



SHRP2 SOLUTIONS

STRATEGIC HIGHWAY
RESEARCH PROGRAM

C20 Product Implementation for Technical Freight
SME Support Services—Phase II

Freight Data Guide for Improved Transportation Planning

Prepared for:
American Association of State Highway and Transportation Officials—AASHTO

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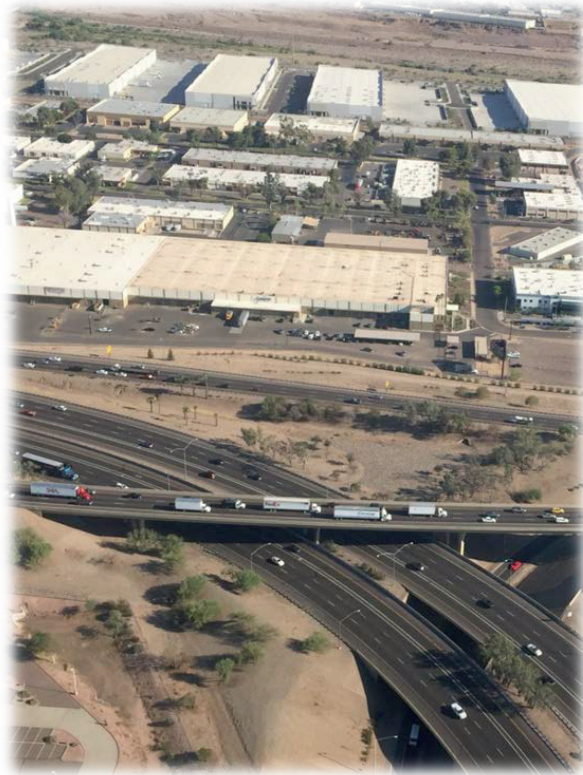


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Summary



During 2016 and 2017, American Association of State Highway and Transportation Officials (AASHTO) and Federal Highway Administration (FHWA) conducted a series of nine regional workshops (plus, an additional pilot workshop) focused on freight data sharing and collaboration as part of an effort to define action plans for the Strategic Highway Research Program 2 (SHRP 2) C20: Freight Demand Modeling and Data Improvement Strategic Plan. Over 135 transportation professionals from States' Department of Transportation (DOT), Metropolitan Planning Organizations (MPOs), and other agencies participated in the workshops overall.

During the workshops, a significant number of participants stated their desire to continue pursuing new opportunities for freight data collaborative activities. They suggested multiple 'next step' action items to improve freight modeling and data sharing activities, one of which was a "user-friendly" data guide that includes a reference for data acquisition decisionmaking and uses/application.

This document is in response to the workshop participants' request for a data guide. This guide is designed to help users who may be less familiar with freight data but who have a need to conduct analyses for their State or region.

Several guidebooks and reports support the understanding of freight data sources and application methods. For example, reports documenting freight data architecture, negotiation and sharing guidelines are also available such as the [NCFRP Report 9: Guidance for Developing a Freight Transportation Data Architecture](#), The [NCFRP 25: Freight Data Sharing Guidebook](#), and [NCFRP 49: New Source of Freight Data for Urban and Metropolitan Mobility*](#).

Purpose of this Document

This guide is designed to supplement the "SHRP2 C20 Regional Workshops: Summary of Themes and Proposed Actions" report by guiding readers through the process of selecting and acquiring data to address common freight issues, needs, and goals.

The guide starts with a decision flowchart to help freight data users **Select the Right Data**. The **Freight Data Cheat Sheet** is meant to help users—especially new freight data users—cut corners directing them to the most relevant data sources to address common questions. The guide also contains **Data Acquisition** (and negotiation) **Tips, Examples of Data Applications**, and a table of **Common Freight Data Sources** in two categories: publicly available and commercial.

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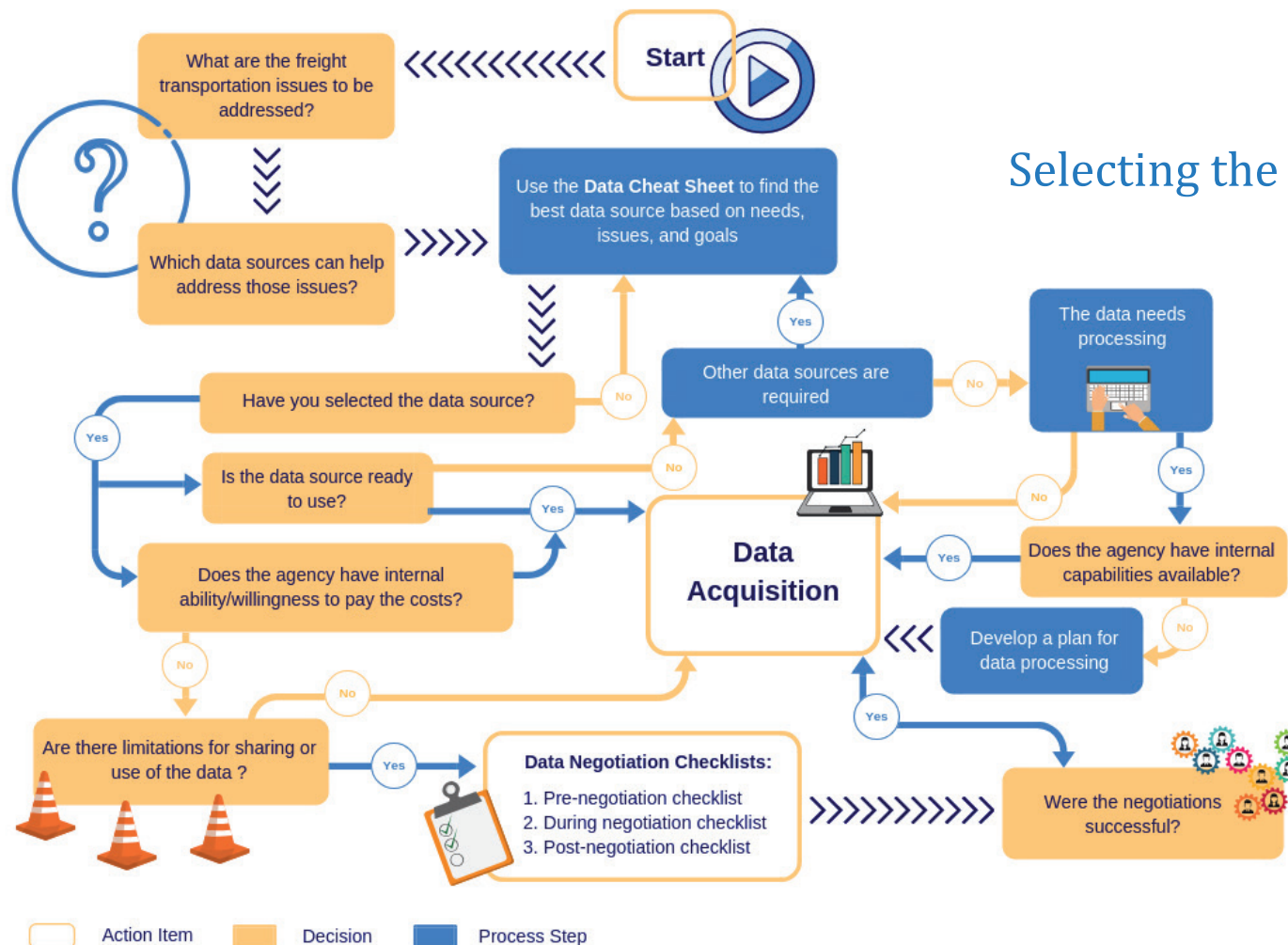


Image source: CPCS

One of the most daunting steps in using freight data—especially for novices—is to know where to start. The adjacent flowchart aims to alleviate some freight data anxiety by walking the user through the data selection process to data acquisition.

The first step in every freight transportation project is gaining an understanding of the issues driving the need for freight data. Only then can an informed decision be made regarding the appropriate data sources and analysis procedures.

Freight Data Cheat Sheet 1

Which data source(s) will help my agency understand ...

Freight Movements

How much freight moves in my region, by volume, by value, by commodity, by mode?

- For overall inbound, outbound, and internal movements: [Freight Analysis Framework \(FAF\)](#), [Commodity Flow Survey \(CFS\)](#), or [Transearch](#). For through movements: [Transearch](#) (truck and rail only) or separate “through” from [FAF](#) network (labor intensive).
- [FAF](#) and [CFS](#) use State and metropolitan geography (and ports of entry). For more granular (county/sub-county) information consult [NCFRP 26](#) to disaggregate. [Transearch](#) can also be purchased to zip code level.
- [Surface Transportation Board \(STB\) Carload Waybill Sample](#) provides rail detailed rail movement data (Caveat: the data set is confidential, and its publication in any form requires STB approval). Caveats: national freight databases are less accurate at the local level (because they are based on disaggregated data/estimates). Validate with the local knowledge and other data sources. Increasingly, agencies are utilizing truck probe data and land use data to quantify local flows (e.g., at the ZIP code or traffic analysis zone (TAZ) level).

How do I break down freight movements by mode?

- [FAF](#), [CFS](#), [Transearch](#) all have modal breakdowns (including multimodal, water, air, and pipeline). For more detail on water, [U.S. army corps of Engineers \(USACE\) Waterborne Commerce Statistics Center](#) and individual ports provide more detail for originating and terminating cargo, but not for origin-destinations (O-D). For air, consult [Bureau of Transportation Statistics \(BTS\)](#) and airports.

What are origins-destinations (by mode)?

- [FAF](#), [CFS](#), [Transearch](#) provide estimated O-D data by mode. Truck probe data can be used to produce O-D data for commercial vehicles. [STB Carload Waybill Sample](#) includes rail O-D data.
- For international trade: consult [US Trade Data Online \(US Census\)](#) for detailed commodity data at the state-level, [BTS Transborder, and Border Crossing](#) data, [Transearch](#) has a flag for port-of-entry, county (and country).
- [PIERS](#), [Datamyne](#), and similar sources provide O-D of international containers, but apply local knowledge to screen errors (usually related to the trip end association with consignee, not necessarily the actual origin/destination facility).

System Condition and Performance

Which assets make up the “freight system”?

- National data, all modes: [BTS Geospatial Data Catalog](#) includes GIS layers for roads, rail, marine, air.
- Highways and Streets: [National Highway Planning Network \(NHPN\)](#) (includes flags for National Highway System (NHS), National Highway Freight Network (NHFN)), [FAF](#), [Highway Performance Monitoring System \(HPMS\)](#) (Caveat: HPMS data coverage and quality can vary widely by state, although there are specific standards for how this data is collected and on what roads the data is collected on). Also consider State DOT or MPO base layers, including the network from travel demand models.
- Railways: [BTS](#) for rail lines, nodes, crossings. Use railroad websites for intermodal and transfer facilities (Hint: much of this information is in State Rail Plans). State rail layers.
- Ports: [BTS](#) for navigable waterways, ports, locks.
- Cargo Airports: [BTS](#) airports.
- Intermodal freight facilities: start with [BTS](#), supplement with other data (e.g., business records, rail terminal data).

What is the condition of the multimodal freight system?

- For highways: use [HPMS](#) and National Bridge Inventory ([NBI](#)) to assess pavement, bridge condition, respectively.
- [Port Performance Freight Statistics Program \(PPFSP\)](#), individual port data (Caveat: the PPFSP provides limited data on infrastructure condition).
- [Association of American Railroads \(AAR\) Class I rail performance measures](#) (speed, dwell time); interviews with short line railroads, State rail plan data.

Is the system underperforming? Where are the bottlenecks, what is their magnitude? What about the overall system?

- State or regional travel demand models may include tools to estimate bottlenecks.
- Agencies are increasingly using truck probe data to identify bottlenecks/hotspots and how they vary by time of day. Use probe data to calculate truck speed differentials (delta between actual speed and the free flow speed) to identify hotspots.
- Truck probe data is available from multiple vendors and from [National Performance Management Research Data Set \(NPMRDS\)](#). Caveat: NPMRDS covers only the NHS.
- For corridors or larger areas (e.g., an entire State or MPO) use truck probe data to also estimate additional measures, including [Truck Travel Time Reliability index](#) and Total Hours of Truck Delay (monitors overall efficiency). Track it over a few years. Use old data to see how things changed, what is degrading most quickly?
- Use truck cost data to estimate impacts of truck delay (one source is ATRI Cost of Congestion Report).

Freight Data Cheat Sheet 2

Which data source(s) will help my agency understand ...

Trends for the Future

How will freight impact our system in the future?

- Conduct a sensitivity analysis using scenario planning (in [NCHRP 750-1](#)) to account for specific issues and demands.
- Purchase a forecast from [IHS Markit](#), [Woods & Poole](#), or some other vendor to examine the future market, population, and economic demand factors.
- Run it through statewide or metro travel demand model to see where the agencies may have freight mobility problems in the future and plan to anticipate future needs.

Freight Generators & Land Use

Where are the freight generators (e.g., clusters of freight-dependent businesses, freight-dependent land use, ports, major terminals, etc.)?

- Use business establishment data (e.g., from [Dunn & Bradstreet](#), [InfoGroup](#)) and other vendors to map out clusters of freight-dependent industries.
- Search Google Earth or similar to validate/identify generators.
- Consult real estate databases (e.g., [COSTAR](#), [CBRE](#)).
- Use land use records (Florida DOT maintains a statewide database of freight facilities over 100,000 square feet developed from tax records).
- Apply the latest freight trip generation rates from [NCHRP 739](#) to estimate trips.
- Use [County Business Patterns](#) establishment data for information on freight-dependent business employment at county or ZIP code level.

Freight Corridors & Last-Mile

How does freight move on the system? What are the major freight corridors?

- [FAF](#) estimates truck flows. [HPMS](#) includes single-unit and combination-unit truck counts and forecasts by link for the NHS. Caveat: [HPMS](#) data quality follows FHWA standards but the quality can vary by State and roadway.
- [Transearch](#) provides network assignment of truck and rail flows and commodities, including through trips. [FAF](#) also includes network assignment. Caveat: national assignments are less accurate at the local level.
- [FRA](#) track density data shows rail volumes (but no breakdown of commodities, O-Ds, or number of trains).
- [USACE Automatic Identification Systems \(AIS\)](#) data can define where ships move (inland, intracoastal, maritime).

What local or last-mile routes do trucks use? How many trucks and what type?

- Use Annual average daily traffic (AADT) or classification counts from State DOT, county, MPO, municipalities.
- Supplement with truck probe data. Use [NPMRDS](#) on NHS. [NPMRDS](#) provides data at 5-minute intervals but for non NHS (local) roads, you will need to use more detailed probe data (e.g., [ATRI](#), [INRIX](#), [HERE](#), [StreetLight](#)).
- Data on small trucks are hard to find. Classification counts can help. Some truck probe data vendors segment the trucks into large, medium, and small classifications.
- Gate surveys (at terminals) and/or roadside surveys provide O-D, commodity, and vehicle data without representative issues.
- Weigh-In-Motion (WIM) and loop detectors can identify truck types and speed in real time (less accurate at lower speed).
- Computer vision is allowing real-time truck counts, volumes, classification for planning, operations, and parking.
- Check with the DOT freight lead or MPO for their data and rationale in establishing Critical Rural and Critical Rural Freight Corridors.

Safety

Where are safety hotspots and what is their cause?

- Obtain State accident database to determine hot-spots of accidents. Consider total accidents and rate.
- Map hotspots by type of accident (e.g., fatality, injury, property damage only).
- For larger geographic areas, monitor truck-involved accidents per 100 million VMT (vehicle miles traveled).
- Consult the [2015 ATRI Truck Rollover report](#) (includes state-level findings).

Where are the rail grade crossing safety problems?

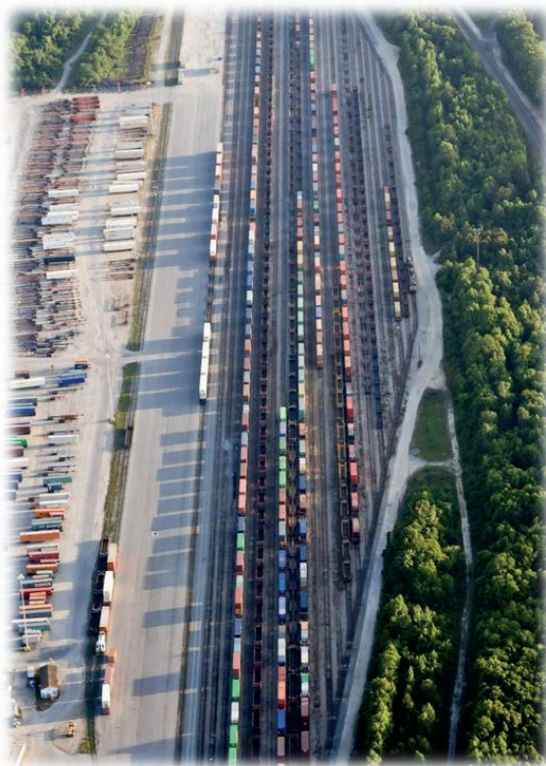
- [FRA Highway-Grade Crossing Inventory](#) data to identify the location, type of accident, frequency to help diagnose and solve issues.
- [FRA Trespass Database](#) has rail-related crashes with pedestrians, bicyclists, including between crossings.

Truck Parking

Where do trucks park (and where are truck parking demand-supply gaps)?

- Utilize truck probe data to identify parking behavior (e.g. length, location of stops).
- Analyze legal vs. informal/illegal truck parking behavior, by time of day and location. Truck parking inventories from Jason's Law Survey provide location and number of parking spaces.
- Utilize automatic detection systems to monitor truck parking utilization in public rest areas.
- Consult with truck stops on spaces and utilization.
- Consult apps ([Trucker Path](#), [Park My Truck](#), [Trucker's Friend](#)) for information on spaces, availability.
- Examine citation for trends in illegal parking.
- Survey drivers, talk to police, freight facilities.
- Use Google Earth to identify locations of legal, informal, and illegal parking.

Freight Data Tables



Freight data sources come in two main categories: those that are publically available and those provided by private vendors for a fee. Publically available data are either readily accessible and downloadable for free, or else are available by request.

The quick reference tables presented in the following pages present freight data sources in a way that allows the user to find applicable sources of information easily. The tables organize the data sources based on their freight analysis applications which include:

1. Freight movement, system condition and performance:

Data related to commodity shipments by mode and origin-destination assist in understanding current and forecasting market changes to prepare for future demands. The [FAF](#) is the most commonly used commodity flow data source, but there are others that provide different geographic granularity and include information on specific commodity types.

Freight system performance measures include safety and travel time factors among others. New data sources that provide near real-time information, or 'probe data', continue to emerge. These data provide valuable information for measuring the performance of the freight transportation system but can require some significant processing to analyze conditions effectively.

2. Freight generator and land use:

The data sources that belong to this category provide information on freight-related business establishments, freight-dependent vendors, and freight origin-destination clusters.

3. Freight corridor and last mile:

Such data sources provide information on major freight corridors and include freight travel patterns, route assignment data, transferring modes, etc. Analysis of the last mile (and also the first mile) of freight delivery (or pickup) typically includes goods movement, travel patterns, and O-D data in a smaller scale for example between freight hubs and personal residences.

4. Safety analysis:

Data sources that provide freight-related incident information belong to this category. Another factor considered in freight safety analysis is the level of exposure to freight movement (for pedestrians and non-freight vehicles) which can be estimated based on the modal break down of road users' data.

5. Trends for the future and truck parking:

These data sources provide a basis for demand modeling and other freight-related projections. One of the critical topics related to future trends is truck parking demand-supply analysis which relies on parking behavior data, vehicle probe data, rest area availability, etc.

Image source: Stock.Adobe.com

Publically Available Data Sources

Data Set		FAF	NPMRDS	HPMS	NHPN	Vehicle Travel Information System (VTRIS)
Provider		FHWA	FHWA	FHWA	FHWA	FHWA
What is it?		Based on the BTS Commodity Flow Survey, the FAF version 4 (FAF4) provides estimates for commodity tonnage and value by regions of origin and destination, commodity type, and mode for 2012. It provides forecasts through 2045 with highway truck flows for 2012 and 2045.	The NPMRDS provides average travel times for passenger and freight vehicles on the National Highway System (NHS). The average travel times based on INRIX data are available at five-minute intervals, and FHWA updates the database on a monthly basis.	This national level highway information system includes data on the extent, condition, performance, use, and operational characteristics of the nation's highways. HPMS also contains system information on NHS system and sample data of other public roads such as minor arterials and collectors. HPMS is consisted of data submitted by each State to FHWA on an annual basis.	Version 14.05 of the NHPN geospatial database tool includes road networks submitted by State DOTs as part of their Highway Performance Monitoring System (HPMS) submittal.	VTRIS provides commercial vehicle weights and classification collected at truck weigh stations. The data are reviewed annually.
Data application	Freight movement & system performance	✓	✓	✓	✓	✓
	Freight generators & land use					
	Freight corridors & last-mile		✓	✓		
	Safety analysis					
	Trends for the future & truck parking					✓
Freight mode		Multimodal	Truck	Truck	Truck	Truck
What can you do with it?		Truck and rail flows data are available through the Data Extraction Tool, for download as a complete database, as well as summary files. The data can be used for national and statewide commodity flow analysis by mode (truck, rail, air, water, and pipeline), flow estimates on the national highway freight network, O-D flow tables for freight weight, value, and ton-miles, and estimates of long distance truck volumes.	The data is referenced to the GPS shapefiles of the NHS to support agencies in planning, analysis, research, and performance measurement using a variety of data retrieval and visualization tools. Average speed and travel time data can be downloaded off-line and users can visualize information such as congestion, trends, performance charts, Buffer Time Index, and Planning time Index on interactive graphics.	The data is used for analysis of highway system condition and performance including pavement condition, congestion, and other traffic information. Other uses of the data are assessing changes in highway performance for planning purposes, MAP 21 and FAST Act performance measures, and Vehicles Miles Travel (VMT) reports for air quality analysis and determinations.	The tool contains roadmap shapefiles in different formats primarily intended to be used as base network for mapping in GIS.	Studies focusing on commercial vehicle weight enforcement methods, calculating pavement and bridge lifespan, estimating highway maintenance costs.
What are the limitations?		Disaggregation of the FAF to smaller geographies has proven to be inaccurate in most instances.	Includes the NHS system while excluding other roadways. The latest version of NPMRDS includes AADT, AADTT, and other data from HPMS.	Limited information on travel and paved miles is included in the summary form for the lowest functional systems.	AADT data updated infrequently.	Data are updated infrequently
Complementary data source		The TRANSEARCH data provides more accurate detail at smaller geographic levels.	The HERE data source can provide incident data.	State travel monitoring programs	HPMS GIS data can improve topology connectivity of data. Statewide regional travel demand models may include NHPN designations.	State WIM data provide consistent information on commercial vehicle weigh enforcement.

Publically Available Data Sources

Data Set		Commodity Flow Survey (CFS)	Air Carrier Statistics	Air Carrier Financial Reports	Trans border Freight Database	Transportation Services Index (TSI)
Provider		BTS	BTS	BTS	BTS	BTS
What is it?		This database provides data on the flow, value, weight, method of transport, and the origin and destination of shipments from/to manufacturing, mining, wholesale, and other selected retail and services establishments. The surveys collect data every five years (years ending in "2" and "7" to comply with the Economic Census).	This database, also known as the T-100 data bank provides segment and market data of international and domestic air carriers certificated in the U.S. The data includes monthly records of air traffic patterns, carrier market shares, and freight and mail cargo flow within the aviation mode. The database is generally six months behind the current date.	Known as the Form 41 Financial Reports, the database provides quarterly collected financial information on large certified U.S. air carriers including balance sheets, cash flow, employment, income statement, and operating expenses.	This database includes three interactive data dashboards: Port and Commodity, State and Commodity, State and Port. Each data dashboard contains commodity flow data which is updated monthly.	Seasonally adjusted data of freight and passenger movements. The transportation service index is available on a monthly basis and measures the output of transportation services.
Data application	Freight movement & system performance	✓	✓	✓	✓	✓
	Freight generators & land use	✓				
	Freight corridors & last-mile	✓				
	Safety analysis					✓
	Trends for the future & truck parking			✓	✓	✓
Freight mode		Multimodal	Air	Air	Multimodal	Multimodal
What can you do with it?		Census Bureau and BTS publish survey summary reports including Hazmat and Export report in downloadable PDF format and the Factfinder tool provides the final estimates for economic analysis and commodity flow study purposes.	Air carrier financial activities and commodity flow analysis based on service type, carrier group, distance group, and origin-destination information. The data is available in monthly, quarterly and annual basis.	Air carrier financial activity analysis. Updates are available on a quarterly basis and can be downloaded separately.	Commodity flow, analysis based on shipment volume, value, and O-D information. Study of cross-border freight activities as well as exports and imports analysis.	Measurement of transportation service output and performance.
What are the limitations?		There are some gaps in commodity type and industry coverage. The five yearly data is unable to capture sudden changes in economic patterns. Geographic coverage is limited.	The data does not include commodity value and other financial information.	Limited information on freight movement	The data is limited to activities at the border and does not include more broad information on international trade. Does not include data at port level.	Limited to historical trends and is difficult to disaggregate.
Complementing data source		FAF and TRANSEARCH			FAF, TRANSEARCH and Commodity Flow Survey	InfoUSA, US Census Economic Statistics

Publically Available Data Sources

Data Set	Pipeline and Hazardous Material Safety Administration (PHMSA)	Motor Carrier Safety Measurement System (SMS)	Motor Carrier Management Information System	USA Trade Online	Annual Survey of Manufacturers (ASM)
Provider	PHMSA	Federal Motor Carrier Safety Administration (FMCSA)	FMCSA	US Census Bureau	US Census Bureau
What is it?	Includes pipeline mileages and facilities as well as hazmat incident and registration statistics. The database is updated annually.	An aggregated source of annual data for commercial vehicle safety violations and crashes. The SMS databases release monthly and were last updated in April 2018.	This database is a collection of operational information systems maintained and published by FMCSA and includes an Online Analysis and Information platform, enforcement management information system (EMIS), and licensing and insurance system. The databases are released monthly.	This online software provides current and historical U.S. import and export data. The U.S. International Trade in Goods and Services Report publishes monthly updates on the data source.	Annual estimates of manufacturing activities such as products, location, employment, payroll, material and cost, inventories, energy consumption, etc. based on the sample survey of approximately 50,000 establishments.
Data application	Freight movement & system performance	✓	✓	✓	✓
	Freight generators & land use				
	Freight corridors & last-mile				
	Safety analysis				
	Trends for the future & truck parking	✓		✓	✓
Freight mode	Multimodal	Truck	Truck	Multimodal	Multimodal
What can you do with it?	Commodity flow analysis and transportation network risk assessment. The databases are available through an interactive search tool and downloadable spreadsheets.	Performance analysis, safety analysis, trend forecasting, and project prioritization.	Commercial vehicle travel demand analysis as well as study of commercial vehicle violations of law, safety analysis, over size/over weight trucks, staff and budget management.	Identifying and evaluating domestic and international markets and performing many other market research tasks. The database can assist the agencies in analyzing domestic and international trade policies.	Bureau of Economic Analysis (BEA) uses the ASM data tables for calculating the Gross National Product (GNP) and GNP weight deflators, input-output tables, producer's equipment and inventories, estimation of the gross domestic product. The data can inform economic forecast and planning/policy-making activities.
What are the limitations?	Publically available data is general and detailed information requires a request to the administration and is provided based on need.			Limited use for local and regional analyses.	
Complementing data source	Private sector pipeline owners/operators. State DOTs that collect HazMat records.		Weight in Motion data	Local economic development data and private sector stakeholder consultations.	

Publically Available Data Sources

Data Set	Survey of Business Owners (SBO)	Service Annual Survey (SAS)	County Business Patterns (CBP)	Vehicle Inventory and Use Survey (VIUS)	Business Dynamic Statistics (BDS)
Provider	US Census Bureau	US Census Bureau	US Census Bureau	US Census Bureau	US Census Bureau
What is it?	This database provides detailed information on economic and demographic characteristics of business owners. The data collection occurs every five years (for years ending in "2" and "7").	The annual data of revenue and other measures collected from companies that primarily belong to the service sector.	Annual data of U.S. businesses, extracted from the Business Register database. Available at the State, County, Metropolitan area, ZIP Code, and Congressional District Levels. The CBP database covers most of the NAICS industries. The data generally has a two year time lag.	Data on the number and types of vehicles, their usage, and vehicle equivalencies. The data provides information on private and commercial trucks registered in the United States. The last data release was in 2002.	Annual measures of employment, establishments opening and closing patterns, and job-related expenses at the state, MSA, and SICs levels. Census Bureau released the 2015 statistics in 2018.
Data application	Freight movement & system performance	✓	✓	✓	✓
	Freight generators & land use				
	Freight corridors & last-mile	✓	✓		✓
	Safety analysis				
	Trends for the future & truck parking	✓	✓	✓	✓
Freight mode	Multimodal	Multimodal	Multimodal	Truck	Multimodal
What can you do with it?	The information is presented in the Census Factfinder interactive search tool by industry classifications, geographic area, and size of firms. The data can inform planning and policy-making decisions.	The SAS reports (published every five years), provide data on revenue and product expenses at the sector, sub-sector and industry group levels.	Suggested data applications are analyzing the economic activities of small regions and market potentials and developing fiscal policies.	Freight demand forecast, cost allocation, fee calculation, highway safety analysis, vehicle equipment market assessment.	Freight demand forecast and cost allocation studies.
What are the limitations?	Limited geographic information about businesses.	Service sector oriented with limited information about other freight reliant industries.	This database does not have employment information on rail transportation, National Postal Service, pension, health, welfare, and vacation funds, trusts, estates, and agency accounts. The database excludes agricultural employment and government employees who don't pay social security taxes.	The smallest geography at the State level. The database is updated infrequently.	Does not have information on self-employed businesses and primarily covers government employment.
Complementing data source	InfoUSA establishment data	Survey of Business Owners	Private data suppliers such as Woods & Poole, InfoUSA, CBRE, etc.	VTRIS	National Establishment Time-Series (NETS).

Publically Available Data Sources

Data Set	Statistics of U.S. Businesses (SUBS)	Fatality Analysis Reporting System (FARS)	Trucks in Fatal Accidents database (TIFA)	FRA Safety Database	Carload Waybill Sample
Provider	US Census Bureau	National Highway Traffic Safety Administration (NHTSA)	NHTSA	FRA	STB
What is it?	Annually updated data of U.S. business establishments and their employment information. The data generally has a 3 year lag time.	National level data of fatal injuries suffered in motor vehicle traffic crashes which is updated annually.	This database provides information on fatal truck accidents across the US.	Monthly railroad safety information including railway crossing accidents. Datasets are available in MS Word and PDF formats.	Annual shipment data of carload waybills for all U.S. rail carriers handling revenue of 4,500 or more carloads. The data is sensitive and is only available to specific types of users. Non-confidential versions are available for public use which disguise the revenues received by the railroads. The most recent data released belongs to the year 2016.
Data application	Freight movement & system performance	✓	✓	✓	✓
	Freight generators & land use				
	Freight corridors & last-mile	✓			
	Safety analysis	✓	✓	✓	
	Trends for the future & truck parking	✓			✓
Freight mode	Multimodal	Truck	Truck	Truck/Rail	Rail
What can you do with it?	Freight demand forecasting, economic development, and developing fiscal policies.	Highway safety analysis through the FARS Query System which provides information by facility with information such as vehicle type, maneuverability, and factors causing the incident.	Analysis of freight activity safety impacts on road safety.	Highway/Railroad safety analysis, performance measurement, accident prediction, risk assessment.	Study of railroad rates and industry dynamics are some of the uses of CWS data. The databases are available as downloadable zip files including the data file, maps of covered regions and users' guide.
What are the limitations?	Does include information on crop and animal production, rail transportation, National Postal Service, Real estates, and agency accounts, private households, and public administration.		Only available for 2000-2010.		Limited geographic availability. Fuel surcharges, and other revenue sources such as port and third party charges are not included in the database.
Complementing data source	CBP data overlaps with this data source	Trucks in Fatal Accidents database, DOT crash statistics	Fatality Analysis Reporting System	Fatality Analysis Reporting System	Rail carrier train volumes

Publically Available Data Sources

Data Set	Energy Information Administration (EIA)	Maritime Statistics Open Data Portal	U.S. Waterways Data	AIS data sharing and vessel tracking	National Agricultural Statistics Service (NASS)	U.S. Economic Accounts
Provider	EIA	US Maritime Administration	USACE	Automatic Identification System hub	U.S. Department of Agriculture	BEA
What is it?	Short-term and annual energy Consumption reports, crude import/export information, and fossil fuel and electricity operating data including demand, generation, and flows. EIA provides the data on a monthly basis for the previous year.	The MARAD open data portal includes port and fleet statistics, trade statistics, surveys, and maritime-related economic information. The latest released document is the 2017 "U.S. coastal tank vessel trade volumes" report.	Annual domestic data of waterborne commerce of the U.S. Includes cargo data, trips data, and vessel operations.	The monthly available data of vessel traffic collected by the U.S. Coast Guard including information such as vessel location, time, type speed, and size characteristics. The latest updates are available for 2016.	Annual State and county level geospatial data of agricultural science and system as well as economic and demographic information of crops, plant, and livestock. The USDA has released its latest datasets for 2017.	This source provides downloadable spreadsheets of GDP, employment, income, and other economic information of different industries. The data is available at the international, national, state, county and MSA levels on a quarterly basis. The first 2018 quarter data release will be on June 21 st .
Data application	Freight movement & system performance	✓	✓	✓	✓	
	Freight generators & land use					
	Freight corridors & last-mile					
	Safety analysis	✓				
	Trends for the future & truck parking	✓	✓	✓	✓	✓
Freight mode	Multimodal	Marine	Marine	Marine	Multimodal	Multimodal
What can you do with it?	The open source database is available through an Application Programming Interface (API) as well as downloadable spreadsheets. The data of consumption and resources have applications in commodity flow analysis.	Data can support port performance analysis, demand and capacity management, maritime forecasting, and cargo movement tracking.	Ports, canals and inland waterway performance analysis and economic development studies.	The data has application in a variety of coastal planning and marine transportation projects.	Commodity flow studies, freight demand forecast, and Origin-Destination analysis.	Transportation industry GDP and economic impact analysis, investment planning, and freight demand management.
What are the limitations?				Data is only available for vessels larger than 300 gross tons. Also, depending on the distance, information about some ships leaving the ports will not appear in the data.		Limited regional data availability.
Complementing data source		PIERS	PIERS			RIMS II can be used to obtain regional I/O tables.

Commercial Data Sources

Transportation agencies often integrate multiple data sources to address limitations of publically available data such as insufficient or uneven mode and geographic coverage. Also, understanding of freight movement and its impacts on a region's economy needs specific data which may not always be available through public data sources. As the process of data collection is often costly, public agencies sometimes rely on commercial data sources to obtain specific information. Commercial data sources are information made available by the private sector data providers in return for a fee.

The following table provides a list of example commercially available data sources to support improved transportation planning and inform regional economic impact analysis, commercial vehicle traffic patterns (using vehicle probe data), freight O-D studies and analysis of freight cluster impacts, freight movement analysis, as well as maritime and rail freight transportation planning. For each category of commercially available data sources, the following table provides a list of similar data that are publically available.

Data Type	Example of Data Sources	The Most Similar Public Data Sources
Regional Economic Impact Models	Various sources such as IMPLAN Group, REMI , BEA RIMS II , TREDIS , etc.	Econworks (FHWA/AASHTO); WISer Economic Impact Analysis Tool (EIAT)
Vehicle Probe Data	Various sources such as ATRI , INRIX , HERE , StreetLight , etc.	NPMRDS; VTRIS; NHPN
Business, Trade Data	Various sources such as Info USA , Woods and Poole Economics , CBRE Establishment data, Datamyne	BDS; SUBS; SAS; COB; CBP
Maritime, Ports and Marine Terminal Data	Various sources such as Windward , Statista , Chartco , PIERS etc.	Maritime Statistics Open Data Portal by MARAD; USACE Waterways Data
Commodity Flow Data	Various sources such as Statista and Transearch	FAF
Railroad and Aviation Data	Various sources such as Association of American Railroads and Airline Data Inc.	FRA Safety Database; Air Carrier Statistics ; Air Carrier Financial Reports

Freight Data Acquisition Considerations

Acquiring data can be as easy as downloading information from a public sector website. However, some sources (public or private) may require a non-disclosure agreement, and many sources require negotiations before they can be accessed. When data negotiation is required, there are three major phases to freight data acquisition: pre-negotiation, during negotiation, and post-negotiation.

As shown in the flowchart on page 4, an agency may decide to collaborate with other organizations in freight data acquisition. However, data acquisition for sharing among multiple agencies requires extensive coordination to ensure meeting the needs and expectations of all partners. It is good practice to develop a list of the important items that must be considered before, during, and after data-sharing negotiations.

1. Pre-negotiation stage:

The pre-negotiation activities depend on the agency's (or collaborating agencies') abilities to define their needs and to process and interpret data. The pre-negotiation checklist includes the following items:

- **Results:** define the desired analysis outcomes.
- **Needs vs. wants:** justify the decision for acquiring/sharing data by reviewing similar studies, evaluating relevant open source data, and taking stock of internal capabilities.
- **Data needs:** define the portion of the selected data source that helps the agency achieve their desired outcomes.

- **Funding availability:** evaluate the agency's funding abilities and options.
- **Choosing a negotiator:** find a data negotiation expert (often not a lawyer) and utilizing an expert in knowledge of data protection and privacy laws.

2. During negotiation:

After developing a customized pre-negotiation checklist, the agency (or collaborating agencies) should seek answers to the following questions:

- What is the agency's purpose for data-sharing?
- How will the agency use the data source?
- What are the agency's institutional barriers to data-sharing?



Freight Data Acquisition Considerations (continued)

- How will the agency protect the data?
- How will the agency contribute to the data acquisition costs?
- How will the agency contribute to the data processing activities?
- What is the agency's timeline for data application?
- How will the agency publish/share analysis results?
- How will the study results benefit other stakeholders?
- Is there a third party involved in the agency's collaborative activities?

By sharing the answers to the questions mentioned above, the parties involved in data acquisition for sharing can eliminate potential data misuse or conflict of interest. Some agencies have used an academic institution as an intermediate party to acquire and maintain sensitive data. [NCFRP 25](#) provides information on other approaches for addressing privacy concerns.

3. Post-negotiation:

Post-negotiation activities among public agencies revolve around data protection methods and legal limitations for data-sharing. Data collaboration activities between public and private agencies should be in line with applicable laws.

The following are the suggested post-negotiation considerations:

- Document data sharing agreements in writing.
- Limit access of shared data to staff involved directly in the data analysis.
- Conduct internal data-evaluation sessions.
- Share evaluation results (if possible) with other parties involved in data collaboration.
- Disseminate the outcomes and best practices (if possible) to support more freight data collaboration in the future.



The legal barriers to freight data sharing are not insurmountable. Due diligence and close collaboration can ensure a successful data acquisition process and set the stage for better freight transportation planning and decisionmaking.

Image source for this page and the previous: www.istockphoto.com

Examples of Freight Data Applications

State DOTs and other public agencies often collect data and conduct studies to address freight transportation needs within their respective regions. These studies are used to forecast future conditions and as the basis of discussions about current or expected problems. Many other agencies have faced similar issues, and the examples provided show how some addressed those through the appropriate use of data. Some of the freight transportation issues an agency may encounter are listed below.

- Improving the efficiency of last mile and last 50-foot connections in urban freight movement.
- Understanding commodity flow by industry and mode to inform system planning and investment decisions.
- Addressing the truck parking shortages.
- Identifying major truck corridors in a specific region and how they affect the region's commerce.
- Synchronizing freight demand and land use planning.
- Identifying current needs and measuring the performance of the freight system.
- Tracking multimodal shipments to understand a region's supply chain.



Some conventional approaches to address freight transportation objectives include developing Statewide Freight Plans, statewide rail plans, regional freight plans and special studies. The following presents examples of these approaches and how the data selected helped the organization address its objectives.

1. Statewide Freight Plans

For states to be eligible for Fixing America's Surface Transportation (FAST) Act National Highway Freight Program funds, they are required to develop a Statewide Freight Plan that includes short-and long-range projects that improve freight mobility and prioritizes those investments in a fiscally constrained investment plan. The [Federal Register 81 FR 71185 \(October 14th, 2016\)](#) provides the complete language for State freight plan guidance.

A Statewide Freight Plan typically includes an analysis of the goods movement within the state, commodity flow over the state's borders, the state's economic makeup (industries), review of the available freight infrastructure and assets, and freight network performance analysis.

As an example, the [Arizona State Freight Plan](#) includes assessment of the following publically available data sources:

- Census Bureau and Bureau of Economic Analysis data for economic analysis,
- BTS data for transportation system analysis,
- FreightFinder businesses data to identify important industries,
- Freight Analysis FAF analysis, and
- Transearch data for a truck volume assessment and forecast.

A Freight Advisory Committee was established to garner ongoing feedback and support from freight stakeholders. The establishment of the Committee provides a permanent body that is responsible for implementation of the plan and continued monitoring of progress, as well as on-going collaboration among the public and private sectors.

*The above image is the cover of Arizona's Freight Plan
Source: www.azdot.gov/freightplan*

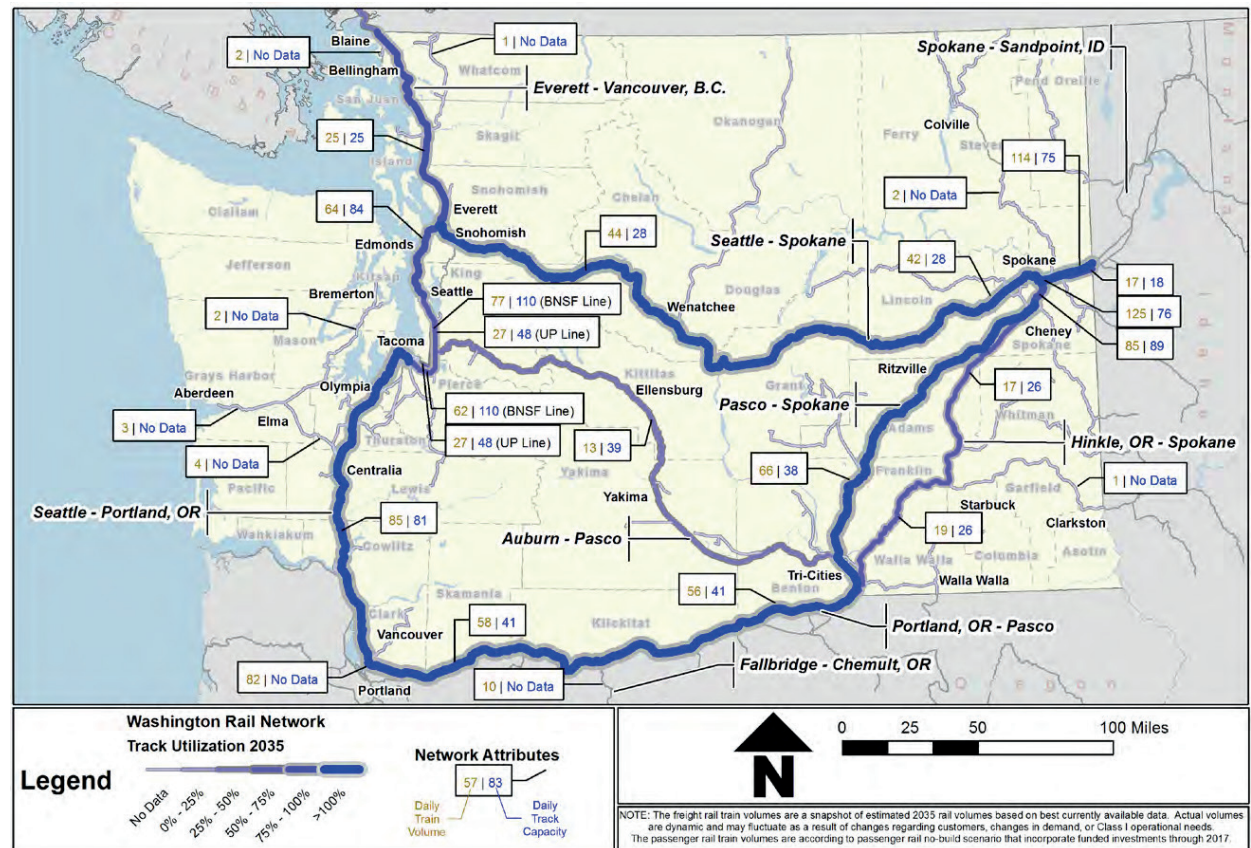
Examples of Freight Data Applications (continued)

2. Statewide Rail Plans

The Federal Railroad Administration provides [guidelines](#) for developing State Rail Plans in line with the Passenger Rail Investment and Improvement Act, but also include freight rail activity. State Rail Plans commonly include an overview of the rail impacts on the state's economy, current rail assets in the state, forecasted demands for rail, strategic plans for the future of the state's rail freight, and a framework for implementing the strategies.

One of the challenges that public agencies face when developing rail plans is lack of communication with the private freight rail operators due to the proprietary nature of their business models. Therefore, the State rail plans often rely on open-source commodity flow data or waybill sample data to assess the current freight flows and forecast future flows on the state's rail network.

The [Washington State 2014 Rail Plan](#) includes a chapter covering the future investment plans and improvements needed for the state's freight rail activities. The plan relies on the use of publically available data such as the Carload Waybill Sample and FAF.



The above image is Washington State's map of rail utilization
Source: www.wsdot.wa.gov/WashingtonStateRailPlan2013

In case of the Washington State Rail Plan, WSDOT used [BNSF's historical train counts](#) and the average daily track capacity to forecast the future growth in the freight rail demand for the State Rail Plan.

Examples of Freight Data Applications (continued)

3. Regional Freight Plans

A common goal among regional freight plans is to improve the mobility and reliability of a region's freight system. Regional freight plans usually focus on freight issues in metropolitan regions such as bottlenecks, freight-related land use, truck parking, etc.

The [2016 Southwestern Pennsylvania Regional Freight Plan](#) is an example of a freight mobility plan focused on the performance of the freight system within the boundaries of an MPO. The Southwestern Pennsylvania Commission (SPC) used information obtained from stakeholder consultations as an input for analyzing the movement of goods in the region and its impacts on the region's economy.

4. Specialized Studies

Although statewide and regional freight plans address large-scale freight issues such as commodity flow movement and some more targeted issues such as freight-related land use planning, they tend to overlook some special freight-related issues such as last mile, last 50-feet of freight delivery, etc.

- **Last mile studies:** These focus on the movement of goods from a freight hub to different destinations in an urban area. The last mile studies are highly interrelated with urban freight management strategies. The recent introduction of truck probe data has assisted in addressing these issues in many regions.



- **Truck parking studies:** These studies are undertaken to assess the truck parking capacity, availability and future demand given the growth in truck traffic. The [National Coalition for Truck Parking](#) supports and encourages collaborative activities among regions for improving truck parking. Primary data collection and probe data have helped to address truck parking issues.
- **Freight cluster analysis:** Understanding the connections between freight generators and destinations as well as truck traffic patterns in a region is critical. The analysis of freight clusters in urban areas is highly interrelated with the last mile studies. Business establishment data provide important inputs to this analysis.
- **Port planning:** These efforts focus on the movement of goods through ports and projecting future capacity challenges. The [Port Planning and Investment Toolkit by MARAD](#) provides guidance for the port planners through modules that address factors and steps in project evaluation, funding and project completion stages.
- **Inland port planning:** These are plans developed for intermodal freight terminals for storage or consolidation of goods within a region. The inland port studies can utilize data used in analyses related to last mile challenges and freight clusters.

The above image is a three wheeler delivery vehicle
source: <http://www.ppmc-transport.org>

Examples of Freight Data Sharing

Applying publically available information and purchasing commercial data are the primary methods of addressing freight data needs. To address the remaining gaps in the data sources, the planners often turn to data collection practices using traditional techniques such as surveying and disseminating questionnaires. However, data collection may become costly especially for smaller transportation organizations.

In a more modern approach, freight agencies enter into collaborative activities for data sharing and effective partnerships with stakeholders to ensure data quality and adequacy. This section provides examples of successful freight data sharing and collaborative activities among freight stakeholders.



Image sources: (left) www.istockphoto.com;
(right) DVRPC's Freight data tool: www.dvrpc.org/webmaps/phillyfreightfinder

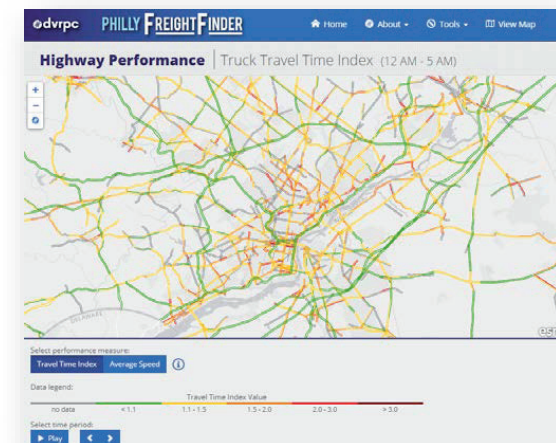
1. Local Data Improvement project by Delaware Valley Regional Planning Commission:

The [Delaware Valley Regional Planning Commission \(DVRPC\)](#) project for improving the region's access to freight data was funded through the SHRP2 C20 program with the primary results being:

- Development of a data collection plan,
- Acquiring data sources for internal use,
- Improving the [PhillyFreightFinder](#) data sharing portal.

One of the primary goals of the study was to establish a portfolio of freight data to support planning, programming and prioritization. To achieve those goals, DVRPC developed a regional primary freight highway network dataset through refining the publically available data at the State and national levels. DVRPC also worked with [Maritime Exchange](#) to identify user agreement options for providing region's public agencies with access to port operation data.

DVRPC purchased Transearch data and made it available to all public agencies in the region, including member counties in New Jersey.

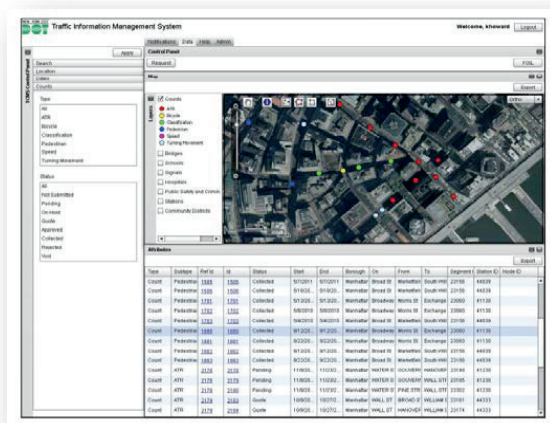
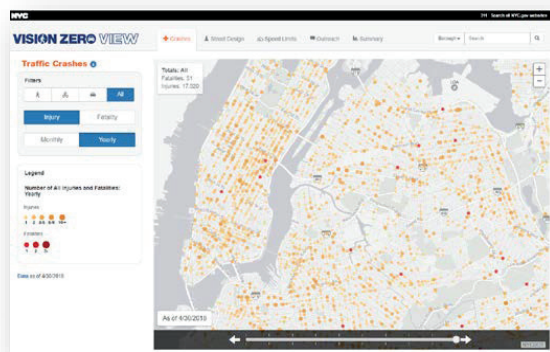


DVRPC's primary tool for freight data sharing is PhillyFreightFinder online data portal. The portal provides access to data of Delaware Valley's port system operations, highway system performance, as well as county freight profiles and trade information. In a successful collaboration, DVRPC worked with [Wilmington Area Planning Council \(WILMAPCO\)](#) to replicate the PhillyFreightFinder portal and launch their freight activity visualization tool.

Examples of Freight Data Sharing (continued)

2. New York City's Urban Freight Initiatives:

To provide efficient and responsible movement of goods in New York City (NYC), the NYC DOT maintains a comprehensive database of freight-related crashes in multiple formats. The NYC DOT receives detailed crash data from New York State DOT (NYSDOT), NYC Department of Finance, and the New York City Police Department (NYPD). The Research, Implementation and Safety team (RIS) at the NYC DOT divides the data into multiple categories including freight-related crashes and provides the results in the [Vision Zero](#) crash data viewer online tool.



NYC DOT also developed the [Traffic Information Management System \(TIMS\)](#) which is an interactive map-based application that provides real-time vehicle count, classification, and speed data, bicycle and pedestrian data, and turning movement information. TIMS application also includes new types of data such as bike sharing and parking information, new links to other data sources such as parking regulations, construction permits, and accident information, and additional reporting interfaces.

Although TIMS application was initially designed based on NYC DOT's need for simplified access to real-time traffic data and elimination of redundant data collection processes, there are access protocols for the non-DOT users to request, view, and download traffic data. NYSDOT, MPOs and other stakeholders in the New York Metropolitan Transportation Council (NYMTC) boundaries, as well as private agencies, are among the main users of TIMS online database.

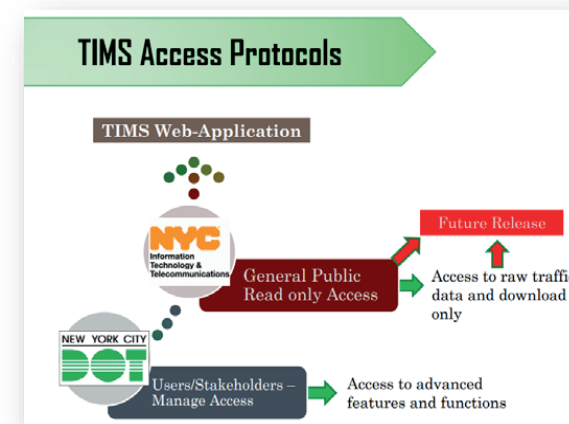


Image sources: (left) <https://www1.nyc.gov/site/visionzero/maps-data/maps-data.page>;
(center and right) <https://ite-metsection.org/pdf/techConference/2012/06TIMSPresentation.pdf>

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Image source: www.istockphoto.com

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