PARAS PROGRAM FOR APPLIED RESEARCH IN AIRPORT SECURITY

PARAS 0052 August 2024

# Planning and Design Considerations for International Arrivals Facilities

## Implementing CBP's Airport Technical Design Standard

**National Safe Skies Alliance, Inc.**

Sponsored by the Federal Aviation Administration

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**NOTICE**

The project that is the subject of this report was a part of the Program for Applied Research in Airport Security (PARAS), managed by Safe Skies and funded by the FAA.

The members of the technical panel selected to monitor this project and to review this report were chosen for their special competencies and with regard for appropriate balance. The report was reviewed by the technical panel and accepted for publication according to procedures established and overseen by Safe Skies.

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Problem Statements, which are descriptions of security problems or questions for which airports need guidance, form the basis of PARAS projects. Submitted Problem Statements are reviewed once yearly by the Safe Skies Oversight Committee, but can be submitted at any time.

A project panel is formed for each funded problem statement. Project panel members are selected by Safe Skies, and generally consist of airport professionals, industry consultants, technology providers, and members of academia—all with knowledge and experience specific to the project topic. The project panel develops a request of proposals based on the Problem Statement, selects a contractor, provides technical guidance and counsel throughout the project, and reviews project deliverables.

The results of PARAS projects are available to the industry at no charge. All deliverables are electronic, and most can be accessed directly at www.sskies.org/paras.

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# EXECUTIVE SUMMARY

This document was developed to provide guidance on the application of the Airport Technical Design Standard (ATDS) to the construction or renovation of Federal Inspection Services (FIS) facilities. The ATDS is a set of technical requirements issued by US CBP with a three-year update cycle. Prior to this publication, the update cycle was every five years.

The guidebook provides the tools that an airport operator can use to proceed to develop an FIS that not only suits the needs of the airport operator but the needs of other stakeholders who operate in or about the FIS. It sets forth information on a varied set of considerations that span decision making associated with planning, coordination, strategies, effecting changes, compliance, and more. The focus of the six sections of the guidebook is described briefly below.

**Section 1** introduces the reader to the ATDS and CBP's characterization of the ATDS as mandatory once an airport's requirements are determined. The section provides a brief overview of the ATDS and discusses what may be needed to tailor an FIS build or renovation to a particular airport.

**Section 2** focuses on key trends that may impact passenger and baggage processing within the FIS. Specifically, this section highlights the role of technologies that can potentially reduce the amount of space requirements. The section addresses the trend of collocating general aviation facilities with commercial airports and fostering hub connectivity improvements.

**Section 3** describes the process of approvals for the FIS as governed by the ATDS for each specific phase, identifies the various roles and responsibilities of CBP headquarters and field offices, and emphasizes the importance of stakeholder participation and consultation. Understanding the roles and the relationships of different stakeholders can be useful in the process of advocating for any changes to the adoptions of the ATDS.

**Section 4** is devoted to considerations that factor into FIS facility planning. Specifically, this section dives into requests for *changes in the adoption* of the ATDS, or *changes from* the ATDS. Key is the explanation of the terminology associated with these *changes from* the ATDS such as "alternative or equivalent means," "exceptions," and "deviations." All these changes from the ATDS require CBP approval, and the guidebook stresses that ATDS Section 1.2.6 maps this process and describes the details associated with a request for the change via the submission of a Deviation Proposal Form (in the case of a deviation). The section provides guidance on considerations underlying the need for a change, including a list of factors that may cause that need.

**Section 5** covers lessons learned from actual new FIS construction and/or renovations. The section focuses on significant examples of CBP approved deviations. Importantly, the section recommends adopting a future-proofing perspective whenever changes are to be made to the FIS. Again, examples are provided of changes that promote future-proofing, such as those pertaining to passenger processing pathways, vertical movements, evolving or new processing technologies, and the use of 3D representations for design and planning.

**Section 6** summarizes key findings and directions to assist airport operators, designers, and CBP in maximizing the effectiveness of the ATDS to future-proof FIS design/construction.

## AUDIENCE OF THIS GUIDEBOOK

This guidebook is intended for the primary stakeholders involved in the design of international arrival facilities in the United States. It is specifically aimed at US airport leadership and individuals involved

in the design and planning of airports. Readers will gain an understanding of the opportunities and lessons learned from others that have designed, constructed, or renovated an FIS facility at a US airport.

## HOW TO USE THIS GUIDEBOOK

While this guidebook serves as a reference document, readers that are relatively new to FIS facility design or terminal design should start with Sections 1 and 2 to help contextualize the opportunities to go beyond the scope of the ATDS when designing FIS facilities.

Readers familiar with airport terminal design can start by reading Section 2 to familiarize themselves with the latest trends that are impacting airport terminals, as well as learning about near-term developments which may be key to future proof current and upcoming designs.

Airport planners and designers who are only looking for guidance on tackling the implementation of the ATDS guidelines on FIS facility design, and who are aware of the latest technology, policy, and process trends, may wish to start with Section 3.

## PARAS ACRONYMS

| | |
|---|---|
| **ACRP** | Airport Cooperative Research Program |
| **AIP** | Airport Improvement Program |
| **AOA** | Air Operations Area |
| **ARFF** | Aircraft Rescue & Firefighting |
| **CBP** | Customs and Border Protection |
| **CCTV** | Closed Circuit Television |
| **CFR** | Code of Federal Regulations |
| **DHS** | Department of Homeland Security |
| **DOT** | Department of Transportation |
| **FAA** | Federal Aviation Administration |
| **FIS** | Federal Inspection Services |
| **FBI** | Federal Bureau of Investigation |
| **FEMA** | Federal Emergency Management Agency |
| **FSD** | Federal Security Director |
| **GPS** | Global Positioning System |
| **IED** | Improvised Explosive Device |
| **IT** | Information Technology |
| **MOU** | Memorandum of Understanding |
| **RFP** | Request for Proposals |
| **ROI** | Return on Investment |
| **SIDA** | Security Identification Display Area |
| **SOP** | Standard Operating Procedure |
| **SSI** | Sensitive Security Information |
| **TSA** | Transportation Security Administration |

# ABBREVIATIONS, ACRONYMS, INITIALISMS, AND SYMBOLS

| | |
|---|---|
| **ACDM** | Airport Collaborative Decision-Making |
| **ACI-NA** | Airports Council International – North America |
| **AI** | Artificial Intelligence |
| **ATDS** | Airport Technical Design Standard |
| **ATL** | Atlanta Hartsfield-Jackson International Airport |
| **CDC** | Centers for Disease Control |
| **DFW** | Dallas Fort Worth International Airport |
| **FBO** | Fixed Base Operator |
| **FIS** | Federal Inspection Services |
| **FOUO** | For Official Use Only |
| **GA** | General Aviation |
| **ICAO** | International Civil Aviation Organization |
| **LHR** | London Heathrow Airport |
| **MCT** | Minimum Connect Time |
| **MPC** | Mobile Passport Control |
| **OECD** | Organization for Economic Cooperation and Development |
| **OSS** | One-Stop Security |
| **PM** | Program Manager |
| **PMO** | Program Management Office |
| **TRB** | Transportation Research Board |
| **TVS** | Traveler Verification Service |

## GLOSSARY AND ATDS TERMINOLOGY

The ATDS uses several distinct terms for any "changes" requested by designers, airports, planners, and stakeholders, when plans are proposed that do not fully/wholly meet the guidelines in the ATDS. These terms, which are key for this guidebook, are:

- **Alternative or equivalent means:** A proposal that achieves the same outcome for CBP and provides an equivalent functionality for the Federal Inspection Services (FIS).
- **Exception:** The FIS will be exempt from specific requirements in the ATDS.
- **Deviation:** Any departure from content within the design standard.
- **Addition:** Additional operational and physical capacity to buildings or site structures, or new equipment, or systems required for port functions and operations.
- **Renovation:** Undefined in the ATDS. Generally, the act or process of repairing, renewing, or restoring to good condition a prior existing facility, or part of a facility. Depending on the scale and impact, this might have different implications.
- **Alteration:** Remodeling, improving, extending, or making tenant requested changes to an existing facility, exclusive of maintenance or repair work.

# SECTION 1: INTRODUCTION

The planning and design of updates, expansions, and new terminal facilities to accommodate future growth is a challenge to terminal planners and airport operators alike. This research has produced guidance for implementing ATDS requirements and adapting to evolving conditions. The guidance addresses:

- Planning and programming considerations, including essential decision points
- Internal and external stakeholder roles and responsibilities, including communication and coordination strategies
- Strategies and considerations for adopting or proposing changes from ATDS requirements
- Project management recommendations, including documentation needs
- Adapting to changes in passenger and baggage processes
- Adapting to rapidly changing technology
- Impact of technology and process changes on passenger throughput and space requirements
- Key findings and lessons learned from new builds and retrofitted facilities

## THE AIRPORT TECHNICAL DESIGN STANDARD

This guidebook specifically focuses on the design and update/expansion of Federal Inspection Services (FIS) facilities at US international airports, which are currently governed by the Airport Technical Design Standard (ATDS), version 2021. Published every three years (previously every five years) by CBP, the ATDS provides an elaborate set of design guidelines and standards for commercial airports. However, due to the pace of technological and process changes, portions of this document are out of date. Consequently, resulting FIS facilities may not have the planning parameters needed for future requirements, or to prevent overbuilding space based on outdated requirements.

Due to specialized facilities and requirements such as information technology cabling, CBP functions can come at greater construction costs than other parts of an airport. These requirements are mandatory, by law, to be provided free of charge to CBP, which has ramifications for the availability of capital for new builds or refurbishments.

CBP also publishes guidance for FIS facilities at General Aviation (GA) airports and preclearance airports, but these are not discussed in this guidebook.

## ATDS REQUIREMENTS AND AVAILABILITY

The 2021 ATDS includes a brief explanation that use of such terms as “must” or “shall” signifies a mandatory requirement as opposed to other terms like “should” or “may.” CBP characterizes the ATDS requirements as mandatory once an airport’s requirements are determined based on the number of peak-hour passengers processed by CBP. The standards, however, do not have the force and effect of law. More precisely, the standards reflect agency policy for a set of technical guidelines.

These guidelines are designated as For Official Use Only (FOUO) in accordance with the Department of Homeland Security (DHS) Management Directive No. 11042.1, which protects unclassified sensitive information that if publicly disclosed could “adversely impact a person’s privacy or welfare, the conduct of Federal programs, or other programs or operations essential to the national interest.” CBP conditions access to the ATDS on the completion of a Non-Disclosure Agreement.

However, not all of the information in the ATDS is sensitive information protected as FOUO. The research team collaborated with CBP to ensure the material presented in this guidebook pertaining to

roles and responsibilities, as explained in the ATDS and related guidance, does not compromise sensitive national security information.

### FIS FACILITY DESIGN STAKEHOLDERS

The process of defining a program and project for an FIS facility is complex. A typical project involves a range of planning, architectural, and technical specialists. There is also a need to interact with the CBP Port Director, a range of internal stakeholders within CBP, and a designated CBP headquarters Project Manager. The Project Manager is the sole official with authority to approve project changes or provide direction on an airport project, including all design work approval and notice to proceed on any work within the scope of the project.

Within CBP, there may be different viewpoints from the Office of Field Operations, Office of Information Technology, and Office of Professional Responsibility. Outside CBP, there are also other divergent perspectives and needs from government/industry stakeholders, including TSA. Asset owners are varied and can include a fixed-base operator (FBO), terminal operator, airport, or airlines.

### CUSTOMIZING FIS FACILITY DESIGN

A common airport industry catchphrase is “If you have seen one airport, you have seen only one airport.” Every airport operator and/or airport asset owner deals with very specific local factors. Nonetheless, there are many lessons learned from past airport projects that can apply to, or inspire, customizing facilities to satisfy local requirements. At times, it can be worth considering going beyond the technical design standard or proposing slight changes.

Section 3 outlines examples of why a design team may request a formal ATDS *deviation*, *exception,* or use *alternative or equivalent means* to attain an envisioned result during the planning and design of a new or updated FIS facility. Each of these requests may be approved by CBP in a process specified in the ATDS, which is the focus of Section 4.

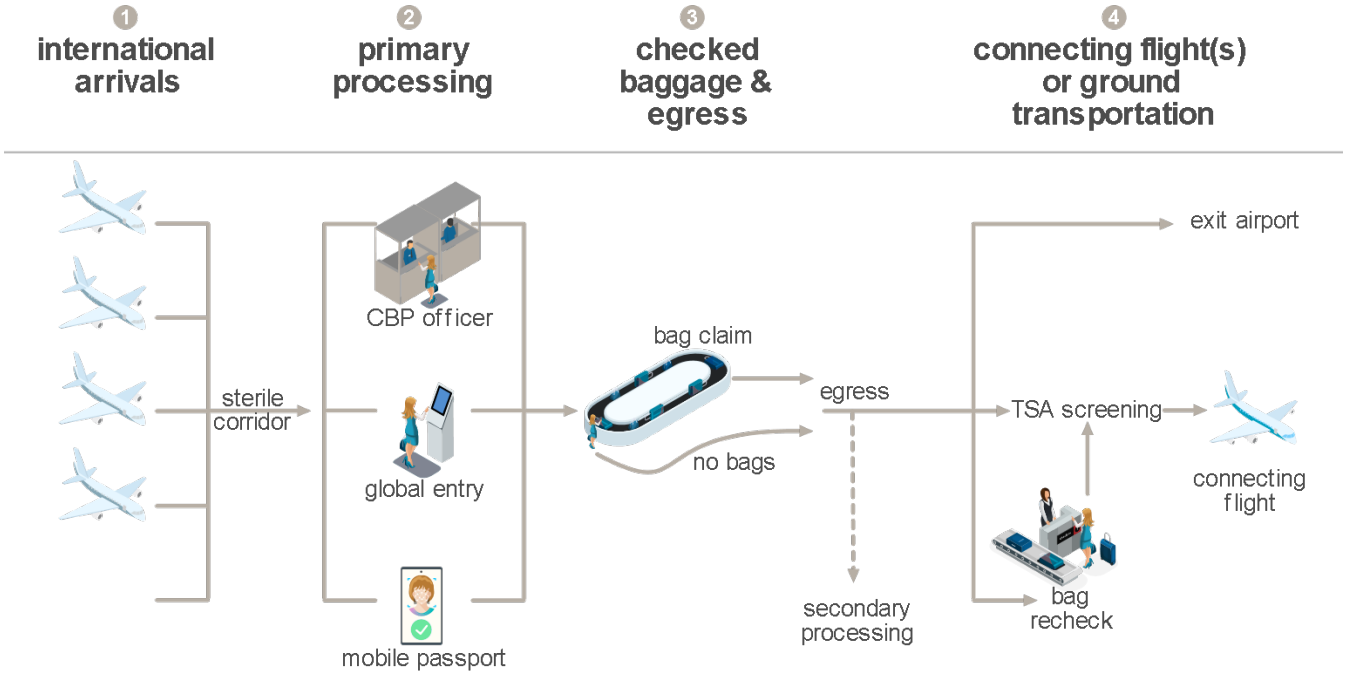
Designers and planners have a wealth of information; however, this is not always codified for FIS projects. CBP maintains a best practices library, but this is accessible only to CBP staff, and there is no formal mechanism within the airport industry to capture lessons learned. Section 5 presents the research findings of example customizations or changes that were approved by CBP for FIS facility designs.

# SECTION 2: KEY TRENDS IMPACTING INTERNATIONAL ARRIVALS FACILITIES

The cornerstone of CBP's current efforts in passenger processing is the Traveler Verification Service (TVS), which provides a platform for facial verification (see CBP's Strategy 2021–2026 and TSA's Biometric Roadmap [TSA, 2018]). Its most robust deployment is in the implementation of Simplified Arrival, which uses facial biometrics to compare the photos of arriving passengers to a small gallery of images that the traveler has already provided to the US government (e.g., passport or visa photos). In 2022, CBP completed the expansion of Simplified Arrival into all international airports in the United States and a number of CBP preclearance facilities. While CBP relies on cloud computing to power facial biometrics, it is worth examining the forecast of data requirements/loads needed to provide real-time facial matching.

The primary passenger flows through an airport FIS facility are visualized in Figure 2-1, below.[1]

**Figure 2-1. Generic Flow of Passengers through an Airport FIS Facility**




Other trends affecting passenger and baggage processes that are also worth noting include:

- Mobile smartphone apps
- Electronic gate self-service
- Open architecture for equipment connectivity
- Baggage handling/bypass and sharing of baggage x-ray imagery
- Remote video interviews
- Convertible GA facilities (process both GA and commercial flights)
- Emerging ideas for hub connectivity

[1] Note: a 'Bags First" FIS configuration, which is no longer mandatory by CBP, swaps steps 2 and 3 in the arrivals process.

These technologies and trends are developing rapidly. The pace of technology and innovation developments continue to increase, which is why airports should monitor technology developments closely.

As illustrated in the following examples, some of these technologies provide the benefit of increased throughput for a particular process. It is important to note, however, that relieving bottlenecks in one area by increasing throughput may shift the congestion downstream in the process. Additionally, while space savings maybe be achieved by eliminating or redirecting demand for a particular function, staffing needs may not change commensurately.

## 2.1 Mobile Smartphone Apps

CBP is moving through a first generation of Mobile Passport Control (MPC) to build capabilities in a smartphone app called CBP One™, which supports a variety of functions for both land and air travel:

- Land travelers can submit their information prior to entering the United States, while air travelers can request an inspection of biological and agriculture products upon their arrival.
- Cargo entities can use the app to make appointments for the inspection of perishable cargo.
- Travelers can use the app to apply for and view their I-94s, and International Organizations can apply permission-based use to verify the status of individuals in CBP programs (CBP, 2023).

Introducing MPC as a means for primary processing only slightly alters passenger flow through the FIS facility. The impact to the facility may be felt in the additional segregation of passengers that is required through the various processing channels and queues, which may be supported by additional signage, wayfinding, or operational support staff.

CBP has seen fit to leverage smartphone technology to:

- Receive information previously deployed on a form (I-94, Customs Declaration)
- Use smartphone cameras to record Machine Readable Zone information from an International Civil Aviation Organization (ICAO)–compliant passport
- Use smartphone cameras to collect a snapshot of a traveler

While usage of the CBP One smartphone app is currently low, it plays an important role in CBP's mission to reduce data errors. Basic errors such as confusing London, Ontario with London, England can be curtailed through the app's form-based entry. The app also has a superior capability to handle different languages and to interact with a CBP officer, if required.

Some possibilities that CBP has discussed in recent years include migrating Electronic Travel Authorization into a mobile phone format, as well as other products such as the Global Entry card. The adoption of near-field communication is expected to increase in the coming years to allow device tapping to convey information, similar to the tap-and-pay function used for mobile phone payments. This technology supports major benefits in usability and accessibility, which are superior in time and breadth of information compared to quick-response (QR) code scanning.

As Apple's iOS and Google's Android operating systems have adopted the mobile driver's license algorithm, there is a pathway to an ICAO Digital Travel Credential–compliant travel document to be housed in the wallet natively available on all iOS and Android devices.

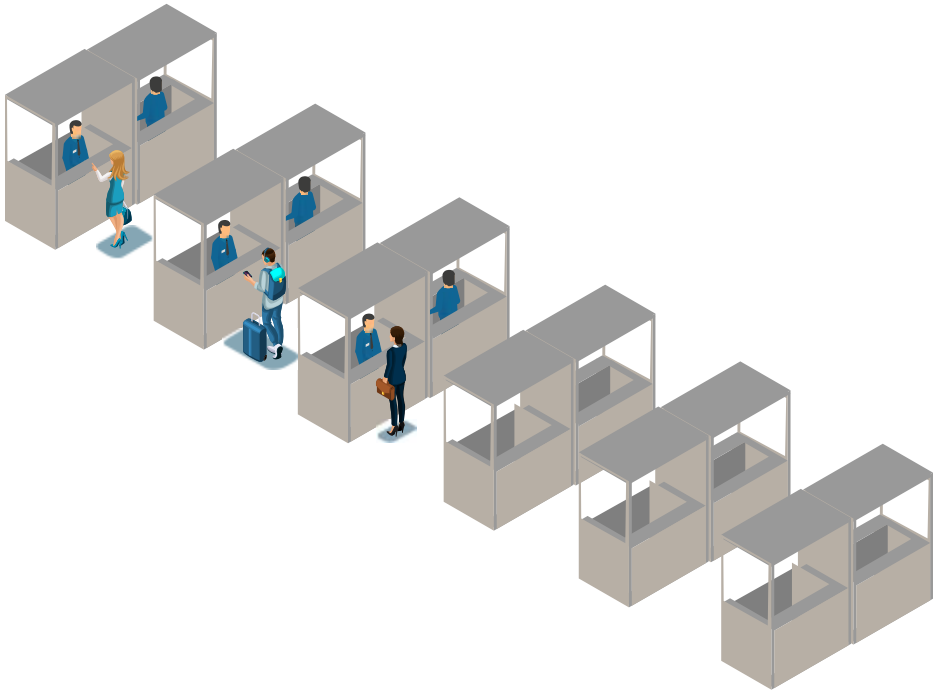
The possibilities for mobile technologies to influence the way CBP facilities are designed/operated are three-fold:

- More processing can be done before a flight takes place, reducing the amount of space needed at the airport upon arrival.
- Enabling real-time communications with passengers moving through the sterile corridor from an aircraft to CBP processing, providing another method to route passengers to the right location.
- Speeding up the CBP Primary Inspection process for any contact time needed with a CBP officer, thereby reducing processing and queueing space.

## 2.2 Electronic Gate Self-Service

Historically, passengers are processed using a set of double booths for CBP officers to conduct Primary Inspection, as illustrated in Figure 2-2.

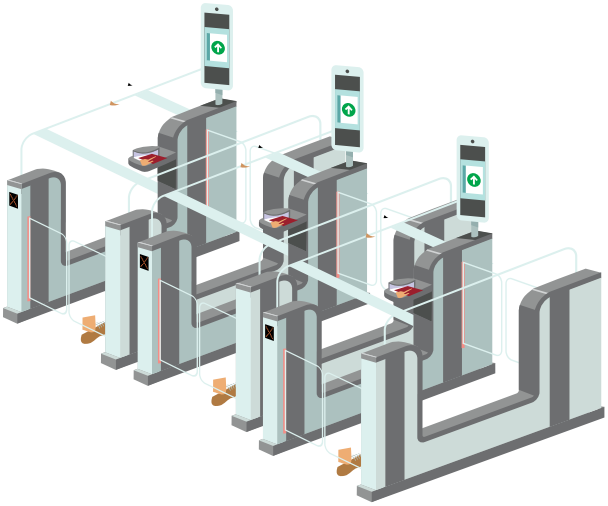
**Figure 2-2. Double Booths for Passenger Processing**



Many border authorities across the world have adopted the use of electronic gates (e-gates), such as those depicted in Figure 2-3, instead of staffed booths to manage flows. In the United Kingdom, for example, the e-borders strategy focuses on the use of e-gates that enable passengers to use ICAO-compliant ePassports, which leads to a more seamless flow of passengers. Border agency staff are redeployed in other functions, which enables highly trained officers to focus on more high-risk issues.

Dozens of other countries, primarily in Europe and Asia, have successfully used e-gates in place of a booth process. The primary benefit of e-gates lies in the increased passenger throughput, largely through performing administrative functions for passport control and immigration purposes. Additionally, these devices increase security through use of biometrics, which combats threats of identity fraud, human trafficking, and illegal immigration.

Figure 2-3. E-Gates



CBP performs more than just passport control. There are questions CBP officers may ask passengers to interact and detect potential importation of illegal goods or false pretenses for entering the United States. E-gates would allow CBP officers to focus on high-risk individuals by reducing the administrative burden and applying a risk-based approach.

There are a couple of areas where e-gates could be employed. For instance, they could support the egress of Global Entry passengers from the baggage claim hall. Additionally, self-service devices could be used to enable passengers who are cleared to re-enter the United States to leave the facility instead of going through a staffed egress point.

There are space, wiring, and operational considerations to determine where e-gate self-service could be employed for CBP processing. For example, there may be an increased amount of processing time required for an MPC receipt to activate an e-gate, as well as modifications to the receipt itself to allow for it to be scanned at an e-gate. The business case for this mode of operation will depend on the extent to which CBP officers need contact time with passengers entering the United States.

## 2.3 Open Architecture for Equipment Connectivity

TSA is developing an open architecture approach with United Kingdom and European Union authorities to support interoperability of software/hardware for both passenger and baggage screening. Open architecture, as defined by TSA in its roadmap, is “founded on the concepts of having equipment components, such as software and hardware, that are standards-based and interoperable. This affords TSA the ability to leverage strategic industry and international partnerships that allow adoption of increasingly interconnected technologies while employing advanced cybersecurity capabilities.” (TSA, 2023)

Discussions are ongoing to provide an intersection for open architecture with CBP and other agencies to facilitate sharing of x-ray images across different platforms.

## 2.4 Baggage Handling/Bypass and Sharing of X-Ray Imagery

In May 2021, the United States and South Korea signed a comprehensive agreement to enable the sharing of x-ray images of baggage (DHS, 2021). Checked bags going through an explosives detection system at Seoul-Incheon (ICN), for example, could generate an image that is transmitted electronically

to CBP for review 10 hours before a passenger arrives in the United States. This would add to existing standards in advance passenger information systems and other critical information on which CBP currently relies. The agreement was further solidified in March 2023 regarding research to establish interoperability of critical and emerging technologies. The United States has pursued comparable agreements with allied countries that set the pathway for image sharing in the future.

Whether the sharing of x-ray images will enable improved baggage flows may also depend on whether the US receiving airport has been approved for the TSA One-Stop Security (OSS) pilot. As discussed in Section 2.8, OSS would remove the need for a passenger to reclaim eligible baggage and recheck it prior to boarding a connecting flight. Bags, if deemed safe and not containing any prohibited items, can in most cases be routed directly to the next aircraft, greatly enhancing the passenger experience and efficiency for airport operators and airlines. With an increased usage of alternate baggage handling processes, there could be a dramatic improvement for connections handling at the US entry airport as well as a reduction of screening resources dedicated to transfer baggage.

## 2.5 Remote Video Interviews

Before the global pandemic ushered in large-scale usage of video conferencing software for the general public, CBP adopted different versions of video interviews. The Reporting Offsite Arrival – Mobile (ROAM™) project, which originated in the Seattle area, allows pleasure boaters to report to CBP via a tablet or phone. CBP then interviews the individual when returning from international waters.

Expanded use of video interviews could offer major space-saving benefits. In FY2022, according to CBP, over 50,000 remote interviews were delivered via Zoom for Global Entry, Customs Trade Partnership Against Terrorism, and other programs that require an interview with government authorities.

The capability for remote video interviews is potentially a force multiplier for staffing resources. In the entire set of 328 ports of entry to the United States, there are 167 land border crossings, 41 marine ports, and 120 airports. At any given time, about 30% of officers are not fully active while on duty due to varying peak period demand. Especially at smaller ports where there may be times without any traffic crossing the border, there are opportunities to be able to conduct remote interviews at a different location. Airports may provide a location to have video reporting stations adjacent to staffed officer booths to conduct primary interviews or Global Entry renewals.

## 2.6 Artificial Intelligence

Artificial intelligence (AI) and machine learning are mechanisms used to correlate different information sources to leverage data into actionable intelligence. CBP is evolving towards greater use of AI in meeting its mission. An AI Machine Learning Center of Excellence was established in 2022 within CBP to explore video analytics, increasing efficiency and throughput, and faster data annotation. In addition, DHS Science & Technology has funded AI projects, including detecting weapons automatically.

The use cases for AI are still in their infancy but may affect how FIS facilities evolve at US airports. Several examples are worth noting, including the use of AI at London Heathrow to be able to automatically detect illegal wildlife trade. TSA's Open Architecture roadmap, published in 2023, also provides interface with CBP for imaging purposes.

At London Heathrow Airport, an AI system, named Project SEEKER, detects animal trafficking in cargo and baggage passing through the airport by scanning up to 250,000 bags a day. Initial testing of the algorithm showed a success rate of over 70% in identifying trafficked animals, including ivory.

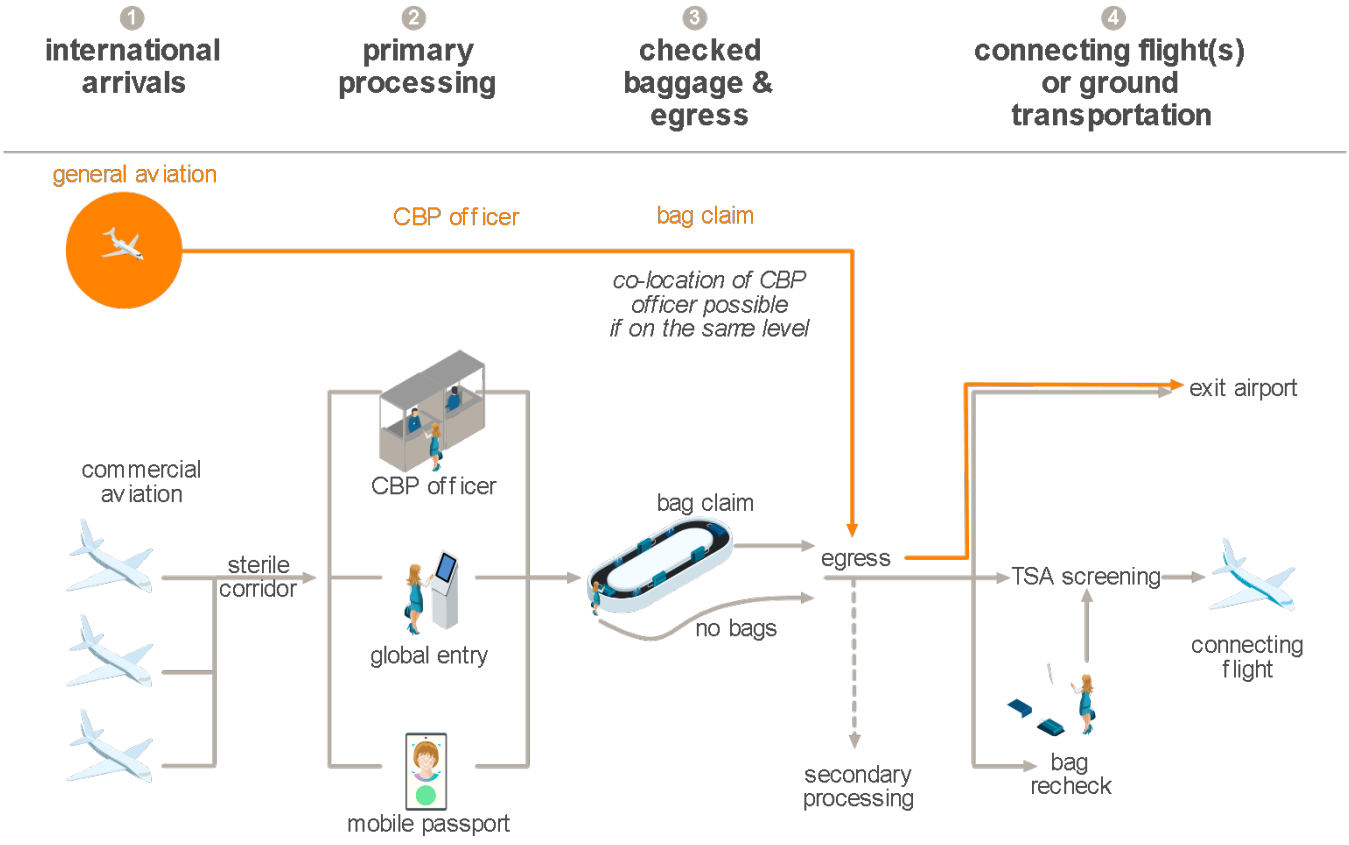
While it is too early to determine the exact implications of AI on the ATDS, there are potential changes that airport planners should consider. If AI is used for automatic detection of potential threats for CBP, there may be a potential reduction in space required for x-ray operator equipment, such as image review screens. AI may also enable CBP to reduce the amount of contact time with low-risk passengers or goods and focus on those with high/unknown risk.

## 2.7 Convertible GA Facilities

There is a recent trend for smaller airports to co-locate a GA facility FIS with a commercial aviation FIS facility, especially with CBP emphasizing the "bags first" approach for commercial facilities. GA tends to follow a similar approach, where passengers collect their luggage planeside and then are processed by CBP. Unlike commercial aviation, however, GA processing typically takes place at ground level, as opposed to a loading bridge one level higher. Without the grade change, the flow demonstrated in Figure 2-4 is a bag claim device as the first stop, and then a CBP officer.

In addition to the cost savings of not spending $1.5 to $2 million to build a new facility for CBP, there are also benefits in terms of staffing efficiencies. These benefits also apply if an airport does not currently have scheduled international commercial service but is interested in a lower cost solution to attract such service in the future.

**Figure 2-4. GA Convertible Facility Passenger Flow**



## 2.8 Emerging Ideas for Hub Connectivity

In the current environment, with the exception of passengers arriving from certain preclearance locations, passengers entering the United States must complete primary processing in the FIS, collect and recheck bags, and clear TSA security before connecting to another domestic or international flight. This necessitates long minimum connect times (MCT) for passengers, duplicates many facilities such as baggage claims and security screening lanes, increases required staffing resources and cost, and puts US airports at a competitive disadvantage compared to their peers.

In December 2022, the President signed into law the National Defense Authorization Act (NDAA, Pub. L. 117-263). Within the NDAA, Section 7132 authorizes TSA, in coordination with CBP, to conduct an OSS pilot program at up to six foreign departure airports, which would permit passengers and their bags to bypass domestic security rescreening at a connecting airport in the United States. The pilot program would last for six years. Of note, the NDAA criteria require that the initial screening meet TSA aviation security standards and protocols, segregate passengers from their bags until they reach their final destination, and retain arriving international passengers in a Sterile Area, separate from other travelers on their way to their connecting flights.

Two OSS pilot project routes are in the early stages of development: London Heathrow Airport (LHR) to Atlanta Hartsfield-Jackson International Airport (ATL) and LHR to Dallas Fort Worth International Airport (DFW). What this means is that passengers on connecting itineraries arriving at ATL or DFW from LHR would be exempt from rescreening prior to their connecting flight.

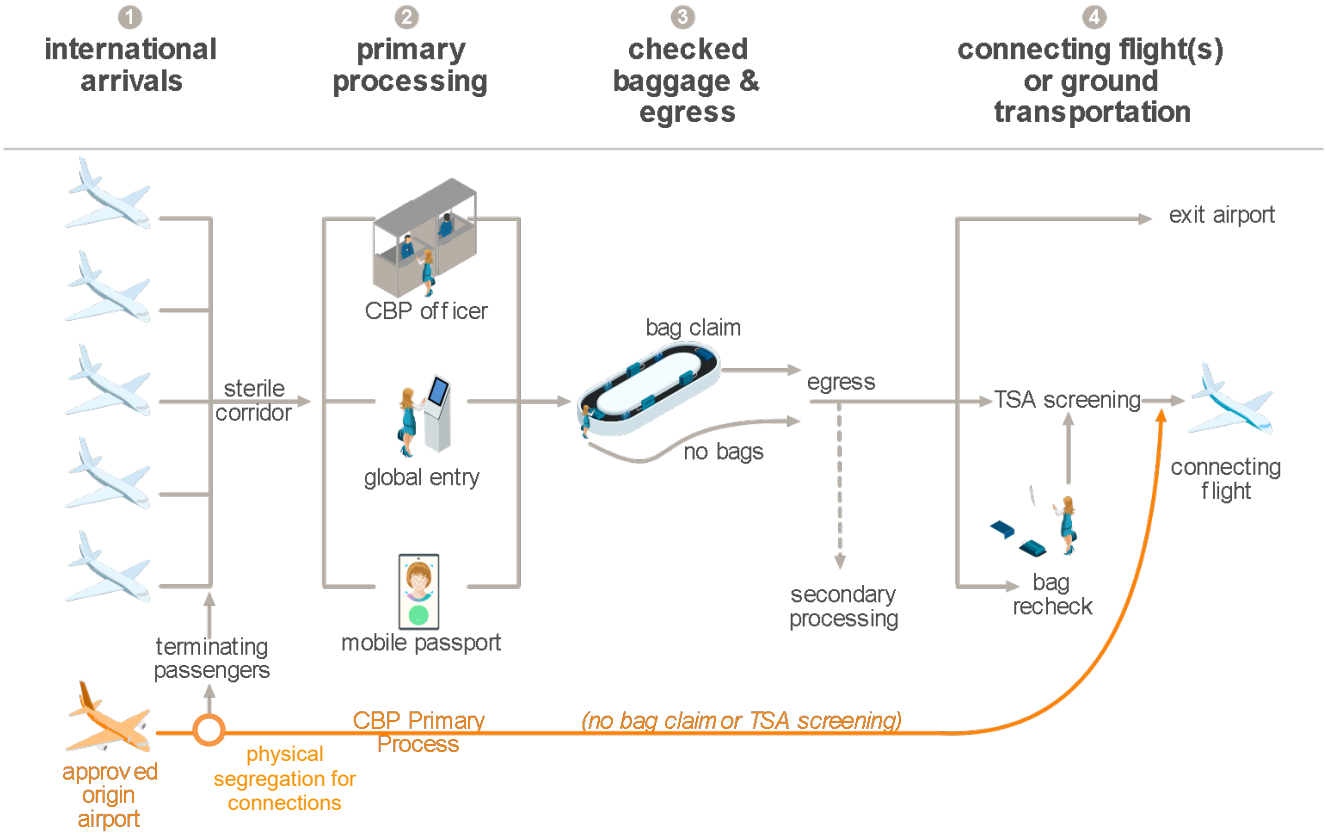
There are a number of effects associated with the elimination of rescreening at the US port of entry, including changes to passenger flows and facilities, reductions in MCTs, and changes in staffing requirements, as outlined below. While the pilot would reduce duplicate screening efforts and improve the overall passenger experience, a significant investment could be required to modify facilities to accommodate the new passenger and baggage flows.

#### NEW PASSENGER FLOWS IMPACTING FACILITIES AND STAFFING

New passenger flows will need to be defined to separate OSS transfer passengers from other arriving passengers. This may require capital investment in new terminal infrastructure, such as temporary or permanent corridors, depending on the layout of the passenger flows between arrival gates, the FIS, and security rescreening. OSS passengers will not have to undergo additional passenger or baggage screening at their connecting airport. As a result, the connecting airport will need to route OSS passengers past a security checkpoint and baggage recheck facilities after clearing CBP Primary without comingling them with unscreened passengers.

A possible scenario could be separate FIS facilities that allow for the routing of OSS passengers directly back into the Sterile Area, while non-OSS passengers would be routed to baggage recheck and security screening facilities. A diagram of the OSS versus non-OSS flows is shown in Figure 2-5. This figure amends Figure 2-1 to show the added OSS flow.

Figure 2-5. Diagrammatic Passenger Flows for OSS vs Non-OSS




One potential benefit of implementing OSS is that it would reduce the overall demand on transfer facilities such as international baggage claim and transfer security checkpoints, which could lead to a reduction in staffing costs as facilities are consolidated. Demand reduction could be seen at recheck facilities with the potential for fewer baggage claim and security screening lanes, fewer airline employees needing to transport bags to the FIS baggage claim and then out to plane, and fewer TSA Full Time Equivalents. However, employee resources may be needed to ensure the correct routing of OSS and non-OSS passengers, as well as for the potential expansion of FIS facilities to enable these new passenger flows.

### REDUCTION IN MINIMUM CONNECTING TIME

A reduction in the time required for a passenger to transfer from aircraft to aircraft (the MCT), increases the number of potential onward connections from an airport that a passenger can take. A reduction in MCT increases the competitiveness for both the airport and the airline, and is often used as a metric for airlines and airports to improve on. For airlines, a higher MCT at an airport means that the aircraft has less flight time.

If OSS can reduce the MCT for eligible passengers by even 20 or 30 minutes, it would have a series of knock-on effects from both a passenger and air service development perspective. Because shorter MCTs can increase passenger access to additional flights, it could help an airline increase the profitability of certain routes, enabling them to maintain or expand service. As shown in Table 2-1, for a representative day in April 2023 at DFW, reducing the MCT from 85 minutes to 55 minutes on the five LHR arriving flights adds between 8 and 44 additional domestic connections on American Airlines (AA). Conservatively, this could enable one million more passengers a year to travel through this hub.

**Table 2-1 Example of MCT Impacts on Connecting Flight Availability from LHR**

| Flight | Arrival Time | 85-Minute MCT Flight Options | 55-Minute MCT Flight Options | Difference |
|---|---|---|---|---|
| AA 51 | 12:56 | 389 | 397 | + 8 |
| AA 21 | 13:47 | 342 | 369 | + 27 |
| AA 79 | 15:32 | 278 | 322 | + 44 |
| BA 193 | 16:50 | 235 | 246 | + 11 |
| AA 81 | 18:22 | 148 | 167 | + 19 |

Source: Innovata schedules by Cirium, April 2023

Additionally, removing the additional baggage reclaim and security screening steps, which could each vary considerably in the amount of processing time, reduces the potential for passengers to experience delays, which in turn reduces the risk of missed connections. The reduction of MCTs also eliminates barriers for passengers with reduced mobility and passengers with disabilities, as walking distances may be shortened and steps eliminated in the connecting process. This supports both airport and airline commitments to making connections more accessible and less onerous.

Airports should undergo a cost-benefit analysis to determine whether an investment in OSS would provide an acceptable return.

# SECTION 3: GUIDANCE ON FIS APPROVALS PROCESSES

One of the biggest challenges for airports is determining the size and scope of the FIS footprint and how international arrival operations connect to other parts of airport facilities.

This section addresses roles and responsibilities during the many phases of building or renovating the FIS. When looking at the FIS design approval process, it is important to include decision making within the overall framework of terminal project delivery. This section compares processes side by side and discusses some of the differences in terminology. This section also provides project delivery recommendations gathered from multiple stakeholders that have gone through the FIS design approval process.

## 3.1 Design Process

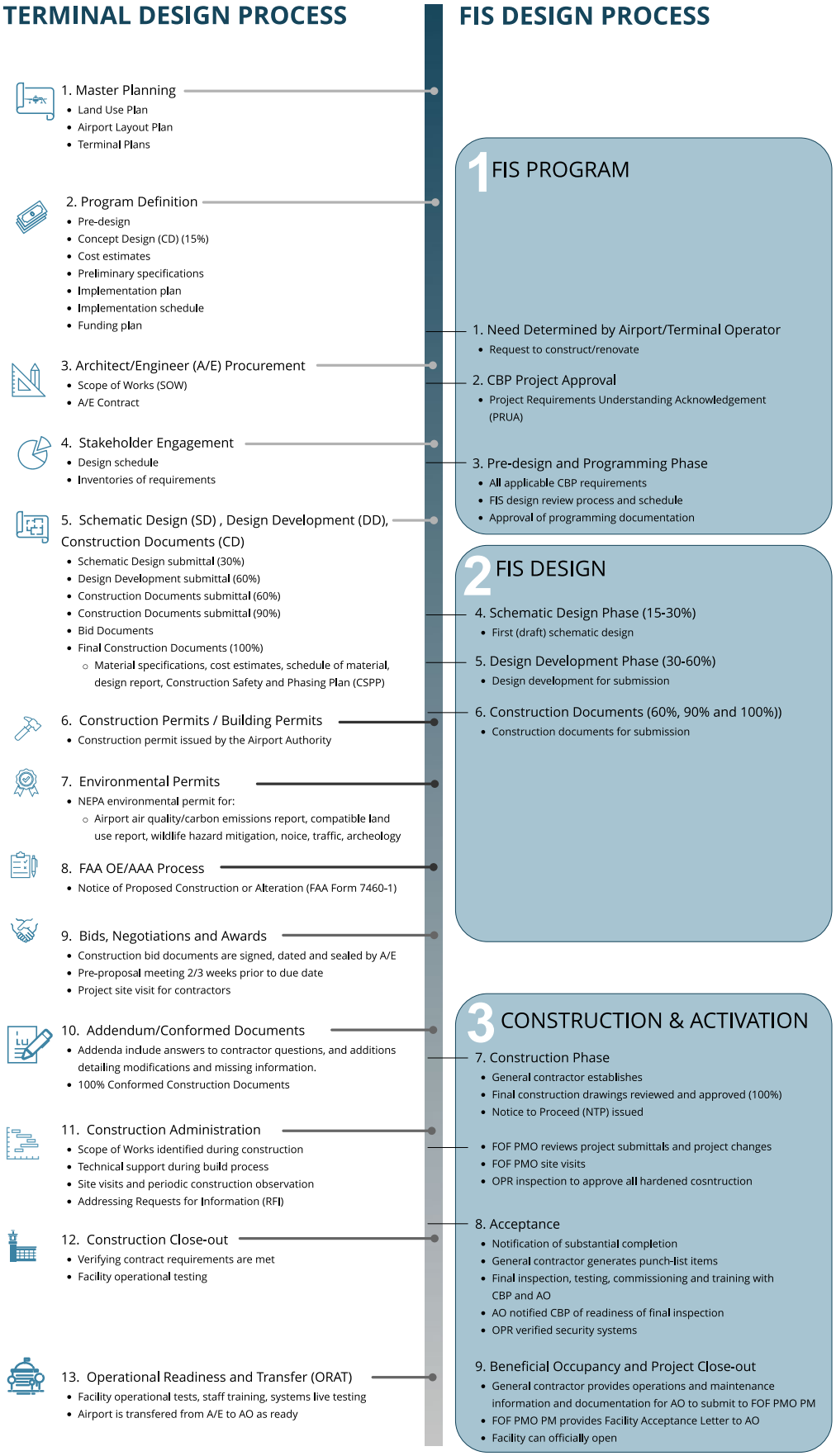
As shown in Figure 3-1, there are different steps outlined for the overall design of an airport terminal building, and a subset of these is defined in the ATDS for FIS.

As shown on the right side of Figure 3-1, the FIS design process has nine basic steps through different project approval stages. This is arrayed as phases for defining the FIS program, designing the facility, and finally constructing/activating the facility.

Key findings from the research indicate that:

- Terminal Concept Design and FIS Schematic Design are both expressed as 15% design drawings, but they can potentially be months/years apart. Alignment and clarity on these deliverables can prevent confusion and accelerate the design process. Both project design timelines should raise awareness of this discrepancy and anticipate the need for flexibility due to potential changes in the design, for instance due to changing ATDS requirements.
- Airport and terminal operators may not always involve CBP in the master planning and program definition processes for general terminal buildings, which can impinge on the speed of understanding constraints on a FIS facility (especially at medium- and large-hub airports)
- Where an FIS program is self-contained as a standalone project, the time from developing an airport master plan/options analyses to realizing a design may be many years.

**Figure 3-1. Comparison of Terminal & FIS Design Processes**



## 3.2 Early Engagement & Stakeholder Management

The number one lesson learned from CBP facility delivery is early engagement on overall stakeholder objectives. Successful FIS projects are in direct alignment with the objectives of airports, airlines, and CBP, and provide the facilities needed to meet commercial and agency objectives. While this may be simple to state, there are challenges including:

- Variation in types of airlines and aircraft to be served
- Differences in content of the ATDS from one version to the next
- Constraints for existing buildings, which may impinge on requirements for different parties

While agreement on programming invariably requires meeting a funding envelope, interviews with different parties for this research highlighted the importance of early engagement and communications with meaningful input from stakeholders.

### AIRLINES

The key driver for the makeup and size of the FIS is the forecast level and type of traffic. The programming for an FIS for a network carrier that is part of a global alliance of routes is fundamentally different than a low-cost carrier focused on origin-destination traffic. For example, the layout of an FIS that more easily provides for baggage recheck and shorter walking distances to a security checkpoint is a consideration for a networked hub FIS, while an origin/destination FIS may employ more flexible features so that its infrastructure may be used for other purposes during the airline's off-peak periods. The pre-design phase and project definition requires documentation of:

- Current levels of traffic
- Forecast levels
- Type of traffic expected (origin/destination vs. connections)

Engagement with current and future airlines should depict the anticipated size/classification of aircraft and peaking characteristics. When not fully known, there should be a scenario-based approach to highlight the potential for greater connectivity in future.

### CBP

The CBP Port Director is the most critical influencer of information about current and future operations. Depending on the facility type (e.g., user fee, landing rights) there may be provisions about the ability to expand services in terms of operations. Airport communication to establish parameters for facility/program objectives are critical to:

- Identify areas of deficient/legacy facilities that should be addressed (e.g., combined Secondary areas)
- Ensure the Port Director is conversant on key trends and major demand drivers (e.g., tourism, business, visiting friends/relatives, students)
- Identify the level of automation achievable through different programs, such as Global Entry, MPC, etc.
- Identify current and future security protocols that may need to be considered (e.g., pandemic-related isolation and equipment, in concert with the Centers for Disease Control [CDC])

### TSA

TSA is a vital stakeholder for the way FIS processing occurs. Most critically for airports with higher connection volumes, there are important ways of being able to align the checked baggage screening and

passenger screening processes. There are typically opportunities to rationalize space demands, including but not limited to:

- Co-locate connecting passenger screening with outbound passenger screening
- Provide facilities to serve PreCheck

## 3.3 Airport Master Plan Considerations

An Airport Master Plan is a long-term planning document that determines the development plans of an airport over a 20-year period. It considers future aviation demand, available funding, environmental components, and airport needs. The Airport Layout Plan is a component of the Airport Master Plan that identifies improvements needed to address design deficiencies and growth in aviation demand levels.

Some critical Airport Master Plan decisions that can impact FIS design include the following:

**Greenfield or Brownfield FIS:** Airport terminals are nestled between limited airside and landside space. Some airports have elected to expand existing terminal facilities to create space for additional CBP operations. Others have developed major capital programs to build brand new facilities on unused lands. Depending on the size and scope of a project, the ability for a greenfield site to provide a blank slate can open up opportunities for unconstrained development parameters and scalability.

**Airside or Landside FIS:** A number of CBP facilities are located airside, including at IAD, LAX, ATL, among others. Typically, these facilities provide more direct access for connecting flights.

**One or Two Levels:** In the past when CBP was composed of separate immigration and customs agencies, there was a model of developing separate levels for immigration and customs operations. Limited space was another driver that led to multilevel FIS project definitions. If an airport has limitations on airside and groundside facilities, there are advantages to building up to multiple levels.

**Connecting or Terminating Passengers:** As noted below, some airports serve primarily originating/terminating passengers. Terminating means those who are destined for the immediate region around the airport, and are not connecting to another flight. Careful planning is needed to ascertain if there is a possibility for future operations to include higher volumes of connecting passengers.

## 3.4 Roles During the FIS Design Approvals

Chapter 1 of the ATDS sets forth steps in the process and approvals required, and describes specific roles and responsibilities of various parties during each phase of the project. CBP advises the airport and architect/engineer about ATDS requirements and constraints.

During the various stages of the Pre-Design and Design Phases, the airport/terminal operator interacts with CBP Field Office representatives who in turn coordinate with CBP headquarters offices, primarily Office of Facilities and Asset Management. Other parts of CBP can be brought on board, including Office of Professional Responsibility, Office of Information Technology, among others.

After the initial request from the airport/terminal operator for an FIS project is submitted by the Port Director, the CBP Field Operations Facilities Program Management Office (PMO) appoints a Program Manager (PM) to coordinate with the airport operator for the duration of the project. The PMO is the office that implements and administers the ATDS. The PM represents CBP at the local/field level and is the point of contact for all communications between the airport operator and CBP.

### FINDINGS ON PROCESSES

The following are findings from reviewing over 20 projects related to FIS construction on process improvements to implement the ATDS:

- Maintain ongoing stakeholder engagement
- Include key stakeholders as early as possible to discuss responsibilities, review periods, etc.
- Set approval milestones
- Establish recurring meetings with key decision makers

Recommendations on engagement with non-traditional stakeholders include:

- Encourage key airport representatives to consult with any party likely to have access to or be impacted by the proposed build or renovation, such as retail operations outside the FIS or baggage handlers, and consider establishing a mechanism for these groups to provide input.
- Solicit input on design improvements/changes from the ATDS on a range of ideas—from passenger/bag flow facilitation to the location of a dog relief area—and benchmark other FIS designs and approaches.
- Consider including any stakeholder at the table (but note CBP's requirement for a Non-Disclosure Agreement) and convene meetings with stakeholders that are topic-specific.
- Consult with non-traditional parties and subject-matter experts, such as software technicians who are responsible for a range of IT matters within the airport, but not necessarily responsible for FIS IT.
- Compile a checklist of parties, their roles to be consulted during the process, and the best time to consult them (e.g., during the design phase, construction phase) depending on the type of design (e.g., new build, reconfiguration, renovation).

### DOCUMENTATION GUIDE

As discussed throughout this guidebook, there are many steps in the process to secure approval of a proposed build, renovation, or alteration of an FIS. There are also numerous steps to ensure compliance with applicable rules, regulations, codes, laws, and other requirements. Accordingly, to avoid missteps and to ensure effective coordination, the following list is provided as a documentation guide for planning for any changes to the FIS:

- Designs, plans
- Checklists and outline of steps in the approval process
- Meeting minutes, including attendees
- Records of decisions
- Contact lists, including CBP Points of Contact and other airports that recently built or renovated an FIS
- Written copies of approvals
- Copies of submissions to CBP such as the Deviation Proposal Form

Planners, airports, and architects interviewed for this research project all emphasized the criticality of documenting agreements/decisions and their rationale, because there are often organizational changes within different parties involved in project approvals that can bring new viewpoints. While this can result sometimes in expensive change orders mid-construction, it is important to ensure that there is knowledge continuity to establish the rationale for the agreed-upon program and design of the FIS.

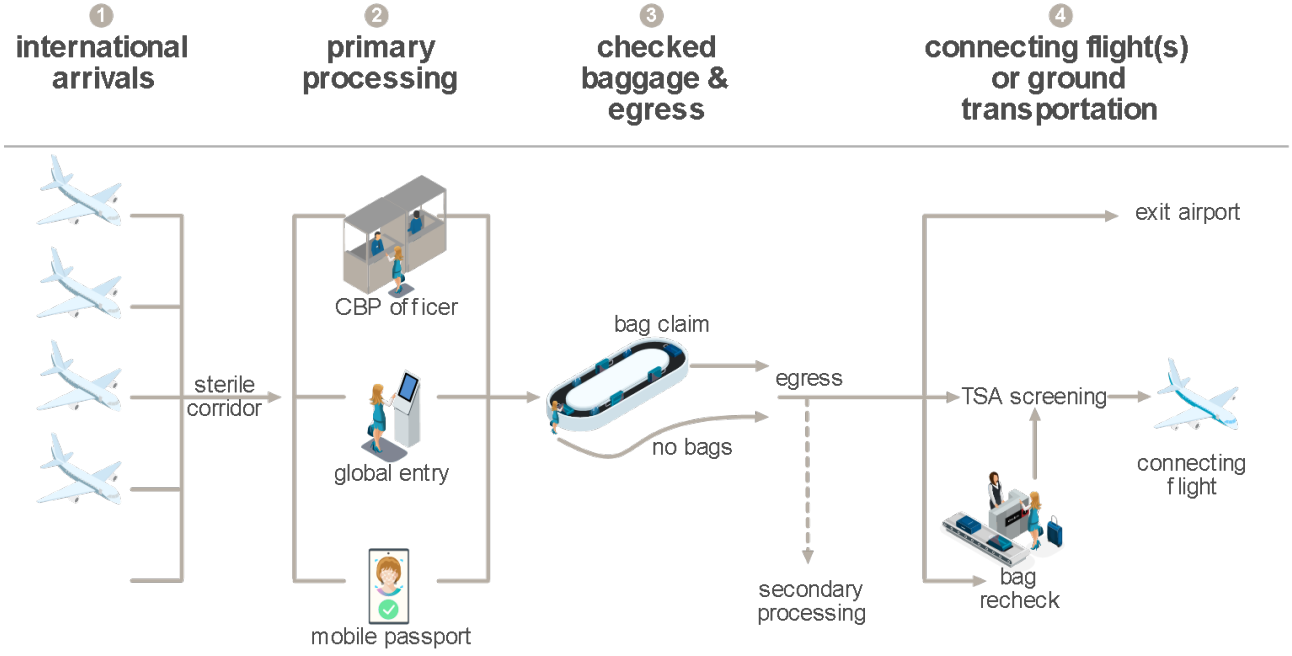
# SECTION 4: REASONS AND STRATEGIES FOR ADOPTING CHANGES FROM THE ATDS

## 4.1 Critical Variables for Space Planning

Before exploring the reasons for implementing changes from the ATDS, it is important to review the critical variables for space planning. The current ATDS is predicated on the number of passengers on an hourly basis. However, passengers are not homogeneous and present different processing characteristics that can drive both time and space resources. A high degree of passengers without checked bags, for example, can result in significantly faster egress from the FIS. A large number of non-English speaking passengers may also affect the rate at which CBP can process passengers.

As shown in Figure 4-1, there are four key steps in the international arrivals process that could drive a business case for changes from the ATDS. At each step in this passenger flow, key planning decisions must be taken into consideration. For example, the impact of a widebody aircraft is quite different than a regional jet when sizing international arrival components.

**Figure 4-1. Key Steps in the International Arrivals Process**




Note: a 'Bags First" FIS configuration swaps steps 2 and 3 in the arrivals process

### STEP 1: INTERNATIONAL ARRIVALS

The international arrivals step is driven by peak-hour arrivals, which represents the number of aircraft and their corresponding passengers arriving around the same peak period. In the past two decades, the planning focus at many international airports was based on the Airbus A380 superjumbo aircraft. As very large aircraft with upwards of 800 passengers are being gradually phased out, there has been a resurgence of new, smaller aircraft (e.g., Airbus A321XLR) that will impact the size and scale of demand for CBP facilities.

The international arrivals process may be influenced by the origin airport of the aircraft, as well as the anticipated profile of passenger demographics. Planners are well advised to move beyond peak-hour

numbers and into the derivatives, such as estimating the percentage of passengers by immigration status, including:

- US citizens
- Canadian citizens
- Lawful permanent residents of the United States
- Citizens of Visa Waiver Program countries
- Citizens of countries requiring visas

Each category will have different processing rates and requirements. Airport planners are also encouraged to evaluate the list of potential airports to be added to CBP preclearance operations.

It is also necessary to consider universal design principles in physical layout, wayfinding and signage, as well as vertical circulation requirements for passengers who use wheelchairs and other mobility aids.

### STEP 2: PRIMARY PROCESSING

As noted in the previous section, primary processing is evolving. Three processing streams should be planned for those who are processed in front of CBP officers, those using Global Entry, and those using MPC. Where there are requirements to understand the baseline of operations, a CBP Port Director will have utilization statistics for Global Entry and MPC.

Planners are advised to compute scenarios associated with Global Entry and MPC usage to get a better understanding of the space requirements. Figure 4-2 presents two different process-share scenarios, one with low utilization of Global Entry and MPC (left) and one with a higher utilization (right), with "booth" representing passengers processed by CBP officers.

**Figure 4-2. Low and High Global Entry and MPC Utilization Scenarios**


If the forecast share of Global Entry and MPC is not significant, such as in the pie chart on the left, there will be no material impact on the usage of the FIS, and the ATDS guidance will be adequate for the design. However, if Global Entry and MPC usage are projected to be in excess of 25%, then it becomes important to flow-plan an FIS to optimize the use of these products in light of their faster processing rates and passengers' likely familiarity with airport processes. Note that Global Entry usage can be considered high when approaching 10% of passengers.

### STEP 3: CHECKED BAGS

Whether passengers check bags depends on journey time, destination, and airline baggage size and fee policies. Some markets for golfing, skiing, and hunting destinations may also require specialized handling of out-of-gauge or oversized bags. The number of bags per person tends to be higher for leisure travelers compared to business travelers.

Overall, planners are advised to identify the market segments that have higher bags per passenger rates, as well as forecast future demand scenarios. The forecast for changes in travel behavior is well documented by airlines in view of ancillary charges with baggage fee collection.

#### STEP 4: CONNECTING FLIGHTS OR GROUND TRANSPORTATION

The final step in the passenger journey occurs outside of the FIS. Baggage recheck facilities are available at many airports to enable passengers to immediately recheck bags for a connecting flight without having to go to the main check-in lobby. Markets with minimal onward passenger connections may not require these facilities immediately, but changes in airline alliances as well as maturation of air carrier models may generate future requirements. For example, some airports have had a baggage recheck installed in the tenth year of a facility's operation when a carrier exercised a trigger point for sufficient inline or online connections.

## 4.2 Design Terminology from the ATDS

As an airport considers building or renovating an FIS, a number of factors must be considered when seeking a change from the ATDS, adopting a design that the ATDS fails to address, or reflecting stakeholder needs (e.g., airlines, retailers). CBP has repeatedly confirmed that it understands and supports the need for flexibility in FIS design and implementation. Airport operators should consider opportunities to customize and future-proof the FIS based on local context and planning parameters that require solutions to be tailored to the specific location.

Additionally, as noted in the previous chapter, technological developments have considerably affected passenger and baggage processes, which have outpaced the five-year cycle of ATDS revisions.

When designs for a new or updated FIS are developed, specific local circumstances at the airport may warrant requesting approval for a change from the ATDS, which can come in three forms: an alternative or equivalent means, an exception, or a deviation. These terms are generally defined as follows:

- **Alternative or equivalent means:** a proposal that achieves the same outcome for CBP and provides an equivalent functionality for the FIS.
- **Exceptions:** the FIS will be exempt from specific requirements from the ATDS.
- **Deviations:** any departure from content within the design standard. This is usually due to local conditions, legacy facility constraints or other objectives. With a deviation, there are aspects of the FIS design that will not follow the ATDS but rather incorporate the idea of flexibility in the planning of proposed design requirements.

The term "deviation" is undefined in the ATDS, but CBP indicated that it should be regarded as "[a]ny departure from content within the design standard."

The ATDS requires CBP approval for "renovations, additions, and/or alterations." A summary of ATDS terminology for different types of changes is provided in Tables 4-1 and 4-2. CBP approval can be obtained pursuant to the Deviation Proposal Form set out in Appendix D.1.4 of the ATDS.

**Table 4-1. ATDS Terminology for Different Types of Changes**

| ATDS Term | Presumed Definition | ATDS References |
|---|---|---|
| Alternate or Equivalent Means | Undefined but understood to mean a proposal that achieves the same outcome for CBP, and provides an equivalent functionality for the FIS | • ATDS Section 1.2.6 |
| Deviation | Undefined in ATDS, but CBP states it is: "[a]ny departure from content within the design standard" | • CBP email (8/10/2023)<br>• ATDS Section 1.2.6<br>• Deviation Proposal Form: Appendix D.1.4 |
| Exception | Undefined but understood to mean the FIS will be exempted from specific requirements from the ATDS | • ATDS Section 1.2.6 |

**Table 4-2. ATDS Terminology for Different Types of Construction Processes**

| ATDS Term | ATDS Definition | • ATDS References |
|---|---|---|
| Addition | Additional operational and physical capacity to buildings or site structures, or new equipment or systems required for port functions and operations | • ATDS Section 1.2.2 |
| Renovation | Undefined | • ATDS Section 1.2.1 |
| Alteration | Remodeling, improving, extending, or making tenant requested changes to an existing facility, exclusive of maintenance or repair work. | • ATDS Section 1.2.2 |

The ATDS outlines the change request process in Section 1.2.6, including the timing of such requests. This process applies to "alternative or equivalent means, exceptions, and deviations." In other words, where the airport is contemplating some sort of change beyond the scope of a standard in the ATDS, it lays out the details for what the Deviation Proposal Form should include, the parties that may submit it, and the steps in the process for its submission.

## 4.3 Reasons for Proposing Changes from the ATDS

There are often competing objectives that can drive the need to request a change from the ATDS. As outlined in the previous section, many of these may be related to the changes in role of the airport. Another competing objective is often the site limitations for the FIS facility. Greenfield development sites at US airports are rare, so there are often pre-existing conditions that dictate facility location, size, and operation. Airports may have insufficient space for a terminal program due to legacy decisions on the airfield and/or the landside. Adding new floors may be hampered by structural limitations, and relocating existing critical infrastructure such as elevators and electrical systems may not be feasible.

After a facility size envelope for the FIS is decided, the changes from the ATDS or change orders for agreed-upon programs are driven typically by one of four considerations:

- **Capital cost savings:** There may be funding limitations impacting the project, especially during a period with high inflationary pressures on construction costs.
- **Passenger service improvements:** Airlines and the airport may desire hub connectivity to domestic/other international flights. Other airport facilities (e.g., check-in areas, security checkpoints) may have a high adoption rate for emerging technologies that can streamline passenger processing.
- **Local environmental conditions:** For example, glare and lighting, especially for airports that have direct natural light can impact on performance of facial recognition sensors and legibility of computer screens.
- **Baggage processes:** An airport may put in place international-to-international baggage connections, or participate in the pilot projects on OSS.

CBP classifies changes to the ATDS into two main categories:

1. **Cost savings:** Typically related to overall capital costs, although most ATDS requirements are non-negotiable (e.g., cabling for CBP computer and storage systems, separate from other systems)
2. **Enhancements to processes or facilities:** For example, changes to facilities to allow for OSS passenger flows, or an additional escalator to exit the FIS for international-international passenger flows. These alternate flows are not described but are also not prohibited in the ATDS.

   These types of changes from the ATDS can:

   a. Sometimes happen during the design/construction
   b. Realize site-specific flows or innovations (e.g., DFW quick exit for Global Entry members from the baggage reclaim hall, separate from the normal egress, with e-gates)

In the case of an enhancement, typically it is the airline and/or airport operator that builds the case for a change from the ATDS, with the Port Director as the first point of contact. This is then brought to the stakeholders as a design enhancement/option, in which the stakeholders can support or protest the enhancement for different reasons. If most parties around the table see merit in the enhancement, the team can work together to bring the other parties around in favor of the enhancement.

## 4.4 Considerations When Initiating a Request for Changes from the ATDS

There are three types of changes from the ATDS: a deviation, an exception, or an alternate means of achieving the intent of facility guidance.

In interviews with airport operators, CBP, facility designers, and other parties involved in recent CBP facilities, a “business case” was suggested to help navigate through proposed deviations/exceptions/ alternatives to the ATDS. A change is typically best received when it is presented as beneficial for all parties involved, with minimal resource impacts, and how it meets all the (primarily security) requirements is shown. There are generally nine sections of a business case to be submitted:

1. Description of the change, together with diagrams indicating flow of passengers/bags
2. Outline of potential impacts on security and/or CBP operations
3. Description of benefits to passengers and airlines, and the rationale for the change
4. Outline of cost factors (savings, costs, capital/operations/maintenance)

5. Evidence of compliance with applicable laws, regulations, building codes, environmental provisions, etc.
6. Options and/or alternatives considered
7. Future-proofing benefits
8. Description of how the design supports other regulations or requirements (e.g., ADA, Air Carrier Access)
9. Solicited stakeholder input on potential developments

These sections can form the basis of submittal of the Deviation Proposal Form to CBP. The sections may also reference CDC/public health requirements, as well as other research documents (e.g., ACRP Report 253) and lessons learned from the COVID-19 pandemic.

After conducting an assessment of the various factors, a key question airports should address is whether the proposed change meets the ATDS change categories discussed above (i.e., cost savings or enhancements to processes or facilities). In the interest of marshaling arguments that the proposed change does not qualify as a change requiring CBP approval, or is a change that has in the past been approved by CBP, the airport would be best prepared for this by surveying other airports with similar experiences. This background equips the airport for the conversation with CBP as to whether the Deviation Proposal Form should be filed, and which justifications should be included to ensure success.

Conversely, airports can obtain information about changes approved by CBP from the CBP Port Director and the Project Manager assigned to the FIS design project. The Project Manager can access historical project information that is documented in a dedicated CBP system, and research the numerous change requests in the system as they relate to existing projects with similar challenges in the planning, design, and construction phase.

## 4.5 Critical Path for Obtaining CBP Approval for a Change from the ATDS

### 1. INFORMAL DISCUSSION

Based on prior experiences and research, it is highly recommended that any planning for a change from the ATDS and/or "departure from the content within the design standards" begin with informal discussions with the local CBP leadership, starting with the Port Director (and the Director of Field of Operations). These informal discussions should outline the expected pros and cons, highlight the benefits and value, and determine what approvals will be required. Mutual agreement will be vitally important to the process.

### 2. FORMAL REQUEST

Based on the informal discussions and agreements, a formal request should be submitted following the ATDS proposal guidelines, detailing the request for exceptions, alternate means and/or deviations. The basic information is the: what, why, who, when, where, and how. As outlined in the business case described in Section 4.4, it is important to ensure there is consideration for what resources are required, impact on stakeholders, timelines, expected outcome, and value added. Recurring leadership meetings should be established to provide updates, adjustments, and specific follow-ups throughout the development of the formal request and business case proposal.

### 3. TIMING

Airport operators interviewed expressed frustration about the lack of certainty in timing of decision-making associated with CBP approvals. CBP has a complicated group of internal stakeholders to manage. The complexity of the changes or exceptions will ultimately determine the length of time for approvals because of the requirements of various offices with oversight responsibilities. For example, a

request may be structural (facility group) or technology related (IT group), or it may require security concurrence (Internal Affairs group), or all of them combined.

### 4. APPEAL MECHANISMS

From time to time, CBP will deny proposed facility ideas or seek amendments to proposed drawings. CBP is obligated to provide an explanation for any denial of proposed changes. It is important for designers and airport operators to exhaust all internal mechanisms for appeals within CBP. Airports that lobbied CBP with congressional pressure indicated limited success in realizing desired outcomes. In-person meetings to resolve major issues with CBP have generally yielded greater success in finding compromises or solutions.

# SECTION 5: LESSONS LEARNED FROM RECENT FIS PROJECTS

Several FIS facilities have recently been constructed, renovated, or expanded at US airports. These projects provide an opportunity to understand and characterize lessons learned for the current edition of the ATDS and technologies available for implementation.

Working from a list of almost two dozen projects, eight recent FIS projects were identified to serve as case studies. These projects range in geography and size, including non-hubs and small hubs all the way up to large hubs. The project types also vary and include renovations, expansions, new commercial FIS facilities, and new GA FIS facilities.

For each case study, representatives from both the airport and design team were contacted. In most cases, feedback was provided from both perspectives. Local CBP officials also provided feedback for some case studies. Feedback obtained from the case study interviews centered around the themes below, which are explored in the following sections:

- Background about the ATDS version and facility functionality
- Coordination and roles
- Design considerations and changes
- Lessons learned

## 5.1 Examples of Significant ATDS Deviations

This section presents a selection of deviations approved by CBP from the current or past ATDS, that saved project capital or operational costs, improved processes, or solved site-specific constraints. The deviations feature a range of voluntary enhancements, such as time savings in connectivity, enabling a quick exit for Global Entry, allowing for convertible domestic/international baggage claim devices, and including convertible commercial/GA flight activities within the terminal facilities. Since every site is unique, the examples have been genericized by airport hub size and are aggregated around broad issues that may be applicable to other airports.

In the various experiences and deviation examples, the common themes in the business cases presented to CBP were operational significance and mutual benefit. In all cases, the key requirements for approval were meeting security requirements, realizing operational efficiencies, and assessing the impacts on all stakeholders. Requests that have minimal or no impact on resources (especially staffing) are considered beneficial by CBP.

### PORT DIRECTOR'S OFFICE DOOR ACOUSTIC PROOFING LEVEL

A new FIS was being designed at a large hub airport. After program definition and during the design drawing process, a question arose about the acoustical noise insulation standard used for Port Director doors and the weight of the doors. As a cost-saving measure, the design team proposed a slightly lower level of noise insulation for the Port Director and Assistant Port Director offices. An added benefit was that the reduced weight of the door would result in ADA compliance, as an individual with reduced mobility could open the door more easily. The cost savings were significant in the level of construction needed to support the weight of the doors (approximately USD 100,000 per door). This change can be replicated across all FIS new builds or renovations.

### CABLING OF CBP IT INFRASTRUCTURE

IT infrastructure, especially the amount of cabling required to integrate systems, is a significant cost driver in the design and construction of facilities. For new or renovated FIS facilities, CBP typically

requires an independent IT system and cabling network, which significantly increases the capital required for the project. At a large hub airport, the airport IT provided CBP a dedicated private network that operated on shared cabling. By reducing the amount of cable required, the project costs were significantly reduced.

### SEPARATE EGRESS FROM FIS FOR GLOBAL ENTRY

A large hub was dealing with considerable congestion at the FIS exit. It was difficult for Global Entry passengers to find the exit from the FIS, especially during peak periods. And, given the shorter anticipated processing time for Global Entry, many of these passengers were attempting to facilitate tight domestic connections. The airport proposed creating a separate egress for Global Entry members to have the shortest route to exit the FIS, as well as access the TSA security screening checkpoint to facilitate connections. While not specifically prohibited or enabled in the ATDS, it is an example of an change that benefitted Global Entry members as well as the layout of the hall.

### EGRESS TO SKIP BAGGAGE RECLAIM FOR PASSENGERS WITHOUT CHECKED BAGGAGE (FOR ACCELERATED CONNECTIONS)

Several hubs developed faster exits for passengers in the CBP clearance process. One large hub created a separate escalator for passengers without checked bags to bypass baggage claim and directly exit the FIS hall. The availability of space for an escalator to be built was coincidental. The flow was approved by CBP as it helped to reduce the number of people that would be around the baggage claim devices and simplified the egress process for passengers without checked bags.

### NUMBER OF DETENTION CELLS REDUCED

A medium hub was designing a new FIS and had a space allocation for secondary detention cells. A proposal was initiated to reduce the number of cells as they were not needed for the traffic makeup of the facility. The reduction of space was approved during the design process, which enabled the airport to use the additional space that was made available to facilitate GA activities.

### SPACE REDUCTION FOR MIDFIELD CONCOURSE FIS

A large hub airport deviated from the basic size requirements in the ATDS by designing a small FIS facility within a satellite concourse. Several gates were being constructed on a new concourse with passenger processing remaining at an existing international terminal headhouse. The original program called for FIS access through a secure tunnel. However, the airport saw the benefit of having an FIS within the satellite area to help reduce airline connection time.

### MIDFIELD CONCOURSE FIS

At a large hub airport, international passengers arrived at a satellite concourse and were transported to the main FIS facility by an automated people mover. Satellite arrivals occurred at the peak time and contributed to overcrowding and processing delays at the FIS. In-transit international passengers, after processing through the FIS, had to re-enter through the TSA security screening checkpoint to return for their outbound flight, often at the same satellite terminal used for their arrival. The airport, airlines, and CBP collaborated on designing a scaled size FIS project at the satellite concourse, allowing in-transit passengers to be processed directly at the satellite without having to be transported to the main terminal. The satellite terminal was retrofitted with all the required CBP equipment, minimum office space, and holding rooms. When operationally necessary, passengers were directed or transported to CBP secondary at the main FIS terminal. This deviation from the ATDS facilitated the efficient processing of passengers and reduced the passenger volume in the main FIS terminal at peak times. After further collaboration with TSA, a scaled-size screening checkpoint was established at the satellite to reduce in-transit passenger throughput at the main terminal TSA checkpoint.

### CONVERTIBLE FACILITIES

A small hub airport needed a new FIS expansion to support additional flight activities. The original size of the terminal was 65,000 square feet, of which 9,000 square feet was allocated for the FIS. The terminal was increased to 97,589 square feet with approximately 23,000 square feet dedicated to the FIS. The 2017 terminal expansion project was advanced for $2.2 million. Originally, there were separate commercial and GA facility requirements. The airport instead wanted to have a single facility that could accommodate both. Work was advanced with CBP to achieve cross-utilized space, with an estimated savings of about 4,000 square feet, with significant capital cost savings.

### TEMPORARY FIS AT GA FACILITY FOR COMMERCIAL FLIGHTS

At this medium hub airport, renovations to the main FIS facility were planned and the airport authority requested permission to construct a "temporary FIS" at the airport's GA facility. The temporary facility processed overflow flights while construction was in progress at the main terminal. The GA FIS was reconfigured to process larger flights with CBP equipment, office space, CBP secondary and holding rooms. Technical CBP processing was completed at the main terminal. This deviation allowed the airport to complete renovations at the main terminal while continuing to process flights efficiently. The business case element that enabled approval was the "temporary" (12–18 months) status of the off-site facility. To date, the reconfigured GA facility remains in use for GA international passengers. All commercial passenger processing is completed at the newly renovated bags-first FIS facility.

### SHARED SPACE REDUCTION

At a medium hub airport, a new FIS facility was planned and scheduled for multiyear completion. After years of planning and design meetings with all stakeholders, business cases were presented to request approval for deviations to the ATDS based on operational needs. An example included bags-first processing with inclusion of biometrics for passengers. Additionally, office space was scaled based on needs and the FIS overall daily usage. Where appropriate, relevant agencies agreed to shared spaces. For example, some DHS components were able to share computer LAN room space for their agencies' requirements. Use of space was adjusted for joint needs and parking requirements were consolidated. Building an FIS facility over multiple years required numerous adjustments as emerging technology and operational requirements changed (e.g., the need for COVID quarantine rooms during the pandemic). Additionally, other government agencies required office space—mainly the CDC and the US Public Health Service.

### ELIMINATION OF SEPARATE STAFF RESTROOMS AND CONSOLIDATION OF OFFICES

At a non-hub airport, a new GA FIS was planned and constructed to replace these services being provided in an FBO on the airport. This new facility, which is served by one CBP officer, was being funded by the airport. As financial pressures mounted due to cost escalations, a business case was prepared to reduce the footprint. Given the limited number of CBP staff onsite, a compromise was reached to eliminate the dedicated CBP staff restroom and convert individual offices to shared offices. These reductions saved $60,000, which represented a substantial percentage of the overall capital cost.

## 5.2 Other FIS Design Considerations

Certain considerations and challenges that exist in general terminal design and construction also apply to FIS facilities. These include vertical circulation, accommodating sun glare, and providing opportunities for revenue generating advertising, among others. The scope of the ATDS, however, is narrow and does not explicitly address many of these design and operating considerations. Some of the common ones identified through the case study interviews are described below.

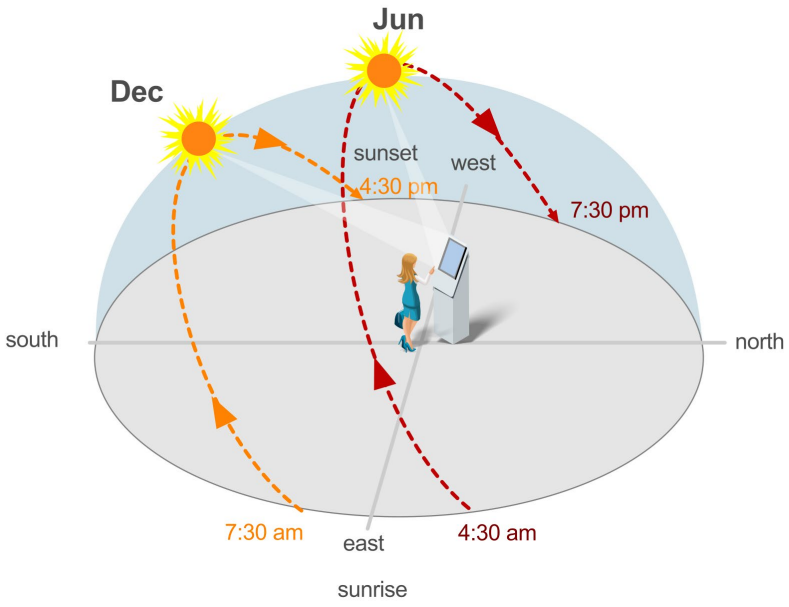
### OTHER GOVERNMENT DEPARTMENTS

The COVID-19 pandemic highlighted the need for airports to maintain flexibility in facilities and operations. Discussions with some stakeholders demonstrated a need to consider future uses of space for other government departments, such as the CDC. When FIS design focuses too specifically on the needs of CBP and only the requirements within the ATDS, airports risk being unable to support government initiatives in times of crisis. In some cases, support for other government departments may include additional storage facilities or additional surface area for ad hoc services like clinical testing on arrival. While these types of plans support biosecurity measures, flexibility and resilience are two key themes that emerged from this research that should be contemplated in design and planning.

### SUN GLARE IMPACTING COMPUTER AND KIOSK SCREENS

Interviews with recent FIS project owners indicate that sun shade should be considered to account for changing sun patterns throughout the year. One recent major FIS project had to include a change order for blinds to shade the facility from sun during the fall months. As shown in Figure 5-1, fall sun tends to be lower than summer in North America, resulting in potential direct glare effects on biometric and screen-based equipment. For some CBP officer positions, additional measures were implemented to shade officers from direct blinding sunlight.

**Figure 5-1. Glare Analysis Impacts on Technological Systems**




Additionally, differences in horizontal and vertical lighting can affect the performance of technological systems on which CBP depends. The National Institute of Standards and Technology has long acknowledged that biometric performance is influenced by lighting and other environmental conditions. In FIS facilities, it is important to install electronic self-service gates and other biometric capture devices in a way that supports best algorithm performance, as well as flexibility in use. This has significant effects on false acceptance rates or false match rates, among other factors. This means that airports must consider the sun, lighting angles, types of ambient lighting, and general passenger behavior when using the systems in a live operational environment.

### DYNAMIC SIGNAGE IN STERILE CORRIDOR

There is the potential for dynamic signs that are carefully placed at key points of the sterile corridor. Terminal designers have an opportunity to examine:

- Placement of signage
- Lighting/glare analyses to ensure visibility
- Other associated wiring/infrastructure needed to support dynamic signage

It is out of the scope of this study to opine on the actual content of dynamic signage. However, CBP prohibits commercial advertising within the FIS, and there is a long-standing debate on whether third-party advertising can be allowed in the sterile corridor.

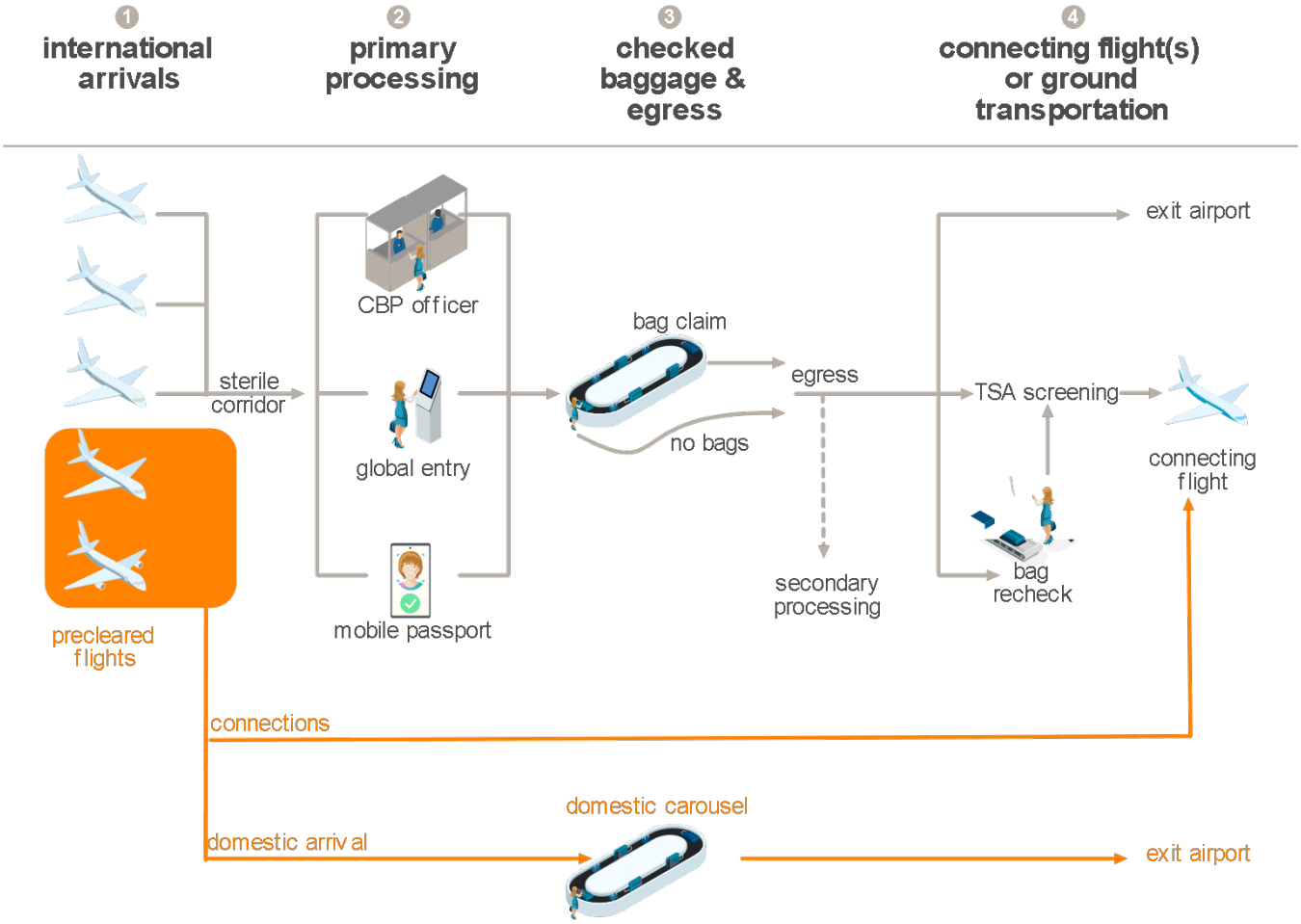
## 5.3 Future-Proofing FIS facilities

FIS planners should evaluate each aspect of the ATDS to review when there are opportunities to address the evolution of facilities in the next 10, 20, or 30+ years. A FIS built today needs to last a life cycle upwards of 50 years. While no one can predict exactly what will happen in aviation demand, technology evolution, or the changing needs of passengers, there is a core principle to provide flexibility and resiliency within the facility design to enable transformation of facilities and operations to different models that will evolve over time. Some examples of approaches to future-proofing an FIS facility are provided below.

#### EXPANSION OF THE PRECLEARANCE PROGRAM

CBP may expand Preclearance to more airports. Arriving as domestic passengers, travelers on precleared flights have less of an effect on the design of the FIS itself, but do have an impact on the demand for processing capacity of the FIS. In the design of the airport terminal, and in the resource planning of aircraft stands/gates, it is essential to consider the influence of the Preclearance expansion trend. As Figure 5-2 depicts, the number of gates currently connected to the FIS sterile corridor may be reduced or flexed over time based on precleared operations, so it is important to ensure that these gates can operate domestically without impacting the sterile corridor.

Figure 5-2. Precleared Flights Reducing the Demand for FIS Processing



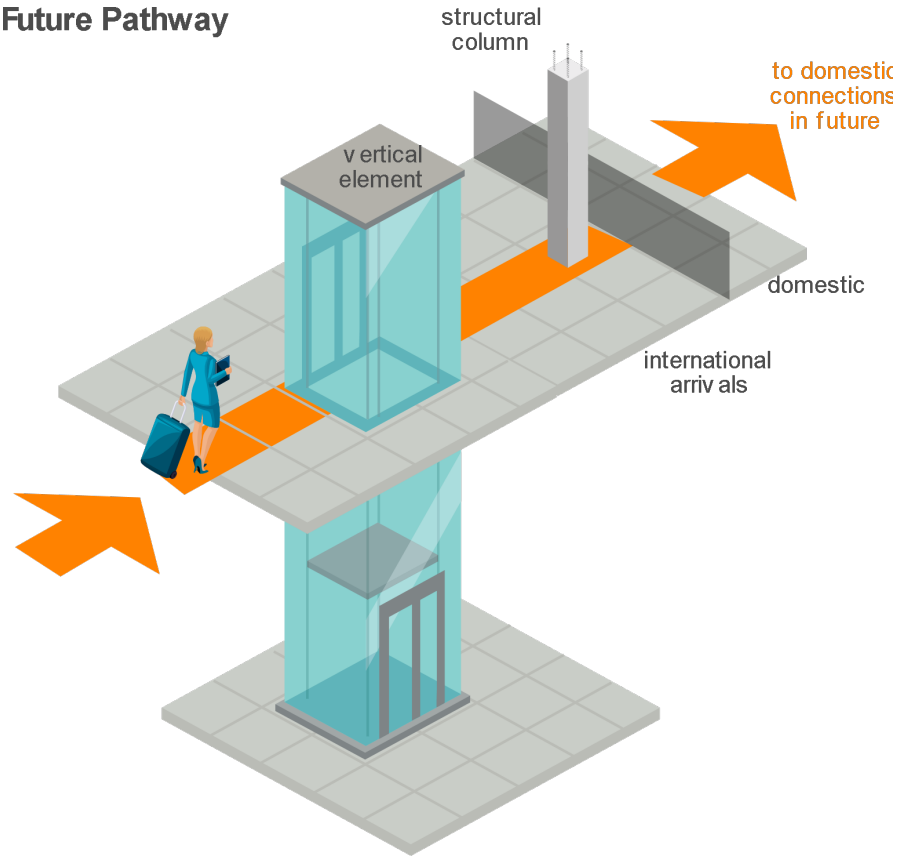

## INCORPORATING FUTURE PATHWAYS OF PASSENGER PROCESSES

Although highly dependent on the airport and the processes in place for international arrivals, it may be possible to add new passenger pathways when regulation or policy changes, when previously international flights become precleared flights, or when other developments cause the airport to redesign existing flows and or processes.

A key mistake FIS designers make is erecting structural walls, vertical elements, or other barriers in the way of future pathways. There are lessons to be learned from roadway planning to preserve rights-of-way to enable future paths.

Shown in Figure 5-3 is a potential pathway through an FIS into a domestic connection corridor. An elevator, escalator, structural wall, or other vertical impediment could be a potential obstacle to enable the future pathway to be leveraged. While there are undoubtedly workarounds, airport planners are advised to anticipate optimal pathways and preserve rights-of-way to facility elements that may be activated in the future. Sometimes the additional corridor/pathway may not be realized for 10+ years after a facility opens. A core planning principle is to ensure the facility is phased through in advance to its ultimate build out such that additional corridors and expansions can be activated as market forces and CBP approvals allow.

**Figure 5-3. Structural or Vertical Elements Blocking Future Pathways Should be Prevented**

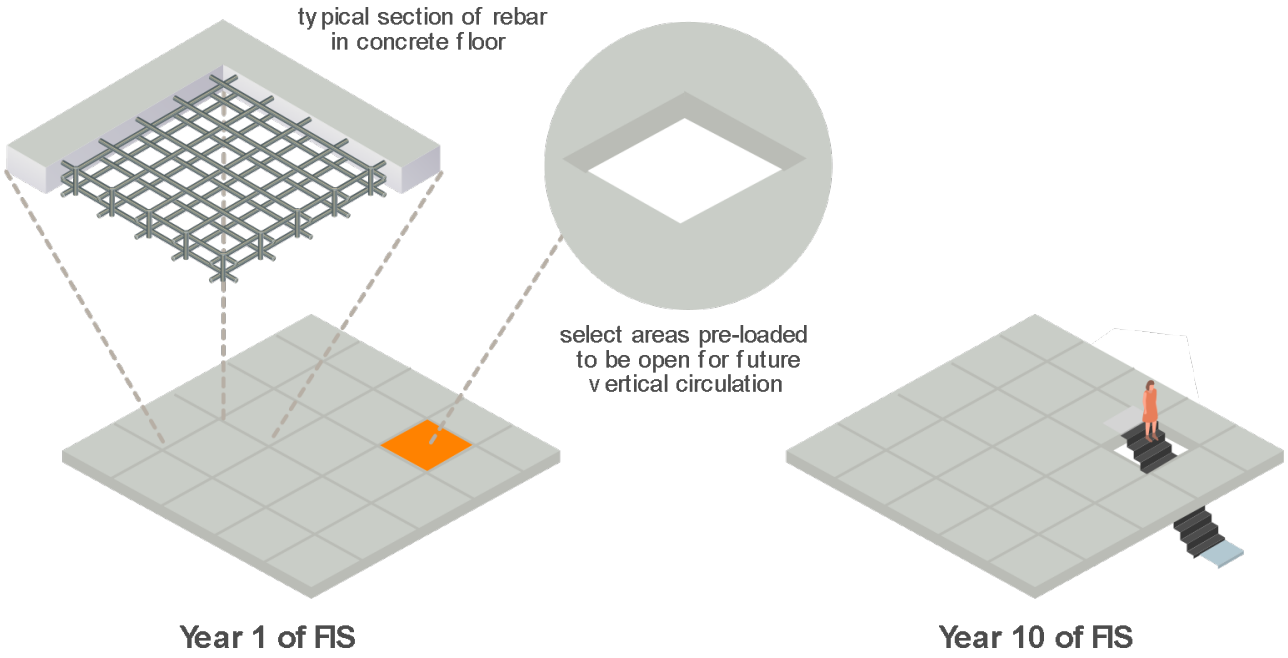



### ANTICIPATING FUTURE VERTICAL MOVEMENT

When describing flexible planning for the FIS, there is often a view towards envisioning solutions along a single level or a two-dimensional plane. While facility constraints may limit the size and volume of an FIS facility, especially in a brownfield scenario, vertical expansion should be a consideration when evaluating the design.

The case study interviews highlighted several instances where multiple levels can be used effectively to process and flow passengers. For example, at Houston George Bush Intercontinental Airport, passengers without checked bags were offered a new route down from primary processing to the FIS exit through the addition of an escalator. These vertical circulation additions can be facilitated with the design of terminal buildings that have concrete flooring designed with cutouts that can allow for escalators, elevators, or other pathways to be easily constructed. As shown in Figure 5-4, the future location of a vertical circulation core was identified at the outset but not activated until demand warranted several years into operation of the facility.

**Figure 5-4. Planning for Future Vertical Circulation**




## THE EVOLUTION OF PROCESSING TECHNOLOGIES

To future proof FIS facilities, designers need to anticipate the evolution of processing. Over the years, CBP has developed concepts to improve processing flow, such as using a messaging system to assign passengers a path based on a risk-based approach, completion of biometrics, or other formalities.

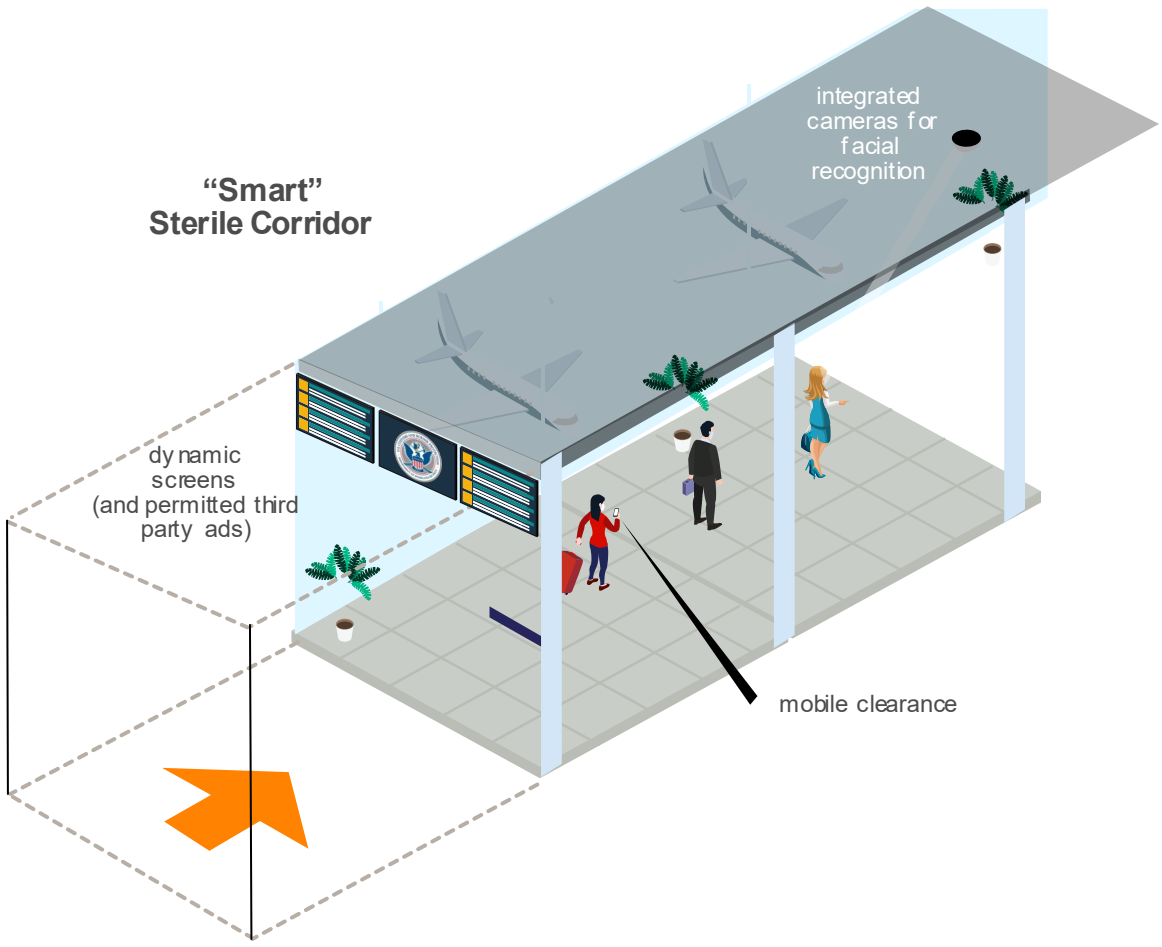
The concept of a "smart" sterile corridor or automated walkway where passenger processes such as passport control and taking biometrics are combined and performed in-flow might seem too far into the future, but when considering that an airport facility is aimed to last several decades, it is necessary to include and evaluate futuristic concepts in the design phases.

Figure 5-5 illustrates a smart sterile corridor concept that could combine several passenger processes in the following order:

1. Dynamic screens that provide public information and notifications such as reminders about current issues (e.g., declare $10k cash) or other advice about the availability of MPC/GE. Other screens could be used for third-party advertising.
2. In-flow passenger processing occurs using MPC while on a moving sidewalk.
3. Finally, the passenger uses TVS (which is now 100% kiosk-and officer-free), travels via a channel that establishes a facial recognition via a camera, and exits through a corridor/gate.

Rejection during any of the above steps could prompt a notification to the passenger's mobile device with instructions (e.g., "Go to Secondary Inspection") prior to the passenger being stopped at a boarding gate before a next flight, or before passing through a "hard" gated area on the path to exit the airport.

**Figure 5-5. The Future of Passenger Processing**



# SECTION 6: KEY RESEARCH FINDINGS

In conducting research for this guidebook, over 30 recent CBP facilities at US airports were reviewed for their sizing, business rationale, and cost of design. Among terminal operators, airport owners, and CBP there is a shared set of objectives to maximize the best use of physical assets and leverage new and creative ways of processing passengers coming into the United States. The key research findings center on three areas:

- Flexible Facilities
- Future-Proofing
- Forum for Continuous Improvement

## FLEXIBLE FACILITIES

Over the past two decades, the pace of change for CBP's operations has been significant. Moving from a strong reliance on paper-based processing to the transformation of data, biometrics, and other ways of processing information are some of the highlights of the evolution of border processing.

For facilities, the faster the process time with CBP, the less demand there will be for space for processing and associated queues. Removing paper-based forms also means elimination of the need for form storage areas.

One of the misunderstood aspects of the ATDS is that its statements are not wholly technical standards. CBP has enabled deviations, exceptions and alternatives to achieve some flexibility. Several areas are worth noting on the evolution of flexible FIS facilities:

- **Shared facilities:** The demand profile for FIS can vary with the introduction of new models. Shared facilities for smaller sites have proven viable for joint GA/commercial aircraft.
- **Connections:** Direct baggage connections between international flights is the norm for a number of airport hubs. More products to facilitate domestic connections are being proposed/accepted, along with planning work for OSS pilots.
- **Reduction in space demand:** Space allocation tables are highlighted for different planning peak-hour arrivals, including reduced space for airside FIS sites and tailoring space requirements.
- **Wiring:** An increasing number of cases for sharing wiring assets while managing cybersecurity and other data threats.

## FUTURE PROOFING

As described Section 5, the design and planning of flexible FIS facility space is increasingly important to protect against future changes to passenger flows and technologies. Bringing each of these concepts together in a holistic view of the facility, and understanding the potential interplays, is the final piece of the puzzle.

Figure 6-1 demonstrates a generic model of an FIS at a US airport. The passenger disembarks to the sterile corridor in step 1, proceeds through primary processing in step 2, picks up their baggage in step 3, and then connects to a subsequent flight or exits the airport in step 4. This flow tracks with the earlier two-dimensional process flow graphic presented in Section 2, in Figures 2-1, 2-4, and 2-5.

A multilevel FIS facility is typical at medium and large airports. As described earlier, this additional dimension introduces the need to think about vertical movement (level changes) as passenger pathways

change over time. While there is a desire to minimize grade changes for wayfinding and universal access reasons, a two-level layout provides flexibility in designing pathway changes into the overall flow.

**Figure 6-1. Isometric Representation of the International Arrival Process**

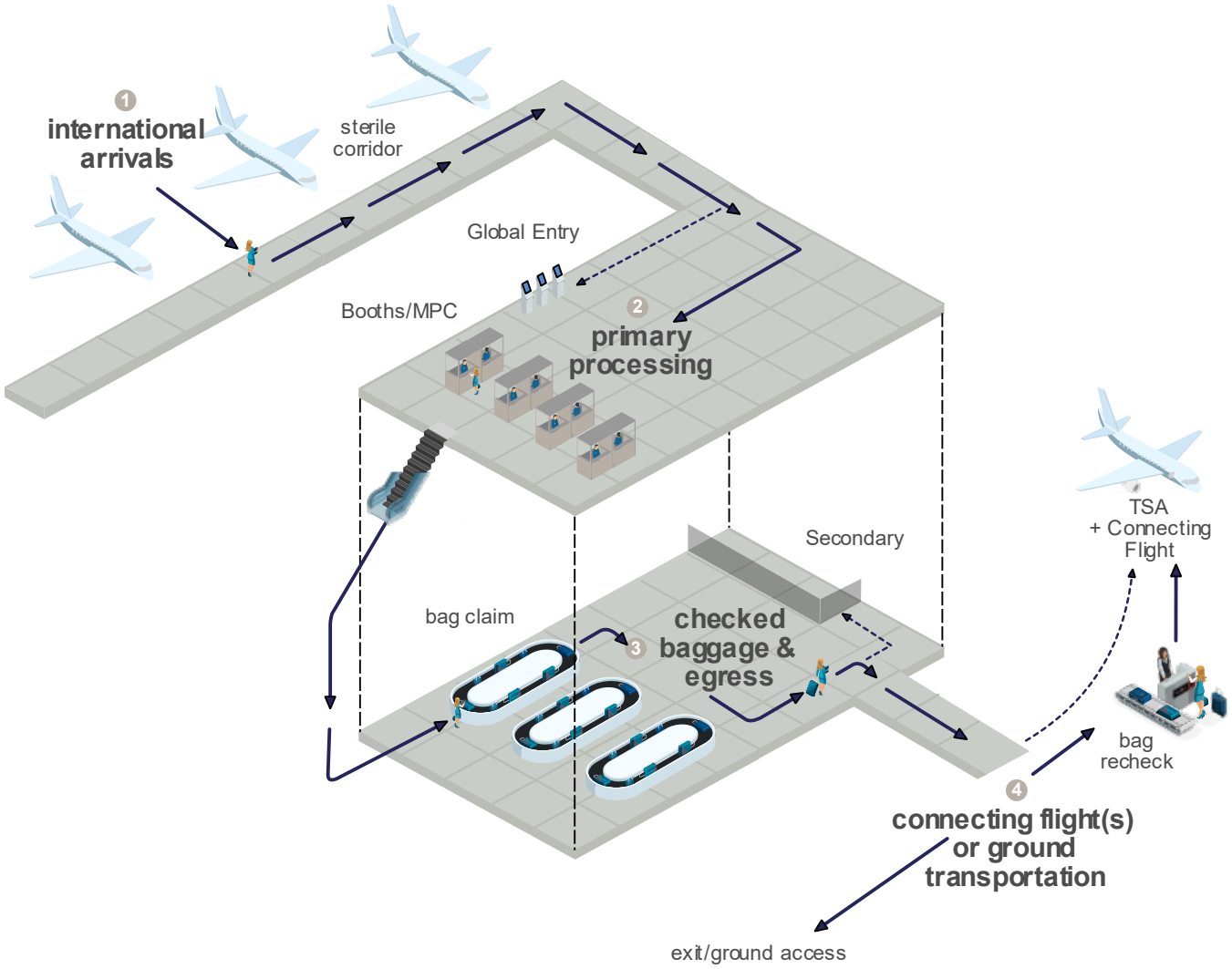


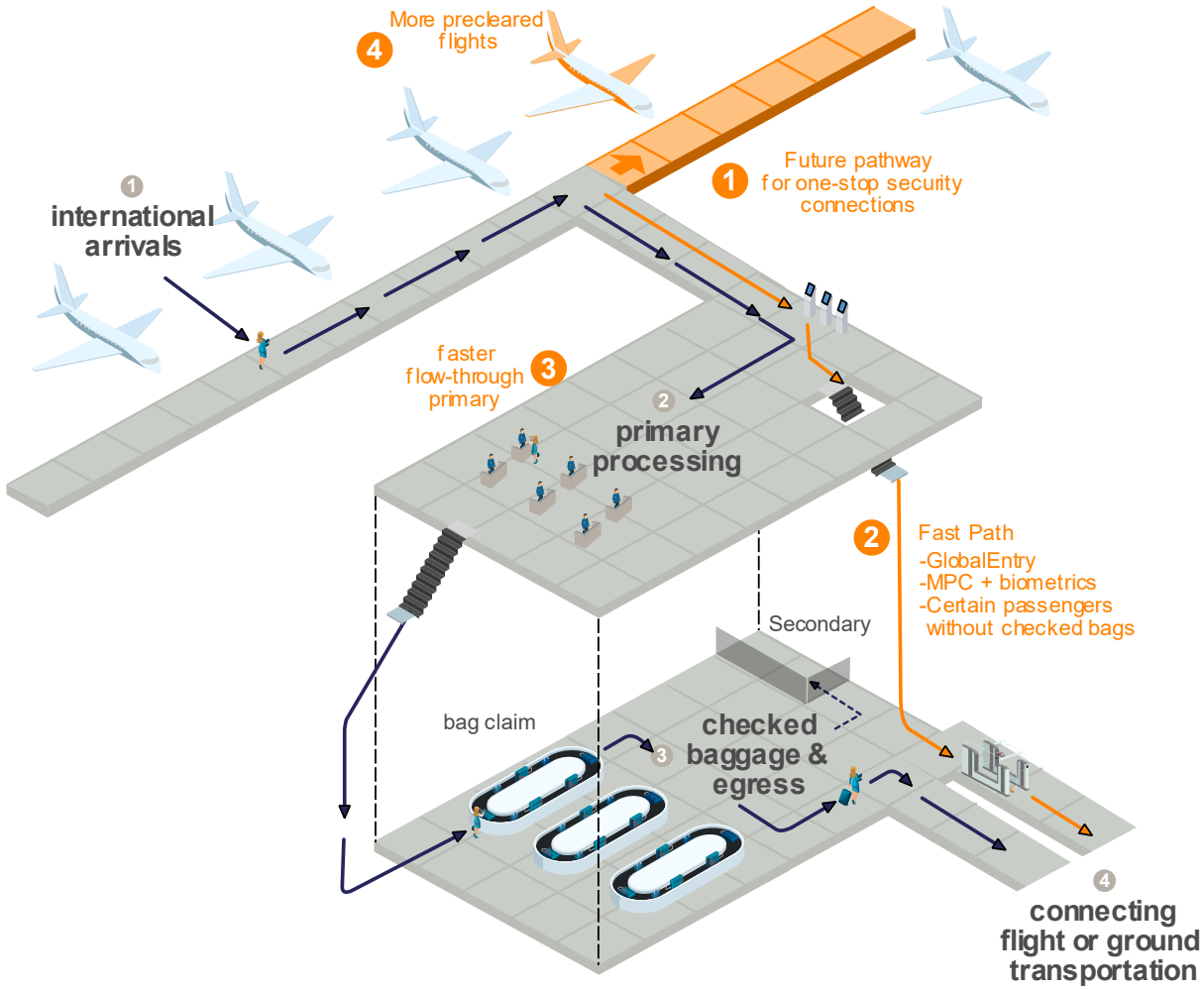

Figure 6-2 depicts four future-proofing examples. All four examples have been discussed earlier in the guidebook but are summarized here to provide the full holistic view on future-proofing:

1. **Future pathway for OSS connections:** This corridor, located prior to the entrance to primary processing, provides a route for OSS connecting passengers to be segregated from non-OSS and terminating international arriving passengers. Maintaining a right-of-way for this corridor during design requires that no structural or vertical elements impede this future route.
2. **Fast Path:** While faster processing can increase throughput and reduce facility requirements, it can also lead to increased congestion. A separate automated egress point and pathway may be implemented for certain passengers in order to reduce overall congestion. A "fast-path" model could include Global Entry, MPC (with biometrics), and/or passengers without checked bags to have the shortest distance to exit the FIS. The anticipated area to facilitate the vertical movement for this fast-path route should be incorporated as a feature in the design of the FIS.
3. **Faster flow-through primary:** The primary processing concepts of hardened primary and booths are giving way to podiums with TVS implementation for faster flow-through primary

processing. The concept depicted in this example is movable CBP-counters that facilitate fast-processing technologies.

4. **More precleared flights:** With the expansion of the preclearance program, fewer flights may require access to the FIS. Airport terminals and FIS facilities need to anticipate adapting gating and passenger corridor flows for different scenarios of preclearance expansion.

**Figure 6-2. Flexible Planning Incorporating Several Future-Proofing Initiatives and Future Trends**




## FORUM FOR CONTINUOUS IMPROVEMENT

Every five years, CBP updates its guidance material in the ATDS. In the intervening period, CBP receives ideas on changes to the ATDS. While this is important to the process of updating guidance material, there is interest among terminal planners, airports and other parties to increase the level of information exchange between ATDS updates.

As the pace of change increases, and as lessons are learned from new technologies introduced by CBP, there is an opportunity to create a continuous improvement forum to collect additional case studies and ideas. Similar to the efforts of TSA to create an annual Design Symposium with industry participants and designers, there is an opportunity to collect and share ideas across designers, CBP Field Operations, and airport operators to ensure that improvements realized at one site can be built into future FIS projects.

There would need to be management of security- or commercially-sensitive information, but models used elsewhere in DHS can be applied to ensure appropriate information sharing across airport sites.

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# APPENDIX A: RELEVANT KEY LITERATURE

### AIRPORT CONSULTANTS COUNCIL GUIDANCE: RETHINKING AIRPORT RESILIENCY IN THE AFTERMATH OF COVID

The guidance from the Airport Consultants Council (ACC) discusses several technological developments that have, potentially temporarily, come into effect in the aviation industry due to the COVID-19 pandemic and presents these as measures to increase resilience.

**Why it is relevant:** Similar to ACRP Report 253, this guidance presents more lessons learned from the pandemic and provides thoughts on how to increase airport resiliency with respect to airport infrastructure and climate change.

**Applicability:** Use this report for background on new ways to enhance resiliency and future-proofing strategies by including flexible areas that can physically separate certain flows, for example, in the case of health issues with specific passenger groups, as well as better protect staff/third parties at the airport. These areas can be outside the FIS and support the airport in different ways in its ability to react to future demands.

### ACRP REPORT 25: AIRPORT PASSENGER TERMINAL PLANNING AND DESIGN, VOLUME 1

The first volume of ACRP Report 25 provides guidance on the planning and development of airport passenger terminals in the United States. The document includes a description of the criteria and requirements necessary for addressing emerging trends, as well as an analysis of issues common to terminal planning.

**Why it is relevant:** This document addresses numerous planning and programming considerations and strategies for adopting or proposing changes from ATDS requirements, as well as adapting to rapidly changing technology. The report also includes best practices and lessons learned from new builds and upgraded facilities.

**Applicability:** Use this document for guidance on how to approach the planning and development of airport terminals, including those with new FIS facilities. It is a generic all-encompassing document, but still relevant on multiple accounts.

### ACRP REPORT 61: ELIMINATION/REDUCTION OF BAGGAGE RECHECK

ACRP 61 identifies potential alternative procedures that could be put into practice for the reduction or elimination of baggage recheck for international passengers arriving at airports in the United States. The potential alternative procedures are compared with current practices, and the associated costs and benefits are described. The testing of risk management techniques such as x-ray image review, baggage tracking technologies, and benefits of connection time reduction are discussed.

**Why it is relevant:** The recommendations in ACRP Report 61 impact the FIS design to a large degree, especially regarding transit passenger process and the One Stop Security pilot project. The recommendations in ACRP Report 61 could pose significant cost savings and process enhancements.

**Applicability:** Use this document when retrofitting a facility with baggage recheck services to learn more about the implications of not requiring baggage recheck in passenger flows that currently allow for this. The document clearly visualizes the benefits of removing baggage recheck from terminal plans and designs.

### ACRP RESEARCH REPORT 233: BIOMETRICS PRIMER

This primer aims to help decision makers, such as airport operators and other aviation stakeholders, understand the various choices available for the use of airport biometrics and their associated challenges. The document is a helpful guide to understanding the legal, privacy, and process implications of biometric systems, and provides guidance on exploring and implementing these technologies.

**Why it is relevant:** ACRP Research Report 233 addresses the impact of technology and process changes on passenger throughput and space requirements, many of which may be applicable in the FIS passenger processing space.

**Applicability**: Read this document to find out more on the impacts of biometric technologies when considering renovating an FIS facility to include more technology-based solutions, such as biometrics.

### ACRP REPORT 229: AIRPORT COLLABORATIVE DECISION-MAKING (ACDM) TO MANAGE ADVERSE CONDITIONS

ACRP Report 229 report describes processes for planning and operating with Airport Collaborative Decision-Making (ACDM) along with tools for implementing changes and assessing impacts on existing practices. The document presents a comprehensive training program framework.

**Why it is relevant:** The best practices and lessons learned on shared decision-making in this document may aid in the design process for a new or updated FIS facility. The report covers topics such as internal and external stakeholder roles and responsibilities, communication and coordination strategies, and developing planning and programming methodologies.

**Applicability:** Use this report before and during the design phase of a new or existing FIS facility to better prepare for increased stakeholder engagement, communication, and coordination, and for strategies for collaboration and decision-making with large groups.

### ACRP RESEARCH REPORT 253: LESSONS LEARNED FROM COVID-19

This document is a resource for continued response to COVID-19 and future communicable disease outbreaks. It summarizes how airports faced challenges such as implementing health protocols, accessing trusted information, accommodating social distancing, and using technology to control the spread of the virus.

**Why it is relevant:** Similar to the ACC guidance on airport resiliency after COVID, ACRP Research Report 253 presents several lessons learned from the pandemic on how to better future-proof airport infrastructure, as well as lessons from climate and operational resilience to weather the potential next disaster.

**Applicability:** Use this report for ideas on ways to improve resiliency and future-proofing by including flexible areas that can physically separate certain flows. These areas can be outside the FIS and support the airport in different ways in its ability to react to future demands.

### ACRP WEB RESOURCE 2: AIRPORT PASSENGER TERMINAL DESIGN LIBRARY

This web resource is hosted on the Transportation Research Board (TRB) website. It provides a tool to search for relevant airport terminal design publications, mainly for the US market. Last updated in October 2021, it houses publications from ACRP, TRB, TSA, and CBP, as well as other authors.

**Why it is relevant:** This web resource is a good landing page to start orientation and access a list of publications with a broad scope of airport design.

**Applicability:** Use this tool before starting on a design or redesign journey to discover publications that can provide inspiration for terminal design. The wide variety of publications also cover a plethora of problems encountered in earlier designs and their solutions.

### CBP STRATEGY 2021–2026

The CBP Strategy Report for 2021–2026 is an effort by CBP to update its May 2019 strategic plan (2020–2025 plan) by introducing a new vision and mission, and further explaining its twelve strategic objectives. This plan also introduces the Enduring Mission Priorities, describing CBP's purpose and prioritization of its responsibilities. The plan details the progress that has been made on its key priorities, from hiring staff to technological implementations, international agreements and partnerships, data innovation, training and veteran programs, and several more operational objectives.

**Why it is relevant:** The report details innovative changes to the Global Entry Trusted Traveler Program and the integrated biometrics entry-exit process. These improvement are made possible by developments in technology, which may directly impact the requirements of FIS design through future versions of the ATDS. Anticipating changes in the ATDS will be essential as FIS design projects can span multiple versions of the ATDS.

**Applicability:** Use this document to understand the direction and position of CBP relative to its mission and strategy, especially when anticipating changes in a new ATDS. This document can support insight into where the design and planning team might incorporate more flexibility in certain FIS areas, as well as accommodate the future plans of CBP.

### INTERNATIONAL CIVIL AVIATION ORGANIZATION: ANNEX 9

Annex 9 to the Chicago Convention by ICAO details internationally agreed upon guidelines for landside facilitation and clearance of passengers, aircraft, goods, and mail, while also respecting the requirements of national authorities for customs, immigration, public health, and agriculture. The guidance in the Annex encompasses international standards and recommended practices.

**Why it is relevant:** The United States plays an active role in shaping ICAO Facilitation Panel dialogue on the evolution of border controls. The processes advanced by individual member states can influence the definition of the ATDS as well as matters related to CDC facility standards.

**Applicability:** Airports in the United States must abide by standards and rules set by the FAA and other national governmental authorities. ICAO Standards function primarily to create international alignment in aviation, formally translating to expectations from all ICAO Member States. ICAO Annex 9 is the foundation for a large number of guidelines that inform the design of border crossing facilities in airport terminals internationally. In order to design an FIS facility that is easily navigable by international travelers, it is important to understand how similar facilities are designed in other countries.

### PARAS 0002: COMPANION GUIDE TO THE AIRPORT TECHNICAL DESIGN STANDARDS

The PARAS 0002 report, developed in 2017, is a companion to the ATDS. The research project developed guidance for FIS facility planners and designers to develop solutions adaptable to changes in CBP processes over time to keep up with new technology and lessons learned. Out of the research came twelve main findings that aim to improve FIS designs above and beyond the specific requirements of the ATDS. The top five findings are on the design of passenger flows. The next seven findings are more generic design improvement concepts.

**Why it is relevant:** PARAS 0002 presents a collection of planning and programming considerations that allow an airport to go above and beyond the requirements of the ATDS, and/or anticipate future changes and technology implementations, and via those considerations realize cost savings or process

efficiency gains. Many developments have followed the recommendations of PARAS 0002. Others are still being developed, such as the optimal use of mobile technologies to process passengers.

**Applicability:** Use PARAS 0002 as a guide to understand how 10 years prior to the writing of this document, and thus governed by two prior versions of the ATDS, guidelines were different, how changes have been made in the ATDS, and how development is still progressing.

### RESOURCE OPTIMIZATION AT THE PORTS OF ENTRY (FISCAL YEAR 2017 REPORT TO CONGRESS)

The Resource Optimization at the Ports of Entry Report by CBP outlines CBP's progress on the implementation of its Resource Optimization Strategy. The three components of the Resource Optimization Strategy include technology and business processes, staffing levels, and alternative funding strategies.

**Why it is relevant:** Albeit slightly more dated than the report on CBP's Strategy for 2021–2026, the first of the three optimization strategy components (which addresses improving technology and business processes) shows the reader how CBP is aiming to improve its business processes and increase the use of technology to better perform its mission. It is highly likely that the technologies and improved processes that were found to be successful within FIS facilities found their way into the requirements of the latest ATDS.

**Applicability:** Use this document to look at the timeline of CBP direction for improvement of its processes, including in FIS facilities, and to compare to newer CBP (strategy) publications, which can be vital to understanding CBP's directive, focusing on improvements and anticipating potential future developments.

### TSA OPEN ARCHITECTURE ROADMAP (2023)

TSA's Open Architecture Roadmap defines the TSA's long-term strategy to enhance its technological screening capabilities. Open architecture is a technology-design approach for software and hardware that uses standards to ensure interoperability across tools and platforms regardless of the technology designer, manufacturer, or supplier.

**Why it is relevant:** The Open Architecture Roadmap lays the foundation upon which other technologies can build and be incorporated into the future TSA technology environment. This can enable a more adaptive approach to security and increase the speed of security processes. Other agencies partnering with the TSA also leverage open architecture, sharing critical information and technology capabilities impacting passenger check-in and carry-on luggage, and, potentially, FIS processes.

**Applicability:** Use this document to learn about the latest technology initiatives that US authorities have incorporated, specifically what TSA is planning and what a switch to open architecture software would mean for the authorities. The additional flexibility in software and hardware that open architecture offers can have a large impact on how TSA, CBP, and related facilities are designed and upgraded in the future. Further discussion within the design process on the IT implications of open architecture—both on software and hardware—is advised.