SKYBRIDGE ARIZONA

Concept Master Plan

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PREPARED FOR | SKYBRIDGE ARIZONA

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INTRODUCTION & VISION

1.1 INTRODUCTION

AECOM Design + Planning (AECOM) was asked by Mesa SkyBridge LLC (Mesa SkyBridge) to develop a master plan for a 363.5-acre site in Mesa, Arizona. This site will become the location of “SkyBridge Arizona”, an international air cargo hub that will house and facilitate both United States and Mexican Customs functions. Upon completion, SkyBridge Arizona will radically transform how cargo and other goods are shipped between the United States and Mexico. Currently, Mexican and United States Customs facilities are separate, meaning that goods are delayed by having to be cleared and processed through both authorities. By consolidating these functions at SkyBridge Arizona, the process will become significantly more efficient and less costly, facilitating additional commerce and trade opportunities between the United States, Mexico, and further beyond to other global markets.

The SkyBridge Arizona site is strategic primarily because of the immediate access to the Phoenix-Mesa Gateway Airport. However, this location also offers a highly connected roadway network in a rapidly growing region. Mesa is anticipated to reach a population of a half-million residents in the near future, making it the third largest city in Arizona.

AECOM has been working closely with Mesa SkyBridge to help deliver the vision for SkyBridge Arizona and develop this master plan document. AECOM’s work has included an analysis of existing site conditions, conceptual site planning, landscape master planning, and sustainable infrastructure planning. AECOM and Mesa SkyBridge have also teamed with Hatch to provide the economic analysis and market conditions portion of the master plan document and Hilgart-Wilson to provide water and drainage studies

This document is intended to provide clear direction for the future development of the SkyBridge Arizona site.

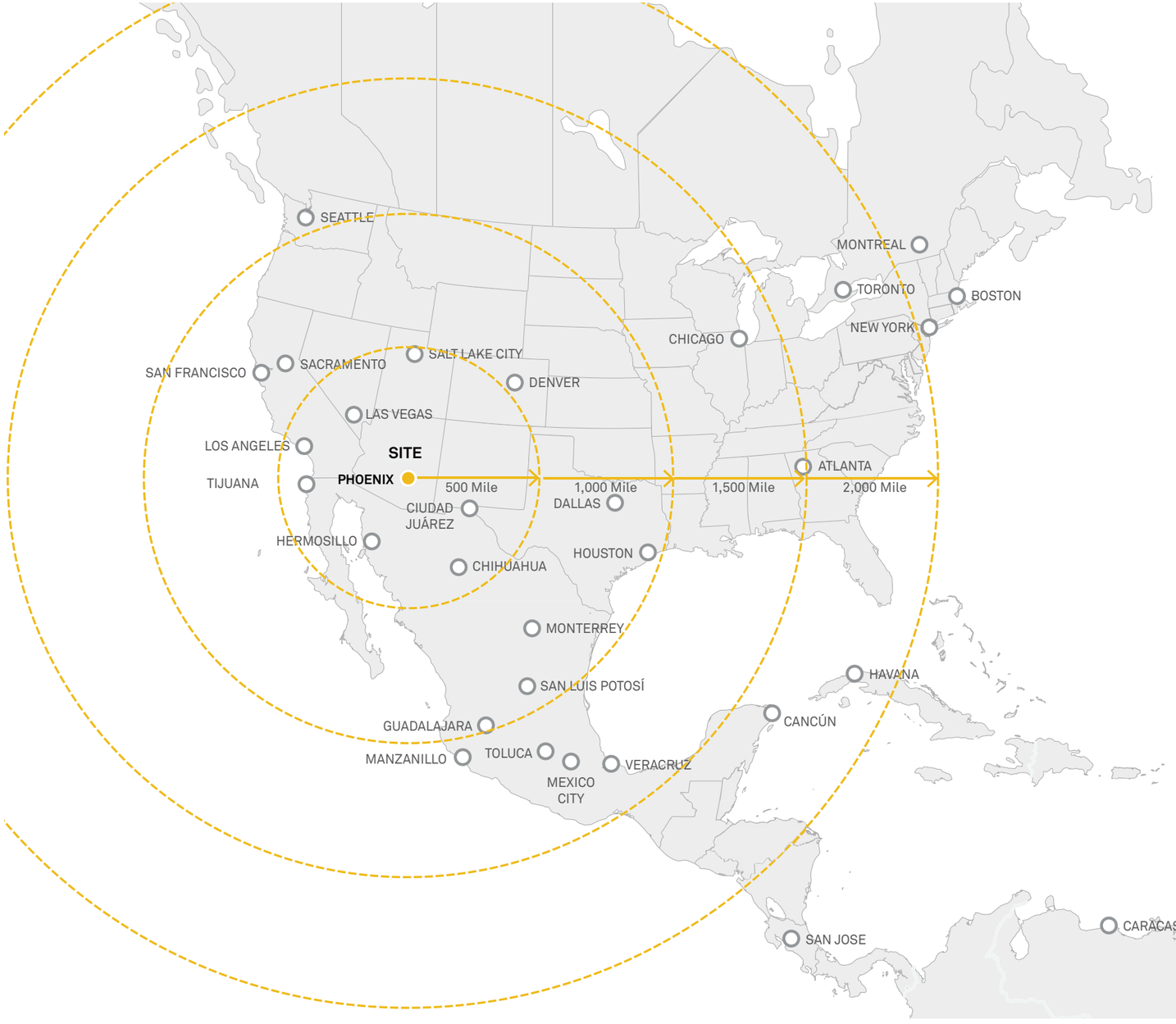

Figure 1.1: SkyBridge Site in North America Context

1.2 DOCUMENT PURPOSE

This document serves as a comprehensive master plan package for potential users of the project. The document includes analysis of the site from economic, social, and physical perspectives; a development vision, as well as a master plan; and public realm guidelines and infrastructure concepts. The document is organized as follows:

Chapter 1 Introduction & Vision
Describes the project background and vision.

Chapter 2 Market Conditions & Economic Analysis
Describes site context including location, labor force, and city attractions.

Chapter 3 Site Analysis
Contains existing site conditions analysis and opportunities and constraints.

Chapter 4 Concept Master Plan Framework
Contains the overall development concept including land use plan, development statistics, and zoning requirements.

Chapter 5 Development Standards & Design Guidelines
Provides development standards and design guidelines that maintain consistency, high standards, and quality over the lifetime of the SkyBridge Arizona project.

Chapter 6 Public Realm Concepts
Includes the overall landscape design approach, overall public realm framework, and the landscape design guidelines manual.

Chapter 7 Sustainable Infrastructure Concepts
Summarizes flood control strategies, water and wastewater planning, and energy planning.



Figure 1.2: Bird's Eye View of SkyBridge Arizona

1.3 NATIONAL CONTEXT

1.3.1 Air Connectivity

The SkyBridge Arizona site is located directly adjacent to the Phoenix-Mesa Gateway Airport on airport land. Phoenix-Mesa Gateway Airport is owned and operated by the Phoenix-Mesa Gateway Airport Authority (PMGAA), a Joint Powers Airport Authority comprised of the Cities of Mesa, Phoenix and Apache Junction, the Towns of Queen Creek and Gilbert, and the Gila River Indian Community. The Phoenix-Mesa Gateway Airport offers commercial flights to destinations across the United States on Allegiant Airlines. WestJet Airlines also operates two flights to Canada from the Phoenix-Mesa Gateway Airport. Canadian flights are limited to Pre-clearance Cities. The International and National Commercial flight routes available from this airport are shown in Figure 1.3.

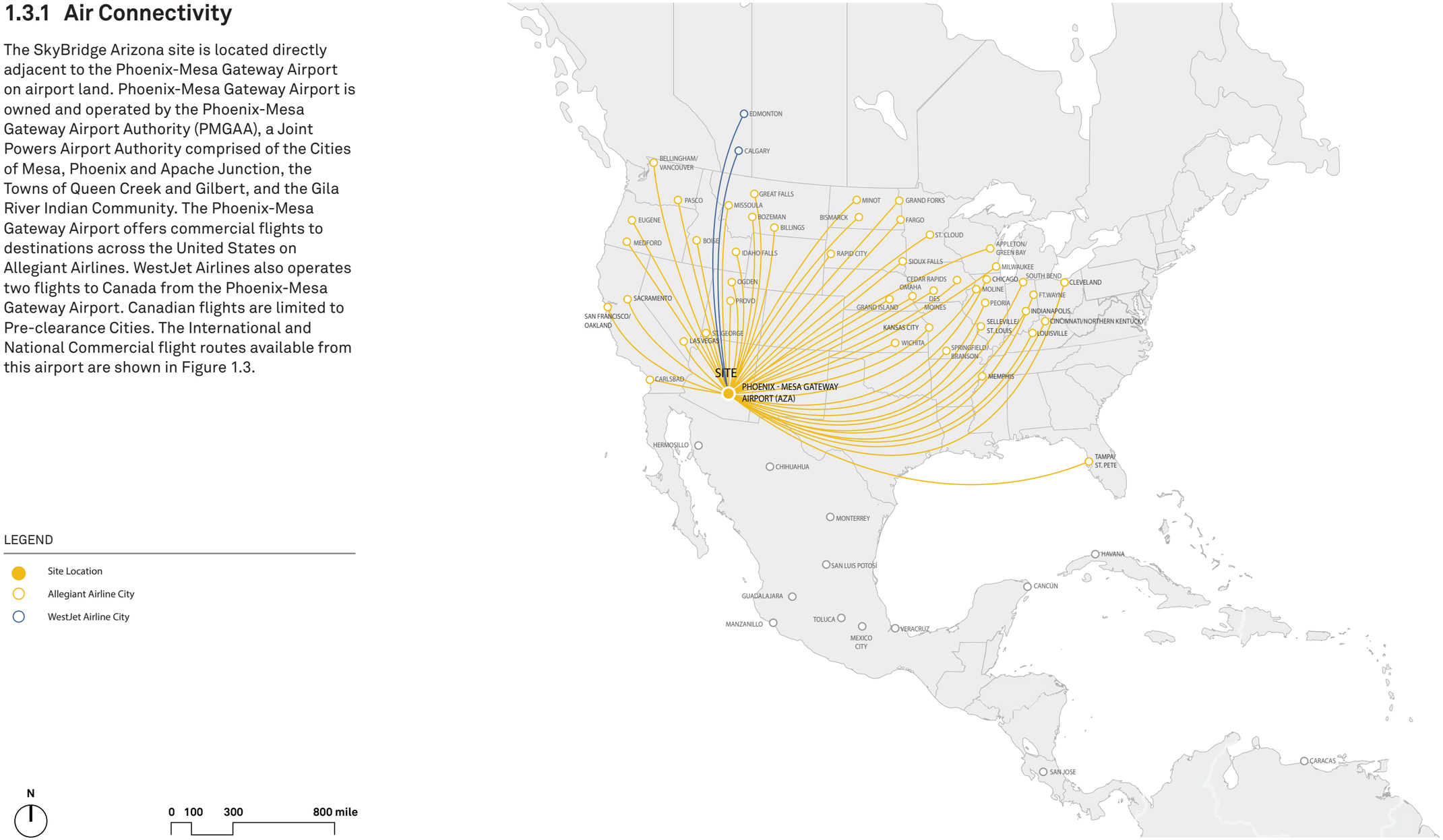

Figure 1.3: International and National Commercial Flight Routes from Phoenix-Mesa Gateway Airport

1.3.2 National Connectivity

The SkyBridge Arizona site is located approximately 36 miles southeast of Phoenix in the city of Mesa, Arizona. The site's advantageous location offers facilitated access to all of the greater Phoenix metro areas, including Tempe, Mesa, Scottsdale, Chandler, and Gilbert. Tucson, Arizona's second most populated city behind Phoenix, is just under two hours away by vehicle, south from the site on Highway 10.

The interconnected highway system surrounding the site makes the site highly connected to the entire southwestern United States and Mexico. From Tucson, Highway 19 travels southbound to the U.S.-Mexico border, where there is a major U.S. Customs and Border Protection checkpoint before reaching Nogales, Mexico. The major city of Hermosillo, Mexico can be reached 173 miles south from Nogales.

Figure 1.4 shows the highway connectivity network of the SkyBridge Arizona site.

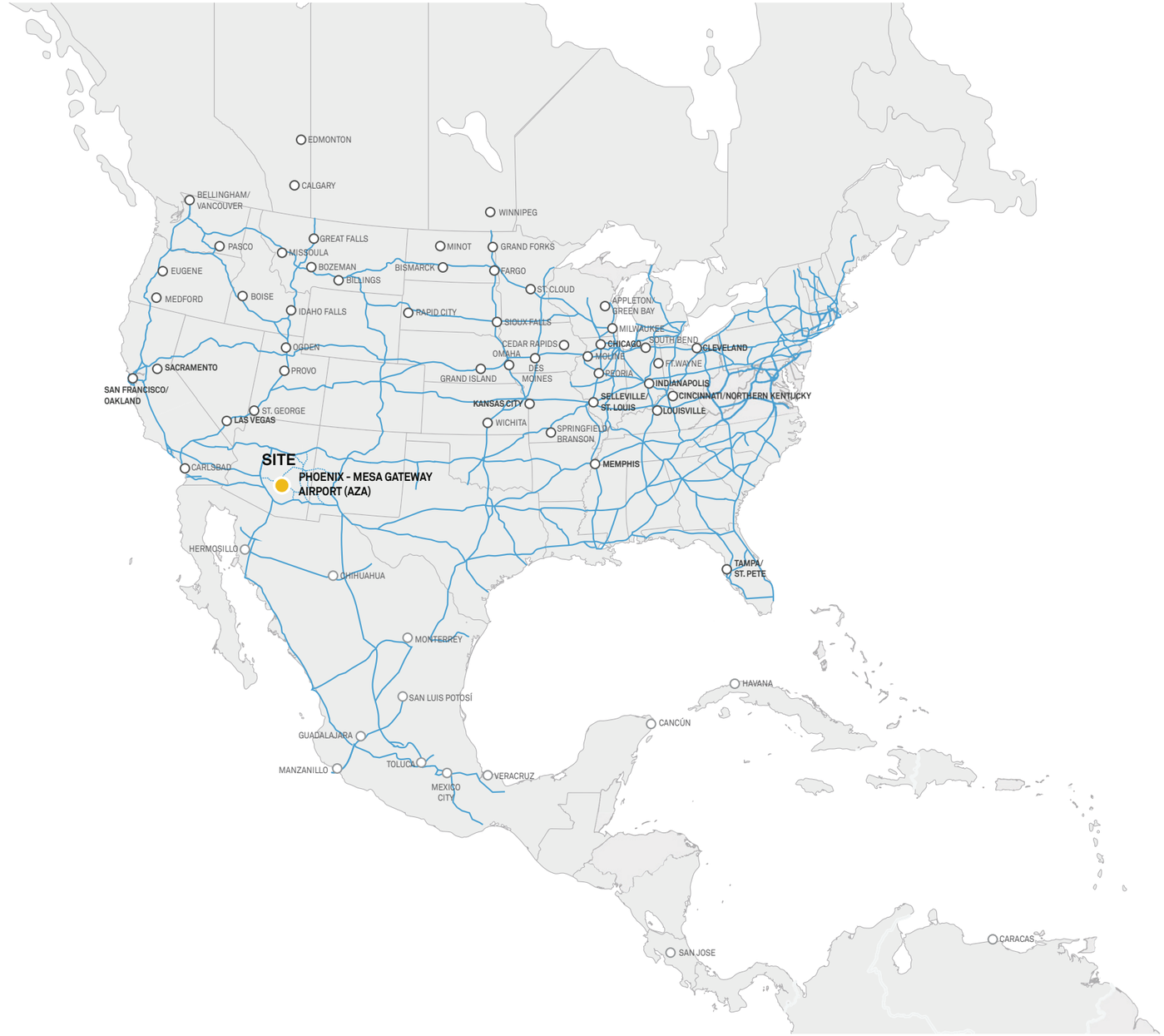

Figure 1.4: Primary Highway Connectivity in US and Mexico

1.4 PROJECT VISION & GOALS

1.4.1 Project Vision

SkyBridge Arizona will provide the nation's first air cargo hub to house both Mexican and U.S. Customs and become a premier destination for auto parts, food processing, and an e-commerce business center.

The 363.5-acre mixed use development will not only include a joint U.S.-Mexico Customs inspections facility to streamline shipments to Mexico and beyond, but will also offer 1.35 million square feet of aeronautical development, 2.19 million square feet of non-aeronautical development, and 270,000 square feet of commercial development. The combination of land uses will be key to SkyBridge Arizona's success and ability to spur important regional and local economic growth.



Figure 1.5: SkyBridge Aerial View



Character images of project goals

Create the first and only inland international air logistics and processing center in the United States



Provide a balanced and market driven mix of uses



Provide flexibility to accommodate various users



Respect and enhance existing natural features

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MARKET CONDITIONS & ECONOMIC ANALYSIS

2.1 THE REGION

2.1.1 Introduction

The SkyBridge master plan represents the culmination of a series of unique opportunities, conditions and projects at a local, regional, national and international scale. SkyBridge Arizona is a new industrial development in a market that shows strong market fundamentals, a growing population, a skilled workforce and a growing demand for industrial space. With its foreign trade zone and expedited routes to Mexico, it is uniquely well-positioned to benefit from Mexico's nascent foray into the e-commerce sector. At full build-out it will contain and operate over 3.8 million square feet of commercial space and over 6,400 on site jobs and another 8,400 in the region as a whole.

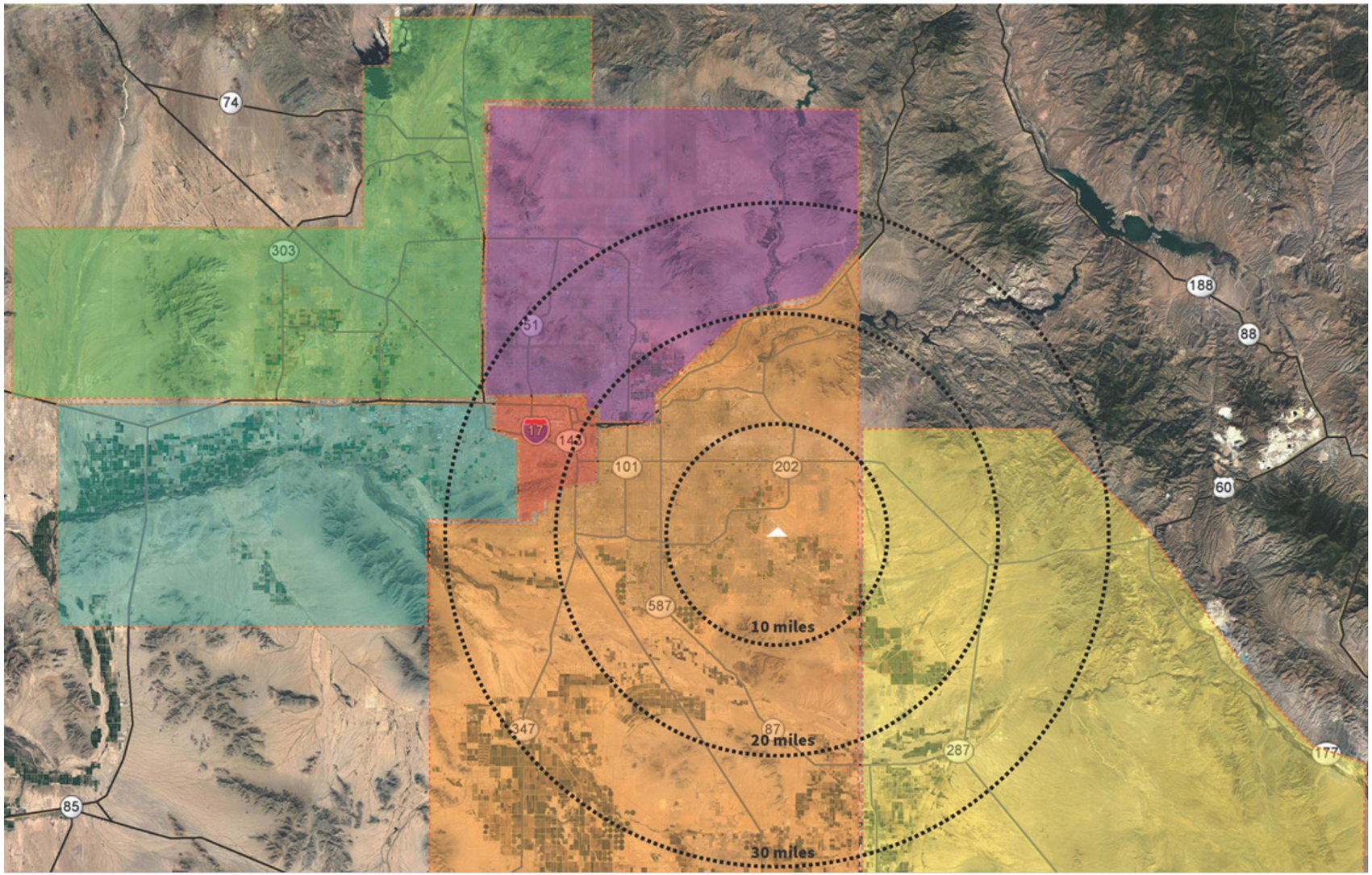


Figure 2.1: SkyBridge Site in Phoenix Metropolitan Area Context

2.1.2 Regional Analysis

The SkyBridge Master Planning Team evaluated market opportunities in the Phoenix Mesa Gateway Airport real estate market area and in context to the SkyBridge conceived by the development team. Hatch with SkyBridge evaluated demographic and economic trends, and real estate trends. These inputs establish absorption projections broken down by the specific program components, phasing and program recommendations, tenant analysis and case study analysis of different airports with similar program strategies. In addition, Hatch evaluated the economic and employment impacts to the Phoenix Metropolitan Area of the construction and operation of the different phases and development program.

All work and recommendation in this section represent the information available in market reports, local broker interviews, census data, and Bureau of economic analysis data as of Q1 2018.

The overall demand for light industrial, warehouse and distribution, and manufacturing is strong with considerable growth in warehouse and distribution space driven by e-commerce growth. With strong GDP, population, and employment growth, SkyBridge is poised to capture a share of the regional real estate demand in warehouse and distribution, office, retail, and hotel demand.

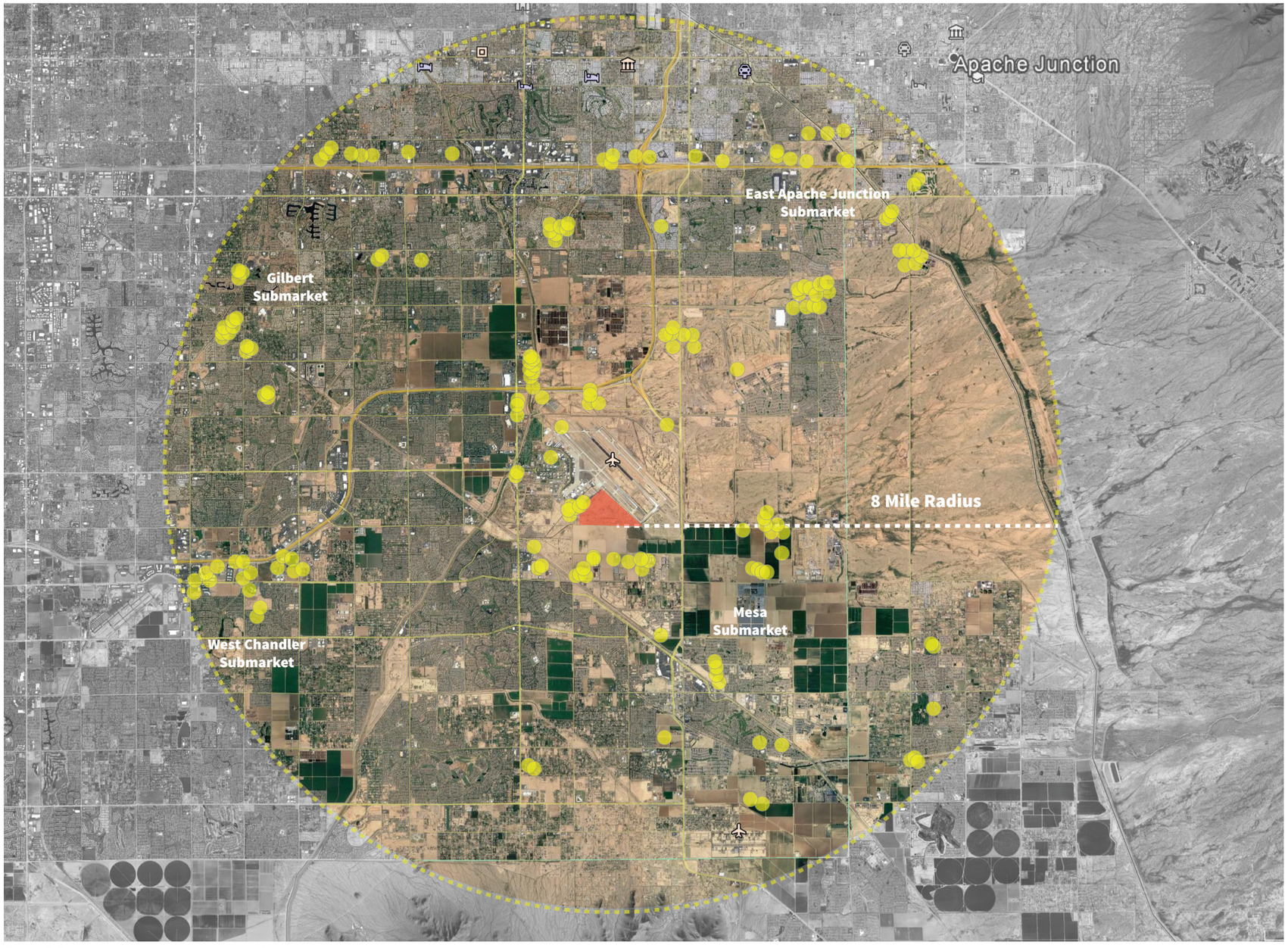


Figure 2.2: SkyBridge Site and Competing Project Analysis

2.2 DEMOGRAPHIC TRENDS

2.2.1 Population & Workforce

According to the US Census, in 2017 the Phoenix Metropolitan Area grew by over 100,000 inhabitants making it the second fastest growing metropolitan area in the US. The population in the Phoenix Metropolitan Area is at an all-time high of approximately 4.7 million residents. Phoenix continues to receive domestic migration with considerable inflow of households from California, Texas, and Colorado.

The region was one of the most affected by the financial crisis. In the years between 2008 and 2010, the unemployment rate increased up to over 10% and the labor workforce decreased by 100,000 people. The recovery in the subsequent years has more than made up the effects of the economic downturn. Since 2010 unemployment has steadily decreased an average of 85 basis points with no signs of slowing down. This trend could continue for two more years without reaching the labor shortage of 2007.

Along with population growth, the region has also experienced considerable employment growth with a growing workforce. The current labor force is 2.3 million workers. This figure represents an all-time high when it comes the labor force of Phoenix Metro Area; 200,000 workers above the previous 2007 peak. Data indicates this growth is driven by increases in the regional population with more room for the decrease in the unemployment rate in the coming years.

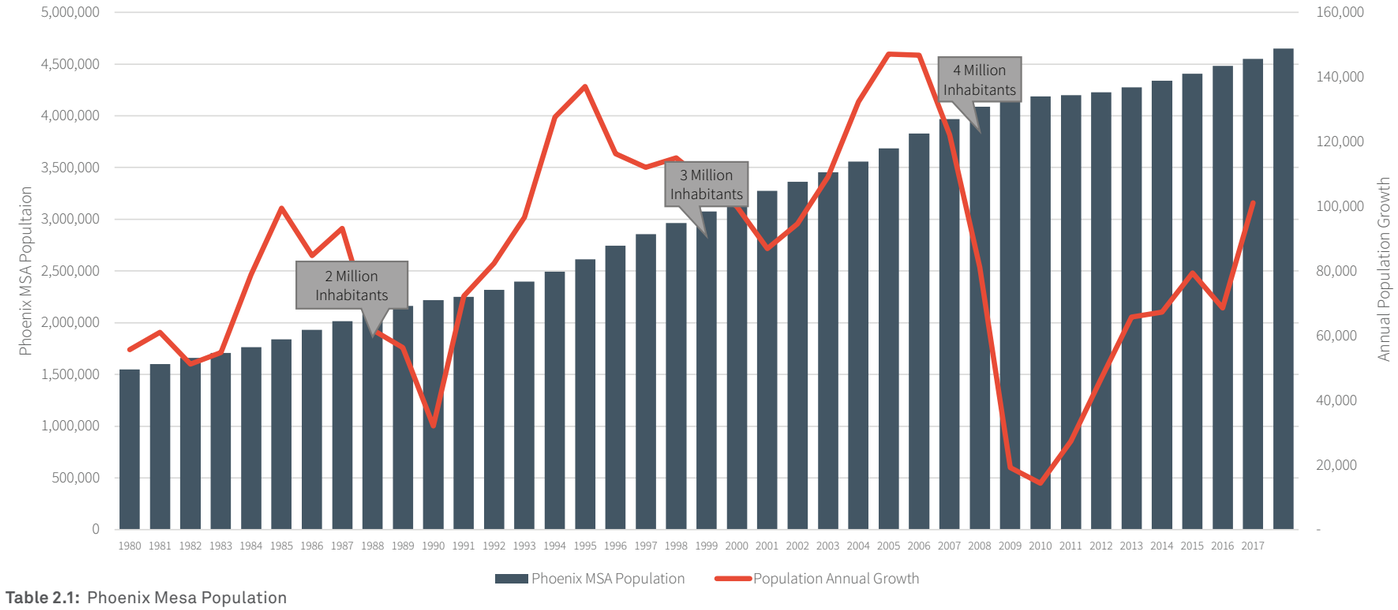


Table 2.1: Phoenix Mesa Population

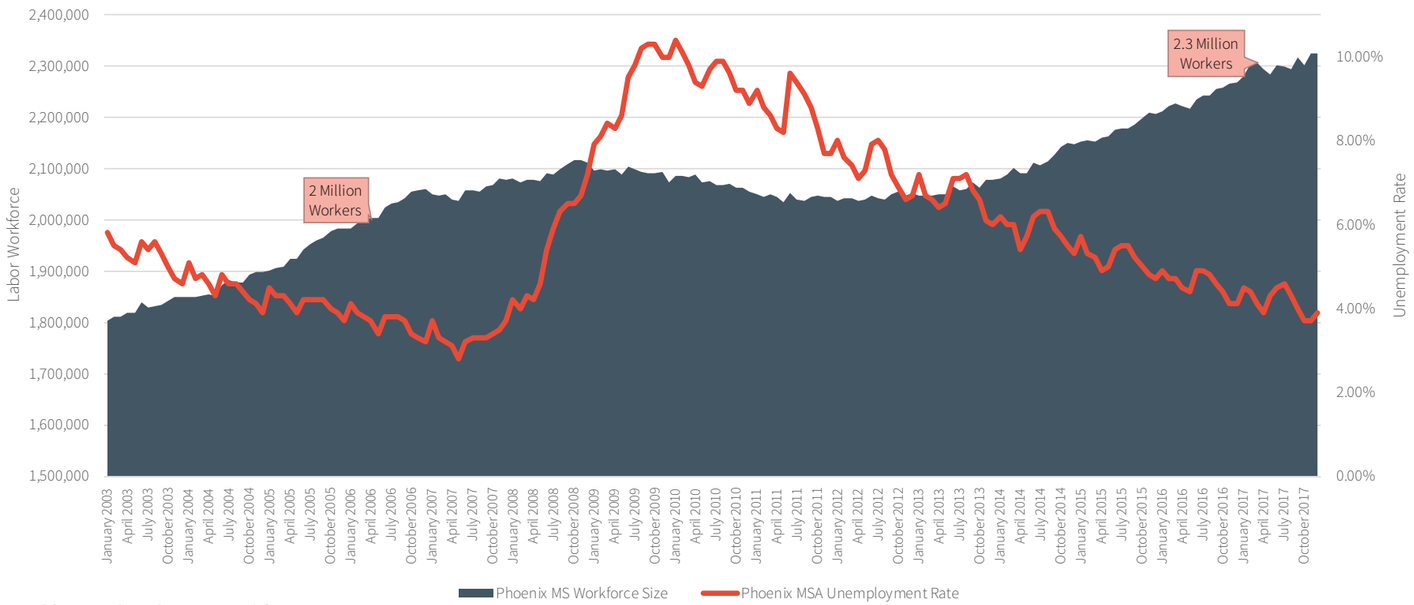


Table 2.2: Phoenix Mesa Workforce

2.2.2 Spending Power

Growth in population, GDP, and wages all indicate strong fundamental indicators for the regional economy. Current trends indicate an increase in spending power, a growing portion of which is expected to go in to the e-commerce market. Projected e-commerce sales in the Phoenix Metropolitan Area in the next 15 years is projected to increase by approximately $94 billion based on population and income growth combined with an increasing share of total consumer expenditures occurring on-line.

Steady increase in purchasing power makes the Phoenix Metropolitan Area a strategic market.

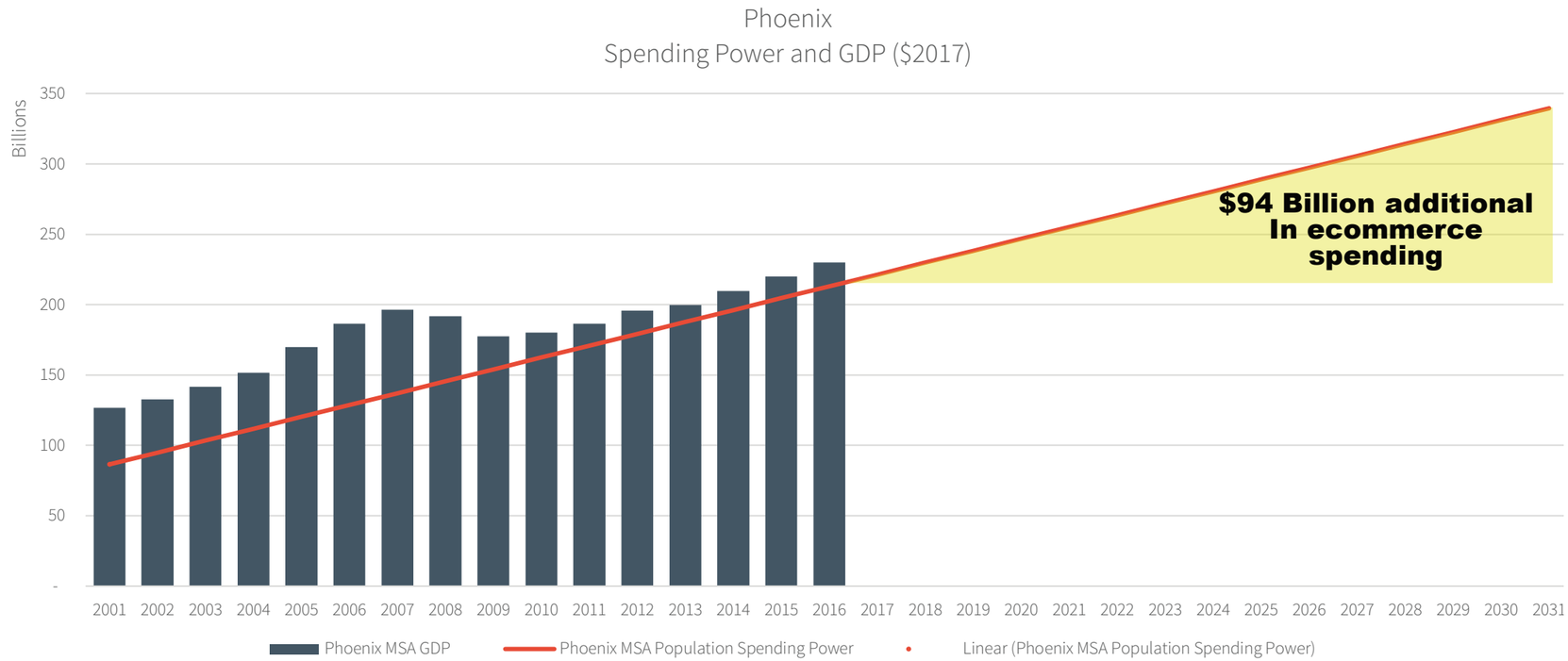


Table 2.3: Phoenix MSA Spending Power

2.3 MEXICAN E-COMMERCE

2.3.1 Growth Projections

The SkyBridge concept offers a unique opportunity to access the emerging Mexican e-commerce market; a market that represents an important opportunity not only to the major e-commerce players in the US but also to the major manufacturers. Estimates by HSBC calculate current e-commerce penetration at 2% or that of the US in 2004 suggesting a potential for consistent double-digit growth. Sales data tell a similar story. E-commerce sales in Mexico grew by 28% between 2015 and 2016 and half of all of Mexico's e-commerce purchases consists of imports from the US. These projections suggest an increase of roughly $375 billion in US exports to Mexico in the next 15 years. Furthermore, a majority of this increase in sales will come from electronics, jewelry and high-end clothing; sectors with a high dollar per pound rates that are more likely to be transported by plane.

Mexican e-commerce is still in the rapid growth phase of the market.

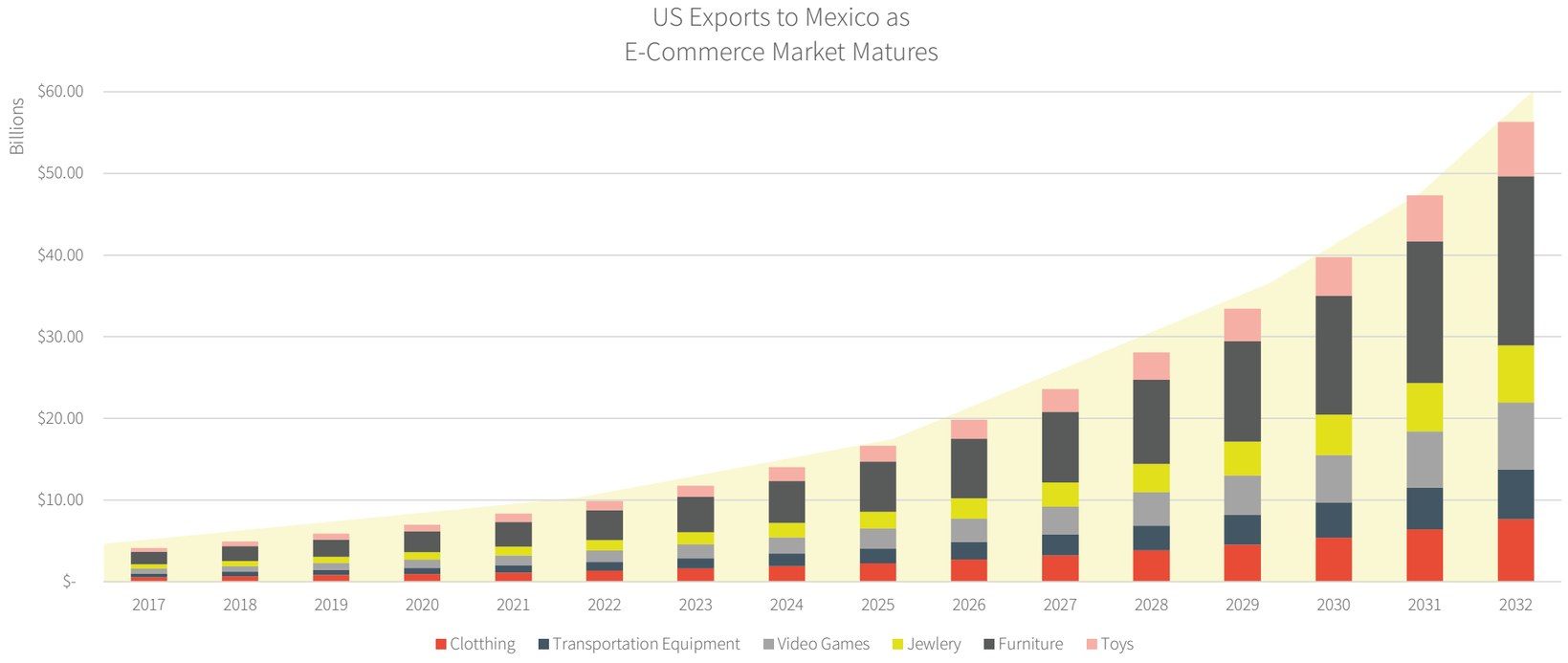


Table 2.4: Mexican E-Commerce Growth

2.3.2 Key Players

Unlike the US e-commerce market, there is no single dominant player in the sector yet. Amazon, the largest e-commerce retailer in the US, just introduced Amazon prime in 2018. Along with this service expansion Amazon is building a 1 million square feet warehouse in the periphery of Mexico City. Walmart, Amazon's largest competitor in the US, announced a $1.3 billion investment in its distribution network infrastructure. These large capital projects from e-commerce retailers are due in large part to a fact that public distribution networks like the Mexican postal network (Correos de Mexico) do not have the capacity or dependability track record to handle the traffic of a mature e-commerce market. This creates a distribution arms race dynamic between the incoming players like Amazon and Walmart, and established Mexican e-commerce companies like Linio and Mercado Libre. One of the deciding factors in the competition for market share in the coming years will be the dependably and reach of each players' distribution network.

amazon

1 million square-foot
Warehouse in Mexico City
(introduced Prime in 2018)

Linio .com.mx

$55 million per year
Distribution

mercado libre

$100 Million
In new distribution centers in 2018.

Walmart
Save money. Live better.

$1.3 Billion
Investment in distribution network

2.4 ABSORPTION MODEL

2.4.1 Absorption Assumptions

The annual absorption of industrial space in the Phoenix Metro Area reacts more dramatically to the regional economic indicators than any other indicator included in this study. After the 2001 recession absorption reached a low point of 2 million square feet of absorption per year and the 2008 recession produced a net vacancy of over 4 million square feet in the metropolitan area. The subsequent recovery in the industrial market absorption has been healthy; with nearly 10 million square feet absorbed in 2017 an all time high figure. 2018 Q1 data indicates a continuation of the strong market fundamentals.

Industrial absorption data was divided into three primary sectors. The first sector, general warehousing includes all warehousing space not associated with e-commerce or manufacturing. For the purposes of the master plan this consists primarily of reefer and cooler space and other space aimed at food processing. Later sections will explain how direct access to air cargo routes represent a distinct competitive advantage when it comes to the food supply chain. The second sector is distribution or e-commerce. This sector is not typically analyzed separately from general warehousing but absorption data shows that e-commerce space absorption in the Phoenix Metro area increased consistently over the last 10 years despite economic downturns that affected other industrial sectors. Finally, manufacturing sector refers primarily to the aerospace and auto parts supply chain.

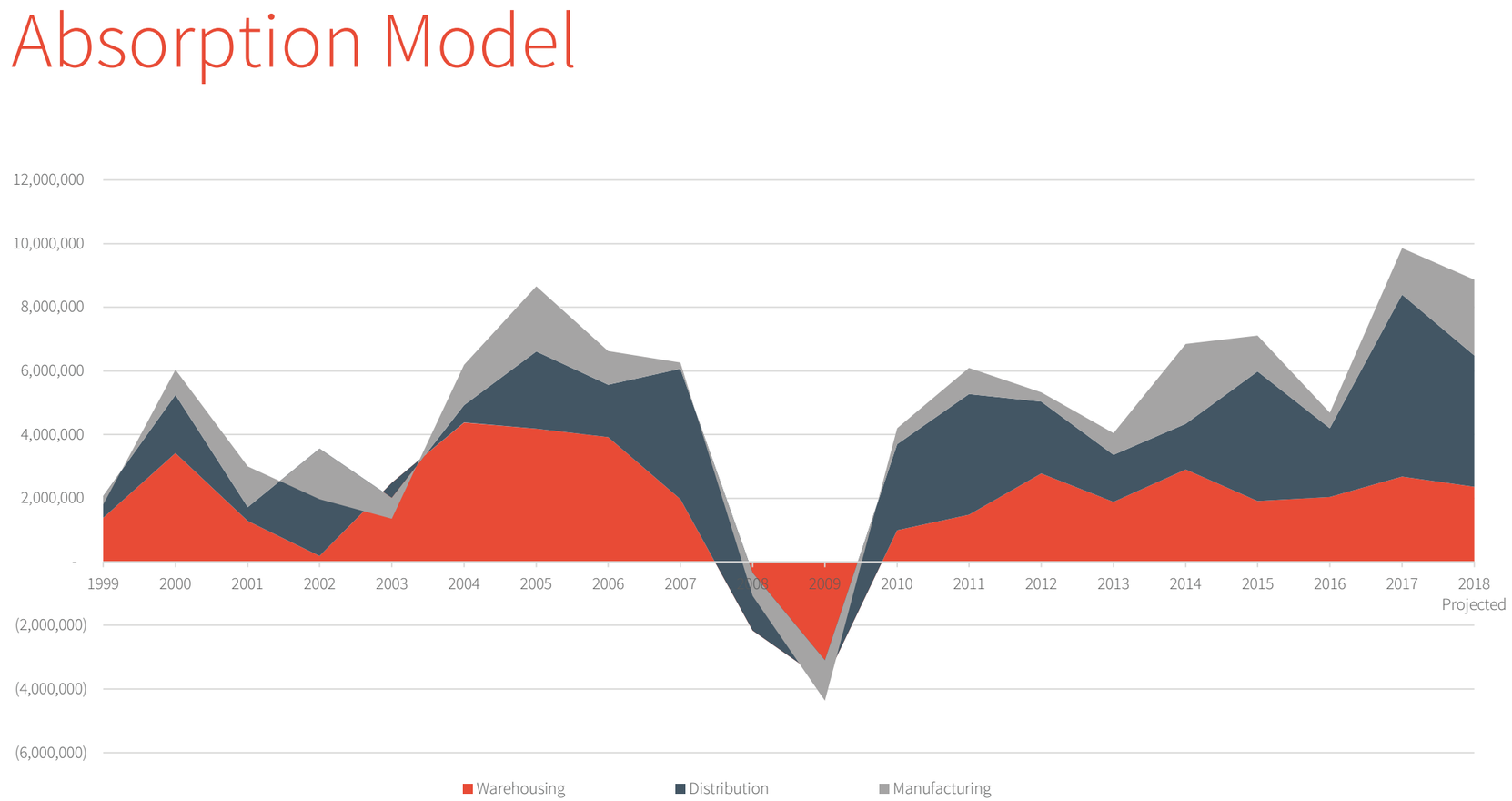
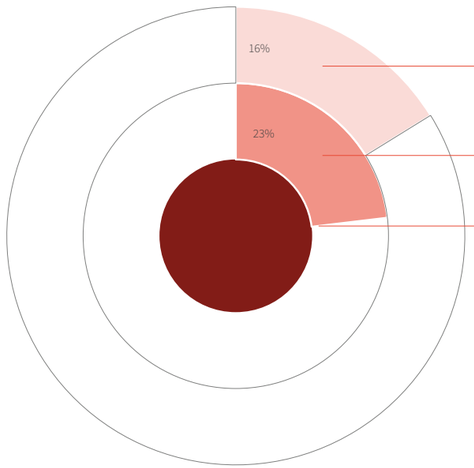


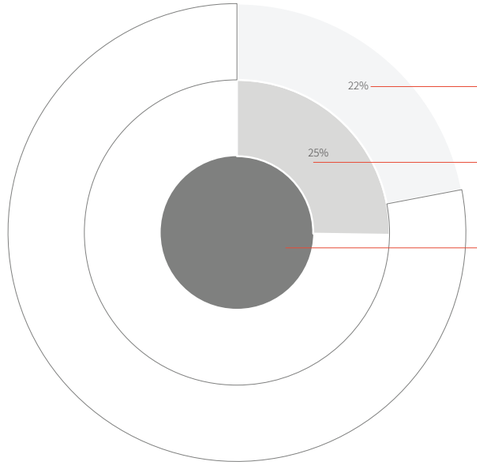
Table 2.5: Industrial Space Absorption Phoenix Area

Warehousing Absorption



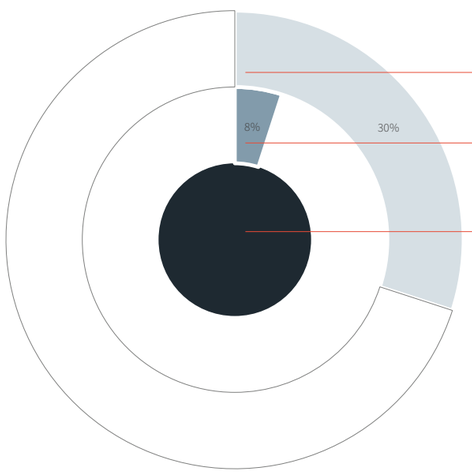
	Aggressive Scenario	Conservative Scenario
Skybridge Arizona	85,000 sq. ft./ year .	50,000 sq. ft./ year .
Mesa Catchment Area	530,000 sq. ft./ year .	320,000 sq. ft./ year .
Phoenix Metro Area	2,300,000 sq. ft./ year .	1,400,000 sq. ft./ year

Manufacturing Absorption



	Aggressive Scenario	Conservative Scenario
Skybridge Arizona	69,000 sq. ft./ year .	36,000 sq. ft./ year .
Mesa Catchment Area	314,000 sq. ft./ year .	160,000 sq. ft./ year .
Phoenix Metro Area	1.2 Million sq. ft./ year .	650,000 sq. ft./ year .

E-Commerce Absorption



	Aggressive Scenario	Conservative Scenario
Skybridge Arizona	62,000 sq. ft./ year .	58,000 sq. ft./ year .
Mesa Catchment Area	208,000 sq. ft./ year .	190,000 sq. ft./ year .
Phoenix Metro Area	2.6 Million sq. ft./ year .	2.4 Million sq. ft./ year

2.5 AIRPORT CASE STUDIES

2.5.1 Absorption Assumptions

SkyBridge's unique connection to different markets in Mexico gives SkyBridge a comparative advantage in food processing and e-commerce, both of which are projected to become very active across the US-Mexico border. Food processing for dried, canned, and bottled goods that do not require refrigeration is present in the Phoenix area with Kellogg's, Kraft, Coca-Cola, and Pepsi all having facilities in the area, but reefer/cooler, which SkyBridge will introduce, is an underserved market. There is substantial activity in cross-border trade for food products that need refrigeration. There is also a growing market for delivery meal-kit and other food products, represented by the growing presence of food-based direct-to-consumer companies like Blue Apron, Freshly, and the like. Similar to e-commerce and logistics, which sees both large anchors like Amazon and smaller start-ups, the food processing and reefer/cooler space has large food distribution corporations like Sysco, which can reach over 100,000 square feet in its leases, and smaller operations.

The major logistics and e-commerce businesses like DHL, FedEx, Amazon, and Walmart will make up a large portion of the e-commerce and air cargo business, but smaller firms that operate direct-to-consumer business strategies and US-Mexico logistics are strong, and represent a reliable and growing tenant. Because of Phoenix's location, logistics firms that work across North and South America locate here.

While direct-to-consumer start-ups that provide niche services are beginning to grow in the US, the potential for growth in the Mexican e-commerce market provides an opportunity to extend services across the border. While Phoenix is already home to several of these companies, as they begin to export across North America, SkyBridge will be well equipped to serve them.

Industries in Common

	Phoenix-Mesa Gateway	Rickenbacker Global Logistics Park	Huntsville JetPlex	Sky Harbor Industrial Park	Chicago Rockford International	Dallas-Forth Worth International
Air Cargo	✓	✓	✓	✓	✓	✓
E-Commerce	✓		✓			✓
Reefer / Cooler	✓					✓
Aerospace / Auto Parts	✓	✓	✓	✓	✓	✓
Food Processing	✓					✓
Office / R&D	✓	✓	✓	✓	✓	✓
Retail	✓	✓				
Hotel	✓				✓	✓
Top Five Market	✓				✓	✓
Intermodal Rail		✓	✓		✓	✓

Figure 2.3: Case Study Comparison Matrix

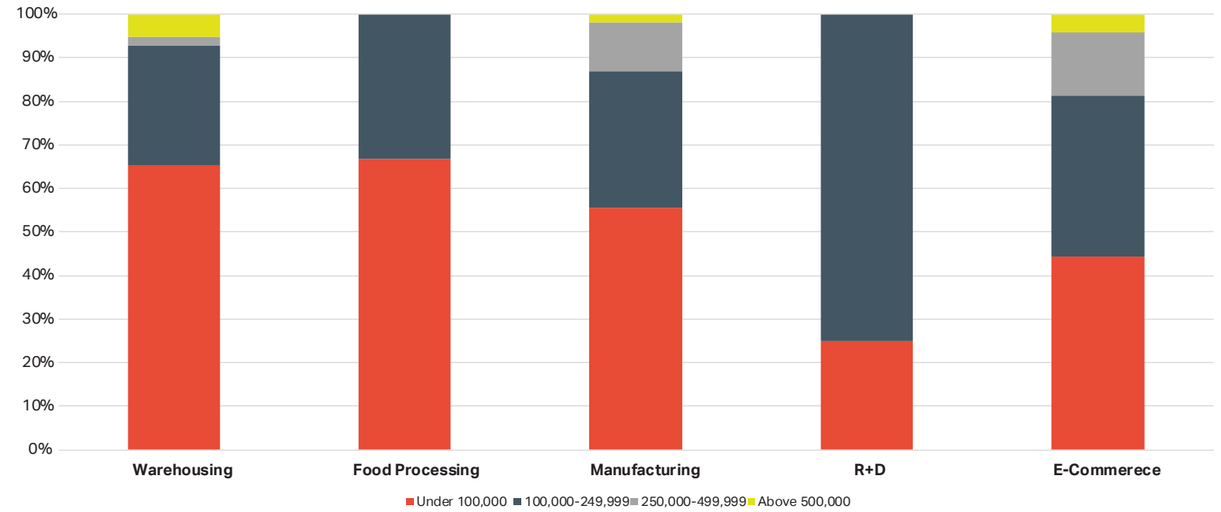


Table 2.6: Parcel Area Analysis

2.6 ECONOMIC IMPACT

SkyBridge Arizona is well-positioned to be a game-changing factor for the workforce and economic development of the area. At full buildout the development will accommodate over 6,400 full time jobs on site. In the region as a whole, SkyBridge Arizona would support over 8,400 full time jobs in the region. In other words, for every job created on-site, 1.4 jobs are created nearby due to spending by on-site firms, their suppliers, and employees. Furthermore, the jobs created in this development pay, on average, $77,000 per year or over 40% above the county average. The contribution to gross regional product is projected to total $3.8 billion, including indirect and induced effects.

		Direct Employment by Phase						
		Non-Aeronautical Use	Aeronautical Use	Office + RD	Retail	Hotel	Cumulative Total	Total
1	Phase I	683	139	0	0		823	823
2	Phase II	924	186	0	0		1932	1110
3	Phase III	807	225	0	118	30	3112	1179
4	Phase IV	1012	0	222	0		4345	1234
5	Phase V	812	0	222	0		5379	1034
6	Phase VI	847	196	0	0		6422	1042
	TOTAL	**5084**	**746**	**444**	**118**	**30**		**6422**

	Sq. Ft. per Full Time Employee			
	Non-Aeronautical Use	Aeronautical Use	Office + RD	Retail
Employment Density	600	1023	450	170

Table 2.7: Direct Employment by Phase

		Indirect Jobs by Phase						
		Non-Aeronautical Use	Aeronautical Use	Office + RD	Retail	Hotel	Cumulative Total	Total
1	Phase I	888	209	0	0	0	1097	1097
2	Phase II	1201	279	0	0	0	2577	1480
3	Phase III	1049	337	0	59	12	4034	1457
4	Phase IV	1315	0	333	0	0	5682	1649
5	Phase V	1055	0	333	0	0	7071	1389
6	Phase VI	1101	293	0	0	0	8465	1394
	TOTAL	6609	1119	667	59	12		8465

	Indirect Jobs per Direce Job by Program				
	Non-Aeronautical Use	Aeronautical Use	Office + RD	Retail	Hotel
Indirect Employment Multipliers	1.3	1.5	1.5	0.5	0.4

Table 2.8: Indirect Employment by Phase

Land Use	Direct Jobs	Labor Income / Job[1]
Warehouse	3,552	$90,000
Light Industrial/Flex	1,525	$76,000
Customs Facility	30	$69,000
Air Cargo Operations	748	$85,000
Office	444	$76,000
Hotel	30	$42,000
Retail/Other	118	$37,000
Total	6,452	$77,000
County Average		$54,000
Difference		+43%

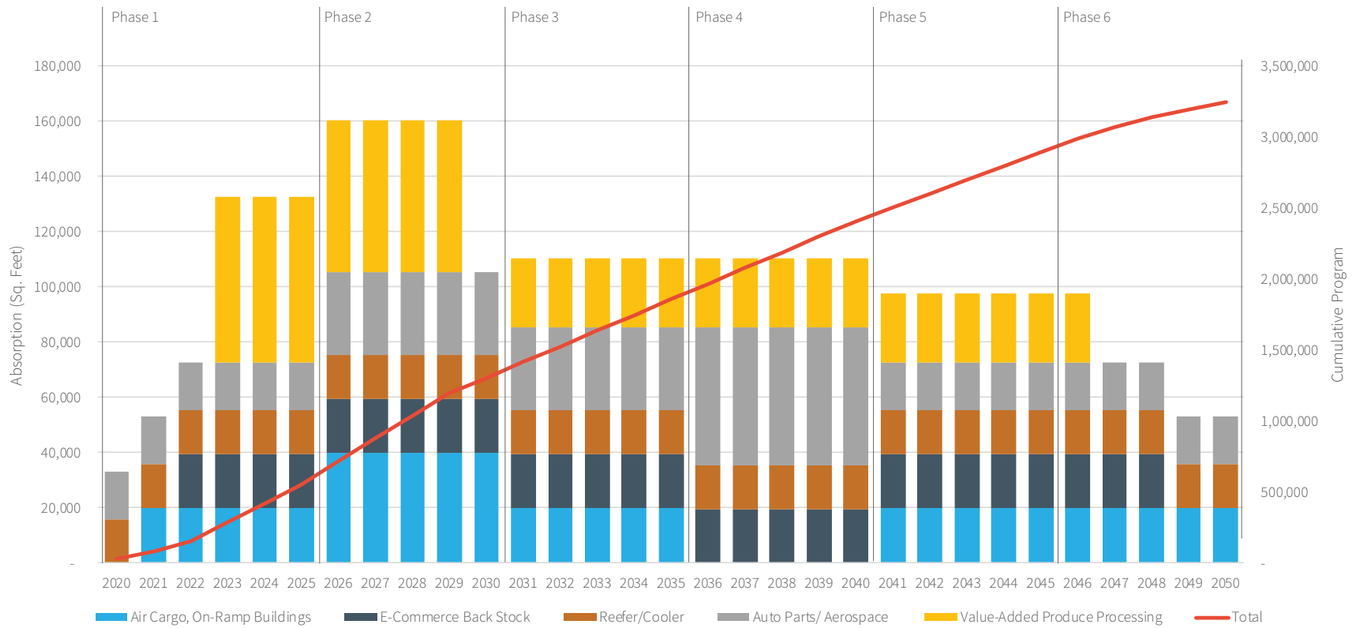
Table 2.9: Average Income by Job

2.7 CONSERVATIVE PHASING SCENARIO

2.7.1 Absorption Assumptions

Conservative absorption phasing represents the average annual absorption of the Phoenix Metropolitan Area going back to the year 2000. This means the annual average includes the two recessions (an average recession like in 2001 and major recessions like in 2008 and 2009). As mentioned, in the regional and macroeconomic indicators do not indicate a high probability of an economic downturn in the coming years so this conservative projection is likely to underestimate short-term projections. However, long-term absorption is more likely to match this scenario.

The conservative scenario represents business-as-usual, meaning that major shifts in market dynamics (such new large tenants in the area or major shifts in the demography of the region) are not accounted for in this scenario.

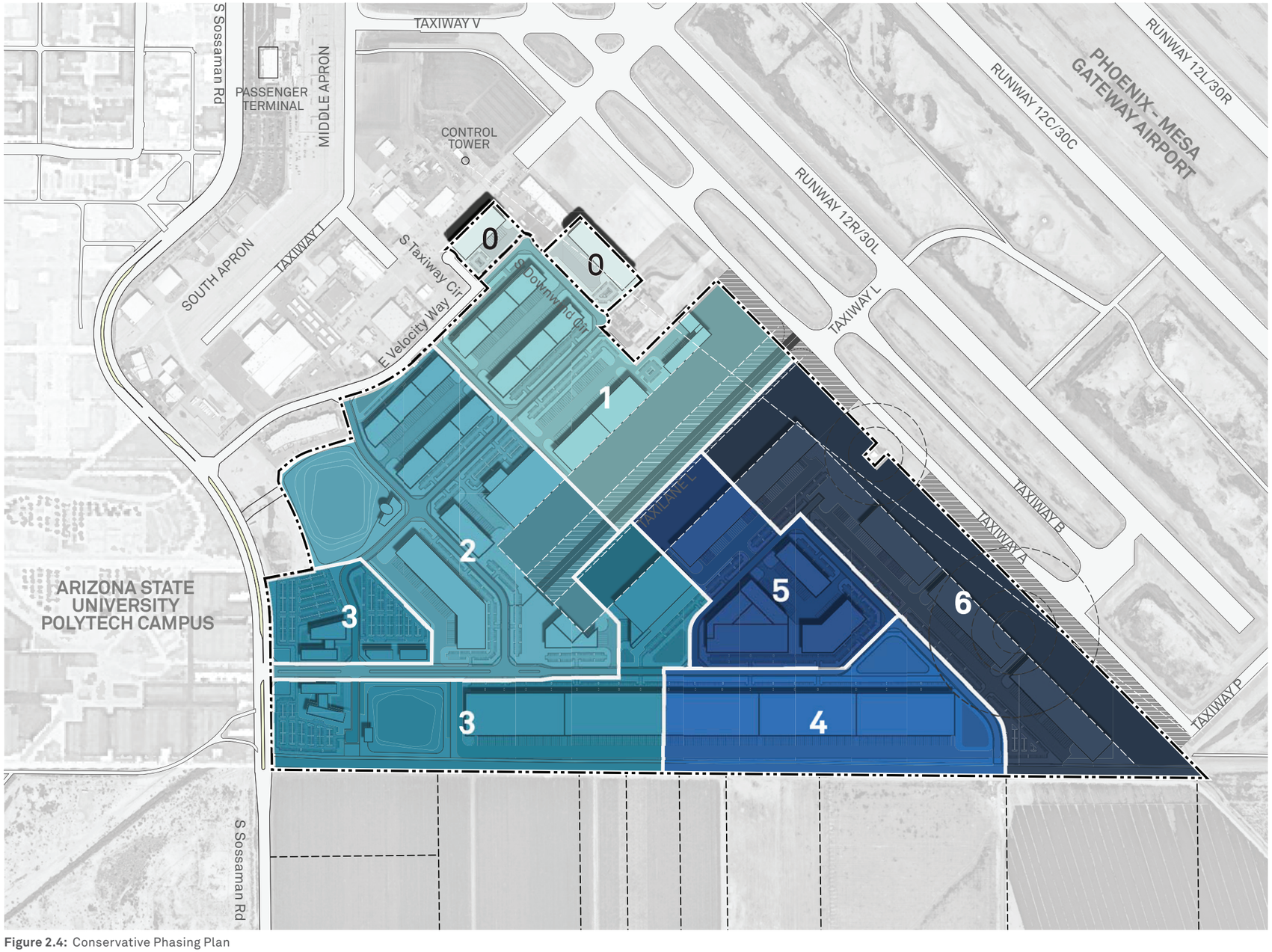


	Phase 1 (Yrs 1-5)	Phase 2 (Yrs 6-10)	Phase 3 (Yrs 11-15)	Phase 4 (Yrs 16-20)	Phase 5 (Yrs 21-25)	Phase 6 (Yrs 25-30)
Air Cargo	100,000	100,000 100,000	100,000		100,000	100,000
E-Commerce	80,000	100,000	100,000	100,000	100,000	60,000
Reefer/Cooler	100,000	80,000	80,000	80,000	80,000	80,000
Aerospace Auto Parts	100,000	150,000	150,000	250,000	85,000	85,000
Food Processing	180,000	200,000	125,000	125,000	125,000	25,000
Office + R&D			210,000			
Retail			20,000			
Hotel			50,000			

Like the Aggressive phasing, the conservative scenario patterns the phasing boundaries in order to minimize the road infrastructure requirements in the first years of operation. Development begins from the Northern tip of the site and follows the line of the existing road E Velocity Way.

Figure 2.4 shows the phasing boundaries according to the conservative scenario. Given the more gradual pace of development under this projection, the factor determining the patterns of development is the pace of absorption of the air-side industrial space. Thus development begins on the northern tip of the site with the construction of the customs facility and moves around the taxiway as demand for air-side access increases.

In this scenario, it takes 10+ year to accumulate enough commercial uses and workers to support the office, retail and hotel space. Full build-out is projected to take 30 years.



LEGEND

- Site Boundary
- Phase 0
- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Phase 5
- Phase 6

N

0 200 500 1,000 ft

Figure 2.4: Conservative Phasing Plan

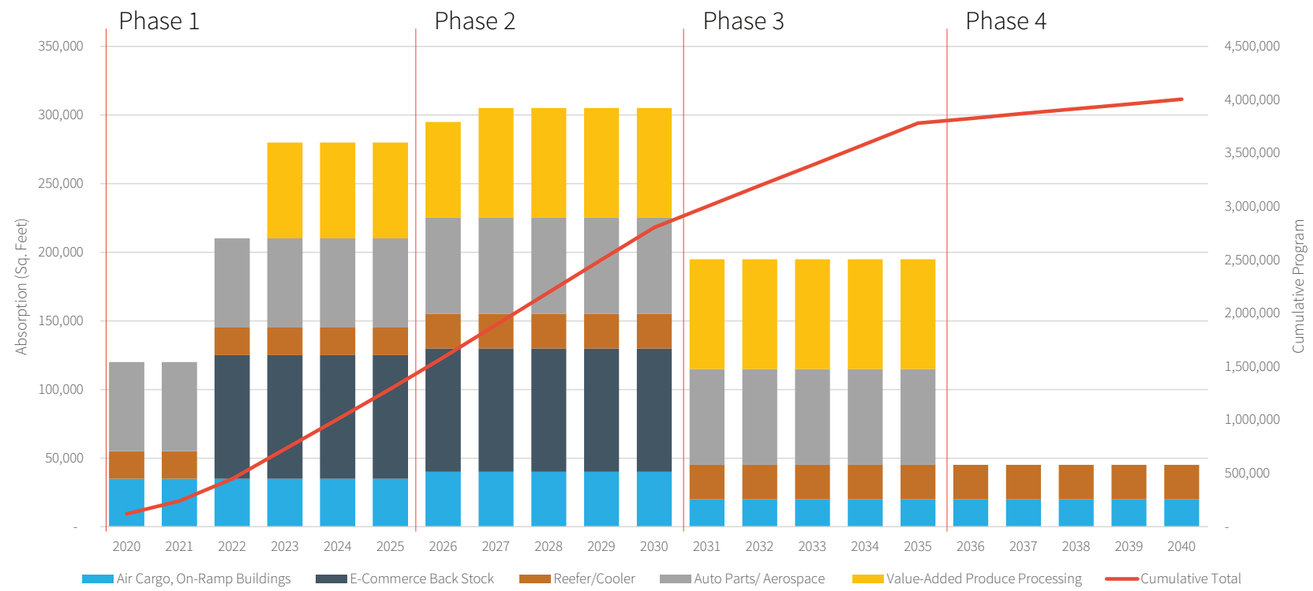
2.8 AGGRESSIVE PHASING SCENARIO

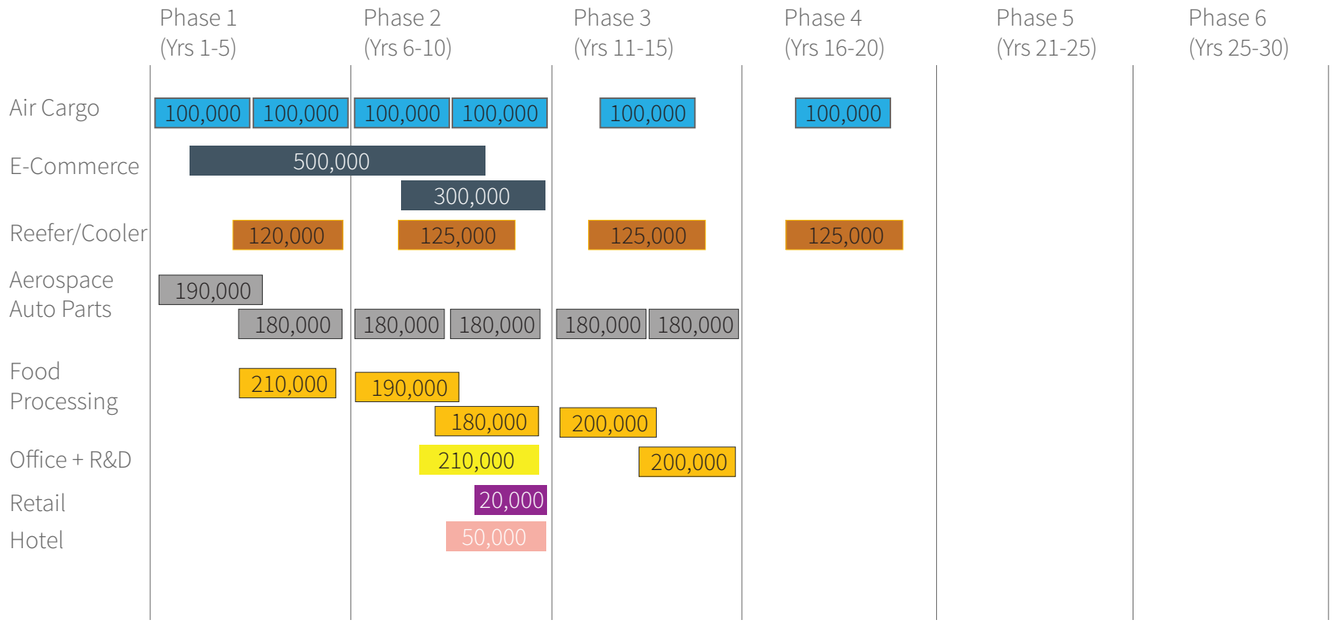
2.8.1 Absorption Assumptions

Aggressive phasing absorption scenario represents the pace of development that matches the pace of the post-recession recovery. This means that data used for these projections does not include recession years. Macroeconomic and regional indicators suggest that the pace of the development in the coming years will more closely resemble this scenario, though long-term projections under this scenario are likely to overestimate the absorption of industrial space.

Furthermore, the aggressive scenario projects the arrival of a large logistics tenant. The consequences of this are twofold. The first consequence is that the building on the southern edge of the site is absorbed by a single client in phase II. This event, in turn, creates a logistics ecosystem surrounding the large tenant thereby accelerating the absorption of the subsequent phases.

Given the accelerated pace of absorption under the aggressive scenario, full build-out is essentially achieved in 15 years. Air-side and refrigerated space are projected to take another 5 years to be completely leased but this remainder makes up less than 10% of the overall development program so it is grouped under phase III.

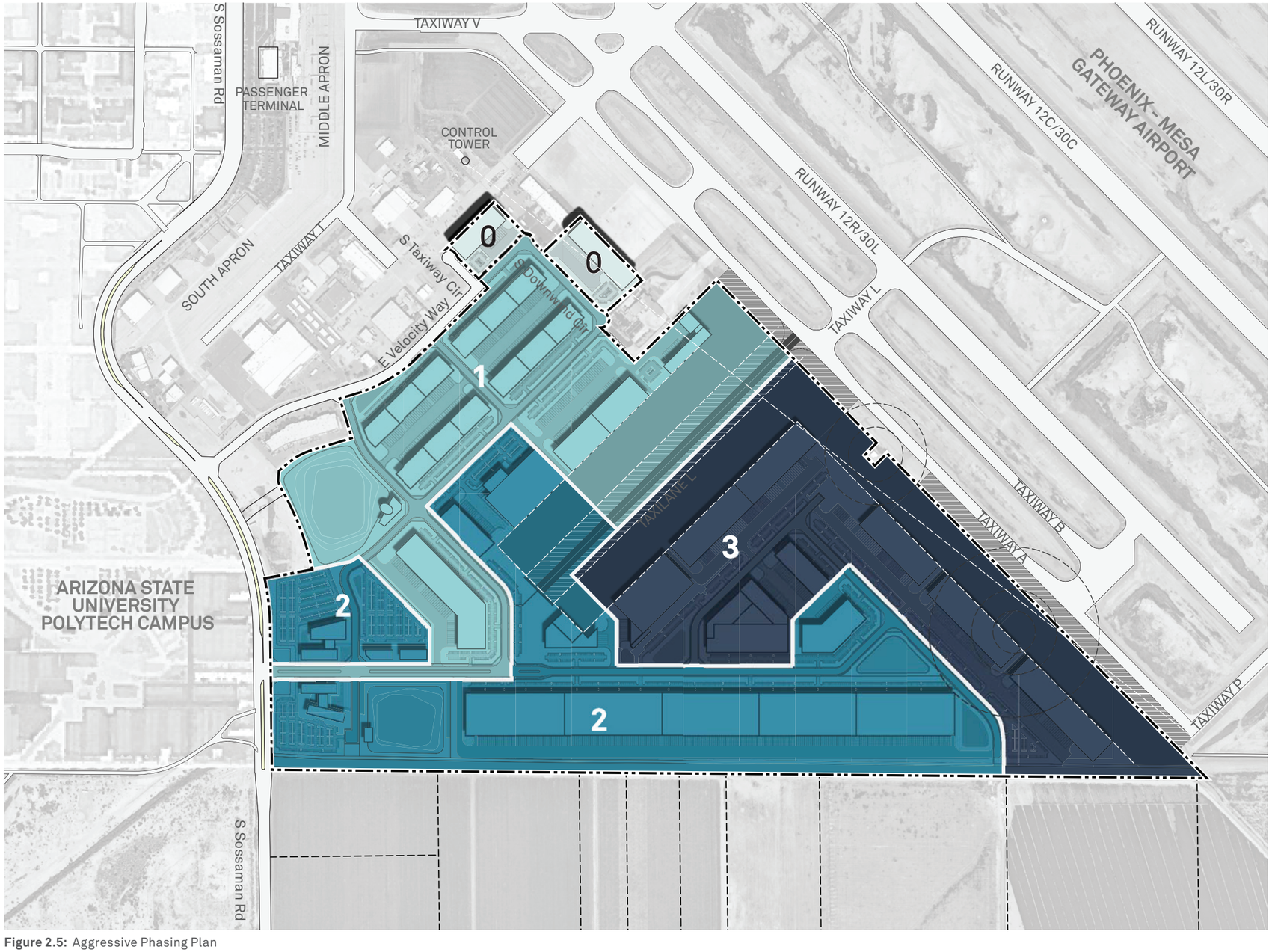




As outlined in the previous section, the accelerated pace of absorption assumes that there will not be an economic downturn in the coming years and the arrival of large tenants (1 million square feet or more) in the first 3 years of operation. Tenants of this size are most likely to be e-commerce focused retailers like Amazon, Walmart/Jet or Alibaba. A large aerospace or medical manufacturer would have the same effect on the absorption pace of the project though it is less likely given that, historically, large manufacturers tend to purchase industrial space before committing the large fixed costs associated with establishing a manufacturing operation.

Figure 2.5 shows the distribution of phasing under the aggressive scenario. The buildings on the Northeast boundary of the site are the first buildings to be developed. This reduces the amount of road infrastructure necessary in the first years of operation. Development then moves southwest along E Velocity Way taking advantage of existing road infrastructure. Even under this accelerated pace of demand, there is not enough air-side demand to lease the entire Northwestern side of the new taxiway. For this reason, the Northwestern hanger is moved to phase II while prioritizing industrial development on the west portion of the site.

This phasing scenario accumulates enough commercial activities to support the public amenities, retail, office and hotel space in the year 6 and 7.



LEGEND

- Site Boundary
- Phase 0
- Phase 1
- Phase 2
- Phase 3

N

0 200 500 1,000 ft

Figure 2.5: Aggressive Phasing Plan

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3

SITE ANALYSIS

3.1 LOCAL CONTEXT

In addition to air travel access, the SkyBridge Arizona site is also highly connected to various roadways. To the north of the site is Arizona State Route 202. Loop 202 is accessible from Sossaman Road and Ray Road, as well as from Ellsworth Road on the east. Loop 202 is a partial beltway that encircles the communities of Chandler, Gilbert, Mesa, and Phoenix. Once on Loop 202, vehicles can travel either eastbound towards Chandler or northbound towards Apache Junction or Mesa. Highway 60, also known as the Superstition Freeway, provides east-west service. This highway intersects Loop 202 north of the site and provides a westward route that intersects with Interstate 10 south of Phoenix. Interstate 10, a major north-south route, provides access to Tucson and even further southward to Mexico.

From the site, there are multiple vehicular routes available to access downtown Phoenix, all less than 40 miles. Using Loop 202 from the site to travel westwards, one can connect to Interstate 17, travel north, and arrive in downtown Phoenix in 36.6 miles. A northern route is also available using Loop 202. One can take the Loop 202 to travel north, then west on Loop 202, connect with Interstate 10 and arrive in downtown Phoenix in 37.9 miles. The final and shortest route (36.2 miles) to downtown Phoenix is using Loop 202 to reach Highway 60, traveling west to connect with Interstate 17.

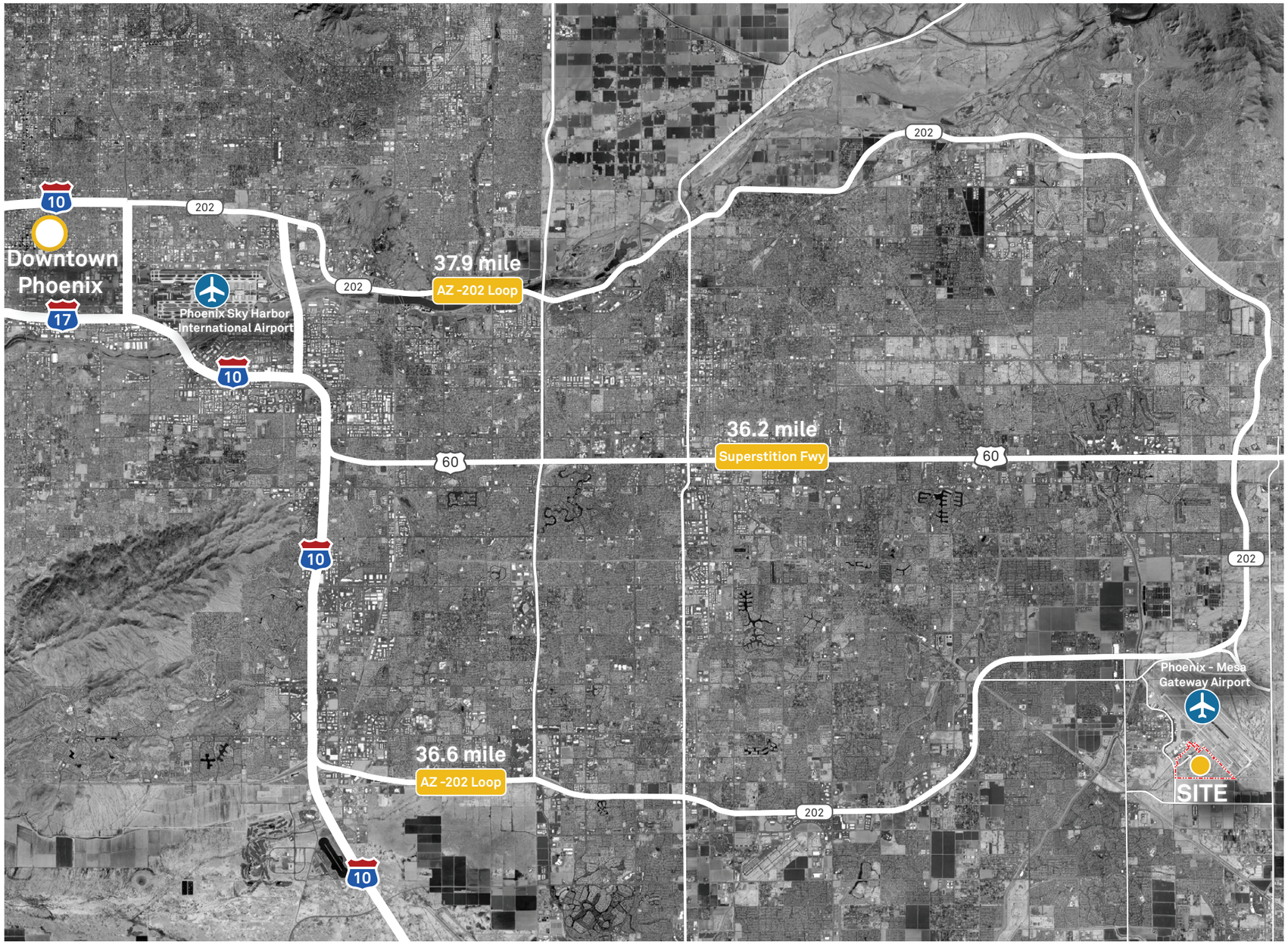


Figure 3.1: SkyBridge Site Local Context

3.2 SITE CONTEXT

3.2.1 Existing Site Conditions

SkyBridge Arizona is a 363.5-acre site adjacent to the Phoenix-Mesa Gateway Airport. The site is triangular in shape. It's southern border is roughly 6,500 feet across. Primary roadway access is provided on the west side from Sossaman Road. Highway access to Loop 202 is available from State Route 24 to the northeast of the airport and from Power Road to the northwest of the airport.

The site is wedged between two active uses--the Arizona State University Polytechnic Campus (ASU) and the Phoenix-Mesa Gateway Airport. The ASU campus is located to the northwest across Sossaman Road. The site falls within the Phoenix-Mesa Gateway Airport boundaries and shares an eastern and northern border with airport functions. Just outside of the site boundaries to the north is the airport's air traffic control tower (ATCT). The passenger terminal where members of the public enter the Phoenix-Mesa Gateway Airport is a short distance north of the site off Sossaman Road.

Southwest of the site are railroad tracks operated by Union Pacific Railroad Company (UPRR). The tracks are oriented towards the northwest and southeast. Near Baseline Road in Mesa, the tracks curve to the north and run parallel to Center Street. Further northwest, the tracks reach Tempe and ultimately Phoenix, aligned just to the north of the Phoenix Sky Harbor Airport.

West of the site is the Roosevelt Canal. This canal carries water from the Salt River southbound, where it connects with the greater canal system within the Roosevelt Water Conservation District.

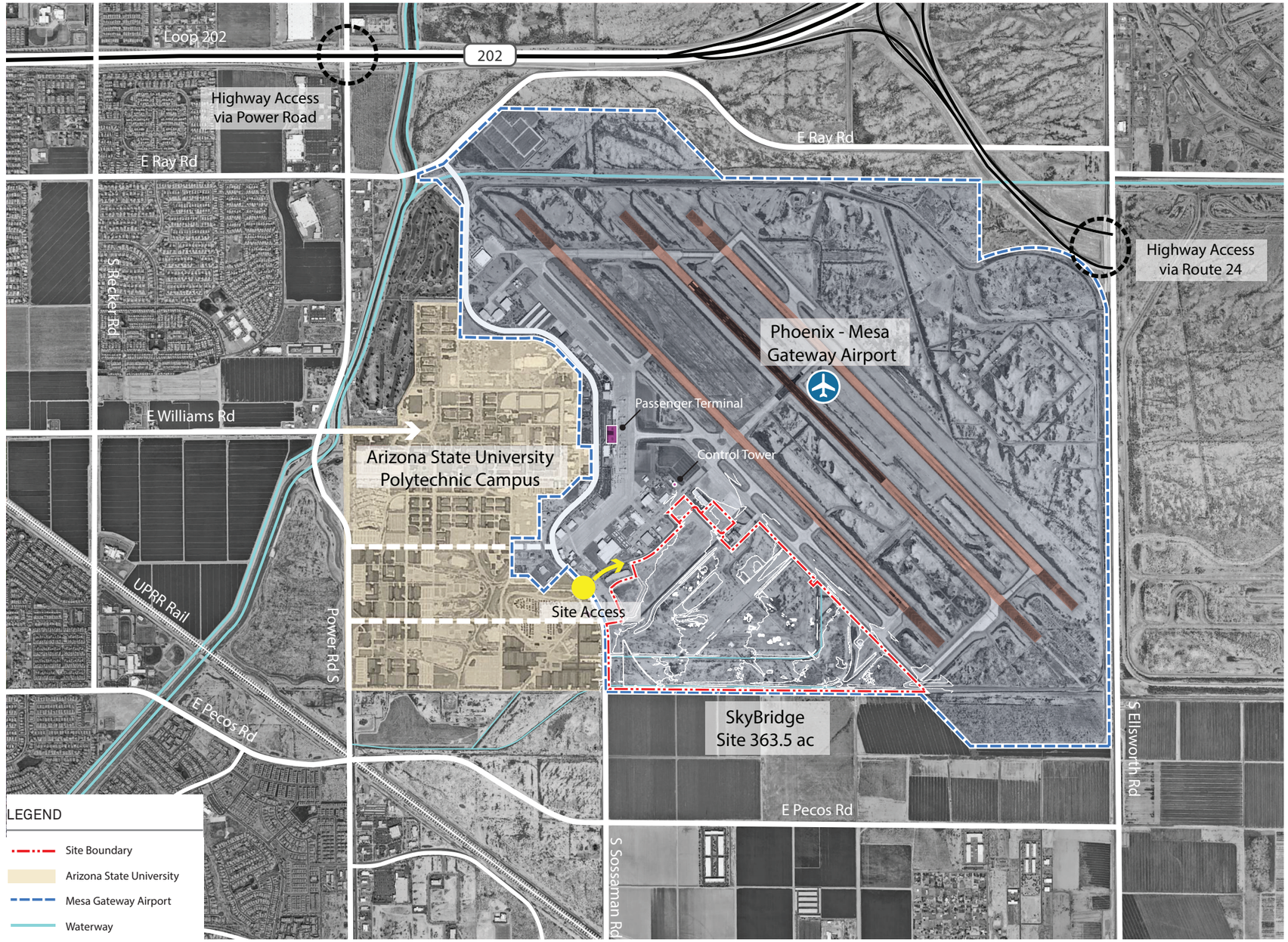


Figure 3.2: SkyBridge Existing Conditions

3.2.2 Surrounding Land Use

The SkyBridge Arizona site is surrounded by a diversity of land uses. Aside from the airport infrastructure, across Sossaman Road to the northwest of the site is the ASU campus with various educational facilities as well as student housing. Directly west of the site is undeveloped land owned by ASU that is set aside for future development opportunities. To the north just outside of the site boundary is the existing Mesa Fire Station 215. The predominant land use north and west of the site beyond the airport and campus is single-family residential development. There are multiple new planned or under-construction residential developments near the site. South and southeast of the site is currently undeveloped agricultural land.

Future Land Use is shown in Figure 3.3. The presently undeveloped agricultural land south of the site will be designated for “Mixed Use - Non-Residential” development in the future. Other areas nearby the site are designated as “Commercial Focus - Business Park/Office/ Tourism”. A portion of land west of Power Road that is currently undeveloped is designated as “Parks and Open Space”. As an economic generator, the development of SkyBridge Arizona may serve as a catalyst for the development of these surrounding sites.

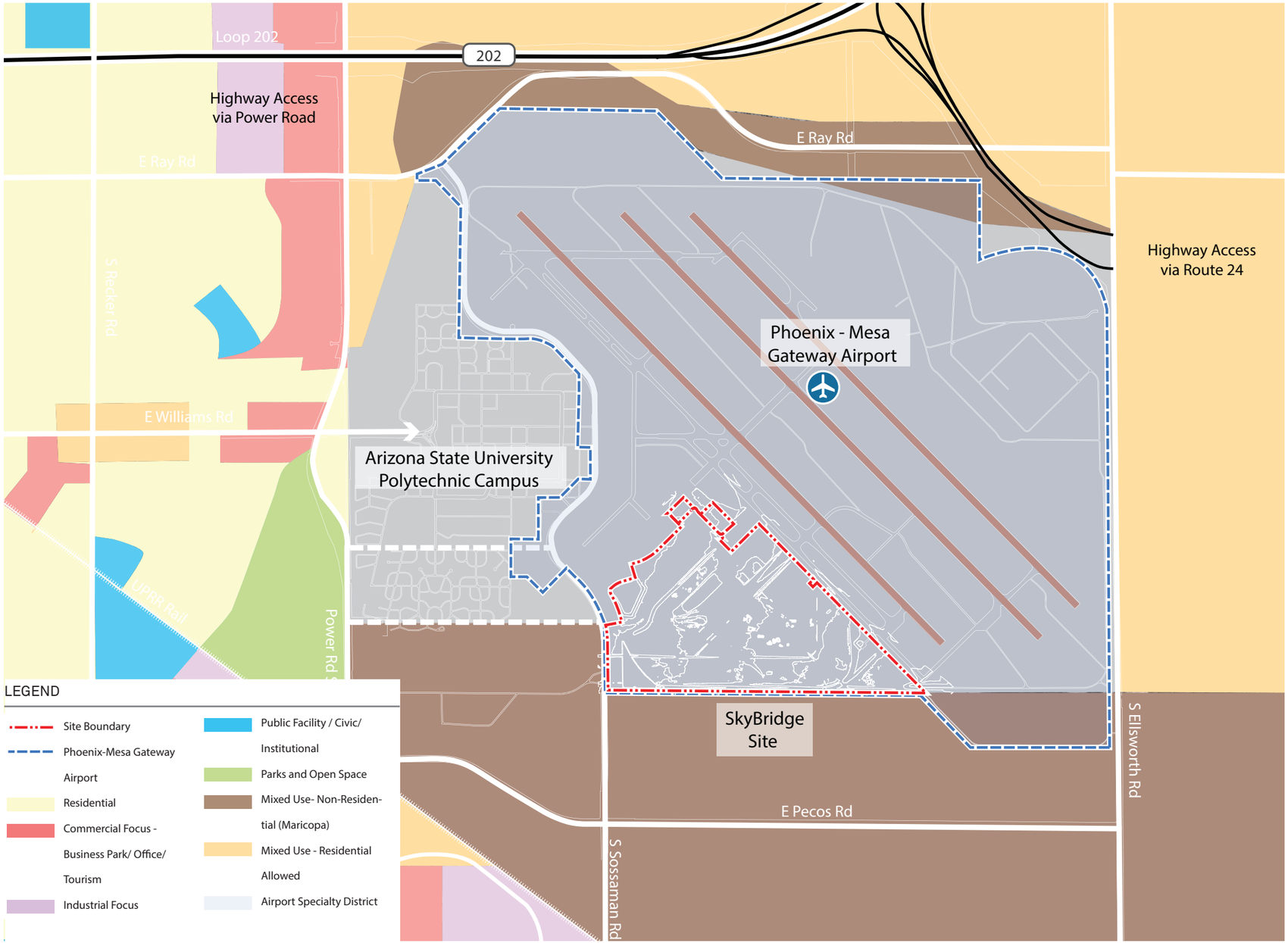


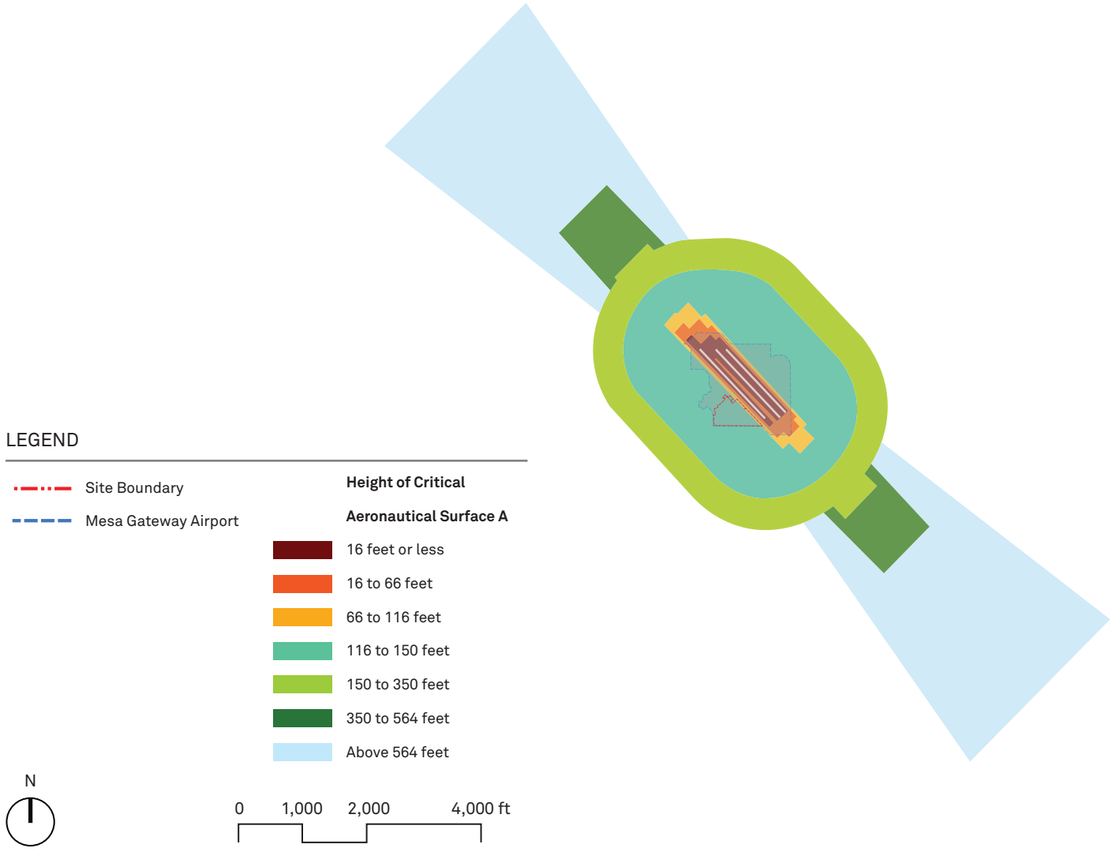
Figure 3.3: SkyBridge Site Surrounding Future Land Use

3.2.3 Height Limitations

The Federal Aviation Administration (FAA) and the Phoenix-Mesa Gateway Airport Authority ensure the protection of critical airspace surfaces by developing a critical airspace surfaces map. The purpose of this map is to define the maximum allowable height of objects within the airport planning area. Figure 3.4 depicts the airspace surfaces surrounding the airport. The various color groups indicate the maximum height of surfaces above the elevation of the airport. No structures or objects are allowed to penetrate these airspace surfaces.

The ways in which the airspace surfaces map impacts the allowable building height at the site is discussed further in Chapter 5 as well as Chapter 4.12 of this document.

[1] Airport Land Use Compatibility Update, 2-19.



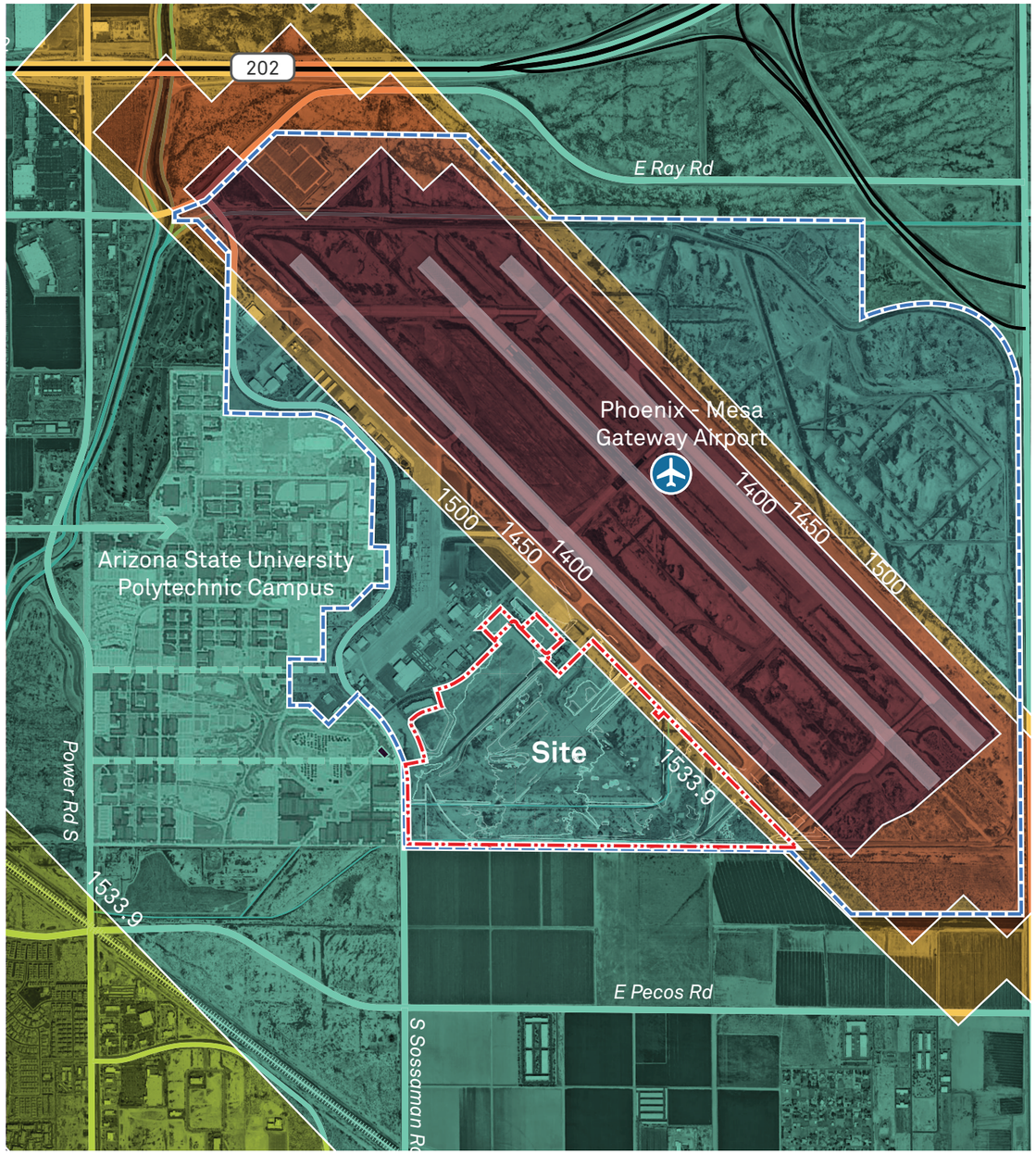


Figure 3.4: Mesa Gateway Airport Height Limitations

3.3 SITE CONDITIONS

3.3.1 Existing Detention Basin & Drainage System

In previous years, numerous drainage studies have been completed for the project site. These previously completed reports were studied and served as the basis for proposed stormwater management plans contained in this report.

Because the site is sloped to the west, runoff produced from the airport runways and taxiways flow westward via the existing storm drains and channels/swales on site. There are two separate drainage areas on site, indicated in yellow and pink on Figure 3.5. Water is directed to one of the two existing detention basins at the southwest corner of the site. Ultimately, this water flows further west to the Rittenhouse channel outside of the project area.

The detention basin and drainage system at the SkyBridge Arizona site is described in more detail in Chapter 7 of this report.

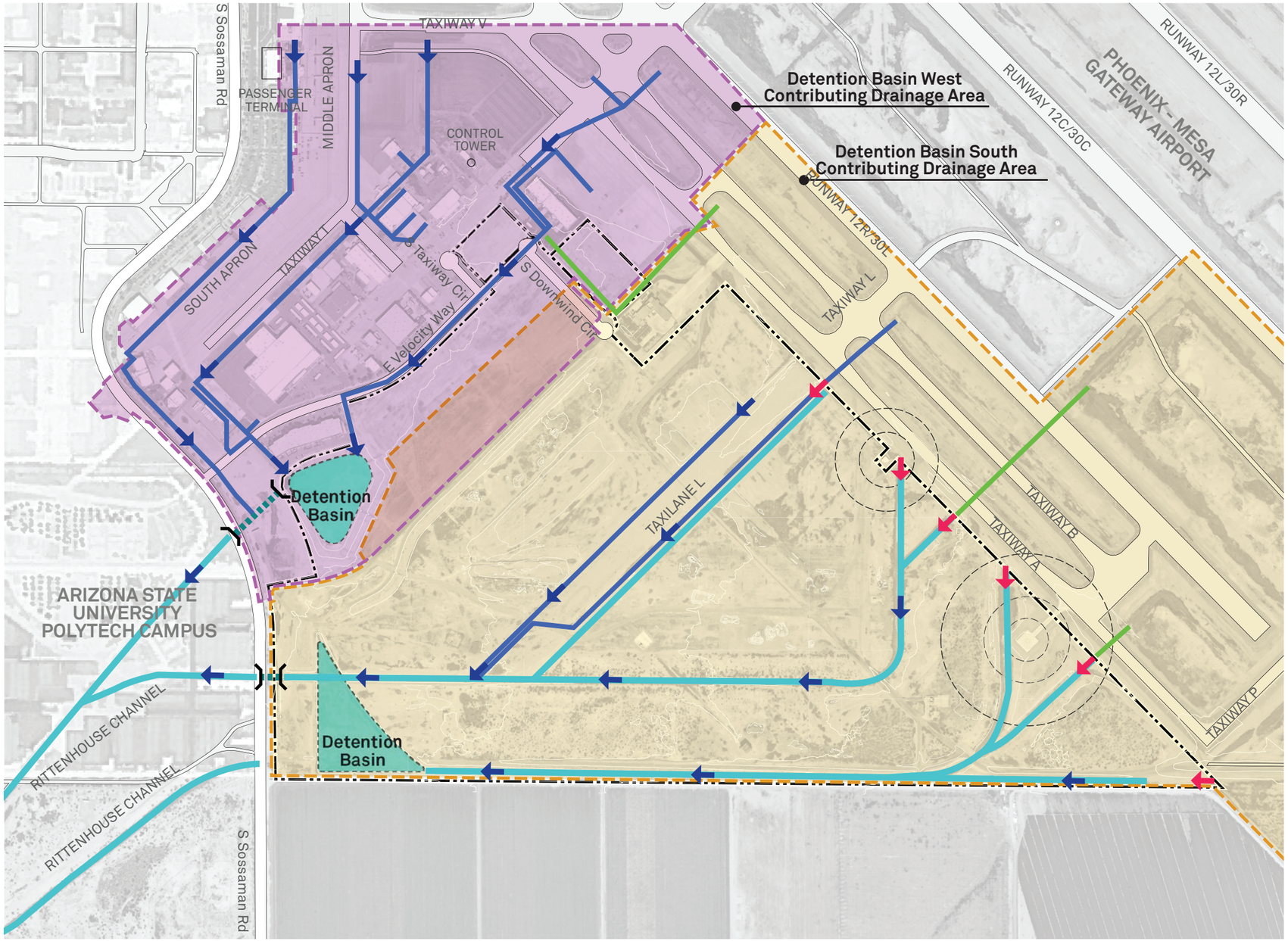


Figure 3.5: Existing Detention Basin and Drainage System

3.3.2 Existing Elevation

The SkyBridge Arizona site generally slopes downward to the west. The easternmost edge has an elevation between 1,376 and 1,380 feet. The westernmost corner of the site has an elevation between 1,336 and 1,340 feet.

Existing elevation of the SkyBridge site is shown in Figure 3.6.

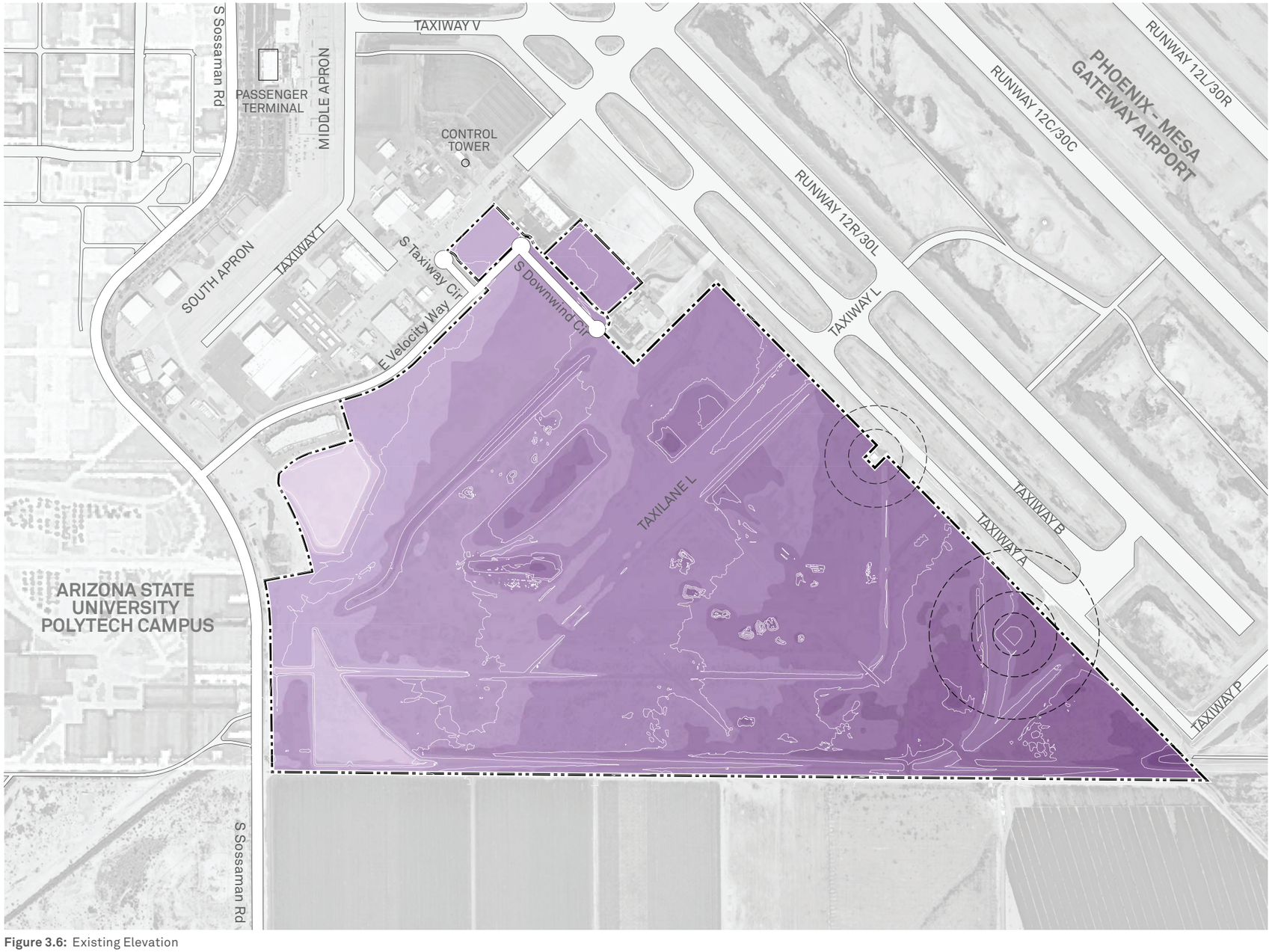
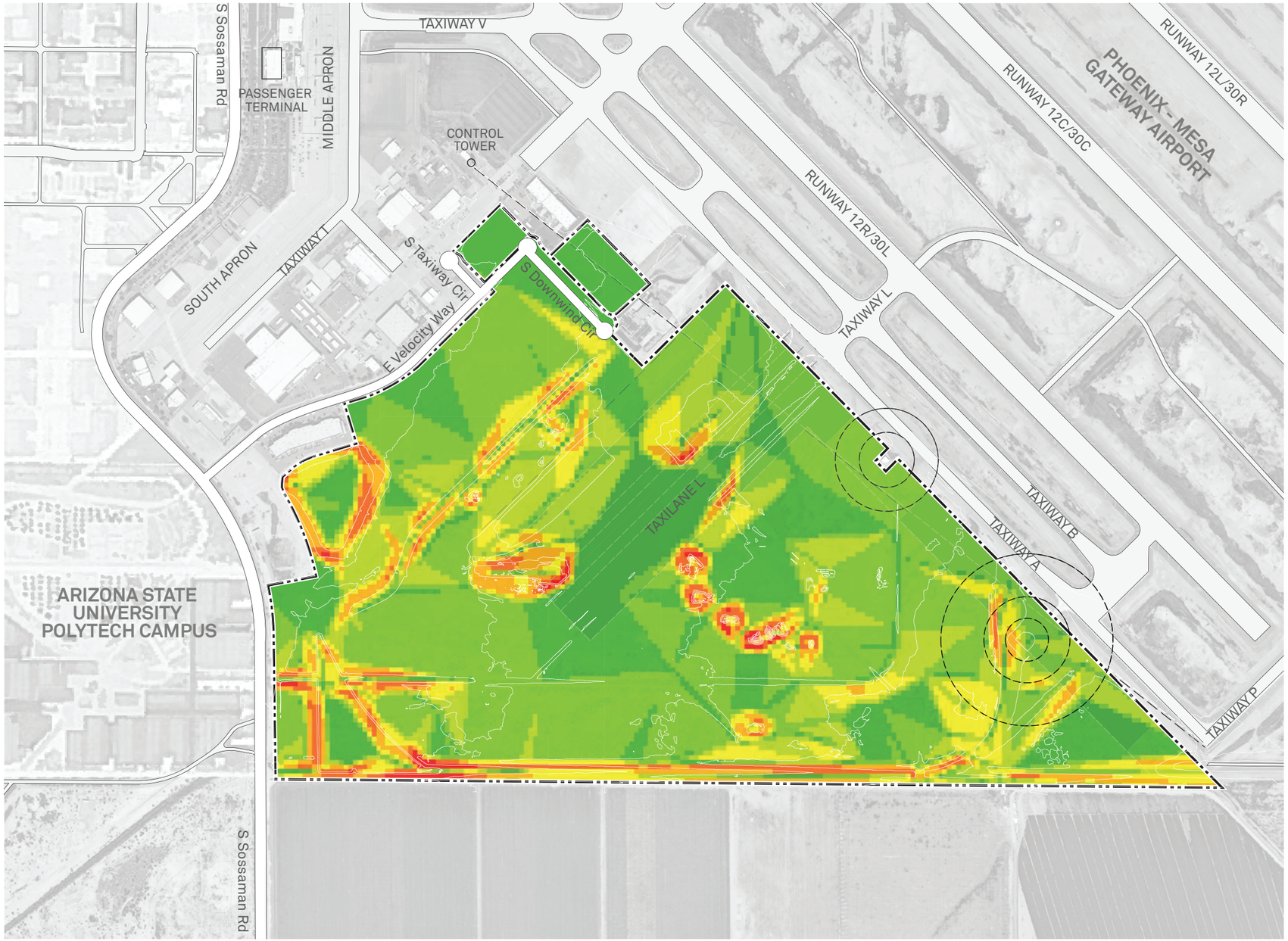


Figure 3.6: Existing Elevation

3.3.3 Existing Slope

The site is relatively flat. The majority of the land area has a slope of less than two degrees overall. However there are some small mounded and bermed areas with greater slope.

Figure 3.7 shows existing slope conditions.



LEGEND

- Site Boundary
- 0.01 - 0.4 degree
- 0.41 - 1.0 degree
- 1.01 - 1.8 degree
- 1.81 - 2.8 degree
- 2.81 - 3.9 degree
- 3.91 - 5.5 degree
- 5.51 - 8.5 degree

N

0 200 500 1,000 ft

Figure 3.7: Existing Slope Conditions

3.3.4 Access & Road Connections

Under present conditions, the site's only public vehicular access is provided from Sossaman Road on the west side. Velocity Way branches from Sossaman Road just above the northern side of the site boundary and continues east, outside of the site boundary. Velocity Way terminates in two culs-de-sacs; Taxiway Circle and South Downwind Circle. South Downwind Circle, which continues towards the southeast, is the only formalized public vehicular access within the site boundaries currently. Taxiway Circle continues to the northwest a short distance before terminating into a parking lot at the International Air Response facility.

Parcels on the eastern side of the site bordering Taxiway A and parcels along Taxilane L have prime access to air flight operations. This is advantageous for aeronautical-oriented land uses that will benefit from adjacency and access to airport operations.

Figure 3.8 depicts the site's existing access conditions.

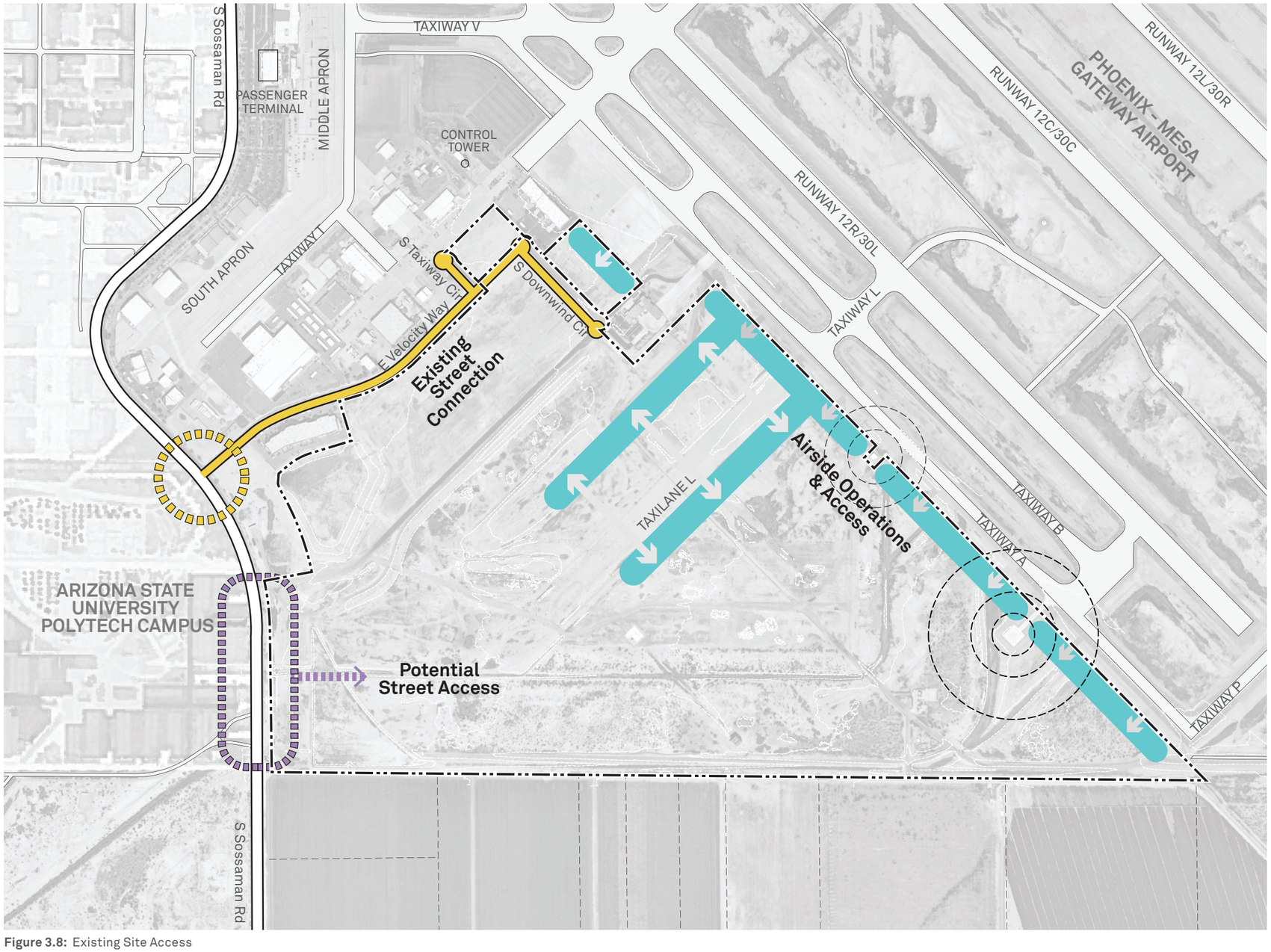


Figure 3.8: Existing Site Access

3.4 OPPORTUNITIES & CONSTRAINTS

3.4.1 Opportunities

The site has many advantages and opportunities for development. The site's most clear advantage is its proximity to both the Phoenix-Mesa Gateway Airport as well as the Arizona State University Polytechnic Campus. For SkyBridge Arizona's operations, the air-side access is unparalleled. With the edge of the site abutting the airport taxiways, and with the extension of Taxilane L into the site, operations and shipments will be seamless. Similarly, the four-lane Sossaman Road provides excellent vehicular access from the west side. Spurring from Sossaman Road and Velocity Way, there are additional opportunities to increase vehicular accessibility to the site.

The ASU campus is located across Sossaman Road to the west and offers an opportunity to enhance and establish a pedestrian connection from the campus to the site. The ASU Polytechnic Campus has been steadily increasing its student enrollment each year, with a total of 4,380 students enrolled in 2016[2]. The ASU Campus offers degree programs specializing in technology and interdisciplinary sciences and has highly ranked flight research programs and facilities. The proximity of ASU to the site can offer potential partnership opportunities as well as the presence of a large student body who may patronize retail uses at the site.

The site's opportunities are shown in Figure 3.9.

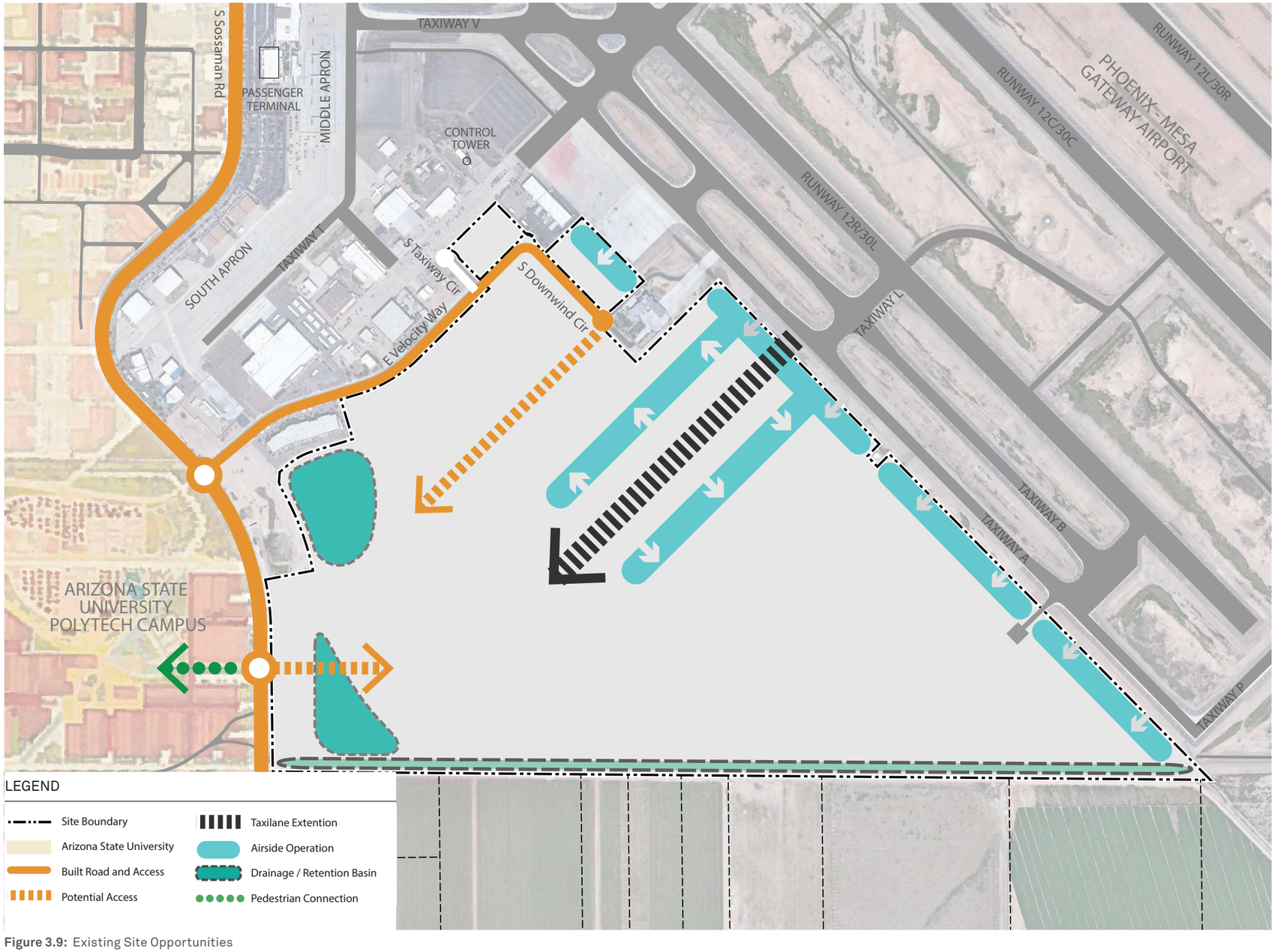


Figure 3.9: Existing Site Opportunities

[2] Arizona State University Enrollment Figures, https://www.asu.edu/about/enrollment.

3.4.2 Constraints

Due to some of the existing infrastructure on the site, there are various setback requirements that affect the site's developable area. As previously described in the 'Building Height Limitations' section, the air traffic control tower (ATCT) located northwest of the site must have full, unobstructed views to the end of the runway where it meets Taxiway P. For this reason, building height is limited within the ATCT line of sight. This area is depicted in Figure 3.10 as the shaded blue area.

Additional building setbacks are required on either side of the new Taxilane L. Buildings must be set back 431 feet on either side from the taxilane centerline. Because of this setback, a fairly large area in the center of the site must be left vacant. This somewhat decreases the buildable square footage of the site.

An existing compass rose (shown on Figure 3.10 with orange dotted lines) requires various setbacks. The largest required setback radius is 600 feet shown as the circle marked "A". No buildings, parking lots, roads, or any infrastructure is allowed within any of the compass rose setback radii. However, it is possible to relocate this. If relocation of the compass rose is approved, it would be relocated in coordination with the airport. There is also an electric vault located next to Taxiway A also with setback requirements shown with pink dotted lines. The electric vault setback requirements occupy a much smaller area of the site.

An additional challenge includes the parcel frontage at the corner of Sossaman Road and Velocity Way. This land is not part of the site area. Therefore, it will not be possible to develop or put any entryway features or monumentation at this significant corner.

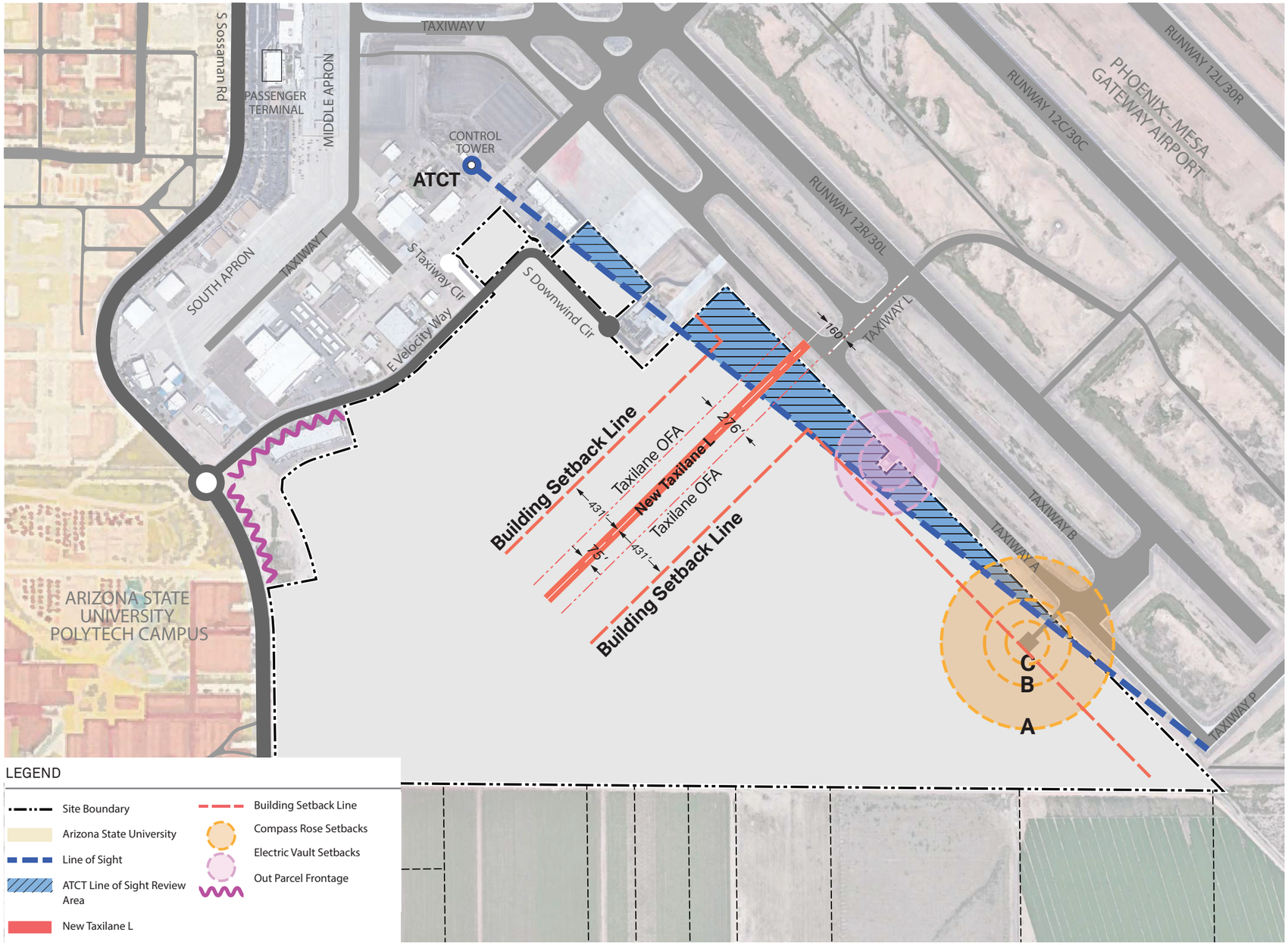
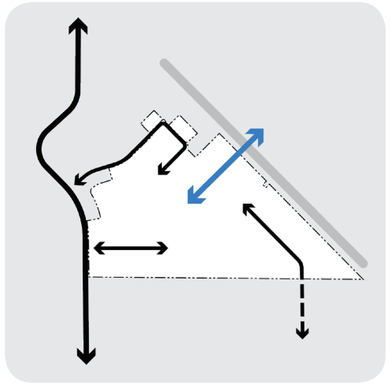


Figure 3.10: Existing Site Constraints

3.5 DESIGN PRINCIPLES



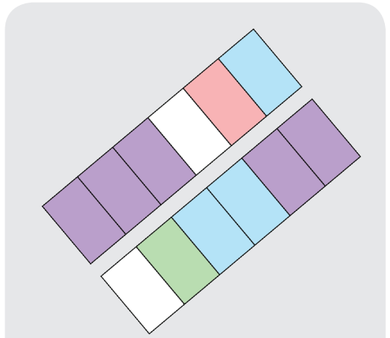
Connectivity

By expanding the Mesa-Gateway Airport taxilane into the SkyBridge Arizona site, they become seamlessly linked. With this connection, aeronautical functions can occur efficiently on the site. Additional proposed roadway connections and site entrances will make the site highly accessible and connected with the surrounding land uses.



Multi-Modal Circulation

The site has been designed to accommodate not only vehicular and truck traffic, but also pedestrians and bicycles. Roadways provide friendly, comfortable, and shaded paths for bikes and pedestrians to access the site.



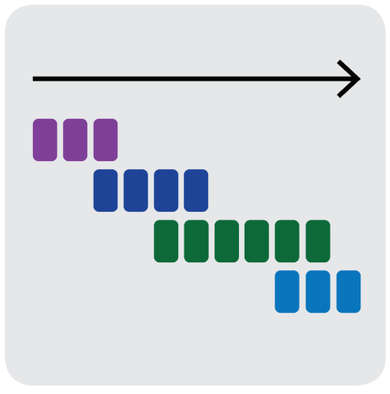
Parcel Flexibility

The ability to divide the site into multiple parcels provides flexibility both in site development as well as in construction phasing. Multiple parcels will allow SkyBridge Arizona to better respond to market conditions and achieve the right development mix on site.



Safety + Security

Security checkpoints at site entrances and controlled facility access will ensure that SkyBridge Arizona is a safe and secure location and complies with the Airport security requirements for employees and visitors to work and conduct business.



Phased Development

Parcel configuration and land use mix at the site will allow for a phased development approach to manage infrastructure and construction costs over time.



Green Infrastructure

SkyBridge Arizona is unique in that it offers open space within the highly functional, aeronautical campus.

Figure 3.11: Design Principles

3.6 FRAMEWORK PLAN

There are two primary vehicular entrances to the SkyBridge Arizona site located on the western edge off of Sossaman Road. These entry points provide access to both the southern and northern portion of the site. Internal roadways stemming from the primary entrance roadways serve the remainder of the site, allowing both north-south and east-west access.

Taxilane L from the Phoenix-Mesa Gateway Airport branches from Taxiway A in a southwestern direction into the site. Taxilane L will be a central access point for air-side aeronautical uses. Aeronautical Industry land uses wrap around Taxilane L to provide facilitated access to runways and the other portions of the Phoenix-Mesa Gateway Airport. Relocating the compass rose provides additional buildable square footage in the Aeronautical Industry land use area. Also located along Taxilane L is the area dedicated to U.S.-Mexico Customs services. Proximity to airport functions is also essential for this land use, therefore it also borders Taxilane L. Beyond the Aeronautical Industry land uses, are Non-Aeronautical land uses that do not need direct taxilane access. This includes the site's light industrial and warehouse uses.

At the southwest corner of the site is a concentration of uses including retail, office, R&D, and the hotel components of the site. These uses are located along the edge of Sossaman Road and one of the primary site access points. In this location, they will have visibility from the roadway and convenient pedestrian access from the ASU campus.

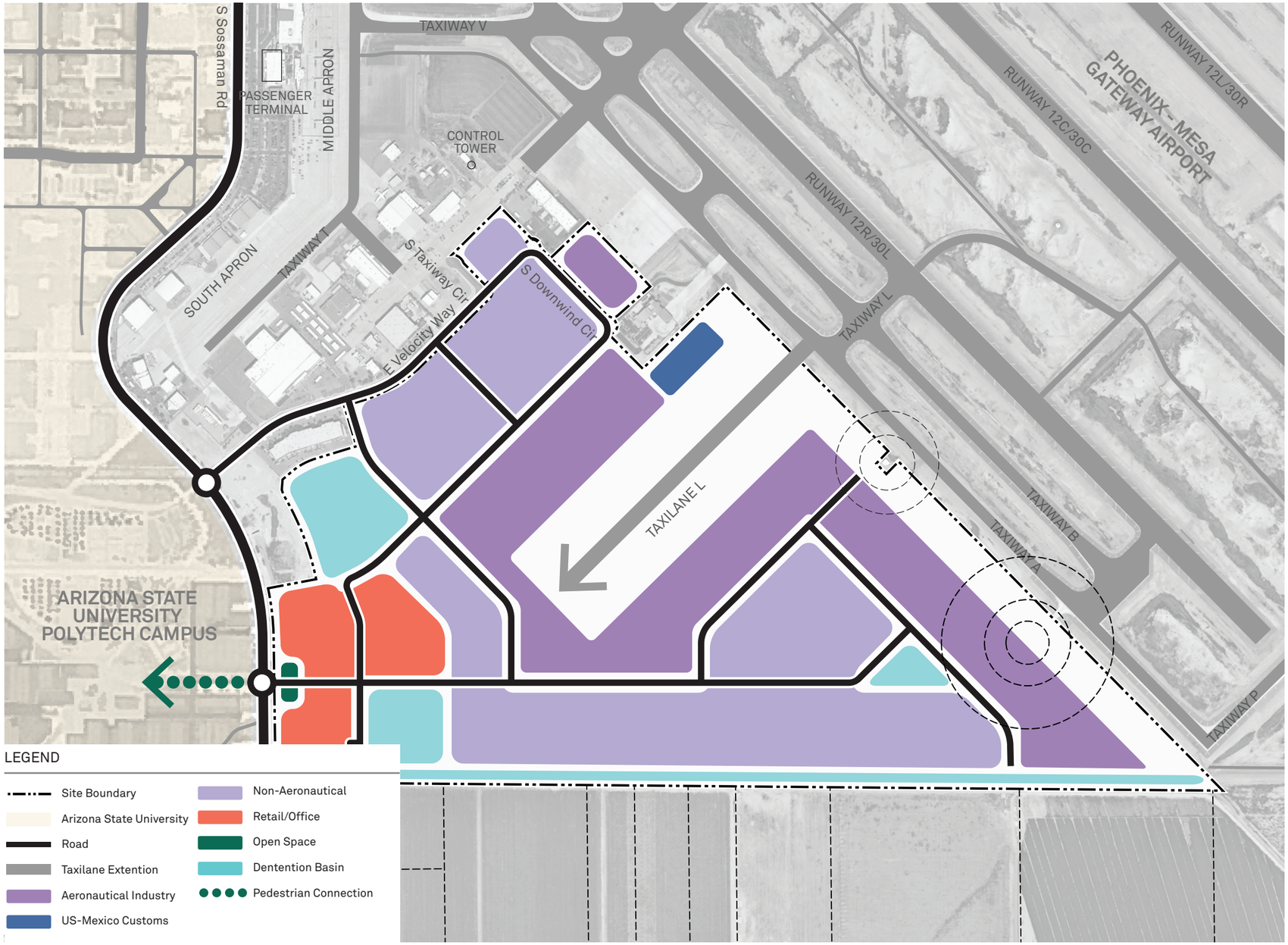


Figure 3.12: SkyBridge Design Framework

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4

CONCEPT MASTER PLAN FRAMEWORK

4.1 MASTER PLAN OVERVIEW

Over the course of this project, the AECOM team considered various alternative concepts for the SkyBridge Arizona site. Working with Mesa SkyBridge, the team developed a preferred plan for the site that works within existing site conditions and challenges, and accomplishes the desired goals for the project.

Figure 4.1 shows the preferred master plan alternative for the SkyBridge Arizona site.



Figure 4.1: Illustrative Master Plan



Figure 4.2: Bird's Eye View from South



Figure 4.3: Bird's Eye View from West



Figure 4.4: Bird's Eye View from South

4.2 LAND USE + DEVELOPMENT PROGRAM

4.2.1 Development Area

The 363.5-acre SkyBridge Arizona project consists of three areas: A, B, and C. Area A is 3.2 acres, located on the western side of E. Velocity Way. Area B is 5 acres, located along the north side of S. Downwind Circle. Area C is the remaining area within the project and is 355.3 acres in size.

Area A and B have received Categorical Exclusion (CATEX) approval under the National Environmental Policy Act (NEPA).

To facilitate the environmental process, Areas A, B, and C are separated into different planning process and development phases. However the planning principles, development goals, and all development standards and design guidelines will be applied to all three areas to ensure consistency in the character and quality of SkyBridge Arizona.

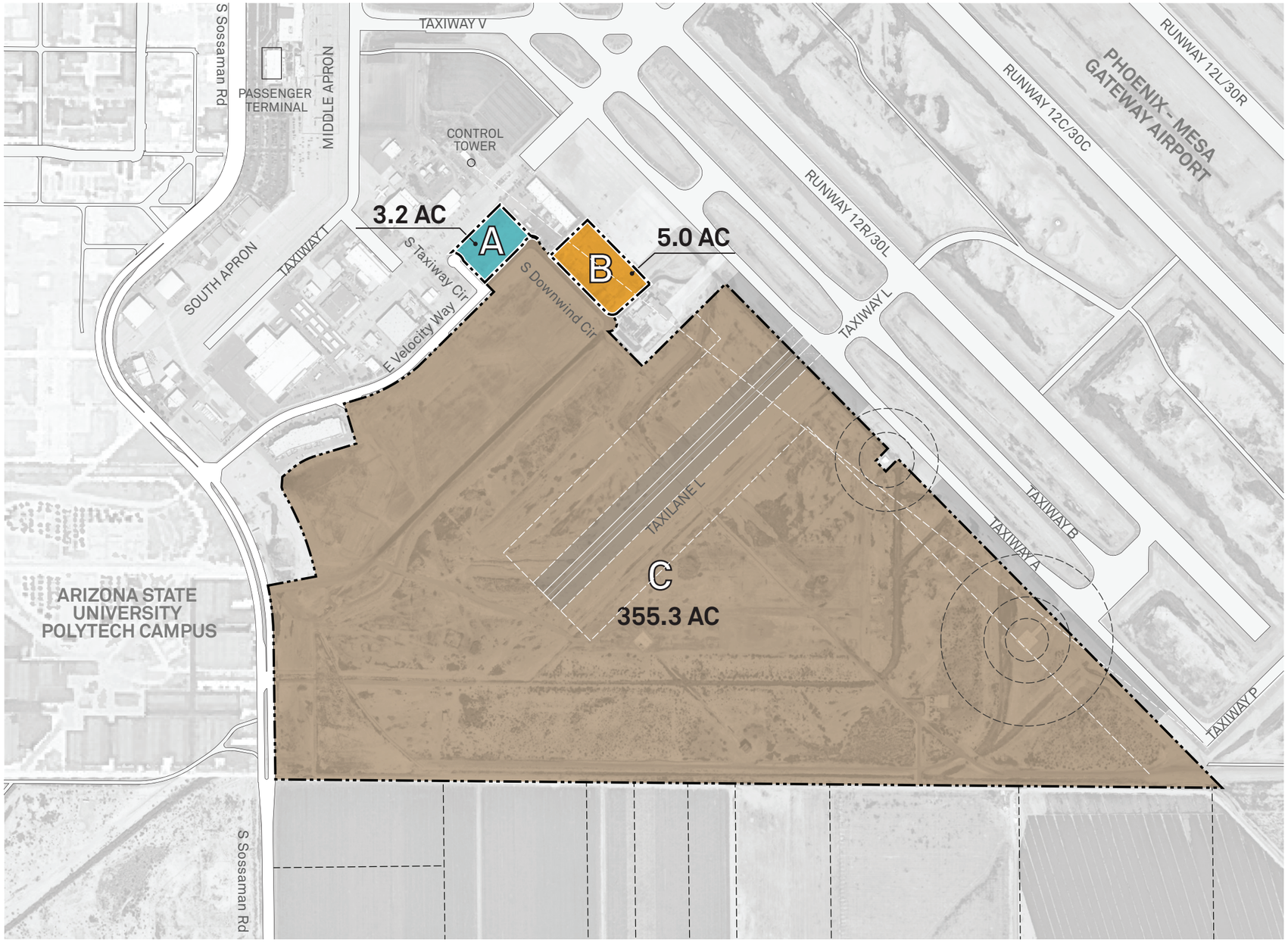


Figure 4.5: Development Area

4.2.2 Development Area A

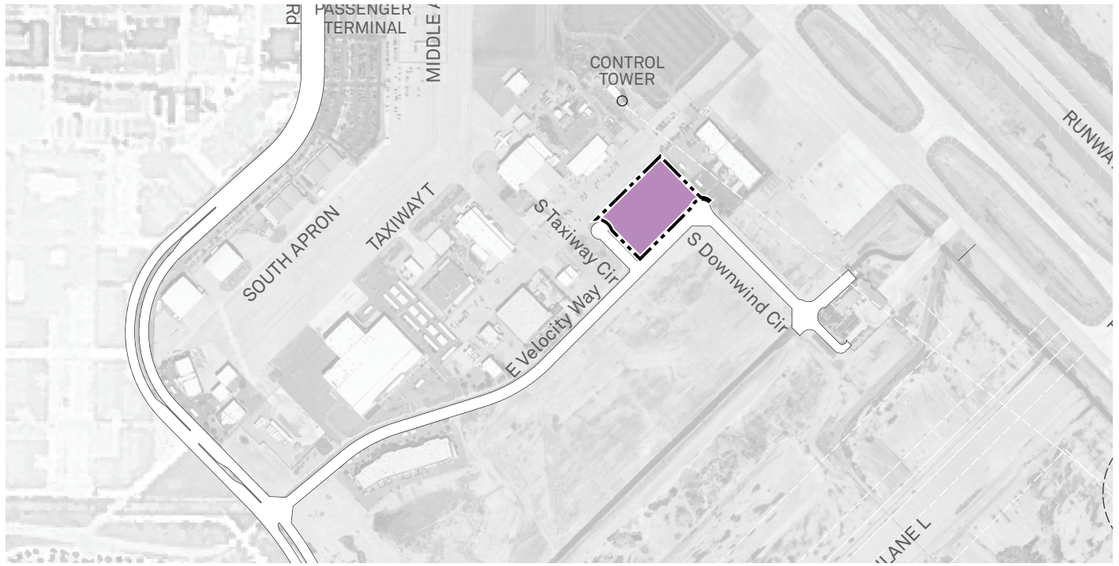


Figure 4.6: Land Use of Development Area A

Area A will be developed in the earliest phase, phase zero. The total land area of Area A is 3.2 acres. Area A will be developed as a non-aeronautical use. In total, Area A will provide 60,000 square feet of development with a Floor Area Ratio (FAR) of 0.42.

DISTRICT	LAND USE	LAND AREA (SF)	LAND AREA (AC)	LAND DISTRIBUTION	GFA (SF)	FAR
Area A		**141,203**	**3.2**	**1%**	**60,000**	**0.42**
	Non-Aeronautical Use	141,203	3.2	1%	60,000	0.42

Table 4.1: Land Use Summary of Development Area A

4.2.3 Development Area B

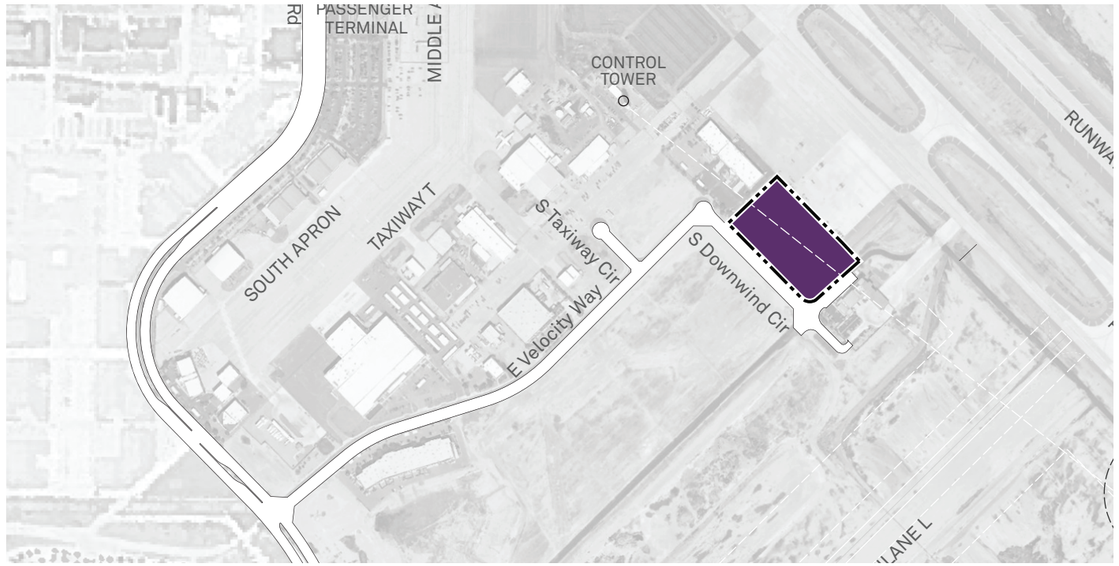


Figure 4.7: Land Use of Development Area B

Area B will be also developed in the earliest phase, phase zero. The total land area of Area B is 5 acres. Area B will be aeronautical uses and will have facilitated access to the taxiway. Area B will contain 82,500 square feet of development with a Floor Area Ratio (FAR) of 0.38.

DISTRICT	LAND USE	LAND AREA (SF)	LAND AREA (AC)	LAND DISTRIBUTION	GFA (SF)	FAR
Area B		**216,666**	**5.0**	**1%**	**82,500**	**0.38**
	Aeronautical Use	216,666	5.0	1%	82,500	0.38

Table 4.2: Land Use Summary of Development Area B

4.2.4 Development Area C

Area C includes the remainder of the development area in SkyBridge Arizona. The total land area of Area C is 355.3 acres. Area C will have both non-aeronautical and aeronautical uses. It will also contain R&D offices, hotel, and retail uses. Upon completion, Area C will provide 3.68 million square feet of development; 2.07 million square feet of which will be dedicated to non-aeronautical uses and 1.33 million square feet dedicated to aeronautical uses. The R&D office and hotel and retail portions will make up 200,000 square feet and 70,000 square feet, respectively. The average FAR in Area C will be 0.24.

Parcels along Taxilane L includes aeronautical and ramp uses, Figure 4.8 illustrates both uses within these parcels.

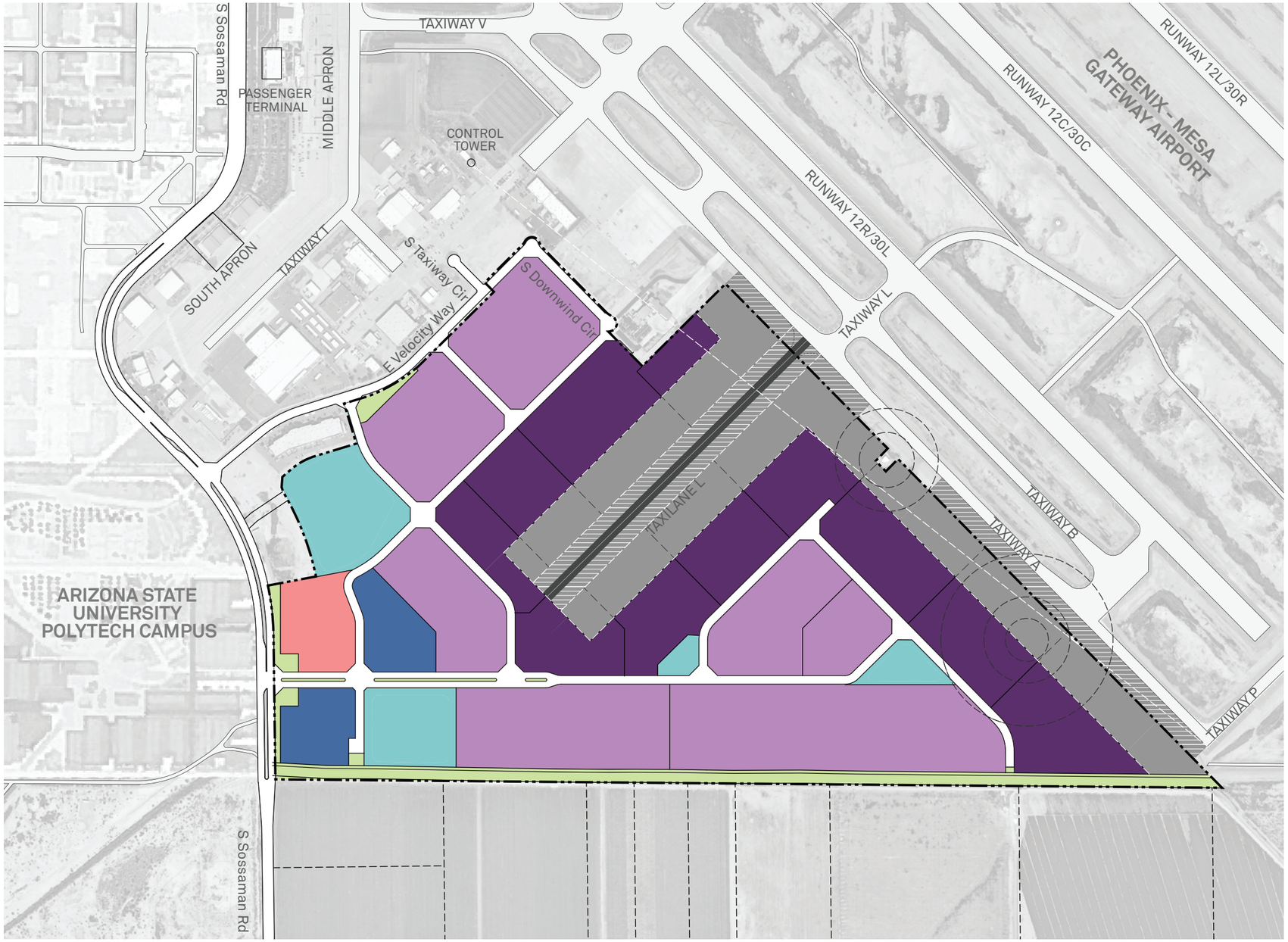


Figure 4.8: Land Use of Development Area C

Area C will be developed in several phases. Detailed phasing concepts are described in section 4.9 of this document.

The efficiency in Area C is 76%, meaning 76% of the land is developable. The remaining 24% is non-developable and will be used for open spaces, detention basins, roadways and taxilane.

DISTRICT	LAND USE	LAND AREA (SF)	LAND AREA (AC)	LAND DISTRBUTION	GFA (SF)	FAR	NUMBER OF ROOMS *
Area C		**15,475,937**	**355.3**	**100%**	**3,683,654**	**0.24**	**150**
	Taxilane/ Taxilane OFA	666,077	15.3	4%			
	Detention Basins	1,058,346	24.3	7%	11,158		
	Open Space	774,199	17.8	5%			
	Roadway	1,144,346	26.3	8%			
	Non-Developable Total	**3,642,968**	**83.6**	**24%**	**11,158**		
	Non-Aeronautical Use	4,797,616	110.1	31%	2,069,430	0.43	
	Aeronautical Use	3,692,787	84.8	24%	1,333,066	0.36	
	R&D / Office **	533,902	12.3	3%	200,000	0.37	
	Hotel / Retail ***	314,574	7.2	2%	70,000	0.22	150
	Ramp	2,494,090	57.3	16%			
	Developable Total	**11,832,969**	**271.7**	**76%**	**3,672,496**	**0.31**	**150**

Table 4.3: Land Use Summary of Development Area C

* Number of Room assuming hotel GFA 50,000sf and 330sf per room
** Office / R&D assuming 3 story buildings
*** Retail / Hotel assuming 3 story buildings

4.2.5 Overall Land Use

Overall, SkyBridge Arizona will include a mix of land uses that provides adequate space for a variety of users. To maximize ramp and taxiway access opportunities, land along Taxilane L and Taxiway A are proposed to be aeronautical uses. In total, the site will provide 89.8 acres of aeronautical uses and 1.42 million square feet of development. Aeronautical uses include air cargo facilities, customs facilities, and hangars. The remaining land area at SkyBridge Arizona will be developed with non-aeronautical uses. The project will provide 113.4 acres of non-aeronautical uses with 2.13 million square feet of development. Facilities in the non-aeronautical use category may be used for e-commerce, or as refrigeration/cooling storage facilities, auto parts/aerospace facilities, and processing facilities. The total commercial use (R&D office and hotel and retail) provided in SkyBridge Arizona is 19.5 acres with 270,000 square feet of development.

Parcels along Taxilane L includes aeronautical and ramp uses, Figure 4.9 illustrates both uses within these parcels.

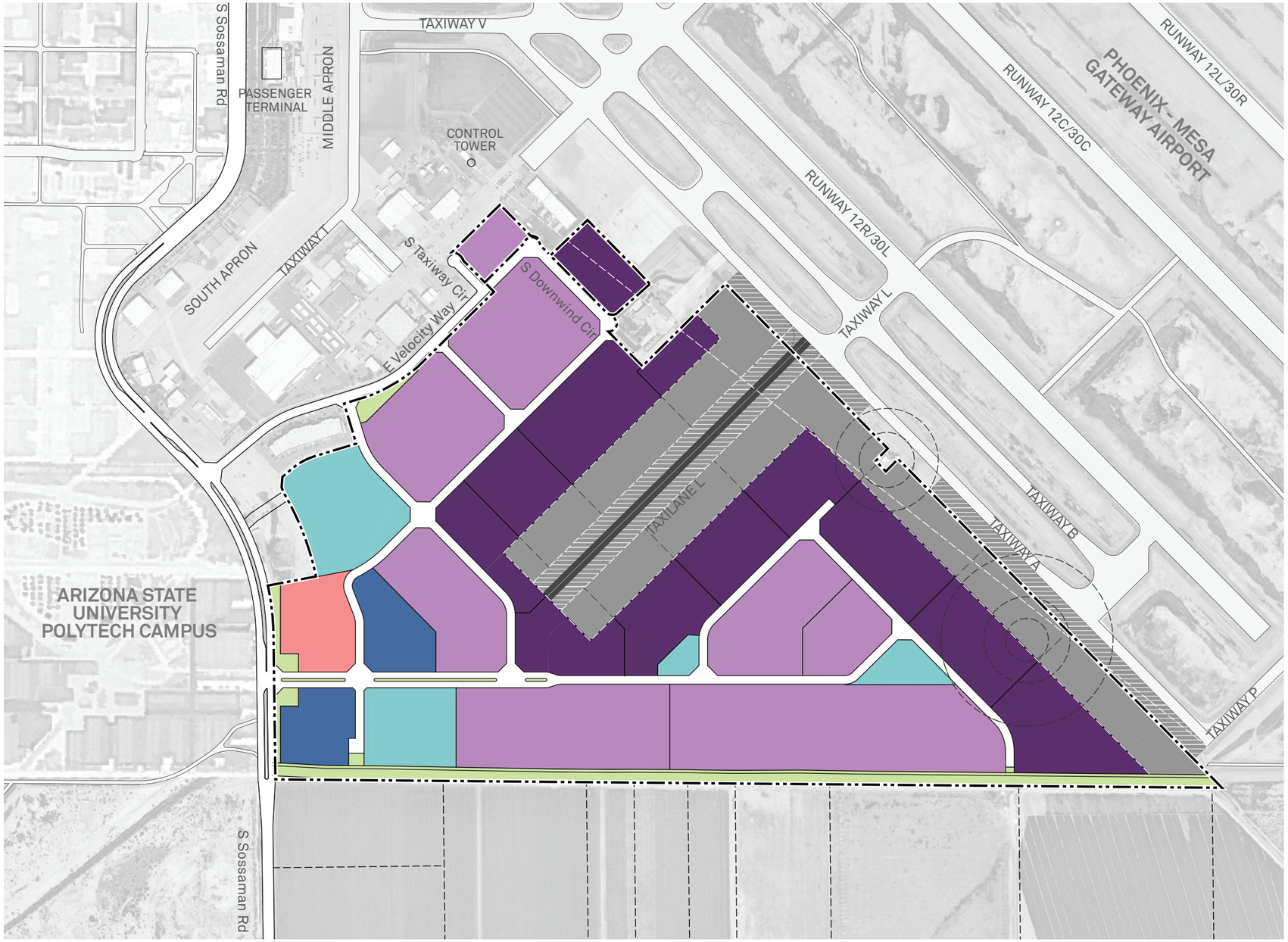


Figure 4.9: Overall Land Use

4.2.6 Land Use Summary

In total, the overall land efficiency achieved at the site is 77%. This means that 77% of the land area is dedicated to developable uses and 23% of the land area is non-developable.

SkyBridge Arizona will provide efficient and adequate space for aircraft circulation, parking, and loading, while also meeting FAA requirements.

Existing natural features are preserved and enhanced to become amenities at SkyBridge Arizona. There are four detention basins in the project area which occupy a total of 24.3 acres of land. In addition to providing adequate stormwater management, these areas also provide recreational facilities. Other open space areas on the site include courtyards and plazas, buffers, linear open space, and other landscaping. These occupy 17.8 acres. Roadways make up 26.3 acres of the total land area.

DISTRICT	LAND USE	LAND AREA (SF)	LAND AREA (AC)	LAND DISTRBUTION	GFA (SF)	FAR	NUMBER OF ROOMS *
Area A	**Non-Aeronautical Use**	**141,203**	**3.2**	**1%**	**60,000**	**0.42**	
Area B	**Aeronautical Use**	**216,666**	**5.0**	**1%**	**82,500**	**0.38**	
Area C		**15,475,937**	**355.3**	**98%**	**3,683,654**	**0.24**	**150**
	Taxilane/ Taxilane OFA	666,077	15.3	4%			
	Detention Basins	1,058,346	24.3	7%	11,158		
	Open Space	774,199	17.8	5%			
	Roadway	1,144,346	26.3	7%			
	Non-Developable Total	**3,642,968**	**83.6**	**23%**	**11,158**		
	Non-Aeronautical Use	4,797,616	110.1	30%	2,069,430	0.43	
	Aeronautical Use	3,692,787	84.8	23%	1,333,066	0.36	
	R&D / Office **	533,902	12.3	3%	200,000	0.37	
	Hotel / Retail ***	314,574	7.2	2%	70,000	0.22	150
	Ramp	2,494,090	57.3	16%			
	Developable Total	**11,832,969**	**271.7**	**75%**	**3,672,496**	**0.31**	**150**
TOTAL		**15,833,806**	**363.5**	**100%**	**3,826,154**		

Table 4.4: Land Use Summary

* Number of Room assuming hotel GFA 50,000sf and 330sf per room
** Office / R&D assuming 3 story buildings
*** Retail / Hotel assuming 3 story buildings

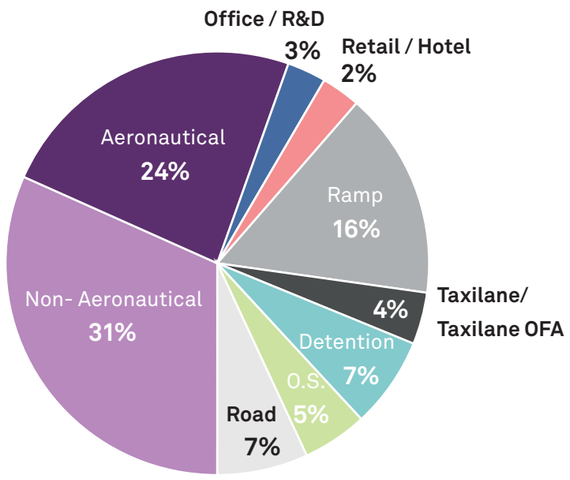


Table 4.5: Land Use Summary Pie Chart

4.2.7 Land Use Character

Aeronautical Use



Aeronautical use character reference

Aeronautical Use	
LAND AREA (AC)	89.8
GFA (SF)	1,415,566
FAR	0.36

Table 4.6: Land Use Detail - Aeronautical Use

The aeronautical land uses at SkyBridge Arizona will be large-scale facilities designed for high functionality and efficiency. These will be some of the tallest and largest facilities on site, able to accommodate aircraft inside in some cases. They will be built for durability and safety. Aeronautical uses will also be designed for flexibility- one side of the building must receive truck loading and unloading, while the other fronts directly onto Taxilane L. The aeronautical uses will be highly secure facilities, used exclusively by staff and other authorized personnel.

Non-Aeronautical Use



Non-aeronautical use character reference

Non-Aeronautical Use	
LAND AREA (AC)	113.4
GFA (SF)	2,129,430
FAR	0.43

Table 4.7: Land Use Detail - Non- Aeronautical Use

Non-aeronautical uses at SkyBridge Arizona make up the largest land use category on site. These facilities will house e-commerce businesses, refrigeration/cooling facilities, manufacturing, and other uses. For this reason, the configuration of non-aeronautical facilities varies the most out of all land uses in order to provide additional flexibility for tenants. Like the aeronautical uses, the non-aeronautical use facilities at SkyBridge will also generally have large footprints and be highly functional and efficient.

Office / R&D



Office / R&D character reference

Office / R&D	
LAND AREA (AC)	12.3
GFA (SF)	200,000
FAR	0.37

Table 4.8: Land Use Detail - Office / R&D

Office/R&D land uses at SkyBridge Arizona will have a modern and urban look and feel. These uses are located in prominent and highly visible locations on site, off of the boulevard street and Sossaman Road. They will be taller facilities than the adjacent non-aeronautical uses to be visible from outside the site as well. These facilities will have additional landscaping features and additional pedestrian-oriented facilities that cater to office workers.

Retail / Hotel



Retail/ hotel character reference

Retail / Hotel	
LAND AREA (AC)	7.2
GFA (SF)	70,000
FAR	0.22

Table 4.9: Land Use Detail - Retail/ Hotel

The retail and hotel portion of SkyBridge Arizona will have a highly active, pedestrian-oriented streetscape. Because this portion of the site is publicly accessible, there will be many features that make it an attractive and welcoming environment for patrons and visitors. Building architecture will also be modern and eye-catching for visibility from ASU and Sossaman Road.

4.3 AERONAUTICAL DEVELOPMENT

As previously described, aeronautical development at SkyBridge Arizona has been proposed surrounding Taxilane L and other taxiway/ramp areas to maximize runway access. Aeronautical uses will include facilities such as hangar buildings, air cargo, and customs functions.

Figure 4.10 and Figure 4.11 show an illustrative plan view and a 3D rendering view of the proposed aeronautical uses.

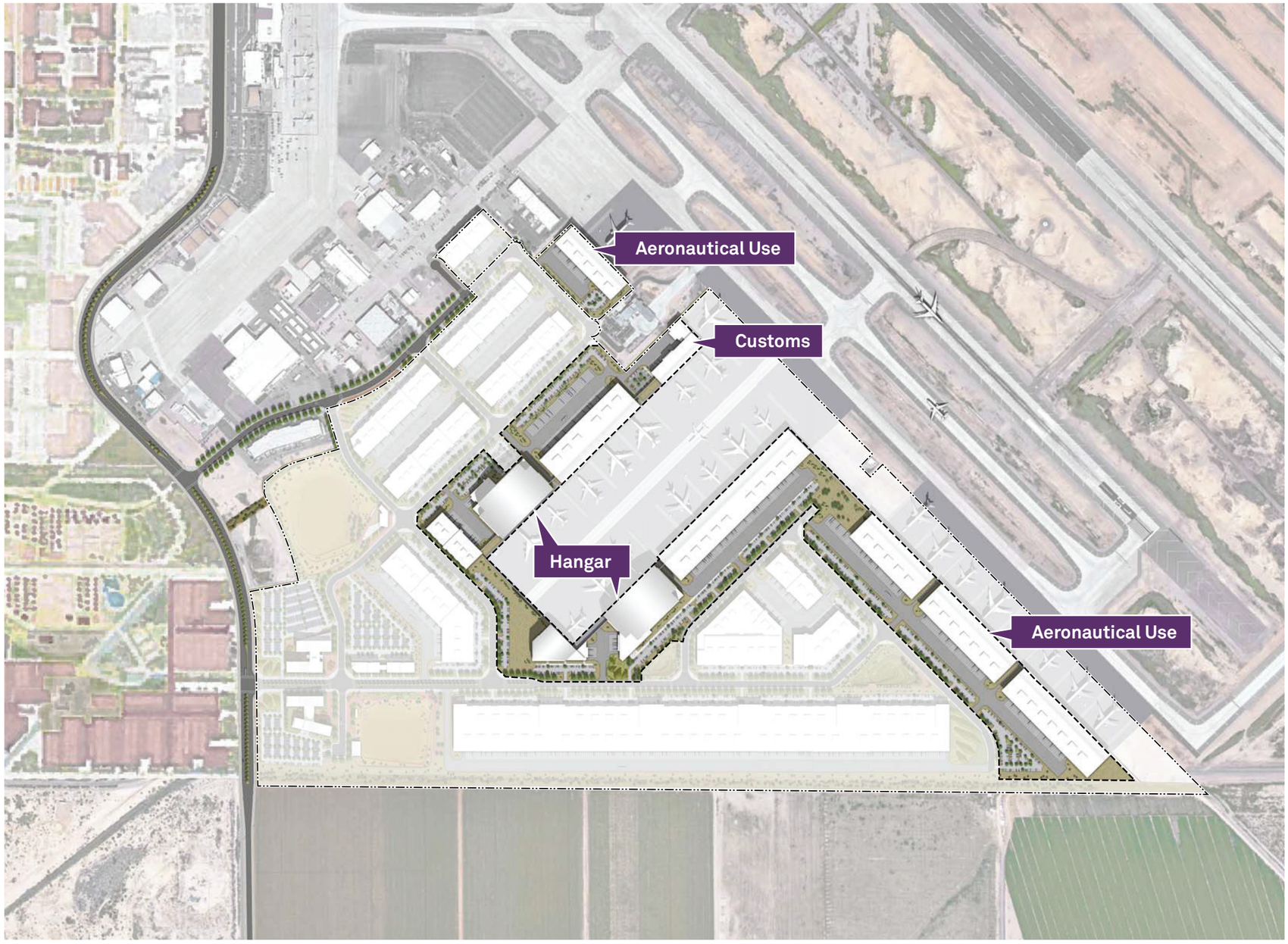


Figure 4.10: Aeronautical Development Area



Figure 4.11: View of Aeronautical Development

4.4 NON-AERONAUTICAL DEVELOPMENT

The non-aeronautical development at SkyBridge Arizona is located internally at the core of the site, beyond the aeronautical development. Non-aeronautical uses can accommodate a variety of users including e-commerce tenants, storage facilities, and manufacturing, amongst others.

Figure 4.12 and Figure 4.13 show an illustrative plan view and a 3D rendering view of the proposed non-aeronautical uses.

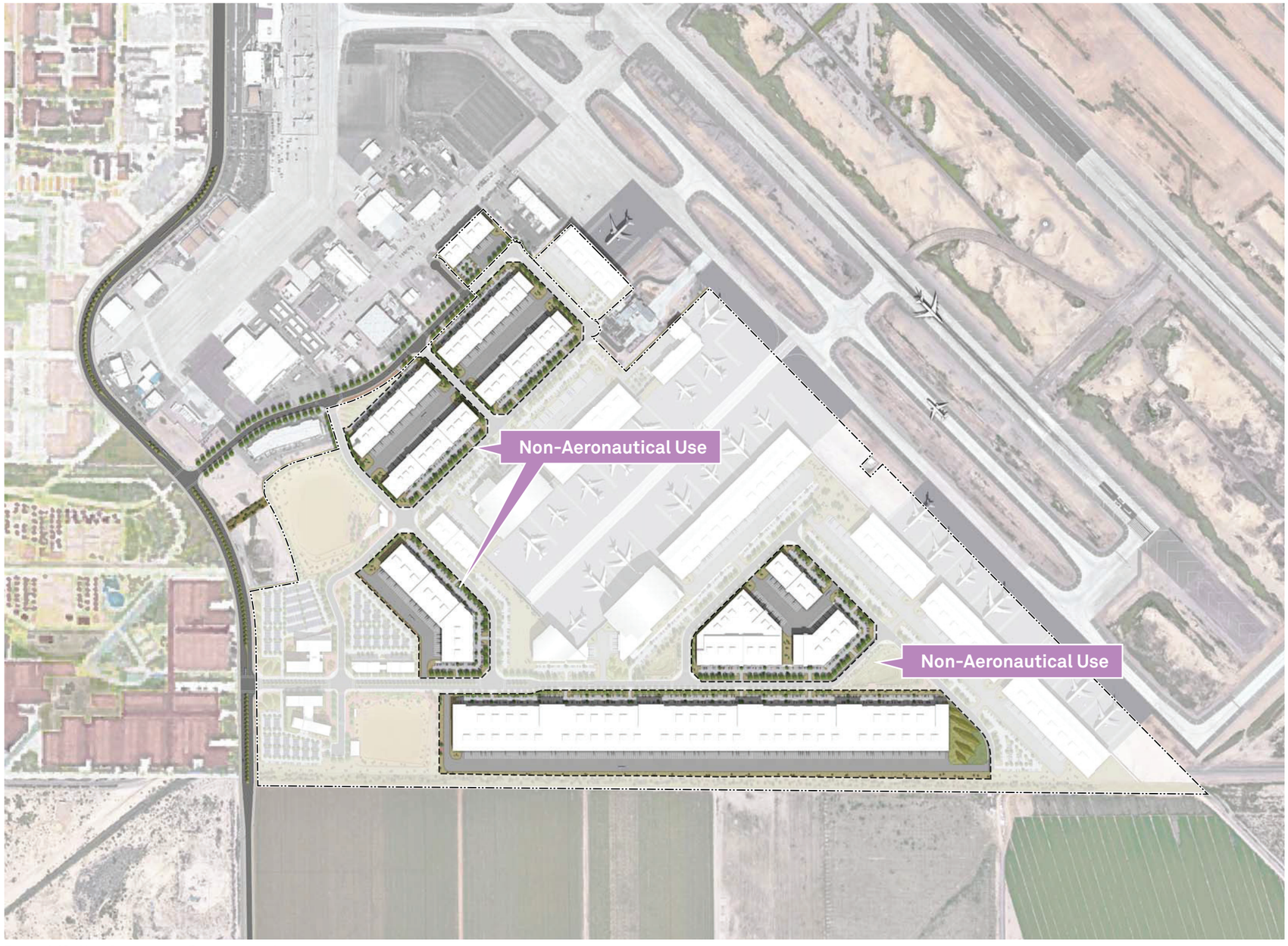


Figure 4.12: Non-Aeronautical Development Area



Figure 4.13: View of Non-Aeronautical Development

4.5 COMMERCIAL DEVELOPMENT

Commercial development at SkyBridge Arizona is proposed in the southwest corner of the site, bordering Sossaman Road. This area will include hotel and retail use as well as R&D office tenants.

Figure 4.14 and Figure 4.15 show an illustrative plan view and a 3D rendering view of the proposed commercial uses.



Figure 4.14: Commercial Development Area



Figure 4.15: View of Commercial Development

4.6 DEVELOPMENT TYPOLOGY

4.6.1 Development Typology

As a first of its kind, inland air cargo hub, SkyBridge Arizona was carefully planned and designed to be highly efficient in both land use and circulation. SkyBridge Arizona is anticipated to generate thousands of additional cargo flights to the Phoenix-Mesa Gateway Airport each year. By land, SkyBridge Arizona will also become the origin and destination of significant semi-truck travel. In order to operate successfully in the future, the site circulation and land uses at SkyBridge Arizona had to be integrally linked. AECOM worked closely with Mesa SkyBridge to anticipate the required technical functionalities, roadway access, and loading/unloading needs of each facility to achieve seamless receipt and delivery of goods. The result of these efforts are five development typologies shown in Figure 4.16. These are described in further detail below.

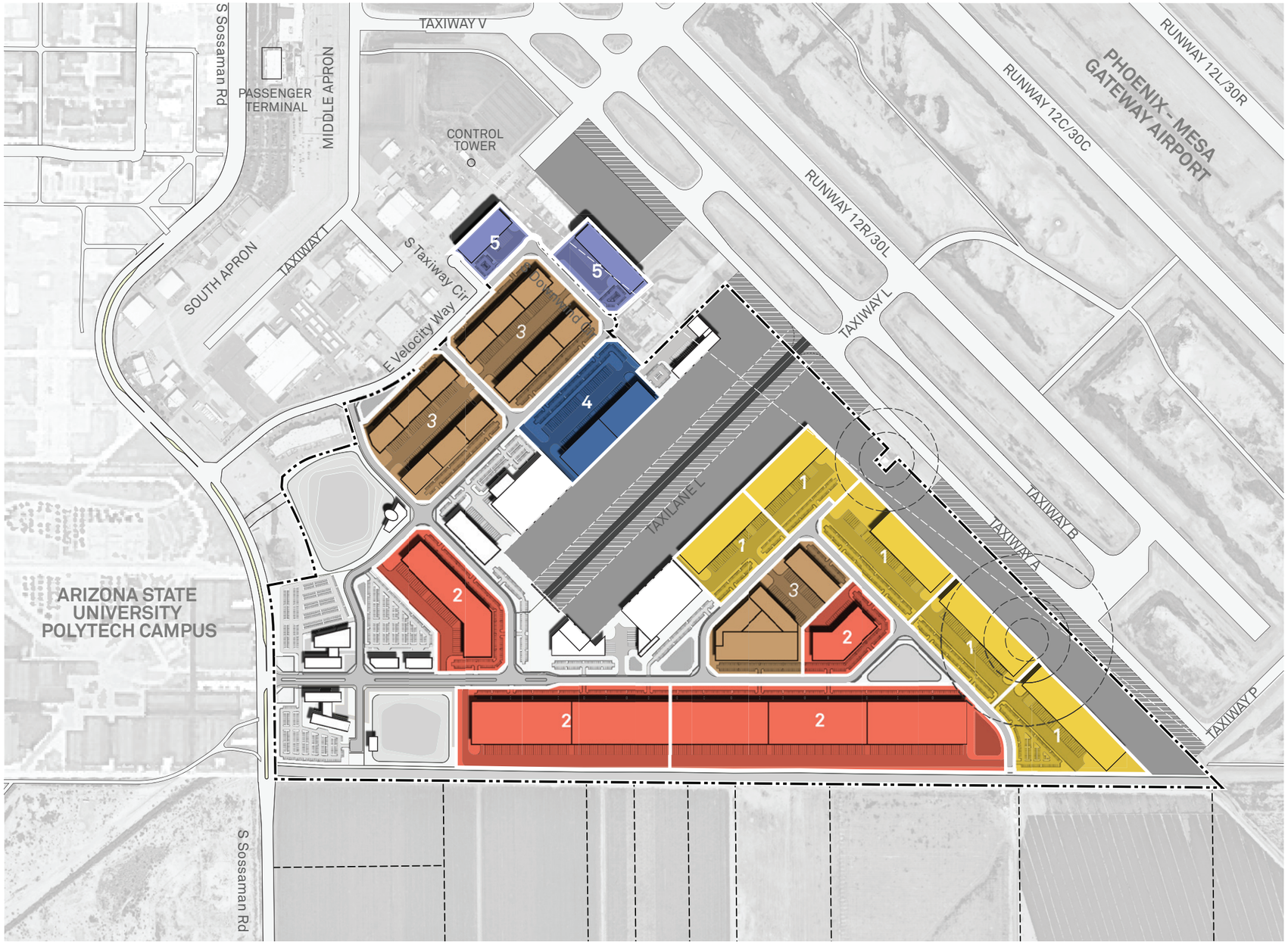


Figure 4.16: Development Typology Plan

4.6.2 Typology 1

Development Typology 1 is applied to the buildings located adjacent to Taxilane L and Taxiway A. This typology is indicated in yellow on Figure 4.18. These facilities are 200 feet in width and house aeronautical uses. The side of the building facing the taxilane/taxiway has a minimal 42.8-foot airplane parking setback if using 747-400 aircraft. The other side of the building will provide adequate space to accommodate truck loading and unloading, and two truck circulation lanes. A planting buffer of 15 feet will act as a barrier between the truck circulation area and the adjacent area dedicated to cars. An area of 60 feet beyond the planting buffer will allow for two rows of standard vehicle parking spaces with a central drive aisle with two circulation lanes. An additional 20-foot planting buffer and a ten-foot Public Utility and Facilities Easement (PUFE) will separate Typology 1 from the right-of-way.

The location and section view of Typology 1 is shown in Figure 4.17 and Figure 4.18.

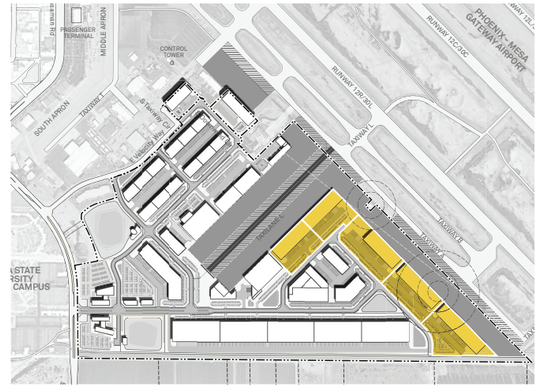


Figure 4.18: Development Typology -Type 1 Key Map

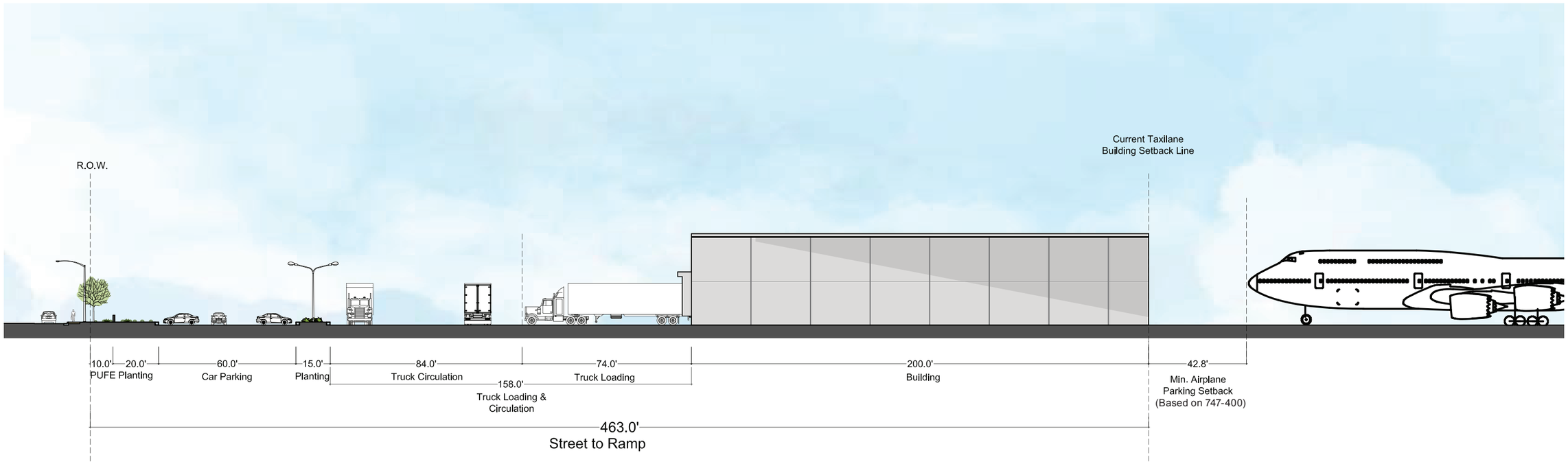


Figure 4.17: Development Typology -Type 1 Section

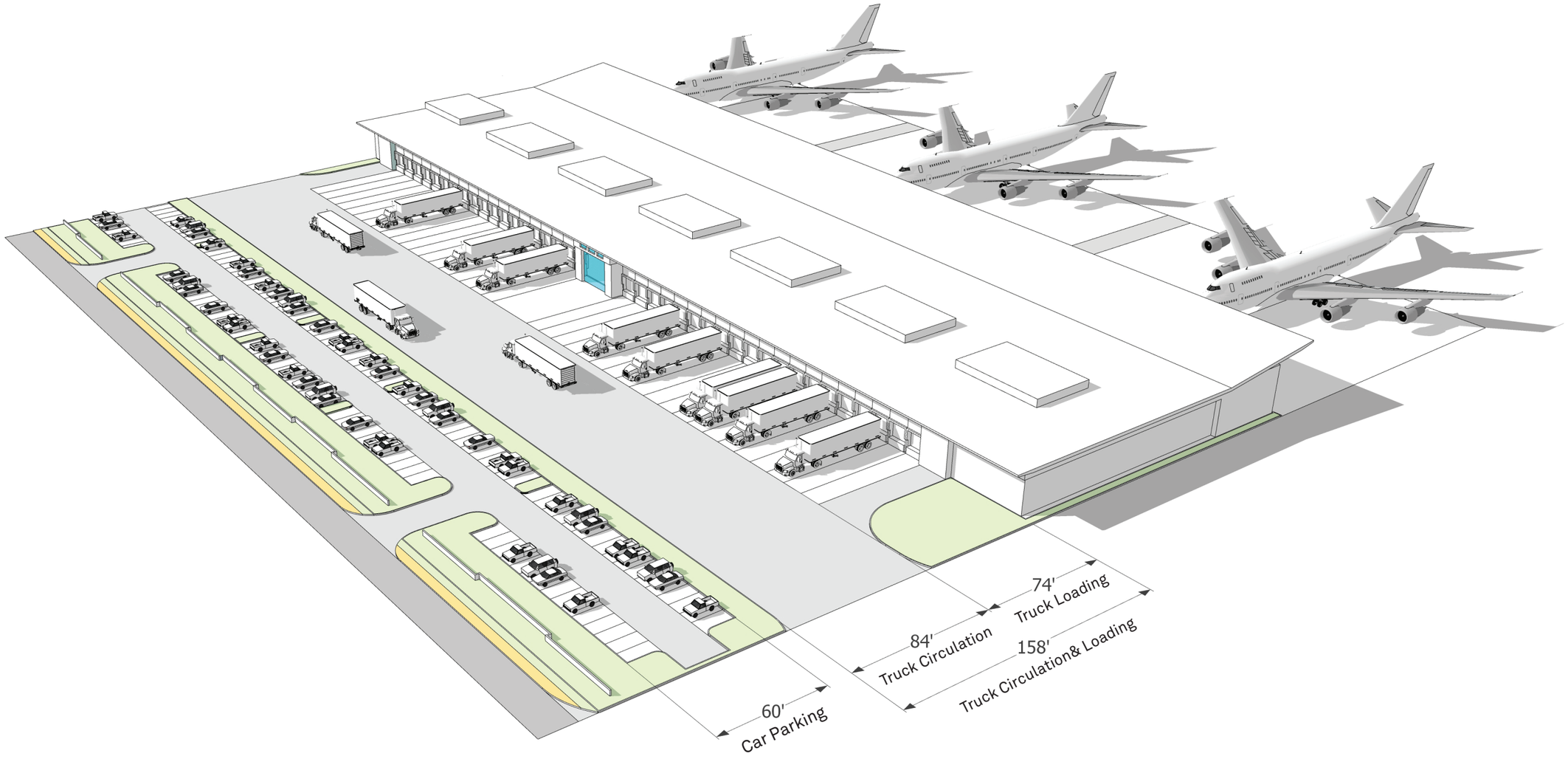


Figure 4.19: Development Typology -Type 1 3D View

4.6.3 Typology 2

Development Typology 2 is applied to the facilities at the southern edge of the site. None of the facilities in Typology 2 directly border taxilane areas. The width of buildings in this typology varies. Similar to Typology 1, Typology 2 separates truck and vehicular parking and circulation. In this case, truck loading/unloading and circulation occurs on one side of the building, while car parking occurs only on the other side of the building.

A total width of 158 feet accommodates two lanes of truck circulation and a 74-foot truck loading/unloading area. This area will also provide adequate space to allow for trucks to maneuver, turn, and back into the loading/unloading area.

On the other side of the building, there is a 10-foot planting and 5-foot sidewalk between the building and car parking area. A 60-foot wide area accommodates two rows of standard dimension parking spaces and a central drive aisle with two circulation lanes. Another planting buffer of ten feet or more and the ten-foot PUFE separates Typology 2 from the right-of-way.

The location and section view of Typology 2 is shown in Figure 4.20 and Figure 4.21.

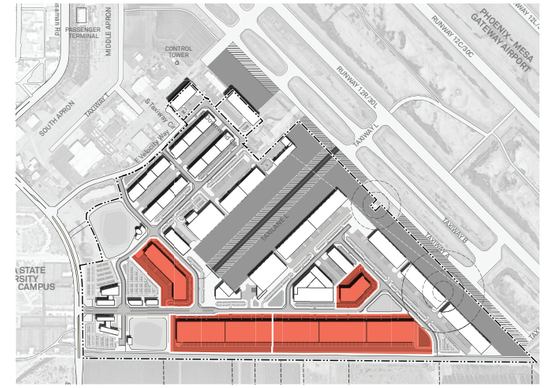


Figure 4.21: Development Typology -Type 2 Key Map

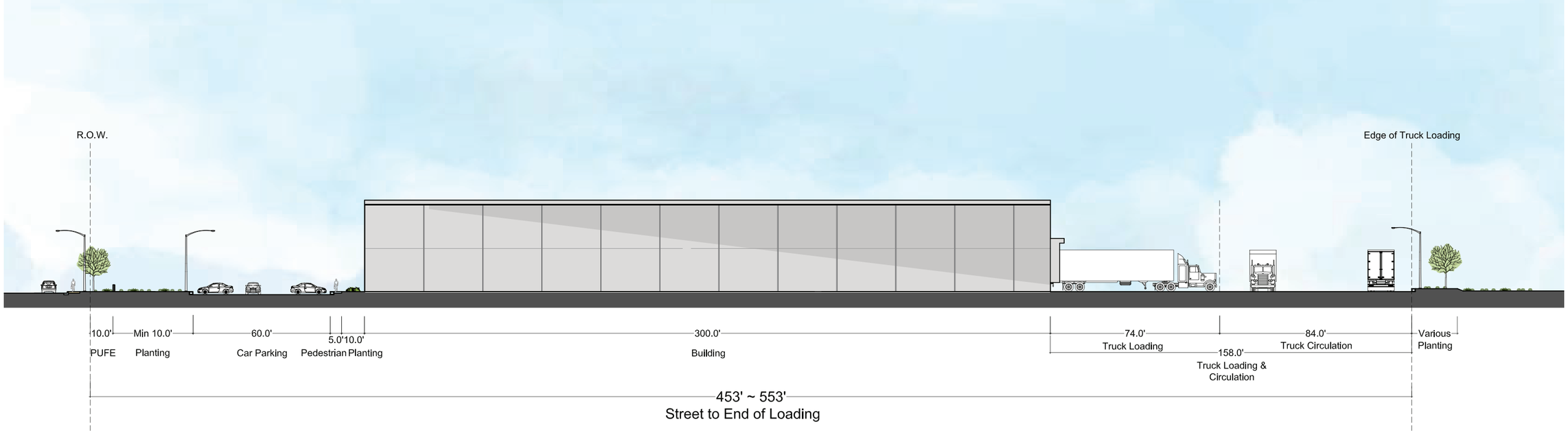


Figure 4.20: Development Typology -Type 2 Section

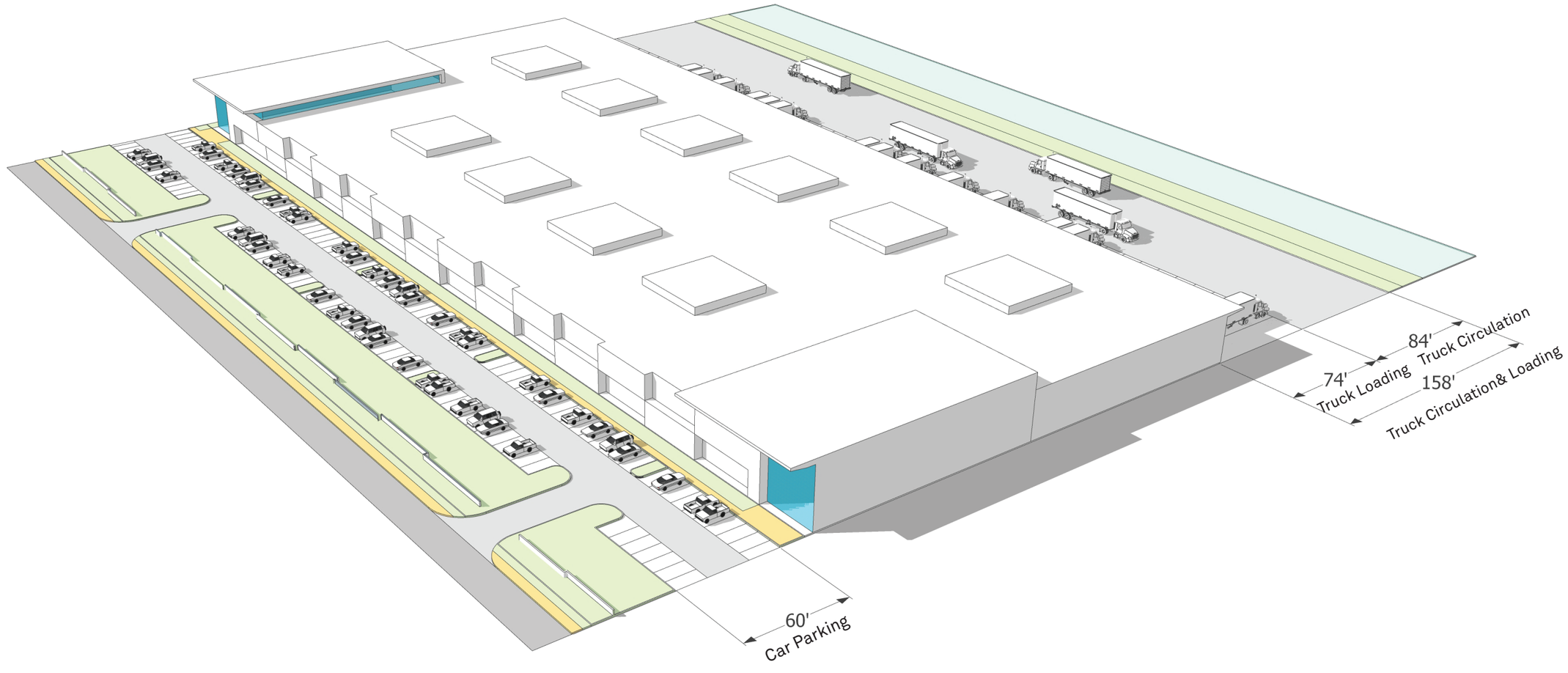


Figure 4.22: Development Typology -Type 2 3D View

4.6.4 Typology 3

Development Typology 3 occurs on both sides of Taxilane L. This typology is configured differently than Typology 1 or 2. In this case, there are two buildings located on either side of a central truck drive aisle with loading/unloading occurring on both sides of this aisle. The aisle provides 232 feet in length for two travel lanes in the center and mirrored loading/unloading spaces adjacent to each building. Buildings in this typology will vary in width.

On the other side of the building, this development typology is configured in the same way as Typology 1 and 2.

The location and section view of Typology 3 is shown in Figure 4.23 and Figure 4.24.

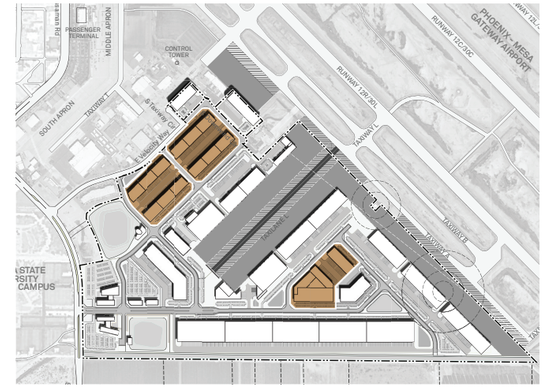


Figure 4.24: Development Typology -Type 3 Key Map

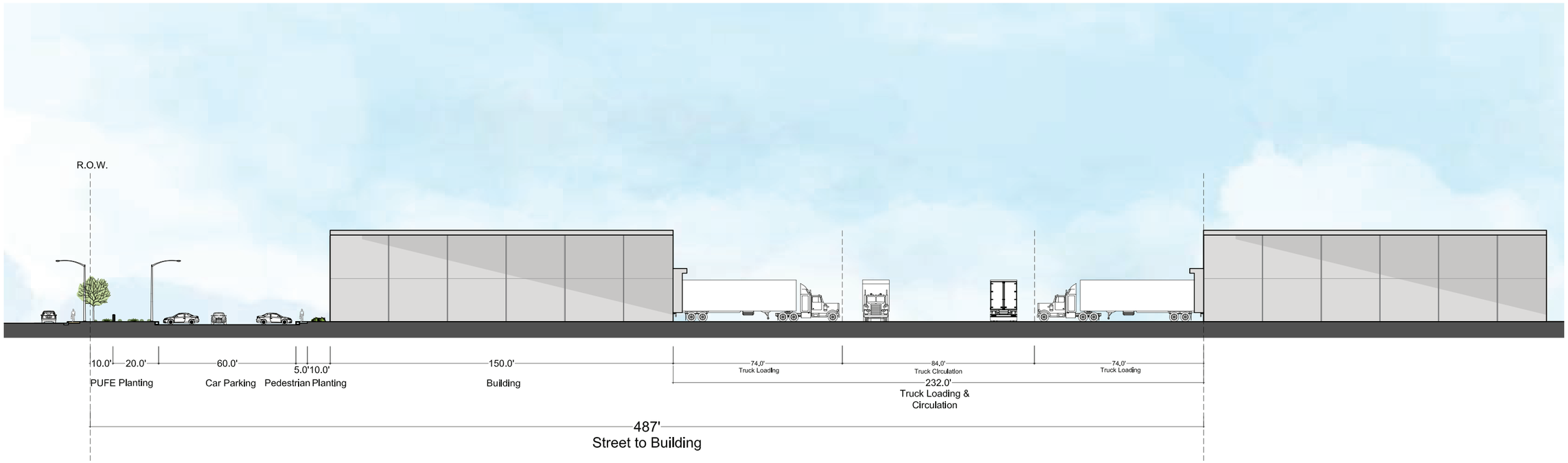


Figure 4.23: Development Typology -Type 3 Section

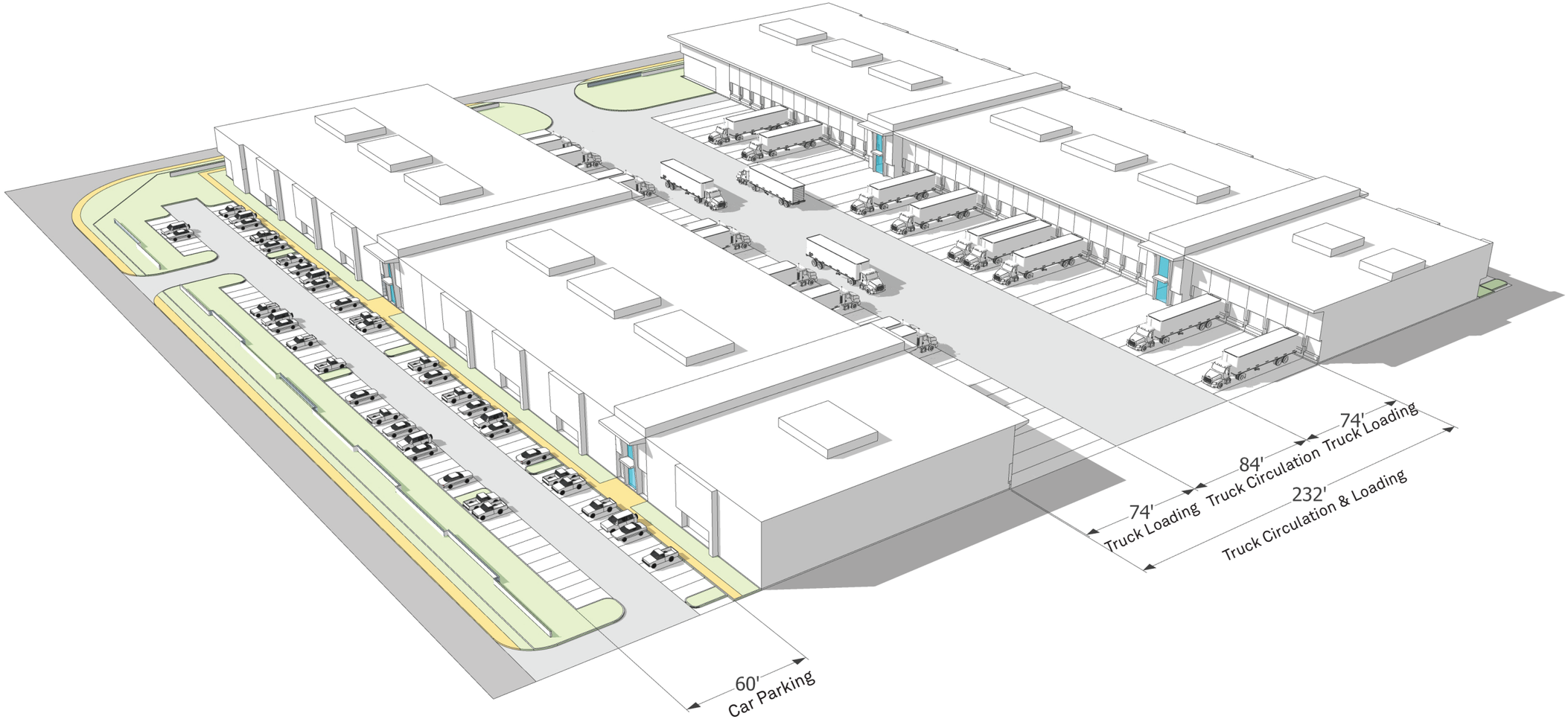


Figure 4.25: Development Typology -Type 3 3D View

4.6.5 Typology 4

Typology 4 applies only to one portion of the site. This typology borders Taxilane L. All buildings in this typology will be 200 feet wide. The side of the building adjacent to Taxilane L will have a minimal 42.8-foot airplane parking setback if using 747-400 aircraft. On the other side of the building is truck loading/unloading, drive aisles, and truck parking. This typology is differentiated from the others because it has a wider area of 232 feet dedicated to truck circulation and parking. Within the 232 feet is the 74-foot truck loading/unloading area, two circulation lanes, and a 74-foot long truck parking area. A larger planting buffer of 30 feet separates the truck parking and circulation area from the car parking area. Typology 4 has the same car parking and circulation configuration as the previous typologies.

The location and section view of Typology 4 is shown in Figure 4.26 and Figure 4.27.

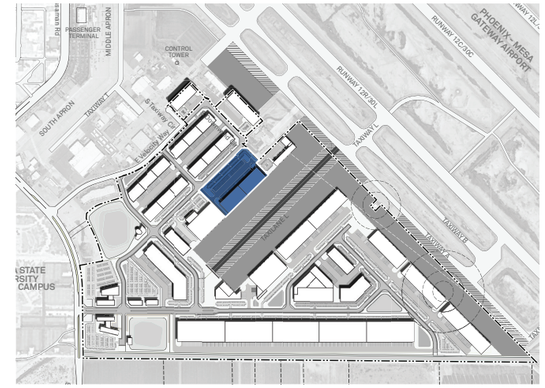


Figure 4.27: Development Typology -Type 4 Key Map

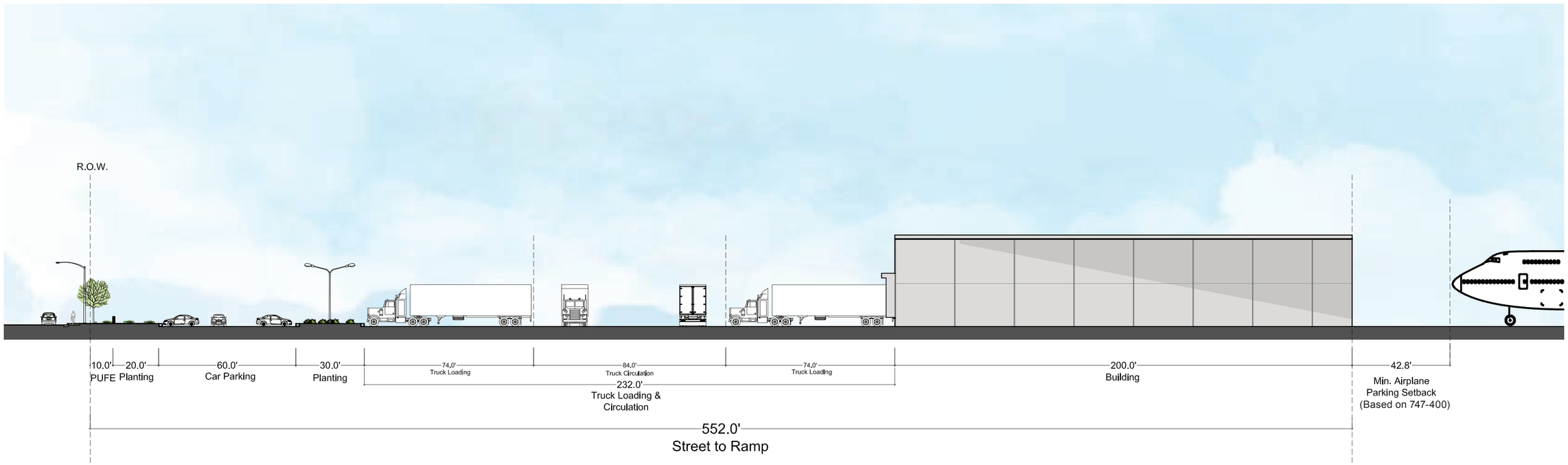


Figure 4.26: Development Typology -Type 4 Section

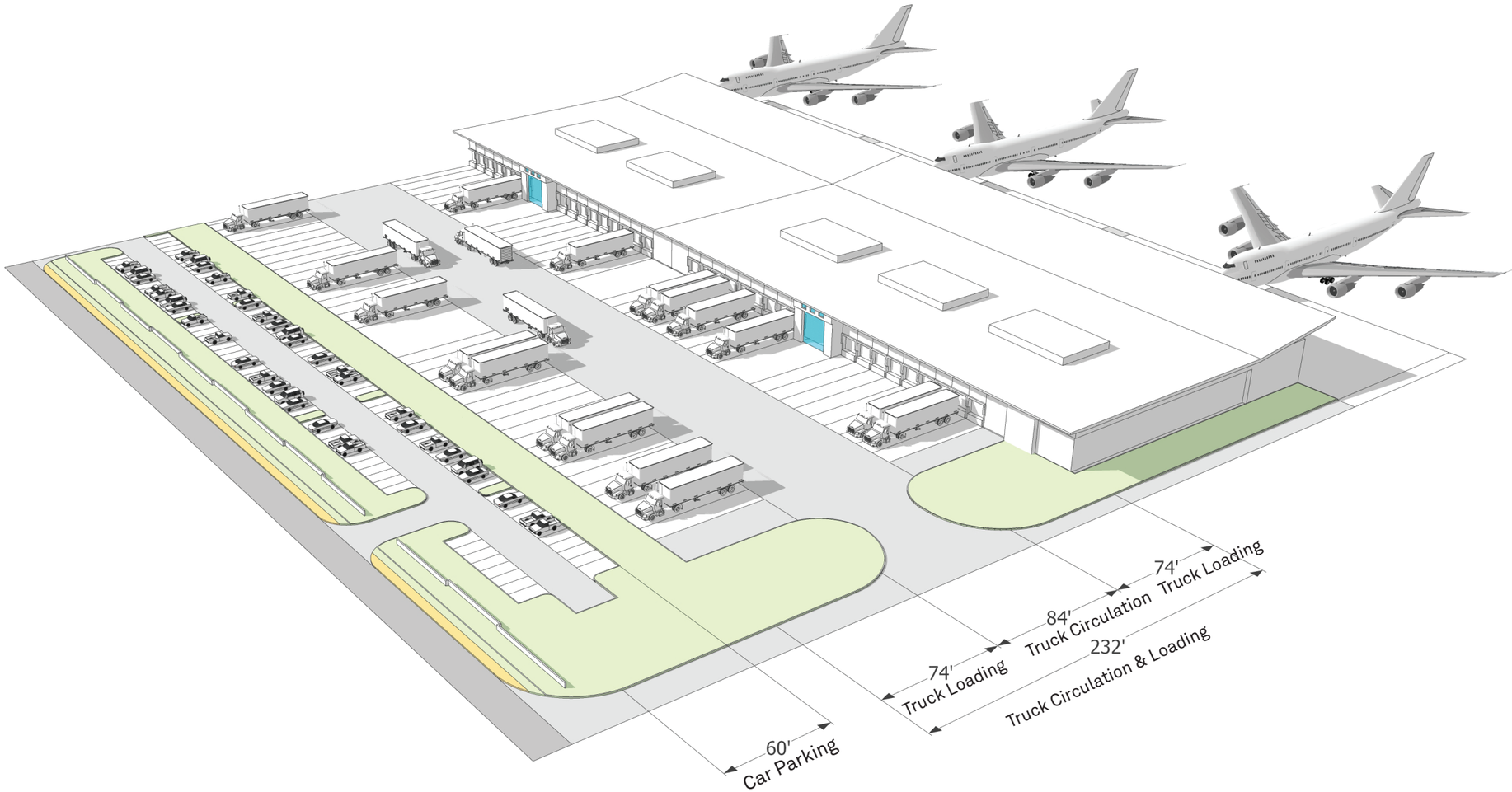


Figure 4.28: Development Typology -Type 4 3D View

4.6.6 Typology 5

Development Typology 5 applies to the two northernmost areas of the SkyBridge Arizona site. This typology represents a special condition that applies only to this portion of the site. For space efficiency, truck and car circulation and parking is shared.

Buildings in this typology will be 150 feet wide. Similar to the other typologies, Typology 5 also has a 74-foot truck loading/unloading area directly next to the building. Beyond this, 84 feet is dedicated to truck circulation. Car parking is provided in separate parking areas adjacent to the building. These parking areas will be separate from any truck circulation.

A planting buffer of varying widths and the standard ten-foot PUFE separates this typology from the right-of-way.

The location of Typology 5 is shown in Figure 4.30. Figure 4.29 shows a section view of Area A and Figure 4.31 shows a 3D view of Area B.

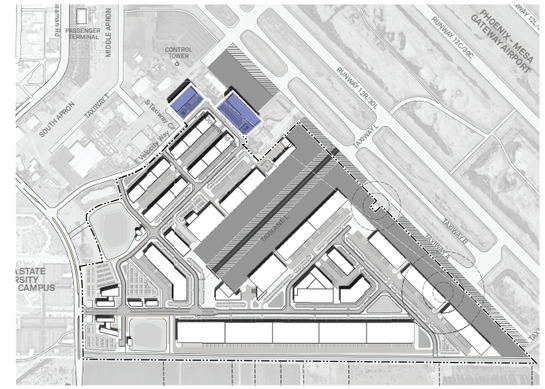


Figure 4.30: Development Typology -Type 5 Key Map

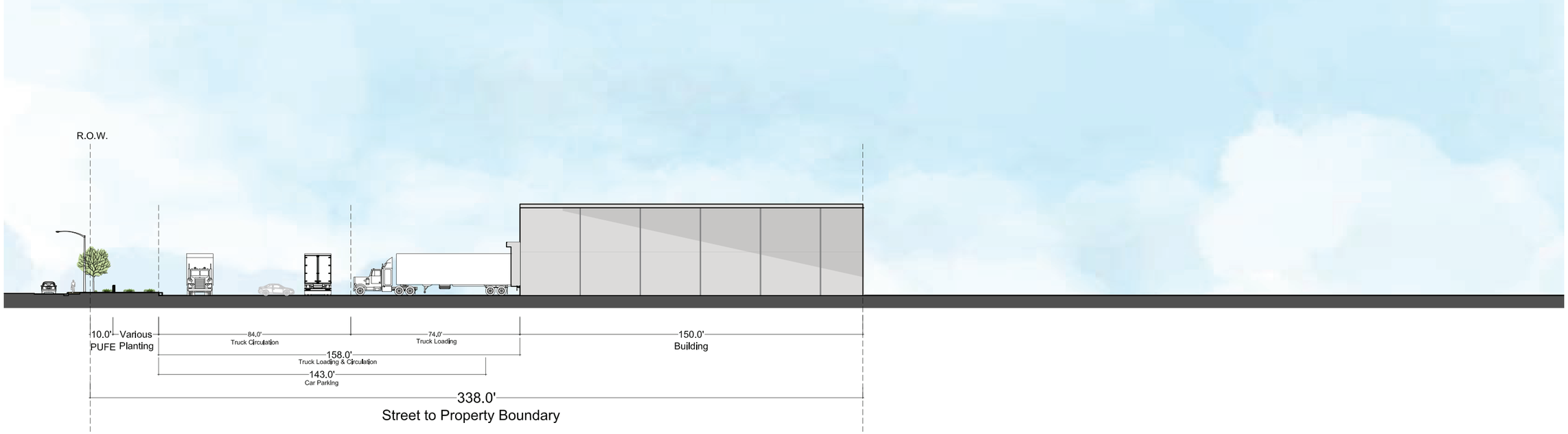


Figure 4.29: Development Typology -Type 5 Section - Area A

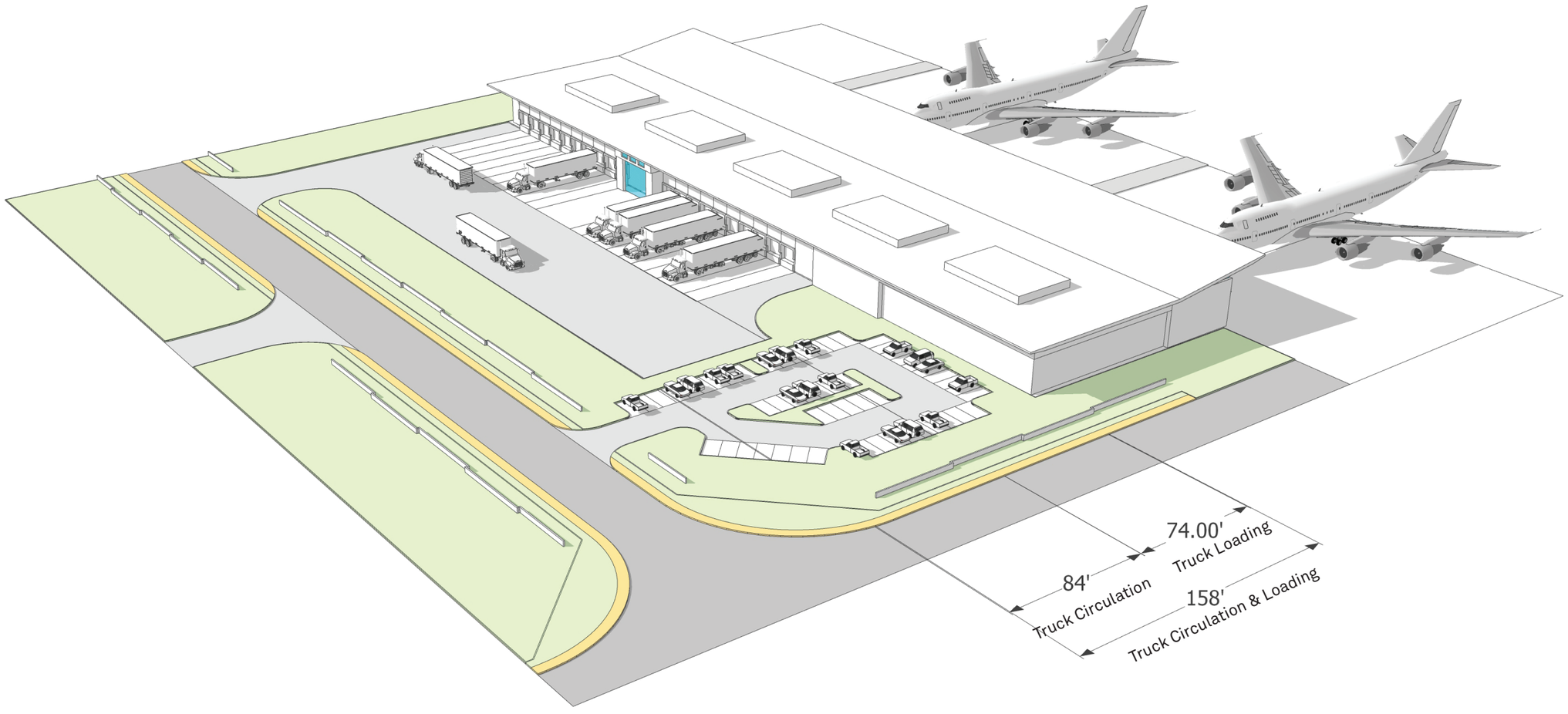


Figure 4.31: Development Typology -Type 5 3D View - Area B

4.7 ACCESS + CONNECTIVITY

4.7.1 Circulation Network

There are two primary street typologies within the site. These include Boulevard and Local Roads. Sossaman Road, forming the western boundary of the site, is an Arterial road. The taxilane is reserved for aircraft circulation and required support vehicles. Members of the public may utilize the taxilane.

The main site entrance will be located off of Sossaman Road, south of Velocity Way. The main entrance will lead onto the boulevard street typology. The existing entrance at Velocity Way will become the site's secondary entrance.

The SkyBridge Arizona circulation network is shown in Figure 4.32.

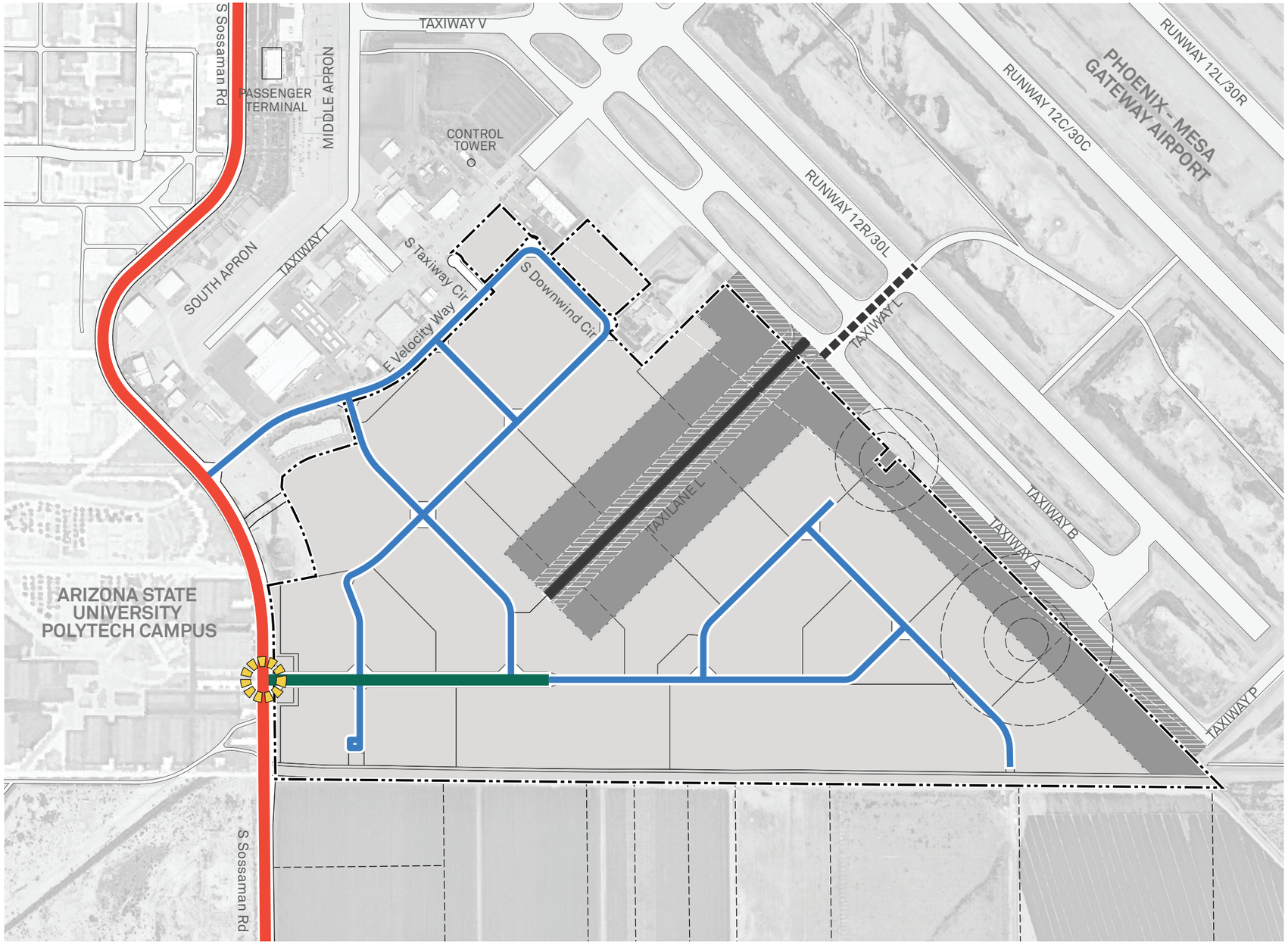


Figure 4.32: Circulation Network

4.7.2 Typical Boulevard Street Section

The Boulevard street section is intended to serve as a pedestrian-friendly connection from the ASU campus into the SkyBridge Arizona site. This roadway typology begins at the southern entrance to the site off of Sossaman Road and continues straight nearly midway into the site. The Boulevard is 110-feet wide with two 11-foot travel lanes, a 6-foot bike lane in each direction, a 12-foot center median, and planting and sidewalks on either side. Both sides of the Boulevard have 6-foot wide sidewalks and landscaped planting strips on either side of the sidewalk. One of these planting areas is a required Public Utility and Facilities Easement (PUFE). These planting areas will enhance the pedestrian experience and create a pleasant and inviting environment. Additionally, the planting area enhances safety on the roadway by creating a buffer between vehicular and pedestrian traffic.

The Boulevard street typology is shown in Figure 4.33.

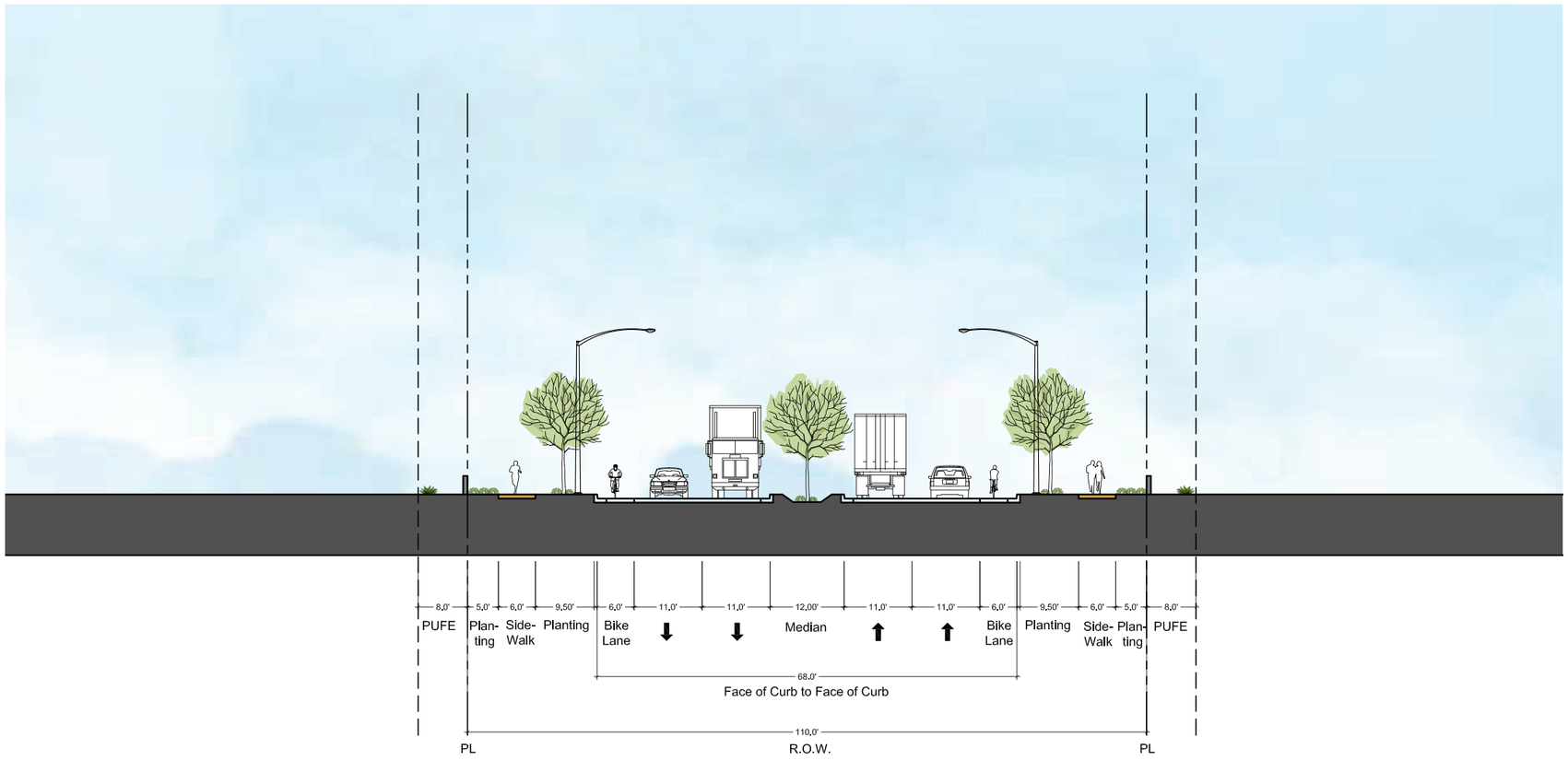


Figure 4.33: Typical 110ft Boulevard Street Section

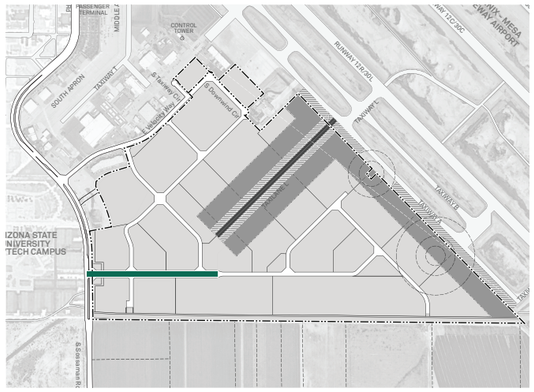


Figure 4.34: Boulevard Key Map



Example of a boulevard street

4.7.3 Typical Local Street Section

The Local Street typology is the most prevalent on the site. This street is 60-feet wide in total, with two 20-foot travel lanes, 5-foot sidewalks, and a 4.5-foot planting strip on either side. On either side of the Local Street typology is a ten-foot wide PUFE. The Local Street has wide travel lanes to accommodate semi-truck traffic easily.

The local street typology is shown in Figure 4.35.

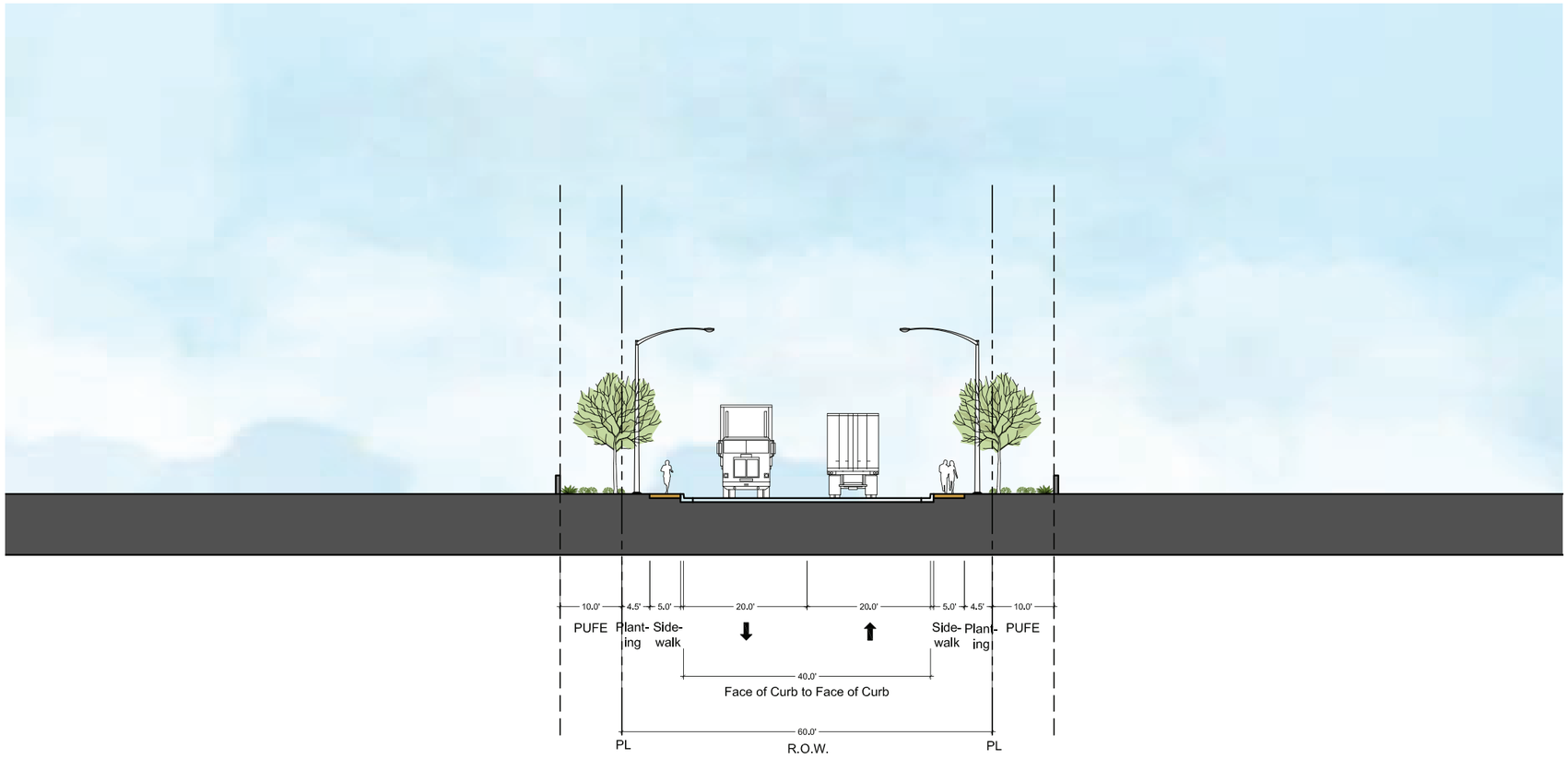


Figure 4.35: Typical 60ft Local Street Section

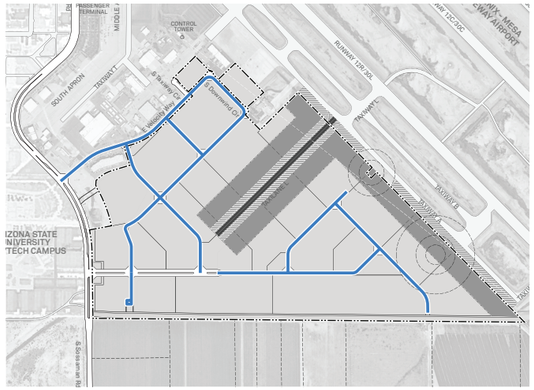


Figure 4.36: Local Street Key Map



Example of a local street

4.7.4 Bike & Pedestrian Network

The SkyBridge Arizona site will have a comprehensive bike and pedestrian network throughout the project. All roadways within the site have been designed with a multi-use path or sidewalk within the right-of-way. The multi-use path will be usable by both pedestrians and bicycles and provide a pleasant and safe environment for users.

Outside of the project area, Sossaman Road also has a continuous pathway on both sides that is utilized by pedestrians and bikes. The bike and pedestrian network within the site will connect with the existing infrastructure on Sossaman Road.

In addition to the multi-use pathways on the site, SkyBridge Arizona will also have walkways and other accessible outdoor areas. The majority of these are located in the publicly-accessible commercial areas near the hotel in the southwest corner of the site. The addition of these walkways and outdoor areas will enhance and complement hotel and retail functions by providing guests and visitors welcoming and attractive outdoor spaces. Students from ASU or employees at SkyBridge Arizona may walk to this area to buy lunch or take a break while enjoying the outdoors.

Additional walkways and outdoor areas will be located surrounding the detention basin/open space areas. These areas will provide employees and visitors to SkyBridge Arizona with outdoor areas for walking, resting, eating lunch, or even informal meetings.

Figure 4.37 shows the bike and pedestrian network.

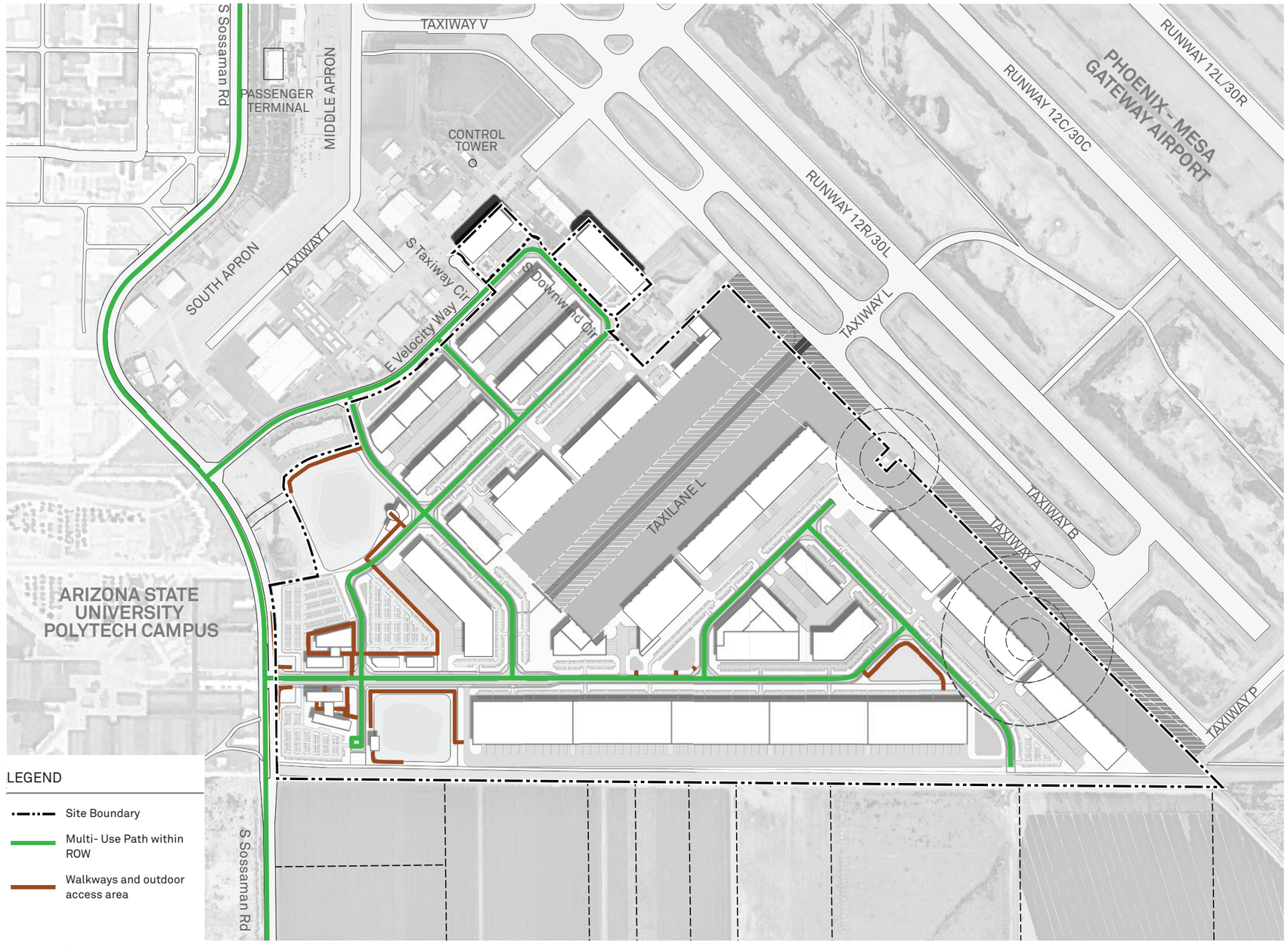


Figure 4.37: Bike & Pedestrian Network

4.7.5 Parking & Access

As shown in Figure 4.38 , SkyBridge Arizona provides ample truck and vehicular parking on site. Parking requirements for new industrial developments mandate that sufficient parking spaces be provided based on facility square footages. These requirements and the total number of parking spaces provided are shown in Table 4.11 and Table 4.10.

The numbers on Figure 4.38 indicate the number of available parking spaces for both vehicles and semi-trucks. As indicated by the yellow and purple shading, vehicle and truck parking areas are separated. This will minimize conflicts and also increase efficiency. The purple and orange triangles on Figure 4.38 indicate truck and vehicle entrances to the parking areas. The design of parking and access areas aims to minimize the number of truck entrances on the site.

Land Use	Car Parking Required	Car Parking Provided	Truck Loading Provided
Non-Aeronautical Use	1,547	1,882	528
Aeronautical Use	1,250	1,439	309
R&D / Office	533	610	-
Hotel / Retail	418	422	-
TOTAL	**3,748**	**4,353**	**837**

Table 4.10: Parking Number Summary

Car Parking Standards	
Gloss Floor Area	**Parking Ratio**
0 to 150,000 sf	1 space per 1,000 sf
150,001 to 500,000 sf	1 space per 1,500 sf
500,001 and greater sf	1 space per 2,000 sf

Table 4.11: Car Parking Standards

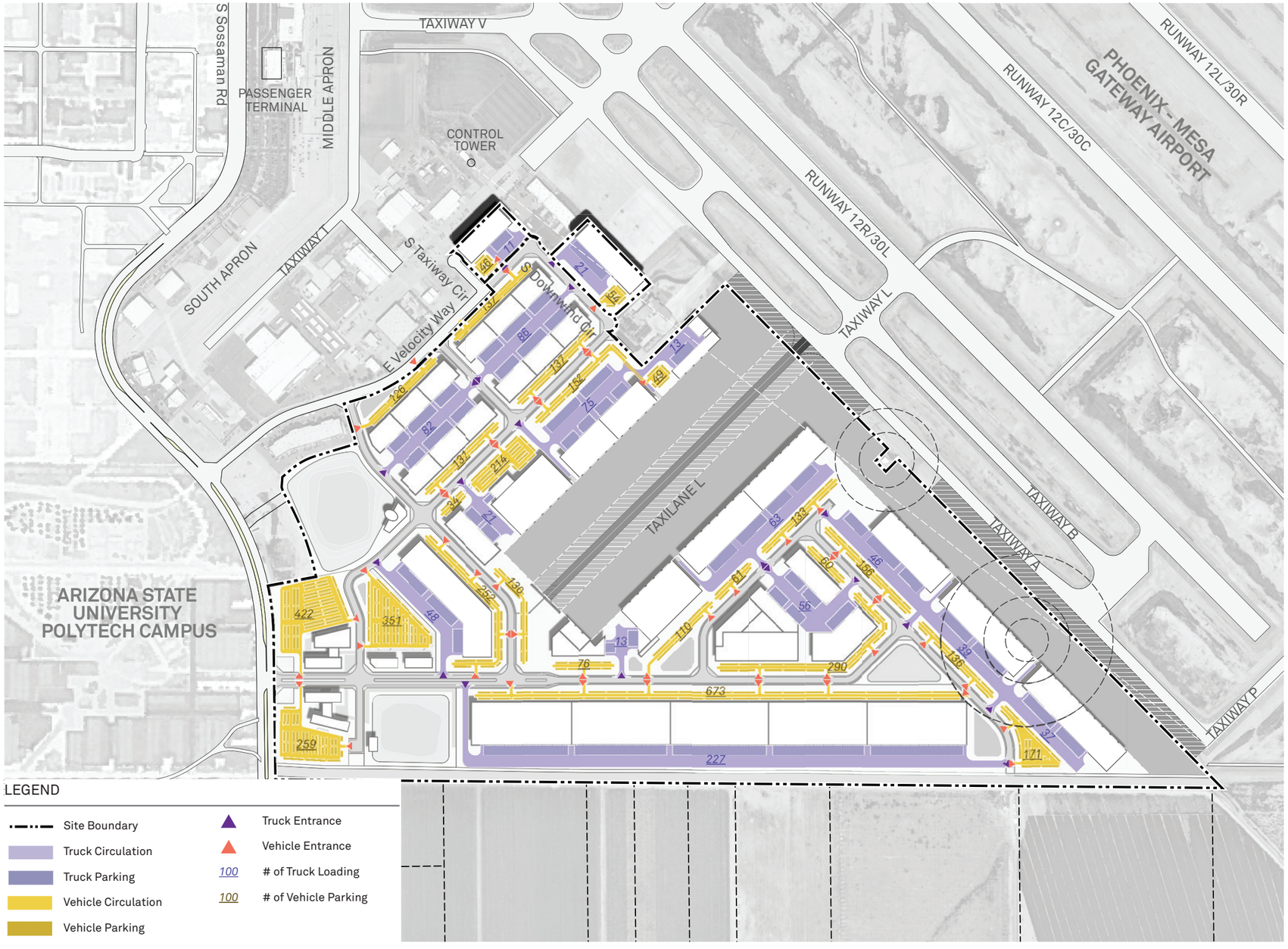


Figure 4.38: Parking & Access Plan

4.8 PARCELIZATION STRATEGY

Under present conditions, the site consists of one large existing parcel with two smaller parcels contained within the boundaries of the large parcel. For additional site flexibility, AECOM recommends that the large parcel be subdivided into multiple smaller parcels. A variety of parcel sizes will allow for the site to be more responsive to current market conditions and facilitate a phased development strategy. The proposed mix of parcels ranges from 3 acres to 17 acres or greater.

As shown in Figure 4.39, the SkyBridge Arizona site will have six categories of parcel size ranges. The site's largest parcels are located on the outer edges of the site with the moderately sized parcels primarily located adjacent to Taxilane L.

Land Area (AC)	Parcel Count	%of Parcel Count	Area (AC)	% of Area
3 - 5	2	9%	8.2	3%
5.1 - 8	5	22%	33.0	12%
8.1 - 11	3	13%	29.1	10%
11.1 - 14	5	22%	61.3	22%
14.1 -17	4	17%	61.6	22%
17 +	4	17%	86.7	31%
TOTAL	**23**	**100%**	**279.9**	**100%**

Table 4.12: Parcelization Distribution

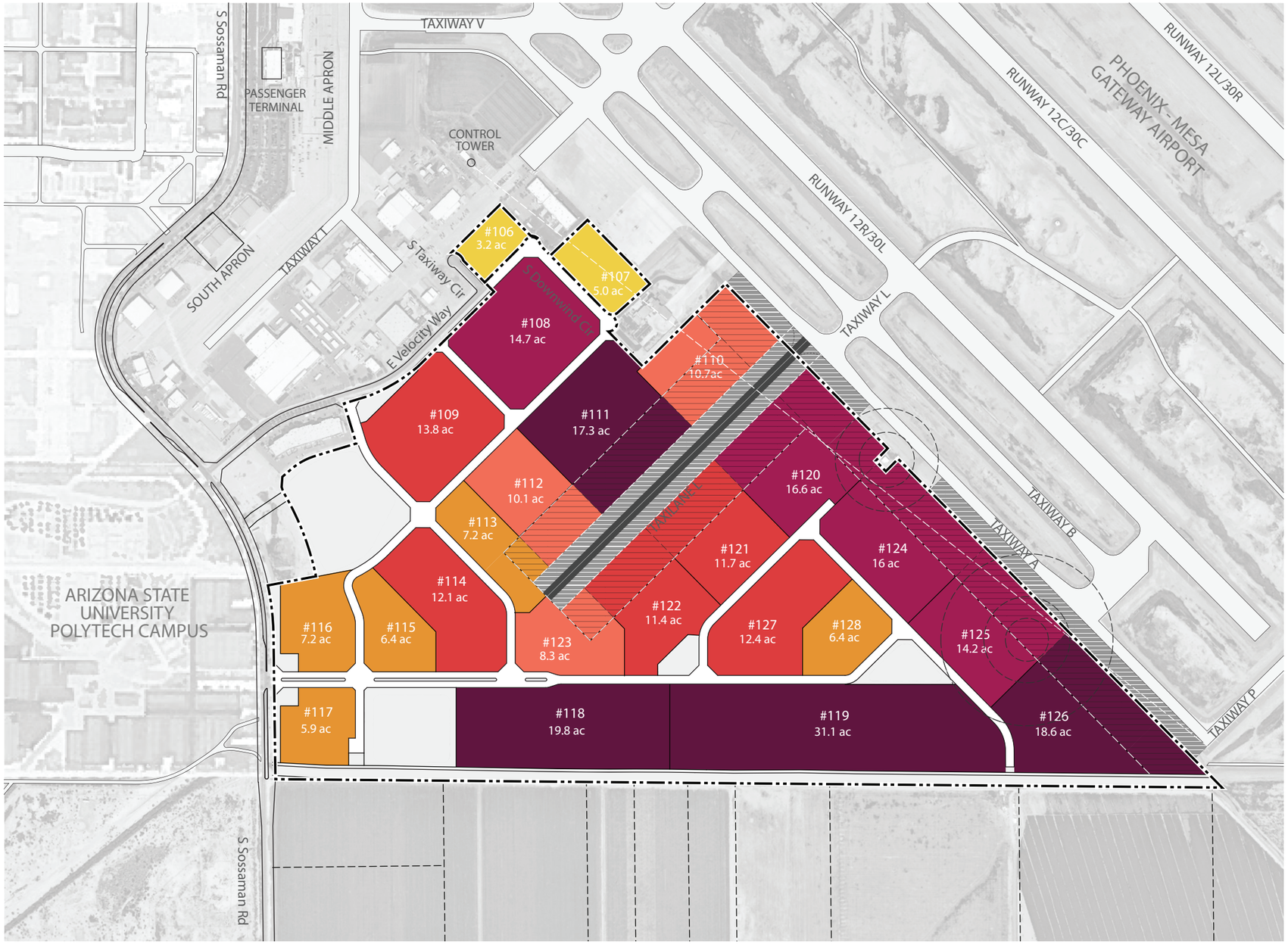


Figure 4.39: Parcelization Plan

Parcels along Taxilane L consist two areas, buildable area and apron area. These parcels are listed in Table 4.13, ranging from 7.2 acres to 18.6 acres in size. Future land tenants of these parcels will be responsible for building and maintaining their own buildings in the buildable area and ramp in the apron area. No buildings are allowed in apron area.

PARCEL	TOTAL AREA (AC)	BUILDABLE AREA (AC)	% OF AREA	APRON AREA (AC)	% OF AREA
110	10.7	3.3	30.5%	7.5	69.5%
111	17.3	11.4	66.0%	5.9	34.0%
112	10.1	6.6	65.4%	3.5	34.6%
113	7.2	6.1	85.5%	1.0	14.5%
120	16.6	7.0	42.3%	9.6	57.7%
121	11.7	7.2	61.2%	4.5	38.8%
122	11.4	7.4	64.9%	4.0	35.1%
123	8.3	6.7	81.5%	1.5	18.5%
124	16.0	10.0	62.4%	6.0	37.6%
125	14.2	8.7	61.6%	5.4	38.4%
126	18.6	10.3	55.4%	8.3	44.6%

Table 4.13: Detailed Area for Parcels along Taxilane L



Figure 4.40: Bird's Eye View from North West

4.9 PHASING STRATEGY

The proposed development at SkyBridge Arizona may occur under an 'aggressive' phasing scenario or a 'conservative' phasing scenario. Figure 4.41 and Figure 4.42 and associated tables depict each scenario.

4.9.1 Aggressive Phasing

Under an aggressive phasing scenario, development could occur in four phases. In this scenario, development would begin at the northern corner and move in a generally southward direction. Figure 4.41 shows the aggressive phasing scenario.

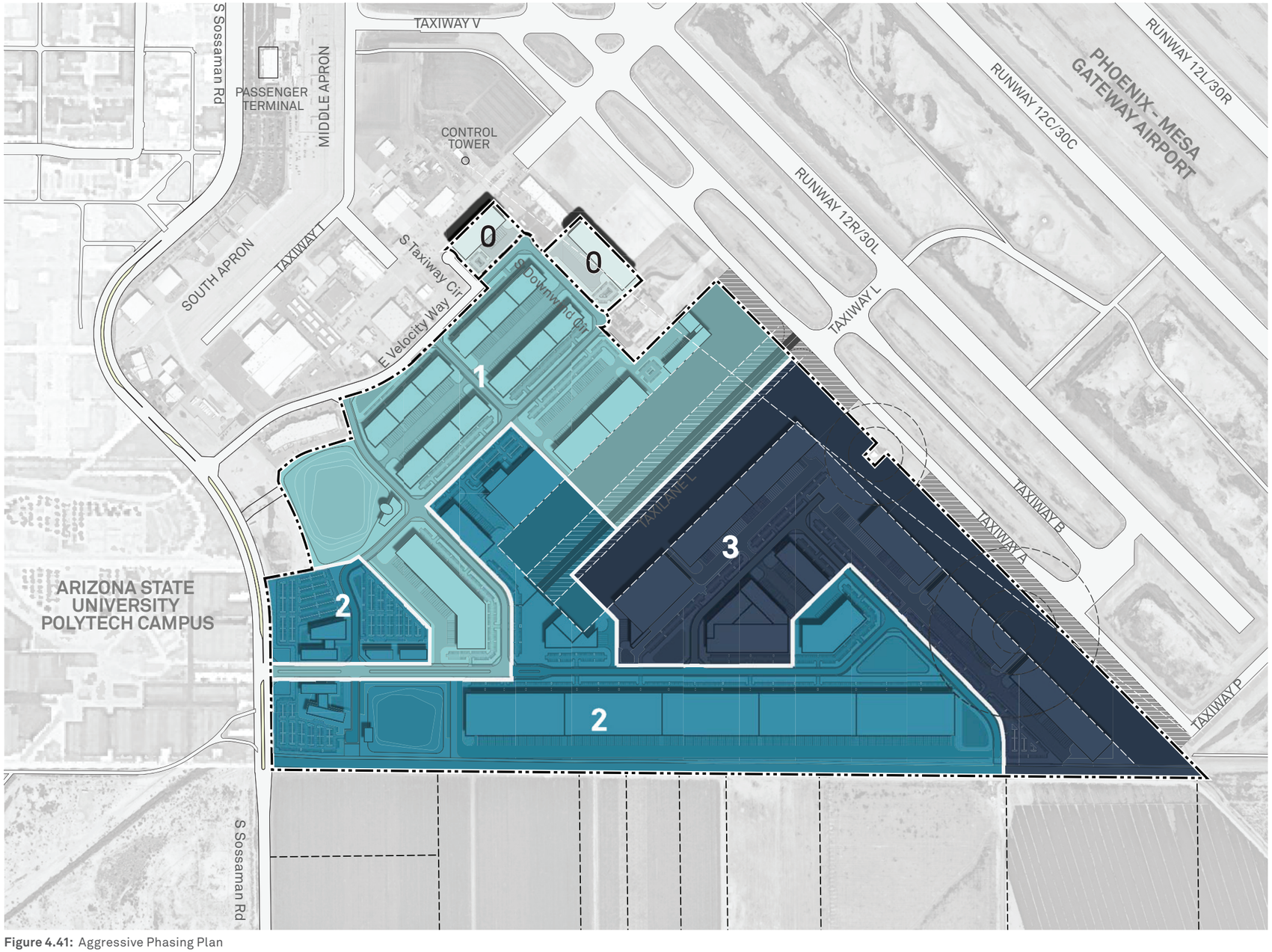


Figure 4.41: Aggressive Phasing Plan

4.9.2 Aggressive Phasing Summary

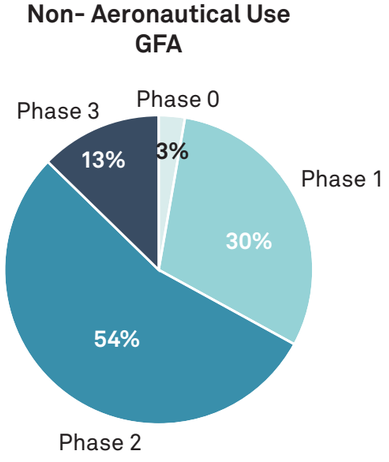
In this scenario, the majority of the total gross floor area (GFA) would be developed in Phase 2. Table 4.14 contains a breakdown of land area and GFA in each phase.

Chapter 2, the Market Conditions & Economic Analysis portion of this document, further describes the data collected that led to the selection of these development phasing strategies.

PHASE	LAND AREA (AC)	LAND DISTRIBUTION	GFA (SF)					TOTAL GFA (SF)	GFA DISTRIBUTION
			Non-Aeronautical Use	Aeronautical Use	Office / R&D *	Retail / Hotel **	Amenity		
Phase 0	8.2	2%	60,000	82,500	-	-	-	142,500	4%
Phase 1	107.0	29%	662,048	198,100	-	-	5,158	865,306	22%
Phase 2	138.6	38%	1,189,313	223,678	200,000	70,000	6,000	1,688,991	44%
Phase 3	109.7	30%	278,046	851,311	-	-	-	1,129,357	30%
GRAND TOTAL	**363.5**	**100%**	**2,189,407**	**1,355,589**	**200,000**	**70,000**	**11,158**	**3,826,154**	**100%**

* Assume 3 story buildings
** Assume 3 story buildings

Table 4.14: Aggressive Phasing Summary



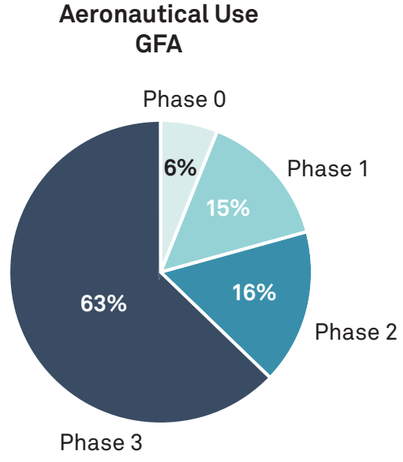


Table 4.15: Aggressive Phasing Land Use Distribution

4.9.3 Conservative Phasing

In a conservative phasing scenario, development is broken down into seven phases. Like the aggressive scenario, development begins with Phase 0 in the northern corner of the site and concludes with the southern and eastern portions of the site. Figure 4.42 shows the conservative phasing diagram for the site.

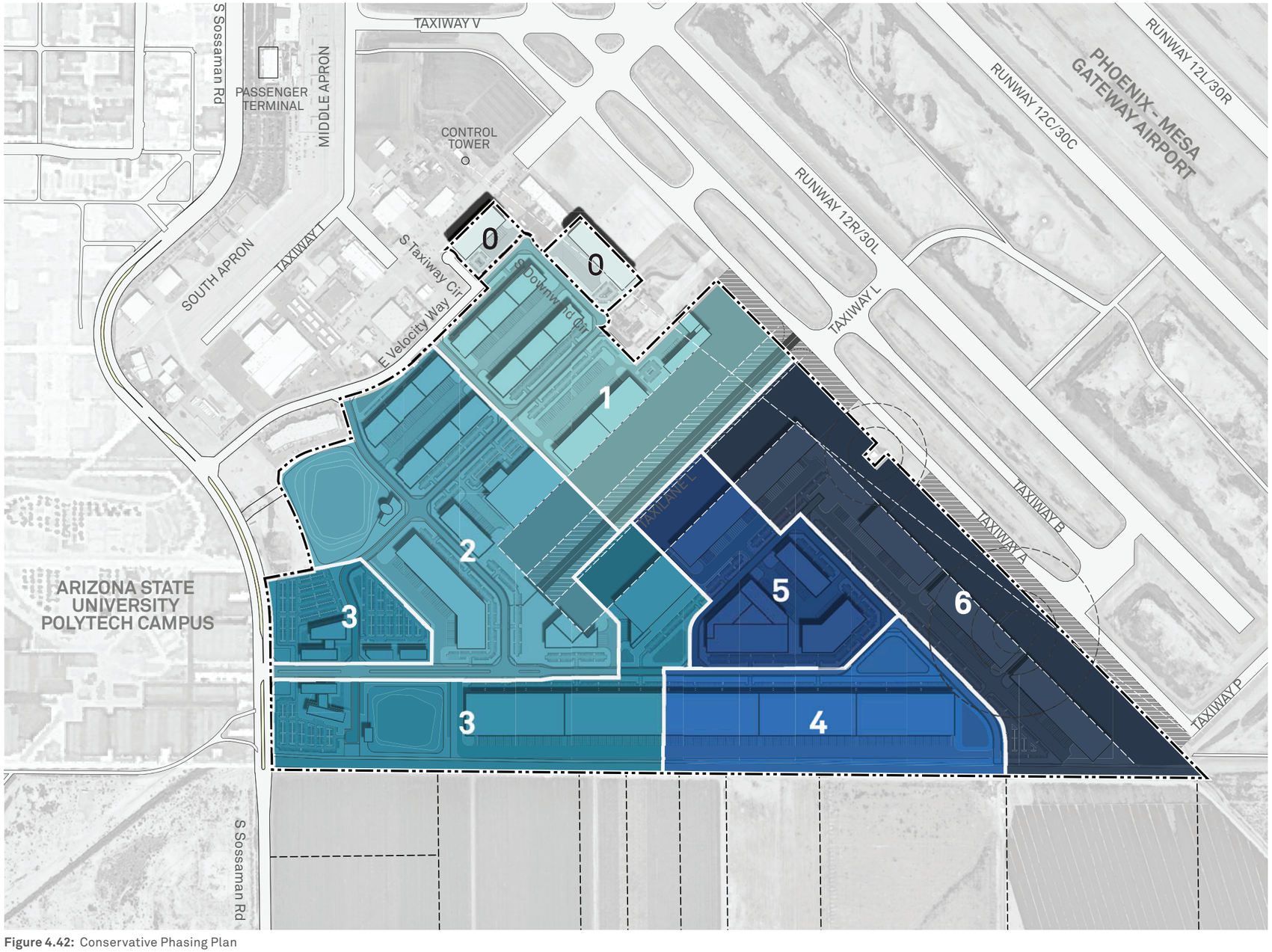


Figure 4.42: Conservative Phasing Plan

4.9.4 Conservative Phasing Summary

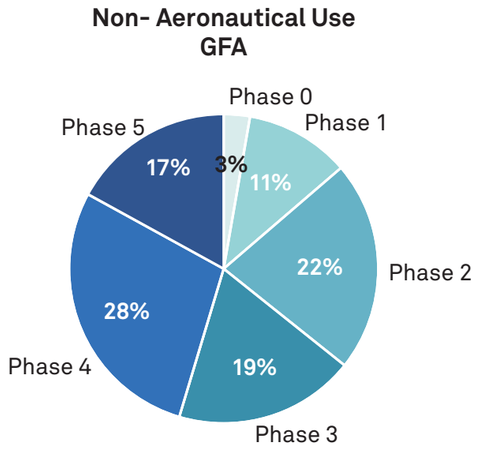
In the conservative phasing scenario, GFA is more evenly distributed across the seven phases. Table 4.16 contains a breakdown of the land area and GFA in each phase.

Chapter 2, the Market Conditions & Economic Analysis portion of this document, further describes the data collected that led to the selection of these development phasing strategies.

PHASE	LAND AREA (AC)	LAND DISTRIBUTION	GFA (SF)					TOTAL GFA (SF)	GFA DISTRIBUTION
			Non-Aeronautical Use	Aeronautical Use	Office / R&D *	Retail / Hotel **	Amenity		
Phase 0	8.2	2%	60,000	82,500	0	0	-	142,500	4%
Phase 1	58.4	16%	240,000	198,100	0	0	-	438,100	11%
Phase 2	78.3	22%	482,025	223,678	0	0	5,159	710,861	19%
Phase 3	72.7	20%	414,000	163,615	200,000	70,000	6,000	853,615	22%
Phase 4	41.2	11%	621,000	0	0	0	-	621,000	16%
Phase 5	35.9	10%	372,382	126,000	0	0	-	498,382	13%
Phase 6	68.8	19%	0	561,696	0	0	-	561,696	15%
GRAND TOTAL	**363.5**	**100%**	**2,189,407**	**1,355,589**	**200,000**	**70,000**	**11,158**	**3,826,154**	**100%**

* Assume 3 story buildings
** Assume 3 story buildings

Table 4.16: Conservative Phasing Summary



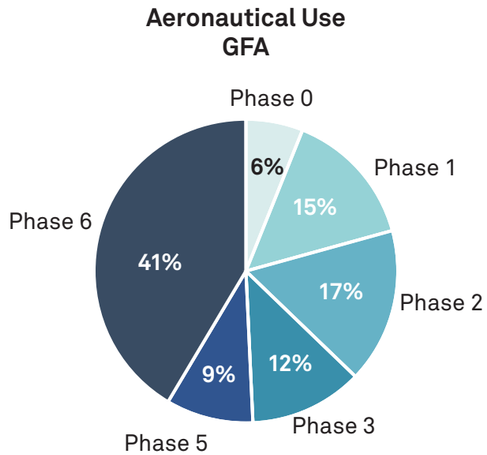


Table 4.17: Conservative Phasing Land Use Distribution

4.10 BUILDING FRONTAGE SETBACKS

Building setbacks determine the distance from the edge of a building to the property line. Setbacks serve an important role at SkyBridge Arizona, ensuring that there is an aesthetically pleasing, landscaped transition area between the building facade and the street.

The building setbacks at SkyBridge Arizona align with the two street typologies within the project area. Buildings located adjacent to the Boulevard Street typology have a larger setback of 30 feet. This setback is wider to impart a more formal entry sequence at the primary entrance to the site. The setbacks along Local Streets is 20 feet. The setback in these areas is intentionally lesser to create a more urban, denser streetscape atmosphere. It also allows the available land area to be used more efficiently.

Building setbacks are shown in Figure 4.43.

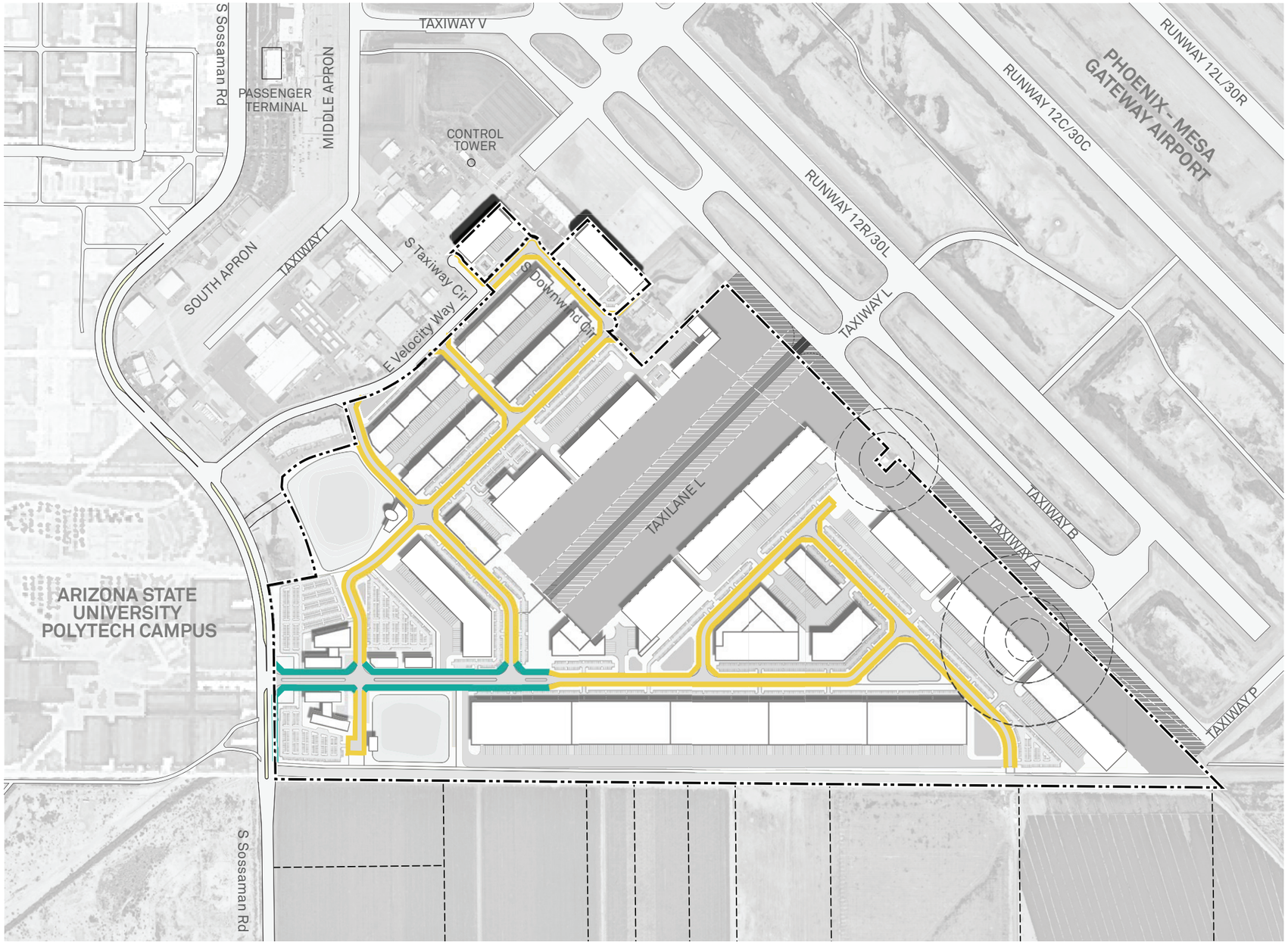


Figure 4.43: Building Setback Plan

4.11 FAR

The FAR, or Floor Area Ratio is a ratio of the built area of a parcel relative to the size of the parcel. Determining the FAR for each ensures that the desired density is maintained and that land is used efficiently.

FAR at SkyBridge Arizona is shown in Figure 4.44. Ramp area is not included in the FAR calculation.

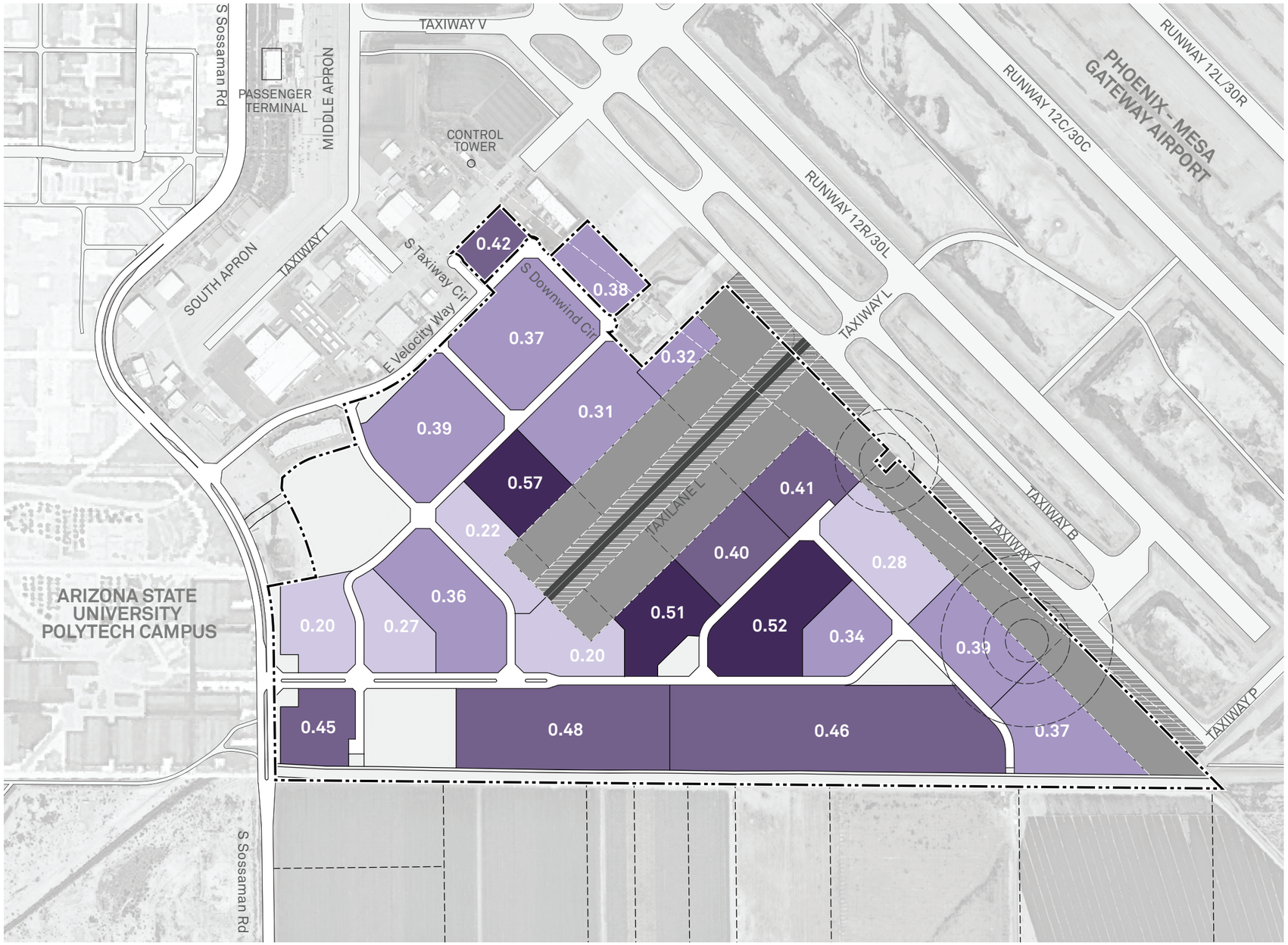


Figure 4.44: FAR Plan

4.12 BUILDING HEIGHT

Figure 4.45 depicts the building height for facilities at SkyBridge Arizona. Allowable building height is determined by both the City of Mesa Zoning Code requirements as well as the Federal Aviation Administration and Phoenix-Mesa Gateway Airport restrictions. Whichever requirement is stricter shall apply.

Per the City of Mesa Zoning Code, buildings in the Light Industrial category are limited to 40 feet. The two hangar buildings at SkyBridge Arizona located on either side of Taxilane L will accommodate the tail height of Boeing 747 aircraft. The parcels at the southwestern corner of the site that will become hotel and retail use will be rezoned to a Mixed-Use zoning designation. This zoning designation allows a height limit of 45 feet.

The methodology for determining building height using FAA regulations is described in more detail in the following Chapter 5.3.5.

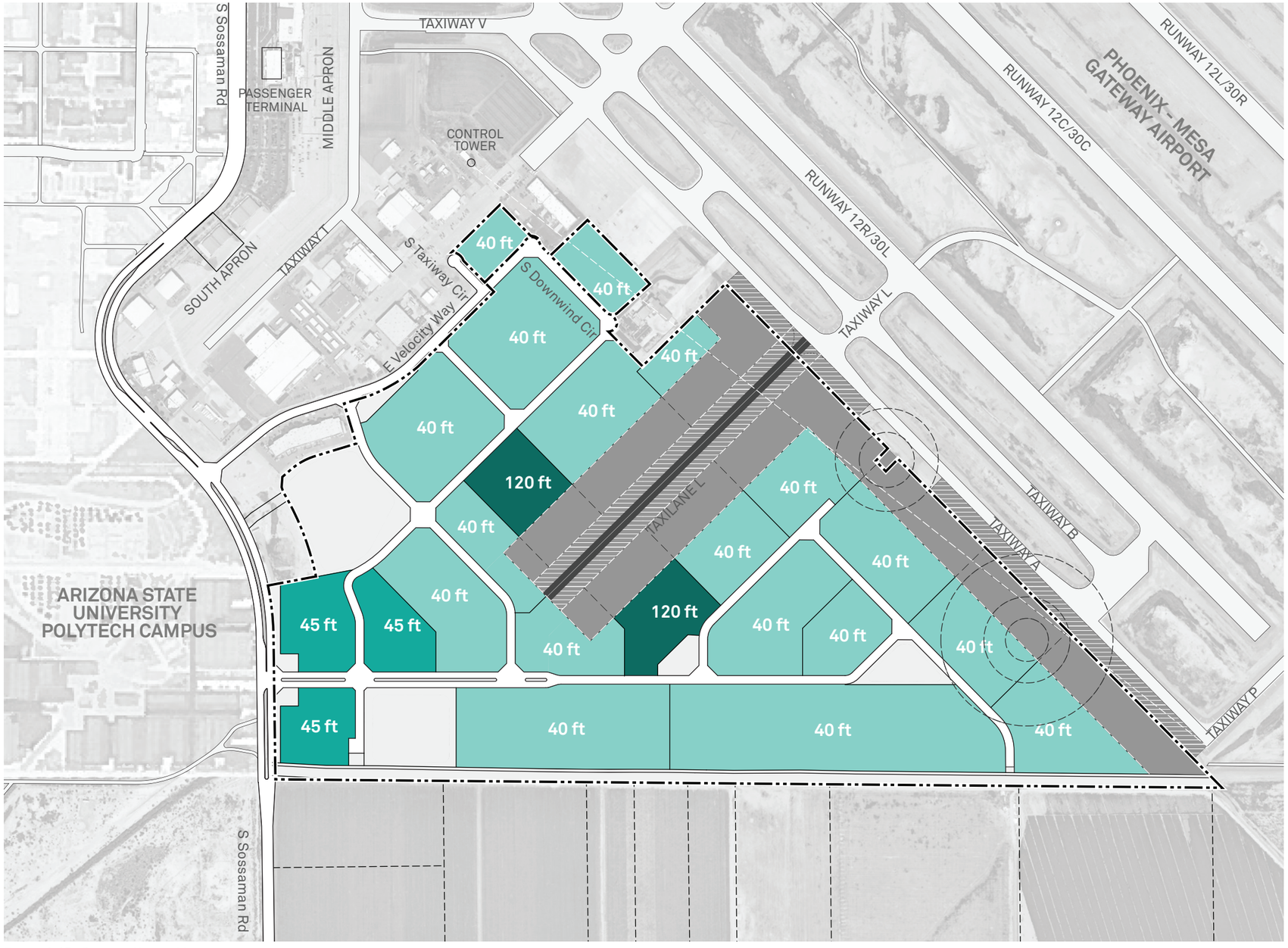


Figure 4.45: Building Height Map

4.13 SITE SECURITY

The site will have security measures to ensure that aeronautical operations are able to function properly and that employees and visitors at SkyBridge Arizona are safe at all times.

Security fences around the perimeter of Taxilane L between building openings will prevent unauthorized persons from accessing the taxilane or the Phoenix-Mesa Gateway Airport. The security fence at the site will be integrated with the existing airport fence.

Additional building-level security measures such as entry systems and controlled access will be implemented.

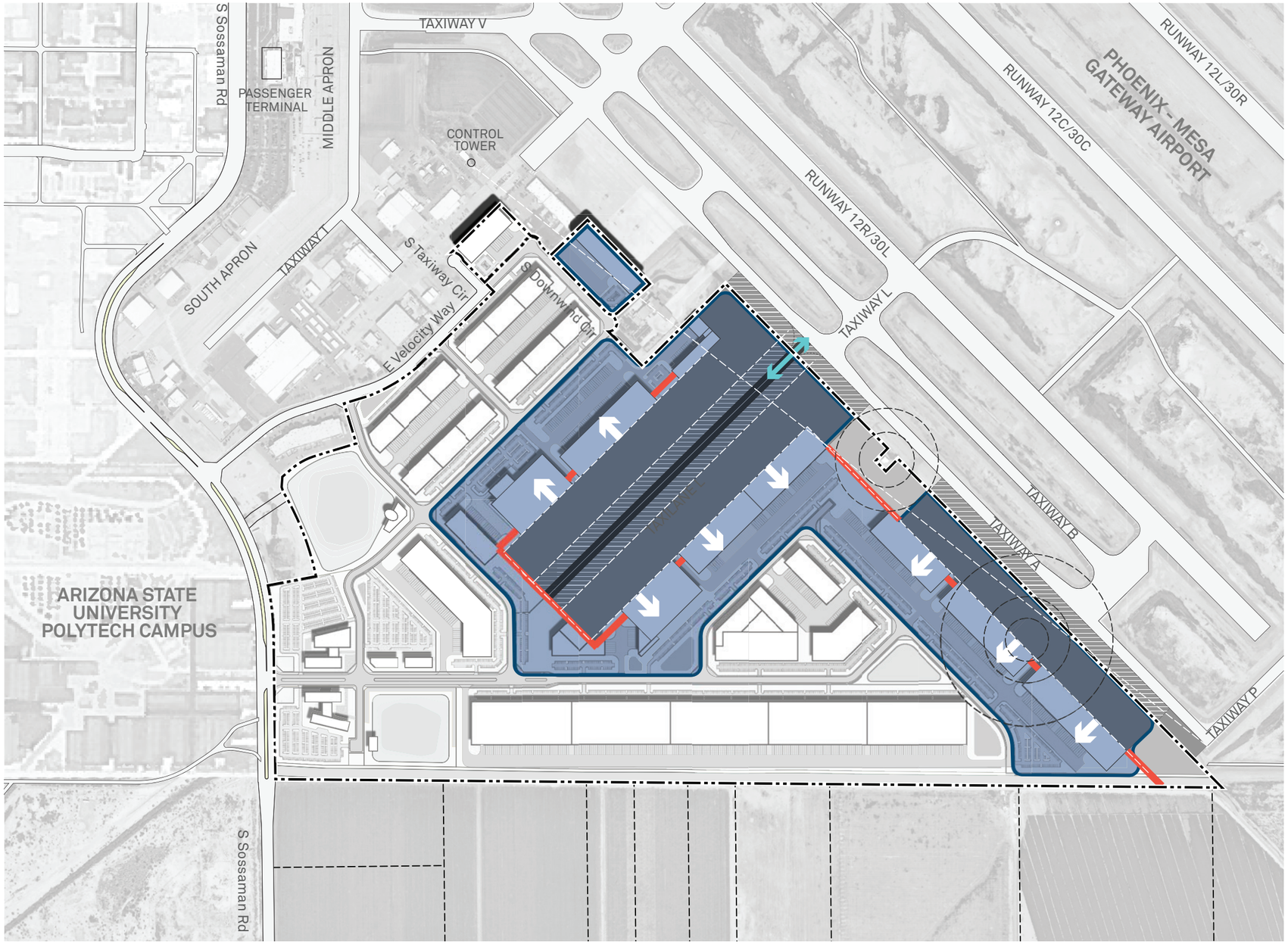


Figure 4.46: Site Security Access Plan

4.14 OPEN SPACE STRUCTURE

The network of open space at SkyBridge Arizona will complement the other land uses on site. Five landscape typologies have been identified as part of the public realm design strategy. A variety of open space types will make the site an attractive and inviting place to visit or conduct business and will enhance the experience of employees at SkyBridge Arizona. Figure 4.47 shows the locations of the five types of open space at the site.

Chapter 6 of this document further describes the open space structure at SkyBridge.

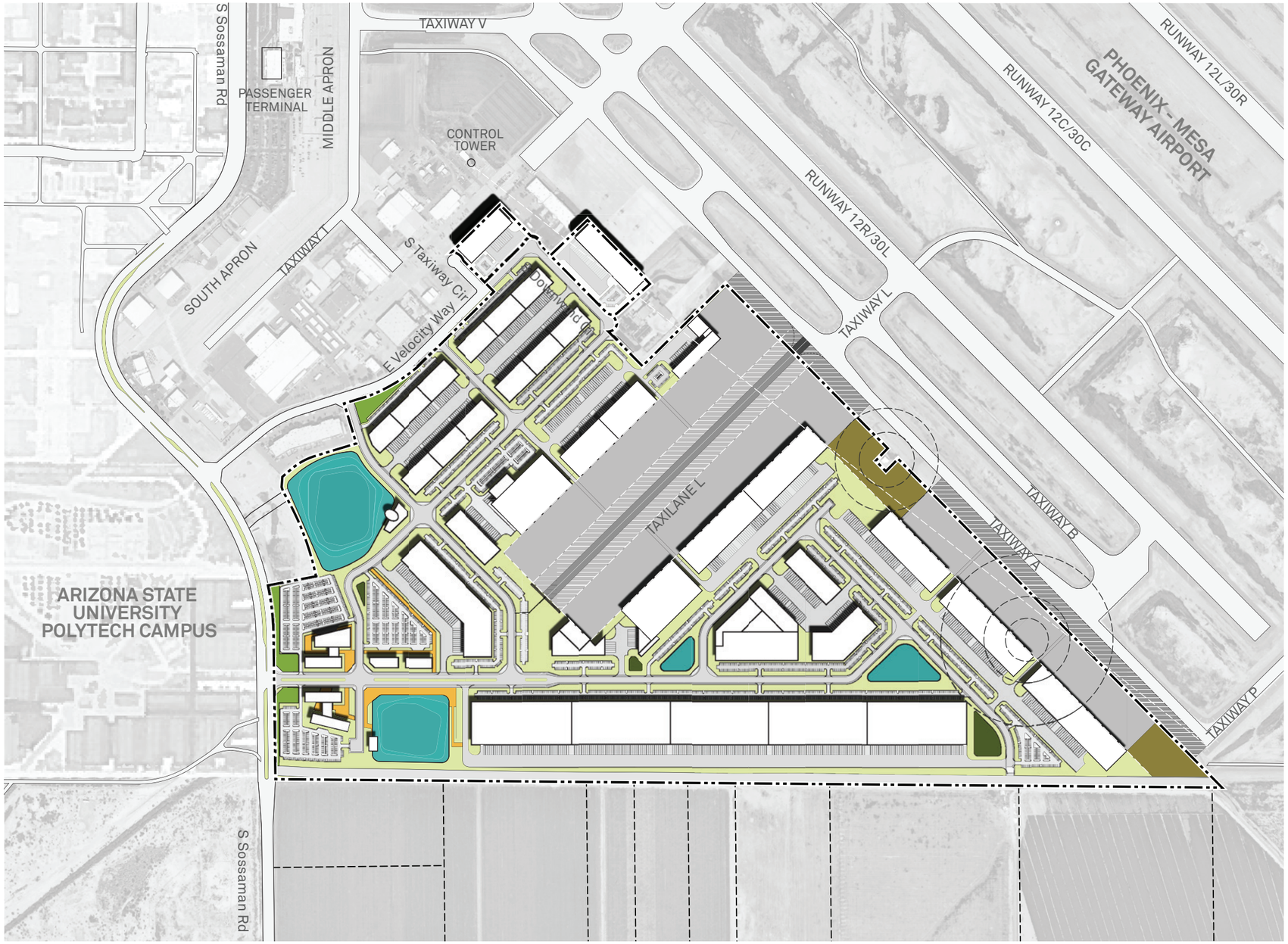


Figure 4.47: Open Space Typology Plan

4.15 INFRASTRUCTURE FACILITIES

Water Infrastructure

Domestic water service and fire protection service to the site is presently provided by the City of Mesa and will continue to be provided by the City in the future. A water distribution network including a 16-inch water main in Sossaman Road and a 12-inch water main in Velocity Way and Downwind Circle are already in place. There are additional domestic water mains of varying sizes a short distance to the north of the project site.

The Phoenix-Mesa Gateway Airport has a supplemental fire protection system including two storage tanks that provide 961,000 gallons of water storage. A 24-inch distribution main crosses Sossaman Road to reach the airport along the southeast side of the taxiway. Another 18-inch fire main runs along Sossaman Road. The system is owned and operated by the Phoenix-Mesa Gateway Airport Authority. This fire protection system may ultimately serve the SkyBridge Arizona site upon completion.

Electrical Infrastructure

Current electrical service on site is supplied by Salt River Project (SRP). The SRP system delivers 12kV service to the site via underground electrical trenches on Sossaman Road. The site also has an existing overhead distribution line which services the few existing facilities on site.

Expansion of the existing 12kV service is proposed for the site and shown in Chapter 7.

Chapter 7 of this document provides further detail on existing and proposed electrical infrastructure at SkyBridge Arizona.

Gas Infrastructure

The existing gas service on the site is provided by Southwest Gas. There is an existing 6-inch, 60 PSI gas line located along Sossaman Road. This same line branches eastward on Velocity Way and Taxiway Circle via a 4-inch, 60 PSI gas line. Presently, these gas lines serve the parcels adjacent to SkyBridge Arizona.

Proposed expansion of the existing gas line service for the site is shown in Chapter 7.

Chapter 7 of this document provides further detail on the existing and proposed gas infrastructure at SkyBridge Arizona.

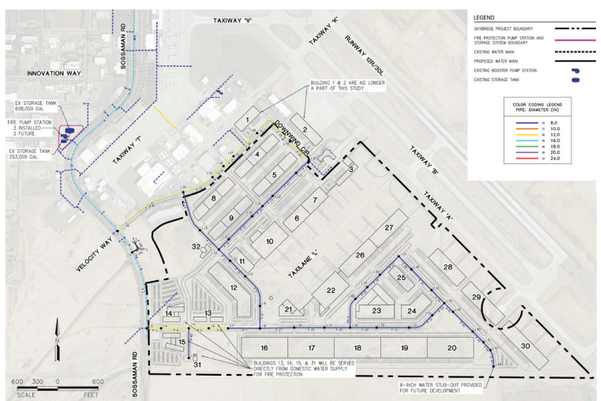


Figure 4.48: Proposed Water Improvements

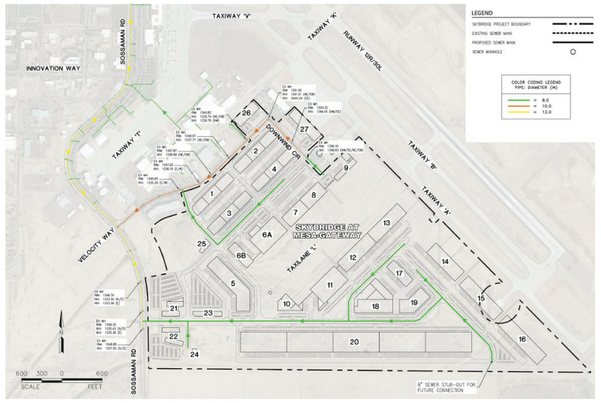


Figure 4.49: Proposed Wastewater Improvements

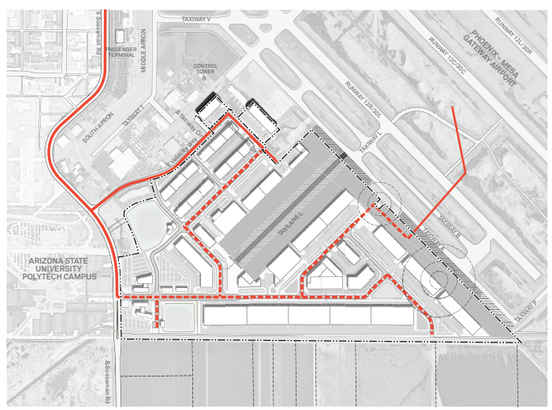


Figure 4.50: Conceptual Routing for Electricity Distribution

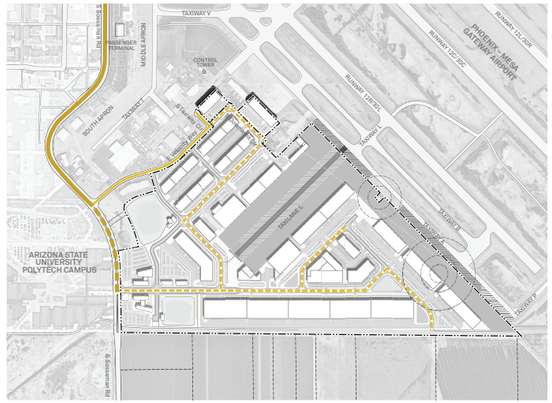


Figure 4.51: Conceptual Routing for Gas Distribution

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5

DEVELOPMENT STANDARDS & DESIGN GUIDELINES

5.1 OVERVIEW AND OBJECTIVES

This chapter is intended to provide a set of development standards and design guidelines for the SkyBridge site and to regulate future development of new projects within the plan area.

The primary objectives of these development standards and design guidelines are to ensure that the development objectives of the master plan are applied project-wide to each individual lot. They are also intended to help maintain high standards and quality over the course of the project's development. These standards and guidelines will help to establish the character of SkyBridge Arizona through the creation of architectural, landscape, and urban identity.



Figure 5.1: Aerial View of SkyBridge

5.2 TERMINOLOGY

Building Setbacks

Building setbacks determine the minimum setback from the property line and serve as an important factor in characterizing the streetscape. Building setbacks determine whether buildings are constructed closer to the property boundary, creating a dense urban environment, or whether the buildings are built further from the property line to create a landscaped transition area between the building façade and the street.

For buildings next to the aircraft parking or taxiway/taxilane, building setbacks will ensure aircrafts have adequate space and meet FAA regulations.

Lot Coverage

Lot coverage is the ratio of the total footprint area of all structures covering a lot to the lot area. Typically, lot coverage is expressed as a percentage. All covered structures that are three feet above grade or more, (such as covered entryways, sheds, and garages) are counted towards lot coverage.

Floor Area Ratio (FAR)

FAR is the primary driver behind the density and intensity of development on a lot or within a district. FAR is the ratio of the built-up area to the size of the lot and is applied to each development parcel to determine the maximum Gross Floor Area (GFA) within the parcel. Building basements and parking garages are not included as part of the FAR calculations.

Building Height

The maximum allowable height of a building is regulated by the height restriction imposed on each parcel. Height restrictions should have some flexibility and promote variety in building heights to avoid a monotonous building form, while within FAA regulations on airport property.

Parcel Access

Parcel access regulates both vehicular and pedestrian access to the development parcel. As a general principle, car access to industrial parcels (aeronautical and non-aeronautical use) is allowed from the side and front of the parcel. Truck access and loading is allowed at the back of the parcel. On commercial parcels (retail/hotel use), car access is allowed at the rear and side of the parcel. Guidelines for providing pedestrian entrances and ensuring limited vehicular curb cuts are in place for parcels that border major streets and along featured open spaces.

5.3 GENERAL DEVELOPMENT STANDARDS FOR INDUSTRIAL LOTS

The guidelines included in this section will guide the design and development of new projects within industrial lots at SkyBridge. 'Industrial lots' refers to parcels designated 'Aeronautical Use' and 'Non-Aeronautical Use' on the SkyBridge site land use plan (Figure 4.9).

These guidelines address the general design requirements for the following nine aspects:

5.3.1 Building Setbacks

5.3.2 Landscape Buffers

5.3.3 Lot Coverage

5.3.4 FAR

5.3.5 Building Height

5.3.6 Parcel Access

5.3.7 Parking

5.3.8 Signage

5.3.9 Lighting

5.3.10 Landscape



Figure 5.2: SkyBridge Illustrative Plan

5.3.1 Building Setbacks

In order to establish a consistent and pleasant environment for all users, all developments are required to have building setbacks. Industrial lots located along streets designated as 'Boulevard' on Figure 5.3 should have setbacks no less than 30 feet. Industrial lots located along streets designated as 'Local Street' on Figure 5.4 should have setbacks no less than 20 feet. These setbacks should be landscaped to enhance the appearance of the industrial park. Pedestrian paths within the wider setback zones along major arterial and boulevard roadways are encouraged. Setbacks between buildings constructed on adjacent parcels should not be less than 20 feet.

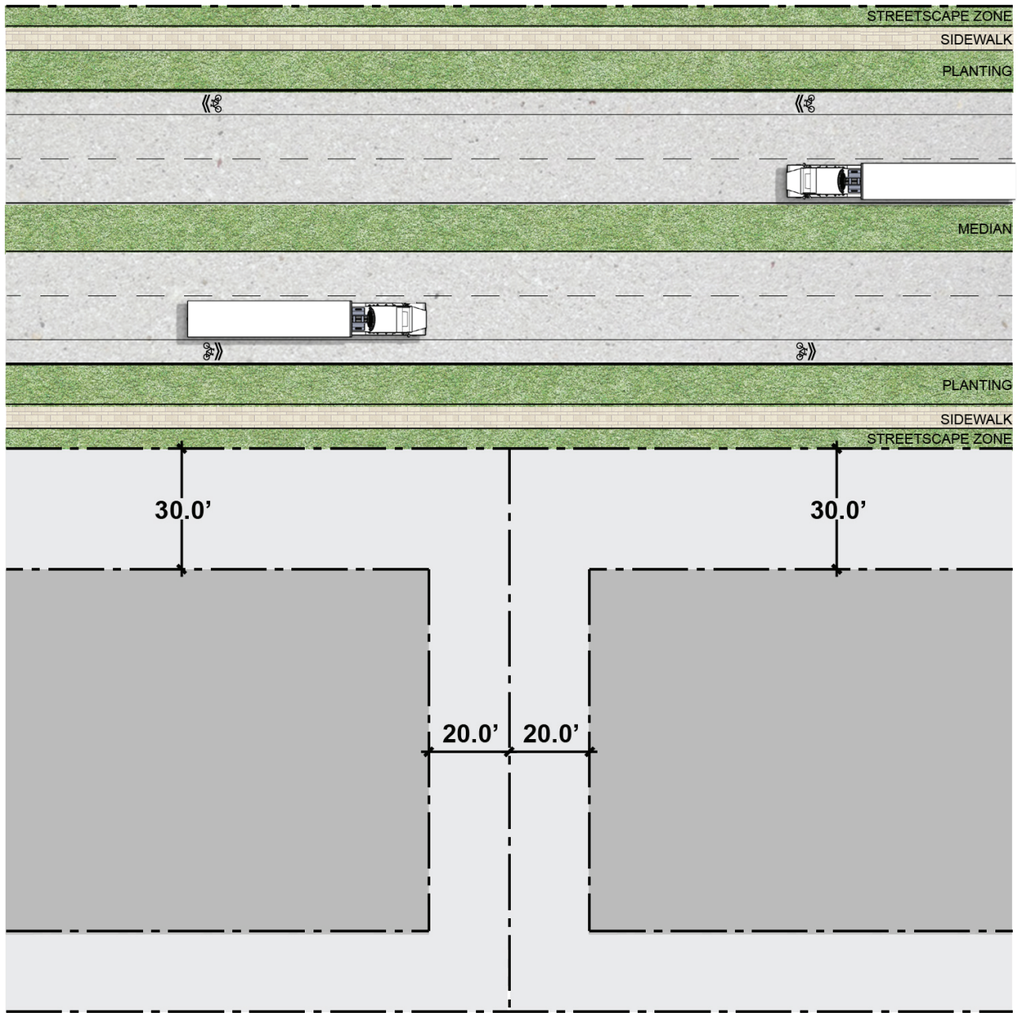


Figure 5.3: Typical Street Setbacks and Adjacent Parcel Setbacks along a Boulevard

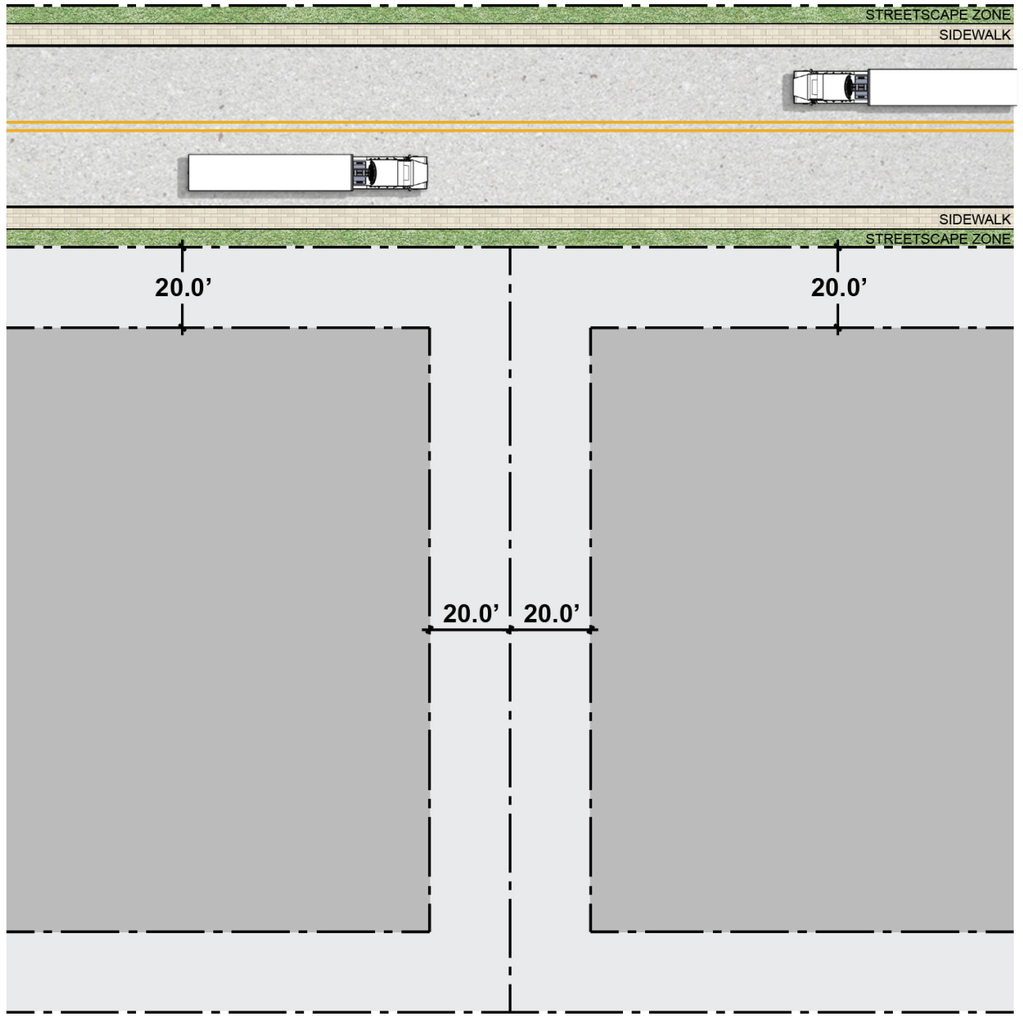


Figure 5.4: Typical Street Setbacks and Adjacent Parcel Setbacks along a Local Street

Street Type	Minimum Building Setback Requirement
Boulevard	30 feet
Local Street	20 feet

Table 5.1: Minimum building setback requirement for all street types

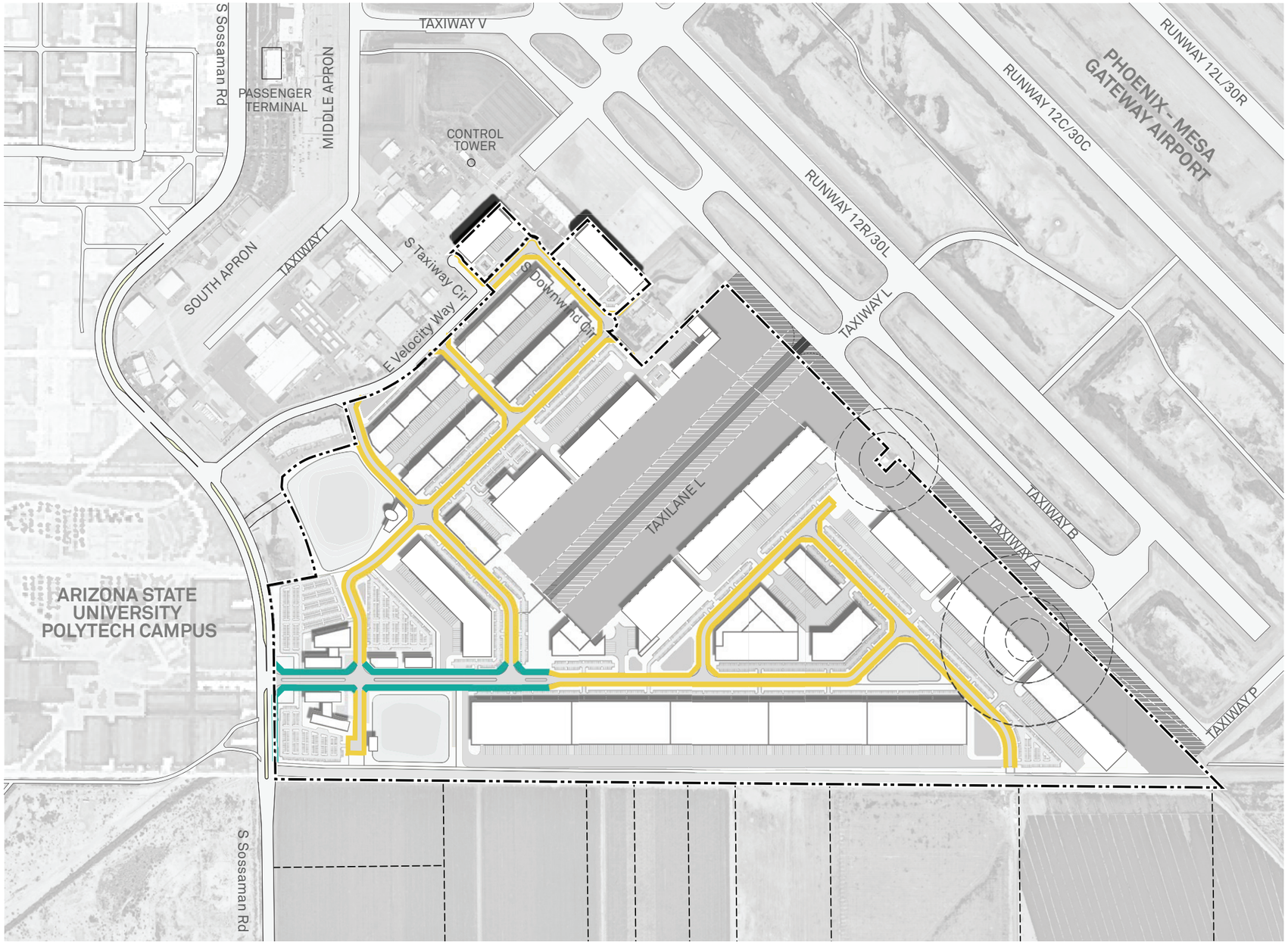


Figure 5.5: Minimum Building Setback Plan

5.3.2 Landscape Buffers

All industrial parcels are required to have a perimeter landscape buffer strip along streets designated as local streets or boulevards. The minimum landscape buffer should be no less than 20 feet along local streets and 30 feet along boulevards. These buffer zones will accommodate low maintenance vegetation and an eight or ten foot PUFE. (Public Utility and Facilities Easement) A low wall between two-and-a half to three feet high should be located at the edge of all landscape buffers to separate development parcels and the public right-of-way.

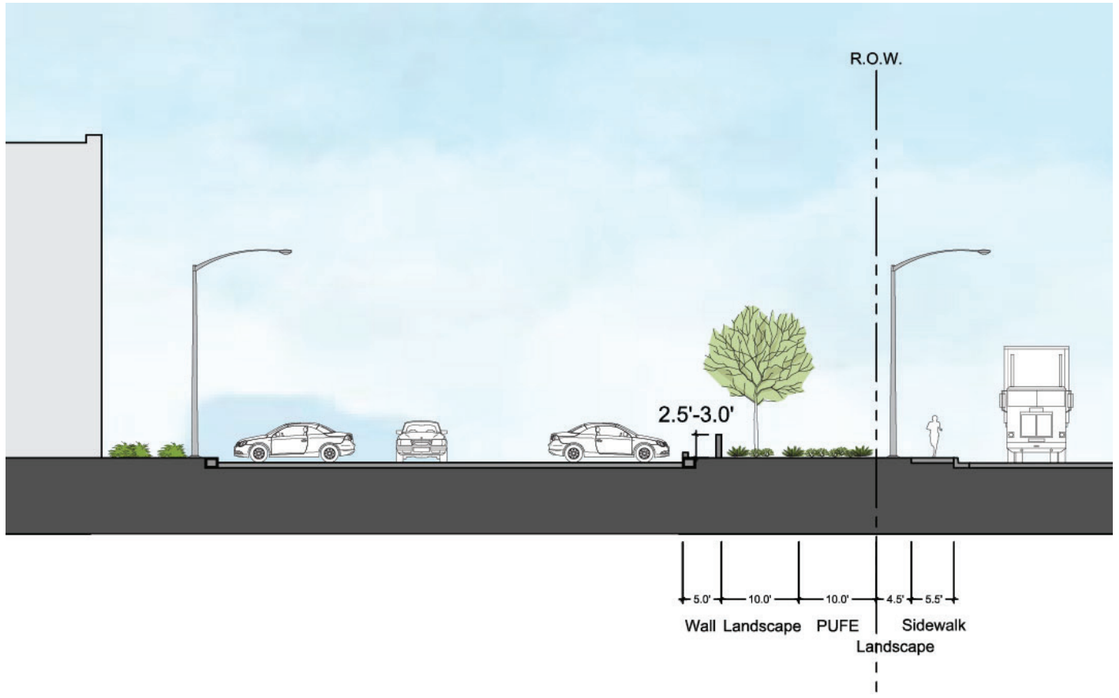


Figure 5.6: Typical Landscape Buffer along a Local Street

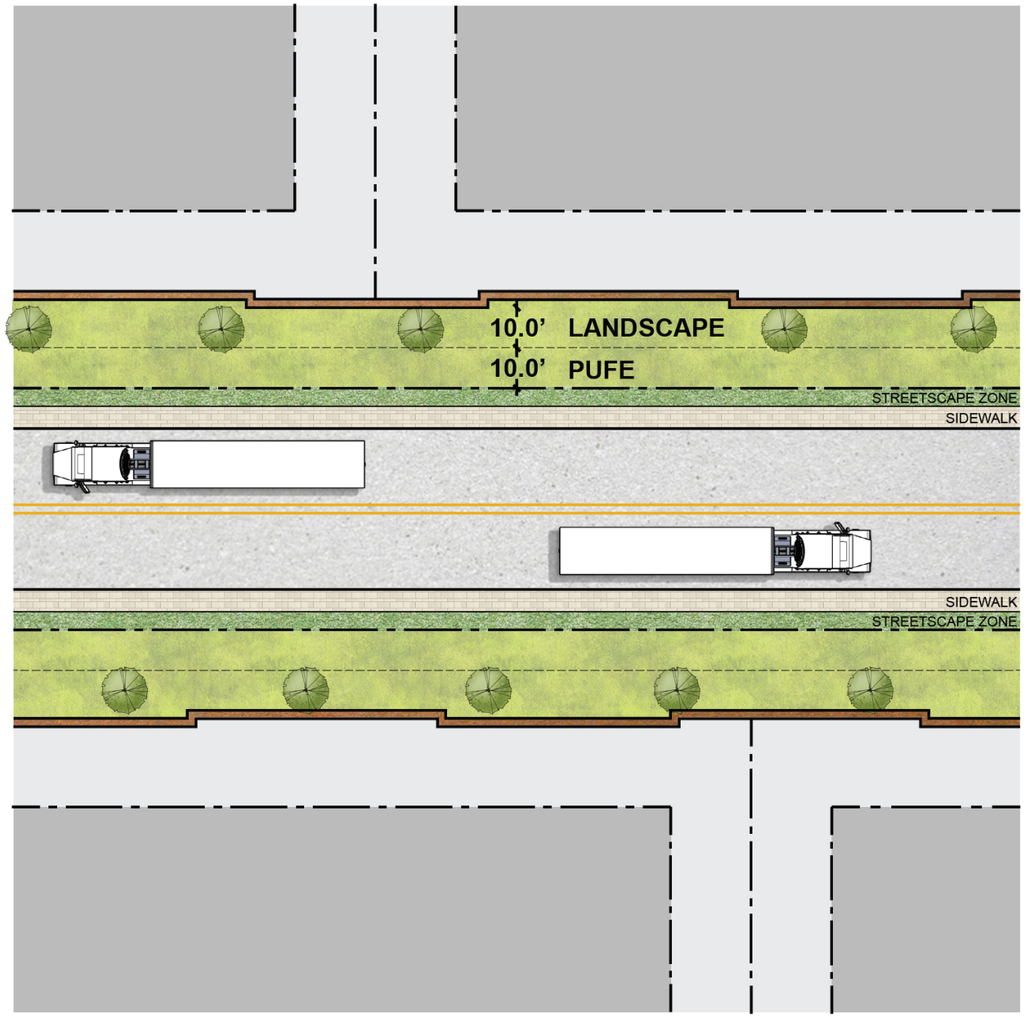


Figure 5.7: Typical Landscape Buffer Zone along a Local Street

5.3.3 Lot Coverage

Industrial parcels must provide adequate space to accommodate circulation, parking, loading, setbacks, buffers, and other auxiliary uses. To ensure functional and efficient parcels, the maximum allowable lot coverage for industrial parcels is 65%.

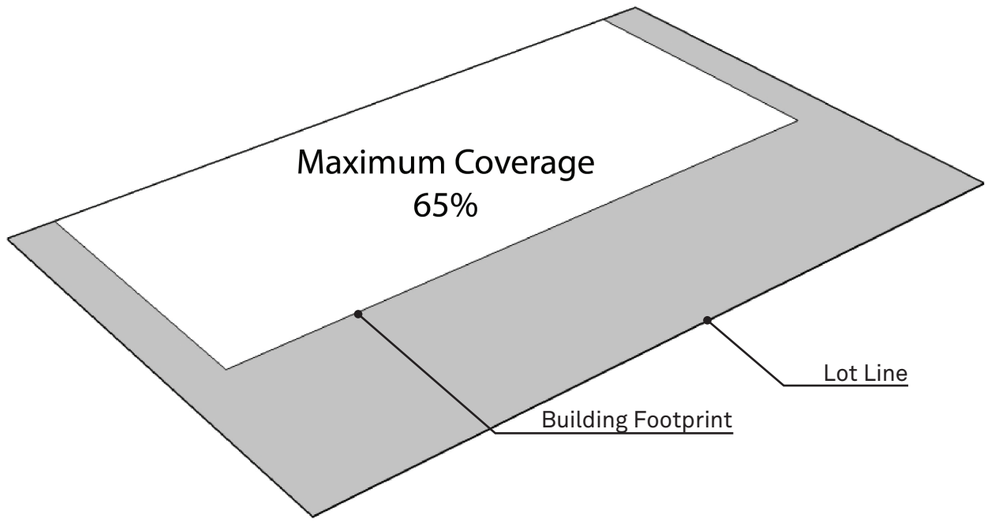


Figure 5.8: Maximum Lot Coverage

5.3.4 FAR

FAR requirements imposed on each parcel helps to ensure that land is optimally utilized and that the desired density is maintained. The maximum FAR for industrial parcels is 0.6.

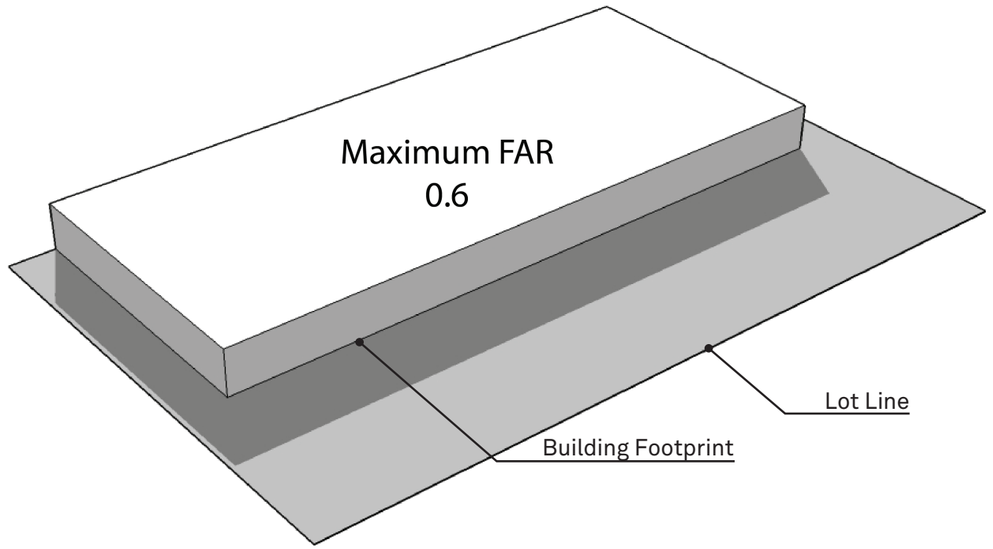


Figure 5.9: Maximum FAR

5.3.5 Building Height

Maintaining development standards pertaining to building heights are critical at SkyBridge Arizona due to FAA Air Traffic Control Tower (ATCT) line of sight height restrictions and proximity to the Phoenix-Mesa Gateway airfield. Structures and objects are height restricted to avoid interfering with air navigation and airport operations. As shown on Figure 5.10, there are two height limit zones within the plan area, Zone 1 ATCT line of sight and Zone 2 Federal Aviation Regulations (FAR) Part 77 Transitional and Horizontal Surfaces. While the Part 77 surfaces also affect Zone 1, the ATCT line of sight is more demanding. Proper notification of proposed construction will be filed 45 days prior for approval.

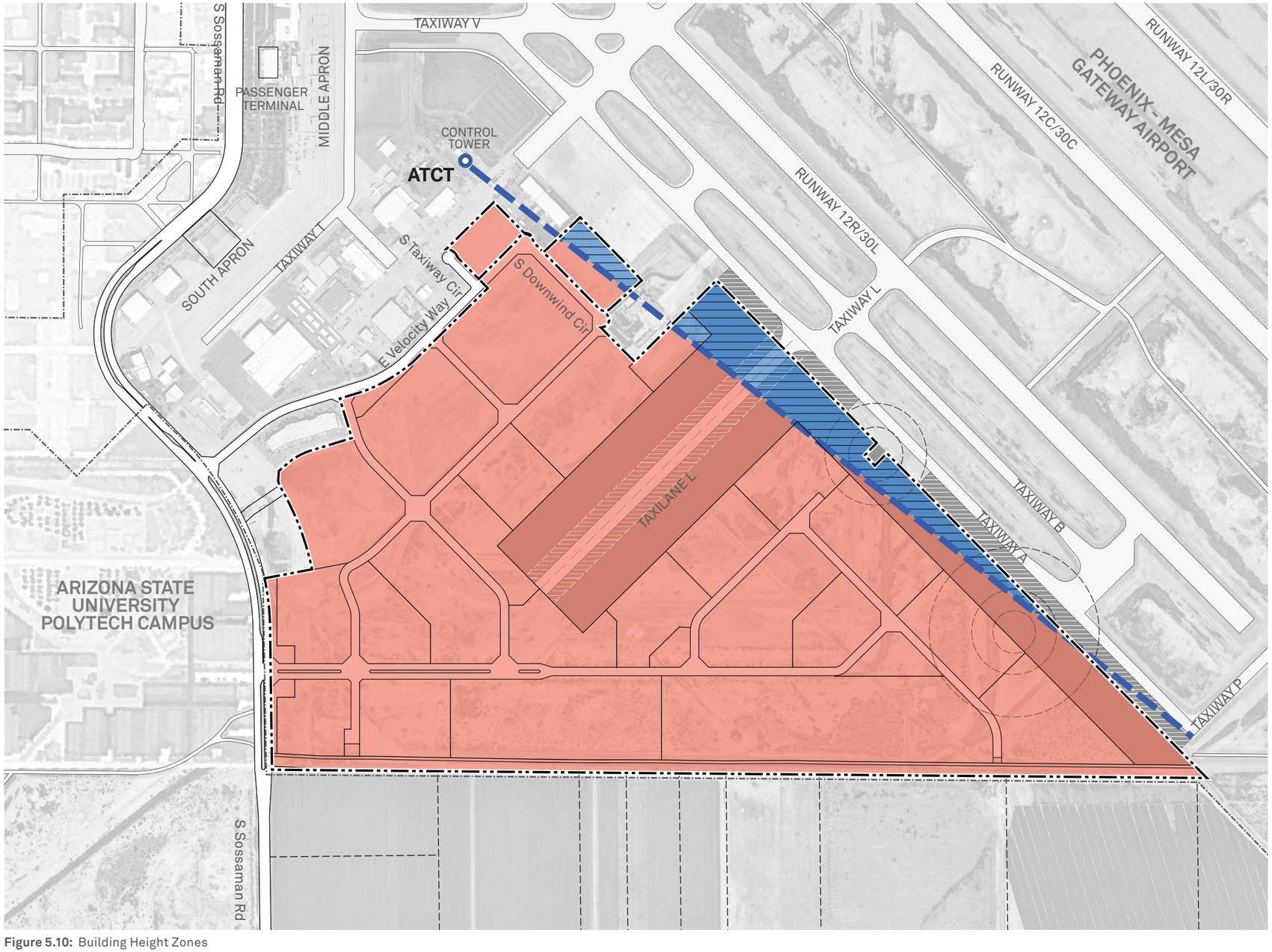


Figure 5.10: Building Height Zones

In order to ensure that there is a clear line of sight from the ATCT to Taxiway A pavement area; height of buildings located in Zone 1 should be calculated using the highest point (eye level in the ATCT), distance from the ATCT to the edge of Taxiway A, distance from the building corner to the edge of Taxiway A, and the elevation of the Taxiway A pavement edge. This calculation is illustrated in Figure 5.11. For Zone 2, the Transitional Surface extends outward and upward at right angles to the runway centerline at a slope of 7 to 1 from the sides of the Primary Surface to a height of 150 feet above the established airport elevation. The Primary Surface is longitudinally centered on the runway with an elevation the same as the nearest point on the runway centerline and a width equal to 1,000 feet. The Horizontal Surface is a horizontal plane 150 feet above the established airport elevation. The height of buildings located in Zone 2 should be calculated using FAR Part 77 Transitional and Horizontal Surfaces, limitations of which are reflected in Chapter 3 Figure 3.4.

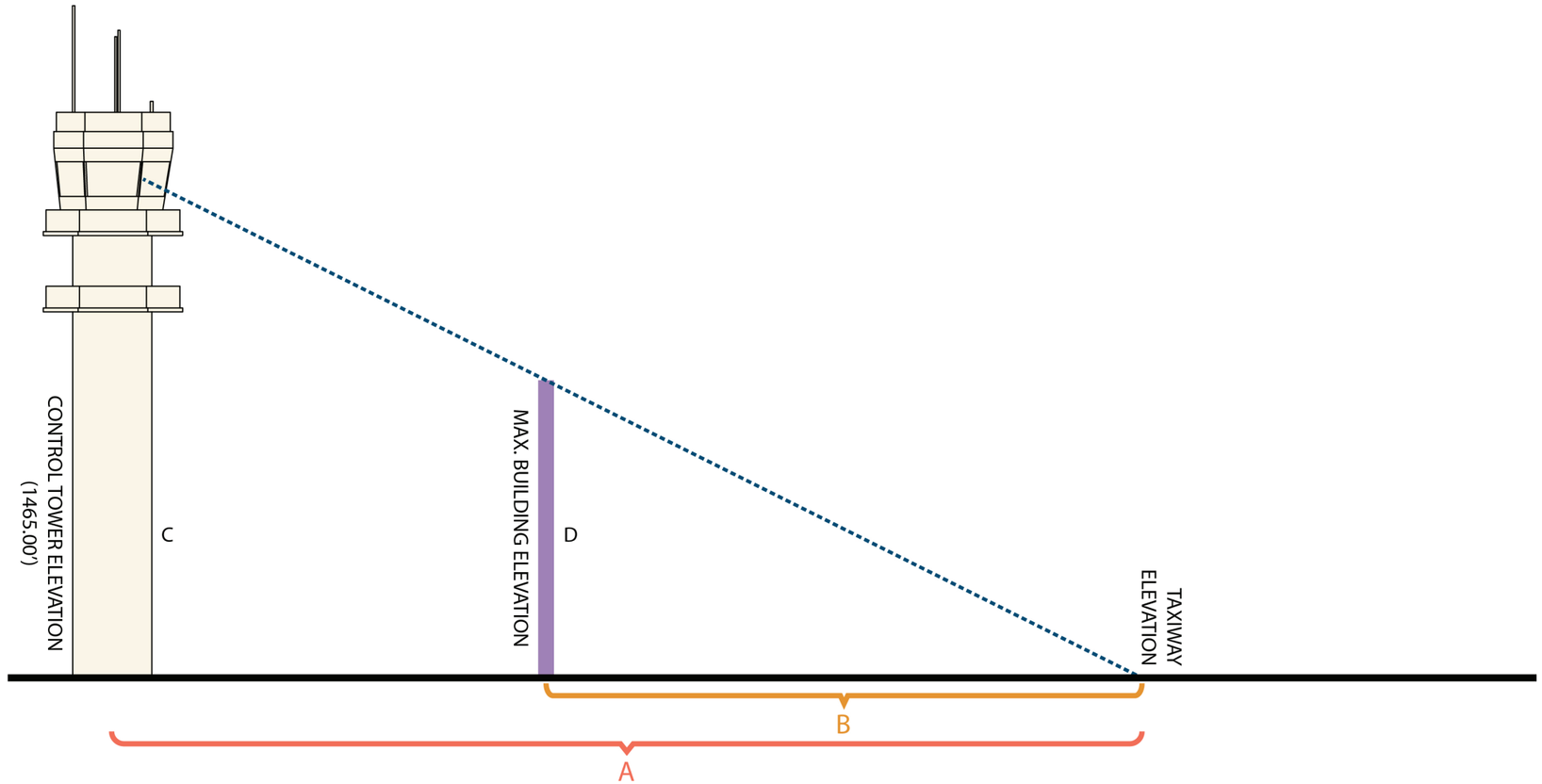


Figure 5.11: FAA Building Height Limit Calculation Method

A: Distance from ATCT to Taxiway A edge

B: Distance from building corner to Taxiway A edge

C: Elevation difference Taxiway A edge and ATCT eye level (1,465' AMSL)

D: Building height above Taxiway A edge elevation

$$D = \frac{C \times B}{A}$$

* Note: The elevation are AMSL elevations

There are three conceptual buildings in the plan area where at least a portion is located within Zone 1 as shown in Figure 5.12. However, proposed buildings at SkyBridge will be reviewed by the airport and FAA to ensure that all meet height restriction requirements.

The Area B building falls into Zone 1 where the lowest corner elevation limit per ATCT line of sight is 1,426 feet AMSL. The Customs building's lowest corner elevation limit per ATCT ling of sight is 1,414 feet AMSL and maximum height limit of the building southeast of Taxilane L is 1,418 feet AMSL.

Per the City of Mesa Zoning Code, the height limit for light industrial buildings is 40 feet. All buildings (except hangars) should meet both the FAA requirement and the City of Mesa building height limit, whichever is stricter.

Figure 5.12 shows the FAA maximum building height.

* Note: The elevation are AMSL elevations

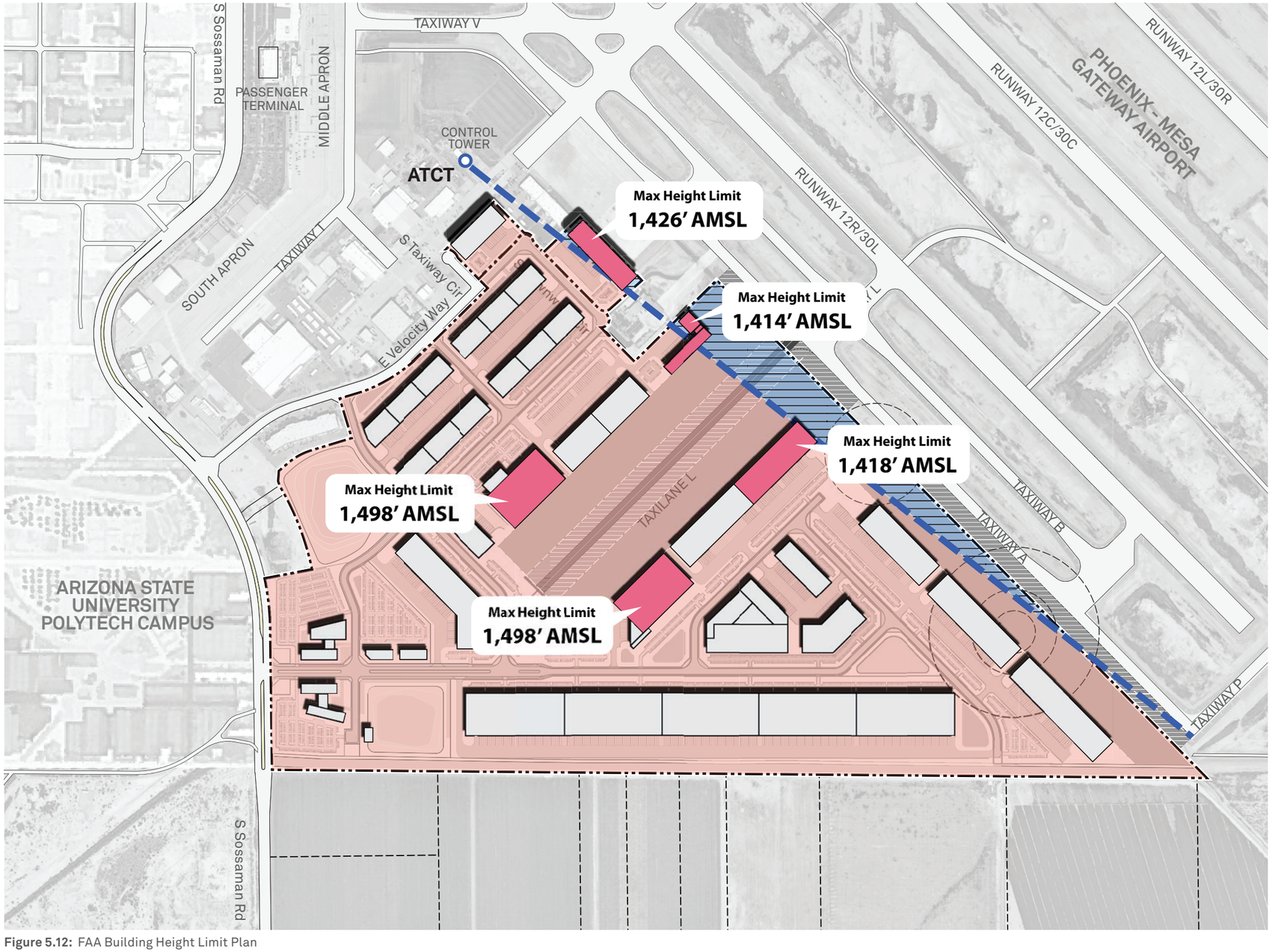


Figure 5.12: FAA Building Height Limit Plan

5.3.6 Parcel Access

To ensure safe and efficient vehicular flow and prevent vehicular conflict, access for cars and trucks should be limited to controlled access points. A maximum of three access points are allowed for industrial parcels larger than ten acres and a maximum of two access points are allowed for industrial parcels smaller than ten acres.

The access points should also follow the below guidelines:

- Access points must be spaced at appropriate intervals and be located in such a way to provide the most efficient access.
- Wherever possible, access points for adjacent parcels should be placed together, on each side of the common border.

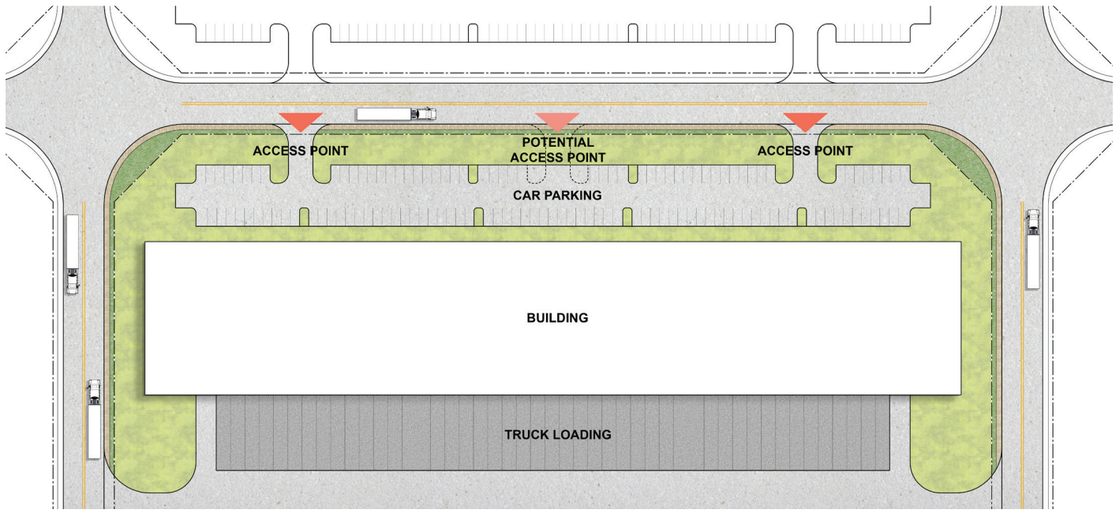


Figure 5.13: Number of Access Points

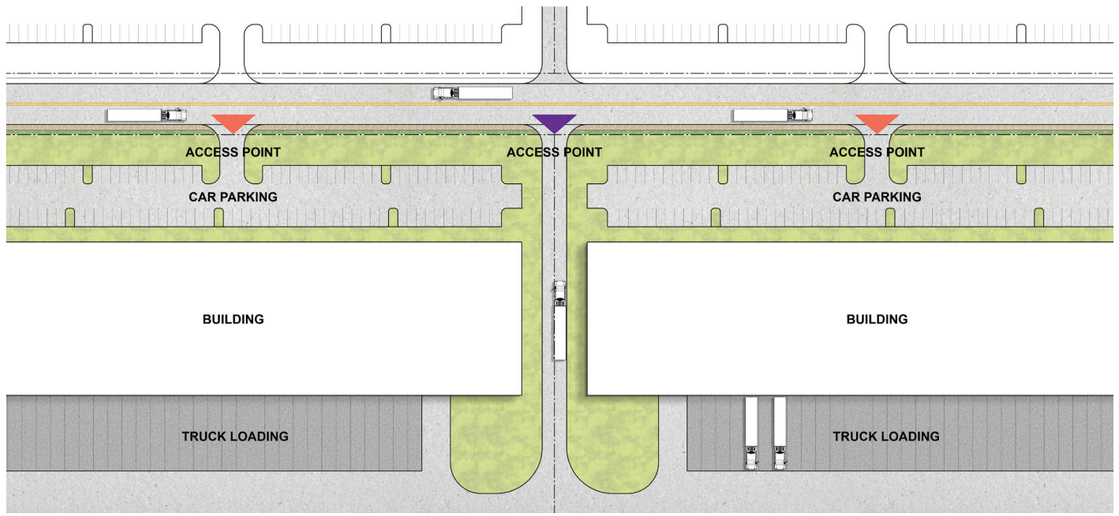


Figure 5.14: Shared Access Points for Adjacent Parcels

- For all truck access, secure check points should be planned at access points.
- Loading zones should be located on the back or side of the building. When it is not possible to locate the loading zone on the back of the building, truck access must be separated from car access. Loading zones will comply with City of Mesa zoning requirements and face away from the public right-of-way.

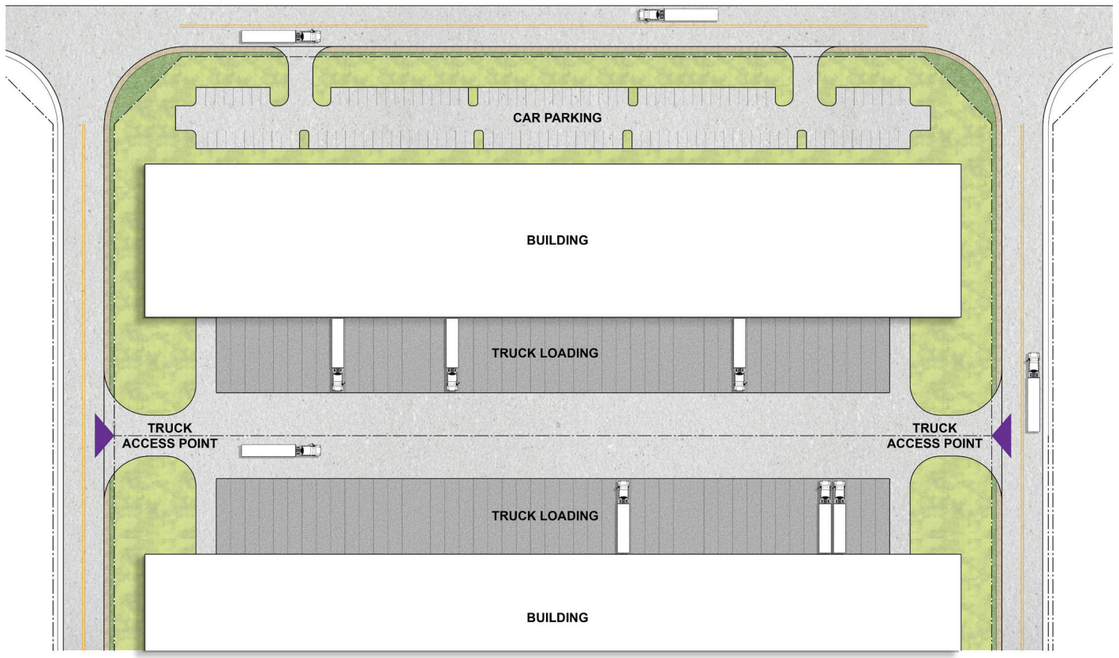


Figure 5.15: Loading at Back/Side of Building

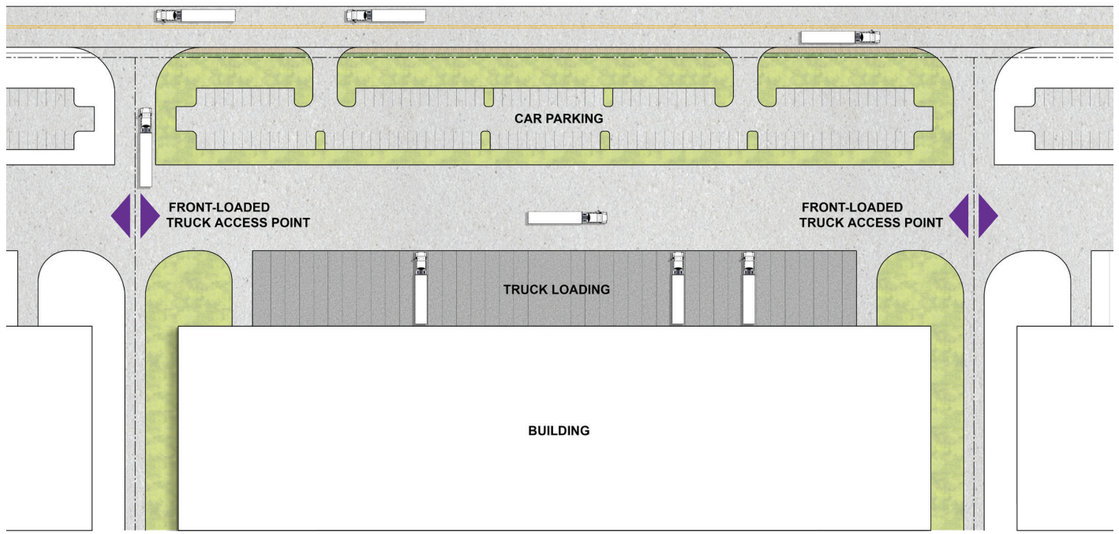


Figure 5.16: Loading in Front, and Loading in the Back but with Front Access

5.3.7 Parking

Mandated parking requirements ensure that new industrial developments provide the minimum number of parking spaces required for its users. Each industrial parcel must provide sufficient parking spaces on-site. Parking for cars and trucks are calculated separately. Parking requirements can be referenced in Table 5.2. Vehicles may only be parked in designated areas with appropriate parking signage. It is prohibited to park any type of vehicle on the public roads within the plan area.

Parking for cars

- A standard parking space is nine feet wide, 18 feet deep.
- The circulation corridor between parking lots should be 24 feet wide.
- Parking lots should be designed to include adequate drainage. Permeable Pavement is recommended.
- A six foot wide landscape median should be located between rows of cars in parking lots. Bioswales are recommended in these medians to control and naturally filter stormwater runoff from parking lots.
- A planting island shall be provided between every 20 linear parking spaces.
- The end of every parking aisle shall have a landscaped island.
- Solar panels are encouraged in car parking area to harvest green energy while providing shade. A study of the glare impact is required and must be approved before any solar PV systems are allowed.

Use	Parking Requirement
Industrial	
0-150,000 sf	1 space per 1,000 sf
150,001-500,000 sf	1 space per 1,500 sf
500,001 and greater sf	1 space per 2,000 sf
Retail	
Food and Beverage	1 space per 75 sf
Retail and Services	1 space per 375 sf
Hotel	1 space per room
Office / R&D	1 space per 375 sf

Table 5.2: Minimum Building Setback Requirement for All Street Types

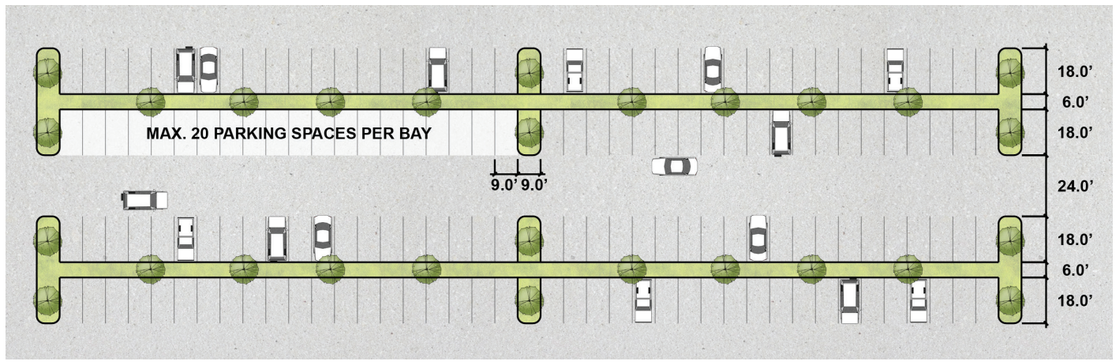


Figure 5.17: Typical Car Parking Layout



Landscape medians between parking can be designed as bioswales



Landscape islands will be located at the end of every parking aisle



Solar panels can provide shade and generate energy

Parking for trucks and loading areas

- The model of truck used to design SkyBridge Arizona is the WB-67. All truck parking areas should be able to accommodate the movement of typical WB-67 trucks.
- A standard truck parking space is 14 feet wide and 74 feet deep.
- The circulation corridor between parking lots should be 84 feet wide.
- The turning radius for truck circulation is 45 feet. Once trucks are in the parking zone, the internal turning radius can be reduced to 30 feet.
- Back-up areas for trucks are encouraged to be located at the outside of each truck parking/loading area.
- All parking lots for heavy vehicles should be designed with drainage slopes and covered with concrete, asphalt, paving stones or other durable paving.

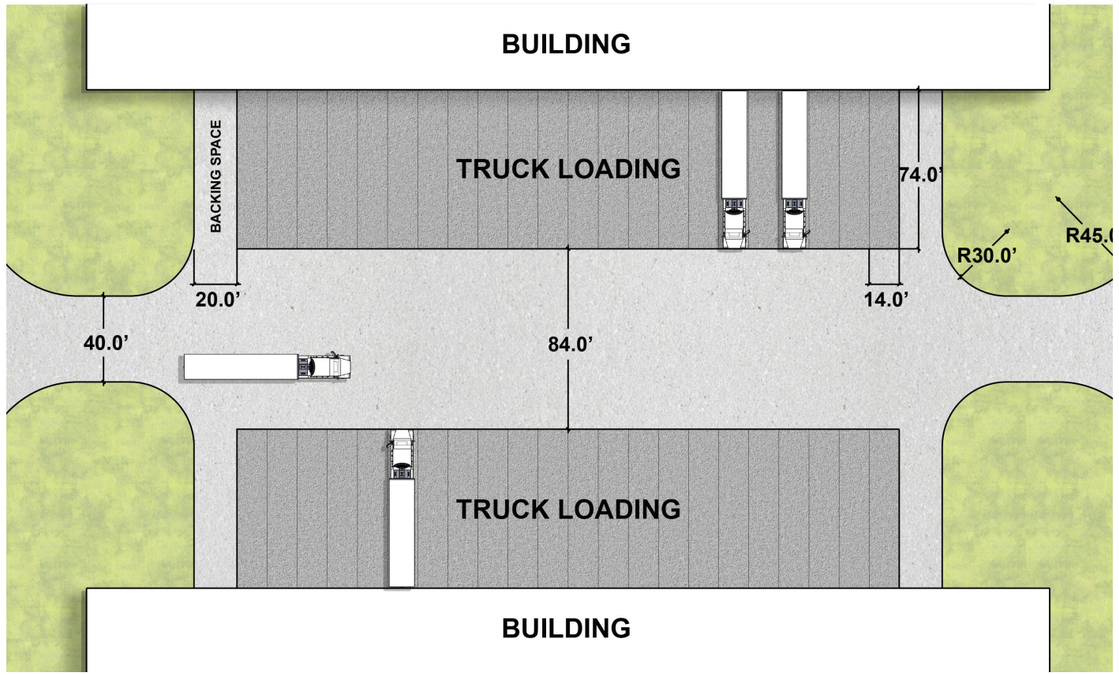


Figure 5.18: Typical Truck Parking Layout

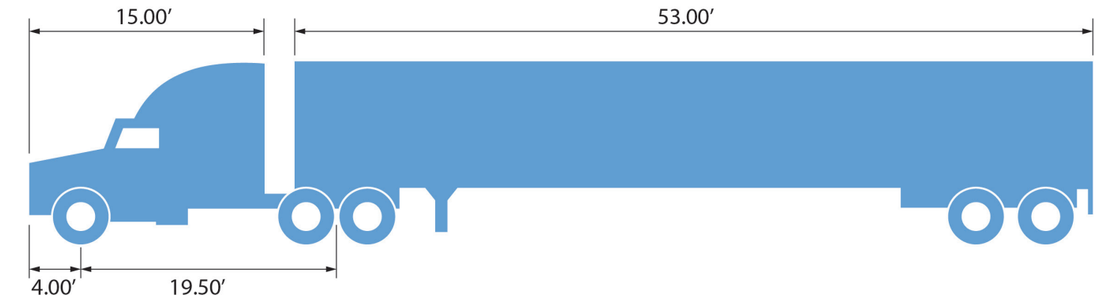


Figure 5.19: WB-67 Vehicle Dimensions

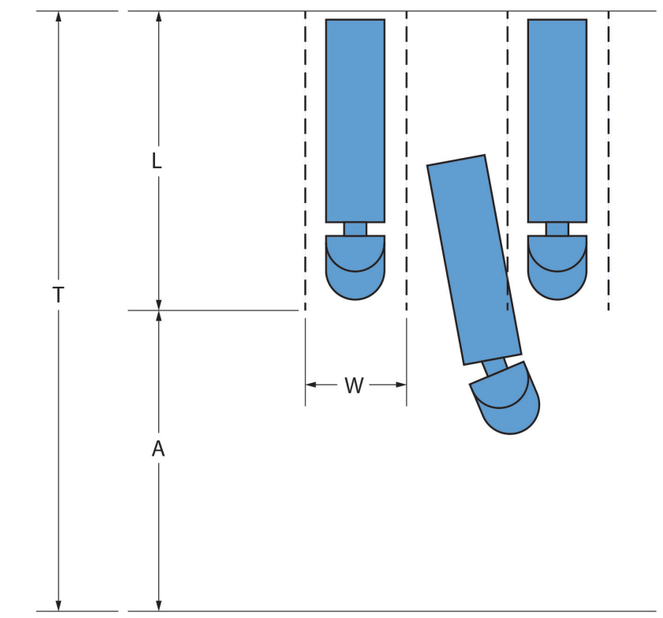


Figure 5.20: WB-67 Typical Parking Standards

Design Vehicle	Length (L)	Trailer	Wheelbase	Min Turning Radius	Apron Space (A)	Berth Width (W)	Total Offset (T)
WB-67	74 ft	53 ft	65 ft	45 ft	84 ft	14 ft	158 ft

Table 5.3: Truck Design Standards

5.3.8 Signage

Signage should be consistent with the overall project design, but should not detract from architectural and landscape elements. Each industrial building or group of industrial buildings should have a consistent and comprehensive signage program. Placement, scale and readability should be considered in signage design.

Signage for all industrial uses should follow the below guidelines:

- Signage should be located so as to be visible from streets and paths without conflicting with safe vehicular movement and visibility.
- The size of signs should be modest and afford businesses sufficient visibility and identification without dominating or obscuring the architectural elements of a building.
- Design and construct signs of durable, high quality architectural materials.
- Limit the total number of colors used in any one sign. Small accents of several colors make a sign unique and attractive, but many different colors reduce readability.
- Limit text on signs to convey the business name or logo. Eliminate words that do not contribute to the basic message of the sign.
- Illuminate signs only to the minimum level required for nighttime readability.



Sinage is consistent with architectural character



Signage should be visible from streets and paths



Use a limited number of colors with small accent colors



Limit text on signs to convey the business name or logo

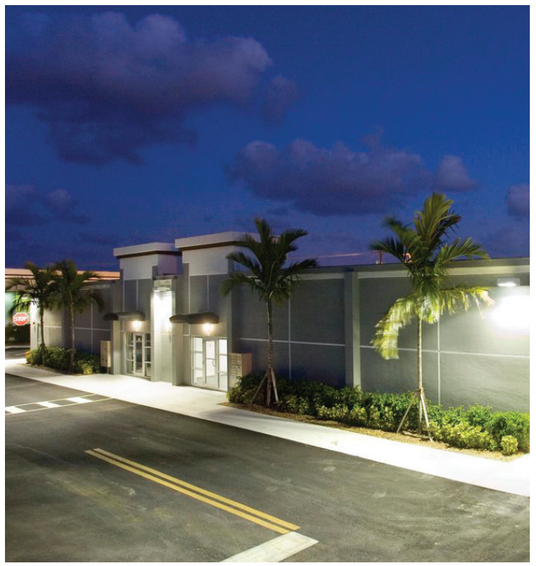
5.3.9 Lighting

Exterior lighting should be used to provide illumination for the security and safety of entry drives, parking, service and loading areas, pathways, courtyards and plazas. Exterior lighting should not intrude on adjacent properties or compromise aircraft navigation. Site lighting shall be architecturally compatible and consistent in design between sites.

- Lighting poles and fixtures should be designed to be architecturally compatible with all other fixtures on site. If possible, a lighting standard theme should be provided throughout the plan area.
- Lighting should be provided at the minimum level to accommodate safe pedestrian and vehicle movements without causing any off-site glare.
- To promote safety and security, lighting levels that are adequate for visibility, but not overly bright should be provided. All building entrances should be well illuminated.
- Lighting fixture placement should provide illumination for outdoor areas such as parking lots, pedestrian walkways, and work areas.
- Walkway lighting should be pedestrian-scale and should provide for safe use of pathways and pedestrian areas. Walkways should be lighted for pedestrian safety, especially in dangerous areas such as stairways, ramps, and intersections.
- Decorative lighting fixtures which meet all above requirements and provide visual interest are allowed.
- Integrate solar-powered lighting to increase energy efficiency.



Figure 5.21: On-site Lighting will not Cause Off-site Glare



All building entrances are well illuminated



Walkways should be lighted for pedestrian safety, walkway lighting should be pedestrian scale



Solar-powered lighting can increase energy efficiency

5.3.10 Landscape

Landscaping is provided in the plan area to enhance the aesthetics of industrial developments and create a pedestrian friendly environment. Appropriate landscape amenities will provide public open space for users. Elements such as trees and shade structures will provide climate control and a respite from high temperatures. The landscaping at SkyBridge is also designed to help manage stormwater and catch runoff.

Detailed landscape design guidelines can be found in Chapter 6.5.

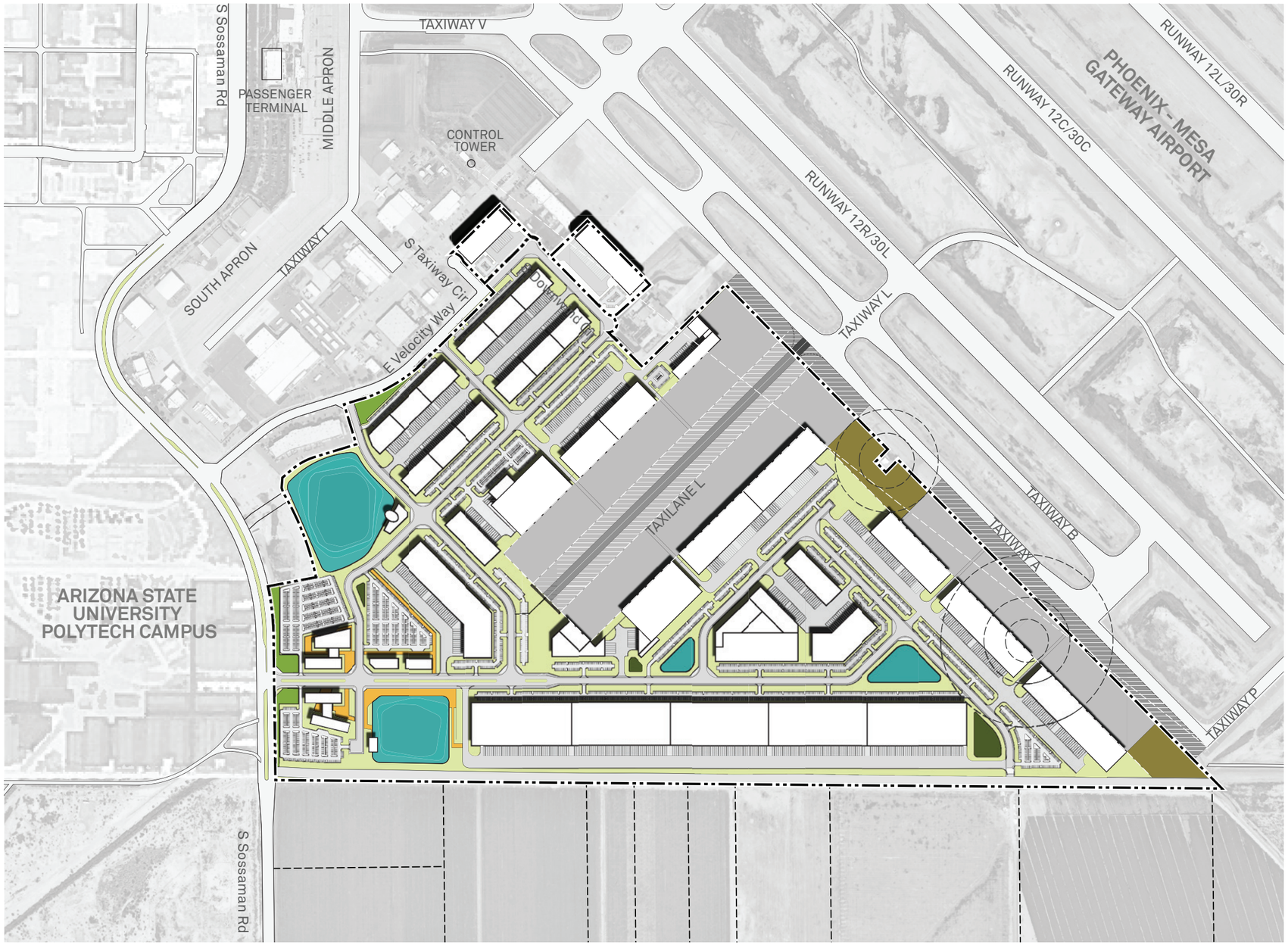


Figure 5.22: Landscape Typology Plan

5.3.11 Jet Blast Protection for Taxilane L

A jet blast fence will be provided at the southwest end of Taxilane L to protect the adjacent property from the jet blast produced by aircraft departing on Taxilane L. The blast protection metal fence will be designed for a Boeing 747-400 aircraft and wind velocity greater than of 35 Mile Per Hour (MPH). Although the jet blast generated by the aircraft on Taxilane L would be less than an aircraft departing on a runway, there will be jet blast due to breakaway thrust required to get the aircraft moving after pushback from the apron parking location.

The metal blast fence will be placed at the end of the Taxilane pavement and will be approximately 200 feet in length, 14 feet high and centered on the Taxilane. The height and width of the blast fence would be designed to deflect jet blast that exceed 35 MPH above the Taxilane pavement surface.

The blast fence at the end of Taxilane L is shown in Figure 5.23.

Blast Fence Protection

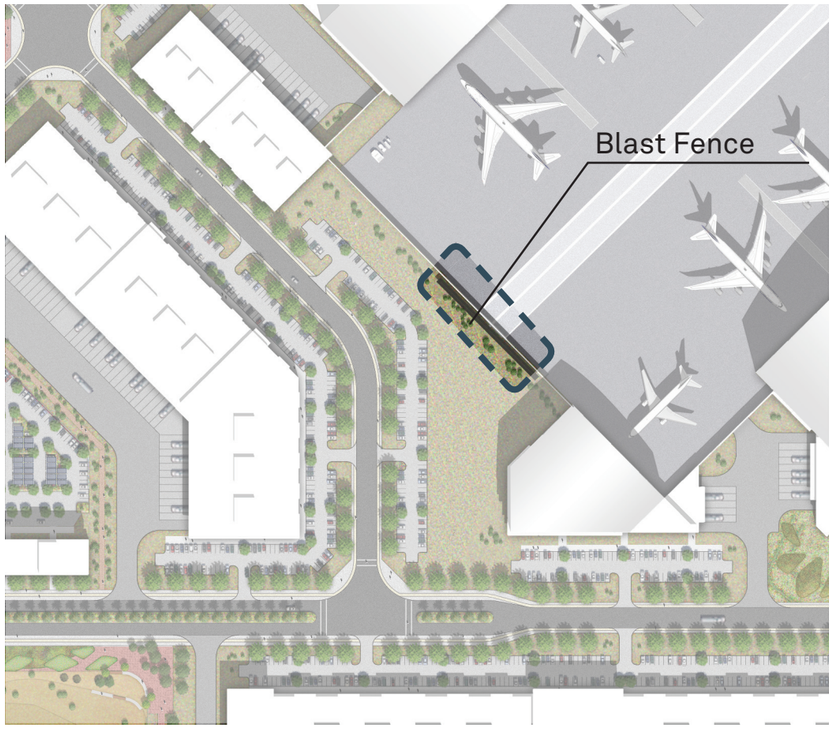


Figure 5.23: Blast Fence

5.4 ARCHITECTURAL DESIGN GUIDELINES

This section is intended to provide a set of building design guidelines for the primary uses within the project. Elements of building design such as massing, envelope, facade, entrances, roofs, and materials are addressed. The design guidelines are applicable to industrial, office/ R&D, and hotel and retail uses.

Embedded in these guidelines is the flexibility necessary to create a diverse range of building configurations which relate to the adjacent streets and featured open spaces.

The following sections provide guidelines by land use type:

5.4.1 Industrial

5.4.2 Office / R&D

5.4.3 Retail / Hotel



Aeronautical



Non-Aeronautical



Office / R&D



Hotel and Retail

5.4.1 Industrial Guidelines

Application of FAA Standards to the Site Layout

The Critical Aircraft (or Design Aircraft) for any given airport facility is defined as that aircraft, or group of aircraft, whose dimensional and/or performance characteristics are the basis for selection of facilities design criteria. The Critical Aircraft must be demonstrated to account for a minimum of 500 annual actual or forecast operations in order to justify FAA funding of improvements that are required to serve the Critical Aircraft. Different aircraft may govern the requirements for runway design, and for lateral and vertical separation standards. The factors considered to establish required runway length are the Critical Aircraft's performance requirements for takeoff at the maximum average temperature at the study airport. The design criteria for other facilities are the Critical Aircraft's maximum gross takeoff weight, approach speed category, wingspan, and tail height.

For each airport, the Critical Aircraft for the purposes of airport geometric design is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and Taxiway Design Group (TDG). These parameters represent the aircraft that are intended to be accommodated by the airport. In the case of an airport with multiple runways, a Critical Aircraft is selected for each runway. Any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin unless air traffic control (ATC) Standard Operating Procedures (SOPs) are in place for those operations. However, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently (less than 500 operations per year), and it is appropriate and necessary to develop ATC SOPs to accommodate faster and/or larger aircraft that use the airport infrequently.

The Phoenix-Mesa Gateway Airport is classified as an Airport Reference Code (ARC) D-V airport. The two components of the ARC are the AAC (the letter designation) and the ADG (the Roman numeral). The AAC D indicates that its primary runways are able to accommodate aircraft with approach speeds of up to 165 knots. The ADG V is used to determine the recommended standards for taxiway and taxilane design.

It is anticipated that the largest aircraft that will use the planned facilities fall into the ADG V category. These are typified by the Boeing 747-400. The site layout in this master plan was developed using the ADG V design standards for aircraft taxi clearance. Computer modeling was performed in order to determine if the Boeing 747-400 could safely taxi and park within the ADG V criteria. The results, shown in Figure 5.24, indicate that this can be accomplished.

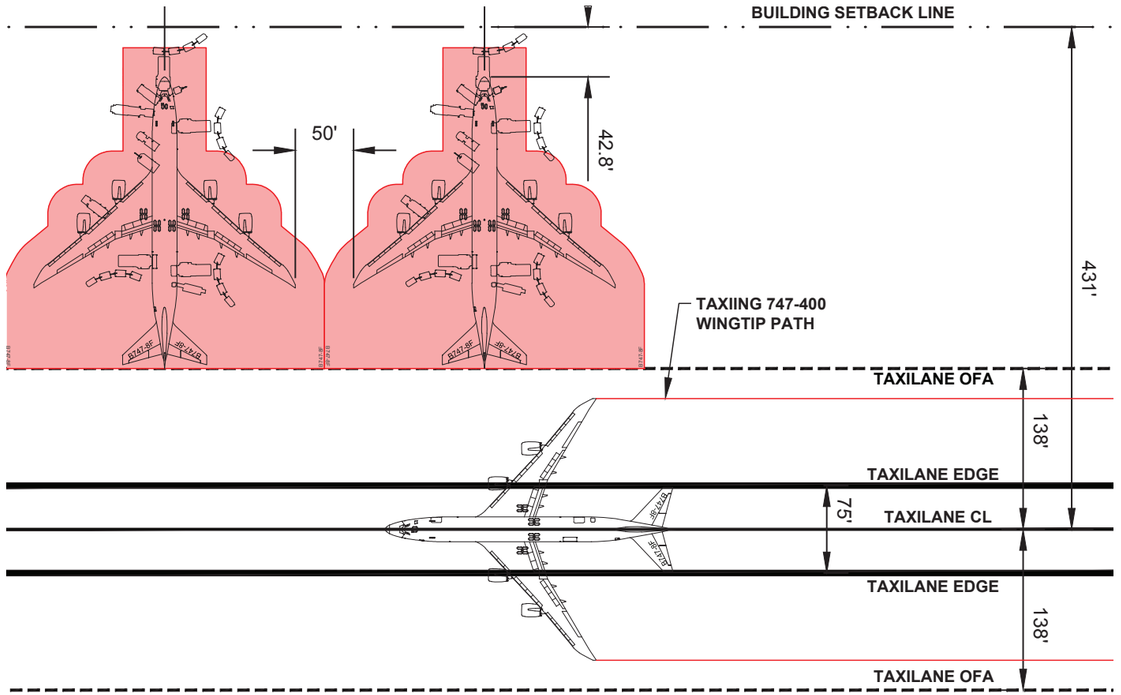
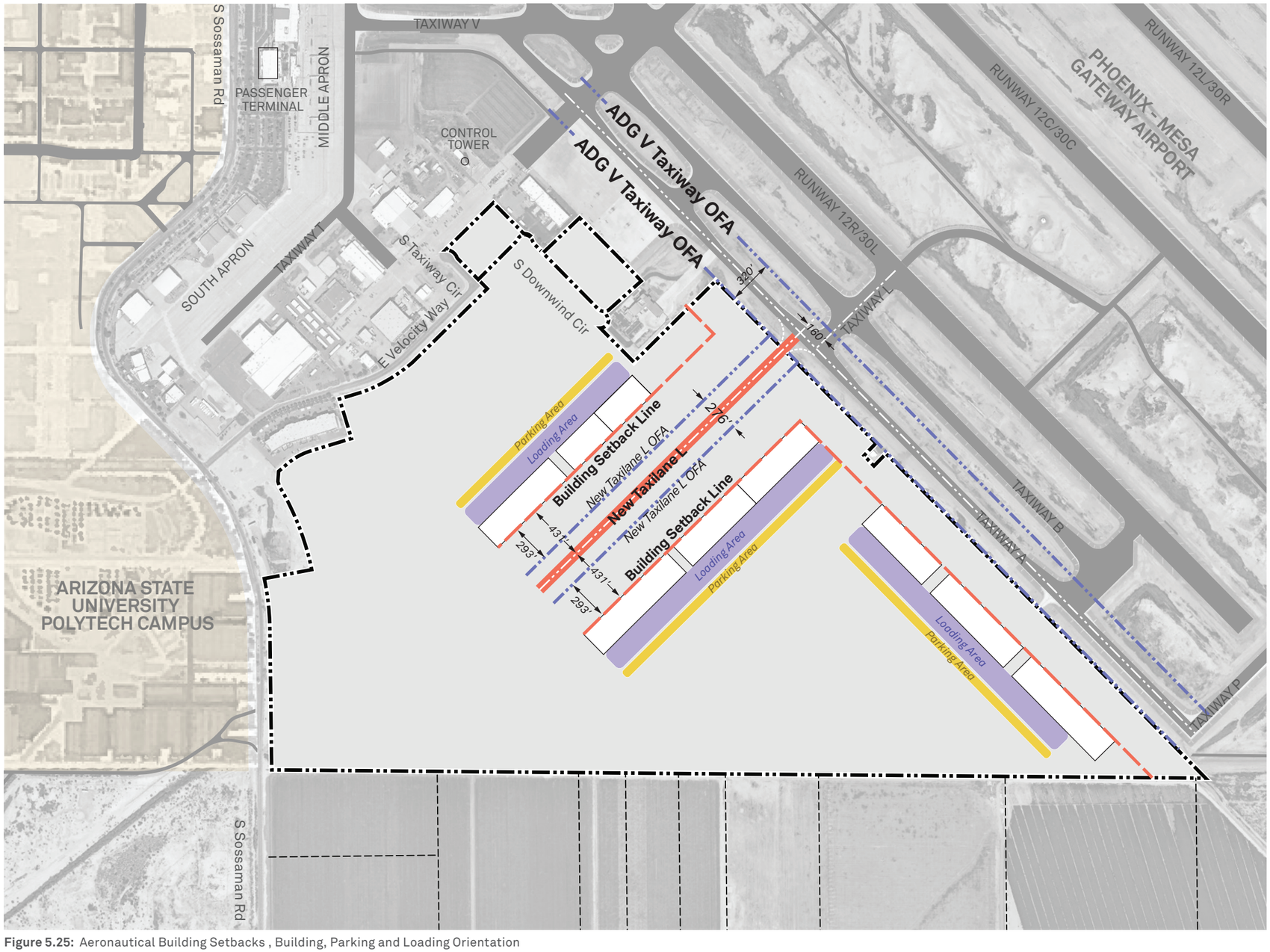


Figure 5.24: Taxilane L Apron Lateral Parking Arrangement for Infrequent Use by Boeing 747-400 Aircraft (ADG V)

Aeronautical Industrial Building Placement and Orientation

- Buildings should be oriented parallel to or perpendicular to Taxilane L or Taxiway A.
- Buildings should have aprons (airport parking) along Taxilane L or Taxiway A. Auto parking and auto loading should be arranged along streets.



LEGEND

- Site Boundary
- Arizona State University
- New Taxilane Lima
- Building Setback Line
- Taxiway A Object Free
- Area
- Building
- Loading Area
- Parking Area

N

0 200 500 1,000 ft

Figure 5.25: Aeronautical Building Setbacks , Building, Parking and Loading Orientation

- Hangar placement should ensure adequate space for Boeing 747-400 aircrafts to back up and access Taxilane L.
- Buildings may have auxiliary structures for maintenance and office functions. These structures should be placed without interfering with vehicular or airplane circulation.
- Hangar placement should ensure adequate space for Boeing 747-400 aircrafts to back up and access Taxilane L Hangar placement should ensure adequate space for Boeing 747-400 aircrafts to back up and access Taxilane L.

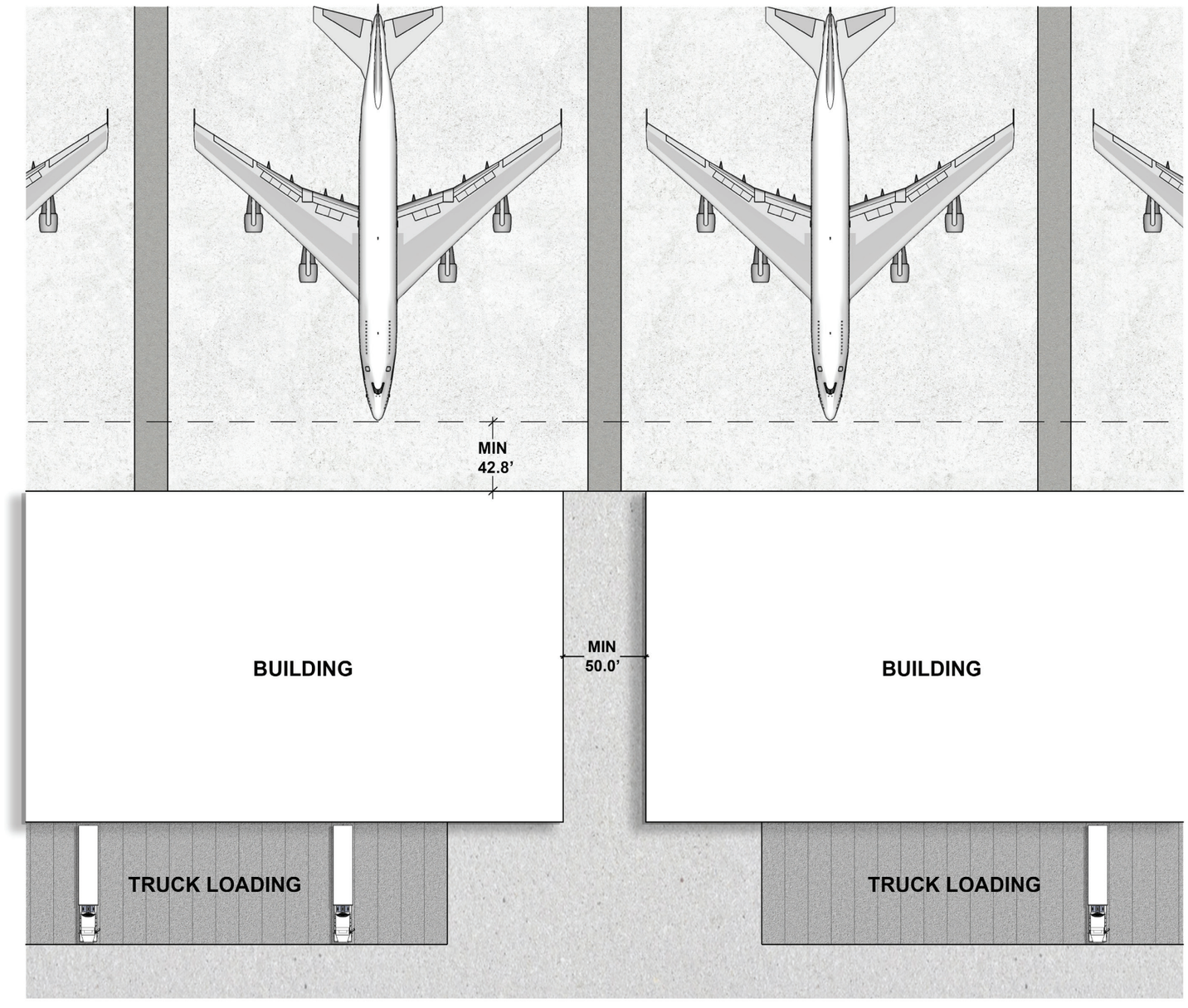


Figure 5.26: Minimum Aeronautical Building Separation

Non-Aeronautical Industrial Building Placement and Orientation

- Locate buildings and structures to minimize development impact on existing natural areas and built infrastructure.
- Locate buildings close to the street. Buildings constructed close to the property line are encouraged
- Situate buildings on the site so they are oriented to maximize daylighting opportunities and take advantage of natural light within interior work spaces. Buildings should be generally oriented north and south to minimize direct exposure to afternoon sun.
- Locate storage, service, and loading areas to the side and/or rear of the main building.
- Share features between adjacent lots with similar uses where possible. These features may include shared access, parking, service and utility areas.

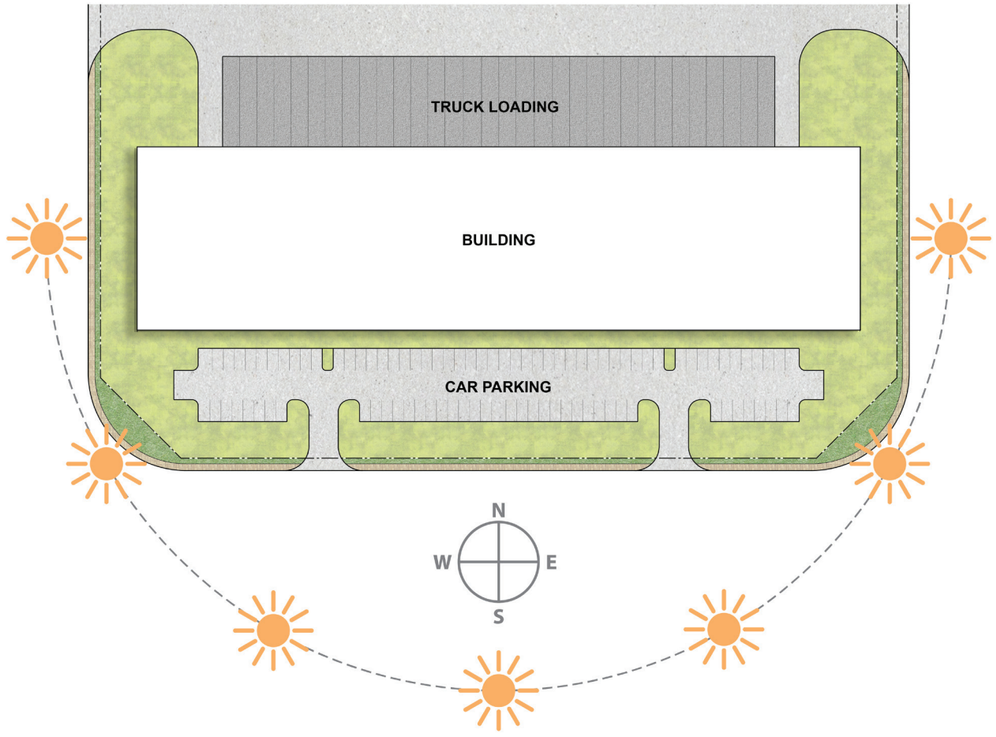


Figure 5.27: Preferred Building Orientation



Locate buildings closer to the street, locate service and loading to the back or side of the building



Buildings are located to minimize impact on existing natural areas



Share access and circulation with adjacent buildings

Massing and Facade

- All buildings and structures should comply with both FAA height restrictions and City of Mesa zoning requirements. All buildings shall be designed not to interfere with safe air-side operations.
- Buildings should be designed to provide tenant flexibility. Larger buildings can be occupied by several tenants.
- Air cargo buildings should be generally 150 feet to 200 feet deep and no more than 40 feet tall or FAA height restriction, whichever is stricter. These facilities will be lightweight steel structures with large spans.
- Hangars should be large enough to accommodate two Boeing 747-400 aircrafts. Hangars should not be taller than 120 feet or FAA height restriction, whichever is stricter.
- Architecturally integrate exposed industrial systems and equipment.
- Buildings should use structural elements and / or architectural facade elements to create visual interest.



Hangars should be large enough to accommodate two Boeing 747-400 aircrafts

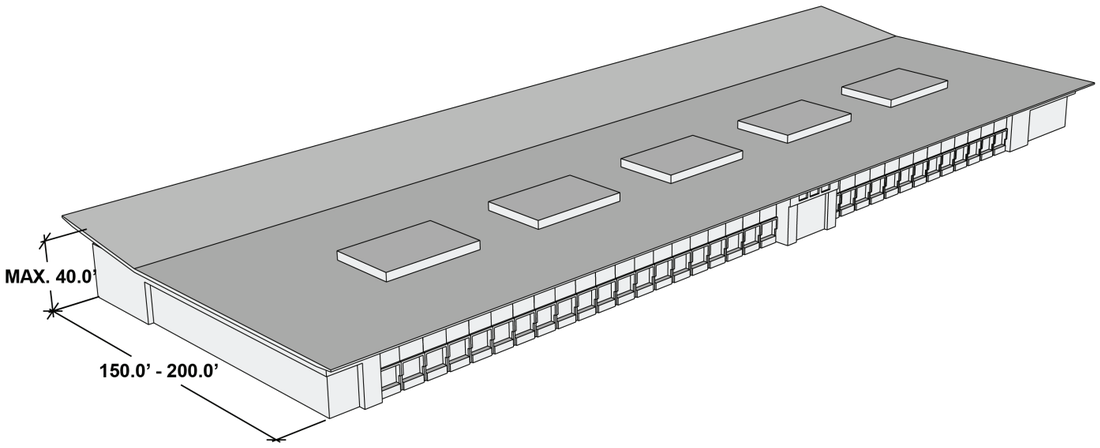


Figure 5.28: Typical Air Cargo Building Dimensions

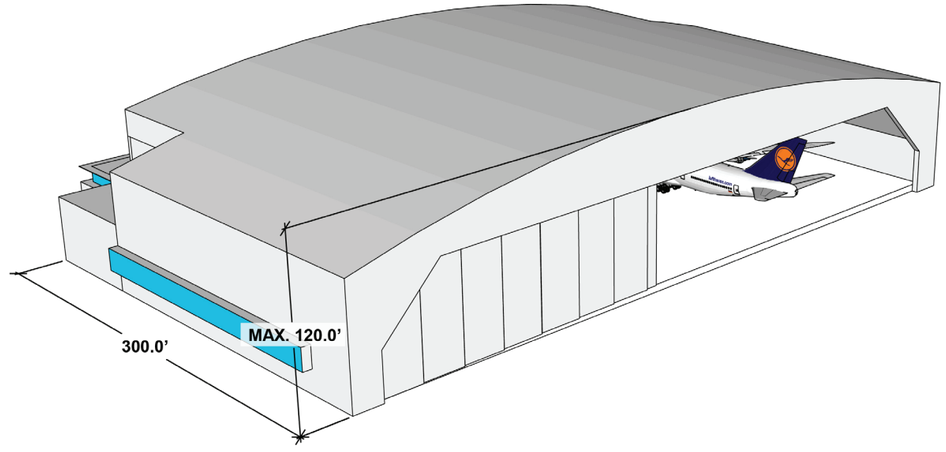


Figure 5.29: Typical Hangar Dimensions

Entrances and Parking

- Large buildings with multiple tenants should provide numerous entrances.
- Entrances should be integrated with the size and scale of the building. Ensure pedestrian entrances provide shelter year round.
- For buildings that can be accessed from both sides, truck loading and parking should be located at the back of the building. Employee parking and pedestrian entrances should be located at the side or front.
- For buildings that only have street access from the front, truck loading/parking and car parking can both be located at the front, but should have separate roadway entrances.
- Truck loading access should be controlled and each entrance should be gated with a security check point.

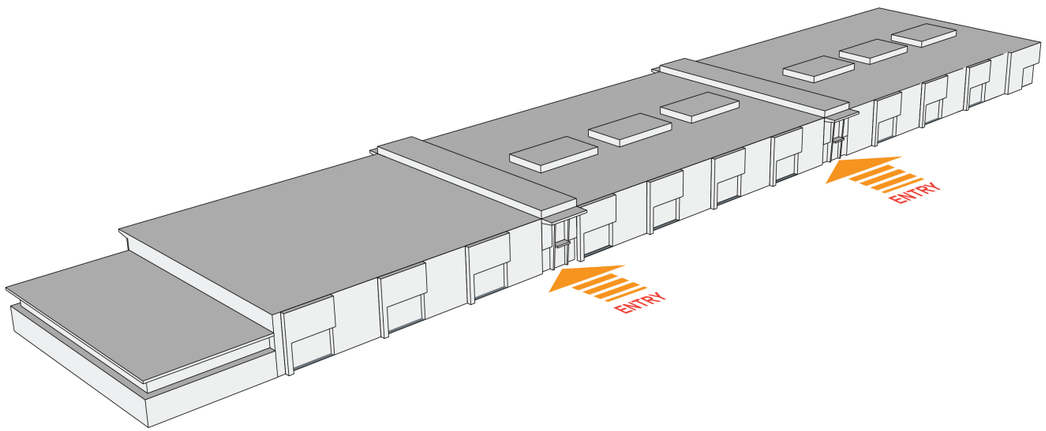


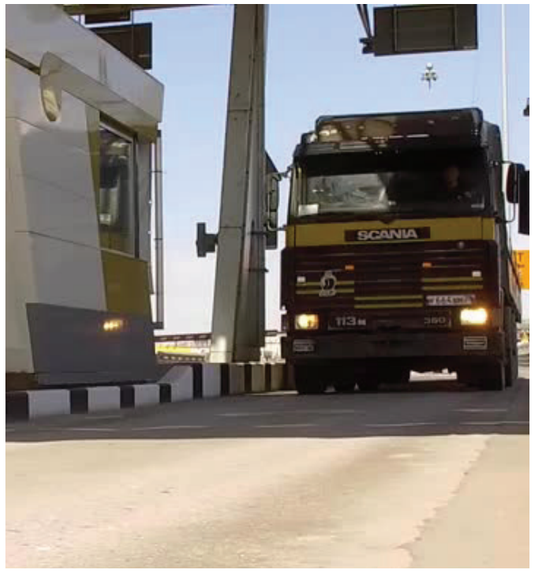
Figure 5.30: Building with Multiple Entries and Tenants



Buildings with multiple tenants should provide numerous entrances



Ensure pedestrian entrances provide shelter year round



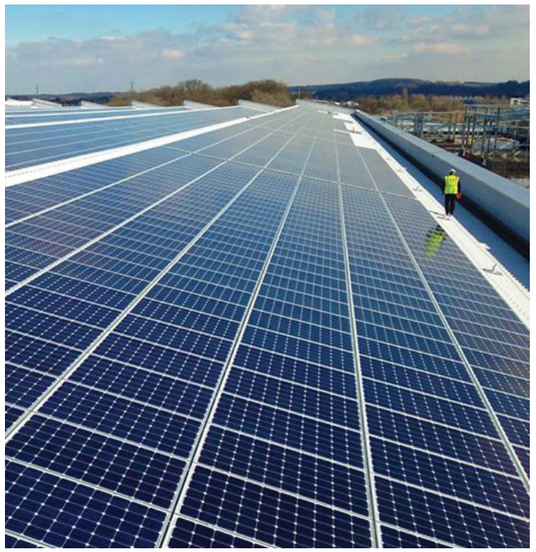
Truck entrances should be controlled

Roofs

- Roof forms should conform to a family of related styles rather than individual roof designs that may compete with one another.
- Use roof forms to create visual interest and minimize the bulk of larger buildings.
- To reduce the urban heat island effect, roof surfaces should be light in color.
- Where feasible, design structures with the ability to accommodate photovoltaic panels on the roof. A study of the glare impact is required and must be approved before any solar PV systems are allowed.



Light colored roof can reduce urban heat effect



Where feasible, photovoltaic panels on the roofs are encouraged

Materials and Color

- All buildings should use high quality materials to enhance visual interest.
- Materials such as concrete, glazed ceramics, and clear glass are encouraged to reflect a modern architectural character.
- The color palette should not compete with other existing elements of color and should be neutral in tone and not detract from the overall visual integration of all buildings in the plan area.
- Glazing should be transparent.
- Materials should be resistant to graffiti and vandalism and require minimal maintenance. Anti-graffiti films or coatings should be used to protect glass surfaces and other materials such as tile or concrete.



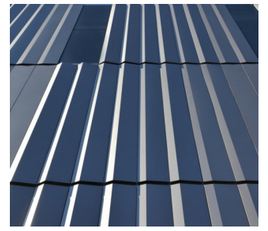
Concrete Panel



Metal Panel



Glass



Corrugated Steel



Materials should reflect a modern architectural character.

Amenities

- Amenity buildings should be placed near tenant open spaces such as plazas or courtyards to create opportunities for all industrial park users.
- Bicycle paths should be encouraged within the plan area. Bicycle paths should connect with a regional or sub-regional bicycle path system.



Figure 5.31: Amenity Building by the Detention Pond

5.4.2 Office / R&D Guidelines

Placement and Orientation

- Buildings should be clustered to create an integrated development that provides clear pedestrian access and circulation as well as outdoor gathering areas.
- Buildings should be located along and oriented towards public streets wherever possible.
- Buildings should have their visual and main functional activities facing the main street and/or public amenities.
- Building frontage should not be separated from the street by extensive surface parking.
- Building placement that creates opportunities for plazas, courtyards, or outdoor dining is strongly encouraged.

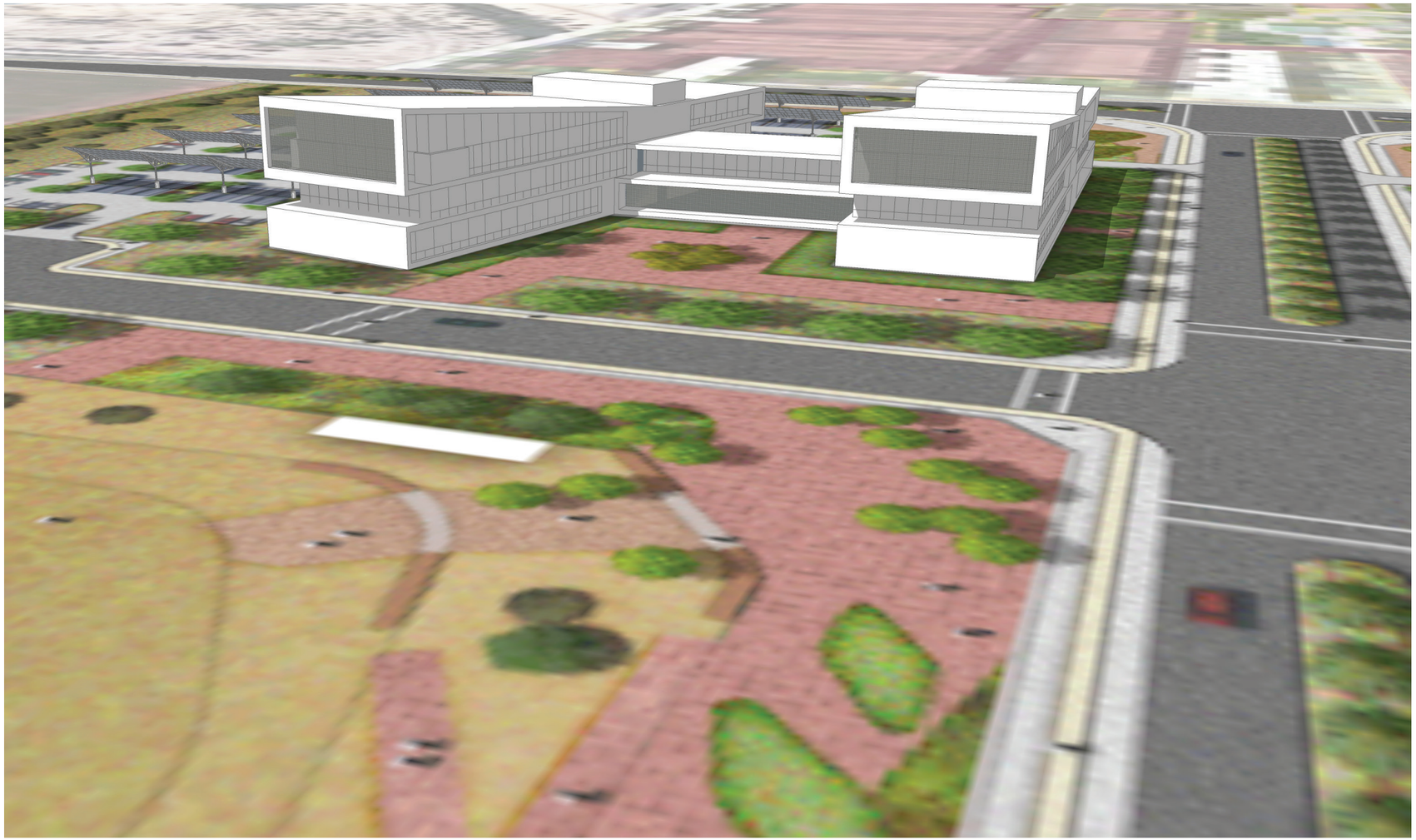


Figure 5.32: Office Buildings Facing a Plaza and the Detention Pond

Massing and Facade

- Building massing should be modulated and articulated using varying planes and horizontal and vertical elements to stimulate visual interest and visual variety.
- Buildings should generally be organized to create a “campus feel” with a series of connected internal courtyards.
- Building depth should be kept to 70 feet or less to maximize the use of natural lighting in the building interior.
- Buildings should not exceed 300 feet in diagonal length to avoid blocking views and natural light.
- Buildings are encouraged to be south facing to minimize exposure to the morning and afternoon sun.
- Building facades facing primary streets should be predominately glazed or contribute positively to the streetscape.
- Building walls should be articulated through the use of texture, color, and material changes.
- Treat all facades of the building with equal architectural rigor, level of detail, and articulation.

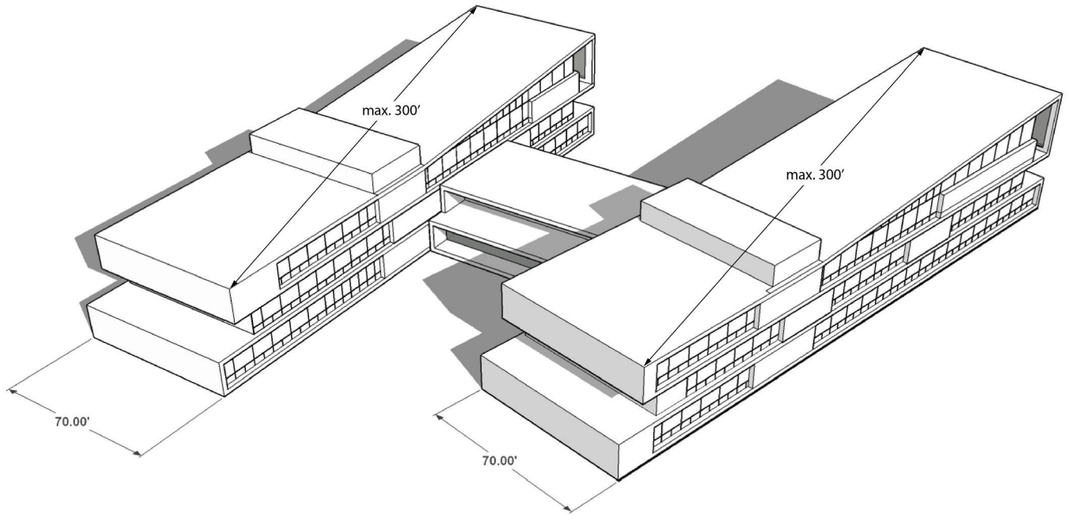


Figure 5.33: Maximum Building Depth and Diagonal Length



Figure 5.34: Office Campus Interconnected by Plazas and Walkways

Entrances and Parking

- Main building entrances for pedestrians should occur on the primary façade of a building with a direct connection to the building core and vertical circulation elements.
- Main pedestrian entrances should be clearly defined using accent materials, special color treatment, and/or lighting.
- Canopies or recessed entrances should be provided in the landing area to provide shelter from the elements.
- Vehicular entry into parking areas should occur from a secondary street or service aisle.
- Loading/unloading and service areas should be screened from public access and placed as far as possible from main public areas.



Main building entrances for pedestrians should occur on the primary façade of a building



Main pedestrian entrances should be clearly defined using accent materials, special color treatment



Drop-off should occur from a secondary street or service aisle



Loading/ unloading and service areas should be screened from public access

Roofs

- Roofs should be designed in accordance with the character and materials of the main body of the building.
- Light colored roofs with high solar reflectance are encouraged to reduce the urban heat island effect.
- Rooftop mechanical equipment should be organized and appropriately screened so as not to detract from the architecture of the building.
- Rooftop gardens are encouraged and should be accessible to the users of the building to provide additional outdoor space.
- Green roofs are encouraged.
- The use of PV panels and/or solar thermal instruments is encouraged. A study of the Glare Impact is required and must be approved before any solar PV systems are allowed.



Roofs should be designed in accordance with the character and materials of the main body of the building



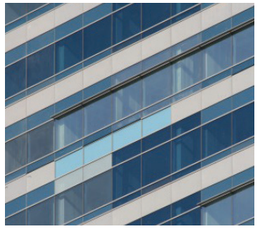
Rooftop gardens are encouraged and should be accessible to the users of the building to provide additional outdoor space



The use of PV panels and/or solar thermal instruments is encouraged

Materials and Color

- Diverse material palettes should be used to provide variety in color and texture, while ensuring compatibility within the office campus.
- All surface treatments or materials should be designed to appear as an integral part of the design.
- The use of environmentally friendly and climate-responsive materials is encouraged.
- Locally or regionally sourced materials are encouraged whenever available.
- High-quality, attractive, and durable materials and stronger, more distinguishable color tones should be used for all buildings. Special attention should be given to the lower building levels to enhance the pedestrian experience.
- Buildings should be designed to incorporate daylighting. This includes the use of high-quality, energy efficient glazing to reduce interior heat gain.
- Vivid accent colors may be permitted to highlight certain components of the building such as entrances or primary building corners.



Metal panel



Polished stone



Glass and steel frame



Light colored concrete



All surface treatments or materials should be designed to appear as an integral part of the design



Special attention should be given to the lower building levels to enhance the pedestrian experience



Vivid accent colors maybe permitted to highlight certain components of the building, such as primary building corners

5.4.3 Retail / Hotel Guidelines

Placement and Orientation

- Buildings should be clustered to create an integrated development that provides clear pedestrian access and circulation as well as outdoor gathering areas.
- Buildings should be located along and oriented towards public streets wherever possible.
- Buildings should have their visual and main functional activities facing the main street and/or public amenities.
- Building frontage should not be separated from the street by extensive surface parking.
- Building placement that creates opportunities for plazas, courtyards, or outdoor dining is strongly encouraged.

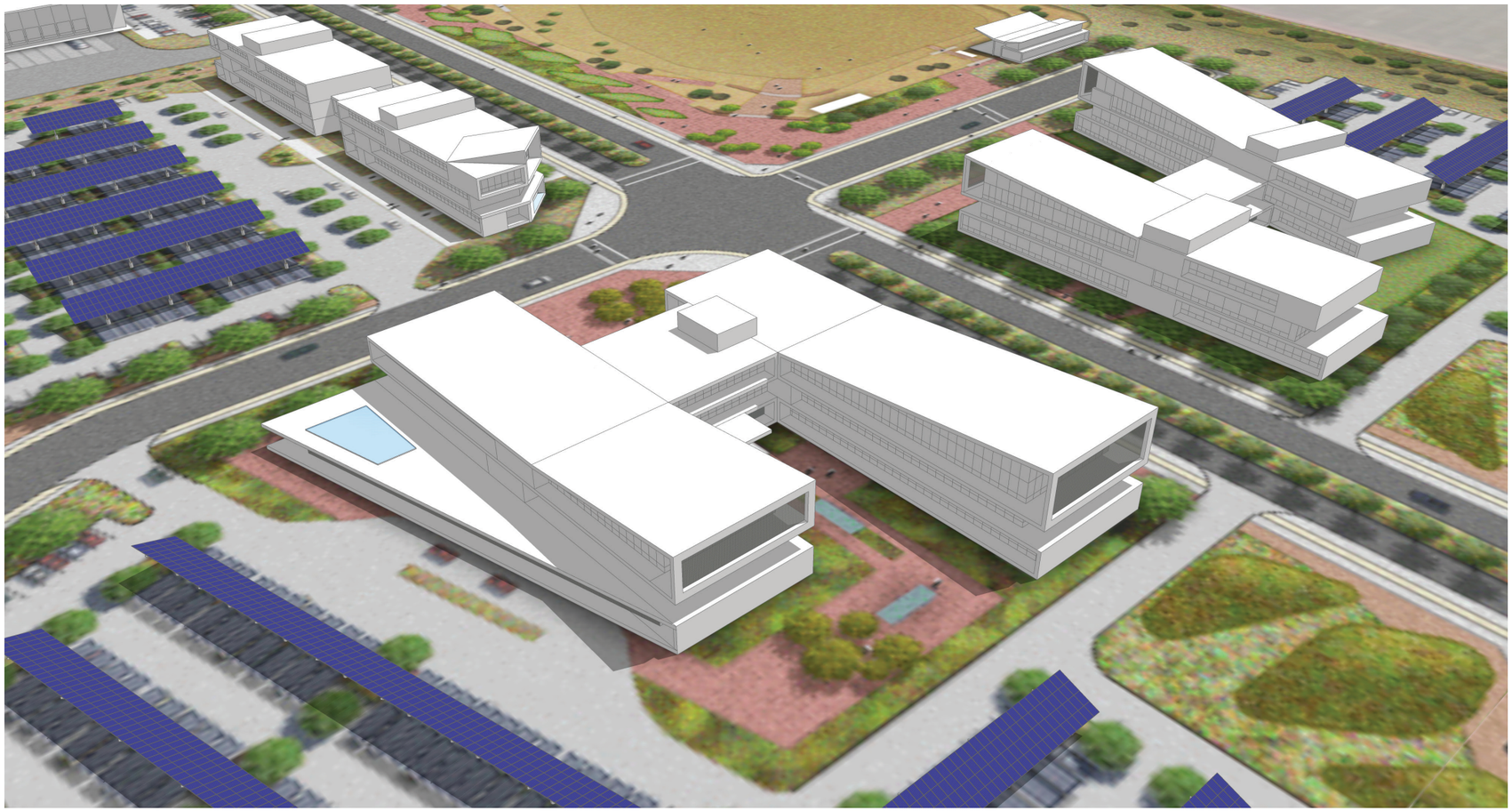
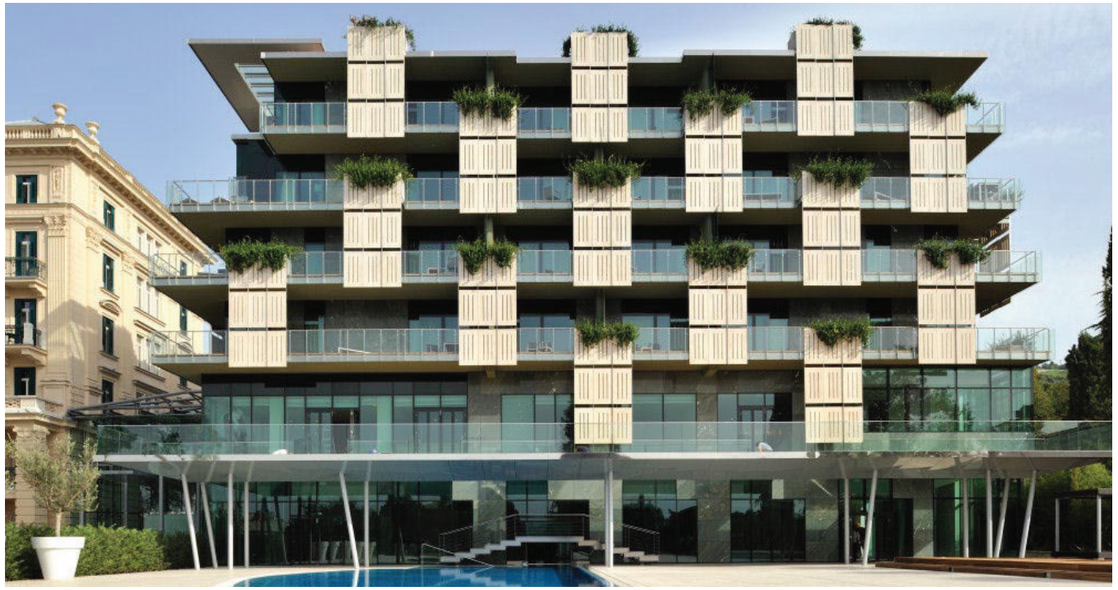


Figure 5.35: The Hotel Building along the Boulevard Street is Oriented to Provide Usable Outdoor Spaces and Establishes Open Space Connections to Adjacent Parcels

Massing and Facade

- Buildings should strive to achieve a human scale through massing and articulation.
- Architectural styles should be consistent throughout a single project to achieve design coherence.
- Architectural elements should be used to provide weather protection and highlight building features and entrances.
- Elements of the chosen architectural style shall be evident on all building elevations. However, not all building elevations will have the same level of articulation and detailing.
- Long, uninterrupted, and flat facades should be avoided.
- Use building massing to emphasize certain parts of the building such as entrances, corners, and conference spaces.



Architectural styles should be consistent throughout a single project to achieve design coherence



Elements of the chosen architectural style shall be evident on all building elevations

Entrances and Parking

- Awnings and canopies at building entrances are encouraged to clearly indicate pedestrian entrances and drop-off areas.
- Pedestrian zones should be distinguished by using special color/texture for the ground paving materials where there are potential points of conflict.
- Parking should be accessed from secondary streets and located at the rear/side of the main buildings.
- Ensure main building entrances can accommodate persons of all mobility levels.



Figure 5.36: Elements Such as Awnings and Special Glazing are Recommended to Create Pleasant Entry Experience

Roofs

- Roofs should be designed in accordance with the character and materials of the main body of the building.
- Light-colored roofs with high solar reflectance are encouraged to reduce the urban heat island effect.
- Rooftop mechanical equipment should be organized and appropriately screened so as not to detract from the architecture of the building.
- Rooftop pools and patios are encouraged and should be accessible to hotel guests to provide an outdoor recreational space.



Roofs should be designed in accordance with the character and materials of the main body of the building



Rooftop pool and patios are encouraged and should be accessible to hotel guests to provide an outdoor recreational space

Materials and Color

- Materials should be durable and of high quality and should be able to withstand climate changes.
- For ground level retail uses, the primary building façade facing a public ROW or plaza should have a minimum transparency of 75%.
- Vivid colors may be permitted at the base of the building to highlight vertical panels, awnings, and/or entrances.
- Reflective glass shall not be allowed at the base of the building to provide continuity between the building interior and the public realm.
- Buildings should be designed to incorporate daylighting. This includes the use of high-quality, energy-efficient glazing to reduce interior heat gain.

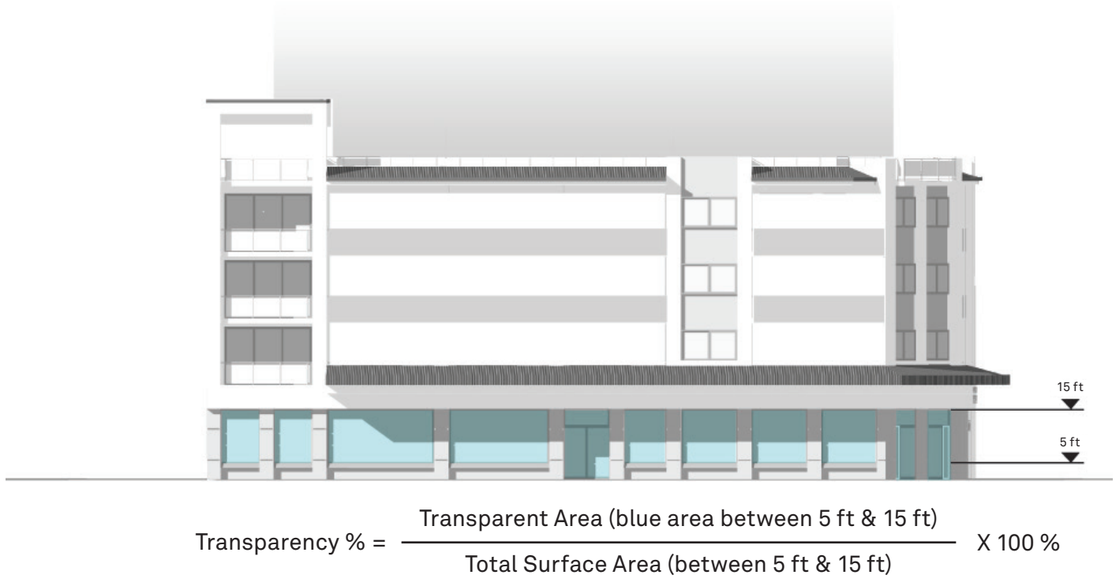


Figure 5.37: Transparency Requirements for the Ground Level



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6

PUBLIC REALM CONCEPTS

6.1 INTRODUCTION

The Public Realm Concepts chapter provides guidance for the design of open spaces within the designated planning area. The public realm concepts work together with the other chapters presented in this document to create a cohesive vision for the project. These design principles will create a project that emphasizes identity and celebrates the surrounding context, sustainability, efficiency and low-maintenance.

The chapter consists of the following sections:

6.2 Site Analysis

This section describes the opportunities presented by the area's unique landscape. It contains a description of the site's natural assets.

6.3 Landscape Design Approach

This section presents the strategies that were used to organize the many landscapes within the project, defining different hierarchies and typologies.

6.4 Open Space Strategy

This section describes the project's design approach by looking at the concepts and the program that influenced and defined the open spaces.

6.5 Public Realm Design Guidelines

This last section presents the design recommendations that should be taken into account while designing or implementing landscape.



SkyBridge site in Phoenix metropolitan area context

6.1.1 Open Space & Public Realm Contributions

Interventions in the open space and public realm should make the following contributions to the SkyBridge Arizona project:

Build an identity - the design of the public realm must encompass the unique characteristics of the site (its views, topography, access, natural environment), while meeting the programmatic needs of the project.

Celebrate the local context- any intervention within the site should attempt to respond to the site's unique characteristics and pull inspiration from local materials, plant palettes and natural patterns.

The open space network throughout the site provides landscape amenities within each landuse typology. All land use areas of the park have an open space design unique to the specific use of that area. Jointly, each of these green spaces provide an array of amenities that can be accessed by visitors, workers, and community members alike.

The flood protection zones should be designed as more than a technical asset; it should be thought of as an amenity and a resource, taking advantage of its seasonal use. The design proposes to maximize and use stormwater control spaces as recreational amenities.









Existing site photos

6.2 SITE ANALYSIS

6.2.1 Existing Site Condition

The site lies within a region with desert climate, with mild winters and very hot summers. Rainfall is infrequent and large rainstorms are unpredictable. However, storm runoff accumulates quickly and flooding is a risk on the site.

The proximity to Arizona State University Polytechnic Campus is a great opportunity for SkyBridge Arizona development. The uses of this project will compliment those of the campus and the dynamic activity of the university will carry into this site; and vice versa.

Agricultural land is found south of the site and the lots' scale and patterns were considered in this project's design framework.

Within the property, on the southern half of the site, run two waterways which have been taken into the account in the design response.

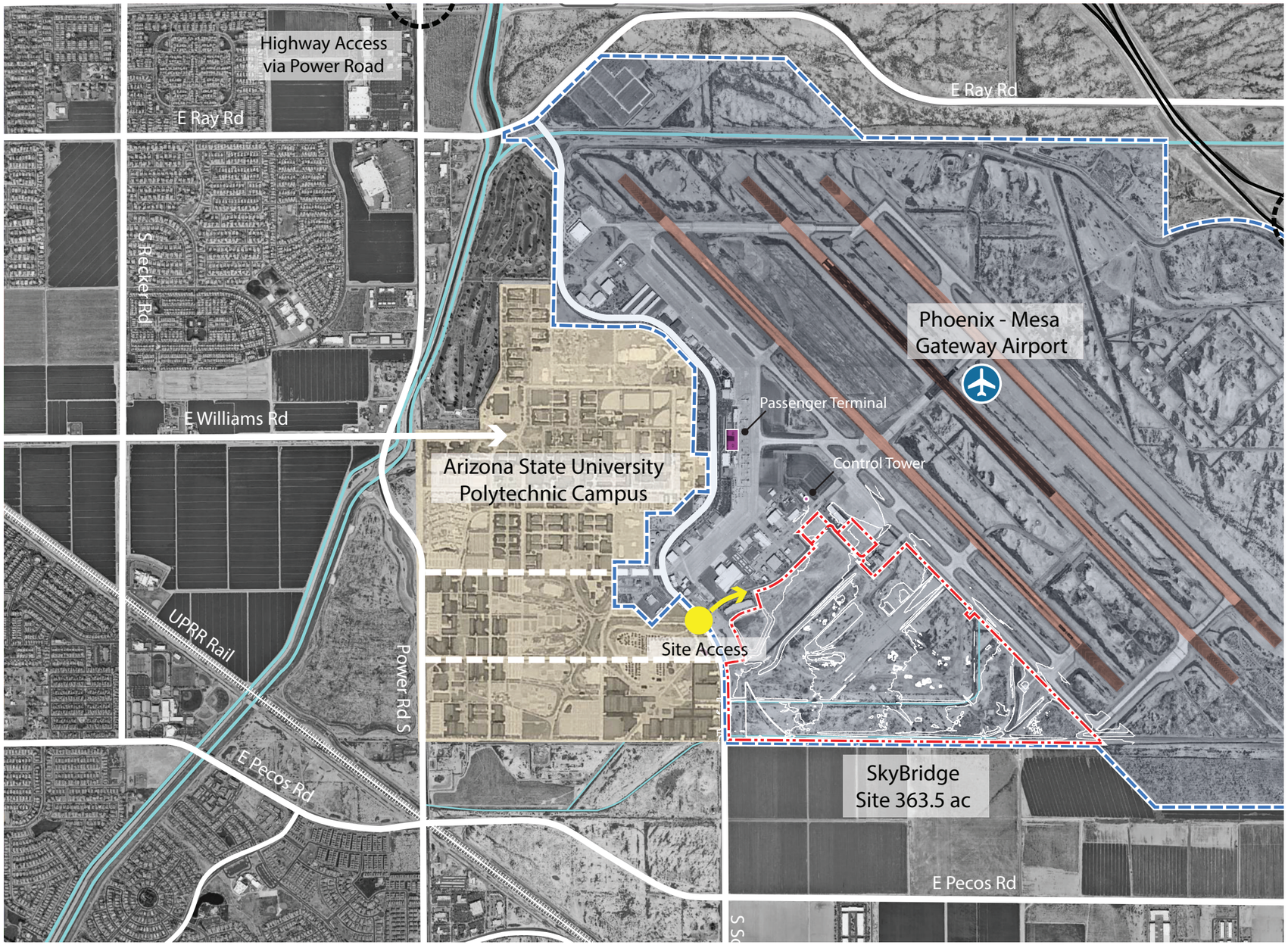


Figure 6.1: Existing Site Condition





Site photos - existing basin

6.2.2 Site Inspirations

The images on this page illustrate the beauty found in the local planting and materials palette. The desert landscape species, colors and patterns serve as inspiration and design cues for AECOM's landscape architecture team. For example, Arizona's native vegetation palette and red rock color provide an aesthetic that the proposed design will build upon.

The native and drought-tolerant plant palette includes a variety of textures and colors. The iconic and characteristic succulents and cacti of Arizona's deserts will be complemented in this project by wispy grasses, desert flowers, and trees with light canopies. Introducing these plants will add an additional layer of interest to the plant palette.









Desert landscape inspirations

6.2.3 Opportunities & Influences

From a landscape design perspective, the sophisticated design of the Arizona State University Polytechnic Campus (ASU) campus sets an important precedent for the area. Winner of the American Society of Landscape Architects Professional Award in 2012, the ASU campus combined concepts of native desert planting, local materials, stormwater management and thoughtful circulation and connections. The AECOM design team has also embraced these design principles for this project.

Landscape design opportunities include providing shade to create pleasant spaces that promote outdoor activities for site users and studying the local planting character to establish a unique identity for the project.











Opportunity areas - prioritize shade and local character

6.3 LANDSCAPE DESIGN APPROACH

6.3.1 An Integrated Landscape

The motivation behind the design of SkyBridge Arizona's open spaces was to build an identity for the site's landscape and create an integrated, sustainable landscape system that reduces noise and provides stormwater management.

The design is a unique integration of landscape architecture, land art, and innovative technology.

The land art features not only reduce noise from aircrafts and disperse ground noise, but also add aesthetic and recreational values to the site.

Providing a clear hierarchy of open space and establishing circulation patterns that encourage walking, biking and recreational activities within the site, helps to improve the open space activities.

SkyBridge Arizona's open scape is the integration of landscape, land art and stormwater management.

Landscape

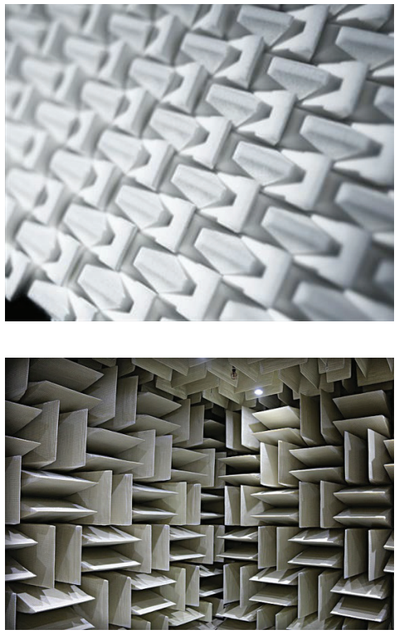
Showcase Arizona's iconic landscape

Land Art

Create an "Image Maker's landscape"
- Utilize land art to reduce noise and create a unique and interesting landscape"

Stromwater Management

Manage stormwater and balance the amount of cut and fill for detention basins





Sound chambers: inspiration for the noise reduction strategy



Example of noise reduction: Buitenschot Park, Amsterdam Airport

Landscape Concept

A series of sculpted mounds are designed as a continuous landscape feature and introduces a unique identity throughout the site.

These mounds act as sound barriers and also are a platform to showcase Arizona's native low-maintenance plants.

The red paving material is the connector between landscape features, buildings and central courtyards. These not only direct people through the site and establish a visible connection, but also provide an interesting color contrast in the open space area.

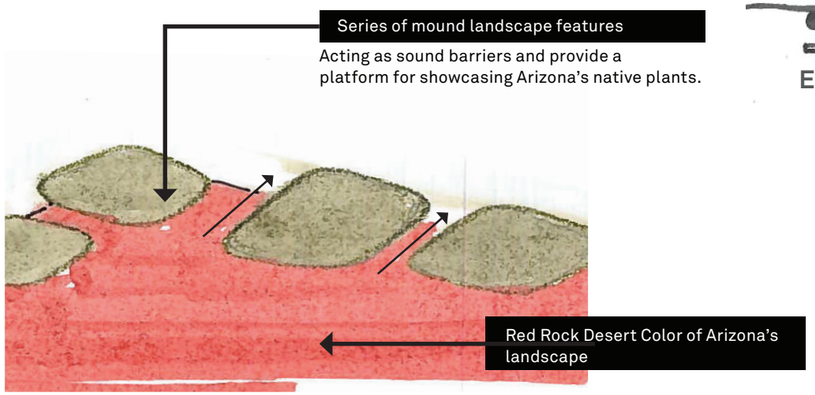
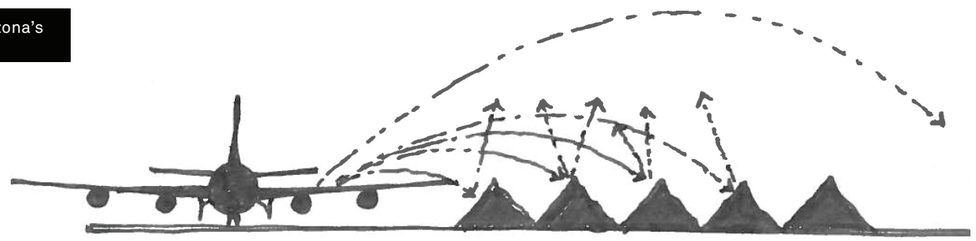


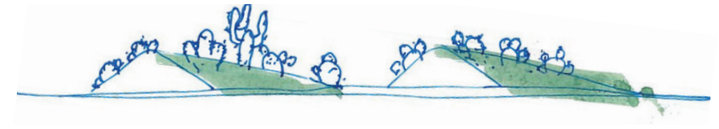
Figure 6.2: Landscape Concept- Sculpted Mounds



Emergence of low frequency sound waves



Dispersion of the low frequency sound waves



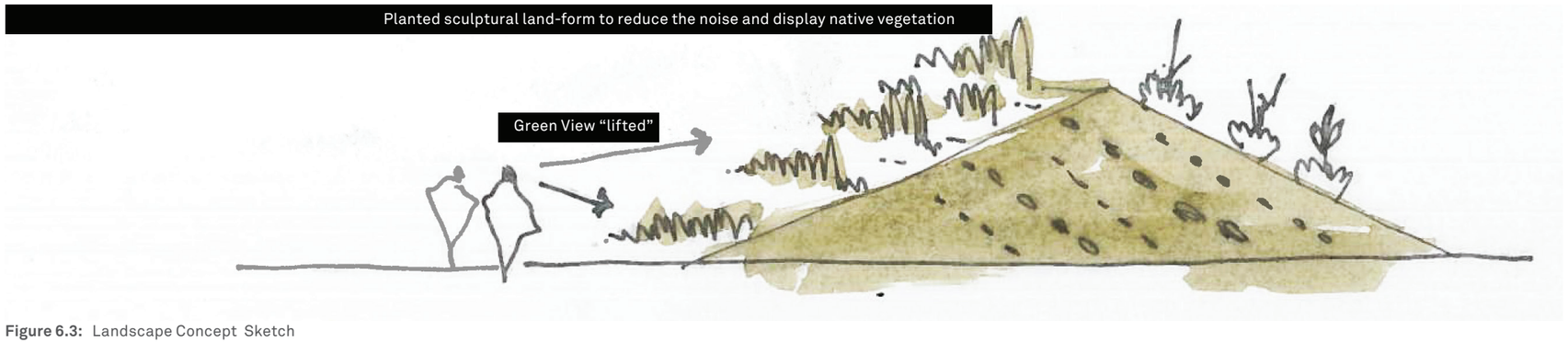


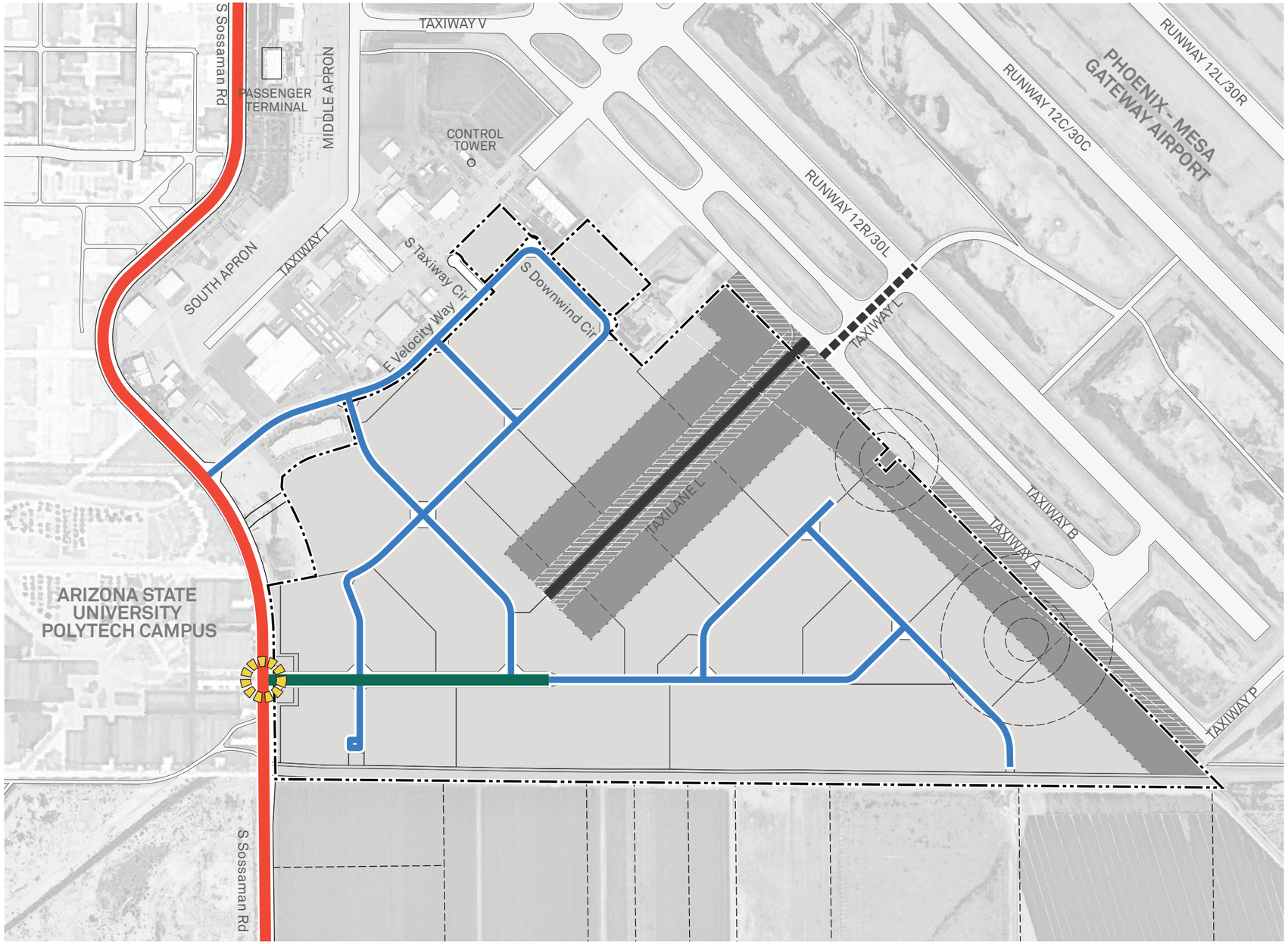
Figure 6.3: Landscape Concept Sketch

6.3.2 Streetscape Typologies

The streetscape will play an important role in helping create a cohesive experience across the site and different land use typologies.

The site's main entrance and boulevard streetscape with drought-tolerant trees in the median will immediately establish the identity of SkyBridge and will welcome users to the site.

The planting character of both boulevard and local road will be unique and will be appropriately scaled for this project and for the hot climate of Mesa.



LEGEND

- Site Boundary
- Arterial
- Boulevard
- Local Road
- Taxilane
- Main Entry

N

0 200 500 1,000 ft

Figure 6.4: Circulation Network

6.3.3 Typical Boulevard Street Section

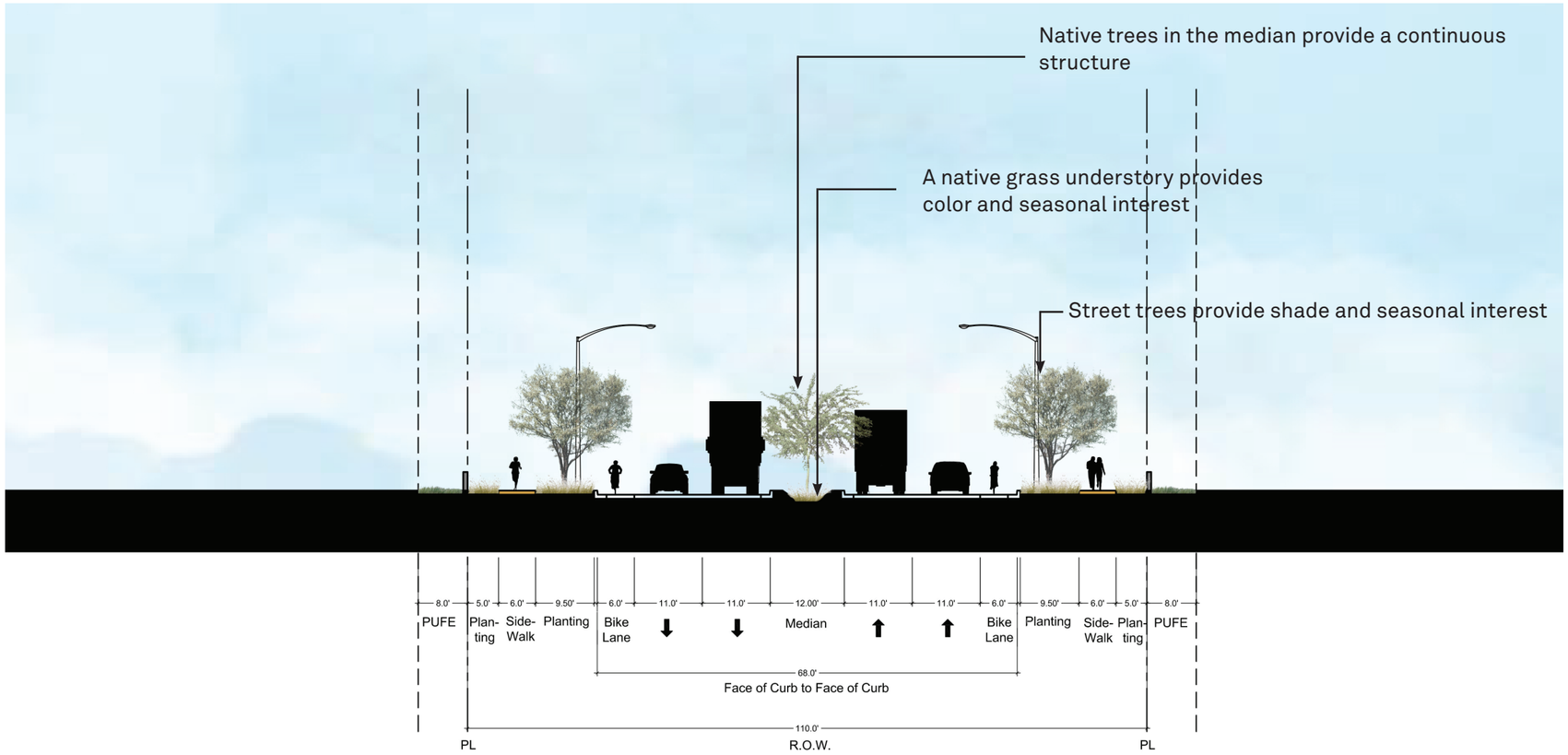


Figure 6.5: Typical 110 ft Boulevard Street Section

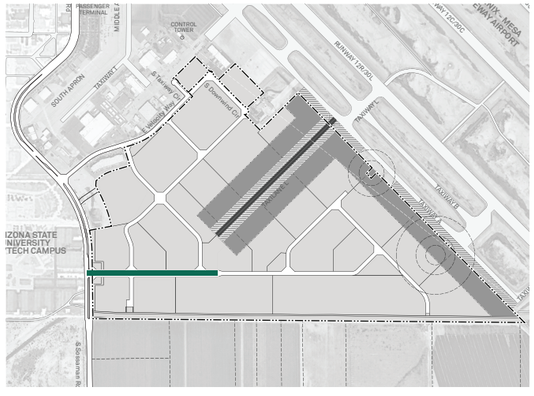


Figure 6.6: Boulevard Key Map

6.3.4 Typical Local Street Section

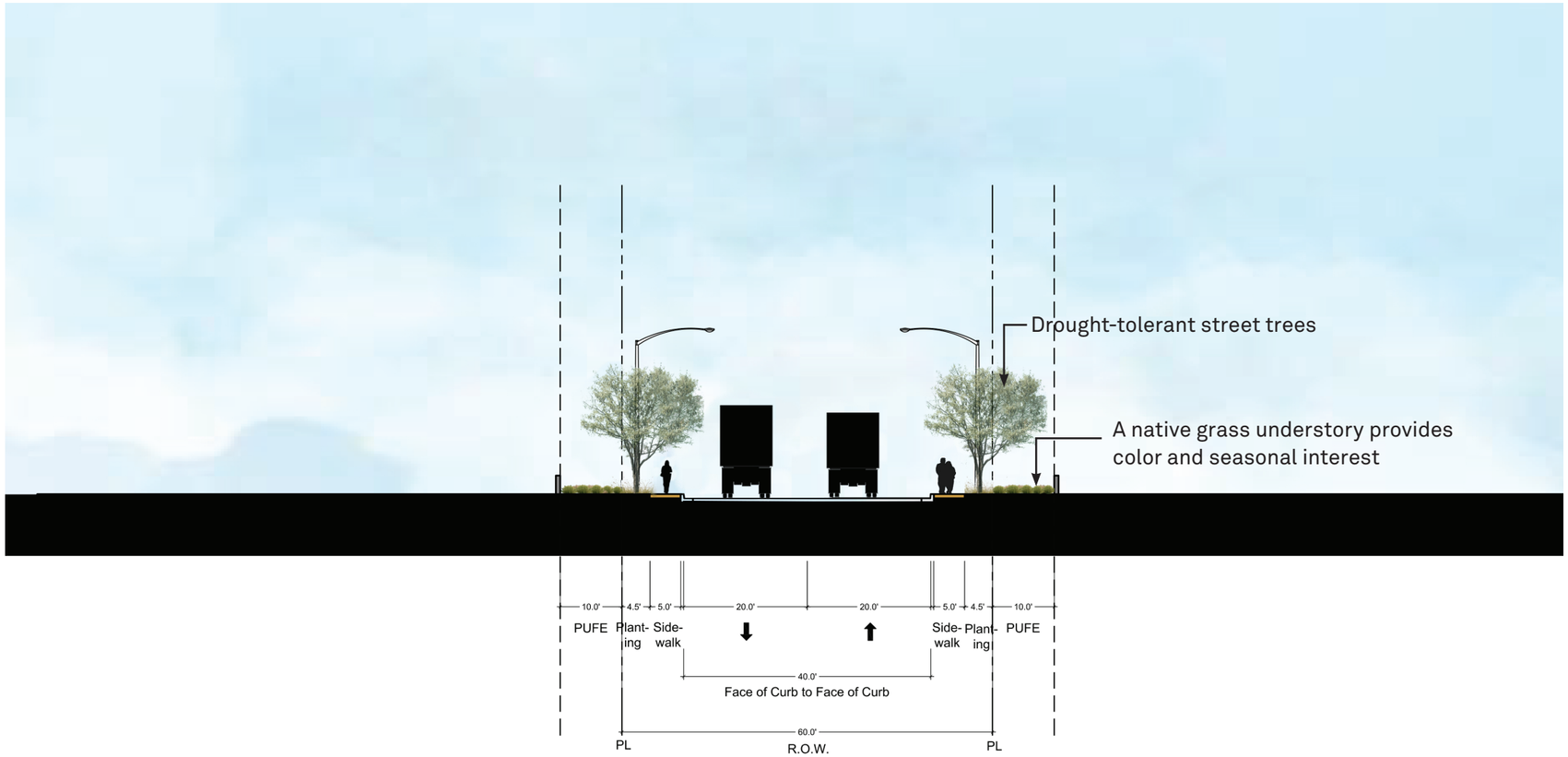


Figure 6.7: Typical 60 ft Local Street Section

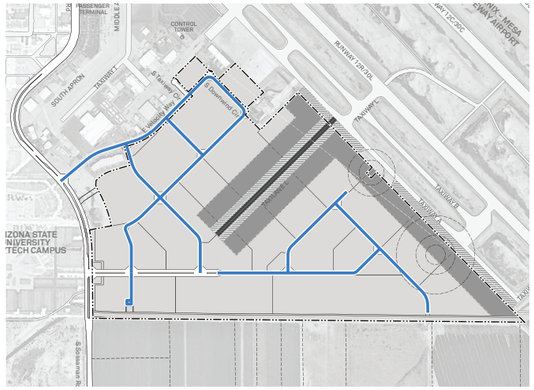


Figure 6.8: Local Street Key Map

6.3.5 Bike & Pedestrian Network

The landscape framework promotes walking and cycling by ensuring safe and continuous access to multi-use paths.

In areas where significant pedestrian traffic is anticipated (close to the hotel, retail, and office buildings) a shade canopy along the sidewalk and outdoor areas is proposed.

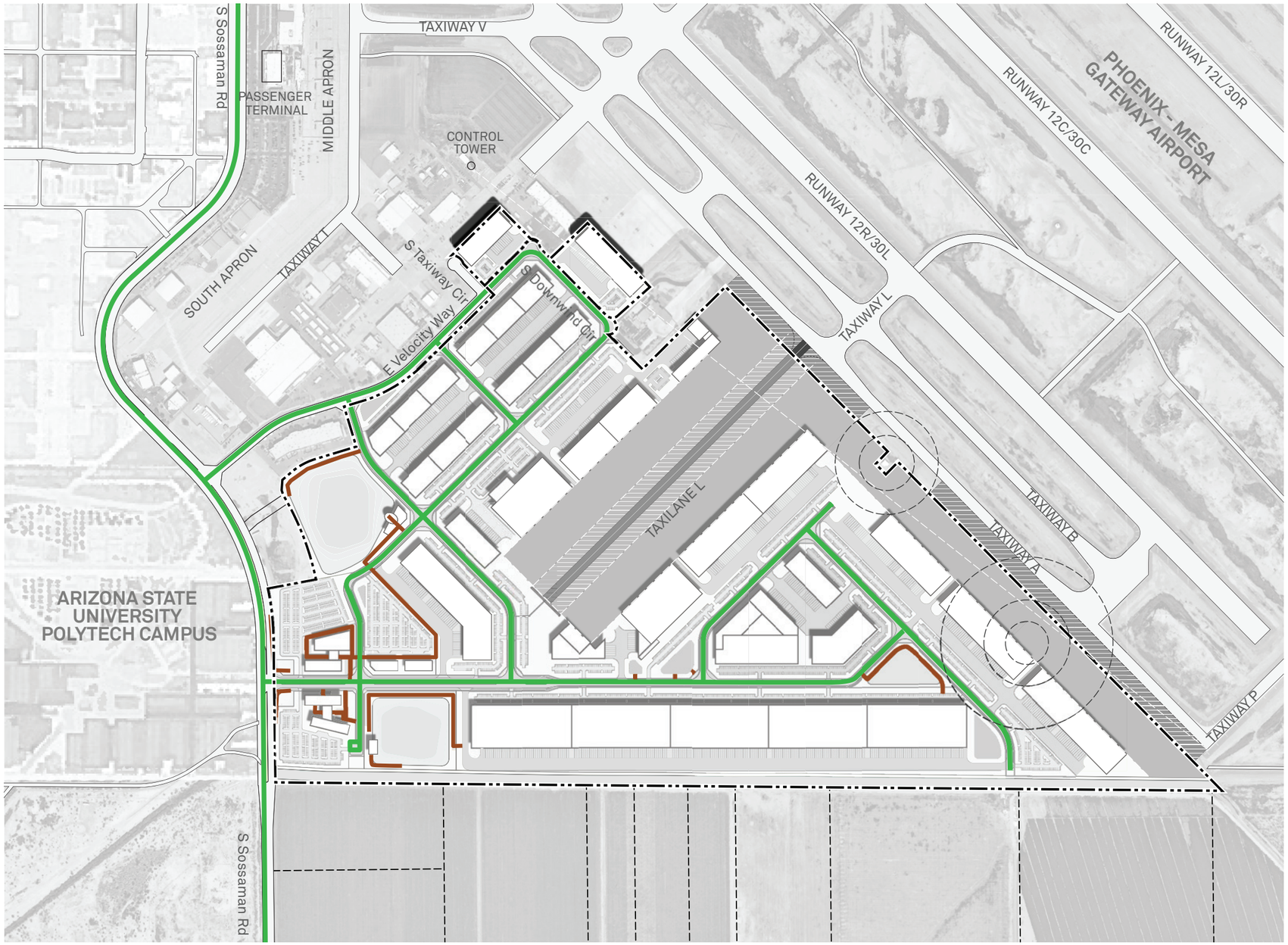


Figure 6.9: Bike & Pedestrian Network

6.4 OPEN SPACE STRATEGY

Differentiating open space areas with unique typologies helps to define the character of each area while also having an integrated landscape system that works together.

The SkyBridge Arizona landscape has been classified in to five major landscape types:

1. Arrival Landscape
2. Detention Basin
3. Buffer
4. Courtyard and Plaza
5. Linear Open Space

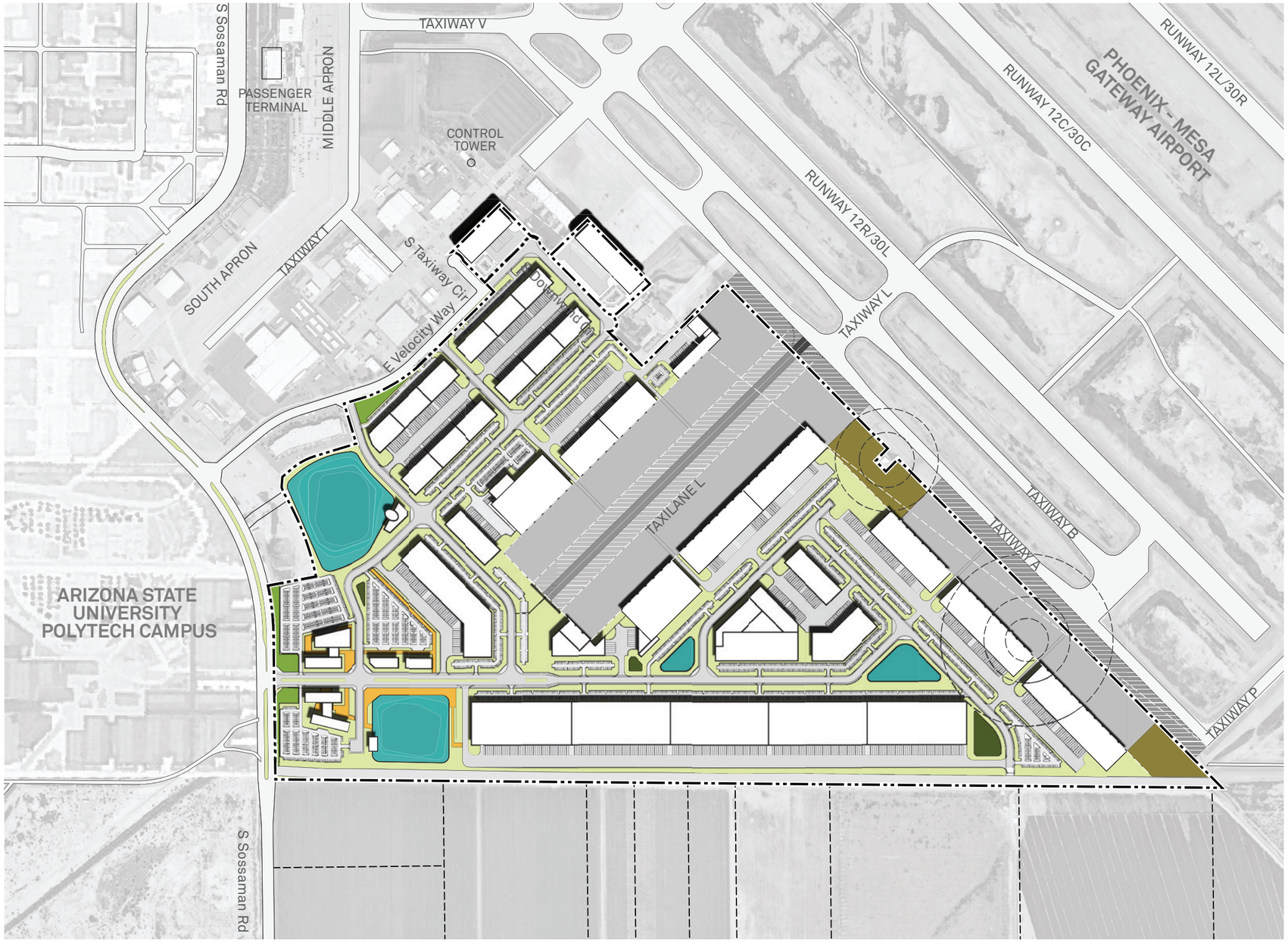


Figure 6.10: Landscape Typology Plan

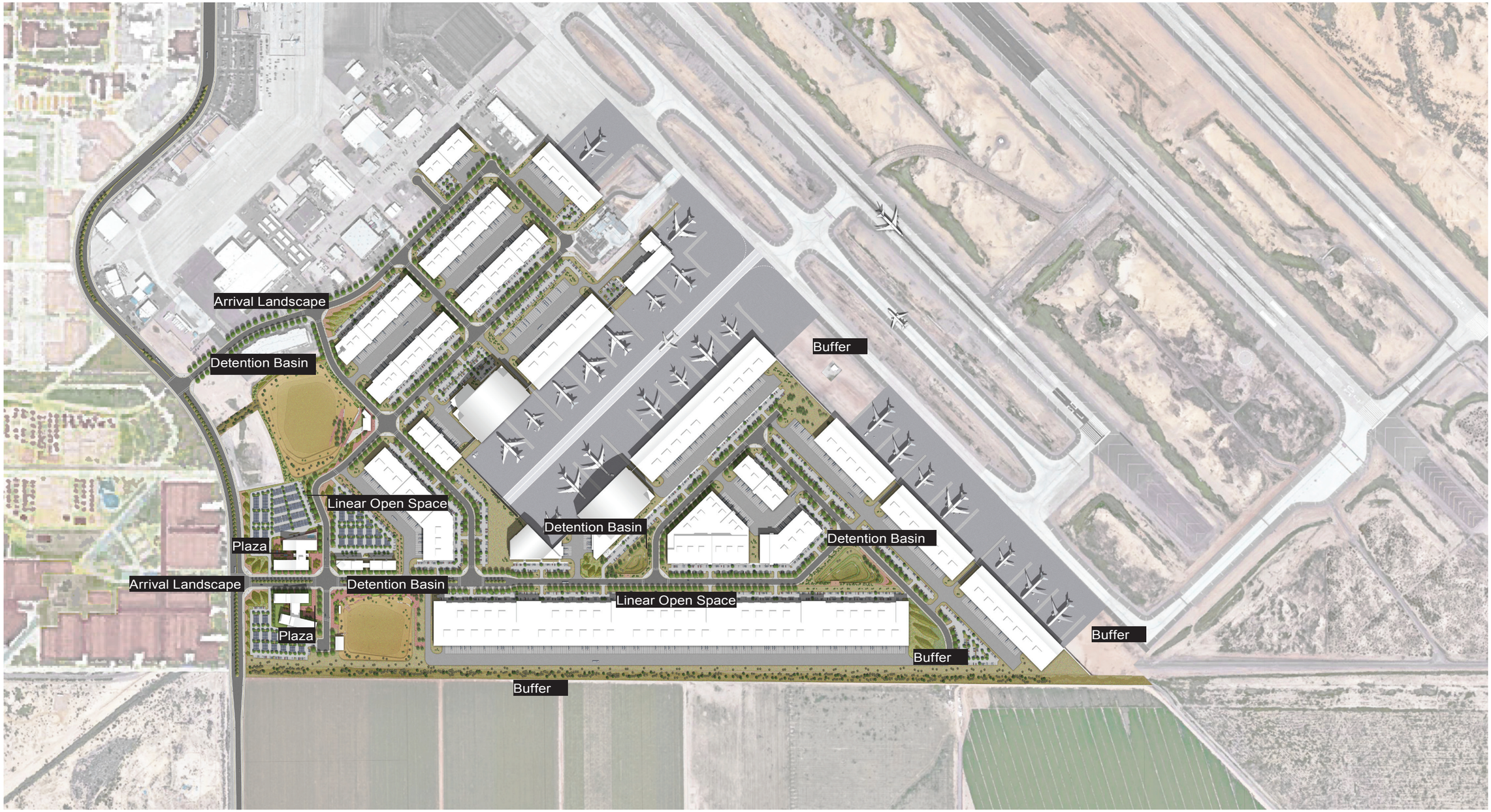


Figure 6.11: SkyBridge Arizona Illustrative Plan

6.4.1 Arrival Landscape

The arrival landscape typology will be an inviting landscape that celebrates the desert plant palette, while welcoming and orienting people to the site.

Having the mound shape landscape features perpendicular to the road helps to create an interesting rhythm for drivers passing by. These features will also be visible from the sky.



Character images for arrival landscape



Figure 6.12: Enlargement Plan of the First Arrival

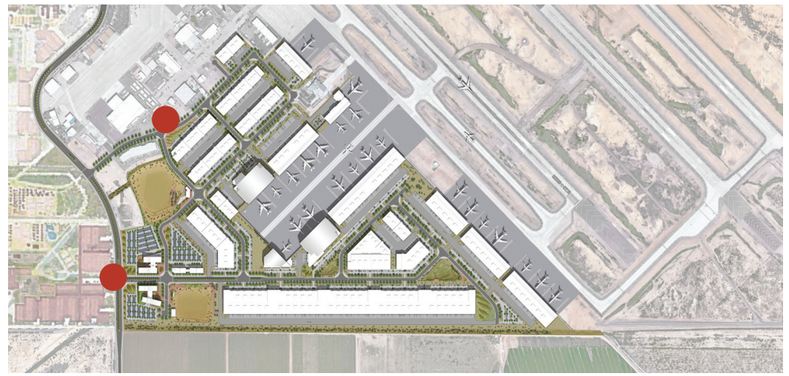


Figure 6.13: Key Plan of the Arrival Landscape



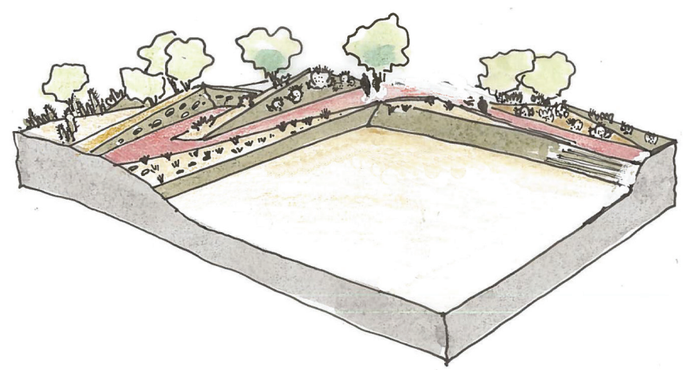
Figure 6.14: Enlargement Plan of the Secondary Arrival

Sculpted Mounds welcome people to the site while providing a buffer and framing the street

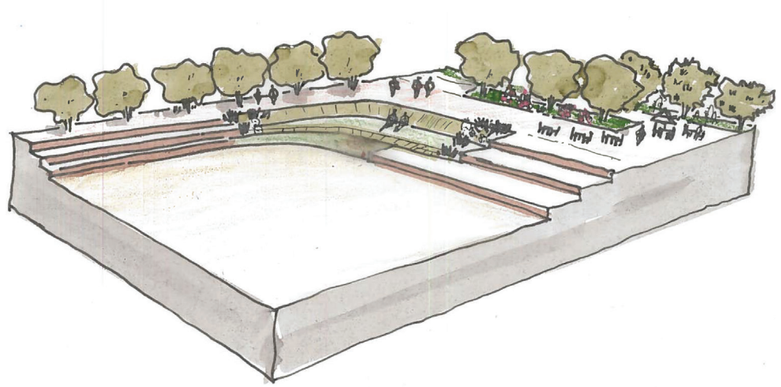
6.4.2 Basins

Detention basins are topographically depressed and at a lower elevation than the surrounding landscape. The depression creates sufficient area to meet the required stormwater capacity in a large rain event.

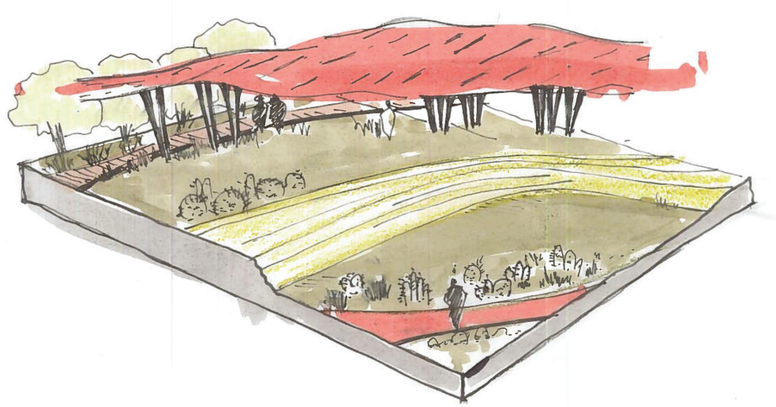
The programming and design of each basin is based on adjacent land uses and is tailored to meet the needs of those specific users. The diagrams below depict the character of each basin and how they serve as multi-functional open spaces.



Structured Basin with soft edge terracing



Structured Basin with hard edge terracing



Natural Basin

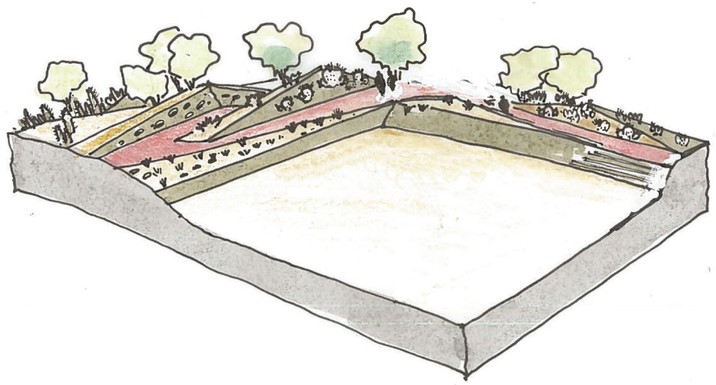
Figure 6.15: Detention Basins Character Sketches

North West Basin

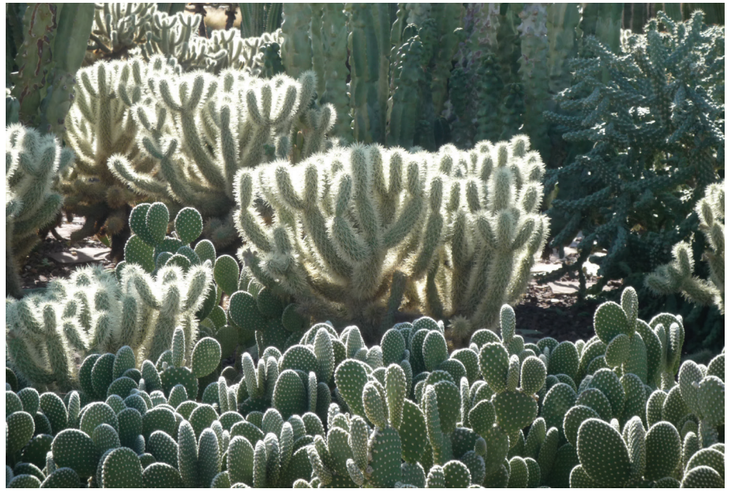
The North West Basin is a detention basin with a soft edge terracing strategy.

The team proposes a flexible basin that can be used as a multi-functional open space. This is a sustainable approach to programming the site.

Landforms along the path would provide a platform to plant drought-tolerant species while orienting people to the basin.









Landscape character images

North West Basin



Figure 6.16: Enlargement Plan of the Detention Basin

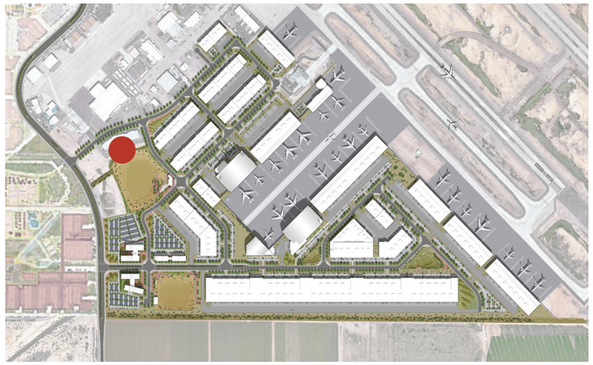


Figure 6.17: Key Plan of the Detention Basin



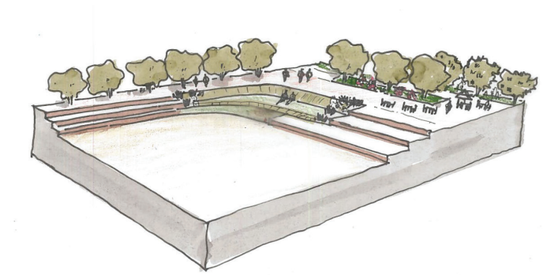
Landscape character image

South West Basin

Because the South West Basin is located near the site's active programming (retail and office buildings), this detention basin is also designed to have multi-function programming. Like the North West Basin, it is designed to serve for recreational use and stormwater management.

Integration of soft and hard edges along a the basin creates flexible seating and gathering areas along the edge.

Planting native shade trees and drought-tolerant ground covers adds volume and texture to the open space.









Detention basin character images

South West Basin



Figure 6.18: Enlargement Plan of the South West Basin

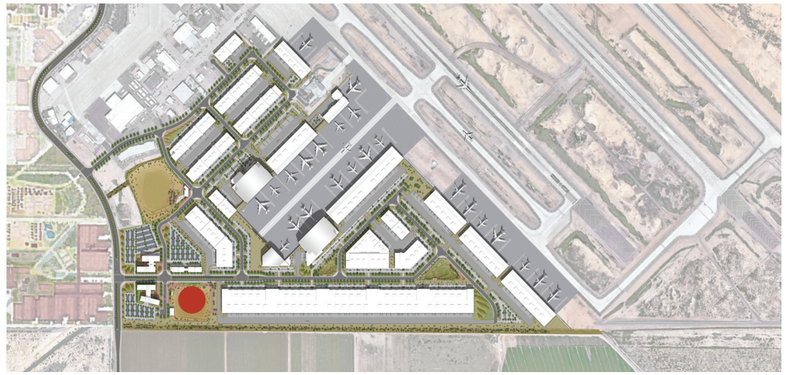


Figure 6.19: Key Plan of the South West Basin

Multi- Use path

Landscape Buffer

Sculptural mounds with the appropriate height and orientation provide noise buffering. The visual appearance of landforms also help reduce the perception of noise

Drought-tolerant shade trees

Land forms along the street act as a buffer

Different levels of terraces

Central Basins

The natural basins in the center of the site introduce different levels of native desert vegetation.

Providing access from the sidewalk to the basins establish a clear entrance to detention basins.

The installation of flexible, light canopies along pathways connecting to the sidewalk are proposed at each basin.

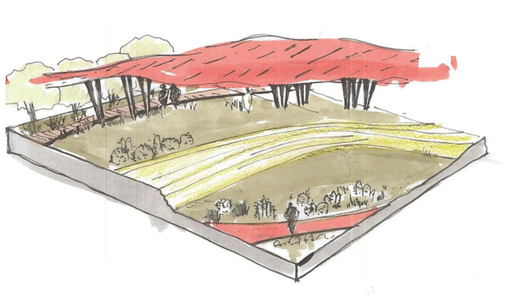




Figure 6.20: Enlargement Plan of the Central Basin

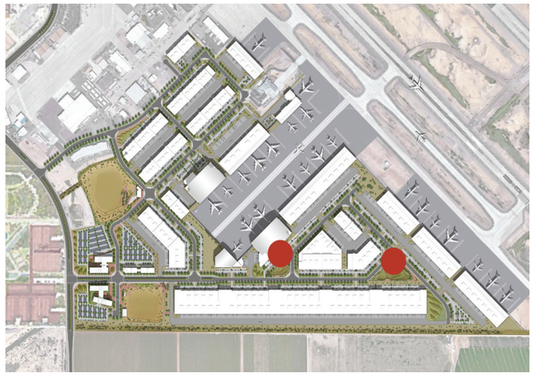


Figure 6.21: Key Plan of the Central Basin







Landscape character images

6.4.3 Courtyards & Plazas

Drought-tolerant native plants are woven together with hardscaped areas to create comfortable, cooler spaces. Shaded rest areas throughout heavily-used pedestrian zones encourages social interaction and increases human comfort.

Each individual building courtyard is designed to take advantage of the microclimates created by the buildings.

The continuous courtyards and gathering areas near the hotel, office buildings, and retail areas is proposed to have shade trees and light canopies. Providing a comfortable environment will encourage people to take advantage of open spaces.

The desert landscape material palette and native plant palette adds value and identity to the site.

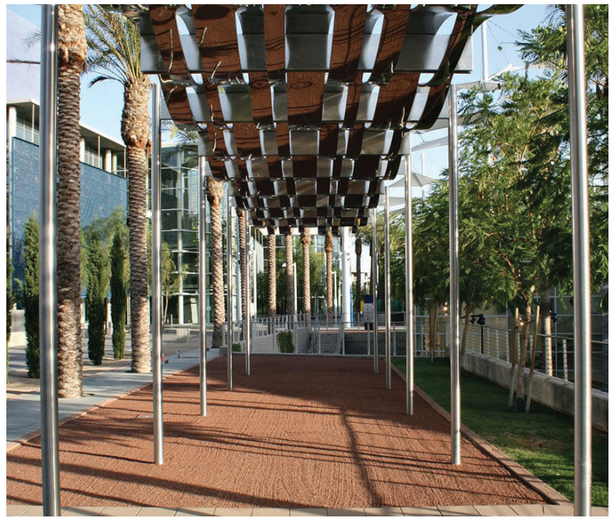
The courtyards also could be used for local event gatherings. Using water features and a seasonal, colorful plant palette creates an interesting and intimate place.





Plaza character images





Drop off area with iconic planting in the median

Shade trees in courtyard

A water feature in the hotel courtyard creates a cool micro-climate in this open space

Cluster of shade trees create an intimate gathering area

Gathering area for office buildings with shade canopy

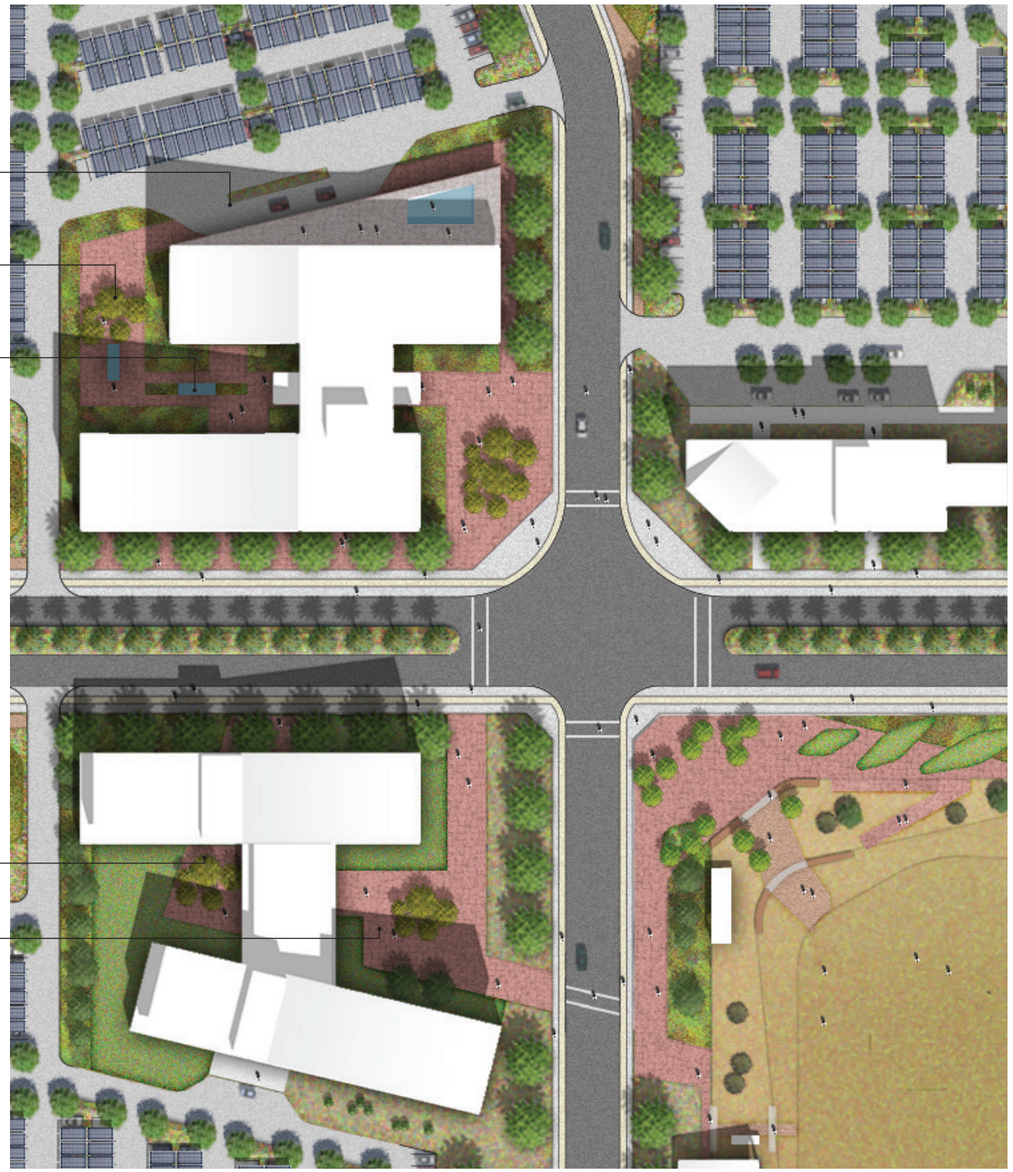


Figure 6.22: Enlargement Plan of the Plaza



Figure 6.23: Key Plan of the Plaza

Seasonal Native Tree

Water feature

Central planting area to divide the space and provide shade

Shaded gathering area

6.4.4 Buffer

An open space system along the site boundary acts as a buffer for SkyBridge Arizona.

The buffer is designed to provide security and a continuous open space.

The buffer on the north side of the site is a large open space covered with stabilized earth ground cover.

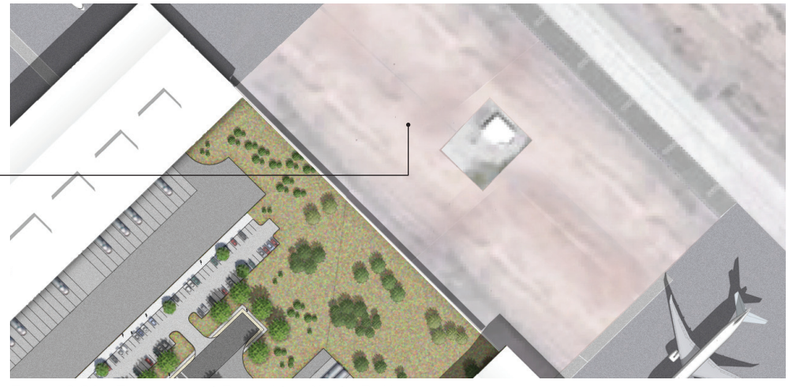


Figure 6.24: Enlargement Plan of the North Buffer

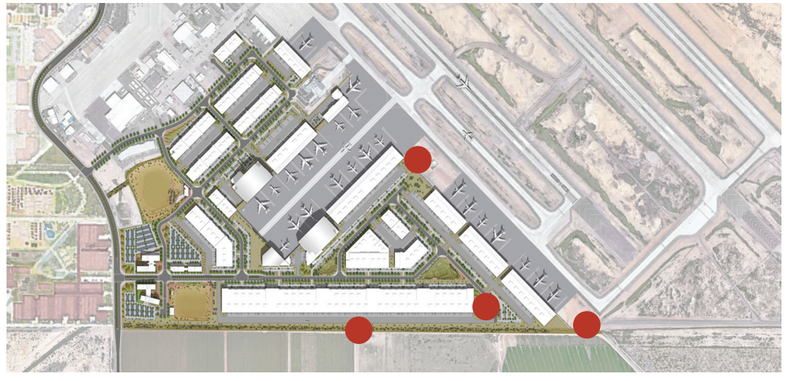
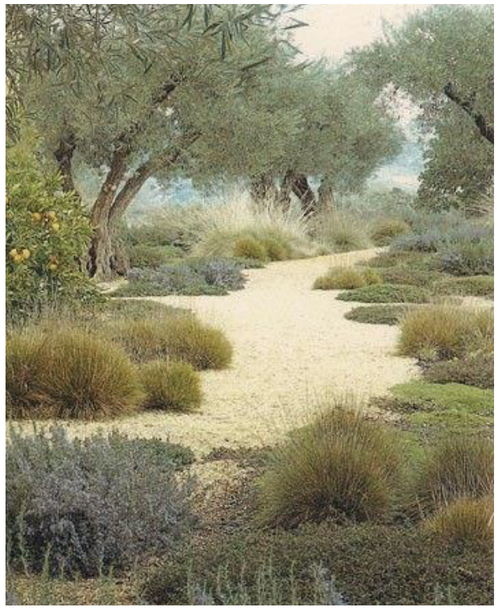


Figure 6.25: Key Plan of the Buffer







Desert plant palette character images

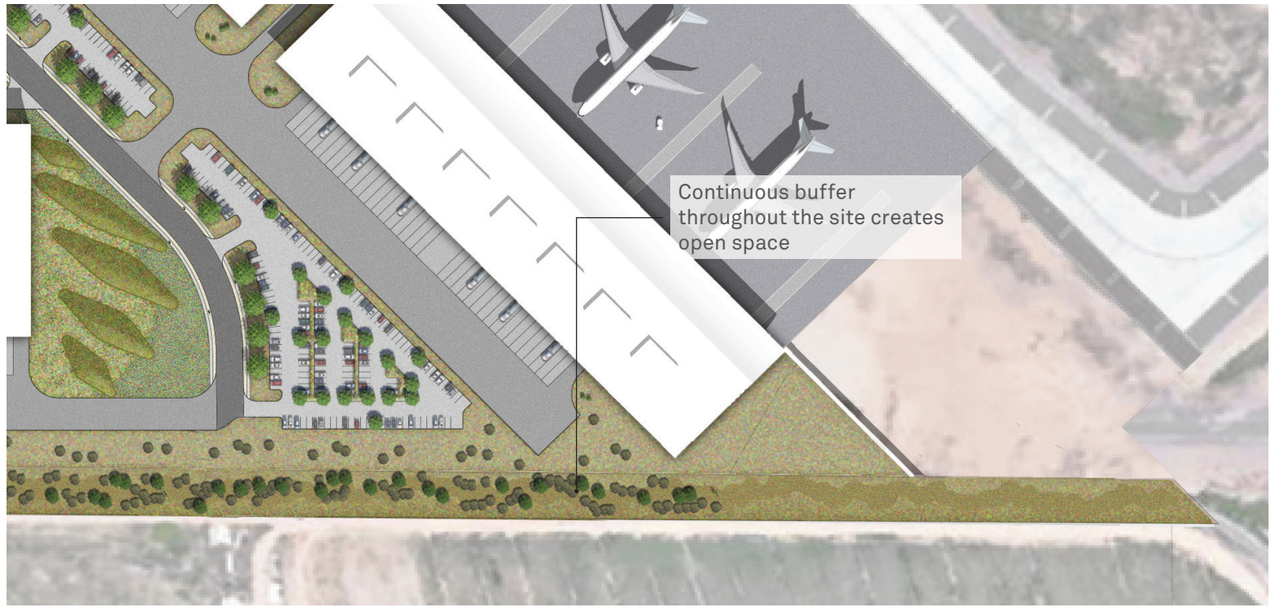


Figure 6.26: Enlargement Plan of the South Buffer

6.4.5 Linear Open Space

All industrial parcels are required to have a linear landscape buffer along streets designated as local roads and boulevards. These linear open spaces will accommodate low-maintenance vegetation.

The landscape median between parking areas will be designed as bioswales. Planning regulations require that landscaped planting islands be placed between every interval of 20 parking spaces.



Figure 6.27: Enlargement Plan of the Linear Open Space



Figure 6.28: Key Plan of the Linear Open Space





Landscape median between parking

Shade trees along the street

Iconic succulents and cacti of Arizona's deserts

6.5 PUBLIC REALM GUIDELINES

The public realm design guidelines provide guidance for open space design throughout this master plan document. The concepts described in this document balance principles of efficiency, low-maintenance, sustainability, and the creation of inviting open spaces.

This section includes the following topics:

6.5.1. Management and Maintenance Guidelines

Describes the operations, management and low-maintenance strategies that are intended to maximize efficiency and minimize costs.

6.5.2. Materials Palette

Illustrates material selections that align with the contextual character of the site and region.

6.5.3. Shade Strategy Guidelines

Explains the use of shade trees and canopies to protect users from extreme heat and sun.

6.5.4. Lighting Strategy Guidelines

Provides design guidance on spaces that can be both welcoming gathering spaces and promote safety.

6.5.5. Acoustic Barriers Guidelines

Explains the design and function of landforms that help serve as acoustic barriers.

6.5.6. Stormwater Management Guidelines

Provides an explanation of the important function of how detention basins meet stormwater and recreation/open space needs.

6.5.7. Planting Palette

Illustrates a native planting palette that is drought-tolerant which could provide shade and year-around landscape interest.



Figure 6.29: SkyBridge Arizona Illustrative Master Plan

How To Use These Guidelines

The designers who use this document are strongly encouraged to follow these guidelines to with the goal of creating comprehensive site-specific designs that relate to the overall Master Plan vision.

Designers should follow these steps to inform their detailed designs for each area of the project's public realm

- Review the Site Analysis section to understand the site's characteristics and context, which inspire the design of the green spaces and the selected palettes.
- Review the Landscape Design Approach. These concepts reflect the intent of the Master Planning team for the project.
- Refer to the Open Space Strategy to understand the site's specific design concepts and recommendations.

Goals & Objectives

Build an Identify for SkyBridge Arizona

- Develop distinct design characteristics for different open space typologies
- Open spaces adjacent to public uses (such as retail and hotel use) shall be welcoming and accessible and incorporate seating, shade and rest areas.

Create an Integrated Sustainable Landscape System

- Provide noise reduction elements, such as Acoustic Barriers (landforms), to mitigate noise pollution.
- Design large, multi-functional open spaces to serve as flood mitigation areas in storm events.
- Encourage low water use by selecting native planting that is drought-tolerant and adapted to the local climate.
- Use previous materials where appropriate to allow stormwater to infiltrate.

Provide a Hierarchy of Open Space and Circulation Patterns

- Encourage walking, biking and recreation activities within the site by creating a clear hierarchy of spaces and circulation.
- Incorporate open space in every area of the development, designed to respond to the specific adjacent land use.

Provide Safe and Secure Open Spaces and Streets Through Thoughtful Design and Programming

- Design open spaces and streetscapes to have high visibility from surrounding building parcels.
- Discourage use of planting which will block views. Encourage use of understory and canopy planting.
- Program a range of activities into key open spaces to encourage use through the day and night.
- Provide appropriate lighting to increase visibility in plazas, gardens and walking paths.

Propose a Low-Maintenance Landscape Design

- Select materials and planting that requires low-maintenance, particularly in the industrial, less public areas.
- Buffer, barrier and screened zones will use native planting, be low-maintenance and serve their specific function.



Landscape Character

6.5.1 Management & Maintenance of Green Areas

Low-Maintenance Requirements

The plant species in this category will require minimal care (lawn mowing, fertilization, soil changes). This will be achieved by selecting planting that does not need frequent care and designing the spaces to look “natural” and not formal or manicured.

Native Planting Palette

The types of plants and trees selected should be native, or at least well adapted to the local climate. The result is a plant palette that is resilient to withstand the local conditions. Also, plants should be grouped by similar water needs, in irrigation zones that share the same water quantity and frequency requirements.

High Use Areas Vs. Low Use Areas

All open spaces are designed to be low-maintenance. It is important to point out however that high-use areas, such as plazas or gardens at key arrival points, retail and hotels, will require more attention and maintenance compared to open space in buffer and industrial zones.



6.5.2 Material Palette

The thoughtful selection of appropriate materials is key to promoting sustainability, durability and the character of the project.

Hardscaped areas near project entrances, retail and the hotel should be distinct to enhance a commercial and hospitality character.

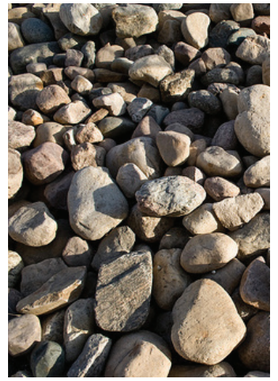
All selected materials should perform well under the site's local conditions of extreme high heat and match the surrounding desert aesthetic.

In specific zones where stormwater runoff is required to infiltrate, permeable paving materials have been selected.


Compacted Gravel


Decomposed Granite


Pebbles + Boulders




Precast Paving Units


Permeable Paving - Precast Units/ Open Joints


Cast in Place Concrete


Sandblasted Concrete


Clay Brick Pavers


Gravel (local)

Materials palette

6.5.3 Shade Strategy Guideline

Thoughtfully selected native tree species with appropriate canopy sizes are to provide shade in plazas, gardens and streetscapes. Shade trees should be carefully placed near seating areas, gathering areas and zones where users will linger for longer periods of time.

Lightweight shade structures work with the shade tree strategy to provide additional respite from the regional extreme climate. The orientation and placement of the shade structures shall respond to protection during hottest times of day, such as the middle of the day and early afternoon.

Building configurations in the hotel and retail areas have been designed to create shaded courtyard areas. Generally, the sidewalks and plaza areas adjacent to the buildings benefit from shade during varying times of day.

















Shade elements

6.5.4 Lighting Guidelines

Areas near the retail, hotel and building entrances shall have lighting design that increases visibility during nighttime to encourage use of the open space at all times.

All areas of the project shall have sufficient lighting to encourage safely lit spaces and high visibility.

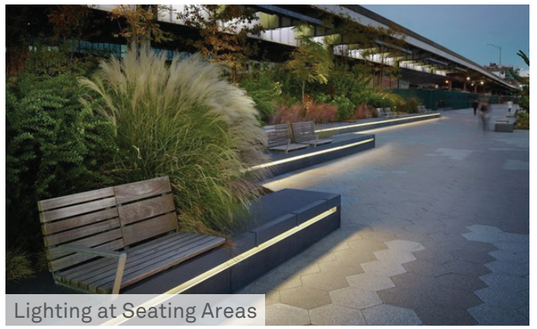
All areas shall have a lighting design that carefully considers the requirements of the project's aerospace activities so as not to distract or challenge the safety of arriving and departing flights.



Recessed Wall Lighting & Retail Lighting



Plaza Lighting



Lighting at Seating Areas



Tree Uplighting



Courtyard Lighting



Mast Lights

Lighting

6.5.5 Acoustic Barriers Guidelines

Thoughtfully designed landforms serve as acoustic barriers near major transportation corridors, with the goal of reducing vehicular noise levels while also providing a public amenity.

Landforms designed with the appropriate height and wind orientation provide noise buffering.

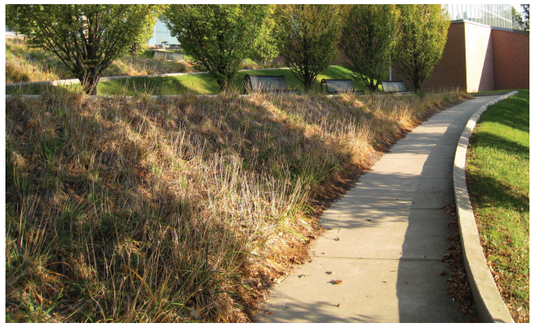
Introducing the acoustic barrier landforms also benefits construction costs for the project. The excavated material as a result of the construction of the detention areas will be used as the fill material for the landforms. This results in a cut-fill balance and a savings in off-haul costs.











Acoustic barrier character images

6.5.6 Stormwater Management Guidelines

The detention basins serve a double function as flood mitigation and stormwater detention areas. They are topographically depressed to be a lower elevation that the surrounding landscape, meeting the required stormwater capacity in a large rain event.

Site grading shall be designed to encourage passive water movement into the detention basins and other planted areas. The use of previous material contributes to the infiltration of stormwater and runoff.









Stormwater management

6.5.7 Planting Palette

Shade trees follow paths and provide seasonal interest and a more intimate pedestrian scale.

Nodes and gateways are emphasized by grouping distinctive flowering trees.

Blue Palo Verde

Cercidium floridum



Sweet Acacia

Acacia smallii



Willow Acacia

Acacia Salicina



Fruitless Olive

Olea europaea



Sonoran Palo Verde

Cercidium Praecox



Chilean Mesquite

Prosopis Chilensis



Desert Ironwood

Olneya tesota



Mexican Grass Tree

Dasylirion longissimum



Planting palette - trees

Desert Hackberry

Celtis pallida



Cardon Grande

Trichocereus terscheckii



Deer Grass

Muhlenbergia rigens



Hairy Awn Muhly

Muhlenbergia Capillaris



Senita

Lophocereus schottii



Argentine Giant Cactus

Echinopsis candicans



Blue Yucca

Yucca rigida



Green Cloud Sage

Leucophyllum frutescens 'Green Cloud'



Planting Palette - Shrubs

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7

SUSTAINABLE INFRASTRUCTURE CONCEPTS

7.1 CONCEPTUAL DRAINAGE PLAN

7.1.1 Introduction & Purpose

SkyBridge Arizona is located at the southeast corner of Sossaman Road and Velocity Way, within the Phoenix Mesa Gateway Airport Authority (PMGAA) limits in the City of Mesa, Arizona. More specifically, SkyBridge Arizona is bound by agriculture fields to the south, existing taxiways to the east, the PMGAA existing facilities to the north, and Sossaman Road on the west. The Vicinity Map illustrates the location of the site.

The intent of the following sections is to provide an overview of the proposed drainage system and management strategy for SkyBridge Arizona. Although this system/management strategy is consistent with what is currently in place at the site, there are elements that deviate from the City's typical design standards. Based on submittals to the City, there is support for the concept. We anticipate a subsequent submittal with additional detailed information. The following sections provide an overview of the existing drainage patterns and infrastructure and the proposed drainage system.

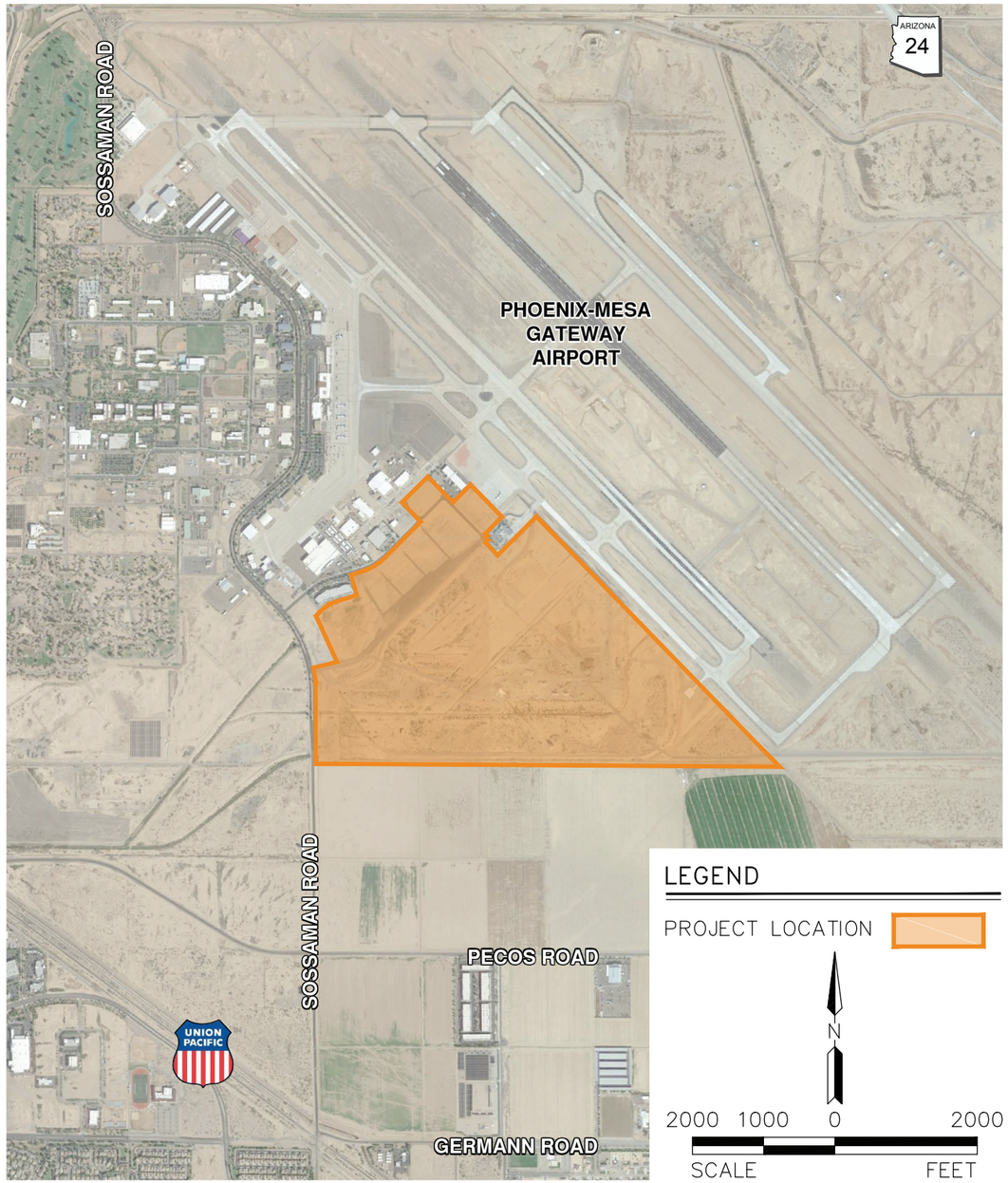


Figure 7.1: Vicinity Map

7.1.2 FEMA Floodplain

The site is currently located within Flood Hazard Zone X as shown on the FEMA Flood Insurance Rate Map (FIRM) 04013C2770L dated October 16, 2013. Flood Hazard Zone X is defined as “areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.” The FEMA Flood Map has been included.

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2770L

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 2770 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2770	L
GILBERT, TOWN OF	040044	2770	L
MESA, CITY OF	040048	2770	L
QUEEN CREEK, TOWN OF	040132	2770	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 04013C2770L

MAP REVISED OCTOBER 16, 2013

Federal Emergency Management Agency

LEGEND

PROJECT LOCATION

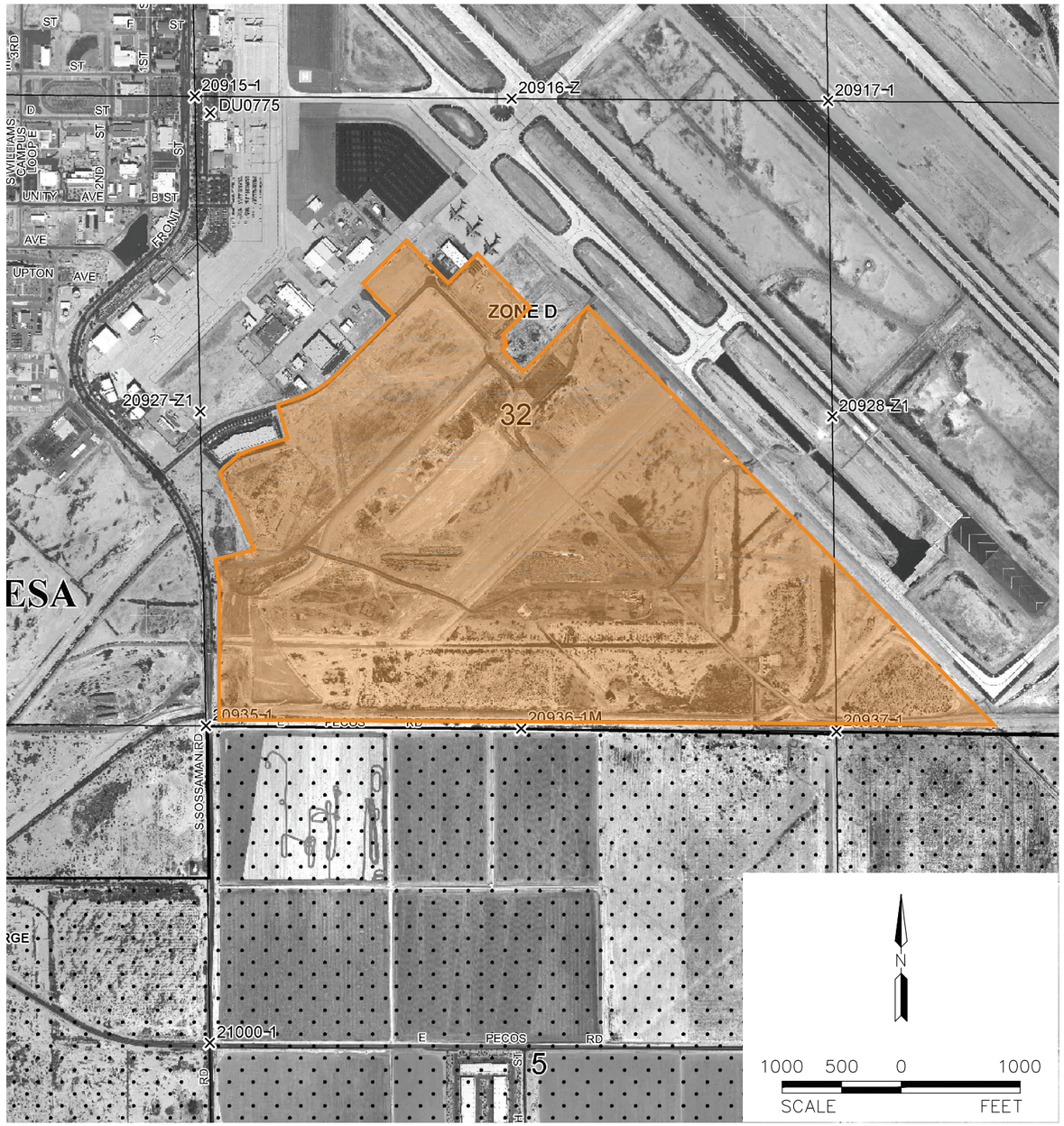


Figure 7.2: FEMA Flood Map

7.1.3 Previous Drainage Studies

A number of drainage studies have previously been completed for the project area. Gilbertson Associates prepared the Williams Gateway Airport Hydrology Study and Drainage Master Plan (Gilbertson Report), dated October 2001. As part of the Gilbertson Report, an existing conditions HEC-1 model was prepared to quantify the flows produced by the Airport. The results were then utilized as the basis for the stormwater management plan that was implemented for the northwest portion of the Airport that was developed at that time.

Dibble Engineering prepared the Phoenix – Mesa Gateway Airport – Taxilane Lima Drainage Evaluation – Final Drainage Report (Dibble Report), dated June 2008. Dibble Engineering also prepared the Phoenix – Mesa Gateway Airport – Detention Basin West – Drainage Evaluation – Drainage Report, dated December 2010. These reports analyzed the southern half of the Airport, including SkyBridge Arizona, for future industrial use. As part of the analysis, the existing conditions HEC-1 model that was prepared for the Gilbertson Report was updated. Updates in the HEC-1 modeling included revising the hydrologic parameters to reflect industrial landuse (approximately 90% impervious) instead of the previously utilized undeveloped desert. Ultimately, this report provided an interim drainage plan for the project area and forms the framework for the drainage system proposed for SkyBridge Arizona.

7.1.4 Existing Drainage Conditions

The region surrounding SkyBridge Arizona generally slopes downwards to the west. Under existing conditions, the runoff impacting the site originates west of the Ellsworth Channel within the Airport limits. Runoff from this area, which has all been graded but remains only partially developed, flows westward and combines with a portion of the runoff produced by the Airport runway and taxiway surfaces. The combined runoff continues west, via sheet flow, until reaching the eastern boundary of SkyBridge Arizona. The runoff then combines with the runoff produced by SkyBridge Arizona and continues westward via sheet flow and through the various stormdrain/swales within the project area. Most of this runoff is directed toward an existing detention basin located near the southwestern corner of the site, herein referred to as Detention Basin South. The remaining runoff, along with that produced by a portion of the Airport located just north of the site, is directed to another existing detention basin located near the northwestern corner of the site, Detention Basin West. Note that the portion of the Airport that contributes to Detention Basin West does so via an existing stormdrain system. Both existing detention basins drain to existing culverts constructed under Sossaman Road. Flows passing through the culverts continue onwards into an existing channel system located west of Sossaman Road that eventually discharges to the Rittenhouse Channel. Review of historical aerial photography indicates that these channels have been in place and receiving runoff from the Airport and project area since the 1940s.

The Gilbertson Report indicated that the two aforementioned channels located west of Sossaman Road (to which the Project's detention basins currently drain) have a capacity of 350 cfs for the northern most channel and 326 cfs for the southern channel. As Dibble Engineering designed the interim configurations of Detention Basin West and Detention Basin South, they targeted the maximum detained discharges to the Sossaman Road culverts accordingly. Each of the detention basins was designed to work independently in the interim condition. The existing drainage patterns for the project area are illustrated on the Existing Conditions Exhibit.

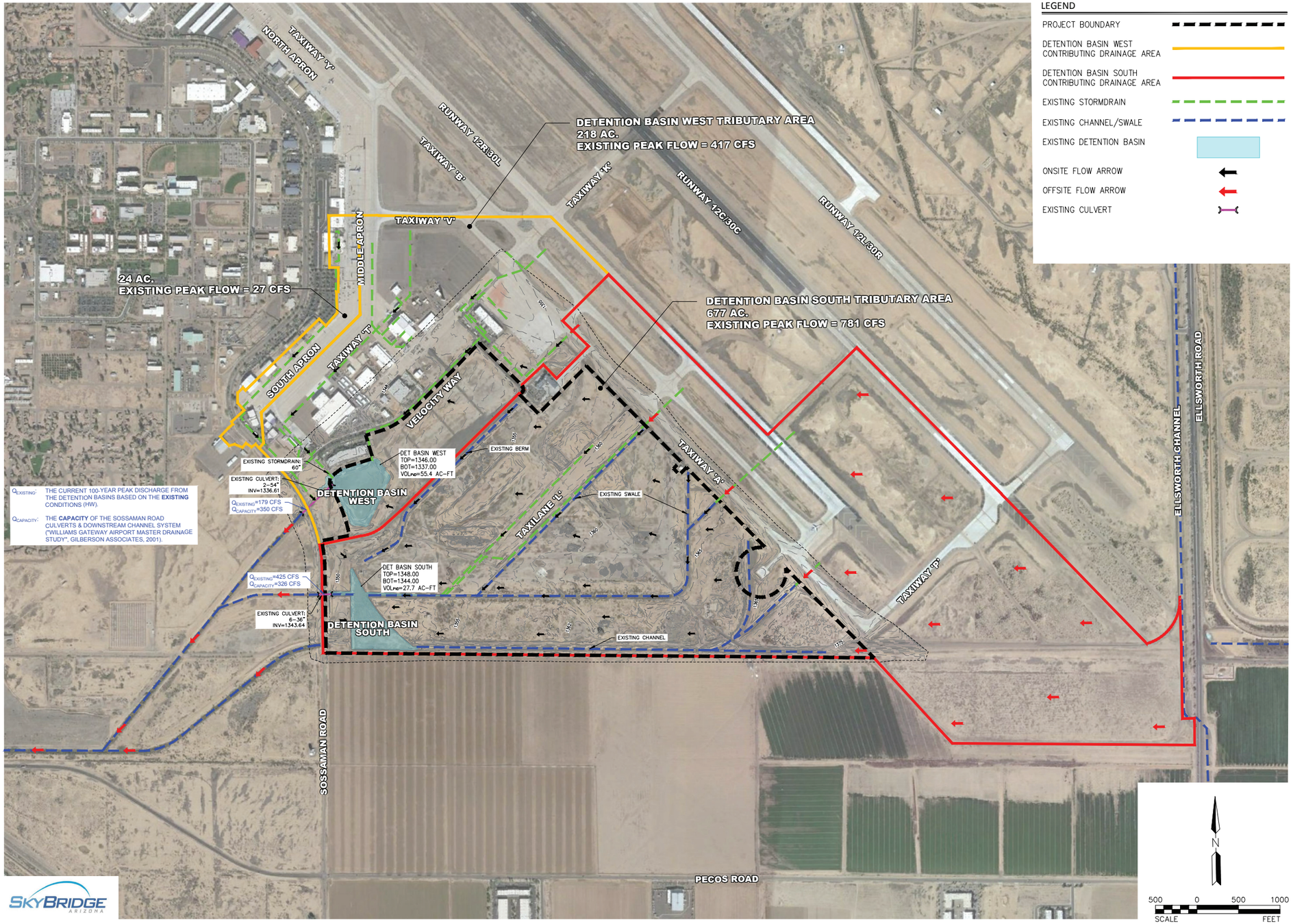


Figure 7.3: Existing Conditions Exhibit

7.1.5 Proposed Drainage System

SkyBridge Arizona will be developed in accordance with the City of Mesa and the Federal Aviation Administration (FAA) drainage design standards. The proposed drainage plan will allow the existing drainage patterns to be maintained. SkyBridge Arizona is expected to be constructed in various phases and the requisite drainage infrastructure will also be phased in a similar way. The phasing plan is further discussed below.

The runoff produced between the Ellsworth Channel and the eastern boundary of the site will continue to reach the eastern boundary via surface flow. Once reaching the eastern boundary of the site, this runoff will be captured by a proposed channel along the southern boundary. The channel will direct this runoff to Detention Basin South.

The onsite rainfall runoff from the Project will be routed to the two detention basins via a network of conveyance infrastructure (combination of channels, swales, and underground stormdrain). The main conveyance infrastructure will be constructed in phases similar to the phasing of the overall project. As development continues, each building will then tie-in to the adjacent main drainage infrastructure. In general, roof drains will be connected directly to the main conveyance drainage infrastructure, and runoff produced by the paved areas (parking lots, taxiways, etc.) will be directed to concentration points where inlets will be installed to remove the surface runoff. Note that temporary swales may be utilized to convey runoff generated by upstream phases. These swales will convey the runoff directly to the corresponding detention basin or may tie-in to the conveyance infrastructure that has already been constructed in earlier phases. The development phasing plan and the drainage infrastructure phasing plan are illustrated on the Conceptual Drainage Plan Exhibit.

Note that the proposed channels/swales will be within assigned drainage corridors that are away from the proposed taxiways. These corridors will vary in width, ranging from 30-70 feet. The channels/swales have been preliminarily designed as earthen with 4:1 side slopes which can be lined with turf. As the design process continues, the earthen channels may be modified to concrete or other lining, as needed.

Based on the Dibble Report, the existing stormdrain has been sized for ultimate conditions. As the design process continues, this stormdrain will be further analyzed in order to verify that it has adequate capacity for the contributing flows. The intent is to continue to use this existing stormdrain and limit modifications.

A detention system, similar to the existing system, will be used to manage the runoff produced by SkyBridge Arizona and the area to the east. The two existing detention basins (Detention Basin West and Detention Basin South) will be modified/reconfigured to accommodate for the site layout and the expected runoff. Similar to the existing conditions, the detention basins will be sized to not exceed the allowable peak discharges into the adjacent channels, established in the Gilbertson Report. To make the drainage system more efficient (primarily to utilize the excess capacity in Detention Basin West and reduce the peak discharge from Detention Basin South to an acceptable level), HILGARTWILSON will connect the two detention basins. The two detention basins will be connected by a high capacity stormdrain system which has been preliminarily sized as 3-48” pipes.

Under proposed conditions, the runoff discharged into Detention Basin South would be directed and dewatered through Detention Basin West during regular storm events. Routing through both basins will provide additional storage time thereby further attenuating flows. During major storm events, a portion of the runoff discharged into Detention Basin South would continue to be directed to Detention Basin West. However, due to the limited capacity of the proposed stormdrain connection between the two basins, Detention Basin South would fill up at a faster rate than it can direct runoff to Detention Basin West. Once the water surface elevation (WSE) within Detention Basin South reaches an elevation of 1,344, the additional runoff would be directed toward the 6-36” pipes that are currently under Sossaman Road. Collectively, the two detentions basins will provide a volume of approximately 111 ac-ft. Based on the results of the preliminary proposed conditions HEC-1 model, the peak flow discharged into the northern channel will be approximately 288 cfs and the peak flow discharged into the southern channel will be approximately 325 cfs. These flow rates are lower than the 350 cfs and 326 cfs capacities established for each outfall, respectively, in the Gilbertson Report. The proposed detention system would dewater from full in less than 36-hours.

The Conceptual Drainage Plan Exhibit illustrates the proposed conditions for SkyBridge Arizona. Note that the drainage system that is illustrated is conceptual at this time. When the site layout is solidified, a master drainage report will be prepared to outline the overall drainage plan for SkyBridge Arizona in more detail. As the project transitions to final design for each phase, a final drainage report will be prepared to refine the parameters established in the master drainage report and to provide final drainage design for the corresponding phase. Not only will the final drainage report, corresponding to each phase, include the ultimate conditions design but it will also include a drainage plan for interim conditions as phases are developed.

7.1.6 Conclusions

SkyBridge Arizona represents an exciting opportunity for PMGAA and the surrounding area. The drainage management system proposed to manage stormwater runoff from the site and other upstream, tributary portions of the Airport property has been preliminarily designed to conform to the existing drainage framework established for the area. The primary elements of the proposed drainage system, much like the existing drainage system, will be a network of collector and conveyance facilities (stormdrains, swales and channels) that route runoff to shared/common detention basins. Outfall locations and peak discharges will be maintained. As such, no adverse impacts to downstream properties or drainage facilities are expected to result from SkyBridge Arizona’s development. As previously mentioned, HILGARTWILSON has presented the proposed drainage system and management strategy to the City and the City has responded with support for the concept.

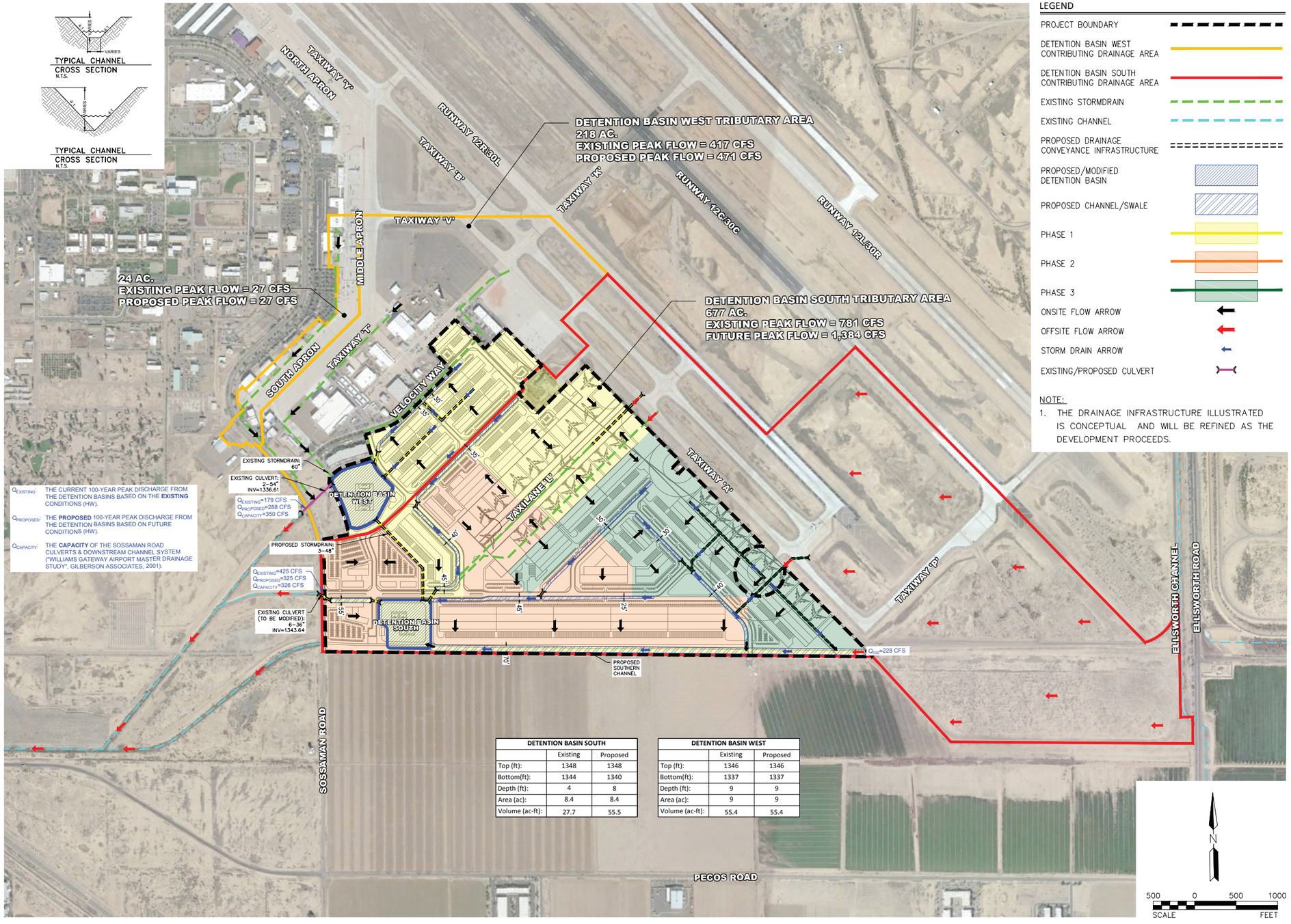


Figure 7.4: Conceptual Drainage Plan Exhibit

7.2 CONCEPTUAL WATER AND WASTEWATER PLAN

7.2.1 Development

SkyBridge Arizona (Project) is anticipated to be developed for industrial, warehousing, research and development, retail, offices, hotels, and open space uses, which will incorporate both aeronautical and non-aeronautical uses. With the exception of the hotel uses, the majority of the developed space is anticipated to be used as warehousing and will not require or generate significant water demand or wastewater flows. For the purposes of establishing water demands and wastewater flows, 5% of the floor area is used to calculate demands and flows. The proposed hotel is assumed to have a total of 150 rooms. The following is a summary of the proposed uses.

Industrial/ Warehouse (SF)	Retail/Commercial (SF)	Hotel (rooms)
3,555,280	20,000	150

Table 7.1: Development Summary Table

7.2.2 Water Service

Overview & Existing Infrastructure

SkyBridge Arizona will be served by the City of Mesa (City) for both domestic and fire protection services. The existing airport fire protection system may be used to provide fire protection needs that exceed the City's capacity. The City currently has an extensive water distribution network within the Project vicinity including a 16-inch water main in Sossaman Road and a 12-inch water main in Velocity Way and Downwind Circle. In addition to these facilities, various domestic water mains exist ranging from 6-inch to 12-inch mains within the airport vicinity and to the north.

The supplemental airport fire protection system consists of two storage tanks providing a total of 961,000 gallons (MG) of storage. A pump station designed for a total of six pumps is constructed with three operating pumps installed. Piping includes a primary 24-inch distribution main running across Sossaman Road and south, then east into the Mesa-Gateway airport along the southeast side of the taxiway. An 18-inch fire main runs northeast from the fire protection system site for approximately 750 feet along the frontage of the south side of Sossaman Road. This system offers fire protection for the large buildings that are anticipated to be developed as part of the project. The system is owned and operated by Phoenix Mesa Gateway Airport Authority (PMGAA).

Figure 7.5 illustrates the existing water infrastructure in the Project vicinity.

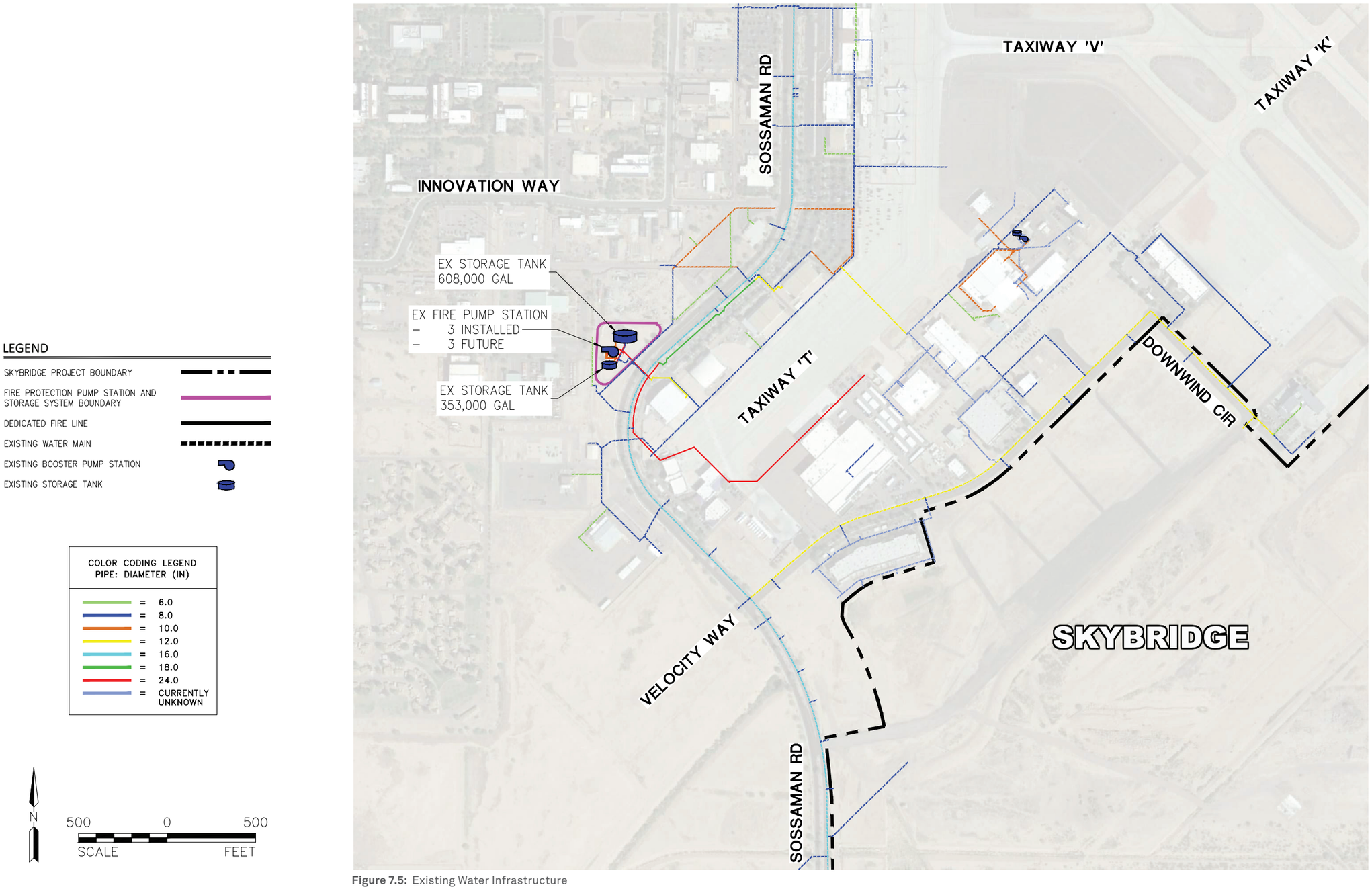


Figure 7.5: Existing Water Infrastructure

Water Demands

Anticipated water demands for the Project have been calculated in accordance with the design criteria listed in the Engineering Procedure Manual: 2017 Engineering & Design Standards (City of Mesa, 2017). Fire flow for the Project is derived from the International Fire Code (IFC, 2018) and assumes Type II-B buildings (unprotected, non-combustible). Approved automatic sprinklers are assumed in every building and allows for the reduction in fire flow by 50 percent. A summary of these design criteria are shown in Table 7.2 below.

Category		Value	Unit
Demand Factors			
	Commercial/Retail	0.2	gpd/sq.ft.
	Office	0.4	gpd/sq.ft.
	Turf/irrigation	4,400	gpad
	Hotel/motel	150	gpd/room
Peaking Factors			
	Maximum Day	2.0	x Average Day Demand
	Peak Hour	3.0	x Average Day Demand
	Open Space demands are anticipated to remain constant and are not peaked.		
Fire Flow*			
	Maximum Fire Flow in Project Boundary**	4,000	gpm for 4 hours
Notes: * Fire Flow based on International Fire Code (IFC, 2018). ** Fire Flow assumes the use of approved automatic sprinklers for a 50% reduction in flow.			

Table 7.2: Water Demand Design Criteria

The anticipated water demands for the Project are calculated based on the four categories above. For industrial and warehouse buildings, for both aeronautical and non-aeronautical uses, the demands are based on using the assumed five percent space allocations for each building for an office usage of 0.4 gallons per day per square foot. The buildings in the commercial and retail area of the project utilize a demand factor of 0.2 gallons per day per square foot. The hotel is anticipated to have 150 rooms and is calculated using the City's water demand factor of 150 gallons per day per room. Open space area is calculated using the City's turf/irrigation water demand factor of 4,400 gallons per acre per day and is not peaked (as demands for open spaces are anticipated to remain constant). Total water demands for the Project are summarized in Table 7.3 below.

Parcel Label	Average Day Demand		Maximum Day Demand		Peak Hour Demand	
	gpd	gpm	gpd	gpm	gpd	gpm
Total	223,306	155.1	330,451	229.5	437,597	303.9

Table 7.3: Water Demand Summary

Proposed Water Infrastructure

For domestic service, the Project is proposed to be served by 8-inch and 12-inch looped water mains. Connections to existing City of Mesa infrastructure are planned along the 16-inch water main in Sossaman Road, the 12-inch water main in Velocity Way, and the 12-inch water main in Downwind Circle. A series of new domestic water mains are planned to be constructed to coincide with the roadway network. With the exception of Buildings 13-15, and 31, the fire protection for the Project is proposed to be served almost entirely by the existing airport fire line system pending capacity analysis.

The proposed fire system improvements contemplate an extension of a new 16-inch fire line from the existing 24-inch fire line located along the south side of Taxiway T at Mesa Gateway. This proposed 16-inch fire line will run southeast to Velocity Way, east along Velocity Way, and enter the Project along the west side of Building 8. The proposed 16-inch fire line will act as the backbone of the SkyBridge fire line distribution system as extensions will be made consisting of 12-inch fire lines to serve the various buildings. Improvements to the existing fire protection pump station are also anticipated to include the installation of new pumps in the open banks of the existing pump station. Existing storage totaling 961,000 gallons at the fire protection system is adequate to meet the maximum anticipated fire flow for the largest building in the Project of 4,000 gpm for four hours.

Figure 7.6 illustrates the proposed domestic water infrastructure for the Project. Figure 7.7 shows the proposed fire protection infrastructure for the Project.

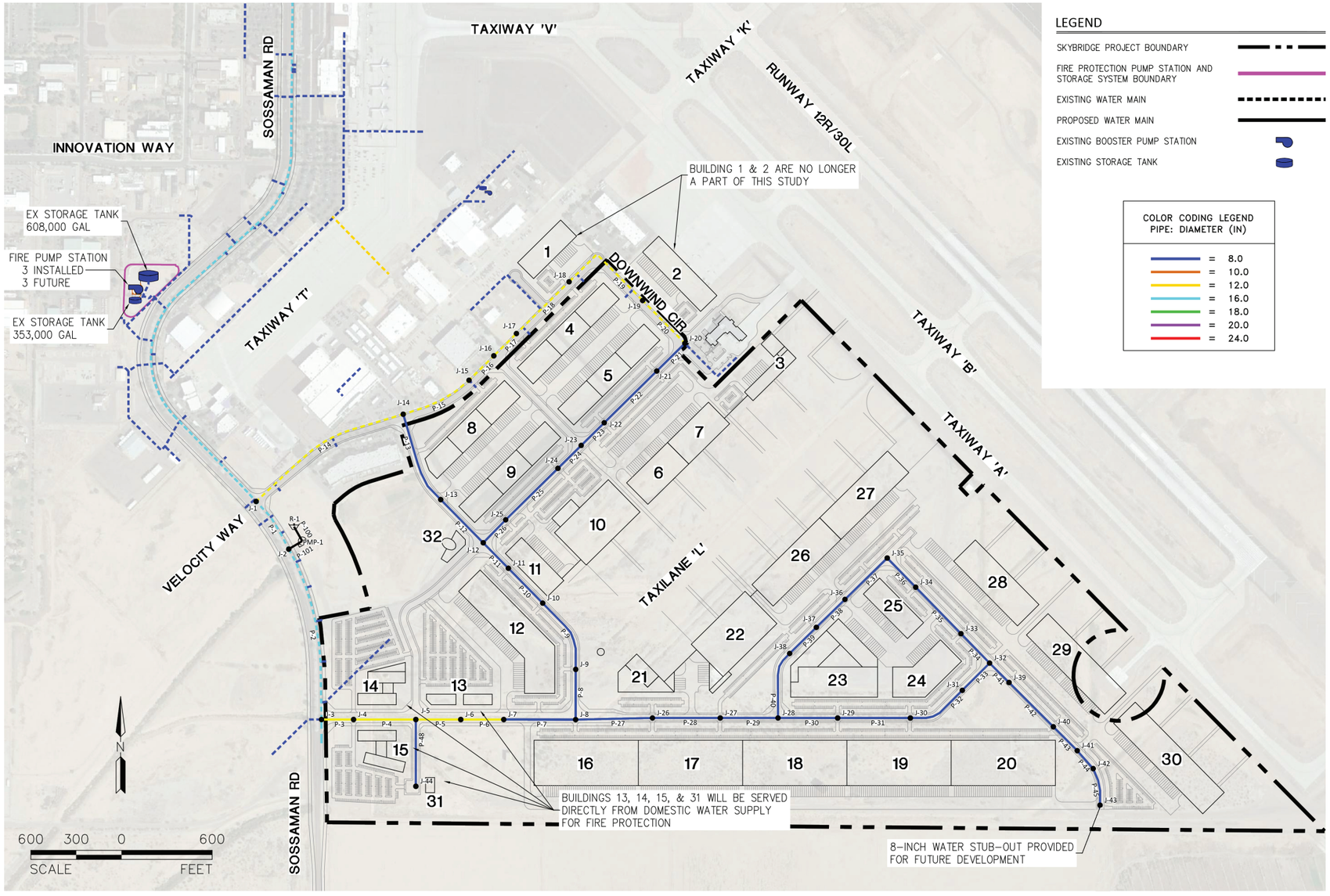
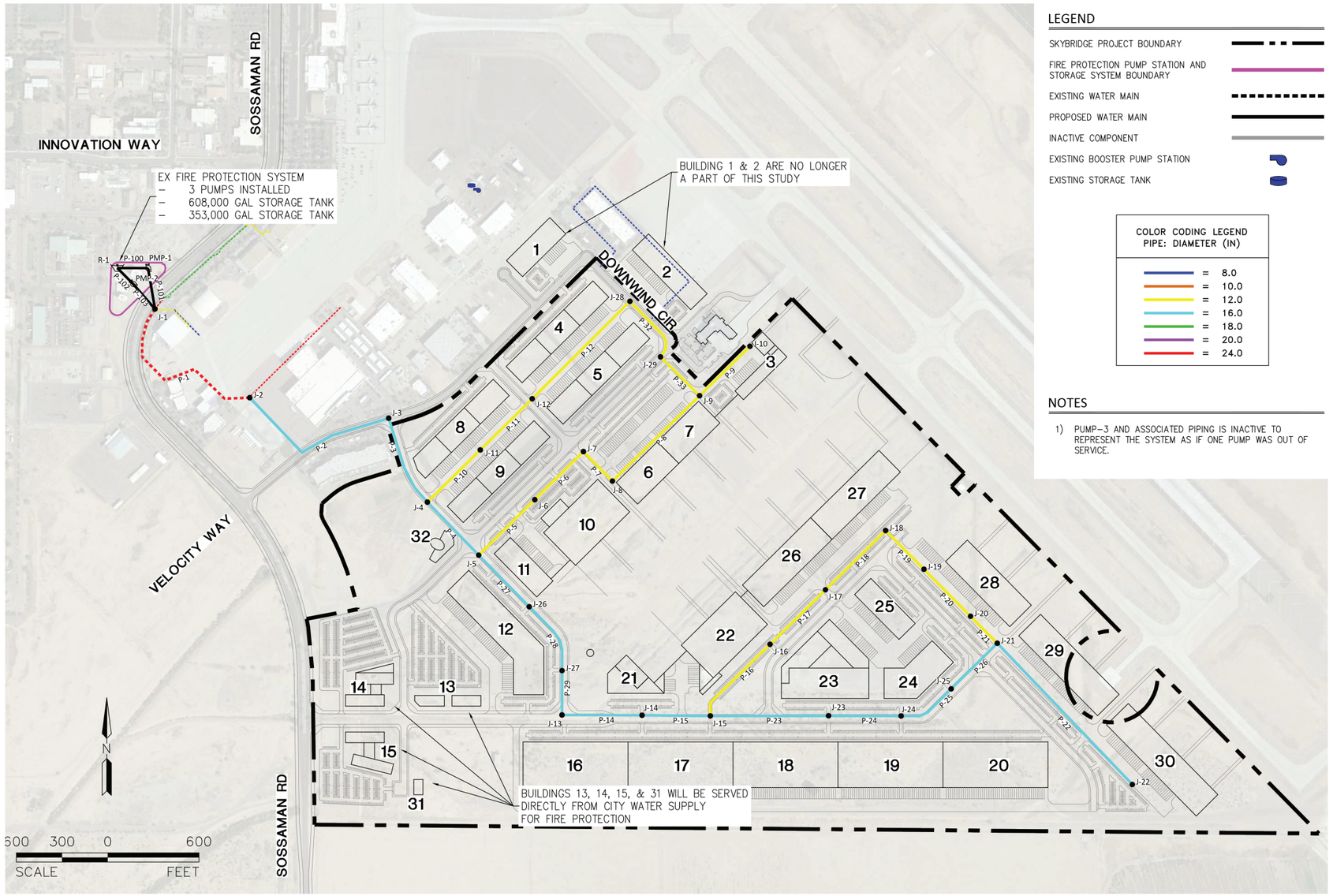


Figure 7.6: Proposed Water Improvements



LEGEND

- SKYBRIDGE PROJECT BOUNDARY
- FIRE PROTECTION PUMP STATION AND STORAGE SYSTEM BOUNDARY
- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- INACTIVE COMPONENT
- EXISTING BOOSTER PUMP STATION
- EXISTING STORAGE TANK

COLOR CODING LEGEND
PIPE: DIAMETER (IN)

- = 8.0
- = 10.0
- = 12.0
- = 16.0
- = 18.0
- = 20.0
- = 24.0

NOTES

1) PUMP–3 AND ASSOCIATED PIPING IS INACTIVE TO REPRESENT THE SYSTEM AS IF ONE PUMP WAS OUT OF SERVICE.

Figure 7.7: Proposed Fire Suppression Improvements

The Project is anticipated to be developed in three phases. The water mains required to serve each phase, both domestic and fire protection, will similarly be constructed in phases as required to serve each phase of development. For any given phase, the offsite water infrastructure required to serve that phase will be constructed at the same time as said phase is developed. Furthermore, the water mains that are installed will be sized for build-out conditions, provide adequate looping in the water system where possible (i.e. two points of connection), and will meet the required fire flows for the area that is developed.

Figure 7.8 illustrates the proposed domestic water infrastructure by phase while Figure 7.9 in shows the proposed fire protection infrastructure by phase.

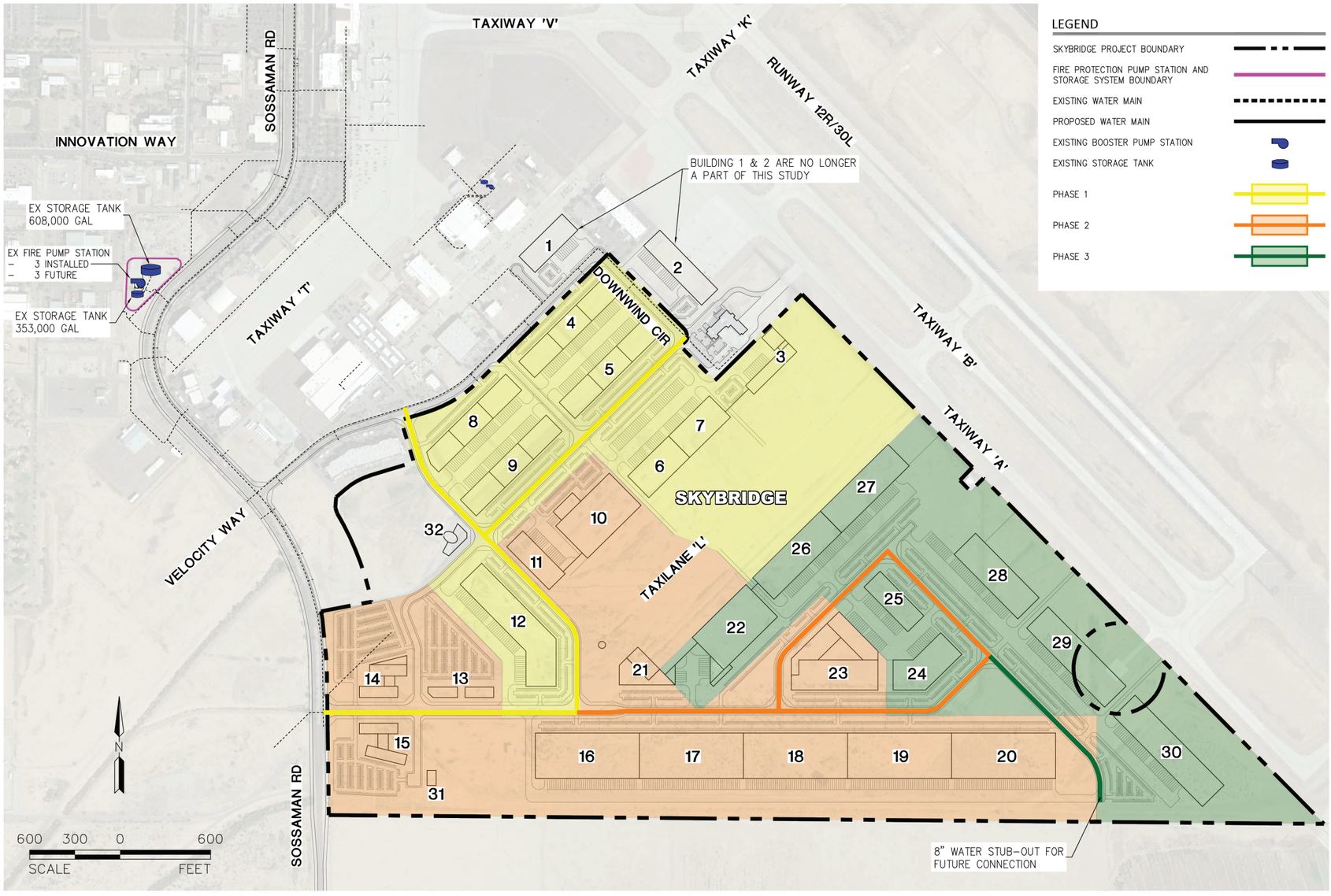


Figure 7.8: Proposed Water Phasing

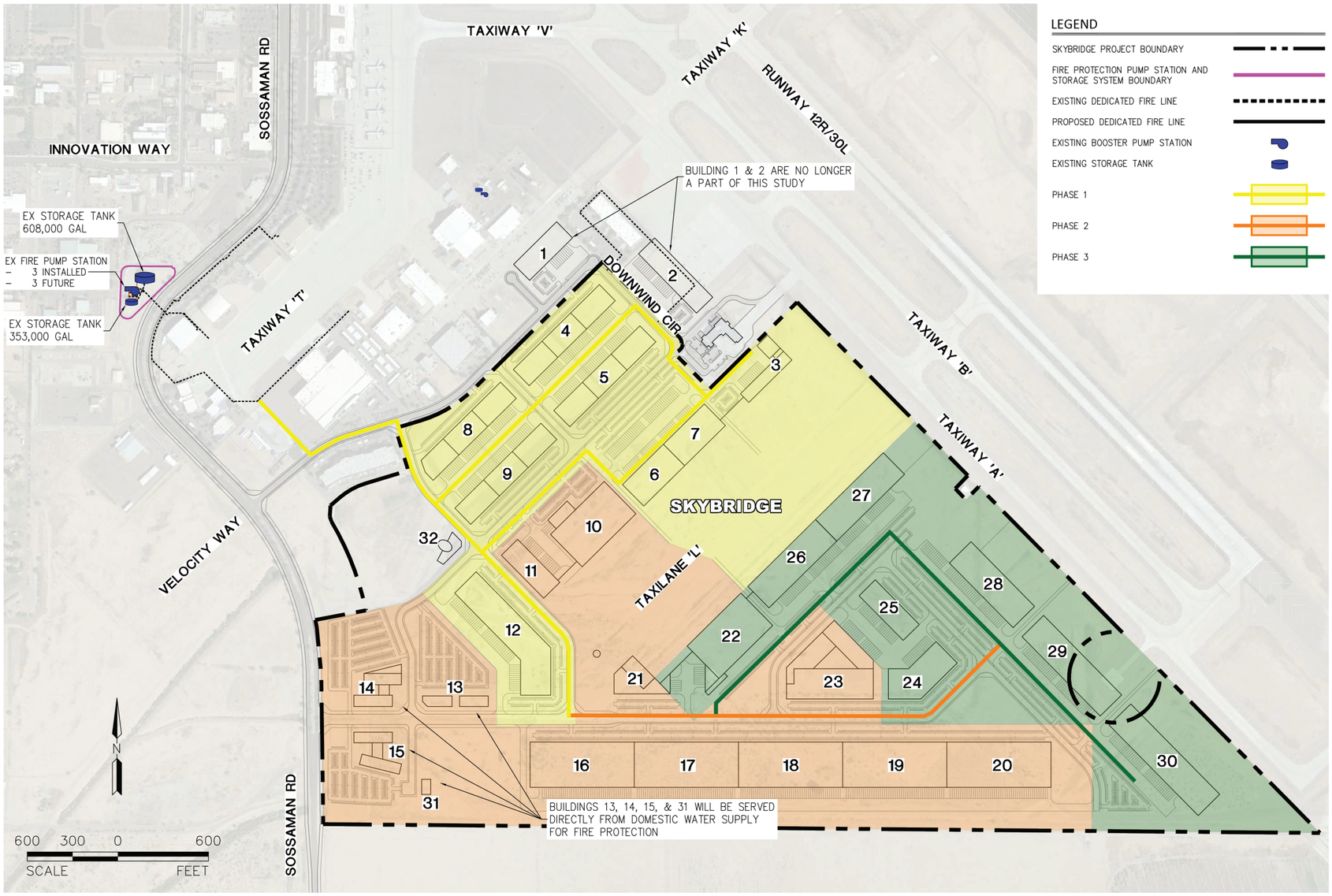


Figure 7.9: Proposed Fire Line Phasing

7.2.3 Wastewater Service

Overview & Existing Infrastructure

SkyBridge will be served by the City of Mesa for wastewater service. The City has an extensive wastewater network for serving the vicinity that includes existing sewer infrastructure south of the Project along Sossaman Road. A 10-inch sewer main currently serves Downwind Circle and Velocity way while a 12-inch sewer main collects flows in Sossaman Road. This 12-inch sewer main extends approximately 1,500 feet south of the intersection of Velocity Way and Sossaman Road. Wastewater is conveyed north along Sossaman Road to ultimately outfall into the East Mesa Interceptor (EMI) along the Roosevelt Canal at Ray Road.

Figure 7.10 shows the existing wastewater infrastructure in the Project vicinity.

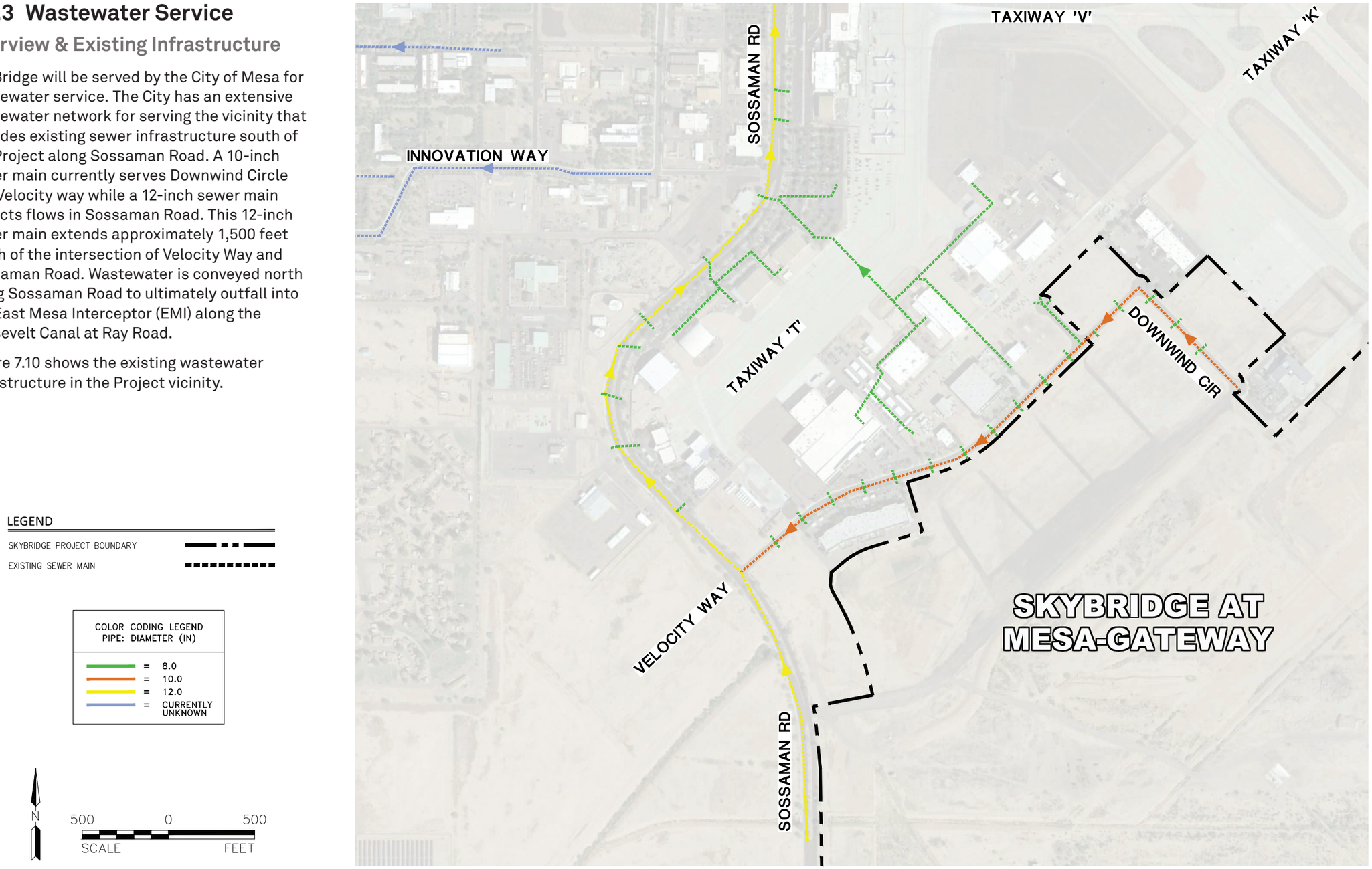


Figure 7.10: Existing Wastewater Infrastructure

Wastewater Flows

Anticipated wastewater flows for the Project have been calculated in accordance with the design criteria listed in the Engineering Procedure Manual: 2017 Engineering & Design Standards (City of Mesa, 2017). Wastewater infrastructure within the Project will be designed to meet all City of Mesa standards including pipe sizes and manhole requirements. Velocity within the pipes will be in the range of 2.0 feet per second and 9.0 feet per second based on the pipe running two thirds (2/3) full. A summary of the wastewater flow design criteria is shown in Table 7.4 below.

Category	Value	Unit
Demand Factors		
Commercial/Retail	0.5	gpd/sq.ft.
Office	0.4	gpd/sq.ft.
Resort Hotel	380	gpd/room
Peaking Factors (x Average Day Demand)		
Average Day Demand (mgd)	Existing Lines	New Lines
Less than 1.0	2.30	3.00
1.0 – 10	1.90	2.50
10 – 20	1.70	2.30

Table 7.4: Wastewater Flow Design Criteria

Similar to water demands, the anticipated sewer flows are calculated based on the four uses above. Total wastewater flows for the Project are summarized in Table 7.5 below.

Totals	Average Day Flow		Peaking Factor	Peak Flow	
	gpd	gpm		gpd	gpm
New Pipes	146,546	101.8	3.00	439,637	305.3
Existing Pipes	146,546	101.8	2.30	337,055	234.1

Notes:
*Peak flows are not additive for existing pipes as peaking factors decrease when connecting into existing sewer mains. Both peak flow calculations are shown here.

Table 7.5: Water Demand Summary

Proposed Wastewater Infrastructure

The Project is anticipated to be served by a network of 8-inch sewer mains. Connections to the existing wastewater system will be made along the 10-inch sewer main in Velocity Way and Downwind Circle and the 12-inch sewer main in Sossaman Road. An 8-inch sewer stub will be provided at the southeastern boundary of the Project for future developments south of the Project.

Figure 7.11 shows the proposed wastewater infrastructure for the Project.

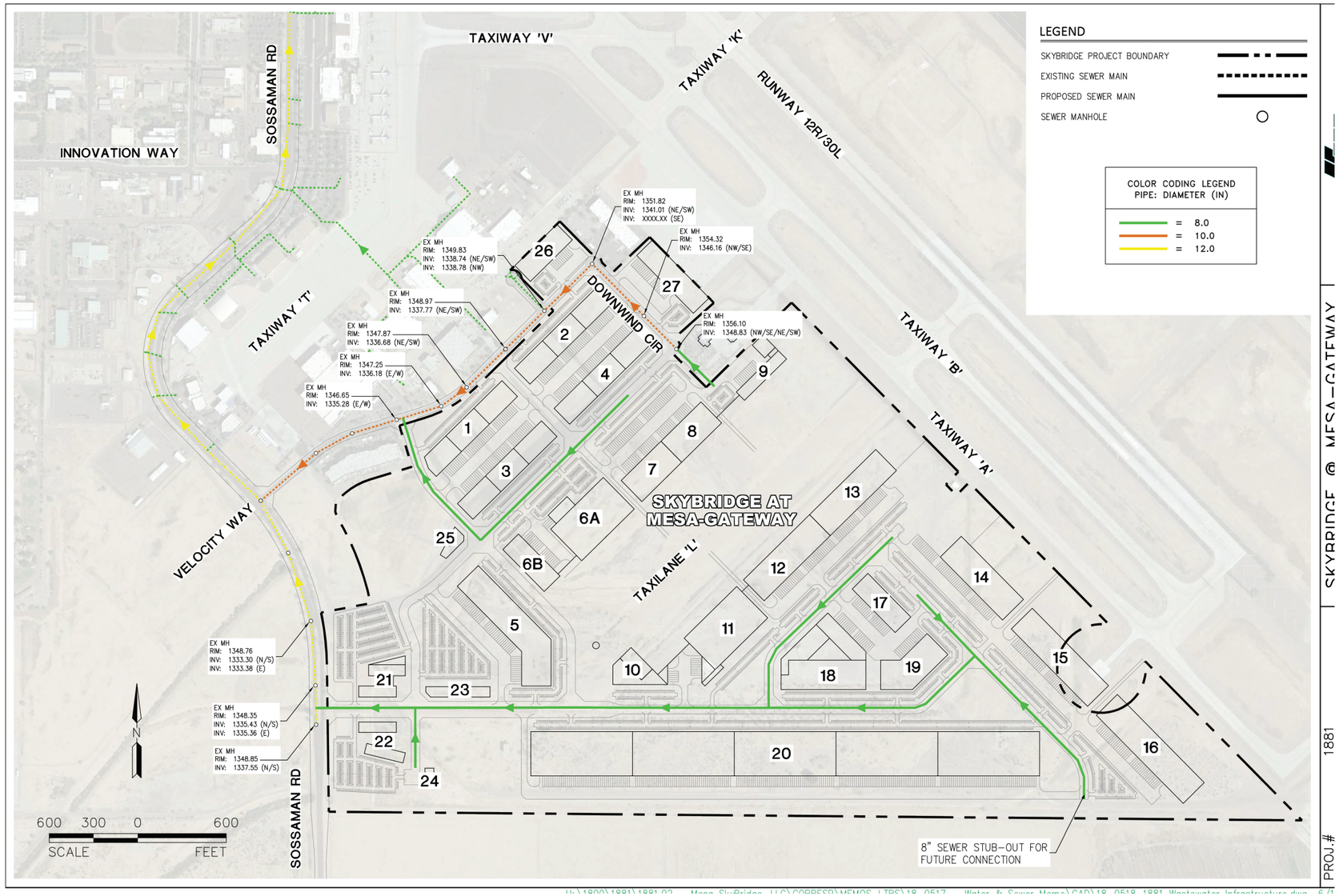


Figure 7.11: Proposed Wastewater Improvements

The Project is anticipated to be developed in three phases. The wastewater system infrastructure will also be constructed in phases as required to serve each phase of development. For any given phase, the downstream sewer mains required to serve that phase will be constructed at the same time as said phase is developed. Furthermore, the downstream sewer mains that are installed will be sized for build-out conditions.

Figure 7.12 illustrates the proposed wastewater infrastructure by phase.

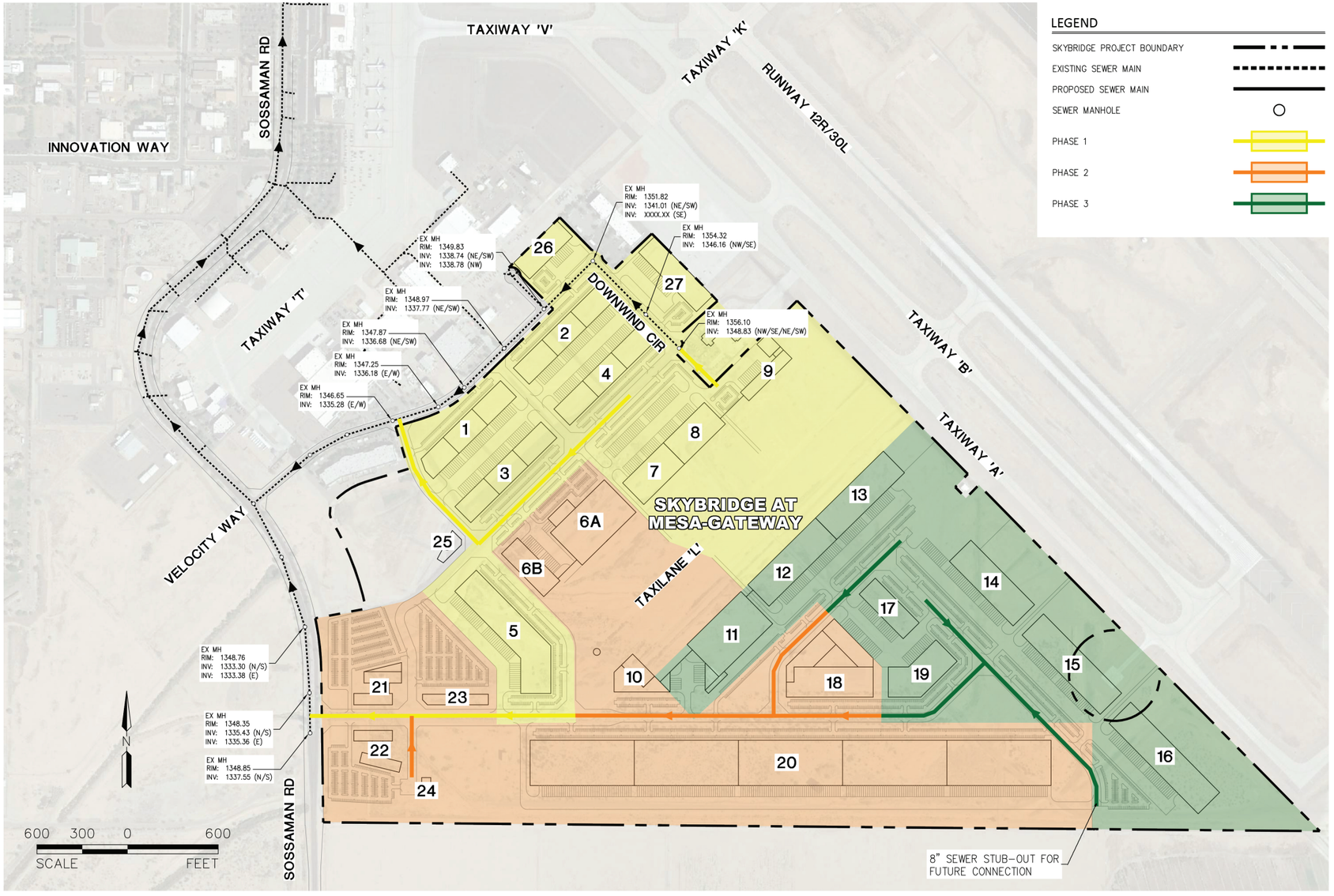


Figure 7.12: Proposed Wastewater Phasing

7.3 CONCEPTUAL ENERGY PLAN

7.3.1 Introduction & Purpose

SkyBridge Arizona is anticipated to be developed as a high-tech commerce, logistics and light industrial site for both aeronautical and non-aeronautical uses. The intent of this section is to outline the energy needs of the site and to present a conceptual energy plan that may be used as guidance for meeting those needs, with an emphasis on innovative and cost-effective strategies.

The general approach for this conceptual energy plan begins with establishing an expected baseline energy demand. The baseline energy demand calculation is based on the anticipated gross floor area, by building type, within the project development area. This baseline energy demand serves as the basis for sizing potential new energy infrastructure needs at the site. The intent of the proposed infrastructure is to follow a cost-conscious approach that meets the needs of the site while allowing for flexibility in meeting evolving needs as the project advances beyond the concept phase.

Beyond the proposed energy infrastructure, the final section offers guidance on innovative energy strategies that the project owner or future tenants can pursue to reduce energy costs, meet sustainability goals, and improve resilience to utility power disruptions.



Figure 7.13: Rendering of Solar Canopies in Parking Areas

7.3.2 Anticipated Energy Demand

The anticipated energy demand is built up from the proposed land use types and floor area volumes. Table 7.6 summarizes the proposed land use and building types; the total GFA (for buildings) or land area (for public realm); the anticipated annual energy consumption by type; and the anticipated peak electricity demand by type.

The anticipated energy demand was developed from template energy models of the proposed land use types. These models are based on the City of Mesa minimum building standards for energy efficiency (IECC 2009) and assume gas is used for space and water heating. Projected growth in workplace electric vehicle (EV) charging is factored into the anticipated demand as well.

Figure 7.14 illustrates the relative scale of energy demand by building type. It shows, primarily, that the dominant energy consumers in the site will be the auto parts/aerospace and produce processing facilities, followed by the reefer/cooler facilities and finally the remaining use types. Figure 7.15 breaks down the energy consumption patterns by end use type. The process/other loads, comprised mostly of processing equipment loads, make up the dominant energy demand. Lighting and cooling loads form the second greatest energy demand, and the remaining energy end uses are relatively minor.

Land use type	Gross Floor Area (SF)	Land Area (SF)	Annual Energy Consumption (MWh/year)	Peak Electricity Demand (MW)
Air Cargo	600,000		5,000	1.2
E-Commerce	800,000		8,900	2.3
Reefer/Cooler	495,000		12,000	2.1
Aerospace/Auto Parts	1,090,000		57,700	8.8
Food Processing	770,000		73,400	10.5
Office + R&D	210,000		3,300	1.3
Retail	20,000		300	0.1
Hotel	50,000		1,000	0.2
Taxilane / Ramp Lighting		2,877,000	149	0.04
Roadway Lighting		1,155,700	187	0.05
Parking Lighting	12,500 units	1,600,400	83	0.02
EV Charging	211 stations		1,200	0.6
Total	**3,820,000**	**7,785,000**	**162,000**	**26 (diversified)**

Table 7.6: Baseline Energy Demand by Building Type

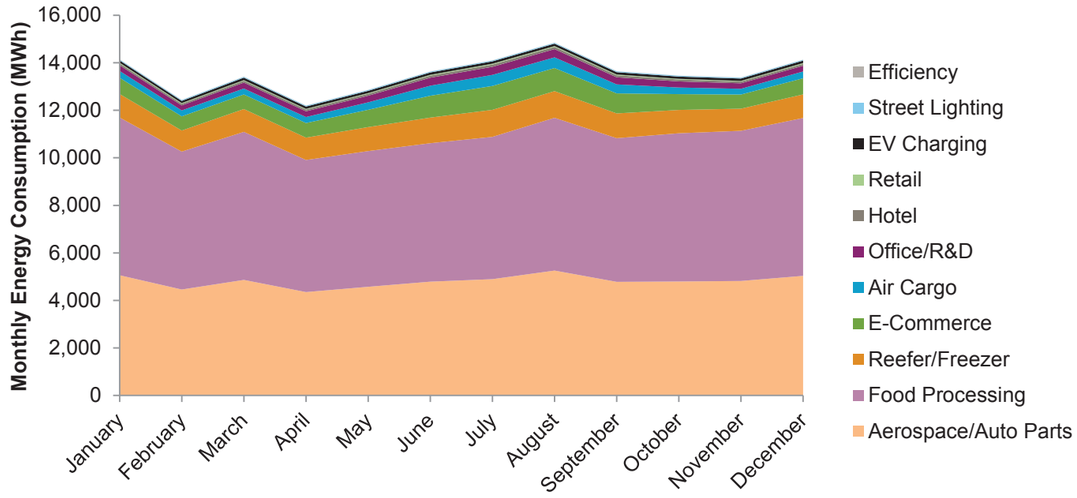


Figure 7.14: Annual Energy Consumption by Building Type

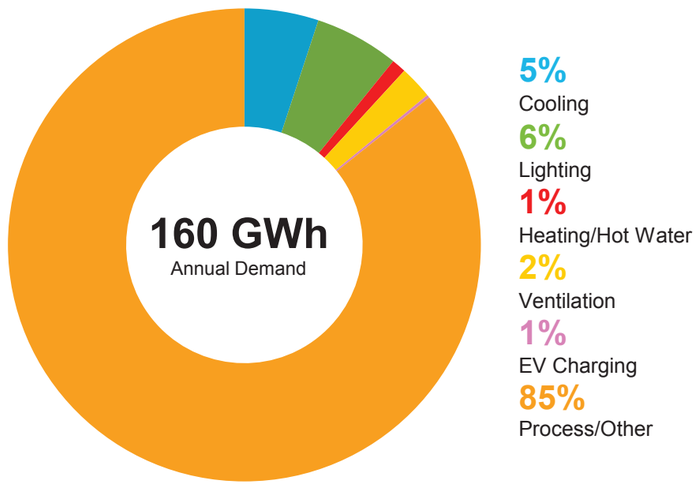


Figure 7.15: Annual Energy Demand by End Use Type

Energy Efficiency

Energy efficiency within the SkyBridge Arizona development area was modeled to estimate the energy demand reduction potential from "low hanging fruit" strategies. These energy conservation measures consist of prepositioning to meet the minimum energy efficiency requirements for LEED certification, i.e. designing all facilities to meet ASHRAE 90.1-2010 minimum standards. The potential impact of these efficiency measures are illustrated in Figure 7.16 (broken down by building/land use type) and Figure 7.17 (broken down by energy end use type). Because the energy demand from processing equipment is so great relative to the other energy end use types, total energy conservation potential through high performance building design is relatively low (4% of annual consumption).

Regardless, these low hanging fruit conservation measures often come at a low marginal cost compared to elements meeting minimum code compliance, and therefore are typically lifecycle cost effective at reducing tenant energy costs.

Further, tenants may be willing to pay a premium for energy efficient design if it can be shown that the improved performance improves productivity (such as through better occupant thermal comfort).

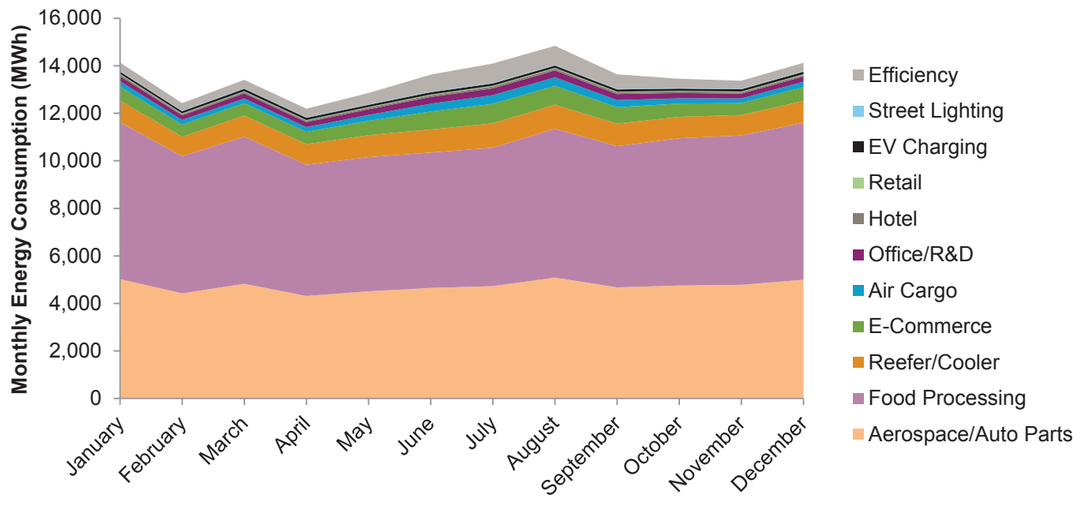


Figure 7.16: Energy Efficiency Potential by Building Type

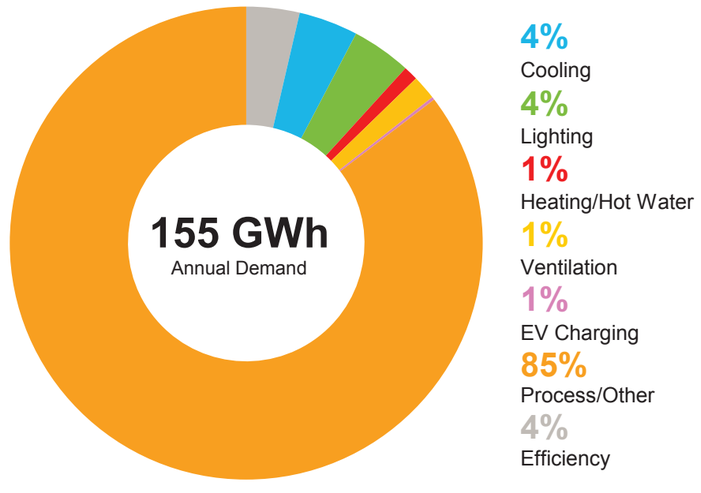


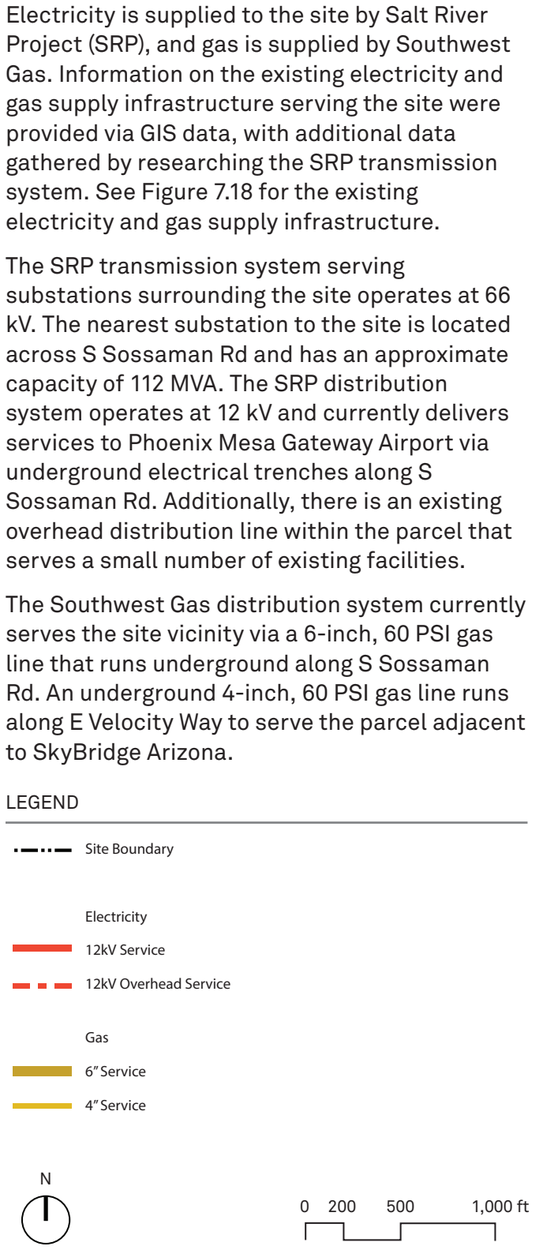
Figure 7.17: Energy Efficiency Potential by End Use Type

7.3.3 Existing Energy Infrastructure

Electricity is supplied to the site by Salt River Project (SRP), and gas is supplied by Southwest Gas. Information on the existing electricity and gas supply infrastructure serving the site were provided via GIS data, with additional data gathered by researching the SRP transmission system. See Figure 7.18 for the existing electricity and gas supply infrastructure.

The SRP transmission system serving substations surrounding the site operates at 66 kV. The nearest substation to the site is located across S Sossaman Rd and has an approximate capacity of 112 MVA. The SRP distribution system operates at 12 kV and currently delivers services to Phoenix Mesa Gateway Airport via underground electrical trenches along S Sossaman Rd. Additionally, there is an existing overhead distribution line within the parcel that serves a small number of existing facilities.

The Southwest Gas distribution system currently serves the site vicinity via a 6-inch, 60 PSI gas line that runs underground along S Sossaman Rd. An underground 4-inch, 60 PSI gas line runs along E Velocity Way to serve the parcel adjacent to SkyBridge Arizona.



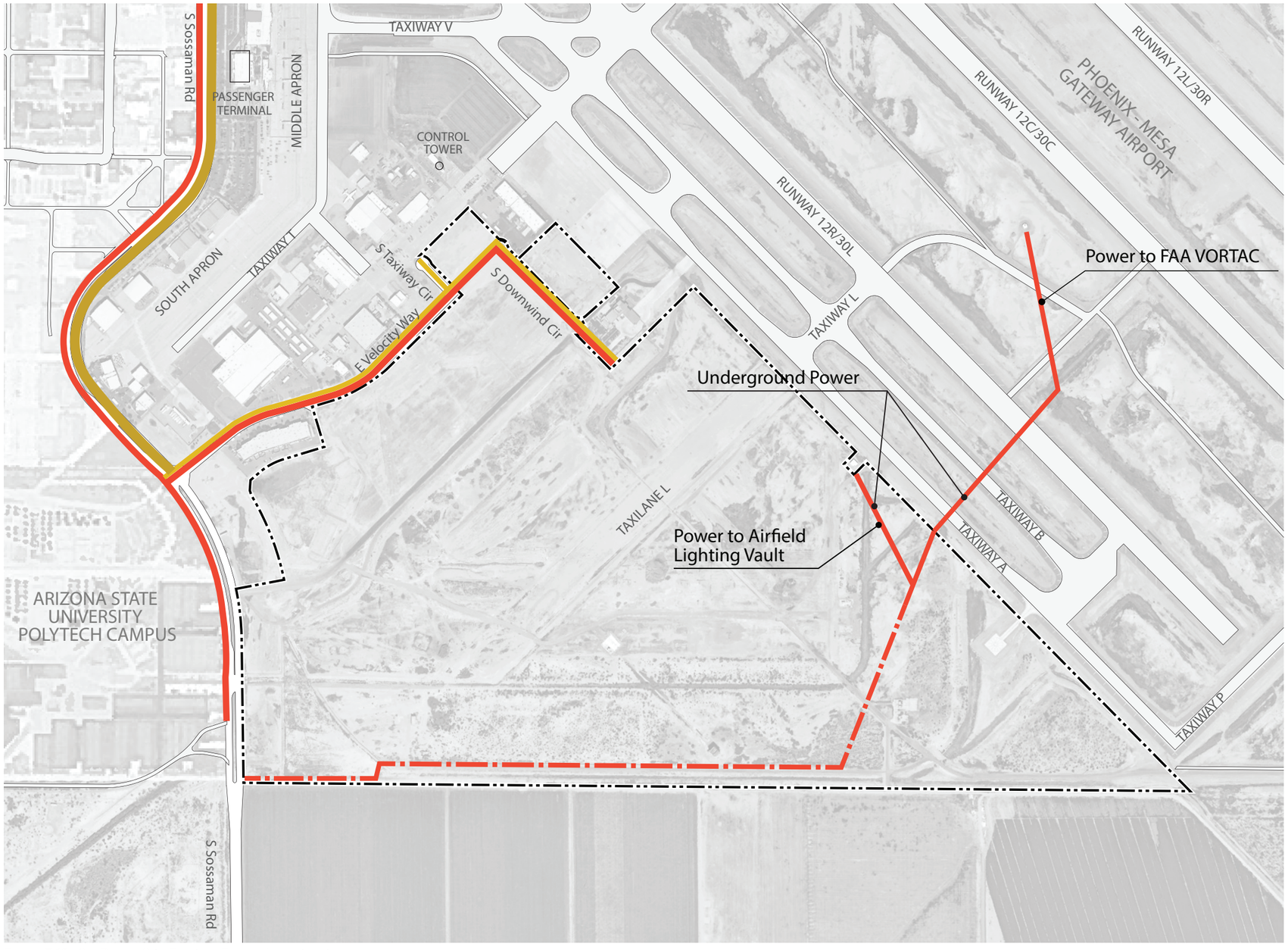


Figure 7.18: SkyBridge Site Existing Energy Infrastructure

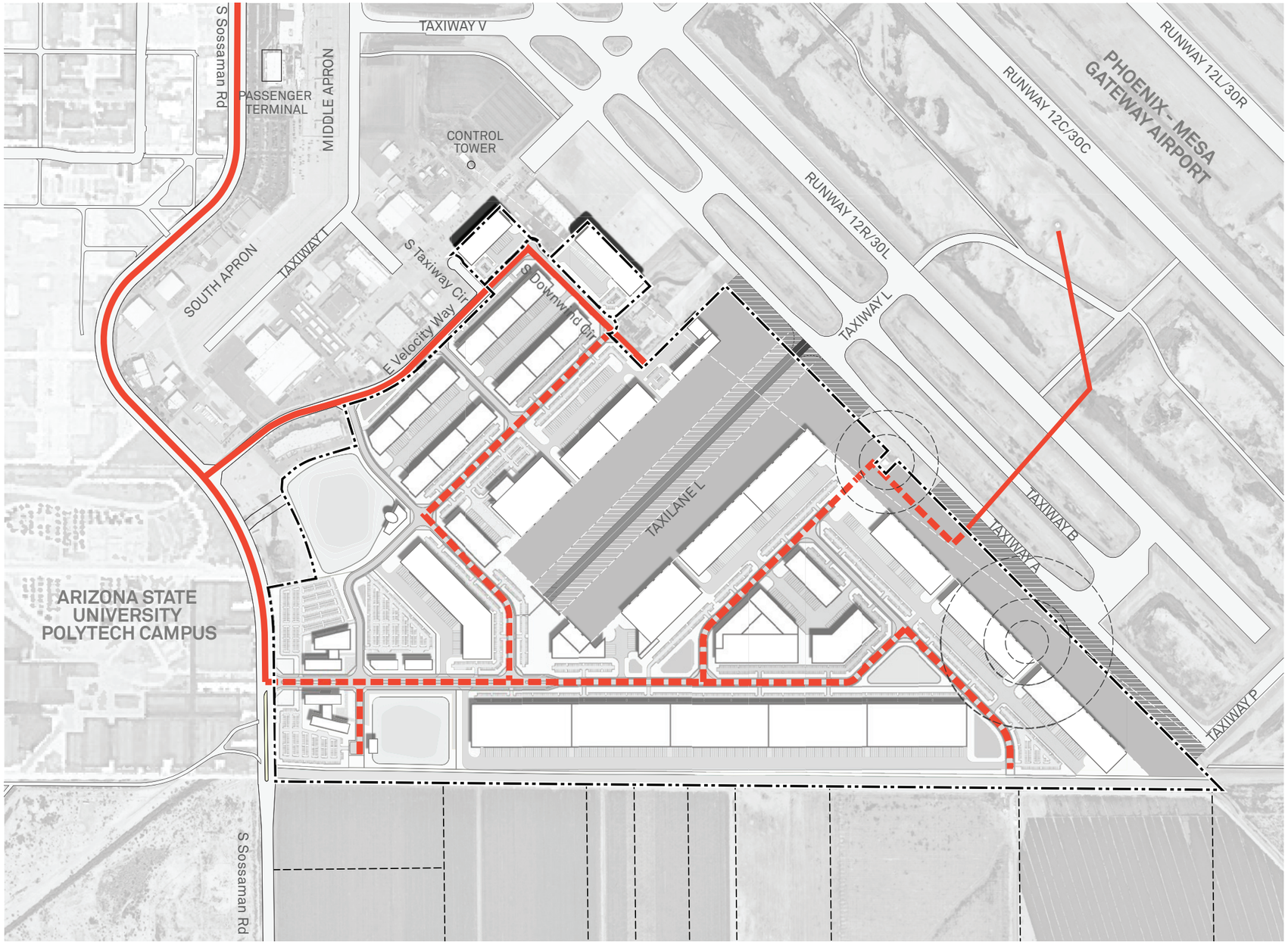
7.3.4 Proposed Energy Infrastructure

Electricity distribution

Figure 7.19 illustrates the conceptual routing for 12 kV electricity distribution within the site. The distribution routing generally follows all roads in the site, with sections removed to reduce cost where it is apparent that all facilities can still be adequately served. On the southeast edge of the site, the distribution infrastructure is extended to the parcel boundary in anticipation of extension to the adjacent parcel.

The anticipated peak electricity demand at the site is approximately 26 MW. However, following conventional electricity distribution planning practices, as provided in the Mesa SkyBridge Master Site Plan Due Diligence Report, yields an approximate local utility capacity requirement of 80 MVA. SRP has preliminarily confirmed that the nearest substation to the site has sufficient spare capacity to serve this anticipated demand.

This plan is preliminary and subject to change per input from SRP and in more detailed phases of the development plan.



LEGEND

- Site Boundary
- **Electricity**
- Existing 12kV Service
- Proposed 12kV Service

N

0 200 500 1,000 ft

Figure 7.19: Conceptual Routing for Electricity Distribution

Gas distribution

Figure 7.20 shows the conceptual routing for gas distribution within the site. As with electricity, the distribution routing generally follows all roads within the site, with sections removed to reduce cost where it is apparent that all facilities can still be adequately served. The distribution service is preliminarily specified as 4-inch lines in alignment with adjacent existing distribution, though more detailed analysis may indicate that smaller lines are possible. On the southeast edge of the site, the distribution infrastructure is extended to the parcel boundary in anticipation of an extension to the adjacent parcel.

This plan is preliminary and subject to change per input from Southwest Gas and in more detailed phases of the development plan.

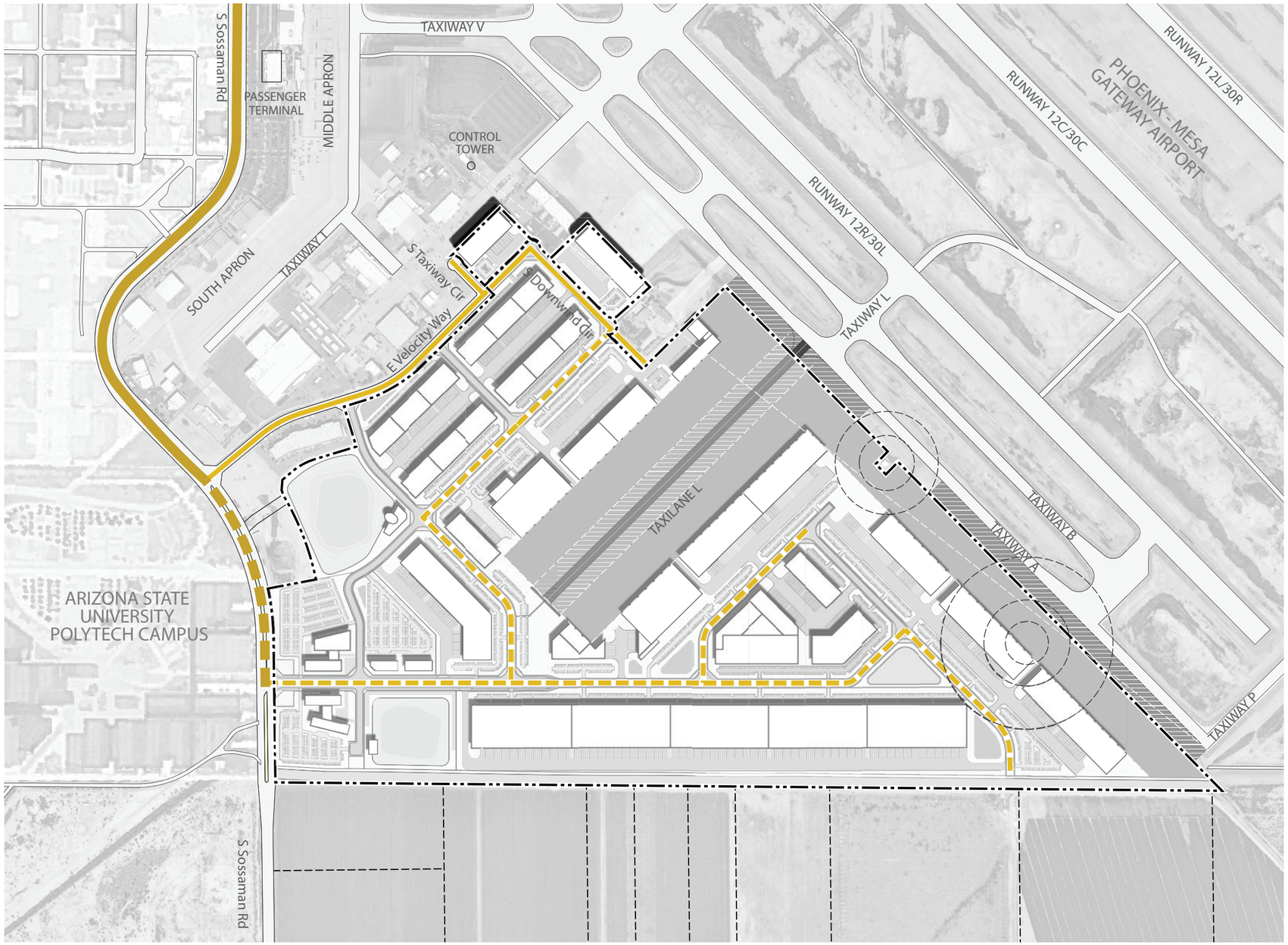


Figure 7.20: Conceptual Routing for Gas Distribution

7.3.5 Innovative Strategies

Renewable Energy

Climate analysis was conducted to review the potential viability of various renewable and clean energy strategies. Figure 7.21 summarizes this analysis. To illustrate the potential for SkyBridge Arizona to help tenants meet business sustainability goals,Figure 7.22 shows the SRP greenhouse gas (GHG) emissions rate and renewable energy portfolio percentage as compared to wider regional and national context. Tenants who install on-site renewable electricity will offset 819 lbs of CO2 equivalent emissions per kWh of renewable energy generated.

Key renewable and clean energy strategies to consider include the following:

Photovoltaic (PV) arrays have a high year-round potential and are recommended for tenants to consider for energy cost savings and sustainability goals. PV can be installed on underutilized rooftop space or over parking lots as canopies that offer shading for cars. Note that glare from solar panels are an important consideration for installations near airports, and must be evaluated for compliance (for more information, see: FAA Technical Guidance for Evaluating Selected Solar Technologies on Airports).

Solar thermal heating systems have a high year-round potential, but are only recommended for consideration at hotel spaces only, where hot water demand may be great enough to justify installation costs.

Wind energy has a low year-round potential due to low average wind speeds and it not a recommended strategy.

Centralized energy, such as a central cooling or cogeneration system, may be viable to reduce energy costs, but a sufficient business case is not anticipated due to the low density of the development plan and the anticipated tenant lease and utility payment structure.

Demand management and energy storage may have potential for tenants to pursue. The high gradient in SRP time-of-use (TOU) rates signals a potential business case for tenants to employ these strategies, which can be employed to reduce electricity demand when the rates are highest. See Figure 7.23 for a sample SRP TOU price structure.

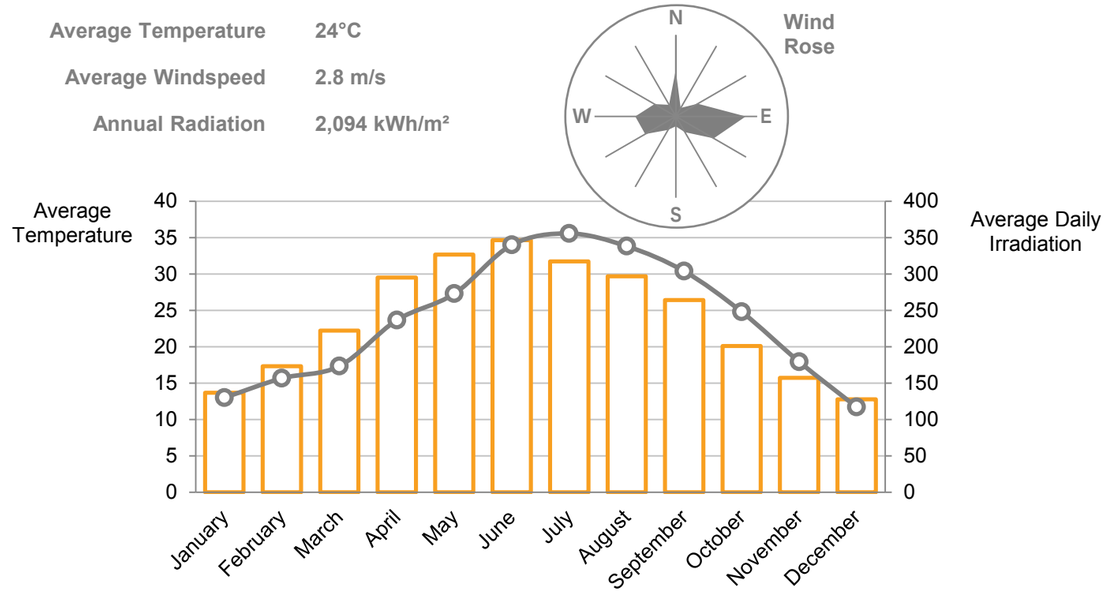


Figure 7.21: Climate Analysis

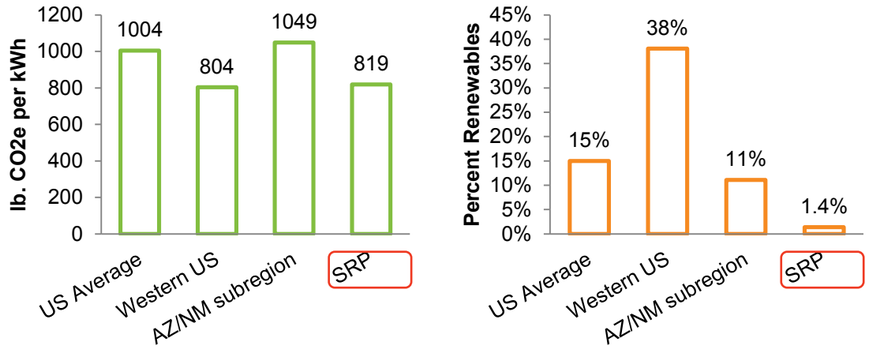


Figure 7.22: Salt River Project (SRP) Greenhouse Gas (GHG) Emissions Rate and Renewable Energy Mix

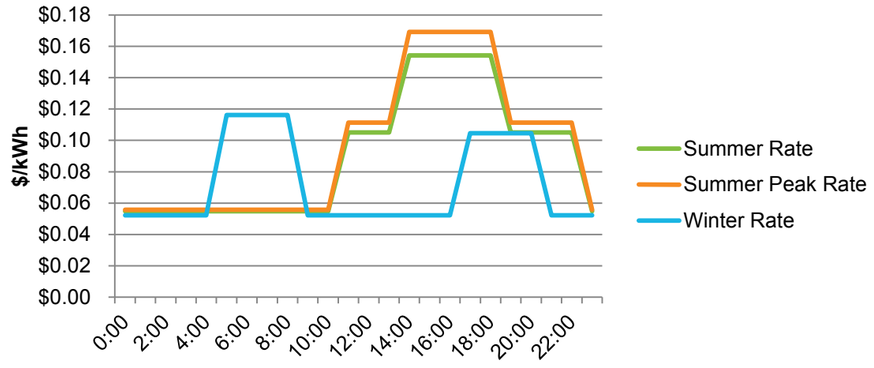


Figure 7.23: Salt River Project (SRP) Time of Use (TOU) Price Structure (Plan E-32)

Figures 7.24 through 7.28 illustrate the potential impact of employing these renewable energy strategies, particularly PV and energy storage. The potential impact of these strategies is separated by building type, because tenants are anticipated to pursue renewable energy strategies individually.

It is recommended for tenants to install PV to cover the maximum available rooftop area, limited to not exceed the tenant's peak demand in accordance with Arizona net energy metering (NEM) policy. Where available rooftop space for PV is insufficient to meet the anticipated peak demand, it is recommended for tenants to consider "solar canopies" over parking areas to increase production and provide shading for occupant parking. Where excess PV generation potential is available (from rooftop solar alone or combined with solar canopies), energy storage may be added to enable greater PV output. To the extent this would improve the financial return on the system, battery energy storage can be installed to capture excess PV generation and discharge during peak utility demand hours.

Finally, the combined impact of renewable energy deployments made by all tenants is shown in Figure 7.29, representing the maximum potential renewable energy offset of utility-supplied power. Table 7.7 summarizes the renewable energy potential and correlating GHG emissions reduction potential for each building type and cumulatively for the entire site.

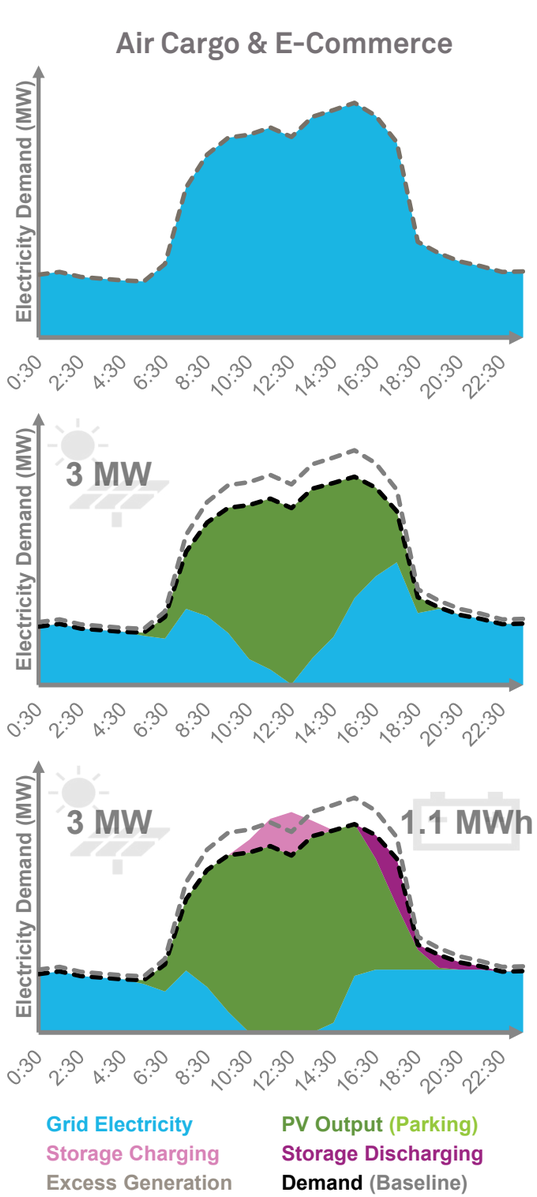


Figure 7.24: Renewable Energy Potential – Air Cargo and E-Commerce

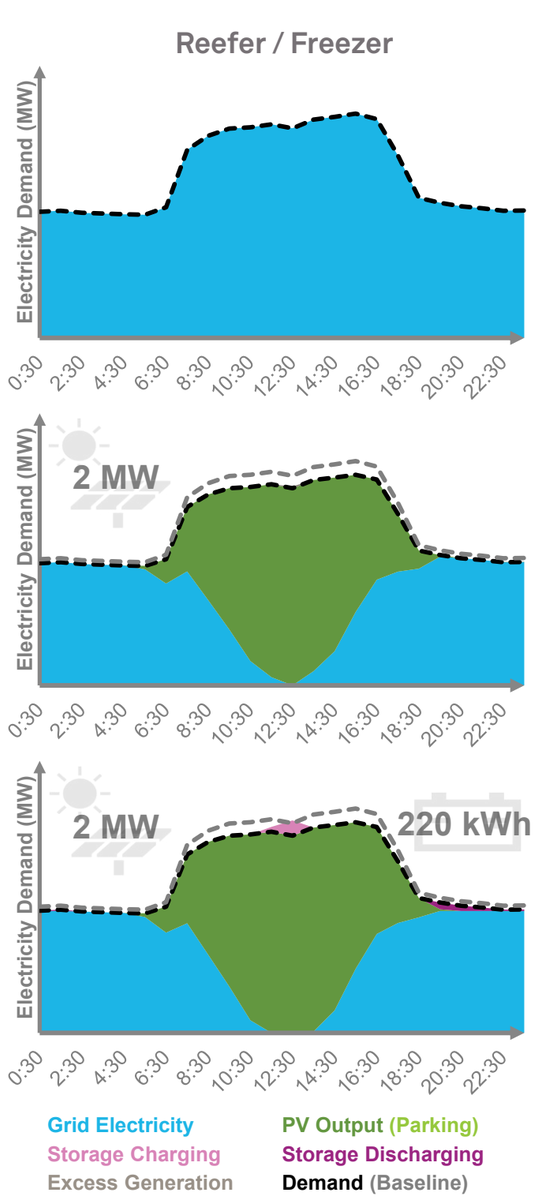


Figure 7.25: Renewable Energy Potential – Reefer/Freezer

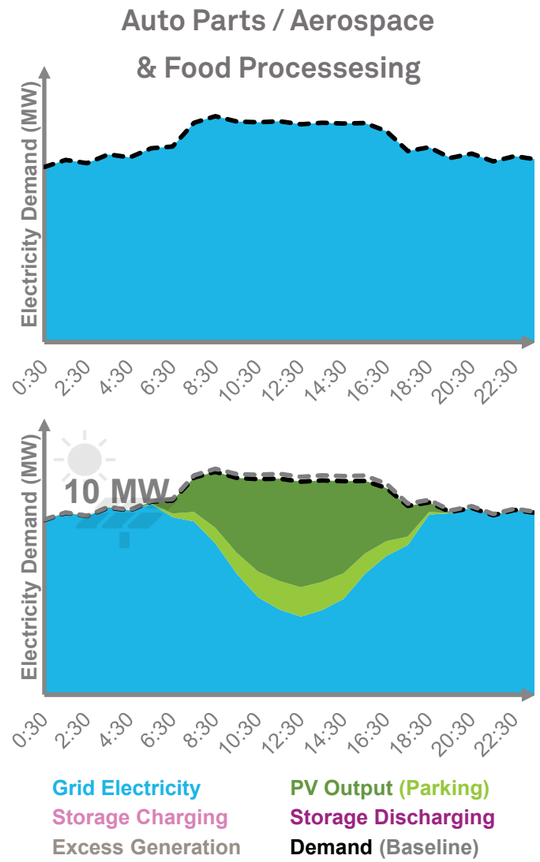


Figure 7.26: Renewable Energy Potential – Auto Parts/Aerospace and Produce Processing

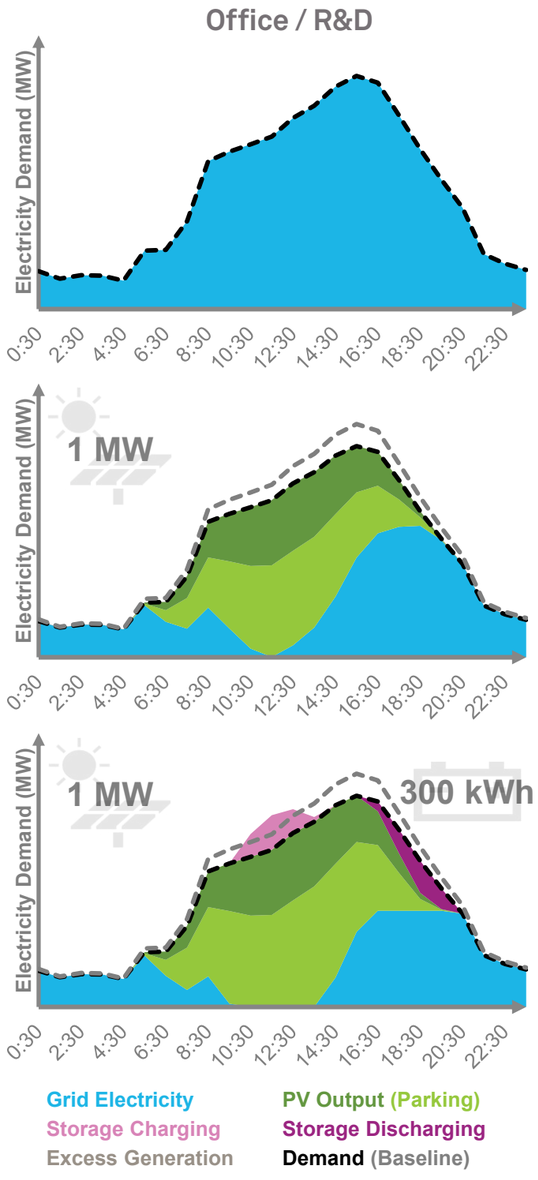


Figure 7.27: Renewable Energy Potential – Office / R&D

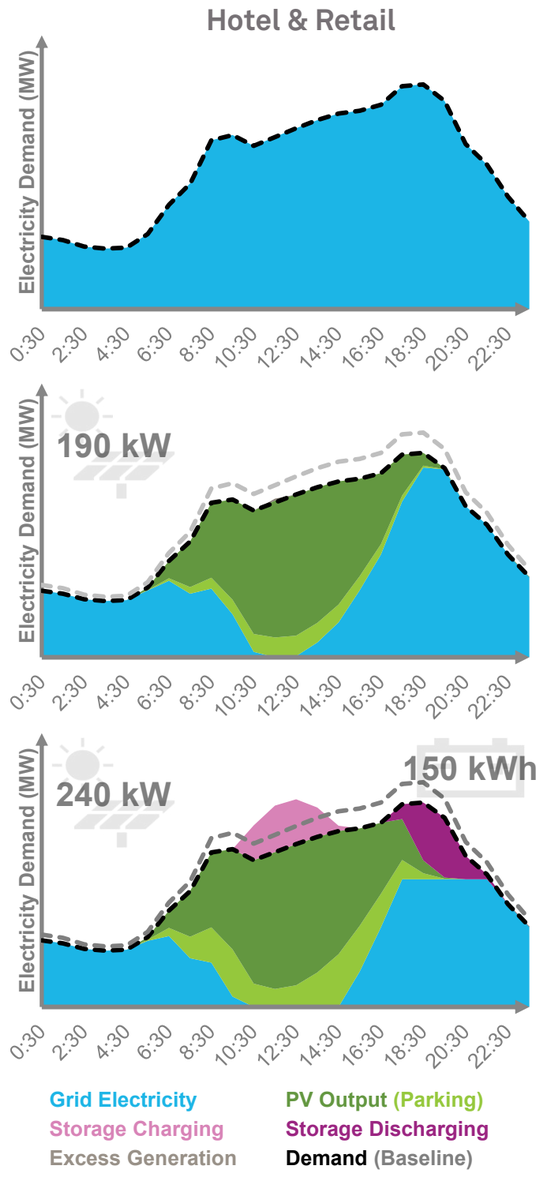


Figure 7.28: Renewable Energy Potential – Retail / Hotel

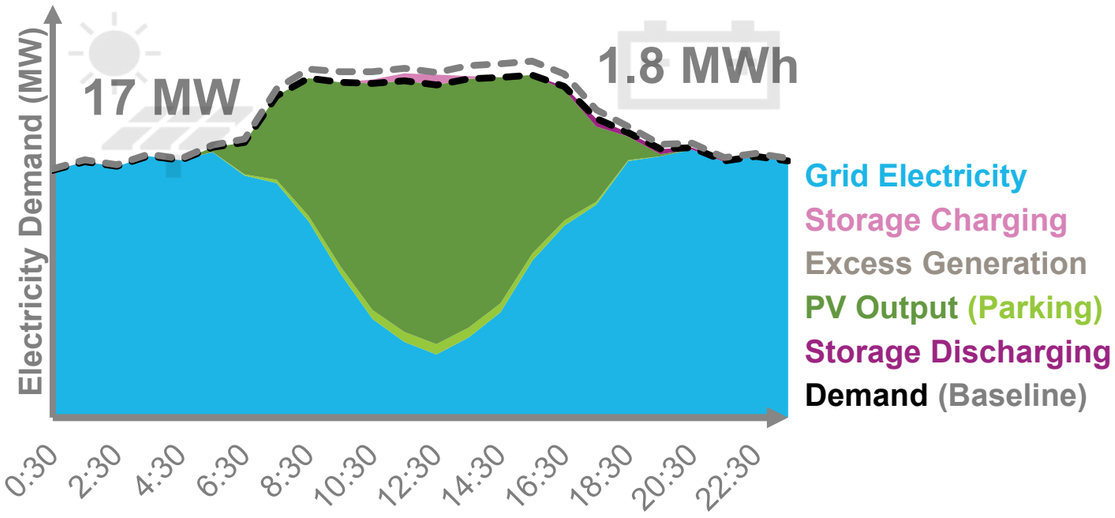


Figure 7.29: Cumulative Renewable Energy Potential

Land use type	Gross Floor Area (SF)	Potential PV Capacity (MW)	Annual Generation (MWh/year)	Percent Electricity Offset (%)
Air Cargo	600,000	1	2,800	67%
E-Commerce	800,000	2	4,200	60%
Reefer/Cooler	495,000	2	3,700	33%
Aerospace/ Auto Parts	1,090,000	5	10,400	18%
Food Processing	770,000	5	9,600	13%
Office + R&D	210,000	1	2,000	75%
Retail	20,000	0.1	200	40%
Hotel	50,000	0.1	300	10%
Total	**3,820,000**	**17**	**33,200**	**20%**

Table 7.7: Renewable Energy Potential by Building Type

Adaptation & Resilience

An important factor in developing a conceptual energy plan for a 20-year development program is that the energy sector is currently undergoing rapid innovation and change. As such, it is crucial to "future-proof" the energy system, to design it for maximum flexibility to as-yet unanticipated or unknown factors. Design decisions made today should, as much as possible, aim to avoid closing the door on future opportunities over the lifetime of the project.

While it is impossible to anticipate all future developments and innovations, the following possible changes to the project's context may impact the findings reported in this conceptual energy plan:

- Site-wide electricity demand may grow beyond what was modeled if market conditions change, resulting in a different land use mix.
- The EV sector may grow faster than anticipated by current market analysts. This modeling effort assumed 3% market penetration of commuter vehicles by 2040, but EV growth may be more rapid.
- The capital cost of PV systems and energy storage are rapidly declining. Combine this with potential changes to Arizona NEM policies, and new business cases may arise for significantly greater installations of renewable energy throughout the site.
- Tenant demand for resilient and reliable energy systems may lead to additional PV and storage beyond what simply reduces utility energy costs, by placing a premium on on-site renewable power supplies to ensure continued operations.
- The declining cost of heat pumps for space and water heating may shift the business case for electric versus gas heating. This would simultaneously increase site electricity demand and reduce gas demand, possibly leading to gas utility disconnection throughout the site.
- Tenants may request expanded gas service to their facilities to power certain process equipment. This is highly dependent on the needs of individual tenants and will be determined as the project develops. Similarly, the actual electricity demand for tenant processing equipment may vary from the modeled demand depending on the specific process needs of the tenant.

7.3.6 Conclusions

SkyBridge Arizona is a forward-thinking development plan to serve the 21st century industrial and logistics needs of the Phoenix metropolitan area. Inherent in this is the need for flexibility to adapt to the rapidly evolving technologies of the coming decades. Designing an energy system that is flexible to these changes will be key to the project's success. This includes planning for spare capacity in the supply distribution infrastructure to meet unanticipated needs, designing rooftops and parking areas for maximum PV capacity (even beyond current demand), and designing for building energy efficiency to meet the growing demand by businesses to meet internal sustainability goals and improve employee wellbeing and productivity.

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