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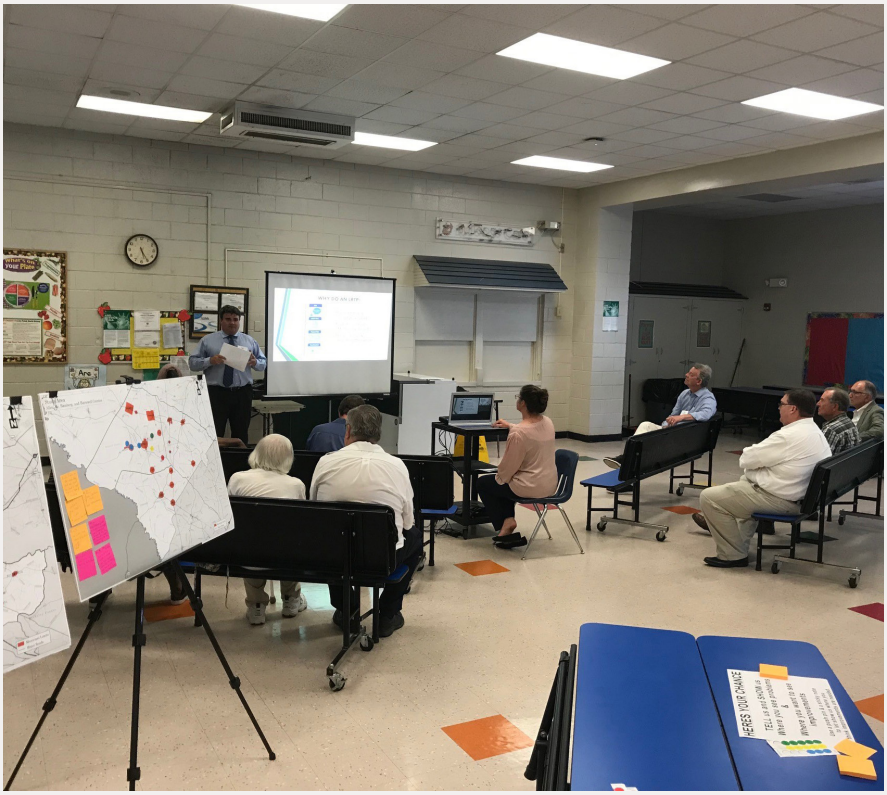

April 9, 2020 - COG Board Approval
March 11, 2020 - TAC Approval

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Lower Savannah Council of Governments (LSCOG)

2045 Long Range Transportation Plan (LRTP)

RKA

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Contents

Executive Summary 5

1. Introduction, LSCOG History and Regulatory Context 10

2. Proposed Transportation Projects 13

Corridor Widening 13

Corridor Safety Projects 16

Intersection Safety Projects 19

Geometric Intersection Projects 23

3. Objective Project Prioritization 27

Intersections 27

Safety Corridor Improvements 31

Widening Projects 33

Resurfacing Projects 33

New Location Projects 34

Financially Viable Projects 34

Vision Projects 39

4. Financial Resources 45

5. Public Involvement Process 50

6. Current Highway System 50

Bridge Condition 54

Pavement Condition 55

Accident History 57

7. Freight 59

8. Air 63

9. Bicycle and Pedestrian 66

10. Transit 70

Fixed Route Bus Service 70

Intercity Bus Service 70

Rail Service 70

The Lower Savannah RTMA 71

Transportation Resources 71

Aiken County: 71

Allendale County: 72

Bamberg County 72

Barnwell County: 72

11. Socio-Economic Background 73

Change Drivers 73

Alternative Energy/Power Plants 73

Autonomous Vehicles 73

Ride Haling Services 74

Shale Oil/Gas 74

Unmanned Vehicles (Drones) 74

Limited English Proficiency (Four Factors Analysis) 75

Portion of the Population Who May have Limited English Proficiency 75

Frequency of Contact with the LEP Population 75

Importance of the Agency's Services to the LEP Population 75

Agency Resources 76
Commuting and the Commute Pattern 76
Employment Snapshot 76
Population Snapshot 77
The LSCOG Population Pyramid 78
Elderly Population 79
Minority Population 79
12. Land-Use Background 80
13. Environmental Background 80
Advanced Project Planning Reports 80
Summary of Environmental Regulations and Mitigations 81
Species of Environmental Interest 86
Appendix A: Project Score Sheets 89
Appendix B: Summary of Public Comment 93
LRTP Survey Results 93
Question 6 – In the last year, how often have you used the following mode of transportation for commuting and leisure? 93
Question 9 – What is the primary method you use to commute to work or school? 93
Question 11 – Please rate your level of satisfaction with the following transportation services and infrastructure? 93
Question 12 – What might encourage you to drive your car less? 94
Question 13 – How often do you experience traffic congestion? 94
Question 14 – How does traffic congestion impact your quality of life? 94
Question 15 –Rate the importance of the following transportation services / issues? 94
Appendix C: Summary of Safety Countermeasures 95
Crash Types 95
Roadway Departure 95
Fixing Roadway Departure Accidents 95
Routine Maintenance Improves Lane Keeping 96
Overturning 99
Fixing Intersection Crashes 101
Pedestrian & Bicycle Incidents 102
Appendix D: Glossary of Acronyms 104

Table 1: LSCOG Approved Funding Distribution 13
Table 2: Financially Viable Maintenance Projects 35
Table 3: Financially Feasible Intersection Safety Projects 36
Table 4:Financially Viable Geometric Intersection Projects 37
Table 5: Financially Viable Corridor Safety Projects 38
Table 6: Corridor Widening Projects 39
Table 7: Intersection Vision Projects 39
Table 8: Corridor Vision Projects 43
Table 9: LSCOG LRTP Financial Resources 45
Table 10: Lower Savannah River Council of Governments Transportation Improvement Program (TIP) 46

Table 11:LSCOG LRTP Project List by Horizon Year 49
Table 12: 2020 State Freight Network Additions (LSCOG only) 60
Table 13: Aiken Municipal Airport (AIK).....63
Table 14: Barnwell County Airport (BNL).....63
Table 15: Orangeburg Municipal Airport (OGB) 64
Table 16: Allendale County Airport (ALD) 64
Table 17 - Bamberg County Airport.....65
Table 18:Bicycle and Pedestrian Goals.....66
Table 19: Possible Effects of Autonomous Vehicles.....74
Table 20: Percent Change by Jurisdiction 78
Table 21: Environmental Mitigation Strategies 82
Table 22:Endangered Species Occurring in the Lower Savannah Region 86
Table 23: LSCOG LRTP Safety Intersection Score Sheet.....89
Table 24: Geometric Intersection Score Sheet.....90
Table 25: Safety Corridor Score Sheet 91
Table 26: Widening Corridor Score Sheet.....92
Table 27: Resurfacing/Rehab Score Sheet 92
Table 28: Selected Intersection Safety Improvements.....102
Table 29: Pedestrian Accident Treatments.....102
Table 30: Bicycle Accident Treatments.....103

Figure 1: LSCOG Rural Study Area 12
Figure 2: Project Ranking Process 28
Figure 3: Example Scissors Intersection.....30
Figure 4: Example Offset/Skew Intersection 30
Figure 5: Current Traffic Demand in LSOG 52
Figure 6: LSCOG Future Traffic Volumes 53
Figure 7:LSCOG Bridge Condition Targets.....54
Figure 8: LSCOG Pavement Quality Summary.....55
Figure 9:Pavement Quality Index.....56
Figure 10: LSCOG Five Year Traffic Fatalities.....58
Figure 11: LSCOG 2016 Goods Movement (Million Tons/Year) 61
Figure 12:LSCOG 2040 Goods Movement (Million Tons/Year) 62
Figure 13:The Four Factors of Limited English Proficiency 75
Figure 14: Commute Pattern.....76
Figure 15: LSCOG Employment by Sector (2016).....77
Figure 16: Population Change 77
Figure 17: Portion of Regional Population by County.....78
Figure 18: LSCOG 2019 Population Pyramid 78
Figure 19: Population Over 65 by County 79
Figure 20: Ethnic Composition by County.....79
Figure 21: Factors Contributing to Accidents.....95
Figure 22: Centerline Rumble Strip 96
Figure 23: Roadway Departure Mitigation Strategies (Fouch, Brian and Dick Albin 2017) 96
Figure 24: Centerline Rumble Strips (KY).....97
Figure 25: Delineators at Night (Source: Michigan DOT).....97
Figure 26: Installing Chevron Signs 97
Figure 27: Shoulder Rumble Strips.....98
Figure 28: Narrow Shoulder 98
Figure 29: Narrow Paved Shoulders 98
Figure 30: Side Slope.....99
Figure 31: Flattening Shoulders from 3:1 to 6:1.....99
Figure 32: Pavement Drop-off.....100
Figure 33: Safety Edge Cross Section (The Safety Edge 2010) 100
Figure 34: Safety Edge 101
Figure 35: Conflicts at Intersection 101

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Executive Summary

Report Section	Page(s)
Introduction, LSCOG History and Regulatory Context	10
The LSCOG is one of 10 council of governments in SC that work together with the SCDOT to plan transportation needs in the rural, non-MPO areas of the state. This report details the 2045 transportation plan for the COG. This plan will help the COG and the SCDOT determine transportation needs for the area for the next 25 years.	
Proposed Transportation Projects	10-13
The LSCOG receives about $5.5M/year in SCDOT Guideshare funding which equates to approximately $125M over the life of the plan. The COG Transportation Advisory Committee (TAC) determined how these funds would be divided, categories in which the money spent, and the projects that would be a part of the financially feasible part of the plan. Safety is a major point of emphasis for the COG and is evident by the projects chosen for the plan. Five main categories were chosen for projects with two other small categories also receiving funding. The five major categories are: Safety Intersections, Geometric Intersections, Safety Corridor Improvements, Widening Corridor Improvements and Resurfacing. The two other categories are Bike/Ped Projects and Transit. Bike and Pedestrian funding is also being used as part of the corridor projects as they are a major portion of those type projects. Well over 100 projects were reviewed and ranked in the five categories. Fifteen Safety Intersection projects across five counties were chosen and included in the financially feasible project list. Fifteen Geometric Intersection projects across four counties were chosen and included in the financially feasible project list. Eleven Safety Corridor projects across three counties and six Widening Corridor projects across five counties were included in financially feasible plan. Five resurfacing projects in two counties were also chosen. Additionally, $75,000/year was designated to be used for transit operations in the COG.	
Objective Project Prioritization	13-31
Act 114 is the basis for which all transportation projects in the state of South Carolina are ranked. As allowed by the law and SCDOT, the LSCOG's Board and TAC agreed to an amended version of Act 114 for their project ranking. The ranking process for the two types of intersections is the same and the ranking process for the two types of corridor projects is the same. The COG uses the SCDOT for ranking its resurfacing projects.	

The Board and TAC approved its ranking procedure shortly after the bill was passed in 2007. The intersections are ranked using seven categories. They are: Traffic Status (20%), AADT (20%), Truck Traffic (20%), Economic Development Potential (15%), Public Safety (15%), Evacuation Routes (5%), and Social and Natural Environmental Impact (5%). As part of this plan, the process for obtaining the data necessary for each category and determining the score each project receives for each category was documented for future plan updates. The full scoring spreadsheet for the intersections are included in Appendix __ and show the scores for all 40 Safety Intersection projects and all 39 Geometric Intersection projects. The corridors are ranked six of the seven categories used in the intersection ranking as well as two new categories. The eight categories used to rank corridors are: AADT (25%), Truck Traffic (10%), Economic Development Potential (15%), Public Safety (15%), Evacuation Routes (5%), and Social and Natural Environmental Impact (15%), Pavement Quality Index (PQI) (10%), and Financial Viability & Maintenance Cost (10%). The full scoring spreadsheet for the corridors are included in Appendix __ and show the scores for all 24 Safety Corridor projects and all 12 Widening Corridor projects.	

There are numerous entities that fund resurfacing projects throughout the COG and most of them use the SCDOT's Resurfacing Ranking list to pick projects. Since the COG often teams with these other entities to pay for projects, it uses the SCDOT's ranking list as well for its resurfacing projects. To obtain project rankings, the District 7 District Engineering Administrator and Contract Manager are contacted they work with the COG to rank their resurfacing projects. Figure 2 on page __ shows the breakdown of scoring for each category.	
Financial Resources	31-67
The LSCOG is only has one guaranteed funding sources and that is the SCDOT Guideshare funds it receives yearly. The COG receives approximately $5.489M per year. Over the life of the LRTP, this equates to approximately $125M. Currently, the COG has a large amount of "Carry-over" funds as there are a number (10+) projects that are about to go to construction. The SCDOT has a 7-year Transportation Improvement Program. The new TIP will be adopted prior to FY 2021, which begins in October. The plan for this window, as well as the subsequent years of the plan are shown in Table 10 on page 41-43. This table takes the ranking list and puts them into action. Also shown, in Table 11, is a window for when each financially feasible project will start.	

Public Involvement Process	67-73
In compliance with both Federal and State regulations and in accordance with its own Public Involvement policies, the LSCOG completed an extensive outreach program as part of this plan update. As per the norm, three public meetings across the region were held to inform the public of the process, gather information, and provide a platform for citizens to provide input to the LRTP. Also, an online survey was conducted and over 400 surveys were completed, providing additional information to help guide with the planning process. Once approved by the TAC and full board, the draft will be presented at a public meeting and then available for public comment in accordance with the LSCOG Public Involvement Plan.	
Current Highway System	73-82
As is the case in most of South Carolina, the majority of the roads in the LSCOG are state maintained. The SCDOT maintains over 5000 centerline miles throughout the COG. I-26 and I-20 parallel the eastern and northern borders of the COG respectively and are also the routes that carry the most traffic. Future year traffic models show this trend continuing but with routes that cross the COG beginning to show growth in traffic as the interstates begin to reach capacity. Future year models show travel around the Orangeburg and Aiken metro areas to continue to grow, as well as traffic along US 78.	
Bridge & Pavement Conditions	
Currently, 42% of the bridges in the LSCOG are rated good and 12% are rated poor. South Carolina is facing a crisis as it sees many of its bridges begin to reach the end of their useful lives (50 years) and need replacement. In 2017, the SC General Assembly passed legislation to increase the gas tax in the state. A portion of these funds are being used to replace substandard bridges. The SCDOT plans to replace over 500 bridges in the state in the next 10 years. As part of this plan, over 70 bridges will be replaced in the LSCOG. The SCDOT maintains a pavement quality database by surveying the primary road system every year and the secondary road system every three years. This information is then used to determine which sections of road receive funding for resurfacing. With the new funding, SCDOT will increase yearly resurfacing by 50%. Currently, over half of the primary system and 40% of the secondary system is in poor shape. The new funding will help to reduce these figures, but it won't happen overnight.	
Accident History	
The rural nature of the LSCOG lends itself to increased accidents as many roads are high speed (55mph) with little to no shoulder, no clear zone, and fixed objects near the edge of,.	

pavement. As part of its construction program the COG has striven to increase safety and reduce accidents. This is evident by the 15 new safety intersections and 11 new safety corridor projects. In addition to these, the SCDOT plans over 20 safety projects as part of its 10-year plan to improve the highway system	
Freight	
Freight is defined as moving goods in bulk by truck, rail, ship, or aircraft and is extremely critical to the success and economy of a region. This is especially true in a relatively rural state like South Carolina that also has a strong manufacturing industry and access to both inland and major ocean ports. The three interstates (I-20, I-26, and I-95) currently and in the future are expected to move the majority of the freight through the region in accordance with the TranSearch freight data the SCDOT received. US 78, which connects I-20 to I-26, is a corridor across the region that is being utilized and will continue to be emphasized as an alternative to the interstates. The COG has a number of projects that are on this corridor.	
Air	
There are no commercial airports located in the region. Columbia Metropolitan (CAE), to the east, and Bush Field (AGS) to the west are located just outside of the COG boundaries. There are five general aviation airports across the region which offer varying levels of service. Four of the five airfields have at least one runway that is a almost or just over a mile long.	

Bicycle and Pedestrian	
The LSCOG completed a region bike plan in 2014. This plan supports improved quality of life by working to provide a safe, multi-modal alternative to driving. The COG also uses this plan to enhance its roadway system by including bike and pedestrian facilities on most corridor projects that is undertakes. The COG earmarked $12.5M over the lifetime of the plan for use on B&P projects. The majority of this money with couple with corridor projects to include these facilities on the project. In the absence of a major transit system, bike and pedestrian facilities play a vital role in providing alternative modes of travel. The continued effort by the LSCOG to improve, enhance, and add to the existing system, is exemplified by the many corridor projects that include these facilities.	
Transit	
The availability to transit is limited. Service is provided within the ARTS MPO by the Best Friend Express. This offers three routes – two in Aiken and one in North Augusta, with connection to both Aiken and Augusta. The service operates from 7AM to 7PM Monday through Friday. Each route has designated stops, but the service also offers "Wave and Ride." This allows a rider to simply wave down the bus at any location and board. The Cross-County Connection provides three routes in Orangeburg and Calhoun Counties. One route provides a Downtown Circulator	

service in the City of Orangeburg while the other Orangeburg route is a Campus Loop serving two campuses in the area. The route connects St. Matthews in Calhoun County with the downtown circulatory route. Paratransit is also provided throughout Orangeburg county. Besides these two systems, Allendale and Bamberg Counties are served by the Allendale Scooter and the Bamberg Handy Ride. Both are regional demand response transit systems. Local Motion serves Barnwell County and is operated by Generations Unlimited. This is also a demand response system that operates from 4AM to Midnight providing rides to medical appointments, jobs, shopping and more.	
Intercity Bus & Rail Service	
Southeastern Stages provide bus service to locations throughout SC, NC, and Georgia with a fleet of 40 motor coaches. Amtrak services the COG with a stop in Denmark. The stop is on the Silver Star line that runs from Miami to Boston.	
Socio-Economic Background	
Five new forms of technology are on the horizon to change the transportation in the future. Alternative energy vehicles, autonomous vehicles, ride haling services, shale oil/gas, and unmanned vehicles all will provide both positive and negative benefits to the transportation system.	

As little as 20 years ago, having daily contact with someone who didn't speak English was an unusual occurrence. Now individuals with Limited English Proficiency (LEP) makeup as much as 20% of the population in some areas of the state. In the LSCOG, the Hispanic population makes up 4% of the overall population. With the rural nature of the COG, this percentage surely will grow in the coming years and dealing with it will transform how transportation decisions are made in the future. Five of the top six jobs are made up by the service industry which tends to have workers that don't travel great distances. This is reflected in the commuting patterns for the region. About two thirds of the workers in the COG live and work within the COG. The other third is split between people that live in the region but work outside or live outside the region and work inside. Population projections for the region show a rise in the percent of older individuals. This will Southeastern Stages provide bus service to locations throughout SC, NC, and Georgia with a fleet of 40 motor coaches. Amtrak services the COG with a stop in Denmark. increase the need for the healthcare and social assistance workers. This rise in the older population coupled with the continued decrease in the population across most areas of the COG will lead to the increase of people living outside of the region and commuting	

into for work. This shift in age and size of the population could put additional strain on the transportation system.	
Land-Use Background	
Outside of the urban centers of Aiken and Orangeburg, land use in the Lower Savannah region is characterized by low density agricultural and residential development supported by small market and manufacturing centers. Most of the region can expect this pattern to hold into the foreseeable future.	
Environmental Background	
Over 15 years ago, the SCDOT implemented the Advance Project Planning Report (APPR) for upcoming transportation projects. Recently this process has gone through a complete overhaul and update. The new APPR will further tie Planning, Environmental, and Pre-Construction activities together. It will work to uncover issues sooner and help to resolve them prior to extensive amount of engineering work has taken place. The report looks to avoid environmental issues well ahead of actually drawing plans and buying right of way. This process will aid the LSCOG in maximizing its limited funds and help to provide a better transportation system all the while enhancing, not impacting, the natural environment.	

1. Introduction, LSCOG History and Regulatory Context

The Lower Savannah Council of Governments (LSCOG) is one of ten regional organizations in South Carolina, established in 1967, which coordinates development among local governments in the six counties of Aiken, Allendale, Bamberg, Barnwell, Calhoun and Orangeburg. Regional planning organizations are associations of local governments that seek regional solutions for common problems. The LSCOG works to strengthen the individual and collective power of member counties and municipalities and works to identify opportunities throughout the entire region. The COG provides guidance and advise when needed but does not have authority over member counties or municipalities. The LSCOG serves as the go-between for local governments and public agencies to secure funding, promote projects and encourage growth on a regional level.

The COG is governed by a Board of Directors, composed of thirty-nine members, who are appointed by participating county governments. The Board set policy and provide direction to the COG's programs, with guidance from the Executive Director and COG staff. The Board set up a Transportation Advisory Committee (TAC) to work with the SCDOT on transportation issues such choosing and ranking projects, as well as developing this plan.

This is the second comprehensive Long-Range Transportation Plan (LRTP) for the rural area of the Lower Savannah region. The Augusta Regional Transportation Study (ARTS) Policy Committee has produced long range transportation plans for the urbanized area of the region since the early 1960's. The ARTS 2015 Long Range Transportation Plan update was adopted in September 1997. In 1998, ARTS extended the Plan to the year 2020. Extending the forecast period, a second time, to the year 2025, was necessary in order to comply with federal transportation planning statutes

and regulations. For the rural areas of the Lower Savannah region, most transportation planning has been under the jurisdiction of the South Carolina Department of Transportation (SCDOT).

SCDOT first began enhancing the statewide planning process and local consultation procedures in response to the directives of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). At that time, rural project identification, evaluation, and prioritization was the responsibility of SCDOT. Consultation with local officials was a function of public involvement activities associated with the statewide long-range transportation plan and State Transportation Improvement Program (STIP). A revised process was ultimately implemented following the directives of the Transportation Equity Act for the 21st Century (TEA-21) and the adoption of the STIP in 1999.

As shown in Figure 1, the study area is composed of the rural parts of Aiken, Calhoun, Orangeburg Bamberg, Allendale and Barnwell. The Lower Savannah COG is in Region study area is in the Upper Coastal Plain of South Carolina. It lies east of the fall line and generally between the Savannah and the Congaree Rivers.

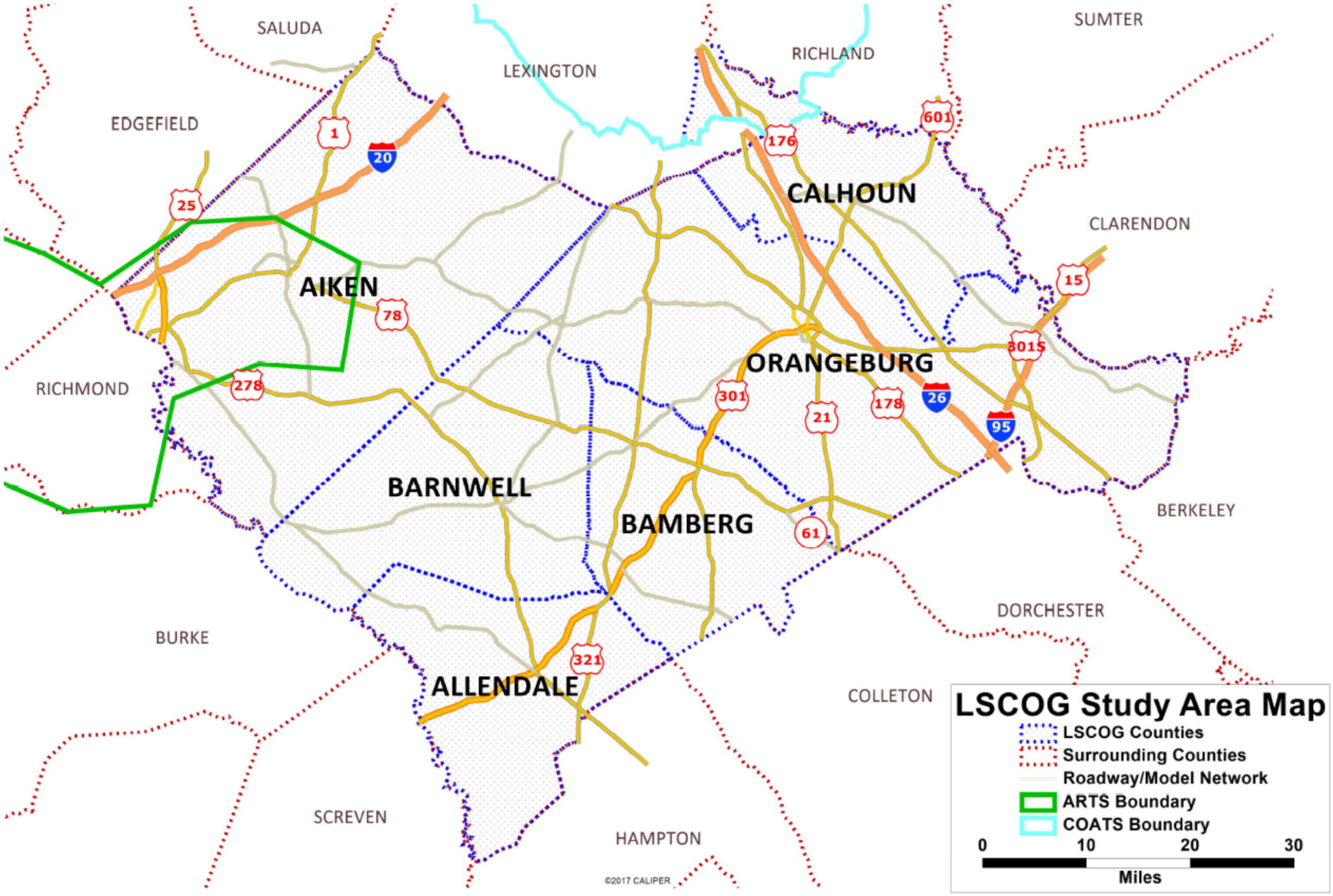


Figure 1: LSCOG Rural Study Area

2. Proposed Transportation Projects

The Transportation Plan is intended as working document for the LSCOG, for SCDOT, for stakeholders and interested residents of the region. For the convenience of all of these audiences this report first discusses the financially viable transportation improvements. The next several pages show project cut sheets, which include project description and cost estimate for each project. Later sections of the report discuss important background information that LSCOG used to arrive at these recommendations.

Before ranking and selecting the submitted projects for the LRTP, the TAC set a guide for the funding level of the different types of transportation projects. Eleven different categories were reviewed for funding. The categories were:

1. Safety Intersection
2. Geometric Intersections
3. Corridor Safety Improvement
4. Road Widening < 5 Miles
5. Road Widening > 5 Miles
6. Bike/Ped Facilities
7. Transit
8. Resurfacing Primary
9. Resurfacing Secondary
10. Bridge
11. New Roadway

The TAC approved distribution of the COG's LRTP funding of approximately $125M between seven categories. The categories and funding levels represent the goals and visions of the region. Below are the total categories, the percent of the total LSCOG funding and the approximate amount of funding available over the life of the LRTP (25 years.)

Table 1: LSCOG Approved Funding Distribution

Category	Share (%)	LRTP Share (Million)
Safety Intersection	20%	$25
Geometric Intersections	20%	$25
Corridor Safety Improvement	20%	$25
Road Widening	15%	$18.75
Bike/Ped*	10%	$12.5
Resurfacing	10%	$12.5
Transit	1.5%	$1.87**
Contingency	3.5%	$4.4
Total		$125

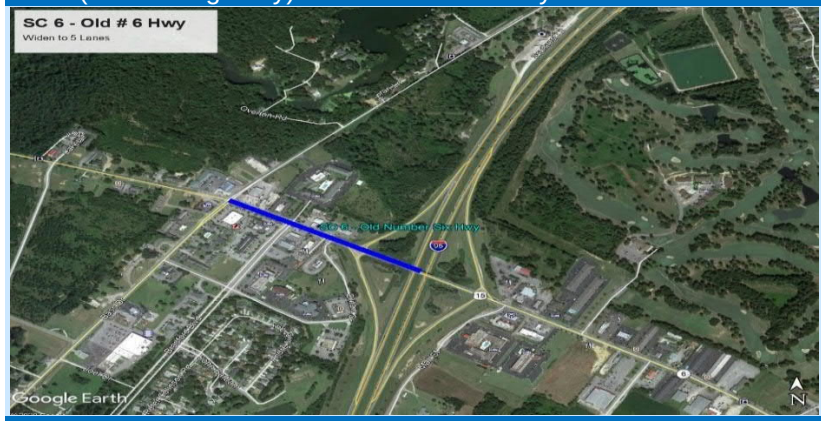
*-All corridor projects (safety and widening) include a major bike and pedestrian element, therefore the Bike & Ped funding was split with $5M ($10M total) of the funding being used to supplement both types of corridor projects and $2.5M of the funding being used for standalone B/P projects.
**-Approximately $75,000 is available each year for transit.

The projects included are recommended based upon LSCOG's current priorities and understanding project design concept and scope and the LSCOG's current understanding of available funding. The priorities can and should change and conditions change.

Corridor Widening

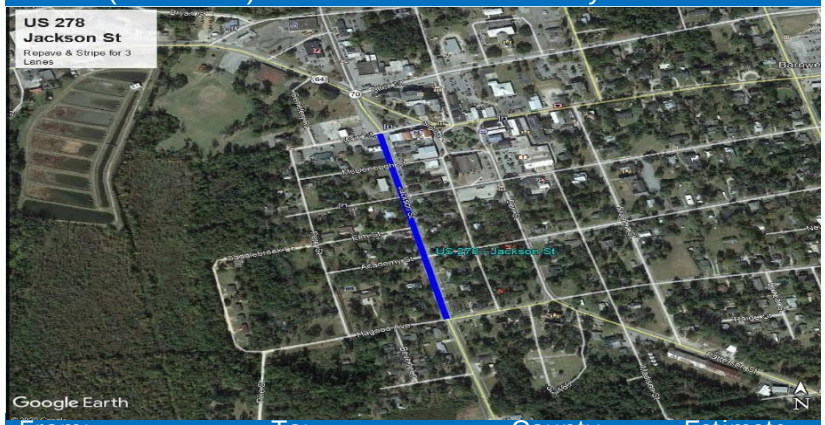
Corridor Widening projects add lanes to add capacity and by building facilities to current standards will improve driver understanding and safety. Originally LSCOG considered 12 corridor widening projects. However, funding is only available for 6 projects as shown in the following cut sheets.

SC 6 (Old #6 Highway) — Priority – 1



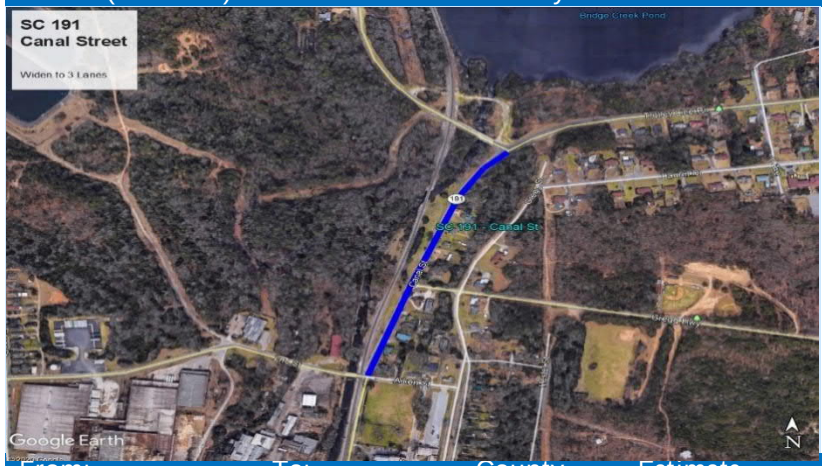
From:	To:	County	Estimate
I-95	US 15 Conn	Orangeburg	$ 4,700,000
Description:	Widen to 5 lanes		

US 278 (Jackson Str) — Priority – 5



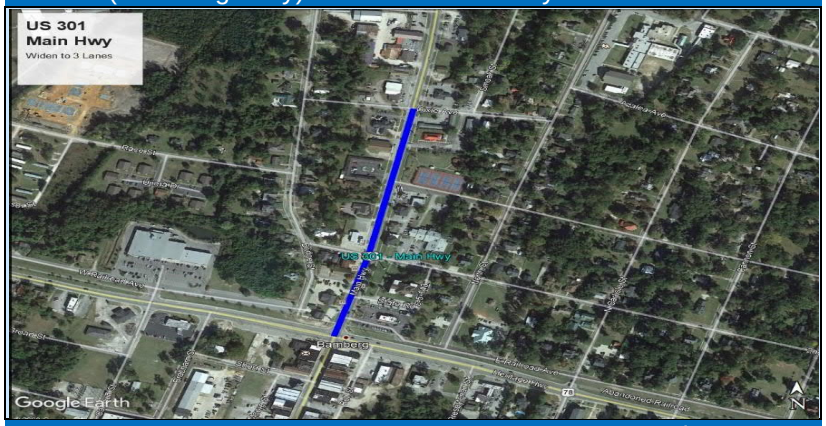
From:	To:	County	Estimate
SC 64 (Hagood Ave)	Main Street (S-154)	Barnwell	$ 250,000
Description:	Repave & Restripe for 3 lanes		

SC 191 (Canal Str) — Priority - 6



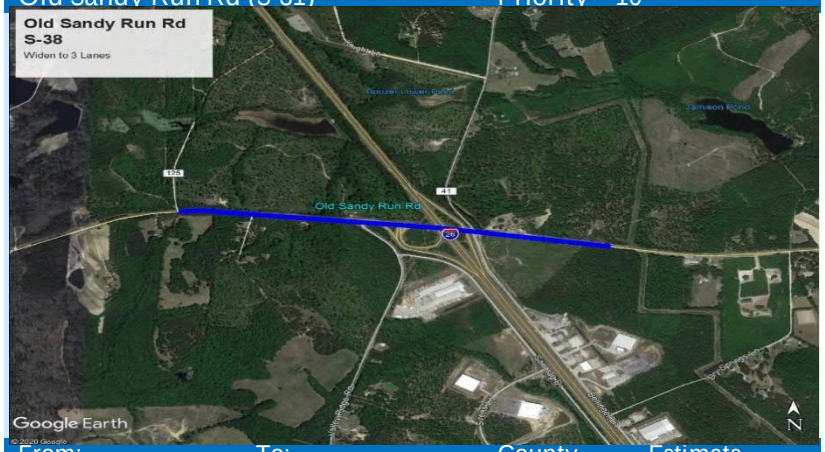
From:	To:	County	Estimate
Ascauga Lake Rd (S-33)	Trolley Line Rd (S-80)	Aiken	$ 3,700,000
Description:	Widen to 3 Lanes		

US 301 (Main Highway) — Priority – 9



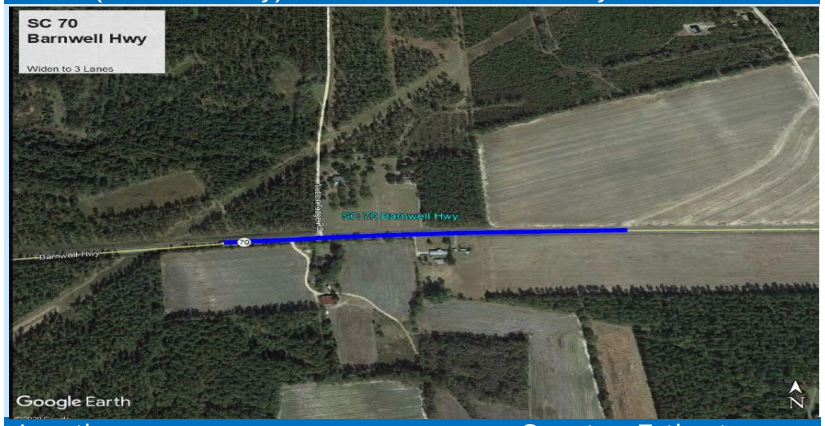
From:	To:	County	Estimate
US 78	Dixie Ave (S-166)	Bamberg	$ 3,200,000
Description:	Widen to 3 Lanes		

Old Sandy Run Rd (S-31)		Priority – 10	



From:	To:	County	Estimate
Old Sandy Run Rd (S-31)	Bates Court (New Frontage Rd)	Calhoun	$ 10,600,000
Description:	Widen to 3 lanes		

SC-70 (Barnwell Hwy)		Priority – 12	

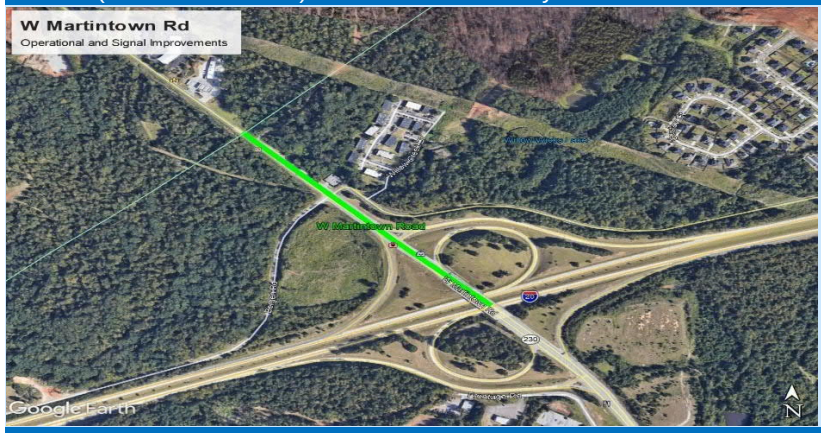


Location		County	Estimate
In front of Bamberg-Barnwell Emergency Center		Aiken	$ 4,300,00
Description:	Widen to 3 lanes		

Corridor Safety Projects

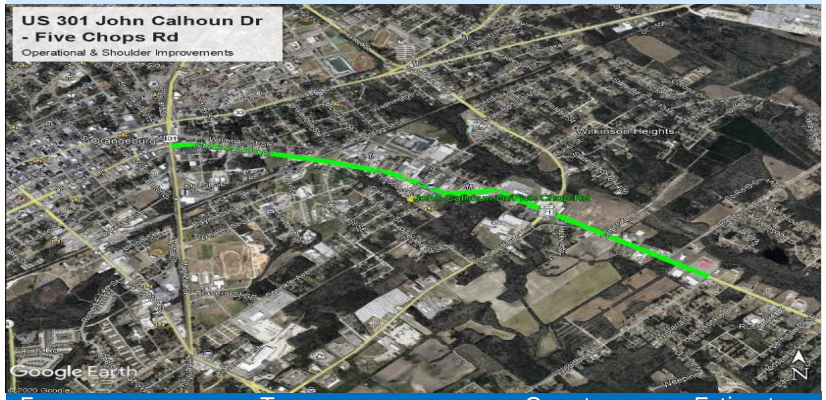
Corridor Safety projects address safety issues along corridors based upon input from the local jurisdiction and SCDOT. Corridor safety projects do not add capacity, instead these projects improve the cross-section by improving shoulder width and clear zones and adding bicycle and pedestrian facilities. Originally LSCOG considered 24 corridor safety projects. However, funding is only available for 11 projects as shown in the following project cut sheets. Examples of these improvements and the benefits associated with them are included in Appendix C: Summary of Safety Countermeasures.

SC 230 (W Martintown Rd)		Priority - 1	



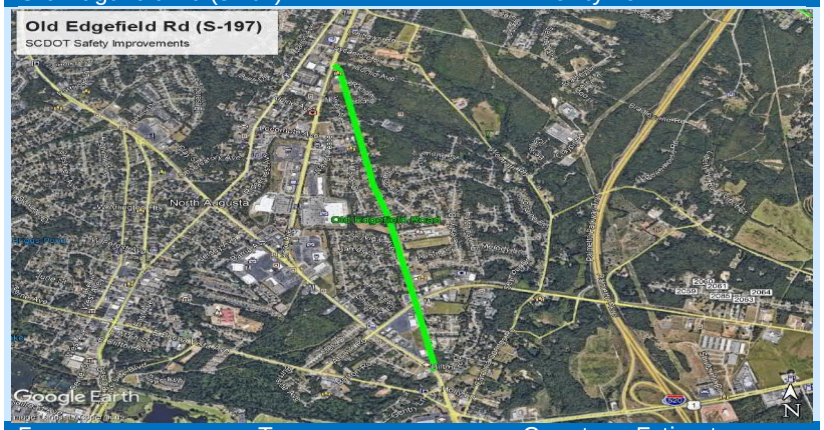
From:	To:	County	Estimate
I-20	Edgefield County Line	Aiken	$ 625,000
Description:	Operational and Signal Improvements		

US 301 (John Calhoun / Five Chop)		Priority – 2	



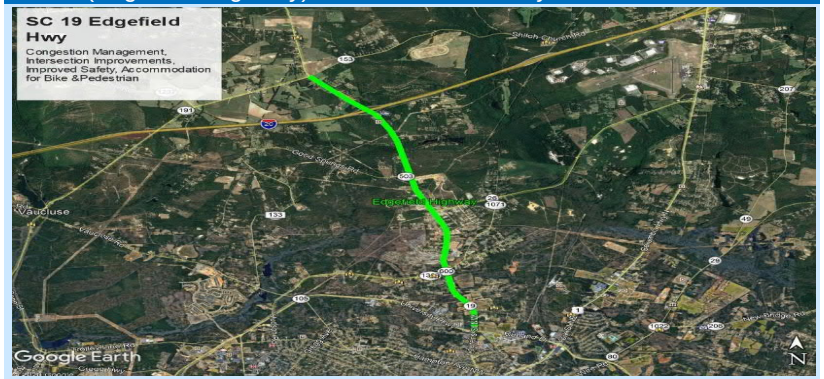
From:	To:	County	Estimate
US 601 (Magnolia St)	US 21 BP / US 178 BP (Five Chop Rd)	Orangeburg	$ 3,100,000
Description:	Operational and Shoulder Improvements		

Old Edgefield Rd (S-197)		Priority - 3	



From:	To:	County	Estimate
US 25 (Knox Ave)	SC 230 (Martintown Rd)	Aiken	$ 2,212,500
Description:	SCDOT Safety Improvements		

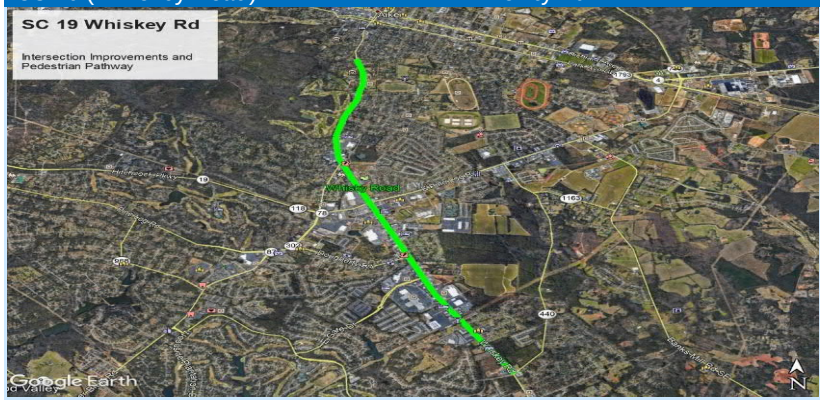
SC-19 (Edgefield Highway) Priority - 4



From:	To:	County	Estimate
SC-118 (University Parkway)	Edgefield County Line	Aiken	$ 12,850,000* :
Description:	Congestion Management, Intersection Improvements, Improved Safety and Accommodation for Bike and Pedestrian		

* - LSCOG funding $2,000,000

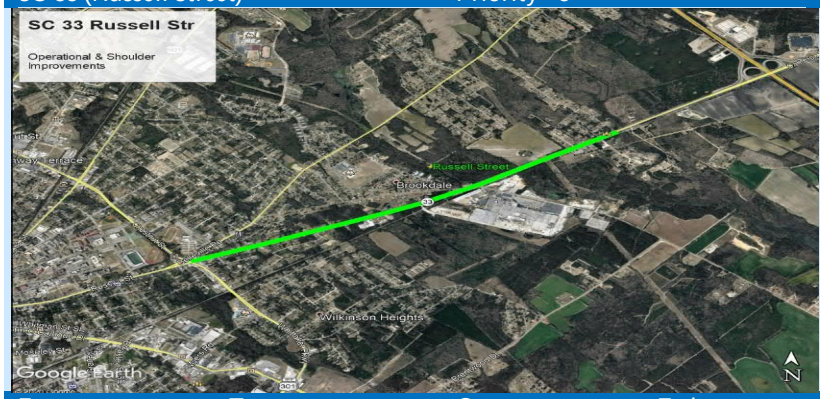
SC-19 (Whiskey Road) Priority - 6



From:	To:	County	Estimate
Powderhouse Rd (S-440)	George Avenue (S-546)	Aiken	$ 6,625,000*
Description:	Intersection Improvements & Pedestrian Path		

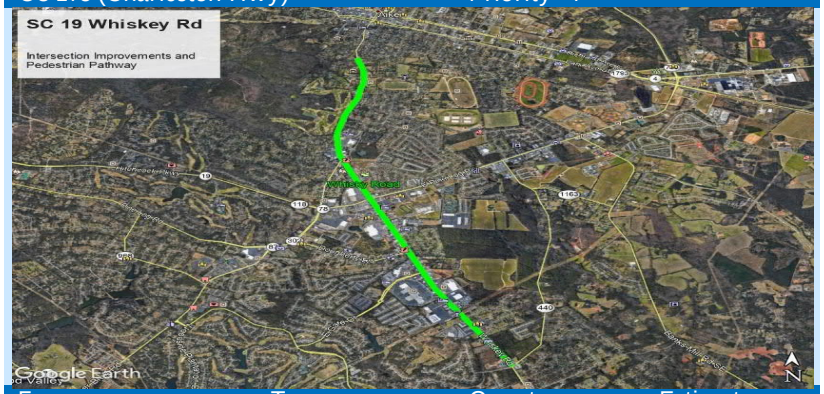
* - LSCOG funding ½ of project cost

SC 33 (Russell Street) Priority - 5



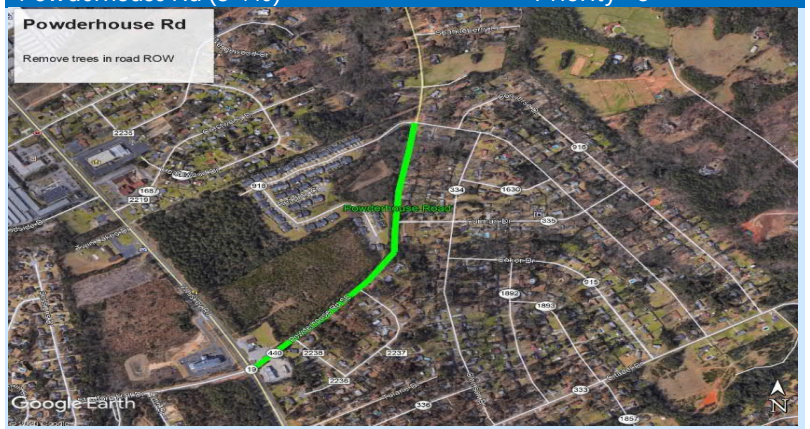
From:	To:	County	Estimate
US 178 (Chestnut Str)	Sylvan Ave (S-1849)	Orangeburg	$ 3,000,000
Description:	Operational Shoulder Improvements		

US 178 (Charleston Hwy) Priority - 7



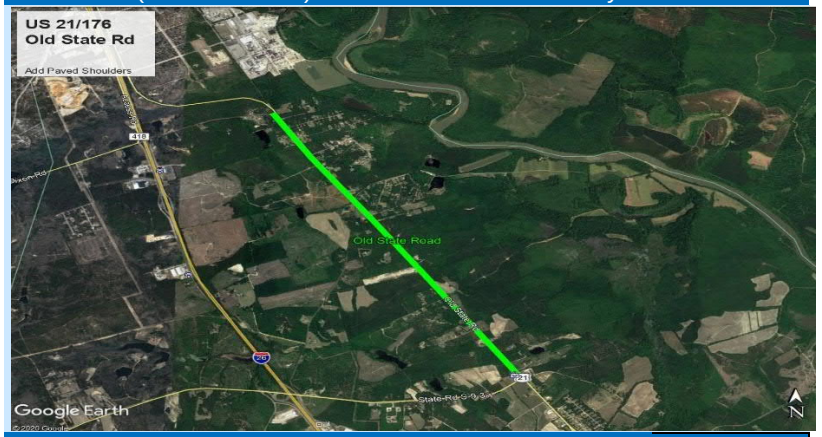
From:	To:	County	Estimate
US 21 / US 178 BYP (Joe Jeffords Hwy)	US 601 (Magnolia Str)	Orangeburg	$ 900,000
Description:	Operational Shoulder Improvements		

Powderhouse Rd (S-440)		Priority - 8	



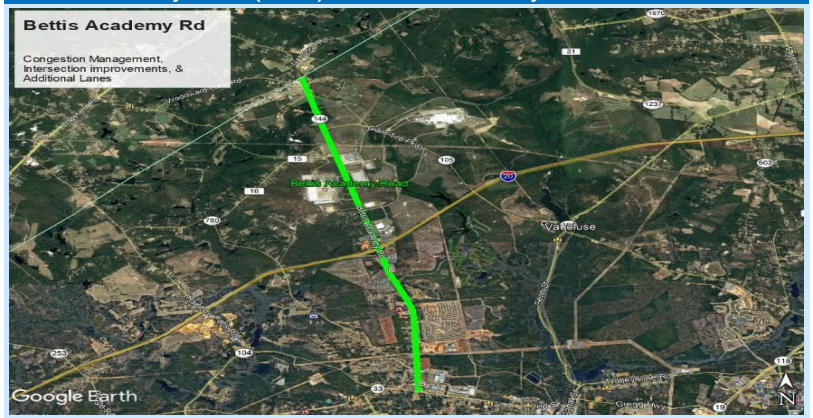
From:	To:	County	Estimate
SC 19 (Whiskey Rd)	Vanderbilt Rd (S-918)	Aiken	$ 75,000
Description:	Remove trees in road ROW		

US 21/176 (Old State Road)		Priority - 10	



From:	To:	County	Estimate
Savany Hunt Creek Rd (S-86)	Old Sandy Run Rd (S-31)	Calhoun	$ 4,125,000
Description:	Add Paved Shoulders		

Bettis Academy Road (S-144)		Priority - 9	



From:	To:	County	Estimate
Ascauga Lake Rd (S-33)	Edgefield County Line	Aiken	$ 6,875,000*
Description:	Congestion Management, Intersection improvements, and Additional Lanes		

* - LSCOG funding ½ of project cost

Intersection Safety Projects

LSCOG is emphasizing safety improvements within the study area. Safety projects have an outsized financial reward because the benefits of avoiding a single accident affect not only improves the transportation system but the broader economy by avoiding the costs of emergency response, medical care, pain and suffering and lost time.

Originally, LSCOG compiled over 50 intersections. After a few iterations, this list was pared down to 40 projects to be ranked. Due to limited funding, only 15 intersections are financially feasible.

Safety Intersection #31		Priority - 1	

Main Route	Crossing Route	County	Estimate
US 21 (Chestnut St)	At US 21 CON (Columbia Rd)	Orangeburg	$ 1,150,000
Description:	Remove Continuous Right-Turn Lanes		

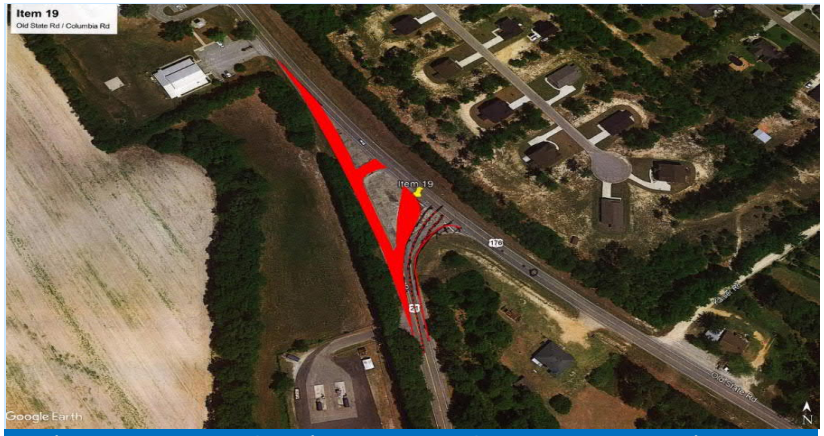
Safety Intersection #30		Priority – 2	

Main Route	Crossing Route	County	Estimate
US 21 (Chestnut St)	St. Matthews Rd (S-94)	Orangeburg	$ 1,750,000
Description:	SCDOT Safety Office Improvement		

Safety Intersection #35		Priority - 3	

Main Route	Crossing Route	County	Estimate
US 601 (Old Edisto Dr)	US 21 Bus (Magnolia St)	Orangeburg	$ 4,000,000
Description:	Add Left Turn Lanes; Remove Glover St RR Crossing		
Safety Intersection #23		Priority - 4	

Main Route	Crossing Route	County	Estimate
US 601 (St. Matthews Rd.)	US 176 (Old State Road)	Calhoun	$ 1,150,000
Description:	Remove Continuous Right-Turn Lanes		



Main Route	Crossing Route	County	Estimate
US 21 / 176 (Old State Road)	US 21(Columbia Rd.)	Calhoun	$ 850,000
Description:	Re-align Intersection		

Safety Intersection #27 Priority - 5

Main Route	Crossing Route	County	Estimate
US 21 (Columbia Rd.)	SC 6/SC 172	Calhoun	$ 850,000
Description:	Re-align Intersection		

Safety Intersection #19 Priority - 6

Safety Intersection #4 Priority - 7

Main Route	Crossing Route	County	Estimate
SC 19(Laurens St)	SC 118 (Rutland Dr)	Aiken	$ 1,750,000
Description:	SCDOT Safety Office Improvement		

Safety Intersection #26 Priority - 8

Main Route	Crossing Route	County	Estimate
US 21 (Columbia Rd.)	SC 6/S-30	Calhoun	$ 1,750,000
Description:	Re-align Intersection		

Main Route	Crossing Route	County	Estimate
SC 4 (Neeses Hwy)	Shillings Bridge Rd (S-74)	Orangeburg	$ 1,750,000
Description:	SCDOT Safety Office Improvement		

Safety Intersection #37 Priority - 9

Main Route	Crossing Route	County	Estimate
SC 4 (Neeses Hwy)	Beason Rd (S-367)	Orangeburg	$ 850,000
Description:	Re-align Intersection		

Safety Intersection #33 Priority - 10

Safety Intersection #18 Priority - 11

Main Route	Crossing Route	County	Estimate
SC 64 (Dunbarton Blvd)	Clinton St (S-224)	Barnwell	$ 850,000
Description:	Re-align Intersection		

Safety Intersection #14 Priority - 12

Main Route	Crossing Route	County	Estimate
US 278 (Railroad Ave)	US 301 (Burtons Ferry Hwy)	Allendale	$ 1,750,000
Description:	SCDOT Safety Office Improvement		

Safety Intersection #2 — Priority - 13

Main Route	Crossing Route	County	Estimate
SC 421 (Augusta Hwy)	Old Cherokee Dr (S-385)	Aiken	$ 1,750,000
Description:	SCDOT Safety Office Improvement		

Safety Intersection #8 — Priority - 14

Main Route	Crossing Route	County	Estimate
SC 118 (Bell Parkway)	Trolley Line (S-80)	Aiken	$ 1,750,000
Description:	Install Left Turn Lanes		

Safety Intersection 21 — Priority - 15

Project Routes	County	Estimate
SC 33(Cameron Rd) / SC 267(McCords Ferry Rd) / Lone Star Rd (S-11)	Calhoun	$ 3,000,000
Description:	Roundabout	

Geometric Intersection Projects

Geometric Intersection projects are intended to improve driver awareness and relieve driver confusion at an intersection, thereby making it easier to navigate while improving safety as a by-product.

The mixture of large expanses of rural areas coupled with urban areas has created many challenges for the LSCOG when prioritizing these type projects. Intersection can range from one serving 25000 cars per day with offset approaches to large, high speed, channelized approaches with low volume but both can cause immense driver confusion. The COG originally compiled 44 intersections to evaluate. After several iterations, this list was narrowed down to 39 intersections. However, available funding only allows for the top 15 intersections to be financially feasible.

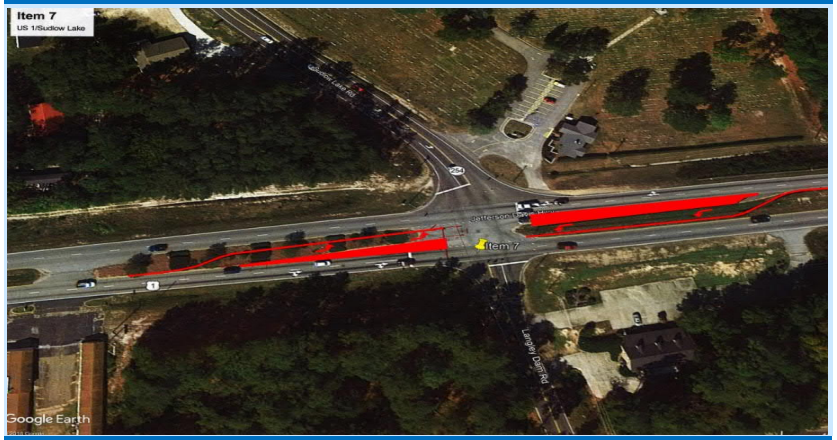
Geometric Intersection #37			Priority - 2

Main Route	Crossing Route	County	Estimate
US 178(North Rd)	Willington Dr	Orangeburg	$ 2,000,000
Description:	Add Northbound Right lane on US 178		

Geometric Intersection #43			Priority - 1

Main Route	Crossing Route	County	Estimate
US 601	Cook Rd(S-906)	Orangeburg	$ 850,000
Description:	Add Left Turn Lane		

Geometric Intersection #7			Priority - 3

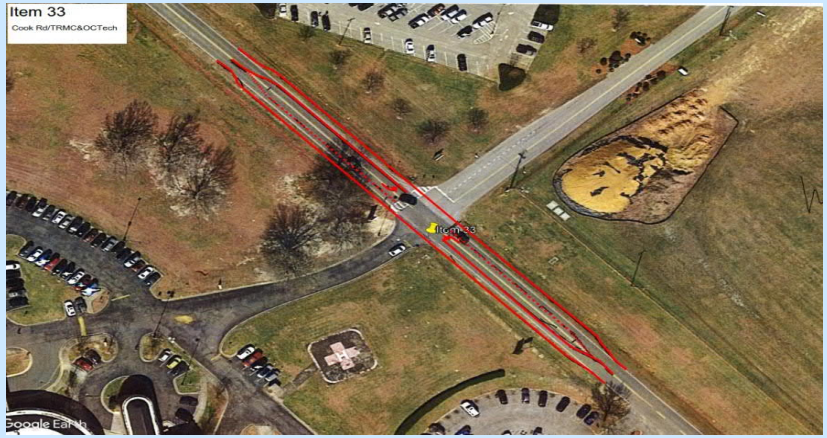


Main Route	Crossing Route	County	Estimate
US 1/78	Sudlow Lake Rd (S-254)	Aiken	$ 2,250,000
Description:	Add Offset Turn Lanes on US 1		

Geometric Intersection #4			Priority - 4

Main Route	Crossing Route	County	Estimate
SC 19 (Whiskey Rd.)	Ola Hitt/ Corporate Pkwy	Aiken	$ 1,150,000
Description:	Extend Ola Hitt Right Turn lane 200 ft		

Geometric Intersection #33			Priority - 6



Main Route	Crossing Route	County	Estimate
Cook Rd (S-906)	TRMC & OC Tech Drives	Orangeburg	$ 1,750,000
Description:	Install Left Lanes on Cook Rd		

Geometric Intersection #42			Priority - 5

Main Route	Crossing Route	County	Estimate
US 601	Silton Rd (S-801)	Orangeburg	$ 1,150,000
Description:	Left Turn lane on US 601		

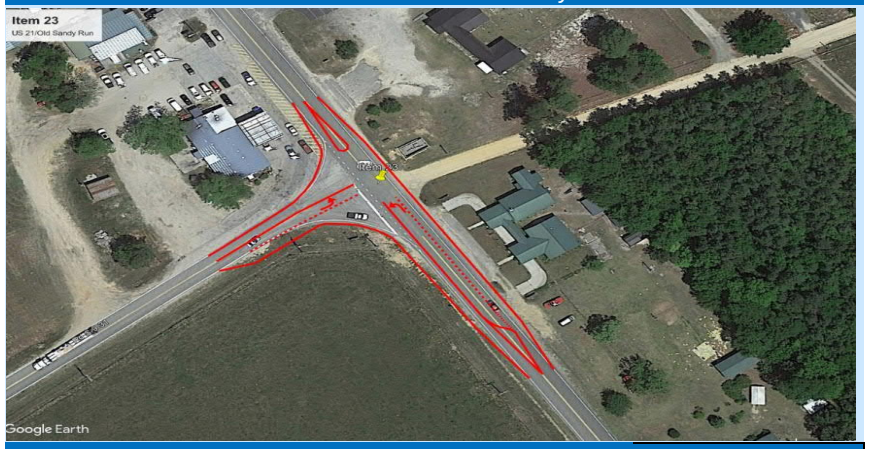
Geometric Intersection #24			Priority - 7

Main Route	Crossing Route	County	Estimate
US 21/176(Old State Rd)	Savany Hunt Creek Rd (S-86)	Calhoun	$ 1,400,000
Description:	Per SCDOT Safety Office: Add dedicated Left and Right Turn lanes on two approaches		

Geometric Intersection #41		Priority - 8	

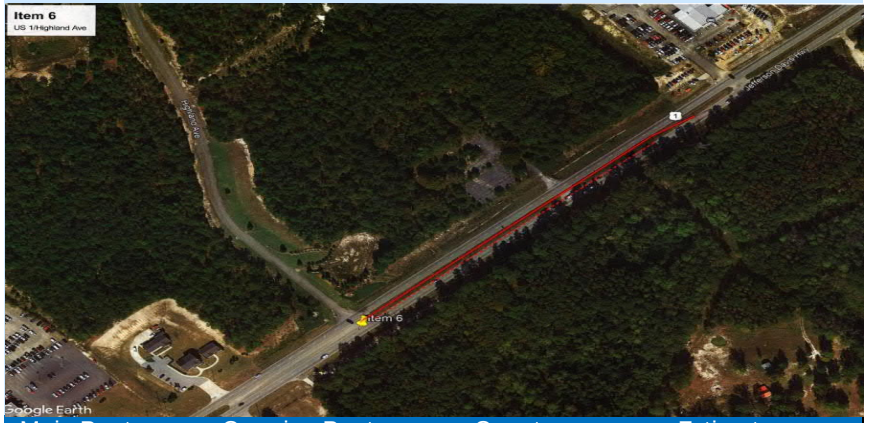
Main Route	Crossing Route	County	Estimate
US 301	Canaan Road (S-1638)	Orangeburg	$ 1,150,000
Description:	Add Left Turn Lane on US 301		

Geometric Intersection #23		Priority - 10	



Main Route	Crossing Route	County	Estimate
US 21/176 (Old State Rd)	Old Sandy Run Rd (S-31)	Calhoun	$ 1,400,000
Description:	Install Left Turn lanes		

Geometric Intersection #6		Priority - 9	



Main Route	Crossing Route	County	Estimate
US 1	Highland Ave (Local)	Aiken	$ 2,750,000
Description:	Install Accel Lane		

Geometric Intersection #8		Priority - 11	

Main Route	Crossing Route	County	Estimate
US 78	Old Barnwell R (S-113)	Aiken	$ 850,000
Description:	Add Left Turn Lane on US 78		

Geometric Intersection #26			Priority - 12

Main Route	Crossing Route	County	Estimate
US 176(Old State Rd)	Old Swamp Road (S-369)	Calhoun	$ 1,400,000
Description:	Add Left Turn Lane on two approaches		

Geometric Intersection #25			Priority - 13

Main Route	Crossing Route	County	Estimate
US 21/176(Old State Rd)	Livingston Rd(S-41)	Calhoun	$ 2,400,000
Description:	Realign offset Intersection for 90 degree skew angle		

Geometric Intersection #32			Priority - 14

Main Route	Crossing Route	County	Estimate
US 178	Shillings Bridge Rd (S-74)	Orangeburg	$ 2,500,000
Description:	Realign offset Intersection for 90 degree skew angle		

3. Objective Project Prioritization

In June 2007, the South Carolina Legislature restructured and reformed the SCDOT. Section 57-1-370 of Act 114 addresses the State Transportation Improvement Program (STIP) development in an effort to make highway project selection more consistent. In addition to restructuring SCDOT's hierarchy, Act 114 established regulations for prioritizing transportation projects. Subsection (B) (8) of this section states, "the commission shall establish a priority list of projects to the extent permitted by federal laws or regulations, taking into consideration at least the following criteria:

1) financial viability including a life cycle analysis of estimated maintenance and repair costs over the expected life of the project;
2) public safety;
3) potential for economic development;
4) traffic volume and congestion;
5) truck traffic;
6) the pavement quality index;
7) environmental impact;
8) alternative transportation solutions; and
9) consistency with local land use plans."

To comply with Act 114, the LSCOG's full board and the Transportation Advisory Committee (TAC) had to establish a ranking system using the guidelines in the state legislation but not necessarily exactly following the SCDOT ranking criteria for project categories. In 2007 the TAC approved project ranking guidelines for new location, widening/corridor, and intersection projects. The LSCOG board approved the recommendations of the TAC in 2008. The criteria set percent weights for each ranking category and project type but did not establish methods for calculating each criteria score. Staff had developed some procedures for developing the scores for each project type, but due to the length of time since the last LRTP update and staff turnover, the exact procedure for developing scores for each category was revamped for this version of the LRTP. The percentages set by the LSCOG board were not changed. LSCOG's project ranking process can be described as either a weighted scoring system or a decision tree. Figure 2, below, summarizes the categories and their weights.

Intersections

LSCOG divides intersection projects into two sub-categories:

1) Safety Intersections, and
2) Geometric Intersections.

While LSCOG does not have systemwide congestion problems, many intersections have safety, geometric or capacity problems. After consulting with the SCDOT, the LSCOG determined that dividing problem intersections into the above listed categories was the best way to tackle the problems facing the region.

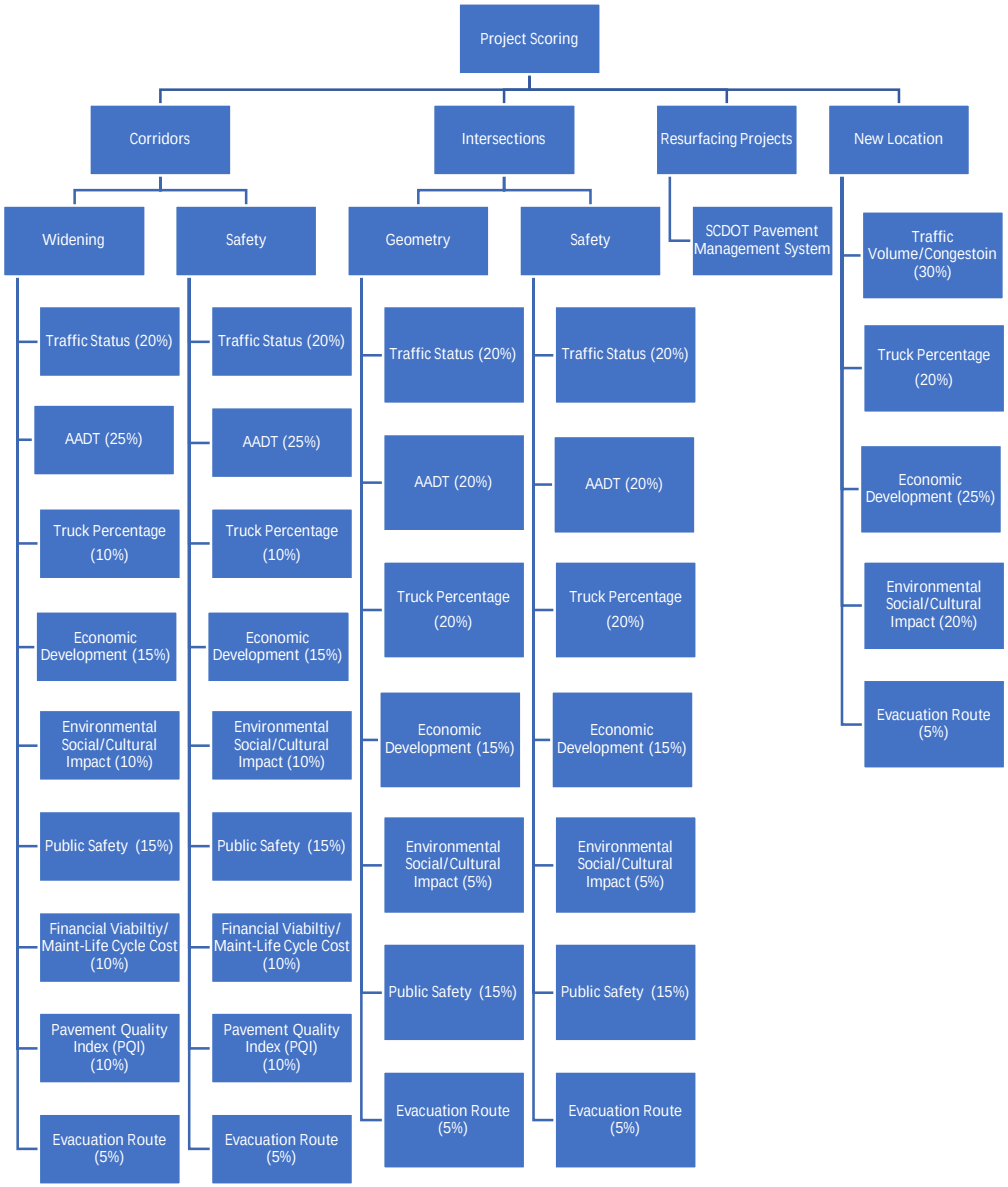


Figure 2: Project Ranking Process

The safety list consists of intersections with the highest SCDOT calculated crash-rates in the COG. It also is made up of intersections that each county deems a safety issue and submits for ranking. The final group of intersections considered in the safety list were developed by Ramey Kemp & Associates (RKA) using the latest three years of crash data. RKA, using the safety data and the SCDOT crash rate formula, identified an additional two or three intersections in each county.

The geometric list of intersections consists of projects submitted by the SCDOT District 7 Traffic Engineer and projects submitted by each county which they deem confusing or hard to navigate. Also, during the public hearings for the LRTP, citizens were asked to review maps of the region and point out places where intersections were unsafe or confusing to travelers. RKA received 2 or 3 of these submissions for each category.

Both categories use the same formula and weighting to determine the score. The criteria are:

Traffic Status (20%) – The total score for traffic status of an intersection is developed from scores an intersection receives from four sub-categories:

1) Scissor Intersection,
2) Conflict Points,
3) Offset Intersection,
4) Approaches.

Sub-category 1 and 3 are scored by determining whether the intersection is a "Scissors Intersection" or the intersection has offset approaches. If yes is the answer, the intersection gets 5 points. If the answer is no, the intersection gets 0 points. Examples of both types of intersection are shown in Figure 4

The score for sub-category 2 is determined by counting the number of conflict points in an intersection. A normal "T-intersection" or "Cross-intersection" will have 1 conflict point. The scissors intersection shown below would have 5 conflicts and thus 5 points (anything intersection with greater than 5 conflicts would receive a 5.) The offsect intersection shown below would have 2 conflict points.

Figure 3: Example Scissors Intersection

Figure 4: Example Offset/Skew Intersection

The score for sub-category 4 is determined by counting the number of approaches for each intersection. A "T-intersection" would have 3 approaches and a "Cross-intersection" would have 4. The scissors intersection above has at least 5, so it would receive a score of 5 (any intersection with greater than 5 approaches would receive a 5.) The offset intersection shown above has 4 approaches.

Once each intersection is scored, the intersection receiving the highest score is determined and if it is less than 20, that intersection is given a score of 20. Then a factor is calculated to determine what the highest score had to be multiplied by to get a score of 20. This factor is then applied to each intersections

Equation 1: Final Intersection Score Calculation

$$Intersection\ Factor = \frac{20}{Highest\ Raw\ Score}$$

$$Final\ Intersection\ Score = Intersection\ Factor \times Raw\ Score$$

Average Annual Daily Traffic (AADT) (20%) – The AADT for the main route and the minor route are obtained from the SCDOT Count Website, if an annual count station is on the road. If a count station is not on the road, the SCDOT Data Services is contacted and a count is obtained. The total intersection AADT is determined and the highest comprehensive AADT is given a score of 20. Each intersection AADT is divided by the highest AADT and then multiplied by 20 to obtain the AADT score for the intersection.

Average Daily Truck Percentage (20%) - The percentage of truck traffic on the main route is determined by consulting with the SCDOT Data Services. This percentage is multiplied by the AADT obtained earlier to obtain the number of trucks on the roadway. The capacity of the roadway is obtained from the SCDOT's LSCOG Model. If a road doesn't appear on the model, a capacity of 9890 (lowest capacity used on the model) is used. The Truck Volume to Capacity (V/C) Ratio is then determined by dividing the calculated number of trucks by the model capacity. The highest V/C ratio is given a score of 20. A factor, similar to the one calculated in the Traffic Status category, is determined and each intersections truck V/C ratio is multiplied by the factor to determine the final Truck Percentage Score.

Economic Development (15%) – To determine the Economic Development score for each location, a KMZ (Google Earth)/Shapefile (GIS layer) was produced with each project location. This file was then forwarded to the LSCOG Staff. The staff evaluated each intersection and assigned a score ranging from 1 to 5 for each intersection. The raw ED score was then multiplied by 3 to get the final ED score.

Environmental, Social, and Cultural Impact (5%) - To determine the Environmental score for each location, a KMZ (Google Earth) / Shapefile (GIS layer) was produced with each project location. The locations were then reviewed, using Google Earth, by the RKA Project Development staff and a score of 1, 3, or 5 was assigned to each project.

Public Safety (15%) – The Public Safety score is based on the intersection crash rate. The rate is obtained from the SCDOT Traffic Engineering Office of Safety. Once the crash rates are received, they are ranked and reviewed and compared. If any rates are out of proportion in comparison to the others, those intersections are marked as special and all the other rates are ranked from highest to lowest. The highest crash rate is given a score of 15. A factor, similar to the one calculated in the Traffic Status category, is determined and each intersection crash rate is multiplied by the factor to determine the final Public Safety Score. The intersections with rates that were deemed out of proportion to the others are given a score of 15. An example of a special crash rate would occur if 30 intersections were being ranked and 28 of the crash rates varied from 0.1 to 3.5 and the other two rates were an 8 and a 10. The two with the very high crash rate would skew the scores dramatically and therefore are not used in the initial ranking procedure and are simply given a score of 15.

Evacuation Route (5%) – If either route of the intersection falls on an evacuation route, the intersection is given a score of 5. If neither route is an evacuation route, the intersection is given a score of 0. Evacuation Routes can be obtained in a shapefile from the SCDOT Mapping website.

Once scores for each ranking category were determined for each intersection, the scores were totaled and ranked from the intersection with the highest total score to the intersection with the lowest total score. If an intersection gets submitted as part of both lists, the list in which the intersection is ranked highest is used for the intersection and it is removed from the other list.

Safety Corridor Improvements

Due to the rural nature of the LSCOG, major congestion is not a major issue. However, the TAC, working with the SCDOT, has determined that there are many corridors across the counties of the COG that have inadequate shoulders, bad geometry, high truck rates, little to no clear zones, and minimal bike and pedestrian facilities. In an effort to improve the safety of these routes, as well as the overall transportation system of the COG, the TAC decided to try and eliminate as many of these corridors as possible. Currently, the LSCOG has eight safety corridor projects in PE, ROW, or construction.

The safety corridor project list is developed by obtaining projects from each member county and from the SCDOT as part of its Rural Road Safety program. The ranking process used is similar to the intersection ranking procedure. Six of the seven criteria are used, along with, two additional criteria. The additional criteria are Financial Viability & Maintenance Cost and Pavement Quality Index (PQI).

The scores for three of the six categories used in both intersections and safety corridors are determined the same in both ranking lists. These three categories are:

1) Economic Development (15%),
2) Public Safety (15%), and

3) Evacuation Routes (5%).

The scores for the other three categories used in both lists are scored the same way, but the percent of the total score is different in the corridor list. These three criteria are:

1) Average Daily Traffic (ADT),
2) Average Daily Truck Traffic, and
3) Environmental, Social, & Cultural Impact.

The ADT made up 20% of the score in intersections but makes up 25% of the score in the safety corridor list. The Average Daily Truck traffic made up 20% of the score for intersections, but only makes up 10% of the score in the safety corridor list. The Environmental criteria makes up 5% of the score for intersections but makes up 10% of the score for safety corridors. The two new criteria and their corresponding percentages are explored below.

Financial Viability & Maintenance/Life Cycle Cost (10%) – This criterion is made up of two sub-criteria. One sub-criterion looks at the immediate cost and the other looks at the long-term cost. The financial viability of a project looks at the estimated cost of a project and the yearly Guideshare funding and awards a score from 1 to 5. If a project's estimated cost is less than or equal to one year of Guideshare funding, the project receives a score of 5. If the cost is less than or equal to two years of Guideshare funding, the project receives a score of 4 and continues until the cost of a project is greater than four times the yearly funding, at which point the project would receive a score of 1.

The maintenance / life cycle cost score for a project is obtained through several steps. The first step is the calculation of the resurfacing cost over 20 years. This is calculated using the SCDOT average cost per lane mile for the type of road (primary or secondary) multiplied by the number of lanes and the length of the project. The amount obtained from this is then multiplied by 3 for primary routes and 2 for secondary routes. This is the number of times each roadway type is assumed to be resurfaced during the life of the LRTP.

The next step is to calculate the maintenance cost for 20 years. This is calculated using the SCDOT average county maintenance cost per lane mile for type of roadway (primary or secondary) multiplied by length of the corridor and the number of lanes.

The third step in the process is to add the estimated cost of the project plus the resurfacing cost plus the maintenance cost together and divide the sum by the length of the project times the AADT of the road. This equation provides the user with an average cost per vehicle miles traveled (VMT) for the project. This is shown in Equation 2.

$$\frac{\$}{Travel\ Mile} = \frac{Constuction\ \$s + Resurface\ \$s_{20} + Maintenance\ \$_{20}}{Miles\ \times AADT}$$

Equation 2: Maintenance/Life Cycle Project Cost

The final step of the maintenance / life cycle cost score is similar to several of the previous criteria. The costs calculated for each project are compared and the project with the lowest value is given a score of five. For all other projects, the lowest cost is divided by the subject project's average cost and multiplied by five to obtain its score. Thus, the higher the total project cost per VMT, the lower the score.

To obtain the total Financial Viability & Maintenance/Life Cycle Cost score, the Financial Viability score and the Maintenance/Life Cycle Cost score are added together. The maximum score that a project can receive is 10.

Pavement Quality Index (PQI) (10%) – The PQI score is determined by obtaining the PQI maps from the SCDOT Pavement Management Office. Once this shapefile has been obtained, the project segments of the PQI map making up the project are determined and the corresponding PQI values are obtained. If a corridor has more than one PQI segment, a weighted PQI score is obtained by using segments' length and PQI value and calculating an overall PQI for the corridor. As in previous criteria, once all the weighted PQI values are determined for the safety corridor projects, the corridor with the lowest PQI is given a score of 10. For the other corridors, the lowest PQI value is divided by the corridor's PQI value and then multiplied by 10. Thus, the corridors with the higher PQI's receive the lower scores and the corridors with the lower PQI's receive the higher scores.

Once scores for each ranking category were determined for each safety corridor, the scores are totaled and ranked from the corridor with the highest total score to the corridor with the lowest total score. If two corridors tie, both receive the same ranking and are equal.

Widening Projects

Projects ranked under the Widening procedure were developed two ways. All member organizations were petitioned to submit any roadway sections for widening to 3, 4, or 5 lanes. Widening projects were also developed using the SCDOT's 2040 LSCOG model. Any link or a combination of links on the model that were projected to be at a LOS of D or greater were evaluated for inclusion in the ranking process.

The procedure for ranking widening projects is the same as the process used for ranking Safety Corridor Projects. The percentage breakdown of the categories and the means by which scores were developed for each category mirror what was used in the Safety Corridor Improvement list.

Once scores for each ranking category were determined for each widening project, the scores are totaled and ranked from the project with the highest total score to the project with the lowest total score. If two corridors tied, both receive the same ranking and are equal.

Resurfacing Projects

Resurfacing projects were developed by having member organizations submit road sections they believed needed to be resurfaced. Since the resurfacing can be funded by a number of parties and since those parties depend on the SCDOT ranking to prioritize their projects, LSCOG determined it was best to also use the SCDOT to rank resurfacing projects. This allows for consistency over all funding groups.

The District Engineering Administrator and the contract manager in the SCDOT District 7 office were contacted and were provided the list of projects. They investigated the projects and reported the priorities set by the Department for the submitted projects back to LSCOG and that ranking was used for prioritizing the resurfacing projects.

New Location Projects

New Location projects were developed by having member organizations submit conceptual sketches they wanted evaluated for construction. Only one new location project was submitted during this update, so no ranking was required. However, if ranking had been required, the LSCOG procedure adopted by TAC in November of 2007 would have been used. The items included in this procedure are:

- Financial Viability & Maintenance / Life Cycle Cost (20%)
- Economic Development (25%)
- Traffic Volume & Congestion (30%)
- Environmental, Social, and Cultural Impact (20%)
- Evacuation Route (5%)

Four of the categories listed above were explained earlier and those items would be scored the same way in this procedure. Traffic Volume and Congestion obviously can't be determined using current traffic counts. Therefore, hours of delay for Build and No-Build model network scenarios will be used to estimate the effect the project would have on delay.

Financially Viable Projects

The tables below summarize the financially viable projects, as calculated above, for resurfacing, corridor widening, corridor safety, intersection safety and geometric intersection improvements. The tables show similar information to the project cut sheets presented earlier in the report. The tables area also grouped by county for ease of use.

Table 2: Financially Viable Maintenance Projects

County	Route	From	To	Improvement	Score	Rank	Estimate
Calhoun	Bridge St (SC 6)	Chestnut St (S-22)	Sikes Rd (S-20)	Resurface	0	5	$ 500,000
	Cameron Rd (SC 33)	SC 6 (Old Number Six Hwy)	SC 267(McCords Ferry Rd)	Resurface	0	3	$ 1,500,000
	Chestnut St (S-22)	SC 6 (Bridge St)	US 176 (Old State Road)	Resurface	0	1	$ 480,000
	Old Belleville Rd (S-24)	Sikes Pond Rd	St. Matthews Town Limits	Resurface	0	3	$ 1,800,000
Orangeburg	SC 33 (Cameron Rd)	I-26	Calhoun Co Line	Resurface	0	2	$ 1,600,000
						Total	$ 5,880,000

Table 3: Financially Feasible Intersection Safety Projects

County	Route	Crossing Route	Improvement	Score	Rank	Estimate
Aiken	SC 118 (Bell Parkway)	Trolley Line(S-80)	Add Left Turn Lanes on Trolley Line Road	40	14	$ 1,750,000
	SC 19 (Laurens St)	SC 118 (Rutland Dr)	Safety Improvements to Reduce Crashes at Intersections	49	7	$ 1,750,000
	SC 421 (Augusta Hwy)	Old Cherokee Dr (S-385)	Safety Improvements to Reduce Crashes at Intersections	40	13	$ 1,750,000
Allendale	US 278 (Railroad Ave)	US 301 (Burtons Ferry Hwy)	Safety Improvements to Reduce Crashes at Intersections	41	12	$ 1,750,000
Barnwell	SC 64 (Dunbarton Blvd)	Clinton St (S-224)	Re-align Intersection; Improve Skew Angle	42	11	$ 850,000
Calhoun	Columbia Rd (US 21)	SC 6/S-30	Re-align Intersection (Remove Scissors; Improve Skew Angle)	48	8	$ 1,750,000
	SC 33(Cameron Rd)	SC 267(McCords Ferry Rd)/Lone Star Rd (S-11)	Roundabout	39	15	$ 3,000,000
	St. Matthews Rd (US 601)	US 176(Old State Road)	Roundabout Remove Continuous Rt turn lanes; Add Mast Arms & Advance Warnings	60	4	$ 1,150,000
	US 21(Columbia Rd)	SC 6/SC 172	Re-align Intersection (Remove Scissors; Improve Skew Angle)	51	5	$ 850,000
	US 21/176(Old State Rd)	US 21(Columbia Rd)	Roundabout Re-align Intersection (Remove Scissors; Improve Skew Angle)	51	6	$ 850,000
Orangeburg	SC 4 (Neeses Hwy)	Beason Rd (S-367)	Re-align Intersection; Improve Skew Angle	46	9	$ 850,000
		Shillings Bridge Rd (S-74)	Remove Continuous Rt-Turn Lanes	44	10	$ 1,750,000
	US 21 (Chestnut St)	St. Matthews Rd (S-94)	Safety Improvements to Reduce Crashes at Intersections	68	2	$ 1,750,000
		US 21 CON (Columbia Rd)	Remove Continuous Right-Turn Lanes	69	1	$ 1,150,000
	US 601 (Old Edisto Dr)	US 21 Bus (Magnolia St)	Add Left turn Lanes; Remove Glover St RR Crossing	63	3	$ 4,000,000
						$24,950,000

Table 4:Financially Viable Geometric Intersection Projects

County	Route	From	Improvement	Score	Rank	Estimate
Aiken	SC 19 Whiskey	Ola Hitt/Corporate Pkwy	Extend Ola Hitt Right Turn Lane 200 ft	51	4	$ 1,150,000
	US 1	Highland Ave (Local)	Add Left Turn lane & acceleration	39	9	$ 2,750,000
	US 1/78	S-254 Sudlow Lake Rd	Offset US 1 (Left Turn Lanes)	57	3	$ 2,250,000
	US 78	S-113 (Old Barnwell Road)	Add Left Turn lane	36	11	$ 850,000
Barnwell	SC 64 (Dunbarton Blvd)	S-20 Patterson Mill Rd	Evaluate for truck traffic usage	32	15	$ 1,750,000
Calhoun	Old State Road (US 176)	Old Swamp Road (S-369)	Left Turn Lanes	35	12	$ 1,400,000
	Old State Road (US 21/176)	Livingston Rd (S-41)	Re-align Intersection; Improve Skew Angle	34	13	$ 2,400,000
		Old Sandy Run Rd (S-31)	Add Traffic Signal & Left Turn Lanes	37	10	$ 1,400,000
		Savany Hunt Creek Rd (S-86)	Left Turn Lanes	45	7	$ 1,400,000
Orangeburg	S-906 Cook Road	TRMC & OC Tech	Left Turn Lanes	46	6	$ 1,750,000
	US 178	Shillings Bridge Road S-74	NB Left Turn Lane	33	14	$ 2,500,000
	US 178 North Rd	Willington Dr	Add NB Right Turn lane on US 178	58	2	$ 2,000,000
	US 301	S-1638 (Canaan Road)	Left Turn lane SB	41	8	$ 1,150,000
	US 601	S-801(Silton Rd)	Add SB left turn lane	48	5	$ 1,150,000
		S-906(Cook Rd)	Add Left Turn Lane on Cook Road	63	1	$ 850,000
						$ 24,750,000

Table 5: Financially Viable Corridor Safety Projects

County	Route	From	To	Improvement	Score	Rank	Estimate
Aiken	Bettis Academy Road (S-144)	Ascauga Lake Road (S-33)	Edgefield county line	Congestion Management, Intersection improvements, & Additional Lanes	52	9	$ 3,437,500*
	Old Edgefield Rd (S-197)	US 25 (Knox Ave)	SC 230 (Martintown Rd)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	68	3	$ 2,212,500
	Powderhouse Rd (S-440)	SC 19 (Whiskey Rd)	Vanderbilt Rd (S-918)	Remove Continuous Rt-Turn Lanes	53	8	$ 75,000
	SC 230 (W Martintown Rd)	I-20	Edgefield County Line	Operational and Signal Improvements	89	1	$ 625,000
	SC-19 (Edgefield H/W)	SC-118 (University Parkway)	Aiken/Edgefield county line	Congestion Management, Intersection Improvements, Accommodation for Bike and Pedestrian	56	4	$2,000,000**
	SC-19 (Whiskey Road)	Powderhouse Rd (S-440)	S-546 (George Avenue)	Intersection Improvements and Pedestrian Pathway	54	6	$ 3,312,500*
	U.S. 78 (Charleston H/W)	SC-302 (East Pine Log Road)	Aiken/Barnwell county line	Intersection Improvements	47	11	$2,000,000**
Calhoun	US 21/176 (Old State Road)	Savany Hunt Creek Rd (S-86)	Old Sandy Run Rd (S-31)	Add Paved Shoulders	51	10	$ 4,125,000
Orangeburg	SC 33 (Russell Street)	US 178 (Chestnut Str)	Sylvan Ave (S-1849)	Operational Shoulder Improvements	55	5	$ 3,000,000
	US 178 (Charleston Hwy)	US 21/US 178 BYP (Joe Jeffords Hwy)	US 601 (Magnolia Street)	Operational Shoulder Improvements	53	7	$ 900,000
	US 301 (John Calhoun/Five Chop)	Woodbine Dr to US 21 BP/US 178 BP US 601(Magnolia St) to US 301 (Five Chop Rd)		Operational Shoulder Improvements	70	2	$ 3,100,000
							$ 24,800,000

* - LSCOG funding 50% of project cost

** - LSCOG funding $2,000,000 total cost of project

Table 6: Corridor Widening Projects

County	Project Index (Type)	Route	From	To	Improvement	Score	Rank	Estimate
Aiken	1	SC 191	Ascauga Lake Road	Trolley Line Road	Widen to improve congestion	56	6	$ 3,700,000
Bamberg	2	US 301	US 78	S-166	Widen to 3 lanes	55	9	$ 3,200,000
	3	SC 70	In front of Bamberg-Barnwell Emergency Center	In front of Bamberg-Barnwell Emergency Center	Widen to 3 lanes	45	12	$ 4,300,000
Barnwell	5	US 278	SC 64 (Hagood Ave)	S-154 Main Street	Resurface; Restripe for 3 lanes	60	5	$ 250,000
Calhoun	7	Old Sandy Run Rd (S-31)	Bates Court (New Frontage Rd)	0.4 miles East of I-26 (Relocated Fr Rds.)	Widen to 3 lanes	54	10	$ 10,600,000
Orangeburg	10	SC 6	I-95	US 15 Conn	Widen to 5 lanes	79	1	$ 4,700,000
								$ 26,750,000

Vision Projects

There are many more transportation needs, and desires, than there are funds to build and maintain them. The tables below summarize projects that LSCOG does not believe are financially feasible with the current funding levels. These projects are needs and LSCOG would be able to fund if more money were available. Cutsheets for projects that are not financially feasible have not been prepared.

Table 7: Intersection Vision Projects

County	Route	Crossing Route	Improvement	Score	Rank	Estimate
Aiken	Pine Log Rd (S-65)	Storm Branch Rd (S-145)	Safety Improvements to Reduce Crashes at Intersections	27	S33	$ -
	Piney Heights Rd (S-87)	Pine Log Rd(S-65)	Safety Improvements to Reduce Crashes at Intersections	37	S20	$ -
	SC 191 (Main)	SC 421 (Augusta)	Safety Improvements to Reduce Crashes at Intersections	36	S22	$ -

County	Route	Crossing Route	Improvement	Score	Rank	Estimate
	SC 302 (Silver Bluff Rd)	Gray Mare Hollow Rd (S-146)	Safety Improvements to Reduce Crashes at Intersections	26	S36	$ -
	SC 19	White Pond Road	Left turn lanes & realign side street	30	G19	$ -
Allendale	SC 125 (Augusta Hwy)	SC 3 (River Rd)	Safety Improvements to Reduce Crashes at Intersections	27	S35	$ -
	US 278 (Charleston Ave)	Revolutionary Trail (S-47)	Re-align Intersection; Improve Skew Angle	39	S16	$ -
	US 321	US 301	Intersection is confusing and hard to navigate	16	G32	$ -
	S-89	RR N of Fairfax	Reconstruct S-curve to 90	15	G33	$ -
Bamberg	SC 70 (Country Club Rd)	Guess Dr (S-271)	Safety Improvements to Reduce Crashes at Intersections	27	S31	$ -
	US 21 (Freedom Rd)	SC 61 (Edisto River Rd)	Safety Improvements to Reduce Crashes at Intersections	25	S37	$ -
	US 78	SC 61	Realign to 90 degrees & add turn lanes	30	G17	$ -
	US 321	Mule Hole Road (S-40)	Left turn lane SB	22	G29	$ -
Barnwell	SC 64 (Dunbarton Blvd)	Seven Pines Rd (S-21)	Evaluate for traffic signal	25	S38	$ -
	US 278	Barnwell High School	Add 278 L-T lane at main drive	26	G25	$ -
	Williston way (S-113)	SC 37	NB LT lane & cut hill	17	G31	$ -
	SC 70	Double Pond Road (S-193)	Reconstruct to tee intersection	14	G34	$ -
Calhoun	Burke Rd (S-22)	Kennerly Rd (S-29)	Improve Sight Distance	36	S21	$ -

County	Route	Crossing Route	Improvement	Score	Rank	Estimate
	SC 172 (Bull Swamp Rd)	Kennerly Rd (S-29)	Safety Improvements to Reduce Crashes at Intersections	28	S30	$ -
	US 176 (Old State Road)	Belleville Rd (S-45)	Improve Sight Distance	21	S40	$ -
	US 176 (Old State Road)	Burke Rd (S-22)	Safety Improvements to Reduce Crashes at Intersections	35	S23	$ -
	US 176(Old State Road)	Old Belleville Rd (S-24)	Improve Sight Distance	30	S27	$ -
	S-22	S-448	Relocate away from I-26 EB off ramp	30	G18	$ -
	SC 267 (McCords Ferry Rd)	Old River Rd (S-203)	Re-align Intersection	29	G20	$ -
	US 601	SC 267	US601 south left turn lane	27	G24	$ -
	Old Belleville Road (S-24)	Preference Road (S-42)	Realign stop to 90 degrees	25	G26	$ -
	US 601	S-11	Eliminate skew	24	G28	$ -
	Whistling Swan Road (S-26)	Houcks Gin Road (S-74)	Realign as 90-degree T	5	G39	$ -
Orangeburg	Bellville Rd (S-29)	Jamison Rd (S-677)	Safety Improvements to Reduce Crashes at Intersections	38	S18	$ -
	Goff St (S-106)	Jamison Rd (S-677)	Safety Improvements to Reduce Crashes at Intersections	27	S32	$ -
	Ninety Six Road (S-389)	Salley Road (S-394)	Safety Improvements to Reduce Crashes at Intersections	30	S28	$ -
	Park St (S-244)	Summers St (S-131)	Safety Improvements to Reduce Crashes at Intersections	33	S26	$ -

County	Route	Crossing Route	Improvement	Score	Rank	Estimate
	SC 267 (Tee Vee)	Antioch(S-82)	Safety Improvements to Reduce Crashes at Intersections	35	S24	$ -
	SC 3 (Capital Way)	Ninety Six Road (S-389)	Safety Improvements to Reduce Crashes at Intersections	29	S29	$ -
	SC 3 (Whetstone Road)	Salley Rd (S-394)	Safety Improvements to Reduce Crashes at Intersections	34	S25	$ -
	SC 4 (Neeses Hwy)	Dragstrip Rd (S-288)	Safety Improvements to Reduce Crashes at Intersections	39	G17	$ -
	Shillings Bridge Rd (S-74)	Lake Edisto Rd (S-1203)	Re-align Intersection; Improve Skew Angle	27	G34	$ -
	Tee Vee Rd (S-199)	Cleveland St (S-105)	Safety Improvements to Reduce Crashes at Intersections	38	G19	$ -
	US 178	Woodhaven Road(S-189)	Safety Improvements to Reduce Crashes at Intersections	23	G39	$ -
	S-68	S-171	Smooth curve on mainline	30	G16	$ -
	US 21N	Longwood (S-1703) & Leeway (S-1758)	NB Left Turn Lane	28	G21	$ -
	US 21	Benjaman Str (S-666)	NB Left Turn Lane	27	G22	$ -
	Boulevard. St. (S-25)	Peasley, Sifley & Amelia	Left turn lanes	27	G23	$ -
	US 15	SC 314	Rebuild 90 T and rt. Turn lane	25	G27	$ -
	Slab landing Road (S-73)	Dragstrip Road (S-288)	Realign to 90 degrees	20	G30	$ -

County	Route	Crossing Route	Improvement	Score	Rank	Estimate
	Stockwell Road (S-279)	SC 394	Reconstruct to tee intersection	14	G35	$ -
	SC 70	Willow Swamp Road (S-162)	Reconstruct to tee intersection	10	G36	$ -
	SC 394	Warner Road (S-129)	Reconstruct to tee intersection	6	G38	$ -
						$ -

Key: S# - Safety Intersection Rank, G# - Geometric Intersection Rank

Table 8: Corridor Vision Projects

County	Road	From	To	Improvement	Score	Rank	Estimate
Aiken	Cherokee Dr (S-386)	US 1/78 (Davis Hwy)	SC 126 (Belvedere Clearwater)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	39	S15	$ -
	Chime Bell Church Rd (S-816)	SC-19 (Whiskey Road)	Gray Mare Hollow Rd (S-146)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	41	S13	$ -
	Old Aiken Rd (S-365)	SC 421 (Augusta Rd)	Carolina Spurs Rd (S-68)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	41	S14	$ -
	Old Sudlow Lake Rd (S-1760)	SC 126 (Belvedere Clearwater)	Blanchard Rd (S-1761)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	32	S22	$ -
	Pine Log Rd (S-65)	SC 125 (Atomic Rd)	S-87 (Piney Heights Rd)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	31	S23	$ -
	Project Rd (S-285)	Pine Log Rd (S-65)	Baker Street (S-1294)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	37	S16	$ -
	Schley St (S-258)	Howlandville Rd (S-81)	Legion Rd (S-486)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	33	S21	$ -

County	Road	From	To	Improvement	Score	Rank	Estimate
	Seymore Dr (S-879)	SC 125 (Atomic Rd)	Old Edgefield Rd (S-197)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	37	S17	$ -
Barnwell	US 278	SC 64 (Hagood Ave)	SC 37	Widen to 3 lanes	61	W3	$ -
		US 278/SC 3 Intersection	US 278/SC 3 Intersection	Widen to 3 lanes	54	W11	$ -
Calhoun	Old State Road (US 21/176)	Savany Hunt Creek Rd (S-86)	I-26 Interchange at US 21/176	Widen to 4/5 lanes	56	W8	$ -
Orangeburg	Griffith/Riverbank Dr (S-1148)	Pruitt Dr (S-1050)	Moore Rd (S-1048)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	29	S24	$ -
	SC 4	US 601	SC 400	Widen to 5 lanes	60	W4	$ -
	Toney Bay Rd (S-119)	Seton St (S-1261)	Jacques Lane	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	34	S20	$ -
	US 178	S-1203 (Lake Edisto Rd)	S-74 (Shillings Bridge Rd)	Widen to 3 lanes	56	W7	$ -
	US 21 North	S-826 (Marshall St)	S-920 (Sifley)	Widen to 5 lanes	62	W2	$ -
	US 21/78 (Freedom Rd)	SC 210 (Bowman Branch Hwy)	Barton St (S-116)	Operational Shoulder Improvements	41	S12	$ -
	Whitman St (S-22)	Five Chop Rd (S-1)	Elliott St (S-1832)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	35	S18	$ -
	Whittaker Parkway (S-796)	US 21/178 BP	Brentwood Rd (S-1002)	SCDOT Safety Improvements to Reduce Crashes Along the Corridor	34	S19	$ -

4. Financial Resources

The only assured funding source for the LSCOG is the SCDOT's Guideshares. This amounts to approximately $5.5M per year for an approximate total of $125M for the life of the plan. Table 9 shows the financial resources available to the LSCOG through the SCDOT Guideshares for Transportation between 2020 and 2045.

LSCOG has been able to leverage these funds to obtain funding from other sources including CTCs, city / county governments, SC State Infrastructure Bank, other funding sources within the SCDOT. This leveraging has allowed the LSCOG to easily have the most robust construction program of any COG in the state. Continuing to form these partnerships within and outside of the region, will allows for the LSCOG to continue to provide transportation improvements well beyond what it is "guaranteed."

The two subsequent tables show the funding breakdown for the next TIP window, scheduled to take effect in July of 2020 and run through FY 2027, and the funding cycles that the remaining LRTP projects will fall within. These tables and the funding scenario they present assume two things: 1) Funding continues at current levels into the future and 2) No other sources of funding become available. Translated, this means the projects will move from the LRTP to the TIP for the most part how they are ranked. As stated earlier, the LSCOG has used many sources of funding to achieve completing projects. If this trend continues, the actual order and year in which the projects actually start, is very much subject to change. The good thing about ACT 114 and the regulations that were promulgated from it, the shifting of project inception is allowed if certain circumstances are met. In this case, it would be the introduction of funding outside of the normal channels. For this to happen, the LSCOG simply has to request permission from the SCDOT Commission to move one project ahead of a higher ranked project. If recent history continues as the norm, this will not be a problem for the LSCOG.

The tables are in nominally dollars (i.e., not adjusted for inflation at this time.

Table 9: LSCOG LRTP Financial Resources

	2020-2029	2030-2039	2040-2045
Revenue			
Guideshare	$ 54,890	$ 54,890	$ 32,934
SCDOT Advance	$ 4,046	$ -	$ -
Carry Forward	$ 89,891	$ -	$ -
Total Revenue	**$ 148,827**	**$ 54,890**	**$ 32,934**
Expense			
Debt Service	$ (3,674)	$ -	$ -
Payback (SCDOT)	$ (4,046)	$ -	$ -
Project Cost	$ (33,070)	$ (750)	$ (450)
Total Expenses	**$ (40,790)**	**$ (750)**	**$ (450)**
Available $s	$ 54,890	**$ 54,140**	**$ 32,484**

Table 10: Lower Savannah River Council of Governments Transportation Improvement Program (TIP)

		Previous Obligations	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Total Funding	Cost to Complete
SC 4 (Jackson Blvd) from S-824 (Airport	PE	$ 450								$ -	
Rd) to US 601 (John C Calhoun Dr)	ROW	$ 170								$ -	
Operational/Shoulder Improvement	Const			$ 1,000						$ 1,000	
P030307	Total	$ 620	$ -	$ 1,000	$ -	$ -	$ -			$ 1,000	
US 21/US 178 BP (Chestnut St) from SC 33 (Russell	PE	$ 850								$ -	
St) to US 601 (Magnolia St) (City of Orangeburg)	ROW	$ 50								$ -	
Operational/Shoulder Improvement	Const		$ 1,000							$ 1,000	
P030267	Total	$ 900	$ 1,000	$ -						$ 1,000	
US 21 - Joe Jeffords Widening	PE	$ 1,250								$ -	
US 178 to US 301	ROW			$ 500	$ -					$ 500	
	Const					$ 8,735				$ 8,735	
	Total	$ 1,250	$ -	$ 500	$ -	$ 8,735	$ -			$ 9,235	
Safety Intersection 1	PE			$ 150						$ 150	
US 21/US 21 Conn	ROW									$ -	
	Const					$ 1,000				$ 1,000	
	Total	$ -	$ -	$ 150	$ -	$ 1,000	$ -			$ 1,150	
Geometric Intersection 1	PE				$ 75					$ 75	
US 601/Cook Rd	ROW					$ 25				$ 25	
	Const						$ 750			$ 750	
	Total	$ -	$ -	$ -	$ 75	$ 25	$ 750			$ 850	

		Previous Obligations	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Total Funding	Cost to Complete
Safety Corridor 1	PE				$ 100					$ 100	
SC 230 (W Martintown Rd)	ROW						$ 25			$ 25	
I-20 to Edgefield County Line	Con						$ 500			$ 500	
	Total	$ -	$ -	$ -	$ 100	$ -	$ 525	$ -		$ 625	
Widening Corridor 1	PE				$ 500					$ 500	
SC 6	ROW						$ 700			$ 700	
I-95 to US 15 Conn	Con								$ 3,500	$ 3,500	
	Total	$ -	$ -	$ -	$ 500	$ -	$ 700	$ -	$ 3,500	$ 4,700	
Safety Intersection 2	PE				$ 200					$ 200	
US 21/St. Matthews Road	ROW						$ 250			$ 250	
	Con							$ 1,300		$ 1,300	
	Total	$ -	$ -	$ -	$ 200	$ -	$ 250	$ -		$ 1,750	
Geometric Intersection 2	PE						$ 200			$ 200	
US 178/Willington Dr	ROW									$ -	
	Con									$ -	
	Total	$ -	$ -	$ -	$ -	$ -	$ 200	$ -		$ 200	
Safety Corridor 2	PE						$ 350			$ 350	
US 301 (John Calhoun/Five Chop)	ROW								$ 500	$ 500	
Woodbine Dr to US 21/178 BP	Con									$ -	$ 2,250
US 601 to US 301	Total	$ -	$ -	$ -	$ -	$ -	$ 350	$ -		$ 850	
Widening Corridor 3	PE							$ 400		$ 400	
SC 191	ROW									$ -	$ 300
SC 64 to Main Str (S-154)	Con									$ -	$ 3,000
	Total	$ -	$ -	$ -	$ -	$ -	$ -	$ 400		$ 400	
Current Project Contingency	Con			$ 2,000						$ 2,000	
	Total	$ -	$ -	$ 2,000	$ -	$ -	$ -	$ -		$ 2,000	

		Previous Obligations	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Total Funding	Cost to Complete
LSCOG Funds transferred to FTA	Con	$ 75	$ 75	$ 75	$ 75	$ 75	$ 75	$ 75	$ 75	$ 525	
Mobility Management Program	Total	$ 75	$ 75	$ 75	$ 75	$ 75	$ 75	$ 75	$ 75	$ 525	
TOTAL	PE	$ 2,550	$ -	$ 150	$ 875	$ -	$ 550	$ 400	$ -		
TOTAL	ROW	$ 220	$ -	$ 500	$ -	$ 25	$ 975	$ -	$ 500		
TOTAL	Con	$ 75	$ 1,075	$ 3,075	$ 75	$ 9,810	$ 1,325	$ 1,375	$ 3,575		
GRAND TOTAL	Total	$ 2,845	$ 1,075	$ 3,725	$ 950	$ 9,835	$ 2,850	$ 1,775	$ 4,075		
		Guideshares	$ 5,489	$ 5,489	$ 5,489	$ 5,489	$ 5,489	$ 5,489	$ 5,489		
		Carry-forward	$ 75	$ -	$ (16)	$ 4,524	$ 178	$ 2,817	$ 6,531		
		Program Funds	$ 5,564	$ 5,489	$ 5,474	$ 10,013	$ 5,667	$ 8,306	$ 12,021		
		Total Debt Service	$ (1,453)	$ (770)							
		Payback (SCDOT)	$ (3,036)	$(1,010)							
		Total Funds Available	$ 1,075	$ 3,709	$ 5,474	$ 10,013	$ 5,667	$ 8,306	$ 12,021		
		Total Project Costs	$ (1,075)	$(3,725)	$ (950)	$(9,835)	$(2,850)	$(1,775)	$ 4,075)		
		Balance	$ -	$ (16)	$ 4,524	$ 178	$ 2,817	$ 6,531	$ 7,946		

Table 11:LSCOG LRTP Project List by Horizon Year

Safety Intersections	Geometric Intersections	Safety Corridors	Widening Corridors	Resurfacing
FY 28-29				
# 3 - US 601 (Edisto Dr) - US 21 B (Magnolia St)	# 3 - US 1/78-Sudlow Lake Rd (S-254)	#3 - Old Edgefield Rd	#6-Ascauga Lake Rd	#1 - Chestnut St (S-22) #2 - SC 33 (Cameron Rd)
FY 30-34				
#4 - US 601 (St. Matthews Rd) - US 176	#4 - SC 19 (Whiskey Rd) - Ola Hitt/Corp Pkwy			
#5 - US 21(Columbia Rd) - SC 6/SC 172	#5 - US 601 - Silton Rd (S-801)	#4 - SC 19 (Edgefield H/W)	#5 - US 278 (Barnwell)	#3 - Old Belleville Rd (S-24)
#6 - US 21/176(Old State Road) - US 21 (Columbia Rd)	#6 - Cook Road (S-906) - TRMC & OC Tech	#5 - SC 33 (Russell Street)	#9 - US 301 (Bamberg)	#4 - SC 33 (Cameron Rd)
#7 - SC 19 (Laurens St) - SC 118 (Rutland Dr)	#7 - US 21/176 - Savany Hunt Creek Rd	#6 - SC 19 (Whiskey Rd)		#5 - SC 6 (Bridge St)
#8 - US 21(Columbia Rd) - SC 6/S-30	#8 - US 301 - Canaan Road (S-1638)			
FY 35-39				
#9 - SC 4 (Neeses Hwy) - Beason Rd (S-367)	#9 - US 1 - Highland Ave (Local)	#7 - US 178 (Charleston H/W)		
#10 - SC 4 (Neeses Hwy) - Shillings Bridge	#10 - US 21/176 - Old Sandy Run Rd (S-31)	#8 - Powderhouse Rd	#10 - Old Sandy Run Rd	
#11 - SC 64 (Dunbarton Blvd) - Clinton St	#11 - US 78 - Old Barnwell Road(S-113)	#9 - Bettis Academy Rd		
#12 - US 278 (Railroad Ave) - US 301 (Burtons Ferry Hwy)	#12 - US 21/176 - Old Swamp Road (S-369)			
FY 40-45				
#13 - SC 421 (Augusta Hwy) - Old Cherokee Dr (S-385)	#13 - US 21/176 - Livingston Rd (S-41)	#10 - US 21/176 (Old State Rd)		
#14 - SC 118 (Bell P/W - Trolley Line(S-80)	#14 - US 178 - Shillings Bridge Road (S-74)	# 11 - US 78 (Charleston H/W)	#12 - SC 70 (Bamberg)	
#15 - SC 33/SC 267/Lone Star Rd - US 21	#15 - SC 64 (Dunbarton Blvd) - Patterson Mill Rd (S-20)			

5. Public Involvement Process

In compliance with both Federal and State regulations and in accordance with its own Public Involvement policies, the LSCOG completed an extensive outreach program as part of this plan update. As per the norm, three public meetings across the region were held to inform the public of the process, gather information, and provide a platform for citizens to provide input to the LRTP.

The first public meeting was held in Barnwell County on May 16th,2019 at the Barnwell County Library. The second public meeting was held in Orangeburg County on May 22nd, 2019 at the Mellichamp Elementary School. The final public meeting was held on May 30th, 2019 in Aiken County at the Aiken County Government Center. A formal presentation was made at all meetings and numerous displays were provided to encourage the public to provide insight into the transportation needs of the region. As part of these meetings, a number of issues were raised and included in the project development phase with several citizen recommendations being included in the final project lists.

Outside of the normal public meeting venue, the COG provided an online survey for citizens of the region to voice their concerns and to gather general knowledge of the transportation users. For users without access to a computer and the internet, printed copies of the survey were made available at the COG office and throughout the region. Surveys were also shared with the local transit providers and provided to riders as well as county and city employees. Over 400 surveys were completed providing useful information to help guide the COG in making informed decisions as part of the LRTP. A summary of the survey results is included in Appendix B>

LSCOG used the local media including newspapers and TV stations to help inform the public about the LRTP, the survey, and the public meetings. Also, as part of the public involvement process, presentations were made to County and City councils, local citizens groups as well as County Transportation Committees.

When a draft plan has been approved for public comment, the opportunity will be provided for input through public meetings as well as the LSCOG website. These comments will be incorporated in the final plan prior to adoption by the LSCOG's TAC and full board.

6. Current Highway System

As is the case in most of South Carolina, the majority of the roads in the LSCOG are state maintained. The SCDOT maintains over 5000 centerline miles throughout the COG with Aiken and Orangeburg counties have the most miles. Figure 5 shows the travel demand on the major roads in the LSCOG region. As expected, the highest volumes are on the Interstate Highways and on highways near Aiken, Barnwell and Orangeburg. The highest traffic volumes are on I-26 as it connects Charleston with Upstate South Carolina and Western North Carolina. The map is also indictive of the major population centers of the LSCOG, as facilities around both Orangeburg and the Aiken/North Augusta area show higher volumes than those throughout the rest of the region.

Figure 6 shows the projected volumes from the SCDOT's 2040 LSCOG model. The future traffic shows the demand continuing around the major population areas of the region along with the interstate highways and connecting arteries. The future projections did show the need for some widenings in the region due to congestion. Two sections of road in Barnwell County and two segments in Orangeburg County were revealed during analysis of the model. All four of these segments were included in the Corridor Widening ranking list.

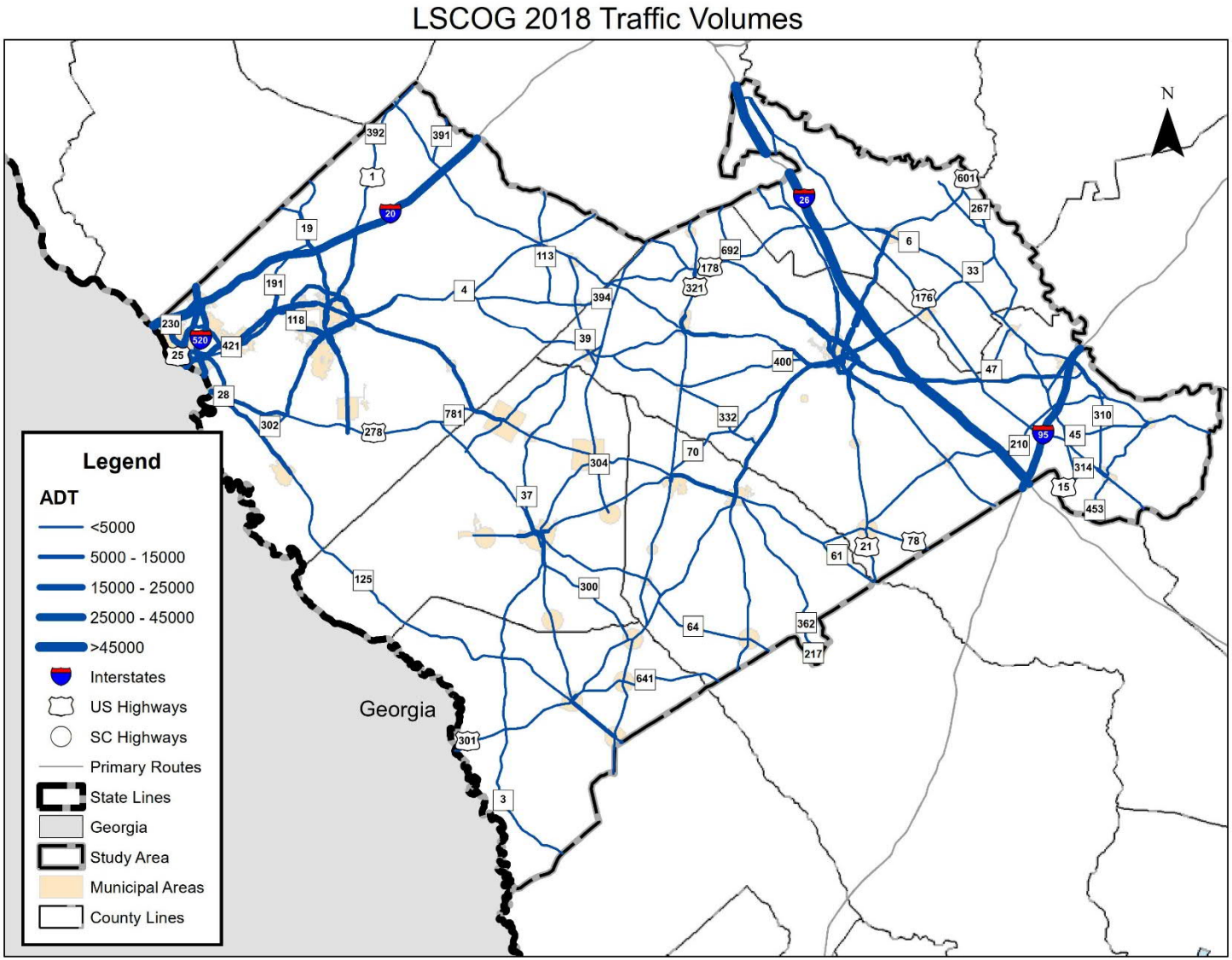


Figure 5: Current Traffic Demand in LSOG

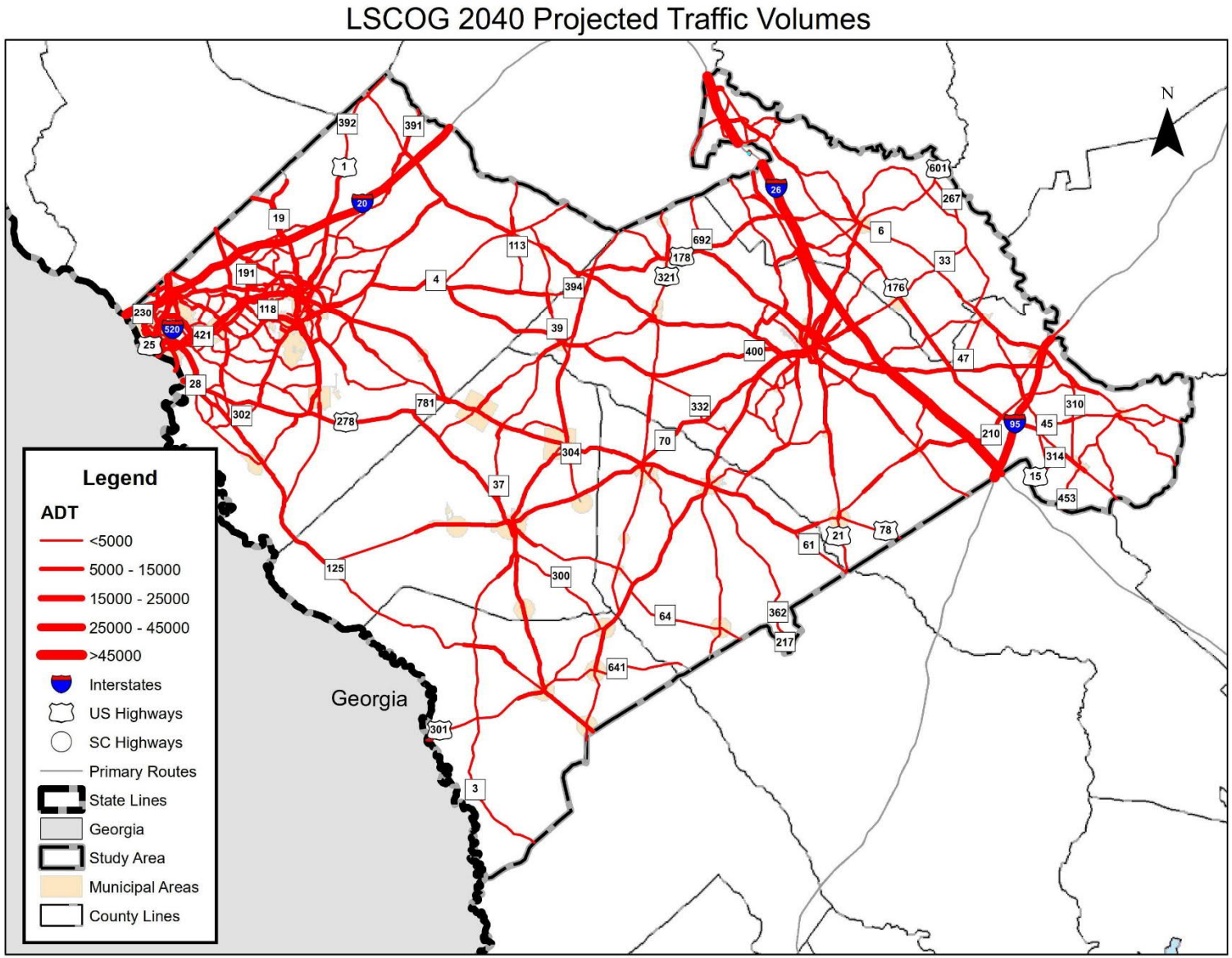


Figure 6: LSCOG Future Traffic Volumes

Bridge Condition

Bridges are critical, long lived, transportation infrastructure. The typical design life of a bridge is fifty (50) years. The FAST Act[1] requires State Departments of Transportation to establish goals for bridge condition on the National Highway System. FHWA requires DOTS to set goals for the number of bridges in good condition and the number of bridges in poor condition. Figure 7 shows the current bridge performance statistics and targets for South Carolina as a whole and for the Lower Savannah Region. As required by law these targets are for the National Highway System routes in South Carolina.

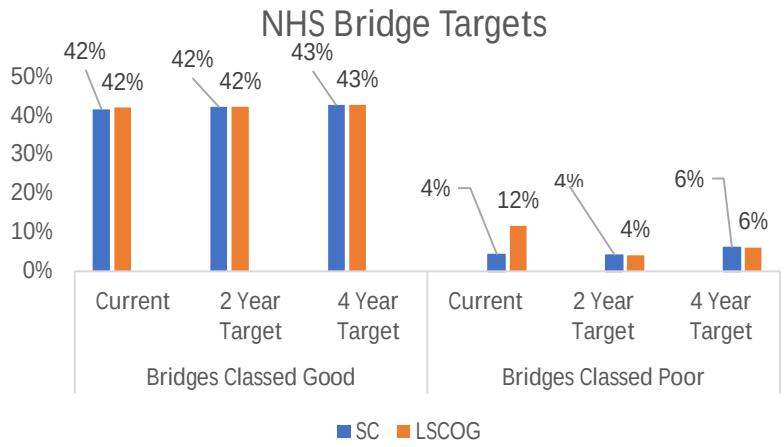


Figure 7:LSCOG Bridge Condition Targets

The two targets are a floor and a ceiling on bridge condition. At this time FHWA is still collecting and analyzing bridge condition data to identify effective national strategies. However, in the future FHWA has the option to become more directive towards DOTs, and others, who fail to meet condition targets over the long term.

There are two main categories of bridges which are considered substandard and eligible for rehabilitation or replacement. Structurally deficient bridges are either restricted to light vehicles only, closed, or require immediate rehabilitation to remain open. Functionally obsolete bridges, on the other hand, are not necessarily structurally unsound. However, a functionally obsolete bridge had deck geometry, load carrying capacity, clearance, or approach roadway alignment that no longer meets the usual criteria for the system of which it is a part.

Bridge maintenance and replacement money is distributed on a formula basis. SCDOT prioritizes bridge improvements on a statewide basis, Similar to the pavement management system used to prioritize road maintenance projects, SCDOT uses a Bridge Management System (BMS) to prioritize bridges. The development, implementation, and data collection of the BMS began in the early 1990's, with full-scale operations starting in 1998. The system provides detailed analyses of South Carolina's bridge needs and priority recommendations. Although replacement projects have been the primary focus, improvements such as widening and raisings, maintenance repairs and rehabilitations are now being considered.

Statewide bridge inspection is a critical component of the highway safety and the eligibility for federal-aid Bridge Program Funds. SCDOT inspects approximately 6,500 bridges per year. Data collected from inspection and maintenance activities are an integral part of the BMS.

Throughout the state, the number of substandard bridges continues to increase. The bridge funding level is far below that required to make significant improvements. Some of the primary factors that affect this trend are the overall construction history and age of the bridge infrastructure, historical lack of emphasis on

[1] Fixing America's Surface Transportation Act (FAST)

bridge maintenance, and inadequate funding levels. Even though SCDOT uses a BMS, it is difficult to overcome the lack of proper funding. The most recent gas tax increase passed by the Legislature has infused new funds into the bridge program and the SCDOT has a plan to replace almost 500 bridges across the state in the next 10 years. This will replace approximately half of the structurally deficient bridges. This additional funding will allow the number of deficient bridges in the state to start to decline, but it will take the life of the LRTP to replace all of the deficient bridges throughout the LSCOG and South Carolina.

Pavement Condition

Pavements are another key element of the transportation network. Pavement roughness, or ride quality, is probably the first thing the average user notices about the highway system and their opinion of the pavement directly affects their perception of the transportation system. The pavement has two purposes. On the higher classifications of the system, and those facilities intended to carry heavy loads (e.g., access to ports and warehouses) the pavement provides significant structural strength over and above the strength provided by the base and sub-base. On secondary roads and residential streets most of the structural strength is provided by the sub-base and the role of the pavement is to keep the sub-base dry. In either case maintaining good pavement is more cost effective than scrimping on resurfacing

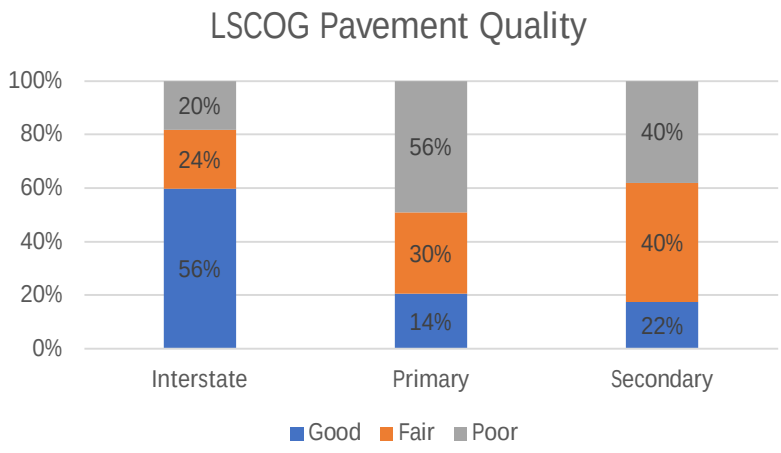


Figure 8: LSCOG Pavement Quality Summary

Figure 9 shows the pavement quality indexes for the highway system in the LSCOG region. As shown above, 80% of the interstates in the region are rated as Fair or above, however, on the Primary and Secondary system nearly 50% of all roadways rank as poor. As was the case with bridge funding, the SCDOT plans to use the new gas tax revenue to double its current level of resurfacing, thus using 50% of the new gas tax just for improving the quality of the state's roads. Currently, 80% of the state's 42,000+ miles of roads need to be resurfaced or rebuilt. As stated above, approximately 50% of the Primary and Secondary roads in the LSCOG need to be resurfaced or rebuilt. The goal of the SCDOT is to have 80% of all roads in the state to the level of "Good" in the next 10 years.

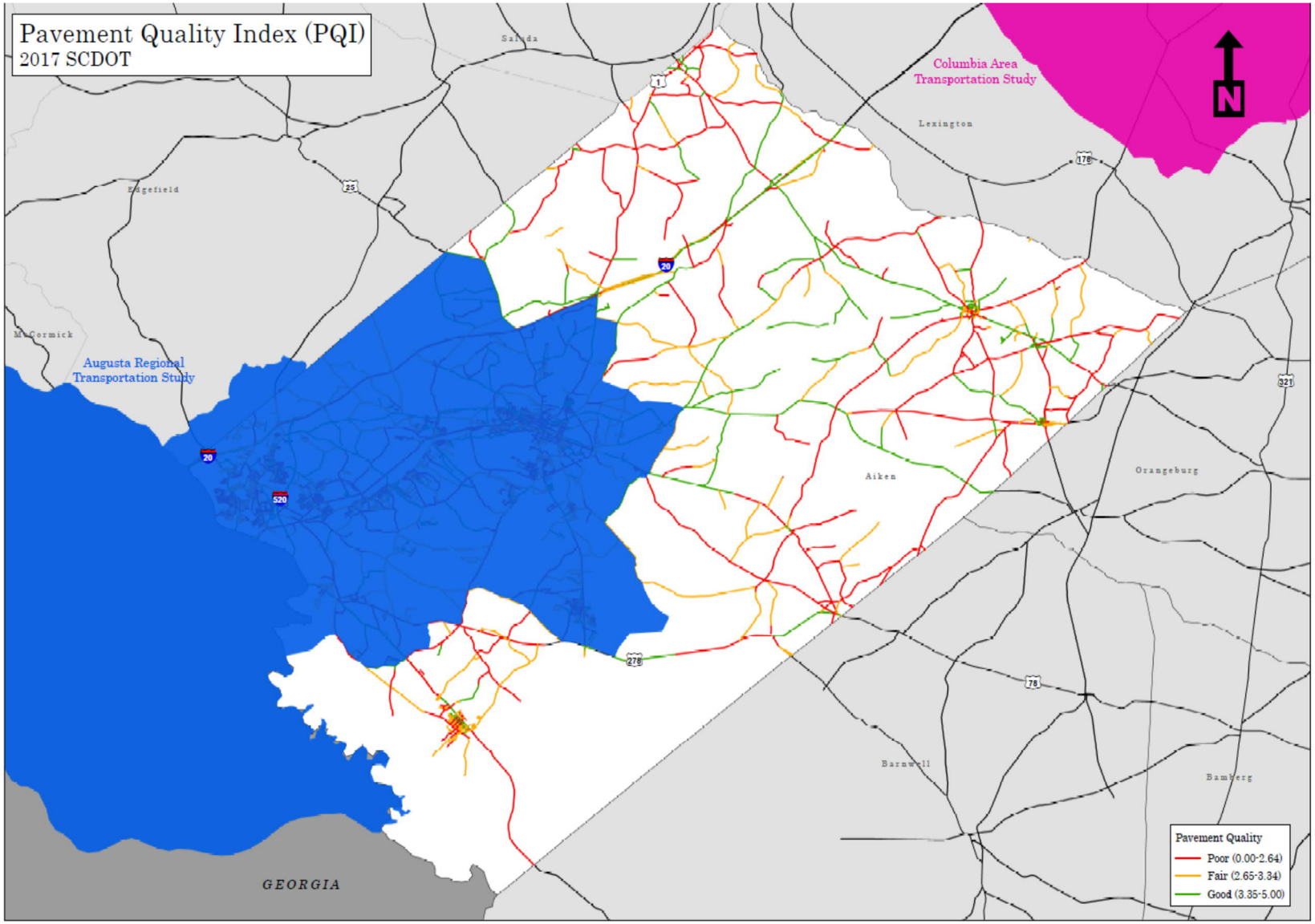


Figure 9:Pavement Quality Index

Safety

According to the Federal Highway Administration, in 2016, the average societal cost of a motor vehicle accident was $1,214,000. The costs ranged from $10,000 for a fender bender to $5,740,000 for a single fatality (Tim Harmon 2018). As shown in Table 1 and discussed in Objective Project Prioritization above, the LSCOG is emphasizing safety in project selection. There are also opportunities to improve safety programmatically as part of other programs or projects. To facilitate this work LSCOG evaluated the most recent five years of fatality data for each county from the National Highway Transportation Safety Administration. Figure 10 shows the results of that analysis. Each county is labeled as are the fatalities associated with that cause. For example, over the five years of data 94 fatalities in Orangeburg county were contributed to leaving the travel lane. The major contributing factors to vehicle crashes in LSCOG are:

- Speeding,
- Roadway Departure (leaving your travel lane)
- Alcohol, and
- Rollovers.

This data is helpful in finding low cost mitigation measures for vehicle crashes.

Speeding, heavy truck related accidents and impaired driving may be affected by enforcement measures while better roadway markings can be helpful in reducing lane departure accidents. Finally, rollovers (overturning) is best limited by fixing low shoulders, side slope and guard rail installation. Appendix XX includes a list of roadway safety improvements and their relative cost for reference.

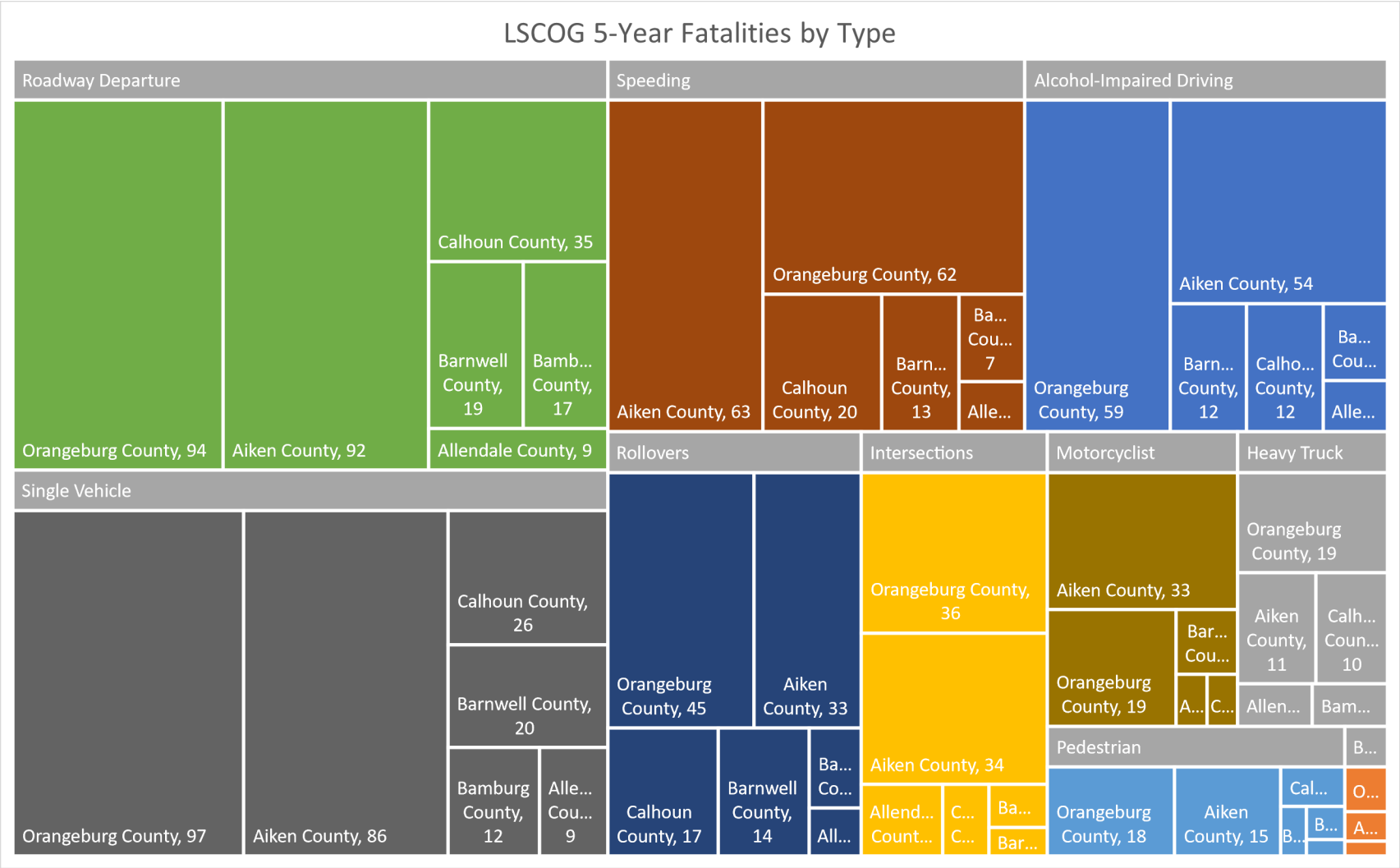


Figure 10: LSCOG Five Year Traffic Fatalities

7. Freight

Freight is defined as moving goods in bulk by truck, rail, ship, or aircraft and is extremely critical to the success and economy of a region. This is especially true in a relatively rural state like South Carolina that also has a strong manufacturing industry and access to both inland and major ocean ports.

Many cities and towns exist, in part, because of freight movement in the seventeenth and eighteenth centuries. Charleston, and Savannah owe their existence, and their continued prosperity to their deep-water ports.

The State and regions such as Lower Savannah must work together to ensure a strong freight network that is structurally maintained and contiguous through-out the state and beyond. As such, the state of South Carolina produced the South Carolina Statewide Freight Plan (SFP) as part of the state's larger Multimodal Transportation Plan in 2014.

Generally, nine issues affect freight movement. The issues are:

1. System Performance,
2. System Management,
3. Truck Operations,
4. Rail System Capacity / Modernization,
5. Port Accessibility,
6. Multimodal Connectivity,
7. Land Use and Transportation Coordination,
8. Multistate coordination, and
9. Funding (Cambridge Systematics, 2014).

In compliance with the MAP and FAST Act and as part of the 2014 Multi-modal plan, the SCDOT developed a statewide freight network to augment the Federal Freight network. Figure 12 below details the current approved SCDOT Freight Network.

Currently, the SCDOT is updating its Multi-modal Plan and as part of this process is also updating the SC Freight Network. Since its development in 2014, stakeholders have requested additional roadway be added to the network. The SCFN supplements the Federal National Highway Freight Network (NHFN). The NHFN and the Critical Rural Freight Corridors (CRFCs) and Critical Urban Freight Corridors (CUFCs) are eligible for funding through the FAST Act. This funding calls expressly for projects to be completed that directly improve the transport of freight and are a part of these networks.

The Federal NHFN consists of 850 miles of interstate roadway and 150 miles of CRFC and 75 miles of CUFC. The portion of I-20, I-26 and I-95 in the LSCOG are the only roadways on the Federal NHFN. There are no CUFC or CRFC in the region. However, there are over 350 miles of the State Freight network in the COG, 100 miles of which are made up by the three interstates within the region. The Federal and State Freight Networks are shown below in Figure __.

In the LSCOG, a number of new roadway segments are expected to be added to the freight network. These segments are listed in Table 11 below.

Table 12: 2020 State Freight Network Additions (LSCOG only)

Route	County	BMP	EMP	Total
S-105	Aiken	9.871	10.161	0.29
S-144	Aiken	0	5.32	5.32
S-37	Edgefield	0	1.649	1.649
SC-118	Aiken	9.48	13.05	3.57
SC-19	Aiken	18.51	22.45	3.94
SC-19	Edgefield	0	4.3	4.3
US-1	Aiken	15.93	24	8.07
US-1	Aiken	22.2	23.94	1.74
US-25	Edgefield	11.72	32.24	20.52
US-25	Edgefield	0	11.719	11.719
US-301	Allendale	0	12.89	12.89
US-301	Allendale	13.2	23.57	10.37
US-301	Bamberg	0	0.29	0.29
US-321	Bamberg	0	19.99	19.99
US-321	Orangeburg	0	20.7	20.7

Figure 11shows both the historic freight tonnages for the LSCOG region. Figure 12 shows the expected freight tonnages for 2040. Assuming that the economy grows on the pace expected by SCDOT there will be very heavy freight movements on I-20, I-26, and I-96. There will also be strong freight movements on US and SC routes as well. Outside of the interstates, US 78 is a primary East/West route that serves as an alternative route from the region to the Charleston port. US 321 serves as a major North/South route for the region to access the Savannah port.

As the country continues to move more and more to a "just in time" delivery society, freight movements and reliability will become more important. This will be no less the case in the LSCOG as stores continue to reduce inventory and rely on daily shipments from suppliers. Continuing to improve major corridors in the region through both intersection and roadway projects will help to foster improved freight access and movement through the region. The LSCOG 's emphasis on safety will continue to pay dividends when new funding sources relating to freight, as directed by the FAST Act, begin to become available in the near future.

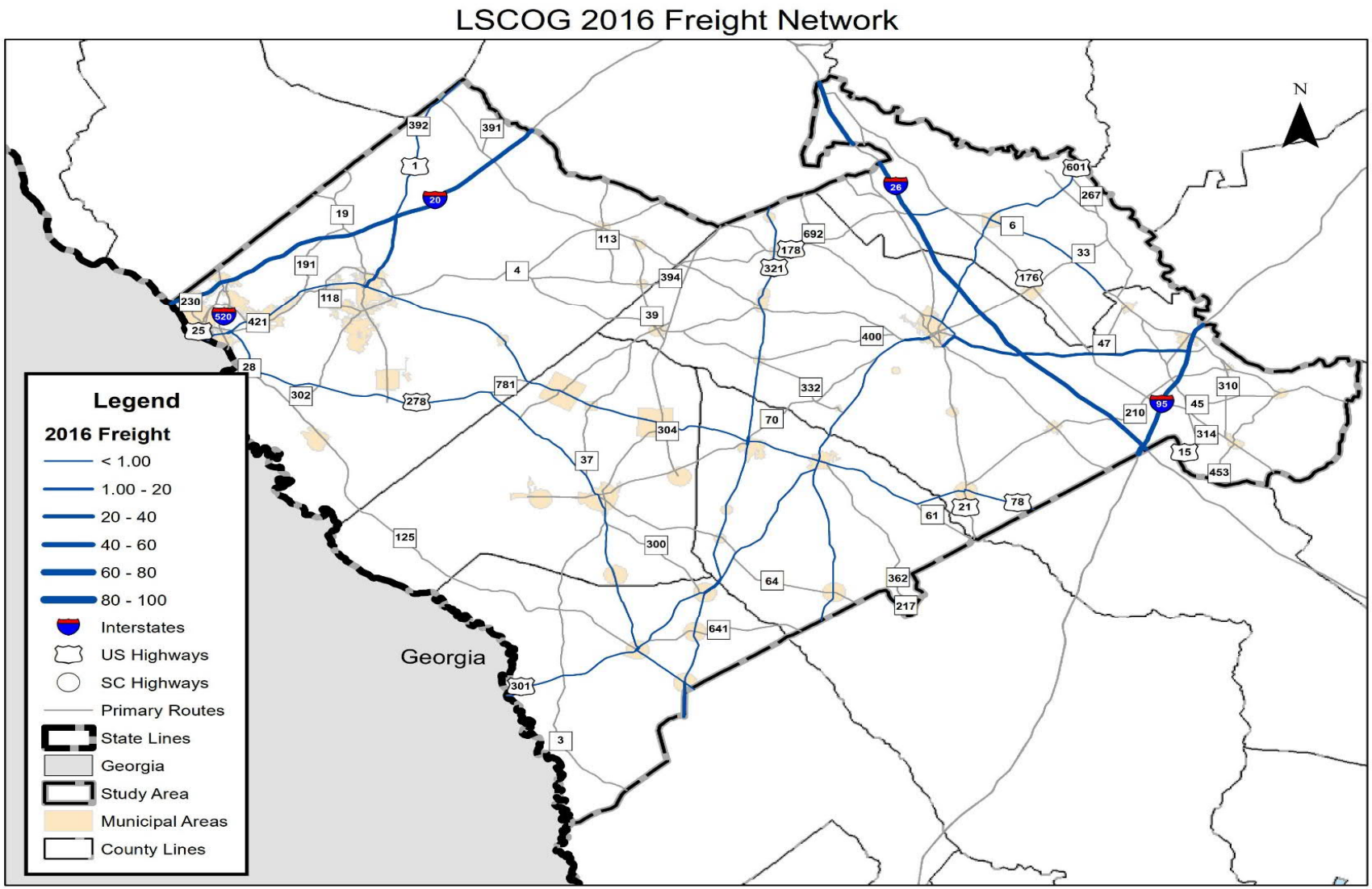


Figure 11: LSCOG 2016 Goods Movement (Million Tons/Year)

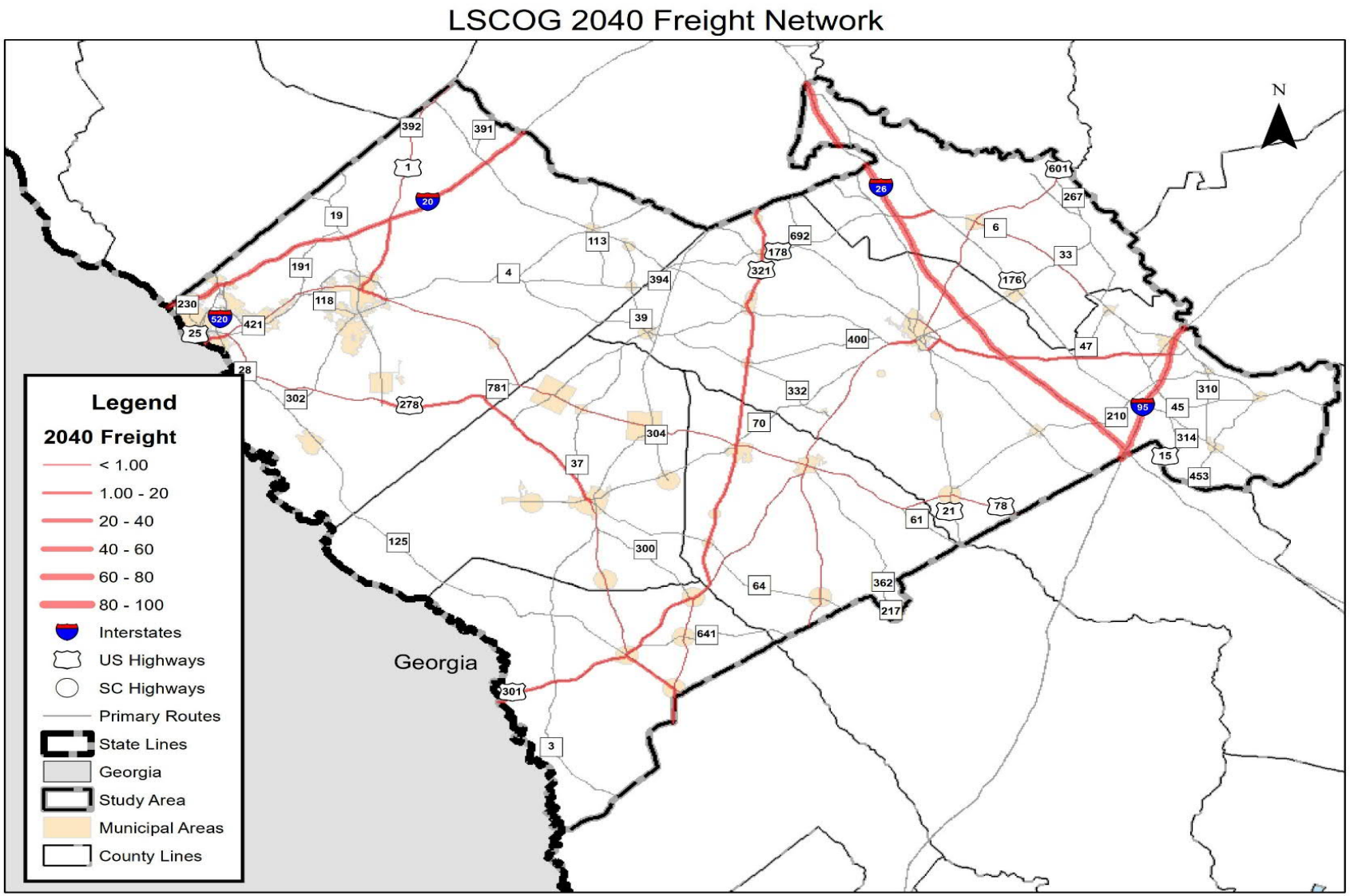


Figure 12:LSCOG 2040 Goods Movement (Million Tons/Year)

8. Air

The closest major airports to the LSCOG region are the Columbia Metropolitan Airport (CAE) to the east and Augusta's Bush Field (AGS) to the west. The Lower Savannah Region is served by three general aviation airports. Their features are summarized below. These general aviation airports serve as economic development tools as they allow business and courier access to the region.

The Aiken Municipal Airport is owned and managed by the City of Aiken. Table 13 summarized conditions at the airport. It has two runways suitable for general aviation. The airport operates sunrise to sunset. Fuel, minor service, hangars and tiedowns are available.

Table 13: Aiken Municipal Airport (AIK)

Runway(s)	Dimensions (ft)	Surface
7/25	5500 x 100	Asphalt
1/19	3800 X 75	Asphalt

The Barnwell County Airport is owned and managed by Barnwell County. Table 14 summarizes conditions at the airport. It has two runways suitable for general aviation. The airport operates sunrise to sunset. Fuel, hangars and tiedowns are available.

Table 14: Barnwell County Airport (BNL)

Runway(s)	Dimensions (ft)	Surface
17/35	5119 x 100	Asphalt
5/23	4526 x 70	Asphalt

The Orangeburg Municipal Airport is owned and managed by the City of Orangeburg. Table 15 summarizes conditions at the airport. It has two runways suitable for general aviation. The airport operates sunrise to sunset. Fuel, hangars and tiedowns are available.

Table 15: Orangeburg Municipal Airport (OGB)

Runway(s)	Dimensions (ft)	Surface
17/35	5399 x 100	Asphalt
5/23	4508 x 100	Asphalt

The Allendale County Airport is owned and managed by Allendale County. Table 14: Barnwell County Airport (BNL)summarizes conditions at the airport. It has one runway suitable for general aviation. The airport operates sunrise to sunset. Fuel, hangars and tiedowns are available.

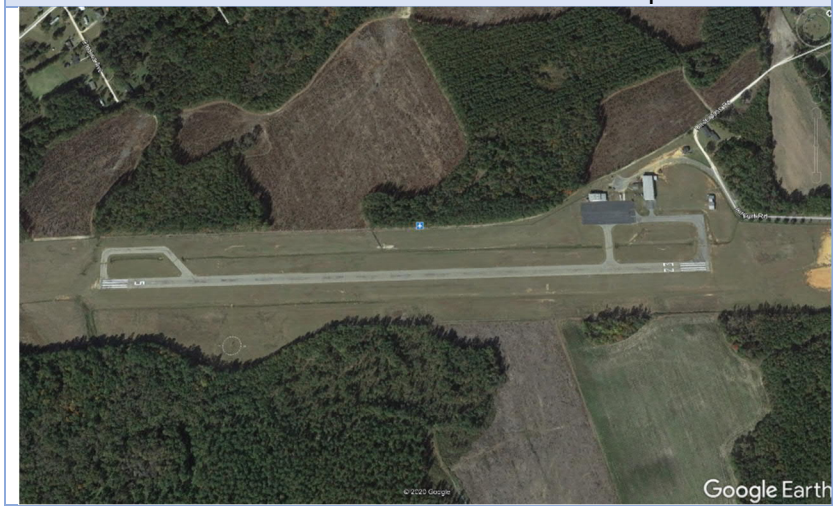
Table 16: Allendale County Airport (ALD)

Runway	Dimensions (ft)	Surface
17/35	5001 x 100	Asphalt

The Bamberg County Airport is owned and managed by Bamberg County Table 17 summarizes conditions at the airport. It has one runway suitable for general aviation. Hangars and tiedowns are available.

Table 17 - Bamberg County Airport

Runway	Dimensions (ft)	Surface
5/23	3603 x 60	Asphalt



9. Bicycle and Pedestrian

Sidewalks and trails allow users to travel by a mode other than the automobile, provide recreational opportunities and access to open spaces.

In 2014 the LSCOG completed a regional bikeway plan. The goal of this plan is to support multi-modal travel through a network of safe network of bike and pedestrian facilities thus providing for healthier lifestyles and an improved quality of life for the region. LSCOG has worked to fulfill this plan through its many corridor projects and as part of this plan continues to carry on this process.

Table 18 summarizes the goals and objectives of the region's Bicycle Plan.

Table 18:Bicycle and Pedestrian Goals

Goal	Objective	Policy
Launch a Bikeway System in LSCOG Area	Improve and update Bikeway Plan for the LSCOG Area	• Coordinate with local jurisdictions and interesting groups for their awareness, interest and ideas. • Use the COG's Policy and Technical Committees to evaluate non-motorized issues. • Create a Bikeway committee to address bicycle needs. • Follow SCDOTs recommended guidelines to establish and implement the bikeway system. • Mainstream, bikeway planning and greenway planning into transportation planning.
	Develop bicycle routes, lanes, and paths/trails throughout the LSCOG.	• Develop a bikeway system that provides access to and among major activity centers, public transportation routes and recreation facilities. • Give high priority to projects that close gaps in LSCOG Area Bikeway Network (especially projects that cross jurisdictional boundaries. • Encourage bikeways through scenic areas. • Encourage maintenance and monitoring efforts that support implementation and operation of the LSCOG Area Bikeway Network. • Request VDOT to include bicycle features on all highway construction, where there is support from the locality and the public.
	Develop direct, convenient, safe and easy to use bikeways	• Develop bikeway information graphics that clearly identify bikeways. • Encourage local jurisdictions to maintain and provide interested citizen with maps of the bikeway system.

Goal	Objective	Policy
		• Encourage using roadway-maintenance funds to make routes safer for bicyclists by realigning grates, repairing potholes, and making traffic signals more responsive to bicycles, etc. • Develop an off-street bike network integrated with the on-street system. • Support local government efforts to improve bicyclist safety by encouraging enforcement of the South Carolina Motor Vehicle Code for motorists and cyclist alike. • Encourage investment choices that help achieve the 2045 Long Rang Plan goals of reducing bicyclist fatalities, injuries and crashes by 5 percent from 2000 to 2045. • Encourage and support the creation comprehensive safety awareness, driver education, cyclist education and diversion training programs for cyclists and motorists.
Encourage using the bicycle as an alternate means of everyday transportation	Provide bikeway access to and within major trip generators	• Encourage bicycle connectivity to school and recreational sites. • Encourage bicycle paths or trails within parks, recreational areas and school sites. • Connect commercial/educational areas (shopping center, central business district, universities) with nearby residential areas along safe transportation routes • Encourage localities to establish bikeways that link with major roadways.
	Plan support facilities and service for bicyclists	• Encourage bicycle-parking facilities in all new employment and commercial developments. • Encourage bicycle-parking facilities at new apartment complexes, schools, parks, churches, hospitals, public buildings, and other areas of large gatherings. • Encourage the installation of bicycle-parking in the public right-of-way • Encourage localities adopting zoning requirements for lockers and showers to be added to new buildings • Consider requiring bicycle parking at major public events
Make bicycling and walking safer	Develop a public-awareness	• Expand the bicycle-safety education program in public schools. • Use civic clubs and associations, as well as local police and sheriff's departments, for the continuation of bicycle-safety clinics.

Goal	Objective	Policy
	program involving bicyclist, motorist and pedestrians on the use and safety bikeways.	• Use mass media (e.g., television, radio and newspapers) to promote a bicycle safety public-awareness program.
	Increase enforcement of traffic laws for the protection and safety of bicyclists and pedestrians	• Apply the bicycle safety-enforcement program to children as well as to adults. • Promote citizen participation in planning, encouraging bicycle and pedestrian safety education and public awareness programs
	Increase awareness of the benefits of bicycling and walking and of available resources and facilities	• Market the health benefits of walking and bicycling.
	Complete a network of sidewalks and trails that serve short trips to employment centers, school, commercial districts, bus stops, and institutions.	• Complete missing sidewalk connections wherever possible to make direct route for walking. • Identify obstacles to walking to schools. • Consider the installation of sidewalks, as part of all transportation improvements.

Goal	Objective	Policy
Funding	Develop an equitable and effective regional funding and implementation process.	• Fund bicycle projects to complete the LSCOG Area Network • Consider the benefits of bicycling improvements in the allocation of transportation funding and in developing performance measures including vehicle trip community livability and public health. • Use Congestion Mitigation and Air Quality (CMAQ) funding for bikeway projects such as bicycle and pedestrian facilities (paths, bike rack, support facilities, etc.) • Identify new funding sources to support operation and maintenance of bicycle and pedestrian facilities. • Help local jurisdictions identify research state and federal funding source to help fund bikeways.
Multimodal integration	Develop seamless transfers between bicycling and public transportation	• Encourage transit agencies to provide, maintain and promote convenient, secure bicycle parking at transit stops and stations. • Ensure that bicycles are accommodated on all forms of public transit. • Foster collaboration between local jurisdictions and regional transit agencies to improve bicycle access to transit station in the last mile surrounding each station.
Enhance local and regional transit connectivity	Connectivity	• Shorten bus headways (the time between buses) on routes with strong ridership. • Install passenger information systems and other passenger support infrastructure at bus stops (e.g., hardstands, shelter, lighting, seating bus schedules, routes connectivity maps etc.) • Maintain schedule adherence through operational improvements along arterials that are planned for transit improvements. • Encourage the PAT riders to use the PAT route schedule app, Route Shout (mobile app). • Develop or integrate Bicycle and Pedestrian Trails into the mobile app.

10. Transit

Public transportation is an important element in rural transportation planning for the Lower Savannah region. Emphasis at both the national and state levels on integrating public transportation planning with construction and engineering planning is a positive step to acknowledging the inter-relations between the two areas. Rural public transportation presents a special challenge. Public transportation offers mobility, safety and independence to senior citizens, people with disabilities, those without vehicles, and people with lower incomes. Transportation options also allow people in rural areas to access health care, employment and other necessary destinations, contributing to the opportunity to live fully and independently. Providing transportation in rural areas, in some respects, is more challenging than in more densely populated areas, as fixed route service often does not work well in rural areas and providing demand-responsive transportation can be both costly and challenging, though in many cases better suited to meeting consumer needs.

Fixed Route Bus Service

Outside of the ARTS MPO, none of the counties within the rural area have a traditional fixed route public transit service specific to their exclusive geographies. Calhoun and Orangeburg are the only counties with public transit service. Transit service in the region is offered by two carriers across two counties within the study area. They are described in detail in sections below.

The Cross-County Connection provides a Downtown Circulator service in the City of Orangeburg, a Campus Loop serving a two campus area, a St. Matthews Connector serving downtown St. Matthews and connecting with the Downtown Circulator in the City of Orangeburg, and a Paratransit Service throughout Orangeburg and Calhoun Counties.

The Santee Wateree Regional Transit Authority (SWRTA) primarily serves the City of Sumter, but also provides express commuter services and Medicaid transportation to areas of Calhoun, Clarendon, Kershaw, Lee, Orangeburg, Richland, and Sumter counties.

Intercity Bus Service

Southeastern Stages – is both a route provider and charter bus service that covers the LSCOG study and beyond. They provide transportation services between Georgia, North Carolina, and South Carolina. Southeastern Stages operates a modern fleet of over 40 motor coaches. Scheduled stops with the study area include Towns of Aiken and Orangeburg.

Rail Service

Amtrak has one stop within the study area at the historic Denmark Train Station. On its southern trek, the Silver Star line go from Denmark to Savannah, GA and then through Georgia and Florida until it reaches its final southern destination of Miami. In turn, on its north route that ends in Boston, MA., the Silver Star leaves Denmark and heads to Columbia. There is no commuter rail service within the study area.

Though currently unfunded the Southeast High-Speed Rail Corridor (SEHSR) is planned to run through Virginia, North Carolina, South Carolina and Georgia. These states have united

to form a coalition to plan, develop and implement the SEHSR. This federally designated rail corridor will extend the high-speed rail service on Amtrak's Northeast Corridor southward to Richmond and Raleigh. There it will split, with one route going to Atlanta by way of Charlotte, and Greenville-Spartanburg, and the other to Jacksonville, FL., by way of Columbia and Savannah.

The Lower Savannah region, as a whole, has experienced a significant growth of older adults over the past few decades. The baby boom has begun to have a dramatic impact which will continue over the next twenty years. In the region, the number of people over the age of 65 was over 56,000 in 2017 and project to over 67,000 by 2030. All of the counties in the Lower Savannah Region rank 8th or above in in-migration of people 65 or older, according to the SC Office of Research and Statistics. At a Best Geriatrics Practices Conference sponsored by the Sage Institute in 2003, a speaker stated that during the last ten years of life, 1 in 2 women and 1 in 4 men will not be able to drive. In four of the Lower Savannah's six counties, more than 30% of people over age 65 reported living alone in the 2000 census. Whether or not the transportation needs of this growing group in our population are met will affect their well-being and level of independence – factors that could have a potentially significant impact on the state's economy.

Income level is another indicator of the need for transportation. Some of the counties in the region are among the state's poorest. Figure 7.1 shows the percentage of each county's population with incomes below the poverty level.

There are hundreds of vehicles in the Lower Savannah Region now being used for transporting local citizens to human services, medical care, employment, etc. Many of these vehicles are only used to transport a small number of specific clients to services and many sit idle for substantial portions of each day.

The Lower Savannah RTMA

In 1998, SCDOT funded a study to explore options for coordinating and making better use of federal, state, and local resources devoted to transporting people in the six-county Lower Savannah Region of South Carolina. In 2000, SCDOT began implementation of those recommendations by funding Lower Savannah COG to carry out the state's first regional coordination demonstration project.

Transportation Resources

Aiken County:

Lower Savannah Council of Governments began management of the Best Friend Express system in November 2004.

Best Friend Express is Aiken County's public transit service. The green and white buses operate throughout 170 miles of the Aiken urbanized area every Monday through Friday.

The routes begin at approximately 7:00 AM and run until 7:00 PM and are based on 2-hour circular routes. The buses themselves are comfortable "cut-aways" that can carry up to 20 passengers. Also, all of the vehicles are ADA compliant including wheelchair lifts.

The Aiken routes travel throughout Aiken, with service to Downtown Aiken, service agencies, Aiken Regional Medical Center USC-A, Aiken Tech., and Whiskey Road to Aiken Mall.

The North Augusta route is a circular route that travels from North Augusta to Aiken Tech every two hours. The route reaches the City Municipal Building, service agencies, shopping areas such as Wal-Mart and North Augusta Plaza, and travels to Riverview Park. Those riding the system to Aiken Tech can attend class knowing that they will have a reliable ride back to North Augusta

or they can travel into Aiken including USC-A and Aiken Regional Medical Center.
The bus also connects with Augusta Public Transit, where riders can transfer to the Augusta transit system.
One of the best customer benefits for a line as small as Aiken County's is the ability to flag down the bus anywhere along the route, not necessarily at bus stop signs. Passengers can also disembark anywhere along the route that the driver deems safe to stop.

Allendale County:

The Allendale Scooter and Bamberg Handy Ride are regional demand response transit systems. LSCOG provided the leadership and facilitation to work with dynamic groups of local leaders and organizations in planning, developing and implementing new public transit services in both Allendale and Bamberg counties.

Bamberg County

The Allendale Scooter and Bamberg Handy Ride are regional demand response transit systems. LSCOG provided the leadership and facilitation to work with dynamic groups of local leaders and organizations in planning, developing and implementing new public transit services in both Allendale and Bamberg counties.

Barnwell County:

Local Motion, Barnwell County's Public Transit System, operated by Generations Unlimited offers demand response transportation services for all communities in Barnwell County. Rides are provided to and from medical appointments, employment, training, shopping and more. The transportation service operates from 4:00 a.m. until midnight, seven days per week. Barnwell's long-established public transportation system plays a significant role in both the Lower Savannah Regional Transit Management Association (RTMA) and the newly created Travel Management and Coordination Center of the COG.

Orangeburg County

The Cross-County Connection is available to residents of Orangeburg and Calhoun Counties with a para transit commuter service that allows residents of both counties to call 24-48 hours ahead to request a ride to local destinations within the two counties.

Cross County Connection also provides a Downtown Circulator bus service in the City of Orangeburg and allows free transfers for travelers from both counties. Residents can access many of the most popular business destinations including governmental buildings, health providers, the regional medical center, schools and institutions of higher learning as well as popular employment and shopping locations in one of our comfortable and convenient Cross County Connector buses.

Calhoun County

The Cross County Connection is available to residents of Orangeburg and Calhoun Counties with a para transit commuter service that allows residents of both counties to call 24-48 hours ahead to request a ride to local destinations within the two counties.

Cross County Connection also provides a Downtown Circulator bus service in the City of Orangeburg and allows free transfers for travelers from both counties. Residents can

access many of the most popular business destinations including governmental buildings, health providers, the regional medical center, schools and institutions of higher learning as well as popular employment and shopping locations in one of our comfortable and convenient Cross County Connector buses.

11. Socio-Economic Background

The transportation system does not exist in isolation. It is part of the social and economic fabric of a community or region. The socio-economic background below is intended to give the reader some context on broader conditions in LSCOG.

Change Drivers

This section of the Transportation Plan discusses some technologies that are changing transportation. We hope to identify for decision-makers things that could dramatically change the needs of the LSCOG during the life of the plan. Since the last update of the LRTP at least four new technologies have begun to show up.

Alternative Energy/Power Plants

The shift from internal combustion engines to electric powered vehicles is continuing. It began with the introduction of the hybrid vehicle. Historically, electric power plants have not lived up to their potential because battery technology was not viable. Recently several car makers (legacy and new) have begun introducing mass market electric vehicles. These manufacturers have plans to introduce more electrics (Renquist, 2017). Going forward the conversion to electric vehicles will place more pressure on already weakening gasoline tax revenues and require the first serious re-imagining of transportation funding in almost 100 years.

Autonomous Vehicles

Autonomous vehicles are moving from design to reality. Recently auto-piloted personal and commercial vehicles have been successfully implemented. Today there are competing opinions of what autonomous vehicles will bring. The only certainty is that autonomous vehicles will change the business model of personal transportation that has been in effect for the last century. In the twentieth century the government provided infrastructure and the user provided the vehicle. In developed countries one of a family's biggest expenses has been transportation. The automobile also affected every aspect of life from location to housing design to urban design (e.g., vehicle parking).

There is no consensus on how autonomous vehicles will affect us. Some authors predict a new golden age of transportation with cheaper vehicles taking up less space on our roads, using fewer resources and generally benefitting everyone in society. Other predict a nightmare future in which empty vehicles are driving around using resources and in which pedestrians are barred from streets. Table 19 shows some speculation about the effect of autonomous vehicles.

Table 19: Possible Effects of Autonomous Vehicles

	Possible Negative	Possible Benefit
Economy	The fall of Existing Industries	New Companies take their place
Environment	More emissions	Less emissions
Jobs	Fewer trucking and delivery jobs	Opportunities in new industries
Personal Finances	Cars will be more expensive	You be able to share a car with several people
Transportation Finance	Lower revenues from fuel tax. Need for new infrastructure	Revised funding streams such as mileage fees or vehicle user fees.
Safety	In the short term there may be more incidents	In the long-term incidents may decline
Travel	Short term more delay More vehicle miles of travel	Less delay over time Less vehicle miles of travel
Urban Design	We may need more roads	We may be able to convert parking to other land uses.

Ride Haling Services

Ride haling services (e.g., Uber or Lyft) have become popular. These services are Smartphone enabled car sharing services. They seem popular with business travelers and others willing to pay a premium for good service. Ride haling services compete with taxicabs and line haul transit services. These services are weakly regulated, and it is unclear how the market for them will change as regulators address public concerns.

Shale Oil/Gas

For years the United States has imported the oil needed to fuel its economy. However, US oil production has increased fifty percent (50%) since 2008. Although the US did not become energy independent as predicted, it has gotten above 85% energy independent (Energy Information Administration (May 19, 2017). Energy independence will stabilize energy costs across the economy and may make U.S. manufacturing more competitive (Zeihan, 2016). Like most technologies, shale oil/gas has benefits and costs. Utility companies will benefit as they retire older coal fired plants and replace them with gas turbines that have lower maintenance needs, lower emissions and quicker start-up times. Natural gas can be piped directly to the power plant eliminating the need for rail lines, trains and crews.

Unmanned Vehicles (Drones)

These are remotely controlled vehicles, usually aircraft. They are used for jobs that may not need a pilot, or jobs that require the ability to be onsite for extended periods. In the future, transportation drones will fill four niches. First, they can help monitor and inspect infrastructure. Second, they can improve design and environmental data. Third, they can improve our ability to monitor system performance, and finally they may provide 'last mile service for parcel or freight delivery.

Limited English Proficiency (Four Factors Analysis)

The United States does not have an official language, although native English speakers compose roughly eighty percent of the population. Executive Order 13166 requires that each federal agency "give guidance to grant recipients on their obligation to provide meaningful assistance to limited English proficient persons." USDOT's LEP regulations cover state DOTs, Metropolitan Planning Organizations, Regional Transportation agencies and other transportation service providers (Policy Guidance Concernting Recipients' Responsibilities to Limited English Proficient (LEP) Persons 2005). The first step in ensuring LEP compliance is to perform a four factors analysis as detailed below. Figure 13 sets out the steps of a four factors analysis.

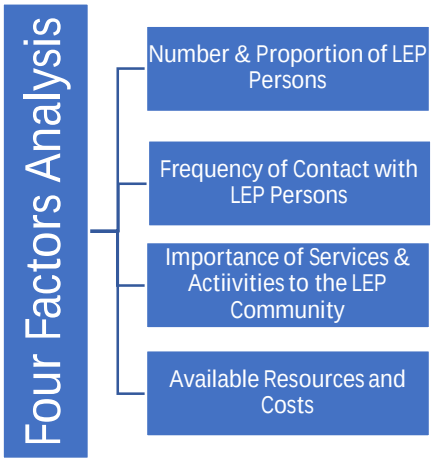


Figure 13:The Four Factors of Limited English Proficiency

The four factors analysis outlined below is focused on the transportation planning program and does not yet consider the requirements of public transportation.

Portion of the Population Who May have Limited English Proficiency

Using information from the American Factfinder it was discovered that Hispanics compose approximately 4.0 percent of the LSCOG population, ranging from a low of 1.9 percent in Bamberg County to a high of 5.5 percent in Aiken County Limited.

Frequency of Contact with the LEP Population

Contacts with the LEP population in the Lower Savannah Region are limited by the programmatic requirements of preparing annual budgets, transportation improvement programs and long-range transportation plans. The opportunities for interacting with the LEP population are generally confined to those functions.

Importance of the Agency's Services to the LEP Population

Routinely, the programs administered through the LSCOG do not have serious or life-threatening implications for LEP individuals. That said, it is possible that transportation infrastructure projects could have significant impacts for LEP individuals. Therefore, the implications of individual projects should be considered on a case by case basis.

Agency Resources

The LSCOG has limited resources to meet the LEP requirements. However, given the small LEP population, the low importance of the program to the LEP population and the available resources it seems appropriate to include a notice in each program, TIP or plan noting that language assistance is available.

Commuting and the Commute Pattern

Figure 14 illustrates the commute pattern in the Lower Savannah Region. Around two thirds of residents live and work in the region. Only one third of resident's commute in or out of the county for work.

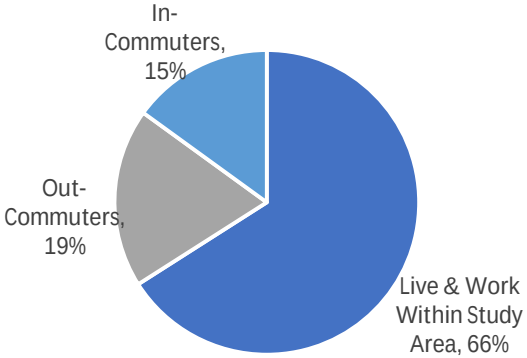


Figure 14: Commute Pattern

Transportation is a derived demand depending as it does upon the large number of choices that people make. The population and employment profile discussed below indicates the following items that need to be addressed going forward:

- The continued reliance on manufacturing suggests that freight and goods movement will continue to be important over the life of the plan;
- The number of retail trade jobs suggests that curb management and loading will be important issues in the more urban parts of the region;
- The aging population (Figure 19) suggests that human services transportation will grow in importance during the life of the plan;
- Low, or negative, population growth will constrain revenues, employment and caregivers, and
- The potential shift from internal combustion engines to electric vehicles will worsen existing funding shortfalls.

Employment Snapshot

As shown in Figure 15 the region's economy is dominated by manufacturing and retail. Almost thirty percent of jobs in the six-county region are concentrated in manufacturing (16%) or retail (13%) (Thomasson n.d.). When healthcare and education are added to the mix these four sectors make up over 50% of the jobs available in the LSCOG region. The region has kept a strong manufacturing base; this means that the region will need to pay close attention to goods and freight movement on its interstates and its rail links.

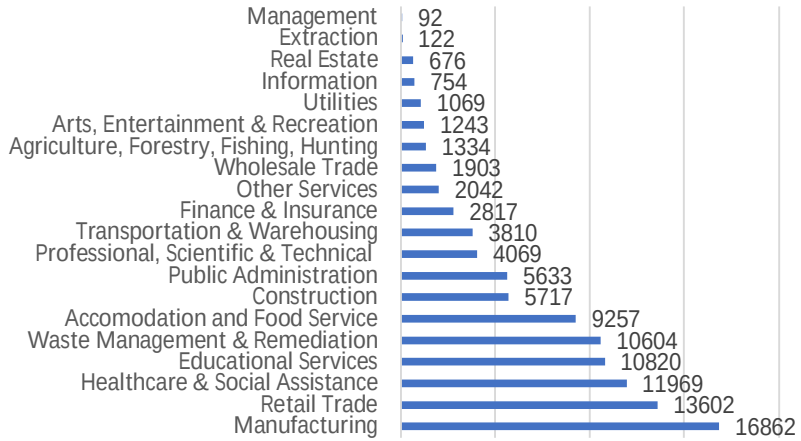


Figure 15: LSCOG Employment by Sector (2016)

Population Snapshot

The COG expects the population of the Region to grow to around 324,000 by 2040. This is an increase of 7.4%. Most of the growth will be in Aiken County or Orangeburg County with the other counties having slow or flat growth. Figure 16 shows the population growth for each jurisdiction from 1920 to 2040.

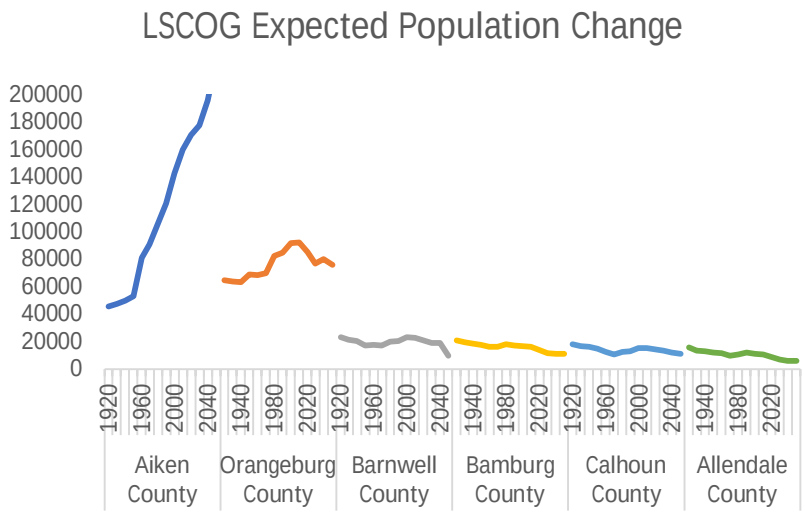


Figure 16: Population Change

Figure 17 shows the contribution of each county to the regional population. Until a generation ago Orangeburg County dominated the population of the region. Since then Aiken County has grown more rapidly than the other counties in the region. As shown in the figure the contribution of each county to the region's population has changed over time and is expected to continue changing over the life of the Transportation Plan.

Several of the counties in the region face declining and aging populations; these populations will require different services than younger populations in more urban areas.

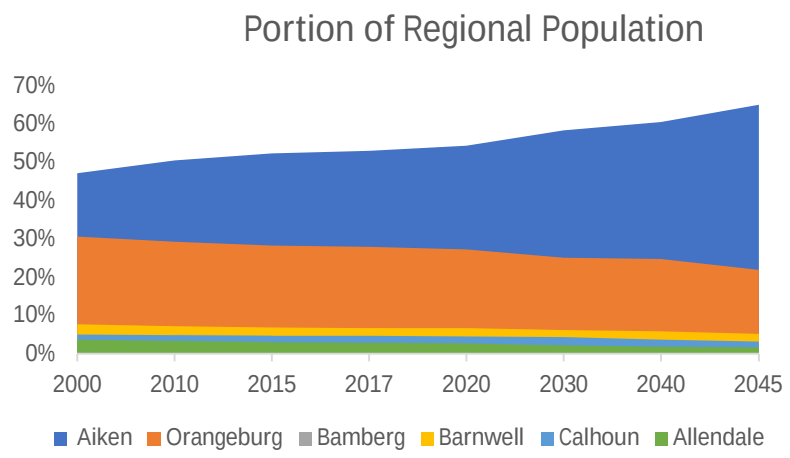


Figure 17: Portion of Regional Population by County

The COG expects most of the region to remain mainly rural or low density. Special concerns arise when dealing with the elderly and the physically challenged in the rural areas. This implies more travel demand and greater difficulty meeting the demand using transit.

Table 20: Percent Change by Jurisdiction

County	% Change	Annual Growth
Aiken	37.5	1.0%
Allendale	(46.5)	Nil
Barnwell	(19.1)	Nil
Bamberg	(34.0)	Nil
Calhoun	(21.0)	Nil
Orangeburg	(13.6)	0.04%
Overall	7.4	0.18%

The LSCOG Population Pyramid

Figure 18 is the 2019 population pyramid for the LSCOG. The population pyramid shows the age and sex of the current population. It can also be interpreted to give some information on the economic and demographic future.

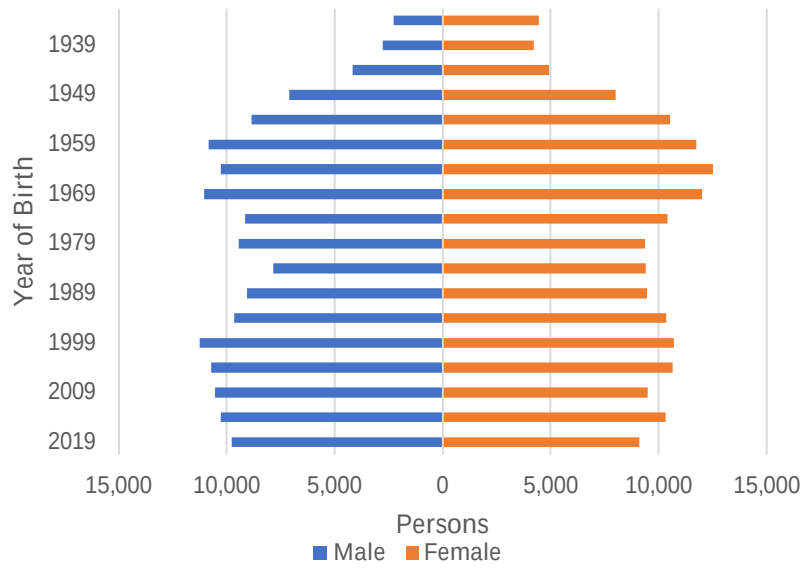


Figure 18: LSCOG 2019 Population Pyramid

The three types of population pyramid are the stationary pyramid, the constrictive pyramid and the expansive pyramid. The LSCOG population pyramid appears to be a stationary pyramid. Stationary demographics are usually seen in developed countries and indicate stable birth rates

and longer life expectancies. Stable population pyramids also imply a need for mobility services for aging populations as discussed below.

Elderly Population

According to the US Census the proportion of elderly[2] in the LSCOG increased steadily between 2010 and 2017. As shown in Figure 19. The trend in the Lower Savannah Region is similar to changes across the U.S. and implies a greater need for paratransit or demand response transportation services.

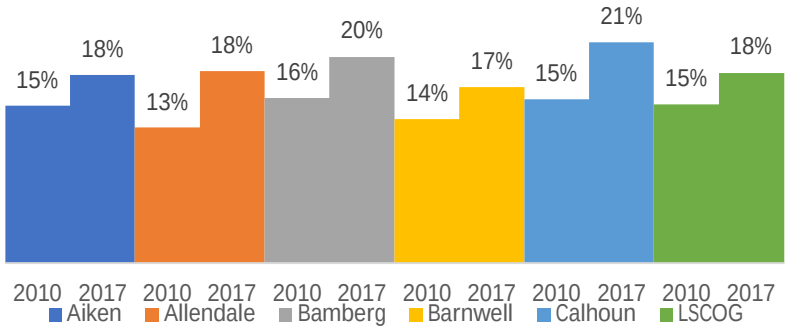
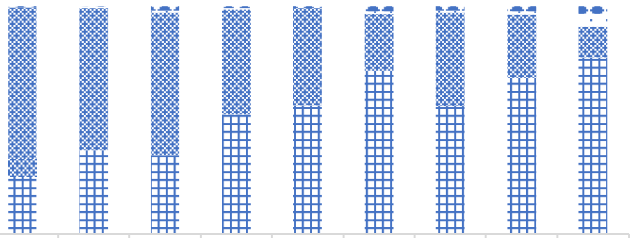


Figure 19: Population Over 65 by County

Minority Population

The 2010 ethnic makeup by jurisdictions is shown in Figure 20. The composition of the region has implications for both Title VI and Limited English Proficiency (LEP). This report includes statements intended to directly address Federal Requirements for both Title VI and LEP.



	Allendale	Bamberg	Orangeburg	Barnwell	Calhoun	Aiken	LSCOG	SC	USA
Mixed	0.5%	0.3%	1.8%	0.9%	0.8%	2.3%	1.8%	2.1%	3.1%
Asian	0.0%	0.4%	1.0%	0.5%	0.0%	1.0%	0.9%	1.5%	5.4%
Black	74.1%	61.5%	61.9%	45.4%	41.7%	24.7%	40.6%	27.2%	12.7%
White	25.1%	36.0%	34.1%	51.7%	54.9%	70.6%	55.3%	67.3%	73.0%

Figure 20: Ethnic Composition by County

[2] The U.S. Census defines elderly as 65+ years of age.

12. Land-Use Background

Outside of the urban centers of Aiken and Orangeburg, land use in the Lower Savannah region is characterized by low density agricultural and residential development supported by small market and manufacturing centers. Most of the region can expect this pattern to hold into the foreseeable future. Given the demographic trends shown in Figure 16 above it is likely that this land use pattern will hold into the future. The exceptions to this expectation are the area near Aiken and the eastern end of Orangeburg County.

Growth in Aiken will likely be strong enough to drive suburbanization in southwest Aiken County. Orangeburg is within the potential commute-shed of Charleston, particularly for the proposed Volvo plant in Charleston.

13. Environmental Background

This section of the report generally discusses the state environmental processes in place for transportation projects used by the State of South Carolina. It provides some general information, federal and state environmental statutes, and shares a list of sensitive species that have habitat in the Lower Savannah Region.

Advanced Project Planning Reports

To streamline project development process, the SCDOT, in partnership with the COG's statewide, are doing early environmental screening clearly defining the project, purpose and need, design expectations, public concerns, and potential environmental, cultural, and social impacts. SCDOT now requires that all new projects in the STIP and all high priority long-range plan projects have Advance Planning Project Reports (APPR).

The contents of the APPR include:

- An introduction defining the purpose of the document and the project sponsor (SCDOT, COG, Other);
- A description of the existing facility describing roadway characteristics and existing features (e.g., utilities, railroad crossings, mass transit, bridges, etc.);
- The purpose and need section will give background information with project goals, current roadway deficiencies, traffic data, socioeconomic projections, level of service, accident data, and funding priority;
- The proposed facility element defines the performance requirements for the project (e.g., design criteria, potential cross sections, bicycle and pedestrian facilities, mass transit accommodations, design techniques, and projected project cost);
- The APPR includes a summary of public involvement highlighting public meetings, comments, and public involvement activities;
- A corridor assessment of social, economic, and environmental concerns including;

- environmental screenings and site information,
- potential cultural resources,
- public parks and recreational areas, wetlands and water bodies, endangered species, potential displacements, hazardous materials, and community impacts; and

- The final section of the APPR contains recommendations and preliminary plans for the project.

The Advanced Project Planning Report can include existing and proposed typical cross section information that can be represented using "before" and "after" computer-generated visualizations for select locations throughout the length of the project. Projected traffic volumes are generated using the travel demand model and provide projected average daily traffic volumes for the proposed facility and the no-build scenario. Social, cultural, natural resources, and environmental concerns are identified using GIS database information for the environmental screening process. The total number of crashes at particular locations is summarized by providing statistics on accidents involving fatalities, injuries, and property damage. Cost estimates are also provided for one or more typical cross sections and may prove to be a key variable in the decision-making process.

Advanced Project Planning Reports are currently being revamped and "beefed up" to include more of a comprehensive look at all projects. The new process will more deeply involve all design disciplines at the SCDOT and help to provide the LSCOG with a better idea of what exactly will be involved in completion of any project. The new APPRs are going to combine the Planning process with early Environmental and Preconstruction work to help provide a better product and more streamlined process over the lifetime of a project.

Summary of Environmental Regulations and Mitigations

The Lower Savannah region is located in the southwestern portion of South Carolina bordered by Georgia, and the Savannah River on the west and the Santee River basin (Lake Marion) on the east. The region is generally in the coastal plane and the geography is composed of broad ridgetops falling off to rolling hills and narrow floodplains. The region contains a number of Carolina Bays[3] (Thomasson n.d.), an unusual class of wetlands prevalent in the coastal planes of the southeast.

[3] Circular depressions/wetlands left from the last ice age.

Table 21: Environmental Mitigation Strategies

Resource	Key Applicable Requirements	Potential mitigation strategies	Potential mitigation areas for project implementation
Air Quality	Clean Air Act at 42 USC 7401-7671, and Conformity regulations at 40 CFR 93	• Avoid	• Voluntary shifts to other modes • Clean Fuel & Alternative Fuel Vehicles
		• Minimize	• Alternative Fuel program • transportation emission reduction measures
		• Mitigate	• Transportation control measures
Cultural resources	National Historic Preservation Act at 16 USC 470	• Avoid	• Choose an alternative that avoids the site, district or resource
		• Minimize	• Landscaping for historic properties; • In place preservation for Archaeological Sites • Minimize the project footprint
		• Mitigate	• Excavation and recording for archaeological sites • Use design features (e.g., weathered guardrail, stamped pavement, or street furniture to maintain context) • Relocate or reuse transportation infrastructure for other purposes • Re-purpose rights-of-way (e.g., rails trails)
Floodplains		• Avoid	• Choose an alternative that avoids the site, district or resource • Choose an alignment that avoids the site, district or resource • Encourage development in growth areas outside of the special flood hazard area

		• Minimize	• Choose designs that limit the extent of encroachment into the special flood hazard areas
			  o Cross special flood hazard areas at their narrowest point
			  o Use bridging to minimize encroachments
			  o Reduce median and lane widths where needed and practical
			  o Use asymmetrical widening (i.e., widen on the side away from the special flood hazard area)
			• Locate stormwater management structures outside special flood hazard areas

		• Mitigate	• Ensure that development in the special flood hazard area complies with the locality's floodplain ordinance.

Resource	Key Applicable Requirements	Potential mitigation strategies	Potential mitigation areas for project implementation
			• Encourage development in the special flood hazard area to exceed the minimum standards of the locality's floodplain ordinances. • Identify projects to mitigate repetitive loss and severe repetitive loss structures in the community's hazard mitigation plan, so that the community can apply for funding for these projects when FEMA grants become available.
Neighborhoods and communities, and homes and businesses	Uniform Relocation Assistance and Real Property Acquisition Policy Act at 42 USC 4601 et seq. Executive Order 12898 (Environmental Justice)	• Avoid	• Choose an alternative that minimizes property takings/relocation
		• Minimize	• Minimize the project's footprint • Select lower design criteria • Use Context sensitive designs solutions for communities (appropriate functional and/or esthetic design features)
		• Mitigate (for homes and businesses in accord with 49 CFR 24)	• Mitigation on-site or in the community • Sound barriers or visual screening
Parks and recreation areas	Section 4(f) of the U.S. Department of Transportation Act at 49 USC 303	• Avoid	• Cooperative Planning (i.e., ensuring that park master plans include future transportation facilities) • Choose an alternative that avoids the site, district or resource
		• Minimize	• On site screening or on-site replacement of facilities
		• Mitigate	• Replace the affected property • Improve the affected property by adding facilities
	Section 6f of the Land and Water Conservation Act	• Avoid	• Cooperative Planning (e.g., ensuring that park master plans include future transportation facilities) • Choose an alternative that avoids the site, district or resource
		• Minimize	• Minimization the project footprint before required mitigation.

Resource	Key Applicable Requirements	Potential mitigation strategies	Potential mitigation areas for project implementation
		• Mitigate	• Replace the affected property adjacent to existing (requires replacement with a property with at least the same area and of equivalent use)
Prime and Unique Farmland	Farmland Protection Policy Act of 1981 at 7 USC 4201-4209, Agricultural and Forest District Act (Code of VA Sections 15.2-4305; 15.2-4307 – 4309; 15.2-4313)	• Avoid	• Choose alignments that avoid the impact
		• Minimize	• Use a context sensitive design approach to minimize the project footprint • Use design exceptions and variances
		• Mitigate	• Replace the forestry operation within existing agricultural/forestal district replacement property for open spaces easements to be contiguous with easement • Landscaping within existing rights of way; • Environmental compliance monitoring
Threatened and Endangered Species	Endangered Species Act at 16 USC 1531-1544	• Avoid	• Choose alignments that avoid the impact • Memoranda of Agreements for species management;
		• Minimize	• Time of year restrictions; construction sequencing • Minimize footprint using design exceptions and variances; • Environmental compliance monitoring
		• Mitigate	• Relocation of species to suitable habitat adjacent to project limits • Develop habit(s) on transportation right-of-way and structures (e.g., nesting sites on bridge structures)
Wetlands and water resources	Clean Water Act at 33 USC 1251-1376; Rivers and Harbors Act at 33 USC 403	• Avoid	• Choose an alternative that avoids the site, district or resource • Choose an alignment that avoids the site, district or resource
		• Minimize •	• Choose designs that limit the encroachment into wetlands and riparian buffers o Cross jurisdictional wetlands at their narrowest point o Use bridging to minimize takings of jurisdictional wetlands o Reduce median and lane widths where needed and practical o Use asymmetrical widening (i.e., widen on the side away from jurisdictional wetlands)

Resource	Key Applicable Requirements	Potential mitigation strategies	Potential mitigation areas for project implementation
			o Avoid stream relocations • Design outfalls and filters to comply with NPDES requirements • Locate stormwater management structures outside jurisdictional wetlands
		• Mitigate	• In kind replacement at ratios greater than 1:1 • Restoration of damaged wetlands • Recreation of destroyed wetlands • Creation of artificial wetlands • Replace the property in kind and nearby • Replace the property in kind and offsite • Use mitigation banks to replace the property

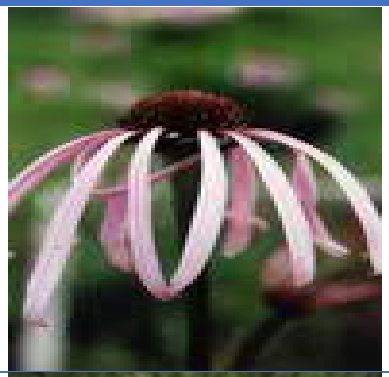
Species of Environmental Interest

Table 22 gives a summary of the Endangered Species that may be found in the Lower Savannah Region. The purpose of Table 22 is to give the decision maker more information on the species and habitats that may become problematic in developing transportation projects. Although this list is most important for large projects even projects with smaller footprints may affect important habitats.

Table 22:Endangered Species Occurring in the Lower Savannah Region

Species	Picture	Description/Habitat
Wood Stork (Mycteria americana)		Wood storks prefer fresh or brackish forested wetlands. They forage in wetlands with water depths between four and twelve inches. (The Cornel Lab n.d.)
Red-Cockaded Woodpecker (Leucontopicus Borealis)		This endangered species is a habitat specialist that is strongly tied to old-growth pine forests that burn frequently, leaving the understory mostly clear of younger pines and hardwoods. They were once common in vast tracts of longleaf pine; now they also occur in loblolly, slash, and some other pine stands in the southeastern pine flatwoods. (The Cornel Lab n.d.)

Species	Picture	Description/Habitat
Shortnose Sturgeon (Acipenser brevirostrum)		Shortnose sturgeon is a small sturgeon found in large rivers and estuaries on the Atlantic Coast of the United States. They spawn in moving freshwater over rubble or gravel bottom streams with little silt. Adults can be found in either fresh water or saltwater although isolated populations survive behind river dams. (Raleigh Ecological Services Field Office 2011)
Relict Trillium (t*rillium reliquum)*		The relict trillium is a perennial herb with a long curving stem that leans or rests on the ground and three mottled leaves. It grows in mature hardwood forests in ravines or stream terraces; often, over calcium rich bedrock. (Raleigh Ecological Services Field Office 2011)
Piedmont Bishop-Weed (p*tilimnium nodosum)*	P	Piedmont bishop-weed is native to the southeast and grows on stream banks. It is an wetlands indicator species. It was placed on the endangered species list in 1988. (Raleigh Ecological Services Field Office 2011)

Species	Picture	Description/Habitat
Smooth Coneflower (Echinacea laevigata)		Smooth coneflower is a perennial herb that grows up to 3.3 feet tall from on a single stalk. Smooth coneflower is sun-loving plant often found in open woods, roadsides, clearcuts and power line rights-of-way. The smooth coneflower prefers calcium and magnesium rich soils. (Raleigh Ecological Services Field Office 2011)
Canby's Dropwort (oxypolis canbyi)		Canby's dropwort is a perennial from 2.5 feet to 4 feet tall on stiff round stems. It prefers shallow ponds, Carolina Bays and wet pine forest and cypress swamps or sloughs. It grows well in acidic sandy loams or peats that hold water. (Raleigh Ecological Services Field Office 2011)

Appendix A: Project Score Sheets

Table 23: LSCOG LRTP Safety Intersection Score Sheet

Item	County	City	Road	From	To	Improvement	Length (miles)	SCDOT Comments	Rank	Estimate
4	Calhoun	St. Matthews	Chestnut St (S-22)	SC 6 (Bridge St)	US 176 (Old State Road)	Resurface	1.60	<= 2 years	1	$480,000
6	Orangeburg		SC 33 (Cameron Rd)	I-26	Calhoun Co Line	Resurface	4.00	2 to 3 years	2	$1,600,000
5a	Calhoun		Old Belleville Rd (S-24)	Sikes Pond Rd (Local)	St. Matthews Town Limits	Resurface	6.00	3+ years	3	$1,800,000
2	Calhoun		Cameron Rd (SC 33)	SC 6 (Old Number Six Hwy)	SC 267(McCords Ferry Rd)	Resurface	3.75	3+ years	3	$1,500,000
3	Calhoun	St. Matthews	Bridge St (SC 6)	Chestnut St (S-22)	Sikes Rd (S-20)	Resurface	1.25	4+ years	5	$500,000
								Financially Feasible Projects Estimated Cost =		$5,880,000

Projects already complete, let, or scheduled to be let in next SCDOT paving cycle

1	Barnwell		US 78	Bamberg County Line	SC-304 (Hilda Str)	Resurface	3.42	Constr Complete	N/A	
5b	Calhoun		Old Belleville Rd (S-24)	Great Circle Rd (S-36)	Sikes Pond Rd	Resurface	2.25	2020 Letting	N/A	
5c	Calhoun		Old Belleville Rd (S-24)	US 176 (Old State Road)	Great Circle Rd (S-36)	Resurface	2.50	Constr Complete	N/A	

KEY: Constr Complete - Segment was recently completed at part of an SCDOT paving contract
2 to 3 years - SCDOT expects road will be resurfaced within the next 2 to 3 years (same nomenclature for 3+ and 4+)
2020 Letting - Segment will be included in the SCDOT 2020 Pavement Cycle
- Finacially Feasible Projects

Table 24: Geometric Intersection Score Sheet

Item	County	City	Road	Crossroad	Improvement Needed	Traffic Status	Average Daily Traffic	Average Daily	Economic Development	Environmental, Social, and	Public Safety	Evacuation Routes (5%)	Score	Rank	Estimate
43	Orangeburg		US 601	Cook Rd (S-906)	Left turn lane on Cook Road	4.71	20.00	17.34	15	5	5.81	0	63.14	1	$850,000
37	Orangeburg	Orangeburg	US 178 (North Rd)	Willington Dr (S-1633)	Add NB R-T lane on 178	11.76	15.61	17.95	15	5	4.86	0	58.42	2	$2.0 M
7	Aiken	Burnettown	US 1/78	Sudlow Lake Rd (S-254)	Offset US 1 L-T lanes	7.06	13.93	7.70	15	5	15.00	0	56.63	3	$2.25 M
4	Aiken		SC 19 (Whiskey Rd)	Ola Hitt/Coorperate Pkwy	extend Ola R-T lane 200 ft	5.88	12.96	12.23	15	5	5.90	0	51.10	4	$1.15 M
42	Orangeburg		US 601	Silton Rd (S-801)	Add SB left turn lane	5.88	8.05	18.43	15	5	1.97	0	48.45	5	$1.15 M
33	Orangeburg	Orangeburg	Cook Road (S-906)	TRMC & OC Tech	Left turn lanes	5.88	9.40	11.06	15	5	5.26	0	45.72	6	$1.75 M
24	Calhoun		US 21/176 (Old State Road)	Savany Hunt Creek Rd (S-86)	Left Turn Lanes	4.71	2.31	4.42	15	5	13.12	5	44.86	7	$1.4 M
41	Orangeburg		US 301	Canaan Road (S-1638)	Left turn lane SB	5.88	6.99	12.04	15	5	1.55	0	40.58	8	$1.15 M
6	Aiken	Burnettown	US 1	Highland Ave (Local)	Add L-T lane & accel? In median	5.88	11.18	5.09	15	5	2.50	0	38.77	9	$2.75 M
23	Calhoun		US 21/176 (Old State Road)	Old Sandy Run Rd (S-31)	Traffic Signal and Left Turn Lanes	5.88	3.52	5.69	15	5	3.10	5	37.31	10	$1.4 M
8	Aiken	Montmorenci	US 78	Old Barnwell Road(S-113)	Add left turn lane	5.88	6.31	7.87	9	5	3.24	5	36.42	11	$850,000
26	Calhoun		US 21/176 (Old State Road)	Old Swamp Road (S-369)	Left Turn Lanes	4.71	1.95	3.90	15	5	3.68	5	34.53	12	$1.4 M
25	Calhoun		US 21/176 (Old State Road)	Livingston Rd (S-41)	Re-align intersection	20.00	3.13	4.42	15	5	1.25	5	33.81	13	$2.4 M
32	Orangeburg	Orangeburg	US 178	Shillings Bridge Road (S-74)	NB Left turn lane	4.71	6.75	5.74	6	5	4.22	5	32.70	14	$2.5M
17	Barnwell	Barnwell	SC 64 (Dunbarton Blvd)	Patterson Mill Rd (S-20)	Evaluate for truck traffic usage	11.76	4.72	5.80	15	5	1.51	0	32.04	15	$1.75M
44	Orangeburg		Target Rd (S-68)	Boyer Rd (S-171)	Smooth curve on mainline	4.71	2.02	13.03	9	5	1.94	0	30.99	16	
13	Bamberg		US 78	SC 61	Realign to 90 degrees & add turn lanes	12.94	1.18	3.07	9	5	7.34	5	30.59	17	
18	Calhoun		Burke Rd (S-22)	Tecklenburg Ln (S-448)	Relocate away from I-26 EB off ramp	4.71	0.70	1.74	15	5	7.93	0	30.37	18	
3	Aiken	Aiken	SC 19	White Pond Road (S-504)	Left turn lanes & realign sidestreet	18.82	7.04	6.57	9	5	2.57	0	30.17	19	
27	Calhoun		SC 267 (McCords Ferry Rd)	Old River Rd (S-203)	Re-align intersection	11.76	1.23	6.47	3	5	9.08	5	29.78	20	
40	Orangeburg		US 21N	Longwood (S-1703) & Leeway (S-1758)	NB Lt. Turn Lane	12.94	4.67	7.46	9	5	2.00	0	28.14	21	
38	Orangeburg		US 21	Benjaman Str (S-666)	NB Lt. Turn Lane	4.71	4.72	7.46	9	5	1.55	0	27.73	22	
29	Orangeburg	Orangeburg	Boulevard. St. (S-25)	Peasley, Sifley & Amelia	Left turn lanes	15.29	4.48	4.10	15	3	1.13	0	27.71	23	
22	Calhoun		US 601	SC 267	US601 south left turn lane	5.88	2.05	11.64	3	5	0.52	5	27.20	24	
16	Barnwell	Barnwell	US 278	Barnwell High School	Add 278 L-T lane at main drive	4.71	1.54	5.24	9	5	1.14	5	26.93	25	
20	Calhoun		Old Belleville Road (S-24)	Preference Road (S-42)	Realign stop to 90 degrees	11.76	0.65	1.11	15	5	3.98	0	25.75	26	
45	Orangeburg	Holly Hill	US 15	SC 314	Rebuild 90 T and rt. Turn lane	12.94	0.92	1.73	15	5	2.97	0	25.62	27	
19	Calhoun		US 601	Lone Star Rd (S-11)	Eliminate skew	11.76	1.25	6.97	3	5	8.39	0	24.61	28	
12	Bamberg		US 321	Mule Hole Road (S-40)	Left turn lane SB	18.82	0.86	3.88	3	5	4.31	5	22.04	29	
31	Orangeburg		Slab landing Road (S-73)	Dragstrip Road (S-288)	realign to 90 degrees	11.76	0.51	0.46	0	5	14.72	0	20.68	30	
14	Barnwell		Williston way (S-113)	SC 37	NB LT lane & cut hill	10.59	1.83	4.63	3	5	3.22	0	17.68	31	
11	Allendale	Ulmer	US 321	US 301	Intersection is confusing and hard to navigate	16.47	1.49	5.54	3	5	1.54	0	16.58	32	
10	Allendale		S-89	RR N of Fairfax	Reconstruct S-curve to 90	9.41	0.41	0.73	9	5	0.00	0	15.14	33	
15	Barnwell	Hilda	SC 70	Double Pond Road (S-193)	Reconstruct to tee intersection	11.76	1.39	2.49	3	5	2.66	0	14.53	34	
30	Orangeburg	North	Stockwell Road (S-279)	SC 394	Reconstruct to tee intersection	10.59	1.54	5.40	0	5	2.08	0	14.02	35	
36	Orangeburg	Cope	SC 70	Willow Swamp Road (S-162)	Reconstruct to tee intersection	12.94	1.55	3.39	0	5	0.62	0	10.56	36	
9	Allendale		Bluff Road (S-22)	Revolutionary Trl (S-47)	Improve skew & curve	5.88	0.52	0.71	0	5	3.09	0	9.31	37	
35	Orangeburg		SC 394	Warner Road (S-129)		4.71	0.39	1.23	0	5	0.00	0	6.62	38	
21	Calhoun		Whistling Swan Road (S-26)	Houcks Gin Road (S-74)	Realign as 90 degree T	12.94	0.39	0.34	0	5	0.00	0	5.73	39	

Financially Feasible Projects Estimated Cost = $24.75M

KEY: - Finacially Feasible Projects

Table 25: Safety Corridor Score Sheet

Item	County	City	Road	From	To	Improvement Needed	Length	# of Lanes	Score	Rank	Estimate
14	Aiken	North Augusta	SC 230 (W Martintown Rd)	I-20	Edgefield County Line	Operational and Signal Improvements	0.5	4	88.79	1	$625,000
22	Orangeburg	Orangeburg	US 301 (John Calhoun/Five Chop)	Woodbine Dr (S-793) to US 21 BP/US 178 BP US 601(Magnolia St) to US 301 (Five Chop Rd)		Operational Shoulder Improvements	1.9	4	70.49	2	$3,100,000
13	Aiken	North Augusta	Old Edgefield Rd (S-197)	US 25 (Knox Ave)	SC 230 (Martintown Rd)	SCDOT Safety Improvements (Entire Length)	1.77	2	68.44	3	$2,212,500
3	Aiken	Aiken	SC-19 (Edgefield Highway)	SC-118 (University Parkway)	Edgefield county line	Congestion Management, Intersection Improvements,	10.25	2	55.74	4	$12,812,500
21	Orangeburg	Orangeburg	SC 33 (Russell Street)	US 178 (Chestnut Str)	Sylvan Ave (S-1849)	Operational Shoulder Improvements	1.65	4	54.59	5	$3,000,000
2	Aiken	Aiken and New Ellenton	SC-19 (Whiskey Road)	Powderhouse Rd (S-440)	S-546 (George Avenue)	Intersection Improvements and Pedestrian Pathway	5.3	4	53.90	6	$6,625,000
23	Orangeburg	Orangeburg	US 178 (Charleston Hwy)	US 21/US 178 BYP (Joe Jeffords Hwy)	US 601 (Magnolia Street)	Operational Shoulder Improvements	0.37	4	53.14	7	$900,000
15	Aiken	Aiken	Powderhouse Rd (S-440)	SC 19 (Whiskey Rd)	Vanderbilt Rd (S-918)	Remove trees in road ROW	0.06	2	53.09	8	$75,000
1	Aiken	Aiken	Bettis Academy Road (S-144)	Ascauga Lake Road (S-33)	Edgefield county line	Congestion Management, Intersection improvements, and	5.5	2	52.48	9	$6,875,000
16	Calhoun		US 21/176 (Old State Road)	Savany Hunt Creek Rd (S-86)	Old Sandy Run Rd (S-31)	Add Paved Shoulders	3.3	2	51.08	10	$4,125,000
4	Aiken	Aiken and Windsor	U.S. 78 (Charleston Highway)	SC-302 (East Pine Log Road)	Barnwell county line	Intersection Improvements	16	2	46.68	11	$20,000,000
24	Orangeburg	Branchville	US 21/78 (Freedom Rd)	SC 210 (Bowman Branch Hwy)	Barton St (S-116)	Operational Shoulder Improvements	1.21	4	41.11	12	$2,100,000
12	Aiken		Chime Bell Church Rd (S-816)	SC-19 (Whiskey Road)	Gray Mare Hollow Rd (S-146)	SCDOT Safety Improvements (Entire Length)	3.311	2	41.07	13	$4,138,750
9	Aiken	North Augusta	Old Aiken Rd (S-365)	SC 421 (Augusta Rd)	Carolina Sprs Rd (S-68)	SCDOT Safety Improvements (Entire Length)	1.96	2	40.52	14	$2,450,000
6	Aiken		Cherokee Dr (S-386)	US 1/78 (Davis Hwy)	SC 126 (Belvedere Clearwater)	SCDOT Safety Improvements (Entire Length)	2.52	2	38.80	15	$3,150,000
10	Aiken		Project Rd (S-285)	Pine Log Rd (S-65)	Baker Street (S-1294)	SCDOT Safety Improvements (Entire Length)	1.227	2	37.16	16	$1,533,750
11	Aiken	North Augusta	Seymore Dr (S-879)	SC 125 (Atomic Rd)	Old Edgefield Rd (S-197)	SCDOT Safety Improvements (Entire Length)	1.097	2	36.99	17	$1,371,250
19	Orangeburg	Orangeburg	Whitman St (S-22)	Five Chop Rd (S-1)	Elliott St (S-1832)	SCDOT Safety Improvements (Entire Length)	1	2	35.21	18	$1,250,000
18	Orangeburg	Orangeburg	Whittaker Parkway (S-796)	US 21/178 BP	Brentwood Rd (S-1002)	SCDOT Safety Improvements (Entire Length)	1.175	2	34.44	19	$1,468,750
20	Orangeburg	Holly Hill	Toney Bay Rd (S-119)	Seton St (S-1261)	Jacques Lane (Local)	SCDOT Safety Improvements (Entire Length)	1.209	2	34.08	20	$1,511,250
5	Aiken		Schley St (S-258)	Howlandville Rd (S-81)	Legion Rd (S-486)	SCDOT Safety Improvements (Entire Length)	1.464	2	32.78	21	$1,830,000
7	Aiken		Old Sudlow Lake Rd (S-1760)	SC 126 (Belvedere Clearewater)	Blanchard Rd (S-1761)	SCDOT Safety Improvements (Entire Length)	1.699	2	31.76	22	$2,123,750
8	Aiken		Pine Log Rd (S-65)	SC 125 (Atomic Rd)	Piney Heights Rd (S-87)	SCDOT Safety Improvements (Entire Length)	8.252	2	30.84	23	$10,315,000
17	Orangeburg	Orangeburg	Griffith/Riverbank Dr (S-1148)	Pruitt Dr (S-1050)	Moore Rd (S-1048)	SCDOT Safety Improvements (Entire Length)	0.922	2	28.81	24	$1,152,500

Financially Feasible Projects Estimated Cost = $24,800,000

KEY: - Finacially Feasible Projects
- Items 1 & 2 are funded at 50% and Items 3 & 4 are funded at $2M/project

Table 26: Widening Corridor Score Sheet

Item	County	City	Road	From	To	Improvement	Length (miles)	Financial Viability & Maintenance (10%)	Average Daily Traffic (ADT) (26%)	Average Daily Truck % (10%)	Economic Development (16%)	Environmental, Social, and Cultural Impact (10%)	Public Safety (16%)	Evacuation Routes (6%)	PQI % (10%)	Score	Rank	Estimate
10	Orangeburg	Santee	SC 6	I-95	US 15 Conn	Widen to 5 lanes	0.30	9.30	24.60	4.45	15	8	8.59	5	4.49	79.42	1	$4.7 M
9	Orangeburg		US 21 North	S-826 (Marshall St)	Sifley Street (S-920)	Widen to 5 lanes	1.29	6.05	17.40	9.83	9	8	4.24	0	7.21	61.73	2	$20.3 M
6	Barnwell		US 278	SC 64 (Hagood Ave)	SC 37	Widen to 3 Lanes	2.25	2.73	13.80	4.78	9	6	15.00	5	5.03	61.34	3	$23.9 M
12	Orangeburg	Orangeburg	SC 4	US 601	SC 400	Widen to 5 lanes	1.25	7.38	25.00	7.79	3	10	2.74	0	4.54	60.45	4	$20.3 M
5	Barnwell		US 278	SC 64 (Hagood Ave)	Main Street (S-154)	Repave & Restripe for 3 lanes	0.30	10.00	14.80	4.10	9	6	1.00	5	10.00	59.90	5	$250,000
1	Aiken		SC 191	Ascauga Lake Road (S-33)	Trolley Line Road (S-80)	Widen to improve	0.35	10.00	19.20	3.66	3	4.00	7.14	0	9.31	56.32	6	$3.7 M
11	Orangeburg	Orangeburg	US 178	Lake Edisto Rd (S-1203)	Shillings Bridge Rd (S-74)	Widen to 3 lanes	1.30	8.38	16.80	2.91	6	8	3.78	5	5.31	56.17	7	$13.3 M
8	Calhoun		US 21/176 (Old State Road)	Savany Hunt Creek Rd (S-86)	I-26 Interchange at US 21/176	Widen to 4/5 lanes	2.25	2.75	10.00	10.00	15	6	2.52	5	4.29	55.56	8	$35.2 M
2	Bamberg		US 301	US 78	Dixie Avenue (S-166)	Widen to 3 lanes	0.30	10.15	19.80	3.43	9	8	0.00	0	4.78	55.16	9	$3.2 M
7	Calhoun		Old Sandy Run Rd (S-31)	Bates Court (New Frontage Rd)	0.4 miles East of I-26 (Relocated Fr Rds)	Widen to 3 lanes	1.00	5.25	4.60	1.76	15	10	10.85	0	6.52	53.98	10	$10.6 M
4	Barnwell		US 278	US 278/SC 3 Intersection	US 278/SC 3 Intersection	Widen to 3 Lanes	1.30	5.69	6.40	2.66	9	6	15.00	5	4.23	53.98	11	$13.8 M
3	Bamberg		SC 70	In front of Bamberg-Barnwell Emergency Center		Widen to 3 lanes	0.40	6.39	5.40	1.68	15	10	1.00	0	5.09	44.57	12	$4.3 M

KEY: - Projects Financially Feasible and Financially Viable

Financially Feasible Projects Estimated Cost = $26,800,000

Table 27: Resurfacing/Rehab Score Sheet

Item	County	City	Road	From	To	Improvement	Length (miles)	SCDOT Comments	Rank	Estimate
4	Calhoun	St. Matthews	Chestnut St (S-22)	SC 6 (Bridge St)	US 176 (Old State Road)	Resurface	1.60	<= 2 years	1	$480,000
6	Orangeburg		SC 33 (Cameron Rd)	I-26	Calhoun Co Line	Resurface	4.00	2 to 3 years	2	$1,600,000
5a	Calhoun		Old Belleville Rd (S-24)	Sikes Pond Rd (Local)	St. Matthews Town Limits	Resurface	6.00	3+ years	3	$1,800,000
2	Calhoun		Cameron Rd (SC 33)	SC 6 (Old Number Six Hwy)	SC 267(McCords Ferry Rd)	Resurface	3.75	3+ years	3	$1,500,000
3	Calhoun	St. Matthews	Bridge St (SC 6)	Chestnut St (S-22)	Sikes Rd (S-20)	Resurface	1.25	4+ years	5	$500,000

Financially Feasible Projects Estimated Cost = $5,880,000

Projects already complete, let, or scheduled to be let in next SCDOT paving cycle

1	Barnwell		US 78	Bamberg County Line	SC-304 (Hilda Str)	Resurface	3.42	Constr Complete	N/A	
5b	Calhoun		Old Belleville Rd (S-24)	Great Circle Rd (S-36)	Sikes Pond Rd	Resurface	2.25	2020 Letting	N/A	
5c	Calhoun		Old Belleville Rd (S-24)	US 176 (Old State Road)	Great Circle Rd (S-36)	Resurface	2.50	Constr Complete	N/A	

KEY: Constr Complete - Segment was recently completed at part of an SCDOT paving contract
2 to 3 years - SCDOT expects road will be resurfaced within the next 2 to 3 years (same nomenclature for 3+ and 4+)
2020 Letting - Segment will be included in the SCDOT 2020 Pavement Cycle
- Finacially Feasible Projects

Appendix B: Summary of Public Comment

The table below is a summary of the results of a community survey conducted during 2018 and 2019.

LRTP Survey Results

As of July 1, 2019

Question 6 – In the last year, how often have you used the following mode of transportation for commuting and leisure?

Drive a personal vehicle	Frequently – 95.25% Infrequently – 3.0% Never-1.75%
Ride as a passenger	Frequently – 46.25% Infrequently – 41.25% Never-12.75%
Walk	Frequently – 25.5% Infrequently – 39.5% Never-35%
Bike	Frequently – 6.0% Infrequently – 21.0% Never-73.0%
Public Transit	Frequently – 1.0% Infrequently – 8.5% Never-90.5%
Rideshare (Uber, etc.)	Frequently – 4.0% Infrequently – 22.5% Never-73.5%
Airline	Frequently – 13.0% Infrequently – 53.5% Never-33.5%
Amtrak	Frequently – 1.0% Infrequently – 12.0% Never-87.0%

Question 9 – What is the primary method you use to commute to work or school?

Drive alone – 96.5%
Carpool – 1.75%
Walk – 1.25%
Bike – 0.5%
Public Transit Bus – 0%
Rideshare service – 0%

Question 11 – Please rate your level of satisfaction with the following transportation services and infrastructure?

Physical Condition of Road	Satisfied – 12.5% Neither – 20.25% Dissatisfied – 67.25%
Availability of Sidewalks	Satisfied – 16.0% Neither – 37.0% Dissatisfied – 47.0%
Availability of Bike Facilities	Satisfied – 7.5% Neither – 43.0% Dissatisfied – 49.5%
Reliability of Transit Services	Satisfied – 5.0% Neither – 62.0% Dissatisfied – 33.0%

Traveler Info about road closures	Satisfied – 23.0% Neither – 43.5% Dissatisfied – 33.5%
Road Maintenance after weather	Satisfied – 17.0% Neither – 43.5% Dissatisfied – 39.5%

Question 12 – What might encourage you to drive your car less?

Better public transportation – 33.25%
Nothing – 25.5%
Better bike / ped facilities – 13.5%
Work closer to home – 8.25%
Retirement – 6.0%
Good carpooling options – 5.25%
Higher gas prices – 4.75%
Work from home – 3.5%

Question 13 – How often do you experience traffic congestion?

Daily – 13.5%
Weekly – 25.75%
Monthly – 17.5%
Few times a year – 35.0%
Never – 8.25%

Question 14 – How does traffic congestion impact your quality of life?

Strong negative effect – 6.0%
Moderate negative effect – 50.0%
No negative effect – 45.0%

Question 15 –Rate the importance of the following transportation services/issues?

Ensuring safety of public	Very Important – 90.25% Moderately – 8.75% Not Important – 1.0%
Road / pavement conditions	Very Important – 90.0% Moderately – 10.0% Not Important – 0.0%
Protecting the environment	Very Important – 69.5% Moderately – 26.5% Not Important – 4.0%
Minimizing cost to taxpayers	Very Important – 67.5% Moderately – 29.75% Not Important – 2.75%
Bike / Ped facilities	Very Important – 48.75% Moderately – 43.0% Not Important – 9.25%
Public transit services	Very Important – 50.0% Moderately – 38.5% Not Important – 11.5%
Reducing traffic congestion	Very Important – 55.75% Moderately – 37.0% Not Important – 7.25%

Appendix C: Summary of Safety Countermeasures

This appendix is a general discussion of accident causes and the countermeasures used to address them.

Crash Types

This discussion considers three types of fatal incidents: roadway departure, intersections and pedestrian/bicycle incidents.

Roadway Departure

Roadway departure means leaving your travel lane. Over half of highway fatalities in the United States involve the travel lane (Golembiewski, G.A. and Chandler, B. 2011). The accident information for the COG shows that roadway departure contributes to most fatalities in the COG.

Figure 21 shows the key types of roadway departure incidents (Fouch, Brian and Dick Albin 2017). Roadway departure accidents involve running off the road and hitting something (e.g., a tree or a utility pole) or turning the vehicle over.

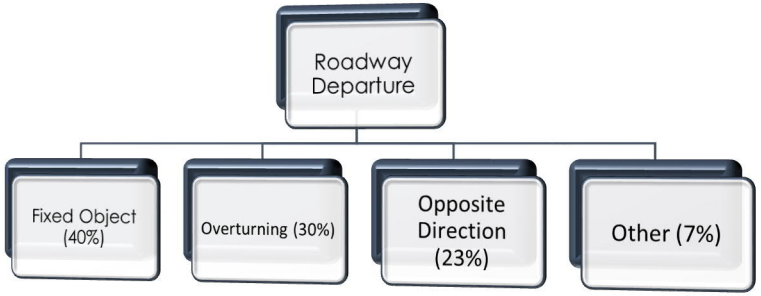


Figure 21: Factors Contributing to Accidents

Fixing Roadway Departure Accidents

Roadway departure accidents can happen anywhere along the road so it is hard to develop defined projects to fix a specific problem. The basic approach to reducing roadway departure accidents is:

1. Keep the vehicle on the road;
2. Allow the driver to safely recover into his lane; and lastly
3. Allow the vehicle to stop safely.

Figure 7 shows strategies for mitigating roadway departure accidents.

Figure 22: Centerline Rumble Strip

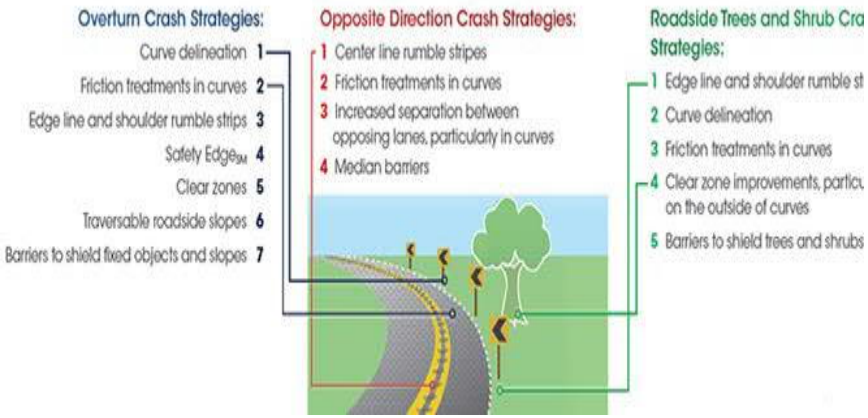


Figure 23: Roadway Departure Mitigation Strategies (Fouch, Brian and Dick Albin 2017)

Routine Maintenance Improves Lane Keeping

Routine maintenance is an overlooked safety strategy (e.g., keeping signs, striping and other roadway warning devices within operating standards). Adding reflective lane markers, freshening roadway striping, adding rumble strips, warning signs and chevron signs, or other delineators to roads are effective and inexpensive ways to help drivers stay in their lane, stay on the road and avoid accidents. However, the lifespan of the improvements (often five years) means that they need continuous attention.

The COG has developed risk analyses for some safety countermeasure discussed in AAA Foundation for Safety's Safety Benefits of Highway Infrastructure. These analyses illustrate what is possible for a countermeasure for a year. The results of any installation may be diffrerent from the estimates.

Centerline Rumble Strips

Figure 7 shows a centerline rumble strip on a two-lane rural highway. The notches ground (milled) into the pavement alert the driver that he is cossing out of his lane. Milled rumble strips can be added to the pavement as part of re-surfacing or as part of an independent project. Centerline rumble strips can reduce crossover accidents from 18% to 64%. Figure 10 shows uses data from a project in Kentucky to estimate the benefit cost ratio of centerline rumble strips (Harwood, D.W., Hutton, J.M., Hans, Z.N. Souleyrette, R.R. & Fields, M.A 2017).

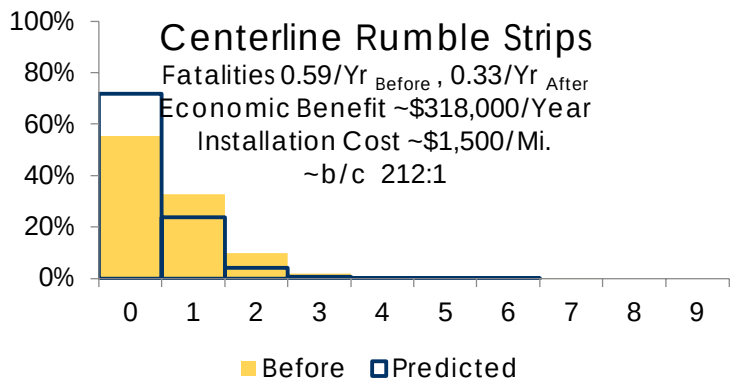


Figure 24: Centerline Rumble Strips (KY)

Delineators on Horizontal Curves

Roadway delineators help drivers see lane boundaries and more easily stay in their lane. Delineators help at night or in bad weather. Figure 11 shows chevron delineators and reflectors at night.

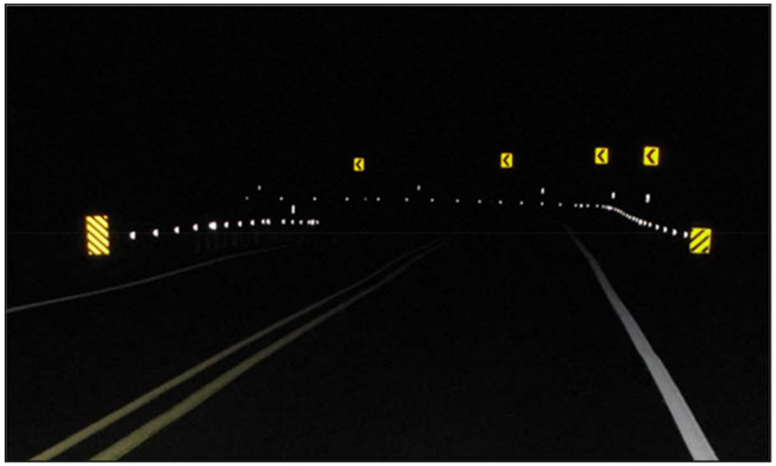


Figure 25: Delineators at Night (Source: Michigan DOT)

Figure 12 shows uses data from a project in Minnesota to estimate the cpst, benefit, benefit and change in crashes of installing delineators on curves (Harwood, D.W., Hutton, J.M., Hans, Z.N. Souleyrette, R.R. & Fields, M.A 2017).

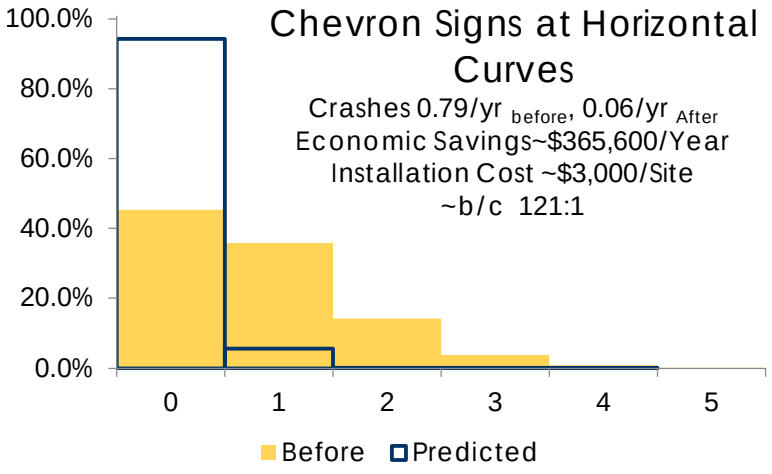


Figure 26: Installing Chevron Signs

Shoulder Rumble Strips

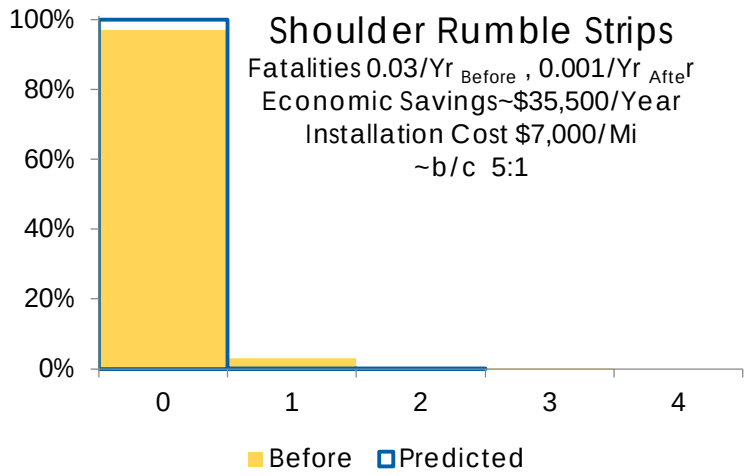


Figure 27: Shoulder Rumble Strips

Figure 28: Narrow Shoulder

Paved Shoulders

Paved shoulders improve safety by giving the driver room to recover from an error. Adding a two-foot (0.6m) paved shoulder to a two-lane rural road reduces accidents around nine percent (9%). As the shoulder gets wider the reduction goes up to as much as twenty-eight percent (28%) for an eight-foot (2.4 m) shoulder (Donnell, Eric; Lyon, Craig;Persaud, Bhagwant;Gross, Frank;and Eccles, Kimberly 2017). In an Iowa case study (Figure 15) the average number of fatalities per mile per year drops from 0.23 fatalities per mile per year before to nil after the improvement.

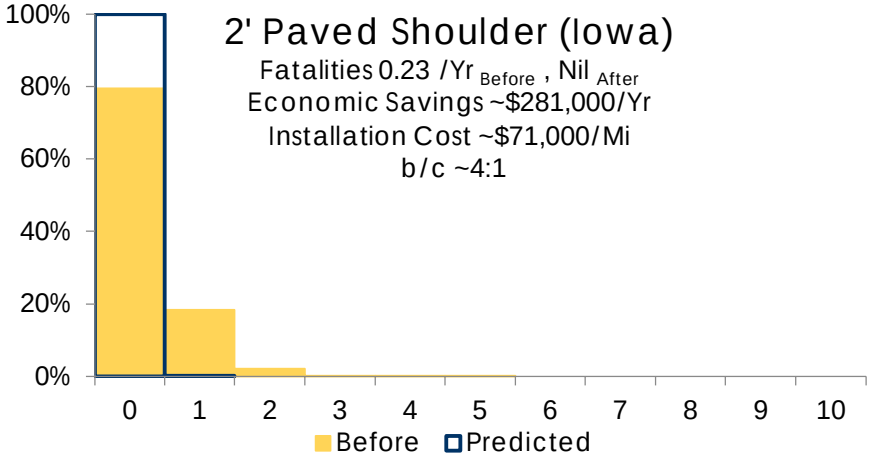


Figure 29: Narrow Paved Shoulders

Flatten Side Slopes

When a vehicle rolls over the chance of a serious injury or fatality goes up significantly. Flat side slopes help a driver recover from leaving the roadway without the vehicle rolling over. Figure 16 shows an example of a slope that could contribute to a vehicle rollover.

Figure 30: Side Slope

The benefit of flattening slopes depends upon the type of roadway, traffic volume, original slope and final slope. Figure 15 shows the costs and benefits of flattening slopes from 3:1 to 6:1. This study was done on a rural highway in Nevada. Because slopes are steeper here and it will probably cost more to flatten the slopes and the benefit cost ratio may be less than 1:1. Therefore flattening slopes should only be considered as part of larger projects.

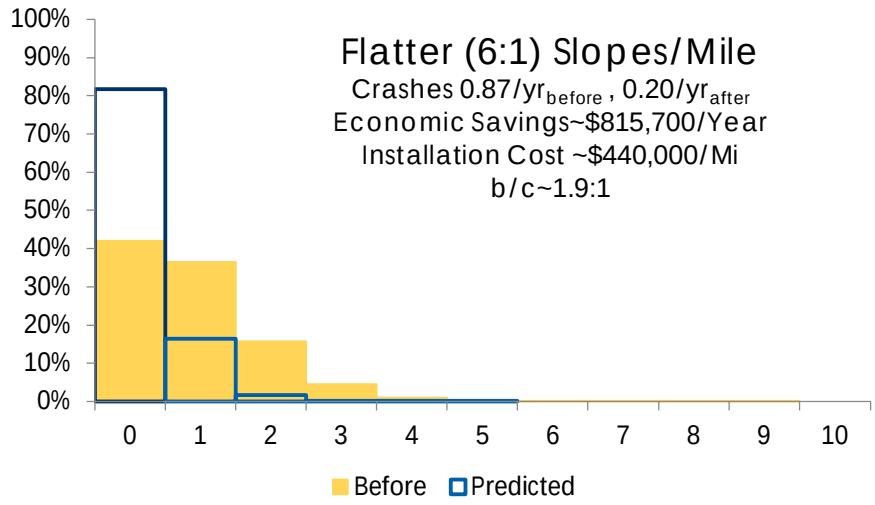


Figure 31: Flattening Shoulders from 3:1 to 6:1

Overturning

Pavement drop-offs (Figure 17) contribute to roadway departure accidents. Depending upon the circumstances at the time a vehicle can overturn as the driver tries to regain control. Figure__ shows a large pavement drop-off. This condition happens as the shoulder material either consolidates or erodes away from the edge of pavement. These drop-offs make it hard for drivers, motorists or bicyclists to get back in to the travel lane once they are on the shoulder. Pavement drop-offs contribute significantly to overturned vehicles. Overturned vehicles, in turn, significantly increase the likelihood of a serious injury or fatality in a vehicle crash.

Figure 32: Pavement Drop-off

The Federal Highway Administration has developed a technique called Safety Edge to mitigate pavement drop-offs. During resurfacing, the contractor shapes the edge of the pavement at a 30-degree angle and the grades the shoulder material back into place against the pavement as usual. Figure 18 shows the concept.

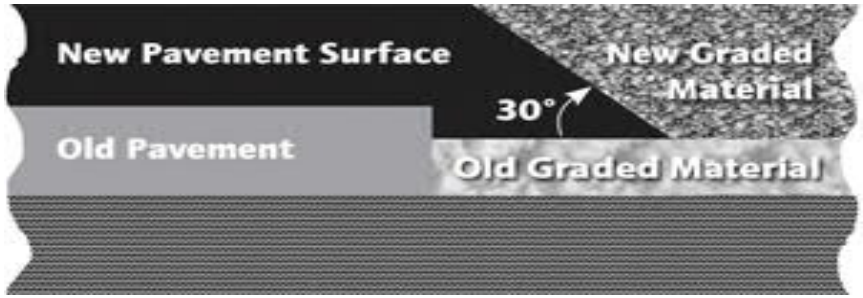


Figure 33: Safety Edge Cross Section (The Safety Edge 2010)

In demonstration projects drop-off related crashes fell between 2.5 % and 13.9%. Using data from FHWA's report the COG estimated that the average number of pavement drop-off accidents dropped from 2.36 per mile per year to 0.8 per mile per year (Donnell, Eric; Lyon, Craig;Persaud, Bhagwant;Gross, Frank;and Eccles, Kimberly 2017) . Figure 19 shows how the number of accidents changed in the test sections. The likelihood of having no accident in a year went from around nine percent (9%) to forty-five percent (45%). Using safety edge in resurfacing adds about 1% to the material costs.

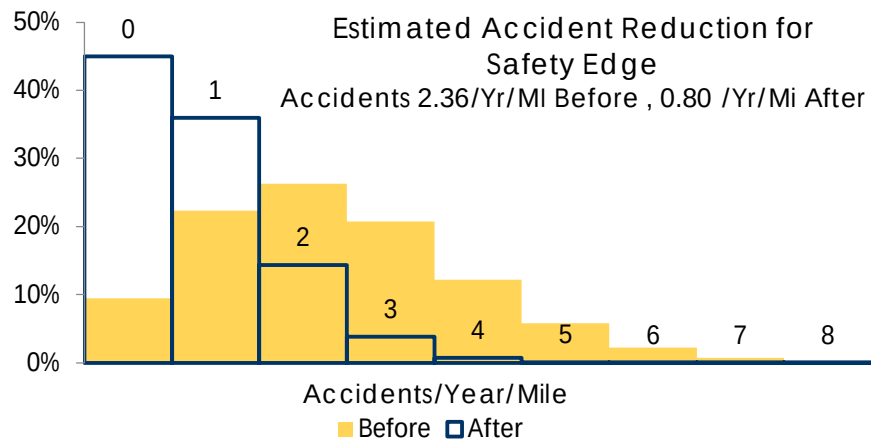


Figure 34: Safety Edge

Fixing Intersection Crashes

About half motor vehicle crashes happen at intersections. A four-way intersection has thirty-two (32) vehicle-to-vehicle conflict points and twenty-four vehicle-to-pedestrian conflict points as shown below.

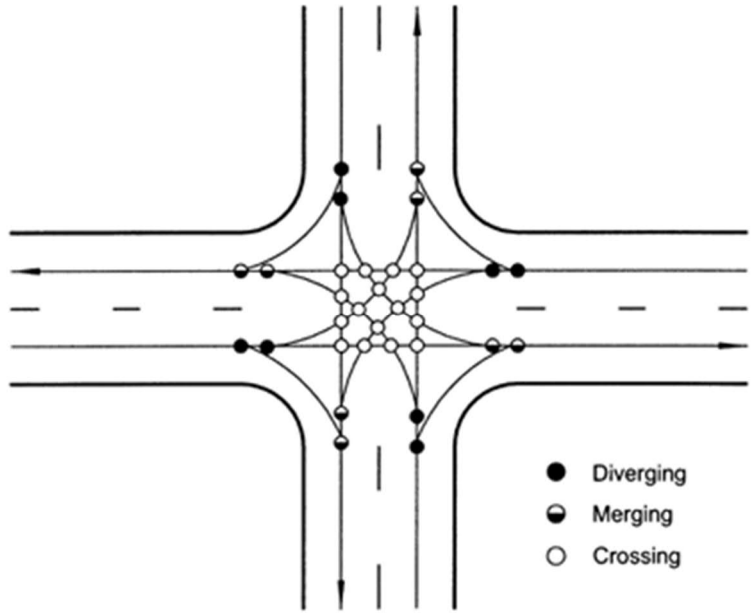


Figure 35: Conflicts at Intersection

Intersections are also a point of conflict for pedestrians (Harwood, D.W., Hutton, J.M., Hans, Z.N. Souleyrette, R.R. & Fields, M.A 2017). Over seventy percent of the pedestrian fatalities involving a single vehicle occur at intersections (Transportatoin Planner's Safety Desk Referenct 2007). Improvements to intersections can involve changing the geometry, changing operations or improving driver awareness.

The range of intersection improvements is broad. Table 3 shows some intersection improvements and the benefit cost ratio for them.

Table 28: Selected Intersection Safety Improvements

Improvement	Crash Reduction Factor	Benefit Cost Ratio
Update a rail crossing		14.1
Improve delineation & signing		4.2
Improve signal phasing		
Signalize the intersection		3.5
Add dedicated turn lanes		2.9
Roundabout conversion		2.0
Grade separate the intersection		1.5

Pedestrian & Bicycle Incidents

In the Region COG, pedestrians or bicyclists are involved in about ten percent of crashes. Unfortunately, or information on who, where and why is limited. Overall, he COG averages between five and six pedestrian fatalities a year with Chesterfield County averaging three pedestrian fatalities a year; Petersburg averaging a pedestrian fatalities a year and the other jurisdictions averaging less than one pedestrian fatality a year. However, staff recommends that the jurisdictions better maintain and updating sidewalks, trails and pedestrian crossings. Table 4 shows the potential reduction in crash frequencies for some typical pedestrian improvements.

Table 29: Pedestrian Accident Treatments

Sidewalk or Shoulder Type	% Accident Reduction
Barrier Separated Sidewalk	100%
Separated Sidewalk	99.6%
Sidewalk 3-10 feet (1-3 meters) from the road	99.5%
Sidewalk Adjacent to Roadway	99.5%
Paved Shoulder >7.8 feet (2.4 meters) wide	30%
Paved Shoulder 3 – 8 feet (1- 2.5 meters) wide	25%
Paved Shoulder < 3 feet (1 meter) wide	10%

Table 4 shows the potential reduction in crash frequencies for some typical bicycle improvements.

Table 30: Bicycle Accident Treatments

Bicycle Facility Type	% Accident Reduction
Barrier Separated Bicycle Path	100%
Separated Bicycle Path	99.5%
Dedicated On-Road Bike Lane	40%
Paved Shoulder >7.8 feet (2.4 meters) wide	20%
Curb Lane > 14 feet (4 meters) wide	15%
Paved Shoulder 3 – 8 feet (1- 2.5 meters) wide	15%
Paved Shoulder < 3 feet (1 meter) wide	10%
Shared Road Signage	5%

As, vehicle, speed goes up the likelihood of a pedestrian or bicyclist fatality goes from five percent (5%) at twenty (20) miles per hour to over eighty percent (80%) at forty (40) miles per hour.

Appendix D: Glossary of Acronyms

Acronym	Definition
AADT	Average Annual Daily Traffic
AC	Advanced construction funding (fund type TBD)
ADA	The Americans with Disabilities Act
ARRA	The American Recovery and Reinvestment Act (Economic Stimulus Act) Signed on February 17, 2009.
BROS	Off-system bridge
BST	State bonds
BTS	Bureau of Transportation Statistics
BTU	The British thermal unit (Btu or BTU) is a traditional unit of work equal to about 1055 joules. It is the amount of work needed to raise the temperature of one pound of water by one degree Fahrenheit.
CAFE	Corporate Average Fuel Economy Standards
CCALS	Commonwealth Center for Logistics Systems
CENTERLINE MILE(S)	A centerline mile is a measure of the total length (in miles) of highway facility in-place or proposed, as measured along the highway centerline
CLASS I RAILROAD	A railroad with annual operating revenue greater than $250,000,000
CLASS II RAILROAD	A railroad with revenues between those of a Class I and a Class III Railroad.
CLASS III RAILROAD	A railroad with annual operating revenue less than $20,000,000
CM	CMAQ funds
CM AC CONVERSION	CMAQ planned to be converted
CMAQ	Congestion Mitigation Air Quality
CMP	Congestion Management Process
CSX	CSX Transportation a Class I Railroad serving the Tri-Cities Area
DEMO	Demonstration Project Funds
DU	Dwelling Unit
EB	Equity Bonus (Minimum Guarantee) Funds
EJ	Environmental Justice as described in Executive Order 12898 and federal guidance derived from that executive order
EN	Enhancement
EQMG	Equity Bonus (Minimum Guarantee)
EV	Electric Vehicle
FAA	Federal Aviation Administration
FAF	Freight Analysis Framework
FALL LINE	The edge of the Piedmont / Coastal Plain, where various rivers cross from hard bedrock to soft sediments, is marked by a line of rapids and waterfalls called the Fall Line.
FARE	The money a passenger on public transportation has to pay
FARE BOX	The revenue derived from passenger fares
FAST ACT	Fixing America's Surface Transportation (FAST) Act, (Pub. L.114-94) was the 2015 surface transportation authorization act.
FEMA	Federal Emergency Management Administration
FHWA	Federal Highway Administration
FRA	Federal Rail Administration
FSM	GARVEE Soft Match
FTA	Federal Transit Administration
FY	Fiscal Year
GARVEE	Grant Anticipation Revenue Vehicle – Bonds secured by the expected federal transportation funds in future years.
GRV	GARVEE Bonds
HPD	High Priority Demo funds
HSIP	Highway Safety Improvement Program
IM	Interstate Maintenance

Acronym	Definition
IM AC CONVERSION	Interstate Maintenance planned to be converted
INT	Interest Income
ISTEA	The Intermodal Surface Transportation Efficiency Act of 1991. The Federal Transportation Authorization Bill signed on December 18, 1991.
ITS	Intelligent Transportation Systems-Transportation Management System and Technologies intended to improve the performance of the transportation system.
LANE MILE(S)	Lane-mile is a measure of the total length of traveled pavement surface. Lane-miles is the centerline length (in miles) multiplied by the number of lanes.
LCB	Lower Control Bound – In statistical process control the upper control bound represents a highest level of variance from the average that is expected. 99% of measured values should be below the UCB. (See UCB)
LEP	Limited English Proficiency
LOAD FACTOR	The number of passengers divided by the number of seats
LOS	Level of Service: A qualitative measure of service
LRP	Long Range Plan
LTO	Landing/Take Off Operations
MAP 21	Moving Ahead for Progress in the j21st Century. The Federal Transportation Authorization Bill signed on June 29, 2012
MG/EB AC CONVERSION	Equity Bonus (Minimum Guarantee) planned to be converted
MGEB	Equity Bonus (Minimum Guarantee)
MIX	Mix of federal (STP/MG/BR/BROS) and state funds
MM	Mile Marker
NEPA	The National Environmental Policy Act of 1970.
NH	National Highway funds

Acronym	Definition
NH AC CONVERSION	National Highway planned to be converted
NHPP	The NHPP provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.
NHS	The National Highway System
NO_X	Oxides of Nitrogen – a chemical compound that contributes to the formation of ground level ozone. NO_X is usually a product of high temperature high pressure combustion (for example jet engines or diesel engines)
OC	Open Container
OPR	Operating Revenue
OTHER	Other funds (state, local, etc.)
PE	Preliminary Engineering - Preliminary engineering is the location, design, and related work needed to advance a project to physical construction. Preliminary engineering includes preliminary and final design; both defined in 23 CFR 636.103, and other project-related work leading to physical construction. This includes costs to perform studies needed to address requirements of the National Environmental Policy Act (NEPA) and other environmental laws. It may include advertising and other pre-award work such as bid analysis, although it is also acceptable to include this work as construction engineering costs.
PPT	TIFIA (Public/Private Partnership)

Acronym	Definition
RSTP	The portion of STP funds allocated to urban areas over 200,000 in population See STP
RSTP AC CONVERSION	Regional STP planned to be converted
RTE.	Route
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users: The Federal Transportation Authorization Bill Signed into law on August 10, 2005. In some contexts, it indicates Congressionally earmarked funding.
SEHSR	Southeast High-Speed Rail
SRS	Safe Routes to School funds
STF	State funds
STM	State match
STP	The Surface Transportation Program (STP) provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.
STP AC CONVERSION	STP planned to be converted
STP/EN	Enhancement funds
STP/HES	Highway Safety funds
STP/RR	Rail Safety funds
STP/SRS	Safe Routes to School funds
TBD	Fund source to be determined
TEA 21	Transportation Equity Act for the 21st Century the Federal Transportation Authorization Bill Enacted on June 9, 1998.
TEU	Twenty Foot Equivalent Unit (the basic measure of shipping containers) is an inexact unit of cargo capacity describing the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks. The container is defined by its length though the height can be between 4 feet 3 inches (1.30 m) and 9 feet 6 inches (2.90 m), with the most common height being 8 feet 6 inches (2.59 m). By volume a TEU is approximately 1,360 cubic feet or 39 cubic meters.
TIP	Transportation Improvement Program
TITLE VI	Title VI of the Civil Rights Act of 1964
TOL	Tolls
TOLL	Tolls
TON	Long – 2240 pounds Metric or tonne- 1000 kilograms/2204 pounds Short – 2000 pounds By volume approximately 60 cubic feet
TRAN	DRPT Equity Bonus
TSM	Transportation Systems Management
TTI	Texas Transportation Institute
UCB	Upper Control Bound – In statistical process control the upper control bound represents a highest level of variance from the average that is expected. 99% of measured values should be below the UCB. (See LCB)
VDOT	The Virginia Department of Transportation
VDRPT	See DRPT
VMT	Vehicle Miles of Travel (1 car driving 1 mile is 1 VMT. 20 cars driving 10 miles each is 200 VMT.
VOC	Volatile Organic Compound – a chemical compound that contributes to the formation of ground level ozone. These may be naturally occurring or the result of industrial processes.