Georgia Department of Transportation



STATEWIDE AIR CARGO STUDY
TECHNICAL REPORT

2022

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1 Introduction/Study Overview

In mid-2021, the Georgia Department of Transportation (GDOT) initiated the Georgia Statewide Air Cargo Study. The study provides an understanding of current air cargo in Georgia and helps identify how to position the state to meet air cargo demand. A Steering Committee of industry and economic experts provided insight and direction for the study. Additional input was provided by a project Focus Group of 20 individuals who work on or near airports supporting current air cargo activity throughout the state.

The study has five basic objectives:

- Providing a general understanding of the air cargo industry
- Identifying current air cargo operators and scheduled air cargo service in Georgia
- Determining how air cargo activity may increase
- Evaluating facilities at selected airports with air cargo operators to identify needed improvements
- Estimating investment to accommodate future air cargo activity

Air cargo is another term for air freight—the carriage or transportation of goods by air. Typically, given its expense relative to other modes of shipping, air cargo is reserved for goods that are of high value, lightweight, perishable, or time sensitive. A few examples of cargo often shipped by air include pharmaceuticals, consumer electronics, and perishable foodstuffs (such as seafood).

The first air cargo flight took place more than 100 years ago On November 7, 1910, an air cargo flight between Dayton and Columbus traveled 65 miles. The world's first official airmail flight took place a year later in 1911. In 1918, regular airmail service was established between Washington D.C. and New York City.

During the 1920s, air cargo developed rapidly; entrepreneurs realized that aircraft could move high value and low volume consignments much faster than railroads or ships. All-cargo carriers, as we know them today, however, did not emerge until after World War II. By the mid-1950s, the world economy was just hitting its post-war economic growth. To meet growing demand, all cargo airlines formed. In 1968, Boeing launched the four-engine 747, the first wide-body aircraft. The 747 was the first aircraft capable of transporting full pallets in its cargo hold and its advent revolutionized the air cargo industry. Growth in the air cargo sector expanded exponentially with the arrival of express parcel carriers such as FedEx Express, DHL, and UPS. FedEx Express, which began operations in 1973, established the express shipment industry, of which air cargo is the central component.

By the 1990's, air cargo emerged as an important part of the revenue stream for commercial airlines. Since the passenger airlines had established facilities and routes, they had lower fixed costs to transport cargo. Commercial airlines continue to carry cargo in the lower deck of scheduled passenger planes. According to the International Air Transport Association (TATA) around 50 percent of all air cargo is transported in the baggage hold (or "belly") of passenger aircraft.[1]

[1] https://www.joc.com/air-cargo/travel-restrictions-keep-air-cargo-capacity-tight_20200728.html

Between 1990 and 2020, the global air cargo industry grew, for the most part, steadily, experiencing an average annual rate of growth of just over 5 percent; growth rates for domestic air cargo for this same period were lower by about half. The industry was negatively impacted by the global recession in 2008–2009 but recovered. The global pandemic in 2020, significantly disrupted all facets of the industry. As discussed later in this report, data from 2021 indicates the industry rebounded from its 2020 declines. Year end 2021 reports indicated that air cargo volumes experienced a record year in 2021. Increased volumes are attributed to log jams in the shipping industry which forced non-traditional products to be transported by air. While air cargo tonnage increased in 2021, the value this tonnage declined.

Air cargo is a staple of the air transportation industry. According to Boeing, the global air cargo market is expected to have a value of over $223 billion by 2028. Worldwide, air cargo is expected to grow at an average annual rate of 4 percent.[2] Air cargo growth is expected to be fueled by e-commerce and internet sales. According to the International Air Transport Association (IATA), in 2019 e-commerce represented around 15 percent of all air cargo by volume.[3] The eruption of global e-commerce has had the greatest impact on the air cargo industry. Companies like Amazon, eBay, Target, and WalMart allow consumers to shop online from home and have their purchases delivered directly to them, often with the assistance air cargo.

The movement of air cargo is an important underpinning for the global economy. By value, according to IATA, air cargo accounts for 35 percent of world trade. By market share, Asia accounts for 34 percent of global air cargo, followed by North America at 24 percent, Europe at 20 percent, the Middle East at 13 percent, Russia at 4 percent, Latin America at 3 percent, and Africa at 2 percent. Areas in Asia and Africa are expected to exhibit the highest rates of growth in air cargo demand. According to Boeing forecasts, worldwide, air cargo is expected to double in volume over the next 20 years.

Demand for air cargo is generated when there is a need for the expeditious movement of goods between two points. Since air cargo is typically the most-costly option, factors considered by businesses when selecting air cargo over another mode of transportation include relative costs, service commitment to the user, value of the goods, and time-sensitivity of the shipment.

To set the stage for this study, a high-level overview of the air cargo industry is provided; this information is presented in **Chapter 2** of this report. To provide context for this study, which focuses almost exclusively on the air cargo industry in Georgia, the following general information on air cargo service airports for other states in the southeast is provided in **Table 1-1**.

[2] Boeing World Air Cargo Forecast 2020-2039

[3] https://www.theinsightpartners.com/reports/air-cargo-market

Table 1-1: Population and Cargo Airports for Southeastern States

State	Number of Airports with Scheduled Air Cargo Service	State Population (2019)	State Population per Cargo Airport
Georgia	7*	10,617,423	1,516,774
Florida	12	21,477,737	1,789,811
Alabama	3	4,903,185	1,634,395
South Carolina	5	5,148,714	1,029,743
North Carolina	5	10,488,084	2,097,617
Tennessee	4	6,829,174	1,707,294

Source: Airport Records, U.S. Census Bureau, Jviation Analysis, November 2021
Note: Includes scheduled daily cargo flights attributed to Quest Diagnostics at Gwinnett-Briscoe County Airport

The information shown here indicates that except for Florida, Georgia has the highest number of airports with some type of scheduled air cargo service. Taken at face value, the population per cargo airport ratio indicates that Georgia's existing scheduled air cargo service is more robust than most other states in the southeast.

Chapter 2 includes information on Georgia airports that currently have scheduled air cargo operations, as well as on those airports that experience varying levels of ad hoc or on demand air cargo activity. Counting specialty air cargo activity accommodated at the airport serving Gwinnett County, there are seven airports in Georgia that have a carrier with scheduled air cargo operations. These additional airports serve Albany, Atlanta, Columbus, Savannah, Statesboro, and Swainsboro. Study research of Federal Aviation Administration (FAA) flight records revealed 58 out of the 103 airports in the Georgia state airport system support some level of ad hoc air cargo activity.

Information on current air cargo carriers, current air cargo facilities, and off-airport operators who support Georgia's air cargo industry is documented in the study. Through secondary data sources, information on the types of products being shipped to and from Georgia via air cargo is documented. Using airport, industry, and FAA information, projections of air cargo demand are developed. A Geographic Information System (GIS) analysis helps to depict 60-minute drive-times for each airport that currently has scheduled air cargo activity.

Once 60-minute drive-times are identified, they are compared to the locations of known generators of air cargo demand. Demand generators include various types of industries that frequently rely on air cargo for supply chain management and logistics; levels of household income typically associated with e-commerce purchases; and the locations of fulfillment and distribution centers. Review of areas beyond 60-minute drive-times for airports currently with integrated express carrier service helps identify areas of Georgia that may have the potential to support air cargo in the future.

Each airport with current air cargo activity was reviewed to determine its need for expanded facilities to meet anticipated air cargo demand and to determine planning-level cost estimates for providing new or expanded facilities. The Georgia Statewide Air Cargo Study includes the following chapters:

- Chapter 1 – Introduction/Study Overview
- Chapter 2 – Overview of the Air Cargo Industry
- Chapter 3 – Inventory of Current Statewide Air Cargo Activity and Facilities
- Chapter 4 – Air Cargo Commodities Analysis
- Chapter 5 – Air Cargo Demand Generators and Accessibility to Integrated Express Carrier Service
- Chapter 6 – Forecasts of Air Cargo Demand
- Chapter 7 – Air Cargo Facility Requirements
- Chapter 8 – Recommendations

Information from the statewide study helps position Georgia and its airport system to meet one of the fastest growing segments of the aviation industry. While still in its infancy, the impact that uncrewed aerial systems (UAS)[4], or drones and electric aircraft, on the air cargo industry is also examined as part of the statewide effort. The report documents the research, analysis, findings, and recommendations from the Georgia Statewide Air Cargo Study.

[4] As of May 13, 2022, Unmanned Aerial Systems (UAS) is still the official FAA terminology.

2 Overview of the Air Cargo Industry

A major step in developing statewide air cargo facility strategies is educating all partners on the many facets that characterize goods movement by aircraft. To set the framework for this study, it is important to provide a multifaceted understanding of the air cargo industry:

- Current air cargo operators serving Georgia airports
- Key players and stakeholders in the air cargo industry
- Global and U.S. trends in the air cargo industry

The air cargo industry provides shippers and consignees (the recipients of cargo) significant advantages in both the speed and reliability of shipments, but at a much higher cost. Air cargo demand is generated when there is a need for expeditious transportation of materials and goods between two points. In the business world, logistics managers must justify the cost of air cargo as their preferred mode of transport, as opposed to shipping by road, rail, or water. Several factors influence the decision to transport via:

- Cost of transporting the material
- Level of service commitment to the customer or end-user
- Value of the material
- Time-sensitivity of the material

This chapter of the Georgia Statewide Air Cargo Study is divided into eight sections:

- Air Cargo Carriers
- Common Aircraft Supporting the Air Cargo Industry
- Airports Supporting the Air Cargo Industry
- Air Cargo Activity at Georgia Airports
- Global Air Cargo Trends
- U.S. Air Cargo Trends
- Air Cargo Commodity Trends

2.1 Air Cargo Carriers

Air cargo is defined by the Federal Aviation Administration (FAA) as express parcels, freight, and mail moved on aircraft. Air cargo is transported in the baggage compartment, or belly, of passenger aircraft or on all-cargo aircraft, sometimes called freighters. Air cargo falls either into the international or domestic category, depending on its point of origin or destination. The various types of carriers involved in the movement of air cargo are discussed below.

Passenger Airlines – Air cargo services provided by passenger airlines vary in scope and size from airline to airline, generally based on the type of aircraft operating within the airline's fleet. Passenger airlines provide airport-to-airport service, with freight and mail carried as "belly" cargo. While airlines provide cargo service, it is important to note that passenger baggage has loading priority over mail and freight; this can, in some instances, delay air cargo transport.

Airlines operating wide-body passenger aircraft often have containerized lower decks capable of handling large volumes of cargo and baggage. Unit load devices (ULDs), which include containers and flat pallets,

are loaded through large cargo doors in the aircraft belly. The lower decks are fitted with rollers fastened to the deck of the aircraft so containers and pallets laden with freight and mail can be rolled on and off aircraft with relative ease. Hartsfield-Jackson Atlanta International Airport (ATL) is the only airport in Georgia where airlines operate wide-body passenger jets on a scheduled basis. While wide-body passenger jets comprise the majority of transoceanic flights, a few carriers, such as Delta Air Lines, operate wide-body passenger jets on domestic routes in and out of ATL.

A regional airline with a fleet of regional passenger jets typically cannot accommodate bulky cargo due to limited cargo capacity in their baggage compartments. If a carrier operating smaller gauge aircraft, such as a regional jet, does not have the capacity to accommodate cargo, the station manager may choose to break the cargo into smaller shipments or arrange for truck transport to the air carrier's hub where larger gauge aircraft can accommodate the cargo.

Freight transported on passenger airlines is often dropped off at a warehouse at or near the origination airport by the shipper (or their agent such as an air forwarder). After arriving on the passenger airline, the freight is then picked up at the destination airport by the customer (or air forwarder).

The COVID-19 pandemic caused numerous passenger airlines to use aircraft for cargo-only flights (earning the moniker of "preighter flights"). This effort enabled the shipment of vital medical supplies and kept many passenger aircraft (that would have otherwise been grounded) earning vital revenue. In these instances, cargo was loaded into both the belly compartment of the aircraft as well as the main deck, where it was placed into passenger seats and overhead compartments. In some cases, airlines chose to remove passenger seats from aircraft to accommodate larger volumes of cargo. In this scenario, the cargo loading and unloading process is very labor-intensive.

Combination Carriers **–** The limited number of carriers that have both passenger and freighter aircraft in their fleet are considered "combination carriers." These carriers include Emirates, Lufthansa, and many Asian airlines. In the U.S., only one carrier, Alaska Airlines, operates both passenger aircraft and freighter aircraft. Korean Air Cargo, Asiana Cargo, Cathay Pacific Cargo, China Airlines Cargo, Eva Air Cargo, Lufthansa Cargo, Qatar Airways Cargo, and Turkish Airlines Cargo are all combination carriers that currently have operations at ATL. Combination carriers typically operate in two areas on an airport: at the passenger terminal and in the air cargo complex. With the exception of ATL, there are no combination carriers operating at other airports in Georgia.

Integrated Express (FedEx Express, UPS, DHL) – Integrated express operators, sometimes referred to as "integrators," move customer goods door-to-door, providing shipment, collection, transport (via aircraft/truck), delivery, and customs clearance functions for international shipments. Integrated express operators include FedEx Express, UPS, and DHL. DHL's U.S. domestic pickup and delivery services were discontinued in 2009 in favor of international shipments.

Table 2-1 identifies U.S. integrated express hub airports for DHL, FedEx Express, and UPS. DHL's North America hub is located at Cincinnati/Northern Kentucky International Airport (CVG), while the primary hub for FedEx Express (known as the Super Hub) is located in Memphis, where FedEx is headquartered. The UPS equivalent, dubbed Worldport, is located in Louisville, Kentucky.

Integrated express operators utilize a hub-and-spoke transport model, similar to some passenger airlines. An air cargo hub used for package sorting and aircraft transfer is the backbone of the integrated express model. The hub allows for connections to any market in the operator's system daily or even multiple times a day. Each day, flights from around North America (and the world) arrive at the hub, where packages are unloaded, sorted by destination market, and then loaded onto outbound aircraft. Integrated express carrier fleets include both wide-body and narrow-body freighter aircraft, many of which are passenger-to-cargo conversion aircraft.

Table 2-1: Integrated Express Carrier Hub Airports

DHL	FedEx Express	UPS
Cincinnati/Northern Kentucky International (CVG)	Memphis International (MEM) Indianapolis International (IND) Fort Worth Alliance (AFW) Newark Liberty International (EWR) Oakland International (OAK) Ted Stevens Anchorage International (ANC)	Louisville International (SDF) Philadelphia International (PHL) Ontario International (ONT) Dallas/Fort Worth International (DFW) Chicago Rockford International (RFD) Columbia Metropolitan (CAE)

Source: Jviation

Regional Air Cargo Carriers – Regional air cargo carriers (Martinaire, Ameriflight, Suburban Air Freight) use turboprop aircraft and/or small business jets to operate between local market stations (O&D) and smaller, or more remote, cargo markets. These carriers typically operate in support of a larger integrated express cargo operator such as FedEx Express, UPS, or DHL. Mountain Air Cargo, Empire Airways, Martinaire, and Ameriflight are examples of contracted "feeder" airlines for both UPS and FedEx Express, all of which operate in Georgia.

Feeder flights often transport cargo from a smaller market to an awaiting cargo jet bound for the carrier's hub. Feeder aircraft may also fly directly to a hub from a nearby smaller market. In addition, some regional air cargo carriers operate charter-only services with a fleet of cargo aircraft on an as-needed basis. These aircraft provide on-demand service to support a customer's immediate air cargo transport needs. For example, an automotive manufacturer who needs to transport critical automobile parts to an assembly plant may utilize on-demand air cargo service. The Kia assembly plant in West Point often receives parts or tooling shipments from aircraft in this way via the nearby LaGrange-Callaway Airport (LGC).

All-Cargo Carriers – All-cargo carriers exclusively operate scheduled airport-to-airport air cargo service for their customers; they do not offer passenger service or ground movement/forwarding of cargo shipments. In the U.S., these non-integrated carriers include Polar Air Cargo, Atlas Air, Kalitta Air, and several others. These carriers typically operate independently but may also partner with integrated express carriers by providing aircraft, crews, aircraft maintenance, and insurance (ACMI) contract services under the integrator brand. These arrangements can include both international and domestic routes. One example of an all-cargo carrier in Georgia is AirBridgeCargo, which operates a scheduled Boeing 747 freighter route

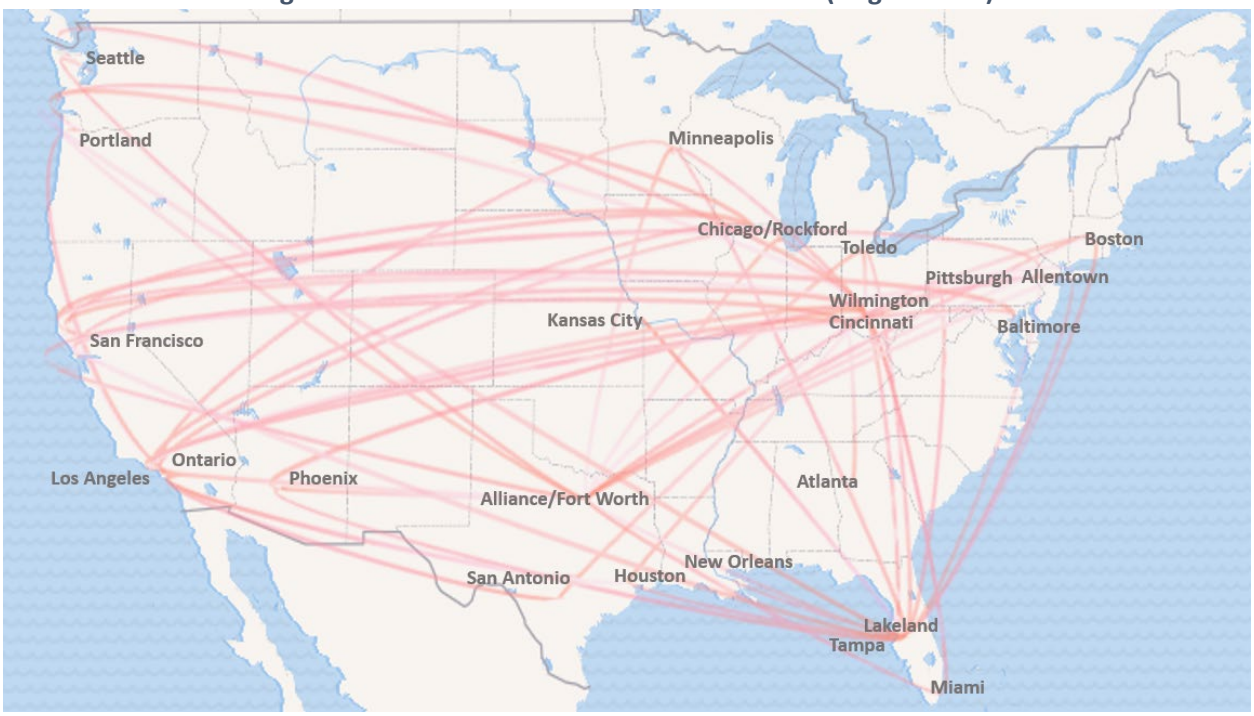
from ATL to Amsterdam (AMS). None of the other airports in Georgia are currently served by an all-cargo carrier.

Heavy Lift Cargo Freighters – Heavy lift cargo freighters are operated by charter cargo airlines like Volga-Dnepr Airlines and Antonov Airlines. These carriers provide specialized heavy-lift operations with fleets of Antonov An-124 and An-225 aircraft. Limited numbers of these aircraft exist, as they are some of the largest aircraft in the world and specifically designed for strategic cargo airlift; therefore, operations by heavy lift cargo freighters are typically highly specialized ad hoc charters. These carriers transport goods and equipment for businesses and governments on an ad hoc basis. This type of cargo activity is commonly referred to as "outsized charter" or "project cargo" operations. Some operators in this category occasionally conduct operations at ATL.

Specialty Cargo Carriers – Specialty cargo carriers support cargo operations for a specific industry or customer. These carriers may specialize in the transport of flowers, medical supplies, or e-commerce. Phoenix Air is a Georgia-based specialty air transportation service company that transports various types of air cargo, including fast-response general cargo, high value/high security cargo, dangerous goods, hazardous materials, explosives, live animals, and emergency medical cargo. Based at the Cartersville Airport (VPC), Phoenix Air's customers include a wide variety of domestic and global corporations, government agencies (U.S. Departments of Defense, Interior, and State, as well as NATO), manufacturers, aquariums, zoos, and motion picture companies. Phoenix Air developed the world's first airborne biocontainment system in conjunction with the CDC. The services they support are important to emergency medical response and national security.

Amazon Air is a specialty cargo carrier operating exclusively to transport Amazon e-commerce packages and inventory. In 2017, the carrier changed its name from Amazon Prime Air to Amazon Air to differentiate itself from the Amazon drone delivery service currently under development. Until January 2021, the airline relied solely on ACMI leased from other operators. Amazon announced in 2021 that it had purchased 11 used Boeing 767-300 passenger jets from Delta Air Lines and WestJet. Amazon Air will convert these aircraft to cargo freighters. As of August 2021, the carrier currently leases a fleet of approximately 75 aircraft, including 51 Boeing 767 and 22 Boeing 737 cargo aircraft that operate under the Amazon Air brand. Operators of these aircraft include Southern Air, Sun Country Airlines, ASL Airlines Ireland, Air Transport International, Atlas Air, and Cargojet Airways. As of August 2021, Amazon Air's network included approximately 45 U.S. airports, but this number is expanding. **Figure 2-1** identifies Amazon Air routes. The only airport in Georgia where Amazon currently operates (as of August 2021) is ATL.

Figure 2-1: Amazon Air – U.S. Route Network (August 2021)



Source: FAA Records, Chaddick Institute for Metropolitan Development at DePaul University[1], Jviation Analysis 2021

Quest Diagnostics, a medical diagnostic testing and information services company, has its own fleet of aircraft and is an example of another type of specialty air cargo carrier. They provide transport service for laboratory test samples, medical materials, radiopharmaceuticals, and related equipment. Their fleet is comprised of small business jets, turboprop, and piston-engine aircraft which are customized to carry time and temperature-sensitive items. Quest operates a maintenance base and a small hub and spoke network based at the Gwinnett County Airport (LZU). LabCorp is another medical laboratory testing company operating its own fleet of cargo aircraft with missions similar to Quest Diagnostics. LabCorp operates regularly out of DeKalb-Peachtree Airport (PDK) and Savannah/Hilton Head International Airport (SAV) using Pilatus PC-12 aircraft.

Air Forwarders – An air forwarder is an intermediary that arranges the best means of transport for goods, typically by accepting cargo from shippers and consolidating them into container loads. These loads are transferred by the air forwarder to a cargo carrier or passenger airline, which then delivers the load to an air forwarder agent or subsidiary at the destination airport. FedEx Express, UPS, and DHL often sell capacity to forwarders when space permits.

Air forwarders rely heavily on capacity provided by commercial passenger airlines, road feeder service providers (trucking companies), as well as all-cargo carriers. Air forwarders generally have facilities near major hub airports such as ATL or large international gateway airports such as Chicago O'Hare International (ORD) and New York's John F. Kennedy International (JFK). Their facilities may be located on

[1] Chaddick Policy Brief | February 16, 2021

an airport, but they are often located off airport property. The largest international air forwarders are DHL Supply Chain & Global Forwarding, Kuehne + Nagel, DB Schenker, DSV Panalpina, and UPS Supply Chain Solutions. Each of these air forwarders have stations in Georgia in the Atlanta metro area.

Table 2-2 identifies cargo aircraft operating at Georgia airports on a scheduled basis. The table includes the carrier, the aircraft type and gauge, and the aircraft's typical cargo capacity.

Table 2-2: Cargo Aircraft Gauge Operating in Georgia

Market	Airport ID	Carriers	Aircraft Gauge	Aircraft Type	Approximate Capacity in Pounds
Albany	ABY	UPS	Boeing 757 Airbus 300	Narrow-body, Wide-Body	68,000, 106,468
		UPS (contractor)	Cessna C208	Feeder	3,500
Columbus	CSG	FedEx Express (Contractor)	Cessna C208	Feeder	3,500
Savannah	SAV	FedEx Express	Boeing 757	Narrow-Body	68,000
		UPS (contractor)	Shorts 360	Feeder	7,000
		DHL (contractor)	Cessna C208	Feeder	3,500
Swainsboro	SBO	UPS (contractor)	Shorts 360	Feeder	7,000
Statesboro	TBR	UPS (contractor)	Cessna C208	Feeder	3,500
Atlanta	ATL	FedEx Express	Boeing 767	Wide-Body	116,000
		UPS	MD11	Wide-Body	180,000
		UPS	B757	Wide-Body	68,000
		DHL	Boeing 767	Wide-Body	116,000
		Amazon Air	Boeing 767	Wide-Body	116,000
		Multiple Int'l Cargo Carriers	Boeing 747-	Wide-Body	249,100-302,000

Source: FAA Air Traffic Control Record, (2019-2021 National Offload Program Data, Traffic Flow Management System Data), Flightaware.com, Airport Records, Wikipedia Jviation Analysis

Road Feeder Service (RFS) Airport-to-Airport – Road Feeder Service (RFS), or air expedited service, is offered by a scheduled air cargo operator to move goods between two airports by truck to avoid the cost of air shipment, particularly when the airports are within a one-day driving proximity. **Table 2-3** identifies the top expediters in the U.S. and shows their locations in Georgia.

This kind of service allows a carrier to offer services to a city that its aircraft do not serve. Cargo moved via these services are typically allocated an airline waybill number, although no aircraft may be involved in the transport. RFS providers operate scheduled "lanes." For example, a truck may depart Atlanta at noon each day for next morning arrival at JFK in New York.

Table 2-3: U.S. Top Road Feeder Service (RFS) Trucking Firms in 2020

Rank 2020	Company	Revenue (000)	Georgia Locations
1	Forward Air	$ 804,100	Atlanta, Savannah
2	Active Aero Group (Ascent)	$ 672,965	Newnan
3	XPO Logistics	$ 477,300	Atlanta Metro (17), Augusta (2), Columbus (3), Dalton, Newnan, Macon, McIntyre, Savannah (2)
4	ArcBest	$ 252,000	Hazlehurst, Lawrenceville, Macon, Savannah, Tifton
5	Landstar System	$ 121,485	Jefferson
6	LoadOne	$ 108,000	None
7	Magnate Worldwide	$ 73,000	None
8	Averitt Express	$ 12,236	Atlanta (2) Augusta, Macon, Savannah, Tifton
9	Sameday Worldwide	$ 9,046	None

Source: Transport Topics News, Top 100 Rankings, 2020 (https://www.ttnews.com/top100/air/2020), Jviation

Less-Than-Truckload (LTL) Carriers – Similar to integrated express carriers, LTL providers operate a hub-and-spoke system to achieve greater cargo transport efficiency. For example, Old Dominion Freight Line provides scheduled surface transportation for LTL "air cargo" shipments. This trucking company provides scheduled surface transportation for cargo as a cost-effective, reliable alternative to air transportation. Many of the shipments they carry are less time-sensitive than conventional integrated express shipments. **Table 2-4** identifies the top 10 LTL carriers in the U.S. in 2020; this table also shows where these firms have stations in Georgia.

Table 2-4: U.S. Top LTL Trucking Firms in 2020

Rank 2020	Company	Revenue (000)	Georgia Locations
1	FedEx Freight	$7,237,000	Albany, Athens, Atlanta (3), Augusta, Macon, Savannah, Valdosta
2	Yellow Corp.	$4,871,200	Athens, Atlanta (3), Augusta, LaGrange, Macon, Ringold, Savannah, Valdosta
3	XPO Logistics	$4,815,000	Atlanta Metro (17), Augusta (2), Columbus (3), Dalton, Macon, McIntyre, Newnan, Savannah (2)
4	Old Dominion Freight Line	$4,109,111	Athens, Atlanta (3), Augusta, Columbus, Macon, Ringold, Savannah, Sylvester, Vidalia
5	UPS Freight (Tforce)	$3,265,000	Albany, Athens, Atlanta (3), Augusta, Blue Ridge, Columbus, Macon, Marietta, Savannah
6	Estes Express Lines	$3,260,000	Albany, Athens, Atlanta (2), Augusta, Marietta, Savannah
7	ABF Freight	$2,145,000	Albany, Atlanta, Hazlehurst, Macon, Savannah, Tifton
8	R+L Carriers	$1,972,000	Albany, Atlanta, Augusta, Cordele, Dalton, Ellenwood, Gainesville, Kennesaw, Savannah, Tifton
9	Saia Inc.	$1,786,735	Athens, Atlanta, Augusta, Columbus, Savannah, Tifton
10	Southeastern Freight Lines	$1,166,622	Albany, Atlanta Metro (4), Columbus, Dalton, Hazelhurst, Macon, Savannah, Valdosta

Source: Transport Topics News, Top 100 Rankings, 2020 (https://www.ttnews.com/top100/ltl/2020), Jviation

2.2 Common Aircraft Supporting the Air Cargo Industry

Three major kinds of aircraft that serve as air freighters: wide-body jets, narrow-body jets, and narrow-body turboprop aircraft which commonly function as feeder aircraft. A significant number of freighters in service today are converted passenger aircraft. Other freighters, particularly wide-body freighters, are manufactured by companies such as Boeing and Airbus. The converted freighters tend to be significantly older, less fuel-efficient, and, given their age, are more susceptible to maintenance problems than recently manufactured freighters.

Table 2-5 lists common types of air cargo aircraft and their Airport Reference Code (ARC) by size grouping. The FAA defines operational and physical characteristics of the most demanding aircraft that are expected to operate at an airport. This type of aircraft, referred to as the critical aircraft, must use the airport on a regular basis and have at least a combined total of 500 takeoffs and landings annually. The ARC has two components related to the critical aircraft: the aircraft approach category and design group. The first component, the aircraft approach category (identified as A, B, C, or D), is based on the aircraft approach speed. The second component, the design group (identified with roman numerals), relates to the aircraft wingspan and/or tail height. Smaller, slower cargo aircraft are listed toward the top of **Table 2-5**, while faster, wider cargo aircraft are listed sequentially. The ARC information by air cargo aircraft is presented here to serve as a reference point for future portions of this study. Each of the Georgia airports has an established ARC; facility analysis completed later in this report will show if current ARCs at existing and potential air cargo airports in Georgia are suited to the operational needs of the cargo aircraft shown in **Table 2-5**. **Table 2-5** also identifies the Georgia airports where various types of air cargo aircraft currently operate.

In the U.S., wide-body freighter aircraft are used by integrated express carriers on both domestic and international routes, whereas all-cargo carriers use wide-body freighter aircraft primarily on international routes. Wide-body freighter aircraft can operate with payloads ranging from 80,000 to 234,000 pounds. In Georgia, wide-body cargo aircraft operate on a scheduled basis at two airports: Hartsfield-Jackson Atlanta International Airport (ATL) and Southwest Georgia Regional Airport (ABY) in Albany.

Narrow-body jet aircraft are typically used for short-haul domestic routes, while feeder aircraft serve small market needs. Narrow-body aircraft payloads range from 18,000 pounds to 95,000 pounds. Feeder aircraft payloads can range from 2,000 to 10,000 pounds. Upper decks on narrow-body aircraft accommodate containers or pallets with cargo packages contoured to fit in the aircraft fuselage. The aircraft's lower deck is bulk loaded—a process where individual pieces of freight are placed directly into the aircraft without the benefit of containers. FedEx Express operates a narrow-body Boeing 757 freighter at Savannah/Hilton Head International Airport (SAV) on a scheduled basis. Feeder aircraft are typically bulk loaded only.

Perhaps one of the most unique attributes of wide-body and narrow-body aircraft is their ability to accommodate containers, such as unit load devices (ULDs) and pallets, on the main deck. These aircraft have large doors and rollers fastened to their decks that allow containers and pallets laden with freight and mail to be rolled on and off aircraft either manually or mechanically.

Cargo aircraft are generally equipped with one large door on the port side of the aircraft on the upper deck and two (baggage compartment) doors on the starboard side of the lower deck. Some cargo aircraft are loaded through an opening at the front of the aircraft, which is revealed when the nose is lifted. Cargo aircraft with nose-loading capabilities can accommodate large items that do not fit through side cargo door openings.

Table 2-5: Common Types of Air Cargo Aircraft by Size Group

Manufacturer	Model	Schedule Operations at Georgia Airports	FAA Airport Reference Code (ARC) Design Group
Regional Cargo Aircraft			
Beech	B99/C99	ABY, ATL, CSG, SAV, TBR	A-II
Cessna Caravan	C208B		A-II
DeHavilland	DASH 8		A-III
ATR	ATR42		B-II
ATR	ATR-42-200/300/320		B-II
Beech	B1900		B-II
Embraer	EMB-120		B-II
SHORT	SD3-60	SBO	B-II
ATR	ATR-42-200/300		B-III
ATR	ATR72		B-III
Fairchild	SA227DC		B-III
Fairchild	Metro III		B-III
Narrow-Body Cargo Aircraft			
Airbus	A321-200		C-III
Boeing	727-200		C-III
Boeing	737-700C		C-III
Boeing	757-200	ATL, SAV, ABY	C-IV
Douglas	DC-8-70		C-IV
Wide-Body Cargo Aircraft			
McDonnell-Douglas	MD10		C-IV
Airbus	A330-200F		C-V
Airbus	A300-600	ABY, ATL	C-IV
Airbus	A310-200	ATL	C-IV
Airbus	A310-300	ATL	C-IV
Boeing	767-300F	ATL	C-IV
Boeing	767-200	ATL	D-IV
McDonnell-Douglas	MD11	ATL	D-IV
Boeing	747-200		D-V
Boeing	747-400	ATL	D-V
Boeing	747-400ERF		D-V
Boeing	747-8	ATL	D-V
Boeing	777-200	ATL	D-V
Antonov	Antonov 124		D-VI
Antonov	Antonov 225		D-VI+

Source: Jviation, August 2021

2.2.1 Uncrewed Cargo Aircraft (UCA) [Drones]

Some air cargo in the future may be transported on Uncrewed Cargo Aircraft (UCA). These aircraft offer a wide range of cargo capacities and flight distances. Many UCAs are electric, but some are conventional aircraft retrofitted with autonomous guidance systems and pilot controls. Currently, there are four different cargo drone use cases, which are in varying phases of development/implementation:

- Automation of intralogistics – these drones are used in industry settings such as large warehouses and factories. FedEx Express uses these on their air cargo ramp in Memphis.
- Parcel delivery (first/last mile) – drones will be used in dense urban areas with e-commerce shipments being transported directly to households. Points of origin may include delivery trucks, nearby distribution centers, or retail big-box stores.
- Supply of medical goods – large medical campus hospitals are currently utilizing drones to transport small lightweight packages carrying medical supplies and pharmaceuticals to normally hard-to-reach places.
- Transportation of air freight, usually in rural areas – larger drones, with heavier payloads and longer flight ranges, will service remote parts of the U.S. by transporting cargo to rural destinations.

The preceding section provides a brief description of the UCA types. More detail on the emerging and changing air cargo drone industry will be presented in a subsequent section of the report.

2.3 Airports Supporting the Air Cargo Industry

The types of airports supporting air cargo are derived from observations of the primary cargo activity taking place at a given airport. The cargo type is used to describe the level of activity and function the airport plays in supporting air cargo activity. These descriptors do not equate to Georgia's state airport system plan role classifications or FAA classifications for airports included in the federal airport system.

International Gateway – An international gateway functions as a consolidation, distribution, and processing point for international air cargo. To a certain extent, an international air cargo gateway is similar to a commercial hub airport in that the gateway airport is not reliant on the surrounding market area to generate sufficient cargo to justify international air cargo-related operations. As with an air cargo hub, much of the cargo moving through a gateway airport does not originate in and is not destined for the gateway airport's surrounding market area. The cargo is often trucked to and from markets hundreds, if not thousands, of miles away.

Airports in the U.S. that are considered international gateway airports include: Miami International (MIA), John F. Kennedy International (JFK), Los Angeles International (LAX), and Chicago O'Hare International (ORD), Hartsfield-Jackson Atlanta International (ATL), Dallas/Fort Worth International (DFW), and George Bush Intercontinental (IAH). ATL is the only airport in Georgia classified as an international gateway.

Integrated Express Primary Air Cargo Hub – The hub is the backbone for integrated express carriers since the hub provides connections to each market in the integrator's network. Each day, international and

domestic air cargo flights arrive at the hub. Once at the hub, packages are unloaded, sorted to the appropriate destination market, and then loaded back onto the appropriate outbound aircraft. The majority of enplaned air cargo traffic at a hub/sort facility is generated from the aircraft-to-sort-to-aircraft process. The cargo traffic originating or destined for the local market is often a small percentage of the airport's total enplaned cargo traffic.

In effect, the hub imports and exports demand for air cargo at the host airport. Currently, Georgia does not support any air cargo hubs. Major cargo hub airports include Memphis International (MEM), where FedEx Express operates its Super Hub, Louisville International (SDF), where UPS has its Worldport, and Cincinnati/Northern Kentucky International (CVG), where DHL operates its U.S. hub. The market area of an airport's integrated express cargo hub is typically located within a two- to three-hour driving radius of the airport. Typically, there are no cargo flights from the hub to airports within this radius since trucking is a less expensive alternative.

Integrated Express Regional Hub – Regional hubs serve the area in which they are located by supporting cargo sorting and distribution functions for a carrier's primary hub. UPS has regional hubs at Dallas-Fort Worth International (DFW), Chicago Rockford International (RFD), Columbia Metropolitan (CAE), and Ontario International (ONT). The regional hub allows cargo within those markets to bypass main hub in Louisville. Similarly, FedEx Express has regional hubs at Oakland International (OAK), Fort Worth Alliance (AFW), Piedmont Triad International (GSO), and Indianapolis International (IND), enabling cargo within those markets to bypass the main hub FedEx hub in Memphis. Currently, there are no airports in Georgia that function as a regional air cargo hub.

O&D/Local Market Stations – The criteria establishing a local market station or direct air cargo service (origin and destination [O&D] service for an airport's surrounding market area) generally coincides with population centers, concentrations of industry and commerce, and the availability of transportation infrastructure. Often referred to as a "node" within a cargo carrier's network, the local market station is the simplest and most common type of air cargo facility. These stations represent the "spokes" in an integrated carrier's hub-and-spoke network. For airport-to-airport service providers, the local market station represents the origin or destination point for the cargo they transport. Examples of airports with a local market station in Georgia include Savannah/Hilton Head International Airport (SAV) and Southwest Georgia Regional Airport (ABY) in Albany, Georgia. Albany serves as a node for UPS and Savannah serves as a node for FedEx Express.

Cargo Focused Airports – Cargo focused airports are dedicated to the movement of air cargo and offer the advantage of uncongested airspace relative to airports with passenger airline service. Just as the lack of passenger service is an advantage to cargo carriers operating at these airports, it is also a disadvantage for forwarders and other air cargo customers as airline aircraft belly space for freight and mail is unavailable. As a result, few examples of strictly air cargo airports exist. For example, Rickenbacker International Airport (LCK) in Columbus, Ohio serves as an intermodal cargo airport for FedEx Express, Mountain Air Cargo (a contracted feeder airline for FedEx), UPS, several air forwarders, and international cargo carriers such as CargoLux and Qatar Airways. This is one of few air cargo focused airports in the U.S.; there are no examples of cargo focused airports in Georgia.

Military Airfields – The U.S. military often has air cargo operations on their respective bases, and facilities are utilized by military aircraft that transport air cargo. Civilian air cargo operations seldom occur at military bases. In Georgia, there are five military airfields capable of accommodating Department of Defense (DOD) related cargo. Although not investigated in this study because of their restrictive use, Georgia bases include:

- Lawson Army Airfield (Fort Benning) (LSF) - Columbus
- Dobbins Air Reserve Base (MGE) – Marietta
- Hunter Army Airfield (SVN) – Savannah
- Moody Air Force Base (VAD) – Valdosta
- Robins Air Force Base (WRB) – Warner Robins

Changes in military status at any of these facilities could impact their future use for accommodating other types of air cargo.

2.3.1 Airport Competition

Airports compete with each other for customers, including air cargo. Each airport serves areas that vary in size and scale based on the types of aviation services provided and the proximity of other airports. The area an airport serves is generally driven by three major considerations – aviation service supply factors, demand factors, and costs in time and resources to the customer.

Areas served by cargo carriers vary in size depending on the level of air cargo services provided by carriers and businesses providing air cargo-related shipping services. For example, an international gateway airport typically has cargo shippers/air cargo dependent businesses located within its metropolitan area, and they may also receive cargo from more distant markets for air shipment. These markets may be as far away as a 16-hour truck drive or more; cargo trucked long distances to an international gateway is likely bound for international locations. Hartsfield-Jackson Atlanta International is the only international gateway airport in Georgia. Airports functioning as the local origin and destination station for integrated express carriers (Georgia-specific examples at Albany and Savannah) typically, based on speed and distance considerations, local origin and destination stations serve about a 60-minute drive-time.

An in-depth analysis of areas served by integrated express carriers operating at Georgia airports is forthcoming in a subsequent chapter of this report.

2.4 Air Cargo Activity in Georgia

Six airports in Georgia currently (August 2021) support regularly scheduled air cargo service. While passenger airlines do carry some freight and mail in the belly of their aircraft, the clear majority of the air cargo at these airports arrives and departs on dedicated air cargo aircraft.

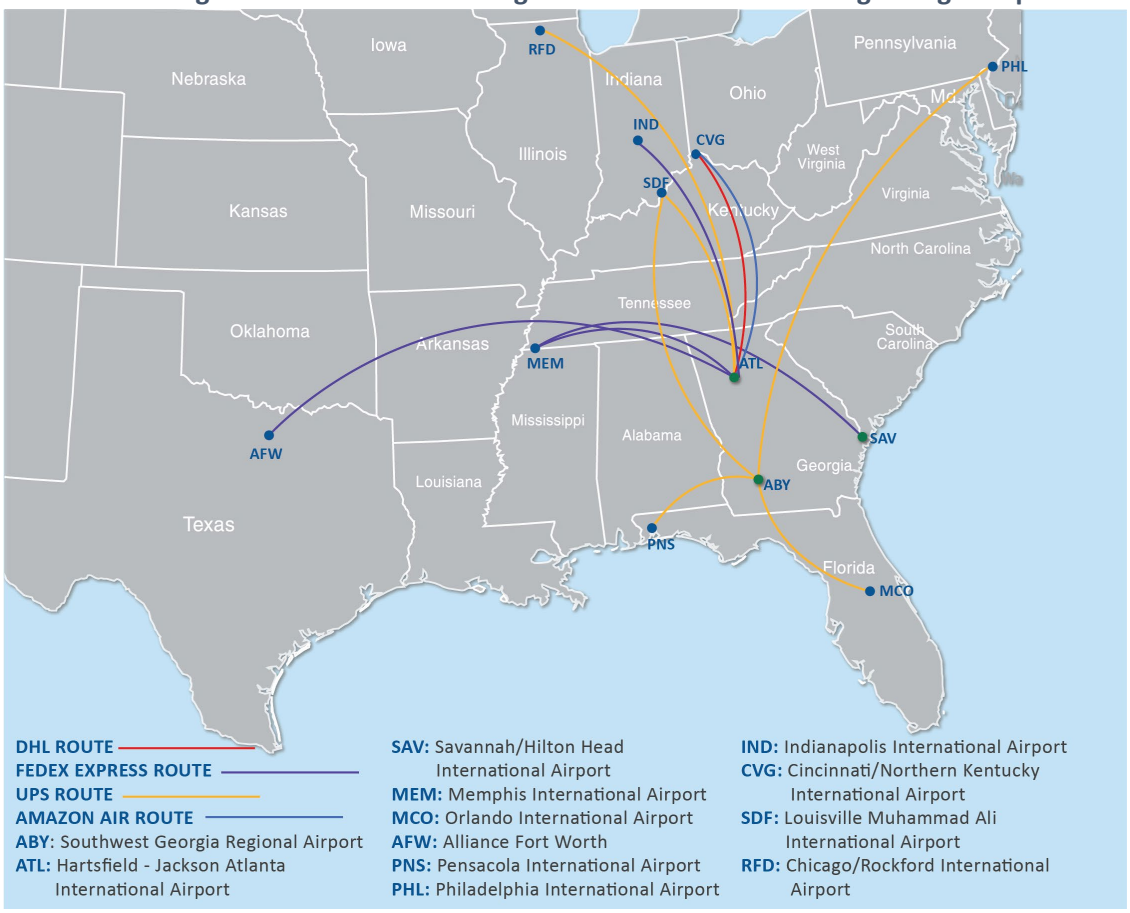
Hartsfield-Jackson Atlanta International Airport (ATL), Savannah/Hilton Head International Airport (SAV), and Southwest Georgia Regional Airport (ABY), serving Albany, are the only Georgia airports with

dedicated cargo jet activity. These airports support flights to and from integrated express hubs. UPS operates two cargo jets to hubs in Louisville and Philadelphia each day from Southwest Georgia Regional Airport. These aircraft also serve Orlando International Airport (MCO) and Pensacola Regional Airport (PNS). Savannah/Hilton Head International Airport (SAV) has cargo jet flights to and from the FedEx Express hub at Memphis International Airport (MEM) five days per week. Hartsfield-Jackson Atlanta International Airport (ATL) has domestic cargo flights to FedEx Express hubs in Memphis (MEM), Indianapolis (IND), and Alliance-Fort Worth (AFW) in Texas. Other scheduled ATL flights to hubs include those by DHL to Cincinnati (CVG) as well as Amazon Air to its hub at CVG. Suburban Air Freight also operates a daily flight from Atlanta to Pensacola using a Beech 1900C. UPS operates scheduled flights to its hubs in Louisville (SDF), Rockford (RFD), and Philadelphia (PHL). **Figure 2-2** identifies Georgia airports with domestic cargo jet service and the routes supported by these airports.

In addition to the airports with jet operators, three other airports in Georgia support turboprop cargo aircraft: Columbus Airport, East Georgia Regional Airport (Swainsboro), and Statesboro-Bulloch County Airport. These operators are contracted to "feed" air cargo to and from larger cargo aircraft or fly directly to the respective air cargo hub of the integrated carrier. **Figure 2-3** identifies Georgia airports with domestic cargo turboprop service and the routes supported by these airports.

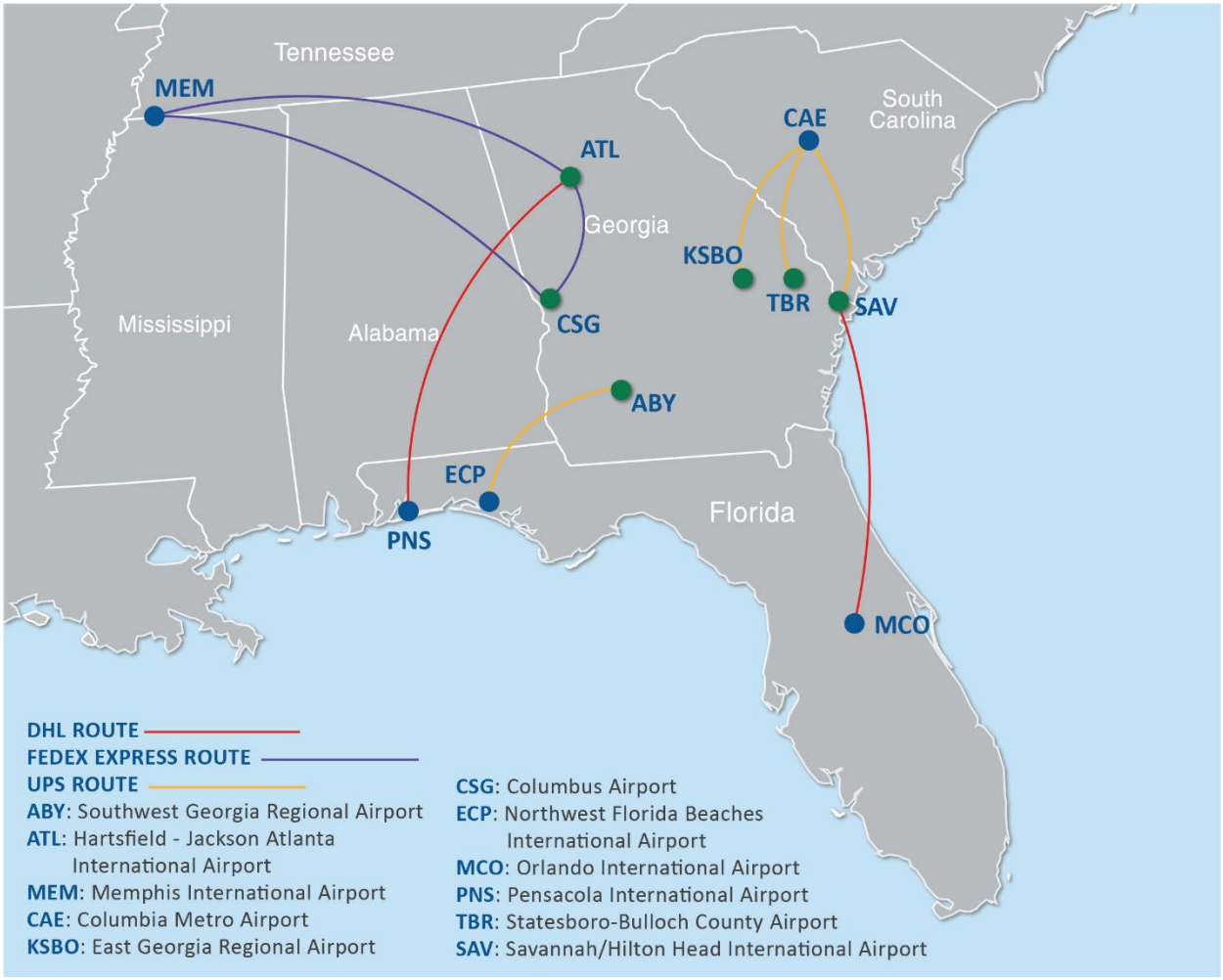
Martinaire, a regional air cargo carrier, feeds cargo to and from the UPS cargo jet serving Southwest Georgia Regional Airport (ABY). This flight, on a Cessna 208, comes from Northwest Florida Beaches International Airport (ECP), serving Panama City, Florida. Savannah/Hilton Head International Airport (SAV) has two regional air cargo carrier flights. UPS contracts with Air Cargo Carriers Inc. to transport air cargo on a Shorts 360 aircraft to and from their regional hub at Columbia Regional Airport (CAE). The same aircraft type and carrier also operates a similar route at East Georgia Regional Airport (SBO) in Swainsboro. UPS also contracts with a Cessna 208 feeder aircraft at Statesboro-Bulloch County Airport (TBR) which is also destined for Columbia (CAE).

Figure 2-2: Domestic Air Cargo Jet Aircraft Routes Serving Georgia Airports



Source: Flightaware.com, Jviation, analysis, August 2021

Figure 2-3: Domestic Air Cargo Turboprop Aircraft Routes Serving Georgia Airports



Source: Flightaware.com, Jviation, analysis, August 2021

As expected, ATL has the greatest volume of air cargo activity among all Georgia airports. The airport has multiple airlines providing nonstop wide-body freighter service by all-cargo carriers to destinations in Europe, the Mideast, and Asia. **Figure 2-4** illustrates these routes, some of which connect with other U.S. airports such as Chicago-O'Hare (ORD). In addition, Delta Air Lines provides nonstop service to nearly 60 international destinations from Atlanta, which is Delta's largest hub. These routes are primarily served by wide-body passenger aircraft with large belly compartment cargo capacities. Shorter routes, such as to destinations in the Caribbean, are flown using narrow-body passenger aircraft and regional jets. Most Delta passenger flights carry some volume of air cargo.

Figure 2-4: Scheduled International All-Cargo-Carrier Wide-Body Routes from Hartsfield - Jackson Atlanta International Airport (ATL)



AMS = Amsterdam Schipol International Airport
ANC = Ted Stevens Anchorage International Airport
ATL = Hartsfield - Jackson Atlanta International Airport
DFW = Dallas Fort Worth International Airport
DME = Moscow Domodedovo International Airport
DOH = Doha Hamad International Airport
FRA = Frankfurt Rhein-Main International Airport
HKG = Hong Kong Chek Lap Kok International Airport
ICN = Seoul Incheon International Airport
ISL = Istanbul International Airport
KIX = Osaka Kansai International Airport
LHR = London Heathrow International Airport
LUX = Luxembourg Findel International Airport
ORD = Chicago O'Hare International Airport
PVG = Shanghai International Airport
SEA = Seattle International Airport
TPE = Taipei Chiang Kai Shek International Airport

Source: Flightaware.com, Delta Air Lines schedules, (Jviation analysis), August 2021

2.4.1 Ad Hoc Air Cargo Activity

Air cargo activity in Georgia is classified into two categories, scheduled or ad hoc (as needed). At commercial service airports, integrated express carriers such as FedEx Express and UPS operate dedicated jet freighter and turboprop aircraft on a regularly scheduled basis to and from their hubs. Commercial service airports also accommodate air cargo carried by passenger aircraft; these flights are also considered in the scheduled air cargo category.

Ad hoc air cargo activity is typically associated with smaller, regional carriers using twin- or single-engine piston or turboprop aircraft, but some ad hoc air cargo activity can be carried on aircraft as large as a DC-9. Ad hoc air cargo operations can occur at nearly any airport, depending on need, operational feasibility, location, and aviation services on the airport.

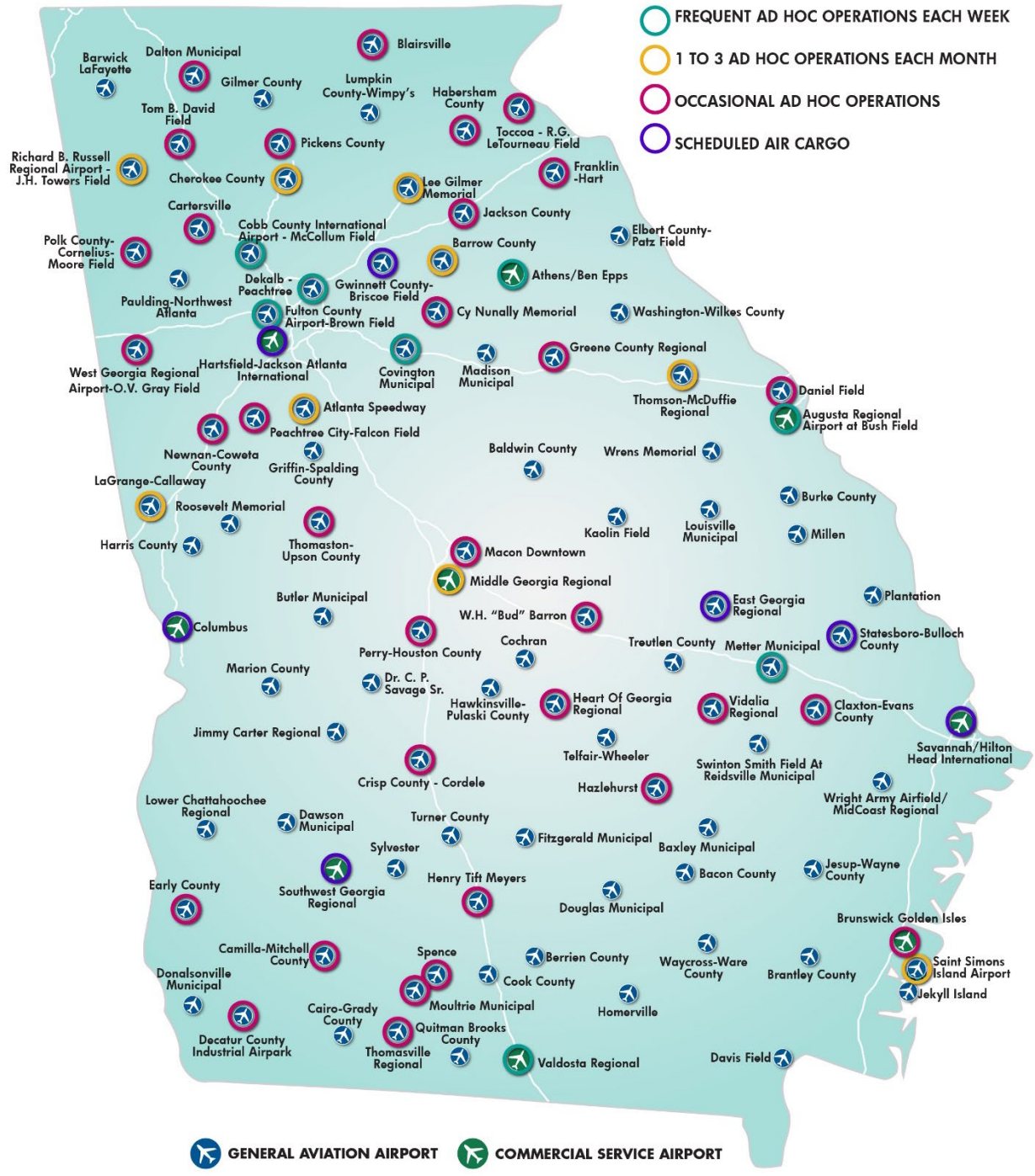
General aviation airports in Georgia frequently support the ad hoc air cargo operations of regional air cargo operators. These airports provide several advantages over larger commercial service airports. General aviation airports are typically less congested, both in terms of airspace (within the airport's vicinity) and on the ground. On the ground, general aviation airports allow for shorter taxi-times, provide easy roadway access, and are usually close in proximity to the market area they serve. Due to the small loads carried by regional/feeder air cargo aircraft, ground support requirements are much less labor-intensive and are therefore easily accommodated at general aviation airports. Fixed Base Operators (FBOs) are available at some general aviation airports. FBOs provide a wide array of services for the ad hoc cargo carriers, limiting the need for capital investment by the carriers themselves. Together, these

factors enable the ad hoc air cargo carriers to operate closer to their customer base and shorten their turnaround times at airports along multi-stop routes.

The types of ad hoc carriers operating at general aviation airports in Georgia include those that carry medical supplies, bank materials, automotive parts and equipment, and specialty cargo. These carriers operate on a scheduled and on an ad hoc or as-needed basis. Analysis of FAA flight records indicates that AirNet Express (AirNet II) and Quest Diagnostics are two of the largest (based on their total operations) ad hoc air cargo carriers operating in Georgia. Quest Diagnostics, a clinical lab testing firm with its own fleet of aircraft, transports medical lab samples on 12 regularly scheduled routes and a handful of ad hoc/on-demand routes from its base of operations at the Gwinnett County Airport (LZU). They average 65 operations per week. LabCorp, which is a competitor to Quest Diagnostics, operates regularly out of DeKalb-Peachtree Airport (PDK) and Savannah/Hilton Head International Airport (SAV). AirNet Express also specialize in transporting medical supplies and radiopharmaceuticals. They operated mainly from the Fulton County Airport (FTY).

Due to the inherent nature of ad hoc flights, general aviation and commercial service airports that have ad hoc air cargo activity far outnumber those that experience regularly scheduled air cargo operations. Review of FAA flight data shows that approximately 58 airports in Georgia accommodate some type of air cargo activity. All of these airports accommodated at least one air cargo flight between January 2019 and June 2020. Of the 58 airports with ad hoc air cargo operations, nine airports were also identified as having an average of one or more ad hoc cargo flights per week. **Figure 2-5** identifies the 58 airports in Georgia supporting ad hoc cargo activity.

Figure 2-5: Airports Supporting Ad Hoc Air Cargo Activity



Source: FAA National Offload Program data 2019, 2020 data, Jviation analysis,

Table 2-6 identifies the 58 airports with air cargo activity and whether the air cargo activity is scheduled, ad hoc, or both. The table also identifies airports that are supported with technology to assist pilots in landing in poor weather conditions. Most cargo airlines prefer to operate at airports with Vertical Guidance Approaches[2]. As presented in the table, 51 of the 58 airports with recorded ad hoc cargo activity are equipped with this type of landing system.

Table 2-6: Georgia Airports by Type of Air Cargo Activity

FAA Identifier	Airport Name	Type of Air Cargo Activity	Approach with Vertical Guidance
CSG	Columbus Airport	Scheduled & Weekly Ad Hoc	Yes
SBO	East Georgia Regional Airport	Scheduled & Weekly Ad Hoc	Yes
ATL	Hartsfield-Jackson Atlanta International Airport	Scheduled & Weekly Ad Hoc	Yes
LZU	Gwinnett County Airport-Briscoe Field	Scheduled & Weekly Ad Hoc	Yes
SAV	Savannah/Hilton Head International Airport	Scheduled & Weekly Ad Hoc	Yes
ABY	Southwest Georgia Regional Airport	Scheduled & Weekly Ad Hoc	Yes
TBR	Statesboro-Bulloch County Airport	Scheduled & Weekly Ad Hoc	Yes
AHN	Athens-Ben Epps Airport	Weekly Ad Hoc	Yes
AGS	Augusta Regional Airport at Bush Field	Weekly Ad Hoc	Yes
RYY	Cobb County International Airport-McCollum Field	Weekly Ad Hoc	Yes
CVC	Covington Municipal Airport	Weekly Ad Hoc	Yes
PDK	DeKalb-Peachtree Airport	Weekly Ad Hoc	Yes
FTY	Fulton County Airport-Brown Field	Weekly Ad Hoc	Yes
MHP	Metter Municipal Airport	Weekly Ad Hoc	Yes
VLD	Valdosta Regional Airport	Weekly Ad Hoc	Yes
WDR	Barrow County Airport	Monthly Ad Hoc	Yes
BQK	Brunswick-Golden Isles Airport	Monthly Ad Hoc	Yes
CNI	Cherokee County Airport	Monthly Ad Hoc	Yes
HMP	Henry County Airport	Monthly Ad Hoc	No
LGC	LaGrange-Callaway Airport	Monthly Ad Hoc	Yes
GVL	Lee Gilmer Memorial Airport	Monthly Ad Hoc	Yes
SSI	McKinnon-St. Simons Island Airport	Monthly Ad Hoc	No
MCN	Middle Georgia Regional Airport	Monthly Ad Hoc	Yes
RMG	Richard B. Russell Regional Airport-J.H. Towers Field	Monthly Ad Hoc	Yes
HQU	Thomson-McDuffie Regional Airport	Monthly Ad Hoc	Yes
CTJ	West Georgia Regional Airport-O.V. Gray Field	Monthly Ad Hoc	Yes
FFC	Atlanta Regional Airport-Falcon Field (Peachtree City)	Occasional Ad Hoc	Yes
DZJ	Blairsville Airport	Occasional Ad Hoc	No
CXU	Camilla-Mitchell County Airport	Occasional Ad Hoc	Yes
VPC	Cartersville Airport	Occasional Ad Hoc	Yes
CWV	Claxton-Evans County Airport	Occasional Ad Hoc	Yes

[2] Vertical Guidance Approaches may be satellite based LPV approaches or ground-based Instrument Landing System (ILS) approaches.

48A	Cochran Airport	Occasional Ad Hoc	Yes
CKF	Crisp County-Cordele Airport	Occasional Ad Hoc	Yes
DNN	Dalton Municipal Airport	Occasional Ad Hoc	Yes
DNL	Daniel Field Airport	Occasional Ad Hoc	Yes
BGE	Decatur County Industrial Air Park	Occasional Ad Hoc	Yes
BIJ	Early County Airport	Occasional Ad Hoc	Yes
18A	Franklin County Airport	Occasional Ad Hoc	Yes
3J7	Greene County Regional Airport	Occasional Ad Hoc	Yes
AJR	Habersham County Airport	Occasional Ad Hoc	Yes
AZE	Hazlehurst Airport	Occasional Ad Hoc	No
EZM	Heart of Georgia Regional Airport	Occasional Ad Hoc	Yes
TMA	Henry Tift Myers Airport	Occasional Ad Hoc	Yes
JCA	Jackson County Airport	Occasional Ad Hoc	Yes
MAC	Macon Downtown Airport	Occasional Ad Hoc	Yes
D73	Monroe-Walton County Airport	Occasional Ad Hoc	No
MGR	Moultrie Airport	Occasional Ad Hoc	Yes
CCO	Newnan-Coweta County Airport	Occasional Ad Hoc	Yes
PXE	Perry-Houston County Airport	Occasional Ad Hoc	Yes
JZP	Pickens County Airport	Occasional Ad Hoc	Yes
4A4	Polk County Airport-Cornelius Moore Field	Occasional Ad Hoc	Yes
MUL	Spence Airport	Occasional Ad Hoc	No
OPN	Thomaston-Upson County Airport	Occasional Ad Hoc	Yes
TVI	Thomasville Regional Airport	Occasional Ad Hoc	Yes
TOC	Toccoa Airport-RG LeTourneau Field	Occasional Ad Hoc	Yes
CZL	Tom B. David Field Airport	Occasional Ad Hoc	Yes
VDI	Vidalia Regional Airport	Occasional Ad Hoc	Yes
DBN	W.H. "Bud" Barron Airport	Occasional Ad Hoc	Yes

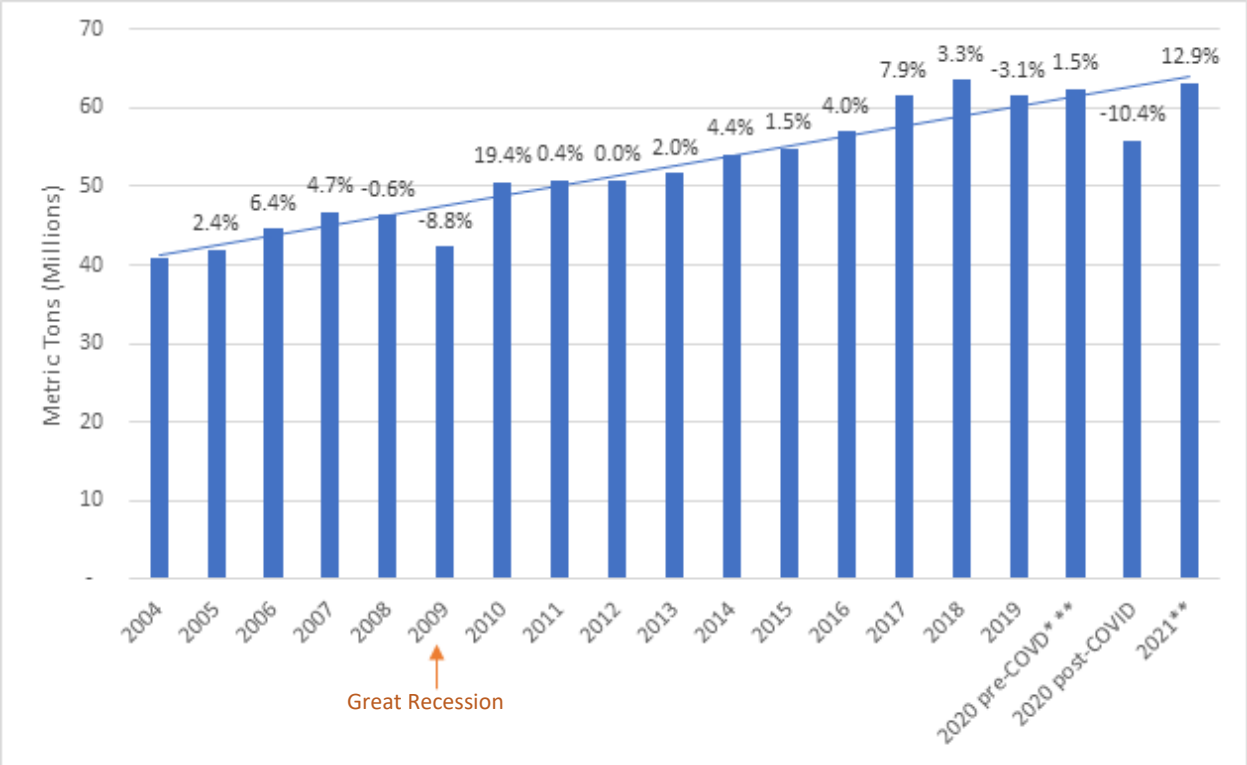
Source: FAA National Offload Program flight records (2019-2020), FAA Approach Plates, Jviation analysis

2.5 Global Air Cargo Trends

Since 2004, global air cargo volumes have increased steadily, despite minor fluctuations and two notable downturns due to major global economic events. From 2004 to 2007, global air cargo traffic grew by an average of 4.5 percent annually before declining by more than 9 percent during 2008 and 2009 due to the Great Recession. In 2010, global air cargo volumes rebounded above pre-recession levels and then experienced slow growth (1.6 percent annually) through 2015.

The latter half of the decade saw accelerated growth, with global air cargo volumes growing 2.9 percent annually from 2015 to 2019. The onset of the COVID-19 pandemic saw global air cargo volumes decrease by over 10 percent. However, according to International Air Transport Association (IATA) data, air cargo volumes in 2021 rebounded[3]. As shown in **Figure 2-6**, since 2004 the overall global air cargo volume trendline experienced an average annual growth rate of 2.8 percent through 2019 or 2.6 percent through 2021 (forecast).

Figure 2-6: Global Air Cargo Volume in Metric Tons, 2004-2021

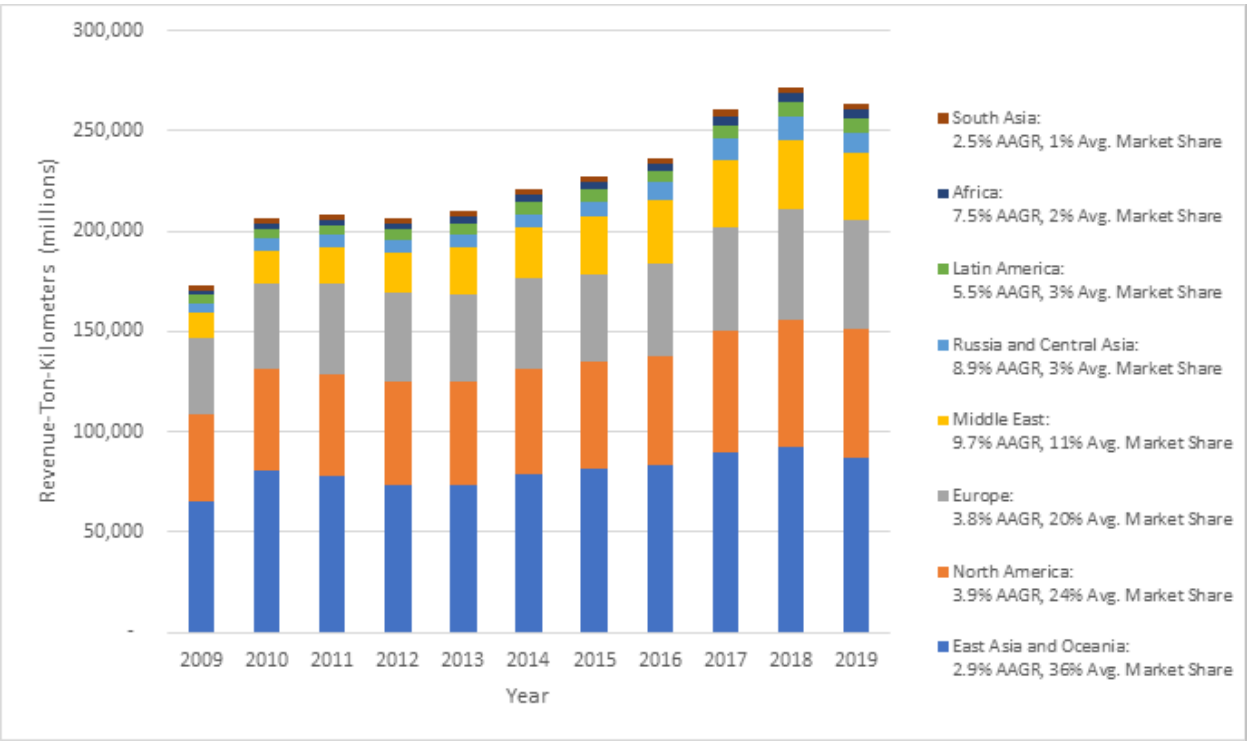


Source: International Air Transport Association (IATA), Statista

[3] https://www.freightwaves.com/news/air-cargo-sector-shoots-toward-2021-recovery

According to the *Boeing World Air Cargo Forecast 2020-2039*, air cargo traffic increased across all regions worldwide from 2009 to 2019 in revenue-ton-kilometers (RTKs)[4]. East Asia and Oceania region represented the largest share of global air cargo traffic, followed by North America, Europe, and the Middle East. Combined, the regions of Russia and Central Asia, Latin America, Africa, and South Asia represented less than 10 percent of the global market share. By average annual rate of growth, the Middle East region was the fastest-growing region at 9.7 percent, followed by Russian and Central Asia at 8.9 percent, Russia at 7.5 percent, and Latin America at 5.5 percent. As shown in **Figure 2-7**, Europe, North America, East Asia and Oceania, and South Asia each grew by 2.5 to 3.9 percent. Any reported RTKs for Georgia airports contribute to the North American trends.

Figure 2-7: Global Air Cargo Traffic by Region in RTKs, 2009-2019



Source: Boeing World Air Cargo Forecast 2020-2039, 2020_WACF_PDF_Download.pdf (boeing.com) Page 98

ATL is the only airport in Georgia to support scheduled international air cargo operations; this cargo primarily arrives via belly compartments of passenger aircraft. Approximately three million metric tons of international cargo were enplaned and deplaned at ATL from 2011 to 2020. International cargo to and from ATL stems from 141 unique airline destinations located on five continents: North America, South America, Europe, Africa, and Asia. **Table 2-7** provides the top ten international cargo lanes for ATL from 2011 to 2020 and the total tonnage transported on these trade lanes over that period. Note that air cargo traveling on these trade lanes does not imply that the airport noted is the final destination. For example, air cargo on the Atlanta (ATL) to Frankfurt (FRA) trade lane may be destined for other parts of Europe, beyond the Frankfort market area. As indicated in **Figure 2-8**, ATL's first five trade lanes make up nearly

[4] The revenue load in ton multiplied by the distance flown

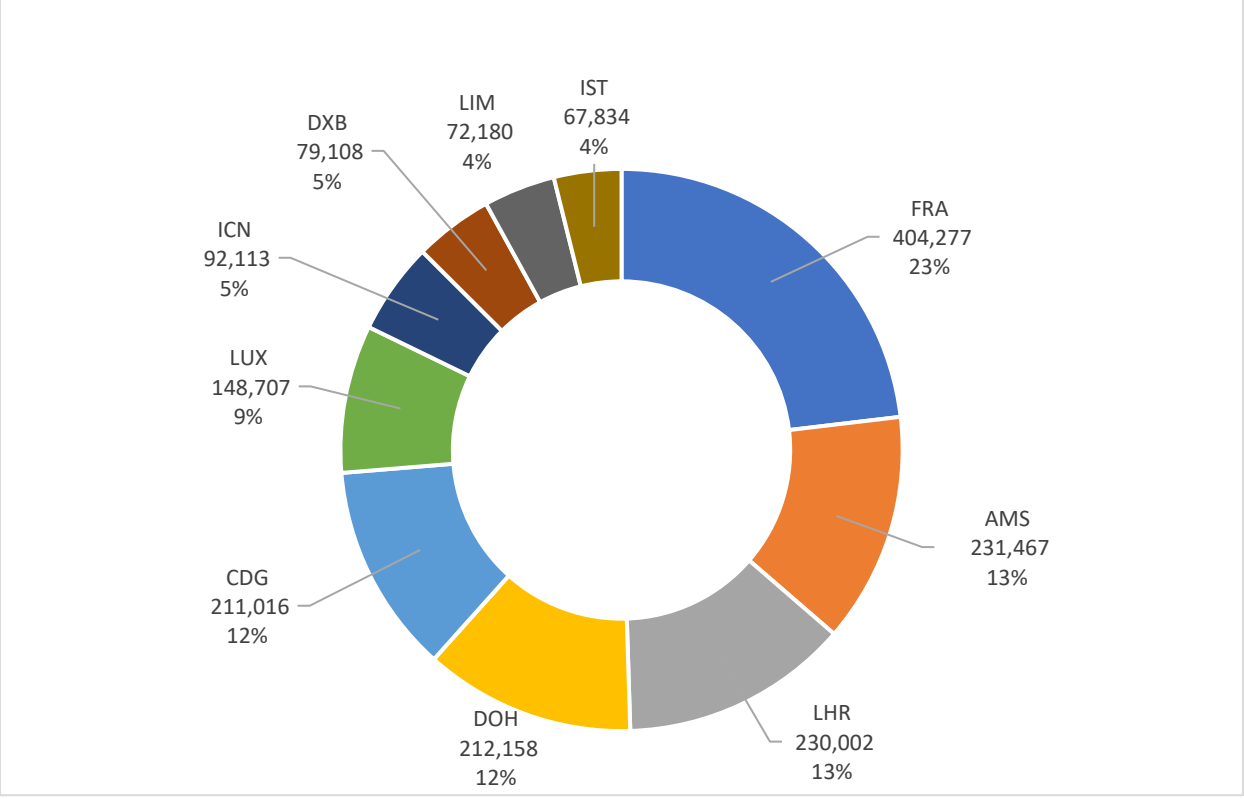
75 percent of the airport's cargo tonnage. The top ten feature trade lanes are flown predominantly passenger and cargo airlines, including Delta Air Lines, KLM, Air France, and Qatar Airways.

Table 2-7: Top 10 International Air Cargo Trade Lanes for Hartsfield-Jackson Atlanta International Airport (ATL)—2011-2020

Airport Code	Location	Metric Tons
FRA	Frankfurt, Germany	404,277
AMS	Amsterdam, The Netherlands	231,467
LHR	London, United Kingdom	230,002
DOH	Doha, Qatar	212,158
CDG	Paris, France	211,016
LUX	Luxembourg, Luxembourg	148,707
ICN	Seoul, South Korea	92,113
DXB	Dubai, United Arab Emirates	79,108
LIM	Lima, Peru	72,180
IST	Istanbul, Turkey	67,834

Source: https://www.transportation.gov/policy/aviation-policy/us-international-air-passenger-and-freight-statistics-report

Figure 2-8: Top 10 International Air Cargo Trade Lanes for ATL by Percent—2011-2020

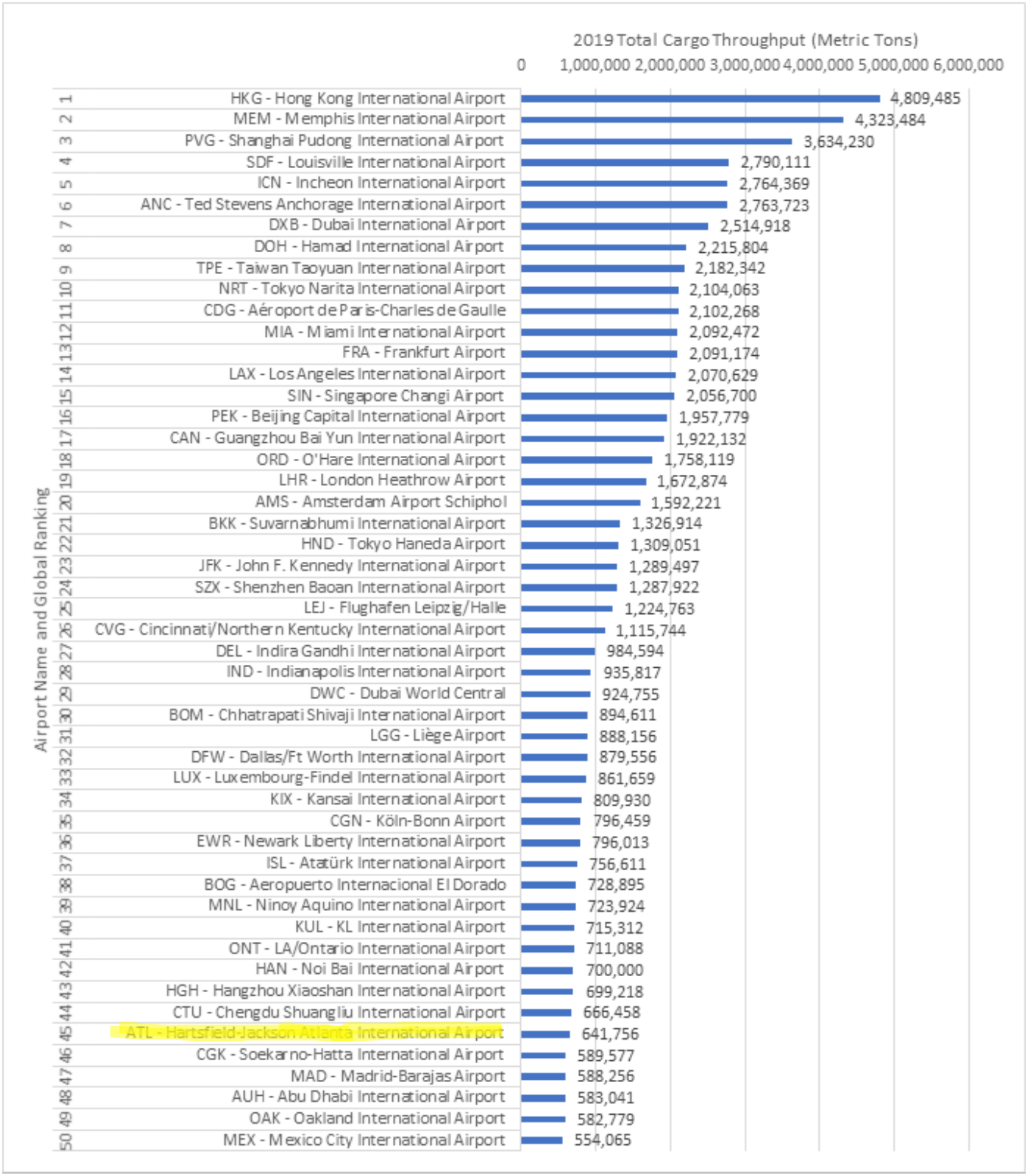


Source: https://www.transportation.gov/policy/aviation-policy/us-international-air-passenger-and-freight-statistics-report

2.5.1 Top Global Airports by Cargo Throughput

The busiest airports in the world, in terms of air cargo tonnage throughput, are either major international gateway cities with significant passenger wide-body, airports served by dedicated freighter activity, and/or primary hub airports for a particular cargo carrier. **Figure 2-9** identifies the world's top 50 busiest cargo airports by 2019 tonnage. As shown, the five largest cargo airports in 2019, as measured by tonnage, were Hong Kong (HKG), Memphis (MEM), Shanghai (PVD), Louisville (SDF), and Seoul (ICN). Out of the top 50 airports, 14 are in North America, 12 in East Asia, 10 in Europe, 6 in Southeast Asia, 4 in the Middle East, 2 in South Asia, and 2 in Latin America. ATL ranks 45th globally for its cargo tonnage, and it ranks 13th in North America.

Figure 2-9: Top 50 Global Cargo Airports, 2019 Tonnage (Metric Tons)

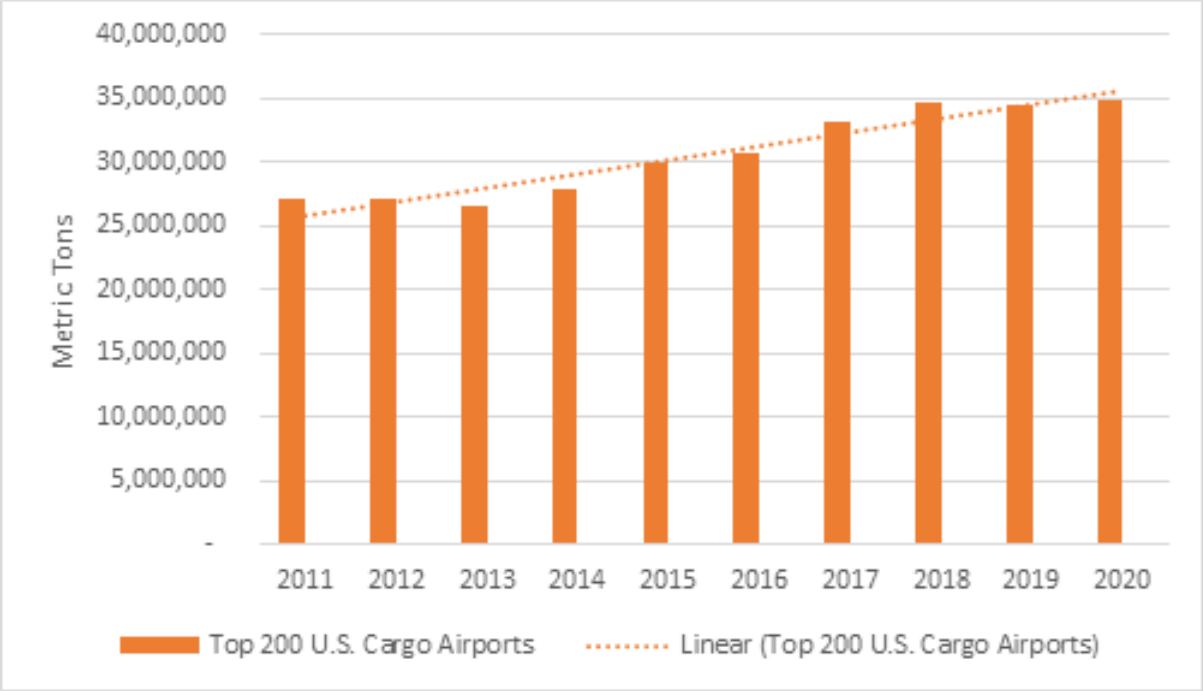


Source: Air Cargo World

2.6 U.S. Air Cargo Trends

Airports Council International-North America (ACI-NA), an airport trade organization, provides data from the top 200 busiest airports for total cargo tonnage served each year. **Figure 2-10** displays the change in volume from 2011 to 2020. Cargo volume increased significantly over the 10 years included in the ACI-NA data. In 2011, 27.1 million metric tons were moved through the 200 busiest U.S. air cargo airports, growing to nearly 34.9 million metric tons in 2020. This represents an average annual growth rate of 2.6 percent. Online retail and the growth of e-commerce and Amazon Air over this timeframe are primary reasons for the large increase.

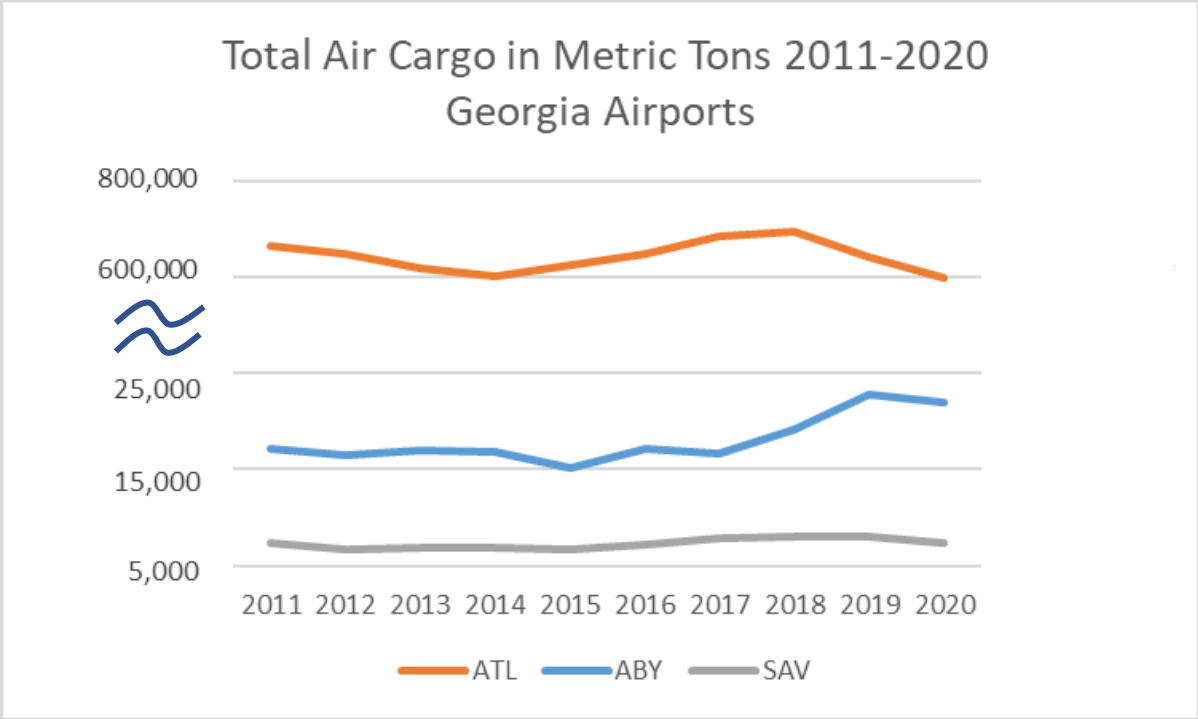
Figure 2-10: Total Air Cargo Tons 2011-2020 Top 200 U.S. Airports



Source: Airports Council International (ACI-NA) Traffic Reports Data 2011 to 2020

Three airports in Georgia are included in the top 200 U.S. airports by cargo volume: Albany (ABY), Atlanta (ATL), and Savannah (SAV). Atlanta and Savannah have maintained steady growth in air cargo activity over the 10-year period, with Atlanta (ATL) ranging from 599,180 to 693,790 metric tons and Savannah ranging from 6,872 to 8,403metric tons. **Figure 2-11** identifies these three Georgia airports and their cargo tonnages from 2011 to 2020.

Figure 2-11: Total Air Cargo in Metric Tons 2011 to 2020 for Georgia Airports



Source: Airports Council International (ACI-NA) ACI-NA, Note: ABY cargo metric tonnage 2011 to 2017 is estimated

2.6.1 The Freight-Passenger Mix of Georgia Airports

To better understand the role or market position Georgia airports play, it is helpful to compare their ratio of freight to passengers within the context of other airports. The range of roles (or mix of roles) airports serve varies greatly, and no two airports are exactly alike in terms of their passenger and cargo mix. At a basic level, there are cargo-focused airports, passenger-focused airports, and those in-between with a balance of both. **Figure 2-12** displays, in scatterplot form, the relationship between freight levels and passenger levels for the Top 50 North American cargo airports as reported in 2019. ATL is the only Georgia airport included in this reporting.

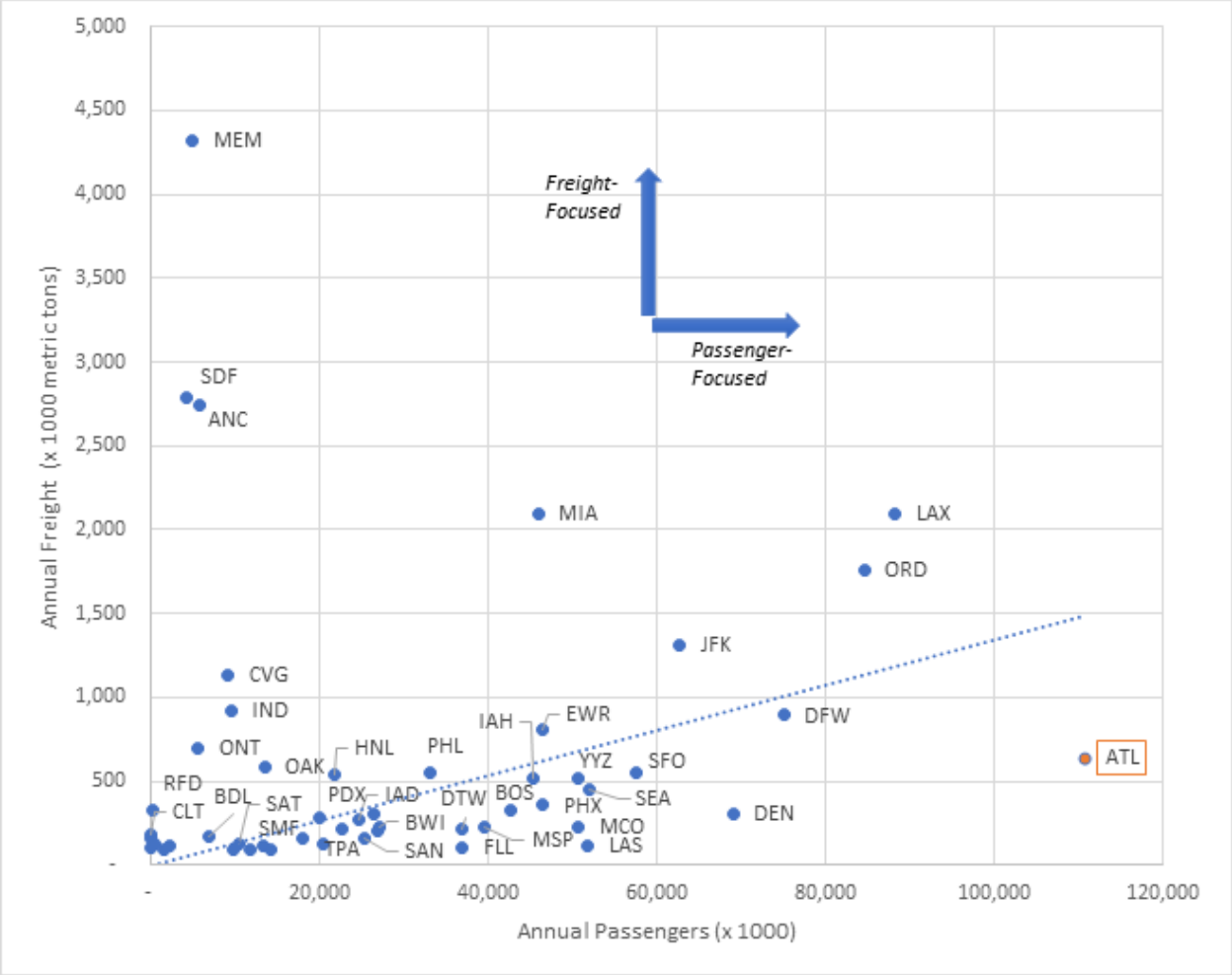
As shown in **Figure 2-12**, freight-focused airports include integrated express carrier hubs such as Memphis (MEM), Louisville (SDF), Cincinnati (CVG), and Indianapolis (IND). Anchorage (ANC) is another highly cargo-focused airport; however, a small percentage of cargo is off-loaded as ANC serves as a fuel stopover for trans-Pacific cargo between North America and Asia, which is further context for understanding the nuances of various roles cargo airports serve.

Passenger-focused airports include Atlanta (ATL), Dallas-Fort Worth (DFW), Denver (DEN), and San Francisco (SFO). Long ranked as the busiest passenger airport in the world due to the presence of Delta Air Lines' largest hub. In 2019, ATL served over 110 million passengers and ranked first among all U.S. airports for commercial passengers served and processed 599,000 metric tons of cargo making it the 13th busiest air cargo airport in the U.S. The airports with the best balance of freight and passengers are typically major international gateway cities with significant wide-body passenger aircraft activity,

integrated express carrier presence, dedicated freighter activity, large populations, and local industry/business demand for air cargo. These include Los Angeles (LAX), Chicago-O'Hare (ORD), New York-Kennedy (JFK), and Miami (MIA). Each of these airports is in or near the top ten busiest airports in North America for both freight and passengers.

Towards the bottom of the Top 50 scatterplot (**Figure 2-12)** are airports with relatively balanced levels of passenger and freight demand. These include airports in Georgia's neighboring states such as Charlotte (CLT), Greensboro (GSO), Fort Lauderdale (FLL), Raleigh-Durham (RDU), and Huntsville (HSV). These airports have annual cargo throughput ranging from 89,000 to 139,000 metric tons.

Figure 2-12: Scatterplot of Freight vs. Passenger Focused Airports North American Airports by 2019 Cargo Tonnage (Top 50 Ranked Airports)

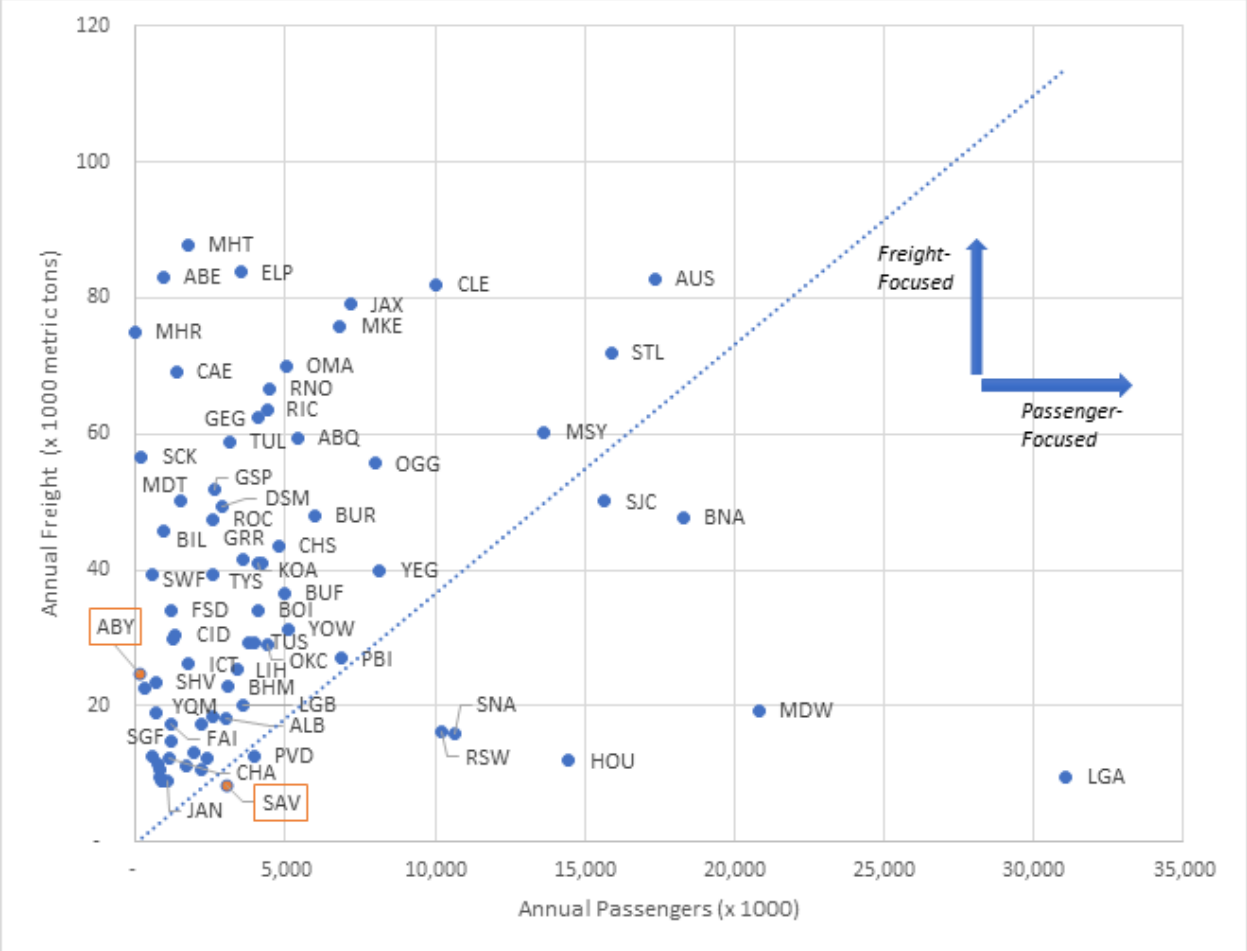


Note: Georgia airports identified in orange
Source: Airports Council International (ACI-NA) Traffic Report 2019

To examine airports more closely in the "middle-of-the-pack," **Figure 2-13** presents a scatterplot visualization of the 51st through 125th ranked North American airports by 2019 cargo tonnage. By

removing the top 50 cargo airports from the picture, the cluster of mid-tier airports is expanded and easier to interpret. As shown in **Figure 2-13**, the extremities of the scatterplot include passenger-focused airline hub airports such as New York-LaGuardia (LGA), Chicago-Midway (MDW), and Houston-Hobby (HOU), while Manchester (MHT), Allentown (ABE), El Paso (ELP), Sacramento (MHR), and Columbia (CAE) are more cargo-focused. The most balanced airports are Austin (AUS), St. Louis (STL), San Jose (SJC), Nashville (BNA), and New Orleans (MSY). At the lower end of the scatterplot are two Georgia airports, Albany (ABY) and Savannah (SAV), which sit at opposite ends of the passenger-freight spectrum. ABY is a freight-focused airport with an annual total of 81,000 passengers (225th) versus 25,000 metric tons of cargo (97th), while SAV is a much more passenger-focused airport with annual totals of over 3 million passengers (88th) versus 8,000 metric tons of cargo (125th).

Figure 2-13: Scatterplot of Freight vs. Passenger Focused Airports North American Airports by 2019 Cargo Tonnage (51st to 125th Ranked Airports)

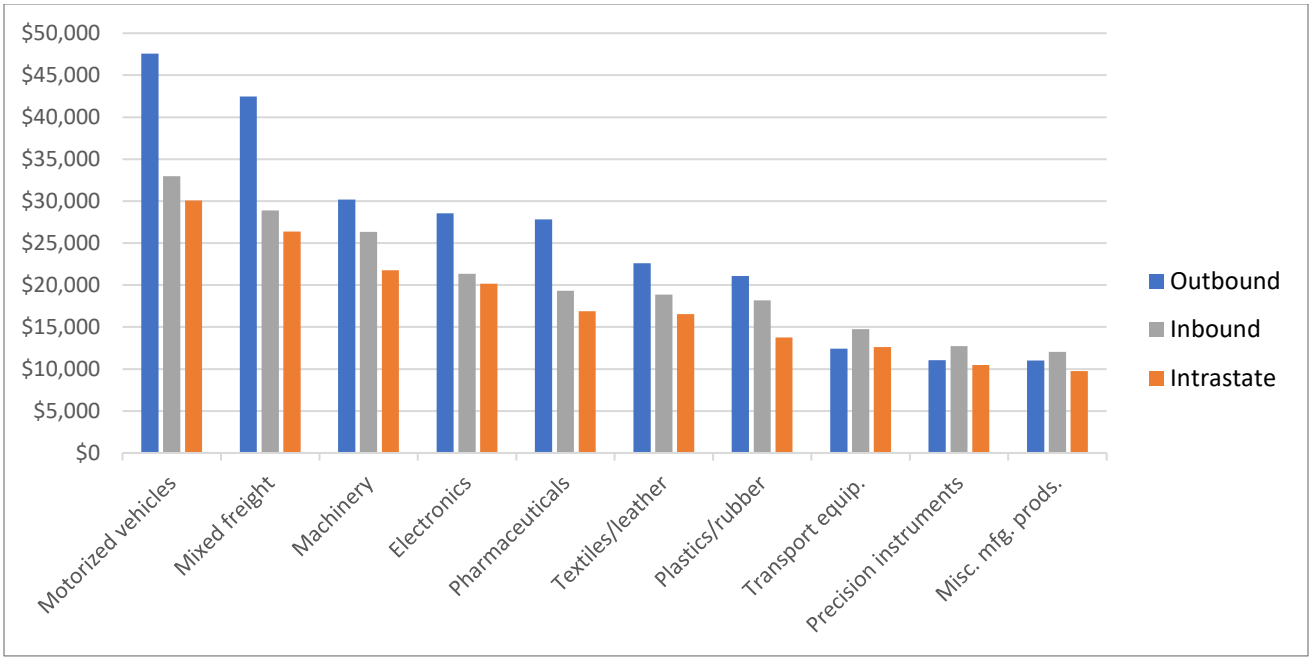


Note: Georgia airports identified in Orange
Source: Airports Council International (ACI-NA) Traffic Report 2019

2.7 Air Cargo Commodities

Commodities transported by air are often high-value, time-sensitive goods. **Figure 2-14** illustrates the top 10 commodities by value in Georgia transported by all modes. Businesses in several of these categories rely directly on air transport to deliver products effectively and efficiently within, to, and from Georgia.

Figure 2-14: 2017—Commodities by Value in Georgia by All Modes (Millions of U.S. Dollars)



Source: Bureau of Transportation Statistics (Freight Analysis Framework 5 Data, 2017)

Motorized vehicles components are the largest air cargo commodity. This particular commodity group supports businesses across the state, including Kia Motors in West Point and Textron Specialized Vehicles in Augusta. While finished vehicle products are not transported by air, critical parts and supplies are shipped by air to locations throughout Georgia. The mixed freight category includes shipments from major logistical groups, including UPS, FedEx Express, USPS, and Amazon[5]. Shipments in this category are often high visibility, with ground deliveries happening in communities throughout Georgia on a daily basis. Electronics such as computers, computer components, telecommunications equipment, and consumer electronic products rank fourth by value. Due to the size and importance of these goods, electronic products are often shipped via air cargo.

Products that require quick distribution and frequent availability include:

- Aerospace - Equipment & Parts
- Automotive - Equipment & Parts
- Pharmaceuticals

[5] Mixed freight is business-to-business shipments, e-commerce retail and consumer goods shipped in parcels and packages. The integrated express industry considers commodity data proprietary and reports commodities as mixed freight.

- Computers, Laptops & Computer Components
- Medical Diagnostic Equipment
- Medical Devices and Equipment
- Textiles – Garments, Seasonal Apparel, and Shoes
- Consumer Electronics
- Telecommunications Equipment - Cell Phones, iPads, etc.
- Perishables - Flowers, Fruit, Vegetables & Seafood
- Economically Perishable Materials - Printed Material
- e-commerce retail goods

Nearly all of these goods are ranked in the top 10 commodities by value in Georgia. The higher the value per pound, the more likely the commodity is to be shipped via air cargo. The surge in pharmaceutical development and distribution has increased the awareness of both the public and economic development officials on the importance of access to expedited air cargo services in their communities. Georgia is a national leader in pharmaceuticals.

2.7.1 Impacts of Medical and Pharmaceutical-Related Shipments

Air cargo enables industries, regardless of geographic location, to efficiently connect to distant markets and global supply chains in a speedy and reliable manner. As major pharmaceutical producers in Europe and the U.S. are expected to expand in India and Latin America, the industry will be reliant on air cargo for its supply chains and distribution networks.

Overseas pharmaceutical manufacturing often drives air cargo demand at the local level in Georgia as local manufactures rely on inbound shipments of pharmaceutical active product ingredients (API). Many of these pharmaceuticals, such as insulin and vaccines, are temperature sensitive and require some level of refrigeration or temperature control. Airports are a critical infrastructure asset for rapidly transporting these types of goods.

Logistical service providers based at and near airports around the world are investing more in dedicated pharma-related infrastructure and specific pharma handling operations. Infrastructure improvements on airports include construction of refrigerated warehouse facilities, as well as improvements in electrical outlet distribution in warehouses to support temporary storage of ULDs with refrigeration capabilities.

The COVID-19 pandemic brought a greater appreciation of both the pharmaceutical industry and of the air cargo industry, which is the core of the vaccine distribution supply chain. Other life sciences industries also rely on air cargo shipments. Surgical devices for joint replacements and reconstructive surgery are often shipped overnight on cargo aircraft to hospitals throughout the U.S. It is an industry practice for surgeons to order two or three replacement joints to ensure the device selected will be the best fit for the patient. Integrated express carriers often fulfill the supply chain needs for both the inbound shipment as well as the return of unused devices. Georgia, and Metro-Atlanta in particular, has significant pharmaceutical and life sciences industry presence. A subsequent section in this report will identify the locations of these industries in Georgia and their proximity to airports with air cargo services.

2.8 Summary

Air cargo shipments are supported by a wide variety of service providers and airport types as outlined in this chapter. The types of air cargo carriers typically found at airports around the U.S. as well as in Georgia are listed and include prominent national brands such as Amazon, FedEx Express, and UPS. Regional cargo airlines, including Suburban Air and Martinaire and specialty carriers such as Quest Diagnostics also use Georgia airports to effectively conduct business operations. These carriers use a wide variety of aircraft types including wide- and narrow-body aircraft and turboprop aircraft to support cargo operations.

Three Georgia airports, Southwest Georgia Regional (Albany), Hartsfield-Jackson Atlanta International (ATL), and Savannah/Hilton Head International, support jet aircraft cargo routes, with ATL serving as an international cargo gateway and the 13th busiest cargo airport in North America. Three other airports, Columbus, East Georgia Regional (Swainsboro), and Statesboro-Bulloch County, support turboprop aircraft cargo routes. Overall, 58 airports in Georgia support some form of on demand or ad hoc air cargo activity.

Globally, air cargo tonnages have increased consistently, while COVID-19 created a small downturn in growth, 2021 saw the air cargo industry rebound. ATL ranks 45th worldwide for cargo tonnage throughput. ATL ranks 13th in most years for the volume of air cargo it processes in the U. S., stemming in part from the high volume of belly cargo carried on commercial passenger aircraft.

The air cargo industry provides the fastest form of good transport and industries which produce high-value products and rely on air cargo services. Multiple major employment sectors in Georgia stand to benefit from increased access to air cargo operators, such as the automotive, aerospace, medical, pharmaceutical and e-commerce industries. Airports in Georgia provide a network of facilities that accommodate a variety of cargo providers with a wide variety of scheduled and on-demand air cargo routes.

The next section of this report provides an analysis of air cargo facilities at airports in Georgia with scheduled and regular ad hoc air cargo operations.

3 Inventory

GDOT's Statewide Air Cargo Study is supported by an extensive data gathering, or inventory. The inventory starts with outreach to all publicly owned, public-use airports in Georgia's airport system. All airports were contacted and given the opportunity to provide information via online survey on their current or anticipated air cargo activity and facilities. The initial effort also provided the study team with information that directed follow-up inventory efforts.

Data collection focused primarily on airports in Georgia served by an integrated express air cargo carrier (i.e., UPS or FedEx Express) or other scheduled air cargo carriers, including feeders. In addition, other airports in Georgia served by a scheduled commercial airline or with notable levels of on-demand or ad hoc air cargo activity were also considered in the more detailed data collection effort. The statewide air cargo study used a variety of inventory tools, including on-site visits and interviews; surveys of airport managers, operations personnel, and planners; and interviews with businesses, both on- and off-airports, in Georgia that support various facets of the air cargo industry. The study team visited the following airports as part of the study:

- Athens-Ben Epps Airport
- Augusta Regional Airport at Bush Field
- Brunswick-Golden Isles Airport
- Cobb County International Airport-McCollum Field (ATL Metro)
- Columbus Airport
- DeKalb-Peachtree Airport (ATL Metro)
- East Georgia Regional Airport (Swainsboro)
- Fulton County Airport-Brown Field (ATL Metro)
- Middle Georgia Regional Airport (Macon)
- Savannah/Hilton Head International Airport
- Southwest Georgia Regional Airport (Albany)
- Statesboro-Bulloch County Airport
- Valdosta Regional Airport
- West Georgia Regional Airport-O.V. Gray Field (Carrollton)

While the airports listed below were not visited as part of the statewide study, these airports were contacted and interviewed for the study:

- Covington Municipal Airport (ATL Metro)
- Gwinnett County Airport-Briscoe Field (Lawrenceville)
- LaGrange-Callaway Airport
- Lee Gilmer Memorial Airport (Gainesville)
- Metter Municipal Airport

- Thomson-McDuffie Regional Airport

Air cargo activity at Hartsfield Jackson Atlanta International Airport (ATL) was inventoried at a high level using existing data sources and information obtained directly from airport representatives. Data collected during the study's inventory task is summarized in this chapter. Inventory information is used to support subsequent portions of the analysis for the Statewide Air Cargo Study.

3.1 Georgia Air Cargo Airports and Current Air Cargo Activity

This section presents information on current air cargo activity and facilities at Georgia airports that support air cargo operators.

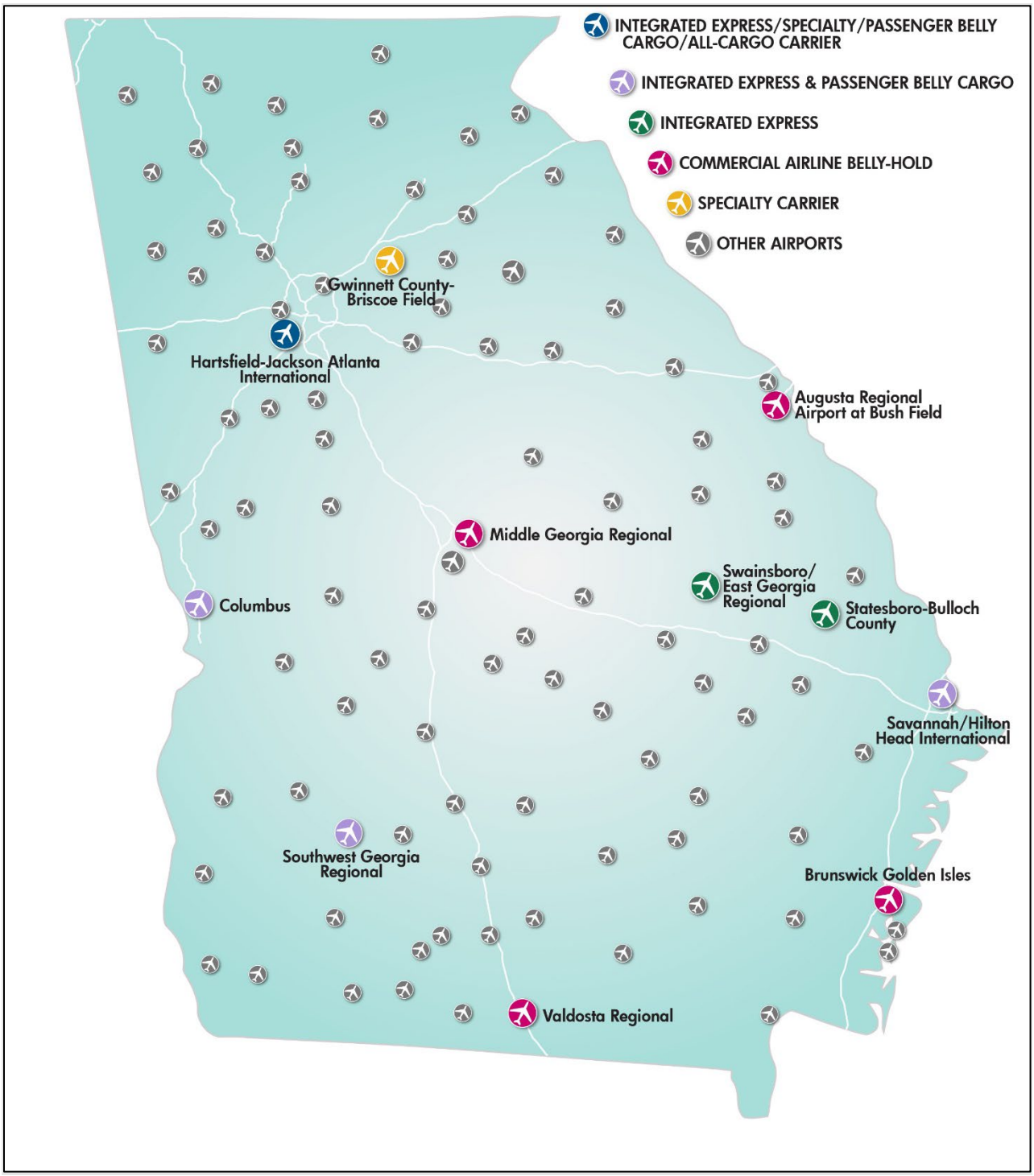
3.1.1 Georgia Airports Supporting Air Cargo Activity

The bulk of the inventory effort focuses on airports in Georgia that have some type of scheduled or regular dedicated air cargo activity. There are three airports with scheduled mainline/jet cargo service, three airports with feeder/turboprop air cargo service, and one airport with specialized scheduled service. These airports are:

- Southwest Georgia Regional Airport – Mainline Jet
- Hartsfield-Jackson Atlanta International Airport – Mainline Jet
- Savannah/Hilton Head International Airport – Mainline Jet
- Columbus Airport – Feeder Turboprop
- Statesboro-Bulloch County Airport – Feeder Turboprop
- East Georgia Regional Airport – Feeder Turboprop
- Gwinnett County Airport – Specialty

In addition, all scheduled commercial airlines have the ability to carry cargo in the belly-hold of their planes; therefore, each commercial airport has some air cargo carrying capacity. The availability of belly-hold capacity for air cargo varies based on the size of the plane and the capacity that remains after all needs for passenger-related checked baggage has been satisfied. As a result, this study does not investigate belly-hold air cargo, but rather focuses on dedicated and scheduled air cargo flights. **Figure 3-1** shows the scheduled air cargo airports, along with other airports that may provide supplemental belly-hold air cargo support.

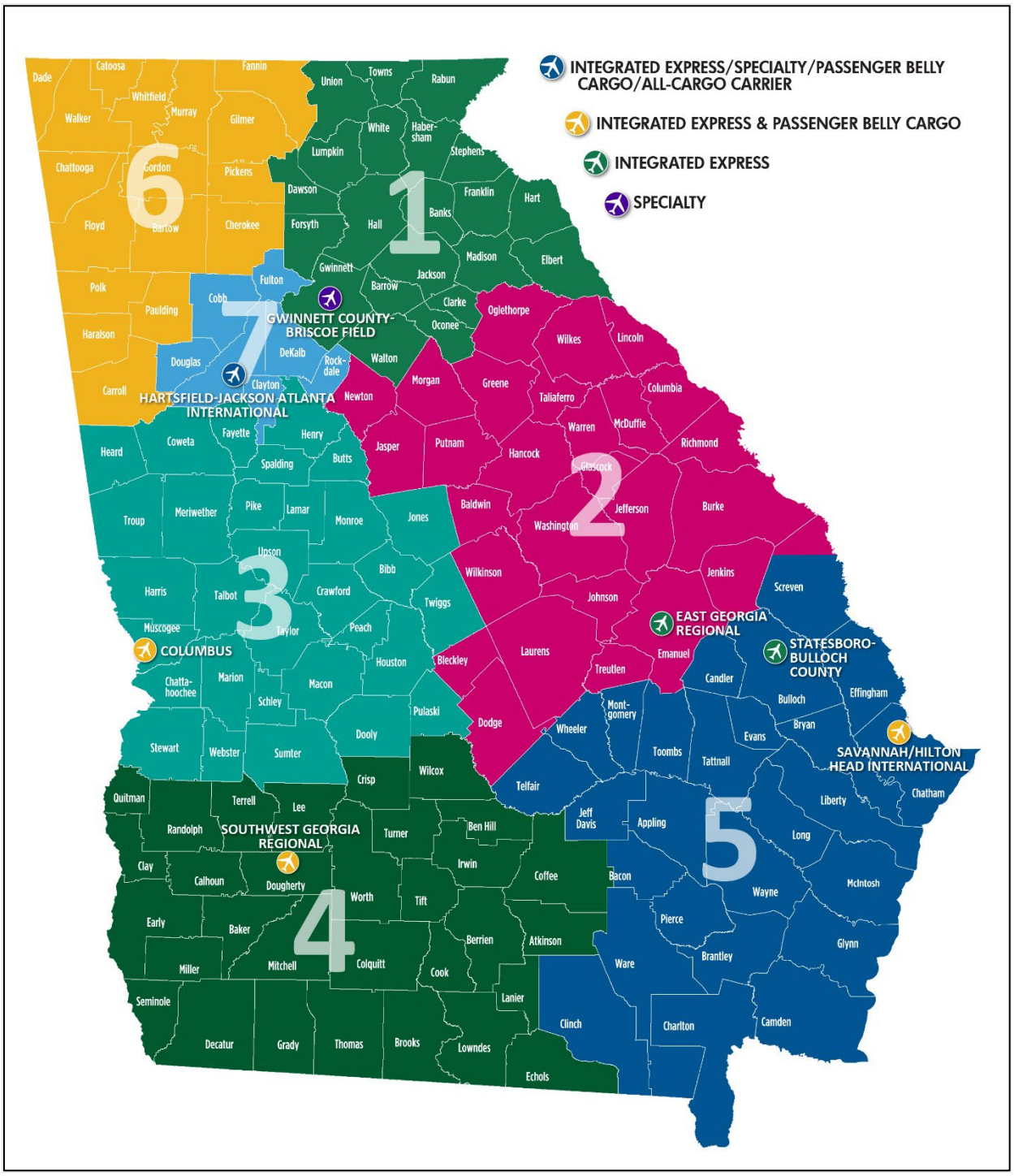
Figure 3-1: Georgia Airports with Scheduled and Belly-Hold Air Cargo Service



Source: FAA NOP 2019 – June 2020

Georgia is a geographically and economically diverse state. As such, the Georgia Department of Transportation has the state divided into seven different districts; each district has employees assigned to maintenance, construction, permitting, and other tasks which support the state's transportation infrastructure. Each of these districts, except for District 6 in the northwest corner of the state, contains an airport with scheduled air cargo operations. GDOT districts are shown in **Figure 3-2.** A subsequent chapter of this report investigates potential gaps in accessibility to scheduled air cargo service.

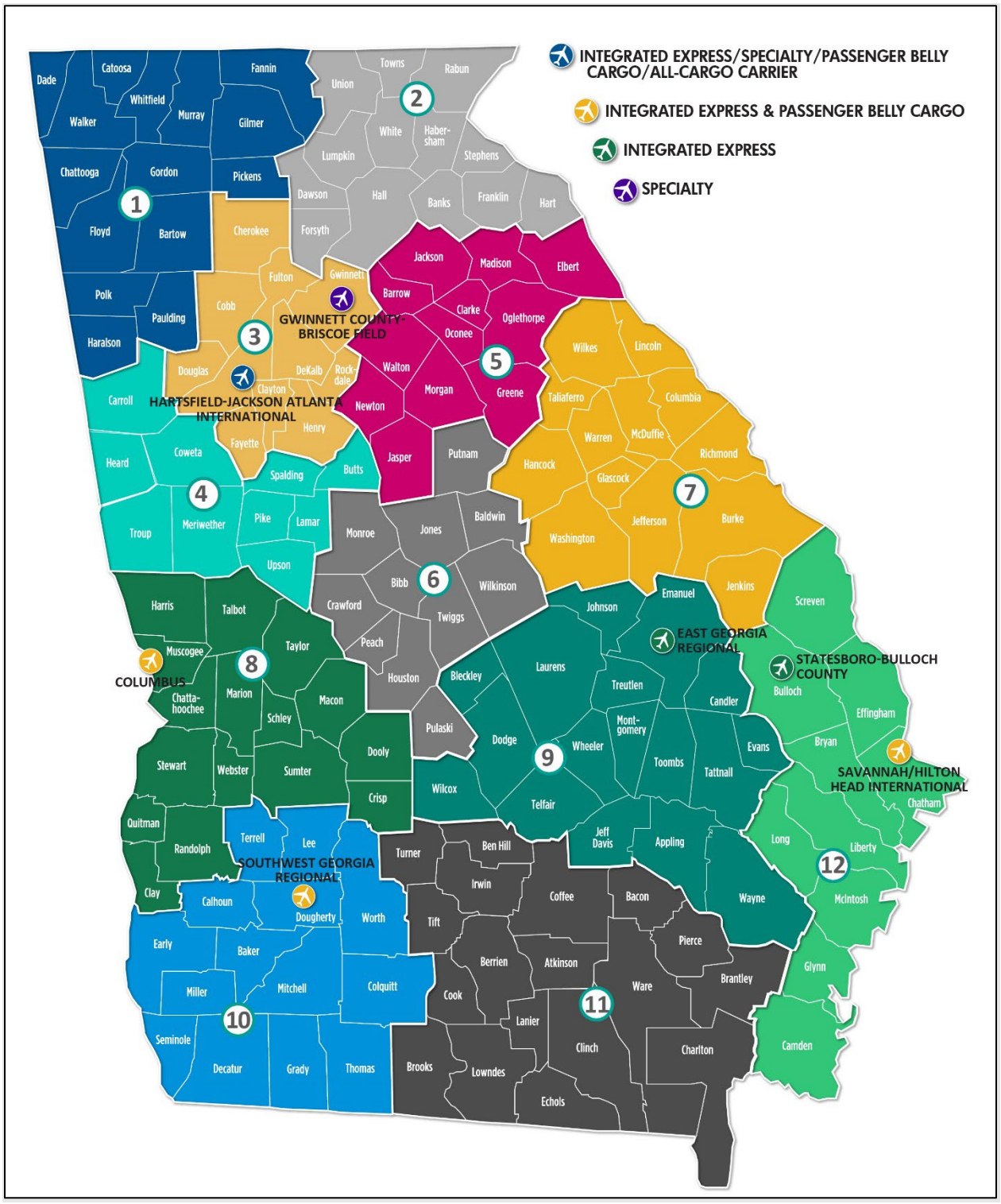
Figure 3-2: GDOT Districts



Source: Georgia Department of Transportation

Georgia is also divided into twelve Economic Development Regions, each with their distinct characteristics. Region 12, in the southeastern part of the state, and Region 3, in the north central part of the state, are each home to two airports with scheduled air cargo service. Regions 8, 9, and 10 are each home to one air cargo airport. The remaining regions do not have an airport with scheduled air cargo service. These regions are shown in **Figure 3-3**.

Figure 3-3: Georgia Economic Development Regions



Source: Georgia Department of Economic Development

Table 3-1 shows each of the airports with scheduled air cargo, their service type, their GDOT district, and their economic development region.

Table 3-1: Georgia Airports with Scheduled Air Cargo by Service Type, GDOT Region, and Economic Development Region

Associated City	Airport Name	FAA ID	Cargo Service Type	GDOT District	Economic Development Region
Albany	Southwest Georgia Regional Airport	ABY	Mainline/Jet Service	4	10
Atlanta	Hartsfield-Jackson Atlanta International Airport	ATL	Mainline/Jet Service	7	3
Columbus	Columbus Airport	CSG	Feeder/Turboprop Service	3	8
Lawrenceville	Gwinnett County Airport	LZU	Specialty Service	1	3
Savannah	Savannah/Hilton Head International Airport	SAV	Mainline/Jet Service	5	12
Statesboro	Statesboro-Bulloch County Airport	TBR	Feeder/Turboprop Service	5	12
Swainsboro	East Georgia Regional Airport	SBO	Feeder/Turboprop Service	2	9

Source: GDOT, FAA NOP 2019

Aside from the Georgia airports that have scheduled air cargo service, many other airports have ad hoc or on-demand air cargo service. A composite map of the airports with air cargo operations, both scheduled and ad hoc, is provided in **Chapter 2** of this report. In total, 58 airports in Georgia accommodated some level of air cargo activity. This finding is per data from the Federal Aviation Administration's (FAA's) National Offload Program (NOP). The NOP database maps and codes flights so that those associated with air cargo activity can be identified. NOP data used to support this study included all flights for 2019 and flights that took place through June of 2020**.** Please refer to **Chapter 2** of this report for information on all airports in Georgia that accommodate scheduled and ad hoc air cargo activity.

Figure 3-4 shows the breadth and extent of ad hoc air cargo operations associated with Georgia airports; this activity is derived from the NOP data. **Figure 3-4** provides a national perspective, and, to a more limited extent, international perspective of Georgia's ad hoc air cargo activity. As this figure reflects, Georgia's ad hoc air cargo activity extends to almost every state and to some nearby international locations. Of interest, **Figure 3-4** shows international ad hoc activity to and from airports supporting Savannah, Brunswick, Fulton Executive, Lee Gilmer Memorial, LaGrange-Callaway, Gwinnett County, Middle Georgia Regional, and DeKalb-Peachtree.

Ad hoc air cargo is transported on many types of airplanes: from jets that have the capability to fly non-stop to destinations on the West Coast to smaller twin and single-engine airplanes that support in-state and regional flights. **Figure 3-4** also shows relative flight frequency for airports within the state that support ad hoc air cargo. As reflected, there is notable ad hoc air cargo activity between various

airports in Georgia. This finding is reflective of Georgia businesses and industries transporting time-sensitive materials and supplies to different locations within the state.

The flight maps in **Chapter 2** showed routes served by only scheduled air cargo flights. As **Figure 3-4** shows, Georgia's scheduled air cargo operations are supplemented by a vast network of ad hoc air cargo-related flights.

Figure 3-4: Known Ad Hoc Air Cargo Operations Supported by Georgia Airports



Source: FAA NOP 2019 - June 2020, Jviation Map Analysis

Table 3-2 lists each of the airports in Georgia with their scheduled air cargo service by service type, carrier, segment, frequency, and most common aircraft type(s). As shown, Hartsfield-Jackson Atlanta International Airport (ATL) has by far the highest volume of scheduled air cargo activity. **Table 3-2** shows scheduled air cargo routes for Georgia airports (reported using the FAA's three-character airport identifiers). Intuitively, the jet aircraft reported in both **Table 3-2** and **Table 3-3** have greater carrying capacity for much higher volumes of cargo than the turboprop aircraft shown in these tables. **Table 3-4** lists the names of each airport whose identifier was presented in both **Table 3-2** and **Table 3-3**.

Among the other study airports with mainline/jet service airports, Savannah/Hilton Head International has the next highest number of scheduled air cargo carriers, with four air cargo carriers operating at the airport. Each of those carriers has daily flights using different aircraft types. Air cargo aircraft operating at Savannah range in size from smaller aircraft used by Suburban Air Freight and Labcorp, to large jet

aircraft used by FedEx. Southwest Georgia Regional (serving Albany) has two scheduled cargo carriers, UPS and Martinaire. UPS flies three different routes daily, whereas Martinaire flies one, connecting Albany with Panama City, Florida. At Southwest Georgia Regional, the aircraft differ in size and capacity with UPS operating large jets and Martinaire relying on a smaller, turboprop aircraft.

Each of the three feeder/turboprop service airports (serving Columbus, Statesboro, and Swainsboro) have one carrier with daily flights. All the carriers serving these locations utilize turboprop aircraft.

The Gwinnett County-Briscoe Field (LZU) is served solely by Quest Diagnostics. Service at this airport falls into the "specialty" category. While Quest operates seven daily scheduled routes from the airport, their service is "not for hire" by others. Quest files medical testing supplies, test samples, and other related items on a scheduled basis each day to other locations within and beyond Georgia. Quest Diagnostics uses both turboprop and jet aircraft for these flights. The existing air cargo service associated with Quest includes many routes with multiple stops at cities both within and beyond Georgia.

Table 3-2: Georgia Airports with Scheduled Air Cargo Service by Carrier, Segment, Frequency, and Aircraft Type

Airport Name	Carriers	Segments / Frequency	Aircraft Type
Mainline/Jet Service			
Hartsfield Jackson Atlanta International Airport	Airbridge Cargo	ATL-AMS-SVO - Weekly	Boeing 737-800
	Amazon Air	ATL-BWI - Daily	Boeing 737-800
		ATL-RFD - Daily	Boeing 737-800
	Asiana Cargo	ATL-DFW-ICN - Weekly	Boeing 747-400F
	Atlas Air	ATL-CVG - Daily	Boeing 767-300
		ATL-MIA - Daily	Boeing 767-300
	Air Belgium	ATL-LGG - Weekly	Airbus A330-200F
	Air Atlanta Icelandic	ATL-LGG - Weekly	Boeing 747-400F
	Aerologic	ATL-FRA - Weekly	Boeing 777F
	Baron Aviation	ATL-CSG-MEM - Daily	Cessna Caravan 208*
	China Airlines Cargo	ATL-SEA-TPE - Daily	Boeing 747-400F
		ATL-ANC-TPE - Daily	Boeing 747-400F
	Challenge Airlines	ATL-LGG - Weekly	Boeing 747-400F
	CargoLogicAir	ATL-LHR - Daily	Boeing 747-400F
	Cargolux	ATL-LUX – 2x Weekly	Boeing 747-400F/747-8F
	Cathay Pacific Cargo	ATL-ANC-HKG – Daily	Boeing 747-8F
	EVA Air Cargo	ATL-ANC-TPE - Weekly	Boeing 777F
	Fedex	ATL-GSO - Daily	Airbus A300F4-600
		ATL-AFW - Daily	Airbus A300F4-600
		ATL-AFW - Daily	Boeing 757-200
		ATL-MEM – 3x Daily	Boeing 767-300
		ATL-IND - 2x Daily	Boeing 767-300
		ATL-IND – 2x Daily	Boeing 757-200
		ATL-EWR - Daily	Boeing 757-200
		ATL-OAK - Daily	Airbus A300F4-600
		ATL-FLL - Weekly	Boeing 767-300
		ATL-MIA - Weekly	Boeing 767-300
	Korean Air Cargo	ATL-DFW-ICN -2x Weekly	Boeing 747-8F
		ATL-SEA-ICN – 2x Weekly	Boeing 747-8F
	Lufthansa Cargo	ATL-FRA – 2x Weekly	Boeing 777F
	Qatar Cargo	ATL-DOH - Daily	Boeing 777F
	Suburban Air Freight	ATL-PNS - Daily	Beechcraft 1900*
	Turkish Cargo	ATL-ORD-ISL-SNN - Weekly	Boeing 747-400F
		ATL-ISL - Weekly	Boeing 777F
	UPS	ATL-DFW - Daily	Airbus A300F4-600
		ATL-SDF - Daily	McDonnell Douglas MD-11
		ATL-SDF - Daily	Boeing 767-300
		ATL-PHL - Daily	Boeing 767-300
Savannah/Hilton Head International Airport	FedEx	SAV-MEM - Daily	Boeing 757-200
	Air Cargo Carriers	SAV-CAE - Daily	Short SD3-60*
	Suburban Air Freight	SAV-ATL- Daily	Cessna Caravan 208*
	Labcorp	SAV-CAE-JQF-BUY - Daily	Pilatus PC12*
Southwest Georgia Regional Airport	UPS	ABY-MCO - Daily	Boeing 757-200
		ABY-SDF - Daily	Boeing 757-200
		ABY-PNS - Daily	Airbus A300F4-600
	Martinaire	ABY-ECP - Daily	Cessna Caravan C208*

Airport Name	Carriers	Segments / Frequency	Aircraft Type
Feeder/Turboprop Service			
Columbus Airport	Baron Aviation	CSG-MEM-ATL - Daily	Cessna Caravan 208*
East Georgia Regional Airport	Air Cargo Carriers	SBO-CAE - Daily	Short SD3-60*
Statesboro-Bulloch County Airport	Martinaire	TBR-CAE - Daily	Cessna Caravan 208*
Specialty Service			
Gwinnett County Airport – Briscoe Field	Quest Diagnostics	LZU-ROA-HEF-AGC-GSO - Daily LZU-GSO-HEF-RDG-RDU-JQF-CAE - Daily LZU-PNS-TLH-VDF-FXE - Daily LZU-TUP-MEM-MKL-JWN - Daily LZU-TRI-GSO-TYS - Daily LZU-DHN-ECP-PNS-BFM - Daily LZU-CRG-GNV-VDF-MCO-VLD - Daily	Pilatus PC-12* Socata TBM 700* Embraer Phenom 100

Source: FlightAware.com, FAA NOP 2019 – June 2020. *Indicates turboprop aircraft.

There are also nearby airports (within a 60-minute drive-time) in neighboring states that have scheduled air cargo service. Airports in neighboring states that may support air cargo transportation for Georgia's residents, businesses, and industries, are shown in **Table 3-3**. The carriers that serve nearby out-of-state air cargo airports, route segments, and aircraft type serving each route are listed in **Table 3-3.**

Table 3-3: Nearby Airports with Scheduled Air Cargo Service by Carrier, Segment, Frequency, and Aircraft Type

Airport Name	Carriers	Routes / Frequency	Aircraft Type
Tallahassee International Airport	FedEx Baron Aviation Mountain Air Cargo Quest Diagnostics	TLH-MEM - Daily TLH-MCO – 3x Daily TLH-MEM – Daily TLH-VDF-FXE-LZU-PNS	Boeing 757-200 Cessna Caravan C208* Aerospatiale ATR-42-300* Pilatus PC-12*, Socata TBM 700*, Embraer Phenom 100
Jacksonville International Airport	FedEx UPS	JAX-MEM – 2x Daily JAX-ATL-IND - Daily JAX-FLL-GSO - Daily JAX-SDF - Daily JAX -SDF - Daily JAX-SJU - Daily JAX-RSW-PHL - Daily JAX-PHL – Daily	Boeing 767-300 Boeing 757-200 Boeing 757-200 Airbus A300F4-600 Boeing 767-300 Boeing 757-200 Boeing 757-200 Boeing 757-200
Columbia Metro Airport	FedEx UPS Mountain Air Cargo Air Cargo Carriers Martinaire Castle Aviation Quest Diagnostics Labcorp	CAE-ATL-IND - Daily CAE-MEM - Daily CAE-DFW - Daily CAE-PHL - Daily CAE-SDF - Daily CAE-ONT - Daily CAE-DFW - Daily CAE-MYR - Daily CAE-GSO - Daily CAE-SAV - Daily CAE-SBO - Daily CAE-MYR - Daily CAE-TBR - Daily CAE-MYR – 2x Daily CAE-LZU-GSO-HEF-RDG-RDU-JQF – 2x Daily CAE-JQF-BUY-SAV – 2x Daily	Boeing 757-200 Airbus A300F4-600 Airbus A300F4-600 Airbus A300F4-600 Boeing 767-300 Boeing 767-300 McDonnel Douglas MD-11 Aerospatiale ATR-42-300* Aerospatiale ATR-42-300* Short SD3-60* Short SD3-60* Short SD3-60* Cessna Caravan 208* Cessna Caravan 208* Pilatus PC12* Pilatus PC12*
Greenville Spartanburg International Airport	Air Atlanta Icelandic Atlas Air FedEx	GSP-FRA - Weekly GSP-HHN - Weekly GSP-FRA - Daily GSP-MEM - Daily GSP-IND - Daily GDP-CAE - Daily	Boeing 747-400 Boeing 747-400 Boeing 747-400 Airbus A300F4-600 Boeing 757-200 Boeing 757-200
Charlotte/ Douglas International Airport	Air Transport International (Amazon) FedEx Atlas Air (Amazon) UPS	CLT-CVG - Daily CLT-MEM - Daily CLT-IND - Daily CLT-GSO - Daily CLT-CVG - Daily CLT-SDF - Daily	Boeing 767-200 Boeing 767-300 Airbus A300F4-600 Boeing 757-200 Boeing 767-300 McDonnell Douglas MD-11

Airport Name	Carriers	Routes / Frequency	Aircraft Type
Chattanooga Metro Airport - Lovell Field	FedEx	CHA-MEM - Daily	Boeing 757-200

Source: FAA NOP 2019 – June 2020. *indicates turboprop aircraft.

Table 3-4 lists the name/location of the airports whose identifiers were used in the previous two tables. Information reported in this table applies to airports in Georgia, as well as to airports in nearby states that may provide supplemental service to meet air cargo demand associated with Georgia business and residents.

Table 3-4: Airport Identifiers and Airport Names

FAA ID	Associated City	Airport Name
AFW	Fort Worth	Fort Worth Alliance
AGC	Pittsburgh	Allegheny County
ANC	Anchorage	Ted Stevens Anchorage International
ATL	Atlanta	Hartsfield - Jackson Atlanta International
BFM	Mobile	Mobile Downtown
BUY	Burlington	Burlington/Alamance Regional
BWI	Baltimore	Baltimore/Washington International Thurgood Marshall
CAE	Columbia	Columbia Metropolitan
CRG	Jacksonville	Jacksonville Executive At Craig
CSG	Columbus	Columbus
CVG	Covington	Cincinnati/Northern Kentucky International
DFW	Dallas-Fort Worth	Dallas-Fort Worth International
DHN	Dothan	Dothan Regional
DOH	Doha	Doha, Qatar
ECP	Panama City	Northwest Florida Beaches International
EWR	Newark	Newark Liberty International
FLL	Fort Lauderdale	Fort Lauderdale/Hollywood International
FRA	Frankfurt-Main	Frankfurt-Main, Germany
FXE	Fort Lauderdale	Fort Lauderdale Executive
GNV	Gainesville	Gainesville Regional
GSO	Piedmont Triad International Airport	Piedmont Triad International Airport
HEF	Washington	Manassas Regional/Harry P Davis Field
HHN	Frankfurt Hahn	Frankfurt Hahn, Germany
HKG	Hong Kong Chek Lap Kok	Hong Kong Chek Lap Kok, Hong Kong
ICN	Seoul Incheon	Seoul Incheon, South Korea
IND	Indianapolis	Indianapolis International
ISL	Istanbul Ataturk	Istanbul Ataturk, Turkey
JQF	Concord	Concord-Padgett Regional
JWN	Nashville	John C Tune
LGA	New York	LaGuardia Airport
LGG	Liege	Liege, Belgium
LHR	London-Heathrow	London-Heathrow, UK
LUX	Laurens	Laurens County
LZU	Lawrenceville	Gwinnett County/Briscoe Field
MCO	Orlando	Orlando International
MEM	Memphis	Memphis International
MIA	Miami	Miami International
MKL	Jackson	Mc Kellar-Sipes Regional
MYR	Myrtle Beach	Myrtle Beach International
OAK	Oakland	Metro Oakland International
ONT	Ontario	Ontario International
ORD	Chicago	Chicago O'Hare International
PHL	Philadelphia	Philadelphia International
PNS	Pensacola	Pensacola International
RDG	Reading	Reading Regional/Carl A Spaatz Field
RDU	Raleigh/Durham	Raleigh-Durham International
RFD	Chicago/Rockford	Chicago/Rockford International
ROA	Roanoke	Roanoke-Blacksburg Regional/Woodrum Field
RSW	Fort Myers	Southwest Florida International
SAV	Savannah	Savannah/Hilton Head International
SBO	Swainsboro	East Georgia Regional
SDF	Louisville	Louisville Muhammad Ali International
SEA	Seattle	Seattle-Tacoma International
SJU	San Juan	Luis Munoz Marin International
SNN	Shannon (Limerick)	Shannon (Limerick), Ireland
TBR	Statesboro	Statesboro-Bulloch County
TLH	Tallahassee	Tallahassee International
TPE	Taiwan Taoyuan	Taiwan Taoyuan, Taiwan
TRI	Bristol/Johnson/ Kingsport	Tri-Cities
TUP	Tupelo	Tupelo Regional
TYS	Knoxville	Mc Ghee Tyson
VDF	Tampa	Tampa Executive
VLD	Valdosta	Valdosta Regional

Source: FAA 5010, AirlineCodes.co.uk

3.2 Airfield Facilities at Georgia's Scheduled Air Cargo Airports

There are a variety of different aircraft that carry cargo, from small turboprops to large jets. As a result, airports with scheduled cargo service have different airfield facilities to accommodate different these various aircraft types. This section provides an overview of airfield facilities all Georgia airports with scheduled air cargo operations; similar information for Hartsfield-Jackson Atlanta International is provided in a subsequent section. In general, larger aircraft require more robust facilities. All the airports in Georgia that have scheduled air cargo service have a primary runway that is at least 6,000 feet long and 100 feet wide.

All existing scheduled air cargo airports also have Airport Reference Codes (ARCs) of at least B-II or greater; some scheduled air cargo airports have an ARC included in categories D-II and D-IV, indicating they are capable of accommodating even larger aircraft. Aircraft in approach Categories C and D have approach speeds ranging from 121-141 knots to 141-166 knots, respectively. Wingspans for aircraft in Group II range from 49-79 feet, while aircraft in Group IV range from 118-171 feet.

Runway dimensions and ARCs indicate that each of the existing air cargo airports can accommodate the cargo aircraft that currently use their facilities. All existing air cargo airports have an Instrument Landing System (ILS) (precision approach) which is considered the highest standard for an airport approach. All airports have an Automated Weather Observing System (AWOS), which provide incoming aircraft with detailed, real-time weather information. Each airport has Visual Glide Slope Indicators (VGSI), which assist pilots in determining if the aircraft is too high or too low during its final approach. This information is shown in **Table 3-5**; information presented in this table helps to highlight the minimum level of facility development that scheduled air cargo carriers operating in Georgia typically need to support their operations. This information is used in subsequent portions of the statewide study to review airports that could serve scheduled air cargo operators in the future.

Table 3-5: Airfield Facilities at Georgia Airports with Scheduled Air Cargo Service

Associated City	Airport Name	FAA ID	Primary Runway Dimensions	ARC	Critical Aircraft	Largest Known Cargo Aircraft	Approach Type	Weather Reporting	VGSI
Mainline/Jet Service									
Albany	Southwest Georgia Regional Airport	ABY	6,601' x 148'	C-IV	A300-600F	A300-600F	ILS	Yes	Yes
Savannah	Savannah/Hilton Head International Airport	SAV	9,351' x 150'	D-IV	Boeing 757	Boeing 757	ILS	Yes	Yes
Feeder/Turboprop Service									
Columbus	Columbus Airport	CSG	6,997' x 150'	C-III	CRJ-200	Boeing 737	ILS	Yes	Yes
Statesboro	Statesboro-Bulloch County Airport	TBR	6,000' x 100'	B-II	Falcon 2000	Gulfstream V - 650	ILS	Yes	Yes
Swainsboro	East Georgia Regional Airport	SBO	6,021' x 100'	B-II	Short 360	Short 360	ILS	Yes	Yes
Specialty Service									
Lawrenceville	Gwinnett County Airport – Briscoe Field	LZU	6,000' x 100'	C-II	Gulfstream III	Gulfstream III	ILS	Yes	Yes

Source: FAA 5010, Air Cargo Inventory Survey, FAA Surface Weather Observation Station Database
Note: similar information for ATL is provided in a subsequent section.

3.3 Other Supporting Air Cargo Facilities

Georgia's airports with scheduled air cargo service have a wide variety of additional airside and landside facilities to support cargo operations. These facilities range from dedicated buildings and apron space to docks and stalls for trucks transporting cargo. An airport's accessibility is also a key factor to scheduled air cargo service. It is often advantageous for air cargo airports to be in proximity to major highways/interstates so that cargo can move from the airport quickly to its intended destination.

There are a variety of dedicated air cargo facilities that support mainline/jet service cargo at airports serving Savannah and Albany. UPS is the sole tenant in Southwest Georgia Regional Airport's dedicated cargo building. The roughly 5,000 square-foot building is supported by approximately 50,000 square feet of dedicated air cargo apron space. The UPS facility is equipped with seven landside and seven airside doors for trucks to load and unload cargo and is supported by 49 compact vehicle and seven truck parking spaces. There is one security gate for the facility, located on Newton Road. The nearest interstate is roughly 41 miles away; however, there are other non-interstate highways in closer proximity to this airport. Albany, where state highway congestion is typically not an issue, provides an interesting example for an air cargo airport that is not in proximity to an interstate highway. Albany's

location enables air cargo to be efficiently trucked to and from the airport, despite the lack of nearby interstate access.

Savannah/Hilton Head International Airport currently has two buildings dedicated to air cargo. FedEx Express is the sole tenant of one building, the FedEx Express Sort Facility. The second building is the Airport Business Center, and this facility has several tenants, including FedEx Express, DHL, and UPS/Logistics. The FedEx Express Sort Facility is approximately 58,000 square feet, and the Airport Business Center is approximately 39,000 square feet. The buildings have approximately 360,000 square feet and 192,000 square feet, respectively, of dedicated air cargo apron space. The FedEx Express Sort Facility has no airside truck docks or doors, but it has one dock and seven doors landside. The Airport Business Center has fourteen airside truck docks/doors, as well as eleven docks and six doors landside. Both buildings have significant parking space for cars, with 140 spaces at the FedEx Express Sort Facility and 164 spaces at the Airport Business Center. Both buildings are located on Nicholson Drive/Bob Harmon Road. The nearest interstate (I-95) is only four miles from the airport. The airport is in the midst of a development program to expand/improve its air cargo facilities; these improvements will be discussed later in this report in **Chapter 7**.

Of the three airports with feeder/turboprop air cargo service, only one, the Columbus Airport, has a dedicated cargo building. This building is occupied by FedEx Express/Barron. This building is a small, 100 square foot office connected to a hangar that is used for cargo weigh-ins. Columbus has approximately 6,000 square feet of apron space dedicated to cargo. The airport's cargo facilities are located along West Britt David Road/Earnie Shelton Drive, just one mile from Interstate 185.

Neither Statesboro-Bulloch County Airport nor East Georgia Regional Airport in Swainsboro have a dedicated cargo building. However, each airport does have approximately 60,000 square feet and 243,000 square feet of apron space, respectively, reserved for cargo operations. Statesboro-Bulloch County Airport has fourteen parking spaces for cars and two security gates; East Georgia Regional airport has twenty-six parking spaces for cars and four security gates. The cargo facilities at Statesboro are located on Georgia Highway 57 West, approximately sixteen miles from the nearest interstate. The air cargo facilities at East Georgia Regional are located on Knight Road, approximately 17 miles from the nearest interstate.

Gwinnett County Airport, which has specialty air cargo service provided by Quest Diagnostics, has a dedicated cargo building in the form of the Quest maintenance facility. The building is roughly 1,900 square feet, with a supporting apron area of approximately 9,000 square feet. The building has one landside truck door, ten parking spaces for cars, and one security gate. It is located on Briscoe Boulevard Northeast, seven miles from the nearest interstate but directly located on a major highway.

Table 3-6 summarizes this information, along with other various data points related to air cargo facilities at study airports.

Table 3-6: Other Supporting Facilities at Georgia Airports with Scheduled Air Cargo Service

Mainline/Jet Service Cargo Airports			
	Southwest Georgia Regional Airport	**Savannah/Hilton Head International Airport: FedEx Sort Facility**	**Savannah/Hilton Head International Airport: Airport Business Center**
Name of tenant occupying building	UPS	FedEx	FedEx, DHL, UPS / Logistics
Dedicated cargo aprons and area	50,000 square feet	360,227 square feet	191,643 square feet
Cargo buildings and area	5,091 square feet	58,703 square feet	38,954 square feet
Airside truck docks/doors	7	0	14
Landside truck docks/doors	0 docks; 7 doors	1 dock; 7 doors	11 docks; 6 doors
Specialized features (refrigeration/climate control)	No	No	No
Truck parking stalls	7	8	0
Automobile parking spaces and area	49	140	164
Security access gates	1	3	1
Immediate access road name	Newton Rd	Nicholson Dr/ Bob Harmon Rd/	Nicholson Dr/ Bob Harmon Rd/
Distance to interstate	41 miles	4 miles	4 miles
Customs	-	Yes	Yes
Feeder/Turboprop Cargo Airports			
	Columbus Airport	**Statesboro-Bulloch County Airport**	**East Georgia Regional Airport**
Name of tenant occupying building	FedEx / Barron	No Dedicated Building	No Dedicated Building
Dedicated cargo aprons and area	6,412 square feet	59,819 square feet	242,880 square feet
Cargo buildings and area	100 square feet		-
Airside truck docks/doors	0	0	0
Landside truck docks/doors	0	0	0
Specialized features (refrigeration/climate control)	No	No	No
Truck parking stalls	0	0	0
Automobile parking spaces and area	0	14	26
Security access gates	0	2	4
Access road name	West Britt David Rd/Earnie Shelton Drive	Georgia HWY-57 West	Knight Road
Distance to interstate	1 mile	16 miles	17 miles
Customs	-	-	-
Specialty Service Cargo Airports			
	Gwinnett County Airport		
Name of tenant occupying building	Quest Diagnostics		

Dedicated cargo aprons and area	9,225 square feet		
Cargo buildings and area	1,900 square feet		
Airside truck docks/doors	0		
Landside truck docks/doors	0 docks; 1 door		
Specialized features (refrigeration/climate control)	-		
Truck parking stalls	0		
Automobile parking spaces and area	10		
Security access gates	1		
Access road name	Briscoe Blvd NE		
Distance to interstate	7 miles		
Customs	-		

Source: Air Cargo Inventory Survey, Desktop Analysis – Google Earth (Aulick Engineering)

3.4 Air Cargo Service at Georgia Airports with Ad Hoc Cargo Activity

In addition to the Georgia airports with scheduled service, many Georgia airports receive ad hoc cargo service. Among those, fourteen airports were visited and surveyed to learn more about their air cargo activity. While these airports do not support scheduled air cargo service, they receive and send air cargo on an on-demand basis or ad hoc basis. Information related to ad hoc air cargo activity at the airports is summarized in **Table 3-7**. In addition, **Table 3-8** provides a general overview of facility characteristics at these ad hoc airports.

Table 3-7: Description of Ad Hoc Cargo Airport Activity

Associated City	Airport Name	FAA ID	Description of Activity & Future Plans
LaGrange	LaGrange-Callaway Airport	LGC	LGC supports numerous air cargo operators, including Royal Air, Ameristar, Berry Aviation, Ameriflight, Pak West, Priority Air, and Sierra West. The main driver of air cargo activity at the airport is area automobile manufacturing. Currently, LGC does not have plans for on-airport cargo expansion or the development of facilities dedicated specifically to air cargo.
Valdosta	Valdosta Regional Airport	VLD	VLD has air cargo activity primarily associated with Delta Air Lines (belly-hold) and Quest Diagnostics. Quest frequently uses VLD as a stopping point between Orlando and their base in Gwinnett County. Occasionally, VLD receives automotive parts from Steeda, who manufactures Ford parts. Currently, VLD does not have plans for on-airport cargo expansions or the development of cargo-specific facilities.
Athens	Athens-Ben Epps Airport	AHN	AHN supports the air cargo operations of Freight Runners Express and Charter Air Transport, among others. The cargo at this airport is typically related to industrial manufacturing and the nearby Caterpillar factory. Occasionally, AHN receives flights from Quest Diagnostics, if they are diverted from LZU. AHN also occasionally receives veterinary medicine and pharmaceutical cargo traffic. Currently, AHN does not have plans for cargo expansion at the airport.

Associated City	Airport Name	FAA ID	Description of Activity & Future Plans
Brunswick	Brunswick Golden Isles Airport	BQK	BQK supports occasional ad hoc cargo flights. Specific carriers are not identified in the NOP database, but most of the activity is driven by MAP international, a nearby non-profit that ships medical supplies to the Caribbean in response to natural disasters. Currently, BQK does not have plans for cargo related expansion.
Carrolton	West Georgia Regional Airport OV Gray Field	CTJ	CTJ receives cargo from an on-demand carrier that supports Honda Lock. There are several unnamed ad hoc carriers that operate at this airport. Much of the cargo activity at CTJ is driven by Bremen, Southwire, and other automotive related businesses. CTJ has long term plans to attract air cargo to the airport by expanding various airside and landside facilities.
Macon	Middle Georgia Regional Airport	MCN	MCN supports ad hoc air cargo flights from a number of undisclosed carriers as well as Contour Airlines and Embraer. Most of this activity is driven by nearby manufacturing industries. There may also be cargo supporting the healthcare industry and pharmaceutical businesses, specifically the Atrium Health System, ecommerce, regional produce, and aircraft parts. At this time, MCN does not have specific plans for dedicated cargo facilities, but a runway extension and new taxiway are planned. These improvements and will open acreage for cargo development.
Atlanta	Cobb County International Airport-McCollum Field	RYY	RYY supports occasional cargo from University Air Center (Quest), Ameristar Air Cargo, Royal Air Freight, Sierra West, and Ameriflight. Much of this activity is related to automotive manufacturing and to diverted Quest Diagnostics flights when LZU is not available. Currently, RYY doesn't have plans for expanding the cargo facilities at the airport.
Metter	Metter Municipal Airport	MHP	MHP has very limited cargo operations from Royal Air Freight. Currently, it is unclear if there are plans for expansion of cargo facilities.
Augusta	Augusta Regional Airport	AGS	AGS supports ad hoc cargo from a variety of carriers, including A1 Aircraft Freight, Ameriflight, Ameristar, Berry Aviation, Delta Air Lines, Freight Runners, IFL, Midwest Air Link, and McNeely Charter. These flights are primarily delivering machine parts for nearby automobile and heavy manufacturing. AGS has plans to expand cargo facilities at the airport. AGS intends to position itself as a testbed for future cargo operations involving eVTOL (electric vertical take-off and landing) aircraft. Cargo carriers see eVTOL aircraft as an incoming technology that could dramatically increase the efficiency of their operations. A working group of stakeholders including UPS, FAA, Georgia Tech, and military officials have drafted layout plans for vertiport development, a drone zone, and numerous other commercial developments to support expanded cargo operations at the airport, especially given the incoming impact of eVTOL aircraft.
Atlanta	Fulton County Airport-Brown Field	FTY	FTY supports occasional cargo from Airnet II, Bank Air, LabCorp, Kalitta Charters and Mountain Aviation. This cargo is mostly medical related, as Airnet II delivers nuclear medicine to the region, and the remainder supports manufacturing. There is also cargo related to parts from Gulfstream and Textron. Currently, there are no plans to expand cargo facilities at the airport.
Atlanta	Dekalb-Peachtree Airport	PDK	PDK supports cargo flights flown by Fenix Air, GTA Air, Kalitta Air, and Royal Air Freight. This cargo includes medical supplies and lab testing. Currently, there are no plans to expand cargo facilities at PDK.

Associated City	Airport Name	FAA ID	Description of Activity & Future Plans
Thomson	Thomson-McDuffie Regional Airport	HQU	HQU supports ad hoc air cargo flights from carriers which include Royal Air Freight and Priority Air Charter. Currently, it is not known if there are plans for the expansion of air cargo facilities at this airport.

Table 3-8: Overview of Facilities of Georgia Airports with Ad Hoc Air Cargo Activity

Associated City	Airport Name	FAA ID	Primary Runway Dimensions	ARC	Critical Aircraft	Largest Known Cargo Aircraft	Approach Type	Weather Reporting	VGSI
Atlanta	Fulton County - Brown Field	FTY	5,797' x 100'	D-III	Gulfstream V	Lineage 1000	ILS	Yes	Yes
Atlanta	DeKalb-Peachtree Airport	PDK	6,001' x 100'	C-II	Gulfstream-650	Gulfstream-650	ILS	Yes	Yes
Atlanta	Cobb County International - McCollum Field	RYY	6,295' x 100'	C-II	Gulfstream-200	Boeing 737	ILS	Yes	Yes
Brunswick	Brunswick-Golden Isles	BQK	8,001' x 100'	D-IV	Boeing 717-200	Boeing 747	ILS	Yes	Yes
Valdosta	Valdosta Regional	VLD	8,002 x 150'	C-II	CRJ-200	N/A	ILS	Yes	Yes
Augusta	Augusta Regional at Bush Field	AGS	8,001' x 150'	D-III	Boeing 757-200	Boeing 757	ILS	Yes	Yes
Athens	Athens-Ben Epps	AHN	6,122 x 100'	C-II	Embraer-145	Boeing 737-400	ILS	Yes	Yes
Carrollton	West Georgia Regional - O.V. Gray Field	CTJ	5,503' x 100'	B-II	Beech King Air	Global 3	ILS	Yes	Yes
Macon	Middle Georgia Regional	MCN	6,500' x 150'	D-III	CRJ-200	Boeing 767-300	ILS	Yes	Yes
Metter	Metter Municipal Airport	MHP	5,001' x 75'	B-I	Beech Baron	N/A	LPV	Yes	Yes
Thomson	Thomson-McDuffie Regional Airport	HQU	5,514' x 100'	B-II	Cessna Citation 560 XLS	N/A	ILS	Yes	Yes
LaGrange	LaGrange-Callaway Airport	LGC	6,500' x 150'	B-II	Cessna Citation	Falcon 20	ILS	Yes	Yes

Source: FAA 5010, Air Cargo Inventory Survey, FAA Surface Weather Observation Station Database. N/A: Airport did not provide cargo aircraft details.

As this table shows, almost all of the Georgia airports that support high volumes of ad hoc air cargo activity have a runway that is at least 5,500 feet long supported by a precision ILS approach. Also, almost all these airports have an ARC of C-II or greater, indicating they are designed to serve larger, more demanding, aircraft. All airports have on-site weather reporting equipment, and the primary runway at all airports is supported by VGSI.

3.5 Hartsfield-Jackson Atlanta International Airport (ATL) Current Air Cargo Facilities

As the largest air cargo airport in Georgia, it is important to have a general understanding of facilities that are currently in place to serve air cargo activity at this international gateway airport. A high-level approach for identifying existing air cargo facilities at the airport was taken. ATL is currently (at the time of this study) undertaking plans to expands its cargo facilities. As part of this task, meetings with ATL staff provided insight into future air cargo expansion at the airport. On a general basis, planned air cargo facilities for ATL are included in **Chapter 7** of this report.

In 2019, ATL ranked as the 13th busiest cargo airport in North America by total tonnage and the 45th busiest globally. After Miami International (MIA), ATL is the second-busiest cargo airport in the southeastern United States. The airport is a major gateway for international cargo, served by all cargo carriers and by passenger airlines in the form of belly-hold cargo.[1] According to ATL's Economic Impact Study, air cargo at ATL supports more than 33,000 direct jobs in Georgia.[2]

Major cargo airlines operating at the airport include Amazon Air, Asiana Airlines, Cargolux Airlines, Cathay Pacific Airways, China Airlines, Delta Cargo, DHL Express, Emirates SkyCargo, EVA Airways, FedEx Express, Korean Air Cargo, Lufthansa German Airlines, United Airlines, Singapore Airlines, Southwest Airlines Cargo, and UPS. Cargo Charter Airlines operating at the airport include Atlanta Air Cargo, Kalitta Air, Mountain Air Cargo, and Polar Air. These carriers operate a variety of narrow-body and wide-body dedicated freighter aircraft, including some as large as the Antonov AN-124 and Boeing 747-8F, on regularly scheduled routes to approximately 14 domestic and eight international markets. International air cargo markets include Frankfurt, Germany; Liège, Belgium; London, England; Taipei, Taiwan; Hong Kong, China; Luxembourg; Seoul, South Korea; and Doha, Qatar.[3]

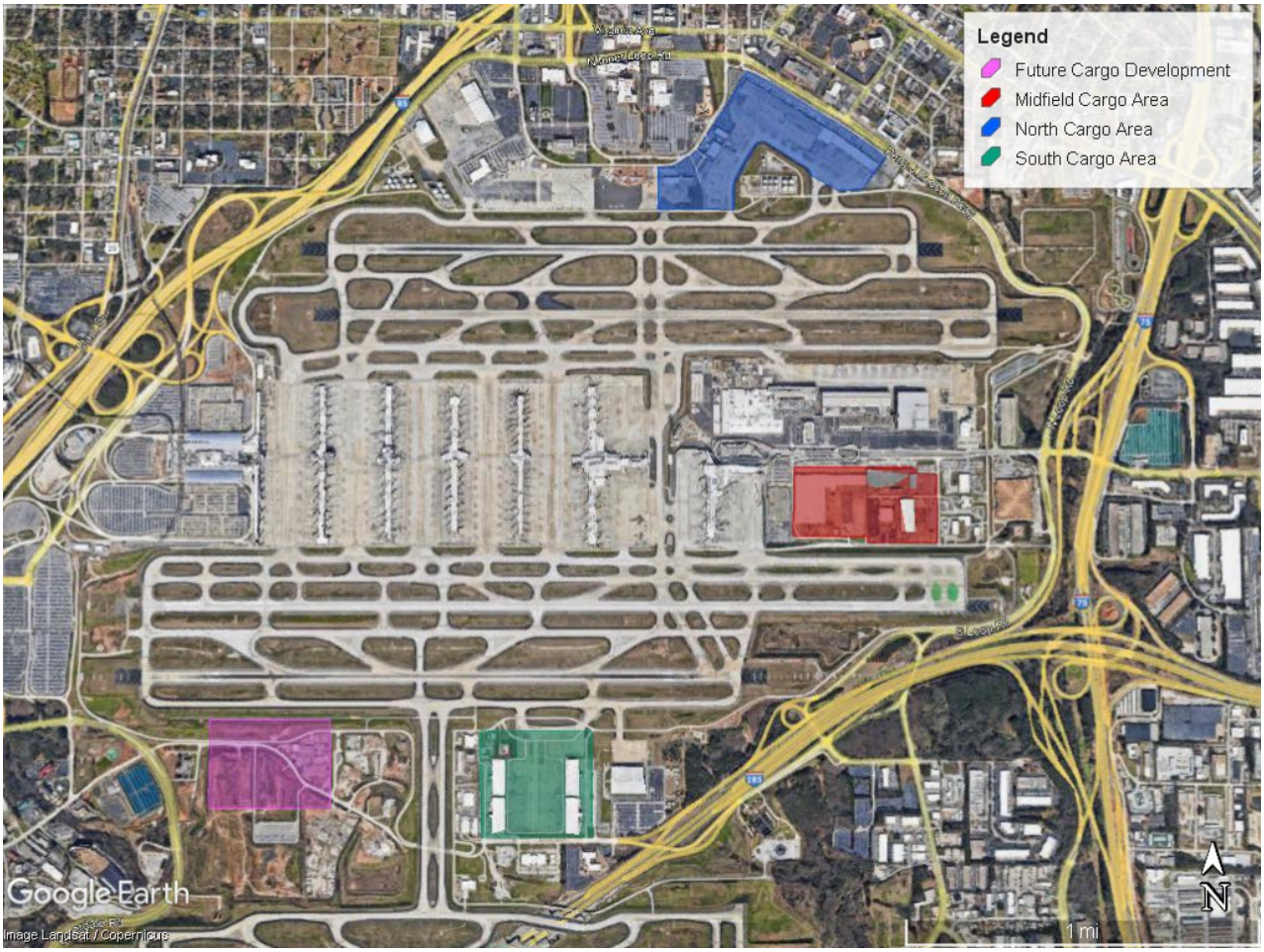
ATL has five runways all greater than 9,000-feet in length, with the longest measuring nearly 12,400 feet. There are currently three main air cargo areas at the airport—North, Midfield, and South—illustrated in **Figure 3-5**. All together, these cargo areas cover a total area of approximately 6.4 million square feet, or 147 acres. As shown in **Table 3-9**, this space can accommodate various cargo operations:

- 2 million square feet of cargo building space
- 1.8 million square feet of aircraft apron area
- 930,000 square feet of vehicle parking area
- 665,000 square feet of truck dock area
- 1 million square feet of other/open area.

Table 3-9 also identifies the dimensions for each individual cargo building and their primary occupants. More detailed views of each existing cargo area are presented in **Figure 3-6**, **Figure 3-7**, and **Figure 3-8**.

[1] Airports Council International – North America (ACI-NA)
[2] https://www.atl.com/wp-content/uploads/2020/02/ATL-2016-2017-Economic-Impact-Study-Executive_Summary.pdf
[3] Airport records, FAA Flight Records, Flightaware.com

Figure 3-5: Location ATL Existing Cargo Areas



Source: Google Earth Pro, Hartsfield-Jackson International Airport (ATL), Jviation, January 2022

Given ATL's position as a preeminent cargo airport, airport leadership is continually striving to optimize its cargo facilities and operations through investment in technology and physical facilities. In 2019, ATL became the first airport in North America to implement an integrated digital tracking technology that improves efficiency and security. Ongoing expansion efforts and future cargo facility development plans at ATL are discussed further in **Chapter 7** of this report. A future cargo development area has been identified to the west of the existing South Cargo Area and will be developed in the near future. The approximate area designated for the future cargo development is presented in **Figure 3-9**.

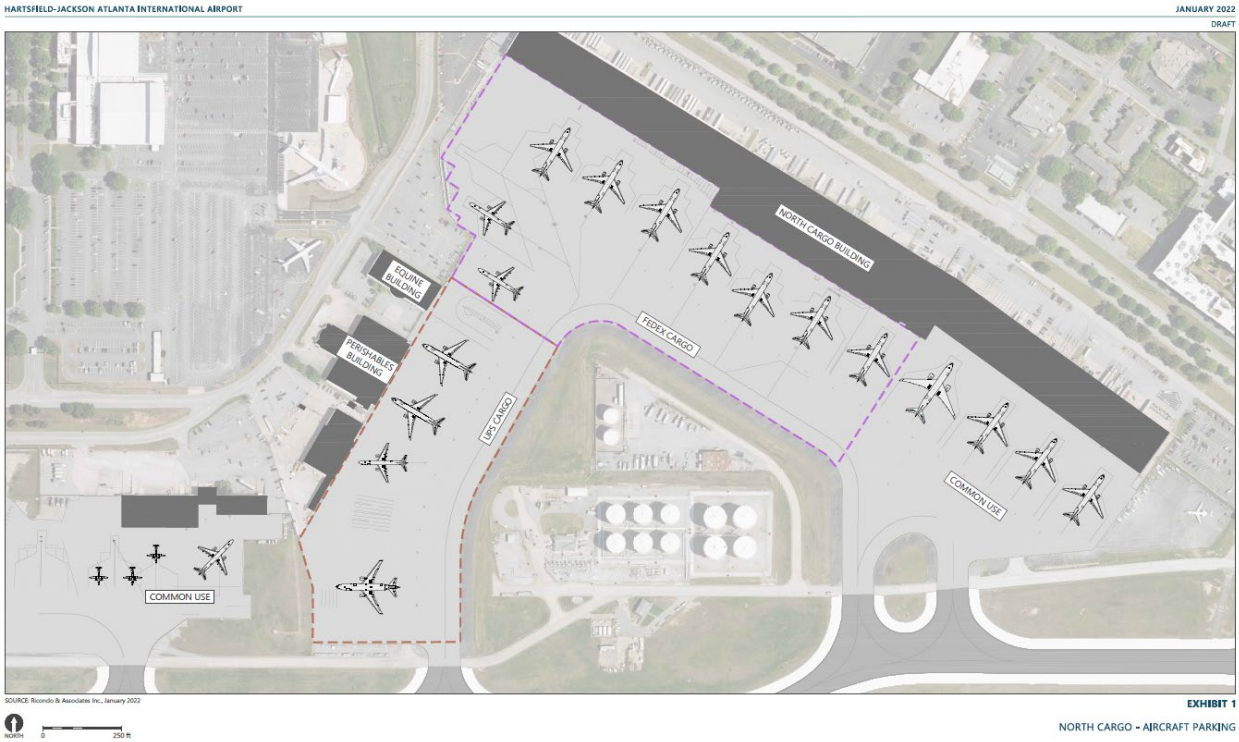
Table 3-9: ATL Existing Cargo Facilities Summary

ATL Cargo Area	Building Name / Description	Occupants / Leased To	Building Footprint	Aircraft Apron Area (Square Feet)	Vehicle Parking Area (Square Feet)	Truck Dock Area (Square Feet)	Other / Open Area (Square Feet)	Total Site Area (Square Feet)	Total Site Area (Acres)
Midfield	Delta International Cargo	Delta Air Lines	637,070	N/A	227,830	157,360	747,180	1,769,440	40.6
Midfield	US Postal Service	US Postal Service	335,620	N/A	254,270	53,120	225,600	868,610	19.9
South	South Cargo Building A	Lufthansa Cargo / Swissport	109,360	167,350	22,010	45,530	N/A	345,250	7.9
South	South Cargo Building B	Alliance Air	132,670	166,700	30,490	43,550	N/A	373,380	8.6
South	South Cargo Building C	DHL / Various	116,400	166,500	22,560	43,550	N/A	349,210	8
South	South Cargo Building D	Swissport International	128,560	160,740	36,100	47,230	N/A	372,630	8.6
North	Equine Complex	N/A	20,160	N/A	24,180	N/A	8,460	52,800	1.2
North	Perishables Facility	N/A	47,580	N/A	17,490	10,540	9,590	89,190	2
North	North Cargo Building (various)	Various	173,490	296,630	81,240	49,750	N/A	601,120	13.8
North	North Cargo Building (FedEx)	FedEx	239,630	561,460	173,690	204,040	6,980	1,185,750	27.2
North	United Parcel Service (UPS)	UPS Air Cargo	23,030	290,340	39,490	10,210	33,330	396,400	9.1
Midfield Subtotal			**972,690**	**0**	**482,100**	**210,480**	**972,780**	**2,638,050**	**61**
South Subtotal			**486,990**	**661,290**	**111,160**	**179,860**	**0**	**1,440,470**	**33**
North Subtotal			**503,890**	**1,148,430**	**336,090**	**274,540**	**58,360**	**2,325,260**	**53**
Grand Total			**1,963,570**	**1,809,720**	**929,350**	**664,880**	**1,031,140**	**6,403,780**	**147**

Source: Hartsfield-Jackson International Airport (ATL), Ricondo & Associates, January 2022

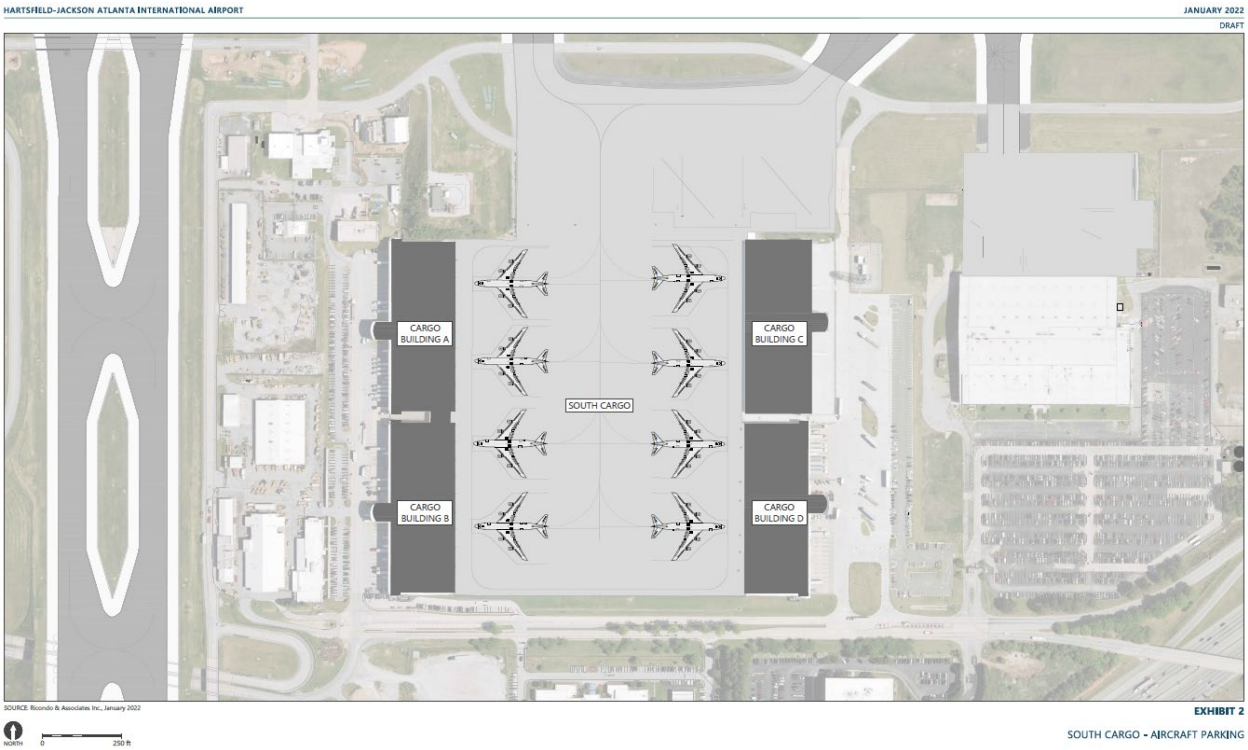
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Figure 3-6: ATL North Cargo Area



Source: Hartsfield-Jackson International Airport (ATL), Ricondo & Associates, January 2022

Figure 3-7: ATL South Cargo Area



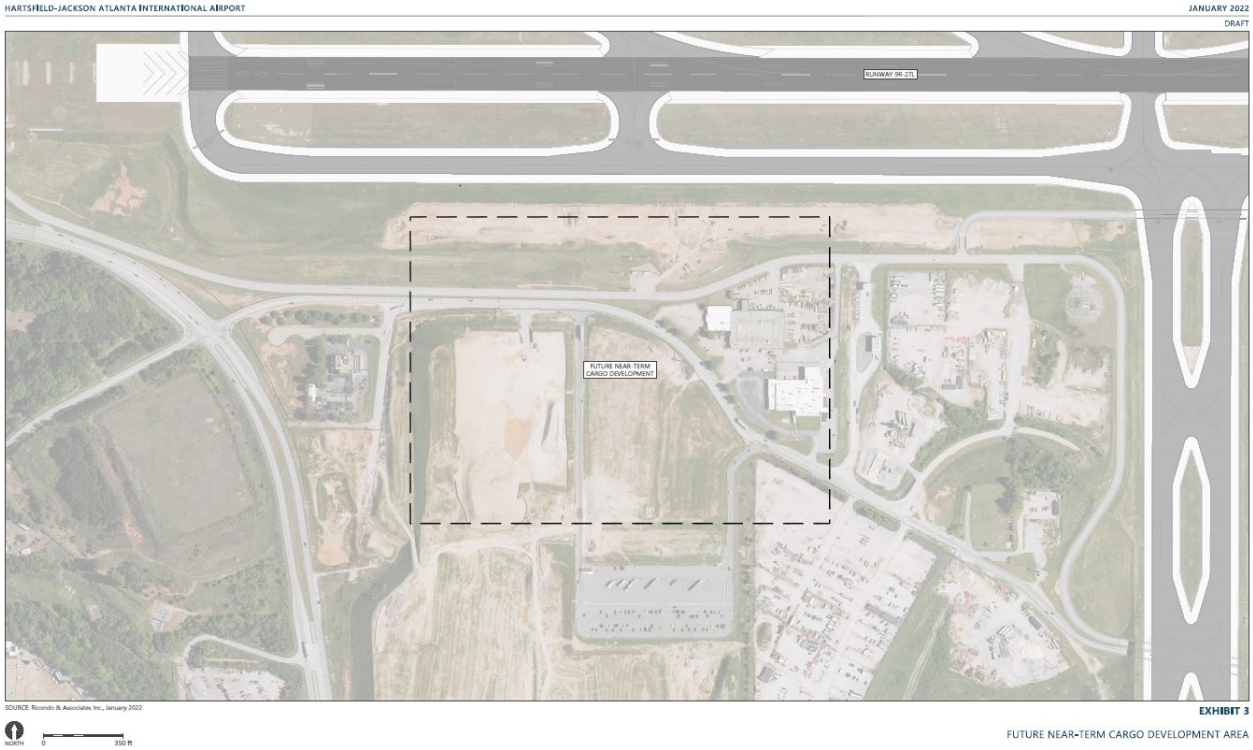
Source: Hartsfield-Jackson International Airport (ATL), Ricondo & Associates, January 2022

Figure 3-8: ATL Midfield Cargo Area



Source: Google Earth Pro, Hartsfield-Jackson International Airport (ATL), January 2022

Figure 3-9: ATL Future Cargo Development Area



Source: Hartsfield-Jackson International Airport (ATL), Ricondo & Associates, January 2022

3.6 Airport Profiles

As part of GDOT's Statewide Air Cargo study, twenty airports completed a project-related survey. As appropriate, these individual airport profiles provide support for analysis completed in the statewide study. The airport profiles provide information on air cargo tenants at each airport, current cargo carriers/service, and planning and marketing efforts related to air cargo service. Data from airport profiles completed in conjunction with the statewide air cargo study is used primarily to support analysis in **Chapter 7**.

3.7 Summary

In Georgia, over half of the system airports support some level of air cargo activity; this includes the airports with scheduled air cargo service and 58 airports that have ad hoc or on-demand air cargo flights. It is worth noting that for some of the airports with ad hoc service, have less than a handful of annual operations.

Air cargo service is essential to supporting the needs of Georgia's businesses, industries, and residents. This chapter documents information that helps to identify current levels of scheduled air cargo service. In addition, information is provided on ad hoc air cargo activity in Georgia. The chapter summarizes an inventory of facilities at airports with scheduled air cargo service and information on facilities at the busiest airports serving ad hoc air cargo operations.

Airports serving cargo need runways that are large enough to support the air cargo aircraft, high quality approaches, and weather reporting systems. Additionally, they need a level of apron space and/or a dedicated building, as applicable, to facilitate the transfer of cargo from plane to sorting facility. Because cargo is typically driven to a sort facility or directly to its destinations, docks and doors are sometimes needed for trucks to pull up and load. In other instances, trucks/vans pull directly onto the aircraft apron for loading and unloading.

Air cargo facilities at Georgia airports serving scheduled and ad hoc operations vary based on the size of aircraft providing service and the frequency of service. Generally speaking, airports serving ad hoc air cargo operations have a runway that is at least 5,500 feet long. Airports serving schedule air cargo carriers typically have a minimum runway length of 6,000 feet. Requirements for air cargo buildings and ramp space vary among airports. However, most airports in Georgia that accommodate air cargo operators have similar characteristics which include the following:

- Airports are served by a precision approach
- Airports have on-site weather reporting capabilities
- Airports have VGSI which support the approach to the primary runway
- Airports have an airport reference code (ARC) to accommodate larger aircraft

Data from the inventory analysis is used primarily to help support the facilities analysis documented in **Chapter 7** of this report. Understanding current facilities and comparing those facilities to projected demand provides the basis for establishing future facility needs. That analysis is presented later in this report.

4 Air Cargo Commodities Analysis

Many types of commodities originate in or are destined for markets in Georgia. These commodities are shipped on a variety of transportation modes, including aircraft. In general, some industries are relatively more reliant upon air cargo:

- Automotive
- Aerospace
- Pharmaceuticals
- Computers and Computer Components
- Medical Diagnostic Equipment
- Medical Devices
- Textiles
- Perishables: Flowers, Fruit, Vegetables, Fish
- Economic Perishables: Printed Material
- Telecommunications Equipment
- Consumer Goods Distribution

Each of these industry sectors has relatively complex supply chains that involve components or finished products that are lightweight, high-value, time-sensitive, or a combination of those three.

An analysis of the locations of many Georgia businesses and industries related to the above categories is presented in **Chapter 5**. The analysis identifyies and illustrates the locations of potential air cargo demand in relation to airports with current scheduled air cargo service. To better understand the scale and types of air cargo coming to and departing from Georgia and how air cargo is intertwined with the state's economy, it is helpful to look at the types of commodities being transported by air. Commodity flow data from the U.S. Bureau of Transportation Statistics (BTS) was used to identify several categories of commodity movements:

- Transportation Mode
- Commodity Type
- Commodity Value
- Commodity Weight
- Commodity Direction (Arriving or Departing)
- Commodity Origin or Destination (State or International Region)

The BTS, in coordination with the Federal Highway Administration (FHWA), issues the Freight Analysis Framework (FAF): a comprehensive database of freight movements around the United States. This database includes information for all modes of transportation and reflects all commodity categories. Several different surveys and sources are used in the FAF model to identify baseline data and to provide an understanding of commodity flows. The FAF is updated every five years and is currently on its fifth iteration (FAF5). For this study, 2017 is the most current available year of FAF data.

The FAF provides detailed commodity data for all transportation modes:

- Truck
- Rail
- Water
- Air
- Multiple Modes & Mail
- Pipeline
- Other and Unknown

Since this study is centered on the air cargo industry, the scope of this analysis is limited to commodities that are transported by modes entirely related to, or with significant reliance on, transporting cargo by air. The FAF transportation mode categories included in this study are Air and Multiple Modes & Mail. The Multiple Modes & Mail category includes integrated express carriers such as FedEx Express, UPS, and DHL who rely on air transportation as the linchpin of their overnight express service networks. Amazon Air was a relatively recent e-commerce entrant and, since 2017 FAF data supports the chapter's analysis, it is presumed that operations by Amazon were categorized under Multiple Modes & Mail as a parcel delivery service.

Additional tables at the end of this chapter (**Tables 4-33**, **4-34**, and **4-35**) include details from the FAF5 user guide. These tables provide additional details on commodity movements in Georgia. The tables present transportation modes, foreign zones (locations of originations and destinations for international cargo), and commodity descriptions.

The commodity analysis in this chapter provides high-level takeaways specifically related to commodities moved by air cargo, both domestically and internationally. From the FAF data, inferences can be drawn as to which industries in Georgia may be involved in the movement of certain commodity types by air. Many FAF5 commodity types are granular solids, raw materials, or components. Those components, such as electronics, textiles, and leather are used by many industries in Georgia, including key aerospace and automotive producers—industries are typically dependent on air cargo service. The primary shortcoming in the FAF5 data is that it is not possible to determine which particular industry is responsible for generating demand or for moving any specific commodity.

This chapter is organized into four main sections:

- Domestic Modes and Commodities
- Domestic Origins and Destinations
- International Modes and Commodities
- International Origins and Destinations

Each section identifies air cargo-related commodities by weight (in metric tons), commodity value (in millions of dollars), and commodity direction (destined for/originating in Georgia). As mentioned, data tied to the ir mode of transportation is the focus of all analysis, but air cargo is also captured in data reported for the Multiple Modes & Mail mode. This is due to the known presence of air cargo activity in

the latter mode associated with the integrated express carriers. Air cargo carried by the integrated express carriers is a primary focus of this statewide study.

4.1 Domestic Modes and Commodities

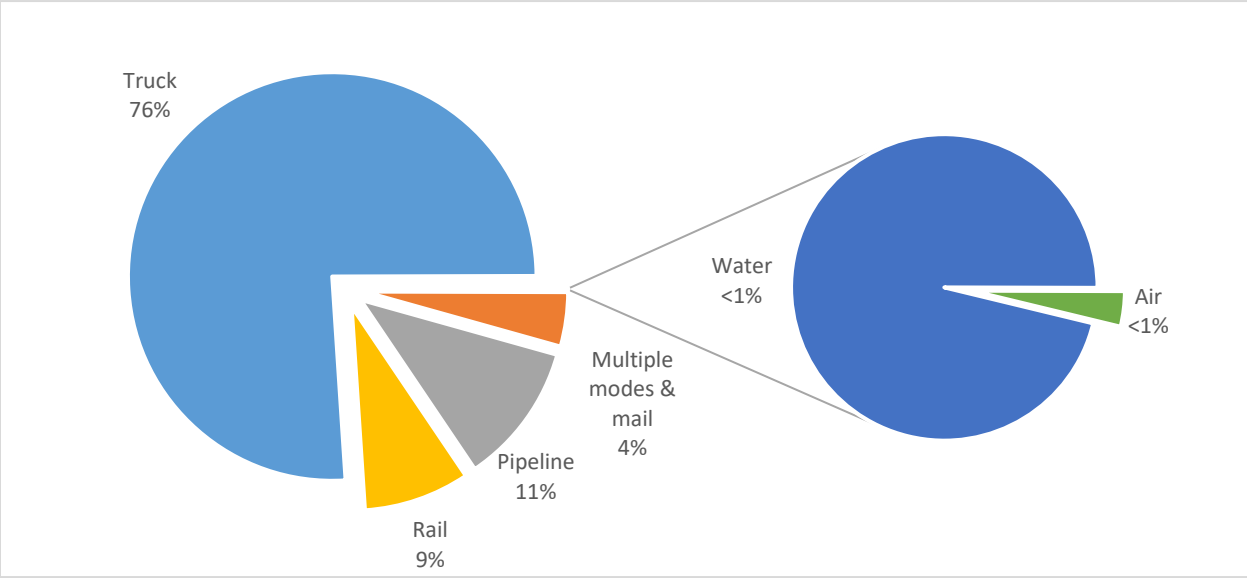
Domestic commodities arrive in and depart from Georgia by truck, water, air, and other modes of transportation. Truck is the primary mode of transportation used for transporting interstate cargo and is often the most economical method of transport, especially forlumber, metal, and other heavier commodities. Rail transport often supplements trucks for transporting natural resource commodities and occasionally some manufactured machinery and related components.

Domestic commodities transported using air cargo services fall under the Air transport designation, and partially under the Multiple Modes & Mail category. The portion of commodities transported strictly under the Air designation is proportionately small compared to all other modes. Although the exact share that air cargo occupies within the Multiple Modes & Mail category is unknown, the category does provides additional insight into the commodities carried by aircraft (specifically the integrated express carriers).

Domestically, carriers such as FedEx Express, UPS, and DHL, fall under the Multiple Modes & Mail transport designation as parcel delivery services. These carriers all operate in Georgia. When examining commodities originating from and destined for Georgia, about 16 percent of the total value for all cargo is associated with movement via Multiple Modes & Mail. When total tonnage is considered, only four percent of the total weight for all commodities is moved by Multiple Modes & Mail. As mentioned earlier, industries that rely on air transport tend to match the pattern displayed for the Multiple Modes & Mail transportation category. Commodities with higher values, compared to their weight, have a much higher propensity to be moved by air. Pharmaceuticals specifically are time-sensitive, lightweight, and high-dollar items that can be transported efficiently and quickly via air cargo provided by parcel delivery services supported by the integrated express carriers.

In 2017, according to the FAF5 data, a total of **764.5 million metric tons** of domestic commodities originated in or were destined for Georgia. **Figure 4-1** illustrates the mode by which commodities are moved when sorted by weight.

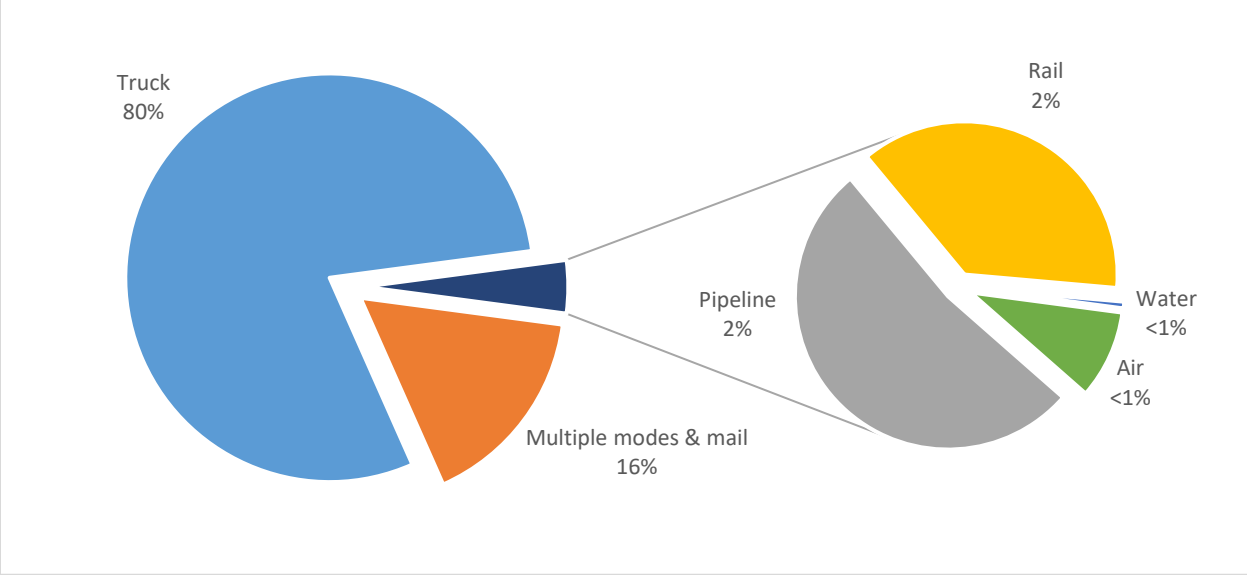
Figure 4-1: Inbound and Outbound Georgia-Related Domestic Commodities by Mode (Weight)



Source: BTS and FHWA

In 2017, a total of **$746.3 billion** in domestic commodities, by value, originated in or were destined for Georgia. **Figure 4-2** illustrates the mode by which commodities are moved when sorted by value.

Figure 4-2: Inbound and Outbound Georgia-Related Domestic Commodities by Mode (Value)



Source: BTS and FHWA

The following sub-sections examine the Air and Multiple Modes & Mail modes in greater detail.

4.1.1 Air

The Air mode designation includes all commodities transported by air cargo or by a combination of air and truck transport. This is an important distinction because most commodities are transported by truck from their origin to an airport and from an airport to their final destination. It is important to restate that some air cargo transport is also included in the Multiple Modes & Mail category, but the exact amount transported using an aircraft is not available in FAF5 data. Data reporting in FAF5 does not make it possible to segregate or identify just commodities moved by air cargo that are transported via this mode. Consequently, the tonnage and value of commodities reported in the Air category do not represent all commodities moved using air transport.

Table 4-1 and **Table 4-2** list the top ten domestic commodities destined for Georgia via the Air mode; commodities are ranked by weight and value, respectively. A total of **13,329 metric tons** of commodities, estimated at a value of **$1.5 billion,** arrived in Georgia by Air in 2017. By both weight and value, this represents less than one-tenth of one percent of all domestic commodities moved by all modes that are destined for Georgia.

Table 4-1: Top Domestic Commodities Destined for Georgia by Air (Weight)

Top Ten Commodities	Metric Tons	Percent Weight
Electronics	5,848	44%
Motorized vehicles	1,962	15%
Meat/seafood	1,164	9%
Plastics/rubber	816	6%
Articles-base metal	616	5%
Pharmaceuticals	603	5%
Machinery	541	4%
Printed prods.	491	4%
Textiles/leather	366	3%
Base metals	194	1%
Other Commodities	729	5%
Total	**13,329**	**100%**

Source: BTS and FHWA

Table 4-2: Top Domestic Commodities Destined for Georgia by Air (Value)

Top Ten Commodities	Value (Millions)	Percent Value
Electronics	$892	60%
Pharmaceuticals	$181	12%
Motorized vehicles	$157	11%
Articles-base metal	$90	6%
Machinery	$61	4%
Textiles/leather	$36	2%
Plastics/rubber	$19	1%
Basic chemicals	$10	1%
Meat/seafood	$10	1%
Base metals	$9	1%
Other Commodities	$24	2%
Total	**$1,488**	**100%**

Source: BTS and FHWA

Table 4-3 and **Table 4-4** list the top ten domestic commodities originating in Georgia transported by the Air mode, ranked by weight and value, respectively. A total of **11,522 metric tons** of commodities, estimated at a value of **$1.5 billion,** originated in Georgia via the Air mode in 2017. This represents less than a tenth of one percent of total metric tons and total value of all commodities originating in Georgia, according to the FAF5 data.

Table 4-3: Top Domestic Commodities Originating in Georgia by Air (Weight)

Top Ten Commodities	Metric Tons	Percent Weight
Motorized vehicles	6,995	61%
Pharmaceuticals	1,059	9%
Electronics	946	8%
Machinery	843	7%
Textiles/leather	608	5%
Live animals/fish	453	4%
Plastics/rubber	249	2%
Chemical prods.	188	2%
Printed prods.	144	1%
Basic chemicals	17	<1%
Other Commodities	21	<1%
Total	**11,522**	**100%**

Source: BTS and FHWA

Table 4-4: Top Domestic Commodities Originating in Georgia by Air (Value)

Top Ten Commodities	Value (Millions)	Percent Value
Pharmaceuticals	$662	46%
Motorized vehicles	$348	24%
Electronics	$256	18%
Machinery	$137	9%
Textiles/leather	$21	1%
Chemical prods.	$8	1%
Live animals/fish	$8	1%
Plastics/rubber	$5	<1%
Printed prods.	$3	<1%
Basic chemicals	$2	<1%
Other Commodities	$1	<1%
Total	**$1,452**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-1** through **4-4**, by value, Georgia's top domestic commodities moved by the Air mode are electronics, pharmaceuticals, and motorized vehicles.

4.1.2 Multiple Modes & Mail

Commodities classified under the Multiple Modes & Mail designation travel by any combination of modes. Transportation via this mode includes shipments by the U.S. Postal Service, UPS, FedEx, and DHL that rely on air transport as a component of their "door-to-door" integrated express networks.

It is important to note that commodities moved by a combination of only Truck and Air are classified under the Air transportation mode. Due to the high number of other possible transport combinations, it is impossible to single out the contribution of commodities moved by aircraft that are reported in the Multiple Modes & Mail designation. It can be assumed, however, that a portion of commodities transported under the Multiple Modes & Mail category involve air transportation.

Table 4-5 and **Table 4-6** list the top ten commodities destined for Georgia via Multiple Modes & Mail transport, ranked by weight and value, respectively. A total of **18.9 million metric tons** of commodities, estimated at a total value of **$57.9 billion,** arrived in Georgia by this mode in 2017. Out of all modes of transportation, this represents five percent of total weight in tons and 16 percent of total value for all domestic commodities destined for Georgia. While not all commodities transported by Multiple Modes & Mail are transported using an aircraft, some are. FAF5 is not reported, sorted, or stored to identify commodities within this category transported using aircraft.

Table 4-5: Top Domestic Commodities Destined for Georgia by Multiple Modes & Mail (Weight)

Top Ten Commodities	Metric Tons	Percent Weight
Cereal grains	2,421,901	13%
Other foodstuffs	2,200,894	12%
Plastics/rubber	2,012,986	11%
Basic chemicals	1,664,845	9%
Nonmetallic minerals	1,205,505	6%
Newsprint/paper	1,164,035	6%
Coal	1,109,137	6%
Gasoline	1,029,740	5%
Nonmetal min. prods.	842,868	4%
Milled grain prods.	699,313	4%
Other Commodities	4,504,921	24%
Total	**18,856,148**	**100%**

Source: BTS and FHWA

Table 4-6: Top Domestic Commodities Destined for Georgia by Multiple Modes & Mail (Value)

Top Ten Commodities	Value (Millions)	Percent Value
Pharmaceuticals	$18,749	32%
Electronics	$10,212	18%
Textiles/leather	$4,379	8%
Motorized vehicles	$3,871	7%
Machinery	$3,579	6%
Plastics/rubber	$3,378	6%
Basic chemicals	$1,985	3%
Chemical prods.	$1,917	3%
Articles-base metal	$1,322	2%
Other foodstuffs	$1,290	2%
Other Commodities	$7,223	12%
Total	**$57,906**	**100%**

Source: BTS and FHWA

Table 4-7 and **Table 4-8** list the top ten commodities originating in Georgia via Multiple Modes & Mail transport, ranked by weight and value, respectively. A total of **14.0 million metric tons** of commodities, estimated at a value of **$63.4 billion,** originated in Georgia via this mode in 2017. This represents four percent of all metric tons and 17 percent of the total value for all domestic commodities originating in Georgia, regardless of the mode of transportation. While not all commodities reported in association with this mode moved by air, some did.

Table 4-7: Top Domestic Commodities Originating in Georgia by Multiple Modes & Mail (Weight)

Top Ten Commodities	Metric Tons	Percent Weight
Nonmetallic minerals	3,294,480	24%
Nonmetal min. prods.	2,273,246	16%
Newsprint/paper	1,428,610	10%
Alcoholic beverages	1,005,706	7%
Motorized vehicles	848,339	6%
Wood prods.	728,847	5%
Basic chemicals	619,643	4%
Coal	603,515	4%
Fertilizers	476,545	3%
Base metals	425,986	3%
Other Commodities	2,291,087	16%
Total	**13,996,005**	**100%**

Source: BTS and FHWA

Table 4-8: Top Domestic Commodities Originating in Georgia by Multiple Modes & Mail (Value)

Top Ten Commodities	Value (Millions)	Percent Value
Pharmaceuticals	$21,079	33%
Motorized vehicles	$12,016	19%
Electronics	$9,548	15%
Machinery	$5,064	8%
Plastics/rubber	$2,956	5%
Articles-base metal	$2,215	3%
Textiles/leather	$1,858	3%
Chemical prods.	$1,833	3%
Printed prods.	$1,127	2%
Newsprint/paper	$1,111	2%
Other Commodities	$4,585	7%
Total	**$63,393**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-5** through **4-8**, Georgia's top domestic commodities moved by Multiple Modes & Mail mirror those moved in association with the Air mode, with pharmaceuticals, motorized vehicles, and electronics all near the top when ranked by value.

4.2 Domestic Origins and Destinations

The following section highlights the top ten states by origin and destination for commodities destined for and originating in Georgia. These are summarized by commodities moved by Air and Multiple Modes & Mail. This section describes the following as they relate to domestic commodities destined for and originating in Georgia:

- Top origins by Air
- Top destinations by Air
- Top origins by Multiple Modes & Mail
- Top destinations by Multiple Modes & Mail

4.2.1 Air

Table 4-9 and **Table 4-10** list the top ten states by weight and value for commodities destined for Georgia via the Air mode.

Table 4-9: Top Origin States by Commodity Weight Destined for Georgia by Air

State	Metric Tons	Percent Weight
CA	4,404	33%
IL	1,374	10%
AK	1,074	8%
FL	778	6%
NJ	765	6%
TN	583	4%
TX	424	3%
NY	420	3%
IA	369	3%
NC	354	3%
Other States	2,783	21%
Total	**13,329**	**100%**

Source: BTS and FHWA

Table 4-10: Top Origin States by Commodity Value Destined for Georgia by Air

State	Value (Millions)	Percent Value
CA	$371	25%
IL	$203	14%
IA	$188	13%
TX	$144	10%
FL	$138	9%
WA	$55	4%
NJ	$50	3%
IN	$45	3%
MA	$41	3%
KY	$40	3%
Other States	$213	14%
Total	**$1,488**	**100%**

Source: BTS and FHWA

Table 4-11 and **Table 4-12** list the top ten states by weight and value for commodities that originated in Georgia and are transported by Air.

Table 4-11: Top Destination States by Commodity Weight Originating in Georgia by Air

State	Metric Tons	Percent Weight
HI	2,502	22%
FL	1,638	14%
CA	1,034	9%
KS	774	7%
TX	724	6%
MO	557	5%
NY	341	3%
NC	324	3%
MI	318	3%
LA	303	3%
Other States	3,006	26%
Total	**11,522**	**100%**

Source: BTS and FHWA

Table 4-12: Top Destination States by Commodity Value Originating in Georgia by Air

State	Value (Millions)	Percent Value
TX	$363	25%
FL	$182	13%
CA	$136	9%
NC	$81	6%
MN	$72	5%
HI	$66	5%
LA	$65	4%
WV	$52	4%
TN	$44	3%
NY	$34	2%
Other States	$358	25%
Total	**$1,452**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-9** through **4-12**, by value, Georgia's top domestic locations for commodities moved by Air from Georgia include California, Illinois, and Iowa. The top domestic destinations for commodities that originated in Georgia by commodity value included Texas, Florida, and California.

4.2.2 Multiple Modes & Mail

Table 4-13 and **Table 4-14** list the top ten states by weight and value for commodities destined for Georgia transported by Multiple Modes & Mail mode.

Table 4-13: Top Origin States by Commodity Weight Destined for Georgia by Multiple Modes & Mail

State	Metric Tons	Percent Weight
IL	3,296,917	17%
GA (intrastate)	2,816,769	15%
TX	2,457,249	13%
IA	1,523,110	8%
AL	1,311,392	7%
IN	982,052	5%
LA	776,007	4%
FL	575,419	3%
NC	517,344	3%
SC	435,391	2%
Other States	4,164,496	22%
Total	**18,856,148**	**100%**

Source: BTS and FHWA

Table 4-14: Top Origin States by Commodity Value Destined for Georgia by Multiple Modes & Mail

State	Value (Millions)	Percent Value
GA (intrastate)	$15,619	27%
TX	$6,171	11%
IN	$5,268	9%
CA	$3,595	6%
FL	$2,502	4%
IL	$2,167	4%
PA	$1,898	3%
AL	$1,562	3%
TN	$1,539	3%
NY	$1,519	3%
Other States	$16,067	28%
Total	**$57,906**	**100%**

Source: BTS and FHWA

Table 4-15 and **Table 4-16** list the top ten states by weight and value for commodities that originated in Georgia carried by the Multiple Modes & Mail mode.

Table 4-15: Top Destination States by Commodity Weight Originating in Georgia by Multiple Modes & Mail

State	Metric Tons	Percent Weight
GA (intrastate)	2,816,769	20%
FL	2,568,902	18%
AL	1,024,889	7%
TN	887,904	6%
MI	623,576	4%
TX	571,948	4%
LA	538,316	4%
OH	461,768	3%
VA	332,424	2%
PA	294,973	2%
Other States	3,874,537	28%
Total	**13,996,005**	**100%**

Source: BTS and FHWA

Table 4-16: Top Destination States by Commodity Value Originating in Georgia by Multiple Modes & Mail

State	Value (Millions)	Percent Value
GA (intrastate)	$15,619	25%
NC	$4,932	8%
SC	$4,741	7%
FL	$4,390	7%
TX	$3,308	5%
TN	$3,234	5%
AL	$2,528	4%
CA	$2,518	4%
IL	$1,547	2%
NY	$1,313	2%
Other States	$19,265	30%
Total	**$63,393**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-13** through **4-16**, aside from goods moved within the state which are significant, by value, Georgia's top domestic locations for commodities moved by the Multiple Modes & Mail mode to destinations in Georgia included Texas, Indiana, and California. The top domestic destinations for cargo

originating in Georgia included North Carolina, South Carolina, and Florida. Intrastate movement of commodities can likely be attributed to mail and parcels being delivered from Georgia business to Georgia business.

4.3 International Commodities

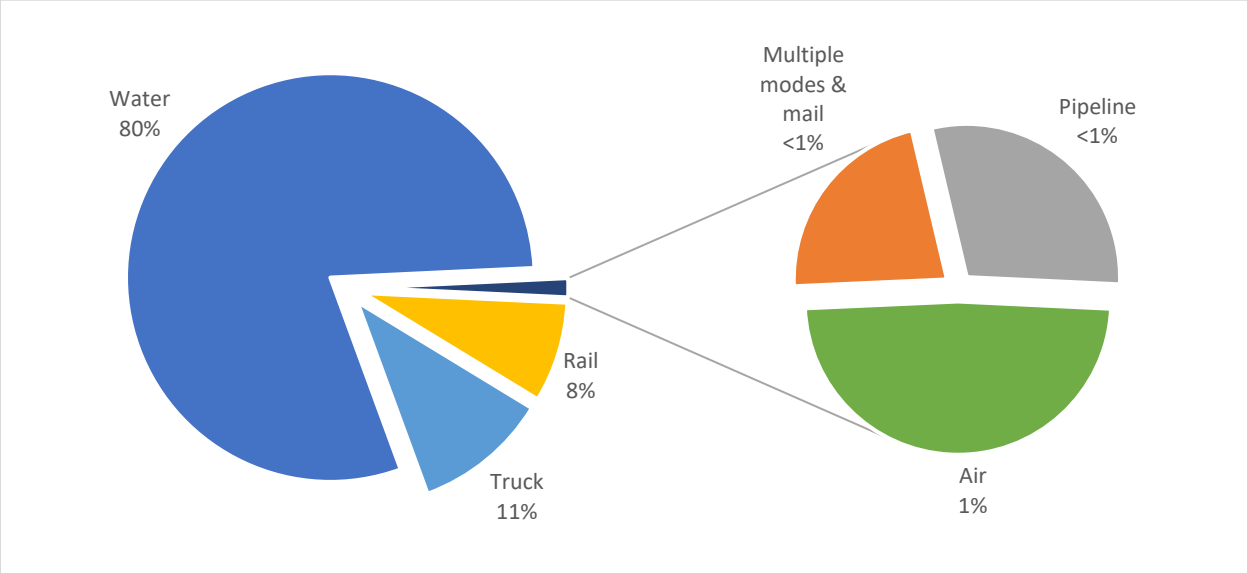
This section describes the following related to international commodities destined for and originating in Georgia:

- Summary of modes used to transport all commodities
- Details of commodities moved by Air
- Details of commodities moved by the Multiple Modes & Mail mode

Compared to the value of domestic goods moved by the Air transportation mode, international movement of commodities illustrates a much higher reliance on Air transport, with an increase from less than one percent of the total value for domestic commodities to 21 percent of the value for international commodities. When moved internationally, transport by Air represents only one percent of all weight. For international commodities destined for and originating in Georgia, Multiple Modes & Mail transport represented around one percent of all modes.

In 2017, a total of **42.1 million metric tons** of international commodities originated in or were destined for Georgia. **Figure 4-3** illustrates the mode by which international commodities are moved, when sorted by weight.

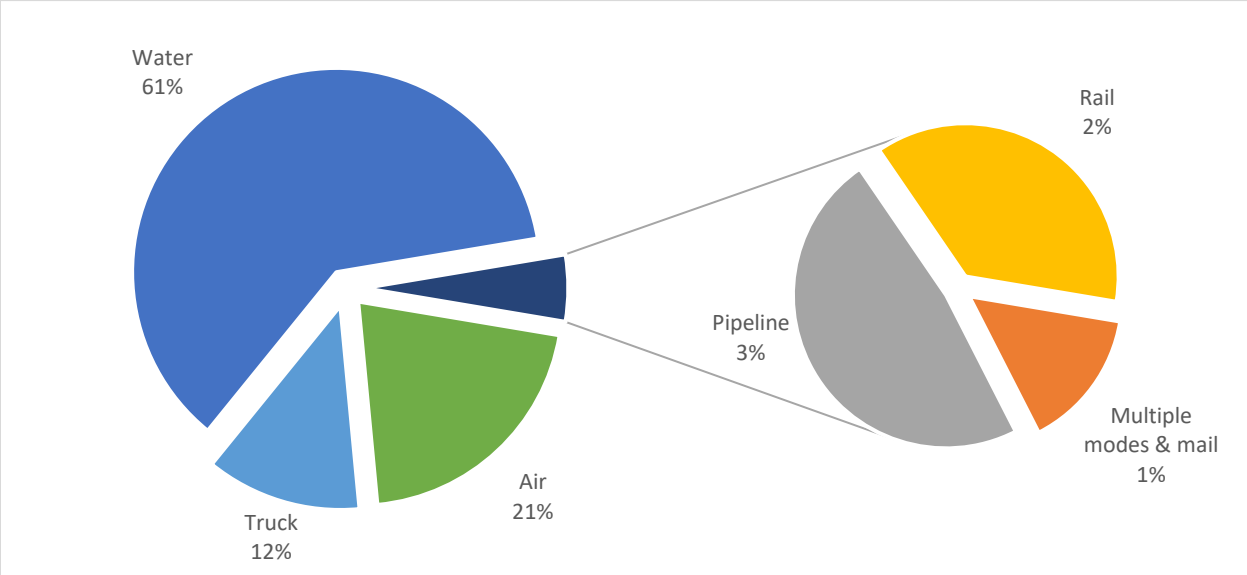
Figure 4-3: Inbound and Outbound Georgia-Related International Commodities by Mode (Weight)



Source: BTS and FHWA

In 2017, a total of $**129.1 billion** in international commodities originated in or were destined for Georgia. **Figure 4-4** illustrates the mode by which international commodities are moved, when sorted by value.

Figure 4-4: Inbound and Outbound Georgia-Related International Commodities by Mode (Value)



Source: BTS and FHWA

4.3.1 Air

Table 4-17 and **Table 4-18** list the top international commodities by weight and value destined for Georgia by Air. A total of nearly **180,000 metric tons** of international commodities, with an estimated value of **$14.9 billion,** arrived in Georgia by the Air in 2017. Out of all transportation modes, the Air mode represents one percent of all international commodities measured by metric tons and 16 percent of the total value of all international commodities destined for Georgia.

Table 4-17: Top International Commodities by Weight Destined for Georgia by Air

Top Ten Commodities	Metric Tons	Percent Weight
Machinery	29,411	16%
Electronics	28,061	16%
Motorized vehicles	25,394	14%
Textiles/leather	15,999	9%
Meat/seafood	11,690	7%
Plastics/rubber	11,517	6%
Precision instruments	9,134	5%
Articles-base metal	7,521	4%
Pharmaceuticals	6,695	4%
Furniture	6,592	4%
Other Commodities	27,645	15%
Total	**179,659**	**100%**

Source: BTS and FHWA

Table 4-18: Top International Commodities by Value Destined for Georgia by Air

Top Ten Commodities	Value (Millions)	Percent Value
Electronics	$4,583	31%
Motorized vehicles	$3,869	26%
Machinery	$1,566	11%
Precision instruments	$1,385	9%
Transport equip.	$434	3%
Textiles/leather	$408	3%
Misc. mfg. prods.	$385	3%
Plastics/rubber	$381	3%
Pharmaceuticals	$318	2%
Articles-base metal	$318	2%
Other Commodities	$1,204	8%
Total	**$14,851**	**100%**

Source: BTS and FHWA

Table 4-19 and **Table 4-20** list the top international commodities by weight and value originating in Georgia that are transported by Air. A total of nearly **127,000 metric tons** of international commodities, with an estimated value of **$12.1 billion,** departed from Georgia by the Air mode in 2017. Out of all modes, Air transport represents one percent of the total annual metric tons of international commodities and 31 percent of the value of all international commodities originating in Georgia.

Table 4-19: Top International Commodities by Weight Originating in Georgia by Air

Top Ten Commodities	Metric Tons	Percent Weight
Machinery	12,776	10%
Transport equip.	11,854	9%
Articles-base metal	11,162	9%
Other foodstuffs	10,824	9%
Mixed freight	10,669	8%
Electronics	9,857	8%
Motorized vehicles	8,231	6%
Precision instruments	7,203	6%
Chemical prods.	6,770	5%
Nonmetal min. prods.	5,717	5%
Other Commodities	31,884	25%
Total	**126,946**	**100%**

Source: BTS and FHWA

Table 4-20: Top International Commodities by Value Originating in Georgia by Air

Top Ten Commodities	Value (Millions)	Percent Value
Machinery	$4,003	33%
Transport equip.	$2,350	19%
Electronics	$1,219	10%
Precision instruments	$1,044	9%
Articles-base metal	$699	6%
Nonmetal min. prods.	$636	5%
Base metals	$460	4%
Motorized vehicles	$395	3%
Chemical prods.	$238	2%
Pharmaceuticals	$228	2%
Other Commodities	$796	7%
Total	**$12,069**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-17** through **4-20**, by value, Georgia's top international commodities moved by Air are electronics, machinery, motorized vehicles, and transport equipment.

4.3.2 Multiple Modes & Mail

Table 4-21 and **Table 4-22** list the top international commodities by weight and value destined for Georgia transported by the Multiple Modes & Mail mode. A total of over **132,000 metric tons** of international commodities, with an estimated value of **$630 million,** arrived in Georgia by this mode in 2017. Out of all modes, this represents less than one percent of total annual international metric commodity tons and one percent of the value of all international commodities destined for Georgia.

Table 4-21: Top International Commodities by Weight Destined for Georgia by Multiple Modes & Mail

Top Ten Commodities	Metric Tons	Percent Weight
Mixed freight	45,211	34%
Nonmetal min. prods.	24,219	18%
Machinery	7,177	5%
Newsprint/paper	6,809	5%
Articles-base metal	6,109	5%
Motorized vehicles	5,910	4%
Base metals	5,530	4%
Other ag prods.	4,826	4%
Nonmetallic minerals	4,793	4%
Furniture	3,906	3%
Other Commodities	18,375	14%
Total	**132,864**	**100%**

Source: BTS and FHWA

Table 4-22: Top International Commodities by Value Destined for Georgia by Multiple Modes & Mail

Top Ten Commodities	Value (Millions)	Percent Value
Machinery	$119	19%
Mixed freight	$99	16%
Electronics	$94	15%
Motorized vehicles	$44	7%
Misc. mfg. prods.	$37	6%
Pharmaceuticals	$36	6%
Articles-base metal	$35	6%
Nonmetal min. prods.	$25	4%
Plastics/rubber	$18	3%
Furniture	$18	3%
Other Commodities	$104	17%
Total	**$630**	**100%**

Source: BTS and FHWA

Table 4-23 and **Table 4-24** list the top international commodities by weight and value originating in Georgia by transported by Multiple Modes & Mail mode. A total of over **6,000 metric tons** of international commodities, with an estimated value of **$383.5 million,** departed from Georgia by this mode in 2017. Out of all modes, this represents less than one percent of total annual international metric commodity tons and one percent of the value of all international commodities originating in Georgia.

Table 4-23: Top International Commodities by Weight Originating in Georgia by Multiple Modes & Mail

Top Ten Commodities	Metric Tons	Percent Weight
Transport equip.	2,020	33%
Motorized vehicles	1,268	21%
Machinery	897	15%
Paper articles	670	11%
Animal feed	259	4%
Plastics/rubber	242	4%
Wood prods.	232	4%
Other foodstuffs	212	3%
Chemical prods.	137	2%
Articles-base metal	94	2%
Other Commodities	141	2%
Total	**6,172**	**100%**

Source: BTS and FHWA

Table 4-24: Top International Commodities by Value Originating in Georgia by Multiple Modes & Mail

Top Ten Commodities	Value (Millions)	Percent Value
Transport equip.	$349	91%
Motorized vehicles	$20	5%
Machinery	$10	3%
Electronics	$1	<1%
Chemical prods.	$1	<1%
Plastics/rubber	$1	<1%
Paper articles	<$1	<1%
Other foodstuffs	<$1	<1%
Misc. mfg. prods.	<$1	<1%
Precision instruments	<$1	<1%
Other Commodities	$1	11%
Total	**$383**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-21** through **4-24**, Georgia's top international commodities moved by the Multiple Modes & Mail mode mirror those moved by Air, with the transport of equipment, motorized vehicles, machinery, and electronics all near the top of international commodities when ranked by value.

4.4 International Origins and Destinations

Analyzing where commodities arrive from and depart to can provide additional insight into how the products are likely used, as well as their relevance to local industries. This section describes the following as related to international commodities destined for and originating in Georgia:

- Top origins by Air
- Top destinations by Air
- Top origins by Multiple Modes & Mail
- Top destinations by Multiple Modes & Mail

4.4.1 Air

Table 4-25 and **Table 4-26** list the top foreign regions (international locations) by weight and value for commodities destined for Georgia by Air.

Table 4-25: Top Foreign Regions by Weight Commodities Destined for Georgia by Air

Foreign Regions	Metric Tons	Percent Weight
Europe	73,559	41%
Eastern Asia	63,680	35%
Southeast Asia & Oceania	15,426	9%
Central/South America	13,726	8%
Southwest & Central Asia	9,306	5%
Mexico	1,695	1%
Canada	1,488	1%
Africa	780	<1%
Total	**179,659**	**100%**

Source: BTS and FHWA

Table 4-26: Top Foreign Regions by Value Commodities Destined for Georgia by Air

Foreign Regions	Value (Millions)	Percent Value
Eastern Asia	$6,303	42%
Europe	$5,115	34%
Southeast Asia & Oceania	$2,384	16%
Southwest & Central Asia	$426	3%
Canada	$298	2%
Central/South America	$206	1%
Mexico	$81	1%
Africa	$36	<1%
Total	**$14,851**	**100%**

Source: BTS and FHWA

Table 4-27 and **Table 4-28** list the top foreign regions (international locations) by weight and value for commodities originating in Georgia that are transported by Air.

Table 4-27: Top Foreign Regions by Weight Commodities Originating in Georgia by Air

Foreign Regions	Metric Tons	Percent Weight
Europe	30,128	24%
Eastern Asia	23,592	19%
Central/South America	21,917	17%
Canada	19,174	15%
Southeast Asia & Oceania	17,442	14%
Southwest & Central Asia	10,600	8%
Africa	2,124	2%
Mexico	1,969	2%
Total	**126,946**	**100%**

Source: BTS and FHWA

Table 4-28: Top Foreign Regions by Value Commodities Originating in Georgia by Air

Foreign Regions	Value (Millions)	Percent Value
Europe	$3,795	31%
Southeast Asia & Oceania	$2,602	22%
Eastern Asia	$2,512	21%
Southwest & Central Asia	$1,223	10%
Central/South America	$1,074	9%
Canada	$508	4%
Mexico	$191	2%
Africa	$164	1%
Total	**$12,069**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-25** through **4-28**, by value, Georgia's top international origins and destinations for commodities moved by Air included Europe, Southeast Asia & Oceania, and Eastern Asia.

4.4.2 Multiple Modes & Mail

Table 4-29 and **Table 4-30** list the top foreign regions (international locations) by weight and value for commodities destined for Georgia transported by the Multiple Modes & Mail mode.

Table 4-29: Top Foreign Regions by Commodity Weight Destined for Georgia by Multiple Modes & Mail

Foreign Regions	Metric Tons	Percent Weight
Canada	94,254	71%
Mexico	38,594	29%
Europe	14	<1%
Eastern Asia	3	<1%
Total	**132,864**	**100%**

Source: BTS and FHWA

Table 4-30: Top Foreign Regions by Commodity Value Destined for Georgia by Multiple Modes & Mail

Foreign Regions	Value (Millions)	Percent Value
Canada	$499	79%
Mexico	$130	21%
Europe	<$1	<1%
Eastern Asia	<$1	<1%
Total	**$630**	**100%**

Source: BTS and FHWA

Table 4-31 and **Table 4-32** list the top foreign regions (international locations) by weight and value for international commodities originating in Georgia transported by the Multiple Modes & Mail mode.

Table 4-31: Top Foreign Regions by Commodity Weight Originating in Georgia by Multiple Modes & Mail

Foreign Regions	Metric Tons	Percent Weight
Canada	5,353	87%
Mexico	754	12%
Europe	29	<1%
Southwest & Central Asia	26	<1%
Southeast Asia & Oceania	6	<1%
Central/South America	2	<1%
Eastern Asia	2	<1%
Africa	1	<1%
Total	**6,172**	**100%**

Source: BTS and FHWA

Table 4-32: Top Foreign Regions by Commodity Value Originating in Georgia by Multiple Modes & Mail

Foreign Regions	Value (Millions)	Percent Value
Canada	$372	97%
Mexico	$11	3%
Europe	<$1	<1%
Southeast Asia & Oceania	<$1	<1%
Southwest & Central Asia	<$1	<1%
Central/South America	<$1	<1%
Eastern Asia	<$1	<1%
Africa	<$1	<1%
Total	**$383**	**100%**

Source: BTS and FHWA

As shown in **Tables 4-29** through **4-32**, by value, Georgia's top international locations for commodities moved by Air that originate in Georgia include Canada, Mexico, and Europe.

4.5 Summary of Findings

Analysis of FAF5 commodity data from the BTS and FHWA confirms that commodities transported by air are often high-value, time-sensitive, or lightweight items. Air transport is comparatively one of the fastest methods to ship goods both domestically and internationally. The ability to move goods around the globe in a matter of a day presents opportunities for businesses that other transportation modes cannot offer. As previously mentioned, **Chapter 5** focuses on demand generators, many of which contribute to commodity flows identified in this chapter. Parallels exist between industries with the propensity to generate demand for air cargo and the commodities that are transported to and from Georgia. These parallels include:

- Aerospace companies like Gulfstream requiring electronic equipment, and leather and other textiles for interiors.
- Automobile manufacturers such as Kia shipping vehicle parts, electronic components, and machinery to produce vehicles.
- Medical companies producing pharmaceutical drugs, electronic devices, and precision instruments.

4.5.1 Domestic Air Cargo

Domestically, FAF5 data reports air cargo under two different modes; air cargo transport is reported in either the Air or the Multiple Modes & Mail transportation mode. As explained previously in this chapter, the Multiple Modes & Mail mode includes commodities transported by integrated express carriers such as FedEx, UPS, and DHL.

4.5.1.1 Air

Movement of domestic commodities by Air in 2017 accounts for approximately $3 billion dollars in annual value, with a relatively even split between inbound and outbound movement in Georgia. Of the commodities moved domestically by Air, the top commodities destined for Georgia as measured in value include electronics (60%), pharmaceuticals (12%), and motor vehicle components (11%). The same categories are included in Georgia's top departing commodities which are pharmaceuticals (46%), motor vehicle components (24%), and electronics (18%).

Commodities moved using the Air mode have a variety of origins and destinations. For commodities destined to Georgia, California (25%), Illinois (14%), and Iowa (13%) are the three highest origin states by commodity value. For commodities departing Georgia, Texas (25%), Florida (13%), and California (9%) are the top three destination states by value of the commodities transported by Air. Nearly all of the $181 million in commodities that originated in Iowa that were transported to Georgia fall under the Electronics category.

4.5.1.2 Multiple Modes & Mail

For domestic commodities moved by the Multiple Modes & Mail mode (which includes integrated express carrier services), pharmaceuticals (32%), electronics (18%), and textiles (8%) were the top three commodities by value destined for Georgia. This aligns closely with the top commodities by value that departed Georgia via this mode: pharmaceuticals (33%), motor vehicle components (19%), and electronics (15%).

Intrastate movements (shipments of commondities within the state) make up a large portion of transport via the Multiple Modes & Mail mode. By value, about 27 percent of all commodities arrived in Georgia and about 25 percent departed from Georgia via this mode in 2017. After considering intrastate movements, the next highest contributing states by value for commodities destined for Georgia, carried via Multiple Modes & Mail transportation, included Texas (11%), Indiana (9%), and California (6%). Aside from movements within Georgia, commodities that departed the state, carried by the Multiple Modes & Mail mode, were destined to more regional destinations that include North Carolina (8%), South Carolina (7%), and Florida (7%).

When reviewing specific commodities by value versus weight arriving and departing Georgia by this mode of transportation, there is a large disparity between the weight and value of motorized vehicle commodities. This difference can likely be attributed to the role manufacturing facilities located in the state play in final vehicle assembly. Motorized vehicle components coming into Georgia, combined with the components manufactured in-state, create a product that is nearer completion when it eventually is transported from Georgia. Other top commodity categories with higher values that tend to use air transport include pharmaceuticals, textiles, and electronics.

4.5.2 International Air Cargo

International commodities moved by Air represent a much higher percentage of total value when compared to commodities moved domestically by Air. Of the $90.4 billion in commodities that arrived in Georgia from international locations, approximately $14.9 billion (about 16%) of those goods were transported by the Air mode. When considering the weight of the commodities, international commodities transported by Air makes up about one percent of all tonnage that arrived in Georgia.

International commodities departing from Georgia help support the final construction and completion of goods produced domestically. Specifically, machinery and vehicle components are among the top commodities by value shipped by Air. These parts are used in end products that are produced in Georgia. Separately, electronics were the top commodity destined for Georgia. Electronics can be components necessary for the completion of a larger product, or finished products such as smartphones or other devices including components of communications systems in automobilies and planes. Of the $14.9 billion in commodities destined for Georgia, electronics (31%), motor vehicle components (26%), and machinery (11%) represent the top three commodities by value. Electronics and motor vehicle components typically arrived from East and Southeast Asia, predominant areas for the manufacturing of those commodities. Machinery primarily originates in European countries. Of the $14.9 billion in international commodities destined for Georgia by Air, Europe (42%) was the leading origin, with Eastern Asia (34%) and Southeast Asia and Oceania (16%) rounding out the top three.

When looking at commodities departing from Georgia to international destinations, Air remains an important mode for transporting goods. Approximately $12.1 billion in international commodities departed by Air (or 31 percent) out of $38.7 billion in exported commodities transported by all modes. This larger percentage share for Air exports are likely attributed to Hartsfield-Jackson Atlanta International Airport's presence as a major international gateway, as well as to the volume of commodities being exported by Air that originate in Georgia. Of those goods departing Georgia, high value components for machinery (33%) and transportation equipment (19%) were the most likely to be transported by Air to

international destinations. These components are sent to manufacturers and producers that, in turn, ship their finished products back to the United States and around the world. Similar to international origins, Europe (31%), Southeast Asia and Oceania (22%), and Eastern Asia (21%) make up the top three destinations for the shipment by Air of international commodities.

Tables that follow provide additional detailed, definitions, and descriptions of terminology used in the FAF5 database. Additional tables include:

- **Table 4-33** provides details on transportation modes
- **Table 4-34** provides details on commodity types
- **Table 4-35** provides details on foreign regions

Table 4-33: FAF Modes of Transportation

Mode	Description
Truck	Includes private and for-hire trucks. Does not include truck that is part of **Multiple Modes and Mail** or truck movements in conjunction with domestic air cargo.
Rail	Includes any common carrier or private railroad. Does not include rail that is part of **Multiple Modes and Mail**.
Water	Includes shallow draft, deep draft, Great Lakes, and intra-port shipments. Does not include water that is part of **Multiple Modes and Mail**.
Air	Includes shipments move by air or a combination of truck and air in commercial or private aircraft. Includes air freight and air express. In the case of imports and exports by air, domestic cargo moves by ground to and from the port of entry or exit are categorized with **Truck**.
Multiple Modes & Mail	Includes shipments by multiple modes and by parcel delivery services, U.S. Postal Service, or couriers (capped at 150 pounds). This category is not limited to containerized or trailer-on-flatcar shipments.
Pipeline	Includes crude petroleum, natural gas, and product pipelines. Note: Does include flows from offshore wells to land which are counted as Water moves by the U.S. Army Corps of Engineers. Does not include pipeline that is part of **Multiple Modes and Mail**.
Other and Unknown	Includes movements not elsewhere classified such as flyaway aircraft, and shipments for which the mode cannot be determined.
No Domestic Mode	Includes shipments that have an international mode, but no domestic mode and is limited to import shipments of crude petroleum transferred directly from inbound ships to a U.S. refinery at the zone of entry. This classification enables a proper accounting of flows that do not utilize any domestic transportation network.

Source: BTS and FHWA

Table 4-34: FAF Commodity Categories

Code	Commodity Description
1	Animals and Fish (live)
2	Cereal Grains (includes seed)
3	Agricultural Products (excludes Animal Feed, Cereal Grains, and Forage Products)
4	Animal Feed, Eggs, Honey, and Other Products of Animal Origin
5	Meat, Poultry, Fish, Seafood, and their Preparations
6	Milled Grain Products/Preparations and Bakery Products
7	Other Prepared Foodstuffs, Fats, and Oils
8	Alcoholic Beverages and Denatured Alcohol
9	Tobacco Products
10	Monumental or Building Stone
11	Natural Sands
12	Gravel and Crushed Stone (excludes Dolomite and Slate)
13	Other Non-Metallic Minerals (not elsewhere classified)
14	Metallic Ores and Concentrates
15	Coal
16	Crude Petroleum
17	Gasoline, Aviation Turbine Fuel, and Ethanol (includes Kerosene, and Fuel Alcohols)
18	Fuel Oils (includes Diesel, Bunker C, and Biodiesel)
19	Other Coal and Petroleum Products (not elsewhere classified)
20	Basic Chemicals
21	Pharmaceutical Products
22	Fertilizers
23	Other Chemical Products and Preparations
24	Plastics and Rubber
25	Logs and Other Wood in the Rough
26	Wood Products
27	Pulp, Newsprint, Paper, and Paperboard
28	Paper or Paperboard Articles
29	Printed Products
30	Textiles, Leather, and Articles of Textiles or Leather
31	Non-Metallic Mineral Products
32	Base Metal in Primary or Semi-Finished Forms and in Finished Basic Shapes
33	Articles of Base Metal
34	Machinery
35	Electronic, Other Electrical Equipment and Components, and Office Equipment
36	Motorized and Other Vehicles (includes parts)
37	Transportation Equipment (not elsewhere classified)
38	Precision Instruments and Apparatus
39	Furniture, Mattresses and Mattress Supports, Lamps, Lighting Fittings, and Illuminated Signs

Code	Commodity Description
40	Miscellaneous Manufactured Products
41	Waste and Scrap (excludes of agriculture or food)
43	Mixed Freight

Source: BTS and FHWA

Table 4-35: FAF Foreign Regions

Code	FAF Region
801	Canada
802	Mexico
803	Rest of Americas
804	Europe
805	Africa
806	Southwest & Central Asia
807	Eastern Asia
808	Southeast Asia & Oceania

Source: BTS and FHWA

5 Air Cargo Demand Generators and Accessibility to Integrated Express Service

Air cargo accommodates the transport of products and commodities from one business to another or from businesses to consumers. Businesses use air cargo to transport goods that are high value, relatively light weight, perishable, or time critical. Each year, more than $6.0 trillion in goods are transported globally by air; this represents 35 percent of all international trade by value, but only 0.5 percent of all international trade by volume.[1] Goods transported by air cargo are linked to manufacturing supply chains or are associated with final product delivery to consumers. This chapter focuses on the linkages between certain types of economic activity and air cargo demand by examining the geographic location of key industries and activities that are known to generate air cargo demand. Brief case studies of airports that recently gained scheduled cargo service are also presented in this chapter, along with information on developments in Unmanned Aerial Systems (UAS) and its relationship to air cargo.

This chapter of the Georgia Statewide Air Cargo Study is divided into five sections:

- Accessibility to airports with integrated express service and other scheduled air cargo operators
- Location of air cargo demand generators
- Identification of gaps in accessibility to integrated express carrier service
- Case studies for new air cargo airports
- Review of current and future roles for UAS in air cargo transport

5.1 Accessibility to Airports with Integrated Express Service

Chapter 2 - *Industry Overview* described the multiple types of air cargo carriers. **Table 2-2** details carriers, aircraft types, and approximate aircraft air cargo capacity for each Georgia airport with existing scheduled cargo service. A table with air cargo route segments from Georgia airports is also available in **Chapter 3** - *Inventory*. Integrated express operators, such as FedEx Express, DHL, and UPS, are the predominate domestic air cargo operators throughout Georgia and in the United States. These operators are responsible for more than 60 percent of domestic air cargo lift capacity via their regularly scheduled operations.

Sometimes referred to as "integrators," integrated express carriers move customer goods door-to-door, providing shipment collection, transport, delivery, and customs clearance functions (for international shipments). The entire chain of custody between shipper and customer occurs on each integrator's respective network of vehicles, with transport by air being the backbone of the express delivery model. This is possible through the use of hub-and-spoke transportation models, similar to those used by some commercial passenger airlines. Each business day, flights from around North America and the world arrive at the hubs, where packages are unloaded, sorted by destination market, and then loaded onto an outbound aircraft. FedEx Express and UPS offer overnight, next business day express service between virtually any two points in North America. Additionally, FedEx Express, UPS, and DHL all offer international express service ranging from one to three business days, depending on the country.

[1] https://www.iata.org/contentassets/4d3961c878894c8a8725278607d8ad52/air-cargo-brochure.pdf

The service these carriers offer is a time-definite delivery guarantee which, aside from parcel weight/size, is a function of the distance traveled and the speed at which the package is moved. Each integrator has unique network areas based on the location of their large hubs and regional facilities where delivery vehicles are based. An area with later cutoff times for package pickup is indicative of closer proximity or shorter travel times to an airport with integrator service, while an area with earlier cutoff times is indicative of a longer travel time to an airport with integrator service. Roadway traffic and congestion in major metropolitan areas are significant factors for determining the cutoff times for package pickup or drop-off. According to information obtained from integrated express carriers as part of this project, speed and distance determine the size of the area they serve from each airport.

For this analysis, 60-minute drive-times, which reflect speed and distance, were used to highlight areas typically served by an integrated express carrier. Airports in Georgia with scheduled air cargo service were assigned to one of three categories:

- Mainline/Jet Air Cargo Airports
- Feeder/Turboprop Airports
- Special Service Airports

Using this approach helps determine if known generators of air cargo demand currently fall inside or outside of one of the 60-minute drive-times for an airport with scheduled air cargo service. The results of this analysis reflect current access to existing integrated express air cargo service in Georgia.

To support comparable analysis in this statewide study, 60-minute drive-times were established for each airport with existing scheduled air cargo service to determine relative access to integrated express service. The 60-minute drive-times are subsequently compared to known generators of air cargo demand. The results of this effort help identify cargo demand generators that are beyond 60 minutes of an airport with scheduled air cargo operations.

The 60-minute drive-times are not necessarily the same as each airport's service or market area. True air cargo market areas are unique to a given airport. Similar to commercial airline market or service areas, actual air cargo market/service areas are defined by geography, accessibility, business and economic characteristics, and proximity to alternative air cargo service. Actual service areas for integrated express carriers are a product of the carrier's overall service network and are highly optimized. An airport with multiple cargo carriers, such as Hartsfield-Jackson Atlanta International (ATL), may have more than one carrier-defined market area. For instance, the actual market area for international air cargo at ATL is significantly larger than its market area for domestic air cargo.

5.1.1 International Gateway Airports Serving Georgia

As defined in **Chapter 2**, international gateway airports function as consolidation, distribution, and processing points for international air cargo. To a certain extent, an international air cargo gateway is similar to an airline connecting hub airport in that the air cargo gateway airport is not reliant on its surrounding market area for sufficient cargo to support international air cargo operations. As with a passenger connecting hub, much of the cargo moving through an international gateway airport may not originate in, and may not be destined for, the gateway airport's surrounding market area. Cargo served at international gateway airports is often trucked to and from other locations hundreds of miles away.

The closest international air cargo gateways serving Georgia are located at the following airports:

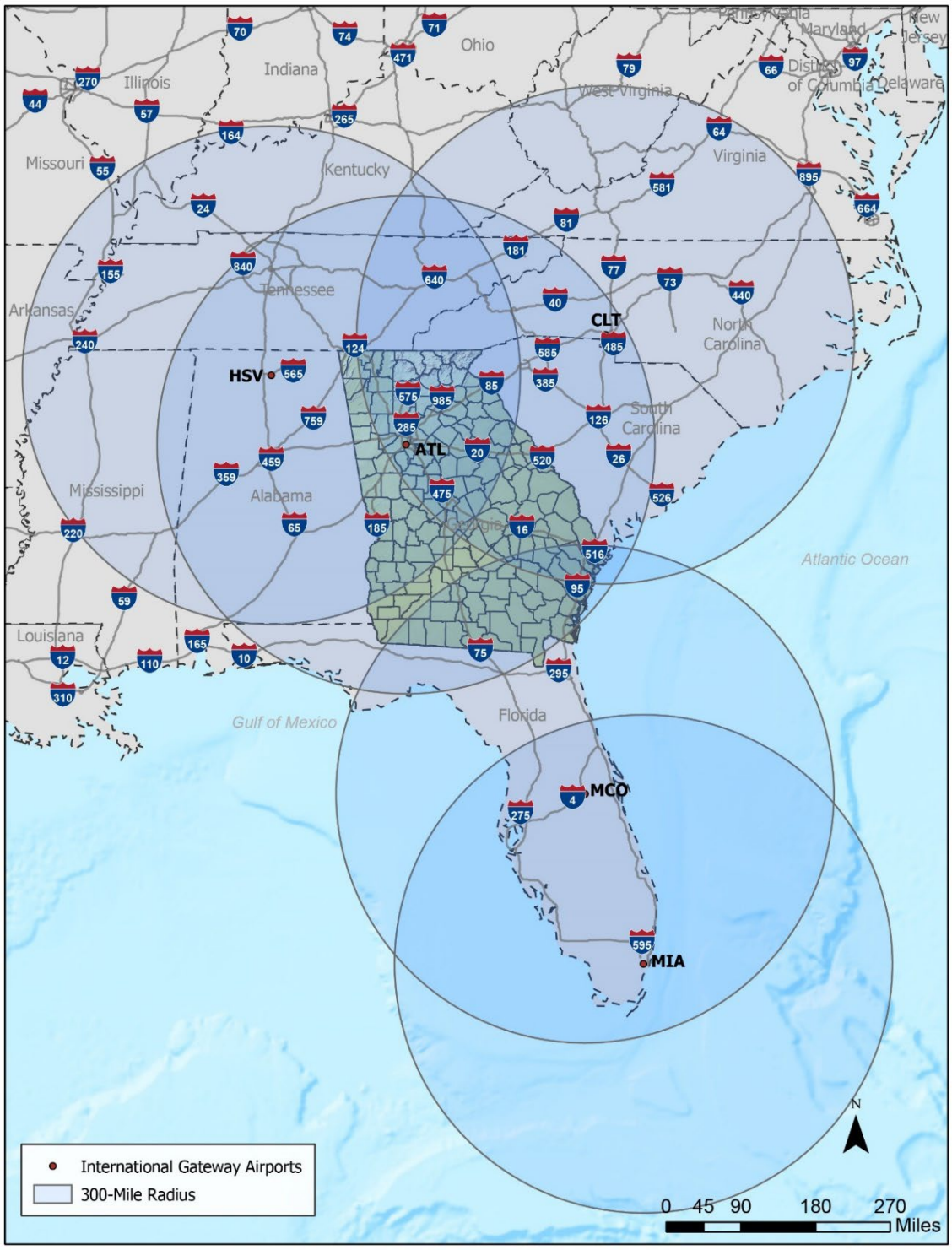
- Hartsfield-Jackson Atlanta International (ATL)
- Huntsville International (HSV)
- Charlotte Douglas International (CLT)
- Orlando International (MCO)
- Miami International (MIA)

Due to their level of international cargo lift capacity, these airports process significant levels of air freight that originates in or is destined to international locations. As a result, the air cargo market area for these airports is set at 300-miles; this distance reflects roughly a five to six-hour trucking time.

Figure 5-1 below illustrates the 300-mile radius for each of the international gateway airports in or near Georgia. As shown, virtually the entire state is covered by ATL's radius, indicating that any international air cargo originating in or destined for Georgia can be reasonably served by ATL. For international gateways in neighboring states, all of Georgia is covered except for a narrow band in the southwest portion of the state. This is not indicative of a service gap and, realistically, any international cargo in this portion of the state would still be trucked to the most suitable existing international air cargo gateway airport.

While MIA's 300-mile radius, shown in **Figure 5-1**, does not overlap Georgia, MIA's unique position as the primary cargo gateway airport to Latin America and the Caribbean means that its true catchment area for international cargo extends well into the eastern half of the U.S. and most likely encompasses all of Georgia, especially for international air cargo coming to and from locations in Latin America. Many perishable products are shipped by air from Latin America counties to destinations in the U.S.

Figure 5-1: 300-Mile Radius for International Gateway Airports



Source: FAA records, Airlines schedules, Airport records, ESRI, Jviation analysis, August 2021

As discussed in **Chapter 2**, ATL supports significant levels of international air cargo via dedicated all-cargo carriers/freighters, as well as international air cargo carried in the belly compartments of passenger aircraft. In 2019, ATL handled more than 639,000 metric tons of air cargo both enplaned and deplaned, approximately 56 percent of which was international.[2] There are several other international gateway airports in neighboring states within a half-day's drive of Georgia, plus any gateway airport east of the Mississippi is within a full day's drive of Georgia. Given existing levels of international cargo service at ATL, combined with the location of other nearby international gateway airports, international cargo service currently available to Georgia is adequate for current and anticipated demand.

5.1.2 Airports with Existing Scheduled Air Cargo Service

As discussed in **Chapter 2**, many airports in Georgia accommodate varying levels of air cargo aircraft activity. According to FAA data from the National Offload Program (NOP), 58 airports in Georgia had at least one annual ad hoc cargo operation during the past 18 months.[3] An ad hoc air cargo operation is one that takes place "on-demand" rather than on a scheduled basis.

Despite the prevalence of ad hoc cargo operations across the state, the majority of Georgia's air cargo demand is met by airports served by regularly scheduled air cargo carriers, primarily service provided by integrated express carriers. GIS analysis of off-airport air cargo demand generating industries/activities helps to show the relationship of the demand generators, as they pertain to airports with scheduled air cargo service. Georgia airports with existing scheduled air cargo service and the type of scheduled air cargo service available are:

- Columbus Airport (CSG) – Feeder/Turboprop Cargo Airport
- East Georgia Regional Airport (SBO) – Feeder/Turboprop Cargo Airport
- Gwinnett County Airport-Briscoe Field (LZU) – Specialty Cargo Airport
- Hartsfield-Jackson Atlanta International Airport (ATL) – Mainline/Jet Air Cargo Airport
- Savannah/Hilton Head International Airport (SAV) – Mainline/Jet Air Cargo Airport
- Southwest Georgia Regional Airport (ABY) – Mainline/Jet Air Cargo Airport
- Statesboro-Bulloch County Airport (TBR) – Feeder/Turboprop Cargo Airport

Carriers serving these airports, along with the routes they serve, are reported and mapped in **Chapter 2** of this report. It is important to note that although Gwinnett County Airport-Briscoe Field (LZU) has scheduled air cargo service, the operator of this service, Quest Diagnostics, is not a typical integrated express cargo carrier. The other six airports support traditional scheduled air cargo operators that accommodate "for hire" air cargo transport. With the exception of air cargo service at ATL, the remainder of the scheduled air cargo service in Georgia is available primarily through integrated express networks like FedEx Express, DHL, and UPS.

While the 60-minute drive-time for LZU is depicted in some of the subsequent mapping, this airport does not have conventional air cargo service by an integrated express carrier. As will be discussed later in this chapter, businesses that support the healthcare industry are frequent generators of air cargo demand. Air cargo service available at LZU only supports the transport of items related to medical specimens and

[2] https://www.atl.com/wp-content/uploads/2020/02/ATL-Traffic-Report-Dec-2019.pdf
[3] FAA National Offload Program Flight Records, January 2019 through May 2020

lab results. The air cargo service at LZU, and its daily frequency, accounts for the airport's inclusion in the scheduled air cargo and helps to determine if there is demand for traditional scheduled air cargo service in this area.

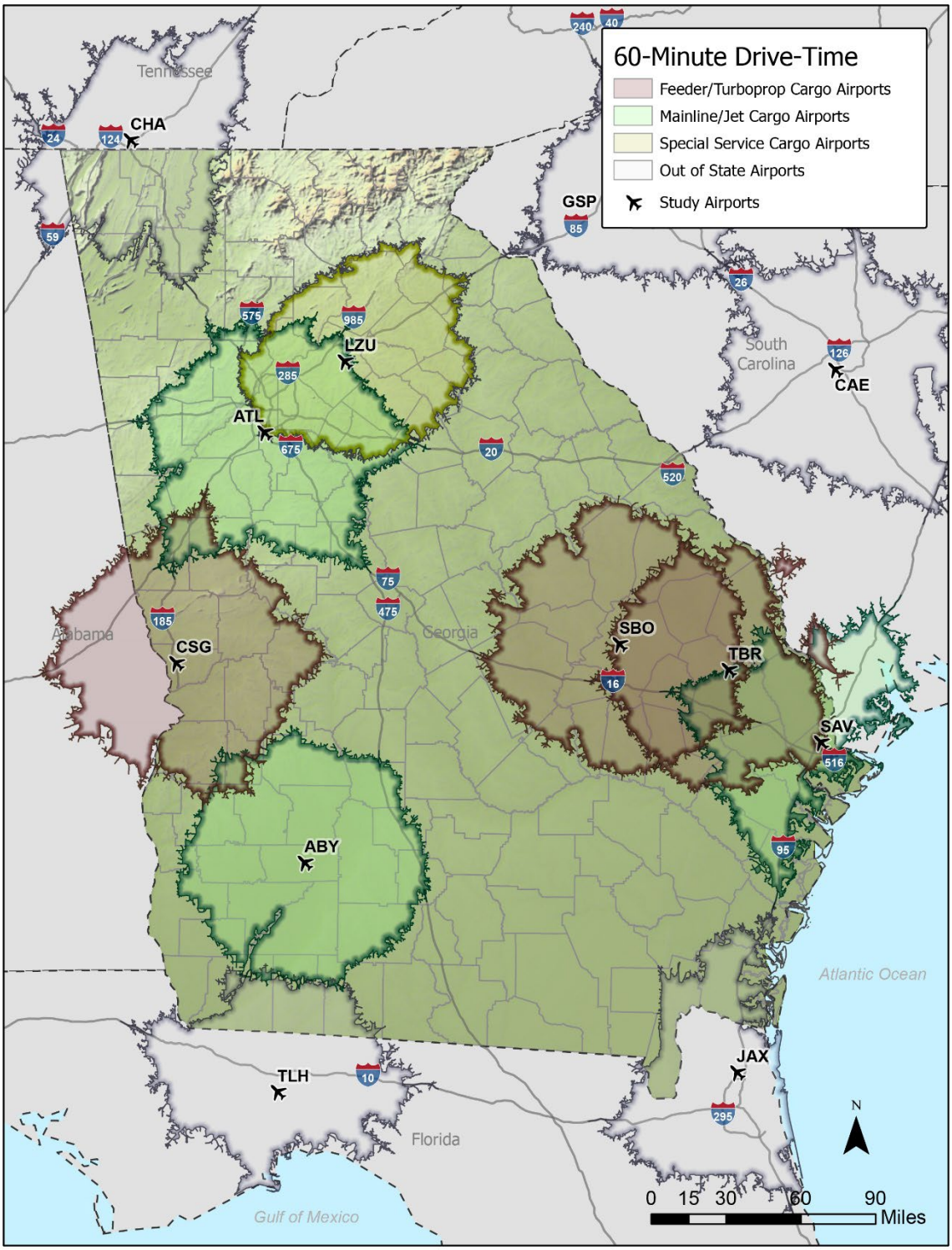
Like interstate commerce, the flow of air cargo does not stop at the Georgia state boundary. There are several airports in neighboring states with scheduled air cargo service that may serve portions of Georgia. These airports are:

- Chattanooga Lovell Field (CHA) in Chattanooga, Tennessee
- Columbia Metropolitan Airport (CAE) in Columbia, South Carolina
- Greenville/Spartanburg International Airport (GSP) in Greer, South Carolina
- Jacksonville International Airport (JAX) in Jacksonville, Florida
- Tallahassee International Airport (TLH) in Tallahassee, Florida

For Georgia and air cargo airports in nearby states, 60-minute drive-times are used to approximate speed and distance variables for integrated express operators. The drive-times are used to determine the proximity of air cargo demand generators to airports with regular air cargo service. **Figure 5-2** presents 60-minute drive-times for seven Georgia airports and five neighboring airports with existing scheduled air cargo service.

Over 90 percent of state's population is within the 60-minute drive-time of an airport with existing scheduled air cargo service. Larger cities outside of existing scheduled cargo airport drive-times include Augusta, Macon, and Valdosta. Subsequent portions of this chapter identify demand generators and areas of higher household income that are beyond the 60-minute drive-times considered in the analysis.

Figure 5-2: 60-Minute Drive-Times for Airports with Existing Scheduled Air Cargo Service



Source: ESRI, Jviation analysis, August 2021.

5.2 Off-Airport Air Cargo Generators Analysis

This analysis highlights the connections between various industries/activities, and income levels, and air cargo demand. This section identifies important economic drivers for air cargo demand, and several key industries known to rely on air cargo. A weighted value, based on the relative scale/size of each industry/activity, was assigned to each demand generator and a cumulative score for each airport's 60-minute drive-time was identified for each industry and for all industries/activities combined. This exercise was performed for each of the seven Georgia airports with existing scheduled air cargo service. LZU is included in this analysis because of the specialty medical air cargo service it supports.

5.2.1 Industry Reliance on Air Cargo

Transporting goods by air is the most expensive mode of shipping and it is used by industries that require the high-speed performance that only air transportation provides. Businesses that rely on air cargo often produce or consume perishable items; generate high-value goods that offset shipping costs; and/or rely on aviation to meet urgent demands, changing schedules, or stringent delivery requirements. Some industries integrate air cargo service into their supply chain management processes: air transport acts as a "conveyor belt" in the manufacturing process by bringing parts from remote areas to the final assembly point. Retailers, particularly in e-commerce, may also heavily rely on air cargo for inventory management and direct-to-consumer shipping. Several industries and activities known to rely on air cargo shipments on a regular basis, were analyzed as part of this study:

- Distribution Centers
- Fulfillment Centers
- Aerospace Manufacturing
- Automotive Manufacturing
- Medical Device Manufacturing
- Pharmaceutical Manufacturing

The industries/activities listed above generate varying levels of demand for air cargo services, and their locations are analyzed relative to the established airport drive-times. Possible system gaps (when air cargo demand generators are not located within the identified drive-times) are discussed later in this chapter.

5.2.2 Air Cargo Demand by Industry/Activity and Airport Proximity

To assess the level of potential air cargo demand from the aforementioned industries/activities, a Geographic Information Systems (GIS) analysis was conducted to identify the number of cargo demand generating locations that fall within the established 60-minute drive-times. Street addresses for almost 900 Georgia businesses/activities that rely on air cargo were collected from a wide variety of sources. A weighted scoring system was developed to assign each activity a relative value for its size and propensity to generate air cargo demand. A number of factors, like facility size, number of employees, or annual revenue, informed the value assigned to each demand generator. Given these considerations, the largest activities in each category were assigned the highest point values in the scoring process.

Once weighted values were established, GIS mapping generated ranges of facility locations for each industry/activity type. The mapping process identified the proximity of industries and activities in relation

to airports in the state with existing scheduled air cargo service. The weighted score for each airport is indicative of the level of potential air cargo demand associated within each drive-time. The drive-time analysis generally follows the process below:

1. Identify the geographic 60-minute drive-time for each airport with scheduled air cargo service using GIS
2. Identify the geographic location and distribution of key industries/activities that rely on air cargo
3. Assign a weighted score to each industry/activity using a relative measure of scale
4. Identify the cumulative score for air cargo generating industries/activities within each airport's 60-minute drive-time

The following sections detail the results of this analysis by industry/activity type.

5.2.2.1 Distribution and Fulfillment Centers

Retail Distribution Networks

Retail businesses may rely on air cargo shipments to meet consumer demand. While trucking is the preferred method of shipment for most retail businesses, air cargo may be used to meet demand, particularly during periods when demand for goods increases. There are two types of retail outlets in the U.S. relying on distribution networks to support consumer demand. Conventional retail stores, also referred to as brick and mortar (B&M), support purchases that occur in a physical retail store. Electronic retail, also known as e-commerce, is a competing sales channel. E-commerce retail allows customers to purchase items through the internet and take possession later, most often through home delivery. E-commerce deliveries may arrive same-day, next-day, or longer. It should be noted that some B&M stores, like Target and Walmart, provide both physical locations and online purchase options.

B&M distribution networks need to provide large quantities of a predictable set of goods to fixed store locations with at least several days of lead time. B&M retailers must transport items to a store that is conveniently located for potential customers, and they must maintain an in-store inventory large enough to supply uncertain demand. By contrast, e-commerce usually requires that small shipments occur on short notice to locations that are not known in advance (i.e., consumer households or businesses), and these deliveries have high consumer expectations. E-commerce delivery requirements necessitate a logistics network differing from B&M retail distribution networks.

Distribution centers (DCs) refer to warehouses that hold inventory and support the shipment of products to B&M retail stores. Fulfillment centers (FCs) refer to facilities that hold inventory and process orders received through an expedited e-commerce sales channel. A single retailer may have many DCs or FCs, depending on its size, geographic scope, and logistics strategy.

Average Household Income and Air Cargo Demand

While business-to-business activity is still a mainstay of air cargo demand, e-commerce has driven the recent increase in demand. Household income is relevant to air cargo demand: higher household income often correlates with more e-commerce purchases and, by extension, air cargo service.

In 2016, Amazon reported the average household income for its Prime members was about $70,000[4] and that 70 percent of households in the U.S. with incomes over $112,000 have a Prime membership.[5] Amazon Prime members receive free expedited shipping (one- or two-day) on most items, and shipments are often transported by Amazon's own growing fleet of aircraft. Many of Amazon's competitors, including Walmart and Target, have paid membership programs which include expedited shipping, furthering increased air cargo demand. **Table 5-1** presents average household income by 60-minute drive-time for each Georgia airport with scheduled cargo service.

Table 5-1: 2021 Average Household Income by 60-Minute Drive-Times for Airports with Existing Scheduled Air Cargo Service

Airport	FAA ID	Number of Households with Income <$50,000	Number of Households with Income Between $50,000-$74,999	Number of Households with Income >$75,000	Total Households
Columbus Airport	CSG	73,640 **(52%)**	26,351 **(18%)**	43,200 **(30%)**	143,191
East Georgia Regional Airport	SBO	62,790 **(57%)**	19,034 **(17%)**	28,620 **(26%)**	110,444
Gwinnett County Airport-Briscoe Field	LZU	511,168 **(34%)**	258,192 **(17%)**	746,423 **(49%)**	1,515,783
Hartsfield Jackson Atlanta Int'l Airport	ATL	664,408 **(35%)**	345,509 **(18%)**	901,601 **(47%)**	1,911,518
Savannah/Hilton Head International Airport	SAV	89,647 **(44%)**	41,772 **(20%)**	72,370 **(36%)**	203,789
Southwest Georgia Regional Airport	ABY	73,315 **(58%)**	21,004 **(16%)**	32,602 **(26%)**	126,921
Statesboro-Bulloch County Airport	TBR	59,116 **(46%)**	25,116 **(20%)**	44,016 **(34%)**	128,248

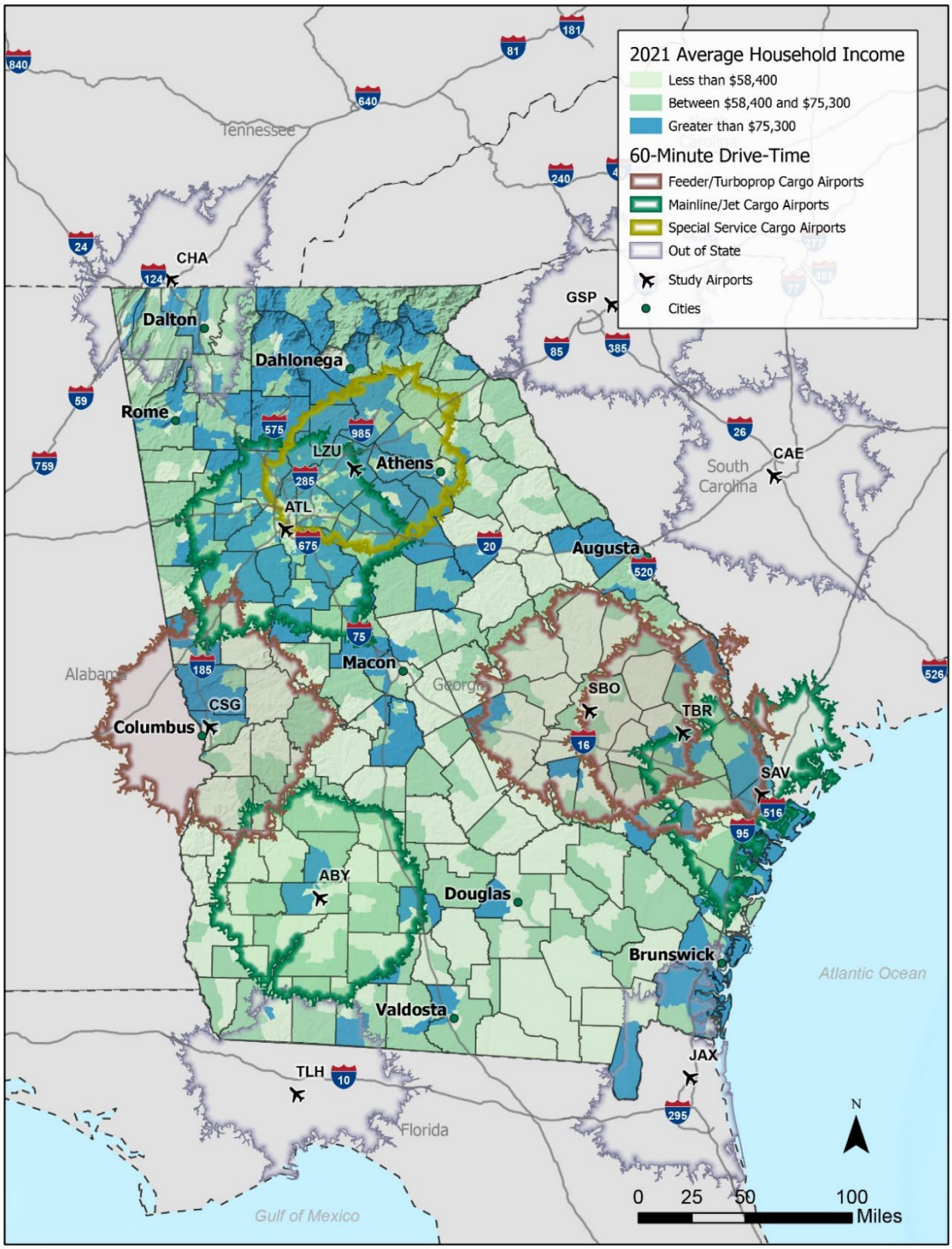
Source: U.S. Census Bureau, ESRI, Jviation analysis, August 2021

As shown, ATL's 60-minute drive-time has more than 900,000 households with a household income above $75,000. This is indicative of potential demand for e-commerce shipments that rely on air cargo for delivery. Based on study analysis, nearly 50 percent of all households in the Atlanta Metro area have annual income levels that approach the $75,000 threshold.

Figure 5-3 presents a map illustrating several ranges of average household income, along with the 60-minute drive-times for airports in and nearby Georgia with scheduled air cargo service.

[4] https://www.retaildive.com/news/amazon-prime-attracting-wealthier-younger-members/410272/
[5] https://www.businessinsider.com/amazon-prime-penetration-by-household-income-2016-4

Figure 5-3: 2021 Average County Household Income and 60-Minute Drive-Times for Airports with Existing Scheduled Air Cargo Service



Source: U.S. Census Bureau, ESRI, Jviation analysis, August 2021.

Distribution and Fulfillment Centers (DCs and FCs)

DCs support the physical distribution of inventory. They typically receive goods via truck, hold the inventory, and process outbound orders, all within the logistics budget of retailers. Shipments usually arrive by the truckload (TL) or less-than-truckload (LTL). Workers in FCs and DCs disassemble inbound pallets and transfer items to inventory.

When stock keeping units (SKUs) are requested by stores or customers, "pickers" physically locate the items and consolidate the entire order that is packaged and loaded onto a truck for delivery. Many automated facilities have electronic systems to pick and consolidate products. Shipments destined for stores are typically transported at the pallet level and can weigh hundreds of pounds, while shipments for consumers are composed of a small number of SKUs that can weigh one to 50 pounds.

Distribution Centers in Georgia

Georgia has seen significant growth and development in the warehousing and logistics industry. The state is home to nearly 800 million square feet of warehouse distribution space. Metro Atlanta—the largest market in Georgia and sixth largest in the U.S.—accounts for 683 million square feet alone of both leased and available distribution center space. Georgia is home to 55 warehouses with at least 1 million square feet of space.

Proximity of Distribution Centers to Georgia Airports

For DCs in Georgia, building size (in square feet) is the metric chosen as the indicator for potential air cargo demand with five scoring ranges. Buildings measuring greater than one million square feet were assigned the highest value (five points), while any building below 250,000 square feet was assigned the lowest value (one point).

Table 5-2 presents points assigned to DC buildings based on their total square footage. As shown, statewide there are nearly 200 distribution centers in Georgia, resulting in a total weighted score of 702. The total weighted score was determined by multiplying the weighting for each building size and the number of buildings in the category. All weighted scores were totaled to generate a total score for the category. Facility locations for DCs were mapped using GIS to identify the proximity of these facilities to airport 60-minute drive-times.

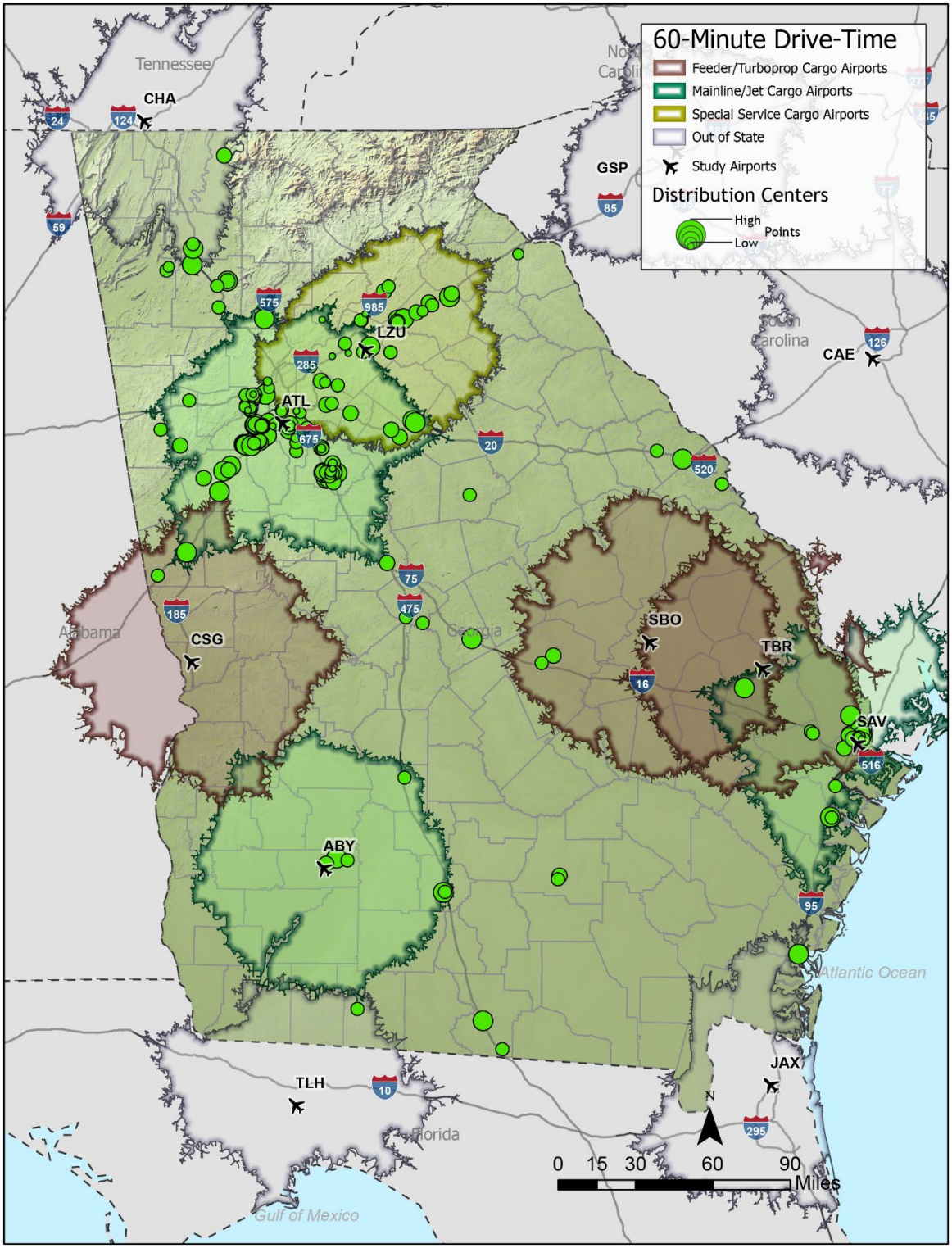
Table 5-2: Weighting of Distribution Centers in Georgia

Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Distribution Centers	**Building Size (Square Feet)**			
	>= 1,000,000	5	55	275
	700,000 to 999,999	4	48	192
	500,000 to 699,999	3	65	195
	250,000 to 499,999	2	17	34
	0 to 249,999	1	6	6
	Subtotal		**191**	**702**

Source: Business Wise, CoStar, and Georgia Power Warehouse/Distribution Database, 2019, Jviation analysis, August 2021

Figure 5-4 maps the locations of the 191 DCs across the state in relation to the airport 60-minute drive-times. As shown on this figure, a number of DCs north and east of the Atlanta Metro along the I-85 corridor lie in the 60-minute drive-time for the airport serving Gwinnett County (LZU). Air cargo demand associated with these DC's is not presently served at LZU, given the specialty nature of the cargo carrier that serves this airport. Air cargo needs associated with DCs in the LZU 60-minute drive-time are served elsewhere. Information presented in the figure is helpful for identifying potential air cargo demand associated with DCs in Georgia.

Figure 5-4: Scheduled Air Cargo Airport 60-Minute Drive-Times and Distribution Centers in Georgia



Source: Business Wise, CoStar, and Georgia Power Warehouse/Distribution Database, 2019, ESRI, Jviation analysis, August 2021

As presented in **Figure 5-4**, DCs in Georgia are concentrated in the Atlanta Metropolitan Area and extend primarily along the state's interstate highway corridors. A number of DCs are located southwest of Hartsfield-Jackson Atlanta International Airport along I-85 towards Newnan. On the northeast side of the Atlanta Metro Area, a series of DCs are located along the I-85 corridor extending towards Gainesville. Distribution centers are also concentrated in the Savannah area along the I-95 corridor. These DCs likely serve retail businesses relying on maritime shipments arriving via the Port of Savannah. For example, Target has a two-million-square-foot DC located in Savannah, while Walmart has a similar sized DC located in nearby Statesboro.[6]

Table 5-3 identifies air cargo demand related to DCs within each airport's 60-minute drive-time. Within the Savannah/Hilton Head International Airport (SAV) 60-minute drive-time, there are a total of 26 DCs that have the potential to generate air cargo demand. Based on the size (in square feet) of these centers, a weighted score of 92 is assigned to SAV's 60-minute drive-time for DCs.

Because the 60-minute drive-time for SAV overlaps with the catchment areas for Statesboro-Bulloch County Airport (TBR) and East Georgia Regional Airport (SBO), the score unique to only SAV is 62, or 67 percent of SAV's total score. DCs in the overlapping portion of the 60-minute drive-times represent a weighted score of 30 and represent the remaining 33 percent of the DCs in the airport 60-minute drive-times.

Not surprisingly, ATL has the highest total score and unique score for all existing cargo airports for DCs. Going forward in the analysis, each airport's unique score, which considers any overlap in airport 60-minute drive-time, is identified.

Table 5-3: Weighted Score of Distribution Centers by 60-Minute Drive-Time Considering Area Overlaps

Airport	FAA ID	Count of Industry Locations in 60-Minute Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Unique Score (Excluding Any Overlap)
Distribution Centers					
Columbus Airport	CSG	3	13	ABY, ATL	3
East Georgia Regional Airport	SBO	4	13	SAV, TBR	7
Gwinnett County Airport-Briscoe Field	LZU	53	159	ATL	74
Hartsfield Jackson Atlanta Int'l Airport	ATL	122	406	CSG, LZU	311
Savannah/Hilton Head International Airport	SAV	26	92	SBO, TBR	62
Southwest Georgia Regional Airport	ABY	6	23	CSG	23
Statesboro-Bulloch County Airport	TBR	10	30	SAV, SBO	0

Source: Business Wise, CoStar, and Georgia Power Warehouse/Distribution Database, 2019, Jviation analysis, August 2021.

[6] https://www.selectgeorgia.com/documents/67/warehousing_and_logistics.pdf

Fulfillment Centers in Georgia (FCs)

Because of its location within the southeastern U.S., Atlanta is an extremely popular location for fulfillment centers (FCs) that serve Georgia, Florida, Alabama, and North and South Carolina. Research by Georgia Tech indicates that, in comparison to DCs, there is generally a closer relationship between FCs and potential air cargo demand.[7].

Proximity of Fulfillment Centers to Georgia Airports

For FCs in Georgia, building size is not available for all locations, and there is a wide range of sizes for these facilities. Small FCs may be 50,000 square feet in size, while a number of Amazon fulfillment centers in Georgia are over one million square feet. All FCs are assigned 5 points, regardless of size, due to their heavier reliance on air cargo shipping.

Table 5-4 presents points assigned to FC buildings. As shown, statewide there are 41 fulfillment center locations, resulting in a total weighted score of 205. These facility locations are mapped using GIS to identify the proximity of the facilities to airport 60-minute drive-times.

Table 5-4: Weighting of Fulfillment Centers in Georgia

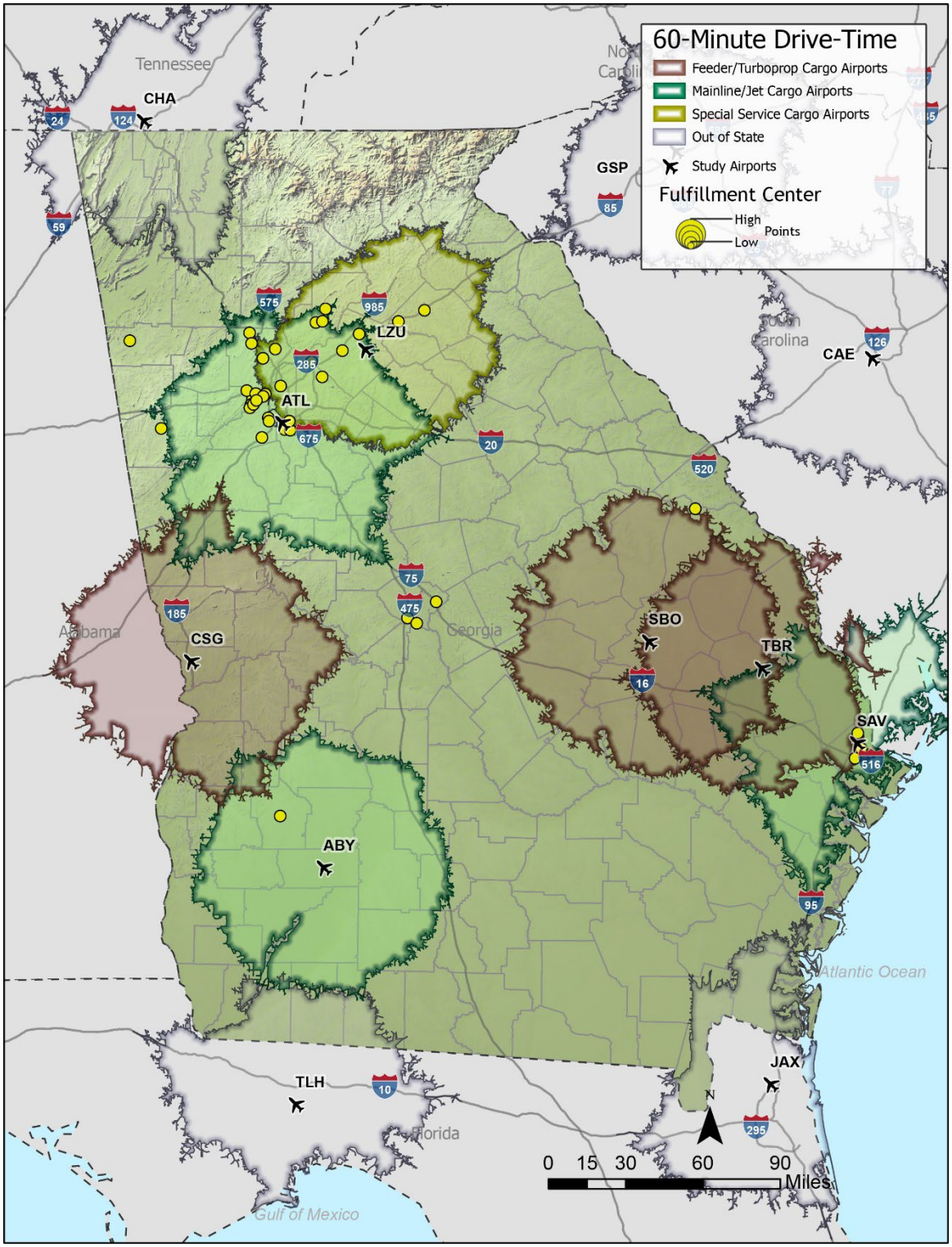
Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Fulfillment Centers	**Building Size (Square Feet)**			
	Any amount	5	41	205
	Subtotal		**41**	**205**

Source: StoreYaBlog eCommerce Tools, FBA Help, Jviation analysis, August 2021

Figure 5-5 maps the locations of the 41 distributions centers across the state in relation to the airport 60-minute drive-times. As reflected in **Figure 5-5**, FCs in Georgia are concentrated in the Atlanta Metropolitan Area and extend along the interstate highway corridors. A number of FCs are also located around Macon and Savannah.

[7] ELECTRONIC RETAIL EFFECTS ON AIRPORTS AND REGIONAL DEVELOPMENT, Page 119, by Peter James Hylton, School of City and Regional Planning, Georgia Institute of Technology, August 2018

Figure 5-5: Scheduled Air Cargo Airport 60-Minute Drive-Times and Fulfillment Centers in Georgia



Source: StoreYaBlog eCommerce Tools, FBA Help, ESRI, Jviation analysis, August 2021

Table 5-5 identifies air cargo demand related to fulfillment centers found within each airport's 60-minute drive-time. As shown, within ATL's 60-minute drive-time there are a total of 29 fulfillment centers for a weighted score of 145.

Table 5-5: Weighted Score of Fulfillment Centers by Scheduled Air Cargo 60-Minute Drive-Times

Airport	FAA ID	Count of Industry Locations in 60-Minute Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Unique Score (Excluding Any Overlap)
Fulfillment Centers					
Columbus Airport	CSG	-	-	ABY, ATL	0
East Georgia Regional Airport	SBO	-	-	SAV, TBR	0
Gwinnett County Airport-Briscoe Field	LZU	13	65	ATL	10
Hartsfield Jackson Atlanta Int'l Airport	ATL	29	145	CSG, LZU	90
Savannah/Hilton Head International Airport	SAV	3	15	SBO, TBR	5
Southwest Georgia Regional Airport	ABY	1	5	CSG	5
Statesboro-Bulloch County Airport	TBR	2	10	SAV, SBO	10

Source: StoreYaBlog eCommerce Tools, FBA Help, Jviation analysis, August 2021.

5.2.2.2 Aerospace Manufacturing

Aerospace Manufacturing in Georgia

Georgia is home to more than 80 businesses involved in the manufacturing of aerospace and aircraft equipment and parts. Similar to the automotive industry, aerospace manufacturing involves complex supply chains that see parts and equipment shipped all over the world from suppliers to assembly plants. Air cargo is often used to transport aerospace parts due to their relatively high value, short lead time, and frequency of need. Aerospace businesses are identified in Georgia Power's Community and Economic Development report on Aerospace Manufacturing. This report identifies more than 80 aerospace businesses, including Gulfstream Aerospace, Delta Air Lines TechOps Division, Lockheed Martin, Pratt & Whitney, L-3 Communications, Northrop Grumman, and Thrush Aircraft, engaged in various aspects of aerospace and aircraft manufacturing.

Proximity of Aerospace Manufacturing to Georgia Airports

For aerospace manufacturing businesses in Georgia, employment is the metric for identifying potential air cargo demand. Five scoring ranges are established from 1 to over 1,000 employees. Businesses with more than 1,000 employees are assigned the highest value (five points), while any business with 50 or fewer employees are assigned the lowest value (one point).

Table 5-6 presents points for aerospace manufacturing locations. As shown in **Table 5-6**, statewide there are 81 aerospace manufacturing locations in Georgia, resulting in a total weighted score of 202. These facility locations are mapped using GIS to identify the proximity of the facilities to the identified airport 60-minute drive-times.

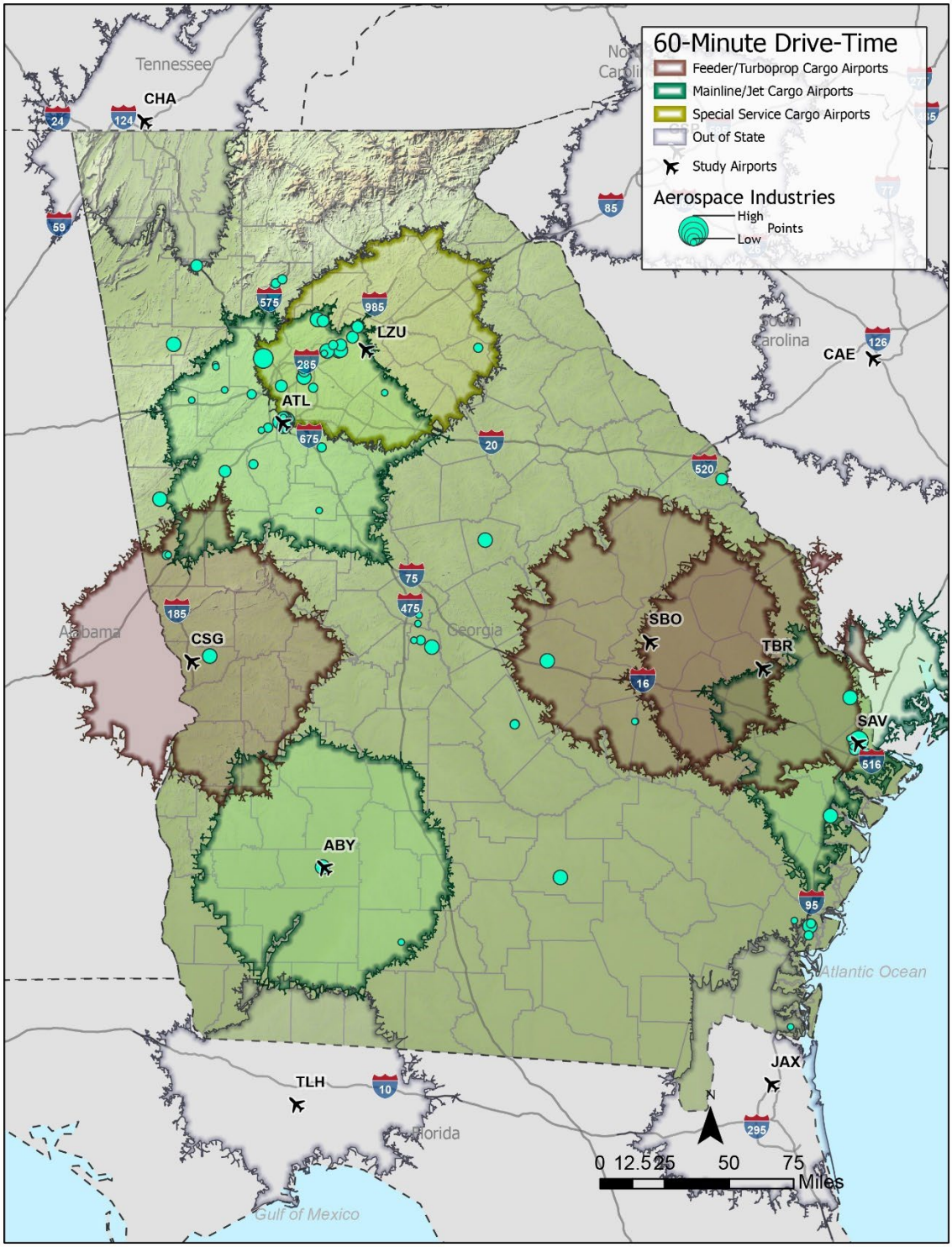
Table 5-6: Weighting of Aerospace Manufacturing in Georgia

Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Aerospace Manufacturing	**Employee Count**			
	>=1,000	5	3	15
	200 to 999	4	20	80
	100 to 199	3	15	45
	50 to 99	2	19	38
	0 to 49	1	24	24
	Subtotal		**81**	**202**

Source: Georgia Power Community and Economic Development (Aerospace Manufacturing), Jviation analysis, August 2021

Figure 5-6 maps the locations of the 81 aerospace manufacturing businesses across the state in relation to the 60-minute drive-times. As presented in **Figure 5-6**, aerospace manufacturing in Georgia is concentrated around larger cities such as Atlanta and Savannah, with a number of aerospace businesses also located around Macon, Columbus, and other parts of south Georgia.

Figure 5-6: Scheduled Air Cargo Airport 60-Minute Drive-Times and Aerospace Manufacturing in Georgia



Source: Georgia Power Community and Economic Development (Aerospace Manufacturing), ESRI, Jviation analysis, August 2021

Table 5-7 identifies air cargo demand related to aerospace manufacturing within each airport's 60-minute drive-time. Of all airports, ATL's 60-minute drive-time is home to the greatest number of aerospace businesses, with 42 locations that combine for a total weighted score of 104.

Table 5-7: Weighted Score of Aerospace Manufacturing by Scheduled Air Cargo 60-Minute Drive-Time

Airport	FAA ID	Count of Industry Locations in 60-Minunte Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Unique Score (Excluding Any Overlap)
Aerospace Manufacturing					
Columbus Airport	CSG	4	11	ABY, ATL	11
East Georgia Regional Airport	SBO	3	6	SAV, TBR	6
Gwinnett County Airport-Briscoe Field	LZU	26	71	ATL	2
Hartsfield Jackson Atlanta Int'l Airport	ATL	42	104	CSG, LZU	35
Savannah/Hilton Head International Airport	SAV	6	16	SBO, TBR	5
Southwest Georgia Regional Airport	ABY	2	5	CSG	5
Statesboro-Bulloch County Airport	TBR	5	11	SAV, SBO	0

Source: Georgia Power Community and Economic Development (Aerospace Manufacturing), Jviation analysis, August 2021.

5.2.2.3 Automotive Manufacturing

Automotive Manufacturing in Georgia

Automotive manufacturing is a major economic driver for Georgia's economy; the state is home to almost 175 assembly plants and/or numerous parts suppliers. Similar to the aerospace industry, automotive manufacturing involves complex supply chains with parts and equipment shipped all over the world from suppliers to assembly plants. Air cargo is often involved in moving automotive parts because of their relatively high value, short lead time, and frequency of need. Due to its highly time-critical nature, tooling for automotive assembly lines is also commonly flown by air cargo aircraft for launches of new car models or when assembly lines break down.

Businesses in the automotive manufacturing category are identified through Georgia Power's Community and Economic Development report on Automotive Manufacturing. This report identifies automotive businesses, which include Kia Motors, Blue Bird, Yamaha, Toyo Tire, Mercedes-Benz, Honda, Panasonic, Hitachi, Porsche, Hyundai, Great Dane, and Club Car.

Proximity of Automotive Manufacturing to Georgia Airports

For automotive manufacturing businesses in Georgia, employment is the metric chosen as the indicator for potential air cargo demand, with five scoring ranges. Employment was the indicator available for all 175 businesses included in the category. Businesses with more than 1,000 employees are assigned the highest value (five points), while any business with below 100 employees is assigned the lowest value (one point).

Table 5-8 presents points assigned to automotive manufacturing locations based on an employment measure. As shown in **Table 5-8**, statewide there are 174 automotive manufacturing locations in Georgia, resulting in a total weighted score of 382. Facility locations are mapped using GIS to identify the proximity of the automotive facilities to the airport 60-minute drive-times.

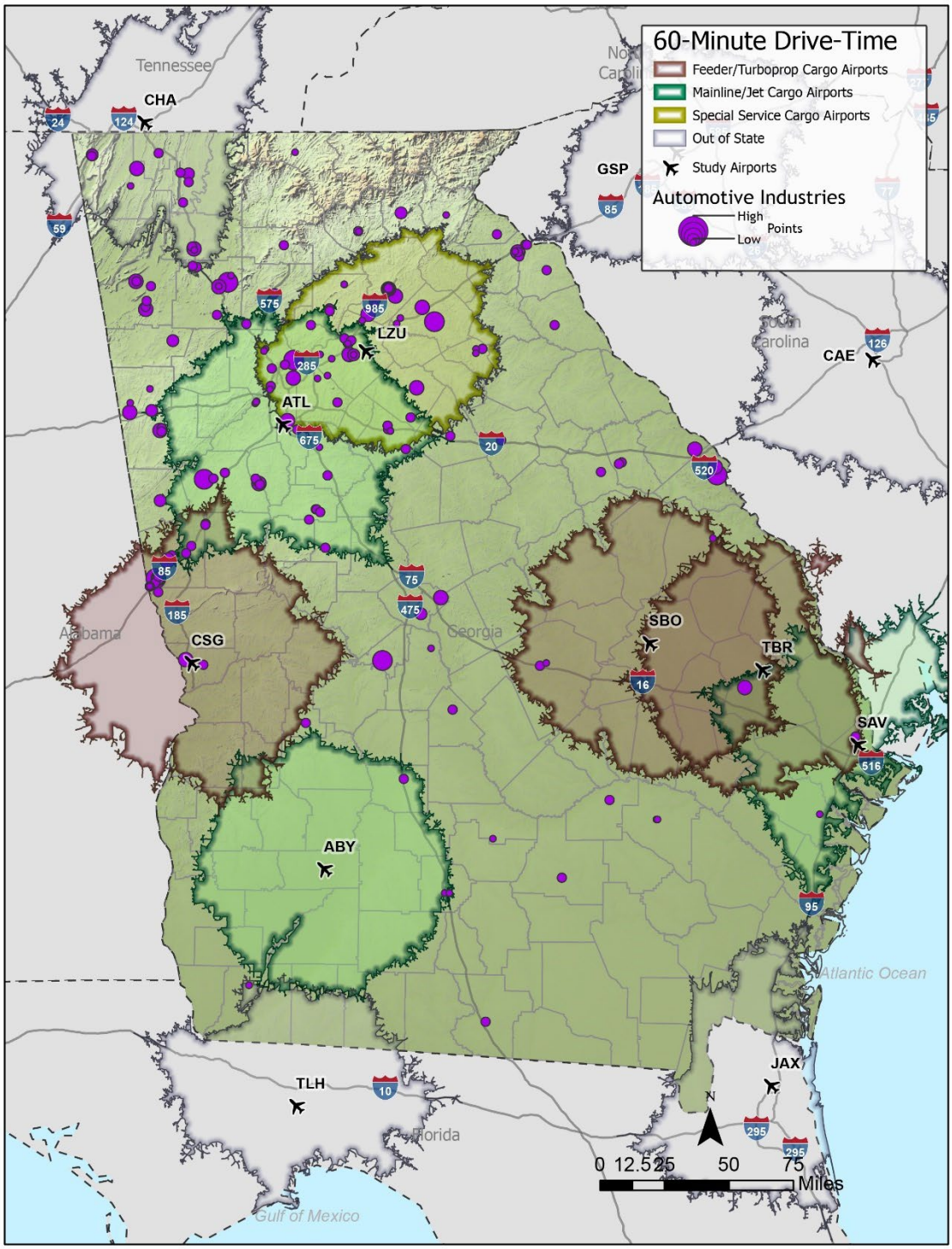
Table 5-8: Weighting of Automotive Manufacturing in Georgia

Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Aerospace Manufacturing	**Employee Count**			
	>=1,000	5	7	35
	500 to 999	4	24	96
	400 to 499	3	11	33
	100 to 399	2	86	172
	0 to 99	1	46	46
	Subtotal		**174**	**382**

Source: Georgia Power Community and Economic Development (Automotive Manufacturing), Jviation analysis, August 2021

Figure 5-7 maps the locations of the 174 automotive manufacturing businesses across the state in relation to the airport 60-minute drive-times of airports. As presented in **Figure 5-7**, automotive manufacturing in Georgia is relatively evenly distributed across northern Georgia, largely mirroring the interstate corridors.

Figure 5-7: Scheduled Air Cargo Airport 60-Minute Drive-Times and Automotive Manufacturing in Georgia



Source: Georgia Power Community and Economic Development (Automotive Manufacturing), ESRI, Jviation analysis, August 2021

Table 5-9 identifies air cargo demand related to automotive manufacturing found within each airport's 60-minute drive-time. Of all airports, ATL's 60-minute drive-time is home to the greatest number of automotive businesses, with 55 locations that combine for a total weighted score of 111. **Figure 5-7** helps to highlight the presence of the large concentration of automotive businesses that are located to the northeast of the Atlanta Metro Area.

The 60-minute drive-time of CSG is home to the third largest number of automotive businesses, and it has the third highest total weighted score of 52. CSG is home to the highest unique score, largely due to the presence of Kia's assembly plant in West Point, Georgia.

Table 5-9: Weighted Score of Automotive Manufacturing by Scheduled Air Cargo Airport 60-Minute Drive-Time

Airport	FAA ID	Count of Industry Locations in 60-Minute Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Unique Score (Excluding Any Overlap)
Automotive Manufacturing					
Columbus Airport	CSG	21	52	ABY, ATL	52
East Georgia Regional Airport	SBO	4	8	SAV, TBR	2
Gwinnett County Airport-Briscoe Field	LZU	53	109	ATL	46
Hartsfield Jackson Atlanta Int'l Airport	ATL	55	111	CSG, LZU	42
Savannah/Hilton Head International Airport	SAV	3	7	SBO, TBR	2
Southwest Georgia Regional Airport	ABY	3	4	CSG	4
Statesboro-Bulloch County Airport	TBR	3	7	SAV, SBO	0

Source: Georgia Power Community and Economic Development (Automotive Manufacturing), Jviation analysis, August 2021.

5.2.2.4 Pharmaceutical Production

Pharmaceutical Production in Georgia

The pharmaceutical industry also referred to as "Bio-Pharma" has a strong presence in Georgia. Companies support research, discovery, production, and distribution. The number of businesses in Georgia producing pharmaceuticals grew by 17 percent from 2014 to 2016. Georgia has a highly educated workforce, and pharmaceutical companies employ more than 3,000 chemical engineers, chemists, technicians, pharmacists, biochemists, microbiologists, epidemiologists, and other medical scientists. Georgia's employment growth for all bioscience-related occupations grew by 12.4 percent from 2012 to 2021, outstripping the national average of 11.6 percent.[8]

As discussed in **Chapter 2**, pharmaceutical manufacturing often drives air cargo demand as manufacturers rely on international shipments of pharmaceutical active product ingredients (API). Many pharmaceuticals, such as insulin and vaccines, are temperature sensitive and require some level of refrigeration or temperature-controlled packaging. The speed offered by air transportation means airports are a critical infrastructure asset for rapidly transporting pharmaceuticals. Examples of Georgia's pharmaceutical businesses include Takeda, Sanofi, Cardinal Health, Pfizer, Mikart, Noramco, Alkermes, Cryolife, Axiom Labs, Arbor Pharmaceuticals, and Dendreon Corporation.[9]

Proximity of Pharmaceutical Production to Georgia Airports

For pharmaceutical businesses in Georgia, annual sales serve as the indicator for air cargo demand. Businesses with more than $500 million in annual sales are assigned the highest value with 10 points, while anything below $1 million in annual sales is assigned the lowest value with two points.

For many pharmaceuticals including vaccines and medication, air cargo is the only viable means of transportation due to their time-sensitive and temperature-controlled needs. As a result of a higher level of dependence on air cargo, 10 scoring ranges are established for this industry to better reflect the wide range of business size as defined by annual sales and to differentiate between the mid- and high ranges.

Table 5-10 presents points assigned to pharmaceutical production locations based on annual sales. As shown in **Table 5-10**, statewide there are 294 pharmaceutical production locations in Georgia, resulting in a total weighted score of 875. These facility locations are mapped using GIS to identify the proximity of these facilities to airport 60-minute drive-times.

[8] bioscience-industry-report-7596 (tradeandindustrydev.com)

[9] https://www.georgia.org/industries/life-sciences/bio-pharma

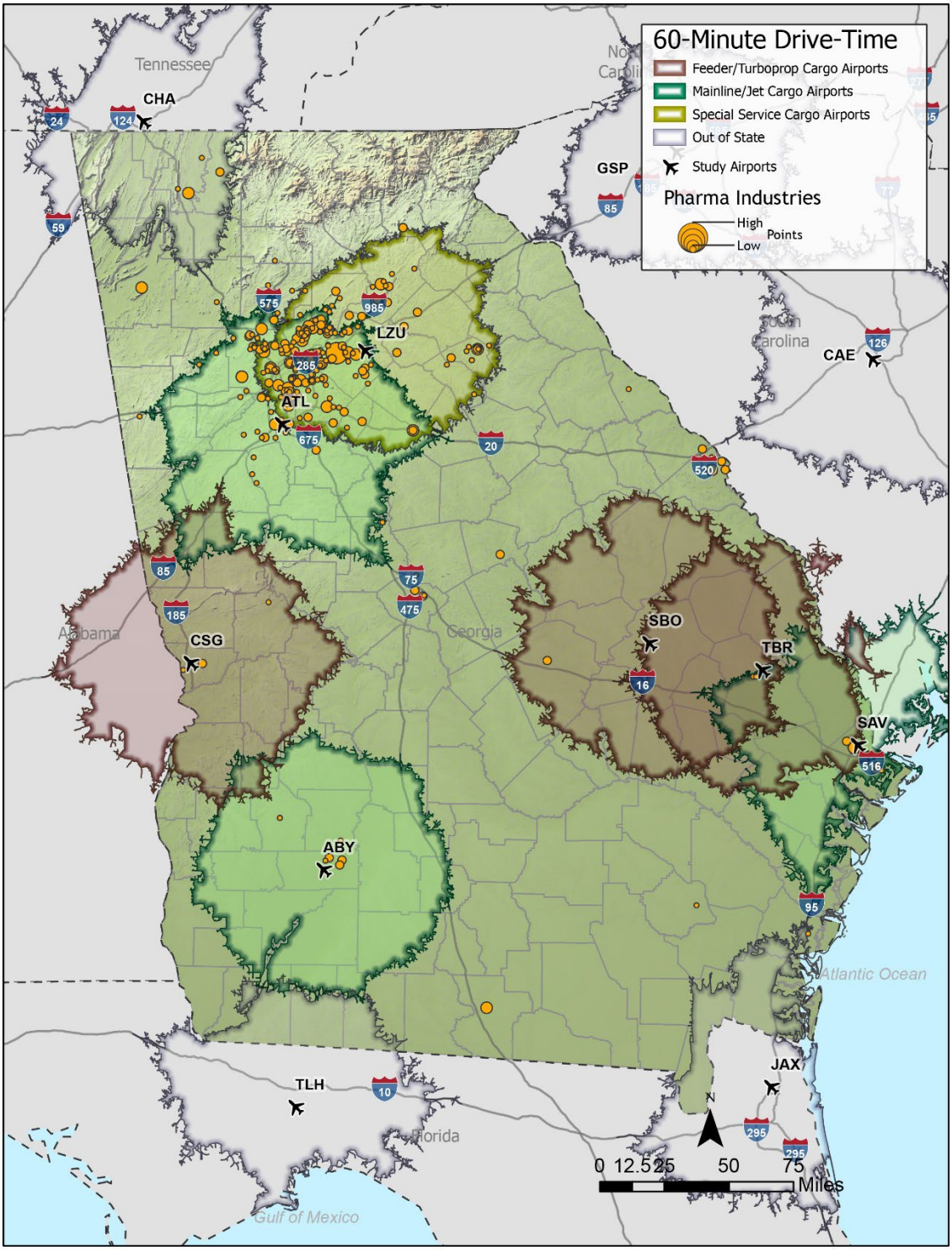
Table 5-10: Weighting of Pharmaceutical Production in Georgia

Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Pharmaceutical Production	**Annual Sales**			
	>=$500,000,000	10	1	10
	$300,000,000 to $499,999,999	9	2	18
	$100,000,000 to $299,999,999	8	3	24
	$50,000,000 to $99,000,000	7	1	7
	$10,000,000 to $49,999,999	6	20	120
	$5,000,000 to $9,999,999	5	15	75
	$2,000,000 to $4,999,999	4	22	88
	$1,000,000 to $1,999,999	3	73	219
	$0 to $999,999	2	157	314
	Subtotal		**294**	**875**

Source: Dun & Bradstreet (Pharmaceutical Companies in Georgia), Jviation analysis, August 2021

Figure 5-8 identifies the locations of the 294 pharmaceutical production businesses across the state in relation to the 60-minute drive-times. As presented in **Figure 5-8**, pharmaceutical production in Georgia is heavily concentrated in the Atlanta Metro Area, and to a lesser extent in some of Georgia's other more populous urban areas. This is likely due to the presence of research facilities, educated workforce, hospitals, and general population concentrations.

Figure 5-8: Scheduled Air Cargo Airport 60-Minute Drive-Times and Pharmaceutical Production in Georgia



Source: Dun & Bradstreet (Pharmaceutical Companies in Georgia), ESRI, Jviation analysis, August 2021

Table 5-11 identifies air cargo demand related to pharmaceutical production found within airport 60-minute drive-times. Metro Atlanta is home to the vast majority of Georgia's pharmaceutical production businesses.

Table 5-11: Weighted Score of Pharmaceutical Production by Scheduled Air Cargo Airport 60-Minute Drive-Time

Airport	FAA ID	Count of Industry Locations in 60-Minute Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Unique Score (Excluding Any Overlap)
Industry: Pharmaceutical Production					
Columbus Airport	CSG	3	8	ABY, ATL	8
East Georgia Regional Airport	SBO	3	7	SAV, TBR	3
Gwinnett County Airport-Briscoe Field	LZU	219	664	ATL	102
Hartsfield Jackson Atlanta Int'l Airport	ATL	216	652	CSG, LZU	90
Savannah/Hilton Head International Airport	SAV	7	21	SBO, TBR	8
Southwest Georgia Regional Airport	ABY	7	17	CSG	17
Statesboro-Bulloch County Airport	TBR	4	13	SAV, SBO	0

Source: Dun & Bradstreet (Pharmaceutical Companies in Georgia), Jviation analysis, August 2021.

5.2.2.5 Medical Device Manufacturing

Medical Device Manufacturing in Georgia

Georgia is home to a concentrated medical device industry that includes businesses involved in the design, prototyping, manufacturing, and testing of medical device products. Georgia's export of medical devices, medical equipment, and pharmaceuticals had a total value of more than $1.9 billion in 2019.

Georgia has a highly educated workforce and is home to the largest university-level Biomedical Engineering Department in the country at Georgia Tech. This facility is one of the highest NIH-funded (National Institute of Health) departments in the U.S. The University of Georgia is also home to several regulatory affairs graduate programs that dovetail with medical device manufacturing.

Similar to the pharmaceutical industry, the global supply chains for medical device manufacturing are often complex and time-sensitive in nature, often requiring air cargo services to meet demand. Examples of Georgia's medical device manufacturing businesses include Alcon, Bard Medical, Elekta, Ethicon, Halyard Health, Medtronic, Philips Healthcare, Siemens, and Stryker.[10]

Proximity of Medical Device Manufacturing to Georgia Airports

Similar to pharmaceutical production, annual sales serve as the indicator for air cargo demand associated with medical device manufacturing businesses. Businesses having more than $500 million in annual sales are assigned the highest value of 10 points, and businesses below $1 million in annual sales are assigned the lowest value of two points. Ten ranges are established for this industry due to the wide distribution of business sizes, determined by annual sales, and better differentiate between the mid- and high range scores.

Table 5-12 presents points assigned to medical device manufacturing locations based on annual sales. As shown in **Table 5-12**, statewide there are 97 medical device manufacturing locations in Georgia, resulting in a total weighted score of 387. Facility locations are mapped using GIS to identify the proximity of the medical device production facilities to airport 60-minute drive-times.

[10] https://www.georgia.org/industries/life-sciences/medical-devices?gclid=EAIaIQobChMI8a-ujfef8wIVCpyzCh3czwceEAAYASAAEgJ0ZfD_BwE

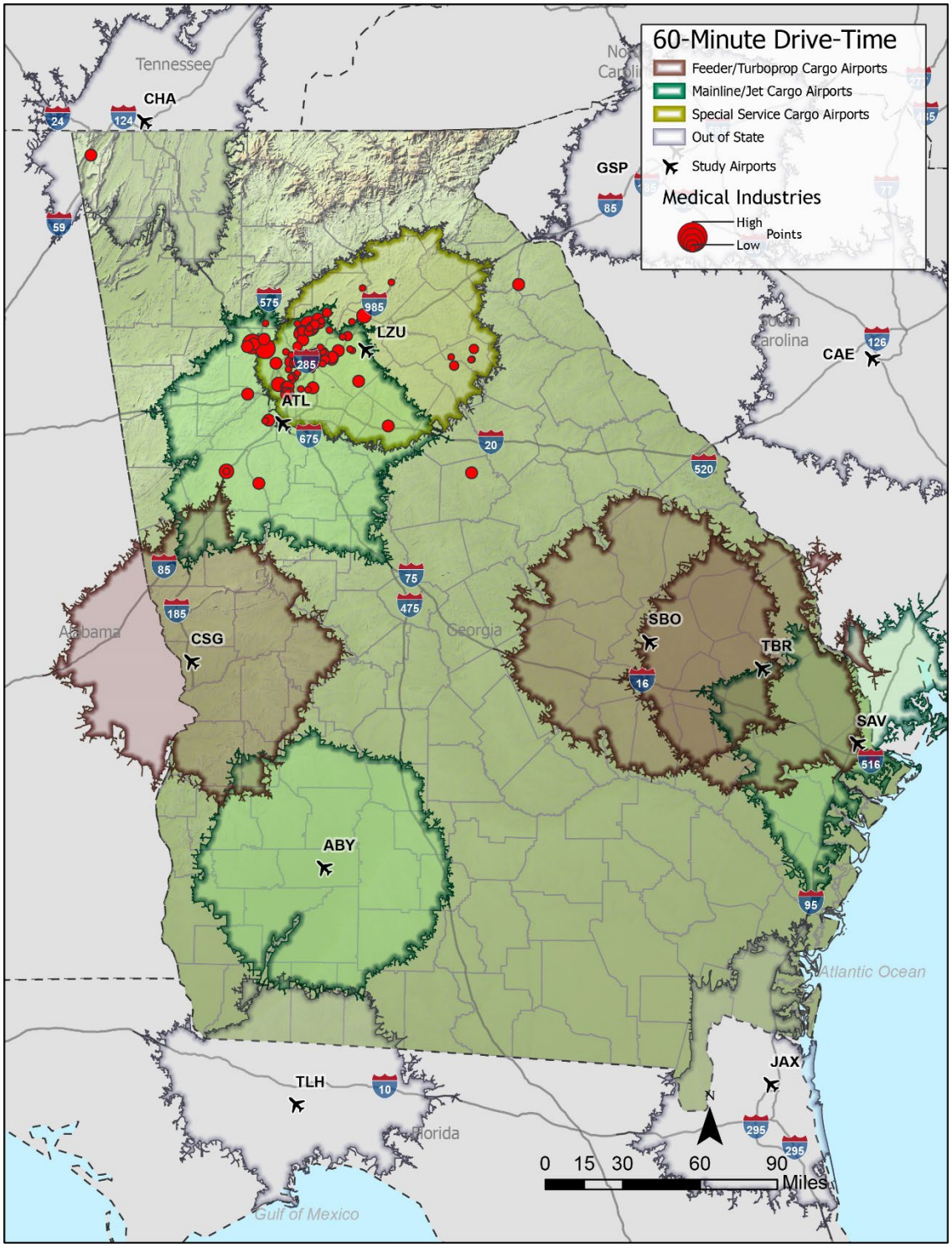
Table 5-12: Weighting of Medical Device Manufacturing in Georgia

Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Medical Device Manufacturing	**Annual Sales**			
	>=$500,000,000	10	2	20
	$200,000,000 to $499,999,999	9	2	18
	$100,000,000 to $199,999,999	8	2	16
	$50,000,000 to $99,000,000	7	2	14
	$10,000,000 to $49,999,999	6	25	150
	$5,000,000 to $9,999,999	5	6	30
	$2,000,000 to $4,999,999	4	7	28
	$1,000,000 to $1,999,999	3	9	27
	$0 to $999,999	2	42	84
	Subtotal		**97**	**387**

Source: BioPharmGuy, Jviation analysis, August 2021

Figure 5-9 identifies the locations of the 97 medical device manufacturing businesses in relation to the established 60-minute drive-times. As presented in **Figure 5-9**, medical device manufacturing in Georgia almost exclusively is located in the Atlanta Metro Area. This is likely due to the presence of research and development institutions/organizations, an educated workforce, and the concentrations of hospitals.

Figure 5-9: Scheduled Air Cargo Airport 60-Minute Drive-Times and Medical Device Manufacturing in Georgia



Source: BioPharmGuy, Jviation analysis, August 2021

Table 5-13 identifies medical device manufacturing locations found within each airport's 60-minute drive-time. Similar to pharmaceutical production, Metro Atlanta is home to the vast majority of Georgia's medical device manufacturing businesses.

Table 5-13: Weighted Score of Medical Device Manufacturing by Scheduled Air Cargo Airport 60-Minute Drive-Time

Airport	FAA ID	Count of Industry Locations in 60-Minute Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Unique Score (Excluding Any Overlap)
Medical Device Manufacturing					
Columbus Airport	CSG	-	-	ABY, ATL	0
East Georgia Regional Airport	SBO	-	-	SAV, TBR	0
Gwinnett County Airport-Briscoe Field	LZU	81	303	ATL	29
Hartsfield Jackson Atlanta Int'l Airport	ATL	82	328	CSG, LZU	54
Savannah/Hilton Head International Airport	SAV	1	6	SBO, TBR	6
Southwest Georgia Regional Airport	ABY	-	-	CSG	0
Statesboro-Bulloch County Airport	TBR	-	-	SAV, SBO	0

Source: BioPharmGuy, Jviation analysis, August 2021.

5.2.2.6 Combined Industries

When considering all six industries/activities combined, there are a total of almost 900 individual industry locations for a total statewide weighted score of 2,882. A summary of all metrics, weighting ranges, locations, and weighted scores are presented by industry in **Table 5-14**.

Table 5-14: Summary of Weighting, Location, and Score by Industry

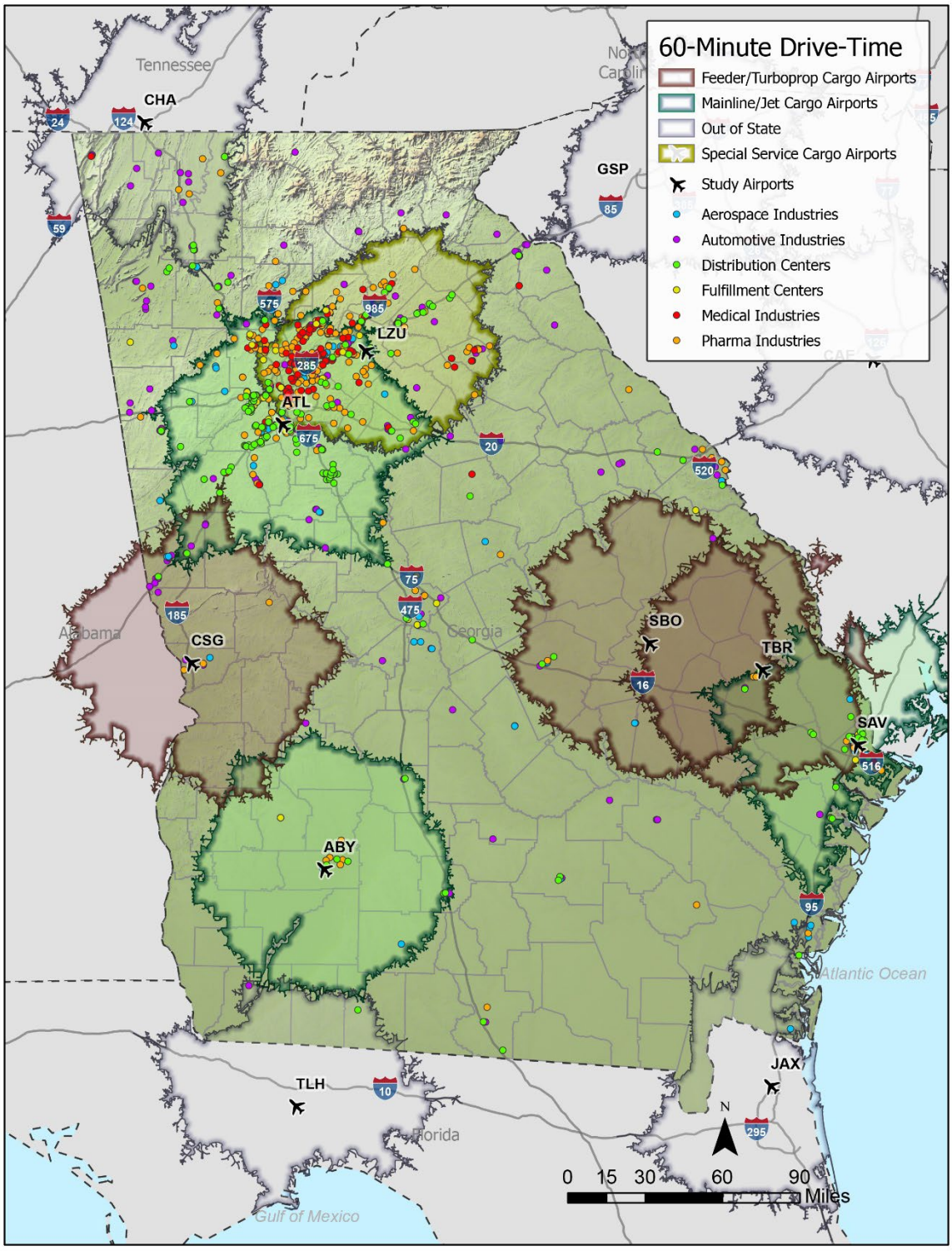
Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
Distribution Centers	**Building Size (Square Feet)**			
	>= 1,000,000	5	55	275
	700,000 to 999,999	4	48	192
	500,000 to 699,999	3	65	195
	250,000 to 499,999	2	17	34
	0 to 249,999	1	6	6
	Subtotal		**191**	**702**
Fulfillment Centers	**Building Size (Square Feet)**			
	Any amount	5	41	205
	Subtotal		**41**	**205**
Aerospace Manufacturing	**Employee Count**			
	>=1,000	5	3	15
	200 to 999	4	20	80
	100 to 199	3	15	45
	50 to 99	2	19	38
	0 to 49	1	24	24
	Subtotal		**81**	**202**
Automotive Manufacturing	**Employee Count**			
	>=1,000	5	7	35
	500 to 999	4	24	96
	400 to 499	3	11	33
	100 to 399	2	86	172
	0 to 99	1	46	46
	Subtotal		**174**	**382**
Pharmaceutical Production	**Annual Sales**			
	>=$500,000,000	10	1	10
	$300,000,000 to $499,999,999	9	2	18
	$100,000,000 to $299,999,999	8	3	24
	$50,000,000 to $99,000,000	7	1	7
	$10,000,000 to $49,999,999	6	20	120
	$5,000,000 to $9,999,999	5	15	75
	$2,000,000 to $4,999,999	4	22	88

Industry	Metric / Range	Weighting	Count of Industry Locations	Total Weighted Score
	$1,000,000 to $1,999,999	3	73	219
	$0 to $999,999	2	157	314
	Subtotal		**294**	**875**
Medical Device Manufacturing	**Annual Sales**			
	>=$500,000,000	10	2	20
	$200,000,000 to $499,999,999	9	2	18
	$100,000,000 to $199,999,999	8	2	16
	$50,000,000 to $99,000,000	7	2	14
	$10,000,000 to $49,999,999	6	25	150
	$5,000,000 to $9,999,999	5	6	30
	$2,000,000 to $4,999,999	4	7	28
	$1,000,000 to $1,999,999	3	9	27
	$0 to $999,999	2	42	84
	Subtotal		**97**	**387**
Total (All Industries)			**878**	**2753**

Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

All air cargo generating industries/activities are presented geographically in **Figure 5-10**, without, however, being scaled by metric/range to indicate relative size. Scaling was eliminated to optimize the visibility of all industry/activity air cargo demand generating points.

Figure 5-10: Scheduled Air Cargo Airport 60-Minute Drive-Times and Combined Industries in Georgia



Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

The distributions and relative concentrations of the six selected air cargo-generating industries/activities generally follow the state's population, household income patterns, and major highway corridors. As shown in **Figure 5-10** and in **Table 5-15**, ATL is home to the greatest number of air cargo generating locations, the highest weighted score, and the highest unique score. The 60-minute drive-times serving SAV and CSG also have a high number of potential air cargo demand generators. Airports with the highest percentage of unique score, out of total score, are ABY at 100 percent and CSG at 88 percent.

Table 5-15: Weighted Score of Combined Industries by Scheduled Air Cargo Airport 60-Minute Drive- Time

Airport	FAA ID	Count of Industry Locations in 60-Minute Drive-Time	Total Weighted Industry Score in 60-Minute Drive-Time	Airport 60-Minute Drive-Time Overlap	Percent Unique Score	Unique Score (Excluding Any Overlap)
Industries Combined						
Columbus Airport	CSG	31	84	ABY, ATL	88%	74
East Georgia Regional Airport	SBO	14	34	SAV, TBR	53%	18
Gwinnett County Airport-Briscoe Field	LZU	445	1,371	ATL	19%	263
Hartsfield Jackson Atlanta Int'l Airport	ATL	546	1,746	CSG, LZU	36%	622
Savannah/Hilton Head International Airport	SAV	46	157	SBO, TBR	56%	88
Southwest Georgia Regional Airport	ABY	19	54	CSG	100%	54
Statesboro-Bulloch County Airport	TBR	24	71	SAV, SBO	14%	10

Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

The results of the demand generator and 60-minute drive-time analyses help to show how existing air cargo demand may be served by existing air cargo service. The next step in the analysis is to determine if there are significant concentrations of air cargo demand generators that are beyond the speed and distance capabilities of the integrated express carriers operating at six airports in Georgia.

5.2.2.7 Possible Coverage Gaps

The preceding sections of this chapter determine if 60-minute drive-times for airports currently with air cargo service are in proximity to known air cargo demand generators and to areas of the state with income levels associated with e-commerce demand.

Table 5-16 presents combined points for air cargo generating activities and weighted scores for each airport with scheduled air cargo operations. The total possible weighted score for all combined industries statewide is 2,753. Without the 60-minute drive-time for LZU, current coverage for air cargo demand generators decreases from 87 percent to 77 percent. Scheduled air cargo service at LZU falls into the "specialty" category and is not for hire. The upcoming gap analysis considers the 60-minute drive-time area for LZU as "unserved" by an existing by a typical scheduled air cargo carrier.

Results of the demand generator and airport 60-minute drive-time analysis show that there may be areas in Georgia with characteristics to support additional scheduled air cargo service. Those areas are identified and discussed in the next section of this chapter.

Table 5-16: Summary of Statewide Industry Coverage/Service Gaps by Existing Cargo Airports

Coverage Category	Weighted Industry Score	Percent of Total Statewide Score
Within Existing Catchment Area (without LZU)	2,388 (2,127)	87% (77%)
Beyond Existing Catchment Area (without LZU)	361 (626)	13% (23%)
Total Statewide Score	**2,749**	**100%**

Source: Jviation analysis, August 2021

5.3 Air Cargo Generator Gap Area Analysis

Similar to scheduled commercial airline service, not all airports or all airport market/service areas in Georgia have, nor will they have, the need or the ability to support scheduled air cargo service. Study analysis determined that, generally speaking, most air cargo demand generators, considered in the 60-minute drive-time analysis, are in or are within close proximity to an airport with existing scheduled air cargo service that is provided by an integrated express carrier. A high percentage of households in Georgia with income likely to generate e-commerce air cargo demand also fall within one of the 60-minute drive-times used in the preceding analysis.

Much like the nation's commercial airline industry, the route networks for the domestic air cargo industry are somewhat mature. Often when one airport attracts new air cargo service, it is a result of the provider relocating from one airport to another to take advantage of more favorable operating conditions/fees or to provide later cut-off times (pickup or drop-off) for shipments. Also, similar to commercial airline service, scheduled air cargo carriers have the potential to up-gage the size of their aircraft to provide more air cargo capacity; carriers can use larger aircraft as an alternative to adding new service to additional points in their network or increasing their flight frequencies. Rearranging within the air cargo industry is more common than actual expansion.

One of the objectives of the Statewide Air Cargo Study is to identify areas in the state currently beyond an existing 60-minute drive-time that appear, from the study analysis, to have concentrations of known

activities/industries that generate air cargo demand. These unserved or "gap" areas may be capable of supporting additional scheduled air cargo activity. Using the results from the 60-minute drive-time analysis, an overview of current conditions determines if there are gaps in existing air cargo coverage for integrated express carrier accessibility. Previously defined air cargo demand generators and income indicators both help to guide the gap analysis.

It is worth noting that some areas that fall outside of the existing 60-minute drive-times, mapped by study analysis, are served by frequent ad hoc or on demand air cargo service. This type of on demand service is often better suited to individual market/industry needs.

When considering if there are areas in Georgia that could potentially support enhanced scheduled air cargo service, it is important to consider factors that the air cargo carriers themselves consider when expanding. Locational factors presented here are obtained from Airports Council International (ACI) and Transportation Research Board (TRB) publications and are supported by integrated express carrier representatives interviewed for this study. Factors that influence the location of scheduled air cargo service include, but may not be limited to, the following:

- Is the area already adequately served from one of the carrier's points of existing service, are shipment pickup and drop-off times adequate?
- Does a new point of service fit into the carrier's overall operating network and business model?
- Is there sufficient demand for scheduled air cargo service in the area that is not currently served?
- Are there constraints or deficiencies at an existing point of service that cannot be resolved to meet carrier requirements?
- Is the market situated near major highways or does the market have good ground access?
- Does the community/airport embrace air cargo activity and operations?
- Does an airport have existing facilities/services to accommodate air cargo activity without significant lead time or investment or are there other more readily available/less costly airport options?

It is not possible, within the context of this statewide planning analysis, to accurately predict how carriers will develop or expand their air cargo route networks in Georgia. The analysis does, however, determine if there appear to be gaps in existing coverage, if there appears to be potential air cargo demand in any gaps, and if there are airports in the gap areas that could be developed to serve scheduled air cargo activity.

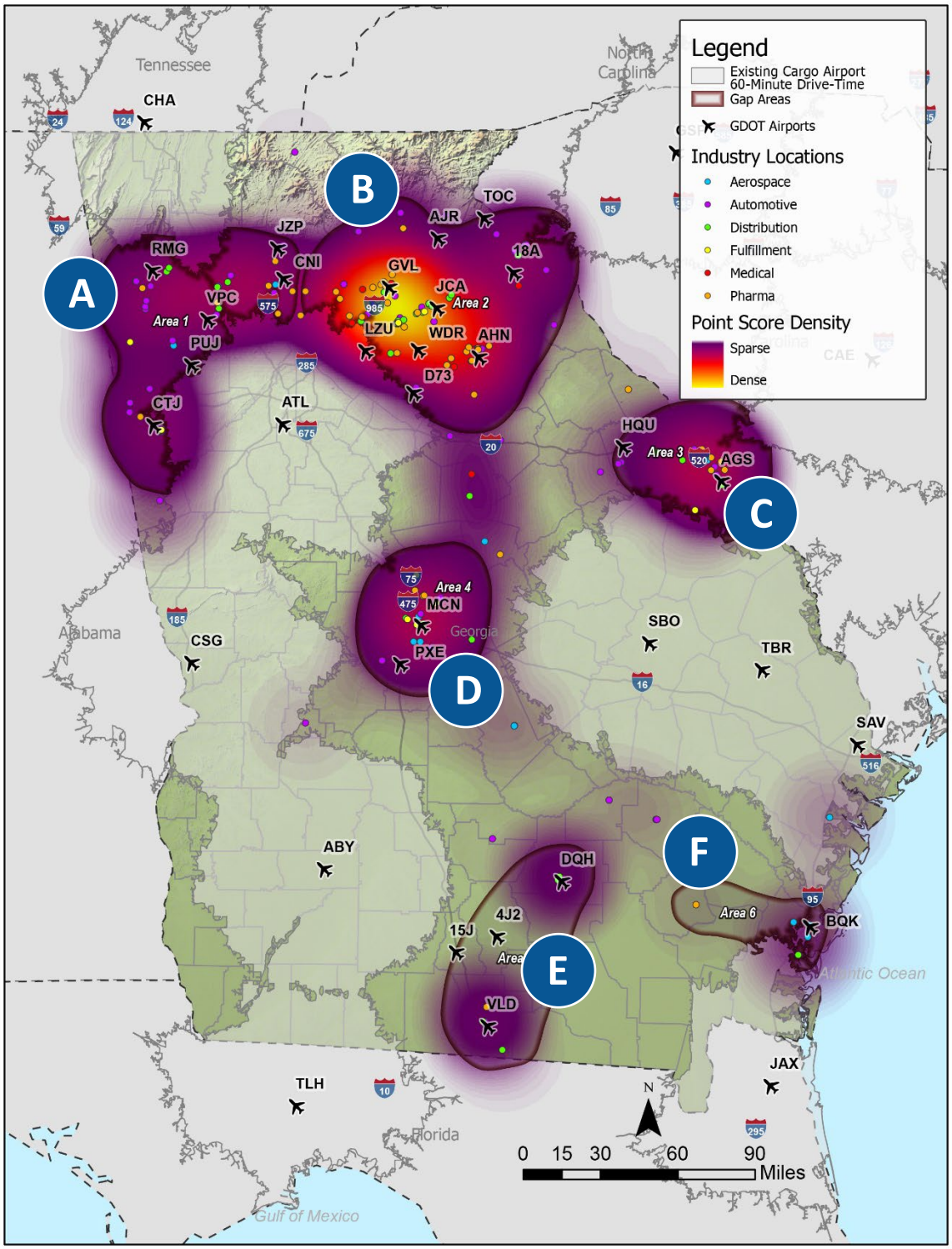
5.3.1 Identification of Gap Areas

A GIS "heat map" analysis identifies areas in Georgia beyond the previously established 60-minute drive-times. The heat map analysis identifies areas that exhibit the highest volumes of known air cargo demand generators. Results of the heat map analysis are presented in **Figure 5-11**. The locations of industries/activities known to generate air cargo demand, beyond current 60-minute drive-times, are the focus of information presented on **Figure 5-11**. The heat map analysis identified six gap areas or unserved areas within Georgia currently beyond 60 minutes of an airport with scheduled air cargo service provided by an integrated express carrier. Since LZU is not served by an integrated express

carrier, the area northeast of the Atlanta Metro is considered a gap area in this analysis. These areas have the highest concentrations of known air cargo demand generators beyond the 60-minute drive-times used to support study analysis.

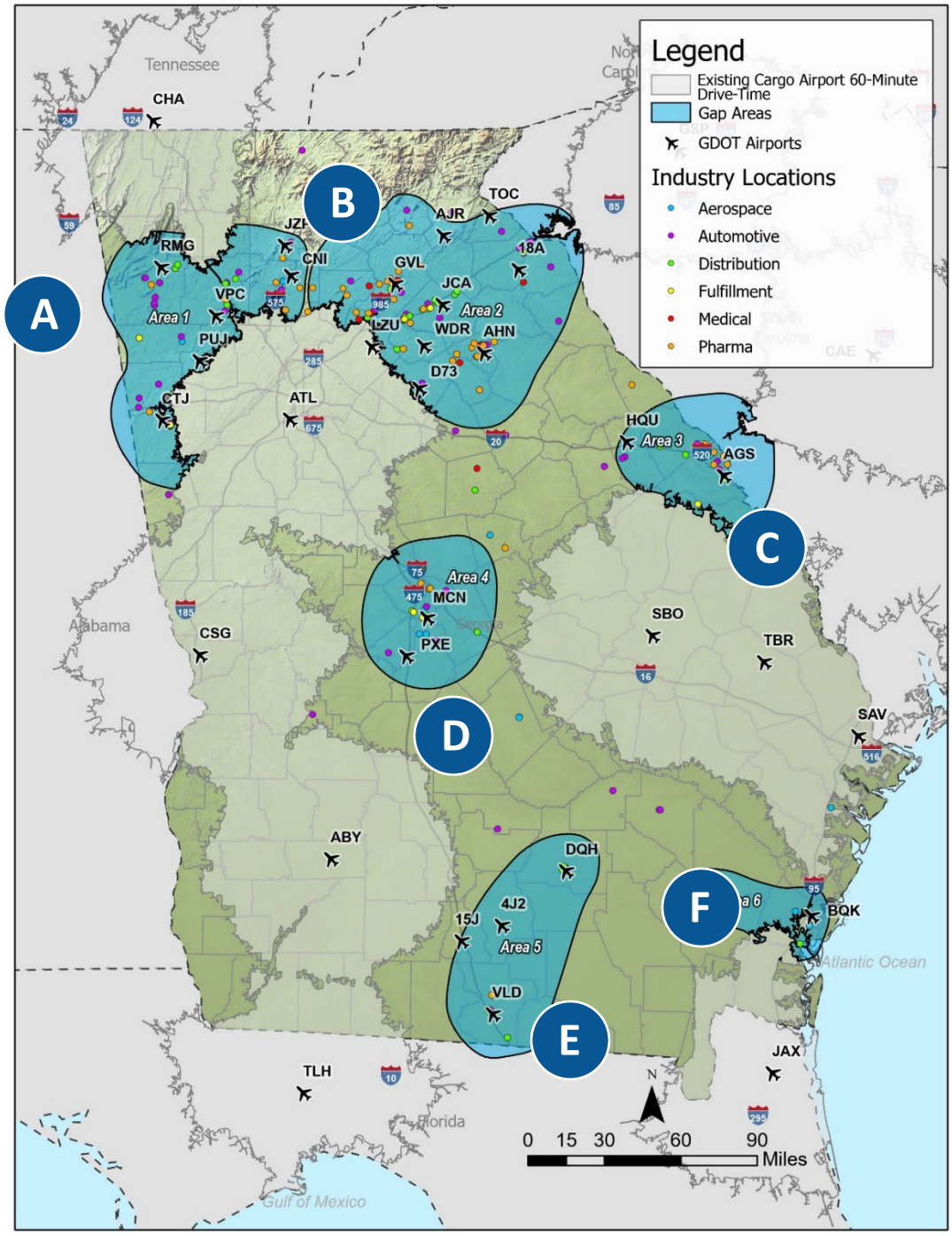
Figure 5-12 identifies the areas in Georgia lying beyond the current 60-minute drive-times for airports with scheduled air cargo service that is provided by an integrated express carrier. According to study investigation, these areas support the highest concentrations of industries/activities generating air cargo demand.

Figure 5-11: Heat Map Analysis



Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, November 2021

Figure 5-12: Locations for Air Cargo Demand Generators in Gap Areas



Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, November 2021

The air cargo demand generating characteristics of the six gap areas vary widely. **Table 5-17** presents information for each of the gap areas; this table reflects each of the known air cargo demand generators by type identified in the GDOT study. As **Figure 5-12** reflects, gap areas with the highest densities of known air cargo demand generators are those located north of Atlanta.

This does not necessarily imply, however, that these areas have the most potential for attracting new scheduled air cargo service. Factors influencing cargo carrier decisions extend well beyond just the level of air cargo demand in any given area. The "fit" of new service points with the existing route structures/networks for air cargo carriers and compatibility with their business model are often of higher importance.

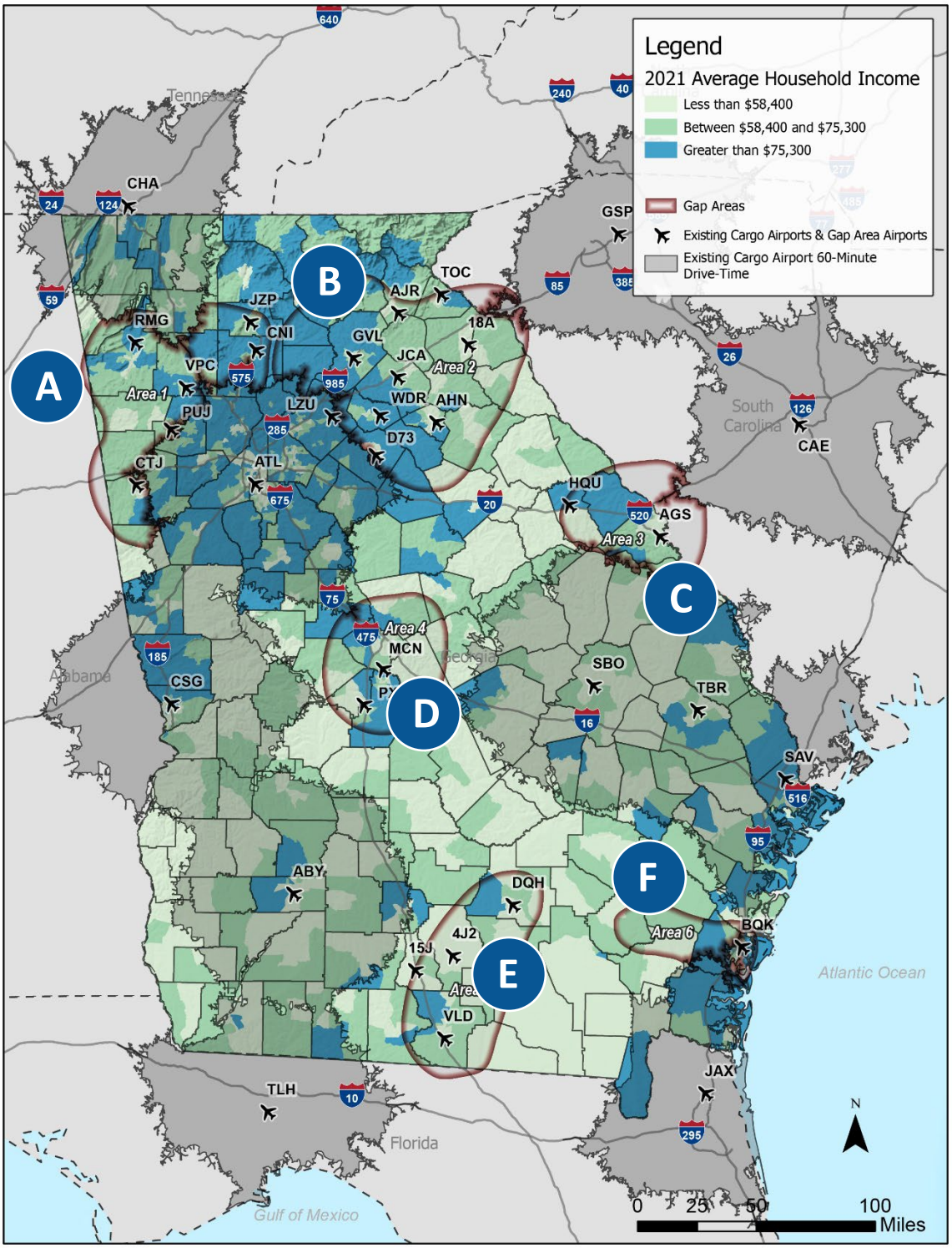
Figure 5-3 previously showed those areas of Georgia that have household incomes exceeding $75,000. This level of income is typically associated with demand for e-commerce shipping. **Figure 5-13** shows income ranges associated with the identified gap areas. As this figure shows, each of the six gap areas are characterized by household income levels typically associated with e-commerce demand. Data reflected in **Figure 5-13** helps to reinforce the viability and potential of the gap areas to support new scheduled air cargo service.

Table 5-17: Comparison of Air Cargo Demand Generators in Gap Areas

Gap Area	Gap Area A	Gap Area B	Gap Area C	Gap Area D	Gap Area E	Gap Area F
General Location Description	Northwest Atlanta Metro/ Interstate 75 Corridor	Northeast Atlanta Metro/ Interstate 85 Corridor	Augusta Area	Macon Area	Valdosta/ Douglas Area	Brunswick Area
Number of Airports In Area (with Primary Runway Length >4,999')	6	8	2	2	4	1
Count of Aerospace Locations in Area	4	1	2	5	1	3
Count of Automotive Locations in Area	20	34	5	4	2	
Count of Distribution Centers in Area	7	21	4	3	4	1
Count of Fulfillment Centers in Area	2	2	1	3		
Count of Medical Manufacturing Locations in Area		12		4		
Count of Pharmaceutical Manufacturing Locations in Area	7	34	5		1	1
Total Industry Locations in Area	40	104	17	19	8	5
Weighted Score of All Industry Locations	112	302	59	58	29	12

Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, November 2021

Figure 5-13: Household Income Ranges in Relation to Gap Areas



Source: U.S. Census Bureau, ESRI, Jviation analysis, November 2021

5.3.2 Airports Located in Gaps Areas

The next step in the analysis is to identify airports located in each of the six gap areas. Currently, airports in Georgia that serve scheduled air cargo operators have a minimum runway length of approximately 6,000 feet. This is not to imply that this runway length is needed to support a scheduled air cargo carrier. Many turboprop aircraft, operated by feeder air cargo carriers, are capable of operating on runways that have a length of 5,000 feet or less. For this review all airports in each of the six gap areas with a runway length of at least 5,000 feet are considered. **Figures 5-14**, **5-15**, **5-16**, **5-17**, **5-18**, and **5-19** provide an enhanced view of each of the six gap areas, the locations of air cargo demand generators, and airports in each of the gap areas that currently have a runway length of at least 5,000 feet.

The next step in the analysis was to further investigate the attributes of airports located in each of the gap areas. The goal of this review was to determine which of the airports in each respective gap area appears to be best positioned to support additional scheduled air cargo service, should air cargo carriers have the need to expand their route structures in Georgia. To make this determination, a wide variety of airport, community, and accessibility factors were investigated. An overview of factors included in the airport attribute analysis included, but was not limited to, the following:

- Population – While not identified in the study's literature review or by the integrated express carriers interviewed for this study, it is intuitive that airports serving a larger population base have a higher propensity to support scheduled air cargo service, especially as it relates to e-commerce. Airports located in a county with a higher number of residents received higher scores for this factor.
- Demand Generator Proximity – **Figures 5-14** – **5-19** help to depict the location of industries/activities near airports in each of the respective gap areas. Airports located in proximity to higher concentrations of air cargo demand generators, identified through study analysis, received higher scores for this factor.
- Runway/Taxiway/Apron Characteristics – Airports in Georgia that currently accommodate integrated express carrier operations typically have a runway that is at least 6,000 feet long. However, as documented in **Chapter 7** of this report, many turboprop aircraft flown by air cargo carriers who act as feeders can operate on runways that are less than 5,000 feet long. Each airport was reviewed and scored for its current airfield attributes. A score was assigned to each airport for its existing runway length, runway width, and taxiway system for the primary runway. For this factor, airports with longer and wider runways scored higher, as did airports that have a full parallel taxiway system for the primary runway. Air cargo carriers often operate on apron areas without the support of a dedicated air cargo building. Airports with larger ramp areas to accommodate a potential air cargo carrier scored higher for this attribute. Consideration was also given in the scoring process to those airports having the potential for ramp expansion.
- Navigational Support – Integrated express carriers prefer airports that support operations in a wide variety of conditions, including nighttime operations and flights during inclement weather conditions. Airports with precision-like approaches and on-site weather reporting equipment scored higher for these attributes.

- Services – Air cargo operators often depend on services provided by a fixed base operator (FBO) and the ability to have access to Jet A fuel. Airports exhibiting these two characteristics scored higher in the airport attributes matrix analysis.
- Proximity to Interstate Highway – Literature review and input from air cargo carriers and the Project Steering Committee indicate that scheduled air cargo carriers typically seek airports that are in proximity to one or more interstate highways. Airports located closer to an interstate received higher scores for this factor.
- Economic Development – Information provided by the Project Steering Committee was used to determine which airports are in areas that are experiencing the highest rates of growth for distribution and fulfillment centers. Airports in areas with higher rates of growth scored higher in the airport attributes matrix analysis.
- Last Mile Road Connection – Easy access is important air cargo operators especially because truck access to airports is often essential. The "last mile" connection to each airport was examined as part of this factor. For this attribute, review was undertaken to determine if traveling the last mile involved traversing areas of residential or commercial development, navigating circuitous roadways, or negotiating numerous traffic signals. Airports that had more direct and less congested access received higher scores.
- Proximity to Current Integrated Express Carrier Service – Integrated express carriers are more likely to expand into areas where they have issues providing reasonable drop-off and delivery times for their customers. For this attribute, airports farther away from existing schedule air cargo service received higher scores.
- Land Available for Expansion – Airports with the ability to expand either or both their airside and/or landside facilities were identified. Airports with more room/flexibility/property to expand received higher scores for this factor.
- Compatible Development and Protection from Encroachment – Input from the Project Steering Committee indicates that airports with nearby residential development are less desirable candidates for air cargo operations. For this factor, airports that showed the least encroachment from residential development received higher scores. For this factor, airports surrounded by communities that have adopted height zoning to protect the airport received higher scores.
- Ad Hoc Air Cargo Activity – Flight records from the FAA's National Offload Program reveal airports that currently have on demand or ad hoc air cargo operations. Higher levels of ad hoc air cargo activity may signal airports that have a higher potential for attracting schedule air cargo operations. Airports with the highest recorded levels of ad hoc air cargo operations received higher scores for this factor.

For all of the factors considered, a numeric value was assigned to each airport included in the attributes matrix. In some instances, based on GDOT or Steering Committee input, some factors received a higher importance weighting. After all factors were scored and weighted, each airport received a final overall score. The final airport score provides an indication for which airports have the highest or lowest potential for accommodating service by an integrated express carrier based only on study analysis. These results are summarized in **Table 5-18**.

The airport attributes matrix evaluated 23 different airports that are located in the six identified gap areas. In addition to these 23 airports, input from the Project Steering Committee indicated that the airports serving LaGrange and Covington may also have the potential to attract scheduled integrated express carrier service. The locations for these two airports are shown in **Figure 5-20**. These two airports were reviewed using the same attribute factors previously discussed in this section. This review shows that the airport serving LaGrange ranked in the medium range for its attributes to serve an integrated express carrier and airport serving Covington also ranked in the medium range.

Additional input received during the study indicates that Dobbins Air Reserve Base in Marietta could be a location that is attractive to an integrated express carrier. Use of this facility, at this time, however, continues to be restricted. Accordingly, no further analysis of this location was completed.

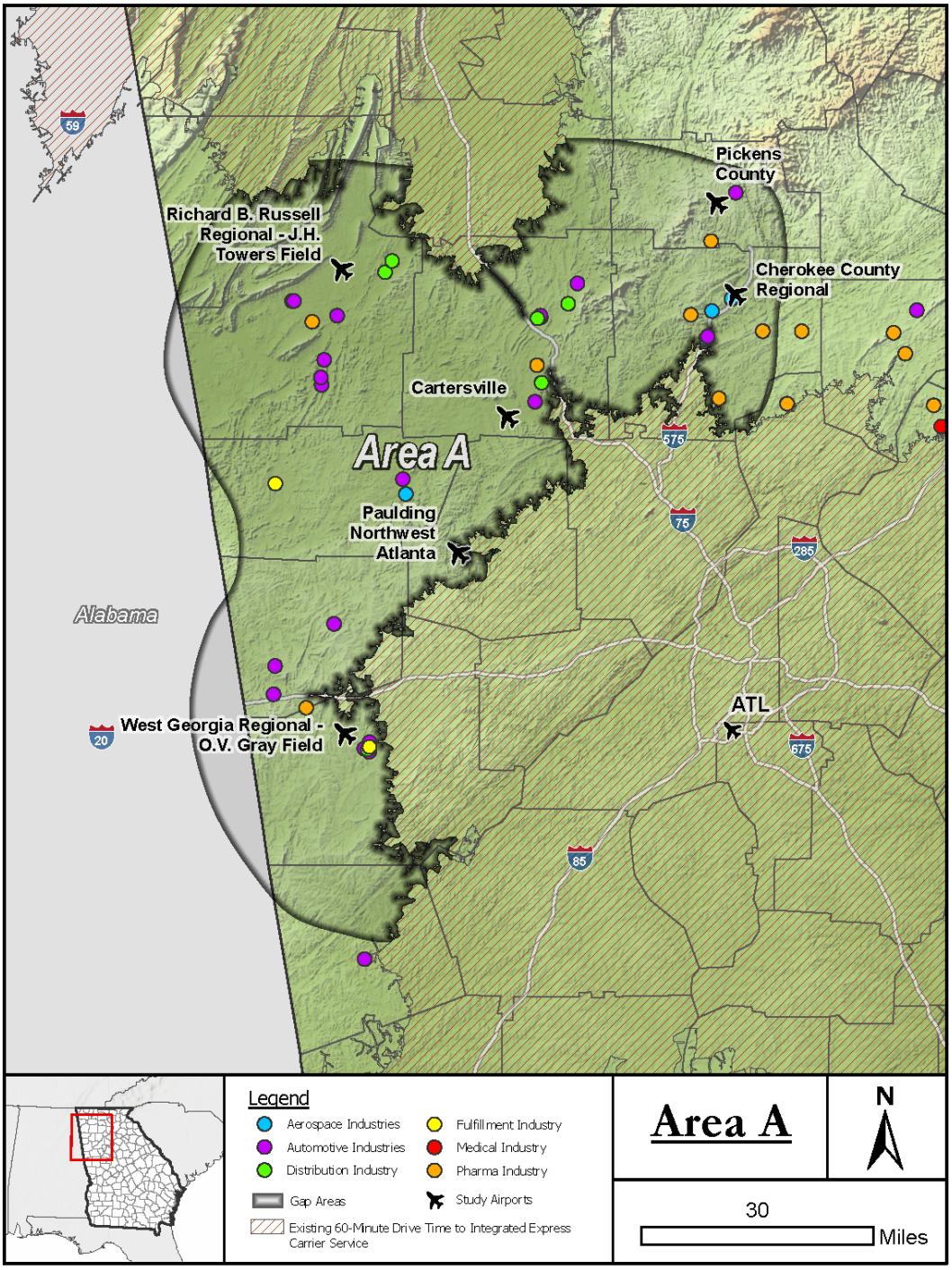
As reflected in **Table 5-18**, the majority of the airports included in the air cargo attributes analysis scored in the medium range, indicating these airports have both positive and less positive characteristics as they relate to accommodating scheduled air cargo operations. Only four airports scored in the high range for all attributes that were investigated and scored. The 25 airports included in the attributes matrix most likely reflect airports in Georgia that have the highest potential for supporting potential expanded scheduled air cargo service in Georgia.

Table 5-18: Summary Results from Airport Attributes Matrix

Gap Area	FAAID	Associated City	Airport Name	County	Scoring Summary
Gap Area A	PUJ	Atlanta	Paulding Northwest Atlanta	Paulding	Medium
Gap Area A	CNI	Canton	Cherokee County Regional	Cherokee	Medium
Gap Area A	CTJ	Carrollton	West Georgia Regional	Carroll	Medium
Gap Area A	VPC	Cartersville	Cartersville	Bartow	Low
Gap Area A	JZP	Jasper	Pickens County	Pickens	Low
Gap Area A	RMG	Rome	Richard B Russell Regional	Floyd	Medium
Gap Area B	AHN	Athens	Athens/Ben Epps	Clarke	Medium
Gap Area B	18A	Canon	Franklin-Hart	Franklin	Medium
Gap Area B	AJR	Cornelia	Habersham County	Habersham	Low
Gap Area B	GVL	Gainesville	Lee Gilmer Memorial	Hall	Medium
Gap Area B	JCA	Jefferson	Jackson County	Jackson	High

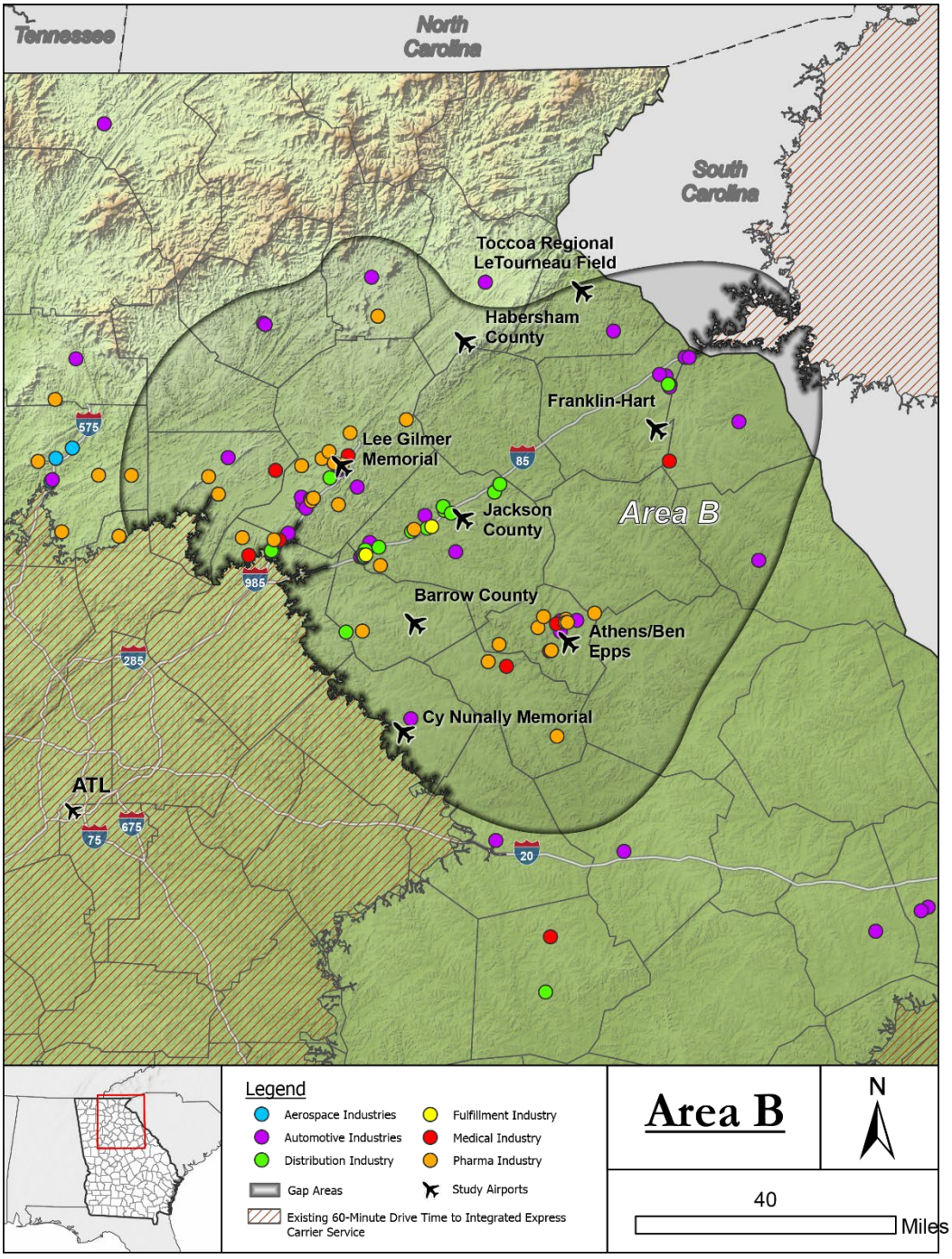
Gap Area B	D73	Monroe	Cy Nunnally Memorial	Walton	Low
Gap Area B	TOC	Toccoa	Toccoa RG Letourneau Field	Stephens	Low
Gap Area B	WDR	Winder	Barrow County	Barrow	Medium
Gap Area C	AGS	Augusta	Augusta Regional At Bush Field	Richmond	High
Gap Area C	HQU	Thomson	Thomson-McDuffie County	McDuffie	Medium
Gap Area D	MCN	Macon	Middle Georgia Regional	Bibb	High
Gap Area D	PXE	Perry	Perry-Houston County	Houston	Medium
Gap Area E	15J	Adel	Cook County	Cook	Medium
Gap Area E	DQH	Douglas	Douglas Municipal	Coffee	Medium
Gap Area E	4J2	Nashville	Berrien County	Berrien	Low
Gap Area E	VLD	Valdosta	Valdosta Regional	Lowndes	High
Gap Area F	BQK	Brunswick	Brunswick Golden Isles	Glynn	Medium
Non-Gap	CVC	Covington	Covington Municipal	Newton	Medium
Non-Gap	LGC	LaGrange	LaGrange Callaway	Troupe	Medium

Figure 5-14: Enhanced View of Gap Area A and Associated Airports



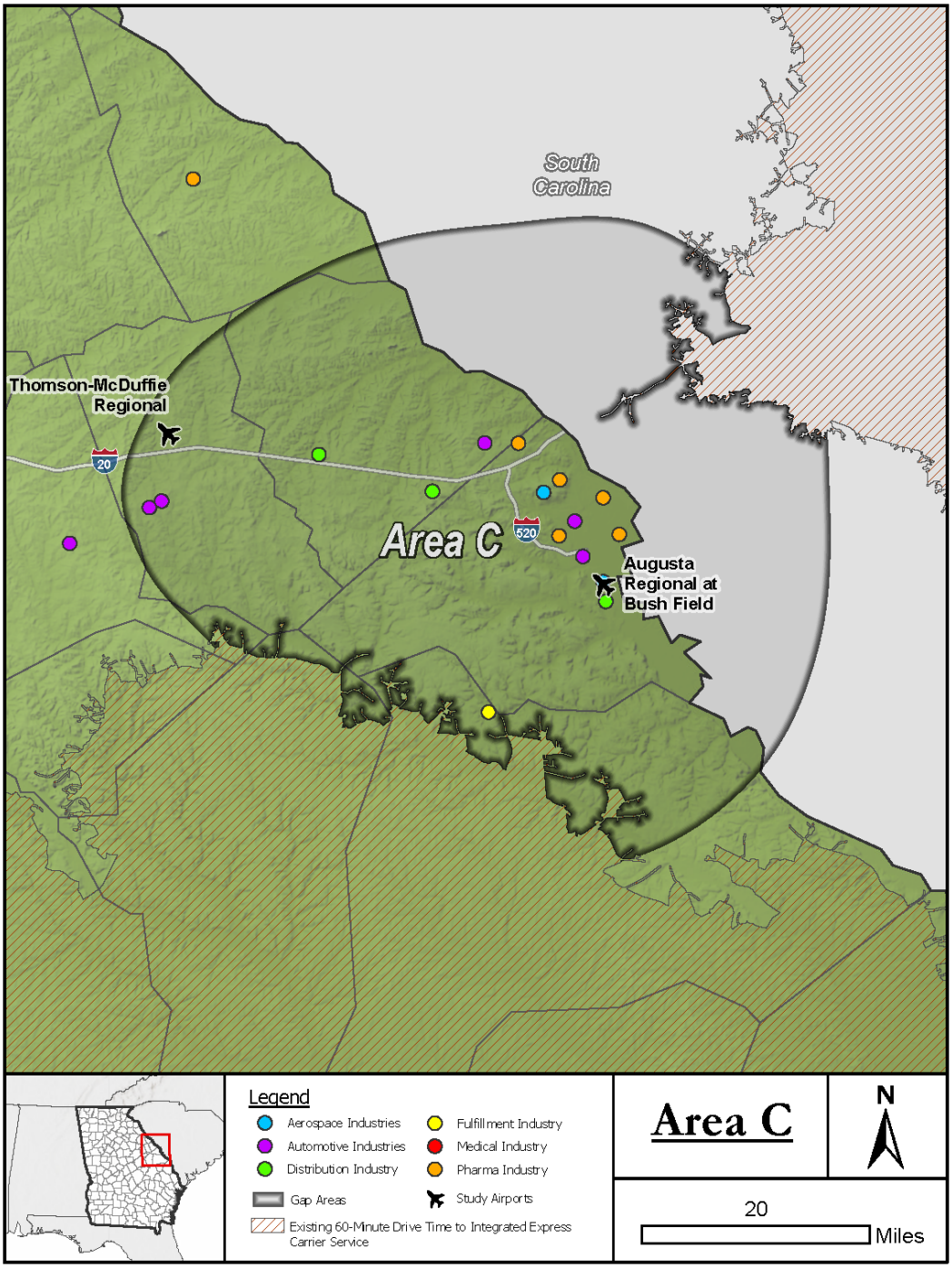
Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Figure 5-15: Enhanced View of Gap Area B and Associated Airports



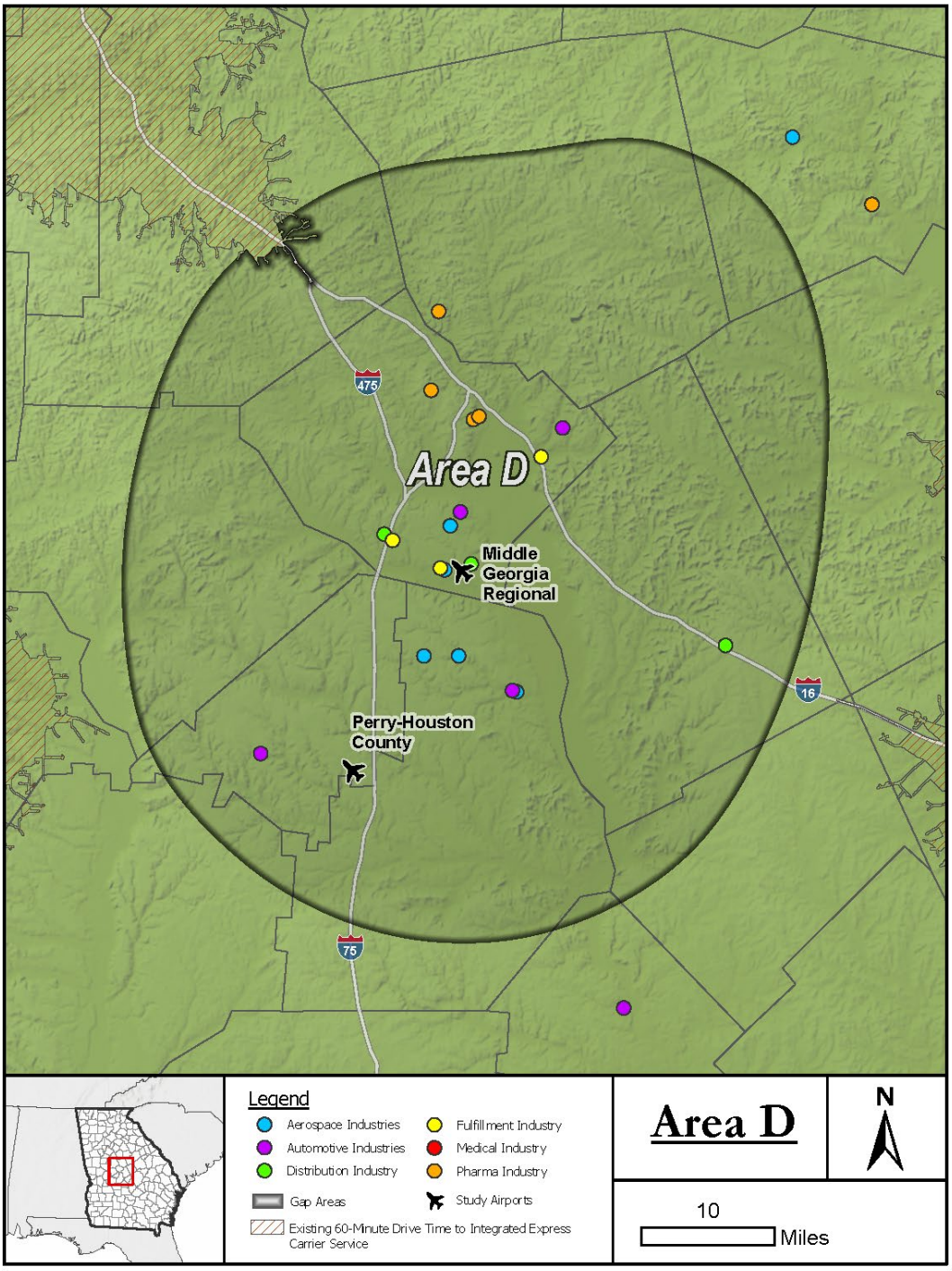
Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Figure 5-16: Enhanced View of Gap Area C and Associated Airports



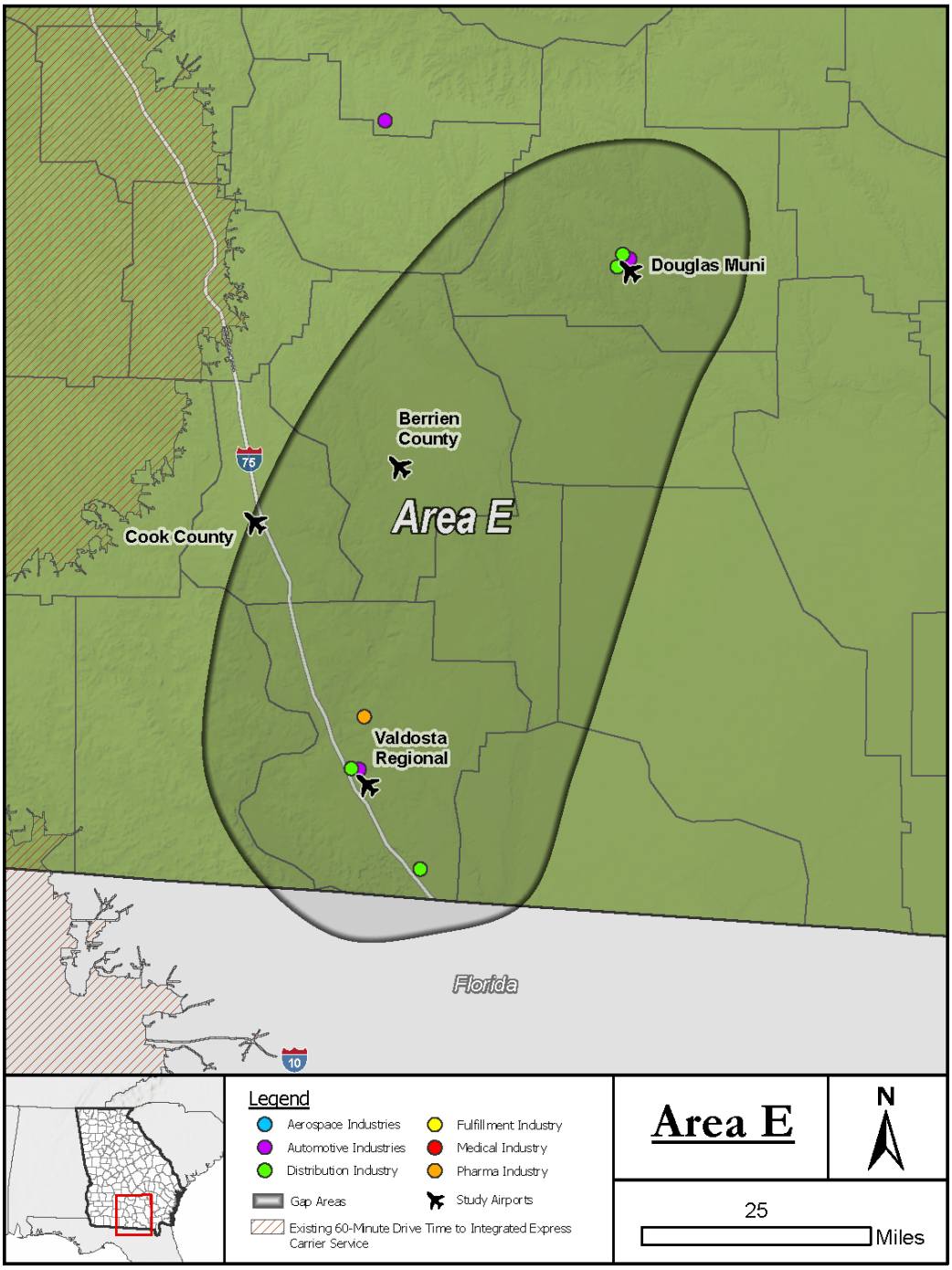
Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Figure 5-17: Enhanced View of Gap Area D and Associated Airports



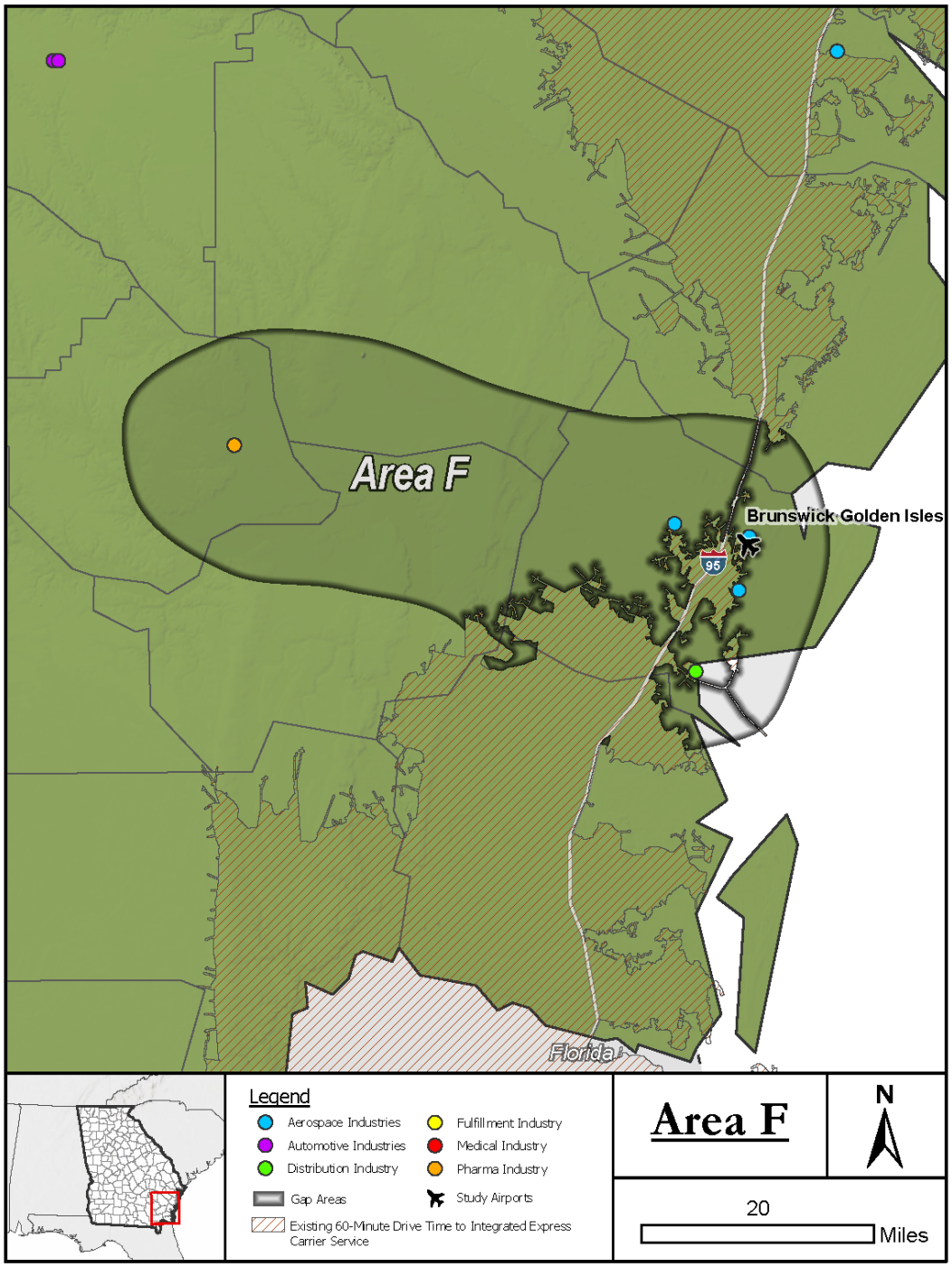
Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Figure 5-18: Enhanced View of Gap Area E and Associated Airports



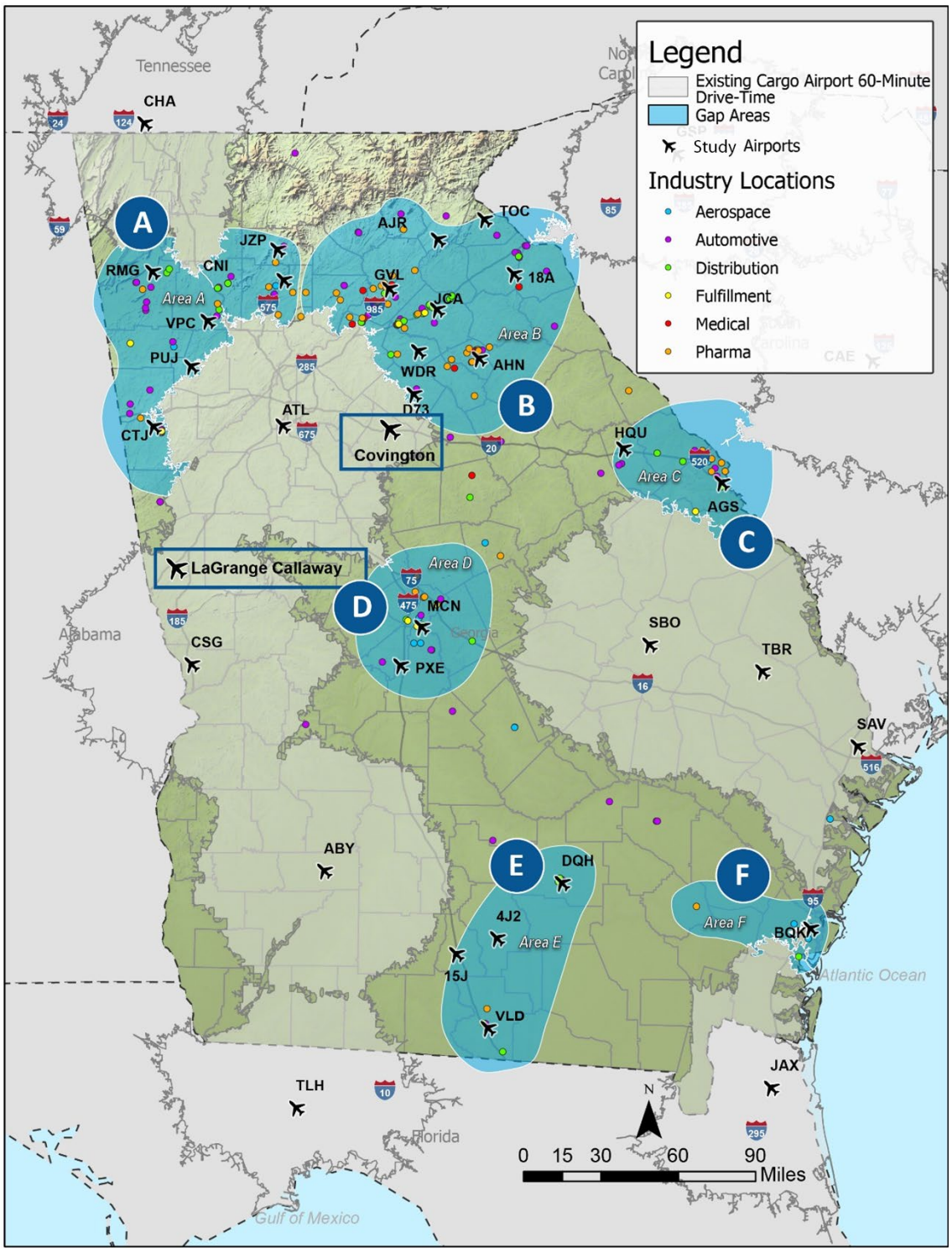
Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Figure 5-19: Enhanced View of Gap Area F and Associated Airports



Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Figure 5-20: Additional Airports for Matrix Evaluation



Source: Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

5.3.3 Conclusions

Study analysis showed that almost 80 percent of industries and activities in Georgia, known to generate air cargo demand, are located within a 60-minute drive-time for an airport that currently has scheduled air cargo service provided by an integrated express carrier. Analysis in this study reveals that there are six gap areas beyond the 60-minute drive-times that have notable concentrations of possible air cargo demand generators. The analysis also shows that in most instances there are several airports in or near each of the identified gap areas.

Information from the gap analysis shows areas in Georgia, primarily north of the Atlanta Metro, that may have the potential to support additional scheduled air cargo service based on the location of known air cargo demand generators. The findings from the analysis do not necessarily imply any of the gap areas are candidates for new or enhanced scheduled air cargo service. Air cargo demand associated with each of the gap areas is currently served by an airport with existing scheduled air cargo service; this airport may be in Georgia or in a neighboring state.

Ultimately, carriers themselves will determine if additional points of scheduled air cargo service are needed in Georgia. This analysis provides an indication of areas in Georgia where new air cargo service may be experienced/supported. As the statewide study shows, there are also many existing airports in the Georgia that have varying attributes that could enable them to support scheduled air cargo service.

5.4 Case Study Airports

Large metropolitan areas in the U.S. are often served by air cargo carriers operating at multiple airports. For example, in Seattle, FedEx Express has cargo operations at both Seattle-Tacoma International (SEA) and Paine Field (PAE). In the New York City Metro Area, air cargo carrier activity is supported at three airports: John F. Kennedy International (JFK), LaGuardia (LGA), and Newark Liberty International (EWR).

The previous section showed that there are additional airports in Georgia that could serve as locations for expanded air cargo service in the state should carriers have the need to expand their route networks. To provide an understanding of how other airports have recently attracted air cargo service, two case studies were undertaken. These case studies explore airports in Indiana and Florida that were both recently selected for new air cargo service. The two general aviation airports were identified to investigate in the case studies; these two airports are Gary/Chicago International (GYY) in northern Indiana and Lakeland Linder International (LAL) in central Florida.

Gary/Chicago International, south of the Chicago Metropolitan Area, has air cargo service provided by United Parcel Service (UPS). UPS also operates at two other airports in the Chicago area, Chicago Rockford International (RFD) and Chicago O'Hare International (ORD). Lakeland Linder International is located in proximity to both the Tampa and Orlando Metropolitan Areas; the airport has air cargo service provided by Amazon Air. Tampa International (TPA); St. Pete-Clearwater International (PIE); Orlando International (MCO); and Orlando Sanford International (SFB) also support scheduled air cargo operations in the two major metropolitan areas.

It is important to note that growing air cargo demand and constraints at other existing airports contributed to the introduction of air cargo service at the two case study airports. While significant improvements to infrastructure and commensurate financial investment was required at both case study airports, facility improvements and investment were not responsible for either airport securing new air cargo service. For both case study airports, they secured air cargo service because of increasing demand and the inability of other airports in each area to expand to adequately meet growing demand.

5.4.1 Gary/Chicago International Airport (GYY)

Gary/Chicago International Airport (GYY) is a joint civil-military public airport in Gary, Indiana. It is three miles northwest of the City of Gary and 25 miles southeast of the City of Chicago. It is operated by the Gary/Chicago International Airport Authority. The airport covers 763 acres and has two asphalt runways: 12/30 is 8,859 feet by 150 feet and 2/20 is 3,604 feet by 100 feet. The airport's proximity to Chicago and major interstates (I-65, I-80, I-90, and I-94) provides a major population base and good ground connections to most locations in the region. While those factors made the airport appealing for scheduled cargo operations, the airport also made improvements to ready itself for air cargo operations, primarily through a major project to resolve runway safety area compliance.

Passenger-ready airports are required by the Federal Aviation Administration (FAA) to have Runway Safety Areas (RSAs) which meet FAA airport design standards. GYY's RSA on Runway 12/30 did not meet this standard. To meet the standard and not shorten the usable runway length, GYY extended the Runway 12/30 RSA and associated taxiway to the northwest by approximately 1,900 feet. The expansion required the relocation of railroad tracks owned by the Elgin, Joliet, and Eastern Railroad (EJ&E), a subsidiary of the Canadian National Railroad. Prior to the project, these tracks were located less than 150 feet from the northwest end of Runway 12/30.

The relocation of the EJ&E tracks required construction in a right-of-way owned by the railroad; that construction also impacted the CSX Railroad and the Norfolk Southern Railroad. In May 2011, the airport and the three railroads signed a Final Memorandum of Understanding that addressed construction projects and allowed the EJ&E track relocation to continue forward.

In addition to acquiring and preparing property to support needed upgrades, the airport relocated a large fuel storage tank, restructured a portion of an access road between two roadways, buried high-voltage power cables, and built an electrical transfer station to accommodate the buried high-voltage cables.

Between 2012 and 2015, over $126 million was spent to accomplish needed improvements and expansion. Major funding sources for the program included:

- The FAA ($60.6M)
- The Northwest Indiana Regional Development Authority ($50.0M)
- The Chicago Department of Aviation ($9.5M) funded through passenger facility charges (PFCs
- The Federal Highway Administration ($6.0M)

UPS began operations at Gary/Chicago International Airport in November 2020 with Airbus A300 jet operations to and from the UPS Worldport in Louisville, Kentucky. UPS and the airport entered a lease agreement in 2020 that includes one round trip between Gary and Louisville each weekday as part of Next Day Air service provided by UPS. UPS Next Day Air service volumes are increasing due to growing internet-based retail, healthcare, and small business demand, all have the potential to expand GYY's role in the UPS network.

The UPS lease has a five-year term, with two five-year extensions possible. As part of the agreement, UPS leases 14,000 square feet of office space in the airport's passenger terminal; a 150,000 square foot ramp that provides space to park two A300s; and an additional 5,800 square feet of hangar space to support their operations. UPS employs approximately 60 people at its Gary facility, including ground handlers, administrative employees, aircraft maintenance technicians, and managers. GYY is the third airport in the Chicago Metropolitan Area to support UPS air cargo operations.

UPS typically operates Airbus A300-600F and Boeing 757-200F aircraft at GYY on a regular basis. Flights are to and from the UPS Worldport in Louisville (SDF) and a UPS regional hub at Philadelphia International Airport (PHL). There are no feeder flights to GYY. UPS occasionally operates flights into GYY from other UPS support airports such as Boston/Manchester (MHT) in New Hampshire and Columbia Metro Airport (CAE) in South Carolina.

In 2010, a consultant team and other experts were contracted by GYY to prepare a Strategic Business Plan for the Gary/Chicago International Airport. The Strategic Business Plan addressed opportunities for improved passenger service, airport facilities (particularly runway length), corporate aviation, and potential air cargo. The Strategic Plan Study found that "the geographic positioning of the region offers potential for the integration of other modes and the longer-term potential of cargo charter activity".

Among the recommendations from the airport's strategic plan was the need to provide a longer runway and improved RSAs to support diversified air traffic. Through a coalition of investors and a collaboration with UPS, an estimated $130 million was spent to improve facilities at the airport. The end result of the improvements included the airport attracting scheduled air cargo service from UPS. UPS already operated at other airports in Chicago's Metropolitan Area, and the service at GYY was added to supplement other existing UPS service.

5.4.2 Lakeland Linder International Airport (LAL)

Lakeland Linder International Airport (LAL) is a public airport located five miles southwest of Lakeland, in Polk County, Florida. The Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems for 2017–2021 categorized the airport as a national reliever facility for Tampa International Airport (TPA). The airport has a Class 1 Federal Aviation Regulation (FAR) Part 139 operating certificate allowing passenger airline flights. Amazon Air began operations at the airport in 2020, transferring nearly all their cargo operations from TPA to LAL[11]. LAL is located one hour east from TPA placing it midway between Tampa and Orlando. It is important to note the airport's Amazon Air service was not new or additive air cargo service; it was a relocation of existing service from one airport in the area to

[11] As of August 2021, FAA flight records indicate Amazon Air continues one operation per weekday from TPA to ILN (an Amazon Gateway airport in Wilmington, Ohio).

another. The airport is one half of a mile from Interstate 4 via the Polk Parkway; according to airport input obtained as part of this study, the airport's location along the I-4 corridor was attractive to Amazon Air.

Lakeland Linder International Airport encompasses 1,710 acres and has two asphalt runways: 10/28 is 8,500 feet by 150 feet and 5/23 is 5,000 feet by 150 feet. Runway 10/28, its associated taxiway system, and the current airport terminal apron can accommodate aircraft up to the Boeing 747 and 777[12].

In May 2019, officials with the City of Lakeland approved a proposal between Lakeland Linder International Airport (LAL) and Amazon. A $100 million investment from Amazon.com Services, Inc. went toward the construction of an air cargo facility and an aircraft apron area. Amazon's main building is three stories and covers nearly 300,000 square feet.

To support Amazon operations, LAL upgraded the approach landing system at the airport to facilitate aircraft operations in inclement weather; made improvements to Runway 9-27; and added five additional fuel tanks in the airport's existing north and south fuel farms. LAL infrastructure improvements cost $18 million, and $25 million more was spent to improve the runway. Combined between Amazon and airport investment, a reported $133 million was initially spent to support the airport's new air cargo operations.

Based on their development and the new jobs that they would support, Amazon qualified for a $225,000 tax credit. Eighty percent ($180,000) of the tax credit was covered by the state of Florida. Polk County covered $22,500 of the credit, and the City of Lakeland paid the other $22,500. County and City funded tax credits were paid out over four years.

Amazon facilities have been developed on a 47-acre parcel leased from the airport. Amazon pays approximately $80,000 a month for the land, with the option to renew the lease three times for ten years each. This could extend the current agreement to a total of fifty years. Amazon pays LAL $0.85 per 1,000 pounds of cargo landed, with a 3-cent surcharge per gallon of fuel[13].

LAL recently opened a U.S. Customs and Border Protection office at the airport. Justification for the customs facility was based not only on the potential for Amazon use, but also on the airport's ability to accept international passenger charter flights destined for the Orland area and to process international business jets that are handled by the airport's FBO, Sheltair. The total cost of the customs facility is estimated at $1 million. Of this total, $450,000 was provided by FDOT, $150,000 was provided by Polk County Tourism and Development Council, and $400,000 was provided by Sheltair. To compensate Sheltair for their investment, they were granted a rent freeze, and Polk County provided the FBO with $150,000 to help fund a 20,000 square foot hangar. The agreement with the U.S. federal government

[12] The gross weight bearing capacity for Runway 09/27 is published in the FAA Airport 5010 as Single Wheel (S) 50,000 pounds. Dual Wheel (D) 250,000 pounds, Dual Tandem (DT) 550,000 pounds, and Two Dual Wheels in Double Tandem (2D/2D2) 1,120,000. Runway 05/23 is published as Single Wheel (S) 94,000 pounds and Dual Wheel (D) 150,000 pounds. Atkins LAL AMP Update | Final | August 2020 | 100057734 5:10

[13] https://cargofacts.com/allposts/e-commerce/amazons-100-million-lakeland-airport-project-approved/

to host this office enables the airport to handle international freight, should Amazon use the airport as an international point of entry. Currently, Amazon is not using the customs facility.

In 2021, Amazon approached the airport with additional plans to expand its existing cargo building by 464,600 square feet, additional parking for three jets, a 370-slot truck bay, and a large employee parking lot will over 1,000 parking spaces. These facilities allow the company to double its number of flights per day, from 22 to 44 by 2027. This will make Lakeland's Amazon hub the largest Amazon facility in the southeast U.S. Amazon expansion plans include:

- More space for aircraft storage (including additional Boeing 767-300s and 737 cargo aircraft)
- An estimated 30,000 square yards of additional aircraft apron to park three additional B-767 aircraft
- Another new fuel farm supported by another access road. The new fuel farm will store 24,000 gallons of gasoline for ground storage equipment (GSE) and 72,000 gallons of Jet A fuel
- The potential for hundreds of new jobs, varying in levels of salary and responsibility; an estimated of project employment that will be added as part of Amazon's expansion plans is not available.

The development of air cargo service at this airport replaced service that previously was accommodated at Tampa International Airport. LAL is ideally located between the two major and growing metropolitan areas of Orlando and Tampa. The airport has good highway access to serve the two market areas. Most likely, the almost 50 acres of property open for development was key to Amazon's decision to locate at the airport. The improvements that the airport made to support Amazon's development of this property also supported the carrier's decision to locate at the airport.

This case study shows that with a strategic location, acreage open for development, appropriate airport facilities, and good highway access, airports not previously serving air cargo carriers can be candidates for air cargo service.

5.4.3 Case Study Takeaways for Georgia Airports

One important finding from the case studies is that both airports secured new air cargo service because there was notable demand that could not be accommodated by service at existing airports. The two case studies showed the two airports selected for expansion had the following characteristics:

- The airports have a strategic location as it relates to centers of population, employment, and industries/activities
- The airport had the facilities typically sought by air cargo operators or they were able to provide these facilities
- The airports had the desire to change their current role
- The airports had sufficient available undeveloped property to serve air cargo operators
- The airports are located in proximity to major highways, including existing interstate highways

Considering these factors and many others, along with the location of generators of air cargo demand in Georgia, this chapter has identified those airports that have the highest number of attributes to support the expansion of scheduled air cargo activity in Georgia should expansion be needed.

5.5 Air Cargo Drone Activity Analysis

5.5.1 Current UAS (Unmanned Aerial Systems) Cargo Delivery Market

The civil Unmanned Aerial System (UAS), also referred to as Unmanned Aerial Vehicles (UAV) or "drones"[14], market had a global market value of $5.5 billion in 2019, and the market for production and service applications, primarily driven by the infrastructure sector, is forecasted to grow around 11 percent a year over the next six-year period.[15] The Covid-19 pandemic fast-tracked this forecasted growth. The top of this decade is a pivotal time to recognize the advancements that have proliferated in the logistics industry. These advancements have allowed for practical progress to be made in the implementation of UAS for retail deliveries to private residences, medical deliveries in otherwise inaccessible locations, and increased efficiencies in point-to-point warehouse deliveries.

At a high level, there are currently four categories of use for UAS cargo deliveries. These include:

- First or last mile deliveries of parcels and other goods
- Intralogistics and automation within controlled environments in factories or warehouses
- Transport of medical supplies in otherwise hard to reach areas
- Transportation of air freight in both urban and rural areas

Each of these categories has the potential to disrupt the conventional way of carrying out tasks within the air cargo industry and are part of the rapidly developing fields of Urban Air Mobility (UAM) and Advanced Air Mobility (AAM)[16]. An analysis of non-military applications of UAS air cargo delivery in the U.S. indicates that the logistics industry is blazing the trail in the use of this disruptive technology, followed by the healthcare, and then the retail industry. Continual research and development, along with practical implementation of autonomous unmanned aircraft systems (UAS) and supporting technologies, will only continue to allow air cargo delivery via UAS to thrive.

To support this technology, the FAA initiated programs such as Integration Pilot Program (IPP) and UAS BEYOND. The former focuses on testing and evaluating the integration of drone operations into the National Airspace System (NAS). The latter focuses on addressing challenges such as Beyond Visual Line of Sight (BVLOS) operations and socio-economic benefits of UAS operations.

The FAA requires drone package delivery operators to obtain Part 135 certification and appropriate airspace authorizations. The FAA also issued two rules in December 2020 for Remote ID and Operation of Small Unmanned Aircraft Systems Over People. These rules anticipate the use of commercial drones in the U.S., particularly for package deliveries and last-mile logistics. Remote ID is foundational to

[14] According to pilotinstitute.com, "drone" is the most commonly used term to refer to any uncrewed aerial vehicle and is a non-technical catch-all for both UAV and UAS and can refer to both fixed-wing and multi-copter models. "UAV" narrows the definition of a drone on to aircraft that can fly autonomously or remotely and refers only to the aircraft itself and none of the other accessories and equipment. "UAS" includes everything that makes UAVs work including GPS, ground control, transmission systems, camera, software, and persons controlling the UAV.

[15] https://www.rolandberger.com/en/Insights/Publications/Cargo-drones-The-future-of-parcel-delivery.html

[16] According to the FAA, Urban Air Mobility (UAM) envisions a safe and efficient aviation transportation system that will use highly automated aircraft that will operate and transport passengers or cargo at lower altitudes within urban and suburban areas. Advanced Air Mobility (AAM) builds upon the UAM concept by incorporating use cases not specific to operation in urban environments.

unmanned traffic management and safety. The rule requires a "license plate" for most drones operating in the NAS, allowing for easy tracking, planning, and responding to UAS threats, operations, and impacts.[17] [18]

According to Drone Package Delivery Global Market Report 2021, "North America was the largest region in the drone package delivery market in 2020". Major players in the delivery drone services market include:[19]

- Airbus SAS
- Flirtey
- Zipline
- United Parcel Service
- Uber Technologies Inc
- Amazon Prime Air
- Zomato
- EHANG
- FedEx Express
- Wing Aviation LLC
- Deutsche Post AG
- Boeing
- Cheetah Logistics Technology
- DHL International GmBH[20]
- Drone Delivery Canada Corp
- Manna Aero
- Matternet Inc.

Key industry players are explored in further detail in the following sections.

Wing – Wing, Alphabet a holding company based in California, partnered with FedEx Express, Walgreens, and local businesses as they encountered increased demand during the pandemic; 78 percent of the U.S. population lives within five miles of a Walgreens store. This means almost 80 percent of the U.S. is within range for Wing shipments, in the event that the technology is widely implemented. Wing is currently operating in four locations: Christiansburg, Virginia (U.S.), Helsinki (Finland), and Canberra and Logan City (both in Australia). Wing has seen a 500 percent surge in their operations from 2019 and plans to expand within the U.S. They currently cater to healthcare and retail interests in

[17] https://www.faa.gov/uas/programs_partnerships/beyond/

[18] https://www.faa.gov/uas/advanced_operations/package_delivery_drone/

[19] https://www.businesswire.com/news/home/20210806005208/en/Drone-Package-Delivery-Global-Market-Report-2021-COVID-19-Impacts-Growth-and-Changes-to-2030---ResearchAndMarkets.com

[20] GmbH is an abbreviation for a German phrase meaning "company with limited liability" in English.

Virginia through the Wing app. Wing utilizes a hybrid drone that can carry up to 2.6 pounds covering a 12-mile round trip distance.[21]

UPS – UPS Flight Forward, a subsidiary of UPS, is the first company that received a full Part 135 certification from the FAA. UPS currently operates in North Carolina. They can conduct drone delivery operations anywhere within the U.S. In August 2021, UPS teamed up with Atrium Health Wake Forest Baptist to expand the delivery of COVID-19 vaccines from Winston-Salem, NC to one of the health system's family medicine practices. Early in 2021, UPS partnered with Skyward, a Verizon company, to test Verizon's 5G Ultra-Wideband connectivity and its integration for drone delivery. In 2020, UPS Flight Forward and CVS collaborated to carry prescription medications to The Villages, Florida, the country's biggest retirement community with more than 135,000 residents. In 2019, UPS joined forces with Wingcopter to build a new generation of package delivery drones for usage in the U.S. and abroad. In 2019, WakeMed Hospital in Raleigh, North Carolina received medical supplies delivered by UPS Flight Forward in partnership with Matternet, an automated drone logistics platform.

Walmart – Walmart's presence across the U.S. includes approximately 4,700 stores within 10 miles of 90 percent of the U.S. population. In a partnership with DroneUp, Walmart planned its first drone operation in Bentonville, Arkansas. Walmart initiated a delivery program during the pandemic for residents living in single-family residences within a 1.5-mile radius of the Walmart Supercenter at 1850 N. Zaragoza Road in El Paso. In Las Vegas, Nevada and Cheektowaga, New York, Walmart launched trial drone deliveries of COVID-19 test kits that were lowered to front yards, driveways, or backyards.

Amazon Prime Air – Amazon Prime Air was founded in 2016 and plans to deliver packages up to 5 pounds up to 15 miles using small drones within the U.S and across the globe. In August 2020, the FAA approved Amazon's Prime Air drone delivery service to be operated under Part 135 FAA regulations, which give Amazon the ability to carry property on small drones beyond visual line of sight of the operator.[22] As of November 2021, Amazon's drone delivery program is still under development.

Zipline – Based in California, Zipline delivers time sensitive and lifesaving products, completing approximately 200,000 commercial deliveries so far. Zipline utilizes autonomous fixed-wing drones that can carry up to 3.9 pounds and cover up to 50 miles. The company is based in San Francisco and operates from distribution centers placed at the center of each service region. Zipline currently operates in areas of North Carolina and Arkansas. Zipline collaborates with Novant Health to deliver medical supplies and samples between North Carolina clinics and hospitals. The company has also teamed up with Walmart to make deliveries within a 50-mile radius of one Arkansas Walmart store. Globally, Zipline is also operating in Rwanda and Ghana.[23]

Volansi – Volansi is in trial stages of testing the delivery of emergency supplies and equipment using drones in places like Ocracoke Island, North Carolina. The company uses hybrid drones with capabilities

[21] https://www.forbes.com/sites/johnkoetsier/2021/08/25/google-now-owns-the-largest-residential-drone-delivery-service-in-the-world/?sh=63cc57711974
[22] Amazon wins FAA approval for Prime Air drone delivery fleet (nbcnews.com)
[23] https://www.auvsi.org/zipline-co-founder-urges-regulatory-updates-speed-benefits-drone-delivery-americans-who-need

of carrying up to 5 pounds. They are planning to conduct delivery operations on the U.S. mainland in the future.[24]

5.5.2 UAS Research and Development

Drone-based medical delivery networks will be used throughout the U.S. by thousands of hospitals as Wingcopter partners with the country's largest air medical provider, Air Methods. Elroy Air is teaming with NASA to accelerate and improve the safe integration of advanced autonomous cargo aircraft into U. S. airspace.

North Dakota and the FAA are advancing operational flight testing for different UAS operators, as well as industries and public services that operate in the state. These include the oil and gas industry; road, railroad, and power line inspectors; cargo and medical deliveries; and emergency response services.

A new patent was awarded to Draganfly for a vertical take-off and landing (VTOL) drone that can deliver cargo beyond visual line of sight (BVLOS) and over people at night in order to transport goods to hard-to-reach areas.[25] Swoop Aero and Iris Automation have partnered to offer BVLOS drone solutions globally and to solve logistics challenges in remote and rural areas. By integrating Iris Automation's detect-and-avoid (DAA) technology into the Swoop Aero drone logistics infrastructure, the organization enables safe integration of manned and unmanned aircraft into global supply chains in various settings and regions.[26]

Flytrex are capable of delivering packages weighing up to 6.6 pounds and of carrying them up to 6.2 miles. The company is currently working on its test programs in North Carolina and North Dakota. Additionally, Walmart integrated uses Flytrex drones as part of their “pilot program” in Fayetteville, North Carolina to deliver groceries and essential items.

UPS plans to purchase 150 electric vertical take-off and landing (eVTOL) aircraft from BETA Technologies to expand its drone delivery operations. The BETA aircraft has a 1,400-pound cargo capacity and will serve healthcare providers, small and medium-sized businesses, and other companies in small communities. “With a 250-mile range and cruising speed of up to 170 miles per hour, UPS will be able to plan a series of short routes, or one long route, on a single charge to meet customer needs.”[27] UPS is also working on eVTOL drone technology with Wingcopter to expand their operations within the U.S., as well as globally.

Augusta Regional Airport (AGS), DeKalb Peachtree Airport (PDK), and Washington-Ware County Airport are proposed locations for BETA Technologies charging stations.

Google plans on expanding its drone delivery services in the U.S. The company has seen success in residential grocery/food delivery in Australia. Kroger, one of the largest retailers in the U.S., has announced partnership with Drone Express to initiate a grocery delivery pilot program in Centerville, Ohio and at a Ralph’s store in California.

[24] https://volansi.com/commercial/
[25] https://www.auvsi.org/industry-news/draganfly-awarded-new-patent-vtol-cargo-delivery-drone
[26] https://www.auvsi.org/drone-powered-logistics-provider-swoop-aero-partners-iris-automation
[27] UPS Flight Forward Adds New Aircraft | About UPS

5.5.3 Potential Done Cargo Delivery Impacts to Georgia

An MIT Paper published in 2019 identified that zero percent of drones delivered, at the time of that study, were eligible to fly deliveries, but the paper indicated that in the future, potentially as high as 35 percent of all drones may be able to complete such deliveries. The paper discusses feasibility studies for cities like Los Angeles, San Diego, San Francisco, Houston, and Dallas and lists these locations as high potentials for drone delivery implementation within five years (2025). It should be noted that this paper does not consider the advancements in done technology made during the Covid-19 Pandemic; research from the forecast may now apply to other locations like Atlanta.[28]

Currently, several airports of varied sizes in Georgia accommodate scheduled air cargo activities. These airports and cargo carriers are listed in **Figure 2-2** in **Chapter 2** (*Industry Overview*).

Some of the air cargo operators in Georgia include UPS and Amazon Air, among others. As identified for the current drone delivery market, UPS has made headway into autonomous deliveries with more advancements and impending plans in place. With the strong presence of UPS in Georgia and Quest Diagnostics based in Gwinnett County, UPS's Flight Forward has the potential to implement autonomous delivery solutions through their collaboration with BETA's technology that can carry up to 1,400 pounds of cargo. UPS's intention to expand drone deliveries within the U.S. may likely have an impact on air cargo in Georgia.

The FedEx Express package delivery trials[29] using Wing's drone in Christiansburg, Virginia demonstrate the benefits of drone delivery for last-mile delivery service. With programs such as the U.S. Department of Transportation's Unmanned Aircraft Systems Integration Pilot Program (IPP), Georgia and other states may be on the horizon for drone deliveries in the foreseeable future. The impact of such operations as they are currently envisioned will have minimal if any impact on airport facilities.

Unmanned air cargo delivery has the potential to both fill traditional rolls and routes along with new and emerging roles/routes served by advanced air mobility concepts. From regional transport to last mile package delivery with UAS, along with the electrification and autonomy of large eVTOLs, there will likely be new landing facilities and the potential off-airport development to be explored. Each requires independent research and oversight.

AURA Network Systems has been selected by NASA to be an agency partner in Advanced Air Mobility (AAM) project's, National Campaign, to integrate air taxis, cargo delivery aircraft, and other air vehicles in the NAS. The campaign will include flight demonstrations and simulations at test sites around the country for several months starting in 2022.[30]

The following examples of UAS air cargo deliveries are linked to directly to Georgia.

- Georgia Tech - A Georgia Tech research team is exploring Swarm Technology in which "vehicles are not connected but flying in formations" to lift larger packages. For example, 4 drones

[28] https://dspace.mit.edu/bitstream/handle/1721.1/121310/Butcher_Lim_2019.pdf?sequence
[29] https://www.fedex.com/en-us/sustainability/wing-drones-transport-fedex-deliveries-directly-to-homes.html
[30] https://www.auvsi.org/nasa-selects-aura-advanced-air-mobility-national-campaign-integrating-air-taxis-cargo-delivery

teaming together lift a package that weighs about 12 pounds while interacting with each other through an algorithm. The number of drones required for this type of operation is modular as required. Further research is needed to explore systems that connect the drones and packages. The research team envisions the application of this technology in commercial package delivery and in military supplies[31] [32]

- Coca-Cola - Coca-Cola worked with Walmart and DroneUp to deliver coke cans via drones to residents in Coffee County, Georgia. This was done in celebration of Coca-Cola's launch of their new product what combines Coke with coffee. While this was a short event, it may ramp up considerations for additional delivery services in the future as the technology progresses, there are more autonomous flying vehicles, more operators obtain certifications to fly over people, BVLOS expands, and there are more drones weighing over 55 pounds.[33]

5.5.4 Georgia Drone Air Cargo Activity Takeaways

Advancements in Unmanned Aerial Systems (UAS) and Advanced Air Mobility (AAM) technologies are occurring at a rapid pace as investment by numerous companies and universities continue to flow into research and development. Of the many UAS technology applications, delivery of air cargo by drones is one of the most promising and the fastest growing. Along with examples of ongoing testing occurring in Georgia, the long-term potential for UAS to augment the air cargo industry is significant.

5.6 Summary

Each day, air cargo demand in Georgia is generated by countless businesses, consumer households, and other activities. This demand is served by numerous scheduled and ad hoc air cargo carriers operating at a variety of airports. Air cargo supports commerce and connects Georgia's economy to national and global supply chains. The vast majority of air cargo demand is accommodated by regularly scheduled air cargo carriers operating at six airports in Georgia; and a seventh airport in Gwinnett County (LZU) supports daily specialty medical related air cargo flights. Other airports see air cargo transported in the belly-hold compartment of commercial airlines and 58 airports support on-demand or ad hoc air cargo flights. This chapter identifies the linkages between economic activity and businesses in Georgia and potential air cargo demand associated with these activities.

To better assess the level of air cargo demand that exists in Georgia and the extent it is being met by airports with existing scheduled air cargo service, 60-minute drive-times for each of Georgia's airports with existing scheduled air cargo service were established. Airports in neighboring states with nearby or overlapping air cargo airports are also considered in the analysis.

Although many types of businesses, activities, and households generate air cargo demand, to help understand the level of demand within each 60-minute drive-time, this analysis focuses on industries that are known to have a higher likelihood of relying on air cargo. These industries/activities include Distribution Centers, Fulfillment Centers, Aerospace Manufacturing, Automotive Manufacturing, Medical

[31] https://rh.gatech.edu/news/645616/control-system-helps-several-drones-team-deliver-heavy-packages
[32] https://consortiq.com/drone-swarm-delivery-system/
[33] https://wfxl.com/news/local/coca-cola-drones-delivering-to-coffee-countians

Device Manufacturing, and Pharmaceutical Manufacturing. Household income is also considered as a proxy for e-commerce demand. Using GIS, almost 900 Georgia industries/activities, categorized as one of those noted here, are plotted and assigned a weighted score based on the relative size of the industry/activity.

Calculating the number of air cargo demand generating locations and weighted score for each airport's 60-minute drive-time, it is determined that the 60-minute drive-time for ATL has the highest level of air cargo demand-generating industries/activities. The distributions and relative concentrations of air cargo demand-generating industries/activities generally follow locations for the state's businesses and household income patterns, as well as its primary highway corridors. Statewide, almost 70 percentage of Georgia's air cargo generating industries/activities (by weighted score) are currently within a 60-minute drive-time for one of Georgia's six airports with existing scheduled air cargo service. These airports serve Albany, Atlanta, Columbus, Savannah, Statesboro, and Swainsboro.

Considering known air cargo demand generators, six air cargo accessibility gap areas were identified; for the six gap areas, two are located north of the Metro Atlanta and the others are centered on Augusta, Brunswick, Macon, and Valdosta. Airports in each gap area with a current runway length of at least 5,000 feet are identified and an airport attributes matrix developed. The attributes matrix shows which airports in or near the various gap areas have the highest number of factors that could make them options for air cargo expansion.

Based on the possibility that there are additional airports in Georgia that could attract scheduled air cargo operations, case studies for Gary/Chicago International (GYY) and Lakeland Linder International Airport (LAL) provide an understanding of how other airports have recently attracted new air cargo service. For both case study airports, underlying demand that could not be accommodated by at an existing operational location drove the need for air cargo expansion. The case study examples show that a strategic location, acreage open for development, appropriate airport facilities, and good highway access are characteristics that often support scheduled air cargo service.

Lastly, UAS and their supporting technologies are discussed for their potential to augment or supplement more traditional air cargo functions. The civil UAS market had a $5.5 billion market value in 2019 and is expected to grow rapidly. Technological advancements in UAS have the potential to support parcel delivery on the first or last mile; intralogistics and automation within factories/warehouses; medical deliveries; and air freight transportation both in urban and rural areas. The logistics industry – some of which is Georgia-based – is blazing the trail in the use of this disruptive technology. Healthcare and retail industries are also testing UAS for cargo delivery. Continual research and development, along with practical implementation of autonomous unmanned aircraft systems (UAS), will allow air cargo deliveries via UAS to continue to expand across the country and in Georgia.

The following chapter projects future air cargo demand at airports that currently have scheduled air cargo service. Demand projections are integral to establishing facility needs for airport that currently have scheduled air cargo activity. Facility requirements for airports with existing scheduled air cargo service are identified later in this report.

6 Air Cargo Forecast

6.1 Introduction and Background

Forecasts of air cargo demand help determine what facility/capacity development an airport, or airports, should undertake to fully meet projected air cargo demand. To provide context for the forecasts developed in this chapter, it is important to remember that air cargo demand is market-driven. In the real-world operating environment, air cargo demand is determined by the decisions of air cargo providers which are influenced by time, cost, and service. Decisions to increase air cargo related activity are made by individual service providers. Integrated express and specialty air cargo carriers expand operations at an existing service point or start operations at additional airports dependent upon and considering the larger needs of their distribution networks. Existing and supporting airport infrastructure both contribute to the decision-making process of air cargo carriers when evaluating their need to expand.

Forecasts developed in this chapter are unconstrained—as such, they do not take into account any limiting factors. With Georgia's existing and potential air cargo airports, the state appears to have ample ability to expand to meet seen and unforeseen air cargo demand.

Forecasts developed in this chapter consider underlying market forces, including recent market disruptions from COVID-19 and the significant increase in e-commerce activity that escalated air cargo demand. This forecasting effort accounts for the best business practices for the carriers themselves, along with more traditional planning metrics, as demand projections are developed.

Air cargo demand is driven by time, cost, and service; similarly, it is important to consider that past trends do not necessarily portend future performance. This forecasting exercise relies not only on past and current air cargo activity but also on projections of air cargo demand generated by several reputable agencies/sources. Because future demand can be higher or lower than adopted projections, this forecasting effort considers low, medium, and high ranges for future demand.

The most reliable and available data was used to support this study's forecasting effort. All forecasts, including those presented here, require some level of judgment. Current issues and events influencing near- and longer-term demand are considered as part of the process. The level of detail provided in the air cargo forecasts, presented in this chapter, is driven by available data for each study airport. Forecasts are developed for airports with existing integrated express carrier air cargo service (with the exception of Hartsfield-Jackson Atlanta International). Forecasts are not developed for airports whose air cargo service is limited to belly-hold cargo on commercial air carriers, nor are they developed for airports that currently have no regularly scheduled air cargo service or only ad hoc air cargo service.

Forecasts are rarely able to predict exactly when or in which year future demand levels will be achieved. Forecasts discussed in this chapter are most useful for predicting future trends. It is often more useful to consider what facilities or improvements might be needed to address future demand levels without tying them to a specific year. Focus is on projected cargo tonnages and air cargo operations rather than

on the specific year in which projected demand levels might occur. When facility needs are identified, it is important to understand demand levels that trigger the need for improvements.

Air cargo demand, like most facets of aviation, is almost always tied to the economy, and in particular, to oil prices. Air cargo in the U.S. and North America is a mature industry; the most rapidly growing and largest air cargo markets are in regions beyond North America. That does not, however, mean that there are no opportunities for air cargo growth at airports in Georgia. In particular, rapidly expanding e-commerce markets have led companies such as Amazon, Target, and Walmart to increase shipping by air in response to customer needs. These circumstances are important facets of a well-developed air cargo forecast for study airports. Though the study airports are most likely not candidates for international shipping routes, their future air cargo activity will likely be tied to decisions made by integrated express carriers such as UPS and FedEx Express, and specialty carriers such as Amazon Air.

The air cargo forecasts developed for airports in Georgia consider demand and supply. Previous sections of this report focused on the presence, size, and location of air cargo demand generators in Georgia. The location of fulfillment centers (FCs) and distribution centers (DCs) have emerged as primary influencers on air cargo demand. Demand generators, FCs, and DCs are related to each study airport's 60-mile drive-time established in **Chapter 5**. Supply relates to current overall air cargo service, service provided by competing modes of transportation, and air cargo service available at airports near demand generators. Supply and demand have the ability to influence individual airport rates of growth for future air cargo demand.

Air cargo demand in Georgia is influenced by a variety of factors:

- The shipment's origination and destination
- The commodity being shipped
- The shipper's desired level of service
- The size (volume) of the shipment

Much of the air cargo activity at the study airports in Georgia is related to e-commerce. These shipments most often require next day delivery. Accordingly, airports serving e-commerce shipments must be within the immediate market area of the intended customer. **Chapter 5** of this report presents information on relative household income levels throughout the state; this information is a primary driver for air cargo demand as it relates to e-commerce shipments.

Subsequent sections of this chapter use various approaches to project future air cargo demand. A preferred forecast is identified for each airport with existing scheduled air cargo service. The preferred forecasts identified in this chapter are important to support the need to improve or provide new facilities at study airports to accommodate future air cargo demand.

6.1.1 General Approach to Georgia's Air Cargo Forecast

Projecting future air cargo demand is part of the planning process. Once projected demand is established, it is possible to determine the adequacy of existing air cargo facilities and the requirements for future facilities. This chapter discusses methodologies used to forecast air cargo demand for five Georgia airports with existing integrated express air cargo service. Forecasts developed in this chapter identify facilities required to support air cargo demand in Georgia. Forecasts for air cargo are developed for the following airports:

- Columbus Airport (CSG)
- East Georgia Regional Airport (SBO)
- Savannah/Hilton Head International Airport (SAV)
- Southwest Georgia Regional Airport (ABY)
- Statesboro-Bulloch County Airport (TBR)

Gwinnett County Airport Briscoe Field (LZU) is excluded from the forecast analysis. The scheduled air cargo service activity at this airport is associated with a single business, Quest Diagnostics, and falls into the speciality category. Quest uses the airport to transport medical specimens and laboratory samples by air via their own fleet of aircraft. This cargo activity at LZU does not serve general cargo demand: the air cargo lift associated with Quest Diagnostics is not available for hire by others. Quest is an example of a privately-owned business that uses its own fleet of aircraft to meet its individual air cargo needs; they do this rather than relying on the services of third-party integrated express carriers. Determining future demand and related facility needs for privately-owned businesses is not included in the scope for the statewide study.

Hartsfield-Jackson Atlanta International Airport (ATL) is also excluded from the state's forecasting analysis. As the largest facilitator of air cargo in Georgia and one of the largest in the southeast, the airport forecasts and plans for its own air cargo needs. A summary of the most current air cargo forecast for ATL, as contained in the airport's master plan, is included for reference this chapter.

The other five airports listed above have scheduled air cargo service that accommodates requisite demand. This service is provided primarily through integrated express carrier networks such as FedEx Express and UPS. Projections of air cargo demand were not developed for airports currently without existing scheduled air cargo service or for those with only ad hoc air cargo flights.

Projections for the five existing cargo airports are prepared using 2019 as the base year because of the COVID-related demand and supply disruptions that characterized most of 2020. Projections were developed for the near-term (2025), mid-term (2030), and long-term (2040) forecasting horizons. These projections assume that the applicable airports will be able to accommodate future increases in air cargo activity. In other words, forecasts presented in this chapter are not constrained.

6.2 Current and Historic Air Cargo Trends

6.2.1 Global Air Cargo Trends

As of 2019, air cargo supported more than 35 percent of global trade by value.[1] Globally, air cargo volumes have increased steadily from 2004-2019 at an average annual rate of 2.8 percent. Cargo volume declined during the Great Recession of 2008-2009, and then volumes steadily increased until the 2020 pandemic. The global pandemic and its related effects led to a greater than 10 percent decline in total transported air cargo volumes in 2020. The International Air Transport Association (IATA) reported that global air cargo demand returned to pre-COVID levels by January 2021 for the first time since the onset of the pandemic.[2] As of October 2021, global air cargo volumes (by weight) were up three percent over October 2019; however, capacity remains below pre-COVID-19 levels due to ongoing reductions in passenger aircraft belly capacity.[3] Lingering impacts of the pandemic, are impacting some aspects of the idustry's recovery as material shortages continue and disruptions in other segments of global and domestic supply chains persist.

The *Boeing World Air Cargo Forecast 2020-2039* determined that air cargo traffic increased across all regions worldwide from 2009-2019. The largest share of air cargo traffic came from East Asia and Oceania, followed by North America. The fastest-growing region for air cargo growth was the Middle East, at 10 percent annually, followed by Russia and Central Asia with average annual air cargo growth of almost nine percent. North America experienced an average annual air cargo growth rate of 3.9 percent for the same timeframe.

6.2.2 National Air Cargo Trends

Nationally, air cargo volumes increased as well. From 2011-2020, the Airports Council International-North America found that air cargo volumes in the United States increased at an average annual growth rate (AAGR) of 2.6 percent, growing from 27.1 metric tons to 34.9 million metric tons. One of the primary contributors to this growth is the rise of e-commerce. According to the U.S. Department of Transportation – Bureau of Transportation Statistics, as of July 2021, domestic air cargo revenue-ton-miles[4] were up by 26 over July 2019, while international revenue-ton-miles increase by 19 percent over the same period.[5] More information on national air cargo trends can be found in **Chapter 2.**

6.2.3 Georgia Air Cargo Trends

In Georgia, air cargo volumes are also increasing, but at a rate below the U.S. average. Data from Airports Council International – North America (ACI-NA) indicates positive growth for Georgia's three busiest cargo airports (by tonnage) from 2009 to 2019: Hartsfield-Jackson Atlanta International, Southwest Georgia Regional, and Savannah/Hilton Head International. Data for the airports serving

[1] https://www.iata.org/contentassets/d22340c37e0c4cfd8fc05ca6ebf6cc9f/stb-cargo-white-paper-e-commerce.pdf
[2] https://centreforaviation.com/news/iata-air-cargo-demand-returns-to-pre-pandemic-levels-in-jan-2021-1055718
[3] https://www.caasint.com/anticipated-pressure-on-supply-chains-pushes-air-cargo-rates-up-again-in-october-but-demand-shows-no-end-of-year-sprint-just-yet/
[4] RTM represents revenue earned for transporting one ton of freight for one mile.
[5] https://data.bts.gov/stories/s/Monthly-Transportation-Statistics/m9eb-yevh/#air-cargo

Statesboro, Columbus, and Swainsboro is not reported to ACI-NA. Data from the Bureau of Transportation Statistics' (BTS) T-100 All Carriers demonstrates growth for dedicated air cargo aircraft originating from and arriving in Georgia between 2009-2019. Available T-100 reports include Hartsfield-Jackson Atlanta International, Southwest Georgia Regional, Columbus Airport, and Savannah/Hilton Head International. While the airports serving Swainsboro and Statesboro do accommodate scheduled activity by integrated express operators, the volume of tonnage accommodated at these two airports falls below the level needed to be included in T-100 reporting.

Table 6-1 identifies tonnage for the four reporting Georgia airports for 2009, 2014, and 2019, as well as the associated average annual growth rate at each airport over that period. ACI data is used for Southwest Georgia Regional, Hartsfield-Jackson Atlanta International, and Savannah/Hilton Head International. T-100 data is used for Columbus Airport, as it is not reported in the ACI data. Reported tonnage for 2020 is also included to demonstrate change due to the pandemic. It is worth noting that partial data from 2021 indicates that some aspects of the air cargo industry are rebounding from declines reported in 2020.

Table 6-1: Historic Tonnage Trends for Georgia Cargo Airports, 2009-2019

Associated City	Airport Name	FAA ID	2009 Metric Tons	2014 Metric Tons	2019 Metric Tons	AAGR 2009-2019	2020 Metric Tons
Albany	Southwest Georgia Regional Airport	ABY	17,260	18,280	24,950	3.8%	24,040
Atlanta	Hartsfield-Jackson International Airport	ATL	554,890	601,270	640,280	1.4%	559,180
Columbus	Columbus Airport	CSG	160	220	430	10.4%	180
Savannah	Savannah/Hilton Head International Airport	SAV	6,470	7,160	8,390	2.6%	7,670
Total (Excluding ATL)			**23,890**	**25,660**	**33,770**	**3.5%**	**31,890**
Total (Including ATL)			**584,310**	**632,860**	**674,000**	**1.5%**	**591,070**

Source: ACI-NA 1997-2020 Traffic Reports, BTS T-100 All Carriers 2009-2019, Jviation Analysis, October 2021

As shown, the reporting airports had a positive average annual growth rate for their dedicated air cargo tonnage between 2009 and 2019. Averaged together, the four Georgia airports with historic tonnage data had an AAGR of 1.5 percent from 2009-2019, which is below the U.S. average of 2.6 percent. While the rate of growth for the Columbus Airport was higher, it was from a much lower volume.

Data for Hartsfield-Jackson Atlanta International (ATL) is also available from ACI-NA and is also presented in **Table 6-1**. The AAGR for total tonnage at ATL for this period was 1.4 percent, also trailing the U.S. average. In addition to having many dedicated freighter aircraft operations, the airport's status as the busiest passenger airport in the world results in significant levels of passenger aircraft belly cargo lift capacity on hundreds daily international and domestic flights both international and domestic. Belly-hold air cargo is discussed later in this chapter. According to T-100 data, dedicated freighter aicraft tonnage at ATL grew at an average annual rate of 2.1 percent from 2009 to 2019.

This historic activity helps to provide context for projecting future air cargo demand. Information presented in **Table 6-1** supports the demand projections presented later in this chapter.

6.3 Baseline Data to Support Forecasts of Demand

This section contexualizes the various air cargo demand projects for study airports.

6.3.1 Baseline Annual Air Cargo Tonnage

Base year (2019) tonnages are identified for each study airport from a variety of sources. Base year air cargo volumes for Savannah/Hilton Head International, Southwest Georgia Regional, and Columbus Airport rely on data reported by both ACI-NA and BTS T-100 cargo databases.

For the other Georgia scheduled air cargo airports with contracted feeder service, air cargo tonnage is not reported through either source. Therefore, it is necessary to estimate tonnage based on a known variable. In this case, the known variable is aircraft capacity (by weight) of the typical cargo aircraft operating at the airport(s), multiplied by the annual operations of that aircraft.

Since air cargo aircraft typically reach maximum volume before weight, 80 percent of their full-weight payload is used to account for any "bulking out" effect. This process is used to estimate base year air cargo tonnage for East Georgia Regional and Statesboro-Bulloch County. In total, the 2019 statewide air cargo tonnage for the five study airports is estimated at 34,810 metric tons. **Table 6-2** displays base year air cargo tonnage for each of the applicable study airports.

Air cargo tonnage for ATL is discussed in the previous section and forecasts for future air cargo activity for this major international airport are provided by the City of Atlanta for use in this study. These projections are presented later in this chapter. Some high-level information on air cargo activity at ATL is presented in this chapter to provide additional context for total air cargo activity in Georgia.

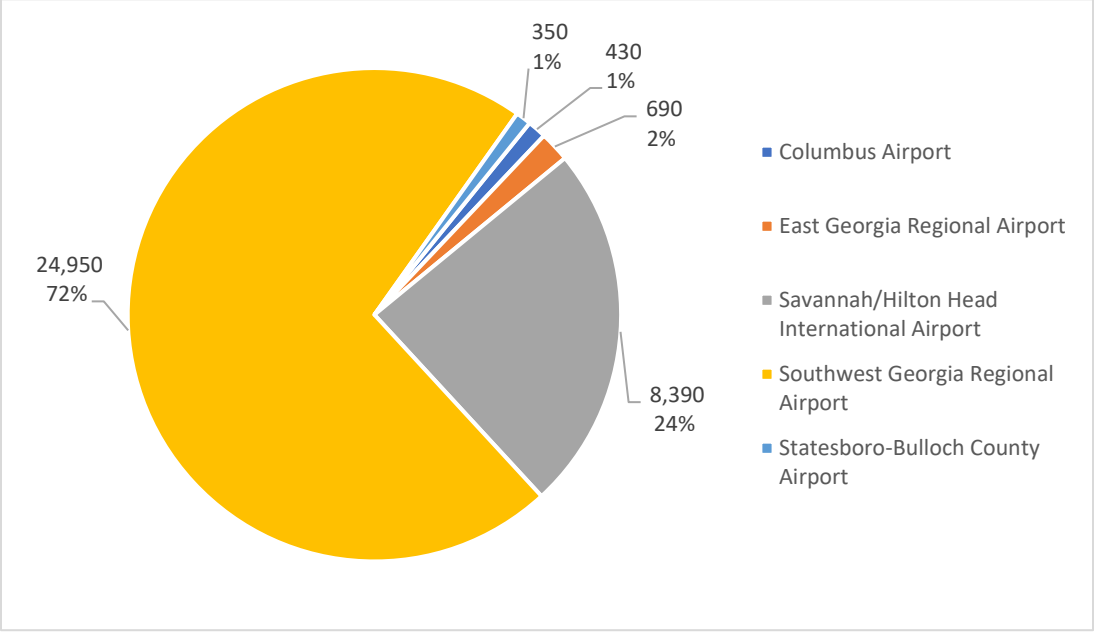
Table 6-2: Base Year Air Cargo Volume by Airport

Associated City	Airport Name	FAA ID	2019 Metric Tons	2019 Market Share
Albany	Southwest Georgia Regional Airport	ABY	24,950	71.7%
Columbus	Columbus Airport	CSG	430	1.2%
Savannah	Savannah/Hilton Head International Airport	SAV	8,390	24.1%
Statesboro	Statesboro-Bulloch County Airport	TBR	350	1.0%
Swainsboro	East Georgia Regional Airport	SBO	690	2.0%
Total			**34,810**	**100%**

Source: ACI-NA 1997-2020 Traffic Reports, BTS T-100, Jviation Analysis, October 2021

As shown, Southwest Georgia Regional Airport accounts for approximately three-quarters of the total reported or estimated annual air cargo tonnage for these airports. Savannah/Hilton Head International accounts for 21 percent, and the remaining airports each have a market share of approximately 2 percent or less of the total annual tonnage for the five airports being investigated. **Figure 6-1** displays this information graphically.

Figure 6-1: Base Year Air Cargo Tonnage and Market Share by Airport (metric tons)



Source: ACI-NA 1998-2020 Traffic Reports, BTS T-100 2019 Cargo Tonnage, Jviation Analysis, October 2021

6.3.2 Baseline Annual Air Cargo Aircraft Operations

Base year data for annual scheduled dedicated air cargo operations is identified through analysis of a combination of sources, including FAA's National Offload Program (NOP), BTS T-100 All Carrier data, airline schedules, and airport records. In total, there were 2,920 air cargo operations at the five Georgia study airports that support scheduled air cargo flights. **Table 6-3** displays base year air cargo operations at each of the applicable Georgia airports.

Table 6-3: Base Year Air Cargo Operations by Airport

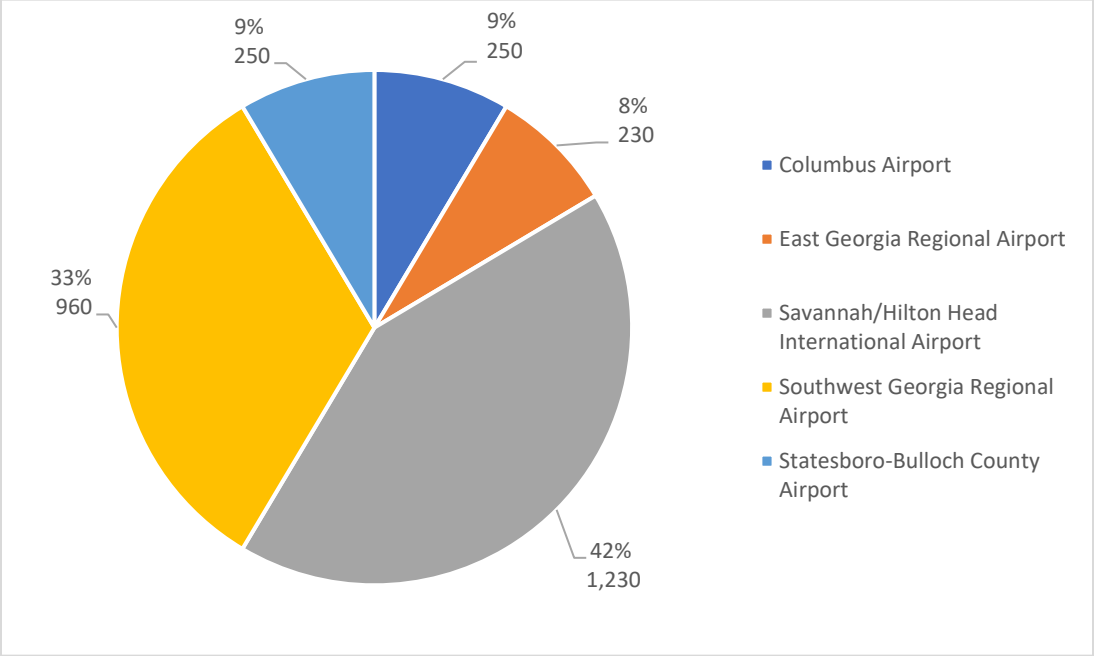
City	Airport Name	FAA ID	2019 Cargo Operations	2019 Market Share
Albany	Southwest Georgia Regional Airport	ABY	960	33.1%
Columbus	Columbus Airport	CSG	250	8.7%
Savannah	Savannah/Hilton Head International Airport	SAV	1,230	41.5%
Statesboro	Statesboro-Bulloch County Airport	TBR	250	8.7%
Swainsboro	East Georgia Regional Airport	SBO	230	8.0%
Total			**2,920**	**100%**

Source: FAA NOP, Airline Schedules, Airport Records, Jviation Analysis. Analysis is an estimate of annual freight-only ops.

As shown, Savannah/Hilton Head International accounts for approximately 42 percent of statewide dedicated cargo operations, Southwest Georgia Regional, serving Albany, accounts for 33 percent, and the remaining airports served by integrated express feeder carriers each support less than 10 percent of statewide dedicated air cargo operations.

Figure 6-2 displays this information graphically. While Southwest Georgia Regional Airports accounts for 75 percent of air cargo by volume (tons) for the five airports, its share of all air cargo operations is only 33 percent. This is due to the larger size of aircraft being operated out of Southwest Georgia Regional Airport by UPS (Boeing 757, Airbus A300) versus that of the other airports, which have more operations by lower capacity aircraft operations. Similarly, the airport serving Statesboro has almost a nine percent market share of cargo aircraft operations, but only a one percent share of the annual cargo volume as measured in tons. These different market shares are reflective of the size (cargo carrying capacity) of the aircraft serving each of the respective airports.

Figure 6-2: Base Year Air Cargo Operations and Market Share by Airport



Source: FAA NOP, BTS T-100, Jviation Analysis

6.3.3 E-commerce

The e-commerce—the common term for buying and selling of goods and services via the internet—is growing at a rapid pace. Since 2005, global internet retail sales have grown at an AAGR of over 20

percent. Total online retail sales accounted for more than $4.8 trillion in 2021.[6] Because of its rapid growth, e-commerce is widely viewed as a future driver of air cargo demand.

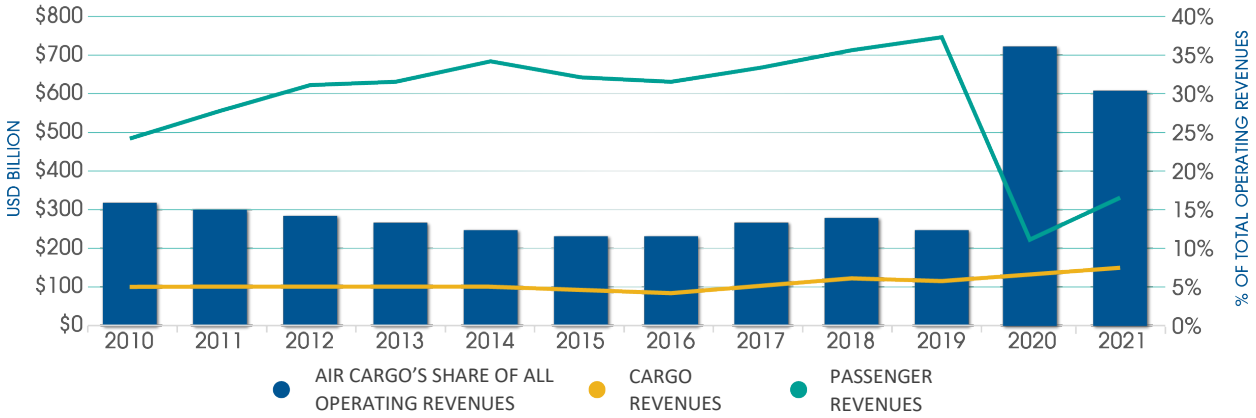
As recently as 2017, e-commerce accounted for only five percent of air cargo shipments.[7] By 2019, 18 percent of all air cargo shipments were related to e-commerce fulfillments. Despite slower than average growth in 2020 due to pandemic-related air cargo supply shortages, e-commerce is expected to account for 20 percent of air cargo in 2022.

The role that e-commerce plays in future air cargo demand at the study airports is considered in upcoming forecast scenarios.

6.3.4 Passenger Airline Belly-Hold Air Cargo

Due to sharp declines in passenger travel during the pandemic (starting March 2020) and associated reductions in belly-hold capacity, in 2020 and 2021 air cargo accounted for 30 to 35 percent of all estimated airline revenue.[8] Passenger and cargo operations both contribute to airline revenue as displayed in **Figure 6-3**.

Figure 6-3: Global Airline Cargo and Passenger Revenues



Source: IATA Economics Economic Performance of the Airline Industry, December 2020

Air cargo can be shipped in two different ways: as dedicated air cargo transported on an aircraft dedicated solely to freight, or as belly-hold cargo transported in the belly of passenger aircraft.

An analysis of BTS T-100 data for airports in Georgia with scheduled airline service indicates that in 2019, measurable belly-hold air cargo is not reported for most of the commercial airports. This is a result of the low volume of belly-hold air cargo that the regional airlines (that serve most of Georgia's commercial airports) are able to accommodate. Often, belly-hold capacity is stretched to accommodate passenger checked baggage. Busier passenger airports, particularly international gateway airports or

[6] https://www.iata.org/contentassets/d22340c37e0c4cfd8fc05ca6ebf6cc9f/stb-cargo-white-paper-e-commerce.pdf
[7] https://www.lloydsloadinglist.com/freight-directory/news/E-commerce-set-for-20-air-cargo-share-by-2022/79108.htm#.YWB3HprMJaQ
[8] https://www.iata.org/contentassets/d22340c37e0c4cfd8fc05ca6ebf6cc9f/e-commerce-monitor-q2.pdf

domestic hub airports (such as ATL) with relatively high numbers of large narrow-body and wide-body aircraft have greater belly cargo volumes.

6.4 Air Cargo Forecast Scenarios and Selected Growth Rates

Forecasting for each of the study airports includes projections for cargo volume in metric tons, as well as the number of annual dedicated cargo aircraft operations needed to support the estimated cargo volumes. Three forecasting methodologies are investigated and compared in this chapter::

- **Growth Rate** – considers growth rates from several aviation-related industry sources.
- **Econometric** – uses past relationships among variables to forecast how changes in variables may affect the future change in other variables.
- **Market Share** – incorporates one of the industry growth rates and allocates statewide projections to each airport based on the scoring of the air cargo demand generator and drive time analysis completed in **Chapter 5**.

A variety of organizations, like Airbus, Boeing, and the FAA, prepare air cargo forecasts. There are several indicators that generally correlate with air cargo demand. These indicators include household income and gross domestic product (GDP). Additionally, any estimates of future growth provided by a specific study airport and/or air cargo business interviews conducted in the inventory element of this study are also considered in the forecasting process. Growth rates from each of the following sources are considered in the development of this study's air cargo projection (selected growth rates for this analysis are in **bold**):

- *Airbus Global Market Forecast (2019-2038)*
- *Airbus Global Market Forecast (2019-2038)* – North American Freighter Aircraft
- *Boeing World Air Cargo Forecast (2020-2039)* – Total RTMs Asia-North America (thousands)
- *Boeing World Air Cargo Forecast (2020-2039)* – Total RTMs Intra-North America (thousands)
- ***Boeing World Air Cargo Forecast (2020-2039)* – Total RTMs World (thousands)**
- *FAA Aerospace Forecast (FY 2021-2041)* – All Cargo Carrier Domestic RTMs (millions) (2021-2041)
- *FAA Aerospace Forecast (FY 2021-2041)* – All Cargo Carrier International RTMs (millions) (2021-2041)
- ***FAA Aerospace Forecast (FY 2021-2041) – All Cargo Carrier Total RTMs (millions) (2021-2041)***
- ***Georgia Cargo Historic Growth (ACI data) (2011-2018)***
- *Georgia Historic Per Capita Personal Income (2010-2020)*
- *Georgia Historic Personal Income (2010-2020)*
- *Georgia Historic Population (2010-2019)*
- *Georgia Housing (annual residential building permits) (2011-2020)*
- *Georgia Population Projection (2021-2041)*
- *Hartsfield Jackson Atlanta Airport Master Plan 2015 (Forecast 2011-2031)*
- *Savannah Master Plan 2014 (Forecast 2011-2035)*
- *Historic Georgia State GDP (2011-2020)*

- *BTS T-100 Tonnage and BTS T-100 Operations (2009-2020)*

After a review of all available growth rates, the bolded sources above were selected to support the forecasting effort. The selection was based on relevance to the air cargo industry and/or the geography at hand. A wide variety of growth rates from a variety of sources helps to provide context and can help validate chosen growth rates where industry-related sources closely align with other socio-economic indicators.

Selected growth rates were incorporated into various forecast scenarios for tonnage and aircraft operations associated with scheduled air cargo carriers. Ultimately, one preferred forecast for tonnage and one preferred forecast for air cargo operations was selected. The preferred forecast supported the forthcoming facility requirements analysis.

6.5 Annual Air Cargo Tonnage Forecast Scenarios

6.5.1 Growth Rate Forecast

The selected growth rates, the FAA Aerospace Forecast, and Georgia's Air Cargo Historic Growth from ACI-NA/BTS T-100, were used to generate high, medium, and low forecasts for annual tonnage at each of the study airports. **Table 6-4** shows the implied AAGR and the source for that growth rate.

Table 6-4: Low, Medium, High Air Cargo Tonnage Growth Rates

Tonnage Forecast Scenarios	Projection Source	Applied AAGR	Timeframe for Growth Rate
Low	Georgia Air Cargo Historic Growth (ACI) / BTS T-100 Historic	1.5%	2009-2019
Medium	FAA Aerospace Forecast 2021-2041- All Cargo Carrier Total RTMs	2.8%	2021-2041
High	Boeing World Air Cargo Forecast 2020-2039 - Total RTMs World	4.0%	2020-2039

Source: Georgia Historic Growth ACI, FAA Aerospace Forecast 2021, Boeing World Air Cargo Forecast 2020

The three selected growth rates are applied to 2019 air cargo tonnage for the study airports previously reported in **Table 6-2**.

Table 6-5 displays the resultant projections of air cargo tonnage. Combined, there were 34,810 metric tons of air cargo transported in 2019 at the study airports in Georgia with scheduled air cargo service. Future tonnage is not projected for ATL as part of the statewide study.

Using the lowest rate of growth, air cargo in metric tons is forecast to increase at an AAGR of 1.5 percent and combined air cargo in metric tons for the study airports will total 47,590 by 2040. Using the medium projected rate of growth, air cargo is expected to increase at an AAGR of 2.8 percent, with air cargo in metric tons to total 62,170 by 2040. Considering the highest rate of AAGR of four percent, air cargo for the study airports will total 79,320 metric tons by 2040.

Table 6-5: Low, Medium, and High Air Cargo Tonnage Projections for Study Airports (metric tons)

Forecast Scenario	Projection Source	AAGR	2019	2025	2030	2040
Low	Georgia Air Cargo Historic Growth (ACI)	1.50%	34,810	38,060	41,000	47,590
Medium	FAA Aerospace Forecast - All Cargo Carrier Total RTMs	2.80%	34,810	41,080	47,170	62,170
High	Boeing World Air Cargo Forecast 2020-2039 - Total RTMs World	4.00%	34,810	44,050	53,590	79,320

Source: Georgia Historic Growth ACI, FAA Aerospace Forecast 2021, Boeing World Air Cargo Forecast 2020. This projection does not include air cargo demand for ATL.

6.5.2 Econometric Forecast

GDP, the market value of goods and services produced by labor and property, is a measure of U.S. economic output.[9] Various industry sources, including the FAA and Transportation Research Board (TRB), indicate a high correlation between demand for air cargo and GDP. As shown in **Table 6-6**, the U.S. GDP grew at an average annual rate of 3.34 percent from 2010 to 2020. Over that same period, Georgia 's GDP grew at a rate of 4.06 percent annually.

According to the Congressional Budget Office, U.S. GDP is projected to grow at an average annual rate of 1.7 percent. Assuming that the rate of growth for Georgia's GDP in relationship to U.S. GDP continues, the AAGR for Georgia's GDP will be 2.06%.

Table 6-6: Historic and Projected Gross Domestic Product Rate of Growth for U.S. and Georgia

Geography	2010	2020	AAGR 2010-2020	Projected AAGR
Georgia	$418,091	$622,628	4.06%	2.06%
United States	$15,048,970	$20,893,746	3.34%	1.70%

Source: Bureau of Economic Analysis (BEA), Congressional Budget Office, Jviation analysis, October 2021

Chapter 5 discussed how household income, often indicative of increased e-commerce shipping, is relevant to air cargo demand. **Table 6-7** identifies projected growth of household income ranges. Income levels in excess of $75,000 correspond to e-commerce demand. From 2020 to 2040, the number of Georgia households above $75,000 is projected to grow at an average annual rate of 2.8 percent.

[9] https://fred.stlouisfed.org/series/GDP

Table 6-7: Projections of Georgia Household Income by Range

Georgia Households by Income Range (in thousands of households)	2020	2025	2030	2040	AAGR 2020-2040
$75,000 to $99,999	533.01	618.84	712.38	894.37	2.6%
$100,000 to $124,999	316.89	369.52	428.65	562.33	2.9%
$125,000 to $149,999	182.38	212.84	246.98	325.42	2.9%
$150,000 to $199,999	169.95	198.21	229.80	302.59	2.9%
>$200,000	160.28	185.42	213.17	276.54	2.8%
Sum of all Households >$75,000	**1,362.50**	**1,584.83**	**1,830.98**	**2,361.25**	**2.8%**

Source: Woods & Poole 2018, Jviation Analysis, October 2021

Both the projected growth rate of 2.1 percent for Georgia's GDP and the projected rate of growth for Georgia household incomes over $75,000 of 2.8 percent are applied to the base year tonnage at each study airport. Considering the GDP growth rate projection, air cargo tonnage at all study airports would increase from 34,810 metric tons in 2019 to 53,460 metric tons in 2040.

Considering the projected rate of growth for Georgia household incomes over $75,000 of 2.8 percent, air cargo tonnage at the study airports would increase from 34,810 metric tons in 2019 to 62,170 metric tons in 2040. These projections are shown in **Table 6-8** and **Table 6-9**, respectively.

Table 6-8: Georgia GDP Projection of Annual Air Cargo Tonnage for All Study Airports

Georgia GDP Projection	AAGR	2019	2025	2030	2040
All Airports	2.06%	34,810	39,370	43,540	53,460

Source: Bureau of Economic Analysis (BEA), Congressional Budget Office, Jviation analysis, October 2021

Table 6-9: Household Income Projection of Annual Air Cargo Tonnage for All Study Airports

Household Income Projection	AAGR	2019	2025	2030	2040
All Airports	2.8%	34,810	41,080	47,170	62,170

Source: Woods & Poole 2018, Jviation Analysis, October 2021

6.5.3 Preferred Tonnage Forecast

The three growth rates and two econometric methodologies identified average annual rates of growth ranging from 1.5 percent to 4.0 percent. Two of the projections identified an average annual growth rate for air cargo tonnage of 2.8 percent. These two methodologies are the FAA's Aerospace Forecast and the econometric methodology using projected growth in household income. The FAA Aerospace Forecast using the average annual rate of growth of 2.8 percent (All Cargo Carrier Total RTMs) was selected as the preferred rate for projecting air cargo tonnage for the five study airports. This growth rate was selected since it is specific to the air cargo industry and the projected growth rate of another key indicator in Georgia household income growth. This growth rate also takes into account feedback by

the study's Steering Committee and projections made by airports and carriers during the inventory process.

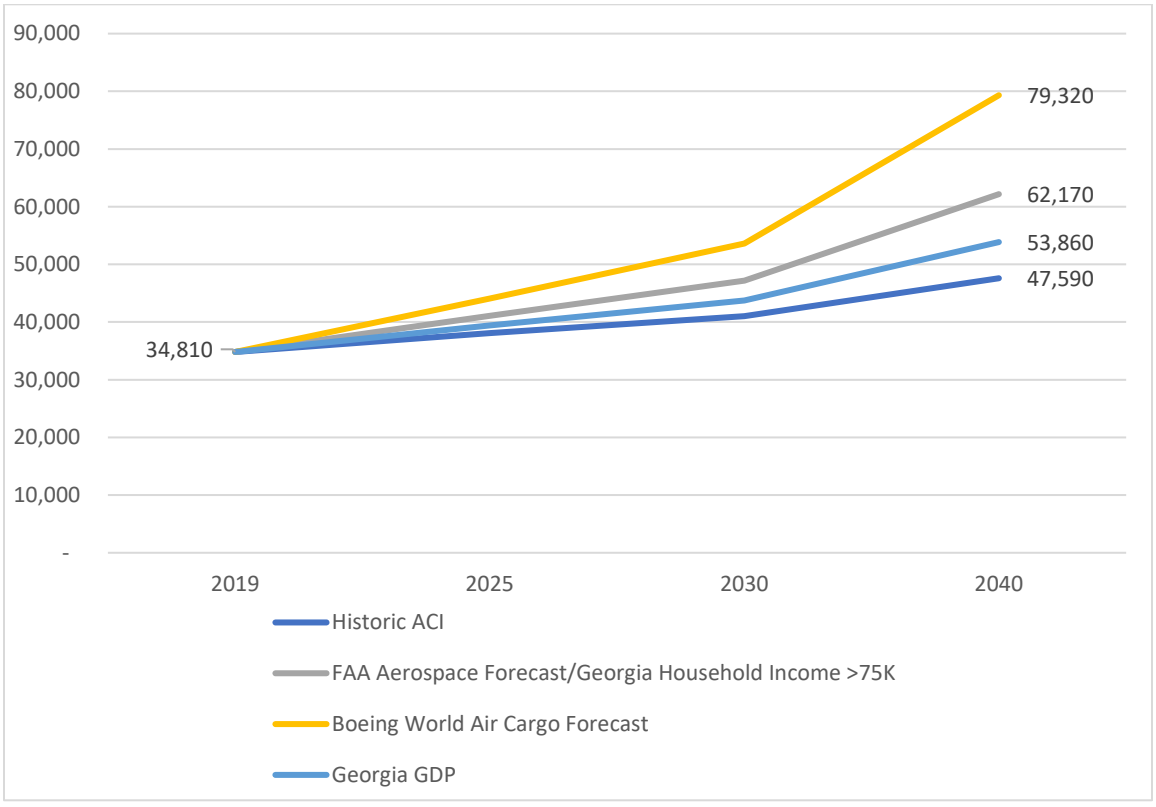
Table 6-10 and **Figure 6-4** summarize the various growth rates considered for this forecasting analysis.

Table 6-10: Summary of Tonnage Growth Rates and Projections

Statewide	AAGR	2019	2025	2030	2040
Historic ACI	1.5%	34,810	38,060	41,000	47,590
FAA Aerospace Forecast	2.8%	34,810	41,080	47,170	62,170
Boeing World Air Cargo Forecast	4.0%	34,810	44,050	53,590	79,320
Georgia GDP	2.1%	34,810	39,430	43,750	53,860
Georgia Household Income >$75,000	2.8%	34,810	41,080	47,170	62,170

Source: FAA, BTS T-100, Boeing, CBO, Woods & Poole, ACI

Figure 6-4: Tonnage Projection Summary



Source: ACI, BTS T-100, FAA Aerospace Forecast, Woods & Poole, CBO, Boeing

While this average annual growth rate is above the growth experienced by the five airports historically, the higher rate of growth takes into account that e-commerce tonnage is expanding by double digits year-over-year. Also, e-commerce is soon expected to account for at least 20 percent of all air cargo, up

from five percent as recently as 2017. The high correlation between household income and air cargo demand helps to support the selection of the preferred rate of growth.

Using the preferred rate of growth, **Table 6-11** presents a preferred forecast of air cargo tonnage for each of the five study airports.

Table 6-11: Preferred Forecast of Annual Air Cargo Tonnage

City	Airport Name	FAA ID	AAGR	2019	2025	2030	2040
Albany	Southwest Georgia Regional Airport	ABY	2.8%	24,950	29,450	33,810	44,560
Columbus	Columbus Airport	CSG	2.8%	430	510	580	770
Savannah	Savannah/Hilton Head International Airport	SAV	2.8%	8,390	9,900	11,370	14,980
Statesboro	Statesboro-Bulloch County Airport	TBR	2.8%	350	410	470	630
Swainsboro	East Georgia Regional Airport	SBO	2.8%	690	810	930	1,230
All Airports				**34,810**	**41,080**	**47,170**	**62,170**

Source: FAA Aerospace Forecast, Jviation Analysis, October 2021

6.5.4 Market Share Potential Tonnage Analysis

Table 6-12 presents the market share for each airport's 60-minute drive-time (established and explained in **Chapter 5**) based on its unique score of combined industries and industry sizes in within that area. This table also shows the airport's market share of households with income greater than $75,000. The two market shares are averaged to create an average market share for each of the five airports included in this forecasting exercise.

Table 6-12: Airport Market Share Based on 60-Minute Drive-Time Analysis of Combined Industries and Household Income

Associated City	Airport	FAA ID	Market Share Based on Unique Score of Combined Industries in 60-Minute Drive-Time	Market Share Based on Households with Income >$75,000 in 60-Minute Drive Time	Average Market Share
Columbus	Columbus Airport	CSG	31.9%	19.6%	25.7%
Swainsboro	East Georgia Regional Airport	SBO	12.1%	13.0%	12.5%
Savannah	Savannah/Hilton Head International Airport	SAV	33.2%	32.8%	33.0%
Albany	Southwest Georgia Regional Airport	ABY	21.1%	14.8%	17.9%
Statesboro	Statesboro-Bulloch County Airport	TBR	1.7%	19.9%	10.8%

Source: U.S. Census Bureau, ESRI, Georgia Power Community and Economic Development, FBA Help, StoreYaBlog, Dun & Bradstreet, BioPharmGuy, ESRI, Jviation analysis, August 2021

Using the preferred forecast for air cargo tonnage shown in **Table 6-11**, the average market share of each airport is applied to the total tonnage forecast. This results in an alternative look at future air cargo demand for all five airports. Market share projections are shown for 2025, 2030, and 2040 in **Table 6-13**.

Table 6-13: Airport 60-Minute Drive-Time/Market Share Potential Air Cargo Tonnage Projections

			2019	AAGR	2025	2030	2040
Forecast Total Annual Cargo Tonnage for Study Airports			34,810	2.8%	41,080	47,170	62,170
City	**Airport Name**	**FAA ID**	**2019**	**60-Minute Drive-Time Projection**	**2025**	**2030**	**2040**
Albany	Southwest Georgia Regional Airport	ABY	24,950	17.9%	7,180	8,240	10,860
Columbus	Columbus Airport	CSG	430	25.7%	10,290	11,810	15,570
Savannah	Savannah/Hilton Head International Airport	SAV	8,390	33.0%	13,190	15,140	19,950
Statesboro	Statesboro-Bulloch County Airport	TBR	350	10.8%	4,330	4,970	6,550
Swainsboro	East Georgia Regional Airport	SBO	690	12.5%	5,010	5,740	7,570

Source: Jviation Catchment Analysis, October 2021

The information shown in **Table 6-12,** when compared to the preferred tonnage forecast by airport presented in **Table 6-11,** sheds light on whether airports are over performing or under-performing as it relates to the identified proximity of air cargo demand generators. Similar to commercial airline travelers, cargo may "leak" to another airport for actual transport where service is more robust.

Tonnage forecasts for each airport are presented in **Table 6-13.** These forecasts are based on the airport's market share from the 60-minute drive-time analysis and reflect potential air cargo demand. In most instances, the 2040 potential air cargo tonnage forecast (**Table 6-13**) is greater than the airport's actual/preferred forecast shown in **Table 6-11**.

Tonnage projections developed using the market share approach are presented only for informational purposes. The projections in **Table 6-13** shed light on which airports have the greatest potential to support improved air cargo service. Subsequent portions of this report that analyze the need for improved or new air cargo facilities, however, are based on the preferred tonnage projection shown in **Table 6-11.** The preferred forecast carried forward in this analysis considers historic and actual, as opposed to potential conditions for each of the five study airports. Nevertheless, as airports are examined for their ability to accommodate expanded or new air cargo facilities, results of the market share analysis will be incorporated for longer-term considerations.

6.6 Annual Air Cargo Operations Forecast Scenarios

Typically, air cargo aircraft operations are projected at the individual airport level as part of an airport master plan. As part of this statewide study, the projection of annual air cargo aircraft operations considers patterns of actual air cargo operators, historic growth in air cargo operations at study airports, and FAA projections of operational demand.

When considering future air cargo aircraft operations, it is important to consider how carriers transport air cargo. When determining how many operations are needed, carriers divide annual tons and into peak daily one-way pounds. The tonnage estimate determines the aircraft type/size required and frequency of aircraft operations.

For the operators themselves, peak daily one-way demand considers both inbound and outbound flights. It is rare for a carrier to experience equal utilization of air cargo capacity on both inbound and outbound flights. This is because air cargo markets typically lean towards being "consumer" (generally inbound) or "producer" (more frequently outbound) markets. Aircraft size is typically dictated by peak one-way demand. These details help determine aircraft capacity/size and resultant operational frequency.

Even if outbound utilization drops to zero percent, a carrier would still "up-gauge" aircraft size if inbound air cargo demand growth is significant enough to warrant the change. When air cargo tonnage in a specific market is growing, the carrier has the choice of increasing operations or using larger aircraft to provide more capacity. Often, they choose to use larger aircraft with greater hauling capacity. Thus, while air cargo tonnage may increase, it is often the case that the number of operations supporting that growth does not necessarily need to increase, as larger aircraft are introduced to meet growing demand.

The statewide study secured information on the type/size of aircraft that currently operate at each of the five study airports. Records are not available, however, for aircraft utilization rates (percent of cargo carrier capacity utilized) by direction (arriving or departing) for all airports. As a result, this analysis examines two different growth scenarios to project annual cargo aircraft operations.

One projection scenario relies on anticipated growth in operations as forecasted by FAA. The other projection relies on historic BTS T-100 data available for some, but not all, of the five study airports.

6.6.1 FAA Air Cargo Operations Forecast Scenario

As shown in **Table 6-14**, there are currently an estimated 2,920 operations by dedicated air cargo aircraft at the five study airports with scheduled air cargo service. Considering the information in the FAA Aerospace Forecast, an AAGR of 1.7 percent was selected to support this projection. **Table 6-14** shows each airport's forecast of air cargo operations using this rate of growth.

As discussed earlier in this chapter, the preferred tonnage forecast for each study airport has an implied average annual growth rate of 2.8 percent. The forecast shown in **Table 6-14** reflects the use of larger aircraft over the forecast period.

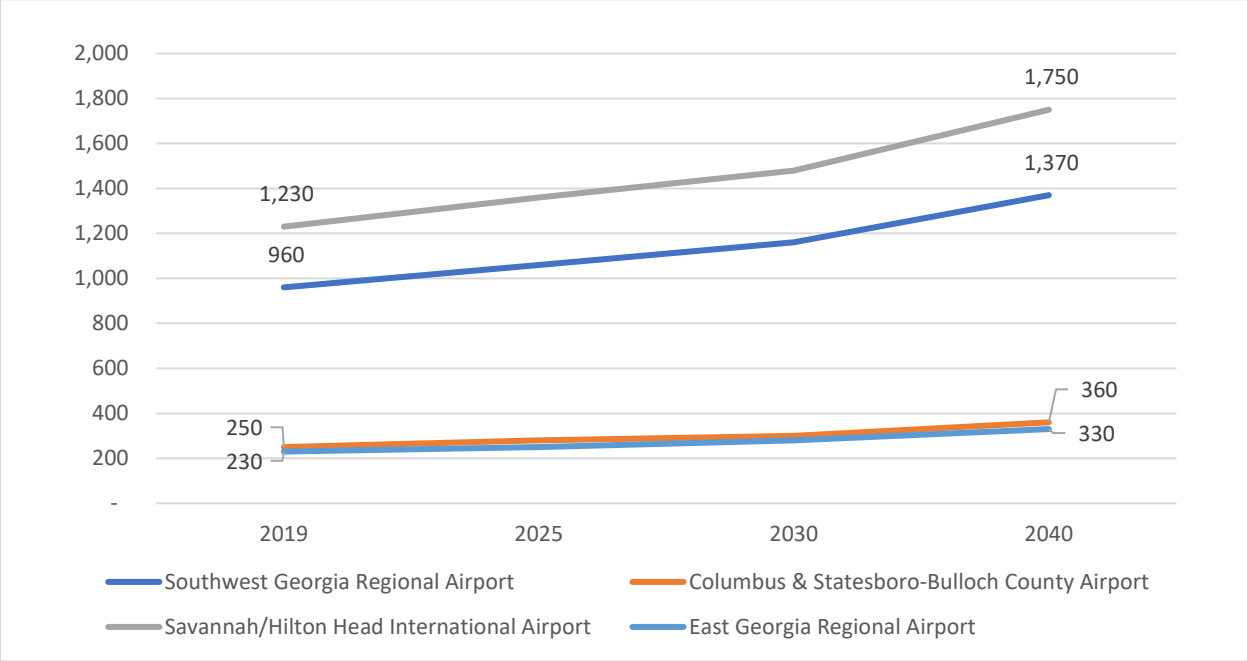
Table 6-14: FAA Growth Rate Air Cargo Operations Projections

Associated City	Airport Name	FAA ID	AAGR	2019	2025	2030	2040
Albany	Southwest Georgia Regional Airport	ABY	1.7%	960	1,060	1,160	1,370
Columbus	Columbus Airport	CSG	1.7%	250	280	300	360
Savannah	Savannah/Hilton Head International Airport	SAV	1.7%	1,230	1,360	1,480	1,750
Statesboro	Statesboro-Bulloch County Airport	TBR	1.7%	250	280	300	360
Swainsboro	East Georgia Regional Airport	SBO	1.7%	230	250	280	330
All Airports				**2,920**	**3,230**	**3,520**	**4,170**

Source: FAA Aerospace Forecast, Jviation Analysis, October 2021

Figure 6-5 shows this projection by airport graphically.

Figure 6-5: FAA Air Cargo Operations Projections



Source: FAA Aerospace Forecast, Jviation Analysis, October 2021

6.6.2 6.6.2 BTS T-100 Air Cargo Operations Forecast Scenario

For the other projection, historic BTS T-100 data is used to establish a growth rate for the study airports that are included in BTS T-100 records. The airports in this analysis that are included in the BTS T-100 data are Southwest Georgia Regional Airport, Columbus Airport, and Savannah/Hilton Head International Airport. Historical operational data for each of these airports was reviewed and an implied historic AAGR for air cargo operations was identified for each airport. The implied historic rates of growth support this forecast scenario. **Table 6-15** shows the historic growth rates from the BTS T-100 data used to develop this projection.

Table 6-15: Historic BTS T-100 Dedicated Air Cargo Operations Growth

Associated City	Airport Name	FAA ID	AAGR 2009-2020
Albany	Southwest Georgia Regional Airport	ABY	0.5%
Columbus	Columbus Airport	CSG	0.2%
Savannah	Savannah/Hilton Head International Airport	SAV	1.0%
Average All Airports			**0.5%**

Source: BTS T-100, Jviation Analysis, October 2021

Statesboro-Bulloch County Airport and East Georgia Regional Airport are not included in T-100 reporting. The average growth rate for the three other study airports, shown in **Table 6-15,** is used to

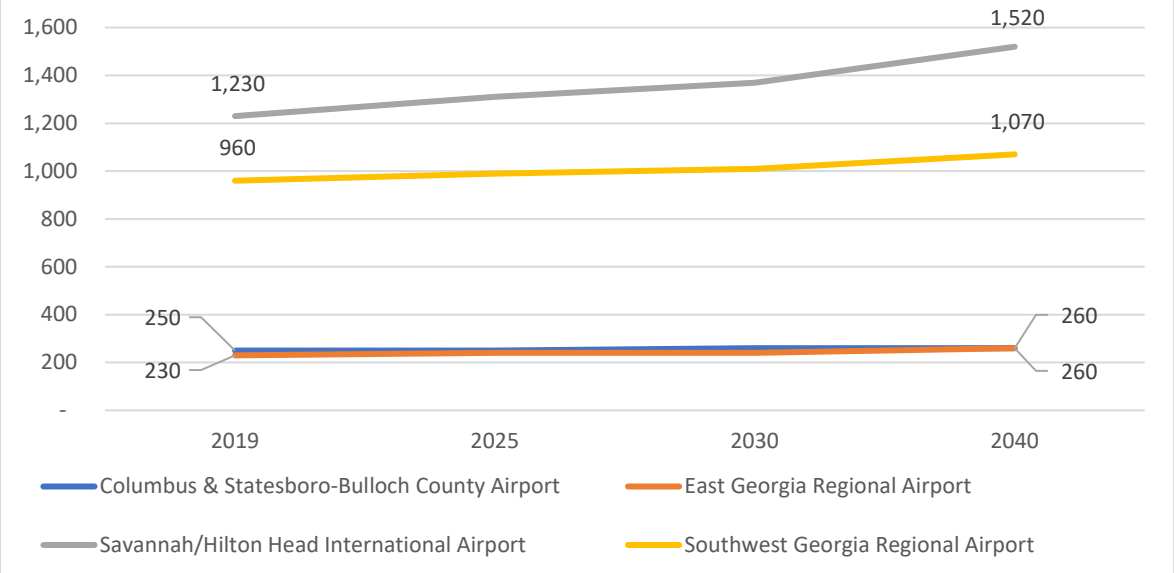
develop an air cargo operational forecast for those airports. Projections of air cargo operations, using historic T-100 data, are presented in **Table 6-16** and **Figure 6-6**.

Table 6-16: BTS-100 Air Cargo Annual Operations Projection

Associated City	Airport Name	FAA ID	AAGR	2019	2025	2030	2040
Columbus	Columbus Airport	CSG	0.2%	250	250	260	260
Swainsboro	East Georgia Regional Airport	SBO	0.5%	230	240	240	260
Savannah	Savannah/Hilton Head International Airport	SAV	1.0%	1,230	1,310	1,370	1,520
Albany	Southwest Georgia Regional Airport	ABY	0.5%	960	990	1,010	1,070
Statesboro	Statesboro-Bulloch County Airport	TBR	0.5%	250	260	260	280
All Airports				**2,920**	**3,050**	**3,140**	**3,390**

Source: BTS T-100, Jviation Analysis, October 2021

Figure 6-6: BTS-100 Air Cargo Annual Operations Projection



Source: BTS T-100, Jviation Analysis, October 2021

6.6.3 Preferred Air Cargo Operations Forecast

As previously noted, it is possible that study airports could experience and process increased air cargo tonnage without an increase in dedicated air cargo operations. This would be the case if larger aircraft with increased hauling capacity are introduced to a market. These types of decisions rest with carriers and cannot be predicted by a planning forecast.

The previous market share analysis revealed that, based on the characteristics of their catchment areas, several of the study airports appear to have the potential to experience increased air cargo demand. As a result, the most robust projection of dedicated air cargo operations that is based on an implied FAA

average annual growth rate is selected as the preferred forecast of air cargo operations. The preferred forecast is shown in **Table 6-17**. Subsequent sections of this report consider the forecasts presented in this chapter to determine where improved, expanded, or new facilities to support air cargo demand may be needed at the study airports.

Table 6-17: Preferred Air Cargo Operations Forecast

Associated City	Airport Name	FAA ID	AAGR	2019	2025	2030	2040
Albany	Southwest Georgia Regional Airport	ABY	1.7%	960	1,060	1,160	1,370
Columbus	Columbus Airport	CSG	1.7%	250	280	300	360
Savannah	Savannah/Hilton Head International Airport	SAV	1.7%	1,230	1,360	1,480	1,750
Statesboro	Statesboro-Bulloch County Airport	TBR	1.7%	250	280	300	360
Swainsboro	East Georgia Regional Airport	SBO	1.7%	230	250	280	330
All Airports				**2,920**	**3,230**	**3,520**	**4,170**

Source: FAA Aerospace Forecast, Jviation Analysis, October 2021

6.7 Hartsfield Jackson Atlanta International Airport (ATL) Air Cargo Outlook

As of 2019, ATL was the busiest airport in the world as measured by total commercial passengers served. ATL supports a wide variety of dedicated air cargo operators and moves a significant volume of belly-hold air cargo on domestic and international commercial airline flights.

Information on anticipated growth in air cargo for this major international airport was provided by the City of Atlanta. Air cargo projections for ATL were not developed as part of the GDOT study. Hartsfield-Jackson International Airport's 2015 Master Plan identifies forecasts for air cargo volume/tonnage and operations for the airport from 2011-2031.

The airport's master plan identifies an AAGR of 3.9 percent for air cargo tonnage and assumes that approximately 60 percent of total air cargo tonnage will be carried on all-cargo aircraft. The plan explains the remaining 40 percent will be carried as belly-hold cargo on commercial passenger aircraft.

The master plan projects total annual air cargo tonnage to increase from 663,136 tons in 2011 to 1,414,000 tons in 2031. Considering the dedicated cargo aircraft to passenger belly-hold ratios implied in the ATL master plan, this means that in 2011 approximately 398,000 tons of cargo were carried on dedicated air cargo aircraft. The master plan forecast implies that the number of tons carried by all cargo carriers is projected to increase to approximately 848,400 tons by 2031.

For air cargo operations, the master plan identified a projected AAGR of 2.4 percent for dedicated air cargo operations. Considering this average annual growth rate, air cargo operations are expected to increase from 11,908 in 2011 to 19,200 by 2031, as shown in **Table 6-18**.

Table 6-18: Hartsfield-Jackson Atlanta International Airport Cargo Forecast

ATL Forecast Type	2011	2031	AAGR
Total Annual Cargo Tonnage	663,100	1,414,000	3.9%
Dedicated Air Cargo Tonnage Only (Estimated)	397,900	848,400	3.9%
Air Cargo Operations	11,900	19,200	2.4%

Source: ATL Master Plan, 2015. Total annual cargo tonnage includes both dedicated and belly-hold cargo.

6.8 Summary

Projections of air cargo tonnage and operations in this chapter help establish the facility and service needs of Georgia airports with scheduled air cargo activity. There are many factors supporting future air cargo growth, especially e-commerce which is rapidly growing and accounting for an increasingly larger portion of the total air cargo market.

While there is some uncertainty as the global economy rebounds from the COVID-19 pandemic, both industry and government projections for air cargo are very strong. This chapter includes a moderate rate of growth for future scheduled air cargo, tonnage, and annual operations at the five study airports. **Table 6-19** summarizes the preferred forecasts. As shown, the preferred forecasts project statewide tonnage to grow at an average annual rate of 2.8 percent, while dedicated cargo aircraft operations are projected to grow at an average annual rate of 1.7 percent.

For tonnage, the FAA Aerospace Forecast (All Cargo Carrier Total RTMs) was selected as the preferred rate of growth since it is specific to the air cargo industry and matches the projected growth rate of another key air cargo demand indicator, Georgia's projected rate of growth for household income. This growth rate also takes into account feedback by the study's Steering Committee and projections made by airports and carriers during this study's inventory process. For dedicated cargo operations, the most robust projection that is based on an implied FAA average annual growth rate. This rate is selected to support the study's forecast as it is tied to the preferred tonnage growth rate, albeit at a reduced rate to account for the likelihood of carriers increasing the size of aircraft before increasing frequency of operation.

Table 6-19: Preferred Tonnage and Operations Forecasts

Associated City	Airport Name	FAA ID	AAGR	2019	2025	2030	2040
Air Cargo Tonnage (Metric Tons)							
Albany	Southwest Georgia Regional Airport	ABY	2.8%	24,950	29,450	33,810	44,560
Columbus	Columbus Airport	CSG	2.8%	430	510	580	770
Savannah	Savannah/Hilton Head International Airport	SAV	2.8%	8,390	9,900	11,370	14,980
Statesboro	Statesboro-Bulloch County Airport	TBR	2.8%	350	400	460	630
Swainsboro	East Georgia Regional Airport	SBO	2.8%	690	810	930	1,230
All Study Airports				**34,810**	**41,080**	**47,170**	**62,170**
Associated City	**Airport Name**	**FAA ID**	**AAGR**	**2019**	**2025**	**2030**	**2040**
Dedicated Cargo Operations							
Albany	Southwest Georgia Regional Airport	ABY	1.7%	960	1,060	1,160	1,370
Columbus	Columbus Airport	CSG	1.7%	250	280	300	360
Savannah	Savannah/Hilton Head International Airport	SAV	1.7%	1,230	1,360	1,480	1,750
Statesboro	Statesboro-Bulloch County Airport	TBR	1.7%	250	280	300	360
Swainsboro	East Georgia Regional Airport	SBO	1.7%	230	250	280	330
All Study Airports				**2,920**	**3,230**	**3,520**	**4,170**

Source: FAA Aerospace Forecast, CBO, Jviation Analysis, October 2021

7 Air Cargo Facilities Review

7.1 Introduction

Air cargo connects Georgia businesses and residents to domestic and international markets. While air cargo operations represent a smaller percentage of overall aircraft activity in Georgia compared to commercial airline or general aviation aircraft flights, air cargo operations are nonetheless a vital component of the state's commerce and transportation infrastructure that supports the economy. At the statewide level, air cargo is a conduit for the economy because of the wide variety of industries that rely on air cargo and the many high value commodities that are carried by air.

One of the primary goals of the Georgia Statewide Air Cargo Study is to identify actions to support current and future air cargo demand at airports that have scheduled air cargo service provided by an integrated express carrier. These actions may come in the form of expansion/modification of existing facilities, or they may be in the form of the development of new facilities.

Various facets of existing facility infrastructure must be understood to identify air cargo development needs:

- The facilities now in place to support existing air cargo demand
- The facilities that are needed to support varying levels of air cargo demand
- The ability of existing facilities to adequately serve current and future air cargo demand

The purpose of this chapter is to document existing air cargo facilities and to identify improvements needed at Georgia airports with existing scheduled integrated express carrier service. The following facilities that support air cargo demand were reviewed:

- Cargo building space
- Air cargo aircraft parking apron
- Truck/automobile parking to support cargo functions
- Ground service equipment (GSE) storage

While the focus of this analysis is determining air cargo related facility needs for Georgia airports served by integrated express carriers, the chapter also considers previously identified airports that are in or near air cargo accessibility gap areas (identified in **Chapter 5** of this report). The gap area airports are located beyond a 60-minute drive-time of an airport served by an integrated express carrier and are in proximity to higher concentrations of air cargo demand generators.

This chapter also examines airports with a 6,000-foot runway that are not considered a gap area airport and do not have scheduled integrated express carrier service. As reported in this and other chapters, there are many types of aircraft used to carry air cargo and the runway length requirements for these aircraft vary widely. However, since all airports with scheduled service in Georgia have runway lengths of 6,000 feet or greater, airports with this specific runway length were considered in the chapter.

7.2 Identification of Airport Groups

As shown in **Table 7-1**, the 44 total airports were organized into five overarching groups. As in previous sections of this report, airports with existing scheduled air cargo service are designated as jet/mainline, turboprop/feeder, or specialty and are included in either Group 1, 2, or 3. The 25 airports in Group 4 were identified and evaluated in **Chapter 5** as being in or near the established air cargo accessibility gaps. Finally, there are 14 additional airports with a primary runway that is 6,000 feet long or longer.

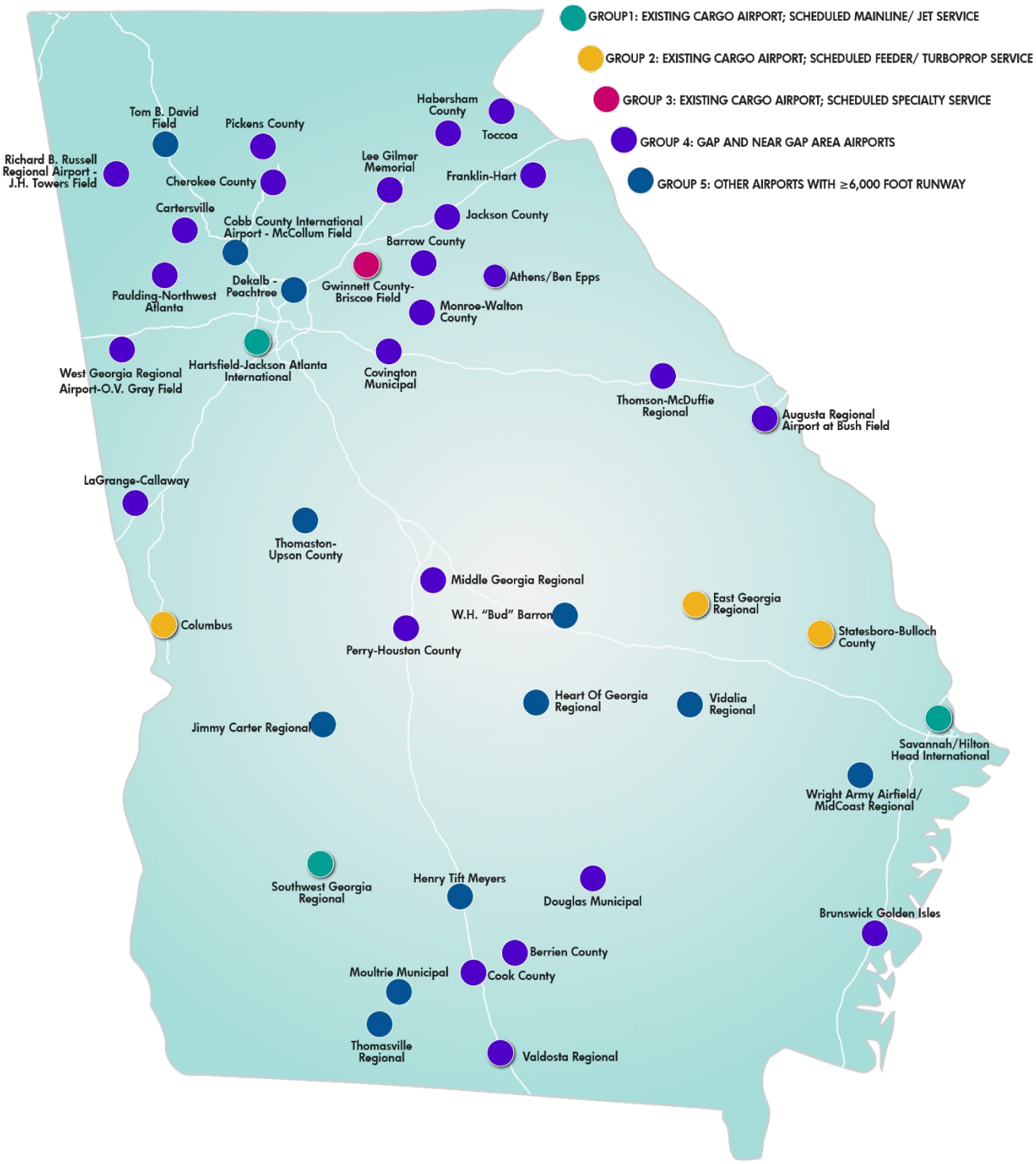
Table 7-1: Airport Groups

Group Number	Criteria for Group Assignment	System Airports in Group
Group 1	Existing Cargo Airport; Scheduled Mainline/ Jet Service	3
Group 2	Existing Cargo Airport; Scheduled Feeder/ Turboprop Service	3
Group 3	Existing Cargo Airport; Scheduled Specialty Service	1
Group 4	Gap and Near Gap Area Airports	25
Group 5	Other Airports with ≥6,000 Foot Runway	14
Total		**44**

Source: FAA Flight Records, Jviation, February 2022

Figure 7-1 illustrates the locations of the 44 airports included in **Table 7-1**—**Table 7-2** provides this information in list form. This chapter focuses on identifying possible facility needs for airports in Group 1 and 2: those are airports currently with integrated express carrier service. Various characteristics and attributes of the airports in **Table 7-2** are presented in sections that follow.

Figure 7-1: Location of Airports by Group



Source: FAA 5010 Records, GDOT Aviation Programs, FAA Flight Records, Jviation, February 2022.

Table 7-2: Airports by Group

Airport Group	Associated City	Airport Name	FAA ID
Group 1	Albany	Southwest Georgia Regional Airport	ABY
Group 1	Atlanta	Hartsfield-Jackson Atlanta International Airport	ATL
Group 1	Savannah	Savannah-Hilton Head International Airport	SAV
Group 2	Columbus	Columbus Airport	CSG
Group 2	Statesboro	Statesboro-Bulloch County Airport	TBR
Group 2	Swainsboro	East Georgia Regional Airport	SBO
Group 3	Lawrenceville	Gwinnett County Airport-Briscoe Field	LZU
Group 4	Adel	Cook County Airport	15J
Group 4	Athens	Athens-Ben Epps Airport	AHN
Group 4	Atlanta	Paulding-Northwest Atlanta Airport	PUJ
Group 4	Augusta	Augusta Regional Airport at Bush Field	AGS
Group 4	Brunswick	Brunswick-Golden Isles Airport	BQK
Group 4	Canon	Franklin-Hart Airport	18A
Group 4	Canton	Cherokee County Airport	CNI
Group 4	Carrollton	West Georgia Regional Airport-O.V. Gray Field	CTJ
Group 4	Cartersville	Cartersville Airport	VPC
Group 4	Cornelia	Habersham County Airport	AJR
Group 4	Douglas	Douglas Municipal Airport	DQH
Group 4	Gainesville	Lee Gilmer Memorial Airport	GVL
Group 4	Jasper	Pickens County Airport	JZP
Group 4	Jefferson	Jackson County Airport	JCA
Group 4	Macon	Middle Georgia Regional Airport	MCN
Group 4	Monroe	Monroe-Walton County Airport	D73
Group 4	Nashville	Berrien County Airport	4J2
Group 4	Perry	Perry-Houston County Airport	PXE
Group 4	Rome	Richard B. Russell Regional Airport - J.H. Towers Field	RMG
Group 4	Thomson	Thomson-McDuffie Regional Airport	HQU
Group 4	Toccoa	Toccoa Airport-R.G. LeTourneau Field	TOC
Group 4	Valdosta	Valdosta Regional Airport	VLD
Group 4	Winder	Barrow County Airport	WDR
Group 4	Atlanta	Covington Municipal Airport	CVC
Group 4	LaGrange	LaGrange-Callaway Airport	LGC
Group 5	Americus	Jimmy Carter Regional Airport	ACJ
Group 5	Atlanta	Cobb County International Airport-McCollum Field	RYY
Group 5	Atlanta	DeKalb-Peachtree Airport	PDK
Group 5	Calhoun	Tom B. David Field Airport	CZL
Group 5	Dublin	W.H. "Bud" Barron Airport	DBN
Group 5	Eastman	Heart Of Georgia Regional Airport	EZM
Group 5	Hinesville	Wright Army Airfield (Fort Stewart)/MidCoast Regional Airport	LHW
Group 5	Moultrie	Moultrie Municipal Airport	MGR

Airport Group	Associated City	Airport Name	FAA ID
Group 5	Thomaston	Thomaston-Upson County Airport	OPN
Group 5	Thomasville	Thomasville Regional Airport	TVI
Group 5	Tifton	Henry Tift Myers Airport	TMA
Group 5	Vidalia	Vidalia Regional Airport	VDI

Source: FAA 5010 Records, GDOT Aviation Programs, FAA Flight Records, Jviation, February 2022

7.3 Runway Length Review

As discussed in **Chapter 2**, air cargo is carried by aircraft that range greatly in size. Consequently, runway length requirements for air cargo aircraft also vary widely. This section provides information on typical runway length requirements and other general requirements and attributes for various types of aircraft used to transport air cargo.

7.3.1 Runway Lengths Required for Common Air Cargo Aircraft

Chapter 2 describes the three main types of air cargo aircraft operating on a scheduled basis at Georgia airports: wide-body jets, narrow-body jets, and narrow-body turboprops (jet or piston). Larger, heavier, wide-body aircraft require longer and wider runways due to their faster approach speeds and wingspans, while smaller, slower aircraft can operate on shorter and narrower runways. To identify an airport's required runway length, the FAA uses the operational and physical characteristics of the most demanding aircraft that operates or is expected to operate at each airport to determine the critical, or design, aircraft.

An airport's critical aircraft is determined by the largest aircraft to have at least a combined total of 500 takeoffs and landings annually. The critical aircraft establishes the airport's ARC (Airport Reference Code). Determining an airport's critical aircraft and establishing an appropriate ARC are part of each airport's master planning process. The ARC has two components that relate to the critical aircraft. The first component is the aircraft approach category (AAC) for approach speed, identified with letters A, B, C, or D. The second component relates to the aircraft wingspan and/or tail height and is known as the airplane design group (ADG), identified with Roman Numerals I, II, III, IV, V, or VI. Information on the two ARC components, AAC and ADG, are shown in **Figure 7-2**.

Figure 7-2: Airport Reference Codes and Example Aircraft Types



Source: Jviation/Woolpert, public domain images, April 2022

Table 7-3 provides details (manufacturer, model, ARC/design group, approximate cargo payload, and approximate runway length) of air cargo aircraft commonly used by air cargo carriers, sorted high-to-low by heavy wide-body aircraft down to light regional turboprop aircraft. As noted, several of the aircraft shown in this table are currently used in Georgia to support scheduled air cargo operations. Note that this is not an all-encompassing list of all air cargo aircraft; there are many more types of smaller aircraft used to support ad hoc (on-demand) air cargo activity at airports across Georgia; these smaller aircraft are not included in **Table 7-3**.

Actual runway length requirements for aircraft shown in **Table 7-3** are best determined in an Airport Layout Plan or Master Plan. Stage length, percent useful load, and operating conditions (temperature and precipitation) for the aircraft depicted in this table have a significant impact on actual runway length requirements for air cargo aircraft. It is important to note that air cargo carriers typically desire a higher operating margin for runway length to increase the level of safety when optimizing their payloads. Therefore, runway lengths depicted in this table are considered the minimal need.

Runway lengths in **Table 7-3** are not reflective of the actual requirements for scheduled air cargo operators; actual runway lengths needed by these aircraft exceed the minimums reported in this table. **Table 7-3** contextualizes the wide range of runway lengths associated with different types of air cargo aircraft. Finally, this table also shows that there are many different types of air cargo aircraft that may be able, under certain circumstances, to operate on runways that are in the 5,000-foot or less range.

Table 7-3: Common Air Cargo Aircraft with Minimum Runway Lengths

Manufacturer	Model	Cargo Aircraft Type	Georgia Airports with Scheduled Operations	FAA Airport Reference Code (ARC) Design Group*	Approximate Cargo Payload (pounds)**	Approximate Minimum Runway Length Required (feet)***
Boeing	747-8F	Wide-Body	ATL	D-VI	246,400	9,800
Boeing	747-400F	Wide-Body	ATL	D-V	200,000	9,800
McDonnell-Douglas	MD-11F	Wide-Body	ATL	D-IV	144,000	9,200
Boeing	777-8F	Wide-Body	ATL	D-IV	198,000	9,000
Airbus	A350F****	Wide-Body		D-V	192,240	9,000
Boeing	777F	Wide-Body	ATL	D-V	184,000	8,900
McDonnell-Douglas	MD-10F	Wide-Body	ATL	C-IV	80,000	8,900
Douglas	DC-8-70	Wide-Body		C-IV	79,366	8,900
Boeing	767-300F	Wide-Body	ATL	D-IV	92,800	8,600
Airbus	A300-600F	Wide-Body	ABY, ATL	C-IV	84,000	8,400
Antonov	An-124	Wide-Body		C-VI	211,643	8,300
Boeing	767-200F	Wide-Body	ATL	C-IV	66,000	8,000
Airbus	A330-200F	Wide-Body		C-V	114,640	6,800
Airbus	A310-200F	Wide-Body	ATL	C-IV	71,606	6,800
Airbus	A310-300F	Wide-Body	ATL	C-IV	68,784	6,800
Boeing	737-800BCF	Narrow-Body	ATL	D-III	42,240	6,800
McDonnell-Douglas	MD-80SF	Narrow-Body		C-III	34,400	6,100
Douglas	DC-9	Narrow-Body		C-III	24,000	5,900
Boeing	757-200F	Narrow-Body	ABY, ATL, SAV	C-IV	48,000	5,600
Boeing	737-700F	Narrow-Body		C-III	32,000	5,500
Convair	580	Regional		B-III	12,000	5,000
Learjet	LJ35	Regional		C-I	1,600	5,000
ATR	72-600F	Regional		B-III	14,462	4,600
Boeing	727-200F	Regional		C-III	42,400	4,500
Embraer	EMB-120	Regional		B-II	6,000	4,500
Short	SD3-60	Regional	SAV, SBO	B-II	5,643	4,100
Beechcraft	BE1900	Regional		B-II	4,720	3,700
Fairchild Swearingen	SW4; SA227 Metroliner	Regional		B-III	3,920	3,500
DeHavilland	Dash 8 Q200	Regional		A-III	7,120	3,300
Cessna	408 Skycourier****	Regional		B-II	4,800	3,300
ATR	42-300	Regional		B-II	9,488	3,000
Beechcraft	B99	Regional		A-II	2,880	2,800
Pilatus	PC12	Regional	LZU, VLD	A-II	2,000	2,600
Cessna	208 Caravan	Regional	ATL, ABY, CSG, TBR, SAV	A-II	2,800	2,500

Manufacturer	Model	Cargo Aircraft Type	Georgia Airports with Scheduled Operations	FAA Airport Reference Code (ARC) Design Group*	Approximate Cargo Payload (pounds)**	Approximate Minimum Runway Length Required (feet)***
Rockwell	Commander 500	Regional		B-II	1,100	2,200
Piper	PA31	Regional		B-I	1,400	2,000

*Note: ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on an airport.
**Note: Assumes 80% of maximum aircraft payload due to "bulking out" by volume. Actual cargo payload may vary depending on aircraft operator
*** Note: Actual runway length requirements depend on several factors including aircraft weight, ambient temperature, airport elevation, wind conditions, runway surface moisture, runway gradient, airline operating procedure, engine configuration, flap settings, etc.
**** Note: Aircraft type not yet operational as of February 2022
Source: Manufacturer specifications (aircraft characteristic manuals), aircraft flight planning manuals, FAA Flight Records, Jviation, February 2022

To determine actual runway length requirements for each aircraft type, manufacturer manuals (specific to each aircraft type) must be considered. Actual runway length requirements depend on several factors such as aircraft weight, load factor, stage length, ambient temperature, airport elevation, wind conditions, runway surface moisture, runway gradient, carrier operating procedures, engine configuration, and flap settings. Actual airport runway length requirements are determined during detailed airport planning efforts.

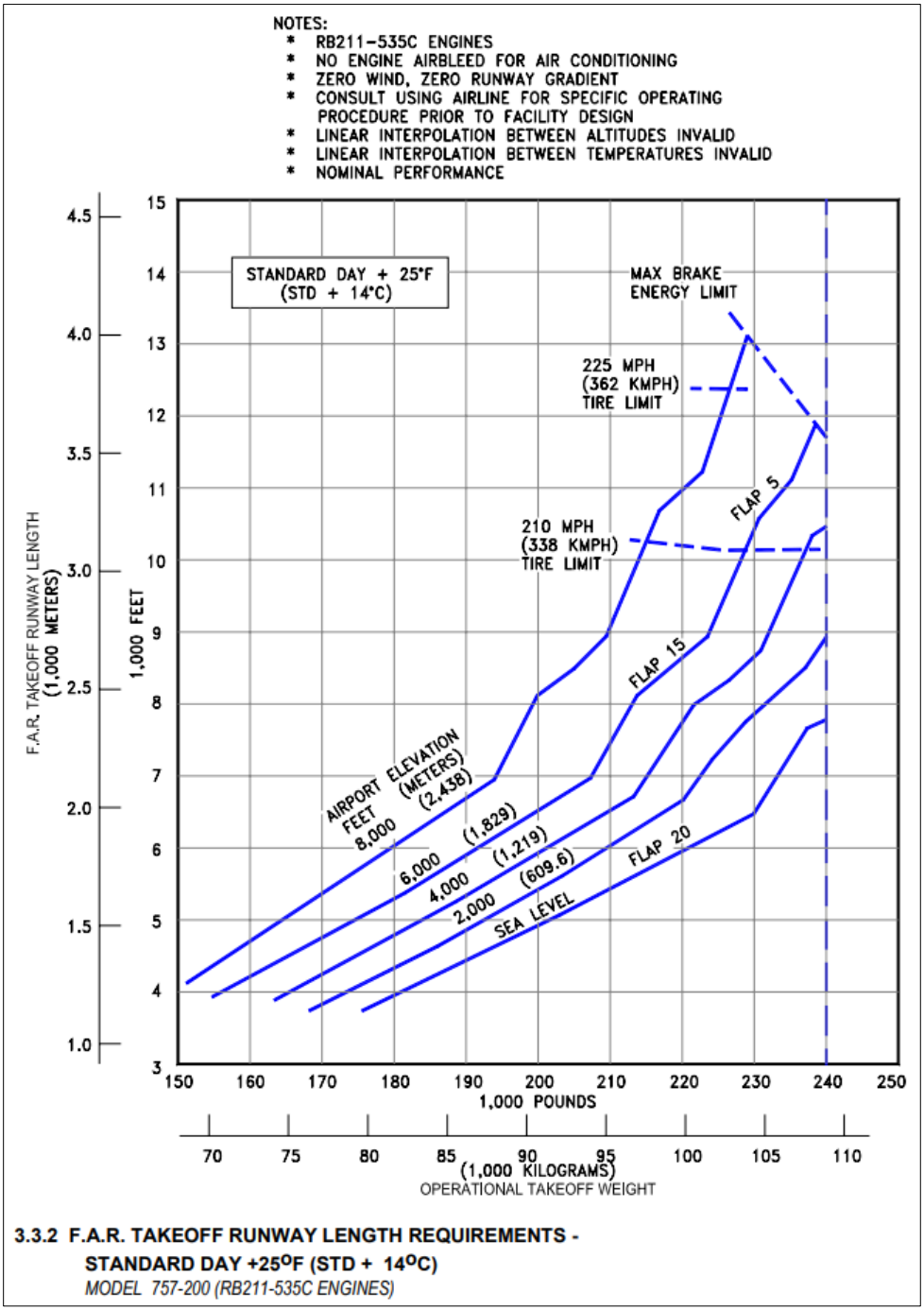
An example of a takeoff runway length requirement chart for a Boeing 757-200 (B757), an aircraft often used to carry air cargo, is presented in **Figure 7-2**. According to manufacturer information and depending upon actual operating conditions, a B757 carrying full air cargo loads could require a runway length of up to approximately 13,000 feet if the runway elevation were 8,000 feet. However, runway elevations at airports in Georgia are between sea level and 2,000 feet, which results in a maximum runway length of up to 9,000 feet at maximum takeoff weight. Often, aircraft are not required to use full fuel loads to reach their destination, resulting in lower takeoff weights and required runway lengths. Runway lengths presented in this table by aircraft type are considered minimums; actual runway lengths needed to accommodate the various types of air cargo aircraft presented in this table will almost always exceed these minimums.

As information in **Table 7-3** reflects, most narrow and wide-body air cargo jet aircraft have minimum runway length needs that are more in the 7,000-8,000 feet range. While turboprop aircraft operated by feeder carriers can operate on runways that have lengths of 5,000 feet or less.

The ARCs, approximate cargo payload, and approximate runway length requirements presented by aircraft in **Figure 7-3** serve as a reference point for comparison to current airport facilities. **Table 7-4** presents airports in each of the five groups and reports on each airport's current runway length, pavement strength, critical/design aircraft, ARC, and, if applicable, largest cargo aircraft currently operating on a scheduled basis. When comparing the information in **Table 7-3** and **Table 7-4**, it can be concluded that most airports in one of the five groups have runway lengths and/or a current ARC that is

compatible with one or more air cargo aircraft types. Considering basic operational characteristics, this indicates that airports in the Georgia system are currently capable of meeting at least the minimal needs of various types of typical air cargo aircraft. As noted in subsequent analysis, the air cargo carriers themselves determine if there is sufficient need or justification for expanding their operations in Georgia. The review completed in this section indicates there are infrastructure options, should the need arise.

Figure 7-3: Example Takeoff Runway Length Requirement Chart (Boeing 757-200)



Source: Boeing 757-200 Airplane Characteristics for Airport Planning, FAA AC 150/5325-4B, February 2022

Table 7-4: Facility Review for Airports in Groups 1 - 5

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Primary Runway	Primary Runway Length	Primary Runway Weight Bearing Capacity (Gross Weight in 000s of Pounds) *	Critical/ Design Aircraft	Airport Reference Code (ARC) Design Group	Largest Air Cargo Aircraft Currently Operating on a Scheduled Basis
1	Albany	Southwest Georgia Regional Airport	ABY	05/23	6,601	80SW / 135DW / 230DTW / 0DDTW	A300-600F	D-IV	Airbus A300
1	Atlanta	Hartsfield-Jackson Atlanta International Airport	ATL	09L/27R	12,390	120SW / 200DW / 360DTW / 0DDTW	Boeing 747-8F	D-V	Boeing 747-8F
1	Savannah	Savannah-Hilton Head International Airport	SAV	10/28	9,351	75SW / 190DW / 310DTW / 0DDTW	Boeing 757	D-IV	Boeing 757
2	Columbus	Columbus Airport	CSG	06/24	6,997	0SW / 160DW / 250DTW / 0DDTW	CRJ-200	C-III	Cessna 208
2	Statesboro	Statesboro-Bulloch County Airport	TBR	14/32	6,000	27SW / 40DW / 0DTW / 0DDTW	Falcon 2000	B-II	Cessna 208
2	Swainsboro	East Georgia Regional Airport	SBO	14/32	6,021	45SW / 65DW / 120DTW / 0DDTW	Short 360	B-II	Short SD3-60
3	Lawrenceville	Gwinnett County Airport-Briscoe Field	LZU	07/25	6,000	93SW / 120DW / 0DTW / 0DDTW	Gulfstream 4	D-II	Pilatus PC-12
4	Adel	Cook County Airport	15J	05/23	5,501	30SW / 30DW / 0DTW / 0DDTW	Raytheon Premier I	B-II	N/A
4	Athens	Athens-Ben Epps Airport	AHN	09/27	6,122	65SW / 125DW / 0DTW / 0DDTW	EMB145	C-II	N/A
4	Atlanta	Paulding-Northwest Atlanta Airport	PUJ	13/31	5,505	90SW / 130DW / 0DTW / 0DDTW	Citation III	B-II	N/A
4	Augusta	Augusta Regional Airport at Bush Field	AGS	17/35	8,001	155SW / 160DW / 450DTW / 975DDTW	Boeing 757-200	D-III	N/A
4	Brunswick	Brunswick-Golden Isles Airport	BQK	07/25	8,001	120SW / 190DW / 323DTW / 0DDTW	Boeing 717-200	D-IV	N/A

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Primary Runway	Primary Runway Length	Primary Runway Weight Bearing Capacity (Gross Weight in 000s of Pounds) *	Critical/ Design Aircraft	Airport Reference Code (ARC) Design Group	Largest Air Cargo Aircraft Currently Operating on a Scheduled Basis
4	Canon	Franklin County Airport	18A	08/26	5,000	15SW / 0DW / 0DTW / 0DDTW		B-II	N/A
4	Canton	Cherokee County Airport	CNI	05/23	5,003	26SW / 0DW / 0DTW / 0DDTW	C560	B-II	N/A
4	Carrollton	West Georgia Regional Airport-O.V. Gray Field	CTJ	17/35	5,503	43SW / 56DW / 83DTW / 0DDTW	King Air	B-II	N/A
4	Cartersville	Cartersville Airport	VPC	01/19	5,760	26SW / 0DW / 0DTW / 0DDTW	Gulfstream 3, Lear 35	D-II	N/A
4	Cornelia	Habersham County Airport	AJR	06/24	5,503	30SW / 0DW / 0DTW / 0DDTW	PA-46 Malibu	A-I Small	N/A
4	Douglas	Douglas Municipal Airport	DQH	04/22	6,000	26SW / 0DW / 0DTW / 0DDTW	Super King Air 200	C-II	N/A
4	Gainesville	Lee Gilmer Memorial Airport	GVL	05/23	5,496	45SW / 100DW / 0DTW / 0DDTW	C560	B-II	N/A
4	Jasper	Pickens County Airport	JZP	16/34	5,000	60SW / 95DW / 0DTW / 0DDTW	King Air 100	B-II	N/A
4	Jefferson	Jackson County Airport	JCA	17/35	5,010	30SW / 43DW / 0DTW / 0DDTW	Beechcraft Baron (B58)	B-I	N/A
4	Macon	Middle Georgia Regional Airport	MCN	05/23	6,500	80SW / 128DW / 237DTW / 0DDTW	CRJ-200	D-III	N/A
4	Monroe	Monroe-Walton County Airport	D73	03/21	5,000	14SW / 18DW / 0DTW / 0DDTW	Cessna Citation II	B-II	N/A
4	Nashville	Berrien County Airport	4J2	10/28	5,002	23SW / 0DW / 0DTW / 0DDTW	Phenom 100	B-II	N/A
4	Perry	Perry-Houston County Airport	PXE	18/36	4,999	40SW / 91DW / 145DTW / 0DDTW	Cessna Citation III	B-II	N/A

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Primary Runway	Primary Runway Length	Primary Runway Weight Bearing Capacity (Gross Weight in 000s of Pounds) *	Critical/ Design Aircraft	Airport Reference Code (ARC) Design Group	Largest Air Cargo Aircraft Currently Operating on a Scheduled Basis
4	Rome	Richard B. Russell Regional Airport - J.H. Towers Field	RMG	01/19	6,006	52SW / 57DW / 114DTW / 0DDTW	Cessna Citation 525	C-II	N/A
4	Thomson	Thomson-McDuffie Regional Airport	HQU	10/28	5,514	30SW / 50DW / 87DTW / 0DDTW	Cessna Citation XLS (C560)	B-II	N/A
4	Toccoa	Toccoa Airport-R.G. LeTourneau Field	TOC	03/21	5,008	30SW / 0DW / 0DTW / 0DDTW		B-II	N/A
4	Valdosta	Valdosta Regional Airport	VLD	17/35	8,002	104SW / 169DW / 303DTW / 0DDTW	CRJ-200	C-II	Pilatus PC-12
4	Winder	Barrow County Airport	WDR	13/31	5,202	20SW / 0DW / 0DTW / 0DDTW	King Air 350	B-II	N/A
4	Atlanta	Covington Municipal Airport	CVC	10/28	6,000	30SW / 0DW / 0DTW / 0DDTW	King Air 90	B-II	N/A
4	LaGrange	LaGrange-Callaway Airport	LGC	13/31	6,500	75SW / 100DW / 100DTW / 0DDTW	Gulfstream 3	D-III	N/A
5	Americus	Jimmy Carter Regional Airport	ACJ	05/23	6,011	30SW / 50DW / 0DTW / 0DDTW		C-II	N/A
5	Atlanta	Cobb County International Airport-McCollum Field	RYY	09/27	6,295	0SW / 0DW / 0DTW / 0DDTW	G200/ERJ145	C-II	N/A
5	Atlanta	DeKalb-Peachtree Airport	PDK	03R/21L	6,001	46SW / 75DW / 0DTW / 0DDTW	G550	D-III	N/A
5	Calhoun	Tom B. David Field Airport	CZL	17/35	6,034	15SW / 100DW / 100DTW / 0DDTW	Cessna CJ1	B-I	N/A
5	Dublin	W.H. "Bud" Barron Airport	DBN	02/20	6,501	30SW / 53DW / 0DTW / 0DDTW	King Air 200	B-II	N/A
5	Eastman	Heart Of Georgia Regional Airport	EZM	02/20	6,506	75SW / 120DW / 0DTW / 0DDTW	G450	A-I	N/A

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Primary Runway	Primary Runway Length	Primary Runway Weight Bearing Capacity (Gross Weight in 000s of Pounds) *	Critical/ Design Aircraft	Airport Reference Code (ARC) Design Group	Largest Air Cargo Aircraft Currently Operating on a Scheduled Basis
5	Hinesville	Wright Army Airfield (Fort Stewart)/MidCoast Regional Airport	LHW	06L/24R	6,500	0SW / 0DW / 0DTW / 0DDTW	C-130	C-IV	N/A
5	Moultrie	Moultrie Municipal Airport	MGR	04/22	6,000	30SW / 49DW / 98DTW / 0DDTW	King Air	C-II	N/A
5	Thomaston	Thomaston-Upson County Airport	OPN	12/30	6,350	20SW / 50DW / 0DTW / 0DDTW	King Air 90	B-II	N/A
5	Thomasville	Thomasville Regional Airport	TVI	04/22	6,004	30SW / 0DW / 0DTW / 0DDTW	Gulfstream II	C-II	N/A
5	Tifton	Henry Tift Myers Airport	TMA	16/34	6,506	42SW / 60DW / 106DTW / 0DDTW	King Air 300	B-II	N/A
5	Vidalia	Vidalia Regional Airport	VDI	07/25	6,002	30SW / 48DW / 85DTW / 0DDTW		B-II	N/A

*Note: SW = Single Wheel; DW = Dual Wheel; DTW = Dual Tandem Wheel; DDTW = Double Dual Tandem Wheel

**Note: Pilatus PC-12 operated by Quest Diagnostics

Source: FAA 5010 Data, GDOT Aviation Programs, Airport Records, Jviation, February 2022

Information in **Table 7-4** shows that in many cases, the largest cargo aircraft operating at a particular airport is the critical/design aircraft for that airport; however, in other instances, the air cargo aircraft is not the design aircraft. For these airports, this indicates that there are larger commercial or general aviation planes that are the design aircraft. Each airport has an established ARC (see **Table 7-4**) based primarily on its critical or design aircraft. The ARC established by the critical aircraft does not, however, limit the size of aircraft that can operate at any airport on a more infrequent basis.

Information in **Table 7-3** and **Table 7-4** can be used to draw several conclusions:

- There are many different types of aircraft that are operated by scheduled air cargo carriers
- Aircraft used to transport air cargo have a wide range of optimal runway length needs as well as a range of ARCs that dictate airport design standards
- Existing infrastructure at Georgia airports can accommodate various types of common air cargo aircraft, especially turboprop aircraft operated by feeder carriers

Ultimately, air cargo demand and carrier needs determine if expansion of air cargo activity in Georgia is warranted. This applies to both airports with existing scheduled air cargo service as well as to airports that may serve future air cargo demand. As information in this section documents, if there is a need for facilities to accommodate expanded air cargo activity, existing infrastructure is available.

7.4 Airside Facility Characteristics

Air cargo carriers often have preferred airside facilities and airport services when operating at an airport. These facilities and services were identified in past research conducted by the Transportation Research Board (TRB) in *ACRP Report 143: Guidebook for Air Cargo Facility Planning and Development*. While facilities that support air cargo operators vary based on the type of aircraft used by the provider and the volume of activity (both number of operations and tonnage processed), the following are common examples of supporting facilities sought by operators:

- Approach with Vertical Guidance
- Weather Reporting
- Jet A Fuel
- Aircraft Rescue and Fire Fighting (ARFF) Facility (optional)
- Full Parallel Taxiway
- Fixed Base Operator (FBO)

It is worth noting that having all the above facilities/services is not a prerequisite for an airport to support an air cargo operator; rather, these facilities/services are a composite of those identified during ACRP research. Air cargo operators can and do operate at airports lacking one or more of these facilities/services.

Table 7-5 lists all airports in Groups 1 through 5 and whether they currently have basic air cargo facility/service characteristics, while **Table 7-6** notes which characteristics are currently lacking. As part of the analysis completed in **Chapter 5**, areas (identified as gap areas) beyond a 60-minute drive-time of an airport served by an integrated express carrier were identified. Subsequently, 25 different airports in or near the gap areas were reviewed using more than 20 different factors to assess the ability of each

airport to potentially support scheduled air cargo service. **Table 7-6** includes airport rankings established in **Chapter 5** (an airport attributes matrix scored the airports and ranked them as high, medium, or low for their characteristics to support scheduled air cargo operations). An important factor considered in the scoring/ranking process was the proximity of a gap area airport to known air cargo demand generators.

It is worth noting that an ARFF facility, while desirable, is not a requirement for an air cargo operator. This is a facility/service most often found at airports that also accommodate scheduled commercial airline operations. There are, in fact, many airports that serve feeder air cargo carriers that do not have ARFF facilities. As reflected in **Table 7-6**, this is the facility/service most often lacking at the airports included in the facilities review. Lack of an ARFF facility would not preclude air cargo operations at these airports, particularly if they are provided by a feeder carrier using smaller turboprop aircraft.

As shown in **Table 7-6**, nine out of the 44 airports currently meet all facility and service air cargo characteristics. If ARFF is removed from the facility/service characteristics, 32 of the 44 airports could theoretically serve an air cargo carrier, should the need arrive, with their existing facilities. This finding shows that the Georgia airport system is equipped to serve additional air cargo demand if needed, especially if that additional demand is related to feeder carriers flying turboprop type aircraft.

Table 7-5: Basic Air Cargo Facility Characteristics – Group 1-5 Airports

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Approach with Vertical Guidance	Weather Reporting	Jet A	ARFF	Full Parallel Taxiway	FBO
1	Albany	Southwest Georgia Regional Airport	ABY	Yes	Yes	Yes	Yes	Yes	Yes
1	Atlanta	Hartsfield-Jackson Atlanta International Airport	ATL	Yes	Yes	Yes	Yes	Yes	Yes
1	Savannah	Savannah-Hilton Head International Airport	SAV	Yes	Yes	Yes	Yes	Yes	Yes
2	Columbus	Columbus Airport	CSG	Yes	Yes	Yes	Yes	Yes	Yes
2	Statesboro	Statesboro-Bulloch County Airport	TBR	Yes	Yes	Yes		Yes	Yes
2	Swainsboro	East Georgia Regional Airport	SBO	Yes	Yes	Yes		Yes	Yes
3	Lawrenceville	Gwinnett County Airport-Briscoe Field	LZU	Yes	Yes	Yes		Yes	Yes
4	Adel	Cook County Airport	15J	Yes		Yes		Yes	Yes
4	Athens	Athens-Ben Epps Airport	AHN	Yes	Yes	Yes	Yes	Yes	Yes
4	Atlanta	Paulding-Northwest Atlanta Airport	PUJ	Yes	Yes	Yes		Yes	Yes
4	Augusta	Augusta Regional Airport at Bush Field	AGS	Yes	Yes	Yes	Yes	Yes	Yes
4	Brunswick	Brunswick-Golden Isles Airport	BQK	Yes	Yes	Yes	Yes	Yes	Yes
4	Canon	Franklin-Hart Airport	18A	Yes	Yes	Yes		Yes	
4	Canton	Cherokee County Airport	CNI	Yes	Yes	Yes		Yes	Yes
4	Carrollton	West Georgia Regional Airport-O.V. Gray Field	CTJ	Yes	Yes	Yes		Yes	Yes
4	Cartersville	Cartersville Airport	VPC	Yes	Yes	Yes		Yes	Yes
4	Cornelia	Habersham County Airport	AJR	Yes	Yes	Yes		Yes	Yes
4	Douglas	Douglas Municipal Airport	DQH	Yes	Yes	Yes		Yes	Yes
4	Gainesville	Lee Gilmer Memorial Airport	GVL	Yes	Yes	Yes		Yes	Yes
4	Jasper	Pickens County Airport	JZP	Yes	Yes	Yes		Yes	Yes
4	Jefferson	Jackson County Airport	JCA	Yes	Yes	Yes		Yes	Yes
4	Macon	Middle Georgia Regional Airport	MCN	Yes	Yes	Yes	Yes	Yes	Yes
4	Monroe	Cy Nunnally Memorial Airport	D73		Yes			Yes	Yes
4	Nashville	Berrien County Airport	4J2	Yes		Yes			

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Approach with Vertical Guidance	Weather Reporting	Jet A	ARFF	Full Parallel Taxiway	FBO
4	Perry	Perry-Houston County Airport	PXE	Yes	Yes	Yes		Yes	Yes
4	Rome	Richard B. Russell Regional Airport - J.H. Towers Field	RMG	Yes	Yes	Yes		Yes	Yes
4	Thomson	Thomson-McDuffie Regional Airport	HQU	Yes	Yes	Yes		Yes	Yes
4	Toccoa	Toccoa Airport-R.G. LeTourneau Field	TOC	Yes	Yes	Yes			Yes
4	Valdosta	Valdosta Regional Airport	VLD	Yes	Yes	Yes	Yes	Yes	Yes
4	Winder	Barrow County Airport	WDR	Yes	Yes	Yes		Yes	Yes
4	Atlanta	Covington Municipal Airport	CVC	Yes	Yes	Yes		Yes	Yes
4	LaGrange	LaGrange-Callaway Airport	LGC	Yes	Yes	Yes		Yes	Yes
5	Americus	Jimmy Carter Regional Airport	ACJ	Yes	Yes	Yes		Yes	Yes
5	Atlanta	Cobb County International Airport-McCollum Field	RYY	Yes	Yes	Yes		Yes	Yes
5	Atlanta	DeKalb-Peachtree Airport	PDK	Yes	Yes	Yes	Yes	Yes	Yes
5	Calhoun	Tom B. David Field Airport	CZL	Yes	Yes	Yes			Yes
5	Dublin	W.H. "Bud" Barron Airport	DBN	Yes	Yes	Yes		Yes	Yes
5	Eastman	Heart Of Georgia Regional Airport	EZM	Yes	Yes	Yes		Yes	Yes
5	Hinesville	Wright Army Airfield (Fort Stewart)/MidCoast Regional Airport	LHW	Yes	Yes	Yes			Yes
5	Moultrie	Moultrie Municipal Airport	MGR	Yes	Yes	Yes			Yes
5	Thomaston	Thomaston-Upson County Airport	OPN	Yes	Yes	Yes		Yes	Yes
5	Thomasville	Thomasville Regional Airport	TVI	Yes	Yes	Yes		Yes	Yes
5	Tifton	Henry Tift Myers Airport	TMA	Yes	Yes	Yes		Yes	Yes
5	Vidalia	Vidalia Regional Airport	VDI	Yes	Yes	Yes		Yes	Yes

Source: FAA 5010 Data, GDOT Aviation Programs, Airport Records, Jviation, February 2022

Table 7-6: Availability Basic Air Cargo Facilities/Services – Group 1-5 Airports

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Gap Area Analysis Score	Meets All Basic Air Cargo Facility/Service Characteristics	Basic Air Cargo Facility Criteria Shortfall Detail
1	Albany	Southwest Georgia Regional Airport	ABY	N/A	Yes	
1	Atlanta	Hartsfield-Jackson Atlanta International Airport	ATL	N/A	Yes	
1	Savannah	Savannah-Hilton Head International Airport	SAV	N/A	Yes	
2	Columbus	Columbus Airport	CSG	N/A	Yes	
2	Statesboro	Statesboro-Bulloch County Airport	TBR	N/A		ARFF (Optional)
2	Swainsboro	East Georgia Regional Airport	SBO	N/A		ARFF (Optional)
3	Lawrenceville	Gwinnett County Airport-Briscoe Field	LZU	N/A		ARFF (Optional)
4	Adel	Cook County Airport	15J	Medium		Weather Reporting, ARFF (Optional)
4	Athens	Athens-Ben Epps Airport	AHN	Medium	Yes	
4	Atlanta	Paulding-Northwest Atlanta Airport	PUJ	Medium		ARFF (Optional)
4	Augusta	Augusta Regional Airport at Bush Field	AGS	High	Yes	
4	Brunswick	Brunswick-Golden Isles Airport	BQK	Medium	Yes	
4	Canon	Franklin-Hart Airport	18A	Medium		ARFF (Optional), FBO
4	Canton	Cherokee County Airport	CNI	Medium		ARFF (Optional)
4	Carrollton	West Georgia Regional Airport-O.V. Gray Field	CTJ	Medium		ARFF (Optional)
4	Cartersville	Cartersville Airport	VPC	Low		ARFF (Optional)
4	Cornelia	Habersham County Airport	AJR	Low		ARFF (Optional)
4	Douglas	Douglas Municipal Airport	DQH	Medium		ARFF (Optional)
4	Gainesville	Lee Gilmer Memorial Airport	GVL	Medium		ARFF (Optional)
4	Jasper	Pickens County Airport	JZP	Low		ARFF (Optional)
4	Jefferson	Jackson County Airport	JCA	High		ARFF (Optional)
4	Macon	Middle Georgia Regional Airport	MCN	High	Yes	
4	Monroe	Monroe-Walton County Airport	D73	Low		Approach, Jet A, ARFF (Optional)

Air Cargo Activity Group	Associated City	Airport Name	FAA ID	Gap Area Analysis Score	Meets All Basic Air Cargo Facility/Service Characteristics	Basic Air Cargo Facility Criteria Shortfall Detail
4	Nashville	Berrien County Airport	4J2	Low		Weather Reporting, ARFF (Optional), Parallel Taxiway, FBO
4	Perry	Perry-Houston County Airport	PXE	Medium		ARFF (Optional)
4	Rome	Richard B. Russell Regional Airport - J.H. Towers Field	RMG	Medium		ARFF (Optional)
4	Thomson	Thomson-McDuffie Regional Airport	HQU	Medium		ARFF (Optional)
4	Toccoa	Toccoa Airport-R.G. LeTourneau Field	TOC	Low		ARFF (Optional), Parallel Taxiway
4	Valdosta	Valdosta Regional Airport	VLD	High	Yes	
4	Winder	Barrow County Airport	WDR	Medium		ARFF (Optional)
4	Atlanta	Covington Municipal Airport	CVC	Medium		ARFF (Optional)
4	LaGrange	LaGrange-Callaway Airport	LGC	Medium		ARFF (Optional)
5	Americus	Jimmy Carter Regional Airport	ACJ	N/A		ARFF (Optional)
5	Atlanta	Cobb County International Airport-McCollum Field	RYY	N/A		ARFF (Optional)
5	Atlanta	DeKalb-Peachtree Airport	PDK	N/A	Yes	
5	Calhoun	Tom B. David Field Airport	CZL	N/A		ARFF (Optional), Parallel Taxiway
5	Dublin	W.H. "Bud" Barron Airport	DBN	N/A		ARFF (Optional)
5	Eastman	Heart Of Georgia Regional Airport	EZM	N/A		ARFF (Optional)
5	Hinesville	Wright Army Airfield (Fort Stewart)/MidCoast Regional Airport	LHW	N/A		Weather Reporting, ARFF (Optional), Full Parallel Taxiway
5	Moultrie	Moultrie Municipal Airport	MGR	N/A		ARFF (Optional), Full Parallel Taxiway
5	Thomaston	Thomaston-Upson County Airport	OPN	N/A		ARFF (Optional)
5	Thomasville	Thomasville Regional Airport	TVI	N/A		ARFF (Optional)
5	Tifton	Henry Tift Myers Airport	TMA	N/A		ARFF (Optional)
5	Vidalia	Vidalia Regional Airport	VDI	N/A		ARFF (Optional)

Source: FAA 5010 Data, GDOT Aviation Programs, Airport Records, Jviation, February 2022

7.4.1 Conclusions from Facilities Review

The facilities review shows that airports that currently accommodate scheduled air cargo operations generally meet all basic facility/service characteristics. Airports serving Statesboro and Swainsboro are not equipped with ARFF; however, both of these airports are served by smaller turboprop aircraft flown by feeder carriers serving UPS. ARFF is not required for one daily air cargo arrival and departure.

Chapter 5 of this report identified areas beyond the 60-minute drive-time of an airport with scheduled integrated express carrier service and identified and reviewed the attributes of airports located in or near the designated gap areas. Considering concentrations of known air cargo demand generators and existing airport characteristics, four airports were rated a "high" for their potential to serve air cargo demand. These four airports are located in Augusta, Jackson County, Macon, and Valdosta. As **Table 7-6** shows, these airports currently meet most if not all of basic facilities and services most often sought by scheduled air cargo carriers.

7.5 Air Cargo Facility Analysis for Airports Served by Scheduled Air Cargo Carriers

This section reviews airports (except for ATL and LZU) that currently have scheduled air cargo operations. Facility needs for ATL were provided by the airport for integration into this study. As previously noted, scheduled service at LZU is provided by a specialty carrier, not an integrated express carrier. Facility needs for the business that provides this service were not included in this analysis.

The purpose of this section is to determine whether existing airport facilities are sufficient to accommodate current and future air cargo tonnage. One method for assessing air cargo facility and space requirements was to consider industry throughput ratios established by *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development* and its accompanying *Air Cargo Facility Planning Model*. The ratios in the model are based on a calculation of average tons per square foot. Ratios in the ACRP model were established using survey data from existing air cargo facilities at airports across the U.S. Specific building, apron, equipment storage, truck parking, and truck dock/door ratios are available for each cargo carrier type and are an output from the cargo facilities model. It is worth noting that the survey research that supports the ACRP model focused on larger air cargo airports in the U.S. As a result, the use of the model is often more applicable to busier air cargo airports and not those served by feeder carriers using turboprop aircraft.

For this analysis, facilities related to integrated express carriers were reviewed. Model ratios were applied to current and forecasted cargo tonnage to establish facility requirements for the five Georgia airports with existing scheduled air cargo service provided by an integrated express carrier:

- Columbus Airport (CSG) – Feeder/Turboprop Cargo Airport
- East Georgia Regional Airport (SBO) – Feeder/Turboprop Cargo Airport
- Savannah/Hilton Head International Airport (SAV) – Mainline/Jet Air Cargo Airport
- Southwest Georgia Regional Airport (ABY) – Mainline/Jet Air Cargo Airport
- Statesboro-Bulloch County Airport (TBR) – Feeder/Turboprop Cargo Airport

While the ACRP model provides one method for determining the adequacy of existing air cargo facilities at these airports, on-site visits, extensive interviews with airport management, and input from the air

cargo carriers themselves served as another means to evaluate the current and future adequacy of air cargo facilities at the airports listed above.

The five airports listed above have scheduled air cargo service provided primarily through integrated express carrier networks such as DHL, FedEx Express, and UPS. Carriers serving these five airports, along with flight segments, aircraft types employed, and flight frequencies are reported in **Chapter 2** and **Chapter 3** of this report. Facility requirements were not developed for airports whose air cargo service is limited to belly-hold cargo on commercial air carriers, that currently have no regularly scheduled air cargo service, or those that only have ad hoc (on demand) air cargo service. The development needs of ad hoc carriers at specific Georgia airports are best addressed within the context of that airport's master plan. As noted earlier in this report, ad hoc activity can vary greatly from one year to the next.

The data gathering effort described in **Chapter 3** for study airports supports the air cargo facility/capacity analysis. Extensive fieldwork identified existing air cargo facilities. Inventory efforts also help detail current dimensions and the general adequacy and condition of existing air cargo facilities. All estimates of air cargo facility/capacity and space requirements, including those presented here, require some level of judgment. It is important to understand this statewide planning exercise relies on industry averages to generate planning-level estimates for air cargo space requirements. The level of detail reflected in the facility/capacity estimates is driven by available data and approximate measurements for existing air cargo facilities at each study airport. Any actual air cargo facility development would need to be supported by detailed master planning and engineering efforts at the individual airport level.

7.5.1 ACRP Modeling for Air Cargo Facility Needs

The model used in this analysis was designed to estimate space requirements for air cargo facilities and is flexible enough to estimate aggregate special or specific needs for cargo areas, buildings, and aprons at an airport. The model used in this analysis is designed to analyze airports serving primarily domestic air cargo demand. The throughput ratios included in the model are based on industry averages from airports across the country. Underlying data that supports the model was collected as part of *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development*.

Air cargo facility requirements can be estimated by applying the ratios to the tonnage throughput. Estimated space requirements re identified for apron area, cargo building area, truck/auto parking areas, and truck docks/doors. Calculations were run for the current/base year, as well as for forecasted tonnage, for four of Georgia's five airports with existing scheduled integrated express activity, not including ATL and SAV due to recent cargo facility development planning initiatives. Projections of future air cargo tonnage used in this analysis are derived from the forecasts presented in **Chapter 6** of this study.

For apron space requirements, the air cargo facility planning model also considers the aircraft type in use (or anticipated to be in use) based on the airplane design group (ADG).[1] The model estimates apron space requirements based on either tonnage or ADG, whichever is greater. The following sections describe estimated facility requirements produced by the ACRP model as well as facility needs identified

[1] FAA Advisory Circular 150/5300-13A, Airport Design

through the study's inventory and interview process. Facility needs are estimated for four of Georgia's five airports with scheduled integrated express activity (not including ATL and SAV). It is worth noting that, based on specific operating conditions observed and/or documented as part of this study, adjustments to model results may be appropriate. Aside from considering model output, this analysis relied on input from airport managers and the air cargo carriers themselves when it came to determining the current and future adequacy of air cargo facilities at each airport.

7.5.1.1 Columbus Airport (CSG)

Columbus Airport supports air cargo activity related to e-commerce, medical, financial, and aircraft/automotive manufacturing. The 60-minute drive-time for this airport extends from LaGrange and West Point, Georgia, to Montgomery, Alabama.

This study's commodities analysis and identification of air cargo demand generators identified business/industry types that frequently rely on air cargo. As determined during the study's inventory interviews, some businesses/industries in the airport's vicinity that may rely on air cargo are Path-Tec, a medical laboratory supplier; TSYS Global, a payment processing company; and Pratt & Whitney, a manufacturer of aircraft engines and auxiliary power units. Kia Georgia, located in West Point, Georgia, is the only automotive assembly plant in Georgia. In addition to its scheduled integrated express carrier service, CSG also supports ad hoc air cargo shipments of auto parts for Kia and Honda. The nearby LaGrange-Callaway Airport also supports ad hoc air cargo activity that supports Kia's operations.

Baron Aviation, a regional air cargo carrier contracted to FedEx, is the sole scheduled cargo operator at the airport. Baron Aviation operates a Cessna Caravan and primarily supports e-commerce and financial related cargo. There is currently no dedicated air cargo apron at the airport; all operations are conducted and accommodated on the airport's non-exclusive general aviation apron. CSG airport management suggests that a large portion of the cargo enplaned by Baron Aviation is in support of TSYS/Global payments, a payment processing service. Baron's route for Columbus operates Monday through Friday with a stop in Columbus between Memphis and Atlanta.

Baron Aviation leases a single tiedown on the general aviation apron, as well as 100 square feet of office space for storage of a computer, phone, scales, tools, and other miscellaneous equipment. Baron Aviation operates mostly at night, departing the airport at approximately 10:30 p.m., Monday through Friday. Baron first flies to Memphis and then to Atlanta. At approximately 6:30 a.m., the Caravan arrives back in Columbus where it parks on the general aviation apron throughout the day.

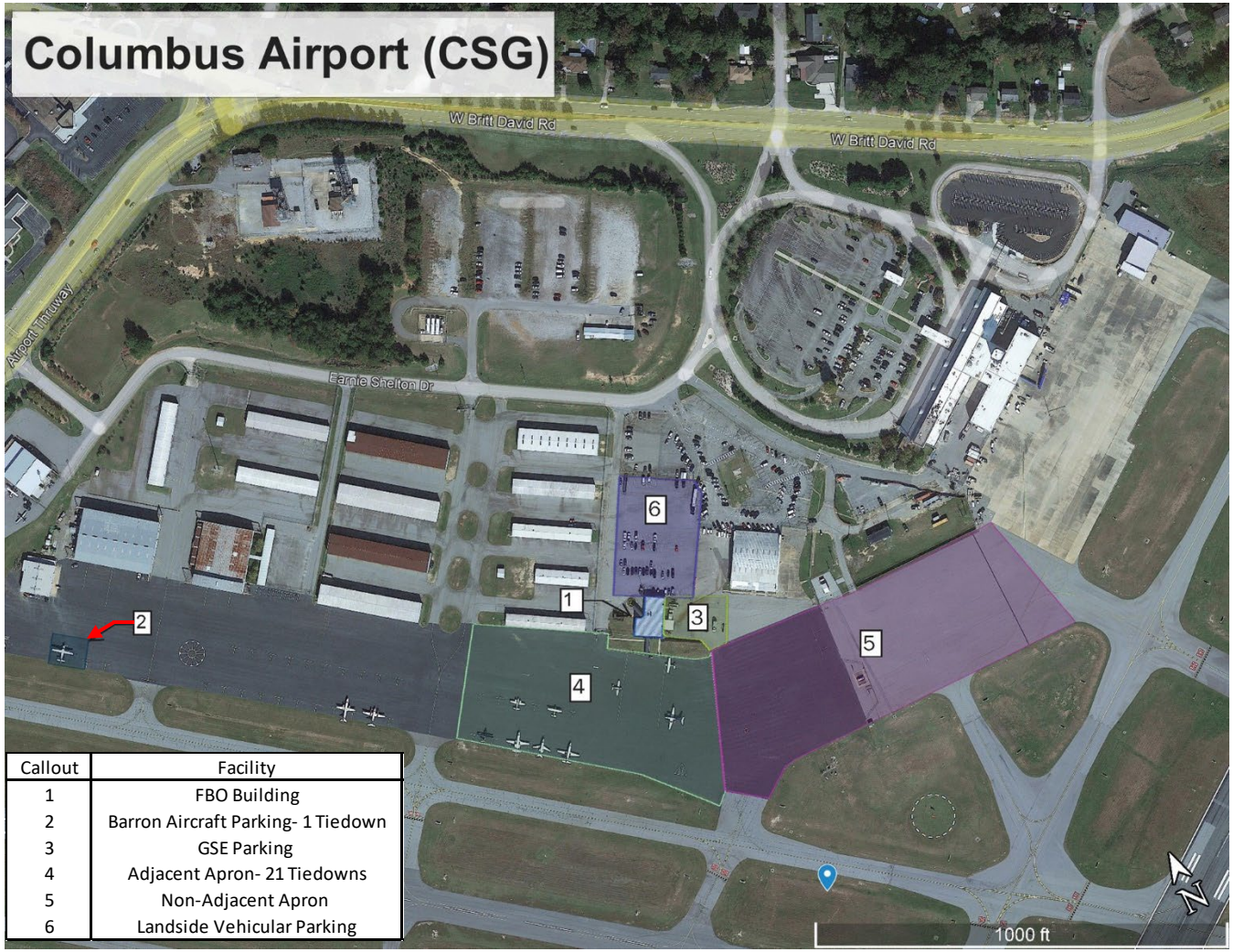
Parcels are enplaned and deplaned from the Cessna Caravan directly on the general aviation apron using small cargo vans. The vans transport cargo between the airport and the UPS sorting facility on Warm Springs Road. According to Baron Aviation, the split between inbound and outbound cargo fluctuates seasonally, but they typically carry more outbound than inbound tonnage.

CSG also supports ad hoc cargo flights; and in 2019, there were between 40 to 50 operations flown by carriers such as Ameristar, IFL, Kalitta Charters, Active Aero, and others. Commonly used aircraft supporting the airport's ad hoc air cargo flights include the Dassault Falcon 20, Boeing 737, Pilatus, and the McDonnell Douglas MD-80 and MD-88. Since these ad hoc carriers only account for an estimated 25

annual arrivals/departures, there is no need to plan for separate facilities to accommodate their operations.

By applying the air cargo facility planning ratios for integrated express carriers implied in the ACRP model to the forecast tonnage throughput and the aircraft type, air cargo facility requirements are estimated. The space requirements for apron area, cargo building area, truck/auto parking area, and truck docks/doors necessary to meet the potential air cargo throughput at CSG are presented by forecast year in **Table 7-7**. It should be noted that the ACRP facilities planning model is not specifically designed to estimate facilities needs at airports such as CSG that have only one daily air cargo arrival and departure by a turboprop aircraft. An aerial image of CSG's existing facilities is presented in **Figure 7-4**.

Figure 7-4: Aerial Overview of Air Cargo and Other Nearby Facilities – CSG



Callout	Facility
1	FBO Building
2	Barron Aircraft Parking- 1 Tiedown
3	GSE Parking
4	Adjacent Apron- 21 Tiedowns
5	Non-Adjacent Apron
6	Landside Vehicular Parking

Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Table 7-7: Air Cargo Facilities ACRP Model – CSG

Year		2019	2025	2030	2035	2019	2025	2030	2035
Annual Tons (Metric Tons)		430	510	580	770	430	510	580	770
Annual Tons (Short Tons)		470	560	640	850	470	560	640	850
FACILITY COMPONENT	Existing Space Used For Cargo	Base Year Required Space To Meet Demand	5-Year Forecast Required Space	10-Year Forecast Required Space	20-Year Forecast Required Space	Base Year Difference	5-Year Surplus Or Deficient Space	10-Year Surplus Or Deficient Space	20-Year Surplus Or Deficient Space
Carrier Type: Integrated Express (FedEx/Baron Aviation)									
Cargo Building Space in Square Feet	100	470	560	640	850	(370)	(460)	(540)	(750)
Total Apron in Square Feet	287,436	5,918	6,074	6,214	6,579	281,518	281,362	281,222	280,857
Truck and Auto Parking in Square Feet	55,889	846	1,008	1,152	1,530	55,043	54,881	54,737	54,359
Total Space in Square Feet	343,425	7,234	7,642	8,006	8,959	336,191	335,783	335,419	334,466
Total Space in Acres	7.9	0.2	0.2	0.2	0.2	7.7	7.7	7.7	7.7
Total Truck Docks/Doors	0.0	0.3	0.4	0.4	0.6	(0.3)	(0.4)	(0.4)	(0.6)

Source: *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development,* Airport Staff Interviews, Aulick Engineering, Jviation, February 2022

As shown in **Table 7-7**, when using the integrated express throughput ratios, the air cargo facility planning model estimates that CSG's baseline of 430 metric tons in 2019 could support a cargo building of 470 square feet. With the preferred forecast for the airport's cargo tonnage projected to increase to 770 metric tons by 2035, a building with an area of 850 square feet could be needed to accommodate this volume of throughput air cargo tonnage. Baron Aviation leases a 100-square foot office, and this space is considered deficient by throughput ratios. However, the existing building space is adequate given the nature of the carriers' operations at CSG. Baron Aviation, a contract feeder for FedEx, transfers cargo directly between their aircraft and vans. Their existing operations are accommodated outdoors on the existing general aviation apron, without the need for a dedicated air cargo building.

For apron area, the model estimates that approximately 5,900 square feet is required for baseline levels of tonnage throughput, and that 6,600 square feet will be required by 2035 to accommodate the forecast tonnage throughput. The airport has a significant amount of existing apron space; one space on the existing 265,000 square foot general aviation apron is leased to serve the air cargo plane flown by Baron Aviation. Existing apron space is sufficient to accommodate existing and future air cargo tonnage.

While the model shows a potential shortfall of truck docks and truck doors, these estimates are not applicable to Baron Aviation's method of operation at CSG. Since vans pull onto the ramp to load and unload air cargo directly from the plane, this method of operation does not require or support the need for dedicated truck doors or docks.

Unless FedEx Express introduces larger aircraft at the airport or significantly increases the frequency of their operations (requiring the airport to accommodate multiple air cargo aircraft at one time), air cargo facilities at this airport appear to be sufficient without any expansion or upgrades.

As part of the statewide study, interviews were conducted with representatives at each airport with existing scheduled air cargo service. Study related interviews found that the airport and the City of Columbus are interested in developing the airport for air cargo activity. Input from the airport indicates that they are considering development projects which include a runway extension, an expanded aircraft ramp, and new hangars for general aviation aircraft. Longer term, depending on demand, the airport is considering expansion that could support air cargo demand; funding to expand the airport could come either through Transportation Special Purpose Local Option Sales Tax (TSPLOST) or a public-private partnership (3P). The airport's ALP identifies facilities which could be developed to suit air cargo needs if there is justification for such development. There are areas near the airport that could be developed or re-developed to suit warehousing activities. The airport has good proximity to an existing interstate, and the airport and the city are both open to expanding activity at the airport. However, at this time, additional justification is required to recommend additional federal and state funding for these air cargo related projects.

7.5.1.2 East Georgia Regional Airport (SBO)

East Georgia Regional Airport (SBO) currently accommodates one air cargo carrier, Air Cargo Carriers, LLC.—a regional cargo carrier that serves as a feeder for UPS. Air Cargo Carriers operates a Short SD3-60 (Shorts 360) aircraft transporting primarily air cargo parcels related to e-commerce. The carrier operates a regular route between Swainsboro, Georgia, and the Columbia Metropolitan Airport (CAE) in Columbia, South Carolina. The Short 360 stays parked at Swainsboro throughout the day before

returning to Columbia in the evening. The time of the flight fluctuates, but typically occurs Monday through Thursday between 7:00 and 7:30 p.m. The return flight typically occurs at roughly 8:00 a.m.

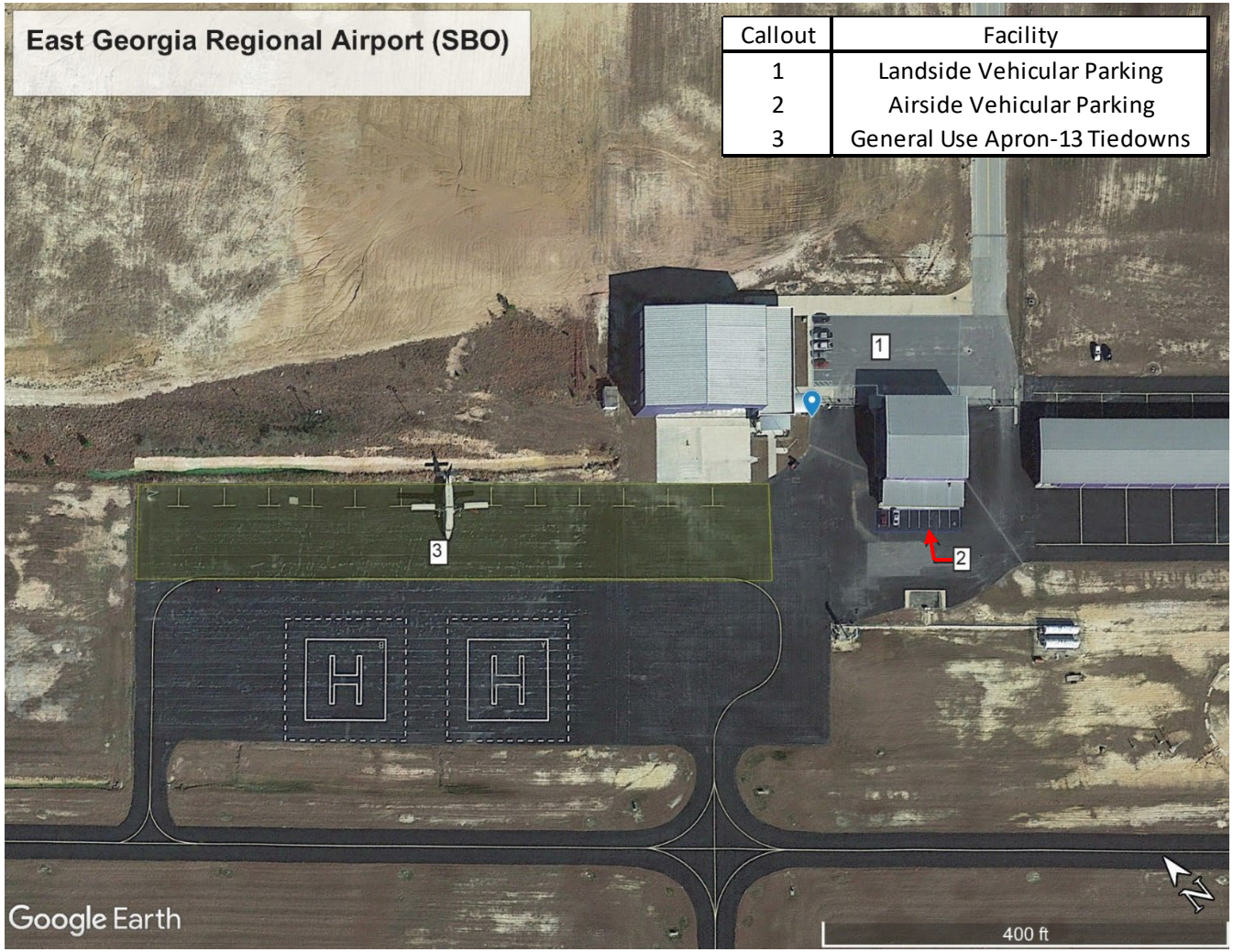
The split between inbound and outbound tonnage fluctuates seasonally, but, on an estimated annual basis, approximately 58 percent of total tonnage is outbound. When the flight lands, delivery vehicles park directly next to the aircraft on the apron area for unloading and loading. The operator uses the aircraft ramp to offload directly from their plane into waiting trucks. The direct transfer of cargo from the aircraft to ground distribution vehicles means no air cargo building is needed at the airport. The size and number of vehicles picking up air cargo vary, but there are often semi-trucks, cargo vans, and smaller vehicles receiving cargo each day. Once unloaded, this cargo is dispersed throughout the region.

All air cargo operations at SBO are currently conducted on the airport's 59,819-square-foot asphaltic/concrete apron. This is a multi-purpose apron area; it is not used exclusively to support air cargo operations.

As a result of how cargo is currently loaded and unloaded, the airport's air cargo activity is supported without a dedicated air cargo building. In a parking lot adjacent to the airport's FBO terminal building, there are 14 landside vehicular parking spaces. These spaces sometimes are used to accommodate vehicles waiting to unload air cargo. The belt loader ground support equipment is provided by the FBO, Air Star Flight Support (the FBO), consists of a belt loader. There is no reported roadway congestion near the airport, and there are no known facility or infrastructure constraints when it comes to accommodating existing air cargo demand.

By applying the air cargo facility planning ratios for integrated express carriers, implied in the ACRP model to the forecast of tonnage throughput and aircraft type, air cargo facility requirements are estimated. The space requirements, according to the model, for apron area, cargo building area, truck/auto parking area, and truck docks/doors to meet the potential air cargo throughput at SBO are presented by forecast year in **Table 7-8**. An aerial image of SBO's existing air cargo facilities is presented on **Figure 7-5**.

Figure 7-5: Aerial Overview of Air Cargo Facilities – SBO



Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Table 7-8: Air Cargo Facilities ACRP Model – SBO

Year		2019	2025	2030	2035	2019	2025	2030	2035
Annual Tons (Metric Tons)		690	810	930	1,230	690	810	930	1,230
Annual Tons (Short Tons)		760	890	1,030	1,360	760	890	1,030	1,360
FACILITY COMPONENT	Existing Space Used For Cargo	Base Year Required Space To Meet Demand	5-Year Forecast Required Space	10-Year Forecast Required Space	20-Year Forecast Required Space	Base Year Difference	5-Year Surplus Or Deficient Space	10-Year Surplus Or Deficient Space	20-Year Surplus Or Deficient Space
Carrier Type: Integrated Express (UPS/Air Cargo Carriers)									
Cargo Building Space in Square Feet	0	760	890	1,030	1,360	(760)	(890)	(1,030)	(1,360)
Total Apron in Square Feet	59,819	11,422	11,649	11,892	12,466	48,397	48,170	47,927	47,353
Truck and Auto Parking in Square Feet	11,161	1,368	1,602	1,854	2,448	9,793	9,559	9,307	8,713
Total Space in Square Feet	70,980	13,550	14,141	14,776	16,274	57,430	56,839	56,204	54,706
Total Space in Acres	1.6	0.3	0.3	0.3	0.4	1.3	1.3	1.3	1.3
Total Truck Docks/Doors	0.0	0.5	0.6	0.7	0.9	(0.5)	(0.6)	(0.7)	(0.9)

Source: *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development,* Airport Staff Interviews, Aulick Engineering, Jviation, February 2022

As shown in **Table 7-8**, when using the integrated express throughput ratios in the ACRP model, the air model estimates that SBO's baseline of 690 metric tons could require a 760 square foot cargo building. With the preferred forecast, the airport's cargo tonnage is projected to increase to 1,230 metric tons by 2035. With that volume of air cargo tonnage, a building covering 1,360 square feet could be needed to accommodate this level of demand. However, the current process for handling both inbound and outbound air cargo at this airport (direct aircraft to vehicle transfer) negates the need for a dedicated air cargo building.

For the apron area, the model estimates that approximately 11,400 square feet is needed for baseline (2019) levels of tonnage throughput, and 12,300 square feet of apron area will be required by 2035 to accommodate forecast tonnage throughput. The airport currently has an adequate amount of apron space, with nearly 60,000 square feet of general aviation apron space. While the model also estimates potential truck docks, truck and auto parking space requirements, these estimates are not applicable to Air Cargo Carriers' method of operation at SBO.

Current air cargo operations are accommodated outdoors on the existing apron without the need for a dedicated air cargo building or truck docks. Interviews with airport and air cargo carrier staff indicate there are no constraints related to existing air cargo facilities at SBO. Unless the frequency of flights, the size of air cargo aircraft serving this airport, or both change, existing facilities appear to be adequate. While the apron at SBO is sufficient in size for current air cargo operations, its condition indicates repair is needed. SBO has included an apron rehabilitation (mill and overlay) project on its Capital Improvement Program (CIP).

7.5.1.3 Savannah/Hilton Head International Airport (SAV)

Savannah/Hilton Head International Airport (SAV) has fifteen known air cargo operators: integrated express operators (FedEx, UPS, DHL), dedicated regional feeders, specialty carriers (Suburban Air Freight, Martinaire, Air Cargo Carriers, LabCorp, Quest Medical), passenger airline belly-hold (American Airlines, Delta Air Lines, Southwest Airlines, United Airlines), ad hoc all-cargo charters (Kolob Air Cargo, Mountain Air Cargo), and freight forwarders (Atlantic Freight, DJ Powers, and J&P Hall Express). Furthermore, business jet manufacturer Gulfstream Aerospace (based at the airport), regularly ship parts to its customers and to receive parts from its suppliers.

The primary generators of air cargo in the Savannah area include aviation manufacturing, medical businesses, electronics, and e-commerce. The airport serves as an origin and destination (O&D)/Local Market Station for FedEx Express. On the airport, there are currently two air cargo areas: Building 1224 and Building 560. Existing air cargo facilities are noted in association with each of the airport's existing air cargo operators. Aerial images providing overviews of each of SAV's relevant air cargo-related areas are presented in **Figure 7-6**, **Figure 7-7**, and **Figure 7-8**.

Figure 7-6: Aerial Overview of Air Cargo Facilities – SAV (All Areas)



Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Figure 7-7: Aerial Overview of Air Cargo Facilities – SAV (Southeast Quadrant)



Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Figure 7-8: Aerial Overview of Air Cargo Facilities – SAV (Northwest Quadrant)



Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

FedEx Express (SAV)

The FedEx Express O&D/Local Market Station is the largest air cargo operation at Savannah; the Local Market Station serves as a distribution center for both air and ground freight. The station handles primarily overnight e-commerce packages and medical supplies. Cargo is flown to SAV directly from the FedEx Express hub in Memphis each morning and the flight returns each evening. The FedEx Express station serves the greater Savannah area, along coastal Georgia from Estill to Beaufort in South Carolina.

FedEx maintains two separate facilities (one airside and one landside) at the airport, and both are located in the southeastern quadrant of the airport. FedEx Express uses 10,000 square feet of their multi-tenant airside facility and uses the entire 39,000-square-foot landside facility as a sorting and distribution center for both air and ground cargo. Adjacent to their airside facility, FedEx Express has approximately 100,000 square feet of reserved apron space. This ramp provides enough space for one Boeing 757-200 (B757) to park and offload air cargo. In extenuating circumstances, a second B757 can be parked temporarily on the same apron. There is a single aircraft hardstand[2] on the apron. FedEx's airside building is primarily used for maintenance and storage of air cargo ground support equipment (GSE) which includes tugs, belly loaders, deicers, and scales. The FedEx Express airside facility has a multi-tenant parking lot with 164 shared landside vehicular parking spaces. FedEx Express has two truck doors in the multi-tenant building.

FedEx's landside distribution center is located across the street from the FedEx Express airside facility. Cargo is transported to this facility with a tug and "train" of cargo bins. The cargo bins themselves are offloaded directly from the FedEx Express aircraft, rather than offloading individual parcels.

FedEx Express peak hours for sorting are in the morning are between 6:30 a.m. and 8:30 a.m. and in the evening between 9:00 p.m. and 10:00 p.m. The station can sort 3,400 parcels each hour. Tuesday through Saturday, a B757 lands at the airport in the morning, bringing in express freight from the FedEx hub in Memphis. The plane is unloaded, and a tug brings cargo bins across the street to the distribution center. At the distribution center, bins are placed on a conveyer belt using a scissor lift with 360 caster decking. The contents of the bins are sorted, and 70 vehicles (ranging from walk-through box vans and Mercedes Sprinter vans to smaller vehicles) pick up the parcels. A single truck dry dock is located next to the air-cargo entrance. At this location, semi-trucks can offload their contents onto the same air cargo conveyer belt. The dedicated cargo sorting building has seven truck doors and eight truck parking stalls, in addition to approximately 140 vehicular parking spaces.

Throughout the day, drivers bring in express freight that is loaded onto the FedEx Express B757 destined for Memphis. Daily parcel counts are variable, but typically fluctuate between 8,000 to 11,000 parcels per day. The contents of the FedEx packages are primarily e-commerce, but approximately ten percent of all parcels are medical supplies. FedEx's Savannah station has individual teams that handle medical shipments to ensure their timely delivery.

Interviews with local FedEx Express personnel indicate that the existing 10,000 square-foot airside and 39,000 square-foot landside facilities are at their maximum capacity and are operating beyond their

[2] A hardstand is a strengthened paved area that is intended for the parking of aircraft over an indefinite period of time.

initial design for the number of daily parcels processed. The airport's FedEx Express facility is categorized as a "3K" facility—in reference to the number of parcels that can be sorted per hour. The existing facility often handles upward of 3,400 to 3,800 packages per hour during peak operating conditions. For perspective, more recently built on-airport integrated express facilities designed for processing capacity of 4,000 parcels per hour are typically between 50,000 and 60,000 square feet in size.

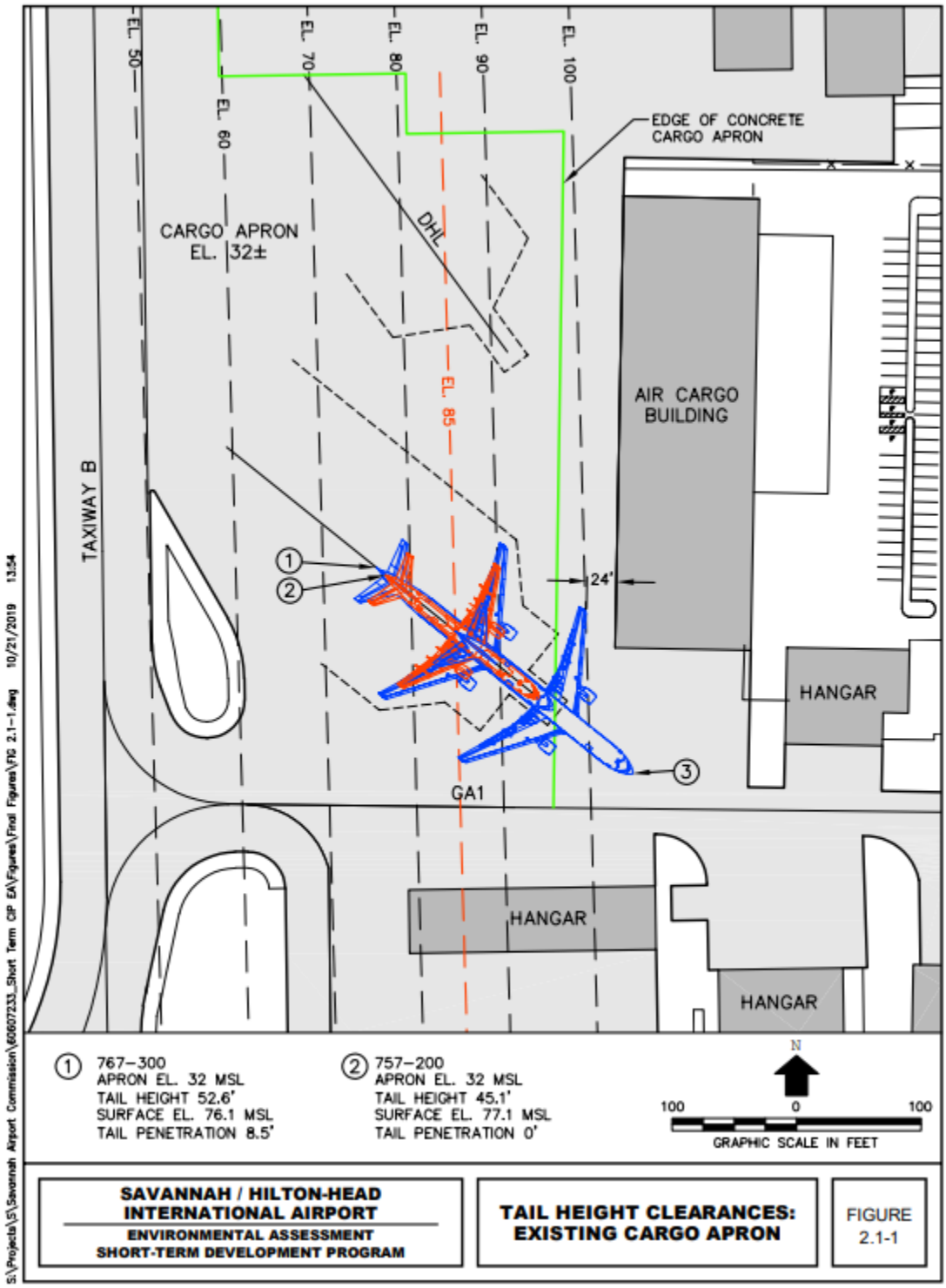
These processing rates are sustained for two to three hours after the inbound B757 lands in the morning. FedEx Express ground personnel report the apron does not have room for a second B757 to park comfortably, in the event of an aircraft being grounded. A replacement/second aircraft has very little room to maneuver on the existing apron. Ground personnel indicate an increase in the number of parcels that their facility processes would most likely be accommodated by upgrading to a Boeing 767-300 (B767), rather than using two B757s. In a cargo configuration, the B767 has a total cargo volume of 15,469 cubic feet with the ability to hold up to twenty-four 88-inch by 125-inch contoured pallets on the main deck and in the lower hold, seven 96-inch by 125-inch pallets, two LD-2 containers, and bulk loading.[3] In comparison, a B757 has a total cargo volume of 8,430 cubic feet and can hold fifteen 88-inch by 125-inch pallets on the main deck plus bulk loading in the lower decks.[4] A larger FedEx Express air cargo jet, operating at SAV, would surpass the processing capabilities of the existing FedEx Express airside and landside facilities.

One additional limitation of the existing multi-tenant air cargo facility relates to tail height. **Figure 7-9** shows the existing air cargo building and apron in the southeast quadrant of the airfield. The aircraft apron parking position which supports a Boeing 757-200 requires it to be parked diagonally from the face of the terminal. This parking position places the aircraft's tail just beneath the Federal Aviation Regulation (FAR) Part 77 transitional surfaces from Runway 1-19. This parking position cannot accommodate existing tenants' growing fleet of Boeing 767-300 which they would prefer to use to accommodate seasonal demand. The Boeing 767-300 will become the operator's most common air carrier aircraft in the near future.[5]

As shown in **Figure 7-9**, indicates that the tail of a Boeing 767-300 parked in this position would result in an 8.5-foot penetration of the 7:1 transitional surface. The aircraft's tail would need to be approximately 60 feet further away from the centerline of Runway 1-19 in order to clear the transitional surface. This would place the aircraft beyond the east edge of the full-strength cargo apron limit shown in the red dashed line (see position 3). It would also place the aircraft too close to the air cargo terminal to safely permit the movement of GSE.[6]

[3] Boeing 767-300F Backgrounder (https://www.boeing.com/farnborough2014/pdf/BCA/bck-767_5_13_2014.pdf)
[4] UPS Aircraft Descriptions (https://www.aircargo.ups.com/en-US/aircraft)
[5] FedEx Corporation Q2 Fiscal 2019 Statistics, December 2018
[6] SAV Short-Term Development Program – Draft Environmental Assessment, November 2019

Figure 7-9: Tail Height Clearances – SAV Existing Air Cargo Apron



Source: SAV Short-Term Development Program – Draft Environmental Assessment, November 2019

SAV is an important cog in the FedEx Express air cargo distribution network. With expanded cargo facilities, the airport has the potential to serve an even larger role in the future. Military, aerospace, and high-tech electronics components are major industries in the Savannah area, and these businesses currently rely on air cargo and are growing.

Because the existing airside multi-tenant cargo apron is not adequate to serve current air cargo demand, expansion of the airport's cargo facilities is currently underway. New facilities will provide increased operational efficiency and provide flexibility for FedEx Express to upgrade its aircraft gauge or increase the number of aircraft operating at SAV as needed. New facilities that are currently being developed will also provide the flexibility to accommodate future air cargo growth. SAV's future air cargo facility development is discussed in greater detail later in this section.

UPS/Air Cargo Carriers (SAV)

Air Cargo Carriers, LLC., is a regional air cargo carrier operating as a UPS feeder from the Savannah/ Hilton Head International Airport (SAV) to the UPS gateway at Columbia Metropolitan Airport (CAE). Air Cargo Carriers operates a Short SD3-60 (Shorts 360), bringing inbound cargo to Savannah in the morning and delivering express packages to Columbia in the evening.

Air Cargo Carriers LLC rents a single tiedown from the airport's FBO, Signature Flight Support. The tiedown is located immediately north of the airport's existing multi-tenant cargo facility and is accessed by a gate on LP Owens Drive. This air cargo operator uses 5,600 square feet of Signature's 41,000 square foot ramp. The UPS flight from Columbia to Savannah occurs at approximately 8:00 a.m. The aircraft stays parked at Signature throughout the day before returning to Columbia in the evening at approximately 7:00 p.m. When the flight lands in Savannah, various delivery vehicles park directly next to the aircraft. A belt loader enables the plane to offload directly into the trucks. The size and quantity of ground vehicles vary, but there are often semi-trucks, cargo vans, and smaller vehicles receiving cargo before making deliveries throughout the region. The peak operating hour for UPS is 7:00 p.m. Monday through Friday.

There is no on-site UPS building for cargo to pass through or to be stored; however, Air Cargo Carriers has a 320-square-foot office where the line and maintenance crews rest while mechanics work. This space has storage racks which are used for parts storage, not the storage of cargo. UPS cargo is sorted and stored at a UPS ground facility located off-site, not on the airport.

Air Cargo Carriers, the UPS feeder, indicates there were no constraints to their current air cargo operations at SAV. Unless UPS operations change in the future, current building/apron space is adequate for both current and future demand. If UPS increases their number of aircraft at SAV, or if they would fly larger air cargo aircraft to the airport, expanded air cargo facilities could be needed in the future.

DHL Express/Suburban Air Freight (SAV)

DHL uses a third-party cargo carrier, Suburban Air Freight, to serve the coastal regions of Georgia and South Carolina. The Savannah station serves Metter, Portal, Reidsville, Claxton, Jesup, Odum, and Darien in Georgia and Ridgeland, Garnett, and Sylvania in South Carolina. Suburban Air operates a Cessna Caravan, bringing inbound cargo to Savannah from Atlanta in the morning and delivering express

packages to Hartsfield-Jackson International Airport (ATL) in the evening for ultimate customer delivery by DHL. Occasionally, DHL parcels are transferred to the United States Postal Service for final delivery. Almost all DHL parcels processed via the airport are related to e-commerce.

Suburban Air Freight uses a single hardstand adjacent to the existing cargo facility for parking and offloading its Cessna Caravan. DHL operates five days a week, Monday through Friday. Exact flight times vary, but Suburban Air typically leaves Atlanta at approximately 7:00 a.m. and arrives in Savannah an hour later.

DHL leases approximately 15,000 square feet of warehouse space in the existing multi-tenant cargo facility that is located in the southwestern quadrant of the airport. DHL has six truck loading docks and one truck door. The airport's multi-tenant air cargo facility has a parking lot with 164 shared landside vehicular parking spaces. When the Cessna Caravan arrives, personnel offload the Caravan onto small carts which are pushed into the warehouse facility before being sorted and loaded onto delivery vans. DHL owns a belt loader, but the belt loader is superfluous to their current hand cart operation. The warehouse contains storage racks which are used strictly to hold frustrated shipments until shipment locations can be resolved.

Daily inbound DHL tonnage fluctuates, but tonnage is estimated at approximately 1.4 tons per flight. This volume is sorted in fifteen minutes. Throughout the day, drivers bring parcels back to the DHL facility, these are loaded onto the Cessna Caravan. Outbound tonnage is typically 0.2 tons per flight.

According to the study's inventory, DHL personnel indicate the multi-tenant cargo apron needs resurfacing. Additionally, according to DHL input, the multi-tenant air cargo building is configured in a way that makes it difficult to maneuver trucks. The existing air cargo facility is also not handicap accessible and does not have a wheelchair ramp entrance. This prevents handicapped persons from entering the facility and dropping off packages.

DHL reports significant roadway congestion related to the CSX railroad crossing on the east side of the airport. Trains frequently stop on the track blocking the intersection and causing delays. There is no alternative route to avoid the tracks, and the trains can sometimes block access for more than one hour. The roadway network near the DHL station includes three rail crossings in the direction of the Port and one rail crossing in the opposite direction. There is no secondary access in case of an adverse traffic event – current access is one-way in and one-way out. The DHL station manager reports there have been two known fatalities on Bourne Road in the last two years; both were motorcyclists who hit a tractor-trailer. DHL also experiences significant delay and roadway congestion related to Gulfstream's 5 p.m. evening shift change.

Delta Air Lines/United Contracting Services (SAV)

Delta Air Lines frequently carries belly-hold cargo on their regularly scheduled passenger flights. Delta utilizes Unify Contracting Services to support their air cargo landside operations. Although Delta leases space in the Global Aviation Services building to support their air cargo operations, they also use this space as a maintenance and storage facility for Delta's miscellaneous needs. Delta flies non-stop from Savannah to Atlanta, Detroit, New York, Boston, and Minneapolis, though Atlanta and New York are the most common destination for the air cargo that Delta carries.

Air cargo that Delta carries most often includes biomedical supplies, live animals, human remains, aircraft parts (both Delta and Gulfstream), and parts needed by shipping concerns operating at the Port of Savannah.

Delta leases approximately 5,000 square feet in the Global Aviation Services Building. This building has one loading dock, three truck doors, and a landside parking lot with 30 vehicular spaces. This space has historically doubled as a ground support equipment maintenance facility for Delta's commercial passenger aircraft, but Delta is in the process of moving these maintenance related operations elsewhere. Unify Contracting Services (providing air cargo support services for Delta) staffs the building with ground service personnel; they have attendants on-site throughout the day to accept packages from customers. The air cargo facility Delta uses is approaching its storage capacity limit for packages. Packages are transported from this facility and loaded onto Delta aircraft along with passenger luggage. When Delta's maintenance function is relocated, additional space to support Delta's air cargo functions will become available.

Gulfstream Aerospace (SAV)

Gulfstream's global headquarters is in Savannah, and the company utilizes the airport to ship and receive time-sensitive aircraft parts. Almost all Gulfstream related freight is either trucked in or flown in by the integrated express carriers. Gulfstream does use its own aircraft to transport some cargo (aircraft parts) directly to clients throughout North America; this activity is equal to nearly two tons of total inbound and outbound cargo annually. The Gulfstream customer service center, located at the airport, serves a geographic area ranging from New York to Mexico and to the Caribbean. Flights transport parts as far west as a Gulfstream aircraft can fly without refueling.

Gulfstream maintains a network of on- and off-site manufacturing facilities and storage warehouses for aircraft parts in the Savannah area. Parts are shuttled up to five miles to reach the maintenance and repair service facility ramp at the airport. From there, parts are flown directly to clients on Gulfstream aircraft if the need is truly urgent. Otherwise, parts are shipped via other means such as an integrated express carrier or as belly-hold cargo on a passenger airline. For international time-sensitive needs, a Gulfstream aircraft will shuttle the part to a departure airport for its final destination via a commercial passenger flight.

Each month, Gulfstream transports by air airplane parts necessary for manufacturing of new aircraft and repair/maintenance of disabled aircraft. On an annual basis, over two tons (or 48,000 pounds) of parts flow in and out of SAV by Gulfstream.

Gulfstream's current facilities are near capacity; exact expansion plans are not known. According to Gulfstream, the greatest impediment to their expansion is not facility size but the congested roadway network. Because Gulfstream has a large network of facilities on or near the airport, they frequently use passenger vehicles to travel between facilities. As the area around the airport has become increasingly developed, it has increased the time it takes to move between facilities. As noted, the CSX railroad crossings east of the airport often cause significant delay.

Future Air Cargo Facility Plans and Other Improvement Considerations (SAV)

To address current and anticipated needs for air cargo facilities that provide enhanced functionality, SAV is currently undergoing a major redevelopment of its air cargo facilities. In the northwest quadrant of the airport, 40 acres are reserved for a new multi-tenant air cargo development that will include 220,000 square feet of combined building space and approximately176,000 square feet of new air cargo aircraft parking area as part of a 262,000-square-foot concrete apron, inclusive of taxiway object free area (TOFA) and taxiway safety area (TSA). This new development reserves space for future expansion that includes options for an additional 315,000 square feet of apron area and additional airside and landside buildings.

A transportation study for the airport is currently underway to provide space planning for vehicles, parking, tethering, and lighting for the new multi-tenant cargo facility. This facility will likely house FedEx Express, DHL, UPS, Gulfstream, a customs facility, and another confidential entity. FedEx Express will likely occupy the single 160,000-square-foot building, and the second 60,000-square-foot building will be divided between the other tenants in 15,000-square-foot increments. This new facility will replace both the existing multi-tenant cargo facility and the current FedEx Express landside distribution facility, which combine for about 73,000 total square feet. The new facility will provide the capability for cold storage to support handling/transfer of temperature-controlled cargo shipments which include various types of medications.

Once built, the future air cargo development area will be accessed via a series of long, one-way taxiways: existing Taxiways A and H. Approximately 7,000 linear feet of one-way taxiway exist between the intersection of Taxiway A and A1 (near the commercial passenger terminal apron and the last bypass opportunity) and the end of Taxiway H at the Gulfstream facility. At typical aircraft taxi speeds of 18 to 22 miles per hour, taxi time over this distance would take approximately three to four minutes one-way. This stretch of one-way taxiway will serve both the new cargo area and the existing Gulfstream facility. The number of aircraft operating on this taxiway has the potential to cause delay for air cargo operators. Finding a solution to expand the taxiway to accommodate two-way traffic, as opposed to one-way traffic, is needed to support the airport's long-term air cargo expansion plan and projected levels of demand. To address this concern, current development plans for SAV include an extension of Taxiway G northward over Gulfstream Road to Taxiway H. This extension will ensure access is available to the proposed air cargo facilities in the event of an emergency or maintenance on Taxiway A by providing two-way taxiing capability.

Figure 7-10 presents a drawing of SAV's future air cargo development layout, while **Figure 7-11** identifies the future extension plan for existing stub Taxiway G.

The total cost for design and construction for the two future cargo buildings is estimated at approximately $50 million. The estimated cost for construction of the Taxiway G extension and bridge over Gulfstream Road is estimated at $13 million. As of October 2021, ground was broken for the 262,000 square foot concrete apron with an estimated $8 million construction cost. The apron is slated for completion in the summer of 2022. The existing cargo area is earmarked for full aeronautical redevelopment, including new hangars.

Existing air cargo facilities limit the number and size of air cargo aircraft that the airport can accommodate. The location of the Savannah/Hilton-Head International Airport near rail lines, the Port of Savannah, and interstate highways make the airport ideal for supporting air cargo. The airport has been actively seeking expanded air cargo service. As a result of existing constraints, historic growth, and anticipated increases in air cargo volumes, the airport has embarked on plans to provide new and expanded air cargo facilities. Planned improvements will be more than ample to accommodate projected demand while providing the airport with the opportunity to expand its air cargo service.

Other Considerations for Improvement

While each air cargo operator has its own unique operating constraints, nearly all air cargo providers indicate that both automobile and railway traffic are a significant impediment to the efficiency of their daily operations. CSX Transportation has four rail lines that cross Gulfstream Road, immediately east of the airport. These rail lines function as an artery for the Port of Savannah, as rail cars often remain immobile on the tracks for an indefinite period of time. Because these rail lines completely bound the eastern side of the airport, there is no alternate route to enter the airport from the east when trains dwell on the tracks. This causes adverse ground access impacts to air cargo operators using the airport.

Interviews completed during the study's inventory indicate trains regularly block Gulfstream Road for over thirty minutes (sometimes as long as 90-minutes), delaying both inbound and outbound vehicles that support air cargo operations. Integrated express operators indicate that their pilots wait for trains to pass resulting in delayed departures for the air cargo operators. Considering the nature of express air cargo service, the CSX lines and their impact on efficient operations are a major concern for air cargo carriers operating at SAV. Inventory interviews indicate that even providing scheduled or advanced warning as to when Gulfstream Road will be blocked would be a significant improvement for air cargo operators at SAV.

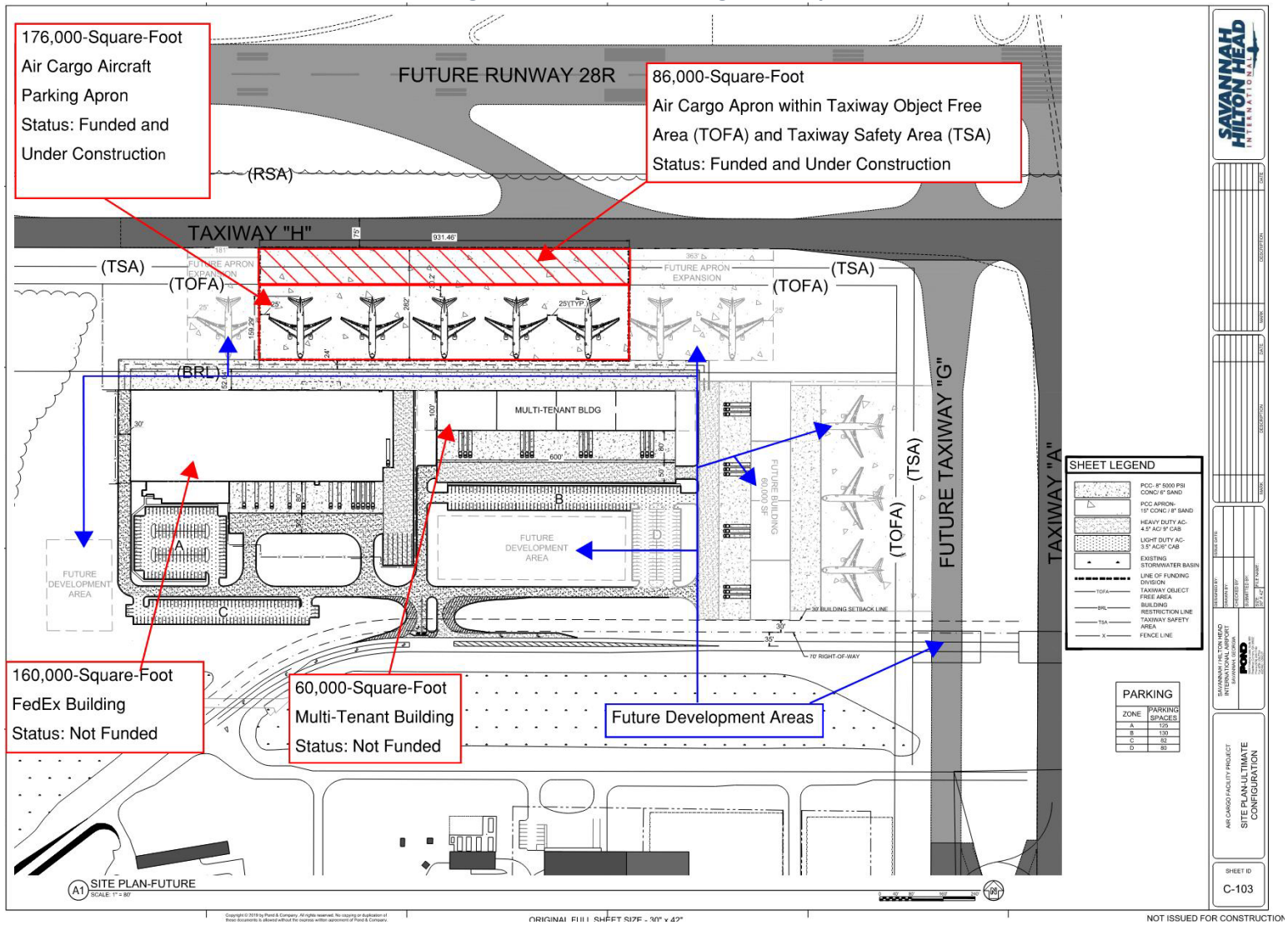
Although the CSX rail lines to the east of the airport can prevent air cargo ground related traffic from entering the airport, traffic congestion west of the airport at I-95 and Pooler Parkway interchange is a more significant concern to efficient air cargo operations. This is according to information provided by air cargo operators and airport management during the study's inventory process. As Pooler Parkway has experienced more commercial development, the interchange at I-95 at Exit 104 has become a significant ground access bottleneck for air cargo operators. A follow-on study is needed to assess the amount of delay and to determine alternatives to address the reported congestion.

These two off-airport access and congestion-related issues are identified in **Figure 7-6**.

Facility Improvements Identified by ACRP Model (SAV)

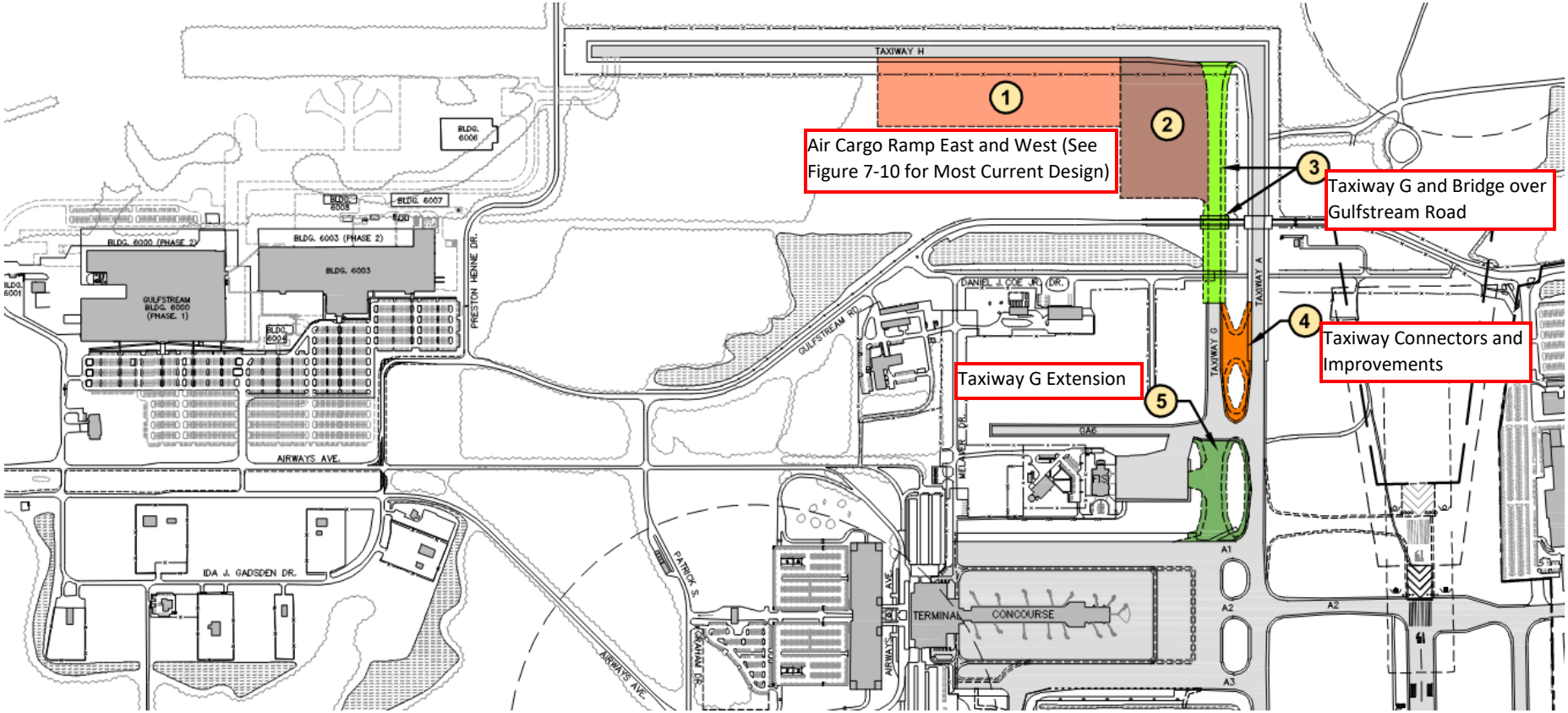
Since SAV's future air cargo development plans have already been formulated, the ACRP model was not necessary.

Figure 7-10: Future Air Cargo Development Plan – SAV



Source: Savannah/Hilton Head International Airport, Jviation, February 2022

Figure 7-11: Future Taxiway G Extension Plan



Source: SAV Short-Term Development Program – Draft Environmental Assessment, November 2019, Jviation, February 2022

7.5.1.4 Southwest Georgia Regional Airport (ABY)

Southwest Georgia Regional Airport (ABY) is home to a regional air cargo facility for UPS. This facility serves a relatively large area of southwestern Georgia, southeastern Alabama, and parts of northern Florida. UPS mainline jets and a UPS contracted feeder carrier, Martinaire Aviation, serve air cargo demand for the area. Air cargo accommodated at ABY is primarily related to medical, legal, and e-commerce shipments. There is a single dedicated air cargo building on airport property, a UPS processing facility, and a dedicated air cargo apron.

UPS (ABY)

UPS is the only integrated express carrier at the airport; they operate from a standalone cargo facility with a dedicated cargo apron. As part of this study, UPS provided considerable input on their needs and plan for future growth at ABY. UPS facilities are located in the northeast portion of the airport's terminal area. ABY serves as the focal point in the UPS network in the southeastern U.S. According to flight records and input directly from UPS, each weekday morning two B757s and one Airbus A300 (A300) depart from ABY flying to larger UPS hub airports before continuing to other markets. The B757 that originates in Louisville (SDF) continues to Orlando (MCO) from ABY before returning to SDF, while the other B757 that originates in Philadelphia (PHL) continues to SDF. The wide-body A300 that originates in SDF continues to Pensacola (PNS) before returning to ABY in the evening and ultimately back to SDF for the night sort. SDF is the primary air cargo hub for UPS and is commonly referred to as "Worldport." PHL is second busiest UPS air cargo hub in terms of daily flights; it serves as a regional air cargo hub for the East Coast.

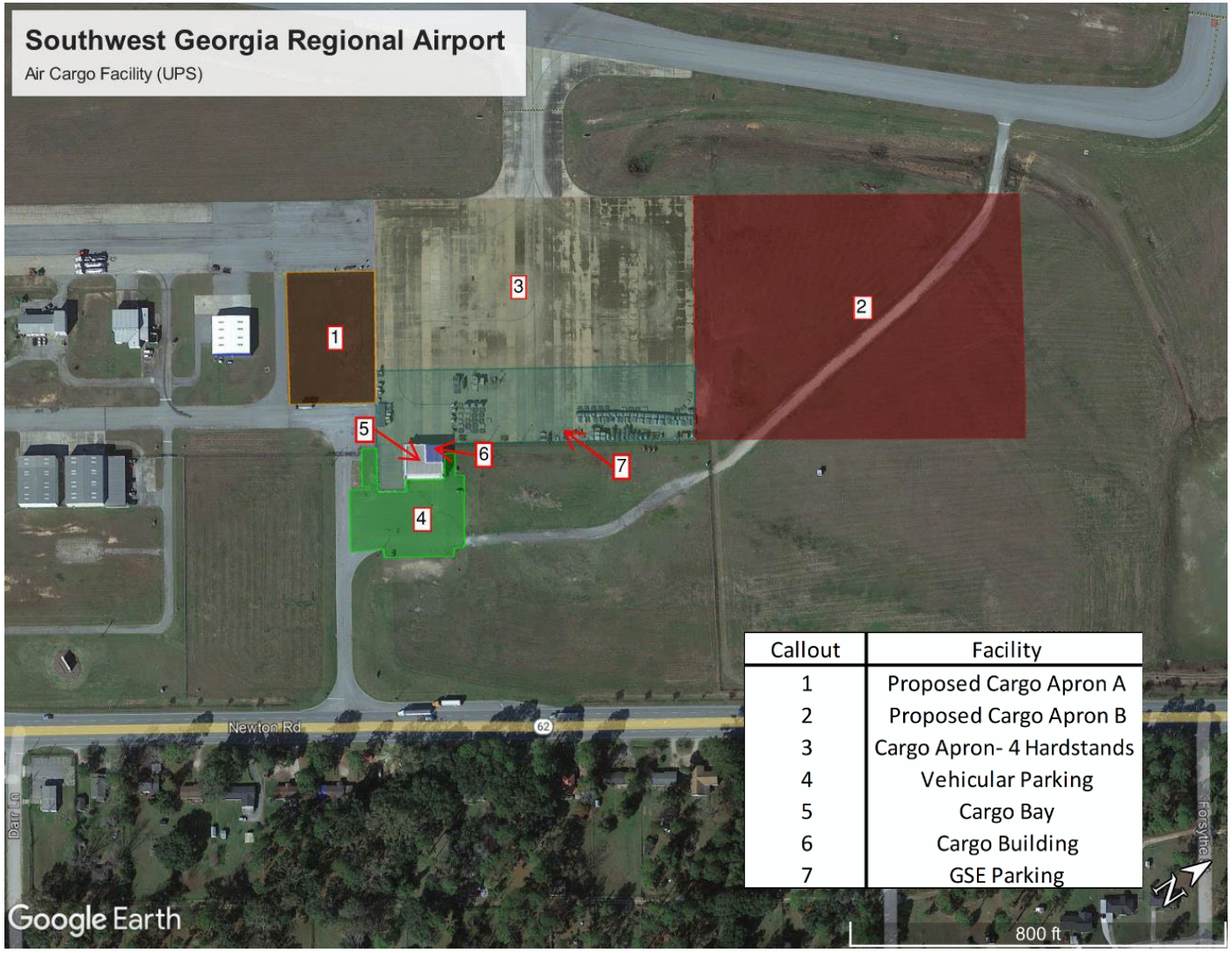
The airport's existing concrete cargo apron covers approximately 360,000 square feet. The apron, as designed, consists of four hardstands but accommodating four UPS aircraft at one time is not realistic on the existing apron. UPS anticipates that its future growth in activity at the airport will result in four large cargo jets to be on the apron at one time. The cargo building is 5,265 square feet, and it serves not only as a distribution and sorting facility but also as a logistics, maintenance, and IT center for UPS ground operations.

UPS operates both day and night shifts at their ABY facility. The night shift begins at 10:00 p.m. to coincide with the departure of an aircraft that leaves at approximately 11:30 p.m. and a later 3:37 a.m. flight, bound for the UPS hub in Louisville (SDF). The morning shift begins at 5:00 a.m. to coincide with an aircraft arriving from Louisville at 5:58 a.m. and a later flight that arrives at 6:28 a.m. The air cargo building has a single conveyer that services six box-truck bays and a single semi-truck bay. There are approximately 50 landside parking spaces adjacent to the cargo building for passenger vehicles. There is a single airside door that enables deplaned cargo to enter the building. There are typically nine trucks that support air cargo movements for the night shift and 13 trucks that service the morning shift. Based on existing facilities and available space, the trucks must coordinate their positions and wait for vehicles to move in order to be able to load and unload their parcels.

An aerial image overview of ABY's air cargo facilities is presented in **Figure 7-12**. Callouts 1 and 2 represent the proposed air cargo apron expansions identified in the airport's 2012 master plan.

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Figure 7-12: Aerial Overview of Air Cargo Facilities – ABY



Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

According to UPS, the existing cargo apron at ABY is inadequate to meet current UPS needs. Although the cargo apron covers a total of 360,000 square feet and was designed for four aircraft parking positions/hardstands, at most, only two UPS mainline jets can occupy the apron simultaneously and have ample space to maneuver. This is because a portion of the apron is occupied for GSE staging. UPS aircraft also conduct self-powered taxiing to and from parking positions, which requires more apron area for maneuvering than with tug-assisted pushback. As shown in **Figure 7-13**, the effective aircraft parking area, excluding GSE staging and aircraft maneuvering/taxi-lanes, is closer to 155,000 square feet.

UPS plans to buy an aircraft tug; this will enable linemen to move the planes rather than requiring the pilots to maneuver aircraft on the apron. This acquisition will facilitate tighter stacking of the aircraft. However, this reconfiguration is only possible if GSE staging is relocated. Based on input from UPS, they anticipate using larger and perhaps additional aircraft to support their operations at ABY. Even if maneuverability is addressed in the short term through the acquisition of a tug, expansion of the ramp area is needed to meet the anticipated needs of larger UPS air cargo aircraft such as the McDonnell-Douglas MD-11 (MD11) and the Boeing 767-300 (B767). It is worth noting that without relocating GSE staging, acquiring large tug equipment would only exacerbate apron congestion.

If the apron space is increased and aircraft tugs are used to facilitate more efficient use of apron space, the existing apron is sufficient to accommodate, at one time, three wide-body aircraft like the A300, which currently operates at ABY, or larger UPS aircraft such as the MD11 or B767. Accommodating additional large jet aircraft on an expanded apron area could necessitate the development of an additional access taxiway, but this facility need is longer term. **Figure 7-14** identifies the optimal layout for the existing cargo apron to accommodate three wide-body aircraft simultaneously. In this configuration, additional apron area would be required to accommodate GSE staging, which would grow in size and number due to larger aircraft fleet mix. It is assumed that in this configuration, the 50,000 square-foot cargo apron expansion (see callout 1 in **Figure 7-12**, **Figure 7-13**, and **Figure 7-14**) would be built to accommodate aircraft pushback, GSE staging, and aircraft parking by feeder carriers. This area would also be available for aircraft maintenance grounding or weather-related delays.

The existing cargo building is reaching its limits in terms of meeting peak hour demand. During the morning shift, nearly 50 drivers are at the facility at one time. The evening shift has 40 drivers coming through the facility in a short period of time. There is often a lengthy queue for the facility's restrooms. Roadway congestion is not an issue for air cargo moving to and from the airport. According to UPS input, however, ramp expansion, rather than building expansion is their number one priority.

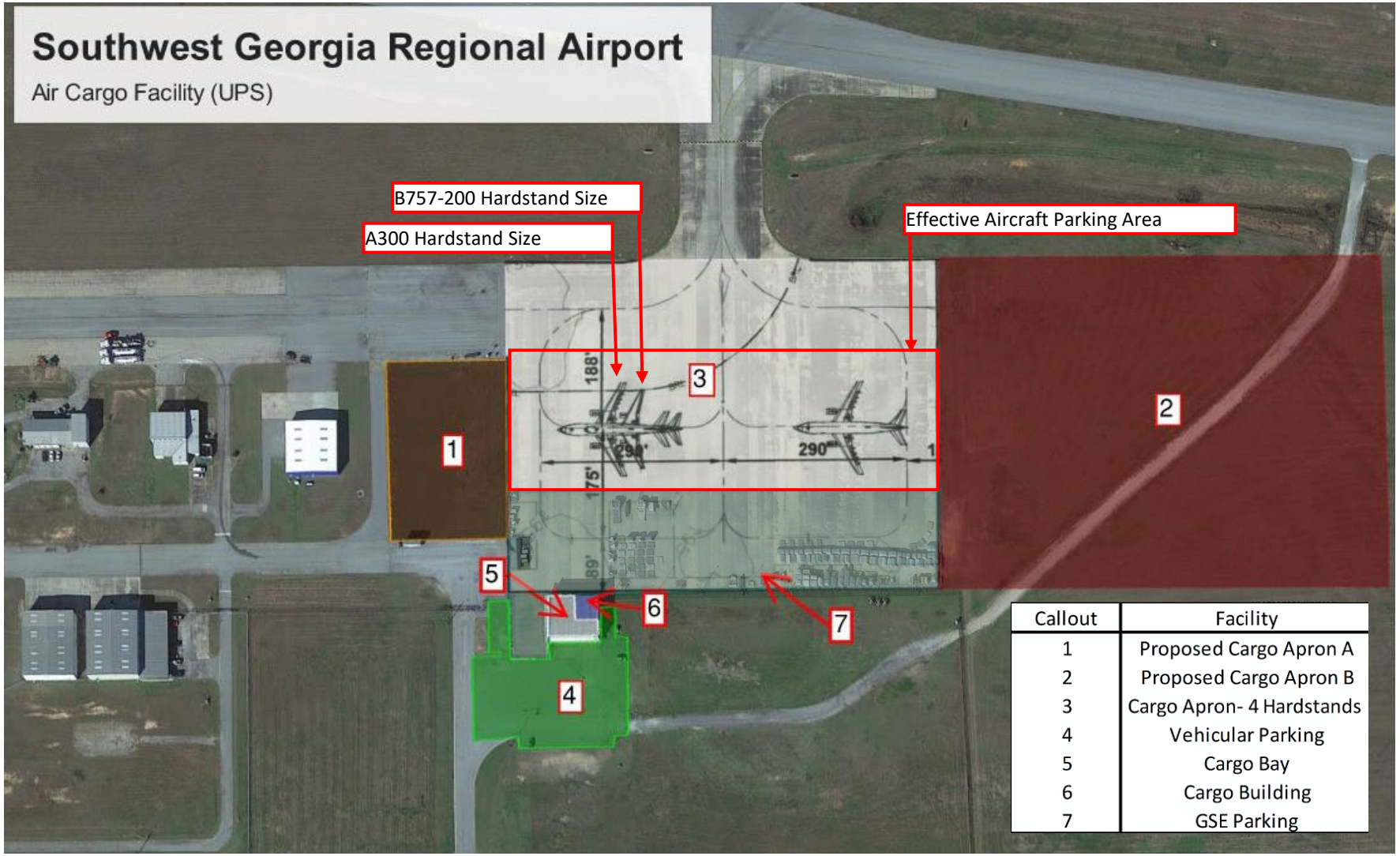
Martinaire (ABY)

Martinaire is a regional air cargo carrier whose operations at the airport are in support of UPS in southwestern Georgia and the greater tri-state area. Martinaire operates a Cessna Caravan on daily flights between ABY and Northwest Florida Beach International Airport (ECP) in Panama City, Florida. This flight feeds into larger cargo jets at ABY for further transport into the UPS network. Martinaire operates a Caravan that uses apron space. They operate adjacent to the main UPS cargo apron; expansion of the airport's existing ramp area would be used to better accommodate this aircraft.

ABY Facility Needs

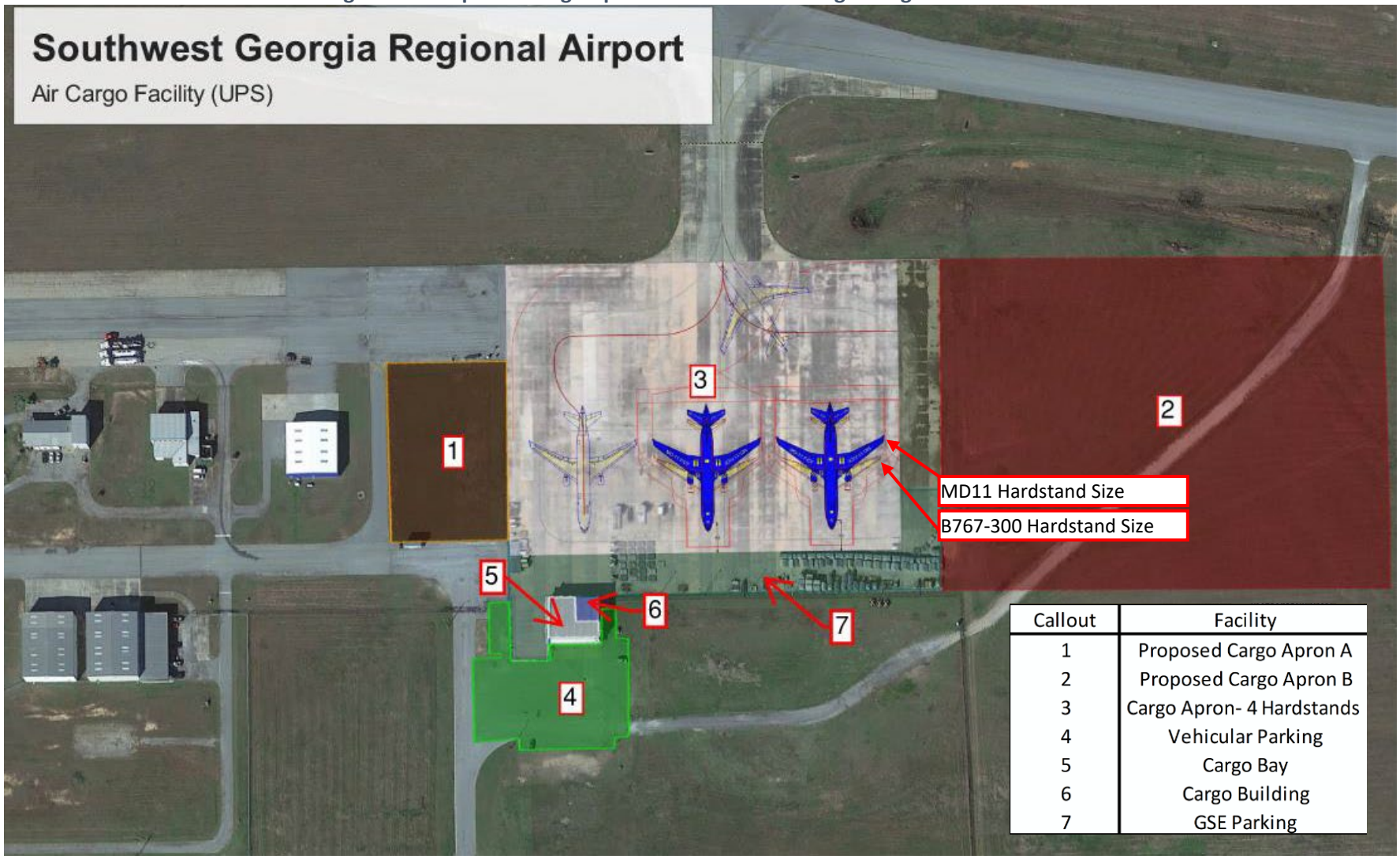
Since integrated express activity is the primary focus of this facility/capacity and requirements effort, the UPS facility is the focus of the ACRP air cargo throughput model. When applying the air cargo facility planning ratios for integrated express carriers to the forecast of tonnage throughput and aircraft types, the air cargo facility requirements are estimated. For ABY, future peak aircraft parking space requirements are a driving factor for apron area. The space requirements for apron area, cargo building area, truck/auto parking area, and truck docks/doors necessary to meet the potential air cargo throughput at ABY are presented by forecast year in **Table 7-9**.

Figure 7-13: Existing Cargo Apron and Aircraft Parking Configuration – ABY



Source: 2012 ABY Master Plan Update, Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Figure 7-14: Optimal Cargo Apron and Aircraft Parking Configuration – ABY



Source: 2012 ABY Master Plan Update, UPS, Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Table 7-9: Air Cargo Facilities ACRP Model - ABY

Year		2019	2025	2030	2035	2019	2025	2030	2035
Annual Tons (Metric Tons)		24,950	29,450	33,810	44,560	24,950	29,450	33,810	44,560
Annual Tons (Short Tons)		27,500	32,460	37,270	49,120	27,500	32,460	37,270	49,120
Peak Hour Aircraft Parking		1 C208 2 B757 1 A300	1 C208 1 B757 2 B767	1 C208 1 B757 3 B767	1 C208 1 B757 4 B767	1 C208 2 B757 1 A300	1 C208 1 B757 2 B767	1 C208 1 B757 3 B767	1 C208 4 B767
FACILITY COMPONENT	Existing Space Used For Cargo	Base Year Required Space To Meet Demand	5-Year Forecast Required Space	10-Year Forecast Required Space	20-Year Forecast Required Space	Base Year Difference	5-Year Surplus Or Deficient Space	10-Year Surplus Or Deficient Space	20-Year Surplus Or Deficient Space
Carrier Type: Integrated Express (UPS)									
Cargo Building Space in Square Feet	5,265	27,500	32,460	37,270	49,120	(22,235)	(27,195)	(32,005)	(43,855)
Total Apron in Square Feet	155,000	208,050	230,680	297,750	325,369	(53,050)	(75,680)	(142,750)	(170,369)
Truck and Auto Parking in Square Feet	39,910	49,500	58,428	67,086	88,416	(9,590)	(18,518)	(27,176)	(48,506)
Total Space in Square Feet	200,175	285,050	321,568	402,106	462,905	(84,875)	(121,393)	(201,931)	(262,730)
Total Space in Acres	4.6	6.5	7.4	9.2	10.6	(1.9)	(2.8)	(4.6)	(6.0)
Total Truck Docks/Doors	12.0	18.3	21.6	24.8	32.7	(6.3)	(9.6)	(12.8)	(20.7)

Source: *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development,* Airport Staff Interviews, Aulick Engineering, Jviation, February 2022

As shown in **Table 7-9**, when using the ACRP integrated express throughput ratios, the air cargo facility planning model estimates that ABY's baseline of 24,950 metric tons in 2019 requires a cargo building of approximately 27,500 square feet. With the preferred forecast for the airport's cargo tonnage projected to increase to nearly 45,000 metric tons by 2035, a building with an area of nearly 50,000 square feet is needed to accommodate this level of throughput. This result reflects a current shortfall of approximately 22,200 square feet and a future shortfall of nearly 44,000 square feet by 2035. Input from UPS indicates that the need for a larger building, from a priority standpoint, to accommodate their operations at ABY is a secondary priority. A larger apron area is their most immediate need.

The air cargo facility planning model also identifies a current and future shortfall of truck docks/doors. These two shortfalls in building space and truck docks/doors are in line with discussions of the adequacy of existing air cargo facilities that took place during this study's inventory effort. These deficiencies would most logically be addressed at the time the air cargo building is expanded.

For the apron area, the model estimates that approximately 208,000 square feet is required to accommodate the current UPS cargo fleet mix of one C208, one A300, and two B757s parked simultaneously during peak hour. By 2035, approximately 326,000 square feet of apron will be required to simultaneously accommodate the future UPS fleet mix of four B767s. The existing cargo apron covers 362,000 square feet; however, given current GSE storage needs and aircraft taxi-lanes, approximately only 155,000 square feet is effectively available for aircraft parking. While this amount of apron area technically is sufficient for two C-IV aircraft, interviews with UPS staff indicate the apron is currently constrained in terms of aircraft parking and maneuvering for multiple large air cargo aircraft.

Each weekday morning, UPS has three C-IV aircraft (two B757s and one A300) sequenced to arrive back-to-back in the early morning hours. The two B757s briefly overlap on the ground. Oftentimes, the second B757 lands and then must wait on the active taxiway to allow the first B757 to depart. The third aircraft to arrive, the A300, overlaps with the second B757 on the cargo apron for about an hour. In the event of a delayed flight, the airport must park aircraft on an active taxiway.

To accommodate more air cargo tonnage, UPS has expressed the desire to upgrade one or more of the two narrow-body B757s to a wide-body aircraft, such as the A300, the B767 with winglets, or the MD11. Existing demand is currently sufficient to justify this upgrade in aircraft size. With the upgrade in aircraft size comes the need for additional, and likely larger, ground service equipment. This may include K-loaders, scissor lifts, belt loaders, dollies, air stairs, aircraft tugs, and ULD tugs/trucks.

To satisfy current and future air cargo demand at ABY, the most immediate need is to expand the existing ramp area. The existing ramp area limits aircraft parking stands and aircraft maneuverability. A 50,000 square foot expansion in the near term, would improve aircraft parking and maneuvering.

The existing airport master plan identifies about 8 acres of land (approximately 360,000 square feet) adjacent to the existing UPS apron designed as future cargo apron expansion. If this area is fully developed this area would essentially double the existing cargo apron area, potentially allowing up to four larger air cargo aircraft to be on the ground simultaneously. This type of expansion would also potentially allow other air cargo operators to establish operations at the airport. The airport is planning

to update its airport master plan; during this update, specific phasing for ramp area expansion will be established.

Discussions with UPS reveal that a phased approach to the large apron expansion would better allow for "flexing" for volume. When UPS "flexes" during peak holiday months, they sub two narrow-body B757s for a B767 or MD11. With each flex comes the need for more and larger GSE. With the 50,000 square-foot apron expansion, combined with an initial phase of the larger apron expansion of 180,000 square-feet, this would allow for five wide-body B767 or MD11 aircraft parking positions side-by-side, nose-in, with tug pushback. A full 360,000 square-foot (8 acre) expansion under a second phase would ultimately allow for a total of six wide-body B767 or MD11 aircraft parking positions. This full expansion would also likely require a second connector taxiway to allow for efficient maneuvering in and out of the cargo apron. It is important to note this ultimate development scenario is for illustrative purposes.

According to this study's inventory results, addressing air cargo facility needs for UPS is a top priority for the airport. The most immediate air cargo expansion project includes a larger cargo apron. In addition, a larger air cargo building, increased truck loading/unloading positions, an auto parking lot, and a runway extension are projects needed to support existing and future air cargo activity. According to input secured during the inventory effort, the existing master plan for ABY has identified the need to extend its current runway. Proposed extensions show plans to extend the runway by 1,500 feet; according to study input provided by UPS, this additional runway length is more consistent with the needs of the B767 and MD11 which UPS plans to use in the future.

The airport also noted that its Automated Surface Observing System (ASOS) experiences frequent disruptions. As a result, the airport has a contract in place with the private operator of its Air Traffic Control Tower (ATCT) to provide after-hours coverage to allow UPS aircraft to operate. Without ATCT coverage or a fully functioning weather reporting system, UPS will not land at ABY. The airport is planning to address its ASOS/weather reporting reliability. However, until it is fixed or replaced, UPS requires ATCT presence to operate. During the peak holiday season of November and December, UPS also prefers full-time (24 hours per day, 7 days per week) ATCT coverage. To provide full-time ATCT staffing during these months, the airport estimates additional ATCT operating costs at $25,000-$30,000 per month.[7] With improved weather reporting reliability, full-time ATCT staffing can be avoided.

Review of current and future air cargo demand levels at ABY shows that expansion to most all air cargo facilities is needed.

[7] Based on currently available FAA ATCT contract information

7.5.1.5 Statesboro-Bulloch County Airport (TBR)

Statesboro-Bulloch County Airport (TBR) has two regular air cargo providers, Martinaire, a contracted feeder carrier for UPS, and Fenix Air, an ad hoc carrier that delivers medical samples from across the region to testing facilities in Smyrna, Tennessee.

UPS/Martinaire (TBR)

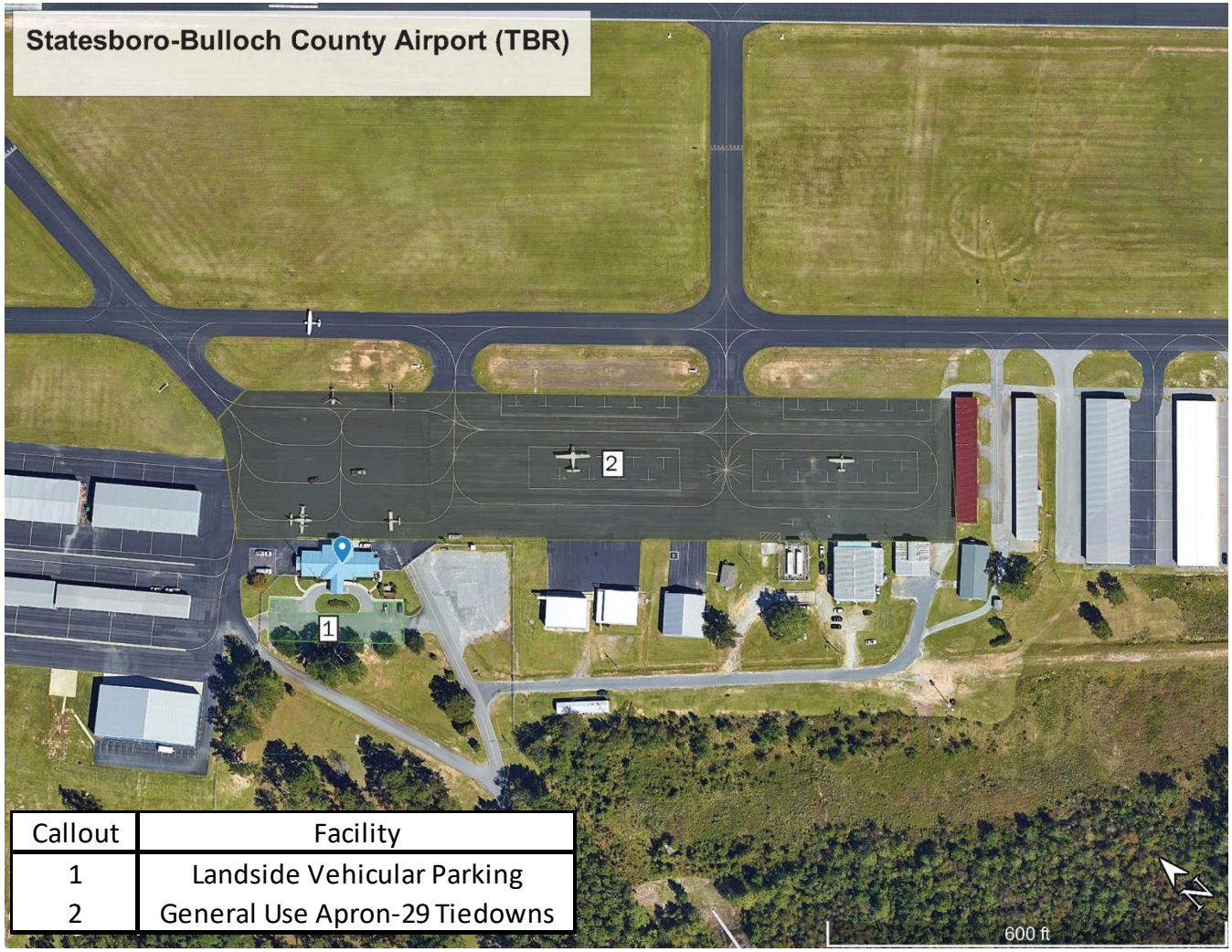
Martinaire operates a Cessna Caravan transporting primarily e-commerce parcels on a daily route between Columbia Metropolitan Airport (CAE) in South Carolina and Statesboro, Georgia. CAE is a regional cargo hub for UPS. Inbound cargo arrives in Statesboro at approximately 7:30 a.m. daily, and outbound cargo departs for Columbia at approximately 7:00 p.m., six days per week. Martinaire rents a single tiedown, and all operations are conducted on the apron without the need for a dedicated air cargo building. Enplaning and deplaning is transferred by hand between the aircraft and UPS delivery vehicles parked on the apron. This flight occurs daily on this schedule on a year-round basis, regardless of the number of packages. Interviews with ground personnel indicated the flight occurs as scheduled, if only to deliver a single parcel.

Fenix Air (TBR)

Fenix Air operates daily routes, Monday through Friday, across the southeastern United States, picking up various medical tests, blood samples, and organs before delivering these items to testing facilities in Smyrna, Tennessee (MQY). Fenix Air services its routes primarily with a Beechcraft Baron or Cessna-402. The timing of the ABY route fluctuates daily, dependent on when the tests arrive at each airport. The Statesboro airport serves a collection point for medical samples from Savannah, Statesboro, Metter, Brunswick, as well as from Jacksonville, Florida. Fenix Air does not transport inbound cargo to TBR, but transports roughly 13 tons in annual outbound cargo and averages 100 pounds of outbound cargo per day, five days per week. Fenix Air does not rent a tiedown or apron space at the airport, and they are typically on the ground for a very short period of time. Given the nature of their operation, dedicated air cargo facilities are not justified or needed to support the operation of this air cargo carrier.

Since integrated express carrier-used facilities are the primary focus of this study, only UPS/Martinaire activity is considered for the air cargo facilities throughput modeling for TBR. When applying the air cargo facility planning ratios for integrated express carriers to the forecast of tonnage throughput and aircraft types, the air cargo facility requirements are estimated. The space requirements for apron area, cargo building area, truck/auto parking area, and truck docks/doors necessary to meet the potential air cargo throughput at TBR are presented by forecast year in **Table 7-10**. An aerial image overview of TBR's air cargo facilities is presented in **Figure 7-15**.

Figure 7-15: Aerial Overview of Air Cargo Facilities – TBR



Callout	Facility
1	Landside Vehicular Parking
2	General Use Apron-29 Tiedowns

Source: Google Earth, Aulick Engineering, Airport Staff Interviews, February 2022

Table 7-10: Air Cargo Facilities ACRP Model – TBR

Year		2019	2025	2030	2035	2019	2025	2030	2035
Annual Tons (Metric Tons)		350	400	460	630	350	400	460	630
Annual Tons (Short Tons)		390	440	510	690	390	440	510	690
FACILITY COMPONENT	Existing Space Used For Cargo	Base Year Required Space To Meet Demand	5-Year Forecast Required Space	10-Year Forecast Required Space	20-Year Forecast Required Space	Base Year Difference	5-Year Surplus Or Deficient Space	10-Year Surplus Or Deficient Space	20-Year Surplus Or Deficient Space
Carrier Type: Integrated Express (UPS/Martinaire)									
Cargo Building Space in Square Feet	0	390	440	510	690	(390)	(440)	(510)	(690)
Total Apron in Square Feet	242,880	5,779	5,866	5,987	6,301	237,101	237,014	236,893	236,579
Truck and Auto Parking in Square Feet	10,347	702	792	918	1,242	9,645	9,555	9,429	9,105
Total Space in Square Feet	253,227	6,871	7,098	7,415	8,233	246,356	246,129	245,812	244,994
Total Space in Acres	5.8	0.2	0.2	0.2	0.2	5.7	5.7	5.6	5.6
Total Truck Docks/Doors	0.0	0.3	0.3	0.3	0.5	(0.3)	(0.3)	(0.3)	(0.5)

Source: *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development,* Airport Staff Interviews, Aulick Engineering, Jviation, February 2022

As shown in **Table 7-10**, when using the integrated express throughput ratios, the air cargo facility planning model estimates that TBR's baseline of 350 metric tons in 2019 supports the need for a cargo building 390 square feet in area. With the preferred forecast for the airport's cargo tonnage projected to increase to 630 metric tons by 2035, a building with an area of 690 square feet could needed to accommodate this level of throughput. For the apron area, the model estimates that approximately 5,800 square feet is required for baseline (2019) levels of tonnage and that 6,300 square feet of apron space would be required by 2035 to accommodate forecast tonnage throughput.

The airport currently has an adequate amount of existing apron space, with nearly 243,000 square feet of general aviation apron area available to accommodate the smaller air cargo aircraft that operate at the airport. However, the majority of this space is marked as aircraft tie down space for general aviation planes. If a larger cargo aircraft were to operate at this airport, the apron layout would require adjustments. The model also estimates potential truck docks and truck and auto parking space requirements. Because of how air cargo is loaded and unloaded at TBR by their existing air cargo operators, estimates of truck docks and truck parking space are not applicable.

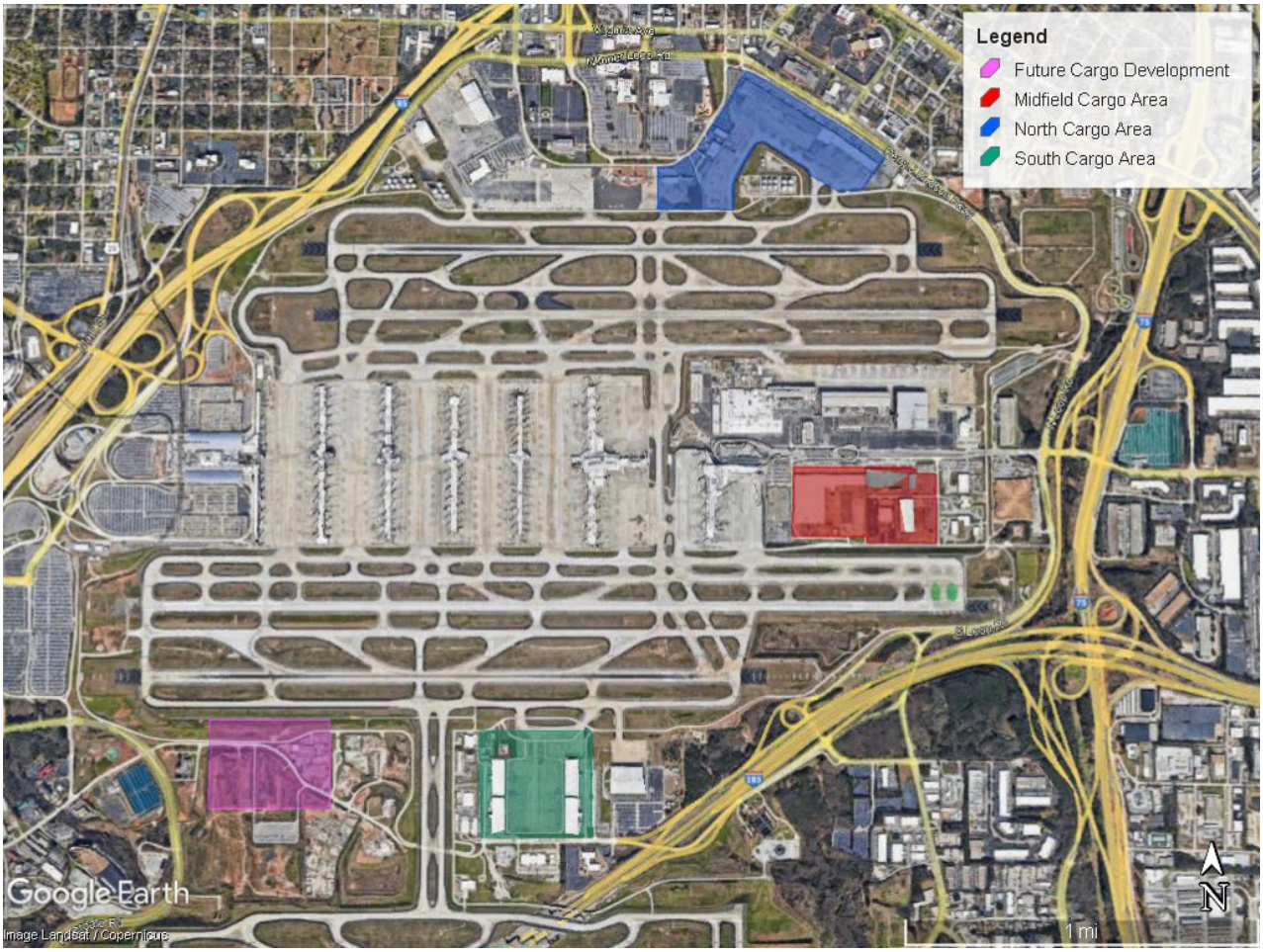
Due to the nature of this air cargo service at TBR, the lack of any dedicated cargo facilities is not considered an issue. Martinaire, the UPS feeder, transfers cargo directly between their aircraft and trucks or vans. This type of operation can be sufficiently accommodated without a dedicated air cargo building on the existing apron. For current operators, existing facilities appear adequate. However, additional air cargo demand in the form of larger aircraft or more frequent operations could require an expanded apron area. The existing access road leading to the airport has a weight restriction of 56,000-pounds. If air cargo tonnage transported by the airport increased significantly, consideration to increasing the weight bearing capacity of this road could be warranted.

If additional air cargo carriers or larger air cargo operate at this airport, facility improvement could be required. This study's forecast of future air cargo tonnage can, however, be accommodated by the existing UPS feeder service and facilities that are currently in place. While the apron at TBR is sufficient in size for current air cargo operations, its condition indicates repair is needed. TBR has included an apron rehabilitation (mill and overlay) project on its CIP.

7.5.2 ATL Air Cargo Facility Plans

According to Airports Council International (ACI), in 2019 ATL ranked as the 13th busiest air cargo airport in North America and the 45th busiest air cargo airport in the world. Given its position as the preeminent air cargo airport in Georgia, leadership is continually striving to optimize the airport's cargo facilities and operations through investment in technology and physical facilities. As discussed in **Chapter 3**, ATL currently has three main air cargo areas at the airport: the North, Midfield, and South areas. These existing air cargo areas are illustrated on **Figure 7-16**. Together, these cargo areas cover a total area of approximately 6.4 million square feet or 147 acres. More details for ATL's three cargo areas are available in **Chapter 3** of this report.

Figure 7-16: Location ATL Existing Cargo Areas



Source: Google Earth Pro, Hartsfield-Jackson International Airport (ATL), Jviation, January 2022

ATL's airfield capacity and facilities such as runways, taxiways, instrument approaches, and navigational aids are expected to remain adequate for almost all cargo aircraft. The airport sees additional cargo building capacity its greatest need in terms of improved air cargo facilities. Building space in the three existing cargo areas is currently at or near capacity. A future cargo development area has been identified to the west of the existing South Cargo Area. The designated site covers about 40 acres, and the facilities layout for this new development area will be similar to the existing South Cargo Area. The approximate area designated for the future cargo development is shown on **Figure 7-16**, while another view is presented in **Figure 7-17**.

Figure 7-17: ATL Future Cargo Development Area



Source: Hartsfield-Jackson International Airport (ATL), Ricondo & Associates, January 2022

ATL sees other opportunities for improvement to address landside constraints and congestion such as truck maneuvering, truck staging, and roadway interchange/traffic pattern improvements. For example, the North Cargo Area is very constrained in terms of truck maneuvering space between the buildings and the main roadway. The airport has plans to reconfigure Perry J. Hudson Parkway to allow for expansion of the truck maneuvering area and the North Inner Loop Road.

Additional examples of an area flagged for improvement is the interchange at Interstate 285 and Riverdale Road and Interstate 85 and Riverdale Road; improvement to these interchanges will become more critical after the new cargo development area is completed. These improvements are important for improving cargo flow between the airport and area roadways. Areas needing improvement to support air cargo growth are reflected on **Figure 7-18** and **Figure 7-19**.

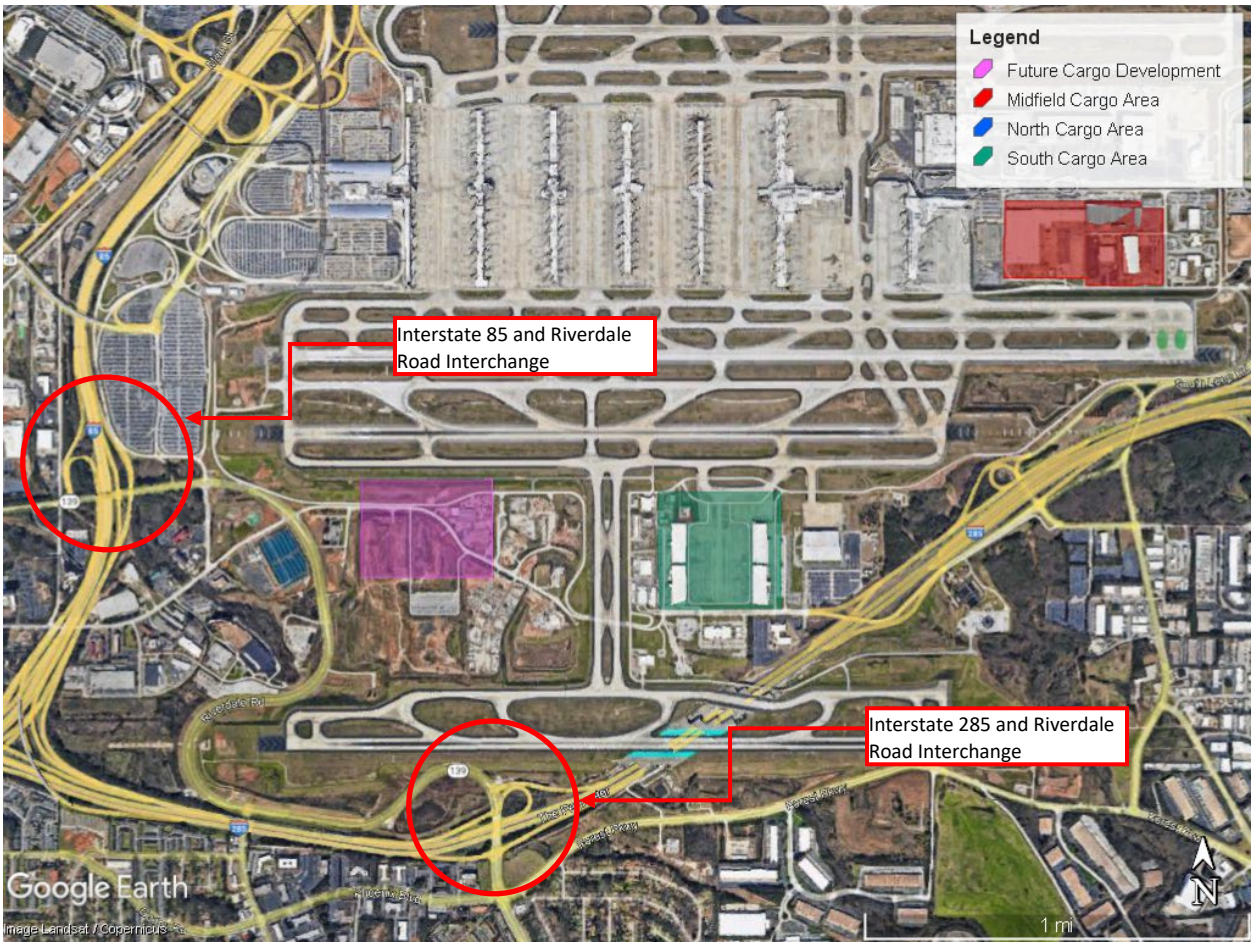
Another issue identified by the airport involves employee access to the South Cargo Area. The airport considers public bus service to this area important to the success of existing and future cargo operations. ATL representatives have had preliminary discussions with MARTA for expanded transit services. Support for expanded/improved transit service to this area is important to air cargo growth. Inability to secure staff, employee badging processing time, customs clearance times, and general congestion related to truck staging areas and truck docks in the South Cargo Area are areas of concern for ATL; these needed were identified by a Focus Group for the Statewide Air Cargo Study. Airport staff are aware of these issues as they relate to the airport's ability to effectively process and grow air cargo activity. Airport plans include steps to address these issues as applicable.

Figure 7-18: ATL North Cargo Area Truck Maneuvering Constraints



Source: Google Earth Pro, Hartsfield-Jackson International Airport (ATL), Jviation, January 2022

Figure 7-19: Interstate-285 and Riverdale Road Interchange



Source: Google Earth Pro, Hartsfield-Jackson International Airport (ATL), Jviation, January 2022

In November 2019, ATL implemented its Cargo Community System, a digital technology that tracks air cargo activity within the entire ATL complex. One of the primary benefits is the "TRUCKPASS" system. This system allows trucks to wait in a staging area to be notified before proceeding to the designated air cargo pickup area. With this advancement in technology, rather than having to guess or dwell at truck docks longer than needed, cargo pick up has become more effective and efficient, helping to make the best use of the airport's existing facilities. ATL was the first airport in North America to implement this technology, and it is now being replicated at other large air cargo airports across the country.

This technology enables all parties in ATL's transportation network to see the movement of cargo in the ATL complex helping the airport to operate as an integrated system. This communications system improves the airport's chain of security and helps meet TSA's requirement to use technology for 100 percent cargo screening. ATL continues to encourage all freight forwarders, ground handlers, airlines, and trucking companies to adopt this technology.[8]

[8] Hartsfield-Jackson Atlanta International Airport - Cargo Information Updated February 12, 2021; ATL staff

7.5.3 Considerations for UAS and AAM (Electric Aircraft)

As discussed in **Chapter 5**, the aviation industry is experiencing growth in new and innovative aviation technology. Unmanned Aerial Systems (UAS) and Advanced Air Mobility (AAM) have the potential to augment or supplement more traditional air cargo transport. It is possible that these technologies will also enable timely delivery of small air cargo parcels to areas that are remote and not easily accessible. The logistics industry is investing in this technology to accommodate parcel delivery on the first or last mile of delivery, intralogistics and automation within factories/warehouses, medical deliveries, and transportation of smaller air freight parcels in urban and rural areas. Companies such as Beta Technologies are developing small electric piloted aircraft (AAM) which may be used to carry air cargo on short routes.

FAA Advisory Circular 107-2A provides guidance for small UAS (less than 55 pounds) operations in the National Airspace System (NAS). Small UAS typically do not operate from airports. As large UAS (greater than 55 pounds) continue to develop and AAM aircraft come online, it is likely that airports will play a greater role in accommodating their operations. Some UAS and AAM aircraft are expected to operate in a manner similar to piloted aircraft and, therefore, will need airfield facilities for their safe and efficient operation. Airfield facility planning guidance, specifically tailored to address the unique needs of large UAS and AAM, is limited. As technologies advance, UAS and AAM operators and civilian airports will find airfield design guidelines useful to their business and operational decisions.

ACRP Research Report 212: UAS and Airports, Volume 2, Incorporating UAS into Airport Infrastructure Planning provides guidance on whether and how airports should update master plans/airport layout plans (ALPs) for UAS operations. Research related to airport considerations for large UAS, Vertical Take-Off and Landing (VTOL), and electric aircraft is ongoing as part of ACRP Project 07-18, "Develop Airfield Design Guidelines for Large Unmanned Aerial Systems"; ACRP Project 03-50, "An Airport-Centric Study of the Urban Air Mobility Market"; and ACRP Project 03-51, "Electric Aircraft on the Horizon."

Per an FAA memorandum, over the next five years, the agency expects to see more aircraft transitioning to electric, hydrogen, and hybrid propulsion. The first type of certified AAM aircraft will operate under the eVTOL and Short Take-Off and Landing (STOL) models. To support these aircraft, airports and heliports will likely begin planning to incorporate electric charging stations, hydrogen refilling stations, and other support facilities into their existing infrastructure. Airports may also choose to identify or construct designated vertiports to support the take-off and landing and takeoff needs of AAM aircraft. The FAA is already seeing an increase in the number of airspace evaluations for electric charging stations at airports and received its first airspace case for a stand-alone vertiport in Florida.

FAA is the clearinghouse for reviewing and approving new vertiports FAA Regional Offices and Airport District Offices (ADOs) are the point of contact for airports and heliports/ vertiports to submit the necessary documentation for securing approval of construction plans and operating procedures.[9]

Given evolving technology, it is prudent for airports in Georgia to start planning for future UAS/AAM activity. One airport that has taken steps to plan for this activity is Augusta Regional Airport (AGS). In

[9] FAA memo on "Process for Submitting and Reviewing Proposed Landing Pads and Supporting Equipment for Advanced Air Mobility and Electric Aircraft," June 2021

2021 AGS created a working group to help plan for electric Vertical Take Off and Landing (eVTOL) aircraft and other electric aircraft charging station infrastructure. Three core questions were asked of the working group:

- How does the airport set up infrastructure/facilities for AAM?
- What will AAM aircraft require for their operations?
- What does the airport need to do to prepare for AAM?

As a result, this airport has designated areas on a proposed layout for a future vertiport, hangars for electric aircraft, and an electric aircraft charging station.

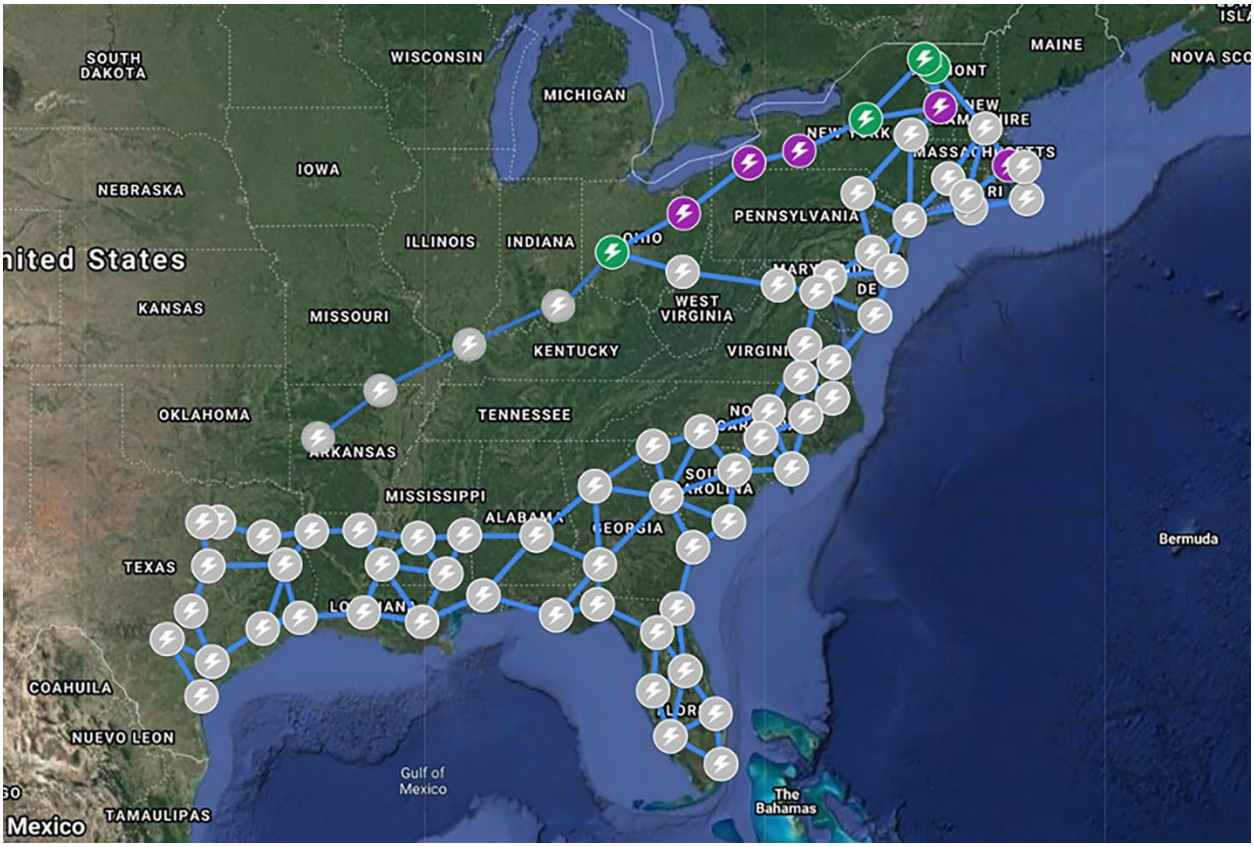
In addition to local airport stakeholders, AGS's working group includes representatives from Georgia Tech, FAA, GDOT, UPS, U.S. Army, and Beta Technologies. Beta Technologies, a Vermont-based eVTOL manufacturer, has secured orders from UPS's Flight Forward program for up to 150 of the Alia eVTOL aircraft. This aircraft is expected to have a range of 250 miles and to be able to carry a cargo payload of 1,000 to 7,500 pounds. This aircraft may operate as a crewed or uncrewed small feeder aircraft (SFAC) supporting regional point-to-point cargo delivery. UPS is expected to take delivery of its first 10 of these electric aircraft in 2024. UPS will also use Beta's proprietary modular charging stations. These stations can rapidly recharge aircraft in less than an hour. UPS also expects to use the charging stations for its growing fleet of electric ground vehicles. [10]

As shown in **Figure 7-20**, Beta is planning for an extensive number of charging stations across its network, including stations at some airports in Georgia. In addition to AGS, Beta is in discussions to partner with Atlantic Aviation at DeKalb-Peachtree Airport (PDK) in metro Atlanta, Washington-Ware County Airport (AYS) in Southeast Georgia, and Southwest Georgia Regional Airport (ABY) in Albany to establish charging stations. The development of these charging stations does not necessarily imply that the airports that do not have scheduled air cargo operations today will have such operations in the future. Introduction of electric aircraft is still at three years in the offing; specific implications of the introduction of this technology will need to be monitored in the interim for their impact on air cargo.

To help Georgia airports and communities stay current on changing aircraft and aircraft related technologies, GDOT plans to undertake a statewide AAM study in 2022. The study is expected to produce a toolkit for airports and communities along with a statewide strategic plan to help Georgia maintain its position as a national leader in all facets of aviation.

[10] https://evtol.com/news/beta-technologies-ups-deal-150-evtol-aircraft/

Figure 7-20: Beta Charging Station Network



Source: Beta Technologies, February 2022

7.5.4 Air Cargo Facility Capacity Analysis Conclusions

This chapter identifies air cargo facility needs for five Georgia airports with existing scheduled integrated express carrier service. These facility needs are based in part on an ACRP planning model and on detailed investigation with airports and air cargo carriers that was completed as part of this statewide study.

Of the five airports modeled, three airports—CSG, SBO, and TBR—are served by contracted integrated express feeder carriers. These carriers operate smaller turboprop aircraft that require primarily only limited apron area to operate. Due to the relatively small volumes of air cargo these operators carry, they do not require cargo building/warehouse space for handling or transferring cargo. Unless there are notable shifts in air cargo demand at these three airports, existing facilities are considered generally adequate.

The two remaining airports, ABY and SAV, are served by integrated express carriers that operate larger mainline cargo jet aircraft (both wide-body and narrow-body). For ABY, based on input from the airport and UPS as well as results from an the ACRP facilities planning model, the need to expand most existing air cargo facilities was identified. UPS indicates that their highest priority for facility expansion is for more apron area. Apron expansion is needed to accommodate current operations more effectively as

well as to serve expansion of air cargo operations at ABY as envisioned by UPS. The ACRP model identified shortfalls in building space, truck docks/doors, and auto parking. These needs were validated through discussions with airport and UPS staff. Other facility needs identified for ABY during on-site interviews include improved weather reporting reliability and a runway extension. Currently, the runway length at ABY is the shortest among all domestic airports accommodating UPS jet operations. Input from UPS indicates larger air cargo aircraft such as the B767 and the MD11 will be used at the airport. While an exact runway length and options for accommodating a runway extension will be addressed in an upcoming airport master plan, an extension of 1,500 feet is needed for these larger planes. When the airport's air cargo building is expanded, additional restrooms are needed. Replacement to the airport's weather reporting system is needed now.

At SAV, the existing multi-tenant airside cargo facility was identified to have shortcomings related to building size and layout. Also, the existing apron limits aircraft parking and maneuverability. SAV's air cargo facilities have long been viewed as functionally obsolete. The development of new cargo facilities is currently underway. According to input from this study's Steering Committee and members of the project's Focus Group, the Savannah market area is considered one with significant potential for air cargo growth. Plans are already in place and underway to provide new air cargo facilities to replace those that currently exist. These new facilities include a 220,000-square-foot air cargo apron and air cargo building space totaling 180,000 square feet. These planned improvements are needed to support current operations more efficiently, to accommodate projected demand in air cargo, and to support opportunities for existing and new air cargo operators to increase activity.

Through on-site interviews at SAV, other actions to support air cargo operations were identified. One major issue is the stub taxiway that now serves the Gulfstream facility. The length of this one-way taxiway has the potential to cause access delays for the new air cargo area. Additional taxiway improvements to resolve this issue by facilitating two-way traffic is a major priority for the airport and its cargo operators. Other air cargo related issues identified for SAV relate to ground movement of cargo and air cargo personnel near/around the airport. Access issues include two separate at-grade CSX rail crossings on Gulfstream Road and Dean Forest Road that cause significant ground access delays. An advance warning system or rail schedule is, at a minimum, desirable. The CSX rail line serves the busy Port of Savannah, but the rail lines are a constraint to air cargo operators at SAV. A second roadway access issue is related to the Exit 104 interchange off Interstate 95. A reconfiguration of this interchange would help alleviate congestion and delay for airport users. Input secured during this study's inventory effort indicates that ideally the reconfiguration of this interchange should include "flyover" ramps. Additional follow-on study related to these two access issues is required to identify the best options for resolving air cargo related ground access issues.

7.6 Summary

The primary focus for the Statewide Air Cargo Study is to identify any improvements or actions needed to support the activities of scheduled air cargo carriers. Any existing deficiencies were identified in one of two ways. The first was through an extensive inventory and interview effort completed as part of the study. The second was through an analysis of air cargo facility space requirements supported by industry throughput ratios established in an ACRP air cargo facilities research model.

This chapter examined air cargo space requirements for the five airports with existing scheduled integrated express carrier service. While ATL is also served by a wide variety of specialty, all cargo, and integrated express carriers, future air cargo space requirements for this major international cargo gateway are addressed directly by the airport and a high-level overview of anticipated improvements to meet future air cargo demand at ATL are incorporated into this study.

Three of the five Georgia airports served by a scheduled integrated express carrier have service that is provided by a "feeder." These operators fly turboprop aircraft and connect air cargo parcels with larger air cargo jets flown by UPS and FedEx. Feeder carriers operate at Columbus, Swainsboro, and Statesboro. Air cargo operators who serve these airports load and unload cargo on an aircraft apron directly to and from vans or trucks. Their method of operation does not require a dedicated air cargo building nor does it require truck docking stations which often characterize air cargo operations at an airport. Unless the type of air cargo service at these three airports changes, current facilities are considered adequate to meet current and future air cargo demand. Activity at these airports should be monitored as a change in aircraft types or volume of operations could signal the need for new or improved air cargo facilities.

Study input and analysis reveals that both airports served by jet air cargo aircraft (ABY and SAV) need of additional facilities to support existing and future air cargo demand. As documented in this report, SAV is in the midst of expanding its air cargo facilities. While plans are already in motion to expand cargo buildings and apron areas, SAV also faces access constraints that limit the efficiency of air cargo operators serving this airport.

ABY serves as a major distribution center for UPS, and the airport's level of activity suggests that improvements are appropriate to serve current and future demand more efficiently. Input from UPS indicates there is an immediate need for an expand aircraft apron. Additional expansion to the airport's air cargo building, truck loading and parking areas, and primary runway length are also needed.

SBO and TBR are both served by contracted feeder carriers to and from the UPS hub in Columbia (CAE). Each airport's facilities are currently adequate for the relatively minimal needs of the smaller turboprop feeder aircraft used on these routes. Both airports have a general-use aircraft apron that are used by the feeder carriers to conduct aircraft-to-ground (and vice versa) vehicle transfers. While the aprons at SBO and TBR are sufficient in size for the current air cargo operations, their conditions indicate repair is needed. As a result, both SBO and TBR have apron rehabilitation (mill and overlay) projects on their accepted Capital Improvement Program (CIP).

A general summary of projects and other improvements for Georgia airports served by an integrated express air cargo operator is presented in **Table 7-11**. The next step in the statewide air cargo study is

to estimate costs that could be associated with addressing noted improvements identified in **Table 7-11**. The next chapter of the report provides more information on quantities of needed facility improvements and on the estimated costs for the facility improvements.

Table 7-11: Summary of Air Cargo Facility Requirements for Airports with Existing Air Cargo Service

Air Cargo Activity Group	Associated City	Airport	FAA ID	Airport/Airfield-Related Air Cargo Issues	Peripheral Issues (Roadway, Access, Other)
Existing Cargo Service Airports					
1	Albany	Southwest Georgia Regional Airport	ABY	•Additional 50,000 square feet of space for UPS aircraft parking/maneuvering •8-acre cargo apron expansion for potential UPS expansion or other future cargo tenant. Should be built in two-separate phases – 4 acres initially, then once demand warrants, build the second phase of 4 additional acres. •Improved weather reporting reliability (fix or replace ASOS); otherwise need ATCT coverage, possibly 24/7 staffing during peak air cargo months (November-December) •Runway expansion to better accommodate existing and larger air cargo aircraft •Additional truck docks or loading/unloading positions at an expanded cargo building •Air cargo employee auto parking expansion •Expanded restroom facilities in association with expansion of air cargo building •	None identified
1	Atlanta	Hartsfield-Jackson Atlanta International Airport	ATL	•Additional capacity at South Cargo Area (warehouse space, truck docks) •Increased automation at all cargo facilities (Wi-Fi availability, encourage Truckpass system adoption, enforcement of truck dock loitering) •Expanded truck staging area •Expanded apron area near UPS facility to include existing grassy area	•Expanded truck maneuverability at North Cargo Area (traffic flow reconfiguration of Perry J. Hudson Road) •Traffic flow improvements at I-285 and Riverdale Road and I-85 and Riverdale Road interchanges due to significant traffic flow congestion and delay. •MARTA bus service to South Cargo Area (employee staffing levels) •Employee badging processing time (employee staffing levels) •Allow air cargo shipments cleared by customs to be held-off airport (to avoid delay related to airport warehouse capacity, understaffed facilities, and truck congestion)

Air Cargo Activity Group	Associated City	Airport	FAA ID	Airport/Airfield-Related Air Cargo Issues	Peripheral Issues (Roadway, Access, Other)
1	Savannah	Savannah-Hilton Head International Airport	SAV	•Replacement of existing air cargo building and ramp areas •Additional taxiway improvements to better serve future cargo development by avoiding conflicts with Gulfstream aircraft and, therefore, allow for efficient taxi times of time-critical cargo aircraft movements	•Frequent traffic flow disruptions due to at-grade rail crossings on Gulfstream Road and Dean Forest Road. Advance warning system or CSX rail schedule desired, at a minimum. Rail traffic related to busy Port of Savannah. •Reconfiguration of I-95 and Exit 104 interchange due to significant traffic congestion and delay. "Flyover" ramps preferred by airport. Diverging Diamond Interchange or basic widening strongly opposed by airport.
2	Columbus	Columbus Airport	CSG	None identified	None identified
2	Statesboro	Statesboro-Bulloch County Airport	TBR	Apron rehabilitation (mill and overlay) needed to improve condition	None identified
2	Swainsboro	East Georgia Regional Airport	SBO	Apron rehabilitation (mill and overlay) needed to improve condition	None identified

Source: *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development,* FAA Records, GDOT Aviation Programs, Airport Interviews, Aulick Engineering, Jviation, February 2022

8 Findings and Conclusions

8.1 Introduction

Previous chapters of this report provide an overview of the air cargo industry, focusing primarily on the industry within the U.S. and specifically in Georgia. Air cargo is important to supporting many facets of Georgia's economy; but as this study has documented, transporting goods via air cargo is unique and highly specialized. Air cargo transport is typically reserved for commodities that are lightweight, high value, and/or time sensitive. By far the highest volumes of air cargo activity in Georgia are processed by Hartsfield-Jackson Atlanta International Airport (ATL). As of 2019, ATL ranked as the 13th busiest air cargo airport in the U.S. and the 45th busiest air cargo airport in the world.[1] While some aspects of existing and future air cargo at ATL are included in GDOT's Statewide Air Cargo Study, the focus of this study is on other airports in Georgia that support varying levels of air cargo activity, in particular scheduled air cargo service.

The vast majority of Georgia's other air cargo activity is transported via integrated express carriers, typically DHL, FedEx Express, or UPS. These carriers have varying levels of scheduled air cargo activity at the airports serving Albany, Columbus, Savannah, Statesboro, and Swainsboro. As documented in prior chapters, integrated express carriers serve these cities with regularly scheduled air cargo flights, flown by a mix of mainline air cargo jets and smaller feeder turboprop aircraft.

However, this is not the only air cargo activity in Georgia. Analysis of FAA flight records over an 18-month period from 2019-2020 shows that as many as 58 other airports in Georgia support air cargo that is transported by ad hoc or on demand cargo carriers. In some instances, these flights are daily and in others they take place sporadically throughout the year. Operations by ad hoc cargo carriers are supported by a wide mix of aircraft types, ranging from larger jets to small single-engine piston aircraft. A map depicting airports in Georgia served by ad hoc air cargo carriers was previously provided in **Figure 2-5**.

The Georgia Statewide Air Cargo Study has two primary objectives. One is to identify current and future facility needs for the five Georgia airports currently served by an integrated express carrier. The other objective is to ensure that Georgia is positioned to meet forecasted air cargo growth and activity. This final chapter of the Georgia Statewide Air Cargo Study addresses these two overarching objectives.

8.2 Options and Opportunities for Future Air Cargo

The focus of the Georgia Statewide Air Cargo Study is on identifying current and future air cargo facility related needs at the airports in the state that are currently served by a scheduled integrated express carrier. Based on current demand, future demand, and any identified operating constraints, **Chapter 7** of this study identified facility improvements for airports in Georgia that currently accommodate scheduled air cargo carriers. A subsequent section of this chapter provides cost estimates to address current and longer-term facility needs at these airports.

[1] Air Cargo World – Top 50 Cargo Airports, 2019

While it is essential to identify improvements at airports with existing scheduled air cargo activity, it is also important to determine if Georgia is positioned to respond to expanded air cargo activity, should this need arise. This section:

- Reviews fleet expansion plans for the integrated express carriers
- Identifies hypothetical facilities that could be required to support different scenarios of air cargo activity
- Summarizes the state's existing airport infrastructure that is available to meet potential demand for expanded air cargo demand

8.2.1 Integrated Express Carrier Aircraft Acquisition Plans

The aviation industry is constantly evolving and changing, and this includes the air cargo industry. Integrated express carriers sell time-definite shipping services to most addresses throughout the U.S. and over 200 countries. These door-to-door shipping services rely on large aircraft fleets and ground vehicles to move parcels between their vast networks of on- and off-airport facilities. Airports are the backbone of the hub-and-spoke model used to facilitate these services.

Pickup and delivery times are predicated on speed and distance. Although integrated express carriers have relatively mature networks, they are always seeking to optimize their route networks to provide improved service. In the simplest terms, this means locating facilities closest to the customer demand "center of gravity" to offer earlier delivery times in the morning and later pickup times in the evening. If the center of customer demand shifts or roadway congestion precludes acceptable pick up and drop off times for customers, network expansion presents one reasonable alternative for integrators to overcome these obstacles.

For the five airports in Georgia now served by an integrated express air cargo carrier (this excludes ATL), all have at least some level of scheduled air cargo service that is provided by smaller feeder type aircraft. Review of near-term acquisition plans shows that FedEx, UPS, and DHL all have plans to bring additional smaller aircraft into their fleets.

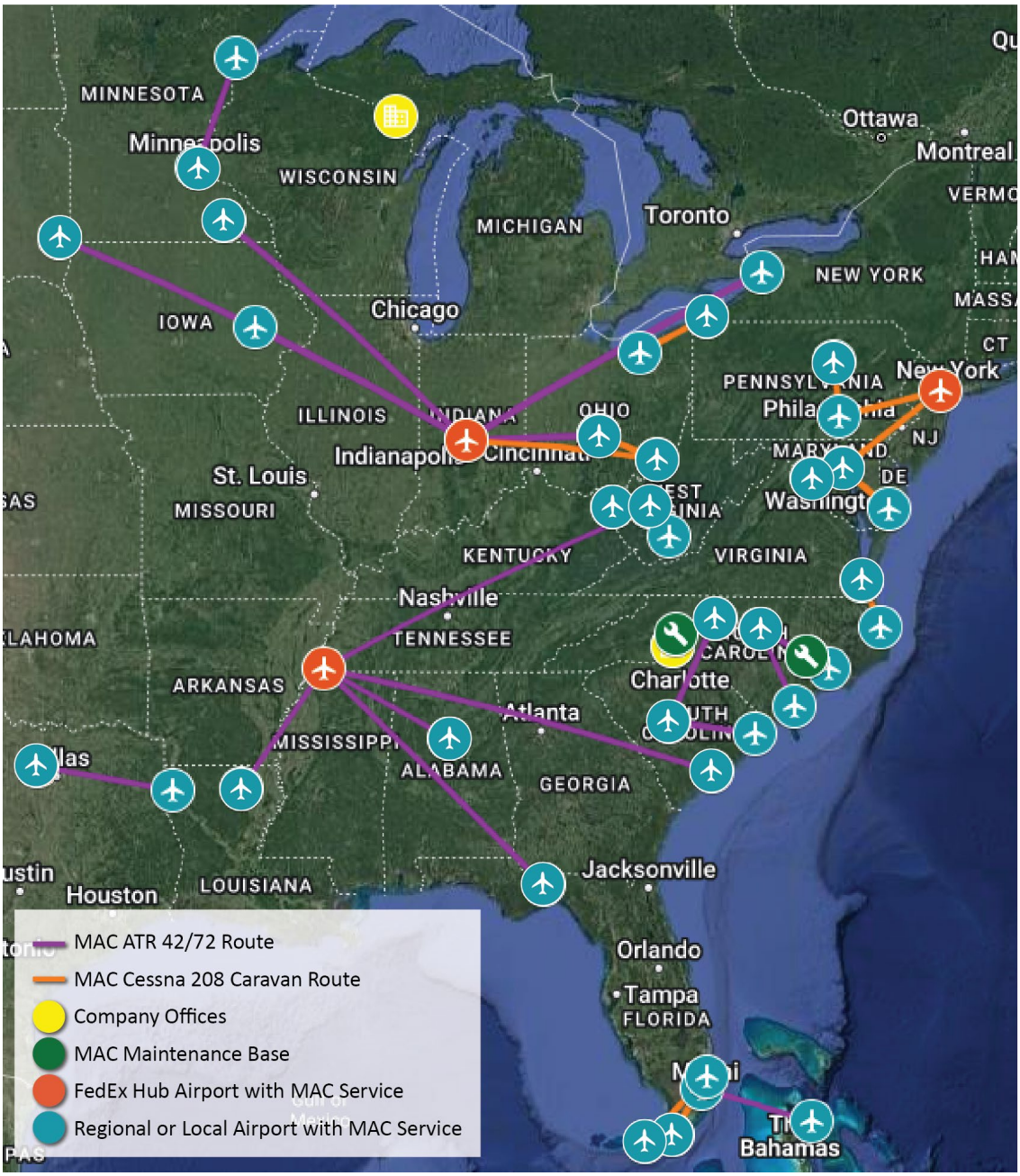
8.2.1.1 FedEx Express

While FedEx Express operates a variety of mainline jets on trunk routes to and from their hub airports, they also operate various types of propeller-driven feeder aircraft out of smaller regional airports to supplement, or "feed," their mainline aircraft. **Figure 8-1** presents a partial route map for Mountain Air Cargo, one of several contracted feeder carriers for FedEx Express. This route map identifies the routes flown by three turboprop feeder aircraft that are currently operated by FedEx Express: the Cessna 208 Caravan, the ATR-42, and the ATR-72. The only FedEx Express feeder aircraft currently operating in Georgia is the Cessna 208.

The Cessna 208, represented by orange lines on the map, is a single-engine turboprop aircraft, while both ATR models are larger twin-turboprop aircraft. As shown in **Figure 8-1**, FedEx Express does not currently (as of May 2022) operate the larger ATR feeder aircraft in Georgia, but this type of aircraft currently supports existing air cargo feeder service at other locations in the Southeast. Given relatively

low minimum runway lengths (see **Figure 7-2** and **Table 7-3**), ATR aircraft could reasonably operate at many Georgia airports if sufficient demand warrants such service.

Figure 8-1: FedEx Express Feeder Example Route Map– Mountain Air Cargo (MAC)



Source: Mountain Air Cargo website (mtaircargo.com), April 2022

In addition to the 40 older model ATR 42 and 72 air cargo freighters in its global fleet, FedEx Express is also acquiring 30 new ATR 72-600F aircraft. This ATR variant is the only purpose-built air cargo freighter, and it was designed and developed with input from FedEx Express who is the launch customer for this plane. With an internal volume of 2,600 cubic feet, it is the first air cargo feeder freighter capable of carrying containers or palletized freight. This plane can accommodate up to five 88-inch by 108-inch pallets or seven LD3 containers. It is designed for longer and heavier shipments; it has payload of around 15,000 pounds and a range of over 1,000 miles. The new ATR 72-600F will play an important role for FedEx Express in its network to deliver fast, economical service to small and medium sized markets. This aircraft will be used to serve markets that have insufficient volumes of air cargo to support a Boeing 757; comparatively, the payload for a B757 is around 48,000 pounds.[2] Images of the new ATR 72-600F in FedEx Express livery is presented in **Figure 8-2**.

Figure 8-2: ATR 72-600F



Source: FedEx Press Release, December 2020; ATR-Aircraft.com 2022

FedEx Express has also ordered 50, with an option for 50 more, of the new clean-sheet-design Cessna 408 SkyCourier aircraft. The SkyCourier is a twin-engine, high-wing turboprop capable of accommodating up to three LD3 containers and a 5,000-pound payload. This is nearly twice the capacity by weight and volume of the Cessna 208; the Cessna 208 is currently the prominent feeder air cargo aircraft. The ability for the SkyCourier to handle pre-loaded containers, coupled with its large cargo door and a flat floor cabin, enables faster loading and unloading. This aircraft is suited to serve small and medium sized markets where loose/bulk loaded cargo is the norm. This aircraft has a range of 1,035 miles and a cruise speed of 230 miles per hour. At maximum takeoff weight (MTOW), this air cargo

[2] https://simpleflying.com/atr-freighter-turboprop-maiden/
https://www.freightwaves.com/news/new-custom-built-atr-72-600-gives-fedex-more-cargo-capacity
https://www.flightglobal.com/airframers/fedex-takes-first-line-built-atr-72-600-freighter/141617.article
https://newsroom.fedex.com/newsroom/fedex-express-further-modernises-fleet-with-delivery-of-first-purpose-built-regional-atr-freighter/

feeder aircraft has excellent short field performance and can operate on runways as short as 3,300 feet.[3] Renderings of the new SkyCourier in FedEx Express livery are presented in **Figure 8-3**.

Figure 8-3: Cessna 408 SkyCourier



Source: Textron Aviation, FedEx Press Release, November 2017

In total, FedEx Express has nearly 700 aircraft in its fleet, including feeders. Approximately 360 aircraft are mainline jets, and the remainder are turboprop feeder aircraft. Most of the small feeder aircraft are owned by FedEx Express and are leased to third-party carriers who operate under their own operating certificates. FedEx Express feeders use a dry lease program; in a dry lease, the contractor leases the aircraft from FedEx Express and provides a crew to operate the aircraft, solely for FedEx Express. All

[3] https://newsroom.fedex.com/newsroom/fedex-express-introduces-new-feeder-aircraft/
https://simpleflying.com/fedex-cessna408-skycourier-delivery/
https://www.freightwaves.com/news/textron-completes-1st-skycourier-feeder-freighter-for-fedex

feeder aircraft operated in U.S. are owned by FedEx Express and are painted with FedEx Express branding.

Single-engine Cessna 208 Caravans are considered the lifeblood of the FedEx Express feeder network. Coupled with the new ATR 72-600F and the Cessna 408 SkyCourier, FedEx Express is increasing its investment in turboprop feeder aircraft, while boosting capacity and generating efficiencies. It is possible that the new Cessna 208 SkyCourier, along with both the new ATR 72-600F and legacy ATR models could operate at airports in Georgia. The ATR 42 has a cargo payload of 9,500 of pounds, and it requires a minimum runway length of about 3,000 feet. The ATR 72-600 has a payload of 15,000 pounds, and its runway length requirement is 4,600 feet. The SkyCourier has a payload of 5,000 pounds with a minimum runway length requirement of 3,300 feet.

FedEx Express is also expanding is fleet of mainline jet cargo aircraft. They are investing in additional Boeing 767-300F and Boeing 777 freighters. These aircraft will be replacing their aging Airbus A300RF, MD-10F, and MD-11F aircraft.

8.2.1.2 UPS

Like FedEx Express, UPS contracts with a number of feeder airlines to extend its service into smaller communities throughout its global network. Unlike FedEx Express, UPS does not own any turboprop, short haul aircraft; their aircraft are chartered from carriers such as Ameriflight, Martinaire, Air Cargo Carriers, Alpine Air, and Wiggins Airways. Since feeder aircraft are not owned by UPS, these aircraft most often do not have UPS branding. A large majority of the UPS feeder air cargo aircraft are Cessna 208 Caravans. Other types of feeder aircraft operated to support UPS operations include the Embraer EMB 120, the Beechcraft 1900, the Beechcraft 99, the Fairchild Swearingen SA-277 Metroliner, and the Short SD3-60. UPS feeder aircraft currently operating in Georgia include the Cessna 208 Caravan, the Beechcraft 1900, and the Short SD3-60.

In 2021, UPS announced plans to purchase the new Alia, which is an electric vertical takeoff and landing (eVTOL) aircraft. The Alia is manufactured by Beta Technologies, a Vermont-based eVTOL manufacturer that has secured 10 initial orders from UPS's Flight Forward program, with options for up to 150 more eVTOLs. The aircraft is expected to have a range of 250 miles and have a cargo payload of up to 7,500 pounds. This aircraft may operate either crewed or uncrewed.[4]

UPS plans to use the Alia as a Small Feeder Aircraft (SFAC) to support regional point-to-point cargo delivery. This aircraft will have the capability to take off and land on property at UPS facilities, creating a "micro air feeder network without the noise or operating emissions of traditional aircraft," according to Beta founder and CEO Kyle Clark.

UPS expects its new fleet to benefit healthcare providers, small and medium-sized businesses, and other companies in smaller communities. The aircraft is expected to fly either one long route or a series of short routes on a single battery charge. UPS will also use Beta's proprietary modular charging stations,

[4] https://about.ups.com/be/en/newsroom/press-releases/innovation-driven/ups-flight-forward-adds-new-aircraft.html

which can recharge the aircraft in less than an hour. UPS is expected to take delivery of its first 10 aircraft in 2024.[5] **Figure 8-4** presents images of UPS Flight Forward initiatives, including the Beta Alia eVTOL, a Beta Technologies charging/landing station, and a last-mile delivery van helper UAS.

Figure 8-4: UPS Flight Forward Images

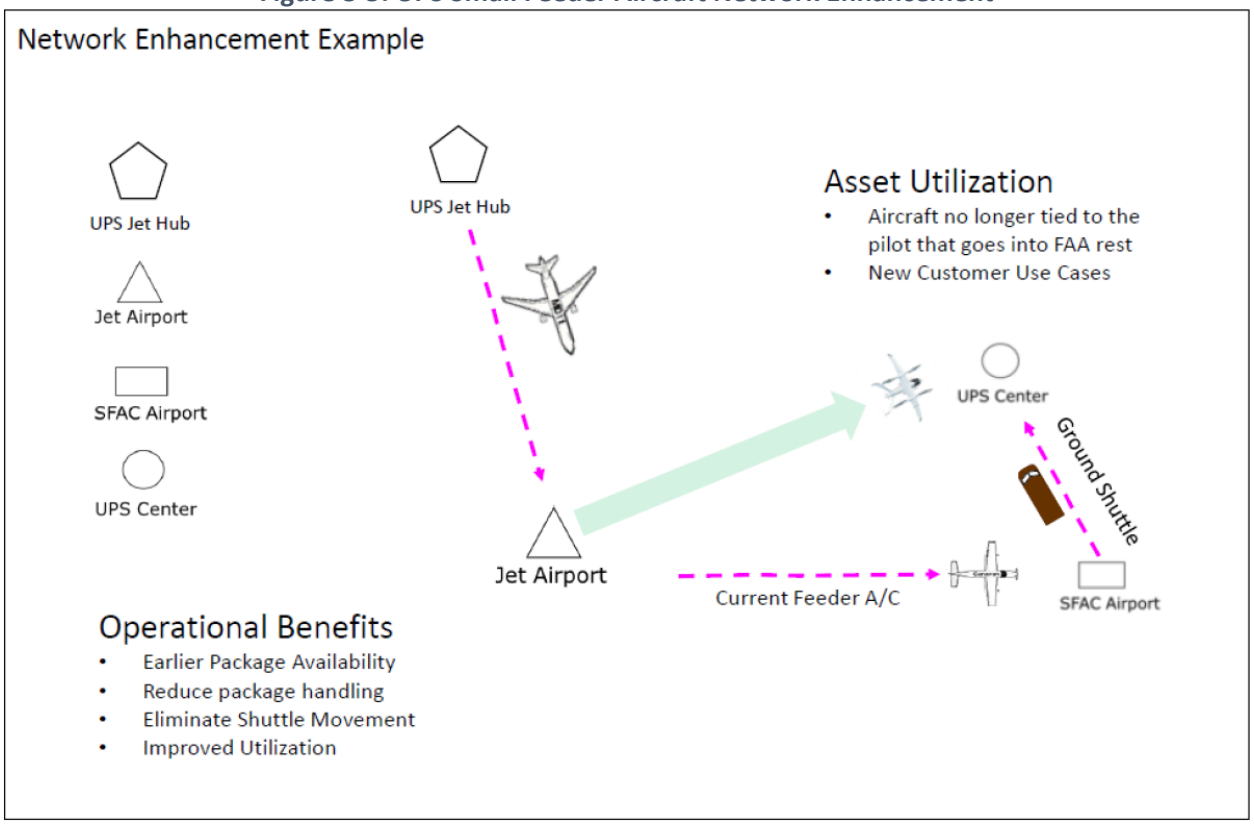


Top-Left: Beta Alia eVTOL; Bottom-Left: Beta Landing/Charging Station; Right: Last-Mile Delivery Helper UAS, Beta Alia eVTOL
Source: UPS Fight Forward, Beta Technologies, April 2021

New eVTOL aircraft technology, such as the Beta Alia eVTOL ordered by UPS, provides an opportunity to change the air cargo delivery model. As shown in **Figure 8-5**, new eVTOL aircraft could fly direct point-to-point flights from a jet hub airport to off-airport UPS facilities. This model could potentially eliminate small feeder aircraft (SFAC) routes from jet hub airports to SFAC airports and/or eliminate the need for ground vehicle transfers.

[5] https://evtol.com/news/beta-technologies-ups-deal-150-evtol-aircraft/

Figure 8-5: UPS Small Feeder Aircraft Network Enhancement



Source: UPS Flight Forward press release, April 2021

It is worth noting that UPS was the launch customer of the Boeing 767-300F, the production freighter version of the Boeing 767-300ER. This aircraft is seen as the future for the UPS jet air cargo fleet. With recent orders, UPS will have a total of 91 of these planes in its fleet.[6] UPS is also the largest operator of the Boeing 747-8F, having taken delivery of the 28th and final one of these planes in April 2022.[7] In total, UPS currently has 290 mainline jet aircraft in its fleet.

8.2.1.3 DHL

Like FedEx and UPS, DHL extends the reach of its network through the use of contracted feeder air cargo operators. In Georgia, DHL contracts with Suburban Air Freight to operate feeder flights between Atlanta (ATL) and Savannah (SAV) using a single-engine turboprop Cessna 208 Caravan. They also operate between ATL and Pensacola (PNS) using a twin-engine turboprop Beechcraft 1900.

In April 2022, it was announced that Suburban Air Freight was being acquired by Alpine Air Express. Alpine Air Express is a Utah-based feeder for FedEx Express, UPS, and the U.S. Postal Service and is one of the largest regional air cargo carriers in the U.S. Its acquisition of Suburban Air Freight will enable this carrier to begin flying for DHL Express to support that air cargo operator's domestic expansion efforts.

[6] https://www.freightwaves.com/news/ups-orders-19-extra-767-freighters-from-boeing
[7] https://aeroxplorer.com/articles/ups-747-takes-delivery-of-final-747-marking-the-end-of-an-era.php

Alpine Air operates a fleet of 85 different feeder aircraft. Alpine Air is pursuing a growth strategy with the conversion of 25 Beechcraft 1900D passenger aircraft to dedicated cargo configurations. Alpine Air Express will likely add more Cessna Caravans to the fleet, which will also enable it to explore autonomous or remotely piloted aircraft using Xwing and Reliable Robotics flight control technology.[8] The aircraft operated by Alpine Air can all operate on runways that are under 5,000 feet long.

In 2021, DHL announced an order for 12 all-electric aircraft called the Alice eCargo from Eviation. With deliveries anticipated in 2024, the Alice is a single pilot aircraft that has a 500-mile range, a 2,500-pound payload, a 250 miles per hour cruise speed, a 2,000 foot-per minute climb rate, and a 32,000-foot service ceiling. It has forward and aft access doors for rapid loading and unloading of its 450 cubic foot cargo hold. The cargo hold will be climate controlled to serve temperature-sensitive shipments such as pharmaceuticals. DHL anticipates using the Alice on routes where piston and turboprop aircraft are currently used, initially focusing operations in the Southeast and West Coast of the United States.[9] While still in development, the Alice is expected to have a 2,600-foot takeoff distance and a 2,040-foot landing distance.[10] Images of the new Eviation Alice eCargo aircraft are presented in **Figure 8-6**.

Figure 8-6: Eviation Alice eCargo Aircraft in DHL Livery



Source: DHL press release, August 2021

While DHL's expanded routes using new electric Alice eCargo aircraft or conventional Alpine Air Express/Suburban Air Freight aircraft are not finalized, DHL does plan to expand in the southeast. This could result in expanded geographic coverage for air cargo services in Georgia.

DHL is also investing in Boeing 777 freighters, having placed an order for six additional planes in March 2022.[11] In total, DHL operates over 260 dedicated air cargo aircraft with 17 partner airlines; they operate over 600 daily flights across 220 countries and territories.[12]

[8] https://www.freightwaves.com/news/fedex-ups-feeder-operator-acquires-small-cargo-airline
[9] https://www.dhl.com/global-en/home/press/press-archive/2021/dhl-express-shapes-future-for-sustainable-aviation-with-the-order-of-first-ever-all-electric-cargo-planes-from-eviation.html
[10] https://www.eviation.co/aircraft/
[11] https://www.freightwaves.com/news/dhl-commits-to-buy-6-more-777-cargo-jets-from-boeing
[12] https://www.dhl.com/global-en/home/press/press-archive/2021/dhl-express-continues-to-strengthen-its-global-aviation-network-with-the-purchase-of-eight-additional-boeing-777-freighters.html

8.2.1.4 Summary of Integrator Aircraft Acquisition Plans

Review of aircraft acquisition plans by the three leading integrated express carriers shows that all are planning to bring additional smaller feeder type air cargo aircraft into their operational fleets. Review shows that feeder type aircraft that will be purchased by the integrated express carriers, along with the types of feeder turboprop air cargo aircraft that currently operate at the airports serving Columbus, Statesboro, Savannah, and Swainsboro, can all operate on runways of 5,000 feet or less. A summary of integrated express feeder aircraft currently operating in Georgia, along with new feeder aircraft with the potential to operate in Georgia in the future, is presented in **Table 8-1**.

Table 8-1: Summary of Relevant Feeder Aircraft

Manufacturer	Model	Cargo Aircraft Type	Associated Integrated Express Carrier	Georgia Airports with Scheduled Operations	Approximate Cargo Payload (pounds)	Approximate Minimum Takeoff Runway Length Required (feet)
New Cargo Feeder Aircraft with the Potential to Operate at Georgia Airports						
ATR	72-600F	Twin-Engine Turboprop Feeder	FedEx	N/A	15,000	4,600
Cessna	408 SkyCourier	Twin-Engine Turboprop Feeder	FedEx	N/A	5,000	3,300
Beta Technologies	Alia	Electric Vertical Takeoff and Landing Feeder	UPS	N/A	7,500	N/A (VTOL)
Eviation	Alice eCargo	Electric Twin-Engine Propellor Feeder	DHL	N/A	2,500	2,600
Existing Cargo Feeder Aircraft Operating at Georgia Airports (or in Adjacent States)						
ATR	42	Twin-Engine Turboprop Feeder	FedEx, Amazon	None	9,500	3,000
Cessna	208 Caravan	Single-Engine Turboprop Feeder	FedEx, DHL, UPS	ATL, ABY, CSG, TBR, SAV	2,800	2,500
Beechcraft	1900	Twin-Engine Turboprop Feeder	DHL	ATL	4,720	3,700
Short	SD3-60	Twin-Engine Turboprop Feeder	UPS	SBO	5,600	4,100

Source: DHL, FedEx, UPS press releases, Jviation, April 2022

This finding confirms that Georgia has many existing airports that can meet the runway infrastructure requirement of smaller feeder aircraft that carry air cargo in support of the major integrated express carriers. Furthermore, Amazon Air is another carrier with a growing fleet of contracted aircraft, including ATR 72-500F and Boeing 737-800BCF (Boeing passenger converted freighter). Both aircraft have relatively shorter runway length requirements (see **Table 7-3)**.

Pilotless aircraft (drone) technology and piloted eVTOL development are moving forward rapidly. Hydrogen-powered aircraft development is also being explored. In the future, new innovative aircraft may

become a highly important factor in air cargo operations. Planning for future air cargo at the individual airport level needs to consider these developments as well as the infrastructure required to support these aircraft types. Master plans should take into consideration actions needed to accommodate both drone and eVTOL operations and their related infrastructure needs.

8.2.2 Prototype Air Cargo Facilities

The bulk of air cargo, both domestically and internationally, will continued to be carried by jet aircraft. With growing e-commerce demand, however, integrated express carriers, as reported in the previous section, have fleet diversification plans that will provide flexibility and network expansion potential. This section focuses on providing a high-level overview of facilities that might be needed to support the expansion of air cargo carrier networks in Georgia.

Georgia's existing scheduled air cargo service is focused on six airports (this number includes ATL). It is possible that growing air cargo demand could be served at these existing airports by increasing flight frequency or by increasing the size of the air cargo aircraft serving each of the existing airports. It is also possible that carriers may opt to expand their networks to provide the level of service needed to meet customer demand and expectations. Where such expansion might take place is speculative. The purpose of this section is to identify facilities that might be appropriate to support future growth in air cargo activity.

As **Chapter 7** documented, airports in Georgia whose scheduled air cargo service is currently provided by a feeder carrier using smaller turboprop aircraft have minimal dedicated air cargo facility needs. In all instances, the feeder carrier essentially only requires sufficient operating and maneuvering space on an aircraft apron. Most often, airports in Georgia now served by smaller air cargo feeders have FBO services, on-site weather reporting equipment, and a precision approach to include horizontal and vertical guidance.

Feeder aircraft that support the air cargo industry have a wide range of runway length requirements. As discussed in the previous section and documented previously in **Table 7-3**, there are many types of feeder air cargo aircraft that can operate on a variety of runway lengths. Next generation air cargo feeder aircraft discussed previously in this chapter can all operate on shorter runways. This finding indicates that there are many airports in Georgia that already have the basic infrastructure needed to accommodate air cargo feeder aircraft.

While more limited facilities are needed to support only one daily flight for a feeder air cargo aircraft (which is the current operational level at Columbus, Swainsboro, and Statesboro), more significant volumes of air cargo tonnage could generate the need for more extensive facilities. Examining air cargo volumes at airports in the Southeast, baseline air cargo tonnage levels of 10,000, 3,500, and 2,200 were selected as proxies for identifying air cargo facilities needed to support varying levels of air cargo activity.

These activity levels roughly correspond to one daily takeoff and landing on weekdays at 80 percent of maximum payload (to account for "bulking out" volume-wise) for each of the following air cargo aircraft:

- Boeing 757-200 – 10,000 metric tons
- ATR 72-600F – 3,500 metric tons
- ATR 42 – 2,200 metric tons

These levels of annual throughput air cargo tonnage and their corresponding facility requirements, per ratios in the Airport Cooperative Research Program (ACRP) air cargo facilities model, are presented in **Table 8-2**. Although the ACRP throughput ratios do generate apron space requirements, apron areas are most often determined by aircraft type.

Table 8-2: Example/Prototype Cargo Airport – Facility Needs by Tonnage Throughput

Example/Prototype Airport	**High Tonnage Scenario** *(One daily 757-200 takeoff and landing Monday - Friday at max payload)*	**Medium Tonnage Scenario** *(One daily ATR 72-600F takeoff and landing Monday-Friday at max payload)*	**Low Tonnage Scenario** *(One daily ATR 42 takeoff and landing Monday-Friday at max payload)*
Annual Tons (Metric Tons)	**10,000**	**3,500**	**2,200**
Annual Tons (Short Tons)	**11,020**	**3,860**	**2,430**
FACILITY COMPONENT	**Required Space to Meet Demand**	**Required Space to Meet Demand**	**Required Space to Meet Demand**
Cargo Building Space in Square Feet	11,020	3,860	2,430
Total Apron in Square Feet	132,675	63,516	61,028
Truck and Auto Parking in Square Feet	19,836	6,948	4,374
Total Space in Square Feet	163,531	74,324	67,832
Total Space in Acres	3.8	1.7	1.6
Total Truck Docks/Doors	7.3	2.6	1.6

Source: *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development*

As shown in the table above, baseline cargo facility requirements range from 2,400 square feet of building and 61,000 square feet of apron space with an ATR 42 in the low tonnage scenario, to 11,000 square feet of building space and 133,000 square feet of apron space when using a Boeing 757-200 in the highest tonnage scenario.

When planning for cargo apron space, there are two primary methods for determining space requirements: a throughput metric based on annual tonnage handled or a need for peak-period aircraft parking. The estimated apron space requirements for a prototype cargo airport, as shown in **Table 8-2**, are based on a calculation of average tons per square foot ratios established by *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development.* These ratios are derived from actual air cargo facilities at dozens of airports across the U.S. and are intended to assist in providing an estimate of facility requirements in a preliminary design stage. The apron area ratios convert annual tonnage flows into estimated space requirements for both cargo aircraft parking and ground support equipment (GSE). When planning an actual cargo apron, there are a wide range of specific considerations, including:

- Aircraft parking distance from building
- Aircraft parking angle relative to building

- Aircraft fleet mix to be used (i.e., aircraft sizes, nose-loading aircraft, nose gear position relative to aircraft nose, wingtip separation, blended wing/winglets)
- Number of aircraft parked simultaneously
- Power or tug aircraft movement
- Presence of service roads
- Number and types/sizes of GSE

When considering only aircraft parking space requirements, the total space required takes into consideration aircraft wingspan and overall length for the largest aircraft type expected to operate at the airport. Buffer space is also included in the total square footage requirements to separate aircraft from other aircraft as well as from buildings and service lanes. While the FAA does not specify cargo apron design standards, Airports Council International – North America (ACI-NA) and Airlines for America (A4A) do provide apron facility guidelines.

Table 8-3 identifies aircraft parking space requirements by Airplane Design Group (ADG) for several common air cargo aircraft. ADG is an FAA-defined grouping of aircraft types based on wingspan and tail height with six groupings represented by Roman numerals I through VI. ADG pairs with Aircraft Approach Category (AAC), which is aircraft approach speed-based, to determine an airport's Airport Reference Code (ARC). These space requirements are designed to ensure aircraft components (wings, tail, fuselage) do not conflict with object free areas for adjacent runways or taxiways. The total apron area (in square feet) for each aircraft is calculated by multiplying aircraft wingspan (plus 25 feet) by aircraft length (plus nose tail buffers). The cargo apron parking space requirements shown in **Table 8-3** are averages for multiple aircraft types in each ADG.

Table 8-3: Prototype Cargo Airport – Aircraft Parking Apron Need by Aircraft ADG

Example Cargo Aircraft	FAA ADG	Parking Space Requirements by Aircraft ADG (square feet)
Beechcraft 99, Cessna 208	A-II	5,100
De Havilland Canada Dash 8	A-III	14,000
ATR 42, Beechcraft 1900, Embraer 120, Short SD3-60	B-II	10,100
ATR 72, Fairchild Swearingen SA227DC/Metroliner	B-III	11,400
Boeing 727-200, Boeing 737-700	C-III	36,100
Airbus A300, Boeing 757-200	C-IV	51,700
Airbus A330-200, Boeing 777-200	C-V	72,000
Boeing 767-300, McDonnell-Douglas MD-11	D-IV	58,700
Boeing 747-400, Boeing 777-300	D-V	76,200
Boeing 747-8F	D-VI	100,000

Source: FAA Advisory Circular 150/5300-13B, Airport Design, *ACRP Report 143: Guidelines for Air Cargo Facility Planning and Development*

8.2.3 Available Airport Infrastructure

Facilities that are dedicated to serving air cargo activity vary in their scope based on aircraft, tonnage carried, and carrier operating patterns. If integrated express carriers were to expand to other airports in Georgia, the information provided in this section provides a range of air cargo facilities that might be associated with accommodating expanded air cargo demand. This information is provided to help airports have a better understanding of facility development that could be needed to support scheduled air cargo activity. Setting expectations for development that might accompany various levels of scheduled air cargo demand help airports evaluate their ability to function as an air cargo facility.

As this study concluded, there are airports in Georgia that currently serve a scheduled integrated express carrier service without dedicated air cargo infrastructure. With growth in air cargo, especially as it relates to e-commerce, it worth understanding the state's ability to respond to growth or expansion in air cargo demand.

This study identified and mapped nearly 900 potential generators of air cargo demand and compared the location of these demand generators to areas of the state currently within a 60-minute drive-time of an airport served by an integrated express carrier. Through GIS analysis, **Chapter 5** of this study identified several "gap areas". These are areas in Georgia identified as having known air cargo generators that are beyond the typical speed and distance parameters considered reasonable by integrated express carriers. Analysis also showed that there are many airports in or near these gap areas that might support expanded air cargo service, should the integrated express carriers have the need to expand their route networks in Georgia.

As identified in **Chapter 7** of this report, there are 44 airports that are either in the identified gap areas or in other parts of the state that have existing facilities that could be used to support feeder air cargo aircraft. These 44 airports, including the 25 airports that were identified as part the Gap Area Analysis in **Chapter 5**, are mapped in **Figure 8-7**.

Figure 8-7 shows airport locations that may be the most viable for meeting expanded air cargo activity in Georgia. **Figure 8-7** shows the following:

- Airports that are in or near gap areas (**Chapter 5**) that have the "highest" number of attributes for supporting air cargo activity. Airports with a high ranking have facilities and services and a setting that makes them potentially attractive for air cargo expansion. These airports are also located near clusters of air cargo demand generators that are beyond current speed/distance service areas for integrated express carriers. When 21 different factors were evaluated and scored, 4 out of 25 gap area airports received a "high" ranking. These 4 "high" scoring airports are presented in **Table 8-4** along with the corresponding evaluation criteria. These airports have adequate facilities and services to accommodate feeder service as they exist today.
- Additional airports in or near the gap areas rank as medium or low for their air cargo attributes. This ranking does not preclude one of these airports from being selected by a scheduled air cargo carrier for route expansion. The medium or low ranking reflects current attributes of airports in these locations as they relate to serving air cargo demand. There are 21 airports

associated with the gap areas (**Chapter 5**) whose current attributes resulted in a medium or low ranking.

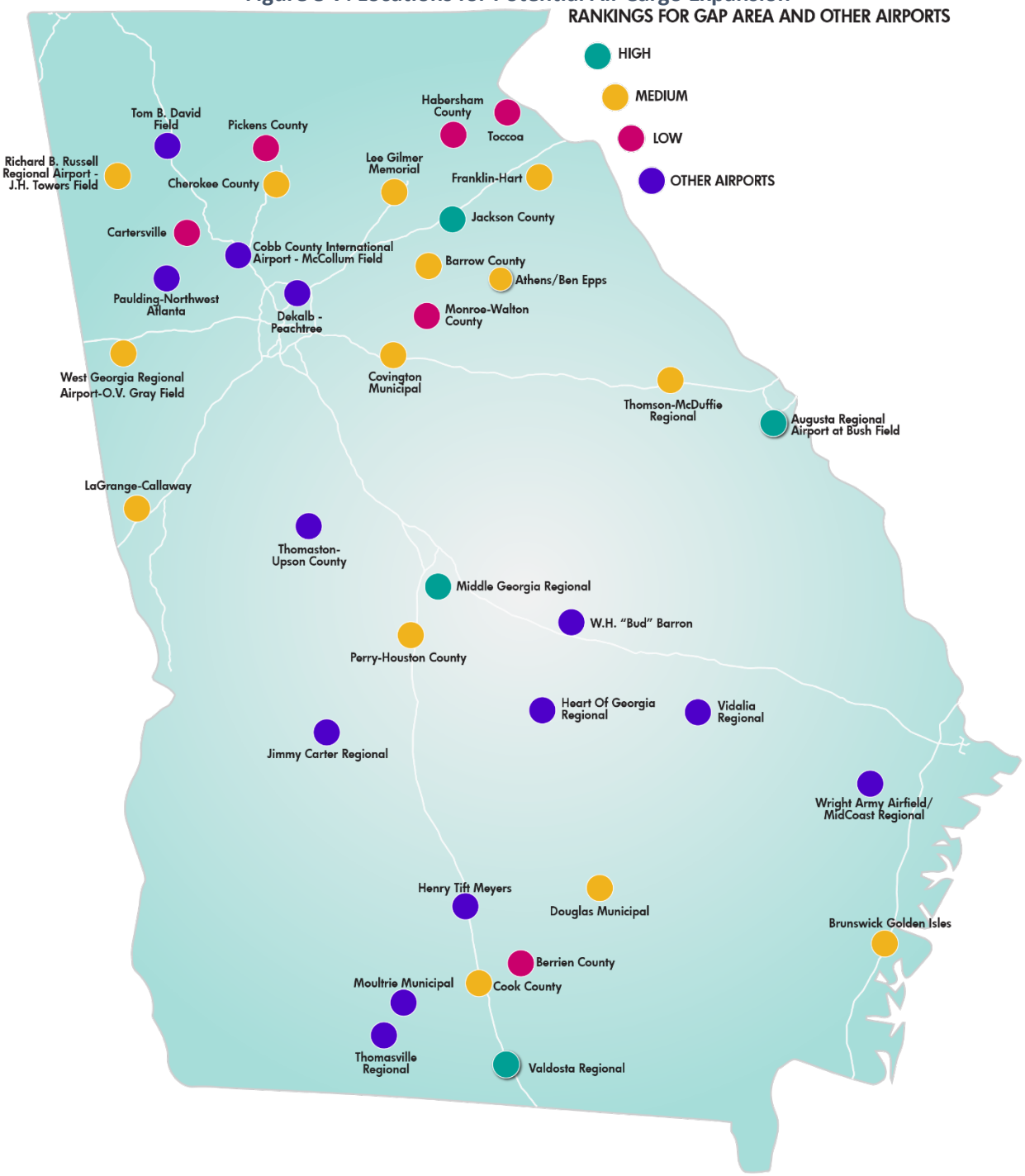
- Additional airports located outside of the identified gap areas are also shown on **Figure 8-7**. These 19 airports are not necessarily near this study's identified clusters of air cargo demand generators, but these airports have existing airfield infrastructure to support, on a more immediate basis, air cargo aircraft.

Table 8-4: Suitability of Gap Area Airport to Serve Air Cargo Feeder Aircraft

Gap Area Analysis - High Scoring Criteria	Augusta Regional Airport at Bush Field (AGS)	Jackson County Airport (JCA)	Middle Georgia Regional Airport (MCN)	Valdosta Regional Airport (VLD)
Primary Runway Length (5,000 feet)	Yes	Yes	Yes	Yes
Apron Area (200,000 Square Feet)	Yes	Yes	Yes	Yes
Full-Parallel Taxiway System	Yes	Yes	Yes	Yes
Higher Concentration of Nearby Industry Generators	Yes	Yes	Yes	Yes
Vertical Guidance Approach, Weather Reporting, FBO, Jet Fuel	Yes	Yes	Yes	Yes
Existing Ad Hoc Cargo Operations	Yes	Yes	Yes	Yes
Proximity to Nearest Interstate Access Point (≤5 Miles)	Yes	Yes	Yes	Yes
Last-Mile Road Quality (Good Access Roads; Proximity to Limited Access Highway; Limited or No Residential Roads)	Yes	Yes	Yes	Yes
Land Area Available for Potential Development	Yes	Yes	Yes	Yes
Limited Residential Area in Vicinity of Airport	Yes	Yes	Yes	Yes

Source: GDOT Aviation Programs, FAA Records, Airport Interviews, Jviation, April 2022

Figure 8-7: Locations for Potential Air Cargo Expansion



Source: FAA 5010 Records, GDOT Aviation Programs, FAA Flight Records, Jviation, April 2022

When locational information in **Figure 8-7** is considered, the take-away is that Georgia has airport infrastructure to respond to the need for near term expansion of feeder air cargo activity should this need arise. The state's growing economy and road congestion in major urban areas, however, portends possible expansion of air cargo carrier networks. With facilities that are in already place, combined with recommended improvements at airports with existing scheduled air cargo service, Georgia is positioned to meet growth in air cargo activity as it is currently projected.

8.3 Facility Needs and Costs for Georgia's Existing Scheduled Air Cargo Airports

The previous chapter reviewed existing facilities and the operating environment for airports with scheduled air cargo service provided by an integrated express carrier. Future facility needs for these airports are determined by considering:

- The adequacy, condition, and efficiency of existing facilities
- Current carrier operational patterns and needs
- Projections of future demand
- Input from airport management and air cargo carriers
- Input from an ACRP air cargo facility planning model

Currently, scheduled air cargo activity in Georgia is accommodated at three commercial airports serving Albany, Columbus, and Savannah, and at two general aviation airports serving Swainsboro and Statesboro. Many improvements identified to support current and projected air cargo demand are associated with Georgia's airports that are presently served by air cargo jets. Airports serving Albany and Savannah are identified as having the greatest need for improved facilities to serve current and future air cargo demand.

Chapter 7 of this report provides detailed information on:

- Current operating patterns for the scheduled air cargo carriers
- Current facilities in place to accommodate air cargo activity
- Applicable projects deemed appropriate to accommodate current and projected air cargo demand as provided by airport management and/or specific air cargo carriers

As study analysis shows, scheduled air cargo operators who provide feeder service and fly smaller turboprop aircraft have minimal needs for dedicated facilities to support their air cargo operations. Air cargo operators who serve the airports in Columbus, Statesboro, and Swainsboro require only sufficient space on the airport's apron to support their operations. For the feeder operators, trucks or vans are typically driven on to the airport's aircraft apron and parked directly next to the air cargo aircraft for loading and unloading.

The following section identifies facility improvements, by airport, identified to meet either current or future air cargo demand. This section also provides cost estimates to support these improvements. It is important to note that **Chapter 7** identifies other peripheral or off-airport access constraints that are beyond the scope of this study to evaluate options or to estimate costs to address these constraints. These include the following:

- Hartsfield-Jackson Atlanta International Airport
    - Expanded truck maneuverability at North Cargo Area (traffic flow reconfiguration of Perry J. Hudson Road)
    - Traffic flow improvements at I-285 and Riverdale Road and I-85 and Riverdale Road interchanges due to significant traffic flow congestion and delay.
    - MARTA bus service to South Cargo Area (employee staffing levels)
    - Employee badging processing time (employee staffing levels)
    - Allow air cargo shipments cleared by customs to be held-off airport (to avoid delay related to airport warehouse capacity, understaffed facilities, and truck congestion)
- Savannah-Hilton Head International Airport
    - Frequent traffic flow disruptions due to at-grade rail crossings on Gulfstream Road and Dean Forest Road. Advance warning system or CSX rail schedule desired, at a minimum. Rail traffic related to busy Port of Savannah.
    - Reconfiguration of I-95 and Exit 104 interchange due to significant traffic congestion and delay. "Flyover" ramps preferred by airport. Diverging Diamond Interchange or basic widening strongly opposed by airport.

Options to evaluate these ground access constraints are not analyzed and cost estimates were not developed as part of this effort. Additional follow-on study is needed to identify suitable alternatives for addressing any ground access constraints as they relate to the efficient movement of air cargo to and from Georgia airports.

8.3.1 Facility Improvements and Estimated Costs

The goal of the Georgia Statewide Air Cargo Study is to identify any improvements or actions needed to support the activities of scheduled air cargo carriers. The primary focus of the study is on the airports served by the three major integrated express carriers FedEx Express, DHL, and UPS. These carriers have both domestic and international service and have robust networks of facilities, aircraft, and ground vehicles. These carriers account for most of the scheduled air cargo operations at Georgia airports, and they are the operators most likely to expand or add new service.

As discussed in **Chapter 7**, five Georgia airports with existing scheduled air cargo service provided by an integrated express carrier were evaluated for facility needs; these airports are:

- Columbus Airport (CSG) – Feeder/Turboprop Cargo Airport
- East Georgia Regional Airport (SBO) – Feeder/Turboprop Cargo Airport
- Savannah/Hilton Head International Airport (SAV) – Mainline/Jet Air Cargo Airport
- Southwest Georgia Regional Airport (ABY) – Mainline/Jet Air Cargo Airport
- Statesboro-Bulloch County Airport (TBR) – Feeder/Turboprop Cargo Airport

At three of these five[13] Georgia airports (CSG, SBO, and TBR), scheduled integrated express service is provided by small turboprop feeder aircraft; as a result, facility needs are limited. Unless aircraft size or service frequencies increase, facilities at these airports are expected to be adequate.

Other Georgia airports served by larger scheduled integrated express jet air cargo aircraft include SAV and ABY. Airport and carrier input, along with study analysis, identified that these airports need additional facilities to support existing and future air cargo demand. As documented in this report, SAV is in the midst of expanding its air cargo facilities. While plans are already in motion to expand cargo buildings and apron areas, SAV also faces ground access constraints which limit the efficiency of air cargo operators serving this airport. ABY serves as a major distribution center for UPS, and the airport's level of activity suggests that improvements are appropriate to serve current and future demand. Input from UPS indicates there is an immediate need for an expanded aircraft apron. Additional expansion to the airport's air cargo building, truck loading and parking areas, and primary runway length are also needed.

A general summary of improvements for Georgia airports served by an integrated express air cargo operator is presented in **Table 8-5**. Facility quantities and estimated costs for facility improvements are also included.

[13] While Hartsfield-Jackson Atlanta International Airport (ATL) is also served by a wide variety of specialty, all cargo, and integrated express carriers, future air cargo facility requirements for this international cargo gateway are addressed directly by the airport. A high-level overview of anticipated improvements to meet future air cargo demand at ATL is incorporated into this study, but costs for making those improvements are not included in this study.

Table 8-5: Summary of Air Cargo Facility Improvements and Estimated Costs

Associated City	Airport	FAA ID	Recommended Improvement	Estimated Cost
Albany	Southwest Georgia Regional Airport	ABY	Build 50,000 SF for aircraft parking and occasional GSE staging to allow more efficient use of existing air cargo apron. Includes estimated cost for environmental assessment.	$3,145,000
Albany	Southwest Georgia Regional Airport	ABY	Replace malfunctioning ASOS to provide reliable weather reporting.	$300,000
Albany	Southwest Georgia Regional Airport	ABY	Build 8-acre (350,000 SF) of additional cargo apron. Should be built in two-separate phases – 4 acres initially, then once demand warrants, build the second phase of 4 additional acres. Includes estimated cost for environmental assessment. Cost shown is for total 350,000 SF.	$10,050,000
Albany	Southwest Georgia Regional Airport	ABY	Construct new cargo building after full 8-acre cargo apron expansion is completed.	$10,000,000
Albany	Southwest Georgia Regional Airport	ABY	Expand parking lot by 20,000 SF after full 8-acre apron expansion is completed.	$265,000
Albany	Southwest Georgia Regional Airport	ABY	1,500' Runway extension of RW 05 end to allow larger cargo aircraft to effectively operate at ABY. Includes estimated cost for environmental assessment.	$6,500,000
Subtotal for Southwest Georgia Regional Airport (ABY)				*$30,260,000*
Savannah	Savannah/Hilton Head International Airport	SAV	Construct air cargo apron as part of new cargo development area (funded and construction underway; funding includes $1.1M of Supplemental Discretionary, $1.7M of Discretionary, and $5.0M of Entitlement)	$7,800,000
Savannah	Savannah/Hilton Head International Airport	SAV	Construct air cargo facility as part of new cargo development area (no specific funding decisions have been made yet)	$50,000,000
Savannah	Savannah/Hilton Head International Airport	SAV	Extend stub taxiway (Taxiway G) and build bridge over Gulfstream Road to allow two-way taxiing to new air cargo development (no funding has been awarded yet; airport pursuing AIP and PFC funding for this project).	$13,000,000
Subtotal for Savannah/Hilton Head International Airport (SAV)				*$70,800,000*
Statesboro	Statesboro-Bulloch County Airport	TBR	Apron rehabilitation (mill and overlay)	$1,300,000
Swainsboro	East Georgia Regional Airport	SBO	Apron rehabilitation (mill and overlay)	$1,300,000
Sum of Estimated Costs for All Identified Airport Projects				**$103,660,000**

Source: GDOT Aviation Programs, Airport Interviews, Aulick Engineering, Jviation, April 2022

As shown in **Table 8-5**, the total cost estimated for projects at ABY, SAV, TBR, and SBO are approximately $103.7million. Most of this cost is associated with SAV, which makes up $70.8 million of the total estimated cost for its new cargo development (apron and building), as well as the taxiway extension and taxiway bridge projects. Estimated costs for ABY are $44.6 million for its two apron

expansions, a runway extension, weather reporting improvements, and other future air cargo facility-related improvement projects. Lastly, TBR and SBO both have estimated costs of $1.3 million for an apron mill and overlay. These are high-level estimates that should be used for planning purposes only. Actual costs will depend on final design, engineering, environmental mitigation, and material costs when the projects are implemented.

8.3.2 Funding for Air Cargo Improvements and Potential Returns from Investment

All five airports in Georgia that have existing scheduled air cargo service are part of the federal airport system. Therefore, in accordance with guidelines in the FAA's Airport Improvement Program (AIP), these airports can seek FAA funding for eligible projects. Eligible FAA projects typically included those that are non-revenue generating and are non-exclusive in terms of their use. Before Georgia airports with scheduled air cargo can apply for FAA funding, projects need to be depicted on an approved airport master plan/airport layout plan (ALP). It is also worth noting that FAA has a priority system for distributing funding. When funding projects, FAA gives a higher funding priority to projects included in the following categories safety, security, reconstruction, capacity, and standards.

GDOT can participate in funding public-use facilities at commercial service airports, assuming GDOT has sufficient funding. It is worth noting that GDOT experiences significant funding shortfalls each year when funding requests are compared to funds available for distribution. Current GDOT policy restricts state funding as it relates to buying land, funding revenue-producing projects, or reimbursing airports for previously completed projects. GDOT funding also is not typically available for facilities that are considered exclusive use. The biggest obstacle for state funding is undoubtedly the shortfall that GDOT faces each year as it relates to being able to respond to funding requests from all 103 public-use airports in the Georgia airport system.

Private and third-party investment could be a consideration for addressing the air cargo development projects identified in this chapter.

Improving the existing air cargo airports would have a number of potential economic benefits.

Project Implementation – over timeframe in which the projects would be implemented, the following would be realized; 1,406 jobs would be supported, and these jobs would have a cumulative salary of $53.7 million. An estimated $148.9 million in materials would be purchased to implement the projects, and $202.6 million in total annual economic activity would be realized from direct, indirect, and induced impacts.

On and Off-Airport Benefits – investment would enable airports to accommodate expanded air cargo operations, both in terms of the size of the aircraft they accommodate and the frequency at which they operate. These increases would support additional air cargo related jobs both on and off-airports in Georgia. Identified improvements would support Georgia's continued position as one of the top ranked states in the U.S. for doing business.

Airport Revenue Streams – increased air cargo activity would support higher airport revenue streams in the form of increased fuel sales, additional landing or other use fees, and FAA entitlement funding for enplaned air cargo.

These benefits should be considered as funding sources for the identified projects are sought.

8.4 Summary

Airports in Georgia with the greatest need for improved air cargo facilities are those serving Albany, Atlanta, and Savannah. As noted in this report, Savannah has already identified and is in the process of implementing a plan to expand its facilities to accommodate current and future air cargo activity. Albany will soon be updating its master plan, and refining facility needs and phasing for implementing new/expanded air cargo facilities will be a major focus of that plan. Atlanta has identified a new on-airport site to accommodate air cargo operations and is in the process of identifying a developer. Development projects included in this report are needed to meet both current and future air cargo demand.

It is important to note that the air cargo carriers themselves and changing technology will determine how and where air cargo activity in Georgia expands. Like scheduled commercial airline service, mainline jet air cargo networks in the U.S. may be relatively mature. The nature of air cargo, which often travels long distances by truck to and from airports, means that airport cargo catchment areas are often large and there is competition between airports for cargo traffic. As discussed in the case studies of Chapter 5, air cargo operators do expand their operations to additional airports when circumstances dictate, depending on their individual needs.

As also documented in the case studies, most often when air cargo carriers expand their operating networks, it is through a collaborative effort between the airport/community and the individual air cargo carrier. As this report has discussed, e-commerce is the fastest growing segment of the air cargo industry, and there are high customer expectations for timely delivery of goods purchased on the Internet. Integrated express carriers that operate in Georgia are planning to expand the types of feeder aircraft they use, in part to meet customer expectations for e-commerce deliveries. This report has confirmed that there is existing airport infrastructure throughout Georgia that is available to support most types of existing and future feeder aircraft that operate in support of the integrated express carriers.

Airports in Albany, Atlanta, and Savannah that serve mainline air cargo jets are all planning for expansion to address not only longer-term air cargo demand, but also to resolve current operating constraints. Implementation of air cargo development plans at these airports is important to ensuring that Georgia has facilities in place that can meet the needs of existing and future air cargo demand. The statewide study has also shown that there are many airports near air cargo demand generators that were identified and mapped during study analysis. These airports, in combination with other existing airport infrastructure currently available in Georgia, provide air cargo expansion opportunities, particularly but not exclusively for feeder type air cargo aircraft.

As part of this statewide study, GDOT established both a study Steering Committee and a Project Focus Group. Members of both groups included representatives of integrated express carriers, airport representatives, and others knowledgeable of air cargo operations and needs in Georgia. It is recommended that from these two groups that GDOT identify interested individuals who can meet virtually on a regular basis to discuss:

- Growth/development in Georgia that can influence air cargo demand
- Progress to implement improvements at airports currently served by integrated express carriers
- Air cargo expansion opportunities in Georgia

Establishing an Air Cargo Working Group as a follow-on to this study to monitor and discuss the air cargo industry will help Georgia stay abreast of near and longer-term air cargo opportunities and development needs. Potential roles for an Air Cargo Working Group follow:

- Help Georgia airports stay informed on changes and strategic issues in the air cargo industry.
- Provide a proactive dialog for Georgia's air cargo stakeholders.
- Act as a resource for air cargo operators seeking expansion opportunities in Georgia.
- Facilitate interchange of information on modal developments that might impact air cargo transport.
- Advocate for air cargo funding from the state legislature to advance this mode of transportation to keep Georgia #1 in Business.
- Provide input for local, regional, and statewide planning efforts for emerging air cargo technology such as eVTOL, charging stations and associated ramp space, and vertiports.

As this study has revealed, end customers for e-Commerce deliveries, whether they be businesses or residents, require increased speed and reliability in deliveries. E-commerce is different from traditional air cargo particularly because it is characterized by small packages; e-commerce requires ultra-efficiency of airport facilities, especially in an environment of escalating costs driven primarily by fuel. This type of required efficiency is one of the reasons that Savannah has undertaken a complete revamp of their air cargo facilities.

Fueled by increases in e-commerce driven by the enduring COVID-19 pandemic, air cargo has and will continue to play an increasingly important role in delivering goods to both Georgia businesses and residents. Bottlenecks in more traditional shipping channels have also supported an increase in air shipments as the preferred means of transport.

It is important for GDOT to keep up with changes in the air cargo industry so that growth opportunities for Georgia airports can be appropriately identified. Infrastructure improvements found in this study are important to supporting the state's competitiveness for air cargo growth and expansion. Resiliency and sustainability also are important considerations in the aviation industry, including the air cargo segment. As this study has documented, technological advancements such as electric-powered eVTOL aircraft, pilotless aircraft, and UAS (drones) in various size categories and autonomy levels will most likely have a future role in moving cargo. It is important for airports now serving scheduled air cargo operations, as

well as other potential air cargo airports, to be aware of changing technology and its potential impacts on facility needs. By establishing a formal Air Cargo Working Group, this group could serve as important resource especially for smaller airports that do or could accommodate air cargo operators.