Comprehensive Asset Management Plan

Preliminary Development of Alternatives
Inventory, Forecast, Facility Requirements, and Preliminary Concepts

April 30, 2018
Agenda

• Input from December Stakeholder Meetings
  – Discussion from Meeting 1
  – Project schedule
• Existing Conditions and Activity Forecasts
  – Inventory of airport facilities
  – Planned facilities and facilities under construction
  – Forecasts of passengers, aircraft operations, cargo volume
• Facility Requirements
  – Airfield
  – Terminals
  – Landside
  – Support facilities
• Preliminary Airport Concepts
• Preliminary Thoughts for Development North of Air Lane and along 24th Street
Input from December Stakeholder Meetings

• Airport Roadway Traffic
  – Address cut-through traffic
  – Plan for potential to screen all vehicles on Airport roadways
  – Improve Airport access from both the east and west
  – Coordinate west access improvements with ADOT and MAG plans
  – Identify ways to increase use of PHX Sky Train to alleviate traffic

• North-side Land Use (between Air Lane and Washington Street)
  – Identify highest and best use of north side land
  – Determine near-term uses for development
  – Maintain Airport control of the land

• Passenger Experience and Service
  – Address holdroom congestion
  – Benchmark security wait times with other airports
  – Address need for more direct international service
  – Provide needed gate capacity
Input from December Stakeholder Meetings

• Financial and Business Considerations
  – Address evolving business model associated with changes such as the proliferation of TNCs
  – Incorporate needed “smaller” projects strategically into the CIP

• Resiliency and Sustainability
  – Proactively address needed infrastructure improvements
  – Develop redundancy within the utility infrastructure
  – Incorporate sustainability into airport planning and development
  – Continue incorporate the percentage for art for Airport development
  – Consider the Airport as part of the overall cultural experience and cultural expression for the City

• Security
  – Provide for separate security screening for Airport employees
  – Integrate CAMP with the security action plan
Input from December Stakeholder Meetings

• Airport Support Facilities
  – Collocate Airport services that have face-to-face customer service (e.g., badging, parking, ground transportation)
  – Consider collocation of other support functions
  – Develop fixed isolation and irregular operations areas
  – Evaluate need for a consolidated receiving and distribution center (CDRC)
  – Ensure fuel storage and distribution system is adequate for future needs
Project Schedule

Stakeholder Meetings
- **Week of April 30, 2018** – Forecast, requirements, preliminary alternative concepts, evaluation criteria
- **Week of August 27, 2018** – Final alternatives, evaluation, refinement of preferred alternative
- **Week of December 3, 2018** – Final review of CAMP recommendations to add to the Airport Layout Plan
Existing Conditions and Activity Forecasts
Existing Conditions – Functional Categories
Existing Conditions – Airfield

- Runway 8-26
- Runway 7L-25R
- Runway 7R-25L
- Taxiway System
Existing Conditions – Terminals and Concourses

Terminal 2

Terminal 3

Terminal 4
Existing Conditions – Transportation / Landside

- Sky Harbor Blvd
- Cell Lot
- Parking
- Terminal Curbs
- Parking
- Parking/Cell Lot
- Sky Train
- Cell Lot
- Parking
- Parking
- Parking
- Rental Car Center
- Ground Transportation Staging
Existing Conditions – Support Facilities

- North General Aviation
- Corporate Office Building
- Facilities
- East/West Cargo
- Mail Sort/Aviation Admin
- ARFF
- Airline Maintenance
- South Cargo
- ARFF
- Aviation Fuel

Comprehensive Asset Management Plan | Preliminary Development of Alternatives | April 30, 2018
Planned Facilities and Facilities Under Construction

- Crossfield Taxiways
- Sky Train Stage 2
- AEOC
- T3 Modernization
- T4 Concourse S1
- Southwest Maintenance Expansion
- Swissport Fuel Tank
PHX Sky Train Stage 2 alignment requires the relocation of:

- Ground Transportation (GT) Staging Area
- FedEx Leasehold
- Bus Maintenance Storage Facility
- Clean Energy CNG Station
- LSG Sky Chefs
- West Economy Parking
- Tow and Abandoned Vehicle Lots
Baseline Forecast

• Continued dual hub/focus city operation for American Airlines and Southwest Airlines.
  – No material changes in the role and scope of PHX in the American Airlines or Southwest Airlines route networks.
  – Maintain similar mix of originating and destination (O&D) and connecting passenger traffic.
• Spoke airlines retain existing levels of service to connecting hubs and do not launch non-hub routes.
• Ultra low-cost carriers do not meaningfully expand service at PHX.
• Socioeconomic factors are the primary drivers of passenger growth.
Forecast Scenarios

Three additional scenarios were developed to represent the potential effects of changes in the socioeconomic and competitive environment.

• **Scenario 1**: Population and economic activity grow faster between 2017 and 2023, returning to baseline growth from 2024 to 2037.

• **Scenario 2**: Connecting passenger traffic is reduced as capacity is realigned across airline networks. The capacity reduction would begin early in the forecast period and result in connecting passenger volume decreasing by approximately 13 percent as compared to the baseline forecast.

• **Scenario 3**: Weakened economic activity would drive a decrease in O&D and connecting passenger volumes. An economic recession was assumed to begin in 2019 and drives year over year decreases in passenger activity through 2021. Growth would resume in 2022, increasing at an accelerated rate through 2026, mimicking the 2008 recession and subsequent recovery.
Passenger Forecast

Annual passenger activity is forecast to increase 25 percent over the next ten years and 55 percent to nearly 68 million total passengers by 2037.
Aircraft Operations Forecast

Aircraft operations are forecast to increase 5 percent over the next 10 years and 20 percent to approximately 526,600 operations by 2037.

Percentage increase in aircraft operations is lower than passengers due to assumed increases in average seats per departure and increasing load factors.
Cargo Forecast

Cargo volume is forecast to increase from 354,000 tons in 2016 to 666,000 tons in 2037.

- Low Scenario reflects a slowdown in e-commerce activity growth.
- High Scenario reflects expanded operations of Amazon, as well as other developments in the cargo market.
Design Day Flight Schedules

- Facilities are planned for the peak month average day (PMAD).
- A Design Day Flight Schedule (DDFS) represents the flight schedule for the PMAD.
- A DDFS has been developed for existing conditions and each of three future planning activity levels (PALs) that correspond to the forecast million annual passengers (MAP):
  - Existing: 44 MAP (2017)
  - PAL 1: 49 MAP (2022)
  - PAL 2: 55 MAP (2027)
  - PAL 3: 68 MAP (2037)
- DDFSs are used to establish requirements considering varying demand over the day rather than total activity over the day or year.
- Although PALs are developed based on the year-based forecasts, requirements are tied to levels of activity, allowing future development decisions to be made based on actual activity.
Design Day Flight Schedules

Deplaned Passengers

Enplaned Passengers

Passenger Aircraft Arrivals

Passenger Aircraft Departures

Rolling Hour Passengers

Rolling Hour Passengers

Rolling Hour Arrivals

Rolling Hour Departures

2017 PAL 1 PAL 2 PAL 3

2017 PAL 1 PAL 2 PAL 3

2017 PAL 1 PAL 2 PAL 3

2017 PAL 1 PAL 2 PAL 3
Facility Requirements
Facility Requirements

Four Functional Categories:

- **Airfield**
  - Runways
  - Taxiways

- **Terminals/Concourses**
  - Terminal Processor
  - Gates and Aircraft Parking

- **Landside Transportation**
  - Roadways and Curb
  - Parking
  - Rental Car

- **Support Facilities**
  - Cargo Facilities
  - General Aviation
  - Other (Office, Flight Kitchen)
Airfield

• Runways are anticipated to meet PAL 3 demand.

• Ongoing RIM Study analysis to provide airfield requirements, including:
  – Taxiway geometry
  – Runway utilization
  – Pavement conditions

• The RIM Study team will complete the airfield capacity analysis in early May, with results incorporated into CAMP.
Terminals/Concourses

- Terminal and gate requirements were developed independently for:
  - Terminal 3
  - Terminal 4 – North
  - Terminal 4 – South
- Requirements were established for:
  - Gates
  - Check-in
  - Security checkpoint
  - Outbound baggage make-up
  - Domestic bag claim
  - International arrivals
### Gates/Aircraft Parking – PAL 1 (49 MAP)

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>EXISTING GATES</th>
<th>ADDITIONAL GATES REQUIRED</th>
<th>TOTAL GATES REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3</td>
<td>25</td>
<td>+2</td>
<td>27</td>
</tr>
<tr>
<td>T4-North</td>
<td>59</td>
<td>+2</td>
<td>61</td>
</tr>
<tr>
<td>T4-South</td>
<td>32</td>
<td>+0</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>116</strong></td>
<td><strong>+4</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

- **Add. Gates Required:**
  - +1 RJ
  - +1 NB

- **Add. Gates Required:**
  - +2 WB

- **International Gate Capable:** +1 NB

- **Low Utilized RJ Gates**

- **Terminal 3 (T3)**
- **Terminal 4 (T4)**

- **Total Remote Parking Required:** 10
### Gates/Aircraft Parking – PAL 2 (55 MAP)

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>EXISTING GATES</th>
<th>ADDITIONAL GATES REQUIRED</th>
<th>TOTAL GATES REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PAL 1 (49 MAP)</td>
<td>PAL 2 (55 MAP)</td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>25</td>
<td>+2</td>
<td>+1</td>
</tr>
<tr>
<td>T4-North</td>
<td>59</td>
<td>+2</td>
<td>+4</td>
</tr>
<tr>
<td>T4-South</td>
<td>32</td>
<td>+0</td>
<td>+0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>116</strong></td>
<td><strong>+4</strong></td>
<td><strong>+5</strong></td>
</tr>
</tbody>
</table>

**International Gate Capable: +2 NB**

**Add. Gates Required:**
- +1 RJ
- +1 NB
- +4 WB

**Add. Gates Required:**
- +2 NB
- +4 WB

**Low Utilized RJ Gates**

**Low Utilized Gates**

**Total Remote Parking Required:** 10
### Gates/Aircraft Parking – PAL 3 (68 MAP)

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>EXISTING GATES</th>
<th>ADDITIONAL GATES REQUIRED</th>
<th>TOTAL GATES REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PAL 1 (49 MAP)</td>
<td>PAL 2 (55 MAP)</td>
<td>PAL 3 (68 MAP)</td>
</tr>
<tr>
<td>T3</td>
<td>25</td>
<td>+2</td>
<td>+1</td>
</tr>
<tr>
<td>T4-North</td>
<td>59</td>
<td>+2</td>
<td>+4</td>
</tr>
<tr>
<td>T4-South</td>
<td>32</td>
<td>+0</td>
<td>+0</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>+4</td>
<td>+5</td>
</tr>
</tbody>
</table>

**Add. Gates Required:**
- 1 RJ
- 1 NB
- 2 WB

**Add. Gates Required:**
- 2 NB
- 9 WB

**Total Remote Parking Required:** 10

**International Gate Capable:**
- +2 NB
- +1 WB

**Low Utilized RJ Gates**
Terminal Requirements Approach

Terminal facility requirements are derived through static and simulation modeling of the DDFS and inputs include:

- Passenger characteristics
- Level of service
- Unique attributes of PHX
  - Operational characteristics
  - Physical layout
- Industry standards such as those identified in the table below

<table>
<thead>
<tr>
<th>OPTIMUM LOS</th>
<th>CHECK-IN</th>
<th>SECURITY</th>
<th>INTERNATIONAL ARRIVALS</th>
<th>BAGGAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITS</td>
<td>SELF-SERVICE KIOSK</td>
<td>BAG DROP DESK</td>
<td>CHECK-IN DESK</td>
<td>CHECKPOINT</td>
</tr>
<tr>
<td>Wait Time (minutes)</td>
<td>0-2</td>
<td>0-5</td>
<td>10-20</td>
<td>5-10</td>
</tr>
</tbody>
</table>
Terminal Level of Service

- Level of service standards are developed by IATA and outlined in their Airport Development Reference Manual (ADRM).
- Terminal requirements are based on optimum level of service.

<table>
<thead>
<tr>
<th>A DRM 10TH EDITION</th>
<th>A DRM 9TH EDITION</th>
<th>FLOWS</th>
<th>DELAYS</th>
<th>COMFORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Design</td>
<td>A - Excellent</td>
<td>Free</td>
<td>None</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>B - High</td>
<td>Stable</td>
<td>Very Few</td>
<td>High</td>
</tr>
<tr>
<td>Goal</td>
<td>C - Good</td>
<td>Stable</td>
<td>Acceptable</td>
<td>Good</td>
</tr>
<tr>
<td>Suboptimum</td>
<td>D - Adequate</td>
<td>Unstable</td>
<td>Passable</td>
<td>Adequate</td>
</tr>
<tr>
<td></td>
<td>E - Inadequate</td>
<td>Unstable</td>
<td>Unacceptable</td>
<td>Inadequate</td>
</tr>
<tr>
<td>Under Provided</td>
<td>F - Failure</td>
<td>System Breakdown</td>
<td>System Breakdown</td>
<td>Unacceptable</td>
</tr>
</tbody>
</table>

**Overdesign**: Poor level of service; conditions of either excessive or empty space and over provision of resources; immoderate or unacceptable level of comfort.

**Optimum**: Acceptable level of service; conditions of adequate to above-average space and reasonable to very few delays; good level of comfort.

**Suboptimum**: Unsatisfactory level of service; conditions that provide crowded and uncomfortable spaces and present unacceptable processing and wait times; inadequate level of comfort.

Terminal Level of Service

- Future facility planning should occur when facilities are operating in the suboptimum level of service.
- Planning for some terminal facility improvements need to be planned and implemented before reaching PAL 2.
- Level of service assumes identified gate requirements are met in T3, T4-North, and T4-South.

<table>
<thead>
<tr>
<th>TERMINAL COMPONENT</th>
<th>PAL 1 (49 MAP)</th>
<th>PAL 2 (55 MAP)</th>
<th>PAL 3 (68 MAP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security(^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checked Bag Screening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outbound Baggage Make-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Bag Claim</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal 4 - South</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checked Bag Screening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outbound Baggage Make-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Bag Claim</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal 4 - North</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checked Bag Screening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outbound Baggage Make-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Bag Claim</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Arrivals</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1 Level of service for Terminal 3 security was revised after the focus group and committee meetings to reflect feedback indicating 10 security checkpoint lanes upon completing of the Terminal 3 Modernization Program (to be completed by PAL 1).
Facility Requirements – Landside/Transportation

- Regional traffic
- Cut-through traffic
- Roadway requirements
- Terminal curbs
- Parking
Cut-Through – Volumes on I-10 and 202 near PHX

Existing Daily Volumes on I-10 and Loop 202 near PHX
• Volumes typically increase from Monday to Friday, then drop on Saturday/Sunday.
• Freeways at capacity during AM and PM peak periods in peak direction.
• Potential for cut-through traffic on Sky Harbor Blvd. is higher on higher-volume freeway days.
• Incidents on I-10 and Loop 202 can also increase cut-through traffic volumes.
Daily Roadway Volume Projections per MAG Model (2018-2040)

- 2nd HOV lane and 1 more general purpose lane on I-10 in each direction (I-17 to Loop 202) by 2025 (*per MAG Spine Study – funding has been programmed*).
- I-10 is at capacity now and will be in the future with programmed improvements.
- Loop 202 is at capacity now and will be in the future.
- Additional traffic growth will extend duration of AM and PM peak periods.

<table>
<thead>
<tr>
<th>ROADWAY</th>
<th>EXISTING DAILY VOLUME</th>
<th>PROJECTED 2040 DAILY VOLUME</th>
<th>TOTAL 2018-2040 GROWTH %</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-10</td>
<td>290,666</td>
<td>350,300</td>
<td>20.5%</td>
</tr>
<tr>
<td>Loop 202</td>
<td>236,544</td>
<td>261,832</td>
<td>10.7%</td>
</tr>
</tbody>
</table>

- As traffic increases on I-10 and Loop 202, cut-through traffic will increase on Sky Harbor Blvd.
- Increasing passenger activity levels will also cause traffic to increase on Sky Harbor Blvd.
Cut-Through – Existing Cut Through Traffic Analysis

Existing cut-through traffic analysis/demand

- Sky Harbor Blvd. traffic volume patterns don’t align with modeled demand patterns during peak commuter times.
- Discrepancy in PM peak period is greater than AM peak period.
Cut-Through – Peak Hour Cut Through Volumes

- AM peak hour cut-through volume
  - 240 vehicles EB
  - 320 vehicles WB
- PM peak hour cut-through volume
  - 670 vehicles EB
  - 240 vehicles WB
- Total EB or WB hourly volume on Sky Harbor Blvd.
  - 1,400-2,400 vehicles
  - Highest at T2-T4
Cut-Through – Bluetooth Data

Bluetooth data being collected at west and east ends of Sky Harbor Blvd.
- Identifies travel time through the Airport
- Assists with estimating cut-through traffic based on travel time threshold
- Data collection is continuing
Roadway Requirements – Airport Roadways

DDFS Model Data (2017-2037)

- Overall originating and destination passengers increase 49% over the planning period.
- Passenger arrival growth rates largest in evening (2.6%).
- Passenger departure annual growth rates largest in morning (3.5%).
- Largest growth in modeled demand coincides with peak cut-through times.
ALPS model identifies roadway demand and laneage requirements on airport roadways to achieve LOS D or better, in accordance with ACRP methodology.
## Terminal Curbside Requirements

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>CURB</th>
<th>TRAVEL MODES</th>
<th>AVAILABLE CURBING LENGTH(^1)</th>
<th>CURBING LOS PER EXISTING CURBING LENGTH (REQUIRED CURBING LENGTH(^2))</th>
<th>ROADWAY LOS PER EXISTING CURBFRONT LAYOUT (VOLUME/CAPACITY RATIO)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>PAL 1 (49 MAP)</td>
<td>PAL 2 (55 MAP)</td>
<td>PAL 3 (68 MAP)</td>
</tr>
<tr>
<td>T3</td>
<td>North Inner</td>
<td>Private Auto, Taxi, TNC</td>
<td>1,090'</td>
<td>C (700')</td>
<td>D (780')</td>
</tr>
<tr>
<td></td>
<td>North Outer</td>
<td>Taxi, Intercity, Courtesy</td>
<td>760'</td>
<td>A (270')</td>
<td>A (290')</td>
</tr>
<tr>
<td></td>
<td>South Inner</td>
<td>Private Auto, Taxi, TNC</td>
<td>820'</td>
<td>D (635')</td>
<td>D (690')</td>
</tr>
<tr>
<td></td>
<td>South Outer</td>
<td>TNC, Van, PA</td>
<td>725'</td>
<td>A (185')</td>
<td>A (225')</td>
</tr>
<tr>
<td></td>
<td>Arrival North Inner</td>
<td>Private Auto</td>
<td>1,000'</td>
<td>D (720')</td>
<td>D (740')</td>
</tr>
<tr>
<td></td>
<td>Arrival North Outer</td>
<td>TNC, Taxi, Intercity, PA, Courtesy</td>
<td>925'</td>
<td>A (520')</td>
<td>A (490')</td>
</tr>
<tr>
<td></td>
<td>Arrival South Inner</td>
<td>Private Auto</td>
<td>1,220'</td>
<td>B (565')</td>
<td>B (670')</td>
</tr>
<tr>
<td></td>
<td>Arrival South Outer</td>
<td>TNC, Taxi, Van, Charter</td>
<td>980'</td>
<td>A (235')</td>
<td>A (240')</td>
</tr>
<tr>
<td></td>
<td>Departure North</td>
<td>Private Auto, Taxi, TNC</td>
<td>1,060'</td>
<td>D (880')</td>
<td>D (905')</td>
</tr>
<tr>
<td></td>
<td>Departure South</td>
<td>Private Auto, Taxi, TNC</td>
<td>1,370'</td>
<td>E (1,285')</td>
<td>E (1,375')</td>
</tr>
</tbody>
</table>

**Notes:**
1. Available Curbing Length represents total linear curbing space (i.e. if double-parking occurs, the end-to-end curb zone length was doubled).
2. Required Curbing Length represents total linear curbing length necessary to accommodate peak curbing demands, in accordance with ACRP methodology. Required curbing length does not include curb space potentially needed for commercial vehicle staging on outer curbs.

**PA** = Prearranged, **TNC** = Transportation Network Company (Rideshare)
Facility Requirements – Parking

- Public parking demand increases based on growth in passenger activity
- Annual enplaned passengers are forecast to increase 55% by 2037
- Parking demand ratio = 790 spaces per million annual enplanements
- Ratio reduction factor estimates parking demand reduction due to TNCs, autonomous vehicles
- Sky Train extension to the west will reallocate approximately 3,000 parking spaces
- Employee parking demand increases based on growth in airline operations
- Airline operations are forecast to increase 22% by 2037

### Public Parking Requirements

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Enplanements¹</td>
<td>22,000,000</td>
<td>24,700,000</td>
<td>27,400,000</td>
<td>34,000,000</td>
</tr>
<tr>
<td>Demand</td>
<td>17,380</td>
<td>19,513</td>
<td>21,646</td>
<td>26,860</td>
</tr>
<tr>
<td>Ratio Reduction</td>
<td>0%</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Adjusted Parking Demand²</td>
<td>17,380</td>
<td>18,537</td>
<td>19,481</td>
<td>22,831</td>
</tr>
<tr>
<td>Supply</td>
<td>21,733</td>
<td>21,733</td>
<td>21,733</td>
<td>21,733</td>
</tr>
<tr>
<td>Surplus / Deficit</td>
<td>4,353</td>
<td>3,196</td>
<td>2,252</td>
<td>(1,098)</td>
</tr>
</tbody>
</table>

**Notes:**
1. CAMP activity forecast.
2. Adjusted Public Parking Demand resulting from TNCs and autonomous vehicles.

### Employee Parking Requirements

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airline Operations¹</td>
<td>380,000</td>
<td>387,000</td>
<td>404,000</td>
<td>462,000</td>
</tr>
<tr>
<td>Demand</td>
<td>4,059</td>
<td>4,134</td>
<td>4,395</td>
<td>5,343</td>
</tr>
<tr>
<td>Supply</td>
<td>4,742</td>
<td>4,742</td>
<td>4,742</td>
<td>4,742</td>
</tr>
<tr>
<td>Surplus / Deficit</td>
<td>683</td>
<td>608</td>
<td>347</td>
<td>(601)</td>
</tr>
</tbody>
</table>

**Note:** 1. CAMP activity forecast.
Support Facilities

- Cargo
- General Aviation
- Airline Maintenance
- Airport Maintenance
- Fuel Farm
- PHX AVN Offices
- Consolidated Receiving and Distribution Center (CRDC)
Integrated and All-Cargo

• The integrated carriers (FedEx and UPS) who operate in the south area, achieve a facility utilization rate of 1.33 tons/square foot which is below the industry average of 1.5 but will face capacity constraints upon reaching PAL 2.

• All-Cargo Carriers (west area) is a critical focus of future cargo.
  – The All-Cargo carrier group is experiencing rapid growth due to Amazon expansion as PHX is one of nine airports currently used in Amazon’s domestic network.

<table>
<thead>
<tr>
<th>Cargo Tonnage</th>
<th>2016</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Existing Cargo Facility (sf)</td>
<td>165,329</td>
<td>165,329</td>
<td>165,329</td>
<td>165,329</td>
</tr>
<tr>
<td>Utilization Rate (annual tons/sq. ft.)</td>
<td>1.331</td>
<td>1.502</td>
<td>1.502</td>
<td>1.502</td>
</tr>
<tr>
<td>Sq. Ft. Surplus/(Deficit)</td>
<td>---</td>
<td>(11,972)</td>
<td>(41,560)</td>
<td>(113,415)</td>
</tr>
<tr>
<td>Acreage Required [Addition Acreage]</td>
<td>38.0</td>
<td>40.3 (+2.3)</td>
<td>45.3 (+7.3)</td>
<td>57.3 (+19.3)</td>
</tr>
</tbody>
</table>

Notes:
1 Calculated 2016 utilization, applied utilization factors represent optimal utilizations for specified cargo type.
2 Ricondo & Associates, Inc. utilization estimate based on observation and industry practices.

All-Cargo Carrier Group

<table>
<thead>
<tr>
<th>Cargo Tonnage</th>
<th>2016</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Existing Cargo Facility (sf)</td>
<td>49,075</td>
<td>49,075</td>
<td>49,075</td>
<td>49,075</td>
</tr>
<tr>
<td>Utilization Rate (annual tons/sq. ft.)</td>
<td>1.481</td>
<td>1.502</td>
<td>1.502</td>
<td>1.502</td>
</tr>
<tr>
<td>Sq. Ft. Surplus/(Deficit)</td>
<td>---</td>
<td>(15,862)</td>
<td>(27,197)</td>
<td>(55,436)</td>
</tr>
<tr>
<td>Acreage Required [Addition Acreage]</td>
<td>17.4</td>
<td>20.2 (+2.8)</td>
<td>22.1 (+4.7)</td>
<td>26.9 (+9.5)</td>
</tr>
</tbody>
</table>

Notes:
1 Calculated 2016 utilization, applied utilization factors represent optimal utilizations for specified cargo type.
2 Ricondo & Associates, Inc. utilization estimate based on observation and industry practices.
Passenger Aircraft (Belly) Cargo

The historical calculated utilization rate for passenger cargo facilities (1.18) does not account for tail-to-tail operations by Southwest and American Airlines.

- Each carrier has separate cargo handling operations in the terminal area to accommodate tail-to-tail transfers.
- 50% of each carrier’s total annual tonnage is handled in these areas; the other half of their cargo passes through facilities in the West Area.
- Using an industry average of 0.75 tons/square feet for tonnage handled in belly cargo buildings, there would be a deficit of approximately 18,500 square feet at PAL 3, with an additional 1.8 acres required.

### Passenger Carrier Group

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belly Cargo Tonnage</td>
<td>61,221</td>
<td>69,148</td>
<td>76,270</td>
<td>91,165</td>
</tr>
<tr>
<td>Total Existing Belly Cargo Facility (sq ft)</td>
<td>51,840</td>
<td>51,840</td>
<td>51,840</td>
<td>51,840</td>
</tr>
<tr>
<td>Utilization Rate (annual tons/sq ft)</td>
<td>1.18&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.75&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.75&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.75&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Surplus/(Deficit), sq ft</td>
<td>---</td>
<td>(3,070)</td>
<td>(7,313)</td>
<td>(15,802)</td>
</tr>
<tr>
<td>Acreage Required [Additional Acreage]</td>
<td>5.9</td>
<td>6.3 [0.4]</td>
<td>6.7 [+0.8]</td>
<td>7.7 [+1.8]</td>
</tr>
</tbody>
</table>

**Notes:**
General Aviation

- **South Area (Fixed Base Operator [FBO]) Considerations:**
  - FBO apron primarily accommodates transient activity with aircraft types and quantities changing daily.
  - Apron meets demand on average day but reaches capacity during special events.
  - Deficit in hangar space of approximately 160,000 square feet required by PAL 3.

- **North Area Considerations:**
  - Majority of hangars are in fair-to-poor condition; select hangars are no longer leased out.
  - Hangar space is utilized by AVN for other purposes.
  - Current vacancies:
    - 30% of corporate/executive hangars
    - 45% of T-hangars
    - 70% of covered/uncovered tie-downs

---

### South Area (Fixed Base Operator) General Aviation Requirements

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Area (acres)</td>
<td>45(^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acreage Required [Additional Acreage]</td>
<td>45</td>
<td>47 ([+2])</td>
<td>48 ([+3])</td>
<td>49 ([+4])</td>
</tr>
</tbody>
</table>

**Note:** 1 Existing acreage includes entire FBO GA campus, including hangars, apron, and common space.

---

### North Area General Aviation Requirements

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>PAL 1</th>
<th>PAL 2</th>
<th>PAL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Area (acres)</td>
<td>9(^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acreage Required [Additional Acreage]</td>
<td>2 ([-7])</td>
<td>2 ([-7])</td>
<td>2 ([-7])</td>
<td>2 ([-7])</td>
</tr>
</tbody>
</table>

**Note:** 1 Approximately 2 acres of the existing hangar and apron space is being utilized by AVN for other purposes and approximately 5 acres is not used.
Other Support Facilities

- Airline GSE Storage
  No additional requirements anticipated
- Airline Maintenance
  No additional requirements anticipated
- Aircraft Fueling & Fuel Storage
  Sufficient capacity, hydrant fueling to new gates
- ARFF
  No additional requirements anticipated
- Airport Police
  Currently occupy valuable location with large apron
- Airport Administration
  New facility, no additional requirements
- Miscellaneous Facilities
Colocated Building or Campus

- Synergistic opportunities – closer coordination and collaboration
- Location important – response ability critical (future crossfield Taxiways U and V open possibilities)
- 24/7 staffing
- Opportunity to repurpose Executive Terminal (currently contains AVN Police Bureau)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>EXISTING FACILITIES (sq ft)</th>
<th>COLOCATED (sq ft)</th>
<th>REMOTE (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>17,676</td>
<td>21,700</td>
<td>0</td>
</tr>
<tr>
<td>Facilities &amp; Services</td>
<td>140,470</td>
<td>61,150</td>
<td>79,320</td>
</tr>
<tr>
<td>Police</td>
<td>8,334</td>
<td>8,334</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>166,480</strong></td>
<td><strong>91,184</strong></td>
<td><strong>79,320</strong></td>
</tr>
</tbody>
</table>

- Need for approximately 6 acres for colocated campus
### Centralized Receiving & Distribution Center (CRDC)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>EXISTING OPERATIONS</th>
<th>NEW PARADIGM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site location</td>
<td>Loading dock within terminals</td>
<td>One remote facility with small docks at terminals</td>
</tr>
<tr>
<td>Airside operations (truck trips)</td>
<td>Limited interaction with airside vehicles/aircraft</td>
<td>Limited, trained drivers interacting with airside vehicles/aircraft</td>
</tr>
<tr>
<td>Security</td>
<td>Visual inspection</td>
<td>Opportunity to fully screen all items</td>
</tr>
<tr>
<td>Tenant operations</td>
<td>Varied</td>
<td>Increased efficiency</td>
</tr>
<tr>
<td>Environmental impact</td>
<td>Varied</td>
<td>Reduced truck trips and centralization can minimize environmental impacts through operational efficiency</td>
</tr>
<tr>
<td>Financial burden</td>
<td>N/A</td>
<td>Varied by project delivery and operational model</td>
</tr>
</tbody>
</table>
Benchmarking to other CRDC facilities at other airports.

<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>CLT</th>
<th>PDX</th>
<th>PHX</th>
<th>SAN</th>
<th>TPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 Million Annual Passengers</td>
<td>46</td>
<td>19</td>
<td>44</td>
<td>21</td>
<td>19.5</td>
</tr>
<tr>
<td>Concession volume (ft³ M)</td>
<td>4.5</td>
<td>2.9</td>
<td>Unknown</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Building size (sq ft)</td>
<td>42,000 (est.)</td>
<td>26,000 (est.)</td>
<td>40,000 – 50,000¹</td>
<td>23,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Site (acres)</td>
<td>9.0 (est.)</td>
<td>2.0 (est.)</td>
<td>4-6²</td>
<td>1.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Construction cost ($M)</td>
<td>20 (est.)</td>
<td>13.5 (est.)</td>
<td>TBD</td>
<td>8.5</td>
<td>8.8</td>
</tr>
<tr>
<td>Max distance from CRDC to delivery (miles)</td>
<td>3.0 (est.)</td>
<td>4.5 (est.)</td>
<td>TBD</td>
<td>2.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Delivery method</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>P3</td>
<td>DBB</td>
</tr>
</tbody>
</table>

Note: ¹ Preliminary estimates only

Need for approximately 4 acres for CRDC
Preliminary Airport Concepts
Level of Difficulty for Redevelopment

- High
  - Existing and Planned Airfield
  - Runway Protection Zones
  - Corporate Office Building
  - Terminals 3 and 4
  - Fuel Farm
  - American and Southwest Maintenance Hangars
  - Existing/Future Sky Train Alignment and Stations
  - AEOC Building
Level of Difficulty for Redevelopment

- High
- Medium
  - South Cargo and General Aviation Area
  - T2 and East Economy Parking Garages
  - Facilities & Services Maintenance Yard
  - North Airfield Area (Honeywell)
Level of Difficulty for Redevelopment

- High
- Medium
- Low
  - North General Aviation
  - North Area
  - Areas along 24th Street
  - Center Core
  - East Economy Surface Parking
  - South of Salt River
  - East of AA Maintenance Hangar
Airfield

• Runways anticipated to meet 2037 demand.
• Other airfield requirements to be confirmed by RIM Study.
• Taxiway adjustments are likely to improve capacity and enhance safety.
Terminal/Concourse

Existing concourses cannot meet future demand at each PAL
• Additional gates/concourses are needed.
• Additional terminal processor or reconfiguration of existing spaces is required.
Expand T3 and T4
West Terminal Concept

- Gate Expansion
- Terminal Expansion
- Gate Expansion
Potential Future Concept
Landside/Transportation

- Roadway requirements show capacity is needed for Airport uses.
- Cut-through traffic is significant during AM/PM peak periods.
- Consider East and West Checkpoints and/or Toll Plazas to deter cut-through:
  - Could be non-intrusive (e.g., license plate readers) so vehicles are not required to stop.
Landside/Transportation

- East-side merge issue
- EB Lane assignments approaching T4
- Driver confusion on Sky Harbor Blvd. for T4 arrivals or departures
- Access improvements
  - Close access from 44th St. to eliminate merge issue
  - Reconfigure 42nd St
  - Improve lane assignment signage
Support Facilities

Planned development projects impact existing support facilities:
• Sky Train Stage 2
• Crossfield taxiways
• Potential terminal development
• Ground Transportation Center
### Support Facilities – Existing Sites

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>EXISTING (ACRES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo – South (Integrated)</td>
<td>38</td>
</tr>
<tr>
<td>Cargo – West (All-Cargo)</td>
<td>41</td>
</tr>
<tr>
<td>Cargo – West (Passenger)</td>
<td></td>
</tr>
<tr>
<td>General Aviation – South Area</td>
<td>45</td>
</tr>
<tr>
<td>General Aviation – North Area</td>
<td>9</td>
</tr>
<tr>
<td>Airline Maintenance</td>
<td>50</td>
</tr>
<tr>
<td>Airport F&amp;S/Ops/Police</td>
<td>6</td>
</tr>
<tr>
<td>Fuel Farm</td>
<td>3</td>
</tr>
<tr>
<td>AVN Offices</td>
<td>5</td>
</tr>
<tr>
<td>CRDC</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Support Facilities – Requirements

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>EXISTING (ACRES)</th>
<th>ADD. PAL 3 REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo – South (Integrated)</td>
<td>38</td>
<td>+20</td>
</tr>
<tr>
<td>Cargo – West (All-Cargo)</td>
<td>17</td>
<td>+10</td>
</tr>
<tr>
<td>Cargo – West (Passenger)</td>
<td>6</td>
<td>+2</td>
</tr>
<tr>
<td>General Aviation – South Area</td>
<td>45</td>
<td>+4</td>
</tr>
<tr>
<td>General Aviation – North Area</td>
<td>9</td>
<td>-7</td>
</tr>
<tr>
<td>Airline Maintenance</td>
<td>50</td>
<td>--</td>
</tr>
<tr>
<td>Airport F&amp;S/Ops/Police</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Fuel Farm</td>
<td>3</td>
<td>+1</td>
</tr>
<tr>
<td>AVN Offices</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td>CRDC</td>
<td>N/A</td>
<td>+4</td>
</tr>
</tbody>
</table>
Incorporate as much growth as possible within the existing airfield area.

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>EXISTING (ACRES)</th>
<th>ADD. PAL 3 REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo – South (Integrated)</td>
<td>38</td>
<td>+20</td>
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<tr>
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<td>50</td>
<td>--</td>
</tr>
<tr>
<td>Airport F&amp;S/Ops/Police</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Fuel Farm</td>
<td>3</td>
<td>+1</td>
</tr>
<tr>
<td>AVN Offices</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td>CRDC</td>
<td>N/A</td>
<td>+4</td>
</tr>
</tbody>
</table>

- Cargo Integrated and All-Cargo (44 ac avail.)
- CRDC and All-Cargo (Collocated with North-Cargo West Terminal)
- Cargo – Passenger Incorporated into terminal area
- Operations Campus (F&S/Ops/Police)
- Reserved for West Terminal
- Integrated and All-Cargo (Collocated with West Terminal)
- North GA (15 ac avail.)
- Fuel Farm
- Cargo – South (Integrated)
- Cargo – West (All-Cargo)
- Cargo – West (Passenger)
- General Aviation – South Area
- General Aviation – North Area
- Airline Maintenance
- Airport F&S/Ops/Police
- Fuel Farm
- AVN Offices
- CRDC

Comprehensive Asset Management Plan | Preliminary Development of Alternatives | April 30, 2018
Utilize land north of the airfield. May relocate existing facilities.

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>EXISTING (ACRES)</th>
<th>ADD. PAL 3 REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo – South (Integrated)</td>
<td>38</td>
<td>+20</td>
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</tr>
<tr>
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<td>5</td>
<td>--</td>
</tr>
<tr>
<td>CRDC</td>
<td>N/A</td>
<td>+4</td>
</tr>
</tbody>
</table>
Support Facilities – Concept 3

Relocate certain support facility function outside of PHX.
North Area and 24th Street Development
Opportunities

- Primarily industrial zoning; also commercial and residential
- Transportation network access
  - High-volume Washington Street corridor
  - Proximity to PHX
  - Easy access to Interstate
  - Light rail (along Washington/Jefferson Streets)
- Transit oriented development (TOD) & commercial mixed use alignments
- Located beyond DNL 65 noise contour
- Large, contiguous Phoenix Greyhound Park and proximity to Sky Train

Challenges

- Many small, non-contiguous Airport-owned properties
- Union-Pacific rail line creates physical barrier north of PHX
- Previous use / environmental conditions
- FAA Requirements:
  - Use restrictions, i.e. residential and mixed use
  - Long-term ground lease requirement
  - Fair market value (FMV) mandate
  - FAA review & approval of leases
Opportunities

• Industrial zoning and interest
• Transportation network access
  – High-volume 24th Street corridor
  – Proximity to PHX
  – Easy access to Interstate
• Significant contiguous acreage of Airport-owned property
• Minimal potential for land use conflicts

Challenges

• Runway Protection Zone (RPZ) limitations
• FAA Requirements:
  – Use restrictions, i.e., Residential and Mixed Use
  – Long-term ground lease requirement
  – Fair market value (FMV) mandate
  – FAA review & approval of leases
Next Steps
Stakeholder Meetings

- **Week of April 30, 2018** – Forecast, requirements, preliminary alternative concepts, evaluation criteria
- **Week of August 27, 2018** – Final alternatives, evaluation, refinement of preferred alternative
- **Week of December 3, 2018** – Final review of CAMP recommendations to add to the Airport Layout Plan
Next Steps

• Respond to comments and finalize Reports 1, 2 and 3
• Complete draft of Report 4 – Facility Requirements
• Prepare alternatives
• Evaluate alternatives
• Develop preferred airport concept
• Present alternatives and preferred airport concept during next meeting the week of August 27, 2018