United States Government Accountability Office

Report to Congressional Committees

July 2025

AIR CARGO

DOT Should Communicate Data Limitations and Identify Stakeholder Challenges

GAO-25-107334

GAO Highlights

Highlights of GAO-25-107334, a report to congressional committees

July 2025

AIR CARGO

DOT Should Communicate Data Limitations and Identify Stakeholder Challenges

Why GAO Did This Study

Aviation is critical for the delivery of high-value, perishable, and time-sensitive goods, like pharmaceuticals. Air cargo depends on ground-based infrastructure such as warehouses and roadways to operate efficiently. During the pandemic, cargo congestion and delays at some airports raised questions about the ability of U.S. air cargo infrastructure to support the efficient movement of goods.

GAO was asked to review air cargo trends, challenges, and federal activities. This report (1) evaluates the extent to which DOT has assessed reliability and communicated any limitations of air cargo data, (2) describes challenges selected stakeholders reported, and (3) assesses the extent to which DOT has identified and addressed air cargo challenges, among other objectives.

GAO selected a nongeneralizable sample of 37 air cargo stakeholders, like carriers and ground handlers, across 11 airports that handled 38 percent of 2023 cargo volume, and conducted semi-structured interviews with them about challenges and federal interactions. GAO observed air cargo infrastructure and operations at nine airports and 28 warehouses. GAO also reviewed DOT air cargo data and documents and interviewed officials.

What GAO Recommends

GAO recommends that DOT (1) assess and communicate air cargo data limitations; and (2) evaluate existing information and routinely communicate with stakeholders to identify, and determine if DOT needs to help address, air cargo challenges. DOT agreed with GAO's recommendations.

For more information, contact Danielle Giese at GieseD@gao.gov.

What GAO Found

The Department of Transportation (DOT) is responsible for ensuring the safe and efficient movement of goods, including air cargo. DOT is also responsible for collecting data on air cargo movements and infrastructure locations. While GAO found that some DOT air cargo data were sufficient to describe changes in volume, DOT has not assessed or communicated the reliability of other air cargo data. For example, GAO found that DOT's Freight Analysis Framework air cargo estimates were not sufficient to describe changes in air cargo value and commodities. In addition, DOT has not fully assessed the reliability or communicated the limitations of these estimates. Without doing so, stakeholders may not use the data appropriately for important purposes such as infrastructure planning and incident response.

Selected air cargo stakeholders reported common challenges with ground-based air cargo infrastructure and operations. More than two-thirds of the 37 stakeholders GAO interviewed reported challenges with warehouses, truck areas, and roadways across 11 selected airports. Stakeholders most frequently reported challenges associated with older warehouses, which slowed operations. GAO visited warehouses that were at least 40 years old at four of the nine airports GAO visited, and observed narrow or obstructed space, blocked doors, and low ceilings. Many stakeholders also reported that a lack of truck areas and poorly configured roadways slowed operations and led to safety hazards.

Example of Roadway Congestion Caused by a Truck Docking at an Air Cargo Warehouse

Source: GAO photo. | GAO-25-107334

DOT's recently established Office of Multimodal Freight Infrastructure and Policy (Multimodal Freight Office)—which is statutorily required to identify infrastructure improvements and policies to reduce freight congestion—has not taken steps to identify and address air cargo challenges. Specifically, the Multimodal Freight Office has not used existing information, such as freight plans that states share with DOT, to identify challenges. Additionally, the office has not communicated with air cargo stakeholders to understand challenges they face. Doing so would help DOT determine whether it needs to act to help address challenges. Multimodal Freight Office officials said they intended to reach out to freight stakeholders, including for air cargo, within the next year as part of other ongoing efforts.

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Abbreviations

AIP	Airport Improvement Program
BTS	Bureau of Transportation Statistics
BUILD	Better Utilizing Investments to Leverage Development Program
CBP	U.S. Customs and Border Protection
Census	U.S. Census Bureau
CFS	Commodity Flow Survey
DHS	Department of Homeland Security
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAF	Freight Analysis Framework
FHWA	Federal Highway Administration
FLOW	Freight Logistics Optimization Works program
INFRA	Nationally Significant Multimodal Freight and Highway Projects Program
Mega	National Infrastructure Project Assistance Grant Program
Multimodal Freight Office	Office of Multimodal Freight Infrastructure and Policy
NHFP	National Highway Freight Program
NTAD	National Transportation Atlas Database

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Congressional Committees

Air cargo plays a significant role in the U.S. economy. In 2022, air cargo operations generated $106.5 billion in economic output, supported over 1 million jobs, and contributed 0.2 percent of U.S. gross domestic product, according to the Federal Aviation Administration (FAA).[1] Air cargo operations are critical for the secure and timely delivery of high-value, perishable, and time-sensitive goods like electronics, produce, and medical supplies. In addition, air is often the transportation mode of choice during emergencies. For instance, during the COVID-19 pandemic, the federal government relied on the U.S. air cargo network to quickly distribute temperature-sensitive vaccines and consumers relied on air cargo for the rapid delivery of e-commerce goods.

Though aircraft move cargo long distances, air cargo spends 80 to 90 percent of its time on the ground, according to industry estimates, where its movement depends on warehouses, trucks, roadways, and other ground-based infrastructure at and around airports.[2] The condition of this infrastructure can affect the efficiency of operations. For instance, insufficient truck parking can slow the movement of goods, according to the Department of Transportation (DOT).[3] During the pandemic, some airports experienced cargo congestion and delays, raising questions about the condition of U.S. air cargo infrastructure and its ability to support the efficient movement of goods.

Many federal agencies support air cargo infrastructure and operations, but DOT and the Department of Homeland Security (DHS) play key roles in ensuring the safety, security, and efficiency of the U.S. air cargo system. For example, DOT is responsible for overseeing the U.S. freight network and ensuring the safe, efficient, and reliable movement of

[1]Federal Aviation Administration, *The Economic Impact of U.S. Civil Aviation* (September 2024). The economic impact estimate includes both primary and secondary impacts. The primary impacts are a sum of the revenue earned from the sale of goods and services or expenditures relevant to the air cargo industry. The secondary impacts capture the spending down the supply chain and payroll impacts that circulate.

[2]Michael Sales, *Aviation Logistics: The Dynamic Partnership of Air Freight and Supply Chain* (Philadelphia, PA: Kogan Page Limited, 2016), 67.

[3]U.S. Department of Transportation, *Supply Chain Assessment of the Transportation Industrial Base: Freight and Logistics* (February 2022).

goods.[4] Several offices and modal administrations within DOT have specific roles and responsibilities related to air cargo. For instance, DOT's Office of Multimodal Freight Infrastructure and Policy (referred to as the Multimodal Freight Office) is to carry out DOT's freight mission by developing the National Freight Strategic Plan and overseeing freight grant programs, including those that may be used for air cargo infrastructure.[5] The Bureau of Transportation Statistics (BTS) develops and shares air cargo data and planning tools, among other activities.[6] Additionally, FAA oversees aviation safety, and it identifies and provides federal financial assistance for airport infrastructure needs.[7]

We were asked to review issues related to air cargo infrastructure and operations, including trends, challenges, and federal activities.[8] In this report, we

- describe changes in air cargo infrastructure and operations from 2004 through 2023;
- evaluate the extent to which DOT has assessed the reliability of and communicated any limitations in its data on air cargo infrastructure and operations;
- describe the challenges selected stakeholders reported with ground-based air cargo infrastructure and operations, and steps they reported taking that may address these challenges; and
- assess the extent to which DOT has identified and addressed challenges to the efficient movement of air cargo.

To address all the objectives, we interviewed DOT and DHS officials to better understand their roles and responsibilities for air cargo. We

[4]U.S. Department of Transportation, *Strategic Plan FY 2022-2026*.

[5]49 U.S.C. § 118.

[6]49 U.S.C. § 6303; see also *id.* § 6309.

[7]Specifically, FAA is responsible for the National Plan of Integrated Airport Systems and oversees the Airport Improvement Program, which includes both formula funds (also referred to as entitlement funds) and discretionary funds. FAA awards discretionary grants for selected eligible airport development projects, including cargo-related projects, through a competitive grant application process.

[8]FAA Reauthorization Act of 2024, Pub. L. No. 118-63, § 1113, 138 Stat. 1025, 1419-20 and H.R. Report No. 118-154, at 22 (2023), which accompanied the Departments of Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, 2024, as well as a request from the Senate Committee on Commerce, Science, and Transportation's Subcommittee on Aviation, Space, and Innovation.

selected a nongeneralizable sample of 37 air cargo stakeholders and conducted semi-structured interviews on air cargo trends and challenges, and on stakeholders' interaction with federal agencies, including DOT.

Specifically, we selected 11 U.S. airports to obtain variety in cargo characteristics such as volume, airport type, and carrier mix as shown in BTS's Air Carrier Statistics T-100 database in 2023, the most recent year of data available at the time of our selection, and in other information. We also selected seven air carriers, three ground handling companies, two developers, three trucking companies, two freight forwarders and customs brokers, and two metropolitan planning organizations based on those that provided services at selected airports and other factors. Additionally, we selected and interviewed representatives from five trade associations and two industry advisers, selected based on recommendations from air cargo stakeholders and industry information, such as published air cargo studies. See appendix I for a full list of our selected stakeholders and selection methods. See appendix II for information on cargo characteristics of selected airports.

We also observed air cargo infrastructure and operations at nine of the 11 selected airports, and more than 5.2 million square feet of warehouse space at 28 cargo warehouses at or near these airports. We selected airports and warehouses to visit for variety in the types of airports, carriers, tenants, and other characteristics of cargo infrastructure. We also considered industry information and recommendations from stakeholders in our selection.

To identify changes in air cargo infrastructure and operations from 2004 through 2023, we analyzed DOT and U.S. Census Bureau (Census) data. Specifically, to identify the volume (weight in pounds) of cargo transported by airport, carrier, route, and type of aircraft, we analyzed segment data from BTS's Air Carrier Statistics T-100 database from 2004 through 2023.[9] To describe trends in air cargo trade partners, and the volume and values of commodities traded by air, we analyzed Census International Trade data from 2004 through 2023.[10] We assessed the reliability of

[9]We reviewed trends through 2023 because that was the most recent year of data available at the time of our analysis. As of March 14, 2025, DOT had released the final month of 2024 T-100 segment data. DOT officials told us that carriers may adjust their data after the data are released, typically within one month.

[10]We reviewed trends through 2023 because that was the most recent year of data available at the time of our analysis. As of February 2025, Census had released the final month of 2024 trade data.

these datasets by reviewing documentation and conducting electronic testing, among other steps. We found both datasets reliable for the purposes of describing U.S. air cargo trends from 2004 through 2023, with some limitations. See appendix I for a comprehensive discussion of the limitations we identified. We also reviewed information from selected stakeholders and industry guidance about air cargo trends and drivers.

To evaluate the extent to which DOT has assessed the reliability of and communicated any limitations in its air cargo data, we reviewed BTS's Freight Analysis Framework (FAF) and National Transportation Atlas Database (NTAD) Air-to-Truck Facilities air cargo data, methodology, and documentation, and interviewed BTS officials. To assess the reliability of the FAF and NTAD air cargo data, we reviewed FAF documentation and interviewed BTS officials, among other steps. We found that the FAF air cargo data were of unknown reliability for our purposes of describing changes in domestic air cargo values and commodities. Additionally, we found that the NTAD air cargo data were unreliable for the purposes of describing changes in U.S. air cargo infrastructure. We further evaluated documentation and information from BTS officials regarding BTS's efforts to assess the reliability of these data and communicate limitations. We also reviewed the nine State Freight Plans that cover our 11 selected airports and interviewed selected stakeholders to identify how they use these data. We compared this information with an Office of Management and Budget directive for statistical agencies and federal internal control standards.[11]

To describe the challenges selected stakeholders reported with ground-based air cargo infrastructure and operations, as well as steps they reported taking that may address these challenges, we analyzed and summarized information from interviews with selected air cargo stakeholders and our observations of airports and warehouses. Information from our interviews with stakeholders and our observations is not generalizable.

To assess the extent to which DOT has identified and addressed challenges to the efficient movement of air cargo, we reviewed DOT documentation of its freight efforts, such as freight and aviation infrastructure funding programs. Additionally, we reviewed the nine State

[11]Office of Management and Budget, *Statistical Policy Directive No. 1: Fundamental Responsibilities of Federal Statistical Agencies and Recognized Statistical Units*, 79 Fed. Reg. 71,610 (Dec. 2, 2014); and GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: Sept. 10, 2014).

Freight Plans covering our 11 selected airports to determine the extent to which these provided information on air cargo challenges. We also analyzed information from interviews with selected air cargo stakeholders regarding their interaction with DOT and interviews with DOT officials. We compared this information with guidelines for evidence-based policymaking and with federal internal control standards for communication.[12]

We conducted this performance audit from January 2024 to July 2025 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.

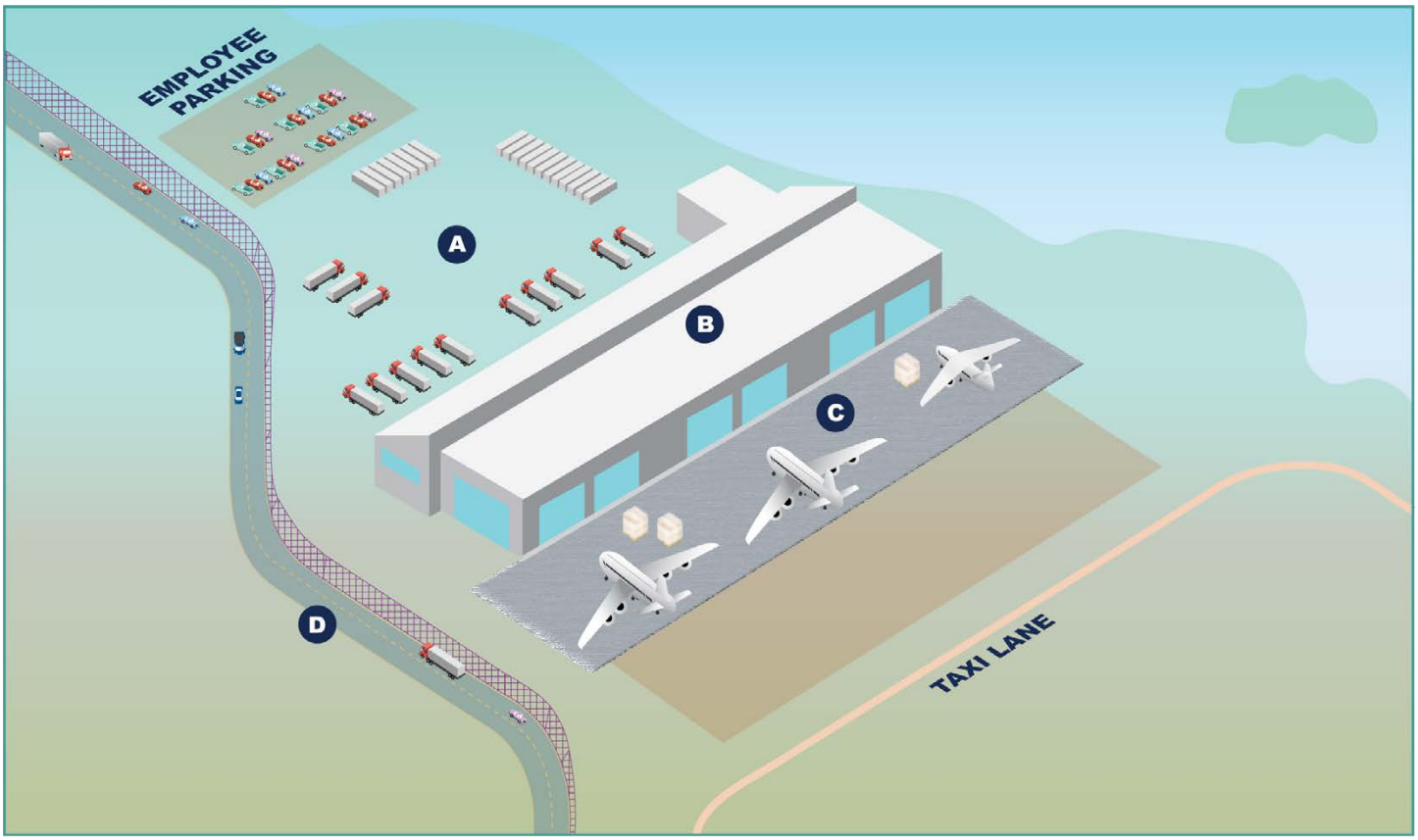
Background

Ground-Based Air Cargo Infrastructure

Ground-based infrastructure—including cargo aprons, warehouses, truck areas, and roadways—is critical for air cargo operations. These infrastructure elements are typically located near each other and, ideally, airside infrastructure such as taxiways and runways. (See fig. 1.)

[12]GAO, *Evidence-Based Policymaking: Practices to Help Manage and Assess the Results of Federal Efforts*, GAO-23-105460 (Washington, D.C.: July 12, 2023); and GAO-14-704G.

Figure 1: Ground-Based Air Cargo Infrastructure



A Truck areas
Truck parking, staging, and queuing areas that provide trucks off-street space to wait for dock access and to maneuver in and out of the dock. Includes areas for drivers to wait while trucks are loaded or unloaded.

B Air cargo warehouse
Buildings where cargo is prepared for air or land transport, inspected, and stored. Warehouses may have airside doors, which provide access to cargo aprons. Warehouses typically have truck dock doors to allow trucks to drop off and pick up cargo.

C Cargo apron
Outdoor space for parking and servicing aircraft, loading and unloading cargo, and storing cargo handling equipment and containers.

D Roadways
Roadways that link air cargo warehouses to critical freight infrastructure. These can include tug roads on airport property that connect warehouses and passenger terminals, as well as state or local roadways off airport property that connect warehouses to major highway networks.

Source: GAO illustration based on analysis of air cargo literature. | GAO-25-107334

The features and layouts of these infrastructure elements can vary widely. For instance, warehouses may have specialized features such as temperature-controlled storage, automated sorting systems, and vertical storage racks with lifts. (See fig. 2.)

Figure 2: Specialized Features of Air Cargo Warehouses

A view through the door of a cold storage area at an air cargo warehouse kept at 4 degrees Celsius, as shown in the temperature gauge to the left of the door.

A vertical storage rack system with a lift called an elevating transfer vehicle.

Source: GAO photos. | GAO-25-107334

Air Cargo Operations

Air cargo operations rely on many different entities, processes, and types of equipment. Public and private entities that play roles in operations include:

- **Carriers.** Private entities that own, lease, or operate aircraft used to transport cargo.[13] These include express carriers, which operate air and ground transportation and provide "door-to-door" service (e.g., FedEx and UPS); all-cargo carriers that fly cargo-only aircraft known as "freighters"; passenger carriers that move cargo in the lower level of passenger aircraft; and combination carriers that carry cargo on both passenger and freighter aircraft.[14] Certified air carriers may

[13]Our review includes both U.S. air carriers and foreign air carriers that operate at U.S. airports.

[14]For the purposes of our review, we consider Amazon Air to be an express carrier because its operational model aligns with that of the traditional express carriers operating in the U.S. (e.g., FedEx, UPS, and DHL).

provide charter services for other carriers or companies, which may include aircraft, crew, maintenance, or insurance.

- **Airports.** Public entities that provide airside infrastructure (e.g., runways) and—at minimum—land for ground-based cargo infrastructure.[15] The role airports play in the development and operation of ground-based cargo infrastructure varies. Different types of airports also serve different functions in the U.S. air cargo network (see table 1).[16]

Table 1: Types of U.S. Cargo Airports

Cargo airport type	Description
Express hub	Airport with specialized facilities developed by express carriers that serves as a central point to process, sort, and distribute large volumes of packages quickly.
Passenger hub	Airport with heavy passenger traffic, infrastructure to handle large aircraft, and locations that allows it to serve as a consolidation and distribution point for international cargo.
Secondary cargo airport	Airport with lighter passenger traffic that often serves as a regional express hub and focuses on cargo.
Origin and destination airport	Airport located at the point of cargo origin or destination that is subject to the demands of the local market.
Transshipment hub	Airport whose primary function is for cargo aircraft to refuel, change crews, or transfer cargo to other aircraft.

Source: GAO analysis of air cargo literature. | GAO-25-107334

- **Ground handlers.** Private entities that contract with carriers to load and unload aircraft and process cargo in warehouses on airport property. Ground handlers may lease a warehouse from the airport or sublease a warehouse from a carrier or third-party developer.
- **Freight forwarders and customs brokers.** Private entities that work with carriers and ground handlers as "travel agents" for cargo, including facilitating customs clearance.[17]
- **Trucking companies.** Private entities that contract with freight forwarders and carriers to transport cargo between airports and other locations.

[15]Nearly all U.S. airports are owned by local or state governments.

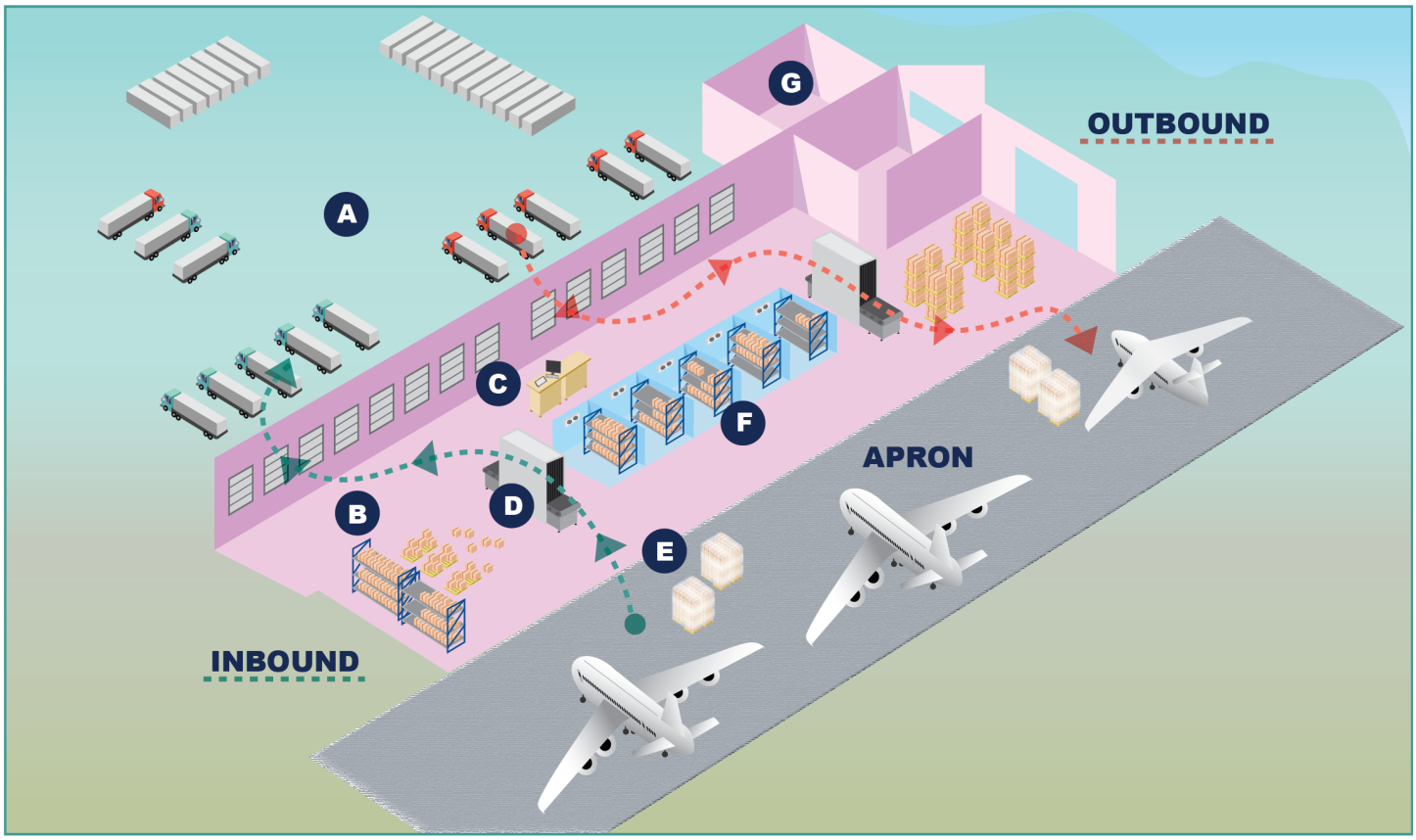
[16]Airports may serve more than one of these functions. However, for the purposes of our review, we placed airports in only one category based on their predominant operations.

[17]Some freight forwarders may be "indirect air carriers"—persons or entities within the United States, not in possession of an FAA air carrier operating certificate, which undertake to engage indirectly in air transportation of property and uses for all or any part of such transportation the services of an air carrier. See 49 C.F.R. § 1540.

- **Third-party developers.** Private entities that contract with airports, carriers, or ground handlers to construct and lease air cargo warehouses and other infrastructure.

Each type of entity above may fund air cargo infrastructure. For instance, airports may use federal grants, bonds, or public-private partnerships to fund certain elements of air cargo infrastructure, while other entities may use private capital. These stakeholders collaborate to implement air cargo operations, which typically follow the process depicted in figure 3.

Figure 3: Typical Air Cargo Operations Process



A — Truck operations
Ground handlers unload outbound cargo from trucks and load inbound cargo onto trucks for distribution. Drivers handle required paperwork at check-in desks or administrative offices.

B — Cargo buildup and breakdown
Ground handlers containerize or bundle loose outbound cargo onto pallets, and separate inbound cargo into pieces.

C — Digital infrastructure
Digital applications allow truck drivers to make appointments and pay fees, among other functions.

D — Security and customs inspections
Security personnel inspect outbound cargo using technology and canines, and customs officers screen inbound cargo for security and to assess duties.

E — Staging
Ground handlers stage outbound goods not requiring special storage on the cargo apron or in designated areas of the warehouse to facilitate efficient aircraft loading.

F G — Storage
Ground handlers place goods that require cold storage in refrigerators or freezers as they await departure or pickup, while inbound goods not requiring special storage await pickup on storage racks.

Source: GAO illustration based on analysis of air cargo literature. | GAO-25-107334

The extent to which air cargo operations occur at the airport or at other locations may vary based on specific operations at each airport. For example, at airports with significant transshipment activities (i.e., the transfer of cargo from one aircraft to another), air cargo operations primarily take place at the airport. At airports with significant road feeder

services (i.e., the use of trucks to transfer cargo between airports), air cargo operations depend heavily on interstate roadways.[18]

Air cargo operations also rely on large, specialized ground support equipment, in addition to standard warehouse equipment like forklifts. For instance, cargo handlers use ground support equipment like lifts that raise cargo up to the deck of an aircraft (i.e., "K-loaders"), containers designed to securely conform to the contours of an aircraft, and "cookie sheet" pallets that lock securely into the floor of an aircraft. (See fig. 4.)

Figure 4: Specialized Air Cargo Equipment

A K-loader lift unloads cargo from the main deck of a freighter.

A cargo container located on an aircraft apron.

Bulk cargo is secured to a specialized aircraft pallet called a cookie sheet with plastic, netting, and ties.

Source: GAO photos. | GAO-25-107334

Federal Roles and Responsibilities for Air Cargo

Many federal agencies support air cargo operations, but DOT and DHS play key roles because they collectively have responsibility for ensuring the safe, secure, and efficient movement of goods, funding infrastructure, and providing data on air cargo infrastructure and operations. DOT and its operating administrations have primary responsibility for ensuring the safety and efficiency of the U.S. air cargo system (see table 2).

[18]Carriers use road feeder services, or "truck flights," to transfer air cargo between airports when it is more efficient to do so than using a connecting flight. These trucks typically have flight numbers and run on routine routes. Since 2006, carriers scheduled between roughly 1 million and 3 million truck flights each year, according to published schedules accessed through Cirium Diio, a private contractor that provides online access to U.S. airline operations data.

Table 2: Department of Transportation (DOT) Responsibilities for Air Cargo Infrastructure and Operations

DOT office	Responsibility for air cargo infrastructure and operations
Bureau of Transportation Statistics (BTS)	BTS is to collect and analyze data on aviation, multimodal freight, and transportation economics. BTS's statutory responsibilities include the development and maintenance of an intermodal transportation database that includes information on the volumes and patterns of goods' movement on all transportation modes, and information on the location and connectivity of transportation facilities.[a]
Federal Aviation Administration (FAA)	FAA is to oversee the safety and performance of the national aviation system and distribute federal financial assistance to airports for airport infrastructure.[b]
Federal Highway Administration (FHWA)	FHWA is to provide federal funding and support the design, construction, and maintenance of the National Highway System and National Highway Freight Network—including intermodal connectors—and the movement of freight on the U.S. transportation system to ensure the efficient and safe movement of goods.[c]
Office of Multimodal Freight Infrastructure and Policy (Multimodal Freight Office)	The Multimodal Freight Office is to administer and oversee DOT's multimodal freight grant programs, develop and manage the National Multimodal Freight Network and the National Freight Strategic Plan, oversee the development and updates of the State Freight Plans, and facilitate information sharing on freight issues between the public and private sector, among other responsibilities. The Multimodal Freight Office was established by law in 2021.[d]

Source: GAO analysis of DOT information and federal statutes. | GAO-25-107334

[a]49 U.S.C. § 6303; see also *id.* § 6309. BTS is a principal federal statistical agency.

[b]49 U.S.C. § 106; 49 U.S.C. ch. 471, subch. I.

[c]49 U.S.C. § 104; 23 U.S.C. § 167.

[d]49 U.S.C. § 118.

DOT grant programs may also support infrastructure that enables the efficient movement of air cargo (see table 3).

Table 3: Examples of Department of Transportation Grant Programs Available to Fund Eligible Air Cargo Infrastructure

Grant program	Description	Examples of eligible air cargo infrastructure projects
Airport Improvement Program (AIP)[a]	Provides funding for eligible public-use airport infrastructure projects that address airport safety, capacity, security, and environmental concerns.	• Cargo aprons where the opportunity to use the area is not limited to one entity (i.e., common use) • Access roads that exclusively serve airport traffic
Better Utilizing Investments to Leverage Development (BUILD) Program[b]	Provides funding for eligible surface transportation infrastructure projects that improve, among other things, safety, economic competitiveness, state of good repair, and innovation.	• The planning, design, construction, or rehabilitation of access roadways to air cargo facilities
National Highway Freight Program (NHFP)	Provides funding for eligible projects that contribute to the efficient movement of freight on the National Highway Freight Network and are identified in a freight investment plan included in a State Freight Plan that is in effect.[c]	• Improvements to highway interchanges and ramps, including those near airports • Electronic cargo technologies that improve truck freight movement
National Infrastructure Project Assistance Grant (Mega) Program[d]	Provides funding for eligible surface transportation infrastructure projects, including freight intermodal projects, that among other criteria are likely to generate national or regional economic, mobility, or safety benefits.	• Construction or rehabilitation of air cargo facilities that access a National Multimodal Freight Network roadway
Nationally Significant Multimodal Freight and Highway Projects (INFRA) Program	Provides funding for eligible multimodal freight and highway projects of national or regional significance, including those that improve the safety, efficiency, and reliability of the movement of freight.[e]	• Construction or rehabilitation of air cargo facilities that access a National Multimodal Freight Network roadway

Source: GAO analysis of relevant statutes, agency documents, and interviews with Department of Transportation officials. | GAO-25-107334

Note: These grant programs represent some of the federal grant programs that are available to fund air cargo infrastructure projects that meet program requirements. This is not intended to be an exhaustive list, and there may be other programs that could fund air cargo infrastructure. We identified these examples through our review of award descriptions in Notices of Funding Opportunity issued in 2024 or earlier and interviews with Department of Transportation officials.

[a]49 U.S.C. ch. 471, subch. I. The Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, div. J, tit. VIII, 135 Stat. 429, 1416-18 (2021), established the Airport Infrastructure Grant Program, which provides additional funding to airports eligible under the AIP for eligible airport-related projects under the Passenger Facility Charge Program.

[b]49 U.S.C. § 6702. This program was formerly named Rebuilding American Infrastructure with Sustainability and Equity (RAISE) and Transportation Investment Generating Economic Recovery (TIGER).

[c]23 U.S.C. § 167. The National Highway Freight Program (NHFP) is a formula funding program that provides funding to states that they may use for eligible projects. The National Highway Freight Network is a set of roadways designated for supporting the movement of goods, which includes critical rural and urban freight corridors. States may designate a roadway as a critical rural freight corridor if the roadway is not an urbanized area and provides access to an intermodal facility or provides access to significant air, rail, water, or other freight facilities in the state. *Id.* § 167(e)(1). States may designate a roadway in an urbanized area as a critical urban freight corridor if the roadway is in an area with a population of 50,000 or more designated by the Bureau of the Census and connects an intermodal facility to the primary highway freight system or is otherwise important to the movement of freight within the region. *Id.* §§ 101(a)(36), 167(f)(3). The NHFP allows states to use up to 30 percent of their apportionment for freight intermodal or freight rail projects.

[d]49 U.S.C. § 6701.

[e]23 U.S.C. § 117. Only 30 percent of total INFRA funding may go to freight intermodal projects; however, projects on the National Multimodal Freight Network do not count toward this limit. The National Multimodal Freight Network is a set of designated route miles and facilities designed to assist states in strategically directing resources toward improved system performance for the efficient movement of freight; to inform freight transportation planning; to assist in the prioritization of federal investment; and to assess and support federal investments to achieve certain freight policy goals. 49 U.S.C. § 70103.

DHS has primary responsibility for ensuring the secure movement of goods in the aviation system. Within DHS, the Transportation Security Administration has responsibility for ensuring the security of all goods transported on aircraft and certifies facilities to screen cargo prior to providing it to airlines for transport. U.S. Customs and Border Protection (CBP) has responsibility for ensuring the security and admissibility of merchandise imported by air and conducts risk-based customs inspections in cargo warehouses at U.S. airports.

Federal Air Cargo Data

DOT's BTS collects and publishes data on air cargo infrastructure and operations.

- **Air Carrier Statistics T-100 database.** BTS collects data from carriers on the volume (i.e., weight in pounds) of air cargo on each flight segment to or from a U.S. airport and makes it publicly available.
- **Freight Analysis Framework (FAF).** BTS develops and publicly provides estimates on the volume and value of commodity movements to or from U.S. origins or U.S. destinations by mode, including air.
- **National Transportation Atlas Database (NTAD) Air-to-Truck Facilities dataset.** BTS develops and publicly provides data on the number, size, location, and tenants of U.S. air cargo warehouses.

Additionally, Census compiles trade data on the weight, value, and types of goods imported or exported through U.S. airports. Shippers report these data to CBP as part of the customs process.

Federal Data Show Air Cargo Growth, Little Change in Operations, and Some Market Shifts That Could Affect Infrastructure

Our analysis of federal data showed that from 2004 through 2023, the overall volume of U.S. air cargo increased, and a small group of airports, carriers, and aircraft types moved most cargo volume. The data also showed notable growth in air cargo volumes for secondary cargo airports, charter and foreign carriers, large aircraft, and temperature-controlled commodities, likely due to market shifts.

The Overall Volume of Air Cargo Increased, and a Small Group of Airports, Carriers, and Aircraft Moved Most Cargo

According to our analysis of BTS's Air Carrier Statistics T-100 database, the overall volume of U.S. air cargo increased from 2004 through 2023, with some fluctuation. During this period, most air cargo was handled by a small group of airports and carriers and transported on the same types of aircraft.

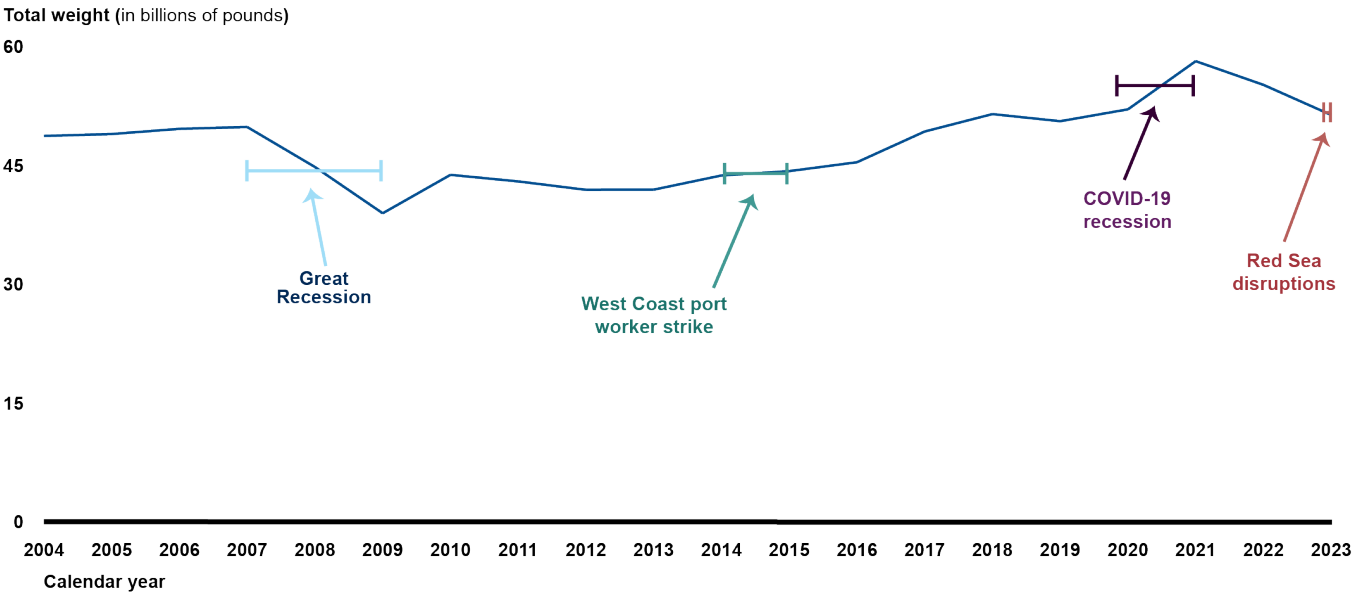
Air Cargo Volume Fluctuated and Increased Overall

Overall U.S. air cargo volume—which includes domestic and international volume—fluctuated but was 5.4 percent higher in 2023 than 2004.[19] Air cargo volume may be influenced by broader economic events and trends, as shown in figure 5. Twenty-three of the 37 selected air cargo stakeholders we interviewed stated that external events such as geopolitical affairs, national and international emergencies, and disruptions in other transportation modes affected air cargo volumes. Similarly, 26 stakeholders told us that e-commerce growth has resulted in increased air cargo volumes. FAA reported that it expects air cargo volume to continue to grow over the next 20 years, which is consistent with industry expectations.[20]

[19]We calculated total air cargo volume by summing the weight of cargo transported by all carriers that operated flights to or from a U.S. airport. If the same piece of cargo is transported over multiple flight segments to reach its destination, then it will be counted for each segment.

[20]Federal Aviation Administration, *FY2024-2044 FAA Aerospace Forecast*; Boeing, *World Air Cargo Forecast 2024-2043* (2024); Airbus, *Global Market Forecast 2024*. These forecasts represent FAA and industry expectations at the time the forecasts were published. A number of factors, such as changes in global trade patterns and policies, could affect these expectations and actual future air cargo activities.

Figure 5: U.S. Air Cargo Volume and Events That May Have Affected It, 2004–2023



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Note: Conflicts in the Middle East and North Africa region have disrupted commercial shipping operations in the Red Sea since December 2023, according to the World Bank.

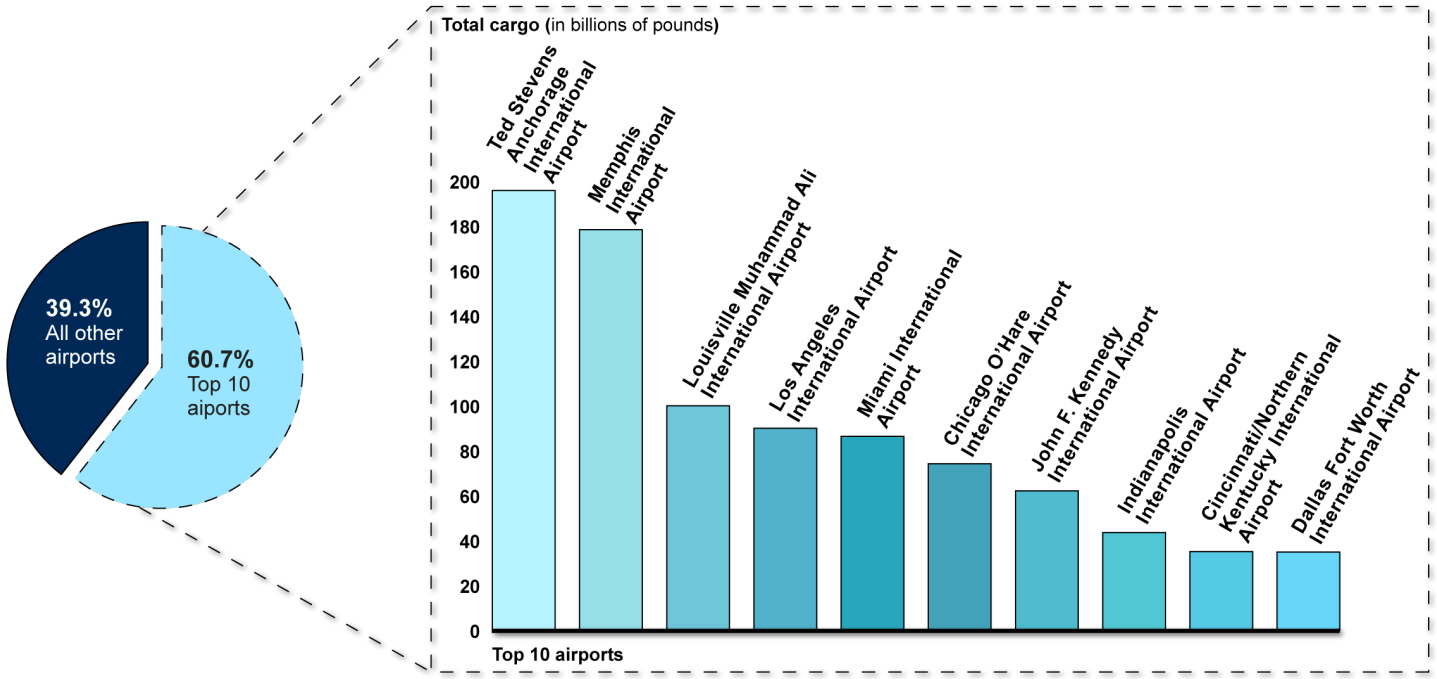
A Small Group of Airports Handled Most Air Cargo Volume

About 50 airports handled more than 90 percent of all domestic and international air cargo volume that arrived at and departed from U.S. airports from 2004 through 2023.[21] Ten of these airports—four express hubs, five passenger hubs, and one transshipment hub—handled more

[21]FAA identifies more than 3,000 public-use U.S. airports in the National Plan of Integrated Airports Systems. To identify airports that handled the highest volumes of cargo, we summed the volume of cargo that arrived at each U.S. airport and the volume of cargo that departed from each U.S. airport. Note that this figure is not equal to the total volume of cargo transported by air because the same cargo is counted twice for domestic flight segments, once at the origin airport and once at the destination airport. This metric instead represents the total volume of cargo handled by each airport and therefore is a useful measure to approximate cargo activity on the ground and the distribution of such activity across airports. Additionally, cargo weight reported from our analysis of T-100 data may not match figures reported by airports due to differences in how cargo is defined, such as whether mail is included and if airports use landed weight, which includes the weight of the aircraft. See appendix I for a comprehensive discussion of the limitations of BTS's air cargo data.

than 60 percent of cargo volume that arrived at and departed from U.S. airports.[22] (See fig. 6.)

Figure 6: Share of Cargo Volume Arriving at and Departing from U.S. Airports, 2004–2023



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Note: Memphis International Airport, Louisville Muhammad Ali International Airport, Indianapolis International Airport, and Cincinnati/Northern Kentucky International Airport are express hubs, meaning that they serve as a central point for express carriers to process, sort, and distribute packages. Los Angeles International Airport, Miami International Airport, Chicago O'Hare International Airport, John F. Kennedy International Airport, and Dallas Fort Worth International Airport are passenger hubs, meaning that they have heavy passenger traffic and infrastructure to handle large aircraft, and that they serve as a consolidation and distribution point for international cargo. Ted Stevens Anchorage International Airport serves as a transpacific transshipment hub,

[22]Express hubs include airports with specialized facilities developed by express carriers that serve as a central point to process, sort, and distribute large volumes of packages quickly. Passenger hubs include airports with heavy passenger traffic, infrastructure to handle large aircraft, and locations that allow them to serve as a consolidation and distribution point for international cargo. Transshipment hubs are airports whose primary function is for cargo aircraft to refuel, change crews, or transfer cargo to other aircraft. A single airport may have elements of express, passenger, and transshipment operations, but for the purposes of our analysis, we put each airport in only one category. We categorized airports based on their hub size as identified in FAA's National Plan of Integrated Airport Systems, information about their express operations, and their overall cargo volume.

meaning that it serves as a stopover point for international cargo aircraft to refuel, change crews, or transfer cargo to other aircraft.

Different types of airports were important for domestic air cargo operations as compared to international operations from 2004 through 2023. Specifically, five express hubs handled about 32 percent of the domestic volume that arrived at and departed from U.S. airports, while seven passenger hubs handled about 51 percent of all international volume.[23]

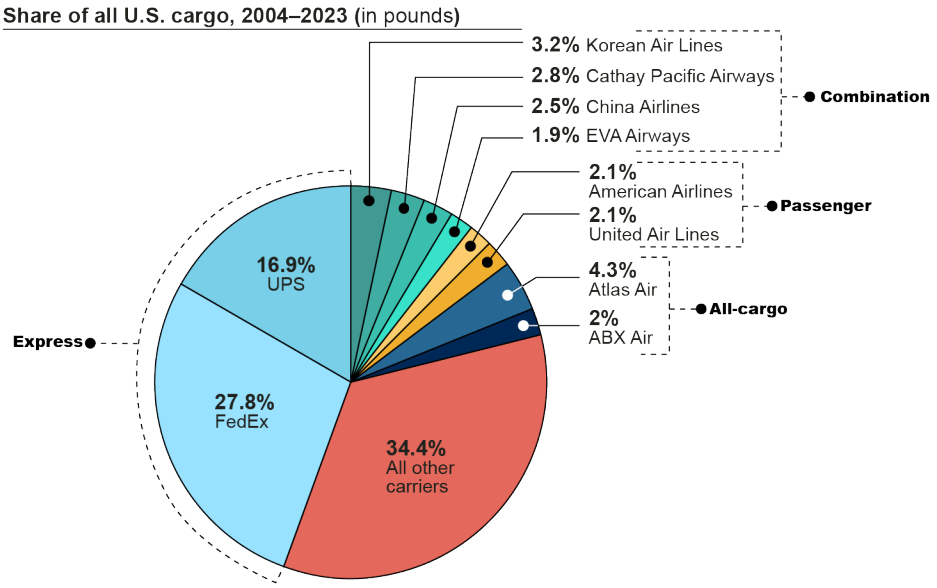
A Small Group of Carriers Transported Most Air Cargo Volume

A small group of carriers transported most U.S. air cargo volume from 2004 through 2023. Ten carriers—two express carriers, two passenger carriers, two all-cargo carriers, and four combination carriers—transported about two-thirds of all U.S. air cargo volume during this period. Express carriers transported the greatest share of this volume—at least roughly 45 percent—though this percentage is likely higher.[24] (See fig. 7.)

[23]The express hubs handling the most domestic air cargo volume during this period were Memphis International Airport, Louisville Muhammad Ali International Airport, Indianapolis International Airport, Cincinnati/Northern Kentucky International Airport, and Oakland International Airport. The passenger hubs handling the most international air cargo volume were Miami International Airport, Los Angeles International Airport, John F. Kennedy International Airport, Chicago O'Hare International Airport, San Francisco International Airport, Hartsfield-Jackson Atlanta International Airport, and Newark Liberty International Airport.

[24]Amazon Air and DHL contract with carriers for the aircraft, crew, maintenance, or insurance to transport goods on behalf of the express carriers. The charter carriers contracting with these express carriers report data to BTS under their respective names, and Amazon Air and DHL do not report this information. As a result, we cannot identify air cargo volumes specific to these express carriers, and the volume transported by express carriers is likely higher.

Figure 7: Share of U.S. Air Cargo Volume Transported by Air Carrier, 2004–2023



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Note: Express carriers are air carriers that provide "door-to-door" transportation (e.g., aircraft and ground transportation). All-cargo carriers fly cargo-only aircraft known as "freighters," while passenger carriers move cargo in the lower level of passenger aircraft. Combination carriers carry cargo on both freighters and passenger aircraft. Atlas Air offers some passenger charter services, but we consider it to be an all-cargo carrier for the purpose of our review.

The types of carriers transporting most domestic cargo volume varied from those transporting most international air cargo volume. Express carriers transported at least about two-thirds of all domestic air cargo volume from 2004 through 2023, while all-cargo and passenger carriers transported approximately 83 percent of international air cargo volume.

Carriers Used Freighter Aircraft to Transport Most Air Cargo Volume

Carriers used freighter aircraft to transport 80 percent or more of U.S. air cargo volume each year from 2004 through 2023. Freighters were especially critical for air cargo operations during the pandemic. The volume of cargo transported on passenger aircraft hit a 20-year low in 2020 due to the pause on passenger air traffic during the pandemic, and carriers used freighter aircraft to replace this lost capacity. As a result, the volume of cargo transported on freighters in 2020 was 15 percent higher than in 2019. Cargo volume transported on passenger aircraft nearly recovered to historic averages by 2023.

Though freighters handled most cargo volume, passenger aircraft played a more significant role in international operations than domestic cargo

operations. On average, passenger aircraft transported 6 percent of domestic air cargo volume, compared with around 31 percent of international air cargo volume.[25]

Market Shifts Likely Contributed to Growth in Air Cargo Volumes for Secondary Airports, Foreign Carriers, and Certain Commodities

As discussed above, a small group of airports, carriers, and aircraft moved most air cargo from 2004 through 2023. However, changes in express carrier networks, growth in international air cargo volume, and greater demand for temperature-controlled goods contributed to some changes. Specifically, these market shifts aligned with substantially increased volume for certain types of airports, carriers, aircraft, and commodities that far outpaced increases in volume for other types of airports, carriers, aircraft, and commodities.

Changes in Express Carrier Networks

We found that DHL's shift to international operations in 2009, and the entrance of Amazon Air to the air cargo market in 2015, aligned with growth in the air cargo volumes that secondary cargo airports and carriers providing charter services handled.[26] Specifically, according to our analysis of BTS's Air Carrier Statistics T-100 database:

Secondary cargo airports. Seven of the 10 airports with the largest growth in cargo volumes from 2004 through 2023 were secondary cargo airports. Almost none of these 10 airports have historically handled high cargo volumes, and just one was among the airports that handled the

[25]When we analyzed the data without air cargo volume at Ted Stevens Anchorage International Airport, we found that passenger aircraft transported nearly half of all air import volume. As noted above, Ted Stevens Anchorage International Airport is a stopover point for cargo aircraft to refuel and change crews or aircraft. As a result, a large proportion of its import cargo volume continues on to other U.S. airports where it is processed and distributed, as we have previously reported. GAO, *Puerto Rico: Perspectives on the Potential to Expand Air Cargo Operations,* GAO-21-21 (Washington, D.C.: Oct. 29, 2020). We found that nearly one-quarter of all international air cargo volume traveled through Anchorage and 99 percent of that volume arrived at or departed the airport on freighter aircraft. As a result, evaluating the percentage of import volume with Anchorage may skew the proportion of passenger and freighter aircraft in international air cargo operations at U.S. airports toward freighter aircraft.

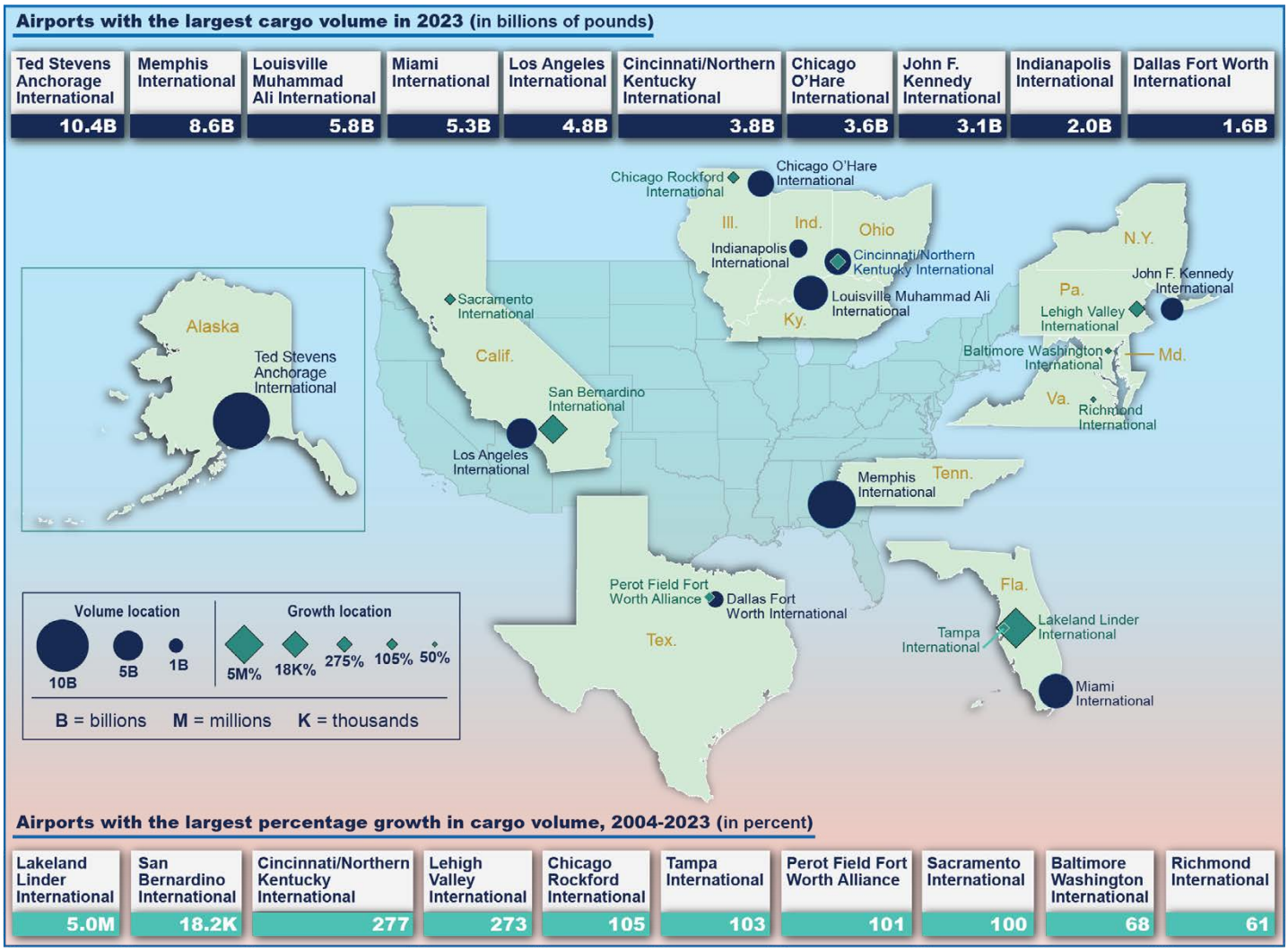
[26]Amazon Air began as a pilot program in 2015 and officially launched operations in 2016, according to our analysis of publicly available information and interviews with air cargo stakeholders. Some air cargo researchers and industry reports have reported similar findings regarding the growth of small, cargo-focused airports and Amazon Air. For example, see Joseph P. Schwieterman and Janson Busby, "The Expanding Role of Cargo-Oriented Airports in the United States since the beginning of the COVID-19 Pandemic," *Chaddick Institute Policy Series* (Aug. 17, 2023); and Airport Cooperative Research Board, Transportation Research Board of the National Academies of Science, Engineering, and Medicine, *Measuring and Understanding the Relationship between Air Service and Regional Economic Development* (Jan. 3, 2022).

most cargo volume in 2023 (see fig. 8).[27] Cargo volumes at almost all 10 airports with the largest growth increased most between 2015 and 2023. All of them began functioning as Amazon Air hubs or part of Amazon Air's network during this period, and one also started functioning as a global hub for DHL in 2009.[28]

[27]We only examined the percentage growth for airports that handled 0.25 percent or more of all U.S. air cargo volume in 2023, or 0.25 percent of total volume from 2004 through 2023. We excluded airports that handled 0.24 percent or less of all U.S. cargo volume in 2023, or from 2004 through 2023, because small fluctuations in absolute weight skewed the change in percentage growth.

[28]Cincinnati/Northern Kentucky International Airport saw much of its growth between 2008 and 2010, when it started functioning as a global hub for DHL after DHL closed other U.S. hubs to focus on international service. We reviewed publicly available information from DHL and other publications to describe DHL's operations.

Figure 8: U.S. Airports with the Largest Cargo Volumes in 2023 and Largest Growth in Cargo Volumes, 2004–2023



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. MapInfo. | GAO-25-107334

Note: Cargo volume for each airport is the sum of volume that arrived at and departed from the airport. We calculated the percentage growth in volume by comparing cargo volume in the first year an airport had recorded cargo volume from 2004 through 2023 with its 2023 volume. All but one of these airports recorded cargo volume greater than zero in 2004. Lakeland Linder International Airport did not have any reported cargo volume until 2007.

Carriers providing charter service. Five of the 10 carriers with the largest growth in cargo volumes from 2004 through 2023 were carriers that have publicly reported charter contracts with DHL or Amazon Air to

transport goods within their networks (see table 4).[29] In 2004, these five carriers transported less than 1 percent of all U.S. air cargo volume, and by 2023 they transported about 7 percent.

Table 4: Air Carriers That Had the Largest Growth in U.S. Air Cargo Volume from 2004 Through 2023 and Provided Charter Services to Express Carriers

Carrier name	Percentage increase in cargo volume
Sun Country Airlines	2,241,955%
Cargojet Airways Ltd.	7,981
Western Global Airlines	1357
AeroLogic GmbH	707
Air Transport International	642%

Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

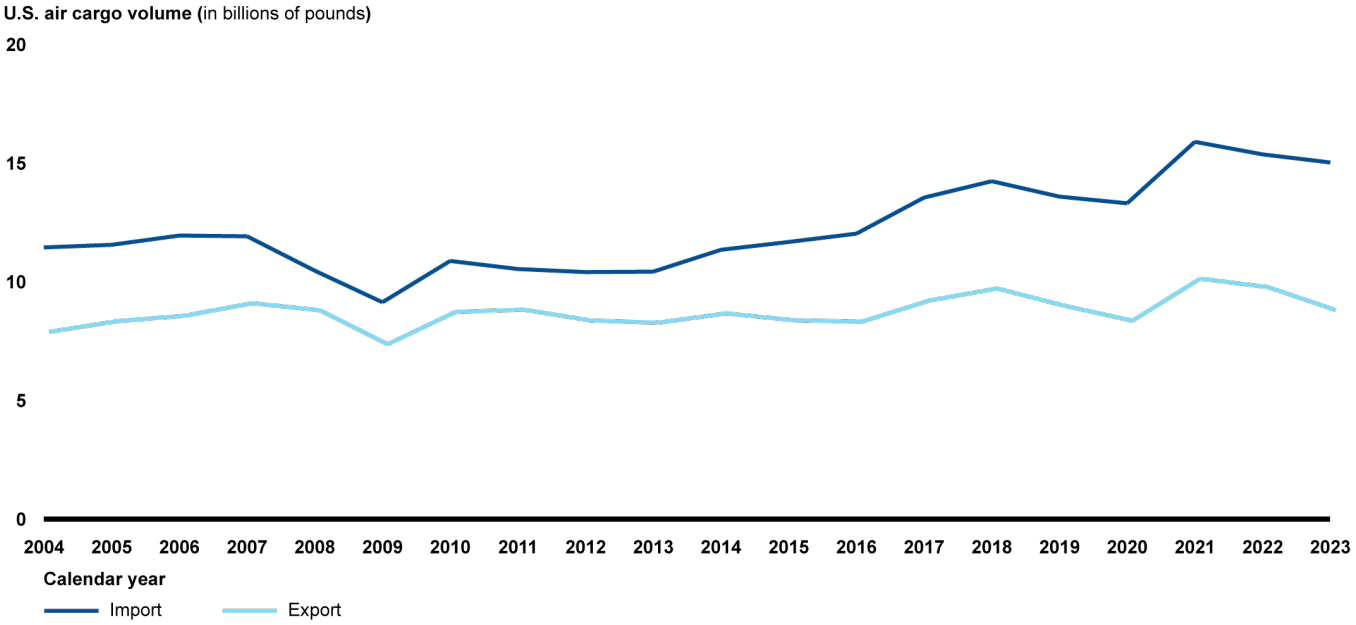
Note: Cargo volume is in pounds and includes both international and domestic volume. These five carriers were among the 10 carriers with the largest growth in cargo volume from 2004 through 2023. The remaining five carriers with the largest growth were Asian or European combination or all-cargo carriers for which we did not identify publicly reported charter contracts with express carriers. We calculated the percentage change by comparing cargo volume in 2004 with cargo volume in 2023 for each carrier. For carriers that did not report cargo volume in 2004, we compared cargo volume in the first year in which they reported volume with their reported cargo volume for 2023. Western Global Airlines and AeroLogic GmbH did not report cargo volumes until 2014 and 2010, respectively. In 2019, Sun Country Airlines added freighter aircraft to its fleet—which previously consisted only of passenger aircraft—and signed a charter contract with Amazon Air, which likely contributed to the significant growth in cargo volume.

Growth in International Air Cargo Volume

Though more than half of all U.S. air cargo volume was transported domestically each year from 2004 through 2023, we found that domestic air cargo volume declined 6 percent. In contrast, import volume grew more than 31 percent and export volume grew nearly 12 percent, according to our analysis of BTS's Air Carrier Statistics T-100 database. (See fig. 9).

[29]The other five carriers were foreign carriers, as discussed below.

Figure 9: Volume of U.S. Air Cargo Imports and Exports, 2004–2023



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

The growth in international air cargo volume aligns with the growth in volumes handled by foreign carriers, the largest aircraft, and passenger aircraft. Specifically, based on our analysis of BTS's Air Carrier Statistics T-100 database:

Foreign carriers. While five of the 10 carriers with the largest growth in cargo volume were carriers providing charter services, as discussed above, the other five were Asian or European combination or all-cargo carriers (see table 5).[30]

[30]We did not identify publicly reported charter contracts with DHL or Amazon Air for these Asian and European combination and all-cargo carriers. The five carriers providing charter services discussed above are also combination and all-cargo carriers.

Table 5: Air Carriers That Had the Largest Growth in U.S. Air Cargo Volume from 2004 Through 2023 and Are Registered in Asia or Europe

Carrier name	Region of registration	Percentage increase in cargo volume
Emirates	Asia	2,364%
Turkish Airlines	Europe	1,517
Cargolux Airlines	Europe	687
Qatar Airways	Asia	671
China Southern Airlines	Asia	495%

Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database and Federal Aviation Administration information. | GAO-25-107334

Note: Cargo volume is in pounds and includes both international and domestic volume. We defined domestic cargo volume as volume transported between two U.S. airports. Foreign air carriers are generally prohibited from transporting domestic cargo or passengers solely between points within the U.S. 49 U.S.C. § 41703, 19 C.F.R. § 122.165. However, foreign carriers may report cargo volume for domestic flight segments in some circumstances. For instance, in 2003, Congress authorized foreign carriers to transport certain cargo between Alaska's international airports and other points in the U.S. Vision 100—Century of Aviation Reauthorization Act, Pub. L. No. 108-176, § 808, 117 Stat. 2490, 2588 (2003). We calculated the percentage change by comparing cargo volume in 2004 with cargo volume in 2023 for each carrier. For carriers that did not report cargo volume in 2004, we compared cargo volume in the first year in which they reported volume with their reported cargo volume for 2023. Qatar Airways did not report cargo volume until 2007. These five carriers were among the 10 carriers with the largest growth in cargo volumes from 2004 through 2023. The remaining five carriers with the largest growth were carriers providing charter services to express carriers.

This growth in cargo volumes for Asian and European carriers aligns with U.S. air trade patterns. According to our analysis of Census International Trade data, most international air cargo was destined for or originated in Asia or Europe from 2004 through 2023. Asia and Europe accounted for more than three-quarters of air import and export volume, more than 90 percent of air import value, and more than 80 percent of air export value during this period, according to the Census data. The volume of air cargo from Asia and Europe was 48 percent and 16 percent higher in 2023 than in 2004, respectively, according to our analysis of BTS's T-100 data.

Aircraft size. The largest aircraft available transported increasing volumes of domestic and international cargo over the period we reviewed, and these increases were driven by international operations. In 2004, about one-third of all U.S. cargo was transported on the largest cargo aircraft. By 2023, half of all U.S. cargo was transported on these aircraft—sometimes known as jumbo freighters.[31] Nearly three-quarters of that

[31]FAA categorizes aircraft into six distinct design groups based on the tail height and wingspan of the aircraft. We use the term jumbo to refer to aircraft in categories five and six.

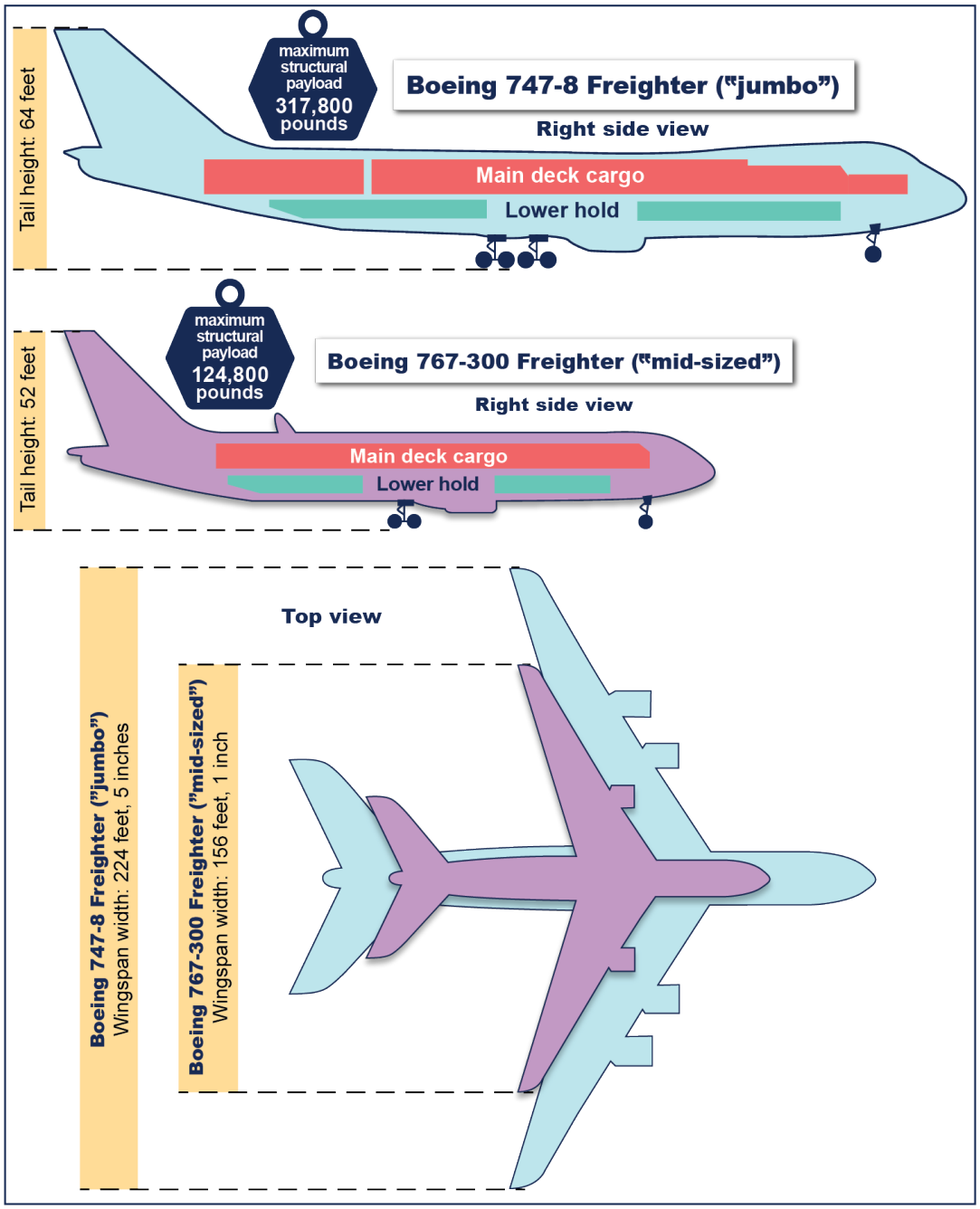
volume was transported internationally. FAA reported that it expects the number of large cargo aircraft to increase over the next 20 years.[32]

Increases in aircraft size can significantly affect ground-based air cargo infrastructure, as these aircraft take up more space and carry more cargo. For example, a Boeing 747-8 freighter—one of the largest jumbo freighters in service—has nearly one-and-a-half times the wingspan and can carry two-and-a-half times more cargo volume than the mid-sized Boeing 767-300 freighter.[33] (See fig. 10.) Leading industry practices state that larger aircraft require larger aprons to accommodate these aircraft, and larger or more efficient warehouses and truck areas to handle greater volumes of cargo.

[32]FAA, *FY2024-2044 FAA Aerospace Forecast.* As discussed above, these forecasts represent FAA expectations at the time the forecast was published, and factors such as changes in global trade patterns and policies could affect these expectations.

[33]The Boeing 747-8 is a design group six "jumbo" aircraft that carried 9 percent of all U.S. air cargo volume in 2023, the most volume of any design group six aircraft that year according to our analysis of BTS's Air Carrier Statistics T-100 data. The Boeing 767-300 is a design group four "mid-sized" twin engine widebody aircraft that carried 26 percent of all U.S. air cargo volume in 2023, the most volume of any design group four aircraft that year.

Figure 10: Comparison of Size and Cargo Capacity for Jumbo and Mid-Sized Freighter Aircraft



Source: GAO illustration based on analysis of publicly available Boeing documents. | GAO-25-107334

Note: The Federal Aviation Administration categorizes aircraft into six distinct design groups based on the tail height and wingspan of the aircraft, with group six containing the largest and group one containing the smallest aircraft. The Boeing 747-8 is a design group six "jumbo" aircraft that carried 9 percent of all U.S. air cargo volume in 2023, the most volume of any design group six aircraft that year. The Boeing 767-300 is a design group four "mid-sized" twin engine widebody aircraft that carried 26 percent of all U.S. air cargo volume in 2023, the most volume of any design group four aircraft that year.

Cargo on passenger aircraft. Prior to the COVID-19 pandemic, the share of U.S. air cargo volume transported on passenger aircraft was steadily increasing, and volume transported by passenger aircraft reached a peak in 2018 that was about 16 percent higher than 2004 volume. This growth aligns with increases in international air cargo volumes, which rely on passenger aircraft more heavily than domestic cargo operations.

Greater Demand for Temperature-Controlled Goods

Our analysis of Census International Trade data showed that while the same commodity groups had the largest import and export volumes from 2004 through 2023, the volumes and values of some commodities traded internationally by air shifted during this period.[34] Machinery and electrical equipment had the largest volume and value of all commodities imported and exported by air each year. Electronics like batteries, mobile phones, and small appliances made up about half of these imported goods and primarily originated in Asia. However, we found that the volume and value of air imports that require temperature-controlled storage—including pharmaceutical and perishable goods—increased more than the air import of other commodities, including electronics, as shown in table 6.[35]

[34]Census International Trade data underestimate trade volume and value of low-value shipments. According to the Census Guide to the Trade Data, the U.S. does not require shippers to file documents for shipments below a specified value. While Census estimates the value of these shipments for each country, the estimates have limitations and are excluded from the air trade data. As a result, the volume and value derived from Census data are underestimated. See appendix I for a comprehensive discussion of the limitations we identified with the Census trade data.

[35]Some federal agencies have reported overall growth in the demand for imported pharmaceutical and perishable products. For example, see U.S. Bureau of Labor Statistics, *The pharmaceutical industry: an overview of CPI, PPI, and IPP methodology* (December 2021), and Office of the U.S. Trade Representative, U.S. Department of Commerce, and U.S. Department of Agriculture, *Report on Seasonal and Perishable Products in U.S. Commerce* (Sept. 1, 2020).

Table 6: Percentage Increase in Volume and Value of U.S. Air Cargo Imports, Including Temperature-Controlled Goods, 2004–2023

Commodity	Volume increase	Value increase
All commodities	23.3%	81.0%
Electronics	35.9	66.7
Pharmaceutical goods	97.6	336.0
Perishable goods[a]	83.7%	139.3%

Source: GAO analysis of U.S. Census Bureau International Trade data. | GAO-25-107334

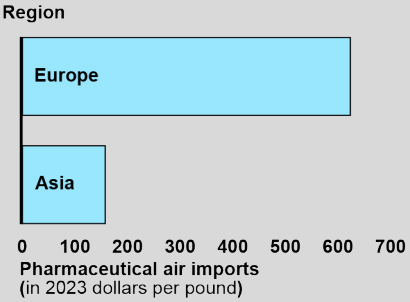
Note: Volume is in pounds and value is in 2023 dollars adjusted for inflation using the Bureau of Labor Statistics Import-Export Price Index. Pharmaceutical goods and perishable goods typically require temperature-controlled transport and storage.

[a]Perishable goods include fresh meat, vegetables, and prepared foods, as well as agricultural products like fresh flowers.

Pharmaceutical and Perishable Air Imports, 2004–2023

Pharmaceutical goods include a range of medical goods, from prescription drugs to bandages. The majority of pharmaceutical volume imported by air originated in Europe, but pharmaceutical volume from Asia grew more than 400 percent. Pharmaceutical goods imported by air from Asia tended to be lower value.

Dollars per Pound for Pharmaceutical Goods Imported by Air from Asia and Europe, 2004–2023



Perishable goods include fresh meat, vegetables, and prepared foods, as well as agricultural products like fresh flowers. By volume, about 71 percent of perishable goods imported by air originated in South and Central America. These goods were typically lower in value than perishable goods imported from Asia and Europe, which made up more than 80 percent of all perishable air import value. (Value is in 2023 dollars adjusted for inflation using the Bureau of Labor Statistics Import-Export Price Index).

Source: GAO analysis of U.S. Census Bureau International Trade data. | GAO-25-107334

We also found that the largest entry point for pharmaceutical air imports shifted from John F. Kennedy International Airport to Chicago O'Hare International Airport, and the largest air entry point for perishable goods was consistently Miami International Airport, according to our analysis of Census trade data. Between 2004 and 2023, the percentage of all U.S. pharmaceutical air imports that entered the country via John F. Kennedy International Airport dropped by more than half, while the volume of these goods at Chicago O'Hare International Airport nearly tripled.[36] By 2023, roughly 38 percent of all air pharmaceutical imports entered the U.S. via Chicago O'Hare International Airport. About two-thirds of the volume of all perishable goods imported to the U.S. via air entered at Miami International Airport each year throughout the period.

More than three-quarters of the 37 selected air cargo stakeholders told us that air transport of pharmaceutical and perishable goods, in addition to e-commerce, has increased in recent years. According to about one-third of the stakeholders we spoke with, growth in the import of pharmaceutical and perishable goods has changed air cargo infrastructure needs, such as increased demand for cold storage.

[36]Based on the volume of pharmaceutical air imports reported for the Port of Chicago, Illinois. Air imports at other Chicago-area airports, such as Chicago Midway International Airport, Chicago Executive Airport, and Chicago Rockford International Airport, are recorded separately from the Port of Chicago in the Census International Trade data.

DOT Has Not Fully Assessed the Reliability or Communicated the Limitations of Some of Its Domestic Air Cargo Estimates

As discussed above, air cargo data from BTS's Air Carrier Statistics T-100 database provide insights into changes in domestic and international air cargo volumes. However, we found that DOT's domestic air cargo estimates in BTS's Freight Analysis Framework (FAF) and National Transportation Atlas Database (NTAD) Air-to-Truck Facilities dataset were not sufficient to describe changes in domestic air cargo value, commodities, or infrastructure—information that is not included in the T-100 database. We also found that BTS has not fully assessed the reliability of these data, nor has it clearly or completely communicated known limitations to stakeholders. As a result, stakeholders are limited in their ability to make informed decisions about the suitability of these data for uses such as freight infrastructure planning and incident response.

DOT's BTS developed the FAF and NTAD to provide information on freight movements and facilities, including air cargo, in response to statutory requirements.[37] Among other requirements, BTS is to develop and maintain databases on freight movements, infrastructure, and flows that are suitable for intermodal analysis.[38]

Freight Analysis Framework air cargo data. The FAF includes information on air cargo moving into, out of, and within the U.S.[39] A range of stakeholders—including DOT, states, and localities—use FAF data to assess the condition of freight infrastructure, plan projects, and help allocate state and federal freight funding. For example, we found that

[37]The Federal Highway Administration (FHWA) originally designed the FAF and produced it in partnership with BTS. According to BTS officials, BTS took sole responsibility for all FAF tasks in October 2023.

[38]49 U.S.C. §§ 6303 and 6309 establish the Intermodal Transportation Database and the NTAD. Under 49 U.S.C. § 6303, BTS is to maintain a transportation database for all modes of transportation that shall be suitable for federal, state, and local analyses. This database shall include information on freight movements and the location of freight infrastructure. Under 49 U.S.C. § 6309, BTS is to develop and maintain geospatial databases that depict transportation networks and flows of people, goods, vehicles, and craft over those networks. The database shall be capable of supporting intermodal network analysis.

[39]The FAF includes information on freight movements for all modes of transportation, including truck, rail, water, air, multiple modes and mail, pipeline, and unknown or other. The FAF includes air cargo volume and value under two different modes of transportation: air (i.e., "truck-air") and multiple modes and mail. We reviewed the data sources and methods for the air mode, which includes shipments moved by air or a combination of truck and air. We did not review information specific to the multiple modes and mail category, which includes shipments that move by multiple modes and freight under 150 pounds moved by parcel carriers like FedEx and UPS, because it is not possible to disaggregate air movements within this category.

seven of the nine State Freight Plans we reviewed used FAF data, and three of these used FAF data to specifically describe air cargo activity. States use these plans to evaluate and plan for freight infrastructure and prioritize funding.[40]

FAF data include information on estimated air cargo volume, value, commodities, origins, and destinations. BTS bases the FAF on the Commodity Flow Survey (CFS) and provides FAF air cargo data in several separate data products, including benchmark year estimates, annual estimates, and forecast estimates.[41] According to our analysis of technical documents and interviews with BTS officials, these products have distinct purposes and methods.

- **Benchmark year estimates.** FAF benchmark year air cargo estimates include the volume and value of commodities moved by air between regions of origin and destination in the year Census administered the CFS. Starting with special versions of CFS and Census International Trade data that contain more data than publicly available datasets, BTS used statistical models and assumptions to generate the benchmark year estimates.[42] BTS also apportioned trade data to the designated geographic regions BTS uses for the FAF using Census payroll data.
- **Annual estimates.** FAF annual air cargo estimates include the volume and value of commodities moved by air between regions of origin and destination in the years between the 5-year CFS cycle. BTS based the annual estimates on the FAF benchmark year data and other data sources for each commodity in the base year and the

[40]We reviewed nine State Freight Plans that cover our 11 selected airports. Under 49 U.S.C. § 70202, each state that receives funding under 23 U.S.C. § 167, which relates to the FHWA's National Highway Freight Program, is to develop a freight plan that provides a comprehensive plan for the immediate and long-range planning activities and investments of the state with respect to freight.

[41]The CFS is a joint survey administered by BTS and Census every 5 years. As of 2025, the most recent data available are from the 2017 survey. Census makes CFS results publicly available, and these results contain some information about air cargo movements. We did not analyze and report these data because we determined they were not appropriate for our purposes. Specifically, the only CFS data available to describe trends from 2004 through 2023 are from 2007, 2012, and 2017. Given that we found significant year-to-year fluctuations in air cargo volumes over the 20-year period in our scope, we determined that 3 years of data were not appropriate to draw conclusions about air cargo trends. As part of the FAF, BTS also provides historical estimates for previous benchmarks.

[42]These special versions still have some data removed to protect confidentiality.

year for which the estimates were being made (i.e., the target year). To estimate the total air cargo volume in the target year, BTS calculated growth rates by commodity and origin as the ratio of weight in the target year and base year for a commodity-origin combination. BTS then applied these growth rates to the benchmark year air cargo estimates.

- **Forecast estimates.** FAF air cargo forecasts include forecasts of long-term air cargo volume and value for domestic, import, and export movements. DOT officials told us that a subcontractor conducted all technical tasks, including running FAF forecast models and preparing estimates.[43] The input data and the forecasting model are proprietary to the contractor. DOT officials told us they reviewed model assumptions and results using professional judgment and FAF benchmark year data.

We found that DOT has not fully assessed the reliability of the FAF air cargo data, nor has it clearly and completely communicated known limitations to stakeholders.

- **Benchmark year estimates.** BTS does not assess or report information on the reliability of the FAF air cargo data, such as the known sampling error associated with the special version of the CFS data it uses to develop the FAF air cargo data.[44] Additionally, BTS does not measure and communicate the potential error introduced through the methods it uses to estimate missing CFS and trade data or to apportion foreign air cargo volume to FAF regions (i.e., process error).
- **Annual estimates**. BTS did not finalize and publicly release technical documentation that describes methods and limitations for the annual

[43]The most recent forecast was published in 2022 and was developed under an FHWA contract. The forecast document notes that the FAF is developed through a partnership between FHWA and BTS. According to BTS officials, BTS has not determined whether it will use the same approach for future forecasts, for which it has sole responsibility.

[44]Sampling error is error associated with survey estimates that sample some and not all of the units in the sampling frame. BTS does report the sampling error for the CFS public use files it publishes separately from the FAF in partnership with Census. Census International Trade data have no sampling error because the data are based on information the shippers report to CBP or Census.

estimates for 2018 through 2023 until April 2025.[45] Officials told us that annual estimates made prior to 2018 were experimental in nature and that no technical documentation for those estimates is available, including assessments of reliability or limitations.

- **Forecast estimates.** DOT presented the forecast data as a federal statistical product despite noting that forecasts are developed using data and assumptions provided by third parties that do not necessarily represent the views of the U.S. government.[46] Moreover, DOT has not clearly communicated that it does not have access to the forecast model and does not review the model to assess its reliability. Nor has DOT completely communicated information on the limitations of the forecast estimates.[47]

According to BTS officials, BTS has not measured error introduced through its process in the FAF air cargo data because of the number of data sources and the complexity of BTS's methods.[48] While the FAF data for other freight modes may use dozens of different datasets, the FAF air cargo data are based on two sources, one of which has known sampling error. Further, BTS has not taken other steps to provide users with information on the reliability of the data, such as providing clear explanations of the limitations or statements indicating that BTS could not determine the reliability of the data.

Though BTS officials told us they communicate limitations and appropriate ways to use the FAF data to stakeholders in webinars and

[45]Specifically, BTS's methodology does not consider mode changes. Any changes that shift volume to or from the air cargo mode in the target year (e.g., temporary seaport congestion resulting in higher demand for air cargo) are not reflected in the estimates. Moreover, annual year estimates assume all shipments originating in the same location have grown at the same rate regardless of their destination. Because annual year estimates rely on benchmark year estimates, they are subject to the same sampling and process error in the benchmark estimates.

[46]As previously noted, FHWA, in partnership with BTS, oversaw the development of the forecast methodology and technical documentation by a contractor. BTS publishes the forecast data on its website as a joint product between BTS and FHWA. As of October 2023, BTS assumed sole responsibility for the FAF, including the forecasts, according to BTS officials.

[47]For example, though a BTS official told us that the reliability of the forecasts decreases beyond 7 years in the future, that assessment of reliability is not reflected in the technical documentation. BTS officials told us that the most recent forecasts were developed during the COVID-19 pandemic and contain significant unknowns.

[48]According to BTS officials, datasets like the FAF that rely on many data sources that are collected using varying methodologies prohibit the development of traditional reliability measures like standard errors or confidence intervals.

technical methodology documents, this information is neither clear nor complete. When we reviewed FAF webinar and technical documents, we found that either the documents did not include information on all the limitations or the information was not presented in a way that a technically proficient user could understand without additional explanation from BTS. For instance, to confirm basic methodological information, such as the underlying datasets that BTS uses to develop the FAF air cargo data, we met with BTS officials and the contractor that prepares the FAF multiple times because this information was not clearly presented in technical documents.

Additionally, BTS officials told us they believe users understand that, as estimates, the FAF air cargo data should not be the sole source for analyses. However, we found no such caveats in the technical documentation or other resources BTS provides to users. Moreover, in January 2025, BTS released experimental, disaggregated FAF data that estimate freight movements at the county level, though BTS officials told us the data should not be used for analysis of freight flows below the regional level. While the technical documentation for this experimental data notes that the underlying data—the benchmark estimates—may not reflect actual freight flows, the documentation does not reflect statements BTS officials overseeing the FAF made to us that the FAF data are not appropriate for such granular analysis.

National Transportation Atlas Database Air-to-Truck Facilities dataset. The NTAD includes information on U.S. air cargo warehouses and is used by federal and other stakeholders for a variety of purposes. The NTAD Air-to-Truck facilities dataset describes the estimated location, number, size, and operators of U.S. air cargo warehouses located on airport property. According to officials, BTS uses NTAD data, including the Air-to-Truck Facilities dataset, to identify transportation vulnerability and resilience, and to support DOT's response to critical incidents. For instance, BTS officials told us that BTS used NTAD data to assess freight disruptions between distribution centers and Baltimore-Washington International Airport after the Francis Scott Key Bridge collapsed in 2024.

We determined the NTAD air cargo data were not sufficient for the purposes of describing the number, size, or location of U.S. air cargo warehouses because these data were not complete, timely, or accurate. Specifically:

- **Completeness.** The data did not include all warehouses at the 60 airports in the NTAD. When we compared NTAD data with information

we collected from our 11 selected airports, we found that more than 10 percent of the warehouses airports reported to us (14 of 127 warehouses) were not included in the NTAD. For four of the 11 airports, the NTAD data were missing more than one-third of the warehouses each airport reported to us.

- **Timeliness.** BTS provided inconsistent information regarding how often it updates the data. For instance, BTS officials told us that they update the data continuously, while NTAD technical documentation states that BTS updates the data irregularly, and BTS's website states that BTS compiled the data in 2019 and updated the data in 2020. Additionally, the dates provided in the data itself are in 2018. According to BTS officials, as air cargo facilities move and change frequently, data from prior years may not accurately reflect the current size and location of air cargo warehouses.
- **Accuracy.** We identified inaccuracies in the number and size of air cargo facilities. Specifically, when we compared NTAD data with information we collected from selected airports, we found the number of warehouses was inaccurate for eight of our 11 selected airports, and the size was inaccurate for all 11 selected airports.

We also found that BTS has not clearly or completely communicated the known limitations of NTAD air cargo data, or how these limitations affect stakeholders' ability to use the data for specific purposes. While BTS shares some information on the methods it uses to develop the NTAD air cargo data and associated limitations in available user guidance, we found that this information is not clear and does not include an assessment of reliability or most of the limitations that we identified or that BTS officials communicated to us. For example, as previously discussed, BTS provided unclear information on how often it updates the data. Additionally, BTS officials advised us that the data should not be used to describe the exact location or size of air cargo warehouses. However, the user guidance contains no information advising stakeholders that the data should not be used for these purposes.

BTS officials told us that it is difficult to accurately capture information on air cargo warehouses in the NTAD because warehouses change frequently, and air cargo stakeholders do not report warehouse data to DOT. BTS is exploring methods to improve the quality of the NTAD air cargo data and will consider providing more explicit information on appropriate uses in the future, according to officials.

The Office of Management and Budget requires that federal statistical agencies—including BTS—describe information about how data were

collected and any known or potential data limitations or sources of error, where appropriate, so users can evaluate the suitability of the data for a particular purpose.[49] These agencies should also describe data derived from outside sources in information products and communications to users, so they can use the data appropriately.[50] Internal control standards also state that agencies should externally communicate necessary quality information to achieve agency objectives.[51]

Without assessing the reliability and clearly and completely communicating the limitations of the FAF and NTAD air cargo data, DOT cannot ensure stakeholders are able to make informed decisions about the suitability of these data for their purposes. As a result, stakeholders may use these data for purposes for which they may not be appropriate. For instance, BTS officials told us that the reliability of the FAF forecasts decreases beyond 7 years in the future. However, of the nine State Freight Plans we reviewed, four cited FAF projections for 20 years or more in the future to evaluate or plan for expected freight movements in their states. Additionally, as previously noted, BTS released experimental, disaggregated FAF data to estimate freight movements at the county level in January 2025. By using these data to produce more detailed estimates without fully understanding or communicating the existing limitations and potential error associated with the FAF, BTS risks exacerbating such limitations and further affecting stakeholders' ability to determine appropriate uses for the data.

[49]Office of Management and Budget, *Statistical Policy Directive No. 1: Fundamental Responsibilities of Federal Statistical Agencies and Recognized Statistical Units*, 79 Fed. Reg. 71,610, 71,615 (Dec. 2, 2014).

[50]*Id.*

[51]GAO-14-704G, 62.

Selected Air Cargo Stakeholders Reported Common Challenges That Reduced Efficiency and Safety, and Some Efforts That Could Address Them

Selected air cargo stakeholders reported common challenges with ground-based air cargo infrastructure and operations across the 11 selected airports we reviewed. Some of the challenges most frequently identified slowed cargo operations and posed safety risks, according to stakeholders. Stakeholders also reported a range of recent or planned steps to modernize air cargo infrastructure that may address these challenges, and their approaches have varied based on each airport's unique operational circumstances.

Selected Stakeholders Reported Common Challenges with Ground-Based Air Cargo Infrastructure and Operations

For each of the seven elements of ground-based infrastructure and operations we reviewed, more than half of our 37 selected air cargo stakeholders reported challenges.[52] While stakeholders reported common challenges, the extent and types of challenges associated with each element varied, as did their impact on overall air cargo operations, according to stakeholders and our observations at nine airports and 28 warehouses.

Among each element of infrastructure we reviewed, more than two-thirds of stakeholders reported challenges with warehouses, truck areas, and roadways. For each of these elements of infrastructure, stakeholders most frequently identified challenges related to the age of warehouses, the availability of truck areas, and the configuration of roadways. Stakeholders also identified challenges related to cargo aprons, especially their size. (See fig. 11.)

[52]We asked stakeholders about challenges with seven elements of air cargo infrastructure and operations at our nongeneralizable sample of 11 selected airports, but some stakeholders also provided information on challenges at other U.S. airports or with elements we did not ask about. We identified these seven elements by reviewing industry guidance for air cargo facility planning. See appendix I for more information.

Figure 11: Challenges That Selected Stakeholders Reported with Ground-Based Air Cargo Infrastructure

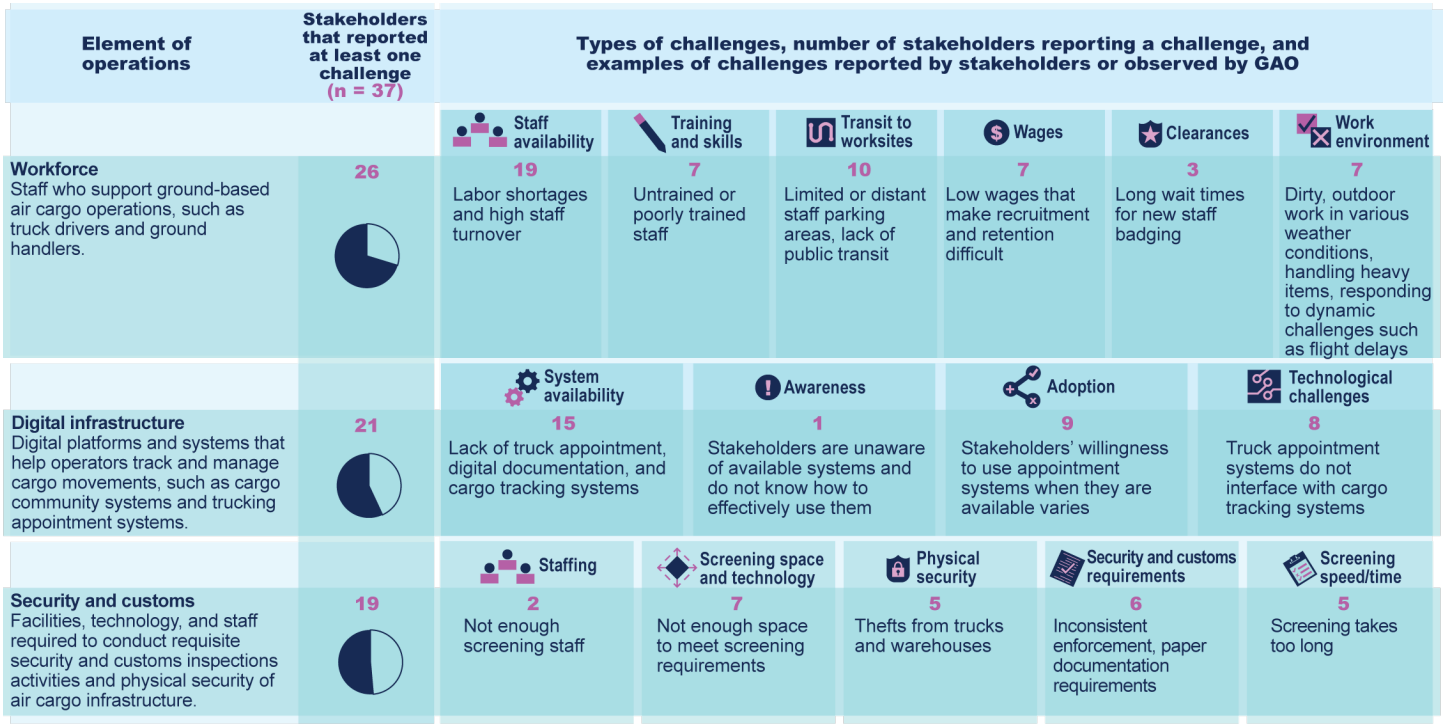
Element of infrastructure	Stakeholders that reported at least one challenge (n = 37)	Types of challenges, number of stakeholders reporting a challenge, and examples of challenges reported by stakeholders or observed by GAO				
		Age	Configuration	Availability	Size	State of repair
Warehouses Buildings for processing, sorting, and storing cargo, distributing cargo to trucks (including truck docks), and conducting federal customs and security inspections.	31 	22 Warehouses that are 40 or more years old	20 Layout obstructions, low ceilings, locations far from passenger terminals	17 Too few warehouses to meet needs	15 Too small to process and store cargo volume or use modern equipment	11 Leaking roofs, broken elevators, holes in walls
Truck areas Parking, queuing, and staging areas for trucks picking up and dropping off cargo at warehouses.	28 	3 Truck areas that have not been updated since original construction	9 Far from warehouses; design of areas obstructs turning	22 Too few or no designated truck areas	10 Small, crowded parking areas	0
Roadways Roads leading into warehouses as well as roads immediately surrounding the airport that connect to major roadways, like the national highway system.	25 	3 Older roadways not designed to accommodate modern cargo vehicles	18 Poorly timed lights, short or tight turn lanes, rail crossings	11 Warehouses with only one or two access points, lack of cargo-only roadways	17 Small, narrow roadways that cannot handle the volume or sizes (length, width, weight) of cargo vehicles	4 Potholes, pavement deterioration
Cargo aprons Parking space for aircraft loading and unloading.	21 	7 Older aprons contribute to design challenges	7 Located far from warehouses; inflexible designs that only allow aircraft to park in specific spots	7 Not enough cargo aprons or parking positions on existing aprons	18 Too small to accommodate jumbo aircraft, too small to both park aircraft and stage cargo and equipment	0

Source: GAO icons and analysis of interviews with selected air cargo stakeholders. I GAO-25-107334

Note: We interviewed 37 selected air cargo stakeholders about air cargo infrastructure and operations at 11 selected U.S. airports. We counted whether a stakeholder reported at least one challenge with a specific element of ground-based air cargo infrastructure within our scope, though some stakeholders reported multiple challenges with specific elements. As a result, the number of stakeholders reporting specific types of challenges with each element of infrastructure adds up to more than 37. We asked selected stakeholders about challenges at one or more of the 11 airports we selected, but some stakeholders also provided information on challenges at other U.S. airports.

Among the elements of air cargo operations we reviewed, more than two-thirds of stakeholders identified challenges with the air cargo workforce. Specifically, stakeholders most frequently identified challenges with staff availability. Stakeholders also identified challenges related to digital infrastructure and security and customs. (See fig. 12.)

Figure 12: Challenges That Selected Stakeholders Reported with Ground-Based Air Cargo Operations



Source: GAO icons and analysis of interviews with selected air cargo stakeholders. I GAO-25-107334

Note: We interviewed 37 selected air cargo stakeholders about air cargo infrastructure and operations at 11 selected U.S. airports. We counted whether a stakeholder reported at least one challenge with a specific element of ground-based air cargo operations within our scope, though some stakeholders reported multiple challenges with specific elements. As a result, the number of stakeholders reporting specific types of challenges with each element of air cargo operations adds up to more than 37. We asked selected stakeholders about challenges at one or more of the 11 airports we selected, but some stakeholders also provided information on challenges at other U.S. airports.

Additionally, more than three-quarters of stakeholders identified other challenges with a variety of elements of air cargo infrastructure and operations that we did not specifically ask about. For example, some stakeholders reported challenges with capital costs, operational fees, utility infrastructure, and planning processes, concerns from surrounding communities, and land constraints.

Some of the Challenges Selected Stakeholders Most Frequently Identified Slowed Air Cargo Operations and Posed Safety Risks

Older Warehouses Slowed Operations

Variations in Truck Length

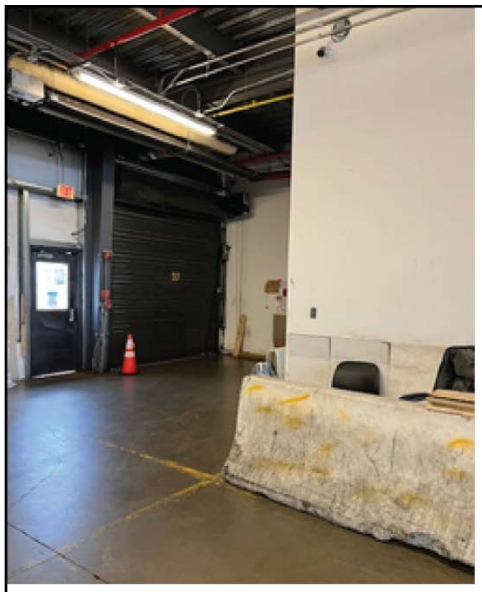
At one airport we visited, we observed mostly small trucks docked at the doors of warehouses that were built roughly 50 to 75 years ago, prior to the establishment of federal length standards for trucks with a single trailer. While stakeholders stated that most trucks picking up and dropping off cargo at selected airport warehouses are 53 feet in length, this has not always been the case.

Source: GAO photo, interviews with selected air cargo stakeholders, and observations at selected airports. I GAO-25-107334

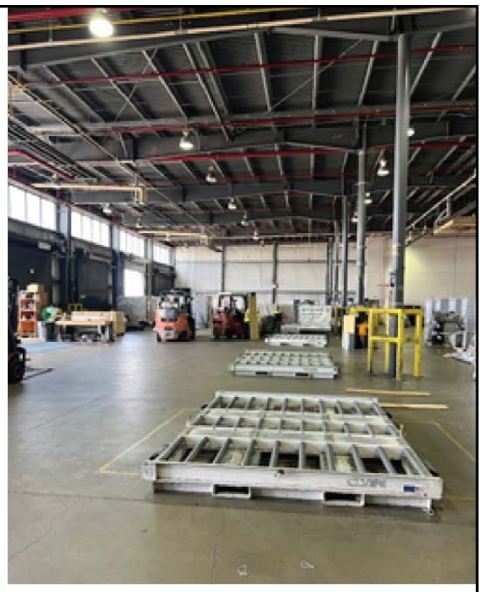
Air cargo stakeholders most frequently reported a range of interrelated challenges associated with older warehouses, including their size, layout, location, and utility infrastructure. These challenges slowed operations and posed safety risks, according to stakeholders.

Stakeholders reported that the size and layout of aging warehouses often posed challenges. For example, older warehouses are often smaller than more recently constructed warehouses, with insufficient space to accommodate separate security screening areas and machines, and with truck docks that are too small for modern trucks, according to stakeholders. Stakeholders also said older warehouses have low ceilings, close-set columns, and thick walls or other structural barriers that impede operations. At four of the nine airports we visited, we visited warehouses that were at least 40 years old. We observed older warehouses with narrow or obstructed space, blocked doors, and low ceilings. For example, at one older warehouse we visited, four of the seven dock doors were fully or partially blocked, and close-set columns obstructed floor space, creating tight spaces for forklifts to maneuver. The tenant told us that these size and layout challenges slowed operations and led to accidents (see fig. 13).

Figure 13: Layout Challenges at an Older Air Cargo Warehouse



Interior office space partially obstructs a dock door.



A warehouse tenant reported that columns in the middle of the warehouse make maneuvering forklifts difficult.

Source: GAO photos. | GAO-25-107334

Additionally, stakeholders told us that older warehouses at some airports are located far from key infrastructure, such as passenger terminals, where cargo is loaded and unloaded onto passenger aircraft. Officials at one airport said that because past tenants constructed warehouses in dispersed areas of the airport, some current tenants must tug cargo across the airfield to get cargo to the passenger terminal. At one warehouse we visited at this airport, handlers must tug cargo 25 minutes to passenger aircraft. In the airport profiles in appendix II, maps detail the location of cargo warehouses at each of our selected airports.

Temperature-Controlled Containers Can Stress Older Warehouses' Electrical Infrastructure

Air cargo operations sometimes use temperature-controlled containers to keep sensitive cargo at designated temperatures during transit and at warehouses. Though the containers use battery power during transit, handlers plug the containers into an electrical outlet when they are in the warehouse (see the photo below). However, a couple of stakeholders told us that electrical systems in older warehouses can struggle to provide the energy required for these containers. One stakeholder told us they have had to call shippers to pick up cargo early when the warehouse's electrical infrastructure failed.

Source: GAO photo, interviews with selected air cargo stakeholders and observations at selected airports. I GAO-25-107334

Stakeholders also reported that older warehouses did not have the utility infrastructure to support the energy demands of cold storage areas or modern equipment such as electric forklifts. For example, a stakeholder at one warehouse we visited told us their warehouse could handle a maximum of four temperature-controlled containers plugged in at one time in the summer. If they plugged in more than four, the warehouse's electrical system would fail.

Lack of Truck Areas, Poorly Configured Roadways, and Limited Digital Infrastructure Contributed to Congestion and Safety Risks

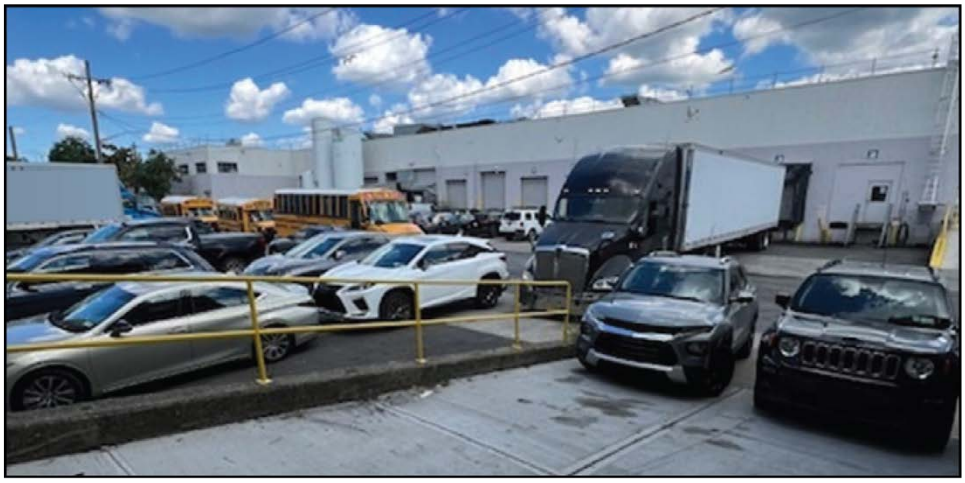
Stakeholders reported that a lack of truck areas, poorly configured roadways, and limited digital infrastructure can pose interrelated, and sometimes compounding, challenges to air cargo operations. For example, officials at one airport told us they did not currently have a digital truck appointment or cargo tracking system. As a result, most trucks arrived at the same times to pick up or drop off cargo, causing backups at warehouses. The airport also did not have a staging or parking area where trucks could wait for access to the warehouses. Instead, when trucks arrived at the same time, they parked on airport access roads and residential streets near the airport. As a result, the trucks caused congestion that impeded other cargo trucks and passenger vehicles trying to access the airport.

Stakeholders at other airports also reported that airport roadways were not configured for cargo vehicles, which led to safety hazards in some instances. They told us that airport roadways are often narrow or single lane, have short turn lanes, and may have incorrect signal timing at intersections. For example, a stakeholder at one airport told us that the

congestion from trucks lining up on the sides of a narrow airport road had resulted in a serious accident.

During our visits to airports, we observed trucks blocking roadways and conducting unsafe maneuvers in and around the airport due to improperly configured roads that did not provide sufficient space to operate modern trucks. For example, at an air cargo warehouse near one airport, we saw a truck block traffic in both directions as it docked. We also saw a truck block traffic, including school buses, as it docked at the warehouse across the street (see fig. 14). At another airport, we observed a truck unable to make a right turn into a warehouse docking area from the access road without intruding into a lane for oncoming traffic.

Figure 14: Example of Roadway Congestion Caused by a Truck Docking at an Off-Airport Warehouse



Source: GAO photo. | GAO-25-107334

Small, Crowded Aprons Posed Challenges for Loading and Unloading Cargo Aircraft

Stakeholders reported that cargo aprons—parking space for loading and unloading aircraft—were too small to accommodate both larger aircraft and staging or storage space for cargo and equipment. Having sufficient space to stage cargo and store ground support equipment on the apron helps reduce delays in loading and unloading aircraft, according to stakeholders. As previously mentioned, aircraft size has continued to increase, which has exacerbated issues with limited apron space at selected airports. Additionally, stakeholders stated that cargo stored on aprons that are too small can create safety hazards for operators trying to maneuver aircraft and equipment. Empty containers stored on aprons

also take up space and, when unsecured, blow around easily, risking damage to equipment. We observed crowded aprons in our visits to selected airports. For example, at one airport, we observed multiple parked aircraft, containers, ground support equipment, a tug, and a truck occupying the same crowded apron (see fig. 15).

Figure 15: A Crowded Cargo Apron at One Selected Airport

Source: GAO photo. | GAO-25-107334

Selected Stakeholders Have Taken Steps to Modernize Air Cargo Infrastructure That May Address Challenges, but Their Approaches Have Varied

Air cargo stakeholders reported that they had taken or were planning to take steps to modernize air cargo infrastructure and operations at selected airports. These steps may address some of the challenges they identified. While stakeholders reported common challenges across selected airports, as described above, their approaches to modernization varied due to factors such as differences in airports' prioritization of air cargo, available resources, state and local government support, and the parties responsible for specific elements of infrastructure.

Most commonly, stakeholders reported airport efforts to consolidate or relocate on-airport warehouses, which may involve constructing new warehouses, aprons, roadways, and other elements of air cargo

infrastructure and operations.[53] Officials at eight of the 11 selected airports reported they planned to consolidate or relocate air cargo warehouses or had done so in the last 10 years.[54] Some airports directly oversaw or planned to directly oversee the modernization plans themselves, while others had used or planned to use third-party developers.

For example, officials at one airport said they were directly handling the demolition, design, and construction of cargo warehouses and aprons in a new area of the airport, and pursuing new cargo business, as part of their modernization plans. According to the officials, by directly constructing the new warehouses, the airport could retain more control over cargo operations than if they used a third-party developer. Officials told us the new cargo area would allow them to address challenges with aging warehouses and accommodate anticipated increases in air cargo volumes over the next 30 years. Additionally, because they recognized the economic benefit air cargo has on the surrounding community, officials told us they were working to attract new cargo business to the airport by supporting nearby off-airport businesses, such as distribution centers.

Officials at another airport said they had contracted a third-party developer to construct, operate, and maintain warehouses and aprons in a new area of the airport as part of the airport's modernization program. According to airport officials, the modernization efforts addressed challenges with apron and warehouse availability and would accommodate future growth. Officials said the developer was responsible for both the capital and operations and maintenance costs for cargo warehouses and aprons. By contrast, the airport directly oversaw the reconfiguration and construction of runways and taxiways to accommodate jumbo aircraft and connect the new cargo area to the airfield. Officials also reported plans to connect roadways to support cargo operations. However, one stakeholder involved in roadway planning reported that airport roadway projects can take decades because they often involve many entities and regulatory approvals. Airport officials noted that the local government recognized the

[53]As previously noted, our sample of airports is not generalizable. Among other factors we considered, we selected airports that had recent, ongoing, or planned air cargo modernization efforts.

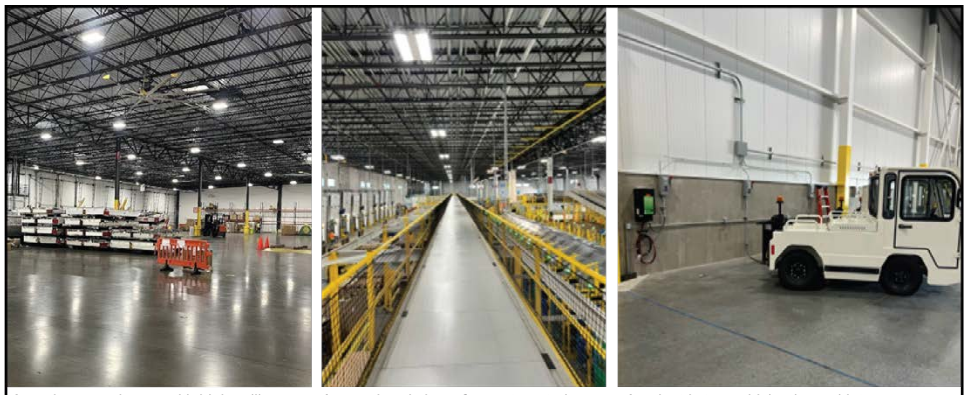
[54]The remaining three airports reported other modernization projects, such as construction or expansion of new warehouses in existing locations or plans to change the layout of taxiways to improve the efficiency of cargo operations.

importance of air cargo to the broader region's economy and therefore supported air cargo modernization efforts.

In addition to large-scale modernization efforts, airports and stakeholders reported stand-alone or smaller-scale efforts such as taxiway reconfiguration or warehouse renovations and expansions. For example, officials at one airport reported both airport-led and tenant-led cargo modernization efforts over the last 10 years. The airport directly oversaw warehouse and apron construction in a new area of the airport, including aprons for jumbo aircraft, while a tenant renovated an existing warehouse. The officials also said they partnered with a private company to develop a digital truck scheduling system to reduce the need for future truck parking.

We visited warehouses at selected airports that were constructed recently, including some that were part of the modernization efforts described above, and we observed features that could support modern air cargo operations. Specifically, nine of the 28 warehouses we observed were constructed in the last 10 years and had features like high ceilings and unobstructed floor space. We also observed amenities like automated sorting equipment, charging areas for electric ground support equipment, and large built-in temperature-controlled areas for cold storage. (See fig. 16.) Stakeholders reported that these types of amenities could speed cargo operations while achieving other goals, including sustainability. For instance, stakeholders at one airport noted that their electric equipment has a removable battery that allows near constant use, because the batteries can be swapped out and recharged. At several new warehouses, we observed charging stations for electric equipment that were built into the new warehouse.

Figure 16: Modern Air Cargo Warehouse Interiors



A modern warehouse with high ceilings and limited interior columns.

An overhead view of an automated sorting system in an updated warehouse.

An electric tug vehicle plugged into a charging station at a new warehouse.

Source: GAO photos. | GAO-25-107334

While stakeholders expressed optimism that recent and planned modernization efforts would address air cargo challenges, some also expressed caution. For example, stakeholders said that the parties leading modernization efforts need to have a comprehensive understanding of how cargo works at their airport; tailor solutions to the needs of their airport; seek out the views of all who may be affected, including members of communities around the airport; and minimize disruptions to ongoing cargo operations.

For example, at one airport, airport officials and stakeholders reported mixed views on CBP's planned implementation of a central examination station. According to CBP, these stations, which centralize customs processes in one location, are intended to improve the efficiency of customs inspections. Airport officials told us the planned central examination station would improve the efficiency of cargo screenings. However, one stakeholder expressed concern that the planned central examination station was across the large airfield from the airport's planned location for new cargo warehouses. They said this distant location would slow operations, because ground handlers would have to tug cargo to and from the station for screening.

DOT Has Not Identified Challenges to the Efficient Movement of Air Cargo, Limiting Its Ability to Help Address Them

DOT's Multimodal Freight Office—which is responsible for promoting the efficient movement of multimodal freight on the U.S. freight network—has not taken steps to identify air cargo challenges since DOT stood up the office in 2023.[55] Its statutory responsibilities include carrying out the U.S.'s multimodal freight policy goals. These goals include identifying infrastructure improvements, policies, and innovations that reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network and improving the short- and long-distance movement of goods, such as those that travel between airports and the National Multimodal Freight Network.[56]

As discussed above, stakeholders we interviewed reported a range of challenges with ground-based infrastructure and operations that impede the efficient movement of air cargo. However, when we spoke with officials from DOT's Multimodal Freight Office, they were unaware of challenges that stakeholders have experienced.

We found that the Multimodal Freight Office has not used available information sources that provide specific information about challenges to the efficient movement of air cargo. Multimodal Freight Office officials said they rely on public comments and requests for funding to identify freight challenges, which could include challenges related to air cargo infrastructure and operations. However, officials told us these sources do not include specific information about challenges to the efficient movement of air cargo. Moreover, we found the Multimodal Freight Office has not used available sources—specifically, State Freight Plans—that do contain this information.

- **Public comments.** Multimodal Freight Office officials said they use public comments on proposed national plans—such as the National Freight Strategic Plan and the National Multimodal Freight Network—to identify any challenges freight stakeholders, including air cargo

[55]49 U.S.C. §§ 118, 70101.

[56]49 U.S.C. § 70101(b). The National Multimodal Freight Network is a set of designated route miles and facilities designed to assist states in strategically directing resources toward improved system performance for the efficient movement of freight; to inform freight transportation planning; to assist in the prioritization of federal investment; and to assess and support federal investments to achieve certain freight policy goals. *Id.* § 70103.

stakeholders, have experienced.[57] However, these plans cover broad freight issues, and Multimodal Freight Office officials said they have not received comments specific to air cargo. In April 2025, Multimodal Freight Office officials told us that they planned to request public comments from freight stakeholders on the update to the National Freight Strategic Plan in calendar year 2025.

- **Requests for funding.** Multimodal Freight Office officials said airports' funding requests may also identify air cargo challenges. As discussed above, airports may apply for funding from various federal grant programs for eligible air cargo infrastructure projects, including the Nationally Significant Multimodal Freight and Highway Projects (INFRA) Program. However, according to Multimodal Freight Office officials, they have not received many requests for funding from airports for air cargo infrastructure. Officials from seven of the 11 airports we reviewed said they had used federal funding for air cargo infrastructure, but most of these airports used a program that does not require them to submit funding requests for specific projects. Six of the airports reported using funding from the Airport Improvement Program, which provides formula and discretionary funding for eligible

[57]The Fixing America's Surface Transportation Act (FAST Act), Pub. L. No. 114-94, § 8001, 129 Stat. 1312, 1606-07 (2015), which changed the requirement first established in the Moving Ahead for Progress in the 21st Century Act (MAP-21), Pub. L. No. 112-141, § 1115, 126 Stat. 405, 470-72 (2012), required DOT to develop a National Freight Strategic Plan that included eleven components to address multimodal freight transportation. 49 U.S.C. § 70102. In December 2019, DOT issued a request for information from the public, including stakeholders (e.g., state and local agencies, private owners and operators, industry trade groups, and shippers and cargo owners) to aid in the development of the National Freight Strategic Plan. National Freight Strategic Plan: Request for Information, 84 Fed. Reg. 71,529 (Dec. 27, 2019). DOT received 82 comments and published the National Freight Strategic Plan in September 2020.

Pursuant to the FAST Act, as amended by the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021), DOT is required to establish a National Multimodal Freight Network. DOT issued a notice and request for comments from stakeholders on an interim National Multimodal Freight Network in 2016 and, in 2017, extended the comment period to February 2018. Establishment of Interim National Multimodal Freight Network, 81 Fed. Reg. 36,381 (June 6, 2016); 82 Fed. Reg. 49,478 (Oct. 25, 2017). DOT received 126 comments in total. In 2024, DOT issued a notice and request for comments on approaches for identifying National Multimodal Freight Network critical freight facilities and corridors. Request for Information on Goals, Criteria, Thresholds, and Measurable Data Sources for Designating the National Multimodal Freight Network, 89 Fed. Reg. 25,913 (Apr. 12, 2024). It received 44 comments. In 2025, DOT published a draft designation of the National Multimodal Freight Network for comment. The draft designation consists of approximately 175,000 miles of highways, railways, and waterways and 205 marine ports and airports that are proposed for designation due to their criticality to freight movement and global and domestic supply chains. Draft Designation of National Multimodal Freight Network and State Input Process, 90 Fed. Reg. 2781 (Jan. 13, 2025). It received 75 comments.

public-use airport infrastructure projects that address airport safety, capacity, security, and environmental concerns.[58] One airport reported receiving a grant from the INFRA competitive program. Specifically, in 2024, DOT announced an award to Lehigh Valley International Airport of $40.8 million in INFRA grant funding to construct a multimodal cargo facility, create a safe truck parking area, and provide specialized facilities for processing time-sensitive packages.[59]

- **State Freight Plans.** State Freight Plans we reviewed contained information about air cargo challenges. However, Multimodal Freight Office officials said they have not analyzed the plans to identify challenges to the efficient movement of air cargo. The Multimodal Freight Office is responsible for overseeing states' development and updates of their State Freight Plans and providing guidance or best practices to help states do so.[60] Multimodal Freight Office officials said that DOT uses these plans to inform the development of the National Multimodal Freight Network and ensure state and federal freight activities are aligned. States use these plans to identify multimodal freight needs and challenges and to prioritize investments. We found that eight of the nine State Freight Plans we reviewed had identified challenges specific to air cargo. For example, six states reported challenges with congestion on roadways to air cargo facilities, three states reported aging warehouses and deteriorated cargo aprons, and one identified funding gaps for priority projects related to air cargo.[61] In April 2025, Multimodal Freight Office officials told us that they had begun efforts to update the National Freight Strategic Plan in November 2024 and planned to analyze State Freight Plans as part of these efforts.

In addition, DOT has not routinely communicated with air cargo stakeholders to identify such challenges. The Multimodal Freight Office's responsibilities include assisting with modal freight planning, helping cities and states develop freight mobility and supply chain expertise, identifying

[58]The formula funds under this grant program are also referred to as entitlement funds.

[59]As of May 2025, airport authority officials reported that its grant agreement was under review by FHWA and they expected it to be approved in late 2025.

[60]49 U.S.C. § 118(d)(2). Pursuant to 49 U.S.C. § 70202 each state that receives funding under 23 U.S.C. § 167, which relates to the National Highway Freight Program, must develop and periodically update a freight plan that provides a comprehensive plan for the immediate and long-range planning activities and investments of the state with respect to freight.

[61]As discussed earlier, responsibility for air cargo warehouses varies across airports.

information-sharing opportunities between the private and public sectors with respect to freight issues, and overseeing freight research activities across DOT.[62] However, according to Multimodal Freight Office officials, the Multimodal Freight Office has not routinely engaged with air cargo stakeholders. Officials also told us the Multimodal Freight Office does not routinely discuss air cargo issues or concerns with DOT's modal administrations, such as FAA or FHWA. Further, according to officials at FAA's Office of Airports, FAA does not routinely engage with the air cargo industry or passenger airlines about air cargo infrastructure needs, despite routinely communicating with airports and airlines regarding other matters.

Selected air cargo stakeholders told us they have not been in contact with the Multimodal Freight Office about air cargo issues. Of the 30 stakeholders that responded to our question about coordination with DOT, none said they had communicated with the Multimodal Freight Office about air cargo issues, though some said they interacted with modal administrations regarding regulatory matters.[63] Many stakeholders noted the lack of attention that DOT has given to air cargo. Nineteen of 30 air cargo stakeholders that responded to our question told us that neither DOT nor the federal government sufficiently prioritized air cargo to meet industry needs.

In April 2025, Multimodal Freight Office officials told us that, they planned to gather information from freight stakeholders, including air cargo stakeholders, on challenges as part of their efforts to update the National Freight Strategic Plan. Officials identified possible mechanisms for outreach, including a request for public comment, webinars, and in-person events. However, officials were not able to provide specific details, such as time frames or the air cargo stakeholders they would include. Officials said the Multimodal Freight Office was in the process of determining its role and establishing priorities.[64] The officials said multimodal freight policy was a new area of interest, and they were still

[62]49 U.S.C. §§ 118(c) & 118(d)(1)(A), 70101(c).

[63]Due to differences in their areas of expertise and experience, not all stakeholders we interviewed responded to questions about their interactions with DOT, DOT's prioritization of air cargo, or steps DOT could take to address air cargo challenges. As a result, we reported this information based on the total number that provided a response to the question.

[64]In 2024, DOT officials told us the Multimodal Freight Office had seven employees. In April 2025, DOT officials told us the Multimodal Freight Office had three employees and that they had no additional information about hiring new staff.

developing efforts to incorporate air cargo into DOT's broader freight and supply chain efforts. However, besides the Multimodal Freight Office's efforts to designate the National Multimodal Freight Network, which will include airports, officials said they were not planning other initiatives relevant to air cargo operations and infrastructure. They said DOT would continue to develop initiatives as needed.

Stakeholders we spoke with reported that increased communication and engagement from DOT could help them address air cargo challenges. Of the 29 stakeholders that identified steps DOT could take to address air cargo challenges, eight said DOT should learn more about air cargo issues, six said DOT should directly communicate with air cargo stakeholders, and eight said DOT should facilitate industry communication and collaboration. For example, one airport authority told us that increased engagement between DOT and air cargo stakeholders could facilitate industry collaboration and help stakeholders identify solutions to challenges.

The Multimodal Freight Office has experience routinely communicating with other freight modes, which, according to officials, has helped the office achieve its goals. For example, the Multimodal Freight Office oversees the Freight Logistics Optimization Works (FLOW) program, a public-private partnership that facilitates information-sharing between government and industry on issues related to maritime freight.[65] According to DOT, FLOW has helped industry stakeholders anticipate changes in the supply chain and take proactive steps to mitigate delays, and it has helped DOT establish routine communication with maritime freight stakeholders. According to officials from the Multimodal Freight Office, DOT has been able to leverage these existing relationships with maritime stakeholders to help address potential supply chain disruptions.

According to evidence-based policymaking guidelines, having methods for obtaining and analyzing information helps agencies identify opportunities to improve their activities.[66] In addition, federal internal control standards state that agency managers should communicate with, and obtain quality information from, internal and external parties, to

[65]As part of the FLOW program, maritime stakeholders (i.e., cargo owners, ocean carriers, ports, terminals, and railways) share logistics data with DOT, and DOT provides them with anonymized data about shipping container supply, demand, and cargo movements and equipment availability.

[66]GAO-23-105460.

achieve their objectives.[67] Open, two-way external reporting lines allow for this communication. As the recently established Multimodal Freight Office determines its role and priorities, evaluating existing sources of information and routinely communicating with stakeholders would enable it to identify challenges and determine whether the agency needs to take steps to address them. Such steps could include facilitating information sharing between air cargo stakeholders about solutions that could address challenges to the efficient movement of cargo.

Conclusions

Air cargo is a vital component of the U.S. freight system. Shippers and the American public rely on the U.S. air cargo network for the transport of critical goods, including life-saving medications, modern electronics, and fresh fruit and other produce. However, stakeholders have reported that aging air cargo infrastructure has not kept pace with modern advancements in cargo operations, including the use of new technologies and equipment that could boost efficiency.

Having information on the condition of air cargo infrastructure and operations, and on the challenges stakeholders face, can help federal, state, and local government decision-makers identify and address areas in need of improvement. However, because BTS has not assessed and communicated the limitations of some of its air cargo data, decision-makers and other stakeholders may not have the information they need to appropriately use these data to target infrastructure investments and improve the flow of air cargo.

Moreover, DOT may not fully understand the infrastructure and operational challenges air cargo stakeholders face because it has not used existing sources of information or routinely communicated with stakeholders to identify such challenges. Having information on air cargo challenges is critical for DOT as it sets federal goals that will inform future investments and priorities for freight infrastructure in the U.S. The Multimodal Freight Office is uniquely positioned to leverage existing information and relationships with modal administrations and freight stakeholders to routinely collect information on these challenges. Additionally, having information about air cargo challenges could help inform the recently established Multimodal Freight Office as it determines its priorities and role within DOT. By obtaining this information, DOT can better determine whether it needs to take action to help address these

[67]GAO-14-704G, 58-59.

challenges as it fulfills its responsibility to ensure the efficient movement of freight on all modes of U.S. transportation.

Recommendations for Executive Action

We are making the following two recommendations to DOT:

The Secretary of Transportation should ensure that the Director of BTS fully assesses the reliability of air cargo data in the Freight Analysis Framework and National Transportation Atlas Database and communicates the limitations of the data. (Recommendation 1)

The Secretary of Transportation should ensure that the Assistant Secretary for Multimodal Freight Infrastructure and Policy evaluates existing sources of information and routinely communicates with air cargo stakeholders, to identify challenges to the efficient movement of air cargo and determine whether the agency needs to take steps to help address the challenges. (Recommendation 2)

Agency Comments

We provided a draft of this report to DOT for review and comment. In its comments, reproduced in appendix III, DOT agreed with both of our recommendations. DOT also provided technical comments, which we incorporated as appropriate.

Additionally, we provided a draft of this report to DHS for review and comment. DHS did not have any comments on the report.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Transportation and the Secretary of Homeland Security. 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 GieseD@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 make key contributions to this report are listed in appendix IV.

//SIGNED//

Danielle T. Giese
Acting Director, Physical Infrastructure

List of Committees

The Honorable Ted Cruz
Chairman
The Honorable Maria Cantwell
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Jerry Moran
Chairman
The Honorable Tammy Duckworth
Ranking Member
Subcommittee on Aviation, Space, and Innovation
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Cindy Hyde-Smith
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The Honorable Kirsten Gillibrand
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Subcommittee on Transportation, Housing and Urban Development, and Related Agencies
Committee on Appropriations
United States Senate

The Honorable Sam Graves
Chairman
The Honorable Rick Larsen
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Steve Womack
Chairman
The Honorable James Clyburn
Ranking Member
Subcommittee on Transportation, Housing and Urban Development, and Related Agencies
Committee on Appropriations
House of Representatives

Appendix I: Objectives, Scope, and Methodology

This report examines (1) changes in air cargo infrastructure and operations from 2004 through 2023; (2) the extent to which the Department of Transportation (DOT) has assessed the reliability of and communicated any limitations in its data on air cargo infrastructure and operations; (3) the challenges selected stakeholders reported with ground-based air cargo infrastructure and operations, and steps they reported taking that may address these challenges; and (4) the extent to which DOT has identified and addressed challenges to the efficient movement of air cargo.

To address all the objectives, we interviewed DOT, U.S. Customs and Border Protection (CBP), and Transportation Security Administration officials to better understand the roles and responsibilities of these agencies related to air cargo. We also selected a nongeneralizable sample of 37 air cargo stakeholders and conducted semi-structured interviews with them about air cargo trends, challenges, and their interactions with federal agencies, including DOT.

Specifically, we interviewed officials at 11 U.S. airports that we selected to obtain variety in cargo characteristics, such as volume, airport type, and carrier mix, as shown in the 2023 Air Carrier Statistics T-100 database from the Bureau of Transportation Statistics (BTS).[1] We also considered the airports' geographic locations; whether the airports had recent, ongoing, or planned cargo modernization projects; and other airport characteristics, such as federal funding. The 11 airports we selected handled 38 percent of all inbound and outbound U.S. cargo volume in 2023. See appendix II for information on cargo characteristics of selected airports.

We also interviewed representatives of three express carriers, two all-cargo carriers, and two passenger carriers that we selected based on the greatest cargo volume for each carrier type and number of selected airports served, as shown in BTS's Air Carrier Statistics T-100 database

[1]The data for 2023 were the most recent available data when we selected airports in April 2024.

in 2023 and other information.[2] We considered Amazon Air to be an express carrier for the purposes of this review, because its operating model shifted in recent years to align with the traditional model for an express carrier. The seven carriers we selected transported at least 58 percent of the total volume of freight that departed from or arrived at U.S. airports in 2023.[3]

Additionally, we selected other stakeholders that represent key areas of the air cargo industry and its operations:

- Three ground handling companies, two developers, two freight forwarders and customs brokers, and three trucking companies, based on those that provide services at selected airports, recommendations from stakeholders, and known characteristics.
- Two metropolitan planning organizations that conduct local and regional freight planning for two of the selected airports. These organizations were also recommended to us by stakeholders at selected airports.
- Five trade associations that represent these industry stakeholders and two industry advisers based on industry information, such as published air cargo studies.

See table 7 for a list of stakeholders interviewed.

[2]We originally selected American Airlines as one of the two passenger carriers, but American Airlines declined our request for an interview. As a result, we obtained written responses from the passenger carrier with the next-highest cargo volume in 2023, Delta Air Lines. Because Amazon Air contracts with other carriers to operate its cargo flights, its volume is not reflected in the data under Amazon Air's name. As a result, we reviewed other publicly available information about Amazon Air's volume and operations to inform our selection. See, for example, Joseph P. Schwieterman and Toni Jahn, A Tale of Two Continents: Amazon Air Expands Hubs & Capacity in North America While Downsizing in Europe (Chicago, IL: Chaddick Institute for Metropolitan Development, March 2024).

[3]As noted above, we cannot identify the total volume attributable to Amazon Air, because Amazon Air contracts with other carriers to operate its cargo flights.

Table 7: Air Cargo Stakeholders GAO Interviewed

Airports		Chicago O'Hare International Airport (ORD), Chicago Department of Aviation
		Chicago Rockford International Airport (RFD), Greater Rockford Airport Authority
		Dallas Fort Worth International Airport (DFW)
		John F. Kennedy International Airport (JFK), Port Authority of New York and New Jersey
		Lehigh Valley International Airport (ABE), Lehigh-Northampton Airport Authority
		Los Angeles International Airport (LAX), Los Angeles World Airports
		Manchester-Boston Regional Airport (MHT), Manchester Department of Aviation
		Memphis International Airport (MEM), Memphis-Shelby County Airport Authority
		Miami International Airport (MIA), Miami-Dade Aviation Department
		San Francisco International Airport (SFO), City and County of San Francisco Airport Commission
		Washington Dulles International Airport (IAD), Metropolitan Washington Airports Authority
Carriers	All-cargo[a]	Air Transport International (ATI)
		Atlas Air
	Express	Amazon Air[b]
		FedEx Corporation (FedEx)
		United Parcel Service (UPS)
	Passenger	Delta Air Lines
		United Airlines
Freight forwarders and customs brokers		Alba Wheels Up International
		Commodity Forwarders Inc. (CFI)
Ground handlers		AGI Cargo
		The ARK at JFK
		Worldwide Flight Services (WFS)
Industry advisers		Dr. I. Richmond Nettey, Chair, Airport Terminals and Ground Access Committee, Transportation Research Board, National Academies of Sciences, Engineering, and Medicine
		Thomas Phillips, Chair, Air Cargo Subcommittee of the Aviation Economics and Forecasting Committee, Transportation Research Board, National Academies of Sciences, Engineering, and Medicine[c]
Metropolitan planning organizations		Chicago Metropolitan Agency for Planning (CMAP)
		Region 1 Planning Council (R1)
Third-party developers		Aviation Facilities Company (AFCO)
		Realterm
Trade associations		Airforwarders Association (AfA)[d]
		Airlines for America (A4A)
		Airports Council International-North America (ACI-NA)
		Cargo Airline Association (CAA)
		JFK Airport Customs Brokers and Freight Forwarders Association

Trucking companies	Geanto's Trucking
	Griley Air Freight
	Mobile Air Transport, Inc.

Source: GAO. | GAO-25-107334

[a]These carriers may provide some passenger charter services. However, we consider them to be all-cargo carriers for the purposes of our review.

[b]We considered Amazon Air to be an express carrier for the purposes of this review. Although Amazon Air is not a certificated air carrier, its operating model has shifted in recent years to align with the traditional model for an express carrier.

[c]Mr. Phillips was the Chair of the Transportation Research Board's Air Cargo Subcommittee of the Aviation Economics and Forecasting Committee at the time of our interview. He no longer serves as Chair.

[d]A representative for the National Customs Brokers and Forwarders Association of America, Inc. (NCBFAA) also participated in this interview.

We also observed air cargo infrastructure and operations at nine of the 11 selected airports and more than 5.2 million square feet of warehouse space at 28 cargo warehouses at or near these airports. We selected airports for our visits to obtain variety in the types of airports and carriers we could observe, as well as based on whether we could observe recent, ongoing, or planned cargo development projects. We selected two pairs of airports that serve the same region and play complementary roles in the air cargo network to observe potential differences in their operations. In selecting airports to visit, we also considered industry information and stakeholder recommendations. We visited airfields at all nine airports. These airfield visits allowed us to view cargo infrastructure throughout the airport and experience the distances between warehouses and other elements of air cargo infrastructure firsthand, such as the distance between aprons and fuel farms.

We selected the 28 warehouses to visit at these nine airports to obtain variety in the type of entity leasing or operating the warehouse (tenant); the type of cargo handled; the known age, condition, or other characteristics of the warehouse, such as advanced technology or temperature-controlled storage; and the warehouse location. We identified and selected these warehouses primarily based on interviews and recommendations from industry stakeholders operating at our selected airports. To obtain information from a cross section of the industry, we observed a mix of warehouses owned or operated by carriers and ground handlers, to include a mix that were selected and were not selected for our interviews. (See table 8.)

Table 8: Airports and Warehouses GAO Visited to Observe Air Cargo Infrastructure and Operations

Airport	Warehouse	Tenant type	Estimated square footage
Chicago O'Hare International Airport (ORD)	ORD 1	Express carrier	54,000
	ORD 2	Ground handler	138,000
	ORD 3	Ground handler	132,000
Dallas Fort Worth International Airport (DFW)	DFW 1	Ground handler	37,000
	DFW 2	Ground handler	232,873
John F. Kennedy International Airport (JFK)	JFK 1	Carrier (various)	220,000
	JFK 2	Ground handler	125,000
	JFK 3	Ground handler	168,000
	JFK 4	Ground handler	155,000
	JFK 5	Ground handler	300,000
	JFK 6[a]	Trucking company	50,000
Lehigh Valley International Airport (ABE)	ABE 1	Express carrier	3,700
Los Angeles International Airport (LAX)	LAX 1	Carrier (various)	130,000
	LAX 2	Carrier (various)	61,949
	LAX 3	Carrier (various)	64,260
Memphis International Airport (MEM)	MEM 1	Express carrier	65,000
	MEM 2	Express carrier	-[b]
	MEM 3	Express carrier	525,000
	MEM 4	Express carrier	1,600,000
	MEM 5	Vacant	35,000
Miami International Airport (MIA)	MIA 1	Ground handler	70,000
	MIA 2	Express carrier	36,000
Rockford International Airport (RFD)	RFD 1	Express carrier	225,000
	RFD 2	All-cargo carrier	90,000
	RFD 3	Ground handler	50,000
	RFD 4	Express carrier	600,000
Washington Dulles International Airport (IAD)	IAD 1	Combination carrier	22,000
	IAD 2	Passenger carrier	90,000

Source: GAO. | GAO-25-107334

Note: We have anonymized the warehouse names by assigning them a combination of the airport code and numbers.

[a]This warehouse was not located on airport property.

[b]The tenant did not provide estimated square footage for this warehouse.

To identify changes in air cargo infrastructure and operations from 2004 through 2023, we analyzed DOT and U.S. Census Bureau (Census) data. Specifically, to identify the volume (weight in pounds) of cargo transported by airport, carrier, route, and type of aircraft, we analyzed segment data from BTS's Air Carrier Statistics T-100 database from 2004 through 2023.[4] To assess the reliability of the data, we reviewed documentation, conducted electronic testing, interviewed DOT officials regarding their assessment of the data reliability, and reviewed our prior reliability assessments of these data. We determined the data were reliable for the purposes of describing trends in U.S. air cargo volume from 2004 through 2023, with some limitations. Specifically, we identified limitations related to carrier information and nationwide cargo volumes:

- **Carrier information.** We cannot attribute volumes to carriers that use aircraft, crew, maintenance, or insurance contracts—known as wet or dry leasing—to move their cargo. Contracted carriers report data to the Federal Aviation Administration under their own name instead of under the name of the carrier that contracted them to move the cargo.
- **Nationwide cargo volumes.** The nationwide volume of cargo moved by air may count the same cargo more than once. We calculated total U.S. cargo volume using the sum of the volume that carriers reported transporting on each flight segment. Because the same piece of cargo may travel on more than one flight segment, and the data do not track unique pieces of cargo, some cargo volume may be counted more than once.

We also reviewed information from selected stakeholders and industry guidance about air cargo trends and drivers.

To describe trends in air cargo trade partners, and the volume and value of commodities traded by air, we analyzed Census International Trade data from 2004 through 2023.[5] To assess the reliability of these data, we reviewed documentation, conducted electronic testing, interviewed Census officials regarding their assessment of the data reliability, and reviewed our prior reliability assessments of these data. We found the

[4]We reviewed trends through 2023, because 2023 was the most recent year of data available at the time of our analysis. As of March 14, 2025, DOT had released the final month of 2024 T-100 segment data. Officials told us that carriers may adjust their data after the data are released, typically within one month.

[5]We reviewed trends through 2023, because 2023 was the most recent year of data available at the time of our analysis. As of February 2025, Census had released the final month of 2024 trade data.

dataset reliable for the purposes of describing trends in U.S. air cargo trade partners, volume, and value from 2004 through 2023, with some limitations. Specifically, the Census International Trade data underestimate the volume and value of low-value shipments. According to the Census Guide to the Trade Data, the U.S. does not require shippers to file documents for shipments below a specified value. While Census estimates the value of these shipments for each country, the estimates have limitations and Census excludes them from the air trade data.

To evaluate the extent to which DOT has assessed and communicated any limitations in its air cargo data, we reviewed BTS's Freight Analysis Framework (FAF) and National Transportation Atlas Database (NTAD) Air-to-Truck Facilities air cargo data. To assess the reliability of these data, we reviewed BTS documentation for the FAF air cargo data and interviewed BTS and Oak Ridge Laboratory officials overseeing the FAF regarding their assessment of reliability and limitations. We determined that these data were of unknown reliability for the purposes of describing changes in domestic air cargo volume, value, and commodities. Based on this information, we further conducted a technical assessment of BTS's methodology for the FAF base year air cargo estimates, including evaluating BTS's efforts to assess and communicate the reliability and limitations of these data. Similarly, to assess the reliability of the NTAD air cargo data we reviewed BTS documentation, compared data with other sources of information, and interviewed BTS officials about their assessment of reliability and limitations of the NTAD air cargo data. We determined that these data were unreliable for the purposes of describing changes in air cargo infrastructure because they were incomplete, inaccurate, and not timely. We also reviewed nine State Freight Plans that cover our 11 selected airports and interviewed selected stakeholders to identify how they use the FAF and NTAD Air-to-Truck facilities data. We compared this information with an Office of Management and Budget directive for statistical agencies and with federal internal control standards.[6]

To describe the challenges selected stakeholders reported with ground-based air cargo infrastructure and operations, and steps they reported taking that may address these challenges, we analyzed and summarized information from semi-structured interviews with the selected air cargo

[6]Office of Management and Budget, *Statistical Policy Directive No. 1: Fundamental Responsibilities of Federal Statistical Agencies and Recognized Statistical Units*, 79 Fed. Reg. 71,610 (Dec. 2, 2014) and GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: Sept. 10, 2014).

stakeholders and our observations of airports and warehouses. We specifically asked stakeholders to report any challenges related to the condition—meaning the availability, state of repair, age, size, configuration, or usability—of seven specific elements of air cargo infrastructure and operations: cargo aprons; cargo warehouses; truck areas, such as parking or staging areas; roadways; digital infrastructure; security screening and customs inspections; and the air cargo workforce. We identified these seven elements by reviewing industry guidance for air cargo facility planning.[7] Stakeholders also identified challenges with other elements. Information from our interviews with stakeholders and our observations is not generalizable.

To assess the extent to which DOT has identified and addressed challenges to the efficient movement of air cargo, we reviewed DOT documentation of its freight efforts, such as funding programs for freight and aviation infrastructure. We also reviewed the statutory responsibilities of DOT's Office of Multimodal Freight Infrastructure and Policy (Multimodal Freight Office). Additionally, we reviewed the nine State Freight Plans covering our 11 selected airports to determine the extent to which these provided information on air cargo challenges.[8] We also analyzed information from interviews with selected air cargo stakeholders regarding their interaction with DOT, and we interviewed DOT officials.[9] We compared this information with guidelines for evidence-based policymaking and with federal internal control standards for communication.[10]

We conducted this performance audit from January 2024 to July 2025 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain

[7]National Academies of Sciences, Engineering, and Medicine, *Air Cargo Facility Planning and Development—Final Report* (Washington, D.C.: The National Academies Press, 2015), doi.org/10.17226/22094; and Airports Council International-North America's Air Cargo Committee, *Air Cargo Guide* (September 2019).

[8]We reviewed the most recent State Freight Plan available for each of the nine states at the time of our analysis, which included plans published between 2019 and 2023.

[9]Due to differences in their areas of expertise and experience, not all stakeholders we interviewed responded to questions about their interactions with DOT, DOT's prioritization of air cargo, or steps DOT could take to address air cargo challenges. As a result, we reported this information based on the total number that provided a response to the question.

[10]GAO, *Evidence-Based Policymaking: Practices to Help Manage and Assess the Results of Federal Efforts*, GAO-23-105460 (Washington, D.C.: July 12, 2023) and GAO-14-704G.

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.

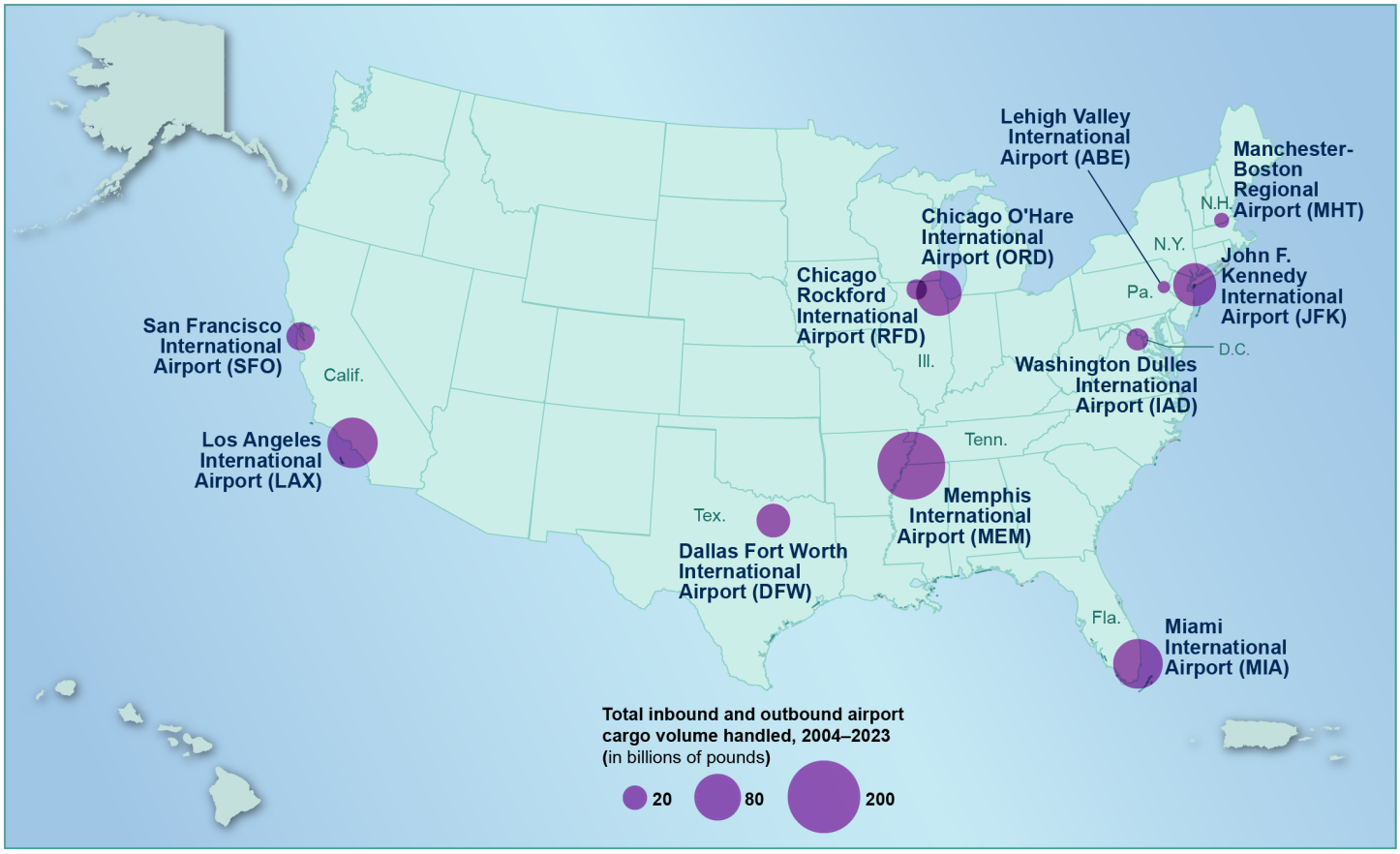
Appendix II: Selected Airport Profiles

We created profiles for the 11 U.S. airports we selected for our review. To identify each airport's relative cargo volumes in 2023, we analyzed air cargo data in the Air Carrier Statistics T-100 database from the Bureau of Transportation Statistics (BTS) (see fig. 17).[1] To identify top international trade commodities for each airport in 2023, we analyzed the U.S. Census Bureau's (Census) International Trade data. To identify information on cargo warehouses, projects, funding, and locations, we analyzed information from each selected airport, including publicly available information and information we collected through pre-interview questionnaires and interviews, and site visits to nine airports.[2]

[1]BTS measures the weight in pounds of cargo transported on an aircraft. Cargo weight reported from our analysis of T-100 data may not match figures reported by airports due to differences in how cargo is defined, such as whether mail is included and if airports use landed weight, which includes the weight of the aircraft.

[2]In April 2025, we obtained satellite images of each airport from the U.S. Geological Survey that were taken between 2019 and 2023 and identified cargo areas based on information from our selected airports. We provided representatives for each airport with a copy of their airport's profile for review in May 2025.

Figure 17: Total Inbound and Outbound Air Cargo Volume at Selected Airports, 2004–2023



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. Base map from MapInfo. | GAO-25-107334

Chicago O'Hare International Airport (ORD)

Air Cargo at a Glance, 2023

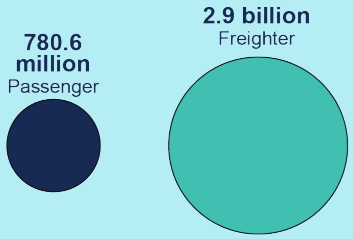
Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
7th	22	4.0 million square feet	**Machinery and electrical equipment; chemicals and chemical products; vehicles, aircraft and transport equipment**

Recent, Ongoing, or Planned Cargo Projects and Funding

- **O'Hare Modernization Project (2021):** Added new runways and taxiways that support cargo.
- **Northeast cargo campus (2016–2023):** Added about 1 million square feet of warehouse space and 13 jumbo aircraft parking spaces for cargo.
- **Federal funding:** Airport Improvement Program cargo entitlement funds for taxiway connection to northeast cargo campus.
- **Nonfederal funding:** Private-sector investment in new facilities.

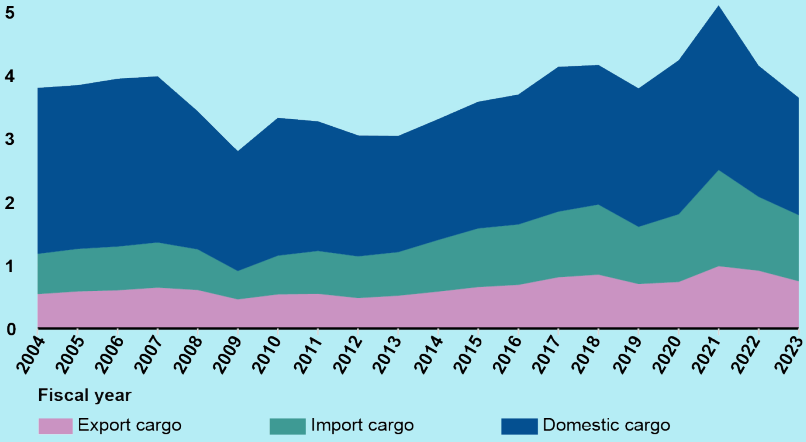
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
Chicago O'Hare International Airport (ORD)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)
Chicago O'Hare International Airport (ORD)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas Chicago O'Hare International Airport (ORD)

Sources: Chicago Department of Aviation (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Aircraft Apron at Chicago O'Hare International Airport (ORD)

Cargo is transferred from an aircraft to a truck on a cargo apron.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Chicago Rockford International Airport (RFD)

Air Cargo at a Glance, 2023

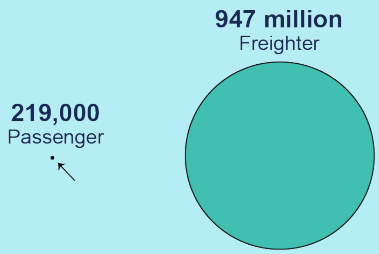
Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
20th	5	1.16 million square feet	**Machinery and electrical equipment; cameras, watches, and musical and surgical instruments; vehicles, aircraft, and transport equipment**

Recent, Ongoing, or Planned Cargo Projects and Funding

- **Midfield international cargo complex (2021):** Added warehouses, aprons, and roadways for international cargo operations.
- Cargo community system (2022): Developed a digital system for international cargo operations.
- Federal funding: Airport Improvement Program funding for cargo aprons.
- Nonfederal funding: Local bond authority for cargo warehousing developed by the Airport Authority.

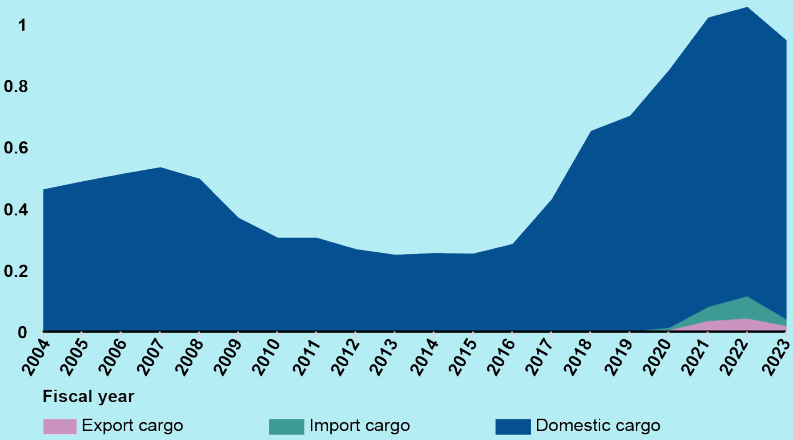
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
Chicago Rockford International Airport (RFD)



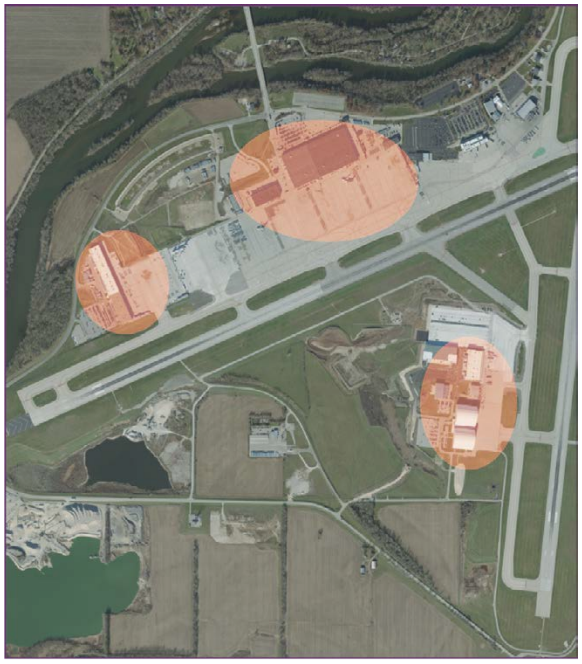
Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)
Chicago Rockford International Airport (RFD)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334
Note: Import and export values are not visible until 2020 because these volumes were negligible from 2004–2020 and did not exceed 2 percent of all cargo volume during these years.

Cargo Areas Chicago Rockford International Airport (RFD)



Source: Greater Rockford Airport Authority. | GAO-25-107334

Air Cargo Warehouse at Chicago Rockford International Airport (RFD)

The airside doors of a cargo warehouse.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Dallas Fort Worth International Airport (DFW)

Air Cargo at a Glance, 2023

Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
10th	10	1.6 million square feet	Machinery and electrical equipment; cameras, watches, and musical and surgical instruments; vehicles, aircraft, and transport equipment

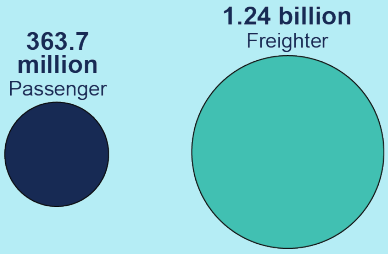
Recent, Ongoing, or Planned Cargo Projects and Funding

- **19th Street cargo redevelopment project (2024):** Demolished old warehouses and will add more than 300,000 square feet of warehouse space and seven jumbo aircraft parking spots.
- **Central Examination Station (2024):** With U.S. Customs and Border Protection, opened a dedicated facility with direct airside access for customs inspection.
- **Federal funding:** None for ground-based air cargo infrastructure.
- **Nonfederal funding:** Private-sector funding for older warehouses and aprons, and airport bonds for planned cargo construction.

Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)

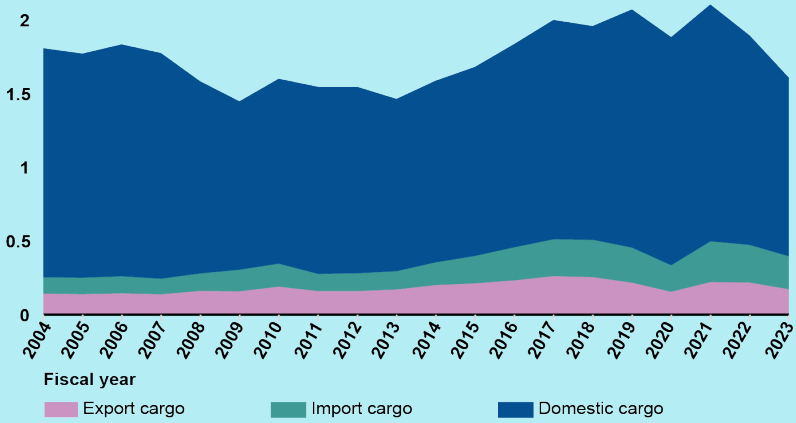
Dallas Fort Worth International Airport (DFW)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)

Dallas Fort Worth International Airport (DFW)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas Dallas Fort Worth International Airport (DFW)

Sources: Dallas Fort Worth International Airport (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Air Cargo Apron at Dallas Fort Worth International Airport (DFW)

An aircraft engine awaiting transport on a cargo apron.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Lehigh Valley International Airport (ABE)

Air Cargo at a Glance, 2023

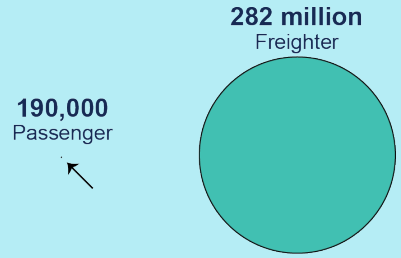
Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
37th	2	106,000 square feet	Machinery and electrical equipment; cameras, watches, and musical and surgical instruments; base metals

Recent, Ongoing, or Planned Cargo Projects and Funding

- **Apron expansion (2018):** Added one cargo aircraft parking spot and access roads for off-airport cargo operations.
- North cargo warehouse (to be determined): Will add a new cargo warehouse, apron, truck staging, and taxiway on the the north side of the airport.
- Federal funding: $40.8 million Nationally Significant Multimodal Freight & Highway Project (INFRA) grant for north cargo facilities.
- Nonfederal funding: Private-sector investment for north cargo warehouse.

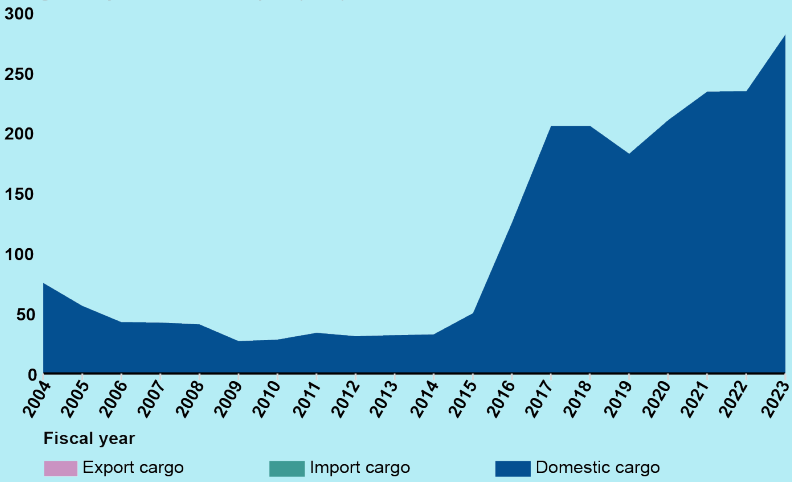
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
Lehigh Valley International Airport (ABE)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in millions of pounds)
Lehigh Valley International Airport (ABE)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Note: Import and export values are not visible because they were negligible in all years and did not exceed 0.02 percent of all cargo volume in any year.

Cargo Areas Lehigh Valley International Airport (ABE)

Sources: Lehigh-Northampton Airport Authority (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Aircraft Apron at Lehigh Valley International Airport (ABE)

A freighter parked on an aircraft apron.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Los Angeles International Airport (LAX)

Air Cargo at a Glance, 2023

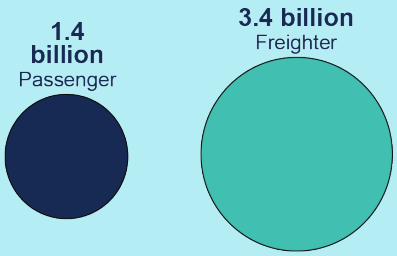
Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
5th	26	2.24 million square feet	Machinery and electrical equipment; animals and animal products; textiles and apparel

Recent, Ongoing, or Planned Cargo Projects and Funding

- **Cargo Modernization Program (to be determined):** Will consolidate and redevelop cargo warehouses and aprons.
- **Federal funding:** None for ground-based air cargo infrastructure.
- **Nonfederal funding:** Private-sector investment for cargo modernization project.

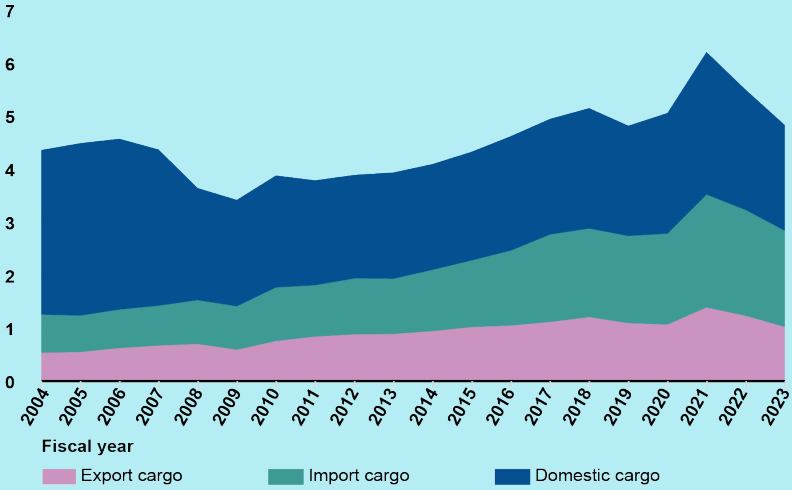
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
Los Angeles International Airport (LAX)



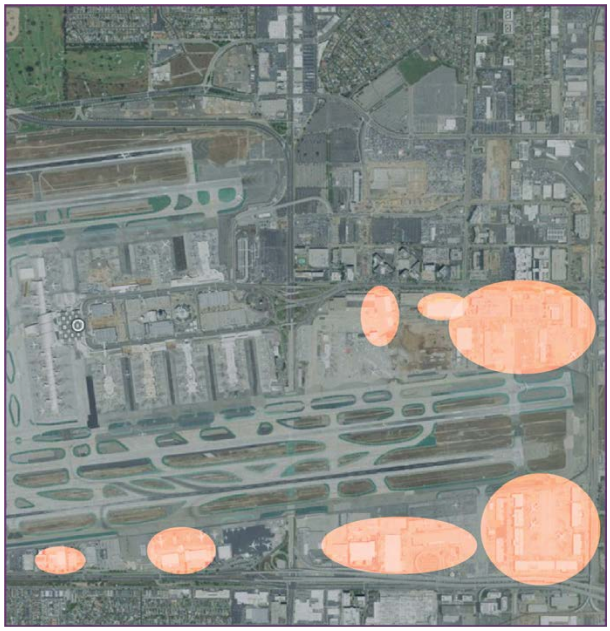
Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)
Los Angeles International Airport (LAX)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas Los Angeles International Airport (LAX)



Sources: Los Angeles World Airports (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Aircraft Apron at Los Angeles International Airport (LAX)

A freighter being unloaded on an aircraft apron.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Manchester-Boston Regional Airport (MHT)

Air Cargo at a Glance, 2023

Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
49th	3	109,800 square feet	**Plastics and rubber; machinery and electrical equipment; vehicles, aircraft, and transport equipment**

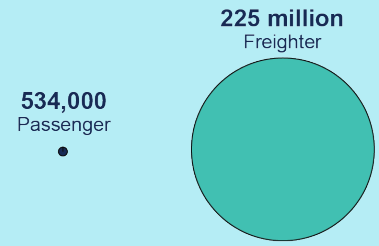
Recent, Ongoing, or Planned Cargo Projects and Funding

- **Cargo warehouse construction (2022):** Constructed a 64,000-square-foot warehouse, an apron, and truck areas.
- **Cargo layout adjustments (to be determined):** Layout changes to more than double the square footage.
- **Federal funding:** Congressionally directed funding used to construct new cargo apron and taxiway tie-in for new warehouse.
- **Nonfederal funding:** Private-sector investment in new cargo warehouse, truck areas, and a portion of the apron.

Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)

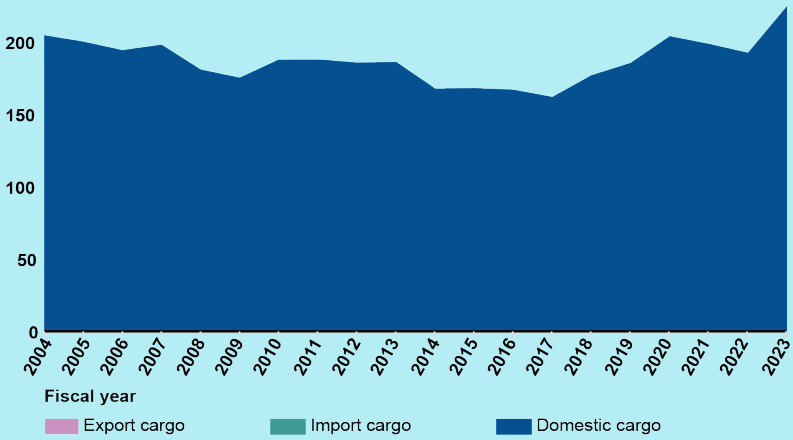
Manchester-Boston Regional Airport (MHT)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in millions of pounds)

Manchester-Boston Regional Airport (MHT)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Note: Import and export values are not visible because they were negligible in all years and did not exceed 0.01 percent of all cargo volume in any year.

Cargo Areas Manchester-Boston Regional Airport (MHT)

Sources: Manchester Department of Aviation (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Air Cargo Warehouse at Manchester-Boston Regional Airport (MHT)

A recently constructed cargo warehouse.

Source: Realterm. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Memphis International Airport (MEM)

Air Cargo at a Glance, 2023

Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
2nd	5	4.0 million square feet	Machinery and electrical equipment; toys, furniture, and sporting goods; cameras, watches, musical and surgical instruments

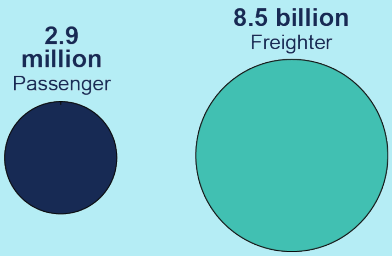
Recent, Ongoing, or Planned Cargo Projects and Funding

- **Consolidated deicing facility (2022):** Built an advanced deicing facility which will support cargo operations.
- **FedEx World Hub Modernization (2024):** Constructed a state-of-the-art automated warehouse and package sorting facility.
- **Federal funding:** Airport Improvement Program funding for deicing facility.
- **Nonfederal funding:** Private-sector investment in new warehouse construction.

Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)

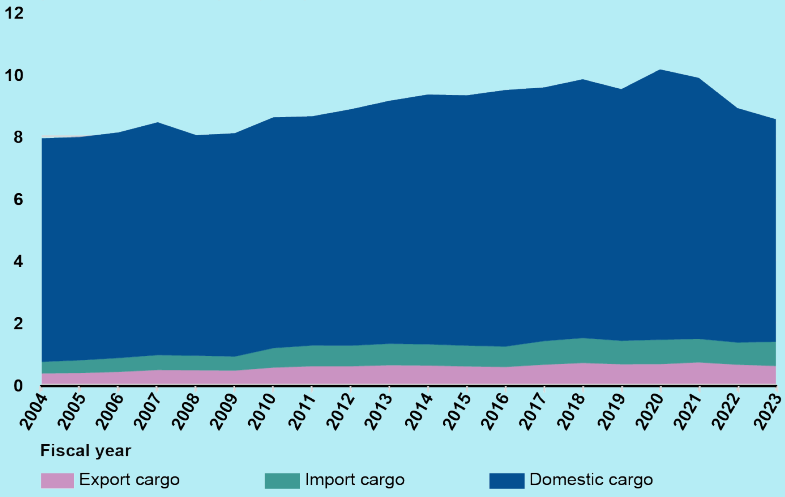
Memphis International Airport (MEM)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)

Memphis International Airport (MEM)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas Memphis International Airport (MEM)

Sources: Memphis-Shelby County Airport Authority (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Aircraft Apron at Memphis International Airport (MEM)

Freighters being loaded and unloaded on the apron.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Miami International Airport (MIA)

Air Cargo at a Glance, 2023

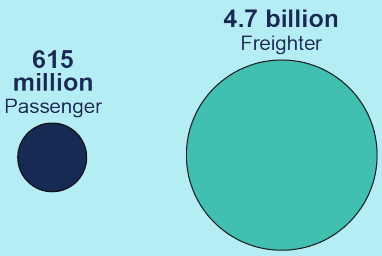
- **Rank (inbound and outbound volume):** 4th
- **Number of cargo warehouses:** 24
- **Total warehouse square footage:** 2.8 million square feet
- **Top commodities (by volume):** Vegetable products; animal products; machinery and electrical equipment

Recent, Ongoing, or Planned Cargo Projects and Funding

- **Express carrier expansions (2015–2024):** Expanded FedEx, DHL, and Amazon Air warehouses and constructed new cold storage facilities.
- **Vertical Integrated Cargo Community Project (expected 2029):** Will develop a vertical cargo warehouse and 10 aircraft parking spots.
- **Federal funding:** Airport Improvement Program funds for runways, taxiways, and aprons supporting cargo operations.
- **Nonfederal funding:** Public-private partnership for vertical integrated cargo community development.

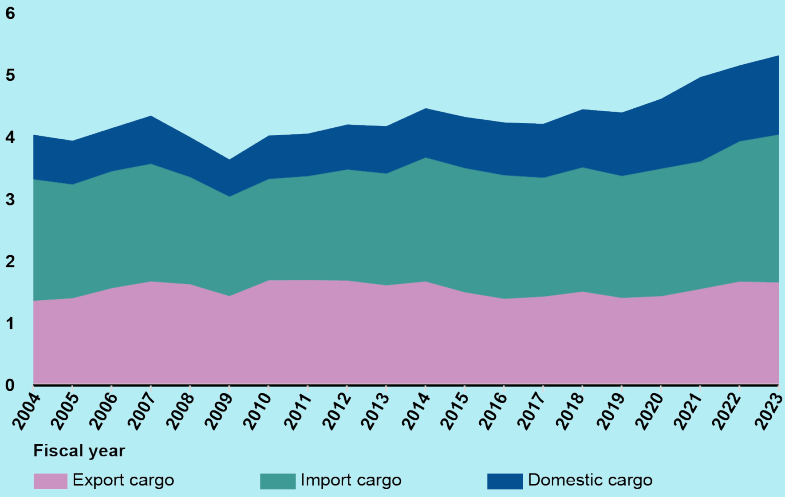
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
Miami International Airport (MIA)



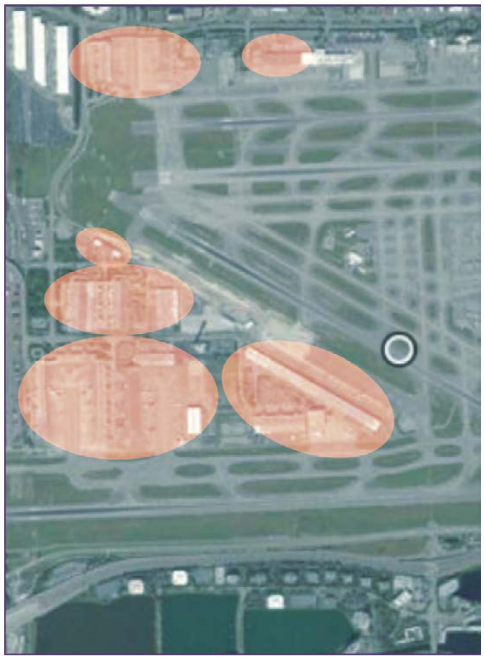
Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)
Miami International Airport (MIA)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas Miami International Airport (MIA)



Sources: Miami-Dade Aviation Department (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Air Cargo Warehouse at Miami International Airport (MIA)

Perishable goods in temperature-controlled space inside an air cargo warehouse.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

John F. Kennedy International Airport (JFK)

Air Cargo at a Glance, 2023

Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
8th	18	1.8 million square feet	**Machinery and electrical equipment; textiles and apparel; animal products**

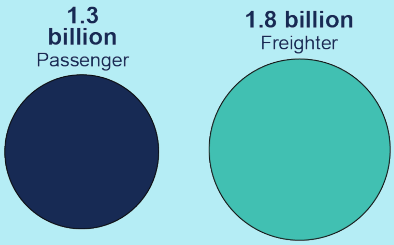
Recent, Ongoing, or Planned Cargo Projects and Funding

- **Cargo building 260 (2025):** Constructed new 300,00-square-foot, state-of-the-art warehouse and apron with spots for three aircraft.
- Air cargo redevelopment (to be determined): Will redevelop and consolidate cargo activities to one designated area.
- Federal funding: Federal funding for taxiway to support a new cargo warehouse.
- Nonfederal funding: Private-sector investment for new warehouse and apron.

Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)

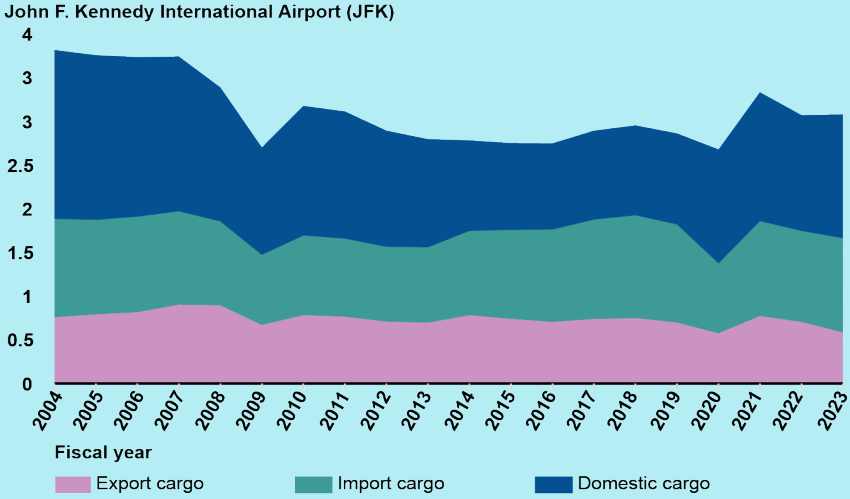
John F. Kennedy International Airport (JFK)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)

John F. Kennedy International Airport (JFK)

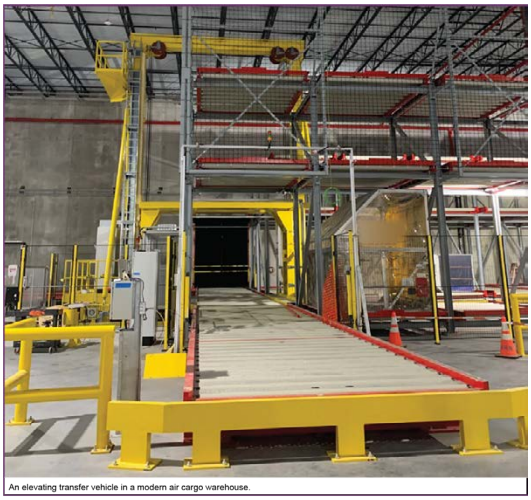


Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas John F. Kennedy International Airport (JFK)

Sources: Port Authority of New York and New Jersey (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Air Cargo Warehouse at John F. Kennedy International Airport (JFK)



An elevating transfer vehicle in a modern air cargo warehouse.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

San Francisco International Airport (SFO)

Air Cargo at a Glance, 2023

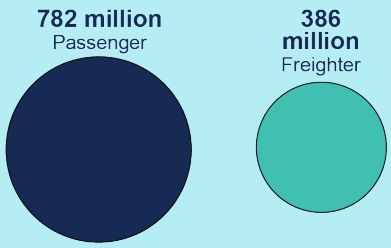
Rank (inbound and outbound volume)	Number of cargo warehouses	Total warehouse square footage	Top commodities (by volume)
16th	7	550,000 square feet	**Machinery and electrical equipment; animals and animal products; textiles and apparel**

Recent, Ongoing, or Planned Cargo Projects and Funding

- **Cargo relocation (expected 2027):** Will build two warehouses and demolish older buildings.
- Cargo warehouse construction and modernization (2014 and 2019): Constructed one warehouse and modernized two others.
- Federal funding: None for ground-based air cargo infrastructure.
- Nonfederal funding: Airport bonds to support air cargo capital projects.

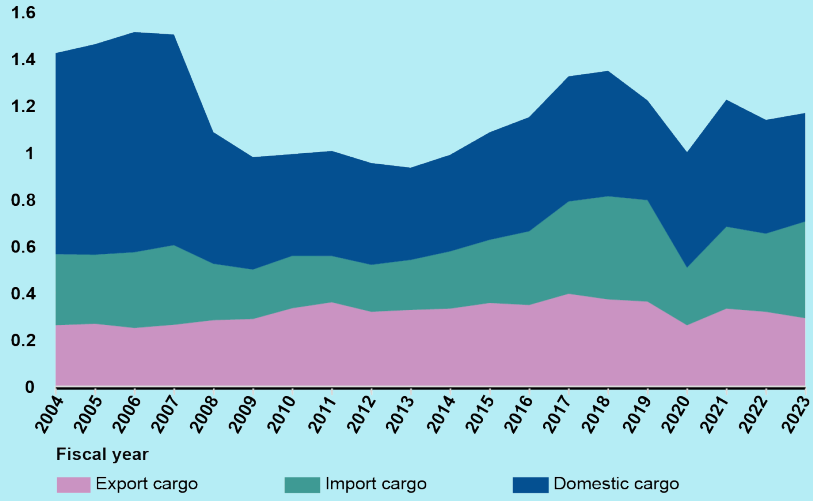
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
San Francisco International Airport (SFO)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in billions of pounds)
San Francisco International Airport (SFO)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas San Francisco International Airport (SFO)

Sources: San Francisco International Airport (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Air Cargo Warehouse at San Francisco International Airport (SFO)

Trucks dock at an air cargo warehouse.

Source: San Francisco International Airport. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Washington Dulles International Airport (IAD)

Air Cargo at a Glance, 2023

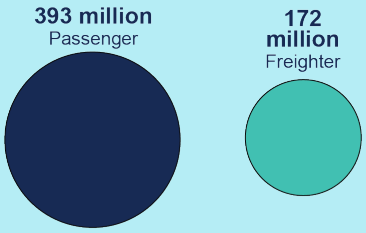
- **Rank (inbound and outbound volume):** 27th
- **Number of cargo warehouses:** 6
- **Total warehouse square footage:** 481,000 square feet
- **Top commodities (by volume):** Machinery and electrical equipment; chemicals and chemical products; plastics and rubber

Recent, Ongoing, or Planned Cargo Projects and Funding

- **Facility improvements (2023–2024):** Rehabilitated four warehouses, expanded vehicle parking, and added a security gate.
- **South cargo development (to be determined):** Preliminary plan to relocate and build new cargo warehouses and aprons.
- **Federal funding:** None for ground-based air cargo infrastructure.
- **Nonfederal funding:** Airport bonds and private-sector investments.

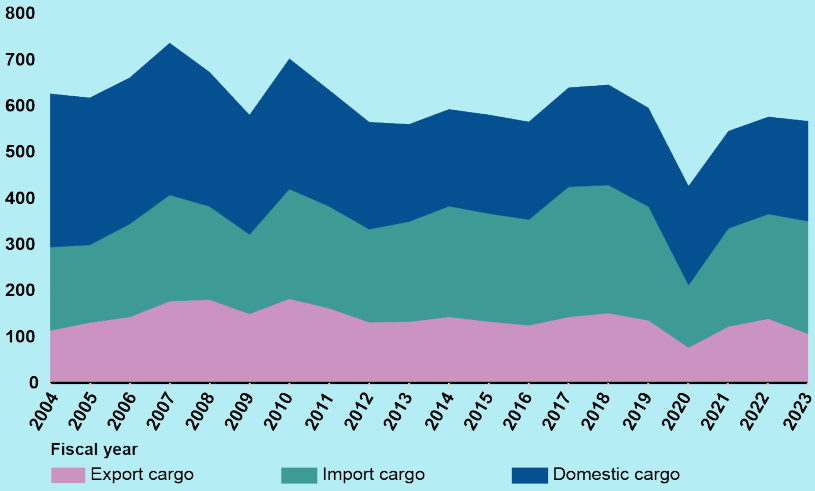
Cargo Statistics

Cargo moved by passenger and freighter aircraft, 2023 (in pounds)
Washington Dulles International Airport (IAD)



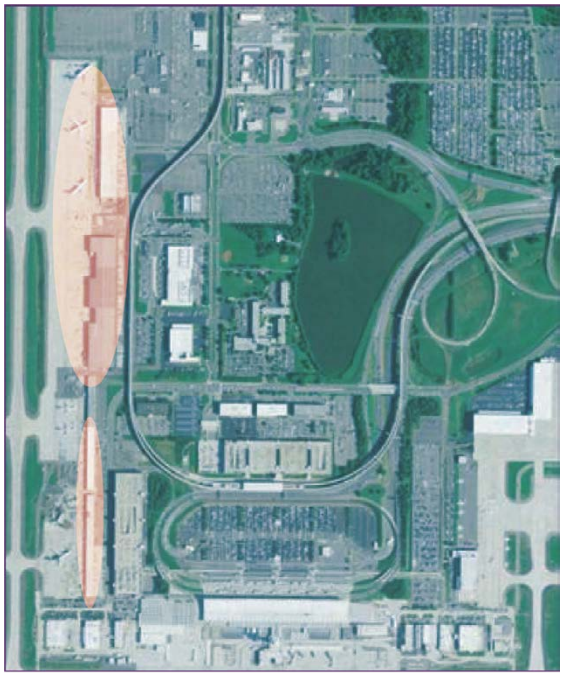
Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Foreign and domestic air cargo volume, 2004–2023 (in millions of pounds)
Washington Dulles International Airport (IAD)



Source: GAO analysis of the Bureau of Transportation Statistics's Air Carrier Statistics T-100 database. | GAO-25-107334

Cargo Areas Washington Dulles International Airport (IAD)



Sources: Metropolitan Washington Airports Authority (cargo areas) and U.S. Geological Survey, The National Map (base map). | GAO-25-107334

Air Cargo Apron at Washington Dulles International Airport (IAD)

Containers wait on a cargo apron to be transported to the passenger terminal and loaded onto aircraft.

Source: GAO. | GAO-25-107334

Source: GAO icons. | GAO-25-107334

Appendix III: Comments from the Department of Transportation

U.S. Department of Transportation
Office of the Secretary of Transportation

Assistant Secretary for Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

July 9, 2025

Danielle Giese
Acting Director, Physical Infrastructure
U.S. Government Accountability Office
441 G Street NW
Washington, DC 20548

Dear Ms. Giese:

The U.S. Department of Transportation (Department and DOT) is committed to carrying out the National Multimodal Freight Policy (49 U.S.C. 70101) and the goals of that policy, to include improving the safety, security, efficiency, and resiliency of multimodal freight transportation. The Office of Multimodal Freight Infrastructure and Policy (Multimodal Freight Office) works in collaboration with DOT operating administrations to coordinate policy and programmatic decision-making to advance the goals of the national multimodal freight policy. In addition, the Bureau of Transportation Statistics continuously seeks to improve reliability and transparency of its data products in support of the Department's national multimodal freight policy goals. In less than 2 years since it was established, the Multimodal Freight Office has already taken steps to incorporate a review of existing sources and build its knowledge base on the issues that impact freight efficiency across all modes. These steps include:

- Assuming responsibility for the review and approval of State Freight Plans;
- Publishing a draft of the National Multimodal Freight Network, and initiating an update to the National Freight Strategic Plan;
- Partnering with operating administrations on new opportunities for freight research and supporting the evaluation and selection process of multiple freight grant programs; and
- Building a new information and data-sharing public-private partnership focused on the container shipping supply chain, known as Freight Logistics Optimization Works (FLOW).

Upon review of the draft report, the Department concurs with GAO's two recommendations to (1) assess the reliability of air cargo data in the Freight Analysis Framework and National Transportation Atlas Database and communicate the limitations and (2) evaluate existing sources of information and routinely communicate with air cargo stakeholders to identify challenges to the efficient movement of air cargo and determine whether the agency needs to take steps to help address the challenges. We will provide a detailed response to each recommendation within 180 days of the final report issuance.

We appreciate the opportunity to respond to the GAO draft report. Please contact Gary Middleton, Director of Audit Relations and Program Improvement, at 202-366-6512 with any questions or if you would like to obtain additional details.

Sincerely,

Anne Byrd

Dr. Anne Byrd
Assistant Secretary for Administration

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Danielle T. Giese, GieseD@gao.gov

Staff Acknowledgments

In addition to the contact named above, Jean Cook (Assistant Director), Katherine Raymond (Analyst in Charge), Paul Aussendorf, Carl Barden, Derrick Collins, Dwayne Curry, Melanie Diemel, Aaron Kaminsky, Chloe Kay, Dan Luo, Grant Mallie, Gail Marnik, Maria Mercado, Rebecca Morrow, Joshua Parr, Minette Richardson, Kelly Rolfes-Haase, Kelly Rubin, Timothy A. Smith, Laurel Voloder, Wesley Wilhelm, Alicia Wilson, April Yeaney, and Christopher Zubowicz made key contributions to this report.

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