

ALLIANCE

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PLANNING STUDY FINAL REPORT

16 APRIL 2021

TERMINAL PLANNING STUDY

RAPID CITY REGIONAL AIRPORT, RAPID CITY, SOUTH DAKOTA

Alliance Commission No.: 2021010

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ABBREVIATIONS, ACRONYMS, AND INITIALISMS

AC	Advisory Circular (FAA)
ACRP	Airport Cooperative Research Program
ADG	Aircraft Design Group
ADRM	Airport Development Reference Manual (IATA)
ASL	Automated Screening Lanes
ATCT	Air Traffic Control Tower
ATO	Airline Ticket Office
BHS	Baggage Handling System
BPH	Bags per Hour
BPM	Bags per Minute
BSO	Baggage Service Offices
CBIS	Checked Baggage Inspection System
CBRA	Checked Baggage Resolution Area
CFR	Code of Federal Regulations
CRPG	Checkpoint Requirements and Planning Guide (TSA)
CT	Computed Tomography
DDFS	Design Day Flight Schedule
EDS	Explosive Detection System
FAA	Federal Aviation Administration
F&B	Food and Beverage
GSE	Ground Service Equipment
HVAC	Heating, Ventilation, and Air Conditioning
IATA	International Air Transport Association
LF	Linear Foot or Linear Feet
LoS	Level of Service (IATA)
LOS	Line-of-Sight
OE/AAA	Obstruction Evaluation / Airport Airspace Analysis (FAA)
PBB	Passenger Boarding Bridge
PGDS	Planning Guidelines and Design Standards (TSA)
PHP	Peak Hour Passenger
PMAD	Peak Month Average Day
RAP	Rapid City Regional Airport
RON	Remain Overnight
SF	Square Foot or Square Feet
TRB	Transportation Research Board
TSA	Transportation Security Administration
VSR	Vehicle Service Road



01 PROJECT OVERVIEW

01 PROJECT OVERVIEW

INTRODUCTION

PROJECT INTRODUCTION

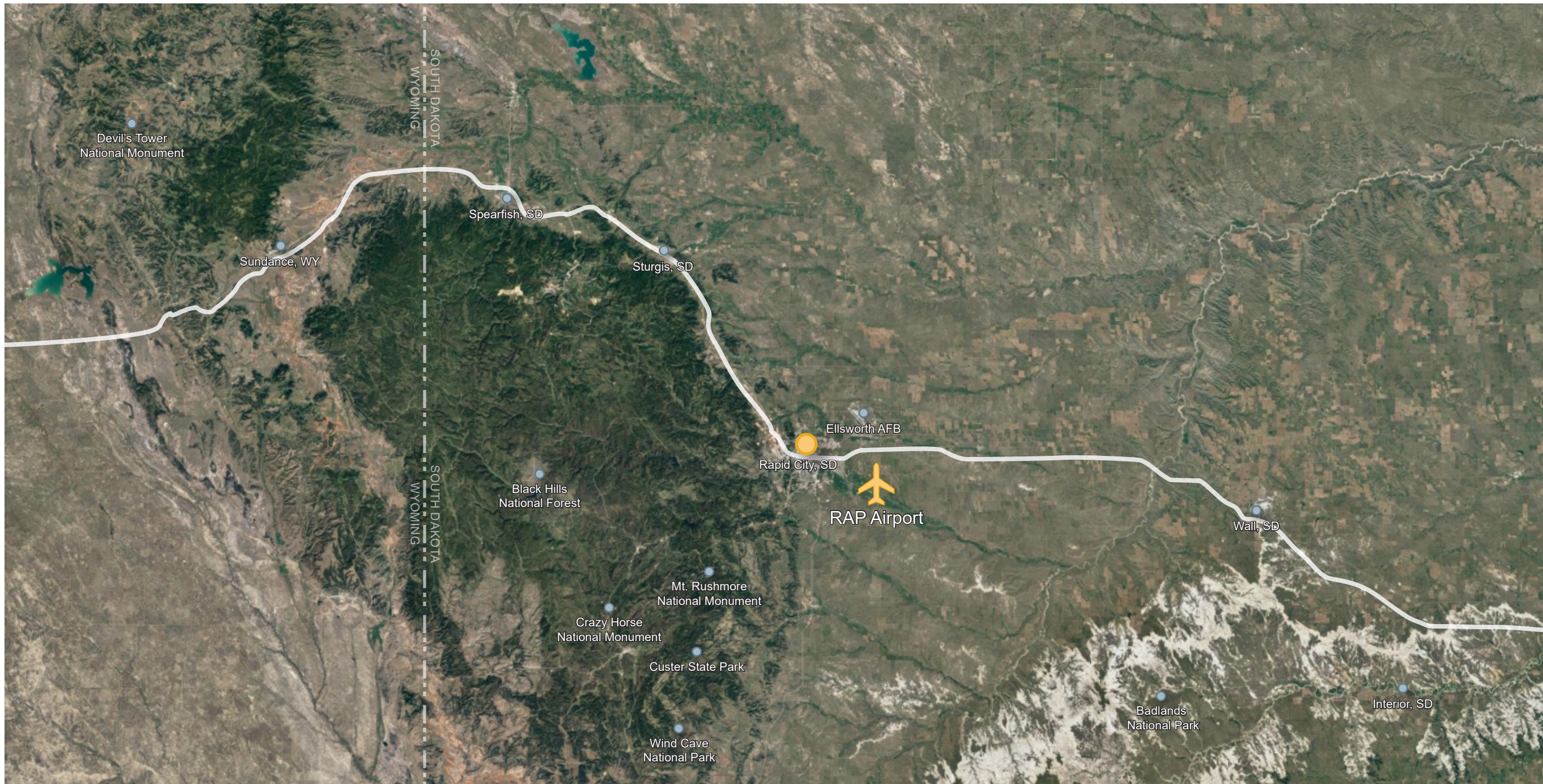
Due to recent air service and industry changes, Alliance was retained by KLJ, the prime consultant, to reassess conceptual alternatives previously developed as the basis of design for the Outbound Baggage Expansion and Check-in Reconfiguration. Together with BNP Associates, Alliance provided refinements and developed new options to serve as the revised basis of design. In addition, Alliance assessed high-level conceptual concourse and gate expansion options based on the results from the Terminal Facilities Demand/ Capacity analysis. This study included taking an inventory and tabulating the existing facilities’ terminal spaces including both public and non-public areas in order to compare demand associated with future facility requirements using a provided 20-Year Air Demand Forecast. Additional studies included alternative layouts for administration offices, pre-security concessions, inbound baggage claim expansion, and relocation of rental car facilities.

PROJECT LOCATION

Rapid City Regional Airport (RAP) serves as a gateway into Rapid City, the surrounding region, and the Black Hills National Forest with its numerous attractions and adventures. RAP is located roughly four miles southeast of downtown Rapid City, South Dakota. RAP is a portal for passengers from near and far, and the airport serves as the entry point to downtown businesses, cultural events, or shopping; National Parks and Monuments; and caves, badlands, canyons, and forests.

01 PROJECT OVERVIEW

INTRODUCTION



PROJECT CONTEXT



02 DEMAND/CAPACITY AND FACILITY REQUIREMENTS

02 DEMAND/CAPACITY AND FACILITY REQUIREMENTS

OVERALL FACILITY DEMAND

OVERALL PROJECT DEMAND

The overall terminal facility requirements were developed through the application of a variety of industry-accepted planning standards and guidelines including: ACRP Report 25, Airport Passenger Terminal Planning and Design; FAA AC 150/5360-13A, Airport Terminal Planning; FAA AC 150/5300-13A, Airport Planning; the Transportation Security Administration (TSA) Checkpoint Requirements and Planning Guide (CRPG); the TSA Planning Guidelines and Design Standards (PGDS) for Checked Baggage Inspection Systems Version 7.0; ACRP Report 130, Guidebook for Airport Terminal Restroom Planning and Design; and the International Air Transport Association (IATA) Airport Development Reference Manual (ADRM), 11th Edition. Additionally, planning factors from comparable airports around the U.S. as well as those unique to RAP, input from Airport and local TSA staff, and knowledge of industry trends informed the development of facility requirements for RAP.

IATA's Level of Service (LoS) standards are typically utilized by airport planners to qualitatively or quantitatively provide LoS planning factors at various processing functions within the terminal building. An “Optimum” LoS, often referred to as LoS “C”, was utilized when validating the functional passenger spaces; this classification is defined by IATA as providing “Good LoS; condition of stable flow; acceptable brief delays; good level of comfort.” Current utilization ratios were determined using the existing terminal lease CAD plans provided by the airport and the 2019 Design Day Flight Schedule (DDFS), which serves to establish a baseline condition of demand compared to current facility capacities.

Airport terminal facilities are typically programmed using demand associated with future projections of annual and peak hour passengers and operations. Although annual activity is a good indicator of overall airport size, peak hour volumes more accurately reflect demand for specific passenger processing functions within the terminal facilities. These peak hours are typically calculated from the peak month’s average day (PMAD) and are commonly referred to as Design Hour passengers. A ten-year 2029 DDFS was utilized for future calculations and represents the demand requirements to which all conceptual options were developed to meet.

This analysis used two types of peak passenger levels based on Preferential Use and Common Use. Preferential Use passenger levels refer to the peak activity for each carrier that occurs over a “rolling” 60-minute period based on that airline’s flight schedule. As a result, these Preferential Use peaks may happen at different times of the day and therefore do not typically coincide in the same clock hour. The assumption is that this peak demand is appropriate to use when determining the facility requirements for individual airlines that are operating under a Preferential Use agreement with the Airport. These areas include individual airline’s ticket counters, gates/holdrooms, and the baggage claim facilities. Common use peak passenger levels refer to the cumulative peak passenger volume in a given “rolling” hour for all airlines at the Airport. These common use peak demand levels are typically used for calculating non-airline specific functions such as passenger security screening, baggage screening, and public areas including general seating and meeter-greeter lobbies.

Results from the 2029 DDFS indicated a need for ten contact gates with associated passenger boarding bridges (PBB). Upon discussions with the airport, two additional gates were provided in the concourse expansion options for a total of twelve gates. This included a total of six large regional and six narrowbody size gates. The airport terminal includes a total of nearly 105,000 gross square feet. The ten-year forecast requires a total programmed area of approximately 182,000 square feet which exceeds current capacity by approximately 77,000 square feet. A majority of this additional area is allocated to areas such as outbound baggage screening and makeup, passenger gate holdrooms, and baggage claim and laydown areas. The results of the baggage space and unit requirements are described in greater detail in the following sections.

RAP Demand Comparison	2019			Forecast	
	Existing	Recommended	Capacity Threshold	2029	Capacity Threshold
General					
Annual Enplanements	343,926			514,497	
Aircraft Gates/PBB	7	8		10	
Aircraft Positions	9	8		10 +2	
Public Space					
Circulation (public seating, ticketing, concourse, bag claim, general circ)	26,090 s.f.	36,340 s.f.	✗	48,120 s.f.	✗
Ticket Lobby Queue	2,735 s.f.	3,370 s.f.	✗	4,530 s.f.	✗
Passenger Security Screening & TSA Offices	7,843 s.f.	6,380 s.f.	✓	8,780 s.f.	✗
Passenger Holdrooms	8,843 s.f.	13,770 s.f.	✗	22,490 s.f.	✗
Baggage Claim (retrieval/device/meeter&greeter)	5,359 s.f.	8,100 s.f.	✗	8,390 s.f.	✗
Restrooms (pre/post security)	3,229 s.f.	5,160 s.f.	✗	6,830 s.f.	✗
Other (Misc Tenant, information)	656 s.f.	650 s.f.	✓	650 s.f.	✓
Airline Space					
Ticketing (counter, ATO)	4,735 s.f.	4,550 s.f.	⚠	6,150 s.f.	✗
Outbound Baggage Screening	595 s.f.	18,000 s.f.	✗	18,000 s.f.	✗
Outbound Baggage Makeup	4,617 s.f.	6,960 s.f.	✗	12,320 s.f.	✗
Airside Ops/Storage	744 s.f.	760 s.f.	✗	990 s.f.	✗
Inbound Bag Claim Laydown	3,395 s.f.	3,900 s.f.	✗	3,900 s.f.	✗
Inbound/Outbound Baggage Circulation	3,325 s.f.	1,630 s.f.	✓	2,430 s.f.	✓
Baggage Service Offices (BSO)	0 s.f.	400 s.f.	⚠	400 s.f.	⚠
Concessions					
Landside/Storage (includes Rental Cars)	5,639 s.f.	4,270 s.f.	✓	5,370 s.f.	⚠
Airside/Storage	1,882 s.f.	3,330 s.f.	✗	4,980 s.f.	✗
Non-Public Space					
Airport Administration	2,474 s.f.	4,130 s.f.	✗	4,130 s.f.	✗
Restrooms/Circulation	1,423 s.f.	2,570 s.f.	✗	3,060 s.f.	✗
Airport Operations (Maintenance, Janitorial, Storage, Shops)	6,703 s.f.	2,490 s.f.	✓	3,230 s.f.	✓
Building Systems (MEP, Communications/IT, Loading Docks, Structure)	14,676 s.f.	13,290 s.f.	⚠	17,370 s.f.	✗
TOTAL GROSS (sq ft)	104,963 s.f.	140,050 s.f.	✗	182,120 s.f.	✗

Legend

✓

Programmed area is less than existing

⚠

Programmed area is at or over 85% of capacity

✗

Programmed area is greater than existing

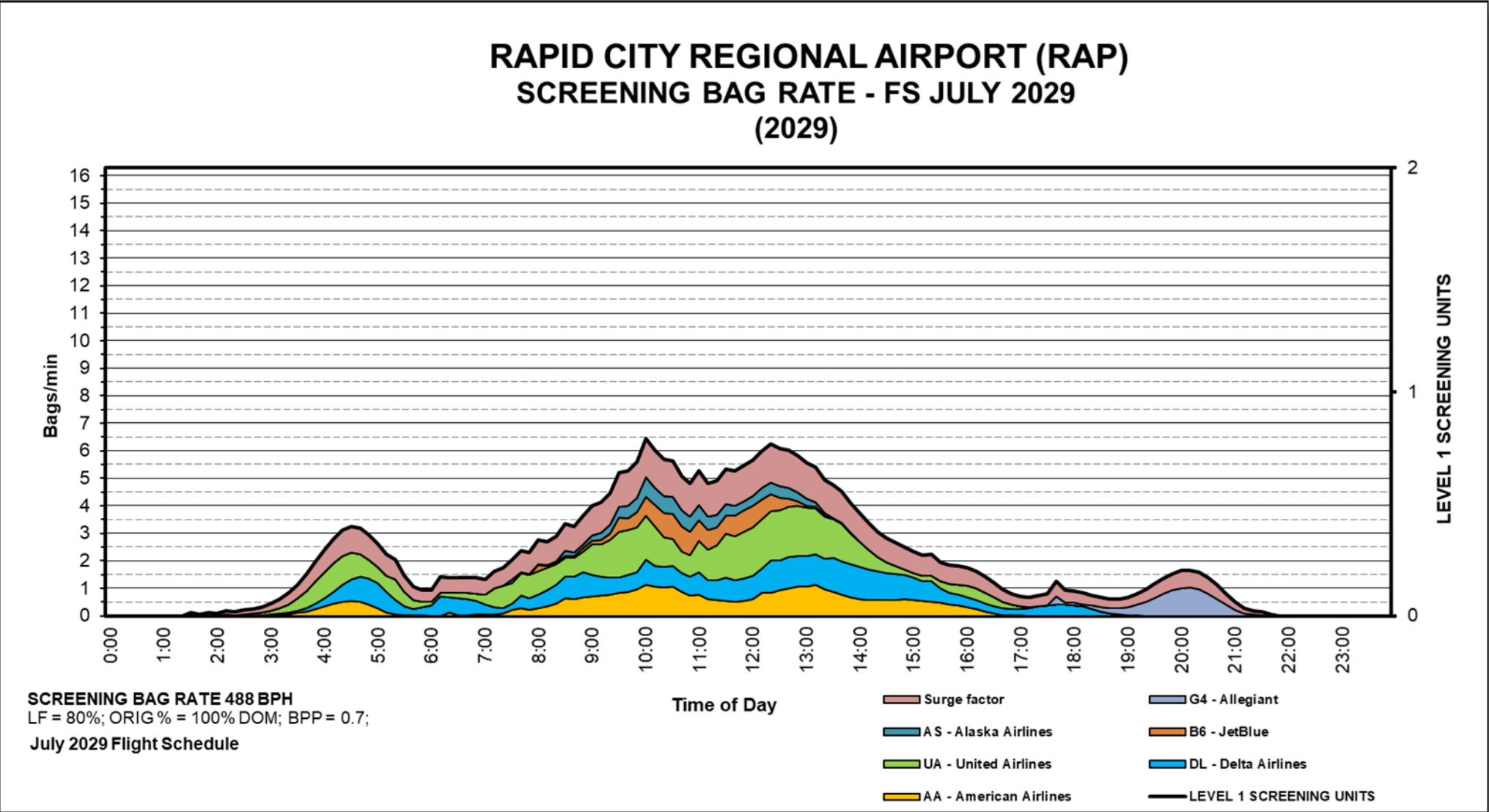
02 DEMAND/CAPACITY AND FACILITY REQUIREMENTS

BAGGAGE REQUIREMENTS

OUTBOUND BAGGAGE: EDS SCREENING

The flight schedule provided for a flight analysis was from 2019 and contains a total of 41 departure and 41 arrival flights. Following the TSA Planning Guidelines and Design Standards (PGDS) V7 guidelines in determining Explosive Detection System (EDS) equipment requirements, the surge-adjusted 10-minute demand of the design day in the design year (Date of Beneficial Use + 5) shall be used. On-screen resolution station and baggage inspection station requirements were based on the capacity of the EDS equipment. The passenger arrival profile used in the flight analysis was per PGDS V7. The design year for the new BHS in RAP is considered to be 2029.

Flight analysis shows a bag demand of 6.4 BPM or 384 BPH at the 10-min peak. This demand requires a Type I EDS for bag screening as the demand exceeds the capacity of Type II EDS device. Checked Baggage Inspection System (CBIS) and Checked Baggage Resolution Area (CBRA) are designed with Type I EDS device in an Inline configuration. One non-redundant and one redundant EDS of Type I, L3-6700 with 505 BPH capacity, will be adequate for the bag screening demand until 2042. Then two non-redundant and one redundant EDS will be required. The outbound inline system requires an estimated minimum combined area for CBIS and CBRA of 16,000 square feet. This area has space allocated for a third EDS shunt line which can be added in the future to meet the anticipated bag screening demand in 2042. Graph 1 to the left presents the bag screening demand calculated for design year 2029.



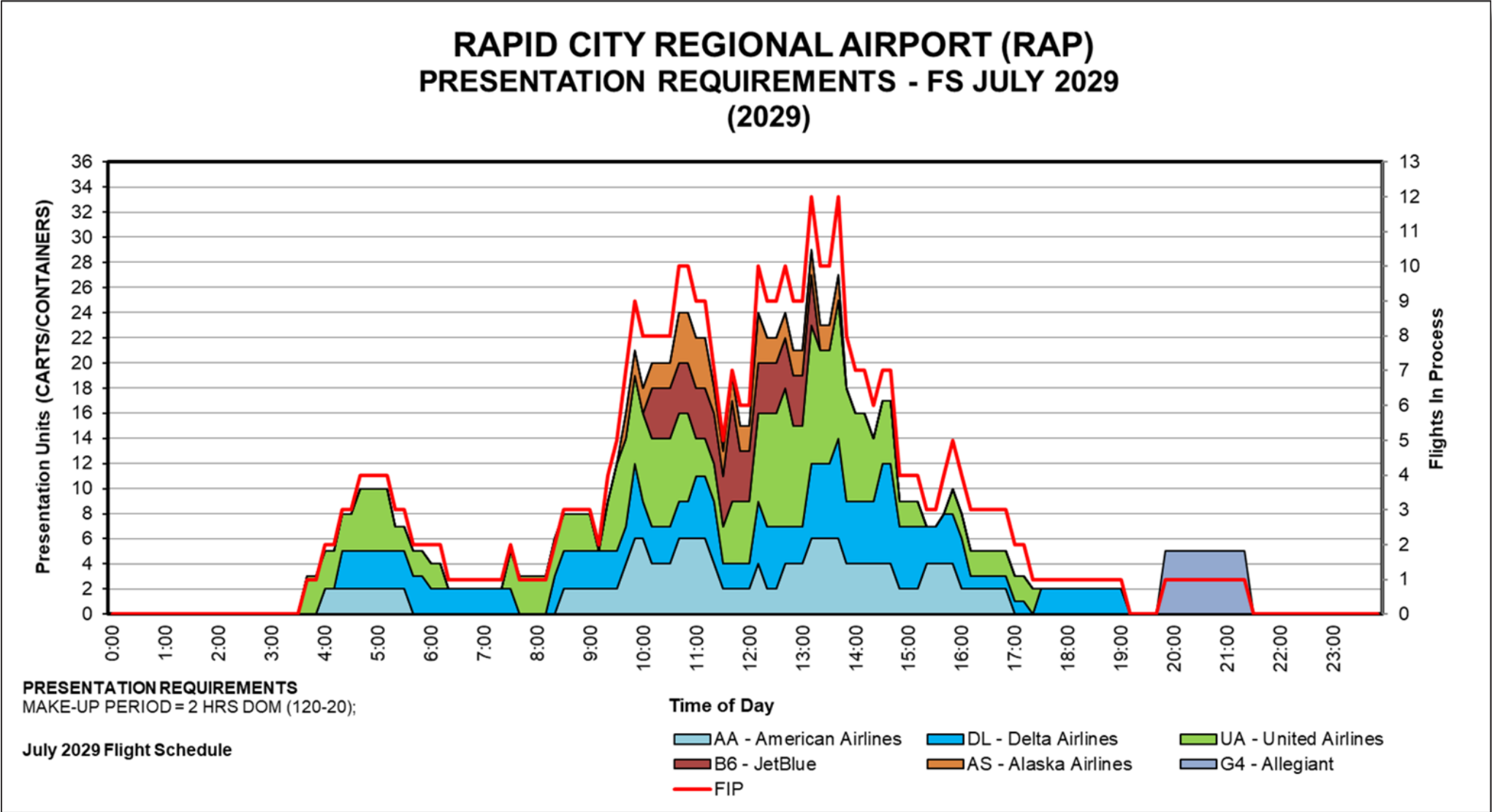
GRAPH 1: EDS REQUIREMENTS

02 DEMAND/CAPACITY AND FACILITY REQUIREMENTS

BAGGAGE REQUIREMENTS

OUTBOUND BAGGAGE: MAKEUP

It is assumed that the make-up devices are opened for a flight starting 120 minutes before and ending 20 minutes prior to standard time departure. The total number of flights in process at the peak is 12 and the total number of cart presentation required is 29. Since the cart presentation peak is only for a short period of time, ten minutes, the following peaks were considered for sizing the make-up devices. Graph 2 at right shows that most of the peaks require a maximum of 24 cart presentation, therefore a total of two make-up devices will be adequate for the projected demand in design year 2029, each with a capacity of 12 cart presentation.



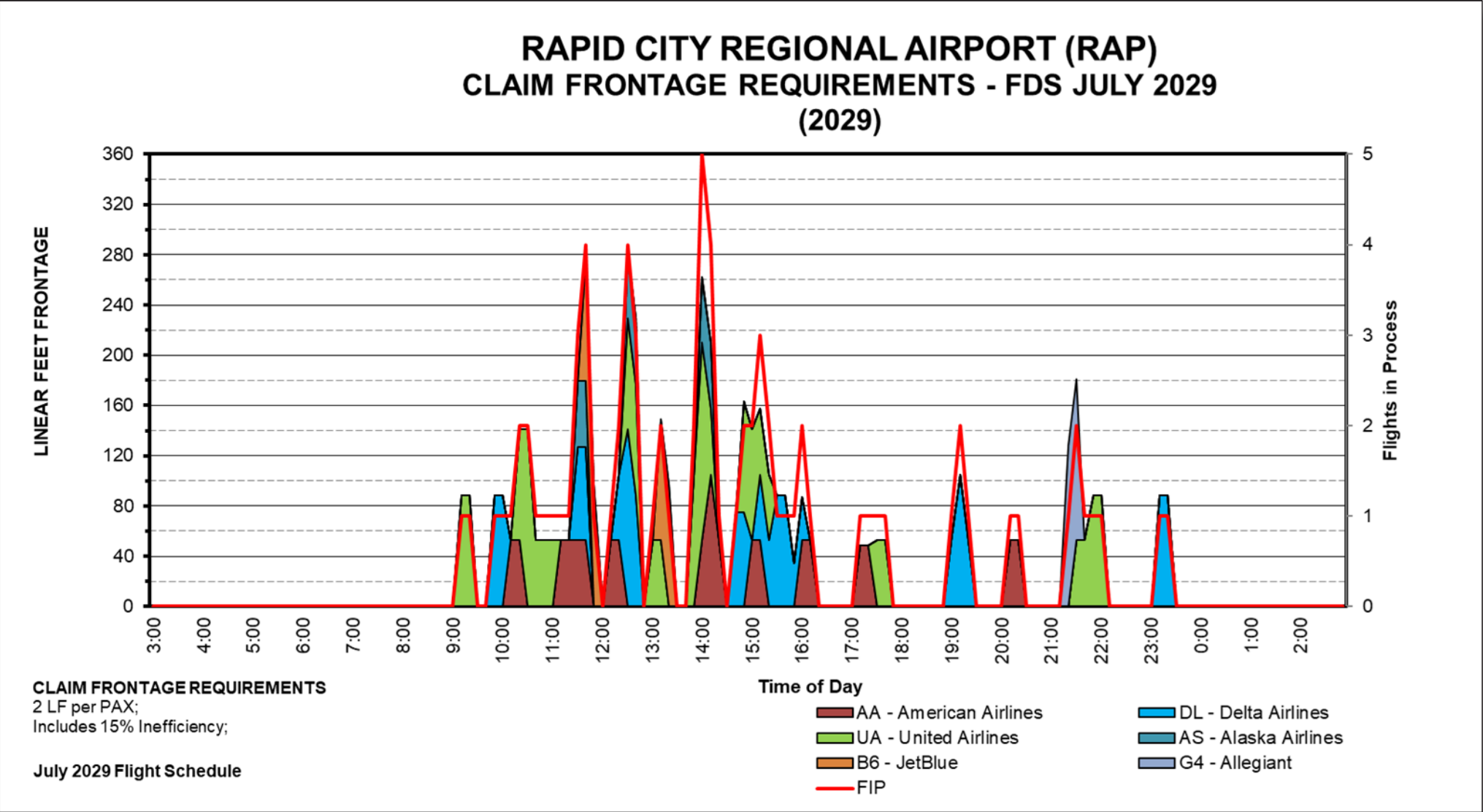
GRAPH 2: BAGGAGE MAKEUP REQUIREMENTS

02 DEMAND/CAPACITY AND FACILITY REQUIREMENTS

BAGGAGE REQUIREMENTS

INBOUND BAGGAGE: CLAIM FRONTAGE

The results of the flight analysis for the inbound portion are illustrated in Graph 3 at right. A total of 282 linear feet of claim presentation is required and five concurrent flight arrivals will be processed at the peak. There are two claim devices currently in operation in RAP, each with a claim presentation of 84 linear feet for a total of 164 linear feet of frontage. Two additional new claim devices, with the same size as existing, will be adequate for the projected demand in design year 2029.



GRAPH 3: BAGGAGE CLAIM FRONTAGE REQUIREMENTS



03 SITE PLANNING OPTIONS

03 PLANNING OPTIONS

PREFERRED OPTION

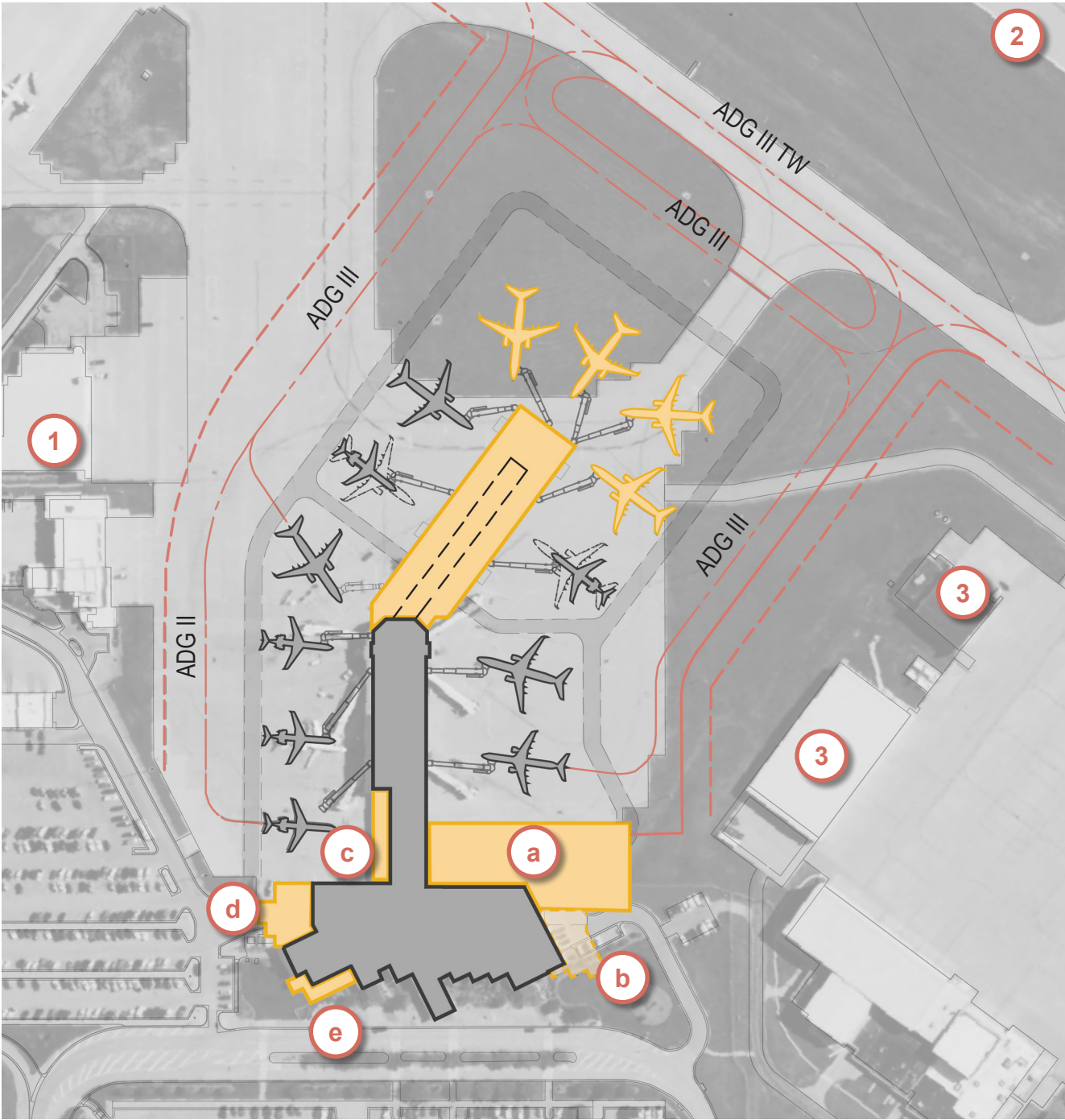
SITE LAYOUT: PREFERRED OPTION — FULL BUILD

The preferred option provides a total of twelve bridged gates plus an additional remain overnight (RON) parking position which shares a passenger boarding bridge (PBB) with the adjacent gate. This increases existing parking capacity by four positions and PBB gates by five. These gates consist of six Large Regional (CR7/9, E75) and seven Narrowbody (739, A320) type aircraft including the RON position. In order to provide the greatest apron parking flexibility, nine of the thirteen parking positions allow for Narrowbody aircraft (739). Due to existing site constraints, the three existing gates on the southwest (Gates 2, 4, and 6) and existing Gate 1 to the southeast are restricted to Regional aircraft. Due to the existing ARFF building and tenant (Fugro) to the northwest, the preferred option “dog-legs” the concourse to the northeast a length of approximately 362 feet. This allows Narrowbody aircraft parking capability along the north face of the new expanded concourse. Apron access to the gates is from existing Taxiway A and is facilitated by the use of Aircraft Design Group (ADG) III taxilanes along all sides of the concourse, with the exception of Gates 2, 4, and 6 where the taxilane narrows to a ADG II. A new vehicle service road (VSR), located at the tails of the aircraft, runs the entire perimeter of the concourse. The VSR has a cross-over running under the departure level occurring just after the “elbow” of the new expansion. The double-loaded expanded concourse provides a width of nearly 100 feet allowing for increased gate holdroom depths.

An expansion of the building to the east of the existing terminal (a) allows for a new consolidated EDS baggage screening matrix and makeup area. A two-bay ticketing expansion (b) to the southeast is also provided to meet the 10-year demand requirements. The increased footprint for the checkpoint will be accommodated by an expansion to the west (c) at the existing checkpoint. An additional flat plate “T” baggage claim device and increased baggage laydown and circulation is also provided in a building expansion (d) to the northwest face of the existing terminal. Additionally, rental car counters and offices are relocated to a curbside building expansion (e) opening space for additional baggage claim retrieval and circulation.

DIAGRAM KEY NOTES

- Site Context
 - Fugro
 - Runway 14/32
 - Army National Guard
- Building Expansion
 - Baggage Screening
 - Ticketing
 - Checkpoint
 - Baggage Claim and Laydown
 - Rental Cars



03 PLANNING OPTIONS

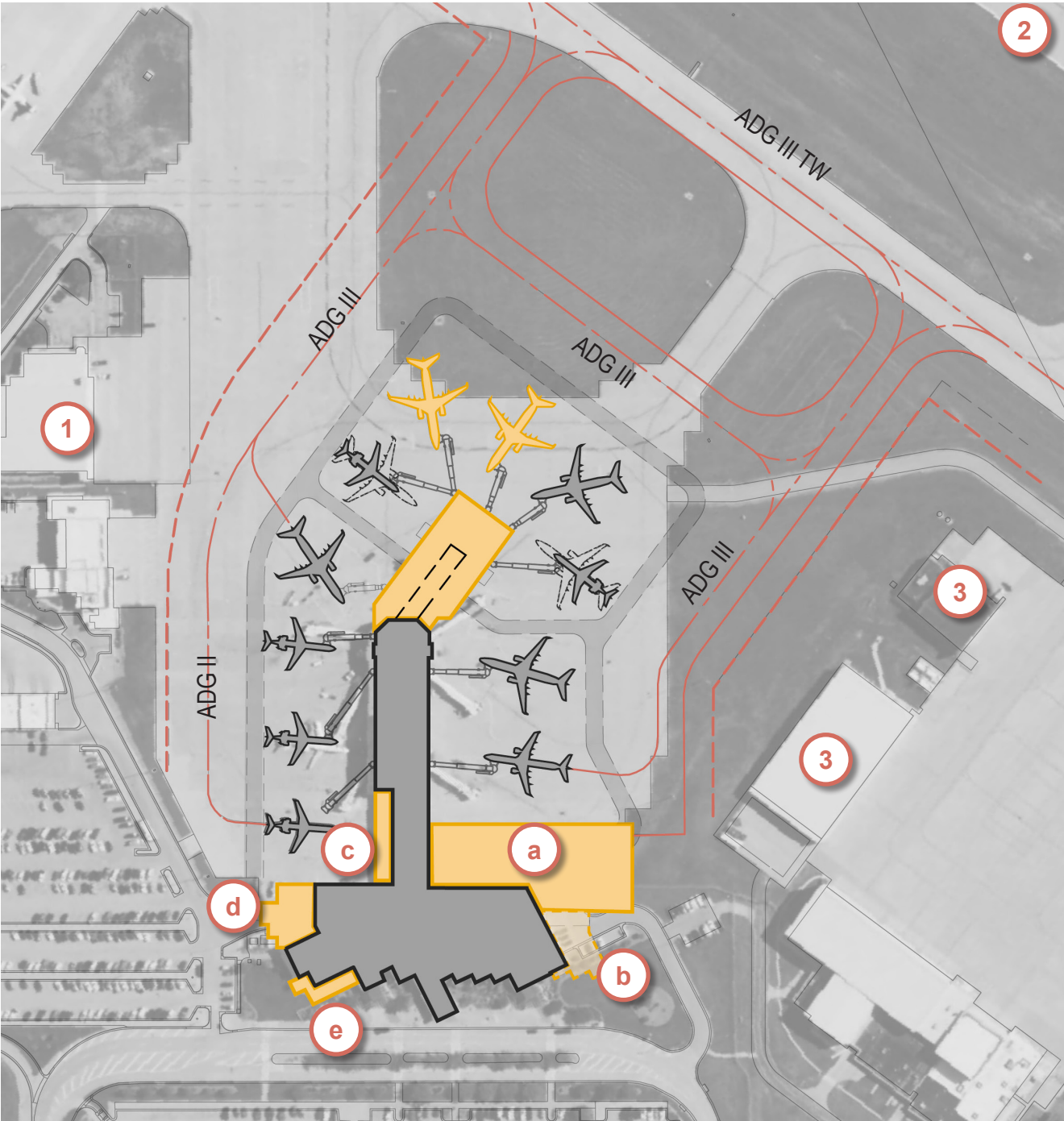
PREFERRED OPTION

SITE LAYOUT: PREFERRED OPTION — REDUCED BUILD

Should funding capacity become a constraint, a reduced ten gate option was developed in order to meet the gate capacity need derived from the 2029 DDFS. This option provides six bridged regional gates and four bridged narrowbody gates, plus an additional narrowbody RON parking position. This position shares a PBB with the adjacent gate located at the end of the concourse. The expansion requires a build-out of approximately 207 feet in length, a reduction of 155 feet from the Full Build option. All other characteristics of the terminal and concourse expansion follow that of the Full Build.

DIAGRAM KEY NOTES

- Site Context**
 - 1. Fugro
 - 2. Runway 14/32
 - 3. Army National Guard
- Building Expansion**
 - a. Baggage Screening
 - b. Ticketing
 - c. Checkpoint
 - d. Baggage Claim and Laydown
 - e. Rental Cars



SITE CONCEPT: PREFERRED OPTION FULL BUILD

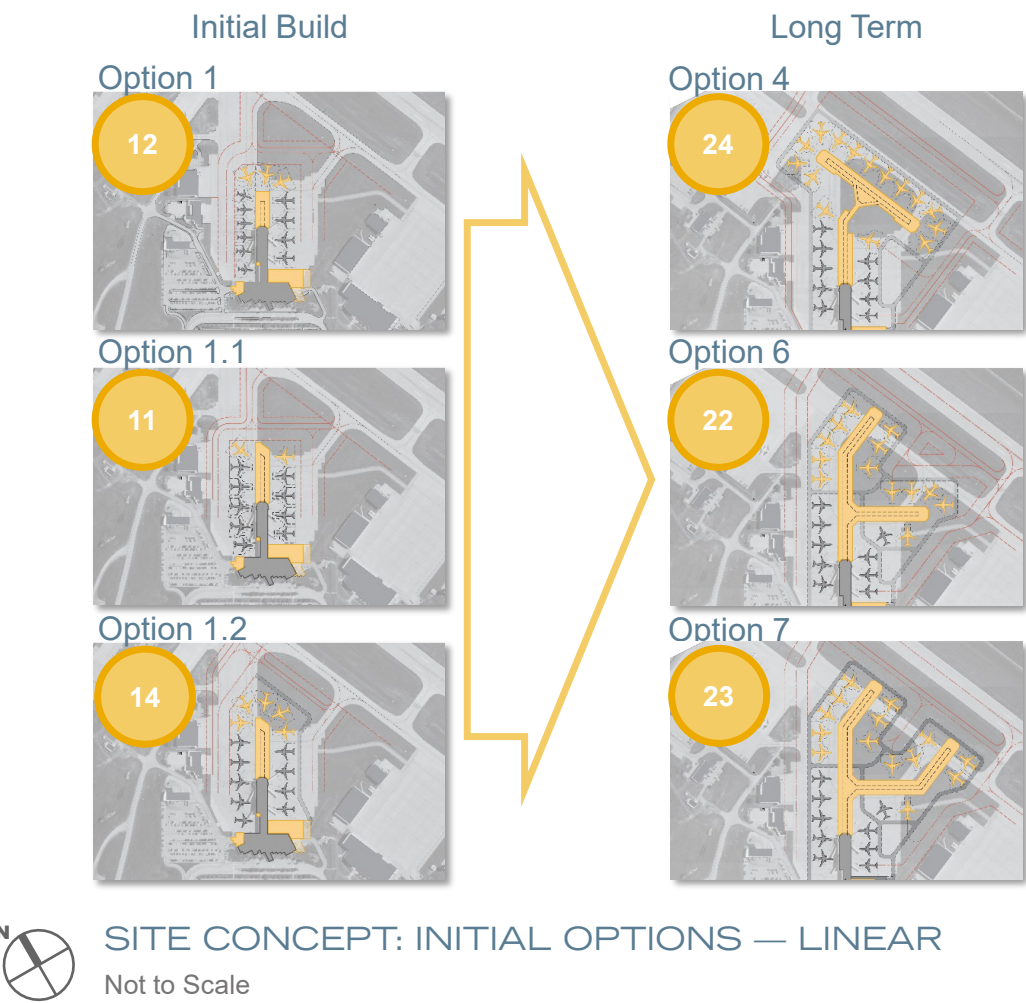
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03 PLANNING OPTIONS

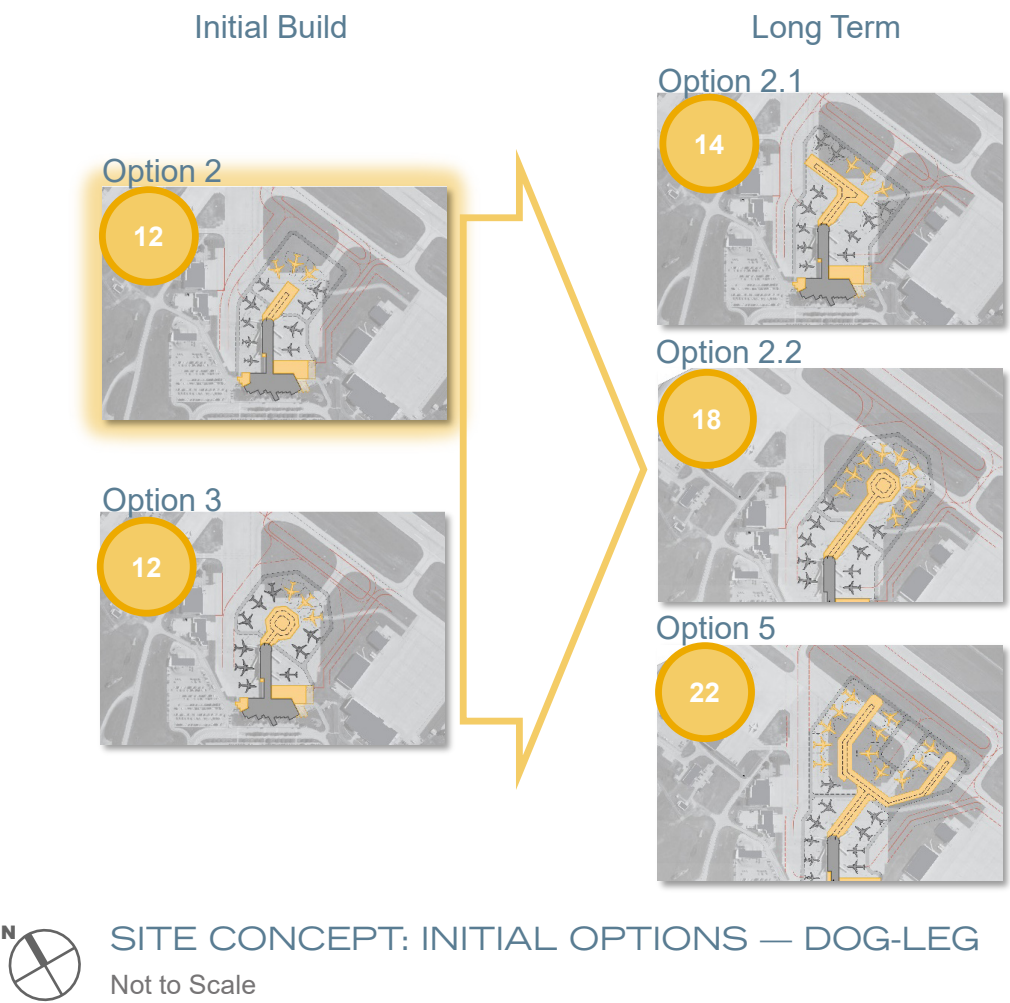
OTHER OPTIONS

SITE LAYOUT: INITIAL OPTIONS

Several site expansion layout options were studied based on existing site constraints that include Runway 14/32 to the north, the Army National Guard to the east, and Fugro to the west. The development of each site option utilized industry-accepted planning parameters such as those identified in FAA AC 150/5300-13A and ACRP Report 25 relative to taxiway and taxilane dimensional criteria, aircraft parking depth and wingtip spacing, concourse width, and associated gate planning. A total of eleven options were developed and grouped according to two major site expansion orientations (“Linear” and “Dog-Leg”) and subgrouped by the initial 10-year demand and future long-term potential. These options were developed to evaluate the extents of the site in regards to providing the most effective layout in terms of initial ten-year and future long-term gate capacity and apron aircraft parking and maneuvering efficiency. Refer to the appendix for additional content regarding the other options studied.



 SITE CONCEPT: INITIAL OPTIONS — LINEAR
Not to Scale



 SITE CONCEPT: INITIAL OPTIONS — DOG-LEG
Not to Scale

03 PLANNING OPTIONS

PREFERRED OPTION — LINE OF SIGHT ANALYSIS

AIR TRAFFIC CONTROL TOWER — LINE OF SIGHT (LOS)

As stated in the FAA Advisory Circular on Terminal Planning (AC 150/5360-13A):

“It is critical to ensure the terminal building, related structures, and aircraft parked at gates will not compromise visibility from the ATCT. An unobstructed view of all controlled movement areas is required. This includes all runways, taxiways, any other landing areas, and air traffic in the vicinity of the airport.”

Full Build and Reduced Build concourse options were reviewed for potential line-of-sight (LOS) issues as shown below.



FIGURE 1:
LINE-OF-SIGHT SHADOWS: PREFERRED OPTION FULL BUILD — ESTIMATED

FULL BUILD

The Full Build concourse expansion stops close to, but short of the LOS from the ATCT to the end of Runway 5. Aircraft parked on on the east end of the concourse may obstruct LOS depending on aircraft tail height. While further analysis would be required to determine potential limitations on aircraft parked on the end of the concourse, Figure 1 provides a general idea of shadowing from “taller” aircraft operating out of RAP like the Airbus A-320 and Boeing 737-800 for the Full Build. Refer to the Appendix (pg. 41) for a general idea of shadowing from “shorter” aircraft operating out of RAP like the CRJ-900.

REDUCED BUILD

The Reduced Build concourse expansion and parked aircraft associated with this option are not expected to obstruct LOS from the ATCT as shown in Figure 2.



FIGURE 2:
LINE-OF-SIGHT SHADOWS: PREFERRED OPTION REDUCED BUILD — ESTIMATED

03 PLANNING OPTIONS

PREFERRED OPTION — PART 77 ANALYSIS

AIRSPACE — 14 CFR PART 77 ANALYSIS

The FAA Advisory Circular on Terminal Planning (AC 150/5360-13A) states:

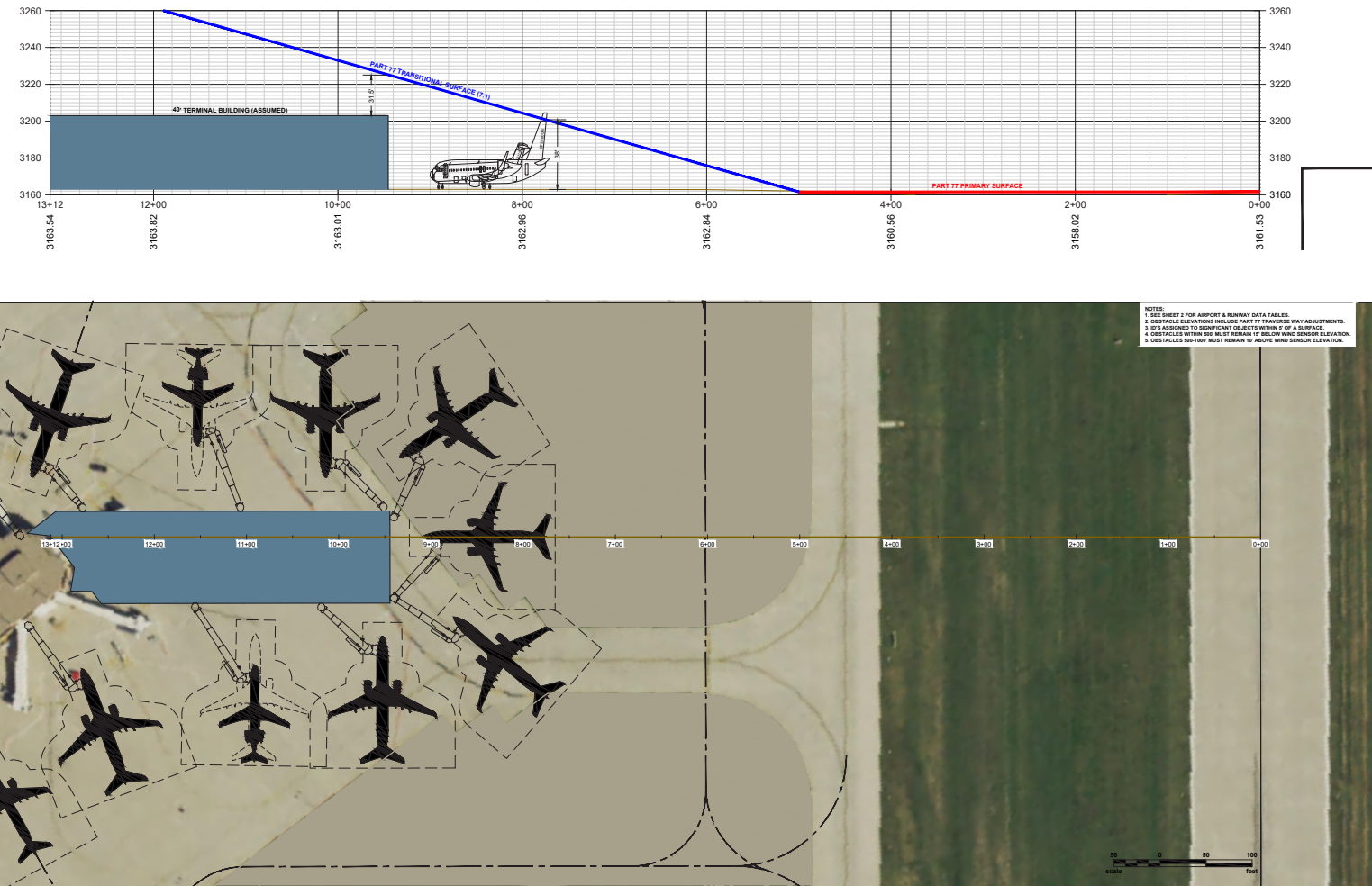
“Airport owner/operators must site passenger terminal facilities and associated vehicles (e.g., aircraft at gate positions) in compliance with airport imaginary surfaces and airspace.”

FULL BUILD

The “full build” concourse expansion building footprint would be below Part 77 Imaginary Surfaces as shown at right. Aircraft with tail heights greater than 38 feet may penetrate the Transitional Surface for parking positions on the east end of the concourse. The FAA Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) process may result in a “Determination of No Hazard to Air Navigation” if analysis finds aircraft tail penetrations to the Transitional Surface will not have a “substantial aeronautical impact to air navigation” as detailed in 14 CFR Part 77.31.

REDUCED BUILD

The Reduced Build concourse and parked aircraft associated with this option would not penetrate Part 77 Imaginary Surfaces.



PART 77 TRANSITIONAL SURFACE: PREFERRED OPTION — FULL BUILD



04 CONCEPTUAL DESIGN

04 CONCEPTUAL DESIGN

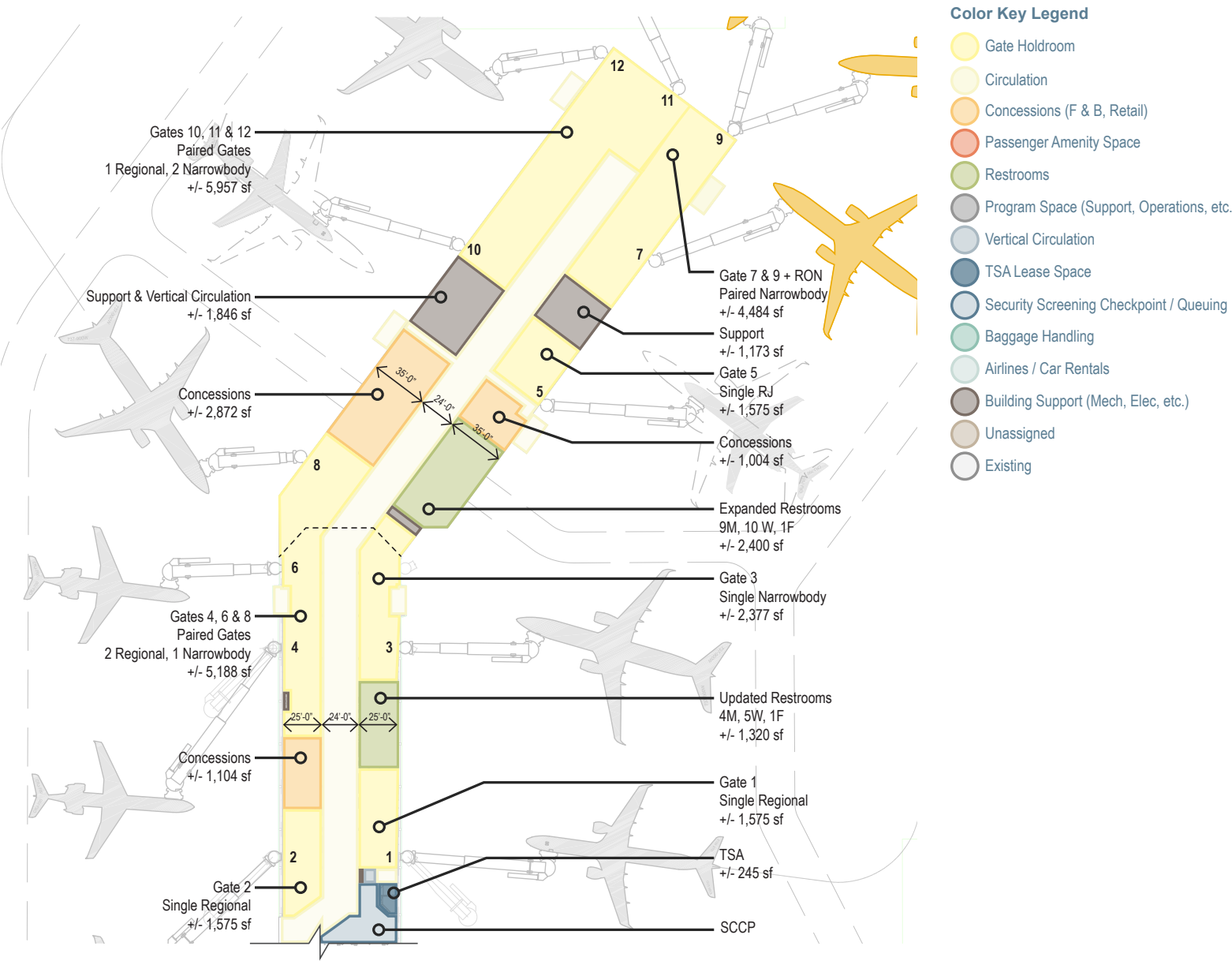
PREFERRED OPTION

CONCOURSE EXPANSION PLAN — FULL BUILD

The design approach for the interior planning of the Full Build concourse expansion concept focused on providing appropriately-sized gate holdrooms for all gates, in line with their scheduled aircraft. Gate holdroom spaces within the modernized existing portion of the concourse were sized to work within the existing 75-foot width of the concourse, while still maintaining adequate central circulation space. The 25-foot depth of these gate holdrooms is less than the recommended 35 feet, but the overall gate holdroom areas meet the recommended size guidelines. The width at the concourse expansion increases to 95 feet to provide the recommended 35-foot clear depth at all gate holdroom spaces.

The existing concessions and restroom spaces within the existing concourse are modernized with a somewhat reduced footprint to serve the initial gates. Additional concessions and restroom spaces are identified in the expansion providing the required overall areas for each, while placing them at a convenient location for the remaining larger gates. Additional support spaces including vertical circulation, mechanical and service spaces are also allotted space within the concourse; the position of these spaces will adjust in later phases based on the requirements of the systems selected as the design progresses.

While not shown, twenty percent additional apron level tempered space would be provided for areas such as mechanical, electrical, and operations space.



CONCEPT PLAN: FULL CONCOURSE EXPANSION

Not to Scale

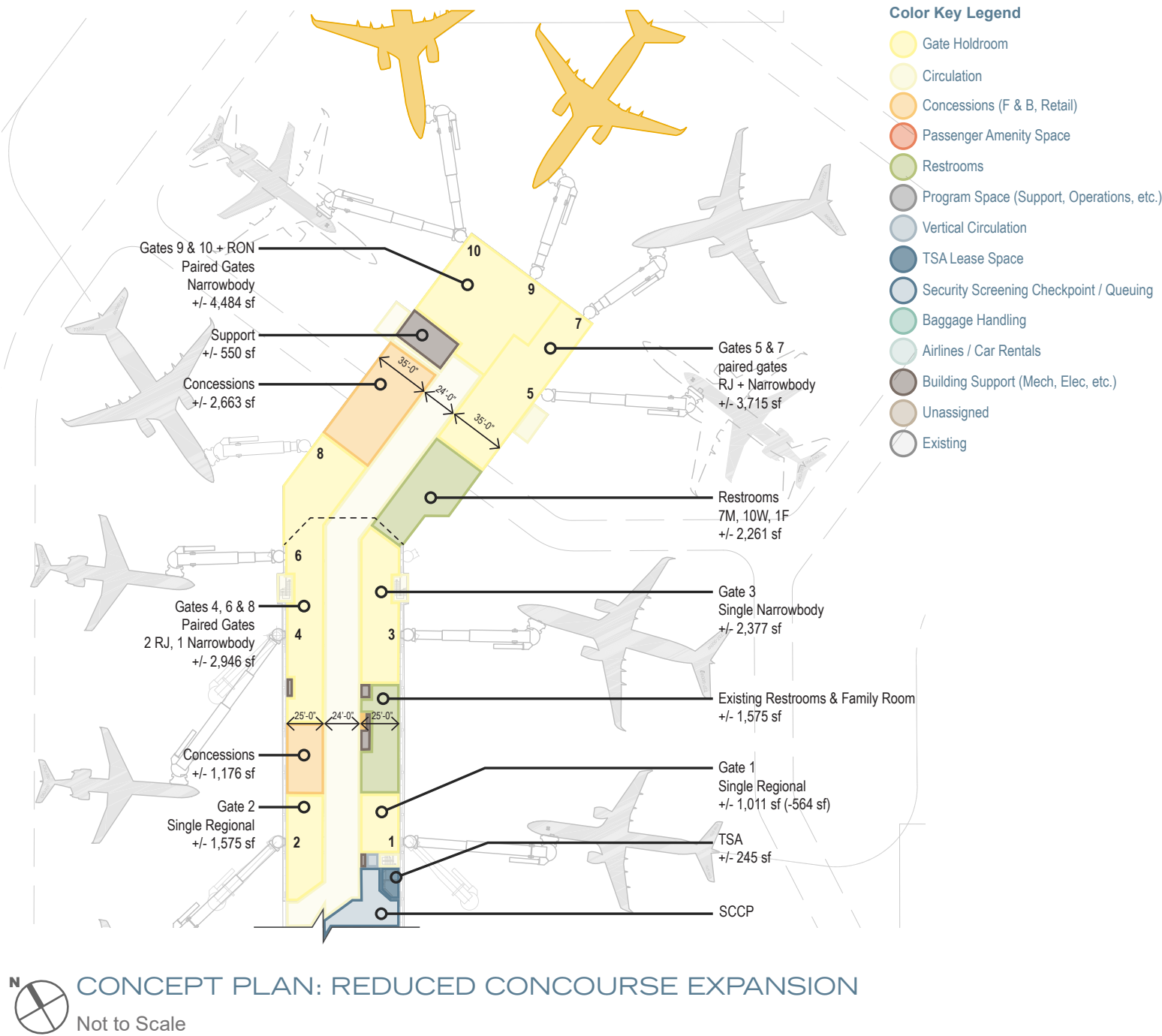
04 CONCEPTUAL DESIGN

PREFERRED OPTION

CONCOURSE EXPANSION PLAN — REDUCED BUILD

The design approach for the interior planning for the ten-gate reduced build concourse expansion concept focused on providing appropriately-sized gate holdrooms for all gates with the exception of Gate 1. This Reduced Build option looked at minimizing the impact to operations within the existing spaces while modernizing all areas of the existing concourse. All gate holdroom spaces within the modernized existing portion of the concourse were sized to work within the existing 75-foot width of the concourse, while still maintaining adequate central circulation space. The 25-foot depth of these gate holdrooms is less than the recommended 35 feet, but the overall gate holdroom areas meet the recommended size guidelines. The width at the concourse expansion increases to 95 feet to provide the recommended 35-foot clear depth at all gate holdroom spaces.

In this lower impact option, the existing restroom is modernized but not relocated. This results in a slightly undersized area available for Gate 1. The existing concessions are modernized although the footprint is reduced somewhat to provide additional area for Gate 2. This layout works to preserve the existing back of house / kitchen zone to maintain existing services and pathways. Additional concessions and restroom spaces are identified in the expansion to provide the required overall areas for each, while placing them at a convenient location for the remaining larger gates. Additional support spaces including vertical circulation, mechanical, and service spaces are also allotted space within the concourse. The position of these spaces will adjust in later design phases based on the requirements of the systems selected as the design progresses.



04 CONCEPTUAL DESIGN

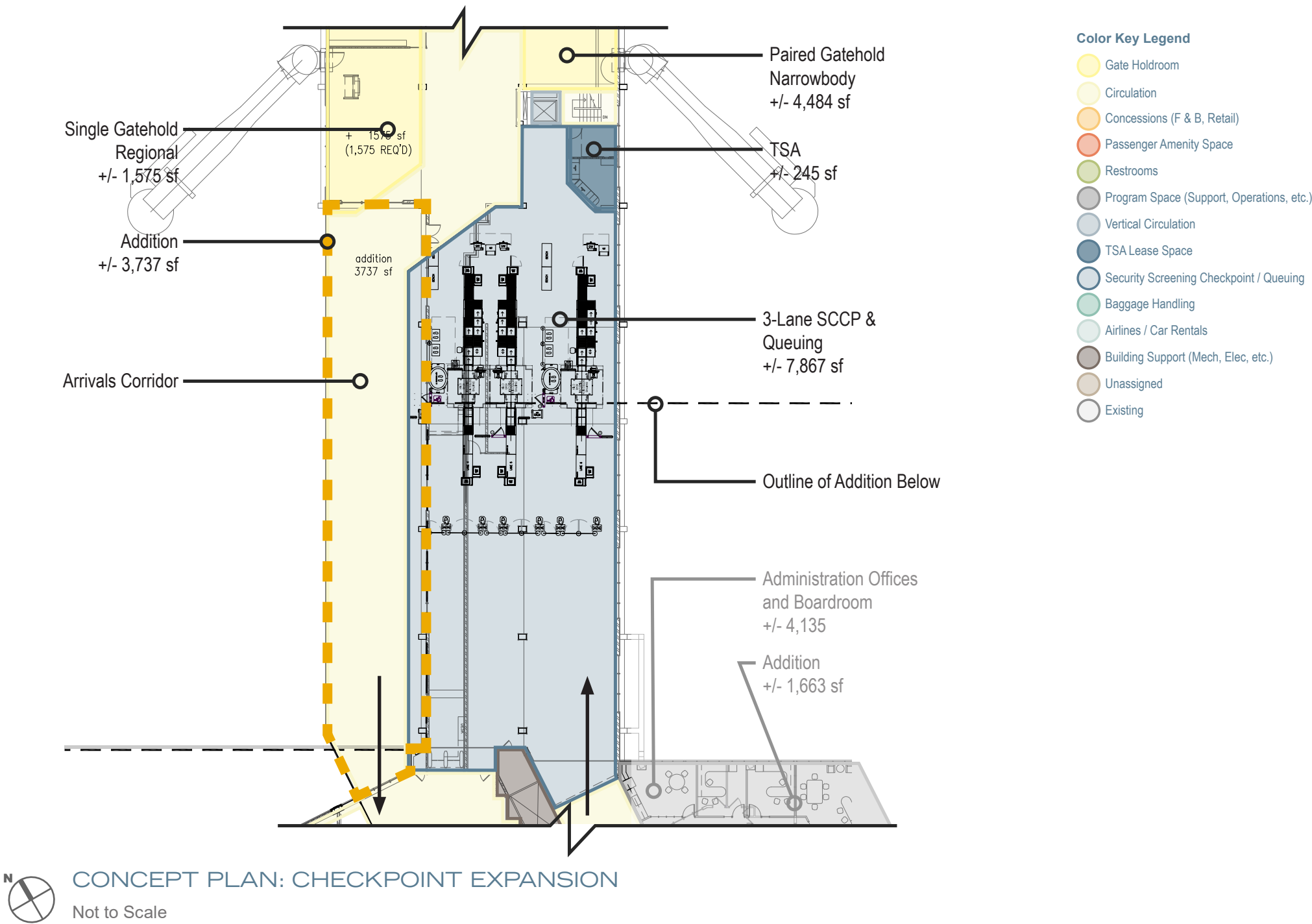
PREFERRED OPTION

CHECKPOINT EXPANSION — FUTURE

Results from the Facility Requirements analysis indicate the potential that a third security screening lane would be required by the 2029 demand year. Future planning requirements and layouts are based on the TSA Checkpoint Requirements and Planning Guide (CRPG) published in May 2020. Demand calculations were based on the common use peak hour since all airlines utilize a single consolidated checkpoint for passenger screening. Requirements were also based on the following planning guidelines and communication from local TSA:

- A peak 30-minute demand of approximately 36 percent of the departing peak hour calculated from the 2029 DDFS
- A passenger split of approximately 30% PreCheck versus 70% Standard passengers
- Average throughput of 225 and 150 passengers per lane per hour for PreCheck and Standard passengers, respectively
- An additional 10% of the daily enplanement activity added for capacity for employee and crew screening
- Industry acceptable maximum waiting time of ten minutes in the queue
- TSA planning recommendation of 600 square feet queuing area per lane

While the total overall length of the existing checkpoint appears to be adequate, additional width would be required for the installation of a new, third screening lane meeting current and future TSA equipment spacing and space required guidelines. The additional width would also allow the implementation of Computed Tomography (CT) X-ray equipment, part of TSA's Checkpoint Property Screening Systems (CPSS) program, as well as the potential use of a variety of Automated Security Lane (ASL) systems.



04 CONCEPTUAL DESIGN

PREFERRED OPTION

PRE-SECURITY CONCESSIONS AND ADMINISTRATION OFFICES

PREFERRED OPTION

The concourse level Commons area, just outside of the security screening checkpoint (SSCP), provides a great opportunity to maximize views to the Black Hills for passengers and meeters-greeters alike. The Preferred Option focuses on right-sizing the pre-security concessions zone while maintaining the existing back-of-house zone, in addition to providing a greater range of seating options and locations, including both lounge seating and tables and chairs. The updated Concessions space is envisioned to offer both table and bar service as well as grab-and-go options, supporting meeters-greeters wishing to wait in the soft seating lounge or along the updated observation deck with its views to the Black Hills.

The addition of the new Arrivals Corridor at the SSCP would allow the Administration Suite to expand out into the space previously required as an entrance into the screening area. The new expanded Administration Suite is reconfigured to provide a clearly organized office area, including an expanded reception area, six offices, conference and support spaces, as well as a large Board Room.

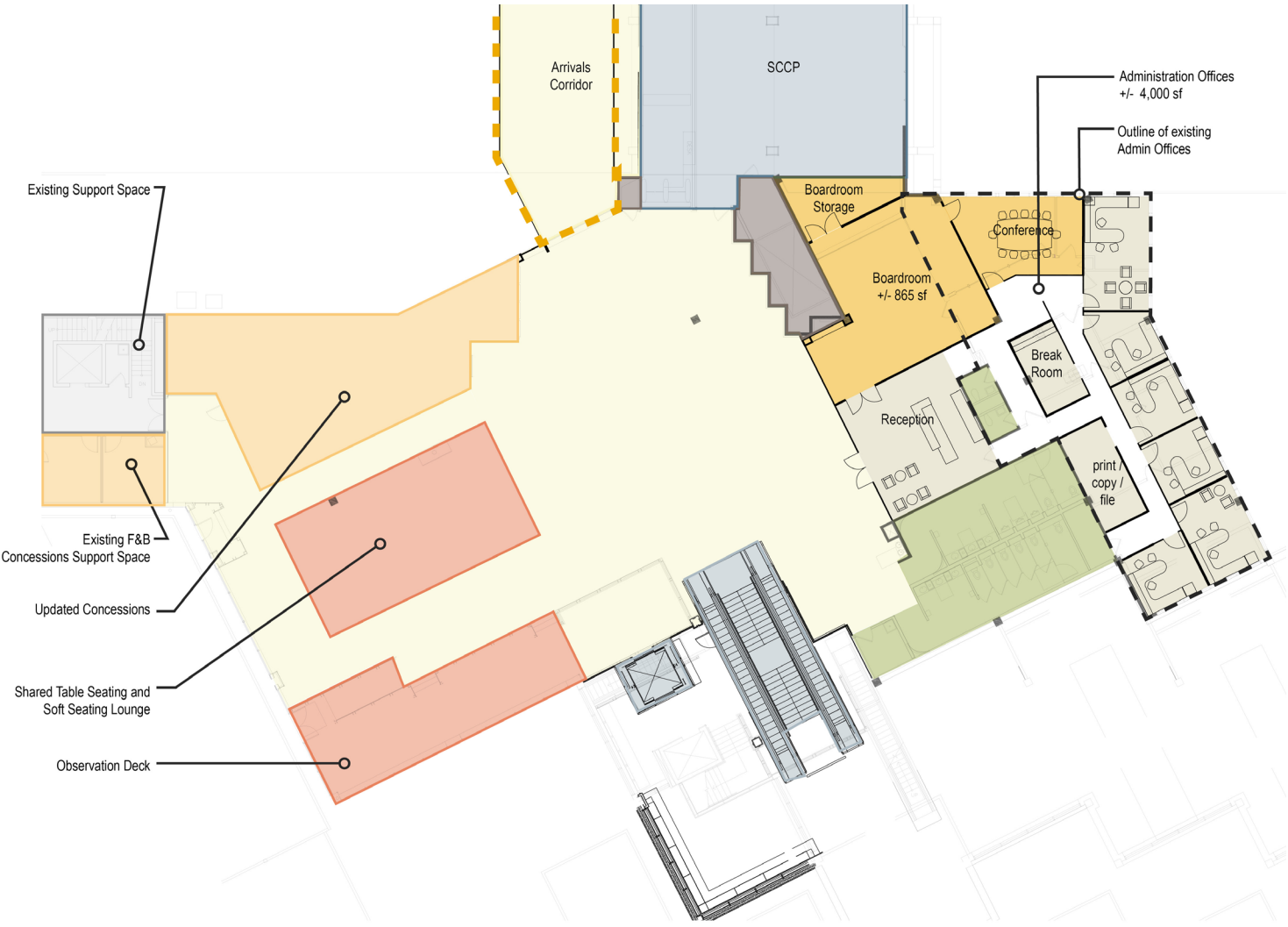
OTHER OPTIONS

Refer to appendix (pg. 34-35) for other options studied relative to the layout of the Pre-Security Concessions and Administration Offices area.

TICKETING, BAGGAGE SCREENING, BAGGAGE MAKEUP, CLAIM HALL, AND CAR RENTALS

PREFERRED OPTION

Updates to the ticketing level focused on creating a consolidated in-line baggage screening area incorporating the required TSA screening equipment as well as space for a future third screening device and oversize baggage screening. This automated system delivers the screened baggage to two baggage makeup devices with frontage for 24 carts. A dedicated zone outside of oversize screening is provided for pickup of these items. The in-line baggage screening area requires roughly 31,000 square foot addition. The existing spaces previously utilized for individual airline bag screening and makeup is reconfigured to provide ATO space and restrooms to support both airline and bag handling personnel. This preferred option also plans for the future expansion of the Ticketing Hall with areas for expanded ticket counters, ATOs, and takeback belts connected to the in-line screening area.



CONCEPT PLAN: CONCOURSE LEVEL CONCESSIONS AND ADMINISTRATION OFFICES

Not to Scale

04 CONCEPTUAL DESIGN

PREFERRED OPTION

On the west (Arrivals) side of the Ticketing level an addition provides space to accommodate a third required claim device. There is sufficient available space to replace the existing claim device, closest to Ticketing, allowing for a larger device when needed.

The loading dock is relocated from its current position to provide the space for the third claim device. It is located on the west side of the addition, accessed by the existing service road.

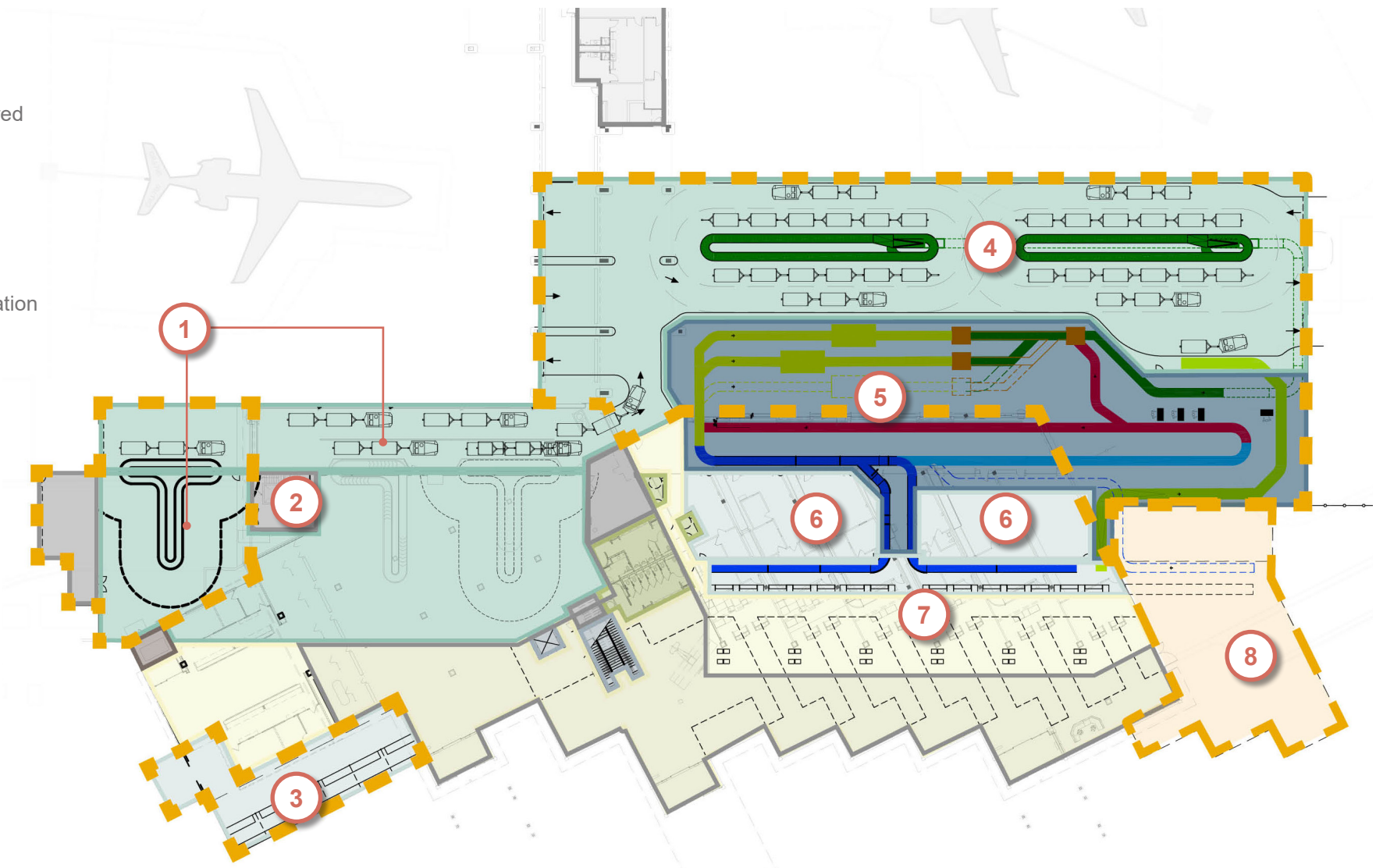
Relocating car rentals to a smaller building addition adjacent to the curbside frees up much needed circulation and waiting space adjacent to the claim devices and remains directly accessible to the rental car lot. The overall Arrivals area addition and renovation totals roughly 13,000 square feet.

OTHER OPTIONS

Refer to appendix (pg. 36-37) for other options studied relative to the layout of these areas.

PLAN KEY NOTES

- 1. Addition for new Loading Dock third 100-150 LF Claim Device, and expanded laydown area (+/- 6,000 sf)
- 2. New enclosure at existing vertical circulation
- 3. New addition for Car Rental (+/- 2,800 sf)
- 4. Baggage Makeup addition for two 160 LF Baggage Makeup flat plate carousels, 24-cart capacity (+/- 20,000 sf)
- 5. EDS Baggage Screening area
- 6. ATOs
- 7. New Ticket Counters & Scales: 28 positions
- 8. Future Ticketing Hall expansion (+/- 6,000 sf)



Color Key Legend

- | | |
|---|---|
| Gate Holdroom | TSA Lease Space |
| Circulation | Security Screening Checkpoint / Queuing |
| Concessions (F & B, Retail) | Baggage Handling |
| Passenger Amenity Space | Airlines / Car Rentals |
| Restrooms | Building Support (Mech, Elec, etc.) |
| Program Space (Support, Operations, etc.) | Unassigned |
| Vertical Circulation | Existing |



CONCEPT PLAN: TICKETING LEVEL BAGGAGE SCREENING, ATOS, BAGGAGE MAKEUP, CLAIM HALL, AND CAR RENTALS

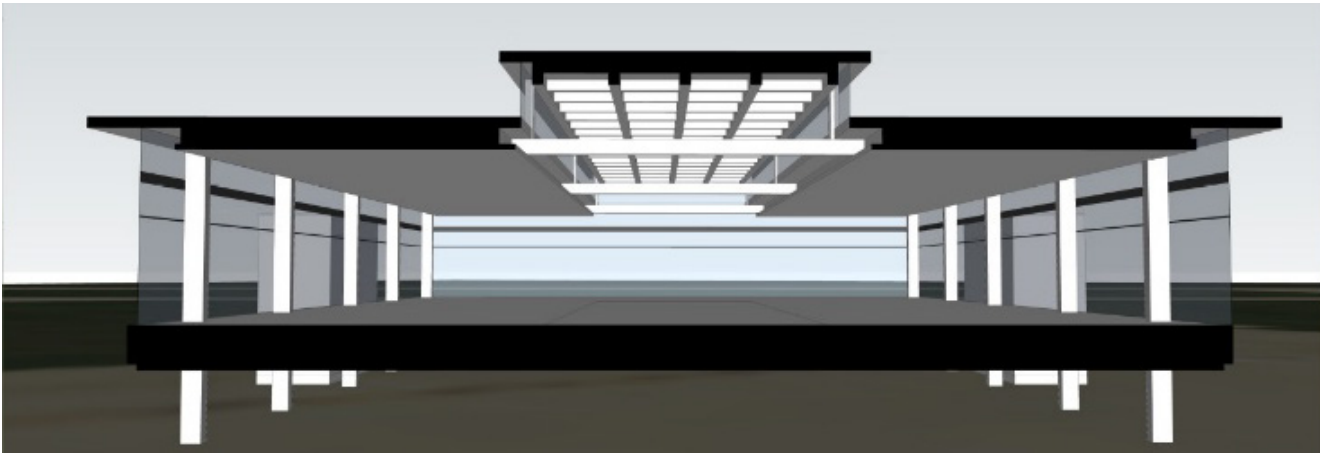
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04 CONCEPTUAL DESIGN

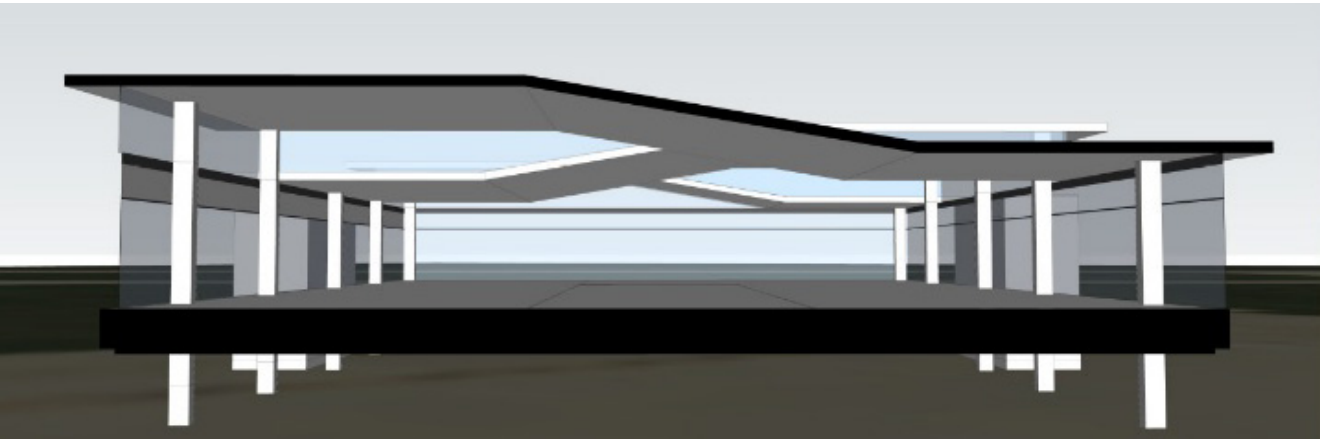
PREFERRED OPTION

BUILDING MASSING

Two building massing options were developed. Both options offer higher ceilings and increased opportunities to bring natural daylight into the concourse, while employing structural bay systems that can easily accommodate future additions to the concourse. Both options draw from the precedent of roof forms of the existing terminal and concourse. Option 1 utilizes a central clerestory to expand on the increased height in the gate holdrooms, drawing light deep into the center of the concourse. Option 2 utilizes a stepped roof form that rises across the width of the concourse directing views to the surrounding hills. The stepped bay is repeated, with every other module reversed, creating a dynamic roof expression along the length of the concourse. Maximum roof height in both studies is forty feet, well within the Part 77 height restriction of sixty feet maximum.



CONCEPTUAL SECTION OPTION 1: CENTRAL CLERESTORY

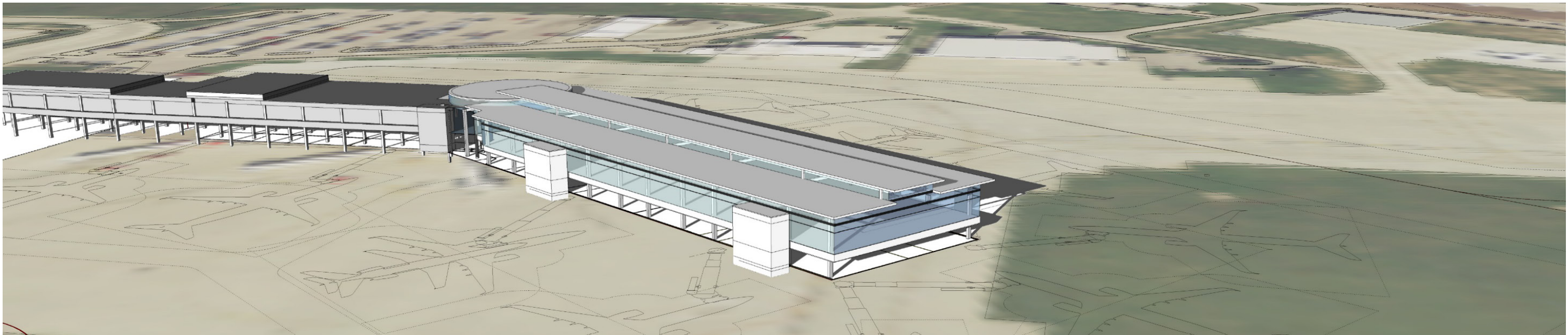


CONCEPTUAL SECTION OPTION 2: STEPPED ROOF

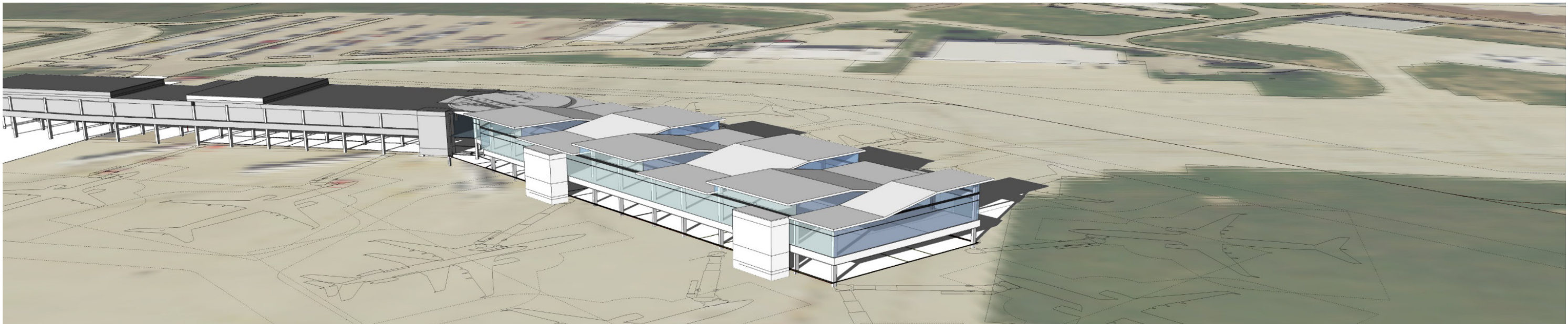


04 CONCEPTUAL DESIGN

PREFERRED OPTION



CONCEPTUAL MASSING OPTION 1: CENTRAL CLERESTORY



CONCEPTUAL MASSING OPTION 2: STEPPED ROOF



05

ROUGH ORDER OF MAGNITUDE (ROM) COSTING

05 ROM COSTING

PREFERRED OPTION

ROM COSTING SUMMARY

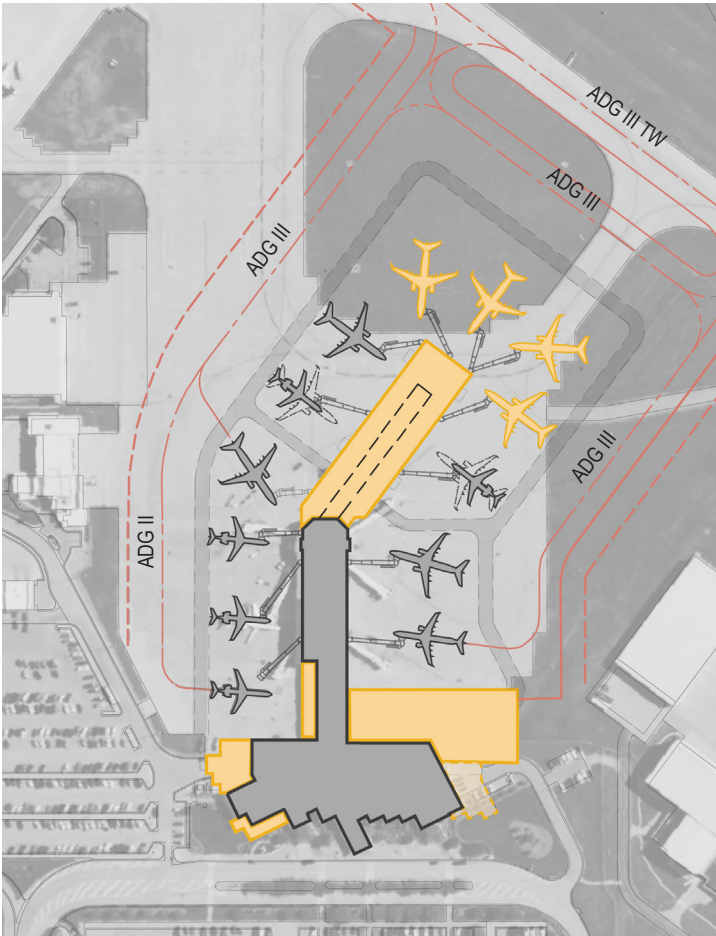
High-level Rough Order of Magnitude (ROM) costs were developed for both the Full Build Concourse and Terminal Expansion Option along with a separate estimate for the Reduced Concourse Build Option. (Larger scale versions of the Full Build and Reduced Build concourse options graphics shown at right are included on pages 14 and 15). Each include “Low” and “High” unit costs providing a range of probable costs for the project. These high-level unit costs were provided based on comparable Allliance projects throughout the country and pertain to the building and baggage handling systems only. Any civil site and similar work will be addressed in the Master Plan. These costs represent 2021 construction dollars without escalation.

The ROM costs are broken down into three main categories:

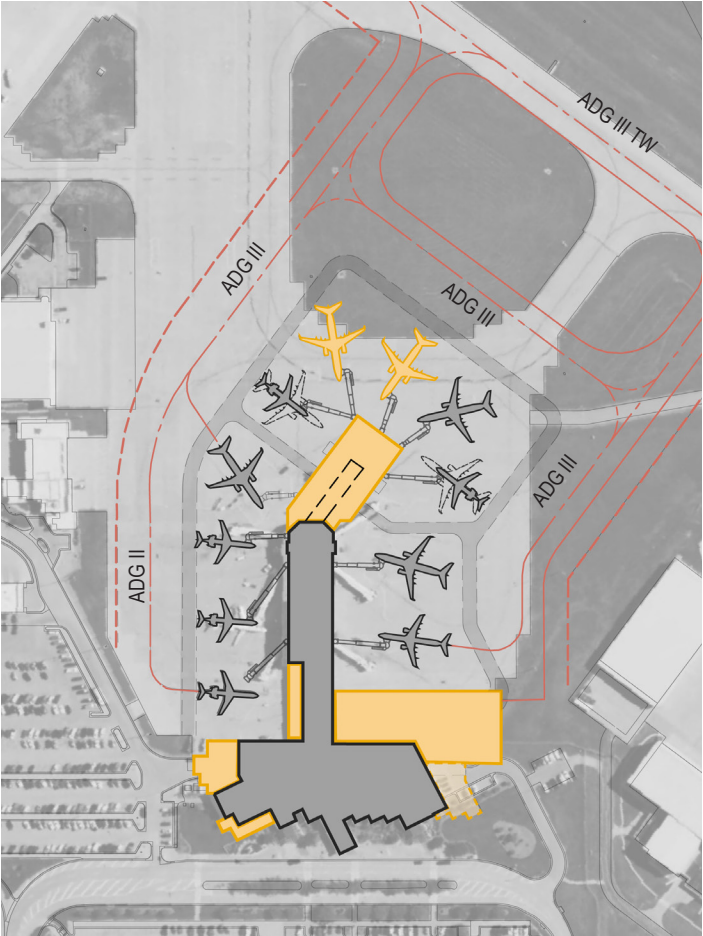
- 1. **New Concourse:** Includes building expansion, small TSA SSCP building infill expansion; existing concourse and SSCP renovations; existing PBB relocation/installation; new PBB installation and associated GSE services.
- 2. **Terminal Expansion:** Includes ticket counter renovations and associated ceiling; HVAC; flooring and ATO space; EDS Baggage Screening and Makeup building addition; baggage handling conveyance and make-up devices; Arrivals Hall expansion including baggage claim device; rental car relocation; and loading dock as well as miscellaneous renovations.
- 3. **Administration & Concessions:** Includes Retail, Food & Beverage remodel; Administration expansion and remodel; and miscellaneous renovations.

Total program costs include the following:

- Direct costs
- Twenty-percent soft costs added to project construction direct costs
- TSA reimbursables



FULL BUILD OPTION



REDUCED BUILD OPTION

05 ROM COSTING

PREFERRED OPTION

Project	QTY	Unit	Unit Cost		Estimate		
			Low	High	Low	High	
NEW CONCOURSE EXPANSION							
New Concourse (includes 20% additional apron level tempered space)	42,754	SF	\$450	\$600	\$ 19,239,120	\$ 25,652,160	
SSCP Building Expansion	3,737	SF	\$350	\$500	\$ 1,307,950	\$ 1,868,500	
Existing Concourse Renovations (including renovations at SSCP)	26,260	SF	\$100	\$200	\$ 2,626,000	\$ 5,252,000	
Passenger Boarding Bridge (PBB) Relocation	2	EA	\$75,000	\$150,000	\$ 150,000	\$ 300,000	
New PBB (Including foundations, PCA, GPU)	5	EA	\$700,000	\$1,000,000	\$ 3,500,000	\$ 5,000,000	
Subtotal Direct Costs	72,751	SF			\$ 26,823,070	\$ 38,072,660	
TERMINAL EXPANSION							
Ticket Counter Renovations (counters, ATO, ceiling, HVAC, flooring)	12,750	SF	\$100	\$200	\$ 1,275,000	\$ 2,550,000	
EDS Baggage Screening & Makeup Expansion (building expansion)	35,344	SF	\$250	\$350	\$ 8,836,000	\$ 12,370,400	
Baggage Handling Equipment (ticket counter conveyor lines, oversize line, sortation conveyor lines, 2 make-up devices)	1	LS	\$4,750,000	\$4,750,000	\$ 4,750,000	\$ 4,750,000	
Arrivals Hall Expansion							
(bag laydown, loading dock, car rental relocation)	8,760	SF	\$350	\$450	\$ 3,066,000	\$ 3,942,000	
New Flat Plate Baggage Claim Device	1	EA	\$400,000	\$400,000	\$ 400,000	\$ 400,000	
Miscellaneous Renovations (renovations at baggage hall/old car rentals and adjacent to ticket counters)	20,793	SF	\$100	\$200	\$ 2,079,300	\$ 4,158,600	
Subtotal Direct Costs	77,647	SF			\$ 20,406,300	\$ 28,171,000	
ADMINISTRATION & CONCESSIONS							
Retail, Food & Beverage Remodel	2,730	SF	\$100	\$200	\$ 273,000	\$ 546,000	
Administration Expansion & Remodel	40,008	SF	\$100	\$200	\$ 4,000,800	\$ 8,001,600	
Misc Renovations (renovations to open area adjacent to concessions)	5,915	SF	\$100	\$200	\$ 591,500	\$ 1,183,000	
Subtotal Direct Costs	48,653	SF			\$ 4,865,300	\$ 9,730,600	
DIRECT COST TOTAL	199,051	SF	\$262	\$382	\$ 52,094,670	\$ 75,974,260	
SOFT COSTS	20%				\$ 10,418,934	\$ 15,194,852	
OWNER CONTINGENCY	10%				\$ 5,209,467	\$ 7,597,426	
TOTAL AIRPORT PROJECT COST					\$ 67,723,071	\$ 98,766,538	
TSA REIMBURSABLE							
CBIS/CBRA Conveyance	1	LS	\$8,250,000		\$8,250,000		
3rd EDS Shunt Line	1	LS	\$2,600,000		\$2,600,000		
HVAC, Fire Protection, UPS, Interior Construction for CBRA/OSR	TBD	%			TBD		
Direct Costs					\$10,850,000		
Soft Costs	20%				\$2,170,000		
Total TSA Reimbursable					\$13,020,000		
TOTAL PROGRAM COST					\$ 80,743,071	\$ 111,786,538	

ROM COSTS: FULL BUILD

Project	QTY	Unit	Unit Cost		Estimate		
			Low	High	Low	High	
NEW CONCOURSE EXPANSION							
New Concourse (includes 20% additional apron level tempered space)	23,784	SF	\$450	\$600	\$ 10,702,800	\$ 14,270,400	
SSCP Building Expansion	3,737	SF	\$350	\$500	\$ 1,307,950	\$ 1,868,500	
Existing Concourse Renovations (including renovations at SSCP)	26,260	SF	\$100	\$200	\$ 2,626,000	\$ 5,252,000	
Passenger Boarding Bridge (PBB) Relocation	2	EA	\$75,000	\$150,000	\$ 150,000	\$ 300,000	
New PBB (Including foundations, PCA, GPU)	3	EA	\$700,000	\$1,000,000	\$ 2,100,000	\$ 3,000,000	
Subtotal Direct Costs	53,781	SF			\$ 16,886,750	\$ 24,690,900	
TERMINAL EXPANSION							
Ticket Counter Renovations (counters, ATO, ceiling, HVAC, flooring)	12,750	SF	\$100	\$200	\$ 1,275,000	\$ 2,550,000	
EDS Baggage Screening & Makeup Expansion (building expansion)	35,344	SF	\$250	\$350	\$ 8,836,000	\$ 12,370,400	
Baggage Handling Equipment (ticket counter conveyor lines, oversize line, sortation conveyor lines, 2 make-up devices)	1	LS	\$4,750,000	\$4,750,000	\$ 4,750,000	\$ 4,750,000	
Arrivals Hall Expansion							
(bag laydown, loading dock, car rental relocation)	8,760	SF	\$350	\$450	\$ 3,066,000	\$ 3,942,000	
New Flat Plate Baggage Claim Device	1	EA	\$400,000	\$400,000	\$ 400,000	\$ 400,000	
Miscellaneous Renovations (renovations at baggage hall/old car rentals and adjacent to ticket counters)	20,031	SF	\$100	\$200	\$ 2,003,100	\$ 4,006,200	
Subtotal Direct Costs	76,885	SF			\$ 20,330,100	\$ 28,018,600	
ADMINISTRATION & CONCESSIONS							
Retail, Food & Beverage Remodel	2,730	SF	\$100	\$200	\$ 273,000	\$ 546,000	
Administration Expansion & Remodel	40,008	SF	\$100	\$200	\$ 4,000,800	\$ 8,001,600	
Misc Renovations (renovations to open area adjacent to concessions)	5,915	SF	\$100	\$200	\$ 591,500	\$ 1,183,000	
Subtotal Direct Costs	48,653	SF			\$ 4,865,300	\$ 9,730,600	
DIRECT COST TOTAL	179,319	SF	\$235	\$348	\$ 42,082,150	\$ 62,440,100	
SOFT COSTS	20%				\$ 8,416,430	\$ 12,488,020	
OWNER CONTINGENCY	10%				\$ 4,208,215	\$ 6,244,010	
TOTAL AIRPORT PROJECT COST					\$ 54,706,795	\$ 81,172,130	
TSA REIMBURSABLE							
CBIS/CBRA Conveyance	1	LS	\$8,250,000		\$8,250,000		
3rd EDS Shunt Line	1	LS	\$2,600,000		\$2,600,000		
HVAC, Fire Protection, UPS, Interior Construction for CBRA/OSR	TBD	%			TBD		
Direct Costs					\$10,850,000		
Soft Costs	20%				\$2,170,000		
Total TSA Reimbursable					\$13,020,000		
TOTAL PROGRAM COST					\$ 67,726,795	\$ 94,192,130	

ROM COSTS: REDUCED BUILD

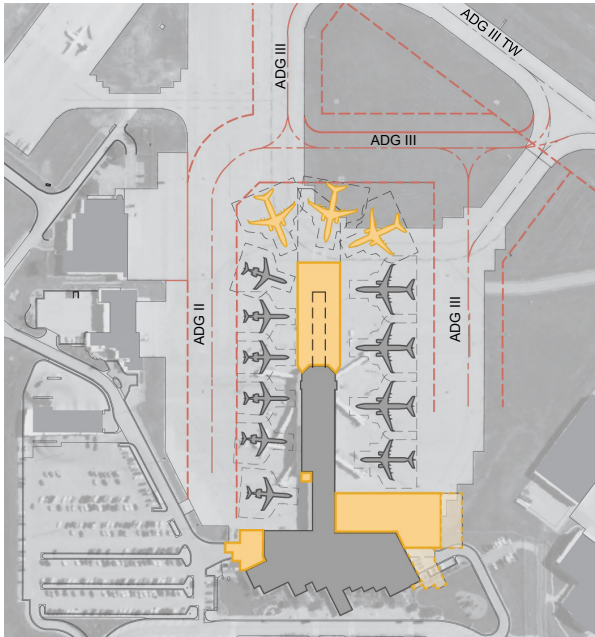


APPENDIX

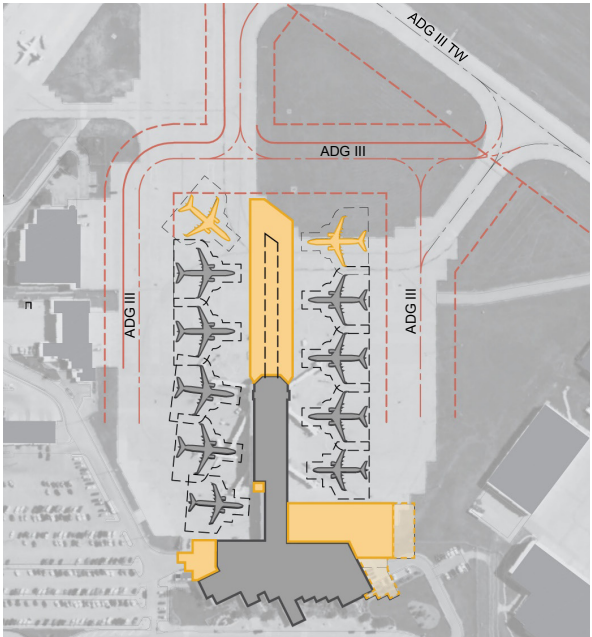
APPENDIX

INITIAL OPTIONS — LINEAR

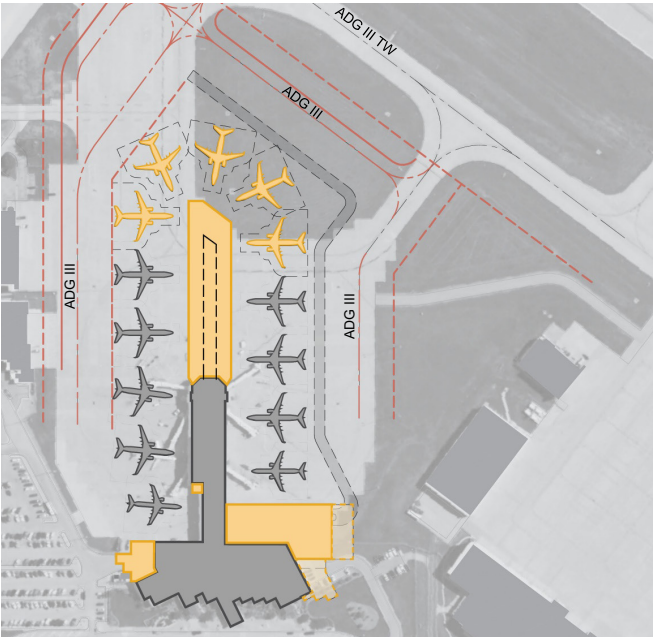
At right are the initial linear-based options that were studied relative to the site layout of the concourse expansion.



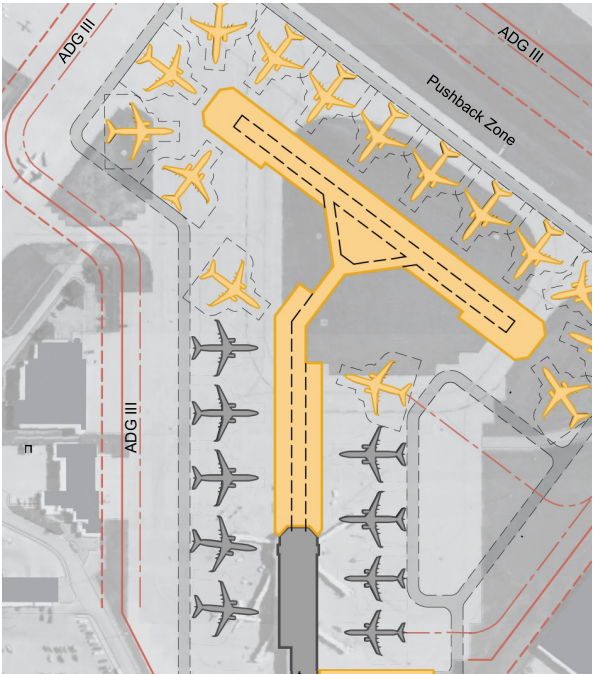
OPTION 1: INITIAL



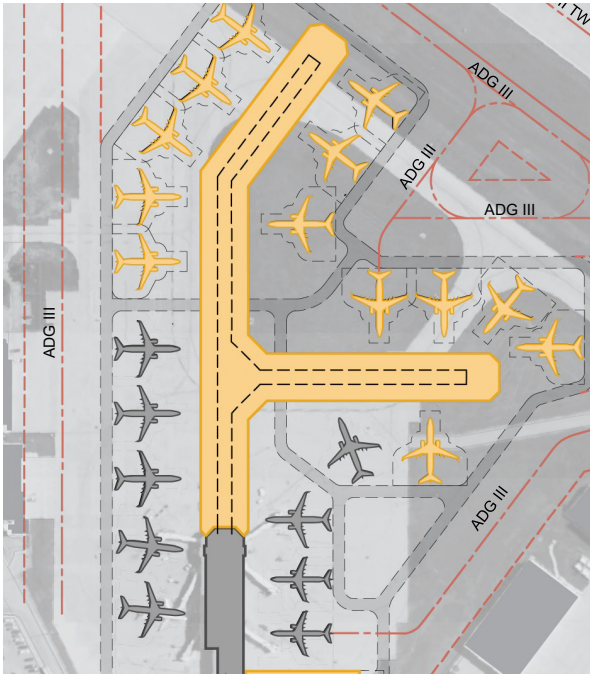
OPTION 1.1: INITIAL



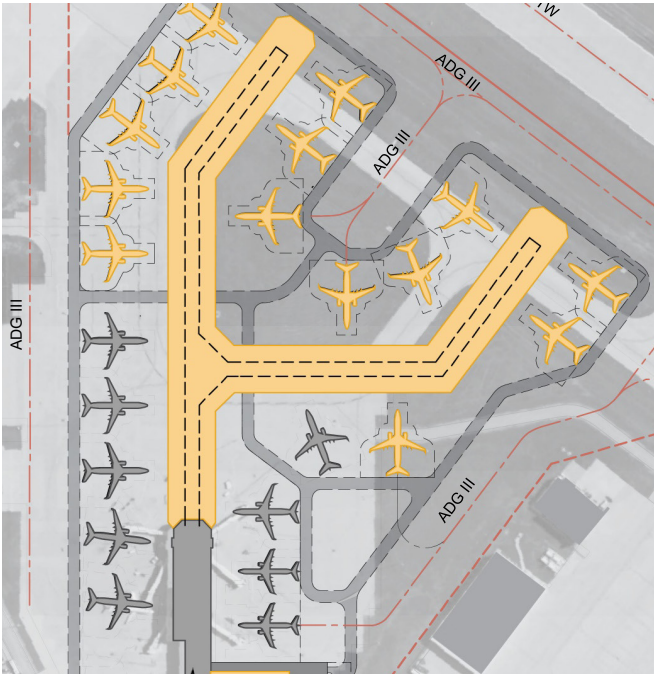
OPTION 1.2: INITIAL



OPTION 4: LONG TERM



OPTION 6: LONG TERM

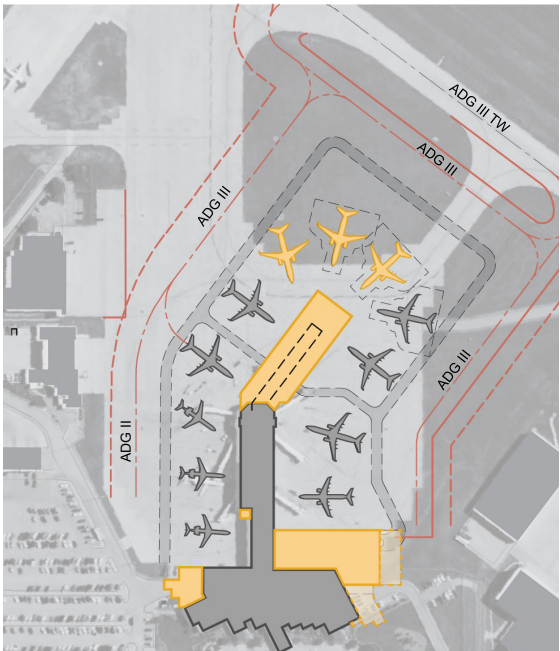


OPTION 7: LONG TERM

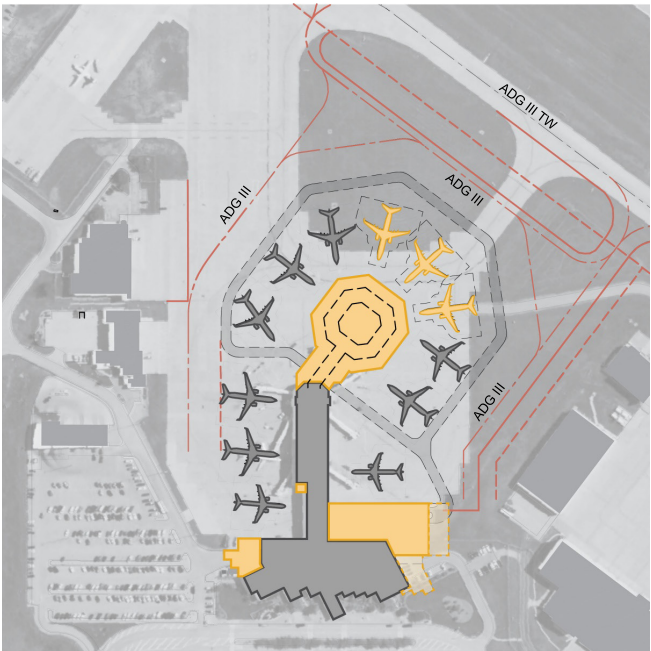
APPENDIX

INITIAL OPTIONS — DOG-LEG

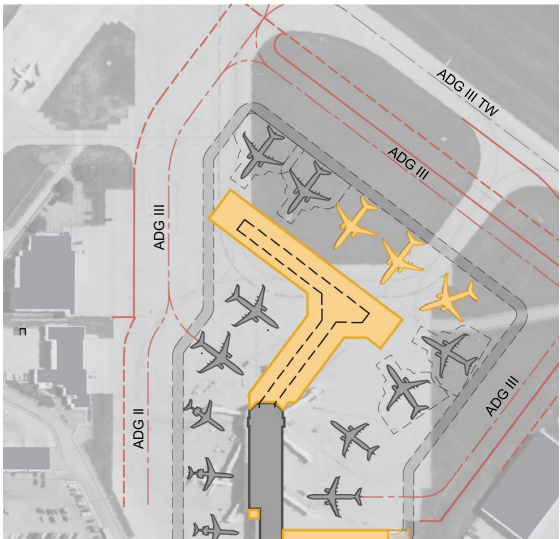
At right are the initial “dog leg” options that were studied relative to the site layout of the concourse expansion.



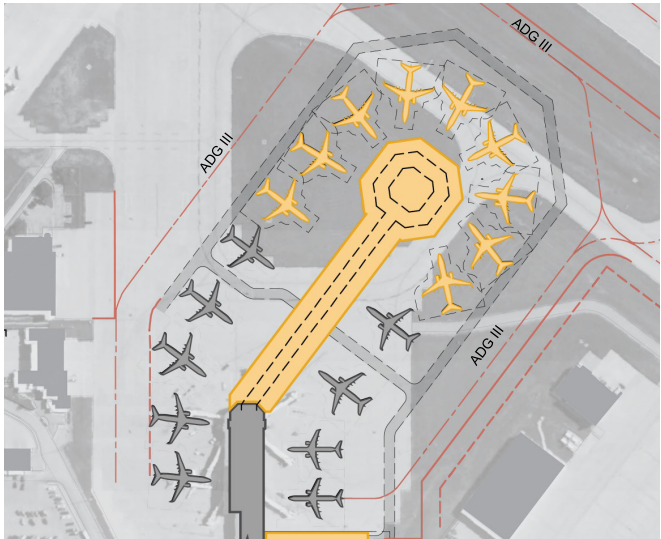
OPTION 2: INITIAL



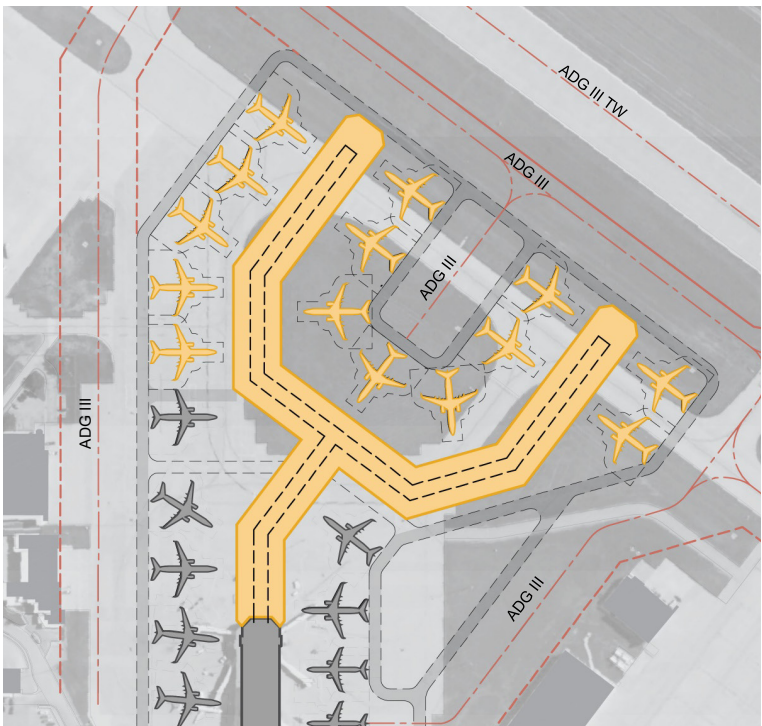
OPTION 3: INITIAL



OPTION 2.1: LONG TERM



OPTION 2.2: LONG TERM



OPTION 5: LONG TERM

APPENDIX

ATCT LINE OF SIGHT: PREFERRED OPTION

At right are diagrams corresponding to those on page 17. Figures 1 and 2 depict the view from the ATCT for the larger aircraft operating out of RAP for the Preferred Option, both Full Build and Reduced Build. Figure 3 depicts the view from the ATCT for the Preferred Option, Full Build for smaller aircraft parked at the concourse. Figure 4 represents Preferred Option ATCT Line of Sight shadow analysis for small aircraft.

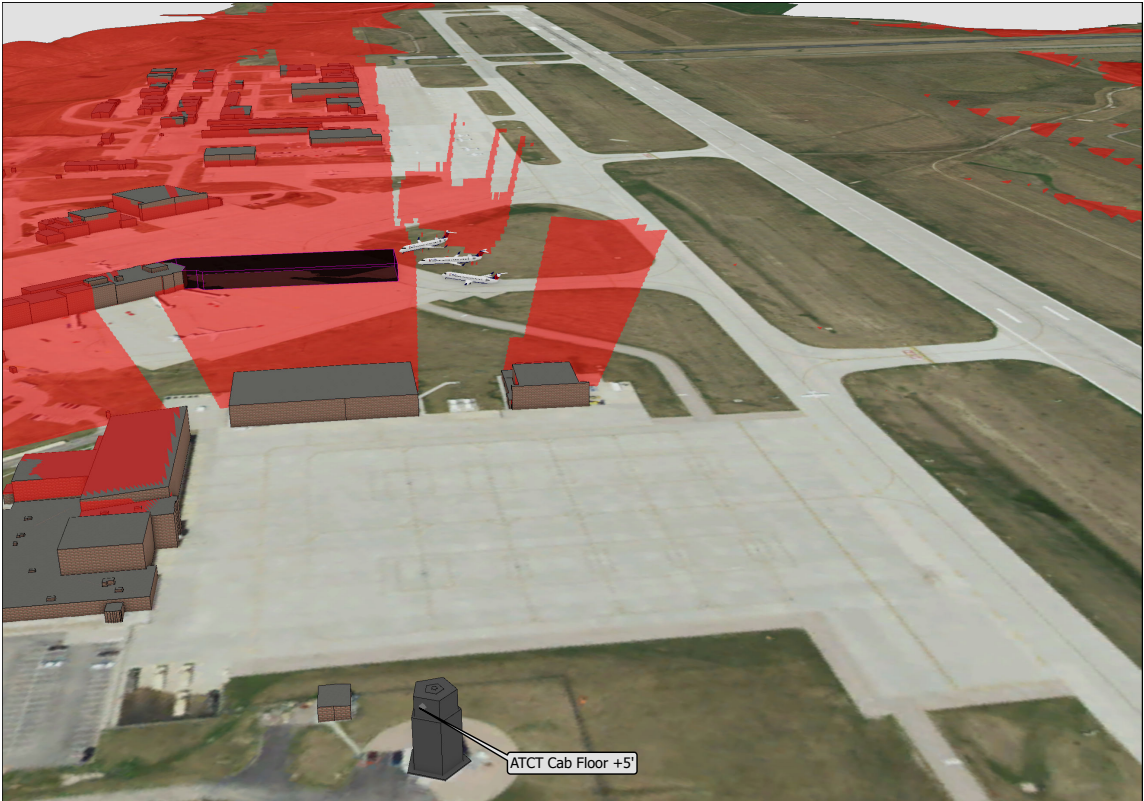


FIGURE 4: LINE-OF-SIGHT SHADOWS: PREFERRED OPTION FULL BUILD — SMALL AIRCRFT — ESTIMATED

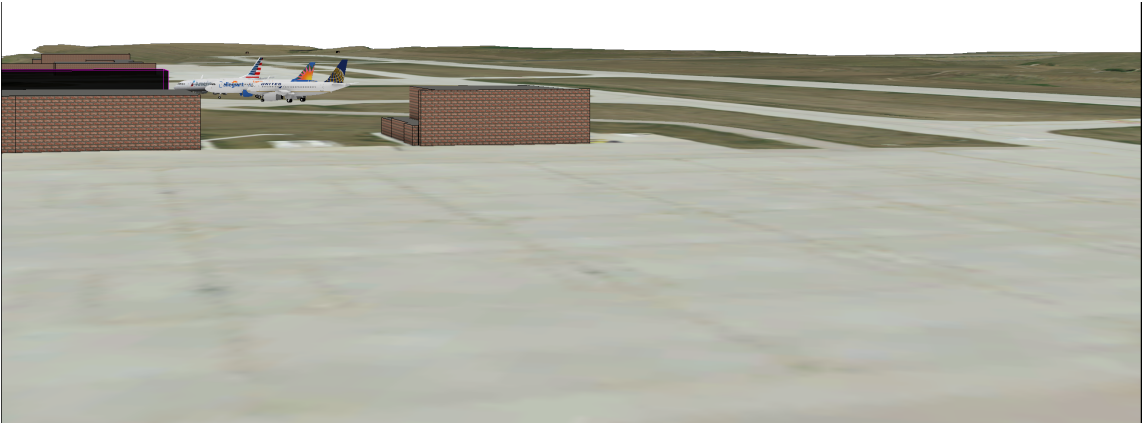


FIGURE 1: VIEW FROM ATCT: PREFERRED OPTION FULL BUILD

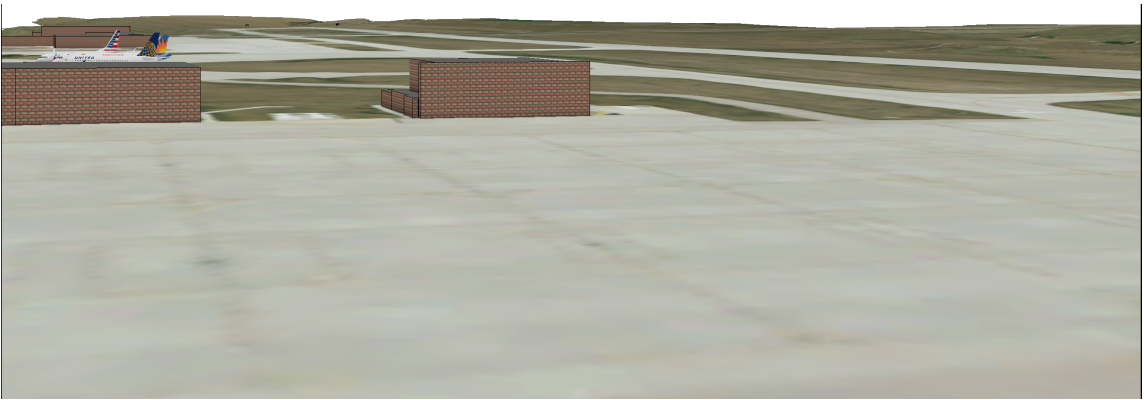


FIGURE 2: VIEW FROM ATCT: PREFERRED OPTION REDUCED BUILD

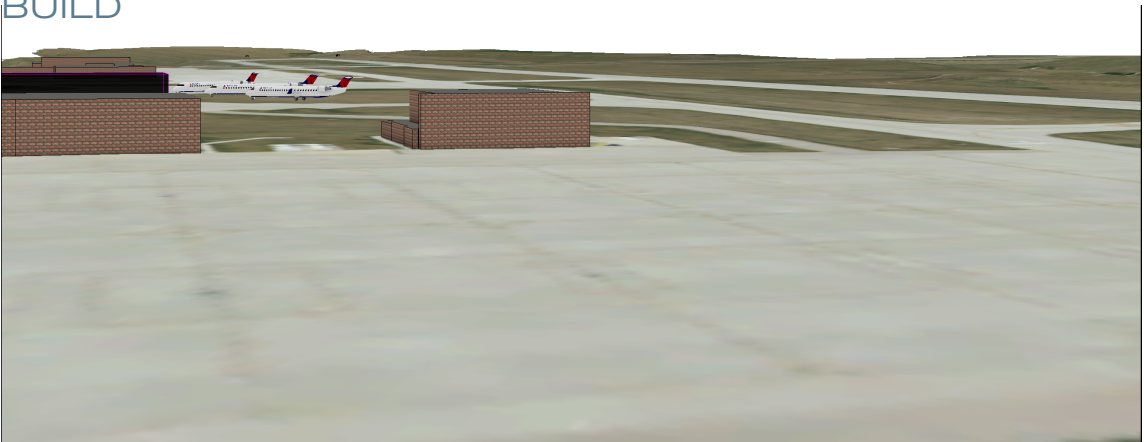
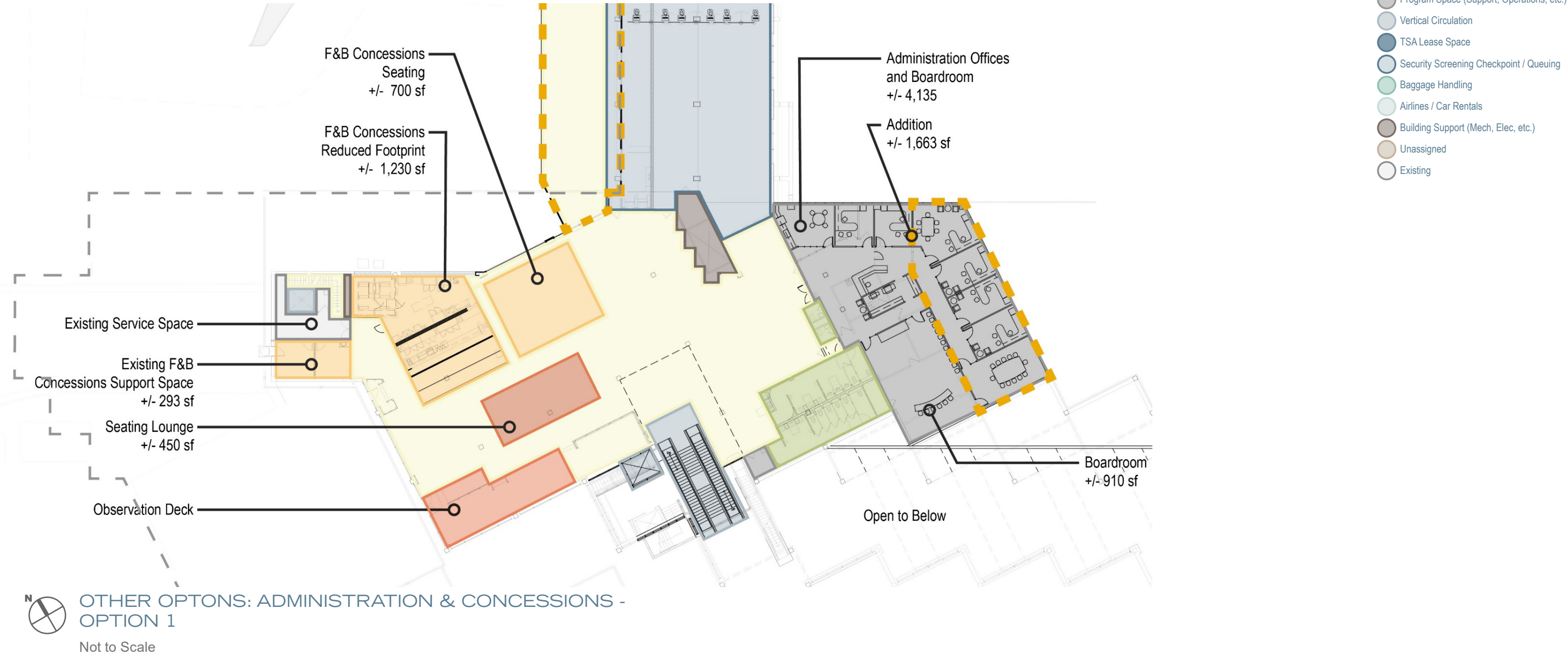


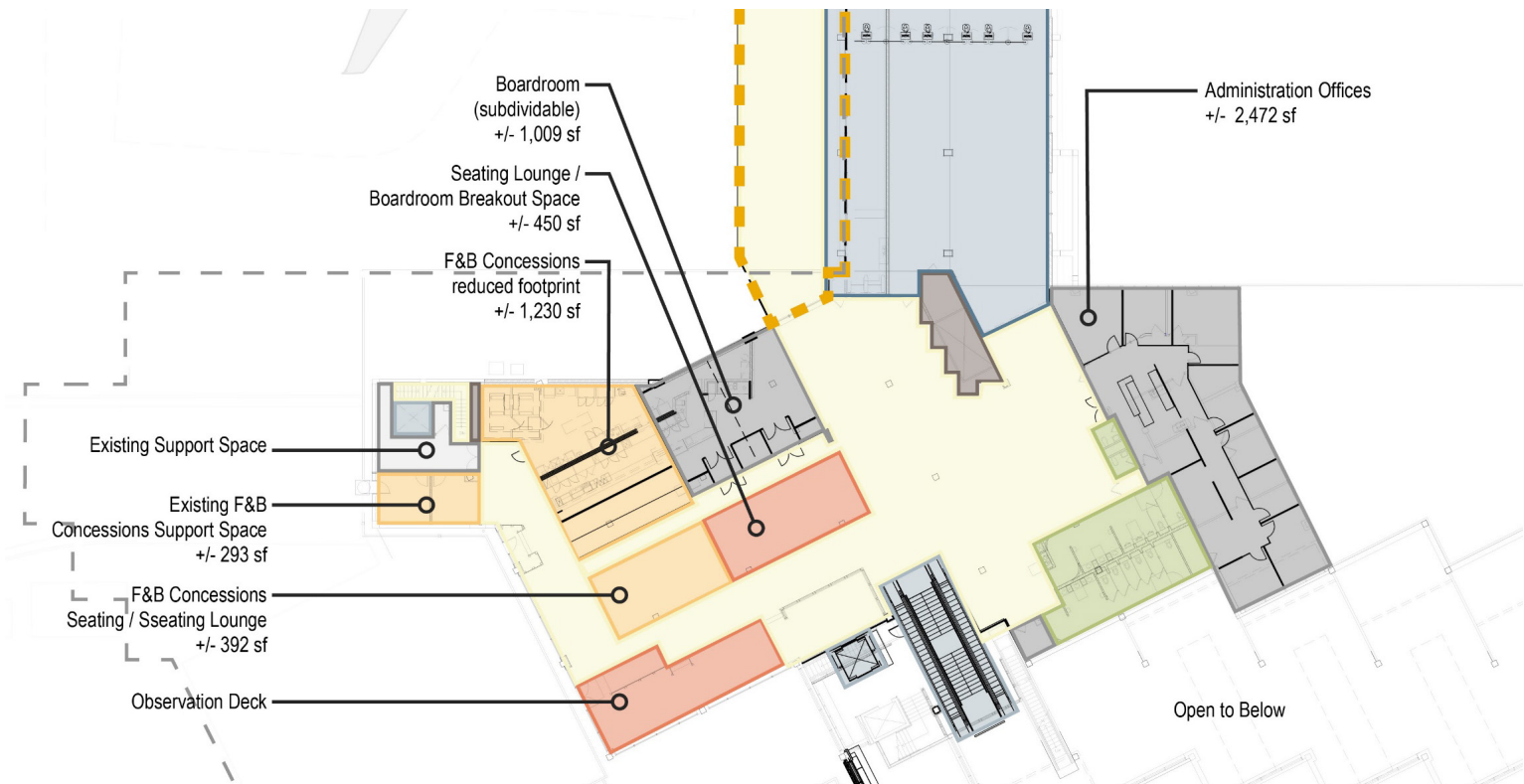
FIGURE 3: VIEW FROM ATCT: PREFERRED OPTION FULL BUILD — SMALL AIRCRAFT

APPENDIX

OTHER OPTIONS: ADMINISTRATION SUITE AND CONCOURSE LEVEL PRE-SECURITY COMMONS

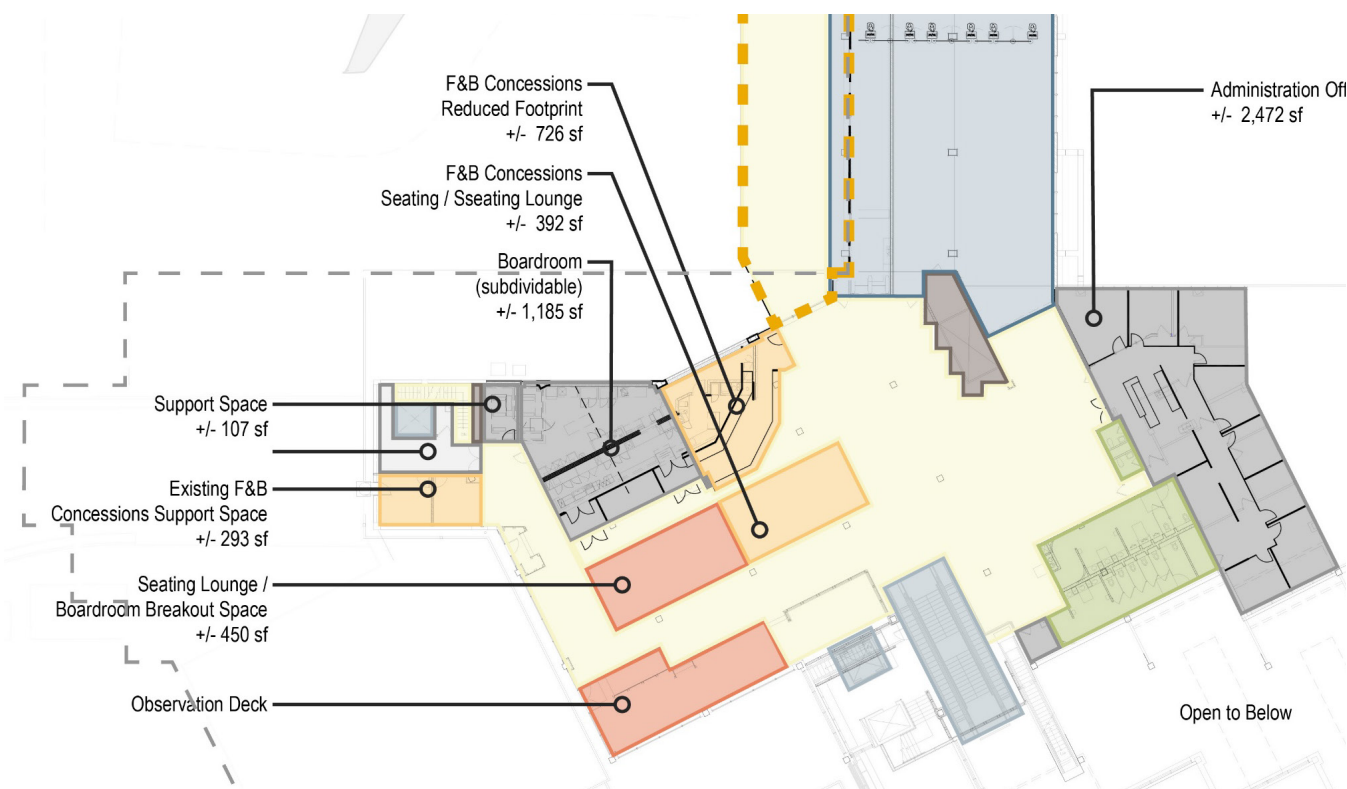
Two additional options for the Administration Suite and three additional options for the Pre-Security Commons were considered. Ultimately the addition of the Arrivals corridor opened up the area previously required for entry to the Security Checkpoint for expansion of the Administration Suite and a Board Room within a single space.





OTHER OPTIONS: ADMINISTRATION & CONCESSIONS - OPTION 2

Not to Scale



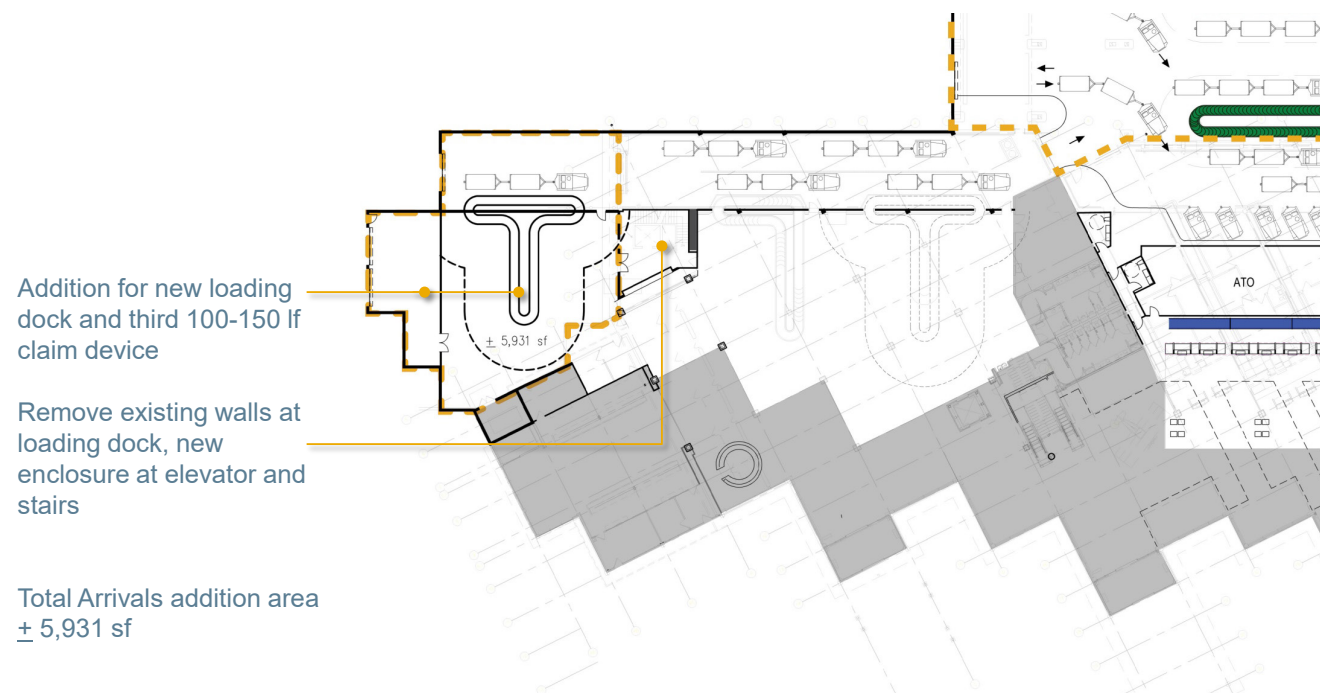
OTHER OPTIONS: ADMINISTRATION & CONCESSIONS - OPTION 3

Not to Scale

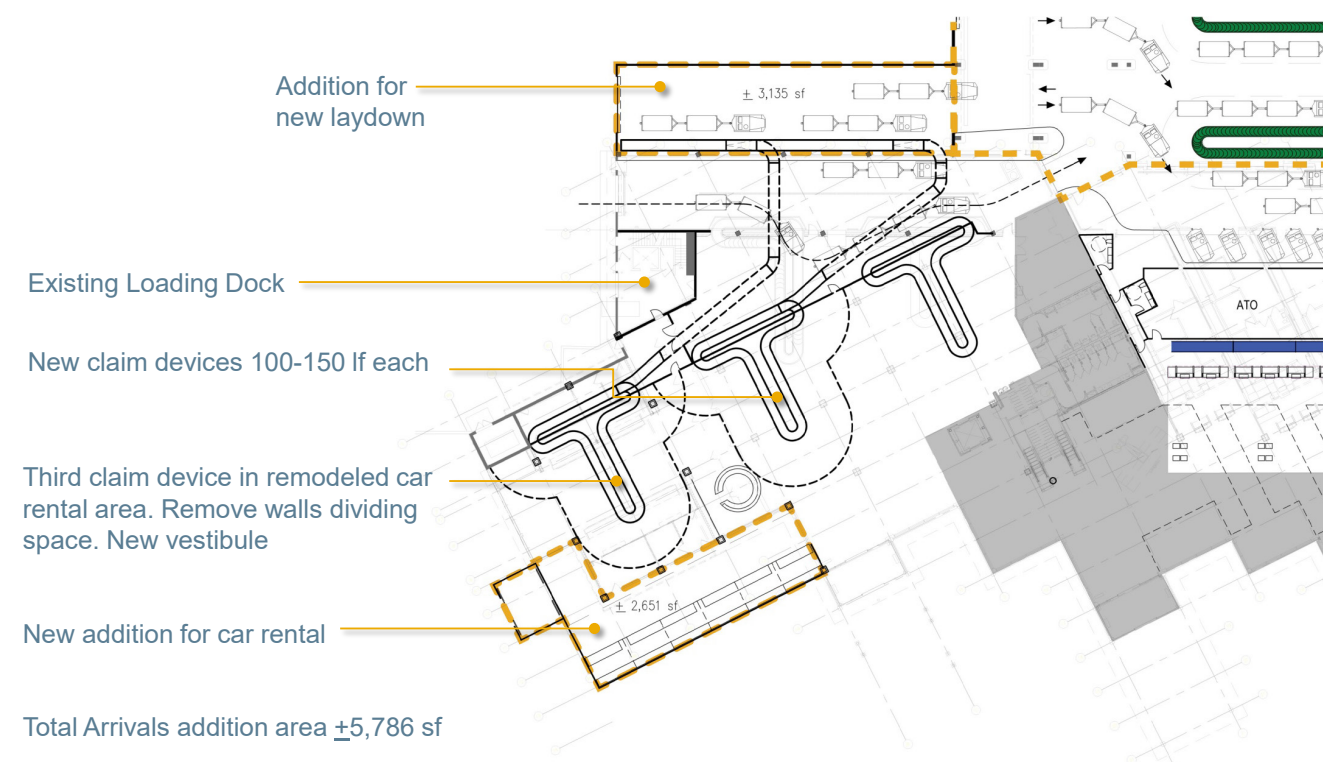
APPENDIX

OTHER OPTIONS: BAGGAGE CLAIM AND LAYDOWN

Two additional options for the Baggage Claim and Laydown areas. Option A did not address the congestion around the existing devices and presented visibility and congestion concerns. Option B preserved the existing loading dock but created significant costs related to the conveyor systems required to support the new claim device locations and also did not provide sufficient relief of the congestion issues within the claim hall.



 OTHER OPTIONS: BAGGAGE CLAIM AND LAYDOWN - OPTION A
Not to Scale

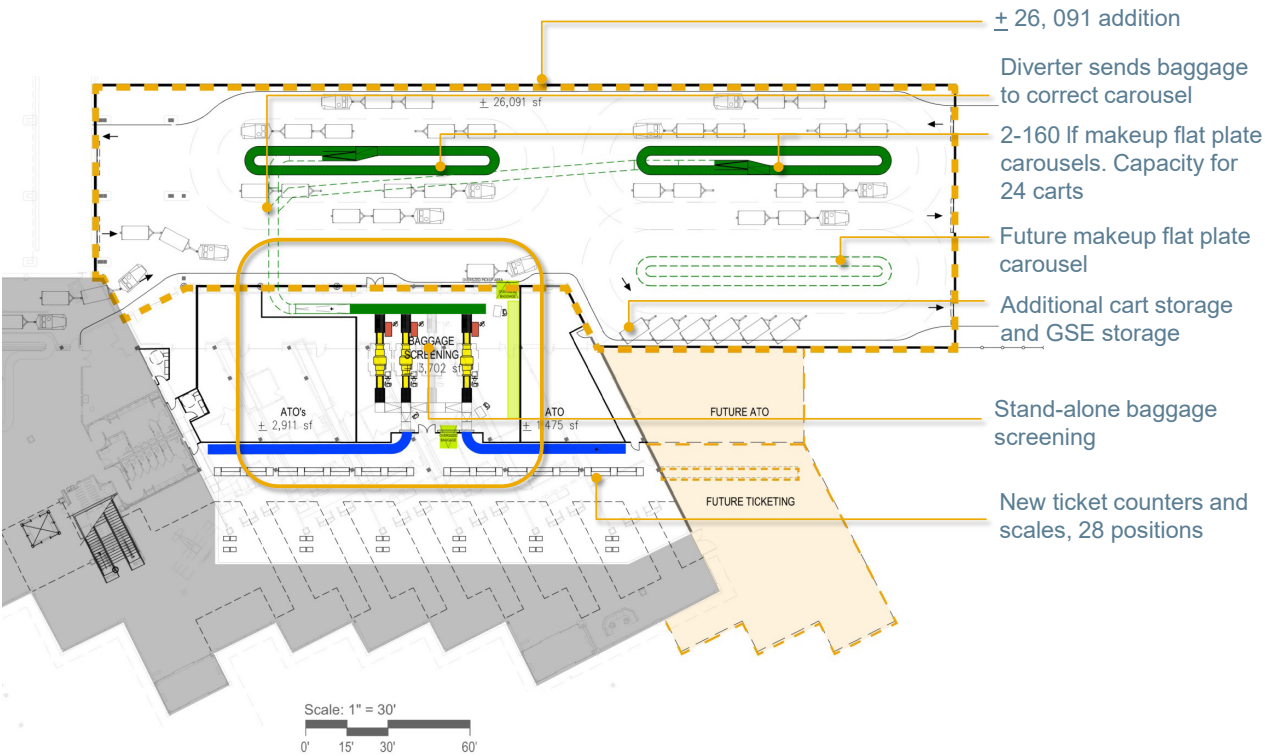


 OTHER OPTIONS: BAGGAGE CLAIM AND LAYDOWN - OPTION B
Not to Scale

APPENDIX

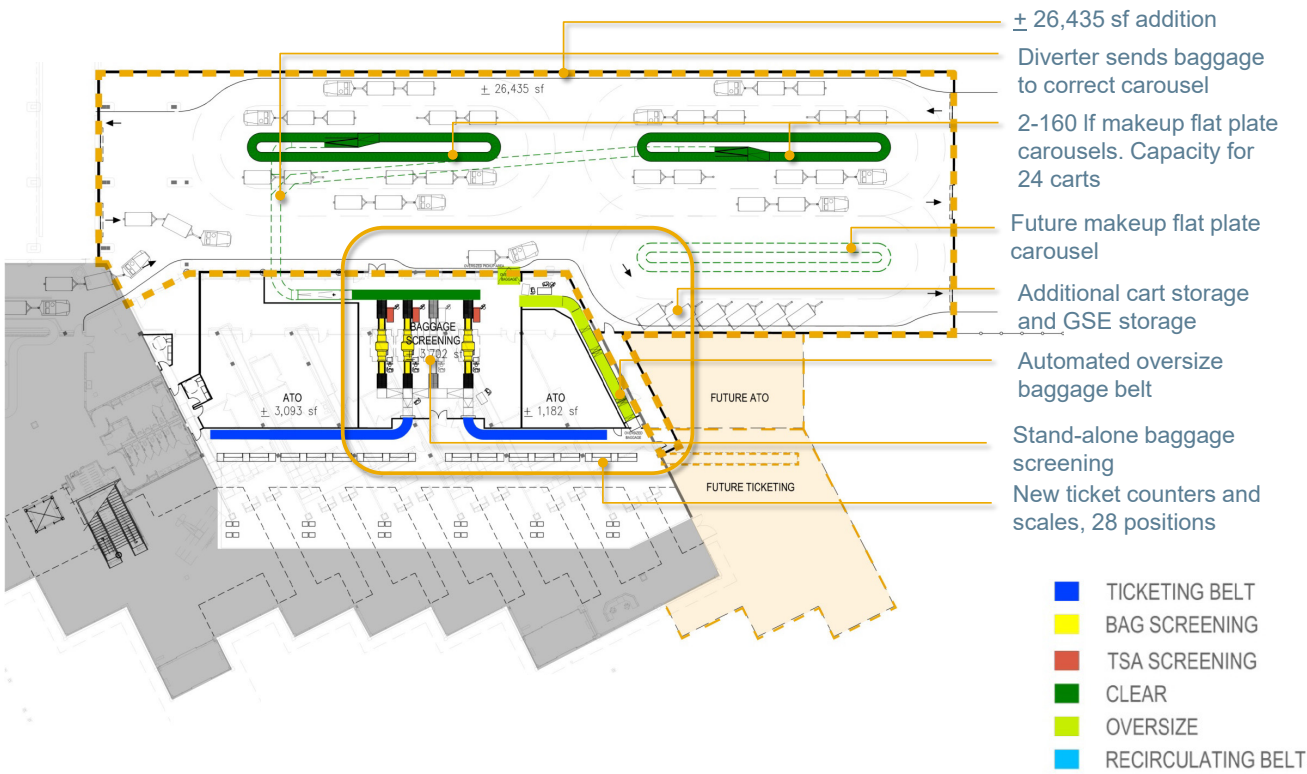
OTHER OPTIONS: EDS BAGGAGE SCREENING

A consolidated stand-alone baggage screening system was considered, but is not an approved screening system supported by the TSA.



OTHER OPTIONS: EDS BAGGAGE SCREENING - OPTION D.1

Not to Scale



OTHER OPTIONS: EDS BAGGAGE SCREENING - OPTION D.1.1

Not to Scale

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