Commodity Flow Survey Workshop
Poster Summaries

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1 Development of a Statewide Freight Plan for Alabama Utilizing the Integrated Freight Planning Framework - Michael Anderson

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Abstract:

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) recognized 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. 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 by employing the Integrated Freight Planning Framework developed by the University of Alabama in Huntsville. 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.

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.
2 Validating the CFS with Transearch - Paul Ciannavei

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Abstract:

Transearch is an independent, proprietary data base of national freight flows that can be used to validate the findings of the CFS. While Transearch does make some limited use of CFS information in its annual construction, the 2007 version was developed and completed two years ago, well before the most recent CFS. Consequently, the results can serve as a completely independent cross-check. Transearch has a time-proven methodology that was established over thirty years ago, and has been refined and utilized on an annual basis over this entire time span. While the overall nature of the two data sets is quite similar, portraying market-to-market freight flow volumes by mode and commodity, there are differences in scope, coverage, commodity, and modal identification that need to be accounted for in order to make accurate comparisons. Highlighting these distinctions, and making necessary adjustments to the data, will be a key component of the presentation. Preliminary findings show that there appears to be a very high level of correlation between the two sets of freight flow volume data, with the correspondence being more pronounced at more aggregate levels of geographic market and commodity detail. The presentation will explain where the two data sets differ in terms of coverage, such as the handling of import and cross-border traffic; modal definitions, particularly in the multimodal categories, such as the CFS’s “truck and rail mode” versus how Transearch portrays each portion of this multimodal movement in the appropriate but distinct “truckload” and “rail intermodal” mode categories; and commodity identification, where the CFS uses SCTG (Standard Classification of Transported Goods) and Transearch uses STCC (Standard Transportation Commodity Code). As practitioners, IHS Global Insight has a significant level of experience and expertise in making the appropriate translations and adjustments to the data to facilitate accurate comparisons. The poster presentation will be heavily graphic, with tables, charts and graphs that illustrate the results of the comparisons. The presentation will first explain and highlight where and how adjustments need to be made to address the issues and differences of scope of coverage, modal identification, and commodity definitions. The analysis will begin by looking at more aggregate level comparisons, such as national mode and commodity tonnages, and will then delve into more detailed assessments, such as looking at individual state level results. Because the Transearch development process is geared towards accurately capturing tonnages, the presentation will focus on this particular unit of measure.
3 CFS Findings in FAF2.2 Results and FAF3 Update for Phase-2 of the I-70 Dedicated Truck Lanes Project - Brad Digre

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Abstract:

Background of the research or project:
Congestion along the 4-state portion of I-70 has led to a study of alternatives for new capacity, including truck lanes. FAF2.2 and now FAF3 analysis summaries are, in part, being used to help profile and quantify freight movements to, from, within, and across the corridor region. The context of these summaries includes the ‘corridor region’ in its entirety, as well as from the context of unique ‘metro areas’ that intersect the I-70 corridor. These regions are defined by selected aggregations of FAF zone geographies. The flow summaries and related map output allows the visualization of directional proportional flow volumes in terms of value and tonnage, by commodity, mode, and combinations thereof. This information is deemed important to better understand, visualize, and contribute to the quantification of need, capacity, and sustainability of developing and maintaining a successful dedicated truck lane system along the I-70 corridor.

Methodology or approach:
The 2002 CFS serves as the foundation of the FAF2.2 Commodity Origin-Destination Database and related geography. While complete data dictionaries, user guides, and documentation of methods and sources for FAF3 are forthcoming, FHWA notes that FAF3 concepts are similar to those used in FAF2.2. For the I-70 project, FAF2.2 and now the FAF3 (v3.0.1) are organized into a GIS database system to measure, report, and visualize freight flows to, from, within, and across the I-70 Region. The context of these measures can be shifted from a ‘Corridor’ encompassing region of aggregation to select ‘Metro Area’ regions of aggregation. Phase 1 of the study reported that while the metropolitan area zones are generally consistent with the defined corridor, and represent the bulk of freight movements within the corridor, several other limitations regarding the resulting FAF summaries are recognized. The coarseness of the extra-territorial “out-state” FAF geography zones (i.e., remainder of state zones) can encompass numerous small, medium and sometimes large cities and towns as well as distributed decentralized freight generating developments. Accordingly, those areas where CFS/FAF zones extend far beyond the defined corridor can be assumed to overstate tonnages and values of flows to and from the intersecting portions of the I-70 corridor.

Findings, lessons learned, and observations:
Where CFS/FAF geography is largely unchanged between 2002 and 2007, initial findings seem to show consistency between flow quantities. An improved ease of summarizing the detail of chained movements is also noted, including in-transit movements. Two FHWA FAF3 planning needs include the development of inventory methods to disaggregate FAF region-to-region flows and estimating county-to-county flows with a prescribed set of locally collected supplemental data. Recent research has focused on various methods to disaggregate the information contained within the coarse extra-territorial ‘out-state’ zones. Methods are currently being reviewed to perform disaggregation with respect to the I-70 corridor project. Development of a successful method would culminate in an improved understanding of rural area freight demands and more efficient project identification, development, and build cost.

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Abstract:

Commodity Flow Survey (CFS) Workshop
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Abstract for Poster Submission

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Proposed Title
2007 CFS Hazardous Materials Report Highlights

Background of the Project
The Bureau of Transportation Statistics (BTS) continues to seek improvements and enhancements to the quality of the information produced from its flagship vehicle for data collection, the Commodity Flow Survey (CFS).

BTS specifically asks for information on hazardous materials (the identifying United Nations/North American, or “UN/NA,” number associated with the commodity) in the survey questionnaire. The resulting dataset is the only source of information on the transportation of hazardous materials for the truck and air modes, as well as multimodal shipments.

The hazardous materials data are used to identify flows and exposure by mode. These data inform policy development, rule-making, and program planning as they relate to public safety concerns, security assessments, and emergency response and preparedness.

Methodology
The questionnaire for the 2007 Commodity Flow Survey collected information on the value, weight, commodity, hazardous material identification number, destination, and mode of each shipment entered on the questionnaire. The establishments in the sample include the largest industries within selected geographies, known as “certainty establishments,” as well as those from a probability sample for other industries across the country. Industries that are sampled at a higher rate are called “over-sampled” industries. Industries producing and shipping hazardous materials were over-sampled in the 2007 CFS to produce more precise estimates and more estimates that could be published.

The 2002 CFS yielded 2.6 million shipment records, of which 4.9 percent were hazardous materials, and the 2007 CFS yielded approximately 5 million shipment records, of which 5.6 percent were for hazardous materials. Further processing procedures classify the materials into nine Hazard Classes, and a subsequent stage distinguishes materials that are Toxic by Inhalation (TIH) and/or part of Packing Group I, the level of transport that has the most stringent safety requirements.

The poster submission will focus on the results and selected highlights from the 2007 CFS hazardous materials report.

Findings and Observations
Hazardous materials accounted for 17.8 percent of all tonnage and 9.7 percent of all ton-miles. The highway mode transported 53.9 percent of hazardous material tonnage, and pipeline transported 28.2 percent of hazardous material tonnage reported in the 2007 CFS.
Hazardous materials shipments made by the Petroleum and Coal Products Manufacturing industry (NAICS 324) were primarily made by pipeline, with 56 percent of tonnage, and by truck with 21.3 percent of tonnage. The hazardous materials category of TIH materials includes gases and volatile liquids that are toxic when inhaled. In 2007, shippers transported 26.9 million tons of TIH materials. Packing Group I designates materials that have the most rigorous standards for preparation of transport. In 2007, shippers placed 586 million tons of Packing Group I materials into the transportation system. The total tonnage of hazardous materials estimated shipped in the 2007 CFS is not significantly different from the tonnage shipped.
5 Using Aggregated Federal Data to Model Freight in a Medium-Size Community - Gregory Harris

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Abstract:

In most urban areas, freight volumes are not explicitly considered within the transportation planning process. This is primarily due to the proprietary nature of freight data, causing any freight data that is released, to be highly aggregated. This research examined a multi-tiered methodology to utilize freight data from a federally available, highly aggregated source, within an urban planning model to accurately model truck transportation. A case study is included that demonstrates the modeling methodology for a medium sized urban area, complete with international port, and contains validation results of the freight transportation in the area. The methodology, presented through the case study, tests the application of the federal freight flow database for travel modeling. The case study location selected was Mobile, AL. The case study community has an area population of approximately 350,000, an international port for bulk and container freight, and is positioned at the intersection of Interstate 10 and Interstate 65 – two important freight corridors within the nation. This study examined the use of a publically available, highly aggregated freight flow database and locally gathered industry information to incorporate freight into an urban model. The process required a multi-tiered modeling approach with many trip purposes to complete the endeavor. The validation of the model demonstrates, with proper calibration, the aggregated freight data can be used as a sufficient transportation planning tool. Finally, as a transportation planning tool, the model results justify the application of the FAF2 2035 forecast as a tool for developing future truck forecasts. These future forecast can be used to model future scenarios and examine freight impacts.
6 Freight Knows No Bounds – The issue of cross border metro areas and the accuracy of freight activity data - Derek Jaeger

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Abstract:

1. The topic category addressed:
   a. Future evolution of the CFS / Improvements and methodological changes that can be implemented in the near term to improve CFS
2. Proposed title:
   a. Freight Knows No Bounds – The issue of cross border metro areas and the accuracy of freight activity data
3. Background of the research or project:
   a. Inability to answer questions accurately regarding infrastructure use and market definition
   b. Reporting of CFS data is bound by state borders making data useless for many of the Multi-State Metro Areas (MSMAs).
   c. MSMAs account for 11.5% of the total number of MSAs in the US. Even more astounding is that they account for 15 of the Top 50 Metro areas by population. That's roughly 30% of the 50 largest MSAs in the US.
   d. Portland-Vancouver is just one example of CFS data shortcomings for metro areas due to geographic reporting and suppression
4. Methodology or approach, findings, lessons learned, and observations.
   a. Methodology / Approach: First hand use of data
   b. Findings:
      i. Understatement of total value/weight shipped
      ii. Unable to accurately define market O / D
      iii. Organizations are spending additional money to create products that accurately represent regional commodity flow (i.e. Portland-Vancouver Commodity Flow Forecast)
      iv. How we could use the CFS data: Community and Government Affairs staff could educate the public, legislators, city councilors, and other elected in order to advocate for freight and infrastructure improvements
   c. Lessons Learned:
      i. Located along the Oregon/Washington border, Portland’s MSA is defined as the Portland-Vancouver-Beaverton Region.
      ii. What Vancouver means to Portland: Vancouver makes up roughly 20% of the 2.2 million people living in the Portland-Vancouver MSA. Approximately 10% of employment in Portland is people who drive across the border to work in Portland from Vancouver each day. Nearly all of the region’s freight handling facilities are located on the Oregon side of the MSA
      iii. Data for the Washington part of the metro area is unavailable
      iv. We are training potential users that accurate data is not available and CFS metro area data is not reliable for use
   d. Observations:
      i. Data is already collected why disaggregate it for MSMAs
ii. Increasing the size and scope of the reported region could potentially remove suppression and improve data accuracy

iii. Other data sets, including other Census data sets, already include full MSMA data
   1. Population
   2. Employment/unemployment/labor force
   3. International trade
   a. Metro area exports
   b. Customs district
A Freight Data Architecture Application at the Local Level Using Commodity Flow Survey (CFS) Data - Catherine Lawson

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Abstract:
The need for a freight data architecture has prompted several major studies, including NCFRP 12 Specifications for Freight Transportation Data Architecture, (in press). The establishment of such an architecture will make it possible to link a variety of existing freight data, and other related datasets, together to create a more robust understanding of freight activities. Previous research, using a special tabulation of the 2007 Commodity Flow Survey, revealed a set of associations between the 4 digit North American Industrial Classification System (NAICS) codes and the 5 digit Standard Classification of Transported Goods (SCTG) codes. These associations were found to be very simple, simple, complex and very complex. For those industry groups where the association between industry group (NAICS) and commodities (SCTG) is very simple, or simple, it should be possible to “crosswalk” the NAICS/SCTG codes to the Land Based Classification Standards (LBCS) system and provide local planning agencies with a clearer picture of freight activity at the local level. To test this hypothesis, we used local administrative and primary survey data collected in Albany, New York by the Capital District Transportation Committee (CDTC), the Metropolitan Planning Organization (MPO) for the Capital District as part of one of their “Linkage Studies”. We then visualized this information using geographic information systems (GIS) and the application of the LBCS system. This paper describes the process and outcomes of creating a crosswalk between the LBCS digital information and the appropriate CFS-NAICS-SCTG profiles. The techniques used in this process will be applicable to any other Metropolitan Planning Organization or local municipalities using the same methodology. Recommendations for using the complex and very complex NAICS/SCTG associations will also be discussed.
Abstract:

This poster is about a current research project which will utilize commodity flow databases such like Commodity Flow Survey (CFS) and Freight Analysis Framework (FAF), and is expected to potentially help improve future CFS & FAF constructions. In this research, we will utilize FAF database to determine a typology or systematic classification of supply chains and their relationships to commodity flows. We will determine if the data in FAF2/FAF3 is enough to accurately portray the supply chains. Additional information may be required. Freight flow models like FAF predict freight flows among regions based on commodity forecasts. The commodity forecasts and predicted flows may reflect many different supply chains – some global and some domestic. A general picture of the national supply chain will be useful for predicting commodity flows, because if supply-chain factors change, trade and product flows may also change. A better understanding of supply chain factors will help in understanding the forces underlying trade and product flows and mapping commodity forecasts to interregional freight flows.

By itself, this study is important due to the fact that recent supply chain studies focus on individual companies, or one specific transport mode. The study would focus on the national supply chains and movement of commodities, and how every factor in the chain may affect one another. We hope to conduct the research in two years time. In the first several months, we want to further review FAF 2 and compare to FAF 3 documentation; review the CFS data and note the source of data; and also review various industry and commodity classification codes. This will prepare us to propose a method to analyze a commodity’s supply chain from its flow records contained in FAF2/FAF3. After the supply chain network is done, the result can be used to better understand and improve commodity flows in CFS/FAF databases. In the whole process, the solid understanding of CFS and FAF databases is critical.
Improvements to 2007 CFS Data Quality: Mileage Estimation of Shipping Distances - Michael Margreta

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Abstract:

Background of the Project
The Bureau of Transportation Statistics (BTS) continues to seek improvements to the quality of the information produced from its flagship vehicle for freight data collection, the Commodity Flow Survey (CFS). A critical measurement, calculated from the CFS data, is the mileage traveled by each shipment.

BTS developed an innovative software tool, called GeoMiler, to calculate the distance traveled in miles by mode from the origin to the destination of any given shipment. This new tool for distance estimation uses Geographic Information System (GIS) technology and a robust spatial data network to create a unique and effective routing tool.

Methodology
Improvements in the routing logic – particularly for highway, railway, and airway – were built into GeoMiler software. Through the use of GeoMiler, distance calculations for freight transportation have been refined to better estimate the actual shipment mileage in the following ways:

• The estimate for highway mileage considers the functional class of highway so that the "best path" is now the quickest path, based on the likely use of interstate and other major roadways, and not necessarily the shortest path.
• The estimate for railway mileage now selects a "single best path" from those calibrated with route density information obtained from rail waybills, assigns a specific railroad company at shipment origin, and considers interlinings, ownership, and trackage rights.
• Likewise, the airway mileage estimate now selects a "single best path" from those calibrated with BTS air route information, and chooses airway hubs from the three closest to origin and three closest to destination, considering cargo lifts at hubs and non-stop routes.
• The mileage estimate on an export shipment via airway or waterway now includes the travel distance over domestic airspace, or on domestic waters, up to the U.S. territorial border.
• The mileage estimate on a waterway shipment now includes the drayage mode and distance into the loading dock, thereby converting a shipment that travels primarily waterway into a multiple mode.
• A finer distinction is now provided between inland river and ocean on waterway shipments.

Findings and Observations
The use of innovative software and revised selection criteria, coupled with a more extensive multimodal transportation network, resulted in the following:

• slightly higher (about 3 percent) mileages on both shorter-haul highway shipments and railway shipments;
• somewhat lower (about 10 percent) mileages on airway shipments;
• mileages calculated to the U.S. border for ALL modes of transportation on ALL export shipments;
• inclusion on waterway routings of the modal means (railway drayage or truck drayage) by which the commodity arrived at, and departed from, the waterside dock;
• a finer distinction between where a river ends and an ocean begins, causing river-ocean routings to be classified in other multiple modes.
Abstract:

Project C20 of the Second Strategic Highway Research Program (SHRP 2) is developing a "road map" for improving freight demand models and freight data to better serve the needs of practitioners and decision-makers in agencies such as state DOTs and MPOs. This poster will describe the process being used to develop the road map and some of the key early findings. The road map will be available to begin implementation in early 2011.
Integrating Freight Considerations in Highway Capacity Planning - David Plazak

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Abstract:

Project C15 of the Second Strategic Highway Research Program (SHRP 2) is just underway and is aimed at improving the integration of freight industry needs and concerns into the planning process for additions to highway capacity through collaboration between the private and public sectors. This poster will provide an overview of the project and its planned products.
12 Overview of the FAF3 Freight Flow Matrix Construction Process - Michael Sprung

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Abstract:

The Freight Analysis Framework version 3 (FAF3) is a Federal Highway Administration (FHWA) freight data product which provides a national origin-destination matrix of commodity flows to, from, and within the United States. FAF3 freight flows are reported in terms of both annual tons and annual dollars of freight moved by mode of transportation. Based on the 2007 Commodity Flow Survey (CFS), FAF3 utilizes domestic freight flow characteristics, geographic regions, and the SCTG commodity coding system from CFS. However, many freight flows were not captured by the 2007 CFS due to scope and sample size limitations. Approximately 100,000 establishments were sampled out of some 754,000 freight moving establishments in 2007 and imports are out of scope entirely. To estimate missing data values, the approach taken in FAF3 was to use a combination of a novel Log-Linear Modeling approach (LLM) with an Iterative Proportional Fitting (IPF) routine that also uses additional data inputs to fill in the missing pieces. The complete FAF3 Origin-Destination-Commodity-Mode database is made up of 131 Origins x 131 Destinations x 43 Commodity Classes x 7 Modal categories, for annual tons and dollars. This poster will discuss how the 2007 CFS data was integrated with several additional data sources using LLM and IPF to create a comprehensive FAF3 national freight flow matrix.
The Impact of the CFS in Supply Chain Models for Freight Planning - Chris Dehaan

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Abstract:

The freight planning process is far more complex than that of the urban passenger transport modeling process. The complexity arises from the fact that the movement of freight in the urban area is a part of the logistics chain for a diverse quantity of goods, moved from its point-of-production via warehouse and distribution center to its final destination which might be another industry or the end-users. Commodities categorized as urban freight are very broad and can be subdivided into diverse groups and each group of these commodities have their own set of supply chain models. The approach of disaggregating commodities into separate groups necessitates availability of data for these individual supply chain groups.