



Technical Memorandum

EXISTING AND FUTURE FREIGHT GOODS MOVEMENT ASSESSMENT

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1. INTRODUCTION

1.1 Study Purpose

The Coastal Region Metropolitan Planning Organization (CORE MPO) Freight Transportation Plan will provide a road map for enhancing freight mobility within and outside of the study area in an effort to improve the Savannah metropolitan area's economic competitiveness. The plan will expand on the Phase 1 efforts of the freight study and expand the study area to include a three-county region (Bryan, Chatham and Effingham). The plan will collect more detailed information, construct descriptions of the study area by mode, analyze economic and system performance projections, and generate recommendations that coordinate with land use projections and the economic development efforts.

1.2 Data Reference List

Table 1-1 shows a composite of all data sources described in this document. It is arranged alphabetically by data file name, but includes the data source year and the level of detail it covers.

Table 1-1: CORE MPO Freight Study Data Sources

Date	Source	Level
2014	Airport Master Plan	MPO
2008	Bryan County and the Cities of Pembroke and Richmond Hill Joint Comprehensive Plan	MPO
2008	City of Bloomingdale Comprehensive Plan	MPO
2007	City of Garden City Comprehensive Plan	MPO
2008	City of Pooler Comprehensive Plan	MPO
2008	City of Port Wentworth Comprehensive Plan	MPO
2013	CORE MPO Travel Demand Model Documentation	MPO
2008 – 2012	Crash Data	State
2014	Downtown Savannah Master Plan	MPO
2010	Effingham County Comprehensive Plan	MPO
2014	Freight Analysis Framework	National, MPO
2011	Georgia Statewide Freight and Logistics Plan	State
2014	Longitudinal Employer Household Dynamics	National
2014	Port Master Plan	MPO
2014	Savannah Economic Development Authority Annual Report	MPO
2014	State Rail Plan	State
2014	Traffic Data from GDOT	State

Source: CDM Smith

2. DATA SOURCES

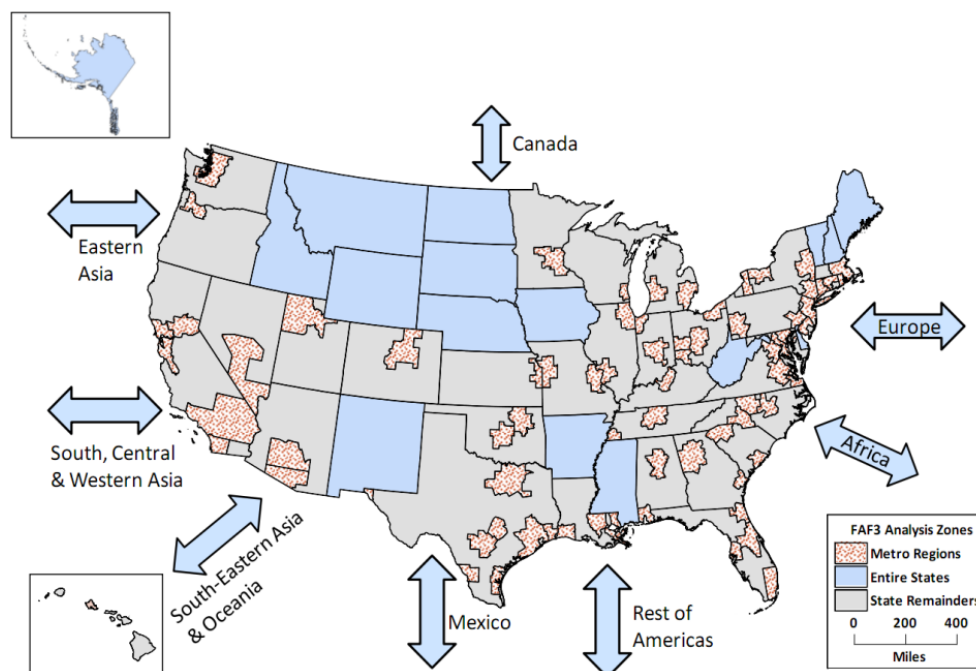
Section 2 provides a description of the data sources that are used in the study. Data sources span the national level data down to the more detailed study area or local level data.

2.1 National Level

2.1.1 FAF

The Freight Analysis Framework (FAF) is a Federal Highway Administration (FHWA) database to help users understand how the movement of freight affects the transportation system and where problems with the transportation system could affect the flow of freight. FAF Version 3 (FAF₃) provides freight flow information for value, tons, and domestic ton-miles. The base year is 2007 as it was the year prior to the recession. However, revised 2011 estimates have been developed. Future-year projections have been done out to 2040 in 5-year increments. The geographic areas consist of 123 domestic zones that are divided into metro regions, state remainders and entire states. Metro regions consist of 74 metropolitan areas. The state remainders represent each of the state's territory outside of the metropolitan areas. Entire states are the 16 regions that do not have a metropolitan region. **Figure 2-1** shows the geographic areas used in the FAF₃.

Figure 2-1: Geographic Areas Used in FAF₃



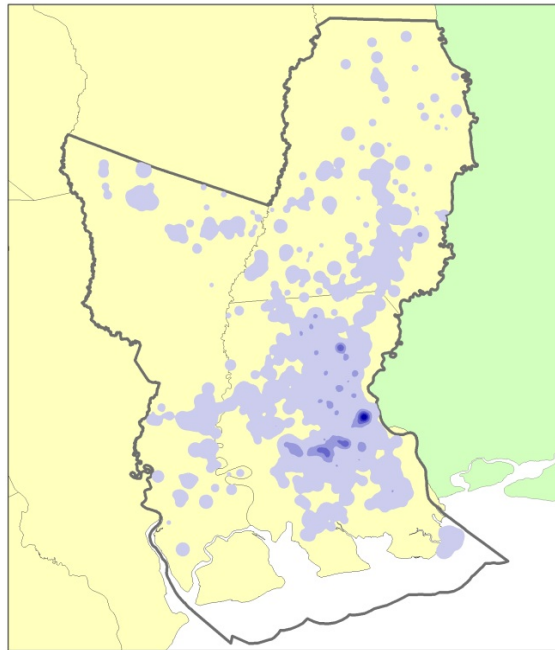
Source: Freight Analysis Framework, <http://faf.ornl.gov/fafweb/Default.aspx>

A more detailed explanation of the FAF₃ data and its utilization in this study are provided in Section 3 of this report.

2.1.2 LEHD

Longitudinal Employer Household Dynamics (LEHD) data are the result of a partnership between the Census Bureau and the States to provide high quality local labor market information and to improve the Census Bureau's economic and demographic data programs. LEHD data are based on the censuses, government surveys, and different administrative sources. Administrative sources include Unemployment Insurance (UI) earnings data and the Quarterly Census of Employment and Wages (QCEW) data. The point data in the LEHD provides a summary of employment by sector which is derived from the two digit North American Incorporation Census State (NAICS) codes for race, gender, and age. The geographic area summarized in the file is the census block group. The intent of the file will be to reflect the high employment locations for specific industry types in the area. The LEHD data will provide both information in economic analysis and validation for the existing and forecasted FAF₃ data. **Figure 2-2** is a heat map of total activities (employment + population) in the Savannah Metropolitan Area to help illustrate the data. The darker blue shows higher density of the activity areas, meaning there is a concentration of employment and/or households in this area.

Figure 2-2: Heat Map of Study Area



Source: US Census Bureau

2.2 State Level

2.2.1 Rail

The two class 1 rail carriers in the study area are Norfolk-Southern (NS) and CSX Corporation (CSX). Rail information in this project will be collected from the state freight plan, the ongoing state rail plan, and representatives from the carriers.

2.2.2 Georgia Statewide Freight and Logistics Plan (December 2011)

Freight improvement project recommendations for the study area will be developed in coordination with the statewide plan, which covers the years 2010-2050. Task 5 report of the statewide plan lays out the projects by mode and applies a potential timeline for these improvements. For the study area, recommendations from the plan include:

- Savannah Harbor Expansion Project (Deepening);
- Develop Jasper Ocean Terminal; and,
- Highway capacity expansion, including I-95 and I-16 and some portions of U.S. 280.

The statewide plan will serve as an initial list of improvements for the CORE MPO Freight Transportation Plan. Further improvements specific to the study area's needs will be generated by the CORE MPO Freight Transportation Plan and filtered back up to the Georgia Department of Transportation (GDOT).

2.2.3 Crash Data

State crash data from GDOT will be collected for the study area. The last 5 years of crash statistics, from 2008 through 2012 will be analyzed and used in subtask 2.5 to identify "hot spots" in the system. Data will be accessed from the GDOT GEARS (Georgia Electronic Accident Reporting System) which collects reports as they are submitted electronically to the GEARS portal from police agencies across the state of Georgia. Assessment and analysis will focus on records coded as involving commercial vehicle accidents. Evaluation of these locations may generate projects or be a part of a greater improvement in the system. **Table 2-1** shows the totals for fatalities, injuries, and total incidents recorded in this database for each year.

Table 2-1: Incidents Involving Trucks in the Study Area – 5 Year Totals

County	2008			2009			2010			2011			2012		
	Fatalities	Injuries	Total Incidents	Fatalities	Injuries	Total Incidents	Fatalities	Injuries	Total Incidents	Fatalities	Injuries	Total Incidents	Fatalities	Injuries	Total Incidents
Bryan	-	14	50	1	17	52	1	25	55	4	27	64	2	17	43
Chatham	5	164	621	2	141	498	9	127	439	2	122	551	5	127	533
Effingham	1	40	51	1	8	23	2	26	31	2	27	42	-	12	26
Study Area Total	6	218	722	4	166	573	12	178	525	8	176	657	7	156	602

Source: GDOT

2.2.4 Traffic Data

Traffic count data is collected at numerous locations around the state by GDOT and is accessed through a web portal on GDOT's website. There are three types of count stations: continuous, short, and Weigh-In-Motion (WIM). The continuous count stations can supply hourly counts for a 24-hour continual loop. The short count station can also provide hourly counts, but for a short duration. Both count station types are used to calculate average annual daily traffic (AADT). Some of the count locations are capable of collecting more detailed information such as vehicle classification. WIM (weigh-in-motion) device can electronically detect vehicle types along with count data; however, there are no WIM stations located within the study area. **Table 2-2** displays the traffic counter information for the study area.

Table 2-2: Study Area Count Stations

County	Continuous	Short	WIM
Chatham	19	594	0
Effingham	0	94	0
Bryan	3	75	0

Source: GDOT

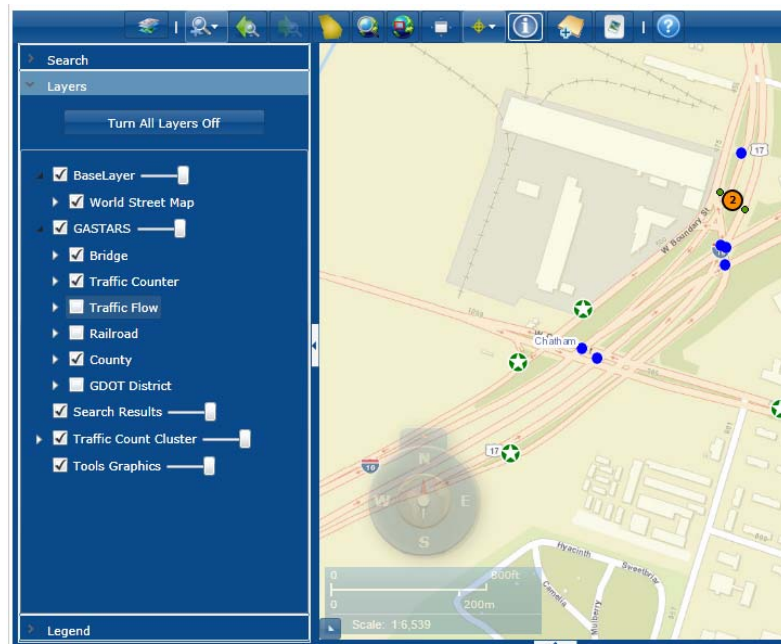
The traffic count data (accessed through the GDOT web portal¹) will be used to validate the hot spots and the FAF disaggregation results, where applicable.

Real-time traffic reports are available on the GDOT website². The mapping technology allows for the identification and assessment of count locations and bridges on specific routes. **Figure 2-3** displays a graphical image that can also be found online. While there is some information available in the identification display tool, more detailed information will be accessible through the other tools or the National Bridge Inventory (NBI) database.

¹ <http://gdot.ms2soft.com/tcds/tsearch.asp?loc=Gdot&mod>

² <http://www.dot.ga.gov/informationcenter/statistics/stars/Pages/default.aspx>

Figure 2-3: Example Real-Time Traffic Report



Source: GDOT, <http://www.dot.ga.gov/informationcenter/statistics/stars/Pages/default.aspx>.

2.2.5 Bottlenecks

Task 2.5 - the Freight network Bottleneck, and Safety and Security Issues Identification - will define the specific bottlenecks throughout the Savannah metropolitan area. The bottlenecks will be divided into AM and PM congestion locations. The congestion areas will be identified and displayed through mapping. Currently, GDOT has bottleneck and congestion maps displayed on a web portal³. The findings are from the 2010 GDOT survey and reflect 2010 congestion information. The survey findings will be vetted through the advisory committee workshop and any clarification to the existing locations or new locations will be added to the spatial database for this project.

2.3 MPO Level

2.3.1 CORE MPO Travel Demand Model

The CORE MPO's travel demand model provides a basic assessment of the network capacity and generated demand based on existing and future socio-economic data for the region. The model will not be used to assess potential project recommendations for the freight plan. The input data to the model, such as model network geometric attributes and economic and demographic data in the traffic analysis zones (TAZs), will be used initially in task 2.4 (network) and task 2.1.1 (TAZ), along with subsequent tasks that are reliant on these tasks.

³ http://www.skycomp.com/Atlanta/HTML_Slides/regional-maps/congestion-maps-savannah.html.

2.3.2 Airport Data

Information on the Savannah - Hilton Head International Airport (SAV) will be reviewed for analyzing the airport's impact on the region, the air cargo movement, and potential needs. Data will come from some national sources, such as FAF₃, and the Airport Master Plan. The plan will help identify needs inside the airport so that external improvements under the MPO/state jurisdiction can parallel the airport's planning efforts. This coordination will maximize the planning efforts by the involved agencies and avoid conflicting recommendations that could prove to be a detriment to the area.

2.3.3 Port Assessment

Master plans and/or engineer's reports for the Port of Savannah will be reviewed to identify cargo operations within the terminal site(s). The CORE MPO Freight Transportation Plan will help identify needs inside the port so that external improvements under the MPO/state jurisdiction can parallel the planning efforts of the Georgia Ports Authority (GPA). This coordination will maximize the planning efforts by the involved agencies and avoid conflicting recommendations that could prove to be a detriment to the area. Some identified transportation improvement projects around the port area are listed below.

- Brampton Road Connector
- Grange Road Improvements
- Bay Street Improvements
- Port's Last Mile Project

2.3.4 SEDA

Bringing new businesses to the Savannah area and exploring new business opportunities are the responsibility of the Savannah Economic Development Authority (SEDA). SEDA produces an annual report, the latest of which will be reviewed and incorporated for the freight plan.

2.3.5 Other

Other plans and/or reports will be reviewed as needed for the freight related issues. These materials might include the Chatham County – Savannah Tricentennial Plan, the comprehensive plans of the local jurisdictions of the study area, and other economic development plans and/or reports. These reports include, but are not limited to:

- Bryan County and the Cities of Pembroke and Richmond Hill Joint Comprehensive Plan
- City of Bloomingdale Comprehensive Plan
- City of Garden City Comprehensive Plan
- City of Pooler Comprehensive Plan
- City of Port Wentworth Comprehensive Plan
- Downtown Savannah Master Plan
- Effingham County Comprehensive Plan

3. FAF DISAGGREGATION

3.1 Purpose of Disaggregation

The FAF disaggregation methodology utilizes the relationship between employment by industry and the commodities of which those industries produce and consume. While the FAF₃ data is available only at a regional level, employment by industry is more readily available at smaller levels of geography. The U.S. Census Bureau provides County Business Patterns (CBP), a publicly available database for employment by county by North American Industrial Classification System (NAICS) industry. Commercial and state data sources may provide employment by NAICS or comparable industry classifications at smaller levels of geography. Employment data can be aggregated to develop mathematical relationships between the FAF₃ commodity shipments to and from a FAF₃ region and the employment by industries in that FAF₃ region. The availability of employment data by industry can be used with these equations to estimate the expected production and attraction of freight tonnage in a FAF₃ region and the units of smaller geography in that FAF₃ region. The shares of the smaller units of geography tonnage to the regional tonnage can then be used to disaggregate the freight flows from FAF₃ regions to the smaller units of geography within those FAF₃ regions. This method is suitable for disaggregating the FAF₃ regional flows to flows to and from the counties and traffic analysis zones (TAZs) in the Savannah Combined Statistical Area (CSA).⁴

There are alternative datasets to FAF₃, with the most common one being TRANSEARCH. TRANSEARCH is a private database compiled by Global Insight that contains freight flows for commodities. The commodities are described by the Standard Transportation Commodity Classification code (STCC) and include code, tonnage, mode of transport, and origin and destination. In order to obtain this data, economic data and motor carrier data exchange is used for truck distribution. Freight flow forecasts are available up to the Year 2040.

TRANSEARCH and FAF₃ are two databases that develop current and future freight flows. They differ in costs and levels at which freight flows are given. TRANSEARCH has a cost associated with it while FAF₃ is free. Each of the databases differs in the level of detail they offer; therefore, cost plays a part in determining which database to use.

Each of the databases covers a vast area to determine freight flows. The FAF₃ database covers all 50 states including non-metropolitan areas. FAF₃ contains forecasts for freight flows at five year intervals from 2010 to 2040, using 2007 as the base year. By contrast, the TRANSEARCH database provides

⁴ According to the U.S. Census Bureau, a CSA is a combination of adjacent metro-metro or metro-micro areas that have substantial employment interchange. The Savannah CSA consists of Bryan, Chatham, and Effingham counties in Georgia. http://www.census.gov/geo/reference/gtc/gtc_cbsa.html

freight flow estimates at the county level. The county level data helps to identify freight origins and destinations and to perform a capacity analysis.

It must be noted that the best way to understand freight flows is to collect local information via establishment surveys and other primary data collection methods and the disaggregation methodology is only a substitute for local data. Therefore, it is important to note some of the issues with using disaggregation due to the lack of local data. Many researchers have noted that in some cases there are weak relationships between commodity production/consumption and the economic indicator data that are often used in the disaggregation procedures. For example, industry-specific employment is often used as an indicator variable for consumption or production within an industry. However, it has been found that for certain commodities, there is not a strong correlation between the quantity of goods produced in an industry and the number of people employed in that industry.

3.2 Disaggregation Inputs

The development of the CORE MPO's Freight Transportation Plan utilizes the FAF₃ database. The FAF disaggregation, as mentioned previously, is a relationship between employment and commodities. The primary steps of disaggregation include linking freight activities with economic activities, the actual disaggregation of FAF₃ database to the district level, and the estimation of average shipment distance by mode on the multimodal network systems. The following will describe the primary inputs to this process.

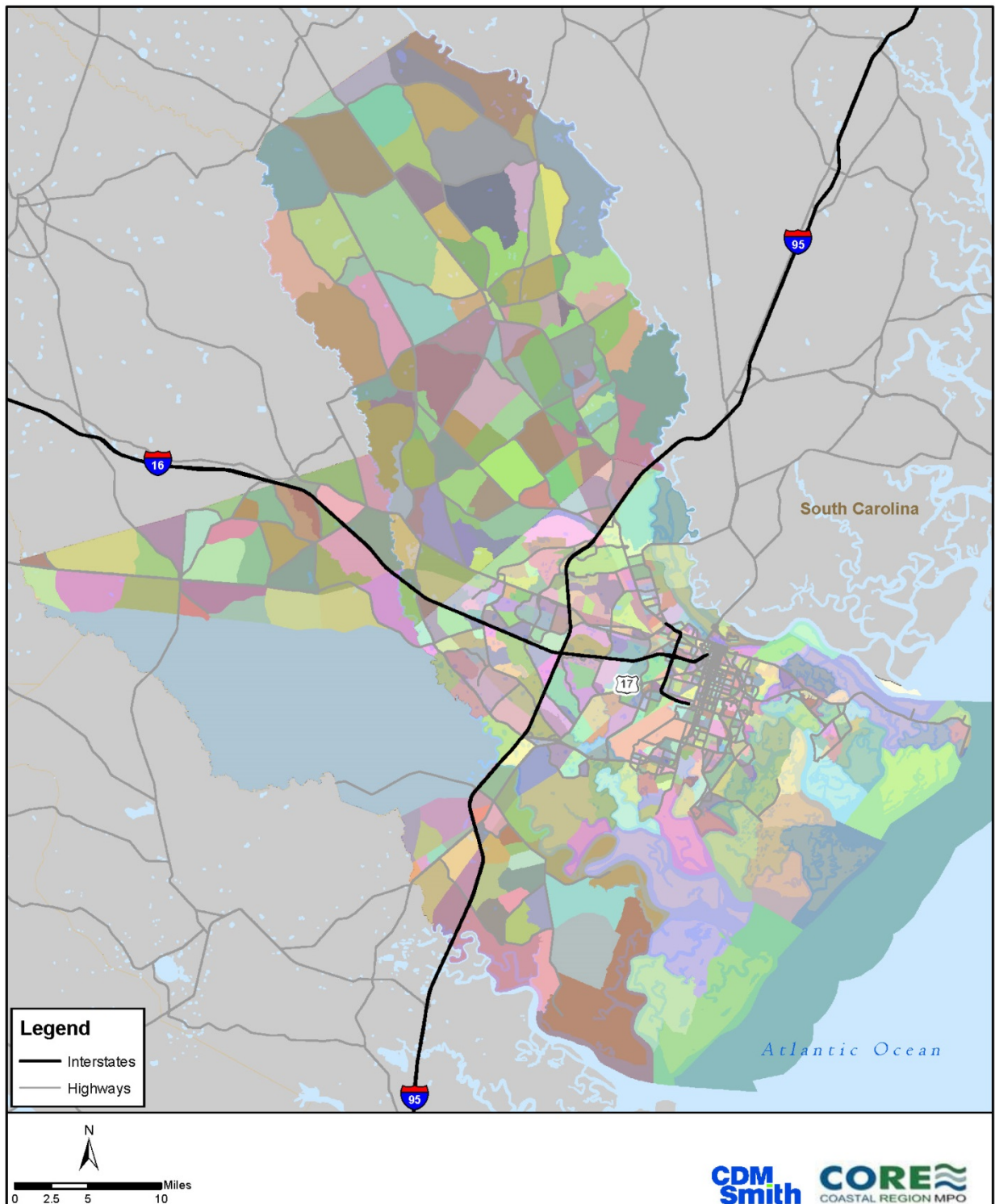
3.2.1 Zonal Data

The geographic portion of the FAF disaggregation uses the traffic analysis zones (TAZs) from the travel demand model. The TAZs have employment data as part of the socio economic attributes of the model. For disaggregation, these TAZs will be aggregated into common areas, which will be referred to as freight districts. The freight districts have common industry types and employment characteristics, as well as some geographic boundaries. The freight districts may be limited by major roadways (e.g., interstates), physical features (e.g., rivers), or a political boundary. Clustering smaller TAZs in this way increases the reliability of the disaggregation while still producing a useful dataset.

For the CORE MPO planning area, the travel demand model has 796 internal TAZs populated using the 2010 Base Year socioeconomic data for each zone. The model area includes Bryan, Chatham, and Effingham Counties. **Figure 3-1** illustrates the model TAZs.

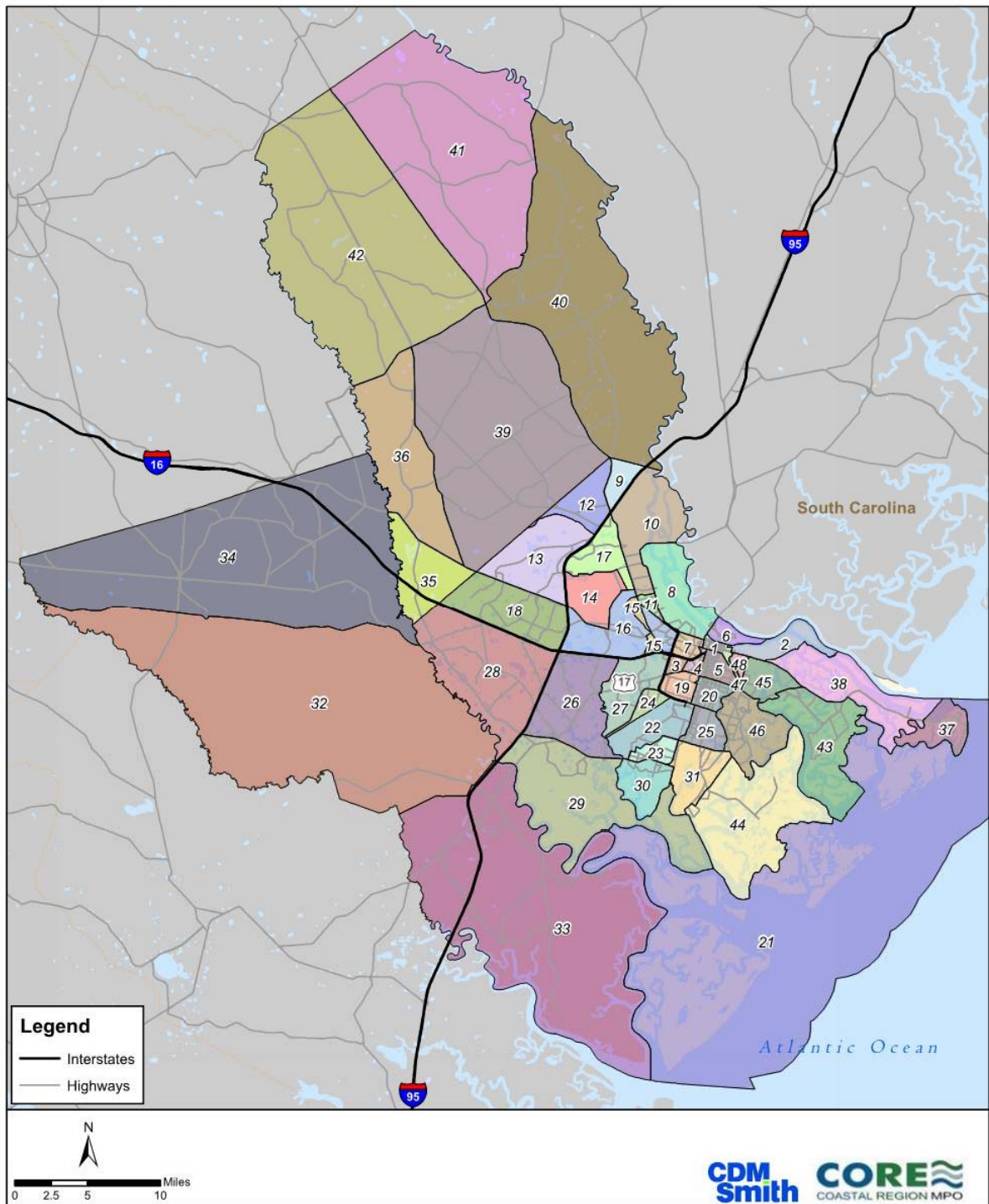
After aggregating the TAZs with input from CORE MPO, the FAF disaggregation will use 42 freight districts in the analysis. **Figure 3-2** illustrates the freight districts.

Figure 3-1: Model Traffic Analysis Zones



Source: CORE MPO, CDM Smith

Figure 3-2: Freight Districts



Source: CDM Smith

3.2.2 FAF Version 3 Data

The Freight Analysis Framework (FAF) integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. With data from the 2007 Commodity Flow Survey and additional sources, FAF₃ provides estimates for tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode for 2007, 2011, and forecasts through 2040.

One of the FAF₃ metro regions is Savannah, which includes Bryan, Chatham and Effingham Counties. This region will be used in the disaggregation process and relate to all other regions throughout the nation. The FAF₃ data currently shows a heavy truck influence in the Savannah metropolitan area for 2011. The imports from 2011 data included coal N.E.C., crude petroleum and fuel oils. In contrast, exports included nonmetallic minerals, newsprint/paper and meat/seafood. Trucks are the heaviest used mode of transport for both imports and exports. **Table 3-1** and

Table 3-2 show the kilotons and millions of dollars (in 2007 base year dollars) for each mode as the freight enters, exits, and stays within the Savannah metropolitan area for the various years.

Table 3-1: 2011 Mode Values

2011	Into		Out Of		Internal	
	Ktons	\$M	Ktons	\$M	Ktons	\$M
Truck	37,663.7	38,794.5	42,243.3	64,684.1	16,691.6	15,878.6
Rail	7,731.6	3,110.3	2,926.4	2,025.4	646.2	289.4
Water	3,008.8	2,396.5	7.0	4.0	5.2	0.7
Air	2.2	489.9	3.8	1,090.7	-	2.0
Multiple modes & other	15,504.8	15,313.3	11,421.9	12,883.4	9,016.3	4,478.1

Source: Freight Analysis Framework, <http://faf.ornl.gov/fafweb/Default.aspx>

Table 3-2: 2040 Mode Values

2040	Into		Out Of		Internal	
	Ktons	\$M	Ktons	\$M	Ktons	\$M
Truck	85,123.1	103,822.2	89,371.6	170,871.0	31,256.2	36,468.0
Rail	11,516.8	6,042.2	5,866.8	5,866.5	1,426.5	613.3
Water	2,354.5	1,868.1	20.8	4.5	15.4	2.2
Air	6.5	1,335.3	11.8	3,416.7	5,054.8	5,305.0
Multiple modes & other	35,883.6	46,514.0	26,936.9	38,534.2	15,679.2	6,132.0

Source: Freight Analysis Framework, <http://faf.ornl.gov/fafweb/Default.aspx>

3.2.3 Additional Data

One of the tasks in disaggregation of the FAF₃ data involves the development of regression equations for tonnage productions and attractions. Regression equations are developed for each of the 42 commodity types and the commodity tonnage is the dependent variable. These equations will also use other variables such as population or farm acreage and livestock information from the National Agricultural Statistics Service database. The need of additional database will depend on the region's industry types.

3.3 Disaggregation Outputs

Outputs from the disaggregation effort will provide a database that contains freight movements by tonnage from each of the 42 zonal districts to the other, internal, and to locations outside the study area. This will occur for all modes in the base year (2011) and the horizon year (2040). For example, the user will be able to determine the projected tonnage leaving Freight District #1 (the downtown area around Bay Street between US 17 and Harry Truman Parkway) by truck and going to the Columbia MSA in South Carolina in 2040. Task 2.3 will discuss the disaggregation outputs for the CORE MPO's Freight Transportation Plan.

This commodity-based origin and destination data has the capability to enhance environmental impact assessments, travel demand models, modal shift analysis, and truck weight and size studies.

Additionally, the data may help influence and establish various freight performance measures. The impacts and applicability to the database will be seen through many projects.

4. NEXT STEPS

It is critical that the right measures are chosen in order to track the progress towards meeting the freight goals and objectives. Performance measures help evaluate the impact of projects and can be used to gauge the successfulness of the plan. Together with the goals and objectives, performance measures create the backbone of the project selection and prioritization process, guiding freight investment decisions.

Development of freight performance measures can be complex. Most importantly, the performance measures must be specific, measurable, attainable, realistic and timely. They are only valuable if they can be re-produced and sustained over a sufficient period of time in order to identify trends and impacts of changes to the system. Performance measures for freight need to be tested, refined, and perhaps replaced on a regular cycle, both to keep up with changing issues as well as to take advantage of new technologies for collecting, processing, and displaying data. Like the freight system itself, performance measures cannot be static. Task 2.2 will delve into the performance measure development for the CORE MPO's Freight Transportation Plan.