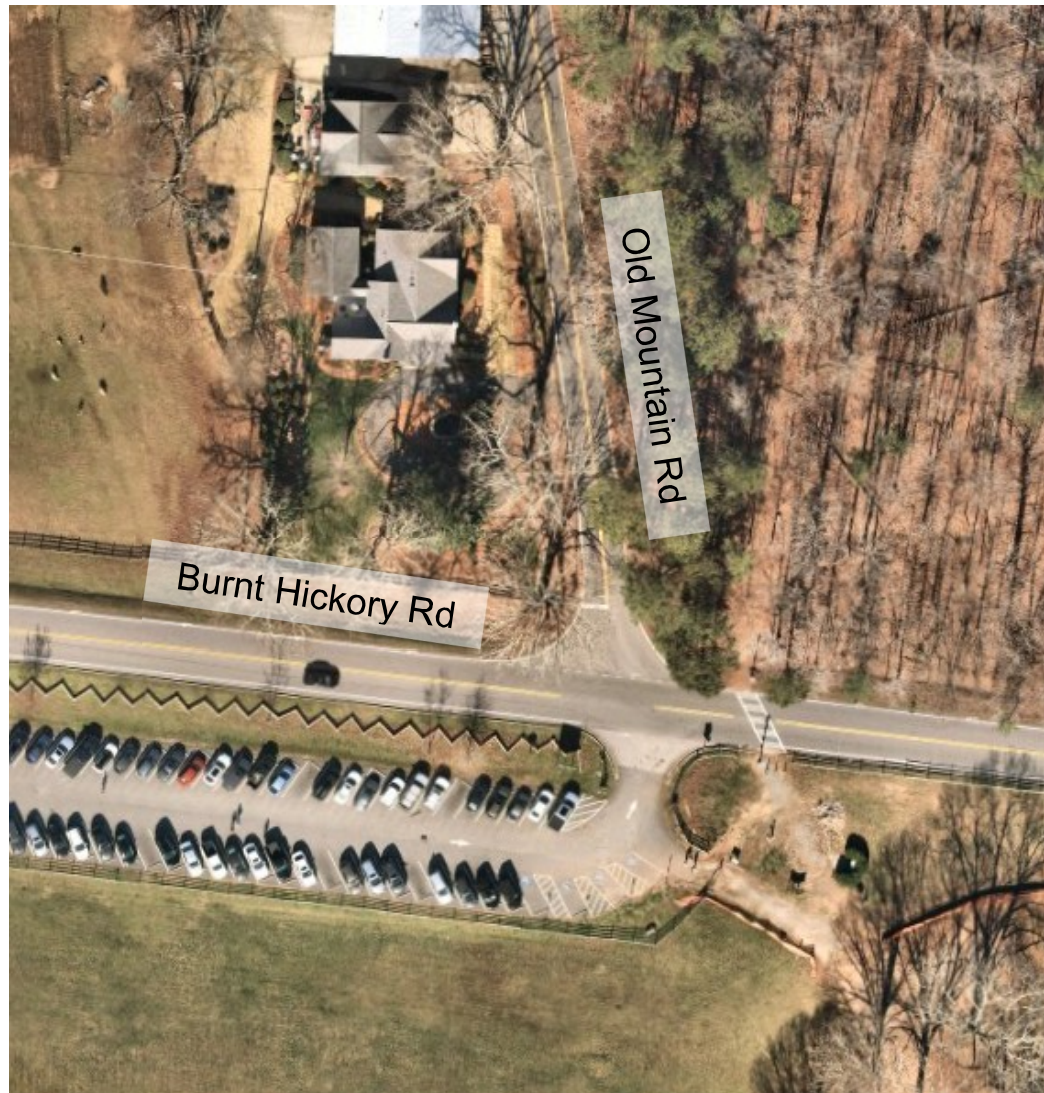


Figure 22: Aerial Imagery of Study Site 3 – Burnt Hickory Rd at Parking Lot



Figure 23: Aerial Imagery of Study Site 4 – Burnt Hickory Rd at ‘S’ Curve



4.5 Study Site 5 – Cheatham Hill Rd Horse Trailer Parking

Cheatham Hill Rd runs in the north-south direction and provides access to a horse trailer parking area north of the Powder Springs Rd intersection. There is a crosswalk striped at the trail crossing just north of the parking lot entrance. There are no traffic control devices in the study area except for a stop sign at the horse trailer parking lot exit for vehicles turning into Cheatham Hill Rd and a pedestrian/equestrian crossing warning sign with user-activated RRFBs at the crosswalk location. There is one crash reported within 250 feet of the trail crossing from 2017-2021: a rear end crash due to distracted driving from the driver at fault as shown in **Figure 24**.

Figure 25 shows an aerial image of Study Site 5.

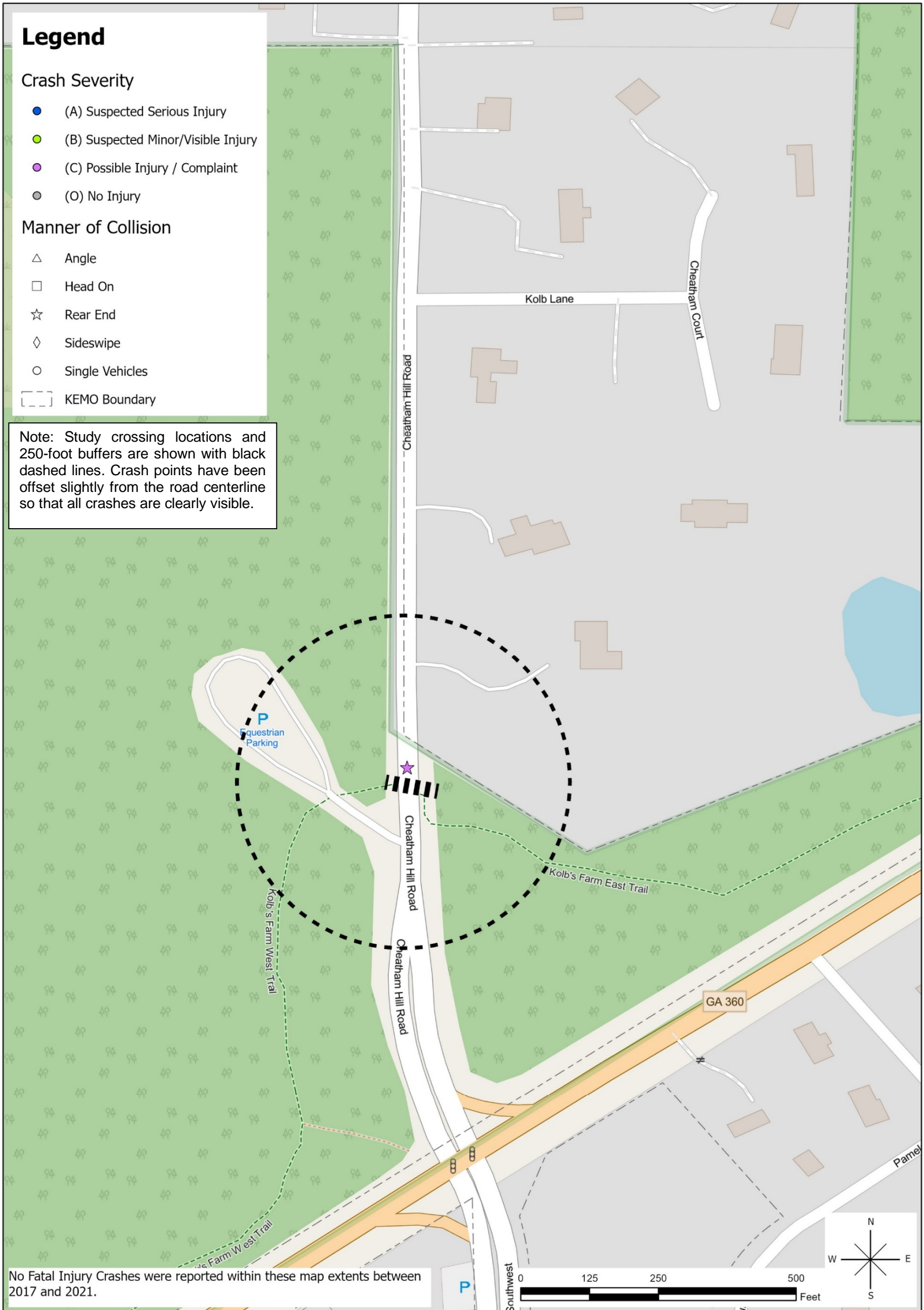


Figure 24: Crash Data at Study Site 5 – Cheatham Hill Rd Horse Trailer Parking



Figure 25: Aerial Imagery of Study Site 5 – Cheatham Hill Rd Horse Trailer Parking