Federal Highway Freight Programs

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Florida Atlantic University
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Outline

• This overview will cover recent activities in freight research at the US Department of Transportation's Federal Highway Administration; technical assistance; and program implementation.

• Key Topics are:
  » State Freight Plans and State Freight Advisory Committees
  » Truck Parking
  » Freight Research and Data Initiatives
Projected Growth In U.S. Freight By 2050

Source: United States Department of Transportation (USDOT), FHWA, Office of Freight Management and Operations, FAF, version 5.4, 2022
Trucks: The Predominant Freight Carrier in the U.S.

Freight demand expected to grow from 19.8 billion tons (2017) to 28.9 billion tons (2050)

- No domestic mode: 1%
- Other and unknown: 1%
- Pipeline: 17%
- Multiple modes & mail: 3%
- Air (include truck-air): 0%
- Water: 5%
- Rail: 8%
- Truck: 65%

No domestic mode: 0%
Other and unknown: 0%
Pipeline: 18%
Multiple modes & mail: 4%
Air (include truck-air): 0%
Water: 4%
Rail: 7%
Truck: 67%

Source: USDOT, FHWA, Office of Freight Management and Operations, FAF, version 5.4, 2022
State Freight Plans and State Freight Advisory Committees
Background: Fixing America’s Surface Transportation (FAST) Act of 2015

• The FAST Act (Public Law 114-94) created a new multimodal freight subtitle (under Title 49) that included a section with 10 requirements for State Freight Plans (49 United States Code (U.S.C.) § 70202) and additional parameters for State Freight Advisory Committees (49 U.S.C. § 70201)

• The FAST Act also added a requirement that States receiving FHWA National Highway Freight Program (NHFP) funding develop a State Freight Plan consistent with the requirements in 49 U.S.C. § 70202

• Every State and the District of Columbia ultimately completed a State Freight Plan

• State Freight Plans were required to be updated every 5 years

• State Freight Advisory Committees were defined and encouraged but not required
State Freight Plans and State Freight Advisory Committees: An Update

- The Bipartisan Infrastructure Law (BIL)/Infrastructure Investment and Jobs Act (IIJA) (Public Law 117-58) added new elements to existing law requiring State Freight Plans as a condition of funding and changed the update cycle to 4 years.
- US DOT issued guidance earlier in 2023 outlining these requirements and recommended improvements.
- Approximately half of the nation’s State Freight Plans have been updated and approved in compliance with the BIL/IIJA.
- Freight plans can be found on the “Freight Professional Capacity Building (FPCB) Browse All Current State Freight Plans” web page by selecting the desired State.
Bipartisan Infrastructure Law/Infrastructure Investment and Jobs Act Changes to State Freight Plans and State Freight Advisory Committees

- BIL/IIJA updates the list of representatives that should be included among the membership of State Freight Advisory Committees and adds a subsection noting the qualifications that State Freight Advisory Committee members should have
  - NOTE: BIL/IIJA does not mandate that States establish State Freight Advisory Committees
- The updated guidance USDOT issued on State Freight Plans and State Freight Advisory Committees on January 12, 2023 encourages States to establish State Freight Advisory Committees and provides suggestions on how to establish these committees
- As of December 2022, 36 State Freight Advisory Committees had met in the previous 6 months
New Bipartisan Infrastructure Law/Infrastructure Investment and Jobs Act Required State Freight Plan Elements

BIL retained the 10 FAST Act elements and added the following new elements:

10. The most recent commercial motor vehicle parking facilities assessment conducted by the State under 49 U.S.C. § 70202(f)

11. The most recent supply chain cargo flows in the State, expressed by mode of transportation

12. An inventory of commercial ports in the State

13. If applicable, consideration of the findings or recommendations made by any multi-State freight compact to which the State is a party under 49 U.S.C. § 70204 (Multi-State Freight Corridor Planning)

14. The impacts of e-commerce on freight infrastructure in the State

15. Considerations of military freight

16. Strategies and goals to decrease:
   A. The severity of impacts of extreme weather and natural disasters on freight mobility
   B. The impacts of freight movement on local air pollution
   C. The impacts of freight movement on flooding and stormwater runoff
   D. The impacts of freight movement on wildlife habitat loss
Strategies and Goals to Decrease the Impacts of Extreme Weather, Flooding/Stormwater Runoff, Local Air Pollution, and Wildlife Habitat Loss

• Each of these 4 sub-bullets must be addressed and for each, State Freight Plans must include both goals and strategies under 49 U.S.C. § 70202 (b)(16)

• Looking for specific references to these items:
  • Example: Overall goal of environmental stewardship—would need to see specific subgoals or objectives related to local air pollution, wildlife habitat loss, etc.
  • Strategies should specifically reference these areas as well

• Going forward, we encourage States to consider including performance measures that address these areas, in addition to common existing measures around safety and state of good repair

• Strongly encourage States to consider environmental justice and equity impacts from freight movements in their State Freight Plans
Truck Parking
Why Is Truck Parking Important?

Just as the trucking industry is critical to the Nation’s economic success and way of life, **SAFE, ACCESSIBLE TRUCK PARKING** is critical to truck drivers.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-haul</td>
<td>Long-haul drivers are on the road days, and sometimes weeks, at a time traveling across the country.</td>
</tr>
<tr>
<td>Staging</td>
<td>Truck drivers picking up and delivering freight at manufacturing plants, warehouses, and distributions centers need a place to park to await their appointment time.</td>
</tr>
<tr>
<td>30-minute break</td>
<td>As part of the federally mandated 30-minute break, the driver must be off duty, meaning they are no longer working and will not have to move the truck for any reason.</td>
</tr>
<tr>
<td>Emergency</td>
<td>Drivers may be impacted by an incident that has either closed or severely congested the roadway and they need a place to park.</td>
</tr>
<tr>
<td>Time off</td>
<td>Independent drivers do not have a company facility to provide parking during time off. They are done with their work week and need a place to park their truck while off-duty.</td>
</tr>
</tbody>
</table>

Source: Cambridge Systematics.
Truck Parking and Safety

Roadway safety is at the heart of the Department of Transportation’s mission and the National Roadway Safety Strategy. Missions and activities of the Department’s modal administrations align with ensuring safe, secure and adequate truck parking. Truck parking concerns are safety concerns for all roadway users and communities, which motivate the Department to:

• Deliver world-class highway and street programs that advance safe, efficient, equitable, and sustainable mobility choices for all while strengthening the Nation’s economy, and
• Reduce fatalities, injuries, and crashes involving large trucks and buses

With 70 percent of domestic freight moved by trucks, when and where to park, sleep and maintain personal security and public safety is an obstacle for drivers and job performance. The underlying causes of crashes include driver fatigue, a contributing factor in 1 of every 7 crashes involving a commercial motor vehicle. And unsafe parking on the roadside, local streets and unsanctioned vacant lots further compromise driver safety.

• 98% of drivers regularly experience problems finding safe parking and personal security is paramount

“Ensuring trucking jobs are good jobs is foundational to a strong, and stable trucking workforce” – Trucking Action Plan
Truck Parking and FHWA’s Mission

FHWA’s mission is to deliver world-class highway and street programs that advance safe, efficient, equitable, and sustainable mobility choices for all while strengthening the Nation’s economy.

- FHWA leads the Jason’s Law Truck Parking Survey and Assessment.
- FHWA leads the National Coalition on Truck Parking, partnering with stakeholder organizations representing trucking, commercial vehicle safety officials, State departments of transportation, and the truck stop industry.
- FHWA has facilitated multiple Truck Parking Workshops with States across the country that bring together truck parking stakeholders to collaborate on solutions.
- FHWA issued guidance on truck parking funding eligibility, stating that truck parking may qualify for 100 percent Federal share as a safety improvement.
- FHWA encourages communication and partnership with private sector truck stop operators and the trucking industry in the siting and development of projects.
Truck Parking and Federal Motor Carrier Safety Administration’s (FMCSA) Safety Mission

FMCSA’s mission is to reduce fatalities, injuries, and crashes involving large trucks and buses. Creating access to designated safe and secure parking is foundational for roadway safety, as commercial driver fatigue is a dangerous risk factor for crashes.

FMCSA works in partnership with FHWA at headquarters and in each division office nationwide.

- Bringing together stakeholders to engage in the state’s planning processes

FMCSA offers the High Priority Grant Information Technology Deployment (ITD) discretionary grant program.

- $25 million per year
- Develop and deploy truck parking information systems
- Most recently FMCSA funded projects in KY and MT
Jason’s Law Truck Parking Survey and Assessment

• Truck parking shortages are still a major problem in every State and region.
• Major freight corridors and large metro areas have the most acute shortages.
• Shortages exist at all times of the day, week, and year, but most occur overnight and on weekdays.
• Challenges exist in funding and maintaining truck parking for public and private sector.
• Truck stop operators need business models that incorporate parking profitably.
• Local government involvement and citizen awareness are needed for effective discussions and realistic plans for truck parking.
Parking Inventory Results

- There are approximately 313,000 truck parking spaces nationally:
  - 40,000 at public rest areas
  - 273,000 at private truck stops

- Between 2014–2019, there was an increase in truck parking spaces:
  - 6 percent increase in public parking spaces
  - 11 percent increase in private parking spaces

Source: FHWA.
Parking Inventory Results

• Current survey includes areas of shortage similar to 2014:
  o I–95 Mid-Atlantic and north
  o Chicago area
  o California

• New shortages emerged in additional locations since 2014:
  o Throughout entire I–95 corridor
  o Pacific corridors
  o States surrounding Chicago region
  o Other major freight corridors

Source: FHWA.
States that reported the highest number of locations with frequent unofficial unauthorized parking tend to have major freight generating areas, major ports, and intermodal facilities.

Source: FHWA.
Commercial Motor Vehicle Safety Agencies

- Unofficial/unauthorized parking occurs mostly on ramps and highway shoulders.
- Unofficial/unauthorized parking throughout the day, but the most frequently between 7PM and 9AM.

Types of Locations with Frequent Unofficial/Unauthorized Parking, 2019

- Ramps: 58%
- Shoulders: 34%
- Parking Lots: 13%
- Local Roads: 10%

Source: FHWA.
State DOT – Observations

• Not many new public facilities or spaces are being developed.

• Challenges exist in planning, funding, and accommodating truck parking.

• Business models and impacts need research and discussion.

• Local government involvement and education is needed.

Source: FHWA.
Truck Drivers – Observations

- Truck parking is most problematic along key freight corridors and in metropolitan areas.
- Drivers need a variety of parking types.
- Design is important in truck parking.
- Safety/security is valued.
- Public rest area closures present challenges.
- Truck spaces need to be reserved for trucks.
- Regulations impact parking.
- Receivers should offer parking on site.
- A public sector/citizen connection to trucks is needed.
- Drivers using apps and smart technology for routing and parking.

Source: FHWA.
Truck Parking by Urban and Rural Areas

The 32 urbanized areas with the greatest freight origins/destinations (38 percent of truck freight tonnage) only have 8.5 percent of truck parking spaces.

- This percentage breakdown reinforces the need for parking near freight destinations and integration of truck parking with regional/local planning.

<table>
<thead>
<tr>
<th></th>
<th>Percent of NHS Truck VMT</th>
<th>Percent of Total Parking Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban areas</td>
<td>47%</td>
<td>34%</td>
</tr>
<tr>
<td>Rural areas</td>
<td>53%</td>
<td>66%</td>
</tr>
</tbody>
</table>

Proportion of Spaces in Rural and Urbanized Areas

- Urbanized areas ≥ 50,000 population
- Urbanized clusters 2,500 – 50,000 population
Truck Parking Activities Update
Section 70202(f) of title 49, United States Code – Commercial Motor Vehicle Parking Facilities Assessments: As part of the development or updating of a State freight plan, each State, in consultation with relevant State motor carrier safety personnel, shall conduct an assessment of:

- The capability of the State, together with the private sector in the State, to provide adequate parking facilities and rest facilities for commercial motor vehicles engaged in interstate transportation;

- The volume of commercial motor vehicle traffic in the State; and

- Whether there exist any areas within the State with a shortage of adequate commercial motor vehicle parking facilities, including an analysis (economic or otherwise, as the State determines to be appropriate) of the underlying causes of such a shortage.
Truck Parking Funding Eligibility – Federal-Aid Formula

States may use the following Federal-aid highway funding programs for truck parking projects as described under section 1401(b) of MAP-21 (Jason’s Law):

- Surface Transportation Block Grant Program (STBG)
- National Highway Freight Program (NHFP)
- Highway Safety Improvement Program (HSIP)
- National Highway Performance Program (NHPP)
- Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT)
- Carbon Reduction Program (CRP)
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
Truck Parking Funding Eligibility – Federal-Aid Discretionary

States and other eligible public entities can also apply for discretionary grants:

- Infrastructure for Rebuilding America (INFRA) Grants
- Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants
- Rural Surface Transportation Grants
- National Infrastructure Project Assistance (Mega) Grants
- Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) to make resilience improvements at truck parking facilities
- Advanced Transportation Technologies and Innovative Mobility Deployment (ATTIMD) Grants for truck parking information and management systems
- Federal Motor Carrier Safety Administration High Priority Innovative Technology Deployment (HP-ITD) Grants for truck parking information and management systems
- Reduction of Truck Emissions at Port Facilities Grants for advanced truck stop electrification systems
- Maritime Administration Port Infrastructure Development Program
Truck Parking Development Handbook

- Presents strategies for integrating truck parking with freight land uses
- Provides tools for estimating truck parking generation and needs
- Identifies benefits of truck parking and benefit/cost and economic impact analyses
- Discusses factors for identifying sites and designing truck parking
- Examines attributes for improving truck parking safety
- Provides case studies of successful truck parking developments

Source: FHWA.
### Parking Demand Considerations

- Where are these land uses located? Are they clustered or spread out?
- Are deliveries and pick-ups confined to a time window?
- Do sites have onsite truck parking?
- Are trucks carrying oversize loads, such as heavy equipment?

### Planning Implications

- Drivers typically want to park as close to their destination as possible.
- Time limitations can result in accumulating staging demand prior to opening hours.
- Onsite truck parking can reduce the demand for parking in other locations, such as rest areas.
- Parking spaces with a larger footprint may not be available at truck stops and rest areas. Some jurisdictions have oversize/overweight curfew hours, causing trucks to park outside of city limits in unauthorized locations.
Key Design Attributes

- Truck trip generation and parking demand
- Access and circulation
- Turning radius
- Parking stall design
- Parking slot type
- Swept path
- Slot density

- Roadway capacity and traffic congestion
- Roadway safety
- Air quality
- Noise emissions
- Light pollution
- Security at facilities

Source: FHWA.
Barriers and Benefits of Onsite Parking

• Barriers
  » Not commonly required today
  » May be limited to new or re-developments
  » State and local zoning powers and policies vary throughout the Nation

• Benefits
  » Concentrates parking supply at point of staging demand
  » Improves driver conditions and potential to become a shipper of choice
  » Site already generates truck traffic and associated externalities

Source: FHWA.
Barriers and Benefits of Shared Parking Facilities

• Barriers
  » Private businesses and property owners may have liability concerns.
  » Security policies at land, air, and water ports may limit when and where parking can occur.
  » Suitable publicly owned sites often need to fulfill other purposes (inspection sites, chain-up lots, weigh scales, park-and-rides).

• Benefits
  » Increases efficiency of parking in a concentrated area
  » Sites can be located near existing centers of truck activity
  » Security, wayfinding, waste, and maintenance are consolidated
Improving Land Use and Zoning Policies

• Incorporate truck parking into Traffic Impact Assessments (TIA):
  » Truck trips can generate parking near the site (staging), as well as farther away (staging or rest breaks).
  » TIAs should include parking onsite and off-site to address changing demand for parking.

• Revising Ordinances and Policies:
  » Zoning code should require minimum truck parking onsite, similar to minimum parking requirements for residents, employees, or customers
  » Handbook proposes language options based on square footage, employees, and loading docks
  » Implemented by Township of Upper Macungie, Pennsylvania
Factors Generating Truck Parking Demand

- Commercial and industrial land use
- Intermodal generators
- Through-truck traffic

Source: Cambridge Systematics.
### Intermodal Generators

<table>
<thead>
<tr>
<th>Parking Considerations</th>
<th>Planning Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Are deliveries and pick-ups confined to a time window?</td>
<td>• Time limitations can result in accumulating staging demand prior to opening hours.</td>
</tr>
<tr>
<td>• How much freight is moved to/from trucks? For existing facilities, has this volume</td>
<td>• Growth in containerized freight on trains and larger vessels can lead to increased</td>
</tr>
<tr>
<td>changed since initial facility design?</td>
<td>truck traffic.</td>
</tr>
</tbody>
</table>

Time limitations can result in accumulating staging demand prior to opening hours.

Growth in containerized freight on trains and larger vessels can lead to increased truck traffic.
## Truck Parking Demand

### FACTORS DRIVING DEMAND FOR TRUCK PARKING

<table>
<thead>
<tr>
<th>Federal Hours of Service (HOS) Regulations</th>
<th>Warehousing Logistics Inventory Management</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory 10 hours of rest following 14 hours on duty</td>
<td>Staging for pickup/delivery windows at factories and warehouses</td>
<td>Local parking for deliveries to replenish supplies and materials</td>
</tr>
<tr>
<td>Required 30-minute breaks at prescribed intervals</td>
<td>Local parking for deliveries to replenish supplies and materials</td>
<td>Unplanned parking due to breakdowns, traffic incidents, or weather-related closures</td>
</tr>
</tbody>
</table>
A New Tool to Estimate Truck Parking

• Trip generation and truck parking studies were combined to estimate parking demand based on two inputs:
  » North American Industrial Classification System (NAICS) code
  » Number of employees

• Primary data sources:
  » Maricopa County Association of Governments (MAG) Truck Parking Study
  » Texas A&M Transportation Institute (TTI) case studies in Texas and Maryland

Source: Cambridge Systematics.
Case Studies on Truck Parking Demand Estimation


- Maricopa County Association of Governments (MAG) Truck Parking Study, 2021

- Winston-Salem Innovations in Local Freight Data

- Texas A&M Transportation Institute (TTI) Truck Trip and Truck Parking Generation Study, 2021
  - Houston, Dallas, and San Antonio, Texas
  - Salisbury and Hagerstown, Maryland

Desired Safety Features of Truck Parking Facilities

- **Ingress and Egress Ramps of Sufficient Length**
- **Site Design Allowing Efficient Flow of Traffic**
- **Fencing or Other Barrier Surrounding the Lot**
- **Sufficient Lighting**
- **Security Cameras or Lot Attendants**
- **Secure Bathrooms**

Source: Cambridge Systematics.
## Discussion of Community Impacts of Truck Parking

<table>
<thead>
<tr>
<th>BENEFITS</th>
<th>CONCERNS</th>
</tr>
</thead>
</table>
| • Enhances roadway and driver safety  
• Reduces unauthorized parking  
• Reduces roadway maintenance costs  
• Increases competitiveness | • Noise  
• Emissions  
• Community safety  
• Trash and litter  
• Low revenue generation  
• Community perception |
Mitigating Community Impacts of Freight Intensive Land Uses

• Avoid sites near residential land uses, schools, and other community amenities.

• Co-locate with existing industrial developments.

• Prioritize locations directly adjacent to major highways.

• Assess the ability of access roadways to accommodate large trucks.

• Consider how truck traffic may impact other critical transportation services.

• Evaluate how siting choices will positively or negatively impact the equitable distribution of transportation externalities.
Freight Data under the Bipartisan Infrastructure Law
<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Requirement</th>
<th>Possible Data Source</th>
<th>Data Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Commercial motor vehicle parking facilities assessment</td>
<td>Truck parking surveys</td>
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<tr>
<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Areas with a shortage of adequate parking and underlying causes</td>
<td>Truck Parking Development Handbook, Truck GPS data</td>
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</tr>
<tr>
<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Supply chain cargo flows by mode of transportation</td>
<td>Freight Analysis Framework (FAF)</td>
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<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Commercial ports</td>
<td>U.S. Army Corps of Engineers Waterborne Commerce Statistics</td>
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<tr>
<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>E-commerce</td>
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<td>E-commerce impacts on demand and delivery</td>
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<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Military freight</td>
<td>Strategic Highway Network (STRAHNET)</td>
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<tr>
<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Impacts of extreme weather and natural disasters on freight mobility</td>
<td>Federal Emergency Management Agency (FEMA) After Action Reports</td>
<td>-</td>
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<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Impacts of freight movement on local air pollution</td>
<td>Environmental Protection Agency (EPA) Motor Vehicle Emission Simulator (MOVES)</td>
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</tr>
<tr>
<td>49 U.S.C. 70202</td>
<td>State Freight Plan</td>
<td>Impacts of freight movement on wildlife habitat loss</td>
<td>-</td>
<td>Wildlife data</td>
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</tbody>
</table>
### Freight Data Needs for Freight Planning in the Bipartisan Infrastructure Law (2/2)

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Requirement</th>
<th>Possible Data Source</th>
<th>Data Gap</th>
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<tbody>
<tr>
<td>23 U.S.C. 117</td>
<td>Infrastructure for Rebuilding America (INFRA) eligible projects</td>
<td>Wildlife crossing</td>
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<td>Wildlife data</td>
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<tr>
<td>23 U.S.C. 117</td>
<td>INFRA eligible projects</td>
<td>Throughput efficiency of border crossings</td>
<td>Customs and Border Protection Border Wait Times</td>
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<tr>
<td>23 U.S.C. 117</td>
<td>INFRA additional considerations</td>
<td>Freight resilience to natural hazards or disasters</td>
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<td>Natural disaster effects on freight</td>
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<tr>
<td>23 U.S.C. 117</td>
<td>INFRA &amp; National Highway freight Program (NHFP) eligible projects</td>
<td>Marine project to reduce on-road mobile source emissions</td>
<td>Environmental Protection Agency (EPA) Motor Vehicle Emission Simulator (MOVES)</td>
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<tr>
<td>23 U.S.C. 175</td>
<td>Carbon Reduction Program (CRP) eligible projects</td>
<td>Efforts to reduce environmental and community impacts of freight movement</td>
<td>EPA MOVES Federal Highway Administration (FHWA) Traffic Noise Model (TNM) FHWA Database for Analysis of Noise and Air Quality (DANA) tool</td>
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<tr>
<td>BIL 11402 (23 U.S.C. 149 note)</td>
<td>Reduction of truck emissions at port facilities</td>
<td>Reducing emissions at ports and intermodal transfer facilities</td>
<td>EPA MOVES</td>
<td>-</td>
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<tr>
<td>Other</td>
<td>-</td>
<td>Complete streets, curb space, last-mile delivery</td>
<td>-</td>
<td>Freight impact on local roads</td>
</tr>
</tbody>
</table>
How Is FHWA Using Freight Analytics?

**Existing Data and Tools**
- FAF
- Truck Parking
- Freight Mobility Trends
- Highway Performance Monitoring System (HPMS)
- National Performance Management Research Data Set (NPMRDS)

**New Research**
- Vehicle Inventory and Use Survey (VIUS)
- TSW Research Roadmap
- Freight Fluidity
- National Behavior-Based Freight Model
- Freight Traveler Information Systems
Infrastructure Conditions and Performance
Freight Mobility Trends and Performance

• National goals and performance management measures for freight movement under 23 U.S.C. 150, including truck travel time reliability (TTTR)

• Freight mobility trends:
  o Freight mobility performance indexes
  o Truck carbon dioxide (CO₂) emissions
  o Freight bottlenecks

• Methods to improve freight reliability and bottlenecks:
  o Freight-related transportation systems management and operations (TSMO)
  o Congestion at bottlenecks
  o Performance-based planning process

Freight Mobility Trends: https://ops.fhwa.dot.gov/freight/freight_analysis/mobility_trends

Source: FHWA Freight Mobility Trends.
The C&P Report includes several indicators of conditions, performance, and safety.

The last published edition (24th) also included information on National Highway Freight Network (NHFN) trends, FHWA initiatives relating to NHFN data improvements, and other topics.

### 24th Edition NHFN C&P Indicators by National Goal Areas

<table>
<thead>
<tr>
<th>NHFP Goal Areas Pertinent to NHFN</th>
<th>Select Indicator</th>
<th>Indicator Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of Good Repair</td>
<td>Pavement condition</td>
<td>Conditions</td>
</tr>
<tr>
<td></td>
<td>Overall ride quality and ride quality by roadway functional class</td>
<td></td>
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<tr>
<td></td>
<td>Individual pavement distresses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge overall condition and condition by roadway functional class</td>
<td></td>
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<tr>
<td></td>
<td>Bridge deck condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge superstructure condition</td>
<td></td>
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<tr>
<td></td>
<td>Bridge substructure condition</td>
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<tr>
<td></td>
<td>Culvert condition</td>
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<tr>
<td>Congestion, Economic Efficiency, Productivity, and Competitiveness</td>
<td>Peak-period congestion on National Highway Freight Network (NHFN)</td>
<td>Performance</td>
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<tr>
<td></td>
<td>Peak-period congestion on high-volume truck portion of NHFN</td>
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</tr>
<tr>
<td></td>
<td>Annual average travel speeds for top 25 domestic freight corridors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel time reliability index for top 25 domestic freight corridors</td>
<td></td>
</tr>
<tr>
<td>Safety, Security and Resilience</td>
<td>Number of fatal crashes and fatalities</td>
<td></td>
</tr>
</tbody>
</table>
C&P Highlights: Condition

• Most NHFN mileage was in “good” condition (assessed in terms of overall ride quality and individual pavement distresses).

• NHFN interstates had most mileage rated “good” for ride quality, while minor collectors had least mileage rated “good” for ride quality.

• More than half of NHFN bridges (53 percent) had a “good” overall condition rating.

NHFN Pavement Condition Based on International Roughness Index, 2016
C&P Highlights: Performance

• Most recurring, highly congested conditions on NHFN occurred in major metro areas:
  o High-volume truck portions of NHFN experienced more congested conditions.
• Between 2011 and 2016 for the top 25 domestic freight corridors on the NHFN:
  o Annual average travel speeds generally increased*
  o Truck travel reliability generally decreased**
• Fatal crashes on the NHFN increased from 2014 (3,633) to 2016 (4,447)

*52 percent of corridors experienced a speed increase over this period
**72 percent of corridors experienced a decrease in truck travel reliability

Truck Parking Development Handbook

- Presents tools and strategies for local planners and officials to integrate truck parking with freight land uses
- Provides tools for estimating truck parking generation and needs
- Identifies public benefits of truck parking and benefit cost and economic impact analyses
- Discusses factors for identifying sites and designing truck parking
- Examines attributes that ensure truck parking areas are safe
- Provides case studies of successful truck parking developments

Truck Parking Webpage:
https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking

Source: FHWA.
Freight Operations

Source: Maritime Administration (MARAD).
Freight Analysis Framework (FAF)

What is moving?
• Types of commodities

Where is it moving?
• Between metropolitan areas
• Between States
• Between U.S. and foreign countries

How much is moving?
• Tons, ton-miles, and value of goods moved
  (including by truck, rail, air, and water)

How much is expected to move (flow scenarios)?
• Base year estimates
• 30-year forecasts

FAF Provides a Comprehensive Picture of Freight Movement in the U.S.
• Includes information on:
  o Weight and value of freight transported
  o Types of commodities & transport mode
  o Freight truck routings
• Offers tools to customize data for analysis
• Updated every 5 years in conjunction with economic census
Applications of FAF

**FAF can help:**
- Inform freight analysis and decisionmaking
- Improve understanding of current and projected future freight needs
- Enhance understanding of current and projected future freight movement
- Illuminate links between freight and economic activity
- Improve freight performance monitoring and management
- Better visualize freight flows and other freight data

**Examples of FAF Use Cases:**
- Support development of, or updates to, the State Freight Plan
- Help identify commodity corridors and trade lanes
- Provide control totals for modeling needs to understand State/regional freight connectivity
- Help conduct macro-level analysis for drafting grant applications
FAF Projected Total Flows by Growth Scenario

Source: USDOT, FHWA, Office of Freight Management and Operations, FAF, version 5.2.
## Updates with Freight Analysis Framework Version 5 (FAF5)

### Origin-Destination Flows
- New data base year (2017)
- Updated data to horizon 2050 with 5-year increments
- New short-term forecasts for 2020, 2022, and 2023
- Revised annual estimates for 2018 and 2019
- Updated base year data and forecast data development processes

### Highway Network Flows
- Updated model highway network (dualized Interstates and included ramps)
- Added new truck flows by commodity groups
- Added new truck flows (domestic, imports, and exports)
- Overhauled highway network model and routing algorithms
- Added new customized model software and analysis capability

### Special Products and Data Tools
- Updated features for web-based data products
- Added new FAF data visualization tools
- Added new national truck flow maps
- Added new State-level truck flow maps
- Added new summary tables by FAF zones
- Added a new special tabulation of CFS 2017 for small areas
- FAF Webinars

CFS = Commodity Flow Survey
New FAF5 Maps: Trucking Corridors by Commodity

Download Packaged National and State Level Trucking Corridor Maps: https://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/index.htm

Source: FHWA.
New FAF5 Web Tool
Specialized Visualization Dashboard

Custom Freight Dashboard: Release in 2023

Source: USDOT, FHWA, Office of Freight Management and Operations, FAF, version 5.2.
Updated Features: Existing Web-Based Data Tool

**Extraction**

- Provides subset of data based on user selection

**Tabulation**

- Provides ability to further customize tabulation of the selected subset data.

**Visualization**

- Provides ability to create bar/pie charts, Sankey diagrams, origin-destination flow maps, etc.

Source: USDOT, FHWA, Office of Freight Management and Operations, FAF, version 5.3.

**Custom Summary Tables on the Web**
https://faf.ornl.gov/faf5/dtt_total.aspx
# FAF5 User Resources and Tools

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Populated Tables</strong></td>
<td>- <a href="https://faf.ornl.gov/faf5/SummaryTable.aspx">https://faf.ornl.gov/faf5/SummaryTable.aspx</a></td>
</tr>
</tbody>
</table>
| **Pre-Populated Maps** | - National maps: https://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/index.htm  
  - State maps: https://ops.fhwa.dot.gov/freight/freight_analysis/state_info/index.htm        
  - Future years maps under publication review                                                  |
| **Truck Flow Data**   | - FAF Highway Assignment Results Section: https://ops.fhwa.dot.gov/freight/freight_analysis/faf/ |
| **Web Based Tool**    | - Summary Tabulation Tools: https://faf.ornl.gov/faf5/dtt_total.aspx                        
  - Visualization Tool for Dashboard: Under Development (release by March 2023)               |
| **Documents**         | - Latest FAF Technical Documents section: https://ops.fhwa.dot.gov/freight/freight_analysis/faf/  
  - FAF Forecast Report: Under Publication review                                               |
| **Webinars**          | - FAF5 Webinar July 2022: Overview of FAF5 Base Year Data and Forecast Data  
  - FAF5 Webinar: Overview of Highway network Assignment Model: October 20, 2022               |
Vehicle Inventory and Use Survey (VIUS)

What type of trucks are included?
• Pickups
• Sport utility vehicles (SUVs)
• Minivans
• Light Vans
• Straight Trucks
• Truck Tractors

Examines Physical and Operational Characteristics of Trucks Registered in the U.S.
• Includes information on:
  o Vehicle technologies and configurations
  o Vehicle operations and commodities carried
• VIUS webpage: https://www.bts.gov/vius

What is the most recent data?
• VIUS 2021 is completed – data release by Fall 2023

When was the last VIUS completed?
• Latest available VIUS data is for year 2002; Summary reports in PDF format
New VIUS Web Tool: Specialized Visualization Dashboard

Increase Data Access and Create Custom Summary: Release in 2023

Source: USDOT, FHWA, Office of Freight Management and Operations.

### Vehicle Inventory Use Survey (VIUS)

#### Operational & Trip Attributes

- **Business**
- **Products Carried**
- **Primary Jurisdiction**
- **Hazardous Material Carried**
- **Months Operated**
- **Range of Operation**
- **Annual Miles**

**Instructions**

Hover over the plus signs (+) to view the VIUS attribute to which the marker corresponds. Click on the plus sign (+) to view the data in the table to the right. Use the filters above the table to alter the table.

---

#### Business: National

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<thead>
<tr>
<th></th>
<th>1992</th>
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<th>2002</th>
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<td>Agriculture</td>
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<td>Forestry/Lumbering</td>
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<td>Agriculture, Forestry, Fishing, or Hunting</td>
<td>2,239.9</td>
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<tr>
<td>Mining or Quarrying</td>
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</tr>
<tr>
<td>Mining</td>
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<td></td>
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<tr>
<td>Utilities</td>
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<td>663.8</td>
<td>679.3</td>
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<td>Construction</td>
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<tr>
<td>Manufacturing</td>
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<td>735.9</td>
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<tr>
<td>Retail Trade</td>
<td>1,950.9</td>
<td>2,243.8</td>
<td>1,530.5</td>
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</table>

Note: Year-to-year comparisons are not recommended. Comparability of estimates may vary across survey years due to changes in category definitions. Values within a single year may not be mutually exclusive and may not sum to equal the total number of survey observations. Comparability of estimates may vary across survey years due to changes in category definitions. Graphic does not represent all truck types; survey for illustrative purposes only.

Download the Data and Views

Use the icons to the right to download the data or capture images used in this view. For more information about VIUS data documentation and other FHWA freight products, visit [https://www.fhwa.dot.gov](https://www.fhwa.dot.gov).
Freight Fluidity: Advancing Multimodal Measures

- Bring a multimodal perspective to freight performance measurement
- Assess end-to-end performance of an individual freight trip or shipment moving across multiple modes and jurisdictions
- Support strategic transportation system investments that directly improve supply chain performance and economic competitiveness
Tracking Cross-Border Mobility: Truck Volume and Crossing Time Data

Border Wait Time Information
• Vehicle speed and travel time data collected at approach to border crossing
• Provide drivers with information on delay at border crossing

Benefits
• Drivers schedule border crossings to avoid congestion
• Truck drivers directed to parking areas when weather creates long delays

Limitations
• Systems and data not consistently implemented at all border crossings

Source: FHWA.
Freight Traveler Information Systems

• Freight-specific dynamic travel planning and performance using real-time information on:
  o Gate wait times at port
  o Traffic conditions, incident alerts, work zones
  o Performance monitoring elements

• Intermodal drayage operations optimization using freight information exchange systems drayage and container load matching to:
  o Schedule best time for pick-up or drop-off
  o Optimize operations based on port terminal conditions

Source: FHWA.
FHWA Pilot of Freight and Fuel Transportation Optimization Tool (FTOT)

FTOT Overview:
- Flexible scenario testing tool
- Created by the Volpe Center in support of the Federal Aviation Administration, Department of Energy, and the Office of Naval Research
- Being considered for adaptation to freight planning

FTOT Features:
- Optimizes routing and flows to maximize delivery and minimize cost
  - Uses a Geographic Information System (GIS) module and an optimization module
  - Multimodal network: road, rail, waterway, pipeline, multimodal facilities

FTOT Available at:
https://github.com/VolpeUSDOT/FTOT-public

Optimizing flow and routing of raw materials (e.g., wood) to processing locations and then to the destination to fulfill demand.

Source: Dane Camenzind, Washington State University, used with permission
FTOT Explores Optimal Solutions to Freight Scenario Questions

**Multimodal Transportation Infrastructure**

What happens if…
- Transportation link(s) are added or removed (e.g., bridge)?
- Infrastructure is added or removed (e.g., inland port, intermodal facility)?
- Key node(s) get knocked out due to a disruption (e.g., a flood)?

**Supply Chain/Industry Infrastructure**

What happens if…
- Supply chain facilities change (e.g., new storage facility, mill, refinery)?
- Steps in the supply chain change (e.g., new processing step)?
- FTOT generates candidate facilities along the supply chain (e.g., processors)?

**Demand and Supply**

What happens if…
- Supply of material changes (e.g., more production)?
- Facility attributes change (e.g., expand capacity) to permit more or less flow?
- Demand changes (e.g., City X wants more of a commodity than City Y)?
New Tools and Training

Source: FHWA.
Freight Professional Capacity Building (FPCB) Program Website

- Freight data library
- Freight data tools
- Freight planning toolkits
- Freight performance measures
- Innovative supply chain analyses
- TSW resources
- Peer-to-peer programs
- Noteworthy practices
- Education and trainings

FPCB Webpage: https://fpcb.ops.fhwa.dot.gov/default.aspx

Source: FHWA.
Freight Data on FPCB

• Freight data tools
  o FAF5 Data Tabulation Tool
  o NHFN Visualization Tool
  o Freight Mobility Trends Tool

• Freight data library
  o Freight Conditions & Performance
  o Freight Facts and Figures
  o Economic Data
  o Energy/Resiliency
  o Freight Data Classification Systems
  o Freight Flows
  o General Transportation Data
  o Trade Data
  o Transportation System Activity Data

• Innovative Supply Chain Analysis

FPCB Webpage: https://fpcb.ops.fhwa.dot.gov/default.aspx
Source: FHWA.
National Highway Freight Network (NHFN) Visualization Tool


Source: FHWA.
Research Relating to Truck Size and Weight
Current Research (1/3)

DOT modal administrations are working to advance long-term Truck Size and Weight (TSW) research including:

• Updating critical information sources, such as expanding use of weigh-in-motion (WIM) technology

• Updating the Freight Analysis Framework (FAF), which integrates data from all modes of transportation to create a comprehensive picture of freight movement

• Re-establishing the Vehicle Inventory and Use Survey (VIUS), the Nation’s principal dataset on physical and operational characteristics of the U.S. light and heavy truck population

What is Vehicle Size and Weight Research?

TSW research includes development of data, models, analytical tools, methodologies, and information sources that support analysis of topics such as:

• Pavement distress
• Freight flows
• Physical and operational characteristics of truck configurations
• Disaggregation of vehicle miles traveled based on truck classifications and weight
Current Research (2/3)

• Developing a pavement distress evaluation model and creating analytical tools based on vehicle classifications and weights
• Conducting the Large Truck Crash Causation Study to analyze safety implications from truck crashes
• Continuing to research impacts of commercial vehicles on bridges
• Advancing the Long-Term Pavement Performance Program with recent publications such as *Facilitating Analysts’ Use of Traffic Data from the Long-Term Pavement Performance Program*
• Improving access to TSW data by creating and maintaining a TSW Enforcement Data portal on the USDOT Public Data Portal website
Current Research (3/3)

• Understanding oversize/overweight (OS/OW) vehicle accommodation in work zones
• Developing products from the recommendations of the Emergency Route Working Group to improve the routing of trucks responding to emergencies
• Researching methods to prevent bridge strikes by OS/OW vehicles
• Improving system performance by promoting automated permitting systems
• Evaluating data on the operation of twin 33-foot trailers in the United States to gain insight into potential impacts of this commercial vehicle configuration on the National Network
Annual TSW Enforcement Data

• Data reported by States in Annual Certifications is posted on USDOT’s Data Hub.

• Dataset consists of TSW enforcement data for 2019 to 2021, including:
  o Number of trucks weighed
  o Number of violations
  o Number of oversize/overweight permits

Source: FHWA.

https://datahub.transportation.gov/Roadways-and-Bridges/Truck-Size-and-Weight-Enforcement-Data/mt5m-skz3
Weigh in Motion (WIM) Data Sources

WIM Pocket Guide: https://www.fhwa.dot.gov/policyinformation/knowledgecenter/wim_guide/


Source: FHWA.
National Network (NN)

• Federal width and length limits apply to the National Network, which includes:
  o Interstate Highway System
  o Federal-aid Primary Highway prior to June 1, 1991
    o Routes designated by States in 1991.
• NN is being reconciled through the FHWA Highway Performance Monitoring Program (HPMS).
• Additions and deletions to NN may require Notice of Proposed Rulemaking (NPRM) and comment period per 23 CFR 658.11.
Revitalized CVSA Emergency Declarations Website

- Jurisdictions may use emergency declarations to temporarily alter permit requirements for expedited delivery of emergency supplies.

- The FHWA, American Association of Highway and Transportation Officials (AASHTO), and Commercial Vehicle Safety Alliance (CVSA) implemented an emergency declarations website on CVSA’s emergency webpage to provide:
  - information on allowable vehicle weights and permit requirements on the Interstate system during an emergency
  - information on changes to allowable weights and up-to-date emergency declarations
  - contact information for State overweight permitting offices

Source: CVSA.
Bridge and Tunnel Strike Mitigation

• Bridge strike data, reporting and tracking
  o Linking structure, roadway inventory, crash, traffic, and other databases
  o Risk-based, data-driven approach to evaluate bridge and tunnel strikes and develop crash prediction models

• Practices and systems for preventing bridge strikes
  o Passive systems—static signage, variable message signs, beacons/flashing signs, and bridge markings
  o Sacrificial systems—crash beams, hanging chains, and bells bars
  o Active systems—Intelligent Transportation Systems (ITS) and early warning detection systems
  o Detection systems—measure dynamic displacement of structure and transit warning to authorities
  o OS/OW permitting
  o Driver training
  o Vehicle-based technology

PIARC Special Project on Bridge and Tunnel Strikes by Oversize Vehicles
• International scan of countermeasures, practices, and technologies.

National Cooperative Highway Research Program (NCHRP) Study on Methods to Prevent Bridge Strikes by Trucks
• Countermeasures and systems for preventing bridge strikes.
• A framework for bridge strike data.

Source: Georgia Department of Transportation (DOT)
For more information:

Caitlin Hughes  
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Federal Highway Administration Office of Operations  
[Caitlin.Hughes@dot.gov](mailto:Caitlin.Hughes@dot.gov)