Chapter Five: DEVELOPMENT CONCEPT

The airport master plan for Scottsdale Airport (SDL) has progressed through a systematic and logical process with a goal of formulating a recommended 20-year development plan. The process began with an evaluation of existing and future operational demand, which aided in creating an assessment of future facility needs. Those needs were then used to develop alternative facility plans to meet projected needs. Each step in the planning process has included the development of draft working papers, which were presented and discussed at previous planning advisory committee (PAC) meetings and public information workshops and have been made available on the project website.

In the previous chapter, several development alternatives were analyzed to explore options for the future growth and development of SDL. The development alternatives have been refined into a single recommended concept for the master plan. This chapter describes, in narrative and graphic form, the recommended direction for the future use and development of SDL.

The recommended concept provides the ability to meet the disparate needs of various airport operators. The goal of this plan is to ensure the airport can continue (and improve) in its role of serving general aviation operators. The plan has been specifically tailored to support existing and future growth in all forms of potential aviation activity as the demand materializes.

The recommended master plan concept, as shown on **Exhibit 5A**, presents a long-term configuration for the airport that preserves and enhances the role of the airport while meeting Federal Aviation Administration (FAA) design standards. The phased implementation of the recommended development concept will be presented in Chapter Six. The following sections describe the key details of the recommended master plan concept.

AIRSIDE CONCEPT

The airside concept generally relates to planned improvements to the runway and taxiway system. **Exhibit 5A** presents the long-term master plan development concept for SDL. The following sections will discuss the preferred future development plan in more detail.

AIRFIELD CAPACITY REVIEW

The capacity of an airport is a measure of the airport's ability to accommodate actual and forecast operational activity, given the existing runway and taxiway layout. The most common capacity measure is the annual service volume (ASV), which is the estimated number of operations an airport can facilitate before delay becomes a significant factor. Delay can manifest in numerous ways, including extended aircraft hold time prior to departure, extended circling maneuvers instructed by air traffic control personnel, and longer intervals between departure or arrival clearance.

According to Federal Aviation Administration (FAA) Advisory Circular (AC) 160/5060-5, *Airport Capacity and Delay*, an airport should plan capacity improvement projects when its annual operations reach 60 percent of the ASV. Capacity improvement projects may include an additional runway, additional strategically located taxiways, and instrument approach improvements.

This analysis was documented in Chapter Three. Annual operations currently represent 77 percent of the ASV. The operations forecast indicates that the airport would be at 155 percent of the ASV in 20 years; therefore, capacity improvement projects are likely justified for SDL and should be considered as a 20-year capital improvement program is developed for this master plan.

RUNWAY DIMENSIONS

Runway 3-21 is 8,249 feet long and 100 feet wide. The runway is planned to remain at these dimensions. Previous analysis indicated that the airport would be justified for a total runway length of 11,700 feet if an extension were feasible. Due to the constrained airport environment, including the Central Arizona Project (CAP) canal to the north and numerous roads to the south, a runway extension is not feasible; this runway already provides for the longest length possible for users.

In collaboration with the FAA, the airport developed a plan during and after the last master plan to maximize runway length while preserving various safety surfaces associated with the runway. The resolution includes FAA approval of two Modifications of Standards (MOS): one for the runway object free area (ROFA) and one for the runway to taxiway separation distance. In addition, the distances declared were modified to maximize runway length and the surrounding safety surfaces.

Analysis in this master plan, presented in Chapter Four, confirmed that the currently implemented MOS and declared distances are still the best method to accommodate demand at the airport. The runway is planned to remain at its current length and width and with the declared distances currently defined.

DECLARED DISTANCES

Declared distances are applied to the runway for object clearing and safety enhancement purposes. As discussed in detail in Chapter Three, runway lengths used in pilot calculations are described using the following four definitions:

- Takeoff run available (TORA): The runway length declared available and suitable for the ground run of an aircraft taking off (factors in the positioning of the departure runway protection zone (RPZ).
- Takeoff distance available (TODA): The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA. The full length of the TODA may need to be reduced because of obstacles in the departure area.
- Accelerate-stop distance available (ASDA): The runway length plus the stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff (factors in the length of runway safety area (RSA)/ROFA beyond the runway end).
- Landing distance available (LDA): The runway length declared available and suitable for landing an aircraft (factors in the length of RSA/ROFA beyond the runway end and the positioning of the approach RPZ).

The TORA and TODA do not involve consideration of the runway safety area (RSA) beyond the runway ends. The ASDA and LDA must include the standard RSA beyond the ends of the runway. The standard RSA for Runway 3-21 extends 1,000 feet beyond the runway ends. The following describes how the declared distances are currently determined and applied at SDL.

Runway 3

- Runway 3 TORA/TODA: The full pavement length, which is 8,249 feet.
- Runway 3 ASDA: The ASDA is measured from the pavement end of Runway 3, extending 7,849 feet to a point on the runway that is 400 feet short of the Runway 21 pavement end. The end of the Runway 3 ASDA coincides with the location of the landing threshold for Runway 21. The end of the ASDA is declared 400 feet short of the pavement end to allow for the full 1,000-foot RSA beyond the runway end.
- Runway 3 LDA: The landing threshold to Runway 3 is displaced by 739 feet. The end of the Runway 3 LDA is 400 feet short of the Runway 21 pavement end, co-located with the Runway 21 landing threshold and the end of the Runway 3 ASDA. The end of the LDA is declared 400 feet short of the pavement end to allow for the full 1,000-foot RSA beyond the runway end. The LDA is 7,110 feet in length.

Runway 21

- Runway 21 TORA/TODA: The full pavement length is 8,249 feet.
- Runway 21 ASDA: The ASDA is measured from the pavement end of Runway 21, extending 8,069 feet to a point on the runway that is 180 feet short of the Runway 3 pavement end. The end of the ASDA is declared 180 feet short of the pavement end to allow for the full 1,000-foot RSA beyond the runway end.
- Runway 21 LDA: The landing threshold to Runway 21 is displaced by 400 feet. The end of the Runway 21 LDA is declared 180 feet short of the Runway 3 pavement end to allow for the full 1,000-foot RSA beyond the declared end of the runway. The LDA is 7,669 feet in length.

Table 5A documents the declared distances, as applied to and planned to be maintained for both runways at SDL. **Exhibit 5A** also documents the length of each of the declared distances.

TABLE 5A: Current/Future Declared Distances

Declared Distance Parameters	Current/Future Declared Distances: Runway 3	Current/Future Declared Distances: Runway 21
TORA: Takeoff Run Available	8,249'	8,249'
TODA: Takeoff Distance Available	8,249'	8,249'
ASDA: Accelerate-Stop Distance Available	7,849'	8,069'
LDA: Landing Distance Available	7,110'	7,669'

Table Source: Coffman Associates Analysis of FAA AC 150/5300-13B, Airport Design

RUNWAY WEIGHT-BEARING CAPACITY

The weight-bearing capacity of a runway does not preclude operations by aircraft that weigh more; however, frequent activity by heavier aircraft can shorten the useful life of that pavement. FAA AIP Grant Assurance #11, *Pavement Prevention Maintenance-Management*, requires that airport sponsors maintain the useful life of any pavement partially funded with a federal investment.

The current published weight-bearing capacity for Runway 3-21 is 45,000 pounds for single-wheel landing type gear (S) and 75,000 pounds for dual-wheel (D) type landing gear. Most small general aviation aircraft have landing gear struts with one wheel on each. Small business jets also may have a single-wheel landing gear strut. Most medium and large business jets have dual-wheel landing gear struts.

According to the *Chart Supplement* FAA publication, "Runway strength-rating is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of supporting limited operations with gross weights in excess of the published figures." The directory goes on to say that those aircraft exceeding the pavement weight-bearing capacity should contact the airport sponsor for permission to operate at the airport. This is the case at Scottsdale Airport, as the *Chart Supplement* states that "Runway 3-21 is limited to 75,000 pounds (D) except with prior permission requested." Aircraft can operate with maximum gross weights in excess of 75,000 pounds and up to 100,000 pounds with prior permission.

The weight-bearing capacity of a runway can change over time. Regular usage by heavier aircraft can decrease the weight-bearing capacity, while periodic runway resurfacing or reconstructing can increase the weight-bearing capacity. Given the high volume of large business jets that utilize the airport, future planning should consider providing a pavement weight-bearing capacity of at least 114,900 pounds (D), which will fully accommodate the existing business jet fleet in operation today.

Next Generation Business Jets

Several models of new business jets exceed the 100,000-pound limit for operation at the airport. There is no design standard safety reason to prohibit these business jets from operating at the airport. It is recommended that the airport consider allowing slightly heavier aircraft, or aircraft up to 114,900 pounds, to operate, in response to evolving business aviation needs. The primary concern is the potential for increased wear on the runway pavement, which may shorten its useful life; however, this impact can be effectively managed through the airport's ongoing program of monitoring and routine pavement maintenance.

RUNWAY DESIGN STANDARDS

All runways are inclusive of various imaginary safety surfaces. Primary among these are the RSA, ROFA, runway obstacle free zone (ROFZ), and runway protection zones (RPZs). The dimensions of these surfaces are a function of the critical aircraft and the instrument approach visibility minimums. The critical aircraft is the largest aircraft or family of aircraft with similar physical characteristics that account for 500 annual operations. The lowest visibility minimum at SDL is 1-mile.

As discussed at length in Chapter Two, the critical aircraft that accounts for more than 500 annual operations is the Gulfstream V, which is classified as a D-III-2B aircraft. Based on previous analysis in Chapter Four in this master plan, the FAA and the airport determined that it is not feasible for the airport to fully meet the D-III-2B design standards; therefore, extensive analysis was undertaken to determine to what degree those standards could be met and if the safety intent of the design standards could be met. Ultimately, the FAA-approved a critical aircraft (and related runway design standards) associated with a D-II-2B classification.

Runway Safety Area (RSA)

The RSA enhances the safety of aircraft that undershoot, overrun, or veer off the runway, and provides greater accessibility for aircraft rescue and firefighting (ARFF) equipment to respond to such incidents. The RSA is to be cleared and graded, with no potential hazards, ruts, humps, depressions, or other surface variations, and drained by grading or storm sewers. The elevation of any point within the RSA is to be no higher than the perpendicular elevation of the runway centerline.

Due to constraints surrounding the runway, a standard RSA is not feasible. The standard RSA is 500 feet wide, extending 1,000 feet beyond the runway ends. FAA Order 5200.8, *Runway Safety Area Program*, outlines six alternatives to examine when the full RSA width and length beyond the runway end cannot be met:

A. Construct the RSA to meet current design standards.

B. Relocate, shift, or realign the runway.

C. Reduce runway length where the existing runway length exceeds the length required for the existing or projected design aircraft.

D. Implement a combination of runway relocation, shifting, grading, realignment, or reduction.

E. Implement declared distances.

F. Install EMAS.

Previous analysis resulted in an RSA that is 400 feet wide, which is allowable for airports with a D-II critical aircraft. Since the full 1,000 feet beyond the runway ends is not feasible, the ends of the runway have been modified based on declared distances for both runway directions.

For operations using Runway 3, the end of the runway is declared to be 400 feet short of the Runway 21 pavement end. This location coincides with the landing threshold to Runway 21. By declaring the Runway 3 end to be 400 feet short of the pavement end, a full 1,000-foot RSA is provided, thus meeting the standard.

For operations using Runway 21, the end of the runway is declared to be 180 feet short of the Runway 3 pavement end. From this point, the RSA extends the full 1,000 feet, thus meeting standard. **Exhibit 5A** shows the position of the RSA, and more detail was provided on Exhibit 3E; therefore, the RSA at SDL meets the RSA standards and is planned to be maintained.

Runway Object Free Area (ROFA)

The ROFA is a buffer zone around runways to provide wingtip clearance in the event of a runway excursion into the RSA by an aircraft. The ROFA is to be clear of terrain or objects that rise above the lateral elevation of the RSA. The standard ROFA for SDL is 800 feet wide and extends 1,000-feet beyond the runway pavement end or beyond the declared runway end.

For SDL, extensive previous analysis and an FAA-approved Modification of Standards allow for the width of the ROFA to be 630 feet as centered on the runway. The length beyond the runway is also modified based on the MOS. The ROFA extends to 470 feet beyond the Runway 3 end (behind Runway 21) and 500 feet beyond the Runway 21 end (Behind Runway 3). Under these conditions, the ROFA meets the safety intent of the surface, as there is no penetration to the ROFA.

Runway Obstacle Free Zone (ROFZ)

The ROFZ dimensions are 400 feet wide and extend 200 feet beyond the pavement end. The ROFZ is set based on the established end of the runway pavement, regardless of the operating direction. The ROFZ surrounding Runway 3-21 fully complies with FAA standards.

Runway Protection Zone (RPZ)

The RPZs are trapezoidal land areas beyond the runway ends. The RPZs are established to protect people and property on the ground. **Exhibit 5A** depicts the portions of the RPZs that extend beyond airport property. Some portions of these RPZs that fall outside of airport property have incompatible land uses. Specifically, behind the Runway 3 end (south), the RPZs cross over roads and portions of buildings. Behind the Runway 21 end (north), the RPZs cross over roadways.

Recently published FAA guidance in AC 150/5190-4B, *Airport Land Use Compatibility Planning*, outlines the FAA's expectations regarding RPZ land use compatibility. The FAA expects airport sponsors to make every effort to provide compatible land uses within RPZs. Incremental improvements are encouraged, and allowing new incompatible land uses is discouraged. The FAA also understands that RPZ lands may be owned by others, which may limit the sponsor's ability to mitigate existing or future incompatible land uses within RPZs.

At SDL, the RPZs are planned to remain in their current location. If there are any surface transportation plans by the city or other agencies that would provide an opportunity to relocate roads out of the RPZs, the airport should support those plans. If there are any plans in the future to construct new buildings within the RPZs, the airport should not support those plans. If there is an opportunity to purchase any of the existing buildings with the RPZs, the airport should pursue those.

RUNWAY/TAXIWAY SEPARATION

The design standard for the separation between runways and parallel taxiways is determined by the runway design code (RDC). The FAA-approved RDC for Runway 3-21 is D-II-5000, which has a separation standard of 300 feet from the centerline of the runway to the centerline of a parallel taxiway. Parallel Taxiways A and B are both 250 feet from the runway.

During the 2015 master plan, extensive analysis was undertaken to determine the feasibility of relocating one or both parallel taxiways to 300 feet. It was determined that such a shift would have a significant and negative impact on airport operations, as well as a significant impact on numerous hangars, buildings, and private property interests. As a result, a Modification of Standards (SDL-MOS3) was approved by the FAA on January 3, 2019.

This analysis was revisited in Chapter Four in this master plan. The impacts are even greater today than when they were originally analyzed in 2015. The MOS supporting the existing runway-to-taxiway separation states the following:

> "*Allowing parallel Taxiways A and B to remain in their existing locations at 250 feet from the Runway 3-21 centerline provides for an acceptable level of safety on the airfield, as the design standards for Runway Safety Area (RSA) and Runway Obstacle Free Zone (ROFZ) are met under the existing airfield configuration. Furthermore, the current locations of the parallel taxiways provide for the appropriate TOFA of 131 feet (since changed to 124 feet) and TSA of 79 feet for Airplane Design Group (ADG) II aircraft. The 250-foot runway centerline to taxiway centerline distance would provide for 171 feet of wingtip clearance of ADG II aircraft simultaneously operating on Runway 3-21 and either parallel taxiway*."

Because of the FAA-approved MOS and the supporting analysis in this master plan, the existing runway to taxiway separation is planned to remain at 250 feet.

HOLD LINE SEPARATION

The distance that aircraft hold lines should be marked on taxiways is a function of the RDC. The standard for the applicable RDC of D-II-2B is 250 feet from the runway centerline. Currently, the hold lines for Runway 3-21 are 152 feet from the runway centerline. Because the parallel taxiways are 250 feet from the runway centerline, it would be impossible to place hold lines on the centerlines of the parallel taxiways; doing so would lead to significant congestion every time an aircraft is holding because the aircraft would block the taxiway.

A Safety Risk Management Document (SRMD) was undertaken between 2010 and 2013 to address the impacts to safety if the hold position markings were relocated from the current 152 feet from the runway centerline to somewhere between 200 and 250 feet from the runway centerline. The panel included active participation from representatives of SDL Airport Management Staff, AWP Office of Runway Safety, AWP ADO, SDL ATCT, Phoenix TRACON, AZD Safety Assurance Staff, Aircraft Owners and Pilots Association, AZD Operations Support (Procedures) Staff, Western Service Area Quality Control Group (AJV-W11), NATCA, Flight Standards, SDL FBOs, and the NBAA. Over the course of several meetings, it was concluded that a hold line change could not be introduced into the National Airspace System (NAS) with an acceptable level of risk, as defined in the FAA Safety Management System (SMS) Manual.

The SRMD states:

> "*Based on the safety analysis conducted by the Safety Risk Management Panel (SRMP), combined with the recorded results from the Tower Simulation System (TSS), some of the air traffic control (ATC) procedures that would be required in support of the hold line relocation change cannot currently be introduced into the National Airspace System (NAS) with an acceptable level of risk, as defined in the FAA Safety Management System (SMS) manual*."

The SRMD identified nine risk hazards associated with relocating hold lines. Four of the hazards were initially considered high-risk, and two of the four hazards could not be sufficiently mitigated. The seven remaining risk hazards could be mitigated. As a result, the holding position markings remain at 152 feet from the runway centerline.

Operationally, the holding position markings define the runway environment for control tower personnel at SDL; therefore, if an aircraft were to fail to hold at the holding position when instructed and enter the runway environment, that action would be reported as a runway incursion. A runway incursion is defined as "any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft." While the RSA typically defines the lateral limits of the protected area of a surface designated for the landing and takeoff, the hold position markings operationally define the lateral limits of the protected area at SDL.

Table 5B shows the clearance available between a large business jet operating on the runway and the hold line. As can be seen, the business jet with the widest wingspan is the Bombardier Global 7500/8000. Assuming the Global 7500/8000 is on the runway centerline, there is 48 feet of clearance to the hold line.

TABLE 5B: Wingspan Clearance for Largest Aircraft Currently Operating and Likely to Operate at SDL

Aircraft Make/Model	Wingspan	Clearance to Hold Line (152')*	Clearance Between Two Same Aircraft on the Runway and Parallel Taxiway*
Gulfstream IV	77.8'	74'	94'
Gulfstream V	93.5'	58'	62'
Gulfstream 600 (G-7)	95.0'	57'	60'
Gulfstream 800	103'	49'	44'
Bombardier Global 5000/6000	94.0'	58'	62'
Bombardier Global 7500	104'	48'	42'
Bombardier Global 8000	104'	48'	42'
Embraer Legacy 650	93.8'	58'	62'

*Wingspans are rounded up to the nearest foot.

The table also shows the clearance available if two of the same aircraft were passing each other, one on the runway and one on the parallel taxiway. If these aircraft were both the Global 7500/8000, then the clearance would be 42 feet. The hold lines are planned to remain at their current separation distance of 152 feet from the runway centerline.

TAXIWAYS

Chapter Three outlined in detail the FAA's guidance in relation to taxiway geometry. The following specific guidelines are pertinent to SDL:

- *Limit Runway Crossings*: By limiting runway crossings, the opportunity for inadvertent entry into the active runway environment can be reduced. This is especially true in the high-energy portion of the runway (middle third) where pilots have less reaction time.

- *Increase Visibility*: Right-angle intersections between taxiways and runways provide the best visibility. Acute-angle runway exits can provide greater efficiency in runway usage but should not be used as runway entrances or crossing points.

- *Indirect Access*: Taxiways should not be designed to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter and turn onto a parallel taxiway.

The following existing taxiway configurations were examined in Chapter Four – Alternatives:

- Taxiways A3, A4, A5, A6, and A7 allow direct access from an apron area to the runway.

- Taxiways A7/B7 and A10/B10 allow runway crossings in the high-energy portion (middle third) of the runway.

- Taxiways A2, A4, A6, A9, A11, A12, B5, B6, B11, and B12 are angled taxiways.

None of these taxiways are non-standard but they do not follow the current design recommendations. For example, the FAA has prioritized removing direct-access configurations, where feasible. Angled taxiways have been less of a priority and, in some cases, are justified by capacity needs at an airport. Even runway crossings may be needed if there is no appropriate alternative that does not diminish ground movement efficiency.

The recommended concept presented in **Exhibit 5A** presents the following taxiway geometry recommendations:

1. A future taxiway connector is planned as Taxiway B2. On the current ALP, this taxiway connector is shown as an angled taxiway to mirror Taxiway A2. Having an angled runway exit taxiway in this location would not increase runway capacity, because existing aircraft must slow significantly to exit due to the parallel taxiway ending immediately. Angled entrance taxiways are also discouraged. While a taxiway in this location is beneficial, it is planned to be at a 90-degree angle to the runway. Taxiway A2 is also planned to be reconfigured at a 90-degree angle in the future for the same reasons. Taxiway A2 would only need to be reconstructed to the 90-degree when it needs replacement.

2. Taxiways A3, A4, A5, A6, and A7 extend from the runway across parallel Taxiway A to apron connecting taxiways, thus allowing direct access to the runway from the apron. The recommendation is to relocate those apron connecting taxiways that currently extend from Taxiways A3, A4, and A5 so that aircraft must make a turn onto parallel Taxiway A when exiting from the apron. Taxiway A6 is planned to remain in its current configuration, as the turn from the apron is considered sufficient to alert pilots that they are intersecting a parallel taxiway. At Taxiway A7, the apron connecting taxiway is planned to remain in its current location because of the efficiency this location provides for ramp circulation. Instead, Taxiway A7, between the runway and parallel Taxiway A, is planned to be shifted to eliminate the direct access condition. All these planned taxiway reconfigurations should be undertaken when the next completed reconstruction of these taxiways is needed.

3. Currently, Taxiways A7 and B7 allow a runway crossing in the high energy portion of the runway. Taxiway A7, between the runway and parallel taxiway, is planned to be relocated to eliminate the apron to runway direct access issues, as described above. This move has the added benefit of eliminating this runway crossing.

4. A future taxiway, Taxiway B9, is planned to mirror Taxiway A9. This project has long been on the ALP and is planned for construction in the near term. As an angled taxiway, it is in a good location to add to airfield capacity by allowing landing aircraft to exit more rapidly. Future Taxiway B9 remains on the recommended plan; however, it is likely redundant with Taxiway B10. Future studies should reanalyze if Taxiway B10 would be necessary.

5. Taxiway A10 is planned to ultimately be removed from service for two primary reasons. First, Taxiways A10 and B10 are currently a runway crossing in the high energy portion of the runway. Second, Taxiway A10 is redundant with Taxiway A9.

6. A new taxiway is planned as Taxiway B15, which will mirror Taxiway A15. This taxiway is planned as a 90-degree angle taxiway; this is a change from the current ALP, which depicts this taxiway as an angled taxiway. Like Taxiways A2 and B2, there is no need for Taxiway B15 to be constructed as an acute angled taxiway.

7. The short taxilanes connecting from Taxiway A to the main apron (currently at the intersections with Taxiways A3, A4, A5, A6, and A7) are somewhat narrow for the wheelbase of the critical aircraft at the airport. When these are reconstructed, the fillets should be widened.

TAXIWAY A/APRON EDGE TAXILANE

In Chapter Four, an extensive analysis of the functional operations of the apron edge taxilane that extend between Taxiway A3 and A7 was undertaken. This taxilane is 105 feet from Taxiway A, centerline-to-centerline. The standard separation distance for an airport with a critical aircraft in airplane design group (ADG) D-II, is 101.5 feet. SDL meets this standard; however, it is also known that there are more than 3,000 annual aircraft movements by aircraft with wingspans wider than the 79-foot ADG-II standard. Therefore, there is reasonable concern that wingtips could collide if two aircraft are passing each other and one or both of them have a wingspan greater than 79 feet.

Four alternatives were considered to mitigate the possibility of wingtips colliding in this scenario. These are summarized as follows:

1. *Meeting ADG III Separation Standard*: Under this alternative, the apron edge taxilane would be shifted to the west to meet the ADG III standard of 144.5 feet. The ADG III taxilane object free area (TLOFA) of 158 feet (centered on the taxilane) would also be applied. This means that existing aircraft parking on the apron would have to be shifted 63.5 feet to the west, essentially eliminating the entire first row of aircraft parking on the apron. This is a capacity loss that the airport cannot absorb in other areas.

2. *Modified ADG III Separation Standards*: The second alternative considered relocating the apron edge taxilane based on the wingspan of a specific aircraft, the Bombardier Global 7500, which has a wingspan of 104 feet (105 feet was used in the analysis). This would relocate the apron edge taxilane to a distance of 131.5 feet from the Taxiway A centerline. This would result in the loss of an additional 44 feet of apron depth, also effectively requiring the loss of the entire front row of aircraft parking area.

3. *Remove the Apron Edge Taxilane*: This alternative would remove the apron edge taxilane entirely, similar to what was recently done recently between Taxiway A3 and the south apron entrance taxilane. The benefit of this option is that more space would be available for aircraft parking. An additional 72.5 feet of space would be available. The analysis showed that there are negative impacts to removing the apron edge taxilane. Because the apron is often crowded with parked aircraft, it is common for the FBOs to have to reposition aircraft through use of tugs. It is much easier to do this using an apron taxilane because the alternative is to use Taxiway A, which would negatively impact overall airfield capacity.

4. *Letter of Agreement (LOA) with FBOs*: This alternative would maintain the apron edge taxilane in its current location. Since the tower does not actively control apron edge taxilane movements, this agreement would not limit tower operations. Under this alternative, Taxiway A would be unrestricted. Movements using the taxilane would need to be restricted based on wingspan. What that limitation is and when it applies needs to be the subject of additional consultation with the FBOs that use the taxilane. The cleanest method would be to restrict all movements on the taxilane to aircraft with wingspans of 100 feet or less. This would provide 55 feet of clearance, which is greater than half the wingspan of the aircraft with the largest wingspan that could be operating on Taxiway A at the same time. A potential point of modification could be that such a limitation is only required if wide wingspan aircraft would actually pass one another in this area at the same time. In the end, the airport and FBOs would have to agree to the restriction and inform the ATCT of that agreement.

The preferred alternative is Alternative 4, which is an agreement with the FBOs, to restrict movements on the apron edge taxilane.

HOLD APRON

Busy general aviation airports with high volumes of activity by smaller fixed-wing aircraft should make runup aprons available near the ends of the parallel taxiways for pilots to perform pre-flight checks and engine runups. Airfield capacity is a concern at SDL. Nearly all operations by small aircraft, those most likely to use a hold apron, emanate from the west side of the airfield. The existing hold apron at the northwest side of Taxiway A provides an excellent facility that increases airfield capacity by allowing other aircraft to depart without delay. This hold apron is planned to remain in its current configuration.

The possibility of mirroring this hold apron design at the south end of Taxiway A was considered. The space available is too narrow to meet the object-free area requirements. Because this is not the favored departure direction, there is not as great a need for a hold apron at the south end; therefore, no additional hold apron is planned at the south end of Taxiway A.

No additional hold aprons are planned at the ends of Taxiway B because of limited space and because all aircraft emanating from the east side of the airfield are primarily business jets, which do not utilize hold aprons to the degree that small planes do.

INSTRUMENT APPROACHES

Instrument approach procedures are a set of predetermined approach maneuvers that pilots can follow to land at an airport. The procedures outline cloud ceiling minimums and visibility minimums. The lower these minimums are, the more opportunity there is to land, especially in poor weather or low visibility conditions. The lowest visibility minimum typically available to general aviation airports is ½-mile, which requires an approach lighting system and other ground-based equipment, including a localizer and glideslope antenna (referred to as an instrument landing system [ILS]); however, the FAA is not installing new ILS systems, as it is moving toward global positioning system (GPS)-based instrument approaches. Without an approach lighting system, the lowest feasible visibility minimum is ¾-mile.

At Scottsdale Airport, there are six published instrument approaches (reference Exhibit 1L), all of which provide visibility minimums greater than or equal to one mile. Three are RNP approaches, which are available for specific aircraft with specific specialized equipment and performance monitoring. Use of RNP approaches requires specialized pilot training and a requirement to perform a missed approach if lateral or vertical navigation limits are exceeded, even if visibility is sufficient for a landing. As such, these instrument approach procedures are rarely used.

The other three instrument approaches are circling in nature; pilots cannot navigate directly to a runway end for landing. Instead, they navigate to the airport traffic pattern and then circle to land, assuming visibility minimums are met.

Busy reliever airports with high volumes of business jet activity, such as SDL, should be equipped with the most sophisticated instrument approach capability available. This may include ILS and/or GPS approaches with visibility minimums not lower than ½ mile.

To date, neither type of approach has been implemented for two primary reasons:

1. The airspace in and around SDL is complex; activity related to Phoenix Deer Valley Airport (DVT) and Phoenix Sky Harbor International Airport (PHX) impacts activity at SDL.

2. Visual conditions apply nearly all the time, making the need for lower visibility minimums less important.

Nevertheless, nearly all pilots of business jets would utilize an instrument approach procedure (either ILS or GPS) regardless of the visibility conditions. While it is obvious to recommend better instrument approach capability for SDL, it will require extensive coordination with all airports and air traffic organizations responsible for the Phoenix region and may require consultation with national airspace experts within the FAA and other organizations, including the military.

Because the dimensions of certain airfield design standards, including the sizes of the RPZs, are a function of the instrument approach visibility minimums, the existing instrumentation is planned to be maintained. No new instrument approaches with visibility minimums below one mile are recommended, as one mile is the threshold at which multiple design standards change.

NAVIGATIONAL AIDS

To provide pilots with visual guidance information during landings, electronic visual approach aids are commonly provided at airports. Both landing thresholds are outfitted with two-box precision approach path indicator (PAPI-2) systems. The PAPIs are set to provide a 4.0-degree glidepath for obstacle clearance, which is higher than the standard 3.0-degree glide path. It is recommended that a four-box PAPI system ultimately be implemented on the runway; the PAPI-4s would better serve business jets that regularly use the airport because they are more visible for these faster approaching aircraft. No other electronic navigational aids are needed at SDL.

AIRSIDE SUMMARY

The runway is planned to remain in its current configuration; Runway 3-21 will keep its length and width of 8,249 feet by 100 feet, and the RDC will remain D-II-5000. Declared distances as currently applied are recommended to remain the same, thus providing the full RSA for both ends of the runway. It is recommended that the runway weight-bearing capacity be increased at the next reconstruction project to better accommodate aircraft currently operating at the airport.

The instrument approach capability is planned to remain the same for the airport. The primary reason for this is the complex airspace surrounding the airport. Any changes or improvements to the instrument approaches would have an impact on several area airports, including Deer Valley Airport (DVT) and Phoenix Sky Harbor International Airport (PHX). The best opportunity for improved instrument approaches for the airport would be a region-wide assessment by the FAA of the instrument approaches to multiple airports. Fortunately, the Phoenix region averages more than 300 sunny days per year, which is approximately 85 percent of the year.

The taxiway system is where most of the improvements are planned. Several taxiways are planned to be reconstructed more in-line with current FAA geometry recommendations. Reducing or eliminating direct access to the runway from apron areas is a priority. Limiting the potential for runway crossings within the middle-third of the runway has also been addressed in the plan. Finally, Taxiway A2 is planned to be reoriented to the preferred 90-degree to the runway. Each of the taxiway improvement projects should be undertaken when they need reconstruction, meaning these are not urgent design standard projects. These are FAA recommended design considerations.

The future of the apron edge taxilane between Taxiways A3 and A7 was the subject of significant analysis, because while the separation distance meets the official ADG II standard, it is known that there are many operations by ADG III aircraft, which could lead to wingtips colliding. To address this concern, it is recommended that the airport and FBOs agree on a limitation for the wingspan of aircraft that can use the taxilane.

LANDSIDE CONCEPT

Landside facilities include hangars, aircraft parking aprons, terminals, fuel farms, control towers, surface road access, and vehicle parking. Essentially, landside facilities are all airport facilities exclusive of the runway/taxiway system and airspace considerations.

FUTURE HANGAR DEVELOPMENT

Scottsdale Airport has a significant demand and need for additional hangar capacity. Specifically, large conventional hangars are in high demand due to the growth in activity by business jet operators; however, Scottsdale Airport is largely built out, meaning there is very limited undeveloped space on airport property. At the same time, there is significant need for additional aircraft parking apron and vehicle parking.

If any new hangars are considered on airport property, they will necessarily displace aircraft apron space. In Chapter Four, locations for three potential new hangars were identified. These potential hangars are located on current leaseholds, and each would displace existing apron area.

When there is essentially no hangar development land available, the airport should consider redevelopment of older hangar sites. One example may be the Air Commerce Center hangar office building at the south end of the terminal apron. Currently, this hangar can only house smaller aircraft due to the hangar door size. If this hangar were to be replaced, a larger conventional hangar could be built to accommodate the larger business jets.

The primary growth area for new hangars is likely to be within the Scottsdale Airpark. The airpark has approximately 150 privately owned parcels that have taxilane access. While most of these properties are developed with a hangar, some are not. The Scottsdale Airpark hangar capacity is vital to meeting the aviation demand at SDL. The airport should actively encourage that any airpark property with taxilane access be exclusively reserved for aeronautical use.

AIRCRAFT PARKING APRON

The main terminal area apron on the west side of the airfield encompasses approximately 131,000 square yards of pavement. The apron forecast model summarized in Chapter Three shows an immediate need for an additional 21,600 square yards of pavement and a 20-year need for 67,000 square yards of pavement. Unfortunately, there is no space on airport property to accommodate new apron area unless hangars are replaced with apron. Of course, there is also a need for additional hangar space as well. Development of Airpark parcels will account for a portion of the overall aircraft apron needs.

VEHICLE PARKING

Vehicle parking at SDL comes at a premium. While the FBOs provide parking for the public using their facilities, all of them have indicated a need for more parking. One potential option is for the airport to construct a parking structure and then lease a portion of the space. This would be a revenue generation tool for the airport while helping to meet the demand for more airport parking.

Identifying a suitable location for a parking structure is challenging due to the lack of developable space on the airport. When considering building a parking structure, it should be planned to have the maximum number of spaces feasible. If private land adjacent to airport could be acquired, then additional parking could be built.

AIRPORT TRAFFIC CONTROL TOWER

The existing airport traffic control tower was constructed in 1989, predating the implementation of the *Americans with Disabilities Act* (ADA). For airports with control towers, it is the airports' responsibility to provide the land to accommodate the tower and for associated vehicle parking. SDL has done that for the existing FAA control tower. The tower is currently 36 years old and may need to be replaced within the timeframe of this master plan.

The current location of the tower is ideal in that it is centrally located to the runway and on the east side of the airfield, allowing sight lines to the west side ramp areas. If the FAA decides to replace the control tower, the best location is the current site. During construction, a temporary control tower may be needed.

VERTIPORT

A vertiport is a defined helicopter and advanced air mobility (AAM) landing and departure area. Currently, there is not a dedicated vertiport at the airport. Helicopters utilize various apron areas and runways for arrivals and departures. SDL experiences regular helicopter operations and does not currently need a dedicated vertiport. With the forecast for the addition of more helicopters to the airfield and the possibility of the introduction of AAM aircraft, a time may come when a dedicated vertiport is needed to accommodate demand.

Vertiports can limit capacity because all vertical takeoff aircraft would be expected to use it. Vertiports also have protected airspace, much like runways, which can limit potential development. A dedicated vertiport is not planned for SDL at this time.

The ALP will not include a specific location for a vertiport at this time. Ultimately, as demand dictates, the airport (or a private developer) may wish to develop a vertiport. At that time, the vertiport should be designed to meet FAA design standards for safety areas and airspace protection, and the ALP will need to be updated.

AIRPORT RESCUE AND FIREFIGHTING (ARFF) BUILDING

The City of Scottsdale owns and operates Fire Station 609 at the airport. This fire station is certified for airport rescue and firefighting (ARFF) services and it also serves the city at large. Unlike commercial service airports, general aviation airports such as SDL are not required to have an on-airport ARFF facility. The fact that there is an ARFF capability is a valuable service that many air charter operators value.

The ARFF facility was built in 2003, making it 23 years old. Within the next 20 years, this facility will be out of date and in need of replacement. The current location of the fire station is ideal, and if a new facility is ever constructed, the current location should be maintained if possible.

The cost to construct a replacement ARFF facility would be the responsibility of the City of Scottsdale and the airport. Funding for the facility would not be eligible for FAA funding because it is not required by FAA standards, but it may be eligible for partial funding from ADOT.

SCOTTSDALE AIRPARK

The Scottdale Airpark is an important contributor of aeronautical facilities, which accommodate a portion of the aeronautical demand for the airport. Without the airpark, SDL would likely be at full capacity, unable to meet growing demand.

One challenge in allowing aircraft access to airpark parcels that are not on airport property is the requirement by the airport to adhere to FAA Grant Assurances. To meet the requirements of the Grant Assurances, the airport has “through-the-fence” agreements with those in the Scottsdale Airpark with aircraft. These agreements essentially create a level economic playing field for those on-airport and those off-airport. SDL’s “through-the-fence” procedures and rate structure are known industry-wide as the gold standard, and they’re often replicated by other airports that have “through-the-fence” activity. These procedures are to be maintained.

Many airpark parcels abut airport property. Periodically, these come up for sale. The airport may want to position itself to purchase select parcels to incorporate them into the airport. This would give the airport much needed land for aeronautical development.

LAND ACQUISITION

Scottsdale Airport is a mature aviation facility in that all parcels are developed with aeronautical uses. **Exhibit 5A** shows several adjacent off-airport parcels that, if acquired, could be used to meet growing aviation demand. The reality is that each of these parcels would be very expensive. A recent land sale adjacent to the airport was $35 million dollars for nine acres; nevertheless, the airport should continue to monitor the feasibility of acquiring any adjacent off-airport property that could support aviation uses.

SUMMARY

The preferred future development plan has been developed with significant input from the planning advisory committee (PAC), the public, and airport staff. The PAC was comprised of a wide range of airport stakeholders, including airport management, FAA personnel, airport tenants, and airport businesses. Several public information workshops were advertised and held to solicit input from the public.

The preferred future development plan provides the necessary development to accommodate and satisfy anticipated growth over the next 20 years and beyond. This plan will be subject to continuous refinement in future years and further engineering refinement as each project ripens toward the implementation stage.

The airfield plan preserves the existing runway orientations and dimensions. Over the course of many years, the appropriate airfield dimensions were analyzed in an effort to maximize runway length and preserve an acceptable level of safety. To this end, the airport has implemented declared distances and implemented three FAA-approved Modification of Standards (MOS). The analysis in this master plan confirms that preserving the status quo regarding the runway is the preferred alternative. Therefore, the runway will remain at 8,249 feet in length and 100 feet wide.

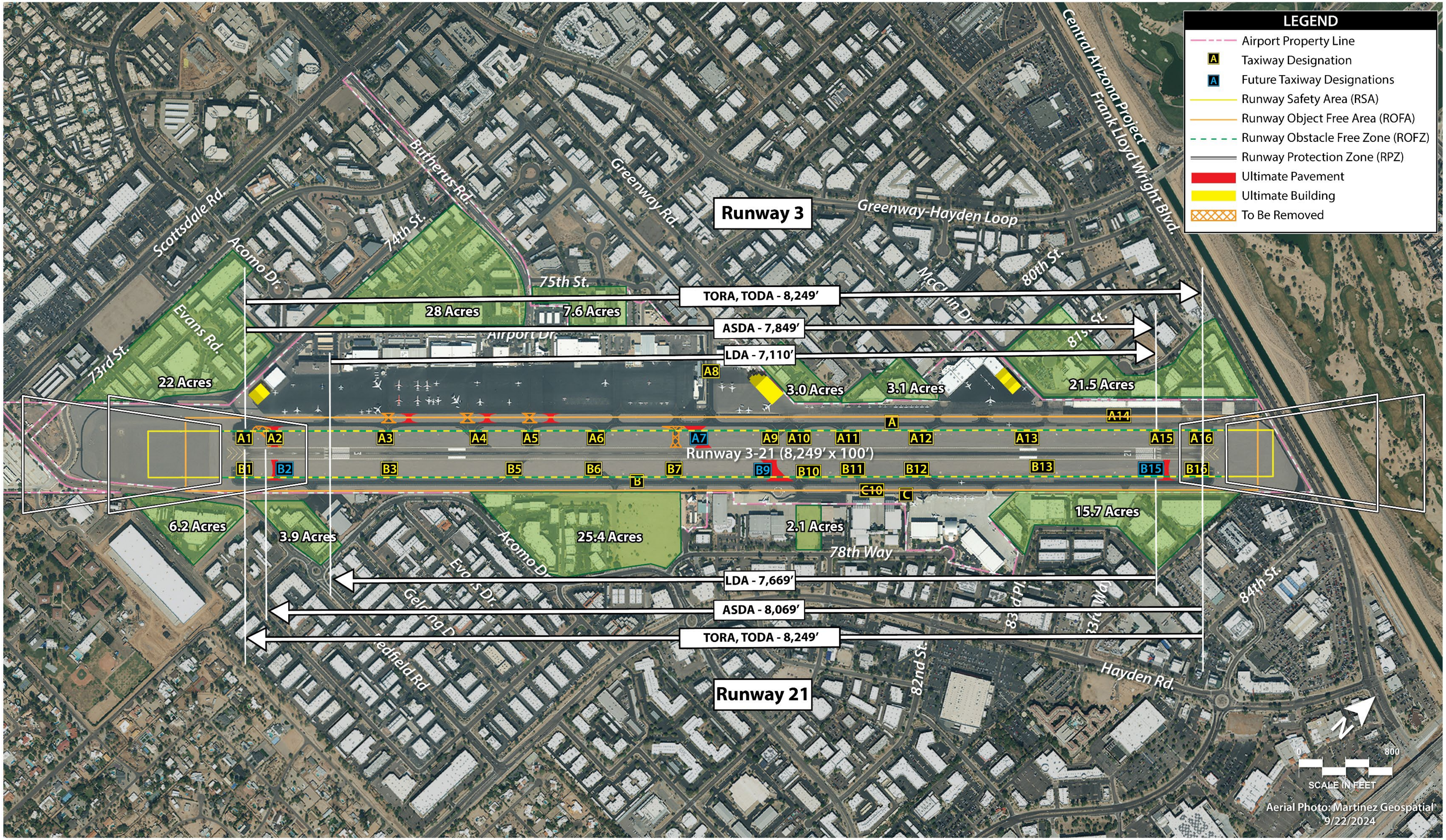
The runway weight-bearing capacity is also a topic of discussion because of the nature of the airport and the city. Scottsdale is a desirable destination for operators of business jets, including the next generation of business jets, several of which exceed the current weight-bearing capacity; therefore, it is recommended that the airport plan for a runway rehabilitation/reconstruction project that increases the weight-bearing capacity of the runway to at least 114,900 pounds for dual wheel landing gear.

The taxiway system at SDL is comprehensive; however, there are some legacy geometry layouts that do not meet current FAA recommendations. The parallel taxiways, Taxiways A and B, will remain at 250 feet from the runway, centerline to centerline, as supported by an MOS. The recommended concept includes removal of some taxiway connectors and relocation and construction of others. These updates will enhance the safety of aircraft ground movements.

On the landside, the airport has very little undeveloped land. This master plan identifies three potential locations for new conventional hangars, but these locations are currently used for aircraft apron parking; therefore, there are some real challenges to meeting future demands. One potential solution is the redevelopment of older, less efficient hangars. Another is to ensure that any Scottsdale Airpark tenant with taxilane access has a need for that access.

Vehicle parking is at a premium at the airport. Each of the FBOs have indicated a need for more vehicle parking. The airport should consider building a parking structure. One possible location is the existing public surface lot across the street from the Aviation Business Center. Another option is to acquire land for the purposes of construction a parking structure. A portion of the parking spaces could be leased to tenants to generate revenue for the airport.

The next chapter of this master plan will consider strategies for funding the preferred future development plan and will provide a schedule for implementing recommended capital improvements.


LEGEND
Airport Property Line
Taxiway Designation
Future Taxiway Designations
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
Ultimate Pavement
Ultimate Building
To Be Removed
Runway 3
Runway 21
Runway 3-21 (8,249' x 100')
TORA, TODA - 8,249'
ASDA - 7,849'
LDA - 7,110'
LDA - 7,669'
ASDA - 8,069'
TORA, TODA - 8,249'
28 Acres
7.6 Acres
22 Acres
3.0 Acres
3.1 Acres
21.5 Acres
6.2 Acres
3.9 Acres
25.4 Acres
2.1 Acres
15.7 Acres
Scottsdale Rd.
Acomo Dr.
Evans Rd.
73rd St.
74th St.
75th St.
Butherus Rd.
Greenway Rd.
Greenway-Hayden Loop
Airport Dr.
80th St.
81st St.
Central Arizona Project
Frank Lloyd Wright Blvd.
78th Way
82nd St.
84th St.
Hayden Rd.
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A
B1 B2 B3 B5 B6 B B7 B9 B10 B11 B12 B13 B15 B16
C10 C
N
0 800
SCALE IN FEET
Aerial Photo: Martinez Geospatial 9/22/2024