

STEAM MILL ROAD



ROAD SAFETY AUDIT

COLUMBUS, GA



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Steam Mill Road

Road Safety Audit

Muscogee County, Georgia

Prepared for:

Columbus Consolidated Government (CCG)

Prepared by:

Stantec Consulting Services Inc. (Stantec)

Project Number: 171007024

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1.0 INTRODUCTION

1.1 Background

Effective vehicular and pedestrian programs often consider the six “E’s”:

- Evaluation – Review and analysis of crash data and information from surveys, walking audits, and other research to determine strategies for improving safety
- Engineering – Design of physical infrastructure to improve safety
- Enforcement – Engagement of law enforcement to patrol problem locations and increase community awareness of safety issues
- Education – Methods to teach motorists and pedestrians about their responsibilities and traffic rules
- Encouragement – Strategies that develop awareness and build enthusiasm for cycling and walking
- Equity – Consideration for the diverse needs of all roadway users

This Vehicular and Pedestrian Road Safety Audit (RSA) covers the first “E”, Evaluation. The RSA process identifies safety issues through an intensive and collaborative forum and uses brainstorming and local knowledge to enhance analysis findings in developing a range of improvement ideas. This preliminary RSA report provides a summary of the safety analysis of the Steam Mill Road corridor. A multi-disciplinary team performed the RSA, bringing a variety of perspectives to the study. Detailed crash data from the most recent five years along with extensive analyses was used to identify high crash patterns and/or rates throughout the study area to share with the study team.

1.2 Project Overview

Over the five-year period from 2015-2019 there have been 246 recorded accidents along Steam Mill Road and its intersecting streets. Four of these accidents resulted in fatalities, one of which involved a pedestrian being struck by a car just east of the Dimon Magnet Academy. The goal of this project is to provide recommendations for safety improvements that will protect pedestrian, bicycle, and vehicular traffic traveling on Steam Mill Road.

The project study area is the approximately 2.25-mile length of Steam Mill Road, which begins at Buena Vista Road and extends east to Pinecrest Drive. Steam Mill Road is a two-lane major collector road with an Average Annual Daily Traffic (AADT) of 4,325 vehicles per day (2020). Steam Mill Rd is a largely residential corridor with a few commercial businesses, churches, an elementary school, and a park along the corridor. The presence of the elementary school, churches, and the park make pedestrian facilities particularly important in order to provide safer routes for children walking along Steam Mill Road.

1.3 Road Safety Assessment Interdisciplinary Team

A multidisciplinary team was formed to evaluate safety needs on Steam Mill Road. The team consisted of engineers and planners from both CCG and Stantec. In order to stay safe during the COVID-19 pandemic, only small teams from Stantec participated in the field visits on April 14 and 16, 2020. Then, the Stantec team presented their findings to CCG in a joint discussion via Skype.

The members of the RSA team were as follows:

- Donna Newman – CCG Engineering Department
- Farhad Alifarhani – CCG Engineering Department
- Hannah Brown – CCG Engineering Department
- Kevin Khoo – CCG Engineering Department
- Lynda Temples – CCG Planning Department
- Mitchell Greenway – Stantec
- Mike Holt – Stantec
- Adam Smith – Stantec
- Stephen Hopper – Stantec
- Ben Keffer – Stantec
- Joshua Ekstedt – Stantec

1.4 Project Scope and Objectives

The purpose of this Road Safety Assessment (RSA) is to evaluate safety issues and other areas of concern along Steam Mill Road between Buena Vista Road and Pinecrest Drive including the intersections located along the route. The study identifies opportunities for improving bicycle, pedestrian, and vehicular safety.

The assessment has three basic components:

- Preassessment
 - Analyze crash data – Crash data over a five-year period was analyzed, with results based on different crash types and trends depicted through various charts, tables, and spreadsheets.
 - The audit team reviewed location characteristics and crash analysis
- Field meeting/Site visit
 - Due to the outbreak of COVID-19, it was not possible to do a traditional field visit that would involve the consultant team from Stantec, representatives from CCG, as well as other community stakeholders.
 - Instead, Stantec sent two teams to visit the project site while maintaining safe social distancing practices.
 - Once the field visits were complete, Stantec held a virtual field audit wherein Stantec presented the findings from the field visit to members of the CCG Engineering and Planning departments and recorded feedback and input from CCG staff.
- Post-assessment – the study team met to share findings and develop a list of issues and potential strategies.

2.0 EXISTING CONDITIONS

2.1 PROJECT LOCATION

The project study area is the approximately 2.25-mile length of Steam Mill Road, which begins at Buena Vista Road and extends east to Pinecrest Drive. Steam Mill Road is a two-lane major collector road in southeast Columbus, Georgia with an Average Annual Daily Traffic (AADT) of 4,325 vehicles per day (2020). Several neighborhoods are located along Steam Mill Road along with a few commercial businesses, churches, the Dimon Magnet Academy elementary school, and Shirley Winston Park.

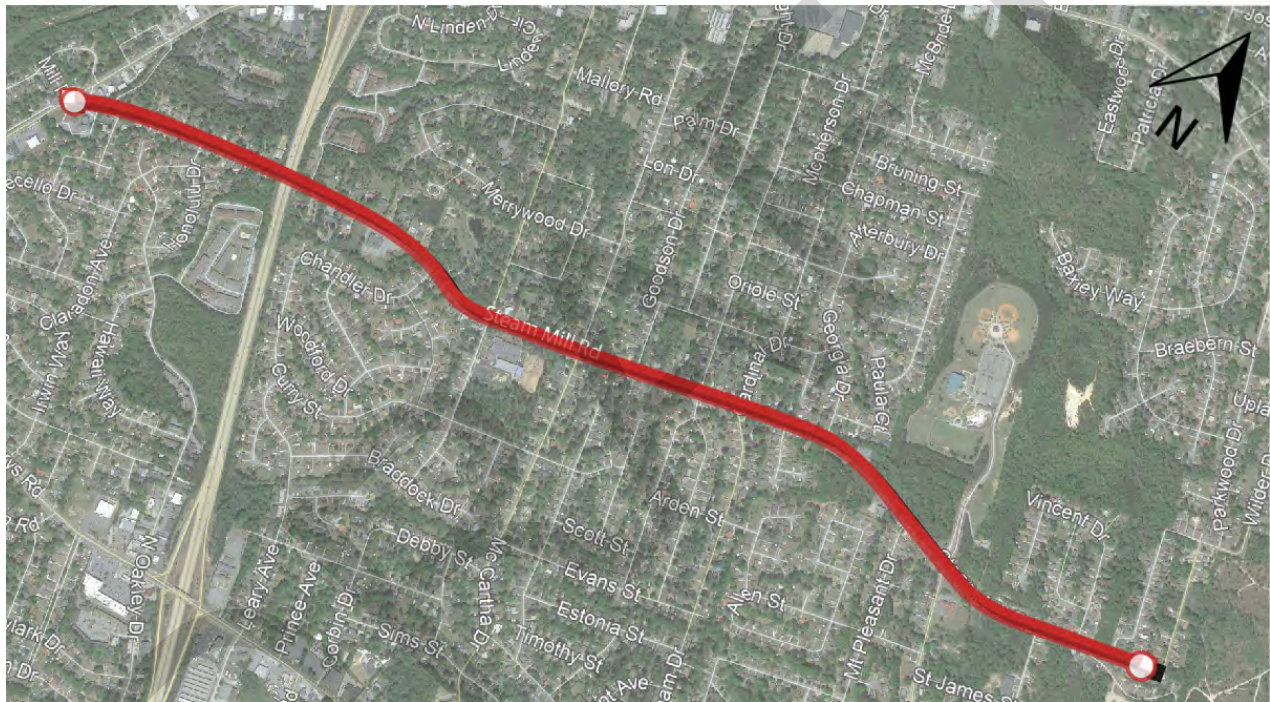


Figure 2.1.1- Project Study Area

2.2 KEY ORIGIN AND DESTINATION POINTS

Steam Mill Rd is mostly residential in nature, with a number of neighborhoods and higher density residential developments either on Steam Mill Rd itself or on connecting streets. There are also several community resources located along this corridor. There are several churches and a few local grocery stores present. Additionally, the Dimon Magnet Academy elementary school is located in the center of the corridor at the Dogwood Drive intersection. Due to COVID-19, this school was not in session during Stantec's field visit, so Stantec could not see how much traffic the school generated and how many students walked to and from school. However, Google Street View shows a number of students walking home from school. Therefore, ensuring that students have a safer route when walking to/from school will be one of the focuses of this report. Lastly, Shirley Winston Park is located at the eastern end of the study corridor. This park provides a number of amenities to the local community including a gymnasium, community room and kitchen, asphalt walking trails, a little league baseball complex and a football field. Providing safer access to this park and its amenities would certainly be of benefit to the community.

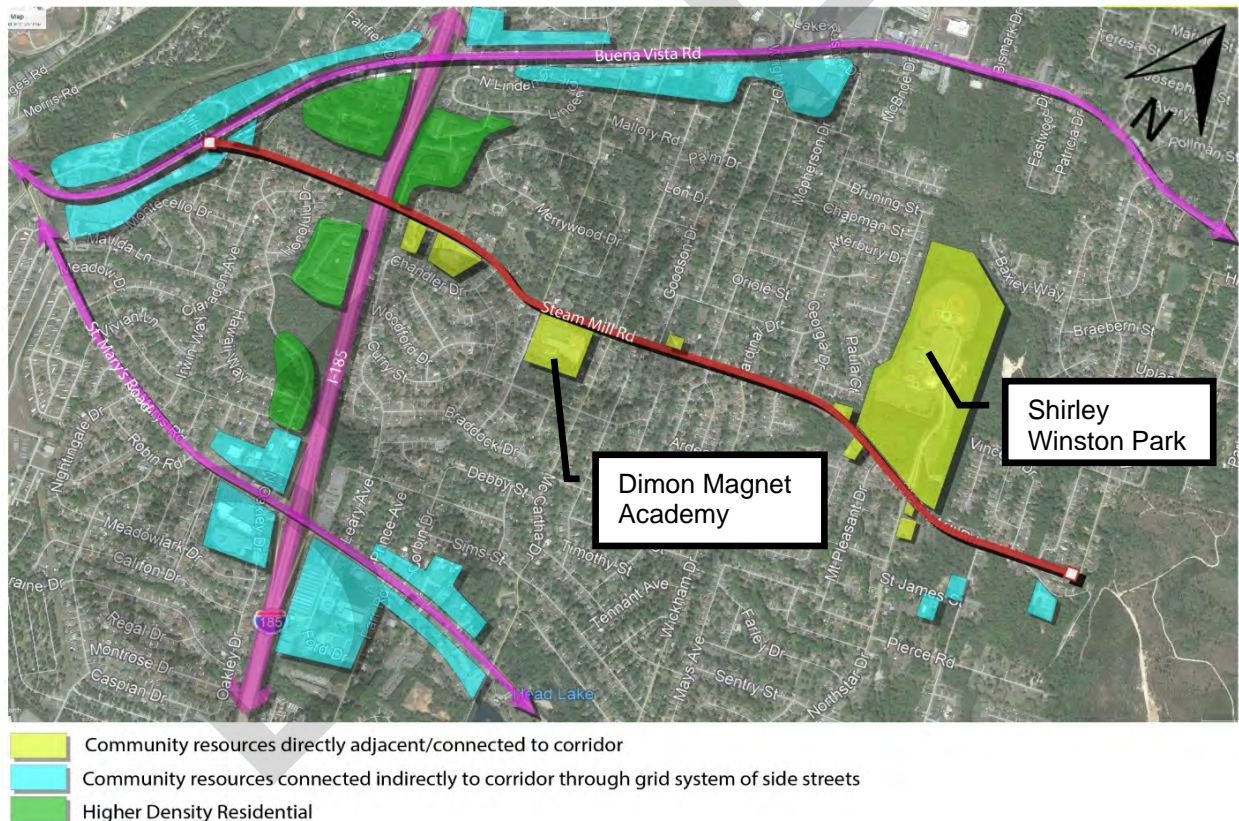


Figure 2.2.1- Key Destination Points

2.3 EXISTING ROADWAYS

Steam Mill Road is a two-lane major collector roadway that serves residential and commercial traffic. It has one lane in each direction of travel and additional left turn lanes at the Northstar Drive intersection. The posted speed limit along the corridor is 35 mph. Eastbound at St. John A.M.E. church the suggested speed limit drops to 25 mph for "Vehicles Entering the Road." The speed limit is also reduced to 25 mph during certain times of day for Dimon Magnet Academy school zone which stretches from west of Dogwood Drive to west of Goodson Drive. The eastern end of the project has a sharp 90-degree turn, which is signed for 15 mph. There are existing traffic signals at the intersections of Buena Vista Road, Dogwood Drive, and Northstar Drive.

There are no sidewalks along Steam Mill Road from Buena Vista Road to the I-185 overpass. Just east of the overpass the sidewalks switches from the westbound (WB) side of the road to the eastbound (EB) side of the road. However, there is a rectangular rapid flashing beacon (RRFB) crossing to allow pedestrians to cross to the EB side of the road with the sidewalk. Continuing east, sidewalks are present on at least one side of the road until Timberlane Drive. However, these sidewalks lack curb and gutter and are often at or below the level of the roadway. Designated pedestrian crossings are also limited, and existing crossings have inadequate facilities.

Key intersecting side streets include:

- **Buena Vista Road** is a principal arterial and is the western limit of the study area. Buena Vista Rd is a five-lane road north of Steam Mill Rd and a four-lane road south of Steam Mill Rd. The posted speed limit is 35 mph and 2018 AADT was 20,400 vehicles per day (vpd).
- **Dogwood Drive** is a two-lane major collector towards the center of the project study area. The posted speed limit is 30 mph. The 2018 AADT north of Steam Mill Road was 3,820 vpd.
- **Southern Pines/McCartha Drive** is a two-lane local road located east of the Dogwood Drive intersection. The posted speed limit is 30 mph. AADT data was not available.
- **Northstar Drive** is a two-lane local road located towards the eastern end of the study area. The posted speed limit is 35 mph. AADT data was not available for Northstar Drive.

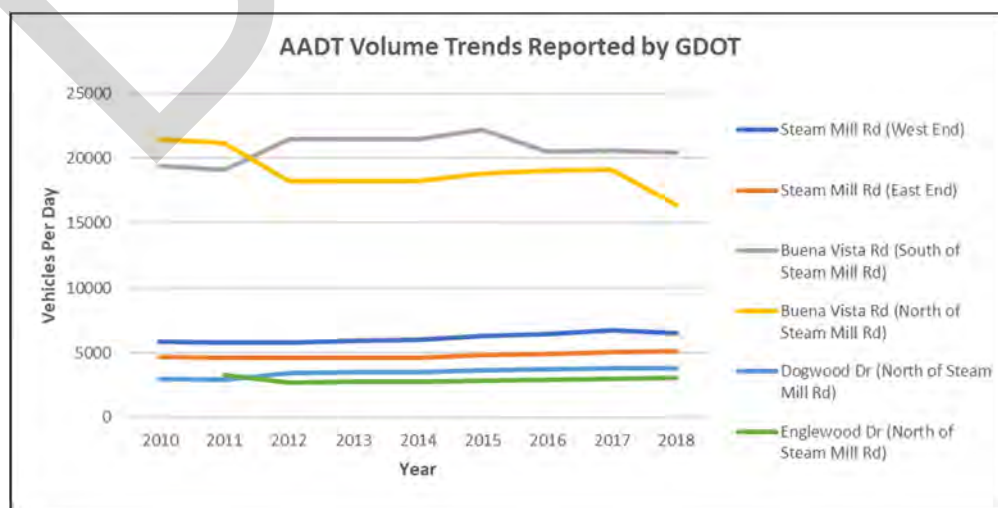


Figure 2.3.1 – AADT Volume Trends for Major Roads

As seen from Figure 2.3.1, GDOT's reported volumes for Steam Mill Rd and the surrounding area have been somewhat flat over the last 9 years. The drop in volumes from the western end of the project study area to the eastern end may be an indicator that most residents traveling along Steam Mill Rd primarily enter Steam Mill Rd from the western end which is nearer to Buena Vista Rd and access to I-185.

2.4 CRASH DATA

Crash data for the study corridor was provided by the Georgia Electronic Accident Reporting System (GEARS) for a five-year period between January 2015 and December 2019. The crash data supplied by GEARS was grouped by intersection, then was reviewed to identify trends in collision types and locations that experienced a high crash frequency. In total, there were 246 reported crashes along the entire route and side streets.

See summaries of the crash data in Figures 2.4.1 through 2.4.9 as well as in tabular form in Appendix A.

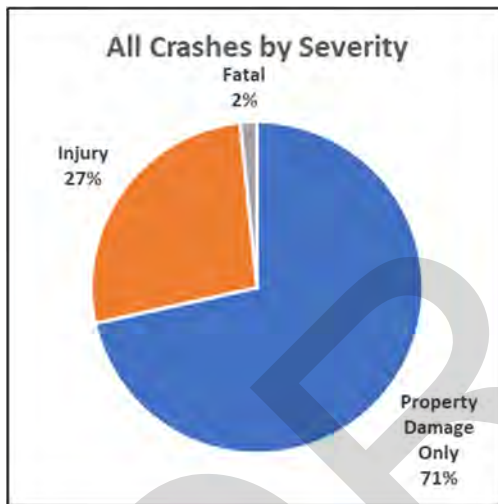


Figure 2.4.1- Steam Mill Rd Crashes by Severity

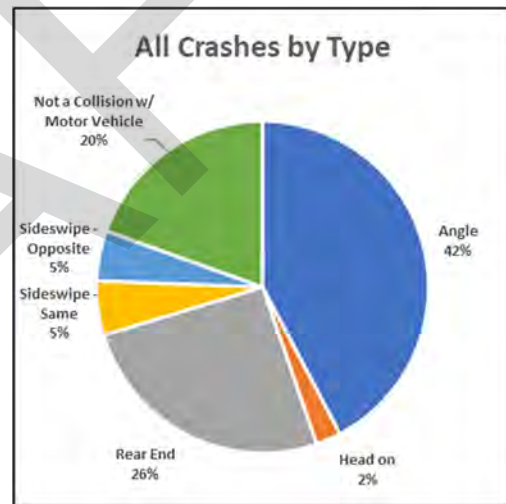


Figure 2.4.2- Steam Mill Rd Crashes by Type

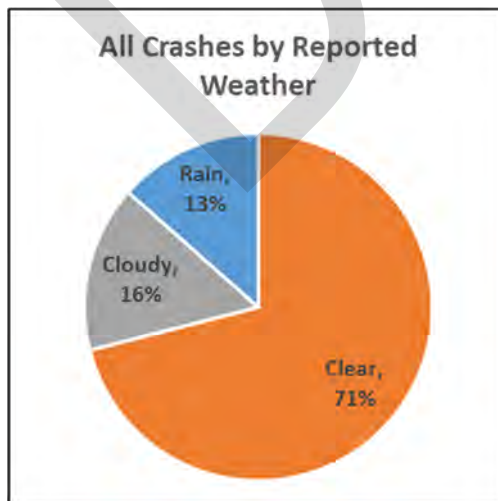


Figure 2.4.3- Steam Mill Rd Crashes by Weather

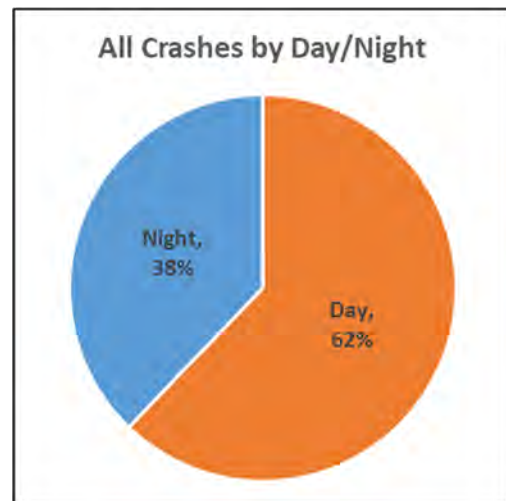


Figure 2.4.4- Steam Mill Rd Crashes by Day/Night

AUGUST 2020

Figure 2.4.1 depicts vehicle crashes by severity along the study area, which shows 27% of vehicular crashes resulted in injuries. Around 71% of the crashes were reported to be property damage only (PDO). Four fatalities caused by vehicular accidents were reported. One of the fatal collisions took place in front of the St. John A.M.E. Church, two of them occurred near the Dogwood Drive intersection, and the last occurred just west of Englewood Drive. One of the reported fatalities was a pedestrian who was struck near Dogwood Dr, in front of the elementary school. As seen in Figure 2.4.2, angle crashes are the most common type, at 42% of all crashes. Rear Ends and Collisions that are not with another vehicle are the 2nd and 3rd most common accident types, respectively. Figures 2.4.3 and 2.4.4 show that most crashes occurred during clear weather conditions and in the daytime.

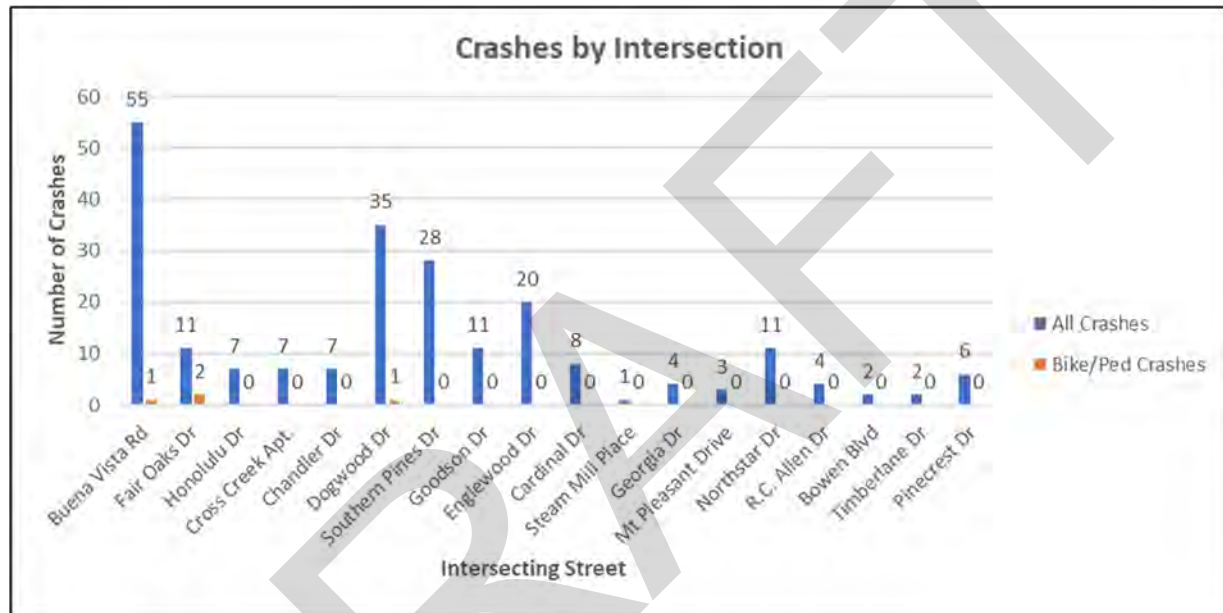


Figure 2.4.5- Steam Mill Rd Crashes by Intersection

From Figure 2.4.5, it is observed that the intersections of Buena Vista Road, Dogwood Drive, Southern Pines Drive/McCartha Drive, and Englewood Drive have the highest numbers of reported collisions along this corridor. Bicycle and pedestrian crashes were concentrated in the western half of the project, at Buena Vista Rd, Fair Oaks Drive, and Dogwood Drive. One of the bicycle/pedestrian crashes was reported as property damage only, two were reported as injuries, and the last was the aforementioned fatality east of Dogwood Drive.

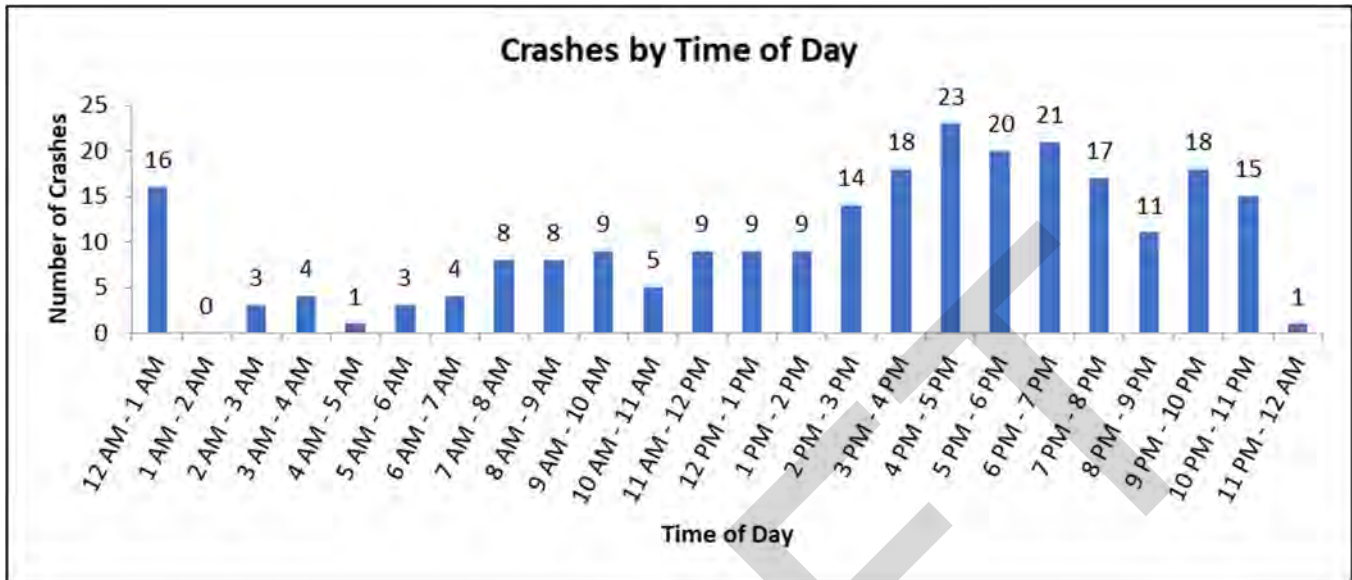


Figure 2.4.6- Steam Mill Rd Crashes by Time of Day

As seen in Figure 2.4.6, the number of reported crashes peaks in the afternoon period from 4-5 pm. Over 50% of the total crashes occur in the evening period from 3 pm to 10 pm. This is likely due to higher overall traffic volumes during the evening rush hour and drivers making maneuvers in and out of the numerous driveways located along Steam Mill Rd. The period from 12 AM - 1 AM is an outlier. The time was recorded by GEARS as 12 AM on nine reported crashes, which indicates a time may not have been properly recorded. While this study does not discount the importance of the conditions surrounding these crashes, the reported time period does not significantly factor into the analysis.

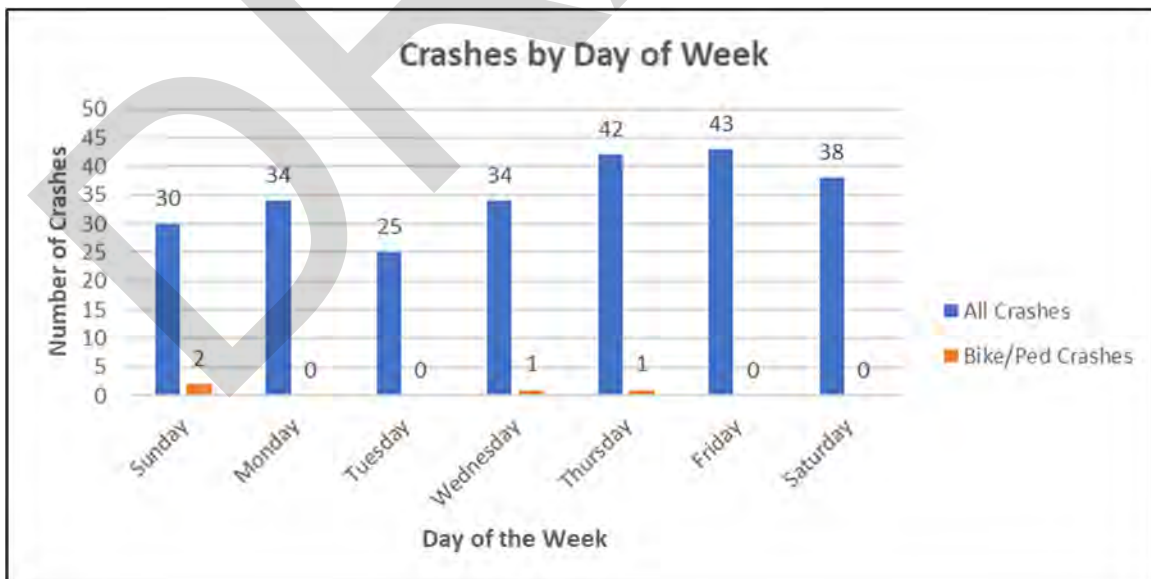


Figure 2.4.7- Steam Mill Rd Crashes by Day of the Week

As seen in Figure 2.4.7, the crashes are spread evenly throughout the week with a slight peak in the second half of the week from Wednesday through Saturday. Thursdays and Fridays recorded the highest number of crashes.

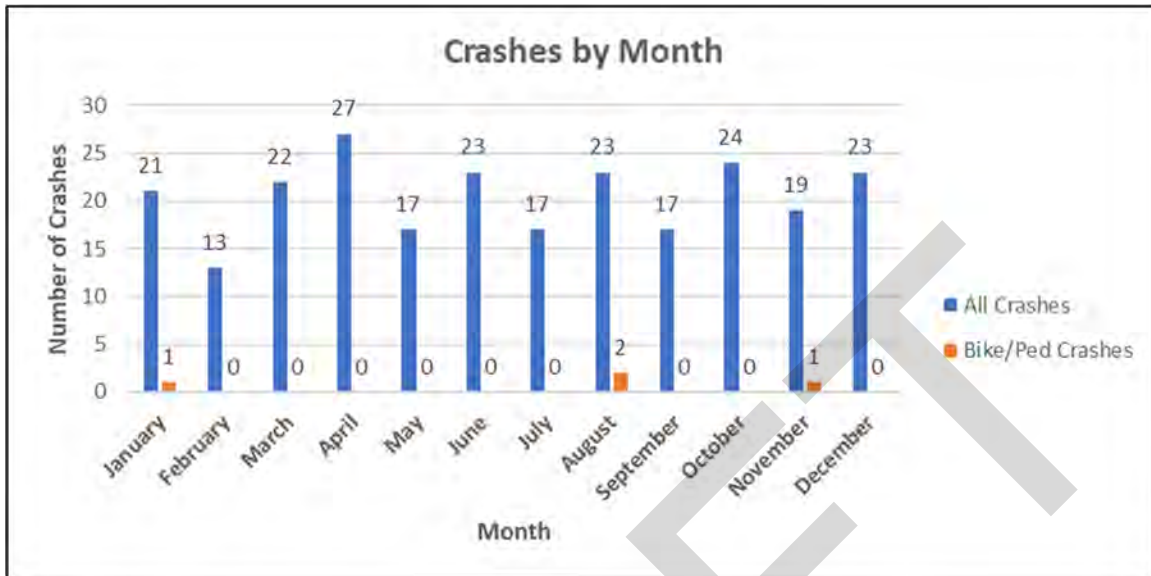


Figure 2.4.8- Steam Mill Rd Crashes by Month

Crashes by month are depicted in Figure 2.4.8. There is not a clear pattern in the rate of monthly crash reports. Most months reported between 17 and 24 collisions. February and April are the two outliers with February reporting the lowest number of collisions and April reporting the most.

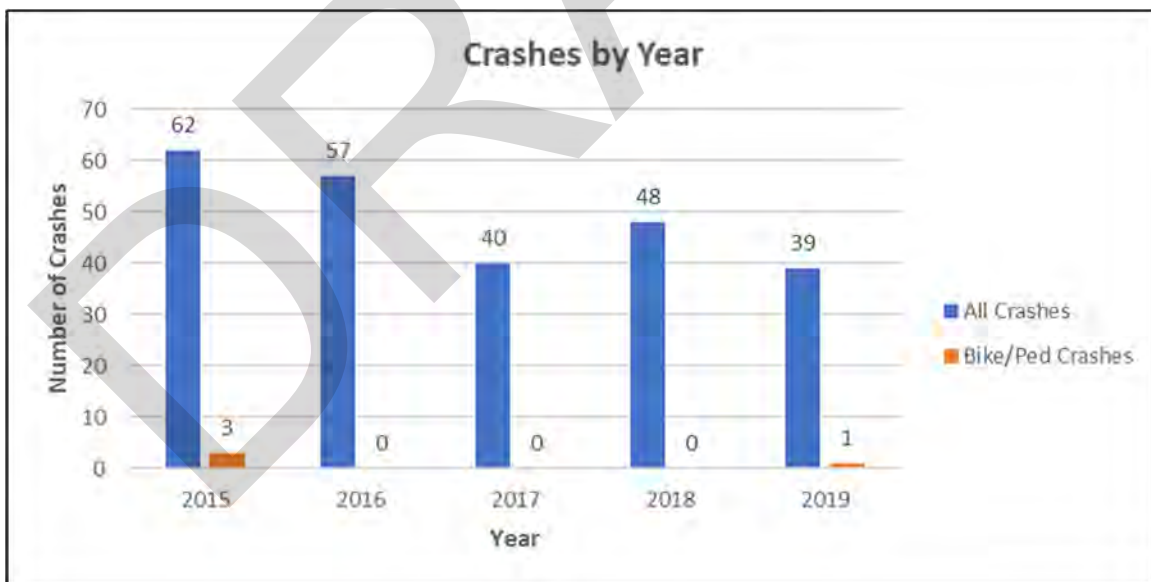


Figure 2.4.9- Steam Mill Rd Crashes by Year

Crashes by year are depicted in Figure 2.4.9. The number of reported collisions appears to be decreasing from 2015-2019, with a small uptick in 2018. Of the 4 reported bicycle and pedestrian collisions, three took place in 2015 and one took place in 2019.

2.5 VEHICLE SPEEDS

Speed counts were collected at 4 locations along Steam Mill Road on March 3rd and 4th of 2020. The results of these speed counts are presented in Figures 2.5.1 and 2.5.2 below. The speed limit of Steam Mill Road is 35 mph. As can be seen in the figures below, the average speed is around 35 mph in both directions. However, the measured 85th percentile speed was found to be as high as 46 mph, and the 95th percentile speed was found to be as high as 50 mph. This demonstrates that some drivers travel as much as 10-15 mph over the speed limit.

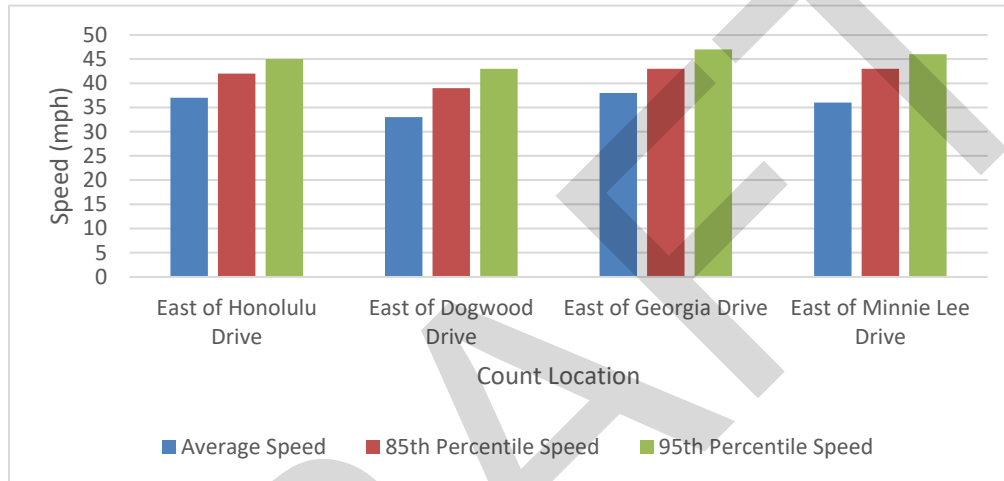


Figure 2.5.1- Eastbound Speeds on Steam Mill Road

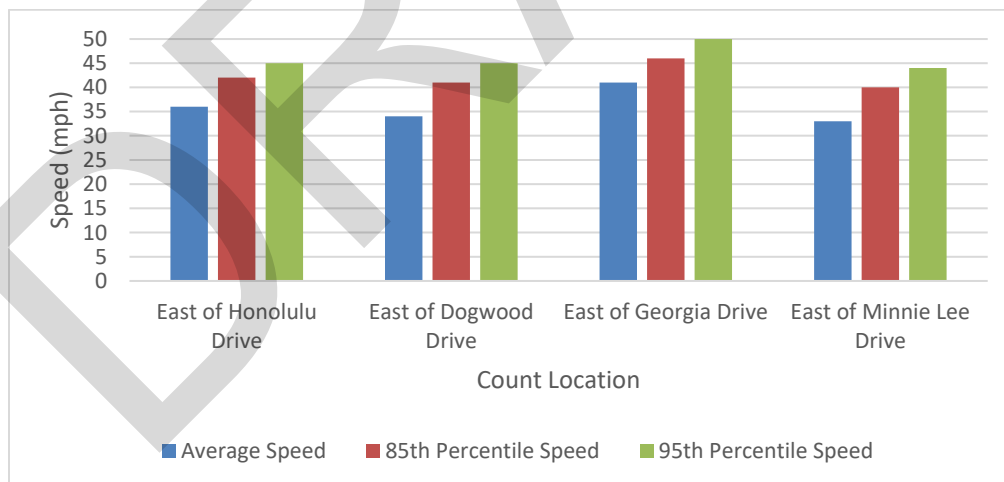


Figure 2.5.2- Westbound Speeds on Steam Mill Road

Speeding vehicles is one of the complaints that CCG receives most frequently in regard to Steam Mill Road. Indeed, both field visit teams reported observing vehicles that were traveling at high rates of speed that appeared to be above the speed limit. The nature of the fatal collisions that were reported on this corridor highlight the impact that high speeds can have in increasing the severity of the collisions. The presence of numerous driveways with sight distance issues along Steam Mill Rd further compound the risk posed by speeding vehicles. Providing infrastructure that slows down these speeding vehicles should help protect vehicular, pedestrian, and bicycle travel along the corridor.

2.6 RECENT AND PLANNED IMPROVEMENTS

No recent or planned improvements to Steam Mill Rd have been identified. However, there are improvements planned on Buena Vista Rd north and south of Steam Mill Rd.

GDOT Project ID # 0011436

This project extends along Buena Vista Rd from MLK Jr. Blvd to St Mary's Rd. It involves the road realignment of the existing 5-leg intersection, the construction of an overpass of the Norfolk Southern Railroad Crossing and the reconstruction of the Buena Vista Rd bridge over Bull Creek. This project is currently listed as under construction on the GDOT's GeoPI website. Given that this project is located less than half of a mile from the study corridor, it is likely to have impacts traffic traveling to and from the study corridor.

GDOT Project ID # 0012577

The purpose of this project was to reconstruct the I-185 at Buena Vista Rd interchange as a Diverging Diamond Interchange. Its current status is listed as rejected on GDOT's GeoPI website. Located approximately half a mile north of the Buena Vista Rd at Steam Mill Rd intersection, this project proposed realigning Steam Mill Road so that it would meet Buena Vista Road at a right angle and be in line with Parkchester Drive (See Figure 2.6.1 below). Left-turn and right-turn lanes would be added to the northbound approach of Buena Vista Road and an additional approach lane would be added to Steam Mill Road. Last, realigning Steam Mill Road would move it away from the Top Notch Customs autobody shop that is currently located in the intersection but has no designated traffic signal.

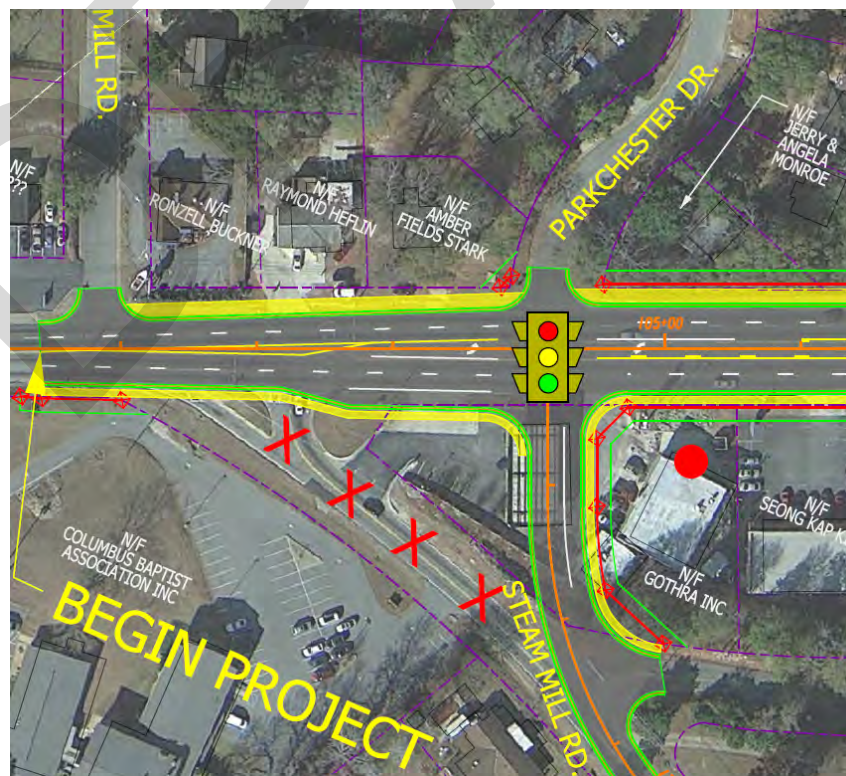


Figure 2.6.1- Steam Mill Rd Redesign in GDOT Project #0012577

2.7 EXISTING ROADWAY SAFETY FEATURES

While conducting the RSA, the study team noted positive features of the existing roadway, including the following.

- The RRFB at the Cross Creek Apartments driveway provides a safer crossing for pedestrians where the sidewalk switches sides of Steam Mill Rd.
- Flashing signs for school zone speed limit signs should make it clear where and when the school zone speed limit is in effect.

3.0 FINDINGS AND POTENTIAL IMPROVEMENTS

3.1 CORRIDOR FINDINGS

NEW STRIPING WITH HIGH-BUILD PAINT OR THERMOPLASTIC



Faded crosswalk at Chandler Drive intersection

FINDINGS:

In many locations along the corridor, crosswalks, stop bars, and other striping are faded or incomplete due to repaving.

POTENTIAL IMPROVEMENTS:

Consider restriping markings along the corridor using either High-Build Paint or Thermoplastic, which is more reflective. This will better delineate the centerlines, edge lines, stop bars, and crosswalks during low light conditions. These materials also have a longer lifespan, so the new striping would not have to be replaced as frequently.

REPLACE EXISTING SIGNS WHICH DO NOT MEET MUTCD STANDARDS

Old School Crossing Sign at Southern Pines Drive/McCartha Drive Intersection

FINDINGS:

Along the corridor, signs were spotted which do not conform to the standards set in the Manual on Uniform Traffic Control Devices (MUTCD). There are old, faded signs with poor retroreflectivity as well as signs which are mounted below the MUTCD recommended heights or with incorrect offsets from the travel way.

POTENTIAL IMPROVEMENTS:

Consider replacing these faded signs with new signs made of MUTCD approved materials. These newer signs have better retroreflectivity for visibility in low light conditions. Additionally, consider replacing these signs with new signs mounted at the MUTCD recommended heights. This should improve visibility and put them at a safe height for pedestrians.

REMOVE VEGETATION THAT IS OBSCURING TRAFFIC SIGNS AND DECREASING SIGHT DISTANCE

Vegetation blocking view at Cross Creek Apartments Driveway

FINDINGS:

At various points along the corridor, vegetation has grown to a point where it hides signs from view or reduces sight distance at intersections

POTENTIAL IMPROVEMENTS:

Consider removing vegetation that blocks signs or reduces sight distance at intersections and driveways.

PEDESTRIAN LIGHTING

Streetlamp above sidewalks at Cross Creek Apartments driveway

FINDINGS:

While streetlamps are located along the corridor, their spacing and overgrown vegetation has limited their effectiveness in lighting the roadway and sidewalks.

POTENTIAL IMPROVEMENTS:

Consider installing shorter streetlamps at shorter intervals alongside pedestrian facilities for the entire length of the corridor. Shorter streetlamps with a closer spacing will provide pedestrian lighting that will make pedestrians more visible to motorists and make pedestrians feel safer.

SHARED USE PATH

Example of a Shared Use Path

FINDINGS:

Sidewalks are not consistently available along the corridor. Additionally, there are no bicycle facilities anywhere on Steam Mill Road.

POTENTIAL IMPROVEMENTS:

Consider constructing a 10-foot wide shared use path along the length of Steam Mill Road. This would allow pedestrians to walk the length of Steam Mill Road without having to cross Steam Mill Road. It would also provide cyclists with a safe way to travel Steam Mill Road.

CONTINUOUS SIDEWALK ALONG THE CORRIDOR

Sidewalk terminates at the western end of the I-185 overpass



Example of a Sidewalk with a buffer and curb and gutter

FINDINGS:

Sidewalks are lacking west of the bridge over I-185. East of I-185, sidewalks are present on one or both sides of Steam Mill Road until Timberlane Drive.

POTENTIAL IMPROVEMENTS:

- Option 1: Fill in sidewalk gaps along the corridor, particularly west of the I-185 overpass bridge to provide pedestrian facilities to Buena Vista Road. This would remove the need for pedestrians to walk in the grass alongside Steam Mill Rd.
- Option 2: Construct a 5-ft sidewalk on the northside of Steam Mill Road from Buena Vista Road to Pinecrest Drive. This sidewalk should be offset at least five feet from the roadway. If this sidewalk is to be incorporated into the Complete Streets Corridor Redesign, then offset this sidewalk by twelve and a half feet so that this sidewalk does not need to be reconstructed.
- Option 3: Construct a 5-ft sidewalk on the northside of Steam Mill Road from Buena Vista Road to Pinecrest Drive. Build Curb and Gutter for the length of Steam Mill Road and offset the new sidewalk from the curb by three feet.

3.2 INTERSECTION SPECIFIC FINDINGS

STEAM MILL ROAD AT BUENA VISTA ROAD



Aerial view of Steam Mill Road at Buena Vista Road



Crosswalk without connecting ADA ramps or sidewalks



Crosswalk without connecting ADA ramps or sidewalks

FINDINGS:

- Skew of east leg of intersection is dangerous, which may contribute to the large number of collisions reported at this intersection.
- Crosswalks are present across the eastern approach of the intersection, but there are no sidewalks or ADA ramps for these crosswalks
- Just east of the Mission Columbus driveway, there is a large drainage structure which is near enough to the roadway that it has clearly been struck by vehicles in the past.

POTENTIAL IMPROVEMENTS:

- If sidewalks are provided along Steam Mill Rd up to the Buena Vista Rd intersection, then consider adding sidewalks across the eastern approach of the intersection to allow pedestrians to traverse the Buena Vista Rd intersection more safely.
- Consider realigning Steam Mill Road and reconstructing this intersection per the concept in GDOT project ID # 0012577.
- Consider rebuilding the drainage structure located east of the Mission Columbus driveway. If curb and gutter is extended to the Buena Vista Rd intersection, then it could be rebuilt as a 1033D catch basin in the curb.

STEAM MILL ROAD AT FAIR OAKS DRIVE

Drainage issues on the northern leg of Fair Oaks Dr



View blocked by vegetation looking east from northern leg of Fair Oaks Drive

FINDINGS:

- Drainage issues on the north leg of Fair Oaks Dr may prompt the need of drainage structures.
- Blocked visibility looking east from the northern leg and looking west from the south leg.

POTENTIAL IMPROVEMENTS:

- Consider clearing back all vegetation back to the right of way to improve visibility.
- Consider altering the cross slopes and shoulder of the northern leg of Fair Oaks Drive, or installing storm drainage structures, to reduce ponding.

STEAM MILL ROAD AT HONOLULU DRIVE



Low visibility looking west from Honolulu Drive



Low visibility looking east from Honolulu Drive

FINDINGS:

- Poor visibility looking east and west from Honolulu Dr.
- Visibility issues can be further exacerbated by vehicles parking in the de facto parking lane on the southern side of Steam Mill Rd.

POTENTIAL IMPROVEMENTS:

- Consider moving the stop sign and stop bar closer to Steam Mill Road to improve visibility.
- Consider prohibiting street parking where Steam Mill Rd widens within a certain distance of all side streets

STEAM MILL ROAD AT CROSS CREEK APARTMENTS DRIVEWAY



Low visibility looking east from Cross Creek Apartments Driveway

FINDINGS:

- Vegetation reduces sight distance looking east from Cross Creek Apartments driveway.

POTENTIAL IMPROVEMENTS:

- Consider moving stop bar and stop sign closer to Steam Mill Road.
- Consider trimming vegetation back to ROW to improve visibility.

STEAM MILL ROAD AT CHANDLER DRIVE



Lack of stop bar at Chandler Drive approach

FINDINGS:

No stop bar present for the Chandler Dr approach.

POTENTIAL IMPROVEMENTS:

Consider adding a stop bar for the Chandler Dr approach.

STEAM MILL ROAD AT DOGWOOD DRIVE



Drop off behind sidewalk on the southwest corner



View looking north from southern leg

FINDINGS:

- There is a dangerous drop off behind the sidewalk on the southwest corner.
- Two of the reported fatal collision took place near this intersection. One took place west of the intersection when a WB driver left the road and struck a headwall. The second happened east of the intersection when a driver left the road and struck a pedestrian. In both cases, high speeds may have led to the drivers losing control. In which case slowing down drivers at this section of Steam Mill Rd may improve safety.
- The pedestrian signal buttons on the northwest corner, where there is no sidewalk, is a few feet away from the pavement behind a grass ditch, making it difficult to access.
- The signal poles and signal cabinet all appear to be within the clear zone.
- The north and south legs drop away sharply as they leave the intersection. The crosswalk across the north leg is not visible from the south leg and vice versa. This is especially concerning at this location since the elementary school is located at this intersection.



Pedestrian signal buttons on northwest corner of intersection



Signal pole and cabinet on the southeast corner of the intersection

POTENTIAL IMPROVEMENTS:

- Consider relocating pedestrian signal buttons on the northwest corner to make them more accessible.
- Consider the following two options to address the drop off behind the southwest corner of the intersection.
 - Option 1: Construct galvanized steel guardrail on the southwest corner of the intersection.
 - Option 2: Regrade the slope behind the southwest corner to flatten the drop off.
- Consider placing guard railing behind the sidewalks on the southwest corner of the intersection to protect drivers and pedestrians from going down
- Consider constructing ADA compliant curb ramps at all four corners of the intersection.
- Consider rebuilding this intersection as a single-lane roundabout. The roundabout would make it safer for pedestrians crossing Steam Mill Rd at this intersection and act as a traffic calming measure.
 - Reconstructing the intersection as a roundabout would involve extensive changes, including turning the northern leg into a cul-de-sac and redirecting traffic from this leg to Southern Pines Dr.

STEAM MILL ROAD AT SOUTHERN PINES DRIVE & MCCARTHA DRIVE



Corner of intersection without ADA compliant curb ramps



Northwest corner of intersection with no receiving sidewalks or curb ramps



Westward view from south leg of intersection



Southern Pines Drive Approach

FINDINGS:

- Ramps at this intersection are currently not ADA compliant.
- No receiving sidewalk or ADA curb ramps on northwest corner despite crosswalks being present at this corner.
- Low visibility when looking west from the south leg.
- Wide lanes and median create a long crosswalk across Southern Pines Drive.

POTENTIAL IMPROVEMENTS:

- Consider constructing ADA compliant ramps at all corners with sidewalk and crosswalks.
- Consider constructing sidewalk on the northwest corner of the intersection to provide a safe place for pedestrians to wait before crossing the street.
- For the southern leg, consider trimming back vegetation to the ROW to improve visibility.
- Consider extending the Southern Pines Drive median closer to Steam Mill Road and incorporate corner bulb-outs at the intersection to reduce speeds and shorten the pedestrian crossing distance.
- Consider reconfiguring the Southern Pines Drive/McCartha Drive intersection as a single-lane roundabout. This will improve safety at this intersection and allow it to handle increased volumes if Dogwood Drive is reconstructed as a roundabout.

STEAM MILL ROAD AT GOODSON DRIVE

Goodson Drive approach to Steam Mill Road

FINDINGS:

- No stop bar for Goodson Dr approach.

POTENTIAL IMPROVEMENTS:

- Consider adding a thermoplastic stop bar to Goodson Dr approach.

STEAM MILL ROAD AT ENGLEWOOD DRIVE & VICTORIA DRIVE

Eastward view from Englewood Drive blocked by crest

FINDINGS:

- There is a crest east of Englewood Dr that creates a sight distance hazard for vehicles entering/exiting Steam Mill Rd. This crest may have played a part in one of the fatal collisions which occurred along this corridor by blocking the vision of an EB vehicle turning left from Steam Mill Rd onto Englewood Dr and another vehicle heading west on Steam Mill Rd.

POTENTIAL IMPROVEMENTS:

- For the crest causing sight distance issues:
 - Option 1: Consider changing the vertical alignment of Steam Mill Rd to lower the crest and thereby improve visibility.
 - Option 2: Consider constructing traffic calming measures such as planted medians or chicanes in order to slow traffic traveling over the crest. At lower speeds, the crest may not pose a significant sight distance issue.

STEAM MILL ROAD AT CARDINAL DRIVE & WICKHAM DRIVE



Wickham Drive approach without stop bar

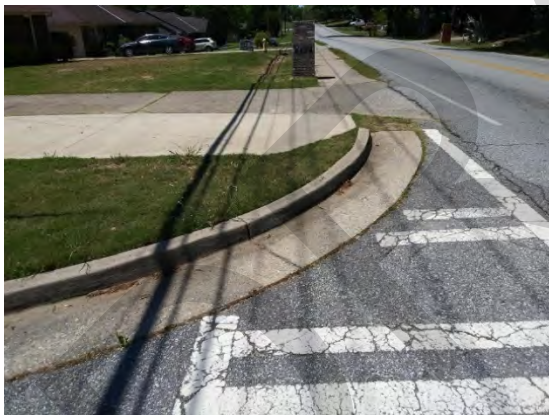
FINDINGS:

- Missing stop bars at the north and south approaches to this intersection.

POTENTIAL IMPROVEMENTS:

- Consider adding thermoplastic stop bars to both approaches.

STEAM MILL ROAD AT STEAM MILL PLACE



Southwest corner of intersection without curb ramp

FINDINGS:

- Missing stop bar at approach.
- Due to presence of driveways at each corner, there are no ADA compliant curb ramps for the Steam Mill Place approach.

POTENTIAL IMPROVEMENTS:

- Consider adding thermoplastic stop bar at Steam Mill PI approach.
- Consider constructing ADA compliant ramps at both corners of this intersection

STEAM MILL ROAD AT GEORGIA DRIVE



Sidewalk terminating at first driveway west of Georgia Dr

FINDINGS:

- The sidewalk on the westbound side of the road terminates at the first driveway just west of Georgia Drive. If pedestrians wish to continue traveling west on a sidewalk, then they must cross Steam Mill Rd without a marked crosswalk.

POTENTIAL IMPROVEMENTS:

- Consider providing a crosswalk where the westbound sidewalk ends to allow pedestrians to cross more safely. Dedicated ramps and warning surfaces would also be required.
- Alternatively, consider continuing the sidewalk so that a crossing is not required at this point.

STEAM MILL ROAD AT MOUNT PLEASANT DRIVE



Stop sign placement and street parked car at Mt. Pleasant Drive

FINDINGS:

- No stop bar is present, and the stop sign is so far back that if a driver were to stop at the stop sign that it, they cannot see approaching vehicles on Steam Mill Rd.
- Potential street parking east of Mt. Pleasant Dr could further hinder visibility.

POTENTIAL IMPROVEMENTS:

- Consider moving the stop sign closer to Steam Mill Rd and add a stop bar.
- Consider changing the striping east of Mt Pleasant Drive to remove space for street parking.

STEAM MILL ROAD AT NORTHSTAR DRIVE



Pedestrian signal buttons on Southwest Corner



Crossing of right turn lane without crosswalk



Crossing of western leg without receiving curb ramp or sidewalk



Curb ramps across Shirley Winston Park Driveway without ADA warning surfaces

FINDINGS:

- Southwest Corner
 - Buttons for pedestrian signal are too far from sidewalk. Buttons are also on the wrong side of the pole.
- Northwest Corner
 - Sidewalk crossing of the southbound right turn lane has curb ramps but no marked crosswalk.
- Curb ramps lack warning surface and are therefore not ADA compliant.
 - No receiving curb ramp for crossing from southwest corner of intersection to northwest corner of intersection.

POTENTIAL IMPROVEMENTS:

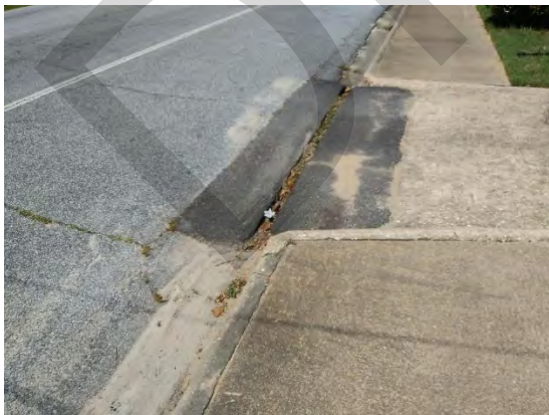
- Consider providing a marked crosswalk across the southbound right turn lane.
- Consider constructing a receiving curb ramp on northwest corner of intersection.
- Consider replacing pedestrian signal and buttons on southwest corner of intersection. Check other pedestrian signal buttons to confirm they are all at correct height and alignment.
- Consider replacing the signalized intersection with a single-lane roundabout. This will reduce delays and air pollution. It also slows travel speeds and allows pedestrians to cross more safely.

STEAM MILL ROAD AT R.C. ALLEN DRIVE

Stop sign placement at R.C. Allen Drive



Large realty sign west of R.C. Allen Drive



Sidewalk crossing of driveway near R.C. Allen Drive

FINDINGS:

- No stop bar is present, and the stop sign is so far back that if a driver were to stop at the stop sign that it, they cannot see approaching vehicles on Steam Mill Rd.
- On street parking near R.C. Allen drive and Bow
- Visibility is further reduced by the presence of a large realty sign.
- Sidewalk on the northside of the intersection is sloped towards the road, which is especially steep at the driveways. The driveway crossings for this sidewalk are not ADA compliant.

POTENTIAL IMPROVEMENTS:

- Consider moving the stop sign closer to Steam Mill Rd and adding a stop bar.
- Consider moving the realty sign to improve visibility.
- Consider reconstructing the driveway crossings for the sidewalk to bring them to ADA compliance.

STEAM MILL ROAD AT BOWEN BOULEVARD



Bowen Boulevard approach without stop bar



Curb ramp angled toward Steam Mill Road at Bowen Boulevard



Drainage structure which reportedly floods during storms

FINDINGS:

- No stop bar is present.
- The curb ramps for the sidewalk crossing Bowen Boulevard are angled towards Steam Mill Rd instead of being angled towards the crosswalk. The ramps are angled towards Steam Mill Rd due to the presence of drainage structures at the corners.
- During the field visit, the resident of the house on the northwest corner of the intersection informed Stantec's team that the drainage structure on the northwest corner of the intersection overflows when it rains, which apparently produces a bad smell.

POTENTIAL IMPROVEMENTS:

- Consider adding a thermoplastic stop bar
- Consider reconstructing the drainage structures and curb ramps at the corners to provide ADA curb ramps which are properly aligned. Confirm that reconstructed drainage structures are properly sized and constructed to avoid overflow.

STEAM MILL ROAD AT TIMBER LANE DRIVE

Placement of stop sign at Timberlane Drive

FINDINGS:

- No stop bar is present, and the stop sign is so far back that if a driver were to stop at the stop sign that it, they cannot see approaching vehicles on Steam Mill Rd.

POTENTIAL IMPROVEMENTS:

- Consider moving the stop sign closer to Steam Mill Rd and add a stop bar.
- Consider trimming back vegetation to the ROW to improve visibility.

STEAM MILL ROAD AT PINECREST DRIVE

Pinecrest Drive approach to Steam Mill Road

FINDINGS:

- Vegetation combined with the sharpness of the curve makes it difficult to see around the corner, which poses a threat to any modes of travel going around this corner.

POTENTIAL IMPROVEMENTS:

- Consider trimming back vegetation to improve visibility.
- Consider providing sidewalk around this curve to give pedestrians a safe place to walk while rounding this corner.
- Consider adding flashing lights for the SB and EB approaches to this intersection to alert drivers to the sharp curve ahead.

APPENDIX A: CRASH TABLES

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Table A.1 Study Area Collisions

Date	Time	Route	Intersecting Route	Collision Type	Injuries	Fatalities	Vehicle 1 Type	Vehicle 2 Type	Weather
1/3/2015	10:40:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
1/13/2015	5:08:00 AM	FAIR OAKS DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Sports Utility Vehicle (SUV)	N/A	Clear
1/15/2015	7:05:00 PM	STEAM MILL RD	BOWEN BLVD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Rain
1/16/2015	11:35:00 AM	BUENA VISTA RD	STEAM MILL RD	Rear End	3	0	0 Pickup Truck	Passenger Car	Clear
1/18/2015	5:15:00 PM	BUENA VISTA RD	PARKCHESTER DR	Not A Collision with Motor Vehicle	0	0	0 N/A	Sports Utility Vehicle (SUV)	Clear
1/19/2015	5:15:00 PM	GEORGIA DR	STEAMMILL RD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
1/24/2015	4:07:00 PM	3512 BUENA VISTA RD		Angle	0	0	0 Passenger Car	Passenger Car	Clear
2/22/2015	9:29:00 PM	STEAM MILL RD	FAIR OAKS DR	Angle	0	0	0 Passenger Car	Passenger Car	Rain
3/3/2015	9:50:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	2	0	0 Passenger Car	Passenger Car	Cloudy
3/6/2015	11:00:00 PM	STEAM MILL RD	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
3/19/2015	4:35:00 PM	STEAM MILL RD	ENGLEWOOD DR	Rear End	0	0	0 Passenger Car	Passenger Car	Cloudy
3/21/2015	12:00:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
4/11/2015	6:30:00 AM	WICKHAM DR	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Cloudy
4/11/2015	10:55:00 PM	STEAM MILL RD	BUENA VISTA RD	Rear End	0	0	0 N/A	Passenger Car	Clear
4/12/2015	6:45:00 PM	MCCARTHA DR	STEAM MILL RD	Rear End	0	0	0 N/A	N/A	Rain
4/15/2015	6:00:00 PM	WICKHAM DR	STEAM MILL RD	Sideswipe-Opposite Direction	0	0	0 Pickup Truck	Sports Utility Vehicle (SUV)	Clear
4/20/2015	5:20:00 PM	STEAM MILL RD	MCCARTHA DR	Angle	4	0	0 Sports Utility Vehicle (SUV)	Sports Utility Vehicle (SUV)	Clear
4/29/2015	11:25:00 AM	DOGWOOD DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Bus	N/A	Rain
5/9/2015	9:17:00 PM	STEAM MILL RD	DOGWOOD DR	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
5/25/2015	10:03:00 AM	STEAM MILL RD	CHANDLER DR	Sideswipe-Opposite Direction	2	1	0 Passenger Car	Passenger Car	Cloudy
6/12/2015	10:20:00 PM	STEAM MILL RD	FAIR OAKS DR	Angle	2	0	0 Passenger Car	Passenger Car	Rain
6/15/2015	1:05:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	0 Sports Utility Vehicle (SUV)	Pickup Truck	Clear
6/20/2015	9:00:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	2	0	0 Pickup Truck	Sports Utility Vehicle (SUV)	Clear
7/8/2015	12:00:00 PM	STEAM MILL RD	CHANDLER DR	Angle	0	0	0 Passenger Car	Other	Clear
7/17/2015	9:40:00 AM	DOGWOOD DR	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
7/23/2015	9:45:00 AM	STEAM MILL RD	CHANDLER DR	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
8/6/2015	7:13:00 AM	STEAM MILL RD	DOGWOOD DR	Not A Collision with Motor Vehicle	0	1	0 N/A	N/A	Clear
8/6/2015	2:20:00 PM	STEAM MILL RD	SOUTHERN PINES DR	Angle	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Rain
8/13/2015	3:30:00 PM	BUENA VISTA RD	STEAM MILL RD	Sideswipe-Same Direction	0	0	0 N/A	Passenger Car	Clear
8/16/2015	12:05:00 AM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	0 Sports Utility Vehicle (SUV)	Sports Utility Vehicle (SUV)	Clear
8/16/2015	3:00:00 AM	3911 STEAM MILL RD		Sideswipe-Same Direction	0	0	0 Passenger Car	Passenger Car	Clear
8/16/2015	3:10:00 AM	STEAM MILL RD	MOUNT PLEASANT DR	Not A Collision with Motor Vehicle	1	0	0 Passenger Car	N/A	Clear
8/28/2015	5:25:00 PM	ENGLEWOOD DR	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Pickup Truck	Clear
8/31/2015	6:50:00 AM	STEAM MILL RD	MCCARTHA DR	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
9/5/2015	4:05:00 PM	STEAM MILL RD. RD	NORTHSTAR DR	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
9/7/2015	12:55:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
9/8/2015	7:13:00 AM	STEAM MILL RD	NORTHSTAR DR	Head On	0	0	0 Pickup Truck	Pickup Truck	Clear
9/18/2015	3:20:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	1	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Clear
9/19/2015	7:00:00 PM	BUENA VISTA RD	STEAM MILL RD	Sideswipe-Same Direction	0	0	0 N/A	Passenger Car	Clear
9/28/2015	2:38:00 PM	STEAM MILL RD	RC ALLEN DR	Not A Collision with Motor Vehicle	1	0	0 Sports Utility Vehicle (SUV)	N/A	Rain
9/28/2015	6:20:00 PM	STEAM MILL RD	NORTH STAR DR	Rear End	0	0	0 Van	Passenger Car	Rain
10/1/2015	5:30:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Cloudy
10/2/2015	8:25:00 PM	STEAM MILL RD	DOGWOOD DR	Angle	2	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Cloudy
10/3/2015	7:30:00 PM	3911 STEAM MILL RD		Angle	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Cloudy
10/3/2015	11:20:00 PM	BUENA VISTA RD	STEAM MILL RD	Sideswipe-Same Direction	0	0	0 Passenger Car	Passenger Car	Cloudy
10/10/2015	3:20:00 PM	ENGLEWOOD DR	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
10/15/2015	4:43:00 PM	STEAM MILL RD	NORTHSTAR DR	Sideswipe-Same Direction	0	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Clear
10/22/2015	2:45:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	0	0	0 N/A	Passenger Car	Clear
10/28/2015	7:55:00 AM	STEAM MILL RD	DOGWOOD DR	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Cloudy
10/28/2015	2:25:00 PM	DOGWOOD DR	STEAM MILL RD	Rear End	0	0	0 Sports Utility Vehicle (SUV)	Pickup Truck	Clear
10/30/2015	9:20:00 AM	STEAM MILL ROAD RD	GEORGIA DR	Angle	0	0	0 Passenger Car	Passenger Car	Clear
10/31/2015	7:30:00 AM	GOODSON DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
11/5/2015	4:00:00 PM	BUENA VISTA RD	PARKCHESTER DR	Angle	1	0	0 Vehicle With Trailer	Pickup Truck	Clear

Table A.2 Study Area Collisions Continued

Date	Time	Route	Intersecting Route	Collision Type	Injuries	Fatalities	Vehicle 1 Type	Vehicle 2 Type	Weather
11/7/2015	6:45:00 PM	STEAM MILL RD	VICTORIA DR	Rear End	1	0	N/A	Sports Utility Vehicle (SUV)	Rain
11/10/2015	7:27:00 PM	STEAM MILL RD	BUENA VISTA RD	Rear End	0	0	N/A	Passenger Car	Cloudy
11/29/2015	6:25:00 PM	STEAM MILL RD	FAIR OAKS DR	Not A Collision with Motor Vehicle	1	0	N/A	Pickup Truck	Clear
12/5/2015	4:46:00 PM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	Passenger Car	Sports Utility Vehicle (SUV)	Clear
12/16/2015	1:00:00 AM	MCCARTHA DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Clear
12/16/2015	8:00:00 AM	STEAM MILL RD	ENGLEWOOD DR	Angle	0	0	Passenger Car	Sports Utility Vehicle (SUV)	Clear
12/30/2015	7:20:00 PM	STEAM MILL RD	RC ALLEN DR	Not A Collision with Motor Vehicle	0	0	Sports Utility Vehicle (SUV)	N/A	Rain
12/31/2015	4:40:00 PM	4451 STEAM MILL RD		Angle	0	0	Passenger Car	Passenger Car	Rain
12/31/2015	5:35:00 PM	BUENA VISTA RD	STEAMMILL RD	Angle	1	0	Passenger Car	Passenger Car	Rain
1/7/2016	1:36:00 PM	BUENA VISTA RD	STEAM MILL RD	Sideswipe-Same Direction	0	0	Tractor/Trailer	Pickup Truck	Clear
1/8/2016	6:10:00 PM	STEAM MILL RD	DR	Rear End	0	0	Passenger Car	Passenger Car	Clear
1/12/2016	5:50:00 PM	STEAM MILL RD	DOGWOOD RD	Rear End	0	0	Passenger Car	Passenger Car	Clear
1/16/2016	6:00:00 PM	STEAMMILL RD	MCCARTHA DR	Angle	0	0	N/A	N/A	Clear
1/23/2016	1:40:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
2/5/2016	2:42:00 PM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	Van	Pickup Truck	Clear
2/13/2016	6:57:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	1	0	Passenger Car	Passenger Car	Clear
2/19/2016	7:00:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	Passenger Car	Sports Utility Vehicle (SUV)	Clear
2/22/2016	10:35:00 AM	STEAM MILL RD	GOODSON DR	Angle	0	0	Passenger Car	Passenger Car	Clear
2/22/2016	8:10:00 PM	BUENA VISTA RD	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Rain
2/25/2016	11:00:00 AM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	Sports Utility Vehicle (SUV)	Van	Clear
3/1/2016	3:32:00 AM	DOGWOOD DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	Sports Utility Vehicle (SUV)	N/A	Clear
3/9/2016	5:40:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
3/20/2016	6:05:00 PM	TIMBERLANE DR	STEAM MILL RD	Not A Collision with Motor Vehicle	1	0	Passenger Car	N/A	Cloudy
4/4/2016	10:37:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	1	0	Other	Sports Utility Vehicle (SUV)	Clear
4/7/2016	9:05:00 AM	STEAM MILL RD	I-185 HWY	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Clear
4/13/2016	3:00:00 PM	BUENA VISTA RD	STEAM MILL RD	Sideswipe-Opposite Direction	0	0	N/A	Pickup Truck	Clear
4/14/2016	12:00:00 AM	STEAM MILL RD	FAIR OAKS DR	Rear End	1	0	Passenger Car	Passenger Car	Rain
4/15/2016	11:28:00 AM	STEAM MILL RD	WICKHAM DR	Angle	0	0	Passenger Car	Passenger Car	Rain
4/20/2016	6:19:00 PM	WICKHAM DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
5/25/2016	10:45:00 PM	STEAM MILL RD	MCCARTHA DR	Angle	1	0	Passenger Car	Passenger Car	Clear
6/3/2016	7:10:00 PM	3911 STEAM MILL RD		Angle	0	0	N/A	Passenger Car	Clear
6/7/2016	9:45:00 AM	FAIR OAKS DR	STEAM MILL RD	Angle	0	0	N/A	Passenger Car	Clear
6/17/2016	1:00:00 PM	STEAM MILL RD	VICTORIA DR	Rear End	0	0	Van	Passenger Car	Clear
6/22/2016	9:54:00 PM	STEAM MILL RD	BUENA VISTA RD	Sideswipe-Same Direction	0	0	N/A	Passenger Car	Clear
6/22/2016	10:15:00 PM	STEAM MILL RD	BUENA BISTA RD	Angle	0	0	Pickup Truck	Passenger Car	Clear
6/23/2016	2:12:00 AM	STEAM MILL RD	CHANDLER DR	Not A Collision with Motor Vehicle	1	0	Pickup Truck	N/A	Clear
7/7/2016	9:25:00 AM	STEAM MILL RD	NORTHSTAR DR	Angle	0	0	N/A	Passenger Car	Clear
7/9/2016	9:34:00 PM	STEAM MILL RD	BUENA VISTA RD	Rear End	1	0	Single Unit Truck	Passenger Car	Cloudy
7/11/2016	6:25:00 PM	STEAM MILL RD	CHANDLER DR	Rear End	0	0	Passenger Car	Passenger Car	Cloudy
7/13/2016	7:08:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	Passenger Car	Van	Clear
8/3/2016	12:05:00 PM	STEAM MILL RD	MCCARTHA DR	Angle	0	0	Sports Utility Vehicle (SUV)	Passenger Car	Clear
8/6/2016	10:05:00 PM	STEAM MILL RD	DOGWOOD DR	Sideswipe-Opposite Direction	0	0	Sports Utility Vehicle (SUV)	Sports Utility Vehicle (SUV)	Clear
8/25/2016	9:30:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Cloudy
8/29/2016	9:12:00 AM	STEAM MILL RD	BUENA VISTA RD	Rear End	0	0	Passenger Car	Passenger Car	Clear
9/18/2016	1:35:00 PM	STEAM MILL RD	SOUTHERN PINES DR	Angle	1	0	Sports Utility Vehicle (SUV)	Passenger Car	Clear
9/19/2016	8:00:00 AM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	N/A	Passenger Car	Clear
10/3/2016	6:00:00 PM	STEAM MILL RD	HONOLULU DR	Angle	2	0	Pickup Truck	Passenger Car	Clear
10/9/2016	5:25:00 AM	STEAM MILL RD	GEORGIA DR	Not A Collision with Motor Vehicle	0	0	Pickup Truck	N/A	Clear
10/21/2016	10:07:00 PM	MCCARTHA DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	Sports Utility Vehicle (SUV)	N/A	Clear
10/22/2016	4:53:00 PM	STEAM MILL ROAD RD	DOGWOOD DRIVE DR	Angle	0	0	Passenger Car	Passenger Car	Clear
10/25/2016	3:02:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
11/5/2016	12:00:00 AM	DOGWOOD DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
11/5/2016	7:30:00 PM	STEAM MILL RD	WICKHAM DR	Angle	0	0	N/A	N/A	Clear

Table A.3 Study Area Collisions Continued

Date	Time	Route	Intersecting Route	Collision Type	Injuries	Fatalities	Vehicle 1 Type	Vehicle 2 Type	Weather
11/11/2016	8:45:00 PM	BOWEN BLVD	STEAM MILL RD	Sideswipe-Opposite Direction	0	0	0 Passenger Car	Single Unit Truck	Cloudy
11/23/2016	4:30:00 PM	STEAM MILL RD	HONOLULU DR	Angle	2	0	0 Passenger Car	Pickup Truck	Clear
11/23/2016	7:45:00 PM	ENGLEWOOD DR	STEAM MILL RD	Angle	0	0	0 N/A	Passenger Car	Clear
11/28/2016	4:30:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Cloudy
11/29/2016	12:00:00 AM	TIMBERLANE DR	STEAM MILL RD	Angle	3	0	0 N/A	Sports Utility Vehicle (SUV)	Rain
11/29/2016	7:45:00 PM	4558 STEAM MILL RD		Not A Collision with Motor Vehicle	0	0	0 Sports Utility Vehicle (SUV)	N/A	Cloudy
12/1/2016	2:55:00 PM	DOGWOOD DR	STEAM MILL RD	Rear End	0	0	0 Pickup Truck	Passenger Car	Clear
12/8/2016	4:30:00 PM	STEAM MILL RD	SOUTHERN PINES DR	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
12/15/2016	6:59:00 PM	DOGWOOD DR	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
12/17/2016	12:30:00 AM	STEAM MILL RD	MT. PLEASANT DR	Not A Collision with Motor Vehicle	0	0	0 Pickup Truck	N/A	Clear
12/17/2016	12:03:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	0 N/A	Passenger Car	Cloudy
12/23/2016	4:15:00 PM	STEAM MILL RD	NORTHSTAR DR	Angle	0	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Clear
12/29/2016	5:30:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
1/2/2017	5:20:00 PM	STEAM MILL RD	MCCARTHA DR	Angle	0	0	0 N/A	N/A	Rain
2/1/2017	7:56:00 PM	WICKHAM DR	STEAM MILL RD	Angle	0	0	0 Sports Utility Vehicle (SUV)	Sports Utility Vehicle (SUV)	Clear
2/6/2017	2:10:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	0	0	0 Passenger Car	Van	Clear
3/5/2017	10:05:00 PM	FAIR OAKS DR	STEAM MILL RD	Angle	2	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Clear
3/9/2017	1:40:00 PM	DOGWOOD DR	STEAM MILL RD	Sideswipe-Same Direction	0	0	0 Passenger Car	Pickup Truck	Clear
3/17/2017	8:23:00 PM	STEAM MILL RD	SOUTHERN PINES DR	Angle	0	0	0 Passenger Car	Passenger Car	Clear
3/26/2017	9:50:00 PM	FAIR OAKS DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
3/27/2017	5:35:00 AM	STEAM MILL RD	I 185	Angle	1	0	0 Passenger Car	Passenger Car	Clear
3/30/2017	12:28:00 PM	STEAM MILL RD	NORTHSTAR DR	Sideswipe-Same Direction	1	0	0 Passenger Car	Farm or Construction Equip.	Clear
4/3/2017	12:25:00 AM	STEAM MILL RD	BUENA VISTA RD	Not A Collision with Motor Vehicle	0	0	0 N/A	N/A	Clear
4/3/2017	4:00:00 PM	ENGLEWOOD DR	STEAM MILL RD	Rear End	0	0	0 Bus	Passenger Car	Cloudy
4/10/2017	9:00:00 PM	STEAM MILL RD	MOUNT PLEASANT DR	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
4/23/2017	4:10:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	2	0	0 Pickup Truck	Pickup Truck	Rain
4/27/2017	7:46:00 PM	DOGWOOD DR	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Rain
5/3/2017	4:35:00 PM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	0 Passenger Car	Passenger Car	Cloudy
5/5/2017	10:30:00 PM	STEAM MILL RD	GOODSON DR	Angle	0	0	0 Passenger Car	Passenger Car	Clear
5/6/2017	5:50:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	0 Pickup Truck	Passenger Car	Clear
5/7/2017	11:15:00 AM	3911 STEAM MILL RD		Angle	0	0	0 N/A	Passenger Car	Clear
5/17/2017	8:53:00 AM	STEAM MILL RD	BUENA VISTA RD	Angle	0	0	0 Pickup Truck	Passenger Car	Clear
6/5/2017	3:30:00 PM	STEAM MILL RD	MCCARTHA DR	Head On	3	0	0 Pickup Truck	Passenger Car	Cloudy
6/11/2017	3:30:00 PM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
6/15/2017	11:51:00 AM	STEAM MILL RD	BUENA VISTA RD	Sideswipe-Opposite Direction	0	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Clear
6/16/2017	10:45:00 AM	STEAM MILL RD	CHANDLER DR	Sideswipe-Opposite Direction	1	0	0 Passenger Car	Pickup Truck	Clear
6/30/2017	12:00:00 AM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Rain
7/10/2017	8:39:00 AM	DOGWOOD DR	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
7/14/2017	4:29:00 PM	SAINT MARYS RD	ENGLEWOOD DR	Sideswipe-Opposite Direction	2	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Clear
7/24/2017	9:31:00 PM	STEAM MILL RD	MCCARTHA DR	Angle	1	0	0 Passenger Car	Passenger Car	Clear
8/3/2017	3:35:00 PM	STEAM MILL RD	MCCARTHA DR	Rear End	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Rain
8/8/2017	12:30:00 AM	DOGWOOD DR	STEAM MILL RD	Not A Collision with Motor Vehicle	1	0	0 Pickup Truck	N/A	Clear
8/16/2017	12:00:00 PM	DOGWOOD DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
8/19/2017	12:20:00 PM	PINECREST DR	STEAM MILL RD	Angle	0	0	0 N/A	Passenger Car	Clear
8/30/2017	4:13:00 PM	BUENA VISTA RD	MILL RD	Rear End	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Cloudy
9/28/2017	5:29:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	0 Passenger Car	Passenger Car	Clear
10/1/2017	5:00:00 PM	STEAM MILL RD	NORTHSTAR	Angle	0	0	0 N/A	Passenger Car	Clear
10/27/2017	7:45:00 AM	STEAM MILL RD	GOODSON DR	Angle	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Clear
10/31/2017	12:00:00 AM	DOGWOOD DR	STEAM MILL RD	Sideswipe-Same Direction	0	0	0 Passenger Car	Passenger Car	Clear
12/1/2017	8:00:00 PM	BUENA VISTA DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Sports Utility Vehicle (SUV)	N/A	Clear
12/2/2017	9:00:00 PM	BUENA VISTA	STEAM MILL RD	Rear End	2	0	0 Passenger Car	Passenger Car	Clear
12/6/2017	3:15:00 PM	BUENA VISTA RD	DOGWOOD DR	Angle	0	0	0 Passenger Car	Passenger Car	Rain
12/18/2017	10:20:00 PM	3911 STEAM MILL RD		Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Rain

Table A.4 Study Area Collisions Continued

Date	Time	Route	Intersecting Route	Collision Type	Injuries	Fatalities	Vehicle 1 Type	Vehicle 2 Type	Weather
1/8/2018	5:00:00 PM	STEAM MILL RD	NORTHSTAR DR	Rear End	0	0	Pickup Truck	Passenger Car	Rain
1/16/2018	6:46:00 PM	STEAM MILL RD	NORTHSTAR DR	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Cloudy
1/18/2018	9:50:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	7	1	Passenger Car	Passenger Car	Clear
2/12/2018	7:05:00 AM	STEAM MILL RD	STEAM MILL PL	Rear End	1	0	Passenger Car	Bus	Cloudy
2/13/2018	5:20:00 PM	STEAM MILL RD	CHANDLER DR	Rear End	1	0	N/A	Passenger Car	Cloudy
2/24/2018	4:12:00 PM	STEAM MILL RD	DOGWOOD DR	Rear End	2	0	Passenger Car	Van	Cloudy
3/9/2018	2:45:00 PM	STEAM MILL RD	MOUNT PLEASANT	Rear End	0	0	Pickup Truck	Passenger Car	Clear
3/11/2018	12:00:00 AM	STEAM MILL RD	RC ALLEN RD	Not A Collision with Motor Vehicle	1	0	Passenger Car	N/A	Rain
3/12/2018	3:30:00 AM	422 PINECREST DR		Head On	0	0	Passenger Car	Passenger Car	Rain
3/25/2018	2:30:00 AM	BUENA VISTA RD	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Clear
3/25/2018	6:45:00 AM	451 WICKHAM DR		Not A Collision with Motor Vehicle	0	0	Sports Utility Vehicle (SUV)	N/A	Clear
4/2/2018	8:10:00 AM	STEAM MILL RD	GOODSON DR	Rear End	0	0	Passenger Car	Pickup Truck	Clear
4/4/2018	12:00:00 AM	STEAM MILL RD	DOGWOOD DR	Sideswipe-Same Direction	0	0	Passenger Car	Passenger Car	Other
4/6/2018	3:15:00 PM	STEAM MILL RD	GOODSON DR	Rear End	0	0	Sports Utility Vehicle (SUV)	Passenger Car	Clear
4/13/2018	8:30:00 AM	STEAM MILL RD	ENGLEWOOD DR	Angle	1	0	Van	Sports Utility Vehicle (SUV)	Clear
4/28/2018	8:55:00 AM	NORTHSTAR DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Cloudy
5/4/2018	7:30:00 PM	CHANDLER DR	STEAM MILL RD	Angle	0	0	Sports Utility Vehicle (SUV)	Passenger Car	Clear
5/8/2018	8:15:00 AM	BUENA VISTA RD	STEAM MILL RD	Angle	1	0	N/A	N/A	Clear
5/11/2018	8:45:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	0	0	Sports Utility Vehicle (SUV)	Sports Utility Vehicle (SUV)	Clear
5/13/2018	10:36:00 PM	STEAM MILL RD	NORTHSTAR DR	Rear End	0	0	N/A	Passenger Car	Clear
5/19/2018	12:30:00 AM	STEAM MILL RD	MINNIE LEE DR	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Clear
6/29/2018	5:00:00 PM	STEAM MILL RD	DOGWOOD DR	Rear End	0	0	Sports Utility Vehicle (SUV)	Sports Utility Vehicle (SUV)	Clear
6/30/2018	12:00:00 AM	STEAM MILL RD	VICTORIA DR	Angle	1	0	Passenger Car	Passenger Car	Clear
7/3/2018	9:20:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	N/A	Passenger Car	Cloudy
7/20/2018	6:05:00 PM	BUENA VISTA RD	OLD BUENA VISTA RD	Angle	0	0	Passenger Car	Sports Utility Vehicle (SUV)	Clear
7/20/2018	6:10:00 PM	STEAM MILL RD	PINE CREST RD	Not A Collision with Motor Vehicle	1	0	Single Unit Truck	N/A	Clear
7/21/2018	10:05:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	1	0	Passenger Car	Passenger Car	Clear
7/26/2018	12:55:00 PM	STEAM MILL RD	SOUTHERN PINE DR	Angle	1	0	N/A	N/A	Clear
8/2/2018	3:40:00 PM	STEAM MILL RD	ENGLEWOOD DR	Rear End	2	0	Passenger Car	Passenger Car	Rain
8/12/2018	5:40:00 PM	STEAM MILL RD	DOGWOOD DR	Angle	3	0	Passenger Car	Passenger Car	Clear
8/12/2018	10:22:00 PM	STEAM MILL RD	GOODSON DR	Rear End	0	0	Passenger Car	Sports Utility Vehicle (SUV)	Clear
8/23/2018	2:50:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	2	0	Passenger Car	Passenger Car	Clear
9/2/2018	5:40:00 PM	MCCARTHA DR	STEAM MILL RD	Angle	1	0	Passenger Car	Passenger Car	Clear
9/23/2018	6:00:00 PM	STEAM MILL RD	GOODSON DR	Angle	0	0	Passenger Car	Passenger Car	Clear
9/25/2018	7:00:00 PM	DOGWOOD DR	STEAM MILL RD	Rear End	2	0	Passenger Car	Sports Utility Vehicle (SUV)	Rain
9/28/2018	8:55:00 PM	STEAM MILL RD	NORTHSTAR DR	Rear End	0	0	Passenger Car	Passenger Car	Clear
10/10/2018	3:10:00 PM	PINECREST DR	STEAM MILL RD	Head On	2	0	Passenger Car	Van	Rain
10/16/2018	6:45:00 AM	STEAM MILL RD	BUENA VISTA RD	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Clear
10/17/2018	5:51:00 PM	NORTHSTAR DR	STEAM MILL RD	Rear End	0	0	Passenger Car	Passenger Car	Clear
10/31/2018	1:40:00 PM	FAIR OAKS DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
11/7/2018	3:15:00 PM	HONOLULU DR	OAKLEY DR	Angle	0	0	N/A	Passenger Car	Cloudy
11/22/2018	6:10:00 PM	STEAM MILL RD	WICKHAM DR	Angle	0	0	Sports Utility Vehicle (SUV)	Passenger Car	Cloudy
11/23/2018	7:12:00 PM	STEAM MILL RD	DOGWOOD DR	Angle	1	0	Sports Utility Vehicle (SUV)	Passenger Car	Clear
11/25/2018	8:30:00 PM	HONOLULU DR	STEAM MILL RD	Angle	0	0	Passenger Car	Van	Rain
11/27/2018	1:24:00 PM	DOGWOOD DR	STEAM MILL RD	Angle	0	0	Passenger Car	Passenger Car	Clear
12/14/2018	3:30:00 PM	DOGWOOD DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	Passenger Car	N/A	Rain
12/19/2018	10:00:00 PM	5231 STEAM MILL RD		Not A Collision with Motor Vehicle	0	0	N/A	N/A	Cloudy
12/25/2018	12:01:00 AM	STEAM MILL RD	HONOLULU DR	Rear End	1	0	N/A	Passenger Car	Clear
1/5/2019	9:35:00 AM	FAIR OAKS DR	STEAM MILL RD	Not A Collision with Motor Vehicle	1	0	Passenger Car	N/A	Clear
1/8/2019	2:45:00 PM	HONOLULU DR	STEAM MILL RD	Rear End	3	0	Sports Utility Vehicle (SUV)	Pickup Truck	Clear
1/11/2019	12:40:00 PM	STEAM MILL RD	SOUTHERN PNES	Angle	1	0	Sports Utility Vehicle (SUV)	Passenger Car	Clear
1/21/2019	7:02:00 PM	STEAM MILL RD	MCCARTHA	Rear End	0	0	N/A	Passenger Car	Clear
1/26/2019	1:30:00 PM	BUENA VISTA RD	STEAM MILL RD	Rear End	0	0	N/A	Passenger Car	Clear

Table A.5 Study Area Collisions Continued

Date	Time	Route	Intersecting Route	Collision Type	Injuries	Fatalities	Vehicle 1 Type	Vehicle 2 Type	Weather
2/18/2019	3:05:00 PM	MCCARTHA DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Cloudy
3/3/2019	11:30:00 AM	BUENA VISTA RD	FAIR OATS DR	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Cloudy
3/13/2019	3:40:00 PM	BUENA VISTA RD	STEAM MILL RD	Sideswipe-Same Direction	0	0	0 Sports Utility Vehicle (SUV)	Passenger Car	Clear
3/14/2019	6:20:00 PM	STEAM MILL RD	CHANDLER DR	Angle	0	0	0 N/A	N/A	Clear
3/26/2019	10:00:00 PM	3512 BUENA VISTA RD		Rear End	0	0	0 Passenger Car	Passenger Car	Clear
4/1/2019	4:45:00 PM	4451 STEAM MILL RD		Rear End	0	0	0 Pickup Truck	Passenger Car	Clear
4/4/2019	4:42:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	2	0	0 Pickup Truck	Passenger Car	Cloudy
4/8/2019	8:20:00 AM	BUENA VISTA RD	STEAM MILL RD	Head On	2	0	0 Passenger Car	Passenger Car	Cloudy
4/11/2019	4:35:00 PM	BUENA VISTA RD	STEAM MILL RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
4/27/2019	4:15:00 AM	RC ALLEN DR	STEAM MILL RD	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
5/16/2019	2:50:00 PM	PINECREST DR	STEAM MILL RD	Rear End	4	0	0 Single Unit Truck	Passenger Car	Clear
5/19/2019	9:35:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	1	0	0 N/A	Passenger Car	Clear
5/28/2019	4:35:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	1	0	0 Passenger Car	Passenger Car	Clear
5/31/2019	6:36:00 PM	STEAM MILL RD	HONOLULU DR	Sideswipe-Opposite Direction	0	0	0 N/A	Passenger Car	Clear
6/2/2019	7:16:00 PM	STEAM MILL RD	SOUTHERN PINE DR	Angle	0	0	0 Passenger Car	Passenger Car	Clear
6/13/2019	6:30:00 PM	STEAM MILL RD	ENGLEWOOD DR	Angle	0	0	0 Pickup Truck	Sports Utility Vehicle (SUV)	Clear
6/14/2019	1:40:00 PM	STEAM MILL RD	DOGWOOD DR	Sideswipe-Opposite Direction	0	0	0 Passenger Car	Passenger Car	Clear
6/16/2019	9:51:00 PM	FAIR OAKS DR	STEAM MILL RD	Angle	2	0	0 Passenger Car	Pickup Truck	Clear
6/20/2019	9:09:00 AM	VICTORIA DR	STEAM MILL RD	Angle	0	0	0 Panel Truck	Van	Clear
6/23/2019	12:40:00 PM	STEAM MILL RD	GOODSON DR	Angle	0	0	0 N/A	N/A	Clear
6/29/2019	12:00:00 AM	WICKHAM DR	STEAM MILL RD	Sideswipe-Opposite Direction	0	0	0 Passenger Car	Passenger Car	Clear
7/11/2019	10:25:00 AM	STEAM MILL RD	MOUNT PLEASANT DR	Sideswipe-Opposite Direction	0	0	0 Sports Utility Vehicle (SUV)	Pickup Truck	Clear
7/26/2019	2:50:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	0	0	0 Passenger Car	Passenger Car	Clear
8/10/2019	3:05:00 AM	STEAM MILL RD	DOGWOOD DR	Not A Collision with Motor Vehicle	0	1	1 Passenger Car	N/A	Clear
8/21/2019	7:10:00 PM	STEAM MILL RD	FAIR OAKS DR	Not A Collision with Motor Vehicle	1	0	0 Passenger Car	Pedacycle, Bicycle	Cloudy
9/11/2019	2:05:00 PM	STEAM MILL RD	DOGWOOD DR	Sideswipe-Same Direction	0	0	0 Passenger Car	Sports Utility Vehicle (SUV)	Clear
9/20/2019	9:46:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	3	0	0 Passenger Car	Passenger Car	Clear
9/20/2019	9:46:00 PM	3512 BUENA VISTA RD		Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Clear
10/8/2019	3:15:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	0	0	0 N/A	Sports Utility Vehicle (SUV)	Cloudy
11/5/2019	6:49:00 PM	STEAM MILL RD	BUENA VISTA RD	Angle	2	0	0 Tractor/Trailer	Passenger Car	Clear
11/27/2019	9:10:00 PM	STEAM MILL RD	DOGWOOD DR	Angle	0	0	0 Passenger Car	N/A	Clear
12/12/2019	9:30:00 PM	PINECREST DR	STEAM MILL RD	Head On	0	0	0 Sports Utility Vehicle (SUV)	Pickup Truck	Cloudy
12/13/2019	8:44:00 AM	STEAM MILL RD	DOGWOOD DR	Angle	0	0	0 Passenger Car	Passenger Car	Rain
12/13/2019	8:20:00 PM	STEAM MILL RD	HONOLULU DR	Not A Collision with Motor Vehicle	0	0	0 Passenger Car	N/A	Rain

Table A.6 Study Area Collisions by Time Period

Time Period	All Crashes	Bike/Ped Crashes
12 AM - 1 AM	16	0
1 AM - 2 AM	0	0
2 AM - 3 AM	3	0
3 AM - 4 AM	4	0
4 AM - 5 AM	1	0
5 AM - 6 AM	3	0
6 AM - 7 AM	4	0
7 AM - 8 AM	8	1
8 AM - 9 AM	8	0
9 AM - 10 AM	9	0
10 AM - 11 AM	5	0
11 AM - 12 PM	9	0
12 PM - 1 PM	9	0
1 PM - 2 PM	9	0
2 PM - 3 PM	14	0
3 PM - 4 PM	18	0
4 PM - 5 PM	23	0
5 PM - 6 PM	20	1
6 PM - 7 PM	21	1
7 PM - 8 PM	17	1
8 PM - 9 PM	11	0
9 PM - 10 PM	18	0
10 PM - 11 PM	15	0
11 PM - 12 AM	1	0

Table A.7 Study Area Collisions by Weekday

Day	All Crashes	Bike/Ped Crashes
Sunday	30	2
Monday	34	0
Tuesday	25	0
Wednesday	34	1
Thursday	42	1
Friday	43	0
Saturday	38	0

Table A.8 Study Area Collisions by Month

Month	All Crashes	Bike/Ped Crashes
January	21	1
February	13	0
March	22	0
April	27	0
May	17	0
June	23	0
July	17	0
August	23	2
September	17	0
October	24	0
November	19	1
December	23	0

Table A.9 Study Area Collisions by Year

Year	All Crashes	Bike/Ped Crashes
2015	62	3
2016	57	0
2017	40	0
2018	48	0
2019	39	1

Table A.10 Study Area Collisions by Intersection

Intersection	All Crashes	Bike/Ped Crashes
Buena Vista Rd	55	1
Fair Oaks Dr	11	2
Honolulu Dr	7	0
Cross Creek Apt.	7	0
Chandler Dr	7	0
Dogwood Dr	35	1
Southern Pines Dr	28	0
Goodson Dr	11	0
Englewood Dr	20	0
Cardinal Dr	8	0
Steam Mill Place	1	0
Georgia Dr	4	0
Mt Pleasant Drive	3	0
Northstar Dr	11	0
R.C. Allen Dr	4	0
Bowen Blvd	2	0
Timberlane Dr	2	0
Pinecrest Dr	6	0

APPENDIX B: CRASH DIAGRAMS

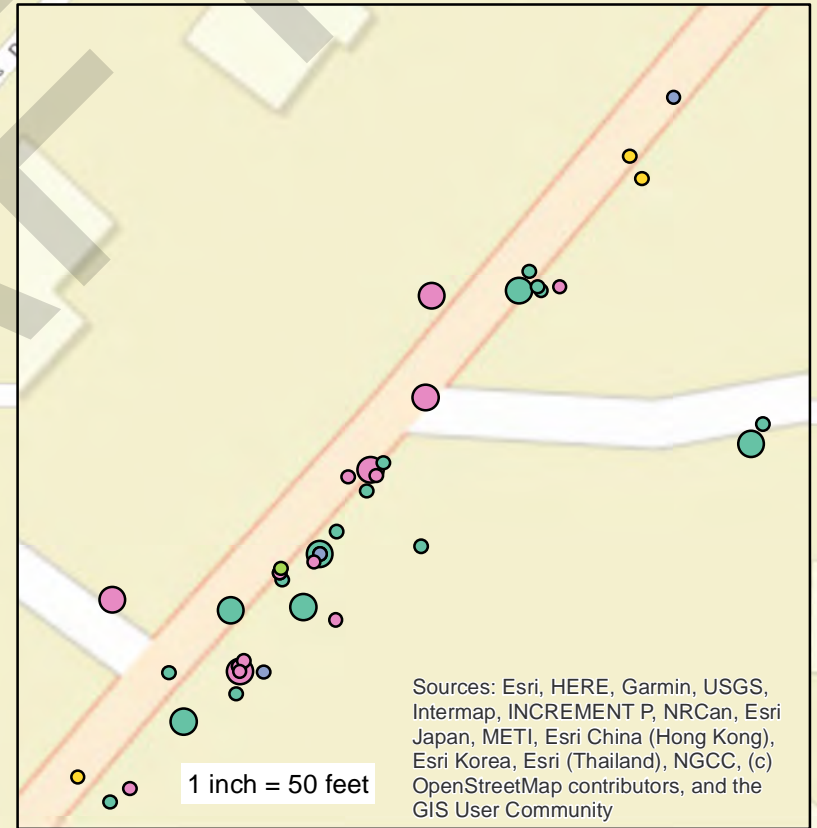
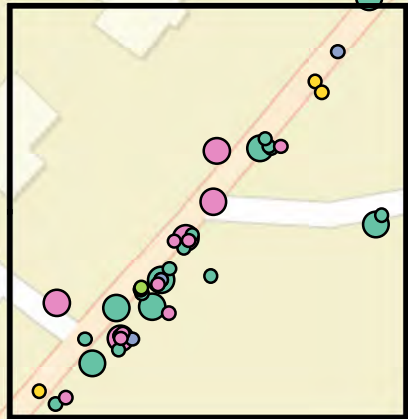
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COLUMBUS, MUSCOGEE COUNTY GA

Steam Mill Rd from Buena Vista Rd to Pinecrest Dr

1/1/2015 to 12/31/2019

Collision Map 1



Legend

Collision Type

- Angle
- Not A Collision with Motor Vehicle
- Sideswipe-Same Direction
- Rear End
- Sideswipe-Opposite Direction
- Head On

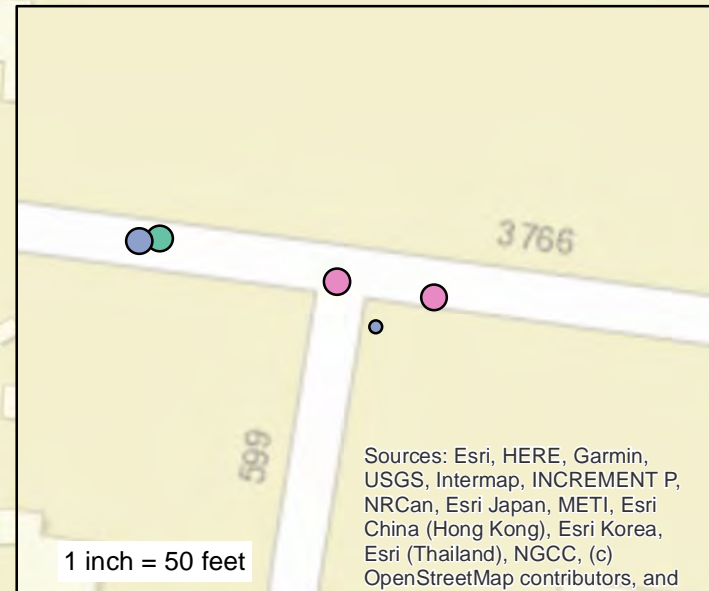
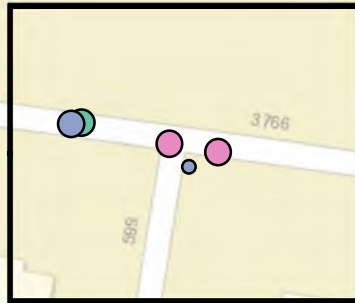
Collision Severity

- Property Damage Only
- Injuries, No Fatalities
- Fatalities

1 inch = 100 feet







Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 2






Legend

Collision Type

-  Angle
-  Not A Collision with Motor Vehicle
-  Sideswipe-Same Direction
-  Rear End
-  Sideswipe-Opposite Direction
-  Head On

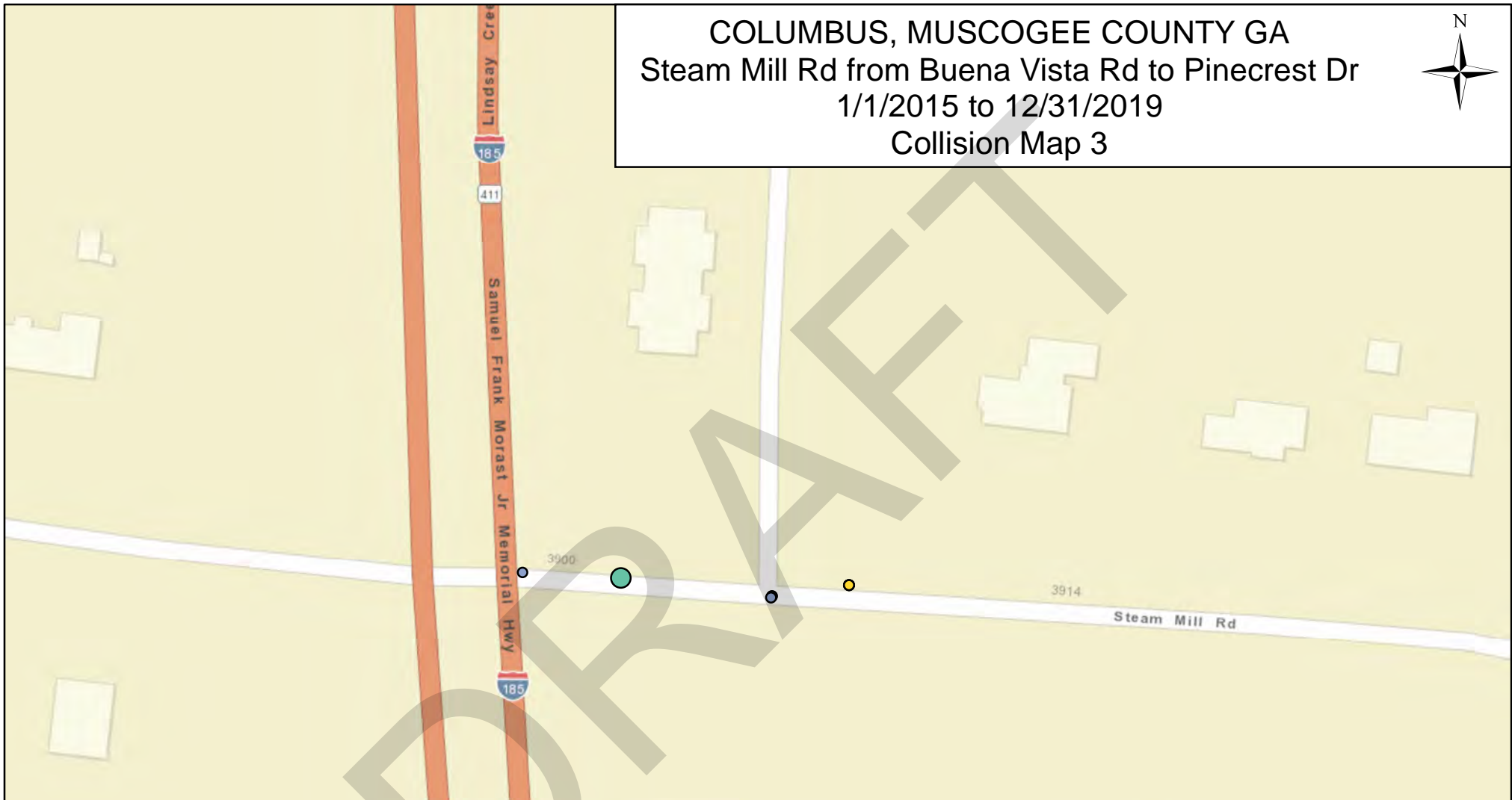
Collision Severity

-  Property Damage Only
-  Injuries, No Fatalities
-  Fatalities

1 inch = 100 feet

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 3



Legend

Collision Type

- Angle
- Not A Collision with Motor Vehicle
- Sideswipe-Same Direction
- Rear End
- Sideswipe-Opposite Direction
- Head On

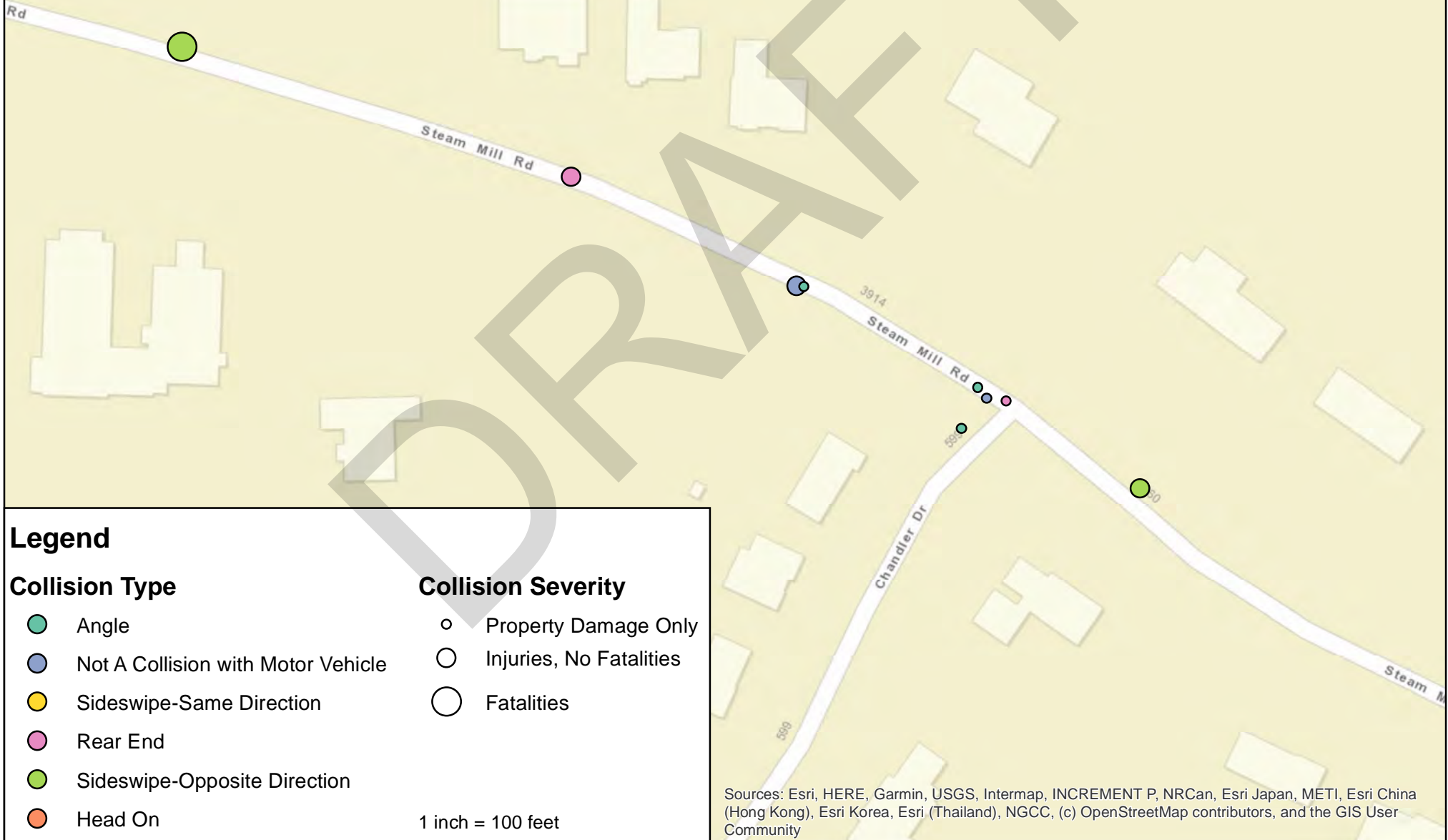
Collision Severity

- Property Damage Only
- Injuries, No Fatalities
- Fatalities

1 inch = 100 feet

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 4

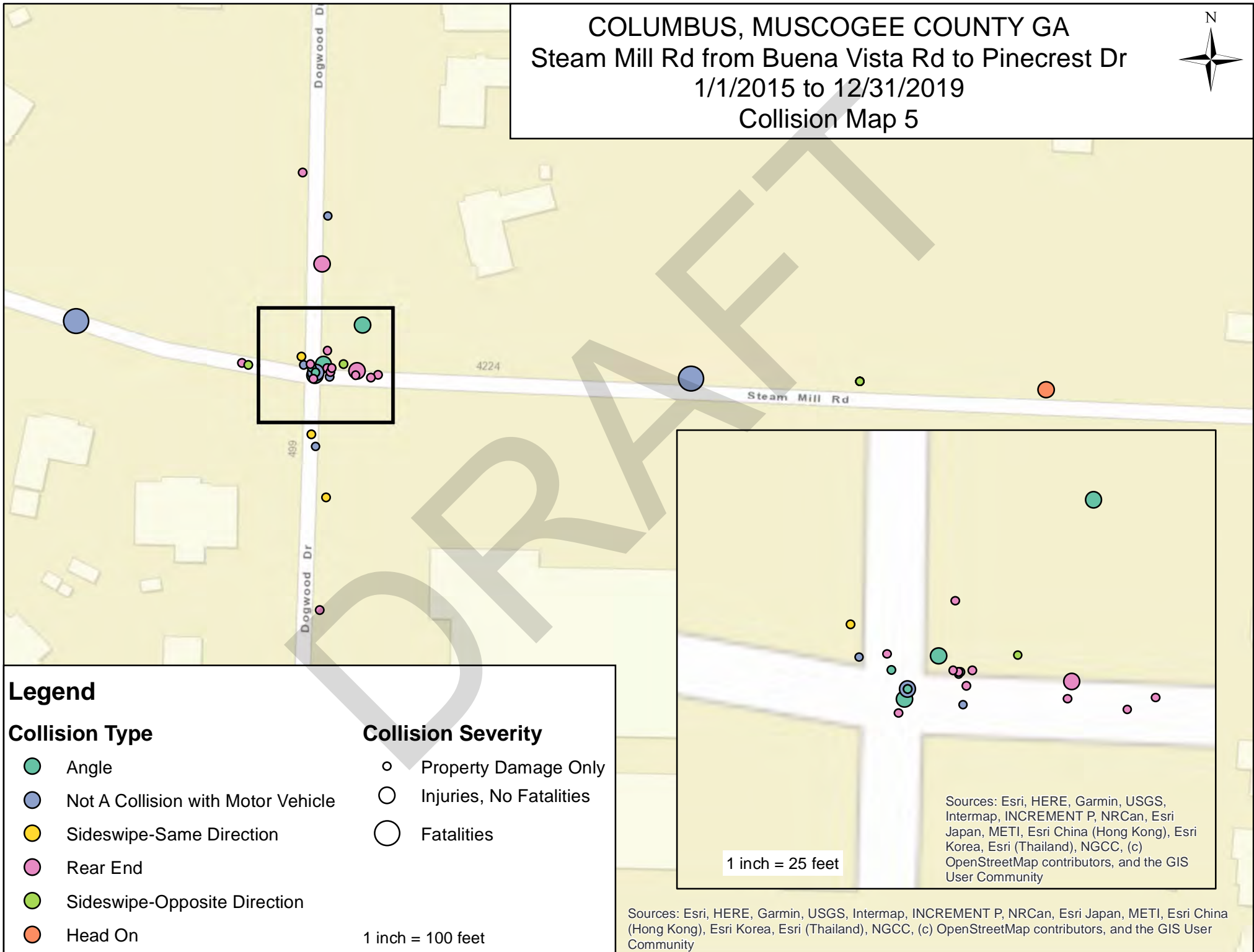


COLUMBUS, MUSCOGEE COUNTY GA

Steam Mill Rd from Buena Vista Rd to Pinecrest Dr

1/1/2015 to 12/31/2019

Collision Map 5

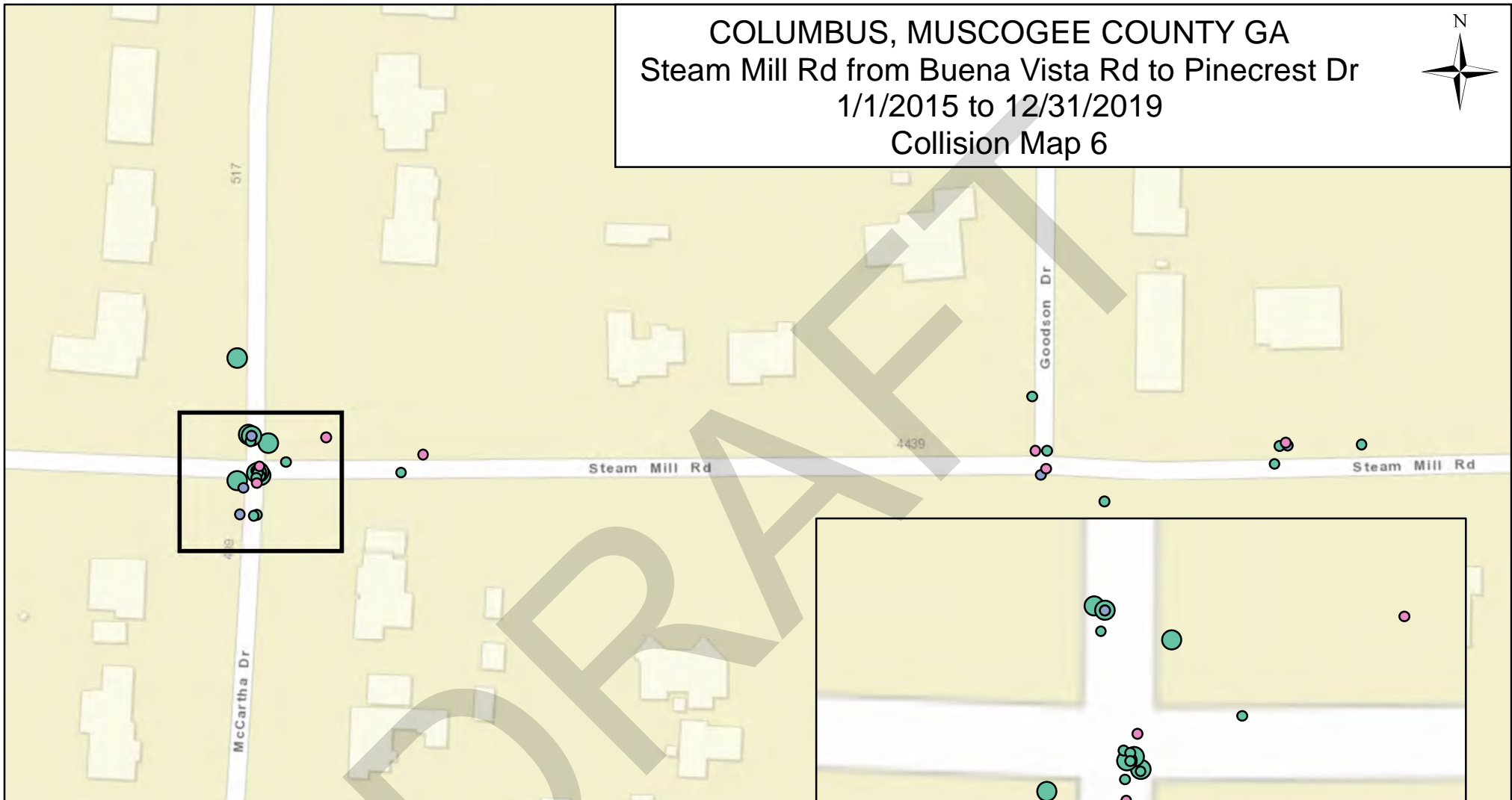


COLUMBUS, MUSCOGEE COUNTY GA

Steam Mill Rd from Buena Vista Rd to Pinecrest Dr

1/1/2015 to 12/31/2019

Collision Map 6



Legend

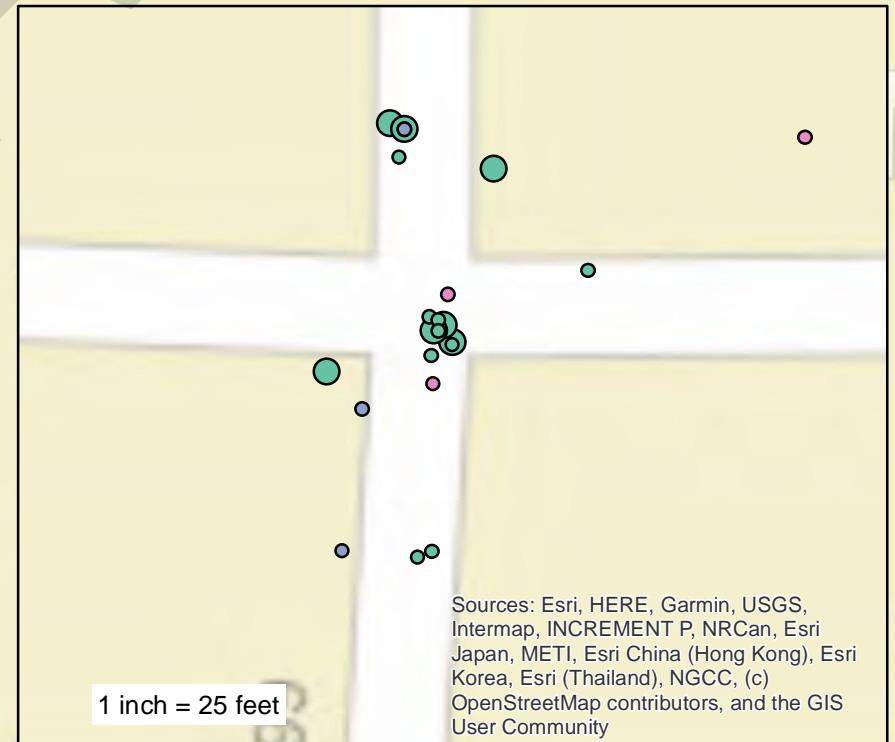
Collision Type

- Angle
- Not A Collision with Motor Vehicle
- Sideswipe-Same Direction
- Rear End
- Sideswipe-Opposite Direction
- Head On

Collision Severity

- Property Damage Only
- Injuries, No Fatalities
- Fatalities

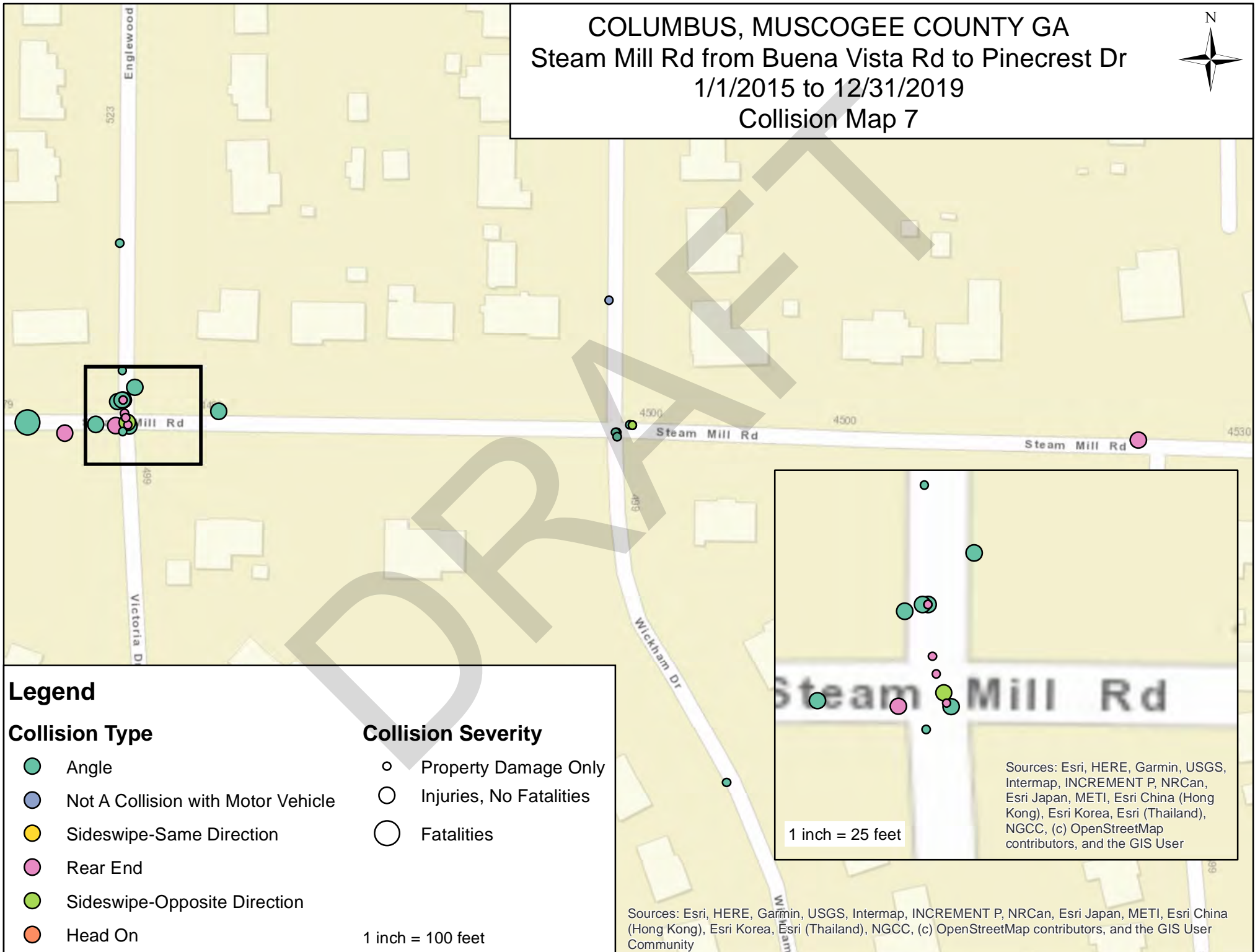
1 inch = 100 feet



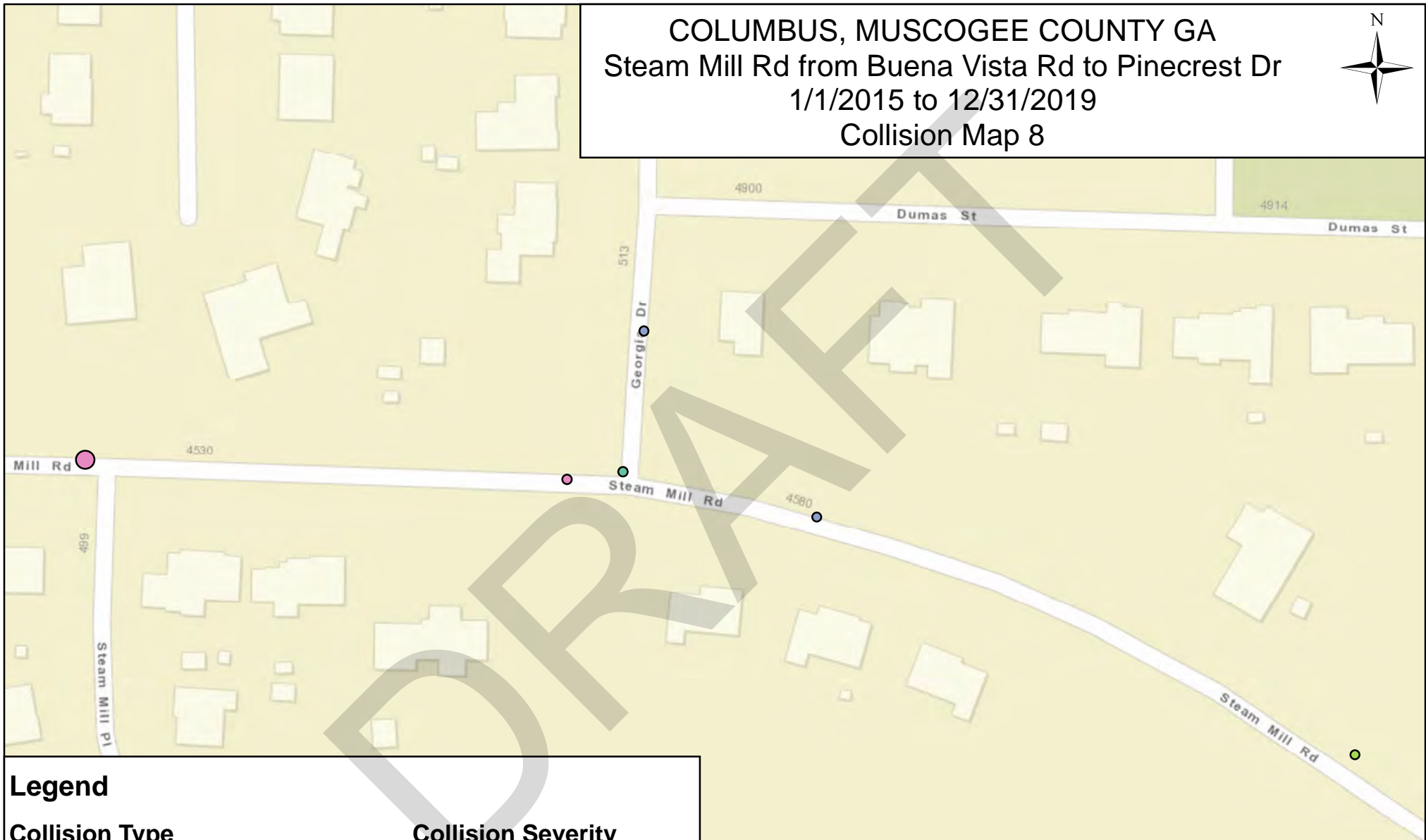
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 7



COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 8



Legend

Collision Type

- Angle
- Not A Collision with Motor Vehicle
- Sideswipe-Same Direction
- Rear End
- Sideswipe-Opposite Direction
- Head On

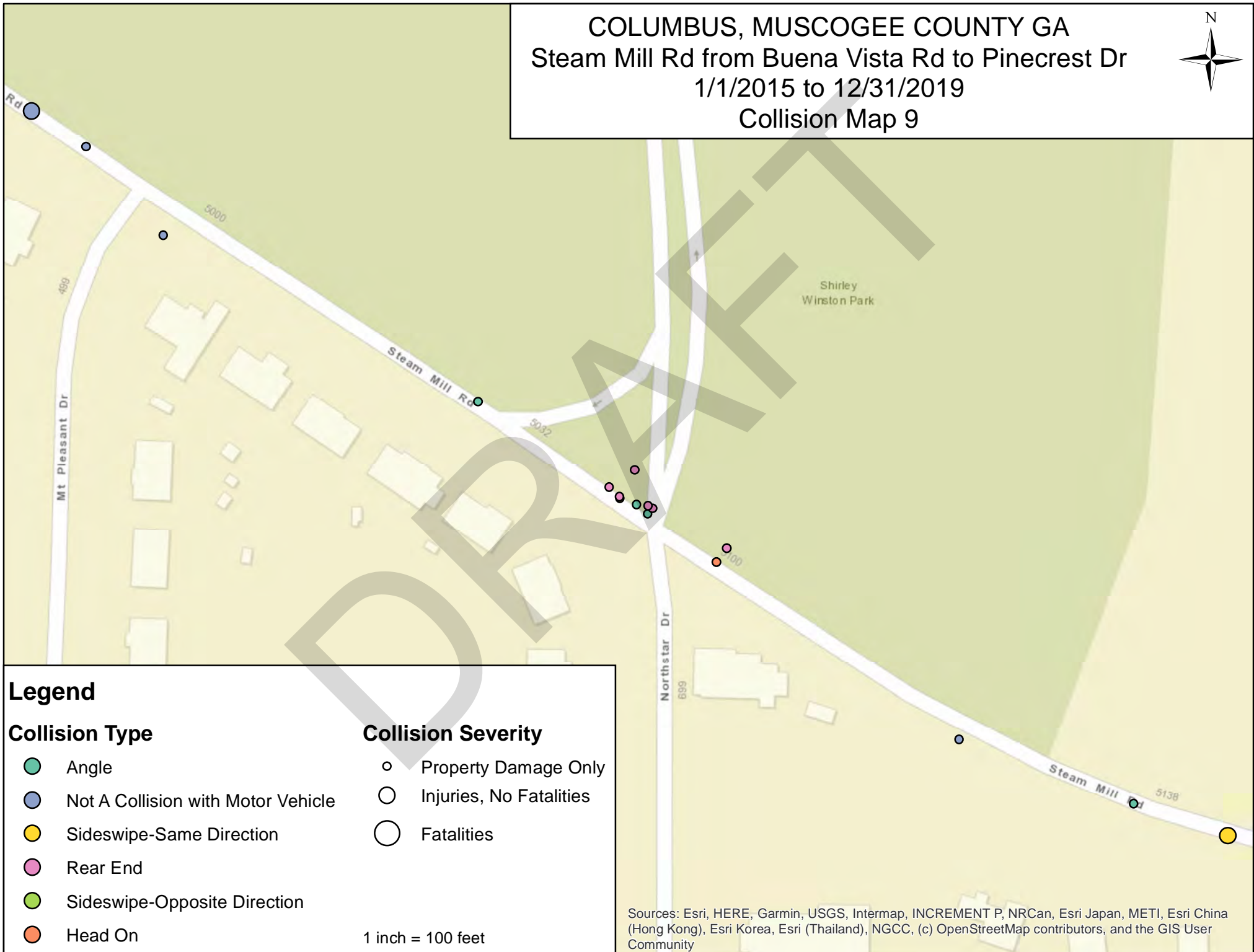
Collision Severity

- Property Damage Only
- Injuries, No Fatalities
- Fatalities

1 inch = 100 feet

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 9









COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 10






Legend

Collision Type

-  Angle
-  Not A Collision with Motor Vehicle
-  Sideswipe-Same Direction
-  Rear End
-  Sideswipe-Opposite Direction
-  Head On

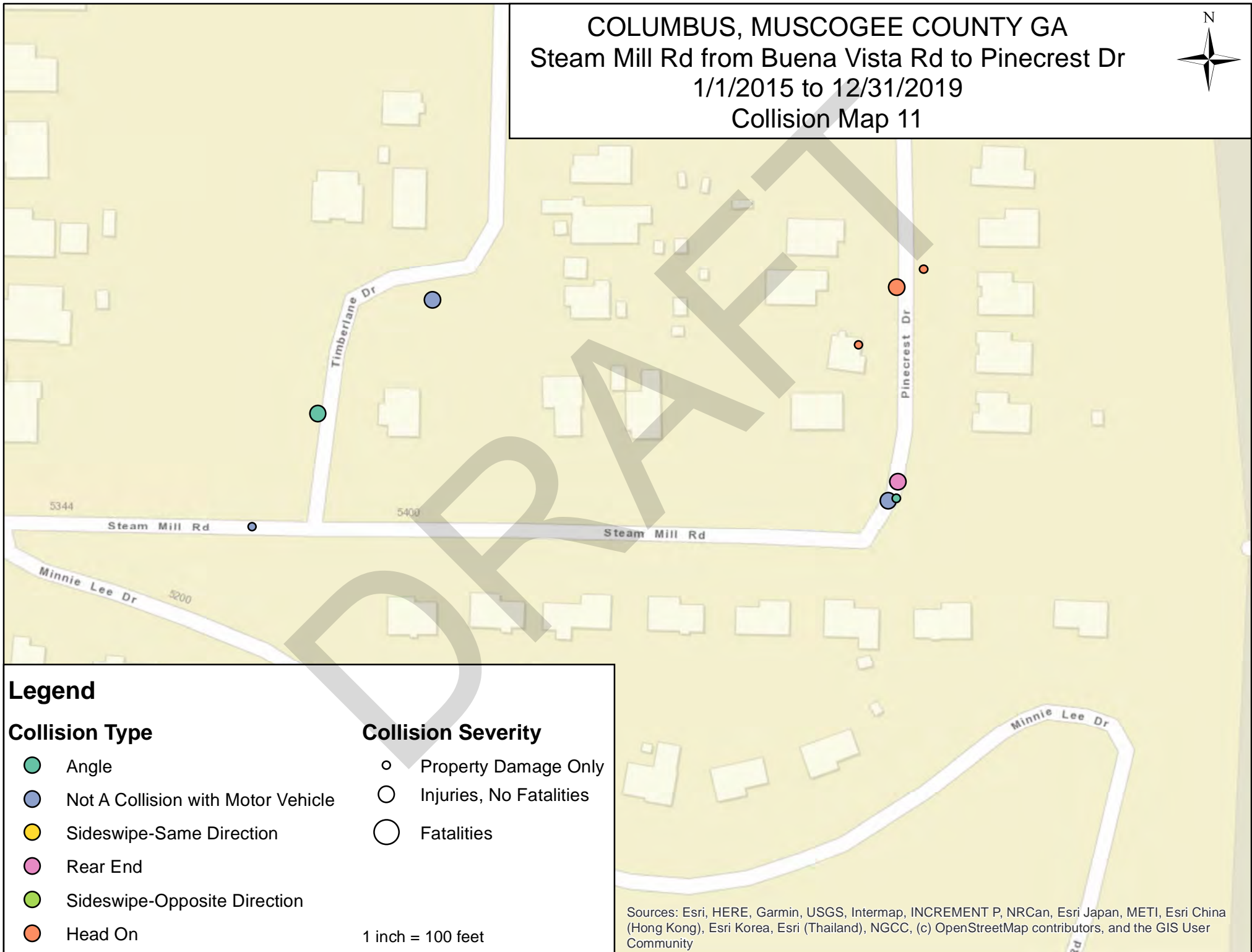
Collision Severity

-  Property Damage Only
-  Injuries, No Fatalities
-  Fatalities

1 inch = 100 feet

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

COLUMBUS, MUSCOGEE COUNTY GA
Steam Mill Rd from Buena Vista Rd to Pinecrest Dr
1/1/2015 to 12/31/2019
Collision Map 11



Legend

Collision Type

- Angle
- Not A Collision with Motor Vehicle
- Sideswipe-Same Direction
- Rear End
- Sideswipe-Opposite Direction
- Head On

Collision Severity

- Property Damage Only
- Injuries, No Fatalities
- Fatalities

1 inch = 100 feet

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

APPENDIX C: VIRTUAL SAFETY AUDIT MEETING MINUTES

DRAFT

Steam Mill Road Virtual Safety Audit

Steam Mill Road Corridor Improvements / 171007024

Date/Time: April 23, 2020 / 2:00 PM

Place: Virtual Meeting Held Via Skype

Next Meeting:

Attendees: Greenway, Mitchell; Holt, Mike; Smith, Adam; Hopper, Stephen; Keffer, Ben; Ekstedt, Joshua; Newman, Donna; Alifarhani, Farhad; Brown, Hannah; Khoo, Kevin; Temples, Lynda

This meeting was a Virtual Safety Audit. Typically, safety audits are held in the field where the Stantec team can discuss safety issues with community members and other stakeholders. However, due to the COVID-19 pandemic, it was not possible to gather all of these people together in the field. Instead, Stantec held a virtual safety audit over Skype wherein each intersection along the study corridor was reviewed for safety issues. The format of this meeting was as follows. First, the intersection in question would be reviewed in Google Street View in order to get a clear picture of the intersection. Then photos from the field visit depicting safety issues at the intersection would be shown to members from the Columbus Consolidated Government (CCG). These safety issues would be discussed and then the meeting would move forward to the next intersection. The safety issues and comments are provided below.

- Buena Vista Rd Intersection
 - Safety Opportunities Pointed Out by Stantec
 - Lack of sidewalks and ADA Ramps at crosswalks
 - Clear desire paths at the intersection demonstrate need for sidewalk
 - Lack of hardscape facilities
 - Drainage structure with sewer manhole at its mouth
 - Mitchell observed that if the sewer manhole prevents this drainage structure from operating properly that it could lead to crashes being caused by hydroplaning.
 - Mike pointed out that this structure is also located very near to the traveled way and has clearly been struck by vehicles.
 - Donna from Columbus Consolidated Government (CCG) asked if we had reached out to GDOT about their plans for Buena Vista Rd.
 - Mitchell answered that our team has not reached out to GDOT about Buena Vista Rd but that we would.
 - Donna stated that this intersection was once a part of the Buena Vista Rd diverging diamond interchange plan but was dropped due to budget.
 - Mitchell added that Steam Mill Rd was going to be realigned as a part of that plan, but the expense of realigning Steam Mill Rd is what got it dropped from the plan.
- Fair Oaks Dr
 - Safety Opportunities Pointed Out by Stantec
 - Standing water and poor pavement condition on the northern leg of Fair Oaks Dr.

- Showed the ditch and headwall on the south side of Steam Mill Rd which could be a real hazard to drivers and pedestrians.
 - Pointed out lack of sidewalks and crosswalks and stop bars at this intersection.
 - Mentioned the brick mailboxes and how they could be considered historic and therefore may be difficult to remove.
- Mitchell asked if there was intention to allow for street parking east of Fair Oaks Dr where steam Mill Rd widens on the south side.
 - Donna responded that she was not sure why the edge line was added. Perhaps it was to make a two-lane road or perhaps to slow down speeds by narrowing the travel lane.
- Mitchell brought up that Stantec will be doing more statistical analysis in terms of the driveways. Each driveway is an intersection, and there are a lot of landscaping decisions along the corridor that are causing site distance issues.
- Stephen and Mitchell also brought up the issue of speeding vehicles on Steam Mill Rd and Mitchell suggested adding more traffic calming measures to the corridor.
- Honolulu Dr
 - Mitchell highlighted some of the angle collisions away from the intersection as likely being the result of vehicles pulling out onto the corridor from driveways.
- Bridge over I-185
 - Mike asked when the crosswalk at the east end of the bridge was installed.
 - Kevin stated that he thought it was two years ago or so.
 - Donna also mentioned that this crosswalk is used by students exiting the apartment complex to get to the sidewalk on the EB side of the road.
 - Mike asked how well students comply with/use this crosswalk or if there is a crossing guard.
 - Donna responded that she was not sure but thought there might be a crossing guard there. However, she said that does seem to be a little far from the school for a crossing guard to be placed there.
- Cross Creek apartments driveway
 - Safety Opportunities Pointed Out by Stantec
 - Mitchell highlighted how vegetation is blocking the cobra head lights at this intersection and along the rest of the corridor.
 - Mitchell also pointed out that cobra head lights are also not great in general since they are so high from the road
 - Pointed out the possible water leak in the ditch to the southeast of the intersection.
 - Mitchell asked who would be the best person to point it out to?
 - Donna said that Howard Shriver would be the best person to provide this information to.
 - Mitchell discussed the Walk Route sign located near the St. John A.M.E. church between the Cross Creek apartments and Chandler Dr
 - The sign is in shadows and obstructed by vegetation.

- Mike pointed out that it is not standard to post signs for WB traffic on the EB side of the road. Therefore, an additional sign should be posted for WB vehicles on the WB side of the road
 - Mitchell pointed out the V-gutter created by the non-curb interface between the sidewalk and road and how water pooling here could be dangerous both to pedestrians and drivers.
 - Mitchell pointed out that the bridge does not meet modern standards.
 - Shoulders are not wide enough
 - Could add a separate pedestrian bridge if that is easier than trying to widen or replace the existing bridge.
 - Stephen also pointed out that sidewalks right against the road make it very dangerous for pedestrians in that a simple slip or trip could lead to a pedestrian falling in front of a vehicle.
- Chandler Dr
 - Mitchell asked if CCG had received any specific complaints on the first 3rd of the corridor?
 - Donna mentioned some of the complaints they have received
 - Speed
 - Sight distance issues
 - Sidewalks
 - Donna also shared that the existing sidewalks were constructed in the 90's as a part of a SPLOST program. They were trying to meet a certain "Miles of Sidewalk" goal. But since they were trying to meet that goal, they didn't do a lot of the utilities and curb work in order to save money.
 - Donna also pointed out the asphalt strip next to the sidewalk in the image was done by maintenance
 - Stephen asked what size of grass strip maintenance felt comfortable mowing. For example, a 3 ft wide strip.
 - Donna responded that roads like Steam Mill Rd are not typically mowed by maintenance. Maintenance is busy elsewhere, especially since they also maintain GDOT roadways. So not likely that they would mow a thin strip of landscaping grass.
 - Mitchell pointed out that in this exercise we are not trying to accuse the city or anyone for that matter of any wrongdoing in terms of the design.
 - Donna replied that she understood.
 - Donna reiterated that speed was one of her largest complaints.
 - Mitchell showed the signal pole and headwall that was taken out in the 2nd fatal collision along the corridor.
- Dogwood Dr

- Mitchell stated that we spent a lot of time at this intersection since there are a lot of accidents, which is particularly worrying given that the students walking through this intersection on the way to school are one of the main groups that we want to protect.
- Safety Opportunities Pointed Out by Stantec
 - Steep approaches from the north and south of the intersection hide pedestrians and cars from each other.
 - Josh pointed out the grass ditch separating pedestrians from pedestrian signal push buttons on the northwest corner of the intersection.
- Talked about the fatal collision that killed a pedestrian.
 - Donna pointed that it was a hit and run and that it was the city manager who found the young man who was killed.
 - Mitchell pointed out that since the collision took place on the long straight away east of the intersection, high speed was likely a factor.
 - Mitchell also stated that curbing on the sidewalk may have helped in this case channelizing motorists back towards the road.
- Going back to the intersection, Mitchell and Mike discussed possible fixes for the Dogwood Dr intersection itself
 - Mitchell stated that if enforcement is a challenge, then introducing some physical traffic calming measures is one way to address that.
 - Issues Mike discussed
 - Lack of turn lanes on Steam Mill Rd
 - Split phase signal timing due to sight distance issues
 - Discussion of potential roundabout at Dogwood Dr by Mitchell and Mike.
 - A roundabout could act as a possible traffic calming measure
 - There would be constructability issues, either related to the need to lower the intersection or the difficulty of keeping traffic flowing on Steam Mill Rd during construction.
 - Could potentially build the roundabout by placing the center in the south east corner of the intersection, on some of the school property. This could allow traffic to keep flowing during construction.
 - However, this would require closing the north leg of the Dogwood Dr intersection.
 - Mike stated that if the roundabout was constructed, the intersection would operate at a very good LOS for the next 20 years.
 - Would be a traffic calming measure on the corridor.
 - A roundabout would create safer crossings for school children.
 - The traffic from the northern leg would be redirected to the Southern Pines Dr intersection.
 - Donna said that a roundabout could be submitted to the public as an option as an option, but that there are a lot of moving parts to consider.

- Donna asked if the intersection could be lowered so that the northern leg of the intersection could be included in the roundabout.
 - Mitchell stated that the proximity of homes and their driveways on the northern leg are an issue.
 - Mitchell also stated that we would need to close Steam Mill Rd during construction if we are not going to build the new intersection offset from the current intersection.
 - Mitchell thinks it would be challenging to accommodate traffic during construction.
 - Donna said that her concern was that if the intersection is not lowered that we'll be chasing the grade problem on all legs of the intersection.
 - Mitchell stated that if the roundabout center is built on the school property that it would be easier to stage traffic and make some of the changes.
 - Donna reiterated that she thinks the grades are going to be the issue here.
 - Mitchell stated that Stantec is just mentioning it as a recommendation and not a necessity. Just wanted to get the city's input on the idea.
 - Donna said she had no major objections at this point, stating that Columbus already has many roundabouts.
- 4543 Steam Mill Rd Image
 - Mitchell shared a street view image from Google of a young girl walking on her way home from school. She was walking near the road where there were no sidewalks, and she was hidden from sight by vegetation.
 - Vegetation forces girl to duck so she can keep a "safe" distance from the roadway.
 - Mitchell shared more street view images of children walking home from school, further highlighting the need for safety along this corridor.
- Southern Pines Drive
 - Mike pointed out the wide crossing distances on the northern approach
 - It's also a very large intersection, so it lends itself to being made into a roundabout
 - Donna asked to confirm if this is the intersection where Stantec was proposing to divert traffic from Dogwood Dr, which Mike confirmed that it was.
 - Donna then asked how far east Southern Pines Drive was from Dogwood Dr. Mike measured on Google maps to find it was roughly 900 feet.
 - Donna then pointed out that redirecting cars from the northern leg of Dogwood Dr 900 feet east might be too much to ask, especially if those people were planning to head west on Steam Mill Rd to begin with.
 - Mitchell asked if CCG had received any complaints about speed on Dogwood Dr.

- Donna figured they probably had.
- Ali said that he doesn't recall receiving any complaints
- Mitchell said that since this is such a straight shot, that closing the northern approach to Dogwood may help slow down speeders.
- Site of Fatal Collision West of Englewood Dr
 - Mitchell and Josh once again described the collision that led to the fatality.
 - Mitchell pointed out the crest located just to the east of Englewood Dr as a sight distance factor that may have led to the collision.
 - Mitchell said speed was probably a contributing factor, and if so, there probably is not enough sight distance over that crest.
 - So, either need to implement strategies to reduce speed or shave the top of the hill to improve the sight distance.
 - Donna asked if shaving the top of the hill would encourage faster traffic.
 - Mike responded that when we were visiting the site that we had discussed installing some chicanes as a traffic calming effect.
 - Mitchell asked if the city had chicanes anywhere.
 - Donna said that they currently do not, but they could be put in. Donna thinks that chicanes could be put in alongside lowering the crest. So that we do not encourage people to go faster.
 - Ali asked if that would affect the right of way
 - Mike responded that it might impact the right of way since we would be putting in narrow medians and thus widening the roadway.
 - Donna added that it would probably be for a relatively short distance since the chicanes are not very long.
 - Ali pointed out that it appears that in this area, the grade of the properties might be something to deal if we try to widen here to fit chicanes.
 - Mike added that we could construct some retaining walls at the back of the sidewalks to minimize any impacts to the properties.
 - Mike reiterated the goal of slowing down traffic to improve safety over that crest
 - Donna stated that they are looking for multiple traffic calming strategies.
 - They don't just want to put speed tables everywhere.
 - Stephen added that the chicanes can be done in creative, aesthetically pleasing way so that it fits in nice with the neighborhood.
- Northstar Dr
 - Brought up again the missing yield sign, but that it had been replaced by the time that we went out there.
 - Mike pointed out that having put the yield sign back may help reduce collisions in the future.
 - Kevin was the one who passed that along and got the yield sign replaced.

- Mitchell pointed out that the sidewalks across the SB right slip turn lane should be reconfigured so that the ramps on either side are pointed towards each other, hopefully away from the intersection.
 - Donna asked to clarify the location, and Mitchell confirmed that it was the park driveway.
- Briefly discussed that there may be a failed detector on the park approach to the intersection. Mike stated that they may want to have the signal maintenance people to check this out.
 - Ali stated that they would check it and that it was probably a damaged loop detector.
 - Donna pointed out that this could be a safety issue because people get impatient, Ali and Mitchell agreed.
- Also pointed out the pedestrian signal button that needs to be better secured to the pole on the northeast corner of the intersection.
- RC Allen Drive
 - Mitchell said there was not much to be done at this intersection.
 - Perhaps cutting back some vegetation to improve visibility.
 - Mike also pointed out that there is a spot here where the sidewalk jogs to the left
 - Ali said that this may be due to the presence of the trees at the jog point
 - Mike also brought up that the cross-slopes on the sidewalks may not meet ADA standards in this location.
 - Donna asked if in the report if we will provide the impacts that would be created when trying to implement any of these fixes.
 - In response, Mitchell discussed the next steps following today's virtual safety audit
 - We will compile everything that we found in our safety audit.
 - Then we will provide a list of possible improvements. These possible improvements will be put into tiers.
 - The first tier will be the easy fixes. Things that improve safety at low cost.
 - The next tier would be things like sidewalks, roundabouts, and intersection upgrades. These will have associated costs.
 - Then there's the big full corridor improvement project, will also provide the associated cost, probably around \$10 million.
 - Donna stated that Steam Mill Road would be a good location for a multi-use path on one side of the road or the other.
 - Good because of the school and the park on the corridor.
 - Donna is thinking an 8 or a 10-foot trail that would ideally be down the entire length of the corridor, although it will be easier in some places than in others.
 - Mitchell agreed that we could make a case for a trail down the entire corridor.

- Donna agrees. It would be a good addition to the corridor, would not be as difficult in some sections with the extra width that is striped in those areas.
- Mitchell stated that Stantec wants to provide the easy short-term fixes that CCG could implement while they are working on bigger, long term projects like a multi-use path.
- Finally, Mitchell asked if CCG had any questions for Stantec at this time.
 - Donna stated that she did not have any questions and that she was pleased with what we had so far.
 - Mitchell stated that if they receive any other complaints or came up with any ideas to please let us know.
 - Mitchell asked if the city could provide the complaints to Stantec in some usable form.
 - Donna said they probably could and asked how many years of data we needed.
 - Mitchell and Mike stated since we have 5 years of crash data then it may be good to have complaints for the same period.
 - Ali stated that maybe they could get the 311 calls sent to us.
 - Mitchell stated that the city should not try this if it is too much trouble, but if they could get the complaints to us it would add value to the report.
 - Donna agreed with this.
 - Mitchell thanked everyone for participating and hope that Stantec's first virtual safety audit had gone well for everyone.
 - Donna said that she thinks the virtual safety audit worked out fine.

The meeting adjourned at 4:00 PM

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec

Joshua Ekstedt

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