CORGAN

CITY OF SAN ANTONIO
AVIATION DEPARTMENT

SAN ANTONIO INTERNATIONAL AIRPORT

Program Definition Manual: Advance Terminal Planning Program

Volume 1

June 9, 2023

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Aviation Acronyms & Terminology

AACS – Automated Access Control System

AC. – Acres

ACM – Asbestos-Containing Materials

ACS – Access Control System

ADAP – Airport Development Aid Program

ADG – Airplane Design Group

AGL – Above Ground Level

AIP – Airport Improvement Program

ALP – Airport Layout Plan

ALS – Approach Lighting System

ALS – Assistive Listening System

ALSF-II – High Intensity Approach Lighting System with Sequenced Flashing Lights in ILS CAT-II

AOA – Airfield Operations Area

AOC – Airport Operations Center

APC – Automated Passport Control

APM – Automated People Mover

APRC – Approach Reference Code

ARC – Airport Reference Code

ARFF – Aircraft Rescue and Fire Fighting

ASDA – Accelerate-Stop Distance Available

ASOS – Automated Surface Observing System

ATCT – Air Traffic Control Tower

ATO – Airport Ticket Office

ATPP – Advanced Terminal Planning Program

AVDGS – Advanced Visual Docking Guidance System

AVE. – Avenue

BAP – Blast Analysis Plan

BAS – Building Automation System

BHS – Baggage Handling System

BIDS – Baggage Information Display Systems

BRL – Building Restriction Line

CAT – Category

CATEX – Categorical Exclusion

CBIS – Checked Baggage Inspection System (TSA)

CBP – Customs & Border Protection (U.S.)

CBRA – Checked Baggage Resolution Area (TSA)

CCTV – Closed Circuit Television (System)

CGID – Connecting Gate Information Display

CHRP – Central Heating and Refrigeration Plant

CIP – Commercially Important Passenger

CIP – Capital Improvement Program

CL – Centerline Lights

CMAR – Construction Manager at Risk

COSA – City of San Antonio

COV – Commercially Operated Vehicles

CUP – Central Utility Plant

CUPPS – Common-Use Passenger Processing Systems

CUSS – Common-Use Self Service

CUTE – Common-Use Terminal Equipment

DCP – Data Collection Package

DCV – Destination Coded Vehicle

DHS – Department of Homeland Security (U.S.)

DME – Distance Measuring Equipment

DOA – Department of Aviation

DOT – Department of Transportation

Aviation Acronyms & Terminology

DPC – Data Control

DPRC – Departure Reference Code

D-RPZ – Departure Runway Protection Zone

DVR – Digital Video Recorder

EDS – Explosives Detection System

EFSO – Emergency Fuel Shut Off

ELEV. – Elevation

EMAS – Engineered Materials Arresting System

EOC –Emergency Operations Center

EPA – Environmental Protection Agency

EST. – Estimate

ETD – Explosives Trace Detection (or Detector)

EVIDS – Electronic Visual Information Display Systems

FAA – Federal Aviation Administration

FAM – Federal Air Marshall (TSA)

FAR – Federal Aviation Regulations

FBO – Fixed Base Operator

FEDEX – Federal Express

FIDS – Flight Information Display Systems

FIS – Federal Inspection Services (U.S.)

FOD – Foreign Object Damage

FSD – Federal Security Director (TSA)

FT. – Feet

GA – General Aviation

GIDS – Gate Information Display Systems

GLF – Ground Loading Facility

GPS – Global Positioning System

GRE – Ground Run-Up Enclosure

GS – Glidescope

GSE – Ground Services Equipment

GTC – Ground Transportation Center

HDRC – Historic and Design Review Commission

HIRL – High Intensity Runway Lights

IATA – International Air Transport Association

ICAO – International Civil Aviation Organization

IDS – Intrusion Detection System

IDF – Independent Distribution Frame

IECC– International Energy Conservation Code

ILS – Instrument Landing System

IM – Inner Marker

IMC – Instrument Meteorological Conditions

ITS – Information Technology Services

KTS – Knots

LAN – Local Area Network

LAT. – Latitude

LBP – Lead Based Paint

LBS – Pounds

LDA – Landing Distance Available

LEO – Law Enforcement Officer

LOC – Localizer

LOI – Letter of Intent

LONG. – Longitude

LOS – Level of Service

MALS – Medium Intensity Approach Lighting System

MARS – Multiple Aircraft Ramp System

MALSR – Medium Approach Lighting System with

Aviation Acronyms & Terminology

Runway Alignment Indicator Lights

MDF– Main Distribution Frame

MER – Main Equipment Room – formally MDF

MII – Majority in Interest

MIRL – Medium Intensity Runway Lights

MITL – Medium Intensity Taxiway Lights

MOU – Memorandum of Understanding

MPH – Miles Per Hour

MRO – Maintenance, Repair, and Overhaul

MSL – Mean Sea Level

MX – Maintenance

MUFIDS – Multi-User Flight Information Display System

N/A – Not Applicable

NAD83 – North American Datum of 1983

NAVD88 – North American Vertical Datum of 1988

NB – Narrow Body (aircraft)

NO – Number

NOAA – National Oceanic and Atmospheric Administration

NPIAS – National Plan of Integrated Airport Systems

NVGS – Non-Vertically Guided Survey

O&D – Origin & Destination

OCS – Obstacle Clearance Surface

OEI/OIS – One-Engine Inoperative Obstacle Identification Surface

OFA – Object Free Area

OFR – Obstacle/Object Free Area

OFZ – Obstacle Free Zone

OL – Obstruction Light

OOG – Out-Of Gauge (checked baggage)

OSR – On-Screen Resolution

PAPI – Precision Approach Path Indicators

PARCS – Parking Access and Revenue Control

PAX - Passengers

PBB – Passenger Boarding Bridge

PDD– Project Definition Document

PCN – Pavement Classification Number

PFC – Passenger Facility Charge

PKWY – Parkway

POV – Privately Operated Vehicles

POFZ – Precision Obstacle Free Zone

PPP – Public Private Partnership

PRCS – Parking Revenue Control Software

RD. – Road

RDC – Runway Design Code

REIL – Runway End Identifier Lights

RF – Radio Frequency

RFID – Radio Frequency Identification

RIDS – Ramp Information Display Systems

RJ – Regional Jet (aircraft)

RNAV – Area Navigation

ROFA – Runway Object Free Area

RON – Remain Over Night

ROW – Right-of-Way

RPZ – Runway Protection Zone

RSA – Runway Safety Area

Aviation Acronyms & Terminology

RTR – Remote Transmitter Receiver

RVR – Runway Visual Range

RVZ – Runway Visibility Zone

RWY – Runway

SAAPD – San Antonio Airport Police Department

SARA – Service Animal Relief Area

SAAS – San Antonio Airport System

SAASSAM – San Antonio Airport System Sustainable Airport Manual

SAIA– San Antonio International Airport

SAT – San Antonio International Airport

SAWS – San Antonio Water System

SM –Statute Mile

SIDA – Security Identification Display Area

SSCP – Security Screening Checkpoint (TSA)

SSD – Self Service Device

SSI – Sensitive Security Information

STSO – Supervisory Transportation Security Officer

SWS – Surface Weather System

TASP – Texas Airport System Plan

TBD – To Be Determined

TCEQ – Texas Commission on Environmental Quality

TCU – Threat Containment Unit

TDP – Terminal Development Program

TDZ – Touchdown Zone

TERPS – Terminal Instrument Procedures

TESM – Taxiway Edge Safety Margin

TLN –Taxilane

TNC – Transportation Network Companies

TODA – Take-Off Distance Available

TOFA – Taxiway Object Free Area

TORA – Take-Off Run Available

TR – Telecommunications Room – formerly IDF

TSA – Transportation Security Administration

TSS – Threshold Siting Surface

TWY – Taxiway

UDC – Unified Development Code

ULD – Unit Load Device

UPS – Uninterruptible/Uninterrupted Power Supply

UPS – United Parcel Service

USAA – United Services Automobile Association

VASI – Visual Approach Slope Indicators

VGS – Vertically Guided Survey

VMC – Visual Meteorological Conditions

VOR – Very-High-Frequency (VHF) Omni-Directional Range

VSR – Vehicle Service Road

WAN – Wide-Area Network

WB – Wide Body (aircraft)

WLAN – Wireless Local Area Network

WTMD – Walk-Through Metal Detector

YOE – Year of Expenditure

Aviation Acronyms & Terminology

Airside – The secure area at an airport. This can be inside or outside the building.

Apron – Area where aircraft movement occurs. This includes gate areas, hard stand areas, taxiways, taxilanes, runways, etc.

Arrivals – Refers to the areas where passengers arriving at an airport via an aircraft enter the building or circulate through it. This could be a floor level, a roadway, or a curb where passengers are picked up.

Baggage Breakdown – Facilities in the secure area of the airport where checked baggage from arriving flights is unloaded from baggage containers or baggage carts and placed on conveyor belts for distribution to the baggage claim device(s).

Bag Drop – A staffed or non-staffed position where passengers use a self-service device to acquire tags for their checked baggage and the baggage is input into the BHS.

Baggage Make-Up – Facilities in the secure area of the airport where checked baggage for departing flights is sorted and loaded into containers or onto baggage carts.

CIP Lounge – A special airline lounge to accommodate commercially important passengers e.g. Business and First Class passengers. The term VIP lounge or Premiere Lounge/Club are also used.

Concessions – Refers to the areas where passengers can shop (retail) or eat (food & beverage) in an airport.

Concourse – Usually Level 2, directly above the Ramp Level where passengers load and unload from an aircraft. Can also refer to the area where public circulation occurs at the Airside of the airport.

Departures – Refers to the areas where passengers departing at an airport via an aircraft exit the building or circulate through it. This could be a floor level, a roadway, or a curb where passengers are dropped off.

HUB –

FAA definition of a Hub:

The notion of hub is used by the Federal Aviation Administration (FAA) to classify commercial service airports. The FAA defines Commercial service airports as publicly owned airports that have at least 2,500 enplanements each calendar year and receive scheduled passenger service. There are 5 types of hubs, each defined by the percentage of the annual number of enplanements among all U.S Commercial service airports.

- Large Hub: if the number of enplanements at the airport represents at least 1 percent of the total annual number of enplanements among all U.S Commercial service airports.
- Medium: if the number of enplanements at the airport represents at least 0.25 percent of the total annual number of enplanements among all U.S Commercial service airports.
- Small: if the number of enplanements at the airport represents at least 0.05 percent of the total annual number of enplanements among all U.S Commercial service airports.
- Nonhub: if the airport has at least 2,500 enplanements each year.

Aviation Acronyms & Terminology

Airlines definition of a Hub:

A Hub or a “transfer hub” is an airport that an airline uses to transfer large number of passengers between flights. Thus for most passengers of the airline, the hub is not their final destination. The hub is a central element of most large airlines. Although a hub airport has to have more infrastructure and manpower in order to transfer passengers and bags, it permits the airlines to provide more frequent and less expensive service to a wider network of destinations.

Landside – The non-secure area at an airport. This can be inside or outside the building.

Meeters & Greeters – The area where a greeter meeting waits on an arriving passenger. Sometimes referred to as an Arrivals Lounge there is usually a designated space or area for them to wait just outside of Customs or just outside of the secure line.

Ramp – Usually Level 1 or Ground Level where aircraft operations occur.

Secure Line – An invisible line that demarks the difference between Airside and Landside. A physical barrier is located along this line.

Wayfinding – The ability of a passenger to easily find their way around an airport due to signage, landmarks, landscaping, lighting, interior design, visual cues, maps, and publications.

1 Executive Summary

1.1 Introduction

The San Antonio International Airport (SAT) is a major economic engine and critical transportation hub for the San Antonio region. Over the years, San Antonio International Airport (SAT) has experienced substantial continued growth in passenger demand and operational activity. As a result, SAT has outgrown its current operational capacity. This growth has led to the necessary expansion of current operations and construction of new facilities to accommodate demand. The future development of SAT creates a gateway for passengers into a world-class airport that exemplifies the unique sense of place manifesting the heritage and history of the City of San Antonio while creating a human-centric passenger experience and efficient operations to meet the demand of 21st century air travel.

The Advance Terminal Planning Program (ATPP) provides a strategic approach to implementing a series of projects to expand and improve SAT facilities and enhance the overall customer experience. This program designed to replace aging infrastructure ensures the airport remains a safe, efficient, and modern facility that serves the needs of the community, travelers, and airlines at SAT. As a result of the ATPP, the San Antonio Airport System (SAAS) will make necessary improvements and upgrades to SAT infrastructure and services. This report is an overview of the capital investment program, including its goals, objectives, expected costs and schedule for implementation. The PDM is organized into four volumes as described below:

- Volume 1– Review of Design Day Flight Schedule (DDFS) and Planning Activity Levels, Facility Requirements, Preferred development alternatives and summary cost for total program.
- Volume 2 – All the Project Definition Documents (PDD) in a single document with summary cost for each project.
- Volume 3 – Detailed costs estimates for each PDD.
- Volume 4 – Appendix for all content developed for the ATPP.

1.2 Scope Components

This PDM is an overview of the scope of work for SAT – ATPP outlining the objectives, programmatic requirements, timeline, and budget for each project. This PDM provides a detailed description of the PDD for each discrete element of the overall program. The comprehensive list of projects is organized into two distinct groups:

1. Early Works – a series of projects that must occur early in the construction phasing of the overall program. The early works project scope of work was developed at the initial conceptual level and Rough Order of Magnitude (ROM) cost estimates.
2. Core Projects – scopes of work were developed to a 15% planning level of detail to support the development of detailed cost estimates.

Figure 1 provides the limits of the ATPP scope of work and location for the proposed development site. The area within the solid yellow polygon includes all the early works and core projects. The two areas with a dashed outline are sites that were under consideration for potential land acquisition and developable areas.

Figure 1: ATPP Scope Limits

Source: Corgan

1.2.1 Early Works

- *Conceptual development to support ROM*
  - Employee Parking Lot Relocation
  - Demolition of Hangar 4 & Public Safety Building
  - Demolition of the Badging Office
  - Remain Overnight (RON) Parking Relocation
  - Relocation of Public Safety

1.2.2 Core Projects

- *Advance Planning & Detailed Cost Estimates*
  - New Terminal
  - Commercial Apron
  - Fueling Storage & New Terminal Hydrant System
  - Utility Corridor Relocation
  - Central Utility Plant (CUP) Upgrades
  - New Triturate for New Terminal
  - New Parking Structure & Ground Transportation Center (GTC)
  - Terminal Curbside Roadway Improvements
  - Administration Building

- o Central Receiving Distribution Center (CRDC)
- o Airport Access Roadway Improvements
- o Terminal A+B Connector
- o Terminal A Reconfiguration
- o Terminal B Reconfiguration

1.2.3 Preferred Terminal Development Site Plan

The terminal development site plan presented in Figure 2 outlines the preferred development alternatives from the ATTP. The main components include a new 17-Gate passenger terminal building with check-in areas, passenger security screening checkpoints, baggage handling system, gate lounges, concession areas, domestic bag claim and international arrivals area. Other airside projects included 18 RON positions, and a new secure side connector between Terminals A & B. Landside developments include expansion of the airport access roadway, terminal curbside expansion and construction of a new ground transportation center.

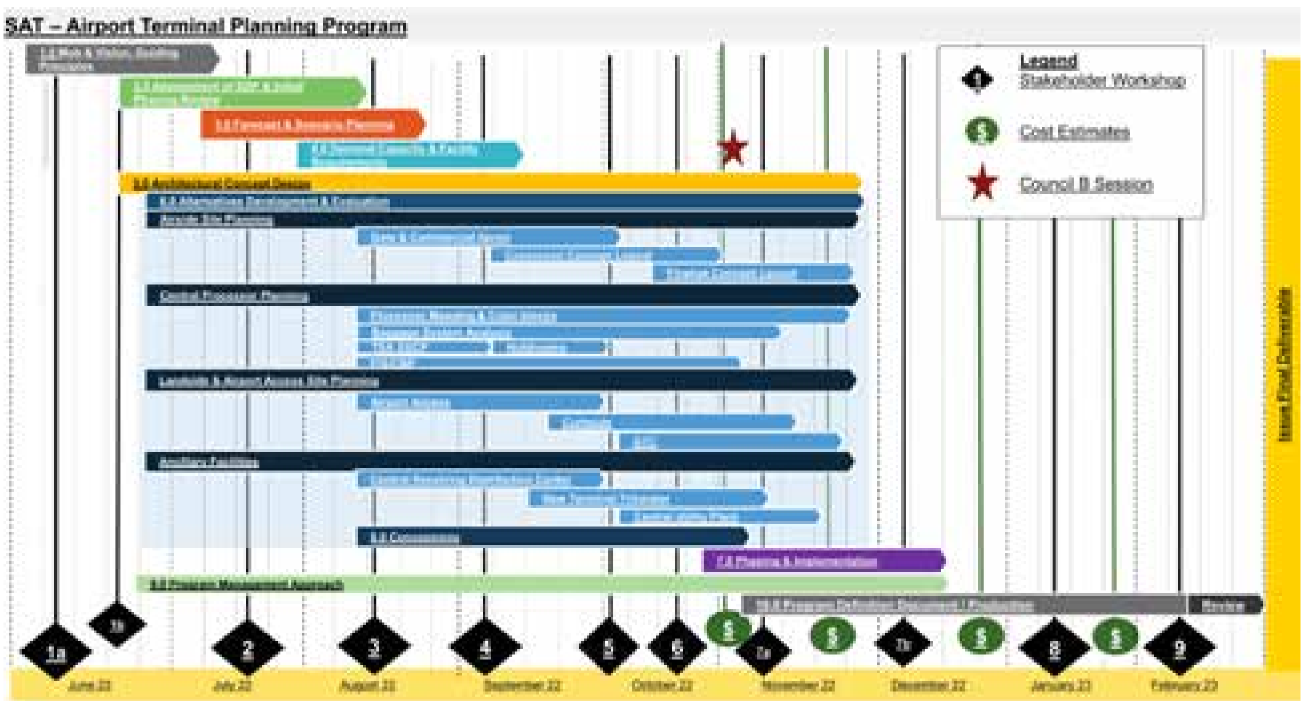
Figure 2: Terminal Development Plan

Source: Corgan

1.3 Schedule

The ATPP project was initiated in June 2022 and spanned 10 months into March 2023. During the ATPP, the Consultant Team engaged in an intensive stakeholder engagement process. Regular outreach and reports outs conducted with airport leadership provide updates and gain input on the ATPP progress.

Figure 3: TDP Development Schedule



Source: Corgan

1.4 Construction Cost Estimates

A critical element of the ATPP are the individual construction cost estimates developed for each project included in the preferred development program. Costs estimates were developed at three major milestones during the project and evolved in parallel with the development of the preferred program. All cost estimates presented in Table 1 were developed in accordance with the Association for the Advancement of Cost Engineering International (AACE) Class 4 level of detail.

Table 1: Construction Cost Estimates

PROJECT	LOW RANGE		HIGH RANGE	
Early Works & CRDC	$	125.56M	$	150.30M
New 17-Gate Terminal, Apron, CUP & Utility Infrastructure	$	1.22B	$	1.47B
Fuel Storage, New Terminal Hydrant System & Fuel Mains	$	168.72M	$	187.00M
Roadways, Curbside & GTC	$	115.91M	$	133.40M
Term A & B Reconfig, A+B Connector	$	48.15M	$	59.30M
Totals	$	1.67B	$	2.00B

Source: Sunland

2 Design Vision

Development of the New Terminal facility at San Antonio International Airport is a crucial part of the long-term goals of the airport and the City of San Antonio. The importance of creating a sense of place was identified by various stakeholder groups, community members, airport users, and city leaders as a priority in designing the New Terminal. A key design goal is to create a memorable gateway (front door) experience that strengthens the passenger's connection to San Antonio's vibrant culture, history, and environment. As part of the process to develop the Program Definition Manual (PDM), the consultant team participated in several workshops with SAAS staff and executive leadership to establish principles for creating a sense of place to enhance the passenger experience. The following themes identified during the workshops are essential in creating an authentic San Antonio experience for airport users.

- Integrate natural colors, textures, and landscape of the San Antonio region, including water, native landscaping, and trees.
- Create an environment balancing serene peaceful spaces with vibrant and colorful spaces that embody the welcoming culture of San Antonio with the exuberant spirit of Fiesta.
- Create a serene and peaceful environment (calming spaces) that embodies the warm and welcoming culture of San Antonio. The airport design should connect to nature and provide an abundance of natural light and views to the outdoors at every opportunity.
- Incorporate regionally sourced stone, materiality, and art referencing San Antonio's culture and history of craftsmanship.

2.1.1 Sense of Place

The purpose of SAT ATPP is to develop a vision for a new terminal representative of the local community and reflect the culture, history, and diversity of this great city and region. The architectural intent of this terminal will create a sense of place – a distinctive landscape and atmosphere determined by elements such as the building design, materials, colors, textures, and public art. Consequently, the design blends San Antonio's distinctive style with modern technology to evoke a sense of warmth, comfort, and familiarity for travelers. Additionally, the building materials, finishes and landscape elements represent an integration of sustainable technologies to ensure energy efficiency and reduce energy consumption.

Figure 4: San Antonio Sense of Place Cultural References

Source: Lake Flato

Figure 5: San Antonio Sense of Place Cultural References

Source: Lake Flato

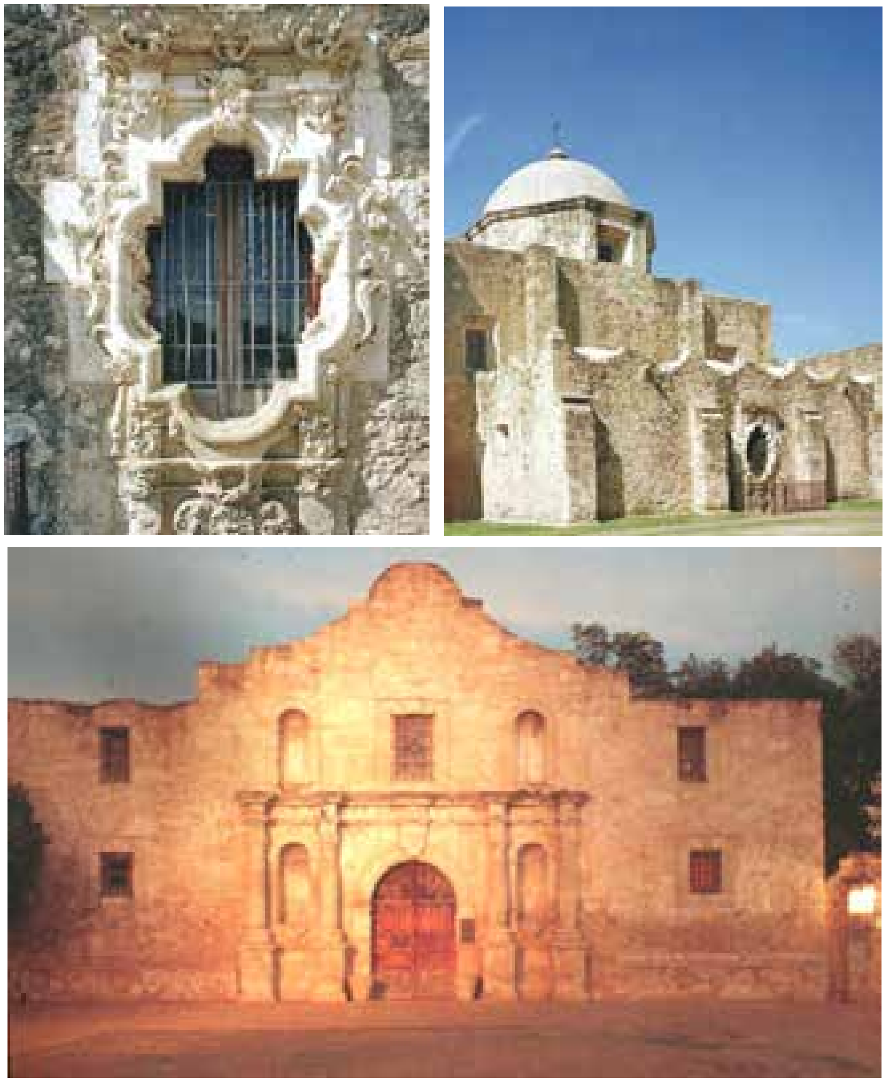
Figure 6: San Antonio Sense of Place Cultural References

Source: Lake Flato

Figure 7: San Antonio Sense of Place Traditional References

Source: Lake Flato

Figure 8: San Antonio Sense of Place Historical References



Source: Lake Flato

Figure 9: San Antonio Sense of Place Landscape References

Source: Lake Flato

2.1.2 Advanced Terminal Planning (ATPP) Guiding Principles

During the workshops with airport leadership and stakeholders, we completed a visioning process that helped identify the guiding principles for the Advanced Terminal Planning Program (ATPP).

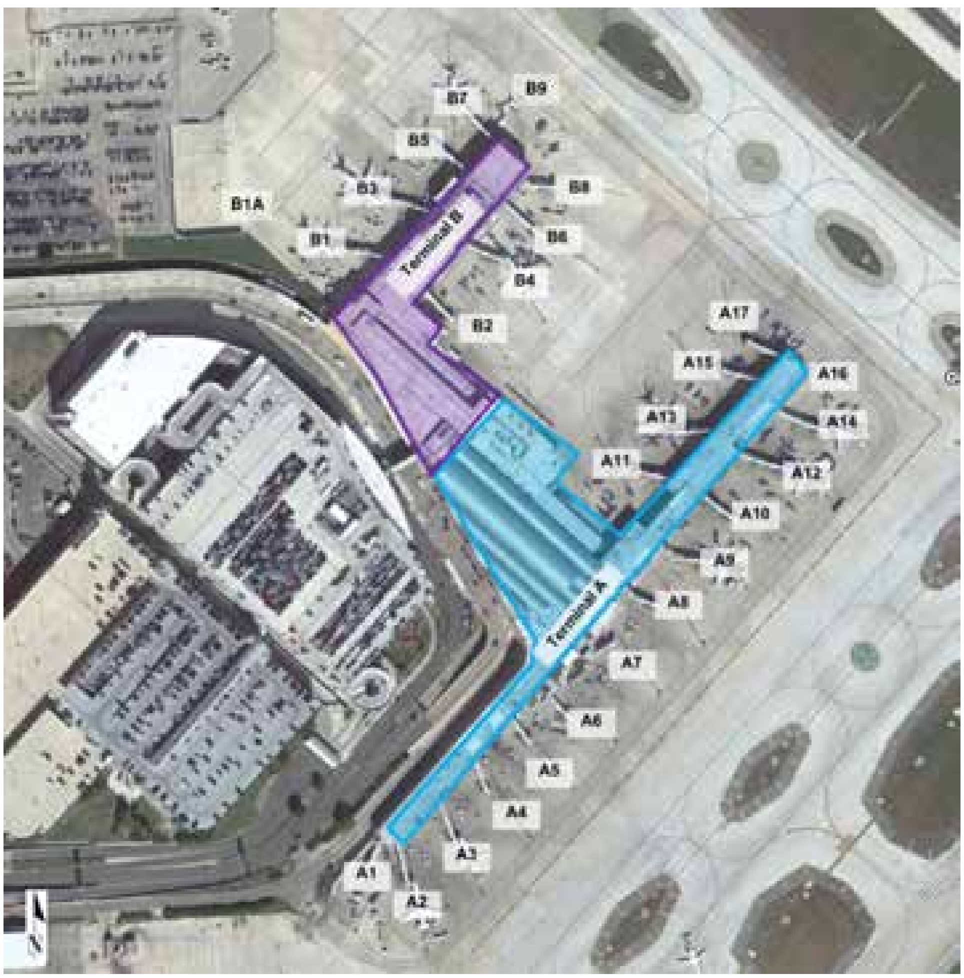
1. Schedule (under schedule)
2. Explore the "Art of the Possible"
3. Budget (under budget)
    a. Balanced by ROI
4. Sense of place
    a. Draw/retain business
    b. Supports Revenue Generation
    c. Pax Experience
5. Has to work!
    a. Improved processes (technology)
    b. Improved Revenue
    c. BOH and FOH - variety of customers
6. Positioned for future Growth
    a. Easy to expand
7. Accessibility
8. Phasing and constructability
    a. Scale up/scale down
    b. Build it once
    c. Customer experience
9. RISK (openness to new ideas)
    a. Willingness to take Risk
    b. Don't be bound by existing constraints or previous work

3 Existing Conditions

3.1.1 Site Plan

San Antonio International Airport is located nine miles North of downtown San Antonio and is boarded by US 281 to the West and I-410 to the South. The commercial terminal area is located on the southwest side of the airport property and is bordered by the CONRAC and parking garage, FAA Air Traffic Control Tower (ATCT), West Ramp, Runway 13R/31L, and the threshold for Runway 4. The main components of the terminal facilities are Terminal A and Terminal B, as well as the West Ramp for remote overnight aircraft parking. The two terminal buildings are connected on the non-secure side, with a single curb front. The two terminals do not have a secure side connection, which requires a connecting passenger to exit security and go through TSA security screening to catch their connecting flight from between concourses. The combined area of both terminals is approximately 640,000 square feet. The passenger commercial terminal facilities are depicted in Figure 10.

Figure 10: Existing Site Plan



Source: Google Earth Pro, 2019 (aerial imagery); WSP USA, 2019 (annotations); Corgan (annotations)

3.1.2 Terminal A

The existing Terminal A has 16 gates, was commissioned in 1984 and has Service, Arrivals, Departures, and Mezzanine levels. The total area for existing Terminal A is 397,634 square feet.

The passenger Level of Service is suboptimum, and contains support spaces, MEP spaces, circulation, and other programmed spaces.

Figure 11: Terminal A - Existing Service Level

EX - TERM A - SERVICE		
Presentation Color	Area	Area Percent
Circulation	8640	22%
MEP	10505	27%
Support-Airport	5076	13%
Unprogrammed	14320	37%
Grand total: 19	38541	100%

Source: Corgan

The Arrivals level is composed of airline support spaces, bag screening, bag claim carousels, restrooms, and MEP spaces. On Arrivals there are 3 bag claim devices, each having 135 linear feet (LF) of claim frontage with a total of 405 LF. There are 3 L3 6600 Explosive Detection System (EDS) units.

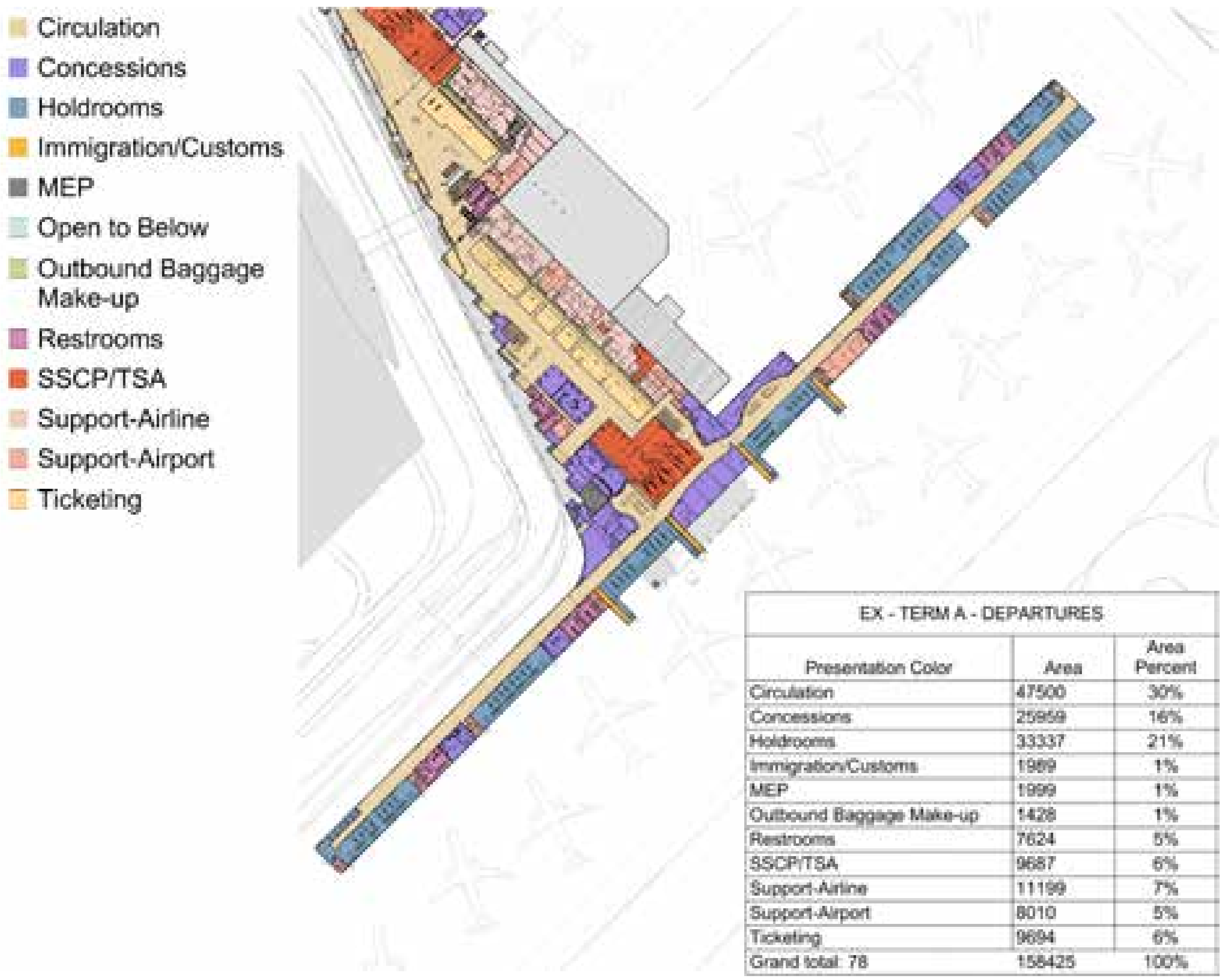
Figure 12: Terminal A – Existing Arrivals Level

EX - TERM A - ARRIVALS		
Presentation Color	Area	Area Percent
Bag Screening	26393	14%
Baggage Claim	9953	5%
Circulation	18044	10%
Immigration/Customs	35029	19%
MEP	14468	8%
Outbound Baggage Make-up	31927	17%
Restrooms	3587	2%
Support-Airline	19117	10%
Support-Airport	26807	14%
Grand total: 60	185326	100%

Source: Corgan

The Departures level contains a check in hall, security screening checkpoints (SSCP), support spaces, hold rooms, concessions, and restrooms. The check in hall has 55 total counter positions, 10 of which are vacant and 25 kiosks. The SSCP has a total of 7 lanes and 4 full body scanners. The concourse serves the holdrooms, 16 gates, concessions, restrooms in secure areas, and airline operations with support spaces.

Figure 13: Terminal A – Existing Departures Level



EX - TERM A - DEPARTURES		
Presentation Color	Area	Area Percent
Circulation	47500	30%
Concessions	25959	16%
Holdrooms	33337	21%
Immigration/Customs	1989	1%
MEP	1999	1%
Outbound Baggage Make-up	1428	1%
Restrooms	7624	5%
SSCP/TSA	9687	6%
Support-Airline	11199	7%
Support-Airport	8010	5%
Ticketing	9694	6%
Grand total: 78	158425	100%

Source: Corgan

The Mezzanine level houses SAAS Administrative offices and other airport support spaces.

Figure 14: Terminal A - Existing Mezzanine Level

EX - TERM A - MEZANNINE		
Presentation Color	Area	Area Percent
Circulation	676	4%
MEP	1016	7%
Support-Airport	13650	89%
Grand total: 6	15342	100%

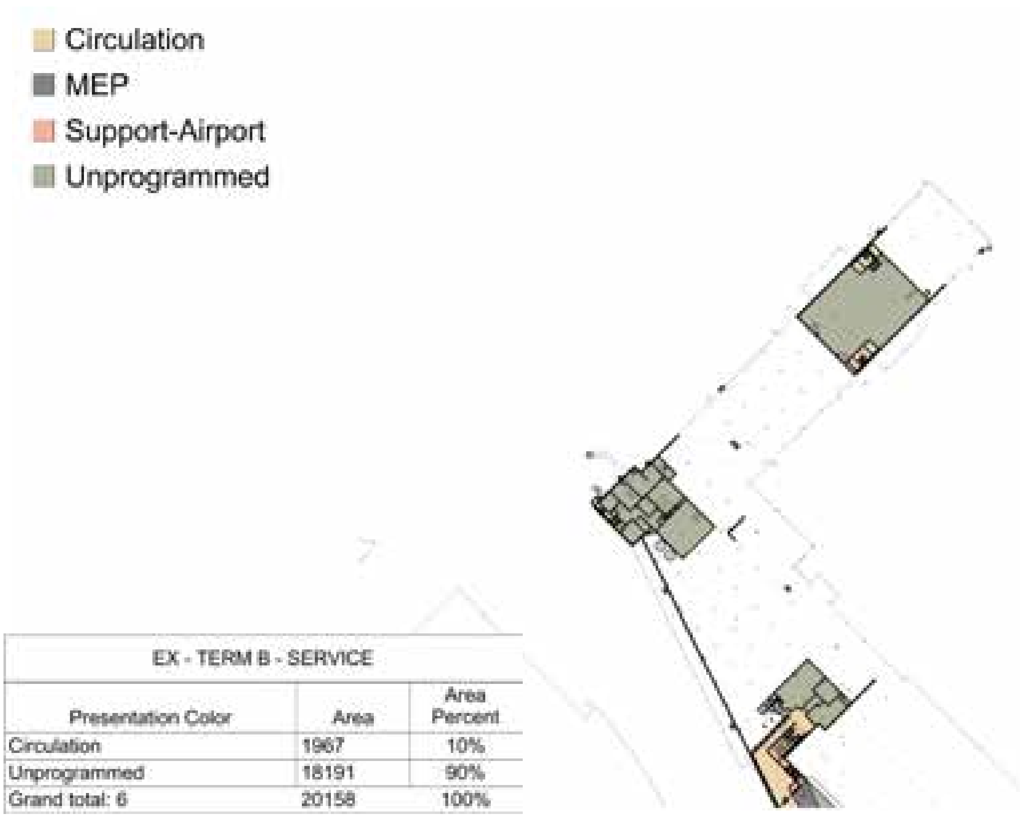
Source: Corgan

3.1.3 Terminal B

The existing Terminal B was constructed in 2010 and has Service, Arrivals, Departures, and Mezzanine levels. The total area for existing Terminal B is 247,099 square feet.

The Service level contains support spaces, MEP spaces, circulation, and other programmed spaces.

Figure 15: Terminal B - Existing Service Level



EX - TERM B - SERVICE		
Presentation Color	Area	Area Percent
Circulation	1967	10%
Unprogrammed	18191	90%
Grand total: 6	20158	100%

Source: Corgan

Terminal B arrivals level consists of checked baggage screening, two L3 6600 EDS units interconnected with EDS units in Terminal A, three baggage carrousels: two (125 LF of claim footage, and one with 110 LF, for a total of 360 LF), airlines baggage services offices, and airlines operational and support spaces.

Figure 16: Terminal B - Existing Arrivals Level

EX - TERM B - ARRIVALS		
Presentation Color	Area	Area Percent
Bag Screening	11942	11%
Baggage Claim	10629	10%
Circulation	22100	21%
Concessions	1126	1%
MEP	3777	4%
Outbound Baggage Make-up	19668	19%
Restrooms	1101	1%
Support-Airline	9712	9%
Support-Airport	24366	23%
Grand total: 44	104421	100%

Source: Corgan

The departures level has 25 check-in counter positions and in-line kiosks, of which three are currently unused, with an additional 13 kiosks located in the check-in lobby, four lane TSA SSCP with two full body scanners backed up with more conventional walk-thru metal detectors, and three queuing spaces: general passengers, premium passengers/employees/crews, and TSA Pre-check. Also included are hold rooms, concessions, and restrooms in the secure areas of the terminal.

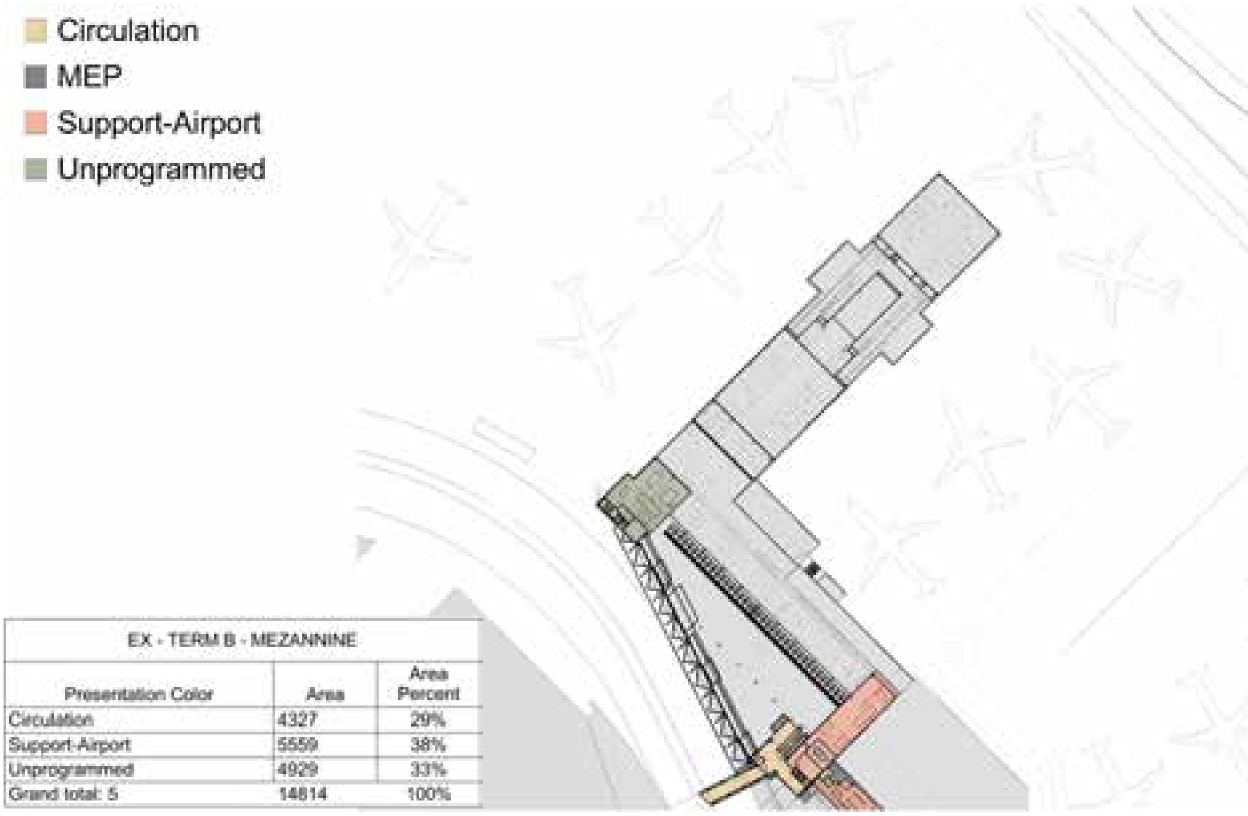
Figure 17: Terminal B – Existing Departures Level

EX - TERM B - DEPARTURES		
Presentation Color	Area	Area Percent
Airline/Club Lounges	2471	2%
Circulation	41566	39%
Concessions	10137	9%
Holdrooms	17053	16%
MEP	1716	2%
Open to Below	261	0%
Outbound Baggage Make-up	794	1%
Restrooms	4399	4%
SSCP/TSA	7389	7%
Support-Airline	8200	8%
Support-Airport	8708	8%
Ticketing	5011	5%
Grand total: 47	107706	100%

Source: Corgan

The Mezzanine level houses mostly mechanical equipment.

Figure 18: Terminal B – Existing Mezzanine Level



EX - TERM B - MEZZANINE		
Presentation Color	Area	Area Percent
Circulation	4327	29%
Support-Airport	5559	38%
Unprogrammed	4929	33%
Grand total: 5	14814	100%

Source: Corgan

3.1.4 Terminal Curbside Roadway Improvement

3.1.4.1 CURBSIDE ACCESS ROADWAYS

Terminal Access/Egress

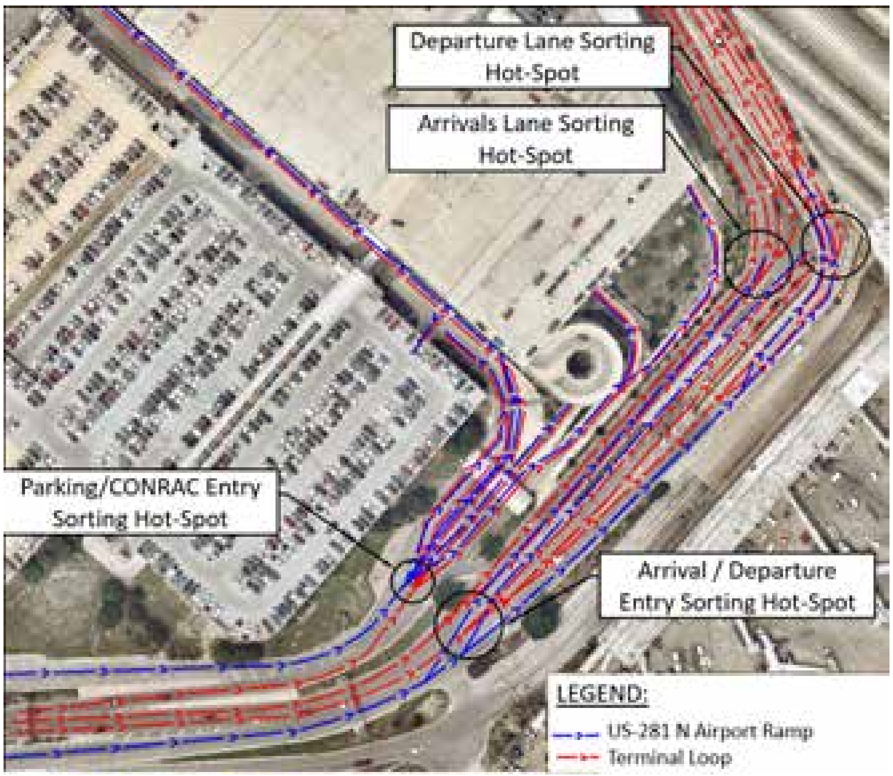
Terminal A and Terminal B have a shared access roadway system leading to their curbsides. The approach roadway to the terminal curbsides consists of 1 lane from Dee Howard Way, 2 lanes from Airport Boulevard, and 2 lanes from Highway 281.

The terminals also share an exit roadway system. Vehicles exit the curbside areas and access the regional roadway network via 2 lanes to Dee Howard Way to access Highway 281 and 2 lanes to Airport Boulevard to access Interstate 40. Traffic exiting the terminal area intending to return to the terminals, also known as recirculation traffic, merges with the accessing Dee Howard Way traffic.

Existing Curbside Access Roadway Issues/Challenges

- Convergence of access roadways – as depicted in Figure 19 - results in automobile weaving maneuvers that limit the driver's decision-making time and may impose additional safety risks to motorists, possibly reducing effective roadway capacity.

Figure 19: Existing Curbside Access Roadway Issues



Source: Kimley-Horn

3.1.4.2 CURBSIDE AND CURBSIDE ROADWAYS

Curbsides are traffic lanes located at terminal front entrances where passengers enter and exit vehicles to access/egress the terminal buildings. The existing Terminal A and B curbsides are served by the at-grade arrivals roadway, the elevated departures roadway, and the at-grade commercial vehicle roadway.

Departures

The departures curbside, which serves both terminals, is comprised of two through lanes and two curbing lanes along an elevated roadway with a continuous 735' curbside. Private vehicles, taxis, Transportation Network Companies (TNCs, i.e., Uber/Lyft), limos, and some shuttles drop off passengers destined for ticketing or the security checkpoint at this location. The departures curbside is accessible from a two-lane ramp and vehicles exit the departures curbside roadway via a two-lane ramp.

Arrivals

The arrivals curbside which serves both terminals consists of two through lanes and two curbing lanes along an at-grade roadway with an effective curbside length of 660'. Four 20' crosswalks present along the arrivals roadway provide pedestrian connectivity between the terminal and the commercial vehicle curb (described further in next subsection). Private vehicles pick up passengers exiting the terminal from the baggage claim at the arrivals curbside. The arrivals curbside is accessed via two lanes and vehicles exit the arrivals curbside roadway via one lane.

Commercial Vehicle Curb

Parallel to the arrivals roadway (on the side opposite from the terminals) is the commercial vehicle curb consisting of two through lanes and one curbing lane along an at-grade roadway with a continuous 905' curbside.

s, taxis, hotel shuttles, parking shuttles, and buses pick up passengers exiting the terminal from the baggage claim at the commercial curb. The parking shuttles and buses concurrently drop off passengers on the commercial curb. The commercial vehicles enter and exit the commercial area via two lanes.

Existing Curbside Issues/Challenges

- Vehicles accessing either the departures or arrivals curb are required to make a tight-radius turn as they approach the curbs with limited sight distance, causing vehicles to slow down which often leads to vehicular back-up.
- The crosswalks along the arrivals curbside restrict throughput, with the most noticeable back-up stemming from the first crosswalk nearest the beginning of the arrivals curbside. Weaving caused from Terminal A vehicles attempting to exit the curbside and mixing with Terminal B vehicles causes congestion and reduces effective roadway throughput.

3.1.5 Airport Access Road

This element of the Advanced Terminal Planning Program included an evaluation of roadways and intersections within the Airport Terminal campus is not evaluated as part of this process. The offsite intersections of US 281 & Jones Maltsberger Road, US 281 & Dee Howard Way, and Loop 410 & Airport Boulevard adjacent to the Terminal campus should also be evaluated for improvements during the next phase of the Terminal program implementation. The Airport access roadway network on the Airport property comprises three main signalized intersections as described in following subsections.

3.1.5.1 DEE HOWARD WAY & JOHN SAUNDERS

The intersection of Dee Howard Way & John Saunders provides access to and from the economy lot for both customers as well as the parking shuttle to the south and access to staff parking for ST Engineering to the north. This is the first intersection on Airport property that users experience from US 281 southbound as they make their way east toward curbside access. Additional access to this intersection on the US 281 is on the northbound frontage road, however users traveling on US 281 northbound access the Airport network primarily through the Airport Boulevard exit ramp or the purpose-built direct connector. The traffic signal operates with split phase services for John Saunders, which is typically considered an inefficient phasing for signalized intersection operations but is required here to support the shared through/left turn lane configurations.

3.1.5.2 AIRPORT BOULEVARD & NORTHERN BOULEVARD

This signalized intersection provides access to the “Red Lot” Economy Parking, cell phone waiting lot, and Taxi/TNC hold lot to the east, the “Green Lot” Economy Parking, and US 281 northbound frontage road to the wet as well as the San Antonio International Airport curbside Terminal Loop to the north. This is the first intersection on Airport property users from Loop 410 access as they make their way north to the Terminal. The signalized intersection also includes the intersection of Northern Boulevard & S Terminal which serves as the exit for delivery vehicles servicing Terminal A. This extra movement requires the Northern Boulevard and south Terminal movements to be split phased necessitating the use of an extra internal clearance phase which impacts the efficiency of the intersection. This phasing contributes to the intersection’s inefficiencies for signalized intersection operations.

3.1.5.3 AIRPORT BOULEVARD / TERMINAL LOOP & DEE HOWARD WAY / TERMINAL LOOP

This signalized intersection is the core of the Airport roadway access network. This traffic signal is the last controlled intersection before users access the counterclockwise loop to the Terminal curbside facilities and meters access into the Terminal pick up and drop off area, creating platoons of vehicles that create friction in the weaving space to the east of the intersection as discussed in Section 3.1.5.1. Geometric constraints exist due to bridge columns supporting the overhead US 281 northbound Airport direct connector. The intersection serves an entrance to the FAA facilities, including but not limited to the Airport Traffic Control Tower and associated facilities. Two southbound right turn lanes and one eastbound right turn lane are signalized enabling users to make right turns on a red indication. Terminal Loop westbound at the intersection has no movements since the Terminal curbside loop are one-way counterclockwise operation. The restricted turning movements constrain the efficiency of the intersection and the dedicated use lanes can be confusing for unfamiliar users.

3.1.5.4 SYNCHRO 11™ ANALYSIS OF EXISTING CONDITIONS

As an additional focus for the initial analysis, a Synchro 11™ analysis was performed at the key intersection of Airport Boulevard / Dee Howard Way / Terminal Loop to establish a baseline of Level of Service (LOS) and seconds of delay experienced by each user. Capacity defines the volume of traffic accommodated by a roadway at a specified LOS. Capacity affected by various geometric factors including roadway type (e.g., divided or undivided), number of lanes, lane widths, and grades. LOS, which measures the degree of congestion and ranges from LOS A (free flowing) to LOS F (a congested, forced flow condition). LOS C is considered the minimum acceptable LOS for design and evaluation purposes according to the City of San Antonio. Table 2 below shows the approximate existing LOS and delay at the intersection during the flight schedule AM peak between 10:30 AM – 11:30 AM and the flight schedule midday peak between 11:30 AM – 12:30 PM.

Table 2: LOS Operational Results – Existing Conditions

Intersection	Method of Control	Approach	Existing 2022			
			AM Peak Hour		MID Peak Hour	
			LOS	Delay (s)	LOS	Delay (s)
Dee Howard Way / Terminal Loop & Airport Blvd / Terminal Loop	Signalized	EB	C	21.5	C	21.1
		NB	F	94.4	F	165.2
		SB	B	17.7	B	19.9
		TOTAL	**D**	**42.7**	**E**	**63.9**

Source: Kimley-Horn

3.1.6 Fuel Farm

The primary fuel storage facility at SAT operated by Allied Aviation is located on the east side of the airfield, off Wetmore Road, south of the Million Air and Hallmark University facilities, as shown in Figure 20. The facility comprises two above-ground 420,000-gallon Jet A tanks built in the late 1980s. Allied Aviation also has a facility south of the fuel farm with office and employee space, which was built in 2017. The fuel tender is located south of the now demolished Nayak building. Allied Aviation provides fueling services to commercial aircraft and other SAT tenants. SAT has no underground fuel hydrant system and all aircraft fueling is performed via truck.

Secondary fuel storage tanks exist on individual tenants' leaseholds but were not identified for the purpose of this inventory. Table 3 lists the current fuel storage capacity by fuel type and number of tanks of the primary fuel tanks at SAT. All tanks are located above ground. The fuel storage facility receives approximately 45 8,000-gallon deliveries daily, each Monday through Friday, with additional deliveries on Fridays to have sufficient fuel through the weekend.

Table 3: Primary Fuel Storage Tanks

Tank Type	Number of Tanks	Tank Capacity (Gallons)
Jet A	2	420,000
Diesel	1	10,000
Gasoline	1	10,000
Avgas	1	10,000
Sump	1	1,000

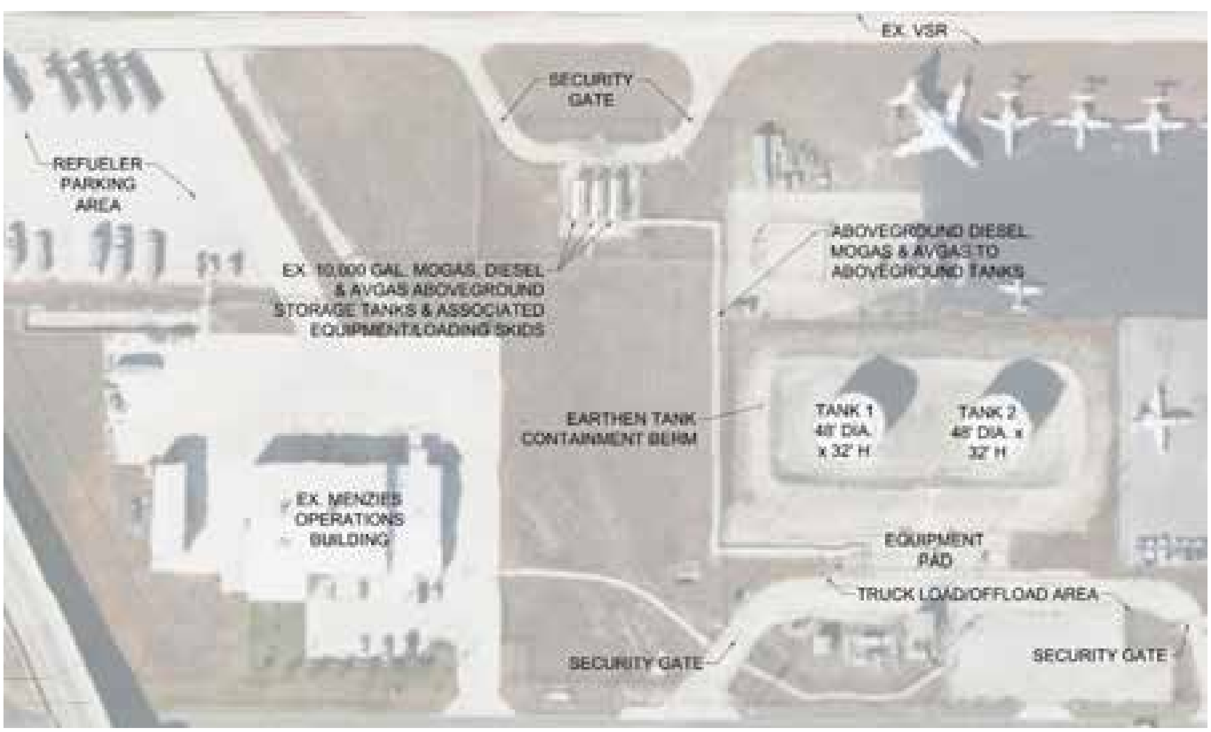
Sources: Tenant Interviews, 2018; WSP USA, 2018.

Table 4: Primary Fuel Tanker Trucks

Tanker Type	Number of Tankers	Tanker Capacity (Gallons)
Jet A	4	10,000
Jet A	2	8,000
Jet A	5	7,000
Jet A	3	5,000
Jet A	1	3,000
Gasoline	1	4,200
Gasoline/Diesel	1	2,000
Diesel	1	1,000

Sources: Tenant Interviews, 2018; WSP USA, 2018.

Figure 20: Existing Hydrant Fuel Tank Farm



Source: Argus

3.1.7 Central Utility Plant (CUP)

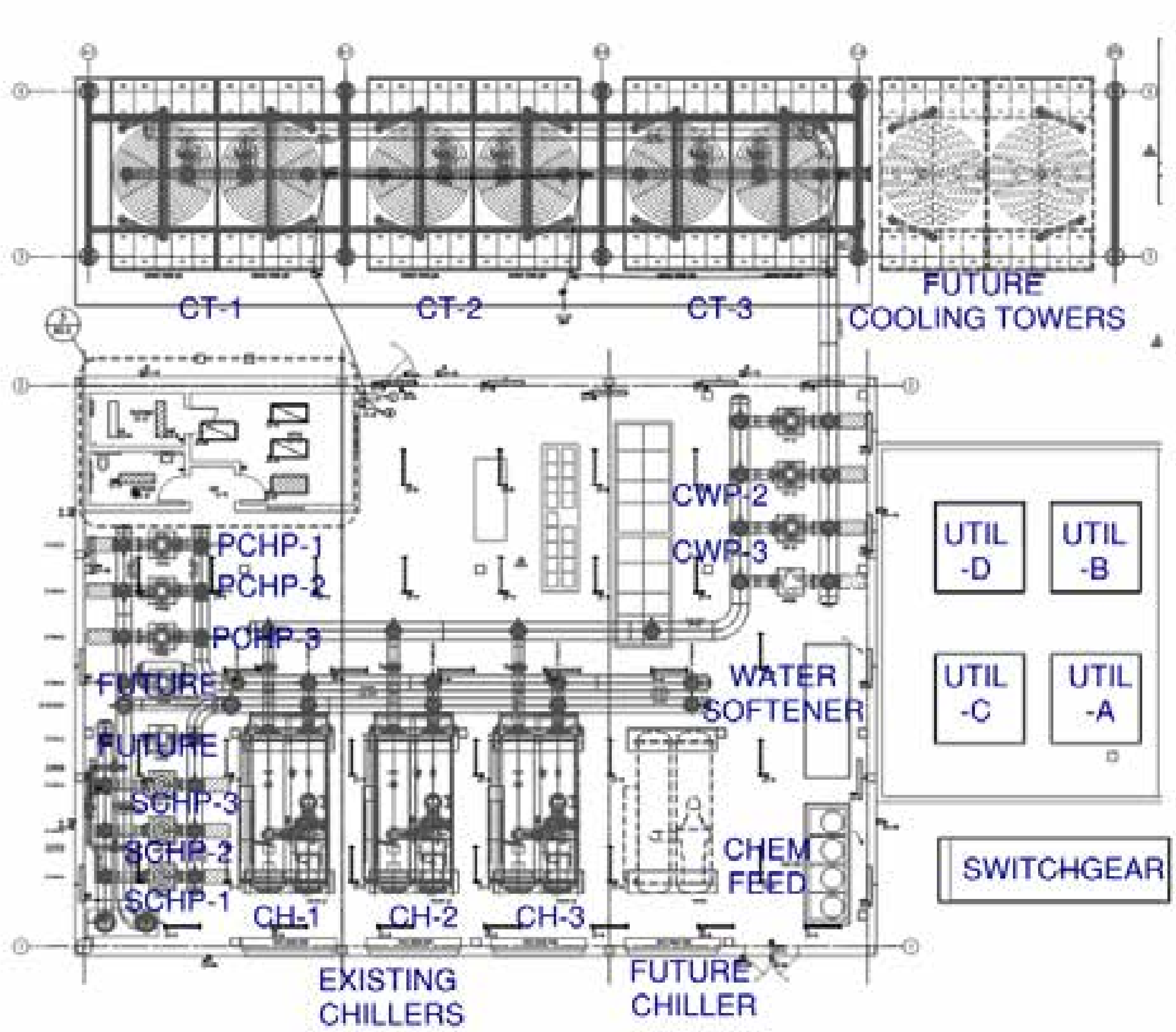
The existing Central Utility Plant built in 2010 provides chilled water for cooling Terminals A and B, ConRAC Building and FAA building. The existing system was installed to provide N+1 redundancy with future connections for additional cooling capacity. Two chillers run during normal operation and the third is in standby mode.

Since 2010, various additions and expansions to Terminals A and B increased the demand load to the extent where the third chiller accommodates peak demands during hot summer days. The Cooling Tower's original design was also intended to be a N+1 redundancy system with future connections for additional heat removal capacity. Two Cooling Towers run during normal operation and the third is in standby mode. The sequence of operation was changed by the airport facilities' staff in 2011 or 2012 and now all three Cooling Towers are operable at 67%.

The existing CUP consist of the following equipment:

- Three Chillers (CH-1,CH-2, CH-3) with a capacity of 1400 Tons each.
- Three Primary Chilled Water Vertical Inline Pumps (PCHP-1, PCHP-2, PCHP-3) with a capacity of 2,800 GPM, 40 Feet of Water Head, and 40 HP horsepower motors each.
- Three Secondary Chilled Water Vertical Inline Pumps (SCHP-1, SCHP-2, SCHP-3) with a capacity of 3000 GPM, 80 Feet of Water Head, and 100 HP horsepower motors each.
- Three Cooling Towers with a capacity of 4,200 GPM, with two (2) cells per tower and a 10 degrees temperature difference of entering and leaving water, 40 HP motor fans/cell.
- Three Condenser Water Vertical Inline Pumps (CWP1, CWP-2, CWP-3) with a capacity of 4,200 GPM, 70 Feet of Water Head, and 100 HP horsepower motors each.
- Water Softeners systems serving the Cooling Towers makeup water.
- Chemical Pot Feeder system.
- Emergency Refrigerant Evacuation Exhaust System.
- Upgraded controls system to record real time cooling load trend data.
- Four 1500 KVA CPSE Transformers.
- Four 2500 A Electrical Switchboards. Three Switchboards are used to support three chillers, three cooling towers, and associated pumps. The fourth switchboard is available for a future fourth Chiller cooling tower, and associated pumps.

Figure 21: Existing Central Plant Mechanical and Electrical Equipment



Source: CNG

4 Peak Aviation Demand & Scenario Planning

4.1 Forecast

Passenger forecasts were established as part of a different project for a Baggage Handling System study. In March 2022 the airport subsequently revised and approved the flight schedules consistent with TSA's Pre-Design Report. The design team is using these four flight schedules to be consistent with other studies at the airport.

Table 5 summarizes the four planning activity levels.

Table 5: Schedule Evolution - Enplanements Planning Activity Level

Year	TransSolutions (June 2019) Annual Growth = 1.6%	TransSolutions (Oct 2021) Annual Growth = 1.66%	Recommended (Feb 2022 Update) Annual Growth = 1.66%	Master Plan[1] (Using Actual 2019 Enplanement Base)	Master Plan High Growth[1] (Using Actual 2019 Enplanement Base)	SDP Estimate[1]	SDP[1] (With 2020 Adjustment for COVID)
2021	5,041,882	5,509,667	**5,633,667**	5,193,130[2]	5,193,130[2]	5,380,101	5,105,069
2022	5,122,553	5,911,333	**6,035,333**	5,364,503	5,395,662	5,561,976	5,282,731
2025 - PAL 1	5,372,390	6,210,631	**6,340,910**	5,754,111	5,924,429	5,966,303	5,731,317
2030 - PAL 2	5,816,156	6,743,514	**6,884,971**	6,260,034	6,709,302	6,502,199	6,283,197
2035 - PAL 3	6,296,578	7,322,119	**7,475,713**	6,710,679	7,443,995	6,953,330	6,768,334
2040 - PAL 4	6,816,684	7,950,370	**8,117,142**	7,193,765	8,259,139	7,431,940	7,233,782

1) *Using Master Plan growth rates (variable by year)*
2) *Using actual 2019 enplanements as 2021 base enplanements*

Source: TransSolutions analysis of 2019 OAG Flight Schedules augmented with airline data

Table 6 summarizes the seats and flights for the Average Day Peak Month (ADPM) flight schedule.

Table 6: Schedule Evolution – Flights & Seats

Parameter	July 2019 OAG	October 2021 OAG	October 2021 OAG + 8 Additional Flights	Recommended ADPM Schedule (adjusted for latest OAG, AC Type and Airport Data)
Number of Flights	129 (incl 8 intl)	133 (incl 9 intl)	141 (incl 9 intl)	143 (incl 12 intl)
Number of Carriers	11	13	13	14
Total Daily Seats	14,653	18,797	20,037	21,047

Source: OAG analyzer and TransSolutions Analysis

Table 7 summarizes the total flights for the four design day flight schedules.

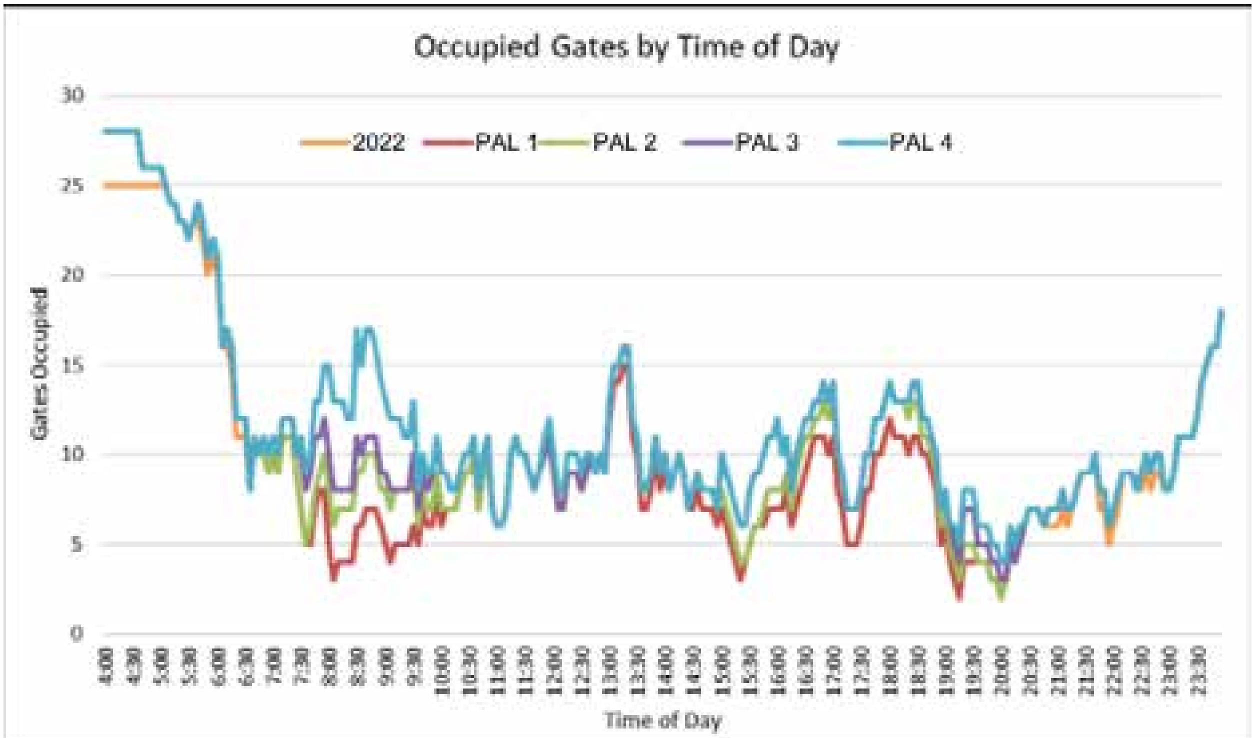
Table 7: ADPM DDFS - Summary Flight Schedule Growth

Airline	Initial Number of Departures (2022)	PAL 1	PAL 2	PAL 3	PAL 4
American Airlines – AA	27	27	29	32	34
Aeroméxico – AM	2	2	2	2	2
Alaska Airlines – AS	1	1	2	2	2
JetBlue Airways – B6	2	2	3	3	3
Delta Air Lines – DL	15	15	17	18	19
Frontier Airlines – F9	3	3	4	4	4
Allegiant Air – G4	1	1	1	1	2
Breeze Airways – MX	1	1	1	5	5
Sun Country Airlines – SY	1	1	1	2	2
United Airlines – UA	23	23	26	28	30
VivaAerobús – VB	3	3	3	4	4
Southwest Airlines – WN	58	58	58	58	61
Volaris – Y4	3	3	3	3	4
New Carrier - XX	3	6	6	6	6
TOTAL	**143**	**146**	**156**	**168**	**178**

Source: OAG analyzer and TransSolutions Analysis

Figure 22 shows the gate occupancy by time of day. Highest gate occupancy is observed in the early morning.

Figure 22: ADPM DDFS Summary - Occupied Gates by Time of Day for Each PAL



Source: OAG analyzer and TransSolutions Analysis

4.2 International Arrivals Demand

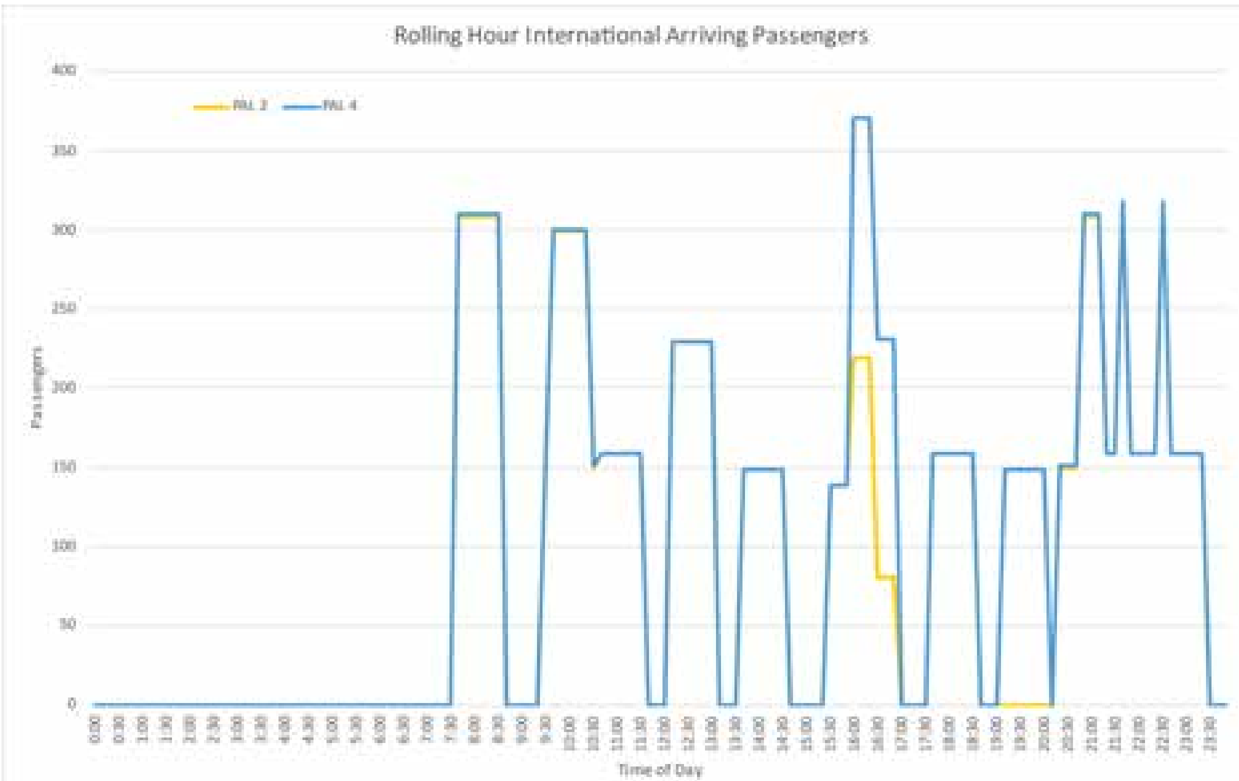
Peak period international arrivals demand was calculated to determine program requirements for the Federal Inspection Services (FIS). Peak hour demand international passenger demand was identified to be 318 passengers for PAL 2 and 370 passengers for PAL 4 as depicted in Figure 23.

The peak hour of 370 passengers in PAL 4 consists of 3 narrowbody arriving from Latin America:

- Southwest Airlines 737-700 with 143 seats and 139 passengers
- Volaris A320 with 186 seats and 151 passengers
- Aeromexico E190 with 99 seats and 80 passengers

Using Customs and Border Patrol (CBP) Airport Technical Design Standards (ADTS), the recommendation was made to design the FIS to accommodate 500 passengers per hour in PAL 2 and 1,000 passengers per hour in PAL 4. The recommendation of 1,000 passengers per hour is intended to provide SAT flexibility and room for growth to accommodate irregular operations, an increase in load factors, aircraft size and unforeseen increase in demand over the baseline such as the reinstatement of Mexico to FAA Category 1 status which will allow Mexican carriers to add additional flights.

Figure 23: Rolling Hour International Arriving Passenger Demand



Source: Corgan

5 Planning Methods, Assumptions and Performance MAPS

The Consultant Team used computer simulation modeling to develop capacity requirements for departing passenger processor requirements—specifically for check-in counter requirements, SSCP, and Federal Inspection Services. With this approach, a computer simulation model represents the logical travel of originating and terminating passengers. Initially, the team elected to use a macro-simulation approach to develop quick programming results to develop terminal plans. As terminal plans are more fully developed, the macro-simulation may be enhanced to offer a 3D computer animation of passengers moving through the facility.

This section summarizes all modeling assumptions, flight schedules, and input for the simulation analyses based on the following sources:

- Forecasted Design Day Flight Schedules developed by TransSolutions
- Passenger data collected onsite at SAT by TransSolutions, September 12-13, 2022
- Processing times data collected onsite at SAT by TransSolutions, September 12-14, 2022
- TransSolutions' knowledge and experience with airport and airlines operations

These modeling assumptions presented to the project team reached consensus on assumptions and ensured they reflected expected operations and passenger behavior/characteristics in the design year. Once the assumptions were approved, the design-team performed a simulation study to develop processor and queueing area requirements.

Table 8 documents key assumptions for the study. A comprehensive list of assumptions is provided in the appendix provided in Volume 4.

Table 8: Key Assumptions

Parameter	Value
Demand-related Parameters	
# of Airlines	14
Planning Day Flight Schedule	PAL 1, PAL 2, PAL 3, PAL 4
Daily Departures (PAL 1, PAL 2, PAL 3, PAL 4)	146, 156, 168, 178
Daily Arrivals (PAL 1, PAL 2, PAL 3, PAL 4)	146, 156, 168, 178
Peak Hour Departures (PAL 1, PAL 2, PAL 3, PAL 4)	20, 20, 20, 20
Peak Hour Departing Seats (PAL 1, PAL 2, PAL 3, PAL 4)	2,766, 2,927, 3,207, 3,497
Peak Hour Arrivals (PAL 1, PAL 2, PAL 3, PAL 4)	14, 15, 15, 17
Peak Hour Arriving Seats (PAL 1, PAL 2, PAL 3, PAL 4)	2,072, 2,200, 2,333, 2,744
Load Factor	93%
Average Origination/Destination (All Airlines)	100%
Passenger Characteristics	
Domestic Passenger Arrival Curve – Pre 8:00 AM	85 minutes average
Domestic Passenger Arrival Curve – Post 8:00 AM	120 minutes average
International Passenger Arrival Curve	123 minutes average
Domestic Average Group Size	1.3 Passengers/Group
International Average Group Size	1.6 Passengers/Group
Premium Passengers	15%-20%
Average Checked-Bags/Passenger Group	1 Bag/Group
SSCP-related Parameters	
% of Pre✓® Passengers	20%
% of General Passengers	80%
Pre✓® Passenger Throughput*	210 Passengers/Hour/Lane
Economy Passenger Throughput*	160 Passengers/Hour/Lane
Travel Document Check (TDC) Processing Time	240 Passengers/Hour/Agent
Terminating Passenger Characteristics	
Deboarding rate	25 PAX/min (WB) 18 PAX/min (NB/Commuter)
% of Passenger Groups with Meeters-Greeters	15% (Domestic) 25% (International)
Meeter-Greeter Arrival Curve	15 min before – 15 min after PAX arrival (Domestic) 15 min – 45 min after PAX arrival (International)

Source: TransSolutions

5.1 Programming Requirements

Programming requirements were developed based on the IATA Terminal Level of Service (LOS) metrics. Passengers should be provided optimum LOS on both time and space performance criteria.

5.1.1 Performance Specifications

Terminal Level of Service (LOS) metrics are taken from the IATA Airport Development Reference Manual (ADRM), 10th Edition, 4th Release, dated October 2016. In this edition, the LOS framework includes four service level categories: Over-design, Optimum, Sub-optimum, and Under-provided. LOS is achieved via a combination of space and waiting time performance. The approach is as follows:

- Identify the space performance for a facility (Table 9)
- Identify the time performance for that same facility (Table 9)
- Combine space and time performances to identify overall LOS for the facility.
- An Optimum LOS is the goal for all Check-in and SSCP facilities analyzed.
- Optimum LOS is effectively equivalent to LOS C performance as identified by the previous IATA ADRM editions.

The following guidelines were presented by the IATA ADRM in Exhibit 3.4.5.3.

Table 9: LOS Guidelines for Terminal Facilities

LOS Guidelines		Space Guidelines (ft^2 / pax)			Max. Waiting Time Guidelines – Economy Class (minutes)			Max. Waiting Time Guidelines – First / Business / Fast-Track (minutes)		
		Over-Design	Optimum	Sub-Optimum	Over-Design	Optimum	Sub-Optimum	Over-Design	Optimum	Sub-Optimum
Check-in	Kiosk	>19.4	14.0-19.4	<14.0	<1	1-2	>2	<1	1-2	>2
	Bag Drop	>19.4	14.0-19.4	<14.0	<1	1-5	>5	<1	1-3	>3
	Check-in Desk	>19.4	14.0-19.4	<14.0	<10	10-20	>20	Business Class <3	Business Class 3-5	Business Class >5
								First Class <1	First Class 1-3	First Class <3
Security Control		>12.9	10.8-12.9	<10.8	<5	5-10	>10	<1	1-3	>3
Holdrooms	Seating	>23.7	19.4-23.7	<19.4	n/a					
	Standing	>16.1	12.9-16.1	<12.9	n/a					
Baggage Claim		>18.3	16.1-18.3	<16.1	<0	0-15	>15	<0	0-15	>15

Source: Taken from Exhibit 3.4.5.3 from 11th Edition IATA ADRM; m2 translated to ft2

Table 10 shows the LOS Space – Time Diagram taken from the IATA ADRM Exhibit 3.4.5.2 describes how the overall LOS is determined, combining the space and time performance levels. Per IATA, the interpretation of the overall LOS guidelines applies if:

- Both space and time are in the Optimum range, or one is in the Optimum range and the other in the Over-Design range, which the LOS considers Optimum.
- One parameter is in the Optimum range and the other is in the Sub-Optimum range, the LOS is considered Sub-Optimum, and improvements should be considered.
- Both parameters are in the Sub-Optimum range, the LOS is considered Under-Provided, identifying the need for major improvements.
- Both parameters are in the Over-Design range, the LOS is considered Over-Design indicating over-sized / unused facilities or room for future growth.

Table 10: Level of Service Space – Time Diagram

LOS Parameters		Space		
		Over-Design[1]	**Optimum[2]**	**Sub-Optimum[3]**
Maximum Waiting Time	Over-Design[1]	Over-Design	Optimum	Sub-Optimum *(consider improvements)*
	Optimum[2]	Optimum	Optimum	Sub-Optimum *(consider improvements)*
	Sub-Optimum[3]	Sub-Optimum *(consider improvements)*	Sub-Optimum *(consider improvements)*	Under-Provided *(reconfigure)*

[1] *Excessive space; overprovision of resources*
[2] *Sufficient space for comfortable environment; acceptable waiting and processing times*
[3] *Crowded and uncomfortable; unacceptable waiting and processing times*

Source: IATA ADRM 11 Exhibit 3.4.5.2, TransSolutions

Please note that IATA LOS metrics are guidelines for international airports and can/should be adjusted as necessary to reflect specific characteristics, requirements, etc. of each facility.

Simulation modeling rather than a formula-based analysis is used for this study and findings are more precise; therefore, the 95% passenger wait time is used instead of the maximum wait time for check-in and SSCP. When simulation modeling is used to evaluate performance, the maximum is an extreme measure.

5.1.2 New Terminal

This section provides a summary of processor and queueing requirements for the New Terminal. A detailed facilities requirement report is provided in the appendix in Volume 4.

5.1.2.1 AIRLINE CHECK-IN COUNTERS

Airline check-in counters typically open three hours prior to the scheduled flight departure time. Originating passengers who show up at the check-in lobby earlier than the counter open time are considered early passengers and must wait in the terminal until the check-in counters open. The four major carriers (AA, DL, WN, UA) operating at SAT are assumed to have counters open throughout the day and are not accounted for in the early passenger numbers.

Critical assumptions used in the simulation study are:

- Domestic Passenger Arrival Curve – Pre 8:00 AM: 85 minutes average
- Domestic Passenger Arrival Curve – Post 8:00 AM: 120 minutes average
- International Passenger Arrival Curve: 123 minutes average
- Domestic Average Group Size: 1.3 Passengers/Group
- International Average Group Size: 1.6 Passengers/Group
- Premium Passengers: 15%-20%

Four scenarios were considered for the check-in lobby primarily.

- Scenario 1: Combined Kiosks – Kiosks serve passengers with and without checked bags. This scenario was identified to be the preferred scenario for check in processing and queuing.
- Scenario 2: Split Kiosks – Separate kiosks for passengers with and without checked bags.
    - Increases inefficiency due to dedicated kiosks.
- Scenario 3: 1-step SSBD – Passengers use a self-service bag drop (SSBD) unit to check-in and drop their bags.
    - Kiosk Passengers without checked bags are assumed to check-in online and proceed directly to SSCP.
- Scenario 4: 2-step SSBD – Passengers use a kiosk to check-in and drop their bags at an SSBD unit.
    - Kiosk Passengers without checked bags are assumed to have checked in online and proceed directly to SSCP.

Table 11: Check-in Processor and Queuing Area Requirements

Scenario	Processor	Processor Requirements				Queueing Area Requirement (SF)			
		PAL 1	PAL 2	PAL 3	PAL 4	PAL 1	PAL 2	PAL 3	PAL 4
All Scenarios	Priority Agent	8	8	8	10	615	870	735	695
	Economy Agent	32	34	34	36	5,310	5,905	6,125	6,175
	Curbside Agent	4	5	4	4	525	2,405	420	480
Scenario 1	Bag Drop Agent	41	41	45	49	4,635	4,635	4,930	5,085
	Kiosks	73	73	83	93	3,620	3,620	4,320	3,840
Scenario 2	Bag Drop Agent	41	40	45	50	3,725	4,190	4,930	4,790
	Kiosk with bags	51	57	60	64	2,930	3,115	3,135	3,020
	Kiosk without bags	38	40	43	48	2,140	2,165	1,870	2,050
Scenario 3	1-Step SSBD	106	110	126	137	4,905	6,355	6,575	6,615
Scenario 4	2-Step SSBD	37	38	41	47	4,010	4,575	4,895	5,025
	Kiosk with bags	51	57	60	64	2,930	3,115	3,135	3,020

** Queueing area requirements do not include circulation space*

Source: TransSolutions

An additional 1,950 SF should be provided to accommodate early passengers who show up at the airport before the check-in counters open.

5.1.2.2 SECURITY SCREENING CHECKPOINT

Analyses performed assumed 20% of passenger demand is Pre✓®. Clear passengers wait in a separate queue, and afterward are processed through either a General or Pre✓® lane based on their enrollment status. Pre✓® Passenger Throughput is assumed to be 210 Passengers/Hour/Lane and Economy Passenger Throughput is assumed to be 160 Passengers/Hour/Lane. Passenger demand to the SSCP varies based on upstream processors. In the SSBD scenarios, kiosk passengers without checked bags are assumed to have checked in online and proceed directly to SSCP. Three scenarios were considered for each demand year:

- Scenario 1 – SY, UA, VB, and Y4 passengers constitute approximately 55% - 58% of the originating demand and are processed through checkpoint A, while the rest are processed through the checkpoint at the New Terminal.
- Scenario 2 – AA and UA passengers constitute approximately 31% – 34% of the originating demand and are processed through checkpoint A, while the rest are processed through the checkpoint at the New Terminal This scenario was identified to be the preferred scenario for SSCP.

- Scenario 3 – DL and UA passengers constitute approximately 23% - 27% of the originating demand are processed through checkpoint A, while the rest are processed through the checkpoint at the New Terminal.

Table 12 shows the SSCP requirements for the four planning activity levels. The queuing area requirements do not include space required for the processors, circulation space, or space required for divest/revest.

Table 12: SSCP Requirements by Scenario

Scenario	Terminal	Lane Type	Lane Requirements				Queueing Area Requirements			
			PAL 1	PAL 2	PAL 3	PAL 4	PAL 1	PAL 2	PAL 3	PAL 4
Scenario 1	A	General	6	6	7	8	1,535	3,030	2,930	1,510
		Pre✓®	2	2	3	3				
	New Terminal	General	6	6	6	8	1,215	1,495	1,495	1,495
		Pre✓®	2	2	2	3				
Scenario 2	A	General	5	5	5	8	1,110	2,220	2,245	1,060
		Pre✓®	2	2	2	2				
	New Terminal	General	7	7	7	9	2,285	2,595	2,595	3,120
		Pre✓®	3	3	3	3				
Scenario 3	A	General	4	4	4	6	980	865	865	2,025
		Pre✓®	2	4	2	2				
	New Terminal	General	8	8	8	9	1,430	2,785	2,785	3,975
		Pre✓®	3	3	3	3				

** Queueing area requirements do not include circulation space*

Source: TransSolutions

Simulation analysis shows the maximum queueing area requirements to be 6,000 SF based on passenger demand. However, TSA recommends add a minimum of 600 square feet in the queue for every checkpoint lane based on Checkpoint Requirements and Planning Guide (CRPG), published May 2020. For PAL4, a maximum of 22 lanes may be required resulting in 13,200 SF of queueing space, significantly higher than estimates developed using simulation models.

An additional 1,150 SF should be provided in front of the SSCP to accommodate well-wishers.

5.1.2.3 BAGGAGE CLAIM REQUIREMENTS

Table 13 shows the baggage claim requirements for the various PAL demand scenarios.

Table 13: Baggage Claim Requirements

Market	Baggage Claim Units Requirements				Claim Frontage Requirements (LF)			
	PAL 1	PAL 2	PAL 3	PAL 4	PAL 1	PAL 2	PAL 3	PAL 4
Domestic	5	5	6	6	715	740	825	825
International	2	2	2	2	270	270	270	270

Source: TransSolutions

The required number of claim devices are calculated based on the peak 20-minute terminating passenger demand at the baggage claim hall. Please note this is a static analysis, and a micro-simulation model will better predict the level of service. Additional capacity is recommended instead of an optimized capacity at the requirements planning phase to accommodate any surges due to flight earliness and lateness.

5.1.2.4 FEDERAL INSPECTION SERVICES

International terminating passengers proceed to the FIS hall where they interact with a United States Customs and Border Protection officer to verify their documentation. Separate queues should be available, so passengers are separated based on their eligibility to enter the country.

The resource requirements largely remain unchanged over four demand years and hence were summarized as one.

Table 14: FIS Requirements

Processor	Processor Requirements	Queuing Area Required (SF)
MPC/Global Entry Agent	1	65
Global Entry Kiosk	1	100
US Citizen – Agents	6	815
Visitors – Agents	8	850
Total	16	1,830

** Queuing area requirements do not include circulation space*

Source: TransSolutions

The wait time performance criteria were increased from 10 to 15 minutes for US Citizens and 10 to 30 minutes for visitors. This analysis predicts queueing area for reduced CBP staffing.

Table 15: FIS Requirements – Reduced Staffing

Processor	Processor Requirements	Queuing Area Required (SF)
MPC/Global Entry Agent	1	65
Global Entry Kiosk	1	100
US Citizen – Agents	2	1,450
Visitors – Agents	3	1,965
Total	7	3,580

** Queuing area requirements do not include circulation space*

Source: TransSolutions

An additional 2,625 SF should be provided for the international meeter-greeter area. A shared area of 3,200 SF accommodates both early passengers and international meeter-greeters.

5.1.3 Concessions

5.1.3.1 CONCESSIONS

A successful airport experience provides quality, diverse and affordable retail, food, and beverage offerings, which today's passengers simply expect. The New Terminal concessions contribute to SAT's success but require careful and timely planning to keep up with evolving consumer tastes.

5.1.3.2 BACKGROUND AND OVERVIEW

The planning and physical lay-out of the airport's concession space is a strategic consideration for the new airport terminal development. The commercial space plan for concessions directly impacts the airport's ability to maximize non-aeronautical revenues, deliver a positive passenger experience, and drive strong overall airport customer satisfaction ratings. The current concessions program is 33,811 square feet (SF) which is approximately 7.1 SF per 1000 enplaned passengers.

- The current concession program size and footprint is less than the industry standard of 8-10 SF/1000 enplaned passengers and constrains SAT from fully achieving its concession program goals. The New Terminal development program provides a new opportunity to right size the program, increase its visibility, enhance customer offerings, increase non-aeronautical revenues, and uniquely showcase the San Antonio culture and sense of place.

- SAT desires to provide passengers with diverse and uniquely San Antonio experiences for dining, shopping, and service amenities all conveniently accessed along the passenger airport journey, both landside and airside.

- Research shows passengers prefer to stay close to their gates, therefore, placing concessions in proximity to airline gate holdrooms or integrated into the hold room maximizes the customer experience and revenues.
- Other locations viable for concessions are areas where customers congregate, such as near restrooms, TSA security, and conveyances.
- Concessions located away from holdrooms should be programmed to be destination attractions that draw customers to locations supported with visible dynamic signage to bring awareness of the concession to the customer.
- A robust WIFI bandwidth supports the emerging customer preferences to use personal technology devices for advance mobile ordering, quick pick-up, delivery, and self-checkout with contactless payment.
- Locating service elevators and service corridors for convenient merchandise restocking deconflicted from passenger circulation areas provides efficient operations, a positive customer experience, and maximizes revenues.
- Concession locations should contain adequate queueing space within their lease line to avoid queues overflowing into airport circulation paths.

5.1.3.3 EXISTING PROGRAM SIZE SUMMARY

A summary of the existing program size, excluding existing storage space, is provided in Table 16.

Table 16: Current Concession Program Size

Category	Area	Share
Square Feet (SF) per 1,000 Enplanements	7.1	
Food & Beverage	23,187	69%
Retail		
Convenience Retail (Formerly N&G)	5,133	15%
Specialty Retail	4,258	13%
Duty Free	1,082	3%
Services[1]	151	0%
Total Concessions Area	**33,811**	**100%**

[1]Included in the Services category are automated retail vending

Source: PMG

5.1.3.4 FUTURE CONCESSIONS PROGRAM OBJECTIVES

To meet SAT's ultimate goal for concessions by providing passengers with diverse and uniquely San Antonio experiences for dining, shopping and service amenities, the following objectives are identified:

- Increase program size to align with industry practices and economic viability.
- Diversify and upgrade merchandise offerings for greater passenger choices, including duty free merchandise.
- Highlight San Antonio culture and sense of place with unique offerings, concepts, and designs.
- Include experiential spaces for passenger use, enjoyment, and education.
- Establish a pre-security signature commercial space to serve meeters, greeters, and passengers with long pre-departure dwell times (i.e. international, military).

Future Concessions Program Size Recommendations

Recommendations for the future concessions program align with the PAL 2 and PAL 4 levels of enplaned passengers. The concession program space plan provides flexibility for the program footprint to grow as the Airport's passenger enplanement growth occurs and new customer needs are identified.

- The commercial program size recommendations are presented with ranges to reflect the distinct characteristics of the San Antonio International Airport program, industry benchmark data and consideration of reprogramming opportunities in Terminals A and B and new space opportunities in New Terminal. The commercial program size recommendations do not include storage space which is discussed is a separate section below.

The final program size is subject to refinement as the business structure and merchandise plan for the new program is developed including design advances for the New Terminal and Terminals A and B modifications, and considerations of airport enplanements and evolving industry trends. The recommended square footage ranges for the Terminal Complex Concessions Program are for the entire Airport which includes the refreshed Concourse A and B as well as the new Concourse. Storage square footage not included in these projections is discussed in a separate section on storage space below.

- The recommended opening day concessions program size to support the PAL 2 level of enplaned passenger activity of 6.9M enplaned passengers is a minimum of 55,080 SF and up to 68,850 SF, assuming 8-10 SF/1000 enplaned passengers or an increase of 63% -104% above the current program size of 7.1 SF/1000 enplaned passenger.
- Ultimate build-out supporting PAL 4 enplanement levels of 8.1M (estimated in 2040) is a minimum of 65,104 SF and up to 81,380 SF, assuming 8-10 SF/1000 enplaned passengers or an increase of 93% - 141% above the current program size.

5.1.3.5 FUTURE PROGRAM SIZE SUMMARY

A summary of the future program size, excluding storage space, is provided in Table 17.

Table 17: Recommended Future Concessions Program Size

Recommended Terminal Complex Concessions Program			
Recommendation: Square Feet (SF) per 1,000 Enplanements Range: 8-10 SF			
		PAL 2 - Estimated CY2030 - 6.9M EPAX	PAL 4 - Estimated CY2040 - 8.1M EPAX
	GOAL: Concessions Mix Ranges	GOAL: Square Feet (SF) Ranges	GOAL: Square Feet (SF) Ranges
Concessions Mix:			
Food & Beverage	60% - 65%	33,048 - 44,753	39,062 - 52,897
Retail			
Convenience Retail (Formerly N&G)	15% - 20%	8,262 - 13,770	9,766 - 16,276
Specialty Retail	10% - 15%	5,508 - 10,328	6,510 - 12,207
Duty Free	3% - 5%	1,652 - 3,443	1,953 - 4,069
Services	1% - 2%	551 - 1,377	651 - 1,628
Overall Concessions Recommended Range		**55,080 - 68,850**	**65,104 - 81,380**

NOTES:

1. The chart provides ranges for square footages, and concept mix to allow for flexibility in build out, current trends and changes in the industry.

2. Recommend that the initial program concessions offering target PAL 2 enplanement level recommendations. Planning for PAL 4 enplanement levels should include infrastructure for future retail and food and beverage locations which will be constructed as PAL 4 enplanements are materialized.

3. Services to be considered for the new program include shoeshine, massage and nail services and gaming.

Source: Corgan, AXN 2019 Fact Book, Paslay Group

5.1.2.14.5 Concession Storage Areas

The majority of concession storage area is provided in the Central Receiving and Distribution Center (CRDC). However, some storage is available within the terminal itself to account for day-to-day storage needs for concessionaires. These areas are provided on both arrivals and departures levels.

5.1.2.14.6 Concession Service Corridors

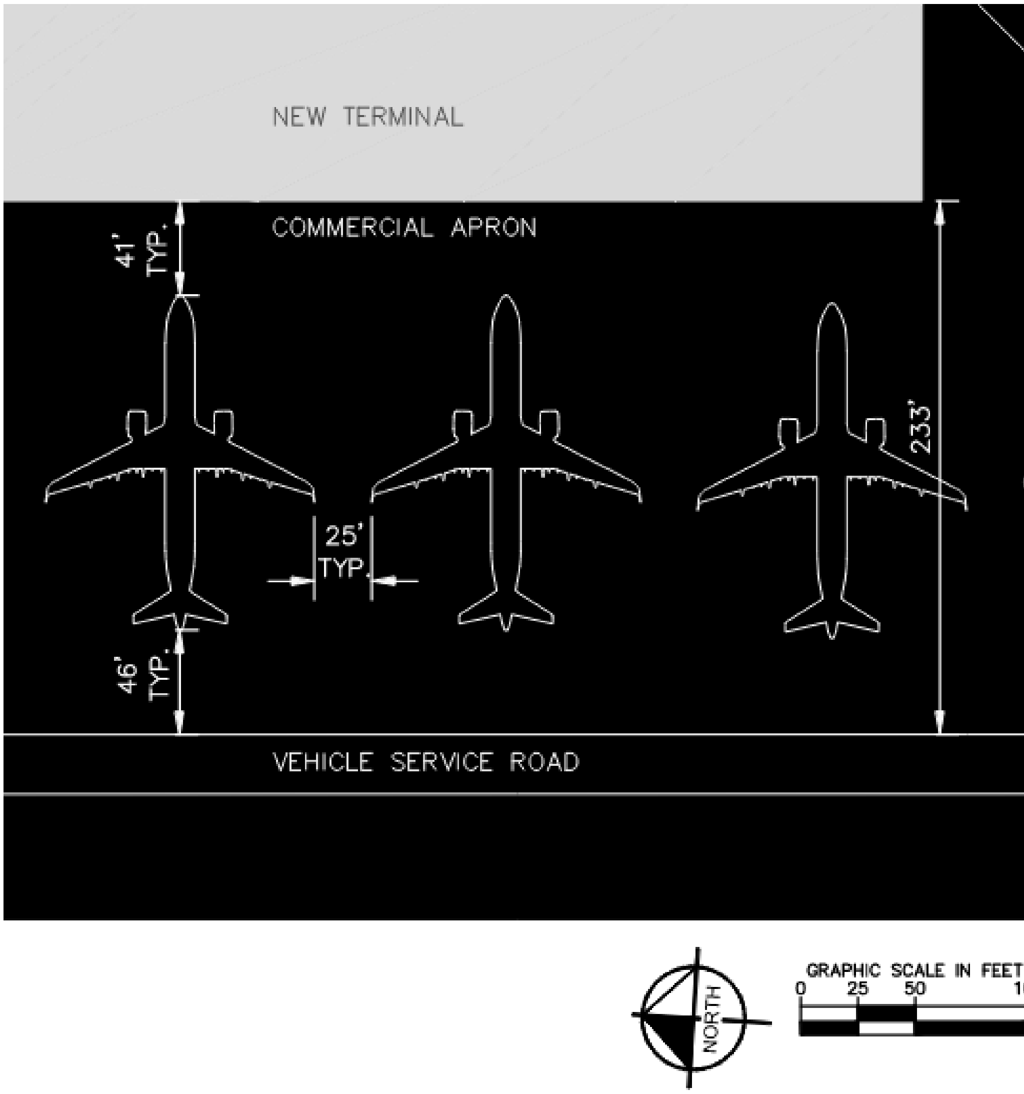
Concession service corridors planned at the apron level extend from the loading dock two vertical cores on the departures level and mezzanine. The intent of these corridors limits the distance of travel goods and waste to traverse in the public circulation areas. This minimizes the time exposure for passengers and the delivery of goods and waste removal. The trash compactor has also been located in the loading dock area. Optimized path of travel to and from loading dock to destination within the New Terminal will be developed in a future phase of design.

5.1.4 Commercial Apron

The commercial apron requires airside services to 17 contact gates, with 6 narrowbody gates capable of handling 3 widebody aircraft in a MARS (Multiple Apron Ramp System) configuration. The commercial apron pavement must structurally support aircraft surface movements and be graded to both maintain positive stormwater drainage in accordance with FAA and National Fire Protection Association (NFPA) guidelines while also allowing for aircraft fueling. The apron must incorporate site and terminal utilities such as fiber, power, sanitary sewer, storm sewer, and fire and domestic water mains. Stormwater collection will drain areas of aircraft refueling and thus designed in accordance with NFPA 415.

Narrowbody gates are designed to accommodate airplane design group (ADG)-III aircraft with 25 feet of wingtip separation. The stand depth from the building face to the near side of the tail-of-stand vehicle service road will accommodate the critical ADG-III aircraft, including the Boeing 737-10 MAX and the Airbus 321neo series, which are the most demanding based on a combination of wingspan and fuselage length. See Figure 24 for additional information.

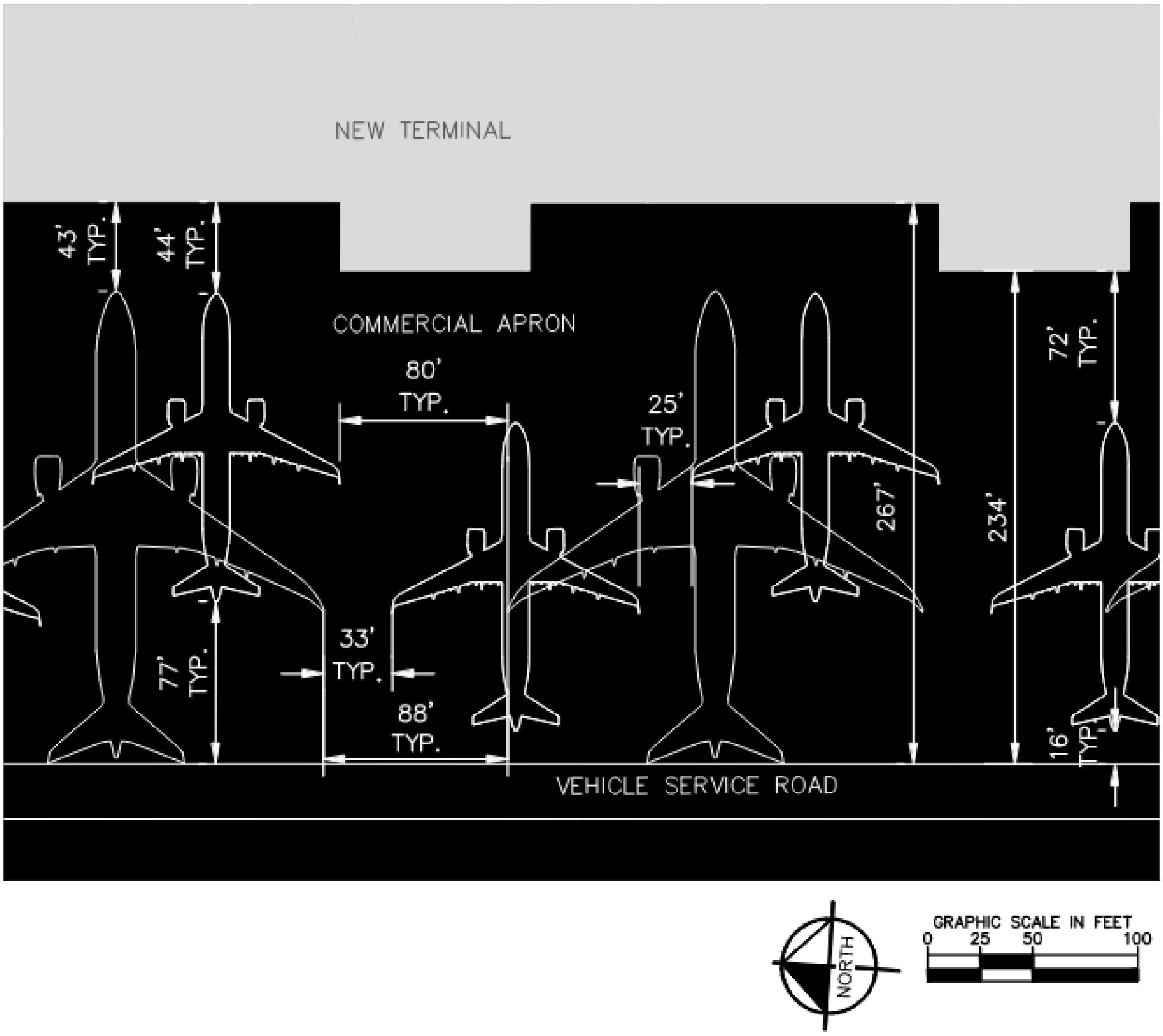
Figure 24: Typical Narrowbody Gate Layout



Source: Kimley-Horn

The MARS gates are designed to accommodate two narrowbody (ADG-III) aircraft with a 25-foot minimum wingtip separation or one widebody (ADG-V) aircraft. Widebody aircraft in one MARS position spaced sufficiently far from a narrowbody in an adjacent gate for ground service equipment circulation while maintaining a minimum 25 feet of wingtip separation. The final MARS gate layout will adapt to accommodate to the passenger boarding bridge requirements. Stand depth between the building face and vehicle service road will vary in the MARS gates due to the shape of the terminal but will accommodate the largest ADG-V aircraft. See Figure 25 for additional information and stand depth dimensions.

Figure 25: Typical MARS Gate Layout



Source: Kimley-Horn

5.1.5 Fueling Storage & New Terminal Hydrant System

When analyzing fuel storage needs for a commercial aviation facility, one of the criteria investigated is "Days of Reserve". This is an estimate of the amount of time that fuel storage facility can continue to serve aircraft operations before running out of fuel in the event of an extended fuel supply interruption. The scalability and planning study performed for the SAT fueling system developed forecast fuel demand for the years 2024 to 2045 based on anticipated aircraft operations. Using the Jet-A consumption demand forecast to the year 2045, the *Useable* and *Operational Days of Reserve* were reviewed in consideration of existing storage capacity and increased tank capacity.

The days of fuel reserve can be defined in terms of two volumes tank farm's usable volumes, known as *Usable Days of Reserve* (UDOR), or the true operational volumes of product, known as *Operational Days of Reserve* (ODOR). While the Usable volumes are calculated between the low and high operational tank levels, the Operational volume considers the average actual volume of Jet-A on hand based on recorded fuel levels remaining in the tanks at the end of the day.

The *Usable Days of Reserve* assumes that the total usable volume in the tank will be available at the time of the fuel supply interruption. However, this overlooks certain aspects of the operation, such as the daily distribution of fuel to the ramp, delivery frequency, fuel settlement times and fuel receiving times. Therefore, consideration of *Operational Days of Reserve* is recommended for storage optimization and planning since it depicts a more realistic scenario. Commercial aviation tank farms typically operate with operational volumes ranging from 60% to 76% of their total usable capacity. The fuel study assumed the operator will align delivery frequency, batch sizes, receiving capacity and process tanks cycles (receiving, settling, and issuing) such that 65% of the usable volume will be on hand in the event of a supply chain interruption.

Industry standards typically set Days of Reserve goals between three and ten days.

Four (4) API-650 tanks each with a nominal or shell capacity of 433,000-gallons were considered to expand the storage capacity and increase the Days of Reserve to optimal levels. Of each tank's volume, approximately 85% (368,000-gallons) is considered to be usable. This is the volume between the tank low and high level alarm setpoints. Similar values are assumed for the two existing tanks at the facility, each estimated at 420,000-gallon shell capacity and 357,000-gallon usable capacity.

The table below summarizes the days of reserve capacity based on forecast fuel demand. Based on forecast data, construction of two additional tanks would provide three days of reserve capacity through the year 2035. Adding two additional tanks would extend this three-day reserve capacity through year 2045. This program's concept reflects the site requirements necessary for a phased expansion at the existing facility concluding with four additional tanks.

Table 18: SAT Usable and Operational Days of Reserve Forecast

Year	Consumption Gallons/Year	Consumption Gallons/Day	Usable Days of Reserve		Operational Days of Reserve (O/U Ratio = 65%)	
			Two Additional Tanks	Four Additional Tanks	Two Additional Tanks	Four Additional Tanks
2023	89,609,906	245,507	5.9	8.9	3.8	5.8
2024	95,028,646	260,352	5.6	8.4	3.6	5.5
2025	96,804,772	265,219	5.5	8.2	3.6	5.4
2026	98,641,753	270,251	5.4	8.1	3.5	5.3
2027	100,542,966	275,460	5.3	7.9	3.4	5.2
2028	102,459,359	280,711	5.2	7.8	3.4	5.1
2029	104,254,318	285,628	5.1	7.7	3.3	5.0
2030	105,974,996	290,342	5.0	7.5	3.2	4.9
2031	107,675,210	295,001	4.9	7.4	3.2	4.8
2032	109,668,805	300,462	4.8	7.3	3.1	4.7
2033	111,499,071	305,477	4.7	7.2	3.1	4.7
2034	113,263,172	310,310	4.7	7.0	3.0	4.6
2035	115,040,398	315,179	4.6	6.9	3.0	4.5
2036	116,815,468	320,042	4.5	6.8	2.9	4.4
2037	118,486,781	324,621	4.5	6.7	2.9	4.4
2038	120,095,358	329,028	4.4	6.6	2.9	4.3
2039	121,698,783	333,421	4.3	6.6	2.8	4.3
2040	123,369,985	338,000	4.3	6.5	2.8	4.2
2041	125,032,783	342,556	4.2	6.4	2.8	4.1
2042	126,747,305	347,253	4.2	6.3	2.7	4.1
2043	128,490,392	352,028	4.1	6.2	2.7	4.0
2044	130,266,201	356,894	4.1	6.1	2.6	4.0
2045	132,078,025	361,858	4.0	6.0	2.6	3.9

Source: Argus

5.1.6 New Triturator for New Terminal

The new triturator is required to accommodate additional demand from the New Terminal. The triturator should have dual pits and grinders and a flow capacity of 1,200 m^3/hr and prevent overflow into Stormwater. Piping will be designed according to code recommendations and an appropriate maintenance plan will be developed at a later date.

5.1.7 Central Receiving Distribution Center (CRDC)

A Central Receiving Distribution Center (CRDC) is intended as the single point of receiving for all goods delivered to an airport. Providing a single portal for receiving for the SAT increases operational efficiency and safety, since third-party truck deliveries will no longer be made to Terminal A or via the airfield. In addition, all goods are screened through x-ray machines prior to deliver to the terminal building for enhanced security.

Functional elements of the CRDC include:

- Loading Dock – secure and non-secure side
- Secure storage
- Non-secure Storage
- Freezer
- Cooler
- High – Value Storage
- Office Space(s)
- Employee functional areas

5.1.8 RON Parking

Remain Overnight (RON) aircraft parking is planned to meet the needs of the Design Day Flight Schedule peak hour at PAL 2. RON positions planned for two areas allow flexibility in supporting the contact gates: one area on the north and one area on the south. The North RON parking requires up to 6 positions to support the demands of the New Terminal Program. The South RON requires up to 7 positions, which supplements future capacity from the 5-gate Ground Loading Facility. The North RON pavement must support both narrowbody and widebody traffic, while the South RON serves narrowbody traffic only. Remaining pavement that exhibits failure distresses or is structurally deficient for the RON fleet mix will be evaluated for removal and replacement. Apron lighting at each RON location will be illuminated in accordance with IES guidelines.

RON position requirements developed using the Baseline DDFS are described in Section 4 of this document and a Derivative DDFS developed resulting from discussions with the Airport. Table 19, Table 17 and Table 20 shows calculated gate requirements for both Baseline and Derivative DDFS, calculated using the following methodology:

- Max Aircraft on Ground (AOG) – identifies minimum gate requirements for all aircraft assuming no towing of aircraft on or off of the contact gates and no RON positions are used.
- MAX Towing Gate Requirements – identifies minimum gate requirements assuming extensive towing operations where the number of RON positions are maximized.

Table 19: Maximum Aircraft on Ground - Baseline DDFS

Baseline DDFS	PAL 2	PAL 4
Total Daily Departures	**156**	**178**
Aircraft on Ground (AOG)		
Max AOG	42	42
Turns Per Gate	3.71	4.24
MAX Towing Gate Requirements		
Minimum Gates Required	21	21
Turns Per Gate	7.43	8.48
Recommended Gate Count between 21 and 42		

Source: Corgan

Table 20: Maximum Aircraft on Ground - Derivative DDFS

Baseline DDFS	PAL 2	PAL 4
Total Daily Departures	**202**	**223**
Aircraft on Ground (AOG)		
Max AOG	48	48
Turns Per Gate	4.21	4.65
MAX Towing Gate Requirements		
Minimum Gates Required	25	25
Turns Per Gate	8.08	8.92
Recommended Gate Count between 25 and 48		

Source: Corgan

Results from Table 19 and Table 20 indicate a recommended gate count between 21 to 42 gates for the Baseline DDFS and between 25 to 48 gates for the Derivative DDFS, with RON positions making up the difference. However, the above results are based upon the DDFS and do not consider gate requirements expressed by individual airlines, nor do they consider the following minimum gate utilization targets provided by the airport:

- PAL 2 – average 5.3 turns per gate per day.
- PAL 4 – average 6.4 turns per gate per day.

The RON requirements for both Baseline and Derivative DDFS equal 16 RON aircraft positions. This is the result of the high demand as seen in Figure 22 and identified as requiring an RON position. Taking into consideration airport gate utilization targets and stakeholder gate requirements, RON aircraft parking position requirements were developed by identifying the number of RON flights to be accommodated with minimal towing operations, while keeping gate utilization metrics within acceptable range.

5.1.9 Employee & Passenger Parking

Programming requirements for employee and public parking facilities are based on the updated passenger forecast explained in Section 4 and parking generation rates calculated as part of the SDP process. No new parking data was collected or made available to the planning team.

Based on the 2018 peak parking occupancy in June and PMAD enplanements, the SDP estimated a parking generation rate for each parking type, as provided in Table 21.

Table 21: Parking Generation Rates by Parking Product

Parking Product	Parking Generation Rate (# of Parked Vehicles per 100 Daily Passengers)
Short-Term Garage	6.11
Long-Term Garage	34.05
Economy Surface Lots	8.15
Employee Surface Lot[1]	5.35
Taxi/Rideshare Staging and Cell Phone Lot	1.61

1 Does not account for STI Employee parking

Source: Table 4.6-4: Parking Generation per Passenger by Facility Type, SAT Strategic Development Plan

The monthly enplanement trends determined the peak month of July accounts for approximately 9.5% of annual enplanements. This percentage estimated the peak month and PMAD enplanements presented in Table 21. The projected parking occupancy was then calculated using the parking generation rates and the projected PMAD enplanements. To determine parking requirements, a 5% service factor applied to all public parking facility occupancies accounting for parking inefficiencies, such as double parking or users searching for a stall. A 10% service factor applied for employee and taxi/rideshare/cell phone lot facilities to account for shift changes and peaking characteristics and presents resulting parking requirements for each of the Planning Activity Levels.

Table 22: Parking Stall Requirements by Parking Product

Parking Type	Baseline (2022)	PAL 1 (2025)	PAL 2 (2030)	PAL 3 (2035)	PAL 4 (2040)
PMAD	18,495	19,432	21,099	22,909	24,875
Public Parking	9,382	9,857	10,741	11,830	13,012
Employee Parking [1]	1,088	1,143	1,241	1,348	1,464
Taxi/Rideshare Staging and Cell Phone Lot	327	344	373	405	440
Total Parking	**10,797**	**11,344**	**12,355**	**13,582**	**14,915**

1 Does not account for STI Employee parking. Preliminary input from stakeholders suggests STI requires 800 parking stalls for their employees.

Source: Kimley-Horn

Parking requirements for this study assumed no loss or gain in the supply of available private parking operator products. A reduction in private operator parking supply may result in an increase of up to 2,400 stalls (loss of all private operators) in the Airport facility parking demand by PAL 4.

Parking deficits for public and employee parking already exist and are expected to continue to grow throughout the planning horizon if no parking development occurs. Table 23 provides the anticipated surplus and deficits for each parking type resulting in a net deficit of 5,402 stalls by PAL 4. Figure 26 illustrates the results presented in Table 22 and Table 23.

Table 23: Projected Parking Stall Surplus/(Deficits)

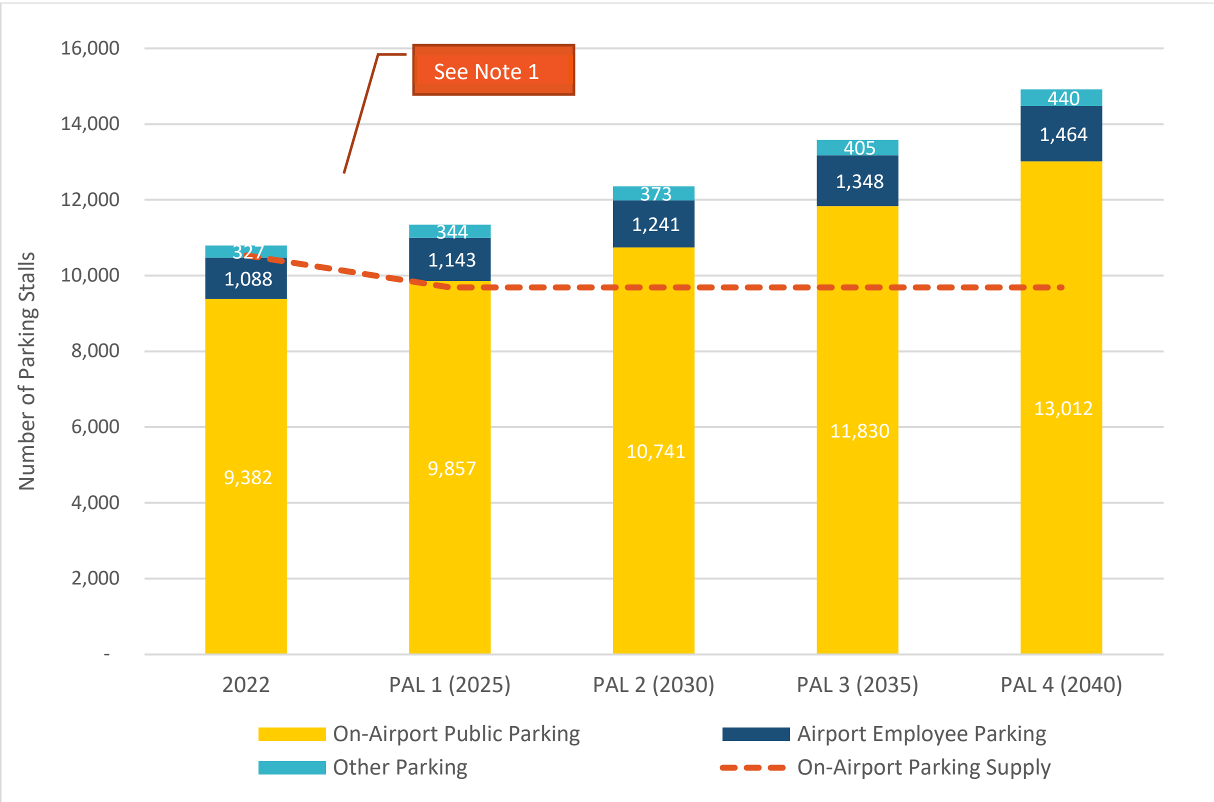
Parking Type	Baseline (2022)	PAL 1 (2025)	PAL 2 (2030)	PAL 3 (2035)	PAL 4 (2040)
Public Parking	(218)	(693)	(1,577)	(2,666)	(3,848)
Employee Parking [1,2]	(313)	(1,143)	(1,241)	(1,348)	(1,464)
Taxi/Rideshare Staging and Cell Phone Lot	23	6	(23)	(55)	(90)
Net	**(264)**	**(1,830)**	**(2,841)**	**(4,069)**	**(5,402)**

1 Does not account for STI Employee parking. Preliminary input from stakeholders suggests STI requires 800 parking stalls for their employees.

2 Assumes that the existing employee parking lot will close between 2022 and PAL 1 to allow for the construction of the New Terminal.

Source: Kimley-Horn

Figure 26: Parking Requirements and Supply



1 Assumes that the existing employee parking lot will close between 2022 and PAL 1 to allow for the construction of the New Terminal.

Source: Kimley-Horn

The parking requirements analysis led to several key takeaways to inform the development of the preferred parking program. These takeaways include:

- Long-term garage parking products are in high demand at SAT and will thus experience the largest deficits through the planning horizon.
- A new and larger employee parking lot is part of the early works for the construction of the New Terminal. Further coordination is required with stakeholders to establish the parking needs for the STI campus.
- The Cell Phone Lot and commercial vehicle staging lots have sufficient capacity but may require relocation based on potential airside developments.
- Private operator parking supply has a direct impact on the parking demand for the on-Airport parking facilities. As such, anticipated changes to the off-airport parking supply must be carefully considered.

5.1.10 Public Safety Building

Figure 27 depicts the location of existing Public Safety services, currently the Airport Operations and Administration Building. The program for the proposed Public Safety Building shown in Table 24. The proposed building program also includes the badging office which is to be combined in a single location.

Figure 27: Existing Public Safety Building

Source: Lake Flato

Table 24: Proposed Public Safety Building Program Summary

No.	Space/Function	Units	SF per Unit	Budgeted Program	Staff	Cars	Notes
1.00	Airport Integrated Control Center (AICC)			10,441		10	
2.00	Airside Operations			4,650		71	
3.00	Airport Rescue and Fire Fighting (ARFF) *locate at terminal*			0		0	
4.00	Airport Police Department			7,170		60	
4.50	K-9 Kennel Facility			360		4	
5.00	Badge, ID & Security			3,040		10	
6.00	General Shared Spaces			0			
7.00	General Parking						
7.50	Secured Parking						
	Total Net Program Area			**25,661**			
	Total Building Gross			**36,686**		**155**	

Source: Lake Flato

5.1.11 CUP Upgrades and Electrical Upgrades

Program requirements:

- Expand and upgrade existing mechanical and electrical equipment to meet 940,000 Sq.Ft (17 Gates) New Terminal.
- Expand the Central Utility Plant's structural, architectural, and civil requirements to accommodate new added cooling system and its electrical components.

5.1.12 Terminal Curbside Roadway Improvements

Programming requirements for the terminal curbside facilities were based on the updated passenger forecast, as described in Section 4 of this document, and data from 2018 previously used for the SDP. Data from 2018, as documented in the SDP, include baseline peak hour passenger activity, baseline peak hour curbside traffic volumes, dwell times, and vehicular mode splits. No new traffic data was collected for this effort.

5.1.12.1 VEHICULAR ACTIVITY GROWTH

In order to grow curbside vehicular activity to estimate future (PAL 4) vehicular demands, first, projected changes in peak hour passengers were determined. Baseline passenger activity was available for the combined Terminal A and Terminal B facility whereas the PAL 4 passenger activity derived from the Design Day Flight Schedule distinguished between two types of passenger groups: one for Terminal A and one for the combined Terminal B and the New Terminal. The peak hour passenger activity for PAL 4 was determined using the Design Day Flight Schedule. The baseline and projected peak hour passenger activity is shown in Table 25.

Table 25: Baseline and Projected Peak Hour Passenger Activity

	Baseline	PAL 4		
Passenger Type	**Terminals A & B Total**	**All Terminals**	**Terminal A**	**Terminal B & New Terminal**
Originating	2,040	2,824 (+38%)	532	2,524
Terminating	2,030	2,360 (+16%)	562	1,962

Source: SAT Strategic Development Plan, 2018
Kimley-Horn

The 2018 traffic volumes used in the SDP served as the baseline for the curbside analysis. The curbside volumes were categorized by vehicle type/mode based on the mode splits determined in the SDP. To develop projected curbside volumes for PAL 4, the baseline volumes increased or reduced in accordance with the projected change in peak hour passenger activity as shown in Table 25 above. For both Terminal A and the combination of Terminal B/New Terminal, traffic increased/decreased at the originating passenger percent change for drop-off vehicles (departures curb) and at the terminating passenger percent change for pickup vehicles (arrivals curb). The resulting vehicular volumes are shown in Table 26. Commercial traffic increased at the peak hour deplaning passenger percent change for all terminals assuming these functions are located in a consolidated area. The resulting commercial vehicle volumes are shown in Table 27.

Table 26: Baseline and Projected Peak Hour Curbside Traffic Volumes

Mode	**Baseline**		**PAL 4 (Terminal A)**		**PAL 4 (Terminal B & New Terminal)**	
	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals
POV	578	685	150	192	717	664
TNC	29	-	8	-	36	-
Shuttles	50	-	13	-	62	-
Taxis	50	-	13	-	62	-
Buses	7	-	2	-	9	-

Source: SAT Strategic Development Plan, 2018

Kimley-Horn

Table 27: Baseline and Projected Peak Hour Commercial Curbside Traffic Volumes

Mode	Baseline	PAL 4
	Departures	Arrivals
TNC	132	153
Shuttles	48	56
Taxis	216	251
Buses	36	42
Other	12	14

Source: SAT Strategic Development Plan, 2018

Kimley-Horn

5.1.12.2 CURBSIDE METHODOLOGY AND REQUIREMENTS

Curbside requirements determined through methodologies are defined in ACRP *Report 40*. The curb frontage for traffic associated with departing and arriving passengers were determined using ACRP's Quick Analysis Tool for Airport Roadways (QATAR), a planning-level macroscopic analysis tool for estimating airport terminal curbside level of service (LOS). QATAR provides Curb LOS and curbside Roadway LOS. The Curb LOS was considered to determine the required curbside length (in feet) and the Roadway LOS to ensure an adequate number of lanes were provided. A target of LOS C was used for the departure and arrival curbside requirements. The curbside analysis assumed a four-lane roadway comprised of two lanes for curbing and two through/bypass lanes.

Since the PAL 4 flight schedule did not break out passenger activity separately for Terminal B and for the New Terminal, the curbside requirements were initially calculated using the combined passenger activity/demand for these two terminals. To develop independent curbside requirements for these two terminals (for Terminal B and for the New Terminal), it was assumed the requirements at Terminal B would match the requirements at Terminal A. Lastly, the combined curbside requirement for Terminal B and the New Terminal was reduced to isolate the curbside requirement for the New Terminal – accomplished by reducing the combined curbside requirement by half the requirement for Terminal B. Table 28 shows the resulting curbside requirements with PAL 4 demand.

Table 28: Departures and Arrivals Curbside Requirements (PAL 4)

	Terminal A	Terminal B	New Terminal
Departures Curbside Requirement[1]	215'	215'	660'
Arrivals Curbside Requirement[1]	190'	190'	440'

[1]Requirement reflects end to end curbfront length assuming double curbing is allowed

Source: Kimley-Horn

The curbside requirements for scheduled commercial vehicles were determined using ACRP's Quick Estimation Method (QEM) due to the scheduled operational nature of these types of vehicles. Peak hour factors (PHF) from SDP data applied to the scheduled commercial vehicle volumes such that the curbside requirements are based on accommodating peak 15-minute surges within the peak hour. In lieu of traditional LOS thresholds, QEM determines the required number of vehicle positions, which then translate into a curbside length requirement. While shuttles are a commercial vehicle mode, they operate on an on-demand basis as opposed to scheduled, thus are similar to privately operated vehicles (POVs), Therefore, TNC curbside requirements were determined using the QATAR tool. The resulting commercial vehicle curbside requirements are shown in Table 29.

Table 29: Commercial Vehicle Curbside Requirements (PAL 4)

	Positions	Curbside Length
TNC	12	300'
Shuttles	2	80'
Taxis	9	225'
Buses	3	150'
Other	2	70'

Source: Kimley-Horn

5.1.13 Airport Access Road

Program requirements for the Airport access roads were evaluated against PAL 4 demand levels and parking generation rates calculated as part of the SDP process.

The roadway improvements recommended in the SDP served as a Terminal starting point, however, this effort followed additional guiding principles. Each of these guiding principles listed below helped inform the development of the recommended alternative:

- Minimize required capital investment.
- Preserve flexibility for additional future expansion by limiting the addition of elevated structures (this is also a cost sensitive approach).
- Accommodate the DDFS for PAL 4.
- Reduce traffic congestion in the Terminal area to avoid unacceptable level-of-service conditions.

The primary goals for the Airport access road were to:

- Develop a recommendation that balances the needs of different user groups based on how they access the Airport and their level of familiarity.
- Maximize the amount of time users have to make decision and maneuver to their desired location.

New traffic data was collected to support this advanced planning effort coinciding with traffic peaks experienced at the Airport and follow the DDFS. Additional counts were conducted at the Airport Boulevard & Dee Howard Way/ Terminal Loop intersection in October 2022 to improve the modeling accuracy at this core intersection and calibrate the SDP traffic data. The new data collected during the proposed PAL4 time of day flight schedule peaks was adjusted seasonally to align with summertime demand volumes. Demand levels adjusted with a 40% growth factor project anticipated demand during the PAL 4 growth scenario once it was confirmed the new Terminal design would support 17 gates.

This effort acknowledges the Airport's central location within the City of San Antonio. Users from all directions inbound and outbound from the Airport should be given adequate opportunity to access the facilities effectively and efficiently. Traffic data collected in October 2022 - combined with the SDP's larger data collection effort - allowed for a more regional understanding of traffic patterns and, ultimately, a more balanced solution. Loop 410 eastbound and westbound and US 281 southbound were the three largest origin and destinations for Airport users.

5.1.14 Term A Reconfiguration

Program requirements for the Terminal A reconfiguration are not quantitative requirements based on demand but rather qualitative requirements to better utilize available space within Terminal A. Construction of the New Terminal is expected to shift most check-in demand away from Terminal A, leaving large portions of the Check-in Hall and landside concessions underutilized. The reconfiguration of Terminal A intends to convert landside areas into airside areas that allow for the relocation and expansion the SSCP and an increase in airside concessions to improve passenger service.

5.1.15 Term B Reconfiguration

Program requirements for the Terminal B reconfiguration project are qualitative requirements to improve operational efficiency and flexibility for carriers operating out of Terminal B. The reconfiguration intends to better utilize airside area by eliminating the existing SSCP and replacing it with airside concession, meaning that after check-in, departing passengers can utilize checkpoints at either Terminal A or New Terminal dependent on their departure gate.

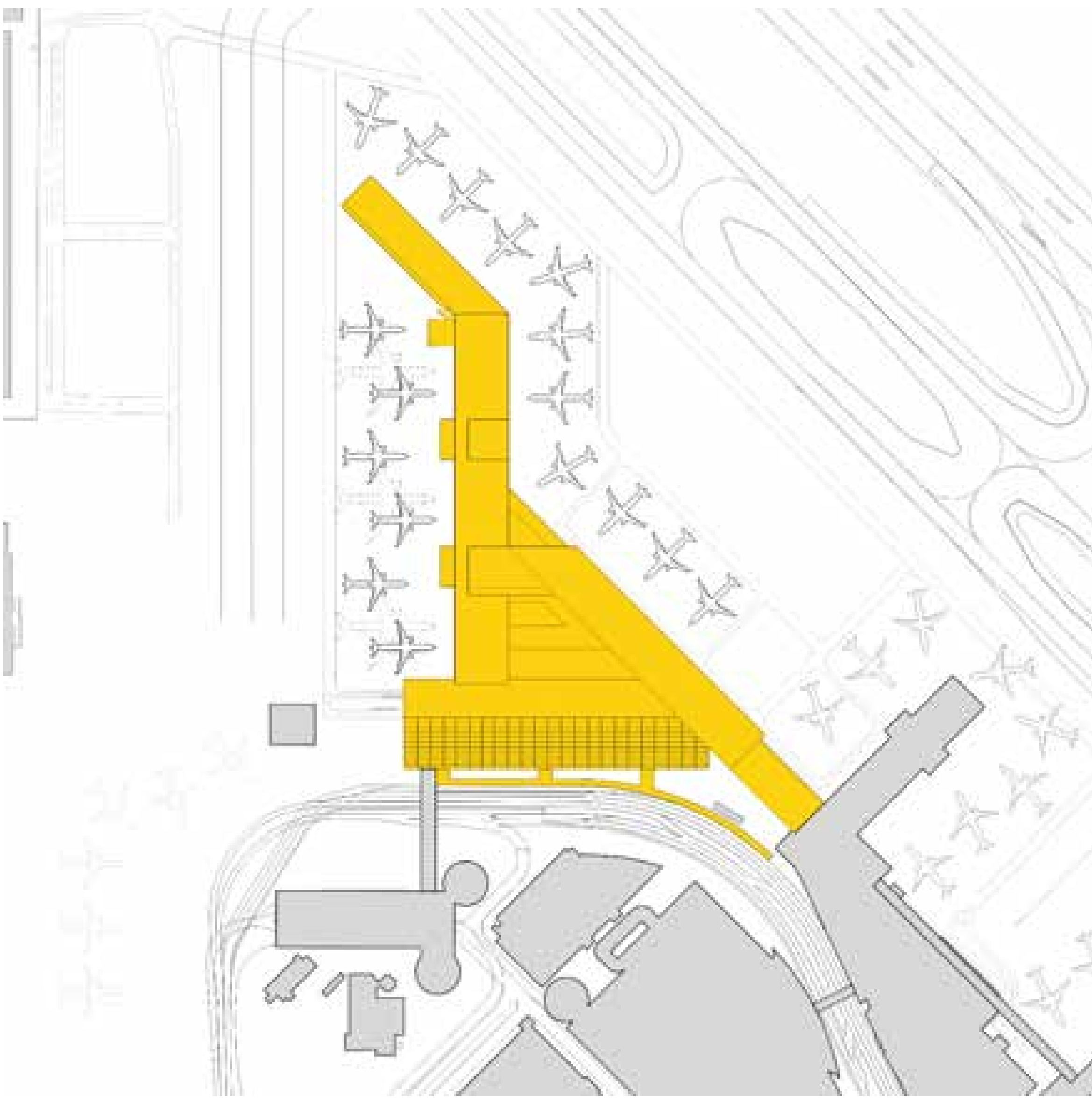
Improvements are intended to provide airlines greater flexibility for passenger connections as described above but also baggage connections, with the Terminal B baggage system being connected to both the Terminal A and New Terminal baggage systems.

6 Preferred Development Program

The preferred development program chapter is a summary of the preferred alternative identified for each project of the overall program, including a brief description and exhibits of the preferred alternative with further details on each individual project provided in Volume 2.

6.1.1 New Terminal

Figure 28: New Terminal



Source: Corgan

The New Terminal building intends to improve existing facilities and develop new facilities to accommodate the growth of SAT with 17 new gates, and 6 gates designed as international capable swing gates. A new central processor will serve both the New Terminal and existing Terminal B.

6.1.1.1 TECHNOLOGY AND SECURITY SYSTEMS

The following figure represents the major technology solutions to be utilized for the program. This is not an exhaustive list and shall be expanded upon in future design phases.

Table 30: SAT Systems Schedule MASTER

System Name	Existing? (Y = Yes, I= Implementing, N = No)	Current Manufacturer	Part of New Terminal Program? (Expand, Replace, or New)
Security Systems			
Video Surveillance System (VSS) - CCTV	Y	Genetec	Expand
Physical/Electronic Access Control System (ACS)	Y	Hirsh Identiv	Expand
Gunshot Detection Systems	N	N/A	New
Terminal Operations			
Airport Operational Database (AODB)	I	TBD - In Procurement	Expand
Resource Management (RMS)	I	TBD - In Procurement	Expand
Common Use Terminal Equipment	I	ARINC - Collins Aerospace	Expand
Common Use Self Service	I	ARINC - Collins Aerospace	Expand
Automated Boarding Gates System	I	ARINC - Collins Aerospace	Expand
Self Bag Drop System	I	ARINC - Collins Aerospace	Expand
Local Departure Control System (LDCS)	I	ARINC - Collins Aerospace	Expand
Multi-Use Flight Information Display System (MUFIDS)	Y	Infax	Expand
Broadcast Television IPTV	N	N/A	New
Advanced Visual Docking Guidance System (A-VDGS) with Ramp Information	N	N/A	New
Public Announcement System	Y	Atlas IED - Globalcom	Expand
Assisted Listening System	N	N/A	New
Queue Management System	Y	TBD	TBD
Information Technology			
Corporate/Public Wi-Fi Infrastructure (Access Points/Controllers/Switches)	Y	Cisco	Expand
Network Automation, Monitoring and Management	Y	Cisco (DNAC)	Expand
Airport Information Management System (AIMS)	I	TBD - In Procurement	Expand

Source: Faith Group

6.1.1.2 BAGGAGE HANDLING SYSTEMS

The New Terminal will have a new Checked Baggage Inspection System (CBIS), Checked Baggage Resolution Area (CBRA), On Screen Resolution (OSR) Area, Makeup/Sortation, Baggage Claim, and Federal Inspection Station (FIS). The design of the CBIS will meet TSA's Planning Guidelines and Design Standards (PGDS) v7 or v8, depending on when version 8 is published and when design work begins. The space in the CBIS can accommodate up to six (6) Explosives Detection Systems (EDS) in case bags from Terminal A and/or B need to be screened in the New Terminal. Figure 29 below displays the preferred layout of the Outbound systems which consists of ticket counter input lines, CBIS, CBRA, and Sortation (makeup area). Figure 30 below displays the preferred layout for the Inbound baggage, which consists of domestic claim devices and international claim devices.

Figure 29: Baggage Handling System (Outbound)

Source: VTC

The domestic claim area consists of 5 claim units and space for additional device in the future. The international claim area consists of 2 claim devices and space for additional device in the future.

Figure 30: Baggage Handling Systems (Inbound)

Source: VTC

While considering an interim solution for SAT Airport, the following is important information regarding TSA funding for the recapitalization:

- TSA does NOT pay for growth, especially if TSA has previously paid for an inline system.
- TSA will pay for Recapitalization, ONLY IF TSA initiates the request. If the airport initiates payment, then the assumption is the airport will pay for it. TSA keeps track of life expectancy of their equipment and will initiate a recap when the time is right.
- If the airport prefers to optimize the system, TSA will pay the equivalent of a recap cost.
- TSA pays for an inline CBIS just once. Then they pay for Recap, if initiated by them.
  - The airport can request for additional funding; however, additional funding approval is at the discretion of TSA and depends on funds available for the requested fiscal year.
  - If TSA has not yet initiated the recap, the airport can still request for TSA funding on the recap project. Given the proximity of these machines reaching end of life, TSA may have a different response/approval process.
- Equipment Life Expectancy per TSA's PGDS:
  - EDS = 15 years
  - BHS Equipment = 20 years
  - ETDs = 10 years

6.1.1.3 MECHANICAL

General Description

The New Terminal shall be provided with an energy efficient HVAC cooling and heating system with direct digital building controls (DDC).

Building HVAC System

The HVAC system for the New Terminal should include the following major elements:

- Chilled water pump system with Variable Frequency Drives (VFD) to control and balance the system.
- Chilled water piping system to reroute throughout the airport from the central plant.
- Direct Expansion packaged or split system with refrigerant piping to support the cooling system serving the electrical rooms and IT server rooms.
- Variable Air Volume Air Handling Units (VAVAHUs) with VFDs. The units provide the air flow required to offer comfort and cooling different spaces.
- Variable Air Volume Terminal Units for different zone (VAVTUs). The terminal units provide accurate amounts of the required cooling air flow to each zone.
- Thermostats and Humidistats for zone temperature and humidity controls. The thermostats help with communicating temperatures of spaces and zones back to the main air handling units.
- Building Automation/Energy Management System (BMS) based on Direct Digital Control (DDC). BMS provides controls and scheduling capabilities.
- Outdoor air intake system for fresh air to support Ventilation air rates in accordance with the minimum requirements per ASHRAE 62.1. and the relief air system to maintain the correct pressure to allow positive building pressurization.
- Air filtration with carbon system or electrical filtration capable of removing jet fuel smells.
- Heating hot water boiler system and piping OR electric heating elements.
- Heating hot water distribution piping system.
- Heating hot water pumps.
- Condensate discharge system which can be collected and then used in an environmentally friendly manner.
- Demand Controls Ventilation Controls provide the correct amount of fresh air to maintain a healthy building air quality.
- Heating systems including gas or electric unit heaters to maintain a non-conditioned space from freezing.
- Supply, return, fresh air, and exhaust air distribution duct systems in accordance with SMACNA Standards.
- Passenger Boarding Bridges (PBB) - HVAC units provide cooling and heating for the boarding bridges.

6.1.1.4 ELECTRICAL

General Description

The New Terminal will require a new CPSE electrical service along with all typically electrical building systems for modern high efficiency airport terminals. The following information identifies major system components and general requirements.

Building Electrical Systems

The electrical system for the new terminal is appropriate for a state-of-the-art airport facility which provides reliable electrical power to facilitate airport operations during power outages. The electrical infrastructure for the New Terminal includes the following major elements:

- Electrical Site Utility CPSE Service Locations: CPSE service provided using two separate medium voltage circuits from CPSE and the new terminal provided with three double ended switchgears to meet capacity and reliability requirements.
- Normal Power Distribution System: Normal power distributed in modular fashion to allow future growth and changes to the localized areas.
- Emergency Power Supply System (EPSS): EPSS provided to support life safety systems as well as critical operational loads to maintain selected operations at the terminal.
- Interior Lighting System: All interior lighting is LED type suitable for the areas served.
- Exterior Lighting System
- Aircraft-Apron Lighting System: The Apron lighting is selected for uniform lighting at the apron areas. Glare shield and visors provided for lighting fixtures to provide optimal glare controls.
- Lightning Protection System.
- Electrical Grounding System
- Fire Alarm System.

6.1.1.5 PLUMBING

General Description

The New Terminal provides domestic cold and hot water, sanitary sewer, and storm drainage systems. Plumbing fixtures comply with the current International Energy Conservation Code (IECC). The building provides a high efficiency domestic hot water unit heater system.

Major components of Plumbing System

Major components of the Plumbing System provide high efficiency domestic cold and hot water, sanitary sewer, and storm drainage systems. Plumbing fixtures comply with the current International Energy Conservation Code (IECC).

The Plumbing system for the New Terminal should include the following major elements.

- Domestic water meter with a full line backflow preventer assembly with a redundant backflow system to serve the New Terminal hot water heaters and associated expansion tank, thermostatic missing valves, a recirculation pump, and a domestic water booster system, if required. A water Softening system is provided for the toilet rooms and airport terminal fixtures, but not to concession spaces.

- Domestic water piping with service valves. All exposed piping shall have a heat trace system with insulation and jacketing.
- Sanitary Sewer system piping and venting system with vent-through-roof to carry all sanitary waste to outside the new terminal building by gravity and if required will provide a Sanitary Sewer lift station. A minimum 6” main sanitary sewer line and sanitary sewer main line cleanouts quantities shall meet or exceed minimum code requirements.
- Low water consumption plumbing fixtures are hard wired connected to sensor operating plumbing fixtures and heavy-duty water closet fixtures.
- Elevator sump pumps with oil minder (to separate oil from water when it exists)
- Roof drainage system with emergency overflow drain system.
- Grease waste piping system that includes a Grease Trap interceptor. Grease waste piping shall be heat traced insulated and jacketed.
- Storm water lift station.
- Water Softening system for the toilet rooms and airport terminal fixtures, but not to concession spaces.
- Roof Drainage system with emergency overflow drain system.
- Potable Water Cabinets to serve the air plans out in the air side.

6.1.2 Commercial Apron

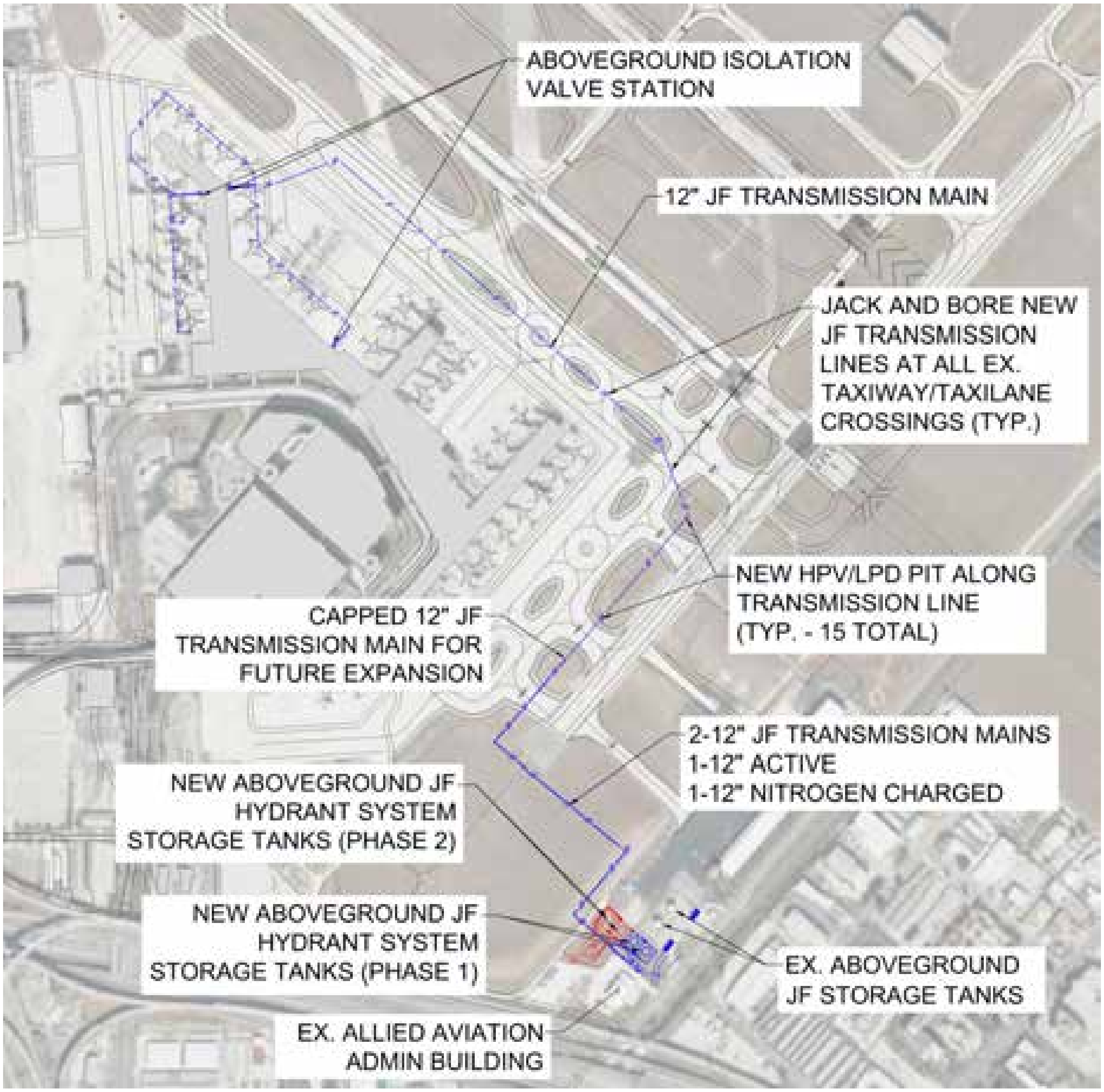
The preferred commercial apron layout plan serves 17 contact stands and responds to the evolution of the New Terminal shape. The commercial apron limits were established based upon available apron and adjacent taxiway pavement grades. Site and building utilities were developed with a focus on economics and functionality, connecting to existing landside infrastructure where possible. Apron grading promotes level aircraft wings during refueling operations. The preferred drainage collection system is trench drains in accordance with NFPA 415.

Figure 31: Proposed Drainage System

Source: Kimley-Horn

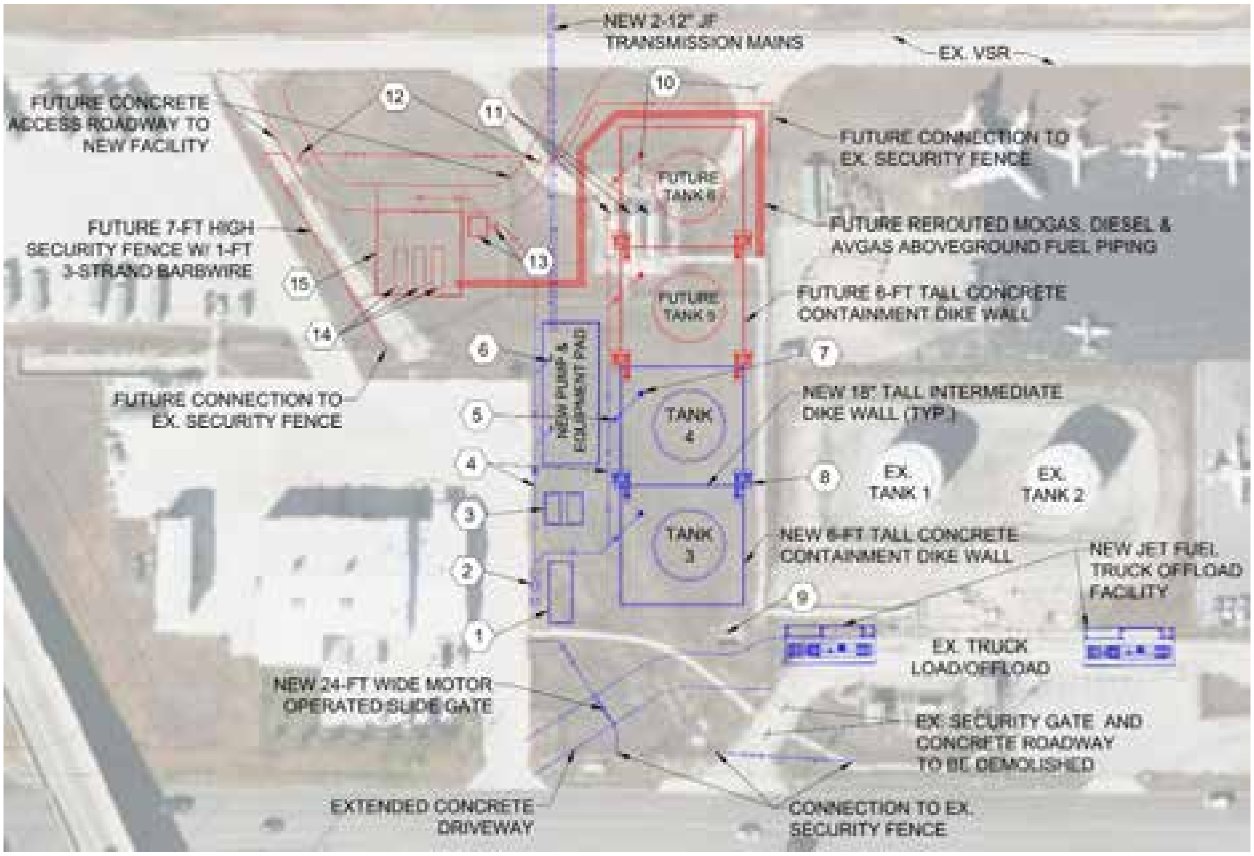
6.1.3 Fueling Storage & New Terminal Hydrant System

Figure 32: Overall Fueling Site Plan



Source: Argus

Figure 33: Fuel Storage Tanks

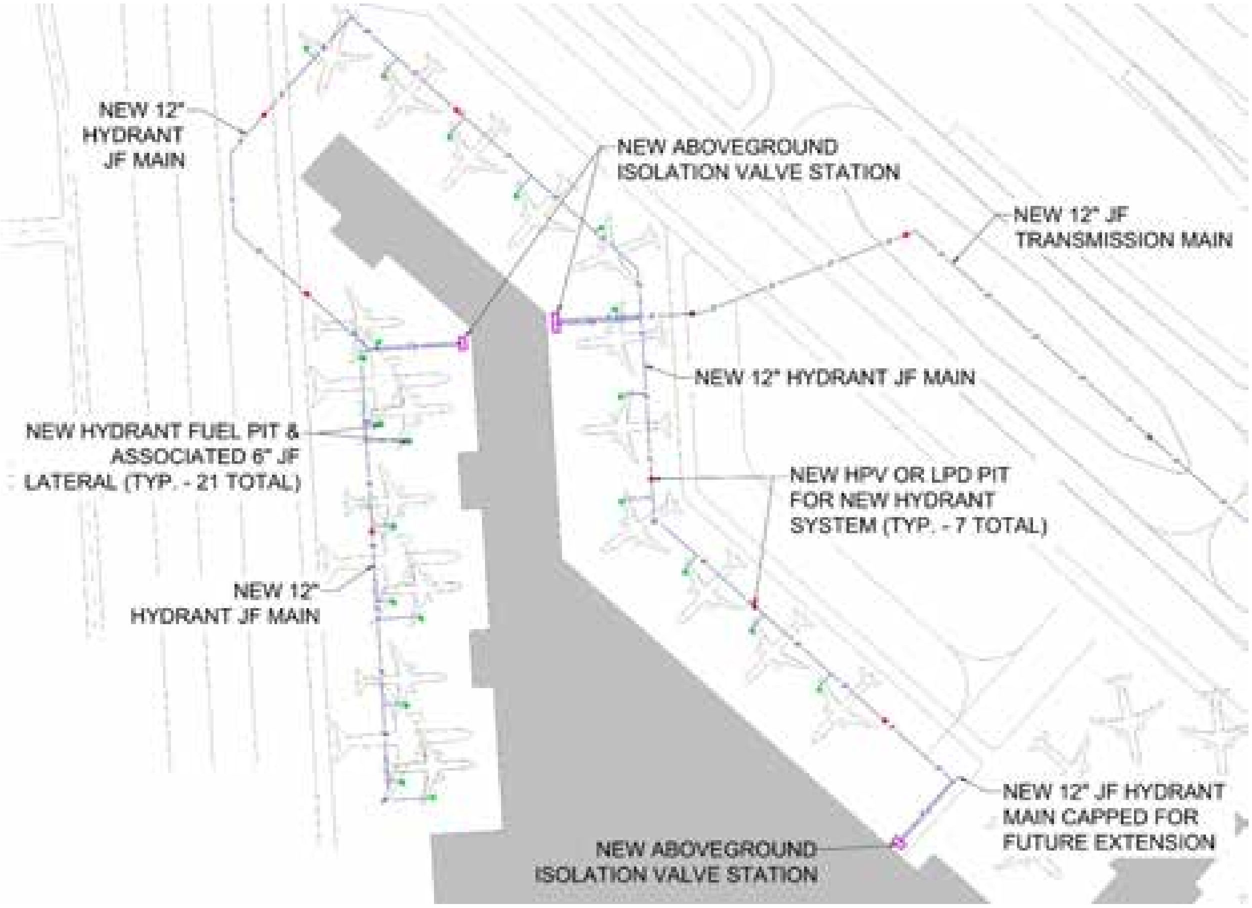


Source: Argus

1. New fire protection building (approx. 15'x 42')
2. New 5,000 gallon oil/water separator
3. New motor control center building (approx. 10'x20') & generator
4. New 10" ductile iron containment drainage piping (typ.)
5. New containment drainage post indicator valve (typ. Of 2 new, 2 future)
6. New equipment pad drain inlet (typ. Of 2)
7. New dike containment drain inlet (typ. Of 2 new, 2 future)
8. New dike crossover stairs (typ. Of 2 new, 2 future)
9. Existing storm drainage outfall structure
10. Existing concrete equipment pad & roadway to be demolished (phase 2)
11. Existing 10,000 gallon Mogas, diesel & Avgas aboveground storage tanks & associated equipment/loading skids to be relocated (phase 2)
12. Future double swing gate (2-10')
13. Future concrete remote containment basin & post indicator valve
14. Future relocated 10,000 gallon Mogas, diesel & Avgas aboveground storage tanks & associated equipment/loading skids

15. Future concrete containment equipment pad

Figure 34: New Terminal Hydrant Fuel System

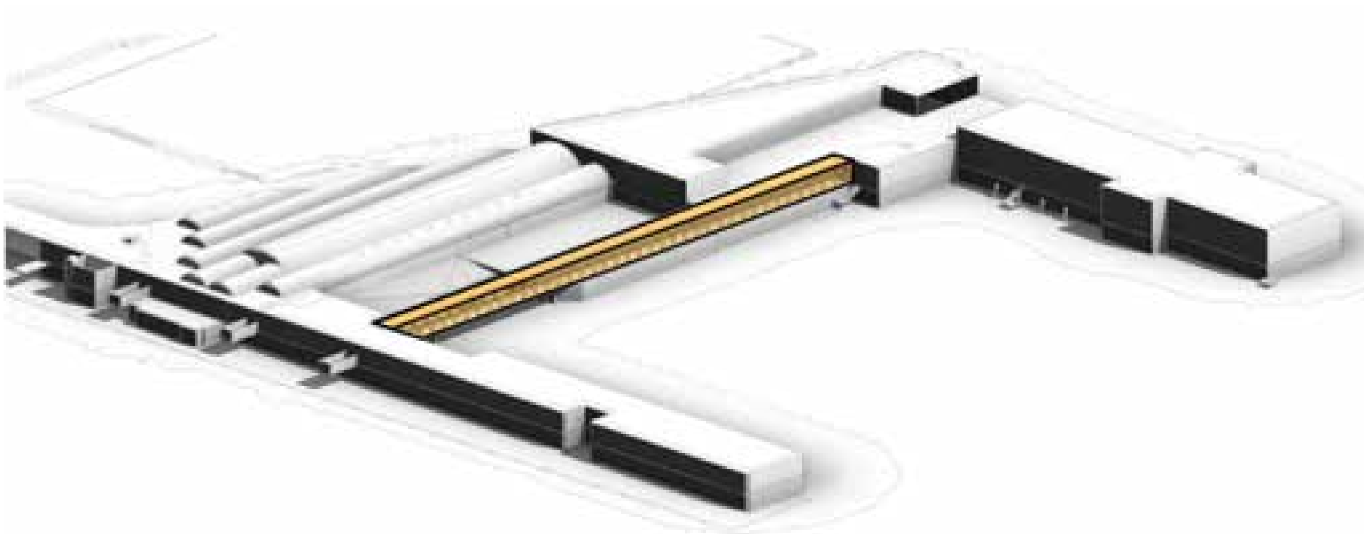


Source: Argus

6.1.4 A + B Connector

A proposed alternative route directly establishes a secure side connection between Terminal A and B to improve the passenger travel experience and increase the functionality of the existing terminals by improving the circulation.

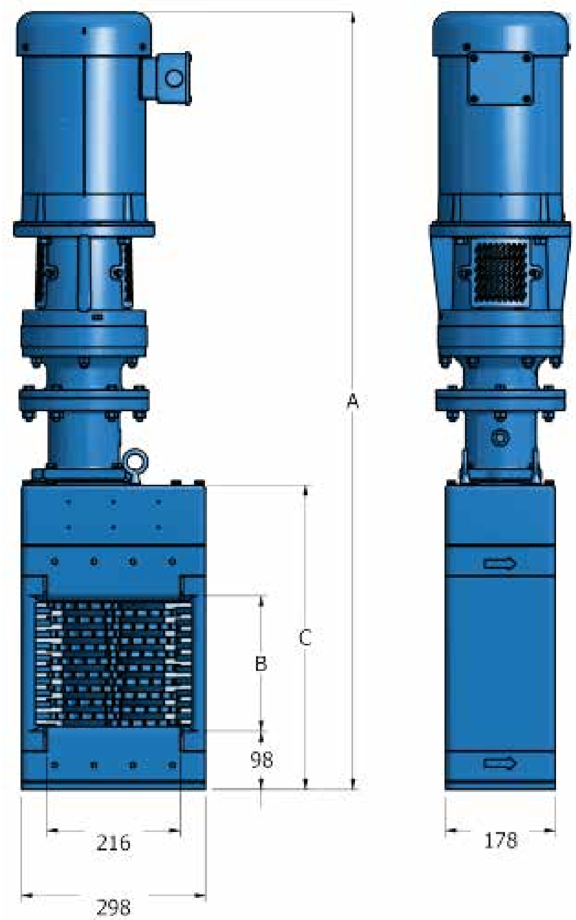
Figure 35: A+B Connector



Source: Corgan

6.1.5 New Triturate for New Terminal

Figure 36: Triturator Example (mm)

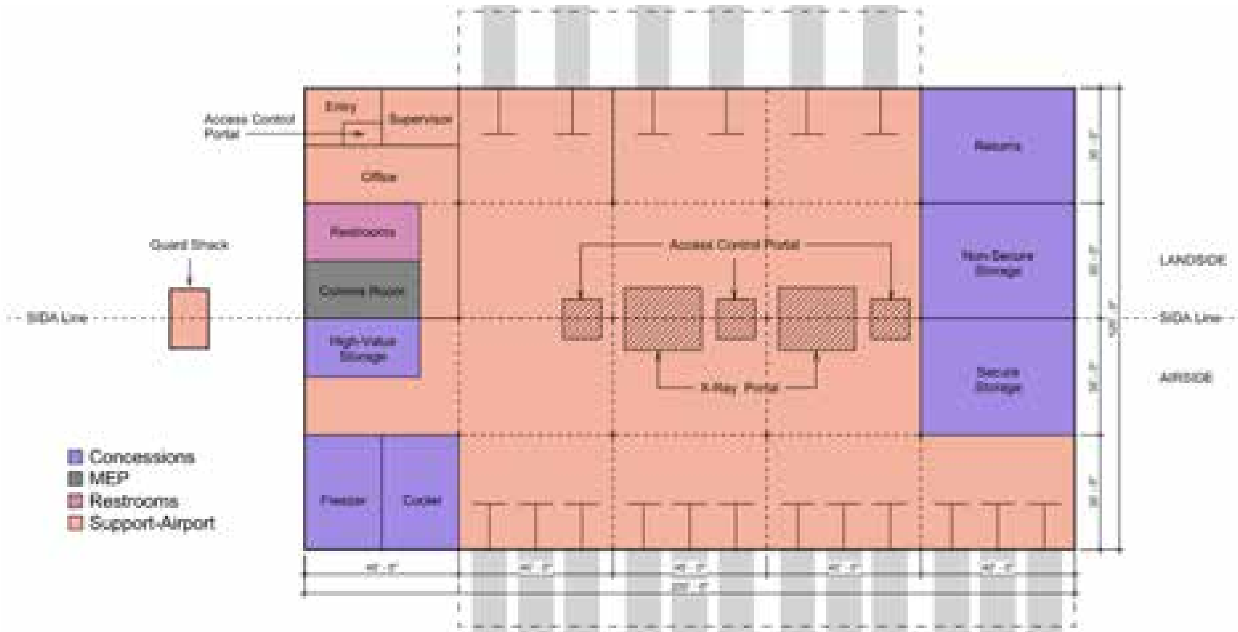


Source: Corgan

The existing triturators at SAT do not have the capacity to accommodate the demand of the New Terminal. The new triturator is proposed to be located west of the Central Utility Plant and assumes that dual pits and grinders will be installed in case of sewer blockages.

6.1.6 Central Receiving Distribution Center (CRDC)

Figure 37: CRDC Plan



Source: Corgan

A new CRDC is required with the construction of the New Terminal and will be a single level 24,000 square foot warehouse facility accessible to both landside and airside. The program includes a pallet screening area, secured interior concessionaire inventory, cold storage, communication room, guard shack, sallyport, and restrooms.

6.1.7 RON Parking

The goal of the preferred North and South RON parking layouts is to provide the most economical and convenient access to the contact gates in each of the terminals. An initial exercise was conducted to identify potential existing and new RON positions. That effort identified 40 possible RON positions (some of them require tenant relocation). The preferred parking layout, presented in Figure 38, focused on the most economical solution to meet PAL 2 demand and includes 13 RON positions (6 to the North and 7 to the South). Volume 4 provides information on the evolution of the RON position analysis, which revealed the Airport has additional options beyond what is planned as part of the ATPP, should demand warrant.

Figure 38: Recommended PAL 2 Parking Layout

Source: Corgan

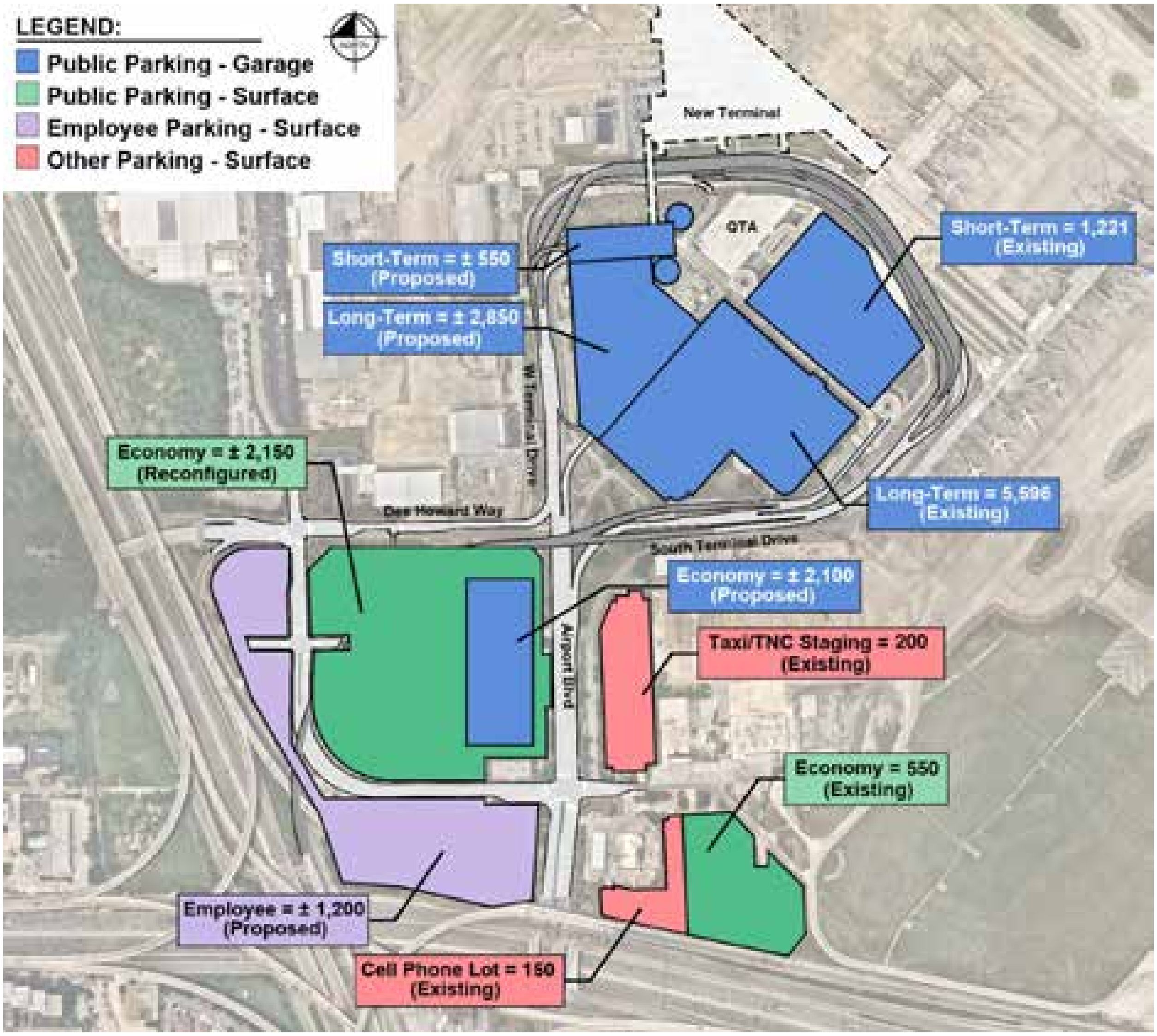
6.1.8 Employee & Passenger Parking

The parking facility requirements identified in Section 5.1.8 exceed the Airport's existing supply. Expanded and/or relocated parking facilities are required to accommodate the projected demand. The following are considerations in the development of parking alternatives:

- Capacity – Provide sufficient parking to meet the projected parking demands.
- Land Use – Potential to accommodate a range of landside operations and to allow maximum flexibility for future Airport development.
- Customer Experience – Increase parking supply within walking distance of the terminal, as this is the most desirable parking product for SAT passengers.
- Impacts to Existing Facilities – Maintain existing facilities where possible, particularly the existing consolidated rental car facility.
- Costs – Balance capital costs and operational costs, such as shuttling.
- Phasing and Construction Impacts – Allow for a phased approach to meeting the PAL 4 parking requirement and minimize impacts to existing operations during construction of new facilities.

Various parking alternatives were explored through the planning study. The evolution of these concepts is presented in the Appendix in Volume 4. The preferred development concept is described in the following sections based on the proposed development timeline. The ultimate parking configuration for the planning horizon is shown in Figure 39.

Figure 39: PAL 4 Ultimate Parking Configuration



Source: Kimley-Horn

6.1.8.1 BEFORE PAL 1 (2025) DEVELOPMENTS

Construction of a new Employee Parking Lot is proposed to occur before 2025 to support the construction of the New Terminal and provide capacity to accommodate future employee parking needs. The new lot is proposed to be located adjacent to the existing Economy Lot and contain approximately 1,200 parking stalls. Several different existing parking lots and properties will be combined into a single parking lot to create an efficient layout of parking. The existing Economy Lot will be reconfigured to respond to proposed roadway developments. The reconfigured Economy Lot will contain approximately 2,100 parking stalls. The location of the proposed Employee Lot and the reconfiguration/optimization of the Economy Lot is shown in Figure 40.

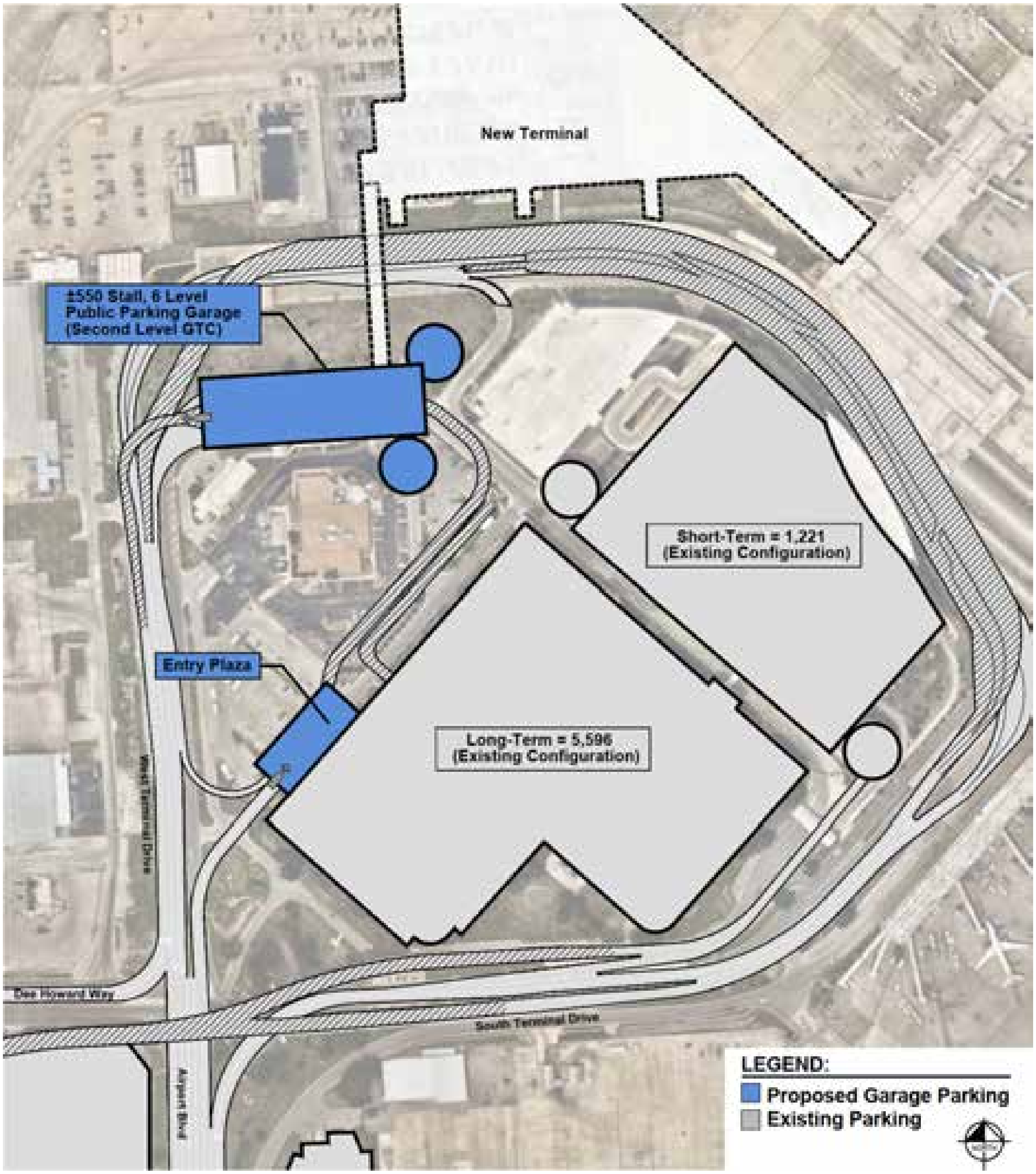
Figure 40: New Employee Parking Lot and Reconfigured Economy Lot

Source: Kimley-Horn

6.1.8.2 PAL 2 (2030) DEVELOPMENTS

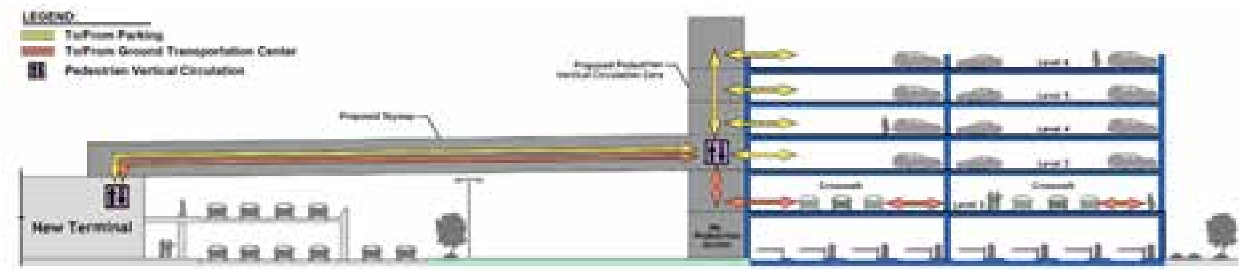
Construction of a new parking garage by 2030 is proposed to provide a parking product within walking distance of the New Terminal. Figure 41 illustrates the location of the new parking structure and entry plaza. The garage is proposed to be five structured levels, with the exit plaza located on the ground floor. A new entry plaza will be constructed to provide access to all the structured parking facilities in a consolidated manner that supports roadway efforts to reduce curb front traffic volumes. Customers can access the new structure via a pedestrian bridge connecting to the New Terminal and Figure 42 provides a cross section of the proposed connection to highlight the pedestrian circulation through the facility. Vehicular access and egress are detailed in Figure 43.

Figure 41: Phase 1 Parking Garage Development



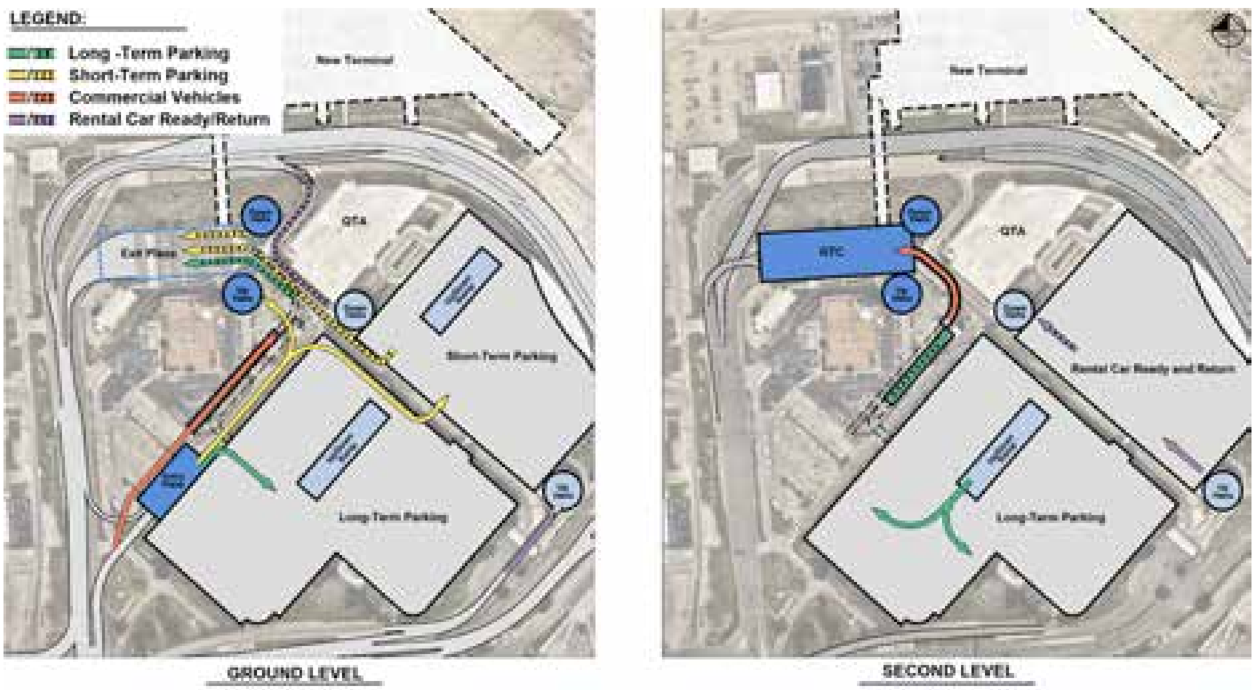
Source: Kimley-Horn

Figure 42: Passenger Flow Through New Parking Structure and GTC



Source: Kimley-Horn

Figure 43: Plan View Showing Vehicular Access and Egress To/From New Parking and Structure



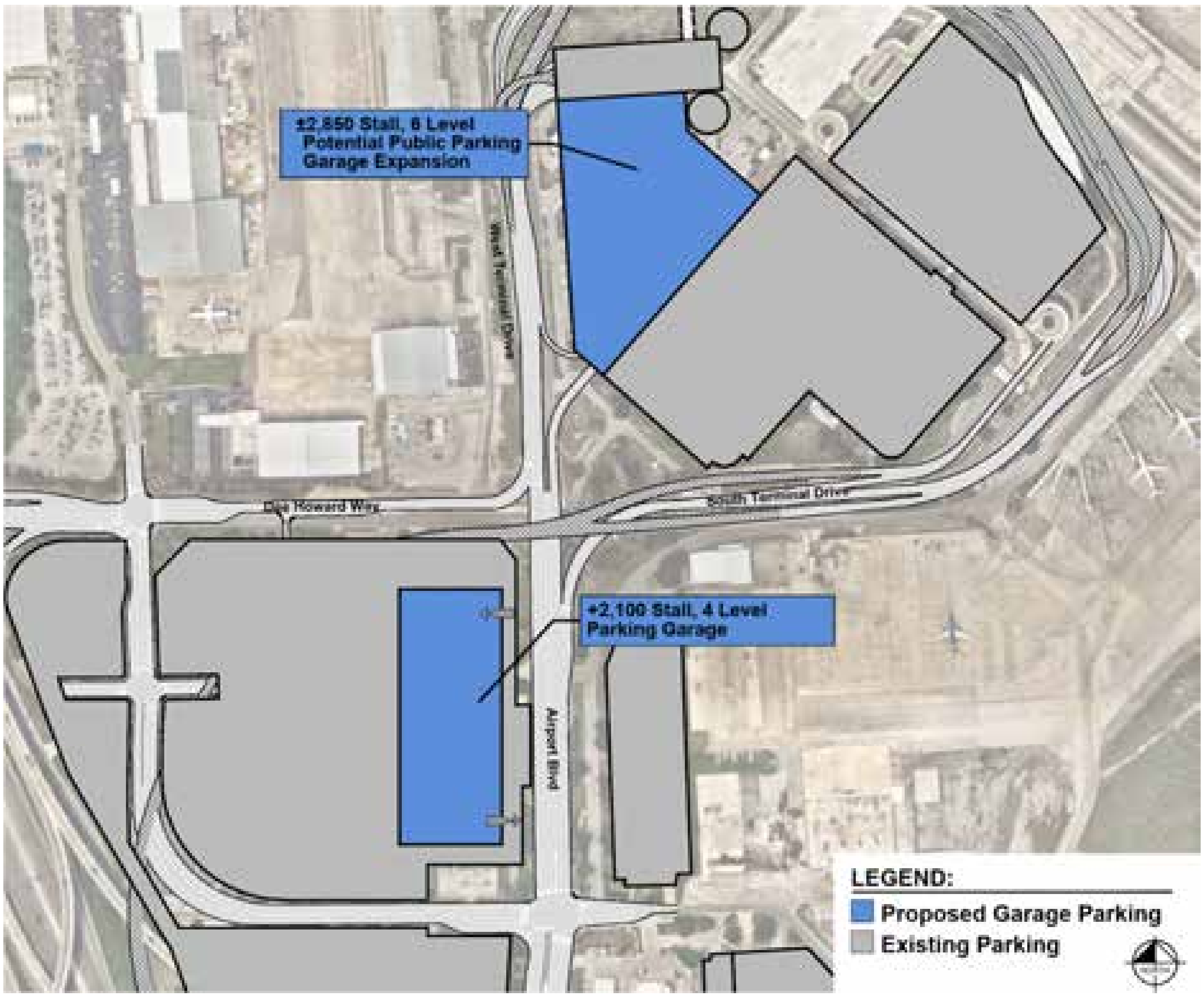
Source: Kimley-Horn

The GTC, and particularly the southern helix, is located adjacent to the FAA ATCT. The existing tower is rated at a Facility Security Level (FSL) 2, meaning it does not require any setbacks or a blast analysis. However, per FAA Security Order 1600-69C, a 20-foot buffer is required on either side of the property perimeter fence. The planning process assumed the FSL will not change in response to future Airport activity levels. Coordination with the FAA is required to determine if the FSL may change in the future.

6.1.8.3 PAL 4 (2040) DEVELOPMENTS

Between 2030 and 2040, two additional parking garage developments are proposed to meet projected demand. An expansion of the Phase 1 parking structure, limited to the GTC footprint, will connect the new structure to the existing Long-Term Garage to provide an additional approximately 2,800 parking stalls among five structured levels. The garage expansion requires the relocation of the existing FAA Airport Traffic Control Tower. An additional three structured level garage with approximately 2,100 stalls is proposed within the Economy Lot footprint. Structured parking is needed to maximize at-grade parking opportunities on Airport property by 2025. The proposed garage footprints are illustrated in Figure 44.

Figure 44: Phase 2 Parking Garage Developments



Source: Kimley-Horn

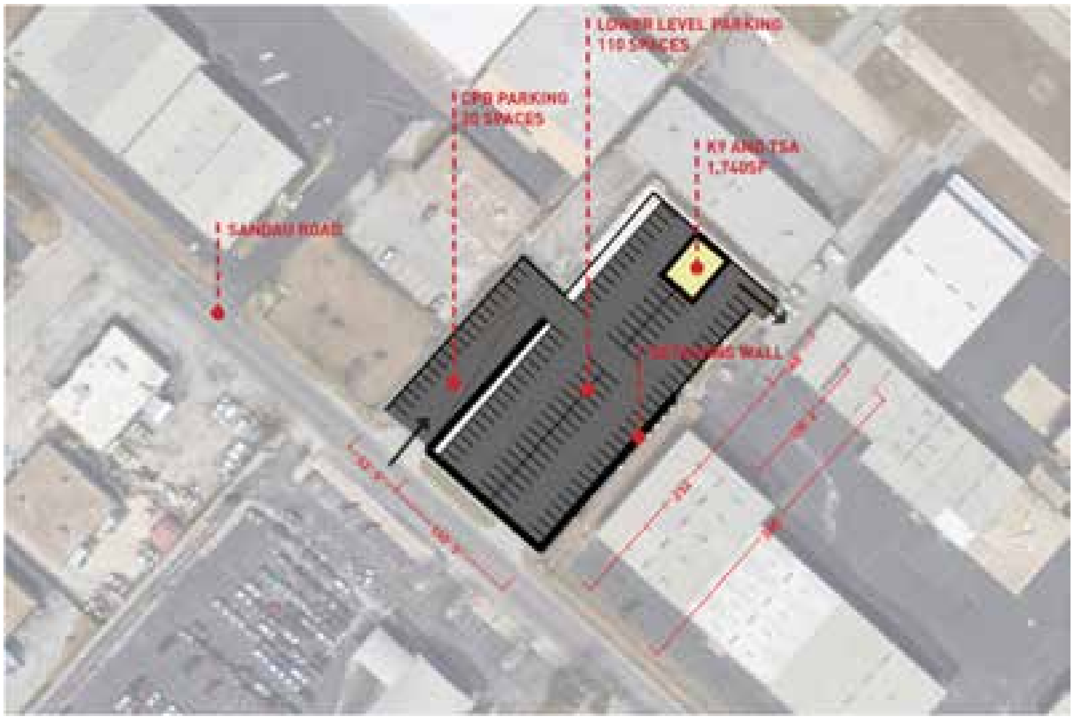
6.1.9 Public Safety Building

Figure 45, Figure 46, Figure 47, Figure 48 and Figure 49 display the proposed Public Safety Building location and layout.

Figure 45: Proposed Public Safety Building Location

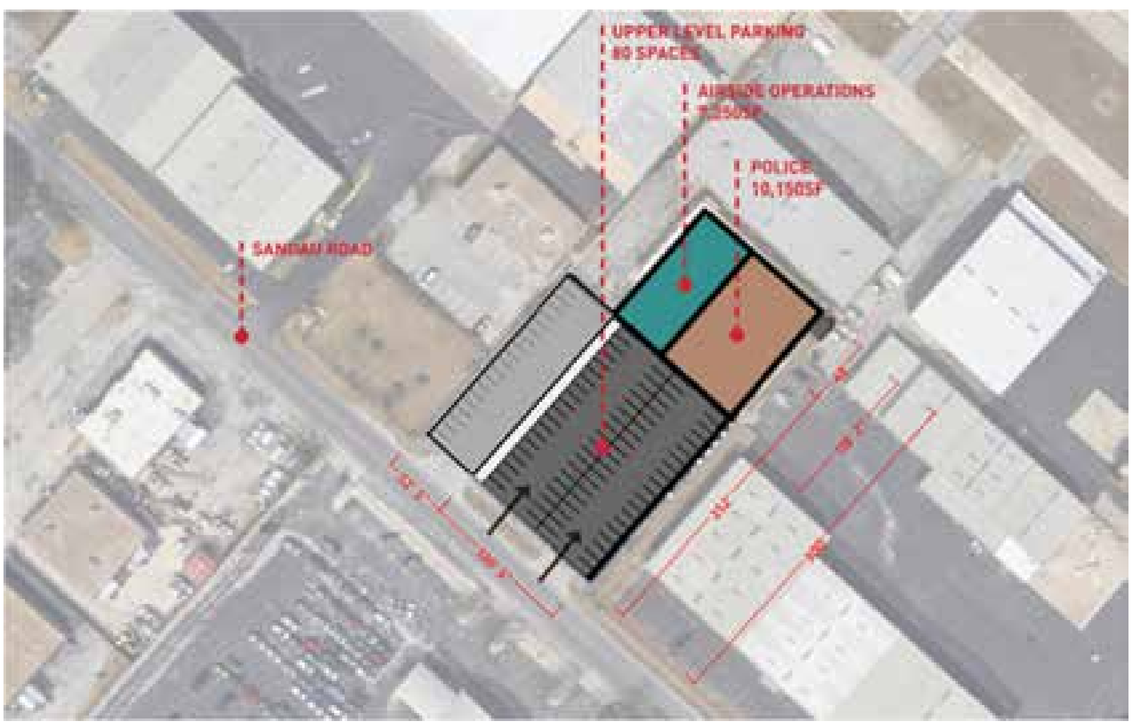
Source: Lake Flato

Figure 46: Proposed Public Safety Building sub-surface parking level



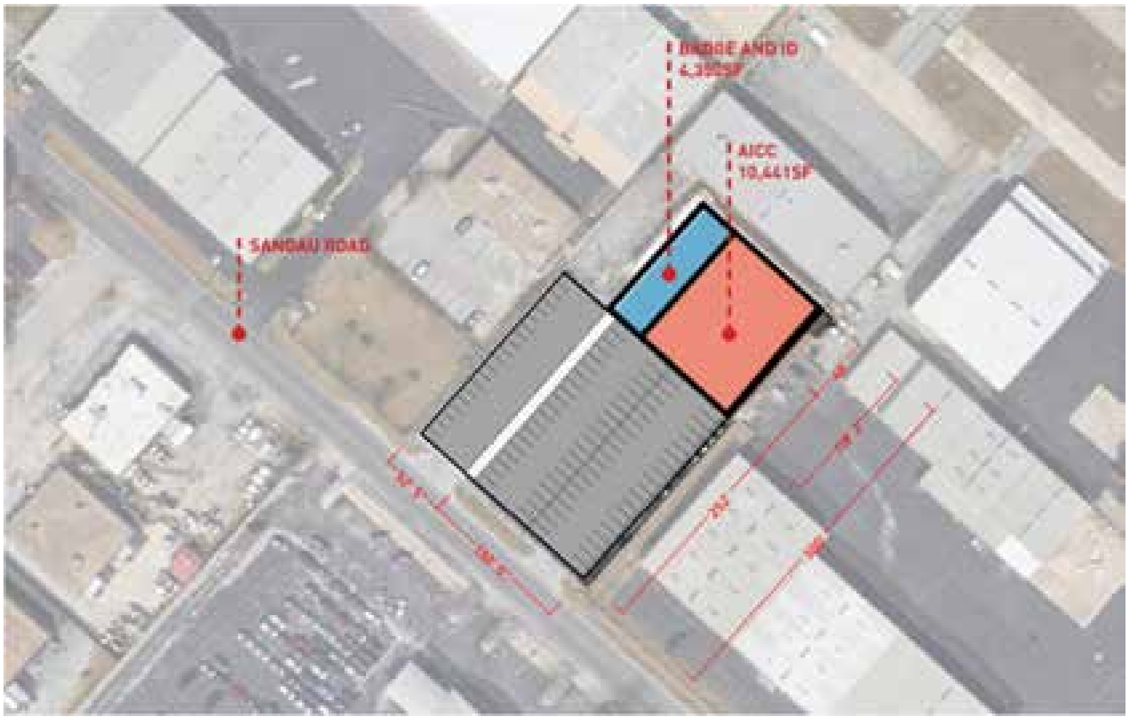
Source: Lake Flato

Figure 47: Proposed Public Safety Building Street level



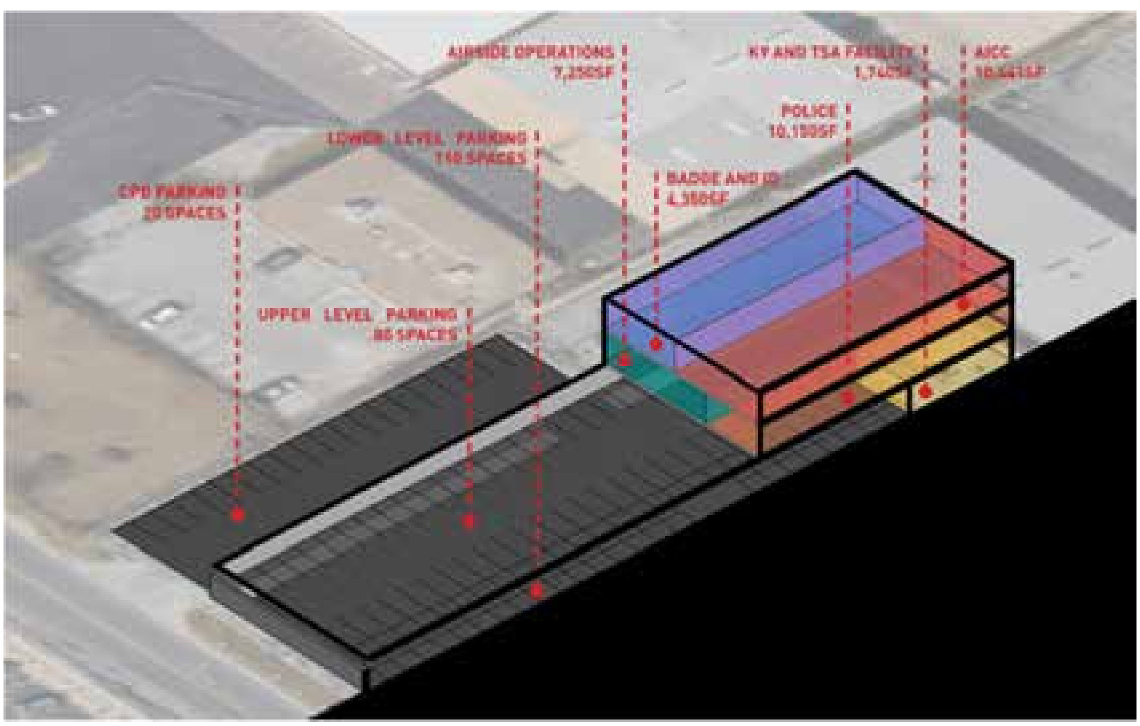
Source: Lake Flato

Figure 48: Proposed Public Safety Building Second level



Source: Lake Flato

Figure 49: Proposed Public Safety Building Section Diagram



Source: Lake Flato

6.1.10 Badging Office

A new location for the badging office will not be built as a stand-alone structure, but rather included within the new Public Safety Building.

6.1.11 Utility Corridor Relocation

Construction of New Terminal will require the existing landside sanitary sewer, water, and storm sewer infrastructure to relocate and increase in capacity to accommodate the additional airport facilities. It is assumed the current capacity of existing sanitary sewer and water infrastructure will double to service the terminal campus, including the New Terminal. Increasing capacity of infrastructure within the utility corridor may require further off-site extensions of sanitary sewers and water mains, which will be determined through coordination with the San Antonio Water System (SAWS) during design.

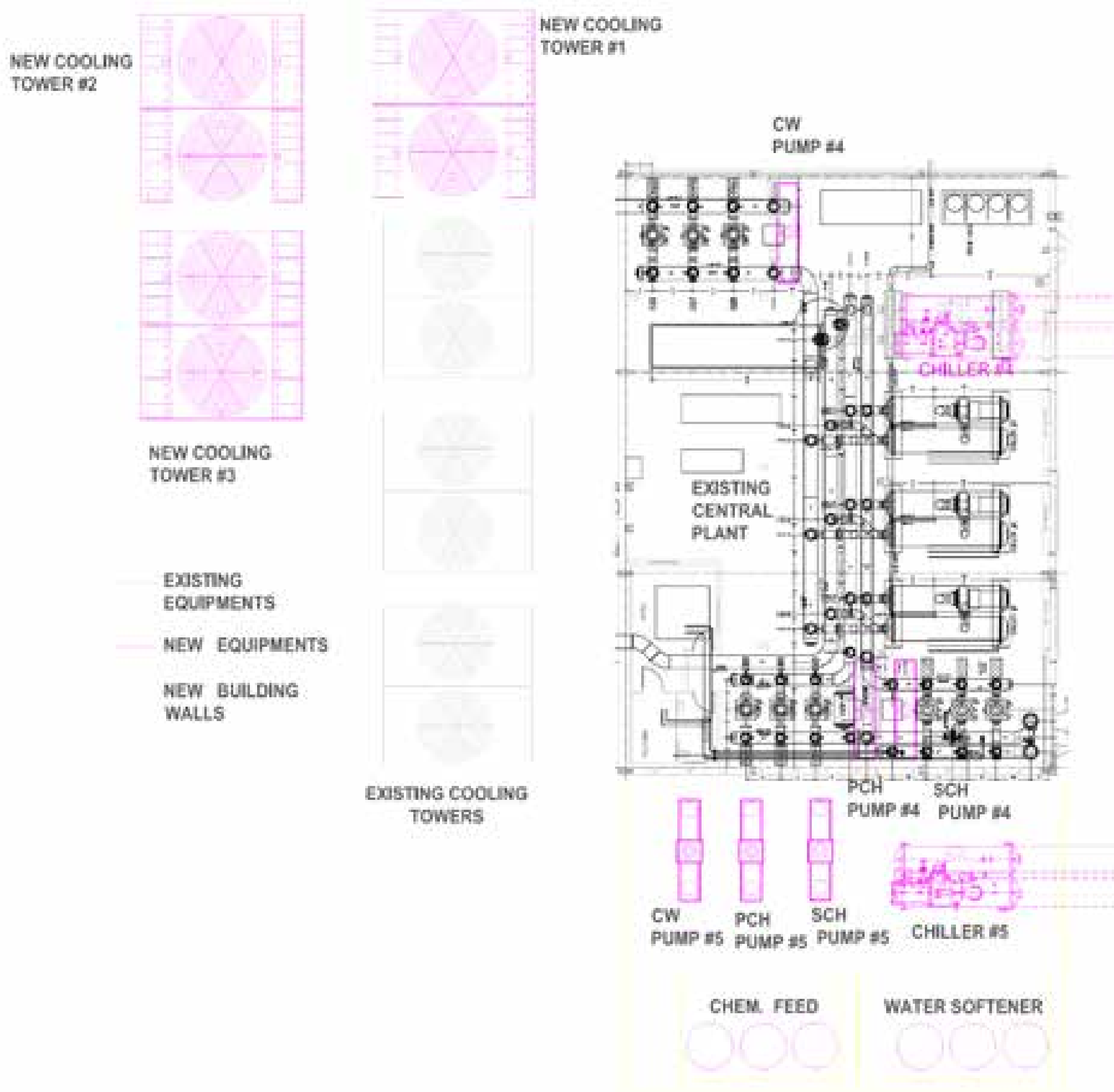
6.1.12 CUP Upgrades and Electrical Upgrades

The current load on the central plant was difficult to determine since no historical data was recorded. The current chillers appear to be operating at 80% capacity during normal operation. However, during hot summer months as well as during peak loads, all three chillers are generally operating, per the facilities' personnel.

The New Terminal has a larger square footage than both Terminals A & B combined. The current building load is approximately 2,240 tons. The estimated cooling load for the New Terminal ranges between approximately 2,200 tons. This load will be added to the current central plant load to accommodate the new 17 gates and 940,000 sq. ft. terminal.

The upgrade to the CUP requires additional CPSE service and adjustment to existing switchboard circuit breakers to accommodate new equipment.

Figure 50: Expansion of Existing CUP



Source: CNG

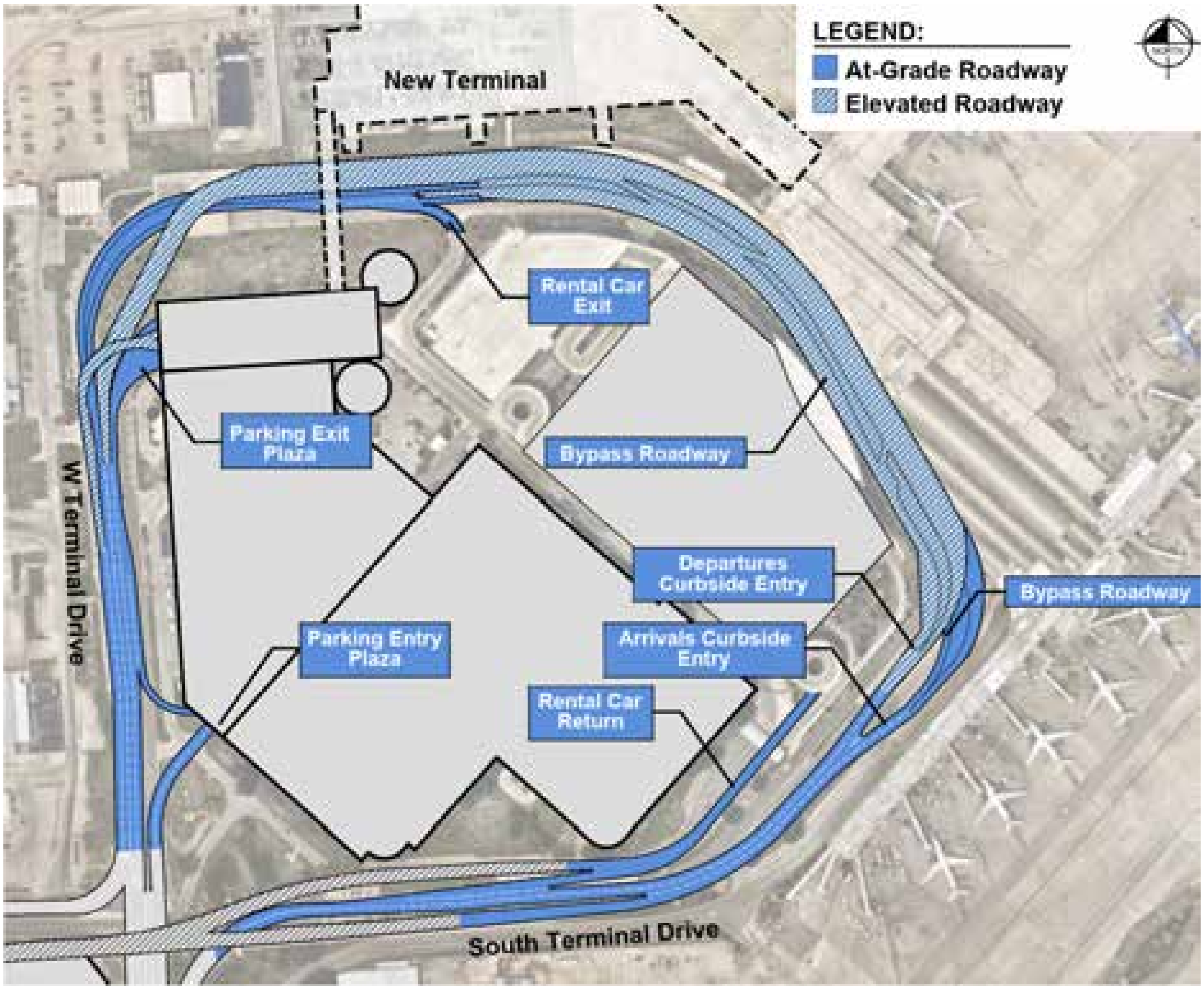
6.1.13 Terminal Curbside Roadway Improvement

Improvements to the terminal curbside roadway are required to meet projected demand. The following considerations in the development of curbside alternatives includer:

- Capacity – Provide sufficient curbside capacity to meet the projected vehicular demands at each of the three terminals while also providing sufficient roadway throughput/capacity with the goal of maintaining LOS C.
- Land Use – Potential to accommodate a range of landside operations with the goal of maintaining flexibility for future Airport development.
- Terminal Access – Address traffic issues associated with the existing Terminal Loop Road caused from curbside congestion and weaving maneuvers, especially near Terminal A.
- Customer Experience – Consider motorist and passenger perception of travel times, wayfinding, and facility location intuitiveness throughout development of alternatives.

Various curbside roadway alternatives were explored during the planning process. The evolution of these concepts is presented in the Appendix in Volume 4. The preferred development concept is described below, and the ultimate terminal curbside roadway configuration for the planning horizon is shown in Figure 51.

Figure 51: Proposed Curbside Roadway Concept

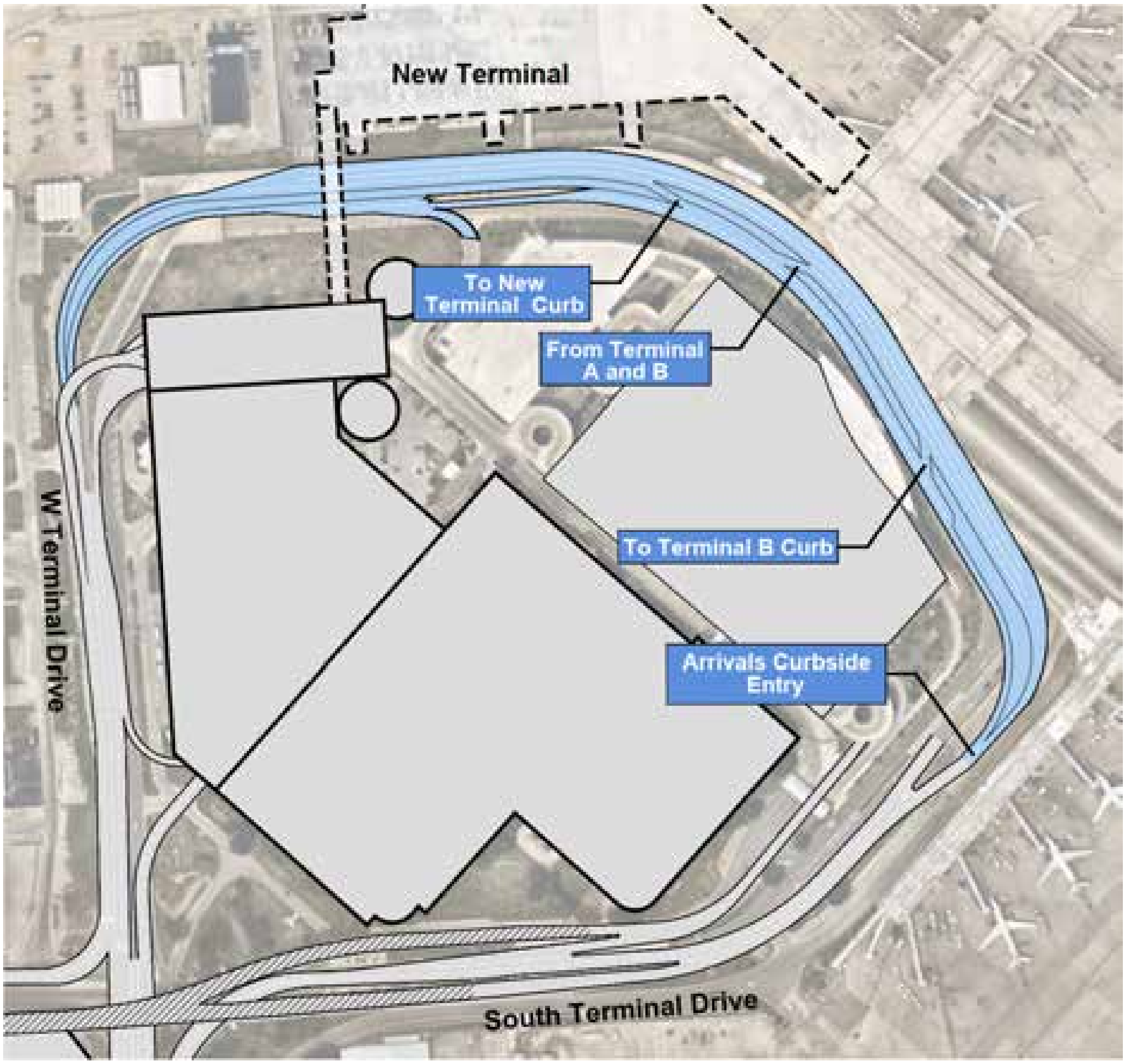


Source: Kimley-Horn

The lower-level arrivals curbside is proposed to increase in length to accommodate Terminal B and the New Terminal curbside demand. The arrivals roadway is proposed to expand and encompass the area currently utilized by commercial vehicles. This expanded area is used as a bypass roadway to allow vehicles to enter and exit the curbsides at key locations to reduce congestion on the roadways immediately in front of the curbsides. The at-grade bypass roadway will also receive rental car vehicles exiting the QTA area and vehicles exiting the upper-level bypass roadway described later in this section.

Approaching the two-lane entry to the arrivals roadway, vehicles destined to the Terminal A curb front follow wayfinding signs to remain in the right lane, while vehicles destined to the New Terminal following wayfinding sign remain in the left lane (for the bypass roadway), and vehicles destined to Terminal B should be signed to take either lane – understanding the bypass roadway allows access for Terminal B vehicles. Along the curbside roadway, wayfinding should effectively communicate the intent of the bypass roadway to get passengers to the curb. The proposed curbside roadway will maintain 4 lanes in front of curbs where pick-up activities occur and will have 3 lanes in the transition area between Terminal B and the New Terminal. Figure 52 shows the layout of the proposed arrivals roadway.

Figure 52: Proposed Arrivals Roadway and Curbside

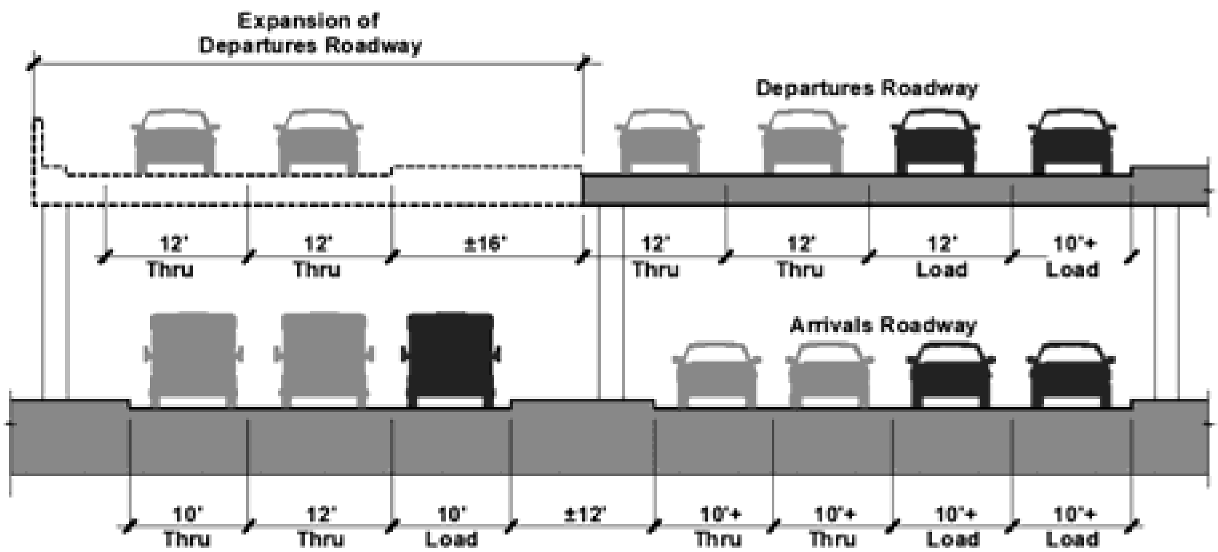


Source: Kimley-Horn

The upper-level departures curbside is proposed to increase in length to accommodate Terminal B and the New Terminal curbside demand. The departures bridge (structured roadway) is proposed to expand in width over the lower-level bypass roadway as shown in Figure 53. This expanded area is used as a bypass roadway to allow vehicles to enter and exit the curbsides at key locations to reduce congestion on the roadways immediately in front of the curbsides. The bypass roadway ramps down and feeds into the at-grade bypass roadway. The proposed departures roadway does not include any pedestrian crossings.

Approaching the two-lane entry to the elevated departures roadway, vehicles destined to the Terminal A curbfront follow wayfinding signs to remain in the right lane, vehicles destined to the New Terminal following wayfinding signs to remain in the left lane (for the bypass roadway), and vehicles destined to Terminal B are assigned to take either lane – understanding the bypass roadway allows access for Terminal B vehicles. Along the curbside roadway, wayfinding should be effective in communicating the intent of the bypass roadway to get passengers to the curb. The curbside roadway is proposed to maintain 4 lanes in front of curbs where drop-off activities occur with 3 lanes in the transition area between Terminal B and the New Terminal. Figure 53 shows the layout of the proposed departures roadway.

Figure 53: Proposed Departures Roadway Expansion



Source: Kimley-Horn

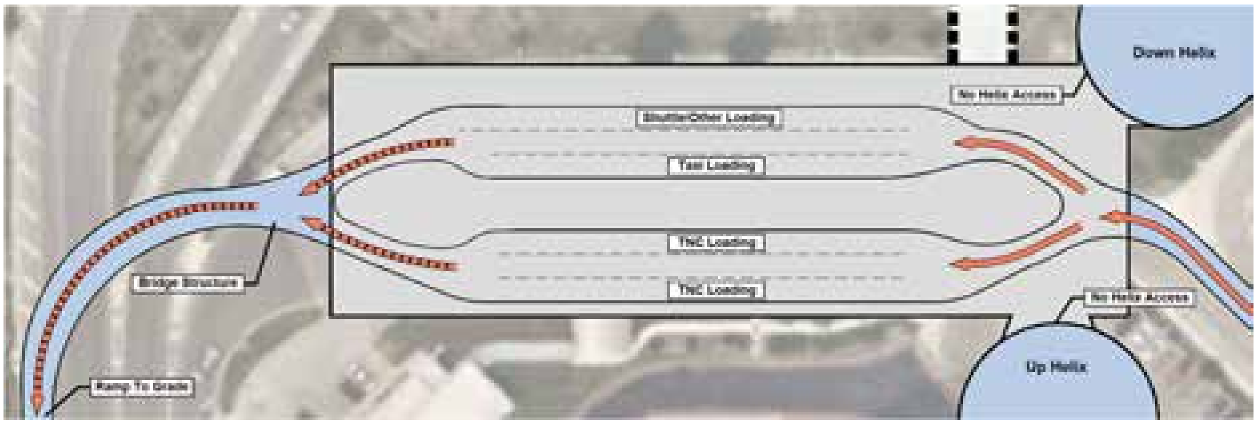
Figure 54: Proposed Departures Roadway and Curbside

Source: Kimley-Horn

6.1.13.1 COMMERCIAL VEHICLE CURBSIDE

The commercial vehicle program is incorporated into a new Ground Transportation Center (GTC), located within the new parking structure described in Section 6.1.8. The GTC located on the second floor of the parking structure accommodates TNC pick-ups, taxi pick-ups, and shuttle/limo pick-ups. One of the primary reasons for moving these functions is to reduce activity on the terminal curbfront roads. Buses will remain on the Departures or Arrivals curbs due to clearance and weight restrictions for the garage. The general floor plan for the GTC is illustrated in Figure 55. The curb allocations among the various user types may be adjusted as the project progresses. The length of commercial curb provided for each mode based on the concept in Figure 55 is provided in Table 29.

Figure 55: Ground Transportation Center Floor Plan



Source: Kimley-Horn

Table 31: Provided Commercial Vehicle Curbfront in GTC

Mode[1]	PAL 4 Requirement	Concept Provided
TNC	300'	430'
Taxi	225'	225'
Shuttle/Other	150'	225'

1 Due to clearance and weight restrictions, buses are assumed to operate on the Departures or Arrivals curbside, as determined by the Airport.

Source: Kimley-Horn

6.1.14 Airport Access Road

Recommended improvements to the Airport access roadway network shown in Figure 56 below.

Figure 56: Preferred Roadway Alignment

Source: Kimley-Horn

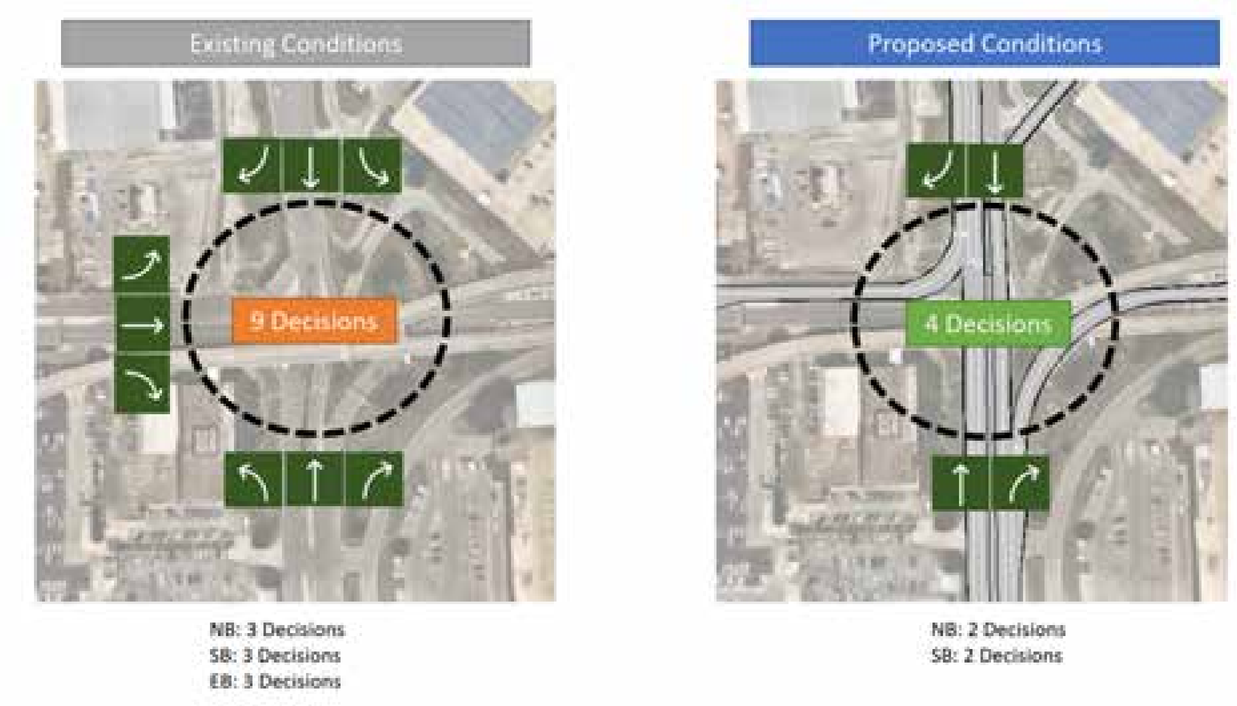
The following key considerations in the development of the roadway alternatives include:

1) The design provides roadway configuration solutions that allow for a substantial operational improvement.
2) The design balances ultimate design and existing fixed construction constraints out of the Airport's immediate control.
3) The design improves user ease of understanding and accessibility of the Airport, improving the overall user experience, and
4) The design avoids new investment in fixed structures, which are hard to move and limit flexibility for future growth.

The following improvements comprise the roadway network modifications recommended to support anticipated PAL 4 volumes of Airport traffic:

- Remove the existing traffic signal at Airport Boulevard & Terminal Loop / Dee Howard Way to:
  - Eliminate the metering effect and support a steadier flow of vehicles to the Terminal.
  - Consolidate all inbound traffic on northbound Airport Boulevard which eliminates the need for users from US 281 driving southbound to merge and weave with users from all other directions. This configuration provides a simplified approach where wayfinding can more easily direct users to their desired destination.
  - Facilitate merging towards and away from the curbside.
  - Remove queuing on the exit from the curbside that currently limits the ability of patrons to navigate the merging and weaving to align with either exiting to Loop 410 or US 281.

Figure 57: Existing and Proposed Roadway Conditions

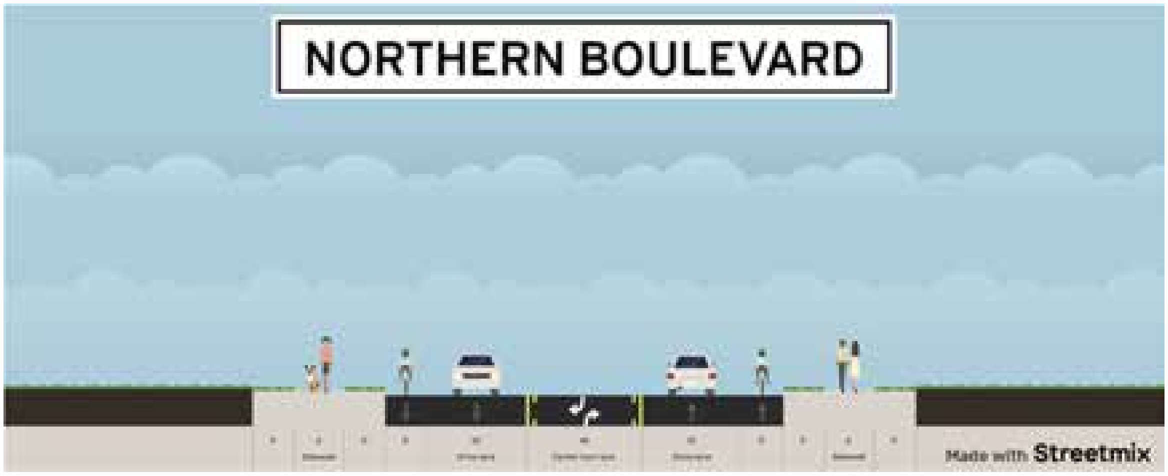


Source: Kimley-Horn

- Provide access to structured parking adjacent to the Terminal directly from Airport Boulevard. This relocated parking entrance eliminates the weaving currently associated with vehicles destined for the current parking entrance, freeing up capacity on the approach to the Terminal.
- Re-construct the existing intersection of Airport Boulevard & Terminal Loop / Dee Howard Way to include a concrete median to restrict northbound left turn and southbound left turn movements. The westbound approach of the intersection is to be removed.
- Reconstruct Dee Howard Way to provide westbound one-way operations only.
- Construct an economy lot entrance only on Dee Howard Way west of Airport Boulevard to provide an outlet for users coming out of Terminal Loop who need to park.
- Rebuild the existing intersection of Dee Howard Way & John Saunders to reflect Dee Howard Way as westbound operations only and construct dual channelized eastbound right turn lanes on Dee Howard Way to connect to the new Northern Boulevard extension.
- Reconstruct the traffic signal at Dee Howard Way & John Saunders to accommodate new traffic pattern and roadway widening.
- Northern Boulevard to be extended from Airport Boulevard to connect to Dee Howard Way. A midblock entry and exit plaza are to be constructed to support economy lot and staff lot operations. Final location to be determined in the design process. This new roadway should be built to City of San Antonio Collector requirements. The collector cross-section was chosen based

on projected traffic volumes and the function of the intended roadway, consistent with the City of San Antonio Unified Development Code (UDC).

Figure 58: Roadway Cross-Section



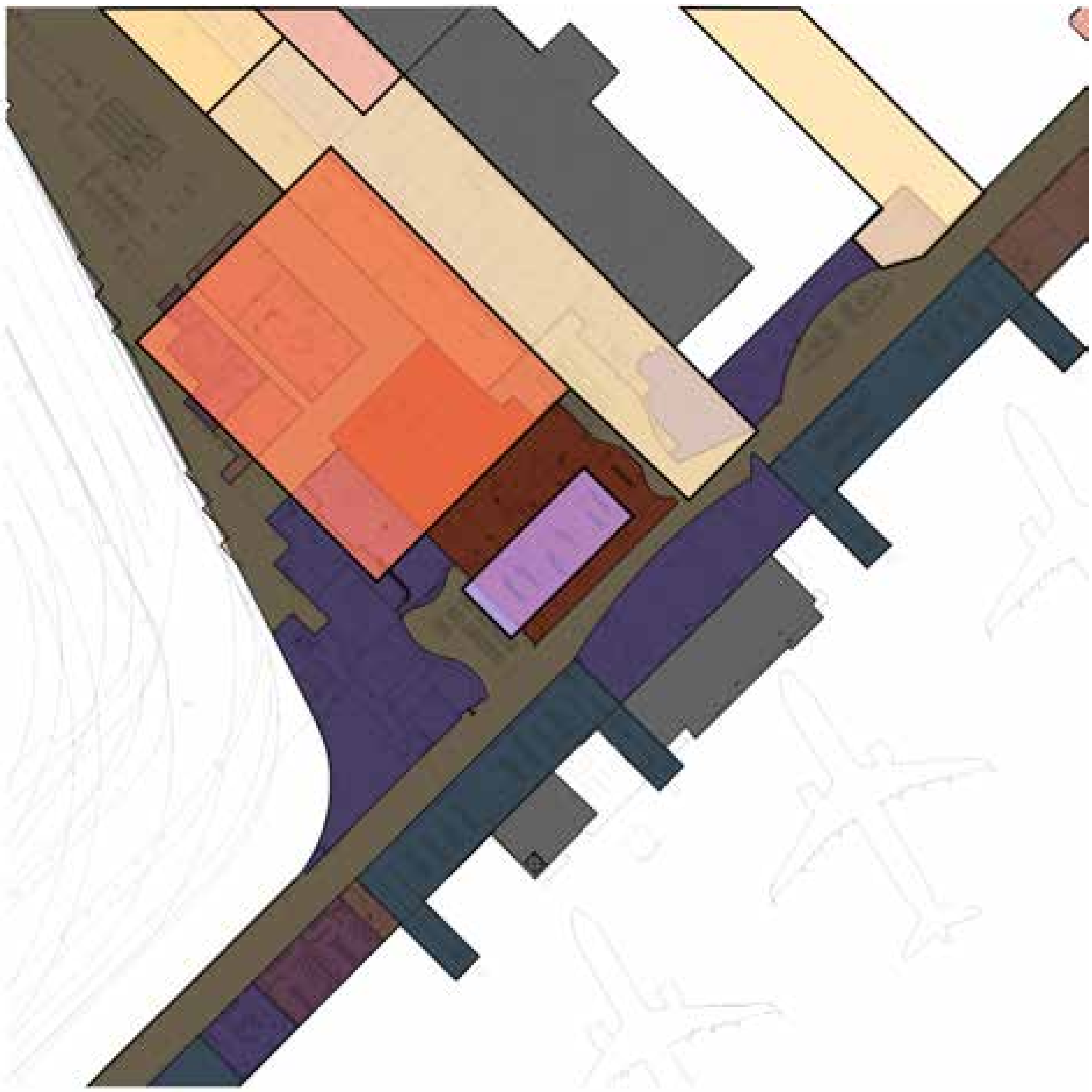
Source: Kimley-Horn

- Once the roadway alignment is set, the economy lot will be re-evaluated for operational improvement including but not limited to a single ingress / egress plaza to unify private vehicle traffic and Airport shuttle services, associated parking revenue control service adjustments, and a re-configuration of the lot's parking layout to improve efficiency and maximize capacity.
- The existing intersection of Airport Boulevard & Northern Boulevard are reconstructed to provide dual left turn deceleration lanes and dual channelized right turn deceleration lanes on the eastbound approach of Northern Boulevard. The eastbound right turn movements are signalized.
- Reconstruct the existing traffic signal at Airport Boulevard & Northern Boulevard to accommodate roadway widening and modified traffic operations.
- No additional roadway improvements are anticipated on Airport Boulevard between the existing intersections of Terminal Loop / Dee Howard Way & Airport Boulevard and Northern Boulevard & Airport Boulevard.
- All Airport wayfinding signage should be evaluated and modified as needed to reflect changes to the roadway network and parking entry / exit points and the Ground Transportation Center (GTC).
- Evaluate the offsite intersections of US 281 & Jones Maltsberger, US 281 & Dee Howard Way, and Loop 410 & Airport Boulevard adjacent to the campus to identify operational improvements to facilitate access to and from the Airport.

6.1.15 Term A Reconfiguration

For the increase in terminal capacity and operations Terminal A reconfiguration proposes SSCP relocation and expansion along with check-in counter reduction to accommodate the closure of the eastern most set of doors on the curbside to lengthen the curb front, reduction of landside concessions displaced by the proposed A + B Connector. This displacement will include expansion and relocation of airside concessions, and replacement of 3 existing flat plate bag claim devices.

Figure 59: Terminal A Departures - Reconfiguration

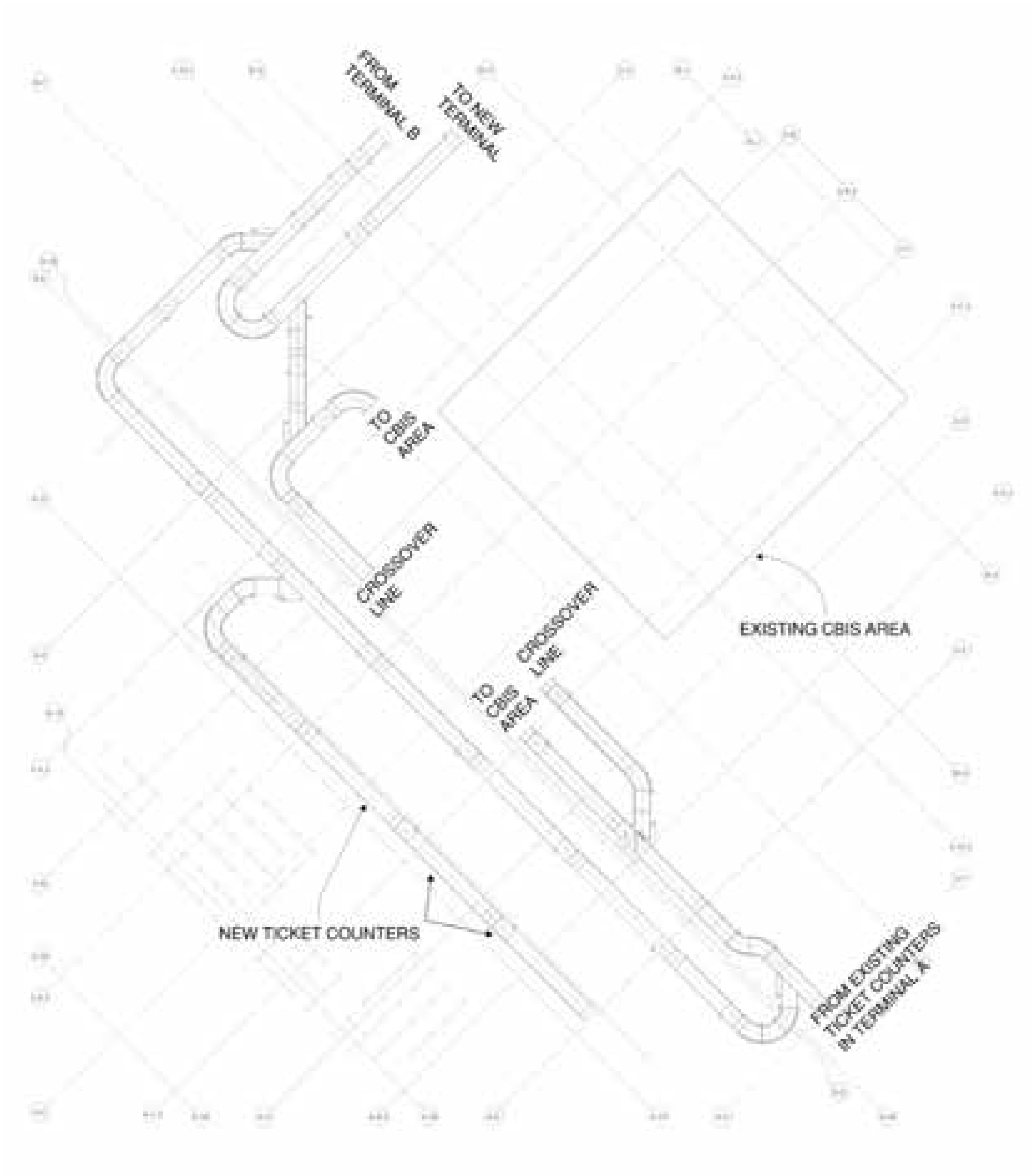


Source: Corgan

6.1.15.1 BAGGAGE HANDLING SYSTEMS

This project considered the feasibility of screening the bags checked in at Terminal A. Figure 60 shows a preliminary layout of conveyor routing from Terminal A to New Terminal CBIS.

Figure 60: Terminal A Ticket Counter to New Terminal CBIS



Source: VTC

6.1.16 Term B Reconfiguration

To accommodate the displacement of 800 SF of airside concessions for the proposed A + B Connector, the preferred strategy replaces current SSCP lanes to expand concessions operations to serve both land and airside of the terminal. No changes will be made to existing layout of check-in along with BHS Conveyors integration to the New Terminal CBIS.

Figure 61: Terminal B Departures - Existing

Source: Corgan

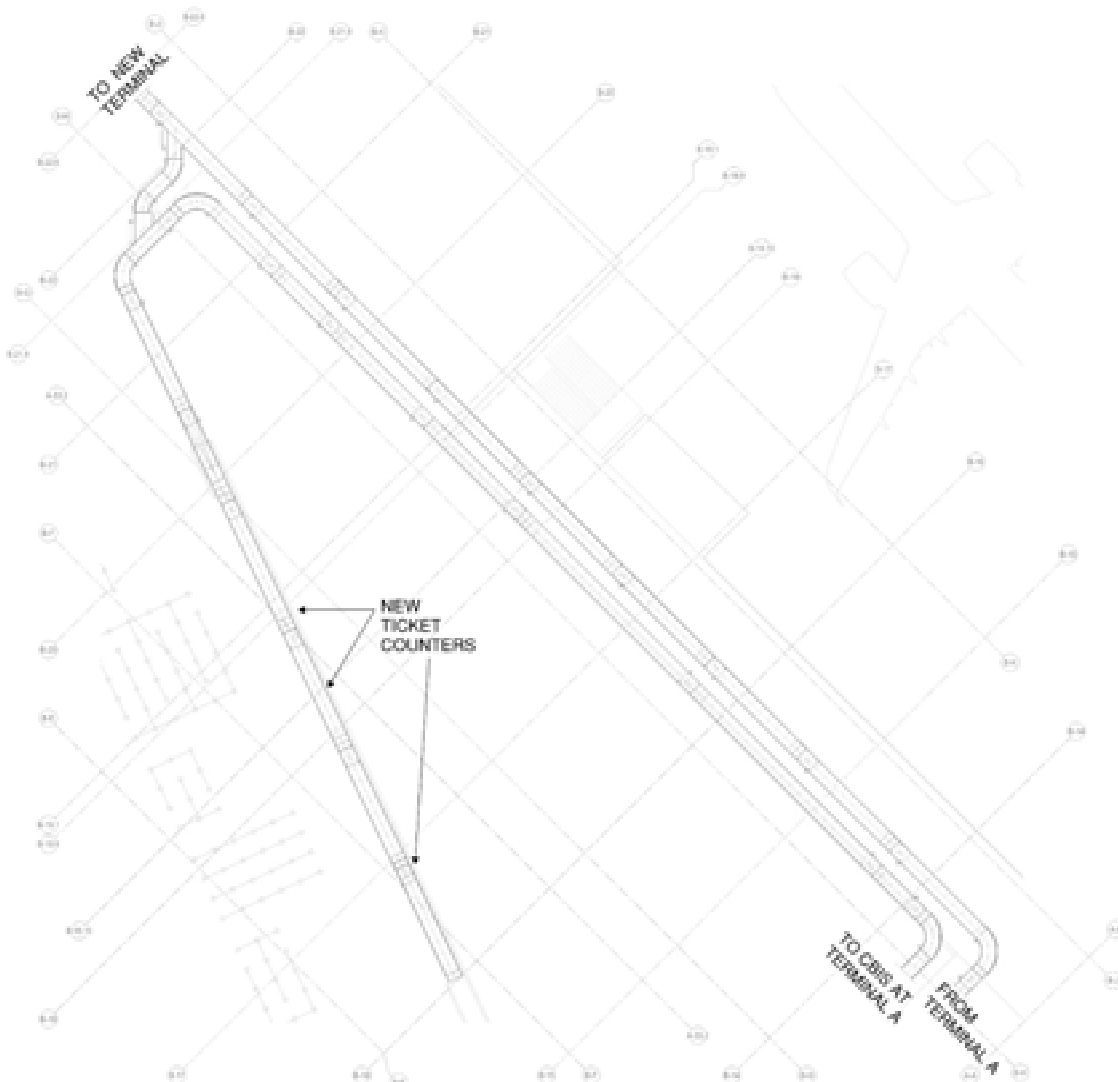
Figure 62: Terminal B Departures - Reconfiguration

Source: Corgan

6.1.16.1 BAGGAGE HANDLING SYSTEMS

This project also considered the feasibility of screening the bags checked in at Terminal B. Figure 63 below shows a preliminary layout of conveyor routing from Terminal B to New Terminal CBIS.

Figure 63: Terminal B Ticket Counter to New Terminal CBIS



Source: VTC

7 Sustainability

The San Antonio Airport System Sustainable Airport Manual (SAASSAM) is the green building manual that provides the guidelines for the San Antonio Airport System's (SAAS) to achieve more environmentally sustainable buildings with minimal impact to schedule or budget. The aim of sustainable design practices is to reduce the environmental impact, creating financial and operational benefits, and social benefits for the community. The SAASSAM guides designers and contractors with information that helps to implement sustainable design practices for new construction and renovations at SAAS. The SAASSAM communicates SAAS's expectations for sustainable design and construction, but it does not supersede existing code requirements from the State of Texas, Bexar County, the City of San Antonio, or other agencies.

This manual is applicable to all new construction and major renovations of occupied and unoccupied buildings greater than 1,000 square feet. New construction includes both facilities that will be occupied by employees and passengers, as well as facilities that are not regularly occupied. For unoccupied buildings, there may be some unapplicable criteria that can be excluded. Criteria that prove to not be demonstrably cost effective over the project life cycle is not required to be implemented. The SAASSAM provides several categories that entail the requirements and standards for new construction and renovation of buildings. The categories are: Integrated Design, Air and Emissions, Energy and Water Management, Health Safety and Security, and Materials Management. Within each category are also several technical standards, "Design Criteria," which provide direction for incorporating sustainability into a project. These Design Criteria are: Responsible Discipline, Purpose, Phase, Benefits, Performance Target, Documentation, Exemptions, and Sustainable Design Strategies.

7.1 Integrated Design

Integrated Design is responsible by Planning and Development and enhances the project design by planning for and identifying sustainable elements across multiple disciplines and stakeholders. Green Meetings also fall under this category, and serve to guide meeting hosts, planners, and attendees towards more sustainable meetings.

7.2 Air and Emissions

Indoor Air Quality Performance falls under the responsibility of Mechanical. Its purpose is to enhance indoor air quality in buildings and minimize occupant exposure to potentially hazardous particulates and chemical pollutants. Environmental Tobacco Smoke Control falls under Architectural responsibility and prevents exposure of building occupants and users to environmental tobacco smoke. The Construction Contractor is responsible for Construction Indoor Air Quality Management and reduces indoor air quality problems resulting from construction or renovation activities to promote the health, comfort, and well-being of construction workers and building occupants. Ozone Depleting Chemicals and Refrigerant

Management is Mechanical responsibility and reduces stratospheric ozone depletion and greenhouse gas emissions. Clean Fuel and Low Emission Construction Vehicles minimizes outdoor air quality impacts and reduces greenhouse gas emissions associated with construction and falls under the Construction Contractor's responsibility. Greenhouse Gas Emissions is Architectural responsibility and reduces the greenhouse gas emissions related to project energy use and optimizes the embodied carbon of products and materials.

7.3 Energy and Water Management

Improved Energy Performance is under Mechanical, and the purpose is to design energy efficient facilities that optimize energy use via industry best practices and systems to reduce environmental impacts. Minimize Solar Heat Gain is Architectural responsibility and reduces heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human wildlife habitat. Daylighting is Electrical responsibility and reduces energy use through the introduction of daylight into regularly occupied areas. Alternative and renewable Energy falls under Electrical responsibility and increases the supply of on-site alternative and renewable energy technologies to reduce energy costs, dependency on fossil fuels, and the environmental impacts associated with fossil fuel energy use. Electric Vehicle Charging Infrastructure is Electrical responsibility and reduces pollution by promoting alternatives to conventionally fueled automobiles. Metering and Verification falls under Mechanical and Electrical responsibility, and it ensures accountability for and optimization of energy and water consumption. Systems Commissioning is under the Commissioning Authority and verifies that fundamental building elements and systems are designed, installed, and calibrated to operate as intended and according to owner requirements. Water Use Reduction is Mechanical's responsibility and aims to maximize water efficiency of buildings and their exteriors. Stormwater Management falls under Civil responsibility, and minimizes the impact on stormwater runoff quantity, rate, and quality while controlling soil erosion and waterway sedimentation.

7.4 Materials Management

Sourcing of Raw Materials and Furniture is Architectural responsibility, and the purpose is to encourage the use of products and material that have been extracted or sourced in an environmentally, economically, and socially responsible manner. Low-Emitting Materials is Architectural's responsibility and aims to reduce the quantity of indoor air contaminants that are odorous, potentially irritating, and/or harmful to the health, comfort and wellbeing of contractors and occupants. Storage and Collection of Recyclables falls under Architectural responsibility and facilitates the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. Construction Waste Management is the Construction Contractor's responsibility and diverts the construction and demolition debris from disposal in landfills and incineration facilities. Thermal Comfort is Mechanical's responsibility and provides a thermally comfortable environment that supports the productivity and well-being of building occupants. Noise and Acoustical Quality is Mechanical's responsibility, and limits exposure to noise and vibration and promotes occupant health, well-being, communications, and productivity through effective acoustic design. Light Pollution to minimize nocturnal light pollution by reducing glare, light trespass and skyglow to avoid unwanted impacts to ecosystems and human health, preserve dark skies, and conserve energy. Exterior Views falls under Architectural responsibility and incorporates exterior views into regularly occupied indoor areas. Occupant Wellbeing Amenities is Architectural responsibility and aims to provide dedicated spaces for occupants to improve well-being. Design for Enhanced Resilience is responsibility, and its purpose is to design and construct buildings that can resist reasonably expected natural disasters and weather events exacerbated by climate change (e.g., flooding, hurricanes/high winds, tornadoes, drought, fire, extreme heat, winter storms, etc.) by protecting infrastructure and avoiding damage to equipment or service interruption.