Charting a Course to 2040

SOUTH CAROLINA MULTIMODAL TRANSPORTATION PLAN

Technical Memorandum Nos. 11, 12, 13 & 14

TRANSPORTATION NEEDS BY MODE

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1. INTRODUCTION

This report identifies South Carolina's multimodal transportation needs. For each mode, an explanation is provided of the sources and methodology used to estimate the needs.

The modal needs addressed in this report include:

- State-maintained roadways,
- State-maintained bridges and culverts,
- Mass transit,
- Premium transit and passenger rail,
- Freight rail,
- Port and waterway,
- Aviation, and
- Bicycle.

Funding these needs is not the sole responsibility of SCDOT and it will involve the partnership of national, state, regional, local governmental agencies, quasi government agencies, as well as the private sector to address and these needs. SCDOT receives federal and state funds to address roadway, bridges, public transportation, and bicycle and pedestrian needs. The freight rail needs are addressed by either the South Carolina Public Railway or the private Class 1 railroads – CSX or Norfolk Southern. Port and waterway needs are addressed by the South Carolina Port Authority. Aviation needs are addressed by federal and state funds provided to the Department of Aeronautics.

The freight rail, port and waterway, and aviation needs were provided to SCDOT by other agencies and the planning horizons were much shorter than the year 2040, which is the out-year for the Multimodal Transportation Plan (MTP).

2. ROADWAY AND BRIDGE

2.1 Analysis Tools

Needs for roadways on the state maintained roadway system were assessed using FHWA's HERS-ST – Highway Economics Requirements System. This widely accepted analysis tool makes use of the state's detailed road condition database that is updated annually. HERS simulates roadway conditions and performance levels and identifies deficiencies through the use of engineering principles.

Similarly, bridge needs were evaluated using the National Bridge Investment Analysis System (NBIAS), which is an investment analysis tool that predicts bridge repair, rehabilitation, and functional improvement needs. This tool is based on the same analytical framework as the Pontis bridge program developed by FHWA in 1989 and subsequently taken over by the American Association of State Highway and Transportation Officials (AASHTO). AASHTO now owns and licenses Pontis to over 50 State transportation departments and other agencies. Pontis provides the bridge engineer with the tools to conduct detailed analysis of the performance of bridges. Both methods make use of detailed databases on infrastructure conditions that SCDOT updates continuously and submits to FHWA annually.

2.1.1 Previous Methodologies for Needs Estimation

There are several differences between how the 2030 MTP needs were developed in 2008 and the 2040 MTP needs update. The first is that the horizon year is extended ten additional years and secondly the 2040 needs analysis used nationally recognized analytical tools to identify highway and bridge needs. This more detailed analysis of South Carolina's multimodal transportation system resulted in a higher overall needs estimate for roadways and bridges than the 2030 MTP and the subsequent work of the Transportation Infrastructure Task Force,[1] which drew upon the 2030 MTP and extended estimates to 2033. The 2030 MTP combined needs information available at that time from a number of existing plans and sources, including SCDOT, MPOs and COGs. The 2040 MTP used SCDOT databases, design standards, cost estimates, and minimum tolerable conditions in FHWA supported analytical tools to develop the roadway and bridge needs. This new process is beneficial because it can be repeated in subsequent plan updates and provides a needs picture based on SCDOT data, design standards, and costs.

The following modal needs were developed by coordinating with SCDOT, MPOs, COGs, and other state agencies, which is the same process used to develop the 2030 MTP in 2008.

- New location roadways
- Routine maintenance
- Interstate interchange upgrades

[1] Transportation Infrastructure Task Force Final Report, December 6, 2012

- Preservation and reconstruction of non-FAE Secondary roads
- Culverts
- Mass transit
- Premium transit and passenger rail

The 2030 MTP did not identify needs for the aviation, freight rail, ports and waterways, and bicycle and pedestrian needs, as well as, culvert and bridge modernization and maintenance needs. However, to capture the full multimodal transportation needs in South Carolina, the 2040 MTP identified these needs based on input from SCDOT staff, South Carolina Port Authority, Department of Aeronautics, MPOs, and COGs.

2.2 SCDOT's Role in Roadway Infrastructure

The South Carolina Department of Transportation (SCDOT) is responsible for almost 41,500 centerline miles of roadway in the state, 62.8 percent of the state's total 65,997 miles of public roadway. South Carolina maintains the 4th largest roadway system in the nation. The SCDOT is responsible for preserving this system and planning for necessary upgrades in capacity and safety when traffic exceeds the designed functionality of the road.

SCDOT classifies this roadway system using three tiers, namely Interstate, Primary, and Secondary, as shown in **Table 2-1**. The interstate system is comprised of 11 routes, which are shown in **Table 2-2**. Nearly 30 percent of roadway travel in the state occurs on the interstate system even though it accounts for only 4 percent of the lane-miles. The primary system is mainly freeways, principal arterials, and minor arterials and consists mostly of U.S. routes and South Carolina state routes. The primary roads accommodate about 45 percent of travel in the state while accounting for 26 percent of lane-miles. The secondary system includes the remaining minor arterials, collector, and local roads under SCDOT jurisdiction. Only one-third of the secondary system is eligible to receive federal-aid. It is important to note that all of the Interstate and Primary system miles are federal-aid eligible (FAE).

In addition to the roadways themselves, as of January 1, 2013, the SCDOT also maintained 8,383 bridge structures.

Table 2-1: State Maintained Roadway Miles

System		Mileage		Lane-miles	
Interstate		851	2.1%	3,800	4.2%
Primary		9,475	22.9%	23,765	26.3%
Secondary	Federal-Aid	10,265	24.8%	21,058	23.3%
	Non-FA System	20,853	50.3%	41,819	46.2%
Total		**41,444**		**90,442**	

Source: SCDOT Highway Pavement Management System (HPMS), 2011 data

Table 2-2: Interstate System Roadway Miles

Route	Miles	Lane-miles
20	142	597
26	221	959
77	91	469
85	106	551
95	199	815
126	4	26
185	16	69
385	42	195
520	8	32
526	20	78
585	2	9
Total	**851**	**3,800**

Source: SCDOT HPMS, 2011 data

2.3 Roadway Needs

2.3.1 Roadway Needs Methodology

As noted earlier, needs for roadways on the state maintained roadway system were assessed using FHWA's analytical tool known as the Highway Economics Requirements System, State Version. The HERS-ST model is designed to analyze the effects of alternative funding levels on roadway performance. In selecting improvements for implementation, the model is designed to select only those projects whose benefits exceed initial construction costs.

2.3.1.1 HPMS Database

The roadway condition database known as the Highway Performance Monitoring System (HPMS) provides the input information for this analysis. SCDOT updates the state roadway system component of the HPMS annually and submits it to FHWA. The FHWA and the U.S. Congress combine this information with similar information from all other states into a national HPMS database and use it for roadway needs analyses, fiscal projections, and performance studies.

In the analysis conducted for the 2040 MTP, HERS-ST estimated future needs utilizing SCDOT HPMS data for 2011.

2.3.1.2 HERS-ST Inputs Customized for South Carolina

In addition to the database of existing pavement conditions, HERS-ST uses a variety of other inputs that can be customized to reflect conditions and business practices specific to a particular state. SCDOT staff played a major role in establishing the values for key HERS-ST inputs, including design standards, thresholds for roadway improvements, and improvement costs, as well as other parameters that were customized to reflect SCDOT's business practices.

Key input values for HERS-ST used to estimate roadway needs for the 2040 MTP are included in **Appendix A**. These inputs generally fall in the following broad groups:

- **Minimum tolerable conditions** – minimum standards of pavement condition and other road characteristics used to determine if improvements should be considered.
- **Design standards** – the standards of the road immediately after improvements are implemented.
- **Roadway Improvement Costs** – the unit cost of each type of improvement action, based on historical information on recent costs in South Carolina.

These key input values can vary by numerous characteristics, including roadway functional classification, terrain, urban/rural area, and level of traffic volume.

2.3.1.3 Roadway Need Categories

HERS-ST defines various types of roadway improvements. For summary purposes, these improvements have been grouped into three categories:

- **Preservation** – the improvement of pavement only - actions that do not change roadway geometry.
- **Modernization** – includes full-depth replacement of the roadway, as well as improvement projects that advance or sustain the safe and efficient operation of the roadway system.
- **Expansion** – capacity oriented projects whose principal purpose is to add lanes to the road.

The types of roadway improvements identified by HERS-ST and the corresponding category used in this report are shown in **Table 2-3**.

Table 2-3: Roadway Improvement Types

HERS-ST Improvement Types	Category
Reconstruction with High-Cost Lanes	Expansion
Reconstruction with Normal-Cost Lanes	Expansion
Reconstruction with Wider Lanes	Modernization
Reconstruction	Modernization
Resurface with High-Cost Lanes	Expansion
Resurface with Normal-Cost Lanes	Expansion
Resurface with Wider Lanes	Modernization
Resurface with Shoulder Improvements	Modernization
Resurface	Preservation

The improvement types within HERS-ST refer to actions or combinations of actions to improve roadways. All improvements involve resurfacing or reconstruction of the existing roadway in some capacity. However, other actions can be taken along with the initial improvement based on need. For example, “Reconstruction with High-Cost Lanes” means some of the existing roadway is being reconstructed, but more importantly that lanes are being added. The groupings are based on the

dominant action being taken. As lanes are being added this is primarily a capacity adding project and so would be classified as an Expansion project. Similarly, "Resurfacing with Wider Lanes" is a modernization effort because the lanes are increasing in width while being resurfaced and changing the performance and safety of the roadway, but there is no increase in the number of travel lanes.

Note that roadway maintenance needs are not considered as construction needs and are not included in the roadway needs estimated by HERS-ST. Roadway maintenance includes, but is not limited to:

- Sign maintenance and signal repair,
- General roadway maintenance such as mowing or traffic control, and
- Routine pavement maintenance such as patching.

For unpaved roads, maintenance costs represent the annualized rehabilitation and reconstruction costs (re-gravelling for example), as well as routine maintenance. Resurfacing is considered a construction need, not a maintenance need.

2.3.2 Projected State Roadway Needs

The 2040 roadway needs in South Carolina total $59.8 billion, including expansion, preservation, and modernization needs, as well as projected maintenance, for the entire 41,500 miles of state maintained roadways. Roadway expansion and preservation needs amount to $21.5 billion and $23.1 billion respectively, while modernization, such as wider shoulders for safety and bicycle accommodations, accounts for $10.2 billion and routine maintenance is estimated at $5.0 billion over the next 29 years.

With $12.9 billion in interstate expansion needs due to added lanes to increase capacity ($7.1 billion), interchanges ($3.4 billion), and a new interstate route, I-73 ($2.4 billion), interstate system needs, which total $18.9 billion, account for almost a third of all state roadway needs, to ensure continued mobility for both passengers and goods.

Approximately two-thirds of highway needs were projected using the HERS-ST analysis tool discussed above. Additional components of the total highway needs include the following:

- $3.4 billion for interchange upgrades, including $1.3 billion for three large interstate to interstate interchange upgrades,
- $2.4 billion for new interstates,
- $2.9 billion for additional new roadways on the primary and secondary systems,
- $5.0 billion for maintenance and general upkeep of the state system,
- $5.2 billion for preservation and reconstruction of non-FAE Secondary roads, and
- $1.2 billion for bicycle accommodations.

Table 2-4 shows the total roadway improvement costs for South Carolina through the 29-year needs analysis period, while **Table 2-5** shows the lane-miles of roadway improved. The largest improvement

costs were for expansion (36.0 percent) and preservation (38.6 percent) of the system, while modernization accounted for 17.1 percent of total needs. Maintenance of the system is estimated at 8.3 percent of the total projected expenditures over 29 years. In terms of lane-miles improved, preservation improvements accounted for 79.8 percent of the total, while modernization (17.9 percent) and expansion (2.3 percent) combined amounted to less than a quarter of the lane-miles improved. Maintenance does not have lane miles associated with the improvements.

Table 2-4: Improvement Cost (2011$ Million)

Category	Interstate	Primary	FAE Secondary	Non-FAE (Secondary)	Total	Percent
Expansion	$12,910	$7,816	$766	$0	$21,492	36.0%
Modernization	$2,673	$4,209	$1,272	$2,060	$10,214	17.1%
Preservation	$2,564	$10,326	$6,584	$3,588	$23,062	38.6%
Maintenance	$741	$1,306	$1,035	$1,908	$4,990	8.3%
Total	**$18,888**	**$23,657**	**$9,657**	**$7,556**	**$59,758**	**100.0%**

Table 2-5: Lane-Miles of Improvement

Category	Interstate	Primary	FAE Secondary	Non-FAE (Secondary)	Total	Percent
Expansion	2,072	2,483	406	0	4,961	2.3%
Modernization	1,972	13,255	10,288	13,683	39,198	17.9%
Preservation	6,847	63,698	48,013	56,049	174,607	79.8%
Maintenance	n/a	n/a	n/a	n/a	n/a	0.0%
Total	**10,891**	**79,436**	**58,707**	**69,732**	**218,766**	**100.0%**

2.3.2.1 Interstate

Interstates in South Carolina will require additional capacity during the next 29 years to accommodate the growth of daily commuters and other traffic. The Interstate system currently consists of 851 centerline miles and 3,800 lane-miles, making it the smallest component of the state system in size. However, it carries 37.2 Million vehicle-miles of travel (VMT) per day, which is 1/3 of all travel in the entire state. While VMT has not grown in recent years due to the recession that began in 2008, growth in VMT is projected during the period to 2040 and is the primary variable driving the expansion needs of the interstate system. With $12.9 billion in expansion needs due to added lanes to increase capacity ($7.1 billion), interchanges ($3.4 billion), and a new interstate route, I-73 ($2.4 billion), interstate system needs account for almost a third of all state roadway needs, to ensure continued mobility for both passengers and goods.

The total needs of the interstate system total $18.9 billion through 2040. As mentioned, the majority are expansion needs at $12.9 billion, which will add 2,072 lane-miles to the system. A further 6,847 lane-miles of existing interstate lanes will be improved through resurfacing totaling $2.6 billion. Almost $2.7 billion of the needs total is allocated to modernization improvements, which include reconstruction, on 1,972 lane-miles of interstate roads. Finally, $741 million will be required to help maintain the system. These maintenance effort projections include capital and other costs for the general upkeep of the system, such as routine mowing and storm-debris removal, as well as ad-hoc items such as crack-sealing of pavement and sign replacement.

2.3.2.2 Primary

The primary roadway is made up of US roadways and other major thoroughfares around the state that are locally important and connect major markets together within the state. The primary system totals 9,475 centerline miles and 23,765 lane-miles, all of which is on the federal-aid network.

While this system does not carry the same amount of daily traffic as the interstate system does, it is still a vital part of the South Carolina infrastructure. The needs on the primary system total $23.7 billion while improving 79,436 lane-miles. Preservation is almost half of the total at $10.3 billion, which improves 63,698 lane-miles to the primary system. Modernization needs total $4.2 billion while improving 13,255 lane miles. Lanes will also need to be added to the primary system during the analysis to mitigate existing congestion and growth in traffic volume. This totals $7.8 billion and adds 2,483 lane miles. Routine maintenance on the system will total an estimated $1.3 billion over 29 years.

2.3.2.3 FAE Secondary

The secondary system is the remainder of the state system. It is comprised of some minor arterials and collectors around the state. Approximately one-third of the secondary roads are on the federal aid network. This group totals 10,265 centerline miles and 21,058 lane-miles.

Total needs for the federal-aid eligible secondary system is $9.7 billion. Preservation is the principal improvement type for this system with $6.6 billion in needs over the life of the plan, 68.2 percent of the FAE Secondary system needs. Just over 48,000 lane-miles are resurfaced in this effort.

2.3.2.4 Non-FAE Secondary

The rest of the secondary roadways under state maintenance (20,853 centerline miles and 41,819 lane-miles) are not on the federal aid eligible (FAE) network. They are comprised of collectors and local roadways.

The total needs for the non-FAE roadways are $7.6 billion. Half of the needs ($3.6 billion) are preservation based improvements, which will resurface 56,049 lane miles. Modernization of these roadways, focusing on reconstruction of the road, will cost an estimated $2.1 billion. The routine maintenance of the non-FAE secondary roadway system requires the highest maintenance amount ($1.9 billion) of any state road category. This is explained by the size of Non-FAE secondary, which contains 50.3 percent of the centerline mileage, as shown in Table 2-1.

2.3.3 Planned New Roadways

New roads are always a function of the expanding network and population within a state and South Carolina is no different. The roadways listed in **Table 2-6** are new construction projects on new of right-of-way. These roadways are a combination of State and MPO planning efforts, but the responsibility for maintenance of all these new roads will lie with SCDOT as they are all state maintained. The total cost for these new roadways is $5.278 billion; this total includes the estimated $2.4 billion for the construction of I-73. The cost of the remaining 27 new roads is $2.878 billion.

2.3.4 Interchanges

Interchange needs were identified through a previous SCDOT planning effort and included in the TITF report. It is estimated that typical Interstate interchange upgrade costs are between $35 and $50 million each, depending on the project location, scope, and size and amount to $2.1 billion in total. The 50 interchanges needing upgrades represent 18.5 percent of the 271 interchanges on access controlled roadways across the state on interstates and freeways. Three large interstate to interstate interchange upgrades at I-85/I-385, I-26/I-20, and I-26/I-526 are anticipated to add an additional $1.3 billion, for a total of $3.4 billion for interchange upgrades.

Table 2-6: Projected New Roadways

County	New Location Projects	Estimated Cost (Millions)
Aiken	I-20 Frontage Connector	$10
Aiken	Bergen-Five Notch Connector	$9
Aiken	Whiskey/Centennial Pkwy Ext.	$9
Aiken	East Gate Extension	$16
Orangeburg	US 301 Connector	$34
Greenwood	Carolina Avenue Extension	$4
Lexington	John Hardee Expressway	$100
Richland	Shop Road Extension	$77
Lexington	Southern Connector	$22
Richland	Rabbit Run	$14
Sumter	New Frierson Road	$8
Sumter	Red Bay Road	$27
Sumter	Alice Drive Extension	$15
Lee	Bishopville Bypass	$20
Kershaw	Camden Truck Route	$21
Horry	Southern Conway Bypass (SELL)	$735
Horry	I-73	$2,400
Horry	Carolina Bays Phase III	$235
Horry	Carolina Bays Phase North	$95
Georgetown	Andrews Bypass Phase II	$39
York	Dave Lyle Boulevard	$220
York	East West Connector	$120
York	Galleria to Manchest Flyover	$15
Charleston	Mark Clark Expressway	$556
Charleston	Glenn McConnell Parkway	$121
Charleston	Port Access Road to I-26	$252
Charleston	Berlin Myers Parkway	$42
Charleston	Sea Island Parkway	$65
Total		**$5,278**

Source: SCDOT Planning Department, 2013.

2.4 Bridge Needs

SCDOT maintains 8,383 bridge structures[2] on the roadway system that are 20-feet or more in length and included in the National Bridge Inventory (NBI). In addition SCDOT also maintains smaller culverts. The 2040 bridge replacement, rehabilitation, and maintenance needs total $5.4 billion and are broken down as follows:

- Maintenance needs total $1.3 billion
- Modernization needs total $32 million
- Replacement needs total $4 billion
- Culvert needs total $90 million

2.4.1 Bridge Needs Methodology

Needs for bridges on the state's roadway system were assessed using FHWA's National Bridge Investment Analysis System tool.

2.4.1.1 National Bridge Investment Analysis System (NBIAS)

NBIAS is an investment analysis tool that predicts bridge repair, rehabilitation, and functional improvement needs. The system estimates bridge needs in dollars and by the number of bridges; distribution of work done; aggregate and user benefits; benefit-cost ratios for work performed, and physical measures of bridge conditions. Outcomes can be presented by type of work, functional classification, whether the bridges are part of the National Highway System (NHS), and whether the bridges are part of the Strategic Highway Network.

NBIAS is based on the same analytical framework as the Pontis bridge program first developed by the Federal Highway Administration (FHWA) in 1989 and subsequently taken over by the American Association of State Highway and Transportation Officials (AASHTO). AASHTO now owns and licenses Pontis to over 50 State transportation departments and other agencies. Pontis provides the bridge engineer with the tools to conduct detailed analysis of the performance of bridges. In order to perform analysis at such a detailed level, Pontis requires data on over 100 attributes pertaining to each individual bridge.

NBIAS incorporates economic forecasting analysis tools to provide planning staff with the ability to forecast the multiyear funding needs required to meet user-selected performance metrics over the length of a specified analysis period. NBIAS is modified to work with bridge conditions as reported by the States for the National Bridge Inspection System, as well as the attribute/condition state inspection regime used in Pontis.

2.4.1.2 Identifying Bridge Needs

South Carolina's bridge needs were identified through the analysis of the National Bridge Inventory (NBI) dataset. NBIAS analyzes bridge structures only and removes culvert records from the NBI dataset.

[2] As of January 1, 2013.

NBIAS can only predict and maintain needs for existing bridges. New bridge location analysis has to be performed outside of NBIAS, which is added to the NBIAS results.

NBIAS uses a parameter table to determine if a bridge is under the acceptable threshold for a structure based on roadway functional class, NHS status, or traffic level. If the bridge is deemed to be deficient by falling below any given level, then an action is required. This action is given a cost to improve, determined from unit cost data. Based on the available funds and the project's ranking related to the cost/benefit ratio, an action will be implemented or passed over to the next year of analysis.

The objective of NBIAS is to optimize the system condition and performance year by year. This will give a state the most efficient and reliable system possible. NBIAS uses the Pontis model to help determine the deterioration of the bridge over time and decide whether the bridge falls into a structurally deficient or functionally obsolete status.

2.4.1.3 NBIAS Inputs Customized for South Carolina

In addition to the NBI data, NBIAS uses a variety of other inputs that can be customized to reflect conditions and business practices specific to a particular state. As with HERS-ST, SCDOT staff again played a major role in establishing the values for key NBIAS inputs, including:

- **Improvement Policy Criteria** – minimum standards of bridge condition and other characteristics used to determine if improvements should be considered.
- **Design Standards** – the standards of the bridge immediately after improvements are implemented.
- **Bridge Improvement Costs** – the unit cost of each type of improvement action, based on historical information on recent costs in South Carolina.

Key input values for NBIAS used to estimate bridge needs for the 2040 MTP are included in **Appendix B**.

2.4.1.4 Types of Bridge Needs

As with roadway needs, bridge needs have been presented in terms of three categories in this report:

- **Maintenance** – Routine and as-need maintenance;
- **Rehabilitation** – Major work to improve structural integrity, safety, and functionality; and
- **Replacement** – replacement of bridge.

The bridge improvement terms maintenance and rehabilitation describe similar activities as do preservation and modernization in the context of roadways. However, the triggers for bridge replacement are somewhat different than those for roadway expansion. For example, bridge replacement is not only an appropriate improvement when a bridge is not wide enough to handle a widened roadway with additional travel lanes. When the age and reoccurring maintenance of a given bridge overshadows the cost to replace it, a bridge replacement will be recommended in these circumstances as well since the long-term benefit/cost ratio is favorable. This applies also to some types of rehabilitation needs. When a potential rehabilitation action is necessary, for example, raising a

bridge with clearance deficiencies, NBIAS will also consider the long-term impacts and the potential benefits that could be realized if the bridge were to be replaced. If the long-term benefit/cost ratio of replacement is just as viable (or better) than the long-term benefit/cost for the respective rehabilitation action, NBIAS will replace the bridge.

2.4.1.5 Improvement Criteria and Design Standards

In order to identify those bridges in need of rehabilitation, the NBIAS relies on input tables from the user. These include the improvement policy criteria for when a bridge should be:

- Widened,
- Raised, or
- Strengthened.

The criteria, also referred to as threshold conditions, are specific to each state and contain the legal condition standards for each bridge type, as defined by roadway functional class, National Highway System (NHS) status, and Annual Average Daily Traffic (AADT) class. The deficiency values trigger an improvement action when a bridge falls below the respective standard. Additionally, design standards set the bridge dimensions and engineering specifications NBIAS uses to determine the need for a replacement bridge.

Parameters used by NBIAS include design and legal standards for lane and shoulder widths, as well as the swell factor, which is a cost-increase coefficient used to estimate bridge replacement costs. All values used were modified through conversations with SCDOT technical staff and through reviewing DOT design manuals to reflect SCDOT's practices and preferences.

2.4.1.6 Bridge Unit Costs

Bridge unit costs are used to determine the improvement cost for each action taken (or potentially taken) by NBIAS. These values include activities such as widening, raising, strengthening, and replacing a bridge and can vary by functional class, national highway status, and/or traffic volume range. An improvement cost within NBIAS is determined by multiplying the unit cost for the improvement type by deck area that will be improved, considering the change in dimensions that may result from the improvement for widening or replacing a bridge. These costs do not necessary include sub-structure improvements, utility relocation, or right-of-way acquisition.

2.4.2 Projected Bridge Needs

2.4.2.1 Bridges

Across all the three bridge improvement types, total bridge improvement needs through 2040 total $5.4 billion, as shown in **Table 2-7**. The number of bridges affected during the plan is also shown, except for the maintenance category. The maintenance, or more fully the maintenance, repair, and rehabilitation (MR&R), action relates to general maintenance and rehabilitation actions on all bridges in the state, therefore no bridge count is shown for this action.

Table 2-7: LRTP Bridge Needs by Improvement Action (2011$ Million)

Improvement	Cost ($M)	Bridge Count
Maintenance	$1,281	N/A
Modernization	$32	219
Replacement	$4,037	5,145
Total	**$5,350**	**5,364**

2.4.2.2 Culverts

Culvert needs are not included in the above bridge needs. The long-range needs (2040) for existing culverts on the state system are $90 million. It should be noted that most of the existing bridge length culverts (approximately 1,000 that are over 20 feet in length) are expected to continually be phased out and replaced with a bridge structure. The cost for this is included in the 2040 culvert needs.

2.5 Summary of Needs

Roadway and bridge needs total $65,198 million over the next 29 years, as shown in **Table 2-8**. The roadway needs total $59,758 million, or 91.6 percent of the total roadway and bridge needs for South Carolina. The roadway needs include the three tiers of the roadway system - interstate, primary, and secondary (FAE and non-FAE) - and encompass interchange improvements, maintenance, and roads on new ROW. The bridge and culvert needs total of $5,440 million, or 8.4 percent of the state's total needs.

Table 2-8: Total Roadway and Bridge Needs Through 2040

Needs (29 year in $M)			
Roadway	Interstate	$12,352	$59,758
	Primary	$19,473	
	FAE Secondary	$8,622	
	Non-FAE Sec.	$5,648	
Routine Maintenance		$4,990	
Interchanges		$3,395	
Roads on new ROW		$5,278	
Bridges (all improvements)		$5,350	$5,440
Culverts		$90	
Total		**$65,198**	**$65,198**

3. MASS TRANSIT

The following section provides the public transportation needs and deficiencies for the State of South Carolina. The analysis includes general public transit needs based on existing services and future needs identified by public input, feedback from individual transit agencies, needs identified in existing plans, and feedback from the local COG, transit agency, and SCDOT staff.

3.1 Future Needs

Future needs for public transportation in the South Carolina were prepared and aggregated by transit agency, summarized by region, and for the state. The following section provides information used to calculate the overall statewide needs to maintain existing public transportation services and to enhance public transit services in the future.

3.1.1 Baseline Data

The primary source of documents used to establish the baseline and existing public transportation information was data reported to SCDOT annually from each individual transportation agency. The following list includes the primary sources of data.

- SCDOT Transit Trends Report, FY 2007-2011
- SCDOT Operational Statistics
- SCDOT FTA Section 5310, 5311, 5316, 5317 TEAM grant applications
- SCDOT Statewide Intercity and Regional Bus Network Plan, Final Report, May 2012
- South Carolina Interagency Transportation Coordination Council, Building the Fully Coordinated System, Self-Assessment Tool for States, June 2010
- SCDOT Provider Needs Survey, December 2012
- SCDOT Regional Transit Plans, 10 Regions, 2008

The development of public transportation future needs was undertaken as a two-step process by estimating costs for:

- Maintaining existing services; and
- Enhancing services.

3.2 Maintaining Existing Services

The long-range transit operating and capital costs to maintain existing services were prepared as follows:

- **Operating Costs**: To calculate the long-term needs for maintaining existing services, a 2011 constant dollar for operating expenses was applied to each of the transit agencies for the life of this plan, which extends to 2040, for a total of 29 years.
- **Capital Costs**: To calculate the capital costs for maintaining existing services, two separate categories were used:
  - Cost for replacing the existing vehicle fleet, and
  - Non-fleet capital cost.

Fleet data and non-fleet capital data are reported to SCDOT annually. The non-fleet capital costs may include facility maintenance, bus stop improvements, stations, administration buildings, fare equipment, computer hardware, etc. A four-year average from FY 2008-2011 data reported by each agency was used to calculate the fleet and non-fleet capital costs for maintaining existing services for the next 29 years. Other data used for the estimation of enhancement of services (as described in the next section) included the approximate value and year of each vehicle upon arrival to the transit agency. These values were used to estimate the average cost to replace the agency fleet.

Table 3-1 summarizes the operating, administration, and capital costs to maintain the existing services to 2040. Annual costs and total cost are also presented.

Table 3-1: Statewide Transit Needs, Maintain Existing Services Cost Summary

Type of Expenditure[(1)]	Maintain 2040 Total (29 yrs)
FTA 5307, 5309, 5311 Rural, Small Urban & Urban Transit Agencies	
Operations	$1,794
Capital: Fleet	$380
Capital: Non-fleet	$246
Capital: Total	$626
Total Needs	**$2,420**
FTA 5310: Administered by SCDOT for Elderly and Disabled Program	
Capital	$59
FTA 5311 Intercity Programs	
Services	$49
Total Statewide Needs: FTA 5307, 5309, 5310, 5311, 5311(f)Rural, Small Urban, Urban, Elderly & Disabled, and Intercity	**$2,528**

3.3 Enhanced Services

The second scenario for estimating future public transportation needs is Enhanced Services, which simply implies a higher level of service or more service alternatives for residents than exists today

across the state of South Carolina. The data sources for obtaining future transit needs were obtained from:

- SCDOT Transit Trends Report, FY 2011;
- SCDOT Operational Statistics;
- SCDOT FTA Section 5310, 5311, 5316, 5317 TEAM grant applications;
- SCDOT Statewide Intercity and Regional Bus Network Plan, Final Report, May 2012;
- SCDOT Provider Needs Survey, December 2012;
- SCDOT Regional Transit Plans, 10 Regions, 2008;
- MPO Long Range Transportation Plans;
- Transit Development Plans, where applicable; and
- 2040 MTP public comments from website, statewide public transportation survey, and other public outreach.

The aforementioned planning documents were the primary resources used to identify future transit needs for the state. For some areas, more detailed future cost and project information were available. In other areas, projects were identified and shown as needed, but the plans did not include cost estimates for the service or project. In these cases, the average transit performance measures were used to determine a cost for the project or recent estimates for similar projects completed by the consultant team were used. Many needs for expanded rural and urban services were identified from recent public outreach efforts, within the above adopted plans, and also in the 2008 Human Services Coordination Plans. The needs included more frequent service, evening, weekend, employment services, and rural transit connections to major activity locations.

Table 3-2 shows a summary of the operating, administration, and capital costs for enhanced transit services through 2040. The 10 Regional Transit and Coordination Plans provide the detailed needs information for each transit agency.

3.4 Needs Summary

To summarize, the total public transportation needs to maintain existing transit services and for enhanced transit services for the state of South Carolina is shown in **Table 3-3**. The public transit services across the state consist of a wide variety of services. Both general public transit services, commuter services, intercity services, and specialized transportation for the elderly and disabled are important components of the overall statewide transportation network.

Table 3-2: Statewide Transit Needs - Enhanced Services Cost Summary

Type of Expenditure[1]	Service Expansion
FTA 5307, 5309, 5311 Rural, Small Urban & Urban Transit Agencies	
Operations	$781
Capital: Fleet	$412
Capital: Non-fleet	
Capital: Total	$412
Total Needs	**$1,193**
FTA 5310: Administered by SCDOT for Elderly and Disabled Program	
Capital	n/a
FTA 5311 Intercity Programs	
Services	n/a
Total Statewide Needs: FTA 5307, 5309, 5310, 5311, 5311(f)Rural, Small Urban, Urban, Elderly & Disabled, and Intercity	**$1,193**

Notes: (1) Needs in Millions of constant 2011 dollars.

Table 3-3: South Carolina Mass Transit Needs

Type of Expenditure[1]	Maintain Existing Services	Service Expansion	Total
FTA 5307, 5309, 5311 Rural, Small Urban & Urban Transit Agencies			
Operations	$1,794	$781	$2,575
Capital: Fleet	$380	$412	$1,038
Capital: Non-fleet	$246		
Capital: Total	$626	$412	$1,038
Total Needs	**$2,420**	**$1,193**	**$3,613**
FTA 5310: Administered by SCDOT for Elderly and Disabled Program			
Capital	$59	n/a	$59
FTA 5311 Intercity Programs			
Services	$49	n/a	$49
Total Statewide Needs: FTA 5307, 5309, 5310, 5311, 5311(f)Rural, Small Urban, Urban, Elderly & Disabled, and Intercity	**$2,528**	**$1,193**	**$3,721**

Notes: (1) Needs in Millions of constant 2011 dollars.

4. PREMIUM TRANSIT AND PASSENGER RAIL

The planning level cost estimates for identified premium transit and passenger rail projects are estimated to be $566 million for BRT projects, $46 million for commuter rail, and approximately $1.0 billion for high speed rail, as summarized in **Table 4-1**. The Atlanta to Charlotte Passenger Rail Corridor Investment Plan (PRCIP) study is currently ongoing with scheduled completion in 2015 and is expected to provide revised estimates for high speed rail.

Table 4-1: Premium Transit and Passenger Rail Project Cost Estimates

Project	Cost Estimate ($ millions)
Rock Hill – York County – Charlotte BRT	$516 (1)
Greenville BRT – I-385	$50 (2)
South Carolina portion of Atlanta to Charlotte High Speed Rail	$1,038 (3) (4)
Charleston Commuter Corridor	$46
Total	**$1,650**

Notes:
(1) Rock Hill – York County – Charlotte Rapid Transit Study.
(2) Estimate for planning purposes
(3) Cost estimate from Evaluation of High-Speed Rail Options in the Macon-Atlanta-Greenville-Charlotte Rail Corridor, Volpe National Transportation Systems, August 2008.
(4) Atlanta to Charlotte Passenger Rail Corridor Investment Plan (PRCIP) study is currently ongoing with scheduled completion in 2015

The **Rock Hill - York County - Charlotte Bus Rapid Transit Service** would run from downtown Rock Hill along US 21 to the I-485 light rail station. The buses would operate in dedicated guide-ways and in general purpose lanes where roadway expansion is constrained. According to the *Rock Hill – York County – Charlotte Rapid Transit Study*, the capital cost estimate for the project is approximately $516 million. The project would be completed in four stages.

- **Phase 1**: start-up phase with all-day limited-stop service connecting the RFATS Study Area with the I-485 light rail station.
- **Phase 2**: Addition of local bus service to Tega Cay and Fort Mill and new connections to Gold Hill Commons.
- **Phase 3**: Implement first stage of exclusive BRT right-of-way segments.
- **Phase 4**: Implementation of the remaining exclusive BRT right-of-way segments.

Greenville BRT - *The Multimodal Transit Corridor Alternatives Feasibility Study* published by the Greenville County Economic Development Corporation was published in March 2010. The study

identifies two BRT alternatives between Fountain Inn and Greenville, one along I-385 ($50 million) and the other route along Main Street in Mauldin ($47.4 million). Each project includes costs associated with stop location amenities, such as, benches, lighting, and shelters and route infrastructure costs, including asphalt paved transitway for the portion outside the GCEDC right-of-way, traffic signal preemption systems for the portion outside the GCEDC right-of-way, and widening of existing bridge structures to accommodate the BRT route. Both BRT routes would total 18.7 miles each. For purposes of the LRTP, the $50 million will be used for the Greenville BRT needs estimate.

Currently, the **Atlanta to Charlotte High Speed Rail** study is underway and cost estimates are not yet available. Recommendations from an *Evaluation of High-Speed Rail Options in the Macon-Atlanta-Greenville-Charlotte Rail Corridor* conducted by Vople National Transportation Systems, dated August 2008, included the need for the states (North Carolina, South Carolina, and Georgia) to develop innovative funding approaches to pay for capital and unified operating deficits, with the latter estimated at $4 to $5 million in 2025. Capital route costs, which exclude equipment, operating and maintenance costs, for the Charlotte-Atlanta segment running through South Carolina with the “best case” scenarios were $1.16 billion and $1.40 billion for 125 mph and 150 mph operation, respectively, in 2006 dollars. Approximately one-half of the 262 miles between these two points lies in South Carolina. Based on an annual cost escalation factor of 3 percent, the cost estimates for capital route costs, which exclude equipment, operating and maintenance costs, are approximately $1.60 in 2011 dollars.

5. RAIL FREIGHT

Cost estimates for short line rail rehabilitation, capacity/service, and safety improvement projects total $248 million, as shown in **Table 5-1.** Class 1 railroads (CSX and Norfolk Southern) did not provide any rehabilitation, capacity/service, and safety needs. Based on limited public information, there is $100 million for undefined grade crossing improvements, capacity increases and bottleneck relief for the Class 1 railroads.

Table 5-1: Estimated Rail Freight Needs

Type of Needs	Needs (Millions)
Short Line	
Rehabilitation	$92
Capacity / Service	$153
Safety	$3
Short Line Total	**$248**
Class I	**$100**
Total	**$348**

6. PORT AND WATERWAY

6.1 Marine Terminals

The South Carolina Posts Authority (SCPA) owns, manages, operates, and finances the public port terminals in South Carolina. These include the Ports of Charleston and Georgetown. Over the past several years, the SCPA has recognized the need to coordinate better with other state agencies to provide the complete package to their customers, which includes both water side services as well as land side connections to markets. This need is currently being addressed by holding quarterly coordination meetings of the SCPA, SCDOT, and South Carolina Department of Commerce. These conversations include issues that affect business across all roles and responsibilities of these three agencies, and ensure planning efforts move ahead with coordination and collaboration across agencies.

6.1.1 Current Needs

The SCPA is executing an active plan to expand their overall capacity to handle containers by 50 percent without expanding their footprint. SCPA is executing this plan in a tri-faceted manner. One way of expanding capacity that is in progress is diversifying the current facilities. A second way is planning and constructing the Inland Port Facility in Greer, SC to address the needs for rail based connections. The third manner in which the SCPA is expanding capacity is by constructing the North Charleston Terminal at the former Naval Base.

Currently, the existing navigation channels serving public and private marine terminals in the Charleston area were designed to accommodate dry bulk, tanker and container vessels limited to a draft of about 42 feet[3]. This serves the current needs of Panamax-class and some Post-Panamax vessels, but larger vessels are expected to exceed the design of Charleston Harbor. This need, a potential limitation to accommodation of larger vessels, is being addressed to support the operations of SCPA with the Post 45 Harbor Deepening project to support the increased business and increased size of ships calling on the Port of Charleston. The Port of Charleston and the United States Corps of Engineers (USACE) recognize the national importance of deepening the harbor as well as the most effective way to use federal dollars for such projects (SCPA).[4] The need for this project is well documented and into the environmental permitting process, in development by USACE[5].

Specific needs for the project are, as defined by the USACE[6]:

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[3] US Army Corps of Engineers. July 2010. "Section 905(b) (WRDA 86) Analysis."
[4] SCPA. (n.d.). http://www.port-of-charleston.com/default.asp. Retrieved March 5, 2013, from http://www.port-of-charleston.com/Cargo/ReadytoGrow/harbordeepening.asp.
[5] US Army Corps of Engineers. (n. d.). www.sac.usace.army.mil. Retrieved March 26, 2013 from http://www.sac.usace.army.mil/Missions/CivilWorks/CharlestonHarborPost45.aspx
[6] US Army Corps of Engineers. July 2010. "Section 905(b) (WRDA 86) Analysis."

- Current harbor depth limits opportunities to accommodate these larger class vessels which are a growing percentage of the world fleet, and allow for economies of scale and transportation cost savings.
- Growth trends in container traffic indicate that the Container ports will need to handle more traffic with expected population growth in South Atlantic Region. Traffic will be exacerbated by an expected shift in trade routes from the West Coast to East coast with the opening of the Panama Canal in 2014. Lack of ports available to handle these larger container vessels would result in inefficiencies in commodity movement as well as safety concerns resulting in increased transportation costs."
- Existing Container services are now deploying Post-Panamax vessels that are calling in Charleston Harbor. These vessels are being forced to delay waiting for tidal advantage due to draft restrictions."

In 2011, SCPA and USACE entered a "Feasibility Cost Sharing Agreement" to fund the feasibility of harbor deepening at a 50/50 cost. The timeline on the feasibility study has completion anticipated by late 2015. The total project cost is estimated at $300 million and is funded by the SCPA, South Carolina's legislature, and the federal government. SC State legislature has dedicated funds towards the project. This project is expected to be complete and Charleston Harbor Deepened to 50 feet before 2020. This project has been included in the "We Can't Wait Initiative" for critical national infrastructure projects.

The Port of Georgetown is a dedicated breakbulk and bulk cargo terminal in Georgetown, SC. Examples of commodities moving through the Port of Georgetown include steel, cement, aggregates and forest products. At this time, the harbor accessing the Port of Georgetown is limited in depth to 27 feet at mean low water[7], but there is not a current demand for this facility to justify the effort to deepen the harbor in the near future.

Aside from these projects, SCPA operates an annual Capital Plan that is typically funded completely by SCPA. This includes standard planning for equipment, cranes, wharf maintenance, and other capital needs of the port terminals.

In the near term, SCPA has the following in the Capital Plan:

- $1.3 billion investment in new and existing facilities within the next decade.
- Of that $1.3 billion, near term investment includes a new terminal operating system that will improve on-terminal operations and processes, construction of the cruise terminal facility in Charleston, construction of the new North Charleston container terminal, and construction of the Inland Port Facility in Greer, SC.[8]

[7] US Army Corps of Engineers. (n. d.). www.sac.usace.army.mil. Retrieved March 21, 2013 from www.sac.usace.army.mil/Portals/43/docs/navigation/CCR_GTH_201302.pdf
[8] Online SCPA Capital Plan, http://www.port-of-charleston.com/Cargo/ReadytoGrow/capitalplan.asp; accessed March 5, 2013

SCPA is a self-funded agency; the $1.3 billion capital plan will be implemented with internally generated funds as well as bond issues backed by the organization itself, opposed to external sources of funding.

Outside of property owned and operated by SCPA, needs recognized for the movement of goods once on land include improved roadway infrastructure to support intermodal connections and access to distribution centers and increasing safety and efficiency of goods movement through the supply chain. Predominantly, the Interstate system is responsible for supporting the goods moving through the Port of Charleston by truck. More specifically, I-26 and I-85 at I-385 are referenced in survey respondents through the stakeholder outreach effort of the SC Statewide Freight Plan. While directly related to the success of the Port of Charleston, those roadways needs are not included in "Port" needs.

6.1.2 Forecast Needs

Looking to the future is a challenge for any industry, and with the ever shifting trends in the global economy, the Ports of Charleston and Georgetown look ahead to the next ten years. Referencing the increase in capacity at the port terminals in South Carolina, it is assumed that forecast needs will include roadway capacity to transport containers via truck. These are the needs addressed by this assessment as needs of this nature are much longer in project planning and forecasting.

On the landside of Port goods movement is the need for demand for dual-access rail service to the Port of Charleston in order to keep this mode of transport equitable for competitiveness. This demand also reflects the recent and expected future growth in the Southeastern United States, in both population and economic development. This consumer market is recognized by the shippers in the marketplace, and those shippers are looking to rail for both cost effective and fuel efficient modes of transport to get their imported goods to their markets. This demand is also recognized in the growing export markets, which include heavy commodities typically shipped via rail, including petroleum products.

Currently, the South Carolina Department of Commerce Division of Public Railways (SCPR) is progressing plans to develop an Intermodal Container Transfer Facility (ICTF) in North Charleston, SC. This ICTF is conceptualized as a dual access, providing business support for both CSX Transportation and Norfolk Southern, to move containerized cargo to and from the Port of Charleston via rail. The ICTF project is recognized as an "essential component to the efficient and cost-effective accommodation of the rapid growth in commerce anticipated after the Panama Canal is widened in 2014."[9] The location of the ICTF is at the former Navy Base and is adjacent to the permitted port terminal, now under construction, in North Charleston. The ICTF is moving into the NEPA permitting process in summer 2013.

[9] *City of North Charleston* v. *SC Department of Commerce, Division of Public Railways* and *Clemson University*, 2011-CP-10-491; *City of North Charleston* v. *SC Department of Commerce, Division of Public Railways*, 2011-CP-10-492; *City of North Charleston* v. *SC Department of Commerce, Division of Public Railways*, 2011-CP-10-493; *City of North Charleston* v. *SC Department of Commerce, Division of Public Railways*, 2011-CP-10-5550; *North Charleston Sewer District* v. *SC Department of Commerce, Division of Public Railways*, 2011-CP-10-3147, Settlement Agreement and Release, South Carolina Court of Common Pleas, Ninth Judicial Circuit (2012).

Also in support of the growing cargo demand through the Port of Charleston, a Port Access Road is planned for the direct connection between the permitted port terminal, now under construction, and I-26. This roadway is conceptualized and permitted to provide truck access to the new marine terminal without adding truck traffic to local roadways in the communities surrounding the port terminal. Per the Intergovernmental Agreement between the South Carolina Department of Transportation and South Carolina State Ports Authority, the roadway will be "constructed and operational and available for by all port related traffic when the approved Terminal Project opens for business."[10] The first phase of the new terminal is planned for fiscal year 2019.[11] Funding commitments are in place for the design and construction of the Port Access Road in the amounts of:

1. $5 million – General Assembly of the State of South Carolina 2006 obligation to SCDOT
2. $10 million – Federal Earmark 2006
3. $167,541,103 in surplus general fund revenues credited to Contingency Reserve Fund and then appropriated for the "State Ports Authority Port Access Road"
4. BALANCE will be funded by general funds of SCPA

SCDOT is committed to the administration of the project of designing and building the Port Access Road in partnership with SCPA. The Port Access Road is currently permitted for construction and is considered fully funded.

In terms of long term needs on the Port terminals, SCPA fully expects to continue planning for capital improvements as currently practiced. All needs at this time are included in the current needs section, as they are within a 10 year time frame.

6.2 Strategic Trends

As reiterated through the current and forecast needs of South Carolina's ports and waterways, the trend in the shipping business is toward larger, Post-Panamax ships. These require deeper harbors and more capacity at port terminals. Larger ships include a greater number of containers. This increase in demand will need to be recognized in the demand for additional capacity of the land side transportation system as well as the above mentioned improvements on the water side of the shipping industry.

Transload facilities are a growing need for the Port of Charleston market. Shippers recognize the cost of fuel, reliability, and availability of truck drivers as concerns for future transportation of goods. Transloading goods are commodities shipped from longer distances by rail to a transloading facility where goods are then transloaded into containers suitable for export through the Port of Charleston. Transload facilities currently operating in South Carolina typically specialize and move a single commodity. The emerging market of moving goods into South Carolina by rail and then transloading

[10] Intergovernmental Agreement between the South Carolina Department of Transportation and the South Carolina State Ports Authority for the Completion of the Port Access Road, dated July 16, 2009.
[11] http://www.scspa.com/Cargo/ReadytoGrow/newterminal.asp (accessed May 16, 2013)

into containers for export include petroleum products and dry bulk goods like soybeans. The increase in this supply chain for goods movement will depend upon those market sectors as well as the availability for rail access to potential transload facility properties. This type of facility would also reduce the need for long-distance truck service, but more short hauls, which are more desirable by truck drivers.

6.3 National Context of Needs

The expected population growth in Southeastern United States compared to other regions of the United States in coming years is well documented. According to the US Census Bureau, while the United States population is expected to grow 29.2 percent between 2000 and 2030[12], growth in regions of the country will vary greatly. The Northeast and Midwest are projected to increase by 7.6 percent and 9.5 percent, respectively, during that same period. The South and West, on the other hand, have population growth forecasts of 42.9 percent and 45.8 percent, respectively. This trend has not gone unnoticed by manufacturers, retailers, and the transportation industry. The consumer goods market is expected to continue growing in this region as the population continues to increase. Getting imported goods to market will require a system of efficient harbors, port terminals, roadways and rail facilities to address the demands of a wide range of goods shipments.

Understanding this range of goods movement, by Post-Panamax ships by water and by truck and rail landside, the southeastern United States must prepare infrastructure on multiple levels. As discussed, the harbor deepening and on-going harbor maintenance are necessary to address the ocean movements. For a sustainable goods movement system, or supply chain, land side capacity must be complimentary. This evolving economy of the Southeastern United States has included the increase of automobile and aerospace manufacturing. Manufacturers have adopted a “just in time” system of production, depending upon a reliable, safe and efficient supply chain. The consumer base around those industries, along with a growing presence of distribution companies in the region, such as Amazon and QVC, will require expedient delivery of consumer goods to market. Just as the economy fluctuated from 2005 – 2010, these markets will continue to change and develop, and the shipping industry will continue to change with those demands. The infrastructure network will need to be inherently flexible to support long term change and growth.

In addition to the near term economic development goals of South Carolina, a visionary transportation system will be required for the economic sustainability of the region and of the United States.

6.4 Navigable Waterway Corridors

6.4.1 Inland Waterways

South Carolina is home to 480 miles of inland waterways[13]. Most of these numerous inland waterways that are authorized navigation projects are utilized for recreational purposes, flood control, and in some cases water supply. Those types of waterway corridors that are operated and maintained by the

[12] U.S. Census Bureau, Population Division, Interim State Population Projections, 2005. Internet Release Date: April 21, 2005.
[13] ASCE Annual Report Card

United State Army Corps of Engineers (USACE)-Charleston District are listed in **Table 6-1**. It is also noteworthy that several hundreds of miles of inland waterways are designated South Carolina State Scenic Rivers. The major waterway corridors utilized for navigation and freight movements are located along the coast of South Carolina and are discussed in the next paragraph.

Table 6-1: Waterway Corridors Used for Recreation, Flood Control

Waterway Corridor	Last Annual Report Completed
Adams Creek	1978
Archers creek	1914
Ashley River	1955
Brookgreen Gardens	2009
Calabash Creek	2003
Charleston Harbor Rediversion	2001
Edisto River	1938
Folly River	2009
Great Pee Dee River	1950
Jeremy Creek	1996
Little River Inlet	2009
Lynches River and Clark Creek	1982
Mingo Creek	1950
Murrells Inlet	2009
Port Royal	2004
Salkahatchie River	1896
Santee River	1950
Town Creek	N/A
Village Creek	1985
Waccamaw River	1978
Wateree River	1940

6.4.2 Major Areas of Navigation

Three major areas of navigation along the coast include Charleston Harbor, Georgetown Harbor, and the Atlantic Intracoastal Waterway (AIWW). The confluences of primary and secondary waterway corridors along the coast are concurrent with the two major port locations, such as the confluence of the Cooper, Ashley, Wando and Stono Rivers that empty into the Charleston Harbor. The Georgetown Harbor and Port of Georgetown, located 50 miles northeast of Charleston, are situated on the Atlantic Ocean with a connecting entrance channel and a turning basin within the adjoining Sampit River. The Atlantic Intracoastal Waterway (AIWW), South Carolina portion, runs the length of the South Carolina coastline, including popular vacation destinations like Charleston, Hilton Head and Myrtle Beach. Lesser bodies of water that make up this segment of the AIWW include the Town Creek, Little, Waccamaw, North Santee, Wadmalaw, Stono, Dawhoo, Ashepoo, Beaufort and Savannah Rivers, as well as dozens of creeks and cutoffs. Dimensional characteristics of the major navigable waterway corridors are presented in **Table 6-2**.

Table 6-2: Characteristics of Major Waterway Corridors, SC

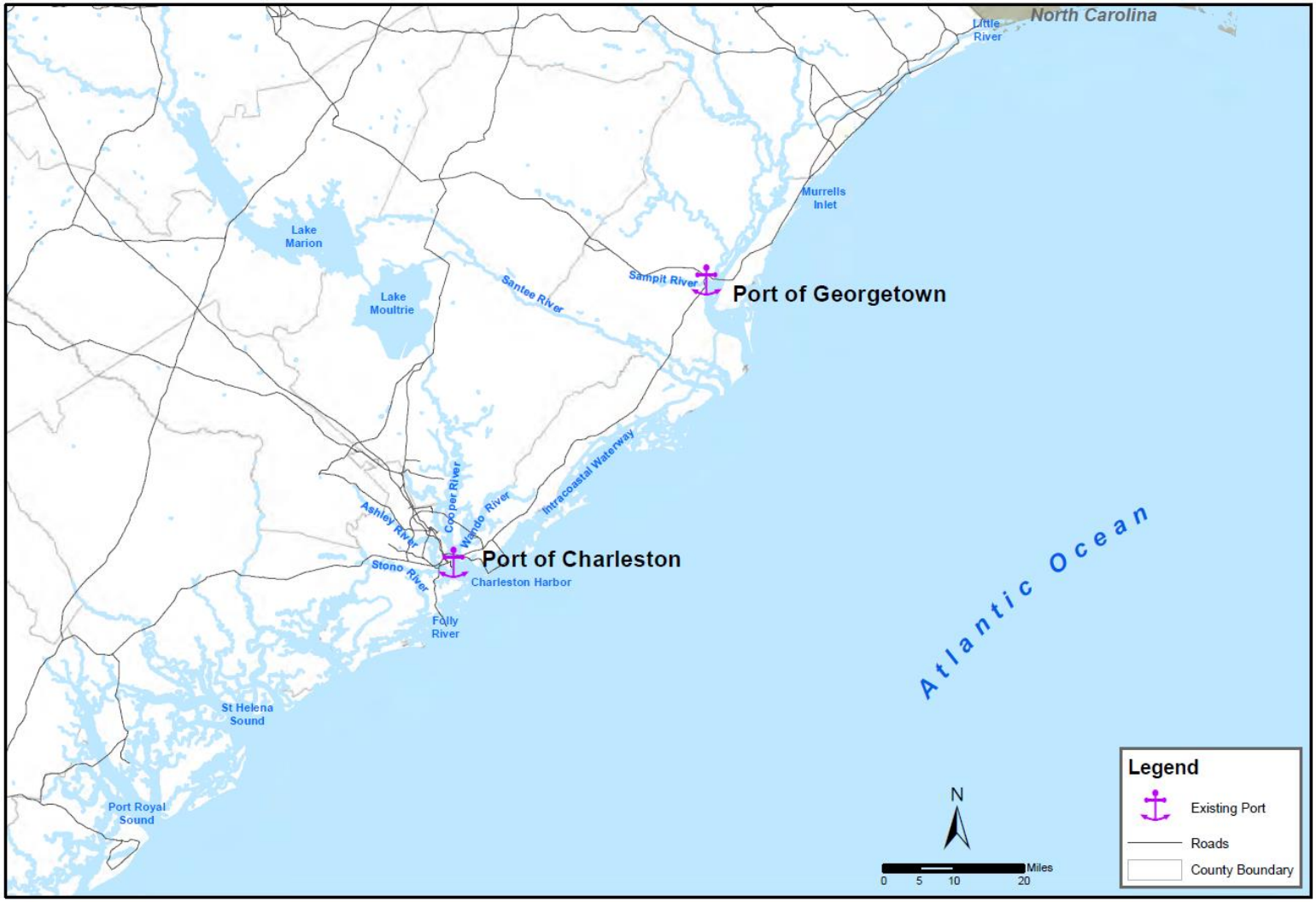
Waterway Corridor	Depth (ft)	Width (ft)
Charleston Harbor (Entrance Channel)	47	800
Georgetown Harbor (Entrance Channel)	18.5	600
Atlantic Intracoastal Waterway (SC Portion)	12	90

For these federally authorized channels and harbors, maintenance is principally the responsibility of USACE – Charleston District. The Corps' primary navigation responsibilities include planning and constructing new navigation channels and locks and dams, and dredging to maintain channel depths at U.S. harbors and inland waterways.

Charleston District's most active navigation project is Charleston Harbor. The District also has responsibility for the Atlantic Intracoastal Waterway, Georgetown Harbor, and four other small harbors along the coast (primarily recreational), which include Little River, Port Royal, Murrells Inlet, and Folly River Inlet, as shown in **Figure 6-1**.

The Corps has maintained Charleston Harbor for more than 130 years and has dredged it every year during that time to ensure the channel is at the required federal project depth, spending approximately $10-15 million and removing 2-3 million cubic yards of maintenance material from the harbor floor each year. Construction to deepen the harbor to the now federally authorized 45 foot depth began in 1999 and was completed in 2004. However, as stated previously, additional deepening of Charleston Harbor is needed to accommodate both growth trends and demand for goods in the area as well as the ability to accommodate larger container carrying vessels.

Figure 6-1: South Carolina Ports and Inlets



6.4.3 Waterborne Commerce and Its Impact

Based on data from the Waterborne Commerce Statistics Center (2010), the Port of Charleston handled over 17.9 million short tons of cargo. Compared to total tonnages of waterborne commerce handled by the entire State of South Carolina, 18.1 million short tons, the Port of Charleston accounted for over 95 percent. From 2002 to 2007, imports rose 34.2 percent[14] and following the peak of recession in 2009, the port realized an 11 percent increase in tonnage handled between 2009 and 2011[15]. Additionally, statistics provided by the South Carolina Ports Authority indicate the Port of Charleston realized a 12 percent increase in containers handled between 2011 and 2012.

The top three trade routes and trading partners using the Port of Charleston include Northern Europe, Northeast Asia, and India and other Asian countries—accounting for 70 percent of cargo handled at the port. The remaining 30 percent of cargo handled at the port involves trade with South and Middle America, the Mediterranean, Africa, Middle East, and the Caribbean. Major commodities include petroleum and petroleum products, chemicals and related products, primary manufactured goods, iron and steel products, manufactured equipment and machinery.

From the perspective of economy for the State of South Carolina, the port is an integral component, supporting over 10 percent of total jobs in the state with earnings of over $11 billion, which is equal to over 13 percent of South Carolina's total income. The tax impacts associated with port-related activity totals an estimated $1.5 billion annually, and the combined added value impact, $18.5 billion, associated with port activities is 12 percent of South Carolina's gross state product. The manufacturing sector in South Carolina is especially reliant upon effective transportation systems, particularly the navigable waterway corridors—which enable the manufacturing sector to compete in an increasingly competitive global environment.

In summary, the Charleston Harbor and the Port of Charleston, and to a lesser extent the other smaller ports and harbors, clearly impact South Carolina's economy in a positive manner. The importance of maintaining and continuing to improve the waterway corridors and the harbor associated with the port cannot be overstated.

6.5 Summary of Ports and Waterway Needs

The cost estimates of needs for Ports and Waterways in South Carolina, shown in **Table 6-3**, are provided for both "Preservation" and "Expansion" scenarios. Preservation should be considered as maintenance of current business and operations with typical growth. Expansion should be considered a scenario of growth in business and operations.

[14] Economic Impact Study, Wilbur Smith Associates (now CDM Smith), 2008
[15] WCUS, 2011.

Table 6-3: Summary of Port and Waterway Needs with Associated Costs (in Thousands)

Identification	Preservation Needs		Expansion Needs	
	Description	Cost	Description	Cost
Waterways				
Atlantic Intracoastal Waterway	Maintenance dredging	$1,717	NA	
Charleston Harbor	Maintenance dredging	$10,163	Channel deepening	$300,000
Cooper River (Charleston Harbor)	Maintenance dredging	$5,138	NA	
Georgetown Harbor	Maintenance dredging (annual to maintain current depth)	$1,016	NA	
	Maintenance dredging needed to return to original depth	$30,000		
	Maintenance dredging once returned to original depth (will likely exceed current annual maintenance and is estimated at twice current annual costs)	$2,032		
Town Creek	Maintenance dredging	$7	NA	
Total for Waterways		**$50,073**		**$300,000**
Ports				
Charleston Harbor	Annual operating costs to maintain current or acceptable conditions; this cost is based on average annual cost for berth maintenance dredging over the past 5 years	$2,400	Capital improvement plan (10-year plan)	$1,300,000
			(Includes new container terminal, major infrastructure improvements, technology upgrades, and new cruise terminal)	
Georgetown Harbor	Annual operating costs to maintain current or acceptable conditions; this cost was incurred in 2008 - additional dredging has/will not be done again until the Harbor is returned to its original depth	$208	Capital Improvement Plan (10-year plan); this plan will not be implemented until the Harbor is returned to its original depth	$6,000
Total for Ports		**$2,608**		**$1,306,000**

Notes:
1) Dollar amount for dredging maintenance was provided by Charleston District USACE (2010)
2) Annual operating costs for the Ports was provided by SCPA

7. AVIATION

This section summarizes the aviation needs for the 53 airports included in the National Plan of Integrated Airport Systems (NPIAS) in South Carolina. There are six Primary Commercial Service airports in the state:

- Hilton Head,
- Charleston AFB/International,
- Myrtle Beach International,
- Florence Regional,
- Columbia Metro, and
- Greenville Spartanburg International.

These airports, which provide passenger and freight services vital to the economy of South Carolina, account for approximately two-thirds of the identified aviation needs. A summary of the financial needs of the other NPIAS airports within the state is also provided by category – Reliever Airports and General Aviation.

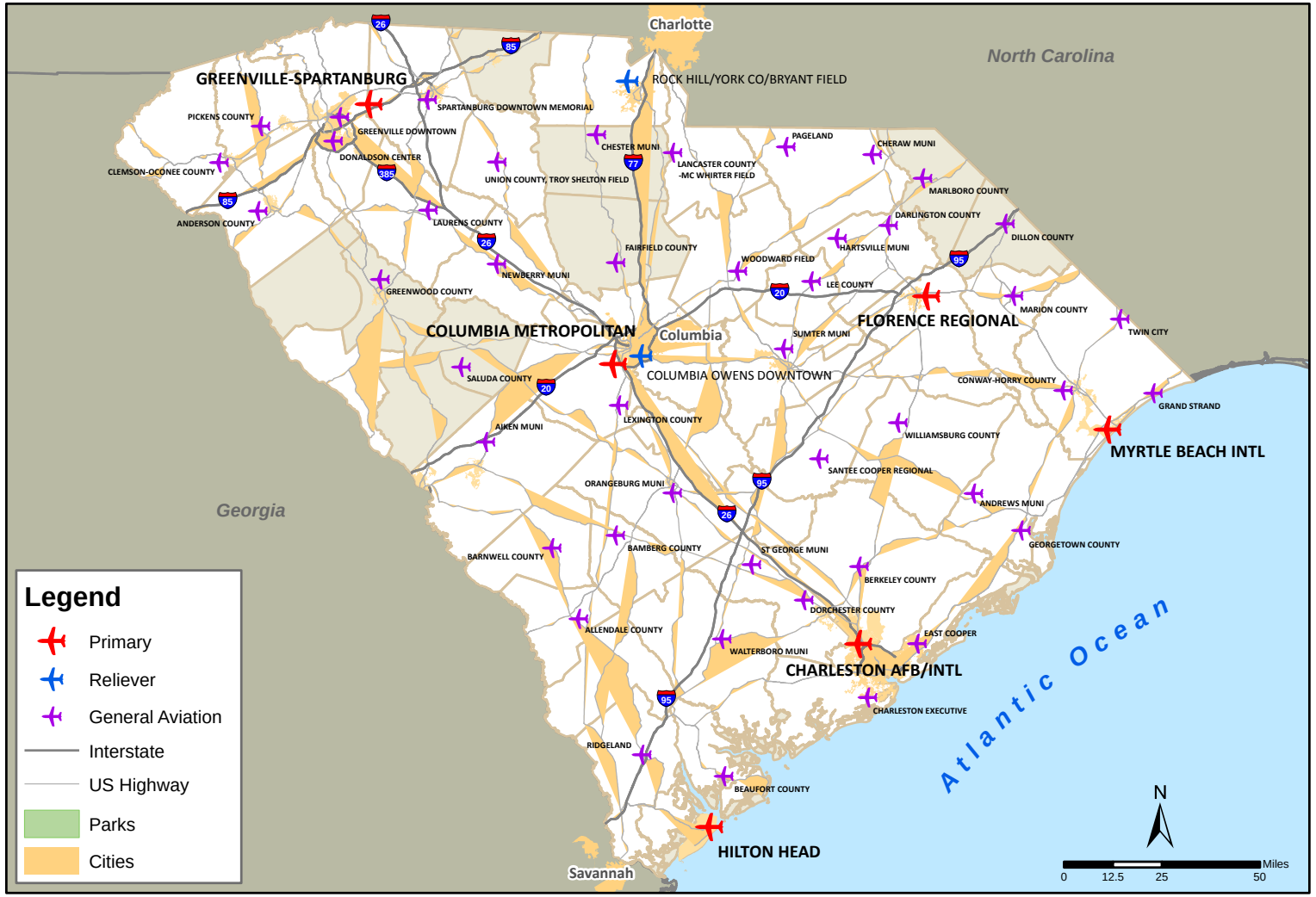
The data for the needs analysis was obtained in February, 2013 from the South Carolina Aeronautics Commission and is a summary of the information the Commission produces of individual airports' 5-year Capital Improvement Plans (CIPS). The data represent the full CIP totals for federal fiscal years 2012 – 2017, though some airports have CIP projects dating back to 2010 and as far out as 2018.

These cost estimates include physical/infrastructure-related needs, such as design/construction, land acquisition, vehicle/maintenance purchases, as well as planning and reporting/assessments, which include Disadvantaged Business Enterprise (DBE) reporting, Airport Layout Plan updates, Master Plans, environmental reports, and wildlife hazard assessments, among others. The amounts shown do not include carryover numbers detailed in the CIPs.

7.1 Airports

South Carolina has 53 airports included in the National Plan of Integrated Airport Systems (NPIAS). The NPIAS identifies 3,380 existing and proposed airports nationwide that have been deemed "significant to national air transportation" and thus are eligible to receive Federal grants under the Federal Aviation Administration (FAA) Airport Improvement Program (AIP). Of the 53 airports, shown in **Figure 7-1**, six are Primary Commercial Service airports, two are reliever airports, and 45 are general aviation facilities. Reliever airports are defined by the FAA as high-capacity general aviation airports in major metropolitan areas that provide pilots with attractive alternatives to using congested hub airports.

Figure 7-1: Map of Airports in South Carolina



7.2 Primary Commercial Service Airports

Table 7-1 lists the capital improvement needs for the state's six Primary Commercial Service airports during the fiscal years shown. The total estimated amount expected to be spent over the approximately 5-year CIP period for the six airports is just short of $600 million for physical and infrastructure related improvements and over $1.6 million for planning and reporting efforts.

Table 7-1: Primary Commercial Service Airport Needs

Airport	Needs in Current CIPs			Span of Project Years
	Physical / Infrastructure	Planning / Reporting	Total	
Hilton Head	$21,812,000	$20,000	$21,832,000	13-17
Charleston AFB/International	$219,561,000	$0	$219,561,000	12-18
Myrtle Beach International	$214,300,000	$886,000	$215,186,000	10-17
Florence Regional	$4,359,000	$0	$4,359,000	11-17
Columbia Metro	$36,908,000	$0	$36,908,000	11-17
Greenville Spartanburg International	$102,363,000	$750,000	$103,113,000	13-17
Totals:	**$599,303,000**	**$1,656,000**	**$600,959,000**	

Note: Costs rounded to nearest thousand dollars.

Some of the improvements listed in the CIPs for these airports include:

- Physical and Infrastructure Related Improvements
  - Taxiway Rehabilitation, Upgrades, and Expansions
  - Clearing Projects
  - Air Cargo Apron Expansions
  - Terminal Redevelopment/Upgrades and Expansions
  - Airfield Signage Replacement and Upgrades
  - Airfield Lighting Rehabilitation and Upgrades
  - Land Acquisitions
  - Hanger Construction, Rehabilitation and Upgrades
  - Runway Safety Area Improvement
  - General Clearing and Obstruction Removal
  - Drainage Improvements
  - Perimeter Fencing Upgrades
- Planning and Reporting Efforts
  - Master Planning
  - DBE Planning
  - EA for Runway Extension

7.3 Reliever Airports

Table 7-2 lists capital improvement needs for the state's two reliever airports during the fiscal years shown. Capital expenditures over the approximately 5-year CIP period for the two airports are

estimated at $23.6 million for physical and infrastructure related improvements and $0.6 million for planning and reporting efforts.

Table 7-2: Reliever Airport Needs

Airport	Needs in Current CIPs			Span of Project Years
	Physical / Infrastructure	Planning / Reporting	Total	
Rock Hill/York County/Bryant Field	$11,546,000	$530,000	$12,076,000	13-17
Jim Hamilton - L.B. Owens Airport	$12,006,000	$43,000	$12,049,000	12-17
Reliever Airports Totals	**$23,552,000**	**$573,000**	**$24,125,000**	

Note: Costs rounded to nearest thousand dollars.

Some of the types of improvements listed in the CIPs for these airports include:

- Physical and Infrastructure Related Improvements
  - Land Acquisition
  - Grading and Drainage Improvements
  - Airfield Signage Upgrades
  - Perimeter Fencing Upgrades
  - Taxilanes Rehabilitation
  - Bypass Road Connector
  - Airfield Lighting
  - Construct Corporate Hanger
  - Runway Extension
- Planning and Reporting Efforts
  - DBE Planning
  - Benefit-Cost Analysis and Environmental Documentation for Runway Extension
  - Master Planning

7.4 General Aviation Airports

Total estimated cost(s) expected to be spent over the approximately 5-year CIP period for the 45 General Aviation airports are $263.3 million for physical and infrastructure related improvements and $5.8 million for planning and reporting efforts. Some of the improvements listed in the CIPs for these airports include:

- Physical and Infrastructure Related Improvements
  - Runway Extension
  - Hanger Design and Construction
  - Terminal Apron Expansion
  - Land Acquisition
  - Perimeter and Security Fencing
  - Airfield Pavement Rehab
  - Taxiway Improvements, Extensions, Upgrades
  - Expand Terminal Aircraft Parking Apron
  - Pavement Rehabilitation

  - Obstruction Removal and Clearing
  - Airfield Lighting System Rehabilitation
  - Taxiway Relocation
  - New Terminal Building
  - Terminal Building Renovations and Expansions
  - Drainage
  - Runway Safety Area Project Construction
  - New Terminal Building

- Planning and Reporting Efforts
  - DBE Reporting
  - Airport Layout Plan Update
  - Runway Extension Justification
  - Master Planning
  - Wildlife Hazard Assessment

7.5 Summary by Airport Type

Table 7-3 summarizes the capital needs for the 53 NPIAS airports in South Carolina for the period covered by the airport's current CIPs. These needs total $886.1 million for physical infrastructure improvements and $8.0 Million for Planning and Reporting for a total of $894.2 million. Two-thirds are of these needs have been identified for the state's six primary commercial airports.

Table 7-3: South Carolina Aviation Needs in CIP Period 2012-2017

Airport	Needs in Current CIPs			Percent
	Physical / Infrastructure	Planning / Reporting	Total	
Primary Commercial Service Airports	$599,303,000	$1,656,000	$600,959,000	67.2%
Reliever Airports	$23,552,000	$573,000	$24,125,000	2.7%
General Aviation Airports	$263,292,000	$5,792,000	$269,084,000	30.1%
Totals	**$886,147,000**	**$8,021,000**	**$894,168,000**	

Note: Costs rounded to nearest thousand dollars.

There is an extensive mix of significant projects, routine projects, and special projects proposed at all three types of airports in South Carolina. While most of the funding is proposed for physical and construction related projects, there is a significant amount of money estimated to be needed for "planning and reporting". This work has a real impact on the experience of the traveler at the airport and the economy of the State.

7.6 Summary by Improvement Type

For the primary and reliever airports needs identified in the CIPs have been grouped into the categories of preservation, modernization and expansion to the extent possible. For the purpose of this exercise the expenditures for planning and reporting have been included within preservation, as they are an essential ongoing routine activity. The results are shown in **Table 7-4** and indicate that expansion-related improvements account for over half of the identified needs.

Table 7-4: Aviation Needs in Current CIPs by Improvement Type

Airport Type and Name	Preservation	Modernization	Expansion	Total
Primary Commercial Airports				
Hilton Head	$370,000	$3,975,000	$17,487,000	$21,832,000
Charleston AFB/International	$0	$25,050,000	$194,511,000	$219,561,000
Myrtle Beach International	$62,647,000	$3,265,000	$149,274,000	$215,186,000
Florence Regional	$2,707,000	$857,000	$796,000	$4,360,000
Columbia Metro	$14,829,000	$17,428,000	$4,650,000	$36,907,000
Greenville Spartanburg International	$8,825,000	$92,913,000	$1,375,000	$103,113,000
Commercial Airport Totals	**$89,378,000**	**$143,488,000**	**$368,093,000**	**$600,959,000**
Reliever Airports				
Rock Hill/York County/Bryant Field	$6,353,000	$0	$5,723,000	$12,076,000
Jim Hamilton - L.B. Owens Airport	$2,535,000	$2,150,000	$7,364,000	$12,049,000
Reliever Airport Totals	**$8,888,000**	**$2,150,000**	**$13,087,000**	**$24,125,000**
General Aviation Airports				**$269,084,000**
All 53 NPIAS Airports in South Carolina				**$894,168,000**

Note: Costs rounded to nearest thousand dollars.

7.7 Economic Impact of Aviation

Almost 2.6 million visitors arrive in South Carolina by air each year, according to *South Carolina: Economic Impact of Aviation on South Carolina*[16]. Those travelers spent an estimated $1.3 billion while in the state. Additionally, the document stated that *"Each year, private, local, state, and federal investment helps to support improvement projects at civilian airports throughout the state. In addition, through the Department of Defense (DOD), annual investment is also made to maintain and improve the four military airfields. When a runway is extended or a taxiway built, South Carolina workers are employed. These same projects require the acquisition of supplies and other services, which further stimulate the local and state economies. Construction projects are responsible for additional aviation related economic activity."*

Overall there is a significant amount of work programmed at the State's airports and it is evident from the numbers above that the 53 NPIAS airports in South Carolina have significant needs as shown through the estimated expenditures programmed to maintain and improve their facilities.

[16] *South Carolina: Economic Impact of Aviation on South Carolina*, South Carolina Department of Commerce, Division of Aeronautics by Wilbur Smith Associates, 2006

8. BICYCLE

Bicycle amenities are an important component of the South Carolina multimodal transportation system and it is estimated that the local, regional, and statewide bicycle needs total to be $1.2 billion. The needs estimate includes planning, design, construction, and contingency costs and it was derived examining the following:

- Current bicycle deficiencies in South Carolina;
- Proposed improvements in adopted bicycle plans; and
- Review of Regional and MPO planning documents.

8.1 Bicycle Needs

8.1.1 Statewide Bicycle Facility Needs

Based on the existing and planned bikeways data collected, **Table 8-1** shows the breakdown of the statewide roadway bicycle facility future needs, which totals $1.2 billion. The comprehensive needs include all local and regional planned bicycle facilities statewide on roadways in the state roadway system with the exception of paved shoulders (shoulder improvements are included in the roadway section).

Table 8-1: Statewide Bicycle Needs on State Roads

Plan Facility Type	Total Miles	Cost Estimate*
Bike Lane or Shared Marking	840	$792,817,500
Bike Route	1,680	$10,920,000
Unspecified Bikeway**	60	$61,080,000
Wide Outside Lane (13' or Larger)	225	$360,000,000
Total	**2,805**	**$1,224,817,500**

**The source of cost-estimate data is a combination of RSMeans Site Work and Landscape Cost Data (2010),cost estimates from previous bid reports, weighted average bid item reports from NCDOT, TxDOT, NYDOT, ODOT, ACHD, pricing brochures from suppliers, and costs supplied by clients for specific line items.*
***Unspecified bikeways represent a facility need that has been identified, but the type of facility has not been determined.*

8.1.2 Facility Types and Needs

Bike Lane

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and optional signage. The bike lane is typically located on the right side of the street, between the adjacent travel lane and curb, and is used in the same

direction as motor vehicle traffic. A bike lane width of 7 feet makes it possible for bicyclists to ride side-by-side or pass each other without leaving the bike lane, thereby increasing the capacity of the lane. On higher volume roadways, bike lanes provide improved comfort and safety for bicyclists over shared lanes and bike routes.

Shared Lane Marking (Sharrow) for Shared Roadways
Shared lane markings (SLM) are used in a shared roadway environment to encourage bicycle travel and proper positioning within the lane. In constrained conditions, the SLMs are placed to discourage unsafe passing by motor vehicles. On a wide outside lane, the SLMs can be used to promote bicycle travel next to (to the right of) motor vehicles. In all conditions, SLMs should be placed outside of the door zone of parked cars. Shared lane markings don't offer the same comfort and protection of separated facilities like bicycle lanes and because of this, this treatment should be used on lower-volume and speed streets.

Bike Route
Bike routes are regular streets shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided. Bicycle routes typically include signage and may include traffic calming devices to improve safety for non-motorized users

Paved Shoulder (included in roadway needs chapter)
Typically found in less-dense areas, paved shoulders are paved roadways with striped shoulders wide enough for bicycle travel. Paved shoulders offer safety and comfort advantages for both motorists and bicyclists along rural routes. Paved shoulders often, but not always, include signage alerting motorists to expect bicycle travel along the roadway. This type of treatment is not typical in urban areas.

Wide Outside Lane
Bike facilities can be accommodated on streets with outside travel lanes that have a minimum width of 13'. On streets that lack a 13' outside lane and that have an excess right-of-way, the bicycle facility can be achieved through shoulder widening. The disadvantage of wide outside lanes as a facility choice is that

they provide no indication of bicyclist positioning or presence in the roadway and they may encourage motor vehicle speeding on long, straight stretches.

8.1.3 State Metropolitan Planning Organizations

Anderson Area Transportation Study (ANATS) 2035 Long Range Transportation Plan (2007)
The 2007 ANATS LRTP estimated $55 million in available transportation funding through 2035. The North Anderson Multi-Use Path Extension project at a cost of $1.5 million was ranked as the 2nd priority project in the financially-constrained funding plan. This prioritization reflects public involvement surveys from the plan where 100% of respondents ranked walking and biking safety, providing bike trails and greenways, and bike lanes along roadways as either very important or somewhat important issues.

Augusta Regional Transportation Study (ARTS) 2035 Long-Range Transportation Plan (2010)
The ARTS 2010 LRTP identified at least 17 multimodal transportation improvement projects that would affect transit, walking and bicycling transportation in the ARTS area, which includes South Carolina and Georgia. Ten of these improvement projects are within South Carolina. Total funding for transportation projects in the South Carolina portion of ARTS through 2035 was estimated at $280 million. The Hitchcock Parkway road widening project included multi-use path and was a Tier 1 priority in the ARTS financially-constrained projects plan, at an estimated cost of $13 million. Several other Tier 1 and 2 projects included provisions for improvements such as bike lanes and sidewalks. A lump set aside for bicycle and pedestrian improvements in South Carolina reserved over $2.8 million in Tier 2 funding.

Augusta Regional Transportation Study (ARTS) Aiken County Bicycle and Pedestrian Plan (2012)
This plan identified $20 million in improvements for the top 20 priority pedestrian and bicycle projects throughout the South Carolina portion of the ARTS MPO.

The Grand Strand Area Transportation Study (GSATS) 2035 Long-Range Transportation Plan (2011)
The 2011 GSATS LRTP estimated $6.8 million in available annual transportation funding, totaling $135 million through 2035. The Plan identified six local segments of the East Coast Greenway as priority projects, at an estimated cost of $8.2 million, not including a bridge replacement project estimated between $4-10 million.

Rock Hill-Fort Mill Area Transportation Study (RFATS) 2035 Long Range Transportation Plan (2009)
The 2009 RFATS LRTP estimated $2.8 million in available annual transportation funding. Through 2018, the Plan estimated $3.5 million in funding available for bicycle and pedestrian projects. The Plan identified six recent bicycle and pedestrian projects funded through Transportation Enhancements and CMAQ funds, totaling nearly $2 million. Since 1997, York County has twice renewed a local sales tax called Pennies for Progress, which raised $359 million for transportation projects.

Spartanburg Area Transportation Study (SPATS) 2035 Long-Range Transportation Plan (2008)
SPATS invested approximately $2.4 million in bicycle and pedestrian projects with Transportation Enhancements funding between 1995 and 2007.

Sumter Urban Area Transportation Study Area (SUATS) Long-Range Transportation Plan (2007)
Funding for transportation maintenance in SUATS is provided by a vehicle registration tax ($740,000 annually) and the gas tax ($1.2 million annually). Funding for capital projects is estimated at $2 million annually. An estimated $6.8 million in funding is allocated for bicycle and pedestrian facilities over the life of the plan, compared to $37 million in identified bicycle and pedestrian project needs.

Greenville-Pickens Area Transportation Study (GPATS) 2030 Long Range Transportation Plan (2007)
The 2007 GPATS LRTP estimated $12.3 million in available transportation funding annually through 2030. GPATS allocated $3.2 million in Transportation Enhancements funding between 2007 and 2010, mainly for bicycle and pedestrian improvement projects. Eight of 14 high priority corridor projects adopted in the financially constrained plan included bike lanes, as did over a dozen other lower priority and unfunded projects.

8.1.4 State Councils of Government

Spartanburg Area Transportation Study Area (SPATS) Bicycle & Pedestrian Master Plan (2009)
From FY 2004 through FY 2007, SPATS allocated approximately $1.6 million to regional Transportation Enhancements (TE) projects, including bicycle and pedestrian projects. The SPATS 2009 LTRP estimated $100 million in total available transportation funding between 2010 and 2035.

The Charleston Area Transportation Study (CHATS) 2035 Long Range Transportation Plan
This plan included $650,000/year in current bicycle and pedestrian project funding. The $400 million financially constrained transportation plan allocates $25 million for Complete Streets projects, including bicycle and pedestrian projects.

Columbia Area Transportation Study (COATS) Midlands Tomorrow - 2035 Long Range Transportation Plan (2006)
The COATS Bicycle and Pedestrian Pathways Plan preliminary implementation plan projects included approximately $19 million in bicycle and pedestrian projects planned to be completed within 0-2 years of plan adoption.

Lowcountry Long-Range Transportation Plan (2007)
Between 2006 and 2012, the Lowcountry 2007 LRTP anticipated an annual budget of $3 million for all regional transportation projects. The plan identified $6 million in needed intersection improvement projects in the region.

LSCOG Rural Long-Range Transportation Plan 2005-2030 (2005)
The LSCOG 2005 LRTP estimated $85 million in total funding available for allocation to new projects between 2005 and 2030. The financially constrained project plan included no bicycle or pedestrian projects. Out of eight project types ranked for future project prioritization, bicycle and pedestrian facilities and sidewalks ranked last.

The LSCOG Bicycle and Pedestrian Master Plan (2012)
This plan identified $39 million in shoulder improvement needs and $35 million in top priority bike/ped projects throughout the region.

Long-Range Rural Transportation Plan for the Pee Dee Region (2008)
The Pee Dee 2008 LRTP estimated an average of $5.5 million in available annual transportation funding through 2022. A one-cent sales tax in Florence County for capital projects provided additional potential project funding.

Santee-Lynches Long Range Rural Transportation Plan (2007)
The 2007 Santee-Lynches LRTP estimated a net available transportation funding of $67.9 million between 2006 and 2026. The plan identified $7.8 million in recommended transit projects (including service improvements), as well as two safety projects to add shoulders along local roadways.

Upper Savannah COG Long Range Transportation Plan (2006)
The 2006 Upper Savannah COG LRTP estimated a total of $155 million of available transportation funding through the next 29 years. At least one prioritized future project included the construction of shoulders.

Waccamaw Regional Council of Governments Rural Long Range Transportation Plan (2007)
The 2007 Waccamaw Regional COG Rural LRTP identified $1.8 billion in prioritized transportation projects, which included no bicycle or pedestrian projects. All projects but one were unfunded. The Plan identified the construction of the East Coast Greenway through three counties as a bicycle and pedestrian transportation need.

9. SUMMARY OF NEEDS BY MODE

Based on the preliminary needs estimates presented above, the 2040 multimodal needs total $73.34 billion as shown in **Table 9-1**. Roadway, bridge, mass transit and Premium Transit / Passenger Rail needs amount to $70.44 billion, or 96 percent, of this total.

Table 9-1: Summary of Preliminary Needs Estimates by Mode to 2040

Mode of Transportation	Needs to 2040 ($ Billions)
Roadways[1]	$59.76
Bridges	$5.44
Mass Transit	$3.72
Premium Transit / Rail Passenger[2]	$1.65
Total Road, Bridge, and Transit Needs	**$70.57**
Rail Freight	$0.35
Ports[3]	$1.66
Aviation[4]	$0.89
Total for Other Modal Needs	**$2.90**
Total	**$73.47**

Notes:
1) Including bicycle accommodations
2) Known BRT, light rail, and HSR needs
3) 10-year SCPA capital plan needs plus dredging
4) 2012-2017 needs

APPENDIX A: KEY VALUES USED IN HIGHWAY NEEDS ANALYSIS

HIGHWAY DEFICIENCY LEVELS

Road Type	Terrain	PSR	Surface Type	V/C Ratio	Lane Width (ft)	Right Shoulder Width (ft)	Shoulder Type	Horizontal Alignment	Vertical Alignment
Interstate	Flat	3.2	3-Intermediate	1.0	12	12	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	3.2	3-Intermediate	1.0	12	12	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	3.2	3-Intermediate	1.0	12	12	2-Stabilized	3-Some Reduced Speed	3-Some Reduced Speed
Principal Arterials AADT>6000	Flat	3.2	3-Intermediate	1.0	12	10	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	3.2	3-Intermediate	1.0	12	10	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	3.2	3-Intermediate	1.0	12	10	2-Stabilized	3-Some Reduced Speed	3-Some Reduced Speed
Principal Arterials AADT<6000	Flat	3	4-Low	1.0	12	10	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	3	4-Low	1.0	12	10	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	3	4-Low	1.0	12	10	2-Stabilized	3-Some Reduced Speed	3-Some Reduced Speed
Minor Arterials AADT>2000	Flat	2.4	4-Low	1.0	12	10	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	2.4	4-Low	1.0	12	10	2-Stabilized	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	2.4	4-Low	1.0	12	10	2-Stabilized	3-Some Reduced Speed	3-Some Reduced Speed
Minor Arterials AADT<2000	Flat	2.4	4-Low	1.0	12	10	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	2.4	4-Low	1.0	12	10	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	2.4	4-Low	1.0	12	10	3-Earth	3-Some Reduced Speed	3-Some Reduced Speed
Major Collectors AADT>1000	Flat	2.2	4-Low	1.15	11	8	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	2.2	4-Low	1.15	11	8	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	2.2	4-Low	1.15	11	8	3-Earth	3-Some Reduced Speed	3-Some Reduced Speed
Major Collectors AADT>400	Flat	2.2	4-Low	1.15	11	6	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	2.2	4-Low	1.15	11	6	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	2.2	4-Low	1.15	11	6	3-Earth	3-Some Reduced Speed	3-Some Reduced Speed
Major Collectors AADT<400	Flat	2	4-Low	1.15	11	4	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Rolling	2	4-Low	1.15	11	4	3-Earth	1-All Curves Appropriate	1-All Grades Appropriate
	Mountainous	2	4-Low	1.15	11	4	3-Earth	3-Some Reduced Speed	3-Some Reduced Speed
Urban	Interstate	3.4	3-Intermediate	1.0	11	11	1-Surfaced	1-All Curves Appropriate	
	Expressway	3.2	3-Intermediate	1.0	11	11	1-Surfaced	1-All Curves Appropriate	
	Principal Arterial	3	3-Intermediate	1.0	11	11	2-Stabilized	1-All Curves Appropriate	
	Minor Arterial	2.4	4-Low	1.15	11	9	3-Earth		
	Collector	2.4	4-Low	1.15	10	7	3-Earth		

RECONSTRUCTION LEVELS FOR PSR

Road Type	Terrain	Reconstruction PSR	Deficiency PSR
Interstate	Flat	2.3	3.2
	Rolling	2.3	3.2
	Mountainous	2.3	3.2
Principal Arterials AADT>6000	Flat	2.3	3.2
	Rolling	2.3	3.2
	Mountainous	2.3	3.2
Principal Arterials AADT<6000	Flat	2.3	3.0
	Rolling	2.3	3.0
	Mountainous	2.3	3.0
Minor Arterials AADT >2000	Flat	1.2	2.4
	Rolling	1.2	2.4
	Mountainous	1.2	2.4
Minor Arterials AADT<2000	Flat	1.2	2.4
	Rolling	1.2	2.4
	Mountainous	1.2	2.4
Major Collectors AADT>1000	Flat	1.2	2.2
	Rolling	1.2	2.2
	Mountainous	1.2	2.2
Major Collectors AADT>400	Flat	1.2	2.2
	Rolling	1.2	2.2
	Mountainous	1.2	2.2
Major Collectors AADT<400	Flat	1.2	2.0
	Rolling	1.2	2.0
	Mountainous	1.2	2.0
Urban	Interstate	2.3	3.4
	Expressway	2.3	3.2
	Principal Arterial	2.3	3.0
	Minor Arterial	2.0	2.4
	Collector	1.5	2.4

HIGHWAY DESIGN STANDARDS

		Surface Type	V/C Ratio	Lane Width (ft)	Right Shoulder Width (ft)
Interstate	Flat	2-High	1.0	12	12
	Rolling	2-High	1.0	12	12
	Mountainous	2-High	1.0	12	12
Principal Arterials AADT>6000	Flat	2-High	1.0	12	10
	Rolling	2-High	1.0	12	10
	Mountainous	2-High	1.0	12	10
Principal Arterials AADT<6000	Flat	3-Intermediate	1.0	12	10
	Rolling	3-Intermediate	1.0	12	10
	Mountainous	3-Intermediate	1.0	12	10
Minor Arterials AADT>2000	Flat	3-Intermediate	1.0	12	10
	Rolling	3-Intermediate	1.0	12	10
	Mountainous	3-Intermediate	1.0	12	10
Minor Arterials AADT<2000	Flat	3-Intermediate	1.0	12	10
	Rolling	3-Intermediate	1.0	12	10
	Mountainous	3-Intermediate	1.0	12	10
Major Collectors AADT>1000	Flat	3-Intermediate	1.15	11	8
	Rolling	3-Intermediate	1.15	11	8
	Mountainous	3-Intermediate	1.15	11	8
Major Collectors AADT>400	Flat	3-Intermediate	1.15	11	6
	Rolling	3-Intermediate	1.15	11	6
	Mountainous	3-Intermediate	1.15	11	6
Major Collectors AADT<400	Flat	3-Intermediate	1.15	11	4
	Rolling	3-Intermediate	1.15	11	4
	Mountainous	3-Intermediate	1.15	11	4
Urban	Interstate	2-High	1.0	12	12
	Expressway	2-High	1.0	12	12
	Principal Arterial	3-Intermediate	1.0	12	10
	Minor Arterial	3-Intermediate	1.15	12	10
	Collector	3-Intermediate	1.15	11	8

PAVEMENT FACTORS

	Rural				Urban				
	Interstate	Principal Arterial	Minor Arterial	Major Collector	Interstate	Expressways	Principal Arterial	Minor Arterial	Collectors
Widening Feasibility	5	4	4	4	5	4	4	4	4
Maximum Lanes	8	6	6	6	8	8	6	6	6
Maximum Normal-Cost Lanes	8	6	6	6	8	8	6	6	6

RURAL UNIT COSTS, IN THOUSANDS

2011 Improvement Costs ($Thousands per Lane Mile)		Reconstruction		Resurface	Shoulder Improve-ments	Add Lanes		New Alignment	
		Lane Widening	Pavement	Pavement		Normal Cost	High Cost	Normal Cost	High Cost
Interstate	Flat	$296	$194	$106	$20	$3,122	$5,477	$5,477	$5,477
	Rolling	$332	$199	$112	$32	$3,122	$5,477	$5,477	$5,477
	Mountainous	$630	$435	$166	$68	$10,538	$12,336	$12,336	$12,336
Principal Arterials	Flat	$289	$194	$106	$16	$1,168	$1,671	$1,671	$1,671
	Rolling	$326	$199	$118	$27	$1,250	$2,018	$2,018	$2,018
	Mountainous	$634	$448	$166	$36	$4,413	$5,082	$5,082	$5,082
Minor Arterials	Flat	$301	$194	$106	$17	$1,199	$1,684	$1,684	$1,684
	Rolling	$363	$214	$114	$32	$1,374	$2,168	$2,168	$2,168
	Mountainous	$604	$396	$156	$72	$4,209	$5,051	$5,051	$5,051
Major Collectors	Flat	$299	$194	$106	$22	$1,220	$1,647	$1,647	$1,647
	Rolling	$327	$197	$112	$29	$1,246	$2,027	$2,027	$2,027
	Mountainous	$497	$308	$153	$45	$2,639	$3,447	$3,447	$3,447

URBAN UNIT COSTS, IN THOUSANDS

2011 Improvement Costs ($Thousands per Lane Mile)		Reconstruction		Resurface	Shoulder Improve-ments	Add Lanes		New Alignment	
		Lane Widening	Pavement	Pavement		Normal Cost	High Cost	Normal Cost	High Cost
Interstates/ Expressways	Small Urban	$280	$194	$106	$19	$2,914	$9,541	$4,075	$13,911
	Small Urbanized	$301	$195	$125	$26	$3,185	$10,463	$5,493	$18,753
	Large Urbanized	$597	$398	$209	$120	$6,640	$22,270	$10,037	$34,266
Principal Arterials	Small Urban	$287	$194	$106	$23	$1,595	$5,211	$5,211	$5,211
	Small Urbanized	$307	$196	$125	$31	$1,728	$5,668	$6,429	$6,430
	Large Urbanized	$438	$287	$157	$100	$2,529	$8,452	$8,824	$8,826
Arterials/ Collectors	Small Urban	$280	$194	$106	$23	$1,611	$5,219	$5,219	$5,219
	Small Urbanized	$293	$196	$120	$28	$1,698	$5,517	$6,404	$6,404
	Large Urbanized	$395	$262	$147	$77	$2,354	$7,815	$8,335	$8,334

APPENDIX B: KEY VALUES USED IN BRIDGE NEEDS ANALYSIS

BRIDGE DEFICIENCY VALUES

Functional Class	Deficiency				
	Right		Left		Vertical Clearance
	Lane Width	Shoulder Width	Lane Width	Shoulder Width	
Rural Interstates	3.4	0.9	3.0	0.9	4.724
Rural Principal Arterials	3.4	0.9	3.0	0.9	4.724
Rural Minor Arterials	3.4	0.9	3.0	0.6	4.724
Rural Major Collectors	3.4	0.0	3.0	0.0	4.724
Rural Minor Collectors	3.4	0.9	3.0	0.3	4.724
Rural Local Roads	3.4	0.9	3.0	0.3	4.724
Urban Interstates	3.4	0.9	3.0	0.0	4.724
Urban Expressways	3.4	0.9	3.4	0.9	4.724
Urban Principal Arterials	3.4	0.9	3.4	0.9	4.724
Urban Minor Arterials	3.4	0.9	3.0	0.6	4.724
Urban Collectors	3.4	0.0	3.0	0.0	4.724
Urban Local Roads	3.4	0.9	3.0	0.3	4.724

BRIDGE DESIGN VALUES

Functional Class	Design		
	Lane Width	Shoulder Width	Swell
Rural Interstates	3.7	4.9	1.2
Rural Principal Arterials	3.7	4.9	1.2
Rural Minor Arterials	3.7	2.4	1.2
Rural Major Collectors	3.7	2.4	1.2
Rural Minor Collectors	3.7	2.4	1.2
Rural Local Roads	3.7	2.4	1.2
Urban Interstates	3.7	2.4	1.2
Urban Expressways	3.7	4.9	1.2
Urban Principal Arterials	3.7	2.4	1.2
Urban Minor Arterials	3.7	2.4	1.2
Urban Collectors	3.7	2.4	1.2
Urban Local Roads	3.7	2.4	1.2

BRIDGE UNIT COST VALUES

Functional Class	Unit Cost per sq ft of Deck			
	Replace	Widen	Raise	Strength
Rural Interstates	$1,237.86	$914.94	$538.20	$484.38
Rural Principal Arterials	$1,237.86	$914.94	$538.20	$484.38
Rural Minor Arterials	$1,237.86	$914.94	$538.20	$484.38
Rural Major Collectors	$1,237.86	$914.94	$538.20	$484.38
Rural Minor Collectors	$1,237.86	$914.94	$538.20	$484.38
Rural Local Roads	$1,237.86	$914.94	$538.20	$484.38
Urban Interstates	$1,237.86	$914.94	$538.20	$484.38
Urban Expressways	$1,237.86	$914.94	$538.20	$484.38
Urban Principal Arterials	$1,237.86	$914.94	$538.20	$484.38
Urban Minor Arterials	$1,237.86	$914.94	$538.20	$484.38
Urban Collectors	$1,237.86	$914.94	$538.20	$484.38
Urban Local Roads	$1,237.86	$914.94	$538.20	$484.38