Gadsden County Road Safety Study

Summary Report

1/31/2017

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Gadsden County Safety Study

Background

The Transportation Safety Center (TSC) at University of Florida (UF) has been engaged by the Florida Department of Transportation (FDOT) to provide technical assistance to small Florida counties to identify highway safety problems and develop countermeasures that can be funded with federal HSIP funds. This report summarizes recommendations for potential improvement projects identified for Gadsden County.

Purpose and Scope of Study

The intent of this study is to identify highway safety problems, recommend feasible countermeasures and provide documentation needed to support requests for funding. The document is intended to provide conceptual descriptions and preliminary cost estimates for the suggested countermeasures.

Process

On March 22-23, 2016, the TSC, along with staff of Gadsden County Public Works Department and FDOT District 3 Safety Office, conducted site visits to several locations where potential safety problems had been identified. Data from four sources were used to identify potential sites:

1. Sites of high crash locations shown in FDOT's Safety Portal
2. Segments and intersections identified as potential concerns by District 3 safety consultant
3. Locations identified by County staff
4. Crash records obtained using Signal Four Analytics (January 1, 2006 through December 31, 2015)

Typical Road Safety Audit process was adopted with the team consisting of representatives from Gadsden County Public Works, Florida DOT District 3, and UF LTAP. Recommendations were developed based on brief site visits, analysis of crash data, and information obtained from available records and photograph such as Google Earth. More detailed information will be required for development of construction plans and final cost estimates. Additional information including surveys, detailed inventories of signs and other road features, and engineering analysis as required by MUTCD for selection and installation of signs may be needed. Detailed descriptions of these sites and recommended countermeasures are included in separate reports*, Supplements 1 – Site Analysis and Recommendations and Supplement 2 – Countermeasures for Immediate Implementation*. This report provides a summary of the recommendations for each location.

Gadsden County Roads

The major county road network consists largely of roads that were original built and maintained as part of the State Secondary Road System by the Florida Department of Transportation (previously State Road Department or SRD). In the late 70s and early 80s, responsibility for managing these roads was transferred from FDOT to counties throughout the State, but many of these roads, as originally constructed by FDOT/SRD do not meet today's needs. Gadsden County has been proactive in upgrading the roads to include safety features such as paved shoulders, upgraded guardrail, pavement markings and signing, but funding limits the County's ability to fully address the needed improvements to the county road system.

Gadsden County is bounded on the east by the Ochlocknee River and on the west by the Apalachicola River. Significant horizontal and vertical curves distinguish the road alignments. The combination of horizontal and vertical curvature contributes to numerous "visual traps" (e.g. locations where the view of the road ahead is obstructed by a hill or some feature associated with a curve). These conditions represent risk factors for highway crashes that may be more severe than for roads in counties with less severe terrain.

Crashes

The primary data source used for this analysis was Signal Four Analytics (https://s4.geoplan.ufl.edu). Except as noted, analysis of general trends was based on the five-year period from 2011 through 2015. For the analysis of individual crash sites, in order to get a good sample size, the team used the 10-year period from 2006 through 2015.

The five-year history of highway crashes in Gadsden County (Figure 1) shows generally a steady increase in crashes, both for the total highway system and Gadsden County's roads. Crashes on the local road system accounted for 43% of all public road crashes and 43% of the fatalities. Of the local road crashes, approximately 85% occurred on the roads identified as "County Roads". These are generally the major numbered roads.

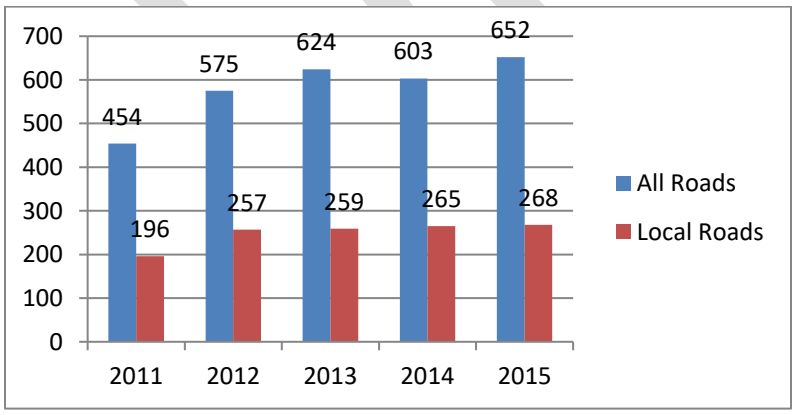
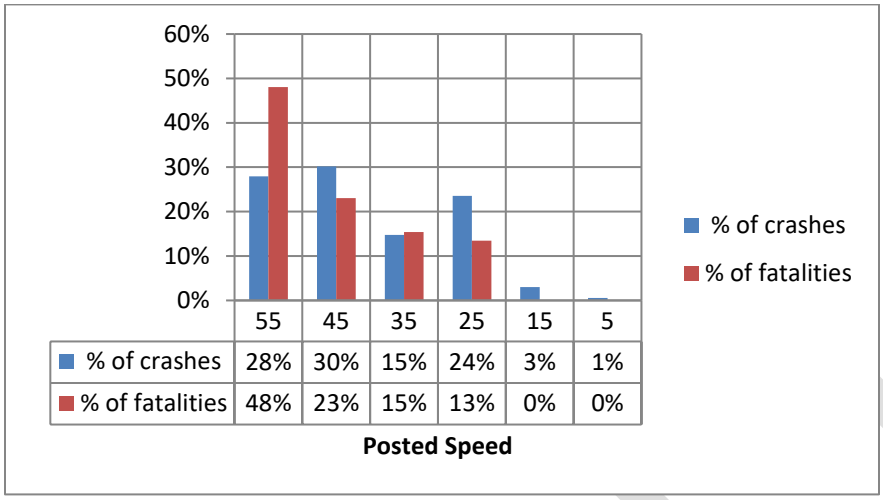


FIGURE 1 FIVE-YEAR HISTORY OF CRASHES IN GADSDEN COUNTY

Source: Signal Four Analytics

As Figure 2 shows, nearly 71% of the fatal crashes on local roads were on roads where the crash report showed a posted speed of 45 mph or greater.



Posted Speed	55	45	35	25	15	5
% of crashes	28%	30%	15%	24%	3%	1%
% of fatalities	48%	23%	15%	13%	0%	0%

FIGURE 2 POSTED SPEED VS CRASHES (2006 –2015)

Source: Signal Four Analytics (crash data)

Crash reports (posted speeds)

Figure 3 Shows the locations of crashes (by severity) on the local road system in Gadsden County for the last 10 years. These crashes were scattered throughout the county, clearly concentrated on the major county roads.

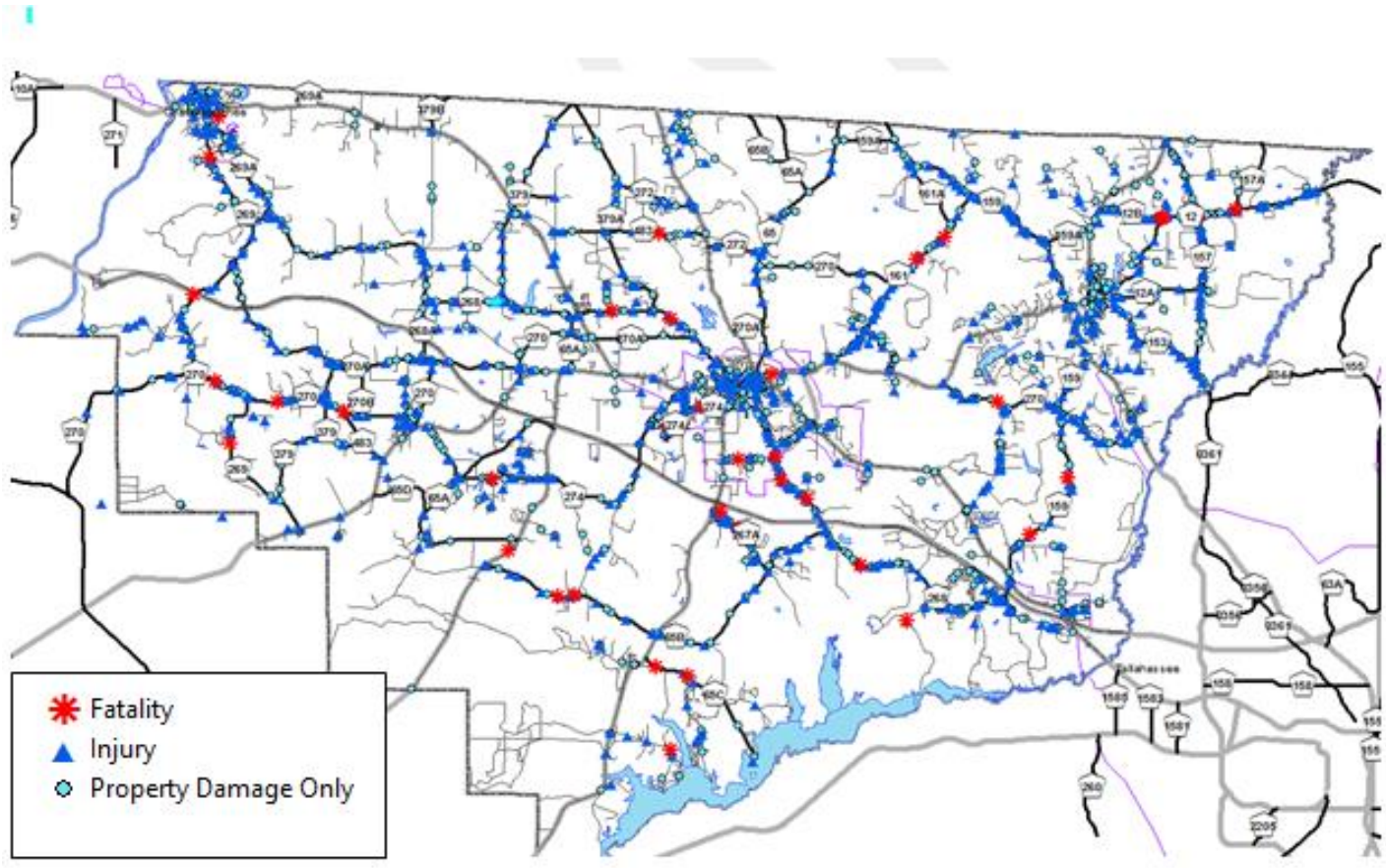


FIGURE 3 LOCATIONS OF CRASHES ON LOCAL ROADS IN GADSDEN COUNTY (2006-2015)

Strategic Highway Safety Plan (SHSP) focus areas

Of the emphasis areas from the Florida Strategic Highway Safety Plan, the following areas are most relevant to this study:

- Lane-Departure Crashes
- Intersection Crashes
- Vulnerable Road Users/Bicycles and Pedestrians

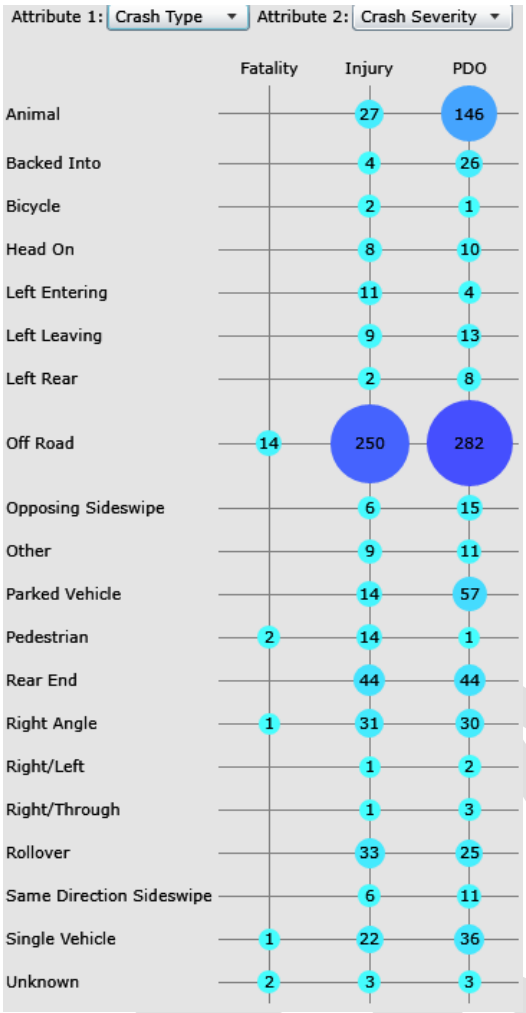


FIGURE 4 DISTRIBUTION OF CRASH TYPES ON LOCAL ROADS (2011-2015)

Lane departure crashes

As shown in Figure 4, the crashes associated with lane departures are the dominant crash type. Many these crashes occurred at curves. Figure 5 shows the locations of crashes where curves were identified in the crash report.

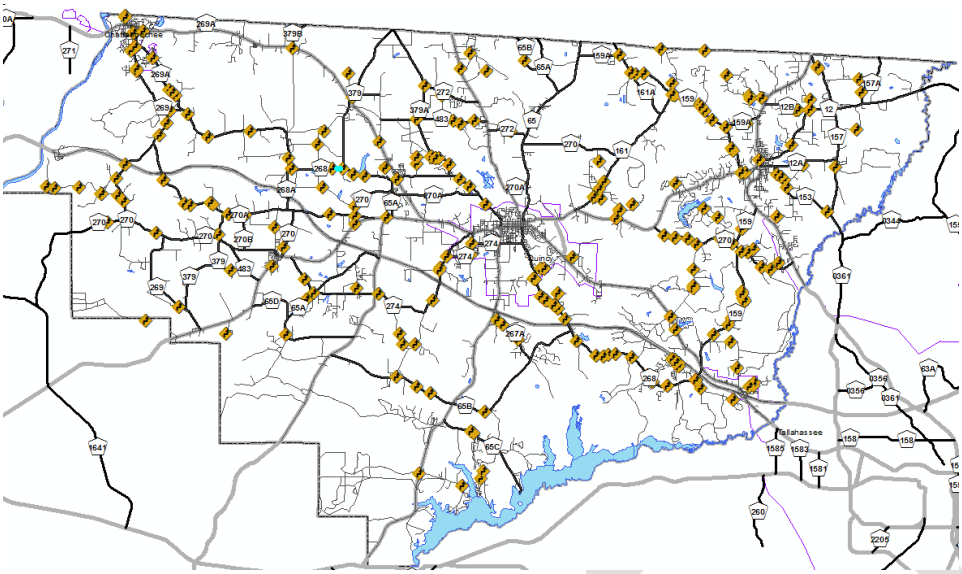


FIGURE 5 CRASHES AT CURVES (2006-2015)

Intersection crashes

Crashes at intersections were concentrated generally within the municipalities as shown in Figure 6.

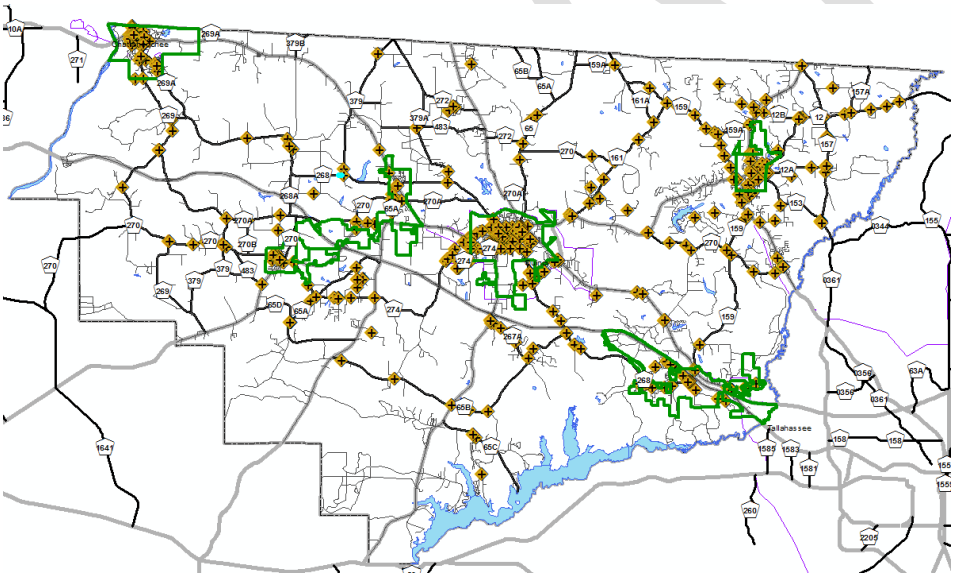


FIGURE 6 INTERSECTION CRASHES (2006-2015)

Bicycle and pedestrian crashes

Bicycle and pedestrian crashes account for a relatively small fraction of the total number of crashes on local roads in Gadsden County. As shown in Figure 7, bicycle crashes generally occurred during daylight hours, while the majority of the pedestrian crashes were at night.

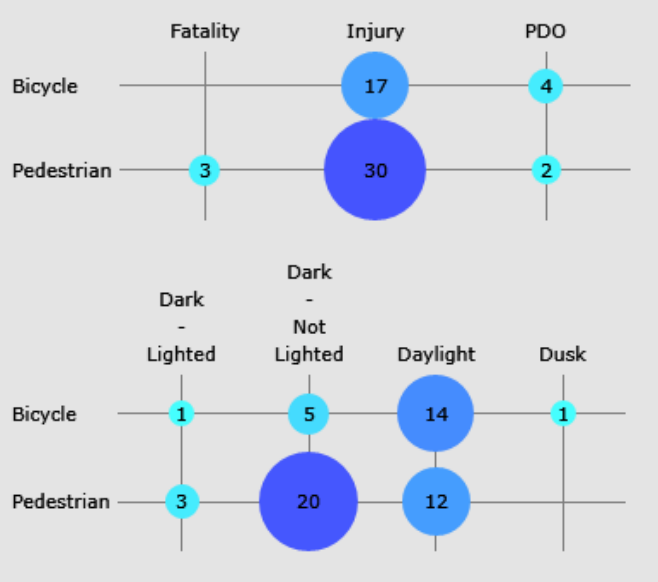


FIGURE 7 SUMMARY OF CRASHES INVOLVING PEDESTRIANS AND BICYCLES (2006-2015)

Figure 8 shows the locations of crashes involving bicycles and pedestrians. Most bicycle crashes occurred within municipal boundries, and generally on local streets, while the majority of pedestrian crashes occurred on rural county roads. None of the bicycle crashes resulted in fatalities, but there were three fatal pedestrian crashes.

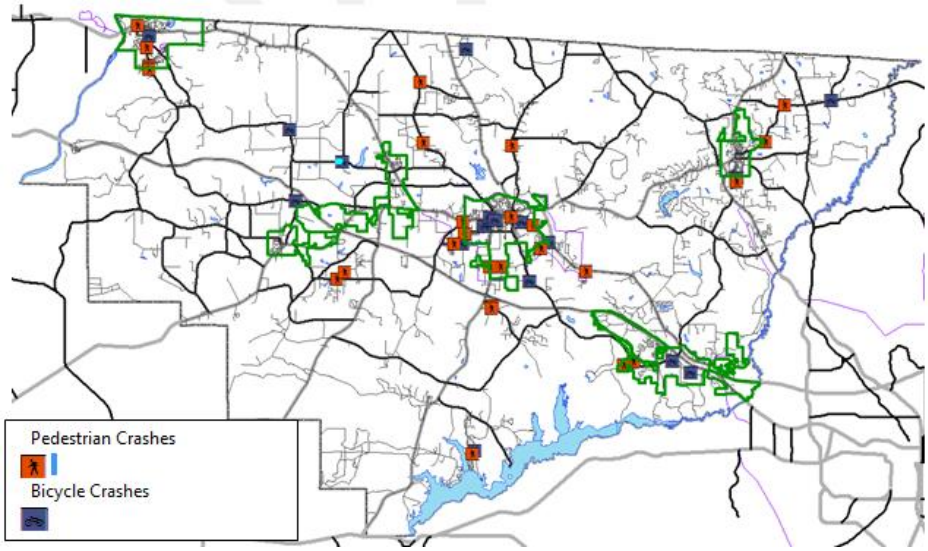


FIGURE 8 DISTRIBUTION OF CRASHES WITH BICYCLES AND PEDESTRIANS ON LOCAL ROADS 2006- 2015

There were no concentrations of either pedestrian or bicycle crashes on the county road network, and it did not appear that there were effective low cost solutions that would significantly mitigate the pedestrian or bicycle crashes on the county road system.

High crash locations

To identify locations with the most serious crash problems, the following data sources were used:

- The FDOT Safety Portal: This identified high crash locations in 2009 and 2010.
- Crash Data provided by FDOT District 3 Safety Office: The District Safety Consultant (HNTB) has provided an analysis of the highway network that ranks each segment and based on crash frequency and severity.
- Identification of problem areas by Gadsden County Public Works staff based on their firsthand knowledge of the road system.
- Concentrations of crashes by segment: The study team used crash data from Signal Four Analytics to determine the rate of crashes per mile for each segment of the local road system and identified the forty segments with the highest crash frequency.

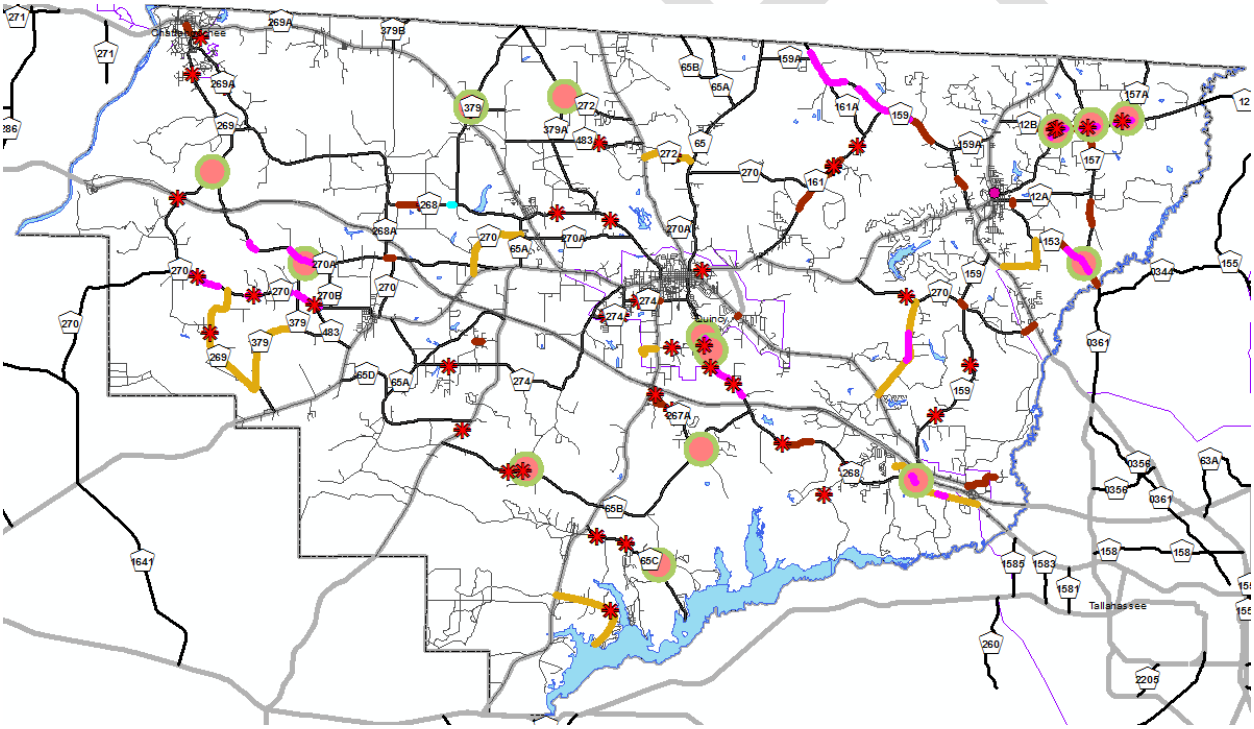


Figure **9** shows these sites with significant crash history. This information provided a basis for more detailed review of the County and for selection of sites that have a high potential for improvement through the HSIP or other safety improvement initiatives.

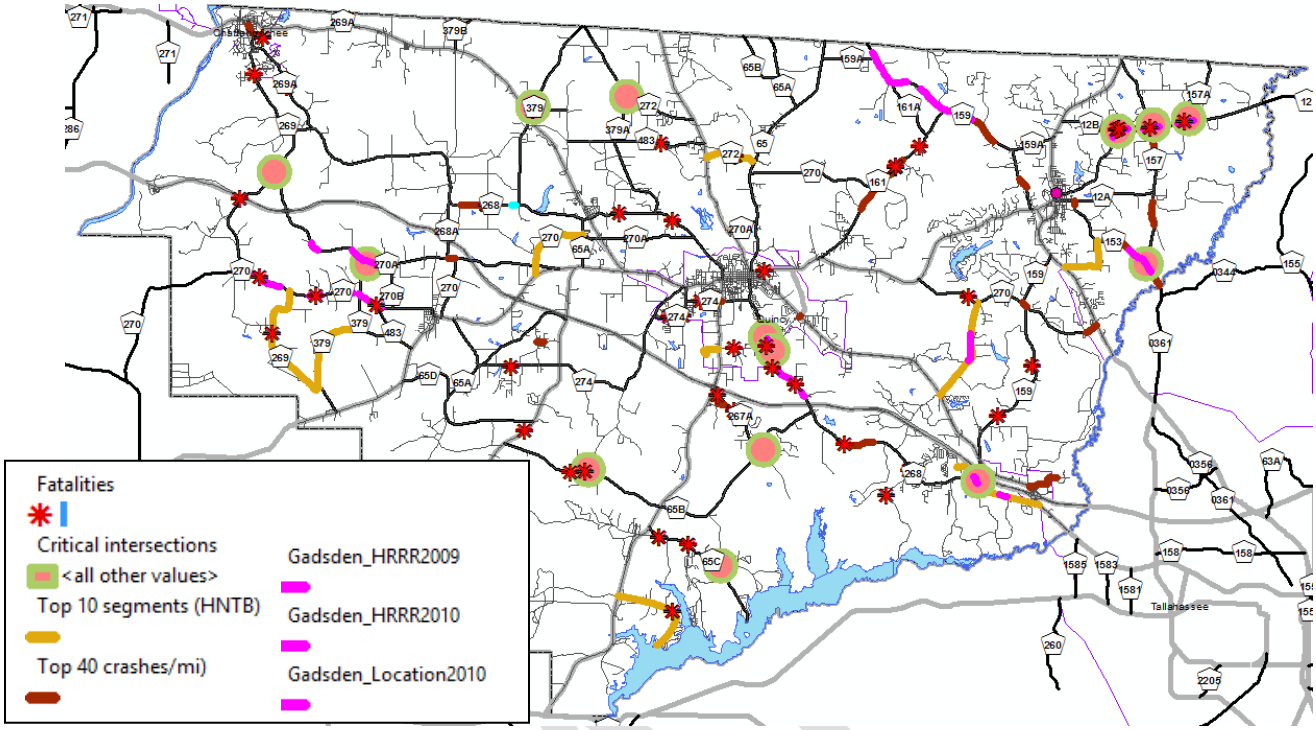


FIGURE 9 HIGH CRASH INTERSECTIONS AND SEGMENTS

Selection of sites for detailed review

Several of the sites identified from the data as high crash locations have been recently improved, are scheduled for reconstruction, or have been the subject of recent Road Safety Audits. The following sites have been addressed by other initiatives and were not included in this analysis:

- Shady Rest Road – CR 12 to US 27: Construction was recently completed; crash information does not reflect current conditions.
- Salem Road - CR 12 to CR 159A: Construction was recently completed; crash information does not reflect current conditions.
- Fairbanks Ferry Road/ Concord Road intersection: Gadsden County is planning to install a traffic signal that is expected to address problems at this location.
- Glades Road – CR 12 to US 27: A road safety audit was recently completed.
- Attapulgus Highway (CR 65) – King State to Florida-Georgia state line: A road safety audit was recently completed.

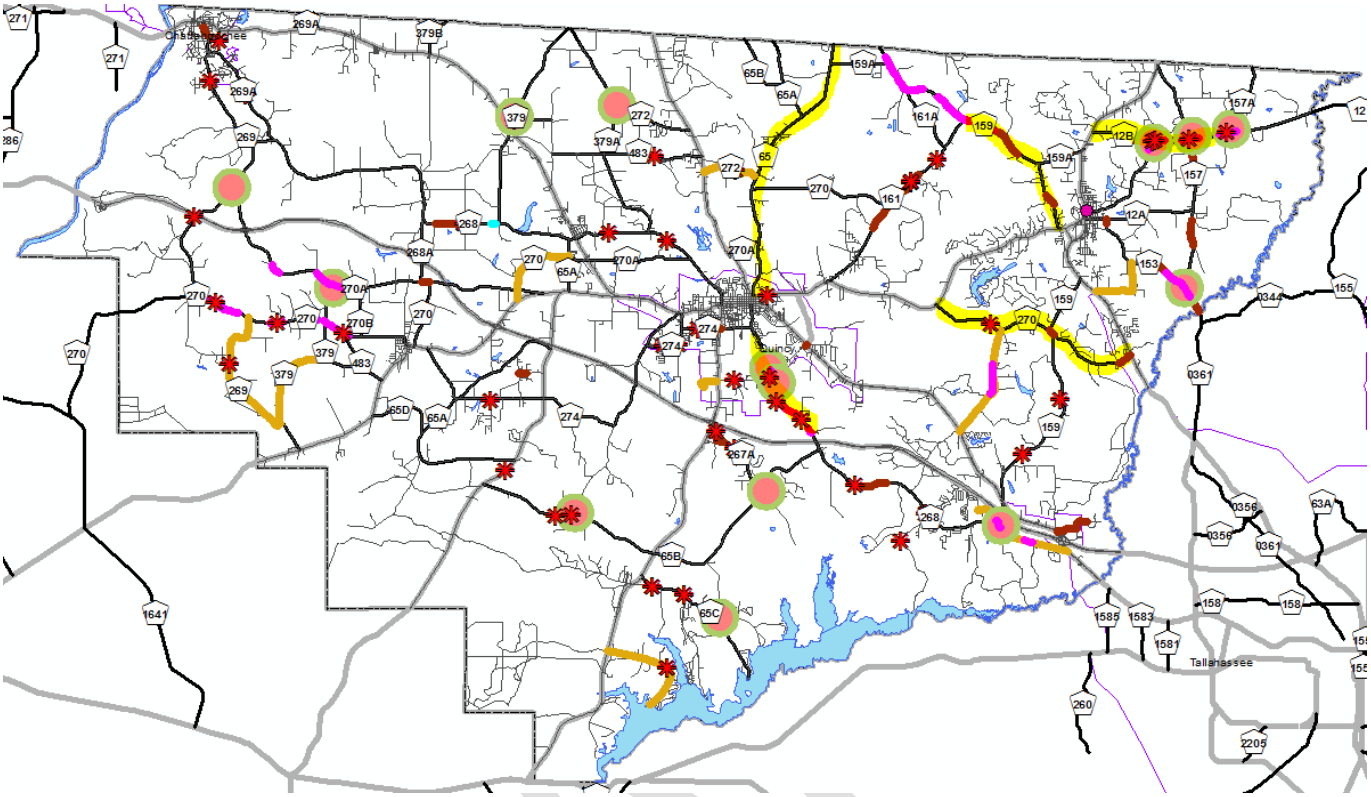


FIGURE 10 SITES REVIEWED OR IMPROVED BY COUNTY (SHOWN IN YELLOW)

Based on the analysis of crash data from Signal Four Analytics, the information furnished by FDOT, and the discussion with Gadsden County, two groups of sites were selected for detailed analysis. These sites were generally limited to county roads outside the boundaries of municipalities where speeds are higher.

*Sites that are candidates for HSIP funding (*Figure 11*)*

> Countermeasures for these sites include significant cost items such as guardrail or pavement widening and may require survey and design work. In most cases these improvements will be performed by a construction contractor.

*Sites recommended for immediate implementation. (*Figure 12*)*

> The study team also identified sites where low cost countermeasures can be implemented quickly, generally using in house maintenance forces. These countermeasures consist mostly of warning signs and pavement markings. In most cases, the time and effort required to develop these as federally funded contracts make this an impractical source of funding. As an alternative, if several such sites can be grouped together, it may be practical to use FDOT's design-build push- button, contracting process.

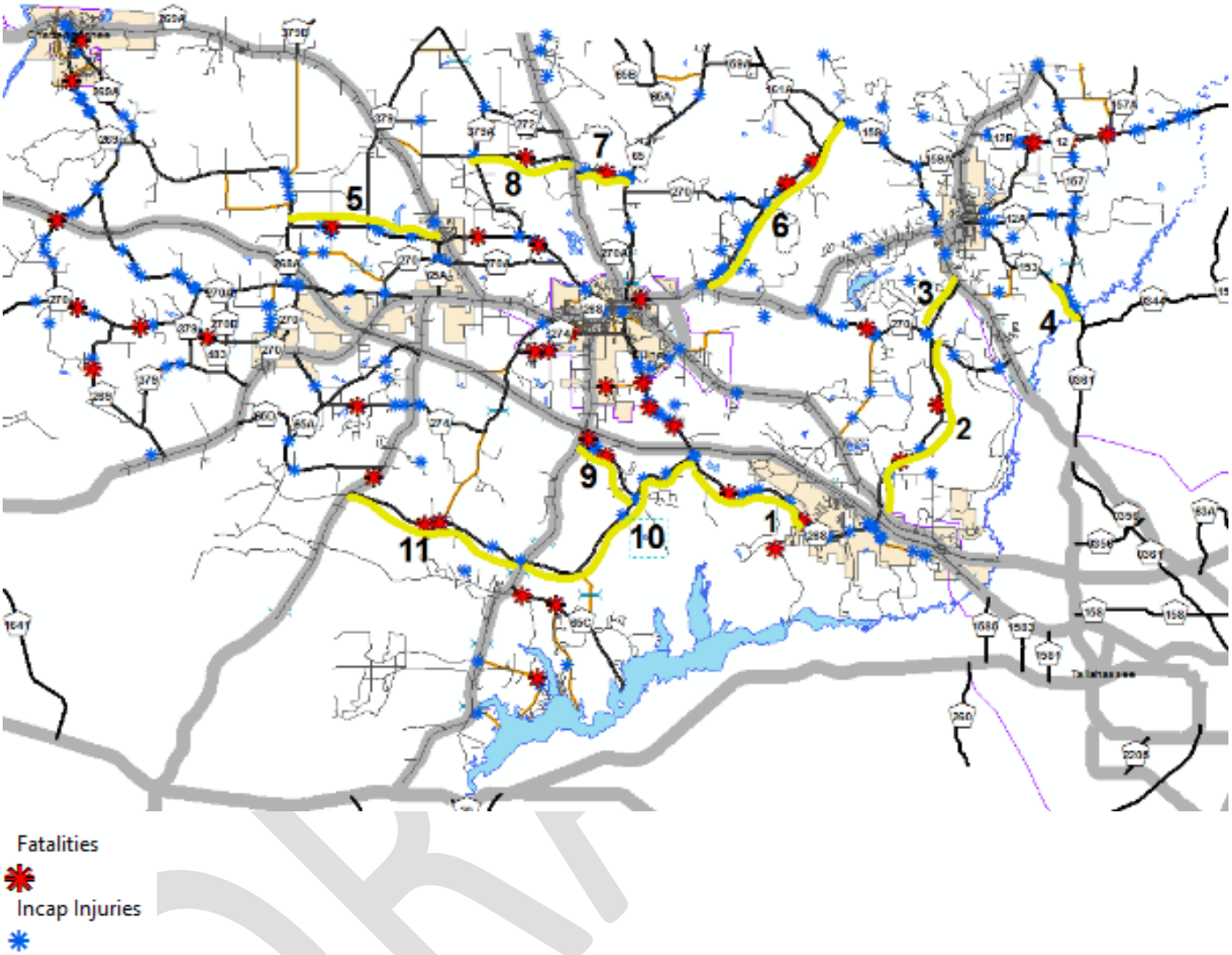


FIGURE 11 LOCATIONS OF STUDY SITES FOR POTENTIAL HSIP PROJECTS

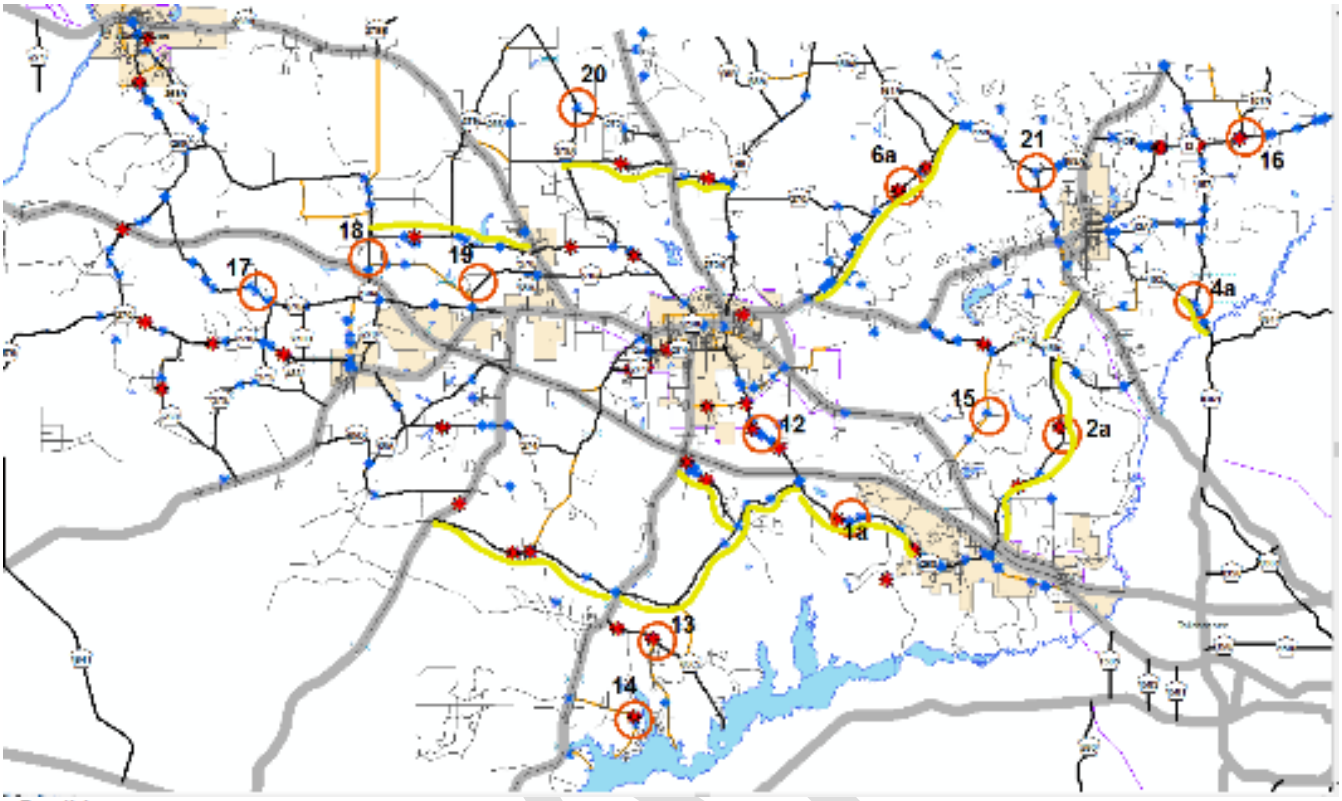


FIGURE 12 LOCATION OF SITES FOR IMMEDIATE IMPLEMENTATION

Sites candidate for HSIP funding

Table 1 lists sites that are potential HSIP funded projects with recommended countermeasures and Benefit/Cost information. Supplement 1 includes detailed descriptions and benefit analyses for each of these sites.

In consultation with FDOT District 3 staff, analysis of five of these was expedited to be considered for inclusion in the FDOT's Five Year Work Program during the 2016 update cycle. This selection for early analysis was based on the ability of the study team to expedite the work to produce meaningful, implementable projects that meet the criteria for funding with federal HSIP funds.

TABLE 1 RECOMMENDED COUNTERMEASURES FOR HSIP FUNDING

Site		Countermeasures	Individual B/C	Individual Project Cost	Combined B/C	Combined Project Cost
1. High Bridge Rd	1	Upgrade Signs and Markings	32.44	$121,249	N/A	$121,249
	2	Install/ Upgrade Guardrail at Sites A, B, and C	2.90	$134,554	16.31	$255,803
	3	Paved Shoulders on approaches to Little River	1.44	$1,200,000	6.85	$1,455,803
	4	Extend/Upgrade guardrail at Little River (Site D)	3.36	$115,960	6.10	$1,571,763
2. Dover Rd	1	Upgrade Signs and All Pavement Markings on Dover Rd	8.42	$129,970	N/A	$129,970
	2	Extend Guardrail at bridges over Double Branch	9.54	$51,229	7.69	$181,199
	3	Pave Shoulders (south of Tucker Monroe Drive to north of Double Branch)	0.91	$606,061	4.48	$787,260
3. Scotland Rd	1	Upgrade Markings on Scotland Rd and Signs at Shady Rest Intersection	18.28	$36,309	N/A	$36,309
4. Iron Bridge Rd	1	Upgrade Signs at CR 157 Intersection	361.78	$4,716	N/A	$4,716
	2	Upgrade/Extend Guardrail	2.29	$86,326	20.92	$91,043
	3	Pave Shoulders	0.69	$800,000	5.75	$891,043
	4	Upgrade Pavement Markings	10.46	$16,506	5.89	$907,549
5. Hardaway Highway	1	Install/Upgrade Guardrail at various locations	1.34	$147,615	N/A	$147,615
6. Point Milligan Rd - CR 161	1	Upgrade Signs and Markings	31.32	$79,259	N/A	$79,259
	2	Install/ Upgrade Guardrail at Sites 1-7	1.44	$334,190	6.87	$413,448
	3	Paved Shoulders on curves	0.87	$795,455	4.42	$1,208,903

Site		Countermeasures	Individual B/C	Individual Project Cost	Combined B/C	Combined Project Cost
7. Old Philadelphia Church Rd	1	Signs, Markings and Evaluation	38.98	$10,040	N/A	$10,040
8. Shade Farm	1	Signs and marking	94.09	$11,694	N/A	$11,694
	2	Upgrade/Extend Guardrail	4.12	$46,474	22.21	$58,168
9. Spooner Rd	1	Upgrade Signs and Markings	5.46	$21,949	N/A	$21,949
10. Old Federal Rd - CR 658	1	Upgrade/Extend Guardrail	2.06	$288,936	N/A	$288,936
11. Old Federal - Cane Creek	1	Upgrade Signs and Marking	44.92	$21,635	N/A	$21,635

Note: Sites 1-5 were identified for early implementation and considered during FDOT's 2016 budget update cycle.

Sites recommended for immediate implementation

Several other sites where serious crash problems occurred can be significantly improved with low cost countermeasures that can be quickly installed. These sites and countermeasures are described in detail in Supplement 2 and summarized in

Table 1 through

Table 4. These countermeasures include installation of flashing beacons, installation of chevrons, upgrade of warning signs, and installation or replacement of raised pavement markings.

The sites identified by this study were selected based on historical crash data, but conditions like those identified at these sites were noted at other locations throughout the county. Gadsden County staff should be aware of these conditions and should be prepared to apply similar countermeasures at other locations as similar conditions are identified.

The time and effort required to use federal funding for these types of projects may make it impractical to consider such low-cost improvements for HSIP funding. Instead, it is recommended that Gadsden County and FDOT work together to obtain the materials required for installation of countermeasures at these locations. As an alternative, FDOT's design- build push-button contracting mechanism may be available if a sufficient number of these sites can be identified to make a contract cost effective.

Flashing Beacons

The study team identified five sites with serious crashes, where changes in the road alignment are not clear to the approaching driver until the vehicle is very close to the condition, causing the driver to react abruptly and sometimes lose control. During a 10- year period, 6 fatal crashes occurred at these sites. These sites are all within areas for which other substantial countermeasures are recommended for HSIP funding, but because of the time required to develop the HSIP projects, flashing beacons represent a way to provide early safety improvements while more permanent improvements are being developed.

Recommendation: Install flashing beacons.

TABLE 2 SITES FOR INSTALLATION OF FLASHING BEACONS

Site number (Refer Figure 1)	*Site*	*Condition*	*Crashes*	*Risk Conditions to correct*	*Comments*
1a	High Bridge Road at Little River Crossing	Curves at bridge approaches Radius: 195' west; 445' east (see note 1)	• Fatality and incapacitating injuries • Most serious crashes at night	• Sharp curves • Bridge near end of curves	Additional improvements recommended for HSIP
2a	Dover Road at Double Creek Crossing	Reverse Curve at northbound bridge approach Radius: 240'	• Fatality • Most crashes at night	• Sharp curves • Bridge near end of curve with unprotected slope • Visual trap	Additional improvements recommended for HSIP
4a	Concord Road at Iron Bridge Road	Hill limits view of intersection for southbound traffic	• Large number of crashes – failure to stop at intersection • Most crashes at night	• Hill restricts view of intersection. • Long straight tangent on approach. • Intersection angle: 45 degrees	Additional improvements recommended for HSIP Realignment of end of road signage is also needed.
6a.	Milligan Road (CR 161)	Reverse curve at southbound bridge approach Radius: 241'	• 2 fatalities • Most crashes at night	• Sharp curves • Bridge near end of curve with obsolete slope protection • Visual trap	Additional improvements recommended for HSIP
12	High Bridge Road north of I-10	Two curves Radius: 365 '	• 2 fatalities • 4 incapacitating injuries	• Sharp curves • Limited shoulder	Add flashing beacon at existing curve warning sign southbound (**Error! Reference source not found.**). Needs additional chevrons

Curve signage and markings

Throughout the county, lane departures at curves account for many crashes. Many of these curves are combined with hills, culverts, bridges, or intersections that introduce additional risks. Often the crashes occur in the non-daylight hours when the road surface is hard to see.

Recommendation:

- **Install or upgrade advanced warning signs (in most cases these have been installed, but should be reviewed to verify adequacy of placement and retroreflectivity).**
- **Add chevrons along the outside of curves.**
- **Add "bright sticks" to chevrons and advanced warning signs at the critical curves.**
- **Add raised pavement markers to improve delineation of centerline and edge line through the entire length of the curve.**

  Raised pavement markers can dramatically improve the driver's ability to see the changes in road alignment in non-daylight conditions. At several of the sites, the pavement markings have reached the end of their functional life, and should also be refreshed, but as a short-term measure, the installation of RPMs through the critical curves will provide a significant safety benefit.

- **Evaluate the need for reduced advisory speeds and revise as appropriate.**

TABLE 3 SITES FOR INSTALLATION OF CHEVRONS, CURVE WARNING SIGNS, AND PAVEMENT MARKINGS

Site number	*Site*	*Condition*	*Crashes*	*Risk Conditions to correct*	*Comments*
12	High Bridge Road north of I-10	Two curves Radius: 365 '	• 2 fatalities • 4 incapacitating injuries	• Sharp curve • Limited shoulder	• Add flashing beacon at existing curve warning sign southbound (**Error! Reference source not found.**). • Needs additional chevrons • Add RPMs through curves
13	McCall Bridge Road (CR 65C)	Reverse curve at intersection Radius: 600'	• 1 fatality (related to intersection, not curve) • 1 incapacitating injury -lane departure at curve westbound • Serious crashes in non-daylight conditions	• Curve at intersection • Visual trap westbound	• Add Chevrons • Add RPMs at curves • Upgrade pavement markings for entire road segment • Upgrade intersection warnings

Site number	*Site*	*Condition*	*Crashes*	*Risk Conditions to correct*	*Comments*
14	Cooks Landing Road	Curve Radius: 320’	• 1 fatality • 2 incapacitating injury crashes • All crashes in non-daylight conditions	• Improve visibility of curve, especially at night	• Add Chevrons • Add RPMs at curves • Upgrade pavement markings for entire road segment
15	Lanier Road	Curve radius: 170’	• Concentration of minor crashes at curve	• Sharp curve with guardrail	• Add chevrons for southbound and extend chevrons for northbound
16	Fairbanks Ferry Road at CR 157A	Curve at intersection Radius: 400’	• 1 fatality • Lane departures associated with curve • Most crashes in non-daylight conditions	• Improve visibility of curve- especially for westbound traffic. • Improve marking/warning for intersection	• Add chevrons along north side of road throughout length of curve. • Upgrade intersection warning/marking signs on Fairbanks Ferry Road • Consider lowering speed limit at curve.
17	CR 270 A	Curve Radius: 345’	• 2 incapacitating injuries	• Visual trap westbound	• Add chevrons

Other countermeasures

Several other potential hazards were noted during the study.

Steep shoulder slopes or drop-offs:

This condition occurs at many locations where the land adjoining the right of way slopes sharply downward away from the road. In some cases, culvert crossings have vertical headwalls close to the edge of pavement resulting in steep drop-offs. While the headwalls may be delineated with small rectangular object markers, use of more prominent warning sign (e.g. W8-23) will better communicate to the driver about the potential hazard. Sites 18 and 19 identified in

Table 4 represent typical conditions. Other locations where similar conditions exist should also be upgraded.

Guardrail or other measures to eliminate the severe slope/drop-off problem are needed in the future, but as short term measures, warnings about the potential hazard are appropriate.

Recommendation:

- ***Install warning signs at locations where there is a steep drop-off or unprotected culvert.***

Intersections

The curvilinear alignment of the road system in Gadsden County results in many intersections where the visibility of between potentially conflicting movements is restricted. Often either vertical or horizontal curves limit the sight distance for vehicles approaching an intersection. In some cases, stop signs and end of road signs are not visible to approaching drivers until the vehicle is very close to the intersection. Sites 20 and 21 are instances in which the signing does not clearly delineate the intersection.

Recommendations:

- ***Review all T and Y intersections to ensure that end of road signs and stop signs are in place and consistent with MUTCD and County policy regarding classes of roads for which signs will be installed.***
- ***Review all "Y" intersections to ensure that signs are visible to vehicles approaching the intersection. This may require addition of stop signs of the left side of the road and possible repositioning of end of road signage.***
- ***Add "stop ahead" signs where the intersection is not clearly visible to an approaching driver.***

TABLE 4 SITES FOR OTHER COUNTERMEASURES

Site number	*Site*	*Condition*	*Crashes*	*Risk Conditions to correct*	*Comments*
18	Cochran Road	Steep slope near road	• Lane departure crashes in vicinity	• Steep unprotected slope	• This is an example of condition common throughout area. • Add warning sign • Long term: add guardrail
19	Bassett Road	Headwall without guardrail near road	• Lane departure crashes in vicinity • Crashes mostly in non-daylight hours	• Drop-off near edge of pavement	• This is an example of condition common throughout area. • Add warning sign • Long term: add guardrail or culvert extension
20	Hutchinson Ferry Road/Gloria Road	Intersection is at curve Intersection angle approximately 25 degrees	• No serious crashes reported, but potential for crashes	• Improve intersection delineation and advanced warning	• Add end of road signage • Add intersection ahead/curve warning signs on all approaches • Long term: realign intersection to reduce angle
21	Shortcut Road at CR 159/159A	Traffic control signs for southbound traffic cannot be readily seen until the vehicle is very near the intersection; Road appears to be continuous without a stop.	• No serious crashes reported to date • Potential exists for head-on crashes	• Improve delineation of intersection	• Add stop sign on left side of road • Long term: realign CR 159A to intersect with Salem Road at 90 degrees.

Other issues

Sign Inventory:

It is our understanding that Gadsden County does not maintain an inventory of signs. Without such records, the sign maintenance personnel must rely on their knowledge of the area and understanding of the sign requirements. Signs that have been knocked down or removed may easily go unnoticed.

An organized inventory of critical signs and a regular process for comparing the existing field conditions to the inventory showing what signs should be in place is important to ensuring the signs continue to function as planned.

Recommendation:

- ***Implement a sign inventory program for regulatory and warning signs. Simple inventories using GIS or a spreadsheet may be developed locally. ESRI has also developed a tool for highway agencies to use for this purpose. http://solutions.arcgis.com/local-government/help/sign-inventory/.***
- ***Institute a regular process for maintaining and using the sign inventory. Generally, this would involve a method of recording the work done on each sign (e.g. date, location using gps, type of work {install new, replace, realign, etc.}, sign type and condition, and possibly a photograph.)***

Advisory speeds in curves:

In areas like Gadsden County where roads are characterized by frequent and sometimes severe changes in horizontal and vertical alignment, it is important to ensure that advisory speeds and other appropriate warnings are in place at curves that cannot be safely negotiated at the posted speed limit. During the study, it appeared that the advisory speeds need adjustment in some locations.

While the procedures for establishing a speed limit or advisory speed require an engineering study, as a practical matter, field personnel can estimate the need for and appropriateness of advisory speeds using a simple ball bank indicator.

Recommendation:

1. ***County obtain ball bank indicators for area supervisors or other appropriate personnel and train in the procedure for their use. This information can be used to most efficiently select sites for which an engineering study may be needed.***
2. ***County review instances where advisory speeds are posted in residential areas. If these are used in lieu of regulatory speed signs, the speed limits may be changed in accordance with the statutory guidance for speeds in "residence areas".***