Intersection Road Safety Audit

SR 17 at Sandhill Road / Marlow Road

Effingham County | Georgia

Georgia Department of Transportation

GRESHAM SMITH AND PARTNERS

Prepared for the Georgia Department of Transportation

Prepared by Gresham, Smith and Partners

In Cooperation with the U.S. Department of Transportation and FHWA

December 2016

Georgia Department of Transportation

One Georgia Center
600 West Peachtree Street
Atlanta, GA 30308
Phone: 404.631.1990
www.dot.ga.gov

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EXECUTIVE SUMMARY

In November of 2016, the Georgia Department of Transportation (GDOT), in collaboration with the Federal Highway Administration (FHWA), and local government representatives and transportation officials, conducted a Road Safety Audit (RSA) at the intersection of Georgia State Route (SR) 17 at Sandhill Road/Marlow Road in Effingham County, Georgia. The purpose of the RSA was twofold: first, to identify elements of the intersection that present safety concerns, to what extent, to which users, and under what circumstances; and second, to identify opportunities to eliminate or mitigate those safety concerns.

The audit process consisted of research into existing conditions at and around the intersection, analysis of crash data over a five-year period, and a thorough field inspection to identify potential safety issues, followed by a review and discussion of findings, observations, and potential solutions to the identified safety issues.

This report is the final result of this formal safety evaluation of SR 17 at Sandhill Road/Marlow Road. The report includes a summary of background information regarding the study area and crash data. It also summarizes findings and observations from the field inspection and offers a range of short-, intermediate-, and long-term recommendations to mitigate potential safety issues. The primary safety concerns at this intersection revolve around the limited sight distance on all approaches leading to lack of intersection awareness, substantial truck percentage on SR 17, and high vehicle speeds. Failure to stop and/or yield from the side street approaches is likely a factor in right angle crashes, which comprise ninety percent of the crashes at this intersection between January 2011 and March 2016. Three of the nine angle crashes were fatal, resulting in five fatalities. To address these and other concerns, the audit team recommends new or additional advance warning signage, new pavement markings, and channelization devices to increase intersection awareness. The team recommends additional lighting to improve visibility and further study of sight distance at the study intersection from all approaches. Some recommendations will require further study and will be discussed during follow-up meetings between the GDOT Office of Traffic Operations and District 5. In the long-term, the audit team recommends considering possible reconfigurations of the intersection to give motorists better opportunities to react to the approaching stop-controlled intersection and potentially reduce the number of crashes at this intersection.

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1. ROAD SAFETY AUDIT

1.1. OVERVIEW AND PROCESS

A Road Safety Audit (RSA) is a formal evaluation of the safety of an existing or future road or intersection by a multidisciplinary team of transportation professionals and local officials. RSAs have been used successfully for a wide variety of locations to identify potential solutions leading to both short term improvements and longer term efforts, including construction projects. The RSA process does not rely solely on crash data or roadway design, but rather takes a proactive approach to identify safety issues through firsthand observation and to offer recommendations to be considered in improvement projects.

The actual audit is a three-step process that includes a meeting to discuss the location, context, and key facts about the area; a field inspection; and review of findings. During these three key steps, the audit team takes an objective, unbiased approach to identifying safety issues and needs, taking into consideration local conditions. The team then develops suggestions for short, intermediate, and long term improvements to address those needs and issues. A diagram of the RSA process is provided in Appendix A.

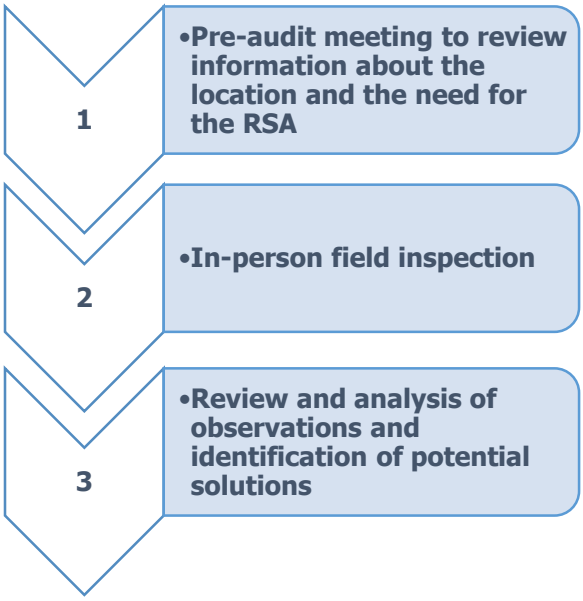


FIGURE 1-1. BASIC STEPS IN A TYPICAL ROAD SAFETY AUDIT

1.2. AUDIT MEETING SUMMARY

An RSA was performed for intersection **of SR 17 at Sandhill Road/Marlow Road**, in Effingham County, Georgia on **November 16, 2016**. The intersection is located within District 5 of the Georgia Department of Transportation (GDOT).

The audit team held a **pre-audit meeting** at the GDOT Transportation Management Center (TMC), located at 935 E. Confederate Ave SE, Atlanta, GA 30316. Representatives of GDOT District 5 participated via telephone. Other participants included representatives of the GDOT Office of Traffic Operations in Atlanta and the consultant team hired to facilitate the audit. The team discussed the limits of the study area, briefly reviewed crash data, discussed known issues at the intersection, and the reasons for conducting an RSA in this location. A primary reason for the RSA is the severity of several crashes that have occurred at this location in recent years. As part of the audit, the team also discussed the adjacent intersection of Sandhill Road at Sandhill Road/Central Avenue (approximately 500' west of the study intersection) as a possible location for improvements.

Following the pre-audit meeting, a **thorough field inspection** was conducted by a team comprised of representatives of the GDOT Office of Traffic Operations and the Atlanta TMC, GDOT District 5, the Federal Highway Administration, and from local agencies including Effingham County and the Effingham County Sheriff's Office. A list of attendees can be found in Appendix D. A nighttime field inspection was conducted prior to the field inspection by representatives of the GDOT District 5.

Following the field inspection, **findings, observations, and possible solutions** were discussed during a debriefing, held at the City of Guyton Police Department a few miles north of the study area. Findings, observations, and recommendations for potential solutions are described and evaluated in the following report.

2. STUDY AREA

2.1. OVERVIEW

The study area consists of the intersection where SR 17 meets with Sandhill Road/Marlow Road just south of Guyton, Georgia. The map below shows the study limits in relation to the City of Guyton and Effingham County.

FIGURE 2-1. RSA STUDY AREA IN RELATION TO GUYTON AND EFFINGHAM COUNTY

Guyton is situated in the center of Effingham County near the coast of Georgia. It is part of the Savannah Metropolitan Statistical Area and is located 28 miles northwest of Savannah's city center. The population was 1,684, according to the 2010 United States Census.

SR 17 is a 293-mile-long state highway that runs north-south across the east-central and northeastern parts of Georgia. The route connects Interstate 16 south of Bloomingdale, GA to the North Carolina state

line. SR 17 runs through the center of the city of Guyton and parallels the Ogeechee River in the section nearest the study area.

Sandhill Road runs northward from US 80 in Eden, GA before making a ninety degree turn to intersect SR 17 perpendicularly. In total, Sandhill Road is approximately 6.5 miles in length with the last 540 feet running easterly to its intersection with SR 17. Marlow Road runs east-west from SR 17 to Midland Road and is approximately one mile in length. Figure 2-2 shows the study intersection in relation to the surrounding area.

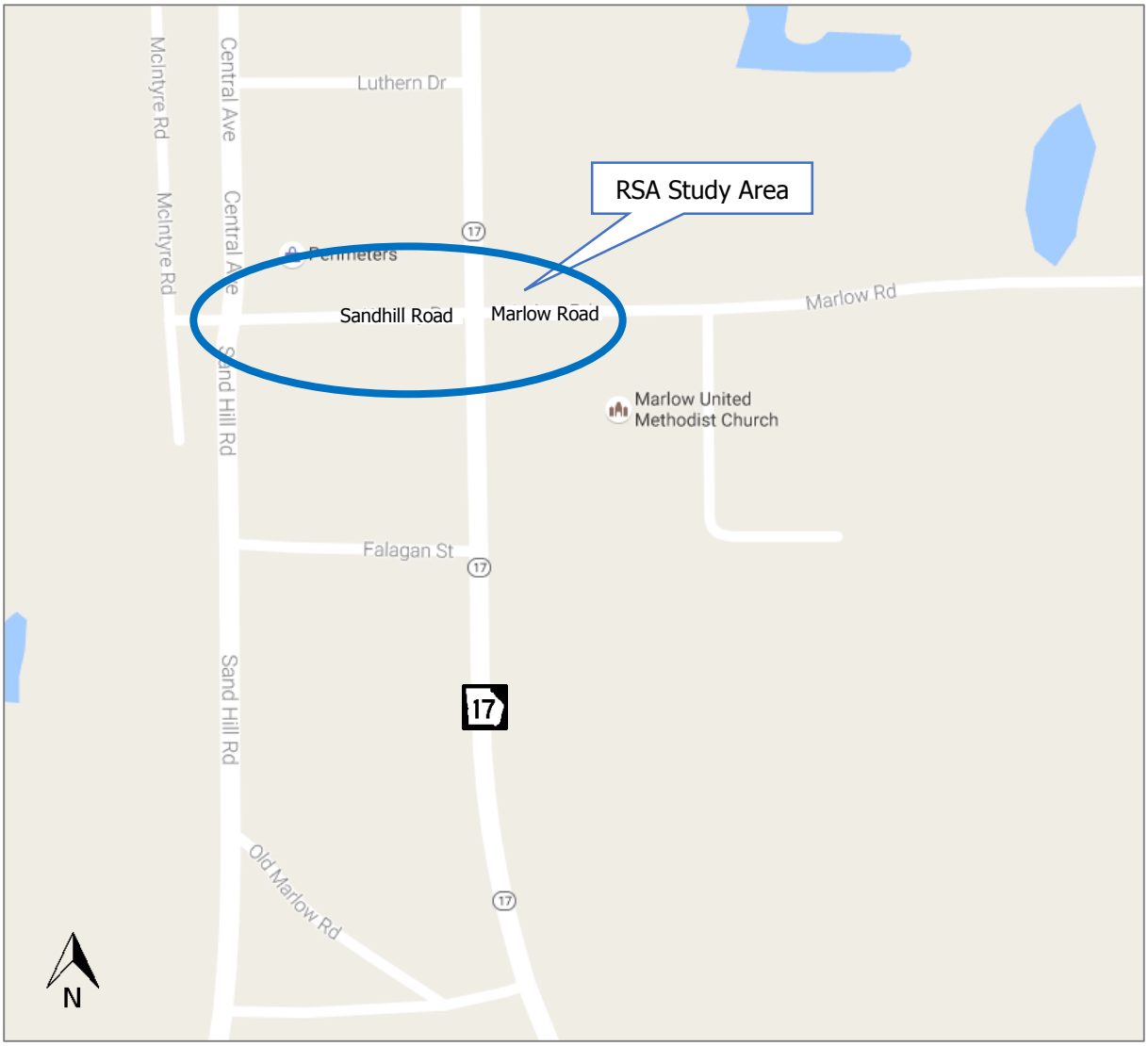


FIGURE 2-2. STREET MAP OF STUDY AREA

The study intersection falls along Georgia Bike Route (GBR) 95, known as the Coastal route. GBR 95 runs north-to-south between the South Carolina state line near Clyo in Effingham County to the Florida state line near St. Marys in Camden County. The route follows portions of SR 119 southward to a part of SR 17 in the RSA study area and then to US 17 south of Effingham County. In total, the bike route is 168.6 miles in length. It travels through seven counties including Effingham, Chatham, Bryan, Liberty, McIntosh, Glynn, and Camden.

Surrounding the study intersection, the area is rural in nature. Portions of nearby land are undeveloped and covered with trees. There is a church located in the southeast quadrant of the intersection. The northern quadrants each have small commercial businesses that are low traffic volume generators. As shown in the aerial view of the study area in Figure 2-3, the area surrounding the intersection is primarily rural with residential and low volume commercial developments.

2.2. THE INTERSECTION

Sandhill Road is a two-lane undivided road with a posted speed limit of 40 miles per hour (MPH). As it approaches the SR 17 intersection, there is a single shared left turn, through, and right turn lane. Across the intersection, to the east, Sandhill Road becomes Marlow Road and the speed limit lowers to 35 MPH. Marlow Road (County Road 221) is a two-lane undivided road with a single shared left turn, through, and right turn lane for the westbound approach to SR 17. The study intersection is unsignalized. The eastbound and westbound approaches are controlled by oversized stop signs (48 x 48 inches) mounted with flashing beacons to draw motorists' attention to the stop sign. On the westbound approach of Marlow Road, there is an additional oversized stop sign on the left (south) side of the roadway.

In the vicinity of the study intersection, SR 17 is a two-lane undivided road with a posted speed limit of 55 MPH. Results from a radar study conducted as a part of a Traffic Engineering Study performed in March 2015 state that the 85th percentile speed was 60 MPH for northbound traffic and 65 MPH for southbound traffic. The road does not have dedicated turn lanes, so turning movements onto Sandhill Road and Marlow Road must be made from the through travel lanes. North of the study intersection, passing is permitted on SR 17. The roadway curves approximately 900 feet south of the study intersection, and southbound passing is prohibited beginning at the study intersection. There is a no passing zone in both directions through the curve. The 2015 average annual daily traffic (AADT) on SR 17 at the study intersection is 4,730 vehicles per day (vpd) with 12.5% trucks. Approximately 0.85 miles north of the study intersection, the AADT (2015) is 4,830 vpd.

There are no sidewalks or bicycle lanes in the vicinity of the study intersection. No pedestrian movements were observed during the Traffic Engineering study conducted in 2015 or during the RSA field inspection. There is no fixed-route transit service in the area.

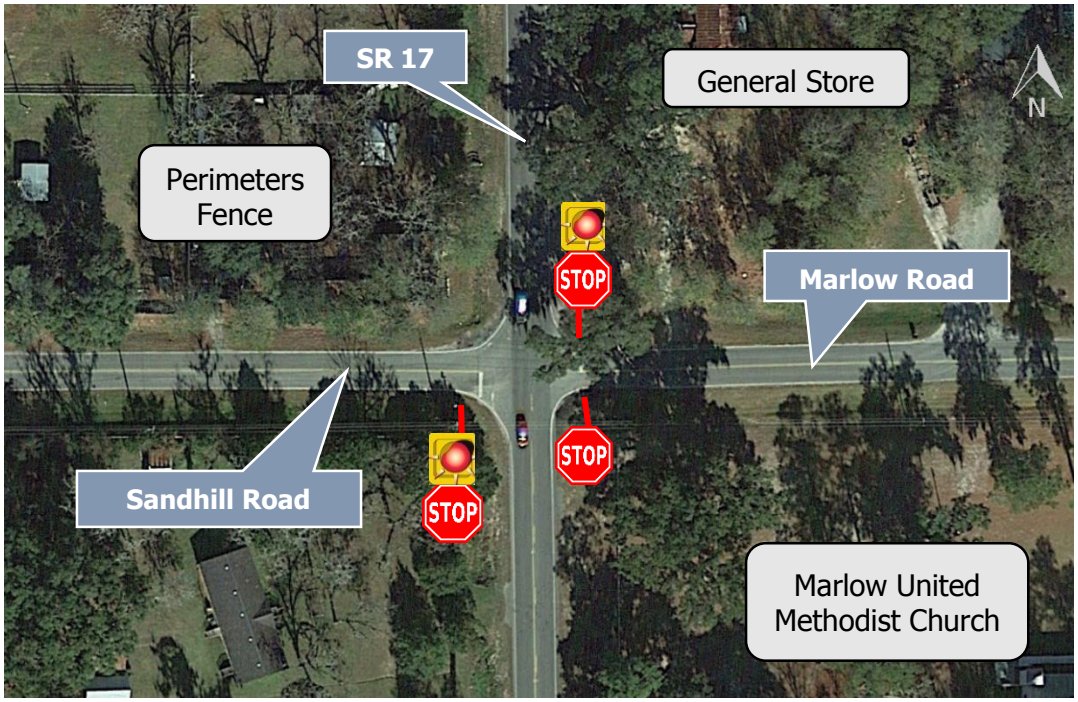


FIGURE 2-3. AERIAL VIEW OF THE INTERSECTION OF SR 17 AT SANDHILL ROAD/MARLOW ROAD

2.3. PENDING PROJECTS

There are no known pending or programmed roadway projects in this area that would impact the study intersection at this time. There is a Maintenance Construction Project on SR 17 from SR 30 to CS 555/Samuel Smalls Senior Ave (PI# M005183), but it is not expected to influence this study.

3. CRASH DATA

3.1. OVERVIEW

GDOT provided crash data for the period from January 1, 2011 – December 31, 2015. In addition, the data includes one severe crash in March of 2016 that resulted in a fatality. According to this data, a total of 10 crashes occurred at or near the intersection of SR 17 at Sandhill Road/Marlow Road. All of the crashes took place within 100 feet of the intersection, according to crash reports and narrative recorded by responding officers. The data includes one crash about 100 feet north of SR 17 and Sandhill Road/Marlow Road; the other nine crashes occurred at the intersection.

Ninety percent of all crashes, or all but one crash, were angle crashes. One crash was a collision with a deer. Table 3-1 and Figure 3-1 below show the breakdown of all crashes by type.

TABLE 3-1. CRASHES BY TYPE (2011 TO 2015)

Year	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Total
2011	1	0	0	0	0	0	1
2012	1	0	0	0	0	0	1
2013	3	0	0	0	0	0	3
2014	2	0	0	0	0	0	2
2015	0	0	0	0	0	1	1
2016	1	0	0	0	0	0	0
Total	**9**	**0**	**0**	**0**	**0**	**1**	**10**

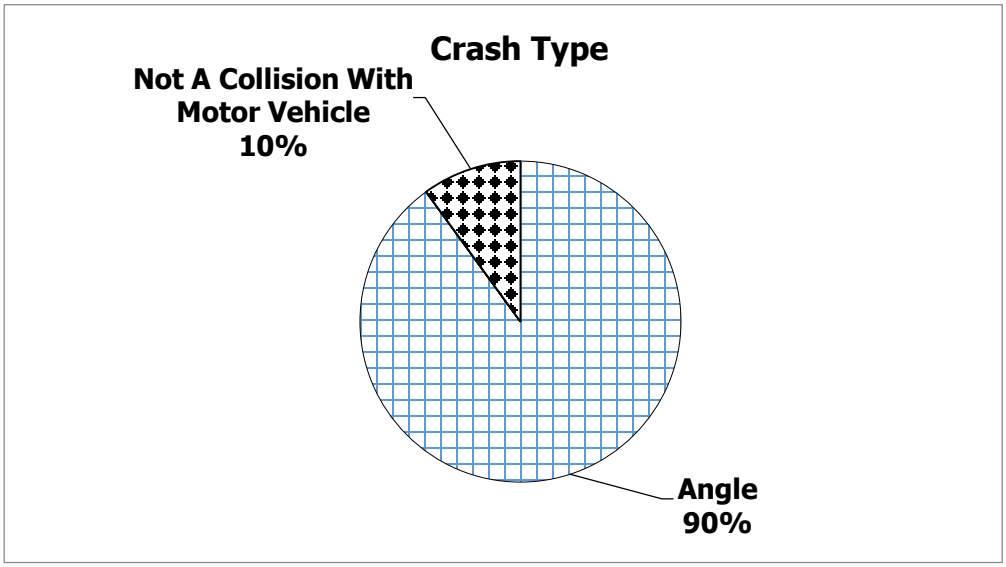


FIGURE 3-1. CRASHES BY TYPE AS PERCENTAGE OF TOTAL CRASHES

In two of the nine angle crashes, the only involved vehicles were traveling **north and south** on SR 17. One involved a southbound vehicle making a left-turn and one took place as the driver attempted to pass

a turning vehicle. The remaining seven angle crashes were right angles between vehicles traveling northbound or southbound on SR 17 and a vehicle traveling eastbound on Sandhill Road or westbound on Marlow Road.

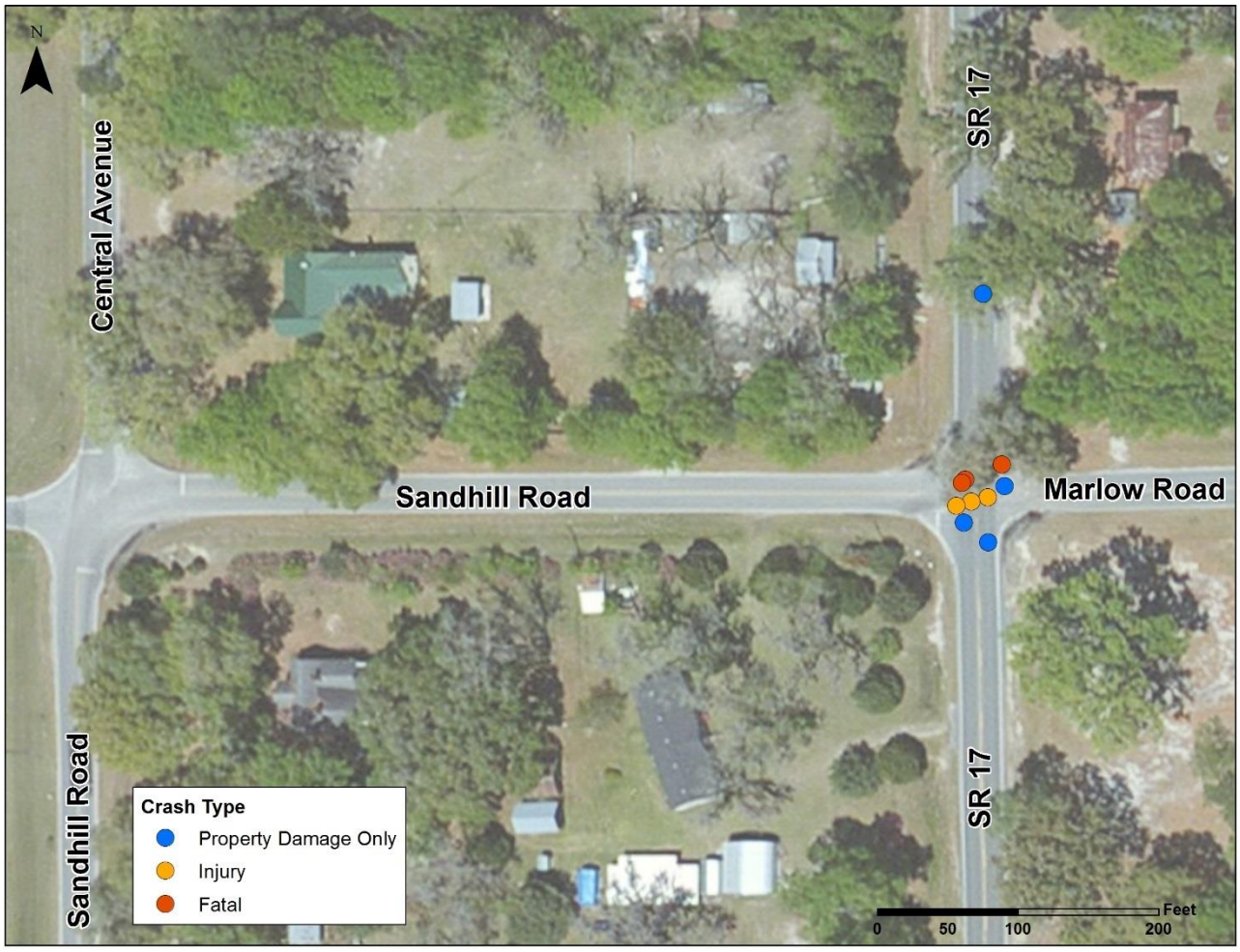


FIGURE 3-2. LOCATION OF CRASHES BY TYPE

The majority of crashes occurred under **daylight, dry conditions**. This can be seen in Figure 3-3 below. All of the **nine total angle crashes** occurred during daylight conditions and the one collision with a deer occurred at night with an unlighted roadway. One angle crash occurred on a wet surface while the remaining crashes occurred on **dry roadway surfaces**. Fog conditions were a factor in 20% of all crashes. The other crashes occurred during clear or cloudy weather conditions.

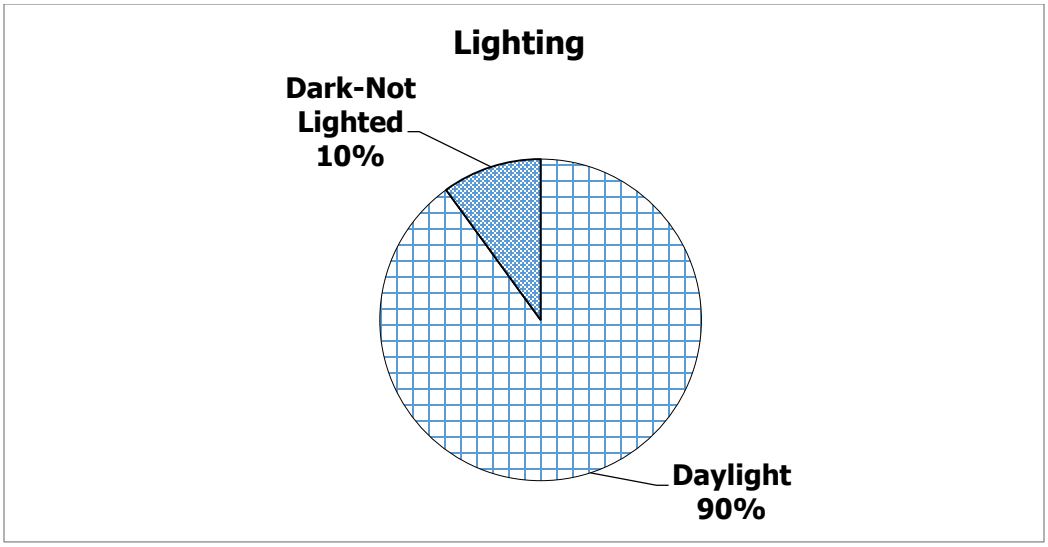


FIGURE 3-3. CRASHES BY LIGHTING CONDITIONS

3.2. INJURY AND FATALITY CRASHES

Of the ten total crashes, six crashes resulted in injury and/or fatality. There were three injury crashes and three fatal crashes in the study area during the timeframe examined.

Two of the injury crashes were right angle crashes while one was a left turn crash. All three fatal crashes were classified as right angle crashes. All injury and fatality crashes occurred in dry, daylight conditions. The three fatal crashes involved a passenger vehicle traveling westbound on Marlow Road colliding with **a tractor-trailer traveling north or south on SR 17**.

TABLE 3-2. CRASHES BY SEVERITY (2011-2016)*

Year	PDO	Injury	Fatal
2011	1	0	0
2012	1	0	0
2013	1	1	1
2014	0	3	1
2015	1	0	0
2016	0	0	1
Total	**4**	**4**	**3**

**Note: Fatal and injury crashes are not mutually exclusive. Totals by severity may add to more than 100% of the number of crashes.*

The following section summarizes details of the fatal crashes at SR 17 and Sandhill Road/Marlow road based upon crash reports filed by attending officers.

Crash #4662625

- This fatal crash occurred on November 21, 2013, at approximately 2:45 PM in dry, daylight conditions. A driver of a pickup truck carrying two passengers was traveling westbound on Marlow Road approaching the intersection of SR 17 at Sandhill Road/Marlow Road. The vehicle skidded 83 feet before the stop sign on Marlow Road, but was unable to stop and continued to skid into the intersection. The pickup truck struck a tractor-trailer traveling southbound on SR 17 and a fire erupted immediately upon impact. After the collision, the tractor-trailer continued to travel south on SR 17 with the pickup truck lodged underneath it. After stopping approximately 870 feet south of the intersection, the vehicles became engulfed in flames and exploded. The crash resulted in three fatalities, with all occupants of the pickup truck killed upon impact. The driver of the tractor-trailer did not sustain any injuries. The manner of collision was listed as an angle crash.

Crash #5113075

- This fatal crash occurred on December 13, 2014, at approximately 8:19 AM in dry, daylight conditions. A driver of a passenger vehicle was traveling westbound on Marlow Road approaching the intersection of SR 17 at Sandhill Road/Marlow Road. The vehicle failed to stop at the stop sign and struck a tractor-trailer traveling southbound on SR 17. After the collision, the tractor-trailer continued to travel south on SR 17 and struck a street sign before coming to rest in a ditch on the west shoulder. The passenger vehicle also continued south after impact before it came to an uncontrolled stop on the west shoulder of SR 17, facing northeast. The crash resulted in one fatality, with the driver of the passenger vehicle killed upon impact. The driver of the tractor-trailer suffered a non-incapacitating injury. The manner of collision was listed as an angle crash.

Crash ID 1603-0074

- This fatal crash occurred on March 1, 2016, at approximately 8:06 AM in dry, daylight conditions. A driver of a passenger vehicle was traveling westbound on Marlow Road approaching the intersection of SR 17 at Sandhill Road/Marlow Road. The vehicle crossed over into the path of a tractor-trailer traveling northbound on SR 17. The driver of the tractor-trailer swerved left in an attempt to avoid collision but struck the driver side of the passenger vehicle. After collision, the vehicles traveled off the roadway, through a ditch and came to final rest in a private driveway on the northwest corner of the intersection. The crash resulted in one fatality, with the driver of the passenger vehicle being transported to the hospital and later passing away. The driver of the tractor-trailer complained of injuries. The manner of collision was listed as an angle crash.

4. FINDINGS AND RECOMMENDATIONS

This section describes and documents the findings, observations, and recommendations of the audit team. Findings and observations are described and illustrated in the following sections. Recommendations are potential actionable items categorized by safety benefit, level of effort, timeframe, and estimated cost. For the purposes of this audit, recommendations are grouped into two sets: (a) low-cost, short to intermediate term (Section 4.5.2); and (b) high-cost, long-term (Section 4.6). Within the recommendations sections, safety benefit, level of effort, and cost are classified as either high, moderate, or low. Timeframe for implementing recommendations is estimated as short term, intermediate, and long term. Photographs are provided to illustrate existing conditions, and aerial and other images are provided to demonstrate potential recommendations.[1] The legend below summarizes these categories.

LEGEND

LEVEL OF EFFORT	TIME FRAME	COST
Low *GDOT or Local Government*	Short Term *1 to 6 months*	Low *$0 to $100,000*
Moderate *Full GDOT Plan Development Process (PDP) – Low Impacts*	Intermediate *6 to 24 months*	Moderate *$100,000 to $300,000*
High *Full GDOT PDP – High Impacts*	Long Term *Greater than 24 months*	High *Greater than $300,000*

[1] Diagrams are intended as general guidance and are not precise with regard to design or placement of suggested improvements. Manual on Uniform Traffic Control Devices (MUTCD) standards, FHWA, and other guidance should be applied as appropriate.

4.1. RECENT IMPROVEMENTS

Over the past several years, GDOT District 5 and Effingham County have made improvements to help facilitate safer movements through the intersection. These include the addition of rumble strips on Marlow Road, double-indicated stop ahead signs on Marlow Road, and large 48"x48" stop signs on Marlow Road at SR 17. A Traffic Engineering Study was conducted in March of 2015. The study concluded that the intersection did not meet 2009 MUTCD signal warrants and that driver speed was a major cause of concern at the intersection. Since that time, GDOT District 5 forces have made improvements to the traffic control devices at the study intersection. In November 2015 a supplemental flashing red beacon was installed on top of the right side of the stop sign on both side street approaches (Sandhill Road and Marlow Road). In June 2016, upgrades were made to the signs, pavement markings, and rumble strips. Raised reflective rumble strips were added to the westbound approach on Marlow Road, along with "Cross traffic does not stop" plaques on the stop signs at the intersections, reflective strips on the stop sign posts, and a "STOP" word pavement marking at the stop bar on the Marlow Road (westbound) approach to the intersection.

FIGURE 4-1. VIEW LOOKING ALONG WESTBOUND MARLOW RD TOWARD INTERSECTION WITH SR 17. NOTE THE RECENTLY INSTALLED OVERSIZED STOP SIGNS, SUPPLEMENTAL FLASHING BEACONS, AND PAVEMENT MARKINGS

FIGURE 4-2. RAISED REFLECTIVE RUMBLE STRIPS ON MARLOW RD WITH ADVANCE WARNING "STOP AHEAD" SIGNS

4.2. PAVEMENT MARKINGS

4.2.1. FINDINGS AND OBSERVATIONS

1. Three sets of transverse rumble strips (Figure 4-2) are present on Marlow Road approaching the intersection. Advance warning "Stop Ahead" signs and word pavement markings are used to supplement the rumble strips. The audit team noted that the rumble strips are located far from the study intersection. An additional set closer to the intersection would enhance their purpose.
2. There is a "STOP" word pavement marking on the Marlow Road intersection approach just before the stop bar. The Sandhill Road approach has no such pavement marking.
3. Raised pavement markings (RPMs) are in fair condition. During the nighttime inspection, RPMs and pavement markings were visible.
4. The double yellow center line, stop bar, and edge lines on the side street approaches immediately adjacent to the intersection were recently replaced. The center line and stop bar are in fair condition; however, the edge lines are already showing signs of wear and are obscured by debris on all legs of the intersection. Farther back from the intersection, pavement markings have not been replaced and are worn and faded.
5. The yellow center line and edge line pavement markings on SR 17 are worn and faded.
6. Pavement markings at the intersection of Sandhill Road and Sandhill Road/Central Avenue are worn and faded.
7. There is a lack of line extensions (dashed or solid white lines) on SR 17 through the intersection. Line extensions may help call attention to the cross street.
8. Along Marlow Road, approaching the intersection, grass and other vegetation has grown over the shoulder and covers the edge line pavement markings.
9. The old (former) stop bar on the Sandhill Road approach is worn yet is still visible (located approximately six feet closer to the center of the intersection than the new one, see Figure 4-4), even though a new stop bar has been installed. This may be potentially confusing to motorists.

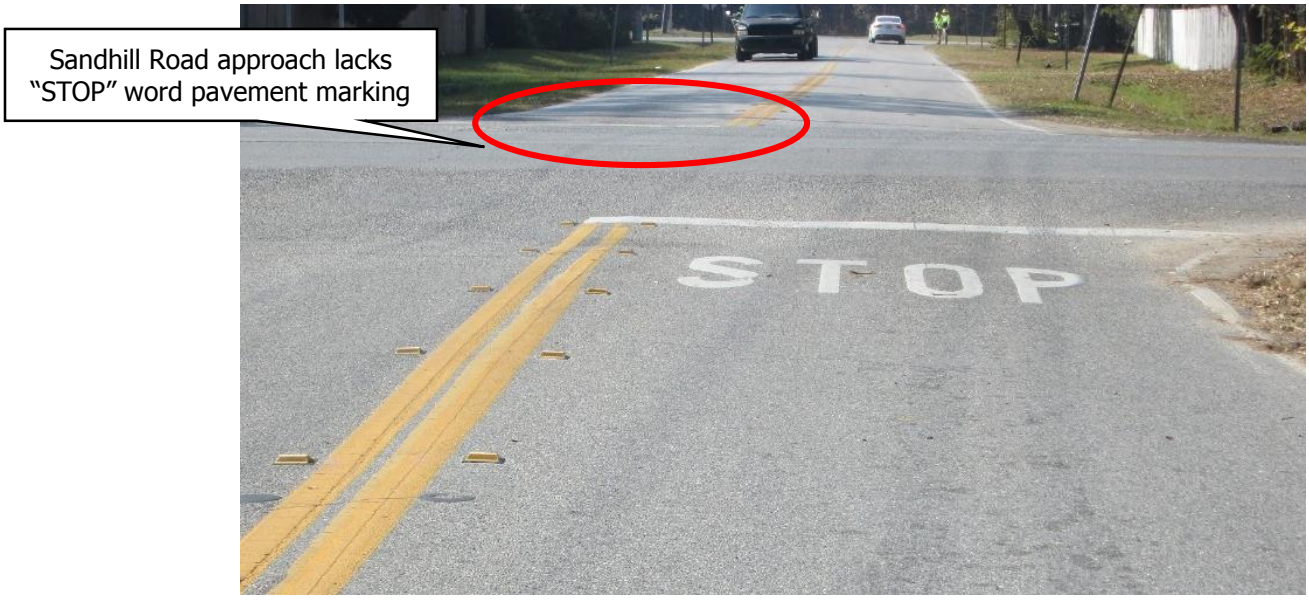


FIGURE 4-3. VIEW OF PAVEMENT MARKINGS AND RPMS ON MARLOW ROAD AT STUDY INTERSECTION

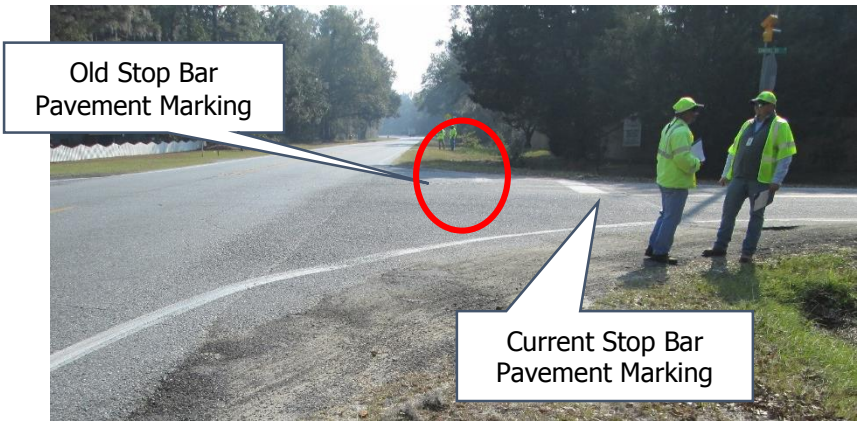


FIGURE 4-4. VIEW FROM SANDHILL RD. STOP BAR LOOKING SOUTHBOUND ALONG SR 17. NOTE THE VEGETATION, MULTIPLE STOP BARS, AND WHITE FENCE IN THE SOUTHEAST QUADRANT.

FIGURE 4-5. VIEW OF PAVEMENT MARKINGS, SIGNS AND RPMS ON MARLOW ROAD AT STUDY INTERSECTION DURING NIGHT INSPECTION

FIGURE 4-6. WORN, FADED STOP BAR AT SANDHILL ROAD AT SANDHILL ROAD/CENTRAL AVENUE INTERSECTION

4.2.2. RECOMMENDATIONS AND RATINGS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Install "Stop" word pavement marking on Sandhill Road approach.	**High**	**Low**	**Short Term**	**Low**
2. Consider installing "Stop Ahead" symbol advance warning pavement markings on Marlow Road and Sandhill Road approaches to raise driver awareness of the stop control at the intersection with SR 17.	**Moderate**	**Low**	**Short Term**	**Low**
3. Work with Effingham County to replace pavement markings and striping along Marlow Road approaching the study intersection (Marlow Road is a County Road).	**High**	**Low**	**Short Term**	**Low**
4. Work with Effingham County to refresh pavement markings throughout the study area, especially at the intersection of Sandhill Road at Sandhill Road/Central Ave.	**High**	**Low**	**Short Term**	**Low**
5. Clear debris and vegetation covering existing pavement markings, such as edge lines.	**Low**	**Low**	**Short Term**	**Low**
6. Remove former, yet still visible, worn stop bar on Sandhill Road approach to avoid potential confusion, since a newer stop bar has recently been installed.	**Low**	**Low**	**Short Term**	**Low**
7. Consider installing additional transverse (a.k.a. in-lane) rumble strips on Marlow Road closer to the intersection to alert motorists to the stop sign ahead. Ensure at least one set of rumble strips is placed between Hickory Ln and SR 17 to warn drivers existing nearby driveways on the approach to SR 17.	**Moderate**	**Moderate**	**Intermediate**	**Moderate**

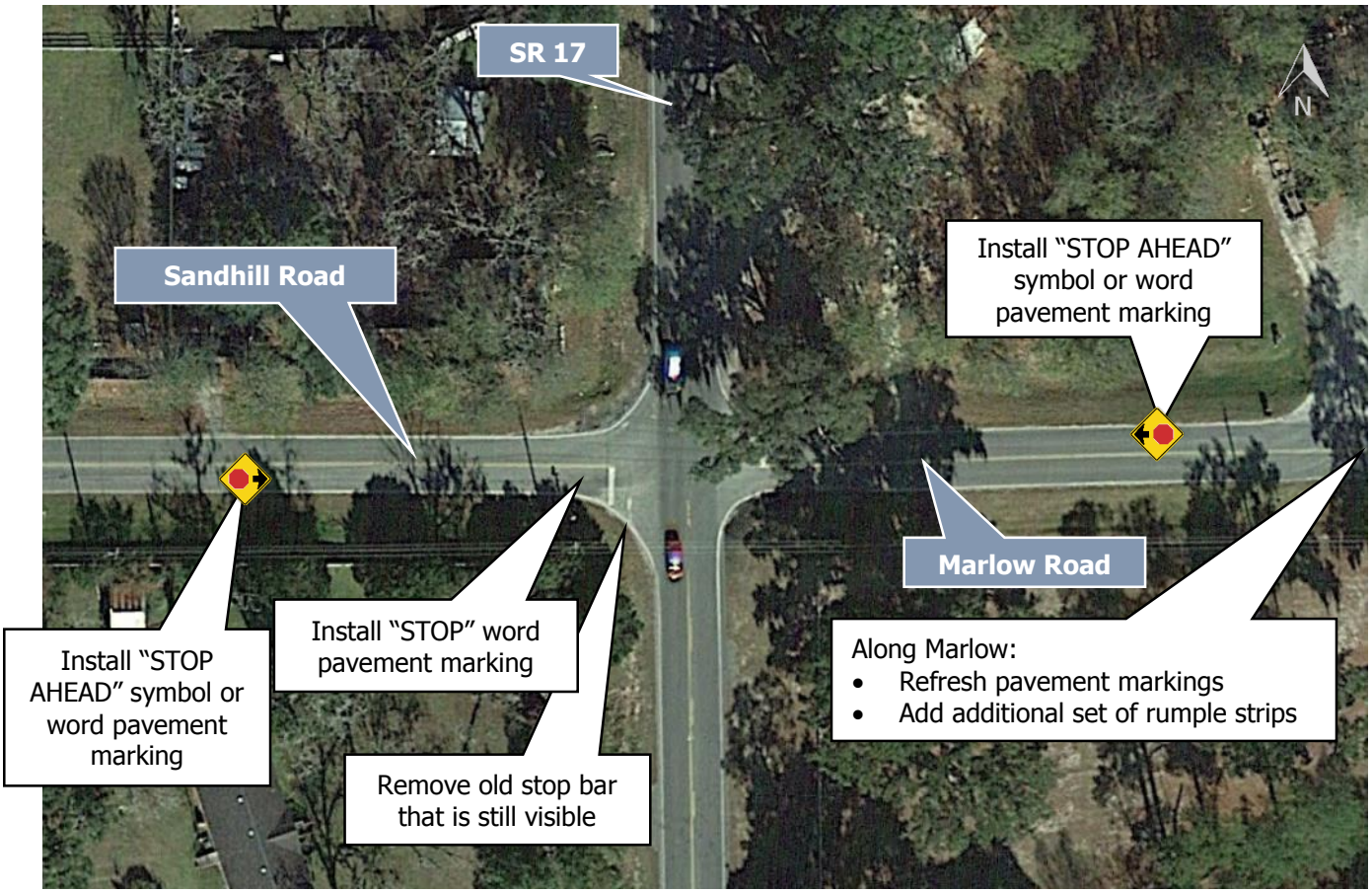


FIGURE 4-7. RECOMMENDED SHORT TERM PAVEMENT MARKING IMPROVEMENTS

4.3. SIGNAGE AND SIGNALIZATION

4.3.1. FINDINGS AND OBSERVATIONS

1. Advance warning "Stop Ahead" signs are used on both side street approaches.
2. On the northbound and southbound approaches of SR 17, an advance warning "Intersection Ahead" sign is present. The sign on the northbound approach has a name plaque for the side streets, but the southbound approach sign does not have a name plaque. The audit team observed that the intersection ahead sign and name plaque on southbound SR 17 may impede sight distance for vehicles at the stop sign on Sandhill Road.
3. "Stop" signs with supplemental flashing beacons on Marlow Road and Sandhill Road are 48-inch signs mounted on double-posts for stability. "Cross Traffic Does Not Stop" plaques are present on two of the stop signs. The stop sign on the left side of Marlow Road has no such plaque.
4. Stop sign posts are marked with red and white reflective strips; however only the stop sign on the left side of Marlow Road has these strips on both posts. The other two stop signs only have reflective strips on the inside post. This configuration does not meet current standards. Reflective strips should be solid red and should be on all sign posts.
5. On Sandhill Road, the SR 17 junction sign obstructs the stop sign at the intersection (Figure 4-9).
6. There is no sign indicating the junction with SR 17 on Marlow Road. Such a sign may help call motorists' attention to the intersection ahead.
7. The directional sign on the left (north) side of the Sandhill Road approach is damaged.
8. Multiple bike route signs are located on individual posts. The audit team suggests consolidating the signs on one post to reduce visual clutter.
9. Signs generally appear to be in good condition and have good reflectivity at night; however, street name signs are barely visible, worn, and are not reflective in the dark.

FIGURE 4-8. DAMAGED DIRECTIONAL SIGN ON NORTH SIDE OF SANDHILL ROAD APPROACH (NORTHWEST QUADRANT OF STUDY INTERSECTION)

FIGURE 4-10. STOP SIGN ON SANDHILL RD WITH SUPPLEMENTAL "CROSS TRAFFIC DOES NOT STOP" SIGN AND FLASHING RED BEACON. NOTE THE REFLECTIVE RED AND WHITE STRIP. TO MEET CURRENT STANDARDS, A RED ONLY STRIP SHOULD BE ON BOTH POSTS.

FIGURE 4-9. OVERLAPPING SIGNS ON SANDHILL RD APPROACH

FIGURE 4-11. MULTIPLE BIKE SIGNS ON INDIVIDUAL POSTS

4.3.2. RECOMMENDATIONS AND RATINGS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Install an additional red warning flasher on the Marlow Road stop sign on the left-hand (south) side of the road to alert motorists to the stop sign. The flasher should be of similar design to flashers currently in place on adjacent signs at the intersection. An overhead flashing beacon at the intersection was discussed as a possible recommendation, but the District no longer installs flashing red/yellow overhead beacons.	**High**	**Low**	**Short Term**	**Moderate**
2. Install an LED flashing "Stop Ahead" warning sign on Marlow Road approaching SR 17.	**High**	**Moderate**	**Short Term**	**Moderate**
3. Upgrade street name signs at study intersection to increase visibility/reflectivity at night and to meet current standards.	**High**	**Low**	**Short Term**	**Low**
4. Conduct a sign inventory and identify signs to remove or relocate as necessary, so as not to have too many signs cluttering the intersection, which may potentially distract or confuse motorists. Special attention should be paid to ensuring that non-critical signs, such as bike route signs, junction signs, and street name signs do not block or distract from regulatory signs.	**Moderate**	**Low**	**Short Term**	**Low**
5. Replace damaged directional sign on the left (north) side of the Sandhill Road approach.	**Low**	**Low**	**Short Term**	**Low**
6. Update and/or install red reflective strips on all "Stop" sign posts to meet current standards.	**High**	**Low**	**Short Term**	**Low**
7. Add name plaques for "Sandhill Road" and "Marlow Road" to the "Intersection Ahead" sign on southbound SR 17 approaching the study intersection.	**Low**	**Low**	**Short Term**	**Low**
8. Install SR 17 sign and auxiliary junction sign (M2-1) on Marlow Road approaching SR 17 to alert motorists to the intersection with the state route ahead. These signs are already present on the Sandhill Road approach (see Figure 4-9).	**Low**	**Low**	**Short Term**	**Low**

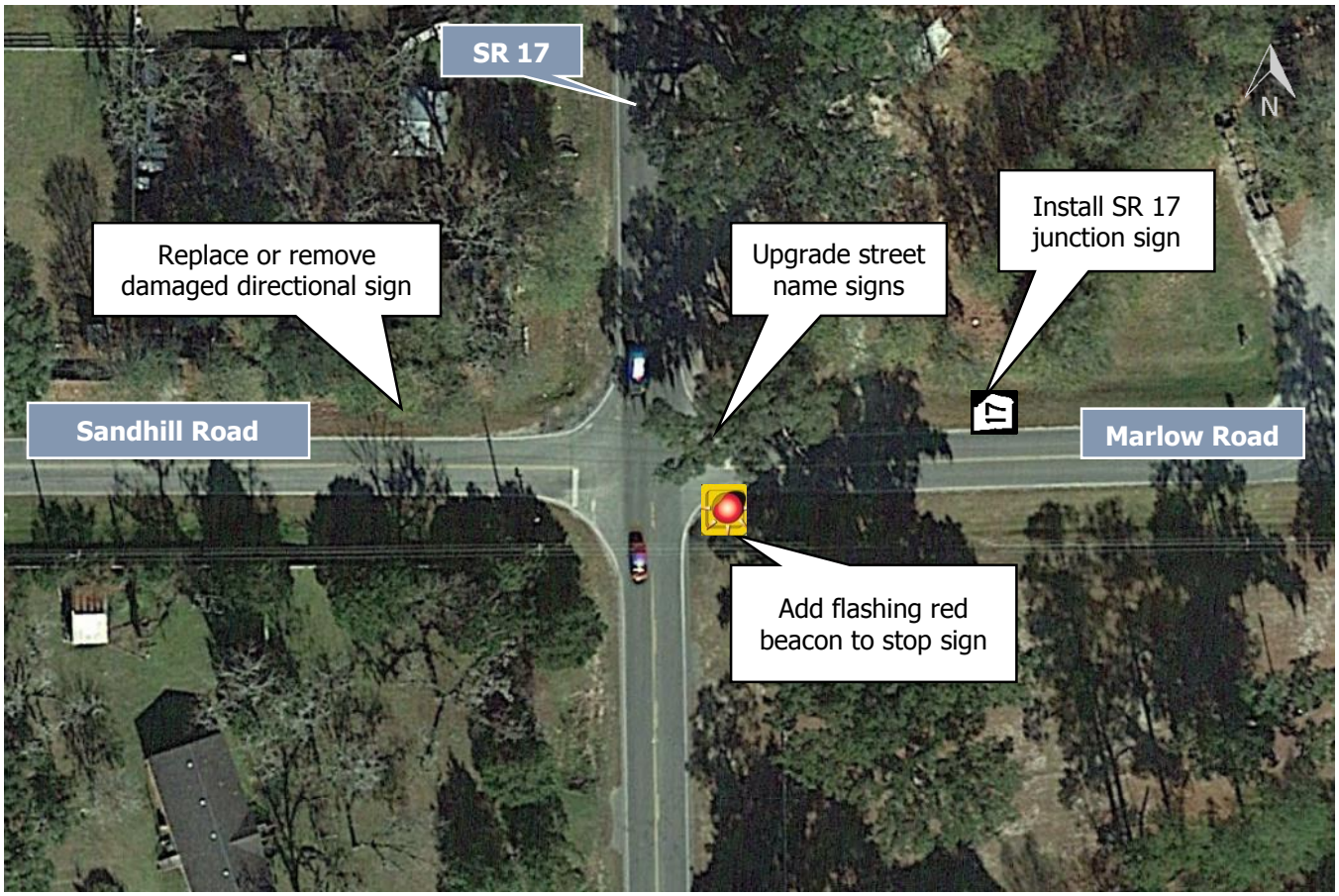


FIGURE 4-12. RECOMMENDED SHORT TERM SIGNAGE IMPROVEMENTS

FIGURE 4-13. DOUBLE-POSTED STOP SIGN WITH REFLECTIVE STRIPS ON THE POSTS.
SOURCE: MICHIGAN DOT VIA FHWA[2]

[2] FHWA. Public Roads *75*(6). Publication number FHWA-HRT-12-004, May/June 2012. http://www.fhwa.dot.gov/publications/publicroads/12mayjune/05.cfm

LED lights can improve the visibility of "Stop" signs by drawing drivers' attention to them. Signs embedded with LEDs, such as the ones shown in Figure 4-14 have been used in Florida and Wisconsin.

FIGURE 4-14. EXAMPLE OF AN LED-LIGHTED "STOP AHEAD" SIGN ON A RURAL ROAD.

Flashing beacons, such as the one shown in Figure 4-15 have also been used successfully at stop-controlled intersections in North Carolina, South Carolina, and at this intersection. The FHWA has published a report evaluating the safety of flashing beacons.[3]

FIGURE 4-15. EXAMPLE OF A FLASHING BEACON MOUNTED ON A "STOP" SIGN.
SOURCE: FHWA PUBLICATION HRT-08-044[3]

[3] FHWA. Publication number FHWA-HRT-08-044. April 2008. http://www.fhwa.dot.gov/publications/research/safety/08044/

4.4. INTERSECTION GEOMETRY

4.4.1. FINDINGS AND OBSERVATIONS

1. There are potential sight distance issues for the Marlow Road and Sandhill Road approaches – it is difficult to see when turning onto SR 17. The audit team noted that it appears that intersection ahead signs on SR 17 may block view of approaching traffic for vehicles waiting at the intersection on Sandhill Road.
2. Trees and vegetation on intersection corners partially block sight lines and limit sight distance of vehicles traveling on SR 17. Although there are advance warning signs, drivers may not be aware of the intersection due to vegetation along the roadway.
3. A white fence on the church property in the southeast corner of the intersection may obscure the view of SR 17 from the Marlow Road approach.
4. The horizontal curve approximately 700 feet east of the study intersection along Marlow Road may limit sight distance. The audit team observed heavy vegetation growing that may obscure the view of the study intersection. Marlow Road is a County Road, therefore improvements to this portion of the road (away from the intersection at SR 17) would be the County's responsibility.

FIGURE 4-16. VIEW FROM SOUTHEAST CORNER OF STUDY INTERSECTION LOOKING SOUTHBOUND ALONG SR 17 TOWARD CURVE. NOTE THE LOG TRUCK TRAVELLING ALONG SR 17.

FIGURE 17. VEGETATION MAY CONTRIBUTE TO DRIVERS NOT SEEING THE INTERSECTION CLEARLY.

4.4.2. RECOMMENDATIONS AND RATINGS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Investigate sight distance at all intersection approaches and implement recommendations as appropriate, including trimming back or removing trees and vegetation.	**Moderate**	**Low**	**Intermediate**	**Low**
2. Install a narrow raised concrete splitter island with delineator posts on the side street approaches to SR 17 to channelize turning movements and help communicate the presence of the intersection to approaching motorists.	**High**	**Moderate**	**Intermediate**	**Moderate**
3. Trim/maintain vegetation near horizontal curve on Marlow Road.	**Low**	**Low**	**Short Term**	**Low**

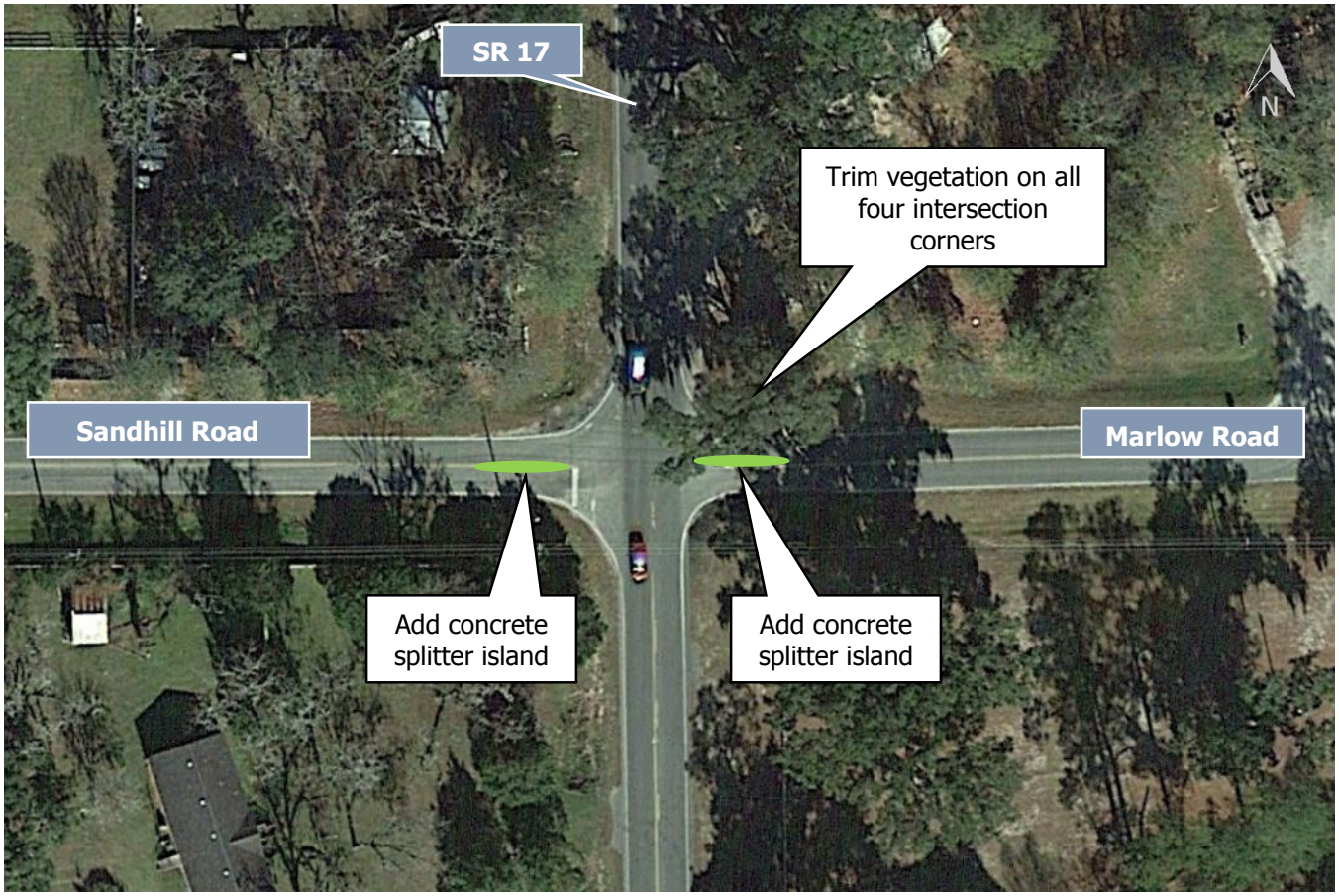


FIGURE 4-18. RECOMMENDED SHORT TERM INTERSECTION GEOMETRY IMPROVEMENTS

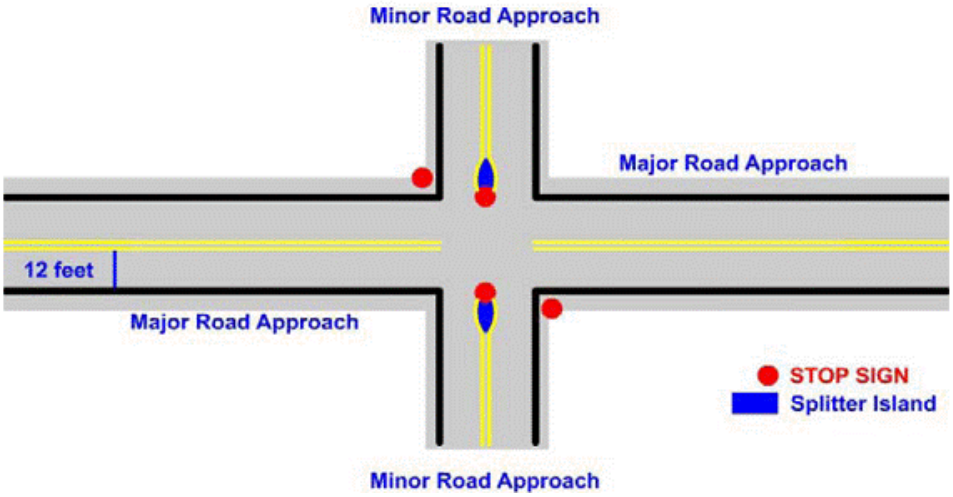


FIGURE 4-19. EXAMPLE CONCRETE SPLITTER ISLAND DESIGN FOR TWO-WAY STOP CONTROLLED INTERSECTION. TOP IMAGE SHOWS EXAMPLE LOCATION
SOURCE: FHWA[4]

[4] FHWA. *Summary Report: Two Low-Cost Safety Concepts for Two-Way STOP-Controlled, Rural Intersections on High-Speed Two-Lane, Two-Way Roadways*. Publication number FHWA-HRT-08-063, September 2008. http://www.fhwa.dot.gov/publications/research/safety/08063/

4.5. LIGHTING AND OTHER

4.5.1. FINDINGS AND OBSERVATIONS

1. There are no street lights or other lighting in this area. It may be difficult for motorists on both roadways to see the intersection at night.
2. Rutting is evident in all corners of the intersection, particularly in the southeast corner, from northbound turning vehicles driving over the shoulder.
3. This intersection experiences a high volume of large trucks. At the time of the audit, it was observed that many trucks travel along SR 17 as well as the minor roads. The team witnessed trucks on northbound Sandhill Road turn right onto Sandhill Road to then turn north or south on SR 17. Log and sand trucks traveled the corridor during the audit due to the close proximity to local mills and sand pits.
4. In a rural area such as this, it is suspected that drivers on SR 17 regularly exceed the posted speed limit of 55 MPH. According to the Traffic Engineering Study performed by GDOT in 2015, the 85th percentile speed was 60 MPH for northbound traffic and 65 MPH for southbound traffic.

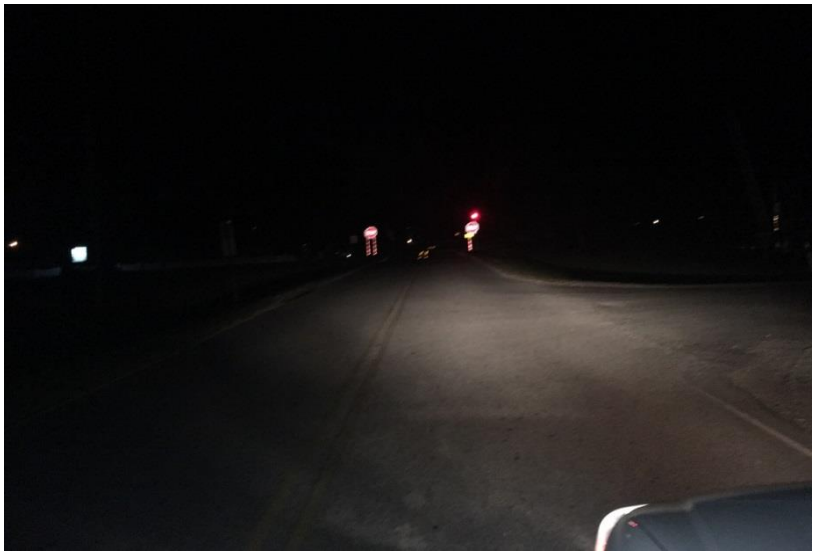


FIGURE 4-20. VIEW OF INTERSECTION AT NIGHT. THERE ARE NO STREET LIGHTS OR OTHER LIGHTING PRESENT

FIGURE 4-21. RUTTING IN THE SOUTHEAST CORNER, FROM VEHICLES TURNING FROM SR 17 ONTO EASTBOUND MARLOW ROAD

4.5.2. RECOMMENDATIONS AND RATINGS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Install general lighting at the intersection to increase visibility and to illuminate the intersection itself.	**High**	**Moderate**	**Intermediate**	**Moderate**

FIGURE 4-22. RECOMMENDED LIGHTING IMPROVEMENTS

4.6. HIGH-COST, LONG-TERM

4.6.1. RECOMMENDATIONS AND RATINGS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Consider converting the Sandhill Road approach into a cul-de-sac with vegetation, a physical barrier (such as guardrail), and object markers used to warn and alert drivers of the end of the roadway. This will eliminate some potential conflicts and force turn movements from Marlow Road. Type 4 Object Markers should be used to indicate the end of the roadway inside the newly closed roadway and double headed arrow signs (see Figure 4-23) should be installed facing drivers on Marlow Road to signify the T-intersection. Northbound traffic on Sandhill Road could be routed to a roadway to the north (Luthern Dr. or Oak Dr.) to access SR 17. Assess feasibility and implement if determined to be feasible.	**High**	**High**	**Long-term**	**High**
2. Study the feasibility of a roundabout to tie all legs of the intersection together and streamline the flow of traffic. This could reduce speeding and it would reduce potential intersection conflicts. Implement if determined to be feasible.	**High**	**High**	**Long-term**	**High**
3. Consider converting this intersection to restricted right-turn-only movements from the side street approaches. This would prohibit through movements and left turns from Sandhill Road and Marlow Road, reducing potential conflict points. Traffic would utilize adjacent intersections to the north and south along SR 17 in order to make the prohibited movements (see Figure 4-25). Assess feasibility and implement if determined to be feasible.	**High**	**High**	**Long-term**	**High**

4. Consider realigning the Sandhill Road and Marlow Road approaches. This could potentially help alleviate the visual impression that the roadway continues through the intersection (because approaching motorists may not see the cross street) and could help reduce vehicle speeds upon approach to the intersection (see Figure 4-26). Right-of-way, existing conditions/topography, etc. would need to be assessed to determine feasibility.	**High**	**High**	**Long-term**	**High**

FIGURE 4-23. END OF ROADWAY (TYPE 4 OBJECT MARKER) AND DOUBLE-HEADED ARROW SIGNS TO BE USED IF SANDHILL ROAD APPROACH IS CLOSED OFF

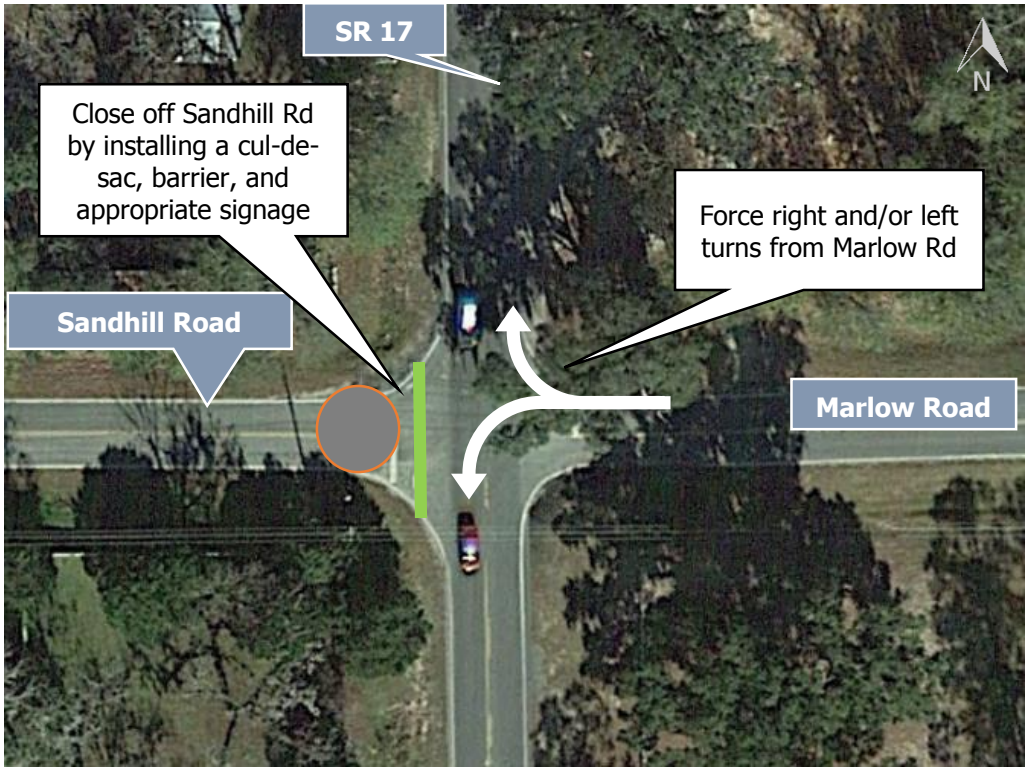


FIGURE 4-24. SKETCH DIAGRAM OF RECOMMENDED CUL-DE-SAC ON SANDHILL ROAD

FIGURE 4-25. DIAGRAM OF RIGHT-TURN-ONLY MOVEMENT IMPROVEMENT OPTIONS

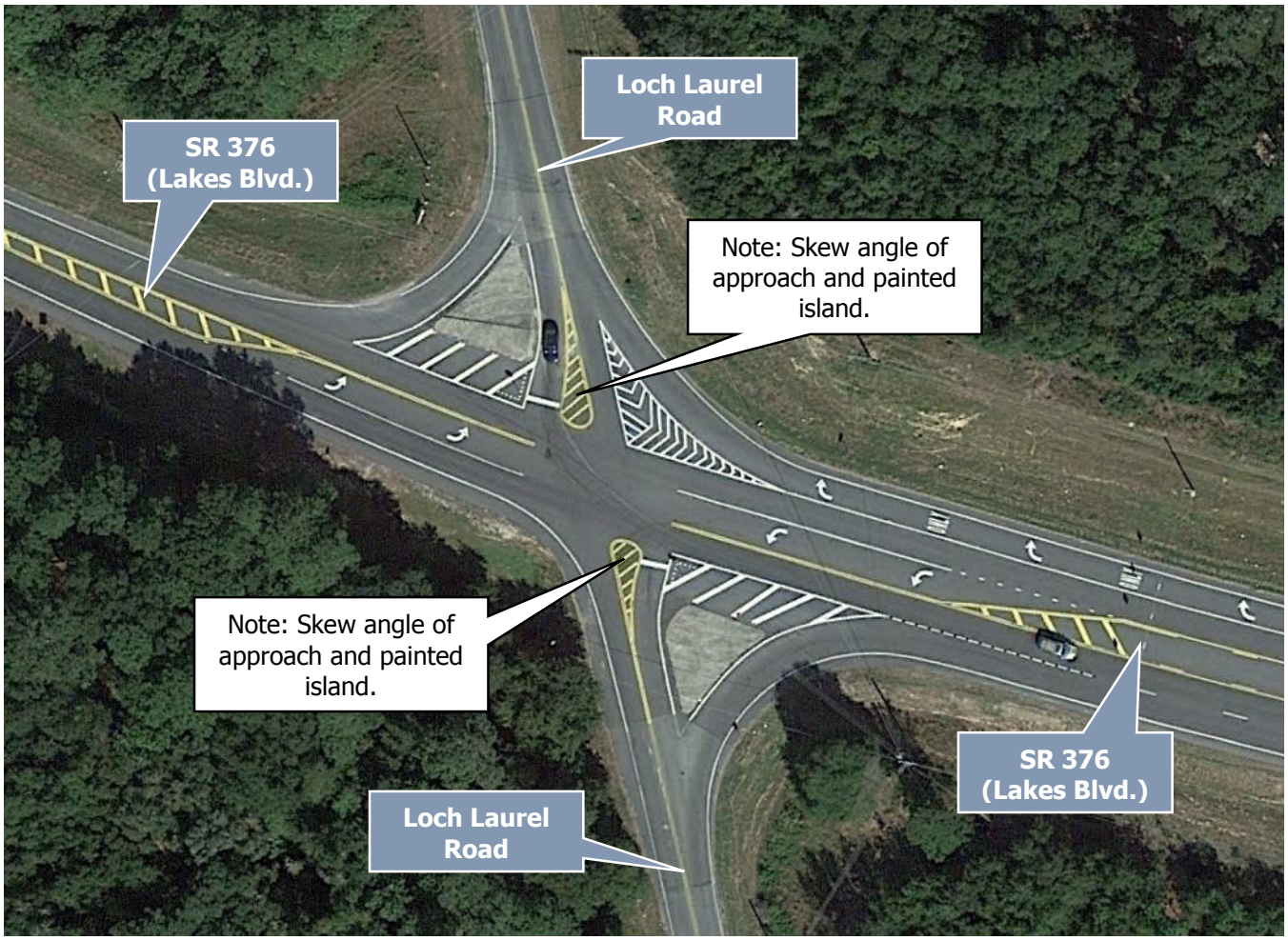


FIGURE 4-26. EXAMPLE OF RECOMMENDED SIDE ROAD REALIGNMENT AT INTERSECTION. THIS DESIGN IS LOCATED IN LOWNDES COUNTY, GEORGIA ON LOCH LAUREL ROAD AT SR 376.

5. CONCLUSION

Primarily, safety concerns at the intersection of SR 17 at Sandhill Road/Marlow Road revolve around drivers not noticing that they must stop before entering or crossing SR 17, or not yielding to oncoming traffic after stopping. The intersection recently underwent improvements which provide key safety benefits. However, more could be done to increase drivers' awareness of the "Stop" signs and to design the Sandhill Road and Marlow Road approaches to the intersection in such a way that makes it difficult for drivers not to notice the intersection and "Stop" signs. Other concerns revolve around ensuring drivers are made aware of the approaching intersection in sufficient time, sight triangles, and the ability for drivers to see cross-traffic and to judge speed and distance to cross SR 17.

Following a thorough field inspection and review of crash data and existing conditions, the audit team recommends a series of short-term steps to alleviate safety deficiencies by providing additional advance warning of the stop-controlled intersection and attempting to make motorists aware of the possible need to stop ahead. It is recommended to provide advance warning via post-mounted signs and to consider the use of LED lighted signs as well. Additional recommendations include trimming vegetation that may obstruct full sight distance.

In a more intermediate timeframe (within the next two years), the audit team recommends adding additional rumble strips on the Marlow Road approach and installing raised concrete splitter islands on both side street approaches to help improve the intersection's visibility, channelize turning movements, and potentially calm traffic through the intersection. Upgrading street name signs at the intersection and adding lighting will also help to make the intersection more visible to approaching motorists at night.

In the long-term (more than two years), potential recommendations include a number of different options to redesign/reconfigure the intersection geometry in an effort to improve safety:

- Reconfiguring the intersection as a T-intersection by closing the Sandhill Road approach,
- Constructing a roundabout design,
- Realignment of the side street approaches, or
- Implementing a restricted side street movement design.

Further study is required for all of these options in order to determine feasibility and potential barriers, such as the acquisition of additional right-of-way.

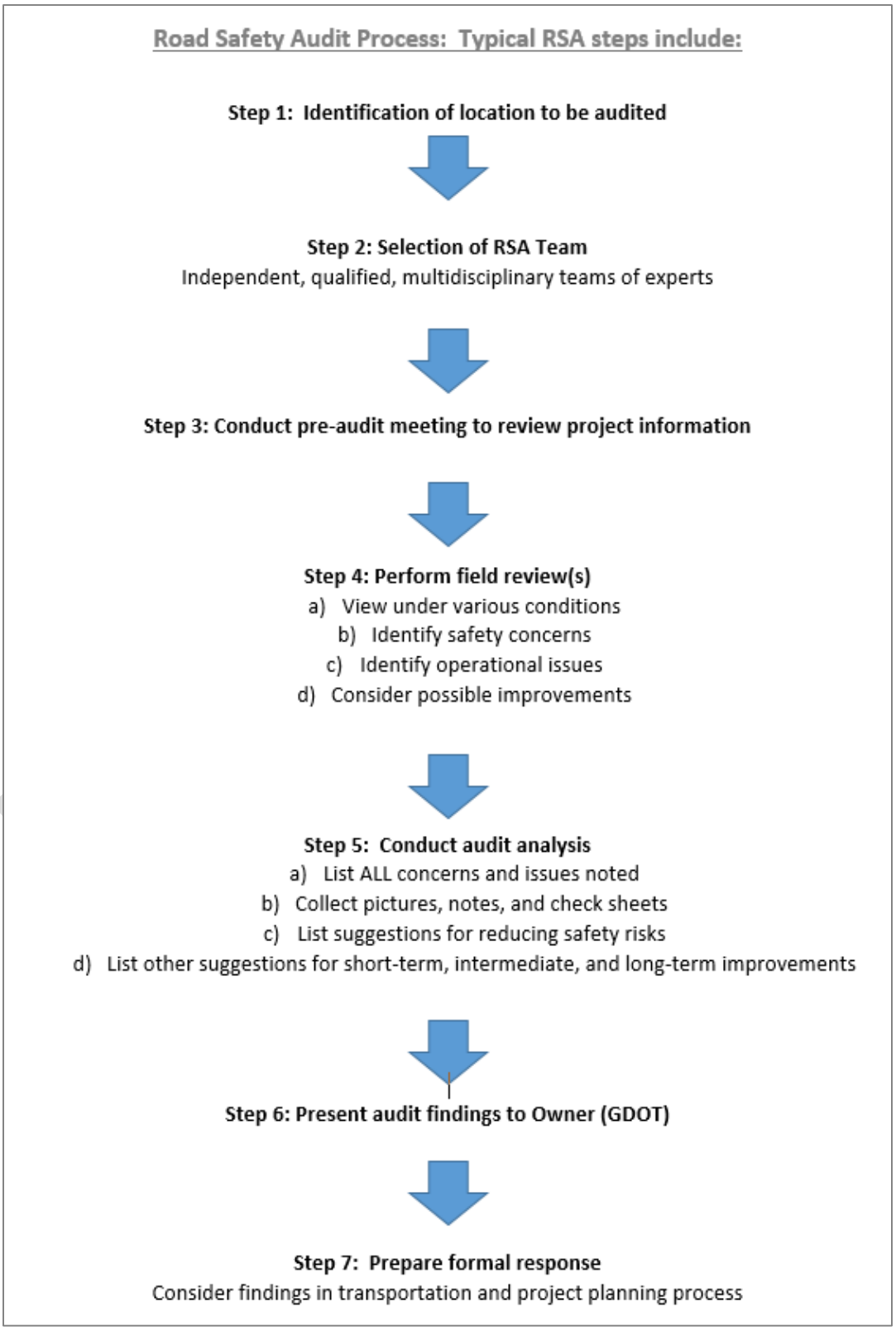
NEXT STEPS

Implementation of recommendations will depend upon available resources and coordination with future projects, and should be prioritized according to need, benefit, and opportunities. Priorities, responsibility for implementation, and timeframe should be determined during post-audit follow-up meetings between GDOT and local officials. It is recommended that responsible agencies document decisions to modify or eliminate recommendations based on engineering judgment or lack of feasibility, along with any plans to advance recommendations and make improvements.

Appendices

A. RSA Process Diagram
B. Invitation Letter
C. Audit Meeting Agenda
D. Sign-in Sheet
E. Crash Data
F. Recommendations At-a-Glance

APPENDIX A. RSA PROCESS DIAGRAM



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APPENDIX B. RSA MEETING INVITATION

Thoresen, Erin

Subject:	Road Safety Audit: SR 17 at Marlow Rd/Sandhill Rd, Effingham County
Location:	SR 17 at Marlow Rd/Sandhill Rd, Effingham County
Start:	Wed 11/16/2016 12:30 PM
End:	Wed 11/16/2016 4:30 PM
Recurrence:	(none)
Meeting Status:	Accepted
Organizer:	Turpeau Jr, Michael

Dear Road Safety Audit Participant:

The Georgia Department of Transportation (GDOT) has determined that a Road Safety Audit (RSA) is appropriate for the location described above. You have been identified as a potential member of the Audit team because of your expertise and experience in local conditions, traffic engineering, safety, roadway design, traffic operations, human factors or some other knowledge specialty area that may be useful in identifying practical solutions for this location. Therefore, your participation is requested for the Audit.

The RSA for this location is expected to require one half day of your time. Realizing that this is a major investment of effort, please accept this email as an expression of appreciation for your consideration and hopefully your participation. A RSA is a formal safety performance examination of a roadway section or intersection performed by an independent, qualified and multidisciplinary team of experts to identify potential solutions to improve the safety of the selected roadway location. The design of the location will be considered, however, this is NOT a design activity. Consequently, this is indeed a positive opportunity to identify short-term, intermediate and long-term solutions which can be considered for implementation by the Department in cooperation with the local governments and the community in the immediate vicinity of the location.

As stated above, it is anticipated that this RSA will require one half day your time and it will be performed on Wednesday November 16, 2016. **It will begin at 12:30 pm with a briefing meeting in the field at the intersection.** During this time we will furnish all the materials and information you will need to perform the field inspection which will occur directly after the briefing. We will conduct the field inspection and then go to a **City of Guyton Facility (503 Magnolia Street, Guyton, GA 31312)** for a debriefing. There we will consolidate your observations and recommendations from the inspection. A night time inspection will be performed prior to the RSA by GDOT District 5 personnel. The purpose of the after-dark inspection will be to determine the existing conditions at the site under limited visibility conditions and, to identify those specific improvements related to nighttime operations. A final report including recommendations for improvements and will be returned to you and a follow-up meeting will be set up to discuss further actions by the Department and/or the local government.

Again, your participation in this activity is greatly appreciated. A response to let us know your availability for the meetings and inspections will also be greatly appreciated. If there are any questions please feel free to contact me as my information can be found below.


CrashData Charts Tables - SR 1...


RSA20_Fatalities...

Michael D. Turpeau Jr.
State Safety Program Supervisor
Georgia Department of Transportation
Office of Traffic Operations
☎: (404)635-2831
Fax: (404)635-2960
mturpeau@dot.ga.gov


RSA20_CrashesB...

Pedestrian deaths are surging in Georgia - 206 people were killed while walking in 2015. With pedestrian deaths up 37% in two years, Georgia DOT's SEE & BE SEEN campaign, in partnership with PEDS, aims to make it safer to walk in Georgia. Safety is a shared responsibility. Walkers and drivers: Pay attention. Walkers: make sure you can **SEE & BE SEEN**. Drivers: Slow down (speed kills). Visit www.dot.ga.gov/DS/SafetyOperation/SBS. #ArriveAliveGA


ATT43516 1.jpg

APPENDIX C. AUDIT MEETING AGENDA

Georgia Department of Transportation

GRESHAM SMITH AND PARTNERS

SR 17 at Sand Hill Road/Marlow Road
Road Safety Audit
Effingham County, GDOT District 5

GDOT Statewide Roadway Safety Audits
Project #: CSSTP-0011-00(651)
PI No. 0011651
GS&P Project No: 28121.14

MEETING DATE:	November 16, 2016
MEETING TIME:	12:30 PM – 4:30 PM
FIELD INSPECTION:	Meet in the Field at SR 17 and Sand Hill Road/Marlow Road
DEBRIEFING:	503 Magnolia Street, Guyton, GA 31312

AGENDA

1. Introduction of attendees (12:30 PM)
2. Brief Overview of RSA Process and Goals/Expectations
3. Overview of Packet Materials
    a. Study Area Location
    b. Crash Data
    c. Known/Apparent Issues
4. Field Inspection (12:45-2:00 PM)
    a. Use Checklist – focus on safety issues
        i. Identification and enumeration of issues
        ii. Identification of short-term, intermediate, and long-term solutions and safety enhancements along corridor
5. Field inspection debriefing at City of Guyton Facility (2:15 PM)
    a. Session to review, enumerate, and list identified safety deficiencies and develop suggested solutions
6. Adjourn at 4:30 PM
7. Nighttime Inspection – *Performed in advance by District 5 Personnel*

Design Services For The Built Environment

2325 Lakeview Parkway, Suite 300 / Alpharetta, Georgia 30009-7940 / Phone 770.754.0755 / www.greshamsmith.com

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APPENDIX D. AUDIT MEETING SIGN-IN SHEET

GRESHAM SMITH AND PARTNERS

Georgia Department of Transportation

Road Safety Audit
Sign-In Sheet
SR 17 at Sandhill Road / Marlow Road – Effingham County, GA (GDOT District 5)
November 16, 2016

Name	Organization	Phone	Email
Michael Turpeau Jr.	GDOT - Traffic Ops	(4)635-2831	mturpeau@dot.ga.gov
J Cory Knox	GDOT- D5 Const	912 424 8975	cknox@dot.ga.gov
Tizon Pittman	GDOT - Precon ST	912 282 5880	tpittman@dot.ga.gov
Gerald Floyd Jr.	GDOT - Traffic Ops	912-403-1278	gfloyd@dot.ga.gov
Maunie Boyd	GDOT - Traffic Ops	912-530-4395	DBoyd@DOT.GA.gov
Cynthia Phillips	GDOT - Traffic Ops	912-538-9410	cphillips@dot.ga.gov
Greg Morris	FHWA	404-562-3619	greg.morris@dot.gov
NEIL DUBBERLY	GDOT - TRAFFIC OPS	912-424-9145	NDUBBERLY@DOT.GA.GOV
Robert Baker Sr	GDOT TMC	404-635-2837	robbaker@dot.ga.gov
Jimmy McDuffie	Effingham Co S.O.	912-754-3945	jmcduffie@effinghamcounty.org
Trey Hendley	GDOT PTE	404-858-0966	Ahendley@DOT.ga.gov
MELVIN JOHNSON	GDOT - Asst. Area Engr	(912)424-9915	mejohnson2@dot.ga.gov
Ron Nelson	GDOT Area Manager	912 4249112	ronelson@dot.ga.gov
Wesley Sherrod	Effingham County	912-754-8064	Wsherrod@effinghamcounty.org
Tass Allen	Effingham County	912-754-8060	Tallen@Effinghamcounty.org

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APPENDIX E. CRASH DATA

Crashes January 1, 2011 – March 31, 2016

Accident No	Date	Time	Route	Distance From	Direction From	Intersect Rte.	Injuries	Fatalities	Manner Of Collision	First Harmful Event	Light	Surface	Veh1Type	MnvrVeh1	Veh2Type	MnvrVeh2
3823897	7/18/2011	17:28:00	SR 17			SANDHILL RD	0	0	Angle	Motor Vehicle In Motion	Daylight	Dry	Pickup Truck	Passing	Utility Passenger Vehicle	Turning Left
5150142	9/5/2012	7:37:00	OLD MARLOW RD			HWY 17	0	0	Angle	Motor Vehicle In Motion	Daylight	Dry	Passenger Car	Straight	Passenger Car	Straight
4436615	5/6/2013	19:29:00	GA 17			MARLOW ROAD	0	0	Angle	Motor Vehicle In Motion	Daylight	Dry	Passenger Car	Straight	Pickup Truck	Straight
4662625	11/21/2013	14:45:00	GA 17			MARLOW ROAD	0	3	Angle	Motor Vehicle In Motion	Daylight	Dry	Pickup Truck	Stopped	Tractor/Trailer	Straight
4671013	12/9/2013	7:25:00	GA 17			MARLOW ROAD	1	0	Angle	Motor Vehicle In Motion	Daylight	Wet	Pickup Truck	Turning Left	Tractor/Trailer	Straight
4973563	8/14/2014	16:13:00	SR 17			MARLOW RD	2	0	Angle	Motor Vehicle In Motion	Daylight	Dry	Passenger Car	Turning Left	Passenger Car	Straight
5035563	10/29/2014	18:04:00	GA 17			SANDHILL ROAD	1	0	Angle	Motor Vehicle In Motion	Daylight	Dry	Passenger Car	Changing Lanes	Passenger Car	Straight
5113075	12/13/2014	8:19:00	SR 17 SB MM 9			MARLOW ROAD	1	1	Angle	Motor Vehicle In Motion	Daylight	Dry	Passenger Car	Straight	Tractor/Trailer	Straight
5413357	3/11/2015	3:10:00	SR 17	100	North	MARLOW RD	0	0	Not A Collision with Motor Vehicle	Deer	Dark-Not Lighted	Dry	Passenger Car	Straight		
1603-0074	3/1/2016	8:06:00	SR 17			SANDHILL RD	0	1	Angle	Motor Vehicle In Motion	Daylight	Dry	Passenger Car	Straight	Tractor/Trailer	Straight

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APPENDIX F. RECOMMENDATIONS AT-A-GLANCE

PAVEMENT MARKINGS RECOMMENDATIONS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Install "Stop" word pavement marking on Sandhill Road approach.	**High**	**Low**	**Short Term**	**Low**
2. Consider installing "Stop Ahead" symbol advance warning pavement markings on Marlow Road and Sandhill Road approaches to raise driver awareness of the stop control at the intersection with SR 17.	**Moderate**	**Low**	**Short Term**	**Low**
3. Work with Effingham County to replace pavement markings and striping along Marlow Road approaching the study intersection (Marlow Road is a County Road).	**High**	**Low**	**Short Term**	**Low**
4. Work with Effingham County to refresh pavement markings throughout the study area, especially at the intersection of Sandhill Road at Sandhill Road/Central Ave.	**High**	**Low**	**Short Term**	**Low**
5. Clear debris and vegetation covering existing pavement markings, such as edge lines.	**Low**	**Low**	**Short Term**	**Low**
6. Remove former, yet still visible, worn stop bar on Sandhill Road approach to avoid potential confusion, since a newer stop bar has recently been installed.	**Low**	**Low**	**Short Term**	**Low**
7. Consider installing additional transverse (a.k.a. in-lane) rumble strips on Marlow Road closer to the intersection to alert motorists to the stop sign ahead. Ensure at least one set of rumble strips is placed between Hickory Ln and SR 17 to warn drivers existing nearby driveways on the approach to SR 17.	**Moderate**	**Moderate**	**Intermediate**	**Moderate**

SIGNAGE AND SIGNALIZATION RECOMMENDATIONS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Install an additional red warning flasher on the Marlow Road stop sign on the left-hand (south) side of the road to alert motorists to the stop sign. The flasher should be of similar design to flashers currently in place on adjacent signs at the intersection. An overhead flashing beacon at the intersection was discussed as a possible recommendation, but the District no longer installs flashing red/yellow overhead beacons.	**High**	**Low**	**Short Term**	**Moderate**
2. Install an LED flashing "Stop Ahead" warning sign on Marlow Road approaching SR 17.	**High**	**Moderate**	**Short Term**	**Moderate**
3. Upgrade street name signs at study intersection to increase visibility/reflectivity at night and to meet current standards.	**High**	**Low**	**Short Term**	**Low**
4. Conduct a sign inventory and identify signs to remove or relocate as necessary, so as not to have too many signs cluttering the intersection. Special attention should be paid to the multiple bike route signs in the area as well as the signs along the Sandhill Road approach. Sign clutter may potentially distract or confuse motorists.	**Moderate**	**Low**	**Short Term**	**Low**
5. Replace damaged directional sign on the left-hand (north side) of the Sandhill Road approach.	**Low**	**Low**	**Short Term**	**Low**
6. Update and/or install red reflective strips on all "Stop" sign posts to meet current standards.	**High**	**Low**	**Short Term**	**Low**
7. Add name plaques for "Sandhill Road" and "Marlow Road" to the "Intersection Ahead" sign on southbound SR 17 approaching the study intersection.	**Low**	**Low**	**Short Term**	**Low**
8. Install SR 17 sign and auxiliary junction sign (M2-1) on Marlow Road approaching SR 17 to alert motorists to the intersection with the state route ahead. These signs are already present on the Sandhill Road approach (see Figure 4-9).	**Low**	**Low**	**Short Term**	**Low**

INTERSECTION GEOMETRY RECOMMENDATIONS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Investigate sight distance at all intersection approaches and implement recommendations as appropriate, including trimming back or removing trees and vegetation.	**Moderate**	**Low**	**Intermediate**	**Low**
2. Install a narrow raised concrete splitter island with delineator posts on the side street approaches to SR 17 to channelize turning movements and help communicate the presence of the intersection to approaching motorists.	**High**	**Moderate**	**Intermediate**	**Moderate**
3. Trim/maintain vegetation near horizontal curve on Marlow Road.	**Low**	**Low**	**Short Term**	**Low**

LIGHTING RECOMMENDATIONS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Install general lighting at the intersection to increase visibility and to illuminate the intersection itself.	**High**	**Moderate**	**Intermediate**	**Moderate**

HIGH-COST, LONG-TERM RECOMMENDATIONS

	SAFETY BENEFIT	LEVEL OF EFFORT	TIME FRAME	COST
1. Consider converting the Sandhill Road approach into a cul-de-sac with vegetation, a physical barrier (such as guardrail), and object markers used to warn and alert drivers of the end of the roadway. This will eliminate some potential conflicts and force turn movements from Marlow Road. Double headed arrow signs (see Figure 4-23) should be installed on newly closed approach of the study intersection to signify the end of the roadway. Northbound traffic on Sandhill Road could be routed to a roadway to the north (Luthern Dr. or Oak Dr.) to access SR 17. Assess feasibility and implement if determined to be feasible.	**High**	**High**	**Long-term**	**High**
2. Study the feasibility of a roundabout to tie all legs of the intersection together and streamline the flow of traffic. This could reduce speeding and it would reduce potential intersection conflicts. Implement if determined to be feasible.	**High**	**High**	**Long-term**	**High**
3. Consider converting this intersection to restricted right-turn-only movements from the side street approaches. This would prohibit through movements and left turns from Sandhill Road and Marlow Road, reducing potential conflict points. Traffic would utilize adjacent intersections to the north and south along SR 17 in order to make the prohibited movements (see Figure 4-25). Assess feasibility and implement if determined to be feasible.	**High**	**High**	**Long-term**	**High**
4. Consider realigning the Sandhill Road and Marlow Road approaches. This could potentially help alleviate the visual impression that the roadway continues through the intersection (because approaching motorists may not see the cross street) and could help reduce vehicle speeds upon approach to the intersection (see Figure 4-26). Right-of-way, existing conditions/topography, etc. would need to be assessed to determine feasibility.	**High**	**High**	**Long-term**	**High**