



April 2023

SUPPLY CHAIN

Updated Freight Handbook Could Enhance Stakeholder Decision-Making

GAO Highlights

Highlights of [GAO-23-106072](#), a report to congressional committees.

Why GAO Did This Study

The COVID-19 pandemic led to cargo container congestion at maritime ports and warehouses. These challenges delayed the delivery of goods to consumers and led to fluctuating prices. In February 2021, the President issued Executive Order 14017, calling for improved resilience of U.S. supply chains.

The House Committee Report accompanying the Department of Homeland Security Appropriations Bill, 2022, includes a provision for GAO to review factors for establishing inland intermodal freight facilities. This report addresses how freight stakeholders use inland intermodal freight facilities and the extent to which FHWA has updated and communicated about its freight and land use handbook, among other objectives.

GAO reviewed DOT's strategic plans and guidance, interviewed officials; and analyzed DOT data on intermodal freight facilities as of July, 2022, the most recent data available during GAO's review. GAO interviewed a non-generalizable selection of 17 stakeholders from state, and local agencies, port authorities, private entities, and associations.

What GAO Recommends

GAO is recommending that DOT (1) develop a plan with timelines to update its Freight and Land Use Handbook, and (2) develop a strategy to communicate the updated handbook to freight stakeholders. DOT concurred with both recommendations.

View [GAO-23-106072](#). For more information, contact Heather MacLeod at 202-512-8777 or macleodh@gao.gov.

April 2023

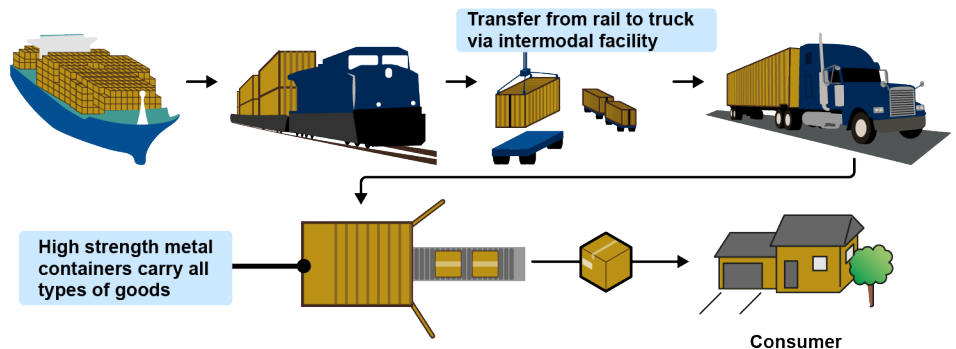
SUPPLY CHAIN

Updated Freight Handbook Could Enhance Stakeholder Decision-Making

What GAO Found

Freight stakeholders (e.g., port authorities, railroads, industry associations, and state and local agencies) told GAO they develop inland facilities, which GAO refers to as inland intermodal freight facilities, to increase supply chain mobility, reduce marine terminal congestion, and process freight. Freight stakeholders use such facilities to transfer cargo containers between modes of transportation (e.g. ships, trains, trucks) to enable cargo to move through the supply chain.

Example of Container Transport through an Inland Intermodal Facility



Source: GAO analysis of DOT documents and testimonial evidence. | GAO-23-106072

The Federal Highway Administration (FHWA) developed a Freight and Land Use Handbook in 2012 as a resource to better inform freight stakeholders about considerations for establishing land-based facilities for freight mobility. For example, the handbook provides information, case studies, and best practices on planning and establishing freight facilities. However, the handbook is outdated, does not reflect new emerging markets, such as e-commerce, and many stakeholders are not aware of it. For instance, 11 of 17 stakeholder groups told GAO they were not aware of the handbook. FHWA officials stated they intend to begin updating the handbook by the end of fiscal year 2023, but have no plan with project milestones to guide the effort.

FHWA officials told GAO they have not proactively communicated the 2012 handbook with freight stakeholders in recent years due to its age. According to DOT, FHWA conducted three regional workshops with stakeholders on 2012 on freight and land use. Moving forward, FHWA officials stated that they plan to involve freight stakeholders in updating the handbook. However, they have not developed a strategy for engaging the different groups of stakeholders or communicating the updated handbook more broadly. Developing a plan to update the handbook can ensure FHWA can better assist freight stakeholders with establishing inland intermodal freight facilities and addressing any associated challenges. Also, by developing a strategy that communicates FHWA's updated Freight and Land Use Handbook, FHWA can raise awareness and better ensure the tools and resources in the updated handbook are reaching relevant freight stakeholders.

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Abbreviations

BTS	Bureau of Transportation Statistics
CBP	U.S. Customs and Border Protection
DOT	Department of Transportation
FHWA	Federal Highway Administration
FTZ	Foreign Trade Zone

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April 25, 2023

The Honorable Chris Murphy
Chair
The Honorable Katie Britt
Ranking Member
Subcommittee on Homeland Security
Committee on Appropriations
United States Senate

The Honorable David Joyce
Chair
The Honorable Henry Cuellar
Ranking Member
Subcommittee on Homeland Security
Committee on Appropriations
House of Representatives

In 2020, the COVID-19 pandemic caused congestion at U.S. maritime ports of entry that led to supply chain delays.¹ Among other things, COVID-19 illnesses affected port operations and many ports struggled to unload large cargo ships in a timely manner. The result was a disruption of the flow of cargo containers. With the majority of cargo entering and exiting the United States by maritime vessel—worth over \$1.8 trillion shipped in 2021²—the disruptions contributed to far-reaching consequences for businesses, consumers, and economies.³ In February 2021, the President issued Executive Order 14017, which calls on federal

¹Ports of entry are facilities that provide for the controlled entry into or departure from the U.S. Specifically, a port of entry is any officially designated location (seaport, airport, or land border location) where U.S. Customs and Border Protection (CBP) officers clear passengers, merchandise and other items; collect duties; enforce customs and other U.S. laws; and inspect persons seeking to enter or applying for admission into, or departing the U.S. pursuant to U.S. immigration and travel controls.

²DOT, Bureau of Transportation Statistics, “U.S.-International Freight Trade by Transportation Mode,” (July 2022), accessed March 20, 2023, <https://www.bts.gov/browse-statistical-products-and-data/freight-facts-and-figures/us-international-freight-trade>.

³U.S. International Trade Commission, “The Impact of the COVID-19 Pandemic on Freight Transportation Services and U.S. Merchandise Imports” in *Shifts in U. S. Merchandise Trade, 2020, Publication 5239 (Nov. 2021)*, accessed Feb. 28 2023, https://www.usitc.gov/research_and_analysis/tradeshifts/2020/special_topic.html_

agencies to collaborate with industry stakeholders to foster improvements to the resilience of America's supply chains.⁴

We have previously reported on challenges facing maritime ports and the supply chain, including cargo container buildup at maritime ports.⁵ To mitigate supply chain disruptions, freight stakeholders, such as railroads, port authorities, and local governments have established facilities located inland of maritime ports. At these facilities, terminal operators can transfer cargo containers between modes of transportation, such as from rail to truck.⁶ Freight stakeholders use these facilities, located away from waterways, which we refer to as inland intermodal freight facilities for the purposes of our report, to conduct some activities that traditionally occur at maritime ports.⁷

At the federal level, the Department of Transportation (DOT) provides oversight and stewardship with respect to the maintenance and construction of the nation's network of highways; promotes and guides projects and planning at port facilities; regulates highway and railway safety; and administers federal funding for highways, railways, and port facilities.⁸ Specifically, through the Federal Highway Administration (FHWA), DOT works with states to ensure the safety and mobility of the highway transportation network. This network serves trucks carrying cargo containers to and from marine terminals. DOT's Maritime Administration carries out federal maritime policy and communicates with ports, state, tribal, and local governments, and private sector

⁴Exec. Order No. 14,017, 86 Fed. Reg. 11,849 (Mar. 1, 2021).

⁵GAO, *Approaches to Mitigate Freight Congestion*, [GAO-09-163R](#) (Washington, D.C.: Nov. 20, 2008).

⁶Cargo containers serve, in essence, as packing crates and portable warehouses for virtually every type of general, containerized cargo moving in the supply chain. See [GAO-12-422T](#).

⁷For the purposes of our report, the term freight stakeholders refers to representatives from port authorities, terminal operators, national railroads, inland intermodal freight facilities, state transportation agencies, and industry associations that have a role in establishing or operating inland intermodal freight facilities. Freight stakeholders using the inland intermodal freight facilities include port authorities, terminal operators, and national railroads.

⁸The BTS Port Performance Freight Statistics Program defines Intermodal as, "The movement of foreign or domestic cargo by more than one mode, e.g., ship - truck or ship-rail-truck. The port industry usually reserves the term "intermodal" for container movements that involve rail.

stakeholders. Additionally, the Bureau of Transportation Statistics (BTS) in DOT's Office of the Secretary tracks data related to ports and intermodal transport and shares that data in the public domain for ports and other freight stakeholders to access.⁹

The House Committee Report accompanying the Department of Homeland Security Appropriations Bill, 2022, includes a provision for us to review the use of inland intermodal freight facilities and the process for establishing them to transfer cargo containers.¹⁰ This report addresses (1) how freight stakeholders use inland intermodal freight facilities to transfer cargo containers from maritime ports of entry, (2) what factors freight stakeholders reported considering when establishing inland intermodal freight facilities, and (3) the extent to which FHWA has updated and communicated about its freight and land use handbook.

To address our first objective, we analyzed relevant laws, DOT's 2015 Transportation Sector-Specific Plan, and our prior work in this area to inform our understanding of how different agencies and stakeholders are involved in establishing and operating intermodal facilities.¹¹ We also obtained and analyzed a BTS dataset under its National Transportation Atlas Database that identified 241 intermodal freight facilities in the U.S. as of July 2022—the most recent data available at the time of our review. We used a set of four criteria to identify which facilities were located inland, away from waterways. We determined if a facility was over two miles from (1) a navigable waterway, (2) a principal port as defined by the Army Corps of Engineers, (3) a waterway with shipping, or (4) a containerized dock facility. We defined facilities located over two miles away from any of the criteria as inland facilities without access to

⁹Federal Railroad Administration and the Federal Motor Carrier Safety Administration play a role in the intermodal freight transport network. The railroad administration's mission is to enable the safe, reliable, and efficient movement of people and goods. The motor carrier administration's mission is to reduce crashes, injuries and fatalities involving large trucks and buses.

¹⁰H.R. Rep. No. 117-87, at 27-28 (2021). The House Committee Print accompanying the Consolidated Appropriations Act, 2022, provided that unless otherwise noted, language set forth in House Report 117-87 carries the same weight as language included in the joint explanatory statement and should be complied with unless specifically addressed to the contrary in this joint explanatory statement.

¹¹DHS and DOT, *Transportation Systems Sector Specific Plan, 2015*. The plan describes an approach to manage security and resilience efforts across the transportation sectors, while enhancing the efficient use of the capabilities and resources of the Sector's government and industry partners.

navigable waterways. We defined facilities within two miles as water port and adjacent facilities with access to navigable waterways.¹²

We selected the BTS dataset because it identifies all intermodal freight facilities in the U.S. with access to railroads and highways. Additionally, we interviewed BTS officials about the data and conducted electronic tests to assess the reliability of the data. We determined that the data were sufficiently reliable for the purposes of identifying the subset of inland intermodal freight facilities nationwide.¹³ Further, we interviewed representatives from 17 stakeholder groups to discuss their perspectives on how they use inland intermodal freight facilities to transfer cargo containers.¹⁴ To understand the federal role with inland intermodal freight facilities, we interviewed officials from two Maritime Administration Gateway Offices and CBP offices at two ports.

To address our second objective, we interviewed representatives from the 17 selected stakeholder groups to obtain their perspectives on establishing and operating intermodal freight facilities. We then corroborated this information with FHWA's 2012 Freight and Land Use Handbook, which lists important factors to consider when developing land for freight use.

¹²Navigable waterways include harbors, shipping channels (including both deep and shallow draft), rivers, lakes, and inland waterways, as well as locks, dams, and other navigation structures such as jetties. They provide safe passage for a wide range of shipping vessels including containerships, tankers, bulk carriers, and other vessel types such as inland and oceangoing barges. See [GAO-13-80](#).

¹³DOT officials told us that BTS does not have a dataset specific to inland intermodal freight facilities; however, we found that this dataset represents the most comprehensive list that includes intermodal freight facilities nationwide at the time of our review. According to officials from the U.S. Coast Guard and U.S. Customs and Border Protection, neither agency maintains data on the total number of inland ports nationwide, because the agencies do not have a role at such facilities.

¹⁴First, we selected a non-generalizable sample of three states—California, Virginia, and Georgia—based on geographic diversity and the volume of containerized cargo moving through their ports of entry. Then, we selected 11 stakeholder groups from the three states to obtain their perspectives on inland intermodal freight facilities. This included representatives from three port authorities, two port terminal operators, three national railroads, two inland intermodal freight facilities, and one state transportation agency. We also interviewed representatives from six national associations from the port, shipping, and rail industries. While the information gathered during these interviews cannot be generalized to all other stakeholders, it provided a range of perspectives on topics relevant to inland intermodal freight facilities.

Further, we conducted a literature search to identify studies about the common factors that stakeholders consider in establishing inland intermodal freight facilities. Our search parameters were from 2007 to 2022 and included web and database searches using ProQuest, Scopus, TRID, and Westlaw Edge. Our search identified six feasibility studies that freight stakeholders (such as port authorities and private sector entities) conducted between 2007 and 2017.¹⁵ One analyst reviewed these studies and determined the extent to which each study identified the same factors as the stakeholders we interviewed and as noted in the FHWA handbook. Any factor that our analysis identified in more than half of the feasibility studies (four out of six) is included in our report. Another analyst subsequently reviewed the analyst's initial determinations and either confirmed agreement with the determination or discussed any discrepancies with the analyst. The analysis identified 14 factors, each of which were identified in at least four of the six studies.

To address our third objective, we reviewed federal documents such as DOT's strategic plan for fiscal years 2022 through 2026, DOT's 2020 National Freight Strategic Plan, and DOT's 2022 Supply Chain Assessment of the Transportation Industrial Base. These documents contain goals and strategic objectives that provide for DOT to develop and share guidance, data, and noteworthy practices to advance freight system planning. We also reviewed the FHWA 2012 Freight and Land Use Handbook, which provides information, case studies, and best practices on planning and establishing freight facilities. Additionally, we interviewed officials from FHWA regarding any plans to update the handbook. Further, we interviewed representatives from the 17 selected stakeholder groups to obtain their perspectives on FHWA's handbook, among other things. We compared the results of our analyses against federal standards for internal control in the federal government on

¹⁵Cambridge Systematics, Inc., *South Florida Inland Port Feasibility Study* (2007); The Tioga Group, Inc., Railroad Industries, Inc., Iteris, *Inland Port Feasibility Study* (August 2008); The Tioga Group, Inc., AdvantageWest, Western Carolina University, *Western North Carolina Inland Port Feasibility Study*; EconWorks, *Project: Huntsville Alabama*; CHA Consulting, Inc., *Central New York Inland Port Feasibility Study* (August 2013); and Cambridge Systematics, Inc., Global Logistics Development Partners, *Utah Inland Port – Feasibility Analysis* (December 29, 2017).

communicating with external stakeholders and leading practices for developing a communication strategy.¹⁶

We conducted this performance audit from May 2022 to April 2023, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Types of Intermodal Freight Facilities

According to DOT and freight industry stakeholders, there is no universal definition for what constitutes an inland intermodal freight facility.¹⁷ According to BTS, an intermodal freight facility is a facility that serves as a freight transfer location between two or more modes of transportation, and where the commodity being transferred is not transformed into other products at the facility.

¹⁶GAO, *Managing For Results, Critical Issues for Improving Federal Agencies' Strategic Plans*, [GAO/GGD-97-180](#) (Washington, D.C.: Sept. 16, 1997) and GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, [GAO-03-669](#), (Washington, D.C. July 2, 2003).

¹⁷Some freight stakeholders often call their facilities by other names, such as inland ports, intermodal terminals, intermodal container transfer facilities, logistics parks, and more.

Models of How Inland Intermodal Freight Facilities Are Operated



Source: Virginia Port Authority | GAO-23-106072

Satellite marine terminals – Relocate maritime port operations to inland satellite facility.

Multi-modal logistics parks – Enhance transportation infrastructure at major junctions with close proximity to large markets.

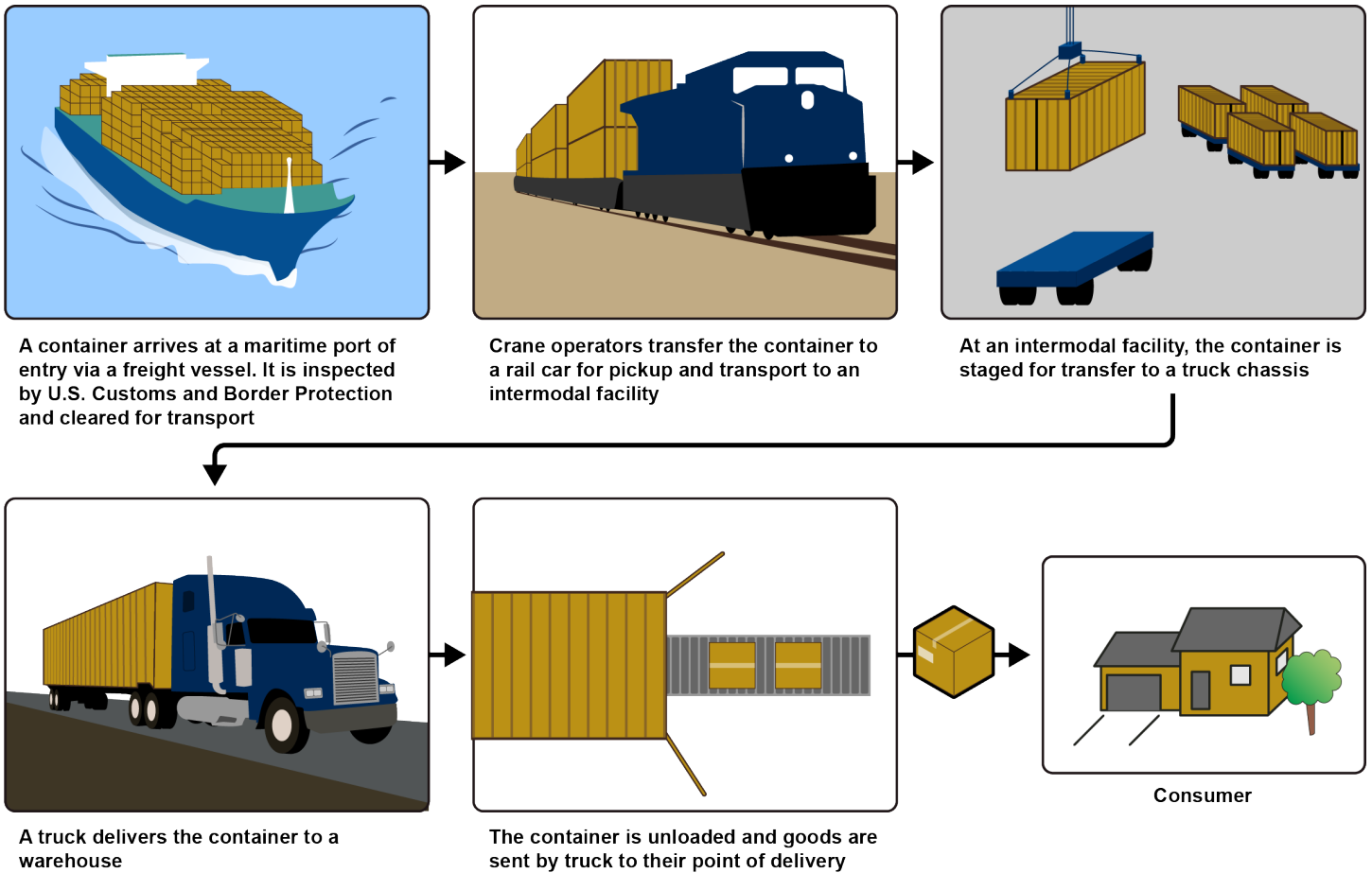
Rail intermodal parks – Host industrial activities such as manufacturing at the same location as an intermodal terminal for ease of access.

Economic development initiatives– Enhance transportation industry in a region without establishing a centralized inland intermodal freight facility. The goal is to use an improved transportation network to spur economic and logistics-based development.

Source: GAO analysis of 6 state and local government feasibility studies | GAO-23-106072

The relationship between maritime ports of entry and inland intermodal freight facilities depends on the operating model of the maritime port or port authority. Some ports are operating ports, meaning they own and operate their facilities. For example, representatives from one port authority told us that they own their inland intermodal facilities and consider them extensions of their maritime port. Other ports are landlord ports, meaning the port authority owns the land but leases it to private terminal operators. This model extends to intermodal facilities. Representatives from one port authority told us that they do not operate any intermodal facilities themselves; rather, private entities run these facilities and are largely reliant on private investment to establish them. See Figure 1 for an example of how intermodal freight facilities serve as a freight transfer location for cargo containers.

Figure 1: Example of Container Transport through an Inland Intermodal Freight Facility



Source: GAO analysis of DOT documents and testimonial evidence. | GAO-23-106072

Federal Roles and Responsibilities Related to Intermodal Freight Facilities

Several federal agencies have roles and responsibilities for ensuring the safe and efficient movement of goods through the supply chain by maritime ports of entry and intermodal freight facilities (see table 1).

Table 1: Selected Federal Agencies' Roles Related to Intermodal Freight

Federal agency	Role at maritime ports	Role with intermodal freight
Department of Transportation (DOT)		
Office of the Secretary	Oversees overall freight policy for DOT, in close coordination with DOT Operating Administrations such as the Maritime Administration, Federal Railroad Administration, and FHWA.	Oversees intermodal freight policy for DOT, including the implementation of discretionary grant programs that include intermodal freight infrastructure opportunities, such as the Infrastructure for Rebuilding America; Rebuilding American Infrastructure with Sustainability and Equity; and the National Infrastructure Project Assistance programs.
Maritime Administration	Headquarters offices oversee federal funding for port projects, marine highway designation, and planning activities. Maritime Administration Gateway offices nationwide act as liaisons to maritime ports and communicate policy objectives and best practices.	Promotes several DOT discretionary grant programs and resources such as the Port Planning and Investment Toolkit to entities such as port authorities, transportation authorities, metropolitan planning organizations, and other public and private entities who are looking to develop inland intermodal freight facilities.
Federal Highway Administration (FHWA)	Provides federal-aid highway program funding, discretionary funding, and other assistance to state and local governments to plan, design, and improve highways; monitors the performance of highway networks, including those that support the nation's freight sector and can link to maritime ports, inland waterway ports, and inland intermodal facilities with truck access. Additionally, FHWA conducts research and provides training, technical assistance, and educational materials to state departments of transportation and other freight stakeholders.	FHWA works with states on transportation performance management to monitor the condition and performance of the highway system and works with other DOT operating administrations to manage the performance of the nation's intermodal system. FHWA makes transportation data available that can be used to monitor the performance of highway networks that feed into the nation's maritime ports and intermodal facilities. ^a Additionally, FHWA's Freight and Land Use Handbook identifies a number of best practices for developing freight facilities in the U.S.
Bureau of Transportation Statistics	Collects, stores, and shares pertinent data on transportation online, including statistics related to ports.	Maintains data on intermodal freight facilities nationwide on their National Transportation Atlas Database, which is a set of nationwide geographic databases of transportation facilities, transportation networks, and associated infrastructure.
Department of Homeland Security		
U.S. Customs and Border Protection (CBP)	Monitors, regulates, and facilitates the movement of goods in and out of U.S. ports of entry. CBP is to safeguard the borders of the United States to protect against the entry of dangerous goods while facilitating and expediting the flow of legitimate travelers and trade. ^c CBP also collects taxes, duties, and fees on imported goods. ^d	CBP's in-bond process allows freight to travel from one port of entry to another before the payment of import duties. ^b This process allows importers to choose where to pay import duties. In-bond freight must pass inspection at its initial port of entry. CBP may conduct additional inspections or processing at inland ports of entry, but all freight is initially inspected at maritime or land borders.
U.S. Coast Guard	Ensures the safety and security of maritime port operations. The Coast Guard ensures structural integrity of cargo containers, proper storage of hazardous materials, and security of maritime facilities in addition to patrolling ports and offering law enforcement responders as necessary.	The Coast Guard has no role with intermodal freight past marine terminal borders.

Source: GAO analysis of federal regulations, documents, and interviews with DOT, CBP, and Coast Guard officials. | GAO-23-106072

^aFHWA makes truck probe data available to states and Metropolitan Planning Organizations through the National Performance Management Research Data Set. According to FHWA, the agency uses this data to create performance visualization tools such as the Freight Mobility Trends Dashboard that can be used to identify bottlenecks on highways surrounding ports and intermodal facilities.

^bSee 19 C.F.R. § 18.1.

^cSee 6 U.S.C. § 211(c).

^dSee 19 U.S.C. ch. 4.

Constraints Facing Maritime Ports of Entry

In 2022, DOT reported that the COVID-19 pandemic compounded issues facing global supply chains.¹⁸ For example, the pandemic compounded growing freight demand with changing consumer preferences, including demand for rapid home delivery of goods. Further, we previously reported that the total monthly value of import shipments declined at the pandemic's onset, but eventually surpassed their pre-pandemic levels.¹⁹ These challenges placed constraints on maritime ports of entry in three ways: (1) limited cargo container availability, (2) cargo container congestion, and (3) limited warehouse availability.

- **Limited cargo container availability:** As of 2022, supply chains face a shortage of available cargo containers to reclaim on return journeys to their countries of origin. According to DOT, this is caused by a spatial mismatch between where cargo containers are located and where they are needed and it was exacerbated by the tendency of shipping lines to prioritize the quick return of empty cargo containers to Asia.²⁰ As consumer demand surged, DOT reported that carriers were able to obtain high shipping rates for the movement of empty cargo containers back to Asia from the U.S. This incentivized them to carry empty cargo containers over U.S. exports. For instance, one private marine terminal operator told us that offsite cargo container storage facilities near the Port of Los Angeles were full of empty cargo containers for shipping lines to take back to Asia for restocking.
- **Cargo container congestion:** We previously reported on industry trends that are increasing cargo container unloading time and causing

¹⁸DOT, *Supply Chain Assessment of the Transportation Industrial Base: Freight and Logistics* (February 2022).

¹⁹[GAO-22-105034](#).

²⁰DOT, *Supply Chain Assessment of the Transportation Industrial Base: Freight and Logistics* (February 2022).

delays and congestion.²¹ Specifically, we found that the growing size of freight carrier ships is contributing to freight congestion at seaports since many ports have insufficient capacity to receive shipping vessels over a certain size. COVID-19 illnesses exacerbated this trend and resulted in worker (e.g. truckers and longshoremen) and equipment (e.g. truck chassis) shortages. For example, one major truck carrier reported in August 2021 that the average time to unload cargo containers from cargo ships had increased by 70 percent, as reported by DOT.²²

- **Limited warehouse availability:** According to DOT, maritime ports and surrounding areas face scarcity in warehouse space and high commercial rent rates.²³ There has been a rise of e-commerce operations because trends in consumer expectations favor faster, direct-to-consumer delivery. DOT reported that e-commerce sales grew by more than 30 percent in 2020, increasing demand significantly for warehouses. To reach consumers faster, retailers are competing for warehouse space, especially near high demand freight markets. For instance, DOT reported that industrial rents nationwide grew 5 percent during 2021, but have grown significantly higher in high-demand areas such as California’s Inland Empire (24 percent) and Northern New Jersey (33 percent).

DOT’s Strategies and Policies to Address Supply Chain Challenges

DOT has strategies and policies in place intended to mitigate the supply chain challenges that occurred in 2020 and 2021 as a result of the COVID-19 pandemic. In particular, DOT’s strategic plan for fiscal years 2022 through 2026 identifies six goals and 27 objectives.²⁴ One of the objectives, Establishing Resilient Supply Chains, provides for DOT to modernize the infrastructure for safer and more efficient movement of

²¹[GAO-22-105034](#).

²²DOT, *Supply Chain Assessment of the Transportation Industrial Base: Freight and Logistics* (February 2022).

²³DOT, *Supply Chain Assessment of the Transportation Industrial Base: Freight and Logistics* (February 2022).

²⁴DOT, Office of the Assistant Secretary for Transportation Policy, *Strategic Plan FY 2022-2026* (Revised March 2022).

goods.²⁵ More specifically, the strategic plan identifies the following DOT strategies:

- address critical supply chain vulnerabilities that affect economic security and resilience, including overarching issues, risks, and bottlenecks resulting from supply-side constraints and shifts in transportation demand.
- convene supply chain stakeholders across freight sectors to reach commitments to support more resilient supply chains.
- support freight and supply chain planning guidance and assistance, and develop and share guidance, data, and noteworthy practices to advance freight system planning.

Additionally, DOT's National Freight Strategic Plan, published in September 2020, identifies three overarching goals and objectives for improving freight transportation.²⁶ Specifically, the strategic objectives state that DOT will prioritize intermodal freight improvements and enhance freight flows at major trade gateways. Further, in February 2022, DOT's Supply Chain Assessment of the Transportation Industrial Base report identified policy goals for addressing long-term resilience challenges facing the nation's supply chains.

Freight Stakeholders Transport Cargo Containers via Rail and Truck to 109 Inland Intermodal Freight Facilities

²⁵DOT, Strategic Plan FY 2022 – 2026. The plan identified FHWA as having a lead role towards achieving a more efficient movement of goods to support the U.S. economy, while maintaining supply chain resilience. Some of the activities identified in the objective are that FHWA 1) address critical supply chain vulnerabilities that affect economic security and resilience, including overarching issues, risks, and bottlenecks resulting from supply-side constraints and shifts in transportation demand, 2) convene supply chain stakeholders across freight sectors to reach commitments to support more resilient supply chains, and 3) support freight and supply chain planning guidance and assistance, and develop and share guidance, data, and noteworthy practices to advance freight system planning.

²⁶DOT, *National Freight Strategic Plan*, (September 2020).

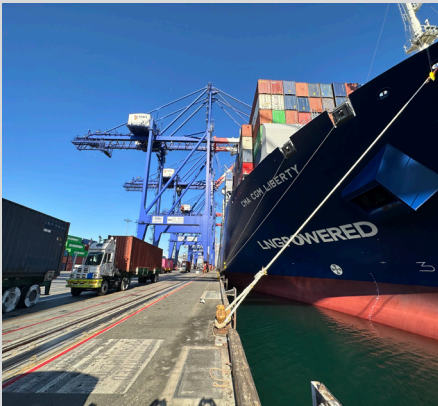
Freight Stakeholders Use Inland Intermodal Freight Facilities for Various Purposes

Freight stakeholders told us that they use inland intermodal freight facilities to move containers along the supply chain, reduce congestion at marine terminals, transfer cargo between modes of transportation, conduct inspections, and consolidate exports. For example:

- Officials from all three port authorities that we interviewed said that their use of intermodal freight facilities facilitates the movement of cargo containers along the supply chain to their inland destinations. For example, since one inland intermodal facility opened, it has reduced cargo container congestion at marine terminals, increased supply chain mobility, and provided opportunity for economic development in the region. Additionally, representatives from one port authority said that their two inland intermodal facilities help manage their maritime port operations.
- Inland intermodal freight facilities can provide dedicated storage space to reduce congestion at marine terminals. For example, storage space at marine terminals can be limited due, in part, to the high cost of waterfront property, according to one marine terminal operator. Further, representatives from two port authorities told us that they use inland intermodal freight facilities to relieve congestion at their maritime terminals.

Cargo Containers Being Unloaded From a Vessel at a Marine Container Terminal

Cranes at this terminal unload cargo containers to be transported by truck and rail to inland intermodal freight facilities.



Source: GAO. | GAO-23-106072

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- Inland intermodal facilities can help shippers transfer cargo between modes of transportation (e.g. trucks and trains). According to representatives from one port, more than half of their total import and export cargo container volume in 2021 traveled to and from the port by truck only, while the rest traveled by rail. Representatives from an inland intermodal facility owned by a port authority said that their marine terminals transfer cargo containers to their facility by Class I rail.²⁷ Once cargo containers arrive at the inland intermodal facility, terminal operators use mobile cranes to move them to railcars or truck chassis for immediate transport, or a paved lot designated for cargo container storage. Further, terminal operators can transfer export-bound cargo containers between truck and rail modes of transportation at inland intermodal freight facilities prior to moving to maritime ports. For example, one inland intermodal facility loads certain goods, such as lumber, directly into cargo containers and sends them to the maritime port that exports them.
 - Some freight stakeholders also use inland intermodal freight facilities to conduct inspections and consolidate exports. For example, representatives from one inland intermodal facility said that their facility is considered a U.S. port of entry and they have a customs processing warehouse for secondary inspections of cargo containers. Freight stakeholders can also consolidate exports at inland intermodal facilities to achieve supply chain efficiencies. According to representatives from one port authority, they seek to establish an intermodal freight facility in their state where farmers can send agricultural goods to a centralized location. At the centralized facility, intermodal terminal operators can more efficiently organize their shipments and transport the cargo containers by short-haul rail to their marine terminals for exportation.

²⁷The Surface Transportation Board classifies freight rail carriers by annual operating revenues for regulatory purposes. Current thresholds establish that Class I freight railroads earn at least \$900 million annually, Class II railroads earn between \$40.4 million and \$900 million annually, and Class III railroads earn \$40.4 million or less annually. 49 C.F.R. pt. 1201.

U.S. Customs and Border Protection (CBP) In-Bond System



Source: National Association of Foreign Trade Zones | GAO-23-106072

CBP's in-bond system allows importers to ship cargo containers to inland destinations without declaring their entry into U.S. commerce at their initial ports of entry. However, CBP still inspects in-bond cargo containers at those initial ports of entry. According to CBP officials, shipping companies transfer cargo containers under the in-bond system to formally declare entry and pay import duties at the inland facility, instead of the seaport. We previously reported that importers use the in-bond system because they prefer to ship merchandise to central distribution warehouses to more conveniently enter the shipments, rather than formally declaring entry at multiple ports. In-bond shipments to FTZs are not required to formally declare entry and are not considered a part of U.S. commerce.

Source: GAO analysis of prior GAO reports, federal regulations, and testimonial evidence. | GAO-23-106072

- Some intermodal freight facilities can have Foreign Trade Zone (FTZ) status.²⁸ For instance, representatives from one port authority told us that their FTZ extends from the border of their port to a region 60 miles inland. CBP officials stated that while they do not clear FTZ-bound cargo for entry into U.S. commerce, they still inspect this cargo at its maritime port of entry. After CBP inspects the cargo, they are to designate it as in-bond and permit the cargo to transfer to the FTZ. Facilities with FTZ status allow international importers to assemble, manufacture, or process cargo within the boundaries of the FTZ without paying import taxes.

DOT Data Shows 109 Intermodal Freight Facilities Located Inland Away from Waterways

Our analysis of BTS's National Transportation Atlas Database shows that 109 of 241 intermodal freight facilities nationwide are located inland, away

²⁸An FTZ is an area in the U.S. under CBP supervision where international cargo can be transported without officially declaring entry into U.S. commerce. Within an FTZ, international importers may manipulate, manufacture, exhibit, or destroy the goods that they bring in. To bring goods into an FTZ and manipulate them, importers must submit an application that is reviewed by CBP. See 15 C.F.R. pt. 400; 19 C.F.R. pt. 146.

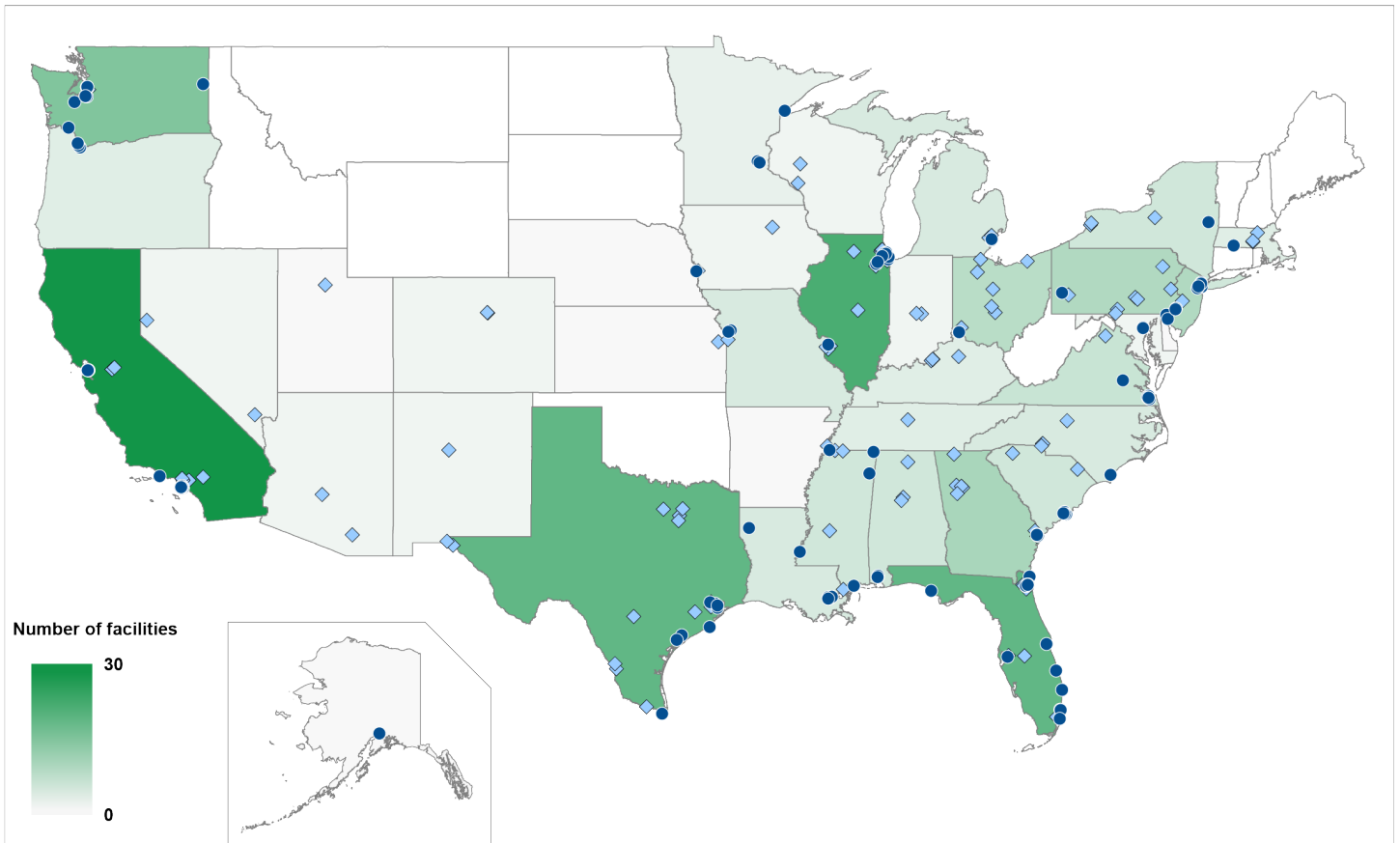
from waterways.²⁹ We found that the 109 inland intermodal freight facilities are located across 29 states.

Additionally, our analysis shows that 51 percent (56 of 109) of the inland intermodal freight facilities are located in six states. Of these six states, the four states with the highest number of inland intermodal freight facilities include Illinois with 14 facilities, Texas with 12 facilities, and California and Pennsylvania with eight facilities each.³⁰ As shown in figure 2 below, inland intermodal freight facilities are generally located along the East Coast, West Coast, Gulf Coast, and mid-west. Representatives from three port authorities told us that the geographic distribution of inland intermodal freight facilities is partially influenced by the interest of shipping lines and affordability of rail rates.

²⁹We analyzed location information from a BTS dataset on intermodal freight facilities to identify which facilities were located within or over two miles away from a navigable waterway, a principal port as defined by the Army Corps of Engineers, a waterway with shipping, or a containerized dock facility. We defined facilities within two miles of these criteria as water port and adjacent facilities and facilities located over two miles away as inland facilities. Some facilities classified as water port and adjacent facilities that are close to the edge of the two mile radius could serve a similar purpose to the facilities classified as inland. Our count of 109 inland facilities does not include these facilities, so we consider our count to be a close approximation. Our analysis of the BTS National Transportation Atlas Database also shows that 132 of the 241 Intermodal freight facilities are located on a water port or are adjacent to waterways. Although there are fewer intermodal freight facilities located inland, they are more widely distributed throughout the U.S. than facilities with access to waterways, according to BTS data.

³⁰The other two states, Ohio and Georgia, have seven inland intermodal freight facilities each.

Figure 2: Locations of the 241 Intermodal Freight Facilities Nationwide, Including 109 Inland Facilities



◆ Inland facility^a ● Water port and adjacent facilities^b

Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-106072

Notes: Intermodal freight facilities include ports, container terminals, intermodal container transfer facilities, logistics parks, and other facilities that transport freight. Some of the inland intermodal freight facility markers overlap themselves when there are various facilities in the same area. Inland facility refers to freight facilities located inland, at least two miles away from a navigable waterway, a waterway with shipping, or a containerized dock facility. In addition, the inland facilities are not included in, or within two miles of a principal port, as defined by the Army Corps of Engineers. Water port and adjacent facility refers to freight facilities located within two miles of a navigable waterway, a waterway with shipping, a containerized dock facility, or within two miles of a principal port, as defined by the Army Corps of Engineers. Some facilities may be classified as water port and adjacent facilities but are close to the edge of the two mile radius, so they could serve a similar purpose to the facilities classified as inland.

Stakeholders Consider Several Common Factors in Establishing Intermodal Facilities

We identified 14 common factors stakeholders generally consider in establishing inland intermodal freight facilities. Specifically, all six feasibility studies we analyzed identified as factors: (1) available land suitable for development, (2) access to rail, (3) access to major highways, (4) favorable cost environment, (5) public sector cooperation and assistance, and (6) access to key markets. Further, our analysis identified other common factors, such as community input. Table 2 shows the extent to which these 14 factors appeared in each of the six feasibility studies we reviewed, and whether the studies: (1) identified the factors or (2) did not identify the factors.³¹

Table 2: Common Factors that Stakeholders Consider When Establishing Intermodal Freight Facilities

	Huntsville, Alabama Study ^a	South Florida Study ^b	Central New York Study ^c	Utah Study ^d	Southern California Study ^e	Western North Carolina Study ^f
Available land suitable for development	X	X	X	X	X	X
Class I rail service	X	X	X	X	X	X
Access to major highways	X	X	X	X	X	X
Favorable cost environment	X	X	X	X	X	X
Public sector cooperation or assistance	X	X	X	X	X	X
Access to key markets	X	X	X	X	X	X
Direct connection to maritime port	–	X	–	X	X	X
Available workforce	X	X	–	–	X	X
Reduced environmental risk	–	X	X	X	X	X
Customs presence	X	X	X	–	X	X
Foreign Trade Zone designation	X	X	X	–	X	X

³¹Federal, state, and local governments, as well as freight industry stakeholders, continue to conduct feasibility studies for new intermodal freight facilities. For example, freight stakeholders from the Virginia Port Authority and the Virginia Economic Development Partnership conducted a feasibility study to identify requirements for establishing an additional inland port facility in Virginia. The feasibility study, completed in January 2023, assessed factors such as market conditions, economic impacts, and the physical and technical conditions. Further, in California, public and private freight stakeholders are considering the development of a California Inland Port System. According to freight stakeholders, the California Inland Port System is considered an intermodal freight facility that is located away from traditional water ports, facilitates international trade through investments in multi-modal transportation assets, and promotes value-added services as goods move through the supply chain.

	Huntsville, Alabama Study ^a	South Florida Study ^b	Central New York Study ^c	Utah Study ^d	Southern California Study ^e	Western North Carolina Study ^f
Centralized Examination Station	–	X	X	–	X	X
Location inland, away from coastal and inland waterways	–	X	X	X	X	X
Community input/approval	–	X	X	X	X	X

Legend: X identified | “–” not identified

Source: GAO analysis of six feasibility studies. | GAO-23-106072

Notes: A factor is classified as “identified” if the feasibility study mentioned it in a list of characteristics of successful facilities, referred to it a case study of existing facilities, or included it in its analysis. A factor is classified as “not identified” if there was no mention of it in the study.

^aCambridge Systematics, Inc., South Florida Inland Port Feasibility Study (2007).

^bThe Tioga Group, Inc., Railroad Industries, Inc., Iteris, Inland Port Feasibility Study (August 2008).

^cThe Tioga Group, Inc., AdvantageWest, Western Carolina University, Western North Carolina Inland Port Feasibility Study.

^dEconWorks, Project: Huntsville Alabama.

^eCHA Consulting, Inc., Central New York Inland Port Feasibility Study (August 2013).

^fCambridge Systematics, Inc., Global Logistics Development Partners, Utah Inland Port – Feasibility Analysis (December 29, 2017).

As shown in table 2, all six feasibility studies identified the following six common factors:

Available land suitable for development. In all six feasibility studies, stakeholders identified available land suitable for development as a factor in establishing inland intermodal freight facilities. Specifically, several studies mentioned that such facilities require hundreds or even thousands of acres of flat land to host intermodal transfer capabilities, and accommodate the flexibility of future growth and expansion. For example, the Western North Carolina feasibility study noted that the available land should be (1) available for conversion to port and industrial expansion, (2) able to accommodate additional connections to existing transportation corridors, and (3) flat, relatively undeveloped, and with room for expansion.³²

³²Additionally, according to the Southern California Association of Governments feasibility study, intermodal terminals may need in excess of 300 acres to accommodate the terminal capacity needed to handle the demand for processing cargo.

Access to Class I rail service. All six studies identified access to Class I rail service as a factor. For example, according to the Southern California Association of Governments feasibility study, new intermodal terminals are most often developed along existing intermodal railroad main lines, avoiding capital requirements to develop additional railroad main lines. The study also states that plans for rail participation in either start-up or long term operations should consider rail operating factors such as pricing, equipment options, and capacity.

Access to major highways. All six studies identified highway access as a factor. Highway access connects the trucking component of intermodal transport to the Nation's highway network. For example, according to the Southern California Association of Governments feasibility study, providing uncongested highway access to customers is a critical element in site selection. Highway congestion may also influence the volume of cargo containers processed at the proposed new terminal.

Favorable cost environment. All six studies identified a favorable cost environment as a factor. A favorable cost environment can include the presence of nearby business activity, favorable facility costs, or favorable transportation logistics costs. For example, according to the Utah Inland Port feasibility study, a favorable cost environment needs to take into consideration favorable transportation logistics costs, facility operating costs, commercial lease rates, and labor cost. The Western North Carolina feasibility study also noted that an intermodal facility requires a well-defined market or anchor tenant to provide the minimum freight volume and revenue needed to cover the startup costs.

Public sector cooperation or assistance. All six studies identified public sector cooperation or assistance as a factor. For example, according to the Utah Inland Port feasibility study, public sector cooperation or assistance can come in the form of funding or direct public sector involvement, with varying levels of public sector involvement. According to the study, the public sector can be a planner, developer, investor, or a combination of the three.³³

³³Utah Inland Port Feasibility study identifies models of how the public sector can play a role in long term planning, marketing support, business development, and infrastructure development.

Additionally, the Central New York study stated that public sector cooperation can come in the form of councils or authorities that are useful for planning logistics.

Access to key markets. All six studies prioritized access to key markets as a factor. For example, according to the Southern California Association of Governments feasibility study, the most successful intermodal-based developments start with an intermodal facility serving an existing market, rather than being dependent on future development success. The study also noted that potential business volume must be sufficient to justify capital investment equipment and labor time. Further, it stated the volume determines service frequency and the possibility of attracting more than one carrier.

In addition to the common factors noted in the six feasibility studies, representatives from stakeholder groups we interviewed noted challenges establishing and operating intermodal freight facilities (see table 3).

Table 3: Summary of Stakeholder Challenges in Operating and Establishing Inland Intermodal Freight Facilities

Challenge	Summary
Identifying suitable locations	It is challenging to find suitable land that has access to Class I rail, interstate highways, and sufficient regional business entities supporting exports and imports.
High cost barriers	The need to purchase land, acquire equipment, and pay for rail connections is expensive up front.
Public/private coordination	Not excluding any relevant public and private stakeholders in the coordination planning and leadership structure is challenging when establishing inland intermodal freight facilities.
Identifying funding resources	Identifying resources to fund the inland intermodal freight facility is challenging because it is difficult to determine what resources are available and who pays for the facility.
Legal limitations	Projects can be hindered by statutory limitations imposed by port authorities' authorizing legislation or state and local laws
Local traffic and congestion	Inland intermodal freight facilities may lead to increased truck and rail congestion in the surrounding community.
Sustaining and growing customer base	It is difficult to maintain freight volume in the competitive supply chain environment. Additionally, facilities that rely on one anchor tenant may be affected by the seasonal nature of their tenant's demand.
Container congestion and transport costs	An imbalance of inbound/outbound cargo can cause container buildup. Since the U.S. operates at a trade deficit, it is difficult to clear empty cargo containers from inland locations. Additionally, many shipping lines abandon cargo containers at inland locations because it is expensive to transport empties back and forth from the seaport.
Mitigating environmental concerns	Complying with regulations and lowering the risk of pollution is an important and costly consideration.

Source: GAO analysis of interviews with state and local government, associations, and private entities. | GAO-23-106072

FHWA Does Not Have a Plan to Update Its Handbook and Has Not Communicated It With Stakeholders

FHWA Has Not Developed a Plan to Update Its Handbook

FHWA's 2012 handbook identifies tools and promotes best practices for land use development of freight oriented facilities for freight stakeholders. Additionally, the handbook identifies factors state and local governments and other stakeholders should consider when planning to establish inland intermodal freight facilities. For example, the handbook identifies factors such as having access to key markets within a given radius and having efficient and local connections to interstate highways, railroad terminals, and major seaports.³⁴

However, the case studies and underlying data used to support the best practices noted in the handbook are dated between 2004 and 2009.³⁵ Since that time, there have been new emerging markets and changes in how stakeholders are addressing the rise in demand. For example, according to DOT's National Freight Strategic Plan, emerging demand in e-commerce is straining the nation's freight system, and impacting land use and development patterns.³⁶

³⁴Additional factors identified in FHWA's 2012 Freight and Land Use handbook as factors to be considered by stakeholders in establishing land development and freight mobility include 1) workforces availability, skill, and cost, 2) availability of suitable facilities or developable sites, 3) cooperation from local, state, and federal agencies regarding permitting and regulations, 4) availability of public assistance and incentives, and 5) perception of low or reduced risk of natural hazards or climate change impacts.

³⁵The case studies were based in geographic locations such as in Seattle, San Francisco, New York City, Baltimore, Pittsburgh, Boston, Los Angeles, and Chicago. See Appendix I for additional information on the Freight and Land Use Handbook's case studies.

³⁶According to DOT's National Freight Strategic Plan, e-commerce sales make up more than 11 percent of total retail sales and are growing at double digit rates each year. This trend for e-commerce is increasing the number of new short-haul and last-mile trips made by trucks, straining the Nation's freight system as retailers compete to meet consumer demands. The plan also stated that new regional distribution hubs are also emerging in secondary markets within 250 miles of the largest transportation and population centers.

Further, freight stakeholders we interviewed identified a number of challenges that are not included in the handbook. For instance, cargo container buildup is occurring at both inland and marine terminals because, according to a representative from one association, it is not cost effective for shippers to pay to transport cargo containers back to marine terminals from their inland distribution destinations. According to stakeholders we interviewed, having more up-to-date information in the handbook about factors to consider in establishing inland intermodal freight facilities and guidance on addressing related challenges would be helpful.

In February 2023, FHWA officials told us they will begin updating the 2012 Freight and Land Use Handbook by the end of fiscal year 2023. However, FHWA does not have a documented plan describing actions needed to update the handbook, such as project milestones to guide the execution of the actions. According to FHWA officials, they have not developed and documented such a plan because the agency is primarily focused on establishing a point of contact for the handbook update, who will be tasked with then developing a project management plan. As of April 2023, DOT officials stated that FHWA drafted the scope of work and identified a project manager, as well as budget and staff resources for the handbook update. Additionally, officials stated that FHWA will begin updating the handbook by the end of fiscal year 2023.

DOT's 2022- 2026 Strategic Plan identifies FHWA as a lead agency, alongside other DOT components, responsible for supporting freight and supply chain planning guidance and assistance; and developing and sharing guidance, data, and noteworthy practices to advance freight system planning. An updated Freight and Land Use Handbook will be a key document that supports FHWA's efforts to implement this strategy.³⁷ In addition, our prior work describes the importance of developing approaches or plans describing how to achieve strategic goals and objectives. Such plans should include (a) the identification of actions needed to achieve goals, (b) development of project milestones to guide

³⁷According to DOT officials, FHWA prepared a number of reports following the issuance of the Freight and Land Use Handbook. The reports that supplement information in the Freight and Land Use Handbook include: Truck Parking Development Handbook; Quick Response Freight Methods; Freight and Land Use Travel Demand Evaluation Report; Freight Demand Modeling and Data Improvement Handbook; Behavioral/Agent-Based Supply Chain Modeling Research; Freight Intermodal Connectors Study; and Improved Urban Freight Mobility and Delivery Operations, Logistics, and Technology Strategies.

the execution of actions, and (c) description of skills and technologies, and resources needed to execute the actions.³⁸

Identifying a point of contact in addition to budget and staff resources necessary to update the plan is a positive first step. However, developing and documenting a plan to update the Freight and Land Use Handbook would help ensure FHWA is better positioned to provide freight stakeholders useful information on establishing inland intermodal freight facilities and addressing any associated challenges.

FHWA Has Not Communicated Its Handbook with Stakeholders

Although FHWA developed its 2012 Freight and Land Use Handbook as information for stakeholders to use for identifying factors needed for establishing inland intermodal freight facilities, representatives from 11 of the 17 selected stakeholder groups we interviewed were generally unaware it existed.

Specifically, representatives from 11 stakeholder groups that were generally not aware the handbook existed told us that in some instances, they relied on other ways to obtain information and research on freight and land use factors to be considered for establishing inland transportation facilities.³⁹ For example, representatives from one national railroad told us they relied on internal assessments to inform them about freight and land use decisions. In another example, representatives from one port authority told us they relied on state and local agencies and a regional commission to inform them about freight and land use decisions.

Additionally, officials from a Maritime Administration office told us that they are not aware of the handbook because FHWA did not include it as a resource and tool in their coordination and discussions in recent years. These officials stated that FHWA may not have shared it because the

³⁸GAO, *Managing For Results, Critical Issues for Improving Federal Agencies' Strategic Plans, September 1997*, GGD-97-180 (Washington, D.C.: Sept. 16, 1997), and *Managing for Results: Agencies Should More Fully Develop Priority Goals under the GPRA Modernization Act*, [GAO-13-174](#), (Washington, D.C.: Apr 19, 2013).

³⁹We interviewed 17 freight stakeholders from a selection of geographically diverse locations, including 3 national railroads, 3 port authorities, 2 terminal operators, 2 inland intermodal freight facilities, 6 national associations, and one state transportation agency to obtain their perspectives on FHWA's 2012 Freight and Land Use Handbook, and their awareness of the handbook. Eleven of the 17 stakeholders told us they were not aware of FHWA's 2012 Freight and Land Use Handbook. The other six stakeholders told us they were aware of the handbook.

case studies and data referenced in the handbook are more than 15 years old.

FHWA officials told us they have not proactively communicated the handbook with freight stakeholders in recent years due to its age.⁴⁰ Moving forward, FHWA officials stated that they plan to involve freight stakeholders in updating the handbook.⁴¹ However, they have not yet developed a strategy for engaging the different groups of stakeholders or communicating the updated handbook more broadly.

According to federal standards for internal control, management should externally communicate the necessary quality information to achieve the entity's objectives.⁴² This includes communicating with external stakeholders and using the appropriate methods of communication, such as a written document—in hard copy or electronic format—or a face-to-face meeting. Additionally, our past work on achieving results showed that creating an effective, ongoing communication strategy is central to forming the partnerships that are needed to develop and implement the organization's plans and strategies.⁴³ Such a communication strategy facilitates a two-way exchange, creating opportunities for stakeholders to communicate concerns and experiences.

By developing a strategy that communicates FHWA's updated Freight and Land Use Handbook, FHWA can raise awareness and better ensure the tools and resources identified in the handbook are reaching relevant

⁴⁰In April 2023, DOT officials stated as part of the handbook development, FHWA held a workshop on freight and land use in 2012 at three regional locations in Florida, Maryland, and New York. The handbook and regional workshops were used to develop the National Highway Institute's training program on freight and land use. The training program has been delivered to 12 locations nationwide. Further, DOT officials stated that FHWA updated the training and manual on freight and land use in 2022 to make it available as on-demand training course available to all stakeholders.

⁴¹In April, 2023, DOT officials stated that in developing a strategy, FHWA could make use of external engagement channels via DOT's other modal agencies to communicate the handbook to stakeholders beyond the traditional freight stakeholders, such as non-traditional groups or other modal entities.

⁴²GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#), (Washington, D.C. Sept. 2014).

⁴³GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, [GAO-03-669](#), (Washington, D.C. July 2, 2003).

freight stakeholders during the planning and establishment of inland intermodal freight facilities.

Conclusions

Congestion at U.S. maritime ports of entry in 2020, including the inability of many ports to unload large ships in a timely manner, has resulted in ports looking for more efficient ways to move goods from maritime ports to U.S. communities. With the majority of cargo arriving in the United States by maritime vessel, inland intermodal freight facilities can serve several purposes, including relieving congestion at maritime ports, facilitating the movement of container cargo along the supply chain, and spurring economic development.

In 2012, FHWA developed its Freight and Land Use Handbook as information for stakeholders to consider when planning to establish inland freight facilities. FHWA officials stated they intend to update the handbook but have not developed a plan for doing so. FHWA has also not proactively communicated the handbook to stakeholders due to its age. Developing a plan to update the handbook could better ensure that FHWA is positioned to provide updated information to freight stakeholders. Also, by developing a strategy for communicating the handbook, FHWA can raise awareness with stakeholders about the handbook.

Recommendations for Executive Action

We are making the following two recommendations to DOT:

The Secretary of Transportation should ensure that the FHWA Administrator develops and documents a plan with timelines to update the Freight and Land Use Handbook. (Recommendation 1)

The Secretary of Transportation should ensure that the FHWA Administrator develops a strategy to communicate FHWA's updated Freight and Land Use Handbook with freight stakeholders. (Recommendation 2)

Agency Comments

We provided a draft of this report to the Department of Homeland Security (DHS) and Department of Transportation (DOT). DHS had no technical comments and waived its agency letter. DOT generally concurred with our recommendations. Additionally, DOT provided technical comments, which we incorporated as appropriate.

With regard to our first recommendation, DOT concurred that the Secretary of Transportation should ensure that the FHWA Administrator develops and documents a plan with timelines to update the Freight and

Land Use Handbook. According to DOT, FHWA has put some plans in place to update the Freight and Land Use Handbook, and will continue to ensure stakeholder involvement and outreach is part of the process. DOT stated that the Freight and Land Use Handbook is one of many examples where FHWA has taken a collaborative approach to promote information on multimodal development and investment in freight intermodal facilities, such as inland ports.

With regard to our second recommendation, DOT concurred that the Secretary of Transportation should ensure that the FHWA Administrator develops a strategy to communicate FHWA's updated Freight and Land Use Handbook with freight stakeholders. DOT stated that FHWA will continue to ensure stakeholder involvement and outreach is part of the process. DOT added that FHWA benefited from stakeholder involvement during the development of the handbook in 2012. Some of the outreach initiatives with stakeholders included focus group meetings as part of the research for developing the 2012 handbook and regional workshops held upon the handbook's completion. In addition, DOT stated that the National Highway Institute offered freight and land use workshops at 12 locations around the country, and online training.

We are sending copies of this report to the appropriate congressional committee, the Secretaries of the Homeland Security and Transportation, and other interested parties. In addition, the report is available at no charge on the GAO website at <https://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-8777 or MacLeodH@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.



Heather MacLeod
Director, Homeland Security and Justice

Appendix I: Federal Highway Administration's Case Studies Identified in 2012 Freight and Land Use Handbook

The Federal Highway Administration's (FHWA) 2012 Freight and Land Use Handbook provides case studies demonstrating how urban and rural areas assess land use for freight mobility. The case studies illustrate how transportation and land use planning practitioners in the public and private sectors assess the impacts of land use decisions on freight movements, as well as the impacts of freight development and growth on land use planning goals. Additionally, the case studies provide examples of collaborative efforts involving numerous levels of government, public-sector entities, and the private sector freight community. According to the handbook, in each case, stakeholders were able to successfully implement projects that account for the needs of freight while preserving environmental and community sustainability.

We identified examples in the handbook showing how freight stakeholders facilitated the planning and development of land use for freight mobility. The issues discussed in the case studies include 1) community engagement/development; 2) congestion reduction; 3) emission reduction; 4) development of freight facilities; 5) regional planning strategies; and 6) zoning. For example, the San Francisco Bay Area Metropolitan Transportation Commission's Goods Movement and Land Use Study looked at how current trends will impact the industrial land base in the San Francisco Bay region. The study's findings concluded that the supply of industrial land in the urbanized San Francisco Bay Area region would be largely unavailable in 13 years. Additionally, the study concluded that by 2035, freight facilities used to warehouse and transfer cargo would have to relocate in outlying areas because of land shortages. Table 4 below shows examples of case studies identified in the 2012 Freight and Land Use Handbook.

**Appendix I: Federal Highway Administration's
Case Studies Identified in 2012 Freight and
Land Use Handbook**

Table 4: Examples of case studies showing how tools and resources were used in planning for the establishment of land use for freight mobility

Issue Area:	Project Name	Location	Project Summary	Goal and/or Outcomes
Community Engagement/ Development	Community Choices Resource Center	Atlanta, GA	The Atlanta Regional Commission offers a Community Choices Resource Center that provides tools and guidance to communities to help them wrestle with land use decisions and (re)development plans.	To offer technical assistance to local jurisdictions and stakeholders.
Community Engagement/ Development	Urban and Industrial Sites Reinvestment Tax Credit Program	Connecticut	Connecticut developed the Urban and Industrial Sites Reinvestment Tax Credit Program as an economic development tool. Connecticut may provide up to \$100 million in tax credits over a 10-year period to support projects that create significant jobs and capital investment in: (1) urban centers, (2) economically distressed communities, or (3) existing or former industrial sites.	Offers tax credits as an incentive to (re)develop in urban and industrial areas, if projects meet performance criteria.
Community Engagement/ Development and Regional Planning Strategy	Power of 32	Pittsburgh-Pennsylvania Region	Launched in 2009, Power of 32 allows residents of the 4-state and 32-county Pittsburgh, Pennsylvania region to participate in creating a shared vision for the region's best future. The group's steering committee includes representatives of many of the region's major shippers and receivers. The effort includes an outreach and education program to communicate the importance of freight land uses in the visioning process.	To set regional stakeholder goals and gain common understanding between different levels of government. The region's vision includes strategies to help businesses find suitable development sites, including those with existing utilities, transportation facilities, and, or in existing industrial or commercial areas.
Community Engagement/ Development	Pedestrian bridge construction	Vancouver, WA	The Washington Department of Transportation plans to improve pedestrian and bike safety by constructing an overpass over tracks near a railyard in Vancouver, WA.	To preserve freight activity while connecting neighborhoods.
Congestion Reduction	Restricted downtown core delivery hours	Boston, MA	Boston prohibits commercial vehicles from using certain downtown streets within its downtown area between 11:00 a.m. and 6:00 p.m. to help reduce congestion.	To reduce congestion and limit competition between trucks and automobiles for curb space.
Congestion Reduction	Freight-only interstate lanes	California	The California Department of Transportation added truck lanes to Interstate-5 to facilitate the rapid movement of freight and safer passenger traffic in separated configurations.	To manage traffic through freight-only transportation facilities.

**Appendix I: Federal Highway Administration's
Case Studies Identified in 2012 Freight and
Land Use Handbook**

Issue Area:	Project Name	Location	Project Summary	Goal and/or Outcomes
Congestion Reduction	The Kansas City Cross-Town Improvement Project	Kansas City, MO	The Kansas City Cross-Town Improvement Project is a pilot study of an intermodal database that was developed to coordinate cross-town traffic to reduce empty moves between terminals, track intermodal assets, and distribute information to truckers wirelessly. ^a The pilot study was conducted in Kansas City because it is the second largest rail hub in the U.S.	To address problems arising from transferring goods from rail to truck in metropolitan regions. When completed, the project aims to help mitigate the number of trucks involved in interchanging freight between truck and rail and will help improve the efficiency of the region's transportation network and ensure the safety of its citizens.
Congestion Reduction	Brownfield Economic Redevelopment Study	New Jersey	The North Jersey Transportation Planning Authority and New Jersey Institute of Technology conducted the Brownfield Economic Redevelopment Study to identify the potential for redeveloping brownfield industrial sites near port terminals and the region's population core. ^b The study included an analysis of potential sites, government land uses, and environmental policies and identified the potential for redeveloping brownfield sites in the region. The study also quantified the expected growth in cargo container traffic, the associated demand for warehouse and distribution space, and gave specifications for the needs of modern facilities.	The North Jersey Transportation Planning Authority and New Jersey Institute of Technology conducted the study to address urban sprawl, which was having a noticeable impact on traffic congestion and quality of life in the northern New Jersey region. The study also addressed an anticipated significant increase in port-related freight volumes traveling into the region. The study found that at least 2,500 acres of brownfield sites suitable for freight-related redevelopment existed within just 10 miles of the seaport, and thousands of additional acres existed up to 25 miles away.
Congestion Reduction	Extending freight facility hours	New York; California	New York and California have incorporated extensions of hours of operation at freight facilities to reduce peak hour congestion.	To reduce peak hour congestion at freight facilities.
Emission Reduction	The San Pedro Bay Ports Clean Air Action Plan	Los Angeles and Long Beach, CA	The San Pedro Bay Ports Clean Air Action Plan is an emissions reduction plan adopted by the ports of Los Angeles and Long Beach to improve air quality in the Los Angeles basin. The plan implements strategies to reduce port-related emissions from ships, trains, trucks, terminal equipment, and harbor craft. ^c	To reduce port-related emissions. The Clean Air Action Plan is a five-year plan, but it also has a long-term component that describes how the Los Angeles and Long Beach ports could integrate their five-year emissions reduction actions into port operations over the long term, and their expected impact on emissions.
Emission Reduction	U.S. Environmental Protection Agency SmartWay Program	Nationwide (U.S.)	The SmartWay Project is a public/private collaboration between the U.S. Environmental Protection Agency and the freight industry. The program helps carriers identify opportunities to improve efficiency, reduce energy costs, and demonstrate their efficiency to potential customers.	To assess and limit freight related emissions and energy consumption.

**Appendix I: Federal Highway Administration's
Case Studies Identified in 2012 Freight and
Land Use Handbook**

Issue Area:	Project Name	Location	Project Summary	Goal and/or Outcomes
Development of Freight Facility	CenterPoint Intermodal Center	Elwood, IL	<p>In 2011, CenterPoint was nearing the completion of its CenterPoint Intermodal Center. The intermodal center was being constructed to address growing regional populations, which were beginning to encroach on freight facilities— converting land that was once vacant to higher-value residential and commercial uses.</p> <p>During the planning phases, the project brought together various levels of government as well as private industry. In planning for the CenterPoint Intermodal Center, CenterPoint estimated that 50 governmental entities were involved throughout the planning and development cycle.</p>	<p>The center is a 2,500-acre intermodal facility, whose goal is to increase speed and capacity of freight.</p> <p>Project proponents decided, early on, to achieve these goals in a manner that benefitted local communities and the environment. For example, the site is located in an area of high unemployment and CenterPoint estimated that the center would create over 8,000 jobs.</p>
Development of Freight Facility	Development of a large logistics park	Gardner, KS	<p>The Burlington Northern Santa Fe railroad is building the Gardener Intermodal Terminal because of the railroad's need to accommodate growing intermodal traffic and diversity away from Chicago. Both the intermodal terminal and the initial stages of warehouse development opened in fall 2009.</p> <p>The facility is about 1,000 acres, of which 418 are devoted to an intermodal facility and the rest will be used for warehousing and distribution centers. The railroad expects the project to result in 7.1-million square feet of new development.</p>	<p>To accommodate growing intermodal traffic and diversity away from Chicago where rail traffic was becoming increasingly congested.</p>
Development of Freight Facility	Roanoke Region Intermodal Facility Report	Roanoke, VA	<p>The 2008 Roanoke Region Intermodal Facility Report reviewed 10 potential sites for a new intermodal facility in Roanoke, VA. The report made recommendations on where to locate the facility based on 6 evaluation criteria including proximity and easy access to a major highway and rail line.</p>	<p>To provide east-west and north-south capacity for freight rail traffic and to improve multistate freight rail facilities.</p>

**Appendix I: Federal Highway Administration's
Case Studies Identified in 2012 Freight and
Land Use Handbook**

Issue Area:	Project Name	Location	Project Summary	Goal and/or Outcomes
Regional Planning Strategy	Freight Advisory Committee	Anchorage, AK	<p>Anchorage Metropolitan Area Transportation Solutions created the Freight Advisory Committee to enrich planning activities by including the private-sector freight industry perspective.</p> <p>Committee members are from the freight industry and provide the private-sector freight industry perspective as well as identify freight-related transportation and land use issues. Committee members are also encouraged to review and provide comments of on-site plans for industrial and retail land uses.</p>	<p>To develop a mutually rewarding collaborative relationship with freight stakeholders in Anchorage and get the private sector involved early in the planning process to help improve transportation and site plans.</p> <p>The committee has helped agency staff acquire a better understanding of freight issues.</p>
Regional Planning Strategy	Truck Route Language in the General Plan	Arroyo Grande, CA	<p>Arroyo Grande's General Plan includes language on keeping truck movements away from residential areas. The plan states that truck routes should coordinate with county and adjoining cities to avoid traversing residential areas.</p>	<p>To coordinate truck route networks with neighboring jurisdictions and avoid areas containing sensitive land uses.</p>
Regional Planning Strategy	Atlanta Regional Freight Mobility Plan	Atlanta, GA	<p>In 2008, the Atlanta Regional Commission developed the Freight Mobility Plan. To identify freight and land use issues and strategies, the plan examined planning documents completed by various agencies in the region, interviewed stakeholders, and conducted a literature review.</p> <p>The plan found that many planning documents and processes do not fully understand logistics and supply chain systems and they apply one-size-fits-all solutions to freight issues. Current trends indicate that freight facilities will locate in areas with relatively inexpensive land capable of accommodating facilities with large footprints, with access to high-speed/high-capacity transportation networks.</p>	<p>To provide guidance for accommodating freight facilities and reduce the sprawl of freight activities by developing goods and trade-related distribution facilities within existing transportation corridors and zones (e.g. integrated freight-land use planning).</p> <p>The plan recognized that freight-supportive land use planning is critical to sustaining the Atlanta Region and recommended that the Atlanta Regional Council work to preserve freight mobility as the region continues to develop, among other things.</p>

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Issue Area:	Project Name	Location	Project Summary	Goal and/or Outcomes
Regional Planning Strategy	Regional Freight Plan/ Freight Village Study	New York, NY	<p>The New York Metropolitan Transportation Council created a Regional Freight Plan in 2004, which recommended that a feasibility study be conducted to consolidate supply chain functions into several activity centers served by multiple modes.</p> <p>In 2011, the Freight Village Study was underway and had done a literature review, developed a list of site evaluation criteria, and selected and assessed 6 sites to determine potential for development of each. As of 2012, the study was finalizing the results of the site evaluations and planned to make recommendations regarding how and where freight villages could be implemented in the region.</p>	<p>To address challenges, including that the region is connected by waterways, so freight relies on a limited number of bridges and tunnels and freight contributes to their severe congestion; and that it is a mature region so there's little space available for new freight land uses.</p> <p>The Freight Villages Study represents a strategy by which a metropolitan planning organization can take a leadership role in visioning and planning for goods movement and related land uses.</p>
Regional Planning Strategy	Goods Movement and Land Use Study	San Francisco, CA	<p>The San Francisco Bay Area Metropolitan Transportation Commission conducted a 2008 Goods Movement and Land Use Study. The study identifies when industrial land would be gone given current patterns. The study's findings concluded that the supply of industrial land in the urbanized San Francisco Bay Area region would be unavailable in 13 years and that by 2035, goods movement businesses with 87,100 jobs would have to relocate in outlying areas because of land shortages.</p>	<p>To understand how current trends will affect the industrial land base in the San Francisco Bay Area.</p>
Regional Planning Strategy	Urban Mobility Plan	Seattle, WA	<p>Seattle's 2008 Urban Mobility Plan provides best practices in freight movement. Many of the examples profiled in the review are from European cities, since they often deal with tighter geometric requirements.</p> <p>The plan also identified a set of policies and practices that Seattle could use to best manage urban freight operations in a manner that both optimizes street operations and ensures safety. For example, Seattle is implementing a policy to offer commercial vehicles a place to load and unload in order to limit illegal or unsafe parking.</p>	<p>To identify best practices and policies that Seattle can utilize as it undergoes rapid population and employment growth in the coming decades.</p>

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Issue Area:	Project Name	Location	Project Summary	Goal and/or Outcomes
Regional Planning Strategy	VISION 2040	Seattle, WA	The Puget Sound Regional Council's VISION 2040 is a regional strategy for accommodating an additional 1.7 million people and 1.2 million new jobs expected to be in the region by the year 2040. The plan is an integrated, long-range vision for maintaining a healthy region and promotes the well-being of people and communities, economic vitality, and a healthy environment.	VISION 2040 designated 21 desired growth areas, including eight industrial and manufacturing centers. VISION 2040 includes an implementation strategy, which will monitor the vital signs of each of the industrial and manufacturing centers.
Zoning	Maritime Industrial Zoning Overlay District	Baltimore, MD	Baltimore's Maritime Industrial Zoning Overlay District preserves a limited and desirable resource for industrial uses in the face of a mixed-use real estate boom that has applied considerable pressure to convert waterfront industrial properties to mixed-use. Baltimore established the zone in 2004.	To preserve freight activity and reduce land use conflicts by balancing the needs of both mixed use and maritime shipping, and maximizing each to the extent possible. Baltimore publishes an annual report to track performance indicators. The 2010 report concluded that the zone has allowed companies to feel confident in making significant capital investments, citing a series of recent and planned investments as evidence.
Zoning	Industrial Corridor Program	Chicago, IL	In the 1990s, Chicago created an Industrial Corridor Program to protect and guide industrial land use development along specific corridors. In 1991, Chicago established Planning Manufacturing District zones as part of the program. These zones have a special zoning designation for defined geographic areas that limits the types of development to industrial activity, as well as other compatible land uses. By 2011, Chicago had established 35 industrial corridors.	To use zoning as a tool to preserve industrial and freight-related land uses and retain manufacturing in the urban core. This program is an example of incremental freight and land use integration and offers: 1) lessons to growing urban regions, in particular those experiencing residential redevelopment pressures on industrial land, 2) guidelines by which to retain goods movement industries within the urban center, and 3) an argument for cities to understand the hidden costs of these changes, both in terms of job loss and new infrastructure needs.
Zoning	M Zoning District	Layton City, UT	Layton City has "M" (Manufacturing/Industrial) zoning districts that provide areas for manufacturing and industrial uses. These districts are located near rail lines and interstate highway interchanges for ease of transportation of goods.	To ensure that freight facilities are located with appropriate access to infrastructure while avoiding sensitive land uses.

Source: GAO analysis of Federal Highway Administration 2012 Freight and Land Use Handbook. | GAO-23-106072

^aEmpty moves refer to empty freight container movement, which may lead to inefficiencies since the cost of moving an empty container does not generate any income during the process.

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^bA brownfield is a property whose expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

^cAlthough the San Pedro Bay ports are a significant source of diesel emissions in the region, the Federal and state governments have no authority over many port emissions sources (such as foreign flagged vessels), so the ports can employ emissions strategies that other entities cannot.

Appendix II: Comments from the Department of Transportation



U.S. Department of
Transportation

Office of the Secretary
of Transportation

Assistant Secretary
for Administration

1200 New Jersey Ave., SE
Washington, DC 20590

April 5, 2023

Heather MacLeod
Director, Homeland Security and Justice
U.S. Government Accountability Office (GAO)
441 G Street NW
Washington, DC 20548

The Federal Highway Administration (FHWA) works to improve goods movement on the highway system and at intermodal connections as part of the nation's multimodal freight transportation system. The FHWA supports the Office of the Secretary and other modal administrations in implementing the multimodal national freight policy established in surface transportation authorizations acts. The FHWA collaborates with the Maritime Administration and the Federal Railroad Administration on freight intermodal connections between highways and marine ports and inland ports. The Freight and Land Use Handbook is one of many examples where FHWA has taken this collaborative approach to promote information on multimodal development and investment in freight intermodal facilities, such as inland ports.

The Freight and Land Use Handbook is a resource that FHWA made available to promote noteworthy practices for improving freight mobility, and has benefited from extensive stakeholder involvement through:

- Several focus group meetings as part of the research for developing the Handbook and three regional workshops upon its completion;
- Development of a Freight and Land Use Training Workshop that was offered through the National Highway Institute (NHI) at 12 locations around the country; and
- Development of a Freight and Land Use Online Training Course available to stakeholders on the NHI website.

The FHWA has already put plans in place to update the Freight and Land Use Handbook and will continue to ensure stakeholder involvement and outreach is part of the process.

Upon review of the GAO's draft report, we concur with the two recommendations to (1) develop and document a plan with timelines to update the Freight and Land Use Handbook, and (2) develop a strategy to communicate FHWA's updated Freight and Land Use Handbook with freight stakeholders. We will provide a detailed response to each recommendation within 180 days of the final report's issuance.

We appreciate the opportunity to respond to the GAO draft report. Please contact Caitlin Hughes, Director of the Office of Freight Management and Operations, at (202) 493-0457 with any questions or if you would like to obtain additional details.

Sincerely,
Philip McNamara

A handwritten signature in black ink, appearing to read "Philip McNamara".

Assistant Secretary for Administration

Appendix III: GAO Contacts and Acknowledgments

GAO Contact

Heather MacLeod at 202-512-8777 or macleodh@gao.gov

Acknowledgments

In addition to the contact named above, Andrew Curry (Assistant Director), James Lawson (Analyst-in-Charge), Jewel Conrad, Elizabeth Dretsch, Schuyler Janzen, Tracey King, Adam Vogt, Ben Crossley, Cristina Toppin, and John Mingus, made key contributions to this report.

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