# Alabama Statewide Freight Study and Action Plan

## FINAL REPORT


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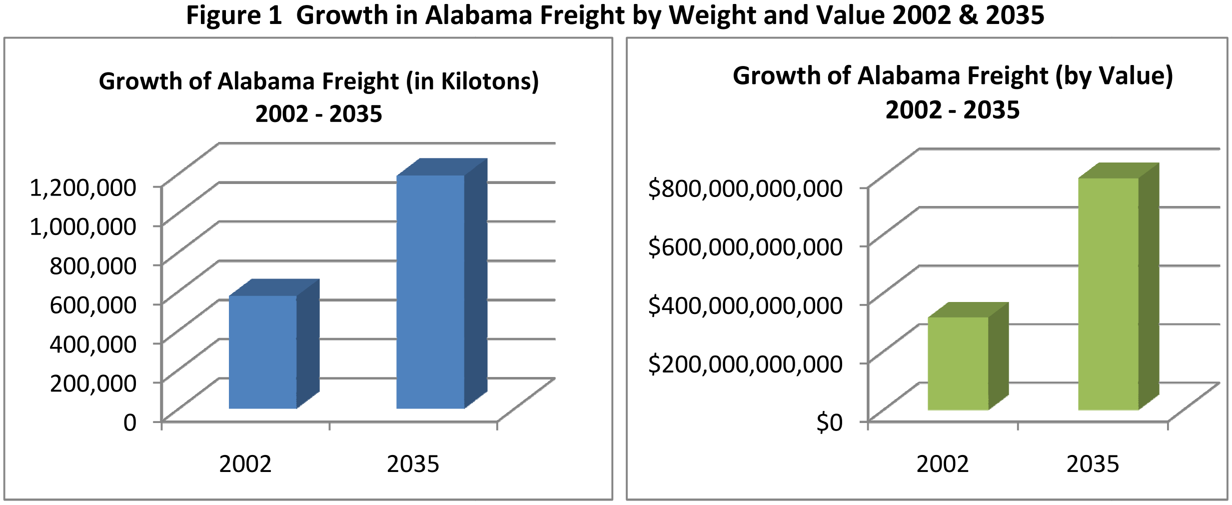
## EXECUTIVE SUMMARY

The efficient movement of freight within and through the state is a critical factor in Alabama's economic competitiveness and vitality. Despite its importance, the modeling of freight traffic and its inclusion in transportation planning has been limited in scope. The Alabama Department of Transportation (ALDOT) recognizes the need to better understand freight needs and issues, and conduct an economical and efficient freight planning process that can be integrated with conventional transportation program. Identifying and addressing critical freight constraints facilitates increased freight mobility within the transportation system, supporting economic growth and development at the state and local level. To this end, ALDOT initiated the Alabama Statewide Freight Study and Action Plan in April 2009. The focus of the research was the development of information systems and tools to assist decision makers in the allocation of resources toward the best possible outcome for transportation system users.

Alabama is ideally located for trade and business. The state's network of highways, ports, rivers, railroads and airports serves the Deep South, Mid-America and provides access to the eastern seaboard. An 11-hour drive from the center of Alabama reaches west to Dallas/Fort Worth, north to Chicago, east to Charleston, and south to Fort Lauderdale. The state's network is also conducive to the interface of all modes of freight travel. Alabama's freight network is comprised of 5 interstate highways, 7 commercial airports, 5 Class I railroads, a deep water port, and 10 inland docks along the largest inland waterway system in the nation. A key piece of this freight system is the Port of Mobile, a full-service deep water port servicing national and international freight cargo and which, combined with access to the inland water systems and the Intracoastal Waterway off Mobile Bay, attracts a broad span of commodity freight.

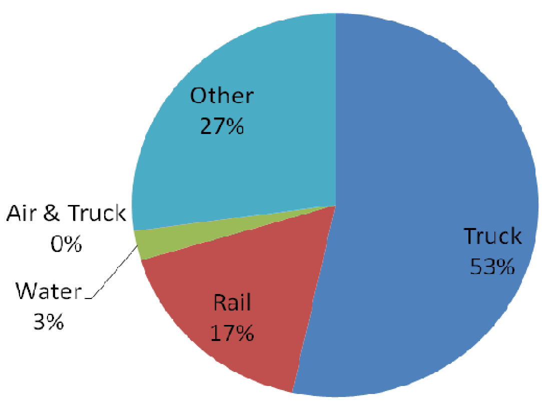
Alabama freight can be quantitatively described in terms of kilotons and value. In 2002 freight in Alabama reached 574,770 kilotons per year, with a value of more than $316 billion. By 2035, freight transportation will increase to 1,189,400 kilotons and valued at $792 billion. This is a 107 percent increase in kilotons and 150 percent increase in value from 2002 to 2035.

**Figure 1 Growth in Alabama Freight by Weight and Value 2002 & 2035**

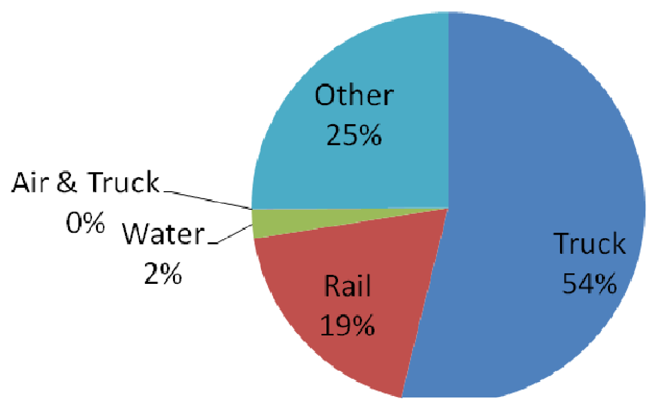


The distribution of the freight market by mode is presented in the figure below. Currently, trucking accounts for approximately 53 percent of all goods movement by weight in Alabama, making it the primary method for freight movements. Truck movements include local and long distance pickup and delivery as well as intermodal connectivity with rail, air cargo and maritime terminals. Rail represents 17 percent of freight movements by weight, and waterborne movements accounted for 3 percent by weight. Relative to other modes, air cargo represents a negligible share of all flows by weight. Air freight primarily serves time sensitive and high value shipments. Future freight movements are expected to reflect these same relationships, with trucks continuing to dominate total freight shipments by a slightly larger percentage than currently. Rail similarly continues to have a stable shipping base with minimal increase in its market share. However, this may not always be the case and market forces with ultimately dictate the mode share.

**Figure 2 Modal Distribution of Freight Flows by Weight (in Kilotons), 2002 and 2035**




**2002**




**2035**

Currently, Alabama's leading trading partners are the neighboring states of Mississippi, Georgia and Tennessee, as shown in Table 6. Approximately 23 percent[1] of trade by tons was with Mississippi, 19 percent with Georgia, 13 percent with Tennessee, 9 percent with Florida, and 7 percent with foreign partners. This same relation is expected to continue into 2035 with Mississippi, Georgia, Tennessee and Florida maintaining leading trade partner status and foreign partners continuing to represent less than 10 percent of the total (Table 2).

[1] FHWA Freight Management and Operations, FAF2

**Table 1 Major Trading Partners by Weight (in Kilotons), 2002**

| By State | | | |
|---|---|---|---|
| **Partner** | **Total** | **Outbound** | **Inbound** |
| **MS** | 85,776 | 13,284 | 72,491 |
| **GA** | 73,867 | 59,144 | 14,723 |
| **TN** | 50,766 | 26,508 | 24,258 |
| **FL** | 34,264 | 28,017 | 6,247 |
| **LA** | 13,712 | 9,876 | 3,836 |
| **TX** | 12,869 | 7,650 | 5,219 |
| **WY** | 12,060 | 272 | 11,788 |
| **KY** | 7,643 | 1,880 | 5,764 |
| **SC** | 7,373 | 4,823 | 2,550 |
| **IN** | 5,739 | 1,751 | 3,987 |

*Note: Due to rounding, sums may not total exactly.*

| By FAF Region | | | |
|---|---|---|---|
| **Partner** | **Total** | **Outbound** | **Inbound** |
| **MS** | 85,776 | 13,284 | 72,491 |
| **TN remainder** | 44,432 | 22,899 | 21,533 |
| **GA Atlanta** | 43,297 | 35,224 | 8,073 |
| **GA remainder** | 29,985 | 23,619 | 6,366 |
| **FL remainder** | 27,344 | 22,861 | 4,483 |
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| **KY remainder** | 6,930 | 1,357 | 5,573 |
| **SC remainder** | 5,917 | 3,941 | 1,976 |
| **TX Houston** | 5,032 | 2,535 | 2,497 |

**Table 2 Major Trading Partners by Weight (in Kilotons), 2035**

| By State | | | |
|---|---|---|---|
| **Partner** | **Total** | **Outbound** | **Inbound** |
| **MS** | 22,805 | 138,229 | 161,034 |
| **TN** | 68,823 | 67,799 | 136,622 |
| **GA** | 97,238 | 39,078 | 136,316 |
| **FL** | 84,815 | 8,887 | 93,701 |
| **CO** | 657 | 37,543 | 38,200 |
| **TX** | 22,193 | 11,180 | 33,374 |
| **WY** | 603 | 22,842 | 23,444 |
| **LA** | 13,495 | 8,788 | 22,283 |
| **KY** | 2,420 | 15,854 | 18,275 |
| **SC** | 7,353 | 5,171 | 12,524 |

*Note: Due to rounding, sums may not total exactly.*

| By FAF Region | | | |
|---|---|---|---|
| **Partner** | **Total** | **Outbound** | **Inbound** |
| **MS** | 22,805 | 138,229 | 161,034 |
| **TN rem** | 61,069 | 59,201 | 120,271 |
| **GA Atlan** | 62,237 | 25,127 | 87,364 |
| **FL rem** | 71,079 | 6,027 | 77,106 |
| **GA rem** | 34,286 | 12,480 | 46,766 |
| **AL-Mobile** | 6,068 | 31,390 | 37,458 |
| **CO Denve** | 444 | 36,989 | 37,433 |
| **WY** | 603 | 22,842 | 23,444 |
| **KY rem** | 1,594 | 14,762 | 16,356 |
| **TX Houst** | 9,732 | 5,314 | 15,046 |

This research project provided insight into the true nature of freight and transportation within the state of Alabama. Freight movement is continuing to grow, with trucking as the preferred method of freight transportation and there is little indication that this preference is going to change. Alabama is in a unique position to benefit from an increase in the globalization of trade and become an important player in the movement of freight. But to take full advantage of this opportunity, it is imperative that a systems approach be taken in the evaluation and understanding of the transportation infrastructure. The transportation system in Alabama must evolve into a flexible, yet efficient system of interconnected resources to move freight both cost-effectively and sustainably.

# 1. INTRODUCTION

## 1.1. Study Purpose

The need to integrate freight traffic into transportation planning has become more imperative in recent years, although its inclusion in most transportation plans and models has predominantly been limited in scope. The Alabama Department of Transportation (ALDOT) recognizes the need for research in freight transportation and the associated interrelationships between economic growth and transportation infrastructure. Identifying freight related constraints and potential improvements to the State's transportation system can facilitate freight mobility. This in turn may support economic development initiatives at the state and local level.

To this end, ALDOT initiated the Alabama Statewide Freight Study and Action Plan in April 2009. The study team was composed of the University of Alabama at Huntsville (UAH) Office for Freight, Logistics and Transportation and the consulting firm of J. R. Wilburn and Associates, Inc. Current and future multimodal freight movements into and out of the state, as well as the condition, operations and safety of the multimodal system, were analyzed. All modes of freight movement—truck, rail, air and water—were examined as a part of this study. Freight transportation operations are unique in that they are composed of both public and private system ownership supporting a multimodal network. Of the four modal elements, only highway infrastructure falls under the direct responsibility of ALDOT. Due to its significance with regard to share of overall freight movement and impact on the general traveling public, truck freight movement underwent analysis at an additional level of detail.

## 1.2. Stakeholder Advisory Group

ALDOT and its federal partners are responsible for State transportation programs and identifying improvements responsive to transportation needs. However, one important aspect of this effort has been to involve the public and private stakeholders who make daily decisions about freight transportation. The goal is to leave everyone, especially the private sector and modal carriers, with information useful in making efficient freight transportation decisions.

Stakeholder coordination for the Statewide Freight Study and Action Plan was very productive, building on the committee system developed during the recent Statewide Transportation Plan update. The Stakeholder Advisory Group (SAG) was updated to include a cross section of Alabama freight operators, shippers, and economic development agencies. Alabama's Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs), which are responsible for transportation planning—including freight planning—in urbanized and non-urbanized areas also participated. Freight transportation planning is an emphasis area for the Federal Highway Administration (FHWA), and statewide plans are expected to provide a point of reference for local urbanized freight planning carried out by the MPOs. The SAG's role was important to understanding and "proofing" study assumptions and analysis results to the reality of the Alabama freight system.

The study incorporated three meetings of the SAG, held at key points in the study schedule. The group met to discuss study progress, analyze findings and assist in developing final recommendations. Input from the group was documented, and a website was developed to disseminate information, including presentations and minutes of the SAG meetings as well as interim deliverables. In addition, a dedicated email address for questions and feedback was assigned and publicized on the web and at meetings. Input from the SAG members and public via the website and contact email was important to guiding the study's direction and developing feasible recommendations for needed improvements.

### 1.3. Study Deliverables

Previous deliverables from this study include Interim Reports 1, 2 and 3, as well as the Shortline Rail Rehabilitation Program technical memorandum. An overview and the key findings from these documents are briefly summarized in the following pages. Appendix A includes a glossary of terms and Appendix B a summary of the shortline rail research findings. The interim documents, as well as materials from the three stakeholder meetings conducted during the study's period of performance, are available on the Freight Study web site at:
http://cpmsweb2.dot.state.al.us/TransPlan/FreightStudy/Default.aspx#

## 2. Information Sources and Data Collection

The process, sources and limitations of the data collection effort conducted for traffic and economic data were documented in Interim Report 1. The report summarized the efforts to incorporate local economic data from many different sources. Freight volumes were allocated into smaller, sub-state zones utilizing highly aggregated national databases of freight traffic volumes. The output of this effort fed into the freight modeling, and the integration of that freight into existing transportation planning and modeling activities at the state and local level. Additionally, analyzing the output determined what improvements could be made to the transportation network to facilitate freight movements and intermodal connectivity.

Incorporating freight information into transportation plans and models is not a trivial process. Almost all types of freight data are considered proprietary by private companies and the release of that data is seen as detrimental to their competitive position. While national freight data are more readily available, there are challenges associated with the high level of aggregation in these databases. Understanding these limitations, the researchers used additional data sources to supplement, disaggregate and validate the data from the highly aggregated sources.

Modal data sources included:

- Freight Analysis Framework Version 2 (FAF2) Commodity Origin-Destination Database
- ALDOT 2008 traffic counts
- Alabama Rail Plan and Rail Directory
- US Army Corps of Engineers waterway data
- Port of Huntsville inbound/outbound volumes
- Port of Mobile import/export volumes

Primary economic/industry sector data sources included:

- US Census of Manufacturing
- US Census of Agriculture
- US Census of Mining
- US Geological Survey
- Alabama Forestry Commission
- US Department of Energy
- Energy Information Agency
- US Department of Commerce
- Bureau of Economic Analysis
- Economic Research Service
- Global Insight
- US Census and regional agency population and employment data
- Review of warehousing, distribution centers, and intermodal centers

The study relied on available data from the Freight Analysis Framework Version 2 (FAF2), which integrates data from several sources to estimate commodity flows for the entire nation among major metropolitan areas, states, regions and international gateways. FAF2 provides current (2002) and future (2035) projections for commodity volumes and value of shipments by mode.

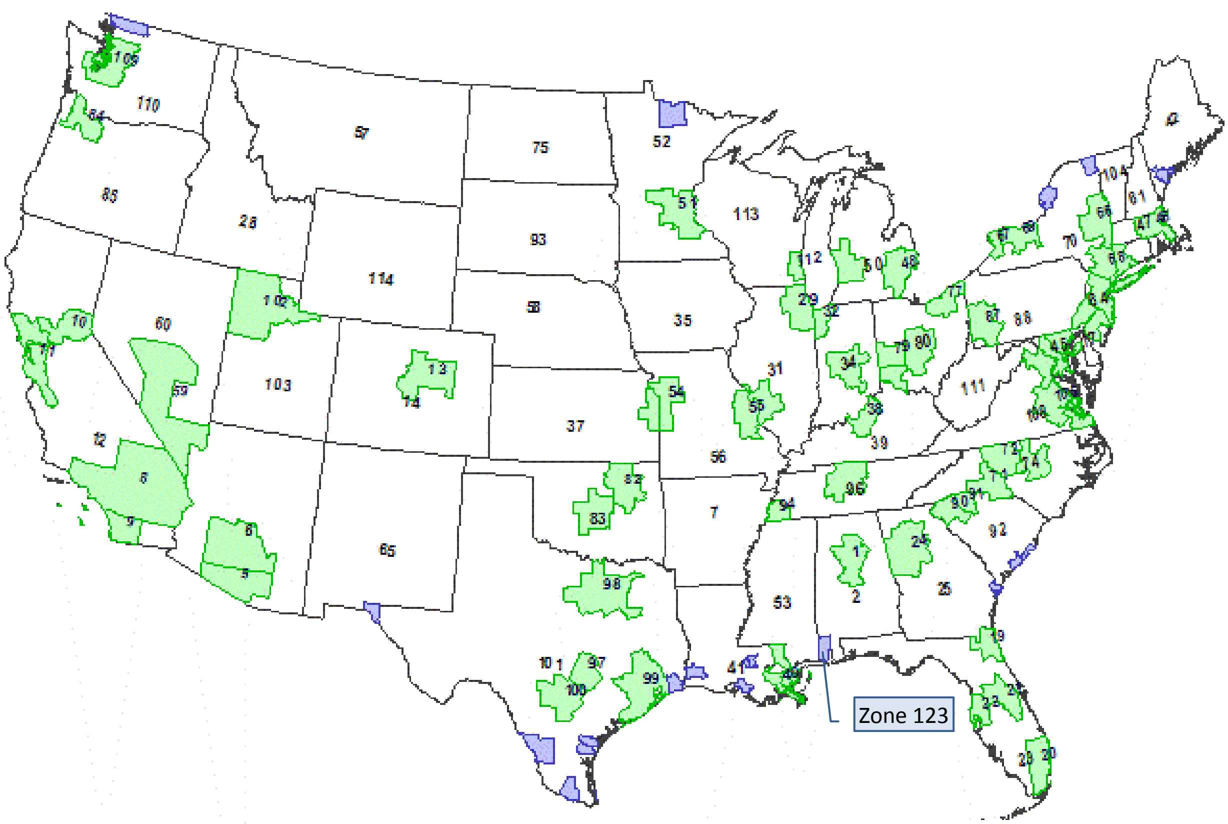
Freight databases report movements by the following categories:

- Internal—freight movements within Alabama with both origin and destination in Alabama
- Inbound—freight movements destined in Alabama but originating outside Alabama
- Outbound—freight movements originating in Alabama but with destinations outside Alabama

A program was developed to obtain freight movement that passed through Alabama (both the origin and destination outside of Alabama.

The FAF2 databases also report on types of commodities and mode of transportation. The information is organized into 114 regions within the US, plus an additional 17 ports/gateways and 7 international regions, as shown below. Alabama is divided into two zones (Zone 1 and Zone 2) and one international gateway located at the Port of Mobile (Zone 123).

**Figure 3 FAF2 Domestic Zones and Gateways, 2002**



The study effort analyzed freight movements to the county level. Detailed county profiles were developed by the UAHuntsville research team. A methodology was developed to determine the freight volumes by county, value of freight by county, and freight movement by mode.

The next steps in the methodology utilized similar methods of data collection, adjustment and reporting to the forecast data from the FAF2 database. This allowed for the modeling of 2035 freight on Alabama's infrastructure, thereby beginning the process of identifying congested locations and specifying potential big-picture solutions. For a more detailed account, see the interim documents mentioned previously.

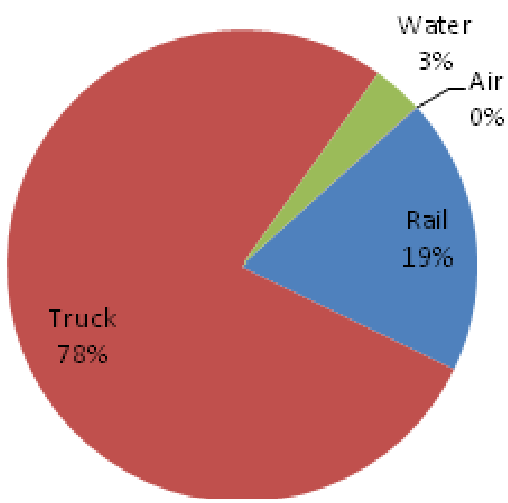
## 3. Overview of Freight Movement in Alabama

Alabama is ideally located for trade and business. The state's network of highways, ports, rivers, railroads and airports serves the Deep South, Mid-America and provides access to the eastern seaboard. An 11-hour drive from the center of Alabama reaches west to Dallas/Fort Worth, north to Chicago, east to Charleston, and south to Fort Lauderdale. The state's network is also conducive to the interface of all modes of freight travel. Alabama's freight network is comprised of 5 interstate highways, 7 commercial airports, 5 Class I railroads, a deep water port, and 10 inland docks along the largest inland waterway system in the nation. A key piece of this freight system is the Port of Mobile, a full-service deep water port servicing national and international freight cargo and which, combined with access to the inland water systems and the Intracoastal Waterway off Mobile Bay, attracts a broad span of commodity freight.

Alabama freight can be quantitatively described in terms of kilotons and value. In 2002 freight in Alabama reached 574,770 kilotons per year, with a value of more than $316 billion. By 2035, freight transportation will increase to 1,189,400 kilotons and valued at $792 billion. This is a 107 percent increase in kilotons and 150 percent increase in value from 2002 to 2035.

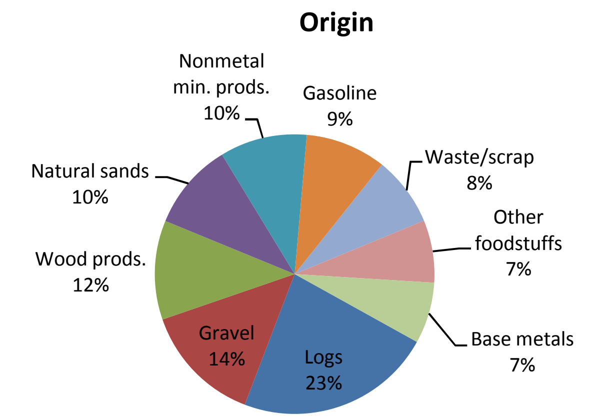
Freight transportation is multimodal, with each mode serving a logistical purpose and employed independently or in combination to satisfy requirements of the commodities established by the shipper for a customer. Figure 4Figure 4 shows the 2002 statewide freight flows by mode. Truck, by far the most utilized mode for shipping freight statewide, accounts for 78 percent of all freight flows. Rail is also common, accounting for 19 percent of all freight flows. Water accounts for 3 percent, while air carries a negligible share of Alabama's freight flows.

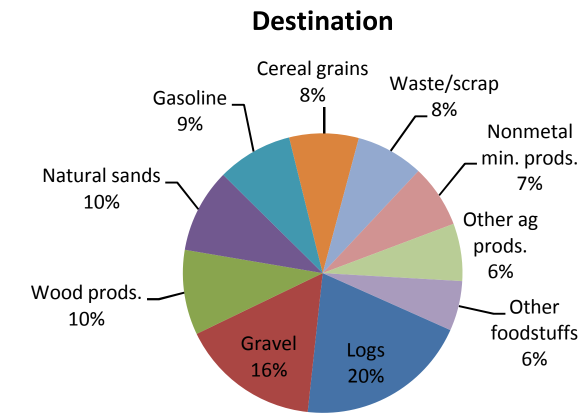
**Figure 4 Statewide Freight Flows by Mode**



The following charts indicate the top commodities shipped by truck that originated in, and were destined for Alabama, respectively. Logs and gravel made up the greatest percent of commodities moved by truck both into and out of Alabama. With the exception of base metals and cereal grains, the remaining eight top commodities are found in both origin and destination.

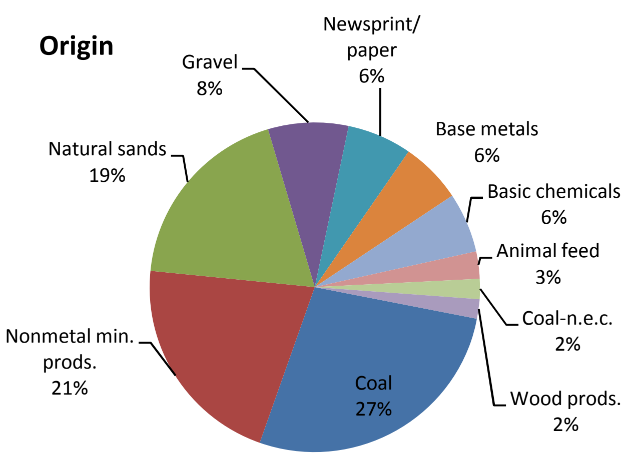
**Figure 5 Commodities by Truck, Origin and Destination**

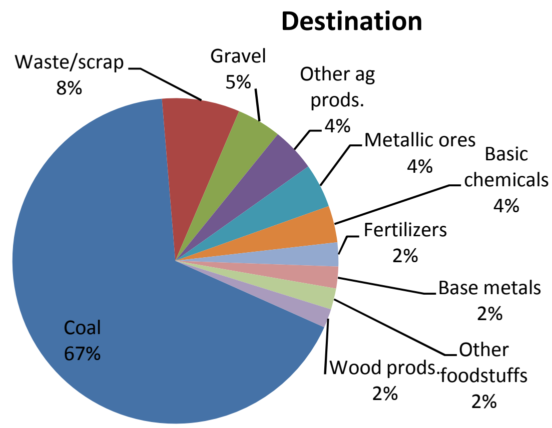



Commodity percentages shipped by rail to and from Alabama are shown in Figure 6. Coal accounts for the greatest percentage of rail shipments in both cases; however, Alabama imports almost two and a half times the amount of coal that it exports, a function of the sulfur content found in Alabama coal. Nonmetal mineral products and natural sands both have sizable shares of the origin shipments, at 21 percent and 19 percent, respectively. None of the other nine top commodities shipped by rail destined for Alabama accounts for more than 8 percent.

**Figure 6 Commodities by Rail, Origin and Destination**



Freight moved using Alabama waterways, both originating and terminating in Alabama, are presented in Figure 7. Coal accounts for almost half of the commodities originating in Alabama and shipped by water, while crude petroleum makes up about a similar percentage of the commodities destined for Alabama.

**Figure 7 Commodities by Water, Origin and Destination**

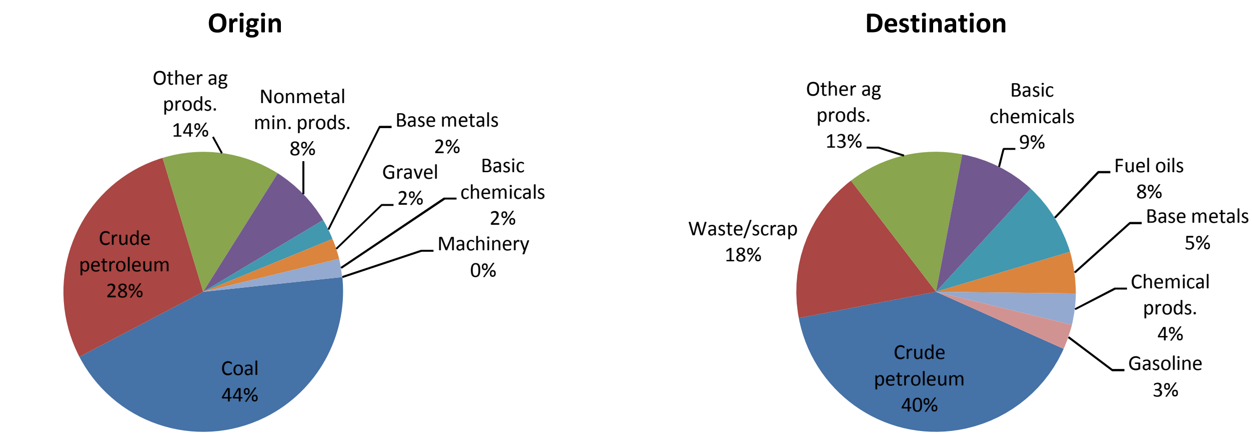



Figure 8 shows the commodities shipped by air that originated and terminated in Alabama in 2002. Commodities moved by air freight are typically high value and time sensitive, such as electronics and machinery, which make up half of all shipments both originating in and destined for Alabama.

**Figure 8 Commodities by Air, Origin and Destination**

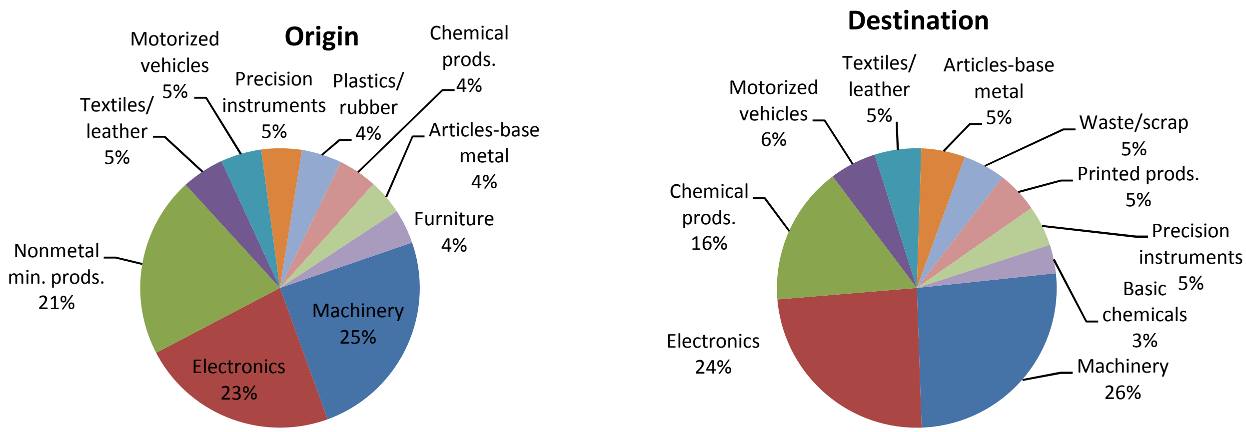


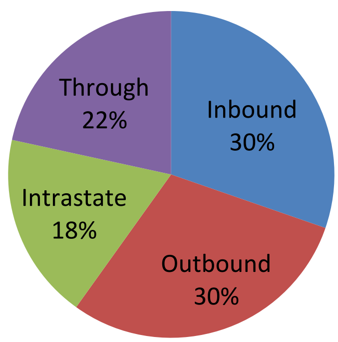
Table 3 presents the annual kilotons by mode and total that originated, terminated, moved within, and passed through Alabama. Figure 9 shows the percentage by direction of 2002 Alabama total annual kilotons.

**Table 3 Alabama Freight by Mode and Total, 2002 (Annual Kilotons)**

| | Truck | Rail | Water | Air | Total |
|---|---|---|---|---|---|
| Inbound | 74,106 | 44,394 | 7,647 | 65 | 126,212 |
| Outbound | 71,661 | 38,554 | 4,069 | 41 | 114,326 |
| Intrastate | 159,062 | 11,659 | 1,024 | 113 | 171,858 |
| Through | 96,055 | 127,167 | 1,555 | 4 | 224,781 |
| TOTAL | 400,884 | 221,775 | 14,295 | 224 | 637,177 |

*Note: Due to rounding, sums may not total exactly.*

**Figure 9 Alabama Freight by Direction, 2002 (Total Annual Kilotons)**



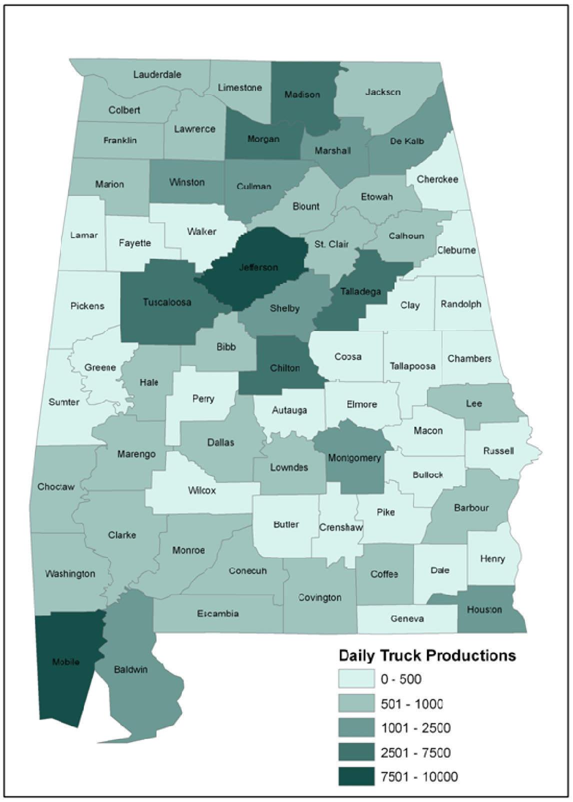

The ten counties with the most truck origins and destinations are listed in the table that follows. Jefferson, Tuscaloosa, and Mobile are the top three counties in both directions.

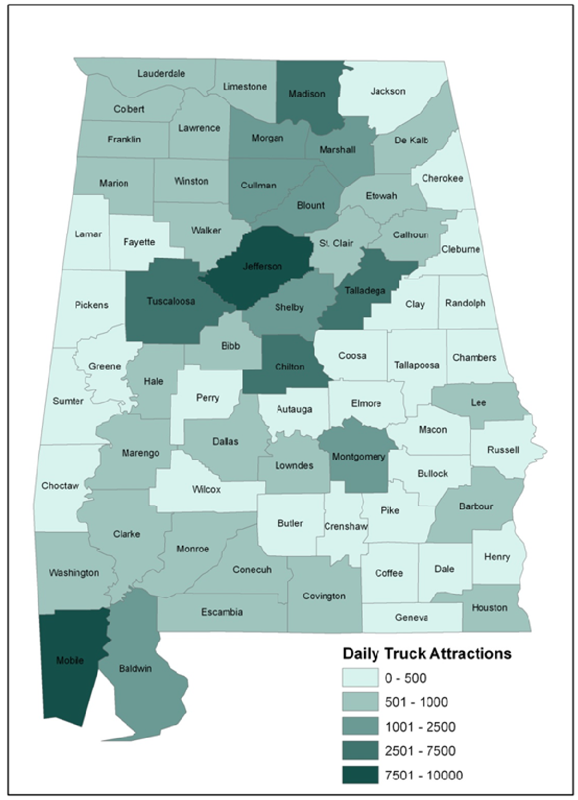
**Table 4 Top Ten Origin/Destination Counties for Truck Freight, 2002**

| Origin | Destination |
|---|---|
| Jefferson | Jefferson |
| Mobile | Mobile |
| Tuscaloosa | Tuscaloosa |
| Talladega | Talladega |
| Chilton | Chilton |
| Madison | Madison |
| Morgan | Shelby |
| Shelby | Morgan |
| Marshall | Cullman |
| Montgomery | Marshall |

Figure 10 illustrates which counties produce and attract the highest and lowest volumes of trucks.

**Figure 10 Daily Truck Productions and Attractions, 2002**



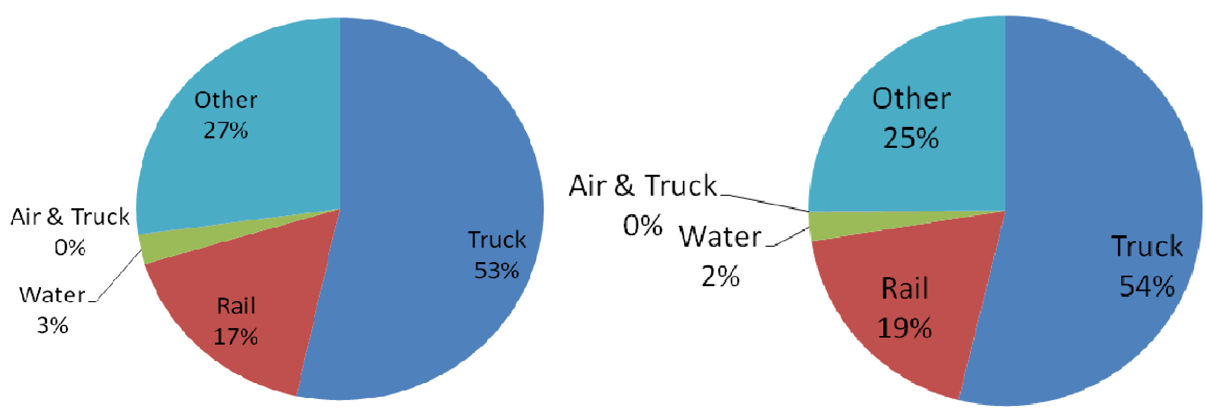

The examination of non-truck modes focused on the counties in Alabama where non-truck freight was likely to originate or terminate. The counties that had the highest number of shipments based on mode in the base year (2002) are listed in Table 5.

**Table 5 Top Ten Origin/Destination Counties for Non-Truck Freight, 2002**

| Rail | | Water | | Air | |
|---|---|---|---|---|---|
| Origin | Destination | Origin | Destination | Origin | Destination |
| Jefferson | Jefferson | Mobile | Mobile | Madison | Madison |
| Tuscaloosa | Mobile | Madison | Tuscaloosa | Mobile | Morgan |
| Mobile | Tuscaloosa | Tuscaloosa | Jefferson | Morgan | Jefferson |
| Franklin | Talladega | Escambia | Morgan | Montgomery | Mobile |
| Shelby | Chilton | Baldwin | Escambia | Dallas | Montgomery |
| Walker | Madison | Monroe | Monroe | Tuscaloosa | Dallas |
| Cullman | Morgan | Talladega | Baldwin | Marshall | Tuscaloosa |
| Morgan | Shelby | Morgan | Madison | Limestone | Marshall |
| Talladega | Marshall | Limestone | Washington | DeKalb | Limestone |
| Chilton | Montgomery | Washington | Montgomery | Houston | DeKalb |

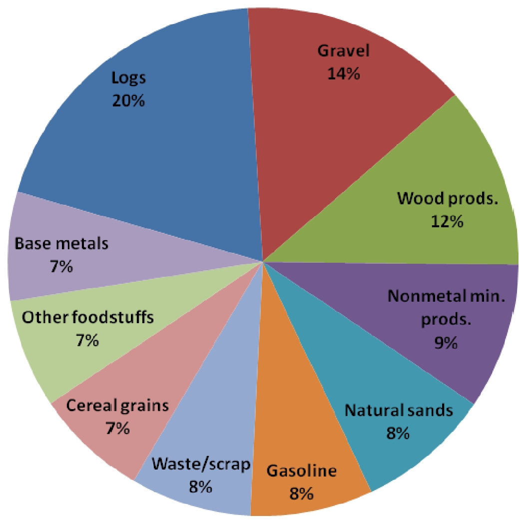
The percent of the freight market by mode is presented in Figure 11. Currently trucking accounts for approximately 53 percent of all goods movement by weight in Alabama, making it the primary method for freight movements. Truck movements include local and long distance pickup and delivery as well as intermodal connectivity with rail, air cargo and maritime terminals. Rail represents 17 percent of freight movements by weight, and waterborne movements accounted for 3 percent by weight. Relative to other modes, air cargo represents a negligible share of all flows by weight. Air freight primarily serves time sensitive and high value shipments. Future freight movements are expected to reflect these same relationships, with trucks continuing to dominate total freight shipments by a slightly larger percentage than currently. Rail similarly continues to have a stable shipping base with minimal increase in its market share. However, this may not always be the case and market forces with ultimately dictate the mode share.

**Figure 11 Modal Distribution of Freight Flows by Weight (in Kilotons), 2002 and 2035**



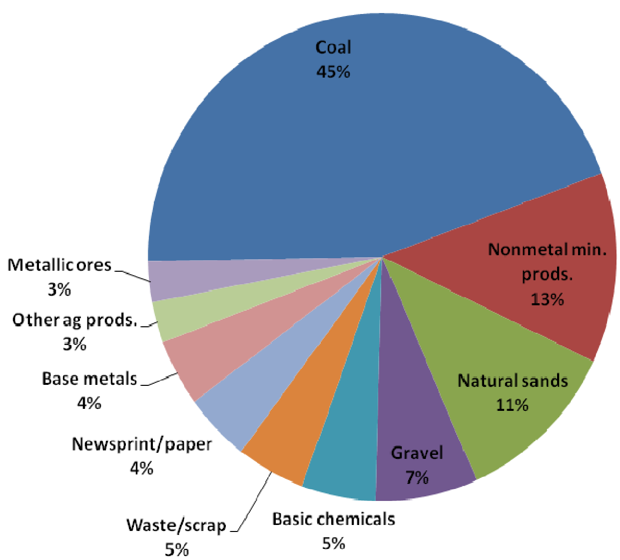

Commodities shipped in Alabama represent a wide range of products. Retail products, supplies for businesses, goods produced in the state's manufacturing, mining and agricultural industries, and daily necessities such as food, clothing, and household goods are among the shipments into, out of, and within Alabama. Trucks move the largest amount of freight in Alabama, with the leading commodities ranging from raw materials to food and finished goods.

**Figure 12 Top Ten Commodities by Truck, 2002**



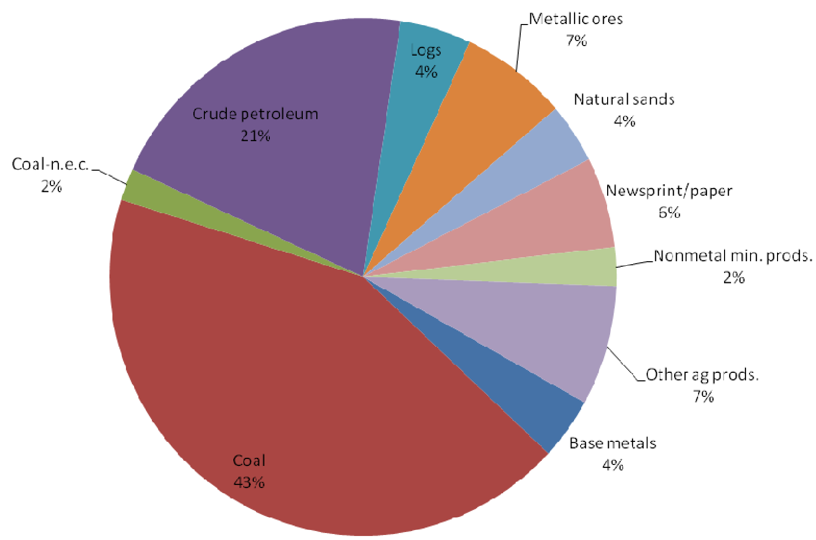

Rail shipments include a broad range of commodities as well, although rail freight tends to be more bulky raw materials as opposed to finished goods. As noted previously, coal represents almost half of all rail shipments in Alabama.

**Figure 13 Top Ten Commodities by Rail, 2002**



The Port of Mobile is a key element in Alabama's freight network, connecting Alabama's economy to national and international markets. As shown in Figure 14, leading commodities shipped through the Port of Mobile include coal and crude petroleum.

**Figure 14 Top Ten Commodities Through the Port of Mobile, 2002**

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[2] FHWA Freight Management and Operations, FAF2

**Table 6 Major Trading Partners by Weight (in Kilotons), 2002**

| By State | | | |
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| **LA New Orleans** | 8,811 | 6,199 | 2,611 |
| **KY remainder** | 6,930 | 1,357 | 5,573 |
| **SC remainder** | 5,917 | 3,941 | 1,976 |
| **TX Houston** | 5,032 | 2,535 | 2,497 |

**Table 7 Major Trading Partners by Value (in Millions of Dollars), 2002**

| By State | | | |
|---|---|---|---|
| **Partner** | **Total** | **Outbound** | **Inbound** |
| **GA** | 44,143 | 30,256 | 13,887 |
| **MS** | 33,737 | 7,750 | 25,987 |
| **TN** | 26,673 | 14,414 | 12,258 |
| **FL** | 19,622 | 13,407 | 6,215 |
| **TX** | 14,569 | 6,736 | 7,833 |
| **LA** | 9,810 | 4,523 | 5,287 |
| **CA** | 8,120 | 4,406 | 3,714 |
| **NC** | 6,991 | 3,256 | 3,735 |
| **MI** | 6,326 | 2,470 | 3,856 |
| **IL** | 6,226 | 2,573 | 3,653 |

*Note: Due to rounding, sums may not total exactly.*

| By FAF Region | | | |
|---|---|---|---|
| **Partner** | **Total** | **Outbound** | **Inbound** |
| **MS** | 33,737 | 7,750 | 25,987 |
| **GA Atlanta** | 26,166 | 17,917 | 8,249 |
| **GA remainder** | 16,596 | 11,878 | 4,718 |
| **TN remainder** | 16,243 | 10,318 | 5,926 |
| **FL remainder** | 13,475 | 10,088 | 3,387 |
| **TN Nashville** | 5,269 | 2,874 | 2,396 |
| **TN Memphis** | 5,160 | 1,223 | 3,937 |
| **LA New Orleans** | 4,922 | 2,397 | 2,526 |
| **LA remainder** | 4,695 | 2,083 | 2,612 |
| **TX Dallas** | 4,695 | 1,256 | 3,439 |

## 4. Deficiencies Analysis

ALDOT initiated this study to gain better understanding of the interrelationships between freight movement, transportation infrastructure, and economic growth. Combining data on commodity flows, transportation operations and economic growth from a variety of sources yields a more complete picture of current and future demands on the transportation network. An assessment of conditions can be used to identify areas of greatest interest specifically related to the transportation system. This enables ALDOT and its public and private freight partners to proactively coordinate in the development of improvements to mitigate adverse impacts. The approach, methodology and findings of the deficiencies analysis activities are documented in Interim Report 2.

The FAF2 (Freight Analysis Framework Version 2) national database information collected in Task 1 was refined using UAH survey data to disaggregate the national data to the county level and focus on Alabama freight movements and commodity market trends. County profiles of commodity flows and freight movements, which are important in understanding priorities for statewide improvements, were also developed. The FAF2 flows indicate which of seven freight modes is used to move the annual kilotons designated by Standard Classification of Transported Goods (SCTG). The freight movements were separated by mode in order to convert to daily vehicles. The analysis resulted in a set of matrices that presented the weight in kilotons of freight moving in and out of the 67 Alabama counties, by mode, for the 2002 base year and 2035 future year. Similar matrices indicated the number of daily vehicles for truck, rail and water modes.

Examining daily truck production and attraction values reveals that the counties with the largest share of manufacturing industries tend to dominate as the counties that produce and attract the highest volume of trucks. There does not seem to be economic factors that would indicate that the major counties for truck volume in 2035 will be significantly different. Nevertheless, the FAF2 database contains the provision that some commodities might undergo changes in their presence in Alabama in the future. Changes in mode of transport might result in reduced numbers of truck movements for some counties, although the amount of freight transported actually increased. A similar evaluation focusing on non-truck freight origination or termination by county was also conducted.

As a part of the study, the Alabama Statewide Travel Demand Model was updated to include a freight component. Specific update activities included: reflecting current conditions; providing an opportunity for the Metropolitan Planning Organizations (MPOs) to update socio-economic characteristics for the Traffic Analysis Zones (TAZ) in their region; and incorporating truck trips (developed in Task 1) into the Alabama Statewide Travel Demand Model. Model outputs of potential current (base year 2002) and future (2035) deficient locations for freight movement were then analyzed in the updated model. The analysis focused on determining the top segment locations—interstate and non-interstate—that would benefit from further study.

Initially, the locations of highest volume to capacity (VC) ratio with the highest truck volume per lane per day were determined independently for interstate and non-interstate systems. The key locations of interest were roadways that ranked high in both truck volume per lane and VC ratio, indicating congested locations with a significant number of trucks contributing to the congestion. This combination would identify locations where potential freight strategies might be useful in alleviating congestion. Locations with a high VC ratio but low number of trucks per lane indicate the main cause of congestion is passenger cars, and therefore truck mitigation strategies would have little effect. Locations with high truck volume per lane but lower VC ratios indicate locations of intense trucking activity, the limited congestion would not likely warrant special improvements with an emphasis on trucks, unless there was an economic reason for the improvement. Figure 15 andFigure 16 illustrate the combined (high VC ratio and high truck volume per lane, interstate and non-interstate) analysis results for the base year (2002) and future year (2035), respectively.

**Figure 15 Key Locations of Interest Due to Congestion and Truck Volumes, Base Year 2002**

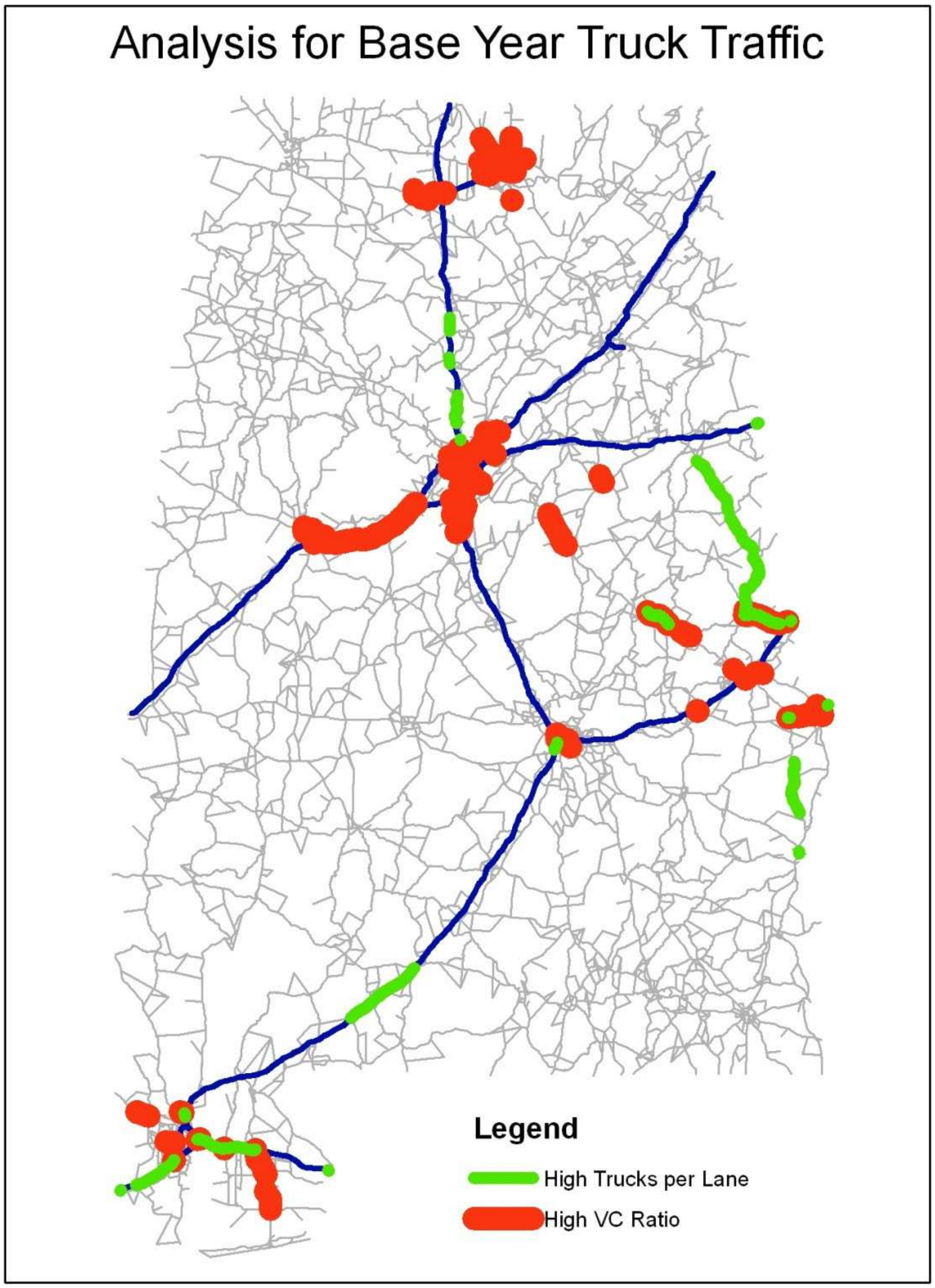
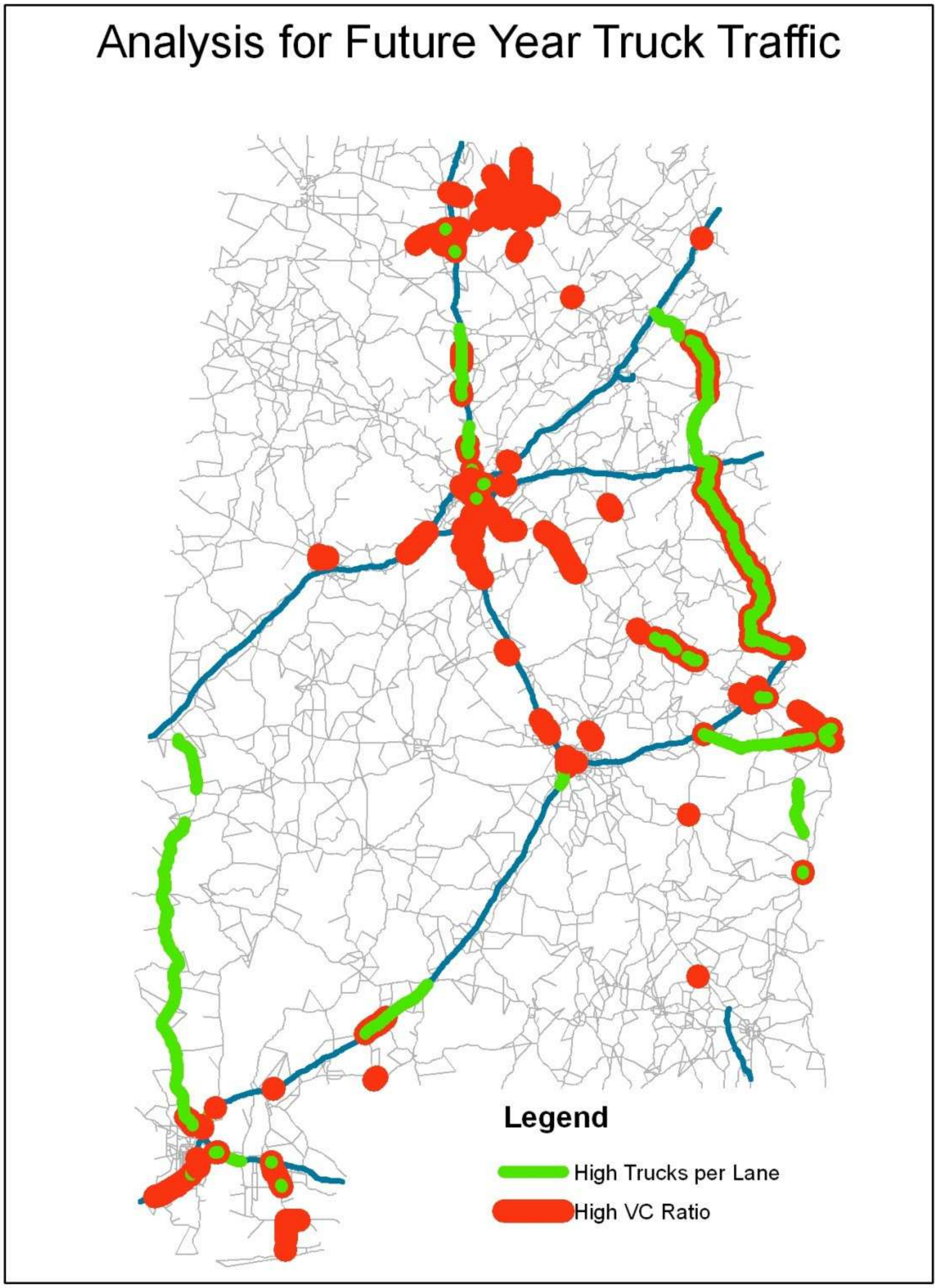
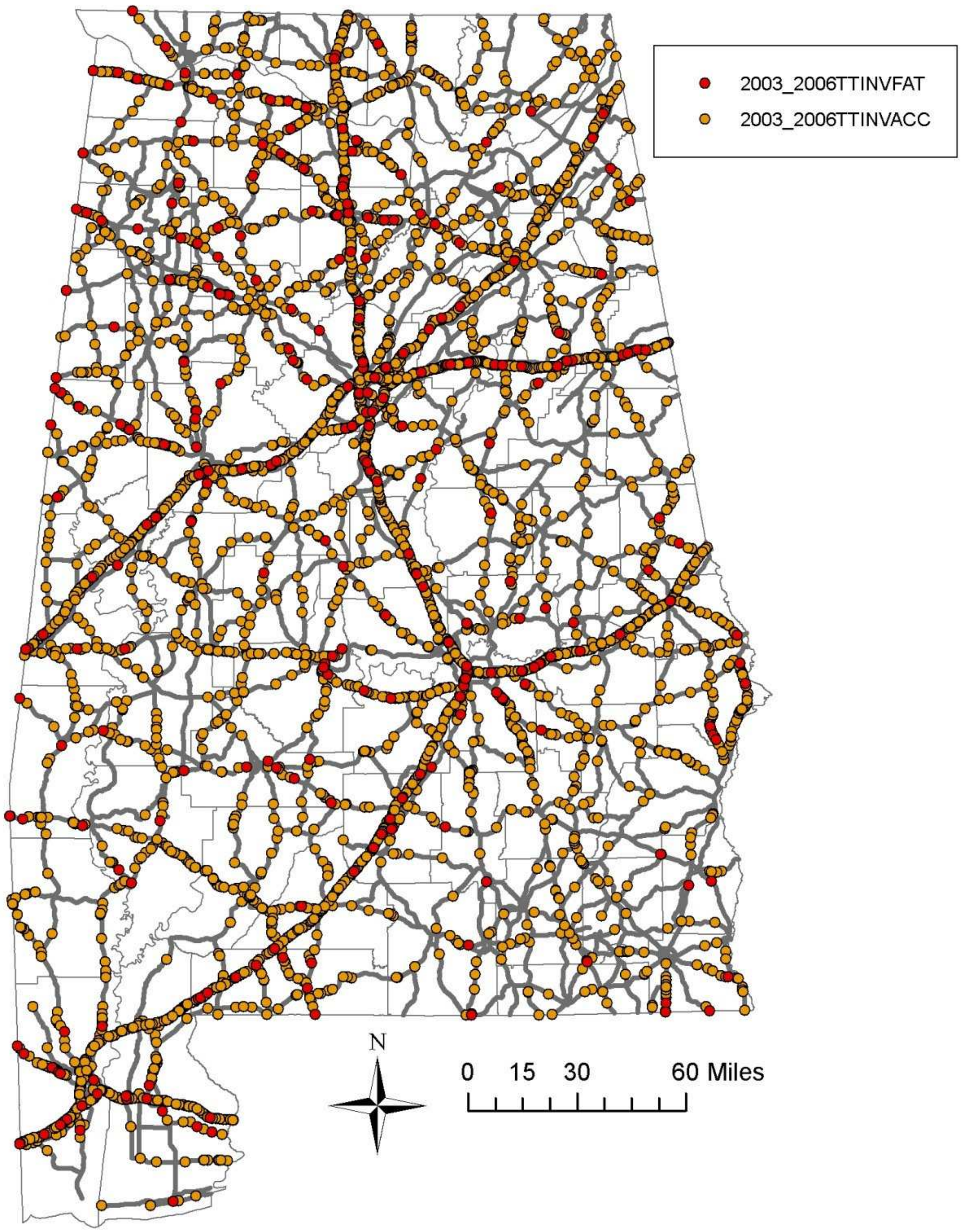


**Figure 16 Key Locations of Interest Due to Congestion and Truck Volumes, Forecast Year 2035**




An additional review of the roadways from the perspective of accidents was undertaken. A hypothesis was considered that areas of high truck volume and high VC ratio could have a relationship to accidents involving trucks. The resulting areas of interest are shown on Figure 17.

**Figure 17 Tractor Trailer Involved Fatalities and Accidents (2003-2006)**




**NOTES ON LEGEND:**

2003_2006TTCINVFAT = Tractor trailer involved accident resulting in a fatality (2003-2006)

2003_2006TTINVACC = Tractor trailer involved accident (2003-2006)

The analysis of potential current (base year 2002) and future (2035) deficient locations for transporting commodities on the Alabama transportation system can be summarized as follows:

- Interstate truck shipments are most likely to be involved in congested conditions on I-59 or I-65 around Birmingham and Montgomery. Heaviest truck movements (truck volumes per lane) exist or will likely occur by future year 2035 on I-65 north of Birmingham near Cullman and on I-65 between Montgomery and Mobile.

- Off-interstate truck movements show that the most problematic areas of the state for freight are US 431 and US 280. These locations show a large amount of trucks operating on roadways with a high level of congestion. Additionally, US 80 and the AL 17 corridor north of Mobile also show a large number of trucks, although these are not necessarily operating on congested roadways. Nevertheless, high truck intensity may impact passenger cars on these facilities with respect to passing movements.

- The non-truck modes were not explicitly modeled in this effort, but having an understanding of the counties with the highest impact and knowledge of commodities being transported is vital in understanding the overall nature of freight within Alabama.

## 5. Responses to Deficiencies

The major commodities flowing by truck along roadways were analyzed to better understand their contribution to congestion on the facility. The State Highway Network was emphasized since truck movements along those facilities are critical from both an intra- and inter-modal perspective. Additionally, roadways were selected for further study because trucks represent the major mode of transport and have the most significant impact on the general public. The analysis focused on the number of trucks loaded with each specific commodity versus the total number of trucks on the roadway. In this fashion, it was possible to determine the major commodities being moved for a wide variety of roadway segments.

Table 8 provides a list of the major commodities flowing by truck in a particular direction and location along key corridors statewide. Although the major commodity presented is frequently the primary commodity being shipped along a particular corridor, another major commodity representing a significant share of the movements may be presented in order to illustrate a variety of commodities. The main products traveling through Alabama are fertilizer, fuel oil, articles of base metals, base metals, natural sand, non metallic minerals, waste/recycled material, unknown and mixed freight. With the exception of unknown and mixed freight, economics and infrastructure would be the only impediments to moving these commodities by rail and/or water modes.

A representative graphic illustrating the results of the major commodity flow evaluation for one location is shown in Figure 18. Fertilizer is a major commodity traveling I-65 north from Mobile, composing approximately 15 percent of all northbound truck movements. A large number of these movements use US 45, US 31 and US 84 to access south Alabama's farming areas, while others access Georgia via I-85 and US 80. The blue highlighting indicates the major origin and destination movements for the truck trips that combine to make up the total number of trucks. Also provided is the analysis location, the total number of trucks on the facility expected in 2035 from the model, and the number of trucks for the major commodity on the facility.

State roadway system corridors were identified where underlying commodity flows or origin-destination patterns indicate a possible alternate management or operational strategy could be considered. Key findings from the detailed analysis are intended to focus on the question of alternatives for freight movement. Examples include off-peak travel, parallel corridors, and freight mode choice.

Building on previous analyses, a comparison was undertaken between those locations likely to experience freight issues in year 2035 and locations where ALDOT has already identified a project in its CPMS (Comprehensive Project Management System). The metrics used in the analysis of potentially deficient locations include truck accident locations (focusing on those locations where a fatality occurred), volume to capacity (VC) ratio (where severe congestion is likely), and truck volumes per lane (where truck volume is intense). The comparison also highlights those locations anticipated to have freight issues but for which a potential project has yet to be identified.

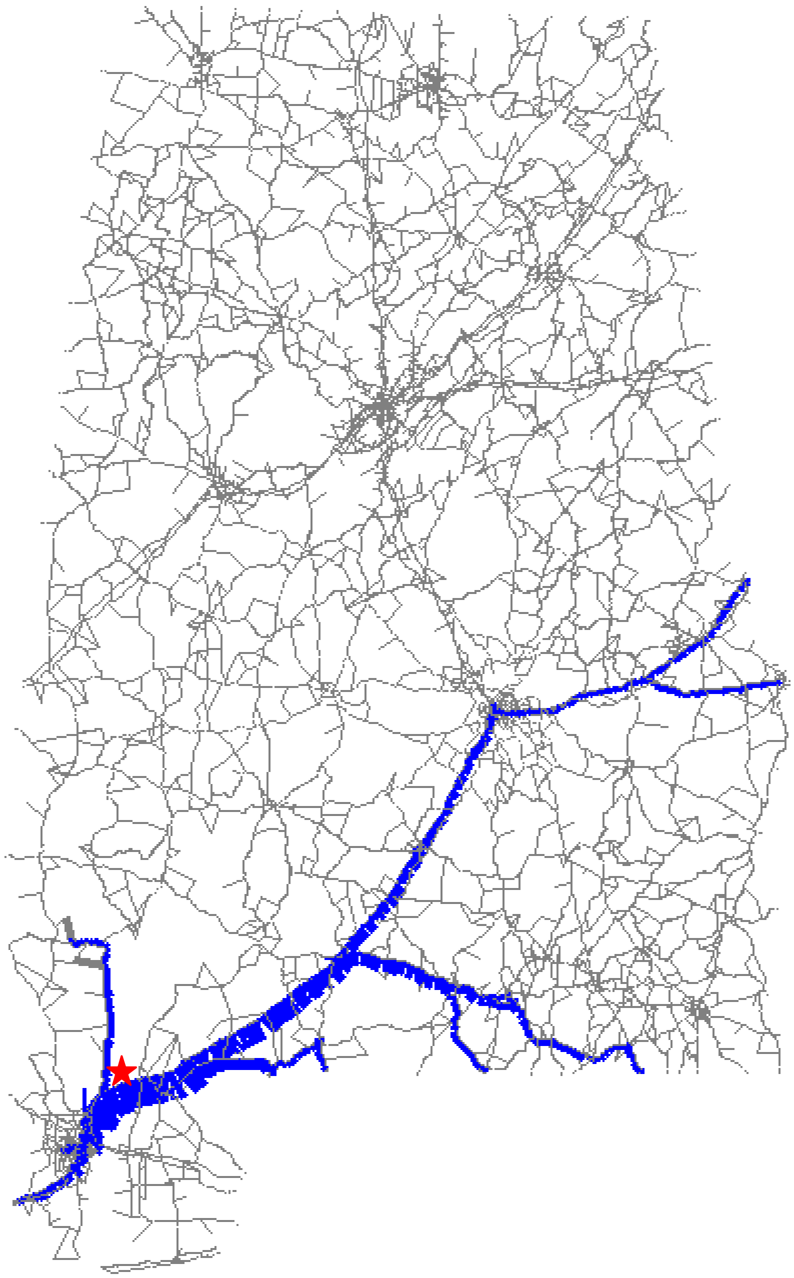
Figure 19and Figure 20 present a comparison of truck accident locations for years 2003-2006 against capacity or safety improvement projects currently identified in the CPMS for 2003-2034. There were a total of 431 accidents, including 329 accidents involving a tractor trailer that resulted in a fatality and

102 accidents deemed to be caused by a tractor trailer and resulting in a fatality. Figure 19 highlights the 244 truck involved/caused fatal accidents located within one mile of a CPMS safety or capacity project. In contrast, Figure 20 identifies the locations of the 187 truck involved/caused fatal accidents not within one mile of a CPMS project. By expanding the examination to include accident locations, VC ratio and truck volumes per lane, a more robust assessment of locations for which there is a potential need but no identified project has yet been initiated.

**Table 8 Major Commodity Flow on Key Corridors**

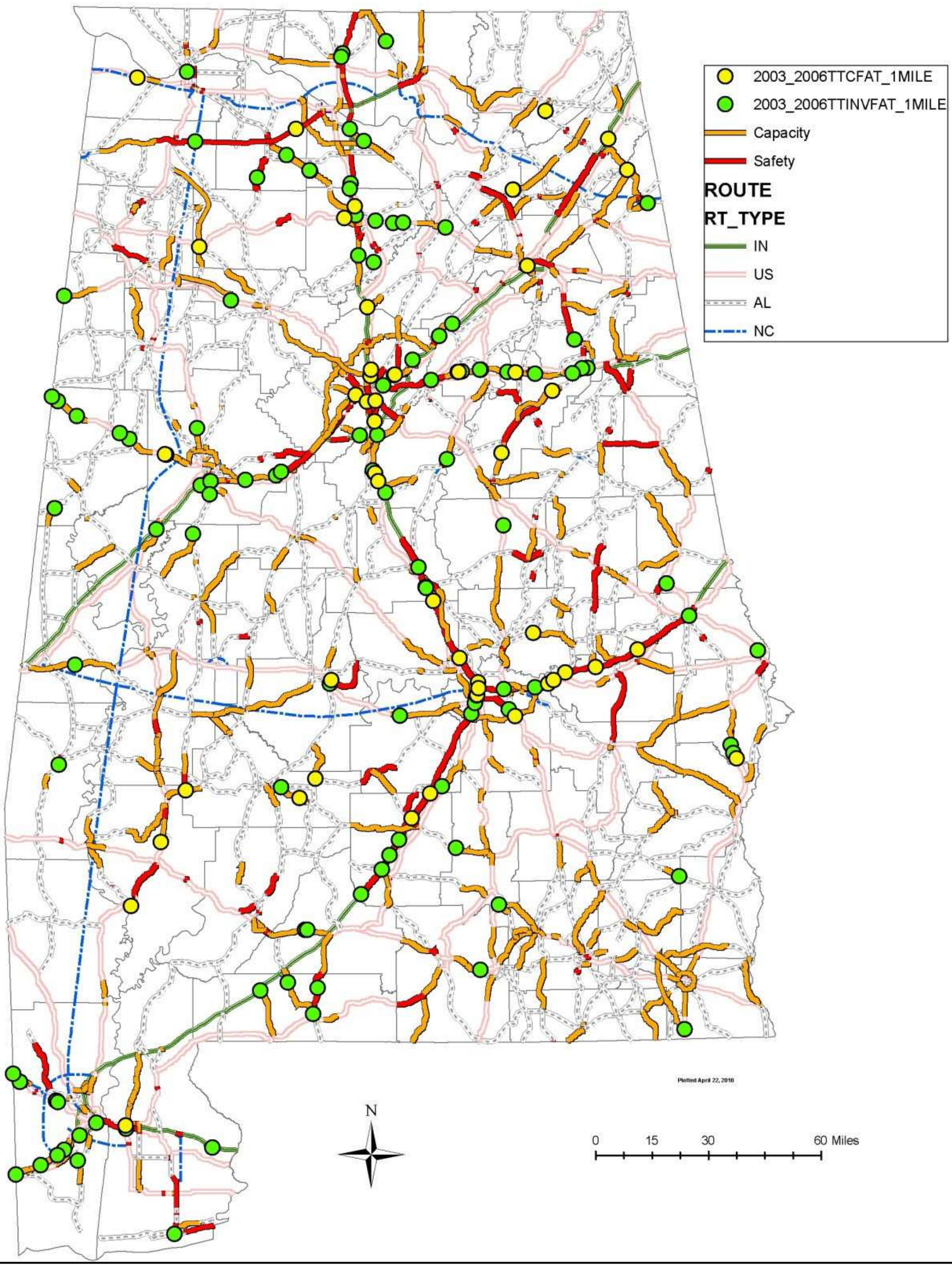
| Facility | Direction | Location | Major Commodity |
|---|---|---|---|
| I-10 | Eastbound | Near Florida | Fertilizer |
| I-10 | Westbound | Near Florida | Waste/Recycled Material |
| I-10 | Eastbound | Near Mississippi | Waste/Recycled Material |
| I-10 | Westbound | Near Mississippi | Fertilizer |
| I-20/59 | Eastbound | Near Mississippi | Waste/Recycled Material |
| I-20/59 | Westbound | Near Mississippi | Base Metal |
| I-20 | Eastbound | Near Georgia | Fertilizer |
| I-20 | Westbound | Near Georgia | Waste/Recycled Material |
| I-59 | Northbound | Near Tennessee | Natural Sand |
| I-59 | Southbound | Near Tennessee | Natural Sand |
| I-65 | Northbound | North of Mobile | Fertilizer |
| I-65 | Southbound | North of Mobile | Fertilizer |
| I-65 | Northbound | North of Birmingham | Unknown |
| I-65 | Southbound | North of Birmingham | Unknown |
| I-85 | Eastbound | East of Montgomery | Fertilizer |
| I-85 | Westbound | East of Montgomery | Wood |
| US 43 | Northbound | North of Mobile | Unknown |
| US 43 | Southbound | North of Mobile | Unknown |
| US 72 | Eastbound | East of I-65 | Mixed Freight |
| US 72 | Westbound | East of I-65 | Non Metallic Ore |
| US 72 | Eastbound | West of I-65 | Base Metal |
| US 72 | Westbound | West of I-65 | Waste/Recycled Material |
| US 84 | Eastbound | East of I-65 | Fertilizer |
| US 84 | Westbound | East of I-65 | Fuel Oil |
| US 84 | Eastbound | West of I-65 | Fuel Oil |
| US 84 | Westbound | West of I-65 | Fuel Oil |
| US 280 | Northbound | Birmingham to Auburn | Unknown |
| US 280 | Southbound | Birmingham to Auburn | Articles of Base Metals |
| US 431 | Northbound | North of Auburn | Natural Sands |
| US 431 | Southbound | North of Auburn | Base Metals |

**Figure 18  Major Commodity Flow, I-65 Northbound, North of Mobile (Fertilizer)**



| | |
|---|---|
| ★ | Location for Commodity and Direction Analysis as Noted in Figure Title Above |
| **10,900** | Total Projected 2035 Daily Directional Truck Volume |
| **1,500** | Projected 2035 Directional Truck Volume for Commodity Noted |

**Figure 19 Tractor Trailer Fatal Accidents (2003-2006) Within 1 Mile of Safety and Capacity Projects (2003-2034)**

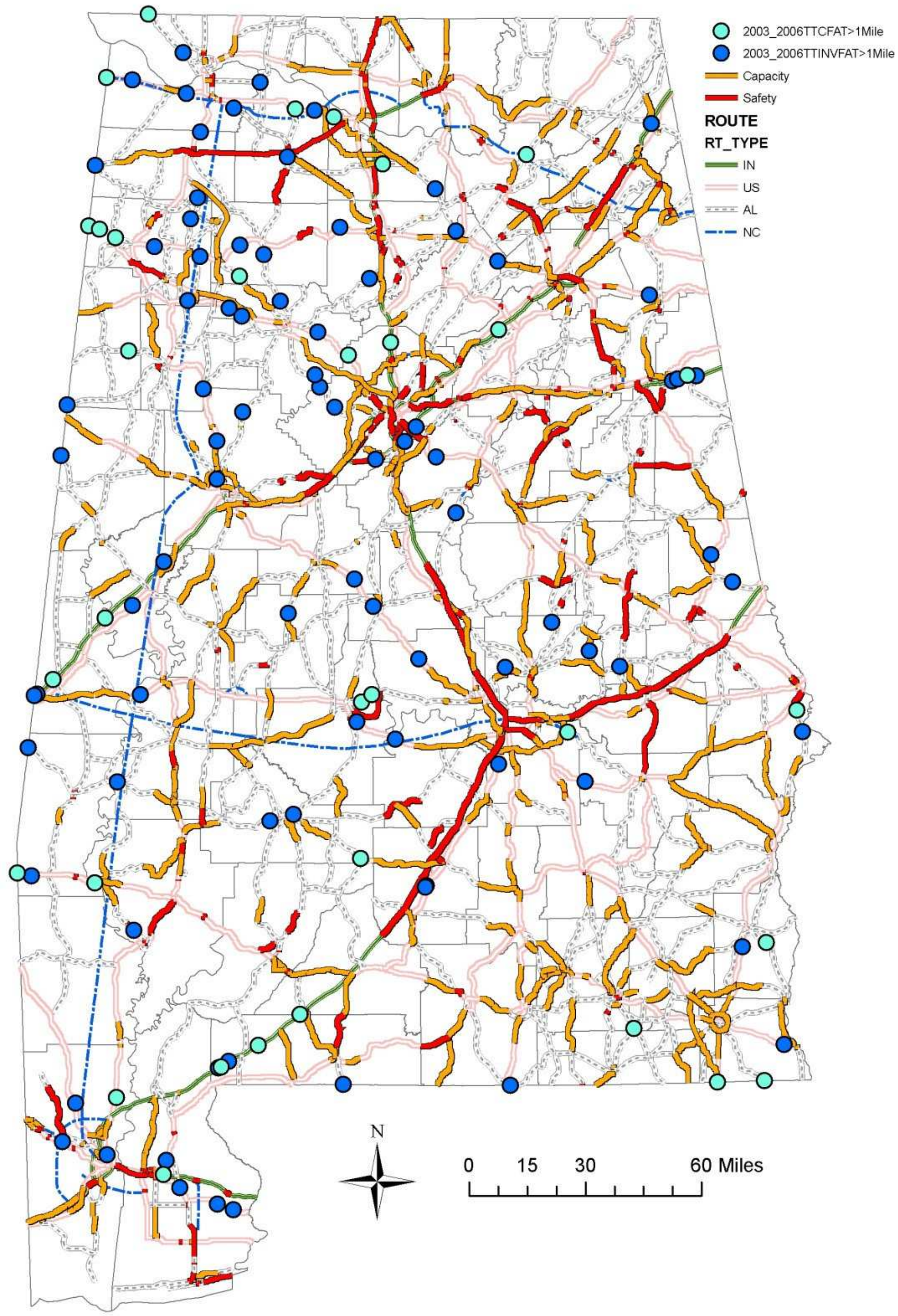



**NOTES ON LEGEND:**

2003_2006TTCFAT_1MILE = Accident ***deemed to be caused by*** a tractor trailer and resulting in a fatality (2003-2006) that occurred within one mile of a CPMS Safety or Capacity project (2003-2034)

2003_2006TTINVFAT_1MILE = Accident ***involving*** a tractor trailer and resulting in a fatality (2003-2006) that occurred within one mile of a CPMS Safety or Capacity project (2003-2034)

**Figure 20 Tractor Trailer Fatal Accidents (2003-2006) Not Within 1 Mile of Safety and Capacity Projects (2003-2034)**




**NOTES ON LEGEND:**

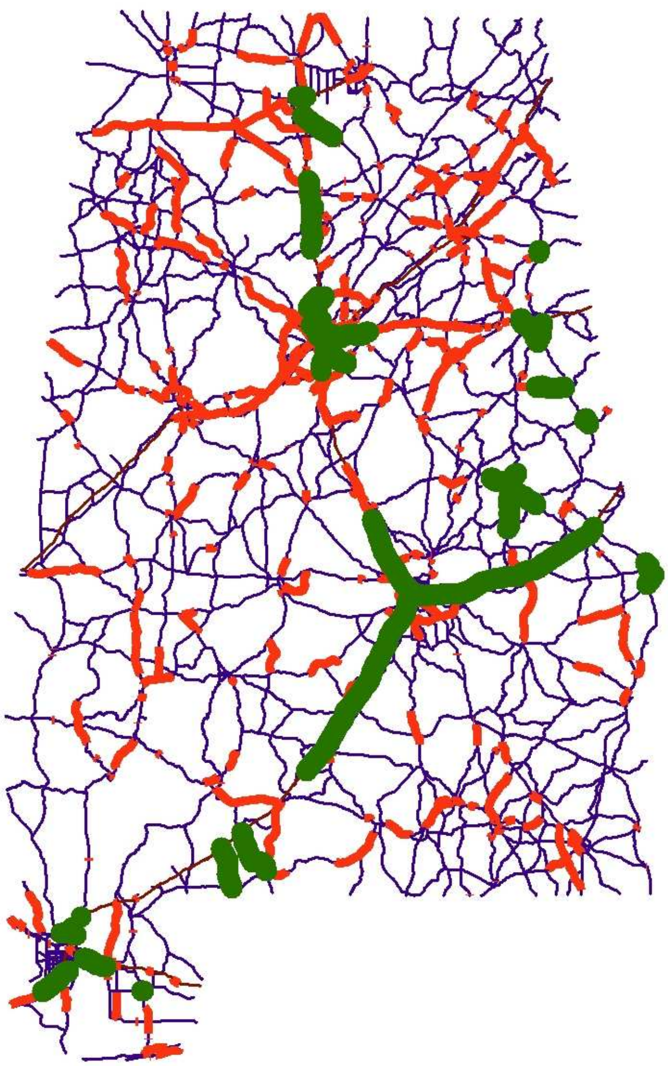
2003_2006TTCFAT>1Mile= Accident ***deemed to be caused by*** a tractor trailer and resulting in a fatality (2003-2006) that occurred at a distance greater than one mile from a CPMS Safety or Capacity project (2003-2034)

2003_2006TTINVFAT>1Mile= Accident ***involving*** a tractor trailer and resulting in a fatality (2003-2006) that occurred at a distance greater than one mile from a CPMS Safety or Capacity project (2003-2034)

Figure 21 andFigure 22 examine projects currently identified in ALDOT's CPMS database in relation to locations where truck VC ratio and truck volumes per lane would potentially deserve further analysis. First, locations in the CPMS that correspond to locations identified as potential problem areas for trucks were identified, and the total number of CPMS projects with potential benefit to trucks was determined. A second analysis identified locations with a potential truck issue but where a project is not currently identified in the CPMS.

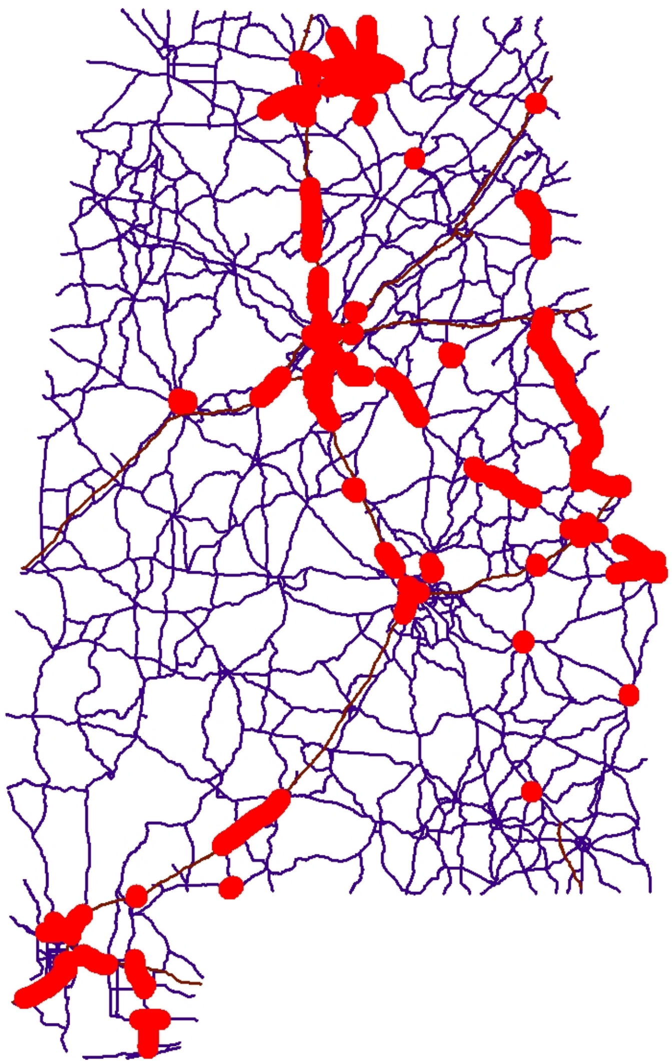
Of the 3,432 centerline miles of roadway with projects identified in the CPMS, 501 centerline miles correspond to locations where the 2035 travel model indicates both high VC ratio and high truck volume per lane, shown in Figure 21. These key roadway locations are where programmed projects will best be able to alleviate freight impacts on congestion of the highway system.

**Figure 21 Locations of High VC Ratio and High Truck Volume per Lane and in the CPMS Database**



Examining the data from the opposite direction yields locations where the 2035 travel model indicates a high VC ratio and high truck volume per lane but which are not currently identified in the CPMS, shown in Figure 22. There were 864 centerline miles of roadway that have a high VC ratio and high truck volume per lane but which are not addressed by projects currently in the CPMS. These locations are expected to become congested and have a large impact on freight; therefore, they deserve attention to ensure they do not become a limitation to growth.

**Figure 22 Locations of High VC Ratio and High Truck Volume per Lane and Not in the CPMS Database**



As the analysis demonstrates, many locations of potential need have already been identified by ALDOT for action. However, previously unidentified locations of potential concern remain. Those include: I-10 and I-65 near Mobile; I-65 around Birmingham; the I-565 and US 72 area west of Huntsville; US 280 between Auburn and Birmingham; and US 431 from I-85 to I-20 and north to the Fort Payne area. Their identification will be beneficial to the Department as it continues to evaluate conditions and develop project lists over the coming years.

Consideration should also be given to how new strategies might assist in addressing freight issues. For example, some trouble locations could potentially be corrected through the development of "freight corridors." By examining a collection of parallel and nearby roadways to determine what freight movement constraints exist, improvement efforts could be focused on the broader subsystem of roadways as a means of alleviating congestion. Such an approach might be appropriate for the I-65 corridor north of Birmingham, where a freight movement issue is apparent, yet continued widening of I-65 might not be feasible. An alternative would be to include US 31 and I-65 together and consider potential improvements to US 31 as a means to assist I-65.

Another approach to reducing congestion resulting from the growth of truck freight could be the concept of an inland port. The state of Alabama is served by a highway network, rail network, inland waterways as well as the Ports of Mobile and Huntsville. There is not a true Intermodal system for the movement of freight in the southeast, but an aggregation of public and private modes which are "stove-piped" within their individual areas of interest with little or no communication and coordination. This is not a true transportation system, but rather a series of transportation entities that must be evaluated and negotiated to execute the movement of cargo. The movement of freight through a true transportation system is where the economies of synergy and speed will provide a competitive advantage to Alabama logistics partners and provide the fertile ground for economic growth of Alabama industry. There is need for a systems approach to efficiently and profitably move freight to promote economic growth and social well being in Alabama. The feasibility of developing an inland intermodal transportation network hub through objective research and models of existing transportation infrastructure is intriguing.

An inland port is an inland facility that allows for the staging and transfer of intermodal, international freight. Containers coming into congested ports of entry are moved to the inland facility by train and then transferred to truck or other modes for distribution around the country. Inland ports are designed to relieve congestion at busy border ports by diverting truck traffic off the road network and also to move the transportation and distribution infrastructure closer to commerce centers.

North Alabama offers convenient access to river, rail, and road transportation infrastructure as well as abundant flat land, all characteristics of successful inland ports. North Alabama can facilitate receiving freight, processing, warehousing, and distributing freight through the southeastern and mid-western U.S. while minimizing impact on overcrowded highways. Requirements for these "logistics provider" type services could bring higher value jobs to regions in need of innovative economic development. The Port of Huntsville is a principle transportation hub in the Southeastern U.S. with amenities particularly attractive to businesses dealing with international cargo. This intermodal complex provides excellent aviation, rail, and road connectivity. The port has most of the infrastructure needed to establish itself as an inland port to the Port of Mobile. There are multiple ways of connecting the two ports that would need to be studied and recommendations presented.

It is important to note that the analysis model utilized in this study should be updated on a regular basis. Ongoing changes in potential projects combined with a wide variety of economic, political and other factors outside ALDOT control will guarantee that conditions do not remain static.

## 6. Conclusions and Action Recommendations

This study has reviewed freight movements and commodities that travel Alabama's interstates and major freight routes. Although there is a diversity of freight on all of the state's highway facilities, it is apparent that certain commodities use specific facilities more often. A review of specific commodities and routes taken is helpful in understanding deficiencies along a route. Similarly, using criteria to determine congestion, safety and truck concentrations on the Alabama Highway Network assists in identifying deficient locations in the freight highway network. Understanding the total character of freight movements along a corridor—its prevalent commodities and potential safety and operational constraints—is helpful in refining possible recommendations and improvements for increasing system efficiency and safety.

ALDOT has a proactive program of projects in its CPMS, with projects identified for many locations where freight system deficiencies were found. Freight is a primary "customer" of the highway network and the State's program to improve safety and intermodal connections is reflected in the current program of projects that address many of the freight transportation needs. In locations where rail, inland river ports and ports, and air cargo facilities are located in proximity to highways, there is additional opportunity to consider highway improvements to facilitate intermodal freight options and/or mode switch.

The study findings are intended to provide information to a number of parties—decision makers at ALDOT, other agencies and the private sector—as they continue looking for ways to accommodate the ever increasing volume of freight on the state's highways. ALDOT will take a lead role in ensuring the accumulated data on freight movement is maintained for use by the Department and others. In particular, ALDOT will be able to use the information regarding existing and future needs in developing its construction program. Because freight movement is heavily driven by the private sector, the role of public agencies including ALDOT is primarily supportive of the objectives. Freight mobility is a multifaceted transportation challenge, and improving its efficiency and safety represent similar hurdles for public and private stakeholders. Ultimately, market factors drive mode choice decisions in freight movement.

The following steps outline recommended actions for ALDOT and others in the continued future use and maintenance of the freight information prepared during this study.

1. Regularly update/maintain data used in the analysis. ALDOT's established monitoring programs provide a wealth of information reflecting the State's road system, its operations, condition and safety. The value of this information is recognized in planning and programming improvements. These existing data sources were applied during the Freight Study effort to develop a "freight sensitivity module" that recognized the level and type of freight transportation in identifying and evaluating freight transportation needs. The Department's incorporation of a freight sensitivity component in its assessment of transportation needs will maintain awareness of freight needs as an ongoing part of ALDOT's transportation program. In addition, analysis protocols and documentation that may be used by ALDOT in the future include: utilize new data

from currently available sources; data compilation/management/programming now available; and GIS/summary tabulation of measures (VC, truck volume per lane, crashes) formats now available.

2. Coordinate ALDOT's schedule for updates of the CPMS and development of the STIP. In addition, freight transportation assessments should be incorporated as a distinct element of annual assessment processes regarding prioritization and selection of programmed projects. In doing so, planning input and findings would reflect the most current freight transportation data regarding safety and systems operations.

3. Continue coordination with the SAG members, including MPOs and RPOs, on any particular freight related issues (specific to Alabama) for their modes, facilities, and organizations. SAG feedback is informative of trends and future directions being considered or in development by freight transportation operators. Periodic SAG surveys would continue the established avenue of communication. This in turn will play an important role in the State's medium and long range planning process as well as in the programming of freight related transportation improvements. For dialog to continue and be effective, maintaining accurate contact information for SAG agencies/organizations will be required.

4. After completing items 1, 2 and 3 above, get input from Division Engineers and appropriate Bureaus. ALDOT's Divisions are sensitive to freight transportation in their areas. The day-to-day maintenance, operations and monitoring of the roadway network provides firsthand insight into transportation issues, both current and evolving. Input from the Divisions focused on freight transportation can be valuable, especially when combined with planning data analysis and SAG survey results.

5. Prepare brief memo (with relevant materials/maps attached) that emphasizes any significant changes to analysis reruns and input from items 3 and 4 annually. Information gathered from SAG surveys and the Divisions/Bureaus should be supported by current data analysis and maps. A review of this information by ALDOT senior management will provide important information in meeting the Department's goals for improving the transportation system's efficiency and safety.

6. Make a directory of the data available to non-ALDOT uses, including the MPOs and RPOs. Freight movements are a key element of safe and efficient transportation in local areas, in addition to being important to the local economy. Making this data available to local planning partners and interested stakeholders will help improve local planning and result in better local transportation decision making. The level of interest generated by the SAG during development of the ALDOT Freight Study and Action Plan was impressive. Rail, air, truck and port participation in the study effort was important to assessing options and understanding the dynamics of the network operations. Freight modal operators are continuously assessing options for improving their operating efficiency and competitive advantage. Sharing information with the private sector modal operators will improve their understanding of current conditions in the State's transportation network. In addition, it will facilitate their assessment of

available options for the most efficient use of that network. Private sector modal operators are a major user of the road network; the more informed the user, the better the working relationship and system operations. Alternate routing, modal shifts/linkage, and identification of new opportunities are all examples of potential improvements to freight transportation which benefit from the involvement of all users, public and private.

## APPENDIX A – GLOSSARY OF TERMS AND ACRONYMNS

ALDOT – Alabama Department of Transportation

CPMS – Comprehensive Project Management System

FAF2 – Freight Analysis Framework Version 2; the FAF2 Commodity Origin-Destination Database contains estimates of tonnage and value of goods shipped by type of commodity and mode of transportation for 114 domestic freight analysis regions, 7 international trading regions, and 17 additional international gateways.

FHWA – Federal Highway Administration

MPO – Metropolitan Planning Organization

RPO – Rural Planning Organization

SAG – Stakeholder Advisory Group

SCTG – Standard Classification of Transported Goods

TAZ – Traffic Analysis Zone; a unit of geography varying in size used in travel demand models and which is constructed by census block information (socio-economic data).

VC – Volume to Capacity Ratio; a measure of congestion whereby 1.0 represents the point at which traffic volume on the roadway equals roadway capacity.

## APPENDIX B – SHORTLINE RAIL REHABILITATION PROGRAM

The *Shortline Rail Rehabilitation Program Technical Memorandum* documents the shortline railroad study element, which researched the operations and issues of Alabama's 23 shortline railroads to determine the quantity and nature of shortline railroad needs and their relative priority. This study element was developed in response to the Alabama Shortline Railroad Infrastructure Rehabilitation Act (Act 2008-382, Effective May 16, 2008) passed by the Alabama Legislature. This Act empowers ALDOT to identify rehabilitation funding needs, create the Shortline Railroad Infrastructure Rehabilitation Fund, and potentially make grants and no-cost loans for shortline rehabilitation. Currently, the Legislature has not authorized funding for this program.

In 2008, ALDOT completed an update to the Alabama Rail Plan and its companion document, the Alabama Rail Directory. A component of the Alabama Statewide Transportation Plan, the Rail Plan complies with federal planning regulations and enables the state to receive federal funding. First and foremost, the Rail Plan and companion Rail Directory provide an inventory of all railroads operating in the state, as well as information on line density and usage, abandonments and intermodal facilities, among others. The Shortline Rail Rehabilitation Program was a follow up to efforts under the Rail Plan.

Research team members directly contacted shortline rail operators seeking to identify specific transportation improvements that could increase the efficiency and safety of freight transportation and thereby enhance Alabama's economic development opportunities. The team began needs identification by developing a survey questionnaire to facilitate a better understanding of the operations and issues of each shortline railroad. An introductory letter was mailed to representatives of each shortline in early June 2009 notifying them of the study, outlining the study's objectives, and informing them of the future interviews and discussion topics. The interviews were conducted via telephone conference call in late June and early July 2009. Periodic attempts to contact those shortlines with whom interviews had yet to occur continued through August 2009. Finally, the research team sought separate correspondence with each shortline in order to increase shortline representation on the Stakeholder Advisory Group (SAG), established to provide guidance throughout the duration of the larger Freight Study.

The questionnaire requested each respondent provide general information regarding their operations, conditions, markets and needs. The accuracy of the information included in the 2008 Rail Plan Directory was confirmed. Additional topics included condition of rail infrastructure (rail, ties, bed, ballast, bridges, cars and signals), Class I connections, commodities and shippers, freight volumes, maintenance and capital costs, and market demands. With few exceptions, the information provided was based upon the respondent's personal knowledge and experience as opposed to verifiable data.

The research team compiled the data gathered during the interviews to analyze general trends impacting shortline railroads operating in Alabama. To facilitate comparison of analysis results, the state was divided into four regions—North, North Central, South Central and Gulf Coast—generally based upon the geographic distribution used in the 2008 Alabama Rail Plan. The geographic distribution of the shortlines is as follows:

North

- Huntsville & Madison County Railroad Authority (HMCR)
- Redmont Railway Company, Inc. (RRC)
- Sequatchie Valley Railroad (SQVR)
- Tennessee Southern Railroad Company (TSRR)

North Central

- Alabama Southern Railroad (ABS)
- Alabama & Tennessee River Railway (ATN)
- Birmingham Southern Railroad Company (BS)
- Eastern Alabama Railway (EARY)
- Jefferson Warrior Railroad Company (JEFW)
- Luxapalila Valley Railroad Company (LXVR)
- Southern Electric Railroad Company, Inc. (SERX)

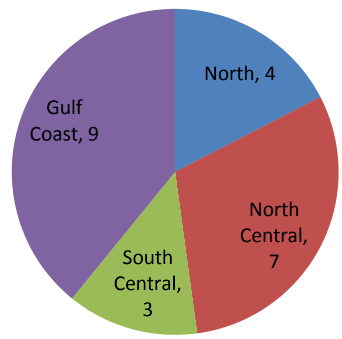
South Central

- Conecuh Valley Railroad (COEH)
- Georgia Southwestern Railroad, Inc. (GSWR)
- M&B Railroad, LLC (MNBR)

Gulf Coast

- Alabama Railroad Company (ALAB)
- Alabama & Florida Railroad Company (AF)
- Alabama & Gulf Coast Railroad (AGR)
- Andalusia & Conecuh Railroad Company (ACRC)
- Bay Line Railroad, LLC (BAYL)
- Chattahoochee Bay Railroad, Inc. (CHAT)
- Terminal Railway Alabama State Docks (TASD)
- Three Notch Railroad Company, Inc. (TNHR)
- Wiregrass Central Railroad (WGCR)

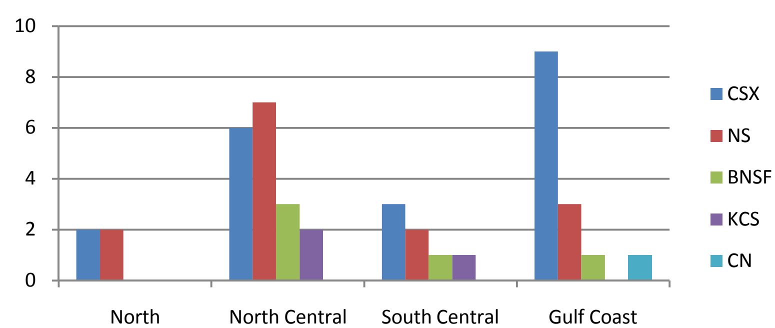
**Figure A.1**
**Distribution of Shortlines**




All of the shortlines connect to at least one Class I railroad, either within Alabama or a neighboring state, as listed below by region and railroad:

North: CSX—2, NS—2

**Figure A.2**
**Class I Connections (Railroad Name)**

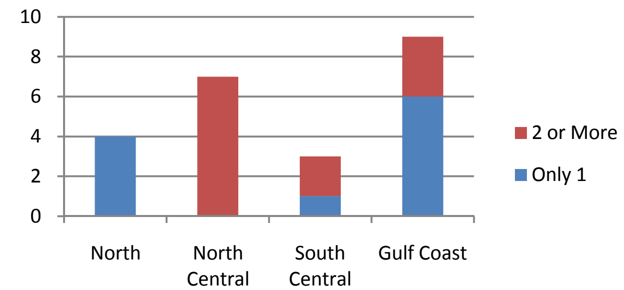


North Central: CSX—6, NS—7, BNSF—3, KCS—2
South Central: CSX—3, NS—2, BNSF—1, KCS—1
Gulf Coast: CSX—9, NS—3, BNSF—1, CN—1

In some instances, a shortline might connect with 2 or more Class I railroads—within Alabama or a neighboring state, directly or via another shortline. By region, this occurs for the following number of shortlines:

North: 0 of 4
North Central: 7 of 7
South Central: 2 of 3
Gulf Coast: 3 of 9

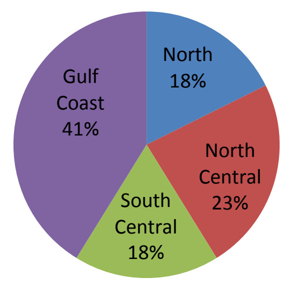
**Table A.2**
**Class I Connections**
**(Number per Shortline)**




Of the 23 shortlines operating in Alabama, 17 completed the interview survey by late August 2009. Their regional distribution is as follows:

North: 3 of 4
North Central: 4 of 7
South Central: 3 of 3
Gulf Coast: 7 of 9

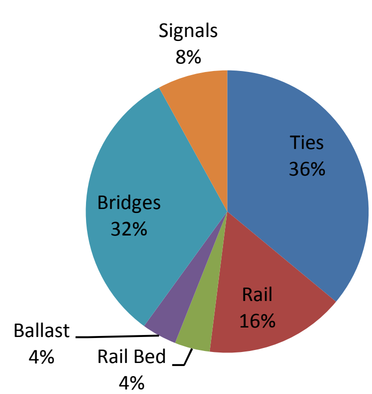
**Figure A.4**
**Distribution of Respondents**




During the interview discussions, representatives of the shortlines self-reported their most critical needs. The most frequently stated needs dealt with infrastructure replacement such as ties, bridges and rail. By region, the number of shortlines indicating a specific rail infrastructure category as a critical need is listed below:

North: ties—2, bridges—2
North Central: ties—1, rail—1, signals—1
South Central: ties—1, rail—1, rail bed—1, bridges—2
Gulf Coast: ties—5, rail—2, ballast—1, bridges—4, signals—1

**Figure A.5**
**Most Critical Needs**
(Multiple Responses Permitted)



A listing of principal commodities shipped by region follows. When more than one shortline ships the same commodity, the appropriate number of shortlines is indicated in parentheses.

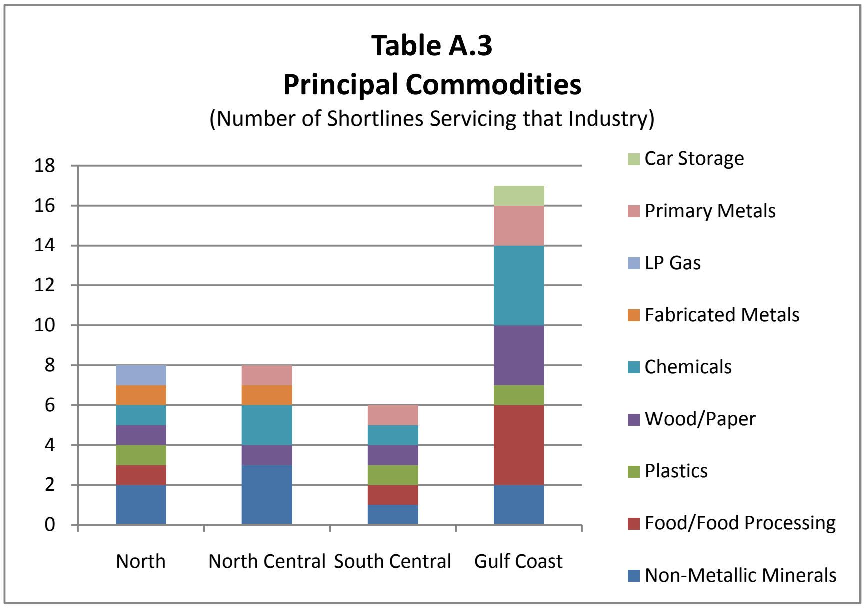


**Table A.3**
**Principal Commodities**
(Number of Shortlines Servicing that Industry)

North: Non-metallic minerals (2), food/food processing, plastics, wood/paper, chemicals, fabricated metals, LP gas (1 ships hazardous materials)
North Central: Non-metallic minerals (3), chemicals (2), wood/paper, primary metals, fabricated metals
South Central: food/food processing, plastics, wood/paper, primary metals, NM minerals, chemicals
Gulf Coast: Food/food processing (4), chemicals (4), wood/paper (3), primary metals (2), NM minerals (2), plastics, car storage (2 ship hazardous materials)

In addition to operational details, discussions with shortline representatives included their perceived ability to service existing clients and whether they believed potential exists for serving new markets along their line. The number of shortlines stating their belief in such potential is indicated below:

North: 1 of 3 respondents
North Central: 2 of 4 respondents
South Central: 1 of 3 respondents
Gulf Coast: 3 of 7 respondents

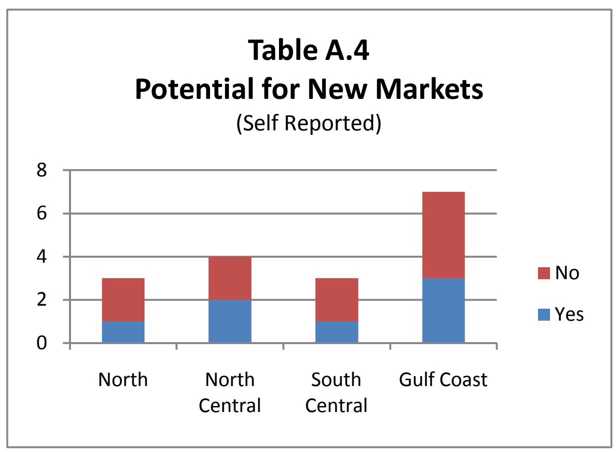


**Table A.4**
**Potential for New Markets**
(Self Reported)

Based on the findings to date, the research team has determined that prioritization of shortline rail needs would not be possible based on the data available and information gathered by the study. The lack of shortline detailed information about their operations makes prioritization of needs invalid.

Answering the question of which railroads will see the most growth over the next 25 years is difficult. Many changes are possible over such a long period. Major changes such as shifts in the customer base, freight mode preference shifts, and import/export volumes fluctuations are difficult if not impossible to predict. However, an economic sector forecast for the industry sectors currently being served can be estimated using an available state-level or national-level forecast. The FAF2 freight data includes a forecast derived from a similar approach for projecting freight decades into the future.

The process steps used to estimate freight growth for Alabama shortline railroad freight are (1) identify the industry sectors and respective freight volumes now being served, (2) find the corresponding growth index for the freight commodity group(s), (3) calculate an average growth factor for the mix of industries served by each railroad, and (4) calculate an estimated 2035 freight volume for each railroad.

This forecasting process suggests that there is freight growth potential resulting from the normal growth in the U.S. economy for each shortline railroad in Alabama. It should be noted that if shortline infrastructure in Alabama deteriorates below a useable state, this future growth will not be realized. Alternatively, investments in Alabama shortline railroad infrastructure could increase the attraction of new customers for Alabama shortline railroads thereby further increasing the demand for rail freight service by 2035.

# Alabama Statewide Freight Study and Action Plan

Interim Report 1

Task 1 – Data Collection

Prepared by

UAHuntsville
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

JRWA
J.R. WILBURN AND ASSOCIATES, INC.

May 10, 2010

## TABLE OF CONTENTS

# 1. Introduction

## 1.1. Study Purpose

Appropriate and efficient transportation infrastructure is a critical component if the State of Alabama is to reach full economic potential. To understand what infrastructure is appropriate and efficient, the need for the integration of freight traffic into the transportation planning effort has become more prominent. However, the inclusion of freight in most transportation plans and models has predominantly been limited in scope. The Alabama Department of Transportation (ALDOT) recognizes the need for research in freight transportation and understanding of the interrelationships between economic growth and transportation infrastructure. To this end, ALDOT contracted with the University of Alabama in Huntsville and J.R. Wilburn and Associates, Inc. to conduct the Alabama Statewide Freight Study and Action Plan.

It is difficult to incorporate freight information into transportation models and plans. Many types of freight data are considered proprietary by private companies and the release of that data is seen as detrimental to their competitive position. While national freight data are more readily available, there are challenges associated with the high level of aggregation in these databases. Understanding these limitations, the researchers have used additional data sources to supplement, disaggregate and validate the data from the highly aggregated sources.

## 1.2. Interim Report Contents and Organization

This report summarizes the efforts to incorporate local economic data from many different sources by allocating freight volumes into smaller, sub-state zones from freight traffic volumes provided by highly aggregated national databases. The output of this effort is used as input to the modeling of freight, and the integration of that freight into existing transportation planning and modeling activities at the state and local level. Additionally, the output is to determine, through analysis, what improvements could be made to the transportation network that may facilitate freight movements and intermodal connectivity.

# 2. Freight Analysis Framework

## 2.1. How FAF2 Database Is Used

The Freight Analysis Framework Version 2 (FAF2) Commodity Origin-Destination Database contains estimates of tonnage and value of goods shipped by type of commodity and mode of transportation for 114 domestic freight analysis regions, 7 international trading regions, and 17 additional international gateways. The 2002 estimate is based on the Commodity Flow Survey (CFS), with some of the data voids in the CFS filled in by analysis of the Economic Census and additional data sources. Forecasts are included for 2010 to 2035 in 5-year increments. The FAF2 database contains origin and destination values for tonnage and value of shipment, identified for 7 unique transport modes and 42 individual commodities identified using the Standard Classification for Transported Goods (SCTG).

The FAF2 database provides commodity flow origin-destination (O-D) data and freight movement data on all highways within the FAF2 highway network. Freight data for Alabama are categorized into one of three zones. Zone 1 (AL Birmi) includes an 8-county region around Birmingham, while the remaining 59 counties in Alabama are within Zone 2 (AL Rem). The Port of Mobile (Zone 123) is included as an International Gateway and is separate from Zone 2.

Data from the FAF2 database were used to analyze freight volumes involving Alabama highways, railroads, and waterways. Freight movements for Zones 1, 2, and 123 were evaluated by commodities originating within each zone by mode, commodities terminating within each zone by mode, as well as commodities passing through each zone by mode. The data were then combined with industry sector information to estimate attraction and production at the county level.

## 2.2. Use of Other Modal Data

### *2.2.1. ALDOT 2008 Traffic Counts*

The Alabama Department of Transportation collects traffic counts for all major roads in the state. These traffic counts, as well as percentages for heavy vehicles (trucks), can be found on the ALDOT website at http://aldotgis.dot.state.al.us/atd/default.aspx. Traffic count data are used for validation of the FAF2 database volumes.

### *2.2.2. Alabama Rail Plan and Rail Directory*

The Alabama Rail Plan was completed as a separate study, but the results of the Rail Plan will be used as input and validation for the Alabama Statewide Freight Study and Action Plan. The rail planning process examines rail elements of the transportation network so that each element can perform its role efficiently. A key component of the Rail Plan is the railroad inventory, which provides data on the State's Class I, II and III rail carriers, including their rail lines, densities and usage.

The Alabama Rail Plan contains several tables of rail traffic flows for Alabama for the year 2006. Four of these tables were used to compare similar data from the FAF2 database.

The Alabama Rail Plan also contains network maps and line segment densities. The network maps provide data on which rail carriers operate the various line segments and which Class I carriers connect to the Class II and Class III (shortline) carriers. This information provided fundamental background information on the Alabama rail network and the interaction among carriers. Since rail lines are privately owned, rail data can be difficult to obtain from the carriers themselves, so the Rail Plan was important for filling some of the gaps in data.

### *2.2.3. US Army Corps of Engineers Waterway Data*

The nation's waterway system is under the management of the US Army Corps of Engineers. The Corps is also responsible for maintaining a number of water transportation information systems. Of particular interest were the data pertaining to waterborne commodity and vessel movements along the inland/coastal waterways, which are publicly available through the Corps' Navigation Data Center website.

The Army Corps data provided valuable background information on the navigable river systems in the state of Alabama. These include the Alabama-Coosa River System and the Black Warrior-Tombigbee

River System. Freight to and from Alabama can also move along the Gulf Intracoastal Waterway, which runs from Florida to Texas.

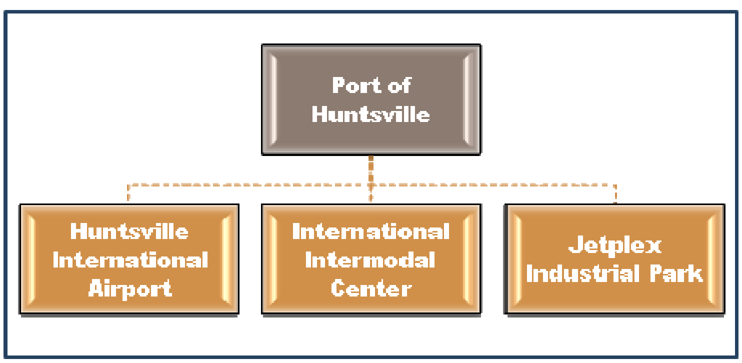
Alabama waterway location information was used to add direction to the FAF2 commodity flows travelling by water mode. Each domestic region/gateway that is connected to Alabama by water was assigned the most likely waterway route. For example, freight moving to and from Texas is most likely to travel on the Gulf Intracoastal Waterway. A barge conversion factor was used to convert annual tonnage to number of barges.

The Army Corps' *Waterborne Commerce of the United States* (WCUS) is a series of publications providing statistics on commerce moved on US waterways. The 2002 commodity flows to and from Alabama were determined from the WCUS. The commodities moved by water mode to and from Alabama were generated from the FAF2 database (2002 base year) and compared with the data from the WCUS.

The US Army Corps also maintains the Lock Performance Monitoring System (LPMS) and Lock Characteristics database. These provide information on the use, performance, and characteristics of the national system of locks. LPMS consists of data from years 1980 to present, and includes the number of vessels and barges locked; type and dates of lockages; durations of and causes for periods of lock unavailability; barge type, size, and commodity type; and tonnages carried. Statistics are published monthly for selected key locks and annually for all locks.

The LPMS provided total tonnages and number of barges on the Black Warrior-Tombigbee Rivers by direction. The data for 2002 were used to compare against the FAF2 data that were allocated to that river system. When compared with the FAF2 commodity flows, both the LPMS and the WCUS contained significantly more data, and with greater detail. These data were used in place of the FAF2 tonnages for freight moved via water mode. In addition, the total tonnage and number of barges were used to validate the barge conversion factor that was used to convert annual tonnage to number of barges.

#### *2.2.4. Port of Huntsville Inbound/Outbound Volumes*




The Port of Huntsville consists of the Huntsville International Airport, the International Intermodal Center, and the Jetplex Industrial Park. The International Intermodal Center is designated as a United States Customs Port of Entry and the location of Foreign-Trade Zone #83. These three elements and Foreign-Trade Zone #83 have made Huntsville a principal transportation hub in the southeastern United

States as well as a global inland port. This inland port is a central location for receiving, transferring, storing, and distributing by air, rail, and highway.

The International Intermodal Center is located on 80 acres of airport property with direct access to the runways, interstate highways, and the Norfolk Southern Railroad main line. The rail intermodal yard can accommodate 52 100-foot railcars on 5 working tracks underneath 2 gantry cranes. There is also space to handle another 80 rail cars with over 8,000 feet of storage track. Over 46,000 rail lifts were performed in 2008.

Huntsville International Airport (HSV) has two parallel runways, one 10,000 feet and one 12,600 feet, with a 5,000-foot separation allowing for simultaneous operations during instrument conditions. The facility is equipped for Category I operations. This high-tech air cargo market is served by domestic and international all-cargo carriers. International nonstop air cargo service is available to Europe daily and twice weekly to Mexico. There is 1.2 million square feet of cargo ramp space at HSV and 294,000 sq.ft. of air cargo building space. A 5,250 sq.ft. cold storage facility is also on site to store perishable air cargo products. Over 160 million pounds of air cargo moved through HSV in 2008.

The final component of the Port of Huntsville is the over 4000-acre Jetplex Industrial Park. One of the main attractions of the Park is its Foreign-Trade Zone status and the amenities provided by the adjacent airport and intermodal facility. Over 50 distribution and manufacturing companies now operate at the Jetport site.

Data from the Huntsville International Intermodal Center which contained the container lifts and container directionality were used for comparison with freight volumes from the FAF2 database and to allocate those volumes to the highways and railroads.

### *2.2.5. Port of Mobile Import/Export Volumes*

The Port of Mobile is owned and operated by the Alabama State Port Authority. The Port is included in the FAF2 database as an international gateway, Zone 123. The Port is a strategic link in the transportation infrastructure of the state and region. It is home to McDuffie Island, one of the largest coal terminals in the country, and a strategic partner in the power generation industry that supports a significant portion of Alabama and surrounding states. The Port of Mobile complex also includes bulk handling facilities, Choctaw Point where the Mobile Container Terminal is located, a general cargo and intermodal center, the Terminal Railway linking the Port to Norfolk Southern, CSX, and Canadian National railroads, and several inland docks. The Port has 37 berths and experienced 1,295 vessel calls in 2008. Other 2008 statistics for the Port include: 130,346 revenue producing rail car movements, 28.1 million total tons handled, and 129,119 Twenty-Foot Equivalent Units (TEUs).

Data from the Port of Mobile were used for comparison with freight volumes from the FAF2 database and to allocate those volumes to the highways and railroads.

## 2.3. Issues Related to FAF2

### *2.3.1. Truck*

Analysis of the final flows against Ports of Mobile and Huntsville information as well as general knowledge of various industries revealed that the FAF2 database assigned commodities as moved by truck that are generally moved by other modes. Coal was a salient example, as it is generally known to move by rail.

### *2.3.2. Rail*

Analyzing commodity flows for freight moved by rail presents unique challenges unlike any other mode. Highways and waterways are shared paths available for use by all freight movers utilizing trucks or barges. Although there may be multiple highway paths available to truckers, their choices can be reasonably predicted by applying various optimization constraints such as shortest time or distance. For rail, however, individual railroad companies own and maintain their own rail lines. Therefore, freight moving by rail between an origin and destination pair by one railroad would take a completely different route if moving by another railroad. The commodity flow data from the FAF2 database provide no information about which railroad is used and therefore which path the freight actually takes through the system. This is further complicated by the various agreements among railroads specifying haulage and trackage rights, as well as possible switches from one railroad to another to move freight into areas not served by the originating railroad.

Furthermore, as with trucking, some commodities assigned as moved by rail are generally known to not move via rail. The Port of Mobile indicated that the vast majority of their coal moves by barge and not by truck or rail.

### *2.3.3. Waterway*

When compared with the US Army Corps of Engineers collection, the FAF2 database seems to be missing large amounts of waterborne freight. It is not entirely known why the huge discrepancy exists. One factor is that maritime imports moved inland by truck are counted as "truck" in FAF2 and as "water" by the US Army Corps of Engineers. However, this accounts for only a small percentage of the water data for Alabama from the Army Corps data.

Additionally, the US Army Corps of Engineers data and waterway maps were used to determine which waterway would be used to move waterborne freight to and from Alabama. Based on that data, some FAF regions could not be reached by water from Alabama. However, the FAF2 data queries produced freight flow via water to and from these regions. For example, there were data flows from Alabama to Arizona via waterway.

### *2.3.4. Other Modes (Air, Pipeline & Unknown, Other Intermodal)*

Data from the ports and other sources raised questions on the other modes of freight flow. FAF2 data included live animals moved via “pipeline and unknown.” As live animals obviously do not move through pipelines, it leaves undetermined the “unknown” mode of moving live animals (or other freight).

### *2.3.5. Two Zones Not Sufficient for State Planning*

For the purposes of statewide planning, it is clear that dividing Alabama into only two zones in the FAF2 database creates a level of aggregation that is too high. Disaggregation of the data to a more detailed level is needed to effectively apply the freight flow data to statewide planning, but without reducing the quality of the data to a point where it would create excessive error.

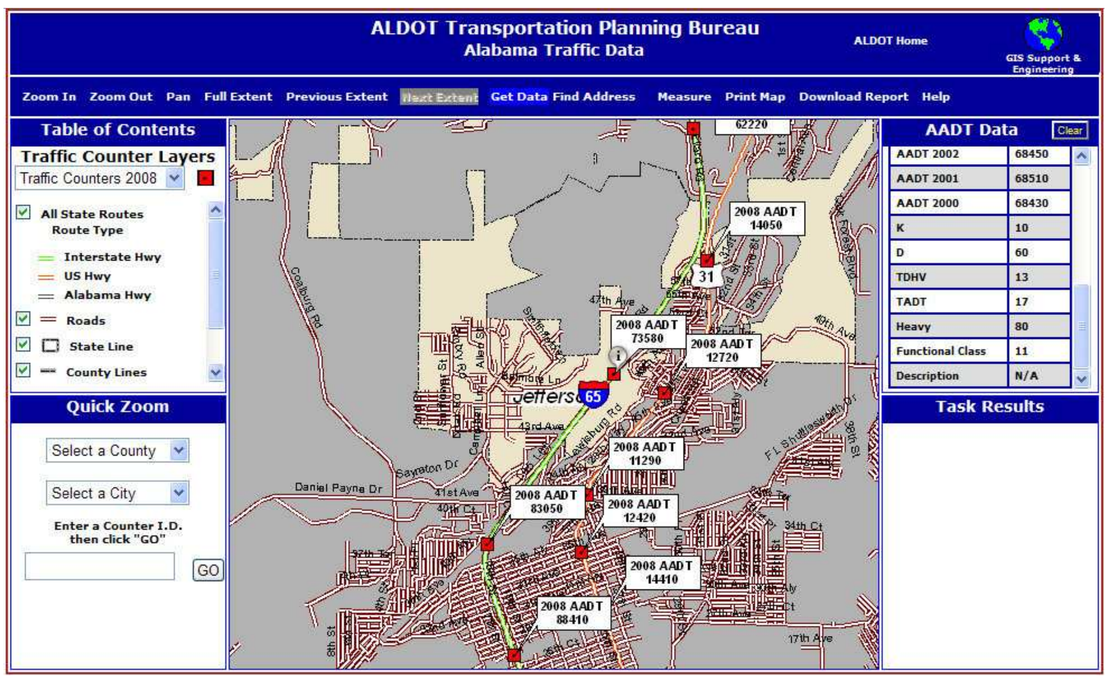
The practice of aggregating data to protect anyone from gaining knowledge about a specific business is common-place. The Rail Plan organized the State system into three zones, an appropriate level for a national and state level database. Still, when trying to focus on specific infrastructure improvements, the data need to be disaggregated to a sub-state, county and sometimes even sub-county level.

## 2.4. Determining Transportation System Deficiencies

### *2.4.1. Highway System Conditions Information*

ALDOT heavy truck counts and percentages are available on its website through the Transportation Planning Bureau's Traffic Data. The data can be accessed via the internet at http://aldotgis.dot.state.al.us/default.aspx (see Figure 1 below) by selecting a count location using the "Get Data" option. The data provide daily count, truck percentage and heavy vehicle percentage.

**Figure 1 Screen Shot of ALDOT Traffic Counts Website**




Additional data from ALDOT include:

- Bridge data, complete with sufficiency rating
- Route data that included beginning and ending milepost
- Urbanized area locations

- Functional classification
- Crash locations from the CARE database
- Railroad data

These data were made available from several different data sources within ALDOT.

*2.4.2. Other Modal Service Capabilities*

The modeling process is heavily dependent on governmental data sources as presented; however, it must be acknowledged that actual shipping decisions remain in the hands of the private sector. The use of the Stakeholder Advisory Group (SAG) to provide input into the actual shipping levels expected is a vital resource in understanding future transportation needs.

2.4.2.1. Shortline Railroad

The Shortline Rail Rehabilitation Program is being developed in response to the Alabama Shortline Railroad Infrastructure Rehabilitation Act, which empowers ALDOT to identify rehabilitation funding needs, create the Shortline Railroad Infrastructure Rehabilitation Fund, and make grants and no-cost loans for shortline rehabilitation as an element of the Freight Study. As the initial step in identifying needs, the research team attempted to contact all 23 shortlines operating in Alabama. An introductory letter was mailed to representatives of each shortline in early June 2009 notifying them of the study, outlining the study's objectives, and informing them of the future interviews and discussion topics. The interviews were conducted in late June and early July 2009, with periodic attempts continuing for those shortlines that have not already been interviewed. In addition, representation for each shortline has been sought for inclusion on the Freight Study's SAG. Following analysis of the data provided during the interviews, a summary of the State's shortline markets, operations and conditions will be compiled. The information will be used to develop a prioritization scheme, identify recommendations, and propose a program for improving shortline rail systems in Alabama.

For a detailed summary of the shortline rail survey, see Appendix 1.

*2.4.3 Commodity Flow and Modal Volume Summary*

2.4.3.1 FAF2 Data

Data from the FAF2 database were used to develop freight flows to and from Alabama counties in multiple steps. First, the FAF2 data were disaggregated to find Alabama freight flows (origin and destination):

<u>Origin</u>

- Freight originating from Zones 1 and 2 to domestic destinations (e.g., Alabama to Arkansas)
- Freight originating from Zones 1 and 2 destined for outside the US (exports) (e.g., Alabama to Canada via Minnesota)
- Imports to US destinations entering through Alabama ports (e.g., Southwest Asia to Ohio via Mobile)

Destination

- Freight destined to Zones 1 and 2 from domestic origins (e.g., Wyoming to Alabama)
- Freight destined to Zones 1 and 2 from outside the US (imports) (e.g., Mexico to Alabama via Texas)
- Exports from US destinations leaving through Alabama ports (e.g., Oklahoma to Europe via Mobile)

These combined queries formed the freight flows for the state of Alabama. The data were selected for the base year of 2002 as well as 2010 and 2035 forecasts. Some of the FAF2 modes were grouped due to having such small quantities. The final modes used were:

- Truck—Includes FAF2 *Truck* and *Truck-Rail* Intermodal
- Rail – FAF2 *Rail*
- Water—FAF2 *Water*
- Air—FAF2 *Truck-Air Intermodal*
- Other—includes FAF2 *Other Intermodal* and *Pipeline & Unknown*

The data were then combined with industry cluster information to estimate attraction and production at the county level. The FAF2 data for the *Truck-Air Intermodal* mode had commodity descriptions as well as SCTG codes; however, commodity descriptions for other modes had to be mapped to SCTG codes. The industry information is generally provided by NAICS codes. Therefore, a crosswalk of FAF2 commodity descriptions, SCTG codes and 3-digit NAICS codes was developed to allow industry cluster information to be added to the FAF2 data.

For Zone 1, Employment and Value of Sales fractions for each of its eight counties were determined as a percentage of the zone total (per commodity). These percentages were used separately as weights to distribute the FAF2 flow for Zone 1 to each of the eight counties. The same was repeated for the 59 counties in Zone 2.

This process resulted in multiple tables of data for each of Alabama's 67 counties:

- Annual kilotons originating in the county (production) by commodity, by mode, weighted by employment and also weighted by Value of Sales for comparison.
- Annual kilotons destined to the county (attraction) by commodity, by mode, weighted by employment and also weighted by Value of Sales for comparison.

A set of tables was developed for the base year 2002 and a forecast for 2035. Appendix 2 shows annual kilotons of freight originating from Jefferson County (production) for 2002, weighted by Employment and Value of Sales for comparison.

#### 2.4.3.2 Rail Plan Data

The Alabama Rail Plan contains several tables of 2006 rail traffic flows for Alabama which were used to compare with similar data from the FAF2 database. These two data sources used different base years so direct comparison was not possible. First, the corresponding data were generated from the FAF2 for its 2002 base year and its 2010 forecast. A 2006 estimate was interpolated from these two values.

Table 1 contains a comparison of tonnage flows for AL to AL (intrastate), Out-of-State to AL, AL to Out-of-State (interstate) and Out-of-State to Out-of-State (overhead). It is not known exactly how the overhead traffic was determined since this consists of rail traffic that neither originates nor terminates in Alabama. Thus, an FAF2 equivalent for overhead traffic could not be created. Interstate and intrastate estimates were generated from FAF2 and compared with the Rail Plan data.

**Table 1 2006 Alabama Tonnage Flows Comparison of Alabama Rail Plan and FAF2**

| From | To | Rail Plan Tons (Millions) | FAF2 Tons (Millions) |
|---|---|---|---|
| Alabama | Alabama | 13.9 | 11.9 |
| Out of State | Alabama | 42.1 | 44.3 |
| Alabama | Out of State | 34.3 | 43.3 |
| Out of State | Out of State | 102.8 | |

Table 2 contains the tonnage for rail traffic that either originated or terminated in Alabama, or did both, in 2006 by commodity from the Alabama Rail Plan.

**Table 2 Rail Traffic in Alabama (from the Alabama Rail Plan)**

| Commodity | Originated Tons | | Terminated Tons | | Intrastate Tons | |
|---|---|---|---|---|---|---|
| | Tons | % | Tons | % | Tons | % |
| | 48,148,681 | 100% | 55,936,090 | 100% | 13,847,579 | 100% |
| Agriculture | 198,808 | 0% | 4,847,921 | 9% | 21,316 | 0% |
| Metallic Ores | 104,600 | 0% | 3,242,069 | 6% | 104,600 | 1% |
| Coal | 11,204,859 | 23% | 26,793,332 | 48% | 8,935,919 | 65% |
| Non-Metallic Minerals | 7,257,600 | 15% | 1,362,548 | 2% | 1,067,820 | 8% |
| Food | 303,040 | 1% | 734,781 | 1% | 0 | 0% |
| Lumber | 1,816,564 | 4% | 1,777,668 | 3% | 538,880 | 4% |
| Pulp & Paper | 4,924,404 | 10% | 1,045,040 | 2% | 189,720 | 1% |
| Chemicals | 4,108,496 | 9% | 2,772,912 | 5% | 418,080 | 3% |
| Coke | 539,576 | 1% | 805,036 | 1% | 50,296 | 0% |
| Plastics | 1,679,890 | 3% | 2,295,584 | 4% | 978,078 | 7% |
| Concrete, Glass, Stone Products | 2,196,476 | 5% | 431,208 | 1% | 262,360 | 2% |
| Metal Products, including Steel | 7,080,776 | 15% | 3,109,320 | 6% | 449,960 | 3% |
| Transportation (autos) | 5,278,252 | 11% | 2,019,723 | 4% | 449,550 | 3% |
| Waste, Scrap | 775,140 | 2% | 3,671,004 | 7% | 381,000 | 3% |
| FAK (intermodal) | 680,200 | 1% | 1,027,944 | 2% | 0 | 0% |
| All Other | 0 | 0% | 0 | 0% | 0 | 0% |

*Note: Due to rounding, sums may not total to exactly 100.0%.*

An FAF2 equivalent was then estimated and compared with the previous Rail Plan data (Table 3).

**Table 3 Rail Traffic in Alabama from FAF2 (Comparison to Alabama Rail Plan)**

| Commodity | Originated (Tons) | Terminated (Tons) |
|---|---|---|
| Alcoholic beverages | - | 24,635 |
| Animal feed | 1,240,365 | 727,095 |
| Articles-base metal | 26,700 | 353,080 |
| Base metals | 2,704,055 | 1,080,820 |
| Basic chemicals | 2,610,225 | 1,842,520 |
| Cereal grains | - | 901,155 |
| Chemical products | - | 50,460 |
| Coal | 10,622,725 | 34,267,570 |
| Coal-n.e.c. | 753,705 | 1,169,105 |
| Electronics | 7,505 | 13,435 |
| Fertilizers | 2,266,250 | 513,695 |
| Fuel oils | 25,445 | 183,870 |
| Furniture | 6,500 | - |
| Gasoline | - | 135,045 |
| Gravel | 4,246,350 | 2,453,500 |
| Logs | 73,655 | - |
| Machinery | 72,385 | - |
| Meat/seafood | 28,700 | - |
| Metallic ores | - | 2,546,635 |
| Milled grain products | 117,250 | 102,810 |
| Motorized vehicles | 158,355 | 19,940 |
| Natural sands | 12,654,470 | 265,435 |
| Newsprint/paper | 2,855,765 | 520,805 |
| Nonmetal mineral products | 11,922,175 | 134,435 |
| Nonmetallic minerals | 503,420 | 326,195 |
| Other Ag products | - | 2,207,610 |
| Other foodstuffs | 842,185 | 1,242,940 |
| Paper articles | - | 29,575 |
| Plastics/rubber | 611,455 | 518,855 |
| Printed products | - | 115 |
| Textiles/leather | - | 18,400 |
| Transport equipment | - | 12,115 |
| Unknown | 83,980 | 84,525 |
| Waste/scrap | - | 3,824,825 |
| Wood products | 830,785 | 618,785 |
| Grand Total | 55,264,405 | 56,189,985 |

Table 4 contains Alabama intrastate traffic flow by commodity from the Alabama Rail Plan as compared to the estimated FAF2 equivalent.

**Table 4 Alabama Intrastate Rail Traffic, 2006 (Comparison of Alabama Rail Plan and FAF2)**

| Rail Plan Data | | |
|---|---|---|
| **Commodity** | **Net Tons** | **% of Total** |
| Coal | 8,341,383 | 65% |
| Metallic Ores | 104,600 | 1% |
| Primary Forest Products | 728,620 | 5% |
| Plastics | 978,078 | 7% |
| Crushed Stone | 1,067,820 | 8% |
| Chemicals | 418,080 | 3% |
| Waste and Scrap | 381,000 | 3% |
| Metals/Metal Products | 449,960 | 3% |
| Other | 1,588,982 | 11% |
| Grand Total | 13,846,759 | 100% |

*Note: This table's data was taken directly from the 2008 Alabama Rail Plan (Table 3-3, Alabama Intrastate Rail Traffic, 2006). All data are exactly as provided in that original source document.*

| FAF2 Data | | |
|---|---|---|
| **Commodity** | **Net Tons** | **% of Total** |
| Animal Feed | 401,675 | 3.4% |
| Base Metals | 174,445 | 1.5% |
| Basic Chemicals | 513,970 | 4.3% |
| Coal | 10,139,450 | 84.9% |
| Coal-n.e.c. | 43,735 | 0.4% |
| Electronics | 7,505 | 0.1% |
| Gravel | 241,255 | 2.0% |
| Newsprint/Paper | 217,275 | 1.8% |
| Nonmetallic Minerals | 26,315 | 0.2% |
| Other Foodstuffs | 21,635 | 0.2% |
| Plastics/Rubber | 40,330 | 0.3% |
| Unknown | 83,980 | 0.7% |
| Wood Products | 24,770 | 0.21% |
| Grand Total | 11,936,340 | 100% |

*Note: Due to rounding, sums may not total to exactly 100.0%.*

Table 5 contains Principal Overhead Traffic Flows through Alabama. This table lists four specific state combinations as the location of principal flows. These state combinations were used to generate the FAF2 estimate for comparison.

**Table 5 Principal Overhead Traffic Flows Through Alabama**
**(Comparison of Alabama Rail Plan and FAF2)**

| | Tons in Millions | |
|---|---|---|
| **Flow Origin/Destination** | **Rail Plan** | **FAF2 Data** |
| {LA, TX} {FL, GA, SC, NC, VA} | 22.6 | 11.3 |
| {OH, IN, MI, IL, WI, MO, IA, MN} {LA, TX, MS, TN, GA, FL} | 19.1 | 79.4 |
| {KY, TN} {GA, FL} | 25.4 | 37.6 |
| {CA, OR, WA} {FL, GA, SC, NC, VA} | 2.9 | 1.8 |

A specific description of the railroads is contained in Appendix 3.

#### 2.4.3.3 Army Corps of Engineers Data

The 2002 commodity flows to and from Alabama were determined from the Army Corps' *Waterborne Commerce of the United States* (WCUS). The commodities moved by water mode to and from Alabama were generated from the FAF2 database for 2002 and compared to WCUS data (Tables 6 and 7).

**Table 6 Comparison of Waterway Data from FAF2 and WCUS, Origin-Alabama**

| **FAF2, Origin-Alabama, 2002** | |
|---|---|
| Destination | Kilotons |
| AL | 1,023.66 |
| FL | 11.453 |
| Foreign | 266.19 |
| LA | 4,650.29 |
| TN | 275.42 |
| TX | 160.89 |
| Grand Total | 6,387.90 |

| **WCUS, Origin-Alabama, 2002** | |
|---|---|
| Destination | Kilotons |
| Alabama | 13,738.06 |
| Arkansas | 131.52 |
| Canada | 11.47 |
| Florida | 2,706.27 |
| Foreign | 8,480.37 |
| Illinois | 280.10 |
| Indiana | 115.78 |
| Iowa | 37.83 |
| Kentucky | 110.75 |
| Louisiana | 3,158.27 |
| Minnesota | 25.37 |
| Mississippi | 1,582.84 |
| Missouri | 232.51 |
| Ohio | 95.33 |
| Oklahoma | 14.93 |
| Other | 145.38 |
| Pennsylvania | 82.90 |
| Puerto Rico | 42.15 |
| Tennessee | 352.54 |
| Texas | 1,214.59 |
| West Virginia | 14.14 |
| Wisconsin | 11.08 |
| Grand Total | 32,584.18 |

**Table 7 Comparison of Waterway Data from FAF2 and WCUS, Destination-Alabama**

| FAF2, Destination-Alabama, 2002 | |
|---|---|
| Origin | Kilotons |
| AL | 1,023.66 |
| Foreign | 2,200.99 |
| GA | 52.87 |
| IA | 117.73 |
| IL | 307.58 |
| IN | 87.83 |
| KY | 443.35 |
| LA | 1,619.38 |
| MN | 445.9 |
| MS | 81.63 |
| NY | 0.004 |
| TN | 1,548.42 |
| TX | 1,001.08 |
| Grand Total | 8,930.43 |

| WCUS, Destination-Alabama, 2002 | |
|---|---|
| Origin | Kilotons |
| Alabama | 13,738.06 |
| Arkansas | 58.33 |
| Canada | 1,153.62 |
| Florida | 1,990.09 |
| Foreign | 13,907.98 |
| Illinois | 3,076.19 |
| Indiana | 358.03 |
| Iowa | 487.03 |
| Kentucky | 5,368.48 |
| Louisiana | 2,242.51 |
| Minnesota | 491.46 |
| Mississippi | 1,156.71 |
| Missouri | 201.89 |
| Nebraska | 29.82 |
| Ohio | 127.46 |
| Oklahoma | 197.95 |
| Other | 116.35 |
| Pennsylvania | 26.71 |
| Puerto Rico | 14.87 |
| Tennessee | 419.34 |
| Texas | 1,682.24 |
| West Virginia | 535.87 |
| Wisconsin | 60.80 |
| Grand Total | 47,441.79 |

For specific commodity movement information from the Corps of Engineers, see Appendix 4.

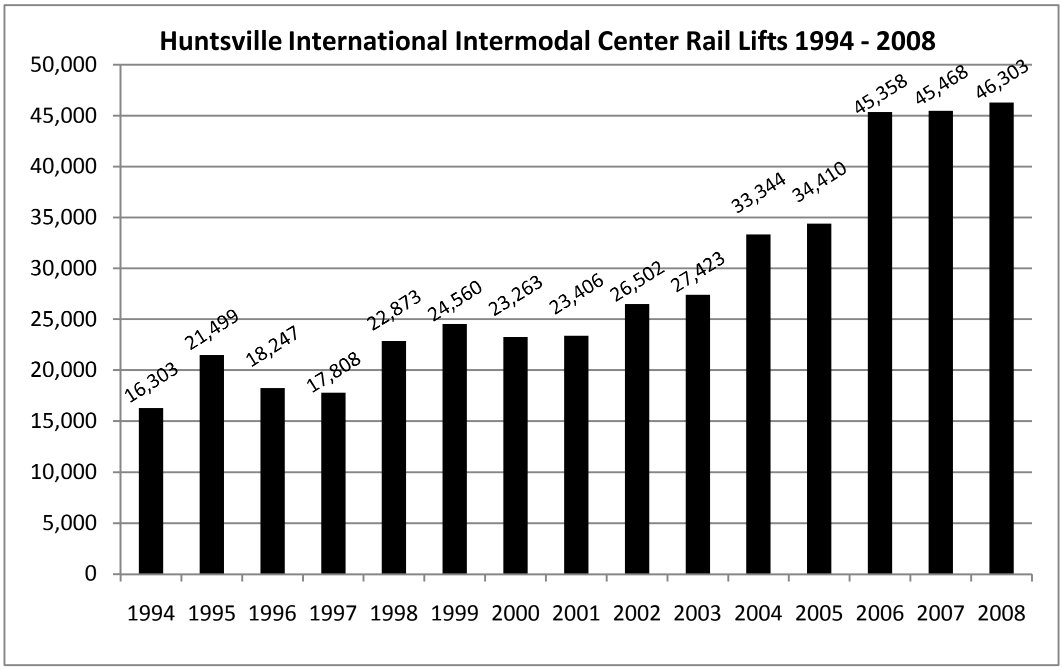
#### 2.4.3.4 Port of Mobile Data

The data are currently being collected and will be included when available.

#### 2.4.3.5 Huntsville Intermodal Center Data

The data from the Huntsville Intermodal Center that are being used for validation contain rail lifts for the center, as shown in Figure 2.

**Figure 2 Huntsville International Intermodal Center Rail Lifts, 1994-2008**




# 3. RELATED ECONOMIC/INDUSTRY CLUSTER DATA

## 3.1 Industry Cluster Data

### *3.1.1 Data Sources*

Each county's economic base must be defined in order to properly gauge the amount of future freight traffic that will be entering and leaving. For freight modeling purposes, the economic base can be defined as all goods producing industries within a county. For Alabama counties, the economic base includes major manufacturing industries, agriculture, logging and mining. Each of these industries can potentially generate both incoming and outgoing freight traffic. Retailing, wholesaling and warehousing activity can also create inbound traffic for sales within a county or outbound traffic for sales located elsewhere.

The base year for the sub-state economic database is 2002, the year corresponding to the FAF2 O-D matrices. The year 2002 was also when the US Census Bureau surveyed industries for its series of state economic censuses including the *Census of Manufacturing*, the *Census of Agriculture* and the *Census of Mining*.

#### 3.1.1.1 Alabama Manufacturing Census 2002

The Alabama 2002 Manufacturing Census was produced by the US Census Bureau and includes data from 20 NAICS sectors (2-digit codes), 100 subsectors (3-digit codes), and 317 industry groups (4-digit codes) at the state, metropolitan statistical area, micropolitan statistical area, combined statistical area, county, and city levels. The data include number of establishments, number of employees, payroll, production worker hours and wages, cost of materials, value-added dollars, capital expenditures, and value of shipments for each of the industry groups present in an area.

Employment and the value of sales for manufacturing were used to allocate a percentage of freight to each county for commodities in the FAF2 database. However, adjustments had to be made for some issues. If there were only a few manufacturers or one or two dominant firms, the value of sales data were suppressed to protect the privacy of the firms. In Alabama, the value of sales data were suppressed in 19 of 67 counties—nearly all of them small rural counties with a single dominant company. An estimate was prepared in these cases. Generally the Census Bureau provides a range of employment for the plant(s) in these counties. Taking the mid-point in the employment range and multiplying it by the average value of sales per employee for the industry as a whole within the state gives a good proxy for the actual value of sales in these counties. The value of sales in each county, including the ones for which estimates had to be made, were summed and compared to the actual total value of sales for the state.

#### 3.1.1.2 Census of Agriculture and Census of Mining

The Census of Agriculture is produced by the US Department of Agriculture and provides employment and value of sales data for each type of crop or animal sold at the county level. The Census of Mining is compiled by the US Census Bureau and provides the same type of data for all mining activities. The US Geological Survey publishes a state geological survey which includes the value of sales for the mineral industry. The most recent USGS survey for Alabama was done in 2003. Production and sales data in this publication are provided by geological area rather than by county, so it must be supplemented by information from the Census of Mining to allocate the value of mineral extraction to each county in the state. Employment and value of sales data from these sources were used to allocate the agricultural and mining commodities from the FAF2 to each county.

#### 3.1.1.3 Forest Resources Report

The Alabama Forestry Commission publishes an annual report containing the physical amount of logs harvested in each county. The data are provided by type of log and by volume in board feet. The value of these logs was determined by translating board feet into tons and using 2002 pricing data for the South published by the Daniel B. Warnell School of Forestry Resources, University of Georgia. The employment data and calculated value of sales were used to determine percentages of freight from the FAF2 allocated to each county.

#### 3.1.1.4 County Business Patterns

The County Business Patterns is an annual series published by the US Census Bureau including county level economic data by industry. Data from the County Business Patterns were used to supplement the data obtained from the Manufacturing Census.

#### 3.1.1.5 Forecast Projections – Global Insight and USDA

Global Insight prepares national production index projections on a quarterly basis for a time period of 30 years. These projections cover all NAICS codes except animals and crops. National projections of crop and animal sales are provided by the US Department of Agriculture and can be found on their website. Since the projections are published for just a 10-year period, they have to be extended another 20 years to make them comparable to the rest of the projections in the database. A simple ordinary least squares (OLS) regression equation for each crop and animal type was used for this purpose.

A projection of personal income growth to the year 2035 was prepared for each county in Alabama using an OLS regression equation and annual personal income data for that county over the time period 1975 through 2005. A few Alabama counties have recently experienced very rapid personal income growth, which skewed the results of the regression analysis in an upward direction. In these cases, projected income growth in the out years was reduced by forcing the growth rate to converge with the US projected rate.

The methods described above provide a unique 30-year projection of value of sales and personal income for each county in Alabama. The projection is based on each county's mix of commodity-producing industries and historical personal income growth. The techniques allow for a county's share of future freight traffic to change significantly over the 30-year period based on its economic growth rate compared to the other counties in the state.

Global Insight data, which are also the TRANSEARCH data, are the same data used in the forecast for the FAF2. This allows for incorporation of the Global Insight data into this project without the necessity to obtain the data directly.

#### *3.1.2 How Industry Sectors Were Used to Disaggregate Data*

Employment and value of sales, as well as industry projections, were used to calculate the percentage of an industry present in each county. This calculated percentage was then multiplied by the FAF2 volumes for the commodities associated with the industry to determine the amount of freight produced in or attracted to each county.

### 3.2 Other Related Data

#### *3.2.1 Economic Development – MPOs, RPCs, and RDCs*

The Metropolitan Planning Organizations (MPOs), Regional Planning Commissions (RPCs), and Regional Development Commissions (RDCs) in Alabama are responsible for gathering data regarding population and employment in their respective regions. MPOs are required to develop Long Range Transportation Plans (LRTPs) every few years, which require the development of base year socio-economic conditions and forecast year conditions. Data used in the process include occupied dwelling units, average income, retail employment, non-retail employment and school enrollment.

#### *3.2.2 Review of Warehousing, Distribution Centers, and Intermodal Centers*

Major retail centers were identified in all of Alabama's cities with populations of over 25,000. A subset of the retailers in these communities was chosen for a detailed analysis of their distribution network based upon research into supply chain strategies and access to data. Major name retailers with at least one distribution center or a significant number of stores in Alabama for each of the retail categories were selected for possible interviews. The resulting list was ranked for interview within each type of retail sector based on probability of getting an interview in person or by phone. The ranked list was then used to contact companies and request an interview. If a company refused or could not be reached, the next company was contacted. The process continued for each retail sector until data were obtained from at least one major retailer within each sector.

The approach was to gather data from specific leading (brand name) retailers rather than conduct a sampling of all retailers. The actual percentage of retailers interviewed was not calculated but would be very small based on the number of stores in Alabama. However, the distribution networks utilized by the major retailers were used as proxies for specific retail sectors. It is doubtful that all stores within a particular retail sector have exactly the same type of distribution network; nevertheless, for retail chains that serve multiple counties in the state, the distribution networks were found to be very similar to one of the network designs. The researchers conducted interviews (between summer 2006 and summer 2007) to gather information about how each network operates. The information collected from the survey included the geographical region served, physical and operational characteristics of the network, volume of traffic, and anticipated future traffic volumes. The survey revealed that most distribution networks serving Alabama can be characterized as either hub and spoke or route-based. The survey also uncovered many unique characteristics of each network.

Finally, researchers determined a method to allocate freight traffic arising from the final demand sector to Alabama counties. Several variables were tested including population, employment, payroll and personal income. It was found that total personal income of residents in the county appeared to work best, with population coming in second.

The research team found major distribution centers of finished goods serving Alabama in the following sectors:

| | |
|---|---|
| Big box supply stores | General merchandise |
| Furniture | Grocery chains |
| Fuel distributors | Home electronics |
| Pharmacies | Sporting goods |
| Autos | Parcel services |

Alabama retail store locations were identified for each company within the selected industry sectors utilizing a national internet research database, *Reference USA*. This database was selected because its desired data elements appeared to be most accurate and complete of the potential data sources reviewed. Telephone directory listings were used to verify locations. Location data by zip code was gathered to ensure appropriate geographic coverage at the county level. Data collection of retail store locations includes sales volume, number of employees, and contact information.

By combining the spatial analysis with the survey analysis, a better assessment of the freight transportation volumes for specific locations was possible. In addition, it met the objective of finding the highest potential traffic volumes across the industry sectors.

#### *3.2.3 Data Collection Tools and Strategy*

The sub-state economic database requires updating so that the most current information can be used to allocate freight traffic. The state's economic circumstances can change because of national, international and local events, and these changes can have long-term consequences for freight movement patterns. Most of the data required by the economic database is publicly available and published by federal or state agencies. Some are published quarterly, annually or with a lag of five years. The update schedule for the Alabama sub-state economic database is provided below.

**Table 8 Alabama Sub-State Economic Database Update Schedule**

| Data Items | Frequency | Next Update | Source |
|---|---|---|---|
| County Baseline Data: | | | |
| Manufacturing | 5 years | 2009 | US Census of Manufacturing |
| Agriculture | 5 years | 2009 | US Census of Agriculture |
| Logging | 5 years | 2009 | Alabama Forestry Commission |
| Mining | 5 years | 2009 | US Census of Mining |
| | | | US Geological Survey |
| | | | County Business Patterns |
| Growth Projections: | | | |
| Manufacturing | 1 year | 2010 | Global Insight |
| Agriculture | 1 year | 2010 | US Department of Agriculture |
| | | | Economic Research Service |
| Mining | 1 year | 2010 | US Geological Survey |
| | | | US Department of Energy |
| | | | Energy Information Agency |
| County Personal Income: | 1 year | 2010 | US Department of Commerce |
| | | | Bureau of Economic Analysis |

# 4. Summary and Next Steps

## 4.1 Summary

This report documents the data sources being used to support the Statewide Freight Study and Action Plan. The initial data collected were from the Freight Analysis Framework, Version 2.2 (FAF2), with adjustments and calibrations being made using additional datasets. The results of the base year data collection effort are intended to support the modeling effort associated with this study by providing a reasonable estimation of the current usage levels for the infrastructure in the state. This process is data intensive but required to disaggregate the federal data to a county/sub-state level.

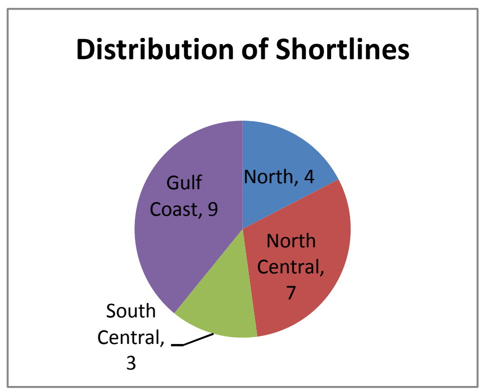
## 4.2 Next Steps

The next steps in the process will be to use similar methods of data collection, adjustment and reporting to the forecast data from the FAF2 database. This will allow for the modeling of 2035 freight on Alabama's infrastructure, thereby beginning the process of identifying congested locations and specifying potential big-picture solutions.

## APPENDIX 1 – SHORTLINE RAILROAD

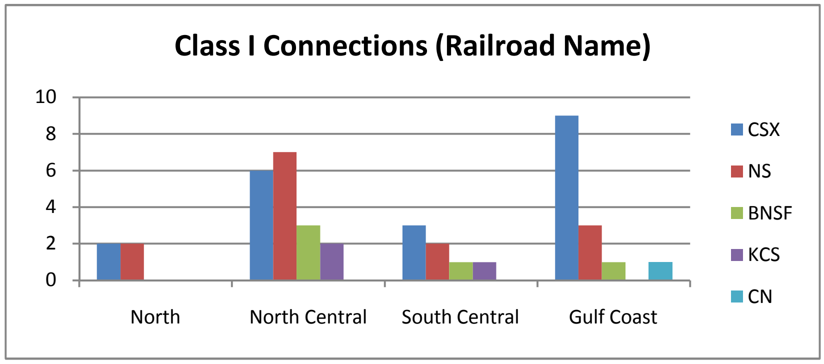
An element of the Freight Study, the Shortline Rail Rehabilitation Program is being developed in response to the Alabama Shortline Railroad Infrastructure Rehabilitation Act, which empowers ALDOT to identify rehabilitation funding needs, create the Shortline Railroad Infrastructure Rehabilitation Fund, and make grants and no-cost loans for shortline rehabilitation. As an initial step in identifying needs, the consultant team attempted to contact all 23 shortlines operating in Alabama. An introductory letter was mailed to representatives of each shortline in early June 2009 notifying them of the study, outlining the study's objectives, and informing them of the future interviews and discussion topics. The interviews were conducted in late June-early July 2009, with periodic attempts continuing for those shortlines that have not already been interviewed. In addition, representation for each shortline has been sought for inclusion on the Freight Study's Stakeholder Advisory Group (SAG). Following analysis of the data provided during the interviews, the consultant team will compile a summary of the State's shortline markets, operations and condition. The information will be used to develop a prioritization scheme, identify recommendations, and propose a program for improving shortline rail systems in Alabama.

- Alabama's 23 shortlines, as identified by major geographic area:
  - NORTH (4): Huntsville & Madison County Railroad Authority (HMCR); Redmont Railway Company, Inc. (RRC); Sequatchie Valley Railroad (SQVR); Tennessee Southern Railroad Company (TSRR)
  - NORTH CENTRAL (7): Alabama Southern Railroad (ABS); Alabama & Tennessee River Railway (ATN); Birmingham Southern Railroad Company (BS); Eastern Alabama Railway (EARY); Jefferson Warrior Railroad Company (JEFW); Luxapalila Valley Railroad Company (LXVR); Southern Electric Railroad Company, Inc. (SERX)

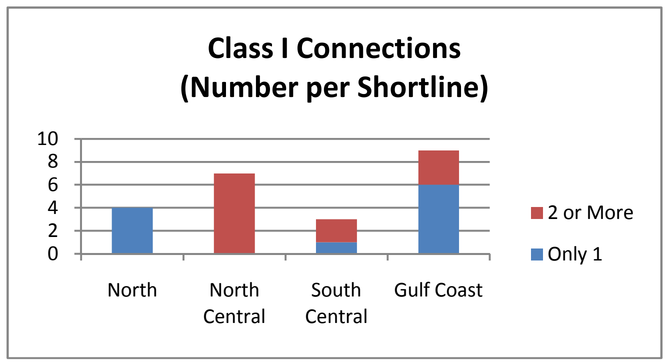



  - SOUTH CENTRAL (3): Conecuh Valley Railroad (COEH); Georgia Southwestern Railroad, Inc. (GSWR); M&B Railroad, LLC (MNBR)
  - GULF COAST (9): Alabama Railroad Company (ALAB); Alabama & Florida Railroad Company (AF); Alabama & Gulf Coast Railway (AGR); Andalusia & Conecuh Railroad Company (ACRC); Bay Line Railroad, LLC (BAYL); Chattahoochee Bay Railroad, Inc. (CHAT); Terminal Railway Alabama State Docks (TASD); Three Notch Railroad Company, Inc. (TNHR); Wiregrass Central Railroad (WGCR)

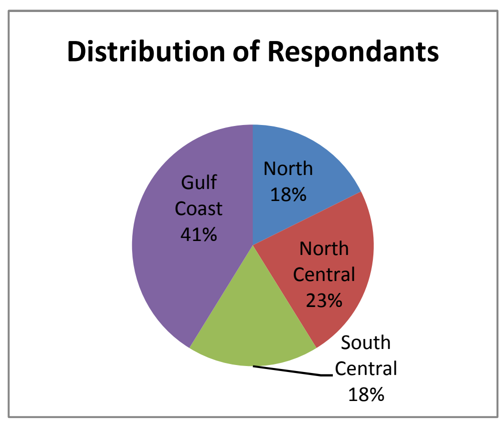
- Class I connections (all shortlines connect to at least 1 Class I railroad):
  - NORTH: CSX=2, NS=2
  - NORTH CENTRAL: CSX=6, NS=7, BNSF=3, KCS=2
  - SOUTH CENTRAL: CSX=3, NS=2, BNSF=1, KCS=1
  - GULF COAST: CSX=9, NS=3, BNSF=1, CN=1



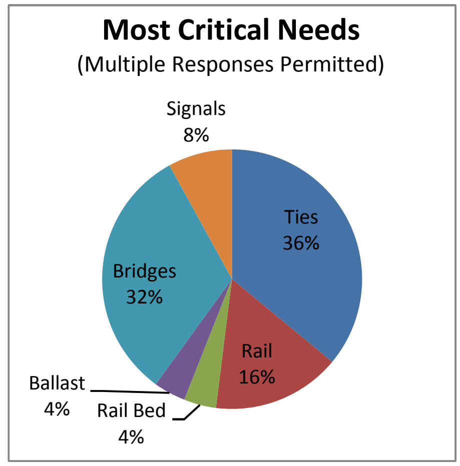

- Shortlines with 2 or more Class I connections:
  - NORTH: 0 of 4
  - NORTH CENTRAL: 7 of 7
  - SOUTH CENTRAL: 2 of 3
  - GULF COAST: 3 of 9



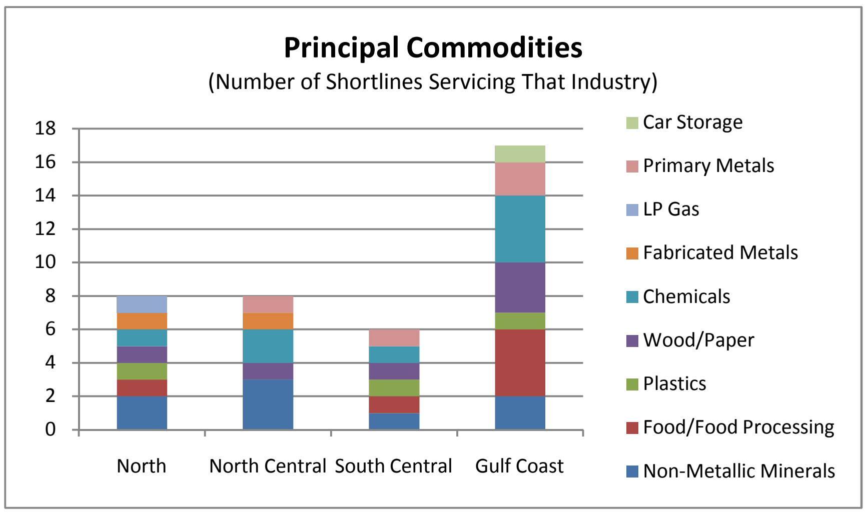

- 17 shortlines have completed the interview survey to date (periodic attempts will be made to interview remaining shortlines over the coming months):
  - NORTH: 3 of 4
  - NORTH CENTRAL: 4 of 7
  - SOUTH CENTRAL: 3 of 3
  - GULF COAST: 7 of 9



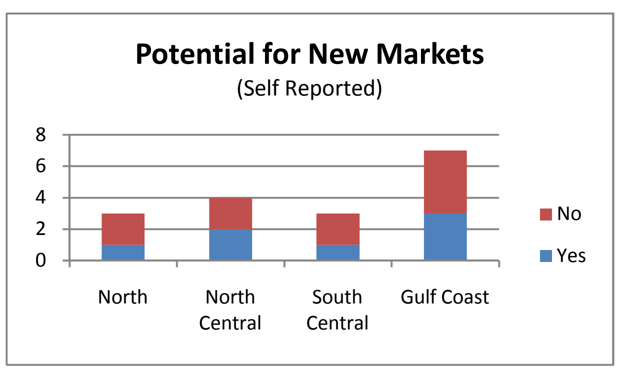
- Most critical needs (number of responding shortlines stating such):
  - NORTH: ties (2), bridges (2)
  - NORTH CENTRAL: rails (1), signals (1), ties (1)
  - SOUTH CENTRAL: bridges (2), ties (1), rail (1), rail bed (1)
  - GULF COAST: ties (5), bridges (4), rail (2), ballast (1), signals (1)




- Principal commodities (number of responding shortlines that service):
  - NORTH: NM minerals (2), food/food processing, plastics, wood/paper, chemicals, fabricated metals, LP gas (haz mat=1)
  - NORTH CENTRAL: NM minerals (3), chemicals (2), wood/paper, primary metals, fabricated metals
  - SOUTH CENTRAL: food/food processing, plastics, wood/paper, primary metals, NM minerals, chemicals
  - GULF COAST: Food/food processing (4), chemicals (4), wood/paper (3), primary metals (2), NM minerals (2), plastics, car storage (haz mat=2)




- Potential for new markets (number of responding shortlines stating such):
  - NORTH: 1 of 3
  - NORTH CENTRAL: 2 of 4
  - SOUTH CENTRAL: 1 of 3
  - GULF COAST: 3 of 7



## APPENDIX 2 – COUNTY FAF2 SUMMARY

The following table presents a summary of the FAF2 data that has been modified to match industry locations within a specific county to freight activity generated from the FAF2 database.

**Table A2-1 2002 Annual Kilotons, Jefferson County**

| Production for: | Jefferson | Weights: Employment | | | | | Weights: Value of sales | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Commodity | | Rail | Truck | Water | Air | Other | Rail | Truck | Water | Air | Other |
| Live animals/fish | 1 | - | 9.71 | 0.00 | 0.00 | 0.00 | - | 9.82 | 0.00 | 0.00 | 0.00 |
| Cereal grains | 2 | 0.01 | 94.03 | - | 0.00 | - | 0.01 | 81.53 | - | 0.00 | - |
| Other ag prods. | 3 | 0.23 | 69.54 | 0.00 | 0.00 | 0.01 | 0.20 | 60.30 | 0.00 | 0.00 | 0.01 |
| Animal feed | 4 | 0.05 | 107.51 | - | 0.00 | - | 0.05 | 105.43 | - | 0.00 | - |
| Meat/seafood | 5 | - | 308.76 | - | 0.00 | - | - | 302.80 | - | 0.00 | - |
| Milled grain prods. | 6 | 0.08 | 33.84 | - | 0.00 | - | 0.08 | 33.19 | - | 0.00 | - |
| Other foodstuffs | 7 | 2.91 | 1806.37 | - | 0.00 | 3.91 | 2.85 | 1771.49 | - | 0.00 | 3.84 |
| Alcoholic beverages | 8 | - | 309.83 | - | 0.00 | - | - | 309.83 | - | 0.00 | - |
| Tobacco prods. | 9 | - | 17.31 | - | 0.00 | - | - | 17.31 | - | 0.00 | - |
| Building stone | 10 | - | 0.00 | - | - | - | - | 0.00 | - | - | - |
| Natural sands | 11 | - | 0.00 | - | - | - | - | 0.00 | - | - | - |
| Gravel | 12 | 0.00 | 0.00 | - | - | 0.00 | 0.00 | 0.00 | - | - | 0.00 |
| Nonmetallic minerals | 13 | 8.65 | 621.07 | - | 0.00 | - | 8.65 | 621.07 | - | 0.00 | - |
| Metallic ores | 14 | - | 118.32 | - | 0.00 | - | - | 118.32 | - | 0.00 | - |
| Coal | 15 | 1919.93 | 828.21 | 0.08 | - | 4636.19 | 1919.93 | 828.21 | 0.08 | - | 4636.19 |
| Crude petroleum | 16 | - | 0.43 | - | - | - | - | 0.43 | - | - | - |
| Gasoline | 17 | - | 4380.53 | - | - | - | - | 4380.53 | - | - | - |
| Fuel oils | 18 | - | 2160.07 | - | - | - | - | 2160.07 | - | - | - |
| Coal-n.e.c. | 19 | 782.35 | 2037.08 | - | 0.00 | 870.73 | 782.35 | 2037.08 | - | 0.00 | 870.73 |
| Basic chemicals | 20 | 128.09 | 678.36 | 0.02 | 0.02 | 0.04 | 128.09 | 678.36 | 0.02 | 0.02 | 0.04 |
| Pharmaceuticals | 21 | - | 55.95 | - | 0.00 | 15.58 | - | 55.95 | - | 0.00 | 15.58 |
| Fertilizers | 22 | 0.78 | 1533.29 | - | 0.00 | - | 0.78 | 1533.29 | - | 0.00 | - |
| Chemical prods. | 23 | 0.06 | 169.90 | - | 0.00 | 0.04 | 0.06 | 169.90 | - | 0.00 | 0.04 |
| Plastics/rubber | 24 | 1.65 | 377.07 | - | 0.00 | 7.28 | 1.65 | 377.07 | - | 0.00 | 7.28 |
| Logs | 25 | - | 0.00 | - | - | - | - | 312.70 | - | - | - |
| Wood prods. | 26 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 |
| Newsprint/paper | 27 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 |
| Paper articles | 28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Printed prods. | 29 | - | 235.70 | - | 0.00 | 5.29 | - | 235.70 | - | 0.00 | 5.29 |
| Textiles/leather | 30 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 |
| Nonmetal min. prods. | 31 | 2418.19 | 2714.62 | - | 0.00 | 26.38 | 2716.50 | 3049.50 | - | 0.00 | 29.64 |
| Base metals | 32 | 1503.83 | 4746.81 | 0.01 | 0.01 | 2.45 | 1541.69 | 4866.32 | 0.01 | 0.01 | 2.51 |
| Articles-base metal | 33 | 7.08 | 1019.64 | - | 0.00 | 4.60 | 7.03 | 1012.47 | - | 0.00 | 4.57 |
| Machinery | 34 | 0.03 | 434.81 | 0.01 | 0.02 | 3.59 | 0.04 | 489.14 | 0.01 | 0.02 | 4.04 |
| Electronics | 35 | 7.45 | 155.27 | 0.01 | 0.02 | 5.82 | 7.45 | 155.27 | 0.01 | 0.02 | 5.82 |
| Motorized vehicles | 36 | 2.66 | 121.65 | - | 0.00 | 23.06 | 2.55 | 116.75 | - | 0.00 | 22.13 |
| Transport equip. | 37 | 0.07 | 60.58 | 0.02 | 0.02 | 0.03 | 0.07 | 58.15 | 0.02 | 0.02 | 0.03 |
| Precision instruments | 38 | 0.06 | 38.57 | 0.01 | 0.01 | 0.92 | 0.06 | 38.57 | 0.01 | 0.01 | 0.92 |
| Furniture | 39 | 0.01 | 225.38 | - | 0.00 | - | 0.01 | 225.38 | - | 0.00 | - |
| Misc. mfg. prods. | 40 | - | 611.60 | - | 0.00 | 2.33 | - | 611.60 | - | 0.00 | 2.33 |
| Waste/scrap | 41 | - | 1451.83 | - | - | 1.13 | - | 1808.36 | - | - | 1.41 |
| Unknown | 42 | 46.94 | 1209.09 | - | - | 1.06 | 58.47 | 1506.01 | - | - | 1.31 |
| Mixed freight | 43 | - | 1203.43 | - | 0.00 | 0.56 | - | 1498.97 | - | 0.00 | 0.69 |
| | **Total** | **6831.11** | **29946.17** | **0.15** | **0.12** | **5611.00** | **7178.56** | **31636.87** | **0.15** | **0.12** | **5614.40** |

*Note: Due to rounding, sums may not total exactly.*

## APPENDIX 3 – RAILROAD SPECIFIC DATA

**Table A3-1 Class I, Class II, Class III, and Shortline Railroads in Alabama, Loads and Commodities Carried**

| Class I Railroads in Alabama | Loads | Commodities |
|---|---|---|
| Burlington Northern Santa Fe Railway - BNSF | Originated: 73,729 carloads<br>Within State: 327,465<br>Terminated: 185,486 | Coal, Consumer Products, Industrial Products, Agricultural Products |
| Canadian National - CN | | Petroleum, Grain, Chemicals, Fertilizers, Coal, Metals, Minerals, Forest Products, Automotive |
| CSX | 575,000 carloads | Coal, Corn, Limestone, Paper/Pulp |
| Norfolk Southern - NS | Intrastate tonnage: 6,318,011 | Coal, Coke, Iron Ore, Metals, Construction Materials, Paper, Clay, Forest Products, Intermodal, Automotive Parts/Vehicles, Agricultural Products, Chemicals |
| **Class II Railroads in Alabama (Regional)** | **Loads** | **Commodities** |
| Alabama & Gulf Coast Railway - AGR | 58,000+ carloads | Paper Products, Wood Chips, Lumber, Coal, Cottonseed |
| **Class III Railroads in Alabama (Local Linehaul)** | **Loads** | **Commodities** |
| Alabama Southern - ABS | | |
| Alabama & Tennessee River Railway - ATN | | Food, Corn, Soybean Prod, Wood Prod, Metals & Scrap, Industrial Chemicals, Cement |
| Bay Line Railroad - BAYL | Carloads: 27,187<br>Tonnage: 2,454,473 | Paper products, Forest products, Steel/Pipe, Aggregates, Chemicals |
| Chattahoochee Bay Railroad - CHAT | | |
| Conecuh Valley Railroad - COEH | | Plastics, Vegetable Oil, Peanuts |
| Eastern Alabama Railway - EARY | Carloads: 15,268 | Paper, Rock, Limestone, Fertilizer |
| Georgia Southwestern Railroad - GSWR | Carloads: 1,628 in AL<br>Tons: 56,270 (Chemicals & Fertilizer), 94,000 (Clay, Glass, Stone), 2,850 Lumber | Chemicals and Allied Products, Fertilizer, Clay, Concrete, Glass, Stone, Lumber |
| Huntsville & Madison County Railroad - HMCR | Tons: 23,000 (Zircon), 6,500 (plastics) | Zircon Sand, Plastics, Alumina, Brick |
| Luxapalila Valley Railroad - LXVR | | Wood Products, Gravel |

| | | |
|---|---|---|
| M & B Railroad - MNBR | (120 ton carloads) Pulp and Paper – 4,622, Forest Products - 741, Chemicals and Plastics - 672, Coal, Coke, Ore - 290, Farm and Food Products - 136, Minerals and Stone - 136, Petroleum Products - 69, Metals - 17, Other - 18,110 | Pulp and Paper, Forest Products, Chemicals and Plastics, Coal, Coke, Ore, Farm and Food Products, Minerals and Stone, Petroleum Products, Metals |
| Redmont Railroad - RRC | | Grain, Soybean Meal, Meat & Bone Meal, Automobile Chassis |
| Sequatchie Valley Railroad - SQVR | Tons: 118,500 | Gypsum Board, Clay, Plastic Resin |
| Tennessee Southern Railroad - TSRR | | Steel Coils, Sand, Potash, Sulfate, Aluminum Can |
| Three Notch Railroad - TNHR | Carloads: 1,600 | Chemicals, Polypropylene, Fertilizer and Other Agricultural Products |
| Wiregrass Central Railroad - WGCR | Carloads: 4,200 (85 ton cars) | Poultry Feed Ingredients, Peanut Products, Seed |
| **Class III Railroads in Alabama (Local Switching & Terminal)** | **Loads** | **Commodities** |
| Alabama & Florida Railroad - AF | Tons Originated: 700<br>Tons Terminated: 3,000 | Unknown |
| Alabama Railroad - ALAB | Tons Originated: 78,500<br>Tons Terminated: 8,000 | Lumber Products (Pulpwood, Particle Board, Finished Lumber) |
| Birmingham Southern Railroad - BS | Intrastate - Scrap 38,945 tons, Coal 322,467 tons | Pipe/Steel, Iron Ore, Coke, Sulfur, Roofing Materials, Scrap Iron or Steel |
| Jefferson Warrior Railroad - JEFW | Carloads: 9,000 | Coal, Coke, Mineral Fiber, Aggregates, Iron Pipe & Scrap, Chemicals |
| Terminal Railway Alabama State Docks - TASD | Tons: 12.3 mil / Coal-7,000,000, Chemicals-384,958, Forest Products-1,382,619, Pig Iron-128,995, Grain-1,911,865 | Coal, Chemicals, Forest Products, Pig Iron, Grain |
| **Class III Railroads in Alabama (Unclassified)** | **Loads** | **Commodities** |
| Andalusia & Conecuh Railroad - ACRC | | Plastic Resin |
| Huntsville & Madison County Railroad Authority - HMCR | Tons: 152,000,000 inbound & outbound | |
| Southern Electric Railroad - SERX | Tons: 13,500,000 | Coal |

## APPENDIX 4 – US ARMY CORPS OF ENGINEERS SPECIFIC WATERWAY DATA

**Table A4-1 US Army Corps of Engineers Waterborne Data, Origin-Alabama**

| DESTINATION | COMMODITY | Kilotons |
|---|---|---|
| **Alabama** | Chemicals excluding Fertilizers | 27.95 |
| | Coal, Lignite, and Coal Coke | 8,855.34 |
| | Crude Petroleum | 1,021.35 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 1,155.70 |
| | Lumber, Logs, Wood Chips, and Pulp | 521.18 |
| | Manufactured Goods | 2.22 |
| | Petroleum Products | 1,461.93 |
| | Primary Metal Products | 402.83 |
| | Primary Non-Metal Products | 109.38 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 169.12 |
| | Unknown and Not Elsewhere Classified Products | 11.07 |
| **Alabama Total** | | **13,738.06** |
| **Arkansas** | Iron Ore, Iron, and Steel Waste and Scrap | 65.96 |
| | Unknown and Not Elsewhere Classified Products | 65.57 |
| **Arkansas Total** | | **131.52** |
| **Canada** | Chemicals excluding Fertilizers | 11.21 |
| | Manufactured Goods | 0.25 |
| | Primary Metal Products | 0.01 |
| **Canada Total** | | **11.47** |
| **Florida** | Petroleum Products | 475.90 |
| | Primary Non-Metal Products | 367.82 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 275.88 |
| | Unknown and Not Elsewhere Classified Products | 1,586.67 |
| **Florida Total** | | **2,706.27** |
| **Foreign** | Chemical Fertilizers | 0.31 |
| | Chemicals excluding Fertilizers | 219.27 |
| | Coal, Lignite, and Coal Coke | 4,108.52 |
| | Food and Food Products | 1,656.40 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 0.06 |
| | Lumber, Logs, Wood Chips, and Pulp | 2,029.02 |
| | Manufactured Goods | 32.31 |
| | Non-Ferrous Ores and Scrap | 0.00 |
| | Petroleum Products | 6.42 |
| | Primary Metal Products | 99.56 |
| | Primary Non-Metal Products | 243.45 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 43.48 |
| | Unknown and Not Elsewhere Classified Products | 41.58 |
| **Foreign Total** | | **8,480.37** |

| DESTINATION | COMMODITY | Kilotons |
|---|---|---|
| **Illinois** | Coal, Lignite, and Coal Coke | 41.05 |
| | Food and Food Products | 8.70 |
| | Lumber, Logs, Wood Chips, and Pulp | 180.57 |
| | Primary Metal Products | 8.68 |
| | Unknown and Not Elsewhere Classified Products | 41.11 |
| **Illinois Total** | | **280.10** |
| **Indiana** | Unknown and Not Elsewhere Classified Products | 115.78 |
| **Indiana Total** | | **115.78** |
| **Iowa** | Lumber, Logs, Wood Chips, and Pulp | 9.86 |
| | Unknown and Not Elsewhere Classified Products | 27.97 |
| **Iowa Total** | | **37.83** |
| **Kentucky** | Iron Ore, Iron, and Steel Waste and Scrap | 18.02 |
| | Primary Metal Products | 7.12 |
| | Unknown and Not Elsewhere Classified Products | 85.61 |
| **Kentucky Total** | | **110.75** |
| **Louisiana** | Chemicals excluding Fertilizers | 402.34 |
| | Crude Petroleum | 1,004.09 |
| | Food and Food Products | 495.78 |
| | Manufactured Goods | 3.79 |
| | Petroleum Products | 711.84 |
| | Primary Metal Products | 33.09 |
| | Primary Non-Metal Products | 419.72 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 55.07 |
| | Unknown and Not Elsewhere Classified Products | 32.55 |
| **Louisiana Total** | | **3,158.27** |
| **Minnesota** | Food and Food Products | 15.46 |
| | Unknown and Not Elsewhere Classified Products | 9.91 |
| **Minnesota Total** | | **25.37** |
| **Mississippi** | Petroleum Products | 258.18 |
| | Primary Non-Metal Products | 82.10 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 113.21 |
| | Unknown and Not Elsewhere Classified Products | 1,129.35 |
| **Mississippi Total** | | **1,582.84** |
| **Missouri** | Primary Metal Products | 28.96 |
| | Unknown and Not Elsewhere Classified Products | 203.56 |
| **Missouri Total** | | **232.51** |
| **Ohio** | Sand, Gravel, Shells, Clay, Salt, and Slag | 80.98 |
| | Unknown and Not Elsewhere Classified Products | 14.36 |
| **Ohio Total** | | **95.33** |
| **Oklahoma** | Unknown and Not Elsewhere Classified Products | 14.93 |
| **Oklahoma Total** | | **14.93** |

| DESTINATION | COMMODITY | Kilotons |
|---|---|---|
| **Other** | Food and Food Products | 20.88 |
| | Manufactured Goods | 17.27 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 60.26 |
| | Unknown and Not Elsewhere Classified Products | 46.98 |
| **Other Total** | | **145.38** |
| **Pennsylvania** | Iron Ore, Iron, and Steel Waste and Scrap | 13.67 |
| | Lumber, Logs, Wood Chips, and Pulp | 13.20 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 36.18 |
| | Unknown and Not Elsewhere Classified Products | 19.85 |
| **Pennsylvania Total** | | **82.90** |
| **Puerto Rico** | Unknown and Not Elsewhere Classified Products | 42.15 |
| **Puerto Rico Total** | | **42.15** |
| **Tennessee** | Food and Food Products | 14.80 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 61.63 |
| | Primary Non-Metal Products | 233.66 |
| | Unknown and Not Elsewhere Classified Products | 42.45 |
| **Tennessee Total** | | **352.54** |
| **Texas** | Chemicals excluding Fertilizers | 306.44 |
| | Petroleum Products | 245.20 |
| | Primary Metal Products | 40.94 |
| | Primary Non-Metal Products | 46.18 |
| | Unknown and Not Elsewhere Classified Products | 575.85 |
| **Texas Total** | | **1,214.59** |
| **West Virginia** | Unknown and Not Elsewhere Classified Products | 14.14 |
| **West Virginia Total** | | **14.14** |
| **Wisconsin** | Food and Food Products | 11.08 |
| **Wisconsin Total** | | **11.08** |
| **Grand Total** | | **32,584.18** |

*Note: Due to rounding, sums may not total exactly.*

**Table A4-2 US Army Corps of Engineers Waterborne Data, Destination-Alabama**

| ORIGIN | COMMODITY | Kilotons |
|---|---|---|
| **Alabama** | Chemicals excluding Fertilizers | 27.95 |
| | Coal, Lignite, and Coal Coke | 8,855.34 |
| | Crude Petroleum | 1,021.35 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 1,155.70 |
| | Lumber, Logs, Wood Chips, and Pulp | 521.18 |
| | Manufactured Goods | 2.22 |
| | Petroleum Products | 1,461.93 |
| | Primary Metal Products | 402.83 |
| | Primary Non-Metal Products | 109.38 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 169.12 |
| | Unknown and Not Elsewhere Classified Products | 11.07 |
| **Alabama Total** | | **13,738.06** |
| **Arkansas** | Food and Food Products | 23.99 |
| | Unknown and Not Elsewhere Classified Products | 34.34 |
| **Arkansas Total** | | **58.33** |
| **Canada** | Chemicals excluding Fertilizers | 131.97 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 730.83 |
| | Primary Metal Products | 116.64 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 174.18 |
| **Canada Total** | | **1,153.62** |
| **Florida** | Unknown and Not Elsewhere Classified Products | 1,990.09 |
| **Florida Total** | | **1,990.09** |
| **Foreign** | Chemical Fertilizers | 7.16 |
| | Chemicals excluding Fertilizers | 53.40 |
| | Coal, Lignite, and Coal Coke | 5,664.08 |
| | Crude Petroleum | 4,690.28 |
| | Food and Food Products | 155.70 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 822.70 |
| | Lumber, Logs, Wood Chips, and Pulp | 298.48 |
| | Manufactured Goods | 80.35 |
| | Non-Ferrous Ores and Scrap | 265.21 |
| | Petroleum Products | 452.07 |
| | Primary Metal Products | 670.83 |
| | Primary Non-Metal Products | 612.72 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 98.43 |
| | Unknown and Not Elsewhere Classified Products | 36.58 |
| **Foreign Total** | | **13,907.98** |
| **Illinois** | Coal, Lignite, and Coal Coke | 1,363.73 |
| | Food and Food Products | 1,244.85 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 50.42 |
| | Petroleum Products | 25.88 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 347.44 |
| | Unknown and Not Elsewhere Classified Products | 43.88 |
| **Illinois Total** | | **3,076.19** |

| ORIGIN | COMMODITY | Kilotons |
|---|---|---|
| **Indiana** | Food and Food Products | 142.57 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 35.49 |
| | Unknown and Not Elsewhere Classified Products | 179.97 |
| **Indiana Total** | | **358.03** |
| **Iowa** | Food and Food Products | 487.03 |
| **Iowa Total** | | **487.03** |
| **Kentucky** | Chemicals excluding Fertilizers | 52.04 |
| | Coal, Lignite, and Coal Coke | 3,717.32 |
| | Food and Food Products | 165.99 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 7.52 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 1,386.23 |
| | Unknown and Not Elsewhere Classified Products | 39.38 |
| **Kentucky Total** | | **5,368.48** |
| **Louisiana** | Chemical Fertilizers | 49.04 |
| | Chemicals excluding Fertilizers | 518.04 |
| | Coal, Lignite, and Coal Coke | 17.62 |
| | Crude Petroleum | 196.25 |
| | Food and Food Products | 51.01 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 147.50 |
| | Manufactured Goods | 2.55 |
| | Non-Ferrous Ores and Scrap | 23.47 |
| | Petroleum Products | 539.32 |
| | Primary Metal Products | 576.93 |
| | Primary Non-Metal Products | 37.08 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 81.58 |
| | Unknown and Not Elsewhere Classified Products | 2.13 |
| **Louisiana Total** | | **2,242.51** |
| **Minnesota** | Food and Food Products | 472.70 |
| | Unknown and Not Elsewhere Classified Products | 18.76 |
| **Minnesota Total** | | **491.46** |
| **Mississippi** | Chemical Fertilizers | 30.04 |
| | Food and Food Products | 9.91 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 55.53 |
| | Lumber, Logs, Wood Chips, and Pulp | 686.14 |
| | Petroleum Products | 237.04 |
| | Unknown and Not Elsewhere Classified Products | 138.05 |
| **Mississippi Total** | | **1,156.71** |
| **Missouri** | Food and Food Products | 111.04 |
| | Unknown and Not Elsewhere Classified Products | 90.84 |
| **Missouri Total** | | **201.89** |
| **Nebraska** | Unknown and Not Elsewhere Classified Products | 29.82 |
| **Nebraska Total** | | **29.82** |
| **Ohio** | Food and Food Products | 80.04 |
| | Primary Metal Products | 39.60 |
| | Unknown and Not Elsewhere Classified Products | 7.83 |
| **Ohio Total** | | **127.46** |

| ORIGIN | COMMODITY | Kilotons |
|---|---|---|
| **Oklahoma** | Food and Food Products | 96.60 |
| | Unknown and Not Elsewhere Classified Products | 101.35 |
| **Oklahoma Total** | | **197.95** |
| **Other** | Manufactured Goods | 4.56 |
| | Primary Metal Products | 3.78 |
| | Unknown and Not Elsewhere Classified Products | 108.01 |
| **Other Total** | | **116.35** |
| **Pennsylvania** | Primary Metal Products | 4.66 |
| | Unknown and Not Elsewhere Classified Products | 22.05 |
| **Pennsylvania Total** | | **26.71** |
| **Puerto Rico** | Unknown and Not Elsewhere Classified Products | 14.87 |
| **Puerto Rico Total** | | **14.87** |
| **Tennessee** | Chemicals excluding Fertilizers | 8.41 |
| | Food and Food Products | 37.71 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 90.37 |
| | Primary Metal Products | 16.95 |
| | Sand, Gravel, Shells, Clay, Salt, and Slag | 260.91 |
| | Unknown and Not Elsewhere Classified Products | 4.99 |
| **Tennessee Total** | | **419.34** |
| **Texas** | Chemicals excluding Fertilizers | 1,130.09 |
| | Crude Petroleum | 233.48 |
| | Iron Ore, Iron, and Steel Waste and Scrap | 26.82 |
| | Petroleum Products | 281.20 |
| | Unknown and Not Elsewhere Classified Products | 10.65 |
| **Texas Total** | | **1,682.24** |
| **West Virginia** | Sand, Gravel, Shells, Clay, Salt, and Slag | 40.40 |
| | Unknown and Not Elsewhere Classified Products | 495.48 |
| **West Virginia Total** | | **535.87** |
| **Wisconsin** | Unknown and Not Elsewhere Classified Products | 60.80 |
| **Wisconsin Total** | | **60.80** |
| **Grand Total** | | **47,441.79** |

*Note: Due to rounding, sums may not total exactly.*

# Alabama Statewide Freight Study and Action Plan

Interim Report 2

Tasks 2 & 3 – Deficiencies Analysis

Prepared by

UAHuntsville
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

JRWA
J.R. WILBURN AND ASSOCIATES, INC.

May 20, 2010

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## 1. Introduction

The Alabama Department of Transportation (ALDOT) initiated the Alabama Statewide Freight Study and Action Plan to gain better understanding of the interrelationships between freight movement, transportation infrastructure, and economic growth. Combining data on commodities flow, transportation operations and economic growth from a variety of sources yields a more complete picture of current and forecast conditions. Areas of greatest concern specifically related to the transportation system can be identified from this assessment of conditions, thereby enabling ALDOT and its public and private freight partners to proactively coordinate in the development of improvements to mitigate adverse impacts.

Interim Report 2 documents the approach, methodology and findings of the deficiencies analysis activities (Scope of Work Tasks 2 and 3). The process, sources and limitations of the data collection effort upon which the deficiencies analysis builds is documented in Interim Report 1.

More detailed, or complete electronic data files, from which examples and screen shots shown in subsequent sections were drawn, are available from ALDOT or UAH staff.

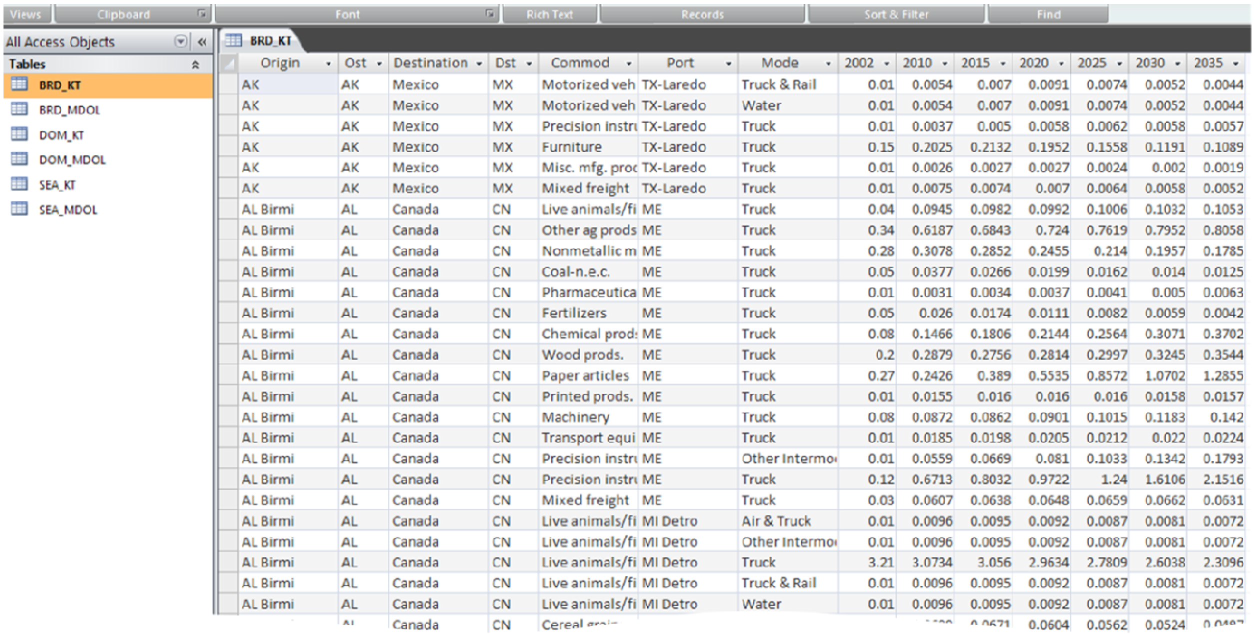
## 2. FAF2 Data Overview

The Freight Analysis Framework, version 2.2 (FAF2) provides estimates of commodity flows between states/regions. The origin-destination database contains tonnage and value of commodity shipments between geographic regions by mode of transportation and commodity type. The commodity flows are provided for the base year (2002) as well as forecasts for 2010 to 2035, in 5-year increments. The data are available as a Microsoft Access database consisting of 6 tables:

- DOM_KT – contains commodity flows between domestic origins and destinations, recorded in thousand short tons (kilotons)
- DOM_MDOL – contains commodity flows between domestic origins and destinations, recorded in millions of dollars
- BDR_KT– contains transborder commodity flows between Canada/Mexico and domestic regions via domestic ports and gateways, recorded in thousand short tons (kilotons)
- BDR_MDOL – contains transborder commodity flows between Canada/Mexico and domestic regions via domestic ports and gateways, recorded in millions of dollars
- SEA_KT – contains commodity flows by water between overseas regions and domestic regions via domestic ports and gateways, recorded in thousand short tons (kilotons)
- SEA_MDOL– contains commodity flows by water between overseas regions and domestic regions via domestic ports and gateways, recorded in millions of dollars

The 3 tonnage-related tables (“BDR_KT”, “DOM_KT” and “SEA_KT”) were initially used in this project. A screenshot of the BDR_KT table is shown below.

**Figure 1 Screen Shot of FAF2 Database**

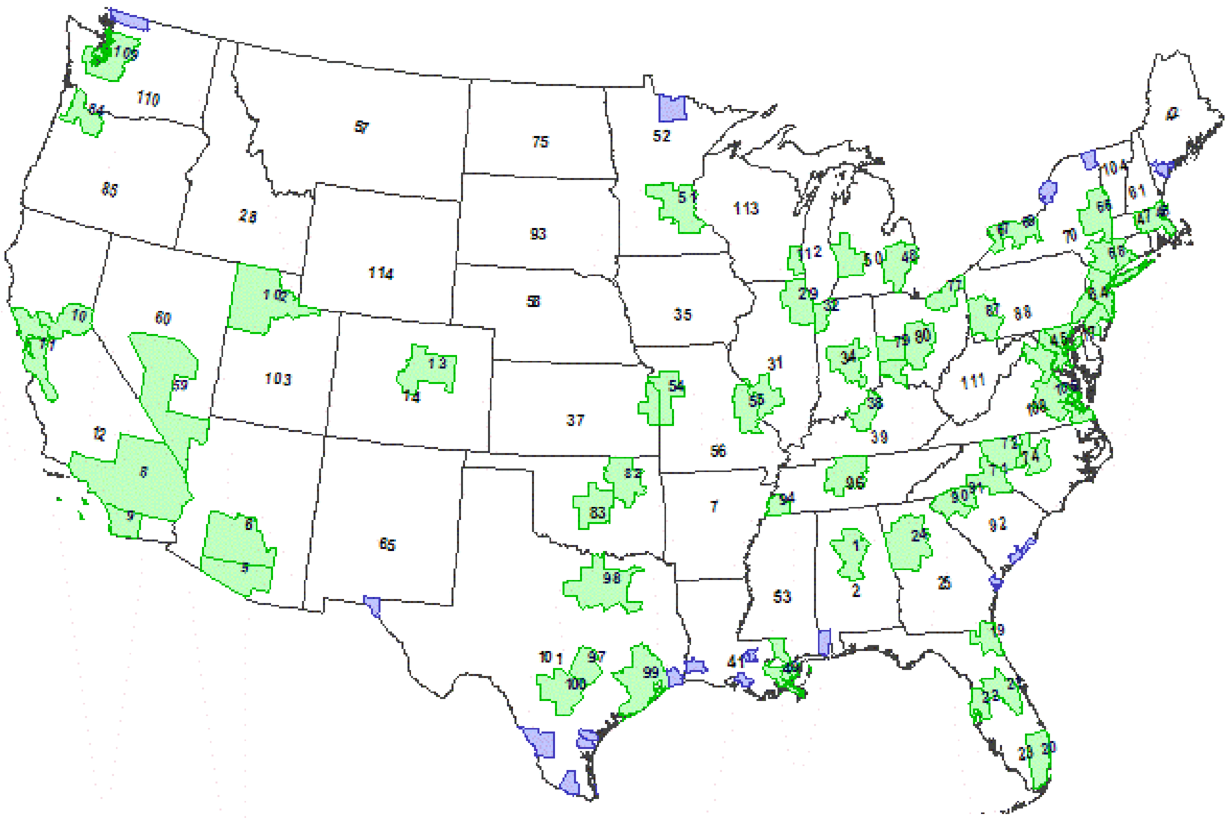



BRD_KT

| Origin | Ost | Destination | Dst | Commod | Port | Mode | 2002 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AK | AK | Mexico | MX | Motorized veh | TX-Laredo | Truck & Rail | 0.01 | 0.0054 | 0.007 | 0.0091 | 0.0074 | 0.0052 | 0.0044 |
| AK | AK | Mexico | MX | Motorized veh | TX-Laredo | Water | 0.01 | 0.0054 | 0.007 | 0.0091 | 0.0074 | 0.0052 | 0.0044 |
| AK | AK | Mexico | MX | Precision instru | TX-Laredo | Truck | 0.01 | 0.0037 | 0.005 | 0.0058 | 0.0062 | 0.0058 | 0.0057 |
| AK | AK | Mexico | MX | Furniture | TX-Laredo | Truck | 0.15 | 0.2025 | 0.2132 | 0.1952 | 0.1558 | 0.1191 | 0.1089 |
| AK | AK | Mexico | MX | Misc. mfg. proc | TX-Laredo | Truck | 0.01 | 0.0026 | 0.0027 | 0.0027 | 0.0024 | 0.002 | 0.0019 |
| AK | AK | Mexico | MX | Mixed freight | TX-Laredo | Truck | 0.01 | 0.0075 | 0.0074 | 0.007 | 0.0064 | 0.0058 | 0.0052 |
| AL Birmi | AL | Canada | CN | Live animals/fi | ME | Truck | 0.04 | 0.0945 | 0.0982 | 0.0992 | 0.1006 | 0.1032 | 0.1053 |
| AL Birmi | AL | Canada | CN | Other ag prods | ME | Truck | 0.34 | 0.6187 | 0.6843 | 0.724 | 0.7619 | 0.7952 | 0.8058 |
| AL Birmi | AL | Canada | CN | Nonmetallic m | ME | Truck | 0.28 | 0.3078 | 0.2852 | 0.2455 | 0.214 | 0.1957 | 0.1785 |
| AL Birmi | AL | Canada | CN | Coal-n.e.c. | ME | Truck | 0.05 | 0.0377 | 0.0266 | 0.0199 | 0.0162 | 0.014 | 0.0125 |
| AL Birmi | AL | Canada | CN | Pharmaceutica | ME | Truck | 0.01 | 0.0031 | 0.0034 | 0.0037 | 0.0041 | 0.005 | 0.0063 |
| AL Birmi | AL | Canada | CN | Fertilizers | ME | Truck | 0.05 | 0.026 | 0.0174 | 0.0111 | 0.0082 | 0.0059 | 0.0042 |
| AL Birmi | AL | Canada | CN | Chemical prod: | ME | Truck | 0.08 | 0.1466 | 0.1806 | 0.2144 | 0.2564 | 0.3071 | 0.3702 |
| AL Birmi | AL | Canada | CN | Wood prods. | ME | Truck | 0.2 | 0.2879 | 0.2756 | 0.2814 | 0.2997 | 0.3245 | 0.3544 |
| AL Birmi | AL | Canada | CN | Paper articles | ME | Truck | 0.27 | 0.2426 | 0.389 | 0.5535 | 0.8572 | 1.0702 | 1.2855 |
| AL Birmi | AL | Canada | CN | Printed prods. | ME | Truck | 0.01 | 0.0155 | 0.016 | 0.016 | 0.016 | 0.0158 | 0.0157 |
| AL Birmi | AL | Canada | CN | Machinery | ME | Truck | 0.08 | 0.0872 | 0.0862 | 0.0901 | 0.1015 | 0.1183 | 0.142 |
| AL Birmi | AL | Canada | CN | Transport equi | ME | Truck | 0.01 | 0.0185 | 0.0198 | 0.0205 | 0.0212 | 0.022 | 0.0224 |
| AL Birmi | AL | Canada | CN | Precision instru | ME | Other Intermo | 0.01 | 0.0559 | 0.0669 | 0.081 | 0.1033 | 0.1342 | 0.1793 |
| AL Birmi | AL | Canada | CN | Precision instru | ME | Truck | 0.12 | 0.6713 | 0.8032 | 0.9722 | 1.24 | 1.6106 | 2.1516 |
| AL Birmi | AL | Canada | CN | Mixed freight | ME | Truck | 0.03 | 0.0607 | 0.0638 | 0.0648 | 0.0659 | 0.0662 | 0.0631 |
| AL Birmi | AL | Canada | CN | Live animals/fi | MI Detro | Air & Truck | 0.01 | 0.0096 | 0.0095 | 0.0092 | 0.0087 | 0.0081 | 0.0072 |
| AL Birmi | AL | Canada | CN | Live animals/fi | MI Detro | Other Intermo | 0.01 | 0.0096 | 0.0095 | 0.0092 | 0.0087 | 0.0081 | 0.0072 |
| AL Birmi | AL | Canada | CN | Live animals/fi | MI Detro | Truck | 3.21 | 3.0734 | 3.056 | 2.9634 | 2.7809 | 2.6038 | 2.3096 |
| AL Birmi | AL | Canada | CN | Live animals/fi | MI Detro | Truck & Rail | 0.01 | 0.0096 | 0.0095 | 0.0092 | 0.0087 | 0.0081 | 0.0072 |
| AL Birmi | AL | Canada | CN | Live animals/fi | MI Detro | Water | 0.01 | 0.0096 | 0.0095 | 0.0092 | 0.0087 | 0.0081 | 0.0072 |
| [illegible] | AL | Canada | CN | Cereal [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 0.0604 | 0.0562 | 0.0524 | [illegible] |

The FAF2 database contains 114 domestic regions as used in the 2002 Commodity Flow Survey, defined to include one or more major Metropolitan Statistical Areas (MSA) or Consolidated Statistical Areas (CSA) or those that lie outside of these MSAs and CSAs. It also includes 17 additional international gateways that are major freight entry/exit points in the US, and 7 designations for international regions. The regions are shown in the figure below. FAF2 freight data for Alabama are categorized into two zones, Zone 1—AL Birmi, an 8 county region around Birmingham, or Zone 2—AL Rem, the remaining 59 counties in Alabama. The Port of Mobile (Zone 123) is included as an International Gateway and is separate from Zone 2.

**Figure 2 2002 Commodity Flow Survey Zones and International Gateways**



Queries were run on all three tables to determine the level and type of freight flows originated in or destined for Alabama. Traffic generated by the Port of Mobile must also be included in statewide freight movements, so queries were run on the BDR and SEA tables to determine import flows and export flows through the Port.

## 2.1. Economic Database Overview

The economic base of Alabama includes major manufacturing industries, agriculture, logging and mining. Each of these industries, along with retailing, wholesaling and warehousing, can potentially generate both incoming and outgoing freight traffic. These industries were examined, and data gathered to form the economic database. The data are developed from several publicly available sources including the economic census, mining reports, and forestry reports. The base year for the economic database is 2002, the year corresponding to the FAF2 origin-destination matrices.

The economic database also includes industry and county specific growth factors of these data to the year 2035. The county-level base year and growth factor data were collated into the *Value of Sales* spreadsheet. This spreadsheet contains value of sales and employment data for the 2002 base year for the industries found in each of Alabama's 67 counties. It also projects these values to the future year using the growth factors. A screen shot of the value of sales spreadsheet is shown below.

**Figure 3 Screen Shot of Value of Sales Database**

**Value of Sales - Autauga**

| SCTG | NAICS | Industry Name/Manufacturing Group | # of EMP | 2002 Value of Sales ($1000) | 2002-2005 Growth Factor | 2005 Value of Sales | 2005-2035 Growth Factor | 2035 Value of Sales |
|---|---|---|---|---|---|---|---|---|
| 1 | 111 | Animals | 277 | $4,787 | 1.020 | $4,883 | 1.491 | $7,280 |
| 2 | 112 | Crops/Grains | 277 | $8,129 | 1.034 | $8,405 | 1.402 | $11,785 |
| 25 | 113 | Logging | | $3,775 | 1.017 | $3,839 | 1.182 | $4,538 |
| 10,11,12 | 2123 | Stone, Gravel, Sand, Clay | 60 | $10,166 | 1.029 | $10,461 | 1.530 | $16,005 |
| **Sum of Agriculture/Mining Data by County** | | | **614** | **$26,857** | | **$27,588** | | **$39,608** |
| 27 | 322 | Paper | 750 | $319,500 | 0.991 | $316,625 | 1.397 | $442,324 |
| **Sum of Manufacturing Data by County** | | | **750** | **$319,500** | | **$316,625** | | **$442,324** |
| County Total | | Manufacturing | 750 | $319,500 | 0.991 | $316,625 | 1.397 | $442,324 |
| **Sum of All County Data** | | | **1364** | **$346,357** | | **$344,213** | | **$481,933** |

**Value of Sales - Baldwin**

| SCTG | NAICS | Industry Name/Manufacturing Group | # of EMP | 2002 Value of Sales ($1000) | 2002-2005 Growth Factor | 2005 Value of Sales | 2005-2035 Growth Factor | 2035 Value of Sales |
|---|---|---|---|---|---|---|---|---|
| 1 | 111 | Animals | 599 | $7,701 | 1.020 | $7,855 | 1.491 | $11,712 |
| 2 | 112 | Crops/Grains | 599 | $71,053 | 1.034 | $73,469 | 1.402 | $103,011 |
| 25 | 113 | Logging | | $14,486 | 1.017 | $14,732 | 1.182 | $17,414 |
| 10,11,12 | 2123 | Stone, Gravel, Sand, Clay | 60 | $10,166 | 1.029 | $10,461 | 1.530 | $16,005 |
| **Sum of Agriculture/Mining Data by County** | | | **1258** | **$103,406** | | **$106,517** | | **$148,141** |
| 32 | 331 | Primary Metal | 750 | $216,750 | 1.002 | $217,184 | 1.596 | $346,625 |
| 39 | 337 | Furniture | 1750 | $229,250 | 1.003 | $229,938 | 1.633 | $375,488 |
| **Sum of Manufacturing Data by County** | | | **2500** | **$446,000** | | **$447,121** | | **$722,113** |

## 2.2. Data Preparation and Use

Industries within the economic database are classified by 3- or 4-digit North American Industry Classification System (NAICS) codes. However, commodities in the FAF database are classified by 2-digit Standard Classification of Transported Goods (SCTG) codes. To prepare to merge the data from the two databases, a cross reference for NAICS and SCTG codes had to first be developed. Then, commodity-level economic data were collated by FAF zone (Zone 1 and Zone 2) to determine the zone totals. A table was then constructed to determine the proportional allocation of zone totals contributed by each county within that zone, for every commodity. This was done twice, once using only employment and once using only value of sales. These percentages became the disaggregation factors for the next step.

**Figure 4 Screen Shot of Commodities by County Fractional Zone Totals Database**

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | Zone | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 2 | SCTG | NAICS | Industry Name | FAF2 Abbr. | Bibb | Blount | Chilton | Cullman | Jefferson | Shelby | St. Clair | Valker | |
| 3 | 1 | 112 | Animals | Live animals/fish | 2.82% | 20.00% | 8.21% | 48.77% | 4.52% | 4.98% | 6.42% | 4.28% | 1.56 |
| 4 | 2 | 111 | Crops | Cereal grains | 0.92% | 15.81% | 19.87% | 21.22% | 3.87% | 20.31% | 15.40% | 2.61% | 1.57 |
| 5 | 3 | 111 | Other ag prods. | Other ag prods. | 0.92% | 15.81% | 19.87% | 21.22% | 3.87% | 20.31% | 15.40% | 2.61% | 1.57 |
| 6 | 4 | 311 | Animal feed | Animal feed | 0.00% | 22.62% | 0.00% | 9.69% | 55.18% | 0.00% | 0.00% | 12.51% | 0.00 |
| 7 | 5 | 311 | Food | Meat/seafood | 0.00% | 22.62% | 0.00% | 9.69% | 55.18% | 0.00% | 0.00% | 12.51% | 0.00 |
| 8 | 6 | 311 | Food | Milled grain prods. | 0.00% | 22.62% | 0.00% | 9.69% | 55.18% | 0.00% | 0.00% | 12.51% | 0.00 |
| 9 | 7 | 311 | Food | Other foodstuffs | 0.00% | 22.62% | 0.00% | 9.69% | 55.18% | 0.00% | 0.00% | 12.51% | 0.00 |
| 10 | 8 | 312 | Beverage | Alcoholic beverages | 0.00% | 0.00% | 0.00% | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | 0.00 |
| 11 | | | | Tobacco prods. | | | | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | 0.00 |

## 2.3. Obtaining Alabama Freight Flows

The first step in obtaining the Alabama-related flows is to query the FAF2 Access database tables for all Alabama-originating flows and Alabama-destined flows. This includes Zone 1 and Zone 2 flows as well as Port of Mobile flows. The Zone 1 and Zone 2 freight flows were then apportioned to the 67 counties based on the value of sales. For example, 20 percent of the FAF flows of live animals/fish to Zone 1 would be allotted to Blount County based on it having 20 percent of sales of live animals in Zone 1. The Port of Mobile flows were kept separate.

## 2.4. Adjustments

Some information was available for the Port of Mobile, which allowed some adjustments to the data. Discussions with Port personnel revealed significant differences between the flows through the Port by mode. For example, the FAF2 data overestimated the amount of coal moved by truck. The vast majority of imported coal is moved from the Port by barge up the river system, while the majority of exported coal is moved to the Port by rail. Once the adjustments for the Port of Mobile were completed, the adjusted flows were added to the Mobile County flows.

## 2.5. Conversion to Daily Vehicles

The FAF2 flows indicate which of seven modes is used to move the annual kilotons freight. The freight movements were separated by mode in order to convert to daily vehicles. The modes “Truck” and “Truck & Rail” were combined, and the freight flows were converted from annual kilotons to daily vehicles using commodity-specific truck payload conversion factors from the Federal Highway Administration (FHWA). A standard 100-ton railcar conversion factor was used for the “Rail” mode flows. A standard 1500-ton barge conversion factor was used for the “Water” mode. The freight moved by "Air" was left in kilotons. The freight moved by “Other Intermodal,” which accounts for less than 1 percent of total freight kilotons, was not analyzed further. The freight moved by “Pipeline and Unknown” was not analyzed as this mode operates independently of the surface transportation system.

### 2.6. Output

The analysis resulted in a set of matrices that showed kilotons of freight moving in and out of the 67 Alabama counties, by mode, for the 2002 base year and 2035 future year. Additional matrices showed daily vehicles for truck, rail and water modes.

### 2.7. Daily Truck Productions and Attractions

Examining daily truck production and attraction values reveals that the large counties with respect to manufacturing industries tend to dominate as the counties that produce and attract the highest volume of trucks. These same counties are anticipated to be the major counties for truck volume in 2035. Nevertheless, the FAF2 database contains the provision that some commodities might undergo changes in their presence in Alabama in the future. For example, a commodity might change as a result of economic factors, or changes in mode of transport might result in reduced numbers of truck movements for some counties, although the amount of freight transported actually increased. The figures on the following pages indicate truck productions and attractions by county in 2002 and 2035.

**Figure 5 Daily Truck Productions 2002**

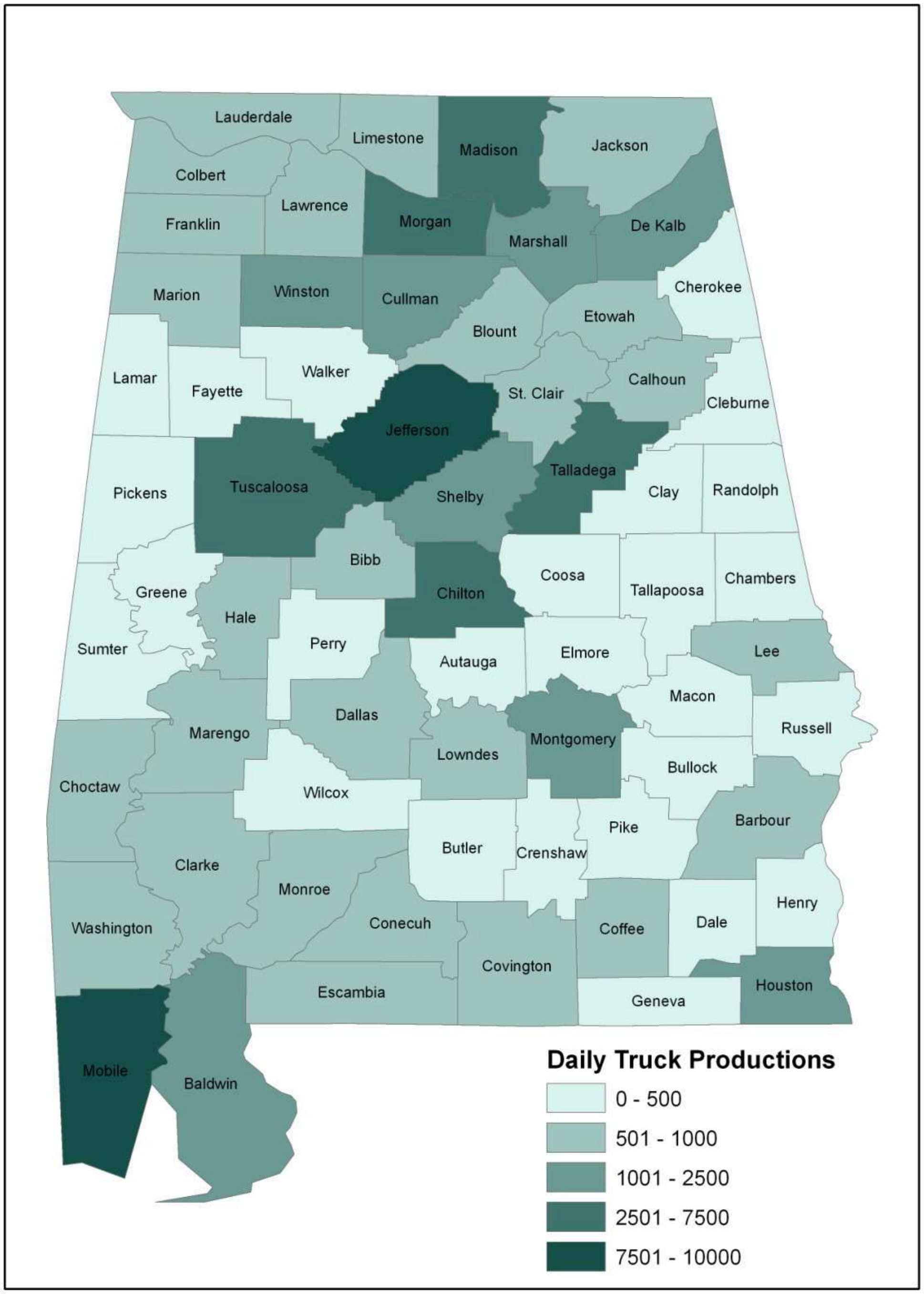


**Figure 6 Daily Truck Attractions 2002**

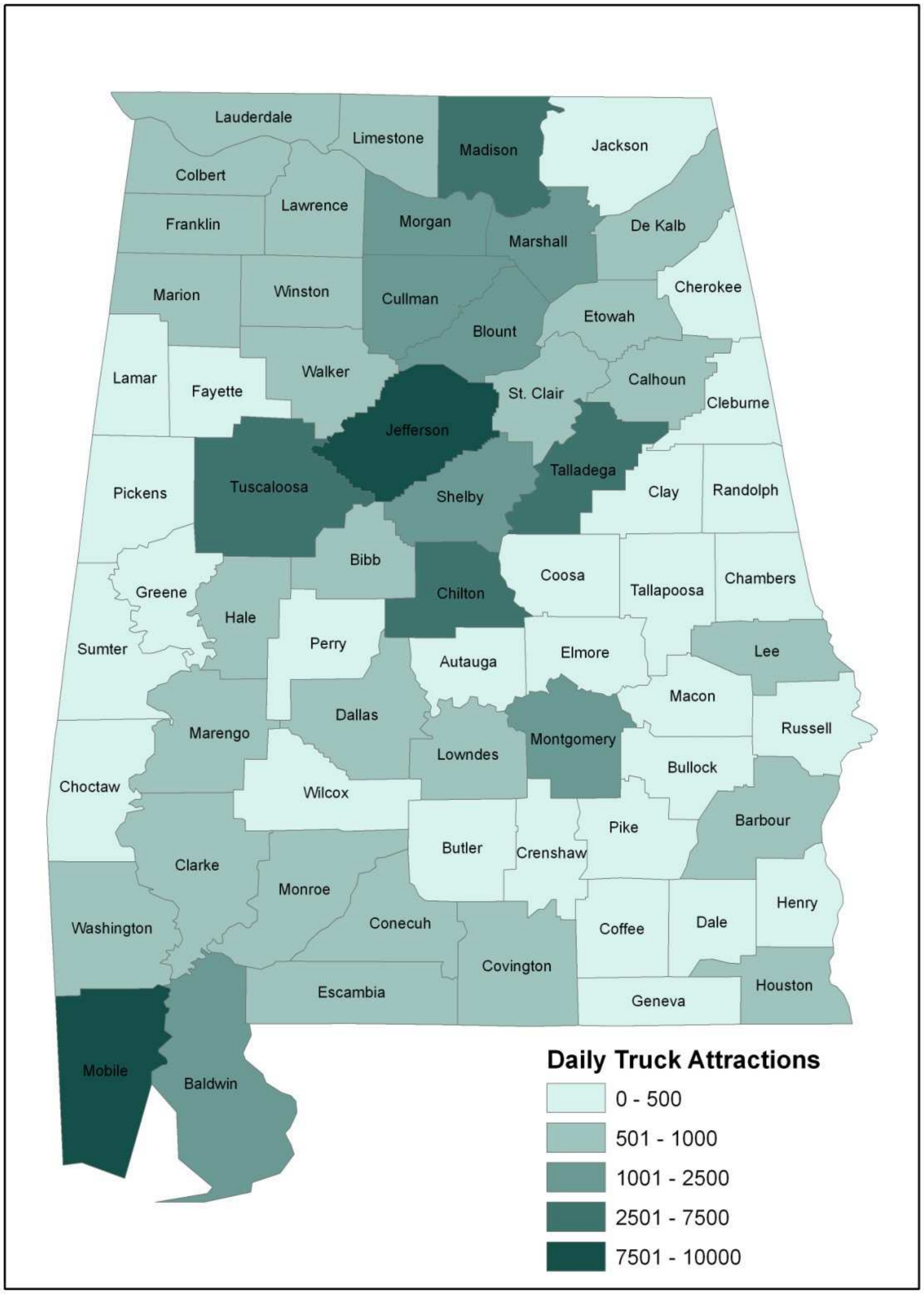


**Figure 7 Daily Truck Productions 2035**

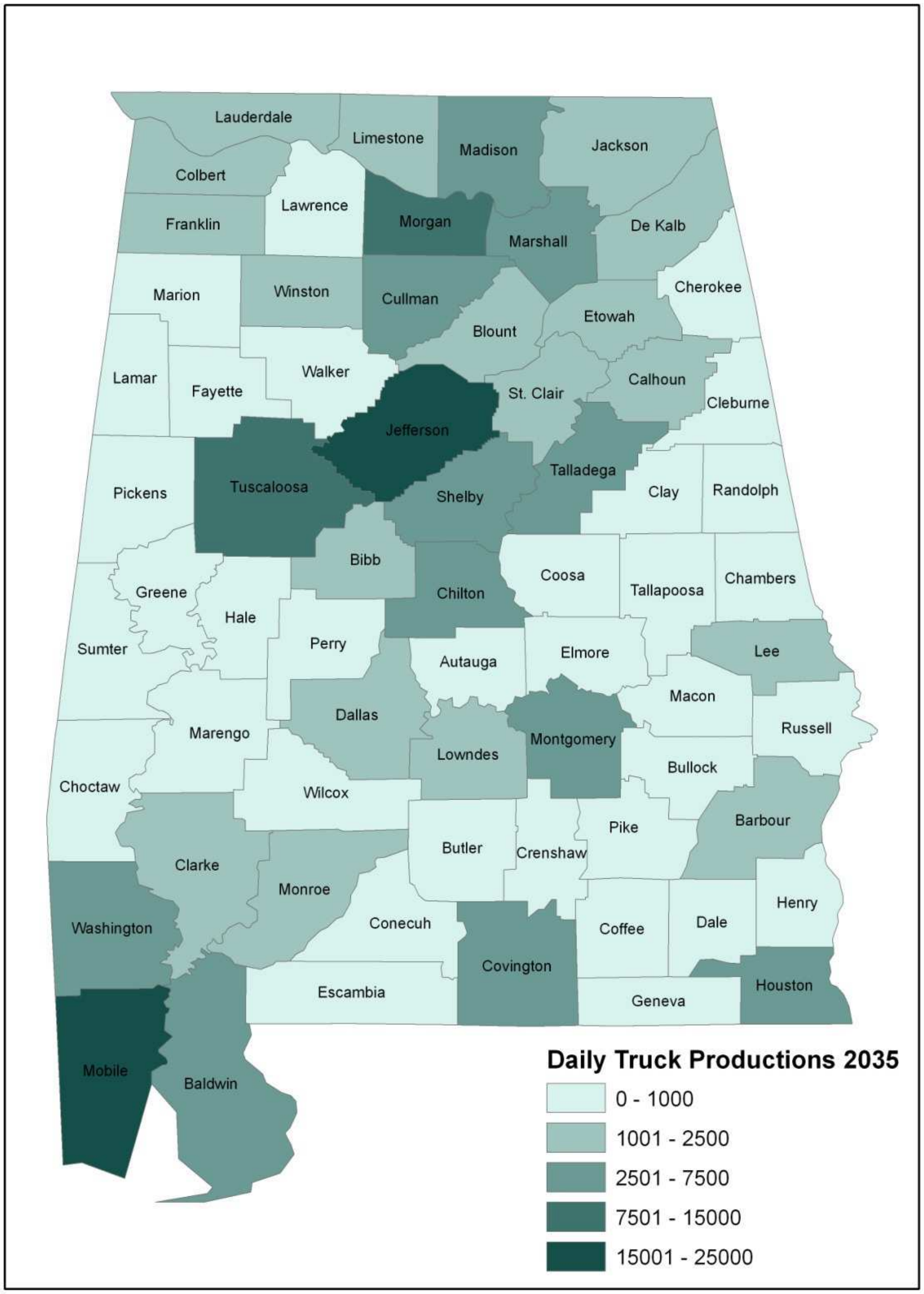
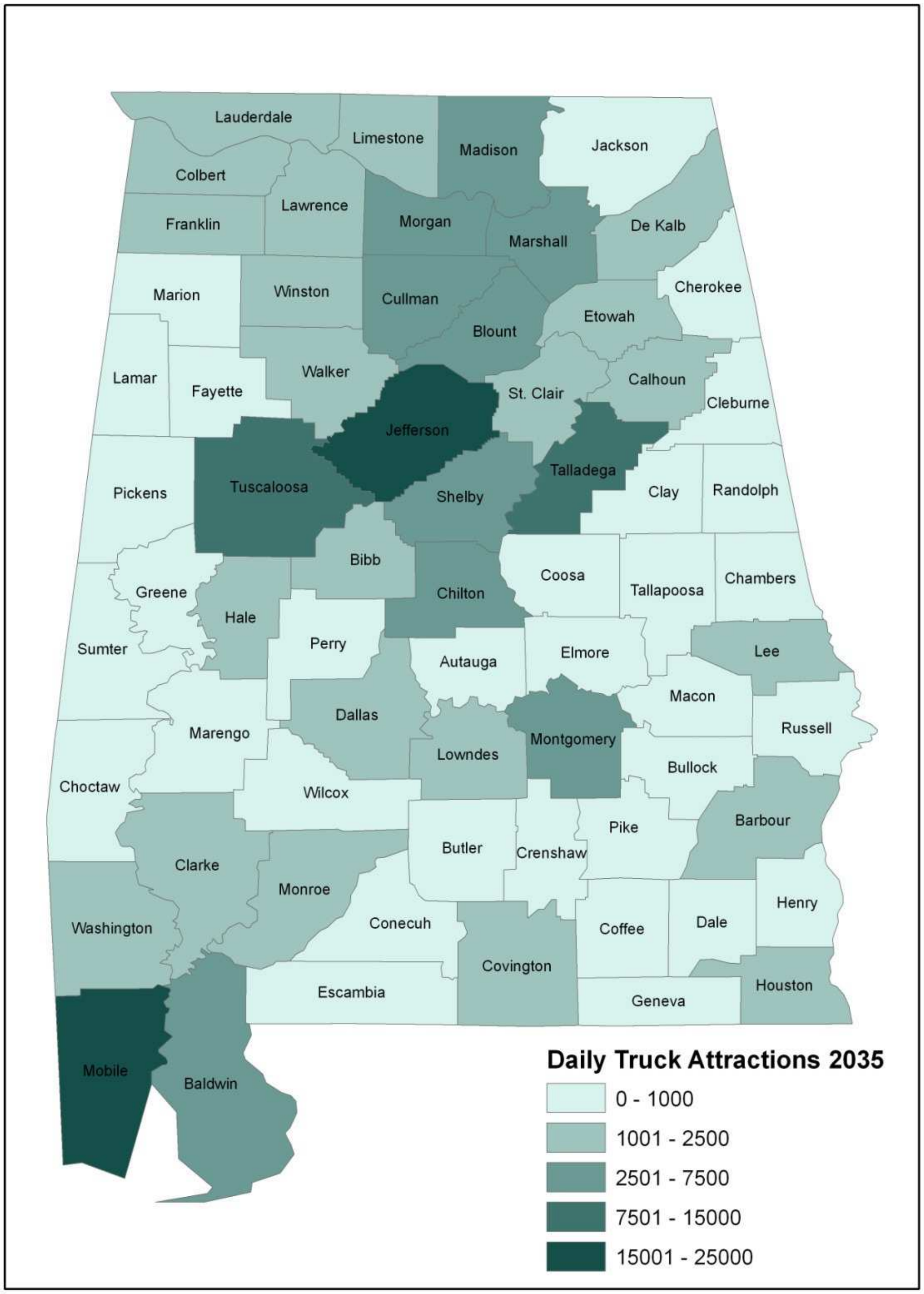


**Figure 8 Daily Truck Attractions 2035**



### 2.8. Non-Truck Modes

The examination of non-truck modes focused on the counties in Alabama where non-truck freight was likely to originate or terminate. The counties that had the highest number of shipments based on mode in the base year (2002) are listed in the following table.

**Table 1 Top 10 Origin/Destination Counties for Non-Truck Freight (2002)**

| Rail | | Water | | Air | |
|---|---|---|---|---|---|
| Origin | Destination | Origin | Destination | Origin | Destination |
| Jefferson | Jefferson | Mobile | Mobile | Madison | Madison |
| Tuscaloosa | Mobile | Madison | Tuscaloosa | Mobile | Morgan |
| Mobile | Tuscaloosa | Tuscaloosa | Jefferson | Morgan | Jefferson |
| Franklin | Talladega | Escambia | Morgan | Montgomery | Mobile |
| Shelby | Chilton | Baldwin | Escambia | Dallas | Montgomery |
| Walker | Madison | Monroe | Monroe | Tuscaloosa | Dallas |
| Cullman | Morgan | Talladega | Baldwin | Marshall | Tuscaloosa |
| Morgan | Shelby | Morgan | Madison | Limestone | Marshall |
| Talladega | Marshall | Limestone | Washington | DeKalb | Limestone |
| Chilton | Montgomery | Washington | Montgomery | Houston | DeKalb |

## 3. Model Documentation

Task 2 and Task 3 focused on the operation of the Alabama Statewide Travel Demand Model with the specific inclusion of freight. The model basis was the travel demand model previously developed as part of the statewide modeling project. Updates to the model included reflecting current conditions (i.e., a comparison to the projects programmed for right of way acquisition or construction in the most current State Transportation Improvement Program, or STIP); an opportunity for the Metropolitan Planning Organizations (MPOs) to update socio-economic characteristics for the Traffic Analysis Zones (TAZ) in their region; and finally the specific incorporation of truck trips developed out of Task 1 into the model.

The initial updates to the statewide network were obtained from ALDOT. Locations of projects identified for completion within the next five years were examined to ensure they were reflected in the future year (2035) network. Based on the information provided, all of the projects scheduled to be completed by the State in the next five years were verified to exist in the future year network. However, further examination of the statewide network for the future year identified a few locations where the network infrastructure lacked the proper capacity. These locations were updated as they were identified.

Each of Alabama's MPOs and RPOs was contacted about providing updated/current socio-economic data for their region for use in the travel demand model spreadsheet that calculates production and attraction values for the TAZs in the network. Although most did not believe updated data necessary for their region, updated values were taken into account for those that provided them.

Finally, travel demand model control files were developed to convert the truck data developed in Task 1 into truck origin/destination files. These files were developed independently for each commodity, implying that the specific analysis could be performed for each commodity. Additionally, a file containing all the freight trips was developed for overall freight analysis. The distribution process within the travel demand model involved the use of a gravity model based on the skim paths (or shortest paths) from each TAZ to all other TAZs in the network. The truck trip tables were combined with the passenger car trip table from the original statewide travel demand model to create a single trip table that contained all vehicles on the highway system. This final trip table was assigned to the network using an equilibrium assignment technique.

**Figure 9 Screen Shot of CUBE Modeling Stream That Combined the Files**

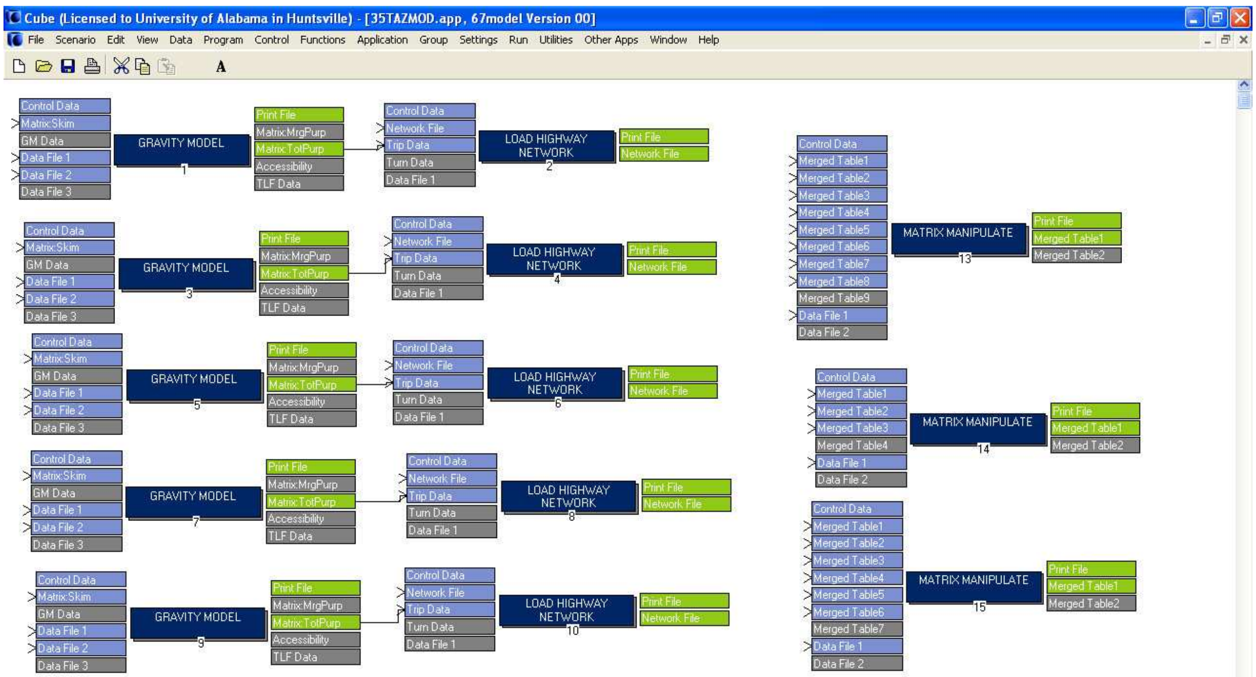



**Figure 10 Example of Original Trip Data**


| | | | | | | |
|---|---|---|---|---|---|---|
| GP | 1 | 1 | 52 | 23 | 0 | 0 |
| GP | 2 | 1 | 8 | 3 | 0 | 0 |
| GP | 3 | 1 | 13 | 6 | 0 | 0 |
| GP | 4 | 1 | 68 | 30 | 0 | 0 |
| GP | 5 | 1 | 8 | 3 | 0 | 0 |
| GP | 6 | 1 | 39 | 17 | 0 | 0 |
| GP | 7 | 1 | 82 | 36 | 0 | 0 |
| GP | 8 | 1 | 8 | 3 | 0 | 0 |
| GP | 9 | 1 | 16 | 7 | 0 | 0 |
| GP | 10 | 1 | 8 | 3 | 0 | 0 |
| GP | 11 | 1 | 13 | 6 | 0 | 0 |
| GP | 12 | 1 | 8 | 4 | 0 | 0 |
| GP | 13 | 1 | 22 | 10 | 0 | 0 |
| GP | 14 | 1 | 13 | 5 | 0 | 0 |
| GP | 15 | 1 | 11 | 5 | 0 | 0 |
| GP | 16 | 1 | 66 | 30 | 0 | 0 |
| GP | 17 | 1 | 24 | 11 | 0 | 0 |
| GP | 18 | 1 | 31 | 13 | 0 | 0 |
| GP | 19 | 1 | 24 | 11 | 0 | 0 |
| GP | 20 | 1 | 11 | 4 | 0 | 0 |
| GP | 21 | 1 | 42 | 18 | 0 | 0 |
| GP | 22 | 1 | 75 | 33 | 0 | 0 |
| GP | 23 | 1 | 46 | 21 | 0 | 0 |
| GP | 24 | 1 | 40 | 18 | 0 | 0 |

Utilizing the truck data obtained from Task 1, the total number of truck trips on the network for the base year was determined to be 163,579 trips. The future was determined to be 310,251 trips, a growth of almost 90 percent.

It should be noted that while the existing statewide travel demand model does include a truck/taxi factor, that factor does not account for freight transportation. The truck/taxi factor is intended to serve as a local delivery factor in the model and is associated with the number of households in the TAZ. In contrast, the truck trip table developed in this task is reflective of 18-wheelers or large over-the-road trucks, a different classification of vehicle.

## 4. Analysis of Freight Needs

### 4.1 Analysis Methodology

The statewide travel demand model was adjusted to add in the truck trip purpose that was developed from the FAF2 database. The truck trips were disaggregated to the county level using the county value of shipment for each specific commodity in the database as a portion of the total FAF2 zone, using both the origins and attractions. The county values were then disaggregated to the TAZ level using employment in the TAZ versus employment in the entire county. In this fashion, the total truck productions and attractions for each TAZ were determined.

These truck trips were then added to the passenger cars trips from the original statewide effort. After running the trip table through an assignment methodology, the total number of passenger cars and trucks were determined for each link of roadway in the model. The output from the model was organized for analysis to develop fields of interest that could be used in the analysis. The additional fields calculated included: trucks per lane, percent truck, and VC (volume to capacity) ratio. The VC ratio was developed two ways, the first equated one truck to one passenger car and the second equated one truck to 2.5 passenger cars. Additionally, it should be noted that the capacity used in the model represents a 10-hour capacity such that volume may exceed capacity on a 24-hour basis. Based on input from ALDOT, the VC ratio that incorporated 2.5 passenger cars per truck was used in this analysis.

The analysis methodology focused on developing the top segments from which the segments of greatest interest would be determined – essentially, those locations that would benefit from further study.

Step 1 analysis determined the locations with the greatest VC ratio, representing the most congested locations in Alabama. Interstate links were considered different from non-interstate links because they operate with different flow parameters and the potential commodities and trip lengths were assumed to be different for these two types of facilities. Therefore, for the interstate system, the VC ratios for all the roadways were rank-ordered and those reflecting the top 200 segments were selected. These locations for the interstate system were used to represent the most congested locations on the system.

Step 2 analysis determined the locations with the greatest number of trucks per lane, representing the roadways with the heaviest trucking use. The trucks per lane locations were rank-ordered and those reflecting the top 200 segments were identified. These locations for the interstate system were used to represent the locations with the greatest truck usage.

It was important that Step 3 consider the VC and trucks per lane values in a combined fashion to understand the truck contribution to congestion. The key locations of interest were roadways that ranked high in both trucks per lane and VC ratio, indicating congested locations with a significant number of trucks contributing to the congestion. This combination would identify locations where potential freight strategies might be useful in alleviating congestion. Locations with a high VC ratio but low number of trucks per lane indicate the main cause of congestion is passenger cars, and therefore truck mitigation strategies would have little effect. Although locations with high trucks per lane but lower VC ratios indicate locations of intense trucking activity, the limited congestion would not likely warrant special improvements with an emphasis on trucks.

Step 4 analysis switched to the non-interstate system. The number of segments on the non-interstate system was so great that merely performing a rank-order would not produce the desired results. Therefore, it was decided that the VC ratio that represented the lowest value for the 200 segments on the interstate would be used as the lower threshold. This allowed for consistency between the two roadway systems.

Step 5 determined the percent of the non-interstate system selected from the VC ratio used in Step 4, and that percentage was then used to identify the top locations of the non-interstate system using trucks per lane. In this fashion, the same number of roadways segments would be selected for the VC ratio trouble locations and the truck intensity value.

Step 6 combined the non-interstate system VC ratio locations and trucks per lane to look for overlapping areas, as in Step 3.

The final step (Step 7) combined all the locations into a single map that could be used to identify the congested locations in Alabama that deserved further analysis.

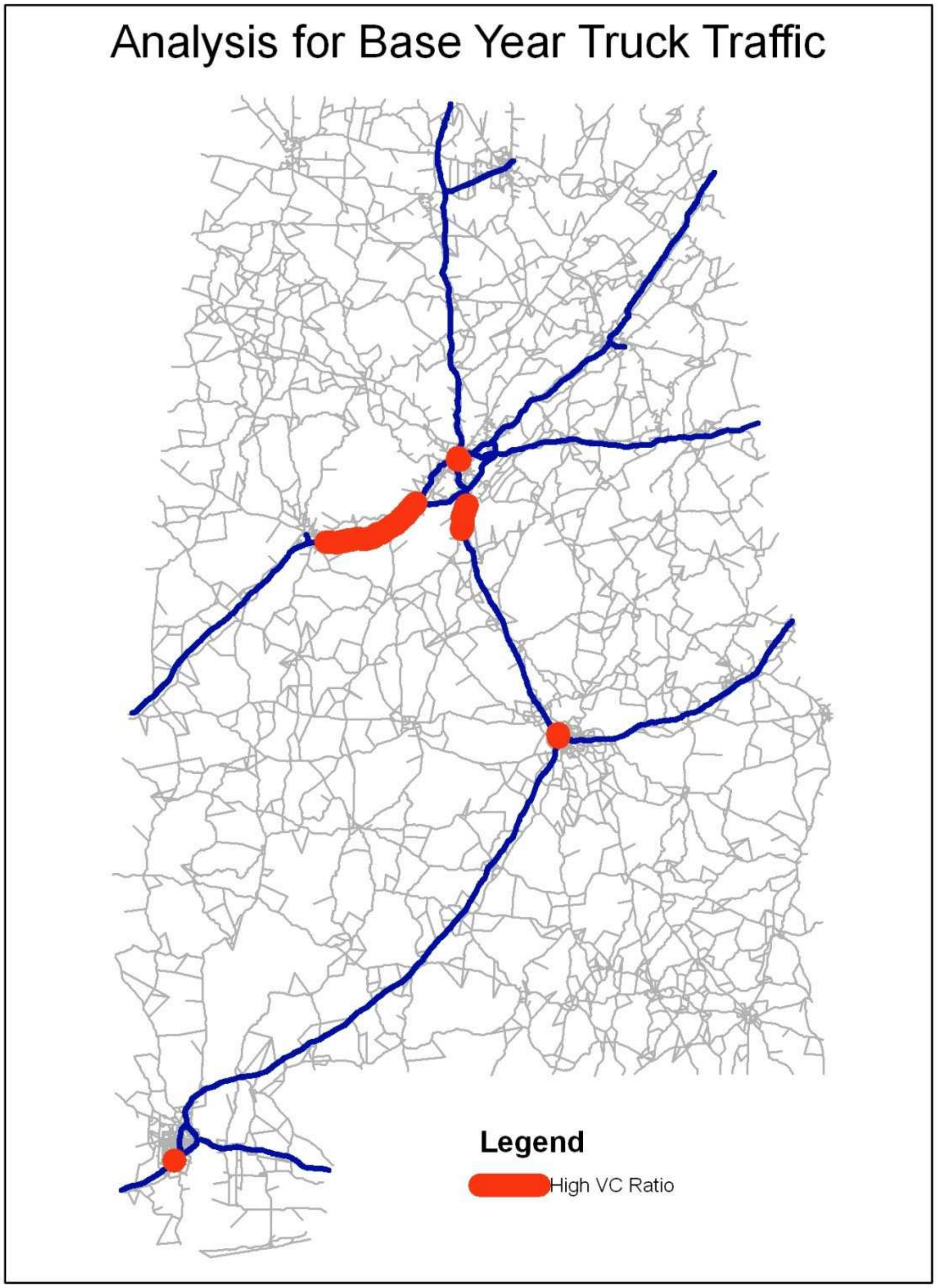
The steps were performed for both the base year model output and future year model output. The base year model analysis identified locations that deserved examination in the base year. These locations were often not the same locations that were expected to be trouble locations in the future year because the State is continually programming roadway improvements. In addition, the locations of business activity and mode used to move freight may be forecast to change between the base year (2002) and future year (2035).

This report is structured to include the data from the base year (2002) followed by the future year (2035).

### 4.2 Assessment for Base Year Conditions

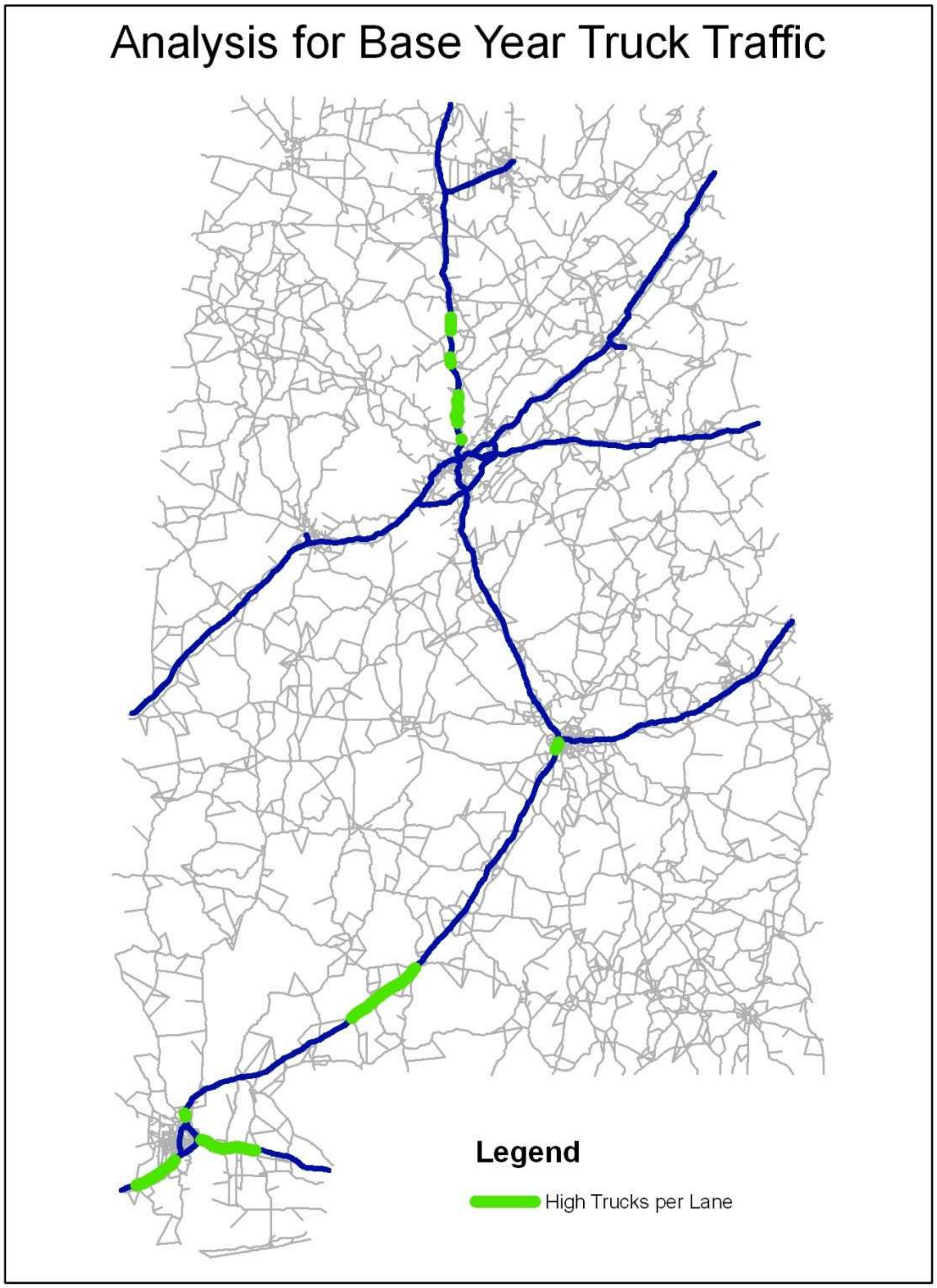
The assessment for the base year was performed using the methodology presented above. Starting with the interstate system, the top 200 VC ratio locations were determined (using 2.5 passenger cars for each truck and 10-hour capacity). The VC ratio ranged from 2.96 to 1.67. The 200 segments, shown in the following figure, are located in and around Birmingham.

**Figure 11 Interstate Locations with High VC Ratios (Base Year 2002)**



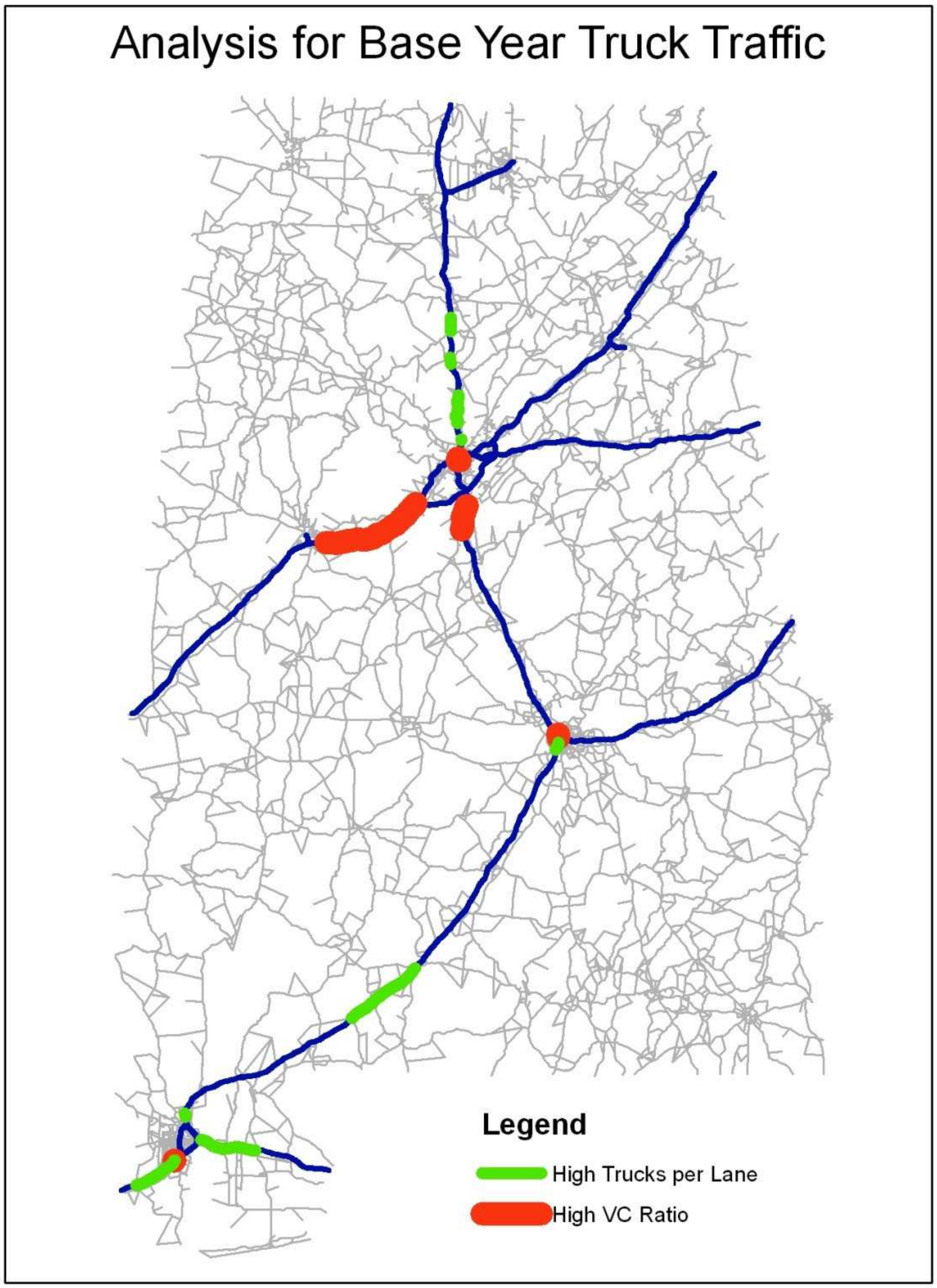
The top 200 segments for trucks per lane per day provided a range from 4,299 to 3,768. The locations focused mainly on the I-65 corridor.

**Figure 12 Interstate Locations with High Truck Intensity Values (Base Year 2002)**



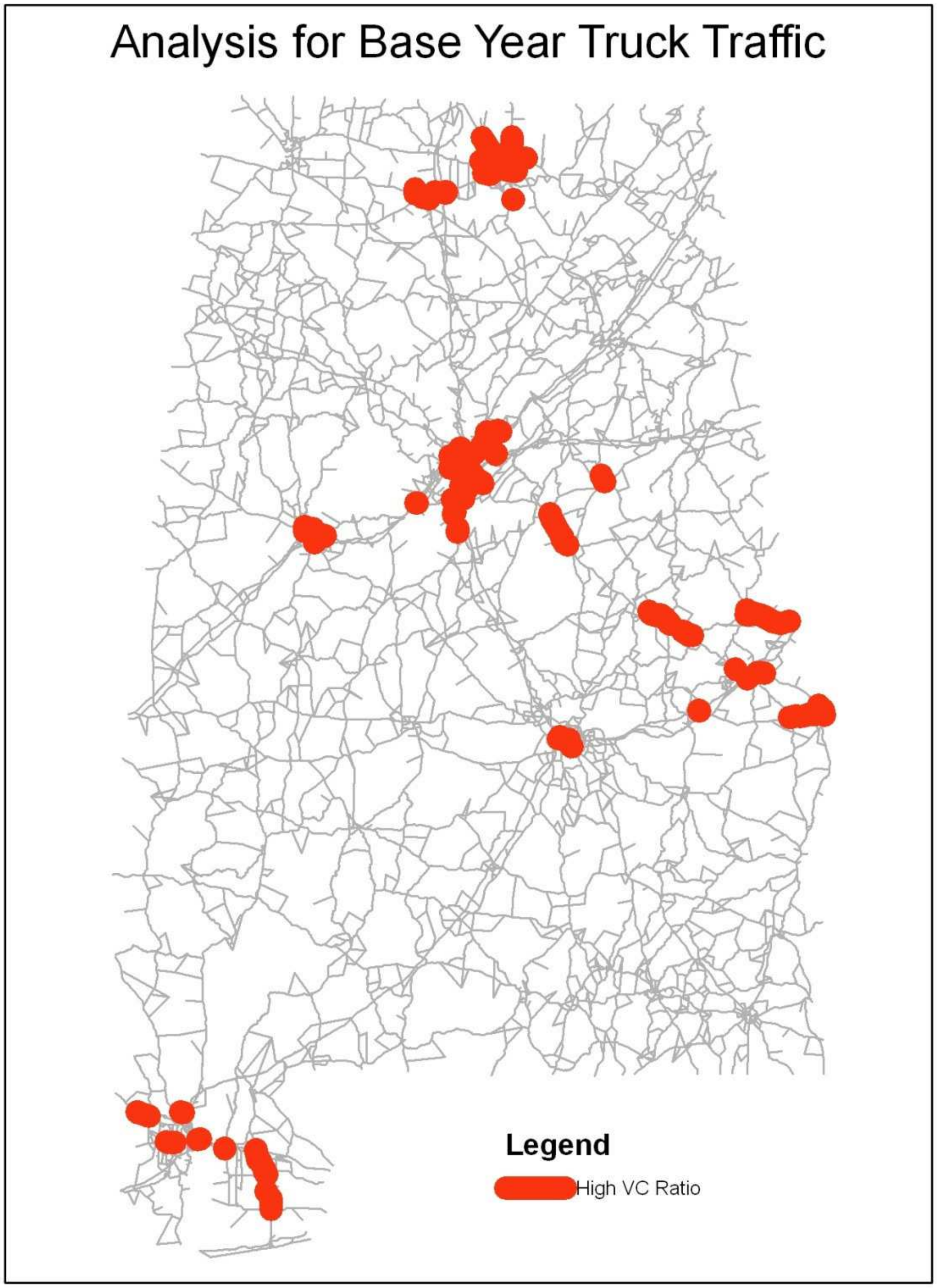
Combining the two measures for the base year yields limited overlap. This indicates that the highly congested interstate locations are not also where trucks are the primary cause of the congestion. Essentially, the locations near Birmingham are a result of high passenger car travel while the locations of high truck intensity are often in areas that are not overly congested.

**Figure 13 Combined Interstate Locations (Base Year 2002)**



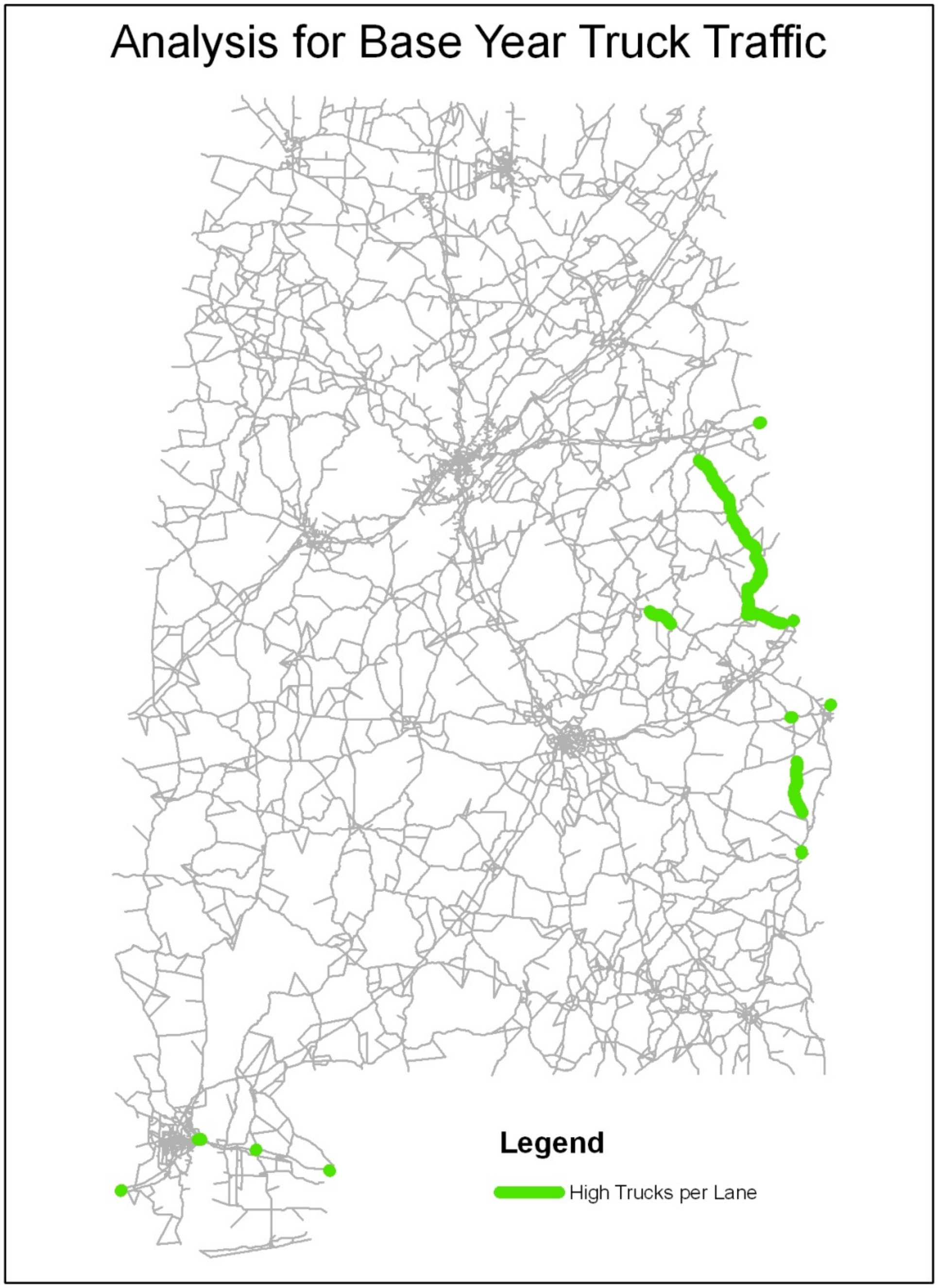
Using the non-interstate roadway segments from the base year model, the following segments have a VC ratio greater than 1.67 (the same threshold used for the interstate system). These represent 956 segments of the total 111,931 segments, or 0.85 percent of the segments.

**Figure 14 Off-Interstate Locations with High VC Ratios (Base Year 2002)**



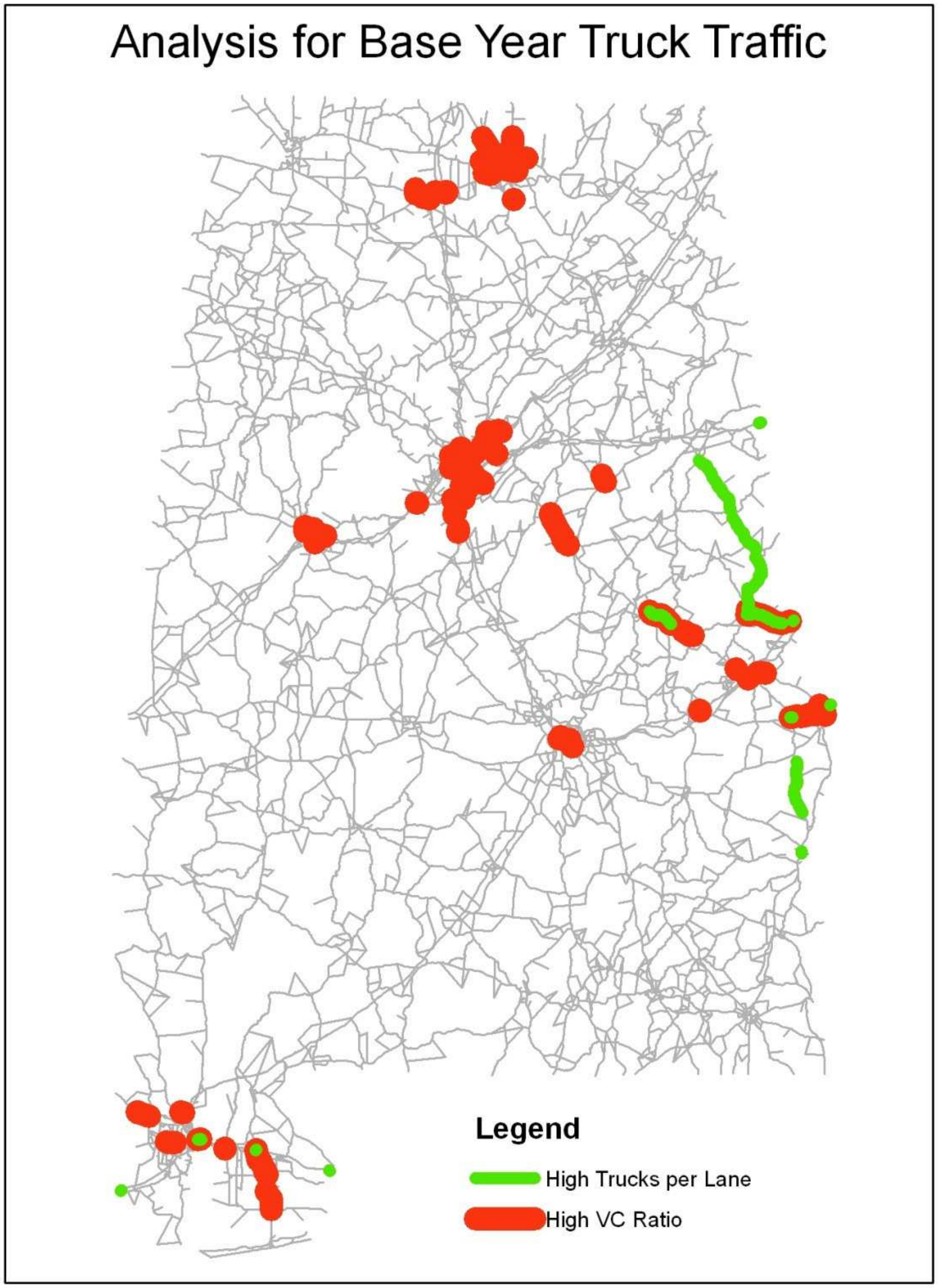
Using the same number of segments (0.85 percent) and threshold as the interstate system analysis, the trucks per lane per day must be greater than 3,262. These locations are shown on the following figure.

**Figure 15 Off-Interstate Locations with High Truck Intensity (Base Year 2002)**



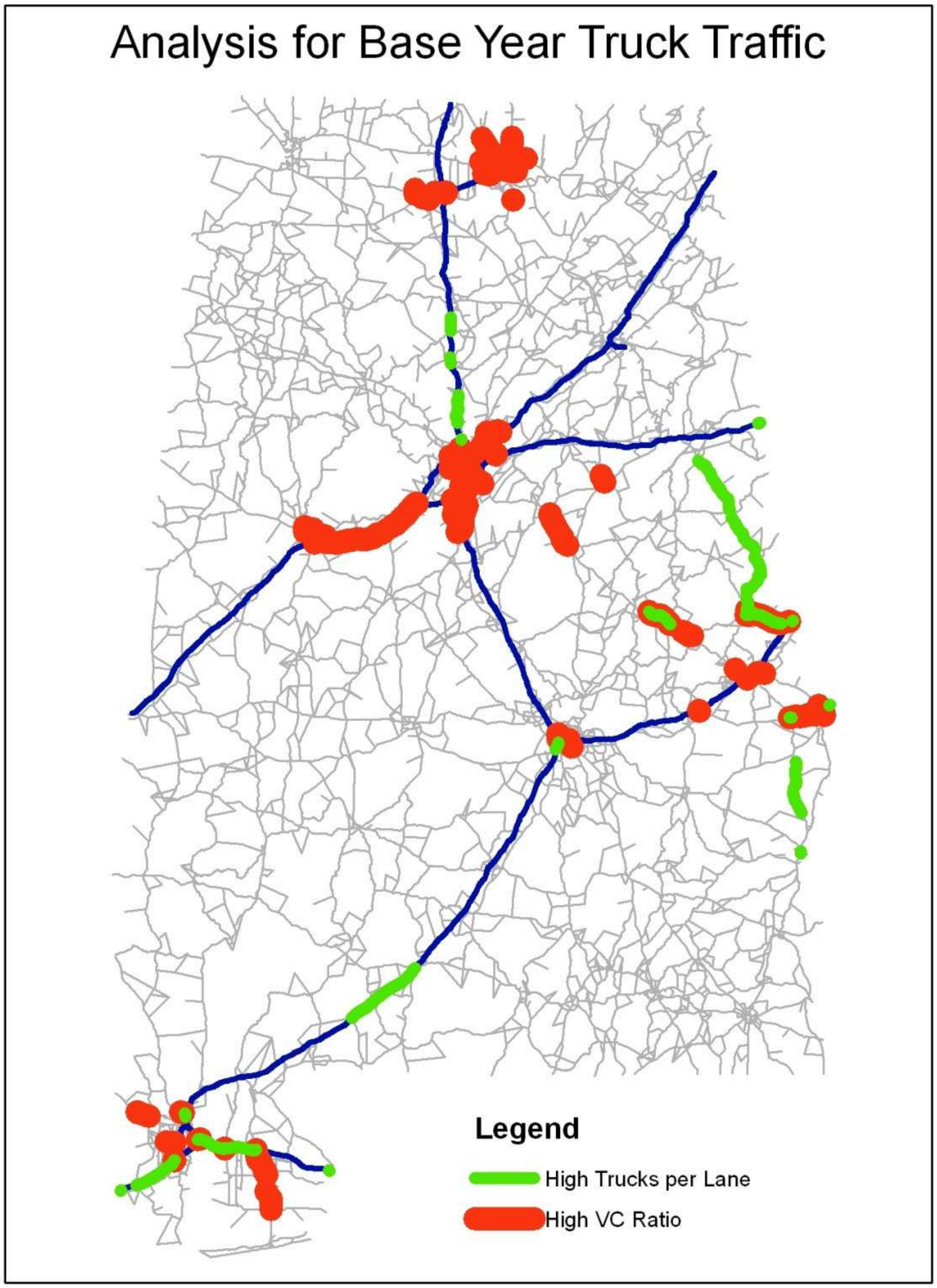
When the two data measures are combined, locations of overlap are centered in Baldwin County, along US 280, and in the Lee-Russell area of eastern Alabama.

**Figure 16 Combined Off-Interstate Locations (Base Year 2002)**



The following figure illustrates the combined interstate and non-interstate locations. Red indicates high VC ratio while green represents high truck intensity.

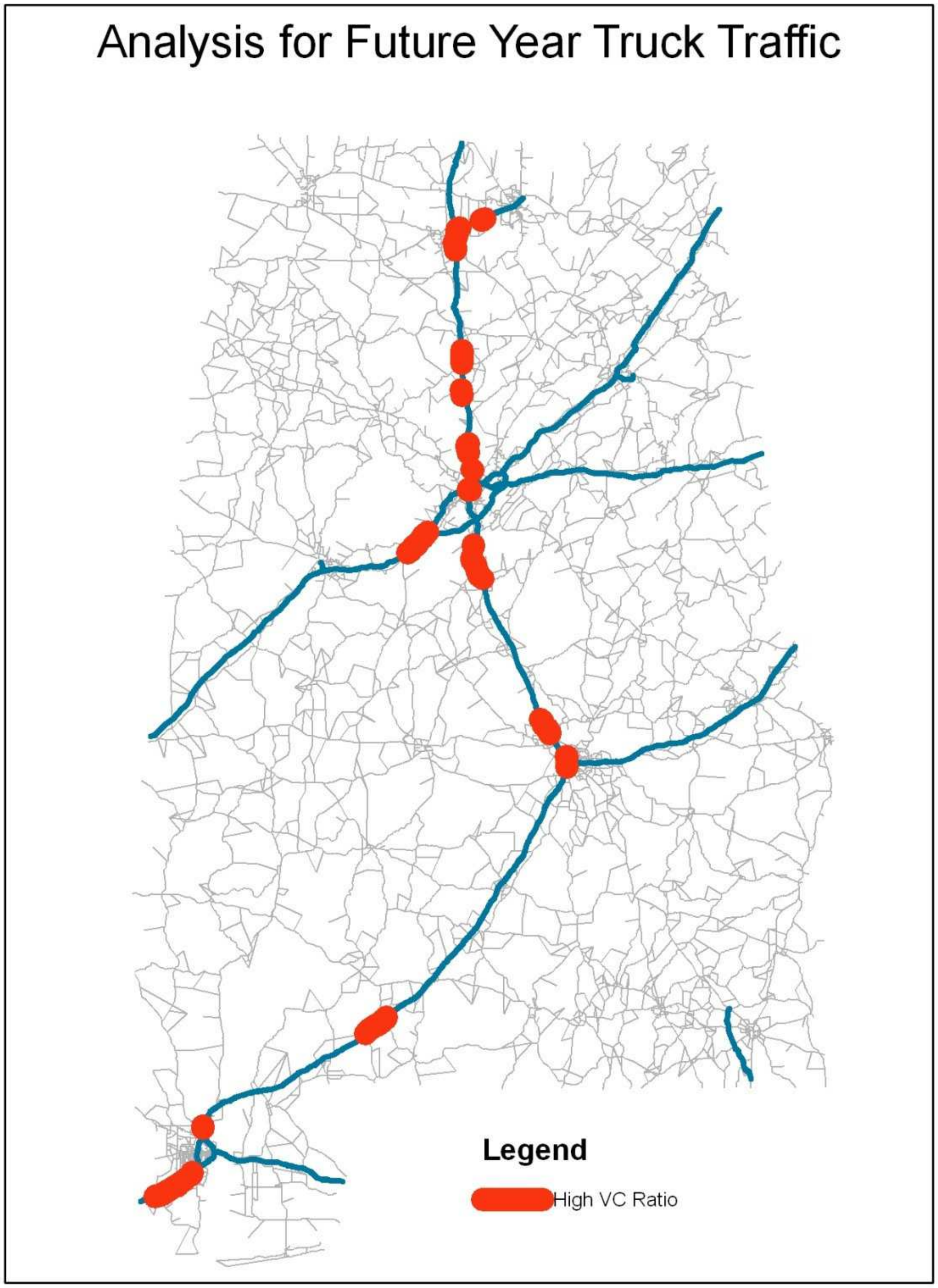
**Figure 17 All Identified Locations (Base Year 2002)**



### 4.3 Assessment for Future Year Conditions

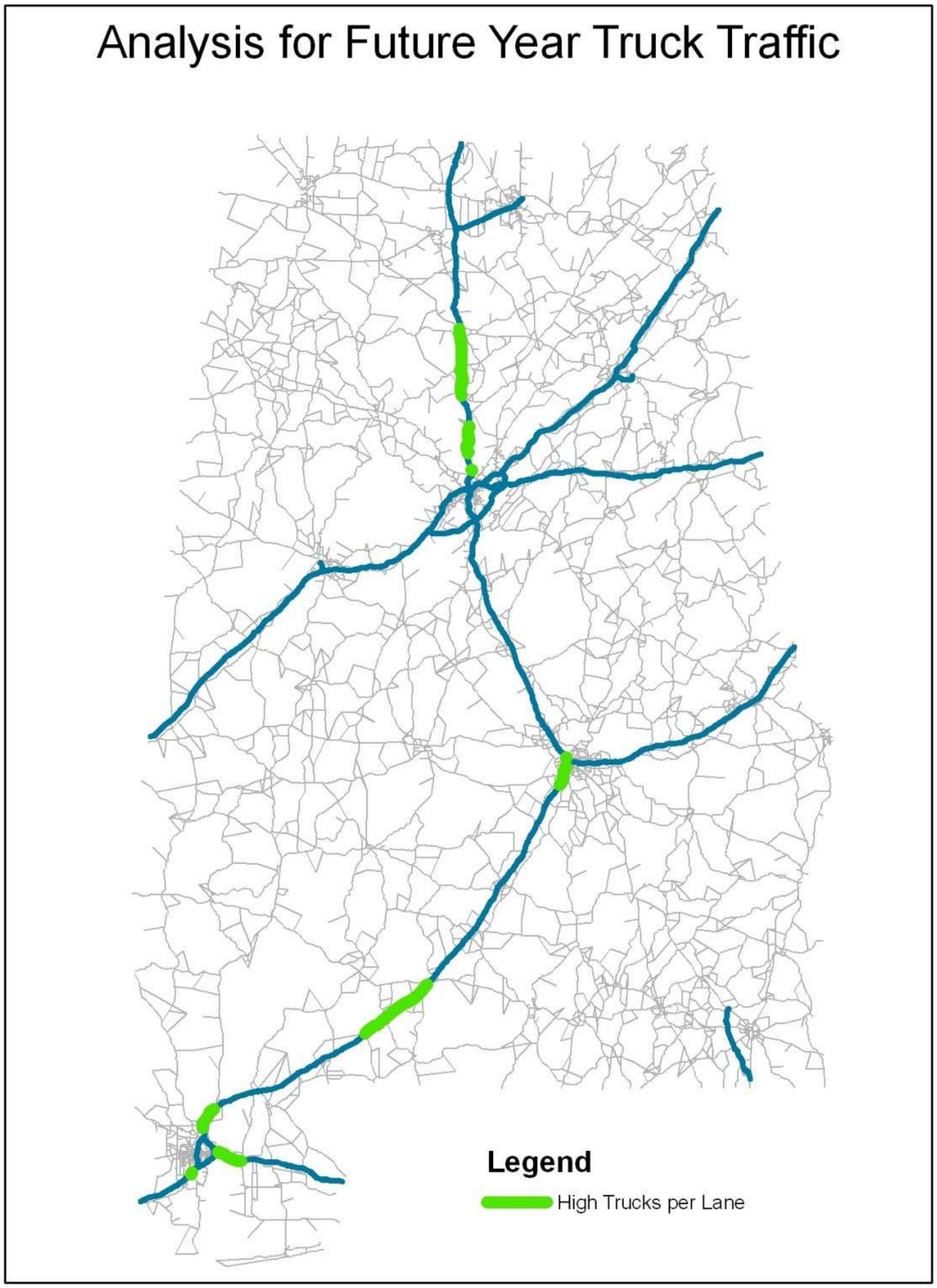
The initial assessment was performed to analyze the top locations deserving additional investigation under future year (2035) conditions. The values for VC ratio ranged from a high of 3.48 to a low of 2.27. The locations of the top 200 congested segments, shown on the following figure, are contained mainly on I-65, with two areas on I-20/59 and I-10, respectively.

**Figure 18 Interstate Locations with High VC Ratios (Forecast Year 2035)**



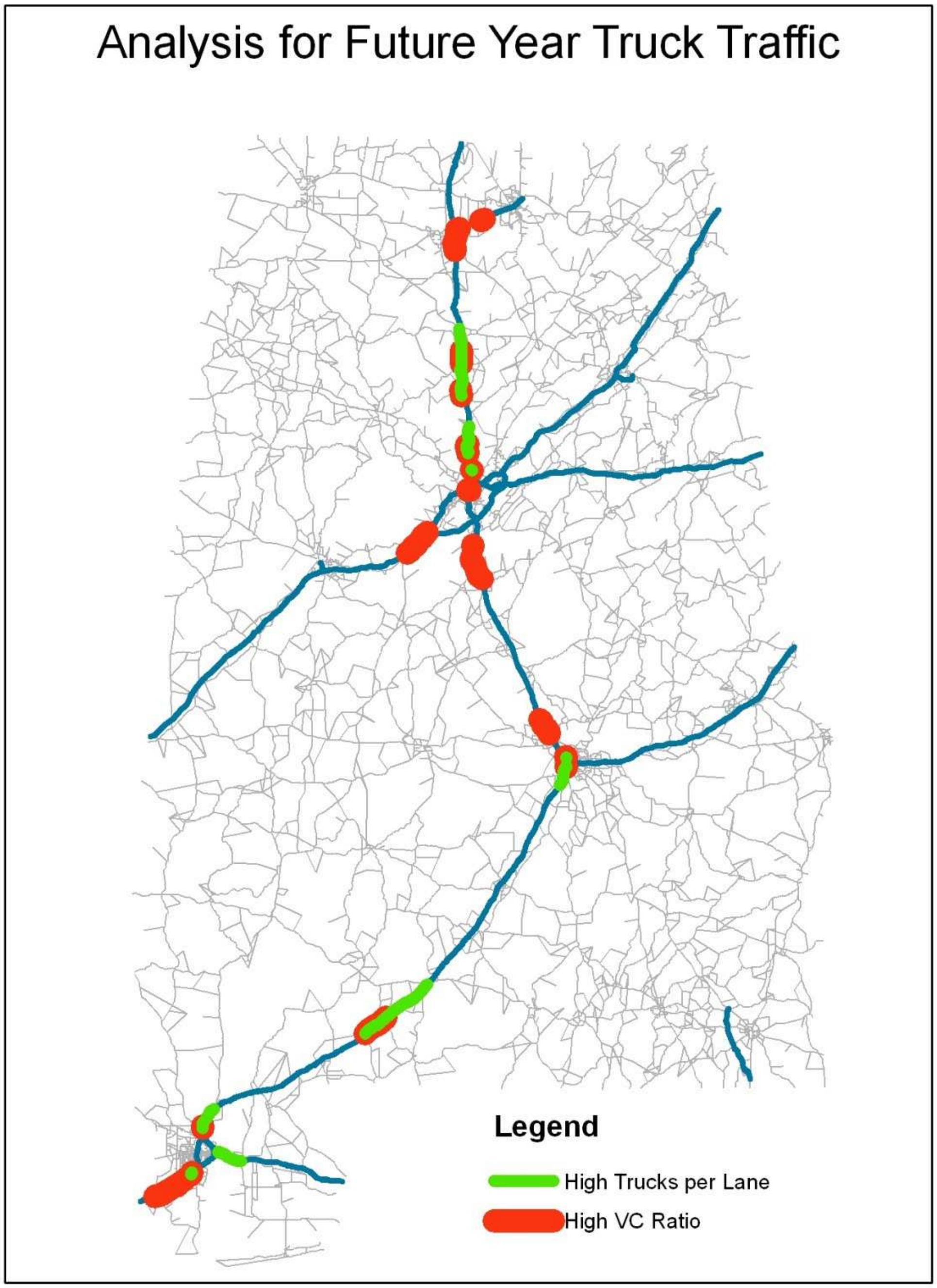
From this information, a secondary plot was developed that examined the top 200 locations using the trucks per lane. This query provides perspective with regard to congestion since there is not necessarily a direct relation between the locations identified as having many trucks and congestion as measured by VC ratio. The values range from a high of 8,894 trucks per lane per day to 7,250 trucks per lane per day.

**Figure 19 Interstate Locations with High Truck Intensity Values (Forecast Year 2035)**



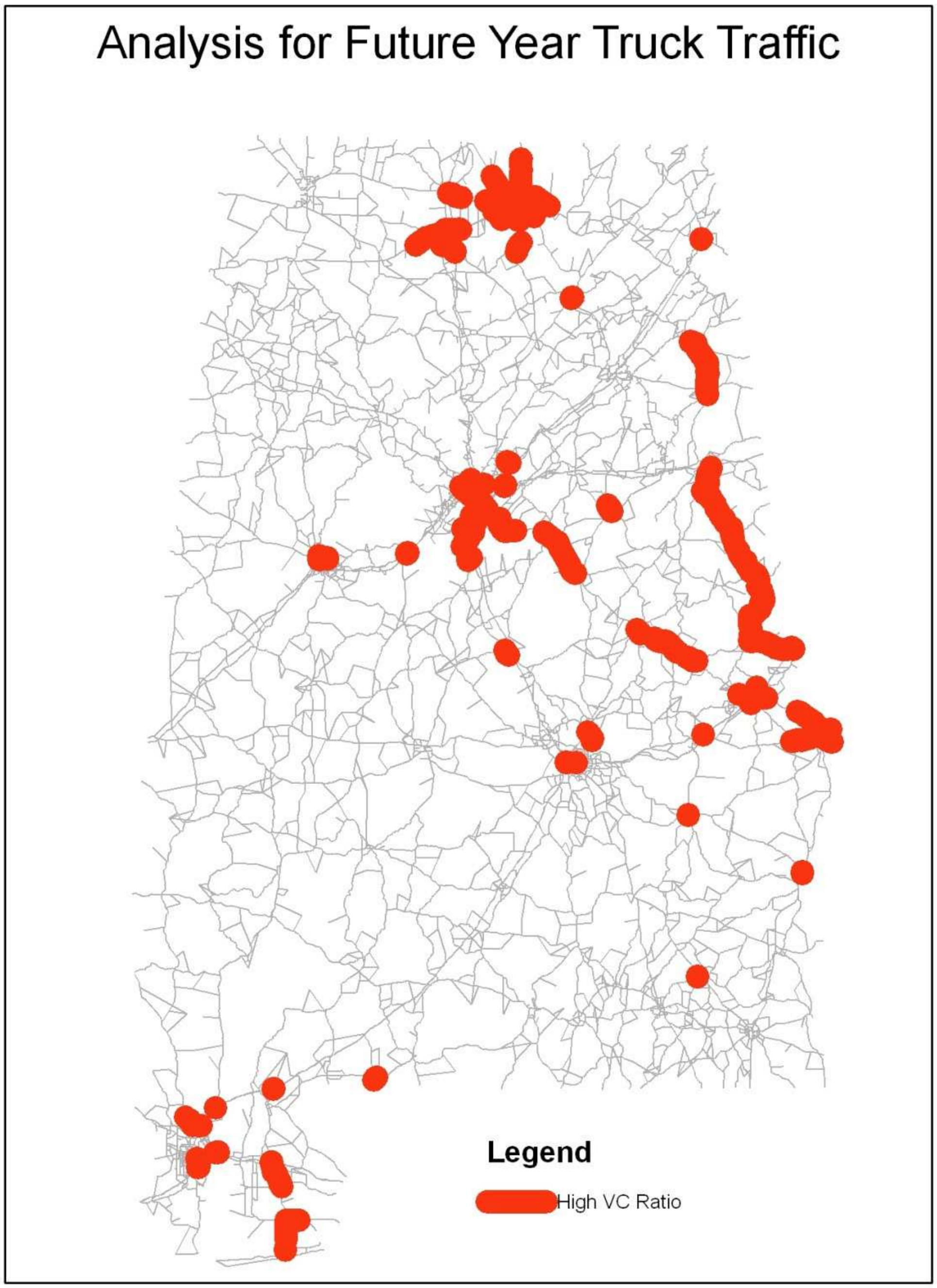
Examining the two data layers together indicates limited overlap between the top 200 locations for the two measures. Several locations where VC ratio and truck intensity factor are both high in the future year include I-65 in south Alabama and I-65 north of Birmingham near Cullman.

**Figure 20 Combined Interstate Locations (Forecast Year 2035)**



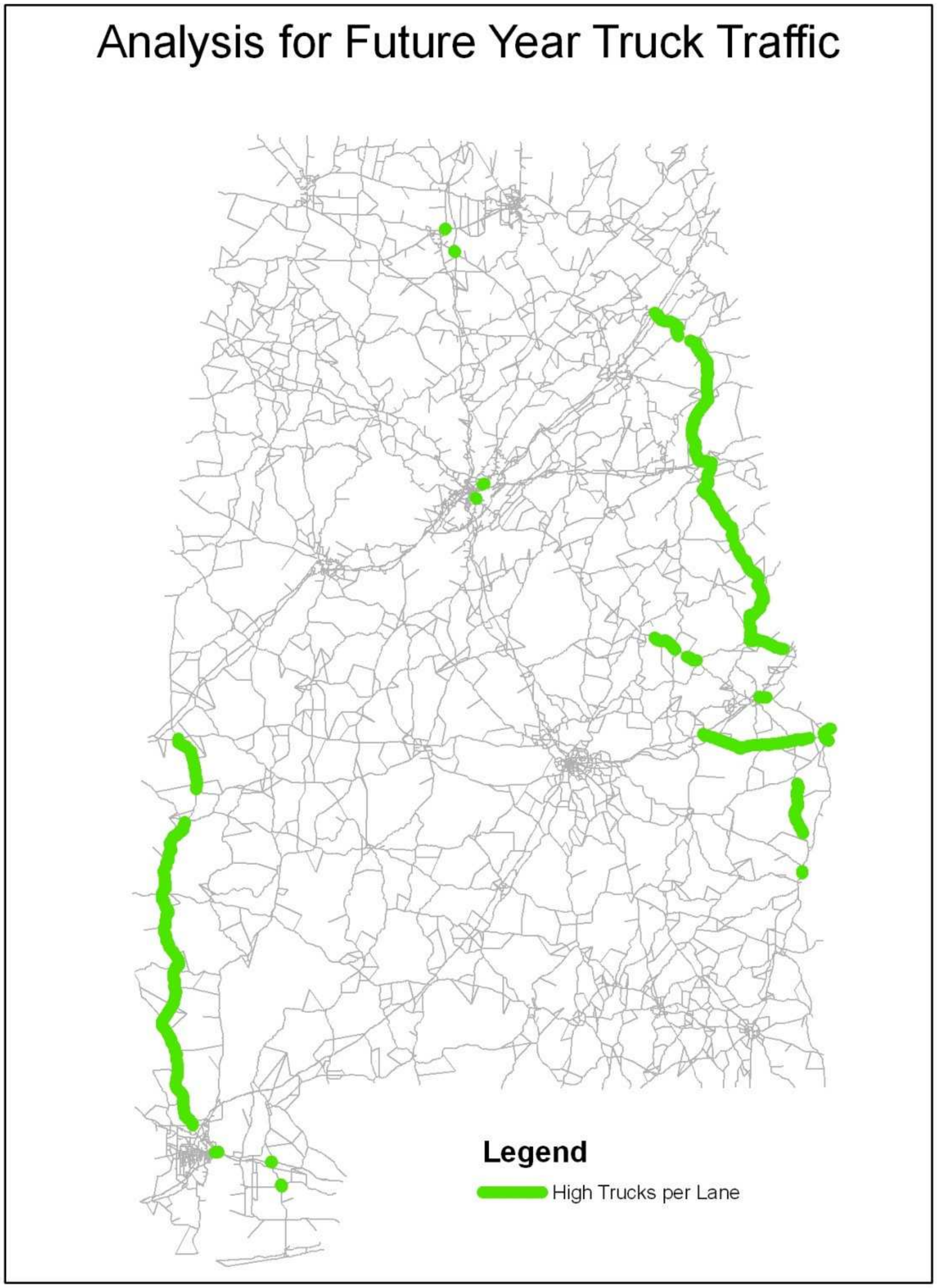
The next steps in the analysis moved to the off-interstate roadways for future year 2035. The non-interstate system methodology used to determine the top segments was similar to that for the interstate system. However, as the top 200 segments did not provide enough visualization, the lower end of the interstate VC ratio—2.27—was used to identify the segments. Using this VC ratio, the top 1,947 segments out of a possible 111,966 segments were selected, or 1.7 percent of the possible segments.

**Figure 21 Off-Interstate Locations with High VC Ratios (Forecast Year 2035)**



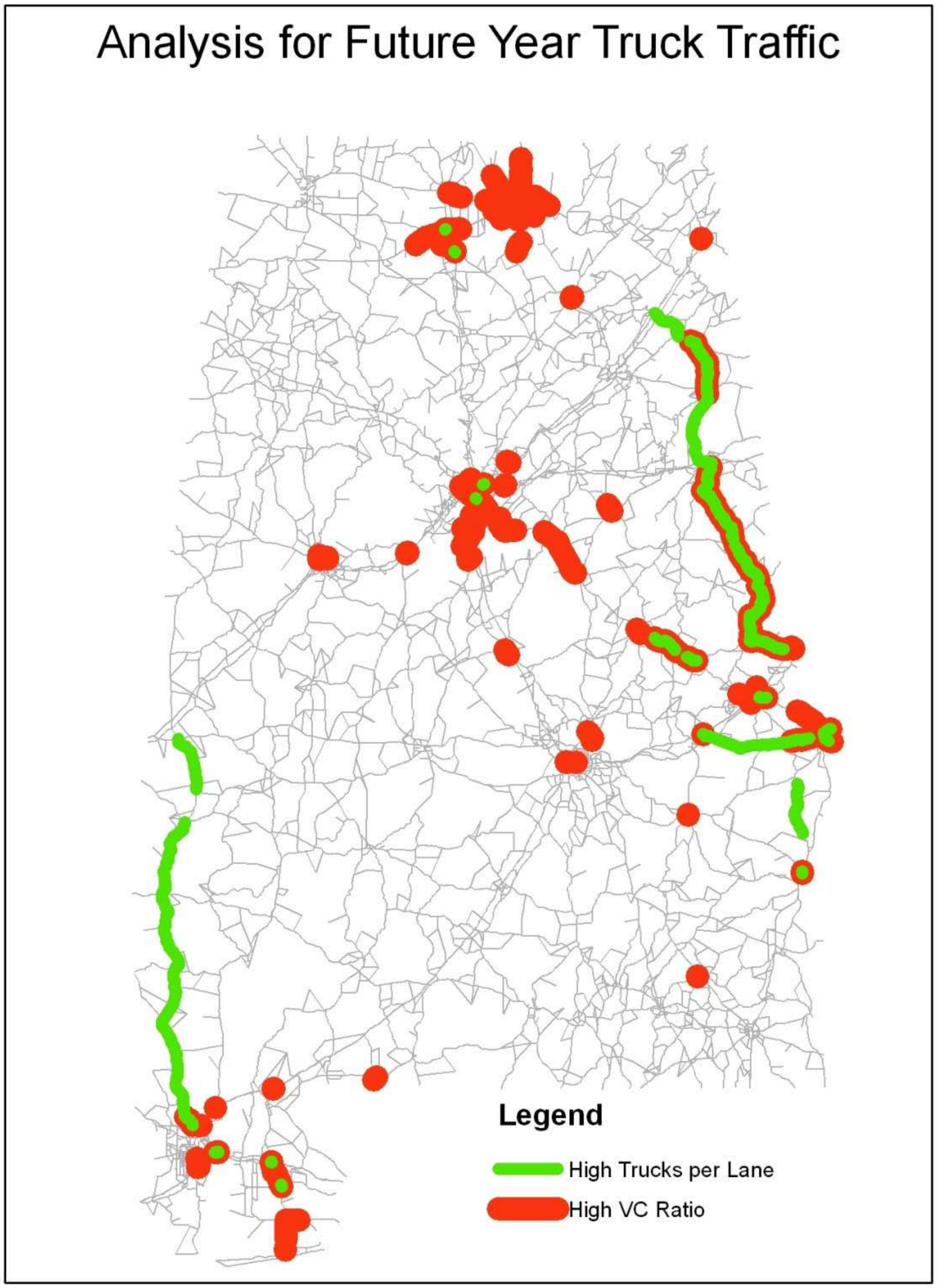
Using the same percentage of segments (1.7 percent), locations for the top roadways based on trucks per lane were then determined. The trucks per lane per day ranged from a high of 8,558 to a low of 4,580.

**Figure 22 Off-Interstate Locations with High Truck Intensity (Forecast Year 2035)**



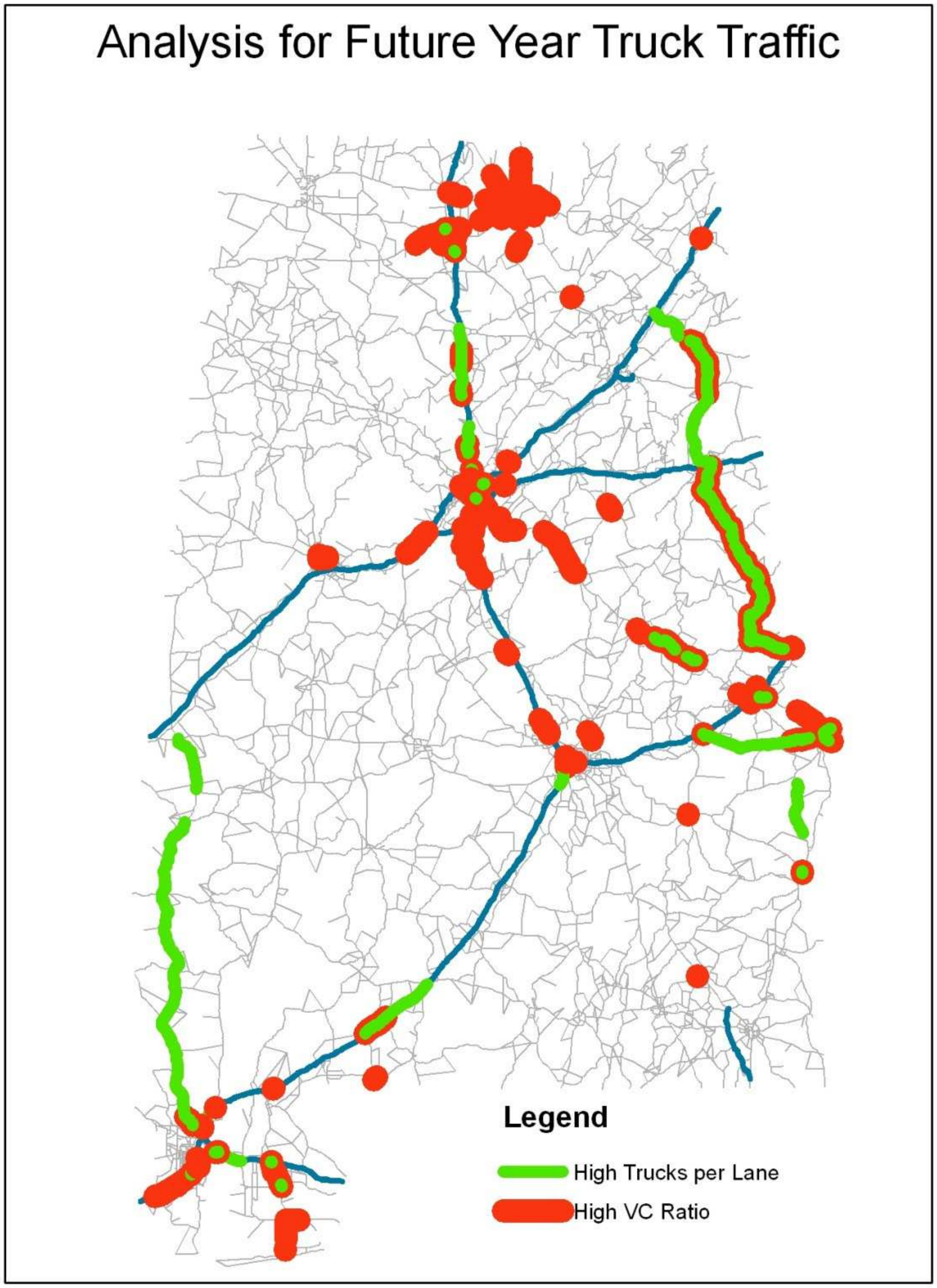
Again, adding the two selections together identifies the locations of the greatest congestion based on VC ratio and trucks per lane. The main overlap locations are US 431 and US 280.

**Figure 23 Combined Off-Interstate Locations (Forecast Year 2035)**



Combining both the interstate and non-interstate layers into a single figure, with red indicating high VC ratio and green indicating high truck intensity, yields the following.

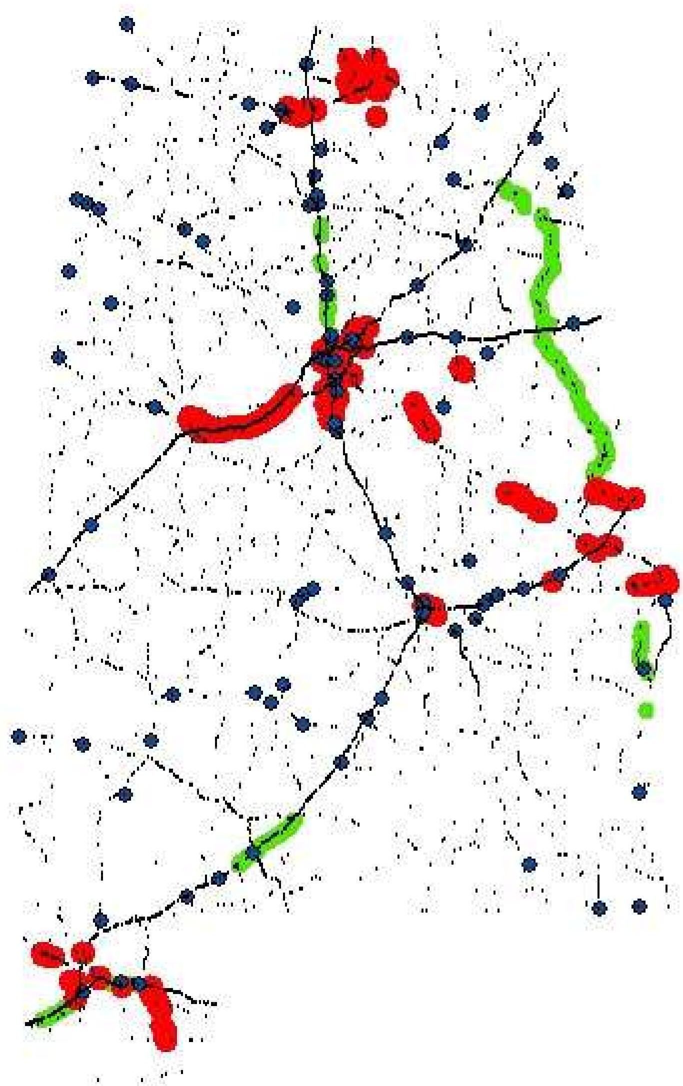
**Figure 24 All Identified Locations (Forecast Year 2035)**



### 4.4 Using Truck Accident Data

To add a level of analysis, the base year data for locations of greatest VC ratio and highest truck intensity (shown previously in Figure 24) were combined with data on truck related accidents and fatalities. The locations of truck related accidents (small blue dots) and fatalities (large blue dots) for 2003-2006 are shown along with the combined congested (red) and high truck intensity (green) locations on the following figure. The figure is intended to show locations where freight accidents might coincide with freight congestion and intensity to assist in determining where to focus roadway improvements specifically designed to improve freight transportation.

**Figure 25 Accident Data with Combined Locations Identified from Forecast Year Model**



# 5. Summary and Next Steps

## 5.1 Summary

The analysis of potential current (base year 2002) and future (2035) deficient locations for transporting commodities on the Alabama transportation system can be summarized as follows:

- Interstate truck shipments are most likely to be involved in congested conditions on I-59 or I-65 around Birmingham and Montgomery. Heaviest truck movements (trucks per lane) exist or likely occur by future year 2035 on I-65 north of Birmingham near Cullman and on I-65 between Montgomery and Mobile.
- Off-interstate truck movements show that the most problematic areas of the state for freight are US 431 and US 280. These locations show a large amount of trucks operating on roadways with a high level of congestion. Additionally, US 80 and the corridor north of Mobile also show a large number of trucks, although these are not necessarily operating on congested roadways. Nevertheless, high truck intensity may impact passenger cars on these facilities with respect to passing movements.
- Approximately 10 percent of 2003-2006 crash fatalities involving trucks and 14 percent of all crashes involving trucks occurred in or are within one mile of the selected roadway segments based on either VC ratio or trucks per lane thresholds.
- The non-truck modes were not explicitly modeled in this effort, but understanding of the counties of highest impact and knowledge of commodities being transported is vital in understanding the overall nature of freight within Alabama.

## 5.2 Next Steps

Interim Report 3 will compare the identified potentially deficient locations (2002 and 2035) to safety improvement segments in ALDOT's 2010-2035 work plan. State roadway system corridors will be identified where underlying commodity flows or their origin-destination patterns indicate a possible alternate management or operational strategy could be considered.

# Alabama Statewide Freight Study and Action Plan

## Interim Report 3

## Task 4 – Potential Solutions for Identified Deficiencies

Prepared by

UAHuntsville
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JRWA
J.R. WILBURN AND ASSOCIATES, INC.

June 11, 2010

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## 1. Introduction

The Alabama Department of Transportation (ALDOT) initiated the Alabama Statewide Freight Study and Action Plan in April 2009 to assist in the identification of potential improvements to the state's transportation system that would facilitate mobility and support economic development initiatives at the state and local level. The study has analyzed multimodal freight movements into and out of the state as well as the condition, operations and safety of the multimodal system in order to identify constraints and consider potential improvements. All modes of freight movement—truck, rail, air and water—have been examined as a part of study efforts. Nevertheless, due to its significance with regard to share of overall freight movement and impact on the general traveling public, truck freight movement has undergone analysis at an additional level of detail.

ALDOT and its federal partners are responsible for State transportation programs and identifying improvements responsive to transportation needs. However, one important aspect of this effort has been to involve the public and private stakeholders who make daily decisions about freight transportation. The goal is to leave everyone, especially the private sector and modal carriers, with information useful in making efficient freight transportation decisions.

Previous study deliverables include Interim Reports 1 and 2. Interim Report 1 documents the process, sources and limitations of the data collection effort conducted for traffic and economic data (Scope of Work Task 1), while Interim Report 2 documents the approach, methodology and findings of the deficiencies analysis activities (Scope of Work Tasks 2 and 3). This document—Interim Report 3—documents the examination of specific commodity flows and deficient locations along Alabama's roadways (Scope of Work Task 4), to assist in development of the Action Plan. The final deliverable, the Action Plan, will provide recommendations to address identified needs and deficiencies through 2035. The anticipated completion date of the Alabama Statewide Freight Study and Action Plan is late June 2010.

Essential to the Action Plan is the knowledge of what is being transported on specific roadways, the distribution of key commodities on specific roadways, locations of accidents involving trucks as they correspond to congestion, and comparison of projects already anticipated versus projects in need of consideration. Interim Report 3 identifies commodity flows that might be amenable to alternate management or operational strategies (e.g., rerouting, rescheduling or modal shifts), as well as the relationship of identified deficient locations to capacity and safety improvements in ALDOT's Comprehensive Project Management System (CPMS).

## 2. Alternate Strategies for Key Commodity Flows

Section 2 examines the major commodities flowing by truck along roadways to better understand their contribution to congestion on the facility. The state highway network was emphasized since truck movements along those facilities are critical both intramodally and intermodally. Additionally, roadways were selected for further study because trucks represent the major mode of transport and have the biggest impact on the general public. The study team will continue coordinating with appropriate agencies and private organizations regarding other modal needs and intermodal connections.

Utilizing the data developed in Task 1 and assigned to the travel demand model in Tasks 2 and 3, an examination of which specific commodities are being moved on each roadway segment was performed. The data used were collected from the FAF2 2035 forecast and disaggregated to the traffic analysis zones (TAZ) within the statewide model, as discussed previously in Interim Report 2. Truck trips for the major commodity utilizing the facility were then assigned to the network. The analysis focused on the number of trucks carrying each specific commodity versus the total number of trucks on the roadway. In this fashion, it was possible to determine the major commodities being moved for a wide variety of roadway segments. It should be noted that while it is possible to perform this analysis for each section of roadway in the statewide model, only a few key corridors around the state were selected for evaluation under this effort. This information enables ALDOT and private companies to better understand commodity flows within the state on certain roadways, and thus facilitate the identification of potential options for shifting commodities to alternate modes of transport to alleviate congestion.

Figures 1 through 15 illustrate truck flows in the study location and direction for the major commodity noted, as summarized in the listing below. Although the major commodity presented is frequently the primary commodity being shipped along a particular corridor, another major commodity representing a significant share of the movements may be presented in order to illustrate a variety of commodities. The main products moved are fertilizer, fuel oil, articles of base metals, base metals, natural sand, non metallic minerals, waste/recycled material, unknown and mixed freight. With the exception of unknown and mixed freight, economics and infrastructure would be the only impediments to moving these commodities by rail and/or water modes.

| Figure # | Facility | Direction | Location | Major Commodity |
|---|---|---|---|---|
| 1a | I-10 | Eastbound | Near Florida | Fertilizer |
| 1b | I-10 | Westbound | Near Florida | Waste/Recycled Material |
| 2a | I-10 | Eastbound | Near Mississippi | Waste/Recycled Material |
| 2b | I-10 | Westbound | Near Mississippi | Fertilizer |
| 3a | I-20/59 | Eastbound | Near Mississippi | Waste/Recycled Material |
| 3b | I-20/59 | Westbound | Near Mississippi | Base Metal |
| 4a | I-20 | Eastbound | Near Georgia | Fertilizer |
| 4b | I-20 | Westbound | Near Georgia | Waste/Recycled Material |
| 5a | I-59 | Northbound | Near Tennessee | Natural Sand |
| 5b | I-59 | Southbound | Near Tennessee | Natural Sand |

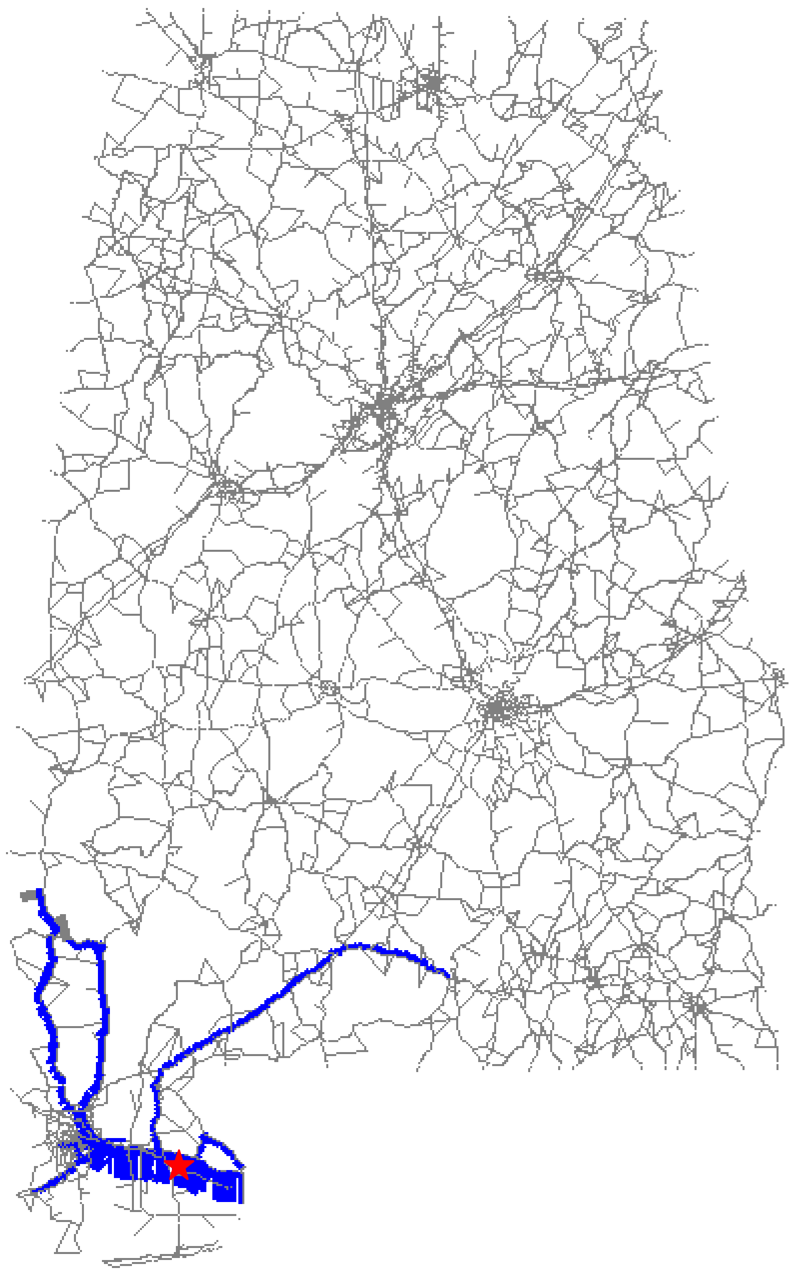
| Figure # | Facility | Direction | Location | Major Commodity |
|---|---|---|---|---|
| 6a | I-65 | Northbound | North of Mobile | Fertilizer |
| 6b | I-65 | Southbound | North of Mobile | Fertilizer |
| 7a | I-65 | Northbound | North of Birmingham | Unknown |
| 7b | I-65 | Southbound | North of Birmingham | Unknown |
| 8a | I-85 | Eastbound | East of Montgomery | Fertilizer |
| 8b | I-85 | Westbound | East of Montgomery | Wood |
| 9a | US 43 | Northbound | North of Mobile | Unknown |
| 9b | US 43 | Southbound | North of Mobile | Unknown |
| 10a | US 72 | Eastbound | East of I-65 | Mixed Freight |
| 10b | US 72 | Westbound | East of I-65 | Non Metallic Ore |
| 11a | US 72 | Eastbound | West of I-65 | Base Metal |
| 11b | US 72 | Westbound | West of I-65 | Waste/Recycled Material |
| 12a | US 84 | Eastbound | East of I-65 | Fertilizer |
| 12b | US 84 | Westbound | East of I-65 | Fuel Oil |
| 13a | US 84 | Eastbound | West of I-65 | Fuel Oil |
| 13b | US 84 | Westbound | West of I-65 | Fuel Oil |
| 14a | US 280 | Northbound | Birmingham to Auburn | Unknown |
| 14b | US 280 | Southbound | Birmingham to Auburn | Articles of Base Metals |
| 15a | US 431 | Northbound | North of Auburn | Natural Sands |
| 15b | US 431 | Southbound | North of Auburn | Base Metals |

On the figures, the blue highlights indicate the origin and destination locations for the truck trips that combine to make-up the total number of trucks. In many cases, the trips originate and/or terminate outside Alabama, but the scale of the model does not extend beyond the borders of the state. Additionally, the scale of the image utilized for visualization purposes makes it impossible to see every origin/destination location for the commodity movements; however, the major movements are shown and the number of trucks is represented by the thickness of the line. Each figure provides the location of the analysis, the total number of trucks on the facility expected in 2035 from the model, and the number of trucks for the major commodity on the facility.

Appendix A provides a comparison of commodity flows for 43 major commodities along key corridors across Alabama in both chart and tabular form. As the charts and matrix illustrate, some roadways carry large amounts of a few main commodities while others carry a more even distribution of all commodities. This is an important consideration for freight movement with regard to distance traveled, congestion and alternate modes of transport. For roadways carrying a high percentage of a single commodity over longer distances, decreases in truck congestion at select locations could potentially be experienced through the transfer of that freight to an alternate mode of transport.

Fertilizer represents a major component of movements on I-10 eastbound near Florida, making up more than 20 percent of all truck movements. The trips originate in Mississippi and Covington County to take I-10 east.

**Figure 1a – Major Commodity Flow, I-10 Eastbound, Near Florida (Fertilizer)**



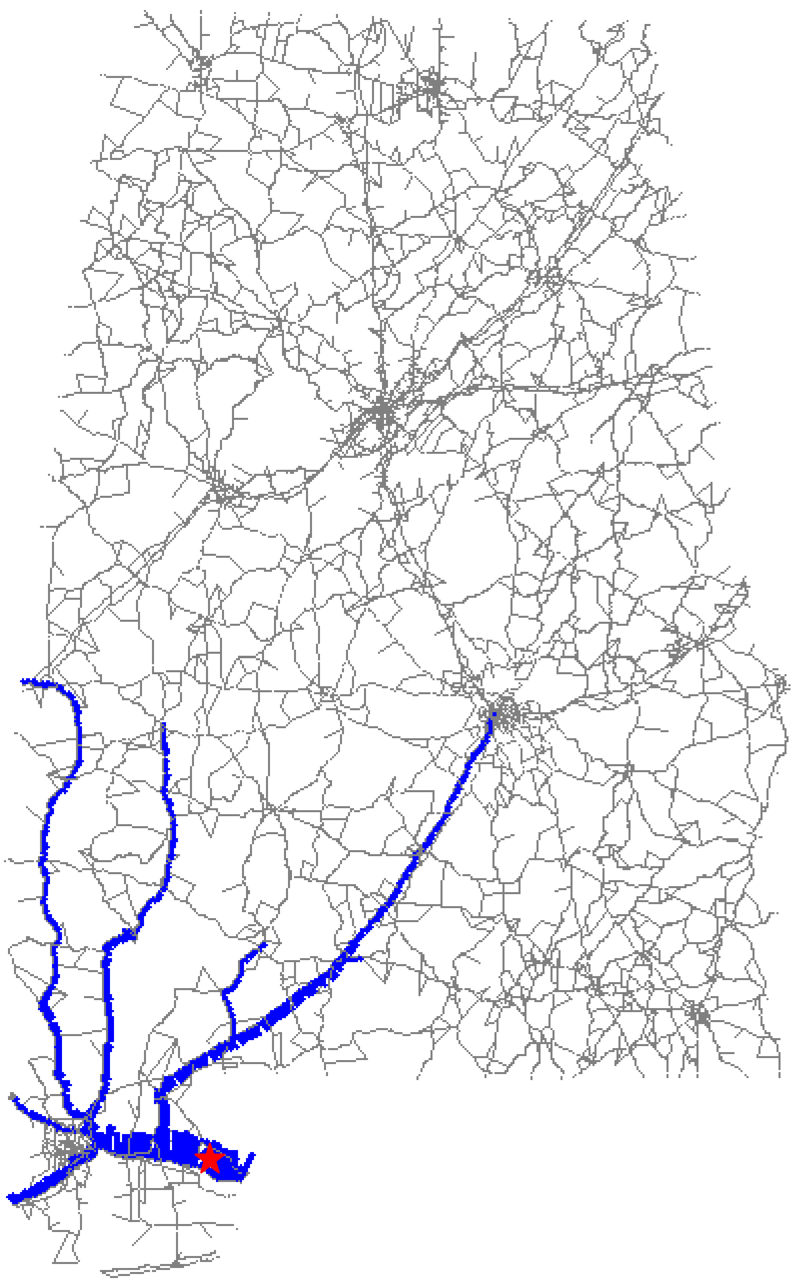
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**7,000** Total Projected 2035 Daily Directional Truck Volume

**1,500** Projected 2035 Directional Truck Volume for Commodity Noted

Waste and recycled material commodity movements traveling westbound on I-10 near Florida make up just over 10 percent of all truck movements on this facility. Trucks with these categories of commodities feed into I-10 using AL 17, US 43 and I-65 from Montgomery.

**Figure 1b – Major Commodity Flow, I-10 Westbound, Near Florida (Waste/Recycled Material)**



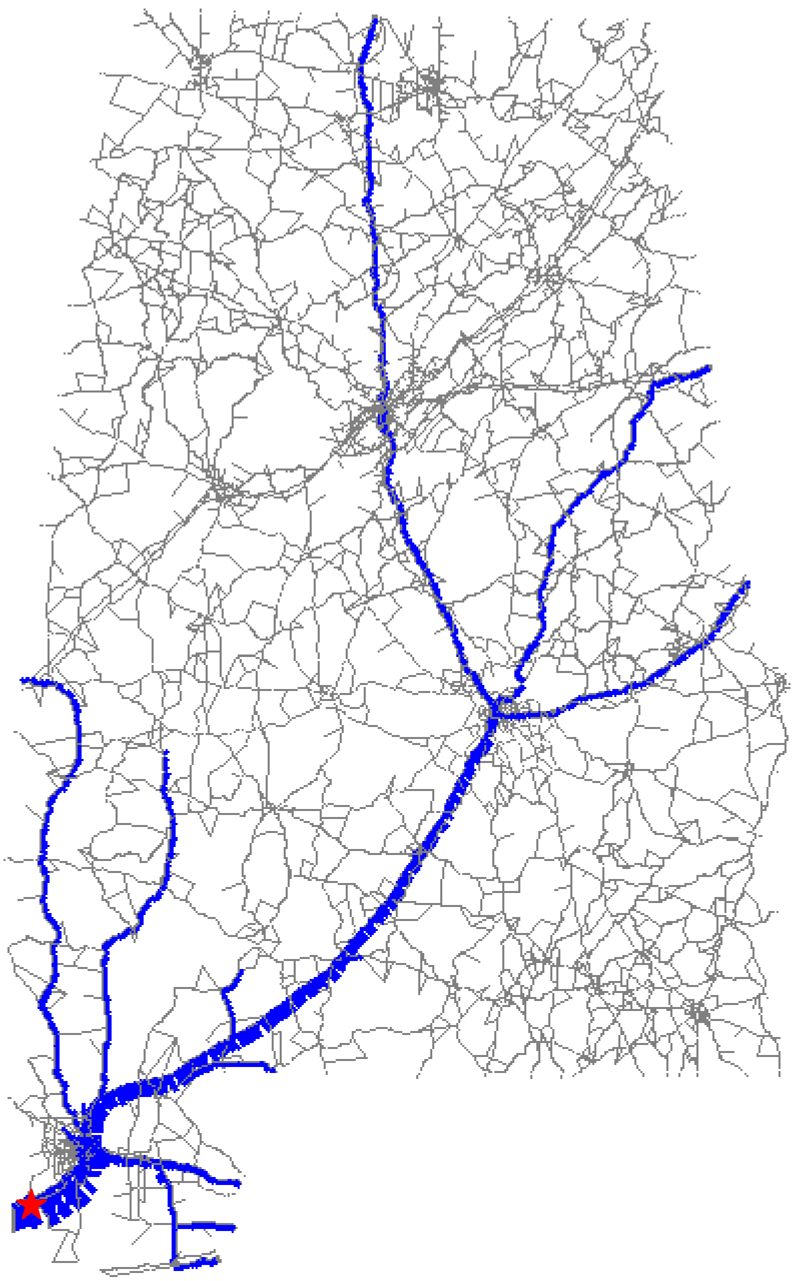
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**7,400** Total Projected 2035 Daily Directional Truck Volume

**800** Projected 2035 Directional Truck Volume for Commodity Noted

A majority of the waste and recycled material movements traveling eastbound on I-10 from Mississippi head northward along I-65 towards Montgomery and beyond. Other routes used for these movements include US 43, US 45, AL 21, I-85 and US 80. Waste and recycled material represents about 5 percent of truck movements at that location.

**Figure 2a – Major Commodity Flow, I-10 Eastbound, Near Mississippi (Waste/Recycled Material)**



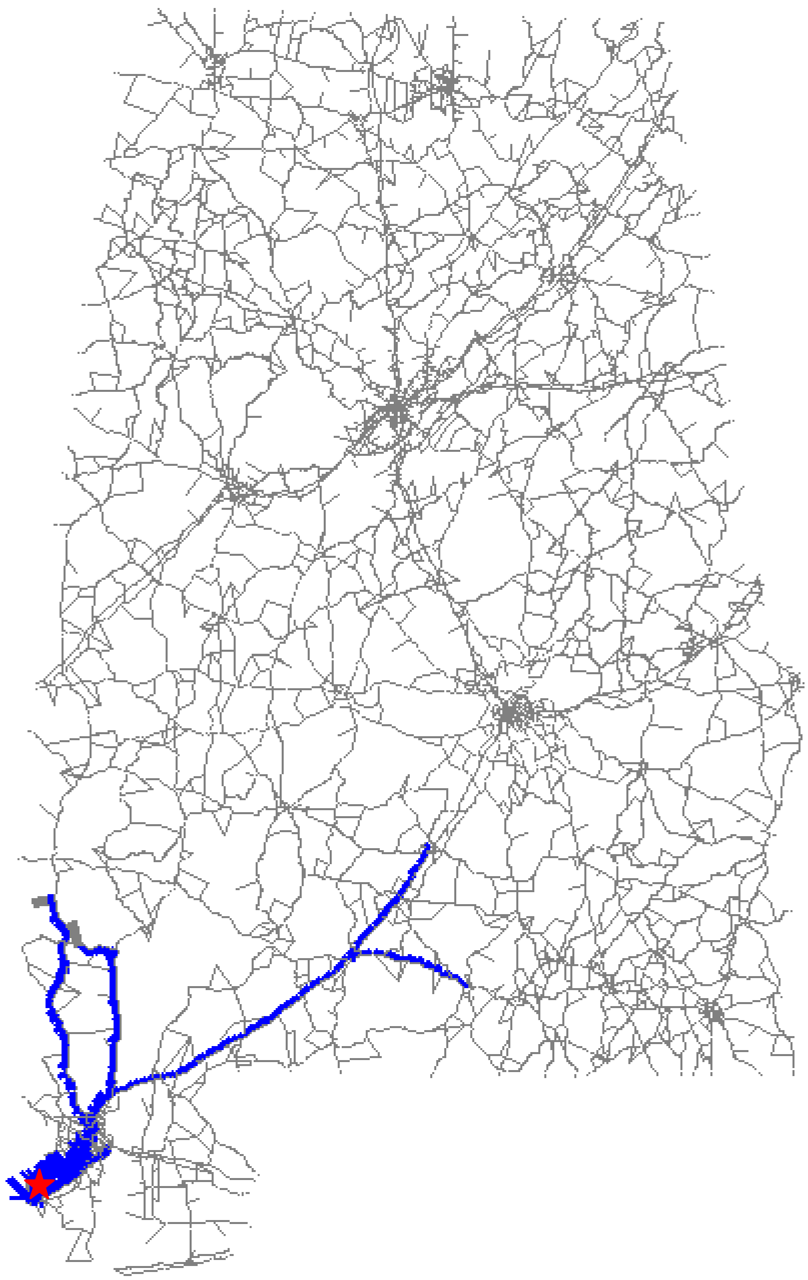
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**14,500** Total Projected 2035 Daily Directional Truck Volume

**1,500** Projected 2035 Directional Truck Volume for Commodity Noted

Fertilizer represents more than 16 percent of truck movements westbound on I-10 near Mississippi. A large part of these shipments originate in the Port of Mobile and other south Alabama locations, and use US 43, US 45, AL 17 and I-65 to feed into I-10.

**Figure 2b – Major Commodity Flow, I-10 Westbound, Near Mississippi (Fertilizer)**



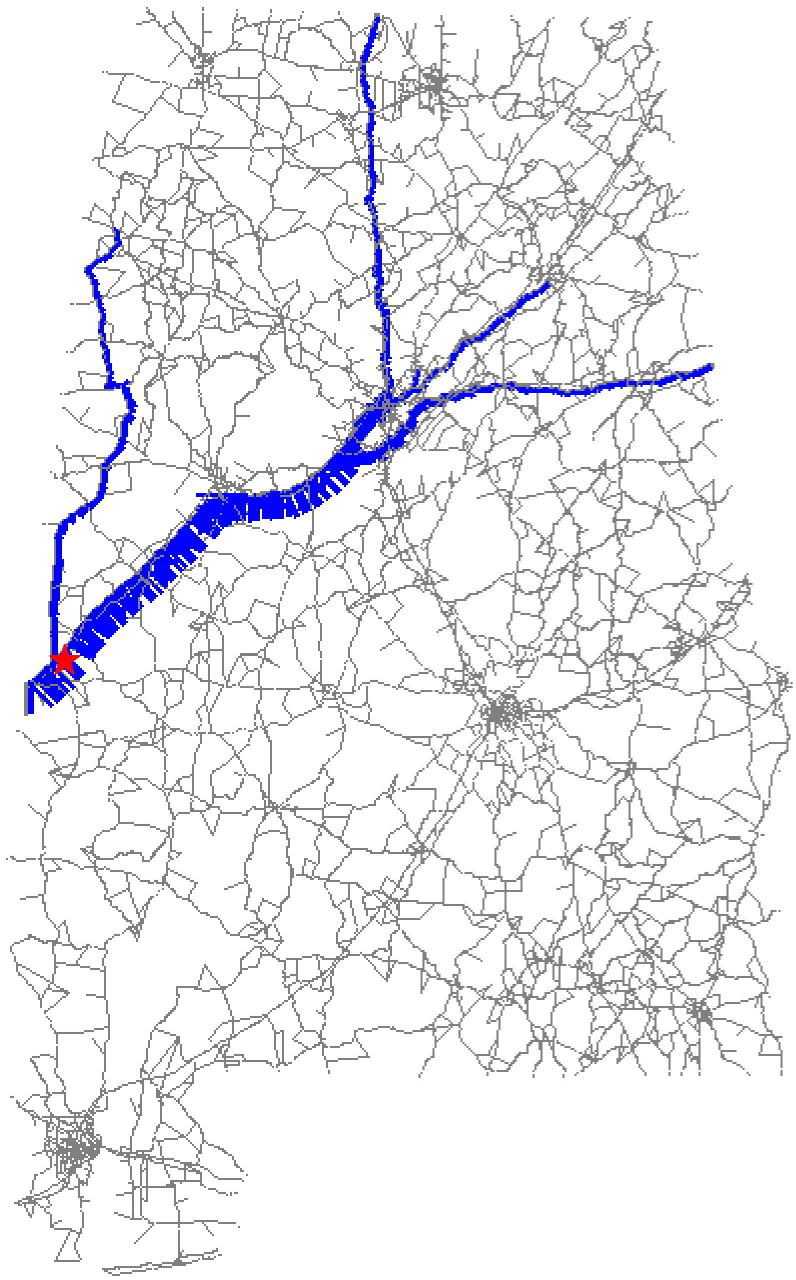
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**13,700** Total Projected 2035 Daily Directional Truck Volume

**2,300** Projected 2035 Directional Truck Volume for Commodity Noted

Waste/recycled material represents over 10 percent of the eastbound movements on I-20/59 near Mississippi. Other primary feeder routes to the corridor include AL 17 and I-65 from the north.

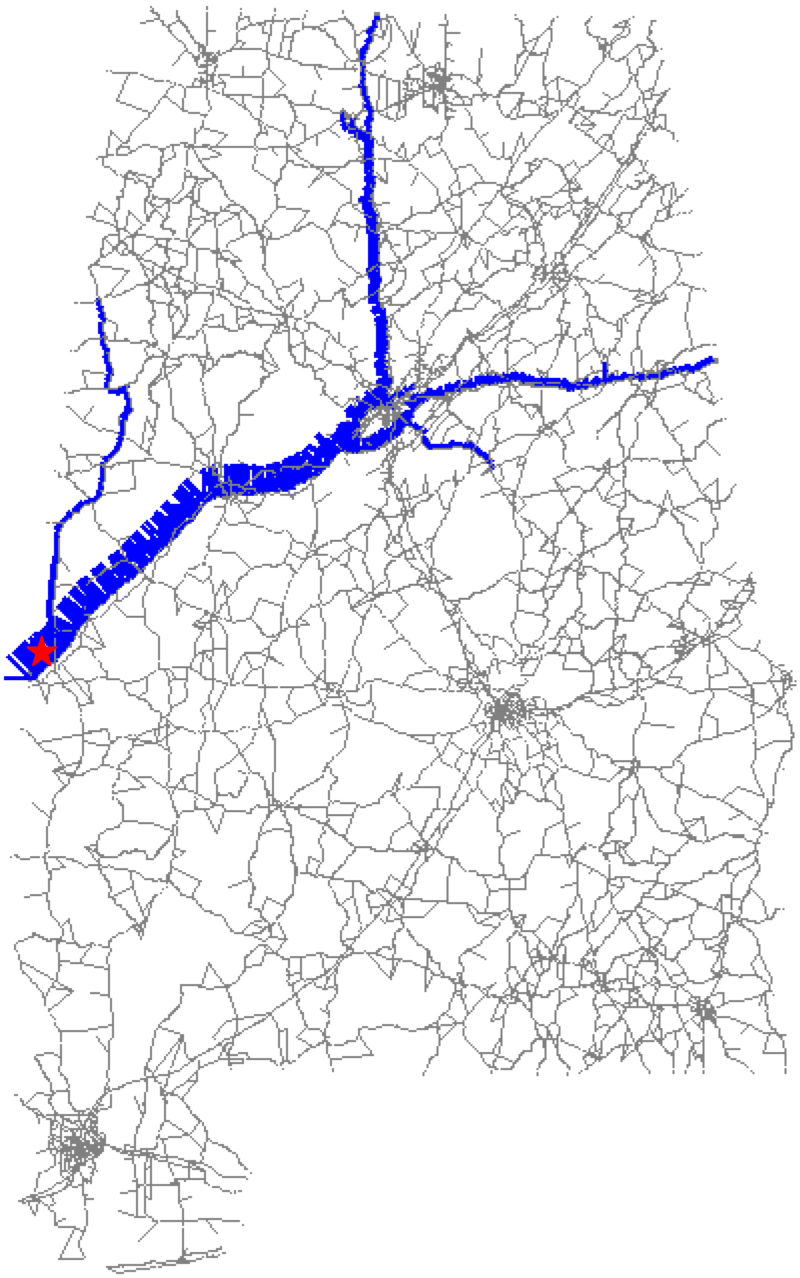
**Figure 3a – Major Commodity Flow, I-20/59 Eastbound, Near Mississippi (Waste/Recycled Material)**



| | |
|---|---|
| ★ | Location for Commodity and Direction Analysis as Noted in Figure Title Above |
| **3,900** | Total Projected 2035 Daily Directional Truck Volume |
| **400** | Projected 2035 Directional Truck Volume for Commodity Noted |

Base metals represent about 10 percent of truck movements traveling westbound on I-20/59 into Mississippi. Many freight trips travel south on I-65 before going west, while others use AL 17. In addition to base metals, fertilizer shipments are also significant on this corridor.

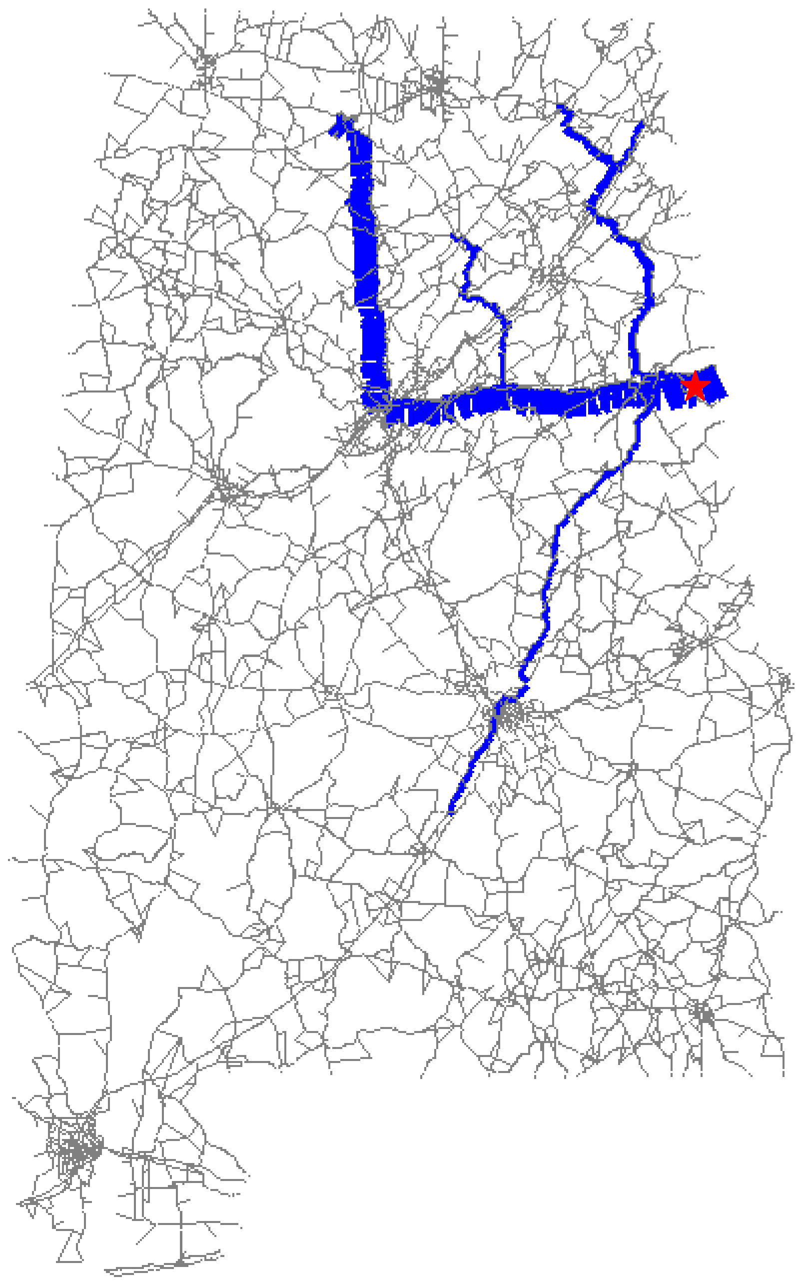
**Figure 3b – Major Commodity Flow, I-20/59 Westbound, Near Mississippi (Base Metal)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**4,000** Total Projected 2035 Daily Directional Truck Volume
**400** Projected 2035 Directional Truck Volume for Commodity Noted

Fertilizer movements make up over 12 percent of freight movements on I-20 eastbound towards the Georgia border. A significant number of these trips use I-65 south to I-20 east. Some shipments use AL 9 north from Montgomery and south from the Fort Payne area to connect with I-20, as well as US 231 from Cullman and Blount counties.

**Figure 4a – Major Commodity Flow, I-20 Eastbound, Near Georgia (Fertilizer)**



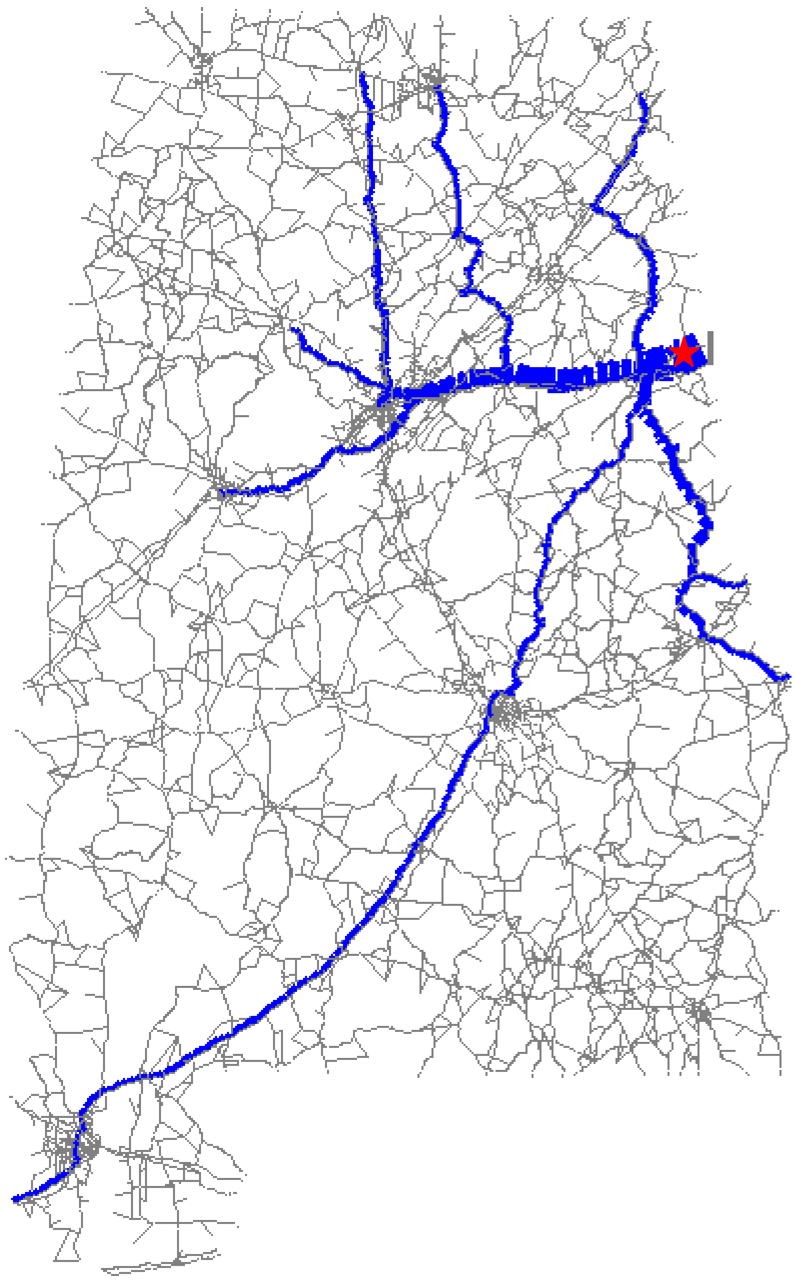
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**9,400** Total Projected 2035 Daily Directional Truck Volume

**1,200** Projected 2035 Directional Truck Volume for Commodity Noted

Waste and recycled materials represent more than 10 percent of freight movements traveling west on I-20 near Georgia. This commodity movement also uses I-65 and AL 9 to connect with I-20 going west.

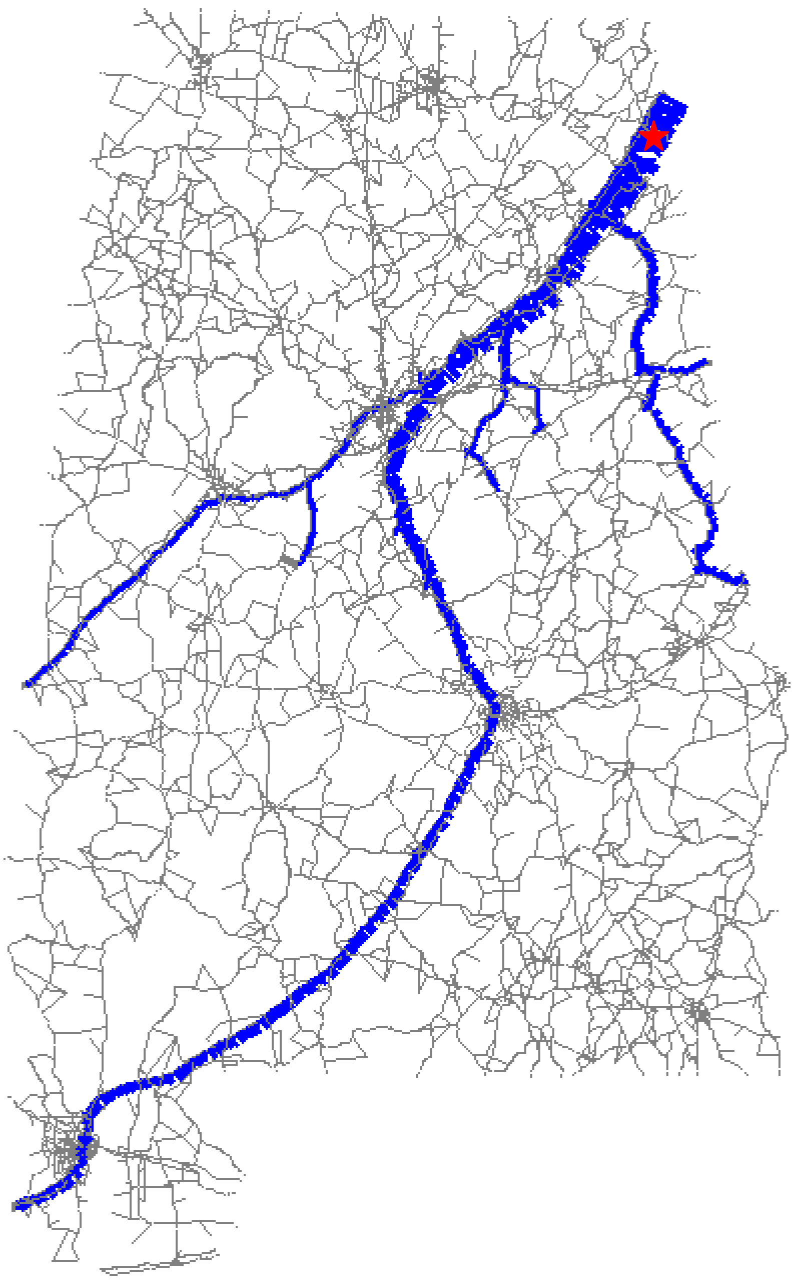
**Figure 4b – Major Commodity Flow, I-20 Westbound, Near Georgia (Waste/Recycled Material)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**9,100** Total Projected 2035 Daily Directional Truck Volume
**900** Projected 2035 Directional Truck Volume for Commodity Noted

Natural sands are shipped on I-59 north towards Georgia and Tennessee. Many of these shipments merge from I-65 out of the Mobile area. Natural sands represent approximately 9 percent of truck movements in that corridor.

**Figure 5a – Major Commodity Flow, I-59 Northbound, Near Tennessee (Natural Sand)**



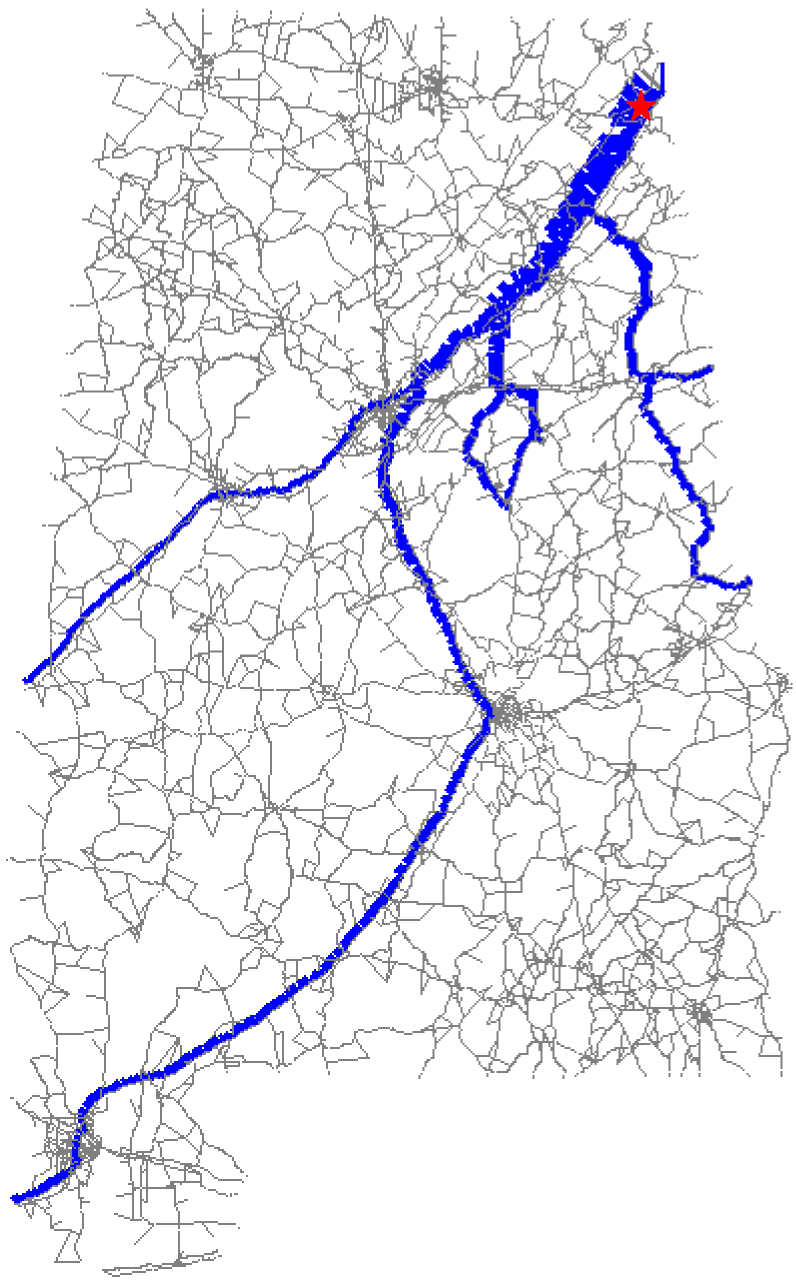
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**5,400** Total Projected 2035 Daily Directional Truck Volume

**400** Projected 2035 Directional Truck Volume for Commodity Noted

Used in construction, manufacturing and other industries, natural sand from Tennessee moves south on I-59 into Birmingham and on towards Mississippi. It also is routed further south on I-65 to Montgomery and on to Mobile. Other shipments use US 431 into Georgia and US 231 south into the Talladega County area.

**Figure 5b – Major Commodity Flow, I-59 Southbound, Near Tennessee (Natural Sand)**



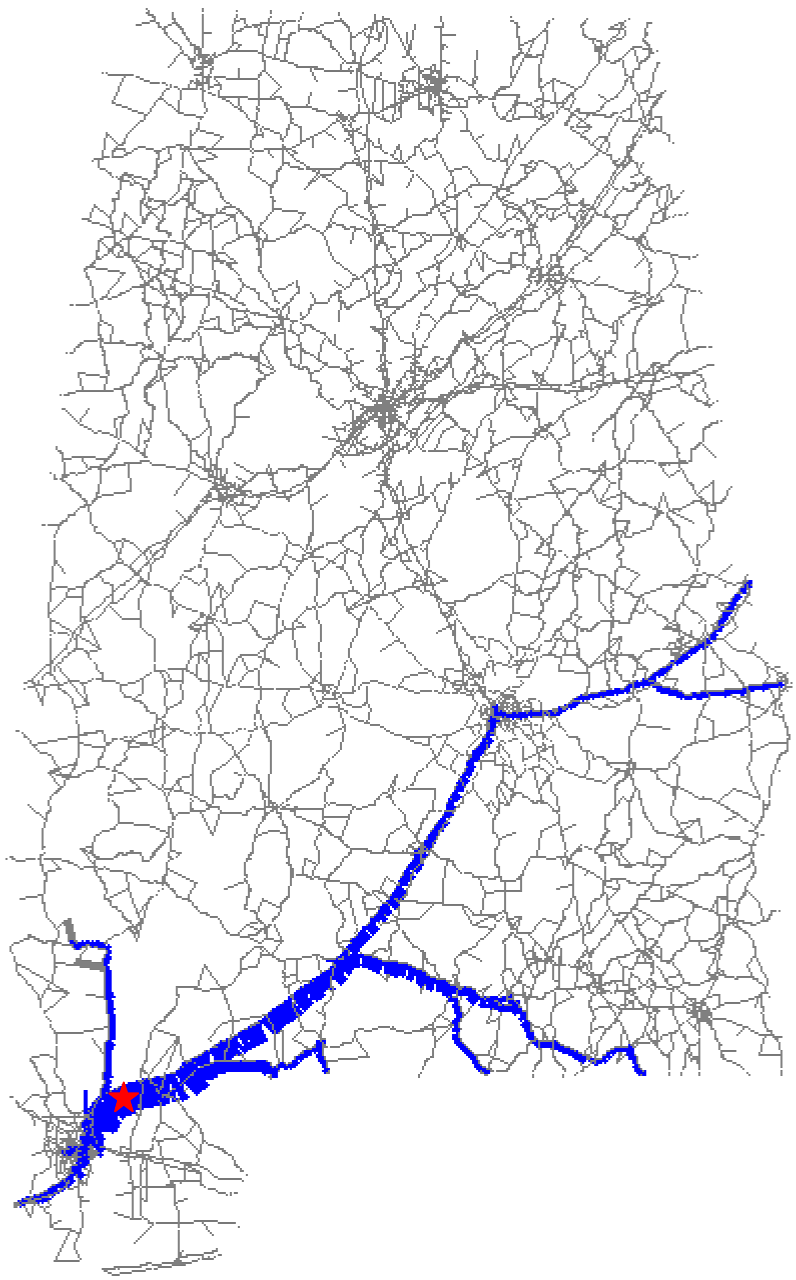
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**5,000** Total Projected 2035 Daily Directional Truck Volume

**500** Projected 2035 Directional Truck Volume for Commodity Noted

Fertilizer is a major commodity traveling I-65 north from Mobile, composing approximately 15 percent of all northbound truck movements. A large number of these movements use US 45, US 31 and US 84 to access south Alabama's farming areas, while others access Georgia via I-85 and US 80.

**Figure 6a – Major Commodity Flow, I-65 Northbound, North of Mobile (Fertilizer)**



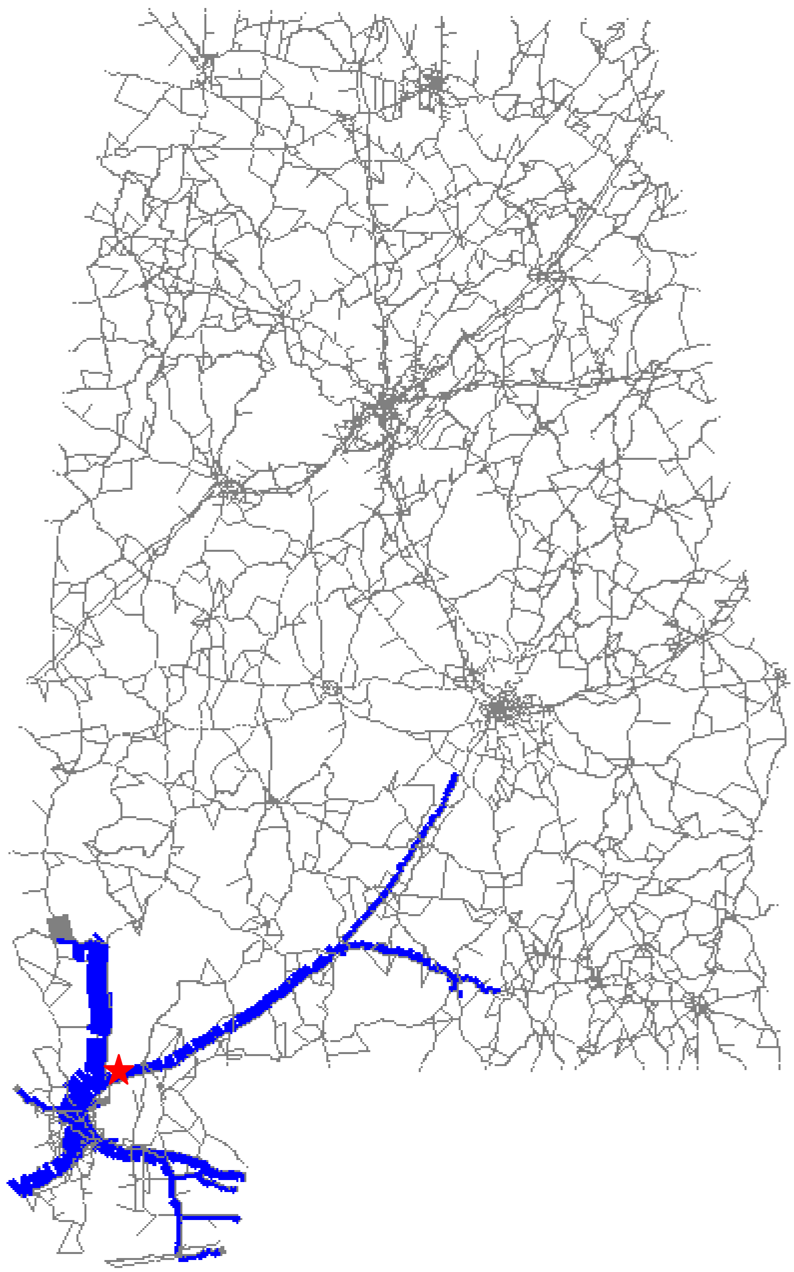
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**10,900** Total Projected 2035 Daily Directional Truck Volume

**1,500** Projected 2035 Directional Truck Volume for Commodity Noted

Fertilizer represents a majority of movements traveling south on I-65 north of Mobile. A large number of these movements enter from US 45, I-85 and US 84, continuing westbound into Mississippi and beyond via I-10.

**Figure 6b – Major Commodity Flow, I-65 Southbound, North of Mobile (Fertilizer)**



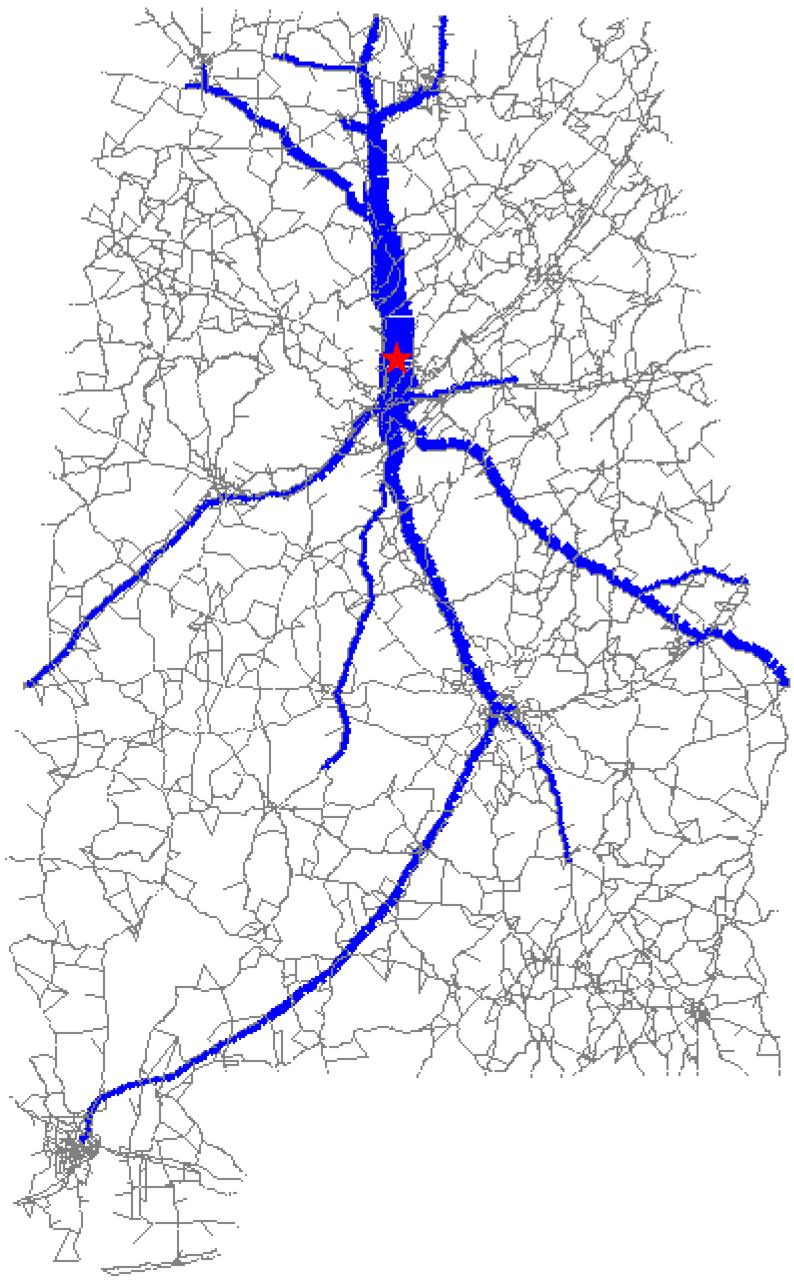
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**14,200** Total Projected 2035 Daily Directional Truck Volume

**1,700** Projected 2035 Directional Truck Volume for Commodity Noted

A substantial amount of freight movements categorized as "unknown" move north on I-65 from Birmingham. These movements represent a compilation of freight movements traveling from the eastern, western and southern parts of the state using major facilities including I-20/59, US 280 and AL 139.

**Figure 7a – Major Commodity Flow, I-65 Northbound, North of Birmingham (Unknown)**

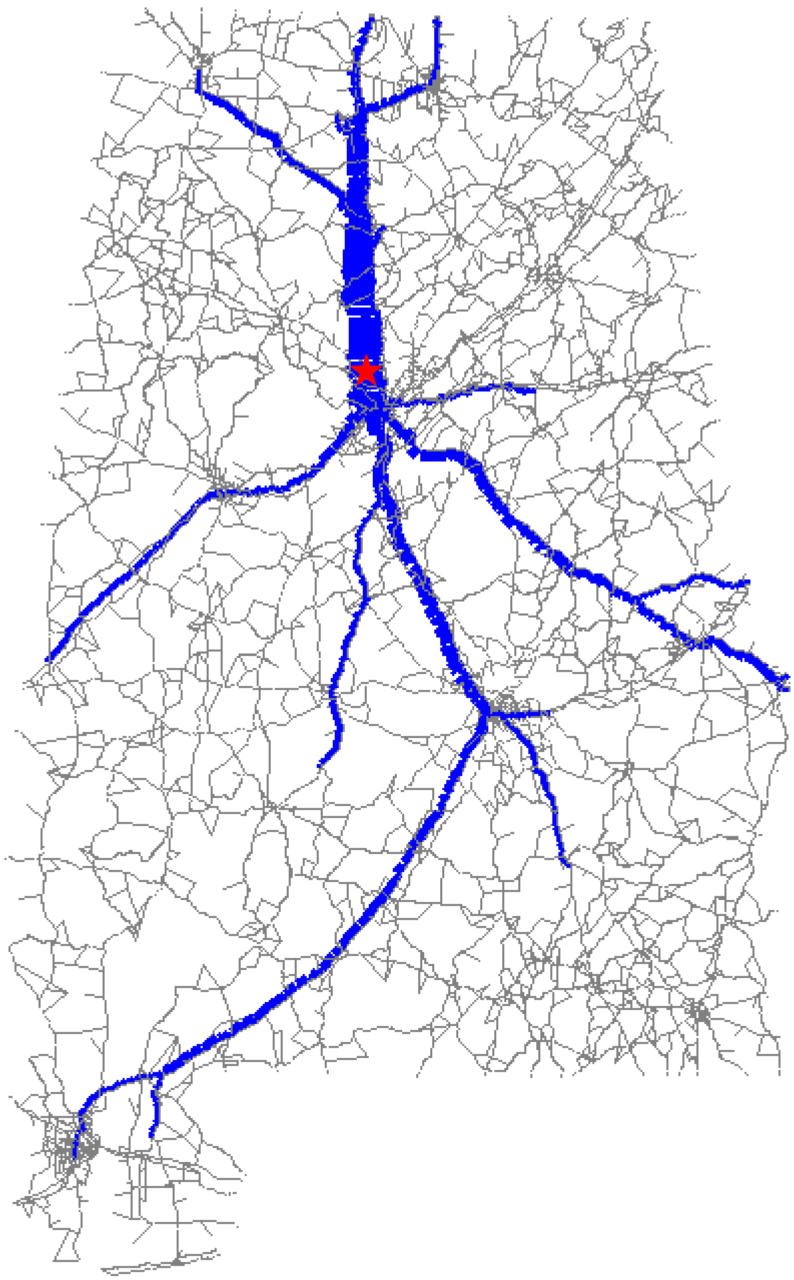


★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

| | |
|---|---|
| **17,200** | Total Projected 2035 Daily Directional Truck Volume |
| **2,700** | Projected 2035 Directional Truck Volume for Commodity Noted |

Southbound movements of I-65 freight categorized as "unknown" mirror the northbound movements illustrated in Figure 7a. Both northbound and southbound movements of "unknown" freight represent approximately 16 percent of all truck movements in both directions traveling on I-65 congregating from north of Birmingham.

**Figure 7b – Major Commodity Flow, I-65 Southbound, North of Birmingham (Unknown)**



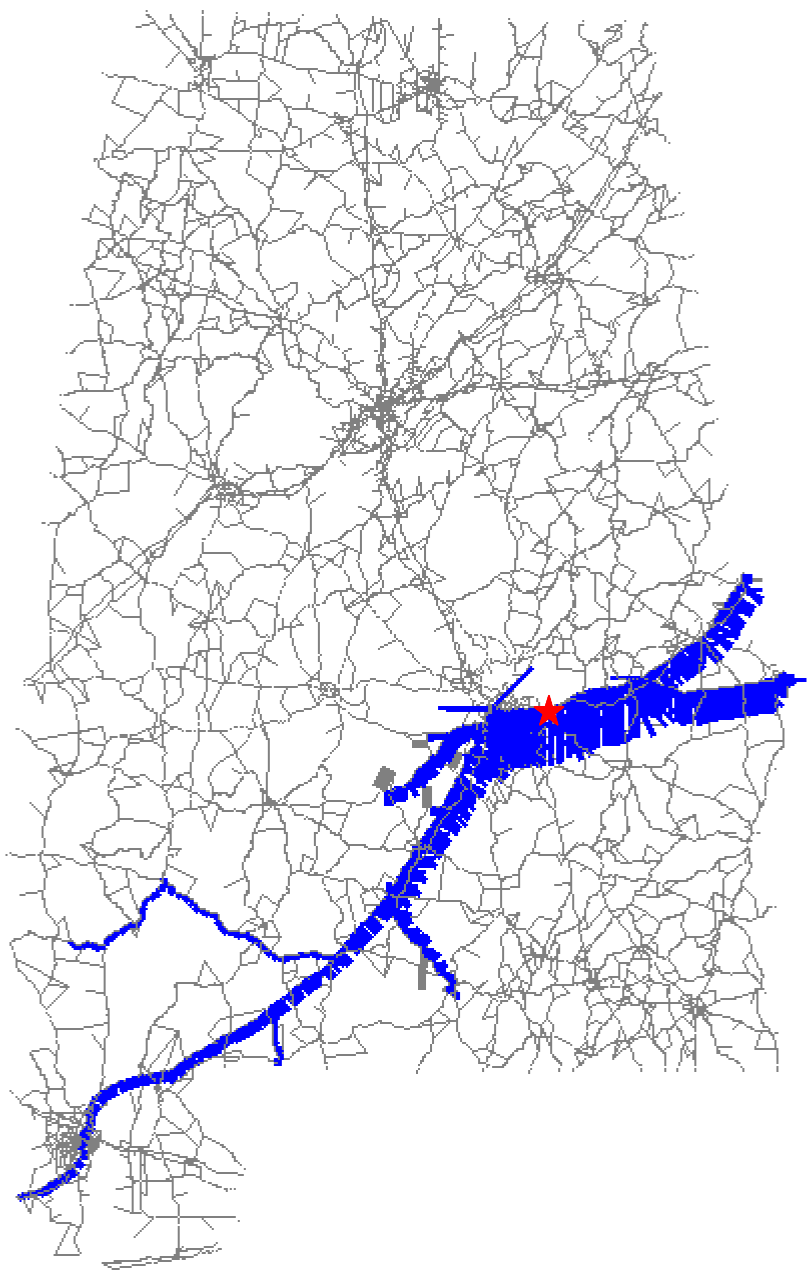
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**14,500** Total Projected 2035 Daily Directional Truck Volume

**2,300** Projected 2035 Directional Truck Volume for Commodity Noted

Fertilizer is a major commodity moving east on I-85 through Montgomery into Georgia, representing 12 percent of total truck movements. Eastbound fertilizer movements come to Montgomery from the direction of Mississippi using I-10, I-65 and US 84, and from Florida using US 31 to I-65. Fertilizer shipments continue east on I-85 and US 80 through Columbus. The farming areas in southern Alabama and Georgia both provide a market for fertilizer products.

**Figure 8a – Major Commodity Flow, I-85 Eastbound, East of Montgomery (Fertilizer)**



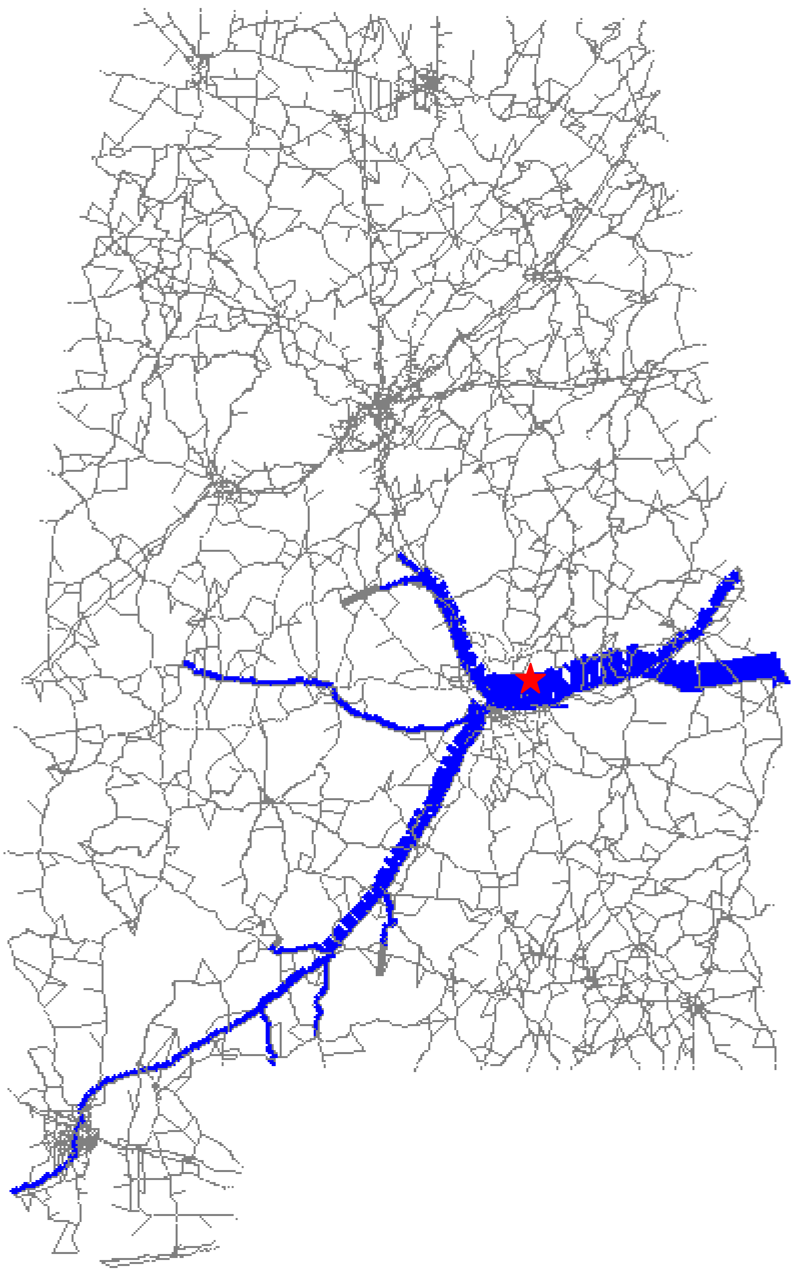
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**9,400** Total Projected 2035 Daily Directional Truck Volume

**1,400** Projected 2035 Directional Truck Volume for Commodity Noted

Wood is a major commodity—approximately 10 percent of all movements—traveling westward along I-85 from Georgia through Montgomery. The movements disperse at Montgomery, with lesser amounts continuing north and south on I-65.

**Figure 8b – Major Commodity Flow, I-85 Westbound, East of Montgomery (Wood)**



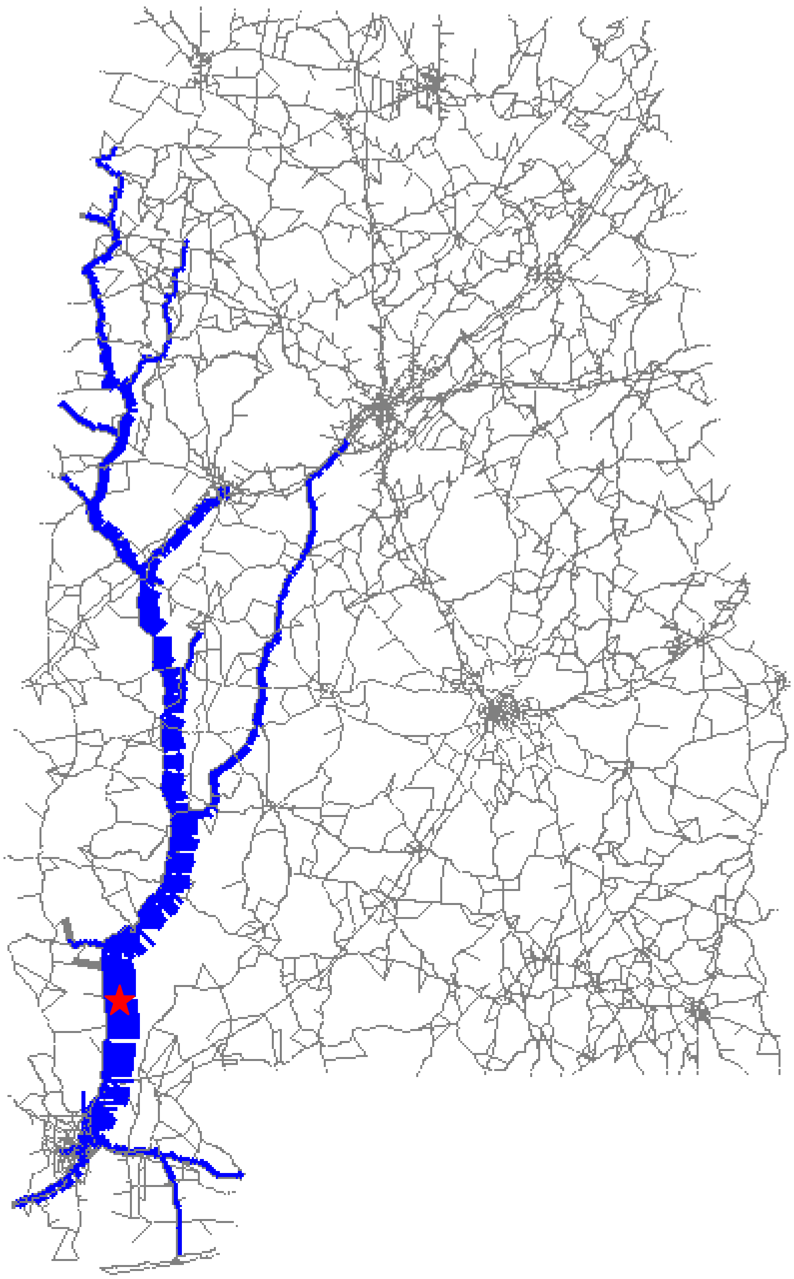
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**9,400** Total Projected 2035 Daily Directional Truck Volume

**900** Projected 2035 Directional Truck Volume for Commodity Noted

Freight categorized as “unknown” represents about 15 percent of all truck movements on US 43 moving northbound. Some of the freight takes I-20/59 into Tuscaloosa or AL 5 towards Birmingham.

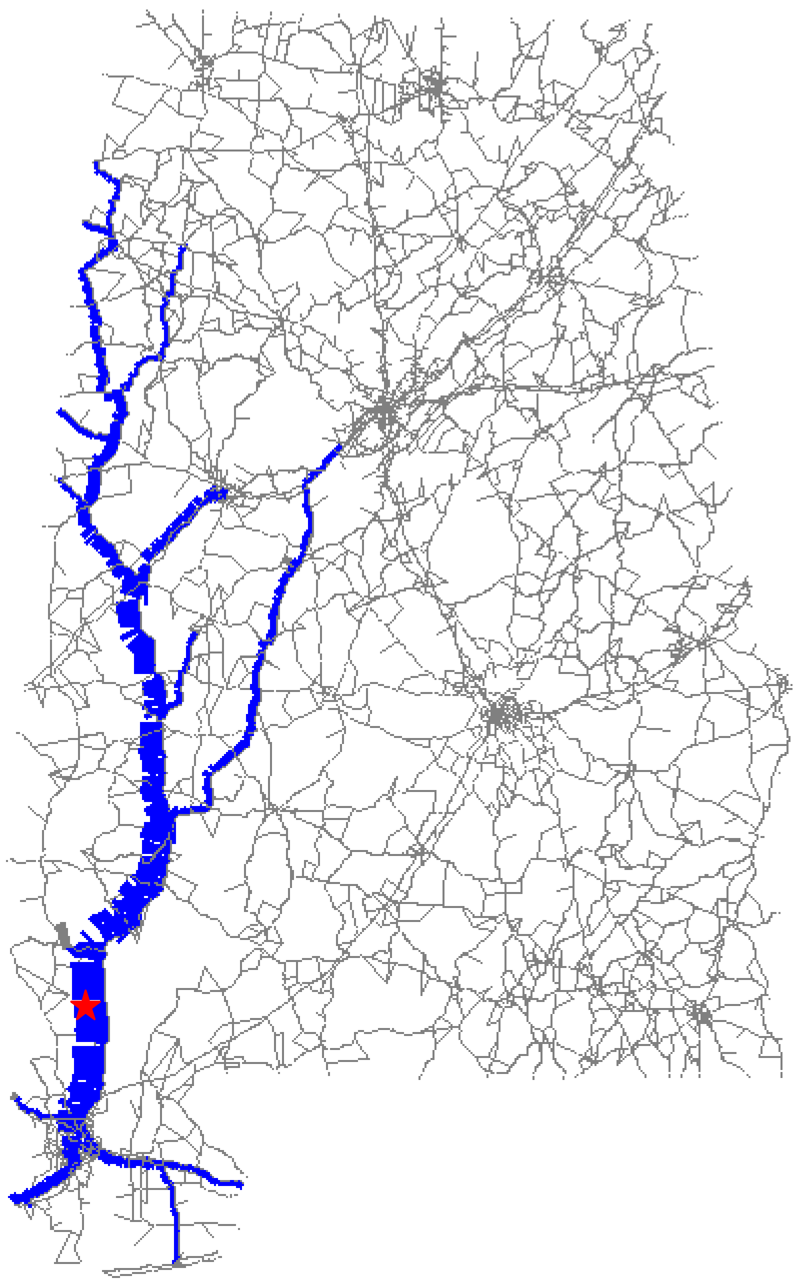
**Figure 9a – Major Commodity Flow, US 43 Northbound, North of Mobile (Unknown)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**2,900** Total Projected 2035 Daily Directional Truck Volume
**400** Projected 2035 Directional Truck Volume for Commodity Noted

As with the northbound movements, "unknown" freight constitutes approximately 15 percent of total southbound movements on US 43 in western Alabama. AL 5 from Birmingham, I-20/59 from Tuscaloosa, and AL 17 feed US 43 from the north-central parts of the state.

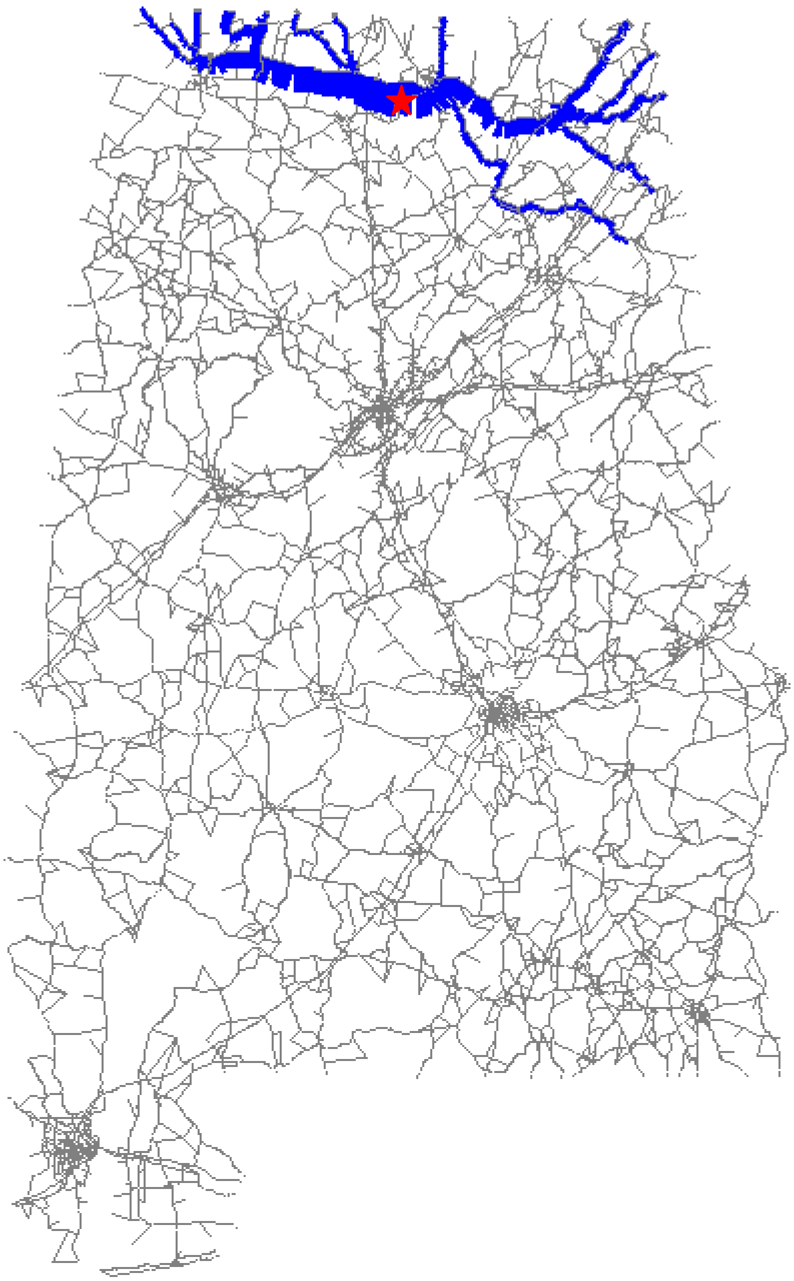
**Figure 9b – Major Commodity Flow, US 43 Southbound, North of Mobile (Unknown)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**2,000** Total Projected 2035 Daily Directional Truck Volume
**300** Projected 2035 Directional Truck Volume for Commodity Noted

Truck movements traveling eastbound on US 72 east of I-65 are largely mixed freight, which represents about 45 percent of total truck movements. In addition to east/west travel along US 72 across the northernmost portion of Alabama, significant amounts of mixed freight movements travel to/from Tennessee.

**Figure 10a – Major Commodity Flow, US 72 Eastbound, East of I-65 (Mixed Freight)**



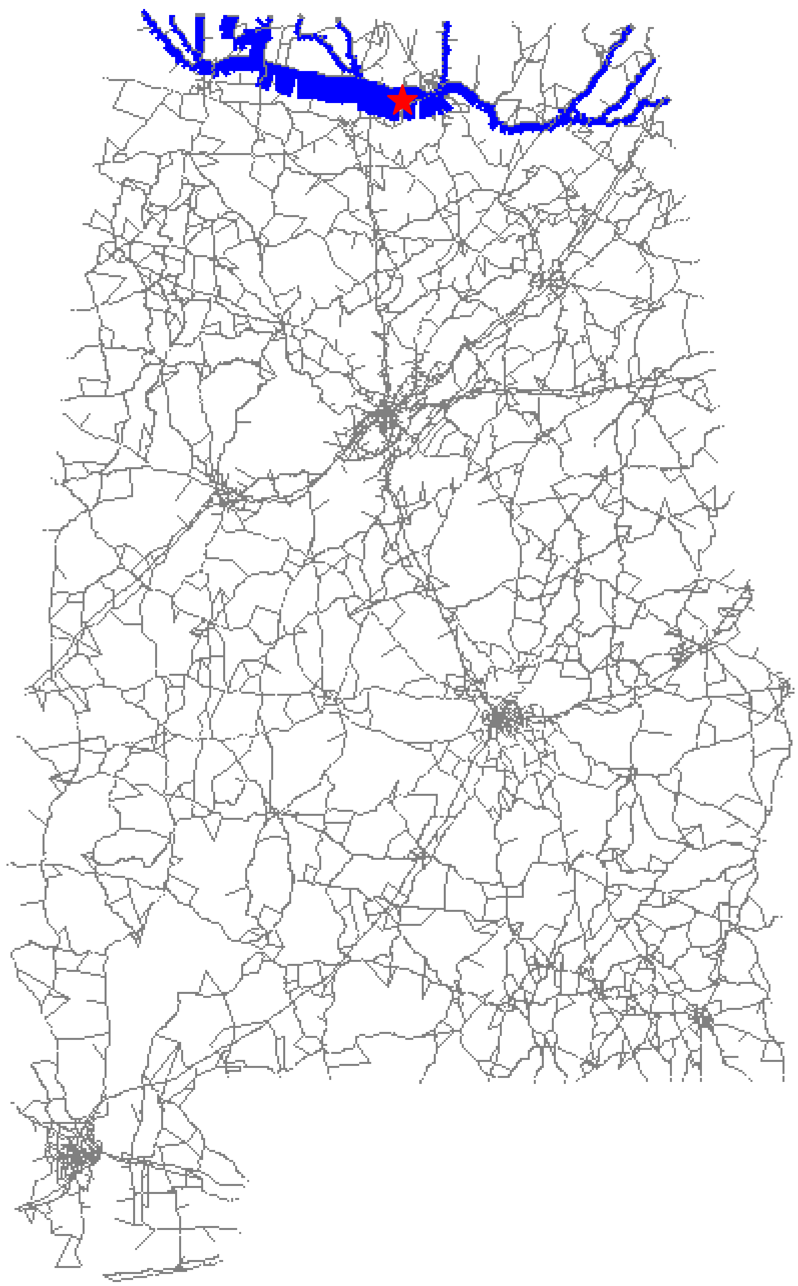
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**2,000** Total Projected 2035 Daily Directional Truck Volume

**900** Projected 2035 Directional Truck Volume for Commodity Noted

US 72 truck movements westbound from east of I-65 include non metallic ore. This commodity represents about 6 percent of total movements.

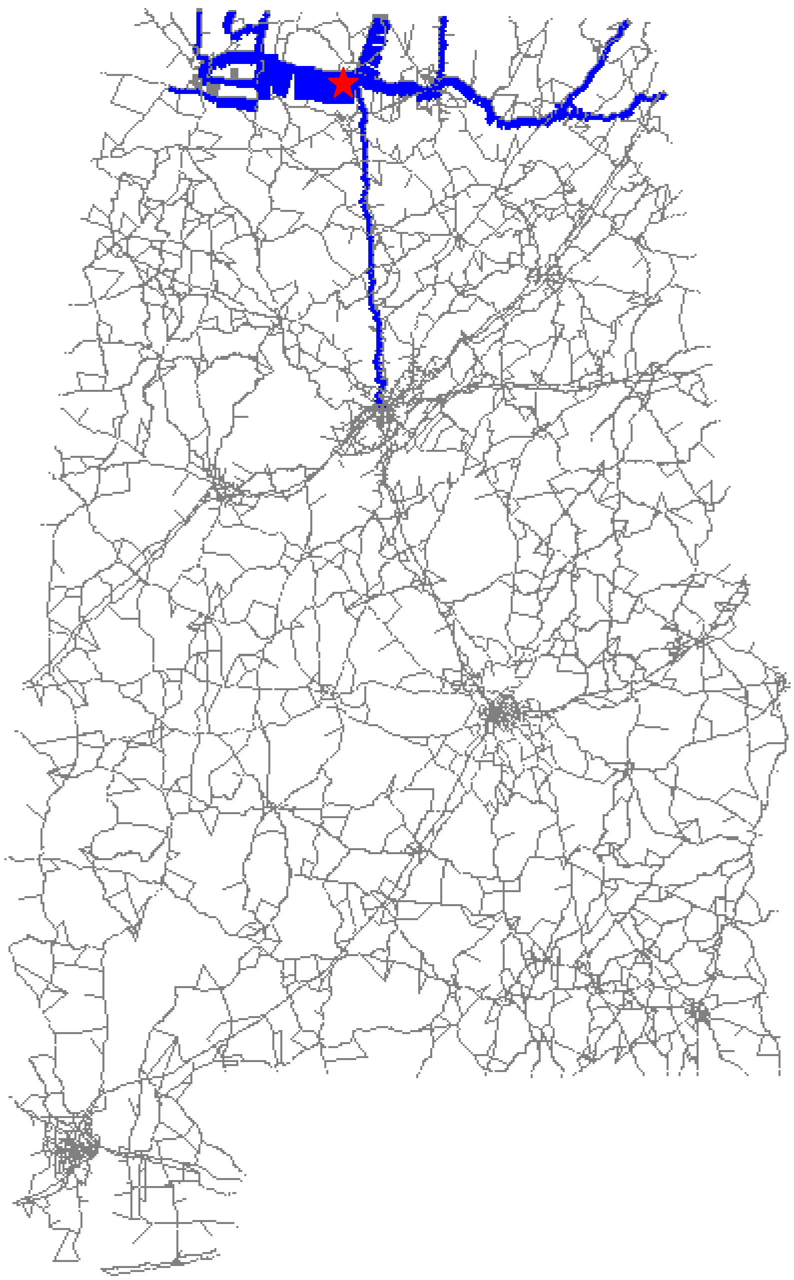
**Figure 10b – Major Commodity Flow, US 72 Westbound, East of I-65 (Non Metallic Ore)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**2,000** Total Projected 2035 Daily Directional Truck Volume
**200** Projected 2035 Directional Truck Volume for Commodity Noted

Base metal commodities make up approximately 10 percent of trucks moving eastbound on US 72 west of I-65. While a majority of trucks travel the US 72 corridor connecting Florence, Decatur and Huntsville, some travel I-65 to/from Birmingham.

**Figure 11a – Major Commodity Flow, US 72 Eastbound, West of I-65 (Base Metal)**



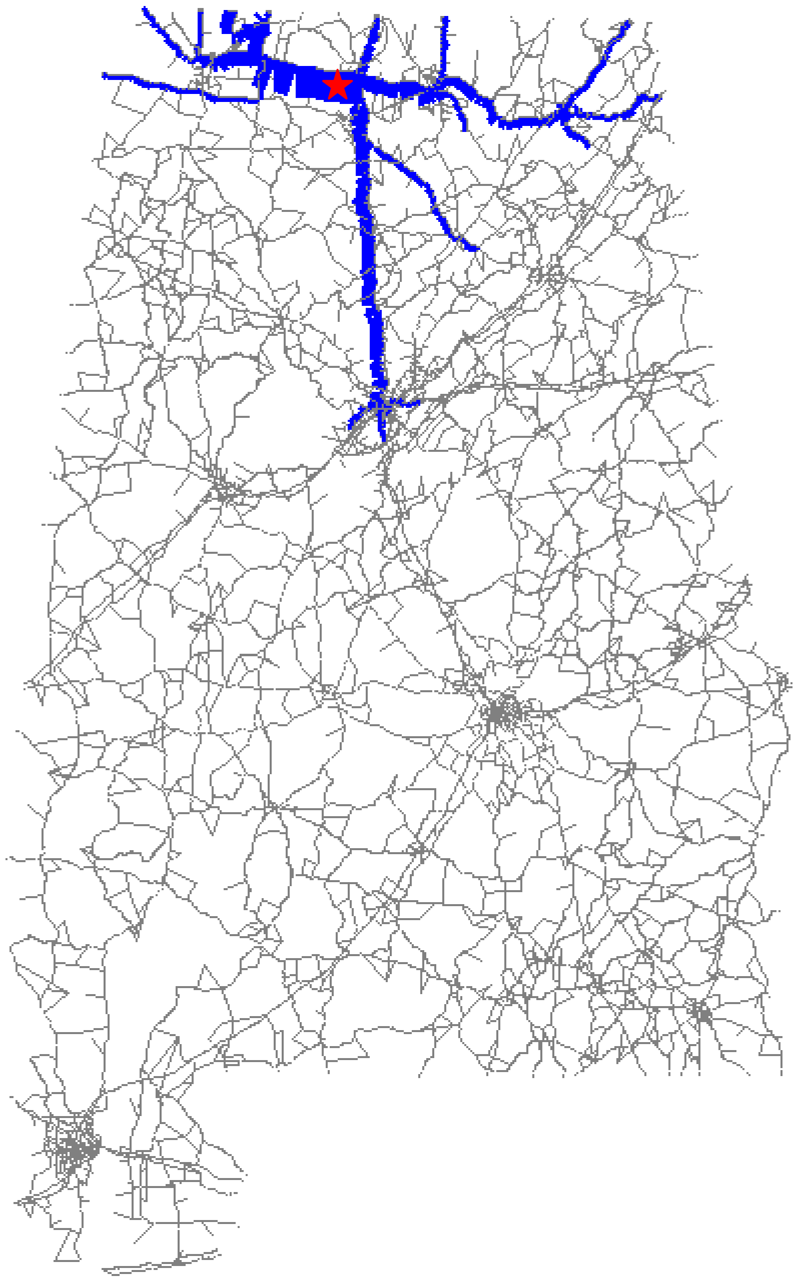
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**2,500** Total Projected 2035 Daily Directional Truck Volume

**300** Projected 2035 Directional Truck Volume for Commodity Noted

Waste and recycled materials shipped across the northernmost portion of Alabama west of I-65 travel westbound on US 72. A significant portion of these shipments travel I-65 to/from Birmingham as well as AL 67.

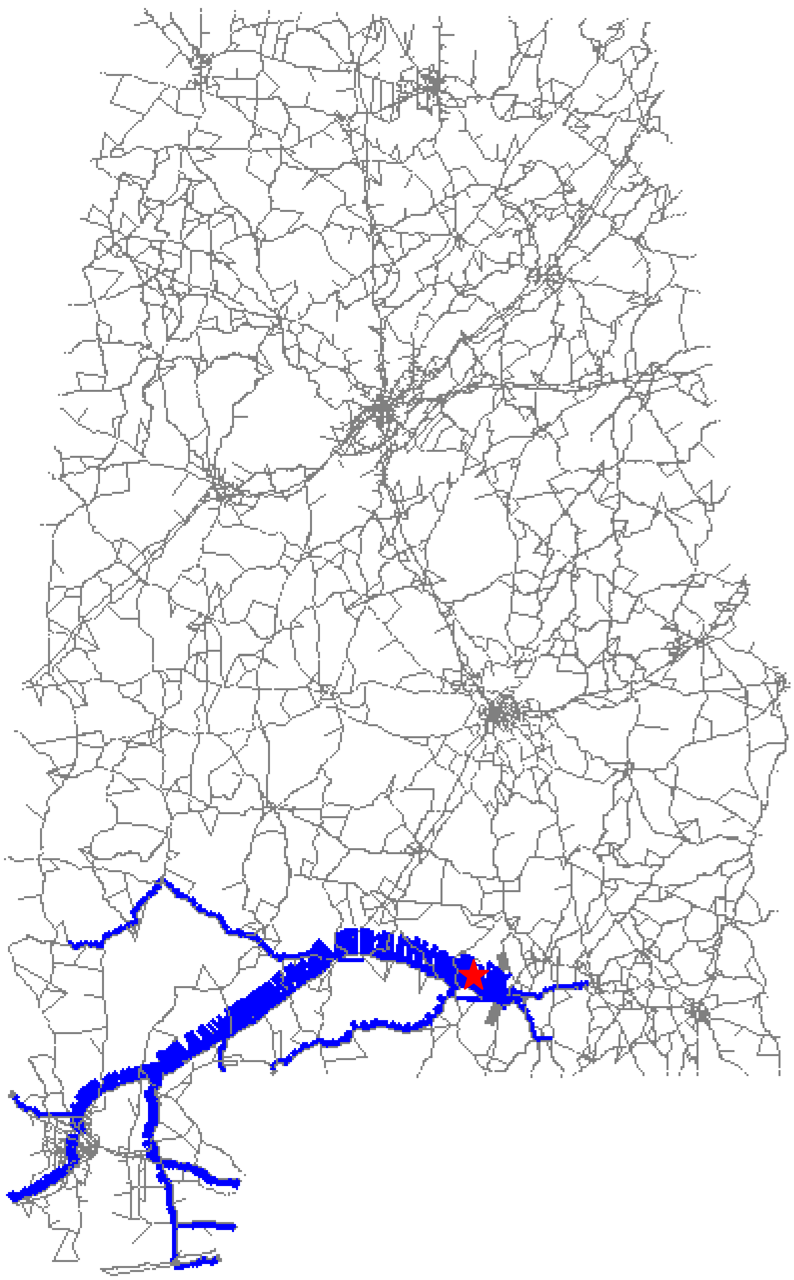
**Figure 11b – Major Commodity Flow, US 72 Westbound, West of I-65 (Waste/Recycled Material)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**2,500** Total Projected 2035 Daily Directional Truck Volume
**300** Projected 2035 Directional Truck Volume for Commodity Noted

Fertilizer shipments represent a substantial part of eastbound freight shipments on US 84 east of I-65. About 22 percent of all eastbound shipments on this corridor are fertilizer. Not surprisingly, US 84 provides access to parts of Alabama where agribusinesses are located.

**Figure 12a – Major Commodity Flow, US 84 Eastbound, East of I-65 (Fertilizer)**



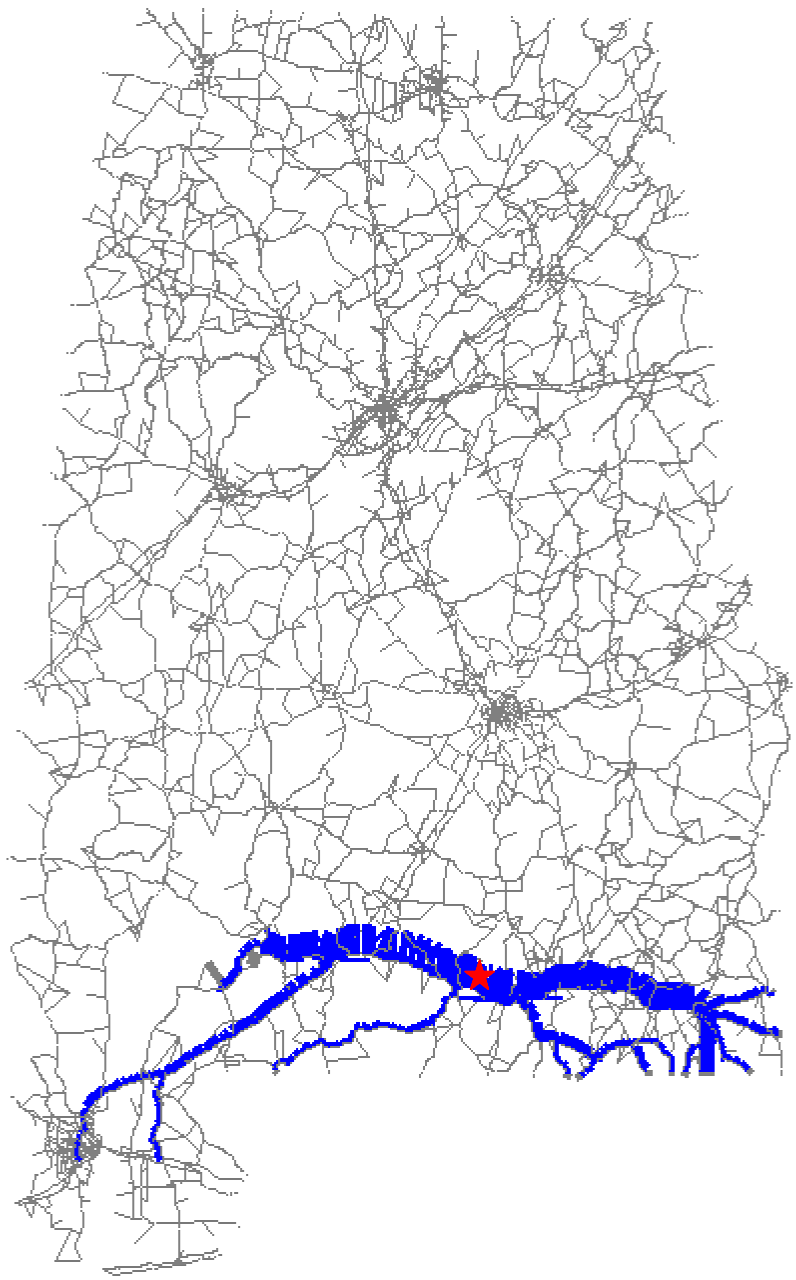
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**2,800** Total Projected 2035 Daily Directional Truck Volume

**600** Projected 2035 Directional Truck Volume for Commodity Noted

Fuel oil represents a large portion, approximately 45 percent, of commodities shipped westbound on US 84 east of I-65. A majority of these fuel oil shipments travel within the southern portion of Alabama.

**Figure 12b – Major Commodity Flow, US 84 Westbound, East of I-65 (Fuel Oil)**



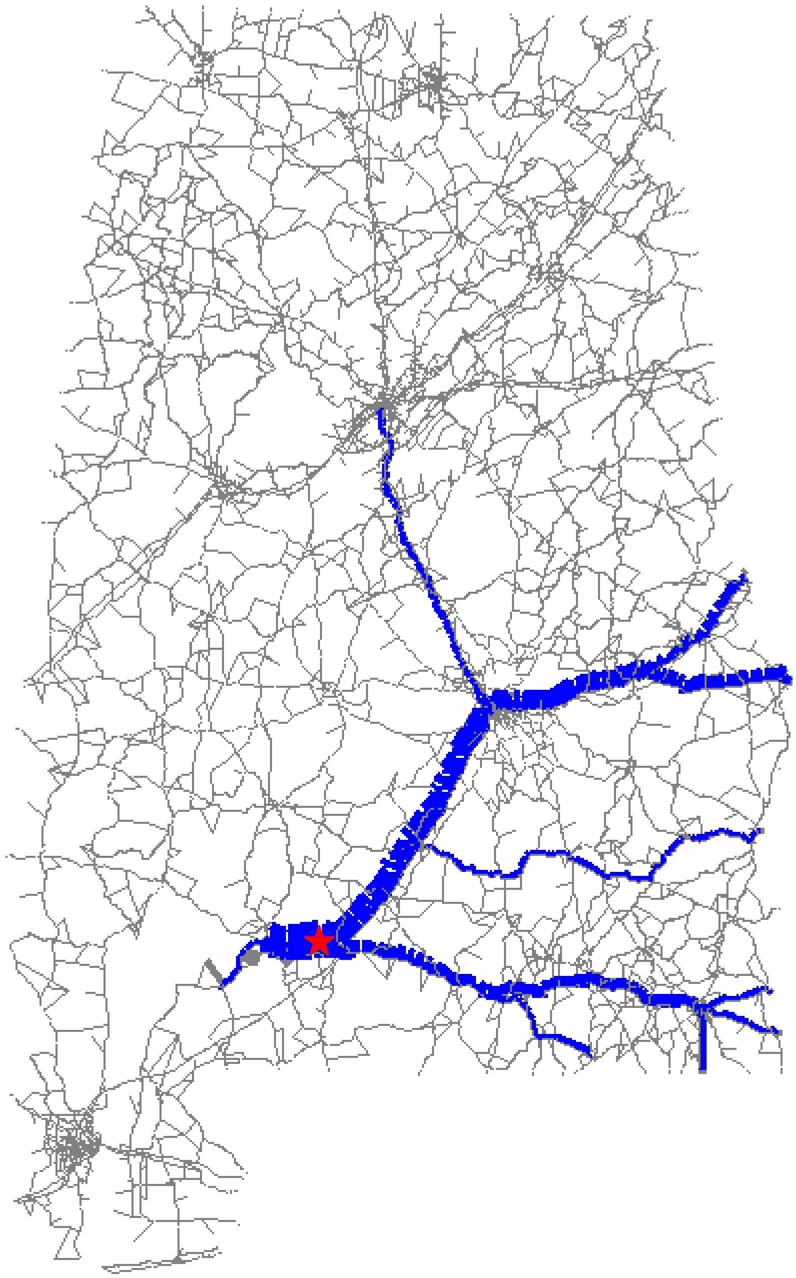
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**2,800** Total Projected 2035 Daily Directional Truck Volume

**300** Projected 2035 Directional Truck Volume for Commodity Noted

Fuel oil is a major commodity shipped eastbound on US 84 west of I-65. Fuel oil moving in this direction on US 84 represents 32 percent of the truck movements.

**Figure 13a – Major Commodity Flow, US 84 Eastbound, West of I-65 (Fuel Oil)**



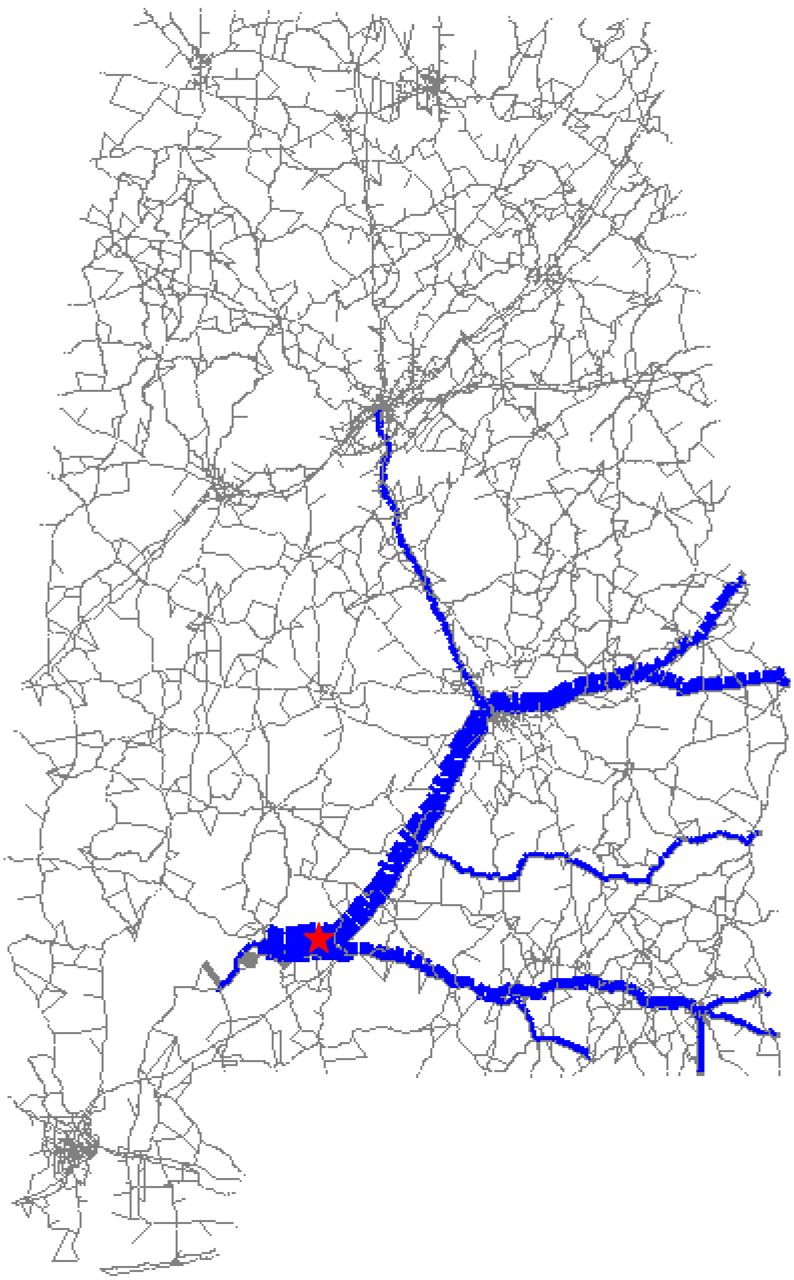
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**500** Total Projected 2035 Daily Directional Truck Volume

**200** Projected 2035 Directional Truck Volume for Commodity Noted

Fuel oil is the predominant freight cargo traveling westward on US 84 from west of I-65. This commodity represents almost 45 percent of truck movements in this direction. In addition to traveling the US 84 corridor itself, many fuel shipments also travel I-65 to/from Montgomery and points north.

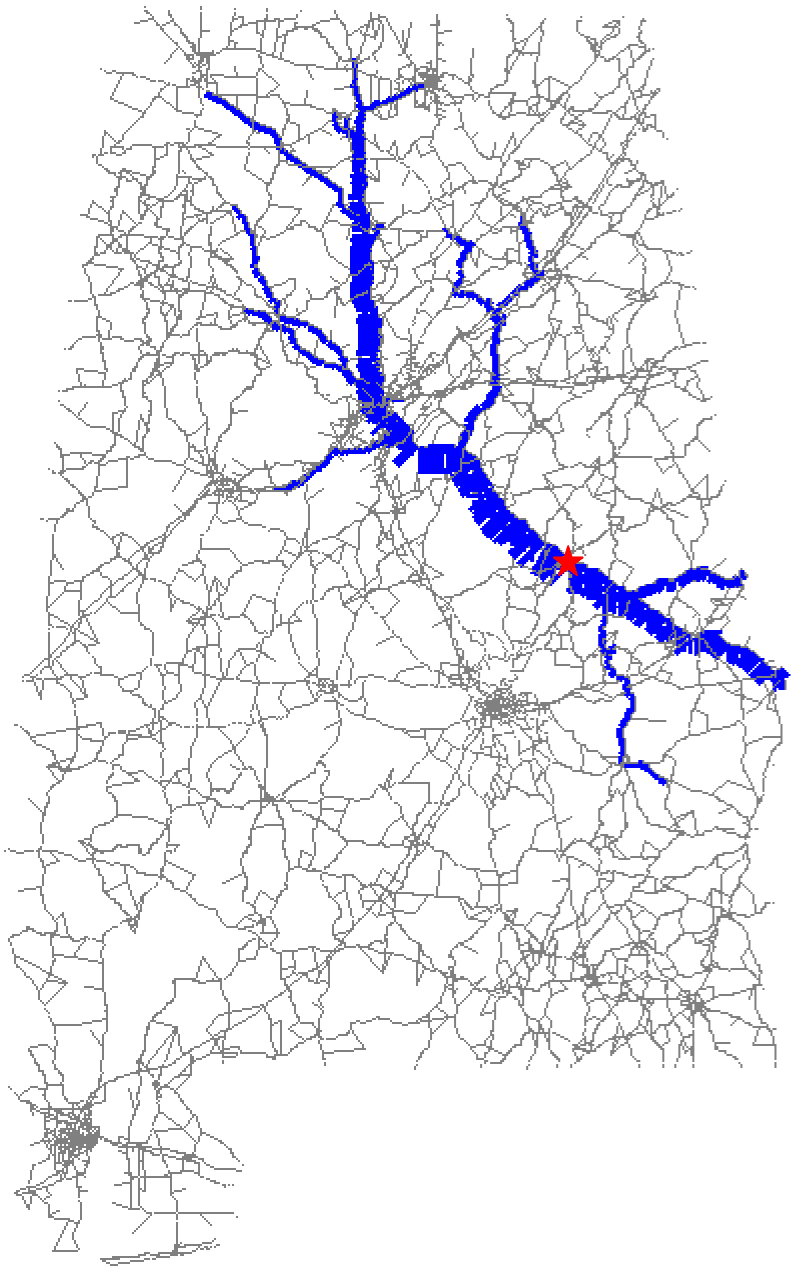
**Figure 13b – Major Commodity Flow, US 84 Westbound, West of I-65 (Fuel Oil)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above
**500** Total Projected 2035 Daily Directional Truck Volume
**200** Projected 2035 Directional Truck Volume for Commodity Noted

A large portion of commodity movements (about 12 percent) traveling north on US 280 are identified as "unknown". After traveling the US 280 corridor between Georgia and Birmingham, most continue north on I-65 and US 231 towards Gadsden, Florence and other points north.

**Figure 14a – Major Commodity Flow, US 280 Northbound, Birmingham to Auburn (Unknown)**



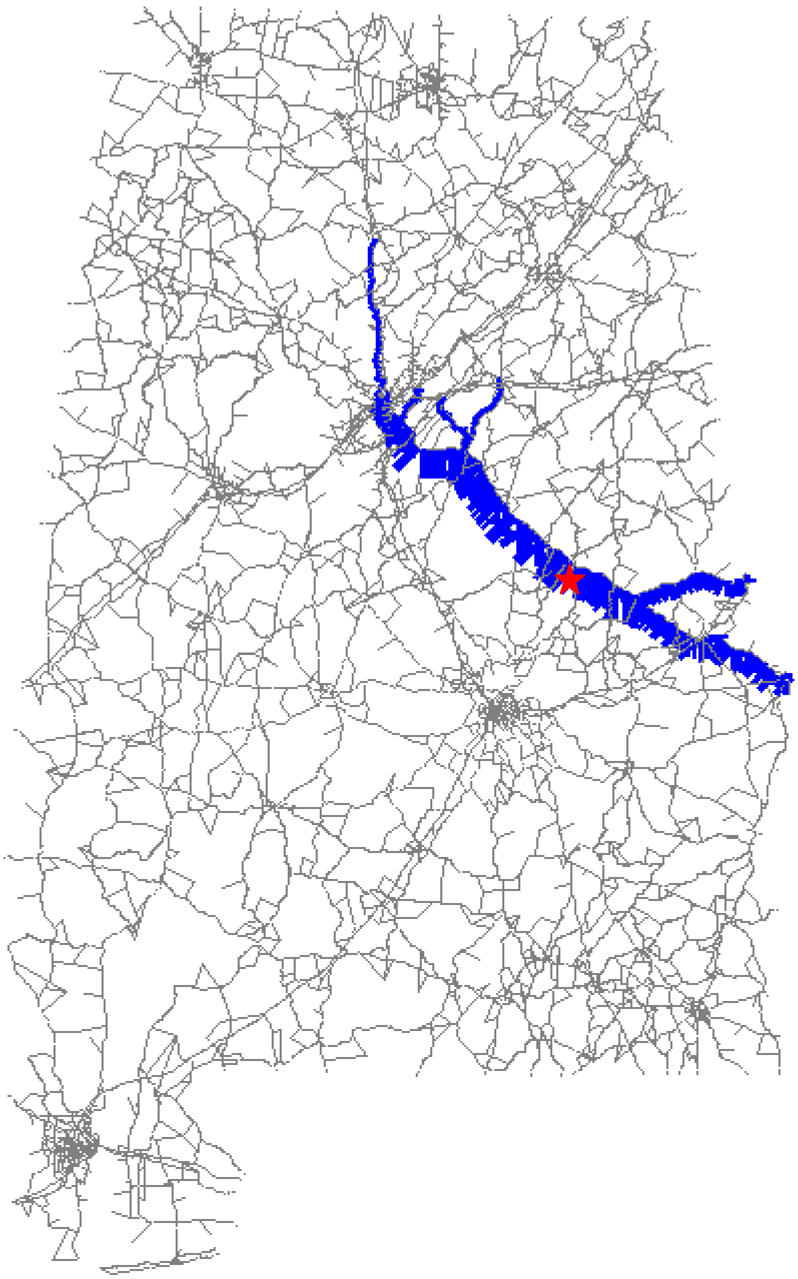
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**3,400** Total Projected 2035 Daily Directional Truck Volume

**400** Projected 2035 Directional Truck Volume for Commodity Noted

US 280 is a major travel corridor in Alabama, and articles of base metals is a major commodity comprising over 12 percent of total movements traveling southbound on this corridor. Trucks carrying articles of base metals travel from Birmingham to Auburn and then onto I-85 and US 280 into Georgia.

**Figure 14b – Major Commodity Flow, US 280 Southbound, Birmingham to Auburn (Articles of Base Metals)**



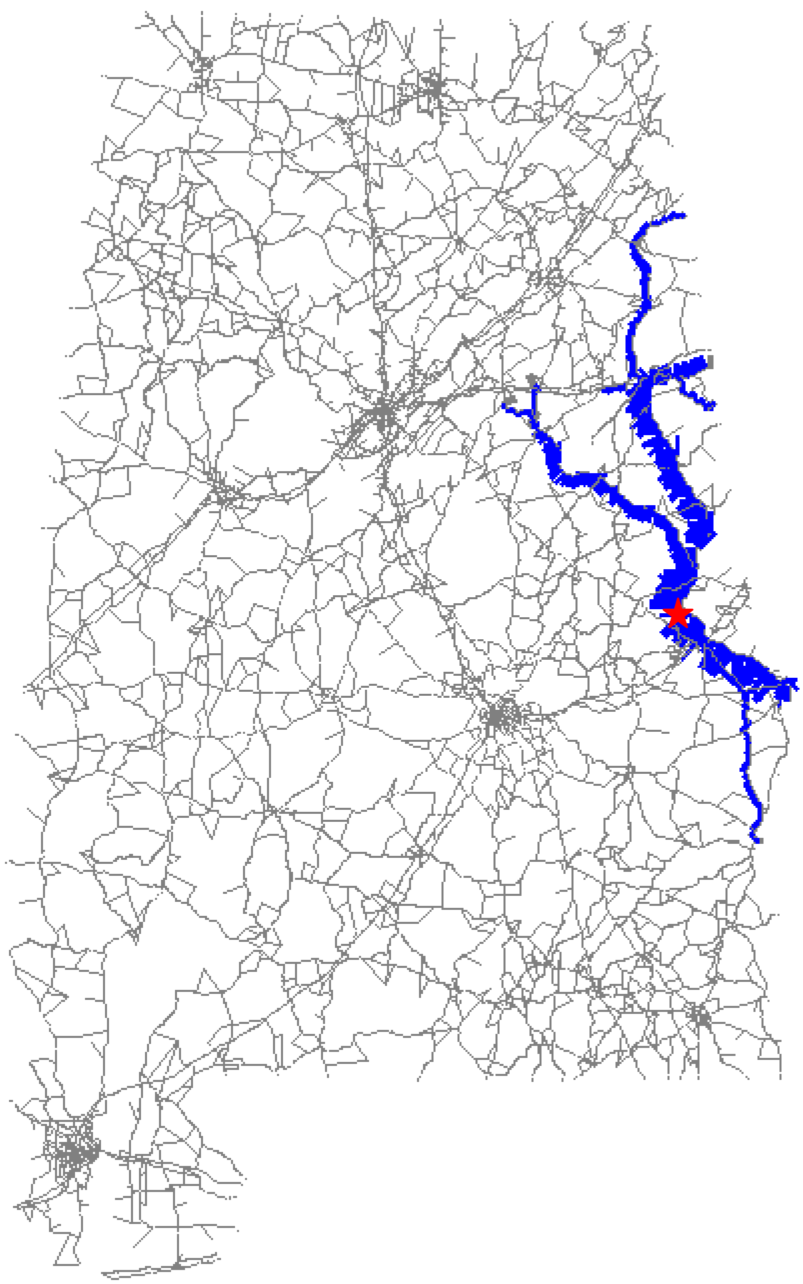
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**3,400** Total Projected 2035 Daily Directional Truck Volume

**400** Projected 2035 Directional Truck Volume for Commodity Noted

Natural sands represent less than 14 percent of truck movements on US 431 northbound. Trucks use US 431 from Russell County and the Columbus-Phenix City area up to Anniston and beyond, connecting with AL 77 up to Clay County and AL 9 north of Anniston.

**Figure 15a – Major Commodity Flow, US 431 Northbound, North of Auburn (Natural Sands)**



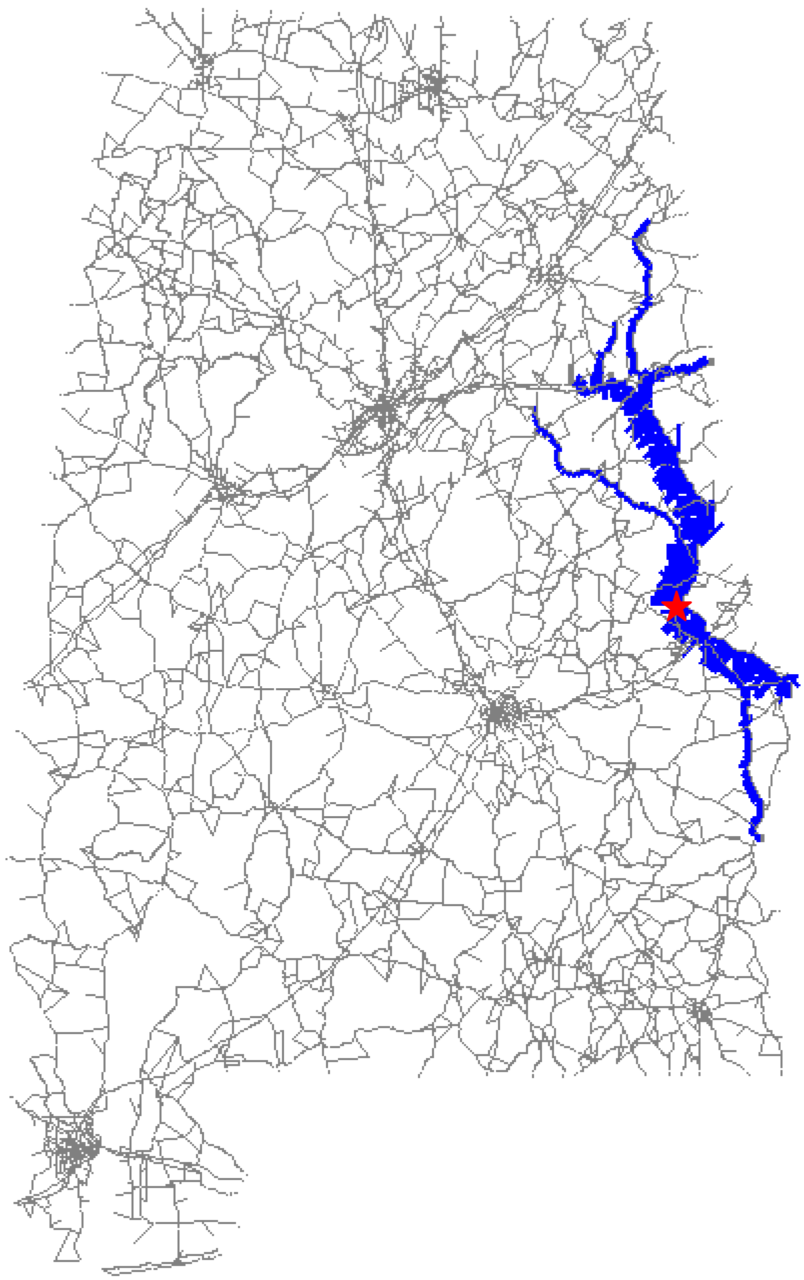
★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**3,000** Total Projected 2035 Daily Directional Truck Volume

**400** Projected 2035 Directional Truck Volume for Commodity Noted

US 431 southbound truck movements are largely base metals (over 14 percent). Movements span a distance from Anniston through Auburn and south to Russell County and the Columbus-Phenix City area.

**Figure 15b – Major Commodity Flow, US 431 Southbound, North of Auburn (Base Metals)**



★ Location for Commodity and Direction Analysis as Noted in Figure Title Above

**3,000** Total Projected 2035 Daily Directional Truck Volume

**400** Projected 2035 Directional Truck Volume for Commodity Noted

Key findings from the detailed analysis are intended to focus on the question of shifting freight to alternatives. For example, if freight were to move to non-peak hours, an examination of the numbers indicates the possibility to essentially move about 10 percent to off-peak or times of less congestion (assuming 10 percent of the freight is operating in the peak hour). When combined with the 2.5 truck to passenger car equivalency factor, this movement would allow for a significant reduction in peak hour traffic. Using a basic example, if a facility experienced 8,000 trucks per day, the shift would equal 800 in the peak hour, which corresponds to freight occupying the same space as 2,000 passenger cars in the peak hour. If these trucks could be moved to an off-peak hour, it would free up a lane of travel on this facility during the peak hour. It is understood that ALDOT does not have the ability to mandate when trucks travel the network; however, the private sector's possible routing of vehicles to optimize deliveries in combination with potential incentives offered by the State might provide some substantial benefits.

Another alternative example would be the routing onto parallel facilities. If a portion of the volume moved to a parallel but close route, the total number of vehicles moved in the corridor could be handled without any single facility being overloaded. One example examines the relationship between I-65 and US 31. Combining the two roadways into a single corridor might provide the needed capacity for all vehicles moving in this location instead of adding capacity to a single facility while a parallel facility has unused capacity. While moving people from one roadway to another is again outside of ALDOT control, the potential improvements offered by the parallel, less used facility might equate the travel times, thus evening out the traffic load and at a significantly reduced cost to the state.

A final consideration involves freight mode choice. It should be noted that this analysis is based on data manipulated in previous study tasks (refer to Interim Reports 1 and 2) and is not intended to encompass an economic analysis associated with the movement of freight. While ALDOT cannot influence the mode of travel for a particular commodity, the ability to show the likely origin/destination locations for freight on particular roadways could be used by the private sector or public-private partnerships to consider improvements and/or establish alternate methods of transport for the major commodities identified.

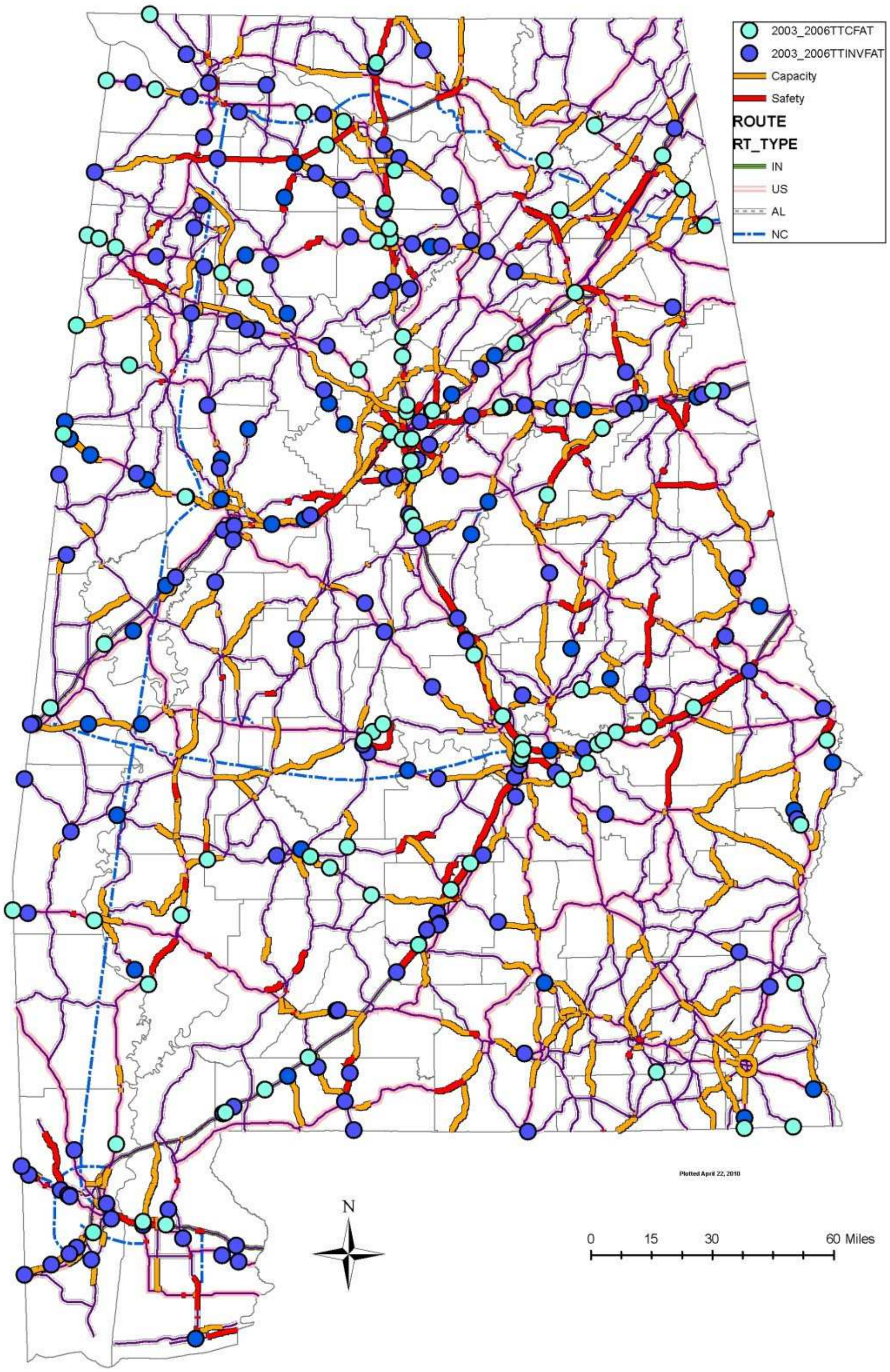
## 3. Comparison of Deficient Locations with ALDOT CPMS

Analysis performed under previous study tasks determined the locations likely to be most impacted by freight growth in the year 2035 (refer to Interim Report 2). Building on that analysis, a comparison was undertaken between those locations likely to experience freight issues in year 2035 and locations where ALDOT has already identified a project in its CPMS (Comprehensive Project Management System). The comparison also highlights those locations anticipated to have freight issues but for which a potential project has yet to be identified.

The metrics used in the analysis of potentially deficient locations include truck accidents locations (focusing on those locations where a fatality occurred), volume to capacity (VC) ratio (where severe congestion is likely), and number of trucks per lane (where truck volume is intense). Interim Report 2 provides a detailed explanation of the methodologies and thresholds utilized to determine high VC and trucks per lane. In summary, for all interstate system roadways, the VC ratios and trucks per lane were rank-ordered and those reflecting the top 200 segments, respectively, were selected. For the non-interstate system, the VC ratio that represented the lowest value for the 200 segments on the interstate was used as the lower threshold. That percentage of the non-interstate system was then used to identify the top locations for trucks per lane on the non-interstate system.

When evaluating which roadway locations are most in need of freight related improvements, it is important the methodology consider metrics beyond only congestion and truck intensity. Another important consideration is the locations of truck involved accidents. Figures 16, 17 and 18 on the following pages present a comparison of truck accident locations against identified CPMS projects. Figure 16 identifies the locations of all truck involved or caused accidents resulting in a fatality for years 2003-2006 as well as all capacity or safety improvement projects currently identified in the CPMS for 2003-2034. There were a total of 431 accidents, including 329 accidents involving a tractor trailer that resulted in a fatality and 102 accidents deemed to be caused by a tractor trailer and resulting in a fatality. Figure 17 highlights the truck involved/caused fatal accidents located within one mile of a CPMS safety or capacity project. These include 181 truck involved fatality accidents and 63 truck caused fatalities, or 244 total. In contrast, Figure 18 identifies the locations of truck involved/caused fatal accidents which are not within one mile of a CPMS project. The truck involved fatal accidents outside the 1 mile threshold total 187, including 148 truck involved fatality accidents and 39 truck caused fatality accidents. By expanding the examination to include accident locations, VC ratio and trucks per lane, a more robust assessment of locations for which there is a potential need but no identified project can be undertaken.

**Figure 16 – Tractor Trailer Fatal Accidents and Safety and Capacity Projects 2003-2034**

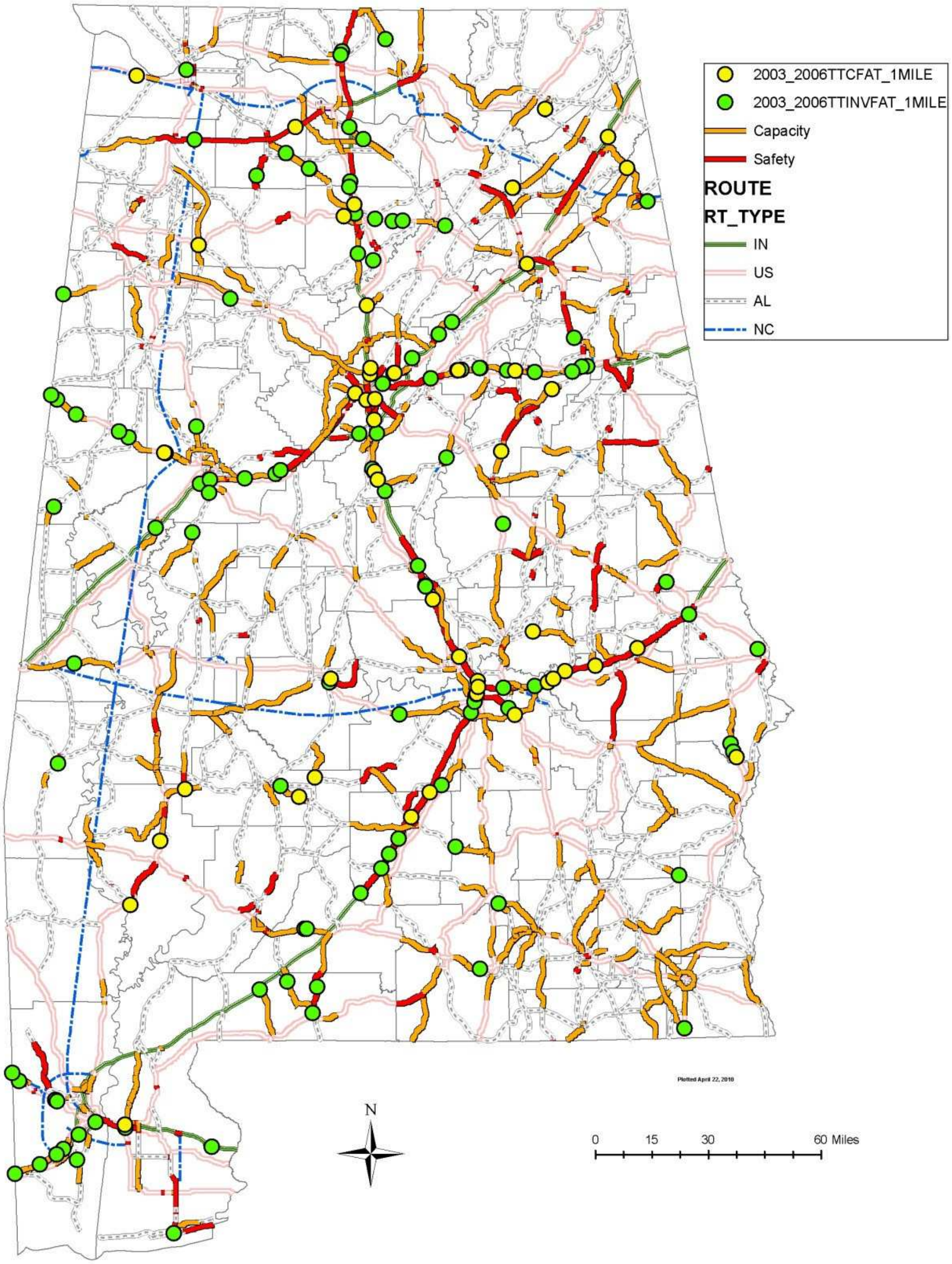



**NOTES ON LEGEND:**

2003_2006TTCFAT = Accident ***deemed to be caused by*** a tractor trailer and resulting in a fatality (2003-2006)

2003_2006TTINVFAT = Accident ***involving*** a tractor trailer and resulting in a fatality (2003-2006)

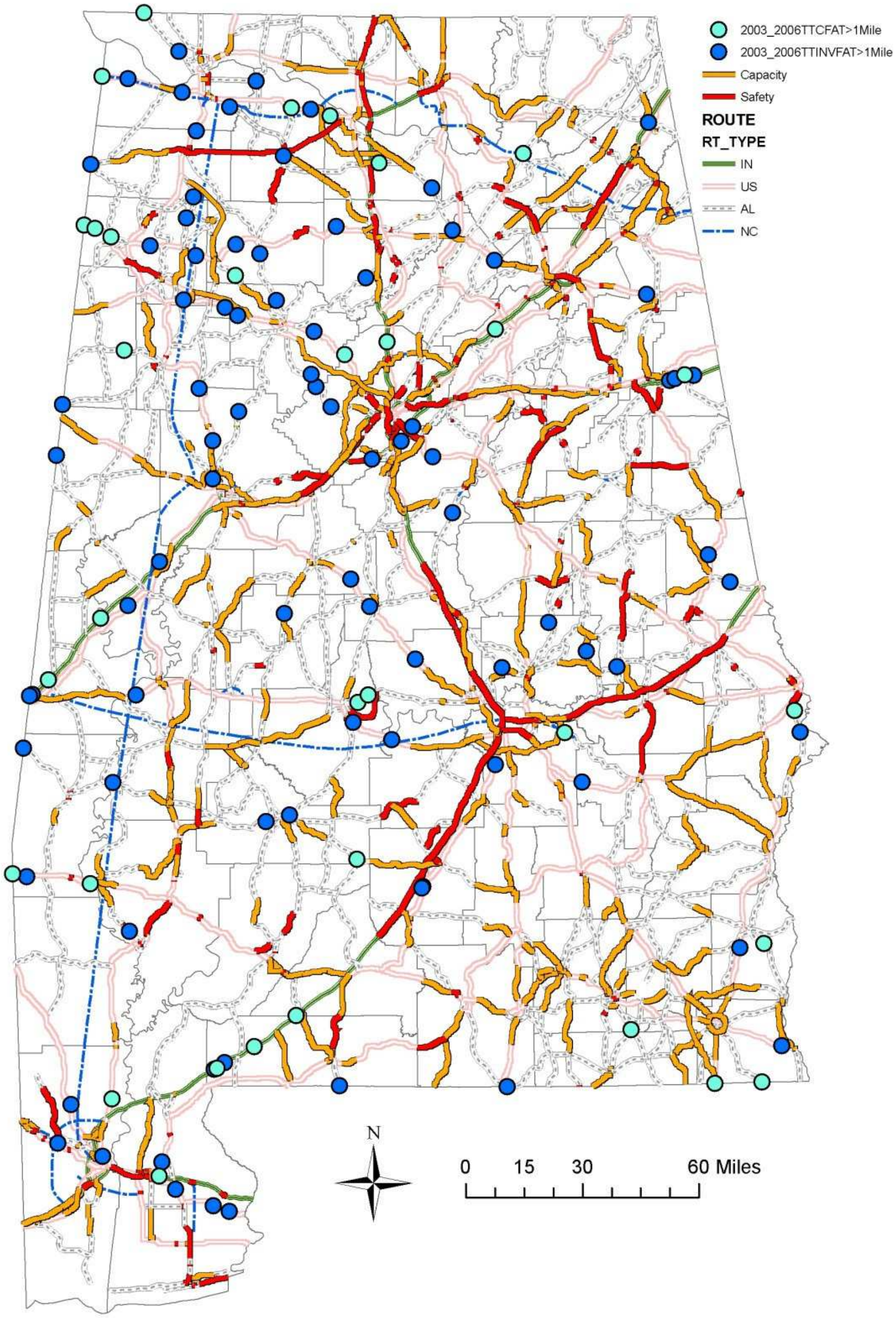
**Figure 17 – Tractor Trailer Fatal Accidents Within 1 Mile of Safety and Capacity Projects 2003-2034**




**NOTES ON LEGEND:**

- 2003_2006TTCFAT_1MILE = Accident ***deemed to be caused by*** a tractor trailer and resulting in a fatality (2003-2006) that occurred within one mile of a CPMS Safety or Capacity project (2003-2034)
- 2003_2006TTINVFAT_1MILE = Accident ***involving*** a tractor trailer and resulting in a fatality (2003-2006) that occurred within one mile of a CPMS Safety or Capacity project (2003-2034)

**Figure 18 – Tractor Trailer Fatal Accidents Not Within 1 Mile of Safety and Capacity Projects 2003-2034**




**NOTES ON LEGEND:**

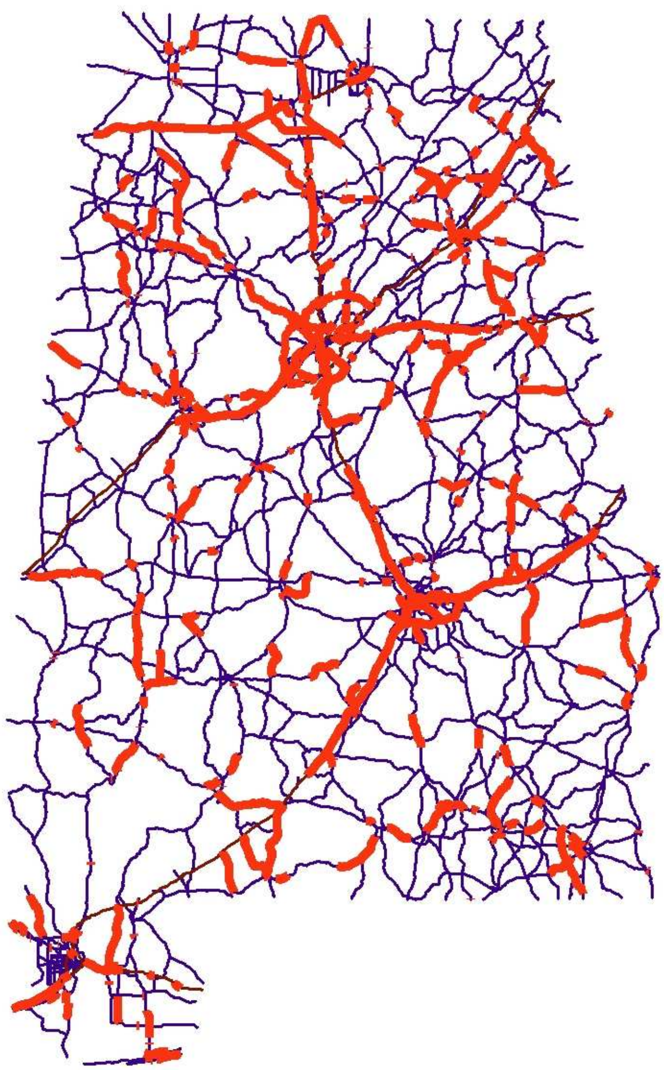
2003_2006TTCFAT>1Mile= Accident ***deemed to be caused by*** a tractor trailer and resulting in a fatality (2003-2006) that occurred at a distance greater than one mile from a CPMS Safety or Capacity project (2003-2034)

2003_2006TTINVFAT>1Mile= Accident ***involving*** a tractor trailer and resulting in a fatality (2003-2006) that occurred at a distance greater than one mile from a CPMS Safety or Capacity project (2003-2034)

Figures 19 through 28 examine projects currently identified in ALDOT's CPMS (Comprehensive Project Management System) database in relation to locations where truck VC ratio and trucks per lane would potentially deserve further analysis. The locations of high VC ratio or high trucks per lane were based on the definitions used in Task 2 (refer to Interim Report #2). First, locations in the CPMS that correspond to locations identified as potential problem areas for trucks were identified, and the total number of CPMS projects with potential benefit to trucks was determined. A second analysis identified locations with a potential truck issue but where a project is not currently identified in the CPMS.

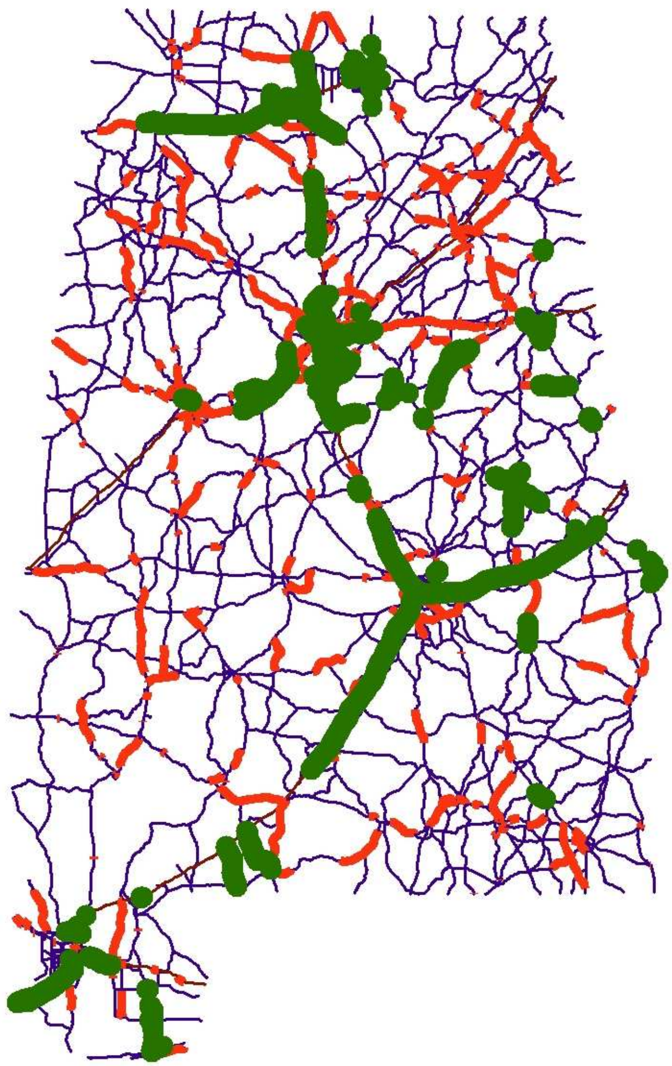
ALDOT's CPMS database identifies 3,432 centerline miles of projects, as shown in the following figure.

**Figure 19 – Locations of Projects in the CPMS Database**



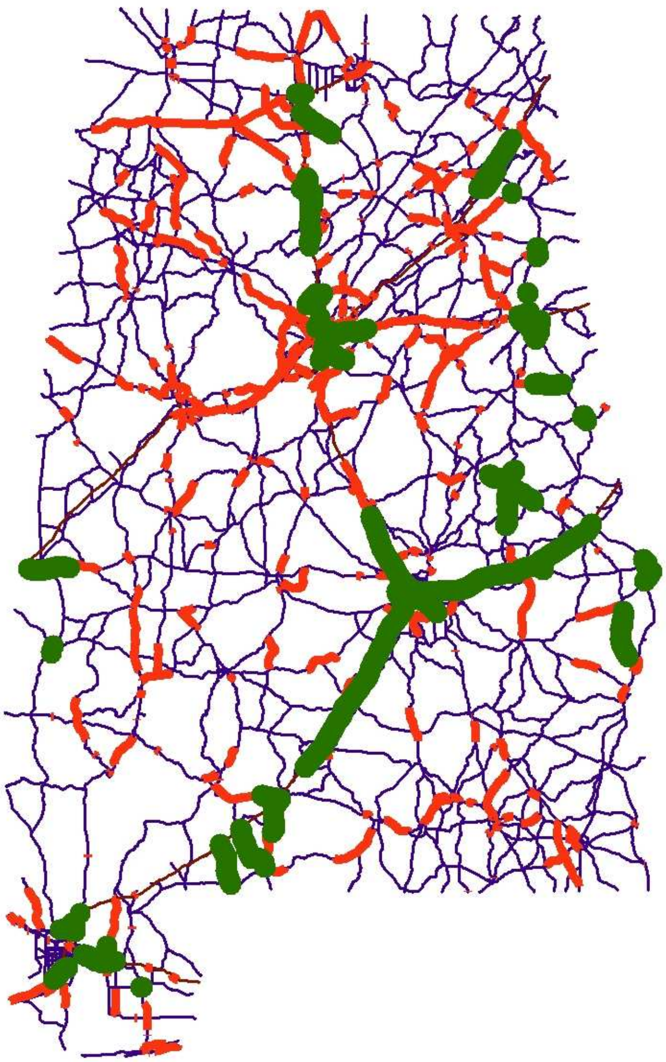
Of the 3,432 centerline miles of roadway with projects identified in the CPMS, 829 centerline miles correspond to locations where the 2035 travel model indicates a high VC ratio, or congested roadway locations. Projects are already programmed at these locations to help mitigate congestion.

**Figure 20 – Locations of High VC and in the CPMS Database**



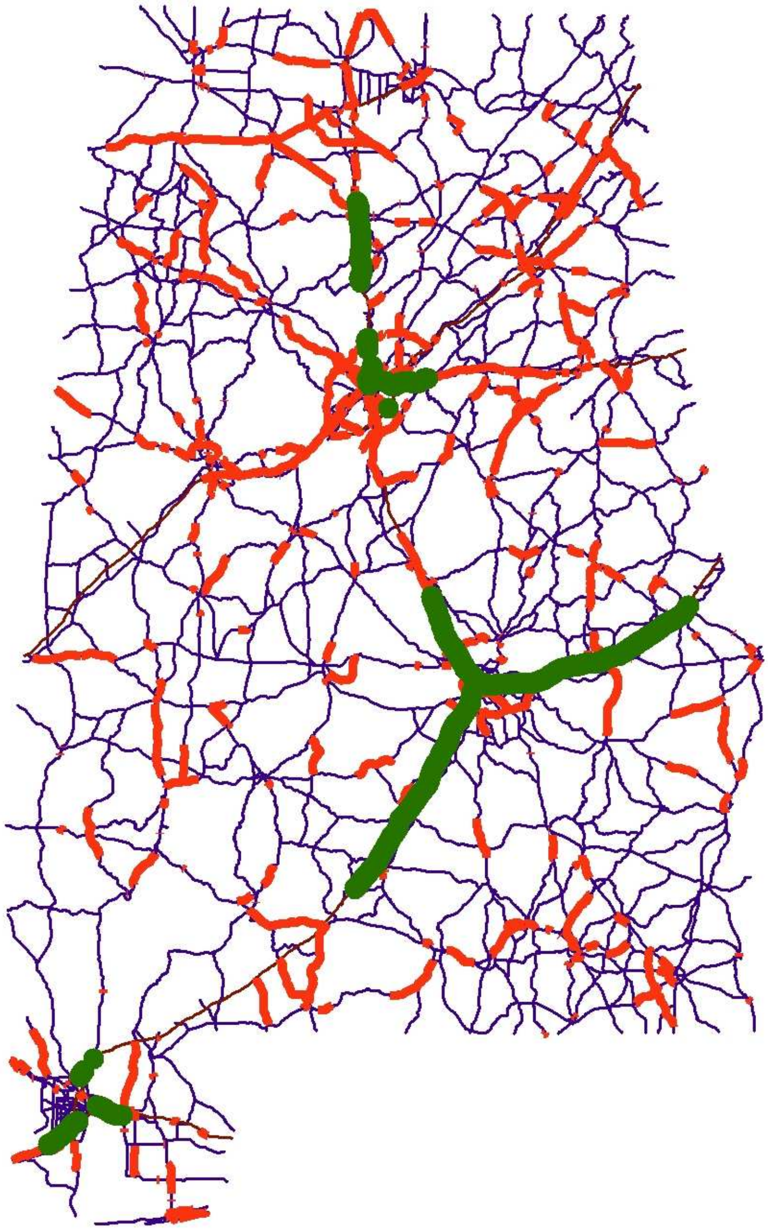
Of the 3,432 centerline miles of roadway with projects identified in the CPMS, 654 centerline miles correspond to locations where the 2035 travel model indicates high trucks per lane, or roadway locations that serve many trucks. Projects are already programmed at these locations to help mitigate the impacts of high truck traffic.

**Figure 21 – Locations of High Trucks per Lane and in the CPMS Database**



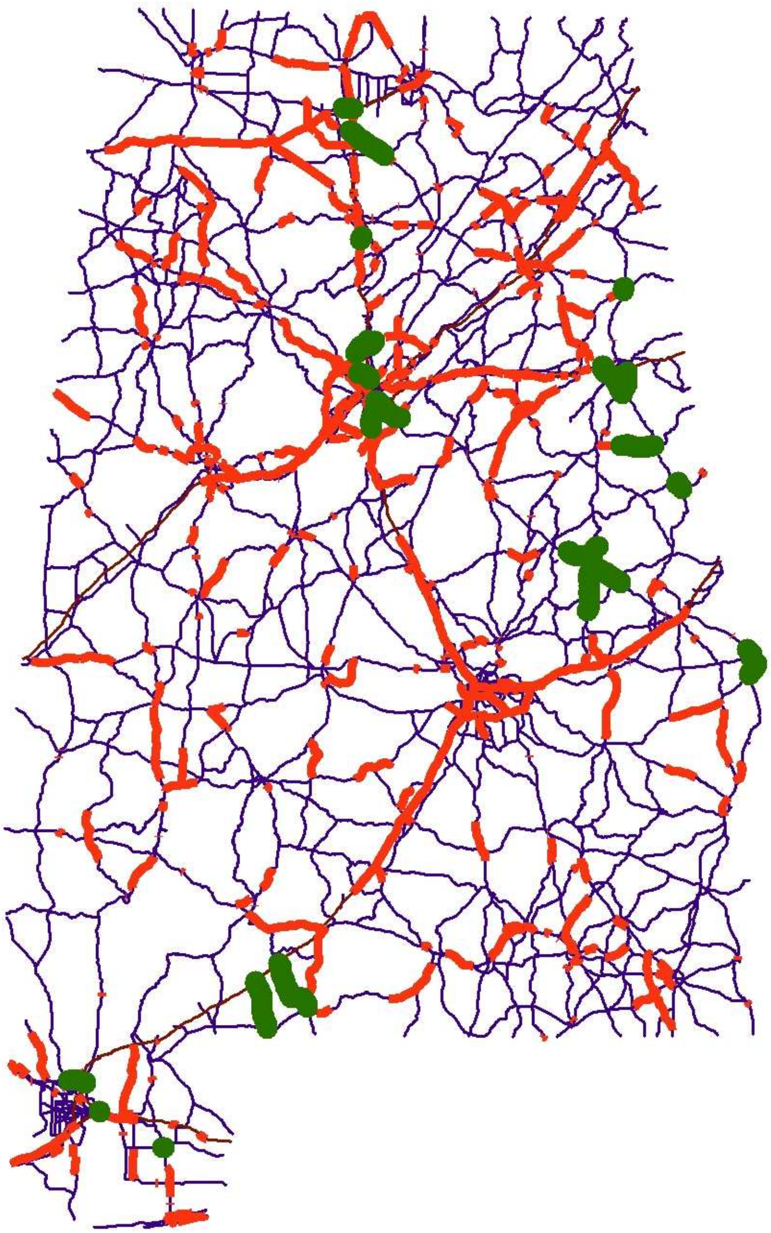
Of the 3,432 centerline miles of roadway with projects identified in the CPMS, 306 centerline miles correspond to interstate locations where the 2035 travel model indicates both high VC ratio and high trucks per lane.

**Figure 22 – Locations of High VC and High Trucks per Lane and in the CPMS Database (Interstate)**



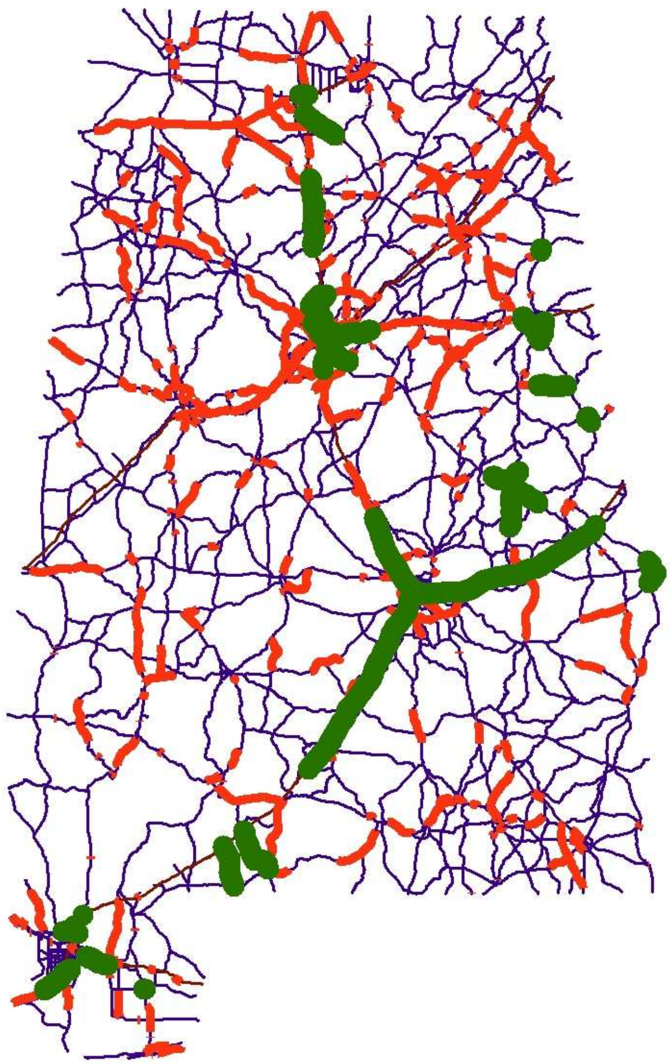
Of the 3,432 centerline miles of roadway with projects identified in the CPMS, 195 centerline miles correspond to non-interstate locations where the 2035 travel model indicates both high VC ratio and high trucks per lane.

**Figure 23 – Locations of High VC and High Trucks per Lane and in the CPMS Database (Non-Interstate)**



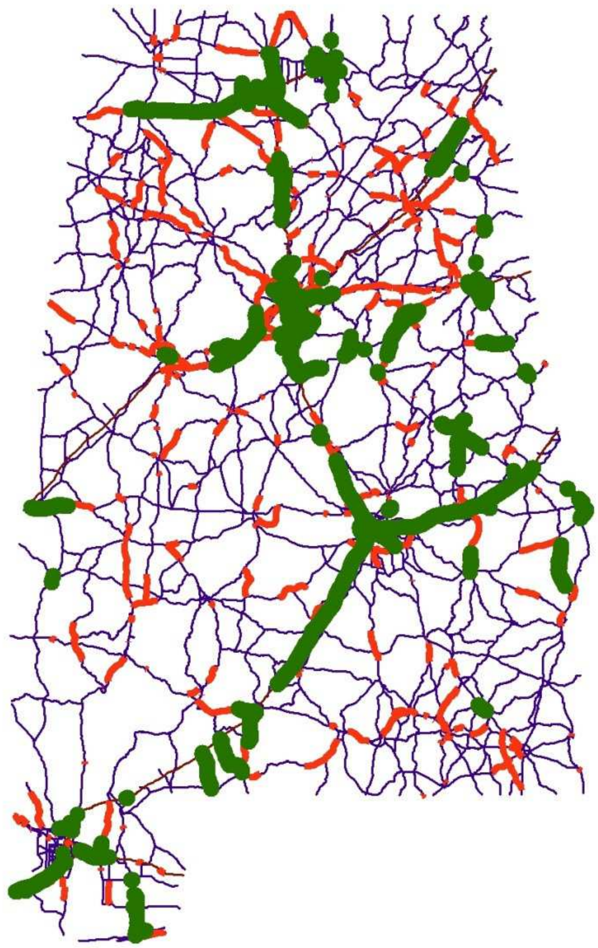
Of the 3,432 centerline miles of roadway with projects identified in the CPMS, 501 centerline miles correspond to locations where the 2035 travel model indicates both high VC ratio and high trucks per lane. These key roadway locations are where programmed projects will best be able to alleviate freight impacts on the highway system.

**Figure 24 – Locations of High VC and High Trucks per Lane and in the CPMS Database (Combined)**



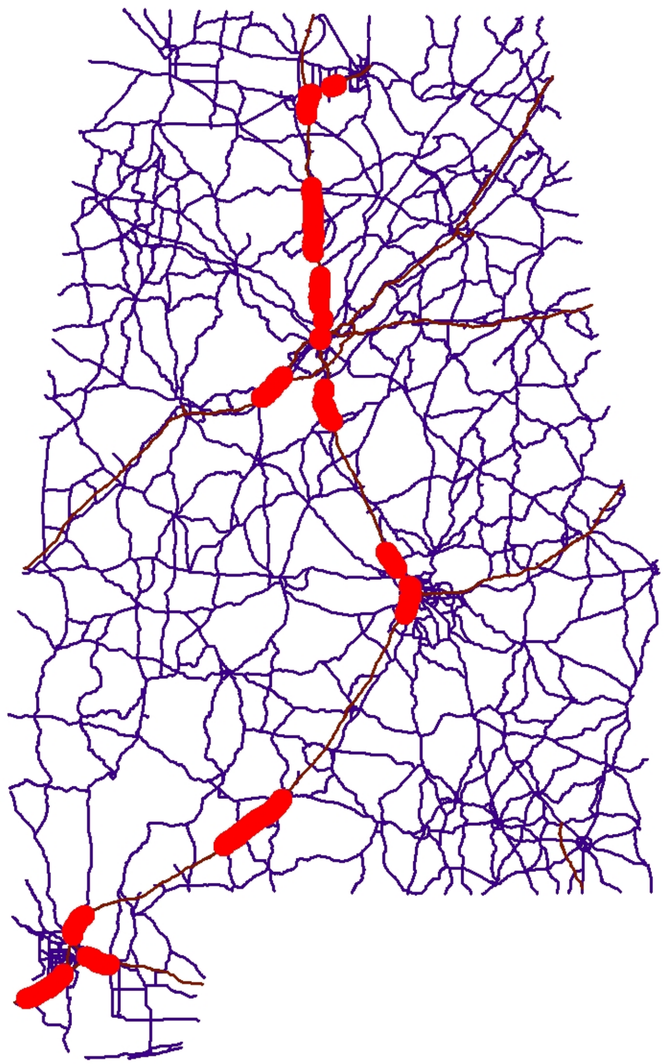
The following figure shows the locations that have been identified as having either a high VC ratio or a high number of trucks per lane and which have a project identified in the CPMS.

**Figure 25 – Locations of High VC or High Trucks per Lane and in the CPMS Database**



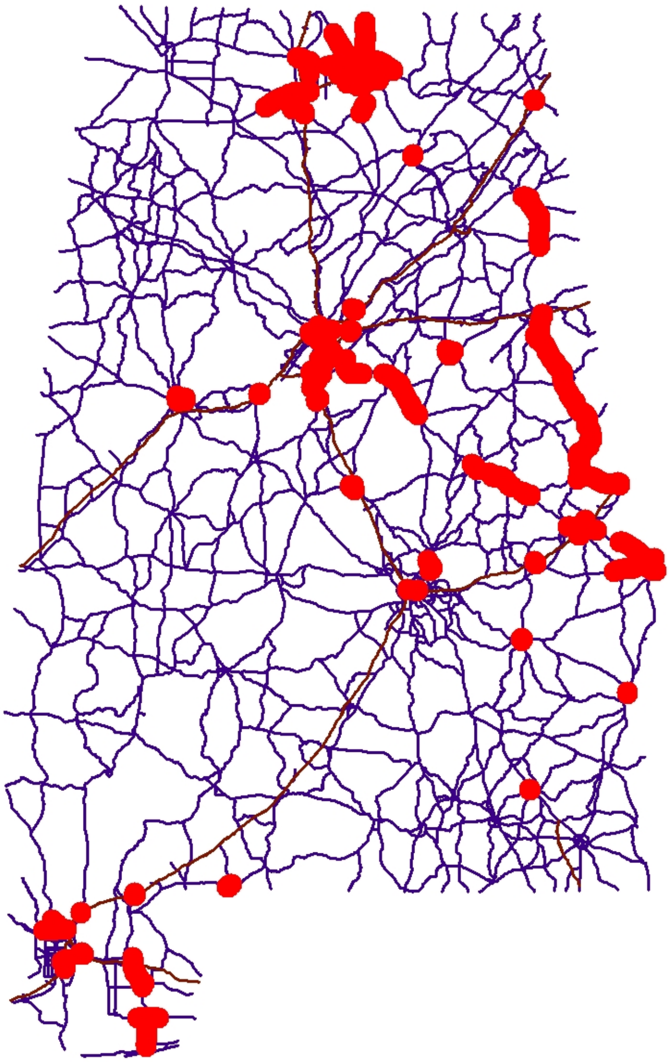
Examining the data from the opposite direction yields locations where the 2035 travel model indicates a high VC ratio and/or high trucks per lane but which are not currently identified in the CPMS. There were 171 centerline miles of interstate segments that have a high VC ratio and high trucks per lane but which are not within locations with projects currently in the CPMS. Because these locations are expected to become congested and have a large impact on freight, they deserve attention to ensure they do not become a limitation to growth.

**Figure 26 – Locations of High VC and High Trucks per Lane and Not in the CPMS Database (Interstate)**



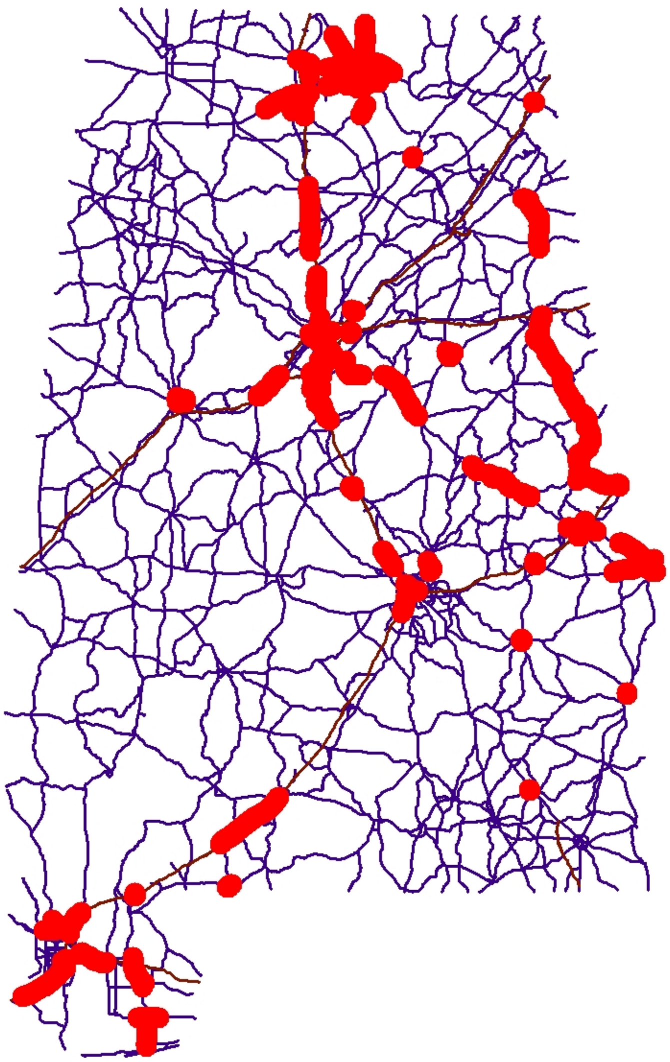
There were 693 centerline miles of non-interstate segments that have a high VC ratio and high trucks per lane but which are not within locations with projects currently in the CPMS.

**Figure 27 – Locations of High VC and High Trucks per Lane and Not in the CPMS Database (Non-Interstate)**



The locations of the total 864 centerline miles of roadway that should be watched for truck congestion and are not addressed by projects currently in the CPMS are shown below.

**Figure 28 – Locations of High VC and High Trucks per Lane and Not in the CPMS Database (Combined)**



As the previous analysis demonstrated, many locations of potential need have already been identified by ALDOT for action. Nevertheless, previously unidentified locations of potential concern remain. Those include: I-10 and I-65 near Mobile; I-65 around Birmingham; the I-565 and US 72 area west of Huntsville; US 280 between Auburn and Birmingham; and US 431 from I-85 to I-20 and north to the Fort Payne area. Their identification will be beneficial to the Department as it continues to evaluate conditions and develop project lists over the coming years.

Consideration should also be given to how new strategies might assist in addressing freight issues. For example, some trouble locations could potentially be corrected through the development of "freight corridors." By examining a collection of parallel and nearby roadways to determine what freight movement constraints exist, improvement efforts could be focused on the broader subsystem of roadways as a means of alleviating congestion. Such an approach might be appropriate for the I-65 corridor north of Birmingham, where a freight movement issue is apparent yet continued widening of I-65 might not be feasible. An alternative would be to include US 31 and I-65 together and consider potential improvements to US 31 as a means to assist I-65.

It is important to note that the analysis model utilized in this study should be updated on a regular basis. Ongoing changes in potential projects combined with a wide variety of economic, political and other factors outside ALDOT control will guarantee that conditions do not remain static.

# 4. Summary of Key Findings and Next Steps

## 4.1 Summary of Key Findings

This report has reviewed freight movements and commodities that travel Alabama's interstates and major freight routes. Although there is a diversity of freight on all of the state's highway facilities, it is apparent that certain commodities use specific facilities more often. A review of specific commodities and routes taken is helpful to understanding deficiencies along a route. Similarly, using criteria to determine congestion, safety and truck concentrations on the Alabama highway network assists in identifying deficient locations in the freight highway network. Understanding the total character of freight movements along a corridor—its prevalent commodities and potential safety and operational constraints—is helpful in refining possible recommendations and improvements for increasing system efficiency and safety.

ALDOT has a proactive program of projects in its CPMS, with projects identified for locations where freight system deficiencies were found. Freight is a primary "customer" of the highway network and the State's program to improve safety and intermodal connections is reflected in the program of projects that address many of the freight transportation needs. In locations where rail, inland river ports and ports are located in proximity to highways, there is additional opportunity to consider highway improvements to facilitate intermodal freight options and/or mode switch.

## 4.2 Next Steps

The third and final Stakeholder Advisory Group (SAG) meeting, scheduled for mid June 2010, is the next study deliverable. Findings from Interim Report 3 will be presented, along with preliminary study recommendations. The key findings documented in Interim Reports 1, 2 and 3 will be incorporated into the Freight Study Final Report. Included within the Final Report will be a brief Action Plan, which will provide recommendations and consider ways that ALDOT can continue to integrate freight into the programming and prioritization of projects. The study findings are intended to provide information to decision makers at ALDOT, other agencies and the private sector as they continue looking for ways to accommodate the ever increasing volume of freight on the state's highways.

## APPENDIX – ALABAMA COMPARATIVE COMMODITY FLOWS

Appendix A provides a comparison of commodity flows for 43 major commodities along key corridors across Alabama in both chart and tabular form. As the charts and matrix illustrate, some roadways carry large amounts of a few main commodities while others carry a more even distribution of all commodities. This is an important consideration for freight movement with regard to distance traveled, congestion and alternate modes of transport. For roadways carrying a high percentage of a single commodity over longer distances, decreases in truck congestion at select locations could potentially be experienced through the transfer of that freight to an alternate mode of transport.

**Chart A-1 – Comparative Commodity Flows, I-10, Near Florida**

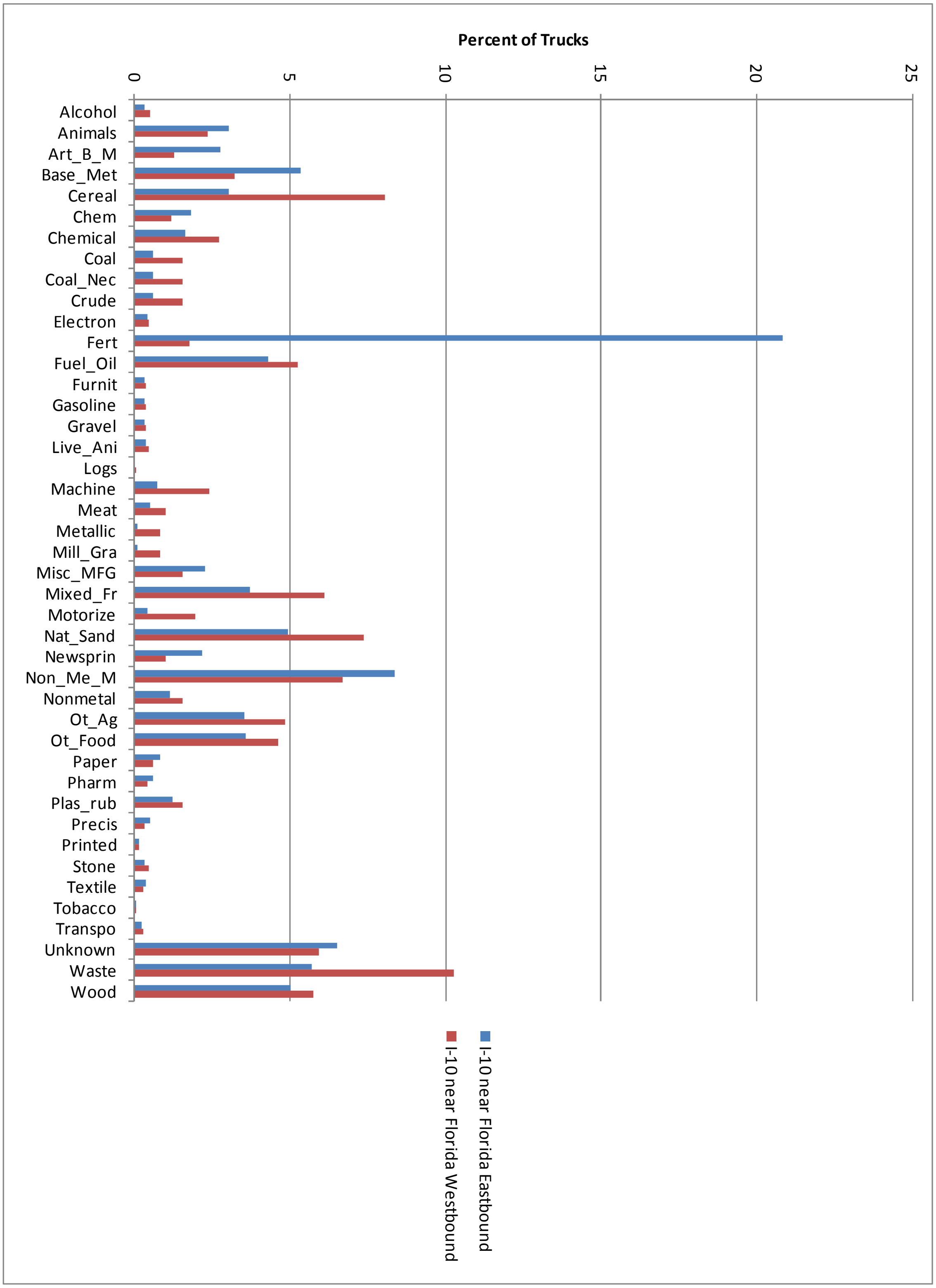


**Chart A-2 – Comparative Commodity Flows, I-10, Near Mississippi**

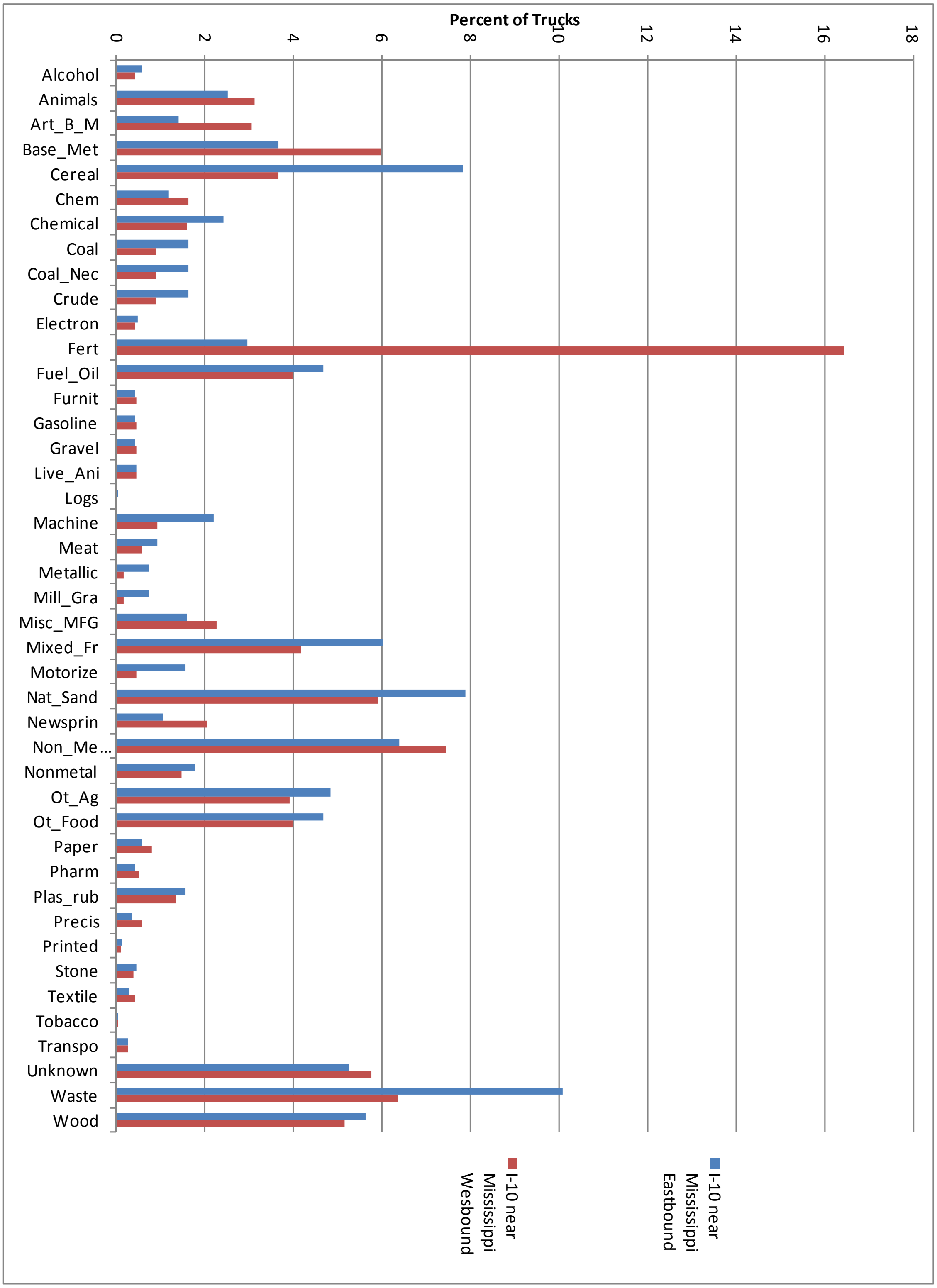


**Chart A-3 – Comparative Commodity Flows, I-20/59, Alabama-Mississippi Border**

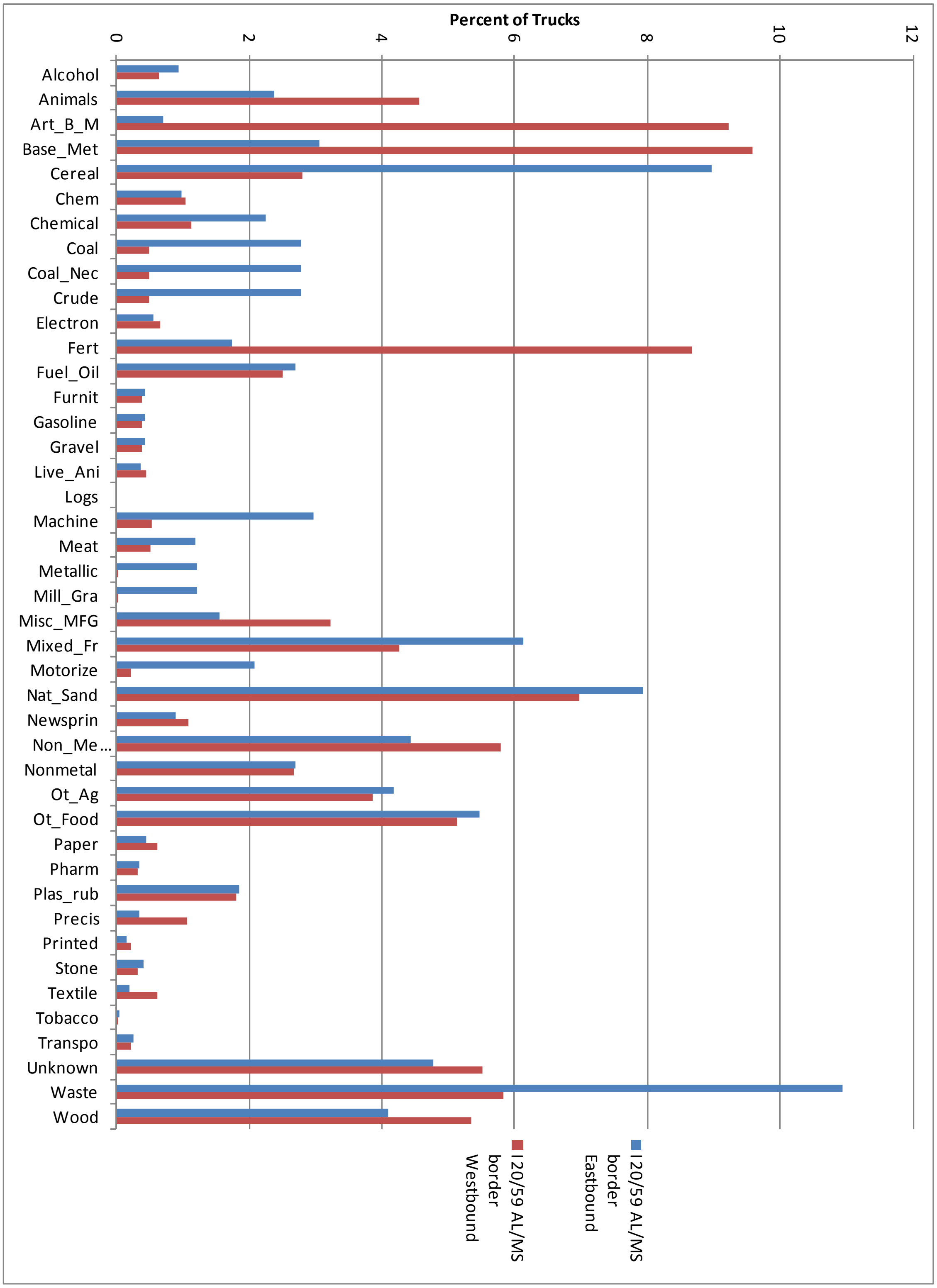


**Chart A-4 – Comparative Commodity Flows, I-20, Alabama-Georgia Border**

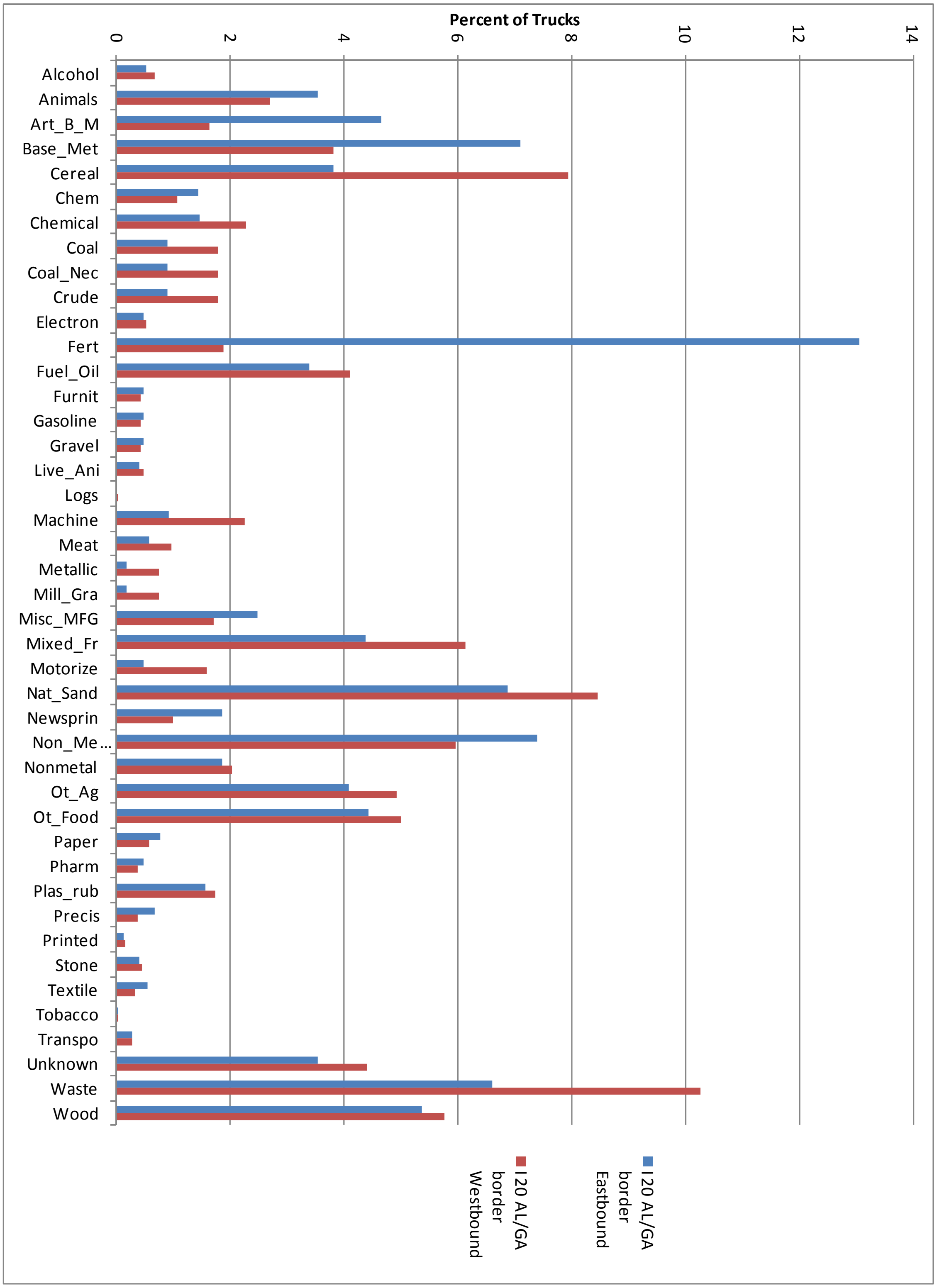


**Chart A-5 – Comparative Commodity Flows, I-59, Alabama-Georgia Border**

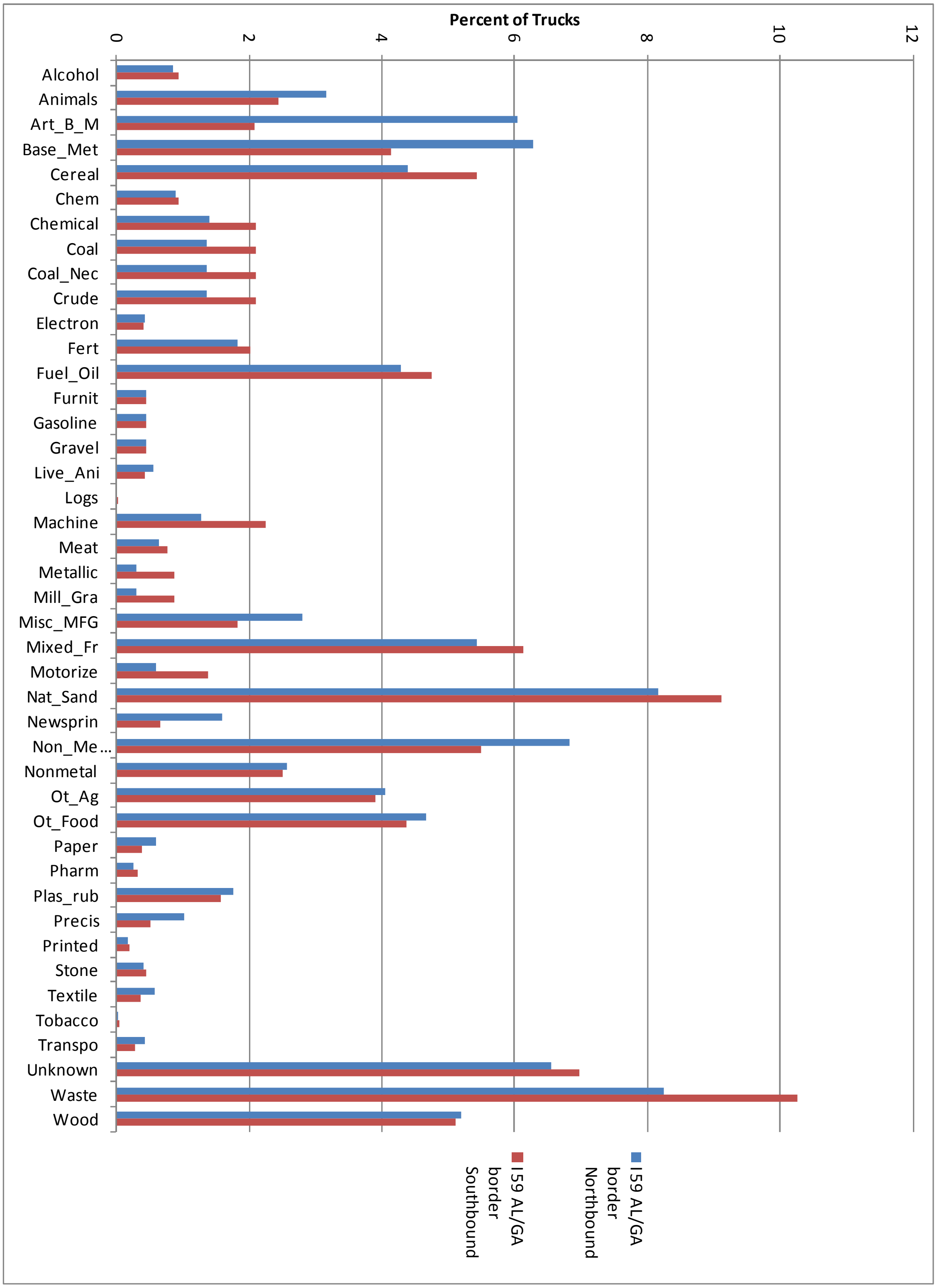


**Chart A-6 – Comparative Commodity Flows, I-65, North of Mobile**

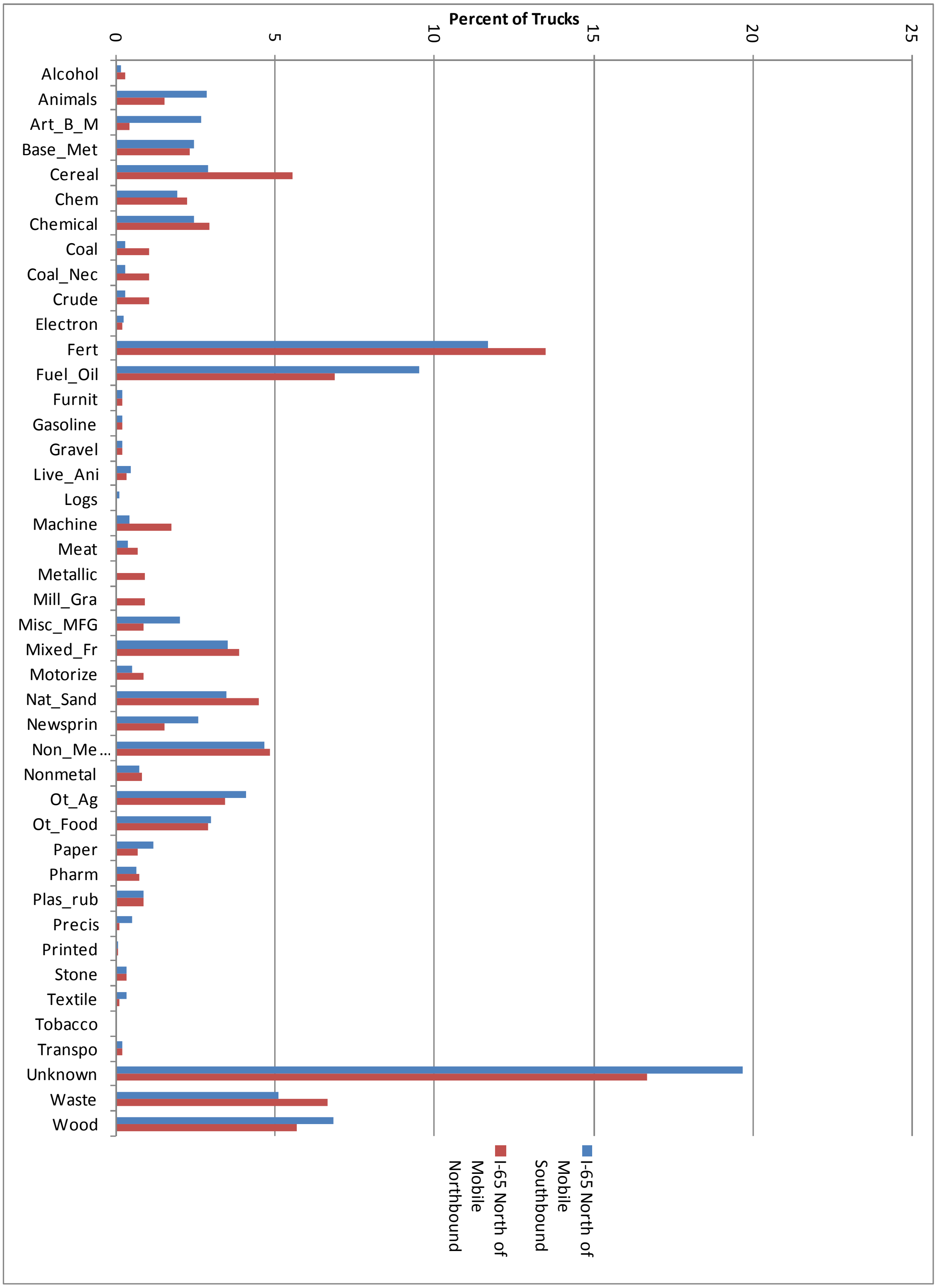


**Chart A-7 – Comparative Commodity Flows, I-65, North of Birmingham**

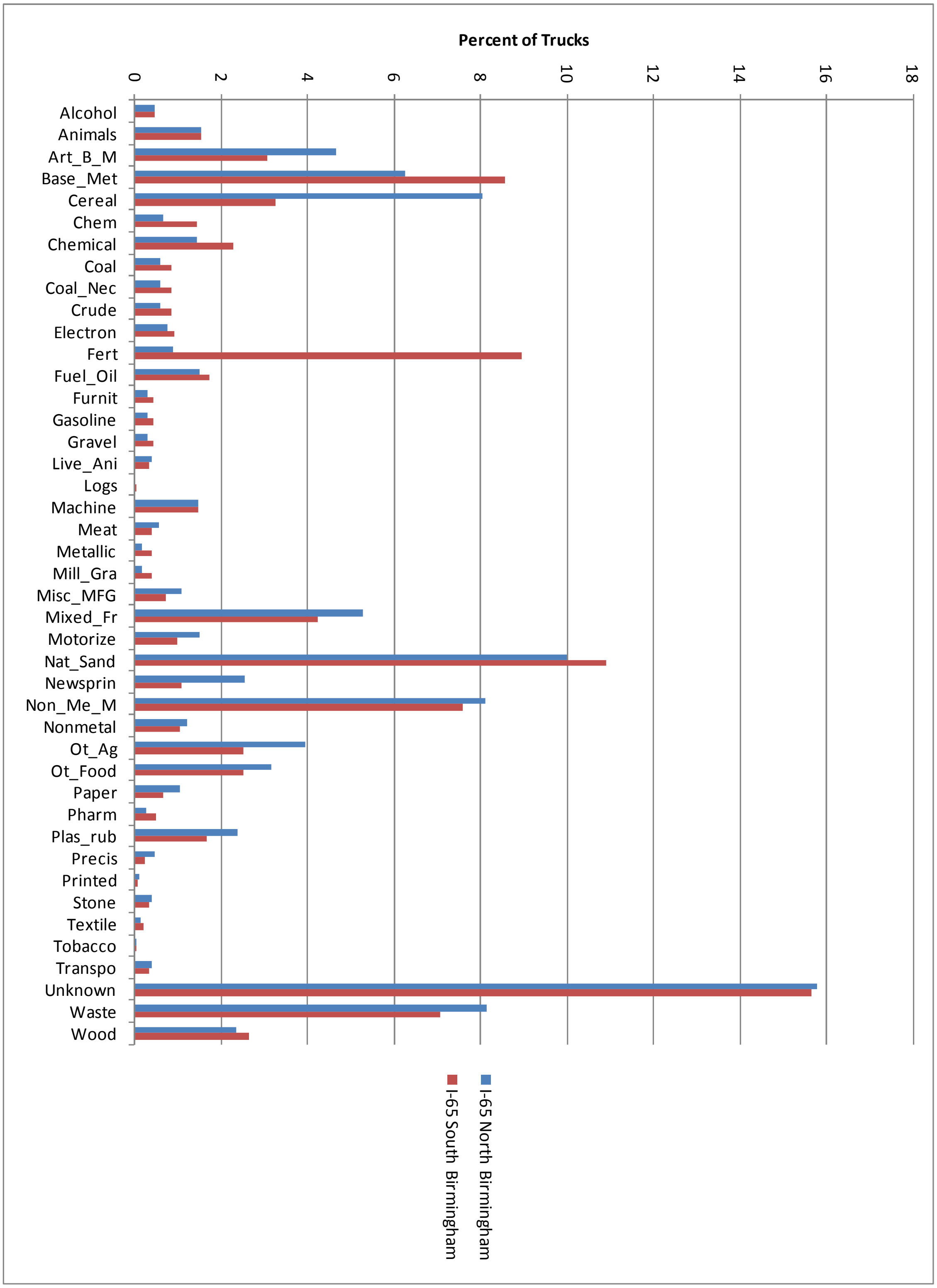


**Chart A-8 – Comparative Commodity Flows, I-85, East of Montgomery**

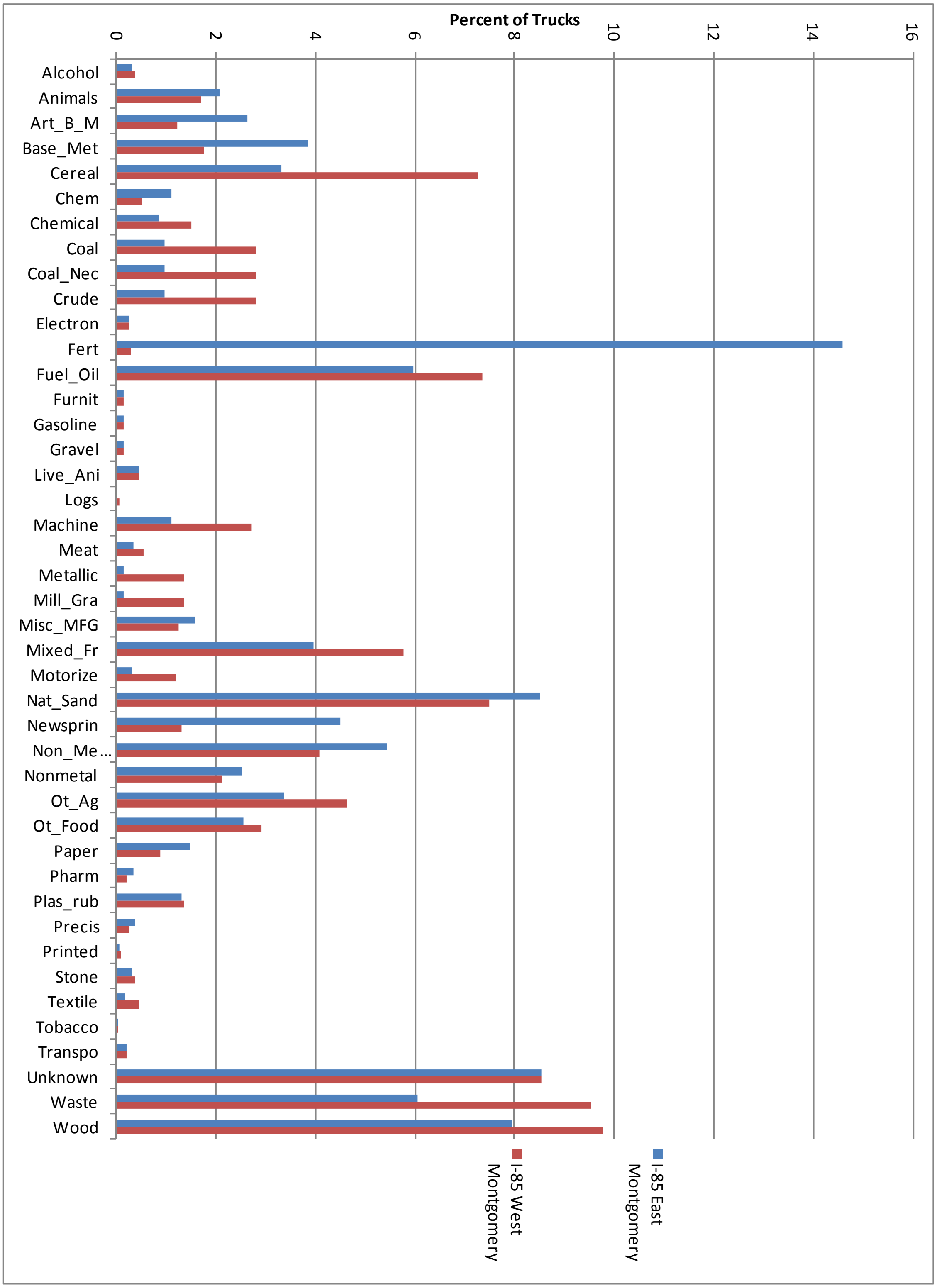


**Chart A-9 – Comparative Commodity Flows, US 43, North of Mobile**

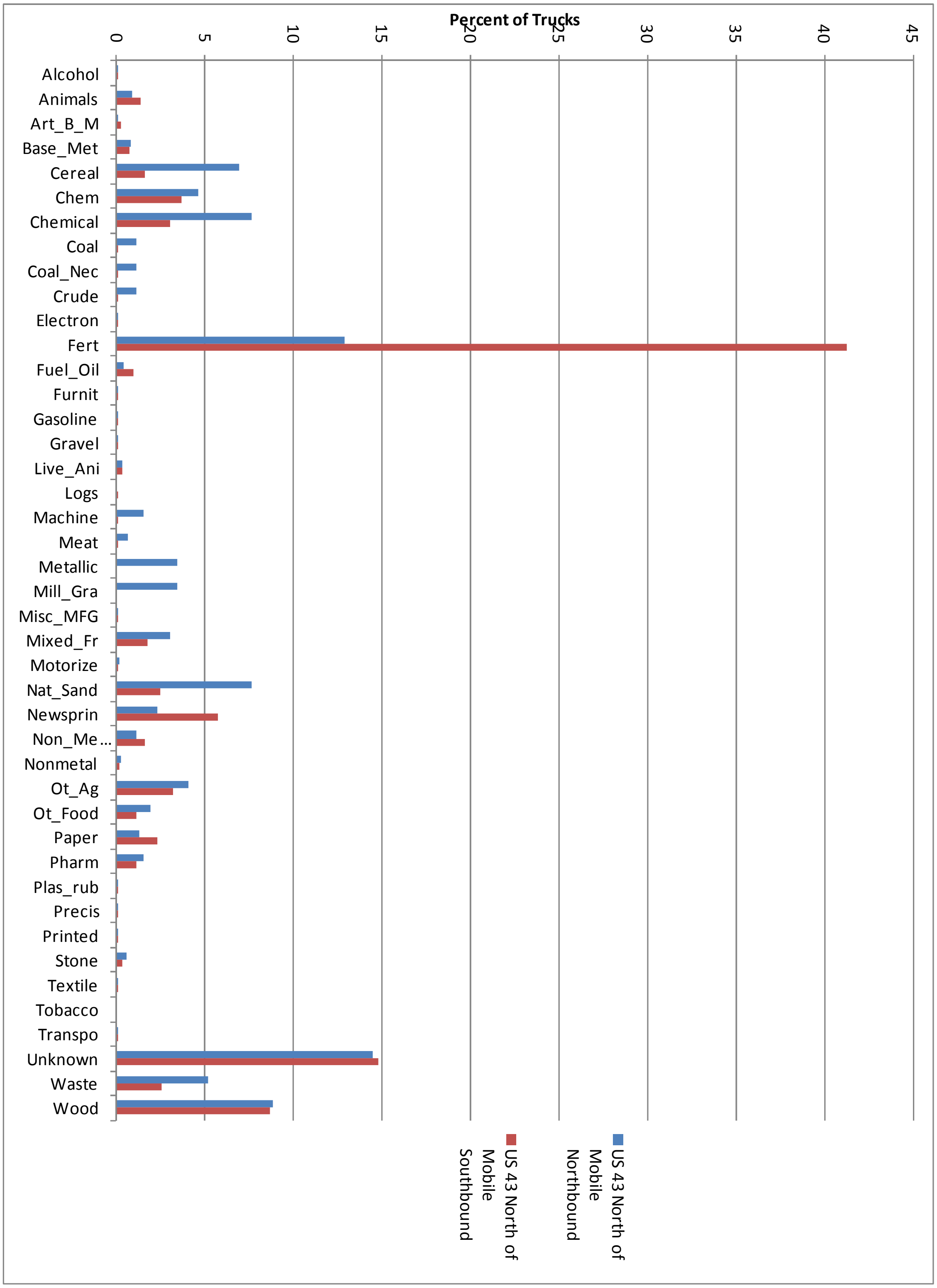


**Chart A-10 – Comparative Commodity Flows, US 72, East of I-65**

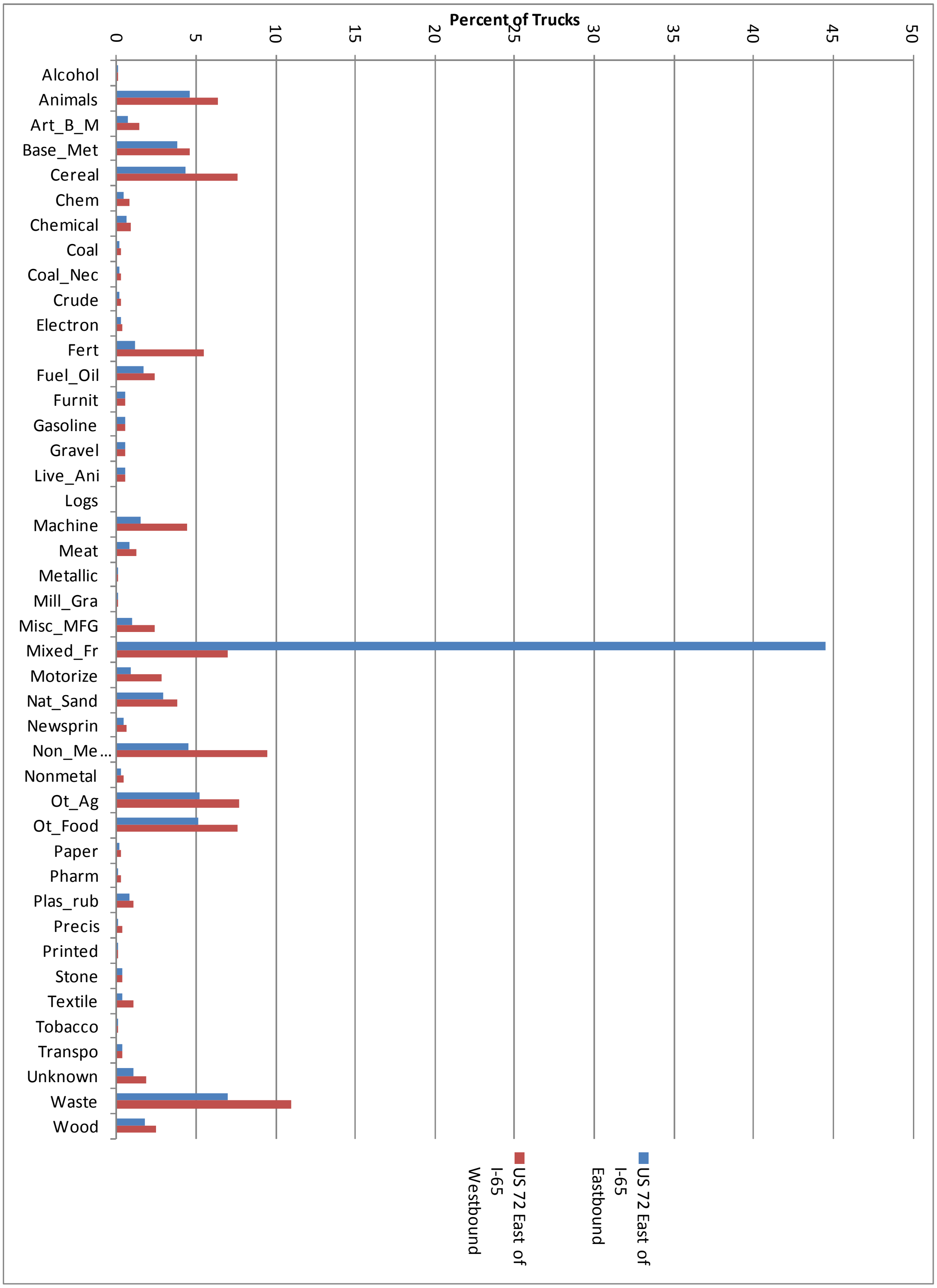


**Chart A-11 – Comparative Commodity Flows, US 72, West of I-65**

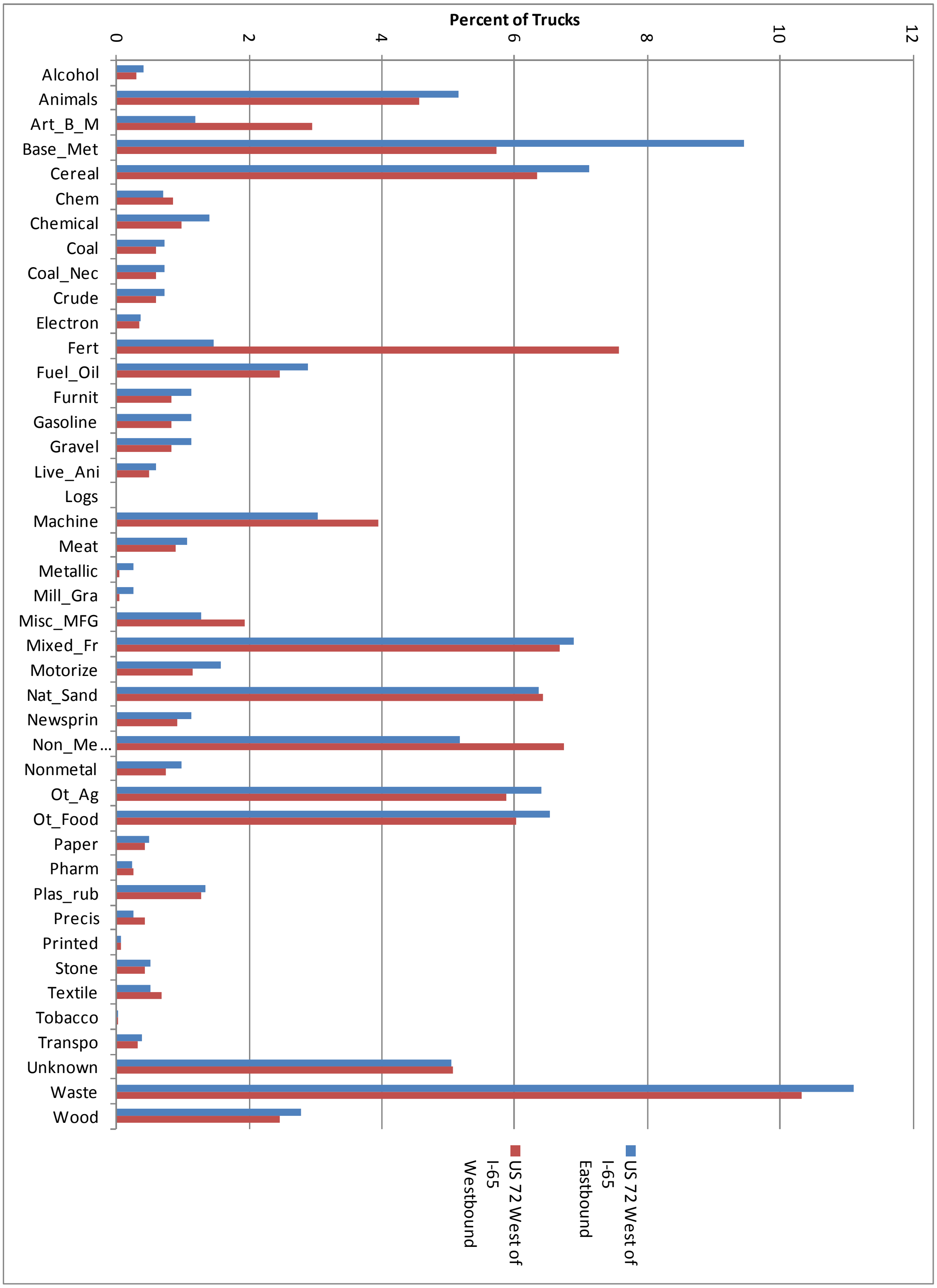


**Chart A-12 – Comparative Commodity Flows, US 84, East of I-65**

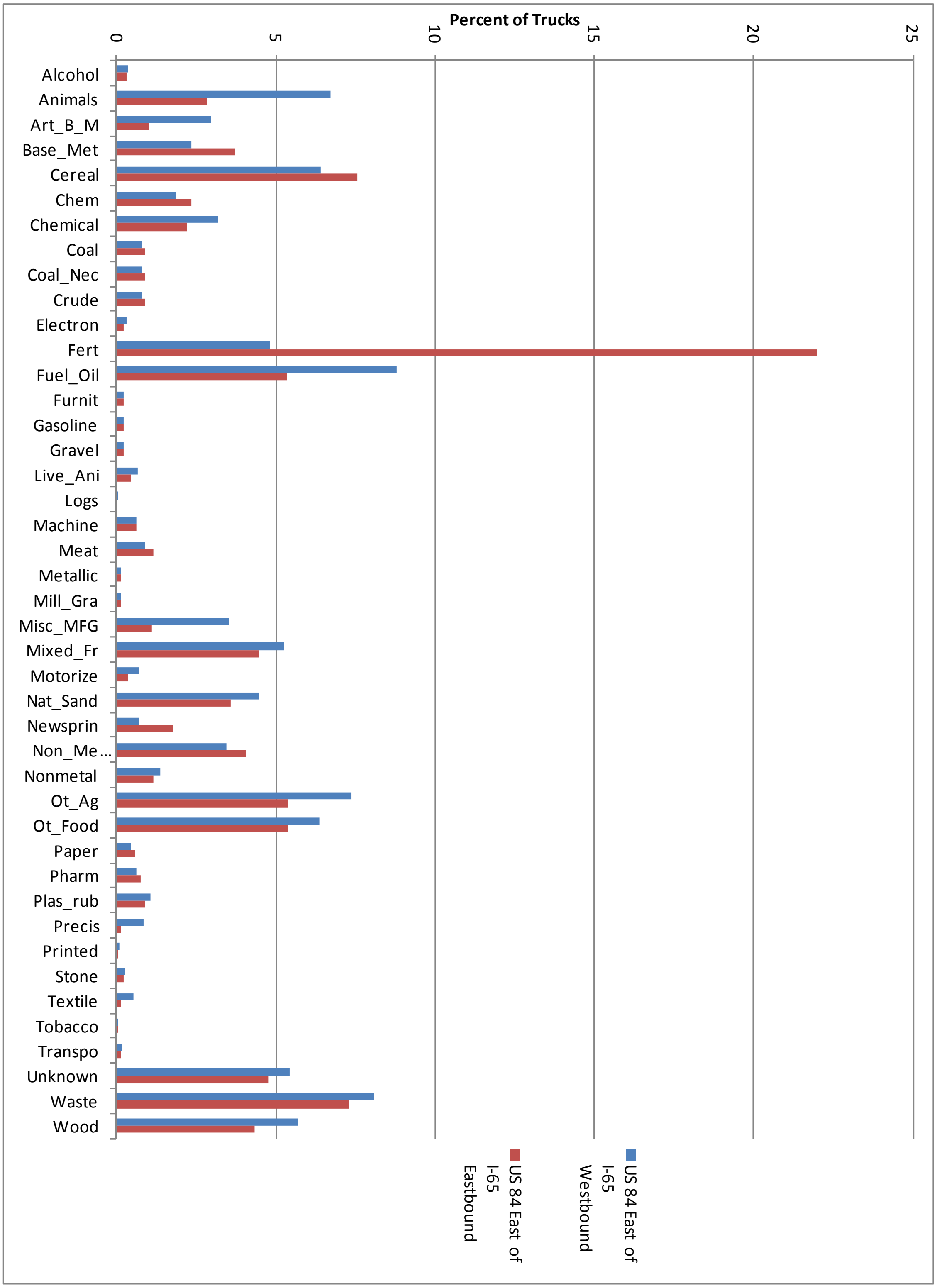


**Chart A-13 – Comparative Commodity Flows, US 84, West of I-65**

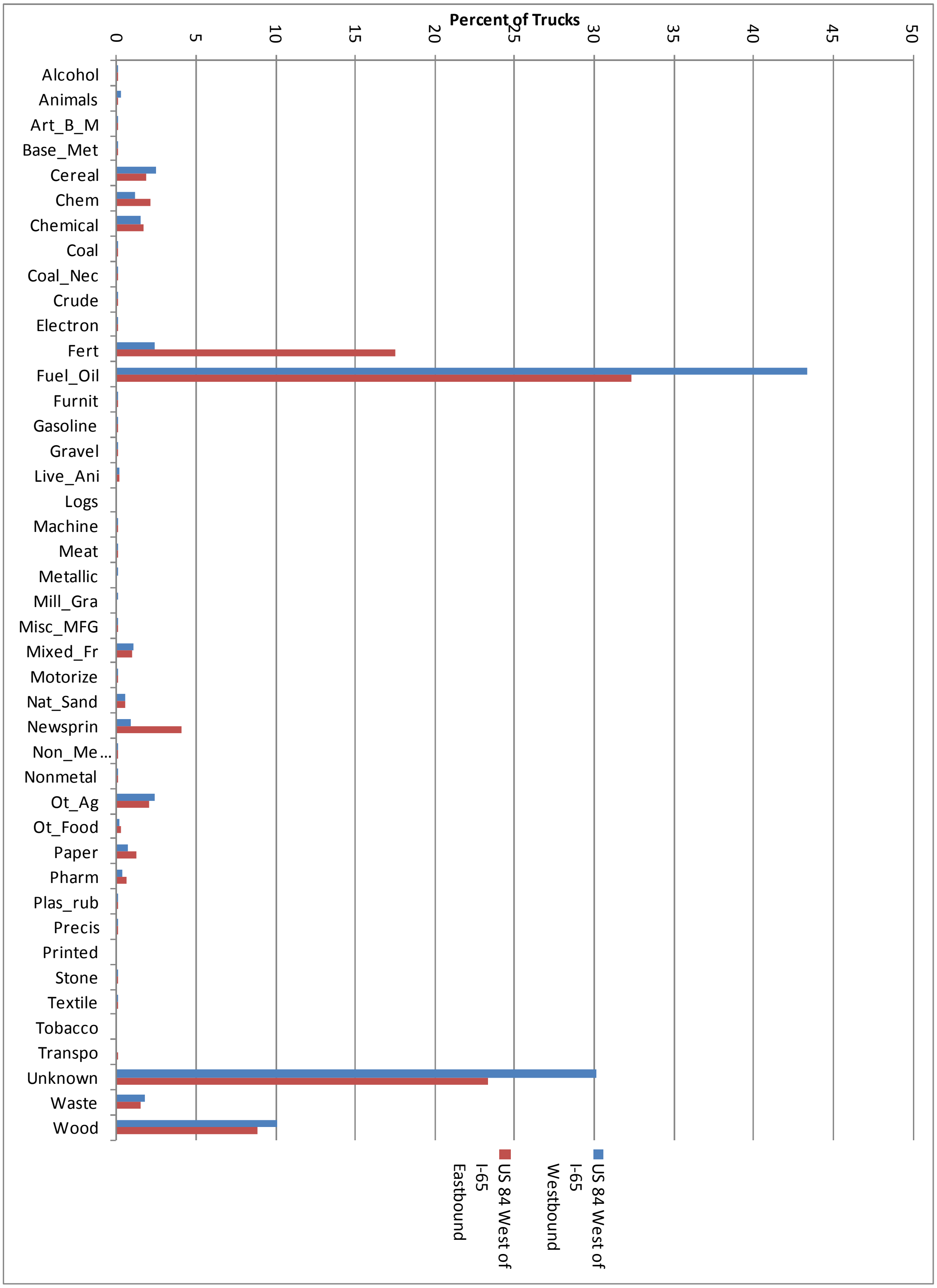


**Chart A-14 – Comparative Commodity Flows, US 280, Birmingham to Auburn**

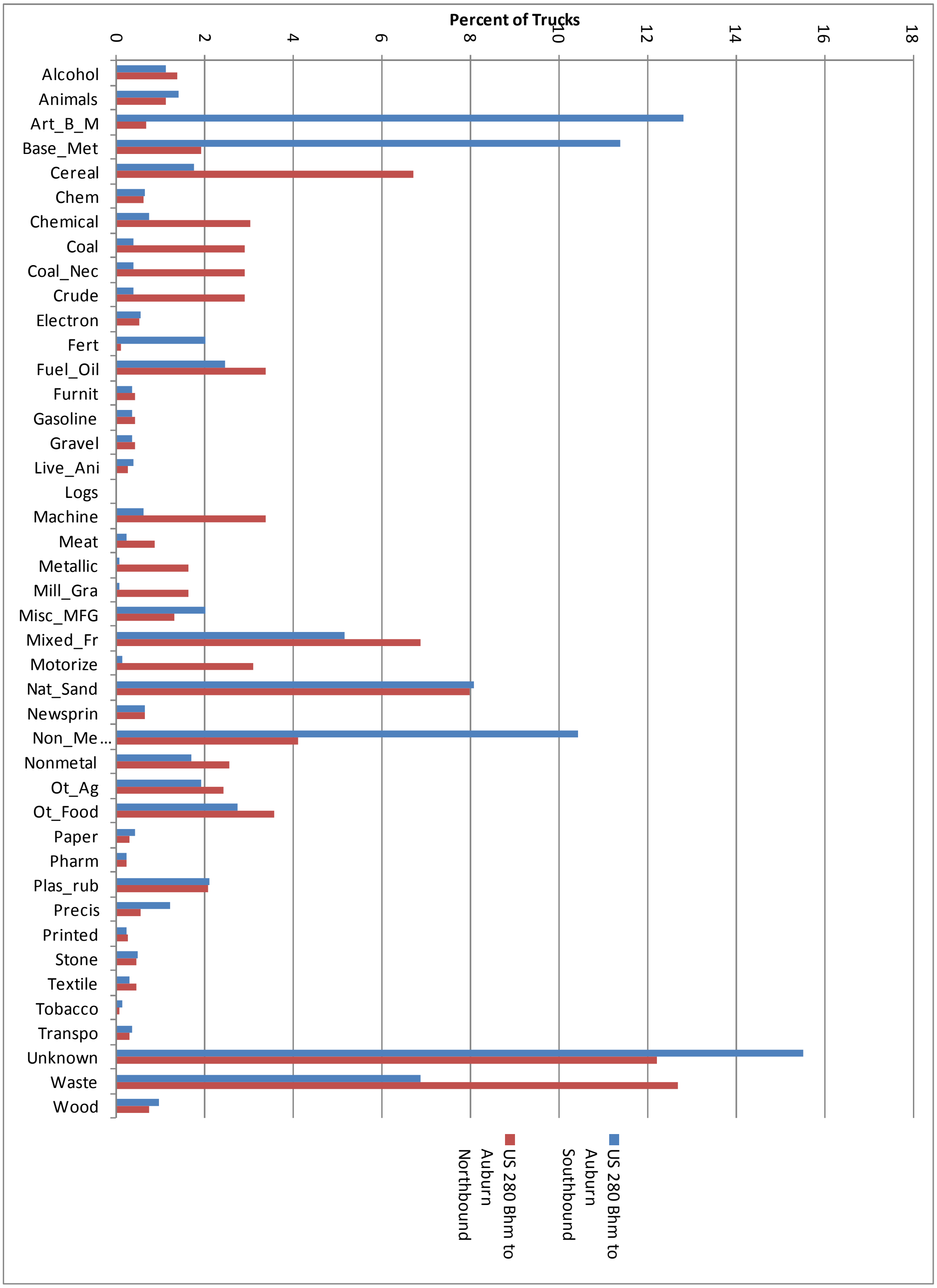


**Chart A-15 – Comparative Commodity Flows, US 431, North of Auburn**

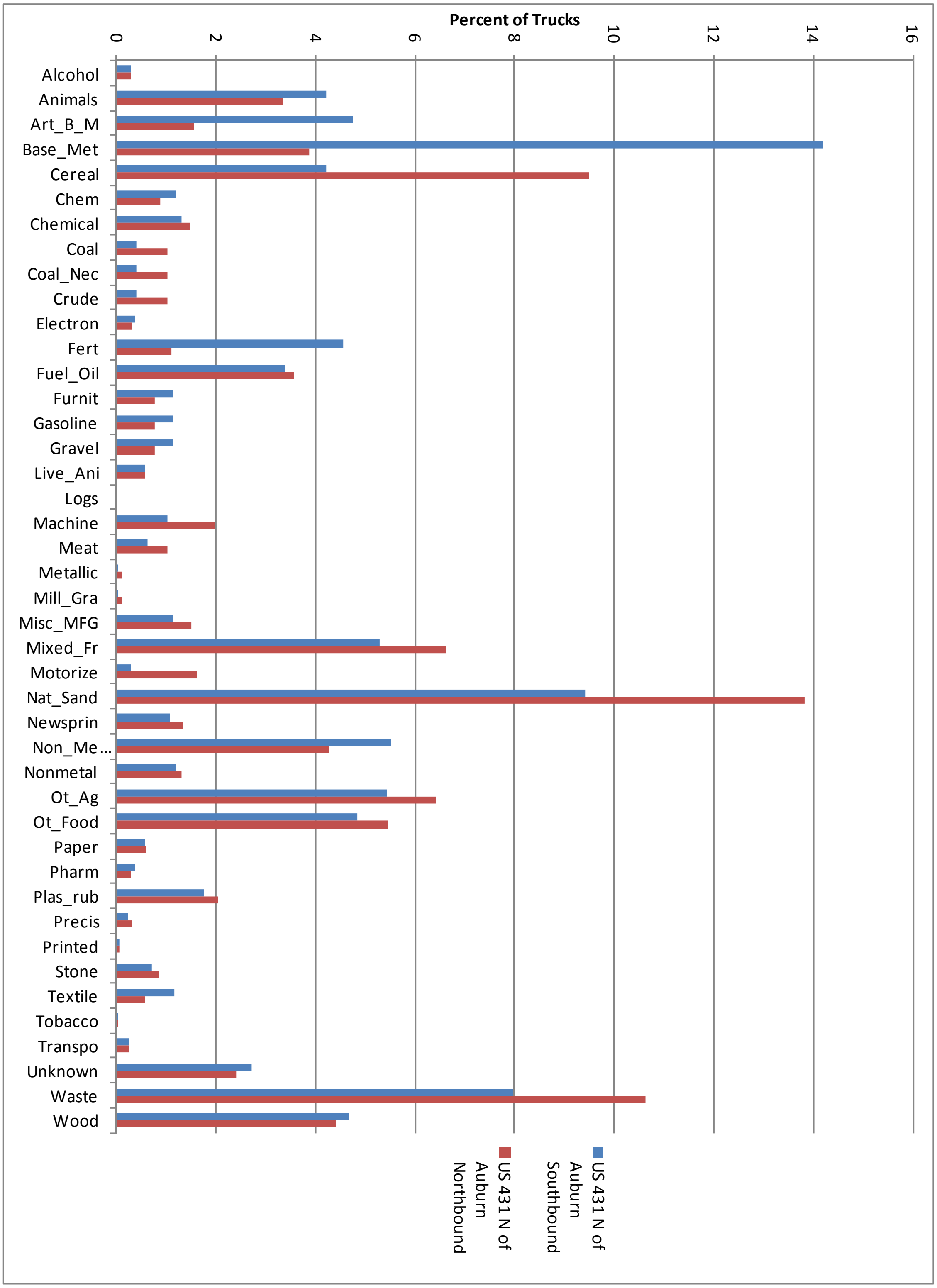


**Table A-1 – Alabama Comparative Commodity Flows Data Matrix**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Alcohol | Animals | Art_B_M | Base_Met | Cereal |
| | | | | | |
| I-10 Eastbound, Near Florida | 0.343114585 | 3.039547685 | 2.782957648 | 5.354079334 | 3.05968702 |
| I-10 Westbound, Near Florida | 0.529640428 | 2.384191772 | 1.277939747 | 3.235341756 | 8.074182054 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 0.590400603 | 2.520694547 | 1.414591227 | 3.676357042 | 7.82891311 |
| I-10 Westbound, Near Mississippi | 0.430013559 | 3.134937561 | 3.06315304 | 5.982390251 | 3.646792411 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 0.934558619 | 2.368142579 | 0.709551657 | 3.047619048 | 8.972431078 |
| I-20/59 Westbound, Near Mississippi | 0.633930368 | 4.559698703 | 9.227208694 | 9.590892102 | 2.805968433 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 0.513830036 | 3.552005033 | 4.646396278 | 7.104010067 | 3.810826656 |
| I-20 Westbound, Near Georgia | 0.664640244 | 2.692389969 | 1.648168508 | 3.813721637 | 7.944341354 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 0.853595447 | 3.170805311 | 6.033367822 | 6.281255389 | 4.390843249 |
| I-59 Southbound, Near Tennessee | 0.944489171 | 2.446639307 | 2.083374242 | 4.137294559 | 5.433267226 |
| | | | | | |
| I-65 Northbound, North of Mobile | 0.277745594 | 1.518428404 | 0.440273433 | 2.301458567 | 5.532705107 |
| I-65 Southbound, North of Mobile | 0.160791214 | 2.831398927 | 2.683176298 | 2.456074961 | 2.890341259 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 0.451231917 | 1.533114828 | 4.657549729 | 6.255933544 | 8.030628391 |
| I-65 Southbound, North of Birmingham | 0.457002322 | 1.552477265 | 3.068935772 | 8.558010847 | 3.246505951 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 0.314267756 | 2.071526285 | 2.620834632 | 3.836179349 | 3.305357341 |
| I-85 Westbound, East of Montgomery | 0.374699076 | 1.694882348 | 1.227641014 | 1.753125728 | 7.261655147 |
| | | | | | |
| US 43 Northbound, North of Mobile | 0.023005253 | 0.879950922 | 0.055596028 | 0.816686477 | 6.895824547 |
| US 43 Southbound, North of Mobile | 0.017539757 | 1.377845338 | 0.274789523 | 0.746414094 | 1.635095104 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 0.089901109 | 4.646888423 | 0.705224253 | 3.813804815 | 4.331235641 |
| US 72 Westbound, East of I-65 | 0.133792593 | 6.359418145 | 1.429018759 | 4.585954624 | 7.623331151 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 0.398844726 | 5.14715995 | 1.19309586 | 9.445055701 | 7.120753679 |
| US 72 Westbound, West of I-65 | 0.304020922 | 4.555410265 | 2.938868911 | 5.732265446 | 6.348479895 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 0.309728575 | 2.835048885 | 1.022104296 | 3.725002323 | 7.536728647 |
| US 84 Westbound, East of I-65 | 0.359771055 | 6.736044005 | 2.97480116 | 2.362298372 | 6.407492753 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0.003062412 | 0.146995774 | 0.024499296 | 0.067373063 | 1.852759233 |
| US 84 Westbound, West of I-65 | 0.002856572 | 0.23995201 | 0.034278859 | 0.039992002 | 2.490930385 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 1.376938713 | 1.134222519 | 0.678955624 | 1.901818283 | 6.712054131 |
| US 280 Southbound, Birmingham to Auburn | 1.133808453 | 1.404398033 | 12.82061054 | 11.37746611 | 1.746128536 |
| | | | | | |
| US 431 Northbound, North of Auburn | 0.281979622 | 3.333625757 | 1.566553457 | 3.871266903 | 9.485794493 |
| US 431 Southbound, North of Auburn | 0.275855023 | 4.214451738 | 4.759776251 | 14.18865419 | 4.202957779 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Chem | Chemical | Coal | Coal_Nec | Crude |
| | | | | | |
| I-10 Eastbound, Near Florida | 1.840884341 | 1.632777886 | 0.604925932 | 0.604925932 | 0.604925932 |
| I-10 Westbound, Near Florida | 1.174279236 | 2.708130871 | 1.527372854 | 1.527372854 | 1.527372854 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 1.194447936 | 2.423730944 | 1.641917006 | 1.641917006 | 1.641917006 |
| I-10 Westbound, Near Mississippi | 1.642721154 | 1.581340186 | 0.892278136 | 0.892278136 | 0.892278136 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 0.971317182 | 2.257866889 | 2.783625731 | 2.783625731 | 2.783625731 |
| I-20/59 Westbound, Near Mississippi | 1.03642584 | 1.125549838 | 0.481557082 | 0.481557082 | 0.481557082 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 1.442346649 | 1.459506094 | 0.892767771 | 0.892767771 | 0.892767771 |
| I-20 Westbound, Near Georgia | 1.06611081 | 2.291416888 | 1.782489515 | 1.782489515 | 1.782489515 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 0.894550785 | 1.39679255 | 1.366614934 | 1.366614934 | 1.366614934 |
| I-59 Southbound, Near Tennessee | 0.926816816 | 2.106937381 | 2.108900976 | 2.108900976 | 2.108900976 |
| | | | | | |
| I-65 Northbound, North of Mobile | 2.256723181 | 2.93869643 | 1.047580427 | 1.047580427 | 1.047580427 |
| I-65 Southbound, North of Mobile | 1.932528366 | 2.463442752 | 0.292978061 | 0.292978061 | 0.292978061 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 0.675011302 | 1.443264014 | 0.586573237 | 0.586573237 | 0.586573237 |
| I-65 Southbound, North of Birmingham | 1.45474484 | 2.277211368 | 0.840590616 | 0.840590616 | 0.840590616 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 1.107595772 | 0.847202489 | 0.978191402 | 0.978191402 | 0.978191402 |
| I-85 Westbound, East of Montgomery | 0.519660376 | 1.501384898 | 2.799565116 | 2.799565116 | 2.799565116 |
| | | | | | |
| US 43 Northbound, North of Mobile | 4.593382156 | 7.607070281 | 1.165599479 | 1.165599479 | 1.165599479 |
| US 43 Southbound, North of Mobile | 3.636576239 | 3.007093857 | 0.019488619 | 0.019488619 | 0.019488619 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 0.42952752 | 0.645290181 | 0.17380881 | 0.17380881 | 0.17380881 |
| US 72 Westbound, East of I-65 | 0.785675653 | 0.888155086 | 0.298898346 | 0.298898346 | 0.298898346 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 0.710012378 | 1.392518223 | 0.728923119 | 0.728923119 | 0.728923119 |
| US 72 Westbound, West of I-65 | 0.856489049 | 0.972540046 | 0.604772802 | 0.604772802 | 0.604772802 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 2.335353452 | 2.210429594 | 0.874467009 | 0.874467009 | 0.874467009 |
| US 84 Westbound, East of I-65 | 1.853861592 | 3.191853118 | 0.802794916 | 0.802794916 | 0.802794916 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 2.146750781 | 1.672076928 | 0.006124824 | 0.006124824 | 0.006124824 |
| US 84 Westbound, West of I-65 | 1.171194333 | 1.516839489 | 0.017139429 | 0.017139429 | 0.017139429 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 0.59495633 | 3.01933376 | 2.907489396 | 2.907489396 | 2.907489396 |
| US 280 Southbound, Birmingham to Auburn | 0.64090349 | 0.726018522 | 0.379841711 | 0.379841711 | 0.379841711 |
| | | | | | |
| US 431 Northbound, North of Auburn | 0.879776421 | 1.465040793 | 1.018886368 | 1.018886368 | 1.018886368 |
| US 431 Southbound, North of Auburn | 1.203034405 | 1.306480039 | 0.401011468 | 0.401011468 | 0.401011468 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Electron | Fert | Fuel_Oil | Furnit | Gasoline |
| | | | | | |
| I-10 Eastbound, Near Florida | 0.42814733 | 20.81437501 | 4.307579849 | 0.340876882 | 0.340876882 |
| I-10 Westbound, Near Florida | 0.472951085 | 1.764658244 | 5.267249757 | 0.37414966 | 0.37414966 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 0.477635525 | 2.966367995 | 4.677236896 | 0.423407732 | 0.423407732 |
| I-10 Westbound, Near Mississippi | 0.416142154 | 16.4303326 | 3.988722548 | 0.45914351 | 0.45914351 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 0.549150654 | 1.736563631 | 2.684489 | 0.417710944 | 0.417710944 |
| I-20/59 Westbound, Near Mississippi | 0.651180174 | 8.665152517 | 2.514159216 | 0.392433085 | 0.392433085 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 0.482371054 | 13.06548711 | 3.388513658 | 0.479987798 | 0.479987798 |
| I-20 Westbound, Near Georgia | 0.520369532 | 1.883976499 | 4.100770605 | 0.428334768 | 0.428334768 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 0.426797724 | 1.83221245 | 4.28522159 | 0.454819797 | 0.454819797 |
| I-59 Southbound, Near Tennessee | 0.40057337 | 2.008757633 | 4.759754158 | 0.457517623 | 0.457517623 |
| | | | | | |
| I-65 Northbound, North of Mobile | 0.222389578 | 13.48144286 | 6.884421787 | 0.196964431 | 0.196964431 |
| I-65 Southbound, North of Mobile | 0.240536722 | 11.67231531 | 9.504884412 | 0.184194787 | 0.184194787 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 0.755255425 | 0.880990054 | 1.492992767 | 0.3125 | 0.3125 |
| I-65 Southbound, North of Birmingham | 0.906433822 | 8.939993209 | 1.726606161 | 0.428095548 | 0.428095548 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 0.259336921 | 14.5899466 | 5.964749193 | 0.159510693 | 0.159510693 |
| I-85 Westbound, East of Montgomery | 0.266625249 | 0.284745412 | 7.347078771 | 0.15013849 | 0.15013849 |
| | | | | | |
| US 43 Northbound, North of Mobile | 0.032590775 | 12.85035083 | 0.429431387 | 0.107357847 | 0.107357847 |
| US 43 Southbound, North of Mobile | 0.037028375 | 41.24961023 | 0.931555971 | 0.054568132 | 0.054568132 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 0.251723105 | 1.146738588 | 1.658176006 | 0.567375887 | 0.567375887 |
| US 72 Westbound, East of I-65 | 0.378604572 | 5.522502775 | 2.39403342 | 0.583563438 | 0.583563438 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 0.35414661 | 1.468161188 | 2.879590153 | 1.136363636 | 1.136363636 |
| US 72 Westbound, West of I-65 | 0.343249428 | 7.564563583 | 2.458319712 | 0.820529585 | 0.820529585 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 0.24055586 | 21.97524236 | 5.359336768 | 0.230231574 | 0.230231574 |
| US 84 Westbound, East of I-65 | 0.312198023 | 4.809336208 | 8.802497584 | 0.231918531 | 0.231918531 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0.003062412 | 17.52618362 | 32.31763337 | 0.006124824 | 0.006124824 |
| US 84 Westbound, West of I-65 | 0.002856572 | 2.362384666 | 43.31990745 | 0.002856572 | 0.002856572 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 0.51559788 | 0.109988027 | 3.384568262 | 0.419996473 | 0.419996473 |
| US 280 Southbound, Birmingham to Auburn | 0.543084721 | 1.997662513 | 2.467065564 | 0.346811997 | 0.346811997 |
| | | | | | |
| US 431 Northbound, North of Auburn | 0.322083391 | 1.109119848 | 3.565475668 | 0.777010515 | 0.777010515 |
| US 431 Southbound, North of Auburn | 0.362698271 | 4.546499451 | 3.388163776 | 1.135347756 | 1.135347756 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Gravel | Live_Ani | Logs | Machine | Meat |
| | | | | | |
| I-10 Eastbound, Near Florida | 0.340876882 | 0.396819477 | 0 | 0.739188161 | 0.510942372 |
| I-10 Westbound, Near Florida | 0.37414966 | 0.461613217 | 0.016196955 | 2.399578879 | 0.987204406 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 0.423407732 | 0.457524555 | 0.014364978 | 2.193891293 | 0.933005333 |
| I-10 Westbound, Near Mississippi | 0.45914351 | 0.456716014 | 0 | 0.925916293 | 0.588494363 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 0.417710944 | 0.368699527 | 0 | 2.972988026 | 1.199665831 |
| I-20/59 Westbound, Near Mississippi | 0.392433085 | 0.448494954 | 0 | 0.524681597 | 0.517494178 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 0.479987798 | 0.398003785 | 0 | 0.916600333 | 0.567214974 |
| I-20 Westbound, Near Georgia | 0.428334768 | 0.4676361 | 0.014924556 | 2.247140704 | 0.972086105 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 0.454819797 | 0.547508191 | 0 | 1.265304363 | 0.638041042 |
| I-59 Southbound, Near Tennessee | 0.457517623 | 0.426100104 | 0.019635949 | 2.250279812 | 0.76972922 |
| | | | | | |
| I-65 Northbound, North of Mobile | 0.196964431 | 0.317331583 | 0 | 1.735346748 | 0.683904273 |
| I-65 Southbound, North of Mobile | 0.184194787 | 0.453769275 | 0.09534789 | 0.40652873 | 0.397427341 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 0.3125 | 0.401503165 | 0 | 1.469823689 | 0.568207505 |
| I-65 Southbound, North of Birmingham | 0.428095548 | 0.324168816 | 0.006882565 | 1.458186123 | 0.394370979 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 0.159510693 | 0.455292111 | 0 | 1.115518489 | 0.351240433 |
| I-85 Westbound, East of Montgomery | 0.15013849 | 0.447179726 | 0.064714866 | 2.72514302 | 0.55201781 |
| | | | | | |
| US 43 Northbound, North of Mobile | 0.107357847 | 0.335493271 | 0 | 1.541351942 | 0.621141827 |
| US 43 Southbound, North of Mobile | 0.054568132 | 0.333255379 | 0.019488619 | 0.134471469 | 0.132522607 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 0.567375887 | 0.557386874 | 0 | 1.480371591 | 0.817101189 |
| US 72 Westbound, East of I-65 | 0.583563438 | 0.575023485 | 0 | 4.455008682 | 1.215519941 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 1.136363636 | 0.591390455 | 0 | 3.032595241 | 1.072754779 |
| US 72 Westbound, West of I-65 | 0.820529585 | 0.491990847 | 0 | 3.944099379 | 0.884275907 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 0.230231574 | 0.460463147 | 0 | 0.625651721 | 1.148060583 |
| US 84 Westbound, East of I-65 | 0.231918531 | 0.66007582 | 0.014866573 | 0.616962759 | 0.880101093 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0.006124824 | 0.168432658 | 0 | 0.052061003 | 0.055123415 |
| US 84 Westbound, West of I-65 | 0.002856572 | 0.151398292 | 0 | 0.011426286 | 0.031422287 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 0.419996473 | 0.268704926 | 0 | 3.382711924 | 0.863197171 |
| US 280 Southbound, Birmingham to Auburn | 0.346811997 | 0.397626942 | 0 | 0.610414523 | 0.217233888 |
| | | | | | |
| US 431 Northbound, North of Auburn | 0.777010515 | 0.563959245 | 0 | 1.996415726 | 1.036431767 |
| US 431 Southbound, North of Auburn | 1.135347756 | 0.568312431 | 0 | 1.015299737 | 0.629613548 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Metallic | Mill_Gra | Misc_MFG | Mixed_Fr | Motorize |
| | | | | | |
| I-10 Eastbound, Near Florida | 0.110393388 | 0.110393388 | 2.289916907 | 3.736965375 | 0.409499799 |
| I-10 Westbound, Near Florida | 0.839002268 | 0.839002268 | 1.545999352 | 6.10058309 | 1.968739877 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 0.748774488 | 0.748774488 | 1.593076081 | 6.023953601 | 1.568655618 |
| I-10 Westbound, Near Mississippi | 0.154319382 | 0.154319382 | 2.267627955 | 4.163155467 | 0.452901378 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 1.220829852 | 1.220829852 | 1.543859649 | 6.128654971 | 2.072960178 |
| I-20/59 Westbound, Near Mississippi | 0.012937354 | 0.012937354 | 3.215651324 | 4.253514648 | 0.208435155 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 0.181127471 | 0.181127471 | 2.478109792 | 4.391864517 | 0.467594866 |
| I-20 Westbound, Near Georgia | 0.758664949 | 0.758664949 | 1.700901941 | 6.146429797 | 1.580510519 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 0.293153992 | 0.293153992 | 2.806518365 | 5.423348853 | 0.601396793 |
| I-59 Southbound, Near Tennessee | 0.875763348 | 0.875763348 | 1.828106898 | 6.122489053 | 1.390225224 |
| | | | | | |
| I-65 Northbound, North of Mobile | 0.92785695 | 0.92785695 | 0.877972168 | 3.875886662 | 0.871857259 |
| I-65 Southbound, North of Mobile | 0.022536774 | 0.022536774 | 2.005339482 | 3.506635346 | 0.520079399 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 0.172920434 | 0.172920434 | 1.080187613 | 5.274638336 | 1.5107934 |
| I-65 Southbound, North of Birmingham | 0.384505969 | 0.384505969 | 0.732075506 | 4.251131035 | 0.985124483 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 0.144721622 | 0.144721622 | 1.576092411 | 3.948153743 | 0.302647772 |
| I-85 Westbound, East of Montgomery | 1.355776449 | 1.355776449 | 1.244466879 | 5.768683182 | 1.183634905 |
| | | | | | |
| US 43 Northbound, North of Mobile | 3.393274798 | 3.393274798 | 0.103523638 | 3.050113109 | 0.17829071 |
| US 43 Southbound, North of Mobile | 0 | 0 | 0.116931712 | 1.781259744 | 0.081852198 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 0.027969234 | 0.027969234 | 0.956947358 | 44.49905104 | 0.928978124 |
| US 72 Westbound, East of I-65 | 0.045546415 | 0.045546415 | 2.413959976 | 7.008454553 | 2.812491104 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 0.26303122 | 0.26303122 | 1.282492092 | 6.898982258 | 1.56787237 |
| US 72 Westbound, West of I-65 | 0.04576659 | 0.04576659 | 1.935272965 | 6.688460281 | 1.152337365 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 0.13834543 | 0.13834543 | 1.095406725 | 4.44770233 | 0.383031004 |
| US 84 Westbound, East of I-65 | 0.130825838 | 0.130825838 | 3.535270943 | 5.261280012 | 0.732922025 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0 | 0 | 0.042873767 | 0.992221474 | 0.024499296 |
| US 84 Westbound, West of I-65 | 0.005713143 | 0.005713143 | 0.03713543 | 1.114062902 | 0.005713143 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 1.61176547 | 1.61176547 | 1.319392235 | 6.857312579 | 3.094515449 |
| US 280 Southbound, Birmingham to Auburn | 0.07368167 | 0.07368167 | 2.013542183 | 5.142472401 | 0.130213296 |
| | | | | | |
| US 431 Northbound, North of Auburn | 0.122817791 | 0.122817791 | 1.513917261 | 6.614615317 | 1.616683168 |
| US 431 Southbound, North of Auburn | 0.026819238 | 0.026819238 | 1.149395929 | 5.288498378 | 0.280963449 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Nat_Sand | Newsprin | Non_Me_M | Nonmetal | Ot_Ag |
| | | | | | |
| I-10 Eastbound, Near Florida | 4.933391016 | 2.195187445 | 8.381692599 | 1.138245342 | 3.533334328 |
| I-10 Westbound, Near Florida | 7.389860706 | 1.003401361 | 6.71930677 | 1.537091027 | 4.842079689 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 7.873085418 | 1.059417141 | 6.397802158 | 1.788798908 | 4.848180137 |
| I-10 Westbound, Near Mississippi | 5.91268644 | 2.033894778 | 7.442008857 | 1.474183581 | 3.907228042 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 7.923141186 | 0.892230576 | 4.433305486 | 2.686716792 | 4.186020607 |
| I-20/59 Westbound, Near Mississippi | 6.983296438 | 1.083862807 | 5.784434925 | 2.670844953 | 3.86395653 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 6.864731145 | 1.851313412 | 7.403823696 | 1.858939832 | 4.072984838 |
| I-20 Westbound, Near Georgia | 8.46122849 | 1.000940247 | 5.958877872 | 2.037699429 | 4.92112372 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 8.165200897 | 1.595102604 | 6.82876358 | 2.575875151 | 4.05673392 |
| I-59 Southbound, Near Tennessee | 9.109116971 | 0.651913523 | 5.500029454 | 2.497692776 | 3.893808785 |
| | | | | | |
| I-65 Northbound, North of Mobile | 4.478044259 | 1.514566356 | 4.849766346 | 0.824547175 | 3.443659161 |
| I-65 Southbound, North of Mobile | 3.458961401 | 2.605164388 | 4.677680793 | 0.719443168 | 4.088257474 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 9.97965642 | 2.544642857 | 8.112850362 | 1.222592676 | 3.953435805 |
| I-65 Southbound, North of Birmingham | 10.89395344 | 1.089280634 | 7.59926953 | 1.046608731 | 2.506859623 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 8.501074849 | 4.4832012 | 5.418081752 | 2.533156569 | 3.366626349 |
| I-85 Westbound, East of Montgomery | 7.497217261 | 1.311123191 | 4.073800834 | 2.118764723 | 4.639408765 |
| | | | | | |
| US 43 Northbound, North of Mobile | 7.622407116 | 2.359955523 | 1.090832407 | 0.249223573 | 4.075763966 |
| US 43 Southbound, North of Mobile | 2.44582164 | 5.733551606 | 1.594169005 | 0.136420331 | 3.188338011 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 2.930776146 | 0.425531915 | 4.535011487 | 0.307661572 | 5.226251124 |
| US 72 Westbound, East of I-65 | 3.771812463 | 0.612029947 | 9.4878875 | 0.458310797 | 7.708730678 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 6.350570761 | 1.136363636 | 5.171228167 | 0.981639389 | 6.407302984 |
| US 72 Westbound, West of I-65 | 6.413860739 | 0.905524681 | 6.739130435 | 0.75351422 | 5.881006865 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 3.58872175 | 1.764420446 | 4.077060469 | 1.141866011 | 5.409925768 |
| US 84 Westbound, East of I-65 | 4.458485096 | 0.718055452 | 3.465398052 | 1.3736713 | 7.364900022 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0.523672444 | 4.103632021 | 0.070435475 | 0.01531206 | 2.076315306 |
| US 84 Westbound, West of I-65 | 0.545605165 | 0.939812038 | 0.048561716 | 0.017139429 | 2.442368669 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 7.998032282 | 0.628370414 | 4.105291491 | 2.552464753 | 2.412775318 |
| US 280 Southbound, Birmingham to Auburn | 8.072589148 | 0.651701665 | 10.43866001 | 1.691502471 | 1.911277107 |
| | | | | | |
| US 431 Northbound, North of Auburn | 13.83078716 | 1.333450303 | 4.272304588 | 1.314651661 | 6.410336746 |
| US 431 Southbound, North of Auburn | 9.423769508 | 1.082986386 | 5.506883605 | 1.187709126 | 5.427702996 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Ot_Food | Paper | Pharm | Plas_rub | Precis |
| | | | | | |
| I-10 Eastbound, Near Florida | 3.56988349 | 0.833171721 | 0.583294795 | 1.215819074 | 0.530335805 |
| I-10 Westbound, Near Florida | 4.616942015 | 0.600907029 | 0.419501134 | 1.569484937 | 0.34175575 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 4.689447128 | 0.593991848 | 0.420534736 | 1.568296493 | 0.347273348 |
| I-10 Westbound, Near Mississippi | 3.985601481 | 0.789629738 | 0.522258403 | 1.3361631 | 0.584332941 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 5.46588694 | 0.439988861 | 0.341966026 | 1.846839321 | 0.336396547 |
| I-20/59 Westbound, Near Mississippi | 5.12175488 | 0.610930627 | 0.311933991 | 1.796854785 | 1.063738033 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 4.421416893 | 0.763595285 | 0.478557844 | 1.571042484 | 0.672554898 |
| I-20 Westbound, Near Georgia | 4.987289253 | 0.573102965 | 0.378088761 | 1.723288775 | 0.381571158 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 4.660286256 | 0.592774616 | 0.258665287 | 1.769701673 | 1.010950164 |
| I-59 Southbound, Near Tennessee | 4.361144383 | 0.37701023 | 0.323993167 | 1.57087596 | 0.510534687 |
| | | | | | |
| I-65 Northbound, North of Mobile | 2.881731227 | 0.695490416 | 0.732501706 | 0.848041298 | 0.13130962 |
| I-65 Southbound, North of Mobile | 2.980488355 | 1.18534763 | 0.649232449 | 0.871566392 | 0.523113195 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 3.153820072 | 1.042608499 | 0.267857143 | 2.377655967 | 0.474400995 |
| I-65 Southbound, North of Birmingham | 2.524066036 | 0.659579154 | 0.492332822 | 1.679804719 | 0.243183966 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 2.534212931 | 1.468343466 | 0.347014984 | 1.312001859 | 0.365501323 |
| I-85 Westbound, East of Montgomery | 2.919934767 | 0.884652222 | 0.194791748 | 1.358365044 | 0.268566695 |
| | | | | | |
| US 43 Northbound, North of Mobile | 1.90176757 | 1.282542847 | 1.522180898 | 0.09585522 | 0.021088148 |
| US 43 Southbound, North of Mobile | 1.101106954 | 2.307452448 | 1.151777362 | 0.085749922 | 0.037028375 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 5.146339027 | 0.18979123 | 0.137848367 | 0.77714514 | 0.101887923 |
| US 72 Westbound, East of I-65 | 7.566398133 | 0.273278488 | 0.24765863 | 1.095960602 | 0.327364855 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 6.53280154 | 0.491679274 | 0.233805529 | 1.346100949 | 0.249277954 |
| US 72 Westbound, West of I-65 | 6.016672115 | 0.433148088 | 0.248447205 | 1.278195489 | 0.431513567 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 5.404763625 | 0.600873435 | 0.747478293 | 0.88788858 | 0.132150858 |
| US 84 Westbound, East of I-65 | 6.370326321 | 0.466810377 | 0.637775961 | 1.07633985 | 0.860774548 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0.287866724 | 1.270900962 | 0.636981687 | 0.045936179 | 0.003062412 |
| US 84 Westbound, West of I-65 | 0.22281258 | 0.694146885 | 0.379924015 | 0.028565715 | 0.002856572 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 3.559992203 | 0.305831686 | 0.243180278 | 2.075849971 | 0.533233091 |
| US 280 Southbound, Birmingham to Auburn | 2.744007012 | 0.409695491 | 0.221680196 | 2.098022028 | 1.199867881 |
| | | | | | |
| US 431 Northbound, North of Auburn | 5.456619002 | 0.612835712 | 0.302031507 | 2.036519494 | 0.315817177 |
| US 431 Southbound, North of Auburn | 4.822354474 | 0.582360604 | 0.385686189 | 1.747081811 | 0.231156292 |

**Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)**

| | Values: percent of total trucks | | | | |
|---|---|---|---|---|---|
| | Printed | Stone | Textile | Tobacco | Transpo |
| | | | | | |
| I-10 Eastbound, Near Florida | 0.134262229 | 0.32819656 | 0.395327674 | 0.020885236 | 0.24614742 |
| I-10 Westbound, Near Florida | 0.166828636 | 0.450275348 | 0.304502753 | 0.027534823 | 0.29478458 |
| | | | | | |
| I-10 Eastbound, Near Mississippi | 0.146881902 | 0.439927457 | 0.30633316 | 0.032321201 | 0.27329371 |
| I-10 Westbound, Near Mississippi | 0.109930886 | 0.380770071 | 0.406778956 | 0.027396025 | 0.263903483 |
| | | | | | |
| I-20/59 Eastbound, Near Mississippi | 0.162628794 | 0.39988861 | 0.201615149 | 0.052353105 | 0.259537733 |
| I-20/59 Westbound, Near Mississippi | 0.218497542 | 0.321996378 | 0.628180433 | 0.007187419 | 0.225684961 |
| | | | | | |
| I-20 Eastbound, Near Georgia | 0.138228859 | 0.39609718 | 0.539569203 | 0.016682793 | 0.270261253 |
| I-20 Westbound, Near Georgia | 0.142778256 | 0.450721602 | 0.332817607 | 0.038306361 | 0.277596748 |
| | | | | | |
| I-59 Northbound, Near Tennessee | 0.178910157 | 0.413864459 | 0.569063632 | 0.012933264 | 0.4354199 |
| I-59 Southbound, Near Tennessee | 0.184577925 | 0.453590433 | 0.375046635 | 0.053017064 | 0.278830483 |
| | | | | | |
| I-65 Northbound, North of Mobile | 0.083677699 | 0.336319984 | 0.132918807 | 0.012873492 | 0.196642593 |
| I-65 Southbound, North of Mobile | 0.083212704 | 0.326349823 | 0.325916423 | 0.010834987 | 0.202397566 |
| | | | | | |
| I-65 Northbound, North of Birmingham | 0.092393761 | 0.414500452 | 0.152294304 | 0.043795208 | 0.409414557 |
| I-65 Southbound, North of Birmingham | 0.086949739 | 0.326692423 | 0.211065329 | 0.022712465 | 0.345963605 |
| | | | | | |
| I-85 Eastbound, East of Montgomery | 0.064438095 | 0.303704134 | 0.171658858 | 0.024296331 | 0.199124276 |
| I-85 Westbound, East of Montgomery | 0.079599286 | 0.370816184 | 0.45494551 | 0.028474541 | 0.196086045 |
| | | | | | |
| US 43 Northbound, North of Mobile | 0.021088148 | 0.550208964 | 0.032590775 | 0 | 0.042176297 |
| US 43 Southbound, North of Mobile | 0.021437481 | 0.342999688 | 0.040926099 | 0 | 0.033130652 |
| | | | | | |
| US 72 Eastbound, East of I-65 | 0.015982419 | 0.343622016 | 0.405553891 | 0.001997802 | 0.389571471 |
| US 72 Westbound, East of I-65 | 0.025619858 | 0.338751459 | 1.08742065 | 0.002846651 | 0.350138063 |
| | | | | | |
| US 72 Eastbound, West of I-65 | 0.068766332 | 0.519185807 | 0.50543254 | 0.015472425 | 0.381653143 |
| US 72 Westbound, West of I-65 | 0.068649886 | 0.431513567 | 0.689767898 | 0.003269042 | 0.313828048 |
| | | | | | |
| US 84 Eastbound, East of I-65 | 0.044394429 | 0.235393717 | 0.151767002 | 0.007227 | 0.13834543 |
| US 84 Westbound, East of I-65 | 0.089199435 | 0.263138333 | 0.542629897 | 0.007433286 | 0.1947521 |
| | | | | | |
| US 84 Eastbound, West of I-65 | 0 | 0.067373063 | 0.003062412 | 0 | 0.003062412 |
| US 84 Westbound, West of I-65 | 0 | 0.042848573 | 0.022852572 | 0 | 0 |
| | | | | | |
| US 280 Northbound, Birmingham to Auburn | 0.264064081 | 0.453410557 | 0.445057036 | 0.070540844 | 0.297478165 |
| US 280 Southbound, Birmingham to Auburn | 0.233113559 | 0.490999403 | 0.303619294 | 0.132754043 | 0.350623118 |
| | | | | | |
| US 431 Northbound, North of Auburn | 0.07268808 | 0.857218052 | 0.573985187 | 0.012532428 | 0.270700437 |
| US 431 Southbound, North of Auburn | 0.068963756 | 0.711348369 | 1.150673035 | 0.012771066 | 0.26563817 |

## Table A-1 – Alabama Comparative Commodity Flows Data Matrix (continued)

| | Values: percent of total trucks | | |
|---|---|---|---|
| | Unknown | Waste | Wood |
| | | | |
| I-10 Eastbound, Near Florida | 6.527382036 | 5.682275894 | 5.006489341 |
| I-10 Westbound, Near Florida | 5.938613541 | 10.26643991 | 5.759637188 |
| | | | |
| I-10 Eastbound, Near Mississippi | 5.256504642 | 10.08026432 | 5.629275826 |
| I-10 Westbound, Near Mississippi | 5.768770612 | 6.356571405 | 5.163630563 |
| | | | |
| I-20/59 Eastbound, Near Mississippi | 4.770815929 | 10.94514063 | 4.09133946 |
| I-20/59 Westbound, Near Mississippi | 5.511312998 | 5.834746859 | 5.334502487 |
| | | | |
| I-20 Eastbound, Near Georgia | 3.542472009 | 6.613059291 | 5.359466532 |
| I-20 Westbound, Near Georgia | 4.415678744 | 10.25864256 | 5.754908935 |
| | | | |
| I-59 Northbound, Near Tennessee | 6.544231764 | 8.240644939 | 5.192705639 |
| I-59 Southbound, Near Tennessee | 6.982543641 | 10.25978361 | 5.111237654 |
| | | | |
| I-65 Northbound, North of Mobile | 16.68018383 | 6.662997721 | 5.6887962 |
| I-65 Southbound, North of Mobile | 19.66203507 | 5.085943121 | 6.846845285 |
| | | | |
| I-65 Northbound, North of Birmingham | 15.76627486 | 8.130933544 | 2.336686257 |
| I-65 Southbound, North of Birmingham | 15.64085858 | 7.061052941 | 2.654834773 |
| | | | |
| I-85 Eastbound, East of Montgomery | 8.545970242 | 6.063519059 | 7.929582895 |
| I-85 Westbound, East of Montgomery | 8.539126608 | 9.514379643 | 9.771944811 |
| | | | |
| US 43 Northbound, North of Mobile | 14.4894751 | 5.180016104 | 8.843602623 |
| US 43 Southbound, North of Mobile | 14.83083879 | 2.545213595 | 8.668537574 |
| | | | |
| US 72 Eastbound, East of I-65 | 1.074817701 | 6.996304066 | 1.756068325 |
| US 72 Westbound, East of I-65 | 1.912949415 | 10.96529933 | 2.448119787 |
| | | | |
| US 72 Eastbound, West of I-65 | 5.040572136 | 11.11435841 | 2.776440655 |
| US 72 Westbound, West of I-65 | 5.058842759 | 10.33017326 | 2.464857797 |
| | | | |
| US 84 Eastbound, East of I-65 | 4.767755191 | 7.276556644 | 4.322778472 |
| US 84 Westbound, East of I-65 | 5.456032112 | 8.074035531 | 5.702817215 |
| | | | |
| US 84 Eastbound, West of I-65 | 23.36314081 | 1.546518038 | 8.850370552 |
| US 84 Westbound, West of I-65 | 30.14539949 | 1.768217785 | 10.09512383 |
| | | | |
| US 280 Northbound, Birmingham to Auburn | 12.22491391 | 12.6773963 | 0.731861257 |
| US 280 Southbound, Birmingham to Auburn | 15.52650635 | 6.877167575 | 0.950239465 |
| | | | |
| US 431 Northbound, North of Auburn | 2.417505295 | 10.63627135 | 4.417680749 |
| US 431 Southbound, North of Auburn | 2.721514138 | 7.960205359 | 4.667824577 |