

April 2022

Phoenix Sky Harbor International Airport

2021-2022 Comprehensive Asset Management Plan Update

Prepared for:

City of Phoenix Aviation Department

Prepared by:

RICONDO

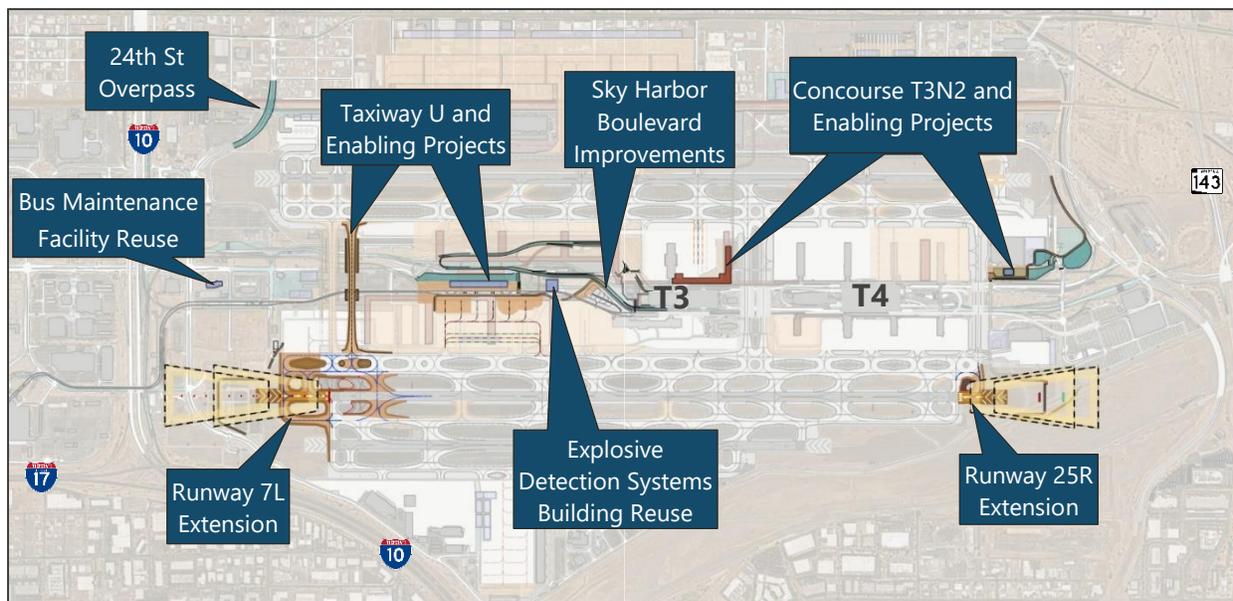
CAMP UPDATE OVERVIEW

In 2019, the Comprehensive Asset Management Plan (2019 CAMP) provided a framework for long-term development at Phoenix Sky Harbor International Airport (PHX or the Airport). The development plan cost effectively addresses requirements to meet forecast aviation demand, enhances safety and security, and increases operational efficiency, while preserving flexibility to respond to evolving conditions. The CAMP projects were incorporated in the 2019 Federal Aviation Administration’s (FAA) conditionally approved Airport layout Plan (ALP). In the summer of 2021, the City of Phoenix Aviation Department retained Ricondo & Associates, Inc. (Ricondo) to update the 2019 CAMP, specifically to address near-term priorities, reflecting changes in operational characteristics that occurred due to the ongoing COVID-19 pandemic, stakeholder needs, and current financial conditions. This CAMP Update does not change or preclude any of the long-term development plans for PHX that were derived from CAMP.

The 2019 CAMP required the existing Union Pacific Railroad (UPRR) to be trenched along the northern portion of the airfield to accommodate future cargo and support facility needs. Since the completion of the 2019 CAMP, negotiations for the UPRR trench have been continually delayed. As part of the CAMP Update, Ricondo focused on providing near-term solutions to accommodate facility growth that did not require the UPRR trench.

Exhibit 1 shows an overview of the CAMP Update projects discussed in this study.

EXHIBIT 1 OVERVIEW OF THE CAMP UPDATE PROJECTS



NOTE: The CAMP Update projects shown here overlay the 2019 CAMP projects shown on the 2019 approved ALP.
 SOURCE: Ricondo & Associates, Inc., April 2022

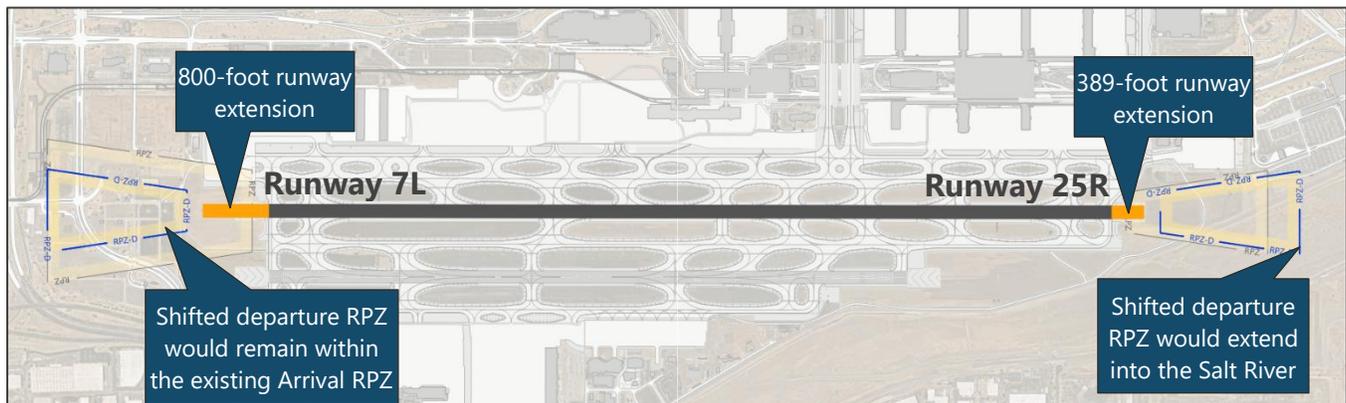
- Concourse T3N2 and enabling projects
- Taxiway U and enabling projects
- Terminal 3 recirculation roadway improvements
- Runway 7L-25R extension
- Terminal 2 Explosive Detection Systems (EDS) Building reuse
- 24th Street Overpass
- Bus Maintenance Facility (BMF) reutilization
- Westbound Sky Harbor Boulevard Improvements

RUNWAY 7L-25R EXTENSION

The Runway 8-26 (north runway) and Runway 7R-25L (south runway) are used primarily for arrivals, and Runway 7L-25R (center runway) is used primarily for departures. In 2021, FAA regulations increased the standard weight per passenger, which is used by airlines and pilots to calculate the aircraft operating weight. This then determines the runway length needed for aircraft to depart. These increased calculated weights resulted in pilots requesting departures from Runway 8-26 (the longest runway at PHX), particularly on hotter days when temperatures reach 105°F. Aircraft departing on Runway 8-26 results in an arrivals and departures mix on a runway used primarily for arrivals. Air traffic controllers must build gaps in the arrival flow to accommodate departures, causing delays. The FAA and airlines identified this issue during the 2021 summer season and requested review of extending the departure Runway 7L-25R to match the departure length of Runway 8-26.

To provide the same takeoff length as Runway 8-26, Runway 7L-25R would require a total extension of 1,189 feet, accomplished by extending the runway in both directions. The runway length could be provided by extending the Runway 7L end 800 feet beyond the existing departure threshold to keep the existing departing Runway Protection Zone (RPZ) within the existing Arrival RPZ. The RPZ is a trapezoidal area beneath the aircraft arrival and departure paths off each end of the runway that should be kept clear to the extent possible. Extending Runway 25R departure 800 feet to the west would keep the departure RPZ within the Runway 7L arrival RPZ, therefore continuing to meet the current FAA RPZ guidelines. This 800-foot extension would require an additional takeoff length to be provided by extending the Runway 25R end 389 feet to the east, providing a full 11,489-foot departure length for Runway 7L-25R in both directions. **Exhibit 2** depicts the two extensions. Note that displaced arrival thresholds would allow the arrival thresholds would remain in their locations.

EXHIBIT 2 RUNWAY 7L-25R WITH EXTENDED DEPARTURE ENDS

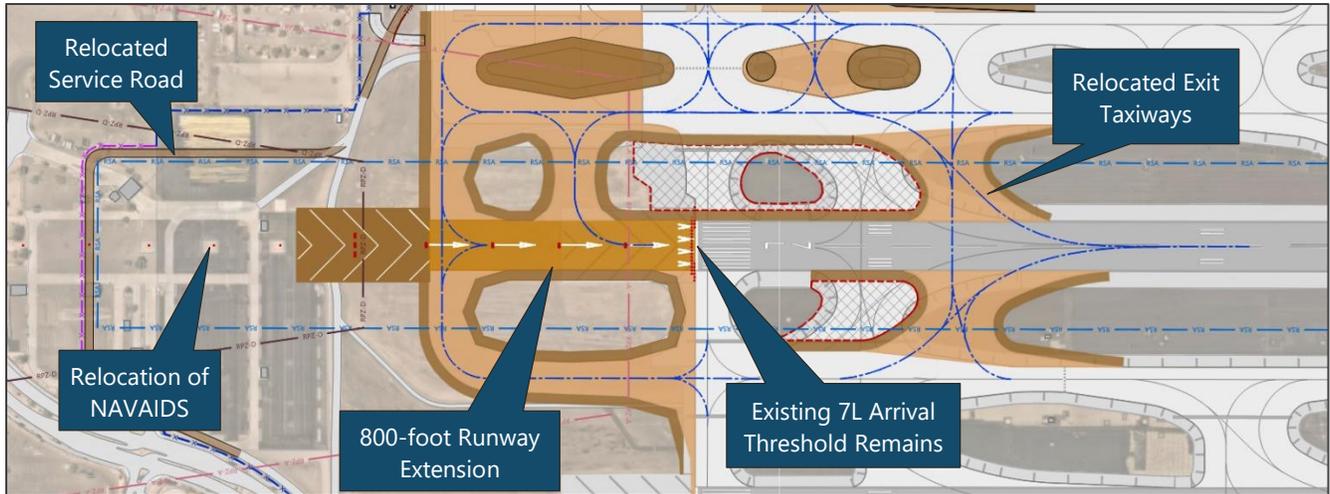


SOURCE: Ricondo & Associates, Inc., April 2022.

The runway extensions would require additional detail and study to determine navigational hazards (such as structures, antenna, terrain) that could impact the extensions to each runway end and to ensure that the extensions would be effective in preventing aircraft from having to depart on Runway 8-26 during periods of high temperatures. A cursory review of the potential departure surface changes did not identify any significant impacts and therefore could likely be extended and allow for a longer departure length to Runway 7L-25R.

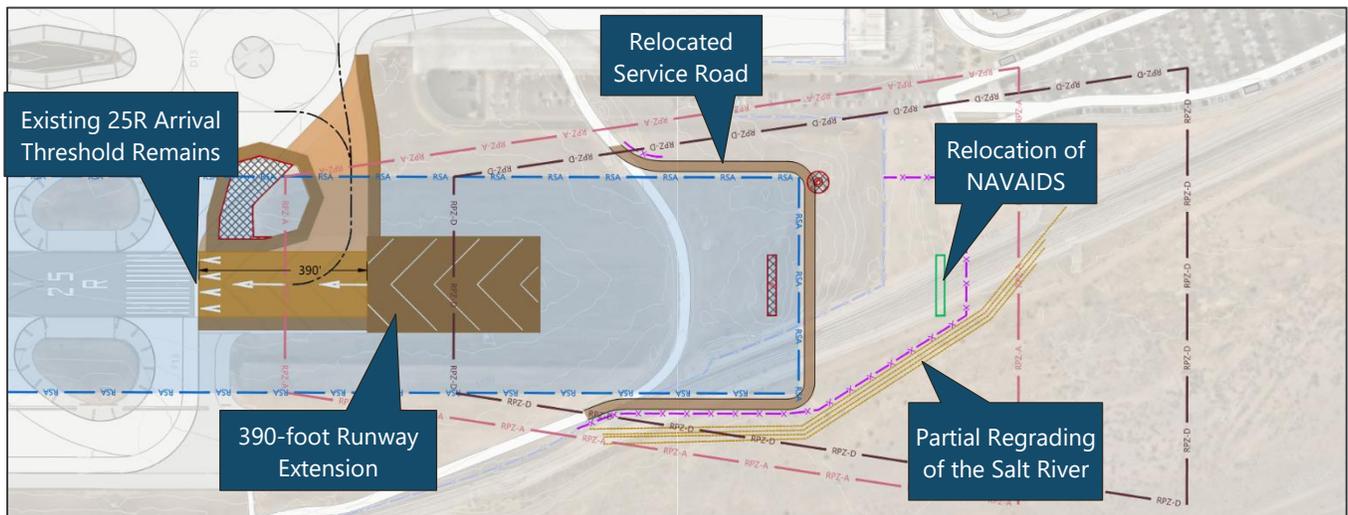
Other taxiway improvements should also be implemented in conjunction with the runway extension to meet FAA regulatory guidance, including layouts that reduce the likelihood of a runway incursion (aircraft accidentally crossing or entering a runway during another aircraft arrival or departure). These taxiway details are shown on **Exhibit 3** (Runway 7L) and **Exhibit 4** (Runway 25R).

EXHIBIT 3 RUNWAY 7R EXTENSION TAXIWAY DETAILS



SOURCE: Ricondo & Associates, Inc., April 2022.

EXHIBIT 4 RUNWAY 25L EXTENSION TAXIWAY DETAILS

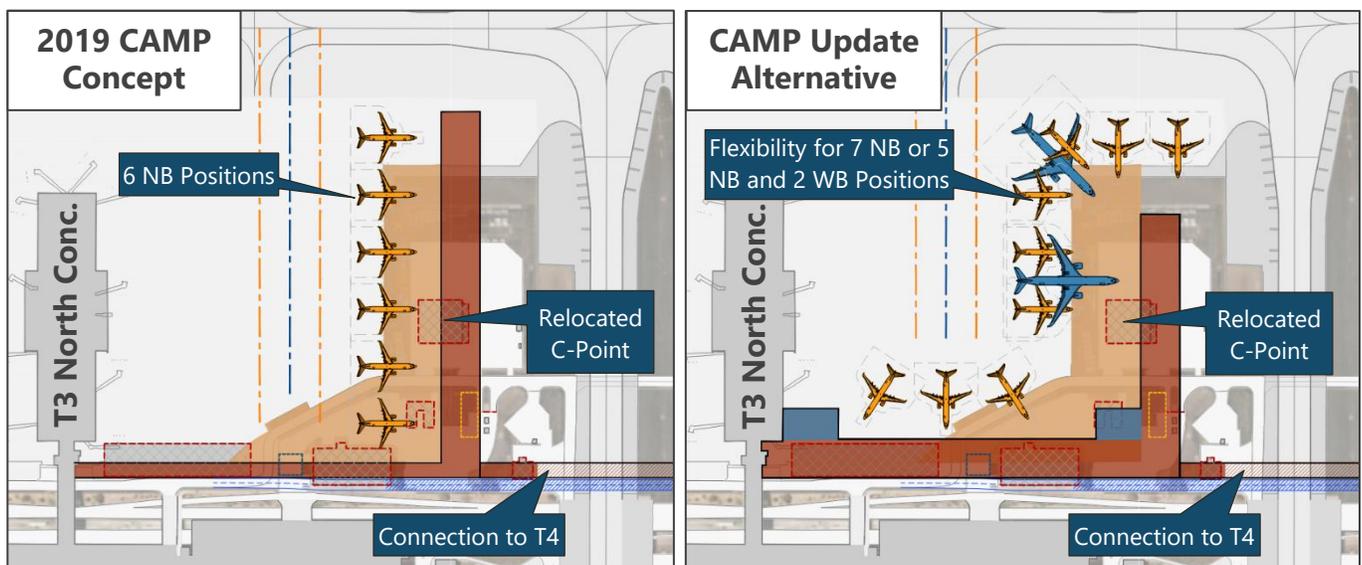


SOURCE: Ricondo & Associates, Inc., April 2022.

CONCOURSE T3N2 AND ENABLING PROJECTS

The 2019 CAMP plan determined the next concourse to be constructed after the completion of Concourse S1 (currently under construction) should be provided between Terminal 3 and Terminal 4 with flexibility to serve airlines in both terminals. Beyond the concourse concept shown in the 2019 CAMP, a second concept was developed as part of the CAMP Update. These two concepts (shown on **Exhibit 5**) provide six or seven narrowbody aircraft (NB) parking positions northeast of Terminal 3. The CAMP Update alternative would also provide the ability to park one widebody aircraft (WB) or two narrowbody aircraft at two locations on the concourse. This would provide flexibility to serve a changing fleet mix, accommodating more widebody domestic aircraft to serve the Airport, particularly in the peak winter months. Both concepts would provide connections to both Terminal 3 and Terminal 4.

EXHIBIT 5 CONCOURSE T3N2 CONCEPTS

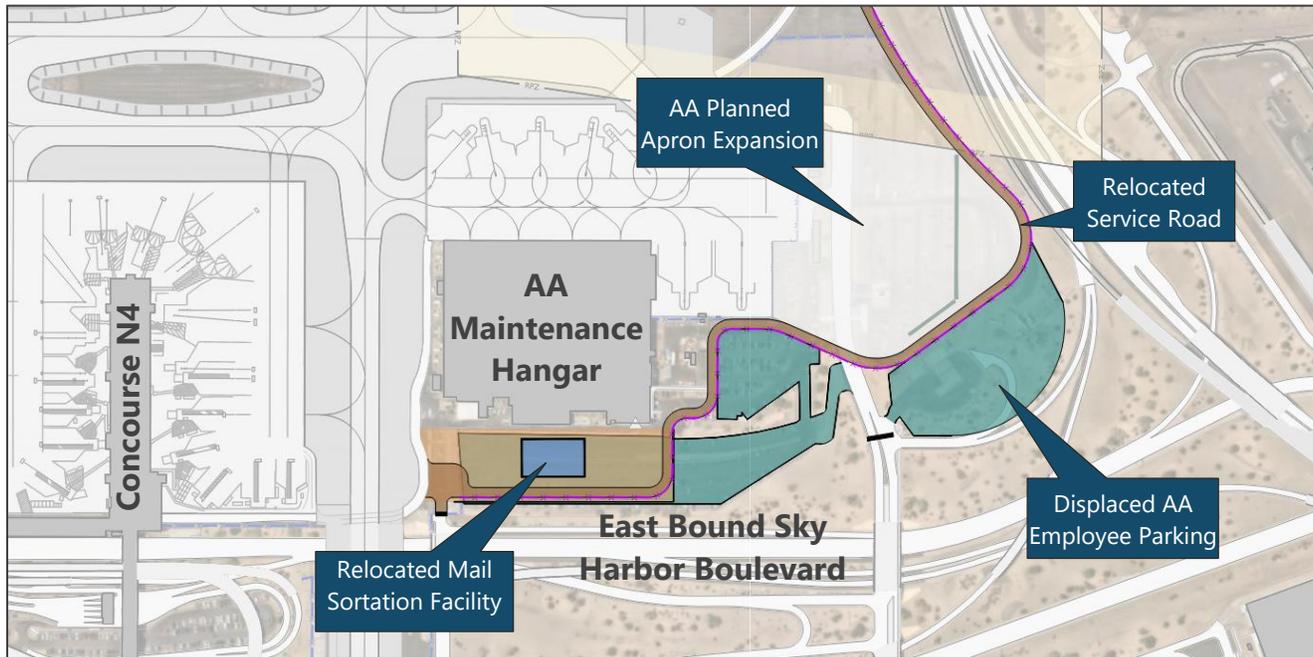


NOTE: NB = Narrowbody Aircraft, WB = Widebody Aircraft
SOURCE: Ricondo & Associates, Inc., April 2022

This location identified for T3N2 in the 2019 CAMP required the relocation of the American Airlines (AA) C-Point mail sortation facility. The new location for the mail sortation facility was envisioned to be directly south of the existing AA Maintenance Hanger, just east of Terminal 4, as shown on **Exhibit 6**. This new location would provide adequate response times to and from aircraft for belly cargo and would maintain continuity with the surrounding AA facilities. Since the 2019 CAMP study, AA has planned an apron extension east of the current maintenance apron. This expansion would displace their existing employee parking area. AA has also stated that they have an increasing need for employee parking. The CAMP Update preferred concept proposes relocating the mail sortation facility onto a structure over existing AA parking, allowing employee parking to remain at that site. The CAMP Update also proposes relocating the East Cell Phone Lot to the 44th Street Sky Train cell phone lot and converting the East Cell Phone Lot to AA employee parking to provide adequate employee parking.

Advanced planning regarding T3N2 and the enabling projects is underway, led by the Aviation Department Design and Construction Services division.

EXHIBIT 6 RELOCATED AA C-POINT MAIL SORTATION FACILITY



SOURCE: Ricondo & Associates, Inc., April 2022.

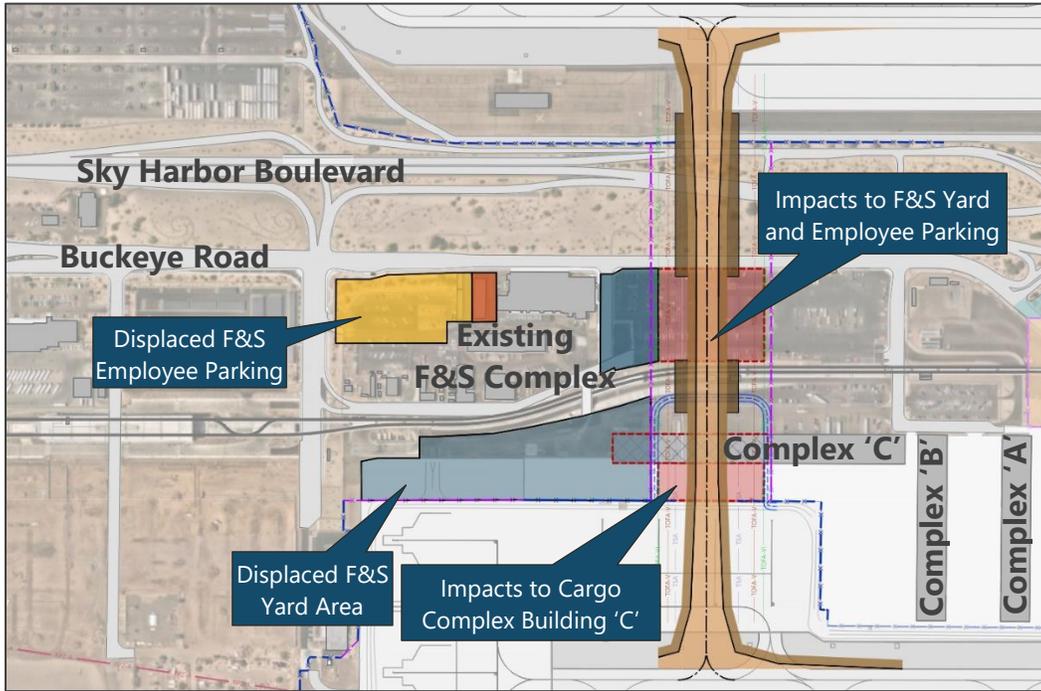
TAXIWAY U AND ENABLING PROJECTS

Crossfield Taxiways U and V were included in the 2019 CAMP and both are shown on the FAA Conditionally Approved ALP. The 2018 HNTB Runway Incurion Mitigation Study and CAMP highlighted Taxiway V construction prior to Taxiway U because it included an adjacent secure vehicle service roadway. Since the completion of these studies, the Aviation Department determined that construction of Taxiway U would be initiated first due to planning and programming of other projects associated with Taxiway V (relocation of the existing Facilities and Services [F&S] complex). Taxiway U would impact the West Cargo Apron and Air Cargo Complex C and surface parking lots utilized by F&S. The F&S yard displacement can be mitigated within the existing site, west of the planned Taxiway U, as shown on **Exhibit 7**.

To mitigate the impacts to Cargo Complex Building 'C', a replacement facility was envisioned east of Cargo Complex Building 'A' and north of the PHX Sky Train extension guideway and south of Buckeye Road. This area, shown on **Exhibit 8**, would allow for the complete replacement of Cargo Complex Building 'C' if warranted (total of 94,000 square feet) and can accommodate several additional aircraft parking positions adjacent to the facility, south of the PHX Sky Train guideway. Ground support equipment (GSE) vehicles would traverse below the PHX Sky Train to access the apron and cargo building. This alternative would also provide a holding bay, similar to those on the north airfield along Taxiway C for aircraft that may arrive prior to their gate becoming available. This hold bay could accommodate two side-by-side narrowbody aircraft or single widebody aircraft along its length.

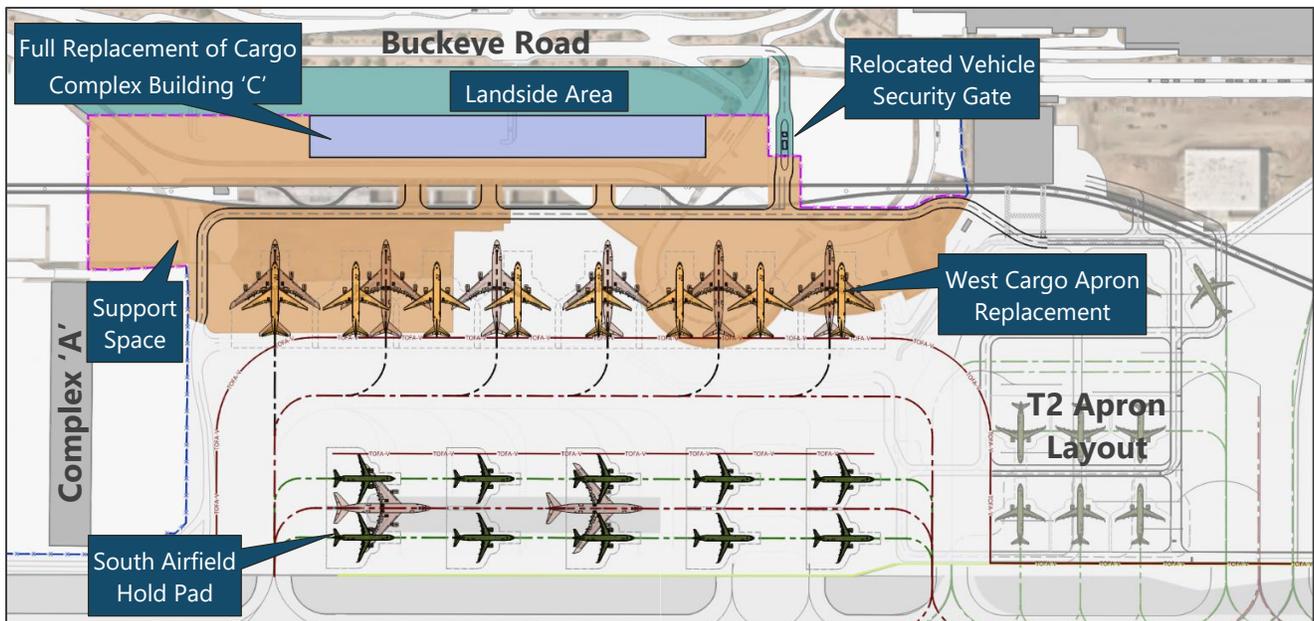
The replacement cargo building as shown on Exhibit 8 would be in approximately the same location as the long-term West Terminal plan as shown in the 2019 CAMP. Therefore, this facility should be considered temporary and constructed for a 10- to 15-year timeframe.

EXHIBIT 7 TAXIWAY U AND FACILITIES AND SERVICES LAYOUT



NOTE: F&S=Facilities and Services
SOURCE: Ricondo & Associates, Inc., April 2022.

EXHIBIT 8 CARGO COMPLEX BUILDING 'C' REPLACEMENT

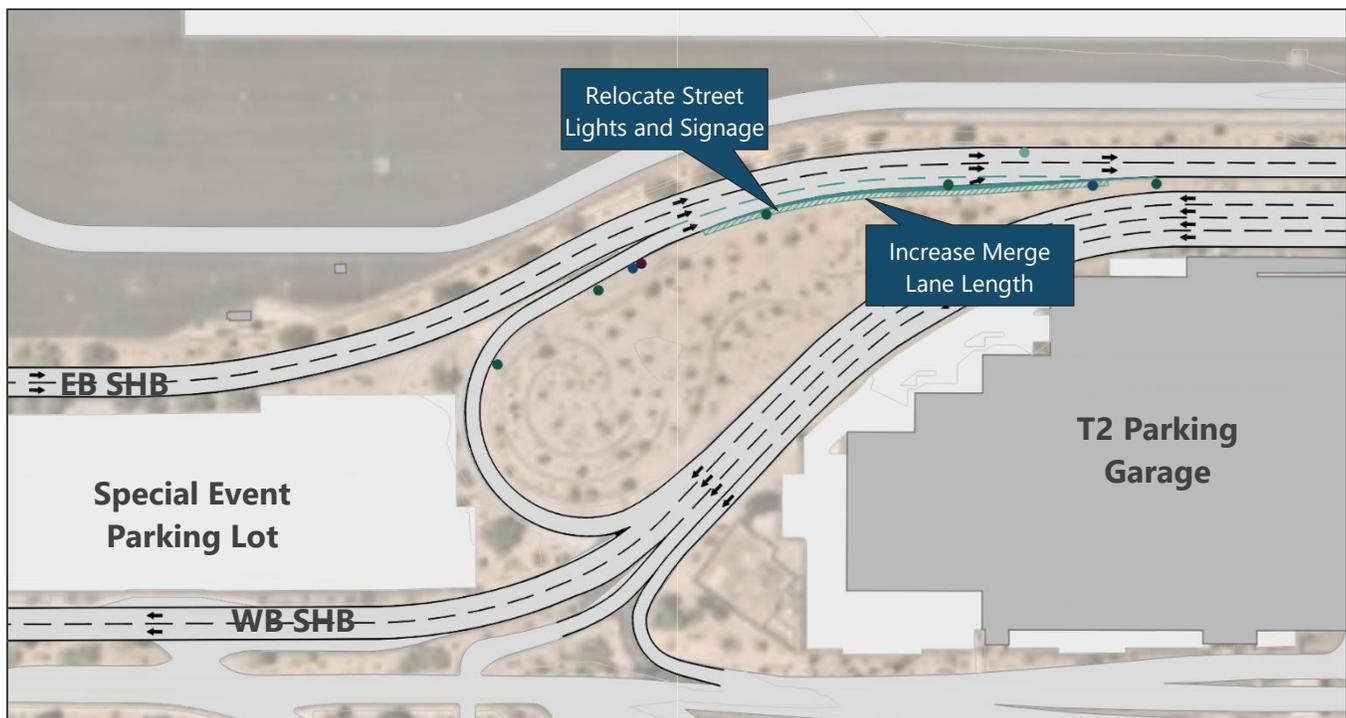


SOURCE: Ricondo & Associates, Inc., April 2022.

SKY HARBOR BOULEVARD IMPROVEMENTS

The westbound recirculation road immediately west of Terminal 3 created vehicle congestion and conflicts due to weaving movements and short merge lanes into the eastbound Terminal 3 curb. Ricondo updated a previously developed PTV VISSIM¹ traffic model and determined that closure of this turnaround would alleviate congestion near the Terminal 3 curbs but would increase congestion at the existing recirculation roadway west of the Terminal 2 parking garage. This increased congestion west of the Terminal 2 parking garage could be mitigated by increasing the merge length from the recirculation roadway onto eastbound Sky Harbor Boulevard, as shown on **Exhibit 9**.

EXHIBIT 9 RECIRCULATION ROADWAY IMPROVEMENT



NOTE: EB = Eastbound, WB = Westbound, SHB = Sky Harbor Boulevard

SOURCE: Ricondo & Associates, Inc., April 2022.

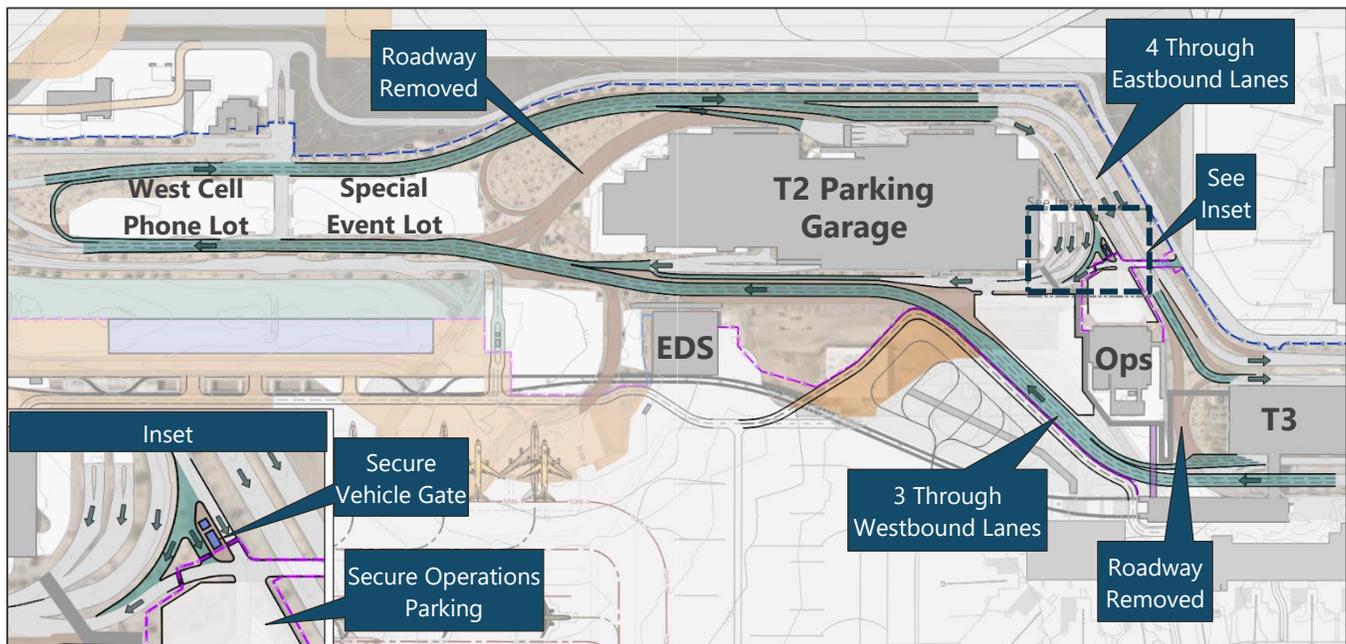
Congestion on Sky Harbor Boulevard also occurs north and east of the Terminal 2 parking garage due to limited lanes (two in each direction) and entrance ramps from the Terminal 2 parking garage, the Operations Building, and exit ramp to the Terminal 3 curb. Limited sight distances and minimal merge lengths along with the necessary signage causes slowdowns throughout this area. The CAMP Update investigated the potential to straighten westbound Sky Harbor Boulevard in advance of the future construction of the West Terminal to alleviate congestion in this area. As shown on **Exhibit 10**, this option would include straightening westbound Sky Harbor Boulevard directly west of Terminal 3 to provide adequate merging lanes from the Terminal 3 inner curb, as well as three full through lanes. This westbound roadway would avoid the existing Operations Building, the Terminal 2 parking garage, and the Terminal 2 EDS building, while utilizing the previous Terminal 2 roadway curb area. It would connect

¹ PTV Planung Transport Verkehr AG, "Traffic in cities – simulation model"

to the existing westbound Sky Harbor Boulevard near the Special Events Parking lot. This movement of the westbound portion of the roadway would allow both roadways north and east of the Terminal 2 parking garage to be designated as eastbound Sky Harbor Boulevard lanes, allowing for four total eastbound lanes (two more than the existing eastbound lanes). This alternative would also provide adequate exit ramps for the Terminal 2 parking garage and the Operations Building.

The existing Operations Building could remain, with new access from eastbound Sky Harbor Boulevard from the north. It would have access to the secure area (Terminal 3 apron) by utilizing the current bridge that crosses both eastbound and westbound Sky Harbor Boulevard (future eastbound only). This area would also house a secure vehicle access from eastbound Sky Harbor Boulevard. The EDS building and Terminal 2 parking garage could also remain. Access to the Terminal 2 parking garage would also be reverse from the current operation, with access into the garage from eastbound Sky Harbor Boulevard (where the exit plaza is currently located) and the exit from the garage would be at the existing entrance plazas to westbound Sky Harbor Boulevard. Additional study is required to further examine this option to improve Sky Harbor Boulevard in advance of the long-term construction of a West Terminal.

EXHIBIT 10 WESTBOUND SKY HARBOR BOULEVARD IMPROVEMENT



NOTE: EB = Eastbound, WB = Westbound, SHB = Sky Harbor Boulevard, Ops = Operations Building, EDS = T2 EDS Facility
 SOURCE: Ricondo & Associates, Inc., April 2022.

ARIZONA AIR NATIONAL GUARD

The Arizona Air National Guard 161st Air Refueling Wing (AZANG) is based at PHX, on a leasehold south of the airfield and adjacent to the South Cargo facilities used by FedEx and UPS. Both the South Cargo carriers and the AZANG expressed a need to expand facilities. The particular need for the AZANG was to position the 161st Wing to apply for the new KC-46 aircraft to be stationed at PHX, replacing the KC-135 aircraft now in service. Due to the larger size of the KC-46 compared to the KC-135, additional space would be required to accommodate the aircraft

and updated hangar and other facilities. The 2019 CAMP included the relocation of the South Cargo area to the north side of the Airport, north of the UPRR alignment. This relocation of the cargo facilities would allow expansion and some reconfiguration of the AZANG leasehold to accommodate the new aircraft. The relocation would require that the UPRR alignment north of the Airport be placed in a trench over which taxiway and ground vehicle roadways would connect the cargo area to the airfield.

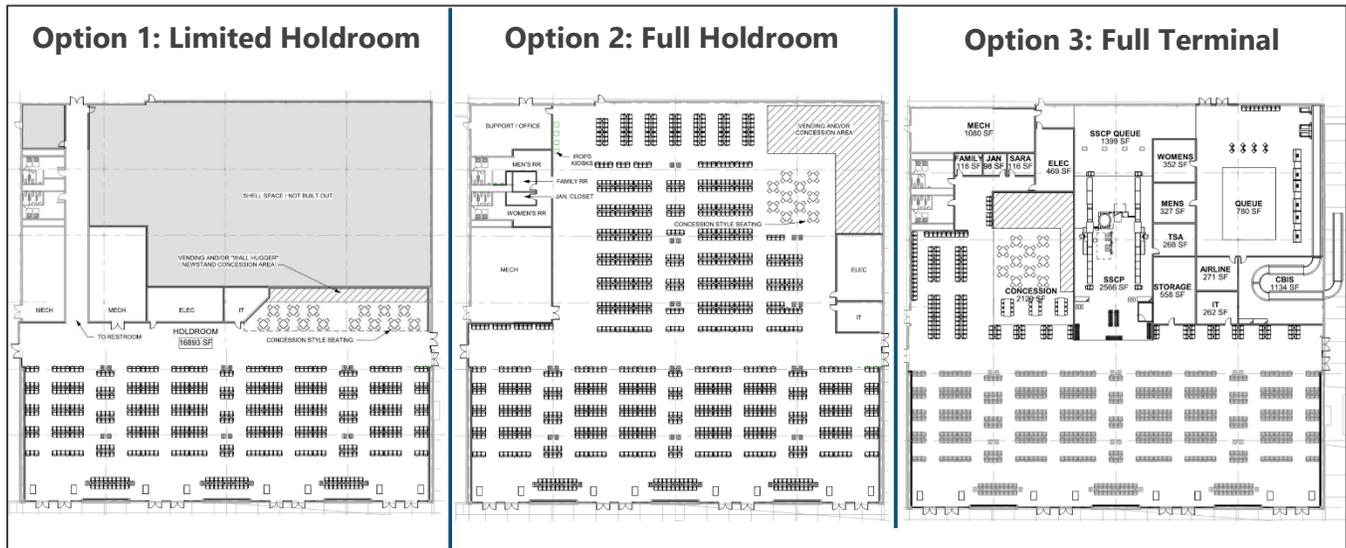
The CAMP Update was to include further planning of AZANG facilities, allowing for the 161st Wing to apply to base the KC-46 aircraft at PHX. The CAMP Update planning team met with AZANG representatives on August 25, 2021. Prior to the meeting, AZANG had provided alternatives to accommodate the KC-46 on the existing leasehold that had been prepared by others in July 2021. AZANG representatives stated that the July 2021 option was unacceptable due to cost. The long-term option presented in the 2019 CAMP that used existing South Cargo apron space for the KC-46 aircraft was still the preferred option. The timing to complete negotiations with the UPRR, construct and place the tracks into a trench, construct replacement cargo facilities north of the airfield, and relocate cargo operations to the site would be well beyond the timing requirements for the AZANG to apply for accommodate the new aircraft in the first round of basing decisions which would include delivery of the aircraft within approximately 8 years. AZANG representatives stated that there would be a subsequent round of upgrades in 10 to 15 years and that they could continue to operate in their current facilities for that period of time and would look to apply for eligibility to receive the KC-46 in the second round of replacements. With that information, no additional planning for AZANG has been conducted as part of the CAMP Update.

TERMINAL 2 EDS FACILITY

The existing Terminal 2 EDS facility was constructed in 2006 to house the Transportation Security Administration (TSA) EDS equipment that scans checked baggage prior to loading on an aircraft. Unlike the rest of the Terminal 2 facility constructed in 1962, the EDS facility remains in satisfactory condition and was not demolished as part of the Terminal 2 demolition. Three alternatives were developed by HNTB² to convert the EDS facility into a passenger holdroom facility or a full terminal. These three concepts, shown on **Exhibit 11** could be used for housing to secure passengers during special events in Phoenix when additional holdroom or terminal capacity is needed, or in the event of an aircraft diversion, where passengers may need to remain segregated from other secure passengers throughout the terminal facilities. After reviewing with Airport Executive staff, all three options will be preserved, and additional study will be undertaken to determine if other aeronautical uses (cargo or support) may be more compatible and a higher and better use for this site.

² HNTB Corp. Terminal 2 EDS Building – *Remote Holdroom Evaluation*, September 2021

EXHIBIT 11 EDS HOLDROOM FACILITY REUSE CONCEPTS

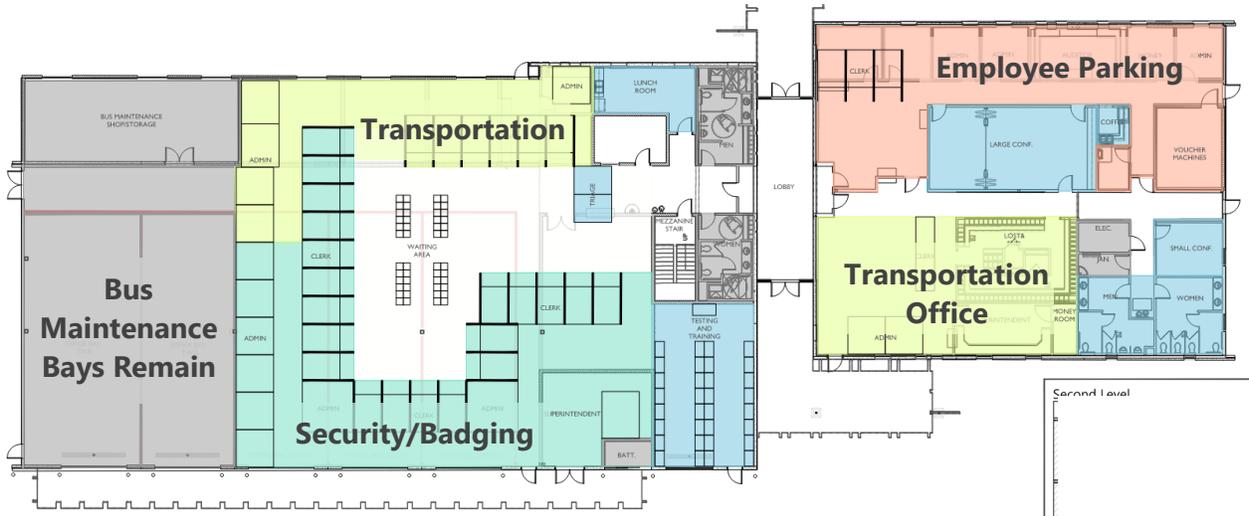


SOURCE: Ricondo & Associates, Inc., April 2022, based on graphics prepared and provided by HNTB Corporation, received December 2021.

BUS MAINTENANCE FACILITY REUSE

The existing Bus Maintenance Facility (BMF) is located at the southeast corner of Buckeye Road and 24th Street, just east of the PHX Corporate Office Building. This facility is used to maintain the buses that connect passengers from the terminals to the Consolidated Rental Car Facility (CRCF). Once the PHX Sky Train extension is opened to the CRCF, there will no longer be a need for this bus fleet, although some will be maintained and stored as a contingency for the PHX Sky Train or other irregular operation. The existing BMF was constructed in 2005 and remains in satisfactory condition. The existing Operations Building, shown on Exhibit 10 also houses front desk operations used by Airport tenants, including transportation clerks (where secure vehicle and drivers' licenses are reviewed), and employee security badging (including testing and administration for tenant and Airport employee badge holders). Employee parking operations (clerks to administer employee parking badges) are in a separate facility from Operations. All three of these Airport functions should be in a single or an adjacent facility to improve the customer experience when needing Airport services. Because the existing Operations Building is at capacity, the transportation and security/badging could be relocated to the BMF, along with employee parking operations. The BMF reuse option shown on **Exhibit 12** provides a clerk and administration office area for these three functions, while maintaining two existing bus maintenance bays and a shop/storage area. Interior modifications would be required but would occur within the existing footprint. After reviewing with Airport Executive staff, additional study is required to determine if the BMF would be the preferred location for this purpose over other sites at the Airport or if a new and long-term development option should be considered.

EXHIBIT 12 BUS MAINTENANCE FACILITY REUSE CONCEPT



SOURCE: Ricondo & Associates, Inc., April 2022.

24TH STREET OVERPASS MAINTENANCE FACILITY REUSE

Existing 24th Street crosses the existing UPRR at grade near the northwest corner of the Airport. Slow moving or sometimes stopped trains at this intersection cause vehicle backups along 24th street, including backups to access several of the Airport properties and facilities, along with Air Lane, which runs parallel to the UPRR alignment. A 24th Street roadway alternative developed by others would bridge over the UPRR alignment while still providing access to Air Lane, as shown on **Exhibit 13**.

EXHIBIT 13 24TH STREET OVERPASS



SOURCE: Ricondo & Associates, Inc., April 2022, based on roadway alignment prepared and provided by HDR, received February 2022

CAMP UPDATE PROJECT COST ESTIMATES AND ENVIRONMENTAL PROCESSING

A rough order of magnitude cost estimate for each of the CAMP Update projects, and potential environmental processing requirement is provided in **Table 1**. Several of these projects discussed require additional study beyond the CAMP Update as noted in Table 1. Project numbers refer to callouts shown on **Exhibit 14**.

TABLE 1 ROUGH ORDER OF MAGNITUDE COST ESTIMATES FOR CAMP UPDATE PROJECTS

PROJECT #	PROJECT	ROM COST	ENVIRONMENTAL PROCESSING REQUIREMENT	OTHER ADDITIONAL STUDY
	Concourse T3N2			
1	6 New Narrowbody Gates (ALP Layout) ¹	\$440.6M	Subject of ongoing environmental assessment	Gate demand analysis/passenger simulation
	Net 7 New Narrowbody Gates ¹	\$523.5M		
2	Taxiway U and Enabling Projects ²	\$242.7M	Subject of ongoing environmental assessment (potential addition of enabling projects)	Airfield delay analysis
3	T3 Recirculation Roadway Improvement	\$0.45M	Likely exempt from environmental processing unless federal funds used	None
4	Runway Extension (7R and 25L) ³	\$93.4M	Likely requires environmental assessment	Airfield delay analysis/ additional obstruction analysis
5	T2 EDS Reutilization	\$11.1M – \$18.1M	Likely requires environmental assessment	Gate demand analysis/ Passenger simulation
6	24th Street Overpass ⁴	\$21.1M – \$30.4M	Likely requires environmental assessment	Design Underway
7	Bus Maintenance Facility Reutilization	\$7.22M	Likely exempt from environmental processing unless federal funds used	None
8	Westbound Sky Harbor Boulevard	\$13.1M	Likely exempt from environmental processing unless federal funds used	Roadway Modeling

NOTES:

All costs are under review and subject to change, developed by Connico Inc in 2021 dollars.

1 Includes C-Point relocation and T3-T4 passenger/VSR tunnel connection

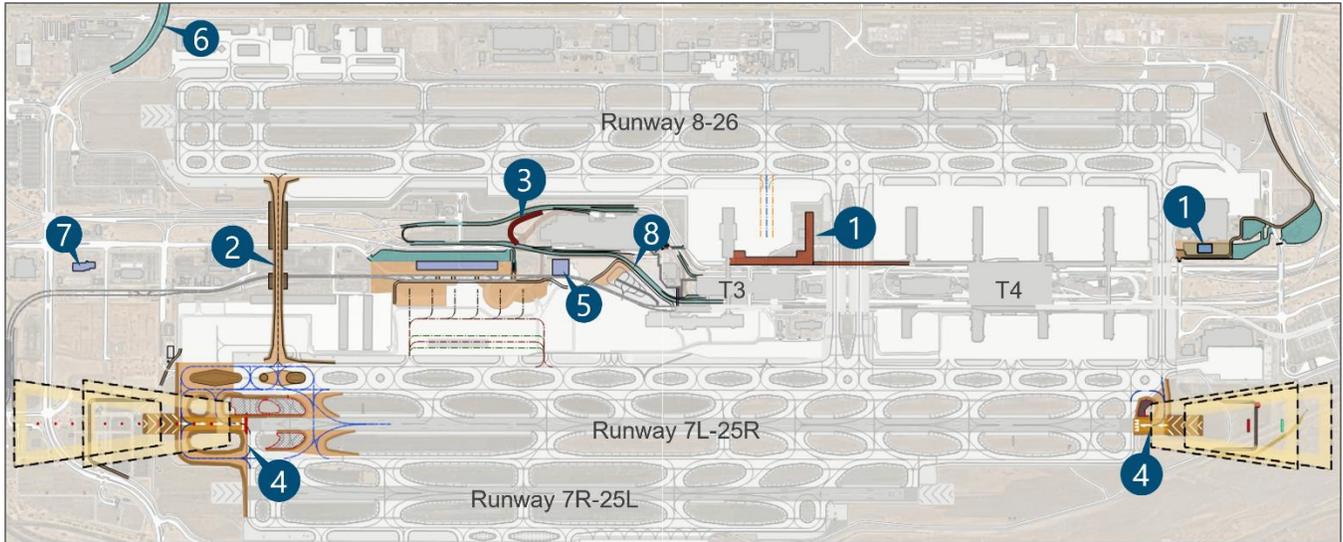
2 Includes full 94,000sf relocated Cargo Building Complex 'C' and Apron Improvements

3 Runway Extension include Taxiway D and E improvements

4 HDR Estimate developed February 2021

SOURCE: Ricondo & Associates, Inc., 2021 CAMP Update PAAB Meeting, April 2022.

EXHIBIT 14 CAMP UPDATE PROJECT LIST



SOURCE: Ricondo & Associates, Inc., April 2022.