



# PARAS

PROGRAM FOR APPLIED  
RESEARCH IN AIRPORT SECURITY



PARAS 0002

May 2017

## Companion Design Guide to US Customs and Border Protection's Airport Technical Design Standards

**National Safe Skies Alliance, Inc.**

Sponsored by the Federal Aviation Administration

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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.

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## SUMMARY

### CBP Facilities Serve Unprecedented Growth

Every year, more than 112 million international travelers arrive at US airports of entry to be cleared into the country. Eighty-five percent of passengers are cleared at airports within the United States, with the balance at 15 airport Preclearance sites in Canada, the Caribbean, Ireland, and Abu Dhabi. The growth in the number of international passengers at the top 100 airports of entry is staggering, with an increase of over 20% over for the past 5 years. By 2036, US Customs and Border Protection's (CBP) workload at airports is forecast to grow from serving 112 million passengers to nearly 250 million. International passenger growth plays an important role in the economy, particularly for tourism development. In addition to clearing returning US residents, foreign nationals bring large amount of economic benefits. Across all modes of transportation, the United States will welcome 94.1 million foreign visitors who will spend upwards of \$250 billion annually. A large proportion of foreigners will come in via airports—hence the importance of making sure CBP facilities can accommodate growth.

### Better Facilities Needed

The CBP Airport Technical Design Standard (ATDS), which is updated every 5 to 7 years, is currently being revised to keep pace with new processes and technologies. Many existing facilities where the CBP operates may not be easily adapted to changing market and processing demands. This Companion Guide to the ATDS was developed to provide airports, airlines, architects, and planners with guidance to build more flexible facilities and future-proof assets that may need to last 50 to 60 years.

### Companion Guide Methodology

InterVISTAS led the effort for the National Safe Skies Alliance Program for Applied Research in Airport Security (PARAS) Project 0002. The research methodology involved reviewing existing literature, conducting stakeholder surveys, holding workshops and consultations, and reviewing select sites.

Through analysis conducted by the team, which includes former CBP and TSA staff, 42 separate design ideas were generated that are above-and-beyond the basic requirements outlined in the ATDS.

### Key Findings

The 42 design ideas were arranged into 12 separate findings. The top five findings, which target the processes for passengers as some of the most important areas to advance quality design, are listed below:

1. Begin passenger immigration processes before the Federal Inspection Services (FIS) areas
2. Coordinate passenger wayfinding for arrivals
3. Adopt convertible processing kiosks
4. Adapt common baggage area for domestic/international use
5. Eliminate baggage recheck areas

The following seven additional findings are associated with the general process principles above that can be applied to all areas:

6. Improve egress from CBP
7. Create dedicated egress for Global Entry/connecting passengers

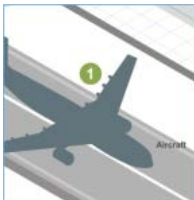
8. Eliminate TSA re-screening for connections
9. Create flexible FIS space
10. Use phased FIS capacity approach with growth triggers
11. Reduce baseline space requirements
12. Customize small airport facilities

Note that the findings are not recommendations for implementation. Some findings can be immediately acted upon, but most will require a business case tailored to the individual facility. The findings for facility design are meant to help airport planners think ahead to the evolution of facilities. As a result, the illustrations are analogous to a right-of-way in highway planning—creating the space or facilities to allow easy implementation of future pathways or options for international arrivals or Preclearance processing.

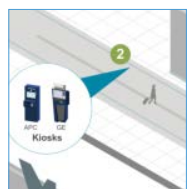
### Finding 1: Begin Passenger Processes Before the FIS

CBP's workload is expected to grow from 112 million passengers cleared in FY2015 to 245 million by 2036, based on FAA forecasts<sup>1</sup>. As a result, US airports need to build at least 75% more space, or find processing methods that are 75% more efficient, to accommodate growth. While some new facilities are planned (e.g., at ORD and SAN), the lives of the vast majority of facilities need to be extended to accommodate growth. One way is to expand processing areas into the sterile corridor (or the hallway that leads from the aircraft to the FIS) to take full advantage of space that is currently unused. CBP obtains passenger data prior to the arrival of aircraft, so there are assessments that can be made before passengers even land. Today, certain passengers can make use of technology to speed their processing. By pushing the location of this processing away from the FIS, airports can free more space for passengers who are required to see a CBP officer at primary inspection.

Key ideas for design/processing elements for this finding:



Mobile Passport Control (MPC) is currently in its infancy and is eligible for US citizens and Canadian visitors only. Eventually, all foreign nationals will have the ability to use smartphone technologies. At the same time, on-board Wi-Fi will become more commonplace for airlines serving international flights to the United States.



Expanding the hall through kiosk processing in the sterile corridor. Several airports have successfully implemented kiosks in the corridor. Careful consideration of local/state rules are needed, and FIS standards have supremacy.



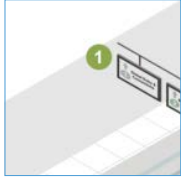
The sterile corridor should be designed to enable and leverage technologies that may be used to process travelers before entering the FIS. Over the past decade, significant improvements have occurred to enable improved biometric capture, especially in overcoming image blurring and noise in low-light conditions.

<sup>1</sup> FAA Aerospace Forecast Fiscal Years 2016–2036.



## Finding 2: Coordinate Passenger Wayfinding for Arrivals

Signage is a critical aspect of wayfinding, and in 2016, there was an airport industry initiative to help standardize the language and colors used in airport signs, and specifically in the FIS. However, some concepts, such as the term one-stop processing, have multiple definitions that are potentially difficult to communicate to passengers.



Adopt coordinated common colors, processing categorization, naming schemes, and other standardization methods among airports. There has been positive consideration and response from the industry to standardize the international arrival experience, and signage/wayfinding should be one of the key priorities in these efforts.



Ensure there is intuitive, continuous wayfinding for signage. All signage should consider principles of universality and accessibility to not only meet Americans with Disabilities Act standards, but consider color-blind travelers. Lettered/named paths should be avoided, since many travelers may not be able to read English.



Integrate wayfinding with any technology that is implemented. While each self-service solution may be supplied by different vendors or manufacturers, the MPC application, Automated Passport Control (APC) kiosk, Global Entry kiosk, and potential future applications should provide wayfinding instructions that are coordinated and integrated with the physical signage at the airport.



Use dynamic signage that can be updated depending on needs while keeping standard processing categorization. Depending on the time of day, day of week, or other seasonality, passengers may need to be directed to specific areas of the FIS for processing.

## Finding 3: Adopt Convertible Processing Kiosks

Currently, there are over 3,000 kiosks used to process passengers through a variety of DHS, CBP, and TSA processes. Demand for a particular kiosk type can be uneven depending on the hour, day, or time of year. The percentage of passengers who use a particular kiosk can vary significantly. For example, when flights arrive that have mostly business passengers, the number of Global Entry kiosks needed is high compared to times when leisure travelers from a Visa Waiver Program country arrive.



Kiosks should be integrated with all biometric identification/verification features and travel document readers. Multi-use kiosks should be able to perform biometric verification via fingerprint or facial recognition/capture with a camera.

Kiosk components (i.e., biometric features and readers) should be modular and be easily re-configurable (plug-and-play) to meet border processing needs.



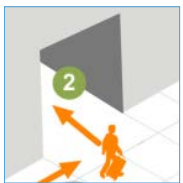
Dynamic signage should be used to communicate to passengers which kiosks to use for APC and which bank of kiosks is for Global Entry/trusted traveler. Each kiosk should also have a dynamic display to identify what mode it is in.

#### Finding 4: Adapt Common Baggage Area for Domestic/International Use

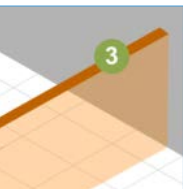
Having dedicated domestic and international bag claim areas is an inefficient use of space and processing capacity. If peak domestic and international flight arrivals do not occur over the same time period, the bag claim carousels cannot be fully or optimally utilized. The problem is exacerbated with the potential growth of US Preclearance sites and increasing demand for domestic wide-body gates.



The pathway for domestic passengers into the bag claim area must be kept separate from international arrival passengers, even if passengers have cleared primary processes. Keeping a separate entrance to the bag claim area is even more important if a checked bag first process has been implemented.



Only after international passengers exit the FIS can they mix with domestic passengers, so there must be a separate exit from the bag claim area to the public area of the airport/terminal.



The key to having a flexible facility that allows the bag claim area to be used for international and domestic arrivals is a partition that can be put in place as needed to keep international and domestic bag claim areas separate/sterile.

#### Finding 5: Eliminate Baggage Recheck Areas

Baggage recheck is a function of enabling an international passenger connecting to another flight (domestic/international) to deposit their bag with an airline agent. The space is typically immediately outside the FIS and can be fully closed to the public (e.g., as at DFW), or in a semi-open area (e.g., as at SFO). The elimination of baggage recheck is the subject of an ACRP study and can be reviewed in ACRP Report 61.<sup>2</sup> In the 5 years since this research report was written, substantial advances in technologies have enabled new options to be considered.



Conduct up-line sortation of checked baggage for connections, to ensure that the unit load device with transfer bags is first to be unloaded from the aircraft to enable expedited connections.

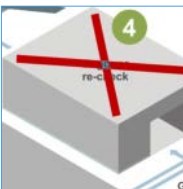
<sup>2</sup> Transportation Research Board, Airport Cooperative Research Program Report 61, *Elimination or Reduction of Baggage Recheck for Arriving International Passengers*, 2012.



Provide a room (or reserve space for future expansion) adjacent to the CBP area that has enough space to accommodate one or more checked baggage X-ray equipment lines. The concept of operations is not for an operator to conduct image-by-image review, but rather to use auto-detect to be able to shortlist bags for further review.



There must be the option for the baggage handling systems to allow for retrieval of checked baggage to CBP Secondary.



Eliminate baggage recheck for connections. The design guidance is to have a facility that is available in the short term, but easily convertible to other functions, such as a larger Global Entry office, retail/concessions for greeters, etc.



The facility should also make allowance for bags that have up-line X-ray image transmission to CBP. Countries such as Australia, New Zealand, and Norway have incorporated the use of explosive detection system images to be used for border security purposes.

## Finding 6: Improve Egress from CBP

The dynamic for changing CBP processes over the past 20 years has been focused on individual systems or processes, but there was not an continuous end-to-end view until recently. Accelerating primary processing was the main focus; when this was solved, there was clarity on issues related to baggage claim. With improvements in baggage delivery times, bottleneck congestion occurs with increasing frequency at the egress from CBP. Tests were underway in 2015–16 to find alternatives for egress from CBP.

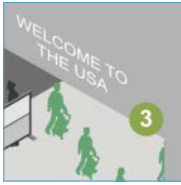


Avoid bottlenecks or designs that funnel passengers at egress, and ensure it is wide enough to allow for modified egress options.



Consider differentiating baggage carousels by risk level, similar to the trial at MIA<sup>3</sup>. Higher risk flights with canine units and additional roving officers should be located away from the egress.

<sup>3</sup> Modified Egress pilot at MIA. See Section 5 of this report for more details of the trial.



Avoid designs with a narrow exit from the area, and ensure enough floor-to-ceiling height to enable future biometric facial recognition cameras to be installed.

## Finding 7: Create Dedicated Egress for Global Entry and Connecting Passengers

Airports with high volumes of international passengers (i.e., greater than 2,000 passengers per hour during peaks) are likely to have high volumes of Global Entry passengers (i.e., up to 15% of passengers) and may have significant percentages of passenger connections, approaching 50% at some airports.



Based on the DFW experience with installing separate exit points from CBP for Global Entry members as well as a separate connections exit, select a path that is straightest and offers the least walking distance between the kiosks and a dedicated Global Entry egress. Minimize cross-flows where possible.



Automate an exit through one-way doors that are (a) activated with a Global Entry card or scannable receipt from the kiosk; (b) capable of preventing piggybacking; and (c) monitored by a CBP officer. Allow a minimum depth of 15 feet for an exit portal, plus an additional 10 feet on either end for circulation.



Ensure signage and branding clearly marks Global Entry to help wayfinding and also further promote the benefits of the program.



Where a separate exit is not feasible, consider the ability to segregate or provide priority queue jumping for Global Entry members for egress, similar to the process implemented at Montréal-Pierre Elliot Trudeau International Airport<sup>4</sup>.

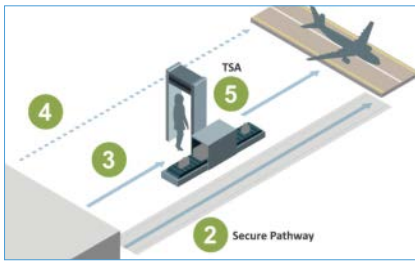
## Finding 8: Eliminate TSA Re-screening for Connections

Elimination of rescreening is a process that is being implemented in various countries. The concept of One-Stop Security (OSS) allows for the transfer of passengers, cabin baggage, hold baggage, and cargo to be exempted from screening if they have been properly screened at the airport of origin. At some FIS facilities, the operations of connections at TSA checkpoints can occasionally back up into CBP operations.



Although only permitted for approved precleared flights, there is the potential during the lifespan of the CBP facility to enable OSS agreements, such as ones being advanced with Canada, Australia, the European Union, and the United Kingdom.

<sup>4</sup> “Global Entry members enjoy the advantage of having access to a special express line through security checkpoints and in the U.S. border Preclearance area where they can use Automated Border Control kiosks.” Montréal Airport website



The sterile corridor needs to have a secure pathway that is available for passengers who do not touch their checked bags to connect to other flights. Connecting passengers must be kept sterile through CBP primary processes and must be kept away from areas with checked baggage.

Ineligible connecting passengers would be rescreened. Passengers coming from countries without an OSS agreement are otherwise not eligible to use the facilitated connection process and must be rescreened.

Where there is too much complexity in dealing with different countries to enable OSS, there could be a pathway to enable Global Entry members to have exemptions from rescreening.

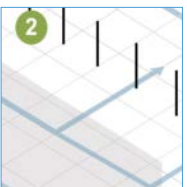
While operationally focused, there may be a closer working relationship between CBP and TSA in the future to develop a connecting process. This could be similar to the pilot at DFW to allow connecting passengers into TSA PreCheck lanes.

### Finding 9: Create Flexible FIS Space

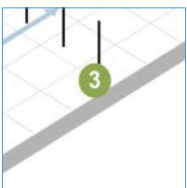
The changes in how passengers are processed have brought forth changes in how the passenger flow is managed. With the implementation of APC kiosks, there has been a trend to move away from the traditional inspection booths to free-standing podiums. While there is still a requirement for booths and not all officers will be at podiums, the tendency is to be flexible with assets. The only fixed asset, for the time being, is the baggage system.



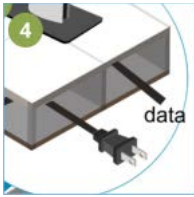
Anticipate future facilities to use contactless Tap-and-Go technology for completing the declaration submission. The main objective would be to use travelers' existing mobile computing technology to perform much of the functionality of an APC kiosk. The Tap-and-Go capabilities would provide a quick means of finalizing the primary process transaction without having to log on to a Wi-Fi network.



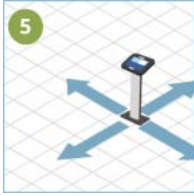
The Tap-and-Go posts must occupy little to no floor space to provide a definitive benefit over APC kiosks.



Connect Tap-and-Go posts to a flooring system that holds them in place without being permanently affixed to one specific location.



Provide a flooring system that has a gap wide enough to house fiber optic, electrical, or other cabling for the ease of locating podiums or other elements. The flexible floor system must also be able to bear loads for placement of a podium or other equipment, and for passenger foot traffic.



The guideline for design is to ensure that where there may be screening equipment, the load is considered or flooring can be easily changed to have more structural support.

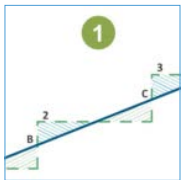


Smaller form factor podiums can be used for primary processing or document verification for APC users. Consider using strong electromagnets (e.g., rare earth magnets) to affix podiums on smooth floor surfaces instead of fixed bolts.

### Finding 10: Use a Phased FIS Capacity Approach with Growth Triggers

In the ATDS, the set of tables used to calculate baseline space allocation has caused some confusion. In the 2016 update to the ATDS (90% draft), CBP has indicated that there is:

- a) Flexibility to the baseline space requirements; and
- b) A process through the CBP Field Operations Facilities Program Management Office Project Manager to allow exemptions from the ATDS.



Delivery of facilities could be done with shell space as quickly as 1 year, or for larger projects, 2–3 years. The amount of flexible space could ensure that the timing of capital and operations are not out of sync, and can meet demand appropriately.



For example, after approximately 12 years within an existing facility, demand growth may be slower than anticipated. Phased capacity expansion may be built to accommodate the increased number of passengers up until a trigger point is reached. The airport may then proceed to execute construction for Phase 2 capacity expansion in order to meet demand only when and if it is needed.



The series of triggers and phases provides flexibility for an airport to expand when growth warrants it and not by fixed calendar dates. All of this should be tied to the physical processing capacity (passengers per hour) from a spatial and processor (e.g. kiosk, other automation) solution.

### Finding 11: Reduce Baseline Space Requirements

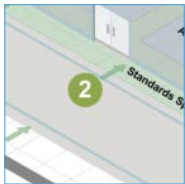
Significant space savings in the primary processing and queuing areas can be attained over traditional booths on a passenger processed per hour basis when implementing self-service automated technology

(i.e., APC, MPC, and Global Entry).<sup>5</sup> The amount of space savings that is attainable is different at each airport based on the passenger profile and ability to use automated solutions, and peak-hour volume of passengers. Based on our findings, the baseline (as defined in the Space Requirement Matrix item ATD-01-03, Chapter 5, Airport Facility Design, ATDS) can be reduced 10–24% from the current value. Specifically, the reduction is from 13.2 square feet per passenger to about 11 square feet per passenger.

We note in this finding that CBP may have new requirements for space in secondary processing to accommodate future activities for additional vetting of certain foreign nationals, similar to the additional space demand used for the legacy program National Security Entry-Exit Registration System.



In order to calculate the actual queuing space that is likely required, a full analysis of the peak hour volume of international passengers, profile of passengers (i.e., percentages of Global Entry members, US citizens and permanent residents, foreign nationals who are exempt from visas, foreign nationals requiring visas, etc.), and the self-service automated solutions that will be implemented. Using queuing analysis and/or multiple simulation model runs, calculate the maximum queue sizes for each border processing stream. By applying a spatial level of service against the number of passengers queuing, the space that will be used can be determined.



If the space actually needed for certain areas of the FIS can be empirically shown to be less than what is specified in the ATDS, the airport can apply for an exemption to the standards. If the FIS does not need to be built to full capacity at first, there are significant capital cost savings that can be attained for the airport. If the calculated amount of space needed is equal to or greater to that stated in the ATDS space requirements, the airport should build the space accordingly and continue with the usual facilities approval.

## Finding 12: Customize Small Airport Facilities

General aviation facilities (GAF) are most often located at small low-volume airports in the United States. Typically, CBP can process up to 20 passengers per hour. The space requirements are therefore much less than commercial airports. It is noted that not all size requirements for GAF will apply to small airports. However, many small airports fall below the “small” category of 200 passengers per hour and operate much more like a GAF. Although the building requirements differ between commercial airports and GAF, there are benefits of considering a consolidated facility to house both general and commercial aviation.



### **Consolidation of Commercial and General Aviation CBP requirements**

An FIS-lite for small markets may be explored further given that there are numerous examples of small airports<sup>6</sup> that are dealing with the issue of deciding

<sup>5</sup> Self-service technologies began over 20 years ago, in the airline industry with check-in kiosks. Today the same technology is used for immigration other processes passengers may perform on their own without the help of an agent. (Airport-Technology.com) (sita.aero)

<sup>6</sup> TOL, Milbury, OH ; FAR, Fargo, ND; VNY, Van Nuys, CA; ACY, Atlantic City, NJ.

how to justify building and maintaining two separate CBP facilities with a number of overlapping requirements.



**Use of technology to save space**

Deploy MPC application, APC kiosks, or Global Entry kiosks/application to alleviate space requirements in the FIS-lite. Similar to Finding 11, there are likely space savings associated with smaller facilities that could allow for a reduced baseline space requirement.



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## PARAS ACRONYMS & ABBREVIATIONS

The following acronyms and abbreviations are used without definitions in PARAS publications:

<b>ACRP</b>	Airport Cooperative Research Project
<b>AIP</b>	Airport Improvement Program
<b>ANSI</b>	American National Standards Institute
<b>AOA</b>	Air Operations Area
<b>ARFF</b>	Aircraft Rescue and Fire Fighting
<b>CCTV</b>	Closed Circuit Television
<b>CDC</b>	Centers for Disease Control and Prevention
<b>CD/DVD</b>	Compact Disc/Digital Video Disc
<b>CEO</b>	Chief Executive Officer
<b>CFR</b>	Code of Federal Regulations
<b>COO</b>	Chief Operating Officer
<b>DHS</b>	Department of Homeland Security
<b>DOT</b>	Department of Transportation
<b>EPA</b>	Environmental Protection Agency
<b>FAA</b>	Federal Aviation Administration
<b>FBI</b>	Federal Bureau of Investigation
<b>FEMA</b>	Federal Emergency Management Agency
<b>FSD</b>	Federal Security Director
<b>GPS</b>	Global Positioning System
<b>ID</b>	Identification
<b>IED</b>	Improvised Explosive Device
<b>IP</b>	Internet Protocol
<b>IT</b>	Information Technology
<b>KPI</b>	Key Performance Indicator
<b>MOU</b>	Memorandum of Understanding
<b>NIST</b>	National Institute of Standards and Technology
<b>R&amp;D</b>	Research and Development
<b>ROI</b>	Return on Investment
<b>SIDA</b>	Security Identification Display Area

<b>SOP</b>	Standard Operating Procedure
<b>SSI</b>	Sensitive Security Information
<b>SSN</b>	Social Security Number
<b>TCP/IP</b>	Transmission Control Protocol/Internet Protocol
<b>TSA</b>	Transportation Security Administration
<b>XML</b>	Extensible Markup Language

## CHAPTER 1: INTRODUCTION

This report serves as a companion guide to the US Customs and Border Protection's (CBP) Airport Technical Design Standard (ATDS). Historically, the ATDS has been the primary source document providing guidance on the planning and design of Federal Inspection Services (FIS) facilities at US airports. Airport FIS areas accommodate the secure processing and flow of international arrival passengers through immigration, customs, and other essential border control functions that are performed by CBP.

### 1.1 Project Background

The FIS planning and design process has always required the close collaboration and coordination of key stakeholders including federal agencies, airport operators, and airlines working together with professional teams of planners, architects, and engineers. Participants in the process today face an expanding array of challenges and opportunities, including increased growth in international passenger demand; advances in and deployment of new technologies such as biometrics; enhanced data collection, analysis, and networking capabilities; changes to the FIS processing functions affecting how passengers flow through FIS facilities; and the continued evolution of a complex global aviation network.

These challenges and opportunities are evolving at an accelerating pace. Today's technology-driven innovation occurs on a rapid development cycle, sometimes evolving in disruptive and unpredictable ways. In contrast, brick and mortar facilities are capital-intensive, long-term investments that, ideally, should be relied on to provide decades of useful life. The number of factors to be considered and the rate of change involved today can result in planning and design guidelines that rapidly go out of date. Strategies to provide greater flexibility and adaptability to change are therefore increasingly necessary considerations in FIS planning and design today.

### 1.2 Project Objectives

The primary objective of this research was to develop useful guidance to assist FIS planners and designers in achieving more flexible and robust solutions capable of adapting to change. Three sets of strategies for surviving and adapting to change emerged as key research findings, including: a) reusing and repurposing available space, b) designing adaptable facilities that can accommodate growth and changing requirements, and c) future-proofing facilities to incorporate evolutionary change. Detailed discussion of each strategy is presented in Chapter 6.

### 1.3 Methodology

The research methodology involved five steps outlined below:

- **Existing literature review.** A review was conducted of existing public documents providing planning and design guidance and standards relevant to FIS facilities. Results of the literature reviews are presented in Chapter 2.
- **Stakeholder survey.** A survey of key stakeholder groups was conducted to obtain comments, concerns, preferences, and desired improvements. Results of the stakeholder surveys are presented in Chapter 3.
- **Industry workshops and consultations.** A number of workshops and consultations with key industry participants were conducted to gain further industry input through discussion and participation. Results of the industry workshops and consultations are presented in Chapter 4.

- **Site reviews.** A set of existing FIS sites were selected and reviewed to gain insights on best practices and design issues seen in the field today. Results of the site reviews are presented in Chapter 5.
- **Key findings.** Data collected in the previous steps was summarized and analyzed to derive key findings and recommendations, which are presented in Chapter 6. All information presented here will also be available in a user-friendly website that can be used as a toolbox for those involved in new airport design and construction; airport renovation and expansion; and developing flexible passenger processing recommendations.

## 1.4 Current Situation Overview

### CBP MISSION

US CBP is the federal agency tasked with processing passengers and their bags for clearance into the United States. CBP operates facilities at airports to meet its national security mission, including managing risks related to a wide array of immigration, customs, and agricultural issues. From dealing with illegal drugs and counterfeit documents to intercepting potential terrorist suspects, CBP is the front line of border enforcement. Every year, more than 112 million international travelers arrive at US airports of entry to be cleared into the country. Approximately 85% of air passengers are cleared at airports within the United States, with the balance of passengers being cleared outside the United States at 15 airport Preclearance sites in Canada, the Caribbean, Ireland, and Abu Dhabi.

### GROWTH OF PRECLEARANCE

CBP continues to expand the number of Preclearance sites to additional countries. In 2015, there were 10 airports prioritized from the selection process: Brussels International Airport (Belgium); Punta Cana International Airport (Dominican Republic); Narita International Airport (Japan); Amsterdam Schiphol Airport (Netherlands); Oslo Gardermoen Airport (Norway); Madrid-Barajas Airport (Spain); Stockholm Arlanda Airport (Sweden); Istanbul Ataturk Airport (Turkey); and London Heathrow Airport and Manchester Airport (United Kingdom). In November 2016, DHS announced a second round of 11 possible candidate airports for Preclearance expansion: Bogota El Dorado International Airport (Colombia); Buenos Aires Ministro Pistarini International Airport (Argentina); Edinburgh Airport (United Kingdom); Keflavik International Airport (Iceland); Mexico City International Airport (Mexico); Milan-Malpensa Airport (Italy); Osaka Kansai International Airport (Japan); Rio de Janeiro-Galeão International Airport (Brazil); Rome Leonardo da Vinci-Fiumicino Airport (Italy); São Paulo-Guarulhos International Airport (Brazil); and St. Maarten Princess Juliana International Airport (St. Maarten).

Preclearance expansion is subject to a formal country-to-country agreement, which was advanced in late 2016 with Sweden and the Dominican Republic. Other agreements may follow, with a potential of 33% of passengers precleared to the United States in the next decade.

### FORECAST INTERNATIONAL PASSENGER GROWTH

International visitors plays an important role in the economy. The U.S. Department of Commerce projected in November 2016 that there will be some 94.1 million visitors to the United States by 2021<sup>7</sup>, including land, air and seaport entries. As visitors will spend upwards of \$250 billion annually<sup>8</sup>, the roles of tourism and trade are also significant in job creation. The hospitality and leisure sector (accommodations, food services, recreation and entertainment) drive domestic employment and are the

<sup>7</sup> US Department of Commerce, Forecast for International Travel to the United States 2016-2021

<sup>8</sup> US Department of Commerce Task Force on Travel & Competitiveness “National Travel and Tourism Strategy” 2012.

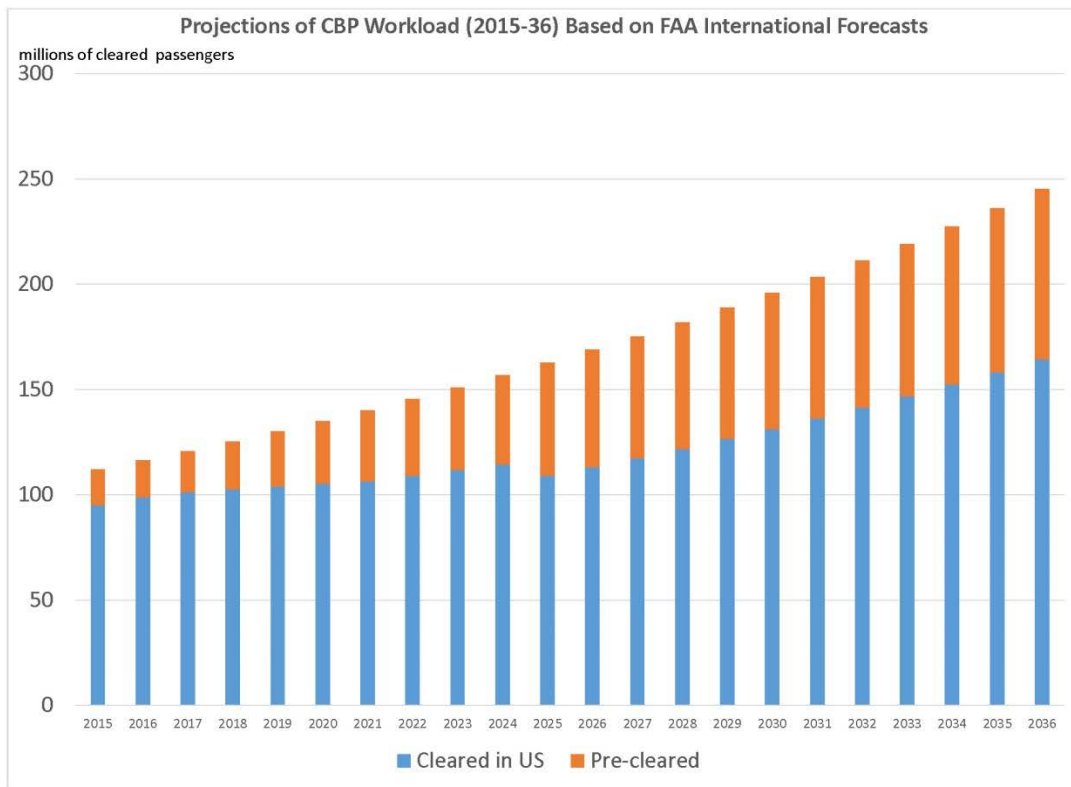
fifth largest employer in the U.S. Based on the projected passenger growth there is a potential increase of over 2 million jobs in the next 10 years<sup>9</sup>.

Even with the expansion of Preclearance sites, the volume of passengers to be cleared at US airports will continue to increase. Should CBP be successful in clearing one-third of total international passengers at the Preclearance sites, there is still 72% growth of international traffic at US airports alone.

The growth at more than 100 airports of entry is staggering: over 20% increase in passengers over the past 5 years. Future forecasts (see FAA forecast in Figure 1-1) are generating even more air passengers in the coming years with:

- Growth of international tourism to the United States, particularly from emerging economies such as China, Brazil, and India
- Business travel with existing and new trading partners around the world
- Other categories of travel including visiting friends/relatives, students, and other outbound travel from individuals residing in the United States

**Figure 1-1: Projections of CBP Workload (2015-36) Based on FAA International Forecasts<sup>10</sup>**



Source: FAA

**RECENT CHANGES TO CBP PROCESSES**

One of the main reasons a Companion Guide was needed for the ATDS was the pace of change associated with CBP processes. The current decade of airport processing heralds some significant changes. Airlines and airports have invested heavily to improve international arrivals—ranging from

<sup>9</sup> McKinsey Global Institute “An economy that works: Job creation and America’s future” June 2011.

<sup>10</sup> Federal Aviation Administration “FAA Aerospace Forecast Fiscal Years 2016-2036” 2016.

modern facilities designed with natural light and high ceilings, new baggage systems and Automated Passport Control (APC) kiosks—as well as marketing programs such as Global Entry and the Mobile Passport Control (MPC) application.

While there are changes to CBP processes to facilitate low-risk passengers, the mandate is increasingly complex with heightened attention on the potential for threats entering the United States. While a lot of process changes are being implemented to prevent boarding of individuals who pose potential threats to the country, there are expected to be increased requirements for biometric verification and augmentation of visa and travel authorization checks to ensure that the security of US borders is enhanced for the air travel mode.

### **SELF-SERVICE**

The most noticeable change has been the adoption of self-service into passenger processing. The ability for CBP to reallocate administrative tasks such as managing documents to passengers, which allows more time for risk management tasks, is a direction that has accelerated in the last decade. With the advancements in biometric technology, the use of kiosks, both for Trusted Traveler programs like Global Entry, or for APC has increased, and is now seen as a standard for border processing. Taking this further is the use of smartphones for mobile self-service processing, such as MPC, which allows the passenger to begin the clearance process up to 4 hours before they arrive onto US territory.

Not only has the technology changed the way passengers are processed, but it has also changed where passengers are cleared. Technology has influenced the design of the FIS, as well as outlined the need to have options for flexible design standards.

### **PASSENGER FLOW AND INFRASTRUCTURE**

The requirement for space in the FIS is invariably a function of passenger volume, peak operational hours, resources and infrastructure, the steps required in the passenger journey, and the process flows to deal with individuals and bags that are deemed low, medium, and high risk.

With new technologies, passengers are able to begin the clearance process outside of the FIS in the airport (APC and Global Entry kiosks are installed in sterile corridors) or with their smartphones using the MPC application. These advancements have greatly influenced how resources and infrastructure are managed, and have contributed to the changes in process flows for passengers and bags.

The modified egress, one-stop, or integrated secondary are no longer pilots but reality in many airports. There are many options for how to design and implement this new process flow, and each will differ from airport to airport. It is safe to assume that with more advances in technology, passenger response, and lessons learned, this process flow will be modified again.

However, even with the new technology and improved process flow, there is still a high risk of over building the FIS. Although the ATDS does incorporate language around technology and a modified passenger flow, which will reduce the number of primary officer booths, standards for space to be used in the FIS has decreased about 14% for larger airports, but has increased close to 18% for smaller airports.<sup>11</sup>

In general, the facilities designed in the 1970s and 1980s do not meet program requirements in the 2010s. In other words, the ability for a design to fully meet expected international volumes, as well as process requirements, is not always possible due to structural issues and competing demands for space. In addition, there are vertical challenges with the amount of space to deal with load-bearing floors for

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<sup>11</sup> Comparison of ATDS 2012, Chapter 3, code PP-01 and ATDS 2016 (90% draft), Chapter 5, ATD01-03

new equipment and associated power/data cabling. Table 1-1 shows how FIS facilities have changed through the decades.

**Table 1-1. Key Facility Changes at International Airports (1970–Present)**

<b>Decade</b>	<b>Notable Changes in CBP (FIS) Facilities/Processes at Airports</b>
Before 1970s	<ul style="list-style-type: none"> <li>▪ Triple inspection on arrival</li> <li>▪ Separate steps for health form, immigration, and customs on arrival</li> </ul>
1970s	<ul style="list-style-type: none"> <li>▪ Growth of wide-body aircraft (e.g., 747s) and major spike in hourly passenger volumes</li> <li>▪ Separation of primary and secondary inspection areas with roving officers to improve flows (1970–71)</li> </ul>
1980s	<ul style="list-style-type: none"> <li>▪ Computerization of records (e.g., Treasury Enforcement Communications System)</li> <li>▪ Increased use of X-ray systems in secondary</li> </ul>
1990s	<ul style="list-style-type: none"> <li>▪ Introduction of voluntary biometrics through INSPASS trusted traveler program</li> <li>▪ Start of passenger manifest reviews through API data</li> </ul>
2000s	<ul style="list-style-type: none"> <li>▪ Formation of CBP from three legacy agencies</li> <li>▪ Investments post-9/11, including API/PNR and other data-based efforts to push the border out</li> <li>▪ New time and requirements to help process incoming passengers (e.g., US-VISIT)</li> <li>▪ Introduction of Global Entry</li> </ul>
2010s	<ul style="list-style-type: none"> <li>▪ APC/MPC</li> <li>▪ One-stop processing for passengers without checked bags at certain airports</li> <li>▪ Trials for process changes (modified egress, biometric comparison)</li> </ul>

### **ROLE OF AIRPORT TECHNICAL DESIGN STANDARD**

The ATDS are design guidelines issued by CBP that reflect the national policy, procedures, and standards that are required when constructing, expanding, or modifying the FIS area in an airport. The ATDS allows airport planners and designers to create a set of facility drawings for new construction or retrofitting of the FIS.

The goal of the ATDS is to provide a standard set of processes that can be applied to all airport facilities, and thus reduce the design requirements. Although the ATDS references various policies and laws, it is intended to serve as a guide and shall be used as a baseline for the facilities work required. In addition to the baseline requirements outlined in the ATDS, which allow for CBP to conduct their inspection operations in the FIS, airports must follow the Program of Requirements (POR) per each project. These POR are specific to each operational need and are issued by the CBP Office of Field Operations (OFO). The POR are mandatory and are specific to each FIS and project. Lastly, airports must comply with national codes and standards; state and local codes; environmental and historic preservation codes; and construction material codes.

The FIS and applicable facilities at the airport must be provided without cost to the Federal Government for CBP operations. The FIS includes the gate for aircraft arrivals, the sterile corridor system, VIP lounges, international baggage claim, passenger processing area, and the CBP operational and support

staff area, all of which must be built to the size and space requirements using the ATDS guidelines and should take into consideration the anticipated throughput of passengers. The guidelines also advise on technology and signage requirements to provide the desired level of operational security and passenger facilitation. Although the guidelines are updated every few years, there are challenges in keeping up to date with the real growth of passengers, as well as the technologies and best practices desired at airports.

#### **2017 AIRPORT TECHNICAL DESIGN STANDARD**

The current version of the ATDS was released in August 2011. A new version is anticipated to be issued in 2017 to amend and replace the current and previous versions. At the time of writing this report, the ATDS has reached a 90% level of completion; therefore, reference will be made to both the 2012 and 2016/17 (90%) version as well.

There are three main challenges to the role of the ATDS to help plan and design CBP facilities:

**The document serves as a building code.** The document does not contain recommended practices and there is little flexibility for interpretation. CBP facilities have an asset lifespan of 40 or more years. One of the oldest facilities in operation today, for example, is at Seattle Tacoma International Airport, which opened in 1973, just 2 years after the process of primary and secondary inspections was implemented. Since then, many new processes and technologies have been introduced, making it difficult for airports to adapt accordingly. Airports must be ready for the future and have designs that allow them flexibility.

**The pace of change far surpasses the ability to update technical standards.** The current ATDS outlines APC, MPC, and Trusted Traveler programs, such as Global Entry. However, the use and acceptance of these programs are changing every year and have influenced the process flow in the FIS. Therefore, it can be assumed that the standards today will not be the same in the next year.

**The role of airports is evolving and diverging more.** The changes in airline networks, the concept of hub and spoke, new carriers from liberalized markets, and the proposed expansion of Preclearance to 33% of cleared passengers by 2025 are all creating demand that will further reduce the one-size-fits-all approach. A menu of choices is needed to provide guidance to airport designers.



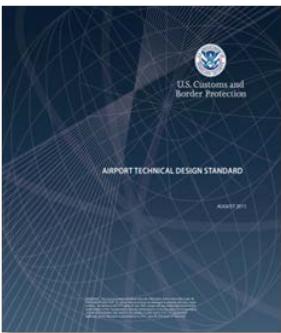
## CHAPTER 2: EVOLUTION OF PLANNING STANDARDS & GUIDELINES

This chapter presents the reviews of existing documents conducted as part of the study research. The review focused on documents that: 1) provided various types of guidance relevant to FIS planning and design; and 2) are currently available from government and industry sources. This included the latest published editions of source documents and, in some instances, forthcoming updated editions that were made available to the study team in draft form. The review focused on identifying and assessing currently available guidance vis-a-vis the key issue of concern for this study: how to build flexibility and adaptability into FIS planning and design. Descriptions of key documents are included in this chapter; see Appendix A for a full list of documents reviewed.

### 2.1 CBP Airport Technical Design Standard (ATDS)

The official primary source guidance on FIS planning is the ATDS, issued by US CBP. The review included both the current (2012) version, and a draft of the forthcoming updated version expected to be released in early 2017. The ATDS provides the most comprehensive and detailed guidance on the process and standards to be followed in developing the program of requirements and design documents for a new or remodeled FIS facility.

#### ATDS (2012)



The current version of the ATDS covers all of the facility, space, and technical requirements for the FIS at various types of airports. This version was released by CBP in two volumes. The first was a 367-page document that outlined sizing, construction requirements, signage, data/telecommunications, and security. Separate chapters defined Preclearance, general aviation, and private aircraft Preclearance facilities. A second volume with 137 pages of plan drawings for each room or component of CBP facilities was also provided. Eleven sizes of facilities were defined, from 200 passengers per hour (small airport) up to 5,000 passengers per hour (large airport).

#### ATDS UPDATE (2017)



An update to the ATDS is in draft format (i.e., 90% draft version) that covers much of the same material, but specifically for non-Preclearance commercial aviation airports. The draft version reviewed is a 440-page document outlining requirements for US airports in sizing, construction, signage, data/telecommunication, and security. Separate volumes will define Preclearance and general aviation facilities.

Eleven sizes of facilities are defined, from 200 passengers per hour (small airport) up to 5,000 passengers per hour (large airport).

### 2.2 Other Secondary Sources

The following sections discuss a number of secondary source documents reviewed as part of the study. Generally speaking, these sources provide guidance that lacks the CBP-specific detail and coverage of the ATDS, but, nonetheless, supplement and augment the ATDS by addressing various issues related to FIS planning and design.

## IATA/ACI AIRPORT DEVELOPMENT REFERENCE MANUAL – 10TH EDITION (2014-15)

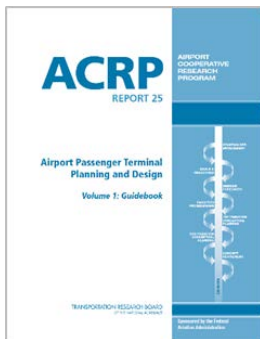


The Airport Development Reference Manual (ADRM), produced by the International Air Transport Association (IATA) and Airports Council International (ACI), is one of the most comprehensive guides used by airport planners around the globe. The guidance material is not US-specific, and covers some things that do not directly apply in a US context. However, the section on terminal planning provides a methodology and level-of-service (LoS) framework for developing terminal facilities requirements, both of which can be adapted to assess key CBP processing elements.

The ADRM is periodically updated and the latest edition (10th) defines a new LoS framework that includes recommended metrics and standards for both space and time. Desired optimal LoS metrics for area per passenger and wait time per passenger can both be specified as inputs when calculating facilities requirements for processing functions. Previous editions of the ADRM only considered LoS space standards. Adding the time dimension facilitates space requirement calculations that better reflect technology-driven advances in processing functions, such as APC kiosks. This also permits a more sophisticated requirements assessment than is usually achievable with spreadsheet methods.

The ADRM methodology for calculating facilities requirements and LoS framework, when appropriately adapted and combined with guidance from the ATDS, can be highly relevant and useful in developing a detailed program of FIS requirements. While the recommendations presented in the manual are aimed at achieving flexibility for an airport to adapt to changes, the ADRM does not speak to specific flexible design practices or strategies.

## ACRP REPORT 25 AIRPORT PASSENGER TERMINAL PLANNING AND DESIGN VOLUMES 1 & 2 (2010)



This two-volume report from the ACRP was developed to provide US-specific guidance on terminal planning. At the time this was produced, US-specific guidance available in FAA Advisory Circular 150/5360-13 was severely outdated (see discussion below). Volume 1 includes a comprehensive overview covering an extensive range of terminal planning topics. Two sections in Volume 1 are of particular relevance to this discussion of CBP planning and design. Volume 2 is a spreadsheet model available for downloading from ACRP's website.

### VOLUME 1 SECTION VI.3.8 INTERNATIONAL ARRIVALS FACILITIES—FEDERAL INSPECTION SERVICES

While the ATDS focuses mainly on FIS functional areas required for CBP administrative and support, this chapter provides additional information on other key FIS functions including baggage claim, transfer and recheck facilities, and meeter/greeter lobby. The sections covering CBP administrative and support functions are not as comprehensive as the ATDS, and do not reflect changes in the forthcoming ATDS update.

### VOLUME 1 SECTION VI.5.1 FLEXIBILITY

This section devotes several pages to the general topic of flexibility and the need to avoid premature functional obsolescence due to unexpected changes in demand, technology, regulations, business strategies, and other factors. The end of the chapter describes a number of general strategies for building flexibility into a terminal design, which can be summarized as follows:

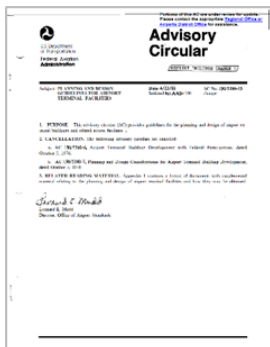
- Maximize shared use of space or multifunction spaces

- Use long-span roof systems and minimize load-bearing partitions that create obstacles for future remodeling
- Use linear, rectangular, and/or modular configurations that can be expanded laterally
- Allow room to expand in all directions, including vertically
- Minimize level changes
- Provide transition zones, i.e., buffer zones between adjacent processing areas
- Separate mechanical, electrical, and plumbing and other service spaces from functional areas

## VOLUME 2 SPREADSHEET MODEL

Volume 2 consists of a spreadsheet model for calculating terminal facilities requirements and accompanying support documentation that can be downloaded from ACRP's website. The spreadsheet model includes a CBP/FIS module, which only covers CBP primary inspection and international baggage claim. It provides a mini-queue model designed to "...help the user determine the required number of primary processing stations and size the baggage claim frontage." The model is no longer useful for primary inspection, as it is based on a single-step legacy process that does not include recent advances such as APC, MPC, and Global Entry kiosks.

## FAA ADVISORY CIRCULAR 150/ 5360-13A



A July 22, 2016 draft version of the forthcoming update to the FAA's Advisory Circular AC 150/5360-13A, entitled *Planning and Design Guidelines for Airport Terminal Facilities* was reviewed. At the time this report was written, the FAA was in the process of reviewing industry comments on the draft circular, which was last updated in 1996.

The draft reviewed provides high-level guidance on key issues to be considered in any terminal planning effort with individual chapters on the following topics:

- Initial Planning Considerations
  - Terminal Planning and Design Process
  - Planning and Design Methodologies and Tools
  - Functional Relationships and Terminal Concepts
  - Terminal Building Space Programming
  - Terminal Apron Areas
  - Airport Ground Access and Circulation
  - Sustainability in Terminal Planning
  - Planning Considerations for Non-Hub Terminals
  - Miscellaneous Planning Considerations

Chapter 6: Terminal Building Space Programming includes a brief section on CBP facilities providing an overview of the functional components of an FIS; how CBP classifies airports for staffing purposes; inputs needed to assess FIS facilities requirements; and additional resource and reference documents, such as ACRP 25 and the ATDS.

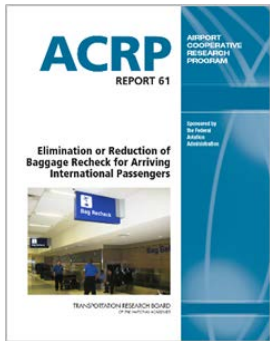
Chapter 6 also includes a paragraph on flexible space planning, which highlights the increasing importance of building facilities that can adapt over time. It recommends programmable design with

“...interior functional components that can be moved around and adapted to new passenger flows driven by technology or other innovations.” Specific design techniques mentioned in this chapter include:

- Designing column-free spaces
- Employing reconfigurable “plug-in” ITC infrastructure
- Using prefabricated, modular building elements

No details are provided on how to develop space requirements; however, readers are provided with references to other source documents, e.g., ACRP 25, IATA ADRM, and the ATDS, where this topic is covered.

**ACRP REPORT 61 ELIMINATION OR REDUCTION OF BAGGAGE RECHECK FOR ARRIVING INTERNATIONAL PASSENGERS (2012)**



Airlines staff recheck areas outside of CBP facilities for passengers that connect to flights. Some airports (e.g., IAH, DFW, and MIA) have processes that eliminate baggage recheck. The research project identifies potential alternative procedures that might be implemented to help reduce or eliminate the need to recheck baggage for arriving international passengers through the use of new technologies or processes to help CBP manage risks in checked bags. Documented are the uses of technologies such as baggage imaging, RFID, and X-ray image review.

**RECOMMENDED SECURITY GUIDELINES FOR AIRPORT PLANNING, DESIGN, AND CONSTRUCTION (2017)**



This document represents the fifth iteration of guidance for the airport security planning and design community, first issued by the FAA in 1996 and 2001, continued by the TSA in 2006 and 2011, and provided by National Safe Skies Alliance in 2017. All have had extensive participation in and contributions of content by federal agencies, industry trade associations, and individual architects, engineers, security consultants, and other subject matter experts. The periodic updates have been driven largely by constant changes in both physical and digital technologies, as well as national and international standards, policies, and operational requirements that reflect the changing aviation threat environment. Appendix C describes the FIS facilities as they relate to the inbound flow to airports within the United States.

**AIRPORTS COUNCIL INTERNATIONAL – NORTH AMERICA FACILITATION COMMITTEE WORKING GROUP ON BEST PRACTICES AND INNOVATION**



A document was developed by the ACI-North America (ACI-NA) facilitation committee and provided to US CBP, last updated in June 2012. An update process is underway, with discussions between ACI-NA, Airlines 4 America (A4A), and CBP. A number of items are operational, such as recommendations on dynamic signage for Global Entry. Other aspects of best practices will be forwarded with the evolution of MPC, modified egress, and other process changes. Facility impacts and best practices will be outlined in a matrix format.

## ACRP REPORT 161 GUIDELINES FOR IMPROVING AIRPORT SERVICES FOR INTERNATIONAL CUSTOMERS (2016)



This document serves as a guidebook to assist airport practitioners in implementing departure and arrival processes, passenger services, and wayfinding techniques for international travelers navigating through US airports. The US has different processes for arriving and departing passengers than many other nations. Among US airports, there are variations of wayfinding, signage, and symbols, and even levels and locations of automation. The guide outlines the passenger journey, provides examples of implementation, and concludes with a summary of notable innovations that will enhance the customer experience.

### OTHER SOURCES

There are a number of other reference documents that can help designers address differences in facility requirements with CBP.

**RTCA DO-230E, Standards for Airport Security Access Control Systems.** This document provides standards and guidelines for implementing access control systems in the context of an integrated security system for an airport. The standards do not prescribe how baggage control should take place, but provide guidelines for access control to security restricted/sterile areas of the airport.

**ICAO Annex 9.** This document contains basic requirements that airports must provide, along with recommendations that airports should strive to make available. While Section 6.1.4 speaks to the principle "...that facilities and services provided at international airports are, where possible, flexible and capable of expansion to meet traffic growth," no specific recommended practices are outlined to help achieve flexibility.

**International Air Transport Association (IATA) Recommended Practice 1701h.** This document recommends that airports "...inform the passenger about a standard waiting time, to gain predictability and reduce stress/hassle." This suggests that dynamic signage be placed in the FIS area that provides real-time queuing information to passengers.

**Best Practice Operational Guidelines for Automated Border Control.** This document, produced by Frontex, the European Union's Border and Coast Guard Agency, recommends that environmental factors such as strong electric lighting, variable daylight, or illuminated advertising boards are also taken into account when positioning an automated system. This is particularly relevant for systems based on facial recognition, where variable lighting due to daylight can trigger performance issues with travelers being silhouetted by strong background light, which may result in a high number of rejections.

**ACI World Airports and Persons with Disabilities Handbook (2003).** This document is now being updated for 2017, along with similar documentation by Frontex, and provides guidance on using automated systems for people with mobility challenges. While everything within the CBP facility is compliant with Americans with Disabilities Act (ADA), there are design features that could assist a population that is increasingly challenged with mobility or disability issues.

**Other Non-public Sources.** A number of best practices guides have been developed but are not published in the public domain. For example, for the deployment of automated processing technologies (e.g., APC kiosks and MPC application), a number of equipment vendors have developed an approach to optimize kiosk placement, number, and spacing to process passengers as quickly and efficiently as

possible. This guidance is generally only used and shared with airport or airline customers based on site-specific customization as they implement the technology.

**Remarks on Secondary and Other Sources**

While the primary documents such as ATDS prescribe exactly what standards are needed and mandatory, the secondary documents provide softer guidance associated with the facility requirements. The ATDS approach for space requirements uses one input factor (number of peak hour passengers) in its reference table along with its internally determined space-to-passenger ratio to determine the total baseline space required (see Figure 2-1).

**Figure 2-1: Key Calculation Used in CBP Space Planning at Airports**



ICAO Annex 9 on Facilitation recommends that passengers who do not require “...more than the normal inspection” be processed in 45 minutes from arrival of aircraft. The IATA ADRM adds another dimension to the basic space calculation that recognizes the significant queue-time savings that can be obtained through self-service automation. Specifically, the amount of time that passengers are expected to wait to be processed is included to calculate the total space needed (see Figure 2-2).

**Figure 2-2: Key Calculation Used for Space Planning at Airports with Time LoS Considered**



\*Expected wait time factor is based on a range for LoS tailored to the facility.

Additionally, the guidance provided by some of the secondary and other sources considers changing demand due to growth in markets for services. The amount of space can vary depending on the desired LoS that an airport wishes to achieve for its passengers (i.e., higher LoS for full-service air carrier passengers; lower LoS for ultra-low cost carriers) (see Table 2-1).

**Table 2-1. LoS Optimization**

		<b>Overdesign</b>	<b>Optimum</b>	<b>Sub-Optimum</b>
		Excessive or empty space	Sufficient space to accommodate necessary functions in a comfortable environment	Crowded and uncomfortable
<b>Overdesign</b>	Overprovision of resources	<b>OVERDESIGN</b>	<b>OPTIMUM</b>	<b>SUB-OPTIMUM</b> Consider improvements
<b>Optimum</b>	Acceptable processing and waiting times	<b>OPTIMUM</b>	<b>OPTIMUM</b>	<b>SUB-OPTIMUM</b> Consider improvements
<b>Sub-Optimum</b>	Unacceptable processing and waiting times	<b>SUB-OPTIMUM</b> Consider improvements	<b>SUB-OPTIMUM</b> Consider improvements	<b>UNDER-PROVIDED</b> Reconfigure

Source: Adapted from IATA Airport Development Reference Manual 10th Edition

The relevance to the ATDS is to ensure that there is appropriate balance between facility requirements. Overdesign is a risk to FIS facilities because there could be a lot of unused space that is costly for airports/airlines to finance. At a reported premium of \$200 per square foot of airport space to accommodate unique security requirements to CBP, the dangers of overdesign are to reduce the competitiveness of the cost structure for airports.

At the opposite extreme, under-provided space means a significant problem for overcrowding and comfort level for passengers. For airlines, there are problems predicting operations that are particularly important to manage for hub facilities.

### 2.3 Review Summary

As the above discussions indicate, there is a large collection of relevant material providing various types of guidance on aspects of FIS planning and design. However, little of this guidance addresses a key issue of concern for this study: how to build more flexibility and adaptability into FIS solutions during the planning and design process. Only two sources directly dealt with flexibility as a planning concern at more than a high-level principle. The most in-depth discussion of flexibility was found in ACRP Report 25 Airport Passenger Terminal Planning and Design. The issue is also addressed, to a lesser extent, in the forthcoming update to the FAA’s Advisory Circular 150/ 5360-13A. In both cases, the recommendations for building in flexibility and adaptability are fairly general. There is clearly room for more in-depth and CBP-specific analysis and recommendations as provided in the following chapters.

## CHAPTER 3: STAKEHOLDER SURVEY

InterVISTAS conducted a survey asking CBP employees, airline managers, and airport managers their views of the FIS area. Participants commented on features in the FIS that they believed work well, those that require improvements, and those they desire to see implemented in the FIS.

Surveys were distributed in 2016 by US CBP, A4A, and ACI-NA.

### 3.1 Responses

Responses were received from airport operators, terminal operators, CBP officials, United Airlines, and American Airlines. Survey feedback solicitation was advanced in several rounds in order to maximize input. A cross-section of inputs came from 28 airports listed below:

- BOI: Boise Airport
- CLT: Charlotte Douglas International Airport
- CVG: Cincinnati/Northern Kentucky International Airport
- DEN: Denver International Airport
- DFW: Dallas/Fort Worth International Airport
- DTW: Detroit Metropolitan Wayne County Airport
- FAR: Hector International Airport (Fargo)
- FLL: Fort Lauderdale International Airport
- GEG: Spokane International Airport
- GRR: Gerald R. Ford International Airport
- HNL: Honolulu International Airport
- IAD: Washington Dulles International Airport
- LAS: Las Vegas McCarran International Airport
- LAX: Los Angeles International Airport
- MCI: Kansas City International Airport
- MIA: Miami International Airport
- MKE: Milwaukee General Mitchell International Airport
- MLI: Moline Quad City International Airport
- MSP: Minneapolis-St. Paul International Airport
- MSY: Louis Armstrong New Orleans International Airport
- OKC: Oklahoma City International Airport
- ORD: Chicago O'Hare International Airport
- PHL: Philadelphia International Airport
- RNO: Reno-Tahoe International Airport
- SEA: Seattle-Tacoma International Airport
- SFO: San Francisco International Airport
- STL: Lambert-St. Louis International Airport
- YVR: Vancouver International Airport

### 3.2 Summary of Preferred Features

Overall, there was a general acknowledgement that FIS areas benefited from clear definitions in the ATDS. Although there was disagreement on the extent of space allocation, the ability to allow different sizes of facilities to have corresponding space requirements was noted.



## INNOVATIVE PROGRAMS AND TECHNOLOGIES

The number one comment about FIS areas is lauding the benefits of innovative programs and technologies. Specifically, the rapid expansion of APC since 2013, in combination with Global Entry, was cited as an important development to allow for better space utilization as well as additional growth.

While the survey itself highlighted the enthusiasm from all parties (CBP, airports, and airlines) to the power of new technologies, the PARAS 0002 research team observed the following:

- Some facilities have better accommodated APC than others—flexible facilities are important for the requirements to develop new data lines for kiosks (in advance of future wireless deployments)
- Kiosk technologies have existed in the FIS for a long time (INSPASS in the 1990s), but there is a wide array of practices for the optimal placement of kiosks within the Primary Processing Area
- Additional facility guidelines (note: guidelines, not standards) will help with the expansion of the FIS to include MPC and kiosks placed away from the FIS

## INTUITIVE FLOW

A number of respondents described the need for the international arrivals process to have a more logical flow for passengers to proceed through different steps in the FIS.

This was seen as important because the different products (Global Entry, One-Stop, APC, MPC, and regular process) can potentially create confusion.

Additionally, a different set of steps is being advanced for passengers to have four possibilities:

- Not be required to pick up bags (e.g., ITI processes)
- Pick up Bags First before Primary Processing (e.g., AUS)
- Continue with the traditional bag claim after Primary Processing
- Pick up bags after Primary and recheck for a connecting flight

The number of combinations and permutations for processing steps could be difficult for operations and customer staff to anticipate and reconcile potential ways individuals could fail to identify their next step.

Although the researchers for PARAS 0002 do not have fully formed opinions or recommendations, some respondents emphatically believe that a one-floor configuration of passport and baggage controls works the best for intuitive wayfinding. The idea is to ensure that passengers can see the entire process without too much difficulty.

## SIGNAGE & WAYFINDING

Where intuitive flows are not possible in design, a number of respondents described the way the signage and wayfinding is advanced at some facilities. Several respondents familiar with multiple sites indicated that clear signage at airports such as DFW, LAX (New Bradley Terminal), and LAS are models to emulate. They praised that these adequate and properly placed signs guide passengers to the appropriate designated areas.

Others highlighted the need for standardized coloring to denote different processes (e.g., OneStop and APC). Although signage is generally regarded as an operational issue, it was felt that a best practices guide could assist with the delivery of the ATDS.

More specifically, the ATDS is currently relegated to a set of two-dimensional diagrams that provide little guidance. When compared to TSA facility standards with axonometric renderings, it was felt that there would be a better understanding of flows for passengers and bags with standardized signage/wayfinding/flows in three-dimensional rendering.

### 3.3 Summary of Desired Improvements

Most respondents were critical of the inflexibility of the ATDS to create sustainable planning for the longevity of facilities. Particularly for the airport and airline groups, the overall premium cost of FIS areas is about \$200 per square foot more than facilities in the rest of the airport.

#### SPACE REQUIREMENTS IRRELEVANT TO OPERATIONS

In general, the current ATDS is viewed as disconnected with the operations of FIS areas. For new facilities, the concern is whether booths will be fully staffed. For older facilities, there were a lot of comments about:

- Expansion several years ago has already been expended (i.e., out of capacity already)
- No logical place for growth
- Mismatched growth areas; too large in some places, too small in others

Furthermore, due to the evolution of US CBP from legacy US Customs Service (USCS) and Immigration and Naturalization Service (INS), many facilities cited the disconnect between new standards and older requirements.

#### CUSTOMER-FRIENDLY ARRIVALS

A number of respondents criticized the areas associated with the international arrivals process that were outside the FIS. “One big long boring corridor” was described as the typical experience for passengers with long walks to reach processing areas.

Furthermore, there were points raised about the challenge of dealing with an increasing number of languages. For instance, the heavy promotion of tourism from China and Brazil has increased the number of Mandarin and Portuguese language demands; signage does not accommodate this growing demographic.

Some respondents indicated that space is inadequate at airport terminals. Some facilities do not meet the current terminal standard. Some areas have blind spots, a small FIS area, a long distance between primary processing and gates, and unpleasant waiting environments.

#### LINKING NEW PROCESSES TO NEW FACILITY GUIDELINES AND THE ENTIRE FLOW

While a range of respondents were very emphatic about the benefits of APC kiosks (and the MPC application), there was an acknowledgment that improvements in one area also need to be undertaken holistically with a set of improvements throughout the arrivals process. Some highlighted the speed of Global Entry to challenges of egress. Not all facilities can have a modified egress model (like DTW); and the ATDS does not lend itself well to the implementation of alternate solutions. DFW has a great initiative to have a separate exit from the FIS; however, the guidance material in the ATDS would not lead one to plan for the possibility of a separate exit for Global Entry.

### 3.4 Key Theme: Reintroducing Flexible Planning to FIS

In reviewing the commentary from airports, airlines, CBP, and terminal operators, there is a single theme that deserves more attention for the work of PARAS 0002: what flexibility is needed to generate a facility that can last the next 40 years of operation?

Over 40 years ago, USCS/INS were faced with the challenge of accommodating large Boeing 747 aircraft, and created the primary/secondary process differentiators that have been used up to this day.

As new experiments (e.g., biometric confirmation at IAD/JFK and modified egress) and capabilities (e.g., One-Stop and APC/MPC phases), there needs to be a method to ensure flexibility is defined in order to address emerging trends, such as:

- Some spaces are too large, others too small
  - Can facilities be structured to allow easier demising/moving walls?
- Surge in secondary referrals
  - Threats change over time, and may require improving areas to deal with permanent/temporary issues.
- Larger travel groups
  - New regions attracted to travel to the United States have statistically larger party sizes.
- Podium-free processing
  - Like APC kiosks/MPC application roll-out, the ability to free CBP officers from fixed units can help to alleviate space requirement constraints.

Flexible planning is a consensus point associated with the survey. Further defining flexibility in the FIS will involve three areas:

#### **FLEX SPACE**

Large airports need to be able to accommodate different operating conditions such as:

- High volume of foreign nationals in the morning, low volume in the afternoon
- Relatively high volumes of Global Entry during certain times versus others
- Connections: Different percentages and passenger profiles depending on banks of flights

Small airports need to address facilities to allow for more easy conversion of the FIS from one use to another. Some changes in PHF and ACY airports enable improved facility sizing; more is needed to potentially enable direct services through 100% on-board MPC, pending addressing foreign national mobile concept of operations.

#### **CRITERIA FOR “NEW” PROGRAMS**

A number of survey respondents are following the models of operation in AUS and the proposed SEA model for Bags First. Additionally, there is increased awareness of international-to-international (ITI) and international-to-domestic baggage recheck elimination practices and ideas. Optional programs depend on adequate business cases for facilities, technologies, and operations; guidelines are needed to help ensure consistency between sites.

## **SCALABLE AND LEVERAGING TECHNOLOGIES**

The ideal process flow developed for future FIS areas will require a view towards scalability of operations. For example, if 100% of passengers use the MPC application or use on-board clearance, what does the hall look like? In this type of thinking, some of the views towards ensuring line of sight throughout the FIS area (to maximize biometric camera coverage), as well as reducing signal interference become important planning parameters for terminal designers and operators alike.

### **3.5 Summary**

The discussion of the survey results above provides a summary of the main issues brought up by respondents. Note that not every individual response is enumerated in this summary document. The key points regarding good and bad features, as they relate to ATDS, are reviewed. The primary key theme through the majority of the responses is the need to have flexible facility planning in order to accommodate the demands on the FIS in the long term.

## CHAPTER 4: WORKSHOPS & CONSULTATIONS

Based on the survey results and the three themes identified (i.e., flexible space, criteria for implementing new programs, and scalable and leveraging technologies), a set of discussions was advanced with CBP, airports and airlines regarding the nature of design requirements for future facilities.

In addition to this, through approvals from CBP headquarters, a formal workshop was held with US CBP in late June 2016 in conjunction with the agency's own internal design guidelines update process.

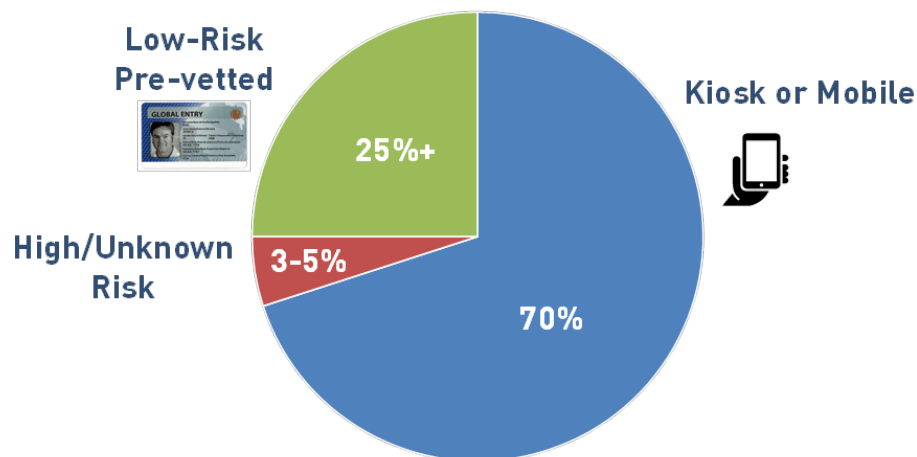
### 4.1 Canada-US Aviation Border Summit March 2016

On March 3–4, 2016, a group of thought leaders on border access at airports in the United States and Canada gathered for a summit hosted by the Vancouver Airport Authority. Senior decision makers from airlines, airports, and governments were well represented at the meeting. For the purpose of this report, senior representation included CBP, A4A, and ACI-NA, as well as individual airlines and airports.

InterVISTAS served as facilitator and secretary for this summit, the goal of which was to develop a future border vision. The following is a summary of discussed topics which are relevant to this research and the ATDS.

**Future changes in risk management.** There is a dramatic change anticipated in the proportions of low-risk pre-vetted passengers compared to high/unknown risk passengers over the next 20 years. As shown in Figure 4-1, workshop participants indicated that in the next 20 years, 95% or more would be handled through some form of automation (compared to about 52% today<sup>12</sup>).

Figure 4-1: Projected Distribution of Passengers Using Automation/Trusted Traveler (2036)



Source: Developed by InterVISTAS, based on forecast of future technology targets and discussions with CBP

**New technologies/opportunities.** Participants indicate that there were four main changes anticipated in the way the facilities would be operated for CBP clearances:

Adopt as much clearance as possible away from the United States (and Canada)

There was an overall endorsement that as threats moved further away from the continent, it would free up space for other functions and reduce the stress on existing facilities.

<sup>12</sup> Based on analyses of Automated Passport Control Public Report (February 2017) and CBP Dashboard (September 2016)

Biometric identity is used for the entire travel process

There was a vision articulated to use biometrics as a single token for the entire journey, rather than using a range of different tokens (smartphone, boarding pass, passport, Global Entry card).

Eliminate baggage claim for transit passengers in the CBP Facility

Carriers expressed interest in the ability to eliminate baggage claim for connections to domestic flights upon arrival in the United States.

Expand trusted traveler programs to accept virtually all foreigners

The ability to grow CBP's approach to accept a range of foreign nationals in Global Entry was endorsed, and also cited as an area to grow dramatically.

**Facility implications.** Although the Border Summit was a much higher level of detail than the sizing of rooms, some notable comments were raised. Participants highlighted the challenge of making 20th century facilities meet a 21st century set of needs. Furthermore, participants acknowledged the power of private-public partnerships to leverage the strengths of airlines/airports and technology to deliver solutions.

## 4.2 US Customs and Border Protection Workshop June 2016

On June 28, 2016, a workshop was held in Washington D.C. at CBP headquarters with key personnel representing a cross-section of different airports, CBP Office of Field Operations, and CBP Facilities. Most, if not all, of the participants also took part in CBP's own process for updating its design guidelines.

Below are the topics discussed that are relevant to this research and the ATDS:

### **STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS**

The strengths, weaknesses, opportunities, and threats for the airport FIS in which the officer is based, as they are currently designed and configured in 2016, were discussed in the context of increasing international passenger traffic growth.

**Strengths**

- Passenger self-service for portions of primary processing (but still need officer input)
- Open line of sight through FIS
- Natural barriers within facility providing physical containment of passengers
- One-level facilities
- Bags First provides whole picture to primary processing officer
- Relationship between all parties (airport, airlines, CBP)
- Raised/accessible flooring to enable wiring/re-wiring
- TSA checkpoints just outside of FIS Preclearance airports – Baggage Image and Weight Identification System (BIWIS) instead of having to see each bag, for connections (for destination?)
- Detention holding rooms that can hold for more than 24 hours – useful for deportations

**Weaknesses**

- Tying systems together
- Two-level facilities
- Satellite facilities difficult for staffing (i.e., two separate facilities)
- Bags First potentially poses a security issue (i.e., weapons in bags)
- TSA checkpoint just outside of FIS may impede flows (back up into FIS if very busy at TSA checkpoint) – egress congestion issues
- Definitions of secure/sterile/etc. with TSA
- Bags delivery and transfers almost always take longer than passengers process (i.e., will cause timing issue for potential future ITI connections)
- Wait time definitions and service levels (i.e., MPC application, when submitted, starts wait time at aircraft arrival time, so penalized by large aircraft with long de-plane time)
- Lack of back office functionality at some airports
- Baggage delivery system – inability to reconfigure
- Systems and network old/outdated

**Opportunities**

- Direct induct of transfer bags into domestic system for aviation security purposes—Preclearance or other TSA recognized security
- Faster connections with elimination of aviation security rescreening
- Work on solutions with TSA as a whole system, sharing resources (equipment, etc.)
- If no checked bag reclaim, can have smaller volume of passengers to monitor
- Using new technology such as biometrics, automated threat detection
- ITI connections
- Making entire process easier from point of origin through to final destination
- Pre-inspection of checked bags at partner/trusted countries

**Threats**

- Passenger self-service being used for nefarious purposes
- Technology failure during operations—need redundancy
- If no bag claim/recheck, then miss on opportunity to see passenger interaction with bags—so plots may be developed with this knowledge
- 5–8% increase in passenger volume per year

## BEST PRACTICES

Some of the leading operational practices at airports were noted below:

- APC/Technology first — before bag area
- Work with airlines to expedite delivery of bags with Bags First. There are, however, space issues for passengers with bag carts, etc. (i.e., wider space between booths, etc.)
- If able to eliminate TSA rescreening in future, ensure that facilities can allow passenger to transfer without coming in contact with checked bags
- Public office located in main terminal (for airports with satellite terminals that contain the FIS; instead of a train ride away)
- Bag claim differentiation—specify which carousel bags go to by risk profile of flight, roving pods are aware of carousels, and carousels are positioned by proximity to Customs Secondary. It was noted that referrals and interceptions have increased significantly since implementation.
- Quick bag exams on floor behind mid-height frosted glass partition area instead of in Secondary
- Staffing, resources, or airport customer service helping with APC usage (especially if positioned in arrivals corridor)
- Natural flow to exit/connections so signage is secondary

## FLEXIBLE FACILITIES

The key features for ensuring that facilities designed today remain flexible to accommodate future growth and operational practices were discussed. The following are some of the recommendations:

- Scalable, distributed antenna system for radios and Wi-Fi—enough bandwidth to accommodate operational processing needs
- Communications systems (telephone, mobile) need to be integrated and up-to-date
- Reconfigurable bag claim systems for different flight types
- Movable walls/partitions—ability to segregate flights for high risk origins
- APC in hallways/corridors if allowed—ensure new builds have adequate space for APC, meet fire code, etc. for processing and circulation
- Currently no differentiation between kiosk user types—possibly separate and ensure some kiosk space meets special needs or family-friendly
- Contingency plan for queuing for outages or other irregular operations

## CRITERIA FOR ALTERNATE/NEW PROGRAMS

The criteria or considerations for evaluating whether to implement a new or alternative program were discussed and the following were recommended by the group:

- APC is an example of a solution that improves number of passengers per square foot of space used
- Governance of facilities needs to be considered
- Elimination of baggage recheck such as ITI processes
- Modified egress shows that enforcement statistics are the same, but provides a much improved flow of passengers out of FIS



- Natural flow/streamline flow into correct path (fewer choices)
- Signage/markings on ground level? Color-coded?
- Coordinated messaging with airlines
- Dynamic signage so changes can be made as required and to adapt for different languages

### SCALABLE TECHNOLOGIES

Some of the technologies that can potentially be used or applied for border processing at the airport to ensure that operations are scalable were discussed:

- APC may only be a stop-gap measure—what can be done in future?
- Mobile APC (90% of self-service processing done on own device)
- Global Entry application
- Facial recognition integration with MPC application so minimal kiosk time needed—first point of contact at Primary or Egress
- Line of sight requirements for non-intrusive technology
- Retinal scans for biometric recognition
- Make use of RFID in Global Entry/Nexus cards and chip on e-Passports
- APC cameras that adjust for different heights of passengers
- Overhead cameras with MPC application users to perform matching
- Multi-use/purpose kiosk (Global Entry and APC switching) to allow flexibility in processing capabilities
- Mobile device fingerprint capture

### 4.3 Additional Consultations

ACI-NA, A4A, and CBP have been coordinating field meetings to observe airport operations, identify best practices, and identify areas of opportunity for standardization. In 2016, the group conducted site visits to four airports (ORD, SFO, IAD and MIA) and identified 27 best practices, highlighting the following key areas:

- Improve and standardize signage and passenger wayfinding
- Make better use of technology for passenger processing
- Standardize modified egress

The study team for PARAS 0002 has consulted, and where applicable, has incorporated best practices identified by ACI-NA into the key findings in this report.

## CHAPTER 5: SITE REVIEWS

For this report, the team conducted site visits to various airports in order to compare how each managed design and use of their FIS.

Airports were categorized based on a thorough review of existing facilities, passenger numbers, and processes implemented. Airports were selected for a high-level review and for a more detailed site visit based on a cross-section of the challenges faced in implementing FIS facilities.

Categorization of airports was based on the following criteria:

- Traveler demographic—business vs. leisure travel; US nationals vs. foreign nationals; proportion of Global Entry users
- Size and location of FIS—main vs. satellite terminal; single vs. split level; multiple FIS at same airport
- Airport type—connecting hub vs. origin/destination focus; Preclearance; airline alliances operating at airport
- Passenger volumes—large (2,000 or more passengers per hour [pph]), medium (between 800 and 2,000 pph), small (less than 800 pph)
- Technology deployed—Global Entry, APC kiosk, or MPC application availability
- Different staffing models/officer roles—roving officers; flexible staffing features; types of scheduling
- Alternative processes—facilitated connections processes available; alternative egress implemented

As a result of the categorization, and to obtain a good cross-sample of facility types, the following airports were reviewed at a high level:

- |                                                        |                                                 |
|--------------------------------------------------------|-------------------------------------------------|
| ▪ Dallas Fort Worth International Airport (DFW)        | ▪ San Francisco International Airport (SFO)     |
| ▪ Dublin Airport                                       | ▪ Seattle-Tacoma International Airport (SEA)    |
| ▪ Houston Hobby International Airport (HOU)            | ▪ Vancouver International Airport               |
| ▪ Houston Intercontinental International Airport (IAH) | ▪ Washington Dulles International Airport (IAD) |
| ▪ John F. Kennedy International Airport (JFK)          |                                                 |

Detailed site visits were completed for the following airports:

- |                                                               |                                                                   |
|---------------------------------------------------------------|-------------------------------------------------------------------|
| ▪ Dublin Airport in July 2016                                 | ▪ Miami International Airport (MIA) in September 2016             |
| ▪ Austin-Bergstrom International Airport (AUS) in August 2016 | ▪ Washington Dulles International Airport (IAD) in September 2016 |
| ▪ Atlantic City International Airport (ACY) in September 2016 |                                                                   |

## 5.1 Dublin Airport

The FIS at Dublin Airport in Ireland is a Preclearance operation that was completed in early 2011. The facility is housed in one of two terminals at the airport. Planning and design of the FIS occurred part way through an existing renovation of that terminal. The airport has a mix of passenger profiles, including leisure and business travelers, US and foreign nationals, and Global Entry users. The FIS is located in one of the main terminals and is single level. The peak hour passenger volumes place it in the medium passenger volume category. Global Entry and APC kiosk technology are used at the FIS. As is the case with all Preclearance facilities in which security screening takes place before CBP processes, originating passengers and connecting passengers proceed through the FIS without their checked bags.

The key features of note at Dublin Airport are the following:

### **AUTOMATED PASSPORT CONTROL OUTSIDE OF FIS**

Passengers have the option to use APC kiosks located within the FIS or outside of it. The initial implementation of APC at the airport had a limited number of kiosks within the FIS. As passenger volumes through the FIS at Dublin Airport have more than doubled since the airport began operating full Preclearance, significant pressures on processing capacity and queuing space have developed. As a result, APC kiosks have been deployed in the main terminal well outside of the FIS. The placement of kiosks outside of the FIS has helped alleviate both the processing capacity and queue space issues in the near term. There is continued growth in demand (i.e., airline requests to operate more flights) at the airport. The minor issues that were noted with having some APC kiosks located outside of the FIS and some located inside the CBP facility were passenger confusion/anxiety regarding where to perform border processes and corresponding wayfinding issues.

**Figure 5-1: APC Kiosks Outside of FIS at Dublin Airport**



Source: InterVISTAS Consulting

### **AVAILABILITY OF CHECKED BAGGAGE X-RAY IMAGES**

For passengers that are referred to Secondary, CBP officers have the ability to review X-ray images of passenger checked bags. All checked bags for precleared flights undergo X-ray security screening at the airport. Dublin Airport Authority has provided a workstation in the CBP Secondary area for officers to be able to review the X-ray images if needed. Subsequent to the X-ray image review, the CBP officer

can request physical retrieval of the bag to the Secondary area. There is still X-ray equipment in the Secondary area for the exclusive use of CBP.

The significance of the availability of checked baggage X-ray images is that it provides a tool for CBP officers to allow bags to remain at ramp level for what is the equivalent of an international-to-domestic connection.

**Figure 5-2: X-Ray Machine in Secondary Area at Dublin Airport**



Source: Inter VISTAS Consulting

## 5.2 Washington Dulles International Airport (IAD)

IAD was built in 1962, and at that time consisted of the Main Terminal and a control tower. Mobile Lounges (or people movers) took passengers to and from the aircrafts to the main terminal. As the passenger volume grew through the years, temporary concourses were built (A, C, D, and Z) to gate aircraft, both domestic and international. In 1991, during a large capital investment project, the new International Arrivals Building (IAB) was built to house the US CBP FIS. To accommodate transfer passengers, United Airlines and its Star Alliance affiliates use Concourse C for connecting passengers. CBP also has a mid-terminal FIS in Concourse C just for the connecting passengers from the United/Star Alliance network. For the volume of passengers processed each day, IAD is classified as a large airport.

Both the IAB and Concourse C FIS have implemented automation for passenger processing. Each has Global Entry kiosks, APC kiosks, and MPC. Once passengers pass through primary inspection, they claim their bags and then exit the hall. At the IAB, there is a recheck area before exit to the main terminal for bags. If passengers connect, they must go through TSA screening in the main terminal. In Concourse C FIS, passengers claim their bags and recheck their bags in the same arrival halls; then they go through TSA screening on the same level, prior to going to their connection gates.

### MODIFIED EGRESS WITH RFID BOX SYSTEM

As stated, Concourse C is dedicated for United and Star Alliance Airlines. This FIS accounts for only 5% of the total arriving international passengers, and all of them are connecting through IAD. It is this controlled environment that allows a modified egress to be tested based on self-wayfinding using RFID

technology. The concept is to allow passengers that are required to have a secondary inspection find their way themselves without a CBP escort.

Once the passenger is identified as needing secondary inspection, the CBP officer places the passenger's passport, declaration documents (if applicable), and a secondary note in a large acrylic box. This box holds an RFID tag inside and is sealed. Only the CBP officer in Secondary can open the box.

The passenger is given the box and can then proceed to collect their bags in the claim area with other passengers. Once they have their bags, the wayfinding signs direct the passenger to secondary. If the passenger does not follow the path and goes beyond the Secondary entrance, there is a signal to notify CBP of this action.

**Figure 5-3: Trackable RFID Box for Travel Documents of Passengers Referred to Secondary**



### 5.3 Austin-Bergstrom International Airport (AUS)

AUS opened its new FIS in December 2014. The airport has a mix of passenger types. It is a relatively small facility with the CBP located in the main single terminal; it acts primarily as an origin-destination airport. The passenger volumes are small (i.e., < 800 pph). APC kiosks are available for passengers at the airport with an estimated 80–90% of passengers using them along with Global Entry. The key alternative process at the airport is for passengers to retrieve their bags before seeing a CBP officer.

#### BAGS FIRST INITIATIVE

The process for passengers to claim their bags before proceeding to a CBP officer has been in place since February 2016. Passengers are instructed by customer service representatives to process through the APC kiosks as they await delivery of their checked bags to the bag claim carousels. The customer service representatives review the APC receipts and write on the receipt using a color-coded system for passengers to follow after they pick up their bags. Specifically, there are three numbered/color-coded lanes for 1) no X on the APC receipt (US citizens, residents, Canadian citizens, and Visa Waiver Program users); 2) US citizens and residents with an X on the APC receipt for expedited processing; and 3) all others (i.e., foreigners with an X on the APC receipt and anybody who cannot use APC). There is a separate, dedicated lane for Global Entry members, crew, and passengers with no checked baggage. After undergoing primary processes with a CBP officer in the appropriate lane, passengers are free to exit the FIS without stopping at egress.

The assessment of benefits from CBP locally at AUS is that the color-coded system makes wayfinding easier, with a 40% improvement from before the system was implemented. It has been estimated that the capacity has tripled with APC usage, Global Entry, and no egress staffing (i.e., frees up CBP officers for document verification function for APC or roving/random checks at the bag claim carousels).

The key features to consider if and when implementing Bags First processes are to provide enough space in each of the lanes for passengers with bags/carts; have a flexible lane/stanchion configuration; and provide a setup that prevents passengers proceeding past unstaffed booths. It was noted that it works well for airports with low volumes of passengers (i.e., one aircraft at a time) and may be difficult to implement for airports with larger aircrafts and passenger volumes, or for split-level facilities.

## 5.4 Miami International Airport (MIA)

There are two FIS areas in MIA: South Terminal J and North Terminal D.

South Terminal J was opened in 2007, and was part of a capital investment plan that continued until 2013. The FIS is a single-level processing area, and has 40 booths in addition to 28 APC kiosks and 4 Global Entry kiosks. The terminal operates 24 hours and is used by all air carriers except for American Airlines.

North Terminal D began a renovation project (North Terminal Improvement) in 2009 that continued through 2014 with the inauguration of the new multi-level FIS area. The terminal is dedicated to American Airlines flights only and features 72 booths/podiums, 74 APC kiosks (with more to be delivered in 2017) and 12 Global Entry kiosks. The terminal operates from 4 am–11 pm. As one of American Airlines' primary network hub airports, the FIS in Terminal D has the higher volume of passenger traffic of the two FIS areas.

The airport is classified as large based on peak hour passenger volume, with a mix of business and leisure travelers, as well as Global Entry members. There is a significant percentage of connecting passengers along with alternative processes implemented at the airport.

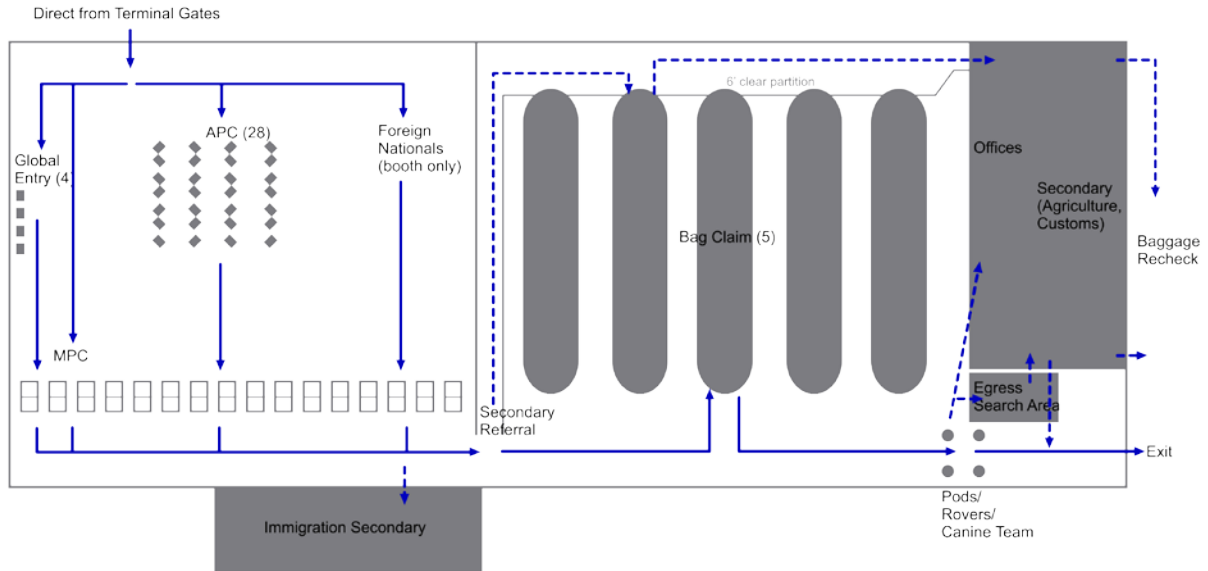
### ENHANCED MODIFIED EGRESS

MIA has introduced a modified egress process at both FIS Terminal J and FIS Terminal D, in which immigration and customs processes take place at Primary (i.e., passengers only stop once to turn in their receipt or customs declaration, unless they are required to be interviewed for Secondary screening). If passengers do not have to be seen at Secondary, they may proceed to baggage claim and exit the hall without stopping again. There are roving officers close to the egress who may question and search passengers, as needed.

In order to facilitate this movement, MIA has introduced a pathway to Secondary for those passengers who are referred to Secondary from Primary processes. Passengers are directed to the pathway, which is a segregated walkway made of clear acrylic that routes the passenger from the Primary area to the baggage reclaim area. Passengers are able to claim their bags while still in this separated area, and can proceed directly to Secondary inspection. Once passengers have their bags, they follow signs to Secondary for the additional inspection.

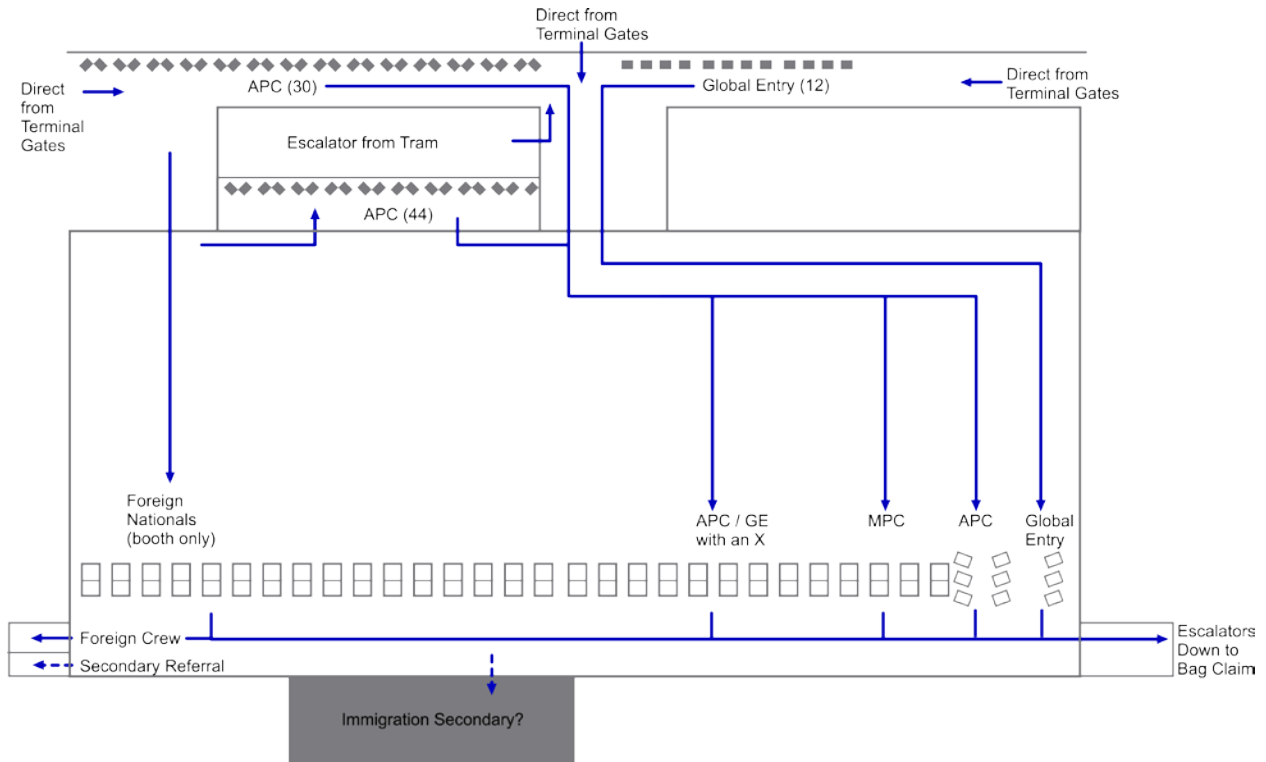
Since FIS Terminal J is a single-level FIS, the pathways from immigration to baggage claim and to Secondary simply follow along the walls of the baggage claim area. There are minimal breaks in the pathway; all baggage carousels are accessible by the passengers, and the connection to Secondary is intuitive. Figure 5-4 shows the conceptual layout of the FIS.

**Figure 5-4: Conceptual Facility Layout of MIA Terminal J FIS (Single Level)**

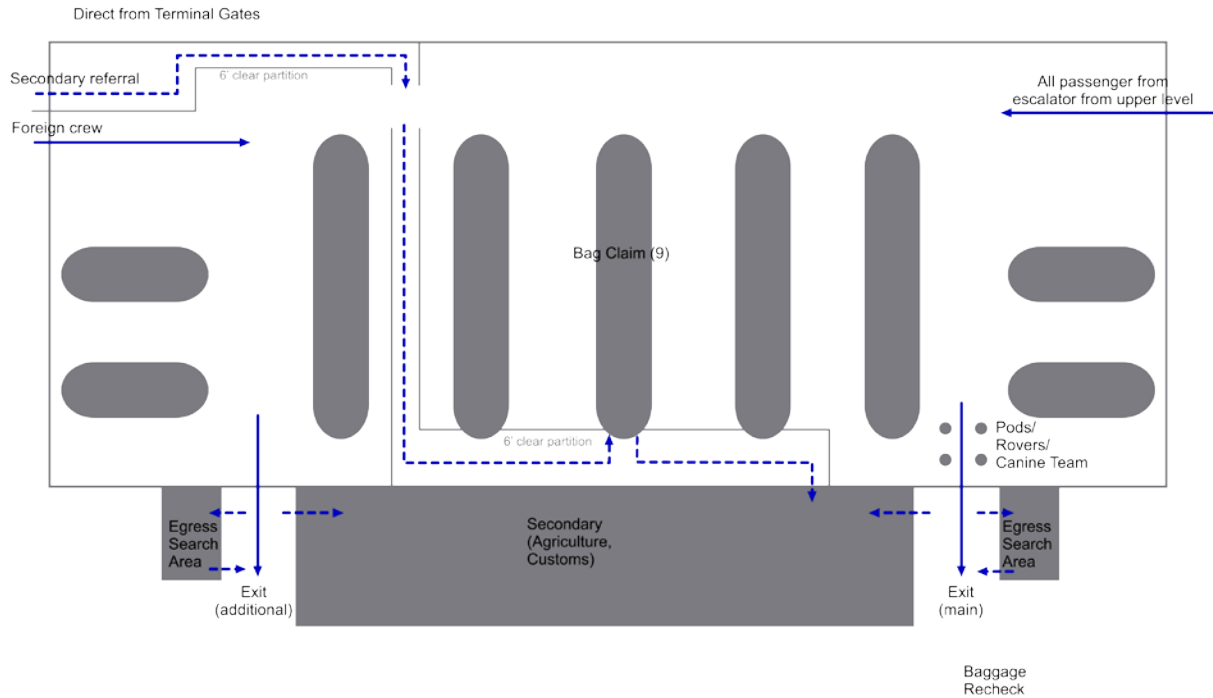


The FIS in Terminal D is a multi-level facility in which the pathway to Secondary begins on the upper level at Primary, and passengers must continue down to the baggage claim carousels. The pathway must access an escalator, which is dedicated for this purpose, and also cuts through the baggage reclaim area. There are breaks in the segregated pathway that require particular attention/care so that referred passengers do not join the flow of all other passengers. Only specific carousels are available for the Secondary pathway access, and therefore, bags must be planned to be delivered to one of these carousels or manually identified and moved to the correct carousel. Figures 5-5 and 5-6 show the general flow of passengers through the two-level FIS.

**Figure 5-5: Conceptual Facility Layout of MIA Terminal D FIS (Upper Level)**



**Figure 5-6: Conceptual Facility Layout of MIA Terminal D FIS (Lower Level)**



**APC AND GLOBAL ENTRY OUTSIDE OF FIS**

In FIS Terminal D, all of the Global Entry kiosks (12), and some of the APC kiosks (30) are placed in the sterile corridor outside of the FIS (see Figure 5-7). The passengers are able to locate these kiosks through overhead signs. Once they have been processed, they continue to the FIS to submit their kiosk receipts at dedicated Primary podiums for document verification, as required. The placement of the kiosks in the sterile corridor allows a greater portion of the Primary processing area to be used for traditional booths and corresponding queues. Expanding the FIS into the sterile corridor helps reduce spacing issues within the FIS, especially during peak times.

**Figure 5-7: Global Entry Kiosks in Hallway Outside of FIS at MIA Terminal D**



Source: Inter VISTAS Consulting



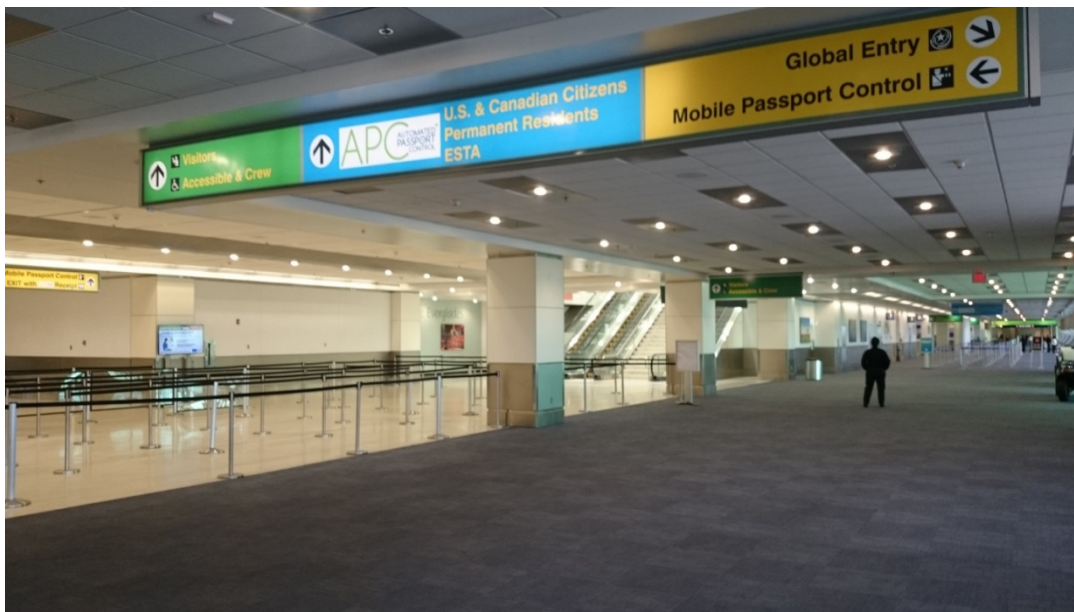
## COMPLEXITIES OF WAYFINDING AND SIGNAGE

For the Terminal D FIS, which is a multi-level facility, much attention is paid to signage and wayfinding. With passengers entering the sterile corridor of the FIS from three possible directions, numerous wayfinding signs are placed in several locations overhead to instruct the passengers where to go for border processing. The signs indicate the different processing options or technologies that they may use (i.e., Global Entry, APC, or MPC), and other options such as wheelchair lanes.

Even with the multiple signs in the sterile corridor and inside the FIS hall, MIA is looking to improve wayfinding options for passengers. Ideas include color-coding processing technologies and continuing with those color schemes throughout the FIS hall and to egress. Other ideas include placement of arrows, lines, or markings on the floor so that passengers can easily follow their way to the next step.

It was noted that there are also technologies that can push information to passengers' mobile phones and indicate which lanes, kiosks, baggage claim, etc. they can use. By implementing locator beacons, the airport and CBP could send specific information to a group or individuals. This technology is used by MIA and other airports in the main terminal and gate areas, and could serve as an option for future wayfinding.

**Figure 5-8: Possible Passenger Pathways for FIS at MIA Terminal D**



Source: InterVISTAS Consulting

## ELIMINATION OF BAGGAGE RECHECK FOR ITI CONNECTIONS

MIA is also a significant hub for ITI connections; passengers arriving from international destinations do not intend to visit the US but are simply connecting at the airport and destined to go to another country. Depending on the country of origin, there are select airlines that transfer the passenger's baggage to their onward international departure aircraft directly without passengers having to claim and recheck the bags at MIA. These bags still undergo security screening prior to loading on their next flight, and CBP has the ability to request retrieval of bags to Secondary if deemed necessary. The ability to connect without airlines having to deliver bags to the claim carousels, or for passengers waiting to collect bags, greatly improves the consistency and reliability of connection times.

## 5.5 Atlantic City International Airport (ACY)

A terminal expansion project was completed in November 2012 in order to accommodate scheduled, commercial international traffic at ACY. Unfortunately, the FIS has never been used for passengers arriving from commercial international flights, and is currently being used for corporate/general aviation purposes. The facility was originally designed to accept a small volume of international traffic (i.e., < 800 pph). The key design feature is the ability to shutter the FIS easily when no international flights arrive, and to be able to use one bag claim carousel for either a domestic or an international flight.

### DUAL INTERNATIONAL/DOMESTIC USE BAG CLAIM CAROUSELS

While the FIS has not been used to accept international flights, portions of the terminal were designed to process international flights or domestic flights. A metal partition could easily and quickly be lowered to separate one of the bag claim carousels to form part of the FIS. The flexibility that the partition provides ensures that the facility can be efficiently utilized depending on the type of flight arrival. Similarly, a number of bridge doors and corridors could be electronically controlled to provide dual international and domestic capabilities.

**Figure 5-9: Partition Lowering to Enable a Baggage Carousel to be Used for International Flights**



Source: InterVISTAS Consulting

### BUILT TO FULL AIRPORT TECHNICAL DESIGN STANDARD

The FIS was built to the full ATDS requirements (2006) at the time that the facility was designed and approved for construction. It was noted that even if this small facility were to operate scheduled, commercial international flights, many of the features of the facility may not be utilized. For example, a fully functional dog kennel and supporting facilities were built. If canine teams were to be used, the animals would be coming from a larger airport such as PHL, and would not likely be on site for prolonged periods of time that would require the kennel to be used. Another example is the multiple interview rooms and holding cells built in the FIS that are not likely to be needed with such small anticipated volumes of international passengers.

**Figure 5-10: Two Kennels for Canine Teams Within the FIS at ACY**



Source: Inter *VISTAS* Consulting

## CHAPTER 6: KEY FINDINGS

As stated in the introduction, this guide highlights key findings collected through airport questionnaires, site surveys, industry documents and working groups. Although there are a number of different findings for processes within the FIS, a common theme is to have flexibility in the design, use, and evolution of the FIS space.

Note that the findings are not recommendations for implementation. Some findings can be immediately acted upon, but most will require a business case tailored to the individual facility. The findings for facility design are meant to help airport planners think ahead to the evolution of facilities. As a result, the illustrations are analogous to a right-of-way in highway planning—creating the space or facilities to allow easy implementation of future pathways or options for international arrivals or Preclearance processing.

We have identified a total of 12 findings, of which the top 5 target the process for passengers as some of the most important areas to ensure quality designs are advanced, and that traveler satisfaction and airport experience are prioritized. These findings, and a section for other design considerations, are listed below:

1. Begin passenger processes before the FIS
2. Coordinate passenger wayfinding for arrivals
3. Adopt convertible processing kiosks
4. Adapt common baggage area for domestic/international use
5. Eliminate baggage recheck areas

The subsequent seven findings are associated with the general process principles above that can be applied to all areas:

6. Improve egress from CBP
7. Create dedicated egress for Global Entry and connecting passengers
8. Eliminate TSA rescreening for connections
9. Create flexible FIS space
10. Use phased FIS capacity approach with growth triggers
11. Reduce baseline space requirements
12. Customize small airport facilities

Additional design considerations are discussed in Section 6.13.

Note that some elements (e.g., TSA re-screening) may require legislative or regulatory changes, and are outside the scope of the study. However, from a design perspective, the results of the research are pointing to the need to preserve a pathway for future implementation, whether the capability is available in the first couple of years to a decade from now.

For each finding, the following sections outline:

- Design issue—overview and applicability at CBP facilities
- Illustration of current FIS facilities—existing operations today to provide the reader with a basis of understanding the design direction
- Illustration of a future FIS facility, addressing the findings from this report—a visual representation of the future concept of operations/space planning requirements
- Description of key design features separated as:
  - Critical—guidance to designers for aspects that must be adhered to
  - Optional—design considerations that could be optionally considered to help enhance the facility
- Airport applicability—corresponding solution based on the type or categorization of airport
- References to the ATDS, including the current (2012) edition and the 90% draft released for comment in November 2016

Elements have been reviewed with stakeholders (e.g., airlines, airports, and CBP) to ensure that there is appropriate input/context for findings.

## 6.1 Finding 1: Begin Passenger Processes Before the FIS

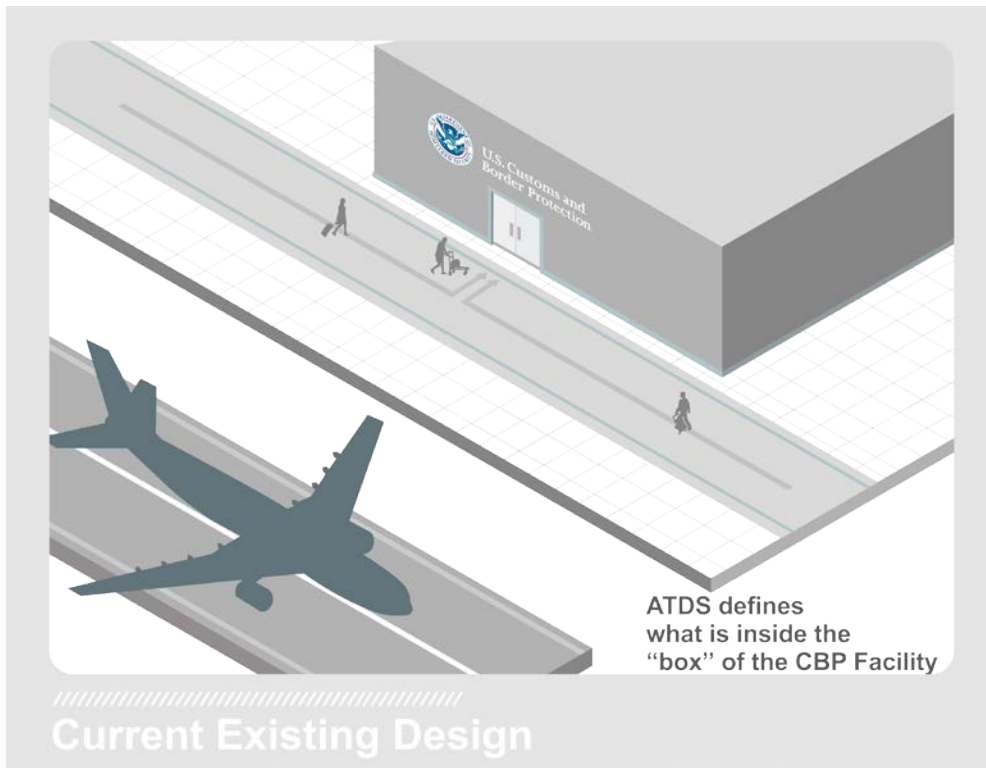
With over 5% international passenger growth year after year, processing areas at US airports are incapable of keeping up with overall annual growth, let alone the peaking that occurs when new flights arrive during the busy hours at airports. The United States has long had a policy to push borders out as much as possible, and has introduced a number of technological tools to aid in this effort. By pushing out the borders, or expanding the processing area away from the immigration hall in the airport, CBP is able to increase a security layer for risk management as well as alleviate the resources on the ground at airports.

The pre-departure screening or Preclearance activity begins once travel is booked. The passenger's booking information, or Passenger Name Record (PNR), and the passenger's check-in information, or Advanced Passenger Information System (APIS), are used together and integrated into the law enforcement database to make risk-based decisions. CBP uses APIS and PNR data to identify known or suspected threats before they depart the foreign location. In addition, US CBP developed an interactive process called Advanced Quick Query (AQQ), which, as above, contains the passenger's information and will also create a board or no-board directive—in essence, not allowing a passenger to board the aircraft if a risk is found.

Even with process improvements to deny boarding for arrivals, a facility strategy needs to be used at airports to dramatically expand the processing environment. This is a particularly important finding because, on average, 3–5 years are needed to realize a construction project for a new FIS, from moment of inception to opening day. Projections used for the design could potentially be outdated by the inauguration.

For CBP, its workload is expected to grow from 112 million passengers cleared in FY2015 to 245 million by 2036, based on FAA Forecasts<sup>13</sup>. As a result, US airports need to build at least 75% more space, or find processing methods that are 75% more efficient to accommodate growth.

While some new facilities are planned (e.g., at ORD and SAN), the lion's share of facilities need to be life-extended to accommodate growth. One way to do this is to expand processing areas into the sterile corridor to take full advantage of miles of corridor space that are currently unused, and are already secured, to ensure monitoring and segregation from other passengers.

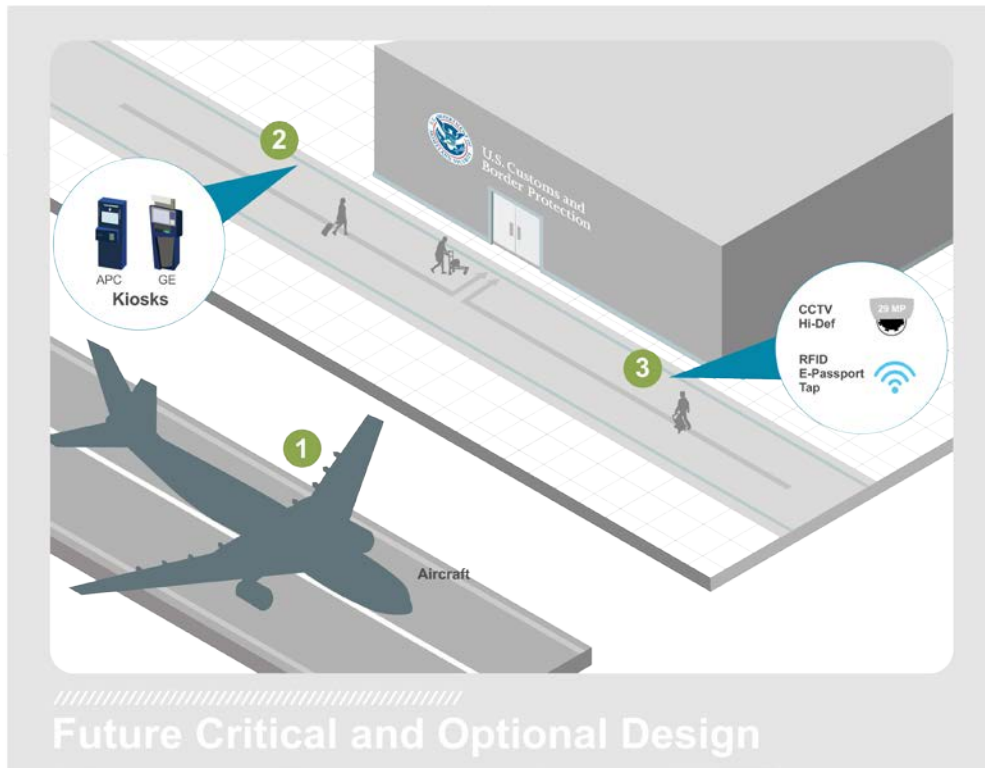


## DESIGN ISSUES

**Completely separate CBP facility from arrivals process:** The ATDS recognizes the presence of a sterile corridor, but does not explicitly endorse the ability to use the corridor on arrival. With the cost of facilities about \$200 per square foot, the amount of space provided for an FIS may not accommodate growth. In addition, border processing has traditionally been considered to only be able to take place within a CBP facility. The international arrivals process should be considered a continuum that can take place at other parts of arrivals facilities.

**Black box philosophy:** The ATDS defines the facility requirements and what activities take place specifically within the FIS related to CBP. However, there are roles for other users of the facility, including airport and airline staff, as well as investments in automation, which indicate that the FIS is no longer a self-contained black box. Some form of international arrivals processing can take place at numerous additional locations, including the origin airport, aircraft, sterile arrivals corridor, or baggage recheck area.

<sup>13</sup> Federal Aviation Administration "FAA Aerospace Forecast Fiscal Years 2016-2036" 2016. See Appendix C Tables 1-31.



### CRITICAL DESIGN FEATURES

- 1 MPC prior to arrival:** MPC is currently in its infancy and is available for US citizens and Canadian visitors only. In the long run, other foreign national passengers will be able to use smartphone technologies for MPC. At the same time, on-board Wi-Fi will become more commonplace for airlines serving international flights to the United States.

Some infrastructure could provide a free Wi-Fi hot spot specifically for MPC application submissions. This avoids travelers having to submit their declaration before their flight or onboard the aircraft.

At Preclearance airports, the ability to use MPC could greatly reduce the pressure for processing facilities that are time-constrained. Potential amalgamation of airline check-in kiosks with automated passport control could also be considered.

- 2 Use of arrivals corridor for processing:** In the traditional view, the ATDS is a space that encompasses only the operating areas directly controlled by CBP. However, there are significant opportunities to make use of the sterile corridor leading to the FIS to make better use of the time for arrivals. A number of airports have reported that state/local building codes do not allow for implementation of kiosks; the typical reason is that building code for congregation spaces (i.e., queues to kiosks) requires a different building structure than circulation spaces. There is a high degree of variability for airports in this regard.

To date, there are two airports in North America that have enabled use of automated kiosks for processing outside of the CBP facility—MIA and Montreal Pierre Elliot Trudeau International Airport. A number of other airports have attempted this capability, with limited success. The biggest obstacle is the fire or building code violation that separates circulation space from congregation space. Circulation is typically assigned for a corridor where people would be continuously moving through a location. ORD had kiosks placed in the sterile corridor in 2015–16;

however, these kiosks were removed due to signage/wayfinding problems. The issue was that passengers would assume that the kiosks in the sterile corridor were the only ones available for processing; improved wayfinding is needed to address this constraint for future deployment of kiosks in the sterile corridor.

In the interim, there is still utility in deploying kiosks in the sterile corridor; planners should ensure that new sterile corridors meet appropriate fire codes to allow for congregation of passengers and not just circulation.

Corridors may need to be wider than a typical hallway as a result, or a ruling that determines that the limited amount of time spent at a kiosk is no different than other items in a corridor (telephone, water fountain, etc.) This will vary from jurisdiction to jurisdiction based on state/county/local rules.

### OPTIONAL DESIGN FEATURES

- 3 Technology-enabled corridors:** The sterile corridor should be designed to enable and leverage technologies that may be used to process travelers before entering the FIS. Over the past decade, significant improvements have occurred to enable improved biometric capture, with much research to overcome image blurring and noise in low-light conditions. Line of sight to capture 100% facial biometrics or RFID detection in the sterile corridor should be considered. For example, a number of vendors have good proof of concepts to allow poses at angles of up to 20 degrees<sup>14</sup>. If/when allowed, consider deploying posts capable of reading RFID from e-Passports to enable Tap-and-Go border process functionality.

### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Medium to high passenger volume:** Having the flexibility to process passengers outside of the FIS is applicable to airports of all sizes that receive medium to high volumes of international passengers. Larger facilities will typically have many miles of sterile corridors to use. Smaller facilities may however face constraints to hold passengers on aircraft if facilities are incapable of handling multiple flights.

**All airport types:** It is applicable to all airport types (connecting hubs, origin/destination, Preclearance, and general aviation airports).

**All passengers except booth users:** It is applicable to airports with any demographic of passengers except for airports that receive almost exclusively passengers that need to use a traditional Primary booth.

### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

#### ATDS (2012)

- Section 1.2 outlining the federal authorities applied in the standard
- Section 3.4.2 refers to the sterile corridors as gates and specifically Figure 3-1 illustrates use of the corridors

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<sup>14</sup> Bourlai, Thirimachos: Face Recognition Across the Imaging Spectrum, 2016, p.118



### ATDS (2016 – 90% Draft)

- Section 1.4 outlining the federal authorities applied in the standard
- Section 5.4.1 defining Sterile Corridor Systems
- Code ATD-01-01 in Chapter 5

## 6.2 Finding 2: Coordinate Passenger Wayfinding for Arrivals

The ATDS recognizes the need for standardized signage “...that helps (passengers) know what to expect and where to go during the arrivals process, even though airports across the country have different layouts and facility constraints.”<sup>15</sup> This version of the ATDS has a CBP Signage Standard to detail the standard used.

Signage is a critical aspect of wayfinding, and there is an airport industry initiative in 2017 to help standardize the language and colors used in airports, specifically in the FIS.

This subject extends globally, where there are many activities to address signage and wayfinding issues.

### GLOBAL STANDARDS

ACI World is in the process of gathering a compendium of signage used in passenger facilitation in order to address the range of different words and symbols used. Although there is a global ISO set of symbols used for pictograms (e.g., taxi and washroom symbols)<sup>16</sup>, over time these have diverged.

### NON-STANDARD WAYFINDING AND TERMINOLOGY

There are subtle differences in signs that indicate where a passenger should be. Pictograms used for MPC, APC, and to a lesser extent Global Entry vary by airport. The reason for this is the different suppliers for signs used locally for APC and marketing used for Global Entry. This may be improved with changes to the CBP Facilities Management & Engineering Signage Standards Guide referenced in the ATDS.

There is also a range of special programs that some airports have branded in order to help compete against other hubs. Examples include:

- **One-Stop:** Could mean an expedited/integrated process related to security, immigration or both
  - The process used at ORD Terminal 5, IAH, and MIA allows passengers with carry-on bags to be expedited through Primary inspection and has a dedicated exit
  - A process to eliminate security rescreening for international passengers
  - The relocation of baggage pickup from after to before Primary processing
  - The unification of CBP primary inspection

Note that One-Stop can be marked differently; for example at DFW, the process is known as Carry E-Z

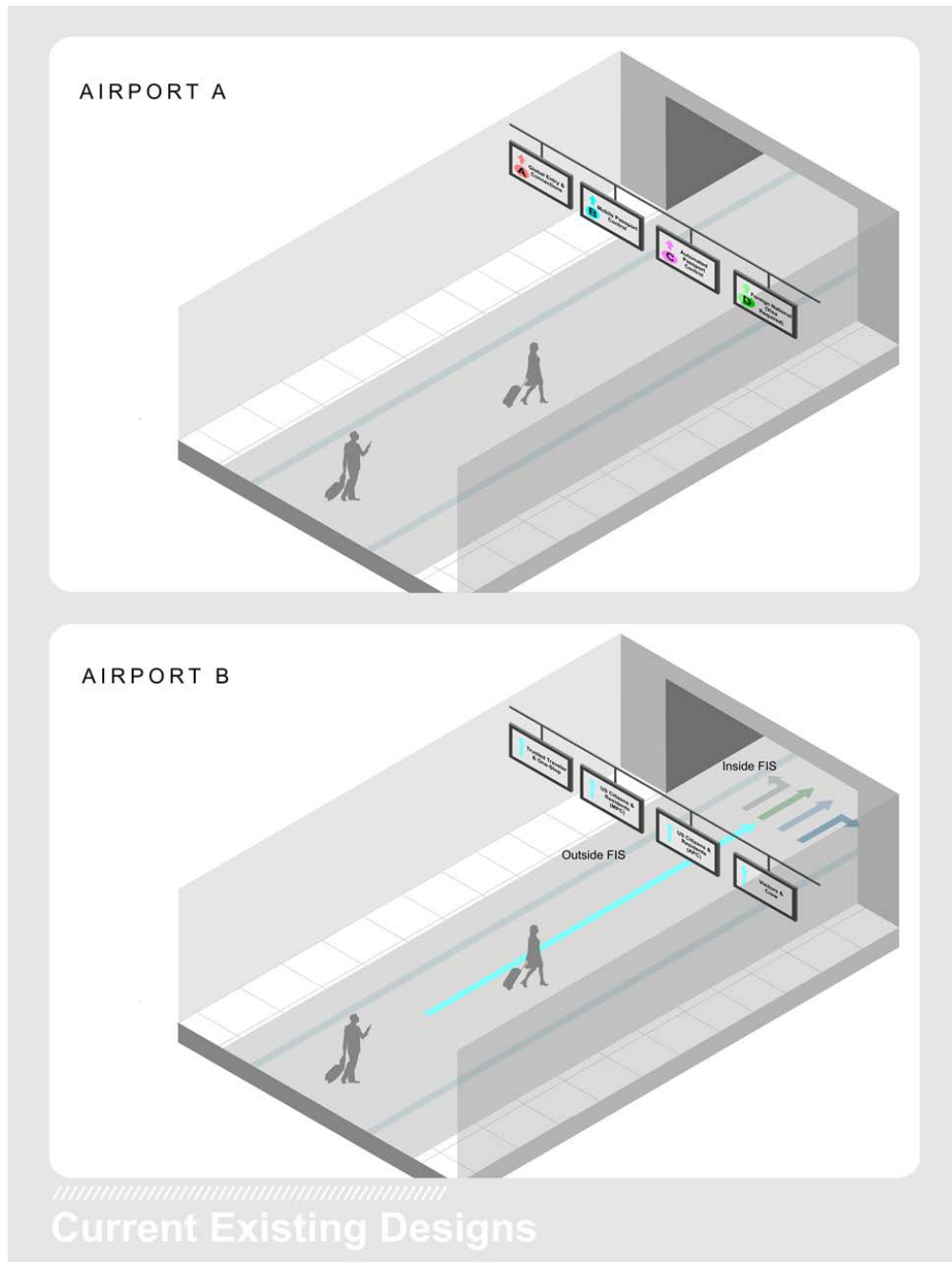
- **Visa Waiver Program (VWP) and Electronic System for Travel Authorization (ESTA):** Although ESTA is a requirement for VWP countries, the wayfinding instructions to those nationals with an ESTA can get confusing.

<sup>15</sup> Section 2.10.4 of 2016 90% draft document

<sup>16</sup> International Organization for Standardization “ISO 7000 Graphical Symbols” 2007.

## OTHER CHANNELS

The challenge for wayfinding extends further with messaging that is, in best practices, coordinated between airline/airport and CBP, utilizing in-flight videos and mobile apps. There are also cases of inconsistent messaging.

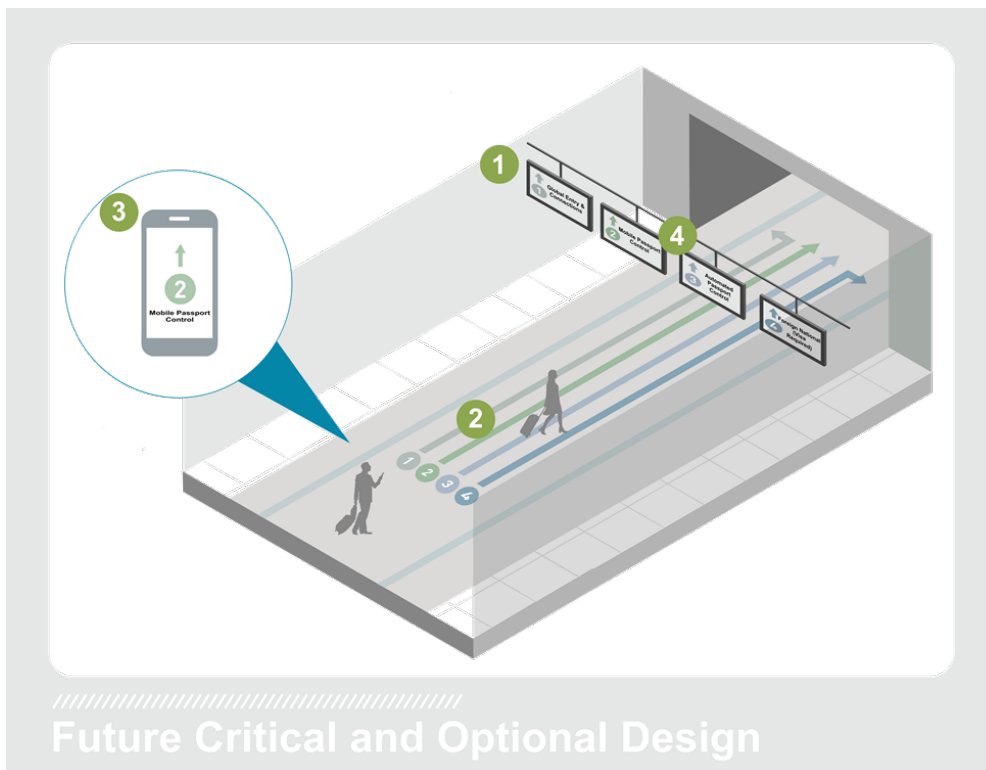


## DESIGN ISSUES

**Different signage at different airports:** The naming conventions, color-coding, and categorization of passenger process alternatives can be very different from airport to airport. For example, the term One-Stop has a number of separate meanings depending on the airport. At IAH or ORD, it can refer to primary processing only with no need to proceed to the bag claim area or egress. In a broader context, it is used to refer to an initiative that eliminates the need for transfer passengers to undergo security screening at the connecting airport.

**Confusing even for frequent travelers:** The differences between airports can even be complicated for experienced travelers, since the same FIS process is shown or displayed differently at various airports. While there are detailed standards and guides for signs (e.g., CBP general printing and graphics requirements in the ATDS, and airport guidelines for wayfinding<sup>17</sup> based on internationally recognized symbols), the international arrivals experience and wayfinding at airports remains inconsistent.

**Placement and continuity of signage and wayfinding:** Signage placed near the ceiling often gets ignored since many passengers may not look up. This is particularly true of travelers that are focused on their mobile devices. In addition, signage outside the FIS is the responsibility of airports, while signage inside the FIS is controlled by CBP. The subtle differences may lead to non-continuous wayfinding between what is shown inside and outside the FIS.



### CRITICAL DESIGN FEATURES

- 1 Coordination and standardization between airports:** Adopt coordinated common colors, processing categorization, naming schemes, and other standardization between airports.

The industry has shown positive consideration and response to standardize the international arrival experience, and signage/wayfinding should be one of the key priorities in these efforts. While some airports may have specific programs that they would like to brand or promote, these programs can still be accomplished alongside a more consistent and standardized national airport framework.

- 2 Ensure there is intuitive, continuous wayfinding for signage:** All signage should consider principles of universality and accessibility to not only meet ADA standards, but also to assist color-blind travelers; avoid lettered/named paths since many travelers may not be able to read

<sup>17</sup> Transportation Research Board, Airport Cooperative Research Program Report 52 “Wayfinding and Signing Guidelines for Airport Terminals and Landside” 2011.

English; and use universally-recognized symbols/icons/numbers where possible. Markings can also be considered on the floor for passengers to follow. These should flow and be consistent from the arrivals corridor through the FIS. All other wayfinding should be continuous from outside the FIS through the entire international arrivals and connections processes.

### OPTIONAL DESIGN FEATURES

- 3 **Integrate wayfinding with any technology that is implemented:** While each self-service technological solution may be supplied by different vendors or manufacturers, the MPC application, APC kiosk, Global Entry kiosk, and potential future applications should provide wayfinding instructions that are coordinated and integrated with the physical signage at the airport.
- 4 **Dynamic signage:** Use dynamic signage that can be updated depending on needs, while keeping standard processing categorization.

Depending on the time of day, day of week, or other seasonality, passengers may need to be directed to specific areas of the FIS for processing. Dynamic signage can be used to provide wayfinding for passengers that can react in real-time to border processing needs. Where permissible, dynamic signage may also provide a revenue source for airports for any third-party advertising that CBP may allow locally (e.g., tourism promotion).

### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Any passenger volumes:** Having coordinated passenger wayfinding is applicable to airports of all sizes and passenger volumes since it helps to guide passengers through the FIS regardless of total number of passengers

**All airport types:** Coordinated passenger wayfinding can be used for destination, connecting, or Preclearance passengers, so this is relevant to origin/destination, connecting hub, and Preclearance airports

**All passenger types:** This is applicable to all passenger types.

### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

#### ATDS (2012)

- Section 4.1 outlines the importance of signage and how best to design it.
- Section 4.1.1 specifically defines wayfinding in the arrivals area.

#### ATDS (2016 – 90% Draft)

- Section 2.10.4 defines standard CBP signs for arriving passengers.
- Section 7.2 recommends wayfinding for MPC.

#### ACRP 161 (2016)

- Chapter 4.3.5 Information Dissemination—recommends signage and wayfinding for arriving passengers

### 6.3 Finding 3: Adopt Convertible Processing Kiosks

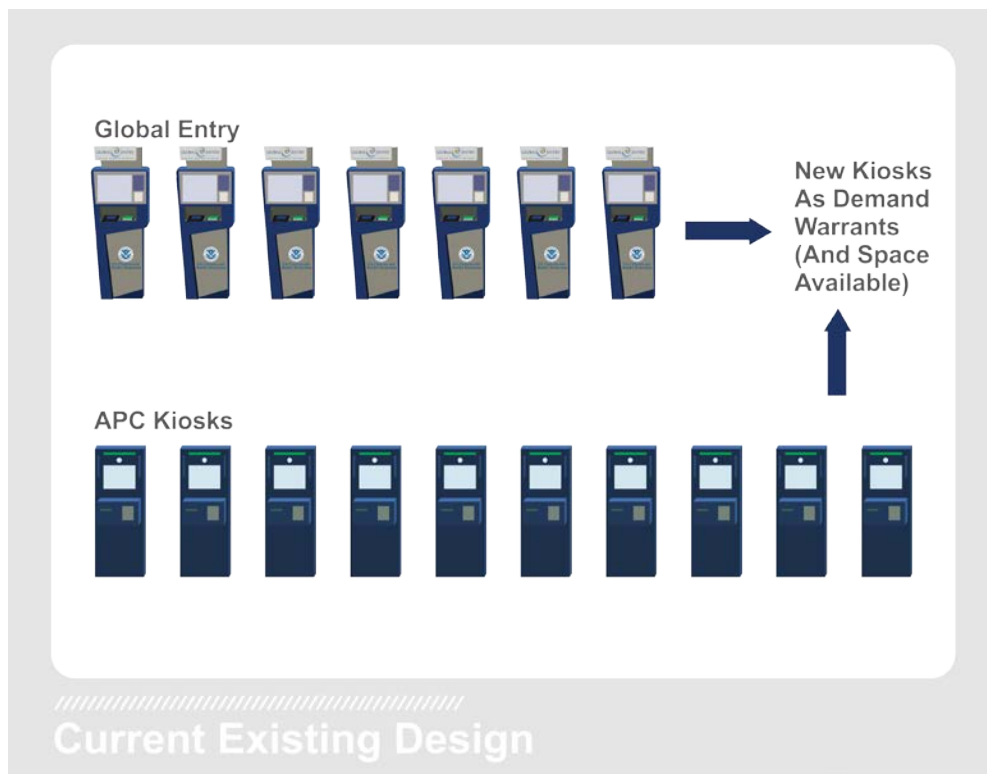
There are over 3,000 kiosks used to process passengers through a variety of DHS, CBP, and TSA procedures. Kiosks were first introduced in 1992 with INSPASS at JFK and Vancouver International Airport and grew significantly through the introduction of Global Entry in 2009 and APC in 2012.

The current generation of kiosks is mostly single-purpose transaction or enrollment units; however, facilities can prepare for the generation of multi-purpose machines that can provide even greater space savings and applications.

For airports in the United States, some further space savings could help deal with different peaks for Global Entry and APC.

Preclearance airports could see applications combine APC, airline check-in, and potentially ESTA information submission/confirmation.

Similar to the models used by airlines for common-use self-serve kiosks, other functions could automate activities in Secondary, such as voluntary payment of duties to a kiosk, similar to automated teller machines.

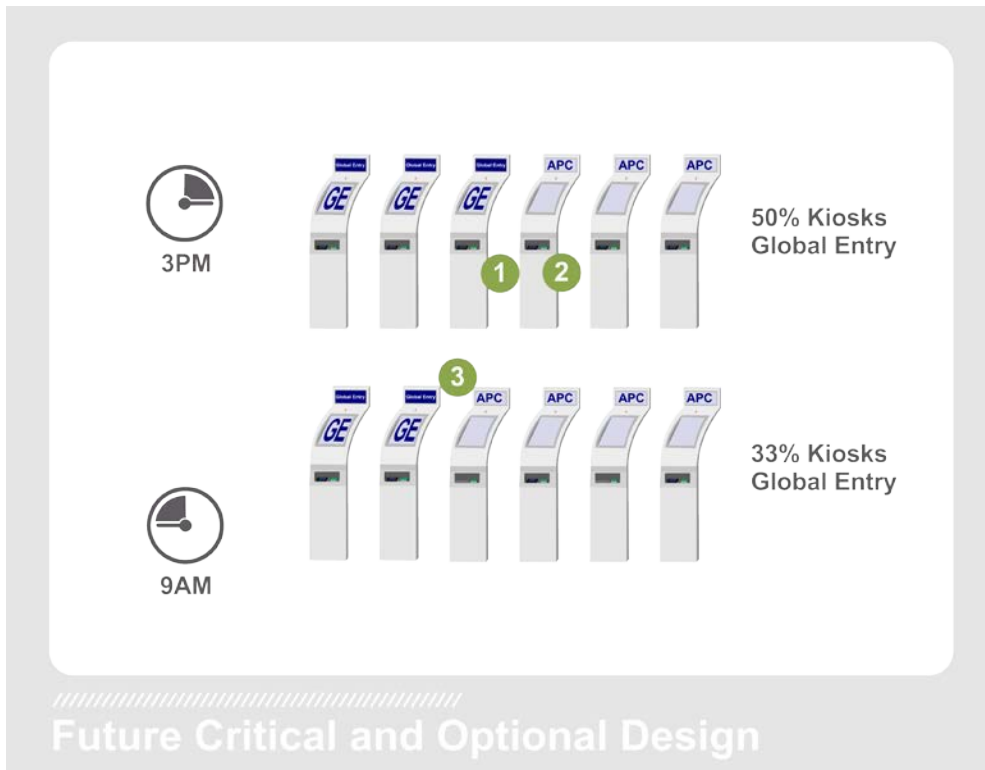


#### DESIGN ISSUES

**Wall of kiosks:** As APC usage and Global Entry enrollment climbs, kiosk demand and the need for additional kiosks similarly increases. The tendency is the creation of a wall of kiosks that needs to be accommodated within limited space of the FIS and, in some cases, the sterile arrivals corridor.

**Single-purpose kiosk:** With single-purpose kiosks (i.e., separate kiosk for APC and for Global Entry) the appropriate number of kiosks must be deployed to meet the peak demand for each kiosk type individually. This results in a higher number of kiosks overall when compared to the number required if the kiosks could meet both users' needs.

**Different time of day operations:** Throughout the hours of the day, days of the week, or seasonally, the demand for a particular kiosk type can be uneven. The percentage of passengers who use a particular kiosk type can vary significantly. For example, when flights arrive that largely have business passengers, the number of Global Entry kiosks needed is likely to be high compared to times when leisure travelers from a VWP country arrive.



### CRITICAL DESIGN FEATURES

- 1 **Adaptable with all necessary technology:** Kiosks must be integrated with all biometric identification/verification features and travel document readers.

Multi-use kiosks must be able to perform biometric verification via fingerprint or facial recognition/capture with a camera. They should also be able to read travel documents with a scanner for the machine-readable zone of passports or Global Entry card, and should have RFID detection capabilities. Kiosks could be used for immigration purposes as well as customs – allowing passengers to pay tax or duties for declared items.

- 2 **Scalability with modular and re-configurable kiosk components:** Kiosk components (i.e., biometric features and readers) should be modular and easily re-configurable (plug-and-play) to meet border processing needs. Future development of kiosks needs to ensure scalability to improved products as well as swappable units that are life-cycle managed.

Since the kiosks are convertible for purpose and use, the requisite components and kiosk functionality should similarly be quickly and easily changed to meet the changing passenger profiles/users throughout the day.

## OPTIONAL DESIGN FEATURES

- 3 Dynamic signage/branding:** Dynamic signage should be used for wayfinding to communicate to passengers which kiosks to use for APC and which to use for Global Entry/trusted traveler. Each kiosk should also have a dynamic display above it to identify what mode the kiosk is in.

Similar to land-border dynamic signage that indicates whether a particular lane is available for use as a NEXUS or SENTRI trusted travelers or a regular lane, the kiosks should have a clear indicator showing their mode and which travelers can use them.

- 4 Simplification of queues for Primary processing:** At present, there is a variety of different queue configurations – Global Entry, APEC, US citizen, foreign national, VWP, etc. There are simply too many choices that can lead passengers to the wrong location. Choices for passengers should be reduced to no more than two pathways: Global Entry or regular processing.

For some stations (e.g., ORD and IAH) with one-stop programs for passengers without checked bags, wayfinding should be enhanced to ensure the facilitation solutions are fully meeting objectives, in view of a plethora of different products available to passengers.

- 5 Incorporate payment capabilities:** Integrate kiosk capabilities to allow for payment of duties at the kiosk. This may potentially alleviate the need for a CBP officer to receive cash and process payments at the cashier desk, and free up resources for other tasks.

## AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Medium to large passenger volumes:** Having convertible, flexible kiosks can be applicable to airports of all sizes and passenger volumes, since doing so helps to make the most efficient use of available kiosk processing capacity regardless of total number of passengers. However, not all medium to large airports have invested in this technology.

**Most airport types:** Kiosks can be used for destination, connecting, or Preclearance passengers, so this is relevant to origin/destination, connecting hub, and Preclearance airports.

**APC and Global Entry users:** This is applicable to airports in which the majority of arriving passengers can use APC or Global Entry kiosks.

## REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

### ATDS (2012)

- Section 3.5.4 describes the Trusted Traveler program and use and placement of kiosks
- Section 7.4.2 suggests that space allocation be made in the Primary hall for processing of trusted travelers

### ATDS (2016 – 90% Draft)

- Section 5.4.8 use of kiosk in APC and Trusted Traveler and queueing area
- Section 7.1 definition of APC and use of kiosks
- Section 7.5 definition of Global Entry and use of kiosk
- Code ATD-01-03(A, C) in Chapter 5

## ACRP 161 (2016)

- Chapter 7.1 Notable Innovations cites both Global Entry and APC kiosk as beneficial to passengers

### 6.4 Finding 4: Adapt Common Baggage Area for Domestic/International Use

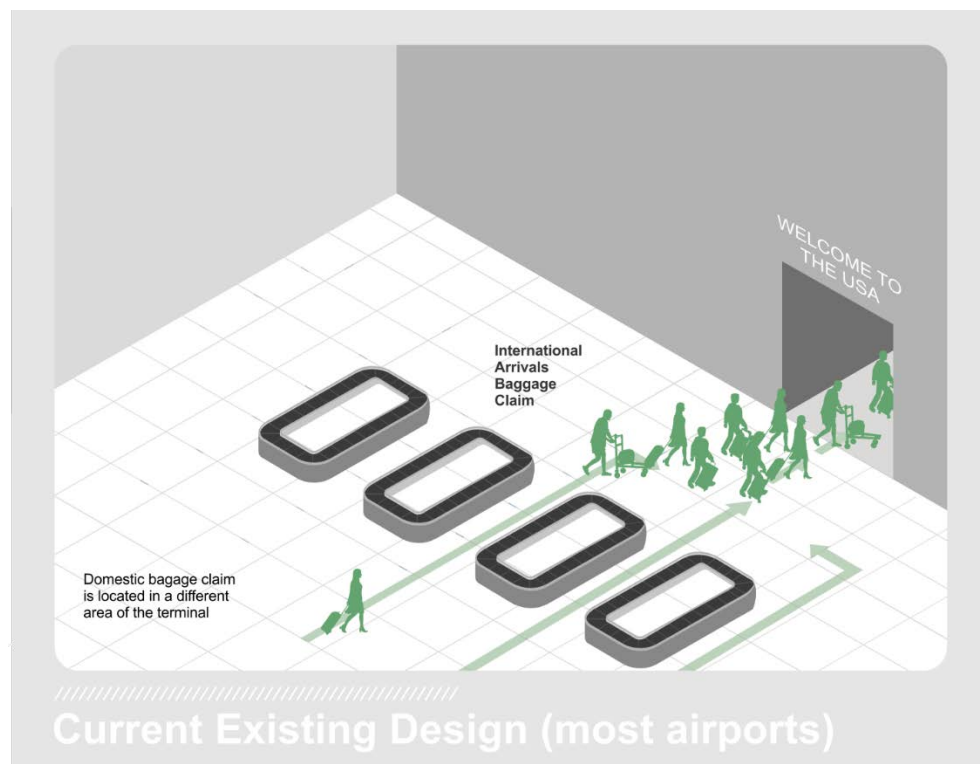
The idea of using a single area for a combined security/screening purpose is not new to CBP, as can be seen from the processes in place for Preclearance. Foreign airports and CBP work together to implement a combined process for security screening, baggage handling, and passenger processing. Both passengers and bags benefit from an integrated process that is flexible and takes advantage of technology to provide a service prior to arrival at a destination.

CBP requires a secure facility to handle the processing of bags. It is already commonplace for a number of facilities to provide swing capabilities to be able to deal with different demands, and to use excess baggage makeup capacity to handle passenger loads. There are, however, a number of facilities that do not have this capability, with some major implications from the proposed expansion of US Preclearance.

CBP set a target in 2014 to have 33% of passengers precleared by 2024. As noted previously, based on FAA forecasts, there will be a 72% increase in passengers cleared within the United States in addition to the growth of existing and new Preclearance sites.

The ramifications are based on the size of aircraft used for gating. Widebodies serve major domestic routes (e.g., New York to Los Angeles), but, for the most part, flights in the United States use narrow body or regional aircraft (e.g., regional jets to Boeing 737/Airbus A320). International routes, with the exception of closer markets such as Canada and the Caribbean, have dominant use of larger aircraft.

With growth of Preclearance, there will be a surge in demand at domestic facilities to accommodate large aircraft that had not been anticipated. One option is to ensure that the baggage area for FIS facilities could be used to accommodate domestic arrivals while expansion projects are planned for domestic piers.



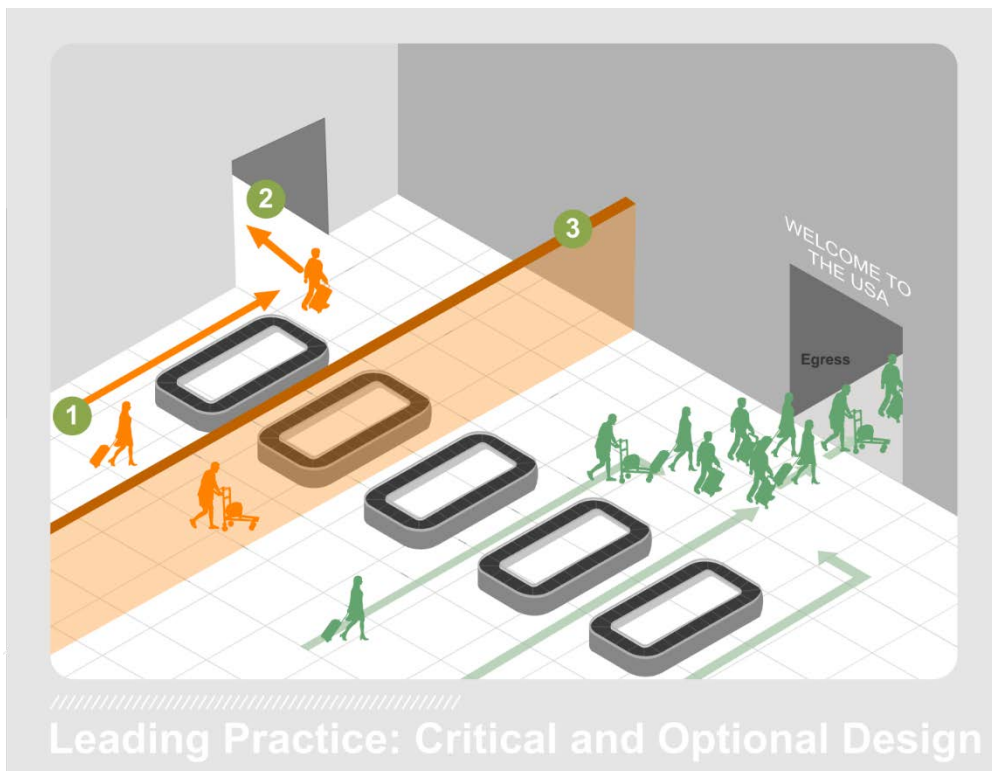


## DESIGN ISSUES

**Small to medium airports:** For most small to medium sized airports, there is no separate domestic and international terminal. The baggage handling system routes bags to the same baggage claim area, but separation of individual bag claim carousels must be maintained between international and domestic flight checked baggage.

**Infrequent international arrivals:** For airports that receive little international passenger traffic, there may be infrequent international flight arrivals. As a result, it is an inefficient use of space to build, operate, and maintain a dedicated bag claim area for only a few international arrivals throughout the day. The international bag claim carousels are under-utilized if they are dedicated to international flights only. This is especially true for airports with seasonal international traffic. For example, some airports may only receive international flights over 3 or 4 hours of the day or over 2 to 3 months of the year.

**Inefficient use of space:** Having dedicated domestic and international bag claim areas is an inefficient use of space and processing capacity. If peak domestic and international flight arrivals do not occur over the same time period, the bag claim carousels cannot be fully or optimally utilized.



Some airports have already implemented dual-use bag claim features into the terminal, such as at airports in ATL, ACY, and MYR.

## CRITICAL DESIGN FEATURES

- 1 Separate pathway to bag claim for domestic and international passengers:** The pathway for domestic passengers into the bag claim area must be kept separate from international arrival passengers, even if passengers have cleared Primary processes. Keeping a separate entrance to the bag claim area is even more important if a checked bag first process has been implemented.

- 2 **Separate exits from bag claim area:** Only after international passengers exit the FIS can they mix with domestic passengers, so there must be a separate exit from the bag claim area to the public area of the airport/terminal.

#### OPTIONAL DESIGN FEATURE

- 3 **Movable partition to separate/maintain sterility:** A partition that can be put in place as needed to keep international and domestic bag claim areas separate/sterile is key to having a flexible facility that will allow the bag claim area to be used for both international and domestic arrivals. With a detailed aircraft arrival analysis and efficient utilization of bag carousels, some airports may be able to reduce the number of bag claim carousels that need to be built.

#### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Low to medium passenger volume:** The flexibility to operate bag claim carousels as either international or domestic, or provide the ability to separate high risk passenger flows is relevant to airports with low to medium passenger volumes (i.e., < 1,000 pph) through to high volume (i.e., > 1,000 pph), but is particularly beneficial to airports that receive infrequent international arrivals.

**Origin-Destination airports:** It is particularly relevant to origin/destination airports in which most passengers use the bag claim carousels.

**Leisure travelers:** It is applicable to airports with mostly leisure travelers (i.e., > 50%), who generally have checked baggage, unlike business travelers.

#### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

##### ATDS (2012)

- Section 2.7.4 outlines location of international baggage reclaim

##### ATDS (2016 – 90% Draft)

- Section 2.10.3 and 5.4.6 state that the baggage claim area must be in the FIS
- Code ATD-01-10 and ATD-02-17 in Chapter 5

## 6.5 Finding 5: Eliminate Baggage Recheck Areas

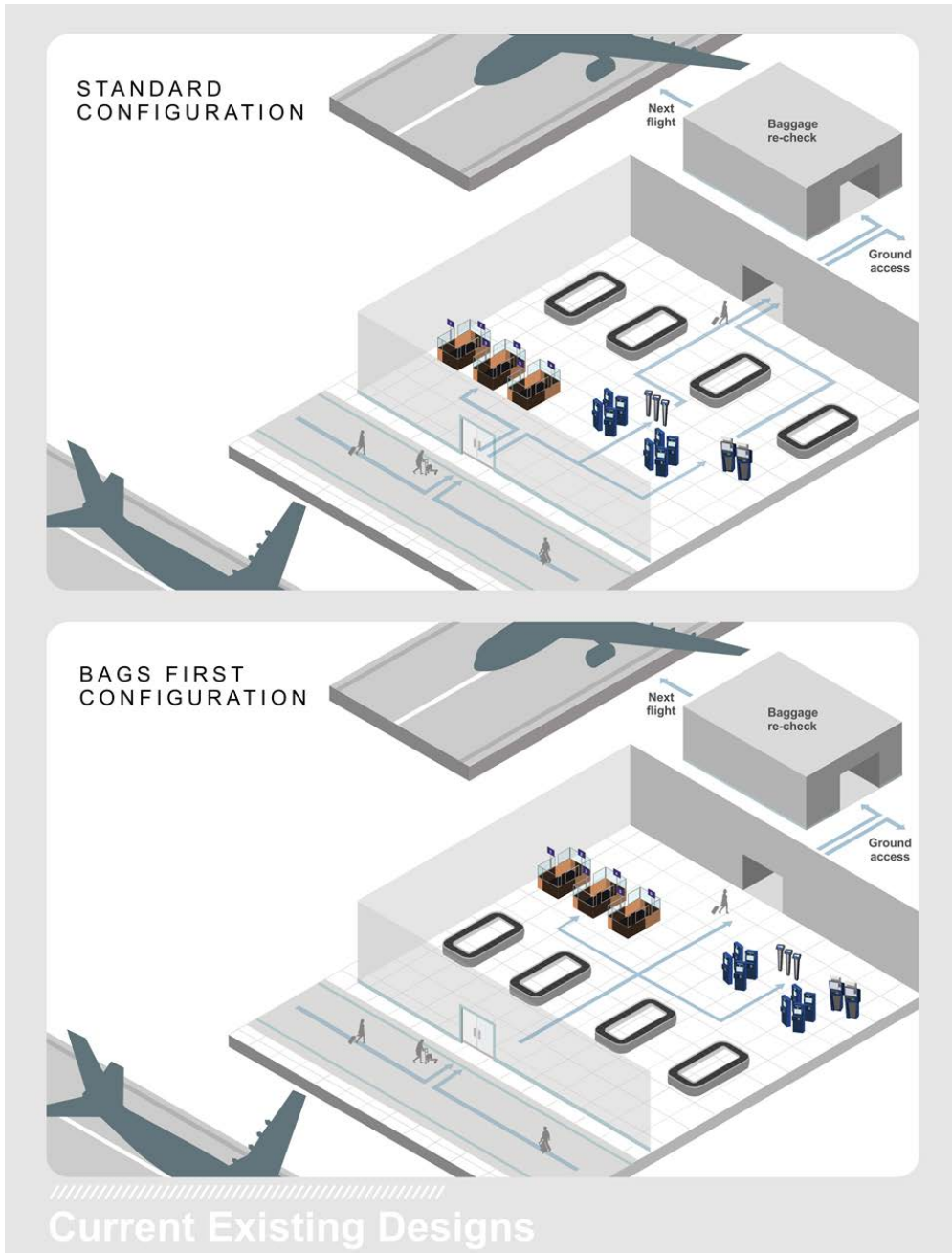
Baggage recheck is a function of enabling an international passenger connecting to another flight (domestic/international) to deposit their bag to an airline agent. The space is typically immediately outside the FIS and can be fully closed to the public (e.g., DFW), or a semi-open area (e.g., SFO).

The elimination of baggage recheck is the subject of an ACRP study and can be reviewed in ACRP Report 61. In the 5 years since this research report was written, substantial advances in technologies have enabled new options to be advanced.

As well, several airports have implemented changes to allow ITI baggage recheck elimination. This includes processes implemented for nearly a decade at IAH, DFW, and ORD, as well as more recent introduction of processes at MIA and DTW.

CBP has indicated willingness to explore options further for international-to-domestic baggage recheck elimination, subject to the availability of X-ray images. There are no specifications, but there is a planning challenge for FIS to have appropriate facilities to easily implement these capabilities.

The importance of this issue is sizable as carriers grow their networks for same-airline and interline connections. In reviewing the top 16 US airports, which account for 67% of all international passengers, we estimate that of those passengers, 26% of them account for international-to-domestic transfers and 7% account for ITI transfers<sup>18</sup>.



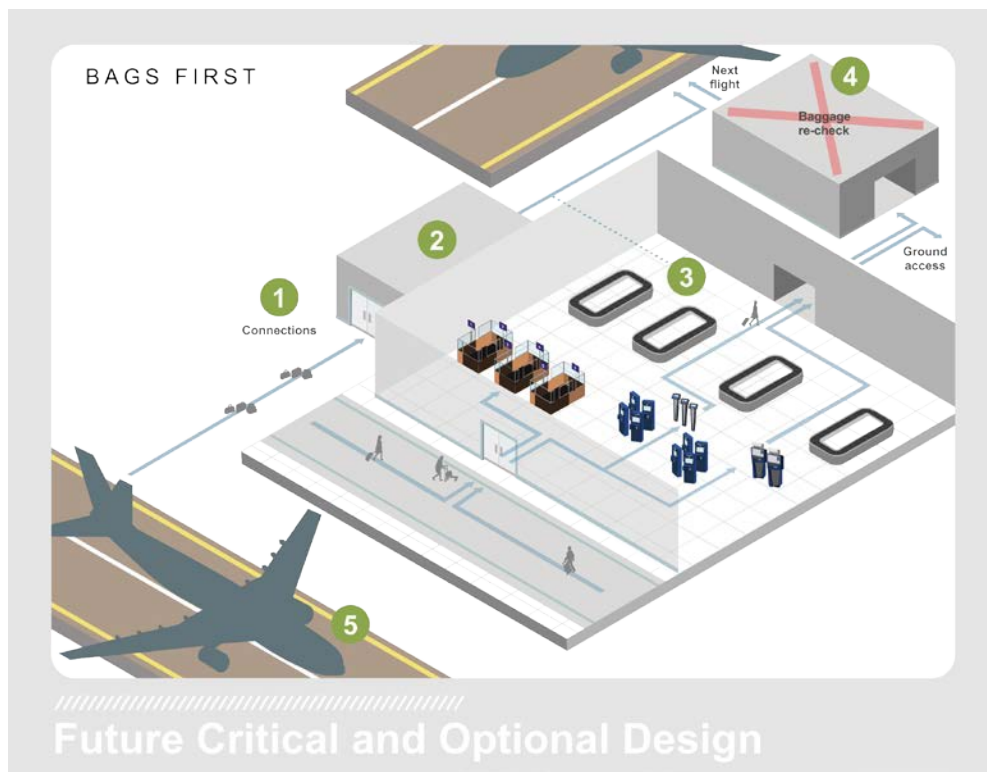
<sup>18</sup> The primary data source is Sabre Marketing Information Data Transfer year ending April 2016. These values have then been cross referenced against US DOT T100 data. Top 16 US hubs are based on passenger volume.

## DESIGN ISSUES

**Low connection time limited:** Airline route networks are highly dependent on arrival and departure banks of aircrafts. The lower the practical connection times and published minimum connection times are, the more flexibility air carriers have for carrying connecting passenger traffic. The fewer process steps involved in a connection, the faster transfers between flights can be.

**Additional handling of bags:** Having to deliver/claim, recheck, and sort transfer bags is a redundant handling of bags that can be eliminated or reduced. Multiple handling steps of connecting bags incurs additional costs, connection time, and potential connection reliability/consistency issues for airlines at the airport.

**Staffing space requirements:** In addition to the bag-handling staffing costs, there are corresponding space requirements needed to get checked bags to the subsequent flights. Specifically, baggage recheck facilities are typically large and located immediately outside of the FIS (i.e., bags are typically rechecked mere seconds after they are picked up at the bag claim carousel).



## CRITICAL DESIGN FEATURES

- 1 **Conduct up-line sortation of checked baggage for connections:** Sort bags at the origin airport to ensure that the unit load device with transfer bags is first to be unloaded from the aircraft to enable expedited connections. Airlines may already perform some baggage sortation for its premium customers at the originating airport, but additional sortation should take place for connecting bags to separate them from destination bags. The unit load devices with the transfer bags should be one of the first to be unloaded from the aircraft in order to quickly be able to induct the bags into any inbound baggage connection sortation system.
- 2 **Space for processing facility for x-ray equipment:** Provide a room (or reserve space for future expansion) adjacent to the CBP area that has enough space to accommodate one or more checked baggage X-ray equipment lines.

The equipment should use computer tomography (CT) technology and employ auto detection of specific items of interest to CBP (i.e., large sums of currency, drugs, agricultural considerations, etc.) The concept of operations is not for an operator image-by-image review, but rather the use of auto-detect to be able to shortlist bags for further review. The number of inbound automated X-ray lines and space allotted is dependent on the potential scenarios: a) only connection bags, b) inbound bags from specifically selected flights, or c) all inbound bags whether connecting or at their final destination.

- 3 **Pathway for retrieval of bags to Secondary:** There must be the ability for the baggage handling systems to allow for retrieval of checked baggage to CBP Secondary.

Having a room adjacent to the FIS for inbound bag X-ray provides a short pathway to CBP Secondary if required for retrieval of bags or for interviews of passengers with their checked baggage.

#### OPTIONAL DESIGN FEATURES

- 4 **Eliminate baggage recheck for connections:** ITI and international-to-domestic connecting bags should be transferred at ramp level and not be delivered to baggage claim carousels. With up-line sortation of checked bags and a bag inspection space adjacent to the CBP area, bags should be transferred without going to baggage claim and subsequent baggage recheck. The design guidance is to have a facility that is available in the short term, but easily convertible to other functions, such as a larger Global Entry office, retail/concessions for meeters/greeters, etc.
- 5 **Up-line X-ray image transmission:** The facility should also make allowance for bags that have up-line X-ray image transmission to CBP. Countries such as Australia, New Zealand, and Norway have incorporated the use of explosive detection system images for border security purposes. Although this technology is in its infancy, there are viable applications that could help facilitate connecting bags from trusted countries of origin.

#### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**High proportion of connections:** Airports with a high percentage/volume of connecting passengers would benefit most from a facilitated inbound connection process.

**Preclearance sites with transit capabilities:** Additionally, it is applicable to Preclearance sites that have inbound connecting passengers that use an in-transit Preclearance solution.

**Medium to high passenger volumes:** Medium and high peak hour volume airports (> 800 pph) are more likely to have a significant number of connecting passengers that would benefit from improved connections and justify the costs. Small airports were considered for this finding; while there are some facilities that could advance proportionately high volumes of international connections, this should not be considered unless there is a critical mass of connecting activity for inbound flights (i.e., over 50%).

#### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

##### ATDS (2012)

- Section 5.6.3 identifies that the baggage recheck area should be after customs egress

**ATDS (2016 – 90% Draft)**

- There is no specific mention of baggage recheck in the new version

**ACRP-161 (2016)**

- Chapter 2.1.3, Connecting Passengers, describes recheck process and recommends recheck elimination for ITI passengers and some international-to-domestic passengers
- Chapter 4.4.3, Customer Experience, cites baggage recheck elimination as key for customer satisfaction

**6.6 Finding 6: Improve Egress from CBP**

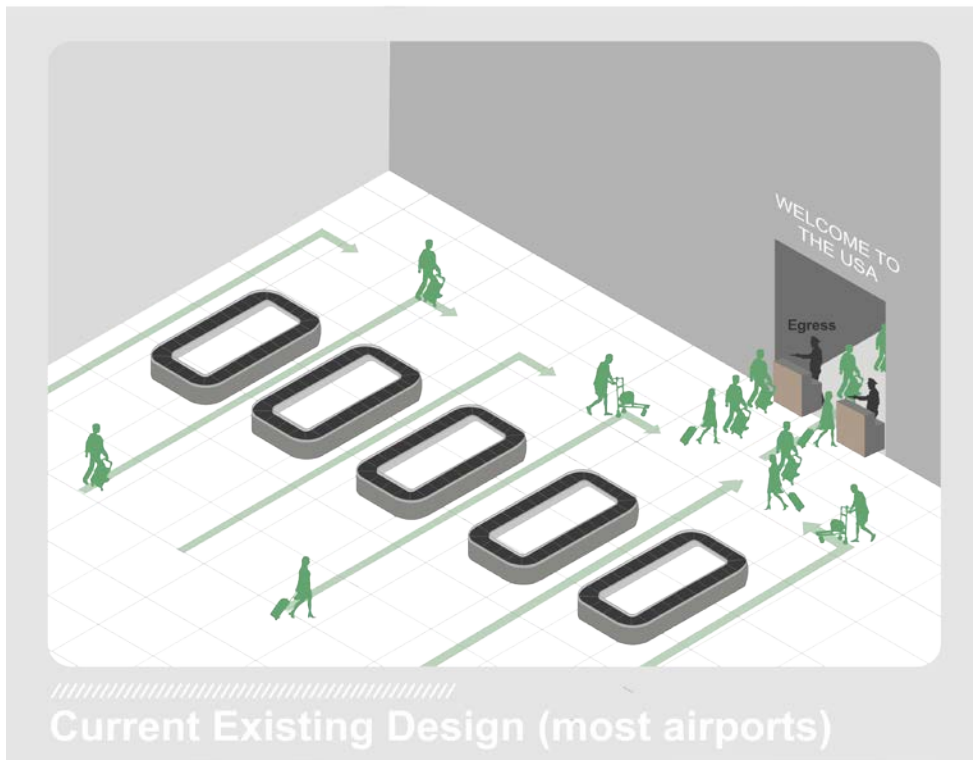
The dynamic for changing CBP processes over the past 20 years focused on system by system, or process by process, but there was not a continuous end-to-end view until recently. Accelerating primary processing was the main focus; when this was solved, there was clarity on issues related to baggage claim. With improvements in baggage delivery times, bottleneck congestion occurs with increasing frequency at the egress from CBP.

While a more holistic view of processes is emerging, there are many different initiatives to improve the exit from CBP. Airports around the world predominantly use the green lane/red lane concept so that passengers self-select through portals that lead to public areas of the terminal. For the most part, green lane passengers free-flow out of the facility; random referrals can be conducted to make sure the integrity of border processing is retained.

In 2015, a few US airports, in collaboration with CBP, tested new ideas to modify the egress from the FIS. The concept of modified egress was to reduce the two-step process of an officer in Primary (immigration) and an officer in customs (baggage hall) to only one. Many airports have implemented the unified process, where passengers only see one officer in the Primary hall, turn in paperwork at that time, and are only required to have an escort to Secondary if needed. Some airports are testing technology to manage the flow exiting the CBP area and allow free-flow for passengers<sup>19</sup>. This necessitates a fundamental change to the way egress is designed.

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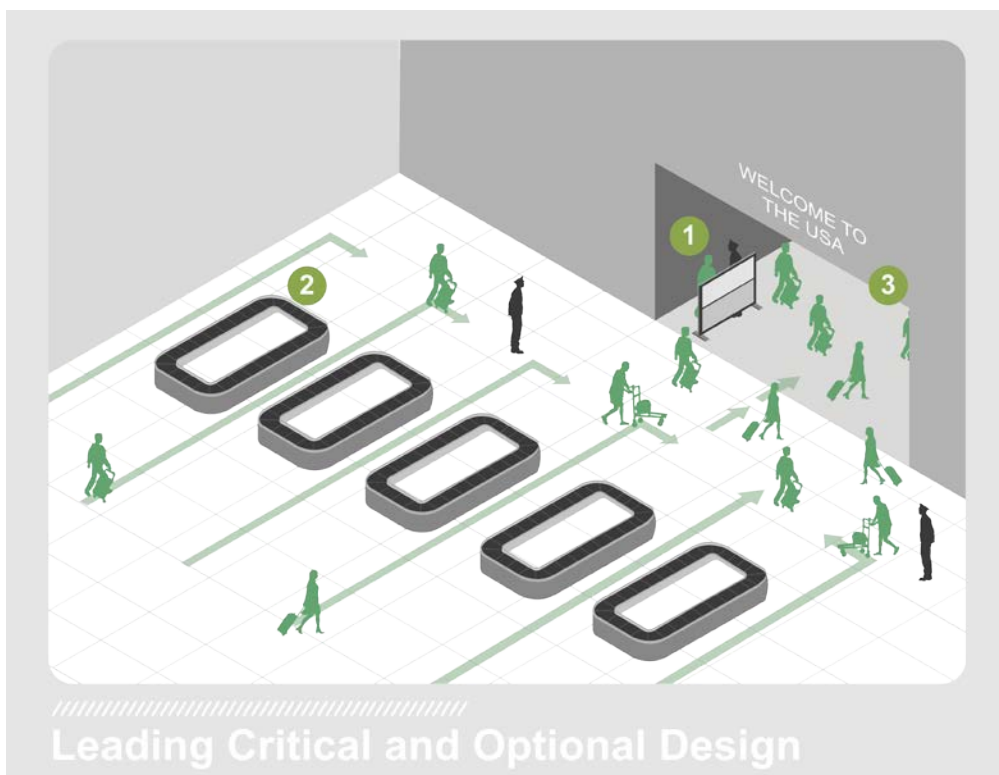
<sup>19</sup> IAD and DTW Orange Box pilot; passengers going to Secondary are handed a box that holds their documents plus a tracking device. The passengers self-escort to Secondary, and CBP is alerted via the tracker if the passenger/documents leave the designated perimeter.



### DESIGN ISSUES

**Congestion on exit:** Significant lines can develop at the egress of FIS facilities given the number of tasks that must be completed by the CBP officer(s) staffing this location. With the collection of declaration cards, instructing/directing passengers to Secondary if referred, and any additional questions that the officer may have; any delays for passengers directly exiting the facility can quickly translate to queues forming. This is especially true during peak international arrival periods, when multiple aircrafts arrive in a short period of time and passenger checked bags are delivered at approximately the same time.

**Phase out of declaration form:** With the increasing adoption of automated self-service options (i.e., APC, MPC, and Global Entry) and these systems' abilities to electronically collect customs declarations, the number of passengers who must use paper copies of the forms has decreased significantly.



### CRITICAL DESIGN FEATURES

- 1 **Space for modified egress:** Avoid bottlenecks or designs that funnel passengers at egress. Ensure it is wide enough to allow for modified egress options (e.g., snaking egress queue similar to the initial DTW deployment in 2015).

The egress must not act as a pinch point and cause queuing into the baggage claim area. If it is sufficiently wide, a snaking queue or other alternative queuing can take place without causing congestion in other areas of the FIS. Additional space should be allowed to provide zones to allow sensors to detect individuals who should be sent to Secondary, similar to the trial for boxed documents at IAD. Like the egress at MIA, the corridor should be wide enough to provide a quick search area for roving CBP officers to perform spot inspections.

- 2 **Risk-based baggage carousel allocation:** Consider differentiating baggage carousels by risk level, similar to the trial at MIA. Higher risk flights with additional inspection by canine units and additional roving officers should be located away from the egress in order to avoid a large crowd obscuring wayfinding and a clear path to exit the CBP area.

### OPTIONAL DESIGN FEATURES

- 3 **Expand throat for exit:** Avoid designs that have a narrow exit from the area, and ensure enough floor-to-ceiling height to enable future facial biometric cameras to be installed.

### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Any passenger volumes:** Enhanced modified egress works for airports of any size from small to large since it helps to reduce congestion at egress.



**Single-level facilities:** It works particularly well for single-level facilities in which bag claim carousels are on the same level as the Primary area.

**Mostly business/carry-on only travelers:** For airports in which a high proportion of passengers have no checked bags (e.g., large percentage of business travelers), modified enhanced egress provides a pathway for passengers to quickly exit and/or make it to their connecting flights.

**Facilitated bag connections:** For airports that have ITI baggage connection programs implemented (i.e., passengers do not have to claim or recheck bags), it is similarly favorable, as long as there is a means of easily identifying passengers using the program.

## REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

### ATDS (2012)

- Section 2.7 specifies the passenger process flow from arrival to egress; specifically, Figures 2-4 and 2-5 illustrate the egress flow

### ATDS (2016 – 90% Draft)

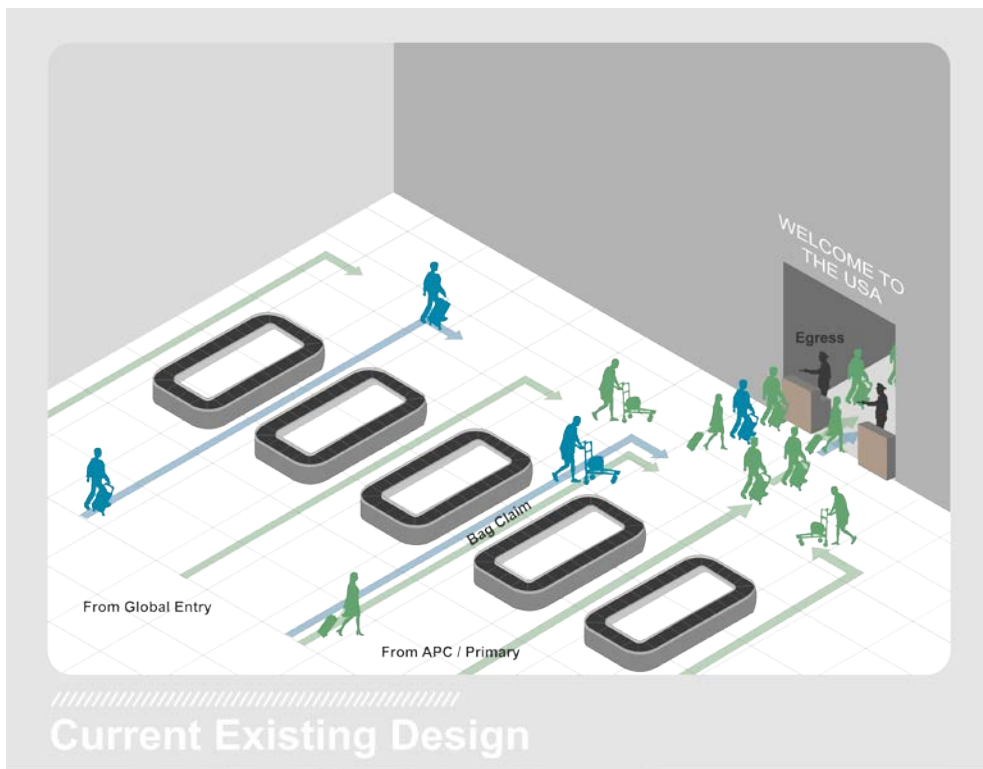
- Section 2.6 describes an overview of FIS layout and passenger flows; specifically, Diagrams 2-1 and 2-2 illustrate the egress separated for different types of passengers
- Section 5.4.13 explains the exit process for all passengers
- Code ATD-01-03; ATD-01-08; ATD-01-10 in Chapter 5

### ACRP 161 (2016)

- Chapter 4.4.4 Physical Environment, CBP Exit Controls describes the process to exit the FIS

## 6.7 Finding 7: Create Dedicated Egress for Global Entry and Connecting Passengers

Airports with high volumes of international passengers (i.e., greater than 2,000 pph during peaks) are likely to have high volumes of Global Entry passengers (i.e., up to 15% of passengers) and may have significant percentages of passenger connections (i.e., approaching 50% at some airports). Even if enhanced modified egress processes are implemented at a large hub airport, creating a separate exit from the FIS to facilitate trusted travelers and connecting passengers should be considered.

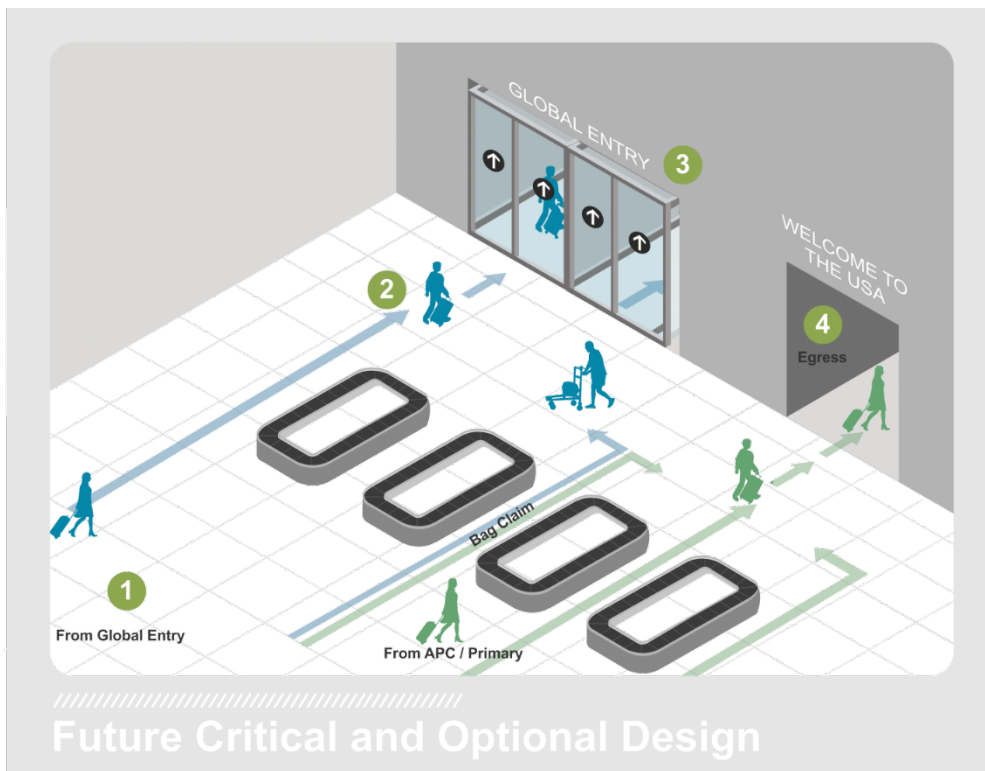


## DESIGN ISSUES

**Insufficient benefits for Global Entry:** While most current facilities have a separate lane for Global Entry members, passengers cannot access the dedicated exit during peak periods. Justification for trusted travelers in applying for, paying for, and enrolling in a program like Global Entry is to have a facilitated border process. There is an expectation that Global Entry should make border processes faster and/or more convenient.

**Mixture of flows and cross flows:** With undifferentiated streams of passengers out of the FIS, significant mixtures of passenger types occur (i.e., Global Entry, APC users, MPC users, foreign nationals, Secondary referral passengers, passengers without checked baggage, crew, etc.) These cross flows of passengers, who have very different risk profiles and requirements to exit the FIS, may cause additional congestion around the egress and in the bag claim area.

**Passengers with no checked bags around claim carousel:** Trusted travelers are likely to be frequent travelers that do not have checked bags. Similarly, airports that have implemented connection processes to eliminate or reduce the need for bag recheck will have a portion of travelers with no bags to retrieve at the claim carousel. The pathways for most trusted travelers and these facilitated connection passengers can be kept separate from all other passengers exiting from the egress.



Another modified egress option is to have a separate automated Global Entry exit be used to facilitate flows and provide benefits to trusted travelers. This idea is primarily aimed at passengers with carry-on baggage.

### CRITICAL DESIGN FEATURES

- 1 **Separate stream for egress:** Based on the DFW experience with installing a separate exit point from CBP for Global Entry members, select a path that is straightest and offers the least walking distance between the kiosks and a dedicated Global Entry egress. Many of the Global Entry members will be frequent travelers at the airport and often have no checked bags. Locate the kiosks and egress to facilitate the most expedient path to exit the FIS area that bypasses the bag claim carousels by default. In addition, avoid cross flows with other travelers (i.e., those not in trusted traveler programs) on their way to bag claim carousels. For two-level FIS facilities, keep the Global Entry egress at the same level as Primary processing, so that these travelers do not need to ascend or descend with other passengers.
- 2 **Automated exit:** Provide an exit through one-way doors that are activated with (a) a Global Entry card or scannable receipt from the kiosk; (b) capable of preventing piggybacking; and (c) monitored by a CBP officer. Allow a minimum depth of 15 feet for an exit portal, plus an additional 10 feet on either end for circulation.

These automated exits should be able to seamlessly allow Global Entry members or facilitated connection passengers to exit the FIS area through self-service activation of the portal via their membership card (e.g., RFID chip), MPC application, or a receipt from the Global Entry or APC kiosk. A CBP officer should be stationed to be able to monitor the egress of passengers and to randomly verify Global Entry cards, receipt photos, or travel documents to ensure that the passenger is participating in a facilitated connections program.

Existing technology should be used that allows only those permitted to egress through the portal (i.e., prevent piggybacking). This can be accomplished through the detection of the appropriate number of Global Entry cards, scannable Global Entry kiosk receipt, MPC application transmission, etc.

### OPTIONAL DESIGN FEATURES

- 3 Clear signage and branding:** Ensure signage and branding clearly marks Global Entry to help wayfinding and also further promote the benefits of the program.

Signage and branding of the automated egress should be clear so that non-members do not attempt to use the egress and potentially cause congestion, since they are unable to exit through the doorway.

The secondary advantage of clear branding of the automated egress is that it showcases the trusted traveler membership benefits, especially if the regular egress has significant queues.

- 4 Clear pathway and prioritize Global Entry if a separate exit not possible:** Where a separate exit is not feasible, consider the ability to segregate or provide priority queue jumping for Global Entry members for egress, similar to the process implemented at Montréal Pierre Elliot Trudeau International Airport.

For facilities where it would be impractical to have an egress specifically for Global Entry, the trusted traveler program members should have a queue that provides the benefit of proceeding directly to the front of the line of the egress. The line should be situated on the side that minimizes cross flows with passengers coming from the baggage claim carousel.

### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**High proportion of Global Entry members:** A large percentage of passengers during peak periods are Global Entry members (e.g., >10%).

**Medium to high passenger volumes:** Airports with a high volume of peak hour passengers (> 2,000 pph) that have potential for egress congestion and passenger cross flows would benefit from separating streams of passengers.

**Two-level facilities:** This would also work well for two-level facilities in which most of the Global Entry users do not have checked bags to retrieve at the bag claim carousel.

**High percentage of connections:** For two-level facilities and at airports/terminals with a significant percentage of connecting passengers (e.g., > 30% connections), a separate automated egress is particularly useful for providing a dedicated pathway to onward flights.

### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

#### ATDS (2012)

- Section 2.7.4 mentions the use of self-service kiosks for passengers enrolled as Trusted Travelers
- Section 3.5.4 defines the Trusted Traveler program

**ATDS (2016 – 90% Draft)**

- Section 2.6 describes overview of FIS layout and passenger flows; specifically Diagrams 2-1 and 2-2 illustrate the egress separated for different types of passengers
- Section 7.1 and 7.2 explain the automation technologies such as APC and MPC
- Code ATD-01-03A

**ACRP 161 (2016)**

- Chapter 7.2.1 Notable Innovations, CBP Processing Options recommend expedited exits for certain passengers

**6.8 Finding 8: Eliminate TSA Rescreening for Connections**

Various countries are in the process of eliminating rescreening. The concept of One-Stop Security (OSS) allows for the transfer of passengers, cabin baggage, hold baggage, and cargo to be exempted from screening if they have been properly screened at the airport of origin<sup>20</sup>. In order for this to be implemented, there needs to be Recognition of Equivalence (RoE).

According to ICAO, in the context of aviation security, RoE is defined as the acceptance and formal approval by a State that security measures implemented in another State are at least similar to its own security measures. In the world of airline hub and spoke, the network carriers rely on quick and efficient connections. Of the 325 million people that travel, 25% of them are connecting, and without RoE, those travelers are being screened twice.<sup>21</sup>

The European Union adopted RoE early on, with France joining in 2009 and citing a reported cost benefit of US \$30 million a year by implementing OSS<sup>22</sup>. The progress in Europe encouraged further dialogue in other regions, and prompted the United States and Canada to begin unilateral deals with countries in Europe.

In the United States, TSA and the European Union (EU) commission have agreed on certain aspects of OSS, whereas the EU recognizes the security screening done in the United States by TSA for all European-bound flights, and allows those passengers to continue on to flights within Europe without additional screening. Although the RoE has not been reciprocated by the United States, other countries such as Canada have reciprocal agreements with Europe. In early 2016, the Government of Canada implemented OSS for flights originating in Europe and the United States. For the European Union and Canada, this means that passengers originating from either country will benefit from OSS in the destination country<sup>23</sup>.

For the United States, there are likely inhibitors for implementing OSS from the Aviation and Transportation Security Act 2011, but there are initiatives that airport designers can help with to minimize the steps for screening. Some could be as simple as the system used at ORD to allow connecting passengers priority screening, or as in DFW where connecting passengers are allowed to use the TSA PreCheck lines—a process known as Easy Carry.

However, the United States is beginning to pilot programs that allow the consolidation of security screening done at US Preclearance locations. Starting with the pilot program called XP-DITE, which is

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<sup>20</sup> ICAO Working Paper “Introduction of a One Stop Security System throughout the Americas Region” - AVEC/FAL/RG6-WP/17, January 2016.

<sup>21</sup> IATA position paper “Recognition of Equivalence” April 2015.

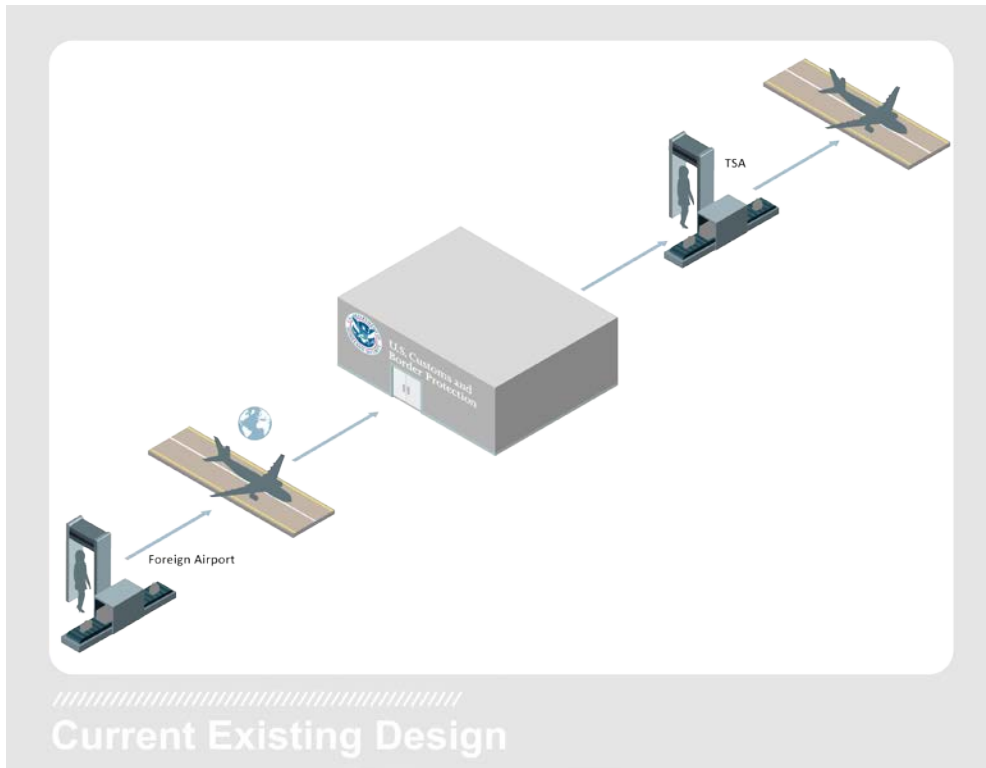
<sup>22</sup> IATA press release “France Implements One-Stop Security” May 2009.

<sup>23</sup> Transport Canada press release “New Airport Security Option Made Available to Speed Up Connections for Air Travelers” February 2016.

being pioneered at Shannon Airport in Ireland, the new approach replaces the two separate checkpoints (EU and US TSA) with just one that is designed to simultaneously comply with both sets of regulations<sup>24</sup>.

### Benefits to the Passenger and Airport/Airline:

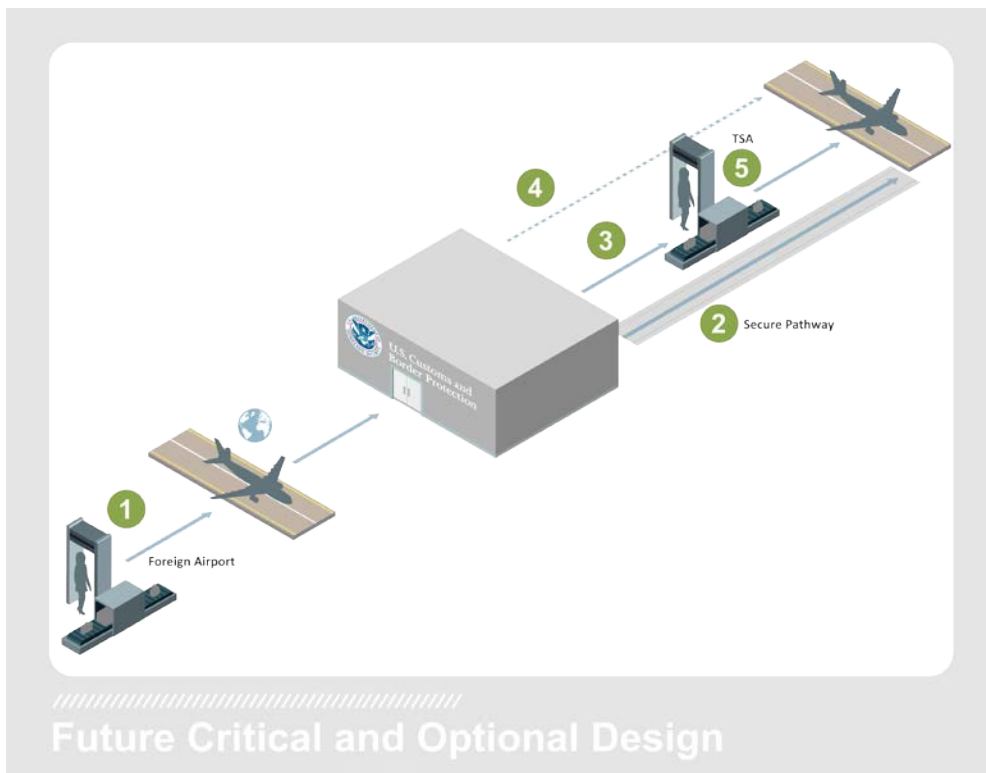
- The transfer process is made easier for travelers, resulting in shorter connections, reducing the risk of losing the connection and/or luggage at the place of destination
- Increased operational efficiency of airports and airlines, including fewer delays
- Optimization of the available resources



### DESIGN ISSUES

**Pathway designed solely for rescreening:** The current pathway at all airports for connections puts passengers into the non-secure area of the terminal. All FIS facilities, up to this point in time, have been designed with the expectation that all transfer passengers must undergo TSA rescreening. With OSS agreements in place, the possibility of eliminating rescreening is available, but current facility layouts physically prevent it from being implemented.

<sup>24</sup> Irish Central “World’s first hi-tech security screening trialled in Shannon Airport” September 2016.



### CRITICAL DESIGN FEATURES

- 1 Future potential RoE of foreign screening:** Although not permitted, except for approved precleared flights, there is the potential during the lifespan of the CBP facility to enable OSS agreements, such as ones being advanced with Canada, Australia, United Kingdom, and European Union. Future OSS agreements are being considered/negotiated with additional countries in order to gain TSA RoE of security screening from the host country.

Country-to-country OSS screening arrangements need to be in place in order to eliminate rescreening for connecting flights. It would allow passenger and checked bag screening to take place at the last point of embarkation before arrival into the United States and be recognized by the TSA for subsequent connecting flights.

- 2 Secure pathway required:** The sterile corridor needs to have a secure pathway that is available for passengers who do not touch their checked bags to connect to other flights. Connecting passengers must be kept sterile through CBP Primary processes, and must be kept away from areas with checked baggage. If passengers are present in areas with checked baggage, they must be rescreened.
- 3 Pathway for those needing to be rescreened:** Other connecting passengers would be rescreened if not eligible. Passengers coming from countries without an OSS agreement are otherwise not eligible to use the facilitated connection process and must be rescreened.

### OPTIONAL DESIGN FEATURES

- 4 Potential Global Entry benefit:** Where there is too much complexity in dealing with different countries to enable OSS, there could be a pathway to enable Global Entry members to have exemptions from rescreening. As a result, Global Entry could be a determinate for eligibility to use the secure pathway.

For a phased or risk-mitigated approach, Global Entry members and other trusted travelers could initially be the only travelers allowed to use the facilitated connection program with reduced rescreening.

- 5 **Work with TSA for a faster connecting screening product:** While operationally focused, CBP could consider working more closely with TSA to develop a connecting process. For facilities, it would mean that the TSA screening checkpoint that is normally located outside and separate from the FIS may be more integrated, and would be located immediately after CBP Primary to allow direct access to the security screening checkpoint without routing passengers through the bag claim area.

#### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**High proportion of connections:** Rescreening elimination is applicable to airports of any size/passenger volume that have a large percentage of connecting passengers (i.e., >30% connections).

**From trusted origin countries:** It is particularly applicable to airports that operate within an airline network in which most of the originating airports are located in a country for which TSA considers departure screening as equivalent.

**Bag recheck eliminated:** It is only relevant, however, for airports that have either eliminated baggage recheck or have a separate egress for connections that prevents transit passengers from coming in contact with checked bags.

#### REFERENCES

Both the 2012 and 2016 ATDS are silent on rescreening (albeit in Figures 2-1 and 2-2, the TSA checkpoint is depicted). During the workshops, it was noted that sometimes TSA checkpoints back up on FIS processing, particularly for those FIS facilities that are located airside (e.g., IAD mid-field, ATL, etc.)

### 6.9 Finding 9: Create Flexible FIS Space

The changes in how passengers are processed have brought forth changes in how the passenger flow is managed. With the implementation of APC kiosks, there has been a trend to move away from the traditional inspection booths to free-standing podiums<sup>25</sup>. While there is still a requirement for booths, and not all officers will be at podiums, the tendency is to be flexible with assets. The only fixed asset, for the time being, is the baggage system.

For airports, these trends should be easily implemented as they arise. But without a flexible design in place to allow for such changes to be implemented quickly, concepts meant to reduce spending on assets and resource space could turn out to be more expensive.

The ATDS focuses on two-dimensional (2D) space (i.e., square footage); this is present in every single diagram in the ATDS (2D only), as well as the entire concept of Chapter 5 in the ATDS – Airport Facility Design. Planning guidelines may lead designers to only address linear space (e.g., 30 feet x 30 feet).

<sup>25</sup> Primary Processing Booths – ATDS 2016, Chapter 5, Section 5.4.8, Item E

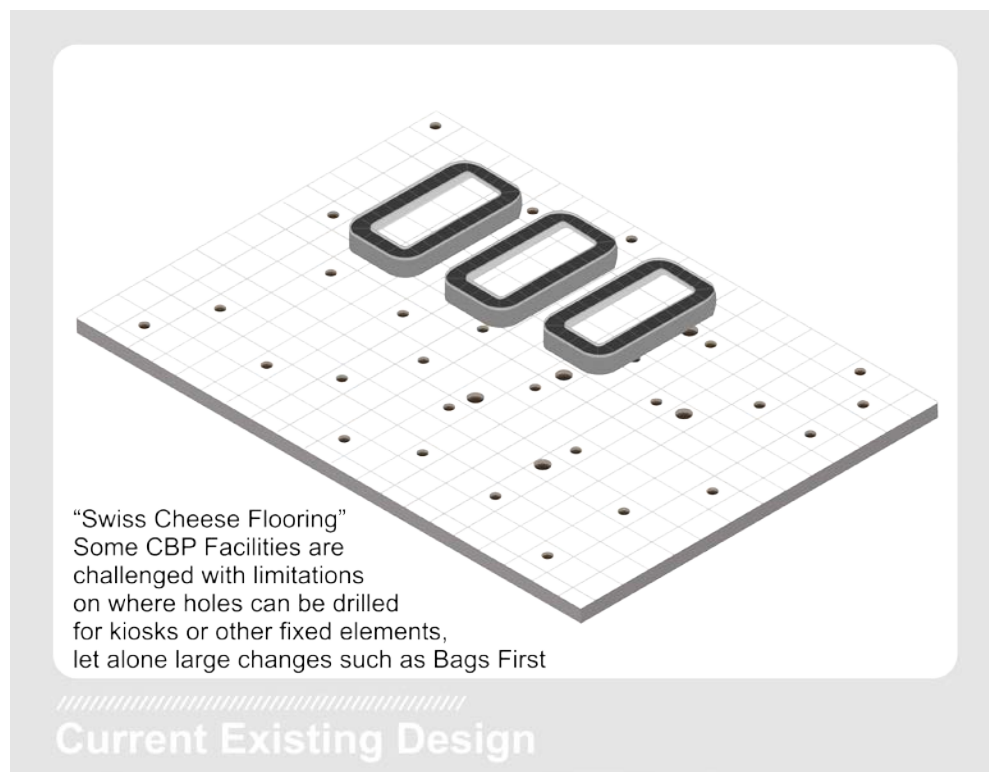


FIS facility designs are increasingly three-dimensional concepts, with more attention paid to the vertical requirements for facilities. This is normally expressed as the height of the structure (i.e., 30 feet x 30 feet with a 30-foot floor-to-ceiling height), but is increasingly a prerequisite to enable use of technologies.

The key areas of vertical elements involve:

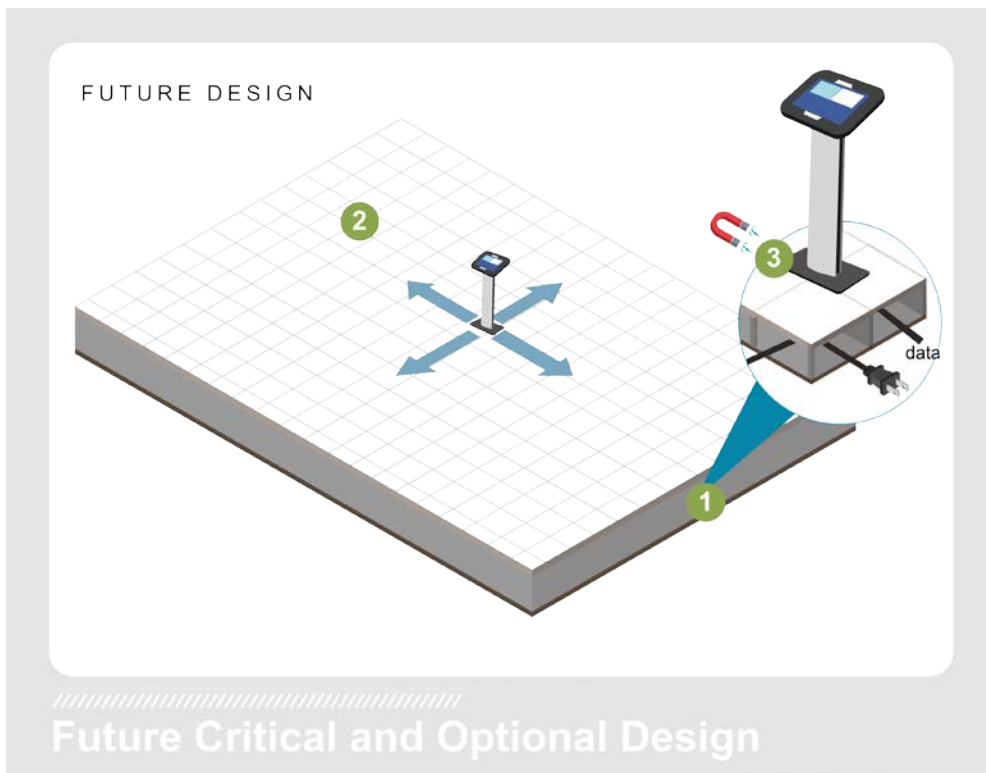
- Raised flooring to enable cabling
- Weight of future equipment, particularly screening equipment
- Possibilities of installing new vertical circulation
- Ability to use camera technologies with appropriate sight lines and visibility

Without taking into account the construction aspects of flooring, newer technologies have fewer options for installation, such as the Tap-and-Go posts that may or may not be needed in future.



## DESIGN ISSUES

**Limitations from intuitive flow:** There are currently multiple ways for passengers to proceed through CBP Primary processes: traditional booths, APC and Document Verification Officer (DVO) podium, Global Entry kiosks, and MPC application user pathways. As technology and border processing evolves, space and location requirements will change. Flexibility is needed for the placement of the different processing options in order to adapt to more intuitive flows for passengers.



### CRITICAL DESIGN FEATURES

- 1 Raised floor leaving space for cabling but able to bear loads:** Provide a flooring system that can bear loads and have a gap wide enough to house fiber optic, electrical, or other cabling so that every square foot can facilitate placement of podiums or other elements. The flexible floor system must not only have space for cables, it must also be able to bear loads for placement of a podium or other equipment, and for passenger foot traffic. It helps to future-proof facilities so that the floor does not have to undergo construction each time a kiosk layout redesign, reconfiguration, or introduction of new technology takes place.

Note that as Bags First is implemented at airports in addition to AUS and the future SEA terminal in 2019, there may be a demand for facilities that offer more flexibility in the location of baggage delivery before Primary. While expensive facility conversion is unlikely, the future build-out of CBP areas needs to incorporate the flexibility to route bags in different ways without the need for major structural retrofit.

- 2 Potential for heavy fixtures or screening equipment in future:** The TSA's experience with advanced imaging technology and the future deployment of CT-scanners at checkpoints is one that could be applied to CBP facilities. The guideline for design is to ensure that where there may be screening equipment, the load is considered or can be changed easily to a system that has more structural support.

Heavier fixtures, such as screening equipment, may be installed in the future. Make sure that the floor can accommodate the higher loads or can be made to do so simply.

### OPTIONAL DESIGN FEATURES

- 3 Movable officer podiums:** Provide movable podiums for CBP officers instead of booths. The podiums should be able to house and recharge tablet technologies to provide information to the officers.

With technology shrinking the size of equipment needed for Primary processing, the traditional booth is less essential. Instead, smaller form factor podiums can be used for Primary processing or document verification for APC users. Consider using strong electromagnets (e.g., rare earth magnets) to affix podiums to smooth floor surfaces instead of fixed bolts.

### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Any passenger volumes:** This is applicable to airports of all sizes/passenger volumes. A flexible facility can enable airports to integrate new technology and processes as they are developed in order to more efficiently meet passenger volume growth with the same footprint.

**All airport types:** It is relevant to all airport types (origin/destination, connecting hub, Preclearance, and general aviation).

**All passengers:** Flexible flooring can be used for airports with all passenger types/demographics since it makes the FIS reconfigurable depending on the circumstances.

### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

#### ATDS (2012)

- Section 3.5.3 identifies flooring requirements for managing exit queueing

#### ATDS (2016 – 90% Draft)

- Section 5.4.8 identifies flooring requirements for managing exit queueing
- Code ATD-01-03 in Chapter 5

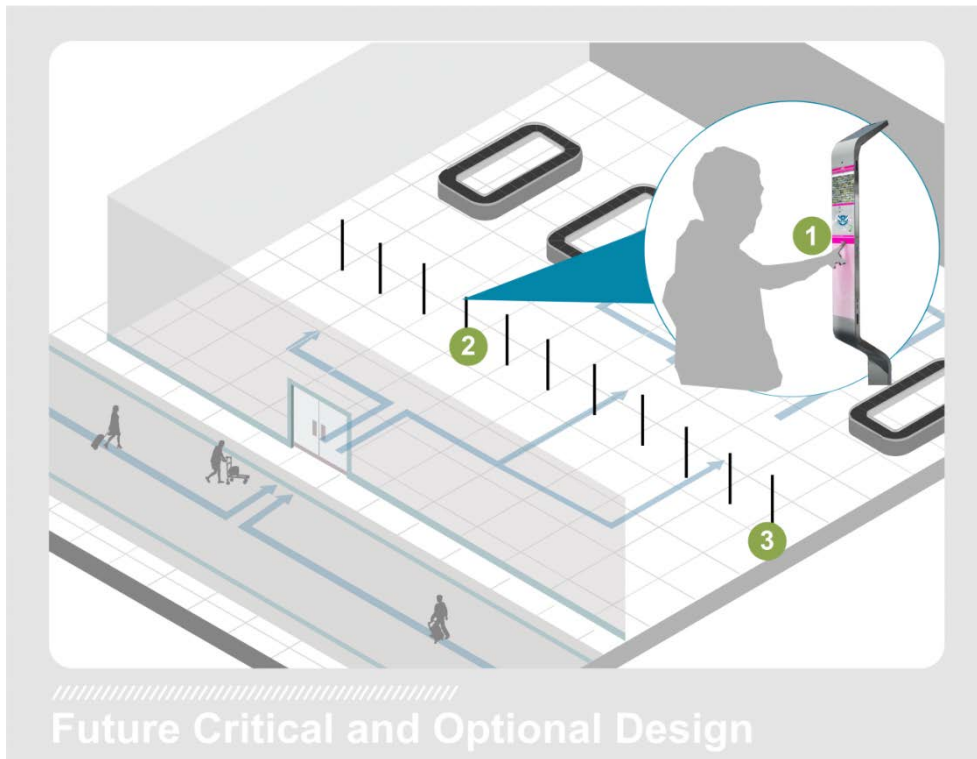
#### ACRP 161

- Chapter 2.1.2 International Arriving Passengers cites that designing flexible facilities aids with the ever-changing policies that affect passengers

### TECHNOLOGY

A specific technology that provides an Optional Design Feature is the Tap-and-Go Posts.

This option will work best with a flexible flooring design, and offers another option to an overall flexible FIS design.



Future Critical and Optional Design

### CRITICAL DESIGN FEATURES

- 1 **Contactless Tap-and-Go post technology for declaration submission:** The main objective would be to use travelers' existing mobile computing technology to perform much of the functionality of an APC kiosk. The Tap-and-Go capabilities would provide a quick means of submitting/finalizing the primary process transaction without having to log on to a Wi-Fi network.

Similar to Apple Pay or Google Wallet for smartphones, these posts would use near-field communication technology integrated in mobile devices to complete declaration submissions and perform most of the Primary processing function. The technology is currently used by some airlines for passenger check-in. Alternatively, technologies could perform a scan of a Quick Response Code (QR code) from a mobile device to enable quick Primary submission.

- 2 **Posts must occupy little space to ensure free-flow of passengers:** The Tap-and-Go posts must occupy little to no floor space to provide a definitive benefit over APC kiosks.

The benefit of a simple Tap-and-Go post is that it takes up very little floor space in the FIS when compared to APC kiosks. Combined with dispersed computing (i.e., using travelers' own mobile devices), the processing capacity and floor space usage is significantly more efficient than traditional booths.

### OPTIONAL DESIGN FEATURE

- 3 **Movable but securely affixed to floor:** Connect Tap-and-Go posts to a flooring system that holds them in place without being permanently affixed to one specific location.

A floor system that can be configured to accommodate such posts must have a way of easily placing and securely affixing them to the floor (see previous sub-section regarding flexible flooring).

## AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Any passenger volume:** This is applicable to airports of all sizes/passenger volumes. For airports with small passenger volumes and infrequent international flights, having small movable posts may allow portions of the space to be dual use (i.e., international or domestic).

**Any airport type:** It is relevant to all airport types including origin/destination, connecting hub, Preclearance, and general aviation airports.

**All except booth users:** Tap-and-Go is applicable to all passenger types/demographics except for those airports in which passengers largely must use traditional Primary booths.

## REFERENCES

There is no mention of Tap-and-Go technology in either version of the ATDS.

### 6.10 Finding 10: Use a Phase FIS Capacity Approach with Growth Triggers

In the ATDS, the set of tables used to calculate baseline space allocation has caused some confusion.

In the 2016 update to the ATDS, CBP has indicated that there is:

- a) Flexibility to the baseline space requirements
- b) A process through the CBP Field Operations Facilities Program Management Office Project Manager to allow exemptions from the ATDS

At the same time, CBP has indicated that a passenger forecast is needed for facilities that drive the values provided in the Space Requirements Matrix in ATDS Section 5.3. Because a planning and design process takes 3–5 years, there is a need to spread the financial risk of a project over different phases.

In the aviation business, a lot of factors can lead to uncertainty with the amount of demand for international travel, such as:

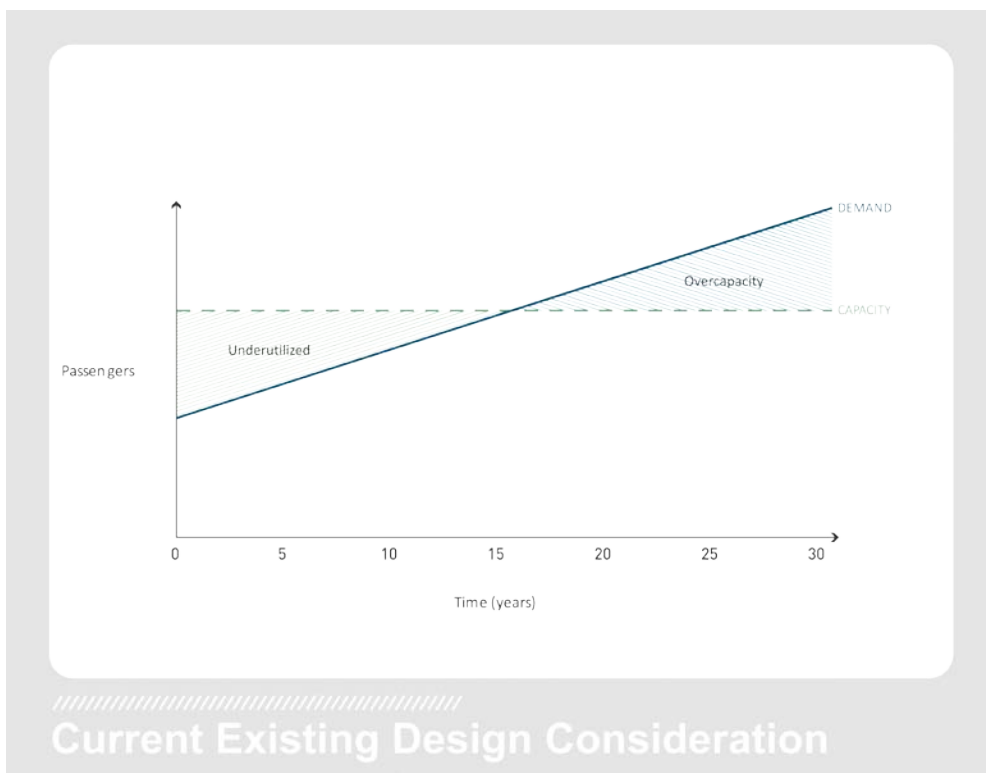
- Changes in the world economy
- Consolidation of airlines
- Weakening demand from some mature markets

At the same time, there are many reasons why growth can accelerate, including:

- Completion of new bilateral agreements to allow new routes<sup>26</sup>
- Initiatives to stimulate trade/travel, such as with Brazil, China, and other emerging markets

Certain risks can accelerate or decelerate the pace of growth, leading to chronic under-capacity at some airports, and major overcapacity at others.

<sup>26</sup> Example: Bilateral US/Mexico agreement, White House press room, and Fact Sheet United States Mexico Relations July 2016.



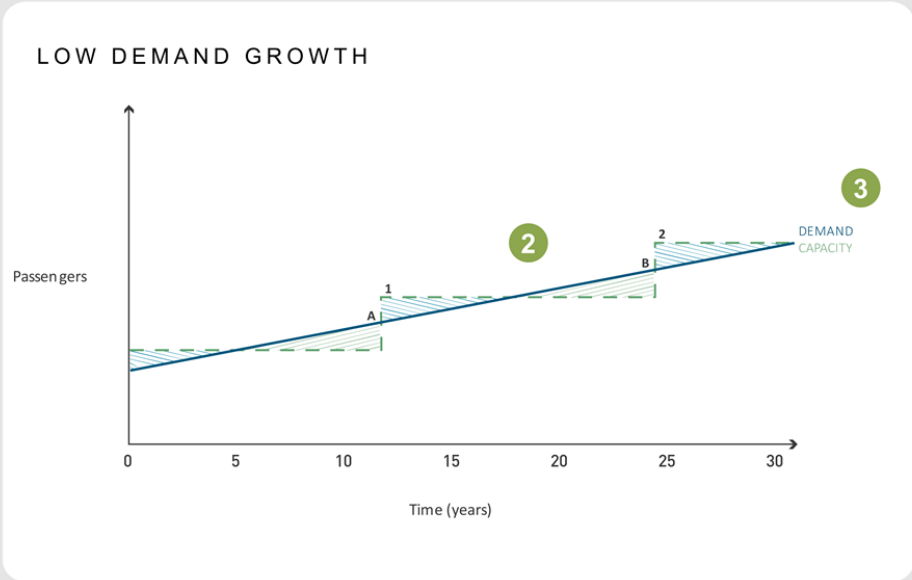
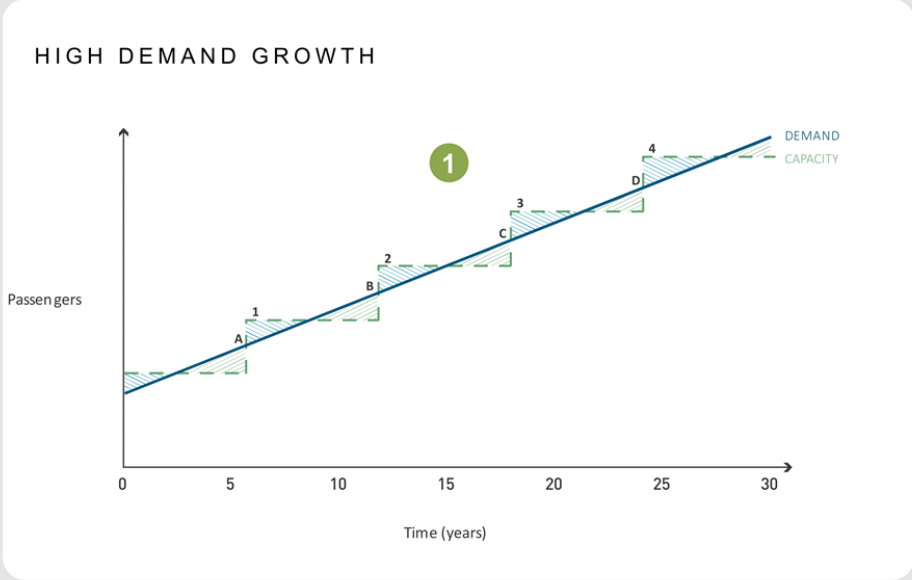
## DESIGN ISSUES

Facilities are typically built to accommodate a specific capacity of passengers. As passenger traffic increases at an airport, the actual demand (versus the forecast) may eventually exceed the particular capacity at some point in the future.

**Underutilization:** If more capacity exists in a particular FIS than the actual passenger throughput for a given year, the facility is underutilized. If this persists for many years, the FIS has been overbuilt and capital expenditures for the facility are far greater than they need to be.

**Overcapacity:** If the demand and volume of passengers through a facility far exceeds the intended facility capacity, significant queues may form for the FIS. In minor cases of overcapacity, the main FIS area may have queues that result in low spatial LoS, which may result in queues outside of the FIS in the arrivals corridors. In extreme cases, passengers may be required to remain on-board the aircraft until space is available within the FIS.

**Fixed Capacity:** During the design process, a fixed single capacity approach is often taken. The intent is to accommodate the predicted demand over a specific time period. For airports that have flat passenger demand (i.e., no significant growth or decline), this minimizes the magnitude and amount of time that the facility is either under or over capacity. For airports with a high growth rate, a single fixed capacity will result either in high cost (i.e., overbuilding the facility) or be detrimental to operations (i.e., overcrowding) for long periods of time.



Future Critical and Optional Design

**CRITICAL DESIGN FEATURE**

In order to manage the program for an airport more adequately, there needs to be a risk-managed approach for phased expansion, and flexibility for facilities to scale as demands warrant.

- 1
**Plan phased expansion with triggers for flexible space:** Shown above is a step ladder approach for four phases of expansion (1, 2, 3, 4) that are planned and triggered in advance of demand (A, B, C, D). Delivery of facilities could be done with shell space as quickly as 1 year, or for larger projects, 2–3 years. The amount of flexible space could ensure that the timing of capital and operations are not out-of-sync and meet demand appropriately.

The 90% Draft calls for a 5–10 year forecast from the airport. The best practice, however, is to ensure risk-based forecasts are done over 10–20 years (see ACRP 76), and that there is a staged expansion that follows triggers<sup>27</sup>.

- 2 **Expandable capacity that only increases when triggered:** For example, after approximately 12 years within an existing facility, demand growth may be slower than anticipated, and only then is trigger point A reached. Phase 1 capacity expansion may be built to accommodate the increased number of passengers up until trigger point B is reached. The airport may then proceed to execute construction for phase 2 capacity expansion in order to meet demand only when and if it is needed.

### OPTIONAL DESIGN FEATURES

- 3 **Minimize time and magnitude of underutilization and overcapacity:** The series of triggers and phases provides flexibility for an airport to expand when growth warrants it, and not by fixed calendar dates. All of this should be tied to the physical processing capacity (i.e., pph) from a spatial and processor (e.g., kiosk, other automation) solution. Subsequent expansion phases 3 and 4 may not need to be built if demand remains flat or if new technology allows greater processing capacity for the amount of space available. The approach ensures that the amount of time the FIS is underutilized or overcapacity is kept to a minimum, while also keeping the difference between demand and capacity as small as possible. If the calculated amount of space is less than that prescribed in the ATDS, an exemption will need to be sought from the CBP Field Operations Facilities Program Management Office Project Manager.

### AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Small to medium passenger volumes:** The finding is applicable to airports with small, medium, or high volumes of passengers. It is especially applicable when there is uncertainty or variability in the growth rate of peak hour passenger volumes.

**All airport types:** Regardless of airport type (connecting hub, origin/destination, Preclearance, etc.), the principles for a phased approach can be applied.

**All passenger types:** Irrespective of passenger profile (i.e., US citizens, foreign nationals, business travelers, leisure travelers, etc.), a phased approach can be used.

### REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

#### ATDS (2012)

- Section 2.7.4 states that the FIS must accommodate all arriving passengers and queues at peak times
- Section 3.1 introduces the airport size specification

#### ATDS (2016 – 90% Draft)

- Section 2.7 states that the FIS size is determined by passengers arriving at peak hours plus the size of aircraft that arrive
- Section 5.3 outlines the space matrix and calculations required for the FIS
- Code ATD-01-03 in Chapter 5

<sup>27</sup> International Facility Management Association has good literature on phasing strategies for buildings (<https://www.ifma.org>).



## 6.11 Finding 11: Reduce Baseline Space Requirements

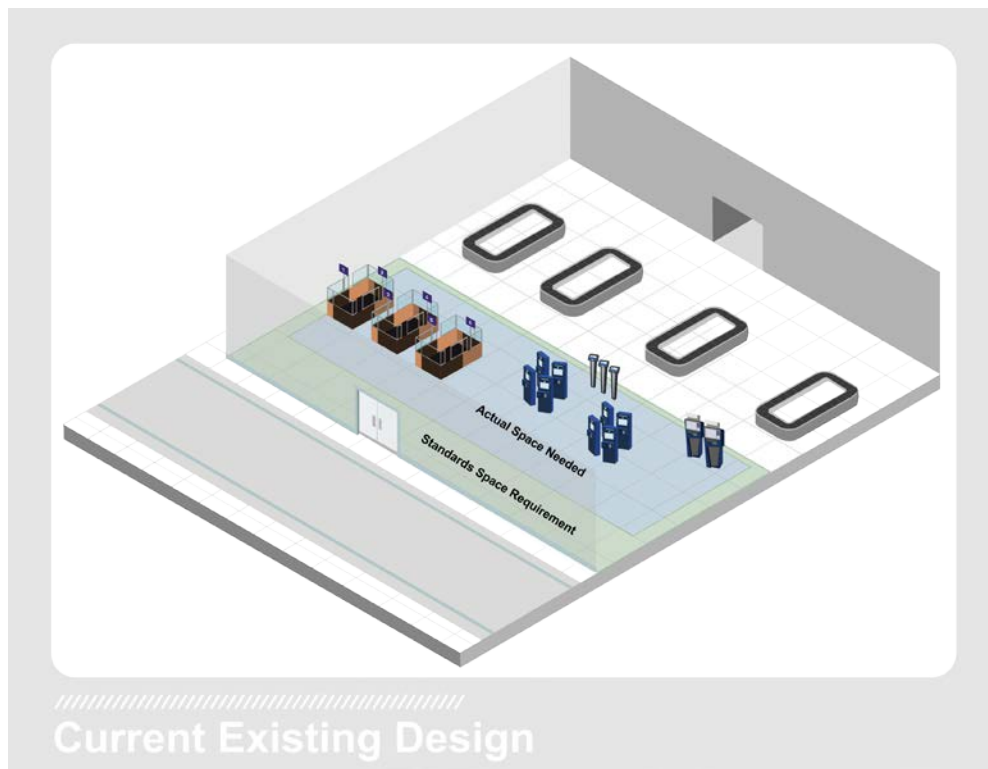
A number of post-implementation analyses of self-service, automated technology (i.e., APC, MPC, and Global Entry) have concluded that significant space savings in the Primary processing and queuing areas can be attained over traditional booths on a passengers processed per hour basis. Much less space is needed for the baseline requirements for the Primary processing and queuing areas if automated solutions are implemented.

As noted previously at each peak hour passenger volume level, the 2016 ATDS required baseline area for Primary processing is very similar to that of the 2012 version and other prior versions of the standards. The baseline space requirements are the same despite the recognized benefits and ability to implement automated solutions and the introduction of podiums rather than traditional booths.

The amount of space savings is different at each airport based on the passenger profile, ability to use automated solutions, and peak hour volume of passengers. Based on our findings, the baseline (as defined in ATD-01-03 Chapter 5) can be reduced 10–24% from the current value; that is, from 13.2 square feet per passenger to about 11 square feet per passenger.

This reduction, albeit 2 square feet per passenger, could save millions in construction costs for new facilities, as well as annual operating costs, without impacting the LoS for passenger clearance.

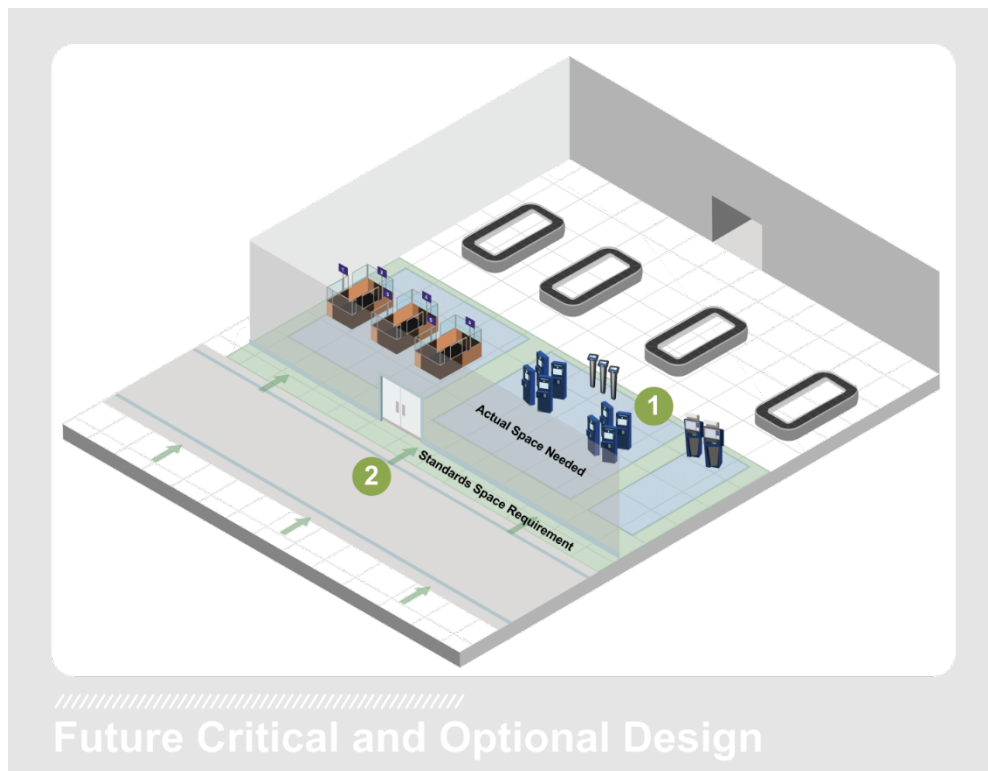
At the time of writing this report, the assumptions are based the 90% Draft of the ATDs released in December 2016. The final ATDS may contain different space assumptions. For example, there may be potential savings in the Primary processing area, but a larger amount of space required for Secondary processing. This may evolve in the coming years with potential additional vetting of certain foreign nationals entering the country. While a lot of the processing may be done long before flight departure, such as with ESTA and visa processing, there may be a requirement for airports to have space to house certain individuals for further processing at CBP Secondary, similar to the method used to implement the National Security Entry-Exit Registration System (NSEERS) from 2002–2011.



## DESIGN ISSUES

**ATDS Primary space requirements are conservative:** The ATDS space requirements for Primary processing are conservative, and are likely based on historical statistics of all passengers proceeding through traditional booths. In addition to occupying a much larger footprint, the hourly passenger processing rate at a booth is significantly less than that of self-service automated solutions. Consequently, the space required for traditional booth processing, for the booth itself and the corresponding queuing space (i.e., slower processing rates result in longer queues), is much larger than what is actually needed in practice with APC, MPC, and Global Entry implemented at an airport.

**Location-specific exceptions available:** There are a number of examples of FIS facilities at airports that do not necessarily follow all standards set forth in the ATDS (e.g., Newport News). The CBP Field Operations Facilities Program Management Office has the ability to grant exceptions on a site-by-site basis if it can be shown that the facility still meets all of the needs of CBP.



## CRITICAL DESIGN FEATURES

- 1 Calculate actual space needed to accommodate anticipated peak hour volumes:** In order to calculate the actual queuing space that is likely required, a full analysis will be implemented of the peak hour volume of international passengers, profile of passengers (i.e., percentages of Global Entry members, US citizens and permanent residents, foreign nationals who are exempt from visa, foreign nationals requiring visa, etc.), and planned self-service automated solutions. Using queuing analysis and/or multiple simulation model runs, calculate the maximum queue sizes for each border processing stream. By applying a spatial LoS against the number of passengers queuing, the space that will be used can be determined.

## OPTIONAL DESIGN FEATURES

- 2 Apply for exemption to the standards if significantly less than calculated:** If the space actually needed for certain areas of the FIS can be empirically shown to be less than what is specified in the ATDS, the airport can apply for an exemption to the standards.

If the FIS does not need to be built to full capacity from day one, there are significant capital cost savings that can be attained for the airport. If the calculated amount of space needed is equal to or greater than that stated in the ATDS space requirements, the airport should build the space accordingly and continue with the usual facilities approval. If the amount of space required is significantly less, the airport should submit a formal request for an exemption to the standards to the CBP Field Operations Facilities Program Management Office Project Manager with the full/comprehensive analysis of space. As noted in Finding 10, a phased approach with triggers should still be considered to account for passenger volume growth.

## AIRPORT APPLICABILITY

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Any passenger volume:** The analysis for determining the actual space used and whether it is less than that specified within the ATDS is applicable to small, medium, or high passenger volume airports.

**Any airport types:** The space calculation and potential savings is applicable to all airport types.

**All passenger types:** While the determination of spatial needs is applicable to airports with any variety of passenger profile types, space savings (and a potential exemption request) are likely to be realized as long as some passengers can use self-service automated Primary processing (i.e., not 100% at traditional booths).

## REFERENCES

The applicability of this finding to the ATDS is found in the following sections:

### ATDS (2012)

- Section 2.7.4 states that the FIS must accommodate all arriving passengers and queues at peak times
- Section 3.1 introduces the airport size specification

### ATDS (2016 – 90% Draft)

- Section 2.7 states that the FIS size is determined by passengers arriving at peak hours plus the size of aircraft that arrive
- Section 5.3 outlines the space matrix and calculations required for the FIS
- Code ATD-01-03 in Chapter 5

## 6.12 Finding 12: Customize Small Airport Facilities

As defined in the 2012 ATDS, “General Aviation Facilities (GAF) are normally located at small, low volume airports in the United States and provide US CBP with the ability to process up to 20 passengers and their baggage at one time.” (ATDS Chapter 8, page 314). The passenger processing space required for the GAF is 2,160 square feet.

The 2012 ATDS and the current Draft ATDS both define the minimum space required for small airports that have a volume of up to 200 pph as 8,328 square feet (2012 ATDS) and 9,789 square feet (Draft ATDS).

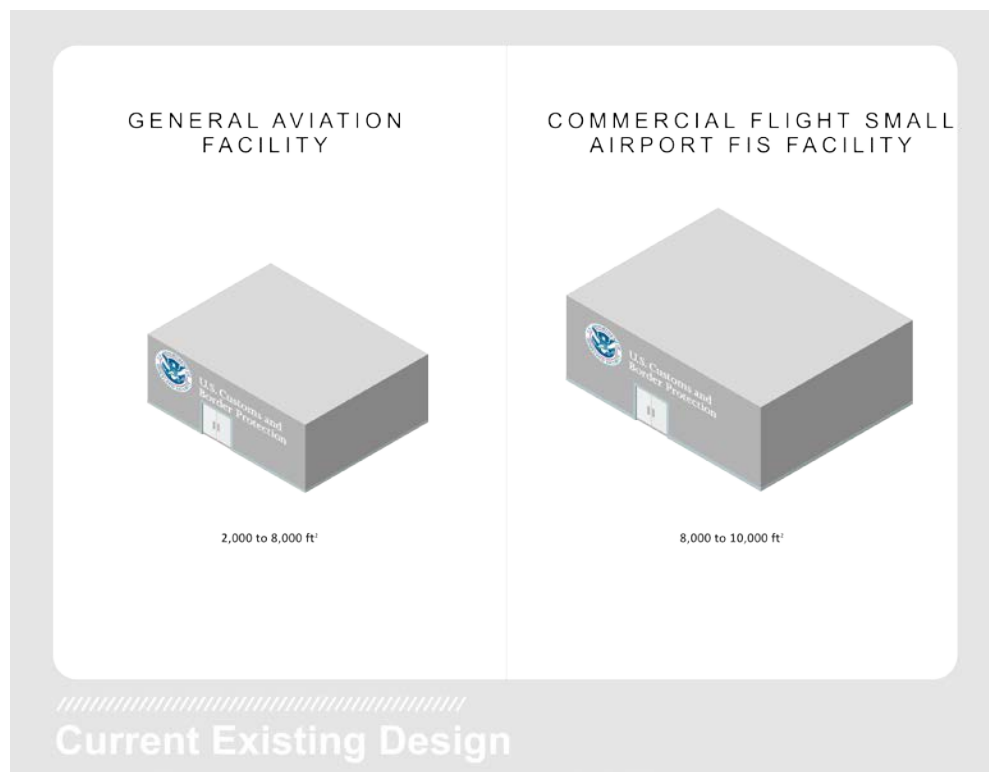
The growth market for some regional flights at commercial airports, however, is as small as a Dash 8 or, in the case of low cost carriers, a jet that could hold up to 160 seats. Small airports may operate as a commercial aviation facility, but in reality may have characteristics that align it more closely with a general aviation facility.

#### Examples of Small Airports and GAF with CBP FIS:

- Toledo Airport, Millbury, OH
  - Commercial air service
  - General aviation—5,000 square feet with CBP FIS\*
  - Executive private aircraft operations
- Hector International Airport, Fargo, ND
  - Commercial air service
  - General aviation—3,600 square feet with CBP FIS\*
- Fort Lauderdale Executive Airport, Fort Lauderdale, FL
  - General aviation—7,900 square feet with CBP FIS\*
- Van Nuys Airport, Van Nuys, CA
  - General aviation—1,600 square feet with CBP FIS\*

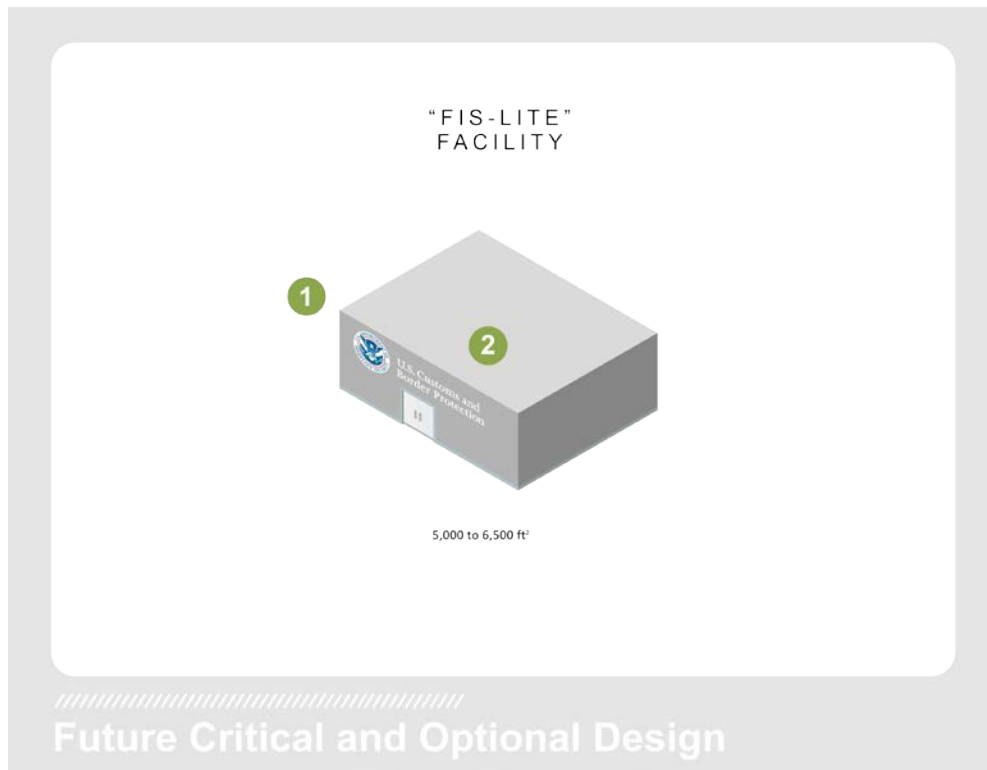
\*Note the total space numbers are estimates

While general aviation is aimed at passenger counts below 20 per hour typically, the difference between a 5,000 square feet facility, as advanced in Toledo, compared with the baseline of 8,328, is not large.



## DESIGN ISSUES

**Baseline requirements may be overstated for small airports:** As noted above, the 2012 ATDS baseline requirement is 8,328 square feet for a facility that handles 200 pph. In reality, the facility may only have 80–160 pph. From site visits to small airports, it was noted that large portions and features built into the facilities may never be used given the low volumes of passengers (e.g., multiple interview rooms and holding cells, canine kennel facility, etc.) Although there are different requirements for the building of a general-aviation-only airport, there are likely elements that could be adapted to have facilities appropriate for both general aviation and commercial markets.



## CRITICAL DESIGN FEATURES

- 1 **Consolidation of commercial and general aviation CBP requirements:** An FIS-lite for small markets may be explored for small airports that are dealing with the issue of deciding how to justify building and maintaining two separate CBP facilities with a number of overlapping requirements. Developing a consolidated set of facility requirements could potentially be conducted as a pilot project for an interested airport that builds on the FAR model.

Both TOL and FAR airports are mixed-use commercial aviation and general aviation airports, and both were able to have CBP facilities in the general aviation space. This has provided the significant benefit of a smaller space requirement and reduced duplicative facilities. It is noted that the VNY facility has a much smaller footprint than recommended. However, it has been included in the analysis to show the large range in the GAF sizes.

- 2 **Use of technology to save space:** Deploy MPC application, APC kiosks, or Global Entry kiosks/applications to alleviate space requirements in the FIS-lite. Similar to Finding 11, there are likely space savings associated with smaller facilities that could allow for a reduced baseline space requirement. Analyses have shown that the use of mobile technologies like the MPC application, and APC or Global Entry kiosks have provided great savings in queue times and space.

**Other Considerations:**

Combining facilities is not without its planning challenges because the user bases are quite different. The location of fixed base operators (FBOs), for example, is not necessarily adjacent to commercial passenger terminals. Colocating FIS facilities may require some creative solutions to ensure land uses are appropriately advanced in an airport land use plan to enable synergies between the facilities.

**OPTIONAL DESIGN FEATURE**

Each airport will have different requirements and could use features from larger airports to pick the solutions that best match its market demographic. An appropriate business case will need to be advanced to demonstrate the benefits that these features achieve.

**AIRPORT APPLICABILITY**

The key findings for addressing this issue are particularly relevant to airports with the following characteristics:

**Low passenger volume:** This finding is aimed at airports with peak hourly international passenger arrival volumes of 200 passengers or less.

**Small airports and GAF:** It is applicable to small origin and destination commercial airports that also have corporate/general aviation flights.

**All passenger types:** All passengers would benefit from these features.

**REFERENCES**

The applicability of this finding to the ATDS is found in the following sections:

**ATDS (2012)**

- Section 2.7.4 states that the FIS must accommodate all arriving passengers and queues at peak times
- Section 3.1 introduces the airport size specification
- Section 8.0 defines general aviation
- Section 3.3 introduces the airport size specifications for GAF

**ATDS (2016 – 90% Draft)**

- Preface states that standards for general aviation are not included in the 2016 version and are published separately.
- Section 2.7 states that the FIS size is determined by passengers arriving at peak hours plus the size of arriving aircraft
- Section 5.3 outlines the space matrix and calculations required for the FIS
- Code ATD-01-03 in Chapter 5

**6.13 Additional Design Considerations****RESTROOMS**

ACRP Report 130: *Guidebook for Airport Terminal Restroom Planning and Design* provides a comprehensive reference for restrooms in airports. Availability of restrooms (location and operability), ambience (design and environment), and maintainability (cleanliness) are all factors recommended to be considered by the terminal owner/operator. This is applicable to airports of all types and passenger volumes as well as passenger profiles.

The research team, in its review, saw varying practices regarding availability of restrooms in and before the FIS that was largely dictated by the age of the facility as well as by space constraints. As noted in ACRP Report 161: *Guidelines for Improving Airport Services for International Customers*, restrooms should be made available for passengers throughout the international arrivals process, including the arrivals corridor, the entrance to the Primary processing area, the baggage claim area, and the arrivals hall (outside of the FIS). For restrooms located prior to Primary processing, consideration should be given for a number of CBP operational issues including how to deal with refuse disposal from international flights, contraband left or flushed in the restroom, and proximity to the FIS (immediately before FIS versus close to aircraft bridges). In terms of spacing, ACRP Report 161 recommends that restrooms near aircraft gates should be located adjacent to every other gate so that customers do not have to walk further than one gate distance (i.e., 250 to 300 feet apart).

### **FOOD, BEVERAGE, AND RETAIL CONCESSIONS**

US Customs and Border Protection currently does not allow food, beverage, or retail concessions to be located in the international arrivals corridor or within the FIS. While it is not anticipated that this policy will change in the near future, consideration for future potential relevant concessions should be made. This is most applicable for larger hub or destination airports. The likely concessions would be for a traveler aid, foreign exchange, mobile phone rental kiosks, etc. The infrastructure requirements for such concessions (i.e., space and wiring) would be minimal compared to food and beverage establishments.

### **ACCOMMODATIONS FOR PERSONS WITH DISABILITIES**

Airports must follow a number of statutory authorities regarding persons with disabilities including: the ADA, Section 504 of the Rehabilitation Act, and Air Carrier Access Act. With regards to the FIS, dedicated queues and booths should be provided for persons with disabilities, the elderly, or others with mobility issues. APC kiosks must be accessible. Seating and space for wheelchairs should be provided in areas where queues can form or potential wait times occur (at Primary or bag claim area). Note that ADA requirements apply equally to airports of all sizes and airport types, including Preclearance airports outside of the United States.

ACRP Report 161: *Guidelines for Improving Airport Services for International Customers* notes that while all restrooms are required to be accessible per the ADA Accessibility Guidelines, many other countries do not have this requirement; therefore, signage should clearly be marked with the accessibility symbol. In addition, universal access principles should be considered throughout the international arrivals process. With changing demographics (e.g., aging population, increase in frequency of autism, etc.), the proportion/number of passengers with special needs or those that may not necessarily fall within ADA rules could increase and require consideration. For example, lifting bags from claim devices or placing them onto screening or recheck conveyors, walking distances, ease of technology use, clarity of signage or announcements, etc. are all areas that may be affected.

### **ACCOMMODATIONS FOR PERSONS WITH SERVICE ANIMALS**

Passengers traveling with service animals are likely to use the same pathways as those with disabilities. The statutory authorities are the same: ADA, Section 504 of the Rehabilitation Act, and Air Carrier Access Act. According to the statutes, all service animals must be allowed by airlines and airports except under the following instances "...fundamental alteration, direct threat, or animal is out of control/not housebroken." While it is specified that all airports must have one service animal relief area that is post-security, the feature is located for departing passenger use and not for arriving passengers. With significant queues and wait times, potential issues for service animals may occur. While dedicated space for service animal relief within the international arrivals corridor, entrance to the Primary

processing area, or bag claim area may not be necessary, portable indoor animal relief systems should be made available.

### INNOVATIVE CBP PASSENGER PROGRAMS

Passengers must be vetted in order to participate in expedited passenger programs such as Registered Traveler or Trusted Traveler, where passengers join by providing biographical and biometric information to the authorities. Other automated processes have been introduced by CBP that can evaluate a passenger's travel risk and allow lower risk passengers to benefit from expedited processes. One key item is having advanced passenger information. With programs such as AQQ, PNR, and ESTA, CBP is able to assess a traveler's risk when he or she makes a reservation, purchases a ticket, and checks in. These programs address an otherwise manual process that would be completed in the Primary line.

Technology also has played a key role in passenger processing programs. With the introduction of trusted traveler schemes like Global Entry, the use of kiosk technology has now become common for passenger processing. This was apparent with programs such as APC and MPC. These programs, which do not require prior biometric registration or a participation fee (as does Global Entry), allow passengers to enter passport and customs declaration data prior to seeing a CBP officer. This again frees up the officers from an otherwise manual process of scanning the passport and reviewing the declaration card (which also may become obsolete).

Passengers who make use of the Global Entry program have a more exclusive expedited process through customs, with dedicated lanes and exits, as well as automatic participation in security programs, such as TSA PreCheck. Passengers who make use of the APC or MPC do not have an expedited exit through customs or security, although some airports do offer an expedited exit for MPC passengers. The setup for these processes differs from airport to airport.

Other programs that have been introduced by CBP and the airports and airlines are focused on passengers that either have no baggage or have a unique transfer process through the US Programs such as One-Stop, Carry E-Z, and Express Connect. These programs allow passengers who are either in transit from an international origin to an international destination or have no checked baggage (International-to-Domestic) to make use of expedited processing areas with dedicated kiosks (as at DFW) and/or exit lanes (as at IAH, ORD, and AUS), bypassing baggage claim and exit control processing.<sup>28</sup>

Most US airports provide passengers with short connection times through a dedicated lane or a cut-to-the-front-of-the-line service.

Many of these programs have evolved from pilots to established processes at airports, but they still vary from site to site. This inconsistency could cause confusion and lack of standardization in signage, passenger flow, and passenger experience.<sup>29</sup>

Typically, these programs benefit the larger international airports with multiple carriers or hub carrier terminals due to the associated costs of implementing facilities changes, IT infrastructure, officer reassignment, and lack of acceptance. These are all risks that must be reviewed and mitigated prior to implementing a new passenger processing program.

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<sup>28</sup> CBP: <https://www.cbp.gov/travel/international-visitors/travel-tourism> (web page has been retired)

<sup>29</sup> As mentioned in Finding 2 – Coordinate Passenger Wayfinding for Arrivals, the program One-Stop has been branded differently by each of the airports that have it (One Stop or 1 Stop or One-Stop), which can cause confusion to the public.



## IMPACT OF CURRENT AND POTENTIAL TECHNOLOGY INNOVATIONS

To date, the most noticeable technology advancement in passenger processing has been the adoption of self-service. Kiosks, websites, and mobile phones are being used for passengers to check in and to process through customs. E-gates are being used for security checkpoints and for self-boarding. Most important of all, passengers themselves through biometrics are becoming the de facto identification for any of these processes.

Airlines and airports implemented self-service technology in the early 1990s, but it was not until the introduction of the Global Entry kiosk that we saw the use of this technology in the US FIS. As mentioned in the previous section, passenger processing programs provide a benefit to CBP officers by expediting the processing of low risk passengers. Technology has helped this effort to an even greater extent. Airports and CBP have seen increased acceptance of technology and the cost benefits as well. The APC program, which began in 2013, has alone shown improvements in passenger processing up to four times faster than the traditional processing with officers at booths.

However, even though the kiosks for Global Entry and APC are still being procured and installed at various airports and Preclearance sites, there has been a surge in the use of other technologies that will ultimately supersede kiosk usage. In particular, mobile technology, RFID technology, and biometrics or single-token technology for passenger processing are predicted to replace kiosks.

IATA defines the single token concept as "...a passenger's identity is verified and authenticated by matching their passport and their biometrics only once throughout a travel journey. This can, for example, be done via a trusted and secure app on their smart phone or at an airport kiosk. A single token is then established within a secure platform and the passenger's identity can be verified in the following steps at the airport via biometrics".<sup>30</sup>

The use of biometrics has expanded from automated border crossing to self-boarding, self-bag-drop and overall customer identification products at airports. The ability to integrate biometrics into the passenger journey allows for a customized traveler experience, which will increase customer satisfaction overall. Airport and airline websites and mobile apps provide customers with a wide range of information that can be accessed on-demand. More recent innovations, such as beacons, can also push information to passengers based on their location.<sup>31</sup> There have been programs using Bluetooth, Wi-Fi, and beacon technology at TSA security checkpoints and in Customs halls. Pushing information to passengers about concessions, wait times, processing lanes, or other amenities in the airport can provide flexibility and efficiency to the overall passenger flow.

Not only has the technology changed the way passengers are processed, but also where and how quickly they are cleared. From a passenger's perspective, there is an expectation that technology means fast and modern; therefore, the more technology that is available for use, the better experience they will have.

## POSSIBLE IMPACT OF ADDITIONAL US EXIT CONTROL REQUIREMENTS

Since 1996, Congress has mandated that an automated entry-exit system be developed and implemented at all air, land, and sea ports of entry. In 2004, the 9/11 Commission<sup>32</sup>, saw biometric exit control as a national security issue and recommended that a screening system be put in place as quickly as possible.

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<sup>30</sup> IATA, Passenger Facilitation Working Group, Single Token Concept

<sup>31</sup> ACRP 161 – Chapter 7.1.2 Customer Service

<sup>32</sup> The **National Commission on Terrorist Attacks Upon the United States**, set up on November 27, 2002, to investigate the September 11 attacks. The commission was also mandated to provide recommendations designed to guard against future attacks.

While DHS was able to implement biometric entry in 2006, to date they have been unable to implement a biometric exit system despite numerous pilots.<sup>33</sup> The use of biometrics has become mainstream for airports and airlines, and DHS has been successful in implementing biometric capture for entry into the United States; however implementing the exit process has been difficult, since a single solution is not available that can fit into the operations of US airports.

In 2009, Congressional appropriators required two airport biometric pilot programs<sup>34</sup> before appropriating further funds for exit. One pilot tested handheld biometric-biographic collection devices at TSA checkpoints at ATL, and the other required CBP to screen departures with mobile laptops configured for a biometric-biographic exit at the aircraft boarding bridge at DTW. Both tests were shown to have worked.

Specifically, airports argue that the lack of segregated international terminals and dedicated international departure gates make it difficult to mandate the installation of certain equipment (such as gates or cameras) for the use of biometric capture, and the deployment of resources at the gates for this particular process should be done by and paid for by the US Government.

In addition, airlines do not want to be burdened with the collection of biometric data on their passengers, so would prefer that the single-token concept be used, where the passenger has the responsibility to confirm their identity with their e-passport and their own biometric.

Therefore, it is likely that some sort of self-service technology—be it boarding gates or facial recognition devices—will be deployed at boarding gates; however, who will be funding this technology is yet to be agreed upon. Airports and airlines will need to work together with CBP to find economies of scale in the use of the current technology backbone, which could be leveraged for other uses, such as the exit process. In addition, there should be an agreement that the use of a single token biometric, which is available to CBP upon the arrival of the passenger, be validated instead of taken again in order to save time and increase comparison efficiency.

## **COST ESCALATION AND ALTERNATE SOLUTIONS**

Several areas of CBP facilities account for a higher construction cost premium of \$200 per square foot associated with increased security requirements. Several items require more detailed work than the scope of this research project, and are evolving based on the changing dynamic of facility security and cybersecurity.

There are a number of potential areas of vulnerability that airports need to invest in to protect the facilities from potential soft target attacks. As well, the prescriptiveness of information technology wiring systems and a separate trunk for data connectivity have significantly higher costs.

CBP has indicated to airports that it is open to alternate proposals. For instance, the ATDS identifies over 12 areas where there may be the need for bulletproof glass and potential walls. CBP's Office of Professional Responsibility Security Management Division can exempt the requirement for bullet resistant glazing through a Designed Based Threat Assessment, which is centered on drawings and the site location. While this assessment will vary from site to site, there can be alternate solutions to ensure

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<sup>33</sup> "The Road to Biometric Entry Exit", Joshua Breisblatt, January 21, 2016

<sup>34</sup> Department of Homeland Security, "Notice to Aliens Included in the United States Visitor and Immigrant Status Indicator Technology (USVISIT) Program; Collection of Alien Biometric Data upon Exit From the United States at Air Ports of Departure", Fed. Register vol. 74, no. 105 (June 3, 2009)

there is strategic deployment of high-cost items such as bullet resistant glazing, and potentially coupling with products such as opaque armor.

Similarly, CBP's Office of Information Technology requires that IT have specific conduits, cabling, and infrastructure. The program elements can often escalate facility costs due to the need to secure systems. For example, the Airport Operator needs to provide a secure conduit, at a minimum, for all CBP cabling through public space. As CBP starts to move to secure cloud-based applications and other ways of handling data securely, further work is needed to develop more cost-effective solutions to handle information within the FIS.

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## CHAPTER 7: CONCLUSIONS

### 7.1 Moving Forward

The ATDS is an important code to help airport designers, as well as airlines and CBP operations, build better facilities. This Companion Guide, developed under PARAS 0002, provides enhanced information to help designers rationalize design choices. Many facilities reviewed in the study have identified consequences of insufficient growth strategies as well as competing facility elements, many of which could have been located elsewhere. More importantly, as the emergence of new ideas is set to arrive at SEA, ORD, and other new FIS facilities, there is the opportunity to ensure that new structures can accommodate improved and less expensive ways of processing international passengers.

The following directions may be worth further pursuit beyond the PARAS 0002 study:

#### 1. Cross-disciplinary input across government/aviation industry

All stakeholders in the operations and planning of facilities are complex entities. With the clarification in the new ATDS of a project management structure, there is the opportunity to consolidate industry input and best practices on an ongoing basis. The openness to review best practices across facilities and codifying a matrix of practices will help to ensure that the elements that work for one site are shared broadly.

#### 2. Benefits and measures

The 12 ideas outlined as findings in the report are concentrated on facility impacts, but dynamically provide more opportunities for increased risk management, throughput of passengers, and airline network improvements (e.g., on-time performance). Systematic measurement of outcomes for the implementation of findings in the report will help to ensure post-implementation reviews can address lessons learned for future facilities.

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## GLOSSARY

<b>AAAE</b>	American Association of Airport Executives is a professional organization designed for airport executives.
<b>ACI</b>	Airports Council International is a global trade representative that advances the collective interests of, and acts as the voice of the world's airports.
<b>ADRM</b>	Airport Development Reference Manual is a comprehensive guide, published by the International Air Transport Association (IATA), which provides guidance on designing airport facilities.
<b>Agricultural Inspection</b>	This is a program within CBP that has responsibility for inspection, quarantine, and disposal of agricultural products imported into the United States.
<b>APC</b>	Automated Passport Control is an automated process in CBP's Primary inspection area that expedites portions of the border entry process for eligible international travelers such as US, Canadian, Visa Waiver Program, and some foreign nationals.
<b>APEC</b>	Asia-Pacific Economic Corporation is a regional economic forum with the aim to create greater prosperity for the people of the Pacific Region. It operates the APEC Business Travel card that the US recognizes at clearance.
<b>APHIS</b>	Animal and Plant Health Inspection Service is a federal agency under the US Department of Agriculture. The program under APHIS at the borders is veterinary services (VS). This program provides special inspection for animals and animal based agricultural products.
<b>APIS</b>	Advance Passenger Information System is a widely used electronic data interchange system that allows carriers to transmit traveler data to CBP prior to a flight.
<b>ATDS</b>	Airport Technical Design Standard reflects national policy, procedures, and facility development standards for the planning, programming, design, and construction of new CBP space or the renovation, addition, or alteration of existing CBP space at airport facilities. The ATDS serves as the primary reference document for Architect/Engineering consultants, government agencies, airport authorities, transportation lines, and all CBP personnel involved with the planning, design, development, and alteration of CBP processing facilities at airports.
<b>Egress</b>	This is the exit from the FIS that typically puts passengers either into the public area of the terminal or at a baggage recheck area.
<b>FIS</b>	Federal Inspection Services describes the physical area and facilities in which CBP border processing activities take place at airports serving scheduled, commercial flights and general aviation airports.
<b>Global Entry</b>	Global Entry is a CBP program that allows expedited clearance for pre-approved, low-risk travelers upon arrival in the United States. Members enter the United States through automatic kiosks.
<b>IATA</b>	International Air Transport Association is a trade association for the world's airlines, representing 265 airlines or 83% of total air traffic. Association members help formulate industry policy on critical aviation issues.
<b>ICE</b>	Immigrations and Customs Enforcement is an investigative agency within the US DHS responsible for border enforcement.
<b>INS</b>	US Immigration and Naturalization Service was an agency between 1933 to 2003 that administered the Immigration and Nationality Act.



<b>INSPASS</b>	INS Passenger Accelerated Service System was a program of the US INS that was designed to facilitate the entry of prescreened low-risk travelers through immigration and customs.
<b>MPC</b>	Mobile Passport Control is similar to APC wherein it is a mobile application program that aims to expedite the entry process into the United States. It is an authorized application that focuses more on the inspection and less on administrative functions.
<b>One-Stop</b>	One-Stop is an alternative process through the FIS that has different meanings depending on the airport. For some airports, it allows connecting passengers with no checked baggage to bypass the baggage and CBP egress through an express corridor. For other airports, it is an initiative used to describe the process of passengers picking up their Bags First before proceeding to a single stop at a CBP booth and proceeding directly out the exit of the FIS.
<b>One-Stop Security</b>	A country-to-country agreement to potentially eliminate the need for security screening for connections from international flights.
<b>Preclearance</b>	US border Preclearance processes that include immigration and customs inspection of international air passengers and their belongings performed at the foreign airport, before the arrival in the United States.
<b>Primary</b>	Primary inspection is where individuals are required to present themselves to a CBP officer at the main arrival location where the CBP officer obtains information directly from the traveler via their travel documents and verbal communication.
<b>Secondary</b>	Secondary inspection is when the primary CBP officer determines that additional inspection is needed. At this stage, the CBP officer may run law enforcement queries to further determine whether a violation has occurred.
<b>USCIS</b>	US Citizenship and Immigration Services is the government agency that oversees lawful immigration to the United States.

## APPENDIX A: FINDINGS SUMMARY TABLE

The following table summarizes the design issues, design features, airport applicability, and references for each finding.

### Finding 1: Begin passenger processes before the Federal Inspection Services areas

#### Design Issues

- Separate CBP facility from arrivals process
- Black box philosophy

#### Design Features

- Mobile Passport Control (MPC) prior to arrival
- Use of arrivals corridor for processing
- Technology-enabled corridors

#### Airport Applicability

- Medium to high passenger volumes
- All airport types
- All passengers except booth users

#### References

- Airport Technical Design Standard (ATDS) (2016 – 90% Draft)
  - Section 1.4
  - Section 5.4.1
  - Code ATD-01-01

### Finding 2: Coordinate passenger wayfinding for arrivals

#### Design Issues

- Different signage at different airports
- Confusing even for frequent travelers
- Placement and continuity of signage and wayfinding

#### Design Features

- Coordination and standardization between airports
- Ensure intuitive, continuous wayfinding for signage
- Integrate wayfinding with technology
- Dynamic signage

#### Airport Applicability

- Any passenger volumes
- All airport types
- All passenger types

#### References

- ATDS (2016 – 90% Draft)
  - Section 2.10.4
  - Section 7.2
- ACRP 161 (2016)
  - Chapter 4.3.5

### Finding 3: Adopt convertible processing kiosks

#### Design Issues

- Wall of kiosks
- Single-purpose kiosk
- Different time of day operations

#### Design Features

- Adaptable with all necessary technology
- Scalability with modular and re-configurable kiosk components
- Dynamic signage/branding
- Simplification of queues for Primary processing
- Incorporate payment capabilities

#### Airport Applicability

- Medium to high passenger volumes
- Most airport types
- Automated Passport Control (APC) and Global Entry users

#### References

- ATDS (2016 – 90% Draft)
  - Section 5.4.8
  - Section 7.1
  - Section 7.5.
  - Code ATD-01-03(A)
- ACRP 161 (2016)
  - Chapter 7.1

**Finding 4: Adapt common baggage area for domestic/international use**Design Issues

- Small to medium airports
- Infrequent international arrivals
- Inefficient use of space

Design Features

- Separate pathway to bag claim for domestic and international passengers
- Separate exits from bag claim area
- Movable partition to separate/maintain sterility

Airport Applicability

- Low to medium passenger volumes
- Origin-Destination airports
- Leisure travelers

References

- ATDS (2016 – 90% Draft)
  - Section 2.10.3
  - Section 5.4.6
  - Code ATD-01-10
  - Code ATD-02-17

**Finding 5: Eliminate baggage recheck areas**Design Issues

- Low connection time limited
- Additional handling of bags
- Staffing space requirements

Design Features

- Conduct up-line sortation of checked baggage for connections
- Space for processing facility for x-ray equipment
- Pathway for retrieval of bags to Secondary
- Eliminate baggage recheck for connections
- Upline x-ray image transmission

Airport Applicability

- High proportion of connections
- Preclearance sites with transit capabilities
- Medium to high passenger volumes

References

- ATDS (2016 – 90% Draft)
  - None
- ACRP 161 (2016)
  - Chapter 2.1.3
  - Chapter 4.4.3

**Finding 6: Improve egress from CBP**Design Issues

- Congestion on exit
- Phase out of declaration form

Design Features

- Space for modified egress
- Risk-based baggage carousel allocation
- Expand throat for exit

Airport Applicability

- Any passenger volumes
- Single level facilities
- Mostly business/carry-on only travelers
- Facilitated bag connections

References

- ATDS (2016 – 90% Draft)
  - Section 2.6 (diagrams 2-1 and 2-2)
  - Section 5.4.13
  - Code ATD-01-03; ATD-01-08; ATD-01-10
- ACRP 161 (2016)
  - Chapter 4.4.4

**Finding 7: Create dedicated egress for Global Entry and connecting passengers**Design Issues

- Congestion on exit
- Mixture of flows and cross flows
- Passengers with no bags around claim carousel

Design Features

- Separate stream for egress
- Automated exit
- Clear signage and branding
- Clear pathway and prioritize Global Entry if separate exit not possible

Airport Applicability

- High proportion of Global Entry members
- Medium to high passenger volumes
- Two level facilities
- High percentage of connections

References

- ATDS (2016 – 90% Draft)
  - Section 2.6 (Figures 2-1 and 2-2)
  - Section 7.1 and 7.2
  - Code ATD-01-03A
- ACRP 161 (2016)
  - Chapter 7.2.1

**Finding 8: Eliminate TSA re-screening for connections**Design Issues

- Pathway designed solely for re-screening

Design Features

- Future potential recognition of equivalency of foreign screening
- Secure pathway required
- Pathway for those needing to be re-screened
- Potential Global Entry benefit
- Work with TSA for faster connections screening

Airport Applicability

- High proportion of connections
- From trusted origin countries
- Bag recheck eliminated

References

- ATDS (2016 – 90% Draft)
  - None

**Finding 9: Create flexible FIS space**Design Issues

- Hall constrained with flooring issues
- Limitations from intuitive flow

Design Features

- Raised floor leaving space for cabling but able to bear loads
- Potential for heavy fixtures or screening equipment in future
- Movable officer podiums

Airport Applicability

- Any passenger volumes
- All airport types
- All passengers

References

- ATDS (2016 – 90% Draft)
  - Section 5.4.8
  - Code ATD-01-03
- ACRP 161 (2016)
  - Chapter 2.1.1

Technology

- Contactless Tap-and-Go technology for declaration submission
- Posts must occupy little space to ensure free-flow of passengers
- Movable but securely affixed to floor

Airport Applicability

- Any passenger volumes
- All airport types
- All except booth users

References

- ATDS (2016 – 90% Draft)
  - None

**Finding 10: Use a phased FIS capacity approach with growth triggers**Design Issues

- Underutilization of facilities
- Overcapacity of FIS
- Fixed capacity

Design Features

- Plan phased expansion with triggers with flexible space
- Expandable capacity only increased when triggered
- Minimize time and magnitude of underutilization and overcapacity

Airport Applicability

- Small to medium passenger volumes
- All airport types
- All passenger types

References

- ATDS (2016 – 90% Draft)
  - Section 2.7
  - Section 5.3
  - Code ATD-01-03

**Finding 11: Reduce baseline space requirements**Design Issues

- ATDS Primary space requirements are conservative
- Location-specific exceptions available

Design Features

- Calculate actual space needed to accommodate anticipated peak hour volumes
- Apply for exemption to the standards if significantly less than calculated

Airport Applicability

- Any passenger volume
- All airport types
- All passenger types

References

- ATDS (2016 – 90% Draft)
  - Section 2.7
  - Section 5.3
  - Code ATD-01-03

**Finding 12: Customize small airport facilities**Design Issues

- Baseline requirements may be overstated for small airports

Design Features

- Consolidation of Commercial and General Aviation CBP requirements
- Use of technology to save space
- Each airport will have different requirements

Airport Applicability

- Low passenger volume
- Small airports and GAF
- All passenger types

References

- ATDS (2016 – 90% Draft)
  - Section 2.7
  - Section 5.3
  - Code ATD-01-03