Central Midlands
Council of Governments

Regional Motor Freight Study

Final Report

December 2008

CENTRAL MIDLANDS
Council of Governments

WilburSmith ASSOCIATES

UNIVERSITY OF SOUTH CAROLINA

Regional Motor Freight Study
Final Report

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CENTRAL MIDLANDS REGIONAL MOTOR FREIGHT TRANSPORTATION STUDY

FINAL REPORT

December 2008

Prepared for:

Central Midlands Council of Governments

Columbia Area Transportation Study
Metropolitan Planning Organization

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In association with:

University of South Carolina

"The preparation of this report has been financed in part through grant[s] from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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EXECUTIVE SUMMARY

The Central Midlands Council of Governments (CMCOG) commissioned this study to analyze freight movements in the Columbia metropolitan region. The area examined by the study included the counties of Fairfield, Lexington, Newberry and Richland Counties in South Carolina. The study elements summarized in this report:

- Examine the supply and condition of the region's multimodal infrastructure to accommodate current and forecasted volumes of goods movement.
- Document the characteristics of goods movement in the region and examine the commodities and markets important to the Central Midlands regional economy.
- Analyze existing data regarding the impact of regional freight movements on the safety and security of the regional transportation system.
- Examine the attitudes of regional businesses about existing infrastructure, access to freight services and their ability to move and source goods to and from national and international markets.
- Provide recommendations for strategies and projects that can enhance the mobility of goods movements in the Central Midlands Region.

In today's global economy, commercial transportation services are crucial to a region's business and industrial development potential. For many industries, economic competitiveness is defined by the ability of goods and services to be transported in an economical, efficient and time-definite manner.

Recently *Logistics Today Magazine* ranked the Columbia region's interstate system in the top ten percent among 362 metropolitan areas in the U.S. The analysis of "logistics friendly" cities ranked Columbia's interstate industry access 36th among all cities [1]. The region is a central point in South Carolina with key highway connections to major cities such as Charleston, Greenville, Spartanburg and other markets in Charlotte.

System Overview and Highway System

The Central Midlands region is currently served by an adequate, well functioning multimodal freight network of highway, rail, and air cargo infrastructure. The backbone of the region's highway system is composed of Interstate highways: Interstate 20, Interstate 77, and Interstate 26, and the Interstate 126 spur connecting I-26 with downtown Columbia. Currently, I-77 carries the highest levels of truck traffic among interstate facilities in the region, at roughly 18 percent of the annualized daily traffic of just over 79,000 vehicles. A variety of arterial highways also supports the region's freight network, including US-76, US-378, US-1, SC-555, US-21, US-321, US-601, SC-34 and SC-215. Most of these facilities carry 10 percent truck traffic or less.

[1] Logistics Today, Top Metro Areas for Logistic

Rail

Both CSX Corporation and Norfolk Southern own and operate an extensive rail network through and within the Central Midlands Region, with approximately 308 route miles of active railroad lines in the four counties. The rail lines within the Central Midlands region are predominately single track, with no extended sections of double track. The usage of single track limits rail line capacity, since trains must wait on sidings to pass each other. The capacity of single track depends on a number of factors including the number of sidings, the mix of trains using a segment, the track grade, curvature, speed limits in effect, and the method of dispatch control.

The Central Midlands region also supports a robust air cargo network centered on the Columbia Metropolitan Airport. The Columbia Metropolitan Airport supports scheduled air cargo flights on DHL, FedEx, and UPS, with UPS operating a regional air cargo hub serving five states in the South East U.S.

Freight Movements

It is estimated 228 billion tons of commodities moved into, out of, within and through the Central Midlands region, in 2006. Of the total volume of goods movement, 73 percent passes through the region and 92 percent moves by truck. Over the next 25 years, the total volume of freight moving over the region's infrastructure is projected to increase by 42 percent, to an estimated 325 billion tons by 2030. Over the next 25 years, truck shipments are forecast to grow by 30 percent and air shipments by 82 percent, while rail shipments are projected to increase by 18 percent, primarily due to through movements. The volume of freight moving in Fairfield County is estimated to grow by 745 percent by 2030 (to 5.5 million tons annually), while Richland County is projected to experience a doubling in freight movements (to 45 million tons annually). This level of growth may strain highway infrastructure, specifically routes such as I-20 and SC 78.

Currently, the primary commodity transported to, through and from the region is *Nonmetallic Minerals*, with projected additional growth in volumes of 18 percent by the year 2030. *Secondary Traffic* defined as freight transiting to and from distribution centers or through intermodal facilities, is projected to surpass Nonmetallic Minerals as the top commodity volume in the region by 2030, growing by 122 percent.

Based on projections from Global Insight, trucks will continue to serve as the primary mode of transportation in the region in the future. The Central Midlands region is a gateway for freight movement throughout the southeast, and the area also serves as a major hub for the consolidation of freight. It is also important to note that the types of commodities that originate in or are destined for the region that are projected to increase are primarily bulk commodities. These commodities are typically used for pure manufacturing purposes and the final products will most likely be consumed outside of the Central Midlands region. From an infrastructure perspective, these commodities dictate mode choice and supply chain efficiency, and are likely to impact roadways in the region by increasing Class 8 truck traffic. This effect will be offset somewhat by the leveling off of growth in some of the commodities that account for the heavier volumes, such as Nonmetallic Minerals.

Safety

Between 2004 and 2006, South Carolina had 9,539 recorded commercial vehicle crashes and 1,515 (15.8%) of these occurred in the Central Midlands region. Almost half of the truck related crashes occurred in Richland County (47%), while Lexington County accounted for an additional 35 percent of the four-county total. Fifty truck-related crashes resulted in a fatality. Additional concerns regarding the safe movement of freight in the region include hazardous materials movements. In the Central Midlands area, Lexington County may be viewed as having high risk transportation corridors for hazardous materials due to the frequency of bulk flammable materials transported, specifically natural gas.

Stakeholder Survey

A survey of regional businesses provided freight stakeholders the opportunity to identify issues of concern regarding the region's transportation system. Of nearly 50 companies who responded to questions regarding capacity of the region's highway system, 12 percent indicated that congestion does cause significant delays in the shipment of their goods.

Roadway Bottlenecks

Specific congestion points/bottlenecks that directly effect local operations included I-20 and I-26, South Lake Drive, Custom Ports, I-77 Killian and Farrow Roads, Clemson Road, and lane widths throughout the region. Reported strengths of the transportation system in the Central Midlands Region included: availability of I-20 and I-26 provides good access; convenient terminals located at the Columbia airport, a good highway system overall and reasonable regulations. Suggestions for improving the transportation services in the Central Midlands Region included reducing the congestion on I-26 and I-20, more lanes and wider roads, improved transit systems, and many specific operational and pavement condition improvements to the roadway system.

Summary of Recommendations

The study provides a series of short, medium and long-term recommendations that can be implemented to improve freight mobility in the Central Midlands Region. In summary these recommendations are:

1. Create design standards for freight infrastructure (short-term).
2. Prepare and adopt regional truck route plan. The study defines a truck route system that could serve as the basis for such a plan (short-term).
3. Improve signage and signalization along key truck routes (medium-term).
4. Support regional economic development (short-term).
5. Work with governments and the private sector to mitigate crossings including reducing the number of downtown at-grade crossings (long-term).
6. Begin to integrate ITS application along freight corridors (long-term).
7. Improve data collection between agencies and private sector (medium-term).
8. Establish advisory group to retrieve input on freight issues (medium-term).

9. Implement "Fast Action Projects" infrastructure improvements that may be achieved at a relatively low cost, with high benefits for users. These projects are providing for the possible inclusion in the MPO's next Transportation Improvement Plan. The top projects identified are:
   - Improve Intersection Turn Radii
   - Improve At-grade railroad crossing at US 601 in Wateree and Assembly Street in Columbia Improve signage along US 321
   - Improve clean zones along major freight corridors
   - Construct two-foot paved shoulders along SC34
   - Improve interchange I20, I26, I126, St Andrews Road access
   - Connect Killian Road to Farrow Road

1. INTRODUCTION

The Central Midlands Council of Governments (CMCOG) commissioned a report to study the movement of motor freight and the role it plays in the Columbia metropolitan region. The objective of the study is to develop a strategic plan and identify and prioritize projects that accommodate and enhance the mobility of goods in this region.

In order to meet this goal, the study focused on the following three elements:

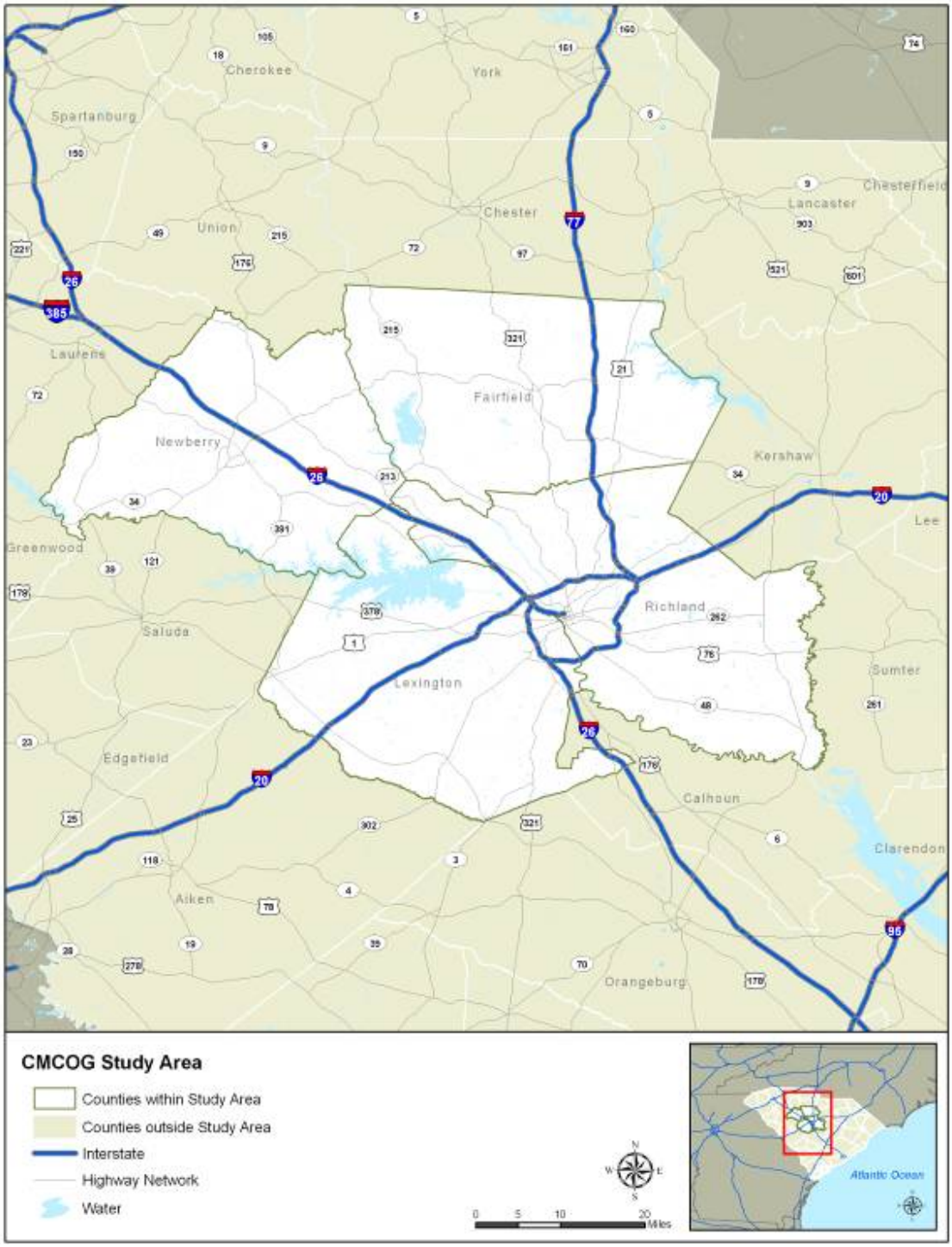
- Collecting and analyzing data to determine the existing condition of the region's freight environment;
- Engaging local public and private freight stakeholders. It is imperative that the importance of freight is understood at the state, local, and regional levels, across all industries and by the general public; and
- Developing a comprehensive freight plan to guide public sector investments to support freight transportation and logistics industries in the region.

This study provides an understanding of goods movement in the Central Midlands region and recognizes the linkage between freight and the economy, and furthermore describes the movement of commodities by truck, rail, water and air. Based on the technical assessment, a set of recommendations were developed that address freight transportation concerns and these recommendations cover a variety of infrastructure and policy improvements.

1.1. The Central Midlands Council of Governments

CMCOG develops local and regional plans within the four midlands counties (Fairfield, Lexington, Newberry, and Richland) of South Carolina, **Figure 1**. The CMCOG functions under a committee structure composed of the CMCOG Board and Transportation Advisory Committee. The CMCOG Board consists of elected officials representing the counties in the study region and provides policy direction and a forum for transportation. The Board meets monthly to approve major planning reports and documents, and to discuss other agenda items.

Figure 1: CMCOG Map



Source: Wilbur Smith Associates

2. The Role of Transportation in the Modern Economy

In today's global economy, commercial transportation is crucial to a region's business and industrial development potential. For many industries, economic competitiveness is defined by the ability of goods and services to be transported in a time-definite manner. A well functioning commercial transport system brings modern quality-of-life benefits that consumer's value. However, freight also may be viewed by many as a threat to commute times and safety.

In the current cost effective business environment, time sensitive transportation services are increasingly a strategy for gaining a competitive advantage in manufacturing and service based industries. Global integration of the U.S. economy has grown at a rapid pace as domestic manufacturers now shop the world for components and subassemblies to manufacturing processes. Advances in technology and management practices are also allowing U.S. firms to develop strategies that enable customized products for mass market distribution.

Many industries that are intent on minimizing costs have focused on ways to manage supply chains effectively and in doing so have placed a premium on logistics and transportation. Logistics, simply put, is the art of moving the right material, to the right place, at the right time, at the least cost. For some industries, logistics are approximately 40-60 percent of the overall costs of a supply chain.[2] The major costs of logistics are typically broken down into transportation and warehousing, with transportation serving as the highest logistics cost. Transportation is also a variable cost, which can be managed to reduce overall costs. However, all industries have to rely on the nation's highway, rail and port systems to move their cargo. A supportive transportation infrastructure for freight movement will continue to drive the U.S. economy by providing reliability and accessibility to local and state markets. **Table 1** presents the cost of logistics as a percent of sales. Transportation accounts for almost 6 percent of total sales and almost 60 percent of logistics costs nationally. This data indicates the importance of logistics to business and the need for efficiencies within the transportation industry to minimize costs.

Table 1: Cost of Logistics

Cost Category	Total Costs ($ Billions)	% of Sales	% of Logistics Costs
Transportation	590	5.9	58.4
Warehousing	78	0.8	7.9
Inventory Carrying Costs	299	3	29.7
Administration	39	0.4	4
Total	1006	10.1	100

Source: Robert Delaney, Cass Logistics 12th Annual State of Logistics Report, 2001.

In summary, the importance of reliable, safe and efficient transportation is paramount to ensure the efficient delivery of goods to population areas throughout the U.S.

[2] Purchasing and Supply Chain Management, Monczka/Trent/Handfield

3. CENTRAL MIDLANDS FREIGHT TRANSPORTATION INFRASTRUCTURE OVERVIEW

This section describes the following components of CMCOG's Freight System infrastructure:

- Highway system;
- Railroads system;
- Airport system; and

The following overview discusses these infrastructure components as they relate to freight movement.

3.1. Primary Highway System

This report classifies the roadway network into two systems for a subsequent discussion of the ability of the region's system to accommodate truck transportation: Primary and Secondary. The Primary Highway Freight System consists of major interstates that provide access to key model transfer points and activity centers. Typically, these roads experience the highest volumes of truck traffic. The Secondary Highway Freight System is more extensive throughout the region, and serves as the connectors to distribution and manufacturing points, as well as end consumers.

3.2. Primary Highway Freight System

The region's Primary Highway Freight System is composed of the following four Interstate highways: Interstate 20, Interstate 77, and Interstate 26, and the Interstate 126 spur connecting I-26 with downtown Columbia. These routes are used to transport the region's inbound and outbound freight. These interstates also serve as the primary motor carrier paths for navigating through and around the region. As shown in **Table 2**, trucks account for 14 percent or more of total traffic on three of the four primary routes in the region. **Figure 2** shows the region's Primary Highway Freight System.

3.2.1. Route Descriptions

3.2.1.1. Interstate 77

I-77 begins as a six-lane highway at I-26 in the southwestern portion of the Columbia metropolitan area. In the Columbia area, I-77 offers convenient access to Fort Jackson before intersecting with I-20 in the northeastern portion of the city. I-77 provides direct access to Charlotte, North Carolina, an area that generates a significant amount of freight destined for the Columbia metropolitan region. I-77 extends to points south to major facilities such as the Port of Charleston via I-26.

3.2.1.2. Interstate 26

I-26 begins in Charleston, South Carolina and travels northwest, intersecting I-95 and then continuing northwest to the Columbia area. I-26 connects with I-77 southeast of the

Columbia Metropolitan Airport. I-26 continues in a northwesterly direction to the industrial upstate region that includes Greenville, Spartanburg and the I-85 corridor. I-26 then continues further north and intersects I-40 near Asheville, North Carolina.

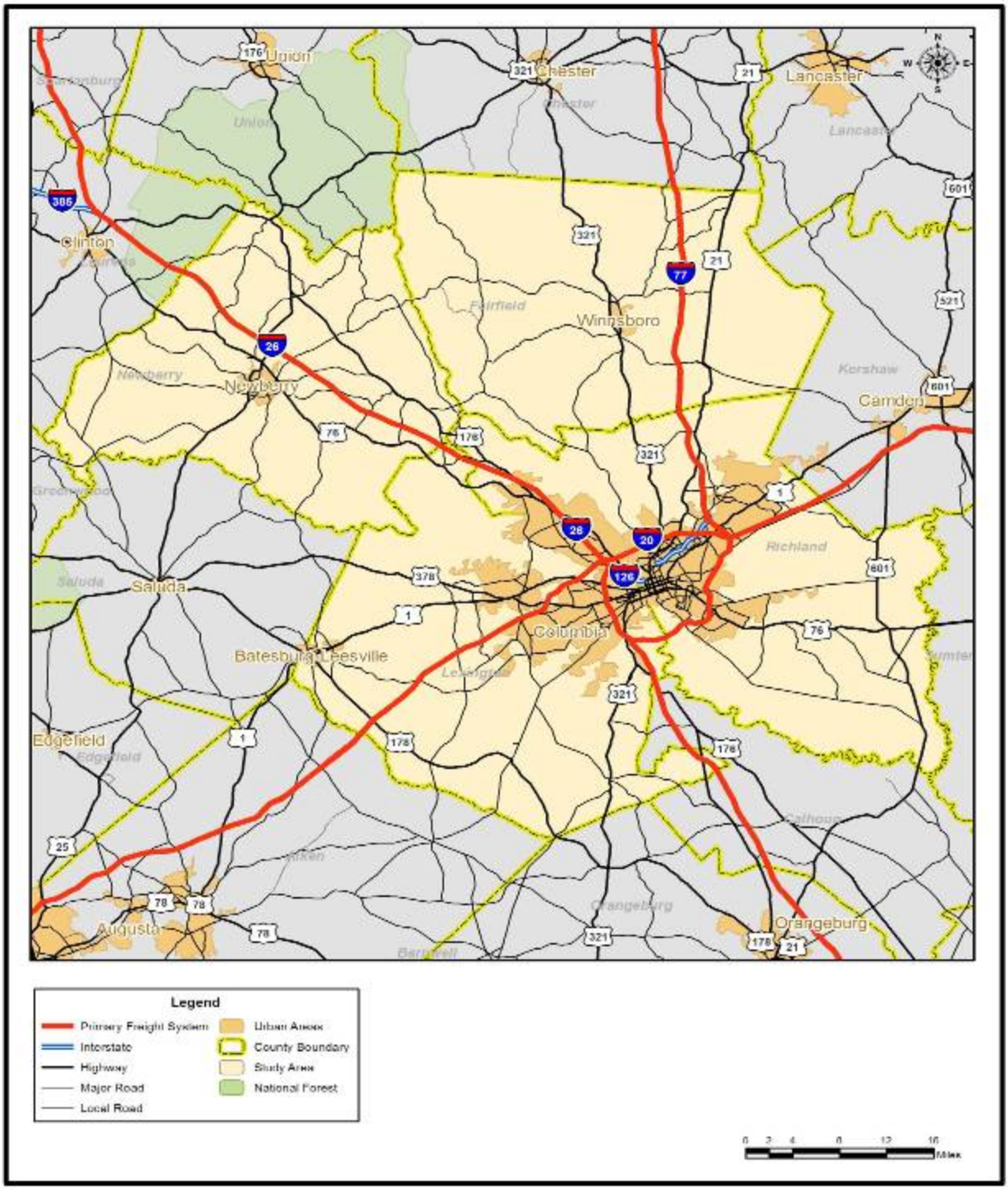
3.2.1.3. Interstate 20

I-20 enters South Carolina south from Georgia and extends northeastward, bypassing Aiken, before reaching Lexington County. I-20 continues through the county bisecting I-26 in the northeast part of the county. I-20 travels through the northern part of Columbia, crosses I-77 and transitions to an eastward direction, passing north of Fort Jackson and south of Camden before terminating at I-95 in Florence.

3.2.1.4. Interstate 126

I-126 begins just south of the I-26 / I-20 interchange in the northwest quadrant of Columbia. It extends from I-26, a distance of four miles, in a southeasterly direction, crossing the Broad River and connecting with Elmwood Avenue and Huger Street on the northern and western edges of the downtown area.

Figure 2: Primary Freight System



Source: Wilbur Smith Associates

Table 2: Primary Freight System Road Characteristics

Road	AADT(per year)*	Percent Truck**
I-77	79,033	18
I-26	75,300	14
I-20	62,100	17
I-126	66,447	5

Source: South Carolina Department of Transportation
* Calculated as Average AADT along corridor
* *Calculated as Averaged Percentage Truck along corridor

3.3. Secondary Highway Freight System

The region's Secondary Freight System, shown in **Figure 3**, consists of state routes and key arterials that support truck movements. These roads provide direct access to freight facilities and serve as the "last mile" for the delivery of goods. An important role of the secondary freight system is that these roadways support freight destined for the region or serve as the road connection for outbound goods produced or distributed by businesses in the region. A clearly identified secondary road system is important as it directly influences the region's ability to move freight efficiently. **Table 3** shows that truck traffic accounts for 9 percent or more of total traffic on eight of the nine routes listed.

3.3.1. Route Descriptions

3.3.1.1. US 76

US 76 is a well-traveled route that extends through the entire study area. The highway parallels I-26 to the northwest, and it serves as the main local route between the many small industrial areas along this corridor. US 76 (co-signed with US 378) extends from the heart of downtown, east of Columbia, to southeast Richland County and east to McEntire Air National Guard Station, Shaw Air Force Base and Sumter.

3.3.1.2. US 378

US 378 is considered a spur of US 78. US 378 extends east-west through the region, stretching from Conway, near the Grand Strand coast, to eastern Georgia. The specific segment of this roadway that most supports freight movements in the Columbia region begins at its intersection with I-26 and extends westward for three miles to the junction with I-20.

3.3.1.3. US 1

US 1 traverses the entire state of South Carolina in a north-south direction, passing through such major cities as Columbia and Aiken. For much of its length through Richland County, US 1 is called Two Notch Road. In Lexington, US 1 is known as Augusta highway, where it parallels I-20 in Lexington and Aiken Counties. US 1 merges with SC 34 for a few miles around Camden. This particular route serves an abundance of commercial retail businesses and residential areas.

3.3.1.4. SC 555

SC 555/Farrow Road extends from the Columbia northward, crossing I-77 and joining US 21 near Blythewood. This route serves as an alternative northern route to I-77. SC 555 provides access to the freight cluster primarily located in Blythewood.

3.3.1.5. US 21

US 21 is a north-south route that connects Charlotte to Columbia and continues to Charleston. This route parallels I-77 and provides access to downtown Columbia, where it transitions into Main Street.

3.3.1.6. US 321

US 321 provides direct access between Savannah, Georgia and Columbia, serving as an alternate to I-95 and I-26. Starting in Hardeeville, US 321 extends through sparsely populated areas and small towns including Estill, Fairfax, and Denmark, heading in a straight and northward direction into the Columbia area, where it merges with US 21. In Columbia, US 321 runs concurrent with US 21 through Cayce. The roads then separate at Hyatt Park. At this point, US 321 passes west of I-77 and US 21 extends north of Columbia passing through Winnsboro in Fairfield County.

3.3.1.7. US 601

US 601 extends north-south on the eastern side of the region and borders the Fort Jackson Military Installation in Richland County. This route also provides access to North Carolina and Orangeburg outside of the study area. US 601 intersects US 76 / US 378, which are major east-west corridors in the Central Midlands Region and serve several large industries near Eastover.

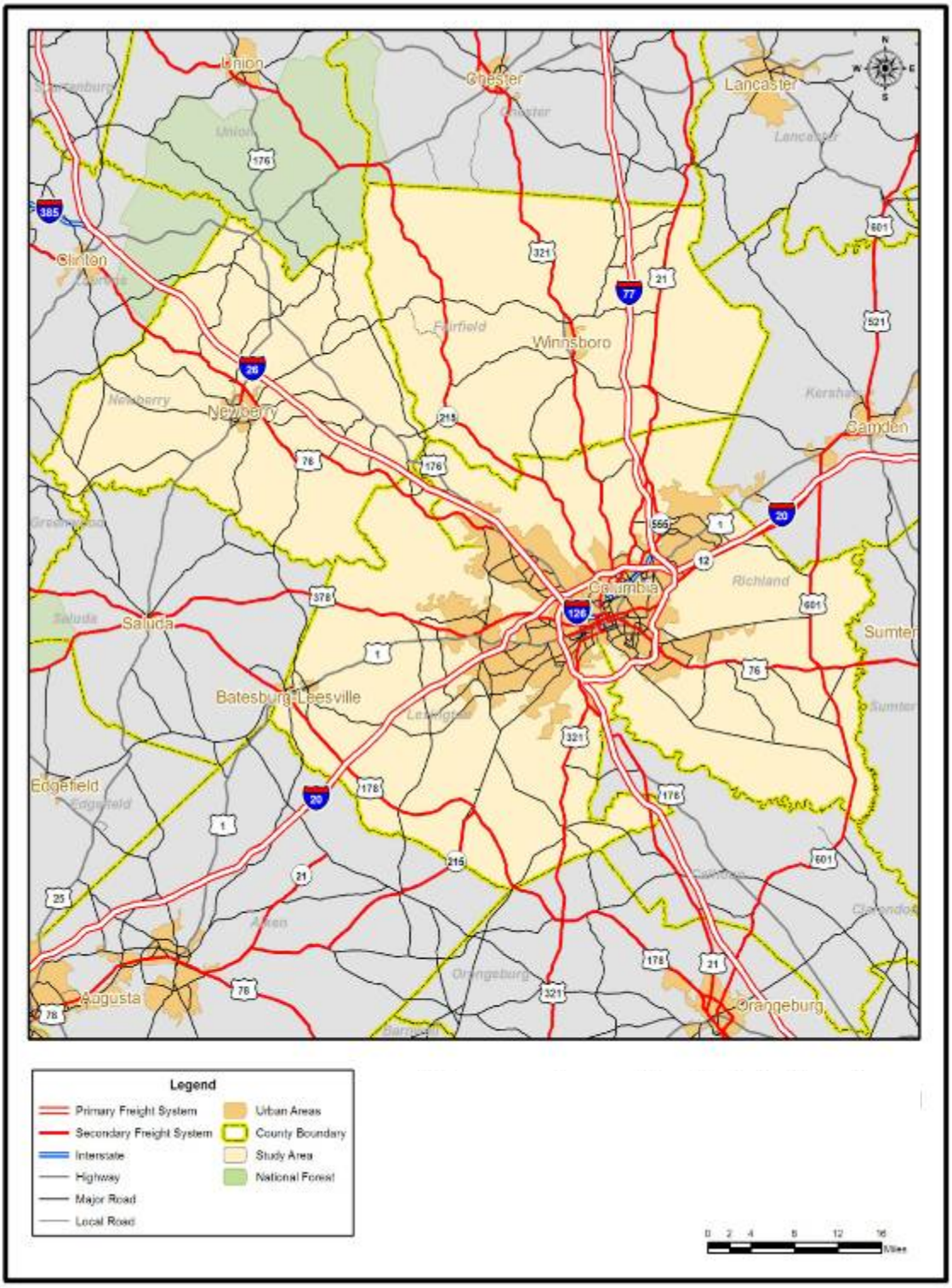
3.3.1.8. SC 34

SC 34 extends east-west from Newbery to Camden north of Columbia. I-26 and I-77 intersect along this route, making this state highway a heavily traveled alternative to I-20. SC 34 also provides connectivity to US 601 in Camden.

3.3.1.9. SC 215

SC 215 extends north from the city center of Columbia to I-20 as Monticello Road, and then travels in a northwesterly direction to provide access to smaller cities located outside of the study area, such as Union.

Figure 3: Secondary Freight System



Source: Wilbur Smith Associates

Table 3: Secondary Freight System Road Characteristics

Road	AADT*	Percent Truck**
US 76	25,416	10
US 378	24,250	10
US 1	21,826	6
US 21	16,850	10
SC 555	15,887	9
US 321	4,225	9
US 601	3,825	14
SC 34	3,007	9
SC 215	1,475	9

Source: South Carolina Department of Transportation 2007
* Calculated as Average Annual Daily Traffic (AADT) along corridor
** Estimated percent trucks

3.4. Railroads

Both CSX Corporation and Norfolk Southern (NS) own and operate an extensive rail network through and within the Central Midlands Region. Approximately 308 route miles of active railroad lines exist within the four counties. NS owns 177 miles (57%) of the total, CSX owns 126 miles (41%), and 5 miles (2%) are owned by the South Carolina Railway Museum.

The rail lines within the Central Midlands region are predominately single track, with no extended sections of double track. The usage of single track limits rail line capacity, since trains must wait on sidings to pass each other. The impact of single versus double track on the capacity of a rail line will vary depending upon a number of factors, including the number of sidings, the mix of trains that use a segment, the track grade, curvature, and speed limits in effect, as well as the dispatch control method that is used on that segment.

On most of the route miles within the region, train traffic is dispatched via manual block system, known as Train Warrant Control (TWC). Under manual block TWC, a dispatcher must give each train verbal authority to occupy a given area of track or block. The train crew must repeat that authority to the dispatcher and can then proceed to occupy that block for a given period of time. This system is generally used for rail lines that are less dense, since it requires more time and planning for train crews to communicate verbally with dispatchers. Out of the 308 route miles in the Central Midlands region, about 217 route miles (70%) are dispatched using this system.

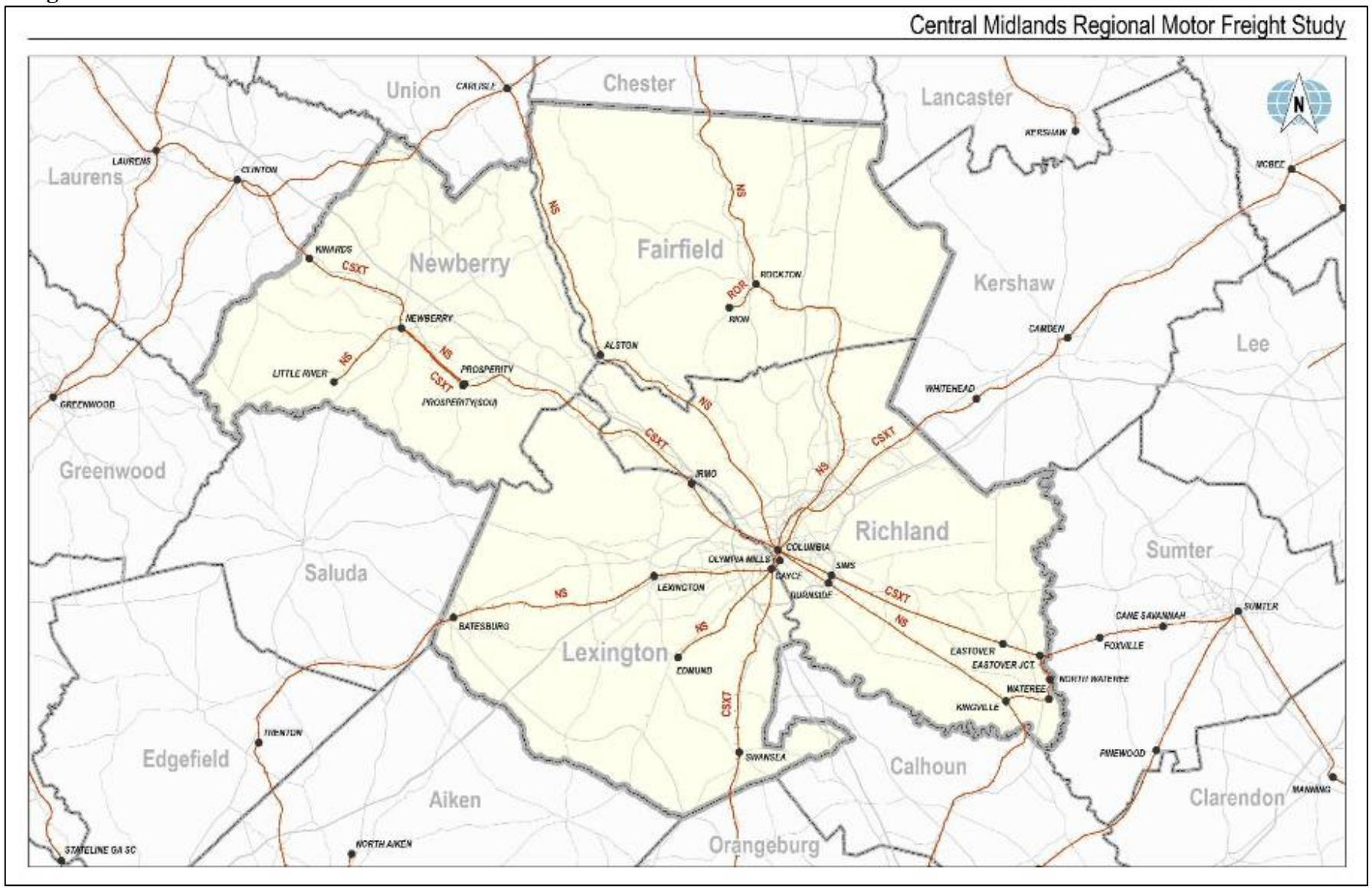
In terms of automation and speed of process, the next fastest dispatching process is the Automatic Block Signaling or ABS. Under this system, the train signals are controlled by a track circuit, which reveals the absence or presence of a train in a given block. Automatic signals indicate whether trains can enter blocks between the signals. Out of the 308 route miles in the Central Midlands region, about 50 route miles (16%) are controlled using the ABS system.

In terms of automation and speed of process, the fastest and most automated dispatching process is Centralized Traffic Control (CTC). By CTC, a central office controls a series of signals and switches that provide trains with the authority to occupy specific areas of track. Train crews do

not need to leave trains to throw switches. The computer software of the CTC system is designed to ensure that conflicting authorities cannot be granted. A dispatcher remotely controls signals and powered switches. Trains crews must observe controlled signals to gain movement authority. Generally, CTC is used for more dense lines. Out of the 308 route miles in the Central Midlands region, 40 route miles (13%) are dispatched using CTC.

Figure 4 displays the railroad lines in the Central Midlands region.

Figure 4: Central Midlands Rail Network



Source: Wilbur Smith Associates

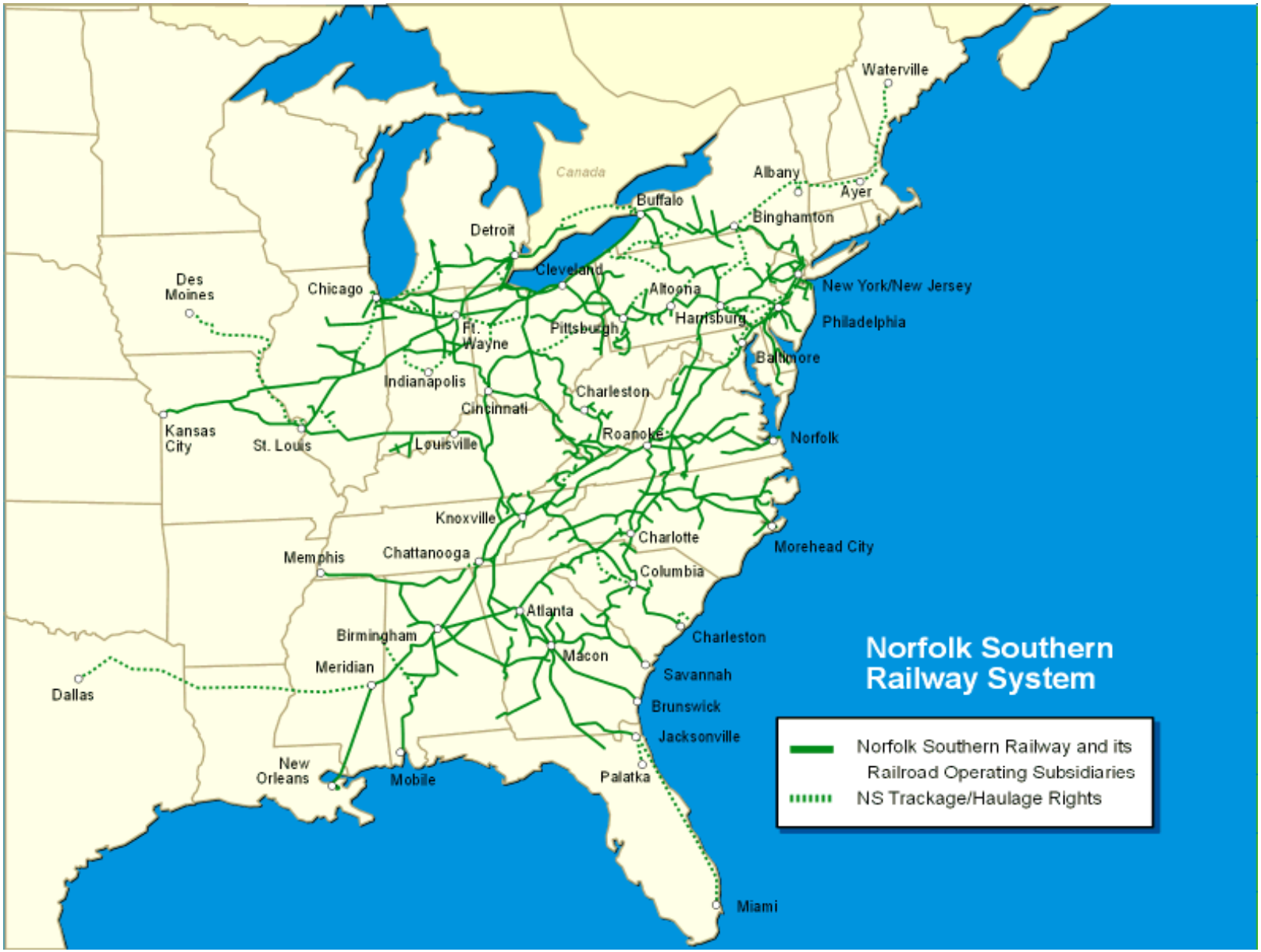
While Columbia is considered a rail hub, the rail traffic through Columbia is not highly dense compared to the rail traffic of other markets in the southeast U.S. Rail lines through Columbia have densities lower than 20 – 40 Million Gross Ton Miles per Mile (MGMT/Mi). This is in contrast to the major corridors in the southeast, segments of which can have traffic densities in excess of 100 MGMT/Mi. Much of the traffic between the southeast and mid-Atlantic/northeast is routed to the east of Columbia through Charleston and Savannah, Georgia. The high density lines that link the southeast to the Midwest, and states to the north, are routed west of Columbia, through Atlanta, and to Jacksonville, Florida. **Figure 5** displays regional rail line densities.

Figure 5: Regional Rail Line Densities

3.4.1. Norfolk Southern Rail Freight Operations

The Norfolk Southern system, shown in **Figure 6**, connects with cities in South Carolina, such as Charleston and Spartanburg, as well as external markets in Charlotte, North Carolina and Augusta, Georgia. These markets are all connected to Columbia through rail main lines, which carry moderate amounts of traffic.

Figure 6: Norfolk Southern Rail Freight Operations



Source: Norfolk Southern Corporation

Four NS mainline segments converge in the downtown Columbia area. These rail lines and their operating characteristics are described in **Table 4** below.

Table 4: NS Operating Characteristics

NS Line Segment	Average Trains per Day	Density MGMT/Mi(1)	Signal System
Augusta, GA – Columbia	11-13	10-20	Manual(2)
Spartanburg, SC -Columbia	6-8	5-10	Manual
Charlotte, NC - Columbia	8-12	10-20	Automatic Block(3)
Charleston, SC - Columbia	8-12	10-20	Manual

Source: Norfolk Southern Corporation
Range of average rail tonnage denoted as millions of gross ton-miles per mile.
Manual block system – this is a series of consecutive blocks of track over which train operations are governed by block signals or instructions transmitted by telephone or other means of communication.
Automatic block system – this is a series of consecutive blocks of track over which train operations are governed by block signals activated by a train engineer or by the conditions of the block beyond the signal.

3.4.2. Spartanburg-Columbia-Charleston Line

The Spartanburg-Columbia-Charleston section of rail line in the Central Midlands is in Norfolk Southern's Piedmont Division, Charleston District. This line traverses the Central Midlands region via Alston in Fairfield County and Columbia, Burnside and Kingville in Richland County. The mainline extending from Spartanburg-Columbia-Charleston has been upgraded with additional sidings and signalization in recent years to accommodate traffic growth and higher speeds. The line connects the Port of Charleston with Norfolk Southern's major north-south route at Spartanburg. The route at Spartanburg, between Lynchburg, Virgina and Atlanta, Georgia, is considered Norfolk Southern's core route in the south, roughly paralleling I-85.

The Norfolk Southern Spartanburg–Charleston line carries dedicated intermodal traffic and autorack trains. The autorack traffic, considered very time sensitive due to its relationship with import and export operations, services the line between a BMW plant, located in Greer, SC, and the Port of Charleston. This rail operation conveys finished autos and automotive parts. Merchandise traffic and coal is also carried on the line for interchange and delivery to South Carolina Electric & Gas (SCE&G) plants in the area. This diversity of train types has implications for the capacity of the line. Generally, rail lines with a larger variety of train types and dispatching priorities will require more capacity than those with a more consistent traffic mix. For example, time sensitive auto trains will receive dispatching priority over other train types, such as unit coal trains or manifest trains. This tends to slow the routing of other trains that use the same track.

The grades and curves on the rail line are moderate to the south of Columbia, with relatively long stretches of tangent (straight) track. However, north of Columbia, the line has some relatively tight curves and steep grades. The line includes a 1.53 percent grade just north of Alston in Fairfield County. While this level of grade is not considered unusual, it is rather steep for a rail line. The rail line also has a sharp, 9.8 degree curve near the northern border of Fairfield County. South of Columbia, the grades and curves are more moderate.

At 132 pounds per yard, the weight of the rail on the line is fairly typical for NS. According to Norfolk Southern's annual report (2007), about 50 percent of NS rail in service is 132 lbs/yd. This rail is continuously welded, so that rail sections are longer with few joints. In contrast to the 39 foot section of track used in joined rail, most modern rail is pre-welded, so that it is typically installed in 1,500 foot lengths. The reduced number of individual sections decreases the wear that the joints cause on the track. The rail is considered standard, in that no hardening process had been applied to the top of the rail to extend its service life, i.e. "premium rail". The line has relatively few sidings, with only two large sidings within the Central Midlands region. The balance of the rail on the line is roughly split between heavier and lighter gauge rail (29 percent is lighter and 21 percent is heavier).

CSX has trackage rights over this line between Columbia and Charleston, SC, thus CSX can operate trains over this section of rail line.

SPARTANBURG-COLUMBIA-CHARLESTON LINE
Route miles within four-county region: Approximately. 73
Sidings in four-county region: 3 (in 2002)
Route miles per siding: 24.3
Siding Lengths:
- Alston: Approximately. 6,800 feet
- Childs: Approximately. 4,500 feet
- Kingville: Approximately. 6,800 feet

Signal System: Manual TWC
Average Trains/day: 6 – 8 between Spartanburg and Columbia; 8 – 12 between Columbia and Charleston
Traffic Density: 5 – 10 MGTM/Mi between Spartanburg and Columbia; 10 – 20 between Columbia and Charleston
Maximum Speed Limit: 45 MPH north of Columbia, 49 MPH south of Columbia
Ruling grade: 1.53 percent north of Columbia, 0.79 percent south of Columbia
Tightest curve: 9.8°
Type of rail: 132 lb/yd continuous-welded rail

3.4.2.1. Charlotte-Columbia-Augusta Line

The Charlotte-Columbia-Augusta section of rail line in the Central Midlands is in Norfolk Southern's Piedmont Division, Columbia District. This line traverses the Central Midlands region via Rockton and Columbia in Fairfield County and Lexington and Batesburg in Lexington County. These lines roughly parallel I-77 north of Columbia and I-20 south of Columbia. NS serves Guardian Fiberglass at the former Mack Truck plant in Fairfield County, the Michelin Plant and the new Golden State Food distribution facility in Lexington County. Further south, the rail line serves the heavy industrial areas in the Aiken area. Norfolk Southern's new intermodal facility at the Charlotte International Airport creates the potential for a significant increase in intermodal traffic through Columbia to Charleston and/or Augusta. The automatic block signaling system north of Columbia creates additional capacity for the line, and allows trains traveling in the same direction to travel closer together.

The topography of this rail line is relatively moderate. A grade of 1.07 percent is considered steep but not exceptional. The maximum curvature of 4.5 degrees is also moderate. In particular, the section south of Columbia has significant sections of tangent (straight) track. As of 2002, the line north of Columbia had new rail laid during the past 30 years. South of Columbia, the rail line had "relay" rail, which had been used elsewhere and moved to this section of rail line in 1987.

3.4.2.2. Columbia-Edmund Brach

COLUMBIA – EDMUND BRANCH
Route miles: 11.7
Signal System: Manual TWC
Traffic Density: < 4.9 MGTM/Mi
Type of rail: 100 lb joined relay rail
Ruling grade: 1.01 percent
Tightest curve: 4.0°

In addition to the above mainline segments, NS also owns and operates over an 11.7 mile branch line between Columbia and Edmund, SC. The branch is the remaining active segment of what had been a larger rail line that had served Springfield, Barnwell, and Furman. This line primarily serves sand pits located at Edmund for short-haul movements within the state. This line has no active signal system and is periodically evaluated by NS for potential transfer to a shortline operator. NS also operates an average of two trains per day via trackage rights over CSX's Columbia – Spartanburg line to access a chip mill in Prosperity. The rail on the line is relatively light, with 100 lb joined relay rail.

3.4.3. Norfolk Southern Rail Yards

3.4.3.1. Andrews Yard

The Andrews Yard just outside of Columbia along Shop Road is NS's largest rail yard in South Carolina. The flat-switch classification yard also serves as a refueling point and locomotive maintenance facility. Industries located along Shop Road are served directly from the yard via spur tracks across Shop Road.

3.4.4. Norfolk Southern Intermodal Transfer Facilities

Norfolk Southern lists a limited number of intermodal transfer facilities by commodity for the Columbia area, which includes the following:

- ***Paper*** – Standard Paper Distribution – McQueen Street, Cayce;
- ***Automobile*** – Kinsler Auto Distribution – Old Dunbar Road, Cayce;
- ***General Merchandise –*** Carolina Bonded Storage – Gadsden Street, Columbia; and
- ***General Merchandise –*** United Refrigerated – Shop Road, Columbia.

Standard Paper Distribution and Kinsler Auto are located in the same general area on or just off Old Dunbar Road. Truck traffic along this roadway is high because it serves United Parcel Service (UPS) and Yellow Truck facilities. Old Dunbar Road is connected to Charleston Highway (US 176/21/321) just north of the I-26/I-77 interchange. It also has close access to SC 302 in the area of the airport.

Carolina Bonded Storage is located near downtown Columbia and it has close access to US 176/21. United Refrigerated has convenient access to I-77 from its location across from NS Andrews Yard on Shop Road. These highway freight routes are addressed in more detail in the Highway Profile section of this report.

As noted previously, all the rail lines that serve the study area are single track, and all NS lines in the region except for the line to the north of Columbia toward Charlotte are Manual TWC dispatched. The Charlotte–Columbia route is dispatched via automatic block signaling. As mentioned previously, the capacity of a given section of rail track is dictated by numerous variables, including the following:

- Number and length of trains;
- Horsepower of trains;
- Peak train counts, delineated by day of week and time of day;
- Terrain (grades and curvature);
- Variance in train speeds and dispatching priorities;
- Track speeds (which depends upon time of day and maintenance requirements;
- Amount of double and triple track mileage;
- Types of signal systems;
- Length and spacing of sidings; and
- Terminal infrastructure.

As a general rule of thumb, sections of track that are single track, with a reasonable number of sidings and Manual TWC should be expected to accommodate a maximum of 16 to 20 trains per day. With automatic block signaling, a rail line's capacity can be increased. As mentioned above in **Table 4**, most of the NS lines in the area carry about 6 to 12 trains per day.

NS does have some operational and market development weaknesses within the study area. The nature of NS operations through the downtown Columbia area and the existence of numerous at-

grade crossings across major roadways require slow operating speeds and present a safety liability. As residential development continues to grow in the southeast section of Columbia and around the USC campus, NS has pedestrian safety concerns and has expressed a continued willingness to work with city and state officials to address safety improvements in this area.

Norfolk Southern markets its services aggressively to existing and potential businesses interested in locating in the area. Norfolk Southern notes that continued market development could be limited due to limitations specific to counties in the study area, as noted in the rail discussion.

3.4.5. CSX Rail Freight Operations

The CSX system, as shown in **Figure 7**, connects Columbia to Spartanburg, Florence, Raleigh and Augusta. Like Norfolk Southern, CSX mainline routes carry moderate levels of traffic. Amtrak utilizes CSX's route between Raleigh and Savannah for its Silver Star passenger service with late night stops (1:00 – 2:00 AM) in both directions at the downtown Columbia Amtrak station.

Four CSX mainline segments converge in the downtown Columbia area. These rail lines and their operating characteristics are provided in **Table 5**.

Table 5: CSX Mainline Segments

Segment	Average Trains/day	Density (MGMT/Mi)	Signals
Spartanburg, SC - Columbia	22	20-40	Manual(1)
Raleigh, NC - Columbia	7	1-5	Centralized TC(2)
Sumter, SC - Columbia	10	10-20	Manual
Savannah, GA - Columbia	12-15	5-10	Centralized TC

Source: CSX Corporation
(1) Manual block signal system
(2) Centralized train control system – For this signal system train dispatchers monitor the location of trains electronically using track circuits and direct traffic by controlling the indication of signals and automatically lining electronically-operated switches to direct trains in sidings, etc.

Figure 7: CSX System Map

Source: CSX website

The CSX mainline system in and around the Columbia area serves the large coal utilities and paper/lumber industries within and south of the study area. The CSX mainline between Columbia and Savannah is used to serve the SCE&G Canadys Plant near Walterboro, and its line to Charleston serves the Cope Plant in Orangeburg County. Pulp and paper customers are generally located in Newberry County and Orangeburg, Bamberg, Allendale and Hampton counties south of Columbia. CSX also has an aggregate transfer facility in Cayce.

The Spartanburg to Columbia section of rail line within the Central Midlands region is on the CSX CN&L (Columbia, Newbery and Laurens Railroad) subdivision within the Florence division. This line extends south from Spartanburg to Columbia via Kinards, Newberry, and Prosperity in Newberry County and Irmo in Lexington County. It is the most heavily used rail line in the region with 20 – 40 MGTM/Mi. It is the primary route by which Appalachian coal trains access Columbia region coal plants, such as Canadys and McMeekin. Industries accessed by the line include:

- Goldkist poultry;
- Packaging Corporation of America;
- Georgia Pacific;
- International Paper;
- Beal Lumber;
- South Carolina Electric;
- Honeywell; and
- Stone Container.

The Spartanburg to Columbia rail line may be closer to capacity than others in the Central Midlands region. The number of trains per day, around 22, is relatively high for a rail line that is single track and controlled by Manual TWC dispatching control. However, compared to other rail segments in the study area, this segment's four large sidings assist in increasing rail line capacity.

Also listed above is the tonnage rating for an SD40 locomotive. The locomotive tonnage rating can be used as a proxy to provide information about a line's grade and curvature. Generally, the higher the grades and curves, the lower the tonnage a locomotive is able to haul. A typical tonnage rating in the CSX Florence Division for an SD40 would be somewhere around 4,800 to 4,900 tons per locomotive. On sections of track in hilly, difficult terrain, an SD40 will tend to have lower tonnage ratings, around 3,000. On easy, flat sections of track, the tonnage rating will tend to be above 5,000. The tonnage rating of 3,550 listed above for the Spartanburg – Columbia line within the Central Midlands region suggests above-average grades and curves for the Florence Division. This in turn will tend to slow trains somewhat per a given locomotive horsepower, given the grades and curves.

Norfolk Southern has trackage rights over this line, so NS has permission to operate trains on this rail line.

3.4.5.1. Sumter-Columbia Line

The section of this rail line that is in the Central Midlands region is on the CSX Eastover subdivision within the Florence division. The line arrives at Columbia via Eastover and Sims in Richland County. This segment includes only one passing siding at 5,670 feet, but also contains a marshalling yard at Eastover Jct. The segment includes the Wateree Spur, which accesses the SCE&G Wateree plant. Other industries accessed by the line include the following:

- International Paper;
- SYSCO Food Service; and
- Cayce Paper.

3.4.5.2. Savannah-Columbia Line

The section of this rail line that is in the Central Midlands region is in the CSX Columbia subdivision in the Florence division. The line arrives in Columbia via Swansea and Cayce. The section is used by Amtrak trains for Amtrak's Silver Star service. While the line is controlled by Centralized Train Control, few of the switches on the sidings appear to be remotely controlled within the Central Midlands area, thus lessening the benefit from Centralized Train Control. Central Midlands Industries that use this line include the following:

- Eastman Chemical Company;
- Foster Dixiana Corporation;
- Tanner Industries; and
- ARCO.

3.4.5.3. Raleigh – Columbia Line

The section of this rail line in the Central Midlands region is in the CSX Hamlet Subdivision of the Florence Division. The line arrives in Columbia via Weddell and Dentsville in Richland County. The section is used by Amtrak trains for Amtrak's Silver Star service. It is the least used CSX rail line in the region with a traffic density of 1 – 5 MGMT/Mi.

3.4.6. CSX Rail Yards

Cayce Yard

The CSX Cayce yard has 23 switching tracks, as well as RIP (railcar repair-in-place), fueling, train control, EOTD (end of train telemetry device), mechanical facilities, maintenance of way, crew change facilities, and other. The longest switching track is 2,580 feet long. It is accessed by Taylor and State Streets in Cayce.

Columbia Yard

CSX's Columbia Yard facility is adjacent to the Norfolk Southern Andrews Yard and can be accessed via Commerce Drive near the Columbia Owens Airport. This is a small yard and it has limited switching and storage capabilities.

Eastover Junction Yard

This is a small yard containing five switching tracks.

3.4.7. CSX Intermodal Transfer Facilities

CSX lists a number of intermodal facilities for the Columbia area on its website. The following provides a list of the intermodal facilities by commodity:

- Paper
  - Union Camp – Eastover; and
  - Federal Paperboard – Prosperity.
- Autos
  - TDSI Auto Distribution Terminal – 3450 Charleston Hwy, US 321, Dixiana.
- Lumber
  - Guys (International Paper) – Prosperity;
  - Georgia Pacific – Prosperity; and
  - ML Haltiwanger Lumber – Newberry.

3.5. Airport System

3.5.1. Columbia Metropolitan Airport

The Columbia Metropolitan Airport is located seven miles southwest of downtown Columbia. The airport covers 2,600 acres and it is situated in a prime geographic location for logistics operations. More than 70 percent of the population and employment centers within the U.S. can be accessed via road transport within 24 hours from Columbia Metropolitan Airport destinations[3]. The airport has one passenger terminal and supports dedicated air cargo activity.

As shown in **Figure 8**, Columbia Metropolitan Airport is situated near three interstate highways: I-20, I-26 and I-77. Of these interstates, both I-20 and I-26 run from east to west while I-77 runs from north to south and is approximately 55 miles from I-95, via I-26. The city is less than two hours away from the Port of Charleston, the largest container port on the U.S. Southeast and Gulf coasts.

Air cargo facilities at the airport are available at two locations: the East Cargo Apron and the West Cargo Apron. The East Cargo Apron is located off SC 302 and borders the airport's

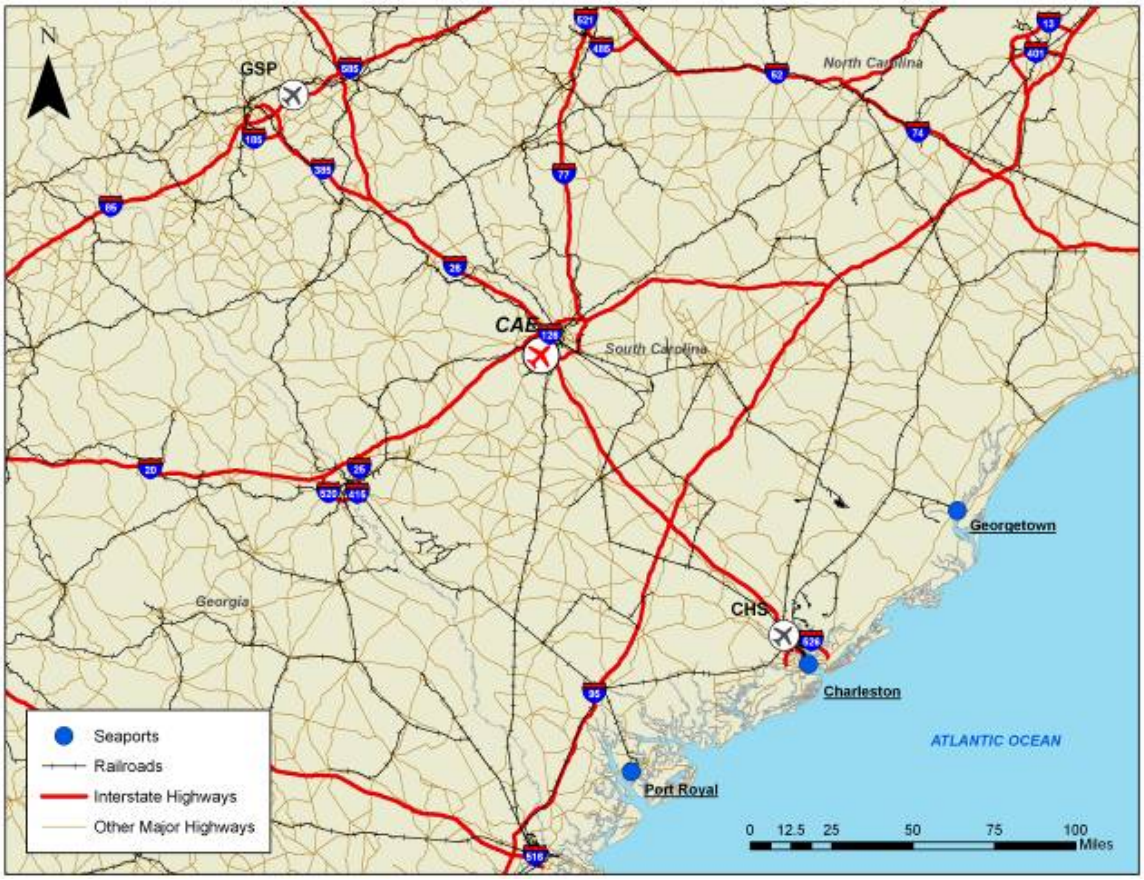
[2]Airport Council International

secondary runway, Runway 05/23. The ramp area measures nearly 1.6 million square feet. The warehouse space on the East side is owned by Untied Parcel Service. This facility is 352,000 square feet with 44 acres of ramp space[4].

The West Cargo Apron is located off SC 602 and borders the airport's primary runway, Runway 11/29. The cargo apron measures more than 660,000 square feet and it covers 15 acres. The air cargo warehouse facilities offer 75,700 square feet of space for cargo handling and storage. FedEx is the dominant integrated express carrier on this side with DHL occupying just 3,000 square feet of warehouse space. Congestion is an issue at times with both DHL and FedEx maintaining operations here.

Figure 9 provides the airfield layout and illustrates the location of the air cargo facilities.

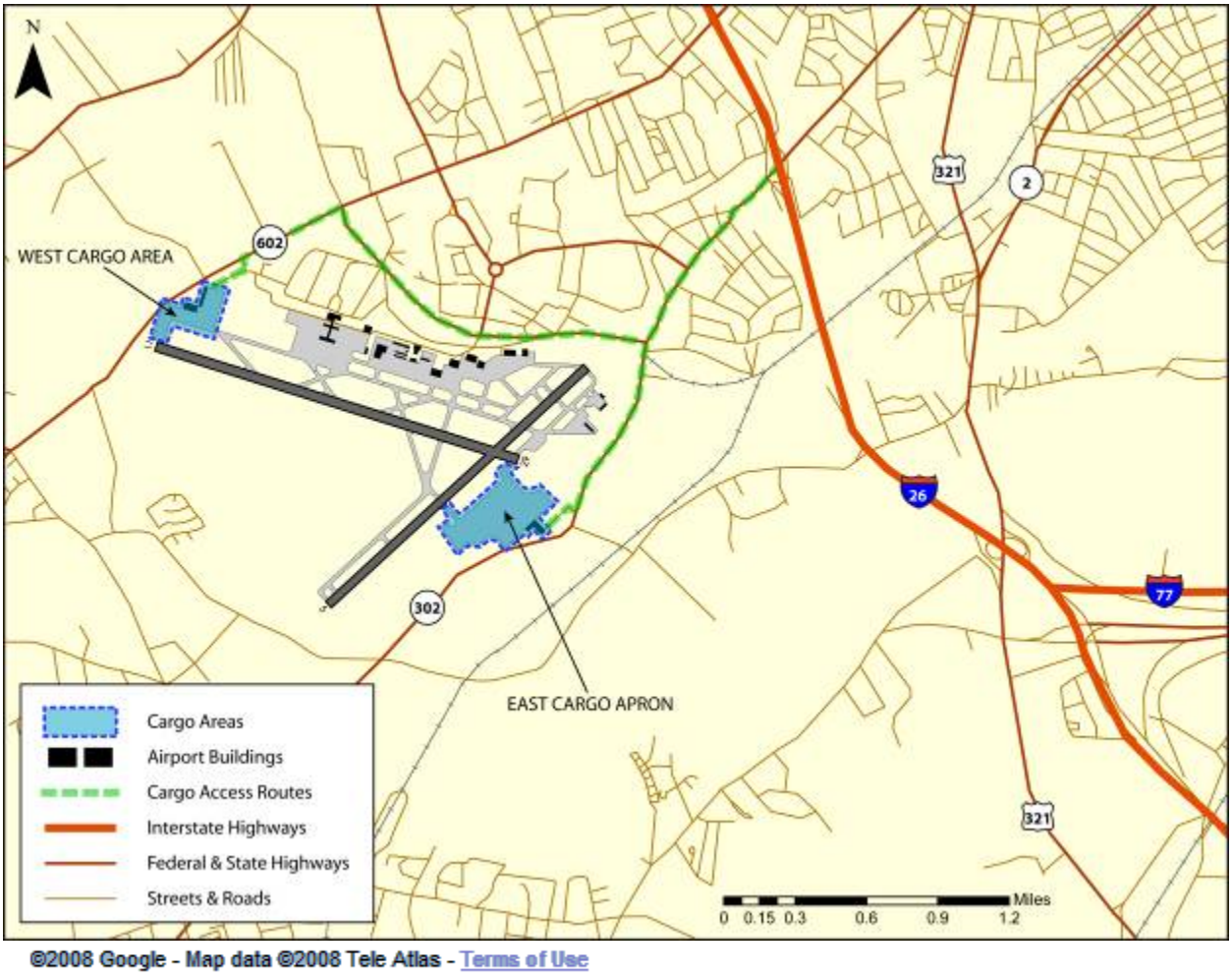
Figure 8: Columbia Metropolitan Airport



Source: Wilbur Smith Associates

[4] The 44 acres includes lead in taxiways. There are 37 acres excluding these taxiways.

Figure 9: Columbia Metropolitan Airport and Air Cargo Facilities



The airport supports scheduled air cargo flights on DHL, FedEx, and UPS. UPS operates a regional air hub in Columbia serving the following five states: Georgia, South Carolina, North Carolina, Florida, and Alabama. This regional hub also serves portions of three additional states: New Jersey (northern region), Illinois (metropolitan Chicago), and New York (metropolitan New York).

3.5.2. Overview of the Air Cargo Industry

3.5.2.1. Types of Air Cargo Carriers

Within the air cargo industry, there are different types of carriers which serve customer needs. This section provides a discussion of the major types of air cargo carriers operating domestic flights, namely:

- Integrated express operators;
- All-cargo carriers; and

- Commercial service passenger airlines.

Figure 10 illustrates the variety of destination offerings, dependant on carrier offering and established market.

3.5.2.2. Integrated Express Operators

Integrated express operators specialize in moving shipments from origin to final destination. Three integrated express operators dominate the domestic air cargo industry: DHL, FedEx, and UPS. Individuals shipping packages for both business and non-business purposes can use these carriers for door-to-door delivery service. In addition to scheduled air network routings, these carriers also use trucks to move material from origin to final destination.

These cargo carriers operate using a hub-and-spoke system similar to the passenger airline system. The hub is the backbone of the integrated express carrier system since it provides connections to each market in the integrator's system. During each day of operation, flights from around the U.S. arrive at the hub where packages are offloaded, sorted to the appropriate destination market, and then reloaded onto the aircraft.

Traditional integrated express service focuses on small-volume, infrequent shippers or higher volume shippers moving product to multiple destinations. This market can be termed the "retail" air cargo market and includes individual, private and business-to-consumer (B2C) shippers. However, integrated express carriers are moving into the "wholesale" market, catering to larger freight movements demanded by manufacturing and distribution operations. This traditional freight forwarder[5] and all-cargo carrier market includes corporate, block-space (guaranteed capacity shippers) and business-to-business (B2B) consumers. It is estimated that integrated express carriers account for more than 60 percent of the U.S. domestic air cargo market, yet hold only 10 to 15 percent of the international market. While DHL, FedEx and UPS have facilities in the Central Midlands region, these carriers do not operate any hubs at Columbia Metropolitan Airport.

3.5.2.3. All-cargo Carriers

All-cargo carriers operate airport-to-airport air cargo services to transport freight for customers. All-cargo air carriers include Atlas Air, Polar Air Cargo, and Tampa Cargo. One prominent U.S. all-cargo carrier, Kitty Hawk, recently declared bankruptcy, and flights to its former national hub in Ft. Wayne, Indiana have since terminated. All-cargo carriers offer scheduled service to markets throughout the world using containerized cargo aircraft. Freight must be dropped off at the airport by the shipper, or the shipper's freight forwarder, and must be picked up at the destination airport by the customer, or the customer's freight forwarder.

All-cargo carriers generally operate scheduled widebody (international routes) or narrowbody (domestic routes) jet aircraft from one airport to another but do not offer door-to-door service. Approximately 10 to 15 percent of world air cargo traffic is moved by all-

[5] A freight forwarder is a firm acting as a broker between the shipper and the carrier.

cargo carriers, primarily on long-haul international or trans-continental routes. Columbia is one of seven domestic air hubs for UPS (United Parcel Service).

3.5.2.4. Commercial Service Passenger Airlines

Commercial service passenger airlines are scheduled passenger airline operators. Cargo space in commercial aircraft is generally available to move cargo from airport-to-airport service. Commercial air carriers account for the majority of international air cargo service, with limited domestic offerings. Within the U.S. domestic market, commercial carriers account for only 15 to 20 percent of the total air cargo transported. The air cargo market share of commercial passenger carriers, particularly on domestic routes, has declined significantly due to security measures and restrictions brought about after 9/11. Prior to 2001, commercial passenger carriers transported approximately 25 percent of all domestic air cargo. Seven airlines provide daily service into and out of Columbia: American Eagle, Continental, Delta, Northwest, Spirit, United, and US Airways.

3.5.2.5. Air Cargo Services

The air cargo carriers discussed in the previous section provide the following three primary types of air cargo service options:

- Integrated express service;
- Freight forwarding; and
- Airport-to-airport.

3.5.2.6. Integrated Express Service

Integrated express companies provide next day, document, and small package (two to 70 pounds) services to the customers they serve. Increasingly, however, express operators are transporting "heavy" freight, identified as more than 70 pounds. In addition to "overnight" service, express carriers now offer deferred service or second-day and third-day "time-definite" service, changing the dynamics of the air cargo industry significantly. Deferred service is predicted to surpass the overnight (express) delivery of letters, documents, and packages. The lower cost deferred delivery does not mean uncertain delivery; most is "time-definite", meaning guaranteed delivery at a specific time on a certain date. Increasing use of electronic transactions for document delivery will further reduce demand for overnight document delivery.

Integrated express carriers operate using a hub-and-spoke system, similar to the passenger airline system. Traditional integrated express service focuses on the small-volume, infrequent shipper or higher volume shippers moving product to multiple destinations. Traditional express carriers, UPS and FedEx, offer national and regional coverage for the Central Midlands. Third party express service is available across a range of smaller carriers, such as USACouriers and Atlantic Courier Services.

3.5.2.7. Freight Forwarding

Firms acting as brokers between the shipper and the carrier are categorized as freight forwarders. Freight forwarders handle wide-ranging types and sizes of freight, from small packages to be consolidated into container loads, to oversized, one-time freight movements. These loads are then tendered to an air cargo carrier or commercial carrier to deliver to the forwarder's agent or subsidiary at another airport. Serving a dual role, the air freight forwarder is, to the shipper, an indirect carrier. From the perspective of the all-cargo carriers, the freight forwarder is the shipper.

In addition to using third-party service providers to move freight from airport-to-airport (commercial carriers and all-cargo airlines), freight forwarders also often rely on third-party less-than-truck load (LTL) motor carriers to move material to and from the airport. LTL market areas are defined by individual customers rather than large population or industrial centers. The forwarder's customers are usually large-volume, high frequency shippers with demand driven by either manufacturing facilities or centralized distribution operations. In Columbia, the active freight forwarders include major industry players such as UPS and BAX Global. Smaller companies are available; such as JA White and Chara distributors.

3.5.2.8. Airport-to-airport

All-cargo carriers, ad-hoc charter operators, and commercial passenger carriers provide airport-to-airport service. Freight must be dropped off at the airport by the shipper, or the shipper's freight forwarder, and must be picked up at the destination airport by the customer or the customer's freight forwarder.

All-cargo carriers operate airport-to-airport air cargo services to customers, but do not offer passenger service. All-cargo carriers offer scheduled service to major markets throughout the world using widebody and/or containerized cargo aircraft.

Commercial airlines provide air cargo services, but these services tend to vary in scope and size from airline to airline. Industry-wide, five to 16 percent of passenger airline revenue is derived from air cargo. An airline's aircraft fleet is a significant factor in determining the size and amount of cargo the airline can transport. A regional airline with a fleet of turboprop and regional jets do not have the capacity to accommodate large, bulky shipments. Airlines operating widebody aircraft, such as the B747, B777, and A300, have containerized lower decks, which allow speed in loading and offloading, and are capable of handling large, bulky shipments.

3.5.3. Air Cargo Activity at the Columbia Metropolitan Airport

Air cargo activity at the Columbia Metropolitan Airport is supported by air cargo carriers, Road Feeder Service (RFS) providers, and passenger air carriers. This section discusses the scheduled routes for each activity.

3.5.3.1. Mainline Integrated Express Activity

The Columbia Metropolitan Airport has scheduled air cargo service on integrated express carriers and also has ad-hoc air cargo activity. The three leading U.S. integrated express carriers: DHL, FedEx and UPS all operate scheduled routings at the airport. Each of these carriers flies from the Columbia Metropolitan Airport to their national hubs. FedEx and UPS also operate scheduled flights to regional hubs from the Columbia Metropolitan Airport. FedEx serves its regional hub in Columbia with a scheduled B727. United Parcel Service has a regional hub at the Columbia Metropolitan Airport. This integrated express carrier uses an A300 to serve its regional hub at Dallas-Fort Worth International. It also routes a B767 directly to its West Coast regional hub.

3.5.3.2. Other Integrated Express Activity

In addition to the scheduled mainline flights operated by DHL, FedEx, and UPS, there are also smaller integrated express carriers serving the region. The three leading U.S. integrated express carriers often use these smaller operators to transport cargo on segments with lower volumes that cannot support a dedicated aircraft. These smaller integrated express carriers include:

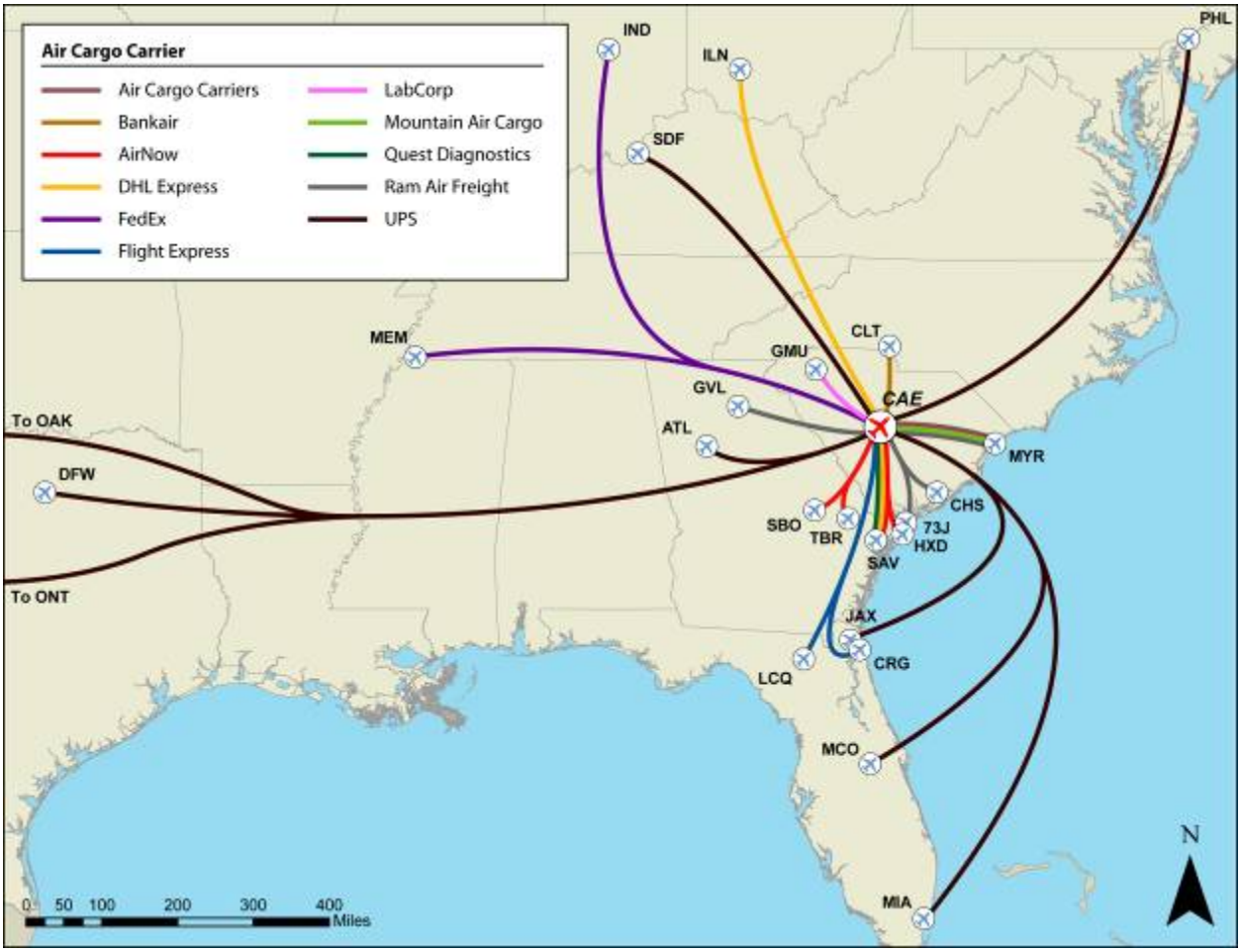
- Air Cargo Carriers;
- Flight Express;
- Mountain Air Cargo; and
- Ram Air Freight.

There are also smaller integrated express operators that do not fly for one of the leading U.S. integrated express carriers. These carriers with operations at the Columbia Metropolitan Airport include:

- Bank Air;
- AirNow;
- LabCorp; and
- Quest Diagnostics.

Integrated express carrier Bank Air specializes in moving cancelled checks. This carrier provides service between Columbia Metropolitan Airport and Charlotte-Douglas International Airport. AirNow specializes in both scheduled and charter aircraft flights. This carrier regularly serves Savannah International Airport, Emanuel County Airport (Swainsboro, Georgia), and Statesboro-Bulloch County Airport (Statesboro, Georgia). LabCorp and Quest Diagnostics haul laboratory shipments to and from the Columbia Metropolitan Airport.

Figure 10: Destinations Served by Air Cargo Carriers



Source: Wilbur Smith Associates

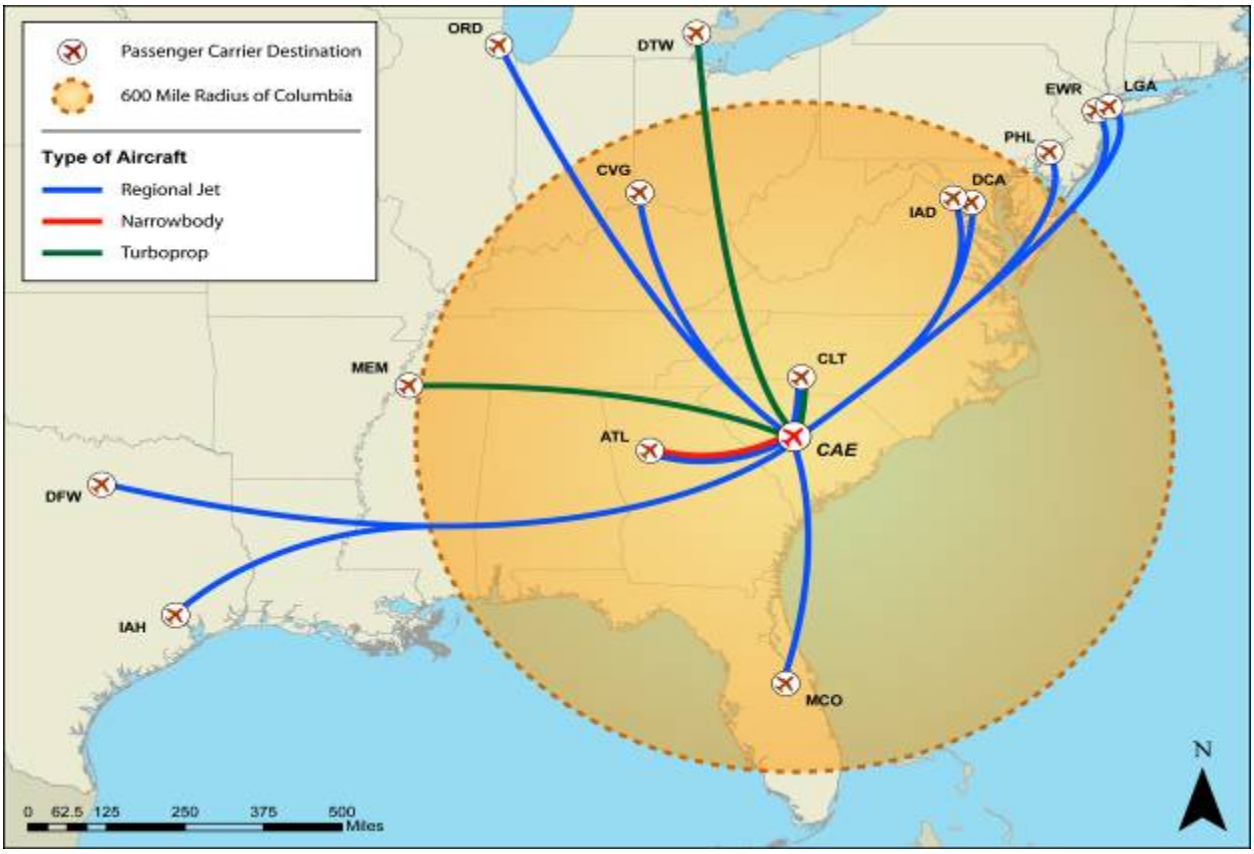
3.5.3.3. Passenger Air Carriers

The Columbia Metropolitan Airport supports scheduled commercial passenger service on seven carriers:

- American Eagle;
- Delta;
- Continental;
- Northwest;
- United Express; and
- US Airways.
- Spirit

Passenger air carriers at Columbia Metropolitan Airport operate 45 daily flights to 14 cities across the U.S. **Figure 11** shows the destinations served by these carriers. With the exception of Delta Airlines, these scheduled flights are all operated with regional jet aircraft and as noted earlier, aircraft cargo capacities are limited. In 2006, Delta Airlines was the only commercial airline with scheduled passenger service reporting air cargo tonnage being transported from Columbia Metropolitan Airport. Delta Airlines operates eight daily non-stop services to Hartsfield-Jackson Atlanta International Airport. However, only one of the eight flights uses a McDonnell Douglas-80 (MD 80) aircraft. In total, Delta Airlines transported 208 tons of air cargo in 2006.

Figure 11: Destinations Served by Commercial Passenger Carriers



Source: Wilbur Smith Associates

3.5.4. Road Feeder Service (RFS)

The increasing use of trucks in air cargo operations underscores the need for airports supporting the air cargo industry to be linked to the interstate system. Air cargo operators are increasingly examining airport connectivity to the interstate system when evaluating the suitability of an airport for expanding air cargo operations. The shift to truck operations, where logistically possible, is not singularly due to the cost benefits of ground versus air transport. There has been

a fundamental shift in supply chain thinking away from just-in-time (J.I.T.) manufacturing and lean-inventory strategies. This move toward a more conservative and concentrated supply chain favors trucking operations over air. With a less time constrained supply chain, coupled with time-definite service now offered by many Less Than Truckload carriers, the cost required for air cargo transport is often not justified.

3.5.4.1. Road Feeder Service (RFS) at the Columbia Metropolitan Airport

Air cargo transport requires support from modes of transportation other than air. Carriers providing pick-up and delivery service must have a means of moving packages to the origin airport and from the destination airport. Further, as long as a shipment can meet its delivery requirement, it may not have to travel on air for its entire routing from origin to destination.

Also of note, there are scheduled RFS connections between Columbia and major international gateways, such as New York and Los Angeles. Leading RFS provider Forward Air has scheduled RFS ground service between the Columbia Metropolitan Airport and its regional hub in Atlanta. Transit expectations may provide an RFS the opportunity to divert from a predominantly air route to a truck route; still providing the service, but at a lower cost to the RFS.

Figure 12 shows the destinations served by RFS carriers in the Central Midlands region.

Figure 12: RFS Destinations Served

Source: Wilbur Smith Associates

3.5.5. Air Cargo Trends

3.5.5.1. Declining Availability of Air Cargo Capacity

Air cargo operations are increasingly diminishing from passenger airline operations. Currently, 55 percent of air cargo carrying capacity is transported by passenger aircraft. Use of air cargo capacity is decreasing, while use of dedicated all-cargo aircraft is increasing. This change can be attributed to the following reasons:

- Increased market share held by the integrated express carriers;
- Higher passenger load factors;
- Increased use of smaller regional jets; and
- Stringent security regulations.

Careful planning, coupled with increased use of regional jets on domestic short-haul routes, has increased the passenger occupancy of many aircraft, resulting in more weight and space requirements for passengers and baggage, and less for freight cargo. Further, airlines are seeking to increase the amount of time aircraft spend in the air and to reduce gate turnaround times. This shorter turnaround time affects cargo operations because shorter gate turnarounds reduce the time for loading and offloading cargo.

While there is likely to be a continued market for passenger airline air cargo capacity, the integrated carriers have been successful in expanding markets to capture freight that formerly was the exclusive domain of the heavy cargo carriers (inclusive of commercial carriers).

3.5.6. Modal Shift

The shift in focus from express to time-definite service, coupled with financial and cost-saving measures, translates into increased use of trucks on longer distance routes traditionally served by aircraft. This modal shift is particularly pronounced within the integrated express carrier community. According to the *FAA Aerospace Forecast*, the majority of the modal shift has already occurred.

Integrated express carriers, either through acquisitions or contracts, are using trucks to provide overnight service on short-haul segments or to meet longer delivery schedules. Passenger and cargo airlines are also using trucks as a substitute for aircraft. This road feeder service (RFS) is commonly used in the Southeast U.S. and also by some of the large domestic heavy-weight integrated carriers such as BAX Global. Among the largest national suppliers of road feeder service are Forward Air, Air Cargo, Inc., Towne Air Freight, and Aeroground.

Less-than-truckload (LTL) companies have also become major competitors to air freight and enjoy a significant cost advantage over the air freight industry because of lower capital costs for equipment and lower wage scales. To compete effectively in this segment, FedEx formed its own LTL subsidiary, FedEx Freight. Other larger LTL companies competing for time-definite shipments include Yellow Freight System, Con-Way, and Roadway Express. LTL companies also operate using a hub-and-spoke system similar to the integrated express carriers in which several banks of trucks arrive and depart daily. The key to LTL expansion into traditional air cargo markets is not increased speed of delivery, but time-definite delivery, a service once exclusive to the integrated express carriers.

4. FREIGHT SYSTEM ANALYSIS

This section analyzes the freight transportation system in the Central Midlands region including, highway, rail, air and water. This chapter also assesses each mode of transportation to analyze key freight access corridors, infrastructure conditions, safety, service utilization, access to markets, and intermodal connectivity.

4.1. Key Highway Access Freight Corridors

The highway system in the Central Midlands region supports a wide spectrum of freight generators. The region is a central point in the state containing key highway connections to major cities within the state, such as Charleston, Greenville and Spartanburg and other markets in Charlotte. In a study conducted by *Logistics Today Magazine*, the Columbia region's interstate system ranked in the top ten percent out of 362 U.S. metropolitan areas in being a "logistics friendly" city.[6] According to the analysis, interstate industry access ranked 36th among all cities, comparable to Columbus, Ohio, Miami, Florida and Knoxville, Tennessee. Understanding the connection between the highway corridors and key freight generating facilities in the region is a critical step in planning for the demand for freight traffic on the primary and secondary freight systems. The following section will profile the corridors that support different industries in the region.

> Supply Chain Network
> Wal-Mart Private Fleet
> Located in Laurens, SC, the Wal-Mart Distribution Center creates over 1,000 inbound and outbound truck moves per day. In addition, the trucks make outbound deliveries to retail outlets within the region at locations such as Newberry, Winnsboro and Camden, averaging a total of nearly 20 deliveries per day. Trucks are used to transport products to the region using the major primary freight system routes throughout the region, such as I-26 and I-20 and US 321.

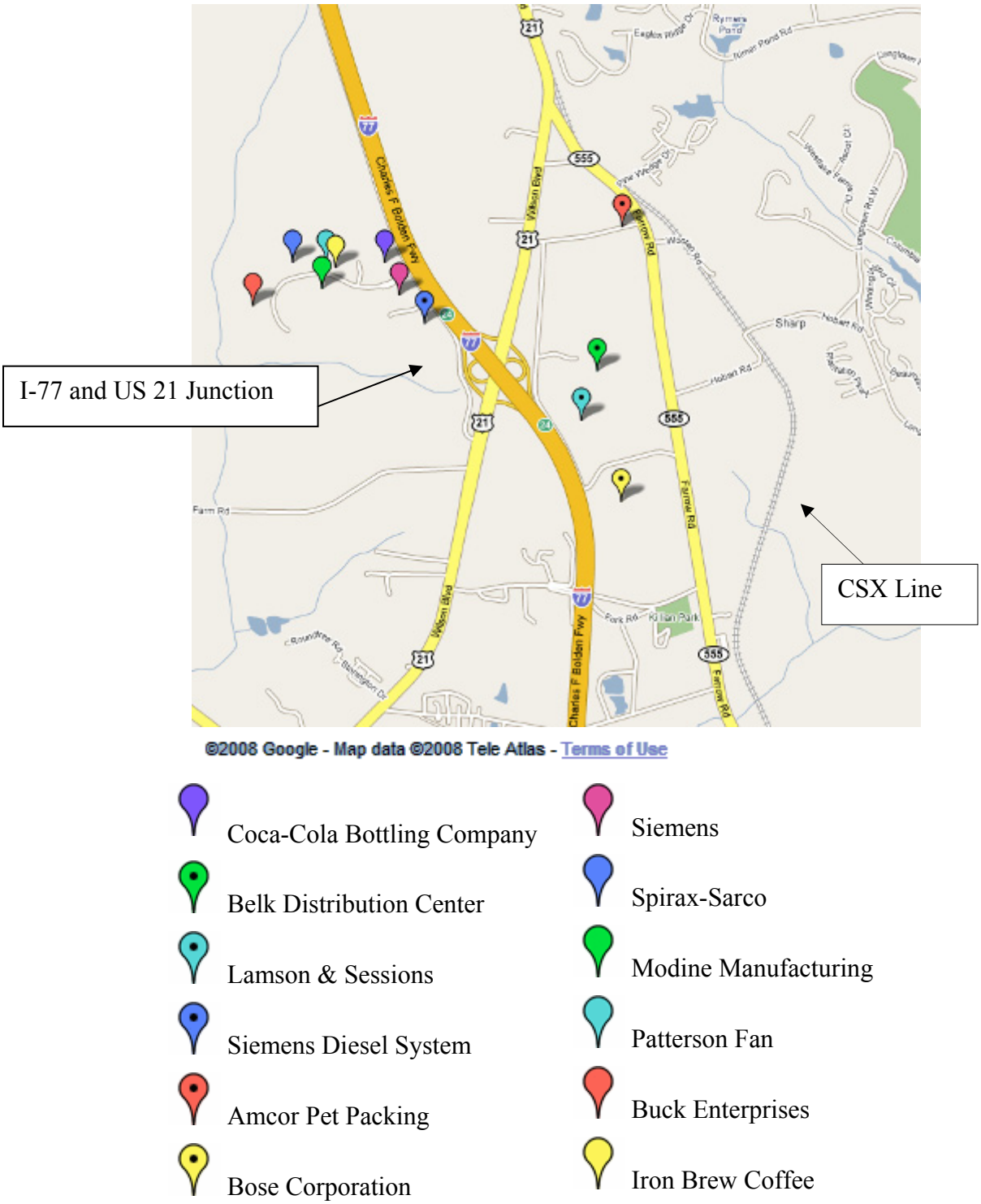
4.1.1. Richland County Industrial Freight Corridor

As noted earlier, the Primary Highway Freight System provides efficient access to major facilities throughout the region. Many major manufacturers and distributors are located in Richland County, specifically near the Town of Blythewood. Interstate 77 and US 21 provide access to these facilities along with key state highways. Trucks access these facilities with few obstacles. In addition, these facilities are along the CSX rail corridor. This eliminates some truck traffic that otherwise would compete for highway capacity.

The primary facilities located adjacent to the I-77 and US 21 interchange are listed and shown in **Figure 13**.

[6] Logistics Today, Top Metro Areas for Logistic

Figure 13: Richland County Major Freight Corridor



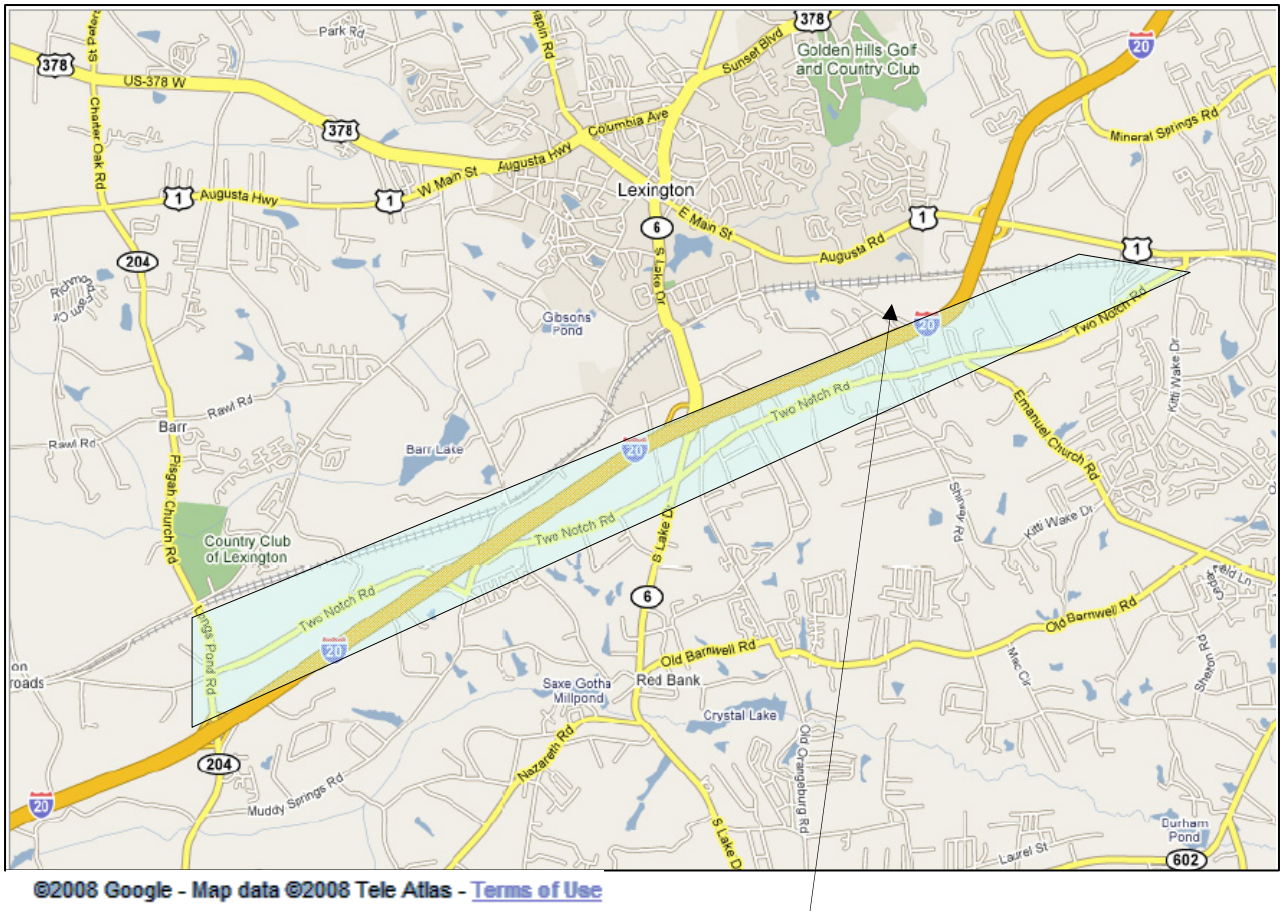
The close proximity of these manufacturers tends to generate higher amounts of larger trucks (Class-8) and which haul products across certain road segments (i.e. US 21 and SC 555). Due to the density of raw materials and processing needs, many raw materials are trucked to and from other locales outside of the region. The road segments that support these heavier vehicles will tend to experience accelerated pavement wear. With regards to this particular section of Richland County, I-77, US 21 and SC 555 serve as primary routes to handle truck freight movements.

4.1.2. Two Notch Industrial and Commercial Corridor

Another key highway corridor is Two Notch Road, located in Richland and Lexington County. This road serves numerous manufacturers and large retail businesses within the southwest and northeast parts of the region. In addition, Two Notch Road serves residential communities along the entire 12-mile corridor. However, businesses located along this corridor also benefit from the close proximity of the interstate system in the region such as I-20 and I-77.

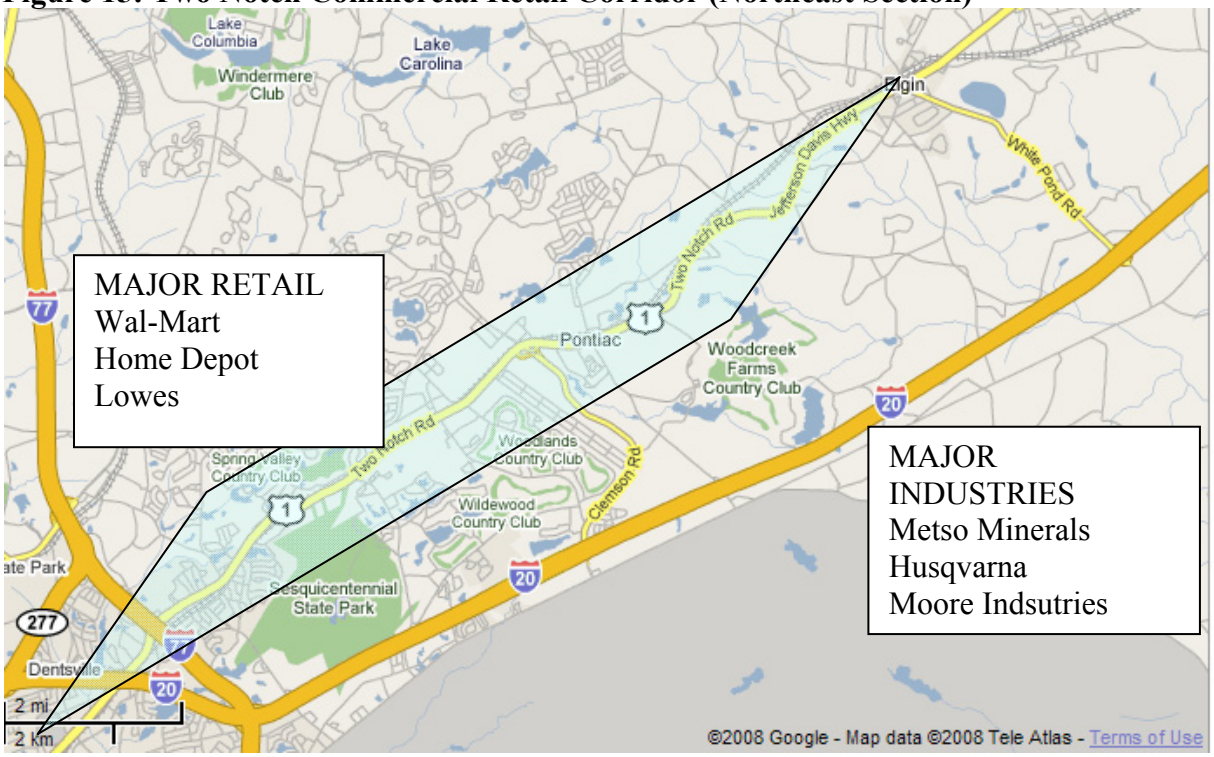
Smaller businesses and retail outfits are located along the northern portion of Two Notch Road in Richland County, while the heavy industrial outlets are found in the south end of the corridor along Two Notch Road and Industrial Drive in Lexington County. This particular mix of commercial activity causes a demand both for large Class-8 trucks and small light duty trucks. Service retail stores that generate medium size truck traffic are located in the Columbia Place Mall and the Village at Sandhills shopping centers, while Wal-Mart, Home Depot and Lowes generate large-sized truck traffic. Appropriate roadway geometric characteristics are critical to support general traffic and large truck traffic and movements along this corridor. **Figure 14** and **Figure 15** depicts these two sections of Two Notch Road and the freight facilities located along the two corridors.

Figure 14:Two Notch Commercial Industrial Corridor (Southwest Section)



Industrial Sites
Cooper Tool Plant
Michelin Tire Plant
Sherwin Williams Distribution Center
OTS Manufacturing

Figure 15: Two Notch Commercial Retail Corridor (Northeast Section)



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As the northeast Columbia region continues to grow and develop, these corridors will be of prime significance. Maintaining good highway freight mobility through the corridors and the region will enable freight to move fluidly, thereby enhancing the region as a prospective location for the placement of commercial retail business and freight facilities.

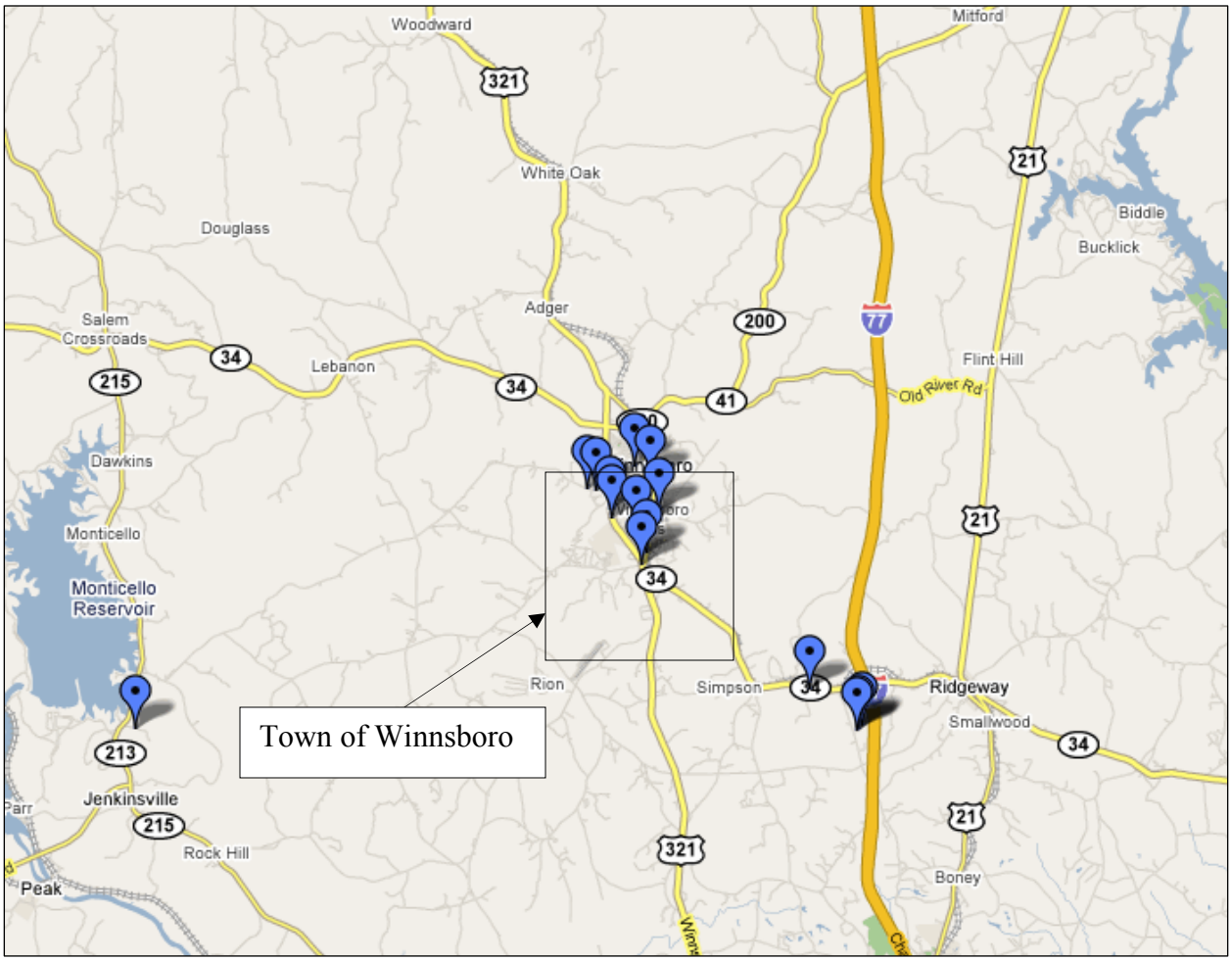
4.1.3. Fairfield County

Fairfield County is located in the northwest quadrant of the Columbia metropolitan area. Industries in Fairfield County provide over 5,000 jobs to the people of the midlands region. Jobs ranging from truck-related positions to pulpwood production, plastics to poultry, tire cord to clothing, computer components to electric power production to agriculture are located in Fairfield County. Interstate 77 is the major interstate that runs through the county and the major highways include SC 34, US 21, and US 321.

The majority of the heavy industrial and freight related activity is centrally located in the city of Winnsboro. SC 34 and SC 200 provide direct access to I-77 and US 321.

Approximately 35 percent of the industrial employers in the county have over 100 employees who work in industries such as food and kindred products, copper and fiberglass. Although Fairfield County is more rural than other counties in the Central Midlands region, freight activity is concentrated and exists within the city limits of Winnsboro. **Figure 16** displays the businesses located in the county.

Figure 16: Fairfield County Major Industrial Employers



Major Industrial Facilities in Fairfield County

Ruff & Tuff	V C Summer Nuclear Station
Hacker Instruments Inc	Ben Arnold Sunbelt Beverage
Vulcan Materials Company	Invista SARL
Phillips Granite	Perry Ellis
Winnsboro Concrete	Lang Mekra North America
Fairfield Fabricators	Isola Laminate Systems
Winnsboro Plywood	St Gobain Technical Fabrics

4.1.4. Fairfield County Industrial Sites

Fairfield County supports the following three major industrial sites: Walter B. Brown Industrial Park, McMaster Industrial Park and Frazier/Brown Industrial Park. These sites together comprise 273 acres of zoned industrial space and each site has good roadway access. Walter Brown and Frazier/Brown facilities are near one another. Isola Laminate, St. Gobain and Lang Merka NA are businesses that are located in the Walter Brown Industrial park. These sites are situated to support truck traffic and future growth. **Figure 17** and **Figure 18** display the various locations of the industrial sites in the county.

Figure 17: Industrial Site Locations

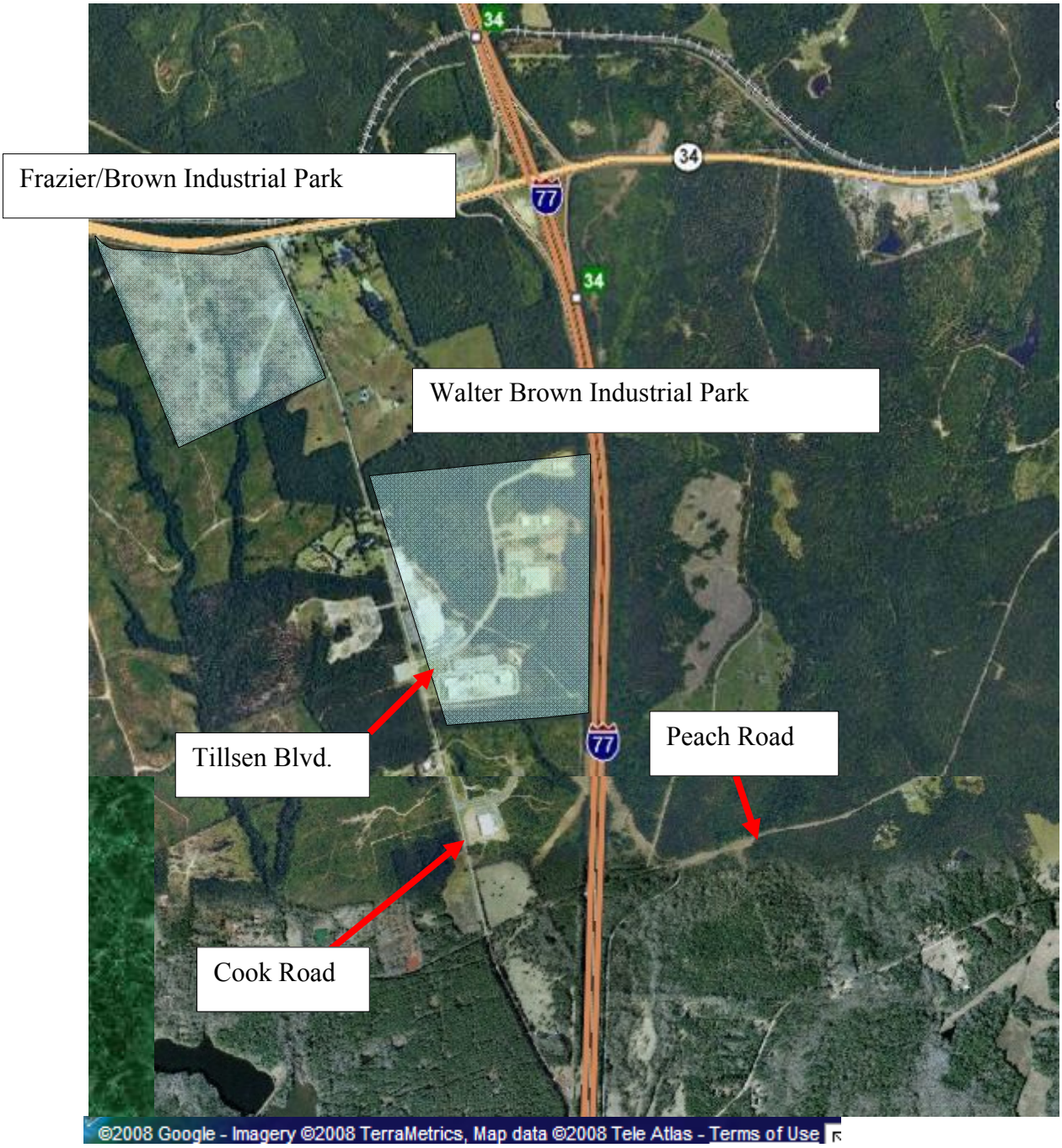
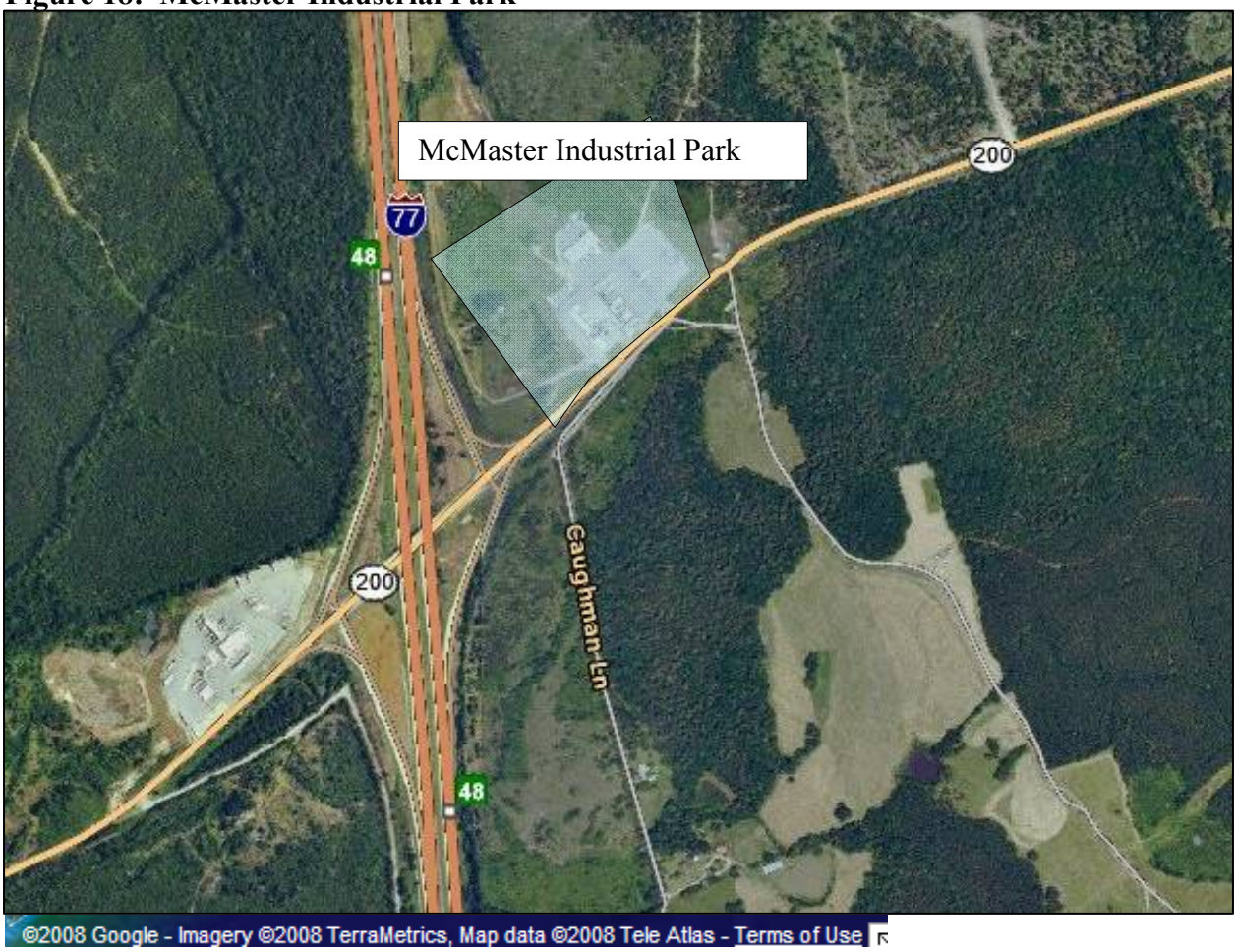


Figure 18: McMaster Industrial Park

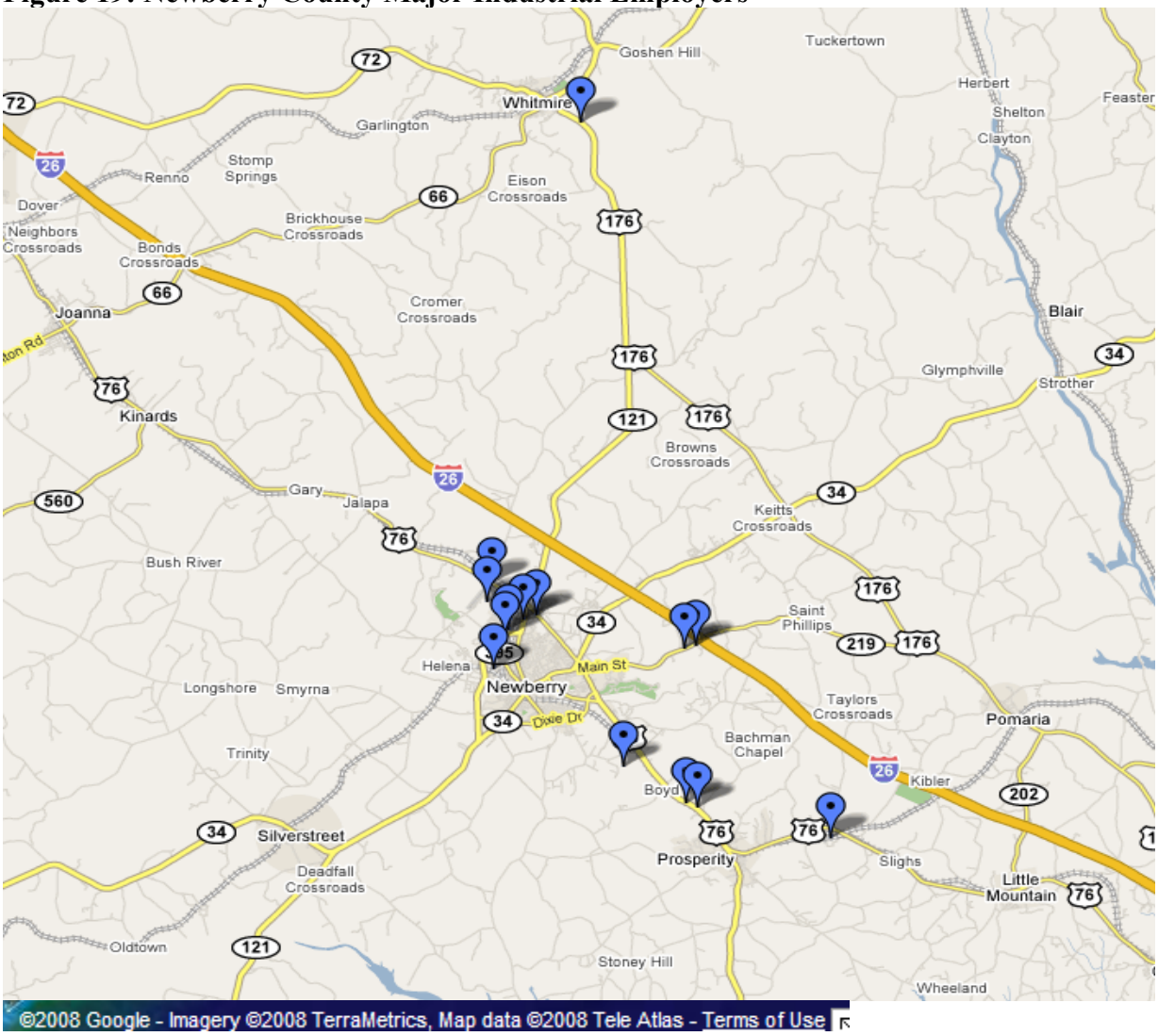


The major manufacturers and industrial sites are located in relative proximity to each other, (primarily west of I-77) and are easily accessible to the interstate system. In addition, Fairfield County has an additional 900 acres of land to be developed for industrial use.

4.1.5. Newberry County

Newberry County has experienced success in attracting domestic and international companies to the region. Seventy percent of the top major employers in the county are manufacturing firms. Newberry County is located in the northwest part of the Central Midlands region and has access to major interstates outside of the region, such as I-385 and I-85. The county also benefits from I-26, a key interstate route that connects with I-85 northwest of the region and extends directly to the port of Charleston. In addition, US 76 is parallel to I-26 and provides access to the major industrial employers and provides an alternative route to I-26. These highway connections create an efficient transportation network for many corporations in Newberry County. **Figure 19** shows the major industrial employers in Newberry County.

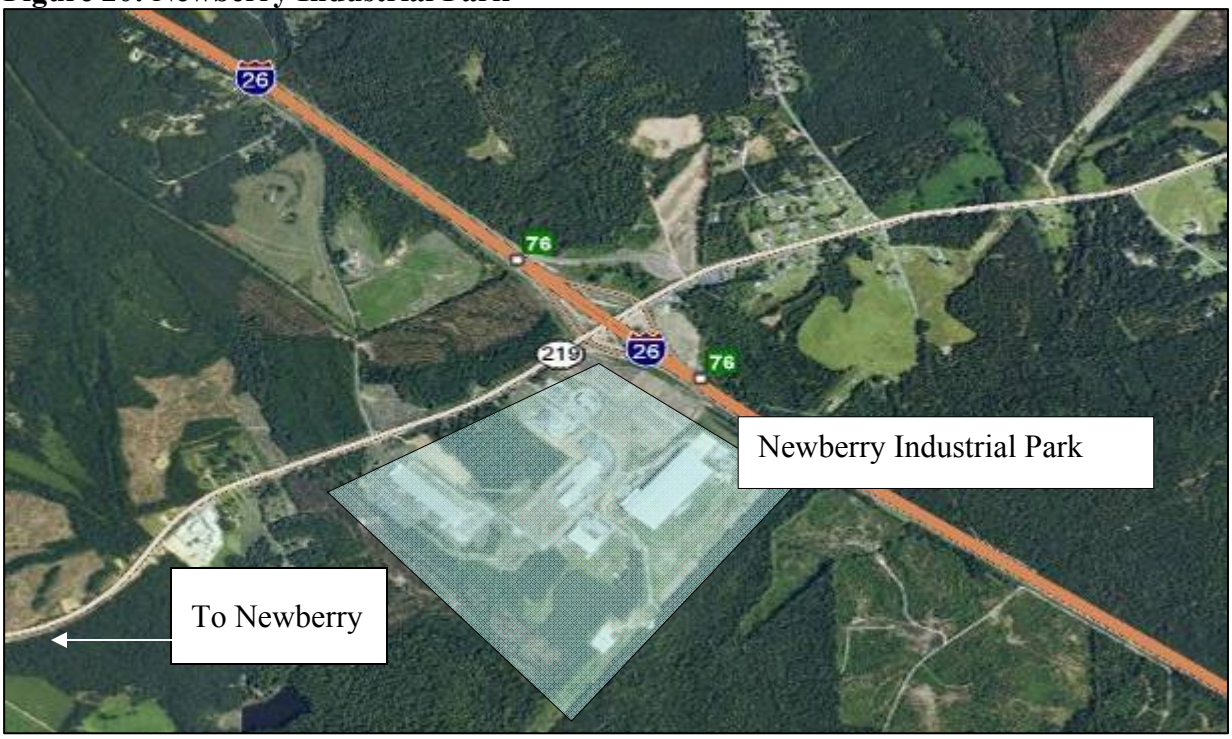
Figure 19: Newberry County Major Industrial Employers



Renfro Corporation	Pioneer Frozen Foods
Georgia Pacific Blvd	Ise America Inc
Komatsu America International	McKechnie Vehicle Components
Blue Water Marine Group	American Fiber & Finishing Inc
Shakespeare Composite Structures	Eagle Construction Co Inc
Caterpillar Inc	Doncasters Trucast Inc
West Fraser Inc	Packaging Corporation of America

There are four main industrial sites in Newberry County, as shown in **Figures 20 through 24**. Primarily located along US 76, these sites have good access to I-26. The proximity of these sites to major roadways and interstates positions the county to attract additional industrial businesses.

Figure 20: Newberry Industrial Park



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Major Industrial Employers: Komatsu, Donacaster Trucast

Figure 21: Bush River Industrial Park

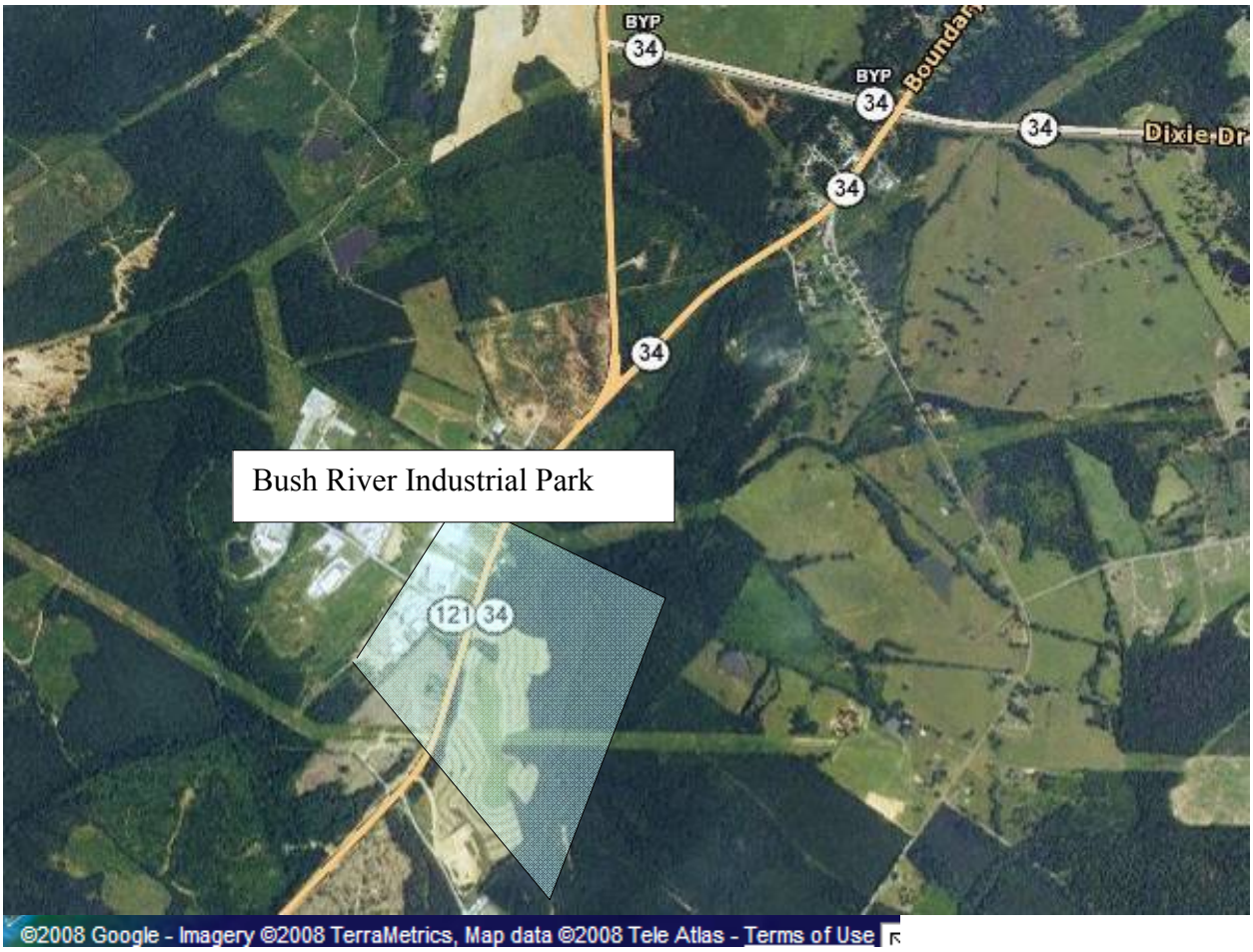


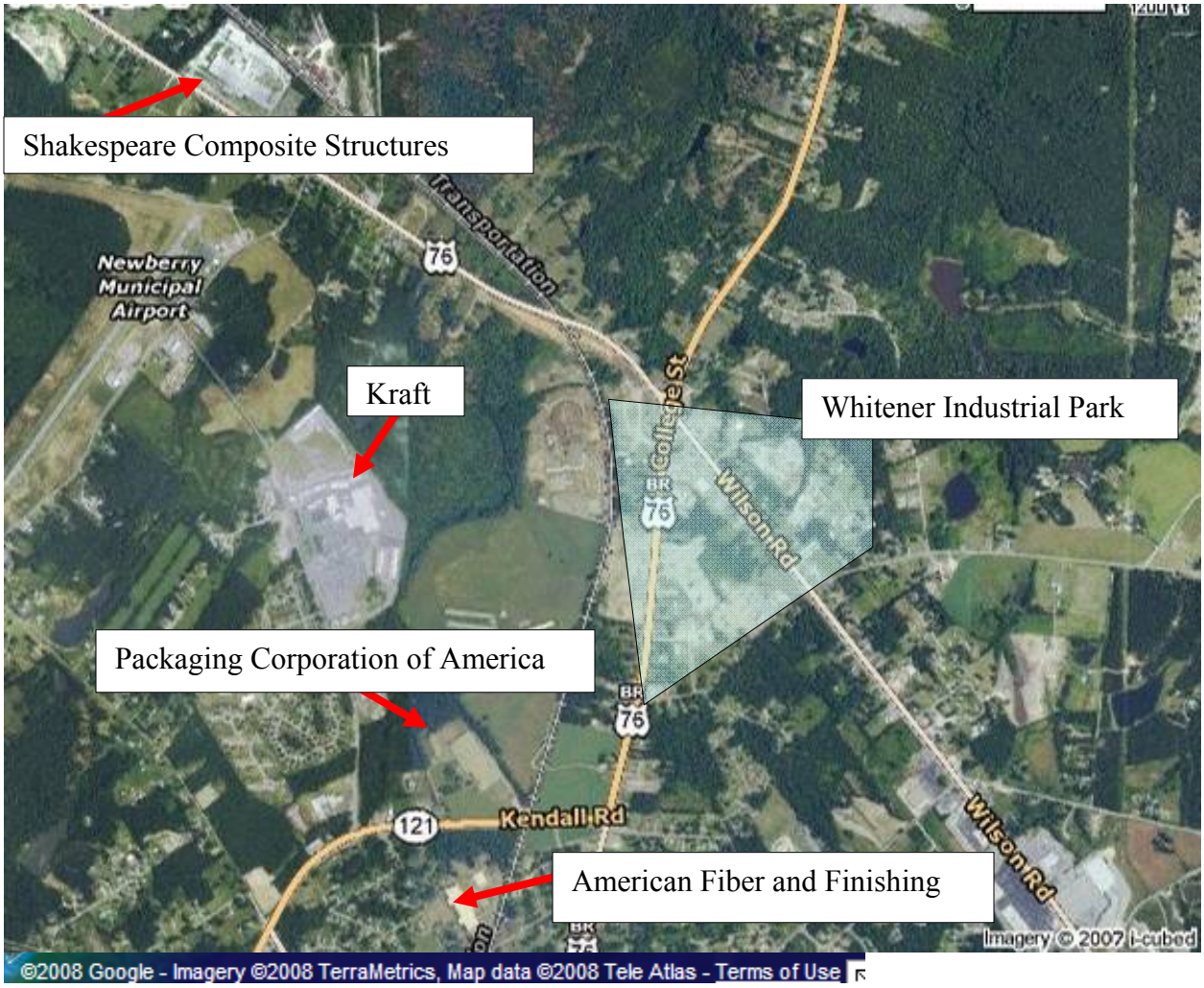
Figure 22: Mid-Carolina Industrial Park

Major Industrial Employers: Georgia Pacific

Figure 23: Whitener Industrial Park

Major Industrial Employers: West Fraser, Eagle Construction

Figure 24: Major Industrial Employer and Industrial Sites

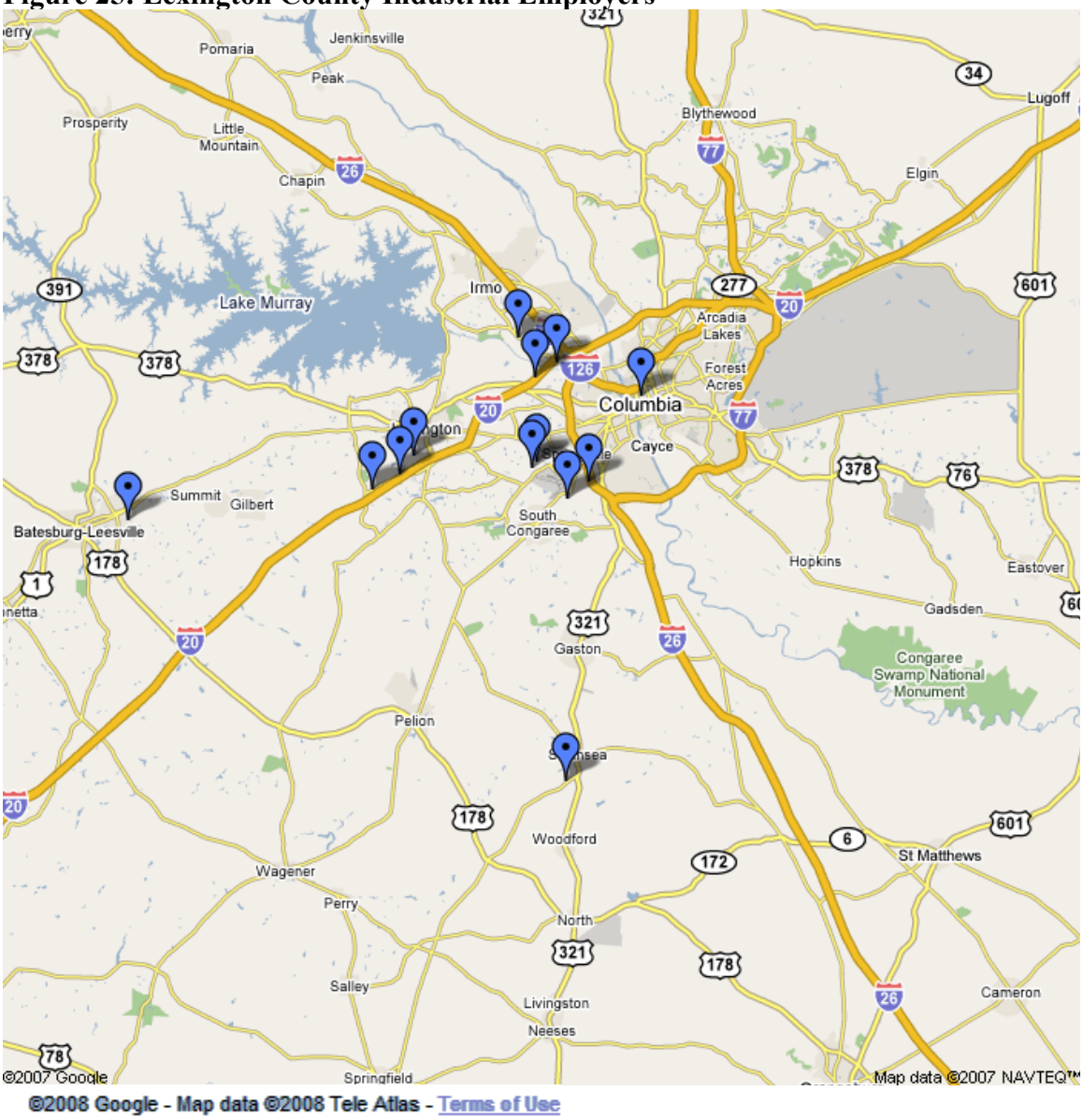


The Whitener Industrial Park is situated near several major manufacturing and distribution facilities. In addition, the CSX rail line travels parallel to US 76 west of the industrial site. Shakespeare Composite Structures, Kraft Foods, Packaging Corporation of America and American Fiber and Finishing are all located within a two mile radius of the industrial site. The close proximity of these locations creates significant truck traffic along US 76.

4.1.6. Lexington County Industrial Sites

Lexington County contains several industrial sites primarily served by I-20, I-26, and I-77 and by rail access from Norfolk-Southern or CSX. Lexington County is the second largest county in the Central Midlands region and houses the state's 2nd largest airport, Columbia Metropolitan Airport. Lexington County is west of the city of Columbia and I-20 serves as the primary major highway throughout the county. Major freight facilities are located along I-20 and I-26. **Figure 25** shows the locations of these major facilities in the Lexington County.

Figure 25: Lexington County Industrial Employers



Michelin North America	Smurfit-Stone Container	Honeywell International
Nucor Building Systems	Solectron South Carolina	J B Martin
PBR Columbia	Cooper Power Tools	Loxcreen
SMI Joist	Food Service INC	

Figure 26: Lexington County Industrial Sites

Figure 26 shows the location of the Dixiana Industrial Park situated east of I-26 and the I-26/I-77 interchange. The Sandhills Industrial Park is also located along the I-26/I-77 interchange. The CSX rail line extends south of these sites. In addition, **Figure 27** shows the 202 acre CAE North Industrial Park, which is located, adjacent to the Columbia Metropolitan Airport in close proximity to the Dixiana Industrial Park. SC 602 and US 21, also important components of the freight highway system, serve the industrial park.

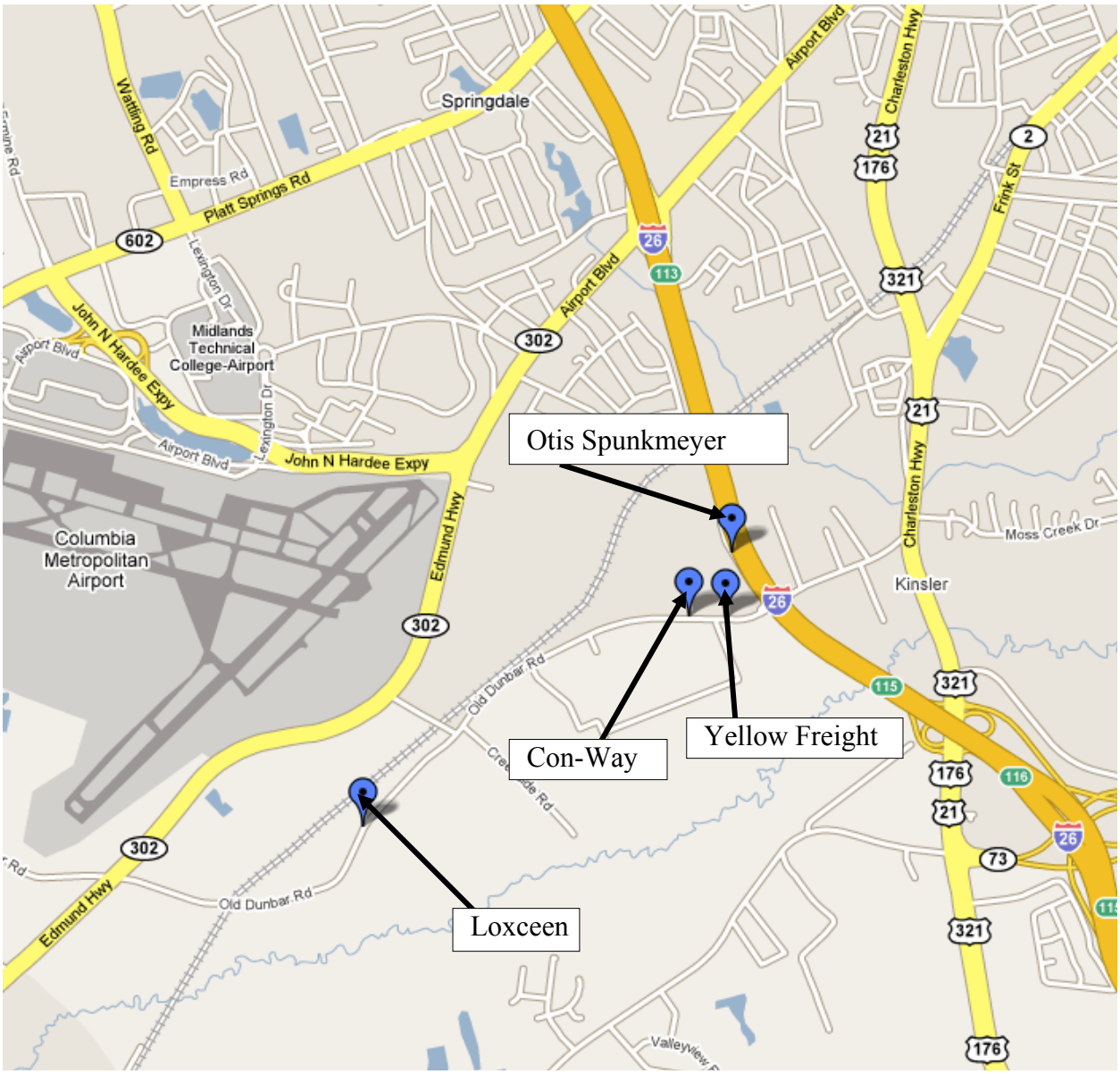
Figure 27: CAE North Industrial Park

4.1.7. Additional Critical Freight Roadway Connectors

4.1.7.1. Old Dunbar Road

Old Dunbar Road carries a considerable amount of truck traffic due to its connectivity to Columbia Metropolitan Airport and the CAE Industrial Park. Trucks often use Old Dunbar Road to connect to these facilities from US 21 (Charleston Highway). Old Dunbar Road connects with SC 302 (Airport Boulevard), which provides direct access to I-26, as shown in **Figure 28**. The Loxcreen Company is located along Old Dunbar Road, as well as the major LTL (Less than truckload and TL (truckload) transportation carriers Yellow Freight and Con-way. The Yellow Freight and Con-way, as well as other surrounding facilities, generate heavy truck traffic along Old Dunbar Road. While Old Dunbar Road is relatively short in distance, (approximately 2 miles) it receives considerable truck use and it is a critical freight roadway connector in the Central Midlands region.

Figure 28: Freight Connector- Old Dunbar Road



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4.2. Highway Grade Crossings

With two Class 1 railroads in the region, the abundance of highway grade crossings can impede traffic flow. Within urban areas, most crossings are public with some type of active safety (flashers and/or gates) warning system. In urban areas, private crossings typically serve manufacturing or other large businesses. These private crossings typically have only passive safety warning systems, such as railroad crossbucks or stop signs. Many train movements at private crossings in urban areas are also operated under a "stop and flag" order, which means the train is stopped before entering the roadway and a crewman flags traffic to a stop before signaling the train to proceed.

Norfolk Southern operates more than 369 at-grade rail/highway crossings within the Central Midlands region. Of this total, 241 (65%) cross publicly owned and maintained roadways and 128 (35%) are cross privately owned roads or driveways.

CSX operates over a total of 225 at-grade rail/highway crossings within the study area. Of this total, 150 are over publicly owned and maintained roadways and 75 are over privately owned roads or driveways.

Since the type of safety crossing warning device (gates, flashers, signs, etc.) used at crossings is based on a Federal Railroad Administration formula that includes highway and rail volume, warning equipment at crossings outside of urban areas is often limited to signs or flashers due to lower highway volumes. There are also more private crossings in rural areas due to the surrounding land use, such as farm land, quarries, etc. **Tables 6 and 7** provide a breakdown of Norfolk Southern and CSX at-grade crossings in the Central Midlands region.

Table 6: Norfolk Southern At-grade Crossings

County	# Public At-Grade Crossings	# Private At-Grade Crossings
Fairfield	34	40
Lexington	90	18
Newberry	24	32
Richland	93	38

Source: South Carolina Department of Transportation

Table 7: CSX At-grade Crossings

County	# Public At-Grade Crossings	# Private At-Grade Crossings
Fairfield	0	0
Lexington	60	27
Newberry	52	24
Richland	138	24

Source: South Carolina Department of Transportation

5. FREIGHT FLOWS

The future flow of commodities that originate, terminate, pass through and move internally in the Central Midlands region is described in this section. This analysis includes commodity flows by mode and county for the year 2006. The commodity profile provides summary freight movements by location of origin and destination for each transportation mode and major commodity type based on the 2-digit Standard Transportation Commodity Code (STCC) designation taken form the Transearch database provided by Global Insight. The database provides base year freight flows (2006). Forecasts for the year 2030 are developed through the use of Global insight's quantitative economic model, which uses various socio-economic and industry data. The flows are described as follows:

- **Inbound** – Freight flows that originate outside of the study region but terminate within the study region; thus representing imports into the region;
- **Outbound** – Freight flows that originate within the study region but terminates outside of the region; thus, representing exports out of the region;
- **Intra** – Freight flows that both originate and terminate within the five county region; thus representing intra-regional trade; and
- **Through** – Freight flows that neither originate nor terminate within the study area but simply pass through the region.

The following are key observations recognized from the Transearch database:

- The total amount of freight movement is projected to increase by 42 percent, from 228 million tons in 2006 to 325 million tons in 2030;
- Out of the approximately 228 billion tons of commodities moving to, from, within and through the Central Midlands region, 73 percent passes through the region, 11 percent terminates in the region, 12 percent originates from the region and 4 percent travels within the region;
- By 2030, trucks will carry 90 percent of all freight traffic, which will be a decrease of 2 percent from 2006;
- Nonmetallic Minerals was the top commodity shipped in the Central Midlands region in 2006; However, secondary traffic will be the dominate commodity shipped in 2030 and will grow by 122 percent to 64 million tons. This commodity will travel almost completely by truck;
- Freight shipped by rail, as a share of total freight hauled, will decrease by 3.4 percent by 2030, but rail volume will increase by 37 percent;
- Air cargo will grow by 82 percent, but it will assume less than one percent of the total share of the total freight flow;
- Fairfield County freight will grow by 745 percent by 2030, potentially straining highway infrastructure, specifically on routes such as I-20 and SC 78; and

- Other states in the southeast such as North Carolina and Florida will continue to be a major component of Central Midlands's freight flow.

The following sections present current and forecast freight flows for truck, rail and air cargo.

Table 8 displays freight flows by commodity, mode and direction for the 4-county Central Midlands region in 2006 and 2030.

Table 8: Total Tonnage by Mode for the 4-county Central Midlands Region

Tons	Direction	2006	2030	Percent Change
Truck	Inbound	18,711,527	28,154,483	50
	Outbound	24,944,666	30,842,739	23
	Local	9,385,285	10,356,901	10
	Through	156,251,816	222,477,941	42
	Total	209,293,294	291,832,064	39
Rail	Inbound	6,541,520	7,048,389	7
	Outbound	2,496,622	2,245,668	-10
	Local	70,532	42,492	-39
	Through	3,220,582	5,259,602	63
	Total	12,329,256	14,596,151	18
Air*	Outbound	58,950	112,862	91
	Inbound	55,178	95,011	72
	Through	61	180	1
	Total	114,189	208,053	82
Water*	Inbound	56,444	279,748	395
	Outbound	1.43	3.24	126
	Though	7,177,674	18,432,180	156
	Total	7,234,119	18,432,180	158
Grand Total		228,970,858	325,348,199	42

*No local freight movements recorded
Source: Global Insight Inc , Transearch Database 2006

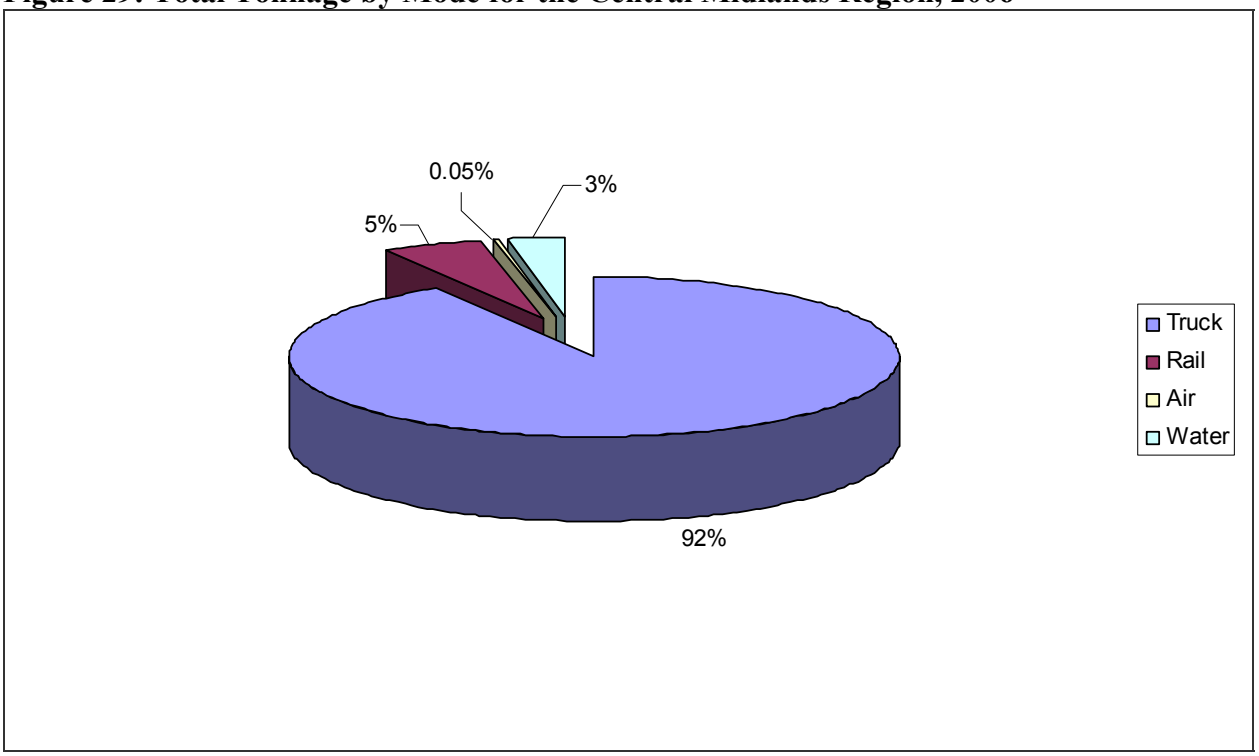
Over the next 25 years, freight shipments by air are forecast to increase by 82 percent, while truck shipments are forecast to grow by 39 percent. The Transearch database also indicates large increases in waterborne freight, but this is due to an anomaly in the modal accounting. Freight shipped by barge even for a portion of its trip is recorded as a waterborne transport move. For the purposes of this analysis, it is understood that the any freight moving by water will ultimately

be transported by rail and truck. The typical commodities shipped partially by barge in the Central Midlands region are Nonmetallic Minerals, Petroleum Products and Waste or Scrap.

The rail volume in the Central Midlands region is projected to increase by 18 percent, primarily due to through movements. However local rail freight is projected to decline by over 39 percent and outbound rail freight is also projected to decline by 10 percent. All truck movements are projected to increase, on average by 39 percent over current volumes.

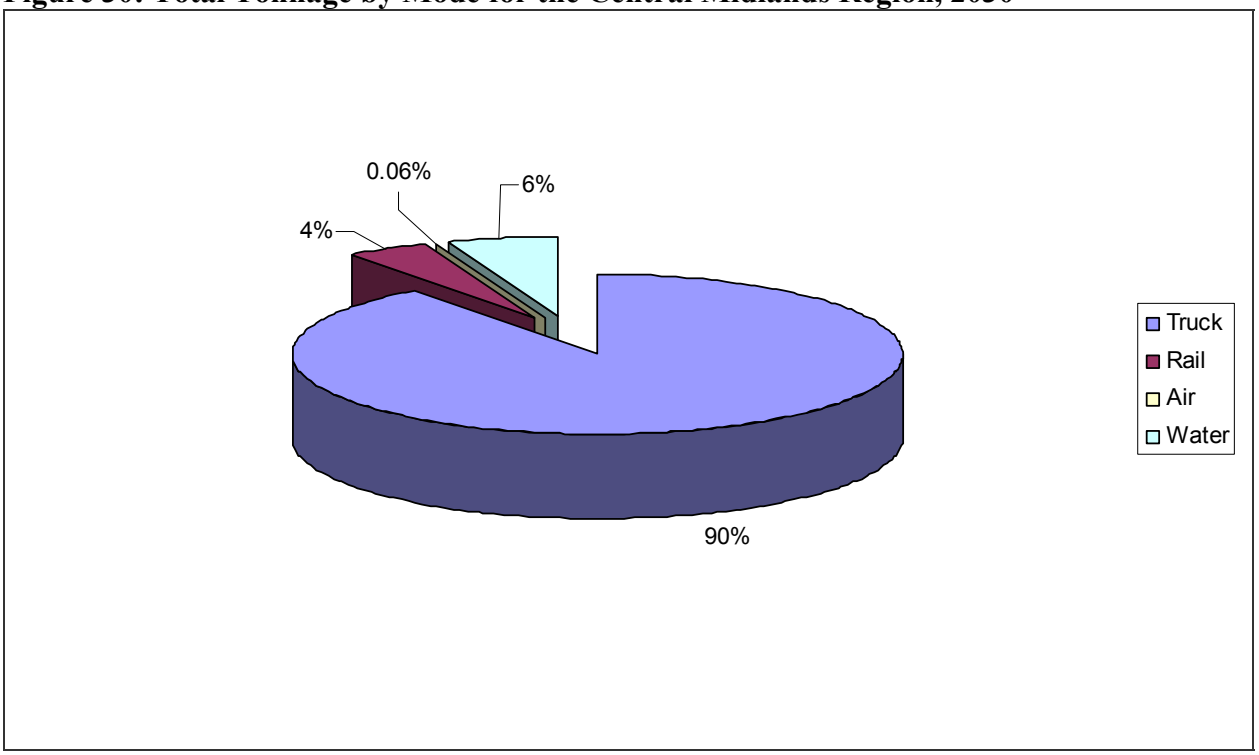
Figures 29 and 30 depict the shares of current and projected freight tonnage by mode. Interestingly, the 2030 freight projections indicate a slight shift in the modal split of the amount of freight moved. The share of freight moved by truck compared to all modes will decrease to 90 percent (291 million) percent of the total volume as compared to 92 percent from 2006. The decrease in the percentage of freight hauled by truck is accompanied by changes in the percentage of total freight moved by rail and air, which account for 6 percent (15 million tons) and .06 percent (208,000 tons) respectively. Although water freight will experience the largest projected increase of freight hauled by mode, the share of the total amount of freight for the region moved by air will actually decrease by 3 percent. In addition, the percent of tonnage for rail will decrease by 1 percent by 2030. With the understanding that freight identified as "water" has a significant truck component in the Central Midlands region, strategic planning for an increase on the reliance of truck movements and its associated infrastructure is imperative.

Figure 29: Total Tonnage by Mode for the Central Midlands Region, 2006



Source: Global Insight Inc, Transearch Database 2006

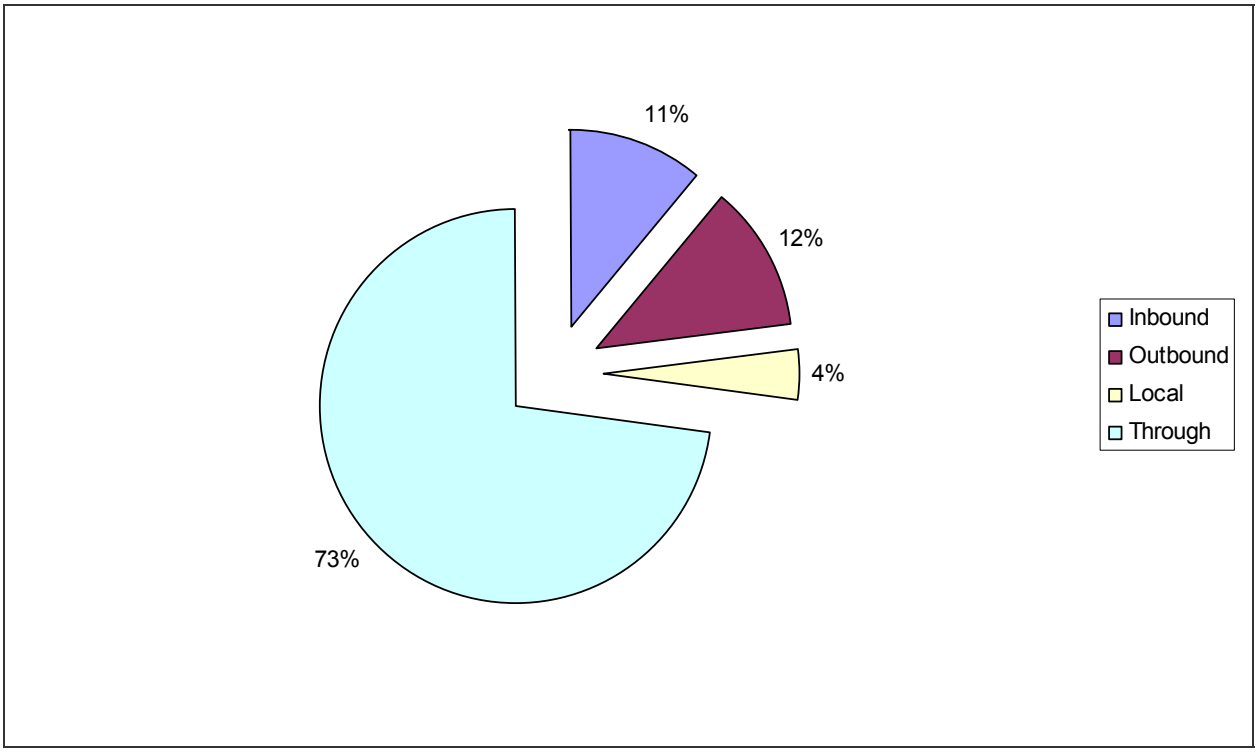
Figure 30: Total Tonnage by Mode for the Central Midlands Region, 2030



Source: Global Insight Inc, Transearch Database 2006

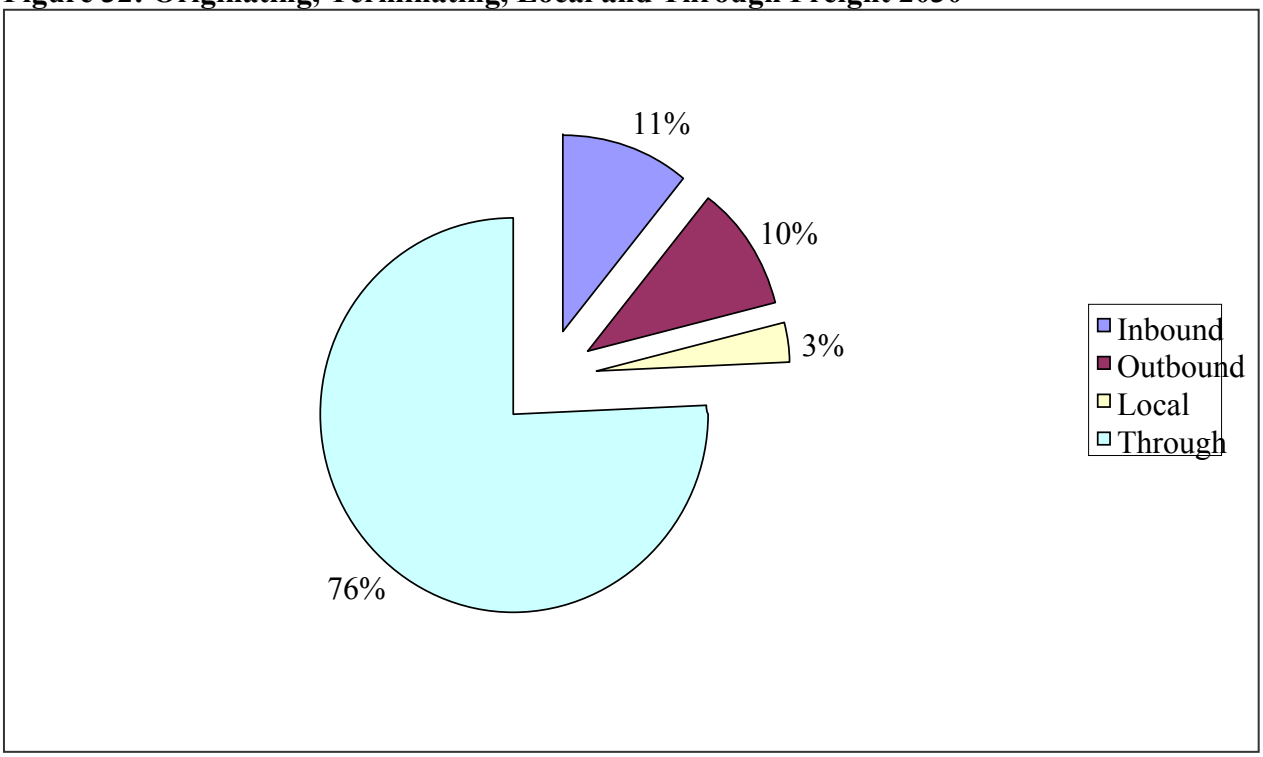
Figures 31 and 32 indicate that through freight movements will still be the primary directional flow of freight in the region; however, the total amount of through freight will increase from 73 percent 76 percent (246 million tons) as compared to 2006. Inbound freight will remain constant at 11 percent and local and outbound freight will decrease slightly by 2 percent to 10 percent or approximately 33 million tons.

Figure 31: Originating, Terminating, Local and Through Freight 2006



Source: Global Insight Inc, Transearch Database 2006

Figure 32: Originating, Terminating, Local and Through Freight 2030



Source: Global Insight Inc, Transearch Database 2006

Currently, the dominant commodity transported to, through and from the region is Nonmetallic Minerals. However, it is projected to grow by 18 percent by the year 2030. Secondary Traffic, defined as freight transiting to and from distribution centers or through intermodal facilities, is projected to surpass Nonmetallic Minerals as the commodity shipped by 2030, growing by 122 percent. Primary Metals will experience a large rate of growth as well, approximately 192 percent and will rank 3rd among all commodities shipped by 2030. **Table 9** shows that the current top commodities in the Central Midlands region are Nonmetallic Minerals (36 million tons in 2006 and 43 million tons in 2030), Secondary Traffic (29 million tons in 2006 and 65 million tons in 2030) and Lumber or Wood products (22 million tons in 2006 and 19 million tons in 2030).

Table 9: Top Five Commodities To, From, Through and Within CMCOG Region by All Modes, 2006-2030 (Tons)

Commodities	2006	2030	Percent Change
Nonmetallic Minerals	35,993,259	42,523,288	18
Secondary Traffic	28,994,978	64,534,000	122
Lumber Or Wood Products	21,952,857	19,376,909	-11
Clay, Concrete, Glass Or Stone	15,935,907	20,321,805	27
Primary Metal Products	10,518,409	30,807,350	192

Source: Global Insight Inc, Transearch Database 2006

Table 10 shows that the top commodities shipped from the Central Midlands region are Nonmetallic mineral (12 million tons), Lumber or Wood products (3 million tons) and Secondary Traffic (3 million tons).

Table 10: Top Ten Commodities Originating from the CMCOG Region by All Modes, 2006 (Tons)

Commodity	Tons
Nonmetallic Minerals	12,620,513
Lumber Or Wood Products	3,238,081
Secondary Traffic	3,213,141
Clay, Concrete ,Glass Or Stone	1,861,640
Pulp, Paper Or Allied Products	1676,489
Primary Metal Products	1,010,465
Chemicals Or Allied Products	868,597
Transportation Equipment	631,612
Rubber Or Misc Plastics	418,053
Food Or Kindred Products	417,881

Source: Global Insight Inc, Transearch Database 2006

Table 11 shows that the top commodities shipped from the Central Midlands region are Nonmetallic Mineral (11 million tons), Secondary Traffic (7 million tons), and Lumber or Wood products (3 million tons).

Table 11: Top Ten Commodities Originating from the CMCOG Region by All Modes, 2030 (Tons)

Commodity	Tons
Nonmetallic Minerals	10,794,283
Secondary Traffic	6,505,004
Lumber Or Wood Products	2,940,943
Clay, Concrete, Glass Or Stone	2,327,459
Machinery	2,287,849
Pulp, Paper Or Allied Products	1,852,546
Transportation Equipment	1,249,143
Metallic Ores	1,174,462
Rubber Or Misc Plastics	826,403
Chemicals Or Allied Products	802,560
Other	2,440,615
Grand Total	33,201,273

Source: Global Insight Inc, Transearch Database 2006

Table 12 shows the top commodities shipped to the Central Midlands region are Nonmetallic Minerals (8 million tons), Coal (4 million tons) and Secondary Traffic (4 million tons).

Table 12: Top Ten Commodities Destined for the Central Midlands Region by All Modes, 2006 (Tons)

Commodity	Tons
Nonmetallic Minerals	8,202,433
Coal	4,399,640
Secondary Traffic	3,758,130
Clay, Concrete, Glass Or Stone	1,795,578
Lumber Or Wood Products	1,360,139
Primary Metal Products	1,063,488
Chemicals Or Allied Products	850,798
Pulp, Paper Or Allied Products	738,673
Farm Products	681,375
Food Or Kindred Products	578,935
Other	23,429,194
Grand Total	1,935,475

Source: Global Insight Inc, Transearch Database 2006

Table 13 shows the top commodities shipped to the Central Midlands region are Nonmetallic Minerals (10 million tons), Secondary Traffic (8 million tons) and Coal (4 million tons).

Table 13: Top Ten Commodities Destined for the Central Midlands Region by All Modes, 2030 (Tons)

Commodity	Tons
Nonmetallic Minerals	10,168,858
Secondary Traffic	8,331,201
Coal	3,787,706
Clay, Concrete, Glass Or Stone	2,804,173
Primary Metal Products	1,488,331
Lumber Or Wood Products	1,437,433
Pulp, Paper Or Allied Products	952,017
Farm Products	942,218
Food Or Kindred Products	850,740
Transportation Equipment	789,880
Other	4,025,069
Grand Total	35,577,631

Source: Global Insight Inc, Transearch Database 2006

Table 14 shows the top commodities shipped within the Central Midlands region are Nonmetallic Minerals (8 million tons) Clay, Concrete, Glass or Stone (652,000 tons) Secondary Traffic (581,000 tons).

Table 14: Top Ten Commodities Moved Within the Central Midlands Region by All Modes, 2006 (Tons)

Commodity	Tons
Nonmetallic Minerals	7,541,220
Clay, Concrete, Glass Or Stone	651,676
Secondary Traffic	580,582
Lumber Or Wood Products	203,284
Primary Metal Products	144,156
Farm Products	80,037
Pulp, Paper Or Allied Products	71,471
Metallic Ores	61,155
Transportation Equipment	32,425
Food Or Kindred Products	28,462
Other	61,343
Grand Total	9,455,817

Source: Global Insight Inc, Transearch Database 2006

Table 15 shows the top commodities shipped within the Central Midlands region are Nonmetallic Minerals (7 million tons), Secondary Traffic (1 million tons) and Clay, Concrete, Glass or Stone (888,000 tons).

Table 15: Top Ten Commodities Moved Within the Central Midlands Region by All Modes, 2030 (Tons)

Commodity	Tons
Nonmetallic Minerals	7,058,975
Secondary Traffic	1,170,263
Clay, Concrete, Glass Or Stone	887,517
Metallic Ores	695,768
Lumber Or Wood Products	175,056
Farm Products	81,475
Pulp, Paper Or Allied Products	66,462
Transportation Equipment	66,132
Primary Metal Products	59,134
Food Or Kindred Products	44,903
Other	93,703
Grand Total	10,399,388

Source: Global Insight Inc, Transearch Database 2006

Table 16 shows the top commodities shipped through the **C**entral Midlands region are Chemicals or Allied Products (32 million tons), Secondary traffic (21 million tons) and Lumber or Wood Products (17 million tons).

Table 16: Top Ten Commodities Moving Through the Central Midlands Region by All Modes 2006 (Tons)

Commodity	Tons
Chemicals Or Allied Products	32,205,678
Secondary Traffic	21,443,123
Lumber Or Wood Products	17,151,351
Food Or Kindred Products	15,762,793
Clay, Concrete, Glass Or Stone	11,627,010
Primary Metal Products	8,300,298
Farm Products	8,195,187
Nonmetallic Minerals	7,629,090
Petroleum Or Coal Products	7,237,589
Pulp, Paper Or Allied Products	5,853,860
Other	23,575,174
Grand Total	166,650,134

Source: Global Insight Inc, Transearch Database 2006

Table 17 shows the top commodities shipped within the **C**entral Midlands region are, Secondary traffic (49 million tons) Chemicals or Allied Products (27 million tons) and Food or Kindred Products (23 million tons).

Table 17: Top Ten Commodities Moving Through the Central Midlands Region by All Modes 2030 (Tons)

Commodity	Tons
Secondary Traffic	48,527,530
Chemicals Or Allied Products	27,130,671
Food Or Kindred Products	22,671,727
Lumber Or Wood Products	17,764,419
Clay, Concrete, Glass Or Stone	16,630,113
Primary Metal Products	16,451,065
Nonmetallic Minerals	14,501,172
Petroleum Or Coal Products	12,808,818
Electrical Equipment	9,885,956
Farm Products	9,304,029
Other	50,494,399
Grand Total	246,169,904

Source: Global Insight Inc, Transearch Database 2006

5.1. Commodity Movement by Mode

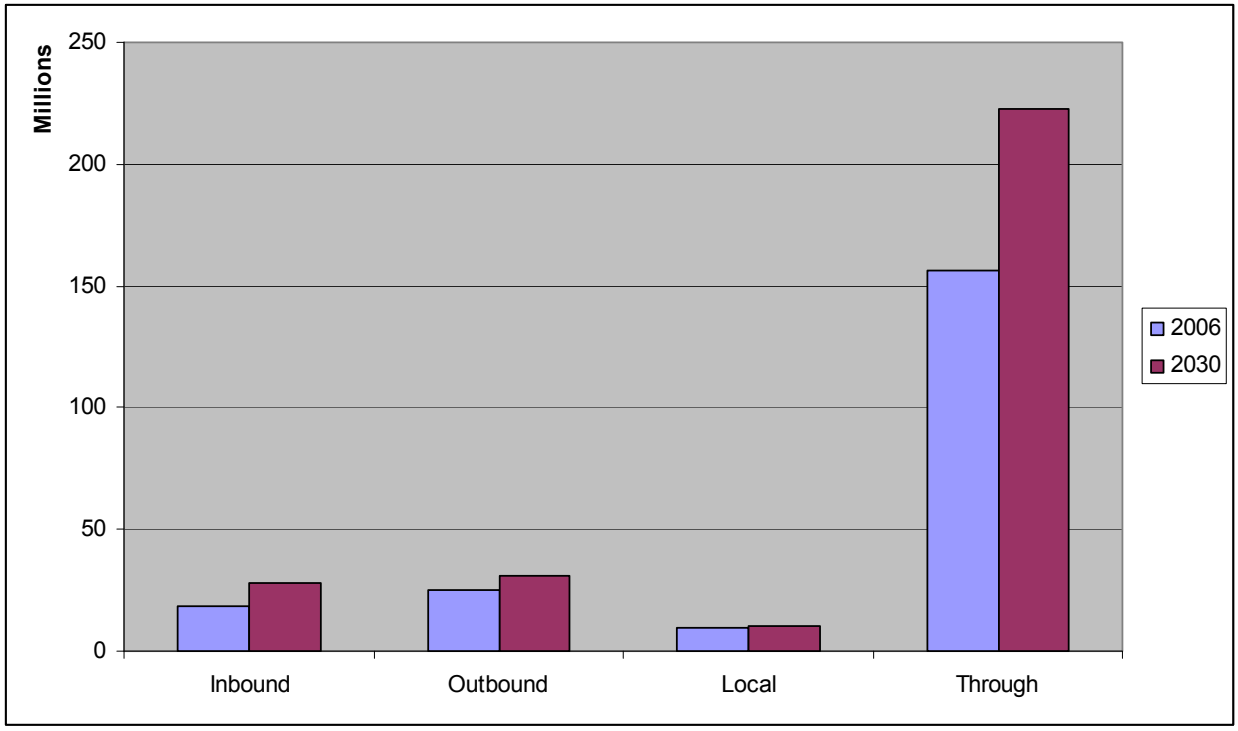
5.1.1. Trucking

The amount of truck freight projected to move among the Central Midlands region will reach 90 percent of the total share of freight by 2030, a 2 percent decrease from 2006. Rail will decrease from 5 to 4 percent, air will increase by .01 percent and water freight will increase from 3 percent to 6 percent. **Figure 33** presents a breakdown of freight movements for 2006 and 2030. Out of the over 90 percent of truck freight:

222 million tons of the freight tonnage moved by truck will pass through the region;

- Inbound movements are projected to increase from 18 million tons to 28 million tons in 2030;
- Outbound movements are projected to increase from 24 million tons to 30 million tons in 2030;
- 9 million tons of the trucked freight tonnage moves internally within the Central Midlands region.

Figure 33: Freight Tonnage Moved by Truck in the Central Midlands Region 2006 - 2030

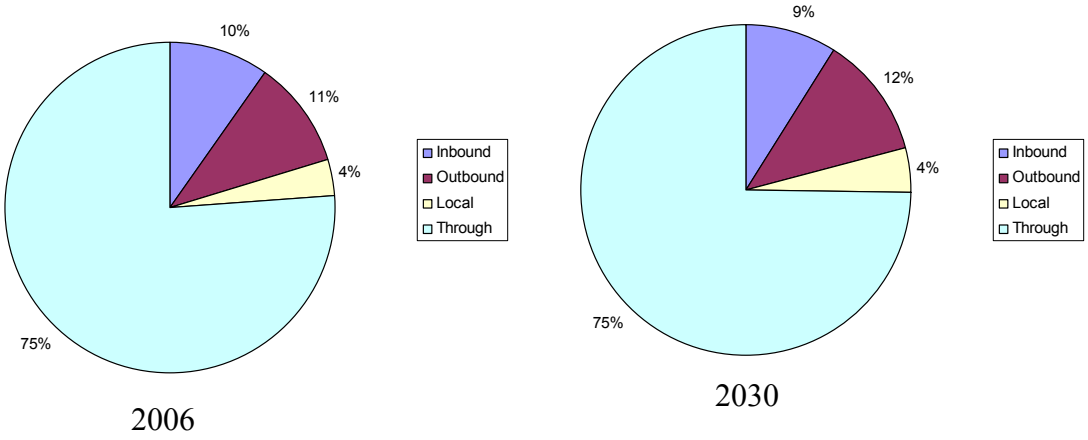


Source: Global Insight Inc, Transearch Database 2006

Figures 34 through 36 depict the tonnages of directional flow for truck commodities for the Central Midlands region. Nonmetallic Minerals, Secondary Traffic and Food or Kindred Products comprise the top commodities shipped. Nonmetallic Minerals is the top commodity that originates (5 million tons) and moves within the region (7 million tons) but will decrease overall by ten percent by 2030.

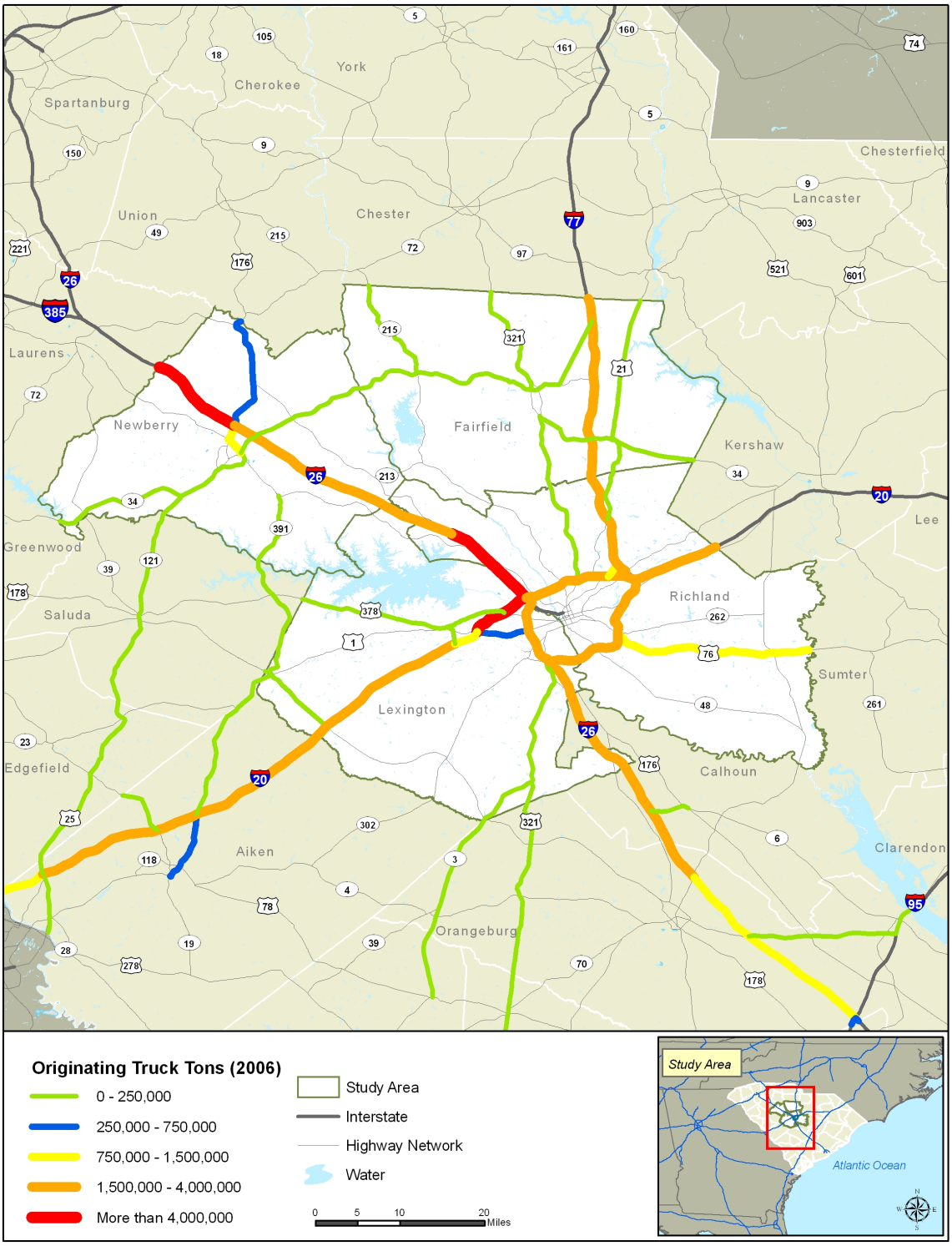
The commodity mix of freight projected to move in 2030 will remain constant when compared to the base year, 2006. Through traffic represents 75 percent of the freight transiting the Central Midlands region in 2006 and is projected to maintain that share of overall freight flow into 2030.

Figure 34: Freight Tonnage Moved by Truck in the Central Midlands Region 2006 and 2030



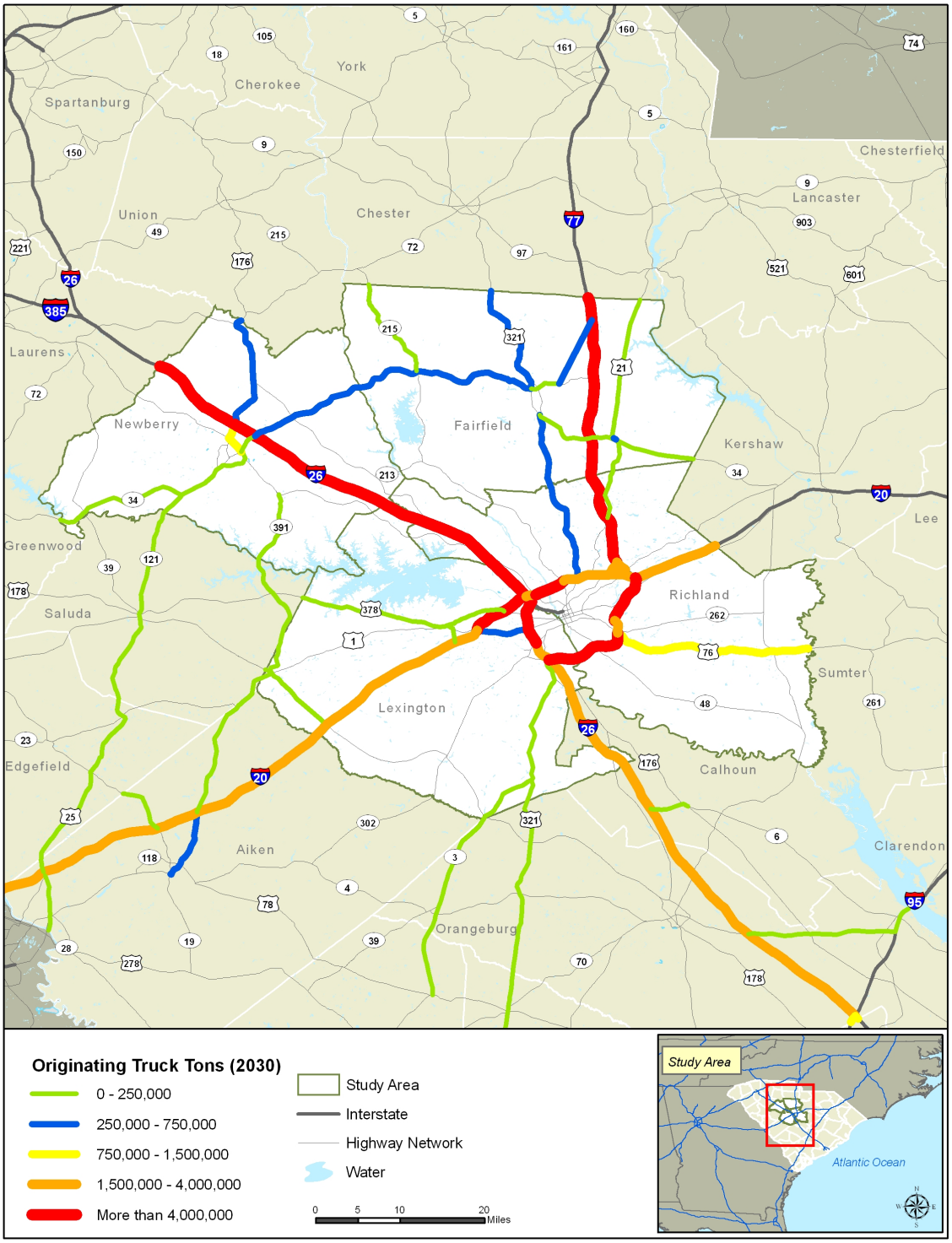
Source: Global Insight Inc, Transearch Database 2006

Figure 35: Truck Tonnage originating in Central Midlands Region, 2006



Source: Global Insight Inc, Transearch Database 2006

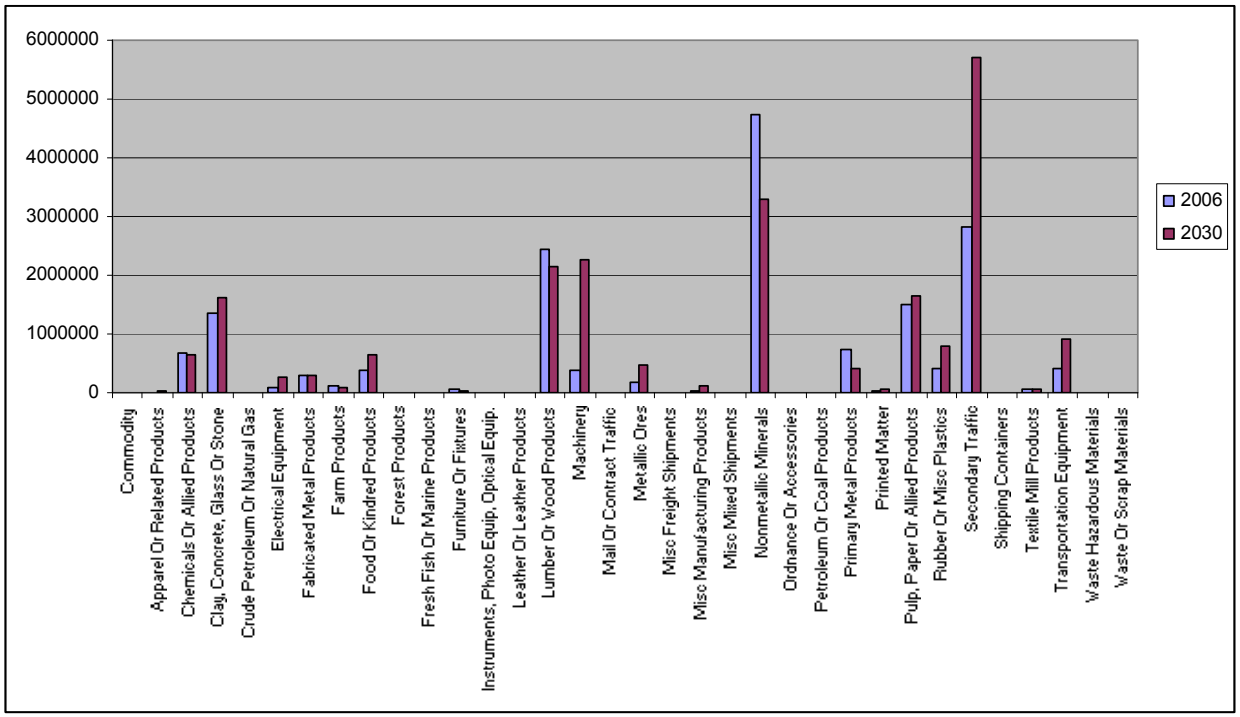
Figure 36: Truck Tonnage originating in Central Midlands Region, 2030



Source: Global Insight Inc, Transearch Database 2006

Figure 37 and Table 18 depict the volume of commodities that originate from the Central Midlands region. The top ten commodities are Nonmetallic Minerals (2.4 million tons in 2006, 3.2 million tons in 2030), Secondary Traffic (2.8 million tons in 2006, 5.7 million tons in 2030), Lumber or Wood Products (2.4 million tons in 2006, 2.1 million tons in 2030), Pulp, Paper, or Allied Products (1.5 million tons in 2006, 1.6 million tons in 2030), Clay, Concrete, Glass or Stone (1.3 million tons in 2006, 1.6 million tons in 2030), Primary Metals (739,000 tons in 2006, 405,000 tons in 2030), Chemicals or Allied Products (688,000 tons in 2006, 638,000 in 2030), Rubber or Misc Plastics (409,000 tons in 2006, 807,000 tons in 2030), Transportation Equipment (405,000 tons in 2006, 923,000 tons in 2030), Food or Kindred Products (395,000 tons in 2006, 645,000 tons in 2030).

Figure 37: Top Commodities Originating in Central Midlands Region by Truck, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

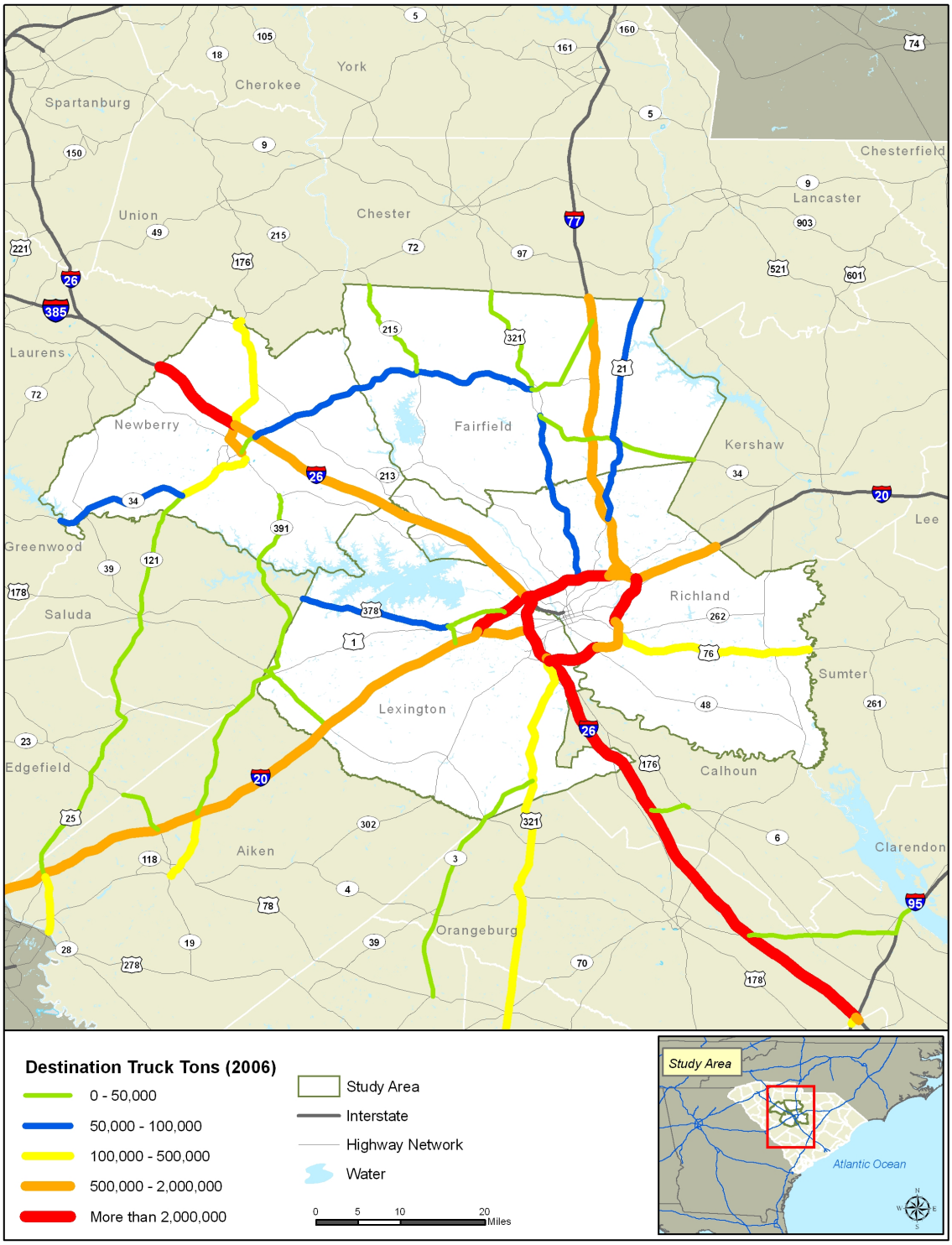
Table 18: Top Commodities Originating in Central Midlands Region by Truck, 2006-2030 (in thousands of tons)

Commodity	2006	2030	% change
Apparel Or Related Products	10,316	30,137	192
Chemicals Or Allied Products	687,757	638,032	-7
Clay, Concrete, Glass Or Stone	1,339,216	1,607,233	20
Crude Petroleum Or Natural Gas	50	109	118
Electrical Equipment	90,781	274,313	202
Fabricated Metal Products	290,478	307,706	6
Farm Products	116,551	93,848	-19
Food Or Kindred Products	395,439	645,175	63
Forest Products	65	166	155
Fresh Fish Or Marine Products	63	97	54
Furniture Or Fixtures	66,120	24,606	-63
Instruments, Photo Equip, Optical Equip.	2,256	5,890	161
Leather Or Leather Products	204	215	5
Lumber Or Wood Products	2,434,183	2,136,297	-12
Machinery	381,813	2,252,695	490
Mail Or Contract Traffic	-	-	-
Metallic Ores	163,044	463,968	185
Misc Freight Shipments	-	-	-
Misc Manufacturing Products	27,504	108,217	293
Misc Mixed Shipments	-	-	-
Nonmetallic Minerals	4,722,088	3,289,669	-30
Ordnance Or Accessories	-	-	-
Petroleum Or Coal Products	6,818	3,130	-54
Primary Metal Products	739,458	405,197	-45
Printed Matter	43,337	55,671	28
Pulp, Paper Or Allied Products	1,488,536	1,633,742	10
Rubber Or Misc Plastics	409,441	806,741	97
Secondary Traffic	2,811,417	5,694,234	103
Shipping Containers	-	-	-
Textile Mill Products	71,689	60,961	-15
Transportation Equipment	404,712	923,153	128
Waste Hazardous Materials	-	-	-
Waste Or Scrap Materials	3,461	6,000	73
Total	16,706,800	21,467,203	28

Source: Global Insight Inc, Transearch Database 2006

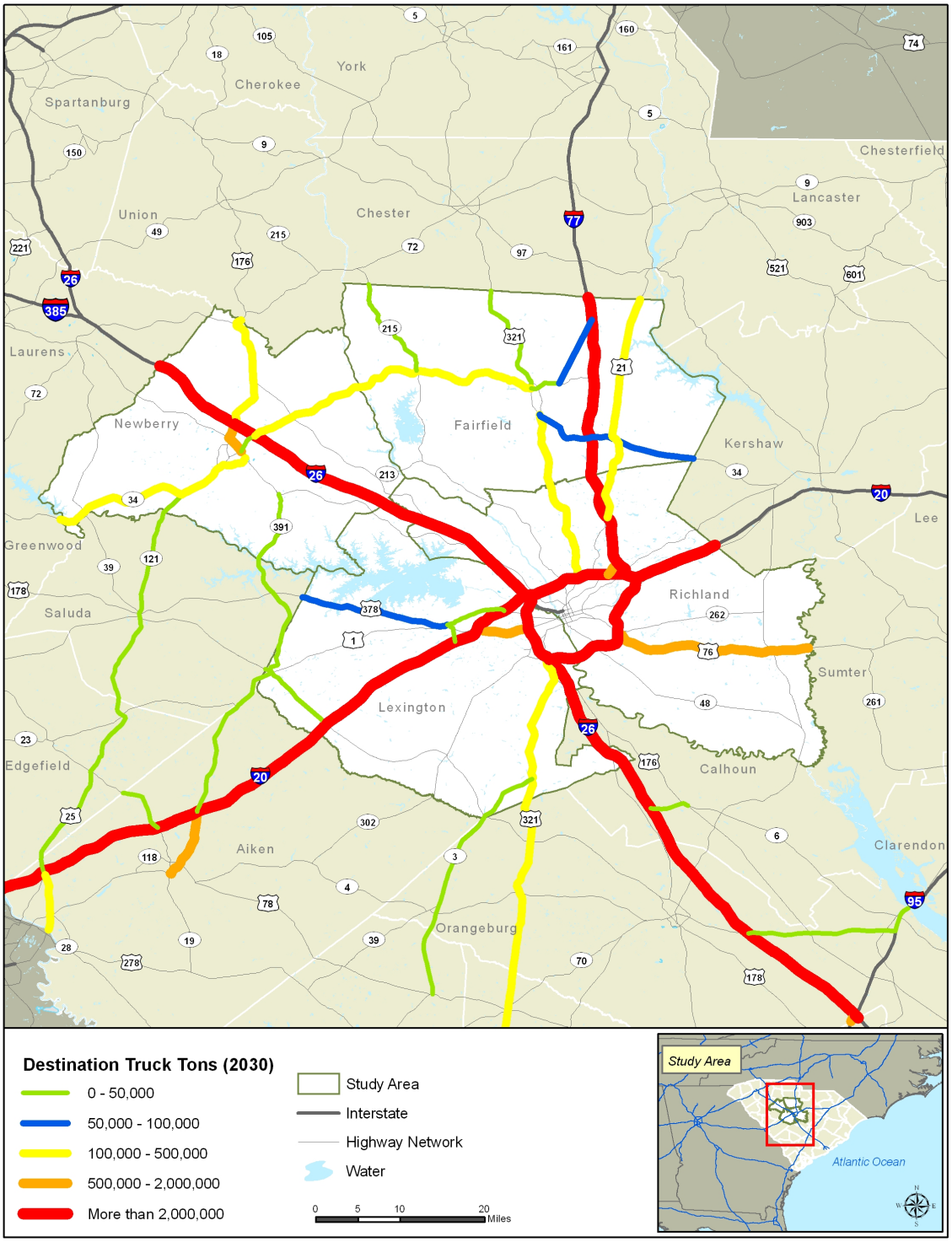
Figures 38 through 40 and Table 19 depict the volume of commodities that terminate in the Central Midlands region. The top ten commodities are Secondary Traffic (3.4 million tons in 2006, 7.5 million tons in 2030), Nonmetallic Minerals (1.3 million tons in 2006, 3.1 million tons in 2030), Lumber, or Wood Products (1.2 million tons in 2006, 1.3 million tons in 2030), Clay, concrete, glass or stone (1.0 million in 2006, 1.7 million in 2030). Primary Metal Products (877,000 tons in 2006, 1.4 million tons in 2030), Pulp, Paper, or Allied Products (497,000 tons in 2006, 516,000 tons in 2030), Transportation Equipment (385,000 tons in 2006, 529,000 tons in 2030) Farm Products (385,000 tons in 2006, 474,000 tons in 2030), Food or Kindred Products (297,000 tons in 2006, 491,000 tons in 2030) and Apparel or Related Products (220,000 tons in 2006, 123,000 tons in 2030).

Figure 38: Truck Tonnage Terminating in Central Midlands Region, 2006



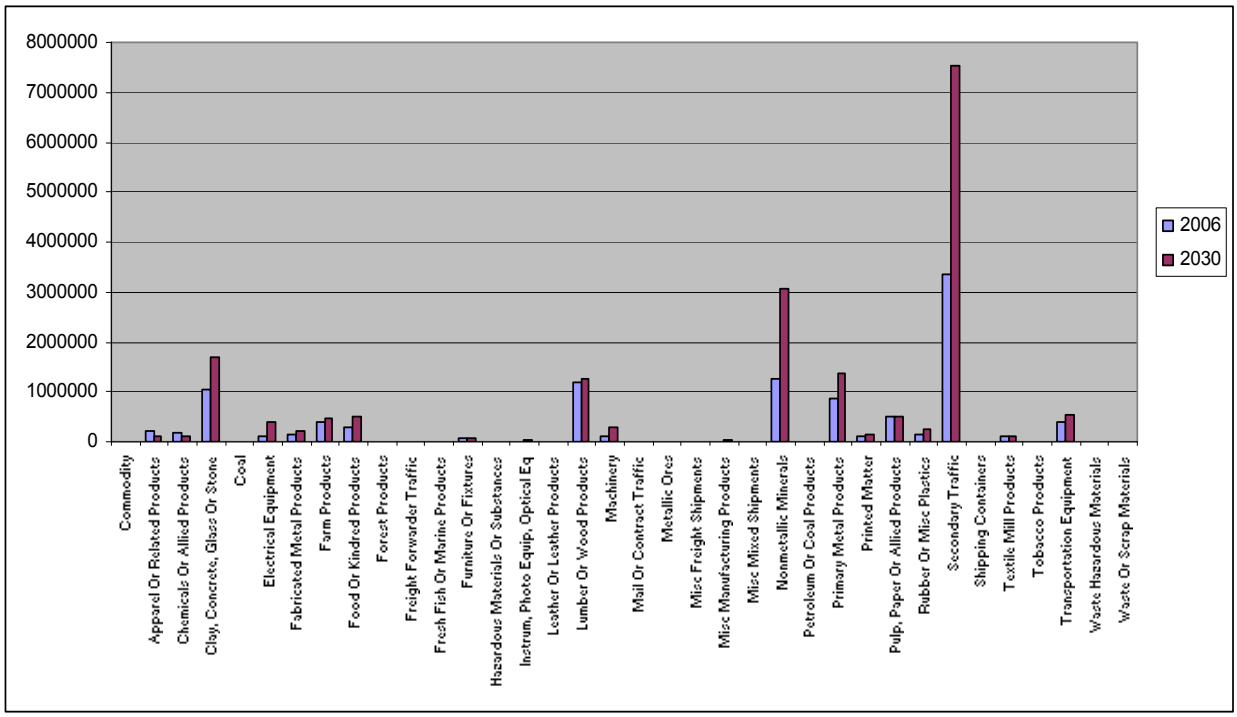
Source: Global Insight Inc, Transearch Database 2006

Figure 39: Truck Tonnage Terminating in Central Midlands Region, 2030



Source: Global Insight Inc, Transearch Database 2006

Figure 40: Top Ten Commodities Terminating in Central Midlands Region by Truck, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

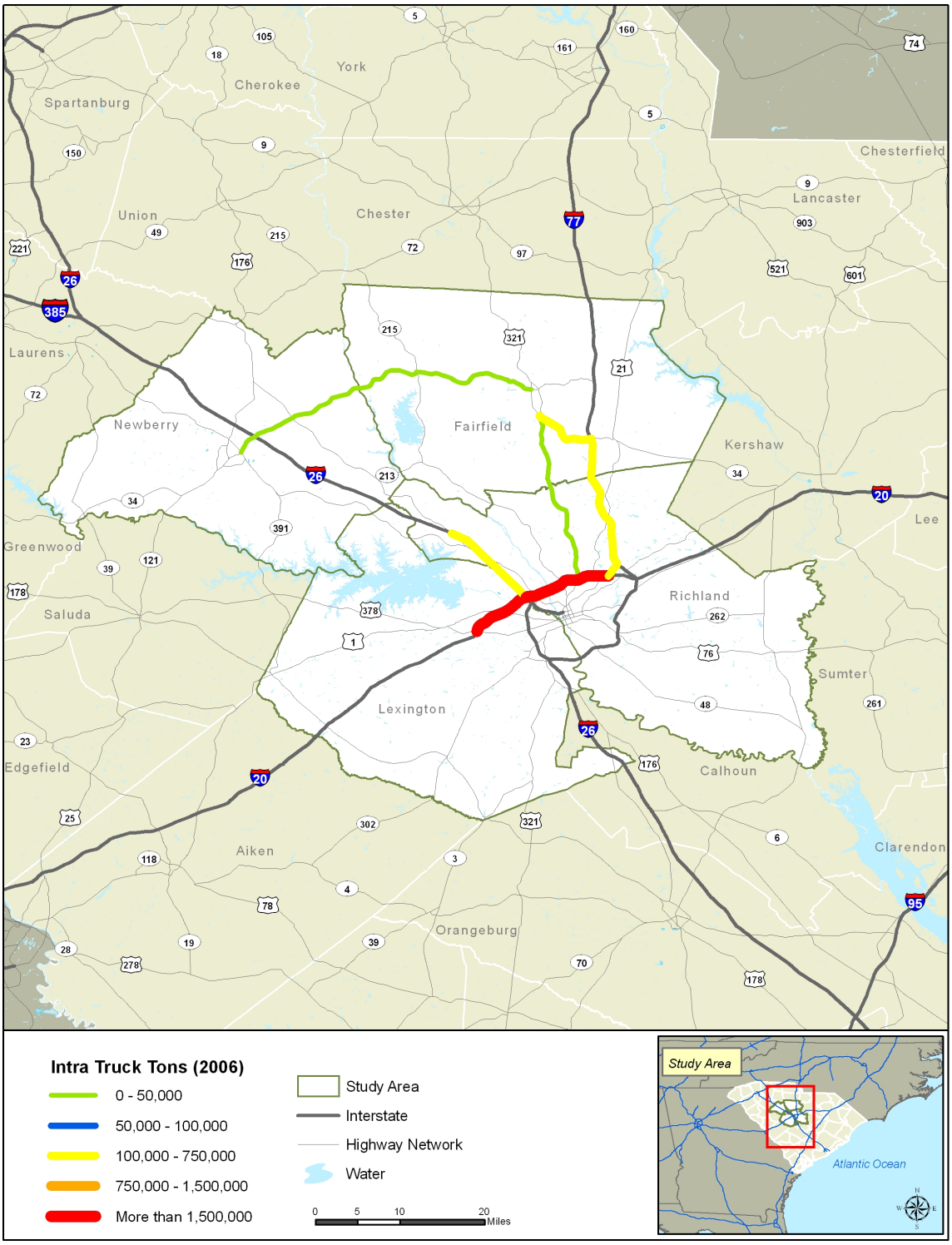
Table 19: Top Ten Commodities Terminating in Central Midlands Region by Truck, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% change
Apparel Or Related Products	220,095	123,122	-44
Chemicals Or Allied Products	176,916	120,212	-32
Clay, Concrete, Glass Or Stone	1,038,530	1,705,303	64
Coal	3,965	6,462	63
Electrical Equipment	95,437	396,329	315
Fabricated Metal Products	130,065	229,149	76
Farm Products	384,840	474,109	23
Food Or Kindred Products	297,038	490,531	65
Forest Products	5	10	100
Freight Forwarder Traffic	-	-	-
Fresh Fish Or Marine Products	121	187	55
Furniture Or Fixtures	54,470	83,761	54
Hazardous Materials Or Substances	-	-	-
Instrum, Photo Equip, Optical Eq	10,622	33,227	213
Leather Or Leather Products	718	716	-
Lumber Or Wood Products	1,188,682	1,268,159	7
Machinery	106,995	284,154	166
Mail Or Contract Traffic	-	-	-
Metallic Ores	-	-	-
Misc Freight Shipments	-	-	-
Misc Manufacturing Products	15,090	45,999	205
Misc Mixed Shipments	-	-	-
Nonmetallic Minerals	1,264,975	3,074,378	143
Petroleum Or Coal Products	2,245	3,698	65
Primary Metal Products	876,946	1,359,275	55
Printed Matter	94,991	142,657	50
Pulp, Paper Or Allied Products	497,342	516,488	4
Rubber Or Misc Plastics	154,067	264,335	72
Secondary Traffic	3,356,405	7,520,431	124
Shipping Containers	-	-	-
Textile Mill Products	112,219	99,869	-11
Tobacco Products	2,454	720	-71
Transportation Equipment	385,291	529,343	37
Waste Hazardous Materials	-	-	-
Waste Or Scrap Materials	3,134	6,320	102
Total	10,473,661	18,778,947	79

Source: Global Insight Inc, Transearch Database 2006

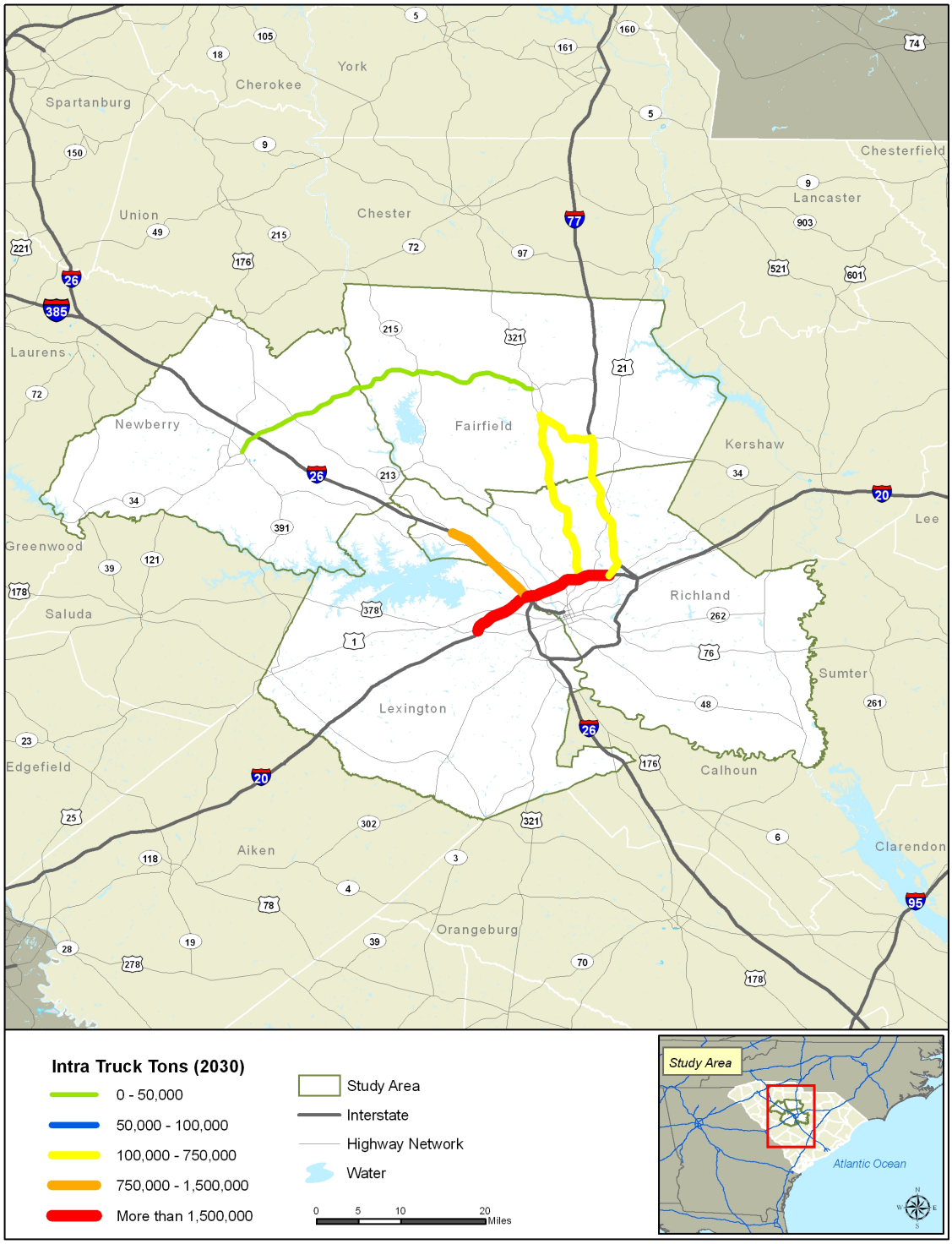
Figures 41 through 43 and Table 20 depict the volume of commodities that move within in the Central Midlands region. The top ten commodities are Nonmetallic Minerals (6.9 million tons in 2006, 6.8 million tons in 2030), Clay, Concrete, glass or stone (481,000 tons in 2006, 677,000 in 2030). Secondary traffic (402,000 tons in 2006, 811,000 tons in 2030) Lumber or Wood Products (141,000 tons in 2006, 123,000 tons in 2030), Primary Metal Products (134,000 tons in 2006, 52,000 tons in 2030), Farm Products (76,000 tons in 2006, 77,000 tons in 2030), Metallic Ores 61,000 tons in 2006, 696,000 tons in 2030), Transportation Equipment (26,000 tons in 2006, 47,000 tons in 2030), Pulp, Paper, or Allied Products (22,000 tons in 2006, 21,000 tons in 2030), Food or Kindred Products (19,000 tons in 2006, 31,000 tons in 2030).

Figure 41: Local Truck Tonnage in Central Midlands Region, 2006



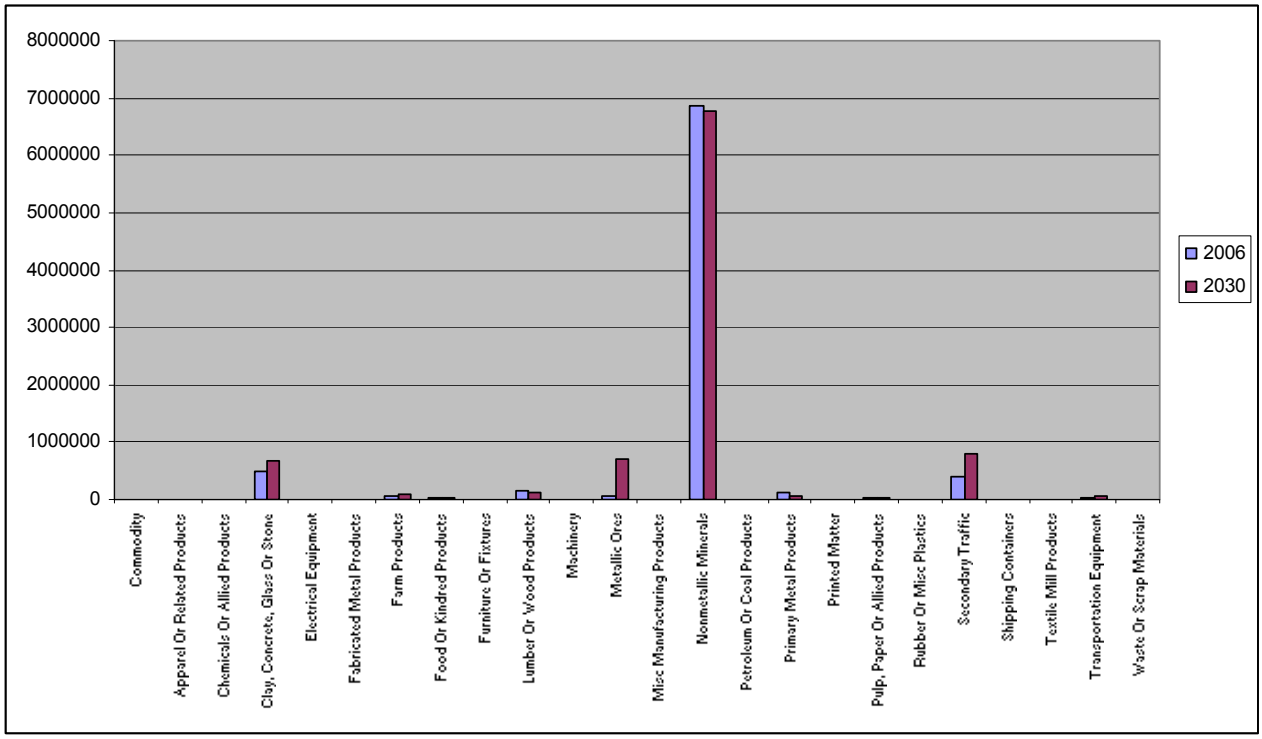
Source: Global Insight Inc. Transearch Database 2006

Figure 42: Local Truck Tonnage in Central Midlands Region, 2030



Source: Global Insight Inc. Transearch Database 2006

Figure 43: Ten Commodities within the Central Midlands Region by Truck, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

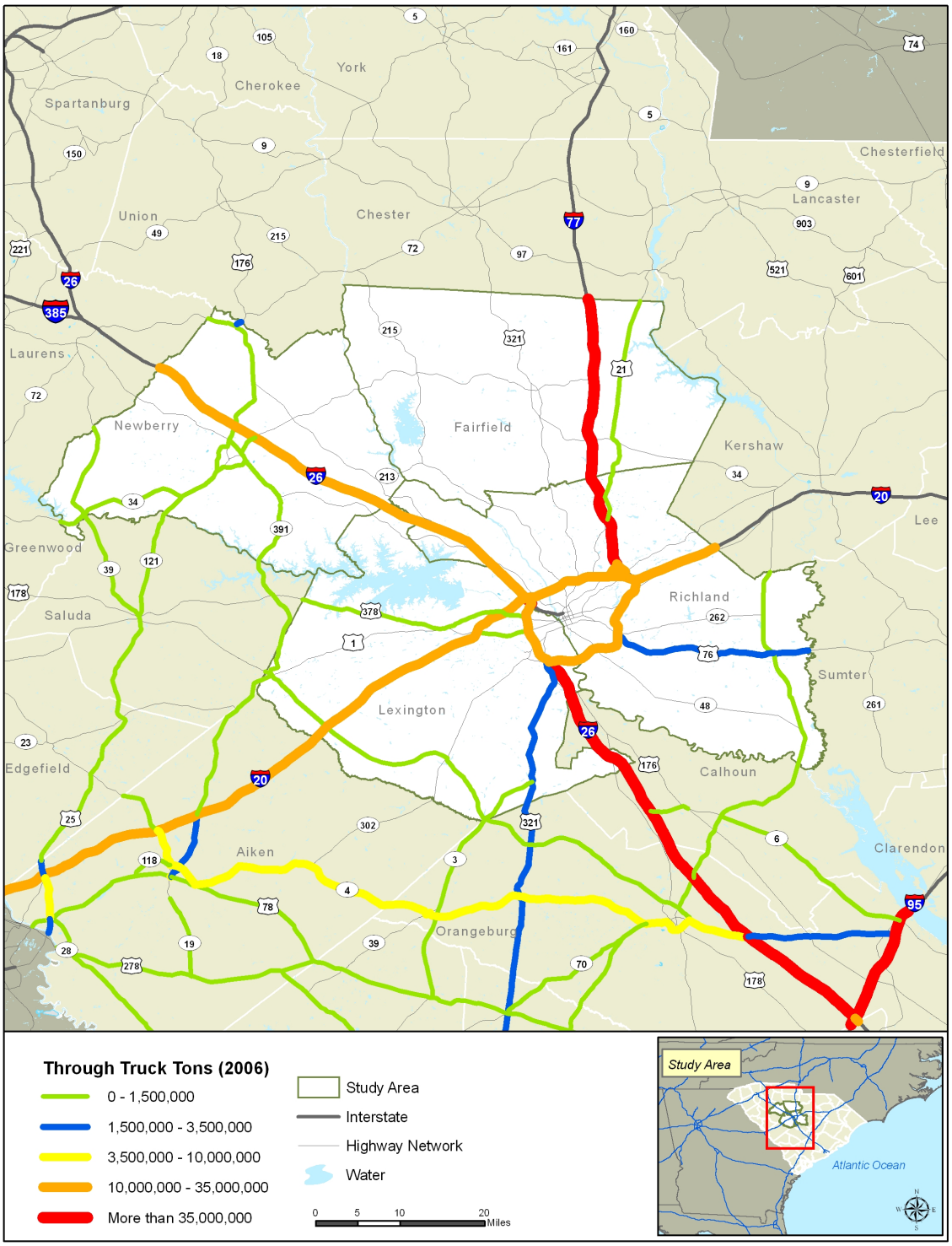
Table 20: Top Commodities within the Central Midlands Region by Truck, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% change
Apparel Or Related Products	727	3,217	343
Chemicals Or Allied Products	153	125	-18
Clay, Concrete, Glass Or Stone	480,927	676,821	41
Electrical Equipment	2,688	14,112	425
Fabricated Metal Products	5,628	6,173	10
Farm Products	75,523	77,414	3
Food Or Kindred Products	18,983	30,602	61
Furniture Or Fixtures	441	169	-62
Lumber Or Wood Products	140,909	122,998	-13
Machinery	2,530	13,123	419
Metallic Ores	61,156	695,768	1038
Misc Manufacturing Products	941	3,782	302
Nonmetallic Minerals	6,852,825	6,783,185	-1
Petroleum Or Coal Products	1,350	466	-65
Primary Metal Products	132,652	52,115	-61
Printed Matter	4,528	5,938	31
Pulp, Paper Or Allied Products	22,275	20,749	-7
Rubber Or Misc Plastics	4,895	9,984	104
Secondary Traffic	401,725	810,770	102
Shipping Containers	-	-	-
Textile Mill Products	838	556	-34
Transportation Equipment	26,173	47,470	81
Waste Or Scrap Materials	-	-	-
Total	8,237,867	9,375,536	14

Source: Global Insight Inc, Transearch Database 2006

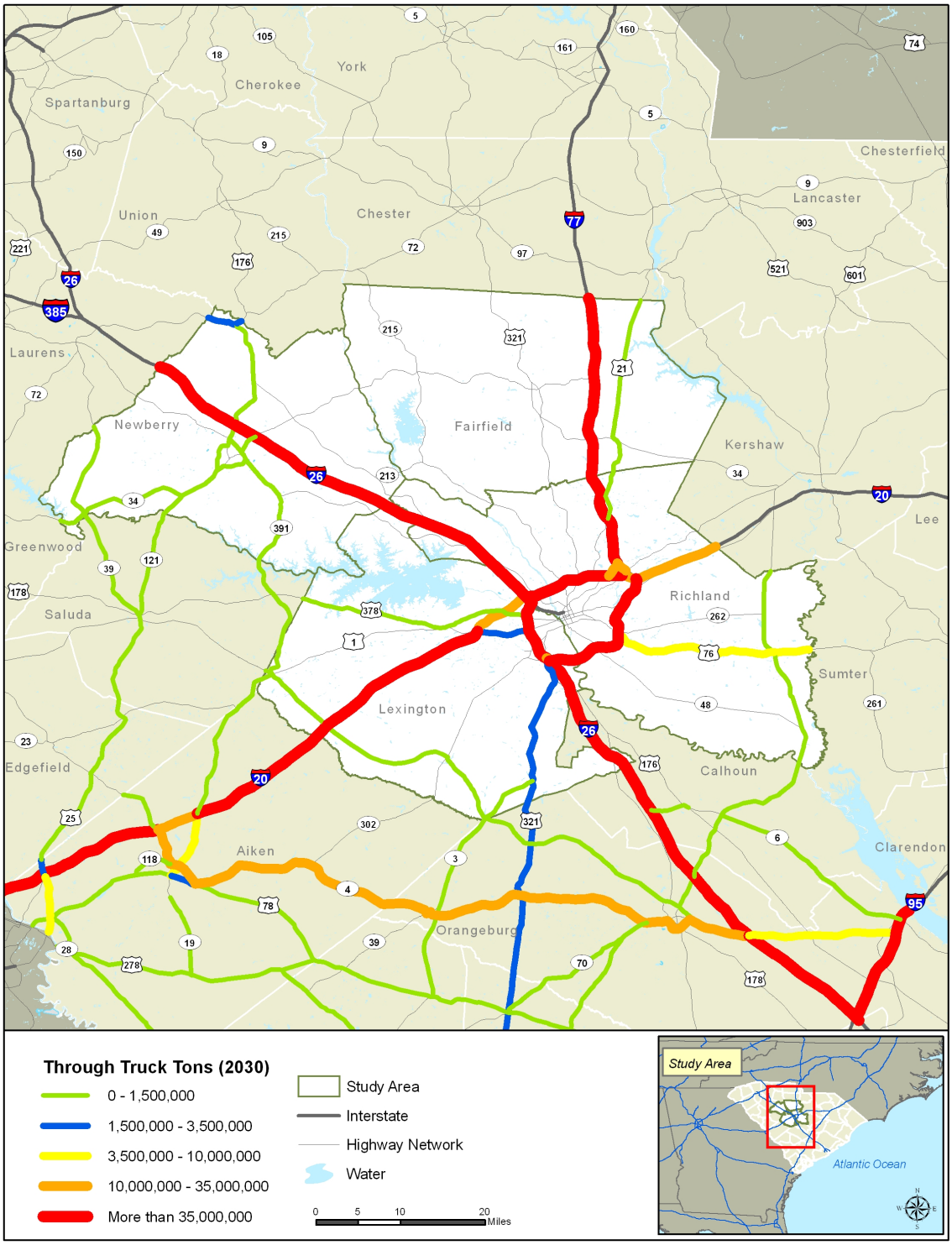
Figures 44 through Figure 46 and Table 21 depict the volume of commodities that pass through the Central Midlands region. The top commodities are Secondary Traffic (21.4 million tons 2006, 48.5 million tons in 2030) Chemicals or Allied Products (31.1 million tons in 2006, 25.7 million tons in 2030) and Lumber or Wood (16.6 million tons in 2006, 16.8 million tons in 2030). Electrical equipment is expected to grow by 287 percent by 2030.

Figure 44: Truck Tonnage moving through Central Midlands Region, 2006



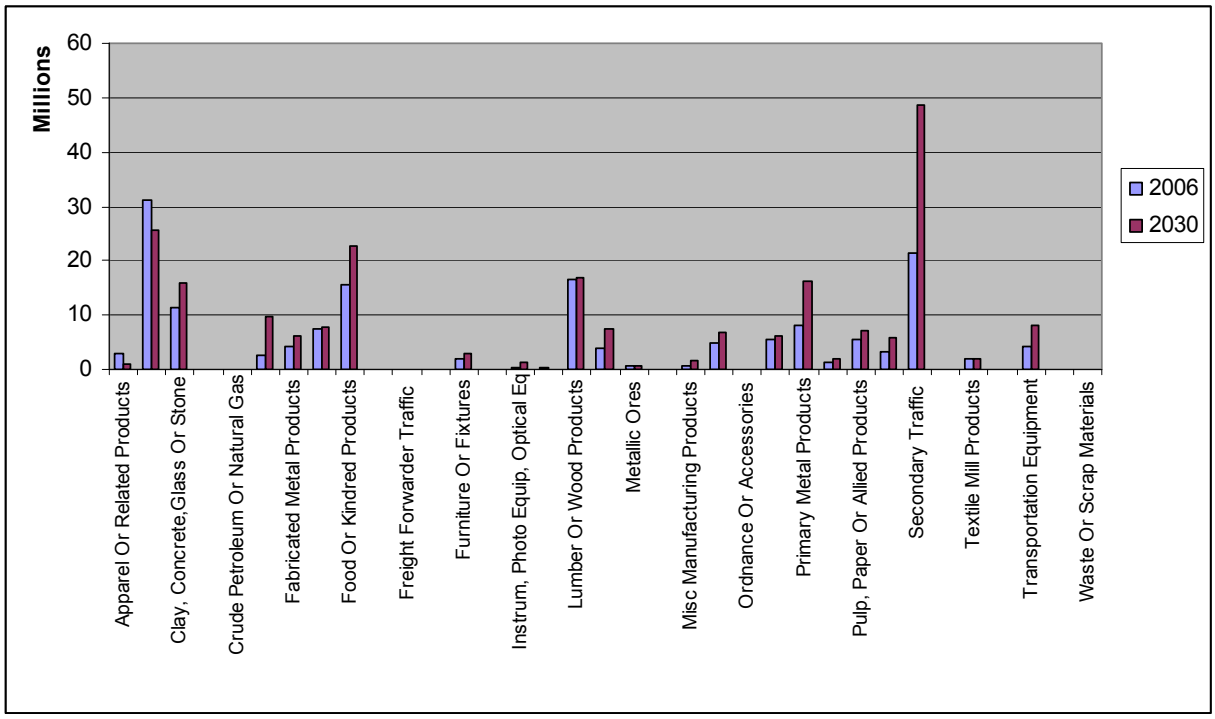
Source: Global Insight Inc. Transearch Database 2006

Figure 45: Truck Tonnage Moving through Central Midlands Region, 2030



Source: Global Insight Inc. Transearch Database 2006

Figure 46: Top Ten Commodity moving within the Central Midlands Region by Truck, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

Table 21: Top Ten Commodities moving through the Central Midlands Region by Truck, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% Change
Apparel Or Related Products	2,860,127	949,228	(67)
Chemicals Or Allied Products	31,120,095	25,715,546	(17)
Clay, Concrete, Glass Or Stone	11,272,567	15,942,729	41
Coal	64,909	57,712	(11)
Crude Petroleum Or Natural Gas	179	390	118
Electrical Equipment	2,547,448	9,867,996	287
Fabricated Metal Products	4,273,306	6,285,182	47
Farm Products	7,335,033	7,722,668	5
Food Or Kindred Products	15,705,546	22,591,876	44
Forest Products	4,181	6,114	46
Freight Forwarder Traffic	-	-	-
Fresh Fish Or Marine Products	12,066	18,604	54
Furniture Or Fixtures	1,914,417	3,025,859	58
Hazardous Materials Or Substances	31,233	34,638	11
Instrument, Photo Equip, Optical Eq	424,497	1,190,552	180
Leather Or Leather Products	177,970	74,425	(58)
Lumber Or Wood Products	16,565,572	16,833,161	2
Machinery	3,907,564	7,326,372	87
Metallic Ores	597,406	547,522	(8)
Misc Freight Shipments	-	-	-
Misc Manufacturing Products	642,059	1,551,388	142
Nonmetallic Minerals	4,908,607	6,701,823	37
Ordnance Or Accessories	32,248	39,265	22
Petroleum Or Coal Products	5,671,644	6,291,970	11
Primary Metal Products	8,174,367	16,236,923	99
Printed Matter	1,275,951	1,859,203	46
Pulp, Paper Or Allied Products	5,540,454	7,197,764	30
Rubber Or Misc Plastics	3,400,432	5,997,721	76
Secondary Traffic	21,443,124	48,527,531	126
Shipping Containers	-	-	-
Textile Mill Products	1,837,469	1,828,814	-
Tobacco Products	105,589	36,139	(66)
Transportation Equipment	4,373,008	7,963,020	82
Waste Hazardous Materials	-	-	-
Waste Or Scrap Materials	32,748	55,807	70
Total	156,253,822	222,479,971	43

Source: Global Insight Inc, Transearch Database 2006

Based on these projections, trucks will serve as the dominant mode of transportation in 2030, and the increase in specific commodities indicates its high use by shippers. The high amount of freight coming into the Central Midlands region supports the fact that this area serves as a major hub for the consolidation of freight. For example, the preponderance of machinery and manufactured products is directly related to the high amount of manufacturing facilities within the Central Midlands region. It is important to note that the types of commodities that originate or terminate in the region that are projected to increase are primarily bulk commodities. These commodities are typically used for pure manufacturing purposes and the final products will most likely be consumed outside of the Central Midlands region. From an infrastructure perspective, these commodities dictate mode choice and supply chain efficiency, and are likely to impact roadways in the region by increasing Class 8 truck traffic. However, for the Central Midlands region, the effect will be offset somewhat by the leveling off of growth in some of the commodities that account for the heavier volumes such as Nonmetallic Minerals. The increase in commodities utilizing truck traffic, by 2030, will promote a growth in the freight stakeholder businesses and their related traffic volumes.

5.1.2. Rail Cargo

Over the next 25 years, the amount of rail cargo transported as a share of the total amount of freight will decrease to 4 percent from 5 percent in 2006. Of that percentage:

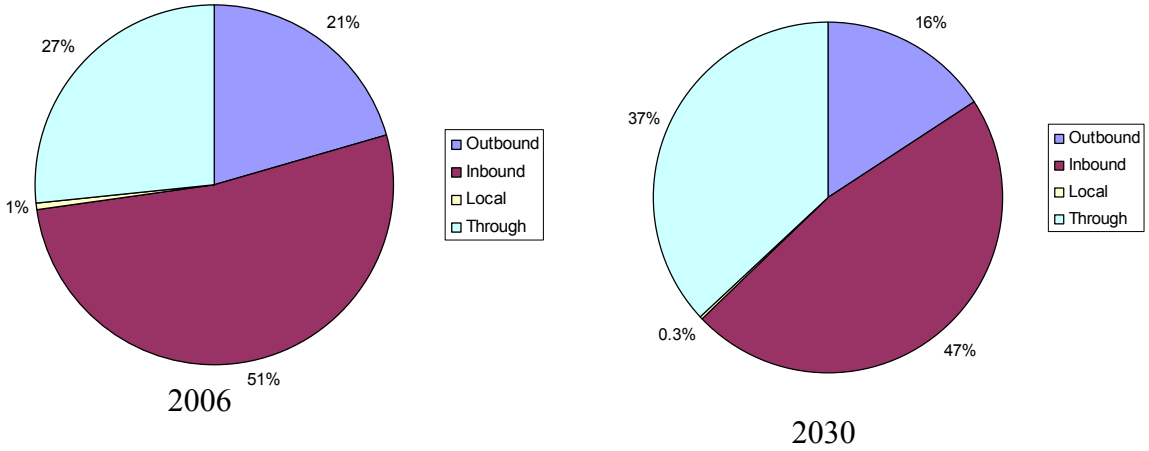
- 3 million tons of the freight tonnage moved by rail passes through the Central Midlands region in 2006 and this amount is projected to increase to 5 million tons by 2030;
- 6 million tons of the freight moves inbound to the Central Midlands region and this amount is projected to increase to 7 million tons by 2030;
- 2 million tons of the freight moves outbound from the Central Midlands region and this amount is projected to remain constant by 2030; and
- Less than 100,000 tons of the rail freight tonnage moves internally within the Central Midlands region.

The shares of rail freight by direction are shown in **Figure 47**. Through rail freight is projected to increase to 37 percent of the total share of rail freight, up from 27 percent in 2006. The shift in rail freight is also reflected in the projected decrease in inbound rail commodities, from 51 percent to approximately 47 percent of the total by 2030. Rail as a mode of transportation is typically used to move highly dense commodities over longer distances. The Central Midlands region has a significant manufacturing sector and therefore it is reasonable to assume that goods moving by rail will account for a high amount of inbound freight to manufacture and produce goods.

Since the Central Midlands region experiences no intermodal service, the amount of inbound and through rail freight is significant. Although the shift in the directional flow from through freight to inbound freight is a slight 4 percent, outbound rail volume will increase by 5 percent. The rail volume that is destined for rail bulk terminals within the region will ultimately need to be transported by truck to other terminals or end users. However the increase in through traffic

indicates a potential reduction in overall truck trips for the region, as the large bulk commodities will shift to rail.

Figure 47: Freight Tonnage Moved by Rail for the CMCOG Region 2006-2030

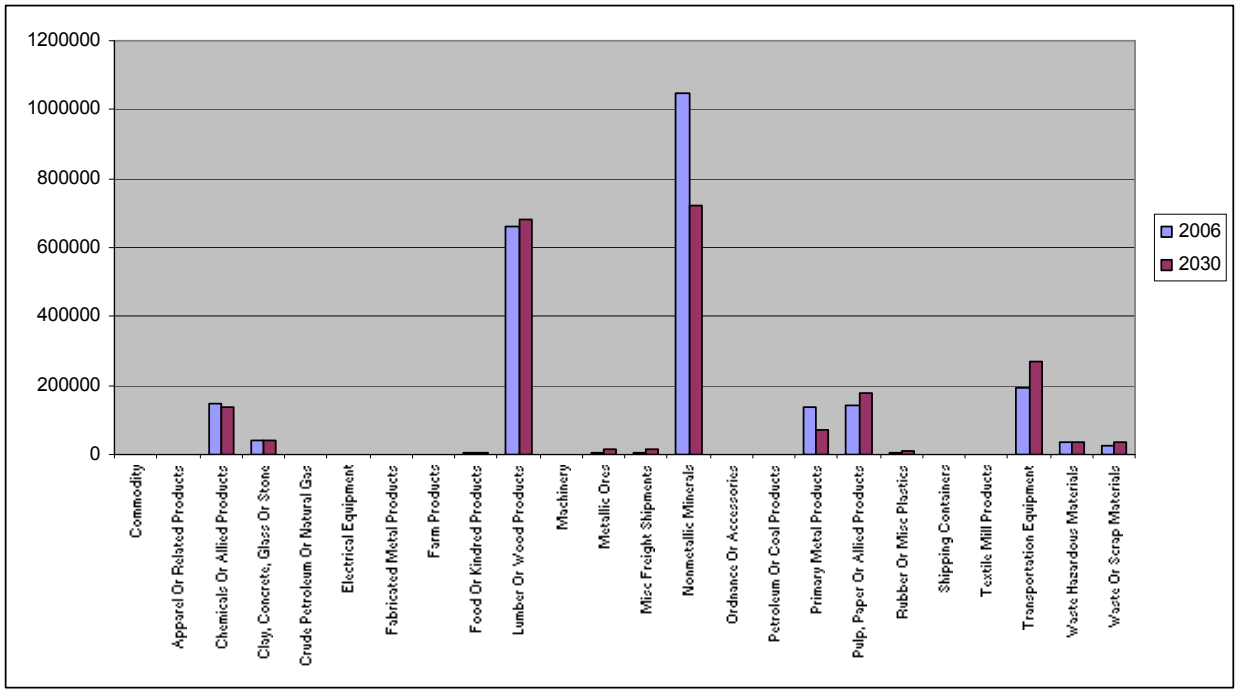


Source: Global Insight Inc, Transearch Database 2006

Nonmetallic Minerals, Lumber or Wood Products and Transportation Equipment are the dominant commodities shipped by rail originating from the Central Midlands region. Coal accounts for 42 percent of all of the commodities shipped that are destined for the Central Midlands region. Transportation Equipment and Waste Scrap Materials constitute for 72 percent of all of the commodities that are shipped by rail from the region by 2030. Transportation equipment shipped by rail is projected to decrease by 31 percent, but as indicated earlier, the region's industrial and manufacturing sectors will determine the volume of these commodities, such as Machinery Equipment, which is projected to increase by 221 percent.

Figure 48 and Table 22 depict the volume of commodities that originate from the Central Midlands region. The top commodities are Nonmetallic Minerals (1.0 million tons in 2006, 721,000 tons in 2030), Lumber or Wood Products (663,000 tons 2006 to 682,000 tons in 2030), and Transportation equipment (195,000 tons in 2006 to 270,000 tons in 2030).

Figure 48: Top Commodity Originating in Central Midlands Region by Rail, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

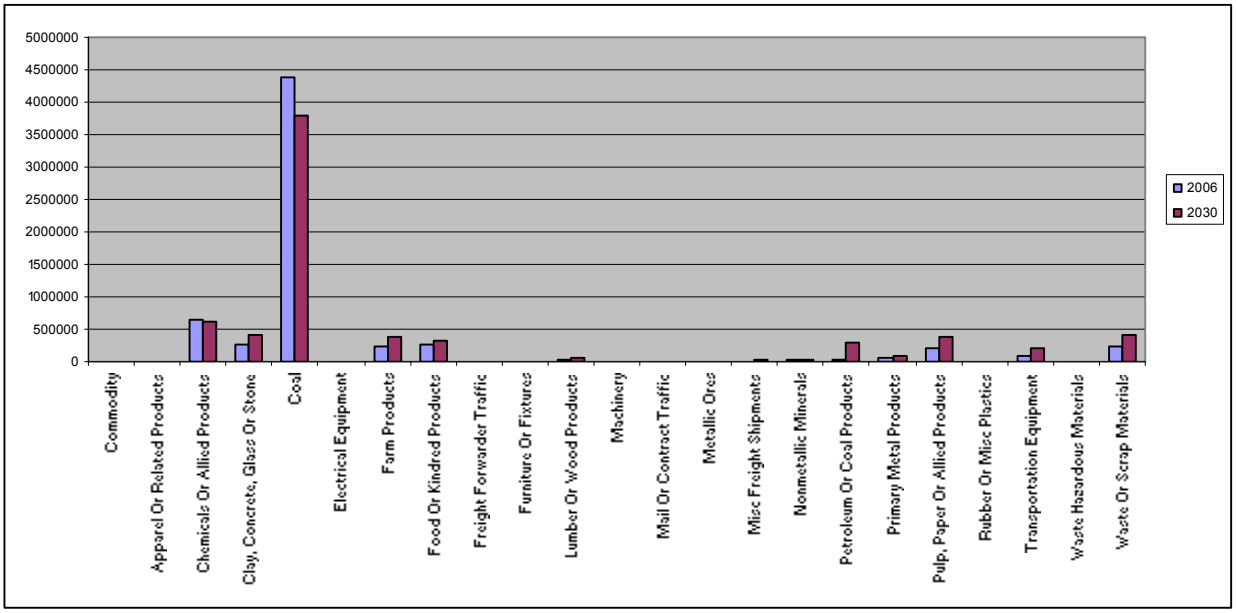
Table 22: Top Commodity Originating in Central Midlands Region by Rail, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% change
Apparel Or Related Products	1	1	-
Chemicals Or Allied Products	147,359	136,592	-7
Clay, Concrete, Glass Or Stone	41,314	43,054	4
Crude Petroleum Or Natural Gas	71	156	120
Electrical Equipment	67	153	128
Fabricated Metal Products	133	318	139
Farm Products	110	58	-47
Food Or Kindred Products	3,099	5,497	77
Lumber Or Wood Products	662,926	681,586	3
Machinery	237	759	220
Metallic Ores	7,428	14,727	98
Misc Freight Shipments	6,687	13,215	98
Nonmetallic Minerals	1,045,600	721,429	-31
Ordnance Or Accessories	108	140	30
Petroleum Or Coal Products	82	175	113
Primary Metal Products	138,133	71,032	-49
Pulp, Paper Or Allied Products	143,866	175,957	22
Rubber Or Misc Plastics	3,037	8,643	185
Shipping Containers	20	43	115
Textile Mill Products	37	38	3
Transportation Equipment	194,432	270,088	39
Waste Hazardous Materials	34,847	37,305	7
Waste Or Scrap Materials	26,273	34,927	33
Total	2,455,866	2,215,893	-10

Source: Global Insight Inc, Transearch Database 2006

Figure 49 and Table 23 depict the volume of commodities that terminate from the Central Midlands region. The top commodities are Coal (4.40 million in 2006, 3.78 million in 2030), Chemicals or Allied products (650,000 tons in 2006, 626,000 tons in 2030), Clay, Concrete, Glass or Stone (276,000 tons in 2006, 422,000 tons in 2030). Coal accounts for 68 percent of the total freight destined for the region.

Figure 49: Top Commodities Terminating in Central Midlands Region by Rail, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

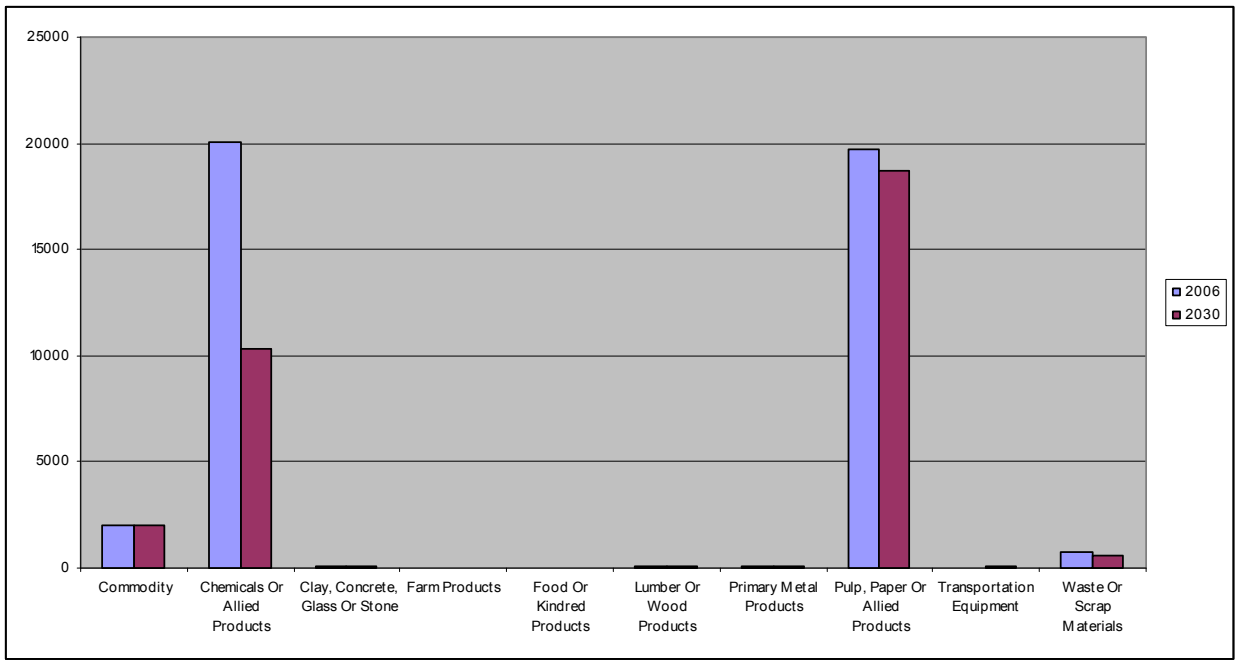
Table 23: Top Commodities Terminating in Central Midlands Region by Rail, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% change
Apparel Or Related Products	2,404	4,721	96
Chemicals Or Allied Products	649,995	626,180	-4
Clay, Concrete, Glass Or Stone	275,950	421,728	53
Coal	4,395,676	3,781,244	-14
Electrical Equipment	11	77	600
Farm Products	220,910	390,522	77
Food Or Kindred Products	262,522	329,065	25
Freight Forwarder Traffic	609	1,345	121
Furniture Or Fixtures	209	308	47
Lumber Or Wood Products	30,582	46,209	51
Machinery	5	11	120
Mail Or Contract Traffic	-	-	-
Metallic Ores	1,610	3,192	98
Misc Freight Shipments	10,525	20,032	90
Nonmetallic Minerals	28,188	31,547	12
Petroleum Or Coal Products	35,076	280,642	700
Primary Metal Products	53,774	76,795	43
Pulp, Paper Or Allied Products	198,896	395,710	99
Rubber Or Misc Plastics	231	790	242
Transportation Equipment	97,990	202,478	107
Waste Hazardous Materials	6,699	7,206	8
Waste Or Scrap Materials	228,999	398,810	74
Total	6,500,763	7,018,614	8

Source: Global Insight Inc, Transearch Database 2006

Figure 50 and Table 24 depict the volume of commodities that move within the Central Midlands region. The top commodities are Pulp and Allied Paper (20,000 tons in 2006 and 19,000 tons in 2030) and Chemical or Allied products (20,000 in 2006 and 10,000 in 2030).

Figure 50: Commodities Moving Internally in Central Midlands Region by Rail, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

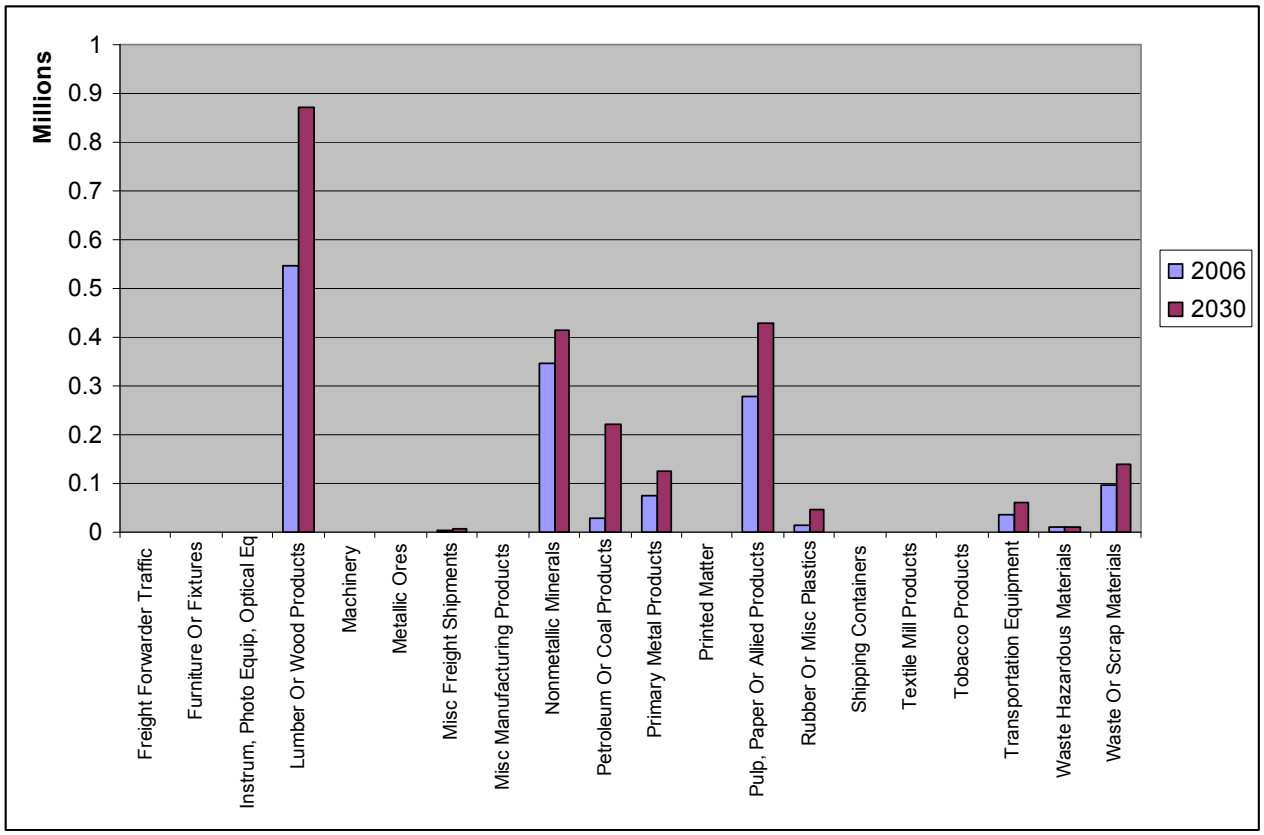
Table 24: Commodities Moving Internally in Central Midlands Region by Rail, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% Change
Chemicals Or Allied Products	20,030	10,280	-49
Clay, Concrete, Glass Or Stone	44	54	23
Farm Products	7	8	14
Food Or Kindred Products	7	11	57
Lumber Or Wood Products	53	43	-19
Primary Metal Products	85	62	-27
Pulp, Paper Or Allied Products	19,743	18,681	-5
Transportation Equipment	38	61	61
Waste Or Scrap Materials	750	576	-23
Total	40,756	29,775	-27

Source: Global Insight Inc, Transearch Database 2006

Figure 51 and Table 25 depicts the volume of commodities that move through the Central Midlands region. The top commodities are lumber and wood products (547,000 in 2006 and 871,000 in 2030), Nonmetallic minerals (345,000 in 2006, 415,000 in 2030) and pulp or Allied products (279,000 in 2006, 429,000 in 2030).

Figure 51: Top Commodities Moving Through the Central Midlands Region by Rail



Source: Global Insight Inc, Transearch Database 2006

Table 25: Top Commodities Moving Through the Central Midlands Region by Rail (In thousands of tons)

Commodity	2006	2030	% Change
Apparel Or Related Products	112.	112	1
Chemicals Or Allied Products	578,744	739,013	28
Clay, Concrete, Glass Or Stone	297,022	532,171	79
Coal	0.55	0.37	(33)
Crude Petroleum Or Natural Gas	158	345	118
Electrical Equipment	4,937	17,687	258
Fabricated Metal Products	2,259	5,674	151
Farm Products	855,499	1,568,321	83
Food Or Kindred Products	44,715	62,455	40
Forest Products	-	-	-
Freight Forwarder Traffic	123	272	121
Furniture Or Fixtures	355	1,260	255
Instrument, Photo Equip, Optical Eq	132	572	331
Lumber Or Wood Products	547,837	871,994	59
Machinery	667	1,131	70
Metallic Ores	113	224	98
Misc Freight Shipments	4,330	8,367	93
Misc Manufacturing Products	115	526	355
Nonmetallic Minerals	345,439	415,532	20
Petroleum Or Coal Products	27,743	222,668	703
Primary Metal Products	73,478	124,263	69
Printed Matter	2	3	53
Pulp, Paper Or Allied Products	279,108	429,217	54
Rubber Or Misc Plastics	15,558	45,750	194
Shipping Containers	5	11	114
Textile Mill Products	169	177	5
Tobacco Products	166	56	(66)
Transportation Equipment	36,434	60,020	65
Waste Hazardous Materials	10,337	12,393	20
Waste Or Scrap Materials	95,011	139,374	47
Total	3,222,588	5,261,632	63

Source: Global Insight Inc, Transearch Database 2006

Figure 42 and Table 25 depict the volume of commodities that move through the Central Midlands region. The top commodities are lumber Sand wood products (548,000 tons in 2006 and 872,000 tons in 2030), Nonmetallic Minerals (345,000 tons in 2006, 416,000 tons in 2030) and Pulp or Allied products (279,000 tons in 2006, 429,000 tons in 2030).

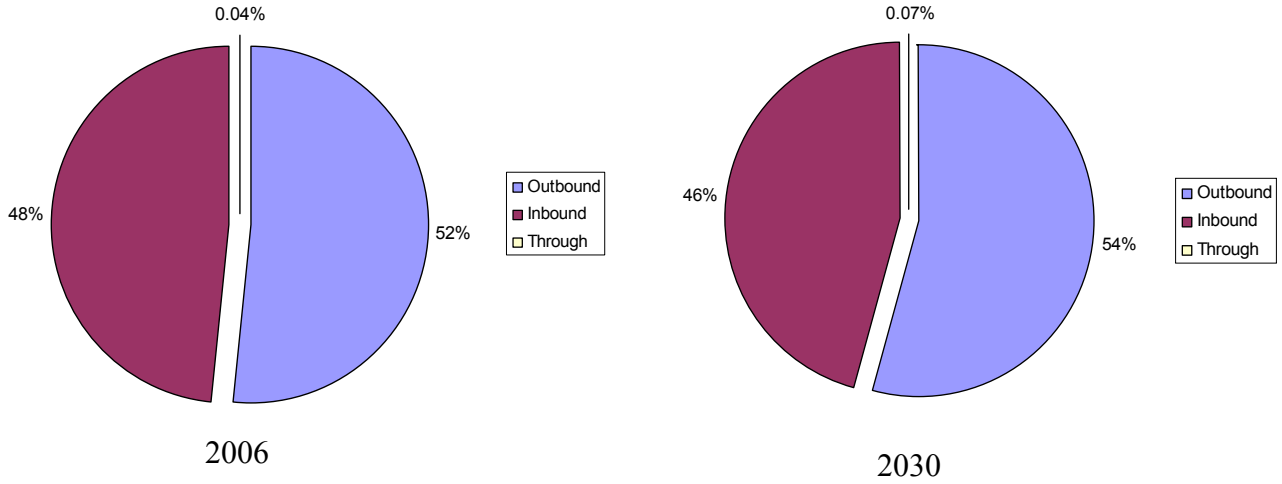
Commodities moved by rail will increase by 18 percent by the year 2030, but will decrease as a share of the total volume of freight hauled. Local freight moves will decrease by 40 percent from 2006 but will only constitute 4 percent of the overall freight volume.

5.1.3. Air Cargo

Air freight is projected to grow 82 percent by 2030 in the Central Midlands regions, and Mail and Machinery will dominate the commodities shipped by Air. Machinery is projected to increase by 716 percent by 2030. In addition, Electrical Equipment will increase by 416 percent. This change in volume is highly significant as it reflects a change in business patterns. The increase in these types of goods create a reliance on high value and time sensitive electrical equipment to move by air and indicates a need for these industries to access a supply chain network that incorporates connection between air and truck carriers. **Figure 52** displays the percentage of freight moved by air; inbound, outbound, and through.

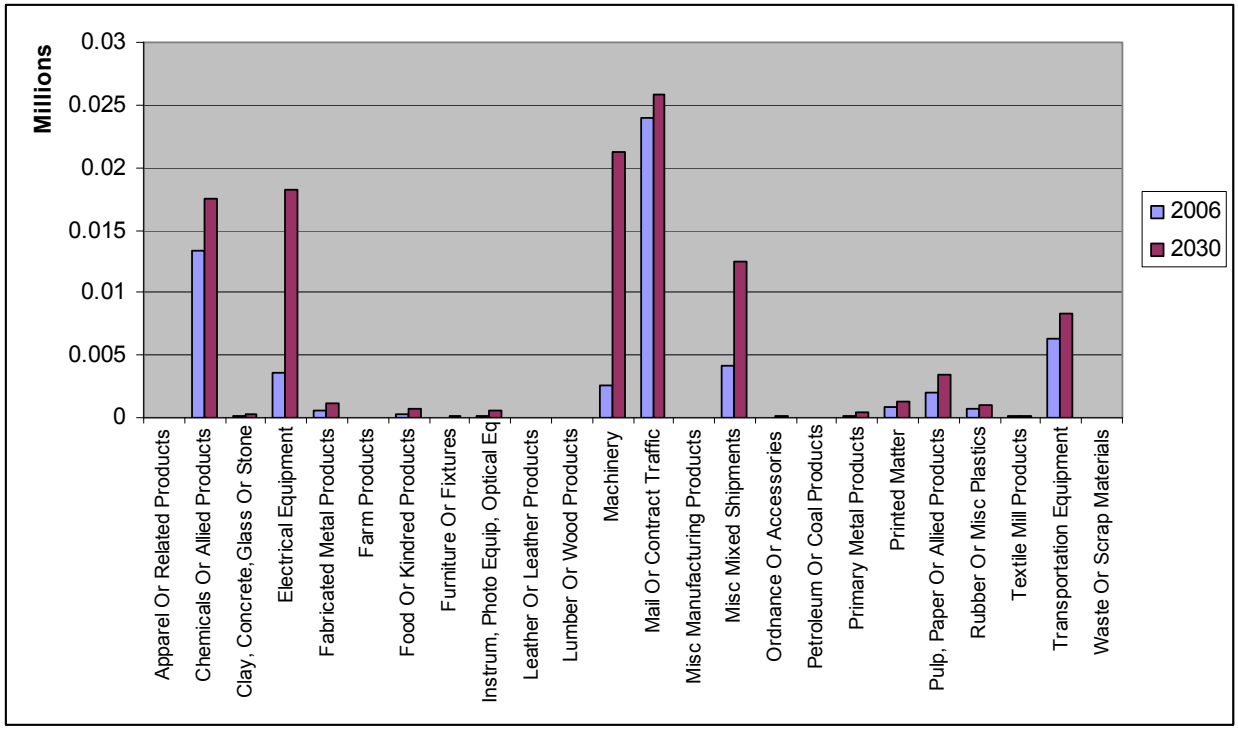
Figure 53 and Table 26 depicts the volume of commodities that originate in the Central Midlands region. The top commodities are Mail or Contract traffic (24,000 tons in 2006, 26,000 tons in 2030), Chemicals (13,000 tons in 2006, 18,000 in 2030) and Electrical Equipment (4,000 tons in 2006, 18,000 tons in 2030).

Figure 52: Percent of Freight Moved by Air for the Central Midlands Region 2006-2030



Source: Global Insight Inc, Transearch Database 2006

Figure 53: Top Commodities Originating in Central Midlands Region by Air, 2006-2030



Source: Global Insight Inc, Transearch Database 2006

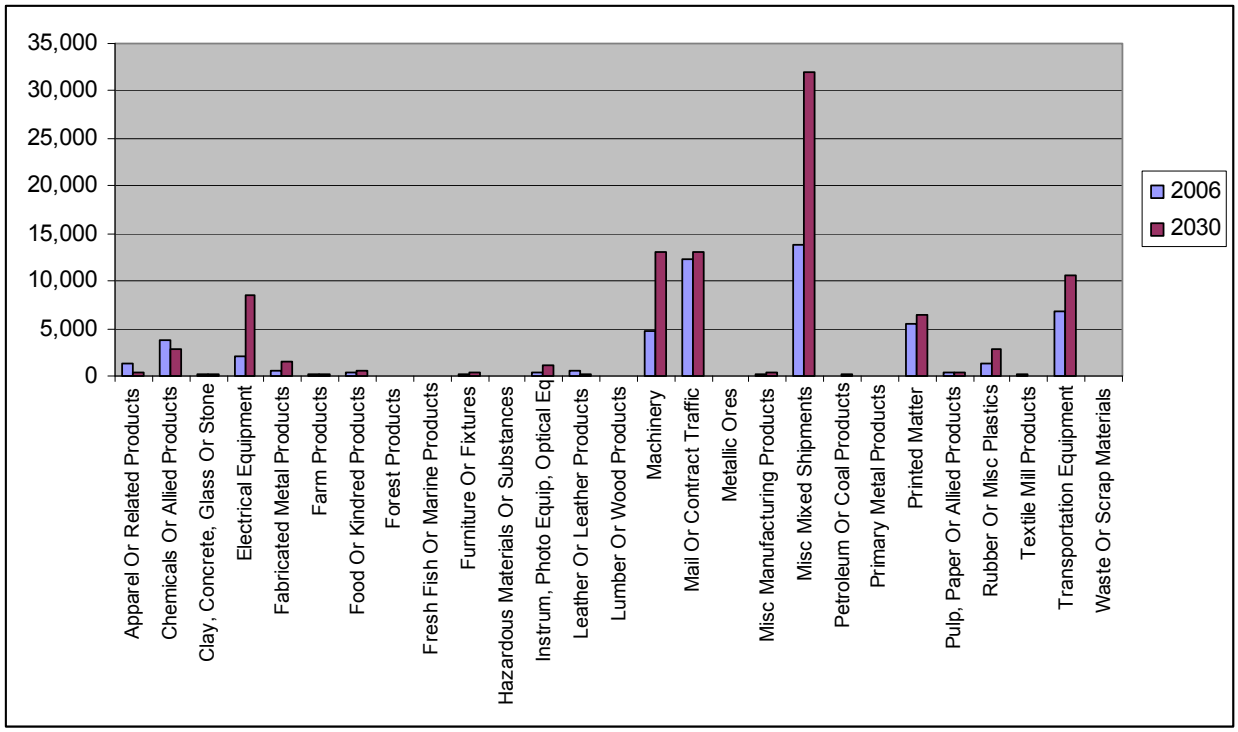
Table 26: Top Commodities Originating in Central Midlands Region by Air, 2006-2030 (In thousands of tons)

Commodity	2006	2030	% Change
Apparel Or Related Products	8	14	64
Chemicals Or Allied Products	13,298	17,531	32
Clay, Concrete, Glass Or Stone	141	298	112
Electrical Equipment	3,525	18,176	416
Fabricated Metal Products	542	1,183	118
Farm Products	41	37	(10)
Food Or Kindred Products	354	649	83
Furniture Or Fixtures	32	118	272
Instrument, Photo Equip, Optical Eq	111	530	378
Leather Or Leather Products	12	15	27
Lumber Or Wood Products	11	19	80
Machinery	2,607	21,271	716
Mail Or Contract Traffic	23,990	25,778	7
Misc Manufacturing Products	2	11	541
Misc Mixed Shipments	4,145	12,484	201
Ordnance Or Accessories	43	129	203
Petroleum Or Coal Products	1	1	31
Primary Metal Products	138	464	236
Printed Matter	858	1,239	44
Pulp, Paper Or Allied Products	2,070	3,418	65
Rubber Or Misc Plastics	680	1,036	52
Textile Mill Products	75	78	3
Transportation Equipment	6,256	8,370	34
Waste Or Scrap Materials	10	15	43
Total	58,950	112,862	91

Source: Global Insight Inc, Transearch Database 2006

Figure 54 and Table 27 depict the volume of commodities that are destined for the Central Midlands region. The top commodities are Miscellaneous Mixed Shipments (14,000 tons in 2006, 32,000 tons in 2030) Transportation Equipment (7,000 tons in 2006, 11,000 tons in 2030) and Machinery (5,000 in 2006, 13,000 tons in 2030).

Figure 54: Top Commodities Terminating in Central Midlands Region by Air 2006-2030



Source: Global Insight Inc, Transearch Database 2006

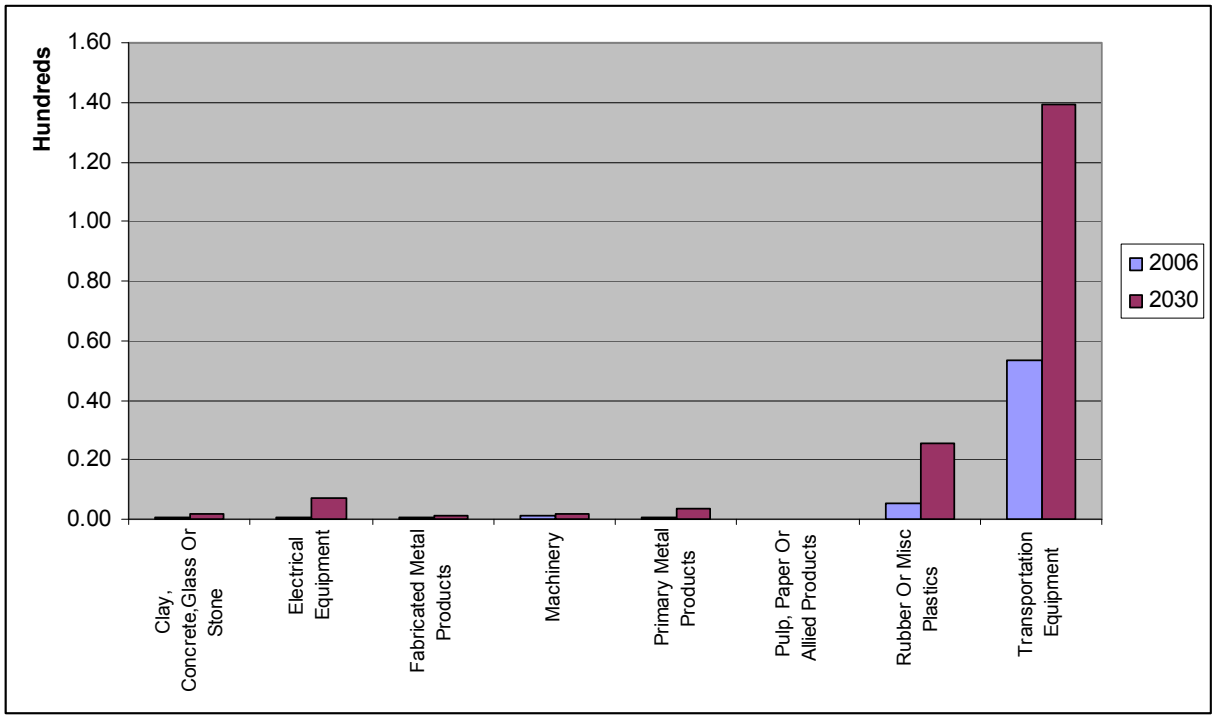
Table 27: Top Ten Commodities Terminating in Central Midlands Region by Air 2006-2030 (In thousands of tons)

Commodity	2006	2030	% Change
Apparel Or Related Products	1,417	294	(79)
Chemicals Or Allied Products	3,703	2,775	(25)
Clay, Concrete, Glass Or Stone	128	266	107
Electrical Equipment	2,156	8,431	291
Fabricated Metal Products	640	1,508	136
Farm Products	95	167	75
Food Or Kindred Products	387	532	38
Forest Products	9	19	122
Fresh Fish Or Marine Products	72	72	1
Furniture Or Fixtures	125	402	221
Hazardous Materials Or Substances	-	-	-
Instrum, Photo Equip, Optical Eq	448	1,139	154
Leather Or Leather Products	500	118	(76)
Lumber Or Wood Products	13	24	79
Machinery	4,809	13,055	171
Mail Or Contract Traffic	12,301	13,121	7
Metallic Ores	3	2	(21)
Misc Manufacturing Products	219	453	107
Misc Mixed Shipments	13,717	32,064	134
Petroleum Or Coal Products	82	210	156
Primary Metal Products	31	85	169
Printed Matter	5,515	6,476	17
Pulp, Paper Or Allied Products	417	389	(7)
Rubber Or Misc Plastics	1,367	2,779	103
Textile Mill Products	125	90	(28)
Transportation Equipment	6,893	10,529	53
Waste Or Scrap Materials	6	10	55
Total	55,178	95,011	72

Source: Global Insight Inc, Transearch Database 2006

Figure 55 and Table 28 indicate that only .07 percent of the freight moved by air the passes through the Central Midlands region. Transportation Equipment is the only significant commodity that is transported in this fashion, followed by Rubber and Electrical Equipment.

Figure 55: Top Commodities Passing Through the CMCOG Region by Air



Source: Global Insight Inc, Transearch Database 2006

Table 28: Top Commodities Passing Through the CMCOG Region by Air (In thousands of tons)

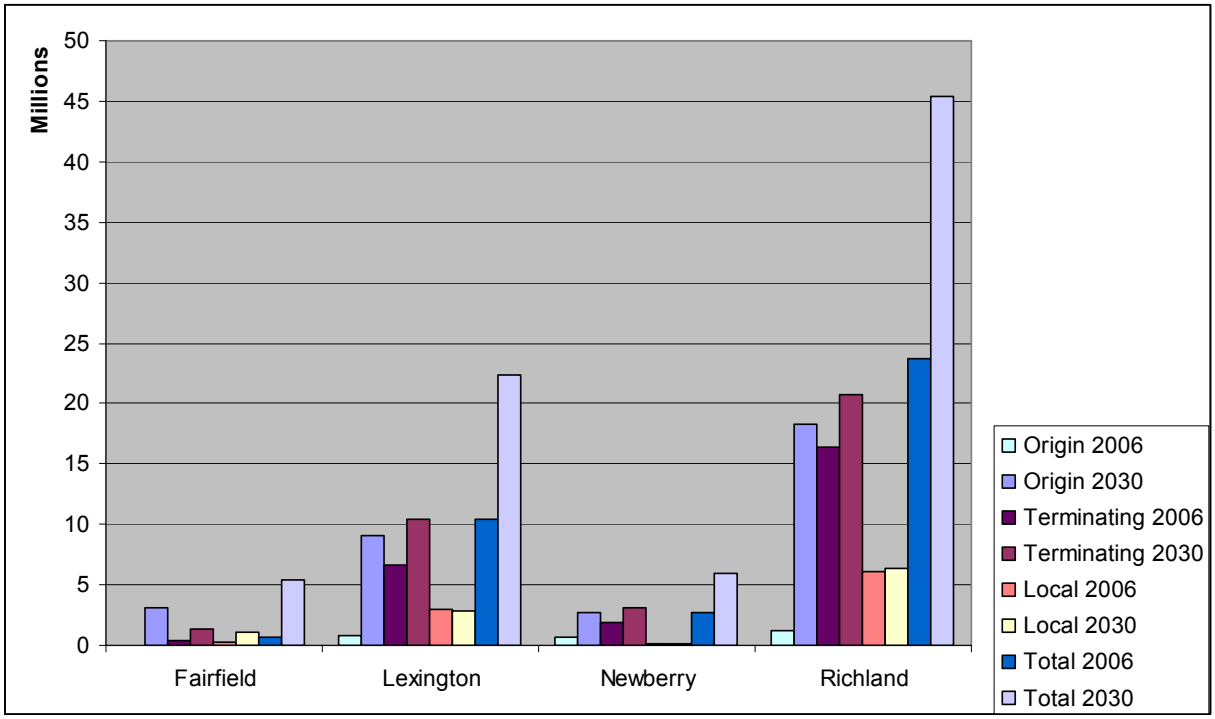
Commodity	2006	2030	% Change
Clay, Concrete, Glass Or Stone	1	2	158
Electrical Equipment	1	7	863
Fabricated Metal Products	0	1	214
Machinery	1	2	103
Primary Metal Products	1	4	567
Pulp, Paper Or Allied Products	0	0	61
Rubber Or Misc Plastics	5	25	401
Transportation Equipment	54	139	160
Total	62	180	191

Source: Global Insight Inc, Transearch Database 2006

5.1.4. County by County Freight Flow

Figure 56, Figure 57, and Table 29 show freight flows by county for originating, terminating and internal freight movements. Richland County will continue to dominate in terms of overall freight flow, specifically for inbound freight. Richland County is projected to generate 23 million tons of freight moving from or to the county, followed by Lexington, Fairfield and Newberry counties at 10 million, 2 million and 647,000 respectively. Richland County accounts for 63 percent of the freight shipped in the Central Midlands region, followed by Lexington County (28%), Newberry County (7%) and Fairfield County (2%).

Figure 56: Freight Movements by County, 2006-2030 (Originating, Terminating, Intra-County)



Source: Global Insight Inc, Transearch Database 2006

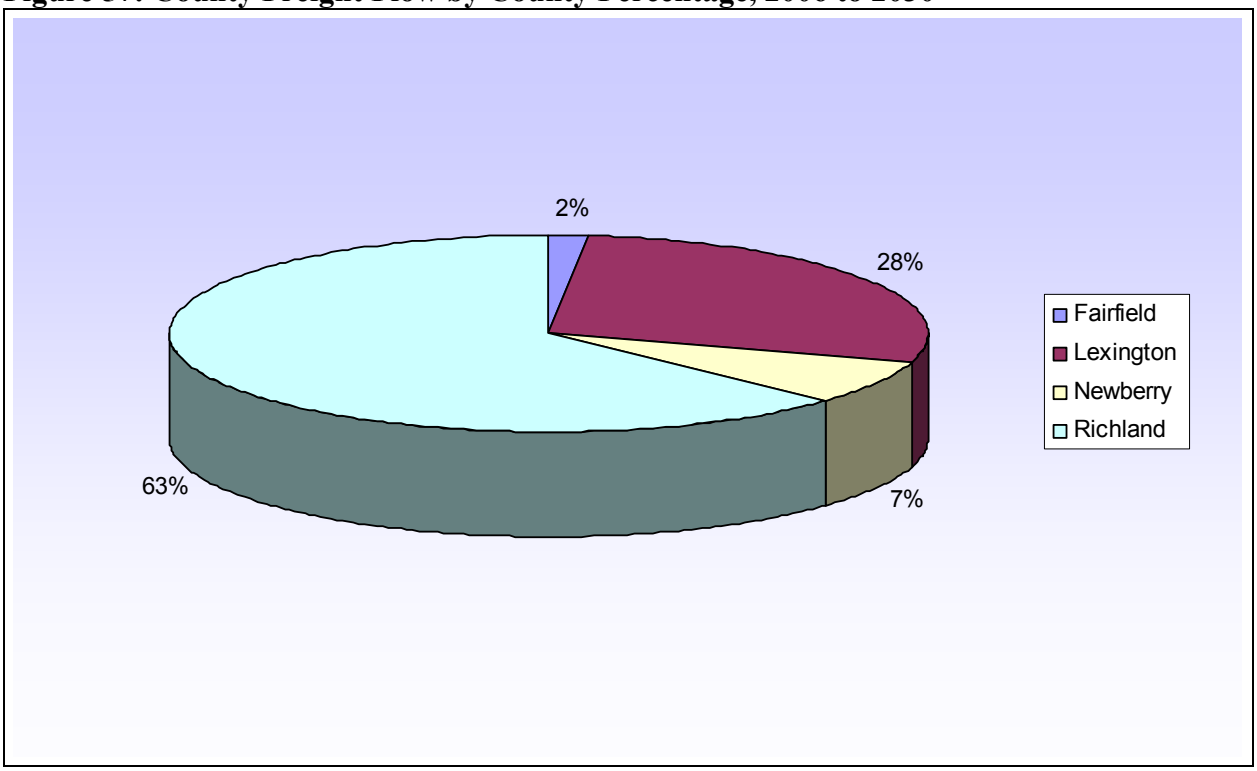
Table 29: Freight Movements by County (2006-2030)

Freight Movements by County, 2006				
County	Origin	Terminating	Local	Total
Fairfield	12,843	346,952	287,878	647,673
Lexington	871,539	6,668,029	2,946,922	10,486,490
Newberry	642,712	1,922,751	145,655	2,711,118
Richland	1,250,411	16,426,938	6,075,362	23,752,711

Freight Movements by County, 2030				
County	Origin	Terminating	Local	Total
Fairfield	3,102,419	1,288,793	1,078,589	5,469,801
Lexington	9,123,345	10,449,230	2,813,067	22,385,642
Newberry	2,655,451	3,158,338	133,121	5,946,910
Richland	18,320,058	20,681,271	6,374,616	45,375,945

Source: Global Insight Inc, Transearch Database 2006

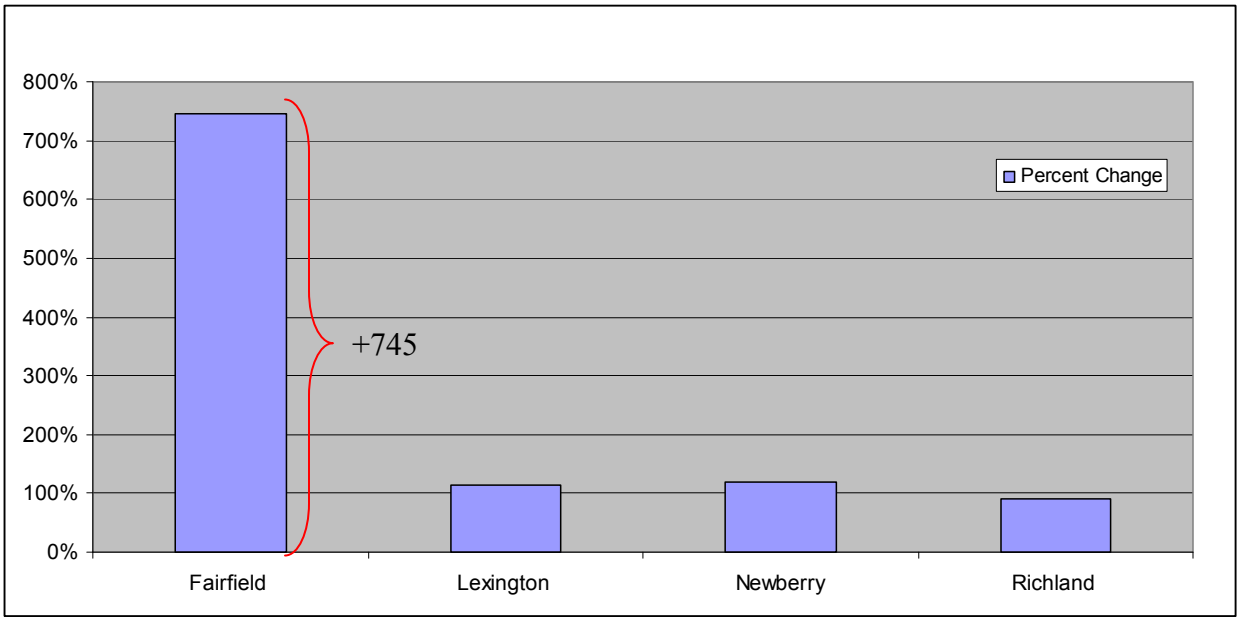
Figure 57: County Freight Flow by County Percentage, 2006 to 2030



Source: Global Insight Inc, Transearch Database 2006

Although Richland, Lexington and Newberry counties account for the highest amount of freight moving in the Central Midlands region, Fairfield County will experience the largest growth rate (745% by 2030, see **Figure 58**). Although the overall tonnage will not compete with the large counties in the region, the projected increase in volume may cause an increase in truck traffic on Fairfield County's roadway infrastructure. This may also cause an increase in freight volume for other neighboring counties such as Newberry and Richland. The most potential impact may be greatest on major truck routes such as I-77 and SC 321, which extend through the county and serve as the main roads to access western markets. I-77 and SC 321 currently have some of the highest truck counts throughout the Central Midlands region, so the projected increase in volume will lead to a growth in truck traffic for these road segments.

Figure 58: Percent Change of County Freight Flow 2005 to 2030
Source: Global Insight Inc, Transearch Database 2006



5.1.5. Domestic Trading Partners

Table 30 through **Table 35** show the urbanized areas that are key trading partners for the Central Midlands region. By 2030, the inbound and outbound freight to and from these urbanized areas will more than double. The top domestic trading partners for freight terminating from the Central Midlands region are Greenville (4 million tons) Lexington County (4 million tons) and Richland County (3 million tons). The top domestic trading partners for freight originating from the Central Midlands region are Richland County (4 million tons), Greenville (3 million tons) and Lexington County (3 million tons). A major point of emphasis throughout this report is that the Central Midlands region is a gateway for freight movement throughout the southeast. The majority of freight moving to and from the Central Midlands region remains in other counties in the state, such as Charleston and Aiken and other states, such as North Carolina and Georgia.

However, other cities such as Lexington, Kentucky are also projected to play a large role in terms of rail freight for the region in 2030 in the southeast.

It is important to understand the relationship of regional shares and other major markets. Over 70 percent of the freight which passes through the Central Midlands region is destined for states as far north as New York. The majority of this freight moves by truck and in 2030, 22 million tons of freight is expected to move through Greenville. As the upstate of South Carolina continues to grow, more goods shipped to the Port of Charleston will be destined for Greenville, passing trough the Central Midlands region. Proposed logistical development in the state, such as the future International Logistics Park in Orangeburg County, may change the manner in which freight moves from the port to its final destination. Florida also generates a high amount of freight that passes through the Central Midlands region, the majority of which moves by truck. These observations signify that increases in truck freight on the Central Midlands region's major Interstates such as I-77, I-20 and I-26 are likely. Understanding the future freight flow in the Central Midlands region will assist in planning for expected growth in vehicle traffic along major roadways in the region.

Table 30: Top 10 Domestic Trading Partners Commodities Originating from Central Midlands Region to All U.S., 2006 (Tons)

Destination	Truck	Rail	Air	Total
Richland County, SC	4,488,482	15,676	0	4,504,158
Greenville, SC	3,572,521	19,093	0	3,591,615
Lexington County, SC	3,026,456	23,157	0	3,049,614
Charlotte, NC	2,368,867	673,475	209	3,042,552
Columbia, SC	1,661,430	6,205	0	1,667,636
Charleston, SC	850,096	241,572	8	1,091,677
Wilmington, NC	887,512	110,499	573	998,584
Atlanta, GA	591,720	6,299	4,003	602,024
Newberry County, SC	592,483	1,762	0	594,246
Orangeburg County, SC	555,008	2,196	0	557,204

Source: Global Insight Inc, Transearch Database 2006

Table 31: Top 10 Domestic Trading Partners Commodities Originating from Central Midlands Region to All U.S, 2030(Tons)

Destination	Truck	Rail	Air	Total
Richland County, SC	5,556,086	39,255	0	5,595,341
Lexington, KY	29,290	3,796,689	0	3,825,980
Lexington County, SC	2,311,915	1,337	0	2,313,253
Charleston, SC	1,898,434	21,015	0	1,919,449
Greenville, SC	1,610,548	9,356	0	1,619,904
Wilmington, NC	912,656	65,019	501	978,177
Charleston, WV	41,772	640,761	0	682,534
Charlotte, NC	648,143	4,938	68	653,150
Aiken County, SC	499,812	1,781	0	501,594
Columbia, SC	451,546	447	0	451,994

Source: Global Insight Inc, Transearch Database 2006

Table 32: Top 10 Domestic Trading Partners Commodities from US. Terminating in Central Midlands Region, 2030 (Tons)

Origin	Truck	Rail	Air	Total
Greenville, SC	4,110,118	14,438	0	4,124,556
Lexington County, SC	3,987,414	12,674	0	4,088,876
Richland County, SC	3,788,800	15,469	0	3,804,269
Charlotte, NC	2,630,130	479,020	424	3,109,575
Charleston, SC	1,500,721	308,600	10	1,809,331
Columbia, SC	1,668,545	11,419	0	1,679,964
Wilmington, NC	1,041,795	142,847	1048	1,185,690
Fairfield County, SC	833,475	572	0	834,048
Newberry County, SC	765,846	1,058	0	766,904
New York, NY	668,386	84,995	532	753,914

Source: Global Insight Inc, Transearch Database 2006

Table 33: Top 10 Domestic Trading Partners Commodities from US Terminating in Central Midland Region, 2030 (Tons)

Origin	Truck	Rail	Air	Total
Richland County, SC	5,761,705	28,932	0	5,790,638
Lexington, KY	51,023	3,227,956	0	3,278,981
Charleston, SC	3,006,344	29766	0	3,036,111
Greenville, SC	2,901,571	13,000	0	2,914,572
Lexington County, SC	2,467,436	723	0	2,468,160
Wilmington, NC	1,752,129	78,652	645	1,831,427
Aiken County, SC	1,156,273	1,257	0	1,157,531
Charlotte, NC	1,088,662	33,431	68	1,122,163
Fairfield County, SC	1,056,748	0	0	1,056,748
Columbia, SC	1,052,761	640	0	1,053,402

Source: Global Insight Inc, Transearch Database 2006

Table 34: Top 10 Domestic Trading Partners, Commodities Passing Through Central Midlands Region, 2006 (Tons)

Destination	Truck	Rail	Water	Total
New York, NY	17,066,715	8,788	260,444	17,335,948
Greenville, SC	14,652,990	3,764	2,262	14,659,016
Washington, DC	9,141,066	10,803	305,570	9,457,441
Miami, FL	8,145,368	465,291	340,371	8,951,031
Wilmington, NC	8,107,722	86,739	707,732	8,902,194
Charlotte, NC	8,864,918	3,140	0	8,868,059
Charleston, SC	6,659,150	79,634	444,609	7,183,394
Boston, MA	5,038,625	11,313	111,254	5,161,194
Philadelphia, PA	4,873,353	593	20,859	4,894,805
Jacksonville, FL	3,583,741	164,919	1,070,134	4,818,796

Source: Global Insight Inc, Transearch Database 2006

Table 35: Top 10 Domestic Trading Partners, Commodities Passing Through Central Midlands Region, 2030 (Tons)

Destination	Truck	Rail	Water	Total
Greenville, SC	22,443,404	7,561	4,124	22,455,090
New York, NY	2,0577,361	10,819	280,556	20,868,737
Miami, FL	1,1546,781	846,764	912,382	13,305,927
Charlotte, NC	1,,2508,688	3,639	0	12,512,327
Wilmington, NC	11,100,,058	148,673	1,131,168	12,379,899
Charleston, SC	11,147,532	139,323	943,402	12,230,258
Washington, DC	11,518,599	18,031	494,005	12,030,635
Tampa, FL	3,336,557	74,890	6,276,593	9,688,041
Jacksonville, FL	5,588,231	289,064.	2,069,225	7,946,521
Orlando, FL	6,366,579	174,664	883,865	7,425,110

Source: Global Insight Inc, Transearch Database 2006

6. FREIGHT SAFETY

Safety is a large component of freight transportation and is extremely important to commercial freight motor carriers, rail service providers and the general public. Examining crash data is vital for creating policy or investing technology to address safety. The following section focuses on safety implications as gleaned from crash data for the region. The data used for this analysis is from the Motor Carrier management Information System (MCMIS) that is developed by the Federal Motor Carrier Safety Administration (FMCSA). All Commercial vehicles and commercial passenger buses are included in this database.

It is desirable to look at data from multiple years in order to look at trends, and to provide a clearer picture of average changes over time. Multiple years of crash data are available within the MCMIS from 2004 to 2006. Examining crash data in Central Midlands region reveals the following findings that will assist in developing improvements to improve safety:

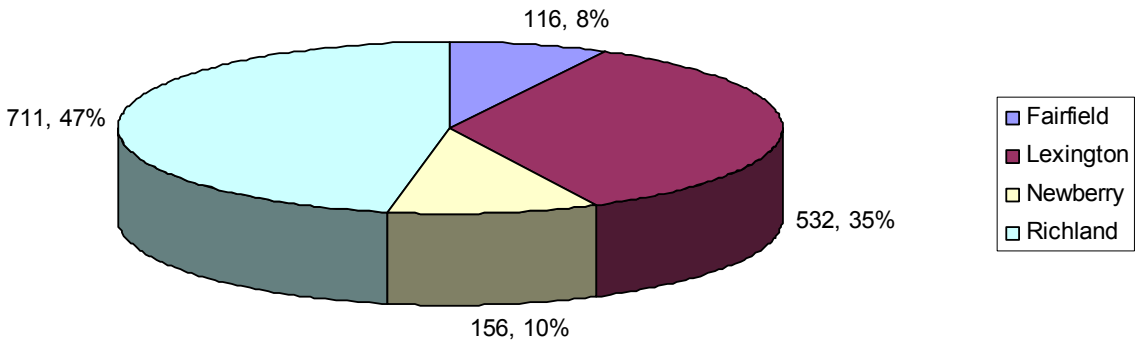
- The Central Midlands region had 1,515 crashes from 2004-2006, which accounted for nearly 16 percent of all crashes in South Carolina;
- Richland County had the most commercial vehicle crashes, registering 711 crashes, followed by Lexington, Newberry and Fairfield counties at 532, 156 and 116 respectively;
- Commercial vehicles crashes decreased by 6.4 percent, between 2004 and 2006;
- Although a slight discrepancy exists when comparing month by month commercial vehicle crashes, the early months of January through May experienced the highest amount of crashes. The immediate cause is difficult to pinpoint; however, adverse weather conditions and fewer hours of daylight may be contributing factors.
- The majority of commercial vehicle crashes occur between 6:00 a.m. to 5:00 p.m., peaking at 6:30 a.m. and 8:00 a.m. and 2:00 p.m. and 5:00 p.m. in the afternoon;
- Approximately three percent of the total amount of commercial vehicles crashes resulted in fatalities. This represents fifty fatalities.
- Fifty-six percent of commercial vehicle crashes involve tractor trailer combination vehicles and 2 percent of these crashes involved a release of hazardous materials.

The database was examined to analyze commercial vehicle crash trends and characteristics in the Central Midlands region. The following section describes the result of this analysis.

6.1. Commercial Vehicle Crashes

Between 2004 and 2006, South Carolina had 9,539 recorded crashes and 1,515 (15.8%) of these occurred in the Central Midlands region. As shown in **Figure 59**, almost half of the crashes occurred in Richland County (47%), while Lexington County attributed for 35 percent of all crashes followed by Newberry and Fairfield counties at 10 percent and 8 percent respectfully.

Figure 59: Commercial Vehicle Crashes by County

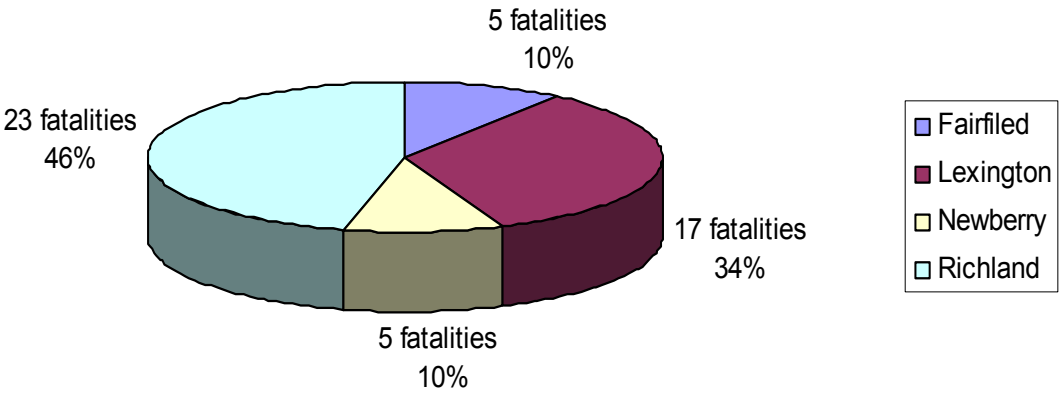


Source MCMIS 2004-2006

6.2. Fatalities and Injuries

Based on the 1,515 recorded crashes in the Central Midlands region (**Figure 60)** between 2004 and 2006, 3.3 percent resulted in a fatality. Richland County had 23 fatalities and this accounted for 46 percent of the total fatalities in the Central Midlands region. Lexington County had 17 fatalities (34%), Newberry County had 5 fatalities (10%) and Fairfield County had 5 fatalities (10%). The frequency of fatalities as compared to the number of crashes averages 3 percent for all four counties, signifying that no county in the Central Midlands region has a greater occurrence of deaths based on the number of commercial vehicle crashes.

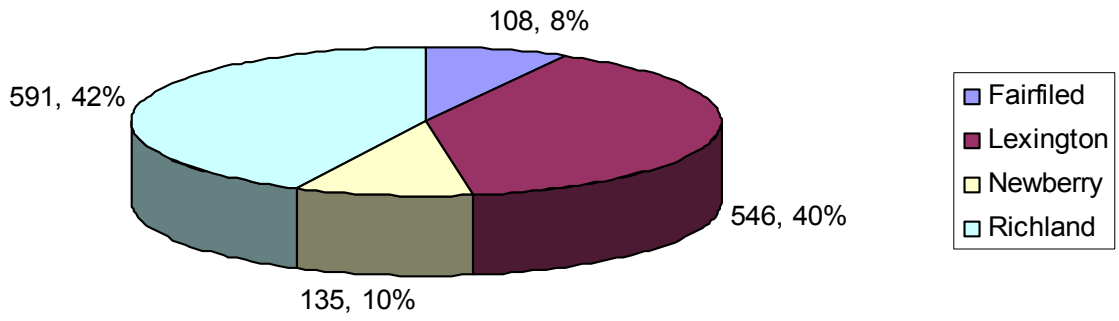
Figure 60: Commercial Vehicle Fatalities by County



Source: MCMIS 20004-2006

Based on the 1,515 recorded crashes in the Central Midlands region between 2004 and 2006, 91 percent resulted in an injury. Compared to auto crashes, this percentage is high, as only 25 percent of auto accidents result in injury[7]. As shown in **Figure 61**, Richland County experienced 591 (46%) injuries, which is the most highest in the Central Midlands region, Lexington County had 546 injuries (40%), Newberry County had 135 injuries (10%) followed by Fairfield County with 108 injuries (8%).

Figure 61: Commercial Vehicle Injuries by County



Source: MCMIS 2004-2006

6.3. Hazardous Materials

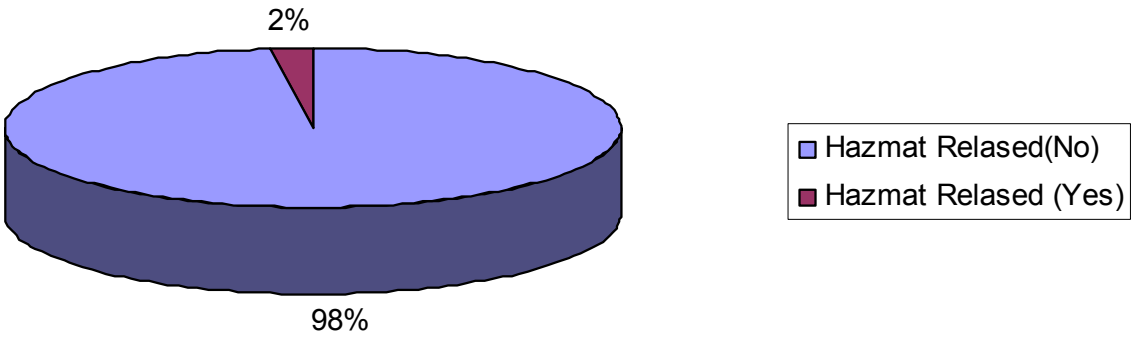
Recognizing the routes used to move these hazardous materials commodities is important for the protection of the local population and for homeland security reasons. The Central Midlands region is impacted by the location of the Savannah River Site in Barnwell and Fort Jackson located in Richland County. These sites produce a large volume of hazardous materials that are transported via truck throughout the Central Midlands region. The nuclear installation at the Savannah River Site stores flammables and corrosives, while Fort Jackson transports firearms, creating a high transportation safety risk. The South Carolina Department of Health and Environmental Control[8] reported that in the year 2000, a total of 79 facilities in the state provided hazardous material storage, treatment and disposal capability, while 3,729 facilities generated numerous hazardous materials shipments.

Nukem Nuclear Facility

[7] Insurance Research Council
[8] Risk Management of Hazardous Materials, SC Department of Public Safety

In the Central Midlands area, Lexington County has one of the highest risk transportation corridors for hazardous materials due to the frequency of bulk flammable materials transported, specifically natural gas. Nukem Nuclear Technologies, a company specializing in radioactive waste management, operates a nuclear shipment and maintenance facility at 1-20 and US 176. As shown in **Figure 62** and **Table 36**, 98 percent of the total 1,515 crashes had no release of hazardous materials. However, of the 2 percent of crashes that did release hazardous materials, 60 percent occurred in Lexington County compared to 22 percent in Richland County and 8 percent in both Fairfield and Newberry counties.

Figure 62: Vehicle Crashes with Hazardous Material Release



Source: SC Dept of Public Safety

Table 36: Crashes causing Hazardous Material Release by County

County	No Hazmat Released	Hazmat Released	Total Crashes
Fairfield	113	3	116
Lexington	511	21	532
Newberry	153	3	156
Richland	703	8	711
Grand Total	1480	35	1515

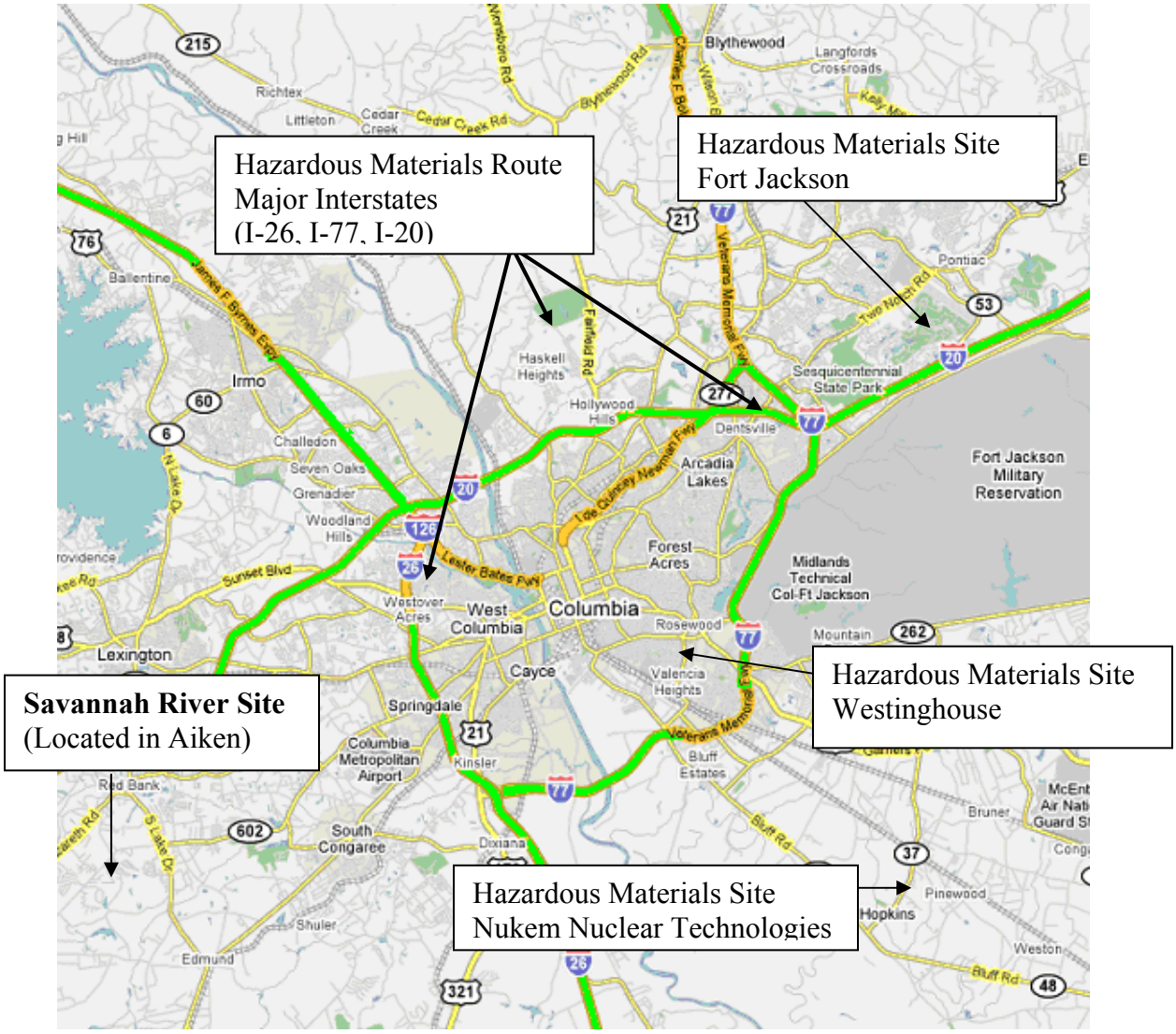
Source: SC Dept of Public Safety

I-20, the main route that provides access to the Savannah River, extends through Lexington and Richland counties. In Richland County, at the I-77 and SC 48 interchange, low level radioactive raw materials are being shipped to commercial nuclear reactors by Westinghouse.

The Port of Charleston is also a facility that transports hazardous materials. The Port of Charleston handles 6.3 million tons of containerized cargo and approximately 600,000 tons (10%) contain hazardous materials. Therefore, I-26 and I-20 are the primary routes in South Carolina that transport hazardous materials from the port to both Richland and Lexington counties. The major hazardous material routes through the Central Midlands region are displayed in **Figure 63**.

Figure 63: Hazardous Materials Routes

Source: MapQuest Maps



Since there are no restrictions on hazardous material routes in South Carolina, motor carriers are strongly urged to travel along the interstate highway system. The prevention of motor carriers hauling hazardous materials along routes with high residential populations provides a constrained environment to monitor and enforce hazmat movements. In addition, the interstate system has sufficient capacity to enable a timely response to spills and other incidents.

6.3.1. Rail Infrastructure Condition/Safety

From a safety standpoint, the condition of Norfolk Southern's rail infrastructure in the Central Midlands region is adequate. Additional sidings have been added and signal systems upgraded in recent years. To verify the safety record of the Norfolk Southern rail lines in the Central Midlands region, Federal Railroad Administration records for rail accidents and incidents from 2004-2007 were reviewed. These reports must be provided by railroads where deaths, injuries or property damage is incurred. During this period of time, no accidents were reported with track condition identified as the causing factor.

The rail infrastructure condition for CSX in the Central Midlands region is considered good. Like Norfolk Southern, CSX lines within the Central Midlands region are major mainline routes built and maintained to accommodate the moderate number of trains and weights carried. Federal Railroad Administration records for CSX rail accidents and incidents from 2004-2007 were reviewed the Central Midlands region. During this period of time, only two CSX accidents were reported with track condition identified as the causing factor. None of these accidents occurred on mainline tracks (a minor derailment occurred in a switching yard and another on an industry spur). Local news reported a derailment in November, 2007 near Prosperity. However, no FRA records were available to determine the cause of this accident.

Evaluating at-grade rail crossings is important, however most crashes between vehicles and trains are overwhelmingly due to driver error or judgment as opposed to physical or operational problems with grade crossing surfaces or warning equipment. Similar to the evaluation of track conditions, Federal Railroad Administration records for grade crossing accidents occurring at any crossings within the study area were reviewed and documented to provide a benchmark of recent accident history and to detect any trends, especially with regard to truck operations over crossings. At-grade rail crossing accident statistics for Norfolk Southern between 2004 and 2007 are provided in **Table 37**.

Table 37: At-grade Crossing Accidents

County	Total Accidents	# Auto Involved	#Truck Involved	Deaths	Injuries
Fairfield	5	3	2	1	2
Lexington	12	5	7	0	5
Newberry	0	0	0	0	0
Richland	11	8	3	1	4

Source: Federal Railroad Administration

The evaluation of truck-related accidents at Norfolk Southern crossings showed a trend toward trucks stopping or becoming stuck on a number of crossings in the Central Midlands region. The crossings in question are listed in **Table 38.**

Table 38: Questionable At-grade Crossings

Location	Public/Private	Type of Warning Device
Westmore Dr, Columbia, Richland Co.	Public	Gates and flashers
Private Dr., Columbia, Richland Co.	Private	Railroad Crossbucks
Thomas St., Ridgeway, Fairfield Co.	Public	Gates and flashers
Kittie Wake Dr., Cayce, Lexington Co.	Public	Gates and flashers
Delree St., Cayce, Lexington Co.	Public	Gates and flashers

Source: Federal Railroad Administration

Norfolk Southern has also noted on-going efforts to address crossings near the downtown Columbia area. On Norfolk Southern's R Line, there are 20 crossings between Tryon Street and Westmore Drive. On its SC Line there are an additional 5 crossings between Catawba Street and Whaley Street. Concerns along these corridors range from pedestrian and driver safety to road congestion and delay. In 2003, Wilbur Smith Associates was hired by the City of Columbia to undertake a "Quiet Zone Study" to evaluate potential crossing eliminations or warning equipment improvements that would not only increase safety and traffic flows, but also eliminate the need for sounding locomotive horns if certain federal criteria were met.

Federal Railroad Administration records for CSX grade crossing accidents occurring at any crossing within the study area were reviewed and documented to detect any possible trends. At-grade rail crossing accident statistics for CSX between 2004 and 2007 are provided in **Table 39**.

Table 39: CSX At-grade accident statistics (2004-2007)

County	Total Accidents	# Auto Involved	# Truck Involved	Deaths	Injuries
Fairfield	0	0	0	0	0
Lexington	7	6	1	1	2
Newberry	5	3	2	0	4
Richland	9	9	0	2	1

Source: Federal Railroad Administration

The evaluation of truck-related accidents showed no trends of trucks stopping or becoming stuck on crossings in the study area.

CSX also has a number of at-grade crossings near the downtown Columbia area. On its Eastover Subdivision there are six crossings between Assembly St. and Gadsden St. On its Columbia Subdivision there are nine crossings between Devine St. and Fontaine Center Drive. As with NS crossings in this vicinity, these crossings were subject to a "Quiet Zone Study" conducted by Wilbur Smith Associates in 2003. These crossings not only cause additional traffic delays, but pose as safety risks as well.

Crashes that involve trains and trucks at certain grade crossings may be due to profile problems, i.e., the road profile or grade at the rail right of way portion of the crossing does not accommodate the clearance available under certain types of trucks, causing trucks to "bottom-out" or become stuck. Another possible cause is the inability of trucks to cross over and properly clear the track right of way prior to awaiting entrance onto a congested cross street or intersection. These types of crossing accidents involving trucks merit additional study and these locations are discussed further in the discussion on safety.

7. FREIGHT STAKEHOLDER INPUT

Freight Stakeholder input is instrumental in identifying regional logistics patterns and infrastructure needs. In order to better understand local freight needs, a survey of major manufacturers located in Richland, Lexington, Newberry, and Fairfield counties was conducted. Since manufacturers are the shippers and/or receivers of the transported goods, they determine key aspects of the freight activity (e.g., commodity type, shipment size, volume, frequency, origin and destination) and therefore play important roles in the supply chain and freight movement. The objectives of this survey were 1) to collect data on the characteristics of freight shipped and received by the manufacturers; 2) to understand how satisfied these companies are with the available freight services and infrastructure in Central Midlands; and 3) to understand the overall freight movement patterns and characteristics.

The survey instrument (shown in the appendix), which was prepared in consultation with the CMCOG, includes four main sections: i) operational characteristics; ii) outbound and inbound shipments; iii) usage of air and rail services; and iv) overall transportation issues. In the first section, respondents are asked to specify hours, days, and months of peak freight activity. In the second section, they are asked to describe the commodities shipped and received, origins and destination for those commodities, and number of shipments they make per week. In the third section, respondents are asked whether they use air and rail services and other information pertinent to rail and air modes. In the last section, the respondents are asked about what they perceive as strengths and weaknesses in the freight infrastructure in Central Midlands and are asked to suggest what they see as needs and improvements in the current freight system. Complete survey results are available in **Appendix A.**

Table 40 shows how many manufacturing companies were contacted and how many of them agreed to participate and complete the survey. A total of 239 companies were contacted by telephone. In addition, an email was sent to approximately 50 of these companies with the link to the online survey. However, most of the surveys (48 out of 54) were completed over the phone and only 6 companies completed the survey online. (Those who completed the survey online did not answer all questions.) The overall response rate was about 23 percent (i.e., 54/239=23 percent).

Table 40: Total number of manufacturing companies contacted and number of completed surveys by each county

	Total number of Companies Contacted	Number of Completed Surveys
Fairfield	9	3
Newberry	29	5
Lexington	93	24
Richland	108	22
Total	239	54

Source: Wilbur Smith Associates

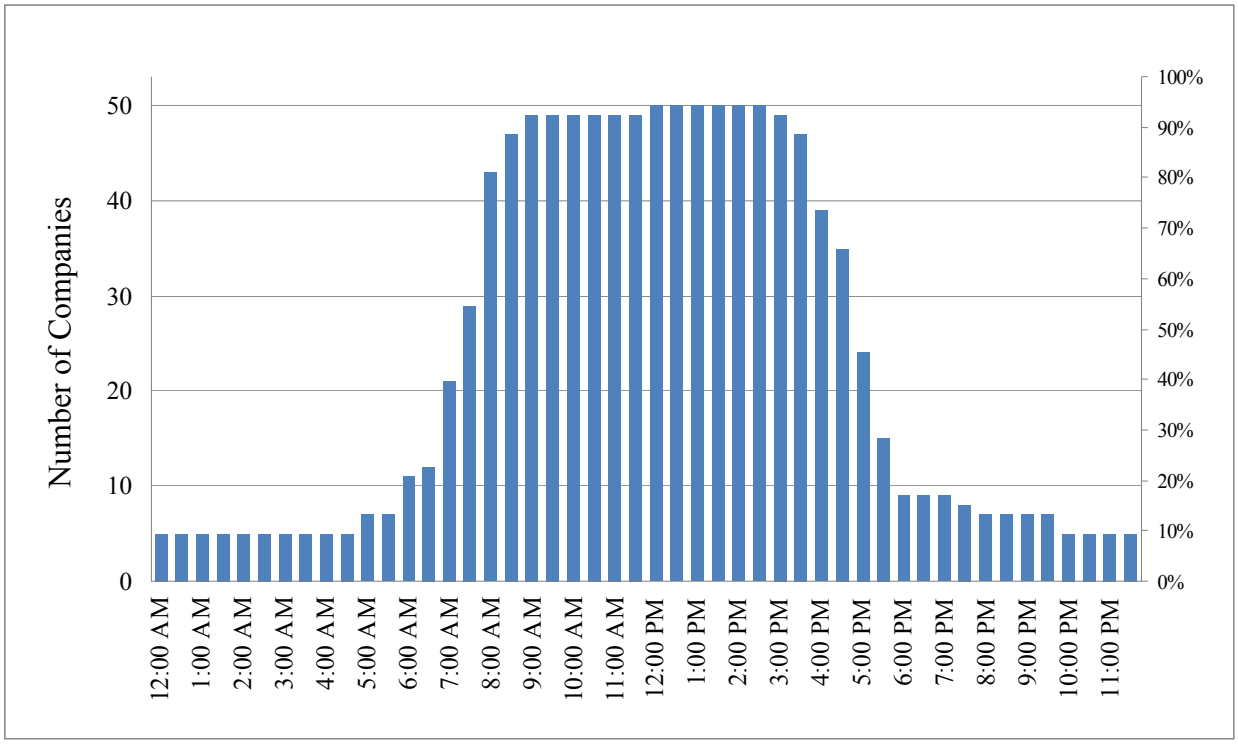
For this survey, manufacturing companies with more than 20 employees were targeted. Both small- and large-size companies, with the number of employees ranging from 20 to 1,100, have participated in the survey. The average number of employees was 108 among all respondents. The results of the survey based on 54 responses are described in the next several sections.

7.1. Operational Characteristics

In this section of the survey, respondents were asked to specify hours, days, and months of peak freight activity. The respondents were asked to indicate both the typical shipping hours and peak hours in a day.

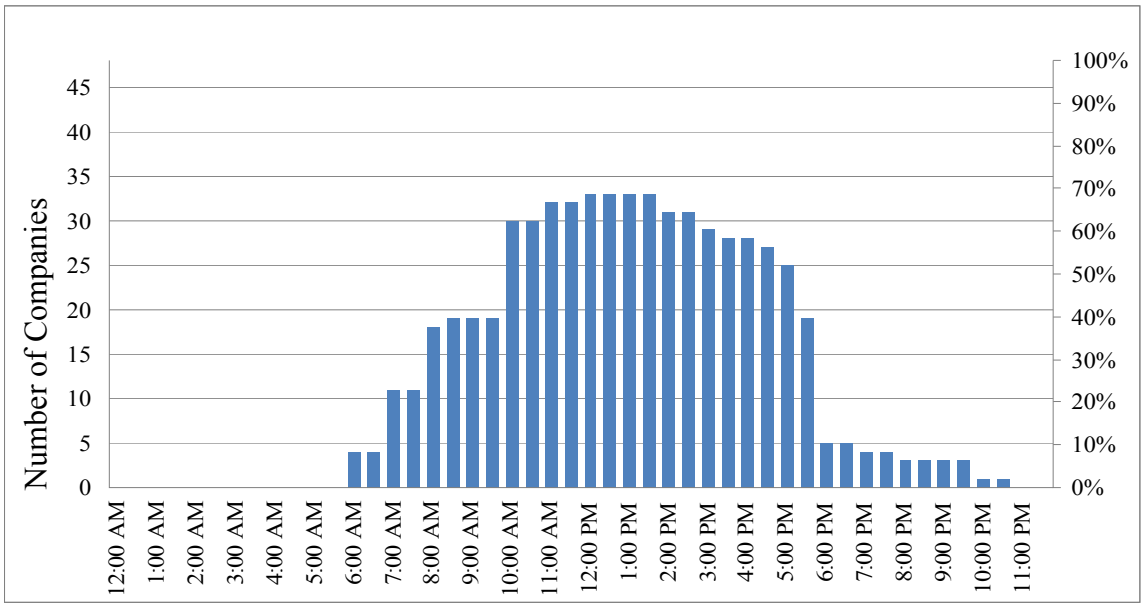
Figure 64 shows the number of companies (and percentage on the second vertical axis) that makes shipments during the 24-hour period. About 90 percent of the companies specify time periods from 8:30 am to 3:30 pm as typical shipping periods. Only 10 percent ship 24 hours a day. **Error! Reference source not found.Figure 65** on the other hand shows the peak periods in terms of shipment activity. It can be seen that more companies ship in the afternoon than the morning hours. More than half of the companies selected time periods between 10 am and 5 pm as peak periods for shipment activity.

Figure 64: Typical shipping hours reported by the respondents



Source: Wilbur Smith Associates
Each vertical bar corresponds to a 30 minute time period and shows how many companies select this period as a typical shipping time.

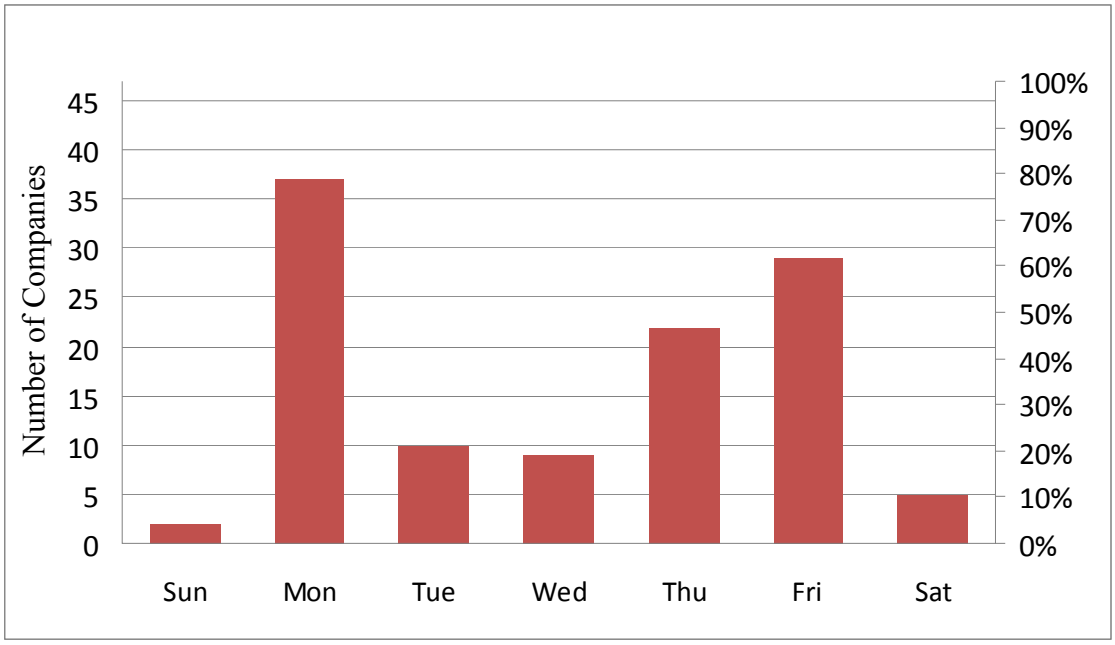
Figure 65: Peak hours of shipping reported by the respondents



Each vertical bar corresponds to a 30 minute time period and shows how many companies select this period as a peak shipping time.

Figure 66 shows that most of the companies make/receive shipments on Monday. The second busiest day of the week is Friday based on the responses. Sunday received the fewest responses.

Figure 66: Days of the week reported to have the highest amount of shipment activity



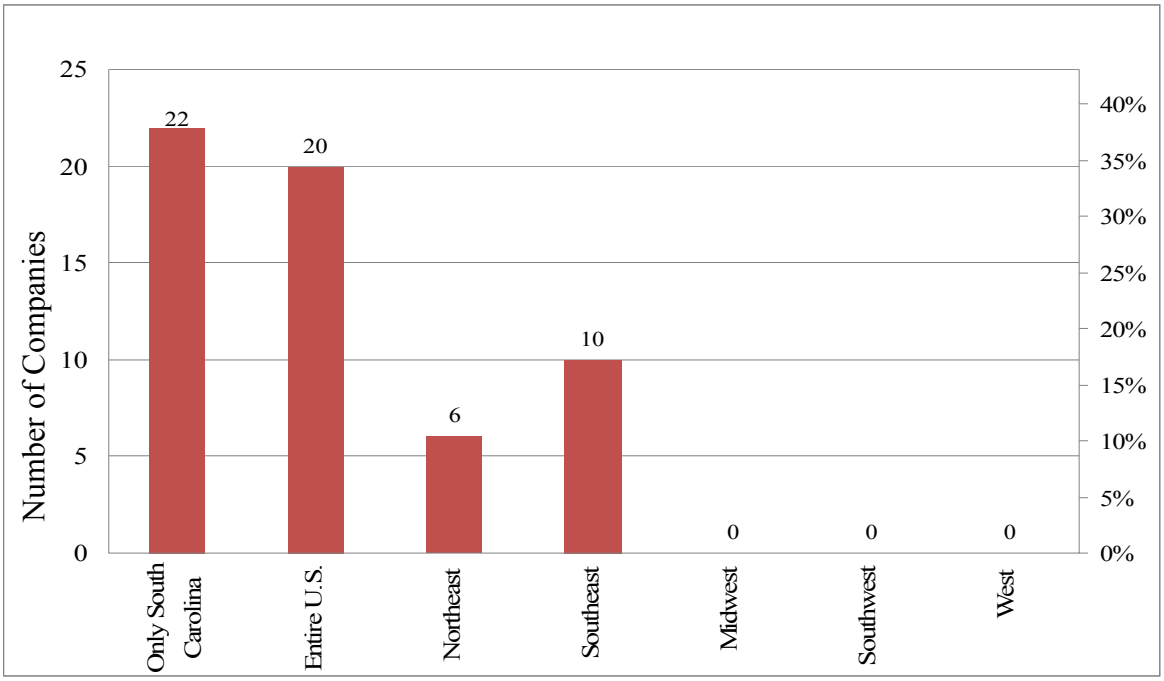
It is important to note the shift in freight volumes from the time of day are based on demand from many customers. Typically, sales increase substantially on the weekend, and many businesses prepare inventories starting on Thursdays to insure merchandise is available during the weekend. Mondays serve as a day to replenish products sold and maintain availability during the week.

7.1.1. Outbound Shipments

In this section, respondents were asked to specify primary and secondary destinations or markets that they ship most of their products to. Respondents were given the option to select both domestic and international destinations. The list of domestic destinations includes: only South Carolina, Northeast, Southeast, Southwest, Midwest, West, and entire U.S.A. The list of international destinations includes Canada, Mexico, Latin and South America, Asia, Europe, Middle East, and rest of the World. The respondents were asked to specify both a primary and a secondary destination for both domestic and international shipments. However, only a few respondents provided a secondary destination. Therefore, the analysis below combines both primary and secondary destinations as one group.

Figure 67 shows that a majority of the companies surveyed send their products either to a destination in South Carolina or somewhere in the U.S. No company specifically selected Midwest, Southwest, or West as a destination.

Figure 67: Domestic destinations of products shipped by manufacturers in the Central Midlands



Respondents were also asked to indicate how many outbound shipments they make per week from their locations. The respondents were allowed to indicate the shipments in terms of truckloads, less than truckload (LTL), express package, rail car or container, and other. As shown in **Table 41,** most companies make shipments in full truckloads (the first row of the table indicates the number of companies specified a value for the corresponding column) with an average of 60 shipments per week. Those making LTL shipments average about 92 per week. Other relevant statistics are given in **Table 41.**

Table 41: Number of outbound shipments per week

	Truckload	Less than Truckload	Express Package	Rail Car/ Container	Other
Count*	**37**	**8**	**5**	**1**	**2**
Average	**60**	**92**	**530**	**22**	**11**
Max.	**550**	**300**	**2,500**	**22**	**15**
Min.	**0.25**	**7**	**1**	**22**	**6**
Standard Deviation	**123**	**102**	**1,102**	**N/A**	**6**

Source: Wilbur Smith Associates

Next, the respondents were asked to indicate what they consider a late delivery by specifying the maximum buffer time that a delivery can be delayed beyond the scheduled time. Only 26 companies provided a valid response to this question (Some indicated zero which were not considered as valid responses.). As shown in **Table 42,** 11 respondents specify the buffer time in minutes whereas 9 companies stated in hours and 6 stated in days. The average buffer times are 16 minutes, 2 hours, and 2 days. Those that indicate the buffer time in days tend to ship commodities that do not usually require urgent delivery (e.g., gravel, textiles, metal, etc.). On the other hand, those that specify the buffer time in minutes ship commodities that require urgent delivery (e.g., grain products, bakery, newsprint, paper, etc.).

Table 42: Specified thresholds beyond which the load will be considered as late

	Minutes	Hours	Days
Count	11	9	6
Avg.	16	2	2
Max.	25	4	5
Min.	3	1	1
Std. Dev.	11	1	2

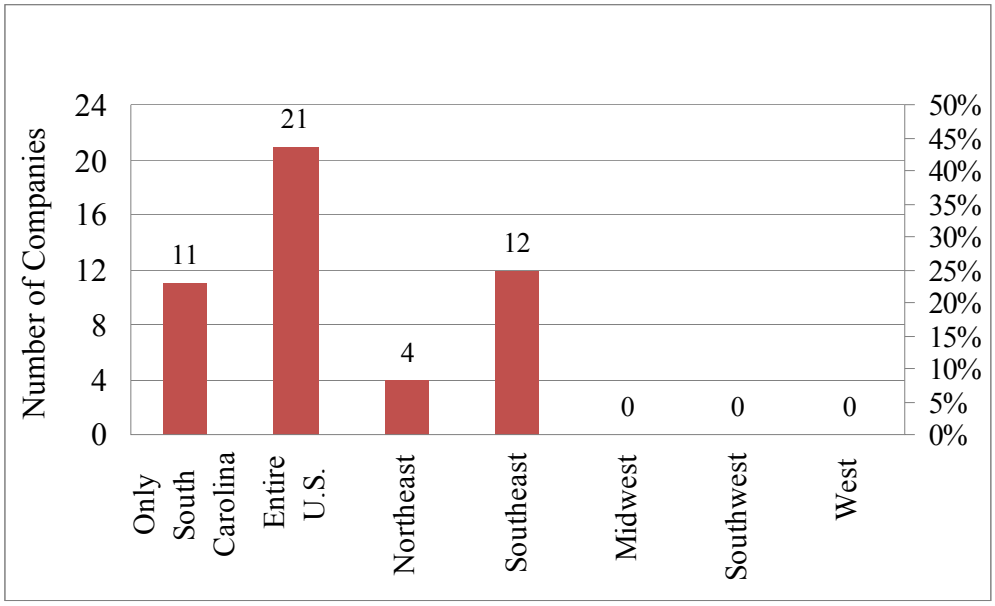
Source: Wilbur Smith Associates

7.1.2. Inbound Shipments

Similar to the set of questions on outbound shipments, the respondents were asked to specify primary and secondary markets or origins from which they receive most of their inbound shipments. Respondents were given the options to select both domestic and international origins. The list of domestic origins includes: South Carolina, Northeast, Southeast, Southwest, Midwest, West, and entire U.S.A. The list of international markets includes Canada, Mexico, Latin and South America, Asia, Europe, Middle East, and rest of the World. The respondents were asked to specify both a primary and a secondary market for both domestic and international shipments. However, only a few respondents provided a secondary origin. Therefore, the analysis below combines both primary and secondary origins/markets as one group.

Figure 68 shows that a significant number of companies receive their products from all over the U.S. No company specifically selected Midwest, Southwest, or West.

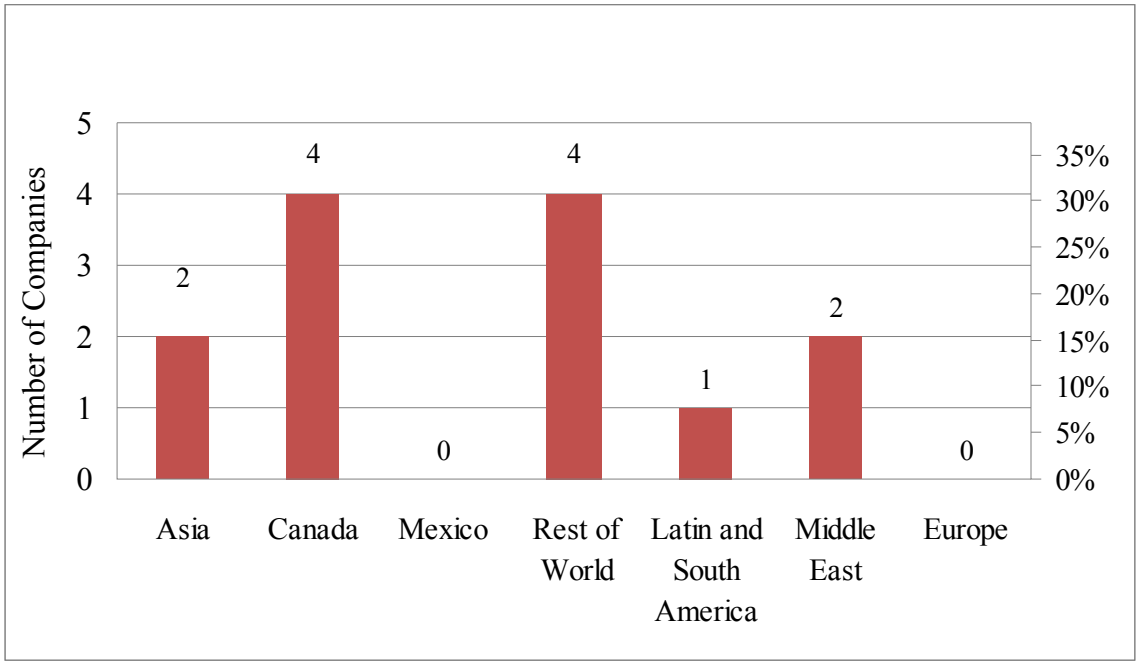
Figure 68: Domestic origins of commodities received by manufacturers in the Central Midlands



Source: Wilbur Smith Associates

For international shipments, Canada and rest of the World were selected the most by those companies that receive commodities from abroad as shown in **Figure 69**. No company specifically selected Europe or Mexico as an international origin for their inbound shipments.

Figure 69: International origins of commodities received by companies in the Central Midlands

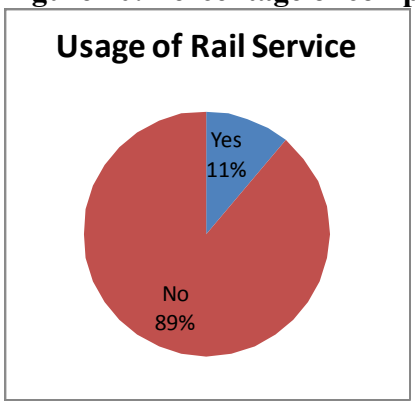


Source: Wilbur Smith Associates

7.1.3. Rail Service

Out of all 54 respondents, only 6 companies (11 percent) indicated that they use rail service as shown in **Figure 70**. Five of those companies are located in Richland County whereas the remaining one is in Fairfield County. Those six companies use both Short Line and Class 1 rail services, and they mentioned time reliability, cost, and safety/security as the main factors that influence their decisions to use rail services.

Figure 70: Percentage of companies using rail services



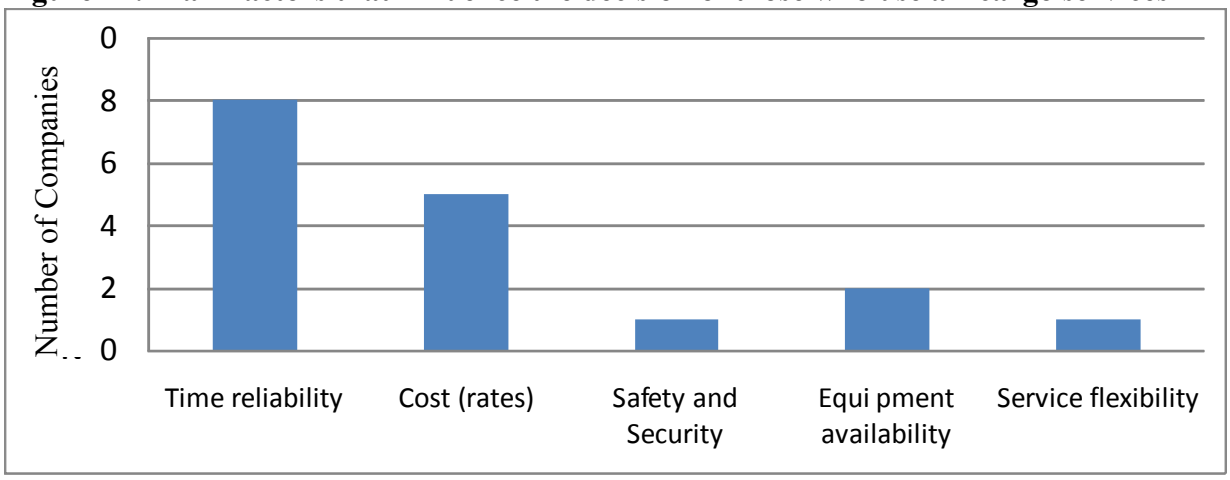
Source: Wilbur Smith Associates

Those who said no were asked to indicate the reason as to why they are not using rail services. Location of the company in relation to access to the rail service and the lack of need to justify rail service were given as the most common reasons for not using rail services.

7.1.4. Air Cargo Service

Out of all 54 respondents, 13 companies (24 percent) indicated that they use air cargo services. Eight of those companies are located in Lexington, 4 in Richland, and 1 in Newberry counties. Eleven of those use Express Carriers and two use Freight Forwarders. In terms of airports, only three companies specify an airport: two indicate that they use Columbia metropolitan airport and one company uses JFK and Atlanta. Those who do not use air cargo services were asked to indicate the reason why they are not using it. Location of the company in relation to access to an airport and the lack of need to use air service were given as the most common reasons. On the other hand, those using air cargo services indicate time reliability and costs as the main factors influencing their decision as shown in **Figure 71**.

Figure 71: Main factors that influence the decision of those who use air cargo services



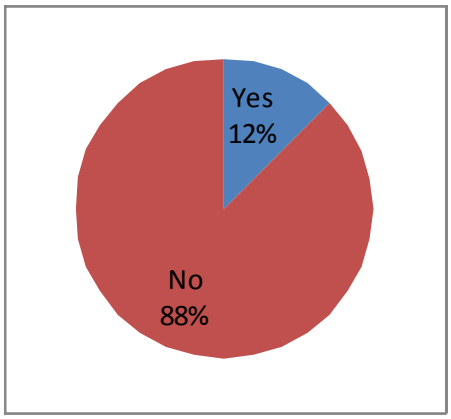
Source: Wilbur Smith Associates

7.2. Overall Transportation Issues of Freight Stakeholders

This survey provided respondents the opportunity to identify issues with the transportation system. The respondents were first asked to indicate if traffic congestion in the Central Midlands Region causes significant delays in their shipments. Out of 48 companies who responded to this question, 6 (12%) indicated that congestion does cause significant delays in shipments as shown in **Figure 72**.

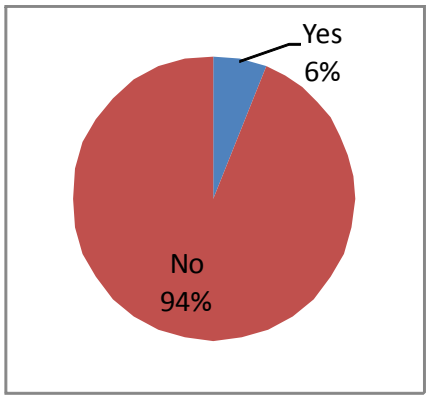
In a parallel question, respondents were then asked to indicate if traffic congestion in the Central Midlands Region is a factor that impacts their decisions on shipment hours. Out of 50 companies who responded to this question, only three (6%), as shown in **Figure 73**, said that congestion is a factor that impacts decisions on shipment hours.

Figure 72: Percentage of companies who indicate that traffic congestion in the Central Midlands Region causes delays



Source: Wilbur Smith Associates

Figure 73: Percentage of companies who indicate that traffic congestion in the Central Midlands Region is a factor that impacts their decisions on shipment hours



Source: Wilbur Smith Associates

The respondents were asked to express their concerns and opinions on transportation related issues in the Central Midlands Region. The answers range from very specific local issues to vast broad policy changes thought to improvement freight movement. The respondents identified the following issues:

Specific congestion point/bottleneck that directly effects your local operations:

- I-20 and I-26
- I-26 to Charleston
- South Lake Drive (two lane road)
- Custom Ports
- I-77 Killian and Farrow Roads

- I-20 and I-26 to Spartanburg
- Clemson Road
- NE areas - limited to access on roads. Irmo and St. Andrews areas limited roads due to the growth of both areas
- Short-term problem on Highway 6 due to road work and a new retail outlet being built.
- Spartanburg to Columbia at I-26
- Lane widths throughout the region

Strengths of the Transportation system of the Central Midlands Region:

- Availability of I-20 and I-26 provides good access
- Good job on improving the highways
- Good job on the speed control on the highways
- Terminals located at the Columbia airport
- The illuminated signs on the highways are good
- Highway systems allow for easy trucking traffic flow.
- Decent highways, good regulations, patrolmen are doing an excellent job

Operational challenges affecting local businesses:

- Fuel Costs
- Poor design of the I-26 ramp for merging traffic
- Improve public transportation
- Not keeping up with the population growth
- Inner city roadways

Suggestions for improving the transportation services in the Central Midlands Region:

- Improve the congestion on I-26 and I-20
- Need a high speed rail system for the southeast area; public ground transportation needs improving to include bikers and walkers and not just around the schools
- Need to revisit the Pisgah Church Road area and fill-in the many potholes.
- Moving people around the Midlands easier. Better transportation system, longer hours. Airport can be improved.
- Need more roads and better planning for the future
- Offer a tax break to companies to start their operating hours early, (i.e., 5 am to 1:30 pm). This will help to eliminate the flow of heavy traffic during regular business hours.

- Additional lanes (non-specific)
- Widen roads
- Lay down more sidewalks, increase public transportation hours and increase the number of buses on the roads
- Improve the on and off ramp to I-26 from St Andrews Rd and Harbison Blvd
- Need a left-hand turn signal at the Killian/Farrow exit.
- Get the railroad tracks moved from downtown
- The highway system need to do something about I-26 to Charleston (non-specific)
- Introduce a Share-A-Ride campaign, better bus transportation to reduce the cars on the highways and roads

8. CENTRAL MIDLANDS TACTICAL FREIGHT PLAN

The purpose of this section is to outline opportunities for incorporating freight into the planning process of the Columbia Area. The recommendations are intended to provide a framework for the development and implementation of specific policies, strategies and projects that serve to enhance the mobility and productivity of freight transportation in the region while enhancing safety, efficiency and environmental quality. The development of an implementation plan includes categorizing recommendations into short or near term, medium-term and long-term actions, as well as identifying organizations responsible for implementation. The short-term actions represent "low-hanging" fruit or initiatives that can and should be implemented in a relatively short time period (2 years or less). In addition, actions that require a higher level of effort or resources but are considered to be a priority action are classified as short-term. The medium-term (2 to 5 years) to long-term (over 5 years) actions require more time and resources for implementation.

8.1. Infrastructure Improvements

The region should focus freight planning efforts on a few key freight corridors to identify investments. Improvement on these routes is important for sustaining the region's freight network. Moreover, investing in routes that function as viable alternatives to the interstate system, such as adjacent arterials, and circumferential bypasses, will help sustain important corridors like I-77, I-26 and I-20. Designated trucks routes should be understood and protected as key links in the overall logistics network.

8.2. Institutional coordination

Integrating freight into the traditional planning process often takes different approaches. Beginning to explore methods to include freight in the project prioritization takes coordination with numerous groups, including organizations in the public sector. Specifically for truck movements, public sector agencies such as the Department of Transportation, The Federal Motor Carrier Safety Administration, Federal Highway Administration, Local government, State Highway Patrol all have a role in dealing with trucks, through providing infrastructure or enforcement of truck regulations. However, coordinating these different organizations and interests is often difficult.

8.3. Public/Private Awareness

Creating a formal advisory group has become a first step for many MPOs wanting routine, meaningful dialogue between planners and freight interests. Too often shippers and their customers (who are also key stakeholders) are not engaged in the planning dialogue that affects their business. Planners, carriers, shippers and delivery customers should all be included, on a routine basis, in the sort of creative problem-solving that is required of this unique type of transportation planning.

Land-Use Planning and Economic Development – The Columbia region is situated in the central part of the state where the majority of the truck freight is moving through the region. Identifying ways to promote economic development can begin to add value to the region by providing opportunity for commercial/industrial growth.

Policies and strategies should be framed around feedback from freight stakeholders in the region, site assessments and through additional evaluation of projects identified through study analysis. The strategies will be geared toward addressing the following freight challenges in the region:

- Interstate Bottlenecks
- Heavy truck volumes on local routes
- In town at-grade rail crossings
- Data Collection
- Enforcement
- Region-wide education of freight
- Lack of a Truck route system
- Signalization and signage improvements
- Linking Land Use and Freight

Each of theses issues exist within the region and will be explored further throughout this section.

8.3.1. Interstate Bottlenecks

The junctions of **Interstates 26, 126 and 20** in Columbia create significant merging issues primarily for passenger vehicles. Motorists traveling eastbound on I-26 often become confused because I-26 traffic headed towards Charleston must bear to the right, while traffic heading towards downtown Columbia via I-126 continues straight. I-26 also intersects with I-20 less than a mile from the junction with I-126. During peak rush hours, vehicles must execute a difficult and dangerous merge maneuver over several lanes in a limited distance.

These merging issues pose an increased safety risk, which causes the motor carrier operators to maintain lower speeds throughout this mile long corridor. According to the Federal Highway's Assessment Freight Bottlenecks on Highways[9], the I-26 / I-20 and I-26 / I-126 junctions both contribute to approximately 15,000 to 30,000 hours of annual truck hours of delay. **Figure 74** displays the proximity of the highway junctions between Interstates 20, 26 and 126.

[9] FHWA Highway Assessment Freight Bottlenecks Report

Figure 74: I-20, I-26 and I-126 Junction

8.3.2. Heavy truck volumes

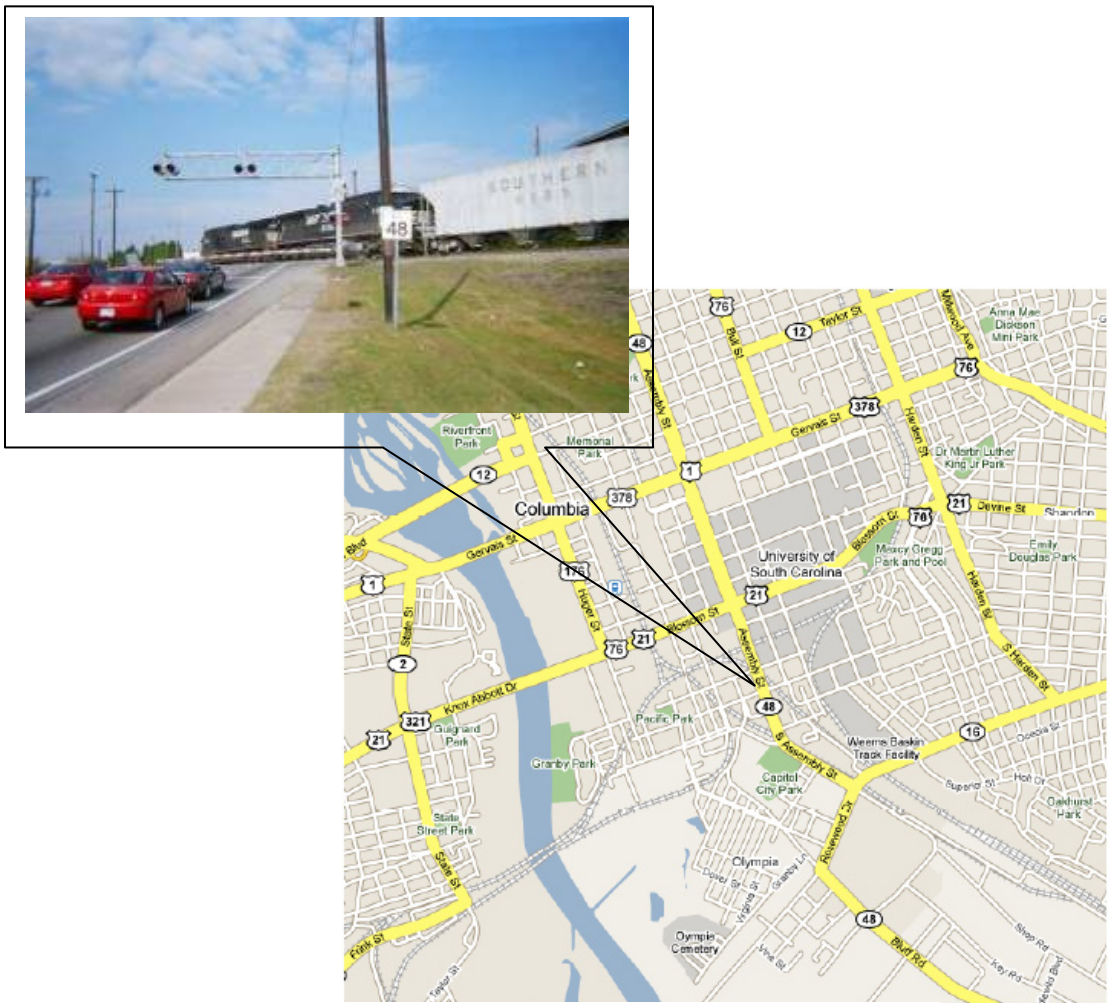
As the amount of freight increases along the highway corridors such as I-26 and I-20, state routes/ local roads will experience high truck volumes. Richland County will still experience the highest amount of freight and truck traffic, but other counties such as Fairfield County, which is projected to grow by 745 percent by the year 2030, will begin to see heavier freight volumes as well. State routes, such as SC 34 and State route 321 will potentially experience higher truck volumes. In addition, as areas begin to develop more residential and industrial space, overall traffic may increase, causing additional strains on the network.

8.3.3. In town at-grade Rail Crossings

Although many of the strategies included in this report will focus on the regional truck network, the other modes impact the flow of freight on the highways, specifically, in downtown areas of Columbia. The Norfolk Southern and CSX rail lines that traverse the downtown impede traffic flow within the region. As many as 20 trains run across these city tracks and cause delays in

traffic. The delays are more prevalent during the morning and lunch time rush hours as the numbers of passenger vehicle increase during these times. More specifically, the at-grade rail crossings at Whaley Street and Assembly Street (**Figure 75)** create the most significant delays of all at-grade crossings in the city.

Figure 75: Whaley Street Grade Crossing



8.3.4. Data Collection

Collecting pertinent data with regards to freight movements is critical in understanding how freight impacts the Central Midlands. Transportation planners in both the public and the private sectors need to understand the dynamics of freight if they are to allocate resources to improve the efficiency and safety of freight movements in an optimal manner. The composition of a region's industries dictates the various freight infrastructure needs. In the Central Midlands region, the

amount of industrial activity is relatively high and situated across the region. Commodities such as Nonmetallic Minerals and Secondary Traffic are often moved by truck or rail, depending on the final destination. For freight facilities internal to the region, these commodities are also shipped via truck, and would typically be hauled by larger tractor trailer combinations. These vehicles would be more likely to use major roads or interstates, when moving through the region. For local deliveries, the larger trucks use local routes as well. Understanding the region's industries and supply chains allows planners to better plan for freight movements, specifically truck traffic in local jurisdictions and across the region. Outside of studies commissioned by the COG, the ability to continuously collect freight data is limited, thereby hindering the complete understanding of changes in freight movements and supply chain needs for the region.

8.3.5. Enforcement of Truck Movement

Since over 90 percent of freight in the region moves by truck, the trucking industry is a key partner in highway safety and trucking regulation enforcement. The trucking industry on average pays 35 percent of the total amount of highway user fees in the state of South Carolina[10]. These taxes are levied on tires and fuel used by motor carriers. Additional fees include registration fees for trailers and vehicles. With all of these taxes and fees, trucks are subject to fines for traffic infraction, disobeying loading/unloading requirements and violating overweight/oversize restrictions.

Although all of these costs cut into the profit of trucking companies, they are necessary to help fund transportation infrastructure projects across the state and to assist in enforcing safety regulations. Approximately 16 percent of all truck crashes occur in the Central Midlands region. Working with agencies to improve ways to identify safety hotspots will help the highway patrol and other agencies such as the Federal Motor Carrier Safety administration provide better oversight. Better truck enforcement helps preserve transportation infrastructure and reduce costs for both the public and private sectors. On average, truck crashes cost over $91,000 per crash[11]. Data with regards to traffic crashes can further support planning and truck enforcement needs in the region.

8.3.6. Region-wide Education of Freight

In discussing the goods movement industry, a key problem is the public's perception of the negative impact of trucks and freight facilities. The ability to advance freight specific projects will hinge on the level of public awareness of the benefits and the impact of freight mobility. Although necessary, finding effective ways to communicate both the benefits and impacts of freight will consistently be a challenge.

8.3.7. Lack of a Truck Route System

This plan proposes a truck route system for the region. Currently, the region does not have a recorded, identified truck route system that establishes an Interstate, State and Local highway

[10] South Carolina trucking Association
[11] Pacific Institute for Research and Evaluation,

freight system which operates in conjunction with other main thoroughfares in the region and assists carriers in circumventing areas highly traveled by the motoring public. The truck routes need to be identified for the region to ensure coordination throughout the region and better connectivity for trucks. Connecting major routes from one section of the region to the other would provide more alternative routes that support freight traffic. Identifying gaps in the region's truck route system in relation to the primary and secondary highway freight systems would assist in prioritizing road projects that are significant for fluid freight movement.

In addition, the ability of a county to designate an official truck route system through local ordinances can help address the issue of hazardous material transport management. Currently, there are no restrictions on transporting hazardous materials in the state of South Carolina. Therefore, counties can implement designated specific truck routes and truck restrictions to better monitor the transport of hazardous materials, and allow commercial vehicles to operate in a more controlled environment.

8.3.8. Signalization and signage improvements

Sign guidelines for design and placement can facilitate the efficient movement of goods, especially for drivers not familiar with the metropolitan area. This applies to roadway identification signs, as well as directional signs along a roadway. Metropolitan areas generally do not specify guidelines regarding the placement of address signs. Consequently, many businesses and residences either lack address signs altogether, or place signs in locations that are difficult to see from the street, making it difficult for many delivery drivers to locate individual stops. This can result in delivery trucks often having to stop several times to find the right location, which adds to congestion problems, and results in excess VMT, fuel consumption and air pollution.

In addition, signal timing plans along freight corridors should be adjusted to account for the larger size and slower acceleration of trucks. As metropolitan truck corridors often span multiple jurisdictions across a region, inter-jurisdictional cooperation on signal timing is essential, so that the maximum benefit of this strategy may be realized.

8.3.9. Linking Land Use and Freight

Commercial land use, especially warehousing and distribution activities, are prevalent in the region. It will be important to plan and provide access to these freight activity centers. Moreover, it is important to shape urban design through municipal and regional policies and plans to provide guidance for accommodating these activities. This can also help ensure a balance between the movement of people and the movement of goods across key corridors in the region and create an environment that enhances economic competitiveness and sustainability.

8.3.10. Evaluating Congestion Mitigation Process and Freight Corridors

Timely transit along the existing and future roadway infrastructure directly determines the capability of the freight structure to support current and future economic development. Corridors must provide the timely movement of goods and services to meet shipper and consignee demands, additionally, delayed transit multiplies noise, air quality, and quality of life negatives. Therefore, accurate understanding of roadway segments where congestion exists initiates a future

review of solutions. The CMCOG completed the Columbia Area Congestion Mitigation Process (CMP) in the fall of 2008. The CMP identified congested roadways in the Central Midlands region during the A.M. and P.M. peak periods. The critical freight corridors that were identified as congested include the following routes:

- **SC 6:** conjunction with US 378 to interchange with I-20.
- **US 1:** intermittent from interchange with I-26 to interchange with I-20 and from interchange with SC 6, thru conjunction with US 378, to US 378 divergence.
- **US 76:** at interchange with I-20 and, as part of the overall area bordered by I-26, Harbison Boulevard, and SC 60.
- **Hard Scrabble Road:** located in northeast Richland County, north of Clemson Road and at the interchange with I-77

9. Region-wide Strategies and Projects

This study has identified a list of recommendations for freight specific strategies and projects. This effort identifies freight specific projects that can be implemented to improve both passenger and freight transportation and reliability. These recommendations are divided in to policy needs and specific project needs.

9.1. Policy Recommendations

9.1.1. Recommendation #1: Implement Freight Infrastructure Design Standards (Short-term)

Officially recognized infrastructure and operational design guidelines implemented by all jurisdictional bodies within the region are a fundamental element of effective metropolitan freight and goods movement planning. Truck traffic, particularly heavy-truck traffic, causes a disproportionate amount of roadway wear in comparison to passenger vehicle traffic. Central Midland's roadways should be designated on a network of freight transport corridors and designed to common physical standards that are more freight-tolerant than conventional roadways. For example, freight network roadways should be designed to higher lane and curb lane widths, as well as shoulder widths. Pavement Condition Rating (PCR) values, as well as intersection radii should also be designed for a significantly higher volume of freight traffic than other facilities. Developing a truck friendly lane in each direction consisting of a 12 to 13 foot lane with freight friendly geometrics would promote freight mobility and enhance safety of operations for both trucks and passenger vehicles.

Roadways on the proposed truck route system (discussed below) were examined to identify geometric deficiencies that impede the flow of truck traffic or present potential safety hazards. Several such locations were identified on SC 34. The locations of these deficiencies are described as a distance, in miles, from the intersection of SC39 and SC34. Deficiencies in other locations are also noted in this section.

Intersection of SC34 and Winnsboro Road. An intersection issue (**Figure 76, 77)** occurs while traveling eastbound on SC 34, beginning at the western border of Newberry County, at mile 20.6. At this intersection, SC 34, Winnsboro Rd, exits the northbound roadway, shared with US 76, Wilson Rd. The turning angle is greater than 90 degrees and contains numerous manmade and natural barriers, requiring a tractor-trailer to remain on the roadway while negotiating the turn.

Figure 76: Intersection of SC 34 and US 76, Newberry, SC

(Viewed westbound on SC 34 at 0742EST)
Source Wilbur Smith Associates

Figure 77: Map SC 34 and US 76 Intersection in Newberry, SC

The length of combination unit pictured was 48 feet, less than the legal limit length of 53 feet. Traffic level was low to moderate and the tractor initiated the turn from a near stop. The maneuver required the use of the opposing dedicated turn lane. This problem occurs where tractor combinations are required to enter restricted -width roadways; less than two lanes in the proposed travel direction. A re-assessment of road surface use by reducing the length of the dedicated turn lane or analysis of aesthetics regulations may provide short-term solutions.

SC34. At two locations, mile 28.2 and miles 30.1, (**Figure 78)** eastbound on SC 34, an issue with the existing lane width is illustrated. The trailer shown is an industry standard 102 inch wide, dry van. The unit is immediately adjacent to the dividing line with approximately 12 inches to the right edge of the roadway (pictured tire width is approximately 11.1”). The moderate to heavy rural residential presence along SC 34 could pose a hazard to persons or require the tractor to exit the narrow lane and enter oncoming traffic lanes.

Figure 78: Eastbound SC 34, Observation of lane width and Residential Activity

Source: Wilbur Smith Associates
(Eastbound on SC-34 at 0812EST)

SC34 and SC601. Figure 79 illustrates two issues. The first is limited or unimproved shoulder access at the Richland-Kershaw county line on SC 601. The second, noted 37.2 miles eastbound from SC34/39, lacks an adequate pull-off area in the event of tire failure or repair. These conditions pose a possible safety hazard and could restrict normal traffic flow.

Figure 79: Shoulder Conditions, SC 601 and SC 34

Source: Wilbur Smith Associates

Identification of traffic patterns on the Freight Routes may mitigate the need for continuous shoulder construction by designation of intermittent truck repair lanes.

9.1.2. Recommendation #2: Prepare and adopt Regional Truck Route Plan (Short-term)

Truck routing strategies and restrictions for regional jurisdictions vary. Some cities and counties have an extensive truck route system while others have provided limited guidance to the trucking industry on preferred routing. It is recommended that a Regional Truck Route Plan be pursued to identify where trucks can and cannot travel in the region. In addition to the other benefits discussed, this will provide a better and more concise way to identify maintenance needs along the regional system. Also, and as noted previously, the identification of a truck route system will help recognize the appropriate routes that trucks hauling hazardous materials can take, since there are currently no restrictions. A proposed Route Map is provided **Figure 80**.

Figure 80: Proposed Route Map

Source: Wilbur Smith Associates

Identifying truck routes is an important component of freight mobility and mitigation of freight-passenger conflicts. Designated truck routes focus on the following:

- **Targeted design standards:** Truck routes provide a means for targeting truck supporting design standards and policies toward specific corridors rather than across the board;
- **Cost effective infrastructure:** Improving roads to accommodate larger trucks requires significant investment. Designated routes provide a means to rationally allocate resources to specific corridors with higher benefits. Truck routes also allow favorable opportunities to implement Intelligent Transportation Systems (ITS) applications;
- **High safety standards:** Improving design standards and segregating freight traffic along specific corridors would also reduce operating incompatibilities and diminish the incidence of crashes; and
- **Operational productivity:** Improving truck operations within trade corridors leads to increased productivity, lower truck operating costs and improved reliability.

Identifying methods to improve these transportation routes that share a significant amount of truck traffic in the region will improve access to the freight facilities along major corridors.

Based on analysis conducted in this study, a regional truck route system is proposed, to improve freight operations on the region's road network. A tiered roadway system is proposed made up of certain routes best suited for truck travel. The proposed truck route system can be framed around road characteristics, truck traffic and accessibility to major terminals and markets. The following was used to develop the tiered system:

Tier I

Roads classified as "Tier I" are routes highly used by trucks. These routes primarily experience high truck volumes compared to other routes in the region. Over 1,200 trucks per day use these routes. From an industry usage standpoint, these routes should at least be able to support Class 9 commercial vehicles of up to 102" in width, 65 feet in length at a gross vehicle weight of 80,000 pounds. These routes should have no restrictions and be open for all commercial vehicles to travel at any time. In addition, these routes should provide access across the Central Midlands region and to markets outside of the region.

In addition, the road characteristics of the route are suitable for truck travel and contain the following:

- Wide lanes of 12 feet or more;
- Pull off shoulders of 6 feet or more;
- Clear site lines;
- Bridges and overpasses along the route are over 14.6 feet in height;
- Minimal 90 degree sharp turns;
- Roads carrying a high volume of truck traffic;
- Roads with high overall traffic volumes (passenger and truck);

- Major regional connectors to surrounding regions;
- Roads best suited for transport of Hazardous materials; and
- Suitable for all levels of truck traffic; allow for Class 9 to Class 13 trucks with no restrictions.

The following roads are suggested as Tier I:

- 77
- I-26
- I-20
- I-126
- US 76
- US378
- US 21
- US 277
- US 321
- US 601

Tier II

Roads classified as "Tier II" are routes that used frequently by trucks, but due to road characteristics and route locations, these roads may not best suited for large commercial vehicles (Class 8). These routes can experience high truck volumes similar to Tier I of over 1,200 trucks per day, but truck traffic on the route would be composed of smaller commercial vehicles. These routes may have more narrow lanes, more narrow shoulder widths and more turns along the route than Tier I roads. From an industry usage standpoint, these routes should be able to support Class 5 to Class 8 commercial vehicles. Although these routes are travelled by Class 9 vehicles, these routes may not be as suitable as Tier I roads and would be more suitable for vehicles that have fewer 5 axles but greater than two axles, with six tires. These roads may have restrictions and may not be open for all commercial vehicles to travel along certain segments of the route. In addition, these roads should provide access across the Central Midlands region but not necessarily to markets outside of the region. The road characteristics for these roads contain the following:

- Lanes of less than 12 feet;
- Pull off shoulders of 4 feet or more;
- Bridges and overpasses along the route are over 14.6 feet in height;
- Moderate number of sharp turns;
- Roads carrying an intermediate level of truck traffic;
- Roadway design and pavement condition less suitable for heavy truck traffic volume; and
- May consist of truck restrictions along the route.

The following roads are suggested as Tier II:

- SC 6
- US 1
- SC 555
- SC 34
- SC 48
- SC 215

Tier III

Roads classified as "Tier III" are primarily connectors to major freight clusters and industrial areas. Although these routes have lower truck volumes than Tier I and II, they are critical to the region's transportation system. Since these roads serve local businesses, all classes of commercial vehicle usage are permitted. These routes may be two lane roads providing direct access to terminals and facilities. From an industry usage standpoint, these routes can be used by all vehicle types and have no truck restrictions. The road would primarily be short in length (less than 5 miles) and connect to State routes. The road characteristics for these roads contain the following:

- 11-12 foot lane widths;
- Pull off shoulders of 2 feet or more;
- Limited turns;
- Low truck volumes compared to Tier I and Tier II;
- Provides direct access to freight clusters; and
- Low passenger traffic volumes.

The following roads are suggested as Tier III:

- Old Dunbar Road;
- Cook Road;
- SC 200;
- SC 219; and
- North Point Blvd.

All of these roads that have been identified are suggested routes for commercial vehicle usage based on existing traffic data and road conditions. Additional analysis would be needed to fully determine geometric design pavement conditions necessary to support truck traffic.

US-76, originating at I-77, eastbound for 2.5 miles, utilizes eight traffic signals. Signal duration is adequate for at-speed tractor trailer combinations. Traffic density and numerous local businesses raise noise and air quality issues as these units decelerate, accelerate and idle to match existing traffic conditions.

Designation of existing routes, with necessary improvements, may provide a short to moderate term solution versus new roadway development. As an example, eastbound SC-768 to north Pineview Road, between I-77 and US-76, could possibly alleviate five of the six signaling devices while reducing traffic volume.

9.1.3. Recommendation #3: Improve Signage and Signalization along Key truck routes (Medium-term)

Key routes that are used by trucks often suffer from poor signage and signal timings. The following routes were identified as routes to consider improving signage or adjusting signals.

- US 1/378 to Interstate 20
- US 601 from Leesburg road to Bluff road

These routes can be further assessed determine the need for improved signing or better signal timing to prevent consistent stopping and starting of trucks lane restrictions

Permanent sign placement and temporary signage requirements warrant review for modification or further enforcement. **Figure 81, 82, 83**, SC 378, westbound traffic, between Lewie Rd and Breezy Bay Dr (approximately 1150 feet), approaches a downgrade bending to the right, with visibility restricted by the grade and the natural vegetation. The speed limit is 55mph.

Figure 81: SC 378, west of Lexington, SC

Figure 82: SC 378, West of Lewie Road

Source: Wilbur Smith Associates

Figure 83: SC 378, East of Breezy Bay Drive

Source: Wilbur Smith Associates

Stopping distance for an 80,000 lb tractor-trailer combination is 426 feet on a dry, level roadway. The road sign is approximately 650 feet from both the intersection and local business [alcohol licensed]. Additional signage or a change in placement may assist in earlier detection and response.

SC-34 (**Figure 84)** is a freight route which consists of two lanes, no median and limited shoulder. Temporary signage indicating lumber and pulp industry activities for traffic awareness can be improved.

Figure 84: SC 34, Temporary Signage

Source: Wilbur Smith Associates

These industries enter the roadway via unimproved or improvised avenues. Limited signage poses a possible safety hazard passenger and freight users of the main freight route.

Freight route designation and utilization of rural routing to satisfy freight flow requirements should coincide with a review of all signage. Increased heavy equipment use requires a change in strategies, from earlier utilization marked by predominant passenger use.

9.1.4. Recommendation #4: Support Regional Economic Development (Short-term)

Working with various county economic development agencies in the Central Midlands region will improve the COG's understanding of the transportation needs of the region. This will begin to integrate the appropriate organizations into the planning process and assist in proactive planning. As metropolitan truck corridors often span multiple jurisdictions across a region, it is essential that there exist inter-jurisdictional cooperation so that the maximum benefit of this strategy comes to fruition. Understanding the travel flow patterns for heavy-duty vehicles allows transportation planners to approach planning from a systems and corridors approach. Thus, it is recommended that developers be required to provide an overall concept plan that identifies the key routes that are expected to be utilized in their review submissions. Critical to this process is the identification of local routes (typically under-designed for heavy vehicles) that are intended to be truck routes between key freight generation and attraction points.

9.1.5. Recommendation #5: Work with governments and the private sector to mitigate crossings including reducing the number of downtown at-grade crossings (Long-term)

Minimizing the number of crossings is the optimal way of addressing at-grade crossings and should be employed when possible. However, elimination is not always feasible. In those circumstances and as a shorter term mitigation strategy when closing may be a long-term alternative, enhancing the safety at rail crossings should be a priority. This can be accomplished via gate systems and signaling devices. The top rail grade crossings that should be addressed are:

- Whaley Street
- Assembly Street

9.1.6. Recommendation# 6: Begin to integrate ITS application along freight corridors (Long-term)

South Carolinas' Intelligent Transportation System (ITS) provides real time traffic information across the interstate system pertain to accidents and detours. The ITS system include eleven Variable Message Sign (VMS) and 20 traffic cameras which are placed along the interstate and managed from the SC DOT control center which alerts travelers of the need for detouring or cautious driving during accidents or unusual road conditions. Variable message signs to inform truckers of lanes restrictions or dangerous ramps can further promote safety and mobility. Further evaluation of the specific locations of the variable message signs would need to be made to determine effectiveness and feasibly, but some suggested corridors include:

- US 321; from Winnsboro to downtown Columbia; and
- I-26; from I-20 through Irmo.

Both safety and cost-revenue enhancements are viable with the implementation of manned or unmanned monitoring systems along the rural freight routes, within the Central Midlands region. Increased heavy truck traffic and the possible inability to appropriately allocate the cost of through traffic will drive the need for non-traditional solutions:

In-ground, manned and unmanned, vehicle weigh station technologies can reduce or maintain existing roadway maintenance budgets and provide visible assurances, to the driving public, of ongoing monitoring for safe transit of these freight routes.

Speed detection devices, manned and unmanned, may also reduce the need for additional costs associated with monitoring increased traffic along these same freight routes. Providing both awareness to the route user of unsafe driving practices and identification of these individuals could enhance the CMCOG's local revenue position and reduce expenditures in emergency response and staffing requirements for law enforcement needs.

9.1.7. Recommendation #7: Improve Data Collection between Agencies and Private Sector (Medium-term)

Coordinating with various agencies in the region will help improve planning needs. The various agencies recommended to retrieve data from are:

- S.C. Department of Transportation Regional Operation center;
- Federal Motor Carrier Safety Administration;
- South Carolina Highway Patrol;
- South Carolina Trucking Association;
- SCDOT Permitting Office;
- South Carolina Manufacturers Association;
- SCDOT District engineers;
- SC Transport Police
- SC Department of Public Safety

Freight data helps transportation planners and economic development analysts understand the trade environment of a community, region, state or multistate region. Commodity flow data helps supports the link between transportation and economic development by revealing information about key domestic and trading partners, key international gateways, high volume and high value industries, and provides indications of how private sector supply chains work.

9.1.8. Recommendation # 8: Establish Advisory Group to Retrieve Input on Freight issues (Medium-term)

CMCOG has established guidelines for public involvement, but has not developed practices or guidelines specifically for engaging the private sector in planning activities. To facilitate greater

participation in state and metropolitan transportation planning, federal legislation encourages states and Metropolitan Planning Organizations (MPOs) to provide opportunities for various interested parties to provide input into the development of transportation plans and programs. Regarding freight, for example, SAFETEA LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) stipulates that MPOs and states shall provide freight shippers and providers of freight transportation services with reasonable opportunities to comment on transportation plans and programs. The Central Midlands COG is positioned to begin to lead a group of representative from local stakeholders to retrieve input form the private sector and begin to include freight in the transportation planning process. This group can include but not be limited to:

- South Carolina Trucking Association;
- Economic Development Agencies (Fairfield, Newberry, Richland and Lexington);
- South Carolina Manufactures Association; and
- Select citizens throughout the region.

This group can serve as a subcommittee to the Technical Committee. The main goal would be to review future transportation plans, and provide input and recommendations that are focused on improving freight needs in the region. This group can also begin to enhance economic development opportunity around the region.

9.1.9. Recommendation #9: Establish HAZMAT Truck Route

In conjunction with the adoption of a Regional Truck Route Plan, designation of corridors for the transportation of Hazardous Material volumes requires assessment. Actively engaging field experts in the handling of hazardous material spills would provide guidance for selecting minimum volume capacities to be considered. Additionally, stakeholder discussions should determine those routes classified as Tier II and III, which are required to satisfy existing business requirements, for the continued handling of these loads. Beyond those required secondary corridors, all Hazardous Material volumes should be restricted to Primary Freight Corridors. This will provide for ready identification of spill locations, direct access to the incident, and future hazardous material containment designs can be incorporated into the shortest road miles.

9.2. Infrastructure Recommendations

This study utilized a process that included feedback from regional freight stakeholders to identify freight oriented projects and improvements that were of immediate concern. The process included a presentation to various stakeholders and assessment of the region's infrastructure. Most of these projects are low cost and provide significant improvements to local freight operations. Eighty-five percent of the carriers interviewed indicated that highway capacity was the most important freight movement need it the region. These projects represent "*Fast Action Projects*" in the sense that they are achievable at a relatively low cost to benefit ratio for users. The top projects identified were:

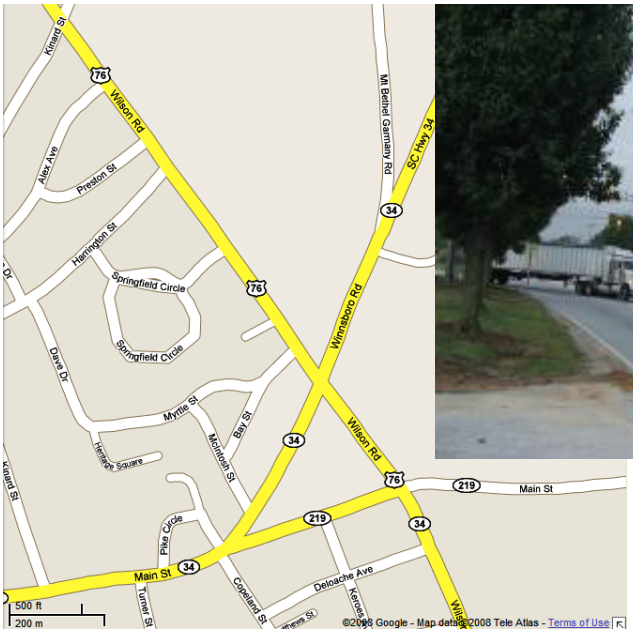
- Improve I-20, I-126 and I-20 junction

- Improve intersection at Killian Road and Farrow Road
- Improve/widen 1-26 from Spartanburg to Columbia
- Improve Old Dunbar Road
- Improve/widen Bluff Road

These projects were selected as the highest priorities are intended for possible inclusion in the MPO's next Transportation Improvement Plan. Specific project profile sheets that describe each project in further detail are located in **Appendix A**.

APPENDIX A: DETAILED PROJECT PROFILE SHEETS

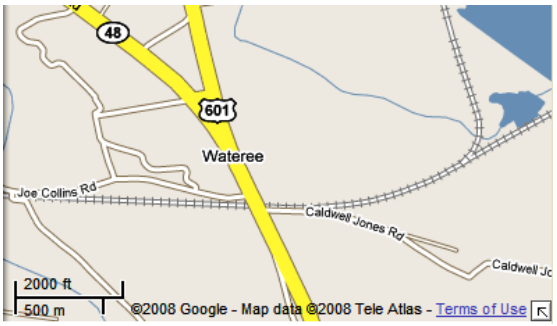
Project # 1	Improve Intersection Turn Radii
Source	Field Review
Jurisdiction	SCDOT
Problem	Insufficient roadway easement for heavy equipment to successfully negotiate turn within provided lanes. Long vehicle length making right turn into a single lane, requires additional space to successfully negotiate the turn. Identified locations: • SC 34 eastbound at US 76 • SC 200 westbound at US321 • SC 555 northbound at Westmore Drive • US 21 northbound at Pisgah Church Road • US 1 northbound at US 178 • I 20, exit 68, at Windhill Road
Proposed Actions	Interim Solution: Review feasibility of reducing length of opposing turn lane, terminating lane further from physical intersection; providing additional roadway for turn negotiation, while not incurring additional road construction cost. Cost Est: $75,000/intersection Long term Solution: Review of geometric design for SC 34 to provide a median, center lane to allow sufficient turn radius without entering dedicated, on-coming traffic lanes. Cost Est.: $500,000 to $750,000/intersection



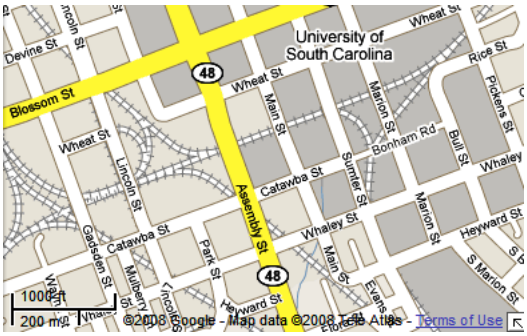
SC 34/US 76 concurrence (four lane moving bottom right to top left) Right turn onto SC 34.

SC 34 observed east to west toward intersection. Note tractor inability to negotiate within provided lane.

Project # 2	Improve At-grade railroad crossing at US 601 in Wateree and Assembly Street in Columbia
Source	Stakeholder survey
Jurisdiction	SCDOT, Norfolk Southern
Problem	Current design of at-grade rail crossings, generate traffic delay and congestion, along Assembly Street. Future increase in truck volumes, presents safety hazard due to limited signage and warning devices, on US 601.
Proposed Actions	Interim Solution: Introduce I.T.S. solutions to provide advance warnings for possible alternative routing or response to traffic flow restriction. Long term Solution: Determine feasibility of below grade placement of rail line. I.T.S. Est.: $1,500,000 Construction Est.: $4,000,000 to $7,000,000



US 601, Richland County, single track, rural



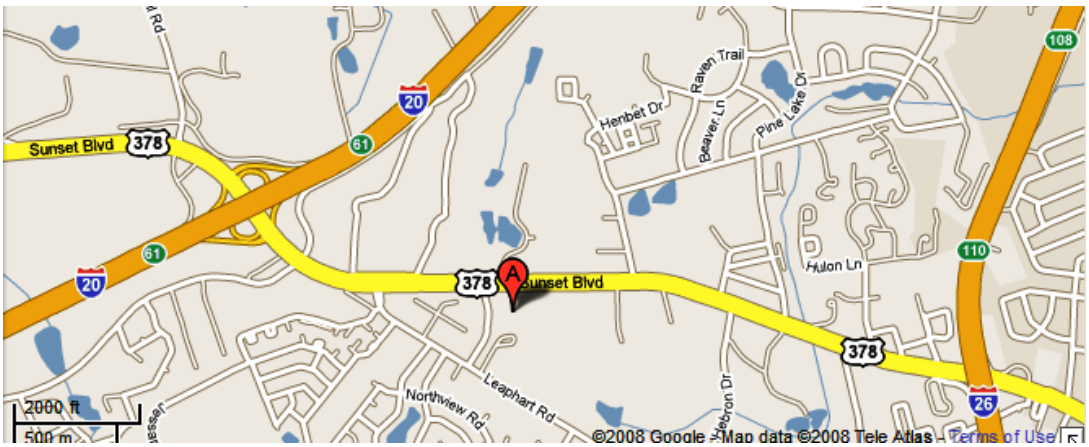
Assembly Street, Richland County, single track, urban

Project # 3	Improve signage along US 321
Source	Field Review
Jurisdiction	SCDOT
Problem	Placement of signage on secondary corridors provide inadequate response distance for larger capacity trucks. Additionally, limited signage may not provide adequate driver awareness.
Proposed Actions	Interim Solution: Placement of additional signage, I.T.S. advance awareness solutions, and placement distance further from physical location. Cost Est.: $250,000 to $2,000,000

Project # 4	Improve clean zones along major freight corridors
Source	Stakeholder survey
Jurisdiction	SCDOT / Richland, Lexington, Fairfield, Newberry Counties
Problem	Vacant lots, with roadside frontage along secondary corridors, provide visual obstacles to vehicle operators' safe egress; example is distribution center .
Proposed Actions	Long term Solution: Coordinate with land owners to properly maintain property to provide adequate sight distance. Cost Est.: $0

3601 Sunset Blvd, Columbia, SC, existing distribution center (currently not utilized)

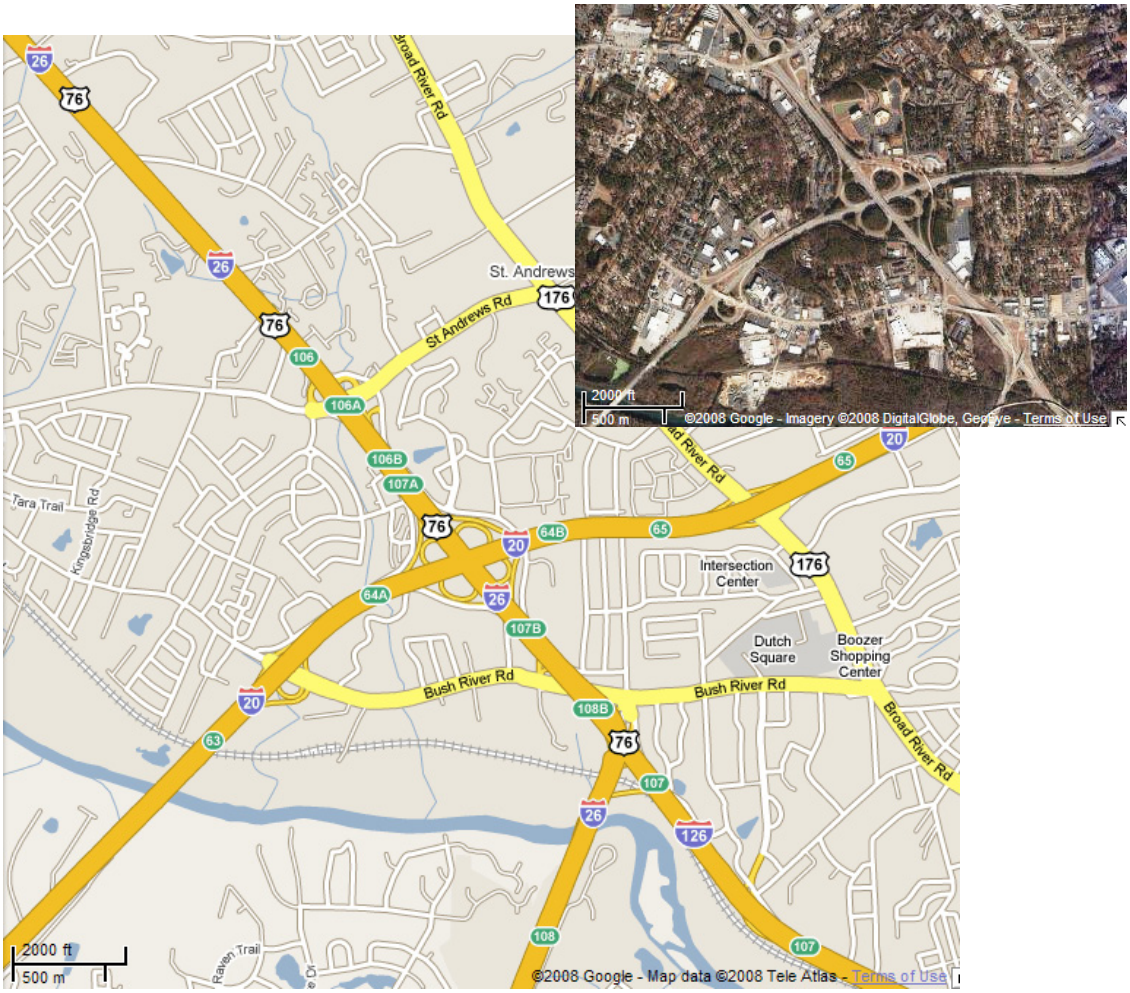
-Heavy equipment is slow to enter and reach posted speed limits and traffic flow.
-Stopping distance of a tractor trailer combination, on a dry, level, paved road service is 468 feet at 55 mph.



Project # 5	Construct two-foot paved shoulders along SC34
Source	Field Review
Jurisdiction	SCDOT
Problem	Absence of paved shoulders, places residential land use immediately adjacent to roadway, impeding traffic along this freight corridor.
Proposed Actions	Interim Solution: Provide education to residents adjacent to freight corridors regarding the impact of increased heavy equipment usage of roadway and safety precautions to minimize risk. Cost Est.: $0 Long term Solution: Provide paved shoulder along SC 34 corridor. Construction Est.: $3,000,000

SC 34 , corridor linking Newberry SC with Winnsboro SC, observations captured at 5.2 and 7.1, respectively, miles east from I-26 interchange with SC 34. Trailer is 102 inch, dry van (industry standard).

Project # 6	Improve interchange I20, I26, I126, St Andrews Road access
Source	Stakeholder Survey
Jurisdiction	SCDOT
Problem	Multiple high volume interchanges in close proximity generates excess delays and higher incident rates during peak traffic periods.
Proposed Actions	Long term Solution: Conduct feasibility study of assignment or construction of alternative routes, bypass development, or limited access. Construction Est.: $1,000,000



Project # 7	Connect Killian Road toFarrow Road
Source	Stakeholder Survey
Jurisdiction	SCDOT
Problem	Access from Killian Rd to Farrow Rd is needed to provide connectivity.
Proposed Actions	Long term Solution: Extend Killian Rd to Farrow Rd and provide appropriate crossing warnings for rail crossing Construction Est.: $7,000,000

Viewed from Farrow Road, East, Killian Road was not completed and lies disconnected from Farrow Road.

Maps illustrate completed over rail line.